FA Pneumatic Hole Clamp

Model WKH

Gripper expands and pulls a workpiece in.

Clamps a workpiece by holding its holes, allowing for 5 faces accessible.
Light Weight, Smaller Footprint, and High Power

PAT.
**Action Description**

- **Clearance** Less than 0.5mm
- **Gripper**
- **Large Clearance**

**< Released State >**
Gripper expands to hold workpiece hole.

**< Clamping State >**
Pulls and clamps in workpiece hole.

**Advantages**

**Transfer • Light Weight**
Compact and light weight loading/lifting hand part enables to downsize transfer equipment.

**No Interference**
Able to access 5 faces of a workpiece and improves work efficiency.

**High Power • Safety**
Powerful gripping and clamping force with mechanical lock. The self-lock function with mechanical lock and internal spring will ensure safety even at 0MPa.

**Specifications**

- **Gripping Force**
  - **Air 0.4MPa** 1600N
  - **Air 0MPa** 220N
**Action Description**  ※ This is a simplified drawing. The actual part components may be different.

- **When Loading / Unloading (Release)**
  1. Air is supplied to the release port.
  2. Air pressure releases the internal mechanical lock and moves the clamp rod forward. The gripper will be retracted.

- **When Gripping / Clamping (Lock)**
  1. Release air to the release port and supply air to the lock port.
  2. The internal mechanical lock with self-locking spring force and air pressure powerfully pulls in the clamp rod. The gripper will be expanded.
  3. After the gripper holds a workpiece, the pulling force pulls in the workpiece onto the seating surface. (Clamping Force = Pulling Force toward Seating Surface)

**Caution**
This product has no function that prevents contaminants. Do not use under environment with coolant and cutting chips.

For such environment, choose the high-power pneumatic hole clamp (model SWE).
Auto Switch

Locking action and releasing action can be detected by an auto switch (prepared by customer).

Installation Sample 1

Installation Sample 2

Note:
1. Depending on difference of workpiece hole diameter, the detection range of an auto switch can be insufficient. If using an auto switch, workpiece hole diameter difference should be within ±0.1mm.

【Applicable Auto Switch】Refer to P.405 - P.414 for detailed specifications. (When using an auto switch not made by Kosmek, check specifications of each manufacture.)

<table>
<thead>
<tr>
<th>Auto Switch Model No.</th>
<th>JEP0000-A2</th>
<th>JEP0000-A2L</th>
<th>JEP0000-B2</th>
<th>JEP0000-B2L</th>
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<td>Reed Auto Switch</td>
<td>Reed Auto Switch</td>
<td>Solid State Auto Switch</td>
<td>Solid State Auto Switch</td>
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<td>Wiring Method</td>
<td>2-Wire</td>
<td>3-Wire</td>
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<td>3m</td>
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<td>Cable Length</td>
<td>1m</td>
<td>3m</td>
<td>1m</td>
<td>3m</td>
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<td>Refer to P.407</td>
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<tr>
<td>• Electric Circuit Diagram</td>
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### External Dimensions

**M2.5×0.45 Mounting Bolt**
Tightening Torque 0.25N·m

- Brown Cable (+)
- Blue Cable (-)
- LED Indicator

**M2.5×0.45 Mounting Bolt**
Tightening Torque 0.25N·m

- Brown Cable (+)
- Black Cable (Output)
- Blue Cable (-)
- LED Indicator

<table>
<thead>
<tr>
<th>Auto Switch Model No.</th>
<th>JEP0000-A2V</th>
<th>JEP0000-A2VL</th>
<th>JEP0000-B3</th>
<th>JEP0000-B3L</th>
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<td>Solid State Auto Switch</td>
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<tr>
<td>• Electric Circuit Diagram</td>
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</tbody>
</table>

### External Dimensions

**M2.3×0.4 Mounting Bolt**
Tightening Torque 0.12N·m

- Brown Cable (+)
- Blue Cable (-)
- LED Indicator

**M2×0.4 (Left-Hand Thread)**
Tightening Torque 0.1N·m

- Brown Cable (+)
- Red Cable (Output)
- Blue Cable (-)
- LED Indicator

- High Sensitivity Position
**Model No. Indication**

**WKH 2 00 0 - 115 - D - **

**Body Size**

1. Standard

**Design No.**

0. Revision Number

**Workpiece Hole Diameter (Workpiece Hole Code)**

- **Workpiece Hole Code**: Workpiece Hole Diameter $d \pm 0.3$
- Indicate the workpiece hole diameter $d$ in 0.5 increments from the allowable range in the list below.
- When using with an auto switch, workpiece hole diameter difference should be within $\pm 0.1\text{mm}$.

<table>
<thead>
<tr>
<th>Workpiece Hole Code</th>
<th>060</th>
<th>065</th>
<th>070</th>
<th>075</th>
<th>080</th>
<th>085</th>
<th>090</th>
<th>095</th>
<th>100</th>
<th>105</th>
<th>110</th>
<th>115</th>
<th>120</th>
<th>125</th>
<th>130</th>
<th>135</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hole Diameter $d \pm 0.3$ (mm)</td>
<td>6</td>
<td>6.5</td>
<td>7</td>
<td>7.5</td>
<td>8</td>
<td>8.5</td>
<td>9</td>
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<td>12</td>
<td>12.5</td>
<td>13</td>
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<td>14</td>
</tr>
</tbody>
</table>

**Functions**

- **D**: Datum (For Reference Locating)
- **C**: Cut (For One Direction Locating)
- **M**: Floating of Expanding Area (No Locating Function)

- When using with expansion locating pin (model WWH, WWM, WWK, VRA, VRC, VX, etc.) please select Function **M**.

<table>
<thead>
<tr>
<th>Function</th>
<th>D</th>
<th>C</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Datum</strong></td>
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<td>Available No. of Gripper: -2</td>
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<tr>
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<td>Available No. of Gripper: -2</td>
<td>Available No. of Gripper: -2</td>
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<tr>
<td><strong>Expanding Area</strong></td>
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<td>Available No. of Gripper: -2</td>
<td>Available No. of Gripper: -2</td>
</tr>
</tbody>
</table>

**Seating Height Dimension**

- **Blank**: Standard Height
- **H Seating Height**: Specifying Seating Height (In 10mm increments)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Blank (Standard)</th>
<th>H10</th>
<th>H20</th>
<th>H30</th>
<th>H40</th>
<th>H50</th>
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<tbody>
<tr>
<td>AA</td>
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<td>70</td>
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<td>AB</td>
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<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
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</tbody>
</table>

**Shape of Gripper (Workpiece Hole)**

- **F**: No Serration (Standard)
- **S**: With Serration
- **T**: Taper Hole (With Serration) ※ Contact us for details.

**Shape of Cap End**

- **Blank**: Standard (Low Head Model)
- **B**: Cone Point Model

※ When inserting the cap adjusting to a workpiece hole, it should be within the floating range, or a workpiece should be light and not fixed.
Specifications

Model No. | WKH2000
---|---
Workpiece Hole Code | 060 065 070 075 080 085 090 095 100 105 110 115 120 125 130 135 140

Machine Part | Workpiece Hole Diameter d (mm) | Hardness | Locating Repeatability (μ) | Allowable Offset (Floating Clearance of Expanding Area) (μ) | Workpiece Pulling Stroke | Cylinder Capacity | Maximum Operating Pressure | Minimum Release Pressure | Withstanding Pressure | Operating Temperature (°C) | Usable Fluid | Weight | Notes:  
| | 6 6.5 7 7.5 8 8.5 9 9.5 10 10.5 11 11.5 12 12.5 13 13.5 14 | Less than HB250 (When Selecting φ S / T ) | mm | mm | mm | cm³ | MPa | MPa | MPa | 0 ~ 70 | Dry Air | |  
1. Locating repeatability under the same condition (no load).  
2. The expanding part of option M is an adjusting structure and the clamping operation is done by locating a workpiece hole. The value in the table shows the amount of tolerance value of single clamp. Please consider the distance accuracy of each clamp mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.

Gripping Force · Clamping Force Curve

Model No. | Shape of Gripper | WKH2000
---|---|---
Gripping Force | F: No Serration | S: With Serration
Air Pressure | 0.5 MPa | 0.4 MPa | 0.3 MPa | 0.2 MPa | 0 MPa | 1950 | 1600 | 1260 | 910 | 220 | Calculation Formula: FH = 3460 × P + 220

Clamping Force
Air Pressure | 0.5 MPa | 0.4 MPa | 0.3 MPa | 0.2 MPa | 0 MPa | 185 | 150 | 115 | 80 | 10 | Calculation Formula: Fc = 350 × P + 10
F: Gripping Force
S: With Serration Clamping Force

Notes:  
1. This graph shows the relationship among supply air pressure, gripping force and clamping force.  
2. Gripping force shows the expanding force acting perpendicular to the clamp’s center axis. Clamping force shows the pressing force against the seating surface.  
3. Thin wall around the workpiece hole can be deformed by clamping action, gripping force and clamping force will not fill the specification.  
4. Gripping force shows the calculated value when the friction coefficient of expanding area is 0.15.  
5. Clamping force of F: No Serration shows the calculated value when the friction coefficient of workpiece and gripper is 0.1.  
6. F: Supply Air Pressure (MPa), P: Supply Air Pressure (MPa).
External Dimensions

The drawing shows the released state of WKH2000-D-F.

Seating Height: Standard

Seating Surface

Air Lock Port

Air Release Port

4-M5 × 0.8 Thread Depth 4

Locating Hole Depth 4

Gripper

(Refer to the Functions and Gripper Direction on P.398 for gripper direction.)

4-φ4.3

Auto Switch Mounting Slot

Workpiece (Pallet) Hole Dimensions

Workpiece Hole End Diameter

Stop Hole

Through Hole

Slope Angle

(3° or less)

Taper Hole

"Contact us for details"

Notes:

1. Mounting bolts are not provided. Please prepare them according to the mounting position. (Refer to "Mounting Hole Clamp" on P.305.)

2. The workpiece must be resting on all seating surfaces when clamping. Otherwise the workpiece can be deformed by the clamping force.

3. The name of each port is marked on the port. (LOCK: Air Lock Port, RELEASE: Air Release Port)

4. Please refer to Seating Height: Standard for dimensions that is not shown.

Specified Seating Height: H

Notes:

1. Thin wall around the workpiece hole can be deformed by clamping action, gripping force and clamping force will not fill the specification. Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

4. When clamping a taper hole, please indicate the detailed dimensions of a clamp hole (including tolerance).
**Functions and Gripper Direction**

Number of Gripper: 3 (120° Interval)

- Shows the expanding direction of the gripper.

**Model No. Indication**

```
WKH 2 0 0 0 - D C M - F S T
```

1. Body Size
2. Design No.
3. Workpiece Hole Diameter (Workpiece Hole Code)
4. Functions
5. Seating Height Dimension
6. Shape of Gripper (Workpiece Hole)

**External Dimensions**

<table>
<thead>
<tr>
<th>Workpiece Hole Code</th>
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<th>065</th>
<th>070</th>
<th>075</th>
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</tbody>
</table>

**Locating Direction of WKH2000-□-C**

When locating with workpiece hole code 090 ~ 140

- The expanding direction of WKH2000-□-C must be vertical toward the line connecting the centers of WKH2000-□-D and WKH2000-□-C.

- Shows the expanding direction of the gripper.

**Notes:**

- 5. Locating repeatability under the same condition (no load).
- 6. The clamping part is an adjusting structure and the clamping operation is done by locating a workpiece hole. The value in the table shows the amount of tolerance value of single clamp. Please consider the distance accuracy of each clamp mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.
**External Dimensions**

*The drawing shows the released state of WKH2000-□□□□-D-FB.*

- **4-MS × 0.8**
  - Thread Depth 10
- **2-∅3H8 -0.014**
  - Locating Hole Depth 4

**Seating Height: Standard**

- **Air Lock Port**
  - MS × 0.8 Thread Depth 4
- **Air Release Port**
  - MS × 0.8 Thread Depth 4
- **∅36.5g7 - 0.009 - 0.032**

**Gripper**

(Refer to the Functions and Gripper Direction on P.300 for gripper direction.)

- **4-∅4.3**
  - Auto Switch Mounting Slot

**Workpiece (Pallet) Hole Dimensions**

- **∅d**
  - Stop Hole
  - Through Hole
  - Taper Hole

**Notes:**

1. Mounting bolts are not provided.
   Please prepare them according to the mounting position.
   (Refer to “Mounting Hole Clamp” on P.305.)
2. The workpiece must be resting on all seating surfaces when clamping. Otherwise the workpiece can be deformed by the clamping force.
3. The name of each port is marked on the port.
   (LOCK: Air Lock Port, RELEASE: Air Release Port)
4. Please refer to Seating Height: Standard for dimensions that is not shown.

**Expanding Area Detail**

**Specified Seating Height:** H□□□□

**Notes:**

1. Thin wall around the workpiece hole can be deformed by clamping action, gripping force and clamping force will not fill the specification.
   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.
2. When clamping a taper hole, please indicate the detailed dimensions of a clamp hole (including tolerance).
**Functions and Gripper Direction**

Number of Gripper: 3 (120° Interval)

- shows the expanding direction of the gripper.

**Mounting Direction of WKH2000-□-C**

When locating with workpiece hole code 090 ~ 140

- The expanding direction of WKH2000-□-C must be vertical toward the line connecting the centers of WKH2000-□-D and WKH2000-□-C.

- shows the expanding direction of the gripper.

**Model No. Indication**

WKH 2 00 0 - □ - □ - □ - □ - □ - □

- 1: Body Size
- 2: Design No.
- 3: Workpiece Hole Dia. (Hole Code)
- 4: Functions
- 5: Seating Height Dimension
- 6: Shape of Gripper (Workpiece Hole)
- 7: Shape of Cap End (When selecting B)

**External Dimensions**

| Model No. | Workpiece Hole Code | WKH2000-□-□-□-□ | 060 | 065 | 070 | 075 | 080 | 085 | 090 | 095 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 |
|-----------|---------------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Workpiece Hole Diameter φ d | 6.1 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | 9.5 | 10.0 | 10.5 | 11.0 | 11.5 | 12.0 | 12.5 | 13.0 | 13.5 | 14.0 |
| Clamp Diameter | At Release | 5.5 | 6.5 | 7.5 | 8.0 | 8.5 | 9.0 | 10.0 | 10.5 | 11.0 | 11.5 | 12.0 | 12.5 | 13.0 | 13.5 | 14.0 |
| At Idle | 6.8 | 7.3 | 7.8 | 8.3 | 8.8 | 9.3 | 9.8 | 10.3 | 10.8 | 11.3 | 11.8 | 12.3 | 12.8 | 13.3 | 13.8 | 14.3 | 14.8 |
| Workpiece Pulling Stroke | 0.5 |

- A | 5.6 | 6.1 | 6.6 | 7.1 | 7.6 | 8.1 | 8.6 | 9.1 | 9.6 | 10.1 | 10.6 | 11.1 | 11.6 | 12.1 | 12.6 | 13.1 | 13.6 |
| B | 9 | 9 | 9 | 10 | 10 | 11 | 11 | 11 | 13 | 13 | 14 | 14 | 14 | 14 | 14 | 14 |
| C | 2 | 2 | 2.5 | 2.5 | 3 | 3 | 4.5 | 4.5 | 5 | 5.5 | 5.5 | 6 | 6 | 6 | 6 | 6.5 | 6.5 |
| D | 3.5 | 4 | 4.5 | 4 | 4.5 | 5 | 5.4 | 5.9 | 6.4 | 6.3 | 6.8 | 7.3 | 7.8 | 7.1 | 7.6 | 8.1 | 8.6 |
| E | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 4.3 | 4.3 | 4.3 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 |
| F | 15 | 16 | 16 | 17 | 17 | 17 | 19 | 20 | 21 | 21 | 22 | 22 | 23 | 23 | 24 | 24 | 24 |
| G | 9.5 | 10.5 | 10.5 | 11.5 | 11.5 | 12 | 13.5 | 14.5 | 14.5 | 15.5 | 15.5 | 16.5 | 16.5 | 17.5 | 17.5 | 18.5 | 18.5 |

- Function D: Locating Repeatability ≈ 5
- Function M: Allowable Offset (Flattening Clearance of Expanding Area) ≈ 6

Notes:
- 5. Locating repeatability under the same condition (no load).
- 6. The clamping part is an adjusting structure and the clamping operation is done by locating a workpiece hole. The value in the table shows the amount of tolerance value of single clamp. Please consider the distance accuracy of each clamp mounting hole and each workpiece machining hole when using with another location clamp / location cylinder, or when using more than two of these products.

<table>
<thead>
<tr>
<th>Seating Height Dimension</th>
<th>Standard Seating Height</th>
<th>Specified Seating Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank</td>
<td>H10</td>
<td>H20</td>
</tr>
<tr>
<td>AA</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>AB</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Weight kg</td>
<td>0.30</td>
<td>0.32</td>
</tr>
</tbody>
</table>
Sample 1 (Layout and Circuit)

Combination Use with Pneumatic Expansion Locating Pin (model VWM) for High Accuracy Locating (Repeatability: 3 μm)

※ This drawing shows a layout sample of WKH-M (FA Pneumatic Hole Clamp) and VWM (Pneumatic Expansion Locating Pin).

Notes:
1. When loading/unloading a workpiece, install two or more rough guides in order to prevent damage to a clamping part.
2. When using with VWM (Pneumatic Expansion Locating Pin), choose Function: M Floating of Expanding Area for FA Pneumatic Hole Clamp.

When Controlled with One Solenoid Valve

When Controlled with Two Solenoid Valves

Note:
※1. Please use solenoid valve to make a sequence operation that WKH (Hole Clamp) starts working after VWM (Pneumatic Expansion Locating Pin) completes the movement. When unable to use solenoid valve, please prepare flow control valve with check valve at ★(1 part) to adjust sequencing speed. If WKH operates before VWM, there is a possibility for the equipment to be damaged due to a thrust load on WKH.
Sample 2 (Layout and Circuit)

Combination Use with High-Power Pneumatic Work Support (model WNC) for Workpiece Inclination Prevention During Transfer

When the gravity center of a workpiece is unbalanced, it could damage a clamp or drop a workpiece affected by inertia moment due to high-speed transfer (sudden stop). Use work supports, etc., when designing a system.

※ This drawing shows a layout sample of WKH-D/C (FA Pneumatic Hole Clamp), WNC (High-Power Pneumatic Work Support) and BWD (Air Sequence Valve).

![Diagram of Sample 2 (Layout and Circuit)]

When Controlled with One Solenoid Valves

When Controlled with Two Solenoid Valves

Note:

※ 1. Please use solenoid valve or BWD (Air Sequence Valve) to make a sequence operation that WKH (Hole Clamp) starts working after WNC (High-Power Pneumatic Work Support) completes the movement. If WKH operates before WNC, there is a possibility for the equipment to be damaged due to a thrust load on WKH.
Cautions

1) Check Specifications
   - Please use each product according to its specifications.
   - This product is an air double-acting clamp which locks with air pressure and spring force (gripping and clamping), and releases with air pressure. Even when air is not supplied to either lock or release port, the built-in spring maintains clamped state (clamp diameter is expanded).
   - Gripping and clamping force at zero pressure is lower than those when air is supplied. For using at zero pressure, please refer to P.296 Gripping・Clamping Force Curve : Air Pressure 0 MPa.
   - Supply the release air when loading/unloading a workpiece. Otherwise the workpiece contacts the grippers leading to damage to workpiece or clamp.

2) Working Reference Plate (Seating Surface) Z Axis
   - The upper surface of the flange of this product is the seating surface of workpiece and locates in Z direction.

   A workpiece must be resting on all seating surfaces when clamping. If not, calculate contacting pressure with clamping force and seating area not to deform a workpiece.

3) Wall Thickness around Workpiece Hole
   - Thin wall around the workpiece hole can be deformed by clamping action, gripping and clamping forces do not fill the specification. Please conduct clamping test and adjust to proper air pressure before use. If clamping force is insufficient, workpiece may fall out.

4) Clamp Installation
   - When Using Functions –D/C –C : Locates the orientation using –D : Datum as a reference. Therefore, it is required to determine the phase of –C : Cut when mounting.

<table>
<thead>
<tr>
<th>Workpiece hole code</th>
<th>(When using Function –D and –C together)</th>
</tr>
</thead>
<tbody>
<tr>
<td>090 – 140</td>
<td>The expanding direction of WKH2000□-C must be vertical toward the line connecting the centers of WKH2000□-D and WKH2000□-C.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Workpiece hole code</th>
<th>(When using Function –C and –C together)</th>
</tr>
</thead>
<tbody>
<tr>
<td>060 – 085</td>
<td>Rotate 90° of the expanding direction of two clamps toward the line connecting the centers of two WKH2000□-C. (Accuracy is not guaranteed since there is no reference locating.)</td>
</tr>
</tbody>
</table>

5) Clamping Force
   - Clamping force shows pressing force against the seating surface. Please conduct clamping test and adjust to proper air pressure before use.
   - Insufficient clamping force causes a workpiece to fall.

6) Workpiece hole size, slope angle and workpiece hardness should be within the range of the specification.

<table>
<thead>
<tr>
<th>When workpiece hole diameter is larger than specification.</th>
<th>Expansion stroke is insufficient and the gripping force ・ clamping force will not fill the specifications.</th>
</tr>
</thead>
<tbody>
<tr>
<td>When using it with insufficient gripping (clamping) force.</td>
<td>Leads to falling of the workpiece.</td>
</tr>
<tr>
<td>When workpiece hole diameter is smaller than specification.</td>
<td>Difficult to attach/detach the workpiece leading to damage.</td>
</tr>
<tr>
<td>When workpiece hole depth is shallow.</td>
<td>May lead to abnormal seating and damage.</td>
</tr>
<tr>
<td>When workpiece hole taper is larger than standard.</td>
<td>The load concentrates on the gripper point when clamping and could/lead to damage.</td>
</tr>
<tr>
<td>When workpiece hole is harder than specified.</td>
<td>Gripper does not dig into work enough and it cannot clamp securely.</td>
</tr>
</tbody>
</table>
7) Horizontal Locating
   ● When a workpiece is set, please make sure there is no lifting or
     slope of the workpiece. If the clamping operation is done with
     lifting or slope of the workpiece, it will lead to possible damage
     of a clamp and deformation of the workpiece hole.

8) Please detach a workpiece with all clamps fully released.
   ● When detaching a workpiece during lock or release operation,
     it may cause damage to the clamp or cause the workpiece to fall.

9) Please set up rough guides.
   ● When detaching a workpiece with slope it may cause the damage
     to the clamp or cause the workpiece to fall.

Please set up rough guides considering the pitch accuracy of
location clamp / location cylinder mounting hole and each
workpiece machining hole when using with another location
clamp / location cylinder, etc.

10) For Use of Auto Switch
    ● Depending on difference of workpiece hole diameter,
      the detection range of an auto switch can be insufficient.
      If using an auto switch, workpiece hole diameter difference
      should be within ±0.1mm.

11) Fall Prevention Measures
    ● In case of accident such as detachment of a workpiece, please
      prepare fall prevention measures for safety.

12) Operating Environment
    This product has no function that prevents contaminants.
    Do not use under environment with coolant and cutting chips.
    For such environment, choose the high-power pneumatic hole
    clamp (model SWE) or pneumatic hole clamp (model SWA).

13) Damage Prevention during Robot Handling, etc.
    ● When inserting the Hole Clamp tip into/taking it out of
      a workpiece hole, the Hole Clamp tip has to be vertical
      to the workpiece hole.
      Especially after releasing a workpiece, the Hole Clamp tip
      must be fully taken out from the workpiece hole before
      moving to a next coordinate.

   ● If the Hole Clamp tip touches a workpiece when inserting,
     control the insertion speed to avoid damage on the workpiece
     and Hole Clamp tip.

   ● When the Hole Clamp is mounting/removing a workpiece,
     make sure that a robot operates only after the Clamp completes
     clamping/releasing action by using a sensor or timer.
     If the robot starts operating in the middle of clamping/releasing
     action, the workpiece may be fallen off.

   ● When mounting/removing a workpiece, it may be tilted
     due to a gap between the workpiece and the stand.
     This causes damage of the Hole Clamp. The gap has to be
     minimized as much as possible when mounting/removing.
Cautions

Installation Notes
1) Check the fluid to use.
   • Please supply filtered clean dry air.
   • Oil supply with a lubricator etc. is unnecessary.

2) Preparation for Piping
   • The pipeline, piping connector and fixture circuits should be
     cleaned and flushed thoroughly.
     The dust and cutting chips in the circuit may lead to fluid
     leakage and malfunction.
   • There is no filter provided with this product for prevention of
     contaminants in the air circuit.

3) Applying Sealing Tape
   • Wrap with tape 1 to 2 times following the screwing direction.
   • Pieces of the sealing tape may lead to air leaks and malfunction.
   • In order to prevent contaminants from entering into the product
     during the piping work, it should be carefully cleaned before working.

4) Mounting Hole Clamp
   • When mounting the product use four hexagon socket bolts
     (with tensile strength of A2-70 or more) and tighten them
     with the torque shown in the list below.
     Tightening with greater torque than recommended can
     depress the seating surface or break the bolt.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Thread Size</th>
<th>Tightening Torque [N·m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WKH2000</td>
<td>M4×0.7</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>M5×0.8</td>
<td>5.0</td>
</tr>
</tbody>
</table>

5) Port Position of Hole Clamp
   • The name of each port is marked on the flange surface.
     Be careful with the mounting direction of piping.
     (LOCK : Air Lock Port, RELEASE : Air Release Port)

Notes on Handling
1) It should be operated by qualified personnel.
   • The hydraulic machine and air compressor should be operated
     and maintained by qualified personnel.

2) Do not operate or remove the product unless the safety protocols
   are ensured.
   ① The machine and equipment can only be inspected or prepared
      when it is confirmed that the safety devices are in place.
   ② Before the product is removed, make sure that the above-mentioned
      safety devices are in place. Shut off the pressure and power source,
      and make sure no pressure exists in the air and hydraulic circuits.
   ③ After stopping the product, do not remove until the temperature
      drops.
   ④ Make sure there is no trouble/issue in the bolts and respective parts
      before restarting the machine or equipment.

3) Do not touch workpieces (pallets) or clamps while they are working.
   Otherwise, your hands may be injured.

4) When transferring a workpiece, make sure the safety of environment
   in case of a workpiece detachment.

5) Do not disassemble or modify.
   • If the equipment is taken apart or modified, the warranty will be
     voided even within the warranty period.
   • Powerful spring is built in inside which is very dangerous.
● Maintenance and Inspection

1) Removal of the Product and Shut-off of Pressure Source
● Before removing the product, make sure that safety devices and preventive devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
● Make sure there is no trouble/issue in the bolts and respective parts before restarting.

2) Regularly clean the clamping part and seating surface.
● If operating with dirt adhering to the clamping part, it will lead to damage to a product and workpiece detachment due to gripping force and clamping force shortage, defective operation, and air leakage, etc.

3) Regularly tighten pipe line and mounting bolt to ensure proper use.

4) Clamping force will be decreased due to friction of a gripper surface caused by repeated operation.
Replacement period differs depending on operating pressure, workpiece material, and shape of hole. When you find friction on gripper surface, the gripper needs to be replaced.
Please contact us for replacement.

5) Make sure there is a smooth action without an irregular noise.
● Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.

6) The products should be stored in the cool and dark place without direct sunshine or moisture.

7) Please contact us for overhaul and repair.

Powerful spring is built in inside which is very dangerous.

※ Please refer to P.716 for common cautions.
Model No. Indication

**JEP 0000 - A1L**

1. **Design No.**
   - 0: Revision Number

2. **Switch Type**
   - **A1**: 2-Wire Reed Auto Switch
   - **A2**: 2-Wire Reed Auto Switch
   - **A2V**: 2-Wire L-Shaped Reed Auto Switch
   - **B1**: 3-Wire Solid State Auto Switch
   - **B2**: 3-Wire Solid State Auto Switch
   - **B3**: 3-Wire L-Shaped Solid State Auto Switch
   - **P**: 3-Wire Proximity Switch for Gripping Detection (Length 32mm)
   - **P2**: 3-Wire Proximity Switch for Gripping Detection (Length 16mm)

3. **Electric Cable Length**
   - **Blank**: 1m
   - **L**: 3m

   Note:
   - ※1: Electric Cable Length is chosen only for **A/B** Auto Switch of **2 Switch Type**.
   - For **P/P2**: Proximity Switch for Gripping Detection, electric cable length is all 2m.

Application Table

<table>
<thead>
<tr>
<th>Switch Type</th>
<th>2-Wire Reed Auto Switch</th>
<th>3-Wire Solid State Auto Switch</th>
<th>3-Wire Proximity Switch for Gripping Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No.</td>
<td>JEP0000-A1</td>
<td>JEP0000-A2</td>
<td>JEP0000-B1</td>
</tr>
<tr>
<td>SWJ2000</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>SWP050</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>SWP100</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WKH2000</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPA0120</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPA0160</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPA0200</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPA0250</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPH0100</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPH0160</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPH0200</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPS0160-C</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPS0200-C</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPW0500-C</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>WPW0600-C</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
**JEP0000-A □ □** (2-Wire Reed Auto Switch)

### Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JEP0000-A1</th>
<th>JEP0000-A1L</th>
<th>JEP0000-A2</th>
<th>JEP0000-A2L</th>
<th>JEP0000-A2V</th>
<th>JEP0000-A2VL</th>
</tr>
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<tbody>
<tr>
<td>Name</td>
<td>Reed Auto Switch</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiring Type</td>
<td>2-Wire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable Load</td>
<td>Relay, Programmable Logic Controller (PLC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Voltage / Load Current</td>
<td>Less than DC24V / 40mA Less than AC100V / 20mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Voltage Drop</td>
<td>Less than 3V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Time</td>
<td>1ms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>-10 ~ 70°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand Voltage</td>
<td>AC1500V (There should be no abnormalities in 1 min. application.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage Current</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>30G</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection Circuit</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection Grade</td>
<td>IP67 (IEC Standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator Light</td>
<td>Red LED illuminates when turned ON</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Cable Length</td>
<td>1m 3m 1m 3m 1m 3m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Electric Circuit Diagram

![Electric Circuit Diagram](image)

**Note:**
1. Auto switch will instantly break due to over loading current if turning on the auto switches without connecting the load. (Refer to Notes on Wiring 4) and 5) on P.413.

### External Dimensions: JEP0000-A1 □ □

![External Dimensions: JEP0000-A1 □ □](image)

### External Dimensions: JEP0000-A2 □ □

![External Dimensions: JEP0000-A2 □ □](image)

### External Dimensions: JEP0000-A2V □ □

![External Dimensions: JEP0000-A2V □ □](image)
JEP0000-B□ □(3-Wire Solid State Auto Switch)

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JEP0000-B1</th>
<th>JEP0000-B1L</th>
<th>JEP0000-B2</th>
<th>JEP0000-B2L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Solid State Auto Switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiring Type</td>
<td>3-Wire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicable Load</td>
<td>Relay, Programmable Logic Controller (PLC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Type</td>
<td>NPN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load Voltage / Load Current</td>
<td>Less than DC10 ~ 24V / 100mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Voltage Drop</td>
<td>Less than 0.7V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Time</td>
<td>1ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>-10 ~ 70°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstand Voltage</td>
<td>AC2000V (There should be no abnormalities in 1 min. application.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage Current</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock Resistance</td>
<td>30G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection Grade</td>
<td>IP67 (IEC Standard)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicator Light</td>
<td>Red LED illuminates when turned ON</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric Cable Length</td>
<td>1m, 3m, 1m, 3m</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Electric Circuit Diagram

External Dimensions: JEP0000-B1 □

External Dimensions: JEP0000-B2 □
### Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JEP0000-B3</th>
<th>JEP0000-B3L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Solid State Auto Switch</td>
<td>Solid State Auto Switch</td>
</tr>
<tr>
<td>Wiring Type</td>
<td>3-Wire</td>
<td>3-Wire</td>
</tr>
<tr>
<td>Applicable Load</td>
<td>Relay, Programmable Logic Controller (PLC)</td>
<td>Relay, Programmable Logic Controller (PLC)</td>
</tr>
<tr>
<td>Output Type</td>
<td>NPN</td>
<td>NPN</td>
</tr>
<tr>
<td>Load Voltage / Load Current</td>
<td>Less than DC5 ~ 28V / 0.1 ~ 40mA</td>
<td>Less than DC5 ~ 28V / 0.1 ~ 40mA</td>
</tr>
<tr>
<td>Internal Voltage Drop</td>
<td>Max. 0.5V</td>
<td>Max. 0.5V</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>Max. 50μA (DC24V)</td>
<td>Max. 50μA (DC24V)</td>
</tr>
<tr>
<td>Current Consumption</td>
<td>Max. 10 mA</td>
<td>Max. 10 mA</td>
</tr>
<tr>
<td>Response Time</td>
<td>Max. 1ms</td>
<td>Max. 1ms</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>0 ~ 60°C</td>
<td>0 ~ 60°C</td>
</tr>
<tr>
<td>Withstand Voltage</td>
<td>AC1500V (There should be no abnormalities in 1 min. application.)</td>
<td>AC1500V (There should be no abnormalities in 1 min. application.)</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>More than 100MΩ / DC500V (Between the Case and Signal Cable)</td>
<td>More than 100MΩ / DC500V (Between the Case and Signal Cable)</td>
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<tr>
<td>Shock Resistance</td>
<td>30G</td>
<td>30G</td>
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<tr>
<td>Protection Grade</td>
<td>IP67 (IEC Standard)</td>
<td>IP67 (IEC Standard)</td>
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<tr>
<td>Indicator Light</td>
<td>Red LED illuminates when turned ON</td>
<td>Red LED illuminates when turned ON</td>
</tr>
<tr>
<td>Electric Cable Length</td>
<td>1m</td>
<td>3m</td>
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### Electric Circuit Diagram

![Electric Circuit Diagram](image)

### External Dimensions : JEP0000-B3

![External Dimensions](image)
Auto Switch / Proximity Switch for Gripping Detection  

**JEP0000-P** (3-Wire Proximity Switch for Gripping Detection)

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JEP0000-P</th>
<th>JEP0000-P2</th>
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<tbody>
<tr>
<td>Name</td>
<td>Proximity Switch for Gripping Detection</td>
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<tr>
<td>Wiring Type</td>
<td>3-Wire</td>
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<tr>
<td>Output Type</td>
<td>NPN</td>
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<tr>
<td>Moving Distance</td>
<td>1.5 ± 0.15mm</td>
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<tr>
<td>Voltage Range</td>
<td>DC10 ~ 30V</td>
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<tr>
<td>Opening / Closing Voltage</td>
<td>Less than 200mA</td>
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<tr>
<td>Current Consumption</td>
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<tr>
<td>Response Frequency</td>
<td>800Hz</td>
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</tr>
<tr>
<td>Ambient Temperature</td>
<td>-25 ~ 70°C</td>
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<tr>
<td>Withstand Voltage</td>
<td>AC2000V (There should be no abnormalities in 1 min. application.)</td>
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<tr>
<td>Protection Grade</td>
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</tr>
<tr>
<td>Indicator Light</td>
<td>Red LED illuminates when turned ON</td>
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<td>Electric Cable Length</td>
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**Electric Circuit Diagram**

![Electric Circuit Diagram](image)

**External Dimensions : JEP0000-P**

![External Dimensions](image)

**External Dimensions : JEP0000-P2**

![External Dimensions](image)
**Cautions**

### Notes for Design

1) Check the Specifications
   - Please use each product according to the specifications. The product may be damaged or malfunction if used outside the range of load or specifications.
2) Notes on Use in the Interlock Circuit
   - When the auto switch is used for an interlock signal that requires high reliability, please use a double interlock system by providing a mechanical protection function. Or by using another switch (sensor) together with the auto switch. Also, please perform periodic maintenance and confirm proper operation.
3) Wiring should be prepared as short as possible.
   - If the wiring length of the solid state auto switch is long, we recommend installing the ferrite core on both ends of the electric cable for noise control.
4) Please avoid using loads that generate surge voltage.
   - If driving loads that generate surge voltage such as relay, please use the auto switch equipped with junction protective circuit or install protective box.
   - If surge voltage is repeatedly applied to the auto switch even with the Zener Diode for surge protection, it may damage the contact. When directly driving loads generating surge voltage, such as solenoid valves, use the auto switch equipped with surge absorption element.
   - The magnet switch is equipped with surge absorption element. However, please provide an absorption element, such as varistor, if there is large surge-generating equipment.
     Example: Motors or welding machines.
5) Leakage Current
   - In case of 2-wire solid state auto switch, the leakage current that activates internal circuit of the auto switch may flow even in OFF state. If the load operating current (the controller is in OFF state) does not satisfy the specified leakage current, it may result in restoration defect (remains ON state).
   - If it does not satisfy the specifications, please use 3-wire auto switch. Also, n parallel connections will multiply leakage current flowing to the load by n times.
6) Internal Voltage Drop of the Auto Switch
   - Due to voltage drop (refer to internal voltage drop on the specifications) caused by internal resistance of LED, voltage drop of n auto switches connected in series will be multiplied by n times.
   - As a result, in some cases the load will not activate even if the auto switch drives properly.
7) When wiring is disconnected, or when forcibly activating the auto switch for action confirmation, carefully design the circuit to avoid reverse current.
   - The auto switch may malfunction or be damaged when reverse current occurs.
8) When multiple cylinders or robotic hands are placed close together.
   - Please provide enough space when using multiple actuators such as cylinders or robotic hands equipped with auto switches. (If allowable distance of each actuator is specified please follow specified instructions.) If they are too close, auto switches may malfunction due to magnetic interference.
9) Secure space for maintenance and inspection
   - Please secure space for maintenance and inspection of auto switches when setting actuators such as cylinders and robotic hands equipped with auto switches.
● Notes on Operating Environment

1) Never use the product in an atmosphere with explosive gases.
   ● Auto switches are not designed to prevent explosion. Do not use the product in an atmosphere with explosive gases since it may cause serious explosions.

2) Do not use the product in an area where a magnetic field is generated.
   ● Auto switches may malfunction, or internal magnet actuators, such as cylinders or robotic hands, equipped with auto switches will be demagnetized.

3) Do not use the product in an environment where the auto switches are continuously exposed to water or coolant.
   ● Although IEC standard IP67 structure is satisfied, please avoid using auto switches in an environment where continuously exposed to water or coolant. This may cause insulation failure or malfunction.

4) Do not use the product in an environment with oil or chemicals.
   ● If auto switches are used in an environment with coolant or cleaning solvent, even in a short time, they may be adversely affected by improper insulation, malfunction due to swelling of potting resin and/or hardening of electric cable.

5) Do not use the product in an environment subject to large temperature cycle.
   ● Heat cycles other than ordinary changes in temperature may adversely affect the internal structure of auto switches.

6) Avoid accumulation of steel dust and close connection of magnetic materials.
   ● An amount of steel chips or steel dusts, such as sputters of welding accumulate around an actuator. Cylinders, robotic hand equipped with auto switches and or magnetic materials (those attracted by magnet) are gathered closely to the actuator. These can weaken internal magnet actuators.

7) Do not use the product in an environment with excessive impact.
   ● Under the condition of the excessive impact of more than 30G, the contact of the reed auto switch will malfunction and the indicator light may signal or may be disconnected.

● Installation Notes

1) Do not drop or bump.
   ● Do not drop, bump or apply excessive impact on auto switches. The auto switches may be damaged and cause malfunction.

2) Tighten auto switches with appropriate tightening torque.
   ● Please follow the tightening torque below. Excessive tightening torque may damage the mounting screw, fitting or main body of the auto switch. Also, mounting position may be shifted due to insufficient tightening torque.

<table>
<thead>
<tr>
<th>Mounting Screw Size</th>
<th>Tightening Torque (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2 x 0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>M2.5 x 0.45</td>
<td>0.25</td>
</tr>
<tr>
<td>M3 x 0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

3) Do not carry cylinders or robotic hands by holding the electric cable of the auto switch.
   ● It may break the electric cable or damage the internal element.

4) Do not fix auto switches with the mounting screws other than attached in main body of the auto switches.
   ● Using non-designated screws may damage auto switches.

5) Install the auto switches at the center of the operating area.
   ● Installation position of auto switches should be adjusted so that a detected object (piston etc.) stops at the center of operating range. (Installation position shown in the catalog shows the most suitable fixed position of stroke end.) Please refer to P.345 for WPS, P.355 for WPA, P.363 for WPH, P.375 for WPP and P.391 for WPQ. If the auto switches are installed at the edge of operating range (near the boundary of ON and OFF), output movement may be unstable.

6) Installation position of the auto switches should be adjusted by checking actual operating state.
   ● Depending on the installation environment, actuators such as cylinders and robotic hands may not operate properly even if they are installed to the appropriate position. Make sure to check the operating condition even when mounting them at the middle of the stroke.
**Cautions**

- **Notes on Wiring**
  1) Check the insulation of wiring.
     - Insulation failure (interference with other circuit, ground fault, and insulation failure between terminals) may send excessive voltage or current to the auto switches causing damage.
  2) Do not place wires and auto switch cables close to other cables and high voltage cables.
     - Otherwise, surge voltages will be induced creating noise and leading to malfunctions.
  3) Repeated bending stress or stretching force should be avoided on electric cables.
     - Wiring with bending stress or stretching force repeatedly applied on electric cables will prematurely breakdown. Bending stress or stretching force applied on the connecting area of electric cables and main body of the auto switches will damage the electric cables. Auto switches or wires should not be moving especially near the connecting areas.
  4) Make sure to check the load state (connection and current value) before turning on the power.
     - For 2-Wire Type
       - Auto switches will instantly break due to over loading current if turning on the auto switches without connecting the load (Shorted Load Circuit). The above statement is also applied to the condition when the brown cable (+, output) of 2-wire type is directly connected to the (+) power terminal of a fixture and etc.
  5) Avoid shorted load circuit.
     - Reed Auto Switch
       - Auto switches will instantly break due to over loading current if turning on the auto switch in load short circuit condition.
     - Solid State Auto Switch
       - Be aware of auto switch breakages when products with PNP output is not equipped with short-circuit protection.
  6) Avoid wrong wiring
     - Reed Auto Switch
       - The electric circuit has polarities. The brown cable is "+", and the blue cable is "−". The reed switch can operate even with reversed connection, but LED light will not illuminate. Also, flowing excessive current will damage LED and it will not operate properly.
     - Solid State Auto Switch
       - In case of 2-wire type, even if connected reversely, the auto switch will not be damaged due to protection circuit, but it is always ON.
       - If reversely connected under short circuit condition, the auto switch will be damaged.
       - In case of 3-wire type, even if the connections are reversed (power supply line "+" and "−"), the auto switch will be protected by a protection circuit.
       - However, if connecting the power supply "+" to the blue cable and "−" to the black cable, the auto switch will be damaged.

- **Notes on Handling**
  1) It should be operated by qualified personnel.
     - Machines and devices with hydraulic and pneumatic equipment should be operated and maintained by qualified personnel.
  2) Do not operate or remove the product unless the safety protocols are ensured.
     - The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.
     - Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
     - After stopping the product, do not remove until the temperature drops.
     - Make sure there is no trouble/issue in the bolts and respective parts before restarting the machine or equipment.
  3) Do not disassemble or modify.
     - If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.
● Maintenance • Inspection

Conduct the below maintenance and inspections periodically in order to avoid unintended malfunctions and to ensure the safety.

1) Removal of the Product and Shut-off of Pressure Source
- Before removing the product, make sure that safety devices and preventative devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
- Make sure there is no trouble/issue in the bolts and respective parts before restarting.

2) Never touch terminals while the power is on.
- It will cause electric shock, malfunction and damage to the auto switches.

3) Retightening of Mounting Screws
- Retighten the screws after adjusting the mounting position when the mounting position of the auto switches is shifted due to the looseness of the mounting screws.

4) Check if the electric cable is damaged or not.
- Damaged cables may cause insulation failure.
- Exchange the auto switch or repair the reed if there is damage on the electric cable.

5) Check the setting position of the detector.
- Confirm the set position is stopped at the center of the detecting range (the area that red LED illuminates).

6) Cleaning Auto Switches
- The auto switch should be clean. Do not use benzene, paint thinner or alcohol for cleaning. Doing so will cause scratches on the product and indications may be erased. If it is hard to remove stains from the product, wipe it out with a cloth soaked in a neutral detergent diluted with water. Wipe with a dry cloth to remove wet residue.

7) Product Storage
- Keep the product out of direct sunlight in a cool area where it is protected from water and humidity.

8) Please contact us for auto switch replacements.

※ Please refer to P.716 for common cautions. • Warranty
Cautions

Notes on Handling

1) It should be operated by qualified personnel.
- The hydraulic machine and air compressor should be operated and maintained by qualified personnel.

2) Do not operate or remove the product unless the safety protocols are ensured.
- The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.
- Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
- After stopping the product, do not remove until the temperature drops.
- Make sure there is no trouble/issue in the bolts and respective parts before restarting the machine or equipment.

3) Do not touch a clamp (cylinder) while it is working. Otherwise, your hands may be injured.

4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

Maintenance and Inspection

1) Removal of the Machine and Shut-off of Pressure Source
- Before removing the product, make sure that the safety devices are in place. Shut off the pressure and power source and make sure no pressure exists in the air and hydraulic circuits.
- Make sure there is no trouble/issue in the bolts and respective parts before restarting.

2) Regularly clean the area around the piston rod and plunger.
- If it is used when the surface is contaminated with dirt, it may lead to packing seal damage, malfunctioning, fluid leakage.

- Locating products (except VRA/VRC/VX/VXE/VXF and SWR without air blow port) can remove contaminants with the cleaning function. When installing a workpiece or a pallet, make sure there are no contaminants such as thick sludge.
- Continuous use with dirt on components will lead to locating failure, fluid leakage and malfunction.

4) Regularly tighten pipe, mounting bolt, nut, snap ring, cylinder and others to ensure proper use.

5) Make sure the hydraulic fluid has not deteriorated.

6) Make sure there is a smooth action without an irregular noise.
- Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.

7) The products should be stored in the cool and dark place without direct sunshine or moisture.

8) Please contact us for overhaul and repair.
● Warranty

1) Warranty Period
   ● The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.

2) Warranty Scope
   ● If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense. Defects or failures caused by the following are not covered.

1. If the stipulated maintenance and inspection are not carried out.
2. Failure caused by the use of the non-confirming state at the user’s discretion.
3. If it is used or operated in an inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
4. If the defect is caused by reasons other than our responsibility.
5. If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
6. Other caused by natural disasters or calamities not attributable to our company.
7. Parts or replacement expenses due to parts consumption and deterioration.
   (Such as rubber, plastic, seal material and some electric components.)

Damages excluding from direct result of a product defect shall be excluded from the warranty.
Company Profile

Sales Offices

Sales Offices across the World

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>TEL.</th>
<th>FAX.</th>
</tr>
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<tbody>
<tr>
<td>JAPAN</td>
<td>KOSMEK LTD. 1-5, 2-chome, Murotani, Nishi-ku, Kobe-city, Hyogo, Japan  651-2241</td>
<td>+81-78-991-5162</td>
<td>+81-78-991-8787</td>
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<tr>
<td>Overseas Sales</td>
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<tr>
<td>United States of America</td>
<td>650 Springer Drive, Lombard, IL 60148 USA</td>
<td>+1-630-620-7650</td>
<td>+1-630-620-9015</td>
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<tr>
<td>KOSMEK (USA) LTD.</td>
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<tr>
<td>MEXICO</td>
<td>Av. Santa Fe #103 int 59 Col. Santa Fe Juriquilla C.P. 76230 Queretaro, Qro Mexico</td>
<td>+52-442-161-2347</td>
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<tr>
<td>KOSMEK USA Mexico Office</td>
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<tr>
<td>EUROPE</td>
<td>Schleppenplatz 2 9020 Klagenfurt am Wörthersee Austria</td>
<td>+43-463-287587</td>
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<tr>
<td>KOSMEK EUROPE GmbH</td>
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<tr>
<td>CHINA</td>
<td>Room601, RIVERSIDE PYRAMID No.55, Lane21, Pusan Rd, Pudong Shanghai 200125, China</td>
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<td>KOSMEK (CHINA) LTD.</td>
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<tr>
<td>INDIA</td>
<td>F 203, Level-2, First Floor, Prestige Center Point, Cunningham Road, Bangalore -560052 India</td>
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<td>KOSMEK LTD - INDIA</td>
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<tr>
<td>THAILAND</td>
<td>67 Soi 58, RAMA 9 Rd., Suanluang, Suanluang, Bangkok 10250, Thailand</td>
<td>+66-2-300-5132</td>
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</tr>
<tr>
<td>KOSMEK Thailand Representation Office</td>
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<tr>
<td>TAIWAN</td>
<td>16F-4, No.2, Jian Ba Rd, Zhonghe District, New Taipei City Taiwan 23511</td>
<td>+886-2-82261860</td>
<td>+886-2-82261890</td>
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<tr>
<td>(Taiwan Exclusive Distributor)</td>
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<tr>
<td>Full Life Trading Co., Ltd.</td>
<td></td>
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<tr>
<td>PHILIPPINES</td>
<td>Victoria Wave Special Economic Zone Mt. Apo Building, Brgy. 186, North Caloocan City, Metro Manila, Philippines 1427</td>
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Sales Offices in Japan

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<th>TEL.</th>
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