Pneumatic Hole Clamp

Model SWA

Gripper expands and pulls workpiece in.

Gripper expands and pulls workpiece in.

Action Description (The Tip of Hole Clamp)

< Released State >
Load/Unload Workpiece

< Clamping State >
Gripper expands to hold workpiece hole.

< Clamping Completed >
Pulls and clamps in workpiece hole.
Advantages

To Workpiece

- Zero interference with 5 faces except clamping face.
- Possible to use standard length tool which provides for better machining accuracy.
- Possible to enhance cutting parameters which leads to shorter cycle times.

To Machining Equipment

- Fixture could be extremely downsized.
- Turn-table could be downsized.
- The movement of tool could be shorten.
- For saving weight of fixture.
- Machining equipment could be more simple.
- Good design for easy flow of chips and reduction in coolant usage.

To Machining Line

- 5-face machining makes it possible to put process together.
- Machining line is kept small and simple.
- Possible to enhance cutting parameters which leads to shorter cycle times.

To Transfer Equipment

- Hand part can be compact and light.
- Transfer equipment can be compact.
**Features**

- **Variable Mounting Dimensions to Suit the Equipment**
  All pipes are set in flange so plate thickness would be much thinner. The body below flange is shorter and lighter than high-power pneumatic hole clamp (model SWE).

- **Seating Surface Height Suitable to Workpiece**
  Level the height in 5mm increments according to the phase of workpiece seating surface.

- **Hole Diameter to Suit a Variety of Workpieces**
  In order to suit different hole diameters and tolerances, hole diameters can be specified in 0.5mm increments.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWA1000</td>
<td>6</td>
</tr>
<tr>
<td>SWA2000</td>
<td>Body Size — Type 1</td>
</tr>
<tr>
<td></td>
<td>Body Size — Type 2</td>
</tr>
</tbody>
</table>

* Refer to the specifications for the tolerance of workpiece hole diameter.
● **Without Pulling Function (Option)**

It has expanding force only, and minimizes deformation caused by clamping.

※ Workpiece pulling stroke per clamp is max. 0.1mm.

### [Standard]

Built-in locking spring and lift spring enable secure clamping and self-locking at zero air pressure.

![Diagram: Standard Clamping System](image)

### [Option: Without Pulling Function]

Not equipped with lift spring, and workpiece pulling stroke is minimum. It clamps a workpiece with expanding force only.

※ This option has no seating confirmation function, but clamp abnormality detection function.

![Diagram: Without Pulling Function](image)

#### <Deformation Analysis>

Since clamping force is applied toward the pulling direction, the workpiece hole might be deformed.

By clamping with expanding force only, there is no force applied or deformation occurred toward the pulling direction.

![Deformation Analysis Image](image)

#### <Application Example of 'Without Pulling Function' Option: Supports the Displacement of Lifting Direction with Hole Clamp>

### [Without Hole Clamp]

Due to the load in lifting direction, there is deflection when machining the workpiece.

![Without Hole Clamp Diagram](image)

### [Support with Hole Clamp]

Grips the workpiece, prevents deflection in lifting direction and improves machining accuracy.

![Support with Hole Clamp Diagram](image)

**Note:** In case there is thrust load (vertical load toward the hole clamp axis), 'without pulling function' has no clamping force, so the product will be damaged or broken when thrust load is applied to the hole clamp. 
Make sure to use a support, etc. for thrust load.
• Various Kinds of Protection by Cap Structure

All sizes are equipped with the cap.

- Minimum clearance between cap and gripper prevents cutting chips from entering inside.

- Small clearance leads to effective purging. Even with a little air flow it prevents coolant from entering inside.

- Workpiece does not have contact with gripper. It makes loading-unloading smooth.

- Not necessary to have rough guide on fixture.

※ Depends on the condition of loading speed, etc.
Pursuit of Good Design for Efficient Swarf Management

Having smaller seating surface and wide sweep area on the flange enables easy flow of chips and reduction in coolant usage.

Secure Clamp Action Out of Sight

Lift spring grips a workpiece strongly and pulls it in.\(^1\)

Even when air pressure is at zero, self-lock function with locking spring ensures safety.

\(^1\) 'Without pulling function' (option) does not pull down the workpiece to the seating surface.
Features

Action Confirmation of Clamping

Lift-up function allows to check the movement of pulling and lifting off the workpiece. It can be used in automated line.

※ Lift-up function is the function of "workpiece lifting option: with lift option".

Abnormality Detection for Unpredictable Troubles

Error detection for unpredictable troubles when machining or transferring. It can be used in automated line.
**Action Description**  ※This is a simplified drawing. Actual components are different.

![Diagram]

- **Released State**
  1. Air pressure is supplied to the release port.
  2. The rod is lifted up and the gripper retracts.
     (For workpiece lifting option, there is a gap between workpiece bottom surface and seating surface.)

<table>
<thead>
<tr>
<th>Air Pressure Switch</th>
<th>Seat Check Detection (Air Sensor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Air Pressure</td>
<td>Lock Air Pressure</td>
</tr>
<tr>
<td><strong>ON</strong></td>
<td><strong>OFF</strong></td>
</tr>
<tr>
<td><strong>OFF</strong></td>
<td><strong>OFF</strong></td>
</tr>
</tbody>
</table>

※ Continuously supply air pressure to the air blow port and seating confirmation port. If clamps are used without air supply, foreign substances enter into clamps resulting in clamping error. Option 1: Without Pulling Function has no seating confirmation detection and only detects abnormality shown below.

- **Locked State**
  1. Air pressure is supplied to the lock port.
  2. The rod descends and the gripper expands along the taper plane. (Since the gripper is lifted by spring force, it does not pull down.)
  3. When pulling force exceeds the spring force for lift up, pulling force works after the gripper digs into workpiece. Then, it presses workpiece onto seating surface. (Clamping force = Pressing force onto seating surface.)

<table>
<thead>
<tr>
<th>Air Pressure Switch</th>
<th>Seat Check Detection (Air Sensor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Air Pressure</td>
<td>Lock Air Pressure</td>
</tr>
<tr>
<td><strong>OFF</strong></td>
<td><strong>ON</strong></td>
</tr>
<tr>
<td><strong>ON</strong></td>
<td><strong>ON</strong></td>
</tr>
</tbody>
</table>

Without Pulling Function (Option) clamps a workpiece with expansion of grippers. There is no action of 3.

- **Abnormality Detected State (Clamping without Workpiece)**

The built-in check valve function and seating confirmation air pressure detect abnormal condition as follows.

- When clamping workpiece which has larger workpiece hole diameter or clamping without workpiece (In this state the gripper expands but the lifting spring does not have pulling force so the workpiece lifting surface does not descend.)
- When rod or gripper is broken.
- If the piston is fully stroked when it has to stop at the bottom.
- In the case workpiece is floated more than 1mm when setting it.

<table>
<thead>
<tr>
<th>Air Pressure Switch</th>
<th>Seat Check Detection (Air Sensor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Air Pressure</td>
<td>Lock Air Pressure</td>
</tr>
<tr>
<td><strong>OFF</strong></td>
<td><strong>ON</strong></td>
</tr>
<tr>
<td><strong>ON</strong></td>
<td><strong>OFF</strong></td>
</tr>
</tbody>
</table>
Pneumatic Hole Clamp

Model No. Indication

**SWA 1000 - A - 090 -**

1. **Body Size**  ※ Please refer to specifications, performance curve and external dimensions for details.

   1: Available in diameters between φ 6 and φ 9mm
   2: Available in diameters between φ 9 and φ 13mm

2. **Design No.**

   0: Revision Number

3. **Workpiece Lifting Option**

   A: With Lift Function (Lift Function Option)
   N: With No Lift Function ※1

   ※1. When using it with expansion locating pin (model VWM, VWK, VFL, VFM, VFJ, VFK, VX ), please choose N: With no lift function.

4. **Workpiece Hole Diameter (Workpiece Hole Code)**

   - Workpiece Hole Diameter φ d
     ※ Workpiece hole diameter should be specified in 0.5mm increments from the allowable range in the table below.
     ※ Refer to the specifications for the tolerance.

<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>
</tr>
</thead>
<tbody>
<tr>
<td>SWA1000</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>
<td>9.5</td>
<td>10</td>
<td>10.5</td>
<td>11</td>
<td>11.5</td>
<td>12</td>
<td>12.5</td>
<td>13</td>
</tr>
<tr>
<td>SWA2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
</tbody>
</table>

5. **Seating Height Dimension**

   **Blank**  : Standard Height (30mm)
   **H Seating Height**  : Specifying Seating Height (In 5mm increments)

<table>
<thead>
<tr>
<th>Model</th>
<th>Seating Height H (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>SWA1000</td>
<td>30</td>
</tr>
<tr>
<td>SWA2000</td>
<td>30</td>
</tr>
</tbody>
</table>

   ※ ★ part is standard height, and seating height dimension code is "Blank".
   ※ Entry example when specifying non-standard seating height.
   Seating Height 50mm : H50
6 Shape of Gripper (Workpiece Hole)

Blank : With Serration
F : Without Serration
T : Taper Hole (With Serration) ⑧ Contact us.

7 Option

Blank : Standard Model (With Pulling Function)
W : Without Pulling Function ⑨ ⑩ ⑪

※2. It has no air blow-out hole for seating confirmation or its function.
With built-in valve it detects clamp abnormality except seating confirmation.
※3. ⑧ Workpiece lifting function is N.

Air Blow-out Hole for Seating Confirmation
Not Equipped for W

Lift Spring
Not Equipped for W

6 Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWA1000</th>
<th>SWA2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece Hole Code</td>
<td>060</td>
<td>065</td>
</tr>
<tr>
<td>Workpiece Hole Diam.</td>
<td>③ A</td>
<td>③ A</td>
</tr>
<tr>
<td>φ</td>
<td>6</td>
<td>6.5</td>
</tr>
<tr>
<td>Workpiece Hardness</td>
<td>HB250 or less</td>
<td>±0.3</td>
</tr>
<tr>
<td>Allowable Offset (Facing Clearance of Expanding Area)</td>
<td>⑤</td>
<td></td>
</tr>
<tr>
<td>Full Stroke</td>
<td>⑦ Blank</td>
<td>4.2</td>
</tr>
<tr>
<td>Workpiece</td>
<td>⑦ Blank</td>
<td>⑦ W</td>
</tr>
<tr>
<td>Pulling Stroke</td>
<td>⑦ W</td>
<td>0.2</td>
</tr>
<tr>
<td>Workpiece Lifting Stroke ⑥ ⑧ (Only for ③ A)</td>
<td>⑦ Blank</td>
<td>0.09</td>
</tr>
<tr>
<td>Workpiece Lifting Force ⑥ ⑧ (Only for ③ A)</td>
<td>⑦ Blank</td>
<td>0.15</td>
</tr>
<tr>
<td>Cylinder Capacity (Empty Action)</td>
<td>Release cm³</td>
<td>4.8</td>
</tr>
<tr>
<td>Lock cm³</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>MPa</td>
<td>0.5</td>
</tr>
<tr>
<td>Min. Operating Pressure</td>
<td>MPa</td>
<td>0.25</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>0.75</td>
</tr>
<tr>
<td>Recommended Air Blow Pressure</td>
<td>MPa</td>
<td>0.2 ～ 0.3</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>⑨ °C</td>
<td>0 ～ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>Dry Air</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>⑧ Please refer to External Dimensions for Mass</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
※4. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.
※5. Workpiece lifting stroke and workpiece lifting force are functions only for lifting option.
### Performance Curve

#### Applicable Model No.

**SWA 1 2 00 0 - A N - 090 - Blank H - Blank F - Blank T**

- **Body Size**: 1
- **Workpiece Lifting Option**: A
- **Workpiece Diameter**: N
- **Seating Height Dimension**: 090
- **Option**: Blank F
- **Shape of Gripper**: Blank T

#### Clamping Force Curve

**Clamping Force**

It shows the pressing force against the seating surface.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWA1000-F</td>
<td>060 ~ 065</td>
</tr>
<tr>
<td>SWA1000-T</td>
<td>070 ~ 090</td>
</tr>
<tr>
<td>SWA2000-F</td>
<td>060 ~ 065</td>
</tr>
<tr>
<td>SWA2000-T</td>
<td>070 ~ 090</td>
</tr>
<tr>
<td>SWA2000</td>
<td>090 ~ 130</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>SWA1000-F</th>
<th>SWA1000-T</th>
<th>SWA2000-F</th>
<th>SWA2000-T</th>
<th>SWA2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7</td>
<td>0.75</td>
<td>1.1</td>
<td>0.21</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td>0.65</td>
<td>0.95</td>
<td>0.19</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>0.55</td>
<td>0.80</td>
<td>0.16</td>
<td>0.22</td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>0.45</td>
<td>0.65</td>
<td>0.13</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>0.35</td>
<td>0.50</td>
<td>0.11</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>0.25</td>
<td>0.30</td>
<td>0.45</td>
<td>0.10</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>0 (Zero Pressure)</td>
<td>0.10</td>
<td>0.10</td>
<td>0.02</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>

**Clamping Force Calculation Formula**

\[
F_c = 0.93P + 0.1 \\
F_c = 1.43P + 0.1 \\
F_c = 0.27P + 0.02 \\
F_c = 0.39P + 0.03
\]

**Notes:**

1. The table and graph show the relationship between clamping force (kN) and supply air pressure (MPa).
2. Clamping force shows pressing force against the seating surface.
3. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
4. Clamping force of **F**: Without Serration shows the calculated value when the friction coefficient of workpiece and gripper is \( \mu = 0.1 \).
5. \( F_c \): Clamping Force (kN), \( P \): Supply Air Pressure (MPa)
6. When selecting SWA1000 with workpiece hole code **060 / 065**, it cannot be used with 0.5MPa or more pressure.
Performance Curve (Option W : Without Pulling Function)

Expanding Force Curve

Expanding Force
It shows the gripping force generated inside workpiece hole.

Expanding Force (kN)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWA1000-N-□□□□-W</th>
<th>SWA2000-N-□□□□-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece Hole Code</td>
<td>060 ~ 065</td>
<td>070 ~ 090</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>0.7</th>
<th>0.6</th>
<th>0.5</th>
<th>0.4</th>
<th>0.3</th>
<th>0.25</th>
<th>0 (At Zero Pressure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expanding Force (kN)</td>
<td>2.4</td>
<td>2.1</td>
<td>1.9</td>
<td>1.6</td>
<td>1.3</td>
<td>1.1</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Expanding Force Calculation formula:

\[ F_H = 2.71P + 0.5 \]  kN

\[ F_H = 3.89P + 0.75 \]  kN

Notes:
1. The table and graph show the relationship between expanding force (kN) and supply air pressure (MPa).
2. Expanding force shows the gripping force generated inside workpiece hole.
3. Expanding force shows the calculated value when the friction coefficient of expanding part is \( \mu = 0.15 \).
4. Thin wall around the workpiece hole could be deformed by expanding action, and expanding force will not fill the specification.
5. 0.1mm or less pulling stroke can be generated caused by accumulated tolerance of inside parts.

\*3. \( F_H \) : Expanding Force (kN), \( P \) : Supply Air Pressure (MPa)
\*4. When selecting SWA1000 with workpiece hole code 060 / 065, it cannot be used with 0.5MPa or more pressure.
Pneumatic Hole Clamp

**External Dimensions**

*This drawing shows the released state of SWA1000-A-□□. *

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Max. 1.5</th>
<th>Max. 1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-R1/8 Thread Plug</td>
<td>67</td>
<td>39</td>
</tr>
<tr>
<td>Seating Surface Outer Diameter φ 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seating Surface Inner Diameter φ W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Air Blow-out Hole for Seating Confirmation φ 1
(Not Equipped for Option 7 W)

Seating Height: Standard

SWA1000-□-060: Grippers 180° Distance
SWA1000-□-090: 3 Grippers 120° Distance

shows the expanding direction of the gripper. (The direction of gripper is as indicated in this drawing.)

4-Mounting Bolt (Included) MS × 0.8 × 20

Cross Section:

Notes:

1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.
2. The port name is marked on the product surface. (LOCK: Air Lock Port, RELEASE: Air Release Port, BLOW: Air Blow Port, FC: Seat Confirmation Port, SENSOR: Clamp Abnormality Confirmation Port) Continuously supply air pressure to the air blow port, and the seating confirmation port or clamp abnormality confirmation port.
3. The numerical value is only for the workpiece lifting option.
4. Please refer to Seating Height: Standard for dimensions that is not shown.

**Workpiece (Pallet) Hole Dimensions**

<table>
<thead>
<tr>
<th>Hole Type</th>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind Hole</td>
<td>G-0.5 or more</td>
<td>CO.5 or less</td>
</tr>
<tr>
<td>Through Hole</td>
<td>S or more</td>
<td>CO.5 or less</td>
</tr>
<tr>
<td>Taper Hole</td>
<td>S or more</td>
<td>CO.5 or less</td>
</tr>
</tbody>
</table>

* Contact us for details.

**Specifying Seating Height**

Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, 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 the clamp head is sticking above the Y surface of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

---

Model SWA1000

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Machining Dimensions of Mounting Area

![Diagram of machining dimensions]

Notes:
1. There should be no burrs at the hole contact surface.
2. It is not required to machine each port if removing SWA R1/8 thread plug (4 plugs) and setting air fitting and air hole directly.

Model No. Indication

![Model number indication diagram]

External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWA1000-</th>
<th>Workpiece Hole Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>060</td>
<td>065</td>
</tr>
<tr>
<td>Workpiece Hole Diam.</td>
<td>( \phi ) d</td>
<td>A</td>
</tr>
<tr>
<td>Clamp Diameter</td>
<td>Released State</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>Empty Action</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Notes:
7. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of one clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.
8. Workpiece lifting stroke is the function only for lifting option.
\section*{External Dimensions}

This drawing shows the released state of SWA2000-A. 

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{external_dimensions.png}
\caption{External Dimensions}
\end{figure}

\section*{Workpiece (Pallet) Hole Dimensions}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{workpiece_hole_dimensions.png}
\caption{Workpiece (Pallet) Hole Dimensions}
\end{figure}

Notes:
1. Thin wall around the workpiece hole could be deformed by clamping action, 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. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

3. The port name is marked on the product surface. (LOCK: Air Lock Port, RELEASE: Air Release Port, BLOW: Air Blow Port, FC: Seat Confirmation Port, SENSOR: Clamp Abnormality Confirmation Port)

4. Continuously supply air pressure to the air blow port, and the seating confirmation port or clamp abnormality confirmation port.

5. The numerical value is only for the workpiece lifting option.

6. Please refer to Seating Height: Standard for dimensions that is not shown.
**Machining Dimensions of Mounting Area**

4-MS × 0.8 Thread Depth 9 or more

Air Blow Port φ 3 1/6

Air Lock Port φ 3 1/6

Seating Confirmation Air Port φ 3 1/6

Clamp Abnormality Confirmation Port when Selecting

![Through Hole](image1)

![Blind Hole](image2)

Notes:
1. There should be no burrs at the hole contact surface.
2. It is not required to machine each port if removing SWA R1/8 thread plug (4 plugs) and setting air fitting and air hose directly.

**Model No. Indication**

![Model No. Indication Diagram](image3)

**External Dimensions and Machining Dimensions for Mounting**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWA2000</th>
<th>Workpiece Hole Code</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>
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<tbody>
<tr>
<td>Workpiece Hole Diameter φ d</td>
<td>9 1/2</td>
<td>9 1/2</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Clamp Diameter Released State</td>
<td>8.5</td>
<td>9</td>
<td>9.5</td>
<td>10</td>
<td>10.5</td>
<td>11</td>
<td>11.5</td>
<td>12</td>
<td>12.5</td>
<td>13</td>
<td>13.5</td>
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<tr>
<td>Empty State</td>
<td>10.2</td>
<td>10.7</td>
<td>11.2</td>
<td>11.7</td>
<td>12.2</td>
<td>12.7</td>
<td>13.2</td>
<td>13.7</td>
<td>14.2</td>
<td></td>
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<tr>
<td>Allowable Offset (Floating Clearance of Expanding Air)</td>
<td>±0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Full Stroke</td>
<td>4.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workpiece</td>
<td>Blank</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulling Stroke</td>
<td>W</td>
<td>0.1 or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Workpiece Lifting Stroke</td>
<td>Blank F</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Notes:
- **7.** The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole.
- The numerical value in the table shows the amount of tolerance value of one clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.
- **8.** Workpiece lifting stroke is the function only for lifting option.

**Seating Height Dimension**

<table>
<thead>
<tr>
<th>Standard Height</th>
<th>H35</th>
<th>H40</th>
<th>H45</th>
<th>H50</th>
<th>H55</th>
<th>H60</th>
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<tbody>
<tr>
<td>H</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>AA</td>
<td>35</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>65</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>
**Layout Sample**

This drawing shows a combination mounting reference of SWA-N (Hole Clamp) and VWM (Expansion Locating Pin).

Notes:
1. When detaching a workpiece, in order to prevent the clamping part from damage, please set up rough guide of 2 or more. Please refer to the above drawing about the length of rough guide and the diameter gap. (Use of rough guides depends on the loading / unloading condition of the workpiece.)
2. When using a combination of VWM (Expansion Locating Pin) and SWA (Hole Clamp), please choose N without lift function.
Air Circuit Reference

※ This drawing shows a combination circuit reference of SWA-N (Hole Clamp) and VWM (Pneumatic Expansion Locating Pin).

When controlled with one solenoid valve

When controlled with two solenoid valves

Notes:
※1. Please use solenoid valve to make a sequence operation that SWA (hole clamp) starts working after VWM (expansion locating pin) completes the movement. When unable to use solenoid valve, please prepare flow control valve with check valve at ★ (1 piece) to adjust sequencing speed. If SWA operates before VWM, there is a possibility for the product to be damaged due to a thrust load on SWA.
※2. To reach required accuracy in setting air sensor, please install air sensor for individual clamp.
※3. With lift function it shows "OFF" since there is clearance between seating surface and workpiece. Without lift function, it shows "ON" depending on set pressure of the air sensor.

Condition for Operation Confirmation of Hose Clamp (Reference) ON: Pressure Increasing, OFF: Pressure Decreasing

<table>
<thead>
<tr>
<th>Pressure Switch</th>
<th>Release Confirmation</th>
<th>When Released</th>
<th>When workpiece is set</th>
<th>When Clamped</th>
<th>When clamped abnormally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Sensor for Seating Confirmation</td>
<td>OFF</td>
<td>OFF</td>
<td>ON (OFF) ★ 3</td>
<td>ON (OFF when air leaks)</td>
<td>OFF</td>
</tr>
</tbody>
</table>
Cautions

Notes for Design

1) Check Specifications
   ● Please use each product according to the specifications.
   ● This product is air double action model which locks with air pressure / spring force and releases with air pressure.
     When air is not supplied to either lock port or release port, built-in spring maintains locked condition (clamping diameter is expanded):
     ① Maintains clamping force even when air pressure is at 0MPa.
     (Refer to Clamping force curve: clamping force at supply air pressure 0MPa on P.225).
     ② When loading/unloading workpiece release air should be supplied.
        If release air is not supplied, workpiece contacts with gripper and it leads to breakage of clamps.

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.

When clamping, make sure all seating surfaces touch workpiece.
When the workpiece is not touching the seating surface area, please refer to external dimension chart and calculate contacting pressure with clamping force and seating area not to deform the workpiece.

3) Seat Confirmation Mechanism
   ● It will be detected when workpiece is pressed against the seating surface by lock (clamp) action.
     (No seat confirmation for Option ‘ without pulling function.)

With lifting function, when workpiece is set (before supplying lock air pressure), the workpiece is lifted by built-in spring, and there will be a clearance of 0.2mm between workpiece bottom surface and seating surface.

4) Distance Accuracy of Clamp Mounting Hole and Workpiece Hole
   ● The clamping part of this product has floating structure (±0.3mm for SWA1000 and ±0.5mm for SWA2000 per clamp). Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.

5) Clamping Force and Expanding Force
   ● Clamping force shows the pressing force against the seating surface. Expanding force shows the gripping force generated inside workpiece hole.
   Make sure to conduct test clamping and adjust supply pressure accordingly. Insufficient clamping force and/or expanding force leads to workpiece detachment.

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 clamping force - expanding force will not fill the specifications.</th>
</tr>
</thead>
<tbody>
<tr>
<td>When using with insufficient clamping force - expanding 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>Could lead to abnormal seating and damage.</td>
</tr>
<tr>
<td>When workpiece hole taper slope angle is larger than specification.</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 the workpiece enough and it cannot clamp securely.</td>
</tr>
</tbody>
</table>

7) Wall Thickness around Workpiece Hole
   ● Thin wall around the workpiece hole could be deformed by clamping action, and clamping force/expanding force do not fill the specification. Please conduct clamping test and adjust to proper air pressure before use. Using with insufficient clamping force and expanding force leads to workpiece detachment.

8) Air Blow Port and Seating Confirmation Port (Clamp Abnormality Confirmation Port)
   ● Continuously supply air pressure to the air blow port, and the seating confirmation port or clamp abnormality confirmation port.
      If air supply is shut off during operation, contaminants enter into the clamp leading to malfunctions.
9) Release Action

- When releasing, it lifts up the workpiece which is normal. When using in a horizontal application, it is recommended to install a fall prevention of workpiece for temporal tacking.

![Temporal Tacking](image)

10) 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.

11) Please detach a workpiece with all clamps fully released.

- When a workpiece is detached during lock or release operation, it will lead to damage of clamp or fall of workpiece.

12) Please set up rough guides.

- When detaching a workpiece with slope it may cause the damage of clamp or fall of workpiece.

![Detaching Workpiece](image)

When using the product with other location clamps / cylinders, please set rough guides considering the center distance accuracy of each mounting hole and workpiece hole of location clamp / cylinders.

- **Installation Notes**

1) Check the fluid to use.
- Make sure to supply filtered clean dry air.
- Oil supply with a lubricator etc. is unnecessary.

2) Procedure before Piping

- The pipeline, piping connector and fixture circuits should be cleaned by thorough flushing.
- The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
- There is no filter provided with this product to prevent foreign materials and contaminants from getting into 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 a foreign substance from going into the product during the piping work, it should be carefully cleaned before working.

4) Mounting Hole Clamp

- When mounting the product use all hexagon socket bolts (with tensile strength of 12.9) and tighten them with the torque shown in the chart below.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Thread Size</th>
<th>Tightening Torque (N-m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWA</td>
<td>M5 × 0.8</td>
<td>6.3</td>
</tr>
</tbody>
</table>

5) Port Position of the Hole Clamp

- The port name is marked on the product surface.
- Be careful of installation direction.
- (LOCK : Air Lock Port, RELEASE : Air Release Port, BLOW : Air Blow Port, FC : Seating Confirmation Port, SENSOR : Clamp Abnormality Confirmation Port)

6) Use air piping with outer diameter φ6 (inner diameter φ4) or larger for air blow.

- In order to conduct an effective air blow, it is recommended to use air piping with outer diameter φ6 (inner diameter φ4) or larger.

- **Please refer to P.1239 for common cautions.**

- **Notes on Handling**
- **Maintenance/Inspection**
- **Warranty**
Cautions

Notes on Handling

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

2) Do not handle or remove the machine unless the safety protocols are ensured.
   ① The machine and equipment can only be inspected or prepared when it is confirmed that the preventive devices are in place.
   ② Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.
   ③ After stopping the machine, do not remove until the temperature cools down.
   ④ Make sure there is no abnormality 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 due to clenching.

4) 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) Please refer to P.1239 for general maintenance.

2) Regularly clean the clamping part and seating surface.
   • There is an air blow mechanism in this product, and cutting chips and coolant can be removed. However, as it may be hard to remove clinging cutting chip and sludge etc., please confirm there is no foreign substance when workpiece is set.
   If operating with dirt adhering to the clamping part, it will lead to fall of workpiece due to insufficient clamping force, defective operation, and air leaks etc.

Even with general cleaning on exterior of hole clamp, there may be contaminants within internal parts of the component. If necessary, please call us for repair.
If repair or modifications are carried out by anyone other than Kosmek, or without our approval or confirmation, it will void warranty.

3) Continuous use will result in wear of the gripper and impairing clamping force.
   Whenever the wear is found the gripper should be replaced. The replacement time varies according to operating pressure, workpiece material and hole shape etc. Please call us.

4) Please contact us for overhaul and repairs.
   Powerful spring is built in inside which is very dangerous.

※ Please refer to P.1239 for common cautions.
   Notes on Handling   Maintenance/Inspection   Warranty
MEMO

<table>
<thead>
<tr>
<th>Features</th>
<th>Action Description</th>
<th>Model No. Indication</th>
<th>Specifications Performance Curve</th>
<th>External Dimensions</th>
<th>Layout Sample Circuit Reference</th>
<th>Cautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Power Series</td>
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<tr>
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<td>Valve / Coupler Hydraulic Unit</td>
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<td>Manual Operation Accessories</td>
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<tr>
<td>Cautions / Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Pneumatic Hole Clamp:

- SWA
  - Pneumatic Swing Clamp: WHA
  - Double Piston Pneumatic Swing Clamp: WHD
  - Pneumatic Link Clamp: WCA
  - Air Flow Control Valve: BZW
  - Pneumatic Expansion Locating Pin: VWM
  - Pneumatic Sensor Pin: WWA
Cautions

● Notes on Handling

1) It should be handled by qualified personnel.

● The hydraulic machine and air compressor should be handled and maintained by qualified personnel.

2) Do not handle or remove the machine unless the safety protocols are ensured.

① The machine and equipment can only be inspected or prepared when it is confirmed that the preventive devices are in place.

② Before the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.

③ After stopping the machine, do not remove until the temperature cools down.

④ Make sure there is no abnormality in the bolts and respective parts before restarting the machine or equipment.

3) Do not touch clamp (cylinder) while clamp (cylinder) is working. Otherwise, your hands may be injured due to clinching.

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 the machine is removed, make sure that the above-mentioned safety measures are in place. Shut off the air of hydraulic source and make sure no pressure exists in the hydraulic and air circuit.

● Make sure there is no abnormality 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 and air leaks.

3) Please clean out the reference surface regularly (taper reference surface and seating surface) of locating machine. (VS/VT/VFL/VFM/VFJ/VFK/VWS/WVM/WWK/VX/XXF)

● Location products, except VX/VXF model, can remove contaminants with cleaning functions.

When installing pallets makes sure there is no thick sludge like substances on pallets.

● Continuous use with dirt on components will lead to locating functions not work properly, leaking and malfunction.

4) If disconnecting by couplers on a regular basis, air bleeding should be carried out daily to avoid air mixed in the circuit.

5) Regularly tighten nuts, bolts, pins, cylinders and pipe line to ensure proper use.

6) Make sure the hydraulic fluid has not deteriorated.

7) Make sure there is smooth action and no abnormal noise.

● Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.

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

9) 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. If the product is used while it is not suitable for use based on the operator’s judgment, resulting in defect.
  3. If it is used or handled in 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.
## Sales Offices

### Sales Offices across the World

<table>
<thead>
<tr>
<th>Country</th>
<th>TEL.</th>
<th>FAX.</th>
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<tr>
<td>Overseas Sales</td>
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<td>Full Life Trading Co., Ltd.</td>
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<td>P.T PANDU HYDRO PNEUMATICS</td>
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<td>078-991-5115</td>
<td>078-991-8787</td>
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<tr>
<td>Osaka Sales Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overseas Sales</td>
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</tr>
<tr>
<td>Tokyo Sales Office</td>
<td>048-652-8839</td>
<td>048-652-8828</td>
</tr>
<tr>
<td>Nagoya Sales Office</td>
<td>0566-74-8778</td>
<td>0566-74-8808</td>
</tr>
<tr>
<td>Fukuoka Sales Office</td>
<td>092-433-0424</td>
<td>092-433-0426</td>
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</tbody>
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Global Network

Overseas Affiliates and Sales Offices
- Canada
- U.S.A.
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- Singapore
- Indonesia

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