For setup improvement of welding applications

Kosmek
Welding Products

Locating Pin Clamp
Model SWP

NEW
Floating Model

High-Power Welding Swing Clamp
Model WHG

High-Power Welding Link Clamp
Model WCG
Spot Welding

**Locating Pin Clamp**
Model SWP

Expansion of the locating part allows for high-accuracy locating and clamping of thin workpieces. Floating option (without locating function) is added to the lineup. [P.03]

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**Robotic Hand Changer**
Model SWR

The World’s Only Robotic Hand Changer with No Backlash Secures the aimed position with 3 μm locating repeatability at connected state. [P.65]

**FA Pneumatic Hole Clamp**
Model WKH

Compact and Light Internal Chucking Hand With self-locking spring, it remains locked even when air is cut off. [P.69]
Arc Welding

High-Power Welding Swing Clamp
Model WHG
Spatter-Resistant High-Power Pneumatic Swing Clamp for Welding Application. Special rod coating and triple protective structure prevents contamination.

High-Power Welding Link Clamp
Model WCG
Spatter-Resistant High-Power Pneumatic Link Clamp for Welding Application. Special rod coating and single link plate allow for spatter resistant. Triple protective structure prevents contaminants from entering the cylinder.

Compact Location Clamp
Model SWQ
For Pallet Exchange Automation. Clamping and locating simultaneously with 3 µm locating repeatability

Auto Coupler
Auto Coupler automatically connects air circuits to provide the air pressure to the pallet when the location clamp is locked.
High Accuracy Locating and Clamping of Thin Workpieces Applicable to Workpiece Hole Diameter $\phi 8$ or larger

**Action Description**

**Release**

- **Release Air**: ON
- **Lock Air**: OFF

**Lock**

- **Release Air**: OFF
- **Lock Air**: ON

**Workpiece Loading / Unloading**

Gripper is retracted. Workpiece loading/unloading is smooth due to an adequate space between the workpiece hole and pin.

1. **Expanding Action**
   - Gripper expands.
   - In case of Function D/C: Locating Function
   - A workpiece is located by the locating part.

2. **Locking Action**
   - Gripper pulls in the workpiece after locating, and the clamping part pulls the workpiece onto the seating surface for locking.

3. **Floating Function**
   - In case of Function M: Floating Function
   - The pin head floats following a workpiece hole.
Function

Locating Function

Locating Repeatability: 0.05 mm

As a general locating pin, Locating Pin Clamp has two types: Datum Locating Pin (round pin) and One-Direction Locating Pin (diamond pin).

For Datum Locating (Equivalent to Round Pin)

Workpiece hole and gripper make contact at three points for datum locating.

For One Direction Locating (Equivalent to Diamond Pin)

Workpiece hole and gripper make contact, perpendicular to the reference hole, at two points for one-direction locating.

Floating Function

Allowable Offset (Pin Head Floating Amount): ±0.8 mm

In a released state, the pin head floats according to a workpiece hole. The pin head remains floated when a workpiece is securely clamped by the gripper (three parts). (No locating function)

* It shows the allowable offset of body size 100
  The allowable offset of body size 050 is ±0.6 mm.

Application Examples of Floating Model

In case there is a large variation in workpiece hole distance due to warp or flexion of a workpiece.

Variation of workpiece hole distance can be absorbed by the floating function.

In case of locating with the locating model and requiring additional clamping force.

The floating model enables additional clamping force without interfering the locating model.

Description Video of the Floating Model

Available on Our Website

Features

Stable Clamping
Gripper makes contact evenly, allowing for stable clamping.

Pin Clamp with One Gripper Only
Gripper force is concentrated only on one part, causing deformation of workpiece.

KOSMEK Locating Pin Clamp with Several Grippers
Three or two grippers press a workpiece hole evenly, so the force is distributed allowing for stable clamping.

High Accuracy
Expansion of locating part enables higher accuracy than general locating pin.

Locating Repeatability : 0.05mm
※ In case of Locating Model (when combining Functions D and C) only.

General Locating Pin
Backlash caused by the gap between locating pin and workpiece hole lowers locating accuracy. Also, variance in tolerance of workpiece hole diameter creates variance in locating repeatability of each workpiece.

KOSMEK Locating Pin Clamp
Gripper expansion allows for high accuracy locating with no gaps. Variance in tolerance of workpiece hole diameter never affects locating accuracy.
Smooth loading/unloading even with robots due to large gap between the pin and workpiece hole in a released state.

**General Locating Pin**

When making a gap smaller in order to improve locating accuracy, it becomes difficult to load/unload workpieces, causing frequent momentary stops of automated system. Also, wear of the pin lowers locating accuracy.

**KOSMEK Locating Pin Clamp**

Workpieces do not touch the grippers and are smoothly loaded/unloaded since the grippers are retracted inside the pin at released state.

1. The gap is 0.2mm for SWP0501-1-80/90 (Workpiece Hole Diameter φ8/9), and 0.5mm for SWP0501-1-100 (Workpiece Hole Diameter φ10). Refer to the specifications for further information.

**Fixture Cost Reduction**

Because a gap between a locating pin and a workpiece hole is small, a lifting device may be required to pull out the workpiece stuck by welding distortion.

**KOSMEK Locating Pin Clamp**

Enables simple and low-cost equipment by smooth loading/unloading due to a large gap between Locating Pin Clamp and a workpiece hole.

**Smooth Workpiece Transfer with Expansion Pin Clamp for Dual Robot Systems**

Application Example:
Using Transfer Robot to hand over the workpiece directly to the other robot. Locating Pin Clamp allows for smooth transfer with large gap in a released state.

1. Before using Locating Pin Clamp (model SWP) and FA Pneumatic Hole Clamp (model WKH): Make sure to test and ensure that there is no trouble such as workpiece deformation, etc.
**Flexible Fixturing**

*Longer stroke* allows for workpiece thickness variance and flexible fixturing.

![Diagram showing fixturing](image)

- **Ability to Clamp Multiple Workpieces**
  
  Spot Welding Example with Three Workpieces.
  
  Even with multiple workpieces, the gripper enables stable clamping.
  
  - When using multiple workpieces, only one of the workpieces with minimum hole diameter can be located within the locating repeatability in the specification.

  ![Diagram showing clamping multiple workpieces](image)

- **Anti-Contamination**

  Since the gap of clamping part is minimal, it keeps contaminants out even in a locked state. Also equipped with air blow function.

  ![Diagram showing anti-contamination](image)

  - **No Gap. Spatter Entering Protection**
    
    The pin itself goes down along with the gripper when locking, so there is hardly any gap at locked state, preventing contaminants.

  - **Air Blow Function**
    
    Air blow keeps contaminants out.

- **Compact•Light**

  Short body allows for more compact and lighter applications.

  ![Diagram showing compact and lightweight design](image)

  - **Weight**: 380 g
  - **Compact**: 108 mm (Compressed State)
  - **Size**: 45 x 50 mm

  - **Weight**: 700 g
  - **Compact**: 135 mm (Compressed State)
  - **Size**: 51 x 59 mm

**Table: Workpiece Hole Diameter vs. Lock Stroke (mm)**

<table>
<thead>
<tr>
<th>Workpiece Hole Diam.</th>
<th>Lock Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø 8</td>
<td>2.3</td>
</tr>
<tr>
<td>ø 9</td>
<td>3.6</td>
</tr>
<tr>
<td>ø 10</td>
<td>5.5</td>
</tr>
<tr>
<td>ø 11</td>
<td>6</td>
</tr>
<tr>
<td>ø 12</td>
<td>6.5</td>
</tr>
<tr>
<td>ø 13</td>
<td>7</td>
</tr>
<tr>
<td>ø 14</td>
<td>8.5</td>
</tr>
<tr>
<td>ø 15</td>
<td>10</td>
</tr>
<tr>
<td>ø 16</td>
<td>10</td>
</tr>
<tr>
<td>ø 18</td>
<td>10</td>
</tr>
<tr>
<td>ø 20</td>
<td>10</td>
</tr>
</tbody>
</table>
More Compact

Less Load to Positioner
Light fixture with light Locating Pin Clamp reduces load to the positioner.

High Accessibility of Spot Welding Gun
Compact Locating Pin Clamp enables high accessibility of spot welding gun to a workpiece hole.

Compact and Light Transfer Hand
Compact and Light Locating Pin Clamp is also suitable for transferring thin plates.

Compact and Light Locating Pin Clamp is also suitable for spot welding with a robot holding a workpiece.

Application Example for Work Efficiency and Space Saving:
One robot can both transfer and weld by using Locating Pin Clamp as a robotic hand. Compact and light body improves operability and reduces a load to the robot.
**Locating Pin Clamp**

**Safety Function**

**Built-in locking spring maintains locked state even when air pressure is cut off.**

*Only for Self-Locking Function Option*

![Locking Spring](image)

**Without Self-Locking Function**

Even when air is cut off, the gripper holds the workpiece to prevent it from falling.

![Gripper](image)

When air is cut off, the gripper will go down due to the workpiece weight, but not retract. This enables the gripper to hold the workpiece.

**Maintenance**

**Removable Pin Allows for Simple Maintenance**

The gripper and cap can be replaced by removing tightening bolts on the seating part. No special tools or hard work are required for maintenance. It also helps customer prepare for replacements.

![Cap, Gripper, Seating Surface, Tightening Bolt](image)

*The picture shows in case of functions D/C.*

**No Bending**

Compared to perimeter clamping, Locating Pin Clamp is able to clamp the center of the workpiece without bending.

![Perimeter Clamping vs Locating Pin Clamp](image)

**Perimeter Clamping**

Perimeter clamping can be the cause of bending.

**Locating Pin Clamp**

No bending with Locating Pin Clamp by clamping workpiece holes.
Safely used in automation systems with action confirmation of Auto Switch.

Auto Switch (Prepared by Customer)

- Ability to Confirm Lock/Release Actions
- Recommended Auto Switch
  - Magnetic Field Resistant Model: D-P3DWA (made by SMC)
  - JEP Series (made by KOSMEK)

Notes:
1. Please refer to FA • Industrial Robot Related Catalog (CATALOG No. FA0020PB-GB) for detailed specifications of JEP series.
2. Please use D-P3DWA (made by SMC) for an environment which generates a magnetic field disturbance.
   - JEP series cannot be used in such an environment.

1. When using an auto switch not made by Kosmek, check specifications of each manufacture.
2. Auto Switch may be stuck out of the clamp depending on the installation position and direction.
**Locating Pin Clamp**

**Model No. Indication**

**SWP 100 1 - D - 150 -**

1. **Body Size**
   - 050: Select from Workpiece Hole Dia. φ 8, 9, 10, 11, 12, 13
   - 100: Select from Workpiece Hole Dia. φ 14, 15, 16, 18, 20

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

3. **Function**
   - D: Datum (For Datum Locating)
   - C: Cut (For One Direction Locating)
   - M: Pin Head Floating (No Locating Function)

4. **Workpiece Hole Diameter**
   - In case of 1 Body Size 050
     - 080: Workpiece Hole Dia. φ 8 ±0.2/0.1
     - 090: Workpiece Hole Dia. φ 9 ±0.2/0.1
     - 100: Workpiece Hole Dia. φ 10 ±0.2
     - 110: Workpiece Hole Dia. φ 11 ±0.2
     - 120: Workpiece Hole Dia. φ 12 ±0.2
     - 130: Workpiece Hole Dia. φ 13 ±0.2
   - In case of 1 Body Size 100
     - 140: Workpiece Hole Dia. φ 14 ±0.2
     - 150: Workpiece Hole Dia. φ 15 ±0.2
     - 160: Workpiece Hole Dia. φ 16 ±0.2
     - 180: Workpiece Hole Dia. φ 18 ±0.2
     - 200: Workpiece Hole Dia. φ 20 ±0.2

5. **Self-Locking Function**
   - Blank: With Self-Locking Function (Standard)
   - N: Without Self-Locking Function

   ※ With self-locking function, the clamp is locked at 0MPa. The ability of SWP varies depending on this function. Refer to the next page for further information.

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**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
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<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece mm</td>
<td>Hole Diameter</td>
<td>8 ±0.2/0.1</td>
<td>9 ±0.2/0.1</td>
<td>10 ±0.2</td>
<td>11 ±0.2</td>
<td>12 ±0.2</td>
<td>13 ±0.2</td>
<td>14 ±0.2</td>
<td>15 ±0.2</td>
<td>16 ±0.2</td>
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<td>Thickness</td>
<td>Min.</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
<td>0.45</td>
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<tr>
<td>Max.</td>
<td>2.3</td>
<td>3.6</td>
<td>5.5</td>
<td>6</td>
<td>6.5</td>
<td>7</td>
<td>8.5</td>
<td>10</td>
<td>0.6</td>
<td>0.6</td>
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<tr>
<td>Locating Repeatability</td>
<td>mm</td>
<td>0.05</td>
<td>0.05</td>
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<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
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<tr>
<td>Allowable Offset</td>
<td>mm</td>
<td>-</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>(Pin Head Floating Amount)</td>
<td></td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
<td>±0.6 (In case of [M])</td>
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<td>Cylinder Full Stroke</td>
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<td>9.3</td>
<td>12.1</td>
<td>13.8</td>
<td>14.3</td>
<td>14.8</td>
<td>16.3</td>
<td>17.8</td>
<td>18.3</td>
</tr>
<tr>
<td>Lock Stroke</td>
<td>mm</td>
<td>2.3</td>
<td>3.6</td>
<td>5.5</td>
<td>6</td>
<td>6.5</td>
<td>7</td>
<td>8.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Cylinder Capacity</td>
<td>cm³</td>
<td>5.5</td>
<td>6.4</td>
<td>8.4</td>
<td>9.5</td>
<td>9.9</td>
<td>10.2</td>
<td>17.2</td>
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<tr>
<td>Blank</td>
<td>Lock Side</td>
<td>Release Side</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Max. Operating Pressure</td>
<td>MPa</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Min. Operating Pressure</td>
<td>MPa</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>N</td>
<td>Operating Pressure</td>
<td>MPa</td>
<td>0.2 ~ 0.5</td>
<td>0.2 ~ 0.5</td>
<td>0.2 ~ 0.5</td>
<td>0.2 ~ 0.5</td>
<td>0.2 ~ 0.5</td>
<td>0.2 ~ 0.5</td>
<td>0.2 ~ 0.5</td>
<td>0.2 ~ 0.5</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
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<tr>
<td>Usable Fluid</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td>Dry Air</td>
<td></td>
</tr>
<tr>
<td>Recommended Air Blow Pressure</td>
<td>MPa</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
<td>0.1 ~ 0.2</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
<td>0 ~ 70</td>
<td>0 ~ 70</td>
<td>0 ~ 70</td>
<td>0 ~ 70</td>
<td>0 ~ 70</td>
<td>0 ~ 70</td>
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</tr>
<tr>
<td>Weight</td>
<td>g</td>
<td>380</td>
<td>380</td>
<td>380</td>
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<td>380</td>
<td>380</td>
<td>380</td>
<td>380</td>
<td>380</td>
</tr>
</tbody>
</table>

**Notes:**

1. Locating repeatability under the same condition (no load).
2. This product locks and releases with air pressure.
3. When using with other clamps, make sure this product operates first by sequence control of a circuit.
### Clamping Force • Expanding Force

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWP0501</th>
<th>SWP1001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clamping Force</strong></td>
<td><strong>Blank</strong> With Self-Locking</td>
<td><strong>N</strong> Without Self-Locking</td>
</tr>
<tr>
<td>Air Pressure 0.5 MPa</td>
<td>380</td>
<td>325</td>
</tr>
<tr>
<td>Air Pressure 0.4 MPa</td>
<td>315</td>
<td>260</td>
</tr>
<tr>
<td>Air Pressure 0.3 MPa</td>
<td>250</td>
<td>195</td>
</tr>
<tr>
<td>Air Pressure 0 MPa</td>
<td>55</td>
<td>-</td>
</tr>
<tr>
<td>Calculated Value Fc</td>
<td>Fc=650×P+55</td>
<td>Fc=650×P</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Expanding Force</strong></th>
<th><strong>Blank</strong> With Self-Locking</th>
<th><strong>N</strong> Without Self-Locking</th>
<th><strong>Blank</strong> With Self-Locking</th>
<th><strong>N</strong> Without Self-Locking</th>
</tr>
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<tbody>
<tr>
<td>Air Pressure 0.5 MPa</td>
<td>1015</td>
<td>880</td>
<td>1600</td>
<td>1330</td>
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<td>Air Pressure 0.4 MPa</td>
<td>840</td>
<td>700</td>
<td>1330</td>
<td>1060</td>
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<tr>
<td>Air Pressure 0.3 MPa</td>
<td>670</td>
<td>530</td>
<td>1060</td>
<td>800</td>
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<tr>
<td>Air Pressure 0 MPa</td>
<td>145</td>
<td>-</td>
<td>260</td>
<td>-</td>
</tr>
<tr>
<td>Calculated Value Fc</td>
<td>Fc=1740×P+145</td>
<td>Fc=1760×P</td>
<td>Fc=2680×P+260</td>
<td>Fc=2660×P</td>
</tr>
</tbody>
</table>

**Notes:**

1. Clamping force shows the pressing force against the seating surface.
2. The values in the table show the calculated value when the workpiece thickness t is 0.45mm.
3. When supplying air pressure to the air blow port, a clamping force may decrease due to internal pressure.
4. Expanding force shows the force acting perpendicular to the pin’s center axis.
5. Expanding force shows the calculated value when the friction coefficient is μ 0.15.

F: Clamping Force, N: Expanding Force

![Clamping Force vs. Air Pressure](image1)

![Expanding Force vs. Air Pressure](image2)
External Dimensions: SWP0501-D/C

This drawing shows the released state of SWP0501-D/C.

External Dimension List: SWP0501-D/C (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
<th>SWP0501</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>-C-080</td>
<td>-D/090</td>
<td>-D/C-100</td>
<td>-C/110</td>
<td>-D/120</td>
<td>-D/C-130</td>
</tr>
<tr>
<td>Hole Dia.</td>
<td>8 ±0.2</td>
<td>9 ±0.2</td>
<td>10 ±0.2</td>
<td>11 ±0.2</td>
<td>12 ±0.2</td>
<td>13 ±0.2</td>
</tr>
</tbody>
</table>

Notes:

1. Continuously supply air pressure to the air blow port.
2. The arrow \( \rightarrow \) in the drawing shows expanding direction of grippers.
   Since the clamping part is not a floating structure, when clamping a workpiece with two of these products, consider distance accuracy and use them with arrangement shown in the drawing on the right. With out-of specification distance accuracy, workpiece will interfere with the guide part causing damages.
External Dimensions : SWP0501-M

※ This drawing shows the released state of SWP0501-M.

External Dimension List : SWP0501-M (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Hole Diameter</th>
<th>Workpiece Thickness</th>
<th>Min.</th>
<th>Max.</th>
<th>0.45</th>
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</thead>
<tbody>
<tr>
<td>SWP0501-M</td>
<td>10 ±0.2</td>
<td>6</td>
<td>5.5</td>
<td>6</td>
<td>6.5</td>
</tr>
<tr>
<td>SWP0501-M</td>
<td>11 ±0.2</td>
<td>7</td>
<td>5.5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>SWP0501-M</td>
<td>12 ±0.2</td>
<td>8</td>
<td>5.5</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>SWP0501-M</td>
<td>13 ±0.2</td>
<td></td>
<td>5.5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

- Pin Height: 17 19 19.5 20
- Pin Outer Diam. E: 9.5 10 11 12
- Pin End Diam. F: 5.5 6 7 8
- Clamping Part At Released: 9.3 9.8 10.8 11.8
- Clamping Part At Locked: 11.8 12.8 13.8 14.8
- Locating Part At Released: 7.7 8.2 9.2 10.2
- Locating Part At Locked: 10.2 11.2 12.2 13.2
- Gripper Width: 3 3.5 3.5 3.5
- Gripper Thickness: 3 3 3 3
- Released Height K: 5.9 6.4 6.9 7.4
- Seating Inner Diam.: 10.3 11.3 12.3 13.3
- Seating Outer Diam.: 16 17 18 19
- Lock Stroke: 5.5 6 6.5 7

Notes:
※ 3. Continuously supply air pressure to the air blow port.
※ 4. The arrow in the drawing shows expanding direction of grippers.
Locating Pin Clamp

**External Dimensions : SWP1001-D/C**

*This drawing shows the released state of SWP1001-D/C.*

![Diagram of locators and clamping parts](image)

### External Dimension List : SWP1001-D/C

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SWP1001</th>
<th>SWP1001</th>
<th>SWP1001</th>
<th>SWP1001</th>
<th>SWP1001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hole Diameter</td>
<td>D/C-140</td>
<td>D/C-150</td>
<td>D/C-160</td>
<td>D/C-180</td>
<td>D/C-200</td>
</tr>
<tr>
<td>Thickness</td>
<td>14 ±0.2</td>
<td>15 ±0.2</td>
<td>16 ±0.2</td>
<td>18 ±0.2</td>
<td>20 ±0.2</td>
</tr>
<tr>
<td>Min.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Max.</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Pin Height</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pin Outer Diam. E</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Pin End Diam. F</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Clamping Part</td>
<td>12.8</td>
<td>13.8</td>
<td>14.8</td>
<td>16.8</td>
<td>18.8</td>
</tr>
<tr>
<td>At Released</td>
<td>15.8</td>
<td>16.8</td>
<td>17.8</td>
<td>19.8</td>
<td>21.8</td>
</tr>
<tr>
<td>Locating Part</td>
<td>11.2</td>
<td>12.2</td>
<td>13.2</td>
<td>15.2</td>
<td>17.2</td>
</tr>
<tr>
<td>At Released</td>
<td>14.2</td>
<td>15.2</td>
<td>16.2</td>
<td>18.2</td>
<td>20.2</td>
</tr>
<tr>
<td>Gripper Width</td>
<td>3.5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Function D</td>
<td>4</td>
<td>4</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Function C</td>
<td>4</td>
<td>4.5</td>
<td>4.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Gripper Thickness</td>
<td>8.9</td>
<td>10.4</td>
<td>10.4</td>
<td>10.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Lock Stroke</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Seating Inner Diam.</td>
<td>14.3</td>
<td>15.3</td>
<td>16.3</td>
<td>18.3</td>
<td>20.3</td>
</tr>
<tr>
<td>Seating Outer Diam.</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Seating Part G</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Notes:**

1. Continuously supply air pressure to the air blow port.
2. The arrow in the drawing shows expanding direction of grippers.
   Since the clamping part is not a floating structure, when clamping a workpiece with two of these products, use them within ±0.4mm of distance accuracy and with arrangement shown in the drawing on the right.
   With out-of-specification distance accuracy, workpiece will interfere with the guide part causing damages.

Cumulative accuracy of workpiece hole distance and clamp mounting distance must be ±0.4mm or better.
External Dimensions : SWP1001-M

This drawing shows the released state of SWP1001-M.

External Dimension List : SWP1001-M

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hole Diameter</td>
<td>14 ± 0.2</td>
<td>15 ± 0.2</td>
<td>16 ± 0.2</td>
<td>18 ± 0.2</td>
<td>20 ± 0.2</td>
</tr>
<tr>
<td>Workpiece Thickness Min.</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max.</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin Height</td>
<td>24</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Pin Outer Diam. E</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Pin End Diam. F</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Clamping Part At Released</td>
<td>12.8</td>
<td>13.8</td>
<td>14.8</td>
<td>16.8</td>
<td>18.8</td>
</tr>
<tr>
<td>At Locked Workpiece</td>
<td>15.8</td>
<td>16.8</td>
<td>17.8</td>
<td>19.8</td>
<td>21.8</td>
</tr>
<tr>
<td>Locating Part At Released</td>
<td>11.2</td>
<td>12.2</td>
<td>13.2</td>
<td>15.2</td>
<td>17.2</td>
</tr>
<tr>
<td>At Locked Workpiece</td>
<td>14.2</td>
<td>15.2</td>
<td>16.2</td>
<td>18.2</td>
<td>20.2</td>
</tr>
<tr>
<td>Gripper Width</td>
<td>4</td>
<td>4</td>
<td>4.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Gripper Thickness</td>
<td>3.5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Released Height K</td>
<td>8.9</td>
<td>10.4</td>
<td>10.4</td>
<td>10.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Seating Inner Diam.</td>
<td>14.3</td>
<td>15.3</td>
<td>16.3</td>
<td>18.3</td>
<td>20.3</td>
</tr>
<tr>
<td>Seating Outer Diam.</td>
<td>21</td>
<td>21</td>
<td>22</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Hex. W (Outer Diam. φ10)</td>
<td>33 (φ36)</td>
<td>33 (φ36)</td>
<td>33 (φ36)</td>
<td>35 (φ38)</td>
<td>35 (φ38)</td>
</tr>
<tr>
<td>Lock Stroke</td>
<td>8.5</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Notes:

3. Continuously supply air pressure to the air blow port.
4. The arrow in the drawing shows expanding direction of grippers.
Accessory : Shim Set

A set of shims for level adjustment of the seating surface.

Model No. Indication

**SWPZ 100 1 - S**

1. **Body Size**
   - 050 : For SWP050
   - 100 : For SWP100

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

**External Dimensions**

- **SWPZ0501-S**
  - Contents : 2 of 0.5mm-thick shims, 2 of 1.0mm-thick shims

- **SWPZ1001-S**
  - Contents : 2 of 0.5mm-thick shims, 2 of 1.0mm-thick shims

Note :
1. Material : SUS304
Cautions

Notes for Design

1) Check Specifications
   ● Please use each product according to the specifications.
   ● This product is an air double-acting clamp which locks and releases with air pressure. In case of Self-Locking Function Option, the clamp will be locked by spring force when release air pressure is released.

2) Reference Surface (Seating Surface) towards Z-axis
   ● This product has the seating surface for workpiece and locates in Z direction.

3) Clamping Force and Expanding Force
   ● Clamping force shows the pressing force against the seating surface, and expanding force shows the gripping force generated inside workpiece hole.
   Make sure to test clamping and adjust pressure accordingly. Insufficient clamping force and/or expanding force leads to locking malfunctions and accuracy failure.

4) Wall Thickness around Workpiece Hole
   ● Thin wall around the workpiece hole could be deformed by locking action, and clamping force and/or locating repeatability will not fill the specification.
   Please test clamping and adjust pressure accordingly before use.

5) Workpiece hole size and thickness should be within the range of the specification.

<table>
<thead>
<tr>
<th>Workpiece hole size and thick.</th>
<th>Distance Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>When workpiece hole diameter is larger than specification.</td>
<td>Expansion stroke is insufficient leading to accuracy failure and locking malfunction.</td>
</tr>
<tr>
<td>When using it with insufficient clamping force.</td>
<td>Leads to locking malfunction.</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>Workpiece is thin.</td>
<td>Leads to locking malfunction.</td>
</tr>
<tr>
<td>Workpiece is thick.</td>
<td>Leads to locking malfunction.</td>
</tr>
</tbody>
</table>

6) Installation of the Clamp
   ● The arrow in the drawing shows expanding direction of grippers. Since the clamping part of Function D (Datum) / C (Cut) does not have a floating structure, when clamping a workpiece with two of these products, consider distance accuracy and use them with arrangement shown in the drawing below.
   With out-of-specification distance accuracy, workpiece will interfere with the guide part causing damages. Please use Function M (Floating) when using more than three of these products.

   ![In case of Workpiece Hole Diam. 080: d 8](image)
   Cumulative accuracy of workpiece hole distance and clamp mounting distance must be as shown in the table below.

   ![In case of Workpiece Hole Diam. 090 ~ 200: d 9 ~ 20](image)
   Cumulative accuracy of workpiece hole distance and clamp mounting distance must be as shown in the table below.

<table>
<thead>
<tr>
<th>Hole Diam.</th>
<th>Distance Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>080 ~ 090</td>
<td>±0.05mm or better</td>
</tr>
<tr>
<td>100</td>
<td>±0.15mm or better</td>
</tr>
<tr>
<td>110 ~ 200</td>
<td>±0.40mm or better</td>
</tr>
</tbody>
</table>

7) Refer to the drawing below for air circuit.
   ● Excessive locking action speed leads to possible damage to the grippers and internal parts. Adjust the flow control valve with check valve (meter-out) to set the locking action time at 0.5 ~ 1 sec.
   When using two Locating Pin Clamps for locating a workpiece, adjust the action procedure so that Function D (Datum) is locked before Function C (Cut). Function M (Floating) should be locked after locating is completed.

8) Fall Prevention Measures
   ● When using for transfer, etc., please prepare fall prevention measures for safety in case of an accident such as detachment of a workpiece.
C Cautions

9) For Use of Auto Switch
- Magnet is built in the cylinder of this product, so the clamp action can be detected by auto switch.
- Refer to the following for the position of the built-in magnet.

Select an auto switch depending on the environment.
Please use D-P3DWA (made by SMC) for an environment which generates a magnetic field disturbance.
An auto switch may be stuck out of the clamp depending on the installation position and direction.
The auto switch detection part (magnet) is interlekaed with the piston movement, so it does not detect the gripper movement.

10) Continuously supply air pressure to the air blow port.
- When using under environment with cutting chips, air blow is recommended in order to prevent spatter.
- When supplying air pressure to the air blow port, clamping force may decrease due to internal pressure.

11) All clamps must be fully released before loading and unloading a workpiece.
- When a workpiece is loaded and unloaded during lock or release operation, it will lead to damage of clamp or fall of workpiece.

Installation Notes
1) Check the fluid to use.
- Please supply filtered clean dry air.
- Also, install the drain removing device such as aftercooler, air dryer, etc.
- Oil supply with a lubricator, etc., is unnecessary.
- Oil supply with a lubricator may cause loss of the initial lubricant.
The operation under low pressure and low speed may be unstable.
(When using secondary lubricant, please supply lubricant continuously.
Otherwise, the initial grease applied from KOSMEK will be removed from the secondary lubricant.)

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 can lead to fluid leakage and malfunction.
- There is no filter provided with this product to prevent contamination in the circuit.

3) Applying Sealing Tape
- Wrap with tape 1 to 2 times following the screwing direction.
- Pieces of the sealing tape can lead to air leakage and malfunction.
- In order to prevent contamination during the piping work, it should be carefully cleaned before working.

4) Mounting Locating Pin Clamp
- When mounting the product use four hexagonal socket bolts (with tensile strength of 12.9 or more) and tighten them with the torque shown in the table below.
- Tightening with greater torque than recommended can dent the seating surface or break the bolt.

5) Port Position of Locating Pin Clamp
- The name of each port is marked on the flange surface.
- Be careful with the mounting direction of piping.
- RELEASE : Air Release Port
- BLOW : Air Blow Port

6) It is recommended to use air piping with outer diameter \( \Phi 6 \) (inner diameter \( \Phi 4 \)) or larger for air blow.

7) Level Adjustment of the Seating Surface
- If requiring level adjustment of the seating surface, use a shim set for level adjustment (sold separately).
• Notes on Handling

1) It should be operated by qualified personnel.
- Hydraulic and/or pneumatic machines and devices 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 removing the product, 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 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 the clamp while it is working.
   - Otherwise, your hands may be injured.
   - In case of Self-Locking Function Option, the clamp will be locked when air pressure is cut off. Be careful not to pinch your hands.

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

5) Do not modify or disassemble the air cylinder.
- Built-in spring is very strong and 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 abnormality in the bolts and respective parts before restarting.

2) Regularly clean the gripper and the seating surface.
   - If it is used when the surface is contaminated with dirt, it may lead to malfunctioning, accuracy failure and air leakage.

   ![Gripper Image](image)

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

4) Friction on the gripper leads to locking malfunction and lower locating repeatability.
   - Replacement period differs depending on operating pressure, workpiece material, and shape of hole. When you find friction on gripper locating part, the gripper needs to be replaced.
   - Please contact us for replacement, or replace the parts by following the replacement procedure.
   - Regularly apply lubricant oil or grease on the gripper locating part in order to prevent friction and extend the gripper’s operational life.

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.
   - Built-in spring in the air cylinder is very strong and dangerous.
High-Power Welding Swing Clamp

Model WHG

Spatter Resistant High-Power Welding Swing Clamp

Features

High Durability

Triple protective structure prevents contaminants from entering the cylinder.

- **Coil Scrapper**
  - Removes weld spatter.

- **Soft Wiper**
  - Dust Seal

- **Special Rod Surface Finishing**
  - Protects body surface from weld spatter.

- **Swing Mechanism with High Speed and High Durability**
  - Our strong hydraulic clamp mechanism is used to pneumatic clamps.
  - Makes it faster with 3 lines of lead groove + outer race.
  - (High Rigidity makes it possible to use a long lever.)
The High-Power Welding Swing Clamp is a hybrid system using air pressure and a mechanical lock.

Action Description

**Released State**
- **Lock Air**: OFF
- **Release Air**: ON

**Locked State**
- **Lock Air**: ON
- **Release Air**: OFF

**Released State**
The piston rod ascends to release.

**Locking Operation**
(Swing Stroke + Vertical Stroke 2mm)
1. The piston rod rotates while it descends along the cam.
2. After swing completion, the piston descends vertically until the lever clamps the workpiece.

**Locked State**
(Brushing Stroke 4mm)
The piston rod descends and the boosting piston activates. Exerts strong clamping force and holding force with the wedge mechanism.

No Hydraulic Use
Welding fixture system with high-power welding clamps exerting equivalent force to hydraulic clamps needs no hydraulic pressure.

Holding Force
Minimal clamping force and powerful holding force minimize workpiece deformation. Mechanical locking allows holding force to exert 3 times the clamping force at most.

Powerful Clamping Force
Holding Force withstands Reaction Force
Reaction Force (Welding Deformation, etc.)
Exerts three times clamping force compared to the same size general air cylinder. Smaller cylinder allows for more compact fixtures.

Energy-saving clamp exerts high clamping force with low pressure.

Optimum clamping force does not distort workpiece and holding force is strong enough to withstand welding load.

High-Power Welding Clamp allows for lighter fixture, minimizing load to the positioner.

High locating accuracy at locked position allows for precise clamping. Swing Complete Position Repeatability：±0.75°
Action Confirmation

Safely used in automation systems with action confirmation of Auto Switch.

**Auto Switch** (Prepared by Customer)

Ability to Confirm Lock/Release Actions

- **Recommended Auto Switch**
  - Magnetic Field Resistant Model: D-P3DWA (made by SMC)
  - JEP Series (made by KOSMEK) \(^1\) \(^2\)

Notes:

- \(^1\) Please refer to FA • Industrial Robot Related Catalog (CATALOG No. FA0020–GB) for detailed specifications of JEP series.
- \(^2\) Please use D-P3DWA (made by SMC) for an environment which generates a magnetic field disturbance.
- JEP series cannot be used in such an environment.
- 1. When using an auto switch not made by Kosmek, check specifications of each manufacture.
Model No. Indication

WHG 160 0 - 2 A R T

1 Cylinder Force

100: Cylinder Force 1.0 kN (Air Pressure 0.5MPa)
160: Cylinder Force 1.6 kN (Air Pressure 0.5MPa)
250: Cylinder Force 2.4 kN (Air Pressure 0.5MPa)
400: Cylinder Force 3.9 kN (Air Pressure 0.5MPa)
※ Cylinder force differs from clamping force and holding force.

2 Design No.

0: Revision Number

3 Piping Method

A: Gasket Option (with Ports for Speed Controller)
G: Gasket Option (with R Thread Plug)
S: Piping Option (Rc Thread)
※ Speed control valve (B2W) is sold separately. Please refer to P.57.

4 Swing Direction when Clamping

R: Clockwise
L: Counterclockwise

5 Action Confirmation Method

Blank: None (Standard)
T: With Auto Switch Installation Slot
### Specifications

<table>
<thead>
<tr>
<th>Model No</th>
<th>WHG1000-2</th>
<th>WHG1600-2</th>
<th>WHG2500-2</th>
<th>WHG4000-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder Force (at 0.5MPa)</td>
<td>1.0</td>
<td>1.6</td>
<td>2.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Clamping Force (Calculation Formula) [1]</td>
<td>kN</td>
<td>[1]</td>
<td>[1]</td>
<td>[1]</td>
</tr>
<tr>
<td>Holding Force (Calculation Formula) [1]</td>
<td>kN</td>
<td>[1]</td>
<td>[1]</td>
<td>[1]</td>
</tr>
<tr>
<td>Full Stroke</td>
<td>mm</td>
<td>14.5</td>
<td>15</td>
<td>17.5</td>
</tr>
<tr>
<td>Swing Stroke (90°)</td>
<td>mm</td>
<td>8.5</td>
<td>9</td>
<td>11.5</td>
</tr>
<tr>
<td>Swing Angle Accuracy</td>
<td>°</td>
<td>90° ± 3°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swing Completion Position Repeatability</td>
<td>°</td>
<td>±0.75°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>MPa</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Operating Pressure [3]</td>
<td>MPa</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td></td>
<td>Dry Air</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

1. F : Clamping Force (kN), Fk: Holding Force (kN), P : Supply Air Pressure (MPa), L : Distance between the piston center and the clamping point (mm).
2. The specification value of cylinder force, clamping force, holding force and swing completion position repeatability is fulfilled only when clamping within the lock stroke range.
   (Please refer to "The specification value is not fulfilled when clamping out of the lock stroke range." on P.37.)
3. Minimum pressure to operate the clamp without load.
   The clamp may stop in the middle of swing action depending on the lever shape. (Refer to "Notes on Lever Design" on P.37.)
4. Please refer to External Dimensions for the cylinder capacity and the product weight.
**Clamping Force Curve**

![Clamping Force Diagram](image)

- **L**: Lever Length (mm)
- **F**: Clamping Force (kN)
- **P**: Air Pressure (MPa)

**Notes:**
1. **F**: Clamping Force (kN), **P**: Supply Air Pressure (MPa), **L**: Lever Length (mm).
2. Tables and graphs show the relationship between the clamping force (kN) and supply air pressure (MPa).
3. Cylinder force (when L=0) cannot be calculated from the calculation formula of clamping force.
4. Clamping force shown in the below tables and graphs is the value when clamping within the lock stroke range. (Please refer to "The specification value is not fulfilled when clamping out of the lock stroke range." on P.37.)
5. The clamping force is shown with lever in the locked position.
6. The clamping force varies as per the lever length. Please use it with supply air pressure suitable for lever length.
7. Operation in the non-useable range can damage the clamp and lead to fluid leakage.

### WHG1000

**Clamping Force Calculation Formula** \( F = (1.8842 - 0.00346 \times L) \times P \)

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range ( )</th>
<th>Max Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>0.98</td>
<td>0.87</td>
<td>0.80</td>
<td>0.77</td>
</tr>
<tr>
<td>0.4</td>
<td>0.78</td>
<td>0.70</td>
<td>0.67</td>
<td>0.64</td>
</tr>
<tr>
<td>0.3</td>
<td>0.59</td>
<td>0.52</td>
<td>0.50</td>
<td>0.48</td>
</tr>
<tr>
<td>0.2</td>
<td>0.39</td>
<td>0.35</td>
<td>0.34</td>
<td>0.32</td>
</tr>
<tr>
<td>Max. Operating Pressure (MPa)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

### WHG1600

**Clamping Force Calculation Formula** \( F = (3.0603 - 0.00505 \times L) \times P \)

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range ( )</th>
<th>Max Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>1.57</td>
<td>1.43</td>
<td>1.38</td>
<td>1.33</td>
</tr>
<tr>
<td>0.4</td>
<td>1.25</td>
<td>1.14</td>
<td>1.10</td>
<td>1.06</td>
</tr>
<tr>
<td>0.3</td>
<td>0.94</td>
<td>0.86</td>
<td>0.83</td>
<td>0.80</td>
</tr>
<tr>
<td>0.2</td>
<td>0.63</td>
<td>0.57</td>
<td>0.55</td>
<td>0.53</td>
</tr>
<tr>
<td>Max. Operating Pressure (MPa)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

### WHG2500

**Clamping Force Calculation Formula** \( F = (4.7875 - 0.00654 \times L) \times P \)

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range ( )</th>
<th>Max Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>2.44</td>
<td>2.20</td>
<td>2.13</td>
<td>2.07</td>
</tr>
<tr>
<td>0.4</td>
<td>1.96</td>
<td>1.76</td>
<td>1.71</td>
<td>1.65</td>
</tr>
<tr>
<td>0.3</td>
<td>1.47</td>
<td>1.32</td>
<td>1.28</td>
<td>1.24</td>
</tr>
<tr>
<td>0.2</td>
<td>0.98</td>
<td>0.88</td>
<td>0.85</td>
<td>0.83</td>
</tr>
<tr>
<td>Max. Operating Pressure (MPa)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>

### WHG4000

**Clamping Force Calculation Formula** \( F = (7.6871 - 0.00947 \times L) \times P \)

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range ( )</th>
<th>Max Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>3.86</td>
<td>3.56</td>
<td>3.46</td>
<td>3.37</td>
</tr>
<tr>
<td>0.4</td>
<td>3.09</td>
<td>2.85</td>
<td>2.77</td>
<td>2.70</td>
</tr>
<tr>
<td>0.3</td>
<td>2.32</td>
<td>2.14</td>
<td>2.08</td>
<td>2.02</td>
</tr>
<tr>
<td>0.2</td>
<td>1.54</td>
<td>1.42</td>
<td>1.39</td>
<td>1.35</td>
</tr>
<tr>
<td>Max. Operating Pressure (MPa)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
</tbody>
</table>
### Holding Force Curve

(How to read the Holding Force Curve: ex.1)

In case of WHG1600,
Supply Air Pressure 0.3MPa, Lever Length L = 50mm
Holding force is about 2.3kN

(How to read the Holding Force Curve: ex.2)

In case of WHG1600,
Supply Air Pressure 0.3MPa, Lever Length L = 100mm
The calculated value is the holding force at point A, but it is in the non-useable range.
The value of intersection B is the holding force that counteracts the reaction force, and it is about 1.5kN.

Notes:

※2. Holding force shows the force which can counter to reaction force in the clamping state, and differ from clamping force.

Please note that it may produce displacement depending on lever rigidity even if the reaction force is below the holding force.
(When slight displacement is also not allowed, please keep the reaction force beyond clamping force from being added.)

※3. Fk : Holding force (kN), P : Supply Air Pressure (MPa), L : Lever Length (mm)

1. When a holding force calculated value exceeds the value of a limit line, holding force becomes a value of a limit line.
2. Holding force shown in the below tables and graphs is the value when clamping within the lock stroke range.

(To specify the value is not fullfilled when clamping out of the lock stroke range.“ on P.37.)

3. Holding force indicates the value when the lever locks a workpiece in horizontal position.

4. Holding force varies depending on the lever length. Set the supply air pressure suitable to the lever length.

5. Using in the non-useable range may damage the clamp and lead to fluid leakage.

### WHG1000

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Usable Range</th>
<th>Lever Length L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>2.33</td>
<td>1.13</td>
<td>0.91</td>
</tr>
<tr>
<td>0.4</td>
<td>1.78</td>
<td>1.13</td>
<td>0.91</td>
</tr>
<tr>
<td>0.3</td>
<td>1.34</td>
<td>1.13</td>
<td>0.91</td>
</tr>
<tr>
<td>0.2</td>
<td>0.89</td>
<td>0.93</td>
<td>0.91</td>
</tr>
</tbody>
</table>

### WHG1600

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Usable Range</th>
<th>Lever Length L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>3.48</td>
<td>1.90</td>
<td>1.52</td>
</tr>
<tr>
<td>0.4</td>
<td>2.79</td>
<td>1.90</td>
<td>1.52</td>
</tr>
<tr>
<td>0.3</td>
<td>2.09</td>
<td>1.90</td>
<td>1.52</td>
</tr>
<tr>
<td>0.2</td>
<td>1.39</td>
<td>1.47</td>
<td>1.51</td>
</tr>
</tbody>
</table>

### WHG2500

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Usable Range</th>
<th>Lever Length L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>5.21</td>
<td>3.12</td>
<td>2.50</td>
</tr>
<tr>
<td>0.4</td>
<td>4.40</td>
<td>3.12</td>
<td>2.50</td>
</tr>
<tr>
<td>0.3</td>
<td>3.30</td>
<td>3.12</td>
<td>2.50</td>
</tr>
<tr>
<td>0.2</td>
<td>2.20</td>
<td>2.28</td>
<td>2.33</td>
</tr>
</tbody>
</table>

### WHG4000

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Usable Range</th>
<th>Lever Length L (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>8.72</td>
<td>6.34</td>
<td>4.22</td>
</tr>
<tr>
<td>0.4</td>
<td>6.97</td>
<td>6.34</td>
<td>4.22</td>
</tr>
<tr>
<td>0.3</td>
<td>5.23</td>
<td>5.36</td>
<td>4.22</td>
</tr>
<tr>
<td>0.2</td>
<td>3.49</td>
<td>3.58</td>
<td>3.69</td>
</tr>
</tbody>
</table>
### Allowable Swing Time Graph

#### Adjustment of Swing Time

The graph shows allowable swing time against lever inertia moment. Please make sure that an operation time is more than the operation time shown in the graph.

Excessive action speed can reduce stopping accuracy and damage internal parts.

---

**WHG1000**

![Graph WHG1000](image)

**WHG1600**

![Graph WHG1600](image)

**WHG2500**

![Graph WHG2500](image)

**WHG4000**

![Graph WHG4000](image)

---

**Notes:**

1. For any lever inertia moment, minimum 90° swing time should be 0.2 sec.
2. There may be no lever swing action with large inertia depending on supply air pressure, flow and lever mounting position.
3. For speed adjustment of clamp lever, please use meter-out flow control valve.
   - In case of meter-in control, the clamp lever may be accelerated by its own weight during swinging motion (clamp mounted horizontally) or the piston rod may be moving too fast.
   - (Please refer to P.37 for speed adjustment.)
4. Please contact us if operational conditions differ from those shown on the graphs.
(How to read the Allowable Swing Time Graph)
In case of WHG1600
Lever Inertia Moment : 0.005 kg·m²
① 90° Swing Time when Locking : About 0.76 sec or more
② 90° Swing Time when Releasing : About 0.38 sec or more
③ Total Lock Operation Time : About 1.27 sec or more
④ Total Release Operation Time : About 0.63 sec or more
1. The total operation time on the graph represents the allowable operation time when fully stroked.

How to calculate inertia moment (Estimated)

\[ I : \text{Inertia Moment (kg} \cdot \text{m}^2) \]
\[ L, L_1, L_2, K, b : \text{Length (m)} \]
\[ m, m_1, m_2, m_3 : \text{Weight (kg)} \]

① For a rectangular plate (cuboid), the rotating shaft is vertically on one side of the plate.

\[ I = m_1 \frac{4L^2 + b^2}{12} + m_2 \frac{4L_1^2 + b^2}{12} \]

② For a rectangular plate (cuboid), the rotating shaft is vertically on the gravity center of the plate.

\[ I = m \frac{L^2 + b^2}{12} \]

③ The load is applied on the lever front end.

\[ I = m_1 \frac{4L^2 + b^2}{12} + m_2 \frac{4L_1^2 + b^2}{12} + m_3 \frac{L_2^2 + b^2}{12} \]
**External Dimensions**

A: Gasket Option (With Ports for Speed Controller : R-Thread Plug Included)

- The drawing shows the released state of WHG-2AR.

![Diagram of Key External Dimensions](image)

**Machining Dimensions of Mounting Area**

![Diagram of Machining Dimensions of Mounting Area](image)

**Piping Method**

G: Gasket Option (With R Thread Plug)

- The drawing shows the released state of WHG-2GR.

![Diagram of Piping Method](image)

S: Piping Option (Rc Thread)

- The drawing shows the released state of WHG-2SR.

**Notes:**

1. The slot for lever phasing faces the port side when locked.
2. Mounting bolts are not provided. Please prepare them according to the mounting height referring to dimension 'S'.
3. Speed control valve is sold separately. Please refer to P.37.
Model No. Indication

WHG 160 0 – 2

External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>WHG1000-2</th>
<th>WHG1600-2</th>
<th>WHG2500-2</th>
<th>WHG4000-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke</td>
<td>14.5</td>
<td>15</td>
<td>17.5</td>
<td>19.5</td>
</tr>
<tr>
<td>Swing Stroke (90°)</td>
<td>8.5</td>
<td>9</td>
<td>11.5</td>
<td>13.5</td>
</tr>
</tbody>
</table>

- Vertical Stroke
- Break Stroke
- Idle Stroke
- Lock Stroke

<table>
<thead>
<tr>
<th>Recommended Stroke</th>
<th>11.5</th>
<th>12</th>
<th>14.5</th>
<th>16.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>138.5</td>
<td>148</td>
<td>174</td>
<td>192.5</td>
</tr>
<tr>
<td>B</td>
<td>60</td>
<td>66</td>
<td>76</td>
<td>87</td>
</tr>
<tr>
<td>C</td>
<td>50</td>
<td>56</td>
<td>66</td>
<td>78</td>
</tr>
<tr>
<td>D</td>
<td>46</td>
<td>54</td>
<td>64</td>
<td>77</td>
</tr>
<tr>
<td>E</td>
<td>99.5</td>
<td>106</td>
<td>124.5</td>
<td>135</td>
</tr>
<tr>
<td>F</td>
<td>74.5</td>
<td>81</td>
<td>94.5</td>
<td>105</td>
</tr>
<tr>
<td>Fu</td>
<td>64</td>
<td>67</td>
<td>79.5</td>
<td>87.5</td>
</tr>
<tr>
<td>G</td>
<td>25</td>
<td>25</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>H</td>
<td>35</td>
<td>38</td>
<td>43</td>
<td>48</td>
</tr>
<tr>
<td>J</td>
<td>25</td>
<td>28</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td>K</td>
<td>39</td>
<td>45</td>
<td>53</td>
<td>65</td>
</tr>
<tr>
<td>L</td>
<td>79</td>
<td>88</td>
<td>98</td>
<td>113</td>
</tr>
<tr>
<td>M</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Nx</td>
<td>28</td>
<td>31</td>
<td>36</td>
<td>41</td>
</tr>
<tr>
<td>Ny</td>
<td>10</td>
<td>13</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>P</td>
<td>max. φ5</td>
<td>max. φ5</td>
<td>max. φ5</td>
<td>max. φ5</td>
</tr>
<tr>
<td>Q</td>
<td>9.5</td>
<td>9.5</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>R</td>
<td>5.5</td>
<td>5.5</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>S</td>
<td>14</td>
<td>13.5</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>T</td>
<td>16.5</td>
<td>17</td>
<td>19.5</td>
<td>21.5</td>
</tr>
<tr>
<td>U</td>
<td>14</td>
<td>16</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>V</td>
<td>12</td>
<td>14</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>W</td>
<td>10.5</td>
<td>11</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

X (Nominal × Pitch) | M12 × 1.5 | M14 × 1.5 | M16 × 1.5 | M22 × 1.5 |

Y | 5 | 5 | 6 | 8 |
Z (Chamfer) | R5 | R5 | R6 | R6 |
AA | 19 | 22 | 24 | 32 |
AB | 6.5 | 7 | 8 | 10 |
AC | 21.2 | 24.5 | 26.5 | 35.5 |
BA | 13 | 15 | 18 | 22 |
BB | 16 | 18 | 22 | 28 |
CA | 5 | 6 | 8 | 10 |
CB | 4.5 | 6.5 | 5.5 | 9.5 |
CC | 4 | 4 | 4 | 6 |

EA (Nominal × Pitch) | M5 × 0.8 | M5 × 0.8 | M6 × 1 | M6 × 1 |
O-ring (Option A/G) | 1BP7 | 1BP7 | 1BP7 | 1BP7 |
Cylinder Capacity | 21.8 | 35.5 | 61.3 | 103.8 |
Lock | cm² | Release | 25.5 | 40.3 | 69.2 | 117.6 |
Weight | kg | 0.8 | 1.0 | 1.8 | 2.9 |

Notes:

#7. The specification value of cylinder force, clamping force, holding force and swing completion position repeatability is fulfilled only when clamping within the lock stroke range.

(The specification value is not fulfilled when clamping within the range of swing stroke and idle stroke.)

#8. It shows the weight of single swing clamp including taper sleeve and nut.
**External Dimensions**
A: Gasket Option (With Ports for Speed Controller: R-Thread Plug Included)
※ The drawing shows the released state of WHG-2ART.

- Release Port: Rc1/8 Thread \( \varphi^{\#3} \)
- R1/8 Thread Plug (Included) (Only for option A: Speed Control Valve Port)

- Lock Port: Rc1/8 Thread \( \varphi^{\#3} \)
- R1/8 Thread Plug (Included) (Only for option A: Speed Control Valve Port)

---

**Machining Dimensions of Mounting Area**

- Release Port \( \varphi \varphi^{\#7} \)
- Lock Port \( \varphi \varphi^{\#7} \)
- 4-EA Thread \( \varphi^{\#4} \)

Remove all burrs \( \varphi^{\#7} \)
\[ \phi D \approx 4 \]
\[ \varphi \approx 0.6 \]
\[ \approx 6 \]

Notes:
※5. EA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.
※6. The depth of the body mounting hole \( \varphi D \) should be decided according to the mounting height referring to dimension 'F'.
※7. The machining dimension is for -A/-G: Gasket Option.

---

**Piping Method**

G: Gasket Option (With R Thread Plug)
※ The drawing shows the released state of WHG-2GRT.
\[ \text{max.} 1.5 \text{mm} \]

- 2-R1/8 Thread Plug (Included)

S: Piping Option (Rc Thread)
※ The drawing shows the released state of WHG-2SRT.

Notes:
※1. The slot for lever phasing faces the port side when locked.
※2. Mounting bolts are not provided. Please prepare them according to the mounting height referring to dimension 'S'.
※3. Speed control valve is sold separately. Please refer to P.57.
※4. The direction of the Head Cover is not as indicated in the drawing. Adjust the direction as you need. Use M3 tapped holes on the bottom to fix the head cover with bracket.
### Model No. Indication

**WHG 160 0 – 2**

(A Format Example : WHG1000-2ART, WHG2500-2SLT)

1. Cylinder Force
2. Design No.
3. Piping Method
4. Swing Direction when Clamping
5. Action Confirmation (When T is chosen)

### External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>WHG1000-2ART</th>
<th>WHG1600-2SLT</th>
<th>WHG2500-2SLT</th>
<th>WHG4000-2SLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke</td>
<td>14.5</td>
<td>15</td>
<td>17.5</td>
<td>19.5</td>
</tr>
<tr>
<td>Swing Stroke (90°)</td>
<td>8.5</td>
<td>9</td>
<td>11.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Vertical Stroke</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Break Idle Stroke)</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(down) Lock Stroke</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Recommended Stroke**

<table>
<thead>
<tr>
<th></th>
<th>11.5</th>
<th>12</th>
<th>14.5</th>
<th>16.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>138.5</td>
<td>148</td>
<td>174</td>
<td>192.5</td>
</tr>
<tr>
<td>B</td>
<td>60</td>
<td>66</td>
<td>76</td>
<td>87</td>
</tr>
<tr>
<td>C</td>
<td>50</td>
<td>56</td>
<td>66</td>
<td>78</td>
</tr>
<tr>
<td>D</td>
<td>46</td>
<td>54</td>
<td>64</td>
<td>77</td>
</tr>
<tr>
<td>E</td>
<td>99.5</td>
<td>106</td>
<td>124.5</td>
<td>135</td>
</tr>
<tr>
<td>F</td>
<td>74.5</td>
<td>81</td>
<td>94.5</td>
<td>105</td>
</tr>
<tr>
<td>Fu</td>
<td>64</td>
<td>67</td>
<td>79.5</td>
<td>87.5</td>
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<td>H</td>
<td>35</td>
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<td>J</td>
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<td>L</td>
<td>79</td>
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<td>M</td>
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<td>P</td>
<td>max. φ 5</td>
<td>max. φ 5</td>
<td>max. φ 5</td>
<td>max. φ 5</td>
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<td>U</td>
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<tr>
<td>W</td>
<td>10.5</td>
<td>11</td>
<td>13</td>
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**X (Nominal × Pitch)**

<table>
<thead>
<tr>
<th></th>
<th>M12×1.5</th>
<th>M14×1.5</th>
<th>M16×1.5</th>
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<tbody>
<tr>
<td>Y</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>8</td>
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<tr>
<td>Z (Chamfer)</td>
<td>R5</td>
<td>R5</td>
<td>R6</td>
<td>R6</td>
</tr>
<tr>
<td>AA</td>
<td>19</td>
<td>22</td>
<td>24</td>
<td>32</td>
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<tr>
<td>AB</td>
<td>6.5</td>
<td>7</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>AC</td>
<td>21.2</td>
<td>24.5</td>
<td>26.5</td>
<td>35.5</td>
</tr>
<tr>
<td>BA</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>BB</td>
<td>16</td>
<td>18</td>
<td>22</td>
<td>28</td>
</tr>
<tr>
<td>CA</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>CB</td>
<td>4.5</td>
<td>6.5</td>
<td>5.5</td>
<td>9.5</td>
</tr>
<tr>
<td>CC</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>6</td>
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**EA (Nominal × Pitch)**

<table>
<thead>
<tr>
<th></th>
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<th>M6×1</th>
<th>M6×1</th>
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<tr>
<td>EA</td>
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<td>UC</td>
<td>31</td>
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<td>7</td>
<td>7</td>
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<td>4.3</td>
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<tr>
<td>UG</td>
<td>12.1</td>
<td>12.1</td>
<td>13.6</td>
<td>13.6</td>
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<td>UH</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
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<td>UJ</td>
<td>20</td>
<td>20</td>
<td>22</td>
<td>22</td>
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O-ring (Option A/G)

<table>
<thead>
<tr>
<th></th>
<th>1BP7</th>
<th>1BP7</th>
<th>1BP7</th>
<th>1BP7</th>
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</thead>
<tbody>
<tr>
<td>Cylinder Capacity</td>
<td>21.8</td>
<td>35.5</td>
<td>61.3</td>
<td>103.8</td>
</tr>
<tr>
<td>cm³/Release</td>
<td>25.5</td>
<td>40.3</td>
<td>69.2</td>
<td>117.6</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.9</td>
<td>1.1</td>
<td>1.9</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Notes:

*8. The specification value of cylinder force, clamping force, holding force and swing completion position repeatability is fulfilled only when clamping within the lock stroke range. (The specification value is not fulfilled when clamping within the range of swing stroke and idle stroke.)

*9. It shows the weight of single swing clamp including taper sleeve and nut.
Taper Lock Lever Design Dimensions

*Reference for designing taper lock swing lever.

### Corresponding Model No.

<table>
<thead>
<tr>
<th>WHG</th>
<th>0 - 2</th>
<th>A</th>
<th>G</th>
<th>S</th>
<th>L</th>
<th>Blank</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cylinder Force</td>
<td></td>
</tr>
</tbody>
</table>

### Pin Hole for Lever Phasing

#### Corresponding Model No.

<table>
<thead>
<tr>
<th>Corresponding Model No.</th>
<th>WHG0000-2</th>
<th>WHG0100-2</th>
<th>WHG2500-2</th>
<th>WHG4000-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>18</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>B</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>8.5</td>
<td>10.5</td>
<td>10.5</td>
<td>14.5</td>
</tr>
<tr>
<td>E</td>
<td>16 + 0.027</td>
<td>18 + 0.027</td>
<td>22 + 0.033</td>
<td>28 + 0.033</td>
</tr>
<tr>
<td>F</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>23.5</td>
</tr>
<tr>
<td>G</td>
<td>7.1</td>
<td>8.1</td>
<td>10.1</td>
<td>13.1</td>
</tr>
<tr>
<td>H</td>
<td>4 + 0.018</td>
<td>4 + 0.018</td>
<td>4 + 0.018</td>
<td>6 + 0.018</td>
</tr>
</tbody>
</table>

### Phasing Pin (Reference)\(^2\)

<table>
<thead>
<tr>
<th></th>
<th>φ 4(h8)×8</th>
<th>φ 4(h8)×10</th>
<th>φ 4(h8)×10</th>
<th>φ 6(h8)×14</th>
</tr>
</thead>
</table>

### Notes:

1. Swing lever should be designed with its length according to performance curve.
2. If the swing lever is not in accordance with the dimensions shown above, performance may be degraded and damage can occur.

*1. The pin hole (φ H) for determining the lever phase should be added, if necessary.
*2. Phasing pin is not included. Prepare it separately.
**Accessories : Material Swing Lever for Taper Lock Option**

**Table**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>WHZ1000-T</th>
<th>WHZ1600-T</th>
<th>WHZ2500-T</th>
<th>WHZ4000-T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corresponding Model No.</td>
<td>WHG1000-2</td>
<td>WHG1600-2</td>
<td>WHG2500-2</td>
<td>WHG4000-2</td>
</tr>
<tr>
<td>A</td>
<td>90</td>
<td>125</td>
<td>150</td>
<td>170</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>28</td>
<td>34</td>
<td>45</td>
</tr>
<tr>
<td>C</td>
<td>16</td>
<td>18</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>D</td>
<td>12.5</td>
<td>14</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>E</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>F</td>
<td>16 $\pm 0.0270$</td>
<td>18 $\pm 0.0270$</td>
<td>22 $\pm 0.0330$</td>
<td>28 $\pm 0.0330$</td>
</tr>
<tr>
<td>G</td>
<td>13</td>
<td>15</td>
<td>17</td>
<td>23.5</td>
</tr>
<tr>
<td>H</td>
<td>12.5</td>
<td>14</td>
<td>17</td>
<td>22.5</td>
</tr>
</tbody>
</table>

**Notes :**
1. Material : SS0C
2. If necessary, the front end should be additionally machined.
3. When determining the phase, refer to taper lock lever design dimensions for each model for the additional machining.
Cautions

Notes for Design

1) Check Specifications
   Please use each product according to the specifications.

2) Notes for Circuit Design
   Ensure there is no possibility of supplying air pressure to the lock port and the release port simultaneously. Improper circuit design may lead to malfunctions and damages.

3) Swing lever should be designed so that the inertia moment is small.
   Large inertia moment will degrade the lever’s stopping accuracy and cause undue wear to the clamp.
   Additionally, the clamp may not function, depending on supplied air pressure and lever mounting position.
   Please set the operating time after the inertia moment is calculated.
   Please make sure that the clamps work within allowable operating time referring to the allowable operating time graph.
   If supplying a large amount of air right after installation, action time will be extremely fast leading to severe damage on a clamp.
   Install the speed controller (meter-in) near the air source and gradually supply air pressure.

4) When clamping on a sloped surface of the workpiece
   Make sure the clamping surface and the mounting surface of the clamp are parallel.

5) Swing Speed Adjustment
   If the clamp operates too fast the parts will wear out leading to premature damage and ultimately complete equipment failure.
   Adjust the speed following “Allowable Swing Time Graph”.
   Install a speed control valve (meter-out) and gradually control the flow rate from the low-speed side (small flow) to the designated speed. Controlling from the high-speed side (large flow) causes excessive surge pressure or overload to the clamp leading to damage of a machine or device.

   When operating multiple clamps simultaneously, please install the speed controller (meter-out) to each clamp.

6) Notes for Lever Design
   Please design the lever as light as possible, and it should be no larger than necessary.
   The clamp may not function depending on supplying air pressure, mounting position and shape of the lever. If using a large lever with the mounting position shown below, it may stop in the middle of swing action. Please use a lever with (Lever Weight W) × (Gravity Center S) lighter than shown in the following table.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Lever Length W × Center of Gravity S</th>
<th>[N·m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHG1000</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>WHG1600</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>WHG2500</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>WHG4000</td>
<td>0.90</td>
<td></td>
</tr>
</tbody>
</table>

7) The specification value is not fulfilled when clamping out of the lock stroke range.
   The mechanical lock function will not work when clamping within the range of swing stroke and idle stroke, and the specification value of cylinder force, clamping force, holding force and swing completion position repeatability will not be fulfilled.
   The actual stroke of the piston that descends from the release-end to lock-end should be designed to have the same value as the recommended stroke listed in the external dimensions.

8) Adjust the direction of the head cover as you need.
   Use M3 tapped holes on the bottom to fix the head cover with bracket.
Installation Notes

1) Check the fluid to use.
   - Please supply filtered clean dry air. (Install a drain removing device.)
   - Oil supply with a lubricator etc. is unnecessary. Oil supply with a lubricator may cause loss of the initial lubricant. The operation under low pressure and low speed may be unstable. (When using secondary lubricant, please supply lubricant continuously. Otherwise, the initial grease applied from KOSMEK will be removed from the secondary lubricant.)

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 screw direction.
   - Wrapping in the wrong direction will cause leakage and malfunction.
   - Pieces of the sealing tape can lead to air leakage and malfunction.
   - When piping, be careful that contaminant such as sealing tape does not enter in products.

4) Installation of the Product
   - When mounting the product use four hexagonal socket bolts (with tensile strength of 12.9) and tighten them with the torque shown in the table below. Tightening with greater torque than recommended can depress the seating surface or break the bolt.

<table>
<thead>
<tr>
<th>Model</th>
<th>Thread Size</th>
<th>Tightening Torque (N-m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHG1000</td>
<td>M5 x 0.8</td>
<td>6.3</td>
</tr>
<tr>
<td>WHG1600</td>
<td>M5 x 0.8</td>
<td>6.3</td>
</tr>
<tr>
<td>WHG2500</td>
<td>M6 x 1</td>
<td>10</td>
</tr>
<tr>
<td>WHG4000</td>
<td>M6 x 1</td>
<td>10</td>
</tr>
</tbody>
</table>

5) Installation of the Flow Control Valve
   - Tightening torque for installing flow control valve is 5 to 7 N • m.

6) Installation / Removal of the Swing Lever
   - Oil or debris on the mating surfaces of the lever, taper sleeve or piston rod can cause the lever to loosen.
   - Please clean them thoroughly before installation.
   - Tightening torque for the swing lever is shown below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Thread Size</th>
<th>Tightening Torque (N-m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHG1000</td>
<td>M12 x 1.5</td>
<td>17 – 20</td>
</tr>
<tr>
<td>WHG1600</td>
<td>M14 x 1.5</td>
<td>21 – 25</td>
</tr>
<tr>
<td>WHG2500</td>
<td>M16 x 1.5</td>
<td>33 – 40</td>
</tr>
<tr>
<td>WHG4000</td>
<td>M22 x 1.5</td>
<td>84 – 100</td>
</tr>
</tbody>
</table>

- If the piston rod is subjected to excessive torque or shock, the rod or the internal mechanism may be damaged. Observe the following points to prevent such shock.

Installation Procedure

1) With a clamp positioned to a jig, determine the lever position, and tighten the nut for fixing the lever (temporal tightening).

2) Remove the clamp from the jig, fix the lever with a machine vise etc., and tighten the nut.

3) If tightening the nut with the clamp positioned to the jig, use a wrench to the hexagon part of piston rod, or fix the lever with a spanner. It is best to bring the lever to the middle of the swing stroke before tightening the nut.

Removal Procedure

1) While the clamp is on the jig or vise, use a hex wrench to bring the lever to the middle of the swing stroke and then loosen the nut.

2) Loosen the nut after securing the lever two or three turns then remove the lever with a puller without any rotational torque applied on the piston rod.

7) Swing Speed Adjustment
   - Adjust the speed following "Allowable Swing Time Graph". If the clamp operates too fast the parts will wear out leading to premature damage and ultimately complete equipment failure.
   - Turn the speed control valve gradually from the low-speed side (small flow) to the high-speed side (large flow) to adjust the speed.

8) Checking Looseness and Retightening
   - At the beginning of the machine installation, the bolt and nut may be tightened lightly. Check the looseness and re-tighten as required.

* Please refer to P.61 for general cautions.
High-Power Welding Link Clamp
Model WCG

Spatter Resistant High-Power Welding Link Clamp

Features

High Durability

Triple protective structure prevents contaminants from entering the cylinder.

Special Rod Surface Finishing

Protects body surface from weld spatter.

Coil Scraper

Removes weld spatter.

Soft Wiper

Dust Seal

Dual Link Plate Design
(Model WCE)

Link Mechanism with Single Link Plate

Compared to dual link plate design (model WCE), the link mechanism of Welding Clamp is designed to be spatter resistant with single link plate.

Case Study

The rod operates without failure even after exposed to spatter for a long time.
The High-Power Welding Link Clamp is a hybrid system using air pressure and a mechanical lock.

**Action Description**

**Released State**
- Lock Air: OFF
- Release Air: ON

The piston rod descends to release.

**Locked State**
- Lock Air: ON
- Release Air: OFF

The piston rod ascends and the boosting piston activates. It exerts strong clamping force and holding force with the wedge mechanism.

**Self-Locking State**
- Lock Air: OFF
- Release Air: OFF

Self-Locking State
(Holding with Spring Force + Mechanical Lock)

If lock air pressure drops to zero at locked state, lock pressure is maintained with the internal spring and mechanical lock.
No Hydraulic Use
Welding fixture system with high-power welding clamps exerting equivalent force to hydraulic clamps needs no hydraulic pressure.

Holding Force
Minimal clamping force and powerful holding force minimize workpiece deformation. Mechanical locking allows holding force to exert 3 times the clamping force at most.

Smaller Footprint
Exerts three times clamping force compared to the same size general air cylinder. Smaller cylinder allows for more compact fixtures.

Energy Saving
Energy-saving clamp exerts high clamping force with low pressure.

High Quality
Optimum clamping force does not distort workpiece and holding force is strong enough to withstand welding load.

Light Weight
High-Power Welding Clamp allows for lighter fixture, minimizing load to the positioner.
Safely used in automation systems with action confirmation of Auto Switch.

**Auto Switch** (Prepared by Customer)

Ability to Confirm Lock/Release Actions

**Recommended Auto Switch**

- Magnetic Field Resistant Model: D-P3DWA (made by SMC)
- JEP Series (made by KOSMEK) ¹ ²

Notes:

1. Please refer to FA • Industrial Robot Related Catalog (CATALOG No. FA002000–000–GB) for detailed specifications of JEP series.
2. Please use D-P3DWA (made by SMC) for an environment which generates a magnetic field disturbance.

JEP series cannot be used in such an environment.

1. When using an auto switch not made by Kosmek, check specifications of each manufacture.
Model No. Indication

**WCG 160 0 - 2 A R T**

1 Cylinder Force

- **100**: Cylinder Force 0.9 kN (Air Pressure 0.5 MPa)
- **160**: Cylinder Force 1.6 kN (Air Pressure 0.5 MPa)
- **250**: Cylinder Force 2.5 kN (Air Pressure 0.5 MPa)
- **400**: Cylinder Force 3.9 kN (Air Pressure 0.5 MPa)

※ Cylinder force differs from clamping force and holding force.

2 Design No.

- **0**: Revision Number

3 Piping Method

- **A**: Gasket Option (with Ports for Speed Controller)
- **G**: Gasket Option (with R Thread Plug)
- **S**: Piping Option (Rc Thread)

※ Speed control valve (BZW) is sold separately. Please refer to P.57.

4 Lever Direction

- **L**: Left
- **C**: Center
- **R**: Right

※ The images show the lever direction when the piping port is placed in front of you.

5 Action Confirmation Method

- **Blank**: None (Standard)
- **T**: With Auto Switch Installation Slot

![Diagram of lever direction and piping options]
### Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>WCG1000-2</th>
<th>WCG1600-2</th>
<th>WCG2500-2</th>
<th>WCG4000-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder Force (at 0.5MPa)</td>
<td>kN</td>
<td>0.9</td>
<td>1.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Clamping Force</td>
<td></td>
<td>Refer to &quot;Clamping Force Curve&quot; on P.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holding Force</td>
<td>Refer to &quot;Holding Force Curve&quot; on P.46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clamping Force and Holding Force at 0MPa</td>
<td>Refer to &quot;Clamping Force and Holding Force Curve at 0 MPa&quot; on P.47</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Full Stroke</td>
<td>mm</td>
<td>22</td>
<td>23.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Idle Stroke</td>
<td>mm</td>
<td>18</td>
<td>19.5</td>
<td>23.5</td>
</tr>
<tr>
<td>Lock Stroke</td>
<td>mm</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Cylinder Capacity</td>
<td>cm³</td>
<td>22.4</td>
<td>35.8</td>
<td>56.1</td>
</tr>
<tr>
<td>Lock Release</td>
<td>18.9</td>
<td>32.1</td>
<td>50.6</td>
<td>85.2</td>
</tr>
<tr>
<td>Spring Force</td>
<td>N</td>
<td>60.8 ~ 78.4</td>
<td>83.5 ~ 140.9</td>
<td>146.5 ~ 218.8</td>
</tr>
<tr>
<td>Max. Operating Pressure</td>
<td>MPa</td>
<td></td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>Min. Operating Pressure</td>
<td>MPa</td>
<td></td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td></td>
<td></td>
<td>0.75</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td></td>
<td></td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td></td>
<td></td>
<td></td>
<td>Dry Air</td>
</tr>
</tbody>
</table>

Notes:

1. The specification value of cylinder force, clamping force and holding force is fulfilled only when clamping within the lock stroke range.
   (The specification value is not fulfilled when clamping within the range of idle stroke.)
2. Minimum pressure to operate the clamp without load.
   1. Please refer to External Dimensions for the cylinder capacity and the product weight.
Clamping Force Curve

\[ F = \frac{28.6 \times P + 2.2}{L - 19.5} \]

### WCG1000

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range</th>
<th>Min. Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 0.5               | 0.94               | 0.85                | 0.65              | 0.54                 | 0.41                | 39
| 0.4               | 0.78               | 0.88                | 0.70              | 0.54                 | 0.45                | 33
| 0.3               | 0.62               | 1.03                | 0.70              | 0.55                 | 0.42                | 29
| 0.2               | 0.45               | 0.76                | 0.51              | 0.41                 | 0.31                | 25
| Max. Operating Pressure (MPa) | 0.33 | 0.43 | 0.50 | 0.50 | 0.50 | 0.50 |

### WCG1600

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range</th>
<th>Min. Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 0.5               | 1.59               | 1.43                | 1.04              | 0.77                 | 0.61                | 42
| 0.4               | 1.32               | 1.19                | 0.86              | 0.64                 | 0.51                | 36
| 0.3               | 1.05               | 1.65                | 1.41              | 0.94                 | 0.68                | 31
| 0.2               | 0.77               | 1.22                | 1.04              | 0.70                 | 0.50                | 28
| Max. Operating Pressure (MPa) | 0.35 | 0.39 | 0.50 | 0.50 | 0.50 | 0.50 |

### WCG2500

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range</th>
<th>Min. Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 0.5               | 2.46               | 2.21                | 1.58              | 1.23                 | 1.00                | 50
| 0.4               | 2.04               | 2.29                | 1.83              | 1.31                 | 1.02                | 42
| 0.3               | 1.62               | 2.81                | 1.82              | 1.46                 | 0.81                | 37
| 0.2               | 1.20               | 2.08                | 1.35              | 1.08                 | 0.77                | 33
| Max. Operating Pressure (MPa) | 0.32 | 0.43 | 0.50 | 0.50 | 0.50 | 0.50 |

### WCG4000

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Cylinder Force (kN)</th>
<th>Clamping Force (kN)</th>
<th>Non-Useable Range</th>
<th>Min. Lever Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 0.5               | 3.92               | 3.52                | 2.64              | 2.11                 | 1.76                | 60
| 0.4               | 3.25               | 2.93                | 2.19              | 1.76                 | 1.46                | 51
| 0.3               | 2.59               | 4.66                | 3.49              | 2.33                 | 1.75                | 44
| 0.2               | 1.92               | 3.46                | 2.60              | 1.73                 | 1.30                | 39
| Max. Operating Pressure (MPa) | 0.31 | 0.39 | 0.50 | 0.50 | 0.50 | 0.50 |

(How to read the Clamping Force Curve)

In case of WCG2500
Supply Air Pressure 0.3MPa
Lever Length L=50mm
Clamping force is about 1.46kN.
### Holding Force Curve

L : Lever Length (mm)

![Diagram showing Holding Force Curve]

**Notes:**

1. Holding force shows the force which can counter to reaction force in the clamping state, and differ from clamping force.
2. It is recommended to use the force shown in the graph to prevent displacement or distortion of the workpiece.
3. When the calculated holding force (Fk) is equal to or greater than the upper limit of the non-useable range, a safety factor is needed for the clamping force.
4. Operation in the non-useable range can damage the clamp and lead to fluid leakage.

#### WCG1000

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Useable Range (kN)</th>
<th>Non-Useable Range Limit Line Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>1.67</td>
<td>1.67</td>
<td>1.67</td>
</tr>
<tr>
<td>0.4</td>
<td>1.84</td>
<td>1.84</td>
<td>1.84</td>
</tr>
<tr>
<td>0.3</td>
<td>2.01</td>
<td>1.90</td>
<td>2.01</td>
</tr>
<tr>
<td>0.2</td>
<td>2.18</td>
<td>1.51</td>
<td>2.18</td>
</tr>
</tbody>
</table>

**Holding Force Formula**

\[
F_k = 97.6 \times P + 10.0 \quad \frac{L}{-19.5}
\]

#### WCG1600

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Useable Range (kN)</th>
<th>Non-Useable Range Limit Line Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>2.58</td>
<td>2.58</td>
<td>2.58</td>
</tr>
<tr>
<td>0.4</td>
<td>2.86</td>
<td>2.86</td>
<td>2.86</td>
</tr>
<tr>
<td>0.3</td>
<td>3.14</td>
<td>3.14</td>
<td>3.14</td>
</tr>
<tr>
<td>0.2</td>
<td>3.42</td>
<td>3.42</td>
<td>3.42</td>
</tr>
</tbody>
</table>

**Holding Force Formula**

\[
F_k = 175.2 \times P + 16.8 \quad \frac{L}{-21}
\]

#### WCG2500

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Useable Range (kN)</th>
<th>Non-Useable Range Limit Line Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>3.81</td>
<td>3.81</td>
<td>3.81</td>
</tr>
<tr>
<td>0.4</td>
<td>4.24</td>
<td>4.24</td>
<td>4.24</td>
</tr>
<tr>
<td>0.3</td>
<td>4.67</td>
<td>4.67</td>
<td>4.67</td>
</tr>
<tr>
<td>0.2</td>
<td>5.10</td>
<td>3.91</td>
<td>5.10</td>
</tr>
</tbody>
</table>

**Holding Force Formula**

\[
F_k = 325.6 \times P + 32.6 \quad \frac{L}{-25}
\]

#### WCG4000

<table>
<thead>
<tr>
<th>Air Pressure (MPa)</th>
<th>Holding Force (kN)</th>
<th>Non-Useable Range (kN)</th>
<th>Non-Useable Range Limit Line Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>5.48</td>
<td>5.48</td>
<td>5.48</td>
</tr>
<tr>
<td>0.4</td>
<td>6.16</td>
<td>6.16</td>
<td>6.16</td>
</tr>
<tr>
<td>0.3</td>
<td>6.85</td>
<td>6.85</td>
<td>6.85</td>
</tr>
<tr>
<td>0.2</td>
<td>7.53</td>
<td>7.53</td>
<td>7.53</td>
</tr>
</tbody>
</table>

**Holding Force Formula**

\[
F_k = 673.9 \times P + 68 \quad \frac{L}{-30}
\]
### Clamping Force and Holding Force Curve at 0MPa

![Diagram showing clamping and holding force curves]

**Notes:**
- **1.** Holding force shows the force which can counter to reaction force in the clamping state, and differ from clamping force. Please note that it may produce displacement depending on lever rigidity even if the reaction force is below the holding force. (When slight displacement is also not allowed, please keep the reaction force beyond clamping force from being added.)
- **2.** \( F \) : Clamping force (kN), \( F_k \) : Holding force (kN), \( L \) : Lever length (mm).
  1. The table and the graph show the relation between lever length (mm) and the clamping force (kN) and holding force (kN) at the time of 0MPa.
  2. The clamping force and holding force at the time of zero pneumatic pressure show capability when a lever locks a workpiece in horizontal position.
  3. Clamping force and holding force vary depending on the lever length.

#### WCG1000

<table>
<thead>
<tr>
<th>Lever Length (mm)</th>
<th>Clamping Force Reference Value at 0MPa (kN)</th>
<th>Holding Force Reference Value at 0MPa (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>0.21</td>
<td>0.95</td>
</tr>
<tr>
<td>35</td>
<td>0.14</td>
<td>0.65</td>
</tr>
<tr>
<td>39</td>
<td>0.11</td>
<td>0.51</td>
</tr>
<tr>
<td>45</td>
<td>0.09</td>
<td>0.39</td>
</tr>
<tr>
<td>50</td>
<td>0.07</td>
<td>0.33</td>
</tr>
<tr>
<td>60</td>
<td>0.05</td>
<td>0.25</td>
</tr>
</tbody>
</table>

\[ F = \frac{2.2}{L - 19.5} \]

\[ F_k = \frac{10.0}{L - 19.5} \]

#### WCG1600

<table>
<thead>
<tr>
<th>Lever Length (mm)</th>
<th>Clamping Force Reference Value at 0MPa (kN)</th>
<th>Holding Force Reference Value at 0MPa (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>0.36</td>
<td>1.40</td>
</tr>
<tr>
<td>35</td>
<td>0.31</td>
<td>1.20</td>
</tr>
<tr>
<td>42</td>
<td>0.20</td>
<td>0.80</td>
</tr>
<tr>
<td>50</td>
<td>0.15</td>
<td>0.58</td>
</tr>
<tr>
<td>60</td>
<td>0.11</td>
<td>0.43</td>
</tr>
<tr>
<td>70</td>
<td>0.09</td>
<td>0.34</td>
</tr>
</tbody>
</table>

\[ F = \frac{4.3}{L - 21} \]

\[ F_k = \frac{16.8}{L - 21} \]

#### WCG2500

<table>
<thead>
<tr>
<th>Lever Length (mm)</th>
<th>Clamping Force Reference Value at 0MPa (kN)</th>
<th>Holding Force Reference Value at 0MPa (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>0.64</td>
<td>2.51</td>
</tr>
<tr>
<td>45</td>
<td>0.42</td>
<td>1.63</td>
</tr>
<tr>
<td>50</td>
<td>0.33</td>
<td>1.30</td>
</tr>
<tr>
<td>60</td>
<td>0.24</td>
<td>0.93</td>
</tr>
<tr>
<td>70</td>
<td>0.18</td>
<td>0.72</td>
</tr>
<tr>
<td>80</td>
<td>0.15</td>
<td>0.59</td>
</tr>
</tbody>
</table>

\[ F = \frac{8.3}{L - 25} \]

\[ F_k = \frac{32.6}{L - 25} \]

#### WCG4000

<table>
<thead>
<tr>
<th>Lever Length (mm)</th>
<th>Clamping Force Reference Value at 0MPa (kN)</th>
<th>Holding Force Reference Value at 0MPa (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>1.07</td>
<td>4.53</td>
</tr>
<tr>
<td>50</td>
<td>0.80</td>
<td>3.40</td>
</tr>
<tr>
<td>60</td>
<td>0.54</td>
<td>2.27</td>
</tr>
<tr>
<td>70</td>
<td>0.40</td>
<td>1.70</td>
</tr>
<tr>
<td>80</td>
<td>0.32</td>
<td>1.36</td>
</tr>
<tr>
<td>90</td>
<td>0.27</td>
<td>1.13</td>
</tr>
</tbody>
</table>

\[ F = \frac{16.1}{L - 30} \]

\[ F_k = \frac{68.0}{L - 30} \]
External Dimensions
A : Gasket Option (With Ports for Speed Controller : R-Thread Plug Included)
※ The drawing shows the locked state of WCG-2AC.

Machinising Dimensions of Mounting Area

Piping Method
G : Gasket Option (with R Thread Plug)
※ The drawing shows the locked state of WCG-2GC.

Notes :
※ 1. Mounting bolts are not provided. Please prepare them according to the mounting height referring to dimension ‘S’.
※ 2. Speed control valve is sold separately. Please refer to P.57.
1. Please use the attached pin (equivalent to φ AD6, φ AE6, HRC60) as the mounting pin for lever.
Model No. Indication

WCG 160 0 - 2

External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>WCG1000-2AR</th>
<th>WCG1600-2AR</th>
<th>WCG2500-2SL</th>
<th>WCG4000-2AR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke</td>
<td>22</td>
<td>23.5</td>
<td>27.5</td>
<td>33</td>
</tr>
<tr>
<td>Idle Stroke</td>
<td>18</td>
<td>19.5</td>
<td>23.5</td>
<td>29</td>
</tr>
<tr>
<td>Lock Stroke</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Recommended Stroke</td>
<td>20</td>
<td>21.5</td>
<td>25.5</td>
<td>31</td>
</tr>
<tr>
<td>A</td>
<td>131.5</td>
<td>143.5</td>
<td>169</td>
<td>197.5</td>
</tr>
<tr>
<td>B</td>
<td>60</td>
<td>66</td>
<td>76</td>
<td>87</td>
</tr>
<tr>
<td>C</td>
<td>50</td>
<td>56</td>
<td>66</td>
<td>78</td>
</tr>
<tr>
<td>D</td>
<td>46</td>
<td>54</td>
<td>64</td>
<td>77</td>
</tr>
<tr>
<td>E</td>
<td>93</td>
<td>99.5</td>
<td>117</td>
<td>133</td>
</tr>
<tr>
<td>F</td>
<td>68</td>
<td>74.5</td>
<td>87</td>
<td>103</td>
</tr>
<tr>
<td>G</td>
<td>25</td>
<td>25</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>H</td>
<td>35</td>
<td>38</td>
<td>43</td>
<td>48</td>
</tr>
<tr>
<td>J</td>
<td>25</td>
<td>28</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td>K</td>
<td>39</td>
<td>45</td>
<td>53</td>
<td>65</td>
</tr>
<tr>
<td>L</td>
<td>79</td>
<td>88</td>
<td>98</td>
<td>113</td>
</tr>
<tr>
<td>M</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Nx</td>
<td>28</td>
<td>31</td>
<td>36</td>
<td>41</td>
</tr>
<tr>
<td>Ny</td>
<td>10</td>
<td>13</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>P</td>
<td>max. φ5</td>
<td>max. φ5</td>
<td>max. φ5</td>
<td>max. φ5</td>
</tr>
<tr>
<td>Q</td>
<td>9.5</td>
<td>9.5</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>R</td>
<td>5.5</td>
<td>5.5</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>S</td>
<td>14</td>
<td>13.5</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>T</td>
<td>33</td>
<td>36</td>
<td>40</td>
<td>50.5</td>
</tr>
<tr>
<td>U</td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>V</td>
<td>27</td>
<td>30</td>
<td>34</td>
<td>42.5</td>
</tr>
<tr>
<td>W</td>
<td>36</td>
<td>37.5</td>
<td>43.5</td>
<td>49</td>
</tr>
<tr>
<td>X</td>
<td>18.5</td>
<td>21</td>
<td>26.5</td>
<td>31</td>
</tr>
<tr>
<td>Y</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>Z</td>
<td>15</td>
<td>16</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>AA</td>
<td>19.5</td>
<td>21</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>AB</td>
<td>66.4</td>
<td>70.5</td>
<td>84</td>
<td>93.4</td>
</tr>
<tr>
<td>AC</td>
<td>42.3</td>
<td>46</td>
<td>55.8</td>
<td>64.4</td>
</tr>
<tr>
<td>AD</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>AE</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>AG</td>
<td>30°</td>
<td>29.7°</td>
<td>29.8°</td>
<td>29.8°</td>
</tr>
<tr>
<td>CA (Nominal × Pitch)</td>
<td>5×0.8</td>
<td>M5×0.8</td>
<td>M6×1</td>
<td>M6×1</td>
</tr>
<tr>
<td>ZA (Chamfer)</td>
<td>R5</td>
<td>R5</td>
<td>R6</td>
<td>R6</td>
</tr>
<tr>
<td>O-ring (Option A/G)</td>
<td>1BP7</td>
<td>1BP7</td>
<td>1BP7</td>
<td>1BP7</td>
</tr>
<tr>
<td>Weight*7</td>
<td>0.6</td>
<td>0.9</td>
<td>1.5</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Notes:

*6 The specification value of cylinder force, clamping force and holding force is fulfilled only when clamping within the lock stroke range.
(The specification value is not fulfilled when clamping within the range of idle stroke.)

*7 It shows the weight of single clamp without the link lever.
**External Dimensions**

A : Gasket Option (With Ports for Speed Controller : R-Thread Plug Included)

※ The drawing shows the locked state of WCG-2ACT.

**Machining Dimensions of Mounting Area**

Release Port φ P ※4

Lock Port φ P ※5

4-CA Thread ※4

Remove all burns ※6

Notes:

※4. CA tapping depth of the mounting bolt should be decided according to the mounting height referring to dimension 'S'.

※5. The depth of the body mounting hole φ D should be decided according to the mounting height referring to dimension 'F'.

※6. The machining dimension is for -A/-G : Gasket Option.

**Piping Method**

G : Gasket Option (with R Thread Plug)

※ The drawing shows the locked state of WCG-2GCT.

**Notes:**

※1. Mounting bolts are not provided. Please prepare them according to the mounting height referring to dimension 'S'.

※2. Speed control valve is sold separately. Please refer to P.57.

※3. The direction of the Head Cover is not as indicated in the drawing. Adjust the direction as you need.

Use M3 tapped holes on the bottom to fix the head cover with bracket.

1. Please use the attached pin (equivalent to φ ADf6, φ AE6, HRC60) as the mounting pin for lever.

S : Piping Option (Rc Thread)

※ The drawing shows the locked state of WCG-2SCT.
### Model No. Indication

(WCG 160 0 - 2 A L G C T)

- **Format Example:** WCG1000-2ART, WCG2500-2SLT
- **Cylinder Force**
- **Design No.**
- **Piping Method**
- **Lever Direction**
- **Action Confirmation (When T is chosen)**

### External Dimensions and Machining Dimensions for Mounting

<table>
<thead>
<tr>
<th>Model No.</th>
<th>WCG1000-2ART</th>
<th>WCG1600-2ART</th>
<th>WCG2500-2ART</th>
<th>WCG4000-2ART</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke</td>
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<td>27.5</td>
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<tr>
<td>Idle Stroke</td>
<td>18</td>
<td>19.5</td>
<td>23.5</td>
<td>29</td>
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<tr>
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<td>76</td>
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<td>max. φ5</td>
<td>max. φ5</td>
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<td>T</td>
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<td>14</td>
<td>14</td>
<td>16</td>
<td>20</td>
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<tr>
<td>V</td>
<td>27</td>
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<td>42.5</td>
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<td>18.5</td>
<td>21</td>
<td>26.5</td>
<td>31</td>
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<td>Y</td>
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<td>18</td>
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<td>Z</td>
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<td>25</td>
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<tr>
<td>AA</td>
<td>19.5</td>
<td>21</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>AB</td>
<td>66.4</td>
<td>70.5</td>
<td>84</td>
<td>93.4</td>
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<td>AC</td>
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<td>AD</td>
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<tr>
<td>AE</td>
<td>5</td>
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<td>8</td>
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<tr>
<td>AG</td>
<td>30°</td>
<td>29.7°</td>
<td>29.8°</td>
<td>29.8°</td>
</tr>
<tr>
<td>CA (Nominal × Pitch)</td>
<td>M5×0.8</td>
<td>M5×0.8</td>
<td>M6×1</td>
<td>M6×1</td>
</tr>
<tr>
<td>ZA (Chamfer)</td>
<td>R5</td>
<td>R5</td>
<td>R6</td>
<td>R6</td>
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</tr>
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<td>UD</td>
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<td>UE</td>
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<td>7</td>
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<td>7</td>
</tr>
<tr>
<td>UF</td>
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<td>4.3</td>
<td>4.3</td>
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<td>UH</td>
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<td>UJ</td>
<td>20</td>
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<td>22</td>
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<tr>
<td>O-ring (Option A/G)</td>
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<td>Weight</td>
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<td>2.6</td>
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</tbody>
</table>

**Notes:**

1. The specification value of cylinder force, clamping force and holding force is fulfilled only when clamping within the lock stroke range.
2. The specification value is not fulfilled when clamping within the range of idle stroke.
3. It shows the weight of single clamp without the link lever.
**Link Lever Design Dimension**

※ Reference for designing link lever.

**Calculation List of Link Lever Design Dimension**

<table>
<thead>
<tr>
<th>Corresponding Model No.</th>
<th>WCG1000</th>
<th>WCG1600</th>
<th>WCG2500</th>
<th>WCG4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA</td>
<td>19.5</td>
<td>21</td>
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<tr>
<td>BB</td>
<td>16</td>
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<tr>
<td>BC</td>
<td>15</td>
<td>16</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>BD</td>
<td>5°±0.012</td>
<td>6°±0.012</td>
<td>6°±0.012</td>
<td>8°±0.015</td>
</tr>
<tr>
<td>BE</td>
<td>5°±0.012</td>
<td>6°±0.012</td>
<td>8°±0.015</td>
<td>10°±0.015</td>
</tr>
<tr>
<td>BF</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>BG</td>
<td>35.5</td>
<td>39.5</td>
<td>46</td>
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<td>BH</td>
<td>R3.5</td>
<td>R3.5</td>
<td>R4</td>
<td>R6</td>
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<tr>
<td>BJ</td>
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<td>26.5</td>
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<tr>
<td>BK</td>
<td>R4.5</td>
<td>R6</td>
<td>R6</td>
<td>R8</td>
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<td>8</td>
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<td>BM</td>
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<td>6</td>
<td>7.5</td>
</tr>
<tr>
<td>BN</td>
<td>4.5</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Notes:
1. Design the link lever length according to the performance curve.
2. If the link lever is not in accordance with the dimension shown above, performance may be degraded and damage can occur.
3. Please use the attached pin (equivalent to φAD6, φAE6, HRC60) as the mounting pin for lever.
   (Please refer to each external dimension of WCG for the dimensions φAD and φAE.)
Accessories: Material Link Lever

Model No. Indication

**WCZ 160 0 – L3**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>WCZ1000-L3</th>
<th>WCZ1600-L3</th>
<th>WCZ2500-L3</th>
<th>WCZ4000-L3</th>
</tr>
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<tbody>
<tr>
<td>Corresponding</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Model No.</td>
<td>WCG1000</td>
<td>WCG1600</td>
<td>WCG2500</td>
<td>WCG4000</td>
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<td>30</td>
</tr>
<tr>
<td>D</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>E</td>
<td>35.5</td>
<td>39.5</td>
<td>46</td>
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<tr>
<td>F</td>
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<td>R3.5</td>
<td>R4</td>
<td>R6</td>
</tr>
<tr>
<td>G</td>
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<tr>
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<td>4.5</td>
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<td>8</td>
</tr>
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<td>P</td>
<td>19.5</td>
<td>21</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>R</td>
<td>4.5</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
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<tr>
<td>T</td>
<td>5 ±0.012</td>
<td>6 ±0.012</td>
<td>8 ±0.015</td>
<td>10 ±0.015</td>
</tr>
<tr>
<td>U</td>
<td>5 ±0.012</td>
<td>6 ±0.012</td>
<td>8 ±0.015</td>
<td>10 ±0.015</td>
</tr>
</tbody>
</table>

**Notes:**

1. Material S45C
2. If necessary, the front end should be additionally machined.
3. Please use the attached pin (equivalent to φ AD6, φ AE6, HRC60) as the mounting pin for lever.
   (Refer to the external dimensions for φ AD, φ AE)
Cautions

Notes for Design

1) Check Specifications
   • Please use each product according to the specifications.
   • The mechanical lock mechanism of this clamp maintains clamping force and holding force even when air pressure falls to zero. (Refer to “Clamping Force and Holding Force Curve at 0MPa”.)

2) Notes for Circuit Design
   • Ensure there is no possibility of supplying air pressure to the lock and release ports simultaneously. Improper circuit design may lead to malfunctions and damages.

3) Do not apply offset load.
   • Do not apply offset load on the link part.
     The point of load (clamping point) should be within the width of the link lever.

4) Notes for Link Lever Design
   • Make sure no force except the axial direction is applied to the piston rod. The usage like the one shown in the drawing below will apply a large bending stress to the piston rod and must be avoided.

5) When clamping on a sloped surface of the workpiece
   • Make sure the clamping surface and the mounting surface of the clamp are parallel.

6) When using in a dry environment
   • The link pin may dry out. Grease it periodically or use a special pin.
     Contact us for the specifications for the special pin.

7) Adjust the direction of the head cover as you need.
   Use M3 tapped holes on the bottom to fix the head cover with bracket.

8) Speed Adjustment
   • If the clamp operates too fast the parts will wear out and become damaged more quickly leading to equipment failure. Do not adjust with a meter-out valve outside the cylinder because there is an orifice of meter-out connected internally. (The operating time of mechanical locking system will be very long if there is back pressure in the circuit.) Install a meter-in speed controller and adjust the operating time to within 0.5 seconds.
     If the operating time is slower than this, pressure rising will slow down taking more time to achieve the clamping force corresponding to the catalog data.
     Even if there is stiff or sudden movement under low pressure and small volume of air, it isn't malfunction.
     (Please note that the above condition will occur when you have to adjust operating time over 1.0 second.)

   Please set one speed controller (meter-in) to each clamp when operating multiple clamps simultaneously.
   When large thrust force is applied to the releasing direction in releasing action, install a meter-out speed controller to the lock port side for speed adjustment.

9) The specification value will not be fulfilled when clamping out of the lock stroke (mechanical lock stroke) range.
   • When the center of link pin hole of piston rod clamps out of the lock stroke range, the mechanical lock function does not work. As a result, the specification value of clamping force and holding force will not be fulfilled. Moreover, there will be no clamping or holding force at 0MPa air pressure.

Make sure the actual stroke to be ±2 mm of recommended lock position. (The specification value will be fulfilled since the center of link pin hole of piston rod is within the lock stroke (mechanical lock stroke) range.)
**Installation Notes**

1) Check the fluid to use.
- Please supply filtered clean dry air. (Install a drain removing device.)
- Oil supply with a lubricator etc. is unnecessary.
  
  Oil supply with a lubricator may cause loss of the initial lubricant.
  The operation under low pressure and slow speed may be unstable.
  (When using lubricant, please supply lubricant oil continuously.
  Otherwise, the initial grease applied by KOSMEK will be removed.)

2) Preparation for Piping
- The pipeline, piping connector and fixture circuits should be cleaned and flushed thoroughly.
- Dust and cutting chips in the circuit can lead to air 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.
- Wrapping in the wrong direction will cause air leakage and malfunction.
- Pieces of the sealing tape can lead to air leakage and malfunction.
- When piping, be careful that contaminants such as sealing tape do not enter into products.

4) Installation of the Product
- When mounting the product use four hexagonal socket bolts (with tensile strength of 12.9) and tighten them with the torque shown in the table 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>WCG1000</td>
<td>M5×0.8</td>
<td>6.3</td>
</tr>
<tr>
<td>WCG1600</td>
<td>M5×0.8</td>
<td>6.3</td>
</tr>
<tr>
<td>WCG2500</td>
<td>M6×1</td>
<td>10</td>
</tr>
<tr>
<td>WCG4000</td>
<td>M6×1</td>
<td>10</td>
</tr>
</tbody>
</table>

5) Installation of the Speed Control Valve
- Tightening torque for speed control valve: 5 to 7 N·m.

6) Installation / Removal of the Link Lever
- When inserting the link pin, do not hit the pin directly with a hammer. When using a hammer to insert the pin, always use a cover plate with a smaller diameter than the snap ring groove on the pin.

7) Speed Adjustment
- Adjust the speed so that the operating time is within 0.5 sec.
  - If the clamp operates too fast the parts will wear out leading to premature damage and ultimately complete equipment failure.
  - Turn the speed control valve gradually from the low-speed side (small flow) to the high-speed side (large flow) to adjust the speed.

8) Checking Looseness and Retightening
- At the beginning of installation, bolts may be tightened lightly.
  - Check looseness and re-tighten as required.

9) Do Not Operate the Clamp Manually
- At the time of not supplying air pressure, when a piston rod is raised by manual operation and it goes into the lock stroke range, the mechanical lock will be activated by built-in spring and the clamp will be locked (the piston rod at the lock end).
  - Clamping force at 0MPa will be generated as well. Since this will cause an injury and accident, never operate the clamp manually.

In order to avoid such accidents, the product is set in the locked state (with mechanical lock activated) before shipping.
- It is recommended to set the clamp in locked state (with mechanical lock activated) when shipping to a user after installing the clamp to a fixture or system.

In the locked state, clamps cannot be operated manually because of the mechanical lock. Supplying release air pressure is required to conduct release action.

**Do Not Operate Manually**

10) Cautions for Trial Operation
- If air pressure with large flow rate is supplied just after installation, operating time will be extremely fast leading to severe damage on the clamp. Install a meter-in speed controller near the air source and supply air pressure gradually.

※ Please refer to P.61 for general cautions.  • Notes on Handling  • Maintenance/Inspection  • Warranty
Air Flow Control Valve

Model BZW

Directly mounted to clamps, easy adjusting

- Directly Mounted to Clamps
  BZW is the flow control valve for Rc thread that enable to mount to the piping method: option -A of WHG/WCG. It is best used in a circuit where the flow control valve cannot be mounted or if necessary to synchronize individual speed.

Corresponding Product Model

<table>
<thead>
<tr>
<th>Clamp</th>
<th>BZW Model No.</th>
<th>Clamp Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Power Welding Link Clamp</td>
<td>BZW0100-A</td>
<td>WCG 0-2</td>
</tr>
<tr>
<td>High-Power Welding Swing Clamp</td>
<td>BZW0100-B</td>
<td>WHG 0-2</td>
</tr>
</tbody>
</table>

Corresponding to piping method -A option.
* When mounting BZW to piping method G, take off R thread plug and remove the seal tape not to get inside cylinder.
Model No. Indication

**BZW 010 0 – B**

Control Method
B : Meter-out
A : Meter-in

Design No.
O : Revision Number

R Thread Size
010 : Rc1/8

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BZW010-B</th>
<th>BZW0100-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Method</td>
<td>Meter-out</td>
<td>Meter-in</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>0.1 ~ 1.0 MPa</td>
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</tr>
<tr>
<td>Withstanding Pressure</td>
<td>1.5 MPa</td>
<td></td>
</tr>
<tr>
<td>Adjust Screw Number of Rotations</td>
<td>10 Rotations</td>
<td></td>
</tr>
<tr>
<td>Tightening Torque</td>
<td>N·m 5 ~ 7</td>
<td></td>
</tr>
<tr>
<td>Corresponding Model No.</td>
<td>WHG-2A</td>
<td>WCG-2A</td>
</tr>
</tbody>
</table>

**External Dimensions**

- Hexagon 14
- Adjusting Screw
- Lock Nut
- O-ring (Included)
- Packing
- (Rc1/8)

**Machining Dimensions of Mounting Area**

- \( L = 0.01 \) A
- \( d_1 = 0.7 \) ± 0.1
- \( d_2 = 0.1 \) ± 0.01
- \( C = 0.1 \) ± 0.01
- \( T = 20° \)
- \( \phi 13.8 \) ± 0.05
- \( \phi 10 \) ± 0.02
- \( \phi 2.5 \) ± 0.02
- \( \phi 6.3 \) ± 0.02

**Flow Rate Graph**

**BZW0100-B/BZW0100-A common**

- Controlled Flow Direction
- Free Flowing Direction

**Notes:**
1. Since the \( \sqrt{N} \) area is sealing part, be careful not to damage it.
2. No cutting chips or burr should be at the tolerance part of machining hole.
3. As shown in the drawing, P1 port is used as the air supply side and P2 port as the clamp side.
Manifold Block

Model WHZ-MD

- Manifold Block
  
The mounting height of clamp is adjustable with the manifold block.
Applicable Model

<table>
<thead>
<tr>
<th>Manifold Block Model No.</th>
<th>Corresponding Item Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model WHZ-MD</td>
<td>Model WCG</td>
</tr>
<tr>
<td></td>
<td>Model WHG</td>
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</table>

Manifold Block for WCG/WHG

Model No. Indication

WHZ 048 0 – MD

<table>
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<tr>
<th>Model No.</th>
<th>WHZ0320-MD</th>
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<td>B</td>
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<td>0.2</td>
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Notes:
1. Material: A2017BE-T4
2. Mounting bolts are not provided. Prepare mounting bolts according to the mounting height using the dimension A as a reference.
3. If thickness other than A is required, perform additional machining on surface Z. Please refer to the drawing.
Cautions

Notes on Handling
1) It should be operated by qualified personnel.
   - Hydraulic and/or pneumatic machines and devices 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 removing the product, 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 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 the clamp (cylinder) while it is working. Otherwise, your hands may be injured.

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

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 abnormality in the bolts and respective parts before restarting.
2) Regularly clean the area around the piston rod.
   - If it is used when the surface is contaminated with dirt, it may lead to packing seal damage, malfunctioning and fluid leakage.

3) Regularly tighten pipes, mounting bolts, nuts, snap rings, cylinders and others to ensure proper use.
4) 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.
5) The products should be stored in the cool and dark place without direct sunshine or moisture.
6) 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 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.
Introducing Kosmek

Robotic Hand Changer
► P.65

Robotic Hand Series
► P.69

Work Support
► P.72
Welding Products

High Accuracy Locating・Clamping
P.73

Auto Coupler
P.74

FA・Industrial Robot Related Product Catalog

Please find further information on our complete catalog. You can order from our website (http://www.kosmek.co.jp/english/).

Scan the QR code for Catalog Request and Inquiry

The World’s Only
Robotic Hand Changer
with Zero Backlash

KOSMEK Exclusive Non-Backlash Mechanism

Before Connecting

When Connected

Detaching Function

Zero-Backlash Connection with Dual Contact

Kosmek Hand Changer with No Backlash
Prevents Electrode Errors  No Noise

Continuity Failure of Electrode

Zero Backlash

No Continuity Failure of Electrode

Frequent Moment Stop

Sharp Decline of Moment Stop
Secures the Aimed Position

When Connected, Locating Repeatability is \(3 \mu m\)

Even with long tools or hands, fluctuation of the edge is extremely small. It secures high-accuracy processing even after tool change.

※ Only SWR0010 (0.5kg~1kg payload model) has repeatability of 5 \(\mu m\).

24-Hour Continuous Operation is Possible

Uncomparably High Rigidity and Durability

Strong to "bend" and "torsion" with high rigidity obtained by non-backlash function. Also, high strength material is used in all the contact part of the master and the tool so that it ensures high durability and 3 \(\mu m\) (5 \(\mu m^2\)) repeatability even after 1 million cycles.

※ Only SWR0010 (0.5kg~1kg payload model) has repeatability of 5 \(\mu m\).

Payload : 0.5kg ~ 360kg

A Variety of Electrode/Air Joint Options

- Resin Connector Electrode
- Solder Terminal
- Solder Terminal with Cable
- Waterproof Electrode (Simple Waterproof)
  Only when connected : Equivalent to IP54
- D-sub Connector
- Circular Connector (Connector Based on JIS C 5432)
- Compact Electric Power Transmission (Ability to Transmit AC/DC200V 5A)
- Power Transmission Option (Connector Based on MIL-DTL-5015)
- High Current Transmission Option
  (Connector Based on MIL-DTL-5015)
- Waterproof Electrode (Noncontact Waterproof) IP67 Compact Model
- Waterproof Electrode (Noncontact Waterproof) IP67
- Air Joint (3 Port Option • with Larger Port : \(\phi 6\))
- Air Joint (2 Port Option)
- Air Joint (4 Port • Solder Terminal Extensible Option)
- Air Port with Check Valve
Holds Welding Workpiece without Backlash

A case study of Robotic Hand Changer exchanging robotic hands which hold a welding workpiece. Kosmek non-backlash changer allows for stable product quality and appearance of arc welding.

High-Accuracy Change of Transfer Arms

Transfers a workpiece to the next process.

General Changer

Kosmek Robotic Hand Changer

No Backlash on Changer Part

Prevents errors on attaching and detaching products.
Change the Transfer Hand and Deburring Tool with High Rigidity

Withstands Heavy Load with Non-Backlash Function

Strong to "bend" and "torsion" with high rigidity.
It ensures stable production even with offset transfer hand or heavy load deburring.

General Tool Changer

Backlash on Changer Part
Due to backlash, a tool changer is weak to torsion and can be broken if high load is applied when deburring surface R which has large contact area.

Low Load
High Load
Contact area of surface R is large and receives high load.

Kosmek Robotic Hand Changer

No Backlash on Changer Part
The changer has no backlash so it is highly rigid and strong to torsion. This allows for no fluctuation on tools.
It also withstands high load of casting deburring.
Light and Compact Robotic Hand Series for Factory Automation

Kosmek Exclusive Internal Chuck Series

FA Pneumatic Hole Clamp
Model WKH

Gripper expands and pulls workpiece in.
Light Body with Selectable Functions: Locating and Floating
Workpiece Diameter \( \phi 6 \sim \phi 14 \) in 0.5mm increments.

High-Power Pneumatic Hole Clamp
Model SWE

Can be used in machine tools. Gripper expands and pulls workpiece in.
High Power with Contaminant Prevention for Machine Tools, etc.
Workpiece Diameter \( \phi 6 \sim \phi 13 \) in 0.5mm increments.

Ball Lock Cylinder
Model WKA

Secures/Transfers a pallet and prevents falling off with steel balls.
Powerful, Light and Compact
Pull-Out Load Capacity (Holding Force): 50N / 70N / 100N / 150N / 200N
Advantages of FA Pneumatic Hole Clamp

Model WKH  FA Pneumatic Hole Clamp

Chucking Inside of Workpiece Holes Allows for Compact and Light Applications

- Larger Space
- Reduce the Hand Weight
- Smaller Space

Loading/Lifting Hand with Parallel Hand/Linear Cylinder

Hole Clamp is Compact and Light with Powerful Gripping Force

Chucking Inside of Workpiece Holes Allows for Zero Interference and Minimum Setup

- Interferes with the hand when holding a workpiece.
- No Interference
- 5 Faces Accessible with No Interference

External Chuck Series

- High-Power Parallel Gripper
- Compact Parallel Gripper
- Wide Angular Gripper
- Parallel Gripper
- Compact Parallel Gripper
- Angular Gripper
- Three-Jaw Chuck
- Two-Jaw Chuck
- Parallel Hand with Auto-Grip Changer

Model WPS  Model WPA  Model WPE  Model WPF  Model WPH  Model WPJ  Model WPP  Model WPQ  Model WPW
For Faster and More Accurate Pallet Transfer

Model WKA  Ball Lock Cylinder

Transfers a workpiece to the next process.
Strong to load of thrust direction
Able to transfer in minimum distance

Current Method  Suction Pad  Ball Lock Cylinder

Limited Speed
Low Suction Force

Powerful • Light • Compact with Mechanical Lock
Single Circuit for Positive Pressure Only

Suction Pad has critical weight limits and speed limits
due to low suction force. Also, the suction force is
affected by the roughness of surface and is decreased
due to deterioration and friction.

Requires Hole Machining
Optional bush simplifies hole machining.

(Ex.) Backlash Prevention with O-ring
O-ring is not included.
Automation Products

Powerful Support for Unstable Parts

High-Power Pneumatic Work Support (Standard / Rodless Hollow)
Model WNC / WNA

Firmly Supports the Workpiece and Prevents Chattering and Distortion
Locks when the tip of work support contacts a workpiece. Securely supports a workpiece with various heights.

High Accuracy Locating of Workpiece • Pallet

Expansion Locating Pin
No Gap with High Accuracy Locating Pin

High-Accuracy Model
Model VWM
Locating Repeatability
3 μm
Workpiece Hole Diameter:
φ8 – φ30

Large-Expansion Model
Model VWH
Locating Repeatability
10 μm
Workpiece Hole Diameter:
φ9 – φ15

Manual-Operating Model
Model VX
Locating Repeatability
5 μm
Workpiece Hole Diameter:
φ8 – φ20

Expansion Locating Pin
Easy to Load/Unload
Zero Clearance and High Accuracy

Fixed Pin
Loading/Unloading
Locating
Difficult to Load/Unload
Some Clearance

Expansion Locating Pin
Large Clearance
Zero Clearance
Loading/Unloading (Released)
Locating (Locked)
High Speed and High Accuracy Fixture Setup

Air Location Clamp

Locates and clamps a fixture on a positioner simultaneously. **Enables setup time reduction and productivity improvement.**
Pneumatic Location Clamp Series

FA Pneumatic Pallet Clamp
Model WVG
Suitable for setup of welding fixtures and pallet transfer.
Locating Repeatability: 0.08 mm

Compact Air Location Clamp
Model SWQ
Compact model. Suitable for setup of compact/light pallets/fxitures.
Locating Repeatability: 3 μm

Air Location Clamp
Model SWT
Equipped with Contamination Prevention
Locating Repeatability: 3 μm

High-Power Pneumatic Pallet Clamp
Model WVS
Exerts equivalent clamping force with hydraulic clamps.
Locating Repeatability: 3 μm

Action Description

Air Blow and Seating Check
Contaminants can be removed by air blow.
Seating surface is provided with the air hole.
Use the gap sensor for seating check.

Self-Locking (Safety) Function
(Holding Force at 0MPa Air Pressure)
Maintains clamped state.
Even if air pressure is at zero, it will stay locked with the self-locking spring.
More than the minimum operating air pressure is required for locating.

Automatic Air Supply to a Pallet on a Positioner

Auto Coupler
Model JT □ JV □

Compact Coupler to Connect Hydraulic/Pneumatic/Coolant Circuits
Connection Stroke: 1mm Commonly Used with Screw Locator and Pneumatic Location Clamp

Locating Pin Clamp
SWP
High-Power Welding Swing Clamp
WHS
High-Power Welding Link Clamp
WCG
Air Flow Control Valve
BZW
Manifold Block
WHZ-MD
General Cautions
Welding Related Products
Quick Die Change Systems
Company Profile
Sales Offices
Die Change Systems

Hydraulic Clamp Series

Die Lifter

Pre-Roller
for Press Machines

All-Pneumatic System

Pneumatic Ball Lifter ► P.79

High-Power Pneumatic Die Clamp ► P.81

Die Change Systems for Press Machines Complete Catalog

Find further information on our complete catalog. You can order the catalog from our website (http://www.kosmek.co.jp/english/).

Scan the QR code for Catalog Request and Inquiry

Revolutionary Long Stroke Design Means

Die Variation Possible!!

Presenting the World's First Long Stroke Lever Clamp!

In the Past...

<p>| | | |</p>
<table>
<thead>
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<tr>
<td>Die</td>
<td>40 mm</td>
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<tr>
<td>Bolster</td>
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<tr>
<td></td>
<td>45 mm</td>
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</table>

Dies are not standardized...

Die standardization held back plans for converting to auto-clamping...

To introduce auto clamping when plates were not standardized...

Milling of a Clamping Pocket
Addition of Spacer Plates in Clamping Area

dies had to be modified to accommodate the auto clamps.

The Future is Now!

With T-slot clamps, Die width variance is possible.

With the GBC clamp long stroke, Die clamping plate thickness variance is also possible!

- 5 mm Thickness Variance : 0100 ~ 0400 model
- 10 mm Thickness Variance : 0630 ~ 5000 model

- For Customer Dies with Non-Standardized Dimensions
- No Accidents Caused by Incorrect Spacer Thickness

An existing system can be converted to a long stroke system by replacing only the clamps.
Announcing, for Kosmek's basic hydraulic clamp line,

**A Full Model Change!!**

Disassembly and assembly possible **with only standard tools!**

Redesigned from the ground up with ease of maintenance in mind.

---

**Point 1:**
Since no special tools are required, **no clamp-specific knowledge is required.**

**Point 2:**
Since anyone can assemble and disassemble the clamp, **only a seal kit is needed to perform on-site maintenance.**

---

Disassembly and assembly of the lever and cylinder **required special tools and jigs...**
Advantages of Die Lifter

A die is easily moved to the bolster with the roller/ball of die lifter.

Ball Lifting Model Newly Added to the Lineup

Lift and Move a Die with Light Force

The Ball Moves 360° Flexibly

Able to move a die easily to the locating point.
Advantages of Pre-Roller

Model MR

Allows the die to roll from the front of the press onto the bolster.

- **Load the Die**
  Load the die with a crane or forklift. Pre-Rollers set in front of press machine enable easy transfer of the die.

- **Move the Die to the Bolster**
  Move the die to the bolster. Pre-Rollers and die lifters allow the die to roll onto the bolster with minimal force.

- **The stopper prevents die fall.**
  By pushing the stopper until the end, the stopper will be released. ※ When using the stopper, it must be returned to set position manually.

More than 100 options with a variety of sizes and folding methods.
The High-Power Pneumatic Die Clamp is a **HYBRID** system using **air pressure** and a **mechanical lock**.

**Advantages of High-Power Pneumatic Die Clamp**

**Self-Lock Function** is built in the clamp.

Even when air pressure is cut off, 20% of holding force will prevent falling of the die.

**With Self Lock Function**

Even when air pressure leaks, the clamp will stay locked with the internal locking spring.

**No Self Lock Function**

When hydraulic pressure leaks, the clamp will be released due to the spring release function.
Improved Maintainability

Dramatically reduces the running cost since valves and other control devices are available on the market and easily replaced in case of trouble.

Short Time • Low Cost Maintenance
Damages on the piping are easily replaced! Valves are available on the market! Recovery of equipment in short time!

Long Time • High Cost Maintenance
Need to talk with manufacturers for replacement of hydraulic hose. Require expensive pumps and valves in stock.

Energy Saving • Time Reduction

Keeps Your Factory Clean.
Also, since clamping action is faster than hydraulic, the die change time is drastically reduced.

Pneumatic System

Less Operation Time Compared to Hydraulic

Hydraulic System

Requires hydraulic unit and oil...

The working environment gets dirty because of oil...

Pneumatic Die Clamping System is suitable for press machines of electronic component.
## Company Profile

**KOSMEK LTD. Head Office**

<table>
<thead>
<tr>
<th>Company Name</th>
<th>KOSMEK LTD.</th>
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<tbody>
<tr>
<td>Established</td>
<td>May 1986</td>
</tr>
<tr>
<td>Capital</td>
<td>¥99,000,000</td>
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<tr>
<td>President</td>
<td>Tsutomo Shirakawa</td>
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<tr>
<td>Employee Count</td>
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<td>Group Company</td>
<td>KOSMEK LTD.</td>
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<td>KOSMEK ENGINEERING LTD.</td>
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<td>KOSMEK (USA) LTD.</td>
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<td>KOSMEK EUROPE Gmbh</td>
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<td>KOSMEK (CHINA) LTD.</td>
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<td>KOSMEK LTD. - INDIA</td>
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<tr>
<td>Business Fields</td>
<td>Design, production and sales of precision products, and hydraulic and pneumatic equipment</td>
</tr>
<tr>
<td>Customers</td>
<td>Manufacturers of automobiles, industrial machinery, semiconductors and electric appliances</td>
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<td>Banks</td>
<td>Resona Bank, MUFG Bank, The Senshu Ikeda Bank</td>
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### Sales Offices across the World

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<thead>
<tr>
<th>Sales Offices</th>
<th>TEL.</th>
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<tbody>
<tr>
<td>JAPAN HEAD OFFICE</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 SUBSIDIARY</td>
<td>+1-630-620-7650</td>
<td>+1-630-620-9015</td>
</tr>
<tr>
<td>KOSMEK USA Mexico Office</td>
<td>+52-1-55-3044-9983</td>
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<td>MEXICO REPRESENTATIVE OFFICE</td>
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<td>EUROPE SUBSIDIARY</td>
<td>+43-463-287587</td>
<td>+43-463-287587-20</td>
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<td>KOSMEK EUROPE Gmbh</td>
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<tr>
<td>CHINA SUBSIDIARY</td>
<td>+86-21-54253000</td>
<td>+86-21-54253079</td>
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<td>KOSMEK (CHINA) LTD.</td>
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<tr>
<td>INDIAN BRANCH OFFICE</td>
<td>+91-9880561695</td>
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<td>KOSMEK LTD. - INDIA</td>
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<tr>
<td>THAILAND REPRESENTATIVE OFFICE</td>
<td>+66-2-300-5132</td>
<td>+66-2-300-5133</td>
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<tr>
<td>KOSMEK Thailand Representation Office</td>
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</tr>
<tr>
<td>TAIWAN (Taiwan Exclusive Distributor)</td>
<td>+886-2-82261860</td>
<td>+886-2-82261890</td>
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<tr>
<td>Full Life Trading Co., Ltd.</td>
<td></td>
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<tr>
<td>PHILIPPINES (Philippines Exclusive Distributor)</td>
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<td>G.E.T. Inc, Phil.</td>
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<td>INDONESIA (Indonesia Exclusive Distributor)</td>
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<td>PT. Yamata Machinery</td>
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### Sales Offices in Japan

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<tbody>
<tr>
<td>Head Office</td>
<td>078-991-5162</td>
<td>078-991-8787</td>
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<tr>
<td>Osaka Sales Office</td>
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<td>Overseas Sales</td>
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<tr>
<td>Tokyo Sales Office</td>
<td>048-652-8839</td>
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<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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</table>
Product Line-up

■ Quick Die Change Systems
FOR PRESS MACHINES

■ Kosmek Factory Automation Systems
FACTORY AUTOMATION INDUSTRIAL ROBOT RELATED PRODUCTS

■ Diecast Clamping Systems
FOR DIECAST MACHINES

■ Kosmek Work Clamping Systems
MACHINE TOOL RELATED PRODUCTS

■ Quick Mold Change Systems
FOR INJECTION MOLDING MACHINES

■ Washing Application Products
KOSMEK PRODUCTS FOR WASHING APPLICATION
KOSMEK LTD.

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For Further Information on Unlisted Specifications and Sizes, Please call us.
Specifications in this Leaflet are Subject to Change without Notice.