Hydraulic Hole Clamp

Model SFA
Model SFC

Gripper expands and pulls workpiece down.

Gripper expands and pulls workpiece down.

Action Description

![Diagram](image)

- **< Released State >**
  Load/Unload Workpiece

- **< Clamping State >**
  Gripper expands to hold workpiece hole.

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

- **To Workpiece**
  - Zero interference with 5 faces except clamping face.
  - Possible to use standard length tool which provides for better machining accuracy.
  - Possible to enhance cutting parameters which leads to shorter cycle times.
  - Elimination of multiple setups provides better machining process and zero setup time.

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

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

---

### Classification

<table>
<thead>
<tr>
<th>Model</th>
<th>Double Action</th>
<th>Double Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFA</td>
<td>Standard Model</td>
<td>Offset Model</td>
</tr>
</tbody>
</table>

- **Features**

  - Model SFA → P. 373
  - Model SFC → P. 397

  - Seating heights available in 5mm increments
  - Avoids interference with workpiece.
More Flexible Fixture Design with New KOSMEK Hole Clamp

- **Variable Mounting Dimensions to Suit the Process**
  Select appropriate mounting dimension according to the plate thickness.

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

※ The number of ( ) is referred to SFA3000.
Hole Diameter to Suit Variety of Work

In order to suit different hole diameters and tolerances, hole diameters can be specified in 0.5mm increments.

![Workpiece Hole Diameter Diagram]

<table>
<thead>
<tr>
<th>Model</th>
<th>Workpiece Hole Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFA/SFC1000</td>
<td>6</td>
</tr>
<tr>
<td>SFA/SFC2000</td>
<td>6</td>
</tr>
<tr>
<td>SFA/SFC3000</td>
<td>6</td>
</tr>
</tbody>
</table>

※Max. operating pressure is 4MPa or 6MPa regarding to some of workpiece hole diameter.

More Powerful Clamping Force

Enables wider range of operating pressure by having more powerful clamping force.

![Clamping Force Diagram]

※Max. operating pressure is 4MPa or 6MPa regarding to some of workpiece hole diameter.
More Safe Operation with New KOSMEK Hole Clamp

- Cap Structure Available in Any Condition

※ SFA/SFC1000 does not have the cap.

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

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

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

- Rough guide is not necessary on fixture.

※ It differs according to the loading speed.
Pursuing Good Design for Cutting Chips

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

Secure Clamp Action Out of Sight

Built-in spring grips workpiece strongly and pulls it in. There is no effect by the temperature and/or amount of oil.
More Safe Operation with New KOSMEK Hole Clamp

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

- Abnormality Detection for Unpredictable Troubles
  Anomaly detection for unpredictable trouble. It can be used in automated line.

The workpiece diameter with larger hole diameter than specification.
The workpiece is floated more than pulling stroke. (Seating Error)
Rod breakage due to transportation.
Offset Model

Hydraulic Hole Clamp Offset Model

Model SFC

The offset model allows for machining with no interference of workpieces, fixtures, tools, etc. when there is interference by using the standard SFA model.

Avoids interference with workpiece.

Avoids tool interference for backside machining.
Hydraulic Hole Clamp Offset Model
Model SFC

Low Pressure (1.5~7MPa)
Ability to Avoid Interferences

Index

Hydraulic Hole Clamp Digest .................................................. P.365
Action Description .............................................................. P.398
Model No. Indication ............................................................ P.399
Specifications ................................................................. P.403
Performance Curve ............................................................ P.405

External Dimensions
- Body Size:1  Mounting Length 0mm (SFC1000-G0) .................. P.407
- Body Size:1  Mounting Length 10/20mm (SFC1000-M□) .......... P.409
- Body Size:2  Mounting Length 0mm (SFC2000-G0) ................. P.411
- Body Size:2  Mounting Length 10/20mm (SFC2000-M□) .......... P.413
- Body Size:3  Mounting Length 0mm (SFC3000-G0) ................. P.415
- Body Size:3  Mounting Length 10/20mm (SFC3000-M□) .......... P.417

Layout Sample ................................................................. P.419
Circuit Reference .............................................................. P.420

Cautions
- Notes for Hydraulic Hole Clamp .......................................... P.421
- Cautions (Common) .......................................................... P.1335
  - Installation Notes
  - Hydraulic Fluid List
  - Notes on Hydraulic Cylinder Speed Control Circuit
  - Notes on Handling
  - Maintenance/Inspection
  - Warranty
Action Description

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

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

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

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

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

  The built-in check valve function and seating confirmation air pressure detect abnormal condition as follows.
  - When clamping workpiece which has larger workpiece hole diameter or clamping without workpiece (In this state the gripper expands but the lifting spring does not have pulling force so the workpiece lifting surface does not descend.)
  - When rod or gripper is broken.
  - If the piston is fully stroked when it has to stop at the bottom.
  - In the case workpiece is floated more than 1mm when setting it.

<table>
<thead>
<tr>
<th>Hydraulic Pressure Switch</th>
<th>Seat Check Detection (Air Sensor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Pressure</td>
<td>Lock Pressure</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
</tr>
</tbody>
</table>
6 Model No. Indication (Workpiece Hole Shape: Straight)

SFC 2000 - G0 N - 115 -

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

1: Available in workpiece hole diameters between φ6 and φ9 (No Cap)
2: Available in workpiece hole diameters between φ9 and φ13mm (With Cap)
3: Available in workpiece hole diameters between φ13 and φ16mm (With Cap)

2 Design No.

0: Revision Number

3 Mounting Methods

G0: Mounting Length 0mm
M1: Mounting Length 10mm
M2: Mounting Length 20mm

4 Workpiece Lifting Option

A: With Lifting Function (Workpiece Lifting Option)
N: Without Lifting Function

The lifting function lifts the workpiece 0.2mm up from the seating surface when the clamp is released.

Note: When using SFC with expansion locating pin(s) (model VFH, VFL, VFM, VFJ, VK, VWH, VWM, VKW, VX), please choose N: Without Lifting Function.
5 Workpiece Hole Diameter (Workpiece Hole Code)

| Workpiece Hole Code | 060 | 065 | 070 | 075 | 080 | 085 | 090 | 095 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| SFC1000 No Cap      | 6   | 6.5 | 7   | 7.5 | 8   | 8.5 | 9   | 9.5 | 10  | 10.5 | 11  | 11.5 | 12  | 12.5 | 13  | 13.5 | 14  | 14.5 | 15  | 15.5 | 16  |
| SFC2000 With Cap    | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   |
| SFC3000             | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   | ▲   |

※ Max. operating pressure: 4.0MPa in case of ▲ workpiece hole diameter. 6.0MPa in case of ▲ workpiece hole diameter.

6 Workpiece Hole (Gripper) Shape

Blank : With Serration (Workpiece Hole Shape: Straight)

F : Without Serration (Workpiece Hole Shape: Straight)

Refer to P.401 ~ P.402 for the taper workpiece hole.
**Model No. Indication** *(Workpiece Hole Shape: Tapered)*

**SFC 2000 - G0 N - 115 - T**

1. **Body Size**  ※ Please refer to the specifications, the performance curve and the external dimensions for details.
   - 1 : Available in workpiece hole mouth diameters between φ6.5 and φ9 (No Cap)
   - 2 : Available in workpiece hole mouth diameters between φ9 and φ13mm (With Cap)
   - 3 : Available in workpiece hole mouth diameters between φ13 and φ16mm (With Cap)

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

3. **Mounting Methods**
   - G0 : Mounting Length 0mm
   - M1 : Mounting Length 10mm
   - M2 : Mounting Length 20mm

4. **Workpiece Lifting Option**
   - A : With Lifting Function (Workpiece Lifting Option)
   - N : Without Lifting Function

   The lifting function lifts the workpiece 0.2mm up from the seating surface when the clamp is released.

   Note: When using SFA with expansion locating pin(s) (model VFH, VFL, VFM, VFJ, VFK, VWH, VVM, VKW, VX), please choose N: Without Lifting Function.
5 Workpiece Hole Mouth Diameter (Workpiece Hole Code)

\[ \text{Workpiece Hole Code} \]

: Workpiece Hole Mouth Diameter \( \phi_d \)

※ Workpiece hole mouth diameter \( \phi_d \) should be specified in 0.5mm increments from the allowable range in the following table.

The allowable tolerance of the hole mouth diameter \( \phi_d \) differs depending on the slope angle. Refer to the table below.

<table>
<thead>
<tr>
<th>Workpiece Hole Code</th>
<th>Hole Mouth Diam. ( \phi \text{d} ) (mm)</th>
<th>Allowable Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFC1000</td>
<td>No Cap</td>
<td>( \phi d \pm 0.3 )</td>
</tr>
<tr>
<td>SFC2000</td>
<td>With Cap</td>
<td>( \phi d \pm 0.15 )</td>
</tr>
<tr>
<td>SFC3000</td>
<td></td>
<td>( \phi d \pm 0.15 )</td>
</tr>
</tbody>
</table>

※ Max. operating pressure: 4.0MPa in case of ▲ workpiece hole diameter. 6.0MPa in case of ■ workpiece hole diameter.
※ Taper hole model is not available for Workpiece Hole Code: 060.

Workpiece Hole Slope Angle and Allowable Tolerance of Hole Mouth Diameter

- 065 ~ 090
- 090
- 095 ~ 130
- 130 ~ 160

6 Workpiece Hole (Gripper) Shape

\[ T \]  : Taper Hole (with Serration)

When ordering this model, please inform us of the detailed dimensions of the workpiece hole.

Refer to P.399 ~ P.400 for the straight workpiece hole.
### Specifications

#### Workpiece Hole Shape: Straight

**Applicable Model No.**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SFC1000-□□□□-F</th>
<th>SFC2000-□□□□-F</th>
<th>SFC3000-□□□□-F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece Hole Code</td>
<td>SFC</td>
<td>SFC</td>
<td>SFC</td>
</tr>
<tr>
<td>Workpiece Hole Diam. mm</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Hardness</td>
<td>HB250 or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable Offset Fluctuation of Expanding Area (mm)</td>
<td>±0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Stroke mm</td>
<td>4.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workpiece Pulling Stroke mm</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workpiece Lifting Stroke (mm)</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workpiece Lifting Force (kN)</td>
<td>0.09</td>
<td>0.12</td>
<td>0.21</td>
</tr>
<tr>
<td>Cylinder Capacity Release (cm³)</td>
<td>2.4</td>
<td>3.8</td>
<td>6.7</td>
</tr>
<tr>
<td>(Empty Action) Lock (cm³)</td>
<td>1.8</td>
<td>3.0</td>
<td>5.4</td>
</tr>
<tr>
<td>Cylinder Inner Diameter (mm)</td>
<td>27</td>
<td>34</td>
<td>45</td>
</tr>
<tr>
<td>Rod Diameter (mm)</td>
<td>14</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Max. Operating Pressure MPa</td>
<td>4.0</td>
<td>7.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Min. Operating Pressure MPa</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>6.0</td>
<td>10.5</td>
<td>6.0</td>
</tr>
<tr>
<td>Recommended Air Blow Pressure MPa</td>
<td>0.4 ~ 0.5</td>
<td>0.2 ~ 0.3</td>
<td>0.2 ~ 0.3</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Usable Fluid:** General Hydraulic Oil Equivalent to ISO-VG-32

**Weight:** Please refer to the external dimensions for the product weight.

**Notes:**

*1. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.*

*2. Workpiece lifting stroke and workpiece lifting force are functions only for lifting option.*

*3. Clamping force cannot be calculated from the cylinder inner diameter and the rod diameter. Please refer to the clamping force curve.*
Specifications (Workpiece Hole Shape : Tapered)

Applicable Model No.

![Workpiece Hole (Gripper) Shape]

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SFC1000-0000-T</th>
<th>SFC2000-0000-T</th>
<th>SFC3000-0000-T</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0</strong></td>
<td><strong>060</strong></td>
<td><strong>065</strong></td>
<td><strong>070</strong></td>
</tr>
<tr>
<td><strong>1</strong></td>
<td><strong>075</strong></td>
<td><strong>080</strong></td>
<td><strong>085</strong></td>
</tr>
<tr>
<td><strong>2</strong></td>
<td><strong>090</strong></td>
<td><strong>095</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><strong>105</strong></td>
<td><strong>110</strong></td>
<td><strong>115</strong></td>
</tr>
<tr>
<td><strong>4</strong></td>
<td><strong>120</strong></td>
<td><strong>125</strong></td>
<td><strong>130</strong></td>
</tr>
<tr>
<td><strong>5</strong></td>
<td><strong>135</strong></td>
<td><strong>140</strong></td>
<td><strong>145</strong></td>
</tr>
<tr>
<td><strong>6</strong></td>
<td><strong>150</strong></td>
<td><strong>155</strong></td>
<td><strong>160</strong></td>
</tr>
</tbody>
</table>

- **6**: Workpiece Hole (Gripper) Shape

**Model No.**

- **5**: Workpiece Hole Code
- **0**: SFC
- **1**: M1
- **2**: M2
- **3**: AN
- **4**: 115
- **5**: T

**Workpiece**

- **5**: Workpiece Hole Code
- **00**: SFC 1000
- **00**: SFC 2000
- **00**: SFC 3000

- **6**: Workpiece Hole (Gripper) Shape

**Model No.**

- **5**: Workpiece Hole Code
- **0**: SFC
- **1**: M1
- **2**: M2
- **3**: AN
- **4**: 115
- **5**: T

**Workpiece**

- **5**: Workpiece Hole Code
- **00**: SFC 1000
- **00**: SFC 2000
- **00**: SFC 3000

**Notes:**

- **4**: The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.
- **5**: Workpiece lifting stroke and workpiece lifting force are functions only for lifting option.
- **6**: Clamping force cannot be calculated from the cylinder inner diameter and the rod diameter. Please refer to the clamping force curve.

---

**Cautions**

- **T**: Taper hole option is not available for Workpiece Hole Code: **060**.
Clamping Force Curve (Workpiece Hole Shape : Straight)

Applicable Model No.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Shape</th>
<th>Clamping Force (kN)</th>
<th>Max. Operating Pressure (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFC1000-100-0</td>
<td>Straight</td>
<td>2.4</td>
<td>4.0</td>
</tr>
<tr>
<td>SFC2000-100-0</td>
<td>Straight</td>
<td>2.0</td>
<td>6.0</td>
</tr>
<tr>
<td>SFC3000-100-0</td>
<td>Straight</td>
<td>5.1</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Shape of Gripper (Workpiece Hole) : Blank (With Serration)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Code</th>
<th>Clamping Force Calculation Formula</th>
<th>Max. Operating Pressure (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFC1000-100-0</td>
<td>060-065</td>
<td>F = 0.35 × P - 0.08</td>
<td>7.0</td>
</tr>
<tr>
<td>SFC2000-100-0</td>
<td>090-095</td>
<td>F = 0.60 × P - 0.12</td>
<td>7.0</td>
</tr>
<tr>
<td>SFC3000-100-0</td>
<td>130-135</td>
<td>F = 1.05 × P - 0.20</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Shape of Gripper (Workpiece Hole) : F (Without Serration)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Code</th>
<th>Clamping Force Calculation Formula</th>
<th>Max. Operating Pressure (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFC1000-100-0</td>
<td>060-065</td>
<td>F = 0.16 × P - 0.04</td>
<td>7.0</td>
</tr>
<tr>
<td>SFC2000-100-0</td>
<td>090-095</td>
<td>F = 0.3 × P - 0.1</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Notes:
1. The table and graph show the relationship between clamping force (kN) and supply hydraulic pressure (MPa).
2. Clamping force shows a pressing force against the seating surface.
3. Thin wall around the workpiece hole can be deformed by clamping action, and the clamping force will not fill the specification.
4. Clamping force of F: Without Serration shows the calculated value when the friction coefficient of workpiece and gripper is μ = 0.1.
5. Standard model (SFA) has higher clamping force than that of the offset model. (Please refer to P.381 for the clamping force curve when using SFA.)

1. F: Clamping Force (kN), P: Supply Hydraulic Pressure (MPa)
### Clamping Force Curve (Workpiece Hole Shape: Tapered)

**Applicable Model No.**

<table>
<thead>
<tr>
<th>SFC</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>00</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body Size</td>
<td>2</td>
<td>G0</td>
<td>M1</td>
<td>M2</td>
</tr>
<tr>
<td>3</td>
<td>Shape of Gripper (Workpiece Hole)</td>
<td>115</td>
<td>T</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Shape of Gripper (Workpiece Hole): T Taper Hole (With Serration)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SFC1000-□□□□-T</th>
<th>SFC2000-□□□□-T</th>
<th>SFC3000-□□□□-T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clamping Force kN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyd. Pressure 7 MPa</td>
<td>2.4</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>Hyd. Pressure 6 MPa</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Hyd. Pressure 5 MPa</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Hyd. Pressure 4 MPa</td>
<td>1.3</td>
<td>2.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Hyd. Pressure 3 MPa</td>
<td>1.0</td>
<td>1.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Hyd. Pressure 2 MPa</td>
<td>0.6</td>
<td>1.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Hyd. Pressure 1.5 MPa</td>
<td>0.5</td>
<td>0.8</td>
<td>1.4</td>
</tr>
</tbody>
</table>

The Clamping Force Calculation Formula is:

\[ F = 0.35 \times P - 0.08 \]

\[ F = 0.60 \times P - 0.12 \]

\[ F = 1.05 \times P - 0.20 \]

Max. Operating Pressure MPa:

- 4.0
- 7.0
- 4.0
- 6.0
- 7.0
- 6.0
- 7.0

Notes:

1. The table and graph show the relationship between clamping force (kN) and supply hydraulic pressure (MPa).
2. Clamping force shows a pressing force against the seating surface.
3. Thin wall around the workpiece hole can be deformed by clamping action, and the clamping force will not fill the specification.
4. Standard model (SFA) has higher clamping force than that of the offset model. (Please refer to P.382 for the clamping force curve when using SFA.)

\[ F : \text{Clamping Force (kN), } P : \text{Supply Hydraulic Pressure (MPa)} \]
**External Dimensions**

- **Air Blow-Out Hole for Seating Confirmation φ 1**
- **Seating Surface Outer Diameter φ 21**
- **Seating Surface Inner Diameter φ W**

**Notes:**
- 1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.
- 2. The port names are marked on the product surface. (HYD: Hydraulic Lock Port, FC: Seating Confirmation Air Port, BLOW: Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.
- 3. The numerical value is only for the workpiece lifting option.
- 4. For - T: Taper Hole model, the first gripper ridge is the reference diameter.

**Expanding Area Detail**

- **Workpiece Lifting Stroke (Distance from seating surface when releasing)**
- **Clamping Area**

**Notes:**
- 3. The workpiece lifting stroke is shown when releasing. (Workpiece Lifting Surface φ Y)

**Workpiece (Pallet) Hole Dimensions**

**Notes:**
- 1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification. Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.
- 5. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.
Machining Dimensions of Mounting Area

2-Hole for Spring Pin ø3 Depth 3 or more (part)
Note: Distance accuracy should be better than ±0.1

Air Blow Port ø3
Hydraulic Release Port

4-M4x0.7 Thread Depth 8 or more

Notes:
1. There should be no burrs at the hole contact surface.
2. Make a hydraulic release port within the range of

Model No. Indication

SFC 1 00 0 - G0 AN - 080 - Blank T F

External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Code</th>
<th>SFC1000-G0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>060</td>
<td>065</td>
</tr>
<tr>
<td>Workpiece Hole Diam. ød Blank F</td>
<td>6.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Diameter</td>
<td>5.5</td>
<td>6</td>
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<tr>
<td>Empty Action</td>
<td>7.2</td>
<td>7.7</td>
</tr>
<tr>
<td>Allowable Offset Flattening Clearance of Expanding Area (1)</td>
<td>±0.5</td>
<td></td>
</tr>
<tr>
<td>Full Stroke</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Workpiece Pulling Stroke</td>
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<td></td>
</tr>
<tr>
<td>Workpiece Lifting Stroke (2)</td>
<td>0.2</td>
<td></td>
</tr>
</tbody>
</table>

Shape of Gripper Blank, F

<table>
<thead>
<tr>
<th>Shape</th>
<th>G</th>
<th>S</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>9</td>
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</tr>
<tr>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
<td>6</td>
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<tr>
<td>6</td>
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</table>

Shape of Gripper T

<table>
<thead>
<tr>
<th>Shape</th>
<th>G</th>
<th>S</th>
<th>U</th>
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</thead>
<tbody>
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<td>5.5</td>
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<tr>
<td>6</td>
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<td></td>
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</tbody>
</table>

Weight kg

| Weight | 0.6 |

Notes:
1. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.
2. Workpiece lifting stroke is the function only for lifting option.
3. For -T: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)
**External Dimensions**

※ This drawing shows the released state of SFC1000-M. A.

- **Air Blow-Out Hole for Seating Confirmation** ø1
- **Seating Surface Outer Diameter** ø21
- **Seating Surface Inner Diameter** øW

![Diagram with dimensions](image)

Gripper (4 Grippers 90° Distance)
(The gripper direction is optional)

Air Blow Port
(for Jack Bolt)

Seating Confirmation
Air Port

Hydraulic Lock Port
(for Jack Bolt)

Workpiece (Pallet) Hole Dimensions

- **Workpiece Hole Diameter**  φ ø d = 0.7
- **Surface Y**  ø d : 0.1
- **Workpiece Hole Diameter**  φ ø d = 0.5
- **Surface Y**  ø d : 0.5
- **Workpiece Hole Diameter**  ø d = 0.5
- **Slope Angle** (3° or less)
- **Workpiece Hole Mouth Diameter** ø d 

Notes:
※ 1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.
※ 2. Use jack bolts to remove the product, keeping it parallel to the mounting surface.
※ 3. The port names are marked on the product surface.
    - (HYD: Hydraulic Lock Port, FC: Seating Confirmation Air Port, BLOW: Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.
※ 4. The numerical value is only for the workpiece lifting option.
※ 5. For -T: Taper Hole option, the first gripper ridge is the reference diameter.

**Expanding Area Detail**

Workpiece Lifting Stroke (Clearance from seating surface when releasing)

Clamping Area

Released State

At Full Stroke (Empty Action)

Cross Section

Notes:
※ 1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
    - Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.
※ 6. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.
**Machining Dimensions of Mounting Area**

![Image of machining dimensions]

Notes:
1. There should be no burrs at the hole contact surface.
2. Please contact us if you need a spacer.
3. Release hydraulic pressure can be supplied from the side or bottom surface.
   - Please make a hydraulic release port within the green area in the case supplied from the side.
   - Please make a hydraulic release port within the purple area in the case supplied from the bottom.
4. Base thickness and remaining depth of the lower hole machining (2.5mm) is for when the material is S55C.

**Model No. Indication**

![Image of model no. indication]

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

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>6</td>
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<td>070</td>
<td>075</td>
<td>080</td>
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<td></td>
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<td>0.6</td>
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<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Empty Action</td>
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<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
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</tr>
</tbody>
</table>
| Notes:
- 9. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.
- 10. Workpiece lifting stroke is the function only for lifting option.
- 11. For -T: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)
### External Dimensions

*This drawing shows the released state of SFC2000-G0A-[ ].*

- **Air Blow-Out Hole for Seating Confirmation **</br>- **Seat Surface Outer Diameter φ X**</br>- **Seating Surface Inner Diameter φ W**</br>- **Grip Valve**</br>- **4-Mounting Bolt (Included)**  
  \[M5 \times 0.8 \times 45\]

### Expanding Area Detail

- **Workpiece Lifting Stroke **</br>- **Workpiece Lifting Surface φ Y**</br>- **Clamping Area**

### Workpiece Hole (Gripper) Shape: 1

- **Workpiece Hole (Gripper) Shape: 1**

### Notes:

1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.
2. The port names are marked on the product surface.
   (HYD: Hydraulic Lock Port, FC: Seating Confirmation Air Port, BLOW: Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.
3. The numerical value is only for the workpiece lifting option.
4. For - T: Taper Hole option, the first gripper ridge is the reference diameter.

### Workpiece (Pallet) Hole Dimensions

- **Workpiece Hole Diameter**</br>- **Surface Y**</br>- **Workpiece Hole Mouth Diameter φ d**

### Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.
2. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.
**Machining Dimensions of Mounting Area**

The diagram shows the dimensions for machining the mounting area, including the hole sizes and tolerances. The 2-Hole for Spring Pin dimension should be accurately placed, with distance accuracy within ±0.1 mm.

**Model No. Indication**

- **SFC 2000 G0**
  - **A**
  - **N**
  - **115**
  - **F**

**External Dimensions and Machining Dimensions for Mounting**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Code</th>
<th>SFC2000–G0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Workpiece Hole Diameter**: 9.0 to 13.0 mm (tolerance ±0.1 mm)
- **Clamping Diameter**: Released State
- **Empty Action**: 10.2 to 12.7 mm
- **Allowable Offset**: ±0.5 mm
- **Full Stroke**: 4.2 mm
- **Workpiece Pulling Stroke**: 1.0 mm
- **Workpiece Lifting Stroke**: 0.2 mm

**Shape of Gripper**

- **Blank, F**
  - **G**: 10, 10, 10, 11.5, 11.5, 11.5, 11.5, 11.5, 11.5
  - **S**: 4.3, 4.3, 4.3, 5.8, 5.8, 5.8, 5.8, 5.8, 5.8, 5.8
  - **U**: 8.6, 9.1, 9.6, 10.1, 10.1, 10.6, 11.1, 11.6, 12.1, 12.6

- **Shape of Gripper T**
  - **G**: 10, 10, 10, 10, 11.5, 11.5, 11.5, 11.5, 11.5, 11.5
  - **S**: 4.3, 4.3, 4.3, 4.3, 5.8, 5.8, 5.8, 5.8, 5.8, 5.8
  - **U**: 8.6, 9.1, 9.6, 10.1, 10.4, 10.9, 11.4, 11.9, 12.4

- **Mx**: 8, 8, 8, 8, 8, 8.6, 8.6, 9.3, 9.3
- **V**: 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5
- **W**: 15, 16, 16, 17, 17, 18, 18, 19, 19
- **X**: 24, 24, 24, 25, 25, 25, 26, 27, 27
- **Y**: 25, 25, 25, 25, 26, 26, 27, 27

**Weight**: 0.8 kg

Notes:

1. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

2. Workpiece lifting stroke is the function only for lifting operation.

3. For -T: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)
Hydraulic Hole Clamp Offset Model

**Workpiece (Pallet) Hole Dimensions**

- **G**: 0.5 or more
- **C0.5 or less
- **Blind Hole** (Straight Hole)

- **Surface**
- **Y**: 0.5 or less

- **Workpiece Hole Diameter**
- **φ**: 0.5 or more

- **Workpiece Hole Diameter**
- **φ**: 0.5 or less

- **Through Hole** (Straight Hole)

- **Workpiece Hole Mouth Diameter**
- **φ**: 0.5 or more

- **Workpiece Hole Mouth Diameter**
- **φ**: 0.5 or less

- **Slope Angle**
- **(3° or less)**

- **C0.5 or less

Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.

   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

2. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

**External Dimensions**

- The drawing shows the released state of SFC2000-M A.

- Workpiece Lifting Stroke
  - Clearance from seating surface when releasing

- Clamping Area

- Released State

- At Full Stroke (Empty Action)

- Cross Section

Notes:

1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

2. Use jack bolts to remove the product, keeping it parallel to the mounting surface.

3. The port names are marked on the product surface. (HYD: Hydraulic Lock Port, FC: Seating Confirmation Air Port, BLOW: Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

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

5. For - T: Taper Hole option, the first gripper ridge is the reference diameter.
Machining Dimensions of Mounting Area

![Diagram of dimensions](image)

Notes:
1. There should be no burrs at the hole contact surface.
2. Please contact us when adding a spacer.
※7. Release hydraulic pressure can be supplied from the side or bottom surface. Please make a hydraulic release port within the area in the case supplied from the side. Please make a hydraulic release port within the area in the case supplied from the bottom.
※8. Base thickness and remaining depth of the lower hole machining (2.5mm) is for when the material is S50C.

Model No. Indication

SFC 2000 - M1 M2 A N - 115 - Blank T F

1. Body Size (When selecting 2)
2. Design No.
3. Mounting Methods (When selecting M1/M2)
4. Workpiece Lifting Option
5. Workpiece Diameter (Workpiece Hole Code)
6. Shape of Gripper (Workpiece Hole)

External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Code</th>
<th>SFC2000-M</th>
<th>Workpiece Hole Diameter (in mm)</th>
<th>Clamping Released State (in mm)</th>
<th>Diameter Empty Action (in mm)</th>
<th>Allowable Offset (in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>E</td>
<td>9.5</td>
<td>0.5</td>
<td>8.5</td>
<td>10.2</td>
<td>±0.5</td>
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<tr>
<td>M2</td>
<td>E</td>
<td>10.0</td>
<td>0.5</td>
<td>9.0</td>
<td>10.7</td>
<td>±0.5</td>
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<tr>
<td></td>
<td>H</td>
<td>11.5</td>
<td>0.5</td>
<td>10.5</td>
<td>11.7</td>
<td>±0.5</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>12.0</td>
<td>0.5</td>
<td>11.0</td>
<td>12.2</td>
<td>±0.5</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>12.5</td>
<td>0.5</td>
<td>11.5</td>
<td>13.2</td>
<td>±0.5</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>13.0</td>
<td>0.5</td>
<td>12.0</td>
<td>14.2</td>
<td>±0.5</td>
</tr>
</tbody>
</table>

Notes:
※9. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.
※10. Workpiece lifting stroke is the function only for lifting option.
※11. For -T: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)
Hydraulic Hole Clamp  Offset Model  model SFC3000-G0

External Dimensions

※ This drawing shows the released state of SFC3000-G0A-□□.

Expanding Area Detail

Workpiece Lifting Stroke ※ 3
(Clearance from seating surface when releasing)

Workpiece Lift Surface ※ 3

Clamping Area

Clamping Dia. ※ 4
(Released State)

Clamping Dia. ※ 4
(Empty Action)

Released State

At Full Stroke
(Empty Action)

Notes:
※ 1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

※ 2. The port names are marked on the product surface. (HYD: Hydraulic Lock Port, FC: Seating Confirmation Air Port, BLOW: Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

※ 3. The numerical value is only for the workpiece lifting option.

※ 4. For - T: Taper Hole option, the first gripper ridge is the reference diameter.

Workpiece (Pallet) Hole Dimensions

Notes:
1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.

   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

※ 5. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.
Machining Dimensions of Mounting Area

![Diagram showing machining dimensions]

Notes:
1. There should be no burrs at the hole contact surface.
2. Please make a hydraulic release port within the range of 

Model No. Indication

```
SFC 3 00 0 - GO A N - 150 - Blank T F
```

External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Workpiece Hole Code</th>
<th>SFC300-G0</th>
<th>Blank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workpiece Hole Dia. (d)</td>
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<td>13.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Clamping</td>
<td>Released State</td>
<td>12.5</td>
<td>13</td>
</tr>
<tr>
<td>Diameter</td>
<td>Empty Action</td>
<td>14.2</td>
<td>14.7</td>
</tr>
<tr>
<td>Allowable Offset (Plunger Clearance of Expanding Area)</td>
<td>±0.5</td>
<td>4.2</td>
<td></td>
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<tr>
<td>Full Stroke</td>
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<td></td>
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<tr>
<td>Workpiece Pulling Stroke</td>
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<tr>
<td>Workpiece Lifting Stroke</td>
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</tbody>
</table>

Notes:
7. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.
8. Workpiece lifting stroke is the function only for lifting option.
9. For -T: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)
**External Dimensions**

※ This drawing shows the released state of SFC3000-M[ ]A-[].

![Drawing of hydraulic hole clamp](image)

**Expanding Area Detail**

Workpiece Lifting Stroke ※ 4
(Tolerance from seating surface when releasing)

Clamping Area

Clamping Dia. ※ 5
(Released State)

At Full Stroke (Empty Action)

Workpiece Hole (Gripper) Shape ※ 7

Cross Section ★ ★

Notes:
※ 1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.
※ 2. Use jack bolts to remove the product, keeping it parallel to the mounting surface.
※ 3. The port names are marked on the product surface. (HYD: Hydraulic Lock Port, FC: Seating Confirmation Air Port, BLOW: Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.
※ 4. The numerical value is only for the workpiece lifting option.
※ 5. For -T: Taper Hole option, the first gripper ridge is the reference diameter.

**Workpiece (Pallet) Hole Dimensions**

![Diagram of workpiece hole dimensions](image)

Notes:
1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification. Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.
※ 6. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.
**Machining Dimensions of Mounting Area**

4-M6×1 Thread Depth 11 or more

**Model No. Indication**

<table>
<thead>
<tr>
<th>SFC 300 0</th>
<th>M1</th>
<th>A</th>
<th>150</th>
<th>T</th>
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<tbody>
<tr>
<td>Model No.</td>
<td>Workpiece Hole Code</td>
<td>M</td>
<td>N</td>
<td>F</td>
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</table>

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

<table>
<thead>
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<th>Workpiece Hole Code</th>
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<th>130</th>
<th>135</th>
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<th>150</th>
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<th>160</th>
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<tbody>
<tr>
<td>Workpiece Hole Diam. φ</td>
<td>Blank, F</td>
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<td>13.0</td>
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<tr>
<td>Clamping</td>
<td>Released State</td>
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<td>Empty Action</td>
<td>14.2</td>
<td>14.7</td>
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<td>16.2</td>
<td>16.7</td>
<td>17.2</td>
<td>17.7</td>
</tr>
</tbody>
</table>

Notes:
1. There should be no burrs at the hole contact surface.
2. Please contact us when adding a spacer.
3. Release hydraulic pressure can be supplied from the side or bottom surface. Please make a hydraulic release port within ◆ area in the case supplied from the side. Please make a hydraulic release port within ◆ area in the case supplied from the bottom.
4. Base thickness and remaining depth of the lower hole machining (2.5mm) is for when the material is S50C.

**Hole Clamp**

- SFA
- SFC
- Swing Clamp
  - LH A
  - LH C
  - LH S
  - LH W
  - LG/LT
  - TL B-2
  - TL A-1
- Link Clamp
  - LKA
  - LKC
  - LKW
  - LJ/LM
  - TMA-2
  - TMA-1
- Work Support
  - LD
  - LC
  - TNC
  - TC
- Air Sensing Lift Cylinder
  - LLW
- Linear Cylinder / Compact Cylinder
  - LL
  - LLR
  - LLU
  - DP
  - DR
  - DS
  - DT
- Block Cylinder
  - DBA/DBC
- Centering Vise
  - FVA
  - FVD
  - FVC
- Control Valve
  - BZL
  - BZT
  - BZX/JZG
  - BZS
- Pallet Clamp
  - VS/VT
- Expansion Locating Pin
  - VFL/VFM
  - VFJ/VFK
- Pull Stud Clamp
  - FP
  - FQ
- Customized Spring Cylinder
  - DWA/DWB

418
Mounting Layout Sample

This drawing shows a combination layout sample of SFC (Hole Clamp) and VFM (Expansion Locating Pin).

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

This drawing shows a combination circuit reference of SFC (Hole Clamp) and VFM (Expansion Locating Pin).

When controlled with one solenoid valve

When controlled with two solenoid valves

Notes:
1. Please use solenoid valve to make a sequence operation that SFC (Hole Clamp) starts working after VFM (Expansion Locating Pin) completes the movement. When unable to use solenoid valve, please prepare flow control valve with check valve at 1 (1 piece) to adjust sequencing speed. If SFC operates before VFM, there is a possibility for the equipment to be damaged due to a thrust load on SFC.
2. Expanded VFM cylinder sometimes releases (unclamps) due to a back pressure of tank-port.
   Please prepare check valve (recommend cracking pressure: less than 0.04MPa).
3. In case high accuracy is required for air sensor setting, please install an air sensor for individual clamp.
Cautions

- Notes for Design

1) Check Specifications
   - Please use each product according to the specifications.
   - This product is a hydraulic double-acting model which locks and releases with hydraulic pressure.

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

   ![Diagram of Workpiece and Base Plate]
   
   When clamping, make sure all seating surfaces touch a workpiece. When the workpiece is not touching the seating surface area, please refer to external dimension chart and calculate contacting pressure with clamping force and seating area not to deform the workpiece.

3) Seating Confirmation Mechanism
   - It will be detected when a workpiece is pressed against the seating surface by locking (clamping) action.

   ![Diagram of Workpiece Lifting Surface and Bottom of Workpiece]
   
   With lifting function, when workpiece is set (before supplying lock hydraulic pressure), the workpiece is lifted up by built-in spring, and there will be a gap of 0.2mm between workpiece bottom surface and seating surface.

4) Clamp Installation
   - The clamping part of this product has floating structure (±0.5mm). Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

5) Clamping Force
   - Clamping force shows a pressing force against the seating surface.
   - Make sure to conduct test clamping and adjust supply pressure accordingly. Insufficient clamping force and/or expanding force leads to workpiece detachment.

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

<table>
<thead>
<tr>
<th>Condition</th>
<th>Result</th>
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<tbody>
<tr>
<td>When workpiece hole diameter is larger than specification.</td>
<td>Expansion stroke is insufficient and the clamping force will not fill the specifications.</td>
</tr>
<tr>
<td>When using it with insufficient clamping force.</td>
<td>Leads to falling of the workpiece.</td>
</tr>
<tr>
<td>When workpiece hole diameter is smaller than specification.</td>
<td>Difficult to attach/detach the workpiece leading to damage.</td>
</tr>
<tr>
<td>When workpiece hole depth is shallow.</td>
<td>May lead to abnormal seating and damage.</td>
</tr>
<tr>
<td>When workpiece hole taper slope angle is larger than specification.</td>
<td>The load concentrates on the gripper point when clamping and could lead to damage.</td>
</tr>
<tr>
<td>When workpiece hole is harder than specified.</td>
<td>Gripper does not dig into the workpiece enough and it cannot clamp securely.</td>
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</tbody>
</table>

7) Wall Thickness around Workpiece Hole
   - Thin wall around the workpiece hole could be deformed by clamping action, and clamping force does not fill the specification. Make sure to conduct test clamping and adjust supply pressure accordingly. Insufficient clamping force leads to workpiece detachment.

8) Air Blow Port and Seating Confirmation Port
   - Continuously supply air pressure to the air blow port and the seating confirmation port.
   - If air supply is shut off during operation, contaminants enter into the clamp leading to malfunctions.
9) Release Action
- When releasing, it lifts up a workpiece which is normal.
- When using in a horizontal application, it is recommended to install a fall prevention of workpiece for temporal tacking.

Temporal Tacking

10) Horizontal Locating
- When a workpiece is set, please make sure there is no lifting or slope of the workpiece. If the clamping operation is done with lifting or slope of the workpiece, it will lead to possible damage of a clamp and deformation of the workpiece hole.

11) Please detach a workpiece with all clamps fully released.
- When a workpiece is detached during lock or release operation, it will lead to damage of clamp or fall of workpiece.

12) Please set up rough guides.
- When detaching a workpiece with slope it may cause damage of clamp or fall of workpiece.

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

Installation Notes

1) Check the Usable Fluid
The appropriate fluid for general use is listed below (P. 1355).

2) Installation / Removal of Hole Clamp
* Use four hexagonal socket bolts for mounting (with tensile strength of 12.9) and tighten them with the torque shown in the table below. Tighten them evenly to prevent twisting or jamming.

<table>
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<tr>
<th>Model No.</th>
<th>Thread Size</th>
<th>Tightening Torque (N·m)</th>
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<tr>
<td>SFA/SFC1000</td>
<td>M4 × 0.7</td>
<td>3.2</td>
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<tr>
<td>SFA/SFC2000</td>
<td>M5 × 0.8</td>
<td>6.3</td>
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<tr>
<td>SFA/SFC3000</td>
<td>M6 × 1</td>
<td>10.0</td>
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</table>

When removing a hole clamp of mounting length 10mm/20mm, use threaded jack bolt (SFA: 4 mounting bolt holes, SFC: 2 mounting bolt holes), in order not to damage the installation tap. The following shows the case in which the pin (hollow set) is set in the tapped hole so that the installation tap will not be damaged.

3) Port Position of the Hole Clamp
The names of the ports are marked on the product surface.
Be careful of installation direction.
(HYD: Hydraulic Lock Port, FC: Seating Confirmation Port, BLOW: Air Blow Port)
Release pressure is supplied from the bottom of the cylinder.

4) Use air piping with outer diameter Φ 6 (inner diameter Φ 4) or larger for air blow.
In order to conduct an effective air blow, it is recommended to use air piping with outer diameter Φ 6 (inner diameter Φ 4) or larger.

5) Restarting at Hydraulic Pressure OFF (Neutral) State.
It is recommended to supply hydraulic pressure from the release side at the first hydraulic supply after installing a clamp, or when restarting at both lock and release hydraulic pressure OFF (neutral) state.
When supplying hydraulic pressure from the lock side, a small amount of oil may leak from the clamping part for a moment, but this is not a functional problem.

Maintenance and Inspection

1) Please refer to P. 1357 for general maintenance.
2) Regularly clean the clamping part and the seating surface.
There is an air blow mechanism in this product, and cutting chips and coolant can be removed. However, as it may be hard to remove clinging cutting chips, sludge, etc., please confirm there are no contaminants when a workpiece is set.
If operating with dirt adhering to the clamping part, it will lead to a workpiece fall due to insufficient clamping force, defective operation, and air leakage.

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

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

※ Please refer to P. 1355 for common cautions.

• Installation Notes  • Hydraulic Fluid List  • Notes on Hydraulic Cylinder Speed Control Circuit
• Notes on Handling  • Maintenance/Inspection  • Warranty
### MEMO

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<th>High-Power Series</th>
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<tr>
<td>Pneumatic Series</td>
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<td><strong>Hydraulic Series</strong></td>
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<tr>
<td>Valve / Coupler</td>
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<tr>
<td>Hydraulic Unit</td>
</tr>
<tr>
<td>Manual Operation Accessories</td>
</tr>
<tr>
<td>Cautions / Others</td>
</tr>
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</table>

#### Hole Clamp
- **SFA**
- **STC**

#### Swing Clamp
- LHA
- LHC
- LHS
- LHW
- LG/LT
- TLA-2
- TLA-2
- TLA-1

#### Link Clamp
- LRA
- LKC
- LWK
- LJ/LM
- TMA-2
- TMA-1

#### Work Support
- LD
- LE
- TNC
- TC

#### Air Sensing
- Lift Cylinder
- LLW

#### Linear Cylinder / Compact Cylinder
- LL
- LLR
- LLU
- DP
- DR
- DS
- DT

#### Block Cylinder
- DBA/DBC

#### Centering Vise
- FVA
- FVD
- FVC

#### Control Valve
- BZL
- BZT
- BZX/JZG

#### Pallet Clamp
- V5/VT

#### Expansion Locating Pin
- VF/L/VFM
- VF/L/VFK

#### Pull Stud Clamp
- FP
- FQ

#### Customized
- Spring Cylinder
- DWA/DWB
Cautions

Installation Notes (For Hydraulic Series)

1) Check the Usable Fluid
   ● Please use the appropriate fluid by referring to the Hydraulic Fluid List.

2) Procedure before Piping
   ● The pipeline, piping connector and fixture circuits should be cleaned
     by thorough flushing.
   ● The dust and cutting chips in the circuit may lead to fluid leakage
     and malfunction.
   ● There is no filter provided with Kosmek’s product except for a part
     of valves which prevents foreign materials and contaminants from
     getting into the circuit.

3) Applying Sealing Tape
   ● Wrap with tape 1 to 2 times following the screw direction.
   ● Pieces of the sealing tape can lead to oil leakage and malfunction.
   ● Please implement piping construction in a clear environment to
     prevent anything getting in products.

4) Air Bleeding of the Hydraulic Circuit
   ● If the hydraulic circuit has excessive air, the action time may become
     very long. If air enters the circuit after connecting the hydraulic port
     or under the condition of no air in the oil tank, please perform
     the following steps.

   ① Reduce hydraulic pressure to less than 2MPa.
   ② Loosen the cap nut of pipe fitting closest to the clamp by one full turn.
   ③ Shake the pipeline to loosen the outlet of pipe fitting.
     Hydraulic fluid mixed with air comes out.

   ④ Tighten the cap nut after bleeding.
   ⑤ It is more effective to release air at the highest point inside
     the circuit or at the end of the circuit.
     (Set an air bleeding valve at the highest point inside the circuit.)

5) 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.

Hydraulic Fluid List

<table>
<thead>
<tr>
<th>ISO Viscosity Grade</th>
<th>Maker</th>
<th>Anti-Wear Hydraulic Oil</th>
<th>Multi-Purpose Hydraulic Oil</th>
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<tr>
<td>3.2</td>
<td>Showa Shell Sekiyu</td>
<td>Tellus S2 M 32</td>
<td>Morina S2 B 32</td>
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<td>32</td>
<td>Idemitsu Kosen</td>
<td>Daphne Hydraulic Fluid 32</td>
<td>Daphne Super Multi Oil 32</td>
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<tr>
<td>32</td>
<td>JX Nippon Oil &amp; Energy</td>
<td>Super Hyrando 32</td>
<td>Super Mulpus DX 32</td>
</tr>
<tr>
<td>32</td>
<td>Cosmo Oil</td>
<td>Cosmo Hydro AWS32</td>
<td>Cosmo New Mighty Super 32</td>
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<tr>
<td>32</td>
<td>ExxonMobil</td>
<td>Mobil DTE 24</td>
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<td>Hydol AW-32</td>
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<tr>
<td>32</td>
<td>Castrol</td>
<td>Hyspin AWS 32</td>
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Note: Please contact manufacturers when customers require products in the list above.
Notes on Hydraulic Cylinder Speed Control Unit

Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Flow Control Circuit for Single Acting Cylinder
For spring return single acting cylinders, restricting flow during release can extremely slow down or disrupt release action. The preferred method is to control the flow during the lock action using a valve that has free-flow in the release direction. It is also preferred to provide a flow control valve at each actuator.

Accelerated clamping speed by excessive hydraulic flow to the cylinder may sustain damage. In this case add flow control to regulate flow. (Please add flow control to release flow if the lever weight is put on at the time of release action when using swing clamps.)

Flow Control Circuit for Double Acting Cylinder
Flow control circuit for double acting cylinder should have meter-out circuits for both the lock and release sides. Meter-in control can have adverse effect by presence of air in the system. However, in the case of controlling LKE, TMA, TLA, both lock side and release side should be meter-in circuit. Refer to P.75 for speed adjustment of LKE.

For TMA and TLA, if meter-out circuit is used, abnormal high pressure is created, which causes oil leakage and damage.

【Meter-out Circuit】(Except LKE/TMA/TLA)

【Meter-in Circuit】(LKE/TMA/TLA must be controlled with meter-in.)

In the case of meter-out circuit, the hydraulic circuit should be designed with the following points.

1. Single acting components should not be used in the same flow control circuit as the double acting components. The release action of the single acting cylinders may become erratic or very slow.

Refer to the following circuit when both the single acting cylinder and double acting cylinder are used together.

- Separate the control circuit.

- Reduce the influence of double acting cylinder control unit. However, due to the back pressure in tank line, single action cylinder is activated after double action cylinder works.

- In the case of meter-out circuit, the inner circuit pressure may increase during the cylinder action because of the fluid supply. The increase of the inner circuit pressure can be prevented by reducing the supplied fluid beforehand via the flow control valve. Especially when using sequence valve or pressure switches for clamping detection, if the back pressure is more than the set pressure then the system will not work as it is designed to.
### Cautions

#### Notes on Handling

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

2. Do not operate or remove the product unless the safety protocols are ensured.
   - The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.

3. Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.

4. After stopping the product, do not remove until the temperature drops.

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

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

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

### Maintenance and Inspection

1. Removal of the Machine and Shut-off of Pressure Source
   - Before the machine is removed, make sure that 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 and plunger.
   - If it is used when the surface is contaminated with dirt, it may lead to packing seal damage, malfunctioning and fluid leakage.

   - The locating products, except VX/VXE/VXF model, can remove contaminants with cleaning functions. However, hardened cutting chips, adhesive coolant and others may not be removed. Make sure there are no contaminants before installing a workpiece/pallet.
   - Continuous use with contaminant on components will lead to locating accuracy failure, malfunction and fluid leakage.

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

5. Regularly tighten nut, bolt, pin, cylinder, pipe line and others to ensure proper use.

6. Make sure the hydraulic fluid has not deteriorated.

7. 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.

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

9. Please contact us for overhaul and repair.
Warranty

1) Warranty Period

The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.

2) Warranty Scope

- If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense.
- Defects or failures caused by the following are not covered:
  1. If the stipulated maintenance and inspection are not carried out.
  2. If the product is used while it is not suitable for use based on the operator’s judgment, resulting in defect.
  3. If it is used or operated in an inappropriate way by the operator.
     (Including damage caused by the misconduct of the third party.)
  4. If the defect is caused by reasons other than our responsibility.
  5. If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
  6. Other caused by natural disasters or calamities not attributable to our company.
  7. Parts or replacement expenses due to parts consumption and deterioration.
     (Such as rubber, plastic, seal material and some electric components.)

Damages excluding from direct result of a product defect shall be excluded from the warranty.
# Sales Offices

## Sales Offices across the World

<table>
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<th>Region</th>
<th>Company Name</th>
<th>TEL.</th>
<th>FAX.</th>
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<tbody>
<tr>
<td><strong>JAPAN</strong></td>
<td>KOSMEK LTD.</td>
<td>+81-78-991-5162</td>
<td>+81-78-991-8787</td>
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<tr>
<td>HEAD OFFICE</td>
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<tr>
<td>Overseas Sales</td>
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<tr>
<td>United States of America</td>
<td>KOSMEK (USA) LTD.</td>
<td>+1-630-620-7650</td>
<td>+1-630-620-9015</td>
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<td>MEXICO</td>
<td>KOSMEK USA</td>
<td>+52-442-161-2347</td>
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<td>EUROPE</td>
<td>KOSMEK EUROPE GmbH</td>
<td>+43-463-287587</td>
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<td>CHINA</td>
<td>KOSMEK (CHINA) LTD.</td>
<td>+86-21-54253000</td>
<td>+86-21-54253709</td>
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<tr>
<td><strong>THAILAND</strong></td>
<td>KOSMEK Thailand Representation Office</td>
<td>+66-2-300-5132</td>
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<tr>
<td><strong>TAIWAN</strong></td>
<td>FULL LIFE TRADING CO., LTD.</td>
<td>+886-2-82261860</td>
<td>+886-2-82261890</td>
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<td>(Taiwan Exclusive Distributor)</td>
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For further information on unlisted specifications and sizes, please call us.

Specifications in this catalog are subject to change without notice.

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Overseas Affiliates and Sales Offices

Distributors

Asia Detailed Map

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1377
Global Network

Overseas Affiliates and Sales Offices
Distributors

Asia Detailed Map

KOSMEK
Harmony in Innovation

FOR FURTHER INFORMATION ON UNLISTED SPECIFICATIONS AND SIZES, PLEASE CALL US.
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