**Air Sensing Lift Cylinder**  
Hydraulic Double Action  
Model LLW

**Compact and Space-Saving Lift Cylinder**  
With built-in action confirmation valve LLW is ideal for automated equipment. The stroke can be set in 5mm increments. PAT.

LLW is much more compact than the conventional model LL.

<Comparison Model>  
LL0400-CAM-025  
(Stroke 25mm)

<Air Sensing Model>  
LLW0401-CAE-025  
(Stroke 25mm)
**Application Examples**

For Lifting

For Shifting

**Cross Section**

- 3 body sizes which are most suitable to space-saving.

- Built-in sensing valve enables to design an extremely small height fixtures. Zero air leakage when the valve is closed. Air sensor with limited flow rate is available.

- The stroke can be set in 5mm increments in the range of 10 ~ 50mm (75mm).※1
  ※1. LLW0361/LLW0401: up to 50mm, LLW0481: up to 75mm

- Tip shape is selectable from 4 types.

- Able to Attach Speed Control Valve Directly
  It is available for directly mounting the speed control valve with air venting function. (Speed control valve is sold separately.)
**Action Description**

- **Push (Supplying hydraulic pressure to push side)**
  
  The piston rod ascends.

<table>
<thead>
<tr>
<th>Hydraulic Pressure</th>
<th>Air Catch Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
</tr>
</tbody>
</table>

  **Push-end Confirmation Valve**
  
  (Circuit diagram differs depending on the sensor.)

  **Push Side: Sensing Chart**
  
  - Supplying Hyd. Pressure to Push Side: Air Catch Sensor = ON
  - Supplying Hyd. Pressure to Pull Side: Air Catch Sensor = OFF

  The spool is pushed back by the piston rod, and the valve is closed.

  - The spool is pushed forward by the built-in spring, and the valve is opened.

  ※1. The sensor pressure for opening the valve depends on the sensor. With air sensor with large air flow, the sensor pressure for opening the valve is higher and the differential pressure for detection is lower.
Pull (Supplying hydraulic pressure to pull side)

The piston rod descends.
- *If releasing the pull side pressure at this state, the piston rod may move with the built-in spring force.*

<table>
<thead>
<tr>
<th>Hydraulic Pressure</th>
<th>Air Catch Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Pull-end Confirmation Valve

- Supplying Hyd. Pressure to Pull Side: Air Catch Sensor: ON
  - Spool
  - Piston Rod
  - Valve Closed
  - Air Supply
  - The spool is pushed back by the piston rod, and the valve is closed.

- Supplying Hyd. Pressure to Push Side: Air Catch Sensor: OFF
  - Spool
  - Valve Opened
  - Air Supply
  - Built-In Spring
  - Air Vent
  - The spool is pushed forward by the built-in spring, and the valve is opened.

Pull Side: Sensing Chart

- (Supply Air Pressure) 0.2
- Air Catch Sensor Set Pressure (ON) 0.1 ~ 0.2 MPa
- Pressure when Valve Closed
- Pressure when Valve Opened

### Notes

1. The sensor pressure for opening the valve depends on the sensor. With air sensor with large air flow, the sensor pressure for opening the valve is higher and the differential pressure for detection is lower.
**Action Description (Explanation about Sensing and Air Sensing Chart)**

Action confirmation of the piston rod can be conducted by detecting differential pressure with the air catch sensor connected to the push-end confirmation port and pull-end confirmation port.

**Air Catch Sensor**

- Air catch sensor is required in order to conduct action confirmation of the piston rod.
- Sensing can be done by the air catch sensor with small air flow (recommended models are in the table below).

**Recommended Operating Air Pressure**: 0.1 ~ 0.2MPa

**Recommended Air Catch Sensor**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>SMC</th>
<th>CKD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Air Catch Sensor</td>
<td>Gap Switch</td>
</tr>
<tr>
<td>Model No.</td>
<td>ISA3-G</td>
<td>GPS3-E</td>
</tr>
</tbody>
</table>

- Please refer to manufacturer’s catalog or other documents for the details about the air catch sensor.
- The air pressure to the air catch sensor should be 0.1 ~ 0.2MPa.
- Please keep supplying air pressure when in use.
- Refer to the drawing below for the air circuit structure.

**Notes for Design and Installation**

- Please keep clear condition at the air vent port / vent hole, and prevent coolant and chips from entering the port / hole. The air sensor can malfunction if the air vent port / vent hole is blocked.
- Prevention of Contaminants to the Air Vent Port / Vent Hole
  Coolant and chips can be prevented by setting a check valve with low cracking pressure. (Recommended check valve: SMC-made series AKH, cracking pressure: 0.005MPa)

**Check Valve**

- Keep clear condition at the air vent hole.
- Coolant and chips enter from the air vent hole.
- Keep supplying air pressure to the air port when in use.
Air Sensing Chart

Number Directly Connected to Clamp : 1

Notes:
1. The sensing chart shows the relationship between the stroke and detection circuit air pressure.
2. The specifications may vary depending on the air circuit. The length of hose should be as short as possible. (Suggest shorter than 5m)
3. There is only push-end confirmation for sensing valve symbol [1], and only pull-end confirmation for sensing valve symbol [2].
   ※1. There is a certain tolerance with regard to the position where the pressure for closing the valve is reached depending on the sensor structure. (Refer to the sensing chart.)
   ※2. The location of a signal from air sensor output varies depending on the sensor setting.
   ※3. The sensor pressure for opening the valve depends on the sensor.

With air sensor with large air flow, the sensor pressure for opening the valve is higher and the differential pressure for detection is lower.
Model No. Indication

**LLW 048 1 - C A E - 025**

1 **Body Size**

- **036**: $\phi D=36\text{mm}$
- **040**: $\phi D=40\text{mm}$
- **048**: $\phi D=48\text{mm}$

*(Outer diameter ($\phi D$) of the cylinder.)*

2 **Design No.**

- 1: Revision Number

3 **Piping Method**

- **C**: Gasket Option (With G Thread Plug)

*With G Thread Plug (able to attach Speed Control Valve) (Order the valve separately Recommended : BZL-8)*

*(Speed control valve (BZL) is sold separately. Please refer to P.947.)*

4 **Shape of Piston Tip**

- **A**: Female Threaded
- **B**: Female Threaded (With Anti-Rotation Pinhole)
- **P**: Pin-Hole
- **T**: Male Threaded

5 **Sensing Valve**

- **E**: Sensing Valves on Both Sides
- **H**: Sensing Valve on Push Side
- **J**: Sensing Valve on Pull Side

6 **Stroke**

*Stroke Value*: Full Stroke

*(Full stroke is set in 5mm increments.)*

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LLW0361-C</th>
<th>LLW0401-C</th>
<th>LLW0481-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke</td>
<td>10–50 (in 1mm increments)</td>
<td>10–50 (in 1mm increments)</td>
<td>10–75 (in 5mm increments)</td>
</tr>
</tbody>
</table>

Push End

Full Stroke

Pull End

Push-end Confirmation Valve

When selecting **E, H**

Pull-end Confirmation Valve

When selecting **E, J**
Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LLW0361-C</th>
<th>LLW0401-C</th>
<th>LLW0481-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke Y (mm)</td>
<td>10 ~ 50 (in 5mm increments)</td>
<td>10 ~ 50 (in 5mm increments)</td>
<td>10 ~ 75 (in 5mm increments)</td>
</tr>
<tr>
<td>Cylinder Area (cm²)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push Side</td>
<td>4.5</td>
<td>5.3</td>
<td>8.0</td>
</tr>
<tr>
<td>Pull Side</td>
<td>2.5</td>
<td>2.8</td>
<td>4.9</td>
</tr>
<tr>
<td>Cylinder Force (kn)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Push Side (Calculation Formula)</td>
<td>10 × 0.45</td>
<td>10 × 0.53</td>
<td>10 × 0.80</td>
</tr>
<tr>
<td>Pull Side (Calculation Formula)</td>
<td>10 × 0.25</td>
<td>10 × 0.28</td>
<td>10 × 0.49</td>
</tr>
<tr>
<td>Cylinder Capacity (cm³)</td>
<td>10 × 0.45</td>
<td>10 × 0.53</td>
<td>10 × 0.80</td>
</tr>
<tr>
<td>Push Side (Calculation Formula)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pull Side (Calculation Formula)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinder Inside Diameter (mm)</td>
<td>24</td>
<td>26</td>
<td>32</td>
</tr>
<tr>
<td>Rod Diameter (mm)</td>
<td>16</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Hyd. Pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Operating Pressure (MPa)</td>
<td>7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Operating Pressure (MPa)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure (MPa)</td>
<td>10.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended Operating Air Pressure (MPa)</td>
<td>0.1 ~ 0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended Air Catch Sensor</td>
<td>ISA3-G (SMC) / GP53-E (CKD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature (°C)</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.6 ~ 0.8</td>
<td>0.7 ~ 0.9</td>
<td>1.0 ~ 1.6</td>
</tr>
</tbody>
</table>

Note: \( P \): Supply Hydraulic Pressure (MPa) \ Y: Full Stroke (mm)

Performance Curve

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Cylinder Force (Push Side) (kN)</th>
<th>Cylinder Force (Pull Side) (kN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW0361-C</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td>LLW0401-C</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>LLW0481-C</td>
<td>0.8</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Notes:
1. The chart and graph show the relationship between the cylinder force and supply hydraulic pressure.
2. Cylinder force (kn) is the theoretical value. Actual force may decrease because of friction and pressure loss.
Tip Shape:

- **A**: Female Threaded
- **B**: Female Threaded (With Anti-Rotation Pinhole)

Notes:

1. Mounting bolts are not provided. Please prepare based on dimension S.
2. Please keep clear condition at the air vent hole, and prevent coolant and chips from entering the hole.
   If exposed to coolant, install an attachment to M3 thread to prevent coolant and chips, but do not block the air vent hole.
3. The port names are marked on the body surface. (PUSH HYD: Hydraulic port on the push side, PULL HYD: Hydraulic port on the pull side, PUSH CHECK: Air port on the push side, PULL CHECK: Air port on the pull side, VENT: Air vent port)
4. Speed control valve is sold separately. Please refer to P.947.
Machining Dimensions for Mounting Area

- Not required to follow the dimension FA when mounting to a through hole.
- Determine the plate thickness accordingly.

External Dimensions and Machining Dimensions for Mounting

**Female Threaded** (With Anti-Rotation Pinhole) (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LLW0361-CA</th>
<th>LLW0401-CA.</th>
<th>LLW0481-CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke Y</td>
<td>10, 15</td>
<td>20–50 (m/min increments)</td>
<td>10, 15</td>
</tr>
<tr>
<td>A</td>
<td>58</td>
<td>Y+43</td>
<td>59</td>
</tr>
<tr>
<td>B</td>
<td>58</td>
<td>63</td>
<td>71</td>
</tr>
<tr>
<td>C</td>
<td>40</td>
<td>45</td>
<td>51</td>
</tr>
<tr>
<td>D</td>
<td>36</td>
<td>40</td>
<td>48</td>
</tr>
<tr>
<td>E</td>
<td>49</td>
<td>Y+34</td>
<td>49</td>
</tr>
<tr>
<td>F</td>
<td>24</td>
<td>Y+9</td>
<td>24</td>
</tr>
<tr>
<td>G</td>
<td>25</td>
<td>25</td>
<td>28</td>
</tr>
<tr>
<td>H</td>
<td>29</td>
<td>31.5</td>
<td>35.5</td>
</tr>
<tr>
<td>K</td>
<td>31.4</td>
<td>34</td>
<td>40</td>
</tr>
<tr>
<td>L</td>
<td>66</td>
<td>73</td>
<td>83</td>
</tr>
<tr>
<td>M</td>
<td>11</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Nx</td>
<td>23.5</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>Ny</td>
<td>8</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Q</td>
<td>7.5</td>
<td>9.5</td>
<td>9.5</td>
</tr>
<tr>
<td>R</td>
<td>4.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>S</td>
<td>16</td>
<td>14</td>
<td>15.5</td>
</tr>
<tr>
<td>T</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>U</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>W</td>
<td>7.5</td>
<td>7.5</td>
<td>8.5</td>
</tr>
<tr>
<td>BB</td>
<td>14</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>BC (Nominal x Pitch Depth)</td>
<td>M6 x 1 x 12</td>
<td>M8 x 1.25 x 16</td>
<td>M8 x 1.25 x 16</td>
</tr>
<tr>
<td>Vb</td>
<td>[only]</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Wb</td>
<td>[only]</td>
<td>5.5</td>
<td>5</td>
</tr>
<tr>
<td>EC</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>ED</td>
<td>45°</td>
<td>60°</td>
<td>60°</td>
</tr>
<tr>
<td>EE</td>
<td>30</td>
<td>31.6</td>
<td>39</td>
</tr>
<tr>
<td>EF</td>
<td>30°</td>
<td>0°</td>
<td>0°</td>
</tr>
<tr>
<td>FA</td>
<td>24.5</td>
<td>Y+9.5</td>
<td>24.5</td>
</tr>
<tr>
<td>FB</td>
<td>15.5</td>
<td>Y+0.5</td>
<td>15.5</td>
</tr>
<tr>
<td>FC (Nominal x Pitch)</td>
<td>M4 x 0.7</td>
<td>M5 x 0.8</td>
<td>M5 x 0.8</td>
</tr>
<tr>
<td>O-ring</td>
<td>DA</td>
<td>A5568-069801</td>
<td>A5568-007901</td>
</tr>
</tbody>
</table>

**Male Threaded**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LLW0361-CT</th>
<th>LLW0401-CT</th>
<th>LLW0481-CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Stroke Y</td>
<td>10, 15</td>
<td>20–50 (m/min increments)</td>
<td>10, 15</td>
</tr>
<tr>
<td>At</td>
<td>74</td>
<td>Y+59</td>
<td>79</td>
</tr>
<tr>
<td>Tt</td>
<td>25</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>Ut</td>
<td>12</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Vt</td>
<td>16</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>Wt</td>
<td>7.5</td>
<td>7.5</td>
<td>8.5</td>
</tr>
<tr>
<td>CB</td>
<td>14</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>CC (Nominal x Pitch)</td>
<td>M10 x 1.25</td>
<td>M12 x 1.25</td>
<td>M14 x 1.25</td>
</tr>
</tbody>
</table>
Cautions

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

2) Notes for Circuit Design
   ● Please read "Notes on Hydraulic Cylinder Speed Control Unit" for proper hydraulic circuit design. Improper circuit design may lead to malfunctions and damages. (Refer to P. 1356)
   ● Ensure there is no possibility of supplying hydraulic pressure to the push side and the pull side simultaneously.

3) Notes for Pipe Design
   ● It is recommended to select as large diameter pipe as possible.
     The back pressure is proportional to the pipe size, so if the pipes are small the releasing and locking times will be longer.

4) Protect the exposed area of the piston rod when using on a welding fixture.
   ● If spatter attaches to the sliding surface it could lead to malfunction and fluid leakage.

5) The Load Direction Given to the Piston Rod
   ● Make sure no force is applied to the piston rod except from the axial direction. Usage like the one shown in the figure below will apply a large bending stress to the piston rod and must be avoided.

   In case a load is applied except from the axial direction

6) When Clamping on a Sloped Surface of a Workpiece
   ● When clamping an inclined surface, make sure that the clamping area is level when looking from the cylinder side. The clamping surface and the cylinder mounting surface should be parallel.
   A workpiece may move and a piston rod may slip when a cylinder is used on an inclined surface. (When the workpiece is a casting, it is recommended that a spiked attachment be used for a cylinder on draft angle.)

7) Notes on Sensing Valve
   ● Please refer to the notes for design, installation and use on P. 827.
Installation Notes

1) Check the Usable Fluid
- Please use the appropriate fluid by referring to the Hydraulic Fluid List (P.1355).

2) Installation of the Cylinder
- When mounting the cylinder, 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 dent 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>LLW0361</td>
<td>M4 × 0.7</td>
<td>3.2</td>
</tr>
<tr>
<td>LLW0401</td>
<td>M5 × 0.8</td>
<td>6.3</td>
</tr>
<tr>
<td>LLW0481</td>
<td>M5 × 0.8</td>
<td>6.3</td>
</tr>
</tbody>
</table>

3) Installation / Removal of Attachment
- When installing or removing an attachment, always use a wrench on the piston rod to keep it from turning, and tighten it with the torque shown below.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Thread Size</th>
<th>Tightening Torque (N·m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLW0361-CA/B</td>
<td>M6 × 1</td>
<td>10</td>
</tr>
<tr>
<td>LLW0401-CA/B</td>
<td>M8 × 1.25</td>
<td>16</td>
</tr>
<tr>
<td>LLW0481-CA/B</td>
<td>M8 × 1.25</td>
<td>16</td>
</tr>
</tbody>
</table>

4) Speed Adjustment
- Adjust the rod operating speed of both the push and pull sides to be less than 100mm/sec. Excessive cylinder speed will accelerate wear and lead to component damage.
- Please make sure to release air from the circuit before adjusting the speed. It will be difficult to adjust the speed accurately with air mixed in the circuit.
- Turn the speed control valve gradually from the low-speed side (small flow) to the high-speed side (large flow) to adjust the speed.

※ Please refer to P.1355 for common cautions.
- Installation Notes
- Hydraulic Fluid List
- Notes on Handling
- Notes on Hydraulic Cylinder Speed Control Circuit
- Maintenance/Inspection
- Warranty
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 ISO-VG-32</th>
<th>Maker</th>
<th>Anti-Wear Hydraulic Oil</th>
<th>Multi-Purpose Hydraulic Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showa Shell Sekiyu</td>
<td>Tellus S2 M 32</td>
<td>Morina S2 B 32</td>
<td></td>
</tr>
<tr>
<td>Idemitsu Kosan</td>
<td>Daphne Hydraulic Fluid 32</td>
<td>Daphne Super Multi Oil 32</td>
<td></td>
</tr>
<tr>
<td>JX Nippon Oil &amp; Energy</td>
<td>Super Hyrando 32</td>
<td>Super Mulpus DX 32</td>
<td></td>
</tr>
<tr>
<td>Cosmo Oil</td>
<td>Cosmo Hydro AWS32</td>
<td>Cosmo New Mighty Super 32</td>
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<td>ExxonMobil</td>
<td>Mobil DYE 24</td>
<td>Mobil DYE 24 Light</td>
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<td>Matsumura Oil</td>
<td>Hydrol AW-32</td>
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<tr>
<td>Castrol</td>
<td>Hyspin AWS 32</td>
<td></td>
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</tbody>
</table>

Note: Please contact manufacturers when customers require products in the list above.
*Notes on Hydraulic Cylinder Speed Control Unit*

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

- 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.

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 at the Release Side

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)**

- 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.

**[Meter-in Circuit](LKE/TMA/TLA must be controlled with meter-in.)**

- 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.

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

- Flow Control Valve (Any location is OK)
Cautions

Notes on Handling

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

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

3) Please clean out the reference surfaces on a regular basis (taper reference surface and seating surface) of the locating products. (VS/VT/VFL/VFM/VFF/VFK/WWS/VMK/VX/VXE/VXF)
- The locating products, except VX/XXE/XXF 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.)

Damage excluding from direct result of a product defect shall be excluded from the warranty.
Control Valve

Model BZL
Model BZT
Model BZX
Model JZG
Model BZS

Directly-Attached Speed Control Valve, Air Bleed Valve, G-Thread Plug and Sequence Valve

- Directly Attached to Clamps
  Control Valves:
  Speed control valve, air bleed valve, G-thread plug and sequence valve attached directly into Kosmek hydraulic clamp G-thread piping option.
<table>
<thead>
<tr>
<th>Component</th>
<th>Operating Pressure Range</th>
<th>Action Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Control Valve (For Low Pressure)</td>
<td>7MPa or less</td>
<td>Adjust the flow rate with a wrench. Able to adjust the clamping speed individually.</td>
</tr>
<tr>
<td>Model BZL</td>
<td></td>
<td></td>
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<tr>
<td>→ P.949</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed Control Valve (For High Pressure)</td>
<td>35MPa or less</td>
<td>Air bleeding in the circuit is possible by loosening the speed control valve.</td>
</tr>
<tr>
<td>Model BZT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ P.953</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Bleed Valve</td>
<td>25MPa or less</td>
<td>Air bleeding in the circuit is possible by wrench.</td>
</tr>
<tr>
<td>Model BZX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ P.955</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G Thread Plug</td>
<td>35MPa or less</td>
<td>Air bleeding in the circuit is possible by loosening the G thread plug.</td>
</tr>
<tr>
<td>Model JZG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ P.957</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct-Mount Sequence Valve</td>
<td>7MPa or less</td>
<td>Sequence Valve directly attaches to KOSMEK hydraulic clamp’s G-thread piping option. Controls the operating sequence of each actuator.</td>
</tr>
<tr>
<td>Model BZS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ P.959</td>
<td></td>
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</tbody>
</table>
Control Valve  Speed Control Valve (For Low Pressure)  model BZL

 cô Model No. Indication (Speed Control Valve for Low Pressure)

**BZL 0101 - B**

1 **G Thread Size**

10 : Thread Part G1/8A Thread  
20 : Thread Part G1/4A Thread  
30 : Thread Part G3/8A Thread

2 **Design No.**

1 : Revision Number

3 **Control Method**

A : Meter-in  
B : Meter-out

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BZL0101-A</th>
<th>BZL0201-A</th>
<th>BZL0301-A</th>
<th>BZL0101-B</th>
<th>BZL0201-B</th>
<th>BZL0301-B</th>
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<td>Max. Operating Pressure MPa</td>
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<td></td>
<td></td>
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<td>Withstanding Pressure MPa</td>
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<td>Cracking Pressure MPa</td>
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<td>Max. Passage Area mm²</td>
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<td>Operating Temperature °C</td>
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<td></td>
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<td>0 ~ 70</td>
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<tr>
<td>Tightening Torque for Main Body N·m</td>
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<td>25</td>
<td>35</td>
<td>10</td>
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<td>Weight g</td>
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<td>26</td>
<td>48</td>
<td>12</td>
<td>26</td>
<td>48</td>
</tr>
</tbody>
</table>

Notes:  
1. It must be mounted with recommended torque. Because of the structure of the metal seal, if mounting torque is insufficient, the flow control valve may not be able to adjust the flow rate.  
2. Do not attach a used BZL to other clamps. Flow control will not be made because the bottom depth difference of G thread makes metal seal insufficient.
### Applicable Products

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LHE (Double Action) High-Power Swing Clamp</th>
<th>LHS (Double Action) Swing Clamp</th>
<th>LHW (Double Action) Swing Clamp</th>
<th>LT (Single Action) Swing Clamp</th>
<th>LG (Single Action) Swing Clamp</th>
<th>LKA (Double Action) Link Clamp</th>
<th>LKC (Double Action) Link Clamp</th>
<th>LKE (Double Action) High-Power Link Clamp</th>
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<tr>
<td>BZL0101-A</td>
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<td><img src="image95.png" alt="Diagram" /></td>
<td><img src="image96.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

Note: 1. Flow control circuit for double acting cylinder should have meter-out circuits for both the lock and release sides (except model LKE/TLA/TMA). Meter-in circuits can be adversely affected by any air in the system.
Flow Rate Graph < Hydraulic Fluids ISO-VG32 (25~35°C) >
## External Dimensions

![Diagram of External Dimensions]

### Machining Dimensions of Mounting Area

![Diagram of Machining Dimensions]

**Notes:**
1. Since the Φ area is a sealing part, be careful not to damage it.
2. Since the Φ area is the metal sealing part of BZL, be careful not to damage it. (Especially when deburring)
3. No cutting chips or burr should be at the tolerance part of machining hole.
4. As shown in the drawing, P1 port is used as the hydraulic supply side and P2 port as the clamp side.
5. If mounting plugs or fittings with G thread specification available in the market, the dimension ‘III’ should be 12.5.

## Notes

1. Please read “Notes on Hydraulic Cylinder Speed Control Unit” for proper hydraulic circuit design. Improper circuit design may lead to malfunctions and damages. (Refer to P.1356)
2. It is dangerous to release the air under high pressure. It must be done under lower pressure. (For reference: the minimum operating range of the product within the circuit.)
Model No. Indication (Air Bleed Valve)

**BZX010**

1 G Thread Size

1 : Thread Part G1/8A Thread
2 : Thread Part G1/4A Thread
3 : Thread Part G3/8A Thread

2 Design No.

0 : Revision Number

### Specifications

<table>
<thead>
<tr>
<th></th>
<th>BZX010</th>
<th>BZX020</th>
<th>BZX030</th>
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<tbody>
<tr>
<td>Max. Operating Pressure MPa</td>
<td>25</td>
<td></td>
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<tr>
<td>Withstanding Pressure MPa</td>
<td>37.5</td>
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<td></td>
</tr>
<tr>
<td>G Thread Size</td>
<td>G1/8A</td>
<td>G1/4A</td>
<td>G3/8A</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
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<td></td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 – 70</td>
<td></td>
<td></td>
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<tr>
<td>Tightening Torque for Main Body N·m</td>
<td>10</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Weight g</td>
<td>12</td>
<td>23</td>
<td>36</td>
</tr>
</tbody>
</table>

Notes:
1. Do not over-loosen the plug during air venting.
   (Do not loosen further than 2 turns from the fully closed position.)
2. Air bleeding under high pressure is dangerous. It must be done under lower pressure.
   (For reference: the minimum operation pressure range of the product within the circuit)
3. Refer to the machining dimensions of BZL mounting area when installing BZX into a hydraulic circuit.
### External Dimensions

<table>
<thead>
<tr>
<th></th>
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### Applicable Products

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<tbody>
<tr>
<td>Block Cylinder</td>
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<td></td>
</tr>
<tr>
<td>Link Clamp</td>
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<td></td>
</tr>
<tr>
<td>Swing Clamp</td>
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</tr>
</tbody>
</table>

---

**Lock Nut**

**Plug**

**Body**

**G Thread**

**Hexagon A**

**Plug (Clamp / Cylinder)**

**Exclusive Packing Included**
© Model No. Indication (G Thread Plug with Air Bleeding Function)

J ZG0 1 0

1 G Thread Size

1  : Thread Part G1/8A Thread
2  : Thread Part G1/4A Thread
3  : Thread Part G3/8A Thread

2 Design No.

0  : Revision Number

© Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JZG010</th>
<th>JZG020</th>
<th>JZG030</th>
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</thead>
<tbody>
<tr>
<td>Max. Operating Pressure</td>
<td>MPa</td>
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<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
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<tr>
<td>G Thread Size</td>
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<td>G1/8A</td>
<td>G1/4A</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td></td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
<td></td>
</tr>
<tr>
<td>Tightening Torque</td>
<td>Female Thread Side Material : Steel</td>
<td>N·m</td>
<td>10</td>
</tr>
<tr>
<td>for Main Body</td>
<td>Female Thread Side Material : Aluminum (For LT/LM²)</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Weight</td>
<td>g</td>
<td>7</td>
<td>15</td>
</tr>
</tbody>
</table>

Notes:
1. Air bleeding under high pressure is dangerous. It must be done under lower pressure.
   (For reference: the minimum operation pressure range of the product within the circuit)
2. Refer to the machining dimensions of BZL mounting area when installing JZG into a hydraulic circuit.
   ※1. Body material of LT/LM is aluminum alloy, so install it with the tightening torque for aluminum.
### Applicable Products

<table>
<thead>
<tr>
<th>Model No.</th>
<th>DBA (Double Action) Block Cylinder</th>
<th>DBC (Double Action) Block Cylinder</th>
<th>FVA (Double Action) Centering Vise</th>
<th>FVC (Double Action) Centering Vise</th>
<th>FVD (Double Action) Centering Vise</th>
</tr>
</thead>
<tbody>
<tr>
<td>JZG010</td>
<td>DBA0250-C</td>
<td>DBC0250-C</td>
<td>FVA0401</td>
<td>FVA0631</td>
<td>FVA1000</td>
</tr>
<tr>
<td>JZG020</td>
<td>DBA0400-C</td>
<td>DBC0400-C</td>
<td>FVC1000</td>
<td>FVC1600</td>
<td>FVD4000</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LC (Single Action) Work Support</th>
<th>LHA (Double Action) Swing Clamp</th>
<th>LHC (Double Action) Swing Clamp</th>
<th>LHE (Double Action) High-Power Swing Clamp</th>
<th>LHS (Double Action) Swing Clamp</th>
<th>LW (Double Action) Swing Clamp</th>
<th>LT (Single Action) Linear Cylinder</th>
<th>LG (Single Action) Linear Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>JZG010</td>
<td>LC0262-C</td>
<td>LHA0360-C</td>
<td>LHC0360-C</td>
<td>LHE0360-C</td>
<td>LHS0360-C</td>
<td>LW0360-C</td>
<td>LT0360-C</td>
<td>LG0360-C</td>
</tr>
<tr>
<td>JZG020</td>
<td>LC0752-C</td>
<td>LHA0650-C</td>
<td>LHC0650-C</td>
<td>LHE0650-C</td>
<td>LHS0650-C</td>
<td>LW0650-C</td>
<td>LT0650-C</td>
<td>LG0650-C</td>
</tr>
<tr>
<td>JZG030</td>
<td>LHA0900-C</td>
<td>LHC0900-C</td>
<td>LHS0900-C</td>
<td>LT0900-C</td>
<td>LG0900-C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LKA (Double Action) Link Clamp</th>
<th>LKC (Double Action) Link Clamp</th>
<th>LKE (Double Action) High-Power Link Clamp</th>
<th>LWK (Double Action) Link Clamp</th>
<th>LM (Single Action) Link Clamp</th>
<th>LL (Double Action) Linear Cylinder</th>
<th>LLLR (Double Action) Linear Cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>JZG010</td>
<td>LKA0360-C</td>
<td>LKC0400-C</td>
<td>LKE0400-C</td>
<td>LWK0400-C</td>
<td>LM0400-C</td>
<td>LL0400-C</td>
<td>LLLR0400-C</td>
</tr>
<tr>
<td>JZG020</td>
<td>LKA0650-C</td>
<td>LKC0650-C</td>
<td>LKE0550-C</td>
<td>LWK0650-C</td>
<td>LM0650-C</td>
<td>LL0650-C</td>
<td>LLLR0650-C</td>
</tr>
<tr>
<td>JZG030</td>
<td>LKA0900-C</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model No.</th>
<th>LLW (Double Action) Lift Cylinder</th>
<th>TL2-A (Double Action) Swing Clamp</th>
<th>TLB-2 (Double Action) Swing Clamp</th>
<th>TLA-1 (Single Action) Swing Clamp</th>
<th>TMA-2 (Double Action) Swing Clamp</th>
<th>TMA-1 (Double Action) Swing Clamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>JZG010</td>
<td>LLW036-C</td>
<td>TLB0401-2C</td>
<td>TLB1601-2C</td>
<td>TLA0401-1C</td>
<td>TMA0250-1C</td>
<td>TMA1600-1C</td>
</tr>
<tr>
<td>JZG020</td>
<td></td>
<td></td>
<td>TLB2001-2C</td>
<td>TLA2001-1C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### External Dimensions

- **Model No. JZG010**: A = 14, B = 3.5, C = 8, D = 5, G = G1/8A
- **Model No. JZG020**: A = 18, B = 4.5, C = 9, D = 8, G = G1/4A
- **Model No. JZG030**: A = 22, B = 4.5, C = 10, D = 8, G = G3/8A

- **External Dimensions Diagram**

- **Control Valve**: Digest P.947
- **Specifications**
- **Applicable Products**
- **External Dimensions**

---

### High Power Series
- **Pneumatic Series**
- **Hydraulic Series**
- **Valve / Coupler Hydraulic Unit**
- **Manual Operation Accessories**
- **Cautions / Others**

- **Hole Clamp**: SFA, SFC
- **Swing Clamp**: LHA, LHC, LHS
- **LHW**: LG/LT
- **TLA**: TLA-2, TLR-2, TLA-1

- **Link Clamp**: LKA, LKC
- **LKW**: LJ/LM, LMA-2, LMA-1
- **Work Support**: LD, LE, TNC, TC
- **Air Sensing Lift Cylinder**: LLL

- **Linear Cylinder / Compact Cylinder**
  - **LL**: LLL
  - **LLU**: DP, DR, DS, DT
  - **Block Cylinder**: DBA/DBC
  - **Centering Vise**: FVA, FVC

- **Control Valve**: BZL, BZT, BZX/ZG, BZ5
- **Pallet Clamp**: VS/VT
- **Expansion Locating Pin**: VF/VFM, VJ/VFK
- **Pull Stud Clamp**: FP, FQ
- **Customized Spring Cylinder**: DWA/DWB

---

958
Direct-Mount Sequence Valve

Model BZS

Attaches directly into Kosmek hydraulic clamps G-thread piping option. Easily and securely controls the operating sequence of actuators.

**Model No. Indication**

**BZS 0100**

1. **G Thread Size**
   - 10: G1/8A Thread
   - 20: G1/4A Thread
   - 30: G3/8A Thread

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

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BZS0100</th>
<th>BZS0200</th>
<th>BZS0300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequence Operating Pressure Adjustable Range MPa</td>
<td>1.0 – 6.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Pressure Range MPa</td>
<td>2.0 – 7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>10.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G Thread Size</td>
<td>G1/8A</td>
<td>G1/4A</td>
<td>G3/8A</td>
</tr>
<tr>
<td>Cracking Pressure MPa</td>
<td>0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusting Screw Turn Ratio: Reference MPa/Rev</td>
<td>1.5</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Min. Passage Area P1 → P2 mm²</td>
<td>2.0</td>
<td>5.7</td>
<td>6.5</td>
</tr>
<tr>
<td>P2 → P1 mm²</td>
<td>2.0</td>
<td>5.0</td>
<td>8.2</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 – 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tightening Torque N·m</td>
<td>10</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Weight g</td>
<td>35</td>
<td>82</td>
<td>155</td>
</tr>
</tbody>
</table>

Notes:
1. Please mount to an actuator using Hex. E shown in External Dimensions on P.961 with the tightening torque shown in the list above. Insufficient or excessive tightening torque leads to malfunction.
2. Do not attach a used BZS to other clamps.
3. Sequence movement may not be done because the bottom depth difference of G thread makes metal sealing insufficient.
4. The difference between the set pressure and the supplying pressure should be 1MPa or more.
5. For using multiple sequence valves to operate cylinders in sequence, the difference of each set pressure should be 1MPa or more.
6. Depending on circuit system (actuator capacity, hydraulic pipe diameter, passage length, etc.), sometimes it is necessary to reduce hydraulic flow rate to achieve proper sequence movement. Make sure you are able to control flow rate. (Since BZS is directly mounted on and used exclusively for one actuator, it is easily affected by hydraulic flow rate.)
7. Filter is not built in this product. Please note that contaminants such as cutting chips and sealing tapes entering into the product cause malfunction. Also when internal parts are damaged, it will not operate properly even after removing contaminants.

**Circuit Symbol**

- **What is a Sequence Valve?**

   The sequence valve controls the clamping and positioning sequence of multiple actuators.

   When the incoming side pressure (P1 port) reaches the sequence setting pressure value, the pressure will be supplied to the outgoing side (P2 port). Refer to P.962 for the action description.
## Applicable Products

### BZS0100

<table>
<thead>
<tr>
<th>Model No.</th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DBA (Double Action)</td>
<td>DBC (Double Action)</td>
<td>FVA (Double Action)</td>
<td>FVC (Double Action)</td>
<td>FVD (Double Action)</td>
</tr>
<tr>
<td></td>
<td>Block Cylinder</td>
<td>Block Cylinder</td>
<td>Centering Vise</td>
<td>Centering Vise</td>
<td>Swing Clamp</td>
</tr>
<tr>
<td>BZS0100</td>
<td>DBA0250-C</td>
<td>DBC0250-C</td>
<td>FVA0401</td>
<td>FVC0630</td>
<td>FVD1600</td>
</tr>
<tr>
<td></td>
<td>DBA0300-C</td>
<td>DBC0300-C</td>
<td>FVA0631</td>
<td>FVA1001</td>
<td>FVD2500</td>
</tr>
<tr>
<td></td>
<td>DBA0400-C</td>
<td>DBC0400-C</td>
<td>LHA0360-C</td>
<td>LHA0400-C</td>
<td>LHA0480-C</td>
</tr>
<tr>
<td></td>
<td>DBA0500-C</td>
<td>DBC0500-C</td>
<td>LHA0550-C</td>
<td>LHA0550-C</td>
<td>LHA0550-C</td>
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### BZS0200

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<td></td>
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</tr>
</tbody>
</table>

### BZS0300

<table>
<thead>
<tr>
<th>Model No.</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cautions / Others

- **Hole Clamp**: SFA, SFC
- **Swing Clamp**: LHA, LHC, LHS
- **Hydraulic Unit**: LHW, LG/LT, TLA-2, TLAB-2, TLA-1
- **Link Clamp**: LKA, LKC, LKW
- **Manual Operation Accessories**: LJA-M, TMA-2, TMA-1
- **Work Support**: LQ, LC, TNC, TC
- **Air Sensing Lift Cylinder**: LLW
- **Linear Cylinder / Compact Cylinder**: LL, LLL, LLU, DRL, DDR, DTS
- **Block Cylinder**: DBA/DBC
- **Centering Vise**: FVA, FVD, FVC

### Note:

- It is not possible to install two BZS valves to FVC1000.

### In case of LC Work Support

For using Direct-Mount Sequence Valve for Work Support (Model: LC), mount Speed Control Valve (Model: BZL□□□-A) on Work Support and mount Direct-Mount Sequence Valve on the middle plate as shown in the drawing below. Please contact us for further information.

![Work Support Diagram](image-url)

**Work Support (Model: LC)**

- Speed Control Valve (Model: BZL□□□-A)
- Direct-Mount Sequence Valve
- Middle Plate

---

**Control Value**

- BZL
- BZT
- BZX/ZG
- BZS

**Pallet Clamp**

- V5/V7

**Expansion Locating Pin**

- VF/L/VFM
- VF/J/VFK

**Pull Stud Clamp**

- FP
- FQ

**Customized Spring Cylinder**

- DWA/DWB
### External Dimensions

![External Dimensions Diagram]

**Hex. Socket M**
- Set Screw for Anti-Rotation

**Sequence Pressure Adjusting Hex.**
- (1 mm per Turn)

**Adjustable Range**
- \( \text{max. } C \)
- \( 0 \sim 0.2 \)

**Machining Dimensions of Mounting Area**

![Machining Dimensions Diagram]

**Hex. A**
- Sequence Pressure Adjusting Hex. (1 mm per Turn)

**Hex. E**
- (Clamp / Cylinder)

**P2 Port Clamp Side**
- \( \phi B \)

**P1 Port Hyd. Pressure Supply Side**
- \( \phi H \)
- \( \phi F \)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BZS0100</th>
<th>BZS0200</th>
<th>BZS0300</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>16</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>B</td>
<td>17.5</td>
<td>24</td>
<td>29.5</td>
</tr>
<tr>
<td>C</td>
<td>30.5</td>
<td>39</td>
<td>49.5</td>
</tr>
<tr>
<td>D</td>
<td>7.5</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>E</td>
<td>14</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>F</td>
<td>15.5</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>G</td>
<td>G1/8</td>
<td>G1/4</td>
<td>G3/8</td>
</tr>
<tr>
<td>H</td>
<td>13.8</td>
<td>20</td>
<td>24</td>
</tr>
<tr>
<td>J</td>
<td>(11.6)</td>
<td>(15.1)</td>
<td>(17.6)</td>
</tr>
<tr>
<td>K</td>
<td>(26.5)</td>
<td>(34)</td>
<td>(44)</td>
</tr>
<tr>
<td>L</td>
<td>9.5</td>
<td>12.5</td>
<td>15</td>
</tr>
<tr>
<td>M</td>
<td>1.3</td>
<td>1.3</td>
<td>1.5</td>
</tr>
<tr>
<td>N</td>
<td>11.5</td>
<td>15</td>
<td>17.5</td>
</tr>
<tr>
<td>P</td>
<td>8.5</td>
<td>11 ( \text{mm} )</td>
<td>13</td>
</tr>
<tr>
<td>Q</td>
<td>9</td>
<td>11.5</td>
<td>13</td>
</tr>
<tr>
<td>R (Flat Surface Area)</td>
<td>16</td>
<td>20.5</td>
<td>24.5</td>
</tr>
<tr>
<td>S</td>
<td>10</td>
<td>13.5</td>
<td>17</td>
</tr>
<tr>
<td>T</td>
<td>8.7</td>
<td>11.5</td>
<td>15</td>
</tr>
<tr>
<td>U</td>
<td>G1/8</td>
<td>G1/4</td>
<td>G3/8</td>
</tr>
<tr>
<td>V</td>
<td>2 \sim 3</td>
<td>3 \sim 4</td>
<td>4 \sim 5</td>
</tr>
<tr>
<td>W</td>
<td>2.5 \sim 5</td>
<td>3.5 \sim 7</td>
<td>4.5 \sim 9</td>
</tr>
</tbody>
</table>

**Notes:**

1. Since the &times; area is sealing part, be careful not to damage it.
2. Since the &times; area is the metal sealing part at the edge of BZS, be careful not to damage it (especially when deburring).
3. No cutting chips or burr should be at the tolerance part of machining hole.
4. As shown in the drawing, P1 port is used as the hydraulic supply and P2 port as the clamp side.

※1. Use the sequence pressure adjusting hex. within the adjustable range of ※2 (the dimensions \( K \sim C \) in the above).

Please note that if it is loosened further than max. C, pressure adjusting hex. part and internal spring will come off.

※2. Dimension when mounted. (+0.5mm before mounted.)

※3. If mounting plugs or fittings with G thread specification available in the market, the dimension ‘※3’ should be 12.5.
**Cautions**

1. Please design hydraulic circuit properly. Improper circuit design may lead to malfunctions and damages.
2. Filter is not built in this product. Be aware that contaminants such as cutting chips and sealing tapes entering into the product cause malfunction. Also when internal parts are damaged, it will not operate properly even after removing contaminants.
3. Depending on circuit system (actuator capacity, hydraulic pipe diameter, passage length, etc.), sometimes it is necessary to reduce hydraulic flow rate to achieve proper sequence movement. Make sure you are able to control flow rate. (Since BZS is directly mounted on and used exclusively for one actuator, it is easily affected by hydraulic flow rate.)
4. The difference between the set pressure and the supplying pressure should be 1MPa or more.
5. For using multiple sequence valves to operate cylinders in sequence, the difference of each set pressure should be 1MPa or more.
6. For using multiple sequence valves to operate cylinders simultaneously, adjust them gradually by checking their actions.
7. Please keep in mind that the minimum passage area of each actuator will be decreased by mounting this product and thus operating time may become longer.
8. Please mount to an actuator using Hex. E shown in External Dimensions on P.961 with the tightening torque shown in the specification list on P.959. Insufficient or excessive tightening torque leads to malfunction.
9. Air bleeding is required as air mixed in the circuit causes malfunction.
10. At shipment, sequence pressure is not adjusted. Please adjust it by referring to the graph below. Install a pressure gauge on the circuit to check pressure as necessary. After adjustment, tighten one or more set screw for anti-rotation. (Tightening torque: 0.2N·m)

---

**Action Description**

- **Actuator ①**
- **Sequence Valve**
- **Workpiece**

**Operating Procedure**

Hydraulic pressure is ON.
Actuator ① is activated.

Pressure increases to the sequence operation set pressure.
The difference between the operating pressure and the sequence operation set pressure should be 1MPa or more.

The sequence valve circuit opens.
Actuator ② is activated.
Locking action is completed.

Machining, etc.

Hydraulic pressure is OFF.
The actuators ① and ② are released almost simultaneously.
The check valve in the sequence valve opens when the incoming side pressure decreases.
Releasing action is completed.

---

**Graph:**

- **BZS0100**
- **BZS0200**
- **BZS0300**

**Legend:**

- **Pressure (MPa)**
- **Dimension C on External Dimension List (mm)**

(This graph is a reference, and the values will not be guaranteed.)
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(Indonesia Exclusive Distributor)
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Overseas Sales
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〒651-2241 兵庫県神戸市西区堂谷2丁目1番5号

**Tokyo Sales Office**
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**Nagoya Sales Office**
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**Fukuoka Sales Office**
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〒812-0006 福岡県福岡市博多区上本町1丁目8-10-101
Global Network

Asia Detailed Map

For further information on unlisted specifications and sizes, please call us.

Specifications in this catalog are subject to change without notice.