Hydraulic Valve INDEX

Kosmek valves are most appropriate for fixtures and setup devices.

- **Non-Leak Valve (Holding Pressure)**
  
  Kosmek valves with non-leak function maintain pressurized condition even when a fixture is detached from a hydraulic power source.

  ![Model BK](image)
  
  Model **BK**
  Single Acting Model
  
  → P.1209

  ![Model BEQ](image)
  
  Model **BEQ**
  Double Acting Model
  
  → P.1213

- **Non-Leak Stop Valve (Manual Switching Valve)**
  
  It is a manual switching valve that can hold pressure without power source.

  ![Model BT](image)
  
  Model **BT**
  
  → P.1217

- **Sequence Valve**
  
  In-line sequence valve for simple sequence control.

  ![Model BZS](image)
  
  Model **BZS**
  Sequence valve directly attaches to a clamp. Refer to P.959

- **Pressure Balance Valve**
  
  This valve prevents deformation of a workpiece caused by release sequence operation in case a work support is arranged facing to an actuator.

  ![Model BLB](image)
  
  Model **BLB**
  
  → P.1225

- **Accumulator**
  
  Spring accumulator absorbs pressure fluctuation caused by temperature change in the fixture circuit when disconnected from the pressure source.

  ![Model JS](image)
  
  Model **JS**
  For High Pressure (Max.25MPa)
  
  → P.1229

  ![Model JSS](image)
  
  Model **JSS**
  For Low Pressure (Max.7MPa)
  
  → P.1229

- **Pressure Indicator (Pressure Switch)**
  
  Detects circuit pressure of the fixture disconnected from the hydraulic pressure source by using a limit switch together.

  ![Model JKA/JKB](image)
  
  Model **JKA/JKB**
  
  → P.1239
Pressure Reducing Valve

By using non-leak function, the in-line reducing valve does not require a drain port which partially reduces the circuit pressure.

Booster (Continuous Discharge Booster/One Shot Booster)

In-line type One Shot Booster (Model: BU), and Continuous Discharge Booster (Model: AU) that allows no restrictions on the outgoing side circuit capacity with continuous discharge.

Pilot Reducing Valve/Reservoir

Pressure of a fixture circuit disconnected from the hydraulic power source, can be reduced to the set pressure only by pilot operation.

Automatic Air Bleed Valve

Placed on the top of the piping, this valve bleeds air automatically during repetition of the hydraulic pressure ON / OFF.

Non-Leak Pilot Check Valve

It holds pressure even after the hydraulic supply is cut off. The mounting surface of modular model is based on ISO4401-03.

Non-Leak Valve Unit (Holding Pressure)

Non-leak valve units which are operated manually or electrically.
Hydraulic Valve Double Acting Circuit Reference
Disconnected Fixture Example in Double Acting Circuit

Model CK
Air Hydraulic Unit
(For Double Action)

Model BEQ
Non-Leak Valve
Double Acting Model

Model BLB
Pressure Balance Valve

Model BMA
Pressure Reducing Valve

Model BLG
Sequence Valve

Model JSS
Accumulator

① Push Cylinder
(For Locating Workpiece)

② Work Clamp 1
(Placed against the Clamp)

③ Work Support 1

④ Work Support 2
(Placed against the Clamp)

⑤ Work Clamp 2
(Placed against the Work Support)

⑥ Work Clamp 2
(Placed against the Work Support)

Pressure Reducing Valve
(model BMA)

Sequence Valve
(model BLG)

Pressure Balance Valve
(model BLB)

Speed Control Valve
(model BZL-B)

Pressure Reducing Valve
(model BMA)

Pressure Gauge
(model JGA)

Accumulator
(model JSS)

Pilot Check Valve

Lock Circuit

Release Circuit

Non-Leak Valve
Double Action
(model BEQ)

Connected to the hydraulic power source.
### Action Description

<table>
<thead>
<tr>
<th>Operating Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locked</strong></td>
<td></td>
</tr>
<tr>
<td>Released State</td>
<td>Release hydraulic pressure is ON when the coupler is connected between the power unit and BEQ.</td>
</tr>
<tr>
<td>Load a workpiece on the fixture.</td>
<td></td>
</tr>
<tr>
<td>Turn off release pressure, and turn on lock pressure.</td>
<td></td>
</tr>
<tr>
<td>Push Cylinder ① is activated to locate the workpiece.</td>
<td>The reduced pressure is supplied by reducing valve.</td>
</tr>
<tr>
<td>Work Support ③ and ④ are activated.</td>
<td>It is activated after ① by sequence valve.</td>
</tr>
<tr>
<td>Work Clamp ② and ⑤ are activated.</td>
<td>To prevent deformation of the workpiece, activate them after ③④ by flow control valve.</td>
</tr>
<tr>
<td>Locking action is completed.</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Pressure Source OFF</td>
<td></td>
</tr>
<tr>
<td>Non-leak valve is disconnected from hydraulic power source.</td>
<td></td>
</tr>
<tr>
<td>Machining and/or Transferring</td>
<td></td>
</tr>
<tr>
<td><strong>Releasing</strong></td>
<td></td>
</tr>
<tr>
<td>Connect hydraulic power source to non-leak valve.</td>
<td></td>
</tr>
<tr>
<td>When release pressure is ON and lock pressure is OFF, the pilot check valve of non-leak valve opens.</td>
<td></td>
</tr>
<tr>
<td>Actuators ① ② ③ ⑤ are released.</td>
<td>Work support is released after ①②③⑤ by pressure balance valve to prevent deformation of the workpiece.</td>
</tr>
<tr>
<td>Work Support ④ is released.</td>
<td></td>
</tr>
<tr>
<td>Releasing action is completed.</td>
<td></td>
</tr>
</tbody>
</table>
Hydraulic Valve Single Acting Circuit Reference
Disconnected Fixture Example in Single Acting Circuit

1. Push Cylinder (model JGA)
2. Work Clamp 1
3. Work Clamp 2 (Placed against the Work Support)
4. Work Support 1
5. Work Support 2 (Placed against the Clamp)

Pressure Gauge (model JGA)
Accumulator (model JSS)
Non-Leak Valve (model BK)
Sequence Valve (model BLS)
Booster (One Shot Model) (model BU)
Pressure Balance Valve (model BLB)

Air Hydraulic Unit (model CV)
### Action Description

<table>
<thead>
<tr>
<th>Operating Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Released State</strong></td>
<td>Hydraulic pressure is OFF when the coupler is connected between the power unit and BK.</td>
</tr>
<tr>
<td>Load a workpiece on the fixture.</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Pressure ON</td>
<td></td>
</tr>
<tr>
<td>Push Cylinder ① is activated to locate the workpiece.</td>
<td></td>
</tr>
<tr>
<td>Actuators ②③④⑤ are activated. (Pressure boosted by BU is supplied to Work Support ③.)</td>
<td>It is activated after Push Cylinder ① by sequence valve. Work Clamp ③ is activated after Work Support ⑤ by flow control valve to prevent deformation of the workpiece.</td>
</tr>
<tr>
<td>Locking action is completed.</td>
<td></td>
</tr>
<tr>
<td>Hydraulic Pressure OFF</td>
<td></td>
</tr>
<tr>
<td>BK valve is disconnected from hydraulic power source.</td>
<td></td>
</tr>
<tr>
<td><strong>Machining, Transferring, etc.</strong></td>
<td></td>
</tr>
<tr>
<td>Connect hydraulic power source to non-leak valve.</td>
<td></td>
</tr>
<tr>
<td>Operate BK valve lever to release.</td>
<td>By holding the lever at release position for about one second, outgoing side pressure will be released even if the operator removes his/her hand in the middle of release operation.</td>
</tr>
<tr>
<td>Actuators ①②③④ are released.</td>
<td></td>
</tr>
<tr>
<td>Work Support ⑤ is released.</td>
<td>It is released after ①②③④ by pressure balance valve to prevent deformation of the workpiece.</td>
</tr>
<tr>
<td>Release action is completed.</td>
<td></td>
</tr>
</tbody>
</table>
Safety Circuit, Holding the Datum Point

By using non-leak valve, non-leak pilot check valve, it allows to secure safety.

Since the non-leak vale and the non-leak pilot check vale can hold pressure even if power is lost, there is no reason for concern that the workpiece falls off.

The workpiece falls off when hydraulic power supply is cut off.

Hold the workpiece in position by maintaining hydraulic pressure. (Non-leak function allows to hold the position for a long time without leakage.)

The Reliability of Non-Leak Function

The following graph shows the data analysis of the oil temperature, the amount of time and the change in pressure while hydraulic pressure is disconnected from power source. Due to temperature change, maintained pressure changes but not due to leakage. You can set the hydraulic circuit more stable when combined with the accumulator.

Influence of Temperature Change on Hydraulic Circuit

Hydraulic pressure of sealed circuit disconnected from hydraulic source by non-leak valve, etc. is significantly affected by ambient temperature change and supply oil temperature change. (Especially when using a motor pump, high temperature oil is supplied and the temperature rapidly decreases after sealing.) Although it differs depending on the amount of air mixed, product, piping/hose expansion and temperature condition, etc., Kosmek standard is as shown on the right regardless of the amount of oil contained.

---

0.69MPa

°C

(0.69MPa of Pressure Fluctuation by 1°C Temperature Change)
One Touch Workpiece Set Up on 4-Surface Tombstone Fixture

Example for Using Non-Leak Stop Valve on 4-Surface Tombstone Fixture

When changing a workpiece on 4-surface tombstone fixture: Installing the non-leak stop valve (Model: BT) on each surface enables to operate clamping/unclamping each surface and prevent a workpiece fall.

Action Description

<table>
<thead>
<tr>
<th>Operating Procedure</th>
<th>Operating Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locking</strong></td>
<td><strong>Releasing</strong></td>
</tr>
<tr>
<td>Hydraulic pressure is ON.</td>
<td>Hold the workpiece not to fall, operate BT lever (open the circuit) and remove the workpiece.</td>
</tr>
<tr>
<td>Place the workpiece on.</td>
<td>Operate BT lever (close the circuit).</td>
</tr>
<tr>
<td>Operate BT lever (open the circuit) to clamp the workpiece.</td>
<td>Repeat the removal of the workpiece for each surface.</td>
</tr>
<tr>
<td>Operate BT lever (close the circuit) to hold the pressure.</td>
<td>Releasing action is completed.</td>
</tr>
<tr>
<td>Repeat the setup of the workpiece for each surface.</td>
<td></td>
</tr>
</tbody>
</table>
Partial Boosting (of Low-Pressure Hydraulic Power Source)

Partial Boosting by Modular Model Valve

Allows to generate high pressure simply by using a continuous discharge booster.

It is not necessary to provide a high-pressure power source only for some high-pressure actuators.

The continuous discharge booster has no restrictions on the outgoing side circuit capacity. (Mounting is based on ISO4401-03.)

Partial Boosting and Partial Reducing for the Fixture Side Pressure

We offer not only the modular model, but also the continuous discharge booster, the one shot booster and the reducing valve that can be installed to the fixture side.

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**Boosting Pressure**

**Model AU**  Continuous Discharge Booster

**Model BU**  One Shot Booster

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**Reducing Pressure**

**Model BMA**  Pressure Reducing Valve
Integration of Rough Machining and Finish Machining

Controlling Clamping Force (Pressure) with Pilot Reducing Valve and Reservoir

It is possible to control clamping force when fixture pressure is disconnected from power source. This valve is useful when it is necessary to have stronger clamping force at initial machining and weaker clamping force at finish machining.

**In Initial Rough Machining**

High Pressure

Workpiece

High clamping force is needed.

Actuator

Before final machining, reduce the clamping force by reducing pressure.

**At Finish Machining**

To Low Pressure

Finish Machining

Low Pressure

Workpiece deformation is avoided by reducing pressure and clamping force.

Hydraulic pressure in the circuit goes to the reservoir by pressing the button of BP valve, and the pressure decreases to the set pressure.
Non-Leak Valve
Single Acting Model
Model BK

Disconnects Fixture from Power Source and Securely Holds Outgoing Side Pressure
This valve reduces set up time and the number of circuits, and saves energy securely.

What is a Non-Leak Valve?
Non-leak valve maintains pressurized condition completely even when the fixture is detached from the power source.
It is able to disconnect from hydraulic pressure power source.

Circuit Symbol

Holds the pressure even after coupler is disconnected.

【Connected State】
Hydraulic Pressure ON

【Pressure Holding State (Disconnected)】
Hydraulic Pressure OFF

0MPa
Advantages

- **Set Up Outside of Machine Improves Machine Operating Ratio**
  
  Non-leak function allows to disconnect a fixture from a hydraulic power source and to set up the fixture outside machine. This reduces machine down time and set up time.

- **Reduce the Number of Circuits in the Machine**
  
  By holding the pressure, the number of circuits inside machine for fixture can be minimized.

- **Ideal for Transferring FMS Pallets**
  
  Because it is able to detach the fixture from the hydraulic pressure source, it allows to move the pallet freely without concerns on handling of hydraulic hoses, and it is suitable for FMS.

- **Energy-Saving and Safety**
  
  The outgoing side circuit hydraulic pressure is held unless the lever is moved. Even if you do not disconnect, you are saving energy by stopping the incoming hydraulic pressure. If a blackout occurs and the hydraulic pressure is shut off, the workpiece will not fall off due to the holding pressure.

### Action Description

<table>
<thead>
<tr>
<th>Operating Procedure</th>
<th>Note</th>
</tr>
</thead>
</table>
| **Locking**
| Hydraulic pressure source is connected to the incoming side of non-leak valve. |
| Hydraulic Pressure ON |
| Hydraulic pressure is supplied to the outgoing side, and locking action is completed. |
| Hydraulic Pressure OFF. |
| Non-Leak valve is disconnected from hydraulic power source. |

| **Machining and/or Transferring** |
| Hydraulic pressure source is connected to the incoming side of non-leak valve. |

| **Releasing** |
| Release the lever on the non-leak valve. |
| Releasing action is completed. |

**About Release Operation**

Before Release Operation (Pressure Held Condition)

Release Operation by pulling up the lever. 

After holding the lever for about one second, the outgoing side pressure will be released even when the lever is released.

The lever is automatically lowered when the lever is released.
Model No. Indication

Model No. **BK 2213 - 0**

1 Port Size
- 2 : Corresponding to Rc1/4
- 3 : Corresponding to Rc3/8

2 Operating Pressure Range
- 2 : 2.0 ~ 7.0 MPa
- 5 : 7.0 ~ 30.0 MPa

3 Lever Position ※Lever position looking from P(R) port
- 1 : Right Hand Lever (Standard)
- 2 : Left Hand Lever

4 Design No.
- 3 : Revision Number

5 Piping Method ※CYL port position looking from P(R)
- Blank : Piping Option (Rc-Thread)
- GA : Left Side Gasket Option (Only for Right Handle)
- GB : Bottom Gasket Option
- GC : Right Side Gasket Option (Only for Left Handle)
- GS : BLS, BLB and BM Valve Connecting Option

Note:
※1. Build to order product. Feel free to ask us about delivery time when placing an order.

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BK2223-0</th>
<th>BK2523-0</th>
<th>BK3223-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range</td>
<td>2.0 ~ 7.0</td>
<td>7.0 ~ 30.0</td>
<td>2.0 ~ 7.0</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>10.5</td>
<td>37.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>17.0</td>
<td>14.2</td>
<td>30.0</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corresponding Coupler/Socket Form</td>
<td>2HS</td>
<td>2HS</td>
<td>3HS</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>1.4</td>
<td></td>
</tr>
</tbody>
</table>

Note: ※2. Shows the format of the quick coupler socket made by Nitto Kohki Co., Ltd.

Combined Model on Valves

Note:
1. Length of the attached mounting bolts varies depending on the combination of valves.
**External Dimensions**

BK□□13-0

※ BK□□23-0 is identical but handle is on left side.

![Diagram of external dimensions](image-url)

- **CYL Port (Outgoing Port)**
- **BK2: Rc1/4 Thread**
- **BK3: Rc3/8 Thread**

2-φ9 Bolt Hole
2-M8×1.25×55 Bolt (included)

- **P(R) Port (Incoming Port)**
- **(Quick Coupler)**

**Release Operation**

1-φ8.2 Bolt Hole
1-φ9 Bolt Hole

**Model No.**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BK2□□13-0</th>
<th>BK3□□23-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(R) Port</td>
<td>3</td>
<td>2HP</td>
</tr>
<tr>
<td>A</td>
<td>135</td>
<td>144</td>
</tr>
<tr>
<td>B</td>
<td>39</td>
<td>46</td>
</tr>
<tr>
<td>C</td>
<td>28</td>
<td>33</td>
</tr>
</tbody>
</table>

Note: ※3. Quick coupler model number made by Nitto Koki.

**BK□□13-0GA**

※ Please refer to BK□□13-0 for other dimensions.

**BK□□23-0GC**

※ Please refer to BK□□13-0 for other dimensions.

**BK□□13-0GB**

※ Please refer to BK□□13-0 for other dimensions.

Note:

※4. Roughness of mounting surface (O-ring seal surface) should be 6.35 or less.
Non-Leak Valve
Double Acting Model
Model BEQ

Pilot Check Method to Hold the Outgoing Side Pressure
This valve reduces set up time and the number of circuits, and saves energy securely.

- Non-Leak Valve (Double Acting Model)
A non-leak valve (double acting model) is equipped with a non-leak function. Unless the hydraulic pressure is supplied to B1 port, the A2 port side pressure is held even if the hydraulic power source is cut off.

Fall prevention : In case of a blackout, it is possible to separate the hydraulic power source from fixture because the actuator holds pressure inside.

Circuit Symbol

![Circuit Diagram]

Hold the pressure even after coupler is disconnected.

- [Connected State]

  **Supplying Pressure**

  **Hydraulic Pressure ON**

- [Pressure Holding State (Disconnected)]

  **Hydraulic Pressure OFF**

  **0MPa**
Action Description

Images

- Releasing
- Clamping
- Pressure Holding

Circuit Example

Operating Procedure

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locking</strong></td>
<td>- Hydraulic pressure on the A1 port side is ON. (Hydraulic pressure on the B1 port side is OFF.)</td>
</tr>
<tr>
<td></td>
<td>- The pressure is supplied to the locking side (A2 port) to lock the actuator. (The pressure is maintained even if the power source is turned OFF.)</td>
</tr>
<tr>
<td></td>
<td>- Hydraulic power source is OFF. Separate the A1/B1 ports from the hydraulic power source.</td>
</tr>
<tr>
<td><strong>Machining and/or Transferring</strong></td>
<td>Connect the A1/B1 ports to the hydraulic power source.</td>
</tr>
<tr>
<td><strong>Releasing</strong></td>
<td>- When hydraulic pressure of the B1 port side is ON (A1 port side hydraulic pressure OFF), the pilot check valve is open and the oil from A2 port (lock side) goes back to the tank.</td>
</tr>
<tr>
<td></td>
<td>- Releasing action is completed.</td>
</tr>
<tr>
<td><strong>In Case of an emergency</strong></td>
<td>- Hydraulic power source is OFF due to a blackout.</td>
</tr>
<tr>
<td></td>
<td>- With the pilot check valve, the locking side pressure (A2 port) will be maintained as it was before the blackout.</td>
</tr>
<tr>
<td></td>
<td>- The B2 port side cannot hold the pressure because it has no check valve.</td>
</tr>
</tbody>
</table>
**Model No. Indication**

**BEQ02 2 0 - 0**

1. **Operating Pressure Range**
   
<table>
<thead>
<tr>
<th>Model</th>
<th>BEQ0220-0</th>
<th>BEQ0250-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1.0 ~ 7.0MPa</td>
<td>7.0 ~ 30.0MPa</td>
</tr>
<tr>
<td>5</td>
<td>7.0 ~ 30.0MPa</td>
<td></td>
</tr>
</tbody>
</table>

2. **Design No.**

   0 : Revision Number

3. **Piping Method**

   ※Cyl port position looking from A1 port
   
   - **Blank** : Piping Option (Rc-Thread)
   - **GA** : Backside Gasket Option
   - **GB** : Bottom Gasket Option

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BEQ0220-0</th>
<th>BEQ0250-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range (MPa)</td>
<td>1.0 ~ 7.0</td>
<td>7.0 ~ 30.0</td>
</tr>
<tr>
<td>Withstanding Pressure (MPa)</td>
<td>10.5</td>
<td>37.5</td>
</tr>
<tr>
<td>Cracking Pressure (MPa)</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Pilot Pressure (MPa)</td>
<td>A2 Holding Pressure / 5.5 + 0.3 or more</td>
<td></td>
</tr>
<tr>
<td>Min. Passage Area (mm²)</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature (°C)</td>
<td>0 ~ 70</td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO VG-32</td>
<td></td>
</tr>
<tr>
<td>Corresponding Coupler/Socket Form</td>
<td>2HS</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>1.3</td>
<td></td>
</tr>
</tbody>
</table>

Note: 1. Quick Coupler model number made by Nitto Koki.

**External Dimensions**

Note: 2. Quick Coupler model number made by Nitto Koki.
Notes:

*2. Quick Coupler model number made by Nitto Koki.
*3. Roughness of mounting surface (O-ring seal surface) should be 6.3µ or less.
Non-Leak Stop Valve
(Manual Switching Valve)

Model BT

Manual Switching Valve to Maintain Pressure
Simple Operation

What is a non-leak stop valve?
The stop valve is operated by a manual operation lever. When the circuit is closed or disconnected it maintains the outgoing side pressure.

In case of manual loading/unloading of multiple workpieces, it enables to clamp/unclamp each workpiece preventing a workpiece fall.

When the circuit is closed the outgoing side pressure is maintained to prevent a workpiece fall.

Application Examples

Clamping operation is possible with each workpiece.

Circuit Symbol

- Each port has a built-in filter.
Model No. Indication

**BT2210 - 0**

1 Operating Pressure Range

- 2: 2.0 ~ 7.0 MPa
- 5: 7.0 ~ 30.0 MPa

2 Design No.

- 0: Revision Number

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BT2210-0</th>
<th>BT2510-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range MPa</td>
<td>2.0 ~ 7.0</td>
<td>7.0 ~ 30.0</td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>10.5</td>
<td>37.5</td>
</tr>
<tr>
<td>Min. Passage Area mm²</td>
<td></td>
<td>15.9</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td></td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td></td>
<td>1.4</td>
</tr>
</tbody>
</table>

External Dimensions

![Diagram of BT2210-0 Non-Leak Stop Valve]
Sequence Valve

Model BLS
Model BLG

Activates multiple actuators in sequence, and reduces the number of ports required.
It is able to control locating and clamping workpiece in sequence in one system.

What is a sequence valve?
This valve operates multiple actuators in sequence to perform positioning and clamping.

When incoming port pressure reaches the sequence setting pressure value, the pressure is supplied to outgoing port.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Sequence Valve</th>
<th>Compact Sequence Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequence Operating Pressure Adjustable Range</td>
<td>1<del>4MPa 3</del>8MPa 8~20MPa</td>
<td>1<del>6MPa 5</del>18MPa</td>
</tr>
<tr>
<td>Operating Pressure Range</td>
<td>2~30MPa</td>
<td>2<del>35MPa 6</del>35MPa</td>
</tr>
<tr>
<td>Piping Method</td>
<td>Piping Option Manifold Option BK Connecting Option BK/BLB Connecting Option</td>
<td>Double Gasket Option</td>
</tr>
</tbody>
</table>

Circuit Symbol

 Incoming Port P(R) Port
 Outgoing Port CYL. Port

Each port has a built-in filter.
**Action Description**

**Images**

![Sequence Valve](image1)

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

2. **Actuator ②**
   - Workpiece

**Circuit Example**

![Circuit Example](image2)

**Operating Procedure**

<table>
<thead>
<tr>
<th><strong>Locking</strong></th>
<th><strong>Releasing</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydraulic pressure is ON.</strong></td>
<td><strong>Hydraulic pressure is OFF.</strong></td>
</tr>
<tr>
<td>Actuator ① is activated.</td>
<td>The actuators ①,② are released at the same time.</td>
</tr>
<tr>
<td>The pressure reaches to the set value for sequence operating pressure.</td>
<td>Releasing action is completed.</td>
</tr>
<tr>
<td>Sequence valve port is open.</td>
<td>When incoming side pressure decreases, internal check valve opens.</td>
</tr>
<tr>
<td>Actuator ② is activated.</td>
<td></td>
</tr>
<tr>
<td>Locking action is completed.</td>
<td></td>
</tr>
</tbody>
</table>

**Machining process, etc.**

**Adjustable Set Pressure**

**Set Hydraulic Pressure Change per Rotation (MPa/Rev)**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BLS/31</th>
<th>BLS/51</th>
<th>BLS/71</th>
<th>BLG2830</th>
<th>BLG2860</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Pressure Change per Rotation (Reference)</td>
<td>0.7</td>
<td>1.0</td>
<td>2.6</td>
<td>1.0</td>
<td>2.8</td>
</tr>
</tbody>
</table>

**Notes:**
1. The set pressure value is set according to the model code.
2. Pressure increases by turning clockwise and decreases by turning anti-clockwise.
**Model No. Indication**

**BLS 251-0 (5.0MPa)**

1. **Port Size**
   - 2: Corresponding to Rc1/4
   - 3: Corresponding to Rc3/8

2. **Sequence Operating Pressure Adjustable Range**
   - 3: 1.0 ~ 4.0 MPa
   - 5: 3.0 ~ 8.0 MPa
   - 7: 8.0 ~ 20.0 MPa

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

   Notes:
   ※1. Build to order product. Feel free to ask us about delivery time when placing an order.
   ※2. W option (BK/BLB connecting option) only available with 2: Rc1/4 port.

4. **Piping Method**

   - Blank: Piping Option (Rc-Thread)
   - G: Gasket Option (O-ring Seal for P Port)
   - K: BK Connecting Option
   - W: BK/BLB Connecting Option

5. **Set Pressure** (Set Value for Sequence Operating Pressure)

   Please indicate the set pressure when ordering
   (Please inform us with proper unit symbols.)

   ※ Provide a difference of more than 1MPa between operating and setting pressure.
   ※ When using multiple BLS sequence valves in a parallel fashion, provide each set pressure with a pressure difference more than 1MPa.

   Entry Example
   - At 5MPa → (5.0MPa) At 3.5MPa → (3.5MPa)
   - At 700PSI → (700PSI)

   Blank: Pressure Setting Free Option

   ※ If set pressure is determined by customer, indicate it within "Blank".
   ※ When shipping, the pressure is set as the minimum pressure indicated in the specification "Actuating Pressure Range".
   ※ For pressure adjustment, please refer to "Sequence Valve Pressure Setting Procedure" included along with the product and "Adjustable Set Pressure" on P.1220.

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BLS:31-0</th>
<th>BLS:51-0</th>
<th>BLS:71-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequence Operating Pressure Adjustable Range MPa</td>
<td>1.0 ~ 4.0</td>
<td>3.0 ~ 8.0</td>
<td>8.0 ~ 20.0</td>
</tr>
<tr>
<td>Operating Pressure Range MPa</td>
<td>2.0 ~ 30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>37.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusting Screw Turn Ratio MPa/Rev</td>
<td>0.7</td>
<td>1.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Cracking Pressure MPa</td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Passage Area mm²</td>
<td>P(R) → CYL.: 7 / CYL.→P(R): 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 1. If the flow volume of the incoming pressure side is too much, there is a possibility that the proper sequential procedures would not work.

   In this instance, use a flow control valve to adjust flow volume from the pressure source.

**Example of a Combination of BLS and BLB**

Operating Procedure (When clamping)
1. Supply hydraulic pressure.
2. The hydraulic pressure passing through the BLB, starts the support action of Work Support. At this time, hydraulic pressure does not reach the actuator side because of BLS.
3. When hydraulic pressure inside the system has exceeded the set pressure of BLS, the hydraulic pressure is supplied to the actuator to lock a workpiece.

Operating Procedure (When releasing)
1. Shut off hydraulic pressure supply.
2. Pressure reduction of BLS/BLG starts right after the hydraulic pressure supply is shut off and the actuator retracts to release the pressure.
3. BLB reduces hydraulic pressure inside Work Support in proportion to the pressure difference (1:20) between the incoming side (P port) pressure drop and the outgoing side (cylinder port) pressure. Therefore, workpiece and fixture damage due to the remaining pressure can be prevented because the workpiece is released after the actuator thrust becomes zero.

BLS/BLG
When the P port (incoming pressure) is pressurized to exceed the set up pressure of BLS/BLG, the valve is opened, and hydraulic pressure is supplied to the cylinder port (outgoing pressure).

When the P port (incoming pressure) is reduced to approximately 1/20 times the cylinder port (outgoing pressure), reduction of the outgoing pressure starts and the outgoing pressure is reduced in proportion to the incoming pressure.
**External Dimensions**

**BLS:01-0**

- **Sequence Pressure Adjusting Thread**
  - Lock Nut M8 x 1.25

- **CYL. Port (Outgoing Pressure)**
  - BLS2: Rc1/4 Thread
  - BLS3: Rc3/8 Thread

- **π: φ 9 Bolt Hole**
  - 2-M8 x 1.25 x 100 Bolt (Included)

**BLS:01-0G**

- **Sequence Pressure Adjusting Thread**
  - Lock Nut M8 x 1.25

- **CYL. Port (Outgoing Pressure)**
  - BLS2: Rc1/4 Thread
  - BLS3: Rc3/8 Thread

- **π: φ 9 Bolt Hole**
  - 2-M8 x 1.25 x 55 Bolt (Included)

**Notes:**

1. BK is NOT included. Prepare it separately.

2. M8 x 1.25 x 55 and M8 x 1.25 x 145 bolts are NOT included.

**BLS:01-0G**

- **Sequence Pressure Adjusting Thread**
  - Lock Nut M8 x 1.25

- **CYL. Port (Outgoing Pressure)**
  - BLS2: Rc1/4 Thread
  - BLS3: Rc3/8 Thread

- **π: φ 9 Bolt Hole**
  - 2-M8 x 1.25 x 55 Bolt (Included)

**Notes:**

1. BK/BLS are NOT included. Prepare it separately.

2. M8 x 1.25 x 55 and M8 x 1.25 x 110 bolts are NOT included.
Model No. Indication

BLG28 3 0 - 0 G (5.0MPa)

1 Sequence Operating Pressure Adjustable Range

3 : 1.0 ~ 6.0 MPa
6 : 5.0 ~ 18.0 MPa

2 Design No.

0 : Revision Number

3 Piping Method

G : Gasket Option

Note:
※1. Hydraulic connecting method is only G option (gasket).
Select BLS if piping option is necessary.

4 Set Pressure (Set Value for Sequence Operating Pressure)

Please indicate the set pressure when ordering
(please inform us with proper unit symbols.)
※ Provide a difference of more than 1MPa between operating and setting pressure.
※ When using multiple BLG sequence valves in a parallel fashion, provide each set pressure with a pressure difference more than 1MPa.

Entry Example At 5MPa → (5.0MPa) At 3.5MPa → (3.5MPa)
At 700PSI → (700PSI)

Blank : Pressure Setting Free Option
※ If set pressure is determined by customer, indicate it within "Blank".
※ When shipping, the pressure is set as the minimum pressure indicated in the specification "Actuating Pressure Range".
※ For pressure adjustment, please refer to "Sequence Valve Pressure Setting Procedure" included along with the product and "Adjustable Set Pressure" on P.1220.

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BLG2830-0G</th>
<th>BLG2860-0G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequence Operating Pressure Adjustable Range</td>
<td>MPa</td>
<td>1.0 ~ 6.0</td>
</tr>
<tr>
<td>Operating Pressure Range</td>
<td>MPa</td>
<td>2.0 ~ 35.0</td>
</tr>
<tr>
<td>Adjusting Screw Turn Ratio</td>
<td>MPa/Rev</td>
<td>1.0</td>
</tr>
<tr>
<td>Cracking Pressure</td>
<td>MPa</td>
<td>0.01</td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>P(R) → CYL : 8.7 / CYL → P(R) : 10.2</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO VG-32</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Notes:
1. If the flow volume of the incoming pressure side is too much,
   there is a possibility that the proper sequential procedures would not work.
   In this instance, use a flow control valve to adjust flow volume from the pressure source.
2. Please refer to BLS page for the example of a combination of BLG and BLB.
### External Dimensions

**BLG2B[.0-0G]**

- **2-φ6.5 Bolt Hole**
- **2-M6×1×35 Bolt (Included)**

- **CYL Port (Outgoing Pressure)**
  - O-ring: GB8 (Included)
  - Sequence Pressure
  - Adjusting Thread
  - Lock Nut M8×1.25

- **P(R) Port (Incoming Pressure)**
  - O-ring: GB8 (Included)

**Note:**

1. **Sequence Valve**
2. Roughness of mounting surface (O-ring seal surface) should be 6.35 or less.
Pressure Balance Valve

Model BLB

A pressure balance valve is actuated in sequence to prevent workpiece deformation

This valve prevents the deformation of workpiece when the work support releases.

What is a pressure balance valve?

This valve prevents deformation of a workpiece during unclamping sequence. This will be useful when using work support and clamp actuator in opposite position.

When releasing, the incoming side pressure reduces around 1/20 of outgoing side pressure. Then outgoing side pressure start to reduce.

Circuit Symbol

- CYL port comes with a built in filter.
  Since a filter is not built in the P(R) port, please sufficiently perform flushing of piping and fitting to prevent foreign substances such as cutting chips from entering the circuit.

![Circuit Symbol Diagram]

Work is deformed

Without Pressure Balance Valve

At Releasing

With Pressure Balance Valve

Sequential Operation
**Operating Procedure**

<table>
<thead>
<tr>
<th>Process</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locking</strong></td>
<td><strong>Hydraulic pressure is ON.</strong> In the case that the workpiece is deformed due to the actuator operating earlier than work support, use the sequence valve (BLS/BLG) or flow control valve in order to operate in sequence.</td>
</tr>
<tr>
<td><strong>Locking action is completed.</strong></td>
<td><strong>Machining process</strong></td>
</tr>
<tr>
<td><strong>Releasing</strong></td>
<td><strong>Hydraulic pressure is OFF.</strong></td>
</tr>
<tr>
<td><strong>Actuator is released.</strong></td>
<td><strong>The pressure balance valve circuit opens.</strong> The circuit opens when the incoming side pressure reduces up to around 1/20 of the outgoing side pressure.</td>
</tr>
<tr>
<td><strong>Work Support is released.</strong></td>
<td><strong>Releasing action is completed.</strong></td>
</tr>
</tbody>
</table>
**Model No. Indication**

**BLB50 0 - 0**

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

2. **Piping Method**
   - Blank : Piping Option (Rc Thread) (Standard)
   - W : BK/BLS Connecting Option

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BLB500-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range MPa</td>
<td>2.0 ~ 30.0</td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>37.5</td>
</tr>
<tr>
<td>Min. Passage Area mm²</td>
<td>4.6</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
</tr>
<tr>
<td>Weight kg</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Note: 1. Please refer to BLS page for the example of a combination of BLS/BLG and BLB.

**External Dimensions**

- **BLB500-0**
  - 2-φ9 Bolt Hole
  - CYL Port (Outgoing Pressure) Rc1/4 Thread

- **BLB500-W**
  - 2-M8×1.25×145 Bolt (Included)※1
  - 2-M8×1.25×55 Bolt (Included)
  - 2-φ9 Bolt Hole

Notes:
※1. In case of Piping Method W : Use M8×1.25×145 bolts (included). M8×1.25×55 bolts and M8×1.25×100 bolts are NOT included.
1. BK and BLS are NOT included. Prepare them separately.
Accumulator

Model JSS
Model JS

Spring Accumulator to absorb pressure fluctuation of a fixture circuit disconnected from a pressure source

Maintenance-Free Spring Accumulator

**What is an accumulator?**

When a fixture is disconnected from the hydraulic pressure source (closed circuit), with the change in volume of hydraulic fluid due to temperature changes, there will be pressure increase and/or decrease.

Accumulator avoids damage and deformation of a machine and workpiece caused by pressure increase, and falling of workpiece caused by pressure decrease.

---

<table>
<thead>
<tr>
<th>Classification</th>
<th>Spring Accumulator for Low Pressure</th>
<th>Spring Accumulator for High Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Operating Pressure</td>
<td>2/3/4/5/6/7 MPa</td>
<td>14/25 MPa</td>
</tr>
</tbody>
</table>

---

Circuit Symbol

* A filter is not built in each port. Please sufficiently perform flushing of piping and fitting to prevent contaminants such as cutting chips from entering the circuit.
**Action Description**

The Image of an Internal Accumulator

※ This is a simplified drawing.
The actual part components may be different.

**Circuit Example**

Oil enters into the hole by supplying hydraulic pressure.

**Temperature Change**

<table>
<thead>
<tr>
<th>Increase in Oil Temperature</th>
<th>With Accumulator</th>
<th>Without Accumulator</th>
</tr>
</thead>
<tbody>
<tr>
<td>When hydraulic pressure increases as oil temperature rises, the piston will be pushed to absorb the pressure increase.</td>
<td>Hydraulic pressure increases as oil temperature rises. Abnormal high pressure will damage a machine and/or deform a workpiece.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decrease in Oil Temperature</th>
<th>With Accumulator</th>
<th>Without Accumulator</th>
</tr>
</thead>
<tbody>
<tr>
<td>When hydraulic pressure decreases as oil temperature drops, the piston will be pushed by spring to absorb the pressure decrease.</td>
<td>Hydraulic pressure decreases as oil temperature drops. This will cause low machining quality and/or workpiece detachment.</td>
<td></td>
</tr>
</tbody>
</table>

- **Influence of Temperature Change on Hydraulic Circuit**

Hydraulic pressure of sealed circuit disconnected from hydraulic source by non-leak valve, etc. is significantly affected by ambient temperature change and supply oil temperature change. (Especially when using a motor pump, high temperature oil is supplied and the temperature rapidly decreases after sealing.) Although it differs depending on the amount of air mixed, product, piping/hose expansion and temperature condition, etc., Kosmek standard is as shown below regardless of the amount of oil contained.

\[
\frac{0.69 \text{MPa}}{\degree \text{C}} \quad (0.69 \text{MPa of Pressure Fluctuation by } 1 \degree \text{C Temperature Change})
\]
Model No. Indication

JSS 5 02 0 -

1 Standard Operating Pressure

<table>
<thead>
<tr>
<th>No.</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2.0MPa</td>
</tr>
<tr>
<td>3</td>
<td>3.0MPa</td>
</tr>
<tr>
<td>4</td>
<td>4.0MPa</td>
</tr>
<tr>
<td>5</td>
<td>5.0MPa</td>
</tr>
<tr>
<td>6</td>
<td>6.0MPa</td>
</tr>
<tr>
<td>7</td>
<td>7.0MPa</td>
</tr>
</tbody>
</table>

2 Amount of Discharge Oil

<table>
<thead>
<tr>
<th>No.</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>2.5cm³</td>
</tr>
<tr>
<td>05</td>
<td>5.0cm³</td>
</tr>
<tr>
<td>10</td>
<td>10.0cm³</td>
</tr>
</tbody>
</table>

3 Design No.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Revision Number</td>
</tr>
</tbody>
</table>

4 Mounting Direction

<table>
<thead>
<tr>
<th>Direction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Horizontal Mounting</td>
</tr>
<tr>
<td>V</td>
<td>Vertical Mounting</td>
</tr>
</tbody>
</table>

5 Piping Method

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Piping Option (G Thread)</td>
</tr>
<tr>
<td>S</td>
<td>Piping Option (Rc Thread)</td>
</tr>
<tr>
<td>G</td>
<td>Gasket Option</td>
</tr>
<tr>
<td>GC</td>
<td>Gasket + Piping Option (G Thread)</td>
</tr>
<tr>
<td>GS</td>
<td>Gasket + Piping Option (Rc Thread)</td>
</tr>
</tbody>
</table>

6 Piping Direction

(Appplies only when selecting both Mounting Direction: H and Piping Method: C/G/G/G/S)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Top Piping</td>
</tr>
<tr>
<td>B</td>
<td>Side Piping</td>
</tr>
</tbody>
</table>

In case of V: Vertical Mounting, piping direction is "Blank".
In case of H: Horizontal Mounting + Piping Method: G, piping direction is "Blank".

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JSS2020</th>
<th>JSS2050</th>
<th>JSS2100</th>
<th>JSS3020</th>
<th>JSS3050</th>
<th>JSS3100</th>
<th>JSS4020</th>
<th>JSS4050</th>
<th>JSS4100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Operating Pressure MPa</td>
<td>2.0</td>
<td>3.0</td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td></td>
<td></td>
<td></td>
<td>14.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Oil Capacity cm³</td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Absorbing Oil Capacity cm³</td>
<td>1.0</td>
<td>2.0</td>
<td>4.0</td>
<td>1.0</td>
<td>2.0</td>
<td>4.0</td>
<td>1.0</td>
<td>2.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Compression Factor (β10³ MPa/cm³)</td>
<td>0.40</td>
<td>0.31</td>
<td>0.16</td>
<td>0.40</td>
<td>0.33</td>
<td>0.17</td>
<td>0.49</td>
<td>0.37</td>
<td>0.18</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td></td>
<td>0 – 70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td>0.8</td>
<td>1.0</td>
<td>1.7</td>
<td>0.8</td>
<td>1.1</td>
<td>1.7</td>
<td>0.8</td>
<td>1.1</td>
<td>2.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JSS5020</th>
<th>JSS5050</th>
<th>JSS5100</th>
<th>JSS6020</th>
<th>JSS6050</th>
<th>JSS6100</th>
<th>JSS7020</th>
<th>JSS7050</th>
<th>JSS7100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Operating Pressure MPa</td>
<td>5.0</td>
<td>6.0</td>
<td>7.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td></td>
<td></td>
<td></td>
<td>14.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Oil Capacity cm³</td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Absorbing Oil Capacity cm³</td>
<td>1.0</td>
<td>2.0</td>
<td>4.0</td>
<td>1.0</td>
<td>2.0</td>
<td>4.0</td>
<td>1.0</td>
<td>2.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Compression Factor (β10³ MPa/cm³)</td>
<td>0.43</td>
<td>0.34</td>
<td>0.17</td>
<td>0.43</td>
<td>0.36</td>
<td>0.21</td>
<td>0.48</td>
<td>0.40</td>
<td>0.27</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td></td>
<td>0 – 70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td>1.4</td>
<td>1.8</td>
<td>2.9</td>
<td>1.5</td>
<td>1.9</td>
<td>3.0</td>
<td>1.7</td>
<td>2.0</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Note: 1. Compression factor (β) means a pressure change (MPa) per 1cm³ change in oil volume.
Performance Curve

### JSS020

**Effective Temperature Range (°C) by Circuit Capacity (V)**

- \(V = 100 \text{cm}^3\): -15.0, -3.2, 0, 12.5
- \(V = 200 \text{cm}^3\): -15.6, -12.5, -6.25, 0, 6.25

![Graph of Effective Temperature Range](image)

### JSS050

**Effective Temperature Range (°C) by Circuit Capacity (V)**

- \(V = 100 \text{cm}^3\): -15.0, -3.2, 0, 12.5
- \(V = 200 \text{cm}^3\): -15.6, -12.5, -6.25, 0, 6.25

![Graph of Effective Temperature Range](image)

### JSS100

**Effective Temperature Range (°C) by Circuit Capacity (V)**

- \(V = 100 \text{cm}^3\): -15.0, -3.2, 0, 12.5
- \(V = 200 \text{cm}^3\): -15.6, -12.5, -6.25, 0, 6.25

![Graph of Effective Temperature Range](image)

How to read the Characteristic Diagram

Requirements (Reference)

- **Clamp Used**: LHA0650×4 units (Lock Cylinder Capacity for each : 26.7cm³)
- **Piping**: Inner Diameter φ 6×2m (Pipe Capacity per 1m : 28.3cm³)
- **Valve Capacity**: 20cm³
- **Temperature Change**: ΔT : -20°C
- **Operating Pressure**: P : 4.0MPa
- **Thermal Expansion Coefficient**: α : 8×10⁻⁴

Selection Method

1. Calculate Fixture Circuit Capacity (V)
   \[ V = (26.7 × 4) + (28.3 × 2) + 20 = 183.4 \text{ cm}^3 \]

2. Calculate Change in Capacity (ΔV)
   \[ \text{Fixture Circuit Capacity (V) } × \text{Thermal Expansion Coefficient (α)} \times \text{Amount of Temperature Change (ΔT)} \]
   \[ ΔV = 183.4 × (8×10⁻⁴) × (-20) = -2.93 \text{ cm}^3 \]

3. Select Accumulator Model
   - Operating Pressure (P)= 4.0MPa select JSS4050
   - Change in Capacity (ΔV)= -2.93cm³ select JSS4050.
     (If the required discharge capacity is greater than shown on the graph, select larger accumulator e.g. JSS4100.)

4. Check the Accumulator Characteristics (Graph on the right)
   - Pressure after Temperature Change (-20°C) : 2.92MPa
   - Residual Oil Discharge Margin : 2.07cm³

5. Select the mounting direction, piping method and piping direction.

Note:

1. When making your selection, calculate tolerance for the oil capacity taking the spring force deviation into consideration.
   **Approximate Amount of Spare Oil** : JSS020 : 0.5cm³, JSS050 : 1.0cm³, JSS100 : 1.5cm³
**External Dimensions**

JSS-020-H□, JSS-050-H□

2 - φ5.5 Bolt Hole

2-Mounting Bolt X (Included)

Hydraulic Port

In case of JSS-020-HCA/HGCA: G1/8 Thread
In case of JSS-050-HCA/HGCA: G1/8 Thread
In case of JSS-020-HSA/HGSA: Rc1/4 Thread
In case of JSS-050-HSA/HGSA: Rc1/4 Thread

Hydraulic Gasket Port O-ring: 1BP8 (Included)
Only with JSS-020/JSS-050-HG/HGCA/HGAS

**Machining Dimensions of Mounting Area**

JSS-□□0-H□

M5 x 0.8 Thread Depth 8 or more
(The number of required holes depends on model used.)

φ6 or less
Only on Gasket Option

JSS-□□0-V□

JSS-□□3/JSS-□□4: 4-M4 x 0.7 Thread Depth 9 or more
JSS-□□5/JSS-□□7: 4-M5 x 0.8 Thread Depth 11 or more

φ6 or less
Only on Gasket Option
### External Dimensions and Machining Dimensions for Mounting (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JSS2020</th>
<th>JSS2050</th>
<th>JSS2100</th>
<th>JSS5020</th>
<th>JSS5050</th>
<th>JSS5100</th>
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<tbody>
<tr>
<td>A</td>
<td>98.5</td>
<td>136.5</td>
<td>241.5</td>
<td>128.5</td>
<td>164.5</td>
<td>275.5</td>
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<tr>
<td>B</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>46</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>C1</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>38</td>
<td>43</td>
<td>55</td>
</tr>
<tr>
<td>C2</td>
<td>-</td>
<td>-</td>
<td>36</td>
<td>-</td>
<td>43</td>
<td>55</td>
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<tr>
<td>D</td>
<td>43</td>
<td>55</td>
<td>79</td>
<td>43</td>
<td>55</td>
<td>79</td>
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<td>E</td>
<td>55.5</td>
<td>81.5</td>
<td>162.5</td>
<td>85.5</td>
<td>109.5</td>
<td>196.5</td>
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<td>F</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>G (1)</td>
<td>15</td>
<td>27</td>
<td>49</td>
<td>15</td>
<td>27</td>
<td>49</td>
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<tr>
<td>H2</td>
<td>-</td>
<td>-</td>
<td>34</td>
<td>-</td>
<td>-</td>
<td>34</td>
</tr>
<tr>
<td>J</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>25</td>
<td>25</td>
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<tr>
<td>K</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>R</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
<td>5.5</td>
<td>5.5</td>
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<tr>
<td>S</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>44</td>
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<td>44</td>
</tr>
<tr>
<td>Mounting Bolt X</td>
<td>M5×0.8×40</td>
<td>M5×0.8×40</td>
<td>M5×0.8×40</td>
<td>M5×0.8×50</td>
<td>M5×0.8×50</td>
<td>M5×0.8×50</td>
</tr>
<tr>
<td>Mounting Bolt Y</td>
<td>M4×0.7×50</td>
<td>M4×0.7×60</td>
<td>M4×0.7×85</td>
<td>M5×0.8×50</td>
<td>M5×0.8×65</td>
<td>M5×0.8×85</td>
</tr>
</tbody>
</table>

Notes:

*1. Indicator extends proportionally to pressure. Be aware not to interfere with other devices of max. extension dimension when designing.

*2. Roughness of mounting surface (O-ring seal surface) of G (Gasket option) should be 6.35 or better.

*3. Do not disassemble. Components include pressured spring parts. It is dangerous to disassemble.
 Accumulator  Standard Operating Pressure 14, 25MPa  model JS

Model No. Indication

JS A711 - 0A

1 Mounting Direction
A : Horizontal Mounting
B : Vertical Mounting

2 Standard Operating Pressure
5 : 14.0MPa
7 : 25.0MPa

3 Amount of Discharge Oil
1 : 2.2cm³
2 : 4.4cm³

4 Design No.
1 : Revision Number

5 Piping Method
A : Front Side Piping Option (Rc1/4 Thread) ※1
B : Top Surface Piping Option (Rc1/4 Thread) ※1
C : Side Surface Piping Option (Rc1/4 Thread)
G : Gasket Option

※1. When selecting Mounting Direction B: Vertical Mounting, A: Front Side Piping Option and B: Top Surface Piping Option cannot be selected.

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JS A511</th>
<th>JS A521</th>
<th>JS A711</th>
<th>JS A721</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Operating Pressure MPa</td>
<td>14.0</td>
<td>25.0</td>
<td>25.0</td>
<td>37.5</td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>25.0</td>
<td>37.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Oil Capacity cm³</td>
<td>2.2</td>
<td>4.4</td>
<td>2.2</td>
<td>4.4</td>
</tr>
<tr>
<td>Absorbing Oil Capacity cm³</td>
<td>1.0</td>
<td>2.0</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Compression Factor (β) MPa/cm³</td>
<td>1.65</td>
<td>1.19</td>
<td>2.24</td>
<td>1.93</td>
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<tr>
<td>Operating Temperature °C</td>
<td></td>
<td></td>
<td>0 ~ 70</td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Weight kg</td>
<td>3.0</td>
<td>4.3</td>
<td>5.4</td>
<td>5.9</td>
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</table>

Note: ※1. Compression factor (β) means a pressure change (MPa) per 1cm³ charge in oil volume.
Performance Curve

**JS511**

Effective Temperature Range (°C) by Circuit Capacity (V)

<table>
<thead>
<tr>
<th>Circuit Capacity (V)</th>
<th>25°C</th>
<th>125°C</th>
<th>0°C</th>
<th>125°C</th>
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</thead>
<tbody>
<tr>
<td>V=100cm³</td>
<td>15</td>
<td>15</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>V=50cm³</td>
<td>30</td>
<td>15</td>
<td>0</td>
<td>15</td>
</tr>
</tbody>
</table>

Standard Operating Pressure [MPa]

- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Circuit Pressure [MPa]

- 0.0
- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Discharge/Absorb Oil Capacity (cm³)

- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

**JS711**

Effective Temperature Range (°C) by Circuit Capacity (V)

<table>
<thead>
<tr>
<th>Circuit Capacity (V)</th>
<th>25°C</th>
<th>125°C</th>
<th>0°C</th>
<th>125°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>V=100cm³</td>
<td>15</td>
<td>15</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>V=50cm³</td>
<td>30</td>
<td>15</td>
<td>0</td>
<td>15</td>
</tr>
</tbody>
</table>

Standard Operating Pressure [MPa]

- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Circuit Pressure [MPa]

- 0.0
- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Discharge/Absorb Oil Capacity (cm³)

- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

**JS521**

Effective Temperature Range (°C) by Circuit Capacity (V)

<table>
<thead>
<tr>
<th>Circuit Capacity (V)</th>
<th>25°C</th>
<th>125°C</th>
<th>0°C</th>
<th>125°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>V=200cm³</td>
<td>25</td>
<td>25</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>V=100cm³</td>
<td>50</td>
<td>25</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

Standard Operating Pressure [MPa]

- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Circuit Pressure [MPa]

- 0.0
- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Discharge/Absorb Oil Capacity (cm³)

- 4.0
- 8.0
- 12.0
- 16.0

**JS721**

Effective Temperature Range (°C) by Circuit Capacity (V)

<table>
<thead>
<tr>
<th>Circuit Capacity (V)</th>
<th>25°C</th>
<th>125°C</th>
<th>0°C</th>
<th>125°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>V=200cm³</td>
<td>25</td>
<td>25</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>V=100cm³</td>
<td>50</td>
<td>25</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

Standard Operating Pressure [MPa]

- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Circuit Pressure [MPa]

- 0.0
- 2.0
- 4.0
- 6.0
- 8.0
- 10.0
- 12.0
- 14.0
- 16.0

Discharge/Absorb Oil Capacity (cm³)

- 4.0
- 8.0
- 12.0
- 16.0

How to read the Characteristic Diagram

Please refer to “How to read the Characteristic Diagram” on JSS page.
# External Dimensions

**JSAB1-0A/B/C/G**

![Diagram of JSAB1-0A/B/C/G](image1)

**JSB1-0C/G**

![Diagram of JSB1-0C/G](image2)
### External Dimensions (mm)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JS□511</th>
<th>JS□521</th>
<th>JS□711</th>
<th>JS□721</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>155.5</td>
<td>187.5</td>
<td>210.5</td>
<td>236</td>
</tr>
<tr>
<td>B</td>
<td>65</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>32.5</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>58.5</td>
<td>68.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>8</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>82</td>
<td>84</td>
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<td></td>
</tr>
<tr>
<td>F</td>
<td>73.5</td>
<td>105.5</td>
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<td>G</td>
<td>25</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>51</td>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>9</td>
<td>16.5</td>
<td>9.5</td>
<td>17.5</td>
</tr>
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<td>L</td>
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<tr>
<td>Q</td>
<td>8</td>
<td></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>R (Nominal×Pitch×Depth)</td>
<td>M8×1.25×16</td>
<td>M8×1.25×16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting Bolt S</td>
<td>M8×1.25×70</td>
<td>M8×1.25×75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting Bolt T</td>
<td>M6×1×90</td>
<td>M6×1×95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. Indicator extends proportionally to pressure. Be aware not to interfere with other devices of max. extension dimension when designing.
2. Roughness of mounting surface (O-ring seal surface) of G (Gasket option) should be 6.35 or better.
3. Do not disassemble. Components include pressured spring parts. It is dangerous to disassemble.
Pressure Indicator

Model JKA
Model JKB

Detects circuit pressure of a fixture disconnected from the hydraulic pressure source

What is a Pressure Indicator?

The circuit pressure of a fixture that is disconnected from the hydraulic power source can be detected by using the pressure indicator with a sensor and/or a switch. It enables to detect operations and errors of an automatic control system.

Circuit Symbol

※ A filter is not built in each port. Please sufficiently perform flushing of piping and fitting to prevent contaminants such as cutting chips from entering the circuit.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Horizontal Mounting</th>
<th>Vertical Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Pressure Range</td>
<td>4.5 – 9.5MPa / 9.5 – 15MPa / 15 – 22 MPa</td>
<td></td>
</tr>
</tbody>
</table>

Mounting Direction
Action Description

Images
※ This is a simplified drawing.
The actual part components may be different.

Circuit Example

<table>
<thead>
<tr>
<th>Operating Procedure</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locking</strong></td>
<td></td>
</tr>
<tr>
<td>Hydraulic pressure is ON.</td>
<td></td>
</tr>
<tr>
<td>Supply hydraulic pressure to the actuator and the pressure indicator.</td>
<td></td>
</tr>
<tr>
<td>When the pressure reaches the set pressure of pressure indicator, the indicator rod is at full stroke (3±0.5mm stick out) and if using the sensor or switch, it can be detected.</td>
<td>The indicator rod extends gradually because of the balance between built-in spring force and pressure just before reaching the set pressure.</td>
</tr>
<tr>
<td><strong>Releasing</strong></td>
<td></td>
</tr>
<tr>
<td>Hydraulic pressure is OFF.</td>
<td></td>
</tr>
<tr>
<td>The pressure is released from the actuator and the pressure indicator. Then the indicator rod retracts back to the edge of the pressure indicator.</td>
<td></td>
</tr>
</tbody>
</table>
**Model No. Indication**

**JK** A 0 3 0 - 0 S (5.5MPa)

1. **Mounting Direction**
   - A : Horizontal Mounting
   - B : Vertical Mounting

2. **Set Pressure Code**
   - 3 : 4.5 ~ 9.5MPa
   - 5 : 9.5 ~ 15.0MPa
   - 7 : 15.0 ~ 22.0MPa

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

4. **Piping Method**
   - G : Gasket Option
   - S : Piping Option (Rc1/4 Thread)

5. **Set Pressure** (Set pressure when indicator rod is at full-stroke.)

   Please indicate the set pressure when ordering.
   (Please inform us with proper unit symbols.)

   - Indicator rod is at full stroke (3±0.5mm) when set pressure is reached.

```
Entry Example
at 5MPa  →  (5.0MPa)
at 20.5MPa  →  (20.5MPa)
at 700PSI  →  (700PSI)
```

---

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JK:030</th>
<th>JK:050</th>
<th>JK:070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Pressure Range MPa</td>
<td>4.5 ~ 9.5</td>
<td>9.5 ~ 15.0</td>
<td>15.0 ~ 22.0</td>
</tr>
<tr>
<td>Max. Operating Pressure MPa</td>
<td>25.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>37.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Change MPa/mm</td>
<td>0.65</td>
<td>1.38</td>
<td>2.55</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:  ※1. It shows the pressure change by 1mm stroke of the indicator.
**External Dimensions**

**JKAO-0-0-**

Hydraulic Port (S: Piping Option only)
Rc1/4 Thread

4- φ6.8 Bolt Hole
4-M6 × 1 × 40 Bolt (Included)

At Hydraulic Pressure Zero

Indicator
At Set Pressure (At Full Stroke)

Hydraulic Port (G: Gasket Option only)
O-ring: TBP8 (Included)

2- φ6 Spring Pin

**JKB0-0-0-**

2- φ6.8 Bolt Hole
2-M6 × 1 × 35 Bolt (Included)

At Hydraulic Pressure Zero

Indicator
At Set Pressure (At Full Stroke)

Hydraulic Port (S: Piping Option only)
Rc1/4 Thread

Note:

※2. Roughness of mounting surface (O-ring seal surface) should be 6.3S or less.
Non-Leak Reducing Valve

Model BMA
Model BMG

No Drain Port Required In-Line Type Reducing Valve

Drain port for reducing pressure is not needed. This allows to reduce the number of circuits.

---

What is a Reducing Valve?

Non-leak reducing valves reduce hydraulic circuit pressure of a fixture. Partial in-line circuit pressures can be reduced. This allows for simple circuit designs and proper quick change fixtures as well as eliminating a need for an exterior drain port.

---

Circuit Symbol

- Each port has a built-in filter.

---

Gasket option is available.

---

<table>
<thead>
<tr>
<th>Classification</th>
<th>Non-Leak Reducing Valve</th>
<th>Compact Non-Leak Reducing Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming Supply Pressure</td>
<td>2 ~ 7MPa</td>
<td>6 ~ 30MPa</td>
</tr>
<tr>
<td>Outgoing Set Pressure</td>
<td>1 ~ 6MPa</td>
<td>3 ~ 14MPa</td>
</tr>
</tbody>
</table>

Piping Method

- Piping Option
- Gasket Option
- BK Connecting Option

---

Model BMA → P.1245
Model BMG → P.1247

1243
Action Description

Operating Procedure

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hydraulic pressure is ON.</td>
</tr>
<tr>
<td>2</td>
<td>Supply hydraulic pressure to actuator ① and ②.</td>
</tr>
<tr>
<td>3</td>
<td>Raise the pressure up to the outgoing side set pressure.</td>
</tr>
<tr>
<td>4</td>
<td>The valve of reducing valve closes and then supply the outgoing side set pressure to actuator ①.</td>
</tr>
<tr>
<td>5</td>
<td>The pressure going into actuator ② raise up to the original pressure and lock completes.</td>
</tr>
</tbody>
</table>

Machining process

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hydraulic pressure is OFF.</td>
</tr>
<tr>
<td>2</td>
<td>The actuators ①,② are released at the same time.</td>
</tr>
</tbody>
</table>

Remarks

- There is differential pressure between outgoing side pressure and incoming side pressure (please refer to specification).
- When incoming side pressure reduces, check valve of reducing valve opens.

Adjustable Set Pressure

Set Hydraulic Pressure Change per Rotation (MPa/Rev)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BMA2030-0</th>
<th>BMA2050-0</th>
<th>BMA2070-0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BMG2030-0G</td>
<td>BMG2050-0G</td>
<td>BMG2070-0G</td>
</tr>
<tr>
<td>Set Pressure Change per Rotation (Reference)</td>
<td>0.3</td>
<td>1.2</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Notes:
1. The set pressure value is set according to the model code.
2. The value varies depending on the incoming port pressure.
3. Pressure increases by turning clockwise and decreases by turning counter-clockwise.
Model No. Indication

BMA20 50 - 0 G (5-25MPa)

1. Outgoing Side Set Pressure

3: 1.0 ~ 6.0MPa
5: 3.0 ~ 14.0MPa
7: 6.0 ~ 27.0MPa

2. Design No.

0: Revision Number

3. Piping Method

Blank: Piping Option (Rc1/4 Thread)
G: Gasket Option
K: BK Valve Connecting Option (Rc1/4 Thread in Outgoing Port)

Note: 1. Please contact us separately for the detailed dimensions of K (BK Valve Connecting Option).

4. Set Pressure (Outgoing Set Pressure - Incoming Supply Pressure)

Please indicate the set pressure when ordering.
(please inform us with proper unit symbols.)

- Pressure difference of incoming supply pressure and outgoing set pressure should be more than the allowable minimum pressure difference.

Entry Example

Outgoing: 5MPa  Incoming: 25MPa Setting → (5.0-25.0MPa)
Outgoing: 725PSI  Incoming: 3625PSI Setting → (725-3625PSI)

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BMA2030-0</th>
<th>BMA2050-0</th>
<th>BMA2070-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming Supply Pressure</td>
<td>MPa</td>
<td>2.0 ~ 7.0</td>
<td>6.0 ~ 30.0</td>
</tr>
<tr>
<td>Outgoing Set Pressure</td>
<td>MPa</td>
<td>1.0 ~ 6.0</td>
<td>3.0 ~ 14.0</td>
</tr>
<tr>
<td>Allowable Min. Pressure Difference</td>
<td>MPa</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>10.5</td>
<td>37.5</td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>23.3</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>

Note: 2. Allowable minimum pressure difference between the incoming supply pressure and the outgoing set pressure.
**External Dimensions**

BMA20\_0-0

※ This drawing shows piping method (Blank) : Piping Option.

BMA20\_0-0G

※ This drawing shows piping method (G) : Gasket Option.

Notes:
※ 3. Roughness of mounting surface (O-ring seal surface) should be 6.3S or less.
※ 4. It can be used as P(R) port by removing the plug.
Model No. Indication

BMG 20 5 0 - 0 G (5-25MPa)

1 Outgoing Side Set Pressure
- 3: 1.0 ~ 6.0MPa
- 5: 3.0 ~ 14.0MPa
- 7: 6.0 ~ 27.0MPa

2 Design No.
- 0: Revision Number

3 Piping Method
- G: Gasket Option

Note: ※1. Only G (Gasket Option) is available for BMG.
- Select BMA if connecting with couplers etc.

4 Set Pressure (Outgoing Set Pressure - Incoming Supply Pressure)
- Please indicate the set pressure when ordering.
  (Please inform us with proper unit symbols.)
- ※ Allowable minimum pressure difference shows the minimum difference between incoming and outgoing pressure.

Entry Example
- Outgoing: 5MPa  Incoming: 25MPa  Setting → (5.0 - 25.0MPa)
- Outgoing: 725PSI  Incoming: 3625PSI  Setting → (725 - 3625PSI)

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BMG2030-0G</th>
<th>BMG2050-0G</th>
<th>BMG2070-0G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming Supply Pressure</td>
<td>MPa</td>
<td>2.0 ~ 7.0</td>
<td>6.0 ~ 30.0</td>
</tr>
<tr>
<td>Outgoing Set Pressure</td>
<td>MPa</td>
<td>1.0 ~ 6.0</td>
<td>3.0 ~ 14.0</td>
</tr>
<tr>
<td>Allowable Min. Pressure Difference</td>
<td>MPa</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>10.5</td>
<td>37.5</td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td></td>
<td>23.3</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td></td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td></td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td></td>
<td>0.8</td>
</tr>
</tbody>
</table>

Note: ※2. Allowable minimum pressure difference between the incoming supply pressure and the outgoing set pressure.
**External Dimensions**

Outgoing Pressure Adjusting Screw (M8 × 1.25)

- 35
- 35
- Hex. Hole 4
- 2-M6 × 1 × 35 Bolt (included)

CYL. Port [Outgoing Pressure Side]
O-ring: 1BP11 (Included)

P(R) Port [Incoming Pressure Side]
O-ring: 1BP11 (Included)

**Note:**

※3. Roughness of mounting surface (O-ring seal surface) should be 6.35 or less.

Mounting Part Machining Drawing

2 - ø 6 or less
[Prepared by Customer]

Port Machining Area

- 33
- 13
- 13
- 16.5
- 14.5
- 18.5

2 - M6 × 1 Thread Depth 10 or more
Continuous Discharge Booster

Model AU
Model AU-M

Continuous discharge booster that has no limitation for the outgoing side circuit capacity

Actuator is made in a compact size by boosting pressure. High pressure hydraulic power source is not needed by partial boosting pressure.

What is a Continuous Discharge Booster?

Boost incoming supply pressure by the back and forth action of piston and using bypass to get the boosted pressure to the outgoing side.

There is no limitation in the outgoing side circuit capacity because it continuously discharges the pressure so it is the best for multiple actuator or big circuit volume.

There are modular option and it can be attached to modular valve.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Piping Option</th>
<th>Modular Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incoming Discharge Pressure</td>
<td>3 ~ 12.5MPa</td>
<td>2 ~ 8.4MPa</td>
</tr>
<tr>
<td>Outgoing Discharge Pressure</td>
<td>6 ~ 25MPa</td>
<td>6 ~ 25MPa</td>
</tr>
<tr>
<td>Boosting Ratio</td>
<td>2 times</td>
<td>3 times</td>
</tr>
</tbody>
</table>

Circuit Symbol

※ Each port has a built-in filter.
**Action Description**

**Circuit Example: Single Action Circuit**

![Diagram of a single action circuit](Image)

**Circuit Example: Double Action Circuit**

![Diagram of a double action circuit](Image)

**Operation Sequence**

<table>
<thead>
<tr>
<th>Supply hydraulic pressure to the continuous discharge booster.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply oil from outgoing port of the continuous discharge booster to the actuator.</td>
<td>Outgoing side oil is full and the pressure start to rise.</td>
</tr>
<tr>
<td>Boosting procedure starts inside the continuous discharge booster. Internal piston moves back and forth until the outgoing side pressure is boosted enough and then the pressure rises. Outgoing side circuit capacity has no limitation.</td>
<td>Locking action is completed.</td>
</tr>
</tbody>
</table>

**Locking**

| Supply hydraulic pressure to the pilot port of the continuous discharge booster. | The pilot valve(※1) opens and lock-side hydraulic pressure goes back to the tank. |
| Actuator released. | Releasing is completed. |

**Relieving**

| The pilot valve(※1) opens and lock-side hydraulic pressure goes back to the tank. | The pilot valve (※1) is operated by approximately 10% of outgoing side pressure. |

※ This drawing is the explanation of piping option (AU). Please refer to the detail page for modular option (AU-M).
Model No. Indication

AU 2 5 2 1 - 0

1 Outgoing Side Discharge Pressure Code

5 : 6 ~ 25MPa
8 : 10 ~ 35MPa

*1. It is “8” only for AU2850-0. Modular model : only “5” can be selected.

2 Boosting Ratio

2 : 2 times
3 : 3 times
5 : 5 times

3 Design No. (Revision Number)

0 : MA, MB selected
1 : Blank selected

4 Piping Method

Blank : Piping Option (Rc1/4 Thread)
MA : Modular Option (A port is boosted up.)
MB : Modular Option (B port is boosted up.)

Blanks

MA

MB

Note:
1. Please refer to the Circuit Symbol for the circuit drawing.

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>AU2521-0</th>
<th>AU2520-0MA</th>
<th>AU2531-0</th>
<th>AU2530-0MA</th>
<th>AU2851-0</th>
<th>AU2550-0MA</th>
<th>AU2550-0MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boosting Ratio</td>
<td>2 times</td>
<td>3 times</td>
<td>5 times</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incoming Supply Pressure</td>
<td>MPa</td>
<td>3.0 ~ 12.5</td>
<td>2.0 ~ 8.4</td>
<td>2.0 ~ 7.0</td>
<td>2.0 ~ 5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outgoing Boosting Pressure</td>
<td>MPa</td>
<td>6.0 ~ 25.0</td>
<td>6.0 ~ 25.0</td>
<td>10.0 ~ 35.0</td>
<td>10.0 ~ 25.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>14.5</td>
<td>12.5</td>
<td>14.5</td>
<td>12.5</td>
<td>14.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Incoming Side Supply Rate</td>
<td>L/min</td>
<td>2 ~ 10</td>
<td>2 ~ 10</td>
<td>2 ~ 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot Valve Opening Pressure</td>
<td>Approx. 1/6 or more of the outgoing pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>1.1</td>
<td>2.3</td>
<td>1.1</td>
<td>2.3</td>
<td>1.1</td>
<td>2.3</td>
</tr>
</tbody>
</table>
Action Description

※ This is referencing to the model drawing of AU2□□□-0.

Pressure Boosting (Discharge)

1. Having hydraulic pressure supplied from the incoming side port oil passes through the built-in check valve C (A and B) to flow to the outgoing side port.
2. As the outgoing pressure comes close to the incoming pressure, the check valve C (A and B) is shut to operate the built-in switching unit. The boosting piston boosts the incoming pressure remaining between the check valves A and B.
3. The switching unit is operated and the boosting piston boosts the incoming pressure remaining between the check valves A and B.
4. When the boosting piston reaches the stroke end, the check valve B is shut to operate the switching unit. So that oil having the incoming pressure flows through the check valve A to push the pressure boosting piston back.
5. When the pressure boosting piston reaches the back end, the check valve A is shut to operate the switching unit again to return to the step 2. These steps are repeated to allow the AU to discharge continuously.

Reducing Pressure (Release)

1. The incoming pressure is supplied through the pilot port.
2. The pilot valve opens the check valve C to release the outgoing pressure.

※ Please refer to the pilot valve opening pressure on specification of the pressure that makes pilot valve activated.

AU Continuous Discharge Booster Flow Characteristic Diagram

Outgoing Discharge Flow Characteristic Diagram

- AU2521-0/□/AU2520-0M
- AU2531-0/□/AU2530-0M
- AU2851-0/□/AU2550-0M
Continuous Discharge Booster

External Dimensions (Piping Option)

AU2521-0 / AU2531-0 / AU2851-0

- Pilot Port (D) commonly used as Drain Port
  RC1/4

- Incoming P1(R) Port
  RC1/4

- 2 M6 x 1 x 55 Bolt (with Square Spring Washer) included

- Outgoing P2 Port
  RC1/4
# External Dimensions (Modular Option)

**AU2520-0MA / AU2530-0MA / AU2550-0MA**

![Diagram of AU2520-0MA with dimensions and notes](image)

- **Note:**
  1. Mounting surface dimensions are based on ISO4401-03.

**AU2520-0MB / AU2530-0MB / AU2550-0MB**

![Diagram of AU2520-0MB with dimensions and notes](image)

- **Note:**
  1. Mounting surface dimensions are based on ISO4401-03.
Cautions (AU)

< Cautions (Common)>

1. Discharge flow decreases as pressure on outgoing side increases. (Refer to Flow Characteristic Graph.) Please keep in mind that if there is larger load when an actuator on outgoing side strokes, the stroke time will be longer due to the decrease of discharge flow.
2. It cannot be pressurized properly if using a device with leakage in outgoing side circuit.
   (Since a general modular solenoid valve has internal leakage, do not connect it to P2 port.)
3. Due to the mechanical structure, there is always internal leakage between the incoming port (P1) and the pilot port (D) for modular model, between the pressurizing incoming port and T port. Please pay attention to the following notes.
   • When using a balance-stop pump (AA/AB/AC Pump manufactured by KOSMEK) as hydraulic power supply, the pump does not stop in balance due to the internal leakage of AU, leading to continuous operation and reduction in pump life.
   • When supply pressure decreases or stops temporarily, pressure in the circuit after the outgoing port (P2) (for modular model: pressurizing outgoing port) of AU will be maintained by non-leak function. However, pressure in the circuit before P1 port will not be maintained due to the internal leakage between P1 port and D port.
4. Stop hydraulic supply before disconnecting from hydraulic power source with auto couplers, etc. (Refer to Reference Circuit.)
5. Depending on incoming supply flow rate, circuit volume on outgoing side etc., surging may occur on incoming supply side.
   This may result by increasing too much set pressure on outgoing side.
   In that case, please prevent surging by installing accumulator or reducing incoming supply, etc.
6. If installing multiple numbers of AU to a low pressure hydraulic unit with high pressure supplied to a circuit, pressure fluctuation will be much larger, causing unstable pressure supply.

< Cautions for Piping Option>

1. Although each port is equipped with a filter, in order to maintain high pressure in the outgoing port (P2) at idle state of pressure supply to the incoming port (P1), the piping and fitting should be thoroughly cleaned before use.
2. Tightening with excessive torque leads to malfunction. (Maximum) tightening torque should be as shown below.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Bolt Size</th>
<th>Tightening Torque (N-m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU2□□□□-0</td>
<td>M6×1</td>
<td>MAX. 10</td>
</tr>
</tbody>
</table>

< Cautions for Modular Option>

1. Although the boosting ports (A1/A2 port for AU2□□□□-0MA, B1/B2 port for AU2□□□□-0MB) are equipped with a filter, the piping and fitting should be thoroughly cleaned before use.
2. When using Three-position solenoid valve, select ABT connection as the neutral position port model.
   Pressure in outgoing side will be released when using a model (closed center, etc.) that supplied pressure in P port flows into A or B port due to internal leakage when shifting to neutral position at outgoing pressure maintained state.
3. Make sure that hydraulic pressure is supplied to the boosting port (A1 or B1) after the actuator on the outgoing side is completely released.
   If pressure is supplied during release when there is still pressure (back pressure) remained in the boosting port, boosting time will be longer.
Circuit Reference

< In the case of separating hydraulic power source from fixture with auto coupler etc. >

![Circuit Diagram]

**Points**

1. AU makes it easier to boost pressure on outgoing side. (Release action is controlled with low pressure.)
2. Use the three-position solenoid valve for control (with neutral position ABT (ABR) connection), and stop hydraulic pressure supply with neutral position before operating connection/disconnection device. Even in this case, the pressure in the circuit after the outgoing port (P2) will be maintained by internal check valve of AU.
3. ★1 BEP Non-Leak Pilot Check Valve is a bypass circuit of AU. When the action speed of a cylinder is insufficient due to AU passage area, it can be accelerated by providing the bypass circuit which increases the amount of oil pass on both lock and release sides.
4. ★2 BEP Non-Leak Pilot Check Valve is an example when maintaining hydraulic pressure at released state.
5. Non-leak circuit will not work when connecting an actuator, which is not to be boosted, to P1(R) port since there is internal leakage between P1(R) port and D port. Please design another circuit. (Refer to Common Cautions No.3.)

< In the Case of Modular Option in Use >

![Modular Option Diagram]

Refer to the Caution of Modular Option No.2

- Solenoid Valve
- Pressure Reducing Valve
- Non-Leak Pilot Check Valve (Use this when release side of double acting circuit pressure needs to be maintained.)
- Flow Control Valve
- AU Modular Option (This drawing is AU25□□□0-MB.)
- Lock (Boosting Circuit)
One Shot Booster

Model BU

BU booster valve is placed in line circuit, compact, the best for boosting pressure partially in fixture

It matches our product AB/AC pump (balance stop pump) and is the best for quick change fixture.

What is a One Shot Booster?

One-shot booster is placed in line circuit type and it is able to boost the hydraulic pressure of the circuit partially with non-leak function.

It has larger capacity of outgoing side circuit than general booster due to built-in sequence valve and check valve. The check valve with non-leak function holds the outgoing side pressure with zero leakage.

It is possible to design simple circuit and it is appropriate for quick change fixture.

Boost the pressure just by connecting the incoming side and the outgoing side.
**Action Description**

**Images**

- **Actuator ①**
- **Work piece**

- **Actuator ②**

**Circuit Example**

- **One Shot Booster**

**Pressure at the Source**

- **Actuator ①**
- **Workpiece**

- **Actuator ②**

**Pressure at the Source**

- **Boosted Pressure**

---

**Operating Procedure**

<table>
<thead>
<tr>
<th></th>
<th>Note</th>
</tr>
</thead>
</table>
| **Locking** | **Hydraulic pressure is ON.**
Both actuator ① and ② are activated. When the pressure reaches up to the built-in sequence set pressure, built-in non-leak check valve is closed. Boosting process starts inside the booster and the internal piston is pushed, then the outgoing side pressure is boosted. The pressure of actuator ② is boosted. Locking action is completed. |
| **Releasing** | **Hydraulic pressure is OFF.**
The actuator ① and ② are released at the same time. Releasing action is completed. |
**Model No. Indication**

**BU50 2 0 - 0 (10.5MPa)**

1. **Boosting Ratio**
   - 2: 2.2 times
   - 3: 3.0 times
   - 6: 6.0 times

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

**Specifications**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BU5020-0</th>
<th>BU5030-0</th>
<th>BU5060-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boosting Ratio</td>
<td>2.2 times</td>
<td>3 times</td>
<td>6 times</td>
</tr>
<tr>
<td>Incoming Supply Pressure</td>
<td>5.0 ~ 11.4 MPa</td>
<td>3.0 ~ 8.4 MPa</td>
<td>1.5 ~ 4.2 MPa</td>
</tr>
<tr>
<td>Sequence Set Pressure</td>
<td>4.0 ~ 9.1 MPa</td>
<td>2.3 ~ 6.7 MPa</td>
<td>1.1 ~ 3.2 MPa</td>
</tr>
<tr>
<td>Outgoing Discharge Pressure</td>
<td>11.0 ~ 25.0 MPa</td>
<td>9.0 ~ 25.2 MPa</td>
<td>9.0 ~ 25.2 MPa</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Volume during Boosting Process</td>
<td>30 cm³</td>
<td>23 cm³</td>
<td>12 cm³</td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>14.1</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>4.4</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Boosting ratio is slightly different depending on packing seal resistance and spring force.
2. Sequence set pressure should be 70 ~ 80% of incoming supply pressure.
3. Discharge volume during boosting process is the total oil discharge volume during boosting after exceeds sequence set pressure.

**Performance Graph**

**Allowable Circuit Capacity Curve**

- Since BU is one shot booster, it has a limitation in the volume of outgoing circuit.

Note: 1. Performance graph curve is referencing.
(Referencing condition: All piping material shall be steel. Air in the circuit shall be completely flushed, and workpiece and attachment (lever) shall be securely fastened.)
Internal Action Description

When supplied

- **charging process**
  - Outgoing Side
  - Incoming Side
  - Rod
  - Check Valve [A]

  1. Check valve [A] is always kept in "Open" position by the rod. Incoming pressure flows to outgoing side through check valve [A], then outgoing side actuators are activated completely.
  2. When the pressure reaches the sequence set pressure, sequence valve [B] opens.

- **boosting process**
  - Outgoing Side
  - Incoming Side
  - Sequence Valve [B]
  - Piston [C]

  4. When piston [C] extends ahead a little, check valve [A] comes off from the rod, then it closes. Up to this time incoming and outgoing pressure are same pressure.
  5. When check valve [A] closes, outgoing circuit becomes closed circuit, and pressure is boosted according to area ratio of piston [C].

At discharged (Discharging Process)

- **outgoing side**
  - **incoming side**
  - Return Spring [E]
  - Check Valve [D]

  7. Piston [C] is pushed back by outgoing pressure and return spring [E], and outgoing pressure drops.

  8. Check valve [A] is opened and pushed by the rod at the time just before piston [C] finishing moving back. Release of the discharge oil from outgoing side actuator is released through the check valve [A].
  9. When the outgoing pressure is completely released and the piston [C] fully retracts back, check valve [D] closes.
  10. Discharge is finished.
  11. Piston [C] stops at the time the area and the pressure are balanced.
  12. Pressure boosting is completed.
C External Dimensions

C Cautions

1. Excessive amount of supply oil in the incoming side leads to malfunction of BU Booster.
   Provide a flow control valve with check valve just before the incoming side port, or adjust the flow rate on hydraulic pressure source side.
2. A large amount of air mixed in the outgoing circuit leads to boosting failure. If it does not work properly, release air from the circuit.
3. A large volume of oil capacity in outgoing circuit leads to boosting failure.
   Refer to the outgoing circuit capacity shown in Allowable Circuit Capacity Curve.
4. Using hydraulic hoses in outgoing circuit may result in insufficient boosting because the volume changes during boosting.
   Please use steel pipes as much as possible referring to the discharge rate of boosting process shown in specification.
5. Installing an accumulator in outgoing circuit may result in boosting failure by the similar reason. In case of using an accumulator,
   please select a proper one referring to the outgoing circuit capacity shown in Allowable Circuit Capacity Curve.
6. It is recommended to install a pressure gauge. It is easy to check the boosting condition by installing a pressure gauge on the outgoing circuit.
7. Do not install a flow control valve to an actuator on outgoing side. It may be boosted before the actuator completes operation leading to boosting failure.
MEMO

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

### Air Sequence Valve
- BWD

### Hydraulic Non-Leak Coupler
- BGA/RGB
- BGC/RGD
- BGP/RGB
- BPP/RGBS
- BNP/RGBS
- BNP/BNS
- BNP/BJS
- BNP/BFS

### Auto Coupler
- JTA/JTB
- JTC/JTD
- JVA/JVB
- JVC/JVD
- JVE/JVF
- JNA/JNB
- JNC/JND
- JLP/JLS

### Rotary Joint
- JR

### Hydraulic Valve
- BK
- BEQ
- BT
- BLS/BLG
- BLB
- JSS/JS
- JKA/JKB
- BMA/BMG
- AU/AU-M
- BU
- BP/JPB
- BX
- BEP/BSB
- BH
- BC

### Air Hydraulic Unit
- CV
- CK
- CP/CPB
- CPC/CQC
- CB
- CC
- AB/AB-V
- AC/AC-V
Pilot Reducing Valve Reservoir

Model BP
Model JPB

Reducing internal circuit hydraulic pressure while it is disconnected from pressure power source
Reduce pressure easily by pilot operation.

- What is a Pilot Reducing Valve?

It is possible to reduce internal circuit pressure of disconnected fixture from hydraulic power source by pilot operation.

Kosmek reservoir can hold the oil discharged from pilot reducing valve temporarily. The reservoir also has a non-leak check valve in it.

Circuit Symbol : Pilot Reducing Valve (BP)

Circuit Symbol : Reservoir (JPB)

※ A filter is built in P port.
A filter is not built in the R port. Please sufficiently perform flushing of piping and fitting to prevent contaminants such as cutting chips from entering the circuit.

※ A filter is built in R2 port.
A filter is not built in the R1 port. Please sufficiently perform flushing of piping and fitting to prevent contaminants such as cutting chips from entering the circuit.

High Pressure

To Low Pressure

Prior to Finish Machining Operation

Less Distortion by Lowering Hydraulic Pressure (Lowering Clamping Force)
### Action Description

#### Images

- **Rough Machining**
  - **Pilot Reducing Valve**
  - **Reservoir**
  - **High Pressure**
  - **Actuator**
  - **Non-Leak Valve**

- **Pushing**
  - **Pressure drops**

- **Finish Machining**
  - **Low Pressure**

#### Circuit Example

- **Quick Change Fixture**
  - **Actuator**
  - **Pilot Reducing Valve**
  - **Non-Leak Valve**
  - **Reservoir**

#### Operating Procedure

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disconnection</td>
<td>Completed when it is locked.</td>
<td></td>
</tr>
<tr>
<td>Rough machining</td>
<td>(Large thrust machining).</td>
<td></td>
</tr>
<tr>
<td>Pressure reducing</td>
<td>When the push button of pilot reducing valve is pushed by main spindle or manually, the circuit is connected to the reservoir and reduces the pressure to the relief set pressure.</td>
<td>Lowering clamping force prior to finish machining operation, it allows to prevent or minimize distortion of workpiece.</td>
</tr>
<tr>
<td></td>
<td>Release the push button.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start the final machining operation.</td>
<td></td>
</tr>
<tr>
<td>Releasing</td>
<td>When the hydraulic power source is OFF, connect the fixture and then release the non-leak valve.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When the circuit pressure becomes lower than the pressure held in reservoir tank, check valve opens and hydraulic oil returns to tank.</td>
<td></td>
</tr>
</tbody>
</table>
1 Pressure Code

203: Operating Pressure 2.0 ~ 7.0MPa
   Relief Pressure 1.5 ~ 5.0MPa
507: Operating Pressure 7.0 ~ 30.0MPa
   Relief Pressure 5.0 ~ 15.0MPa

2 Design No.

0: Revision Number

3 Piping Method

Blank: Piping Option (Rc1/4 Thread)
G: Gasket Option
   (Select G: Gasket option for connecting JPB)

4 Set Pressure (Relief Set Pressure)

Please let us know the relief set pressure.
(please inform us with proper unit symbols.)

Entry Example
Relief Pressure: 4MPa → (4.0MPa)
Relief Pressure: 1200PSI → (1200PSI)

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BP2030-0-G</th>
<th>BPS070-0-G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure†1</td>
<td>MPa</td>
<td>2.0 ~ 7.0</td>
</tr>
<tr>
<td>Relief Pressure†2</td>
<td>MPa</td>
<td>1.5 ~ 5.0</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>10.5</td>
</tr>
<tr>
<td>Pilot Operating Force†3</td>
<td>kN</td>
<td>0.06 ~ 0.22</td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>9.1</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>℃</td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Notes:
†1. Operating pressure shows initial operating pressure.
†2. Relief pressure shows the relief set pressure after operating pilot.
†3. Set the pilot operating force at more than minimum operating force (More than operating pressure × 0.032) and less than 1.5kN.

External Dimensions

BP2030-0-G: Piping Option

BP2030-OG: Gasket Option

Notes:
†4. The dimensions that are not shown in BP2030-OG (gasket option) area, please refer to BP2030-0-G (piping option). They are the same.
†5. Roughness of mounting surface (O-ring seal surface) should be 6.3S or better.
Model No. Indication

**J PB 540 - 0 P**

1. **Pressure Code**
   - 2: Operating Pressure Range 2.0 ~ 7.0MPa
   - 5: Operating Pressure Range 5.0 ~ 30.0MPa

2. **Tank Capacity**
   - 4: 40cm³
   - 6: 60cm³

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

4. **Piping Method**
   - P: BP Connection Option
   - S: Piping Option (Rc Thread)

### Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JPB240-0</th>
<th>JPB260-0</th>
<th>JPB440-0</th>
<th>JPB560-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range [MPa]</td>
<td>2.0 ~ 7.0</td>
<td>5.0 ~ 30.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withstanding Pressure [MPa]</td>
<td>10.5</td>
<td>37.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tank Capacity [cm³]</td>
<td>40.0</td>
<td>60.0</td>
<td>40.0</td>
<td>60.0</td>
</tr>
<tr>
<td>Circuit Capacity [cm³]</td>
<td>800 or less</td>
<td>800 ~ 1200</td>
<td>800 or less</td>
<td>800 ~ 1200</td>
</tr>
<tr>
<td>Operating Temperature [°C]</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight [kg]</td>
<td>2.1</td>
<td>2.2</td>
<td>2.1</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Notes:
- 6. Select the tank capacity based on the circuit capacity to be used.
- 7. Operating pressure and withstanding pressure are the pressure which is connected to R2 port. Please refer to Circuit Symbol.

### External Dimensions

<table>
<thead>
<tr>
<th>Model No.</th>
<th>JPB240-0</th>
<th>JPB260-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>110</td>
<td>126</td>
</tr>
<tr>
<td>M</td>
<td>86</td>
<td>102</td>
</tr>
<tr>
<td>S</td>
<td>102</td>
<td>118</td>
</tr>
</tbody>
</table>

- Mounting Bolt: M8x1.25x115
- M8x1.25x130

---

**Push Button Position**

**R2 Port**

**R1 Port (Only for P:BP Connection Option)**

**BP-G Valve Gasket Option**

**R1 Port (Only for S: Piping Option)**

**R1/4 Thread**

---

**Features**

- High-Power Series
- Pneumatic Series
- Hydraulic Series
- Valve / Coupler
- Hydraulic Unit
- Manual Operation Accessories
- Cautions / Others
- Air Sequence Valve
- BWD
- Auto Coupler
- JTA/1TB
- JTC/1TD
- JVA/1VB
- JVC/1VD
- JVE/1VF
- JMA/1NB
- JNC/1ND
- JLP/1LS
- Rotary Joint
- JR
- Hydraulic Valve
- BK
- BEQ
- BT
- BLS/BLG
- BBL
- JSS/JS
- JKA/JKB
- BMA/BMG
- AU/AU-M
- BU
- BP/JPB
- BK
- BEP/BSP
- BH
- BC
- Air
- Hydraulic Unit
- CV
- CK
- CP/CPB
- CPC/CQC
- CB
- CC
- AB/AB-V
- AC/AC-V

1266
**Automatic Air Bleed Valve**

**Model BX**

Drains air out automatically in the hydraulic circuit

With Manual Air Bleed Valve

- **What is an Automatic Air Bleed Valve?**

  Placed on the top of the piping, this valve bleeds air automatically during repetition of the hydraulic pressure ON and OFF.

---

### Operating Procedure

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Procedure</td>
<td>Note</td>
</tr>
<tr>
<td>Hydraulic pressure is OFF</td>
<td></td>
</tr>
<tr>
<td>Hydraulic pressure is ON</td>
<td></td>
</tr>
<tr>
<td>The air and oil is drained out from drain port of auto air bleed valve.</td>
<td>Drains air or oil out each time of hydraulic pressure is switched. (Please refer to the specification for the drain volume.)</td>
</tr>
<tr>
<td>The check valve of auto air bleed valve is closed and drain-out is stopped.</td>
<td>There is no oil leakage from check valve after drain-out.</td>
</tr>
</tbody>
</table>
### Model No. Indication

**BX 001 0-02**

- **Port Size**
  - 2: Rc1/4 Thread
  - 3: Rc3/8 Thread

- **Design No.**
  - (Revision Number)

### Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BX0010-02</th>
<th>BX0010-03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Operating Pressure MPa</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Cracking Pressure MPa</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>Withstanding Pressure MPa</td>
<td>37.5</td>
<td>37.5</td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO VG 32</td>
<td>General Hydraulic Oil Equivalent to ISO VG 32</td>
</tr>
<tr>
<td>Drain</td>
<td>Air only</td>
<td>Air only</td>
</tr>
<tr>
<td>Volume</td>
<td>Oil only</td>
<td>Oil only</td>
</tr>
<tr>
<td>Minimum Oil Flow Rate</td>
<td>50 cm³/min.</td>
<td>50 cm³/min.</td>
</tr>
<tr>
<td>Mounting Position</td>
<td>Vertical Upward (See Outline Drawing)</td>
<td>Vertical Upward (See Outline Drawing)</td>
</tr>
<tr>
<td>Weight kg</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>3-P(R) Port</td>
<td>Rc1/4 Thread</td>
<td>Rc3/8 Thread</td>
</tr>
</tbody>
</table>

**Notes:**

1. It shows the drain volume returning from valve to tank at the moment when the circuit pressure switches from zero to normal operating pressure.
2. Air and oil are exhausted from T port. Please make sure to connect drain piping to tank.
3. Please make sure to mount this as shown in the drawing. In case of an incorrect position, air cannot be bled out.

### External Dimensions

- **T Port**
  - Rc1/8 Thread
- **3-P(R) Port**
  - Rc Thread
- **Mounting Hole**
  - 3.55 Hole
- **Manual Air Bleed Valve (Air Bleed Valve)**
- **Dimensions:**
  - Width: 31 mm
  - Height: 62 mm
  - Depth: 19 mm

---

**High-Power Series**

**Pneumatic Series**

**Hydraulic Series**

**Valve / Coupler**

**Hydraulic Unit**

**Manual Operation**

**Accessories**

**Cautions / Others**

**Air Sequence Valve**

**BWD**

**Hydraulic Non-Leak Coupler**

- BGA/RGB
- BGC/RGD
- BGP/BSG
- BGP/BSB
- BNP/BNB
- BNP/BSB
- BNP/BJS
- BNP/BJS
- BNP/BJS

**Auto Coupler**

- JTA/1TB
- JTC/1TD
- JVA/1VB
- JVC/1VD
- JVE/1VF
- JVA/1VB
- JNC/1ND
- JLP/1LS

**Rotary Joint**

- JR

**Hydraulic Valve**

- BK
- BEO
- BT
- BLS/BLG
- BLB
- JSS/JQ
- JAK/KB
- BMA/BMG
- AU/AU-M
- BU
- BP/IPB
- BEP/BSB
- BH
- BC

**Air Hydraulic Unit**

- CV
- CK
- CP/CPB
- CPC/CQC
- CB
- CC
- AB/AB-V
- AC/AC-V
Non-Leak Pilot Check Valve

Model **BEP**
Model **BSP**

Pressure is maintained even when pressure supply is stopped.

Maintains pressure until hydraulic pressure is supplied to pilot port.

**What is a Non-Leak Pilot Check Valve?**

Even if pressure supply from the hydraulic power source is stopped, the outgoing side pressure is held until the pressure is supplied to pilot port.

Even if the hydraulic power source is cut off due to energy saving (Stop hydraulic supply to incoming side) or blackout etc., it holds the pressure and prevents the workpiece drop off.

### Circuit Symbol (BEP)

![Circuit Symbol](image)

- **Incoming A Port**
- **Outgoing B Port**
- **Pilot Port**

※ This drawing shows BEP. (Please refer to the BSP page for the BSP circuit symbol.)

A filter is built in each A port and B port.
A filter is not built in the pilot port. Please sufficiently perform flushing of piping and fitting to prevent contaminants such as cutting chips from entering the circuit.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Piping Model</th>
<th>Modular Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure</td>
<td>1.0 ~ 7.0MPa / 7.0 ~ 30.0MPa</td>
<td>2.5 ~ 7.0MPa / 7.0 ~ 25.0MPa</td>
</tr>
</tbody>
</table>

### Application Examples

![Application Example](image)
**Action Description**

**Circuit Reference**  Two numbers of Non-Leak Pilot Check Valve BEP are used in this reference.

---

**Operating Procedure**

<table>
<thead>
<tr>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locking</td>
<td>Lock hydraulic pressure is ON. (Release hydraulic pressure is OFF.)&lt;br&gt;BEP pilot check valve (release side) opens.&lt;br&gt;The release side circuit pressure returns to the tank.&lt;br&gt;Actuator is locked by supplying hydraulic pressure to the lock side.&lt;br&gt;(The locking pressure is maintained even after hydraulic power source is OFF.)&lt;br&gt;Machining Process, etc.</td>
</tr>
<tr>
<td>Releasing</td>
<td>Release side hydraulic pressure is ON. (Lock side pressure is OFF.)&lt;br&gt;BEP pilot check valve (lock side) opens and the lock side circuit pressure returns to the tank.&lt;br&gt;Actuator is released by supplying the hydraulic pressure to the release side.&lt;br&gt;(The releasing pressure is maintained even after hydraulic power source is OFF.)</td>
</tr>
<tr>
<td>In case of an emerging hydraulic power source is OFF due to a blackout.</td>
<td>The actuator will remain in the same state as it was before blackout by non-leak pilot check valve.</td>
</tr>
</tbody>
</table>
Model No. Indication

**BEP220-0**

1 Pressure Code

2 : Operating Pressure Range 1.0 ~ 7.0MPa  
5 : Operating Pressure Range 7.0 ~ 30.0MPa

2 Design No.

0 : Revision Number

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BEP220-0</th>
<th>BEP250-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range</td>
<td>MPa</td>
<td>1.0 ~ 7.0</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>10.5</td>
</tr>
<tr>
<td>Cracking Pressure</td>
<td>MPa</td>
<td>0.24</td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>28.3</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td></td>
<td>General Hydraulic Oil Equivalent to ISO-VG32</td>
</tr>
<tr>
<td>Pilot Hydraulic Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Pressure at 25MPa</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Operating Pressure at 14MPa</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Operating Pressure at 7MPa</td>
<td></td>
<td>2.0MPa or more</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>1.4</td>
</tr>
</tbody>
</table>

External Dimensions

**BEP220-0 / BEP250-0**

- Markings: Incoming Port Side [A], Outgoing Port Side [B]
  - Front Surface [C] that shows free flowing direction from incoming side to outgoing side.

2-M8 × 1.25 × 60 Bolt (With Square Spring Washer) (Included)
**Cautions (BEP)**

1. Do not place any devices that occurs oil leakage between outgoing side (B) port and actuators.
2. Non-leak function does not work properly if there is an oil leakage inside actuators.
3. Connecting the hydraulic source to outgoing (B) port and controlling hydraulic supply of A port with pilot port will lead to sealing malfunction. We offer other compatible products. Please contact us.
Model No. Indication

BSP3 50 - 0 W 6R (8.0MPa)

1 Pressure Code
- 2 : Operating Pressure Range 2.5 ~ 7.0MPa
- 5 : Operating Pressure Range 7.0 ~ 25.0MPa
(Please refer to the specification for pressure compensating valve.)

2 Design No.
- 0 : Revision Number

3 Circuit Symbol
- A : A Port Check
- W : A/B Port Check

Specifications

Without Pressure Compensating Valve

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BSP320-0A</th>
<th>BSP350-0A</th>
<th>BSP320-0W</th>
<th>BSP350-0W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range</td>
<td>2.5 ~ 7.0</td>
<td>7.0 ~ 25.0</td>
<td>2.5 ~ 7.0</td>
<td>7.0 ~ 25.0</td>
</tr>
<tr>
<td>Cracking Pressure</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot Hydraulic Pressure</td>
<td>More than one third of A2 port holding pressure</td>
<td>More than one third of A2 (B2) port holding pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>℃</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>1.1</td>
<td>1.1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

With Pressure Compensating Valve

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BSP320-0A4R</th>
<th>BSP350-0A6R</th>
<th>BSP320-0A7R</th>
<th>BSP350-0W4R</th>
<th>BSP350-0W6R</th>
<th>BSP350-0W7R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range</td>
<td>2.5 ~ 7.0</td>
<td>7.0 ~ 15.5</td>
<td>15.5 ~ 25.0</td>
<td>2.5 ~ 7.0</td>
<td>7.0 ~ 15.5</td>
<td>15.5 ~ 25.0</td>
</tr>
<tr>
<td>Relief Set Pressure Range</td>
<td>3.5 ~ 8.0 +1.5</td>
<td>8.5 ~ 17.0 +2</td>
<td>17.5 ~ 27.0 +2.5</td>
<td>3.5 ~ 6.0 +1.5</td>
<td>8.5 ~ 17.0 +2.5</td>
<td>17.5 ~ 27.0 +2.5</td>
</tr>
<tr>
<td>Cracking Pressure</td>
<td>MPA</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot Hydraulic Pressure</td>
<td>More than one third of A2 port holding pressure</td>
<td>More than one third of A2 (B2) port holding pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. Passage Area</td>
<td>mm²</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>℃</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Cautions (BSP)

1. Please note that pressure will be decreased by oil temperature drop when stopping pressure supply to A1(B1) port and maintaining pressure on A2(B2) port side.
2. The pressure relief valve is used for relieving volume of hydraulic pressure which is increased by oil temperature rise. It cannot be used for reducing supply pressure that is out of relief set pressure range.
3. When using with pressure compensating valve, if there is back pressure generated in T port, it cannot be relieved properly. Please contact us for further information.
### External Dimensions

**BSP3□0-0A**

- **Mounting Surface Dimension**
  - (Based on ISO 4401-03)
  - 100  (11) 40.5  34.5
  - 32.5  0.5

**4-φ 5.5 Bolt Hole**
(For Mounting Bolts)

**Surface Roughness of Mounting Surface**

- **2-O-ring: 18P10 (Included)**
- **2-O-ring: 18P9 (Included)**

**BSP320-04AR□ / BSP350-04AR□ / BSP350-04AR□**

*Please refer to BSP3□0-0A for any dimensions that are not shown.*

**BSP3□0-0W**

- **Mounting Surface Dimension**
  - (Based on ISO 4401-03)
  - 140  (14) 40.5  34.5
  - 32.5  0.5

**4-φ 5.5 Bolt Hole**
(For Mounting Bolts)

**Surface Roughness of Mounting Surface**

- **2-O-ring: 18P10 (Included)**
- **2-O-ring: 18P9 (Included)**

**BSP320-04WR□ / BSP350-04WR□ / BSP350-04WR□**

*Please refer to BSP3□0-0W for any dimensions that are not shown.*

### Circuit Symbol

- **BSP3□0-0A**

- **BSP3□0-0W**
Non-Leak Valve Unit
Manual Operation Model

Model BH

Manual Direction Control Valve with Non-Leak Function
A Variety of Circuits and Combination Options

What is a manual operating non-leak valve unit?

It is a manual operated direction control valve. It holds outgoing side hydraulic pressure even after the pressure power supply is cut off.

Even if the hydraulic power source is cut off due to energy saving (Stop hydraulic supply to incoming side) or blackout etc., it holds the pressure and prevents the workpiece drop off.

Application Examples

Activate the single acting actuator manually by AA circuit.

Activate the double acting actuator manually by NN circuit.

Circuit Symbol

<table>
<thead>
<tr>
<th>A</th>
<th>Normal Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Port</td>
<td>R Port</td>
</tr>
<tr>
<td>B Port</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>Normal Close</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Port</td>
<td>R Port</td>
</tr>
<tr>
<td>A Port</td>
<td></td>
</tr>
</tbody>
</table>

NN Exclusively used for Double Acting Circuit

<table>
<thead>
<tr>
<th>B Port</th>
<th>P Port</th>
</tr>
</thead>
</table>

Note:
A filter is built in each port other than R ports.

Operating Procedure

1. While pulling lever
2. Up and down the lever (45°)

Operating Procedure

While pulling lever (to prevent wrong operation)
Operate the lever up and down.
Model No. Indication

BH00 4 1 - NN - 0 - (7.0MPa)

1 Pressure Code
4: Operating Pressure Range 2.5~7.0MPa
7: Operating Pressure Range 6.0~30.0MPa
※ Pressure code is the same as BC unit if it is with pressure switch option or with pressure gauge option.

2 Design No.
1: Revision Number

3 Circuit Symbol
A: Normal Open
B: Normal Close
NN: Exclusively used for Double Action Circuit
(Example) A, AA, AB, ANN, NNNN

4 Usable Fluid
0: General Hydraulic Oil
(Please refer to Hydraulic Fluid List)
S: Silicon Oil
G: Water-Glycol

5 Option
Blank: None (Standard: Piping Block is only on the right side.)
GR: With Pressure Gauge installed on the right side. (Piping Block is on both sides.)
GL: With Pressure Gauge installed on the left side. (Piping Block is on both sides.)
H: With Piping Block installed on the left side. (P=Port)

6 Unit of Pressure Gauge
Blank: MPa (Standard)
P: PSI / Rc Thread Fitting

7 Operating Pressure
Specify the operating pressure.
(Please indicate the pressure with a proper unit symbol)
(Example) (7.0MPa) (20.0MPa) (2000PSI) (2000kg/cm²)

Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BH0041</th>
<th>BH0071</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range</td>
<td>MPa</td>
<td>2.5 ~ 7.0</td>
</tr>
<tr>
<td>Withstanding Pressure</td>
<td>MPa</td>
<td>10.5</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>°C</td>
<td>0 ~ 70</td>
</tr>
<tr>
<td>Usable Fluid</td>
<td></td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32</td>
</tr>
</tbody>
</table>

Note:
※1. It shows withstanding pressure without pressure gauge.

External Dimensions

- A Port: n-Rc1/4 Thread
- R Port: Rc1/4 Thread
- Lever: One Position

The Number of Valves (n) (mm)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>88</td>
<td>138</td>
<td>188</td>
<td>238</td>
</tr>
<tr>
<td>B</td>
<td>69</td>
<td>119</td>
<td>169</td>
<td>219</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
<td>3.9</td>
<td>6.3</td>
<td>8.7</td>
</tr>
</tbody>
</table>

Note:
※2. It shows the outline dimensions of valve unit with left hand side piping block option.
Non-Leak Valve Unit
Electrical Control Model

Model BC

Electrical direction control valve with non-leak valve
A variety of circuits and combination options.

What is a non-leak valve unit (Electrical Control Model)?

It is an electrical directional control valve. It operates built-in non-leak valves by switching air solenoid valve electrically. Even if the pressure supply is cut off from the hydraulic power source, it maintains the pressure in outgoing side circuit.

Even if the hydraulic power source is cut off due to energy saving (Stop hydraulic supply to incoming side) or blackout etc., it holds the pressure and prevents a workpiece fall.

Application Examples

Control lock and release action of actuators electrically.

Circuit Symbol

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Normal Open</td>
</tr>
<tr>
<td>U</td>
<td>Double Solenoid Valve Option</td>
</tr>
<tr>
<td>YY</td>
<td>Exclusively used for Double Action Circuit</td>
</tr>
</tbody>
</table>

※ Filter is built in other than Pa port and R port.
Model No. Indication

**BC00 4 1 - CC - 10 - (7.0MPa)**

1. **Pressure Code (Operating Pressure Range)**
   - 3: 2.5 ~ 7.0MPa
   - 4: 4.0 ~ 7.0MPa
   - 5: 6.0 ~ 11.0MPa

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

3. **Circuit Symbol**
   - C: Normal Open
   - Z: Normal Close
   - U: Double Solenoid Valve Option
   - YY: Exclusively used for Double Action Circuit (Example) C, CZ, UU, UUYY
   - ※ Please contact us if a different circuit is needed other than what is shown.

4. **Control Voltage**
   - 1: AC100V
   - 2: AC200V
   - 3: AC110V

5. **Usable Fluid**
   - 0: General Hydraulic Oil (Refer to Hydraulic Fluid List)
   - S: Silicone Oil
   - G: Water-Glycol

6. **Option**
   - Blank: None (Standard: piping block is only on the right side.)
   - GR: With Pressure Gauge installed on right side. (Piping Block is on both sides.)
   - GL: With Pressure Gauge installed on left side. (Piping Block is on both sides.)
   - H: With Piping Block installed on the left side. (P: Port)

7. **Unit of Pressure Gauge**
   - Blank: MPa (Standard)
   - P: PSI / Rc Thread Fitting

8. **Operating Pressure**
   - Specify the operating pressure.
   - (Please indicate the pressure with a proper unit symbol)
   - (Example) (7.0MPa) (20.0MPa) (2000PSI) (200kg/cm²)

### Specifications

<table>
<thead>
<tr>
<th>Model No.</th>
<th>BC0031</th>
<th>BC0041</th>
<th>BC0051</th>
<th>BC0061</th>
<th>BC0071</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure Range MPa</td>
<td>2.5 ~ 4.5</td>
<td>4.0 ~ 7.0</td>
<td>6.0 ~ 11.0</td>
<td>10.0 ~ 17.5</td>
<td>15.5 ~ 30.0</td>
</tr>
<tr>
<td>Withstanding Pressure <strong>(1)</strong> MPa</td>
<td>10.5</td>
<td>37.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Leak Valve Part Number</td>
<td>BA2011-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Switch Part Number</td>
<td>JBA070-0G-2002G</td>
<td>JBA070-0G</td>
<td>JBA2700-0G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature °C</td>
<td>0 ~ 70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Fluid</td>
<td>General Hydraulic Oil Equivalent to ISO-VG-32 (It depends on fluid code.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. INC. (Pressure Increase Detection) of Pressure Switch (JBA) is set to 70% of operating pressure. Contact us for other set pressure.
2. Force pressure gauge (for incoming pressure) option, piping ports are provided on both sides.

### Air Solenoid Dimensions

**External Dimensions**

**Air Solenoid Valve**

**Conduit Hole**

<table>
<thead>
<tr>
<th>The Number of Valves (n)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90</td>
<td>140</td>
<td>190</td>
<td>240</td>
</tr>
<tr>
<td>B</td>
<td>70</td>
<td>120</td>
<td>170</td>
<td>220</td>
</tr>
<tr>
<td>Weight kg</td>
<td>6</td>
<td>8.8</td>
<td>11</td>
<td>14</td>
</tr>
</tbody>
</table>

Notes:
2. When circuit symbol is U and YY.
3. Dimension of valve unit with left side piping block option.
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.
   - Reduce hydraulic pressure to less than 2MPa.
   - Loosen the cap nut of pipe fitting closest to the clamp by one full turn.
   - Shake the pipeline to loosen the outlet of pipe fitting.
   - Hydraulic fluid mixed with air comes out.

   - Tighten the cap nut after bleeding.
   - 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>JK Nippon Oil &amp; Energy</td>
<td>Super Hyrado 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>
<td></td>
</tr>
<tr>
<td>ExxonMobil</td>
<td>Mobil DTE 24</td>
<td>Mobil DTE 24 Light</td>
<td></td>
</tr>
<tr>
<td>Matsumura Oil</td>
<td>Hydol AW-32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castrol</td>
<td>Hyspin AWS 32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 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)

[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.
   ① The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.
   ② Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
   ③ After stopping the product, do not remove until the temperature drops.
   ④ Make sure there is no 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/WWM/VX/VXE/VXF)
   • 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>
<thead>
<tr>
<th>Country</th>
<th>Address/Office</th>
<th>Telephone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>KOSMEK LTD. 1-5, 2-chome, Murotani, Nishi-ku, Kobe-city, Hyogo, Japan 651-2241</td>
<td>+81-78-991-5162</td>
<td>+81-78-991-8787</td>
</tr>
<tr>
<td>United States of America</td>
<td>KOSMEK (USA) LTD. 650 Springer Drive, Lombard, IL 60148 USA</td>
<td>+1-630-620-7650</td>
<td>+1-630-620-9015</td>
</tr>
<tr>
<td>Mexico</td>
<td>KOSMEK USA Mexico Office Av. Santa Fe #103 int 59 Col. Santa Fe Juriquilla, C.P. 76230 Queretaro, Qro Mexico</td>
<td>+52-442-161-2347</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>KOSMEK EUROPE GmbH Schleppplatz 2 9020 Klagenfurt am Wörthersee Austria</td>
<td>+43-463-287587</td>
<td>+43-463-287587-20</td>
</tr>
<tr>
<td>China</td>
<td>KOSMEK (CHINA) LTD. Room601, RIVERSIDE PYRAMID No.55, Lane21, Pusan Rd, Pudong Shanghai 200125, China</td>
<td>+86-21-54253000</td>
<td>+86-21-54253709</td>
</tr>
<tr>
<td>India</td>
<td>KOSMEK LTD - INDIA F 203, Level-2, First Floor, Prestige Center Point, Cunningham Road, Bangalore -560052 India</td>
<td>+91-9880561695</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>KOSMEK Thailand Representation Office 67 Soi 58, RAMA 9 Rd., Suanluang, Suanluang, Bangkok 10250, Thailand</td>
<td>+66-2-300-5132</td>
<td>+66-2-300-5133</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Full Life Trading Co., Ltd. 16F-4, No.2, Jian Ba Rd., Zhonghe District, New Taipei City Taiwan 23511</td>
<td>+886-2-82261860</td>
<td>+886-2-82261890</td>
</tr>
</tbody>
</table>

Sales Offices in Japan

<table>
<thead>
<tr>
<th>Location</th>
<th>Telephone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Office</td>
<td>TEL. 078-991-5162</td>
<td>FAX. 078-991-8787</td>
</tr>
<tr>
<td>Osaka Sales Office</td>
<td>☏ 651-2241</td>
<td>☏ 651-2241</td>
</tr>
<tr>
<td>Overseas Sales</td>
<td>☏ 812-0006</td>
<td>☏ 812-10-101</td>
</tr>
<tr>
<td>Tokyo Sales Office</td>
<td>TEL. 048-652-8839</td>
<td>FAX. 048-652-8828</td>
</tr>
<tr>
<td>Nagoya Sales Office</td>
<td>TEL. 0566-74-8778</td>
<td>FAX. 0566-74-8808</td>
</tr>
<tr>
<td>Fukuoka Sales Office</td>
<td>TEL. 092-433-0424</td>
<td>FAX. 092-433-0426</td>
</tr>
</tbody>
</table>
OVERSEAS AFFILIATES AND SALES OFFICES

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

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Global Network

Asia Detailed Map

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Philippines

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