Proportional Electro-Hydraulic Relief Valves

This valve is derived by combining a small, high-performance 1/8 proportional electro-hydraulic pilot relief valve with a specially developed low-noise relief valve. With this valve, it is possible to regulate the system pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.

Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>EBG-03</th>
<th>EBG-06</th>
<th>EBG-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Operating Pres. MPa (PSI)</td>
<td>24.5 (3550)</td>
<td>24.5 (3550)</td>
<td>24.5 (3550)</td>
</tr>
<tr>
<td>Max. Flow L/min(U.S.GPM)</td>
<td>100 (26.4)</td>
<td>200 (52.8)</td>
<td>400 (106)</td>
</tr>
<tr>
<td>Min. Flow L/min(U.S.GPM)</td>
<td>3 (.79)</td>
<td>3 (.79)</td>
<td>3 (.79)</td>
</tr>
<tr>
<td>Pressure Adjustment Range MPa (PSI)</td>
<td>Refer to Model Number Designation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated Current C: 770 mA H: 820 mA</td>
<td>C: 750 mA H: 800 mA</td>
<td>C: 730 mA H: 780 mA</td>
<td></td>
</tr>
<tr>
<td>Coil Resistance 10 Ω</td>
<td>10 Ω</td>
<td>10 Ω</td>
<td>10 Ω</td>
</tr>
<tr>
<td>Hysteresis 3% or less</td>
<td>3% or less</td>
<td>3% or less</td>
<td>3% or less</td>
</tr>
<tr>
<td>Repeatability 1% or less</td>
<td>1% or less</td>
<td>1% or less</td>
<td>1% or less</td>
</tr>
<tr>
<td>Approx. Mass kg (lbs.)</td>
<td>5.6 (12.3)</td>
<td>6.3 (13.9)</td>
<td>10 (22)</td>
</tr>
</tbody>
</table>

Model Number Designation

<table>
<thead>
<tr>
<th>F- Special Seals</th>
<th>EB Series Number</th>
<th>G Type of Mounting</th>
<th>-03 Valve Size</th>
<th>-C Pres. Adj. Range MPa (PSI)</th>
<th>-T Safety Valve</th>
<th>-51 Design Number</th>
<th>* Design Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)</td>
<td>EB Proportional Electro-Hydraulic Relief Valve</td>
<td>G: Sub-plate Mounting</td>
<td>03</td>
<td>C: * 15.7 ( - 2275)</td>
<td>None: With Safety Valve</td>
<td>51</td>
<td>Refer to 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>06</td>
<td>H: * 24.5 ( - 3550)</td>
<td>T: Without Safety Valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Min. adjustment pressure shall be referred to the curves on page 680.
### Series Relief Valves

**Attachment**

- **Mounting Bolts**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EBG-03</td>
<td>M12 x 40 Lg.</td>
<td>1/2 - 13 UNC x 1-1/2 Lg.</td>
<td>4</td>
</tr>
<tr>
<td>EBG-06</td>
<td>M16 x 50 Lg.</td>
<td>5/8 - 11 UNC x 2 Lg.</td>
<td>4</td>
</tr>
<tr>
<td>EBG-10</td>
<td>M20 x 60 Lg.</td>
<td>3/4 - 10 UNC x 2-1/4 Lg.</td>
<td>4</td>
</tr>
</tbody>
</table>

**Sub-plate**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EBG-03</td>
<td>BGM-03-20</td>
<td>Rc 3/8</td>
<td>BGM-03-3080</td>
<td>3/8 BSPF</td>
<td>BGM-03-2090</td>
<td>3/8 NPT</td>
<td>2.4 (5.3)</td>
</tr>
<tr>
<td></td>
<td>BGM-03X-20</td>
<td>Rc 1/2</td>
<td>BGM-03X-3080</td>
<td>1/2 BSPF</td>
<td>BGM-03X-2090</td>
<td>1/2 NPT</td>
<td>3.1 (6.8)</td>
</tr>
<tr>
<td>EBG-06</td>
<td>BGM-06-20</td>
<td>Rc 3/4</td>
<td>BGM-06-3080</td>
<td>3/4 BSPF</td>
<td>BGM-06-2090</td>
<td>3/4 NPT</td>
<td>4.7 (10.4)</td>
</tr>
<tr>
<td></td>
<td>BGM-06X-20</td>
<td>Rc 1</td>
<td>BGM-06X-3080</td>
<td>1 BSPF</td>
<td>BGM-06X-2090</td>
<td>1 NPT</td>
<td>5.7 (12.6)</td>
</tr>
<tr>
<td>EBG-10</td>
<td>BGM-10-20</td>
<td>Rc 1-1/4</td>
<td>BGM-10-3080</td>
<td>1-1/4 BSPF</td>
<td>BGM-10-2090</td>
<td>1-1/4 NPT</td>
<td>8.4 (18.5)</td>
</tr>
<tr>
<td></td>
<td>BGM-10X-20</td>
<td>Rc 1-1/2</td>
<td>BGM-10X-3080</td>
<td>1-1/2 BSPF</td>
<td>BGM-10X-2090</td>
<td>1-1/2 NPT</td>
<td>10.3 (22.7)</td>
</tr>
</tbody>
</table>

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.
- Sub-plates are those for pilot operated relief valves. For dimensions, see page 213.

**Applicable Power Amplifiers**

For stable performance, it is recommended that Yuken’s applicable power amplifiers be used (for details see page 767, 771, 780).

Model Numbers: AME-D-10-***-20  SK1015-11 (For DC power supply)
AME-D2-1010-11  AMN-D-10 (For DC power supply)
SK1022-***-11

**Instructions**

- **Safety Valve**

  The pressure of the safety valve for EBG-03 is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa (290 PSI) subject to a flow rate of 50 L/min (13.2 U.S.GPM).

  The same for EBG-06 is preset at the value equal to the upper limit of the pressure adjustment range plus 3.5 MPa (510 PSI) subject to a flow rate of 100 L/min (26.4 U.S.GPM).

  The same for EBG-10 is preset at the value equal to the upper limit of the pressure adjustment range plus 4 MPa (580 PSI) subject to a flow rate of 200 L/min (52.8 U.S.GPM).

  In case where the upper limit of operating pressure is low or the upper limit of flow rate to be used is different from the specified maximum flow, please adjust and determine the setting pressure of the safety valve at the value calculated from the following formula.

  \[
  \text{Setting pressure} = (\text{Operating pressure upper limit}) + (\text{Additional pressure indicated blow})
  \]

To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.
**EBG-03 - 51/5190**

With Safety Valve

- For other dimensions, refer to the without safety valve.

**EBG-06 - 51/5190**

Without Safety Valve

- This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.
- On the sub-plate, plug the port which corresponds to this port.

### Model Numbers

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Dimensions (mm (Inches))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>EBG-03</td>
<td>197.5 (7.78)</td>
</tr>
<tr>
<td>EBG-06</td>
<td>205.5 (8.09)</td>
</tr>
</tbody>
</table>

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.213) in common use.
EBG-10-***-51/5190

With Safety Valve

Mounting surface:
ISO 6264-AT-10-2-A

DIMENSIONS IN
MILLIMETRES (INCHES)

EBG-10-***-T-51/5190

Without Safety Valve

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.213) in common use.

★ This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.

On the sub-plate, plug the port which corresponds to this port.

* For other dimensions, refer to the without safety valve.
Min. Adjustment Pressure
Viscosity: 30 mm²/s (141 SSU)

- **EBG-03**
- **EBG-06**
- **EBG-10**

![Graphs showing Min. Adjustment Pressure vs Flow Rate for EBG-03, EBG-06, and EBG-10](image)

Step Response (Example)
These Characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

1. **EBG-03-C**
   - Pressure vs. Flow Rate
   - Step Signal
   - (Flow Rate: 100 L/min, 26.4 U.S.GPM)

2. **EBG-06-C**
   - Pressure vs. Flow Rate
   - Step Signal
   - (Flow Rate: 200 L/min, 52.8 U.S.GPM)

3. **EBG-10-C**
   - Pressure vs. Flow Rate
   - Step Signal
   - (Flow Rate: 400 L/min, 106 U.S.GPM)

4. **EBG-03-H**
   - Pressure vs. Flow Rate
   - Step Signal
   - (Flow Rate: 100 L/min, 26.4 U.S.GPM)

5. **EBG-06-H**
   - Pressure vs. Flow Rate
   - Step Signal
   - (Flow Rate: 200 L/min, 52.8 U.S.GPM)

6. **EBG-10-H**
   - Pressure vs. Flow Rate
   - Step Signal
   - (Flow Rate: 400 L/min, 106 U.S.GPM)

- **Trapped Oil Volume**: 1 L (.264 U.S. Gallons)
- **Viscosity**: 30 mm²/s (141 SSU)
## Input Current vs. Pressure

### EBG-03

- **EBG-03-H**
- **EBG-03-C**

### EBG-06

- **EBG-06-H**
- **EBG-06-C**

### EBG-10

- **EBG-10-H**
- **EBG-10-C**

## Frequency Response

**EBG-03**

- Gain
- Phase

- Pressure: 7.8 ± 1.6 MPa (1130 ± 230 PSI)
- Flow Rate: 100 L/min (26.4 U.S.GPM)

**EBG-06**

- Gain
- Phase

- Pressure: 7.8 ± 1.6 MPa (1130 ± 230 PSI)
- Flow Rate: 200 L/min (52.8 U.S.GPM)

**EBG-10**

- Gain
- Phase

- Pressure: 7.8 ± 1.6 MPa (1130 ± 230 PSI)
- Flow Rate: 400 L/min (106 U.S.GPM)

### Trapped Oil Volume

- 1 L (.264 U.S. Gallons)

### Viscosity

- 30 mm²/s (141 SSU)

### Flow Rate

- 7.8 ± 1.6 MPa (1130 ± 230 PSI)
- Flow Rate: 100 L/min (26.4 U.S.GPM)

- 7.8 ± 1.6 MPa (1130 ± 230 PSI)
- Flow Rate: 200 L/min (52.8 U.S.GPM)

- 7.8 ± 1.6 MPa (1130 ± 230 PSI)
- Flow Rate: 400 L/min (106 U.S.GPM)
Viscosity vs. Pressure

**EBG-03**

Viscosity: ISO VG 46 Oil

Flow Rate: 100 L/min (26.4 U.S.GPM)

Pressure vs. Temperature vs. Viscosity

Pressures:
- 3600 PSI
- 3450 PSI
- 3300 PSI
- 3200 PSI
- 3100 PSI
- 3025 PSI
- 2950 PSI
- 2900 PSI
- 2250 PSI

Temperatures:
- 25°C
- 50°C
- 75°C
- 100°C

Viscosities:
- 20 SSU
- 40 SSU
- 60 SSU
- 80 SSU
- 100 SSU

**EBG-06**

Viscosity: 30 mm²/s (141 SSU)

Flow Rate: 200 L/min (52.8 U.S.GPM)

Pressure vs. Temperature vs. Viscosity

Pressures:
- 3400 PSI
- 3250 PSI
- 3100 PSI
- 3000 PSI
- 2950 PSI
- 2250 PSI

Temperatures:
- 25°C
- 50°C
- 75°C
- 100°C

Viscosities:
- 20 SSU
- 40 SSU
- 60 SSU
- 80 SSU
- 100 SSU

**EBG-10**

Viscosity: ISO VG 46 Oil

Flow Rate: 400 L/min (106 U.S.GPM)

Pressure vs. Temperature vs. Viscosity

Pressures:
- 3600 PSI
- 3450 PSI
- 3300 PSI
- 3200 PSI
- 2950 PSI
- 2850 PSI
- 2250 PSI

Temperatures:
- 25°C
- 50°C
- 75°C
- 100°C

Viscosities:
- 20 SSU
- 40 SSU
- 60 SSU
- 80 SSU
- 100 SSU
List of Seals and Pilot Valves

### List of Seals

<table>
<thead>
<tr>
<th>Item</th>
<th>Name of Parts</th>
<th>Part Numbers</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>O-Ring</td>
<td>SO-NB-P32</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td>SO-NB-P32</td>
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<tr>
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<td></td>
<td>SO-NB-P42</td>
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</tr>
<tr>
<td>12</td>
<td>O-Ring</td>
<td>SO-NB-P28</td>
<td>1</td>
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<td></td>
<td>SO-NB-P28</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>SO-NB-P28</td>
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<tr>
<td>13</td>
<td>O-Ring</td>
<td>SO-NB-P9</td>
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<td>SO-NB-P9</td>
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<td>O-Ring</td>
<td>SO-NB-P9</td>
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<td>SO-NB-P9</td>
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<tr>
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<td>O-Ring</td>
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<td>SO-NB-A128</td>
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<td>O-Ring</td>
<td>SO-NB-P18</td>
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<td>SO-NB-P28</td>
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<tr>
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<td>SO-NB-P32</td>
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</tbody>
</table>

Note: When ordering seals, please specify the seal kit number from the table below. In addition to the above O-rings, seals for pilot valve are included in the seal kit. For the details of the pilot valve seals, see page 674.

### List of Seal Kit

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Seal Kit Numbers</th>
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</thead>
<tbody>
<tr>
<td>EBG-03</td>
<td>KS-EBG-03-51</td>
</tr>
<tr>
<td>EBG-06</td>
<td>KS-EBG-06-51</td>
</tr>
<tr>
<td>EBG-10</td>
<td>KS-EBG-10-51</td>
</tr>
</tbody>
</table>

Note: For the details of pilot valves, refer to “Pilot Relief Valves” on page 674.
**Interchangeability between Current and New Design**

EBG-03/06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

**Specifications and Characteristics**

No change in specifications and characteristics between current and new design.

**Mounting Interchangeability**

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to pilot valve improvement and other modifications.

---

**Model Numbers**

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBG-03-***-50/5090</td>
<td>217 (8.54)</td>
<td>118.6 (4.67)</td>
<td>40.2 (1.58)</td>
<td>199.5 (7.85)</td>
<td>130 (5.12)</td>
</tr>
<tr>
<td>EBG-06-***-50/5090</td>
<td>217 (8.54)</td>
<td>120.5 (4.74)</td>
<td>42.1 (1.66)</td>
<td>199.5 (7.85)</td>
<td>130 (5.12)</td>
</tr>
<tr>
<td>EBG-10-***-50/5090</td>
<td>217 (8.54)</td>
<td>102 (4.02)</td>
<td>23.6 (0.93)</td>
<td>235.5 (9.27)</td>
<td>166 (6.54)</td>
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<td><strong>New</strong></td>
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<td></td>
</tr>
<tr>
<td>EBG-03-***-51/5190</td>
<td>216 (8.50)</td>
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<td>40.2 (1.59)</td>
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<td></td>
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<tr>
<td>EBG-06-***-51/5190</td>
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<td>119.5 (4.70)</td>
<td>42.1 (1.66)</td>
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<td></td>
</tr>
<tr>
<td>EBG-10-***-51/5190</td>
<td>216 (8.50)</td>
<td>101 (3.98)</td>
<td>23.6 (0.93)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**DIMENSIONS IN MILLIMETRES (INCHES)**

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