Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves are double-deck directional and flow control valves employing as their pilot the electro-hydraulic proportional pressure reducing valves with two proportional solenoids. The flow rate can be controlled by changing an input current to the solenoids and the direction of the flow can be controlled by providing the current to either solenoid of the two.

By combining the valves with the power amplifiers specially designed for the valves, the speed control, acceleration, deceleration and directional control can be done with a single valve, which eventually makes the hydraulic circuits simple and contributes the cost of the hydraulic systems.

Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>EDFHG-03</th>
<th>EDFHG-04</th>
<th>EDFHG-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Operating Pressure</td>
<td>25 (3630)</td>
<td>25 (3630)</td>
<td>25 (3630)</td>
</tr>
<tr>
<td>Rated Flow L/min (U.S.GPM) at Valve Pressure Difference: 1.0 MPa (145 PSI)</td>
<td>100 (26.4)</td>
<td>140 (37.0)</td>
<td>280 (74.0)</td>
</tr>
<tr>
<td>Pilot Pressure MPa (PSI)</td>
<td>1.5 - 16 (220 - 2320)</td>
<td>1.5 - 16 (220 - 2320)</td>
<td>1.5 - 16 (220 - 2320)</td>
</tr>
<tr>
<td>Pilot Flow L/min (U.S.GPM) at Normal</td>
<td>1 (.26)</td>
<td>1 (.26)</td>
<td>1 (.26)</td>
</tr>
<tr>
<td>at Transition</td>
<td>3 (.79)</td>
<td>4 (1.06)</td>
<td>6 (1.59)</td>
</tr>
<tr>
<td>Max. Tank Line Back Pressure MPa (PSI)</td>
<td>16 (2320)</td>
<td>21 (3050)</td>
<td>21 (3050)</td>
</tr>
<tr>
<td>Max. Drain Line Back Pressure MPa (PSI)</td>
<td>3.0 (435)</td>
<td>3.0 (435)</td>
<td>3.0 (435)</td>
</tr>
<tr>
<td>Rated Current</td>
<td>800 mA</td>
<td>980 mA</td>
<td>900 mA</td>
</tr>
<tr>
<td>Coil Resistance</td>
<td>10 Ω</td>
<td>10 Ω</td>
<td>10 Ω</td>
</tr>
<tr>
<td>Hysteresis Value</td>
<td>5% or less</td>
<td>5% or less</td>
<td>5% or less</td>
</tr>
<tr>
<td>Repeatability Value</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>11 (24.3)</td>
<td>12 (26.5)</td>
<td>15 (33.1)</td>
</tr>
</tbody>
</table>

Graphic Symbols

External Pilot Type | Internal Pilot Type

Internal Pilot Type

Model Number Designation

<table>
<thead>
<tr>
<th>F-</th>
<th>EDFH</th>
<th>G</th>
<th>-03</th>
<th>-100</th>
<th>-3C2</th>
<th>-XY</th>
<th>-E</th>
<th>-31</th>
<th>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special Seals</td>
<td>Series Number</td>
<td>Type of Mounting</td>
<td>Valve Size</td>
<td>Rated Flow L/min (U.S.GPM)</td>
<td>Spool Type</td>
<td>Direction of Flow</td>
<td>Pilot Connection</td>
<td>Design Number</td>
<td>Design Standards</td>
</tr>
<tr>
<td>F-</td>
<td>EDFH: Proportional Electro-Hydraulic Directional and Flow Control Valves</td>
<td>G: Sub-Plate Mounting</td>
<td>03</td>
<td>100: 100 (26.4)</td>
<td>-3C2</td>
<td>3C40</td>
<td>XY: Metre-in • Metre-out</td>
<td>E: External Pilot</td>
<td>31</td>
</tr>
<tr>
<td>Special Seals for Phosphate Ester Type Fluids (Omit if not required)</td>
<td>04</td>
<td>140: 140 (37.0)</td>
<td>-3C2</td>
<td>3C40</td>
<td>XY: Metre-in • Metre-out</td>
<td>E: External Pilot</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>280: 280 (74.0)</td>
<td>-3C2</td>
<td>3C40</td>
<td>XY: Metre-in • Metre-out</td>
<td>E: External Pilot</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Attachment

Mounting Bolts

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Socket Head Cap Screw</th>
<th>Qty.</th>
<th>Tightening Torque Nm (in. lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDFHG-03</td>
<td>M6 × 35 Lg. 1/4-20 UNC x 1-1/2 Lg.</td>
<td>4</td>
<td>12 - 15 (106 - 133)</td>
</tr>
<tr>
<td>EDFHG-04</td>
<td>M6 × 45 Lg. 1/4-20 UNC x 1-3/4 Lg.</td>
<td>2</td>
<td>12 - 15 (106 - 133)</td>
</tr>
<tr>
<td>EDFHG-06</td>
<td>M12 × 50 Lg. 3/8-16 UNC x 2 Lg.</td>
<td>4</td>
<td>58 - 72 (513 - 637)</td>
</tr>
<tr>
<td>EDFHG-06</td>
<td>M12 × 60 Lg. 1/2-13 UNC x 2-1/2 Lg.</td>
<td>6</td>
<td>100 - 123 (885 - 1089)</td>
</tr>
</tbody>
</table>
Sub-plates

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sub-plate Model Numbers</td>
<td>Thread Size</td>
<td>Approx. Mass (kg) (lbs.)</td>
</tr>
<tr>
<td>EDFHG-03</td>
<td>DHGM-03Y-10</td>
<td>Re 3/4</td>
<td>4.7 (10.4)</td>
</tr>
<tr>
<td>EDFHG-04</td>
<td>DHGM-04-20</td>
<td>Re 1/2</td>
<td>4.4 (9.7)</td>
</tr>
<tr>
<td></td>
<td>DHGM-06X-50</td>
<td>Re 1</td>
<td>7.4 (16.3)</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 solenoid controlled pilot operated directional valves. For dimensions, see page 401 and 402.

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 784).

Model Numbers: SK1091-D24-10

Instructions

Manual Adjustment

In the event of an electric fault or emergency, a manual shift can be made by screwing in the manual adjustment screw. Take care, however, that this manual shift has no flows adjusting function.

For this operation, set the pilot pressure (or P-port pressure on an internal-pilot model) below 7 MPa (1020 PSI).

After operation, be sure to return the manual adjustment screw completely to the original position.
EDFHG-03-100-3C*-XY-**-31/3190

★ Of the two tank ports "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.401) in common use.

EDFHG-04-140-3C*-XY-**-31/3190

★ Position of cable departure can be changed. For details, refer to above EDFHG-03.

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.401) in common use.
EDFHG-06-280-3C*-XY-*-31/3190

Position of cable departure can be changed. For details, refer to EDFHG-03 valve on page 748.

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.402) in common use.

Interchangeability between Current and New Design

- **Specifications and Characteristics**
  No changes in specifications and characteristics between current and new design.

- **Mounting Interchangeability**
  The mounting surface are interchangeable.
  Note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.
Input Current vs. Flow
Viscosity: 30 mm²/s (141 SSU)
Valve Pres. Difference: P → A (B), B (A) → T 1 MPa (145 PSI)

Valve Pressure Difference vs. Flow
Viscosity: 30 mm²/s (141 SSU)

EDFHG-03

EDFHG-04

EDFHG-06
### Frequency Response

#### EDFHG-03
- **Frequency (Hz)**: 0.2, 0.4, 0.7, 1, 2, 4, 7, 10, 20, 40
- **Gain (dB)**: -20, -10, 0, 10, 20, 30, 40 (Phase in degrees: -180 to 0)
- **Model Number**: EDFHG-03-100-3C2-E-31
- **Viscosity**: 30 mm²/s (141 SSU)
- **Pilot Pressure**: 15.7 MPa (2280 PSI)
- **Travel of Spool**: ±10% of Maximum Stroke

#### EDFHG-04
- **Frequency (Hz)**: 0.2, 0.4, 0.7, 1, 2, 4, 7, 10, 20, 40
- **Gain (dB)**: -20, -10, 0, 10, 20, 30, 40 (Phase in degrees: -180 to 0)
- **Model Number**: EDFHG-04-140-3C2-E-31
- **Viscosity**: 30 mm²/s (141 SSU)
- **Pilot Pressure**: 15.7 MPa (2280 PSI)
- **Travel of Spool**: ±10% of Maximum Stroke

#### EDFHG-06
- **Frequency (Hz)**: 0.2, 0.4, 0.7, 1, 2, 4, 7, 10, 20, 40
- **Gain (dB)**: -20, -10, 0, 10, 20, 30, 40 (Phase in degrees: -180 to 0)
- **Model Number**: EDFHG-06-280-3C2-E-31
- **Viscosity**: 30 mm²/s (141 SSU)
- **Pilot Pressure**: 15.7 MPa (2280 PSI)
- **Travel of Spool**: ±10% of Maximum Stroke

### Step Response

These characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

- **Viscosity**: 30 mm²/s (141 SSU)
- **Supply Pressure**: 15.7 MPa (2280 PSI)

#### EDFHG-03
- **Step Signal**: 0.1 s
- **Flow Rate**

#### EDFHG-04
- **Step Signal**: 0.1 s
- **Flow Rate**

#### EDFHG-06
- **Step Signal**: 0.1 s
- **Flow Rate**
## EDFHG-03-100-3C-XY-31/3190
EDFHG-04-140-3C-XY-31/3190
EDFHG-06-280-3C-XY-31/3190

### List of Seals and Solenoid Ass'y

#### EDFHG-03
- Item 6: Solenoid Ass'y
  - E318-Y06M1-28-61: Qty 2
- Item 11: O-Ring
  - SO-NB-P28: Qty 2
- Item 12: O-Ring
  - SO-NB-A014: Qty 5
- Item 13: O-Ring
  - SO-NB-P9: Qty 2
- Item 14: O-Ring
  - SO-NB-P9: Qty 6
- Item 25: O-Ring
  - SO-NB-P9: Qty 4
- Item 26: O-Ring
  - SO-NB-P4: Qty 2

#### EDFHG-04
- Item 6: Solenoid Ass'y
  - E318-Y06M1-28-61: Qty 2
- Item 11: O-Ring
  - SO-NB-P34: Qty 2
- Item 12: O-Ring
  - SO-NB-P22: Qty 4
- Item 13: O-Ring
  - SO-NB-P9: Qty 2
- Item 14: O-Ring
  - SO-NB-P9: Qty 2
- Item 25: O-Ring
  - SO-NB-P9: Qty 4
- Item 26: O-Ring
  - SO-NB-P4: Qty 2

#### EDFHG-06
- Item 6: Solenoid Ass'y
  - E318-Y06M1-28-61: Qty 2
- Item 11: O-Ring
  - SO-NB-P40: Qty 2
- Item 12: O-Ring
  - SO-NB-P14: Qty 6
- Item 13: O-Ring
  - SO-NB-P9: Qty 4
- Item 14: O-Ring
  - SO-NB-P4: Qty 2
- Item 25: O-Ring
  - SO-NB-P9: Qty 2
- Item 26: O-Ring
  - SO-NB-P4: Qty 2

---

### List of Seal Kits

<table>
<thead>
<tr>
<th>Valve Model Numbers</th>
<th>Seal Kit Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDFHG-03</td>
<td>KS-EDFHG-03-31</td>
</tr>
<tr>
<td>EDFHG-04</td>
<td>KS-EDFHG-04-31</td>
</tr>
<tr>
<td>EDFHG-06</td>
<td>KS-EDFHG-06-31</td>
</tr>
</tbody>
</table>

---

Note: The GDM-211-B-11 connector assembly (Item 29) is not included in the solenoid assembly. When ordering seals, please specify the seal kit number from the table below. In addition to the above o-rings, seals for solenoid ass'y are included in the seal kit. For the detail of the solenoid ass'y o-rings, see page 674.

---

Section X-X

Section Y-Y

Removed for internal pilot models

---

List of Seal Kits