Modular safety valves with optional spool position monitoring
On-off, direct operated, conforming to Machine Directive 2006/42/EC - certified by TÜV

HF are spool type, direct operated solenoid valves in modular execution, normally used for safety functions to shut-off or to by-pass the hydraulic user lines. They are available with optional FV inductive position switch for spool position monitoring, CE marked and certified by TÜV in accordance with safety requirements of Machine Directive 2006/42/EC.

Technical characteristics
They are derived from standard directional valves type DHE (see KT tab. E015), but with special body for modular assembly with all ISO 4401 size 06 modular valves.

Applications
Syncro press brakes, vertical presses, plastic injection, ceramic presses.

Certification
The TÜV certificate can be downloaded from www.atos.com, catalog online, technical information section.

Mounting Surface: ISO 4401 size 06
Max flow: 60 l/min
Max pressure: 350 bar

1) MODEL CODE

<table>
<thead>
<tr>
<th>HF-0</th>
<th>61</th>
<th>1 / A / FV - E - X</th>
<th>24DC</th>
<th>**</th>
<th>/</th>
</tr>
</thead>
</table>

Modular directional valve size 06

Valve configuration, see section B
61 = single solenoid, central plus external position, spring centered
67 = single solenoid, central plus external position, spring offset

Spool type: 1, 3, 4 see section B

Options:
A = solenoid mounted at side of port B
B = orientation of coil and proximity connectors rotated of 180°
WP = prolonged manual override protected by a rubber cap (1)

Optional spool position monitor:
FV = inductive position switch (only for HF-0611, HF-0614, HF-0673)

(1) Not available for FV version

Voltage code, see section B:
00-AC = AC solenoids without coils (1)
00-DC = DC solenoids without coils (1)
X = without connector
See section B for available connectors, to be ordered separately

Coils with special connectors (1)
XJ = AMP Junior Timer connector
XK = Deutsch connector
XS = Lead Wire connection

E = solenoid OE for AC and DC supply

2) CONFIGURATION

<table>
<thead>
<tr>
<th>HF-0611</th>
<th>HF-0611/FV</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-0611/A</td>
<td>HF-0611/AFV</td>
</tr>
<tr>
<td>HF-0613</td>
<td></td>
</tr>
<tr>
<td>HF-0614</td>
<td>HF-0614/FV</td>
</tr>
<tr>
<td>HF-0614/A</td>
<td>HF-0614/AFV</td>
</tr>
<tr>
<td>HF-0673/FV</td>
<td></td>
</tr>
</tbody>
</table>

Seals material, see section B:
- = NBR
PE = FKM
BT = HNBR (1)

Table EY050-2/E
3 MAIN CHARACTERISTICS OF HF-* DIRECTIONAL VALVES

Assembly position / location: Any position for all valves
Subplate surface finishing: Roughness index Ra 0.4 - flatness ratio 0.01/100 (ISO 1101)
MTTFd values according to EN ISO 13849: 150 years, for further details see technical table P007
Ambient temperature: Standard -30°C ÷ +70°C /PE option -20°C ÷ +70°C /BT option -40°C ÷ +70°C
Fluid: Hydraulic oil as per DIN 51524, ... 535; for other fluids see section 4
Recommended viscosity: 15 ÷ 100 mm²/s at 40°C (ISO VG 15 ÷ 100)
Fluid contamination class: ISO 4401 class 21/19/16 NAS 1638 class 10 (filters at 25 μm value with β25 ≥ 75 recommended)
Flow direction: As shown in the symbols of section 2
Operating pressure: (standard and /FV version) Ports P, A, B: 350 bar;
                     Port T: 210 bar (DC solenoid); 160 bar (AC solenoid)
Maximum flow: 60 l/min

3.1 Coils characteristics

Insulation class: H (180°C) for DC coils  F (155°C) for AC coils
Protection degree to DIN EN 60529: IP 65 (with connectors 666, 667, 669 correctly assembled)
Relative duty factor: 100%
Supply voltage and frequency: See electric feature 7
Supply voltage tolerance: ± 10%
Certification: cURus North American Standard

4 SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature: NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C
FKM seals (PE option) = -20°C ÷ +80°C
HNBR seals (BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C
Recommended viscosity: 15 ÷ 100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s
Fluid contamination class: ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 μm (
Recommended viscosity: 15 ÷ 100 mm²/s at 40°C (ISO VG 15 ÷ 100)
Fluid contamination class: ISO 4401 class 21/19/16 NAS 1638 class 10, in line filters of 25 μm (β25 ≥ 75 recommended)

5 OPTIONS

A = Solenoid mounted at side of port B. In standard versions, solenoid is mounted at side of port A.
B = Orientation of coil and proximity connectors rotated of 180°
WP = Prolonged manual override protected by a rubber cap (not for FV)
WARNING: the manual operation is not permitted for safety valves, than the valve is provided with solenoid blind rings to prevent
the access to the manual override. The manual override protected by rubber cup (option /WP) is not available

6 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately)

<table>
<thead>
<tr>
<th>666, 667</th>
<th>669</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.5</td>
<td></td>
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<tr>
<td>27</td>
<td>39.5</td>
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<tr>
<td></td>
<td>29</td>
</tr>
</tbody>
</table>

CONNECTOR WIRING

<table>
<thead>
<tr>
<th>666, 667</th>
<th>669</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Positive</td>
<td>1 = Supply voltage Vac</td>
</tr>
<tr>
<td>2 = Negative</td>
<td>3 = Coil ground</td>
</tr>
</tbody>
</table>

SUPPLY VOLTAGES

- 666
- 667
- 669

Note: for electronic connectors type E-SD, see tab. K00
7 ELECTRIC FEATURES

<table>
<thead>
<tr>
<th>External supply nominal voltage ± 10%</th>
<th>Voltage code</th>
<th>Type of connector</th>
<th>Power consumption (W)</th>
<th>Code of spare coil DHE</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 DC</td>
<td>12 DC</td>
<td>COE-12DC</td>
<td>30 W</td>
<td></td>
</tr>
<tr>
<td>14 DC</td>
<td>14 DC</td>
<td>COE-14DC</td>
<td>30 W</td>
<td></td>
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<td>24 DC</td>
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</tr>
<tr>
<td>28 DC</td>
<td>28 DC</td>
<td>COE-28DC</td>
<td>30 W</td>
<td></td>
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<tr>
<td>48 DC</td>
<td>48 DC</td>
<td>COE-48DC</td>
<td>58 VA (3)</td>
<td></td>
</tr>
<tr>
<td>110 DC</td>
<td>110 DC</td>
<td>COE-110DC</td>
<td>80 VA (3)</td>
<td></td>
</tr>
<tr>
<td>125 DC</td>
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<td>80 VA (3)</td>
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</tr>
<tr>
<td>220 DC</td>
<td>220 DC</td>
<td>COE-220DC</td>
<td>80 VA (3)</td>
<td></td>
</tr>
<tr>
<td>110/50 AC</td>
<td>110/50/60 AC</td>
<td>COE-110/50/60AC (1)</td>
<td>80 VA (3)</td>
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</tr>
<tr>
<td>230/50 AC</td>
<td>230/50/60 AC</td>
<td>COE-230/50/60AC (1)</td>
<td>80 VA (3)</td>
<td></td>
</tr>
<tr>
<td>115/60 AC</td>
<td>115/60 AC</td>
<td>COE-115/60AC</td>
<td>80 VA (3)</td>
<td></td>
</tr>
<tr>
<td>230/60 AC</td>
<td>230/60 AC</td>
<td>COE-230/60AC</td>
<td>80 VA (3)</td>
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<tr>
<td>110/50 AC - 120/60 AC</td>
<td>110 RC</td>
<td>COE-110RC</td>
<td>58 VA (3)</td>
<td></td>
</tr>
<tr>
<td>230/50 AC - 230/60 AC</td>
<td>230 RC</td>
<td>COE-230RC</td>
<td>58 VA (3)</td>
<td></td>
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</tbody>
</table>

(1) Coil can be supplied also with 60 Hz of voltage frequency; in this case the performances are reduced by 10 -15% and the power consumption is 52 VA.
(2) Average values based on tests preformed at nominal hydraulic condition and ambient/coil temperature of 20°C.
(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

8 TECHNICAL CHARACTERISTICS OF FV INDUCTIVE POSITION SWITCH

- Supply voltage: 20÷32 V
- Ripple max: ≤ 10%
- Max current: 400 mA
- Reaction time: 15 ms
- Max peak pressure: 400 bar
- Mechanical life: virtually infinite
- Switch logic: PNP

9 CONNECTING SCHEME OF FV INDUCTIVE POSITION SWITCH

- Single solenoid
- Connector type ZBE-06 (supplied with the valve)
- Configuration: 611, 614, 673
- Pin 2: ON/OFF
- Pin 4: ON/OFF

Note: the FV position switch is not provided with a protective earth connection.

10 STATUS OF OUTPUT SIGNAL FOR MODULAR VALVES WITH /FV INDUCTIVE POSITION SWITCH

- Hydraulic configuration
- Spool position
- Pin 2: ON/OFF
- Pin 4: ON/OFF

Note: FV position switch can be electrically wired by the customer as NO or NC and then the status of the output signal will be in accordance to the selected configuration.

= intermediate spool position corresponding to the hydraulic configuration change
11 **Q/P DIAGRAMS** based on mineral oil ISO VG 46 at 50°C

<table>
<thead>
<tr>
<th>Flow direction</th>
<th>Valve type</th>
<th>A</th>
<th>A1</th>
<th>B</th>
<th>B1</th>
<th>A-B</th>
<th>A1-T</th>
<th>B1-T</th>
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<tr>
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<td>HF-0611</td>
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<td>2</td>
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<tr>
<td></td>
<td>HF-0613</td>
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<tr>
<td></td>
<td>HF-0614</td>
<td>1</td>
<td></td>
<td>2</td>
<td>3</td>
<td></td>
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<td>HF-0673</td>
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<td></td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

12 **OPERATING LIMITS** based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value ($V_{nom} - 10\%$)

<table>
<thead>
<tr>
<th>Valve type</th>
<th>Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF-0611</td>
<td>A</td>
</tr>
<tr>
<td>HF-0613, HF-0614, HF-0673</td>
<td>B</td>
</tr>
</tbody>
</table>

13 **DIMENSIONS [mm]**

ISO 4401: 2005
Mounting surface: 4401-03-02-0-05
Seals: 4 OR 108
Ports P, A, B, T: $\varnothing = 7.5$ mm (max).

1. Power supply connector code 666, 667 or 669, to be ordered separately
2. Inductive position switch connector code ZBE-06, supplied with the valve