Complementary safety valves with FC mechanical microswitches conforming to Machine Directive 2006/42/CE

These valves are provided with FC mechanical microswitches for the spool position monitor and they are designed to fulfill the safety criteria imposed to machine manufacturers by the European Machine Directive.

In addition to the normal function they supplies an electrical on-off output signal indicating the position of the spool/poppet of the valve.

The safety function performed by the valve is to cut off the hydraulic power line in case of emergency condition, avoiding dangerous movements of the machines actuators. The spool position signal informs the machine controller about the “open” or “intercepted” status of the hydraulic line.

These valves are available in direct and piloted execution and they keep the same hydraulic and electric characteristics of standard products from which they are derived.

Classic example of application: on presses or on blow moulding machines the safety valves are used to shut off the fluid energy to one or more actuators as a consequence of the opening of a mechanical safety device (“gate”) or as a consequence of an “emergency stop” command.

The components shown on this technical table are CE marked and certified by TÜV, in accordance with the technical safety requirements provided in the Machine Directive 2006/42/CE but not included in the safety components of annex IV.

For details about the applicable EN standards, see www.atos.com, catalog online page, section P, table P004.

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**MODEL CODE OF DIRECTIONAL CONTROL SAFETY SOLENOID VALVES**

<table>
<thead>
<tr>
<th>DHI</th>
<th>0</th>
<th>63</th>
<th>1/2</th>
<th>A</th>
<th>FC</th>
<th>X</th>
<th>24DC</th>
<th>**</th>
<th>/</th>
</tr>
</thead>
</table>

- Type of solenoid valve
  - DHI = direct, size 06 (see tab. E010)
  - DKE = direct, size 10 (see tab E025)
  - DPHI, DPHE = piloted, size 16 and 25 (see tab. E085)

- Size ISO 4401
  - 0 = size 06 (DHI, DHU)
  - 1 = size 10 (DKE, DKER)
  - 2 = size 16 (DPH*)
  - 3 = size 25 (DPH*)

- Valve configuration, see section 8
  - 61 = single solenoid, central plus external position, spring centered
  - 63 = single solenoid, 2 external positions, spring offset
  - 67 = single solenoid, external plus central position, spring offset
  - 71 = double solenoid, 3 positions, spring centered (only DPH*)
  - 75 = double solenoid, 2 external positions, with detent (only DPH*)

- Spool type, see section 8

Options (WP not available for safety valves)
### 4 TECHNICAL CHARACTERISTICS OF MECHANICAL MICROSWITCHES

<table>
<thead>
<tr>
<th>MECHANICAL MICROSWITCHES (FC)</th>
<th>With resistive load</th>
<th>With inductive load</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125 V</td>
<td>5 A</td>
<td>5 A</td>
</tr>
<tr>
<td>250 V</td>
<td>5 A</td>
<td>5 A</td>
</tr>
<tr>
<td>50 V</td>
<td>3 A</td>
<td>3 A</td>
</tr>
<tr>
<td><strong>DC</strong></td>
<td>250 V</td>
<td>0.25 A</td>
</tr>
<tr>
<td>0.03 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max switching power</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125 V</td>
<td>0.5 A</td>
<td>0.03 A</td>
</tr>
<tr>
<td>250 V</td>
<td>0.25 A</td>
<td>0.03 A</td>
</tr>
<tr>
<td><strong>Mechanical life</strong></td>
<td>Min 100 millions cycles</td>
<td></td>
</tr>
</tbody>
</table>

### 5 CONNECTING SCHEME OF MECHANICAL MICROSWITCHES

ALL VALVES WITH
MECHANICAL MICROSWITCH (FC)

Connector type 664

The drawing shows the switch in closed position

1 = common (C)
2 = normally open contact (NO)
3 = normally closed contact (NC)
* = EARTH

### 6 MAIN CHARACTERISTICS

#### 6.1 Coils characteristics

**Insulation class**
- H (180°C) for all valves with DC coils and DHI, DPHI with AC coils
- F (155°C) for DKE, DPH with AC coils

Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 EN ISO 4413 must be taken into account.

**Connector protection degree**
- IP 65

**Relative duty factor**
- 100%

**Supply voltage and frequency**
- See electric feature

**Supply voltage tolerance**
- ± 10%

**Certification (only DHI, DKER, DPHI)**
- cURus North American standard

**WARNING:**
- the inobservance of following prescriptions invalidates the certification and may represent a risk for personnel injury.
- Safety valves must be installed and commissioned only by qualified personnel
- Safety valves must not be disassembled.
- The inductive proximity switch or the position switch can be adjusted only by the manufacturer.
- Valve’s components cannot be interchanged.
- The valves must operate without switching shocks and spool / poppet vibrations.

**Installation position**
- Any position

**Subplate surface finishing**
- Roughness index Ra 0.4 - flatness ratio 0.01/100 (ISO 1101)

**Ambient temperature**
- from -20°C to +70°C

**Fluid**
- Hydraulic oil as per DIN 51524 .... 535; for other fluids see section /L51879

**Recommended viscosity**
- 15 ÷ 100 mm²/s at 40°C (ISO VG 15 ÷ 100)

**Fluid contamination class**
- ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 μm (β10 >75 recommended)

**Fluid temperature**
- -20°C ÷ 60°C (standard seals)     -20°C ÷ 80°C (/PE seals)

**Flow direction**
- As shown in the symbols of tables /L51880

**Operating pressure**

<table>
<thead>
<tr>
<th>DHI</th>
<th>P, A, B = 350 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>T = 20 bar</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DKE</th>
<th>P, A, B = 350 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>T = (with Y port not connected to tank) 20 bar</td>
<td></td>
</tr>
<tr>
<td>T = (with Y port drained to tank) 250 bar</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DPH*</th>
<th>P, A, B, X = 350 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>T = 250 bar for external drain (standard)</td>
<td></td>
</tr>
<tr>
<td>T and Y with internal drain (option /D) = 120 bar DPHE; 210 bar DPHE (DC); 160 bar DPHE (AC)</td>
<td></td>
</tr>
<tr>
<td>Minimum pilot pressure for correct operation is 8 bar</td>
<td></td>
</tr>
</tbody>
</table>

**Maximum flow**

<table>
<thead>
<tr>
<th>DHI</th>
<th>60 l/min see technical table E010, section 8, operating limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKE</td>
<td>150 l/min see technical table E025, section 9, operating limits</td>
</tr>
<tr>
<td>DPH*</td>
<td>DPH*-2: 300 l/min; DPH*-3: 700 l/min;</td>
</tr>
</tbody>
</table>

### DHI-*/FC Dimensions [mm]

**ISO 4401: 2005**

Mounting surface: 4401-03-02-0-05

- **Fastening bolts:** 4 socket head screws M5x50 class 12.9
- **Tightening torque:** 8 Nm
- **Seals:** 4 OR 108
- **Ports P,A,B,T:** Ø = 7.5 mm (max)

For the max pressures on ports, see section 5.

**P** = PRESSURE PORT

**A, B** = USE PORT

**T** = TANK PORT

**Mass:** kg 1.6

### DKE-*/FC Dimensions [mm]

**ISO 4401: 2005**

Mounting surface: 4401-05-05-0-05 (without port X)

- **Fastening bolts:** 4 socket head screws M6x40 class 12.9
- **Tightening torque:** 15 Nm
- **Seals:** 5 OR 2050, 1 OR 108
- **Ports P,A,B,T:** Ø = 11.5 mm (max)
- **Ports Y:** Ø = 5 mm

For the max pressures on ports, see section 5.

**P** = PRESSURE PORT

**A, B** = USE PORT

**T** = TANK PORT

**Y** = DRAIN PORT

**Mass:** kg 4.3

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**DKE/FC-DC**

**Mass:** kg 4.3

**DKE/FC-AC**

**Mass:** kg 3.7
DPH*-2* ISO 4401: 2005
Mounting surface: 4401-07-07-0-05
Fastening bolts:
- 4 socket head screws M10x50 class 12.9
- 2 socket head screws M6x45 class 12.9
Tightening torque = 70 Nm
Diameter of ports A, B, P, T: Ø = 20 mm;
Diameter of ports X, Y: Ø = 7 mm;
Seals: 4 OR 130, 2 OR 2043

DPH*-3* ISO 4401: 2005
Mounting surface: 4401-08-08-0-05
Fastening bolts:
- 8 socket head screws M12x50 class 12.9
Tightening torque = 125 Nm
Diameter of ports A, B, P, T: Ø = 24 mm;
Diameter of ports X, Y: Ø = 7 mm;
Diameter of port L: Ø = 5 mm;
Seals: 4 OR 4112, 3 OR 3056

Note: for configurations 71 and 75 the switch position is on both sides of the valve

Mass:
- kg 9.6 (one solenoid)
- kg 10.3 (two solenoids)

Note:
for configurations 71 and 75 the switch position is on both sides of the valve