Solenoid directional valves type DKE

direct, spool type

Spool type, two or three position direct operated valves with threaded solenoids certified according the North American standard cURus.

Solenoids are made by:
- wet type screwed tube, different for AC and DC power supply, with integrated manual override pin
- interchangeable coils, specific for AC or DC power supply, easily replaceable without tools - see section 2 for available voltages

Standard coils protection IP65, optional coils with IP67 AMP Junior Timer or lead wire connections.

The valve body is 5 chamber type for all DC versions and for AC safety version 1/F and 1/V

Standard AC version uses 3 chamber type body

Wide range of interchangeable spools, see section 2.

The body is made by shell-moulding casting with wide internal passages ensuring low pressure drops

Mounting surface: ISO 4401 size 10
Max flow: 150 l/min
Max pressure: 350 bar

1 MODEL CODE

<table>
<thead>
<tr>
<th>DKE - 1</th>
<th>61</th>
<th>1 / A - X</th>
<th>24 DC</th>
</tr>
</thead>
</table>

Directional control valves size 10

Valve configuration, see section 3
61 = single solenoid, center plus external position, spring centered
63 = single solenoid, 2 external positions, spring offset
67 = single solenoid, center plus external position, spring offset
70 = double solenoid, 2 external positions, without springs
71 = double solenoid, 3 positions, spring centered
75 = double solenoid, 2 external positions, with detent

Spool type, see section 2.

Options, see note 1 at section 4.

Seals material, see section 4:
- = NBR
PE = FKM
BT = HNBR

Voltage code, see section 5
00-AC = AC solenoids without coils
00-DC = DC solenoids without coils
X = without connector
See section 2 for available connectors, to be ordered separately
Coils with special connectors, see section 3
XJ = AMP Junior Timer connector
XK = Deutsch connector
XS = Lead Wire connection

2 CONFIGURATIONS and SPOOLS (representation according to ISO 1219-1)

Note: see also section 4 note 3 for special shaped spools
3 MAIN CHARACTERISTICS, SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Assembly position / location
Any position for all valves except for type - 170* (without springs) that must be installed with horizontal axis if operated by impulses.

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

Storage temperature
Standard = -30°C ÷ +80°C /PE option = -20°C ÷ +80°C /BT option = -40°C ÷ +80°C

Surface protection
Body: zinc coating with black passivation
Coil: plastic encapsulation

Air consumption
15 ÷ 100 mm³/s - max allowed range 2.8 ÷ 500 mm³/s

Max fluid contamination level
ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog

3.1 Coils characteristics

Operating pressure
Ports P.A.B. 350 bar; Port T 210 bar for DC version (250 bar with option /Y); 160 bar for AC version

Rated flow
See diagrams Q/Ap at section 3

Maximum flow
150 l/min, see operating limits at section 3

3.1.2 Options

- A = Solenoid mounted at side of port B (only for single solenoid valves). In standard versions, solenoid is mounted at side of port A.
- WP = prolonged manual override protected by rubber cap - see section 2
- L, L1, L2, L3, LR, L7, L8 see section 2 = device for switching time control (only for DC solenoids).
- L7 and L8 are available only for spool type 0/1, 1/1, 3/1, 4 and 5.
- Y = external drain, only for AC version, to be selected if the pressure at T port is higher than the max allowed limits.

2 Accessories

WPD/KE-DC = (only for DC supply) manual override with detent, to be ordered separately, see tab. K150

3 Special shaped spools

- spools type 0 and 3 are also available as 0/1 and 3/1 with restricted oil passages in central position, from user ports to tank.
- spool type 1 is also available as 1/1, properly shaped to reduce the water-hammer shocks during the switching.
- spool type 1/9 has closed center in rest position but it avoids the pressurization of A and B ports due to the internal leakages.

4 NOTES

- In case of 60 Hz voltage frequency the performances are reduced by 10÷15% and the power consumption is 90 VA

- Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

- When solenoid is energized, the inrush current is approx 3 times the holding current.

5 ELECTRIC FEATURES

<table>
<thead>
<tr>
<th>External supply nominal voltage</th>
<th>Voltage code Type of connector</th>
<th>Power consumption (2)</th>
<th>Code of spare coil</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 DC</td>
<td>12 DC</td>
<td>666 or 667</td>
<td>CAE-12DC</td>
</tr>
<tr>
<td>14 DC</td>
<td>14 DC</td>
<td>666 or 667</td>
<td>CAE-14DC</td>
</tr>
<tr>
<td>24 DC</td>
<td>24 DC</td>
<td>666 or 667</td>
<td>CAE-24DC</td>
</tr>
<tr>
<td>28 DC</td>
<td>28 DC</td>
<td>666 or 667</td>
<td>CAE-28DC</td>
</tr>
<tr>
<td>110 DC</td>
<td>110 DC</td>
<td>666 or 667</td>
<td>CAE-110DC</td>
</tr>
<tr>
<td>125 DC</td>
<td>125 DC</td>
<td>666 or 667</td>
<td>CAE-125 DC</td>
</tr>
<tr>
<td>220 DC</td>
<td>220 DC</td>
<td>666 or 667</td>
<td>CAE-220DC</td>
</tr>
<tr>
<td>110/50/60 AC</td>
<td>110/50/60 AC</td>
<td>669</td>
<td>CAE-110DC</td>
</tr>
<tr>
<td>230/50/60 AC</td>
<td>230/50/60 AC</td>
<td>669</td>
<td>CAE-230DC</td>
</tr>
<tr>
<td>115/60 AC</td>
<td>115/60 AC</td>
<td>669</td>
<td>CAE-115/60AC</td>
</tr>
<tr>
<td>230/60 AC</td>
<td>230/60 AC</td>
<td>669</td>
<td>CAE-230/60AC</td>
</tr>
<tr>
<td>110/50/60 AC</td>
<td>110 DC</td>
<td>669</td>
<td>CAE-110DC</td>
</tr>
<tr>
<td>230/50/60 AC</td>
<td>220 DC</td>
<td>669</td>
<td>CAE-220DC</td>
</tr>
</tbody>
</table>

(1) In case of 60 Hz voltage frequency the performances are reduced by 10÷15% and the power consumption is 90 VA

(2) Average values based on tests performed 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.
Q/A P DIAGRAMS 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%). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.

**Operating Limits** based on mineral oil ISO VG 46 at 50°C

Valve inlet pressure [bar] vs. flow rate [l/min]

<table>
<thead>
<tr>
<th>Valve</th>
<th>Switch-on AC</th>
<th>Switch-on DC</th>
<th>Switch-off AC</th>
<th>Switch-off DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKE + 666 / 667</td>
<td>40</td>
<td>60</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>DKE + 669</td>
<td>60</td>
<td>—</td>
<td>90</td>
<td>—</td>
</tr>
<tr>
<td>DKE- /L7</td>
<td>—</td>
<td>75+150</td>
<td>—</td>
<td>45+150</td>
</tr>
<tr>
<td>DKE- /L7 - DKE- /L8</td>
<td>—</td>
<td>100+150</td>
<td>—</td>
<td>100+150</td>
</tr>
</tbody>
</table>

Test conditions:
- 50 l/min; 150 bar
- nominal supply voltage
- 2 bar of back pressure on port T
- mineral oil ISO VG 46 at 50°C

The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

SWITCHING TIMES (average values in msec)

<table>
<thead>
<tr>
<th>Valve</th>
<th>Switch-on AC</th>
<th>Switch-on DC</th>
<th>Switch-off AC</th>
<th>Switch-off DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKE + 666 / 667</td>
<td>40</td>
<td>60</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>DKE + 669</td>
<td>60</td>
<td>—</td>
<td>90</td>
<td>—</td>
</tr>
<tr>
<td>DKE- /L7</td>
<td>—</td>
<td>75+150</td>
<td>—</td>
<td>45+150</td>
</tr>
<tr>
<td>DKE- /L7 - DKE- /L8</td>
<td>—</td>
<td>100+150</td>
<td>—</td>
<td>100+150</td>
</tr>
</tbody>
</table>

SWITCHING FREQUENCY

<table>
<thead>
<tr>
<th>Valve</th>
<th>AC (cycles/h)</th>
<th>DC (cycles/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKE + 666 / 667</td>
<td>7200</td>
<td>15000</td>
</tr>
</tbody>
</table>

DEVICES FOR SWITCHING TIME CONTROL

These devices are only available for DC valve version (5 chambers body) and can control the switching time and therefore reduce the coil hammering in the hydraulic circuit. The different types are available shown in the figure:

- **L**: controls and regulates the switching time in both moving directions of the spool: regulation is carried out by screwing/unscrewing the element itself (regulating choke);
- **L1/L2/L3**: controls the switching time in both moving directions of the spool by means of fixed calibrated restrictor (gauged flow). The restrictor is positioned in the valve’s body ØL1 = 1.25 mm; ØL2 = 1 mm; ØL3 = 0.75 mm;
- **LR**: controls and regulates the switching time in the B→A direction of the spool movement. The device does not control the switching time (standard time) in the opposite direction A→B of the spool movement.
- **L7/L8**: controls the switching time in both moving directions of the spool by means of fixed calibrated restrictor (gauged flow). The restrictor is installed in the solenoid’s anchor.

For a correct operation of the switching time control, the passage in which the control device is installed must be completely filled with oil.
ISO 4401: 2005

Mounting surface according to 4401-05-05-0-05
(without X port, Y port optional)

Fastening bolts:
4 socket head screws M6x40 class 12.9
Tightening torque = 15 Nm

Seals: 5 OR 2050 and 1 OR 108

Ports P, A, B, T: Ø = 11.5 mm (max)
Ports Y: Ø = 5 mm

12 INSTALLATION DIMENSIONS [mm]

ISO 4401: 2005
Mounting surface according to 4401-05-05-0-05
(without X port, Y port optional)

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

Option /WP

Standard manual override PIN. The manual override operation can be possible only if the pressure at T ports is lower than 50 bar

Bleed screw

13 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately, see tech table K500)

666 = standard connector IP-65, suitable for direct connection to electric supply source
667 = as 666, but with built-in signal led. Available for power supply voltage 24 AC or DC, 110 AC or DC, 220 AC or DC
669 = with built-in rectifier bridge for supplying DC coils by alternate current (AC 110V and 230V - Imax 1A)

14 MOUNTING SUBPLATES

<table>
<thead>
<tr>
<th>Model</th>
<th>Ports location</th>
<th>GAS Ports A-B-P-T (X-Y)</th>
<th>Ø Counterbore [mm] A-B-P-T (X-Y)</th>
<th>Mass [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA-308</td>
<td>(Y) Ports A, B, P, T (X, Y) underneath</td>
<td>1/2&quot; (1/4&quot;)</td>
<td>30 (21.5)</td>
<td>2.5</td>
</tr>
<tr>
<td>BA-428</td>
<td>(Y) Ports A, B, P, T (X, Y) underneath</td>
<td>3/4&quot; (1/4&quot;)</td>
<td>36.5 (21.5)</td>
<td>5.5</td>
</tr>
<tr>
<td>BA-434</td>
<td>(Y) Ports P, T, (X, Y) underneath; ports A, B on lateral side</td>
<td>3/4&quot; (1/4&quot;)</td>
<td>36.5 (21.5)</td>
<td>8.5</td>
</tr>
</tbody>
</table>

The subplates are supplied with 4 fastening bolts M6x40. Also available are multi-station subplates and modular subplates.
For further details see table K250.