Intrinsically safe solenoid directional valves
on-off poppet type, leak free, direct - ATEX or IECEx

DLWH
On-off poppet type, directional valves designed for application in hydraulic systems with leak-free requirements and equipped with intrinsically safe solenoids certified for safe operation in hazardous environment with potentially explosive atmosphere.

Certifications:
- ATEX or IECEx
  II 1G Ex ia IIC, IIB, IIA surface plants zone 0, 1 and 2
- ATEX or IECEx
  IM2 Ex ia IMb, Ex ib IMb surface, tunnels or mining plants

See section for certification data

The valves must be electrically powered through specific “safety barriers” limiting the max current to the solenoid, see section

Size: 06
Max flow: up to 12 l/min
Max pressure: 350 bar

1 MODEL CODE

Intrinsically safe valve, poppet type, direct

Certification type:
- = Omit for Atex Group II
M = Atex Group I (mining)
IE = IECEx Group II
IEM = IECEx Group I (mining)

Configuration:
2A = 2 way, open in rest position
2C = 2 way, closed in rest position
3A = 3 way, A-T connection in rest position
3C = 3 way, P-B connection in rest position

(1) Not for certification M and IEM, Group I (mining)
(2) Possible combined options: all combinations are available

The pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar

2 VALVE CONFIGURATION
### 3 General Characteristics

- **Assembly position / location**: Horizontal position only
- **Subplate surface finishing to ISO 4401**: Acceptable roughness index, Ra ≤0,8 recommended Ra 0,4 - flatness ratio 0,01/100
- **MTTFd values according to EN ISO 13849**: 150 years, for further details see technical table P007
- **Ambient temperature**: Standard = -20°C + 60°C, /PE option = -20°C + 70°C, /BT option = -40°C + 70°C
- **Storage temperature range**: Standard = -20°C + 70°C, /PE option = -20°C + 70°C, /BT option = -40°C + 70°C

### 4 Hydraulic Characteristics

- **Operating pressure**: Ports P,A,B: 350 bar; Port T 160 bar
- **Rated flow**: See Q/Δp diagrams at section 9
- **Maximum flow**: 12 l/min, see operating limits at section 10

### 5 Electrical Characteristics

- **Nominal resistance at 20°C**: 150 Ω
- **Coil insulation**: Class H
- **Working voltage**: 12 ÷ 26 V
- **Minimum supply current**: 65mA, from I.S. barriers
- **Protection degree**: IP66
- **Duty factor**: 100%
- **Electrical connector**: DIN 43650 2 pin+GND

### 6 Seals and Hydraulic Fluids

- **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

### 7 Certification Data

- **Valve type**: DLWH
- **Certification**:
  - ATEX (Group II)
  - IECEx (Group II)
  - ATEX (mining) (Group I)
  - IECEx (mining) (Group I)

<table>
<thead>
<tr>
<th>Method of protection</th>
<th>Ex II 1G</th>
<th>Ex ia</th>
<th>Ex I M2</th>
<th>Ex ia I Mb</th>
<th>Ex ib I Mb</th>
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<tbody>
<tr>
<td>IIA T5 Ga / IIB T6 Ga</td>
<td>28</td>
<td>28</td>
<td>19,5</td>
<td>19,11</td>
<td>19,5</td>
</tr>
<tr>
<td>Ex I M2</td>
<td>28</td>
<td>28</td>
<td>19,5</td>
<td>19,11</td>
<td>19,5</td>
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<tr>
<td>Ex ia I Mb</td>
<td>19,5</td>
<td>19,11</td>
<td>19,5</td>
<td>19,11</td>
<td>19,5</td>
</tr>
</tbody>
</table>

- **Electronic characteristics** (max values)
  - U, Li [V] = 28
  - Li [mA] = 396
  - Pi [W] = 2,8

- **Temperature class**:
  - T5
  - T6

- **Ambient pressure** (ambient temp. +60°C)
  - ≤ 100°C
  - ≤ 85°C

- **Ambient temperature**
  - -20°C + 60°C

### Notes

1. Performance limitations in case of flame resistant fluids with water:
   - Max operating pressure = 210 bar
   - Max fluid temperature = 50°C

2. Only for /BT option

**WARNING**: Service work performed on the valve by the end users or not qualified personnel invalidates the certification.
8 SOLENOIDS WIRING

Connector wiring

| 6 | Connections 
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Coil</td>
</tr>
<tr>
<td>2</td>
<td>Coil</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
</tbody>
</table>

DIN 43650

9 QΔp DIAGRAMS based on mineral oil ISO VG 46 at 50°C

<table>
<thead>
<tr>
<th>configuration</th>
<th>2A</th>
<th>2C</th>
<th>3A</th>
<th>3C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow direction</td>
<td>P→A</td>
<td>P→B</td>
<td>A→T</td>
<td>B→T</td>
</tr>
<tr>
<td>P→A / P→B (1)</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>A→T / B→T</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

(1) For two-way valves pressure drop refers to P→T

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

The diagrams refer to warm solenoids and power supply provided by the Atos barrier type Y-BXNE-412.

In case of asymmetric flow the operating limits must be reduced.

11 INTERNAL LEAKAGES

DLWH internal leakages based on mineral oil ISO VG 46 at 50°C

less than 5 drops/min (0.36 cm³/min) at max pressure.

12 INTRINSICALLY SAFE BARRIERS - see tech. table GX010

The electric supply to these valves must be done through intrinsically safe barriers situated out of potentially flammable environment (i.e. in safe zone), which limit the electric current to the intrinsically safe solenoid. The "intrinsically safe" circuit is virtually unable to produce electrical surges or thermic effects able to cause explosion in hazardous environments also in presence of specific break-down situations. The intrinsically safe barriers must be approved and certified according to the Ex ia protection mode.

To select the proper intrinsically safe barriers following data must be considered:
1) Vmax and Imax of the solenoid as specified in section must not be exceeded also in fault conditions;
2) the resistance of the solenoid is 150 Ω and the current supplied by the barrier, in normal operation condition, must be over the min. limit (65 mA) to ensure the valve correct operation (over 70 mA for max performances).

The barriers type Y-BXNE 412 are galvanically isolated electronic devices, complying with European Norms EN60079-0/06, EN60079-11/07 and ATEX certified according to protection mode Ex ia IIC.

These barriers ensure the optimized functioning of the Atos valves up to the max operating limits specified in section [9].

The barriers Y-BXNE-412 are double channel type, suitable to operate valves with double or single solenoid. Two single solenoid valves can be connected to the barrier (one to each channel) but they cannot be contemporary operated.

MODEL CODE OF I.S. BARRIER

Y-BXNE 412 00 *

Supply voltage

E = 110/230 Vac

2 = 24÷48 Vdc

EX120
**DLWH-2A, DLWH-2C**

ISO 4401: 2005  
Mounting surface: 4401-03-02-0-05  
(see table P005)

- Fastening bolts: 4 socket head screws M5x50 class 12.9
- Tightening torque = 8 Nm
- Seals: 2 OR 108
- Diameter of ports P, T: Ø 7.5 mm (max)

Valve's bottom view

\[ P = \text{PRESSURE PORT} \]
\[ T = \text{USE PORT} \]

**DLWH-3A, DLWH-3C**

ISO 4401: 2005  
Mounting surface: 4401-03-02-0-05  
(see table P005)

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

Valve's bottom view

\[ P = \text{PRESSURE PORT} \]
\[ A = \text{USE PORT} \]
\[ (\text{not used for DLAH-3C version}) \]
\[ B = \text{USE PORT} \]
\[ (\text{not used for DLAH-3A version}) \]
\[ T = \text{TANK PORT} \]

**Mass [kg]**  

<table>
<thead>
<tr>
<th></th>
<th>DLWH-02</th>
<th>DLWH-03</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2.3</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Note: the connector is supplied with the valve