Explosion-Proof Valves
According to Directive 2014/34/EU (ATEX) and IECEx Requirements
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<td>Dimensions</td>
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<td><strong>D1FP*ED Explosion Proof</strong></td>
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<td>Characteristics</td>
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<td>Characteristic Curves</td>
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</tr>
<tr>
<td>Dimensions</td>
<td>43</td>
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</table>
Explosion-proof valves: now available with IECEx certificates

Parker has expanded the range of application for its explosion-proof industry hydraulic valves. All series are not only ATEX certified but also equipped with IECEx compliant solenoids.

Parker has certified the solenoids of the explosion-proof directional control valves in accordance with IECEx standard for equipment class 2 G, as well ensuring ATEX compliance. Technically-speaking the valves are practically unchanged. Both the performance characteristics and the dimensions are identical to the values of the previous versions, so that the valves can also easily be used as a replacement in existing systems.

In addition, the proportional valves series D1FB*EE, D1FV*EE and D*1FB*EE are optionally available with a coil which is approved for an ambient temperature up to 60 °C. These variants can be ordered by selecting the modification code XG371. Series D1FP*ED is even completely certified according to IECEx.

All valves offered in this catalogue are ATEX certified for usage in zone 1 and 2.

Among other things, the provided operating instructions contain:

- EC declaration of conformity for the valve
- Safety instructions
- Operating instructions, CE type examination certificate and declaration of conformity

<table>
<thead>
<tr>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining-equipment</td>
<td>Non-mining equipment</td>
</tr>
<tr>
<td>Category M</td>
<td>Category 1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Gas: Zone 0</td>
<td>Gas: Zone 1</td>
</tr>
</tbody>
</table>

**Very high level of protection.** Equipment can be operated in presence of explosive atmospheres. Covered by means of two protective safety measures.

**High level of protection.** Equipment to be de-energised in presence of explosive atmospheres.

**Very high level of protection.** Used where explosive atmospheres are present continuously or for long periods of time. Covered by means of two protective safety measures.

**High level of protection.** Used where explosive atmospheres are likely to occur in normal service.

**Normal level of protection.** Used where explosive atmospheres are unlikely to occur and would be infrequent and for short time only.
The D1VW with explosion proof solenoids is based on the standard D1VW series. The specific solenoid design allows the usage in hazardous environments. The explosion proof class is

\[
\text{CE \ (Ex \ II \ T4 \ Gb) for use in zone 1 and 2 (conform to ATEX).}
\]

Additionally the solenoids have IECEx conformity. All explosion proof solenoids are DC design. The valves for AC operate with integrated rectifier.

**Technical data**

**General**
- Design: Directional spool valve
- Actuation: Solenoid
- Size: DIN NG06 / CETOP 03 / NFPA D03
- Mounting position: unrestricted, preferably horizontal
- Ambient temperature: \([-20...+60\] °C\)
- MTTF\(_D\): 150 years
- Weight: 1.8 (1 solenoid), 2.7 (2 solenoids)

**Hydraulic**
- Max. operating pressure: \(P, A B: 350; T: 210\) bar
- Fluid: Hydraulic oil in accordance with DIN 51524
- Fluid temperature: \([-20...+60\] °C\)
- Viscosity permitted: \(\text{cSt} / \text{mm}^2/\text{s}\) 2.8...400
- Viscosity recommended: \(\text{cSt} / \text{mm}^2/\text{s}\) 30...80
- Filtration: ISO 4406 (1999); 18/16/13
- Flow max.: \(60\) [l/min]
- Leakage at 50 bar: Up to 10 per flow path, depending on spool

**Static / Dynamic**
- Step response at 95 %: Energized: 32 (DC), 40 (AC) / De-energized: 40 (DC), 75 (AC)

**Electrical characteristics**
- Duty ratio: 100 % ED; CAUTION: coil temperature up to 135 °C possible
- Max. switching frequency: 15000 (DC), 7200 (AC)
- Protection class: \(\text{CE \ (Ex \ II \ T4 \ Gb) , Ex \ mb \ II \ T4 \ Gb, IP66 (plugged and mounted correctly)}\)
- Supply voltage / ripple: \(24 \text{ V} = 230 \text{ V} / 50 \text{ Hz} / 110 \text{ V} / 50 \text{ Hz}\)
- Tolerance supply voltage: \(\pm 10\) %
- Current consumption: \(1.0\) A
- Power consumption: \(24\) W
- Solenoid connection: Box with M20x1.5 entry for cable glands. Solenoid identification as per ISO 9461.
- Wiring min.: \(3 \times 1.5 \text{ recommended}\)
- Wiring length max.: \(50 \text{ recommended}\)

With electrical connections the protective conductor (PE) must be connected according to the relevant regulations.

HY11-3343UK ATEX.indd 14.02.18
Directional Control Valve
Series D1VW Explosion Proof

Size
DIN NG06
CETOP 03
NFPA D03

Wet pin solenoid

3-chamber valve

Spool type

Directional control valve

Spool position

Solenoid options:
Explosion proof
Ex e mb II T4 Gb
+ IECEx conformity

Code
Voltage
J 24 V=
P 110 V / 50 Hz
N 230 V / 50 Hz

Connection:
Explosion proof with cable glands

Seal

Code
Seal
N NBR
V FPM

3 position spools

<table>
<thead>
<tr>
<th>Code</th>
<th>Spool type</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>001</td>
<td>a 0 b</td>
<td></td>
</tr>
<tr>
<td>002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>003</td>
<td></td>
<td></td>
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<tr>
<td>008</td>
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<tr>
<td>082</td>
<td></td>
<td></td>
</tr>
<tr>
<td>102</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 position spool codes:

- Code C: 3 positions. Spring offset in position “0”.
- Code E: 2 positions. Spring offset in position “0”.
- Code K: 2 positions. Spring offset in position “0”.

2 position spools

<table>
<thead>
<tr>
<th>Code</th>
<th>Spool position</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>2 positions. Spring offset in position “b”. Operated in position “a”.</td>
</tr>
<tr>
<td>D</td>
<td>2 positions. No center or offset position.</td>
</tr>
<tr>
<td>H</td>
<td>2 positions. Spring offset in position “a”. Operated in position “b”.</td>
</tr>
</tbody>
</table>

Further spool types, styles and combinations on request.

1) Consider specific spool position.
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

<table>
<thead>
<tr>
<th>Spool</th>
<th>Position “b”</th>
<th>Position “a”</th>
<th>Position “0”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-A</td>
<td>B-T</td>
<td>P-B</td>
</tr>
<tr>
<td>001</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>002</td>
<td>1</td>
<td>4</td>
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<td>6</td>
<td>3</td>
</tr>
<tr>
<td>016</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>020B</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>026B</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>030B</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>081</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>082</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>101B</td>
<td>11</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>102</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>P-B</td>
<td>A-T</td>
<td>P-A</td>
</tr>
<tr>
<td>008</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>009</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spool</th>
<th>Position “b”</th>
<th>Position “a”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-A</td>
<td>P-B</td>
</tr>
<tr>
<td>021</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>022</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

1) Only for pressure compensation, no high flow possible.

Flow curve

All characteristic curves measured with HLP46 at 50 °C.
The diagram below specifies the shift limits for valves with AC and DC solenoids. The specifications apply to a viscosity of 40 mm²/s and balanced flow conditions. The shift limits can be considerably lower at unbalanced flow conditions. To avoid flow rates beyond the shift limits, a plug-in orifice can be inserted in the P port.

**Shift limit diagram with DC solenoid**

Measured with HLP46 at 50 °C, 90 % \(U_{\text{nom}}\) and warm solenoids

**Shift limit diagram with AC solenoid**

Measured with HLP46 at 50 °C, 95 % \(U_{\text{nom}}\) and warm solenoids
## Directional Control Valve
### Series D1VW Explosion Proof

**B, E -style**

- Dimensions:
  - Ø9.5
  - 122 max
  - 190 max
  - 108
  - 46

**H, K -style**

- Dimensions:
  - Ø9.5
  - 165 max.
  - 190 max
  - 108
  - 46

**C, D -style**

- Dimensions:
  - Ø9.5
  - 122 max
  - 287 max
  - 108
  - 46

### Specifications

<table>
<thead>
<tr>
<th>Surface finish</th>
<th>Kit</th>
<th>screw type</th>
<th>torque</th>
<th>NBR</th>
<th>FPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>[R_{a}=6.3]</td>
<td>BK375</td>
<td>4x M5x30</td>
<td>7.6 Nm</td>
<td>±15 %</td>
<td>SK-D1VW-N-91</td>
</tr>
</tbody>
</table>

**ISO 4762-12.9**
The D*1*W*EE with explosion proof solenoids is based on the standard D*1*W series. The specific solenoid design allows the usage in hazardous environments. The explosion proof class is

\[ \text{Ex \: II \: T4 \: Gb} \]

for use in zone 1 and 2 (conform to ATEX).

Additionally the solenoids have IECEx conformity.

All explosion proof solenoids are DC design. The valves for AC operate with integrated rectifier.

The pilot operated valves are available in 4 sizes:

- D31DW NG10 (standard)
- D31NW NG10 (high flow)
- D41VW NG16
- D91VW NG25 (for port diameter up to 32 mm)
- D111VW NG32

All valves are piloted by a D1VW valve. The minimum pilot pressure must be ensured for all operating conditions of the directional valve.

Additionally spools with a P to T connection in the de-energized position need an external pressure supply (external inlet) or an integral check valve.
General

<table>
<thead>
<tr>
<th>Design</th>
<th>Directional spool valve</th>
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<tbody>
<tr>
<td>Actuation</td>
<td>Solenoid</td>
</tr>
<tr>
<td>Series</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td></td>
</tr>
<tr>
<td>Weight (1/2 solenoids) [kg]</td>
<td>6.0 / 6.6</td>
</tr>
<tr>
<td>Mounting interface</td>
<td>DIN 24340 A10</td>
</tr>
<tr>
<td></td>
<td>ISO 4401</td>
</tr>
<tr>
<td></td>
<td>NFPA D05</td>
</tr>
<tr>
<td>Mounting position</td>
<td>unrestricted, preferably horizontal</td>
</tr>
<tr>
<td>Ambient temperature [°C]</td>
<td>-20...+60</td>
</tr>
<tr>
<td>MTTTF, value [years]</td>
<td>75</td>
</tr>
</tbody>
</table>

Hydraulic

| Max. operating pressure [bar] | P, A, B: 350; T: 210 |
| Fluid | Hydraulic oil in accordance with DIN 51524 |
| Fluid temperature [°C] | -20...+60 |
| Viscosity permitted [cSt] / [mm²/s] | 2.8...400 |
| Viscosity recommended [cSt] / [mm²/s] | 30...80 |
| Filtration | ISO 4406 (1999); 18/16/13 |
| Flow max. [l/min] | 150 | 170 | 300 | 700 | 2000 |
| Leakage at 350 bar (per flow path) [ml/min] | up to 100* | up to 150* | up to 200* | up to 800* | up to 5000* |
| Opening pressure integral check valve [bar] | n.a. | n.a. | see p/Q diagram | see p/Q diagram | n.a. |
| Minimum pilot supply pressure [bar] | 5 | 7 | 5 |

Static / Dynamic

| Step response at 95 % [ms] | Energized / De-energized |
| DC solenoids Pilot pressure | 50 bar | 100 bar | 250 bar | 350 bar |
|                           | 60 / 40 (50/60) | 55 / 40 (50/60) | 55 / 40 (50/60) | 55 / 40 (50/60) |
|                           | 95 / 65 | 75 / 65 | 60 / 65 | 60 / 65 |
|                           | 150 / 170 | 110 / 170 | 90 / 170 | 85 / 170 |
|                           | 470 / 390 | 320 / 390 | 210 / 390 | 200 / 390 |
| AC solenoids Pilot pressure | 50 bar | 100 bar | 250 bar | 350 bar |
|                           | 40 / 30 (30/50) | 35 / 30 (30/50) | 35 / 30 (30/50) | 35 / 30 (30/50) |
|                           | 75 / 55 | 70 / 55 | 65 / 55 | 65 / 55 |
|                           | 130 / 155 | 95 / 155 | 70 / 155 | 65 / 155 |
|                           | 450 / 375 | 300 / 375 | 190 / 375 | 180 / 375 |

Electrical characteristics

| Duty ratio | 100 % ED; CAUTION: coil temperature up to 135 °C possible |
| Protection class | Ex eb II T4 Gb, Ex eb II T4 Gb (plugged and mounted correctly) |
| Code | J | N | P |
| Supply voltage / ripple [V] | 24 V = 230V / 50 Hz | 110V / 50 Hz |
| Tolerance supply voltage [%] | ±10 | ±10 | ±10 |
| Current consumption [A] | 1.0 | 0.12 | 0.25 |
| Power consumption [W] | 24 | 24 | 24 |
| Solenoid connection | Box with M20x1.5 entry for cable glands. Solenoid identification as per ISO 9461. |
| Wiring min. [mm²] | 3 x 1.5 recommended |
| Wiring length max. [m] | 50 recommended |

With electrical connections the protective conductor (PE ↓) must be connected according to the relevant regulations.
Pilot Operated Directional Control Valve

Series D*W*EE Explosion Proof

**Ordering Code**

<table>
<thead>
<tr>
<th>Code</th>
<th>Bore</th>
<th>Size</th>
<th>Feature</th>
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</thead>
<tbody>
<tr>
<td>D31DW</td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
<tr>
<td>D31NW</td>
<td>Ø11 mm</td>
<td>NG10</td>
<td>High flow</td>
</tr>
<tr>
<td>D41VW</td>
<td>Ø20 mm</td>
<td>NG16</td>
<td></td>
</tr>
<tr>
<td>D91VW</td>
<td>Ø32 mm</td>
<td>NG25</td>
<td></td>
</tr>
<tr>
<td>D111VW</td>
<td>Ø50 mm</td>
<td>NG32</td>
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**3 position spool**

<table>
<thead>
<tr>
<th>Code</th>
<th>Spool type</th>
<th>Bore</th>
<th>Size</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>a b</td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
<tr>
<td>002</td>
<td></td>
<td>Ø11 mm</td>
<td>NG10</td>
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<tr>
<td>006</td>
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<td>Ø11 mm</td>
<td>NG10</td>
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<tr>
<td>0091</td>
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<td>Ø11 mm</td>
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<td>011</td>
<td></td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
<tr>
<td>015</td>
<td></td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
<tr>
<td>016</td>
<td></td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
<tr>
<td>021</td>
<td></td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
<tr>
<td>022</td>
<td></td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
</tbody>
</table>

**2 position spool**

<table>
<thead>
<tr>
<th>Code</th>
<th>Spool type</th>
<th>Bore</th>
<th>Size</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>020</td>
<td>a b</td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
<tr>
<td>030</td>
<td></td>
<td>Ø11 mm</td>
<td>NG10</td>
<td></td>
</tr>
</tbody>
</table>

1) Consider specific spool position.
2) All sizes (D31, D41, D91, D111) available.
3) Only D31, D41, D111 available.
4) D31DW*D/R/S is not available with accessories 3D, 3E or 3F.
5) Not for D31DW and D111VW available.
6) Not for spools 002, 009 and 030 available.
7) Only D31, D41, D91 available.
Pilot Operated Directional Control Valve
Series D*W*EE Explosion Proof

Solenoid options:
- Explosion proof
- Ex e mb II T4 Gb
- IECEx conformity

Solenoid voltage options:
- 24 V
- 230 V / 50 Hz
- 110 V / 50 Hz

Seals:
- NBR
- FPM

Pilot oil supply and drain options:
- w/o accessories
- Pilot choke, meter-out
- Pilot choke, meter-in
- Pilot with pressure reducing valve
- Stroke adjustment side B
- Stroke adjustment side A
- Stroke adjustment side A and B
- meter-out / pressure reducing valve
- meter-in / pressure reducing valve

Accessories:
- Standard valve w/o accessories
- Pilot choke, meter-out
- Pilot choke, meter-in
- Pilot with pressure reducing valve
- Stroke adjustment side B
- Stroke adjustment side A
- Stroke adjustment side A and B
- meter-out / pressure reducing valve
- meter-in / pressure reducing valve

Design series:
(not required for ordering)

Further spool types on request.
The flow curve diagram shows the flow versus pressure drop curves for all spool types. The relevant curve number for each spool type, operating position and flow direction is given in the table below.

### D31DW and D41VW

<table>
<thead>
<tr>
<th>Spool Code</th>
<th>Curve number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-A</td>
</tr>
<tr>
<td>D31DW</td>
<td>D3</td>
</tr>
<tr>
<td>001</td>
<td>3</td>
</tr>
<tr>
<td>002</td>
<td>3</td>
</tr>
<tr>
<td>003</td>
<td>3</td>
</tr>
<tr>
<td>004</td>
<td>3</td>
</tr>
<tr>
<td>005</td>
<td>3</td>
</tr>
<tr>
<td>006</td>
<td>3</td>
</tr>
<tr>
<td>009</td>
<td>3</td>
</tr>
<tr>
<td>011</td>
<td>3</td>
</tr>
<tr>
<td>015</td>
<td>4</td>
</tr>
<tr>
<td>016</td>
<td>4</td>
</tr>
<tr>
<td>020</td>
<td>3</td>
</tr>
<tr>
<td>021</td>
<td>4</td>
</tr>
<tr>
<td>022</td>
<td>3</td>
</tr>
<tr>
<td>030</td>
<td>3</td>
</tr>
</tbody>
</table>

### D31NW

<table>
<thead>
<tr>
<th>Spool Code</th>
<th>Curve number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P-A</td>
</tr>
<tr>
<td>D31NW</td>
<td>D3</td>
</tr>
<tr>
<td>001</td>
<td>3</td>
</tr>
<tr>
<td>002</td>
<td>3</td>
</tr>
<tr>
<td>003</td>
<td>2</td>
</tr>
<tr>
<td>004</td>
<td>2</td>
</tr>
<tr>
<td>005</td>
<td>2</td>
</tr>
<tr>
<td>006</td>
<td>8</td>
</tr>
<tr>
<td>009</td>
<td>4</td>
</tr>
<tr>
<td>011</td>
<td>3</td>
</tr>
<tr>
<td>015</td>
<td>2</td>
</tr>
<tr>
<td>016</td>
<td>4</td>
</tr>
<tr>
<td>020</td>
<td>6</td>
</tr>
<tr>
<td>021</td>
<td>–</td>
</tr>
<tr>
<td>022</td>
<td>4</td>
</tr>
<tr>
<td>030</td>
<td>5</td>
</tr>
</tbody>
</table>

All characteristic curves measured with HLP46 at 50 °C.
Pilot Operated Directional Control Valve
Series D*W*EE Explosion Proof

Flow Curves

**D91VW and D111VW**

<table>
<thead>
<tr>
<th>Spool Code</th>
<th>P-A</th>
<th>P-B</th>
<th>P-T</th>
<th>A-T</th>
<th>B-T</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>–</td>
</tr>
<tr>
<td>002</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>003</td>
<td>4</td>
<td>–</td>
<td>2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>004</td>
<td>4</td>
<td>–</td>
<td>3</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>005</td>
<td>1</td>
<td>–</td>
<td>2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>006</td>
<td>2</td>
<td>–</td>
<td>2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>009</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>011</td>
<td>3</td>
<td>–</td>
<td>2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>015</td>
<td>3</td>
<td>–</td>
<td>3</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>016</td>
<td>3</td>
<td>–</td>
<td>3</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>020</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>–</td>
</tr>
<tr>
<td>021</td>
<td>5</td>
<td>–</td>
<td>9</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>022</td>
<td>9</td>
<td>–</td>
<td>5</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>030</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>–</td>
</tr>
</tbody>
</table>

**Integral check valve in the P port**

Mounting an integral check valve in the P port is necessary to build up pilot pressure for valves with P to T connection and internal pilot oil supply. The pressure difference at the integral check valve (see performance curves) is to be added to all flow curves of the P port of the main valve. Directional valves with an integral check valve are available for the series D31NW and D41VW.

**Flow curve D31NW**

**Flow curve D91VW**

**Flow curve D41VW**

HY11-3343UK ATEX.indd 14.02.18
Pilot Operated Directional Control Valve
Series D*W*EE Explosion Proof

D31DW

Pilot Oil Options

D31NW

D41VW

D91VW

D111VW

All orifice sizes for standard valves
Pilot Operated Directional Control Valve
Series D*W*EE Explosion Proof

Dimensions

**D31DW**

![Diagram of D31DW]

<table>
<thead>
<tr>
<th>Surface Finish</th>
<th>Kit</th>
<th>Dimensions</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>BK385</td>
<td>4x M6x40</td>
<td>ISO 4762-12.9</td>
<td>±15 %</td>
</tr>
</tbody>
</table>

NBR: SK-D31DW-N-91
FPM: SK-D31DW-V-91

**D31NW**

![Diagram of D31NW]

<table>
<thead>
<tr>
<th>Surface Finish</th>
<th>Kit</th>
<th>Dimensions</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>BK385</td>
<td>4x M6x40</td>
<td>ISO 4762-12.9</td>
<td>±15 %</td>
</tr>
</tbody>
</table>

NBR: SK-4D02V-B1
FPM: SK-4D02V-B5
Pilot Operated Directional Control Valve
Series D*W*EE Explosion Proof

**Dimensions**

**D41VW**

- Surface finish: BK320
- Kit: 4x M10x60, 2x M6x55
- ISO 4762-12.9
- Torque: 63 Nm ±15 %
- NBR: SK-D41VW-N-91
- FPM: SK-D41VW-V-91

**D91VW**

- Surface finish: BK385
- Kit: 4x M6x40
- ISO 4762-12.9
- Torque: 13.2 Nm ±15 %
- NBR: SK-D81VW-N-91 / SK-D91VW-N-91
- FPM: SK-D81VW-V-91 / SK-D91VW-V-91
Pilot Operated Directional Control Valve
Series D*W*EE Explosion Proof

D111VW

<table>
<thead>
<tr>
<th>Surface finish</th>
<th>Kit</th>
<th>Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{a, 3, 3}$</td>
<td>BK386</td>
<td>6x M20x90</td>
</tr>
<tr>
<td>ISO 4762-12.9</td>
<td></td>
<td>517 Nm</td>
</tr>
<tr>
<td>±15 %</td>
<td></td>
<td>NBR: SK-D111VW-N-91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FPM: SK-D111VW-V-91</td>
</tr>
</tbody>
</table>
The D1FB*EE series with explosion proof solenoids is based on the standard D1FB series. The specific solenoid design allows the usage in hazardous environments. The explosion proof class is

\[
\text{Ex e mb II T4 Gb}
\]

for use in zone 1 and 2 (conform to ATEX).

Additionally the solenoids have IECEx conformity.

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400 (to be used in an explosion proof cabinet or outside of the hazardous area).

The valve parameters can be edited with the common ProPxD software.

The D1FB valves can be ordered with spool/sleeve design (D1FB*0) for maximum precision as well as spool/body design (D1FB*3) for high nominal flow - see functional limit curves for maximum flow capability.

**Features**

- Spool/sleeve and spool/body
- High repeatability from valve to valve
- Low hysteresis
- Manual override
- Optional: coil to permit ambient temperature up to +60 °C, modification XG371
# Direct Operated Proportional DC Valve

**Series D1FB*EE Explosion Proof**

## Ordering Code

<table>
<thead>
<tr>
<th>Code</th>
<th>Spool type</th>
<th>Flow [l/min] at Δp 5 bar per metering edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1FB<em>0</em>EE: Spool/sleeve design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E01C</td>
<td>Spool type</td>
<td>6</td>
</tr>
<tr>
<td>E01F</td>
<td>Spool type</td>
<td>12</td>
</tr>
<tr>
<td>E01H</td>
<td>Spool type</td>
<td>20</td>
</tr>
<tr>
<td>E02C</td>
<td>Spool type</td>
<td>6</td>
</tr>
<tr>
<td>E02F</td>
<td>Spool type</td>
<td>12</td>
</tr>
<tr>
<td>E02H</td>
<td>Spool type</td>
<td>20</td>
</tr>
<tr>
<td>E03C</td>
<td>Spool type</td>
<td>6</td>
</tr>
<tr>
<td>E03F</td>
<td>Spool type</td>
<td>12</td>
</tr>
<tr>
<td>E03H</td>
<td>Spool type</td>
<td>20</td>
</tr>
<tr>
<td>B31F</td>
<td>Spool type</td>
<td>12 / 6</td>
</tr>
<tr>
<td>B31H</td>
<td>Spool type</td>
<td>20 / 10</td>
</tr>
<tr>
<td>B32F</td>
<td>Spool type</td>
<td>12 / 6</td>
</tr>
<tr>
<td>B32H</td>
<td>Spool type</td>
<td>20 / 10</td>
</tr>
<tr>
<td>D1FB<em>3</em>EE: Spool/body design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E01F</td>
<td>Spool type</td>
<td>10</td>
</tr>
<tr>
<td>E01H</td>
<td>Spool type</td>
<td>20</td>
</tr>
<tr>
<td>E01K</td>
<td>Spool type</td>
<td>30</td>
</tr>
<tr>
<td>E02F</td>
<td>Spool type</td>
<td>10</td>
</tr>
<tr>
<td>E02H</td>
<td>Spool type</td>
<td>20</td>
</tr>
<tr>
<td>E02K</td>
<td>Spool type</td>
<td>30</td>
</tr>
<tr>
<td>B31F</td>
<td>Spool type</td>
<td>10 / 15</td>
</tr>
<tr>
<td>B31H</td>
<td>Spool type</td>
<td>20 / 10</td>
</tr>
<tr>
<td>B31K</td>
<td>Spool type</td>
<td>30 / 15</td>
</tr>
<tr>
<td>B32F</td>
<td>Spool type</td>
<td>10 / 15</td>
</tr>
<tr>
<td>B32H</td>
<td>Spool type</td>
<td>20 / 10</td>
</tr>
<tr>
<td>B32K</td>
<td>Spool type</td>
<td>30 / 15</td>
</tr>
</tbody>
</table>

## Design series

- **Spool position**
- **Seals NBR** (other seal compounds on request)
- **Explosion proof**
- **Modification**

## Connection

- **Explosion proof with cable glands Ex e mb II T4 Gb + IECEx conformity**

## Code

<table>
<thead>
<tr>
<th>Code</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>XG371</td>
<td>Coil to permit ambient temperature up to +60 °C</td>
</tr>
</tbody>
</table>

## Solenoid

<table>
<thead>
<tr>
<th>Code</th>
<th>Solenoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>12 V / 2.3 A</td>
</tr>
<tr>
<td>K*XG371</td>
<td>12 V / 2.0 A</td>
</tr>
<tr>
<td>J</td>
<td>24 V / 1.15 A</td>
</tr>
<tr>
<td>J*XG371</td>
<td>24 V / 1.0 A</td>
</tr>
</tbody>
</table>

## Spool position

- **C**
- **E**
- **K**
Direct Operated Proportional DC Valve
Series D1FB*EE Explosion Proof

**General**

<table>
<thead>
<tr>
<th>Design</th>
<th>Direct operated proportional DC valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuation</td>
<td>Proportional solenoid</td>
</tr>
<tr>
<td>Size</td>
<td>NG06/CETOP 03/NFPA D03</td>
</tr>
<tr>
<td>Mounting interface</td>
<td>DIN 24340 / ISO 4401 / CETOP RP121 / NFPA</td>
</tr>
<tr>
<td>Mounting position</td>
<td>unrestricted</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>(-20...+40); XG371: (-20...+60)</td>
</tr>
<tr>
<td>MTTFD value</td>
<td>150</td>
</tr>
<tr>
<td>Weight</td>
<td>3.5 (2 solenoids), 2.5 (1 solenoid)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>10 Sinus 5...2000 Hz acc. IEC 68-2-6</td>
</tr>
<tr>
<td></td>
<td>30 Random noise 20...2000 Hz acc. IEC 68-2-36</td>
</tr>
<tr>
<td></td>
<td>15 Shock acc. IEC 68-2-27</td>
</tr>
</tbody>
</table>

**Hydraulic**

<table>
<thead>
<tr>
<th>Max. operating pressure</th>
<th>[bar]</th>
<th>Ports P, A, B 350; Port T 210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. pressure drop PABT / PBAT</td>
<td>[bar]</td>
<td>350</td>
</tr>
<tr>
<td>Fluid</td>
<td>Hydraulic oil as per DIN 51524 ...51535, other on request</td>
<td></td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>([-20...+40); XG371: (-20...+60)</td>
<td></td>
</tr>
<tr>
<td>Viscosity permitted</td>
<td>([\text{cSt}] / [\text{mm}^2/\text{s}])</td>
<td></td>
</tr>
<tr>
<td>recommended</td>
<td>20...400</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30...80</td>
<td></td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 4406 (1999); 18/16/13</td>
<td></td>
</tr>
<tr>
<td>Nominal flow at (\Delta p = 5) bar per control edge *</td>
<td>(6 / 12 / 20)</td>
<td>(10 / 20 / 30)</td>
</tr>
<tr>
<td>Leakage at 100 bar</td>
<td>(&lt;50)</td>
<td>(&lt;60)</td>
</tr>
<tr>
<td>Overlap</td>
<td>25, electrically normalized at 10 (see flow characteristics)</td>
<td></td>
</tr>
</tbody>
</table>

**Static / Dynamic**

| Step response at 100 % step | [ms] | 30 |
| Hysteresis                 | [%]  | <4 |
| Temperature drift solenoid current [%/K] | <0.02 |

**Electrical characteristics**

| Duty ratio | [%] | 100 |
| Protection class | Ex e mb II T4 Gb, IP66 (plugged and mounted correctly) |

<table>
<thead>
<tr>
<th>Solenoid Code</th>
<th>J</th>
<th>J*XG371</th>
<th>K</th>
<th>K*XG371</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>[V]</td>
<td>24</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Current consumption</td>
<td>[A]</td>
<td>1.15</td>
<td>1.0</td>
<td>2.3</td>
</tr>
<tr>
<td>Resistance</td>
<td>[Ohm]</td>
<td>12.0</td>
<td>12.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Solenoid connection</td>
<td>Box with M20x1.5 entry for cableglands. Solenoid identifications per ISO 9461.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiring min.</td>
<td>[mm²]</td>
<td>3 x 1.5 recommended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiring length max.</td>
<td>[m]</td>
<td>50 recommended</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With electrical connections the protective conductor (PE ↓) must be connected according to the relevant regulations.

* Flow rate for different \(\Delta p\) per control edge:

\[
Q_x = Q_{\text{Nom.}} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{\text{Nom.}}}}
\]
Direct Operated Proportional DC Valve
Series D1FB*EE Explosion Proof

Flow characteristics
at $\Delta p = 5$ bar per metering edge

**D1FB*0*EE**

![Flow characteristics graph for D1FB*0*EE](image1)

**D1FB*0*EEXG371**

![Flow characteristics graph for D1FB*0*EEXG371](image2)

**Functional limits**

at 25 %, 50 %, 75 % and 100 % command signal
(symmetric flow)

At asymmetric flow a reduced flow limit has to be considered – typically approx. 10 % lower.

**Spool type E01H**

![Flow characteristics graph for Spool type E01H](image3)

**Spool type E01H*XG371**

![Flow characteristics graph for Spool type E01H*XG371](image4)

All characteristic curves measured with HLP46 at 50 °C.
Flow characteristics

at $\Delta p = 5$ bar per metering edge

### D1FB*3*EE

![Graph of D1FB*3*EE flow characteristics]

### D1FB*3*EEXG371

![Graph of D1FB*3*EEXG371 flow characteristics]

**Functional limits**

at 25 %, 50 %, 75 % and 100 % command signal (symmetric flow)

At asymmetric flow a reduced flow limit has to be considered – typically approx. 10 % lower.

### Spool type E01K

![Graph of Spool type E01K flow characteristics]

### Spool type E01K*XG371

![Graph of Spool type E01K*XG371 flow characteristics]

All characteristic curves measured with HLP46 at 50 °C.
Direct Operated Proportional DC Valve
Series D1FB*EE Explosion Proof

### Dimensions

**D1FB*C*EE**

![Diagram of D1FB*C*EE]

**D1FB*K*EE**

![Diagram of D1FB*K*EE]

**D1FB*E*EE**

![Diagram of D1FB*E*EE]

### Surface Finish

<table>
<thead>
<tr>
<th>Surface finish</th>
<th>Kit</th>
<th>Bolt</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_{\text{min}} 6.3 )</td>
<td>BK375</td>
<td>4x M5x30 ISO 4762-12.9</td>
<td>7.6 Nm ±15 %</td>
</tr>
</tbody>
</table>

**NBR**

<table>
<thead>
<tr>
<th>Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SK-D1FB</td>
</tr>
</tbody>
</table>
The D1FV*EE series with explosion proof solenoids is based on the standard D1FV series. The specific solenoid design allows the usage in hazardous environments. The explosion proof class is

\[ CE \text{ II 2 G} \]

\[ \text{Ex e mb II T4 Gb} \]

for use in zone 1 and 2 (conform to ATEX).

Additionally the solenoids have IECEx conformity.

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400 (to be used in an explosion proof cabinet or outside of the hazardous area).

The valve parameters can be edited with the common ProPxD software.

The D1FV valves control the pressure in the A or B ports using the barometric feedback principle.

**Features**

- Barometric feedback
- High repeatability from valve to valve
- Low hysteresis
- Manual override
- Optional: coil to permit ambient temperature up to +60 °C, modification XG371
Proportional Pressure Reducing Valve
Series D1FV*EE Explosion Proof

Ordering code

<table>
<thead>
<tr>
<th>Code</th>
<th>Spool position</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>a 0 b</td>
</tr>
<tr>
<td>E</td>
<td>a 0</td>
</tr>
<tr>
<td>K</td>
<td>0 b</td>
</tr>
</tbody>
</table>

- **DIN NG06**
- **CETOP 03**
- **NFPA D03**

**Size**

**Proportional control**

**Spool**

**Control function**

**Seals**

**FPM**

**Pressure range**

25 bar

**Explosion proof**

**Solenoid**

**Spool/body design**

**Connection**

Explosion proof with cable glands

Ex e mb II T4 Gb + IECEx conformity

**Code**

**Modification**

- **XG371**
  - Coils to permit ambient temperature up to +60 °C

**Solenoid**

- **K**
  - 12 V / 2.3 A
- **K*XG371**
  - 12 V / 2.0 A
- **J**
  - 24 V / 1.15 A
- **J*XG371**
  - 24 V / 1.0 A

**Characteristic curves**

**Standard**

**Characteristic curves**

**XG371**

All characteristic curves measured with HLP46 at 50 °C.
### General

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Direct operated proportional pressure reducing valve</td>
</tr>
<tr>
<td>Actuation</td>
<td>Proportional solenoid</td>
</tr>
<tr>
<td>Size</td>
<td>NG06 / CETOP 03 / NFPA D03</td>
</tr>
<tr>
<td>Mounting interface</td>
<td>DIN 24340 / ISO 4401 / CETOP RP121 / NFPA</td>
</tr>
<tr>
<td>Mounting position</td>
<td>unrestricted</td>
</tr>
<tr>
<td>Ambient temperature [°C]</td>
<td>-20...+40; XG371: -20...+60</td>
</tr>
<tr>
<td>MTTF_d value [years]</td>
<td>150</td>
</tr>
<tr>
<td>Weight [kg]</td>
<td>3.5 (2 solenoids), 2.5 (1 solenoid)</td>
</tr>
<tr>
<td>Vibration resistance [g]</td>
<td>10 Sinus 5...2000 Hz acc. IEC 68-2-6</td>
</tr>
<tr>
<td></td>
<td>30 Random noise 20...2000 Hz acc. IEC 68-2-36</td>
</tr>
<tr>
<td></td>
<td>15 Shock acc. IEC 68-2-27</td>
</tr>
</tbody>
</table>

### Hydraulic

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. operating pressure [bar]</td>
<td>Ports P, A, B 350; Port T 185</td>
</tr>
<tr>
<td>Max. pressure drop PABT / PBAT [bar]</td>
<td>350</td>
</tr>
<tr>
<td>Fluid</td>
<td>Hydraulic oil as per DIN 51524...51535, other on request</td>
</tr>
<tr>
<td>Fluid temperature [°C]</td>
<td>-20...+40; XG371: -20...+60</td>
</tr>
<tr>
<td>Viscosity permitted [cSt] / [mm²/s]</td>
<td>20...400</td>
</tr>
<tr>
<td>Viscosity recommended [cSt] / [mm²/s]</td>
<td>30...80</td>
</tr>
<tr>
<td>Filtration</td>
<td>ISO 4406 (1999); 18/16/13</td>
</tr>
<tr>
<td>Max. flow [l/min]</td>
<td>10</td>
</tr>
<tr>
<td>Min. primary pressure [bar]</td>
<td>30</td>
</tr>
</tbody>
</table>

### Static / Dynamic

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Hysteresis [%]</td>
<td>&lt;4</td>
</tr>
<tr>
<td>Temperature drift solenoid current [%/K]</td>
<td>&lt;0.02</td>
</tr>
</tbody>
</table>

### Electrical characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty ratio [%]</td>
<td>100</td>
</tr>
<tr>
<td>Protection class</td>
<td>CE Ex II G, Ex e mb II T4 Gb, IP66 (plugged and mounted correctly)</td>
</tr>
<tr>
<td>Solenoid Code</td>
<td>J, J<em>XG371, K, K</em>XG371</td>
</tr>
<tr>
<td>Supply voltage [V]</td>
<td>24, 24, 12, 12</td>
</tr>
<tr>
<td>Current consumption [A]</td>
<td>1.15, 1.0, 2.3, 2.0</td>
</tr>
<tr>
<td>Resistance [Ohm]</td>
<td>12.0, 12.0, 3.0, 3.0</td>
</tr>
<tr>
<td>Solenoid connection</td>
<td>Box with M20x1.5 entry for cableglands. Solenoid identifications per ISO 9461.</td>
</tr>
<tr>
<td>Wiring min. [mm²]</td>
<td>3 x 1.5 recommended</td>
</tr>
<tr>
<td>Wiring length max. [m]</td>
<td>50 recommended</td>
</tr>
</tbody>
</table>

With electrical connections the protective conductor (PE ↓) must be connected according to the relevant regulations.
**Dimensions**

**Proportional Pressure Reducing Valve**

**Series D1FV*EE Explosion Proof**

**D1FV*C*EE**

- Surface finish: NBR
- BK375
- 4x M5x30
- ISO 4762-12.9
- 7.6 Nm ±15%

**D1FV*K*EE**

**D1FV*E*EE**
The series of pilot operated proportional directional valves D*1FB*EE is offered in 4 sizes:

- D31FB*EE - NG10 (CETOP 05)
- D41FB*EE - NG16 (CETOP 07)
- D91FB*EE - NG25 (CETOP 08)
- D111FB*EE - NG32 (CETOP 10)

The D*1FB*EE series with explosion proof solenoids is based on the standard D*1FB series. The specific solenoid design allows the usage in hazardous environments. The explosion proof class is

\[ \text{CE Ex e II T4 Gb} \]

for use in zone 1 and 2 (conform to ATEX).

Additionally the solenoids have IECEx conformity.

The parameters can be saved, changed and duplicated in combination with the digital power amplifier PWD00A-400 (to be used in an explosion proof cabinet or outside of the hazardous area).

The valve parameters can be edited with the common ProPxD software.

**Features**
- Progressive flow characteristics for sensitive adjustment of flow rate
- High flow capacity
- Optional: coil to permit ambient temperature up to +60 °C, modification XG371

**D91FB*EE**
### Ordering Code

**Pilot Operated Proportional DC Valve**

**Series D*1FB*EE Explosion Proof**

#### D*1FB

- **Directional control valve**
- **Size**
- **Proportional control**
- **Spool type**
- **Flow**
- **Pilot connection**
- **Spool position**
- **Seals**
- **Expansion proof**
- **Design series**
- **Connection**
- **Modification**

#### Nominal size

<table>
<thead>
<tr>
<th>Code</th>
<th>Nominal size</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>NG10 / CETOP 05</td>
</tr>
<tr>
<td>4</td>
<td>NG16 / CETOP 07</td>
</tr>
<tr>
<td>9</td>
<td>NG25 / CETOP 08</td>
</tr>
<tr>
<td>11</td>
<td>NG32 / CETOP 10</td>
</tr>
</tbody>
</table>

#### Spool type

- **E01**
- **E02**
- **B31**
- **B32**

#### Flow [l/min]

<table>
<thead>
<tr>
<th>Code</th>
<th>Flow [l/min] at Δp = 5 bar per metering edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>D31</td>
<td>-</td>
</tr>
<tr>
<td>D41</td>
<td>-</td>
</tr>
<tr>
<td>D91</td>
<td>-</td>
</tr>
<tr>
<td>D111</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>100 (2)</td>
</tr>
<tr>
<td>C</td>
<td>75 (2)</td>
</tr>
<tr>
<td>D</td>
<td>90</td>
</tr>
<tr>
<td>E</td>
<td>120</td>
</tr>
<tr>
<td>F</td>
<td>200</td>
</tr>
<tr>
<td>H</td>
<td>400</td>
</tr>
<tr>
<td>L</td>
<td>1000</td>
</tr>
</tbody>
</table>

#### Seals

- **N** NBR
- **V** FPM

#### Solenoid description

- **K** 12 V / 2.3 A
- **K*XG371** 12 V / 2.0 A
- **J** 24 V / 1.15 A
- **J*XG371** 24 V / 1.0 A

#### Spool position

- **C**
- **E**
- **K**

1. With enlarged connections Ø 32 mm
2. Not for spool type B31 and B32
## Technical Data

### General

<table>
<thead>
<tr>
<th>Design</th>
<th>Pilot operated DC valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuation</td>
<td>Proportional solenoid</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td></td>
</tr>
<tr>
<td>NG10 (CETOP 05)</td>
<td></td>
</tr>
<tr>
<td>NG16 (CETOP 07)</td>
<td></td>
</tr>
<tr>
<td>NG25 (CETOP 08)</td>
<td></td>
</tr>
<tr>
<td>NG32 (CETOP 10)</td>
<td></td>
</tr>
<tr>
<td>Mounting interface</td>
<td>DIN 24340 / ISO 4401 / CETOP RP121 / NFPA</td>
</tr>
<tr>
<td>Mounting position</td>
<td>unrestricted</td>
</tr>
<tr>
<td>Ambient temperature [°C]</td>
<td>-20...+40 ; XG371: -20...+60</td>
</tr>
<tr>
<td>MTTF₀ value [years]</td>
<td>75</td>
</tr>
<tr>
<td>Weight [kg]</td>
<td>9.4</td>
</tr>
<tr>
<td>Vibration resistance [g]</td>
<td>10 Sinus 5...200 Hz acc. IEC 68-2-6</td>
</tr>
<tr>
<td></td>
<td>30 Random noise 20...20 Hz acc. IEC 68-2-36</td>
</tr>
<tr>
<td></td>
<td>15 Shock acc. IEC 68-2-27</td>
</tr>
</tbody>
</table>

### Hydraulic

| Max. operating pressure [bar] | Pilot drain internal: P, A, B, X 350; T, Y 185 (NG10: T, Y 15) |
| Fluid                        | Pilot drain external: P, A, B, T, X 350; Y 185 (NG10: Y 15) |
| Fluid temperature [°C]       | -20...+40; XG371: -20...+60 |
| Viscosity permitted [cSt] / recommended [cSt] / [mm²/s] | 20...400 |
| Fluid                        | 30...80 |
| Filtration                   | ISO 4406 (1999), 18/16/13 |
| Nominal flow at Δp = 5 bar per control edge [l/min] | 75/90/120 |
| Leakage at 100 bar [ml/min]  | 100 |
| Pilot supply pressure [bar]  | min. 30 (+ T/Y pressure) |
| Pilot flow at 100bar [l/min] | <0.5 |
| Pilot flow, step response [l/min] | 2.0 |

### Static / Dynamic

| Step response at 100 % step [ms] | 50 |
| Hysteresis [%]                  | <5 |

### Electrical characteristics

| Duty ratio [%] | 100 |
| Protection class | Ex e mb II T4 Gb, IP66 (plugged and mounted correctly) |
| Solenoid Code | J J'XG371 K K'XG371 |
| Supply voltage [V] | 24 24 12 12 |
| Current consumption [A] | 1.15 1.0 2.3 2.0 |
| Resistance [Ohm] | 12.0 12.0 3.0 3.0 |
| Solenoid connection | Box with M20x1.5 entry for cableglands. Solenoid identifican as per ISO 9461. |
| Wiring min. [mm²] | 3 x 1.5 recommended |
| Wiring length max. [m] | 50 recommended |

With electrical connections the protective conductor (PE) must be connected according to the relevant regulations.

* Flow rate for different Δp per control edge: \( Q_x = Q_{Nom.} \cdot \sqrt{\frac{\Delta p_x}{\Delta p_{Nom.}}} \)
Flow characteristics D*1FB
at $\Delta p = 5$ bar per metering edge

Spool code E*

![Graph of Flow characteristics D*1FB for Spool code E*]

Spool code B*

![Graph of Flow characteristics D*1FB for Spool code B*]

Flow characteristics D*1FB*XG371

Spool code E*

![Graph of Flow characteristics D*1FB*XG371 for Spool code E*]

Spool code B*

![Graph of Flow characteristics D*1FB*XG371 for Spool code B*]

All characteristic curves measured with HLP46 at 50 °C.
Pilot Oil Options

Pilot oil inlet (supply) and outlet (drain)

D31FB

![Diagram of D31FB valve]

- **Pilot oil options**
  - Internal/External options
  - Open/Closed options

<table>
<thead>
<tr>
<th>Pilot oil Inlet</th>
<th>Drain</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>External</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>External</td>
<td>External</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Internal</td>
<td>Internal</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>External</td>
<td>Internal</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>

D41FB

![Diagram of D41FB valve]

- **Pilot oil options**
  - Internal/External options
  - Open/Closed options

<table>
<thead>
<tr>
<th>Pilot oil Inlet</th>
<th>Drain</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>External</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>External</td>
<td>External</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Internal</td>
<td>Internal</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>External</td>
<td>Internal</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>

D91FB

![Diagram of D91FB valve]

- **Pilot oil options**
  - Internal/External options
  - Open/Closed options

<table>
<thead>
<tr>
<th>Pilot oil Inlet</th>
<th>Drain</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>External</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>External</td>
<td>External</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Internal</td>
<td>Internal</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>External</td>
<td>Internal</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>

D111FB

![Diagram of D111FB valve]

- **Pilot oil options**
  - Internal/External options
  - Open/Closed options

<table>
<thead>
<tr>
<th>Pilot oil Inlet</th>
<th>Drain</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>External</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>External</td>
<td>External</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Internal</td>
<td>Internal</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>External</td>
<td>Internal</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>
Pilot Operated Proportional DC Valve
Series D*1FB*EE Explosion Proof

**Dimensions**

**D31FB**

![Diagram of D31FB valve]

**Surface finish** | **Kit** | **Dimensions** | **Total Torque** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BK385</td>
<td>4x M6x40</td>
<td>ISO 4762-12.9</td>
<td>13.2 Nm ±15 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NBR: SK-D31FB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FPM: SK-D31FB-V</td>
</tr>
</tbody>
</table>

**D41FB**

![Diagram of D41FB valve]

**Surface finish** | **Kit** | **Dimensions** | **Total Torque** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BK320</td>
<td>2x M6x55</td>
<td>4x M10x60</td>
<td>13.2 Nm ±15 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ISO 4762-12.9</td>
<td>63 Nm ±15 %</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NBR: SK-D41FB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FPM: SK-D41FB-V</td>
</tr>
</tbody>
</table>
Pilot Operated Proportional DC Valve
Series D*1FB*EE Explosion Proof

**Dimensions**

**D91FB**

- **Surface finish**: BK360
- **Kit**: 6x M12x75
- **ISO 4762-12.9**: 108 Nm
- **±15 %**
- **NBR**: SK-D91FB
- **FPM**: SK-D91FB-V

**D111FB**

- **Surface finish**: BK366
- **Kit**: 6x M20x90
- **ISO 4762-12.9**: 517 Nm
- **±15 %**
- **NBR**: SK-D111FB
- **FPM**: SK-D111FB-V
The direct operated control valve series D1FP Explosion Proof of the nominal size NG06 (CETOP 03) is technically based on the standard D1FP design and allows the usage in hazardous environments. The flameproof enclosure of the electronics ensures that no potential explosion energy inside the valve can leak out.

The explosion proof class is Ex II 2G Ex db IIC T5 and T6 Gb for use in zone 1 and 2 (conform to ATEX) and IECEx conformity.

The D1FP shows extremely high dynamics combined with maximum flow. It is the preferred choice for highest accuracy in positioning of hydraulic axis and controlling of pressure and velocity.

Driven by the patented VCD® actuator the D1FP reaches the frequency response of real servovalves. At power-down the spool moves in a defined position. All common input signals are available.

Technical features
- Real servovalve dynamics (-3 dB / 350 Hz at ±5 % input signal)
- High flow
- Defined spool positioning at power-down - optional P-A/B-T or P-B/A-T or center position (for overlapped spools)
- Onboard electronics
Direct Operated Proportional DC Valve
Series D1FP*ED Explosion Proof

Ordering Code

- Directional control valve
- Proportional control
- Spool type
- Y-port (plugged)
- Command signal
- Spool/sleeve design
- Types of protection for solenoid

<table>
<thead>
<tr>
<th>Code</th>
<th>Spool type</th>
<th>Flow [l/min] at Δp 35 bar per metering edge</th>
</tr>
</thead>
</table>
| Zerolap
| E50B | 3 |
| E50C | 6 |
| E50F | 12 |
| E50G | 16 |
| E50H | 25 |
| E50M | 40 |
| B60C | 6 / 3 |
| B60F | 12 / 6 |
| B60G | 16 / 8 |
| B60H | 25 / 12.5 |
| B60M | 40 / 20 |
| Underlap
| E55B | 3 |
| E55C | 6 |
| E55F | 12 |
| E55G | 16 |
| E55H | 25 |
| E55M | 40 |
| Overlap
| E01B | 3 |
| E01C | 6 |
| E01F | 12 |
| E01G | 16 |
| E01H | 25 |
| E01M | 40 |
| B31C | 6 / 3 |
| B31F | 12 / 6 |
| B31G | 16 / 8 |
| B31H | 25 / 12.5 |
| B31M | 40 / 20 |
| B32B | 3 |
| B32C | 6 |
| B32F | 12 |
| B32G | 16 / 8 |
| B32H | 25 / 12.5 |
| B32M | 40 / 20 |

Note:
IECEx certified screwed cable glands are not included.
Adapter plate for ISO 4401 to ISO 10372 size 04, Ordering code HAP04WV06-1661
Parametrizing cable OBE -> RS232, item no. 40982923

1) On power down the spool moves in a defined position. This cannot be guaranteed in case of single flow path on the control edge A – T resp. B – T with pressure drops above 120 bar or contamination in the hydraulic fluid.

2) Approx. 10 % opening, only zero lapped spools and underlap spools.

3) Only for overlapped spools.

HY11-3343UK ATEX.indd 14.02.18

Parker Hannifin Corporation
## General

<table>
<thead>
<tr>
<th>Design</th>
<th>Direct operated servo proportional DC valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuation</td>
<td>VCD® actuator</td>
</tr>
<tr>
<td>Size</td>
<td>NG06 / CETOP 03 / NFPA D03</td>
</tr>
</tbody>
</table>

**Hydraulic**

<table>
<thead>
<tr>
<th>Max. operating pressure</th>
<th>[bar]</th>
<th>Ports P, A, B 350; Port T max. 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td></td>
<td>Hydraulic oil according to DIN 51524 ... 535, other on request</td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>[°C]</td>
<td>T5: -20...+60 at max. 60 ambient temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T5: -20...+70 at max. 50 ambient temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T6: -20...+60 at max. 45 ambient temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T6: -20...+70 at max. 35 ambient temperature</td>
</tr>
<tr>
<td>Viscosity permitted</td>
<td></td>
<td>ISO 4406 (1999); 18/16/13</td>
</tr>
<tr>
<td>Viscosity recommended</td>
<td></td>
<td>20...400</td>
</tr>
<tr>
<td>Filtration</td>
<td></td>
<td>30...80</td>
</tr>
<tr>
<td>Nominal flow at Δp=35 bar per control edge</td>
<td>[l/min]</td>
<td>3 / 6 / 12 / 16 / 25 / 40</td>
</tr>
<tr>
<td>Flow maximum</td>
<td>[l/min]</td>
<td>72 (at Δp=210 bar over two control edges)</td>
</tr>
<tr>
<td>Leakage at 100 bar</td>
<td>[ml/min]</td>
<td>&lt;400 (zerolap spool); &lt;50 (overlap spool)</td>
</tr>
<tr>
<td>Opening point</td>
<td>[%]</td>
<td>set to 23 commande signal (see flow characteristics)</td>
</tr>
</tbody>
</table>

### Static / Dynamic

| Step response at 100 % step | [ms] | <3.5 |
| Frequency response (±5 % signal) | [Hz] | 350 (amplitude ratio -3 dB), 350 (phase lag -90°) |
| Hysteresis                 | [%]  | <0.05 |
| Sensitivity                | [%]  | <0.03 |
| Temperature drift          | [%/K] | <0.025 |

### Electrical characteristics

| Duty ratio              | [%]  | 100 |
| Protection class        |      | C6 (2) II 2 G , Ex db IIC T5 Gb and T6 Gb IECEx, IP65 and ATEX |
| Supply voltage/ripple   | [V]  | DC 22 ... 30, electric shut-off at < 19, ripple < 5 % eff., surge free |
| Current consumption max. | [A]  | 3.5 |
| Pre-fusing              | [A]  | 4.0 medium lag |

**Input signal**

| Code, (K) Voltage       | [V]  | 10...0...–10, ripple <0.01 % eff., surge free, 0...+10 V P->A (P->B) |
| Code, (L) Current       | [mA] | 20...0...–20, ripple <0.01 % eff., surge free, 0...+20 mA P->A (P->B) |
| Code S Current Impedance | [Ohm] | <3.6 mA = disable, >3.8 mA = according to NAMUR NE43 |
| Code S Current Impedance | [Ohm] | <3.6 mA = enable off, >3.8 mA = enable on according to NAMUR NE43 |
| Code S Current Impedance | [Ohm] | <3.6 mA = disable, >3.8 mA = according to NAMUR NE43 |
| Code S Current Impedance | [Ohm] | <3.6 mA = enable off, >3.8 mA = enable on according to NAMUR NE43 |

**Differential input max.**

| Voltage                | [V]  | 30 for terminal A9 and A11 against PE (terminal A1/A2) |
|                       | [V]  | 30 for terminal A9 and A11 against 0 V (terminal A5) |

**Enable signal**

| Voltage                | [V]  | 5...30, Ri = > 8 kOhm |

**Diagnostic signal**

| Voltage                | [V]  | +10...0...–10 / +12.5 error detection, rated max. 5 mA |

**EMC**

| EN 61000-6-2, EN 61000-6-4 |

**Electrical connection**

<table>
<thead>
<tr>
<th>Code B, E, K, S, L EtherCAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal block 12-14-pole</td>
</tr>
</tbody>
</table>

**Wiring min.**

<table>
<thead>
<tr>
<th>Code N</th>
<th>[mm²]</th>
<th>8x1.0 (AWG 16) overall braid shield</th>
</tr>
</thead>
</table>

**Wiring length max.**

| [m] | 50 |

---

1) Flow rate for different Δp per control edge: \( Q \times \sqrt{\frac{\Delta p}{\Delta p_{\text{Nom.}}}} \)

2) Measured with load (100 bar pressure drop/two control edges).
Characteristics Curves

**Flow curves**
(Overlapped spool opening point 23 %)
at $\Delta p = 35$ bar per metering edge
Spool type **E01/E50**

- $100 \% = Q_{Norm}$
- $50 \%$
- $0 \%$

**Pressure gain**

- $100 \% = Q_{Norm}$
- $50 \%$
- $0 \%$

**Frequency response**
±5 % command signal
±90 % command signal

Functional limits
On request

All characteristic curves measured with HLP46 at 50 °C.
Direct Operated Proportional DC Valve
Series D1FP*ED Explosion Proof

Block Diagram

Block diagram of onboard electronics

Pin adjustment

<table>
<thead>
<tr>
<th>Connector</th>
<th>Range</th>
<th>Pin</th>
<th>Signal in/out</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>14 pin</td>
<td>A1</td>
<td>PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A2</td>
<td>PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A3</td>
<td>+Up Power supply (22...30 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A4</td>
<td>+Us Sensor supply (+Up bridged)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A5</td>
<td>GND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A6</td>
<td>GND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A7</td>
<td>Enable (5...30 V)</td>
</tr>
<tr>
<td></td>
<td>Command</td>
<td>A9</td>
<td>Command+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A11</td>
<td>Command-</td>
</tr>
<tr>
<td></td>
<td>Diagnostic</td>
<td>A8</td>
<td>Diagnostic (±10 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A10</td>
<td>Diagnostic (4...20 mA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A12</td>
<td>Valve OK</td>
</tr>
<tr>
<td></td>
<td>Reserve</td>
<td>A13</td>
<td>n. c.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A14</td>
<td>n. c.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connector</th>
<th>Range</th>
<th>Pin</th>
<th>Signal in/out</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>12 pin</td>
<td>B10</td>
<td>Feedback IN+ (±10 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B12</td>
<td>Feedback/Diagnostic GND</td>
</tr>
<tr>
<td>BUS</td>
<td></td>
<td>B9</td>
<td>Feedback IN+ (4...20 mA)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B11</td>
<td>Feedback IN+ (4...20 mA)</td>
</tr>
<tr>
<td></td>
<td>Sensor</td>
<td>B1</td>
<td>Data GND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B2</td>
<td>RD- OUT (blue)</td>
</tr>
<tr>
<td></td>
<td>BUS</td>
<td>B3</td>
<td>RxD / TxD-N (green) RD+ OUT (white)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B4</td>
<td>RD+ IN (white)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B5</td>
<td>RxD / TxD-P (red) TD- OUT (orange)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B6</td>
<td>TD- IN (orange)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B7</td>
<td>Power supply plus (5V) TD+ OUT (yellow)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B8</td>
<td>TD+ IN (yellow)</td>
</tr>
</tbody>
</table>

Position of the pin connectors

Do not connect with supply voltage zero.

* The ProfiBUS plug-in connections are internal connected in pairs (1 and 2, 3 and 4, ...).
Direct Operated Proportional DC Valve
Series D1FP*ED Explosion Proof

**ProPxD Interface Program**

The ProPxD software allows quick and easy setting of the digital valve electronics. Individual parameters as well as complete settings can be viewed, changed and saved via the comfortable user interface. Parameter sets saved in the non-volatile memory can be loaded to other valves of the same type or printed out for documentation purposes.

The PC software can be downloaded free of charge at www.parker.com/euro_hcd – see page “Support” or directly at www.parker.com/propxd.

**Features**

- Comfortable editing of valve parameters
- Saving and loading of customized parameter sets
- Executable with all Windows® operating systems from Windows® XP upwards
- Simple communication between PC and valve electronics via serial interface RS232C

The valve electronics cannot be connected to a PC with a standard USB cable – this can result in damages of PC and/or valve electronics.

The parametrizing cable may be ordered under item no. 40982923.
Direct Operated Proportional DC Valve
Series D1FP*ED Explosion Proof

Dimensions

Surface finish

<table>
<thead>
<tr>
<th>Kit</th>
<th>Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BK300</td>
<td>4x M5x50 ISO 4762-12.9</td>
</tr>
<tr>
<td>NBR: SK-D1FP</td>
<td>FPM: SK-D1FP-V</td>
</tr>
</tbody>
</table>
Your local authorized Parker distributor

EMEA Product Information Centre
Free phone: 00 800 27 27 5374
(from AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, IE, IL, IS, IT, LU, MT, NL, NO, PL, PT, RU, SE, SK, UK, ZA)

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Toll-free number: 1-800-27 27 537
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