D03 Pattern
Directional Control Valves

Also refer to "Directional Valve Features, Selection and Operating Recommendations" (dynexdcvoperating.pdf)
VALVE DESCRIPTION

D03 valves provide high pressure and high flow capability in a very compact size. Flows to 15 gpm (57 L/min) are possible at pressures to 5000 psi (350 bar).

These valves operate very efficiently, with large-core flow passages and uniform flow areas throughout the body coring. Typical pressure drop (open center spool) is a low 98 psi at 8 U.S. gpm (7 bar at 30 L/min) nominal flow.

For a description of spools, internal operators and application information, see dynexdcvoperating.pdf.

Mounting
Subplate, N.F.P.A. D03 (CETOP 3) pattern.

Actuator Options

Rated Flow
Nominal: 8 U.S. gpm (30 L/min); Maximum: 15 U.S. gpm (57 L/min).

Rated Pressure
5000 psi (350 bar).

Tank Port Pressure (Maximum)
Solenoid Actuated Models: Standard, 1500 psi (105 bar); High Pressure Option (“HT”), AC models, 2300 psi (160 bar); DC models, 3000 psi (210 bar).
Hydraulic and Air Actuated Models: 1500 psi (105 bar).

Response Time (Full Stroke)
Solenoid Energized: AC, 12 ms; DC, 20 ms.
Spring Returned: AC, 15 ms; DC, 20 ms.

Solenoid Options
Models are available with standard AC or DC solenoids. Optional Plug-In-Terminal Solenoids fit DIN Connector, Standard 43650 Form A (“Hirschmann” type).

Electrical Connections
Standard Wiring Box with UL listed and CSA approved wire leads;
Optional Terminal Strip, Cable Grip or Pin Connector (N.F.P.A. standard T3.5-29-1980; A.N.S.I. standard B93.55M-1981).

Explosion Proof Option (“EP”)
Solenoids with special enclosures are approved by UL and CSA for use in hazardous locations. Available with AC or DC solenoids.

UL Classification:
Class I, Group C, D;
Class II, Group E, F, G.

CSA/UL Recognized (“C” Option)
Solenoid coils are printed with the symbol:

Introduced by UL and CSA for use in hazardous locations. Available with “115DF” standard AC solenoids only. For availability with other voltages, contact the Dynex sales department.

VALVE FLOW CAPACITY

Flow capacity depends on valve actuator, internal operator and spool type.

Solenoid Models
The flow capacity curves, above, show typical performance for each spool type. The letters in the “Flow Curve Reference” table identify the appropriate curve.

Lever Operated Models
Most manual models are rated for 15 U.S. gpm (57 L/min) maximum. The exception is model 613011-D03 which is rated for 13 U.S. gpm (49 L/min) maximum. This model has a Code 3 internal operator (two position, detented operation) with Type 011 spool (tandem center).
Pilot Operated Models

The nominal flow capacity for most pilot operated valves is 15 U.S. gpm (57 L/min). When using a Type 011 spool (tandem center, open crossover), the maximum flow is 10 U.S. gpm (38 L/min).

Maximum flow for pilot operated valves is dependent on pilot pressure. The table shows the minimum pressure required to shift the spool, for various flow capacities.

Maximum Pilot Pressure:
- Hydraulic, 3000 psi (210 bar);
- Air, 200 psi (14 bar).

Required Volume (to shift spool full stroke):
- Hydraulic, 0.014 in³ (0.23 cm³);
- Air, 0.220 in³ (3.61 cm³).

## Minimum Pilot Pressure

<table>
<thead>
<tr>
<th>Series (Actuator Type)</th>
<th>Spool Type</th>
<th>5 U.S. gpm (19 L/min)</th>
<th>8 U.S. gpm (30 L/min)</th>
<th>15 U.S. gpm (57 L/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>psi</td>
<td>bar</td>
<td>psi</td>
</tr>
<tr>
<td>6800 Series (Hydraulic Piloted)</td>
<td>011, 2 or 2R</td>
<td>190</td>
<td>13,1</td>
<td>275</td>
</tr>
<tr>
<td></td>
<td>32 or 32R</td>
<td>150</td>
<td>10,3</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>150</td>
<td>10,3</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>130</td>
<td>9,0</td>
<td>165</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6900 Series (Air Piloted)</th>
<th>011</th>
<th>25</th>
<th>1,7</th>
<th>28</th>
<th>1,9</th>
<th>33</th>
<th>2,3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>21</td>
<td>1,4</td>
<td>22</td>
<td>1,5</td>
<td>24</td>
<td>1,7</td>
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<tr>
<td></td>
<td>3 or 4</td>
<td>25</td>
<td>1,7</td>
<td>28</td>
<td>1,9</td>
<td>34</td>
<td>2,3</td>
</tr>
<tr>
<td></td>
<td>011</td>
<td>23</td>
<td>1,6</td>
<td>40</td>
<td>2,8</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>25</td>
<td>1,7</td>
<td>28</td>
<td>1,9</td>
<td>33</td>
<td>2,3</td>
</tr>
</tbody>
</table>

1. The values listed are based on zero tank pressure. As back-pressure increases above zero, the minimum pilot pressure must be increased by the same amount.

## VALVE EFFICIENCY

D03 valves provide exceptionally low pressure drop, as shown in the performance curves.

### Determining Pressure Drop

The curves show typical resistance to flow for various spool types. The table identifies the proper pressure drop curve for each spool and flow path.

### An Example

In the table under spool Type 1, curve “C” is called out to determine the pressure drop for P→A. Looking at the curves, “C” indicates a drop of about 55 psi at 8 U.S. gpm (3.8 bar at 30 L/min).

To determine total “loop” drop, the individual pressure drops for P→A and B→T (or P→B and A→T) must be added.

## Flow Curve Reference

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>0</th>
<th>1</th>
<th>3</th>
<th>4</th>
<th>011</th>
<th>2</th>
<th>2R</th>
<th>32</th>
<th>32R</th>
<th>36</th>
<th>03</th>
</tr>
</thead>
<tbody>
<tr>
<td>P→A</td>
<td>B</td>
<td>C</td>
<td>B</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>P→B</td>
<td>B</td>
<td>C</td>
<td>B</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>A→T</td>
<td>E</td>
<td>F</td>
<td>F</td>
<td>E</td>
<td>C</td>
<td>C</td>
<td>E</td>
<td>G</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>B→T</td>
<td>E</td>
<td>F</td>
<td>F</td>
<td>E</td>
<td>C</td>
<td>C</td>
<td>F</td>
<td>E</td>
<td>G</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>P→T</td>
<td>–</td>
<td>D</td>
<td>–</td>
<td>–</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
INSTALLATION AND DIMENSIONS

Valve Mounting
The mounting surface drawing shows the minimum flush or raised surface required for the N.F.P.A. D03 (CETOP 3) pattern.
Port o-rings are included with all valves.
Mounting bolts must be ordered separately: 10-24 U.N.C. Threaded x 0.75 inch (19 mm), Grade 8 or better, four required. Recommended mounting torque is 65 lb-in (7.3 N-m).
See “Subplate and Bolt Kits” on page 5.

Solenoid Model Dimensions
Dimensions are shown for both AC and DC solenoids. DC configuration is shown printed in gray.
The overall length of a single solenoid model (not shown) is 6.78 inches (172.2 mm) AC and 7.39 inches (187.7 mm) DC.
Weight (Mass):
Single Solenoid, AC, 3.4 lb (1.5 kg); DC, 3.9 lb (1.8 kg).
Double Solenoid, AC, 4.0 lb (1.8 kg); DC, 5.3 lb (2.4 kg).

Explosion Proof Solenoids
"EP" solenoids with special enclosures are approved by UL and CSA for use in hazardous locations. Overall length of single solenoid models (not shown) is 8.23 inches (209.9 mm).
A kit with a spacer plate (part number KV00301065) is required when valves are mounted on manifolds, side outlet subplates or when used as a pilot valve.
Weight (Mass):
Single Solenoid, 8.3 lb (3.8 kg); Double Solenoid, 14.0 lb (6.4 kg).
**Manual Operated Models**

Manual models are lever actuated, with handle positioned in a choice of four positions on either port “A” or port “B” end of valve. To specify position, refer to “Typical Model Code” on page 6.

Valves can be mounted without removing nameplate; openings in the nameplate provide access to mounting holes in valve body.

Weight (Mass):
- 3.2 lb (1.5 kg).

**Hydraulic Pilot Operated**

Overall length of single actuator configuration (not shown) is 5.25 inches (133.4 mm).

Valves can be mounted without removing nameplate; openings in the nameplate provide access to mounting holes in valve body.

Weight (Mass):
- Single Actuator, 2.5 lb (1.1 kg);
- Double Actuator, 2.8 lb (1.3 kg).

**Air Piloted Models**

Overall length of single actuator configuration (not shown) is 5.56 inches (141.2 mm).

Valves can be mounted without removing nameplate; openings in the nameplate provide access to mounting holes in valve body.

Weight (Mass):
- Single Actuator, 2.3 lb (1.0 kg);
- Double Actuator, 2.5 lb (1.1 kg).

**D03 SUBPLATE AND BOLT KITS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P25-D03-38</td>
<td>Universal, 3/8 inch N.P.T.F.</td>
</tr>
<tr>
<td>P27-D03-8AE</td>
<td>Bottom Ports, No. 8 S.A.E.</td>
</tr>
<tr>
<td>PS027-D03-8AE</td>
<td>Side Ports, No. 8 S.A.E.</td>
</tr>
<tr>
<td>P25-BK-12</td>
<td>Four 10-24 U.N.C. Threaded x 0.75 inches (19.0 mm)</td>
</tr>
</tbody>
</table>
### PF3000 SERIES, 10 DESIGN

#### D03 PATTERN

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**Actuator**

- 1 Manual Lever
- 5 Solenoid Operated
- 8 Hydraulic Piloted
- 9 Air Piloted

**Valve Type**

- 6 Subplate Mounted Directional Control

**Valve Size**

- D03 N.F.P.A. D03 (CETOP 3) Mounting Pattern

**Internal Operator**

- 1 Two Position: Spring Offset (P→B), Actuator Offset (P→A)
- 2 Two Position: Spring Offset (P→A), Actuator Offset (P→B)
- 3 Two Position: Actuator Offset, Detented
- 4 Two Position: Spring Centered, Actuator Offset
- 5 Three Position: Spring Centered, Actuator Offset
- 6 Two Position: Spring Offset, Actuator Centered
- 7 Two Position: Detented (Manual Lever Only)

**Reverse Flow Option**

- R Reverse Flow (Code 4 and Code 6 Internal Operators Only)

**Solenoid Options**

- BH3A 3-pin Connector for single solenoid models on port ‘A’ end
- BH3B 3-pin Connector for single solenoid models on port ‘B’ end
- BH5A 5-pin Connector for single or double solenoid models on port ‘A’ end
- BH5B 5-pin Connector for single or double solenoid models on port ‘B’ end
- C CSA and UL Recognized Coils (Etched with Symbol)
- CG Cable Grip for .38 to .44 inch (9,5 to 11,1 mm) O.D. machine tool cable
- HT High Pressure Tank Port: 2300 psi (160 bar) maximum AC models; 3000 psi (210 bar) maximum DC models
- M Hand Actuated Manual Override
- SL Solenoid Lights (available 115DF AC only)
- T Terminal Strip

**TYPICAL MODEL CODE**

<table>
<thead>
<tr>
<th>6</th>
<th>5</th>
<th>4</th>
<th>0</th>
<th>D03</th>
<th>115DF</th>
<th>R</th>
<th>T</th>
<th>*</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
</table>

**Spools**

- 0
- 1
- 3
- 4
- 011
- 2
- 2R
- 32
- 32R
- 36
- 03

**Electrical Options**

**Standard AC Solenoids (Dual Frequency):**
- 24DF 24V/60Hz, 24V/50Hz
- 115DF 115V/60Hz, 110V/50Hz
- 230DF 230V/60Hz, 220V/50Hz
- 460DF 460V/60Hz, 440V/50Hz

**Standard DC Solenoids:**
- 12DC 12VDC
- 24DC 24VDC

**Plug-In Terminal AC Solenoids:**
- 115HA 115V/60Hz, 110V/50Hz
- 230HA 230V/60Hz, 220V/50Hz

**plug-In Terminal DC Solenoids:**
- 12HD 12VDC
- 24HD 24VDC

**Explosion-Proof AC Solenoids:**
- 115EP 115V/60Hz
- 110EP 110V/50Hz
- 220EP 220V/50Hz

**Explosion-Proof DC Solenoids:**
- 12EP 12VDC
- 24EP 24VDC

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1 Option not available with “EP” solenoid models.
2 Option not available with “Plug-In Terminal” solenoid models.
4 Available with 115DF solenoids only.

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1 Fits DIN Connector Standard 43650 Form A ("Hirschmann" type).