D05 Pattern
Directional Control Valves

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

D05 valves operate efficiently, with large internal flow passages and uniform flow areas throughout the body coring.

Low pressure drop is enhanced with the use of the Dynex standard subplate, which takes advantage of the valve's special double tank port design.

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

Mounting
Subplate, N.F.P.A. D05 (CETOP 5) pattern.

Actuator Options
6100 Series: Manual Lever;
6500 Series: Direct Solenoid;
6800 Series: Hydraulic Piloted;
6900 Series: Air Piloted.

Rated Flow
20 U.S. gpm (76 L/min) nominal. For maximum flows see “Valve Flow Capacity”.

Rated Pressure
5000 psi (350 bar).

Tank Port Pressure (Maximum)
Solenoid Actuated Models:
Standard, 1500 psi (70 bar);
High Pressure Option (“HT”), AC models, 2000 psi (140 bar);
DC models, 2500 psi (170 bar).
Hydraulic and air actuated models: 3000 psi (210 bar).

Response Time (Full Stroke)
Solenoid Energized:
AC, 10-20 ms; DC, 25-35 ms.
Spring Returned:
AC, 15-20 ms; DC, 30-40 ms.

Flow Capacity – Solenoid Models

Flow Curve Reference

<table>
<thead>
<tr>
<th>Operator Code</th>
<th>Solenoid Type</th>
<th>Spool Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>AC</td>
<td>N C – – – B B K K F</td>
</tr>
<tr>
<td></td>
<td>DC and “EP”</td>
<td>N D – – – B B J J G</td>
</tr>
<tr>
<td>3</td>
<td>AC</td>
<td>N E – – – B B K K F</td>
</tr>
<tr>
<td></td>
<td>DC and “EP”</td>
<td>N E – – – B B J J G</td>
</tr>
<tr>
<td>4 and 5</td>
<td>AC</td>
<td>N K N N A B B K K F</td>
</tr>
<tr>
<td></td>
<td>DC and “EP”</td>
<td>N N N N A B B J J G</td>
</tr>
<tr>
<td>6</td>
<td>AC</td>
<td>N K K M A B B K K F</td>
</tr>
<tr>
<td></td>
<td>DC and “EP”</td>
<td>N H M L A A B J J G</td>
</tr>
</tbody>
</table>

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:

This option is 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 internal operator and spool type. The letters in the “Flow Curve Reference” table identify the appropriate curve.
Lever Operated Models
Manual models are rated for 20 U.S. gpm (76 L/min) nominal flow at 5000 psi (350 bar). Higher flows may be possible with some models. Contact the Dynex sales department to discuss your application.

Pilot Operated Models
The nominal flow capacity for most pilot operated valves is 20 U.S. gpm (76 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, 0.018 in³ (0.30 cm³); Air, 0.640 in³ (10.49 cm³).

VALVE EFFICIENCY
D05 valves provide exceptionally low pressure drop, as shown in the performance curves. The values indicate typical performance using the Dynex standard subplate, which takes advantage of the valve’s special double tank port design.

Flow may be limited for certain spools. See “Flow Capacity” curves on page 2.

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 “D” is called out to determine the pressure drop for P→A. Looking at the curves, “D” indicates a drop of about 28 psi at 12 U.S. gpm (1.9 bar at 45 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.

Pressure Drop (ΔP)

Flow Curve Reference

<table>
<thead>
<tr>
<th>Flow Path</th>
<th>Spool Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>P→A</td>
<td>D D D D B C C D D D</td>
</tr>
<tr>
<td>P→B</td>
<td>D D D D B C C D D D</td>
</tr>
<tr>
<td>A→T</td>
<td>F H H G E H H F F G</td>
</tr>
<tr>
<td>B→T</td>
<td>F H H G E H H F F G</td>
</tr>
<tr>
<td>P→T</td>
<td>– – – A B B – – –</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.
**INSTALLATION AND DIMENSIONS**

**Valve Mounting**

D05 valves have a second “T” port into a common tank passageway, for lower pressure drop. The mounting surface drawing shows the standard N.F.P.A. pattern, with the optional second “T” port. Port o-rings are included with valves. Mounting bolts must be ordered separately: .250-20 U.N.C. Threaded x 1.00 inch (25.4 mm), Grade 8 or better, four required. Recommended mounting torque is 12 lb-ft (16 N•m).

**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 7.67 inches (194.8 mm) AC and 9.02 inches (229.11 mm) DC.

Weight (Mass):

- Single Solenoid, AC, 8.1 lb (3.7 kg);
- DC, 9.5 lb (4.3 kg).
- Double Solenoid, AC, 9.6 lb (4.4 kg);
- DC, 12.6 lb (5.7 kg).

See “Subplate and Bolt Kits” on page 5.

**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 9.31 inches (236.5 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, 15.7 lb (7.1 kg);
- Double Solenoid, 24.8 lb (11.2 kg).

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**Recommended Minimum Mounting Surface, N.F.P.A. D05 (CETOP 5) Pattern**

With Two Ports (T) Into Common Tank Passageway
**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.

The location of the handle can be changed by removing the bracket and handle assembly and rotating it to the desired position.

Weight (Mass):
7.8 lb (3.5 kg).

**Hydraulic Pilot Operated**

Overall length of single actuator configuration (not shown) is 6.60 inches (167.6 mm).

Weight (Mass):
- Single Actuator, 7.1 lb (3.2 kg);
- Double Actuator, 7.8 lb (3.5 kg).

**Air Piloted Models**

Overall length of single actuator configuration (not shown) is 7.13 inches (167.6 mm).

Weight (Mass):
- Single Actuator, 8.0 lb (3.6 kg);
- Double Actuator, 9.5 lb (4.3 kg).

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**D05 SUBPLATE AND BOLT KITS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subplates:</strong></td>
<td></td>
</tr>
<tr>
<td>P23-D05-.50</td>
<td>Bottom Ports, 1/2-14 N.P.T.F.</td>
</tr>
<tr>
<td>P28-D05-.75</td>
<td>Bottom Ports, 3/4-14 N.P.T.F.</td>
</tr>
<tr>
<td>P28-D05-SAE12</td>
<td>Bottom Ports, No. 12 S.A.E.</td>
</tr>
<tr>
<td>PS011-D05-.50</td>
<td>Side Ports, 1/2-14 N.P.T.F.</td>
</tr>
<tr>
<td>PS028-D05-.75</td>
<td>Side Ports, 3/4-14 N.P.T.F.</td>
</tr>
<tr>
<td>PS011-D05-SAE8</td>
<td>Side Ports, No. 8 S.A.E.</td>
</tr>
<tr>
<td>PS028-D05-SAE12</td>
<td>Side Ports, No. 12 S.A.E.</td>
</tr>
<tr>
<td><strong>Bolt Kit:</strong></td>
<td></td>
</tr>
<tr>
<td>P22-BK</td>
<td>Four .250-20 U.N.C. Threaded x 1.00 inch (25.4 mm)</td>
</tr>
</tbody>
</table>

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**D05 PATTERN**
**Typical Model Code**

- **Valve Type**: 
  - 6: Subplate Mounted Directional Control

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

- **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 (Manual Lever Only) 
  - 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)

- **Spools**: 
  - 0: A
  - 1: B
  - 2: A
  - 3: B
  - 4: A
  - 5: B
  - 6: A
  - 7: B

- **Valve Size**: 
  - D05 (CETOP 5) Mounting Pattern

- **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

- **Electrical (Solenoid 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

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

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

- **Electrical (Solenoid Options)**: 
  - Standard DC Solenoids: 
    - 12DC: 12VDC
    - 24DC: 24VDC
    - 250DC: 250VDC

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

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

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1. Only available with Type 0, 1 and 03 spools.
3. Option not available with “EP” solenoid models.
4. Option not available with “Plug-In Terminal” solenoid models.
5. Not available with Type 3 Internal Operators (except Manual Lever models).
6. Closed Crossover.
7. Fits DIN Connector Standard 43650 Form A ("Hirschmann" type).