

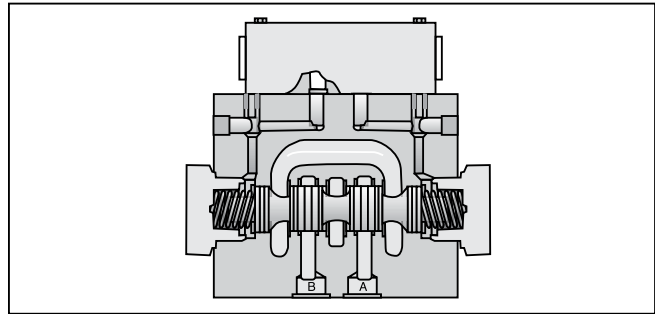
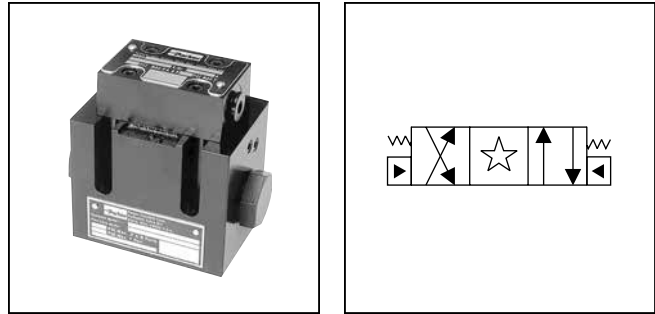
## General Description

**A**

Series D3\*P directional control valves are 5-chamber, oil pilot operated valves. The valves are suitable for manifold or subplate mounting.

## Features

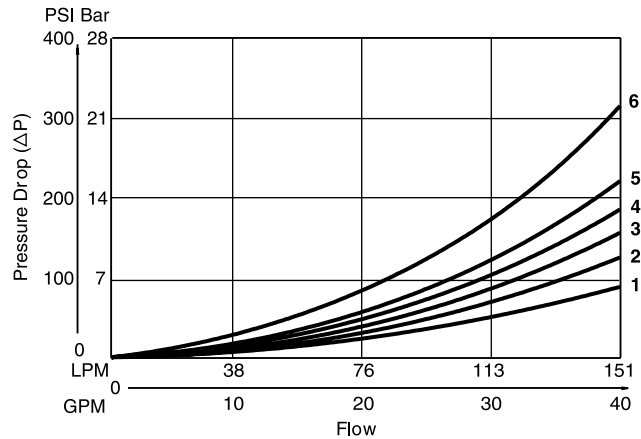
- **World design** – Available worldwide.
- **Mounting bolts below center line of spool** – Minimizes spool binding.
- **High pressure and flow ratings** – Increased performance options in a compact valve.



## Specifications

<b>Mounting Pattern</b>	NFPA D05H , CETOP 5 NFPA D05HE, CETOP 5H
<b>Max. Operating Pressure</b>	345 Bar (5000 PSI)
<b>Max. Tank Line Pressure</b>	207 Bar (3000 PSI)
<b>Pilot Pressure</b>	Oil Min: 6.9 Bar (100 PSI) Oil Max: 345 Bar (5000 PSI)
<b>Response Time</b>	Varies with pilot line size and length, pilot pressure, pilot valve shift time & flow capacity (GPM)

## Pressure Drop Chart



Spool No.	Shifted				Center Condition							
	P-A	P-B	B-T	A-T	(P-T)	(B-A)	(A-B)	(P-A)	(P-B)	(A-T)	(B-T)	
1	3	3	2	1	-	-	-	-	-	-	-	
2	3	3	1	1	3	3	3	4	4	1	1	
4	3	3	1	1	-	-	-	-	-	1	1	
9	3	3	1	1	6	-	-	-	-	-	-	
20	5	4	2	2	-	-	-	-	-	-	-	
30	4	3	1	1	-	-	-	-	-	-	-	

Viscosity (SSU)	75	150	200	250	300	350	400
% of ΔP (Approx.)	93	111	119	126	132	137	141

Curves were generated using 100 SSU hydraulic oil. For any other viscosity, pressure drop will change as per chart.

## D3P Pressure Drop vs. Flow

The chart to the left provides the flow vs. pressure drop curve reference for the D3P Series valves by spool type.

### Example:

Find the pressure drop at 76 LPM (20 GPM) for a D3P with a number 1 spool. To the right of spool number 1, locate the number 3 in the P-A column, and 2 in the B-T column.

Using the top graph, locate curves 2 and 3 and read the pressure drop values. Total pressure drop through the valve is the sum of the two values.

**Ordering Information**

<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">D</div> <p>Directional Control Valve</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> </div> <p>Basic Valve</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">P</div> <p>Hydraulic Pilot</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> </div> <p>Spool</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> </div> <p>Style</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> </div> <p>Pilot Supply and Drain</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> </div> <p>Seal</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> </div> <p>Valve Variations</p>	<div style="border: 1px solid black; padding: 2px; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> </div> <p>Design Series</p> <p>NOTE: Not required when ordering.</p>
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>3D</td> <td>NFPA D05HE, CETOP 5H</td> </tr> <tr> <td>3</td> <td>NFPA D05H, CETOP 5</td> </tr> </tbody> </table>	Code	Description	3D	NFPA D05HE, CETOP 5H	3	NFPA D05H, CETOP 5	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Symbol</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> </tr> <tr> <td>2</td> <td></td> </tr> <tr> <td>4</td> <td></td> </tr> <tr> <td>8**</td> <td></td> </tr> <tr> <td>9*</td> <td></td> </tr> <tr> <td>20**</td> <td></td> </tr> <tr> <td>30*</td> <td></td> </tr> </tbody> </table> <p>* 9 and 30 spools have open crossover.  ** 8 and 20 spools have closed crossover.</p>	Code	Symbol	1		2		4		8**		9*		20**		30*		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>N</td> <td>Nitrile</td> </tr> <tr> <td>V</td> <td>Fluorocarbon</td> </tr> </tbody> </table>	Code	Description	N	Nitrile	V	Fluorocarbon	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>Ext. pilot/Ext. drain</td> </tr> <tr> <td>5#</td> <td>Ext. pilot/Int. drain</td> </tr> </tbody> </table> <p># Available on "B" and "H" styles only.</p>	Code	Description	2	Ext. pilot/Ext. drain	5#	Ext. pilot/Int. drain	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code</th> <th style="text-align: left;">Description</th> <th style="text-align: left;">Symbol</th> </tr> </thead> <tbody> <tr> <td>B†</td> <td>Single operator, 2 position, spring offset. P to A and B to T in offset position.</td> <td></td> </tr> <tr> <td>C</td> <td>Double operator, 3 position, spring centered.</td> <td></td> </tr> <tr> <td>H†</td> <td>Single operator, 2 position, spring offset. P to B and A to T in offset position.</td> <td></td> </tr> </tbody> </table> <p>† Only spools 20 and 30.  This condition varies with spool code.</p>	Code	Description	Symbol	B†	Single operator, 2 position, spring offset. P to A and B to T in offset position.		C	Double operator, 3 position, spring centered.		H†	Single operator, 2 position, spring offset. P to B and A to T in offset position.	
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**Valve Weight:**  
Single Operator 1.4 kg (3.0 lbs.)  
Double Operator 1.6 kg (3.5 lbs.)

**Standard Bolt Kit:** BK98

**Metric Bolt Kit:** BKM98

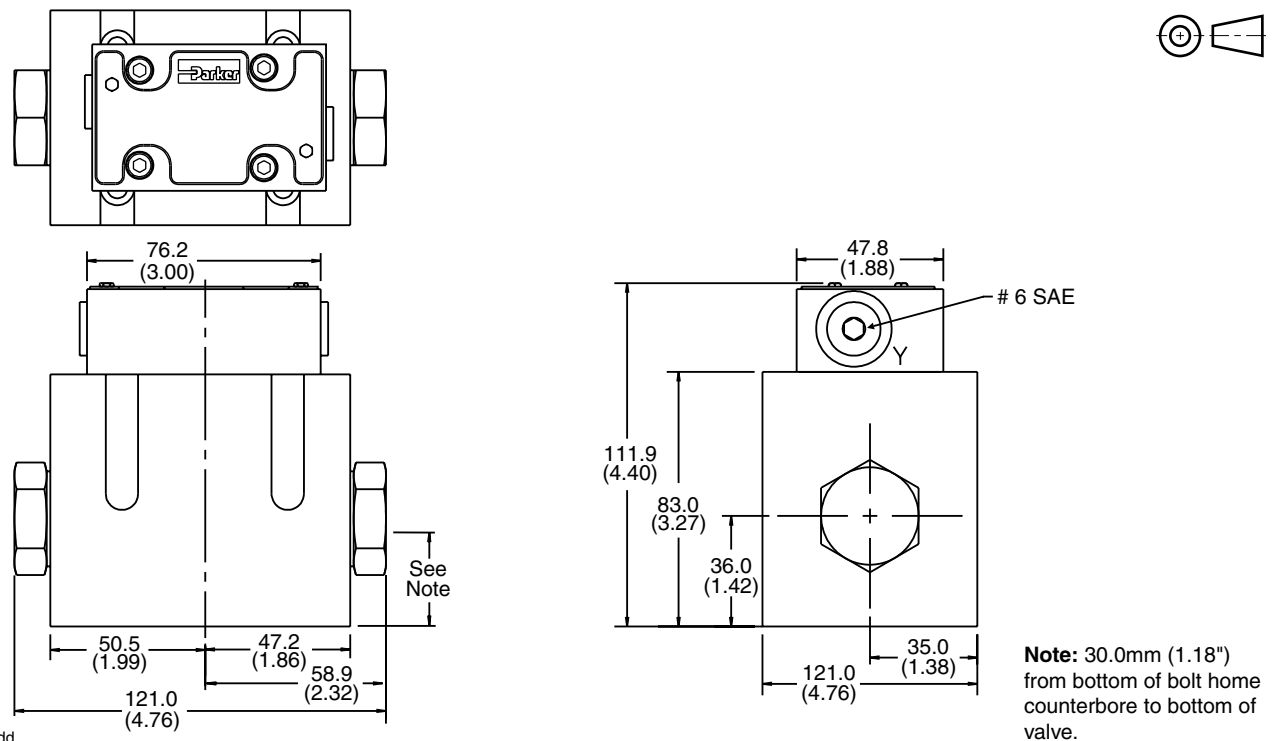
**Seal Kit:**  
Nitrile SKD3P  
Fluorocarbon SKD3PV

Valve schematic symbols are per NFPA/ANSI standards, providing flow P to A when energizing operator X. Note operators reverse sides for #8 and #9 spool. See installation information for details.

**Bold: Designates Tier I products and options.**

**Non-Bold: Designates Tier II products and options. These products will have longer lead times.**

**Dimensions – Oil Operated** Inch equivalents for millimeter dimensions are shown in (\*\*)



**Note:** 30.0mm (1.18") from bottom of bolt home counterbore to bottom of valve.

D31.indd, dd



FOR MAXIMUM VALVE RELIABILITY, ADHERE TO THE FOLLOWING INSTALLATION INFORMATION.

The following is important installation information which applies to all directional control valves described in this catalog.

**Mounting Position**

- Detent – Horizontal
- Spring Offset – Unrestricted
- Spring Centered – Unrestricted

**Fluid Recommendations**

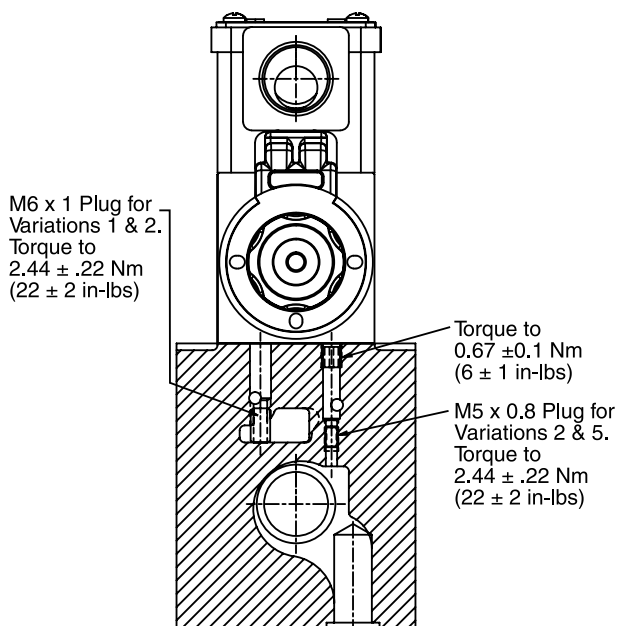
Premium quality hydraulic oil with a viscosity range between 32-54 cst. (150-250 SSU) At 38°C (100°F) is recommended. The absolute operating viscosity range is from 16-220 cst. (80-1000 SSU). Oil should have maximum anti-wear properties and rust and oxidation treatment.

**Fluids and Seals**

Valves using synthetic, fire-resistant fluids require special seals. When phosphate esters or its blends are used, FLUOROCARBON seals are required. Water-glycol, water-in-oil emulsions and petroleum oil may be used with STANDARD seals.

**Filtration**

For maximum valve and system component life, the system should be protected from contamination at a level not to exceed 125 particles greater than 10 microns per milliliter of fluid (SAE class 4/ISO 16/13).



**Silting**

Silting can cause any sliding spool valve to stick and not spring return if held under pressure for long periods of time. The valve should be cycled periodically to prevent sticking.

**Special Installations**

Consult your Parker representative for any application requiring the following:

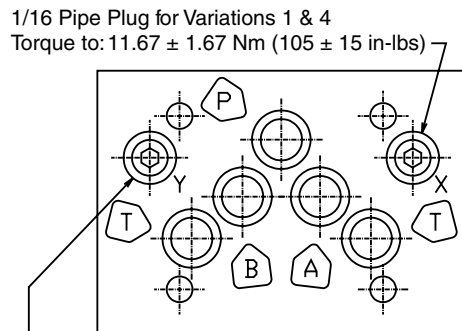
- Pressure above rating.
- Fluid other than those specified.
- Oil temperature above 71.1°C (160°F).
- Flow path other than normal.

**Mounting Patterns**

Series	NFPA	Size
D31V*, D3P	D05H, CETOP 5	3/8"
D31D*, D3DP, D31NW	D05HE, CETOP 5H	3/8"

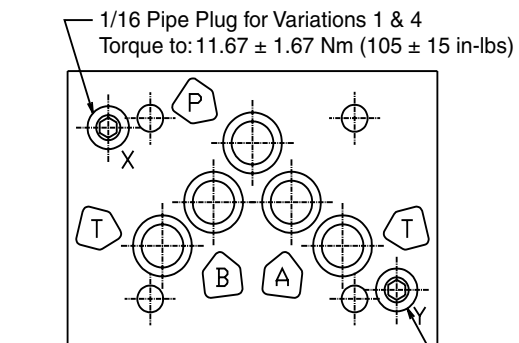
**Torque Specifications**

The recommended torque values for the bolts which mount the valve to the manifold or subplate are as follows: 16.3 Nm (12 ft-lb).



1/16 Pipe Plug for Variations 4 & 5  
Torque to: 11.67 ± 1.67 Nm (105 ± 15 in-lbs)

**NFPA D05HE, CETOP 5H Pattern D31DW**



1/16 Pipe Plug for Variations 4 & 5  
Torque to: 11.67 ± 1.67 Nm (105 ± 15 in-lbs)

**NFPA D05H, CETOP 5 Pattern D31VW**

**SERIES D31\*W, D31\*A, D31\*L**  
**PILOT OPERATED,**  
**DIRECTIONAL CONTROL VALVES**

**Tank and Drain Line Surges**

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. No spring style valves are most susceptible to this. Separate tank and drain lines should be piped in installations where line surges are expected.

**Electrical Failure or  
 Loss of Pilot Pressure (D31\*A)**

Should electric power fail or loss of pilot pressure occur, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

**Electrical Characteristics  
 (Detented Spool)**

Only a momentary energizing of the solenoid is necessary to shift and hold a detented spool. Minimum duration of the signal is 0.1 seconds for DC voltages. For AC voltages the response time is 0.06 seconds. Spool position will be held provided the spool centerline is in a horizontal plane, and no shock or vibration is present to displace the spool.

**Pilot/Drain Characteristics**

**Pilot Pressure:** 6.9 to 345 Bar (100 to 5000 PSI)

**External:** An oil source sufficient to maintain minimum pilot pressure must be connected to the “X” port of the main body. When using the external pilot variation, an M5 x 0.8 x 6mm long set screw must be present in the

main body pilot passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with pilot code 2 or 5.

**Internal:** Flow is internally ported from the pressure port of the main valve body to the “P” port of the pilot valve. The pressure developed at the “P” port of the pilot valve must be 100 PSI (6.9 Bar) minimum at all times.

If the valve center condition allows flow from pressure to tank, 100 PSI (6.9 Bar) back pressure must be developed in the tank line to ensure sufficient pilot force at “P”. The “X” port in subplate must be plugged when using internal pilot variation (1/16 NPT).

**Pilot Valve Drain:**

Maximum pressure 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional.

**External:** When using an external drain, an M6 x 1 x 10mm long set screw must be present in the main body drain passage. (For details see Dimension pages.) This plug will be furnished in valves ordered with drain code 1 or 2.

Drain flow from the pilot valve is at the “Y” port of the main body and must be piped directly to tank. Maximum drain line pressure is 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional. Any drain line back pressure is additive to the pilot pressure requirement.

**Internal:** Drain flow from the pilot valve is internally connected to the main valve tank port. Tank and drain pressure are then identical so tank line pressure should not exceed 102 Bar (1500 PSI), 207 Bar (3000 PSI) optional. Any tank line back pressure is also additive to the pilot pressure requirement. If flow surges (a cause of pressure surges) are anticipated in the tank line, an external drain variation is recommended. The “Y” port in subplate must be plugged when using internal drain variations.

**D31\*W, D31\*A, D31\*L Flow Paths**

Style Code	Description	No Solenoid/Operator Energized	Solenoid/Operator A Energized	Solenoid/Operator B Energized
B	Spring Offset	P→A and B→T	—	P→B and A→T
C	Spring Centered	Centered	P→A and B→T	P→B and A→T
D	Detented	Last Position Held	P→A and B→T	P→B and A→T
E	Spring Centered	Centered	—	P→B and A→T
F†	Spring Offset, Shift to Center	P→A and B→T	—	Centered
H	Spring Offset	P→B and A→T	P→A and B→T	—
K	Spring Centered	Centered	P→A and B→T	—
M†	Spring Offset, Shift to Center	P→B and A→T	Centered	—

† D31\*W only.

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**A**

**SERIES D3P, D3DP PILOT OPERATED  
 DIRECTIONAL CONTROL VALVES**

**Tank and Drain Line Surges**

If several valves are piped with a common tank or drain line, flow surges in the line may cause an unexpected spool shift. Separate tank and drain lines should be piped in installations where line surges are expected.

**Loss of Pilot Pressure**

Should oil pilot pressure fail, spring offset and spring centered valves will shift to the spring held position. Detented valves will stay in the last position held before power failure. If main flow does not fail or stop at the same time power fails, machine actuators may continue to function in an undesirable manner or sequence.

**Mounting Pattern**

D3P valves may be mounted on a standard D05 pattern subplate or manifold only if the “X” and “Y” ports are externally connected to the pilot block on top of the main body. All other mounting styles require a D05H or D05HE pattern which incorporates ports for the “X” and “Y” pilot and drain passages. Location of these ports can be found on the Recommended Mounting Surface pages in this section.

**Pilot Drain Characteristics**

Pilot Pressure: 6.9 to 345 Bar (100 to 5000 PSI)

Direct pilot operated valves use the “X” and “Y” ports to supply pilot oil directly to the ends of the spool, providing spool shifting force. A block mounted on top of the valve body is internally cored to make the necessary connections. Thus when “X” is pressurized, “Y” is used as a drain; and when “Y” is pressurized, “X” becomes the drain.

Any back pressure in these lines when they are being used as a drain is additive to the pilot pressure requirement.

**Internal Drain:** On spring offset models, only the “X” port is pressurized, as the spring returns the spool to its at rest position. On these models, “Y” may be internally drained through the main tank passage in the valve.

**D3P Flow Path/Pilot Pressure**

Style Code	Description	“X” & “Y” De-Pressurized	“X” Port Pressurized	“Y” Port Pressurized	Special Notes	Recommended Control Valve For Pilot Oil
B	Two Position Spring Offset	P→A, B→T	P→A, B→T	P→B, A→T	“X” Port may be pressurized to assist spring in returning spool to offset position (ext. only)	
C	Three Position Spring Centered	Center	P→A, B→T	P→B, A→T	Flow paths will be reversed on valves with tandem center (8) spools	
H	Two-Position Spring Offset	P→B, A→T	P→A, B→T	P→B, A→T	“Y” Port may be pressurized to assist spring in returning spool to offset position	

**Series D31VW, D31VA, D31VL, D3P**  
**Subplate Mounting**  
**NFPA D05H, CETOP 5**

**Recommended Mounting Surface**

Surface must be flat within .102 mm (0.0004 inch) T.I.R and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 16.3 Nm (12 ft-lbs).

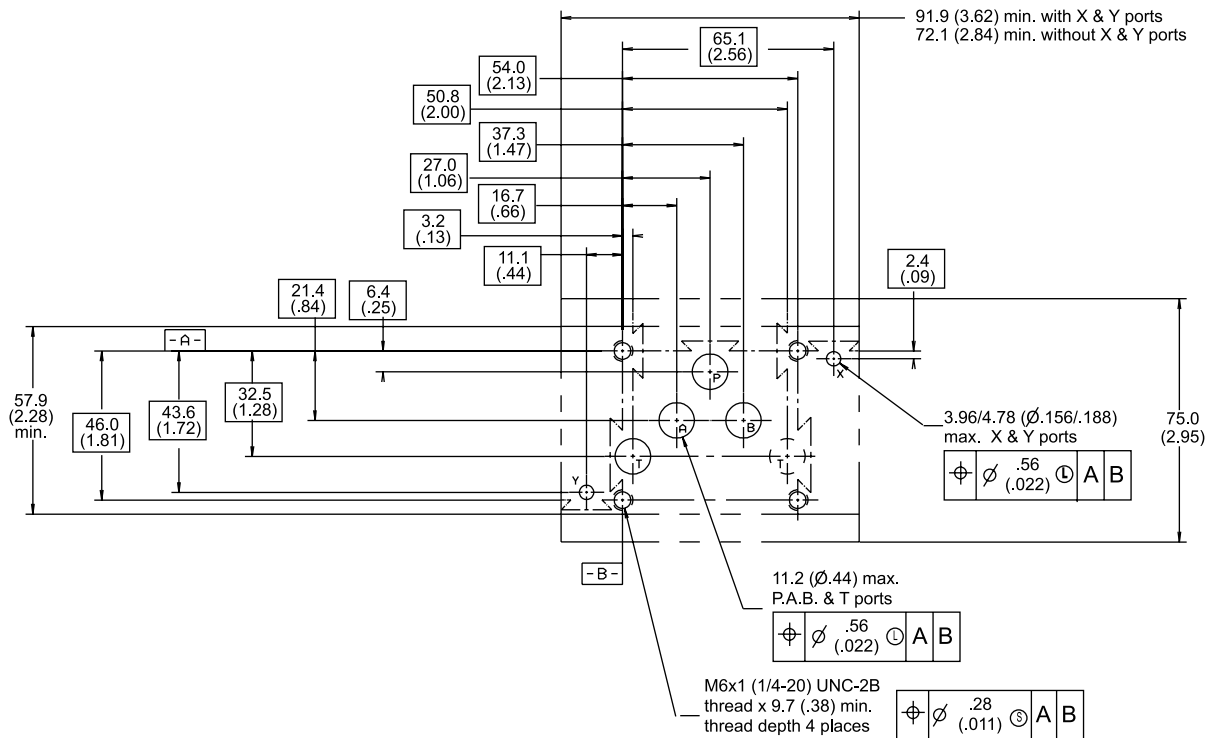
**Mounting Position**

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

***For maximum valve reliability, adhere to the following installation information.***

**Mounting Pattern — NFPA D05H, CETOP 5**

Inch equivalents for millimeter dimensions are shown in (\*\*)



**Series D31DW, D31DA, D31DL, D3DP, D31NW**  
**Subplate Mounting**  
**NFPA D05HE, CETOP 5H**

**A**

**Recommended Mounting Surface**

Surface must be flat within .102 mm (0.0004 inch) T.I.R. and smooth within 812.8 micro-meters (32 micro-inch). Torque bolts to 16.3 Nm (12 ft-lbs).

**Mounting Position**

Valve Type	Mounting Position
Detent (Solenoid)	Horizontal
Spring Offset	Unrestricted
Spring Centered	Unrestricted

***For maximum valve reliability, adhere to the following installation information.***

**Mounting Pattern — NFPA D05HE, CETOP 5H**

Inch equivalents for millimeter dimensions are shown in (\*\*)

