

Vickers®

## Directional Controls



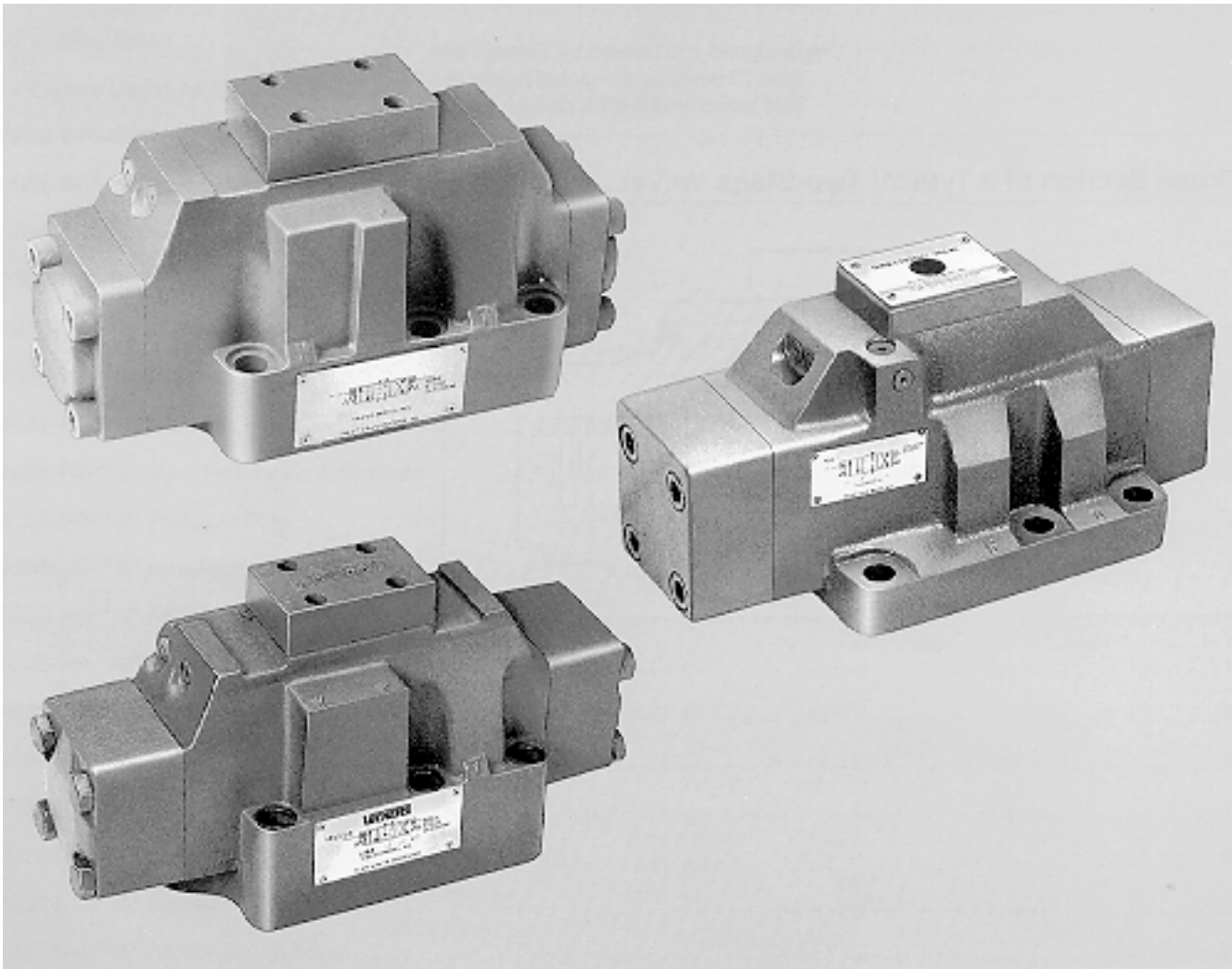
### Remote Operator Directional Control Valves

NFPA D08/D10, ISO-4401-08/10

DG3S-8-\*\*X-\*\*-10

DG3S-H8-\*\*X-\*\*-2\*

DG3S4-10\*\*X-\*\*-5\*



**VICKERS**

Revised 3/99

670

# Introduction

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## General Description

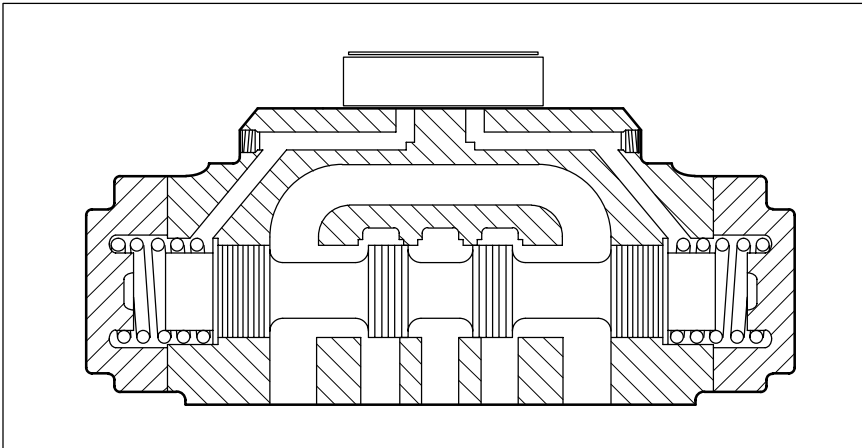
These valves are generally used to control the direction of flow in a hydraulic circuit. This, in turn, would control the direction of movement of a hydraulic cylinder, or the rotation of a fluid motor.

- DG3S-8 Remote Pilot
- DG3S-H8 Remote Pilot (high flow)
- DG3S4-10 Remote Pilot

## Features and Benefits

- Suitable for the most demanding industrial applications with flow capacities up to 946 l/min (250 USgpm) and rated pressure of 310 bar (4500 psi).
  - Available with a wide variety of spool and spring arrangements, stroke and pilot choke adjustments, integral check valves, and port orifices.
  - Solid cast body and core passages for maximum strength and minimal pressure drop.
  - Designed and backed by Vickers, with over 70 years as the global leader in fluid power and motion control.
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## Cross Section of a Typical Two-Stage Valve



# Contents

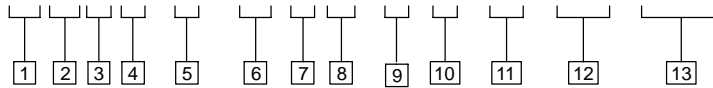
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# DG3S-8 Model Code

## Remote Pilot Directional Valves

**D G 3 S - 8 - \* \* \* X - \* - \* - 10 - LH - S557**



**1 Directional Control**

**2 Mounting Type**

G - Manifold or Subplate

**3 Valve Operator**

3 - Remote operated

**4 Sliding Spool**

**5 Valve Size**

8 - ISO-4401-08, NFPA-D08 interface

**6 Spool Type**

0, 2, 3, 4, 6, 8, 9, 11, 31, 33  
(See flow rating tabulation for description)

**7 Spool/Spring Arrangement**

A - Spring offset  
C - Spring centered  
D - Pressure centered  
Blank - Omit for no-spring models

**8 Fast Response**

(omit for standard low shock models)

**9 Spool Control Modifications**

1 - Stroke adjustments both ends. (except A models)  
2 - Pilot choke adjustments  
3 - Pilot choke and stroke adjustments  
7 - Stroke adjustment - port A end only (for right hand models)  
8 - Stroke adjustment - port B end only (for left hand models)  
Blank - Omit when not required.

**10 Check Valve**

(in pressure port)

K - 0,35 bar (5 psi)  
R - 3,45 bar (50 psi)  
S - 5,20 bar (75 psi)  
Blank - Omit when not required.

**11 Design Number**

Subject to change. Installation dimensions remain as shown for design numbers 10 through 19.

**12 Spring Offset Model**

LH - Offset to B  
Blank - Omit for offset to A models shown.

**13 Special Feature**

S557 Anti-spin feature for type 4 & 8 spools.

### DG3S-8 Pilot Pressure

Valve Type	Spool Type	Minimum Pilot Pressure Required	
		For Recommended Flow at System Pressure up to 210 bar (3000 psi)	For Maximum Flow at System Pressure up to 210 bar (3000 psi)
Spring Centered	0, 1, 4, 8, 9 & 11	5 (75)	5 (75)
No-Spring	2, 3, 6, 31 & 33	8 (120)	10 (150)
Pressure Centered	0, 1, 4, 8, 9 & 11	P → A 5 (75) P → B 10 (150)	P → A 5 (75) P → B 10 (150)
	2, 3, 6, 31 & 33	P → A 8 (120) P → B 16 (240)	P → A 10 (150) P → B 20 (300)
Spring Offset	0, 9	5 (75)	5 (75)
	2, 6 & 33	8 (120)	10 (150)

Minimum pilot pressure required at zero flows (all spools): 5 bar (75 psi)

# General Information

These directional controls are single stage, remote pilot operated valves. They are generally used to control the direction of flow in a hydraulic circuit. This would control the movement of a work cylinder or the rotation of a fluid motor.

## DG3S-8 Basic Characteristics

Max. pressure: . . . . 210 bar (3000 psi)  
Max. flow: 380 l/min (100 USgpm)  
Max. pressure ports P, A & B:  
..... 210 bar (3000 psi)  
Max. pilot pressure:  
..... 210 bar (3000 psi)  
Max. pressure port T:  
..... 210 bar (3000 psi)  
Weight:  
DG3S-8-\*C-3-10 13,0 kg (29 lbs)  
w/pilot choke 14,0 kg (31.5 lbs)  
w/1 stroke adj. 13,8 kg (30.5 lbs)  
w/2 stroke adj. 14,5 kg (32 lbs)  
w/pilot choke & stroke  
15,5 kg (34.5 lbs)  
DG3S-8-\*A-10 13,6 kg (30 lbs)  
DG3S-8\*D-10 15 kg (33 lbs)

## DG3S-H8 Basic Characteristics

Max. pressure: 210 bar (3000 psi)  
Max. flow: 530 l/min (140 USgpm)  
Max. pressure ports P, A & B:  
..... 310 bar (4500 psi)  
Max. pilot pressure:  
..... 310 bar (4500 psi)  
Min. pilot pressure: 5 bar (25 psi)  
is required for all spools at zero flow.  
Max. pressure port T:  
..... 310 bar (4500 psi)  
Weight:  
DG3S-H8-\*C-3-20 15 kg (33 lbs)  
w/ pilot choke 16,1 (35.5 lbs)  
w/1 stroke adj. 15,5 kg (34 lbs)  
w/2 stroke adj. 15,9 kg (35 lbs)  
w/pilot choke & stroke  
17,9 kg (39.5 lbs)  
DG3S-H8-\*A-10 15,9 kg (35 lbs)

### Mounting Interface

ISO 4401-08  
NFPA D08  
CETOP 8

## DG3S4-10 Basic Characteristics

Max. pressure: 210 bar (3000 psi)  
Max. flow: 946 l/min (250 USgpm)  
Max. pressure port T:  
..... 210 bar (3000 psi)  
Max. pilot pressure:  
..... 210 bar (3000 psi)  
Weights:  
- spring centered: 40,4 kg (89 lbs.)  
- spring offset: 43,1 kg (95 lbs.)  
- pressure centered: 44 kg (97 lbs.)  
- pilot choke: 42 kg (92 lbs.)  
- (Subplate): 17,2 kg (38 lbs.)  
Fluid Cleanliness: See page 27.

### Mounting Interface

ISO 4401-10  
NFPA D10

## Optional Features

### • Pressure Centered Valves - See pages 12 & 25

Pilot pressure is not available through use of an integral check valve. Pressure centered valves have a drain port "W" and must be used with subplate DGAM-06-D-50.

This option provides more positive centering through greater force. Centering springs are used, in addition to pilot pressure, to ensure centering (flow must be within the spring centered ratings) should pilot pressure fail. Springs can be removed by the user if not wanted. Connect pressure centered drain port directly to the reservoir through a surge free line so there will be no back pressure at this drain.

### NOTE

Pressure centered valves require a pilot oil to connections "X" and "Y" of this valve at the same time pressure centering is desired. The centering time depends on the rate at which the pilot oil reaches the pilot chambers.

### • Integral Check Valves

(In pressure port): For pilot pressure - 3,5 bar (50 psi) cracking pressure. This back pressure will be present at the cylinder ports, if spool is "0" to "9" type. For preventing reverse flow, other than leakage, in clamp circuits - 0,34 bar (5 psi) cracking pressure. Order according to the model code.

### • Adjustment Options - See pages 12, 18 & 25

### • Fast Response

Use of this option decreases the shift time and increases the system shock generation. Available by adding the symbol "X" to model code (example: DG3S-(H)8-2CX-10). See shift time curves for fast response times.

Because of the high drain line pressure transients generated during shifting, use of fast response option is not recommended for pilot pressures exceeding 140 bar (2000 psi).

### NOTE

Any sliding spool valve, if held for long periods of time, may stick and not spring return due to fluid residue formation and therefore, should be cycled periodically to prevent this from happening.

## Mounting Position

No-spring type valves must be installed with the longitudinal axis horizontal for good machine reliability. The mounting position of spring-centered and spring-offset models is unrestricted provided that the pilot pressure is maintained as required.

## Installation Data

Drain connection must be piped directly to tank through a surge free line so there will be no back pressure at this port.

## Shifting Action

Spring centered, pressure centered and spring offset models require continuous pilot pressure to maintain shifted position. Spring centered models return valve spool to center position by centering springs when pilot pressure fails or falls below minimum requirement.

Spring offset model has an internal spring which returns the spool to offset position when the pilot connection "X" is open to tank. Pilot connection "Y" becomes a drain connection and must be piped directly to tank at atmospheric pressure through a surge-free tank line. Back pressure at this connection would cause valve to malfunction.

When pilot pressure is removed on no-spring models, the spool remains in the last position attained provided there is no unusual shock, vibration, pressure transients and the spool axis is horizontal.

Port connections are made by mounting the valves on a subplate or manifold having mounting dimensions which conform to NFPA-D08/D10 (ISO-4401-08/10) pattern.

## Caution

Surges of oil in a common pilot valve drain line serving these and other valves can be of sufficient magnitude to cause inadvertent shifting of these valves. This is particularly critical in the no-spring type valves. Separate drain lines or a vented drain manifold with a continuous downward path to tank is necessary. This applies to connection "Y" on spring offset valves where "Y" is piped as a drain for pressure centered models. Drain connection "W" must be piped directly to tank through a surge free line so there will be no back pressure at this drain.

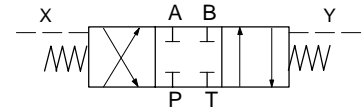
## Service Literature

Refer to specific Vickers parts drawing for service parts information. A complete parts breakdown is contained in these drawings.

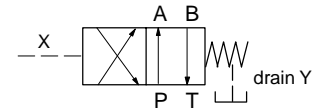
Order by literature number.

DG3S-8-*D*-10	I-3436-S
DG3S-8-*A*-10	I-3437-S
DG3S-8-*C*-10	I-3438-S
DG3S-H8-*A*-20	I-3443-S
DG3S-H8-*C*-20	I-3444-S
DG3S4-10*A(X)-5*	I-3563-S
DG3S4-10*C(X)-5*	I-3626-S
DG3S4-10*D*-5*	I-3569-S

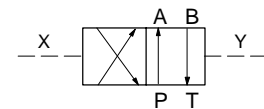
### Spring Centered C



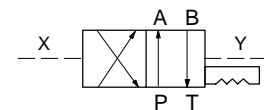
### Spring Offset A



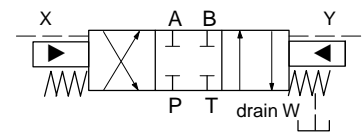
### No-Spring



### No-Spring Detented (DG3S-H8 only)



### Pressure Centered D



# DG3S-8-\*\*-10 Max. Flow Ratings & Graphical Symbols

Spring Centered ▼ -C-	Spring Offset ▼ -A-	No-Spring Detented ▼	Pressure Centered ▼ -D-	Standard Spool Types		Recommended Flow Capacity at 207 bar (3000 psi)
All Spools	0, 2, 6, 9 & 33	0, 2, 6, 9 & 33	All Spools	Center Position & Spool Type	Description Center Position	l/min (USgpm)
DG3S-8-0C-10	DG3S-8-0A-10	DG3S-8-0-10	DG3S-8-0D-10	"0" 	Opens to T all ports	170 (45)
DG3S-8-1C-10	-	-	DG3S-8-1D-10	"1" 	Open P & A to T Closed B	170 (45)
DG3S-8-2C-10	DG3S-8-2A-10	DG3S-8-2-10	DG3S-8-2D-10	"2" 	Closed to T all ports	170 (45)
DG3S-8-3C-10	-	-	DG3S-8-3D-10	"3" 	Closed P & B Open A to T	170 (45)
DG3S-8-4C-10	-	-	DG3S-8-4D-10	"4" 	Tandem P to T Closed Crossover	170 (45)
DG3S-8-6C-10	DG3S-8-6A-10	DG3S-8-6-10	DG3S-8-6D-10	"6" 	Closed P only Open A & B to T	95 (25) - A 170 (45) - C & D
DG3S-8-8C-10 <sup>†</sup>	-	-	DG3S-8-8D-10	"8" 	Tandem P to T Open Crossover	170 (45)
DG3S-8-9C-10	DG3S-8-9A-10	DG3S-8-9-10	DG3S-8-9D-10	"9" 	Open to T all ports Over Tapers	133 (35) - A & C 170 (45) - D
DG3S-8-11C-10	-	-	DG3S-8-11D-10	"11" 	Open P & B to T Closed A	170 (45)
DG3S-8-31C-10	-	-	DG3S-8-31D-10	"31" 	Closed P & A open B to T	170 (45)
DG3S-8-33C-10	DG3S-8-33A-10	DG3S-8-33-10	DG3S-8-33D-10	"33" 	Closed P Open A & B to T Over Tapers	95 (25) - A 170 (45) - C & D

▼ See Direction of Flow Chart, next page.

→ Full flow

→ Restricted flow

<sup>†</sup> Fast valve switching of large oil volumes, without adequate decompression circuitry, can develop instantaneous flows well above the maximum ratings. The type eight (8) spool may spin within the body, causing unusual valve body wear when applied in this type of circuit. With this and other spool types, valve malfunction might occur. Where these applications exist use the DG3S-8-10-S557 special designator for the 4C and 8C anti-spin spools/spring.

# DG3S-8-\*\*-10 Flow Ratings












Model Code	70 bar (1000 psi)			140 bar (2000 psi)			210 bar (3000 psi)		
	Model -C-	Model -A-	Model D & No-Spring	Model -C-	Model -A-	Model D & No-Spring	Model -C-	Model -A-	Model D & No-Spring
	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)
DG3S-8-0C-10 DG3S-8-0A-10 DG3S-8-0-10 DG3S-8-0D-10	380 (100)	380 (100)	380 (100)	380 (100)	380 (100)	380 (100)	380 (100)	380 (100)	380 (100)
DG3S-8-1C-10 DG3S-8-1D-10	303 (80)	–	380 (100)	303 (80)	–	380 (100)	303 (100)	–	380 (100)
DG3S-8-2C-10 DG3S-8-2A-10 DG3S-8-2-10 DG3S-8-1D-10	380 (100)	227 (60)	380 (100)	380 (100)	227 (60)	380 (100)	380 (100)	227 (60)	380 (100)
DG3S-8-3C-10 DG17S-8-3D-10	380 (100)	–	380 (100)	380 (100)	–	380 (100)	380 (100)	–	380 (100)
DG3S-8-4C-10 DG3S-8-4D-10	303 (80)	–	380 (100)	303 (80)	–	380 (100)	303 (80)	–	380 (100)
DG3S-8-6C-10 DG3S-8-6A-10 DG3S-8-6-10 DG3S-8-6D-10	380 (100)	114 (30)	380 (100)	380 (100)	95 (25)	380 (100)	380 (100)	95 (25)	380 (100)
DG3S-8-8C-10 DG3S-8-8D-10	303 (80)	–	380 (100)	303 (80)	–	380 (100)	303 (80)	–	380 (100)
DG3S-8-9C-10 DG3S-8-9A-10 DG3S-8-9-10 DG3S-8-9D-10	133 (35)	190 (50)	380 (100)	133 (35)	133 (35)	380 (100)	133 (35)	133 (35)	380 (100)
DG3S-8-11C-10 DG3S-8-11D-10	303 (80)	–	380 (100)	303 (80)	–	380 (100)	303 (80)	–	380 (100)
DG3S-8-31C-10 DG3S-8-31D-10	380 (100)	–	380 (100)	380 (100)	–	380 (100)	380 (100)	–	380 (100)
DG3S-8-33C-10 DG3S-8-33A-10 DG3S-8-33-10 DG3S-8-33D-10	380 (100)	114 (30)	380 (100)	380 (100)	95 (25)	380 (100)	380 (100)	95 (25)	380 (100)

## Direction of Oil Flow for Spool Types & Positions

Spool Type	Pilot Pr. → Y Conn. X → Tank or Spring Offset	Pilot Pr. → X Conn. Y → Tank
0, 1, 2, 3, 6, 9, 11, 31 & 33	Pr. → Cyl. A Cyl. B → Tank	Pr. → Cyl. B Cyl. A → Tank
4 & 8	Pr. → Cyl. B Cyl. A → Tank	Pr. → Cyl. A Cyl. B → Tank



# DG3S-8-\*\*-10 Pressure Drop

Spool Type & Center Position	P → A	B → T	P → B	A → T	P → T on Center
"0" 	2	3	2	2	1
"1" 	2	4	3	2	2
"2" 	3	4	3	2	-
"3" 	3	4	3	2	-
"4" 	6	6	6	6	5
"6" 	3	3	3	2	-
"8" 	2	5	2	5	4
"9" 	2	3	2	2	13,8 bar @ 95 l/min. (200 psi @ 25 USgpm) 43,3 bar @ 170 l/min. (700 psi @ 45 USgpm)
"11" 	3	3	3	2	2
"31" 	3	3	3	2	-
"33" 	3	4	3	2	-

**Example:**

Find the pressure drop from P → B for type 2 spool. Using the table above find numeral 2 in spool type column. To the right of numeral 2, find the reference curve number 3 under P → B column. The pressure drop from P → B for type 2 spool would be obtained on curve number 3.

1. Pressure drop curves give approximate pressure drop ( $\Delta P$ ) when passing 21 cSt (100 SUS) fluid(s) having .865 specific gravity.
2. For any other viscosity(s), the pressure drop ( $\Delta P$ ) will change as follows:

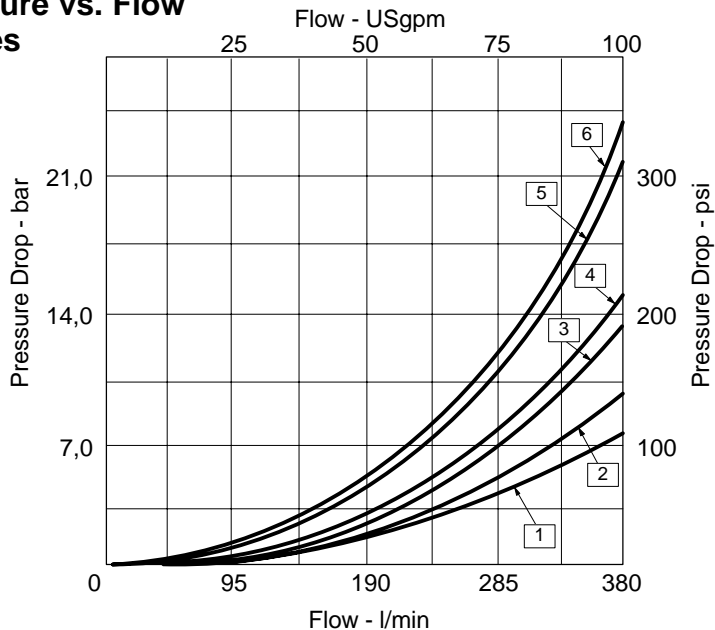
Viscosity cSt	14	32	43	54	65	76	86
(SUS)	(75)	(150)	(200)	(250)	(300)	(350)	(400)
% of $\Delta P$ (Approx.)	93	111	119	126	132	137	141

3. For any other specific gravity ( $G_1$ )\*, the pressure drop ( $\Delta P_1$ ), will be approximately:

$$\Delta P_1 = \Delta P(G_1/G)$$

\* Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.

## Pressure vs. Flow Curves



# DG3S-8-\*\*-10 Pressure Drop Across Check Valve

## Integral Check Valves

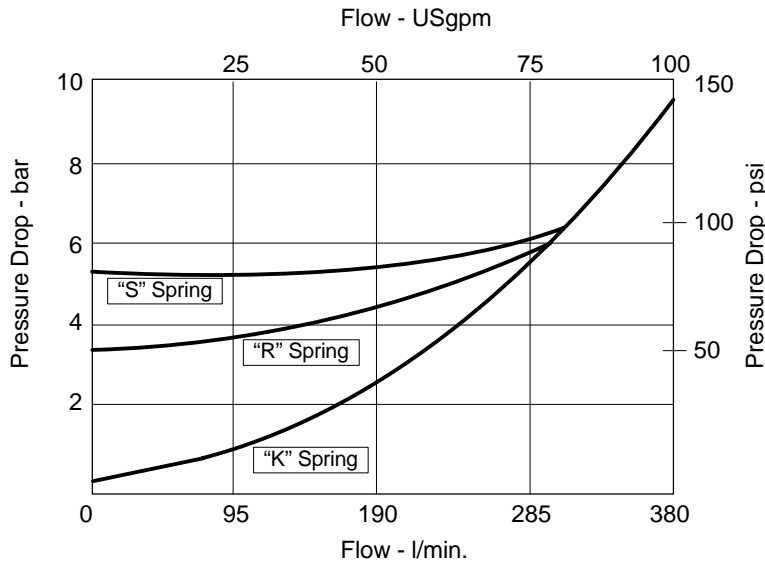
The pilot pressure (refer to pilot pressure chart) is the total of pressure drop through valve (P to T) on center from pressure drop vs. flow curve at actual minimum application flow plus pressure drop through check valve using appropriate spring model (K, R or S) from check valve pressure drop vs. flow curve plus other pressure drops downstream of valve.

## For Other Uses:

A check valve with 0,35 bar (5 psi) cracking pressure model "K" can be used to prevent reverse flow other than leakage as in clamp circuits and where the check is not required for pilot pressure.

### NOTE

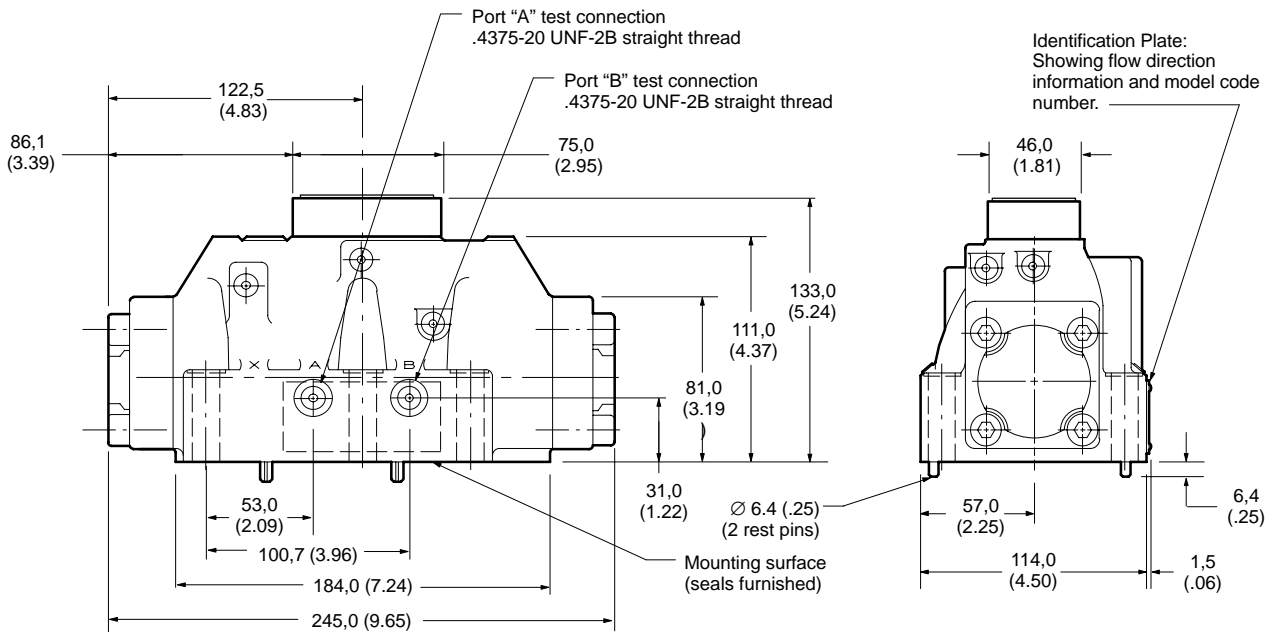
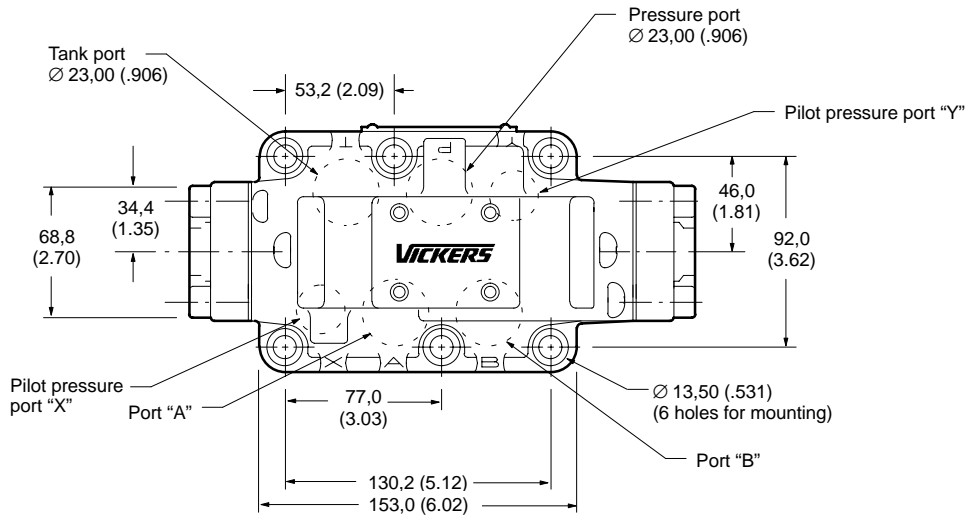
Total pressure drop must be greater than minimum pilot pressure required for good machine reliability.



# DG3S-8-\*\*-10 Installation Dimensions

## Spring Centered DG3S-8-\*C-10 No-Spring Pilot Operated DG3S-8-10

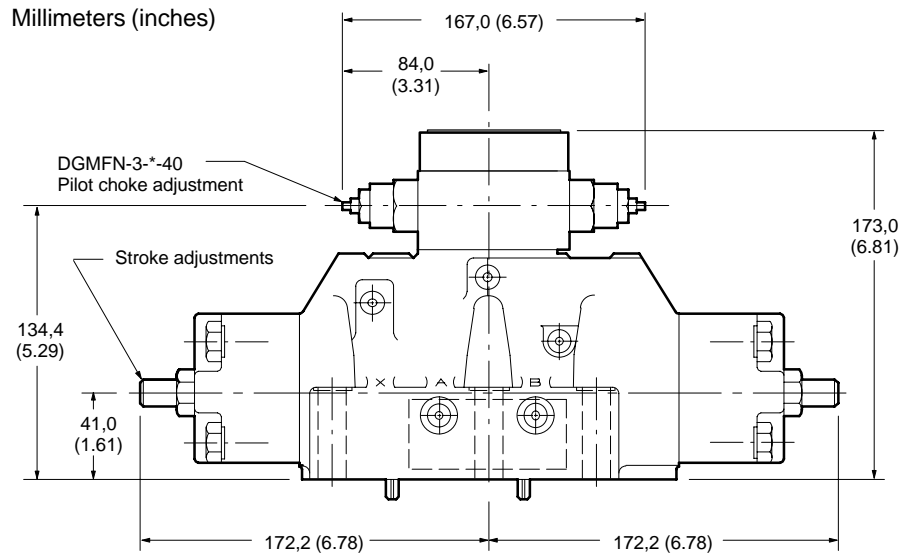
Millimeters (inches)



# DG3S-8-\*\*-10 Adjustment Options

## Pilot Choke Adjustment(s)

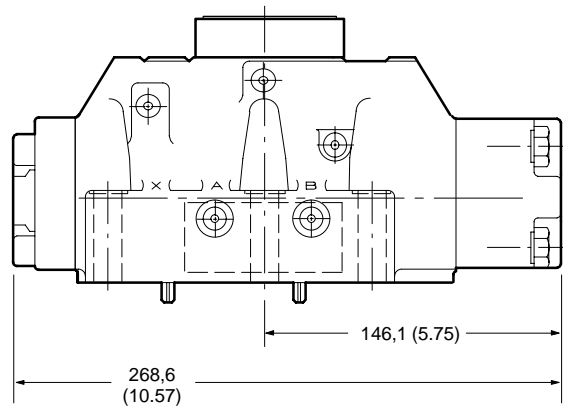
Pilot choke is adjusted by backing off locknuts and turning adjusting screws inward (clockwise) to decrease rate of spool travel and outward (counterclockwise) to increase the rate. Pilot oil for models with this feature should be taken from a source having a constant pressure. See spool control modifications in model code.



## Spring Offset Pilot Operated Models DG3S-8-\*A-10

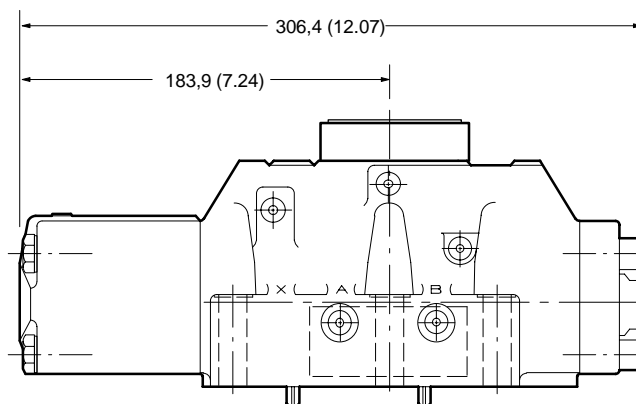
Spring offset model has internal spring which offsets the spool when pilot connection "X" is open to tank. Pilot connection "Y" becomes a drain connection, which must be connected directly and independently to tank at atmospheric pressure through a surge-free line. Back pressure at this connection would cause valve malfunction.

NOTE: High assembled spring load. Call Vickers Service for disassembly instructions.



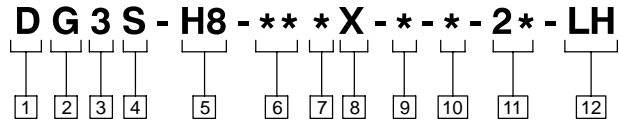
## Pressure Centered Pilot Operated Models DG3S-8-\*D-10

This option provides faster spring centering time by using pilot pressure to center the spool. The centering springs are used in addition to pilot pressure to insure positive centering of the spool. The valve spool is returned to center position by pilot pressure and centering springs. If pilot pressure fails or falls below the required minimum, the spool will return to center position at minimum pilot pressure flow rates for pressure centered valves.



# DG3S-H8 Model Code

## Remote Pilot Directional Valves - High Flow



<p><b>1 Directional Control</b></p> <hr/> <p><b>2 Mounting Type</b> G - Manifold or Subplate</p> <hr/> <p><b>3 Valve Operator</b> 3 - Remote operated</p> <hr/> <p><b>4 Sliding Spool</b></p> <hr/> <p><b>5 Valve Size</b> 8 - ISO-4401-08, NFPA-D08 interface High Flow</p> <hr/> <p><b>6 Spool Type</b> 0, 1, 2, 3, 4, 6, 8, 9, 11, 31, 33 (See flow rating tabulation for description)</p>	<p><b>7 Spool/Spring Arrangement</b> A - Spring offset C - Spring centered Blank - Omit for no-spring models</p> <hr/> <p><b>8 Fast Response</b> (omit for standard low shock models)</p> <hr/> <p><b>9 Spool Control Modifications</b> 1 - Stroke adjustments both ends. (except A models) 2 - Pilot choke adjustments 3 - Pilot choke and stroke adjustments 7 - Stroke adjustment - port A end only (for right hand models) 8 - Stroke adjustment - port B end only (for left hand models) Blank - Omit when not required.</p>	<p><b>10 Check Valve</b> (in pressure port) K - 0,35 bar (5 psi) R - 3,45 bar (50 psi) S - 5,20 bar (75 psi) Blank - Omit when not required.</p> <hr/> <p><b>11 Design Number</b> Subject to change. Installation dimensions remain as shown for design numbers 20 through 29.  20 - Standard 21 - Uses 4C &amp; 8C special anti-spin spools/spring.</p> <hr/> <p><b>12 Spring Offset Model</b> LH - Offset to B Blank - Omit for offset to A models shown.</p>
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### DG3S-H8 Pilot Pressure

Valve Type	Spool Type	Minimum Pilot Pressure Required	
		For Recommended Flow at System Pressure up to 310 bar (4500 psi)	For Maximum Flow at System Pressure up to 310 bar (4500 psi)
Spring Centered	0, 1, 4, 8, 9 & 11▲	5 (75)	5 (75)
	2, 3, 6, 31 & 33	8 (120)	10 (150)
Spring Offset	0, 9	10 (150)	10 (150)
	2, 6 & 33	10 (150)	14 (200)
No-Spring	0, 2, 6, 9 & 33	2 (30)	5 (75)

▲ Fast valve switching of large oil volumes without adequate decompression circuitry, can develop instantaneous flows well above the maximum ratings. The type eight (8) spool may spin within the body, causing unusual valve body bore wear when applied in this type of circuit. With this and other spool types, valve malfunction might occur. Where these applications exist use the DG3S-H8-\*\*-21 design using the 4C or 8C anti-spin spool/spring.

# DG3S-H8-\*\*-2\* Max. Flow Ratings & Graphical Symbols

Spring Centered ▼ -C-	Spring Offset ▼ -A-	No-Spring Detented ▼	Standard Spool Types		Recommended Flow Capacity at 210 bar (3000 psi)
All Spools	0, 2, 6, 9 & 33	0, 2, 6, 9 & 33	Center Position & Spool Type	Description Center Position	l/min (USgpm)
DG3S-H8-0C-2*	DG3S-H8-0A-20	DG3S-H8-0-20	"0"	Opens to T all ports	265 (70)
DG3S-H8-1C-2*	-	-	"1"	Open P & A to T Closed B	265 (70)
DG3S-H8-2C-2*	DG3S-H8-2A-20	DG3S-H8-2-20	"2"	Closed to T all ports	265 (70)
DG3S-H8-3C-2*	-	-	"3"	Closed P & B Open A to T	265 (70)
DG3S-H8-4C-2*	-	-	"4"	Tandem P to T Closed Crossover	265 (70)
DG3S-H8-6C-2*	DG3S-H8-6A-20	DG3S-H8-6-20	"6"	Closed P only Open A & B to T	265 (70)
DG3S-H8-8C-2*	-	-	"8"	Tandem P to T Open Crossover	265 (70)
DG3S-H8-9C-2*	DG3S-H8-9A-20	DG3S-H8-9-20	"9"	Open to T all ports Over Tapers	265 (70)
DG3S-H8-11C-2*	-	-	"11"	Open P & B to T Closed A	265 (70)
DG3S-H8-31C-2*	-	-	"31"	Closed P & A open B to T	265 (70)
DG3S-H8-33C-2*	DG3S-H8-33A-20	DG3S-H8-33-20	"33"	Closed P Open A & B to T Over Tapers	265 (70)

▼ See Direction of Flow Chart, next page.

→ Full flow

↔ Restricted flow

† Fast valve switching of large oil volumes, without adequate decompression circuitry, can develop instantaneous flows well above the maximum ratings. The type eight (8) spool may spin within the body, causing unusual valve body wear when applied in this type of circuit. With this and other spool types, valve malfunction might occur. Where these applications exist use the DG3S-H8-10-S557 special designator for the 4C and 8C anti-spin spools/spring.












# DG3S-H8-\*\*-2\* Max. Flow Ratings

Model Code	70 bar (1000 psi)			140 bar (2000 psi)			310 bar (4500 psi)		
	Model -C-	Model -A-	Model No-Spring	Model -C-	Model -A-	Model No-Spring	Model -C-	Model -A-	Model No-Spring
	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)	l/min (USgpm)
DG3S-H8-0C-20 DG3S-H8-0A-20 DG3S-H8-0-20	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)
DG3S-H8-1C-20	530 (140)	-	-	454 (120)	-	-	340 (90)	-	-
DG3S-H8-2C-20 DG3S-H8-2A-20 DG3S-H8-2-20	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)
DG3S-H8-3C-20	530 (140)	-	-	530 (140)	-	-	530 (140)	-	-
DG3S-H8-4C-20	530 (140)	-	-	454 (120)	-	-	380 (100)	-	-
DG3S-H8-6C-20 DG3S-H8-6A-20 DG3S-H8-6-20	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)
DG3S-H8-8C-20	530 (140)	-	-	530 (140)	-	-	530 (140)	-	-
DG3S-H8-9C-20 DG3S-H8-9A-20 DG3S-H8-9-20	265 (70)	530 (140)	530 (140)	340 (90)	530 (140)	530 (140)	380 (100)	530 (140)	530 (140)
DG3S-H8-11C-20	530 (140)	-	-	454 (120)	-	-	340 (90)	-	-
DG3S-H8-31C-20	530 (140)	-	-	530 (140)	-	-	530 (140)	-	-
DG3S-H8-33C-20 DG3S-H8-33A-20 DG3S-H8-33-20	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)	530 (140)

## Direction of Oil Flow for Spool Types & Positions

Spool Type	Pilot Pr. → Y	Pilot Pr. → X
	Conn. X → Tank or Spring Offset	Conn. Y → Tank
0, 1, 2, 3, 6, 9, 11, 31 & 33	Pr. → Cyl. A Cyl. B → Tank	Pr. → Cyl. B Cyl. A → Tank
4 & 8	Pr. → Cyl. B Cyl. A → Tank	Pr. → Cyl. A Cyl. B → Tank

# DG3S-H8-\*\*-2\* Pressure Drop

Spool Type & Center Position	P → A	B → T	P → B	A → T	P → T on Center
"0" 	2	3	2	3	2
"1" 	1	1	2	3	5
"2" 	1	2	1	3	-
"3" 	1	2	1	4	-
"4" 	2	4	2	4	6
"6" 	1	4	1	4	-
"8" 	2	4	2	4	6
"9" 	2	3	2	4	-
"11" 	2	1	1	3	5
"31" 	1	4	1	2	-
"33" 	1	2	1	3	-

**Example:**

Find the pressure drop from P → B for type 2 spool. Using the table above find numeral 2 in spool type column. To the right of numeral 2, find the reference curve number 3 under P → B column. The pressure drop from P → B for type 2 spool would be obtained on curve number 3.

1. Pressure drop curves give approximate pressure drop ( $\Delta P$ ) when passing 21 cSt (100 SUS) fluid(s) having .865 specific gravity.
2. For any other viscosity(s), the pressure drop ( $\Delta P$ ) will change as follows:

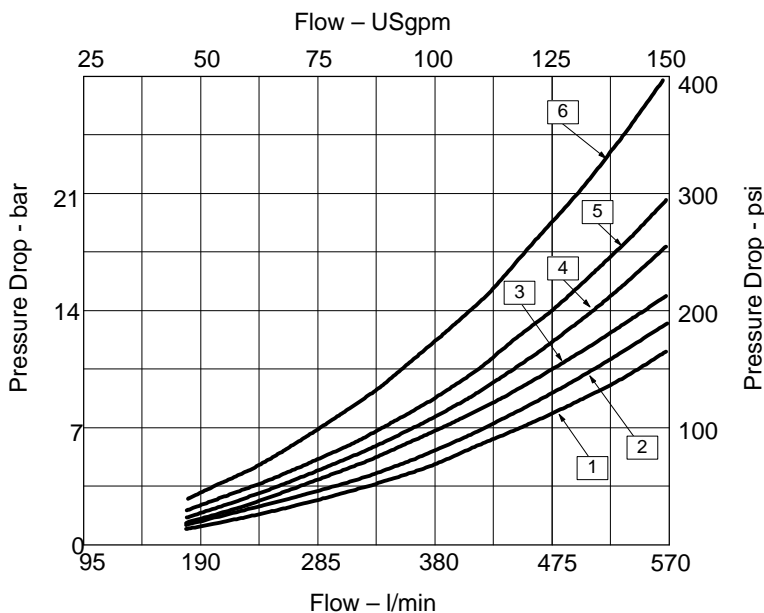
Viscosity	14	32	43	54	65	76	86
cSt	14	32	43	54	65	76	86
(SUS)	(75)	(150)	(200)	(250)	(300)	(350)	(400)
% of $\Delta P$ (Approx.)	93	111	119	126	132	137	141

3. For any other specific gravity ( $G_1$ )\*, the pressure drop ( $\Delta P_1$ ), will be approximately:

$$\Delta P_1 = \Delta P(G_1/G)$$

\* Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.

## Pressure vs. Flow Curves

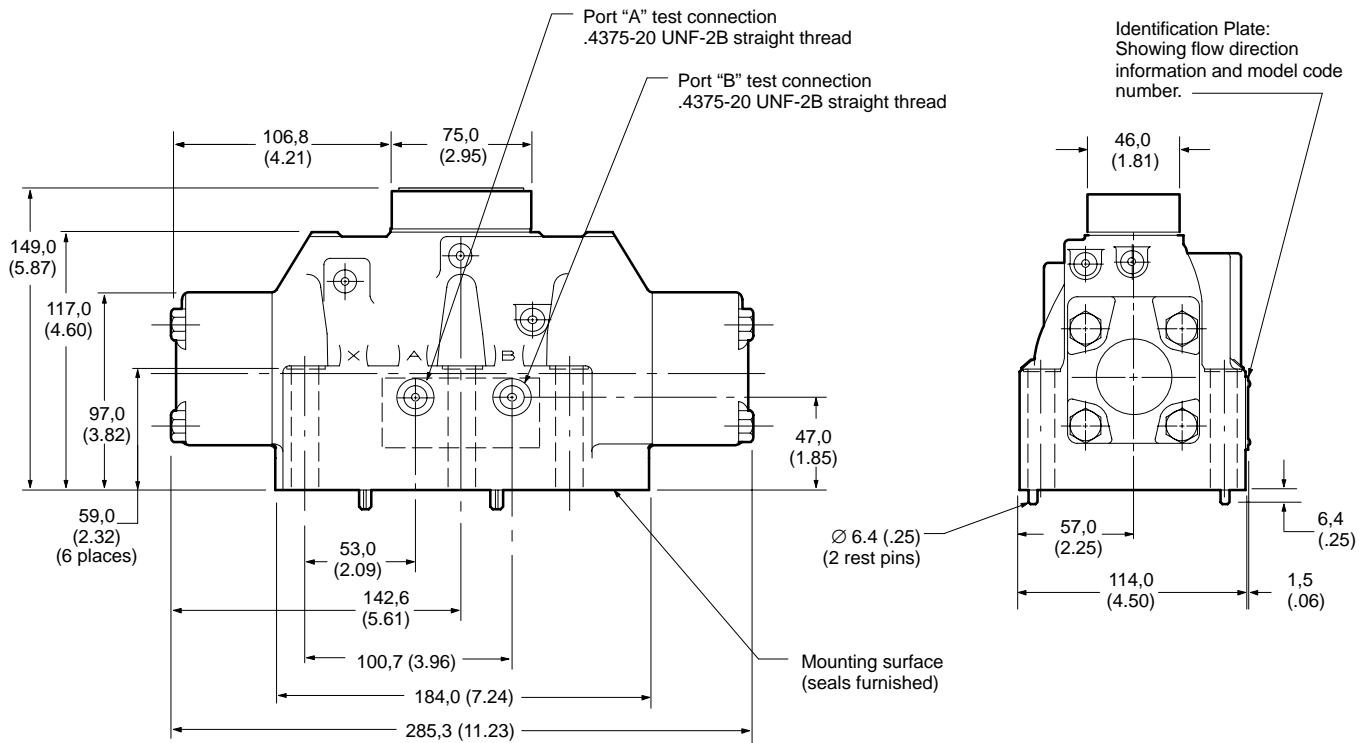
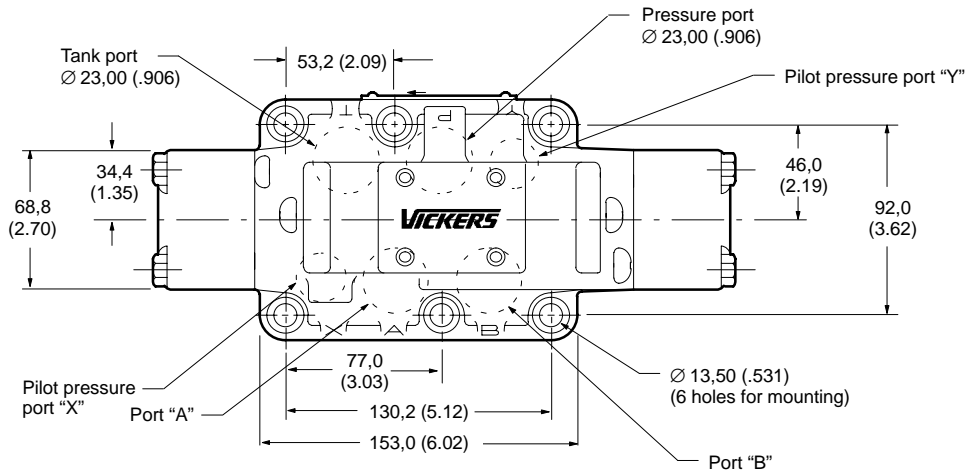




# DG3S-H8-\*\*-2\* Installation Dimensions

## Spring Centered DG3S-H8-\*C-2\* No-Spring Pilot Operated DG3S-H8-2\*

Millimeters (inches)



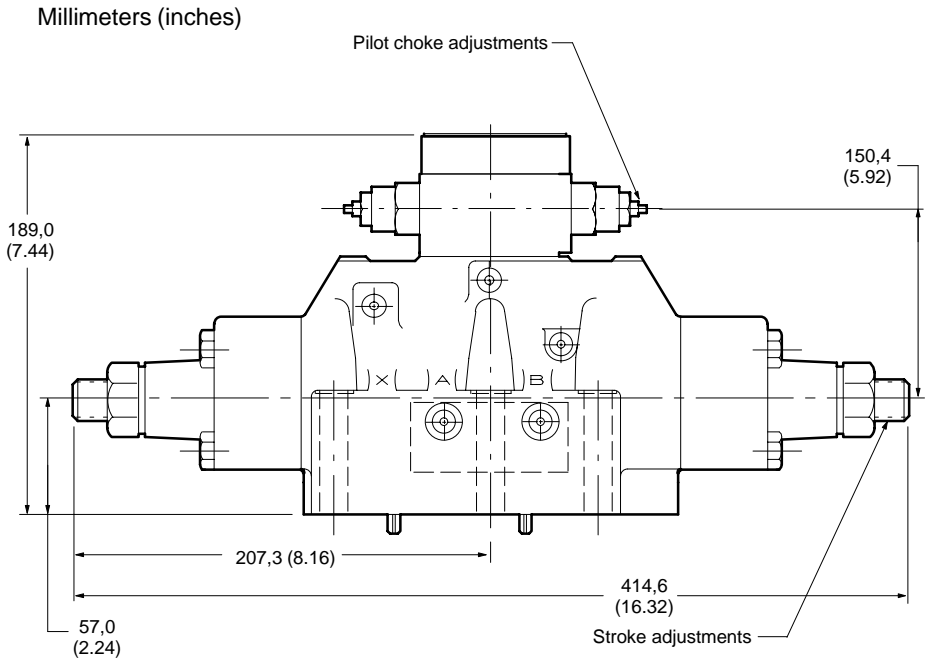
# DG3S-H8-\*\*-2\* Adjustment Options

## Pilot Choke Adjustment(s)

Pilot choke is adjusted by backing off locknuts and turning adjusting screws inward (clockwise) to decrease rate of spool travel and outward (counterclockwise) to increase the rate. Pilot oil for models with this feature should be taken from a source having a constant pressure. See spool control modifications in model code.

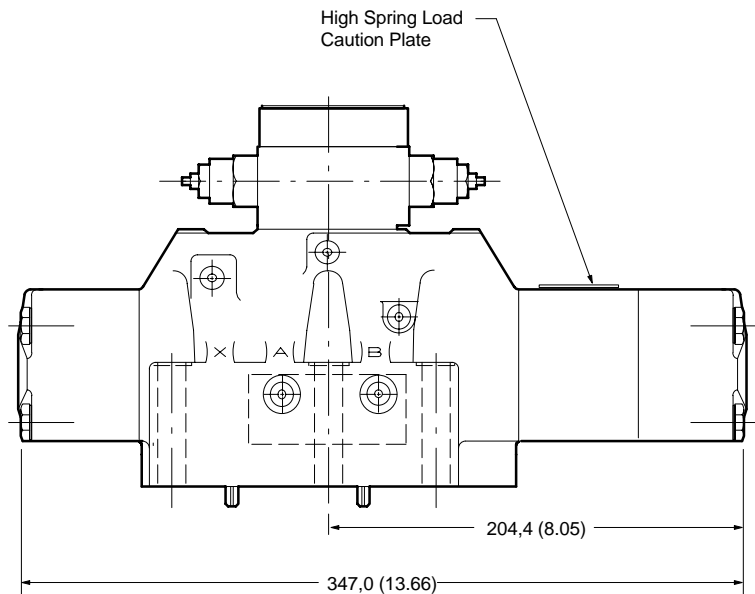
## Stroke Adjustment(s)

Stroke adjustment limits movement of the main stage spool. Backing off the jam nut and turning the adjusting screw inward (clockwise) decreases spool stroke. See spool control modifications in model code.



## Spring Offset Pilot Operated Models DG3S-H8-\*A-2\*

This option provides faster spring centering time by using pilot pressure to center the spool. The centering springs are used in addition to pilot pressure to insure positive centering of the spool. The valve spool is returned to center position by pilot pressure and centering springs. If pilot pressure fails or falls below the required minimum, the spool will return to center position at minimum pilot pressure flow rates for pressure centered valves.



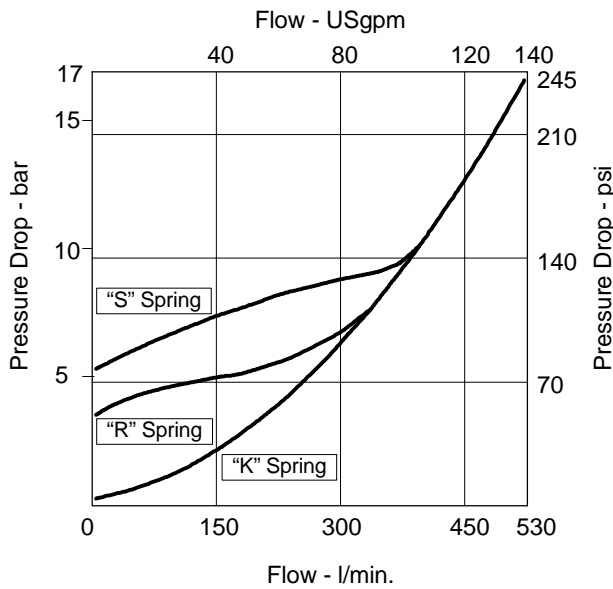
# DG3S-H8-\*\*-2\* Pressure Drop Across Check Valve

## Integral Check Valves

An integral pressure port check is required for "internally piloted" valves with open center spools (0, 1, 4, 8, 9, and 11). The pilot pressure generated is the total of the P to T drop through the valve in the center condition, the pressure drop through the check valve, and the pressure at the tank port. For proper operation, the total pressure drop must be greater than the minimum required pilot pressure (see chart below).

## For Other Uses:

A check valve with 0,35 bar (5 psi) cracking pressure model "K" can be used to prevent reverse flow other than leakage as in clamp circuits and where the check is not required for pilot pressure.



# DG3S-(H)8-\*\*-10/2\* Subplates & Bolt Kits

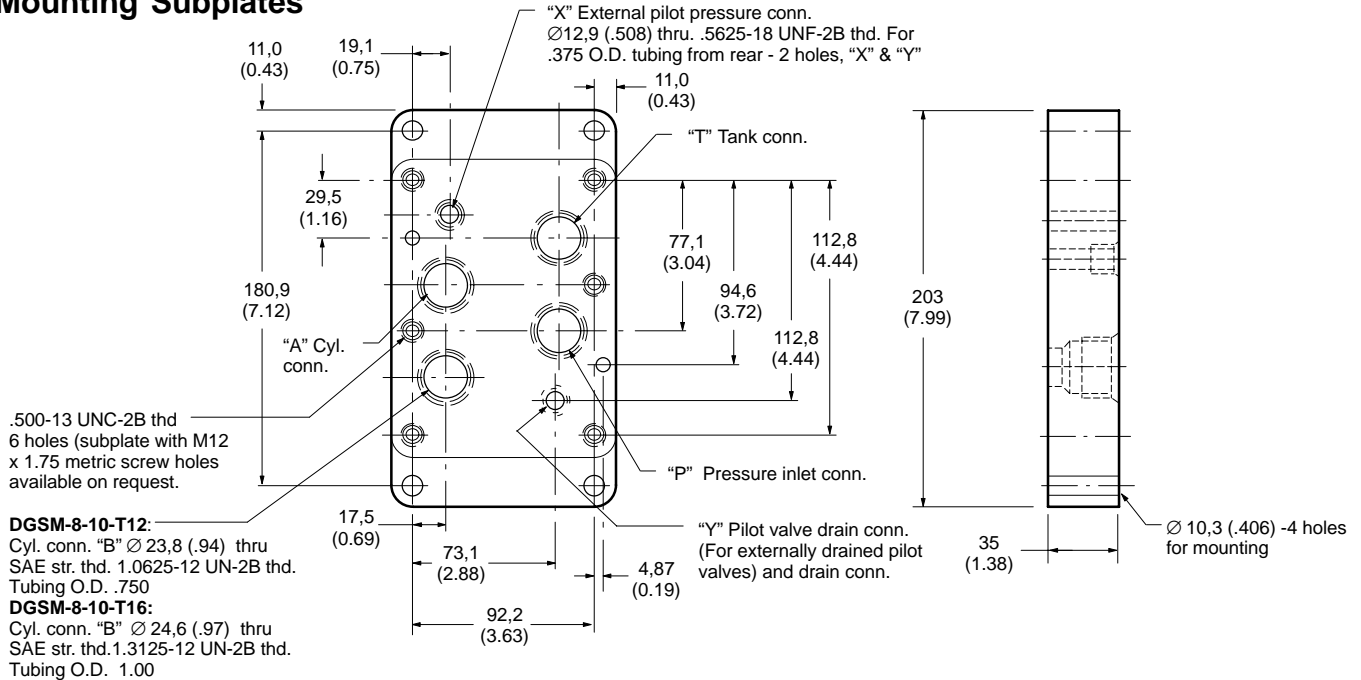
Valves, subplates and mounting bolts must be ordered separately.

When subplate is not used, a machined pad must be provided for mounting. Pad must be flat within 0,0127 mm (.0005 inch) and smooth within 1,6 µm (63 microinch). Mounting bolts, when provided by customer, should be SAE grade 7 or better.

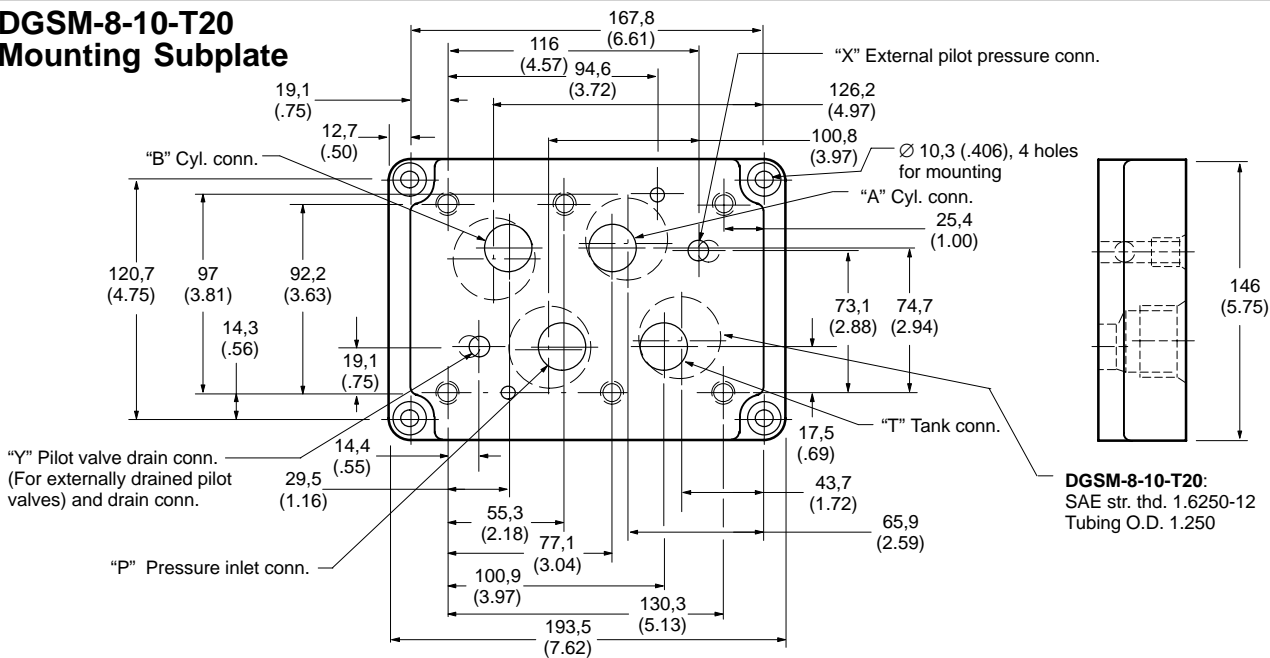
Example:

- (1) DG3S-(H)8-2C-10/2\* Valve
- (1) DGSM-8-10-T12 Subplate
- (1) BKDGH06-618 Inch Bolt Kit or
- (1) BKDGH8-655M Metric Bolt Kit

## DGSM-8-10-T12/16 Mounting Subplates



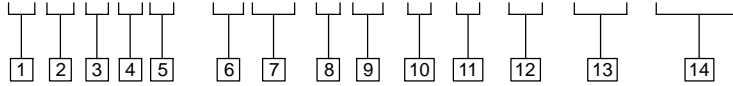
## DGSM-8-10-T20 Mounting Subplate



# DG3S4-10 Model Code

## Remote Pilot Directional Valves

**D G 3 S 4 - 10 \*\* \* X - \* - \* - 5\* - LH - S534**



<b>1</b> Directional Control	<b>7</b> Spool Type	<b>12</b> Design Number
<b>2</b> Mounting Type	0, 1, 2, 3, 4, 6, 8, 9, 11, 31 & 33	Subject to change. Installation dimensions remain as shown for design numbers 50 through 59.
G - Manifold or Subplate	<b>8</b> Spool/Spring Arrangement	-51 - 1/4" NPT thread
<b>3</b> Valve Operator	A - Spring offset	-53 - .4375-20 UNF-2B thread
3 - Remote operated	C - Spring centered	Circuit diagram plate mounting (see installation dimensions page).
<b>4</b> Sliding Spool	D - Pressure centered	
<b>5</b> Flow Direction	Blank - Omit for no-spring models.	<b>13</b> Spring Offset Model
4 - Four-way	<b>9</b> Fast Response	LH - Offset to "B"
<b>6</b> Valve Size	(omit for standard models)	Blank - Omit for offset to "A" model
10 - ISO-4401-10, NFPA-D10 interface	<b>10</b> Spool Control Modifications	<b>14</b> Special Feature
	2 - Pilot choke adjustments	S534 Anti-spin feature for type 4C & 8C spools.
	Blank - Omit if not required	
	<b>11</b> Check Valves	
	K - 0,34 bar (5 psi)	
	R - 3,4 bar (50 psi)	
	Blank - Omit if not required	

### Minimum Pilot Pressure

Spool Type	Flow l/min (USgpm)	Shifting P→ A		Shifting P→ B	
		● Pressure Centered Models	All Other Models	● Pressure Centered Models	All Other Models
All Spools	0	5,2 bar (75 psi)	5,2 bar (75 psi)	13,9 bar (200 psi)	5,2 bar (75 psi)
0, 1, 4, 8 & 9	946 (250)	5,2 bar (75 psi)	★5,2 bar (75 psi)	13,9 bar (200 psi)	★5,2 bar (75 psi)
2, 3, 6 & 33	946 (250)	10,3 bar (150 psi)	10,3 bar (150 psi)	27,6 bar (400 psi)	10,3 bar (150 psi)

- On pressure centered models, end covers cannot be interchanged. Pilot pressure is not available through use of integral check valves.
- ★ Pilot pressure 6,2 bar (90 psi) for spring offset models.

# DG3S4-10\*\*-5\* Ratings

## Pressure Drop

473 l/min (125 USgpm)

Spool Type	P to A	B to T	P to B	A to T	P to T Centered
0	3,1 bar (45 psi)	5,0 bar (73 psi)	3,5 bar (51 psi)	4,5 bar (65 psi)	3,8 bar (55 psi)
1	2,5 bar (36 psi)	4,0 bar (58 psi)	2,3 bar (34 psi)	2,1 bar (30 psi)	3,2 bar (47 psi)
2	3,8 bar (55 psi)	5,7 bar (83 psi)	3,8 bar (55 psi)	5,2 bar (76 psi)	—
3	3,8 bar (55 psi)	5,7 bar (83 psi)	3,8 bar (55 psi)	3,3 bar (48 psi)	—
4	5,5 bar (80 psi)	10,3 bar (150 psi)	5,5 bar (80 psi)	11,7 bar (170 psi)	5,5 bar (80 psi)
6	3,8 bar (55 psi)	5,2 bar (75 psi)	3,8 bar (55 psi)	3,2 bar (46 psi)	—
8	4,3 bar (62 psi)	8,4 bar (122 psi)	4,3 bar (63 psi)	9,5 bar (138 psi)	5,5 bar (80 psi)
9	3,2 bar (46 psi)	5,2 bar (75 psi)	3,4 bar (50 psi)	4,8 bar (70 psi)	27,6 bar (400 psi)
33	3,8 bar (55 psi)	5,7 bar (83 psi)	3,8 bar (55 psi)	5,2 bar (76 psi)	—

1. Figures in the pressure drop chart give approximate pressure drops ( $\Delta P$ ) when passing 473 l/min (125 USgpm) flow (Q) of 100 SUS fluid(s) having .865 specific gravity.

2. For any other flow rate ( $Q_1$ ), the pressure drop ( $\Delta P_1$ ) will be approximately:  

$$\Delta P_1 = \Delta P(Q_1/Q_2)^2$$

3. For any other viscosity(s), the pressure drop ( $\Delta P$ ) will change as follows:

Viscosity	14	32	43	54	65	76	86
cSt	14	32	43	54	65	76	86
(SUS)	(75)	(150)	(200)	(250)	(300)	(350)	(400)
% of $\Delta P$ (Approx.)	93	111	119	126	132	137	141

4. For any other specific gravity ( $G_1$ )\*, the pressure drop ( $\Delta A_1$ ), will be approximately:

$$\Delta P_1 = \Delta P(G_1/G)$$

\* Specific gravity of fluid may be obtained from its producer. The value is higher for fire-resistant fluids than for oil.

## Flow Ratings

Valve Type	Spool Type	Recommended Flow Capacity	Maximum Flow without Malfunction
No Spring	0, 2, 6 & 9 ■	473 l/min (125 USgpm)	946 l/min (250 USgpm) at 207 bar (3000 psi)
	0, 4 & 8 †		
	2, 3, 6 & 33 ■		
Spring Centered	9	378 l/min (100 USgpm)	378 l/min (100 USgpm) at 207 bar (3000 psi) 473 l/min (125 USgpm) at 138 bar (2000 psi) 568 l/min (150 USgpm) at 69 bar (1000 psi)
	0	473 l/min (125 USgpm)	946 l/min (250 USgpm) at 207 bar (3000 psi)
2	757 l/min (200 USgpm) at 207 bar (3000 psi)		
6	757 l/min (200 USgpm) at 69 bar (1000 psi)		
9	757 l/min (200 USgpm) at 138 bar (2000 psi)		
Pressure Centered	0, 1, 2, 3, 4, 6, 8, 9 & 33 ■	473 l/min (125 USgpm)	946 l/min (250 USgpm) at 207 bar (3000 psi)

■ As system flow increases the minimum pilot pressure required increases. These spools will operate satisfactorily in excess of 946 l/min (250 USgpm) with higher pilot pressures.

† Fast valve switching of large oil volumes, without adequate decompression circuitry, can develop instantaneous flows well above the maximum ratings. The type "8" spool may spin within the body, causing unusual valve body bore wear when applied in this type of circuit. With this and other spool types, valve malfunction might occur. Where these applications exist, use the DG3S4-10-5\*-S534 special designator for the 4C and 8C anti-spin spool/spring.

# DG3S4-10\*\*-5\* Flow Direction

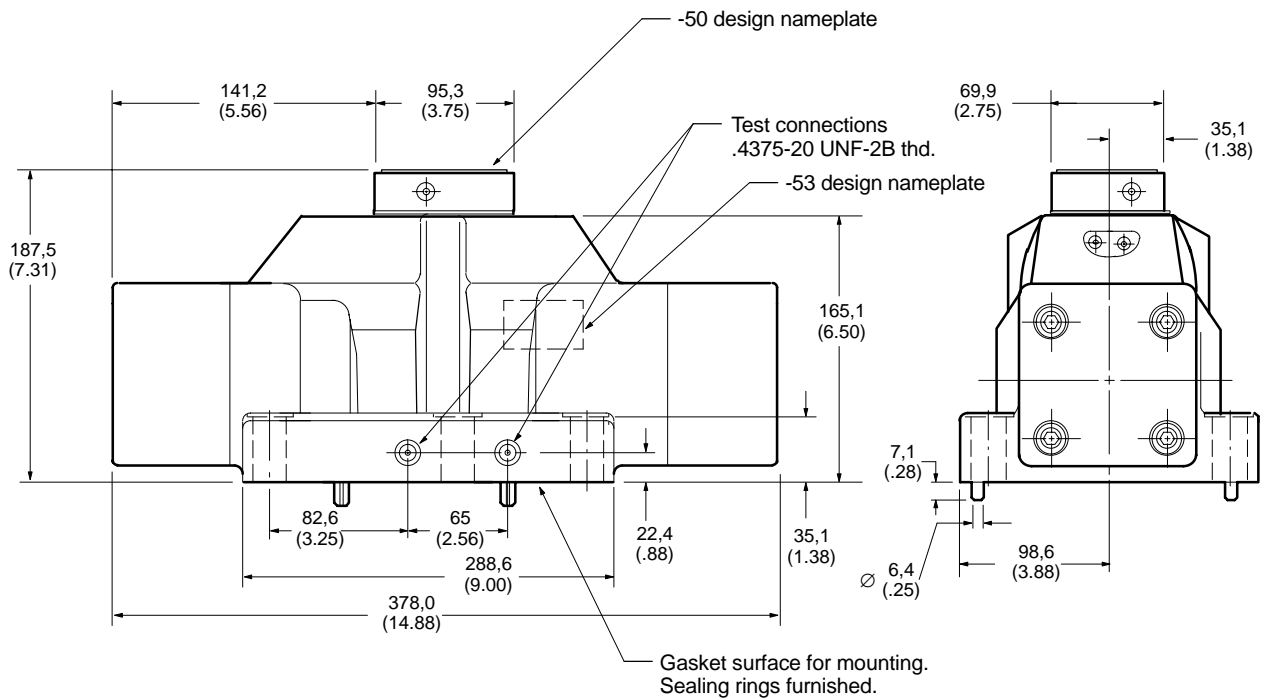
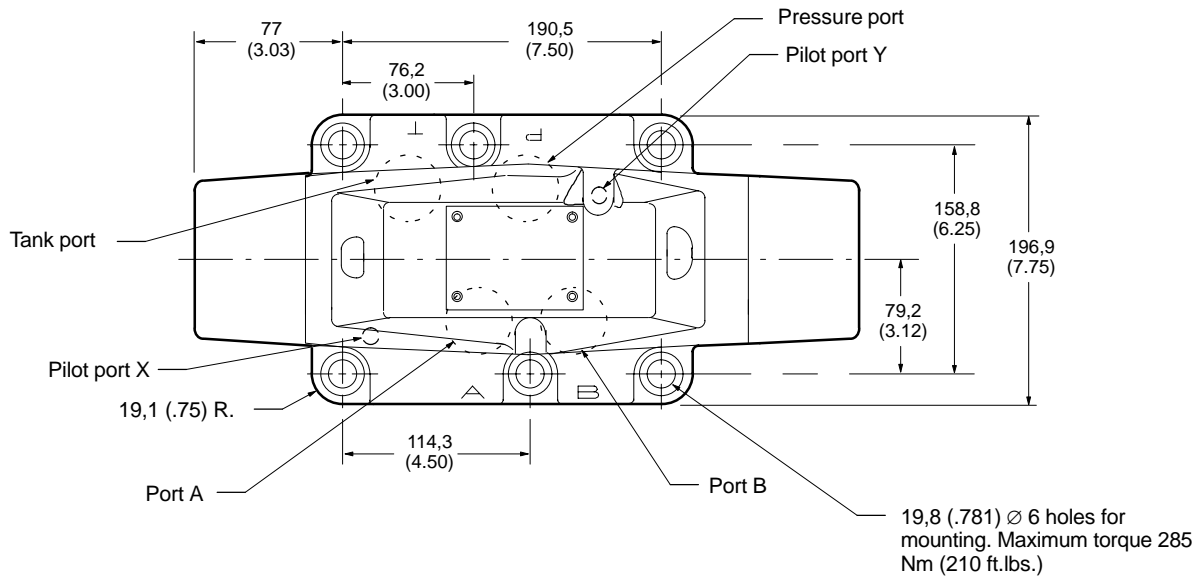
Model Numbers		Spool Type	Direction of oil flow for valve spool position		
No Spring Detented	Spring Centered		Center - Applies to: 1. Spring or pressure centered models at center. 2. No spring or spring offset models at crossover.	Pilot Pr → Y Conn. X → T or spring offset	Pilot Pr → X Conn. Y → T
DG3S4-100	DG3S4-100C	Open center all ports	Press. Port A & Port B → Tank	Press. → Port A Port B → Tank	Press. → Port B Port A → Tank
	DG3S4-101C	Open center all ports	Press. Port A → Tank		
DG3S4-102	DG3S4-102C	Closed center all ports	Press. Port A & Port B Blocked		
	DG3S4-103C	Closed center P & B	Press. & Port B Blocked Port A → Tank		
	DG3S4-104C	Tandem Closed crossover	Press. → Tank Port A & Port B blocked	Press. → Port B Port A → Tank	Press. → Port A Port B → Tank
DG3S4-106	DG3S4-106C	Closed center P only	Press. Blocked Port A & Port B → Tank	Press. → Port A Port B → Tank	Press. → Port B Port A → Tank
	DG3S4-108C	Tandem Open crossover	Press. → Tank Port A & Port B blocked	Press. → Port B Port A → Tank	Press. → Port A Port B → Tank
DG3S4-109	DG3S4-109C	Open center Partial - all ports	Press. Port A & Port B ≡→ Tank	Press. → Port A Port B → Tank	Press. → Port B Port A → Tank
	DG3S4-1033C	33 - Closed center Bleed A & B	Press. Blocked Port A & Port B ≡→ Tank		
		Spool Type	Direction of oil flow for valve spool position		
Spring Offset	Pressure Centered		Center - Applies to: 1. Spring or pressure centered models at center. 2. No spring or spring offset models at crossover.	Pilot Pr → Y Conn. X → T or spring offset	Pilot Pr → X Conn. Y → T
DG3S4-100A	DG3S4-100D	Open center all ports	Press. Port A & Port B → Tank	Press. → Port A Port B → Tank	Press. → Port B Port A → Tank
	DG3S4-101C	Open center all ports	Press. Port A → Tank		
DG3S4-102A	DG3S4-102D	Closed center all ports	Press. Port A & Port B Blocked		
	DG3S4-103D	Closed center P & B	Press. & Port B Blocked Port A → Tank		
	DG3S4-104D	Tandem Closed crossover	Press. → Tank Port A & Port B blocked	Press. → Port B Port A → Tank	Press. → Port A Port B → Tank
DG3S4-106A	DG3S4-106D	Closed center P only	Press. Blocked Port A & Port B → Tank	Press. → Port A Port B → Tank	Press. → Port B Port A → Tank
	DG3S4-108D	Tandem Open crossover	Press. → Tank Port A & Port B blocked	Press. → Port B Port A → Tank	Press. → Port A Port B → Tank
DG3S4-109A	DG3S4-109D	Open center Partial - all ports	Press. Port A & Port B ≡→ Tank	Press. → Port A Port B → Tank	Press. → Port B Port A → Tank
	DG3S4-1033D	33 - Closed center Bleed A & B	Press. Blocked Port A & Port B ≡→ Tank		

Full flow →  
Restricted flow ≡→

# DG3S4-10\*\*-5\* Installation Dimensions

## No Spring & Spring Centered Models DG3S4-10\*C-5\*

Millimeters (inches)



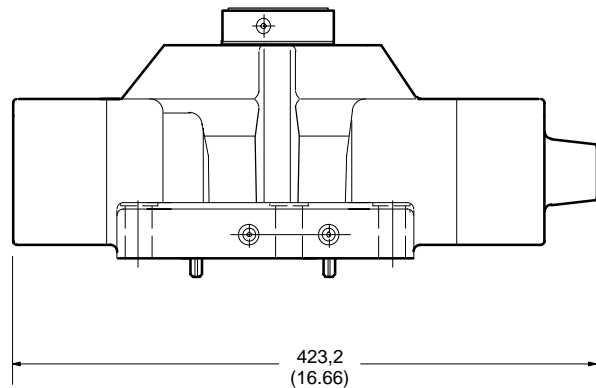


# DG3S4-102\*-5\* Adjustment Options

## Spring Offset Models DG3S4-102A-5\*

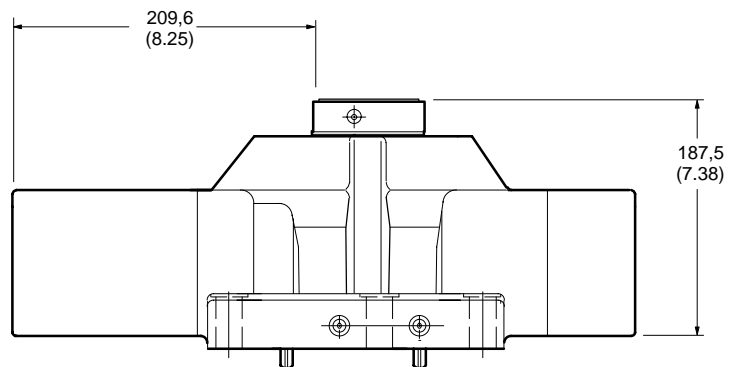
Spring offset model has internal spring which offsets the spool when pilot connection "X" is open to tank. Pilot connection "Y" becomes a drain connection, which must be connected directly and independently to tank at atmospheric pressure through a surge-free line. Back pressure at this connection would cause valve malfunction.

NOTE: High assembled spring load. Call Vickers Service for disassembly instructions.



## Pressure Centered Models DG3S4-102D-5\*

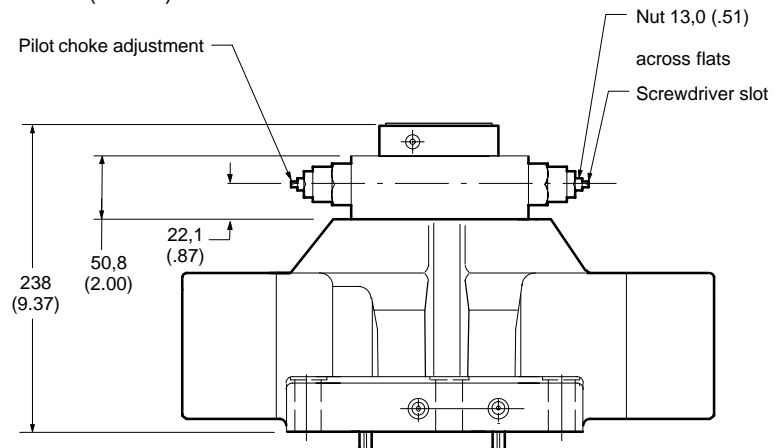
This option provides faster spring centering time by using pilot pressure to center the spool. The centering springs are used in addition to pilot pressure to insure positive centering of the spool. The valve spool is returned to center position by pilot pressure and centering springs. If pilot pressure fails or falls below the required minimum of 10,3 bar (150 psi) the spool will return to center position at minimum pilot pressure flow rates for pressure centered valves.



## Pilot Choke Adjustment DG3S4-102C-2-5\*

Pilot choke is adjusted by backing off locknuts and turning adjusting screws inward (clockwise) to decrease rate of spool travel and outward (counterclockwise) to increase the rate. Pilot oil for models with this feature should be taken from a source having a constant pressure. See spool control modifications in model code.

Millimeters (inches)



# DG3S4-10\*\*-5\* Subplate & Bolt Kits

## Subplates & Bolt Kits

Valves, subplates and mounting bolts must be ordered separately.

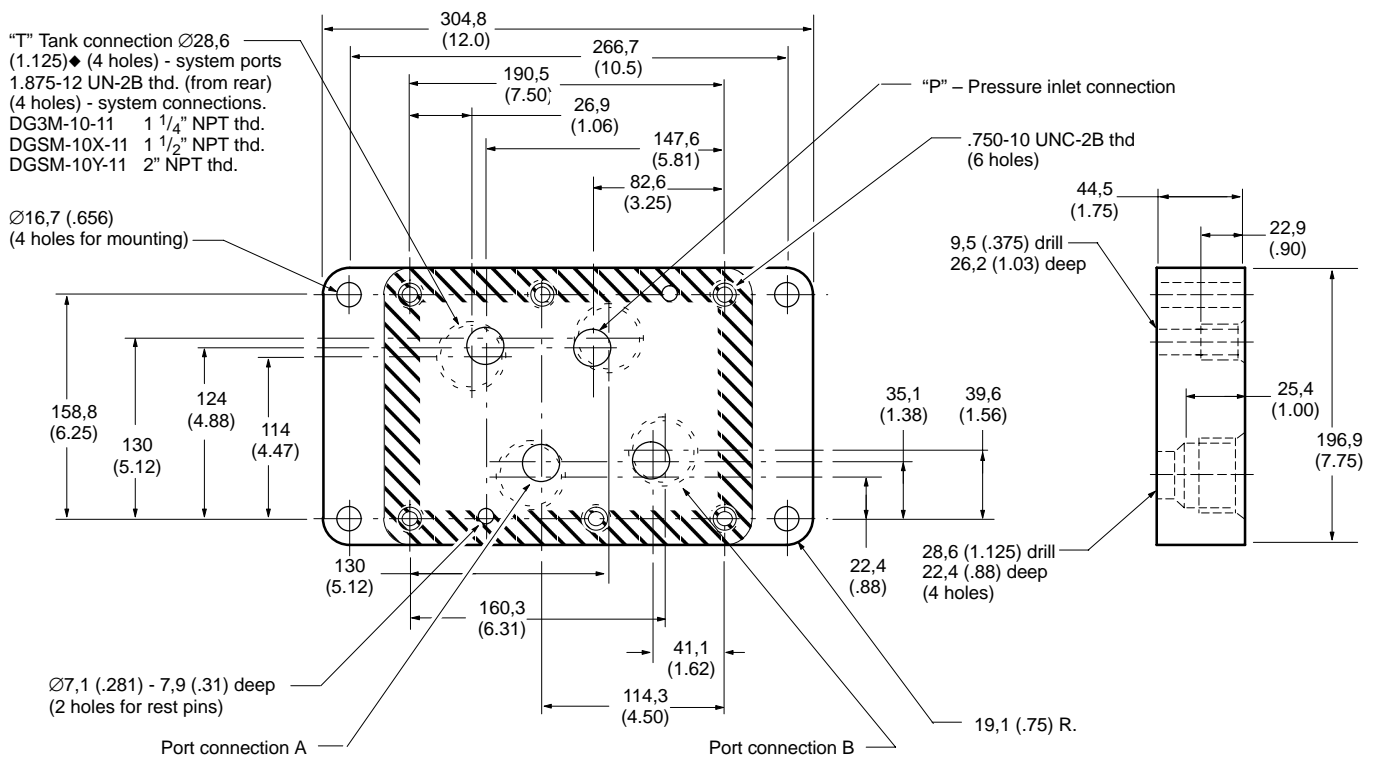
Example:

- One (1) DG3S-102C-5\* Valve
- One (1) DGSM-10-24S-11 Subplate
- One (1) BKDG10-636 Bolt Kit  
(bolt length 69,9 (2.75))

When subplate is not used, a machined pad (as indicated by subplate shaded area, below, must be provided for mounting. Pad must be flat within 0,0127 mm (.0005 inch) and smooth within 1,6  $\mu$ m (63 microinch). Mounting bolts, when provided by customer, should be SAE grade 7 or better.

## Mounting Subplate

### DGSM-10(\*) -11



◆ Manifolds or other mounting interface can be drilled to 33,3 (1.312) dia. Fitting size and fitting spacing limit the subplate port size to 28,6 (1.125) dia.

# Application Data

## Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561 "Vickers Guide to Systemic Contamination Control" available from your local Vickers distributor or by

contacting Vickers, Incorporated. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Vickers publication 561 for exact details.

Vickers products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those specified. Experience has shown, however, that life of any hydraulic component is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long, trouble-free service life for the products shown, regardless of the manufacturer.

Product	System Pressure Level bar (psi)		
	<70 (<1000)	70-210 (1000-3000)	210+ (3000+)
Vane Pumps – Fixed	20/18/15	19/17/14	18/16/13
Vane Pumps – Variable	18/16/14	17/15/13	
Piston Pumps – Fixed	19/17/15	18/16/14	17/15/13
Piston Pumps – Variable	18/16/14	17/15/13	16/14/12
<b>Directional Valves</b>	<b>20/18/15</b>	<b>20/18/15</b>	<b>19/17/14</b>
Pressure/Flow Control Valves	19/17/14	19/17/14	19/17/14
CMX Valves	18/16/14	18/16/14	17/15/13
Servo Valves	16/14/11	16/14/11	15/13/10
Proportional Valves	17/15/12	17/15/12	15/13/11
Cylinders	20/18/15	20/18/15	20/18/15
Vane Motors	20/18/15	19/17/14	18/16/13
Axial Piston Motors	19/17/14	18/16/13	17/15/12
Radial Piston Motors	20/18/14	19/17/13	18/16/13

## Fluids and Seals

Fluorocarbon seals are standard and are suitable for use with phosphate ester type fluids or their blends, water glycol, water-in-oil emulsion fluids and petroleum oil. Refer to data sheet I-286-S for hydraulic fluid and temperature recommendations.