

MECHANICAL DIRECTIONAL CONTROL



**DIRECT ACTING CHECK VALVES** ..... MD3

**PILOT TO OPEN AND DOUBLE PO CHECK VALVES** ..... MD33

**PILOT TO CLOSE CHECK VALVES** ..... MD47

**CHECK VALVES WITH THERMAL RELIEF** ..... MD53

**2W2P POSITION MANUAL VALVES** ..... MD57

**3W2P POSITION MANUAL VALVES** ..... MD79

**4W2P POSITION MANUAL VALVES** ..... MD83

**PILOT TO SHIFT VALVES** ..... MD91

**SHUTTLE VALVES** ..... MD97

**ROTARY VALVES** ..... MD103

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mail: delta@delta-power.com • [www.delta-power.com](http://www.delta-power.com)



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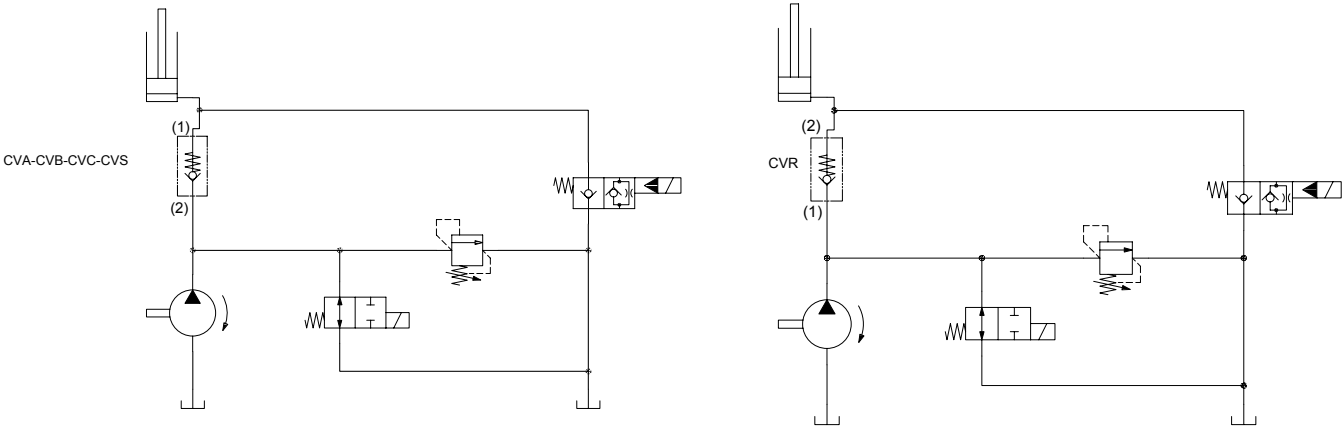
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**DIRECT ACTING CHECK VALVES**

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	5	3500	19	241	5/8-18	<b>MA-CVA</b>	MD4
	10	4350	38	300	3/4-16	<b>HB-CVA</b>	MD6
	15	3500	57	241	7/8-14	<b>DE-CVA</b>	MD8
	15	5000	57	345	7/8-14	<b>HE-CVA</b>	MD10
	35	5000	132	345	1 1/16-12	<b>HT-CVA</b>	MD12
	40	3500	151	241	1 5/16-12	<b>SJ-CVA</b>	MD14
	10	3500	38	241	7/8-14	<b>DE-CVB</b>	MD16
	10	3500	38	241	3/4-16	<b>PB-CVC</b>	MD18
	8	3500	30	241	7/8-14	<b>DE-CVC</b>	MD20
	15	3500	57	241	7/8-14	<b>DE-CVR</b>	MD22
	35	5000	132	345	1 1/16-12	<b>HT-CVR</b>	MD24
	2.5	1500	9.5	103	5/8-18	<b>MA-CVS</b>	MD26
	5	3500	19	241	3/4-16	<b>PB-CVS</b>	MD28
	10	1000	38	70	7/8-14	<b>DE-CVS</b>	MD30

**TYPICAL SCHEMATIC**

Typical application for the CVA, CVB, CVC, CVR, and CVS is load holding in a lift, check, or dump circuit.



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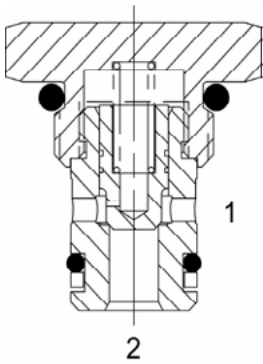


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**MA-CVA DIRECT ACTING CHECK VALVE, POPPET**



**DESCRIPTION**

7 size, 5/8-18 thread, "Mini" series, direct acting check valve.

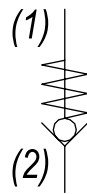
**OPERATION**

The MA-CVA allows flow passage from (2) to (1), while normally blocking oil flow from (1) to (2). The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

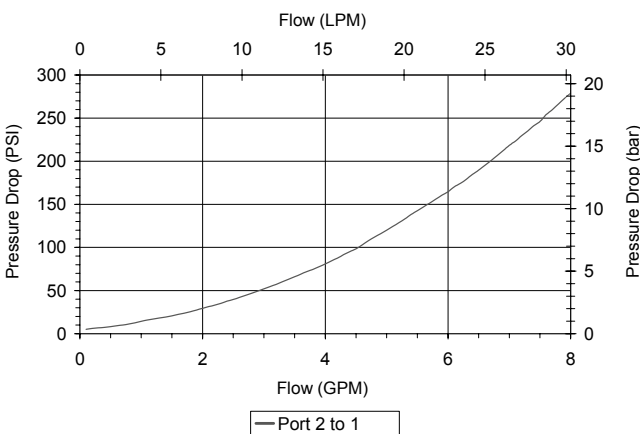
- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	5 GPM (19 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.08 lbs (.03 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Cavity	MINI 2W
Cavity Form Tool (Finishing)	40500003
Seal Kit	21191000

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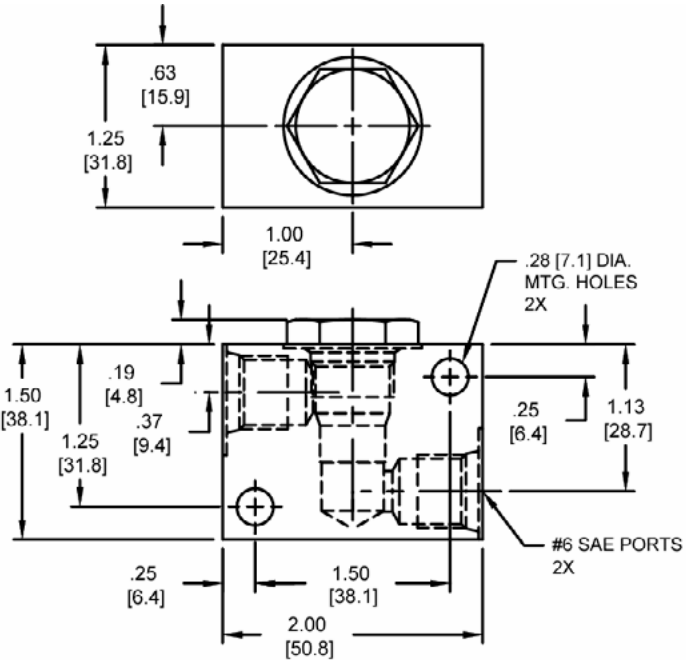
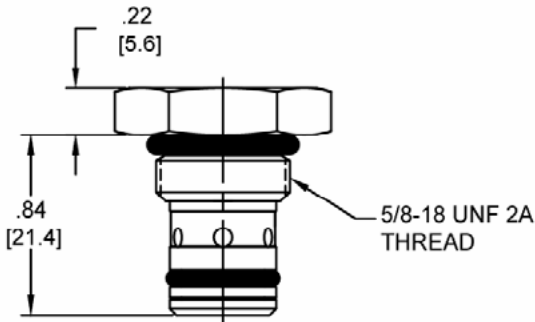
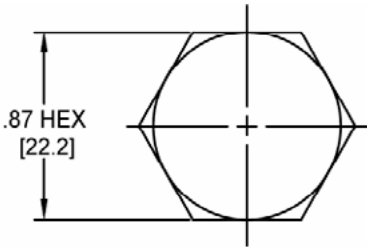


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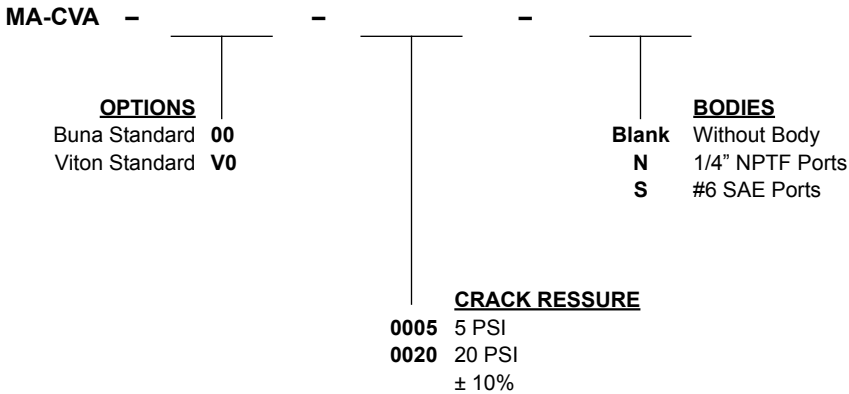
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DIMENSIONS



Body Weight: .29 lbs (.13 kg)

ORDERING INFORMATION



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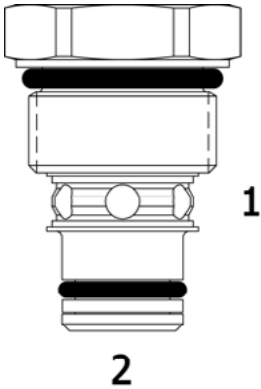


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**HB-CVA DIRECT ACTING CHECK VALVE, POPPET**



**DESCRIPTION**

“High Pressure” 8 size, 3/4-16 thread, “Power” series, direct acting check valve.

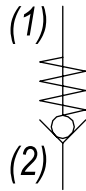
**OPERATION**

The HB-CVA allows free flow passage from (2) to (1), and blocks flow from (1) to (2). The cartridge has a fully guided check poppet, which is spring-biased closed until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

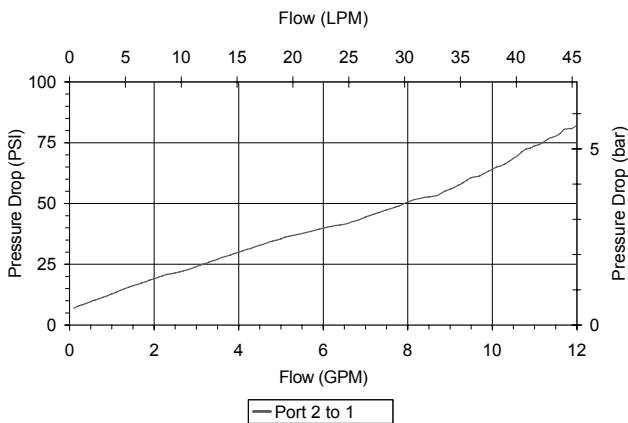
- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	10 GPM (38 LPM)
Rated Operating Pressure	4350 PSI (300 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.10 lbs (.05 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	35 ft-lbs (47 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191100

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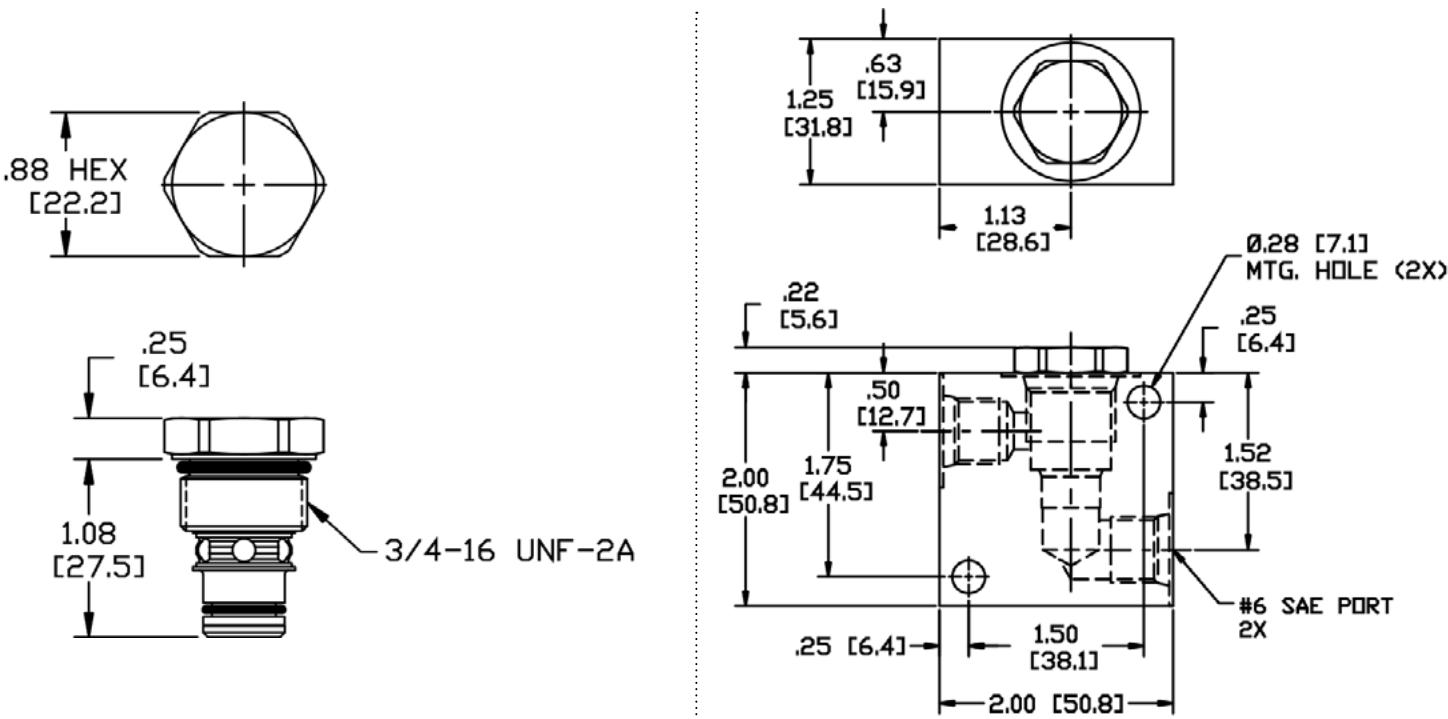


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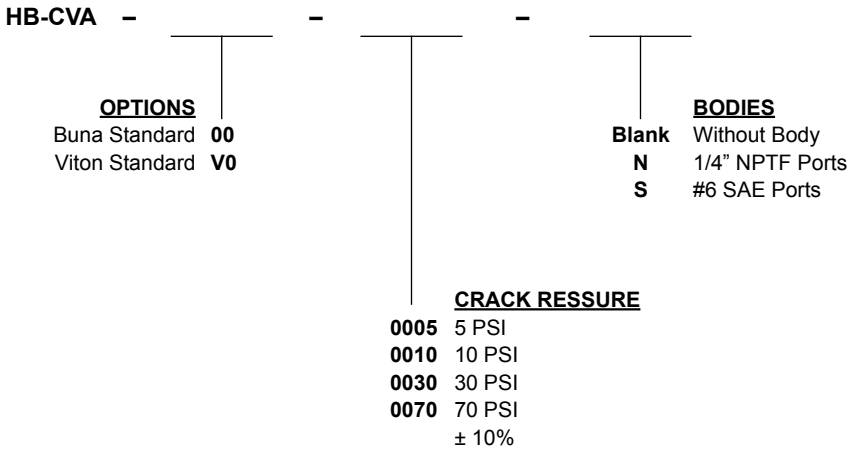
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DIMENSIONS



Body Weight: .40 lbs (.18 kg)

ORDERING INFORMATION



Note: Aluminum, NOT durability rated for 4350 PSI. Consult factory for options.

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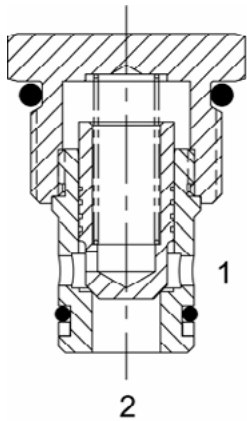


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**DE-CVA DIRECT ACTING CHECK VALVE, POPPET**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, direct acting check valve.

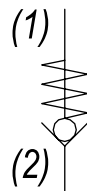
**OPERATION**

The DE-CVA allows free flow passage from (2) to (1), and blocks flow from (1) to (2). The cartridge has a fully guided check poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

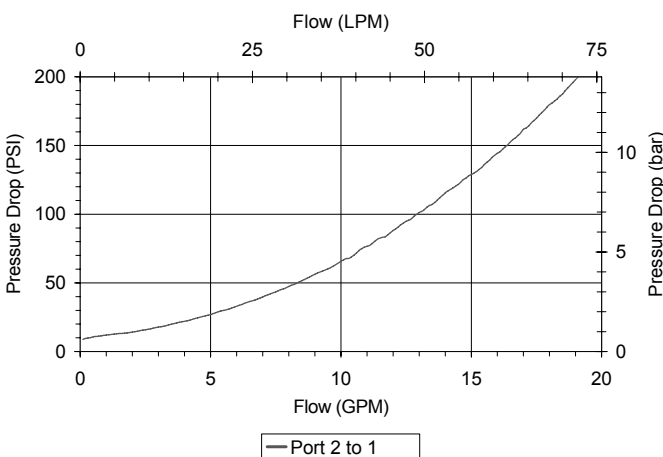
**HYDRAULIC SYMBOL**



*Drop-In pilot pistons can be used (except the 135 and 150 PSI version) to create P.O. Check Valve Function, see the Hydraulic Integrated Circuits section for details.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	15 GPM (57 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.15 lbs (.07 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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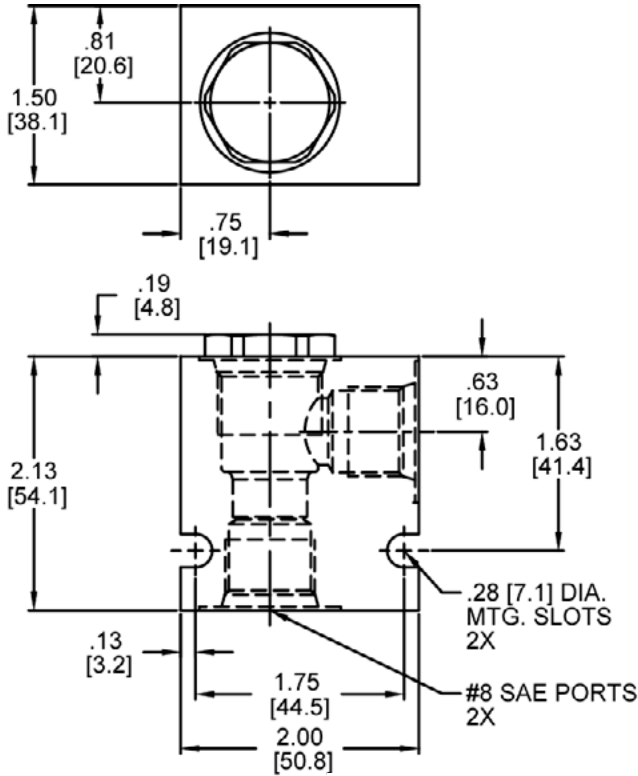
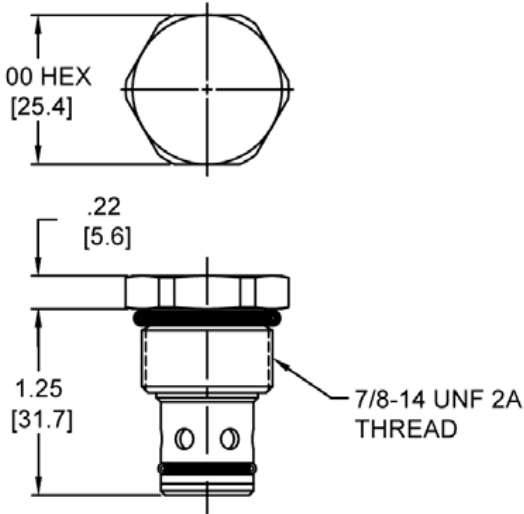
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DIMENSIONS



Body Weight: .47 lbs (.21 kg)

ORDERING INFORMATION

<p><b>DE-CVA</b> - - -</p> <p style="text-align: center;"><u>OPTIONS</u></p> <p>Buna Standard <b>00</b> Viton Standard <b>V0</b></p>	<p style="text-align: center;"><u>BODIES</u></p> <p>Blank Without Body <b>N</b> 3/8" NPTF Ports <b>S</b> #8 SAE Ports</p>
<p style="text-align: center;"><u>CRACK RESSURE</u></p> <p><b>0010</b> 10 PSI <b>0035</b> 35 PSI <b>0070</b> 70 PSI <b>0090</b> 90 PSI <b>0135</b> 135 PSI <b>0150</b> 150 PSI ± 10%</p>	

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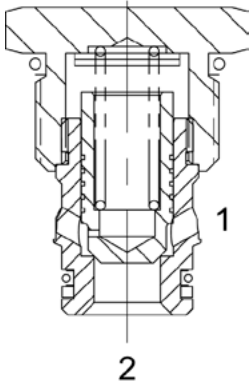


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**HE-CVA DIRECT ACTING CHECK VALVE, POPPET**



**DESCRIPTION**

“High Pressure” 10 size, 7/8-14 thread, “Delta” series, direct acting check valve.

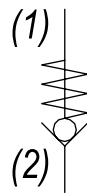
**OPERATION**

The HE-CVA allows free flow passage from (2) to (1), and blocks flow from (1) to (2). The cartridge has a fully guided check poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

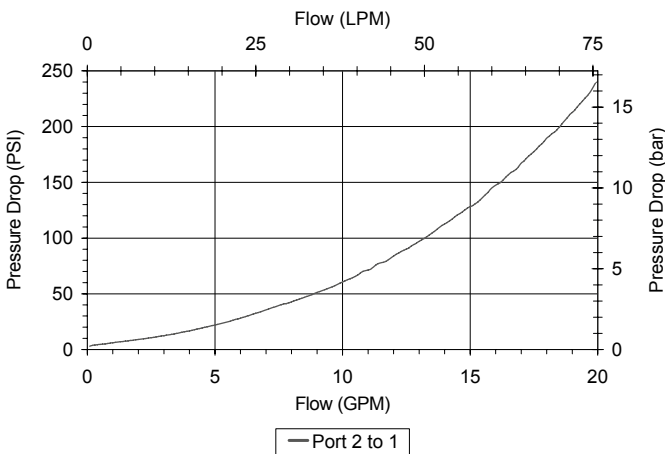
**HYDRAULIC SYMBOL**



*Drop-In pilot pistons can be used (except the 135 and 150 PSI version) to create P.O. Check Valve Function, see the Hydraulic Integrated Circuits section for details.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	15 GPM (57 LPM)
Rated Operating Pressure	5000 PSI (345 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	1.23 lbs (.56 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	50 ft-lbs (67.8 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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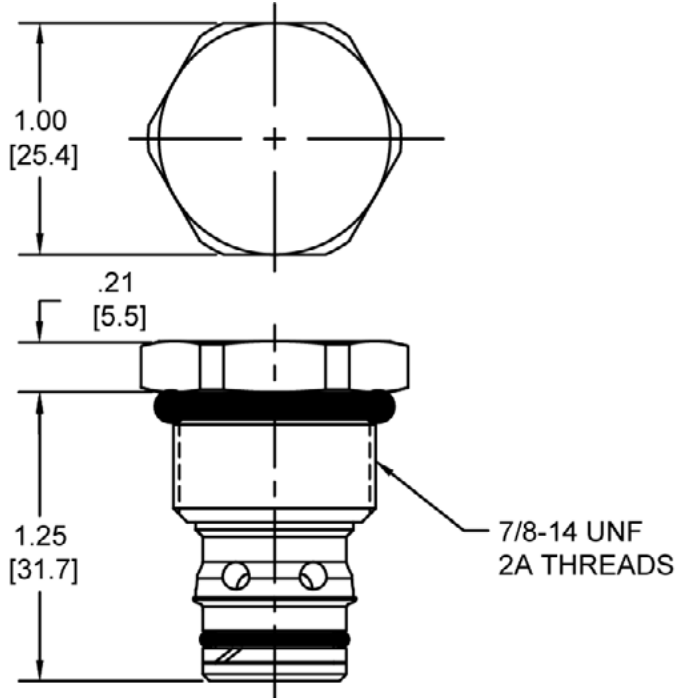


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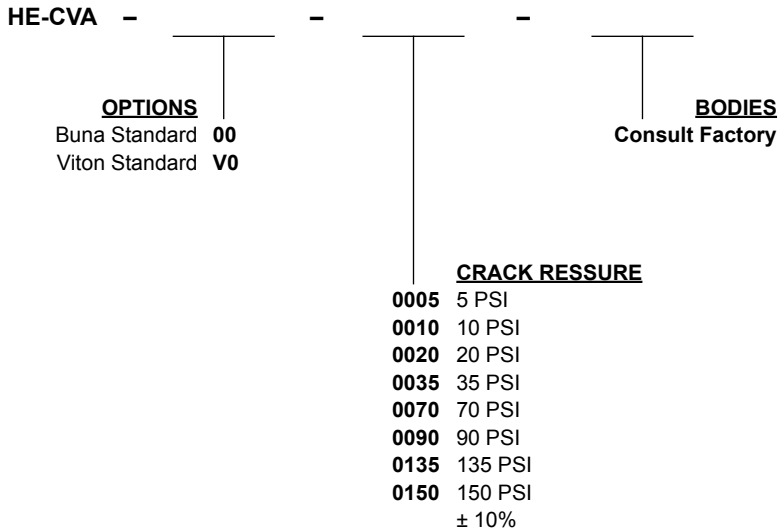


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**WARNING**  
DO NOT USE ALUMINUM BODY  
HIGH PRESSURE (5000 PSI) PRODUCT

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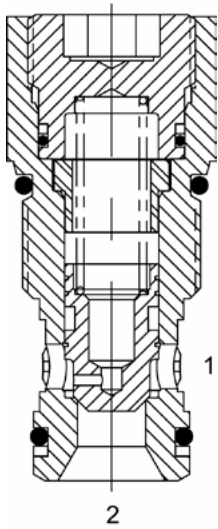


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**HT-CVA DIRECT ACTING CHECK VALVE, POPPET**



**DESCRIPTION**

“High Pressure” 12 size, 1 1/16-12 thread, “Tecnord” series, direct acting check valve.

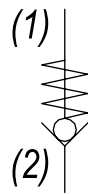
**OPERATION**

The HT-CVA allows flow passage from (2) to (1), while normally blocking oil flow from (1) to (2). The cartridge has a fully guided poppet, which is spring biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

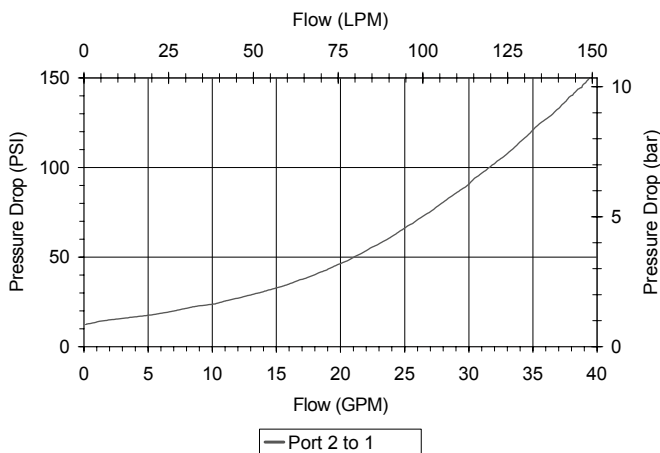
- Hardened parts for long life and low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	35 GPM (132 LTR/M)
Rated Operating Pressure	5000 PSI (345 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.55 lbs (.25 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	70 ft-lbs (95 Nm)
Cavity	TECNORD 2W
Cavity Form Tool (Finishing)	40500032
Seal Kit	21191300

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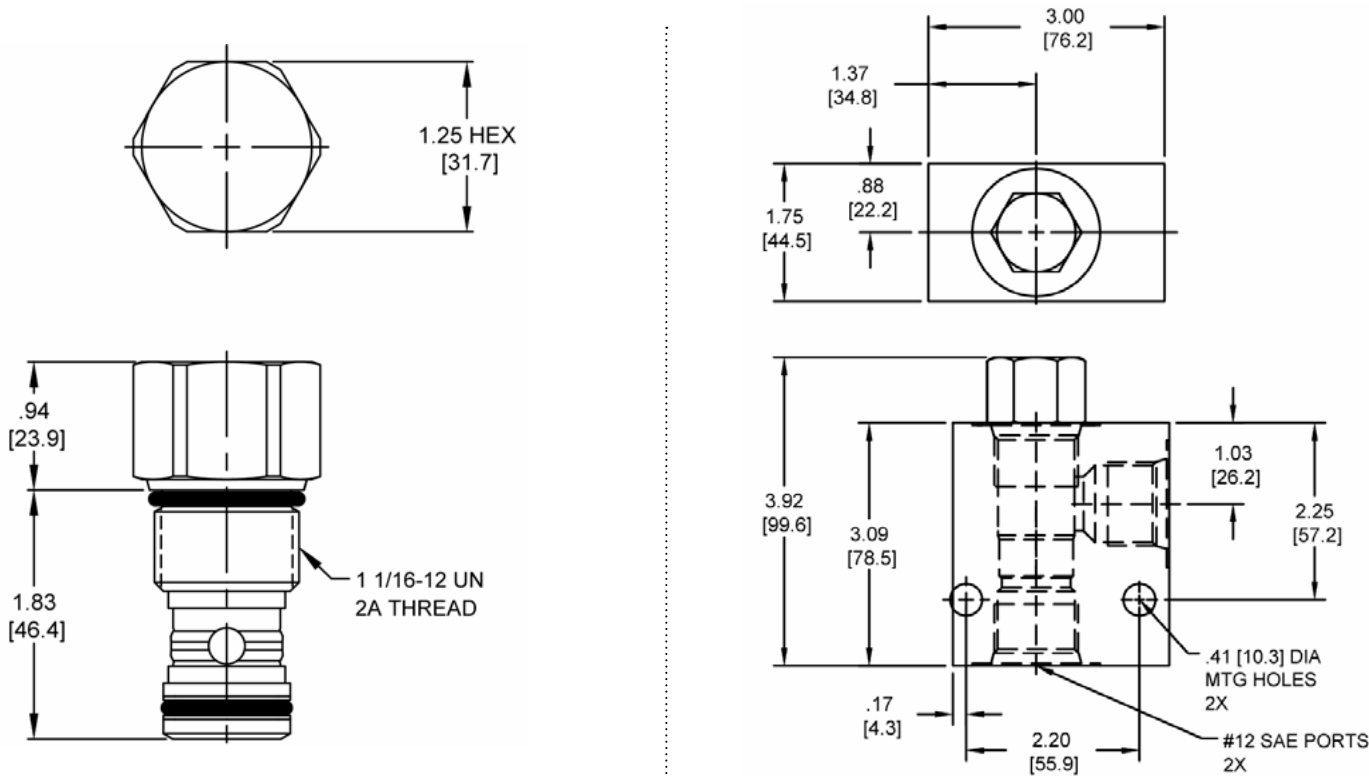


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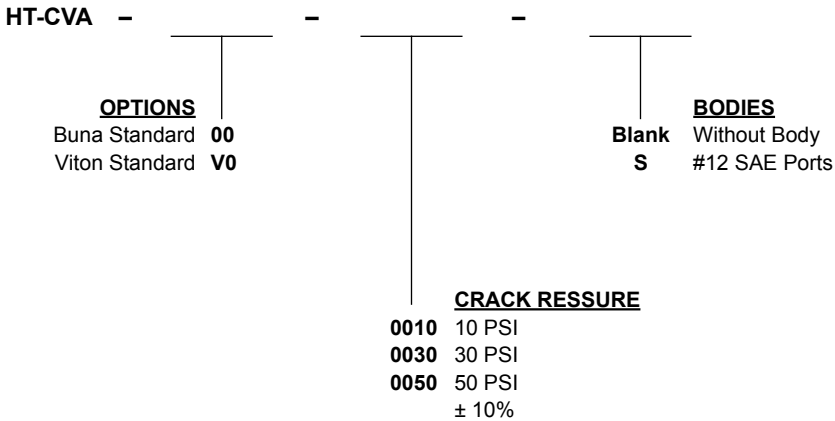
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**DIMENSIONS**



Body Weight: 3.71 lbs (1.68 kg)

**ORDERING INFORMATION**



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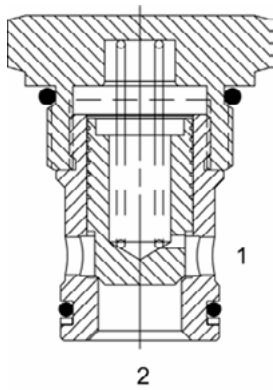


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**SJ-CVA DIRECT ACTING CHECK VALVE, POPPET**



**DESCRIPTION**

16 size, 1 5/16-12 thread, "Super" series, direct acting check valve.

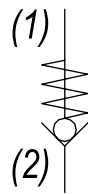
**OPERATION**

The SJ-CVA allows free flow from (2) to (1) and blocks flow from (1) to (2). The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

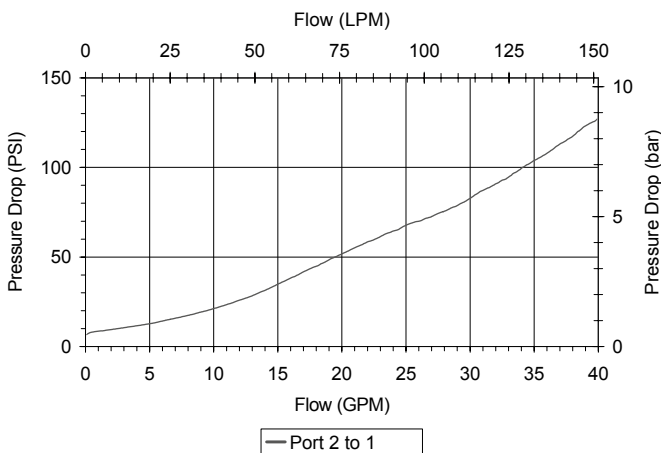
- Hardened parts for long life and low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	40 GPM (151 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.67 lbs (.30 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	90 ft-lbs (122 Nm)
Cavity	SUPER 2W
Cavity Form Tool (Finishing)	40500017
Seal Kit	21191400

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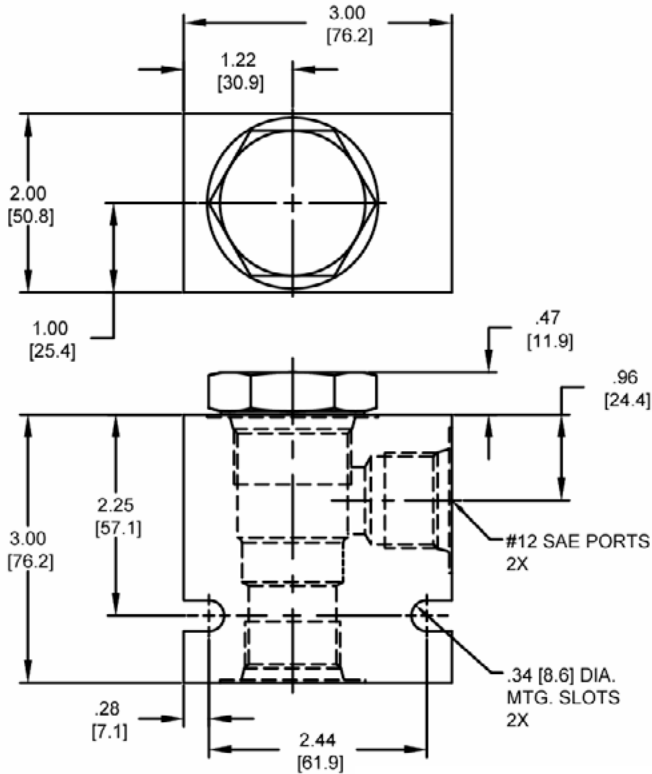
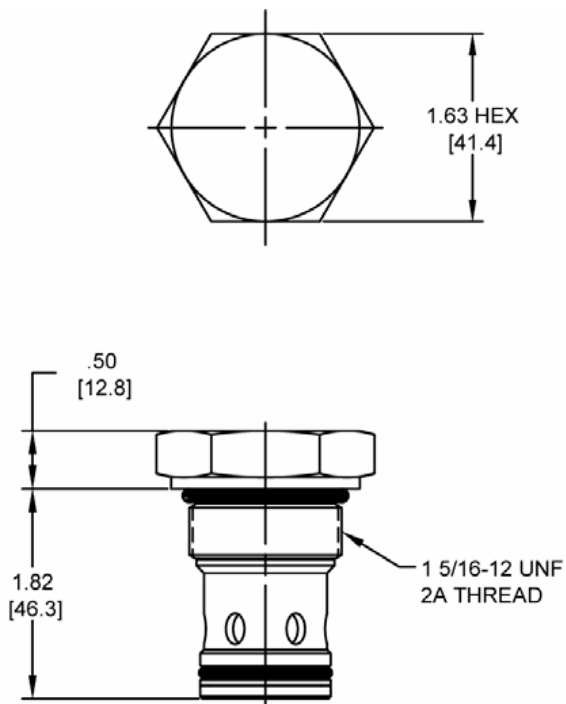


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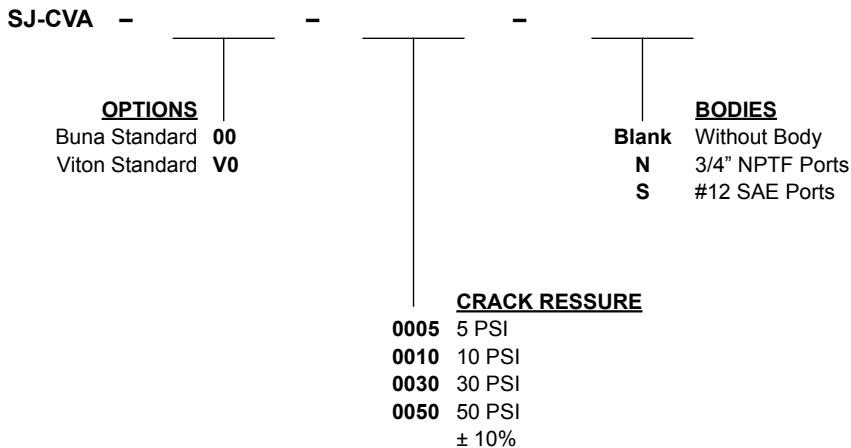
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**DIMENSIONS**



Body Weight: 1.29 lbs (.58 kg)

**ORDERING INFORMATION**



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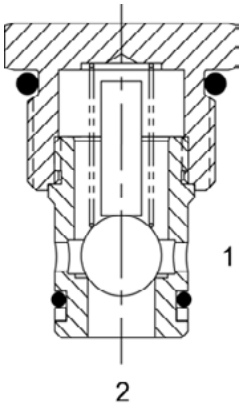


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**DE-CVB DIRECT ACTING CHECK VALVE, BALL**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, direct acting, check valve.

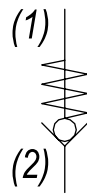
**OPERATION**

The DE-CVB allows free flow passage from (2) to (1), and blocks flow from (1) to (2). The cartridge has a hardened ball, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

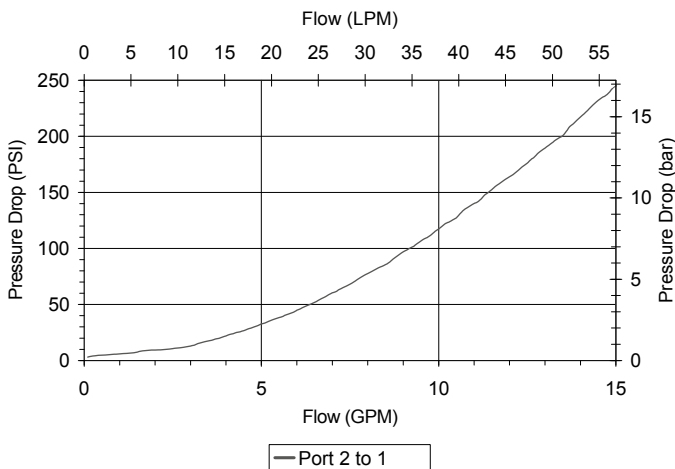
- Hardened seat for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	10 GPM (38 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.14 lbs (.06 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191000

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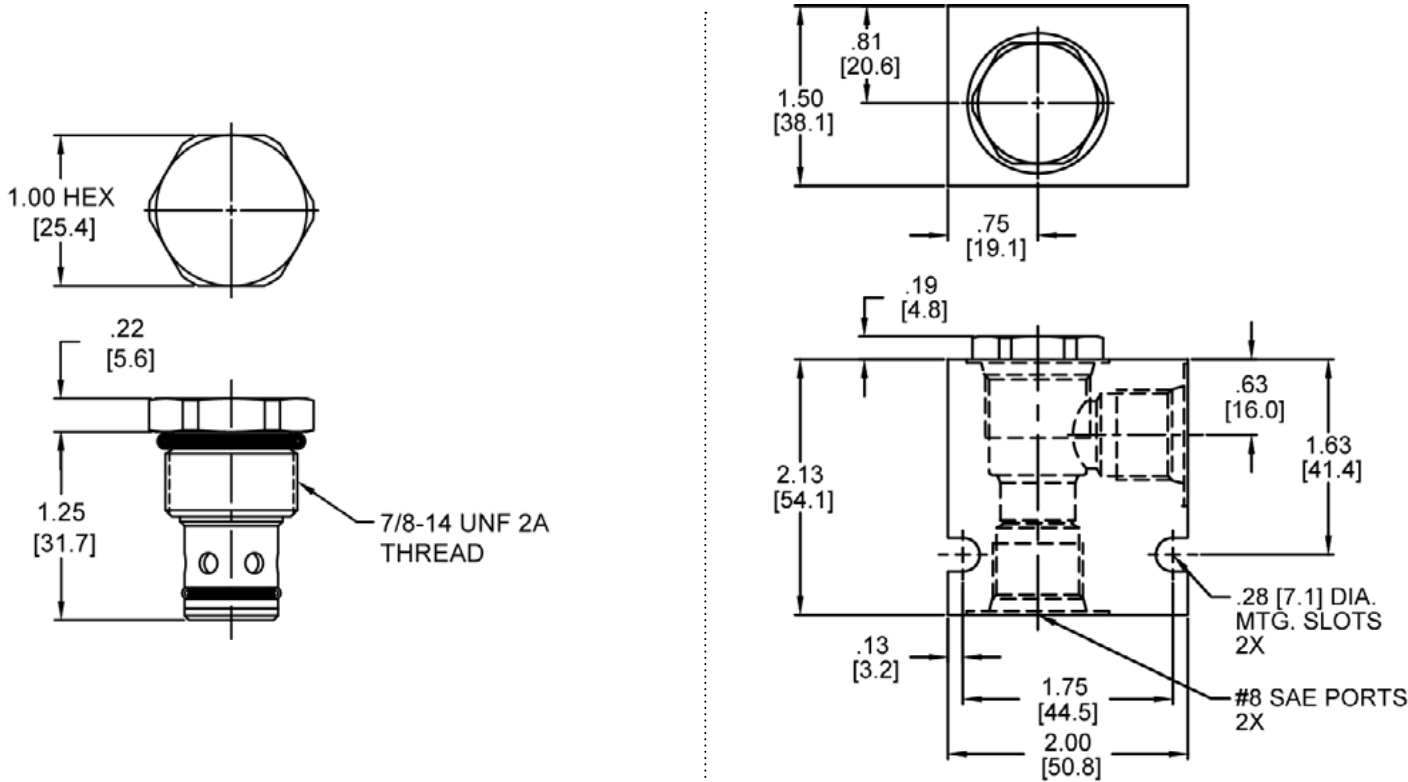
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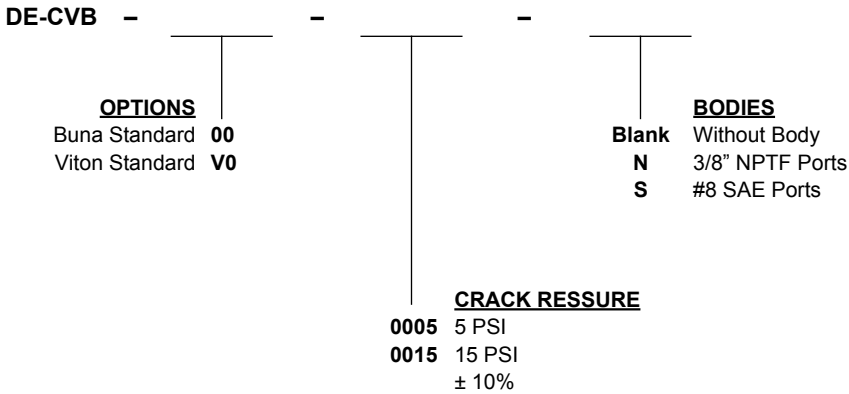


**DIMENSIONS**



Body Weight: .47 lbs (.21 kg)

**ORDERING INFORMATION**



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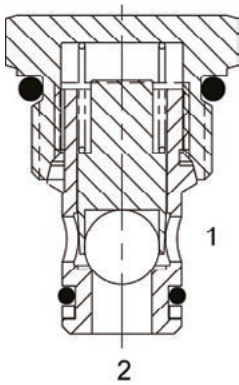


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**PB-CVC DIRECT ACTING CHECK VALVE, GUIDED BALL**



**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, direct acting check valve.

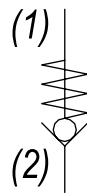
**OPERATION**

The PB-CVC allows free flow passage from (2) to (1), and blocks flow from (1) to (2). The cartridge has a fully guided hardened ball, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

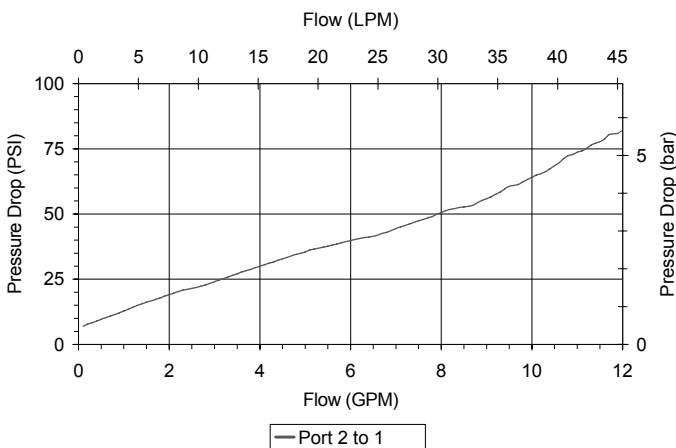
- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided ball assembly.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	10 GPM (38 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.10 lbs (.05 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191100

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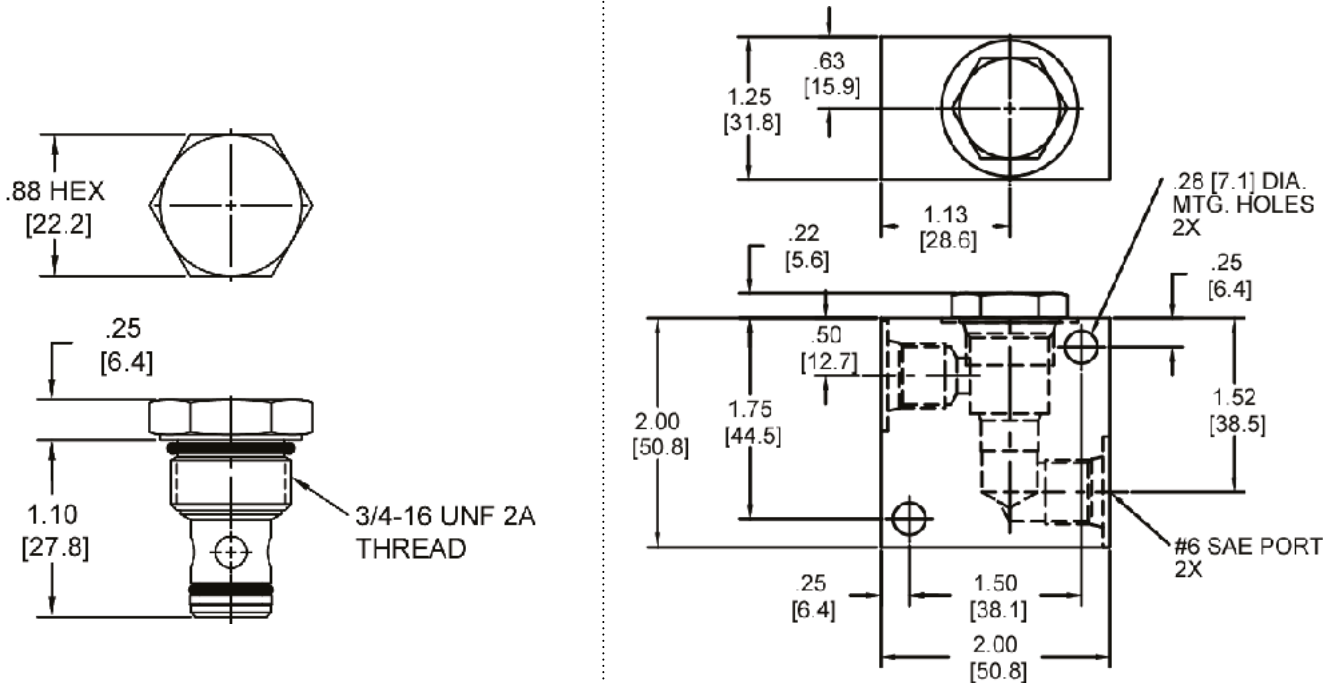


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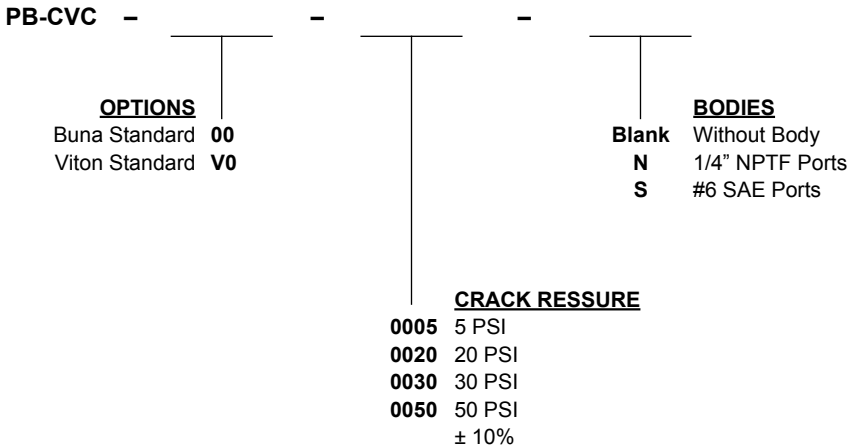
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DIMENSIONS



Body Weight: .39 lbs (.18 kg)

ORDERING INFORMATION



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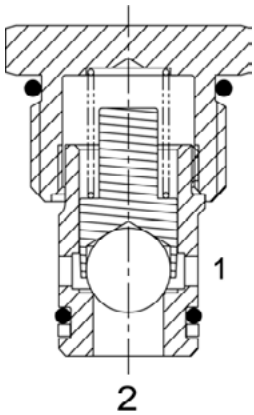


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**DE-CVC DIRECT ACTING CHECK VALVE, GUIDED BALL**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, direct acting check valve.

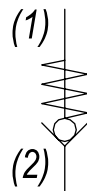
**OPERATION**

The DE-CVC allows free flow passage from (2) to (1), and blocks flow from (1) to (2). The cartridge has a fully guided hardened ball, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

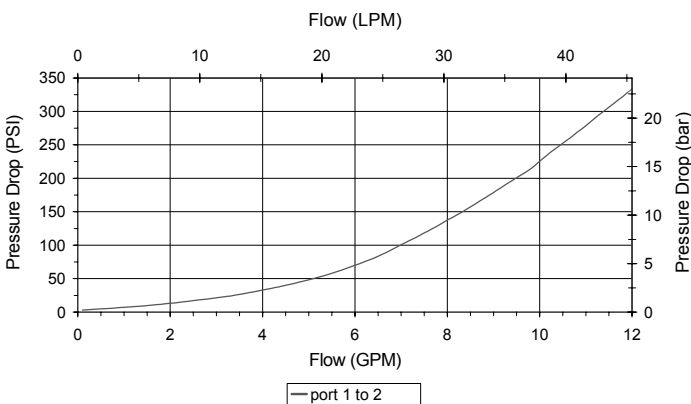
- Hardened parts for long life and low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided ball assembly.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	8 GPM (30 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.15 lbs (.07 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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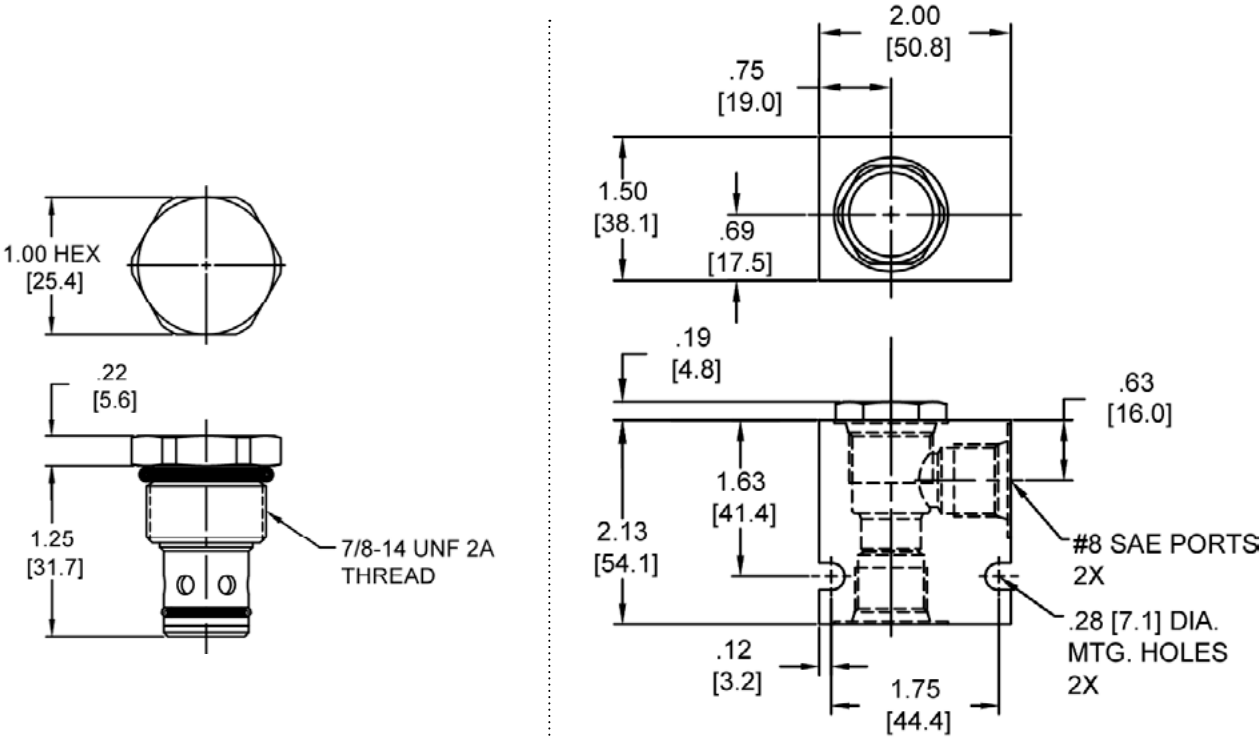


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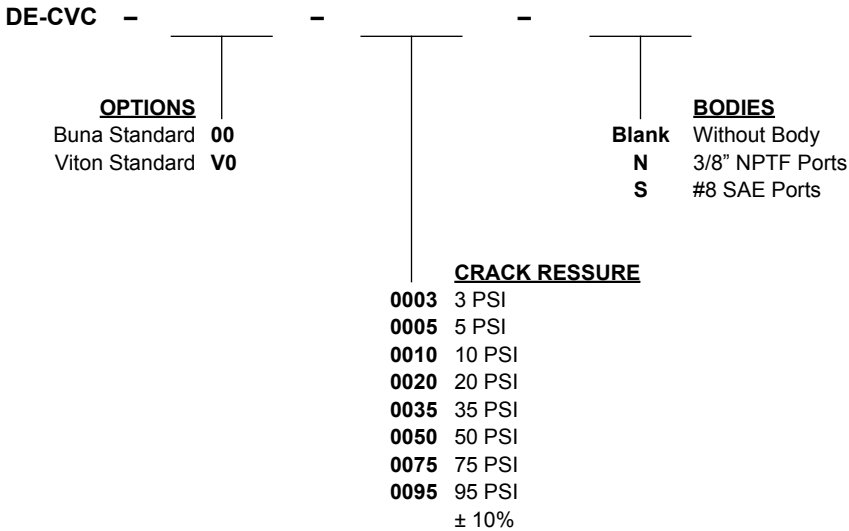
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**DIMENSIONS**



Body Weight: .47 lbs (.21 kg)

**ORDERING INFORMATION**



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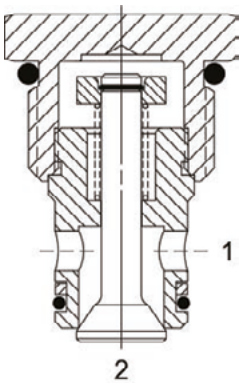


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**DE-CVR REVERSE FLOW CHECK VALVE, POPPET**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, reverse flow check valve.

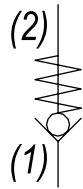
**OPERATION**

The DE-CVR allows free flow (1) to (2) and blocks flow from (2) to (1).

**FEATURES**

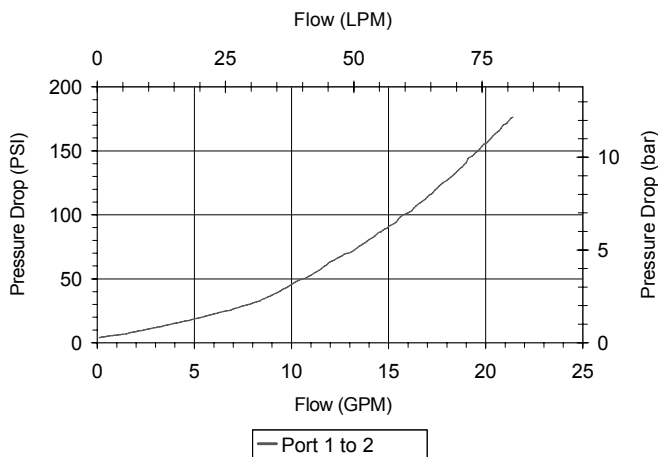
- Hardened parts for long life and low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	15 GPM (57 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.15 lbs (.07 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191204

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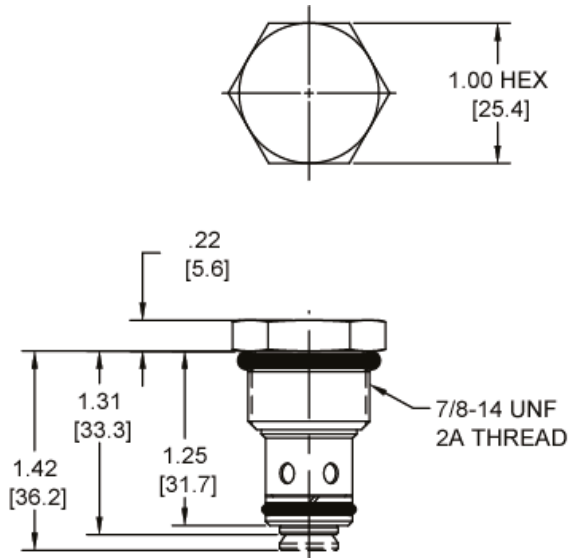


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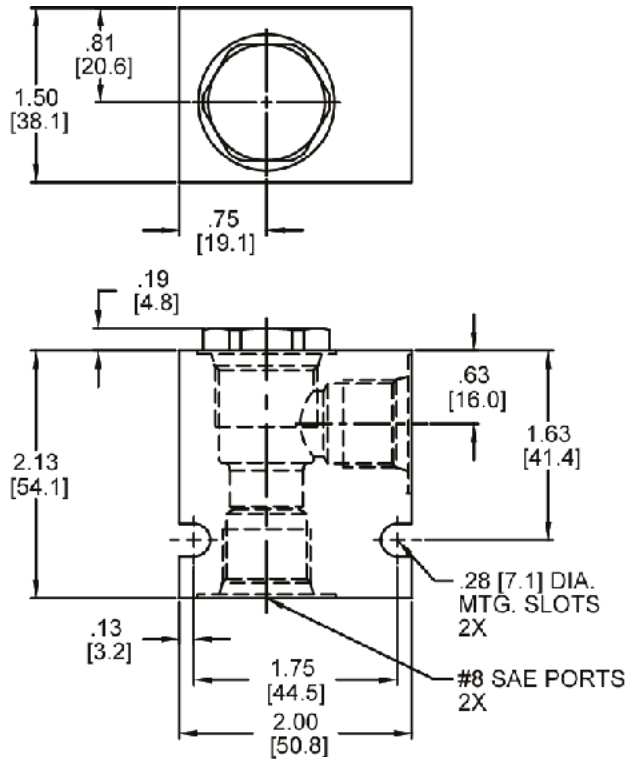


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DIMENSIONS

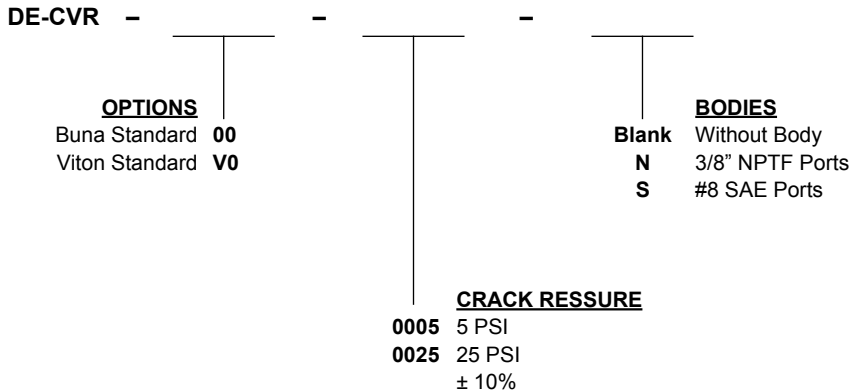


MINIMUM .563 DIAMETER PREDRILL 1.53 DEEP REQUIRED.



Body Weight: .47 lbs (.21 kg)

ORDERING INFORMATION



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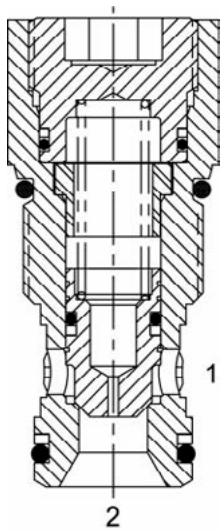


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**HT-CVR REVERSE FLOW CHECK VALVE, POPPET**



**DESCRIPTION**

“High Pressure” 12 size, 1 1/16-12 thread, “Tecnord” series, reverse flow check valve.

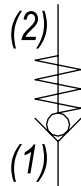
**OPERATION**

The HT-CVR allows free flow from (1) to (2) and blocks flow from (2) to (1). The cartridge has a fully guided poppet, which is spring biased closed, until sufficient pressure is applied at (1) to open to (2).

**FEATURES**

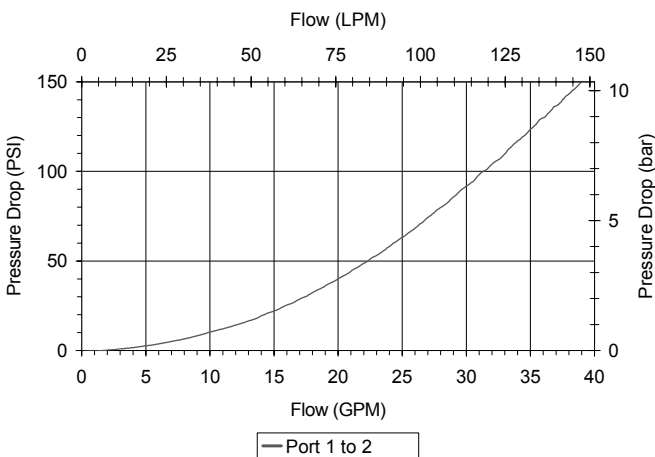
- Hardened parts for long life and low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	35 GPM (132 LPM)
Rated Operating Pressure	5000 PSI (345 bar)
Typical Internal Leakage (150 SSU)	0-8 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.55 lbs (.25 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	70 ft-lbs (95 Nm)
Cavity	TECNORD 2W
Cavity Form Tool (Finishing)	40500032
Seal Kit	21191300

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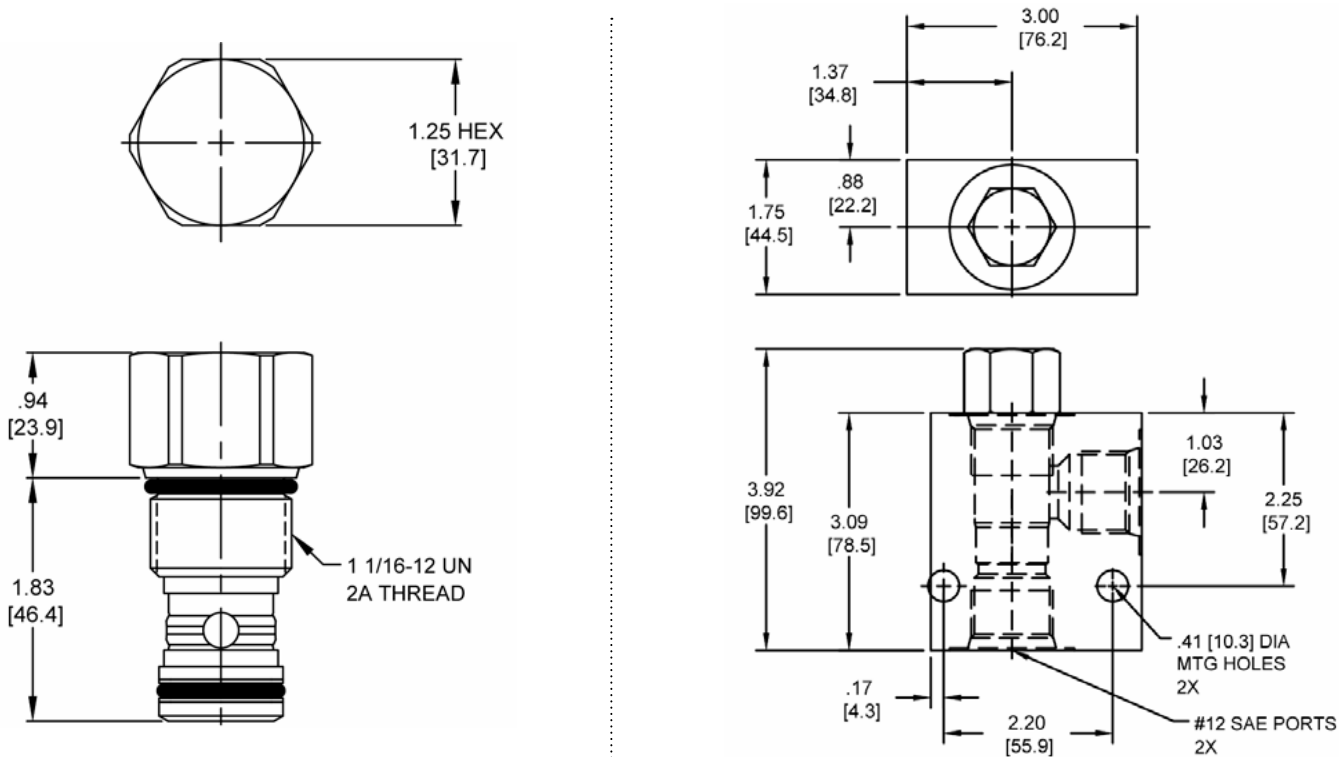
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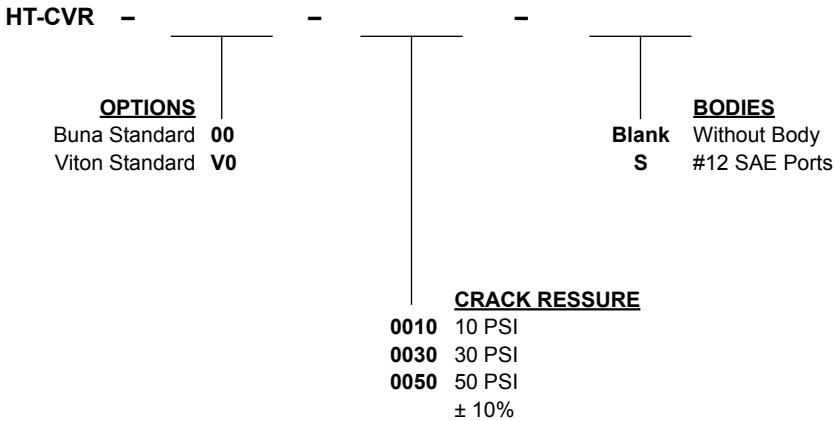


**DIMENSIONS**



Body Weight: 3.71 lbs (1.68 kg)

**ORDERING INFORMATION**



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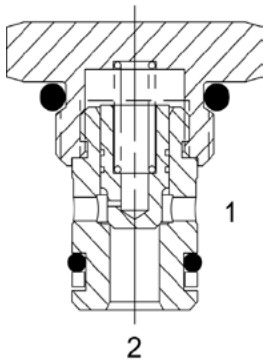


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**MA-CVS** DIRECT ACTING CHECK VALVE, SOFT SEAT, POPPET



**DESCRIPTION**

7 size, 5/8-18 Thread, "Mini" series, direct acting check valve, soft seat, poppet.

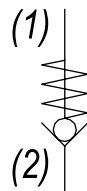
**OPERATION**

The MA-CVS allows free flow (2) to (1) and blocks flow from (1) to (2). The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open (1).

**FEATURES**

- Soft seat for ultra low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet.

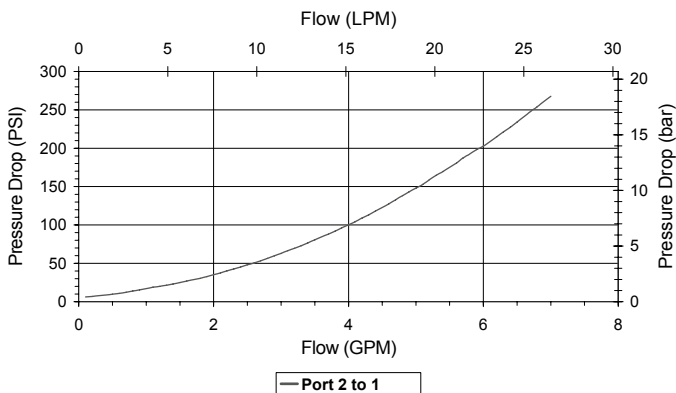
**HYDRAULIC SYMBOL**



*Drop-in Pilot Pistons are NOT RECOMMENDED for this valve.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	2.5 GPM (9.5 LPM)
Rated Operating Pressure	1500 PSI (103 bar)
Typical Internal Leakage (150 SSU)	Negligible
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-32° to 120°F (0° to 49°C)
Weight	.08 lbs (.03 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Cavity	MINI 2W
Cavity Form Tool (Finishing)	40500003
Seal Kit	21191000

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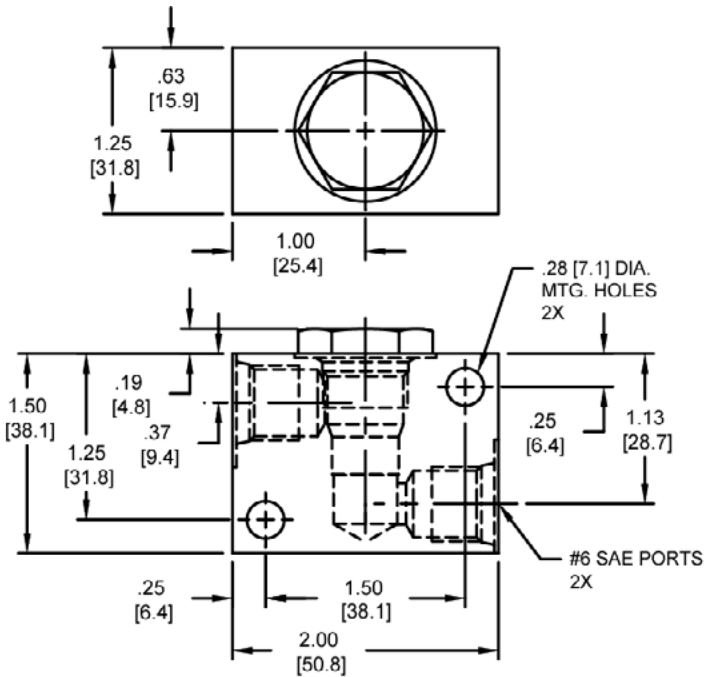
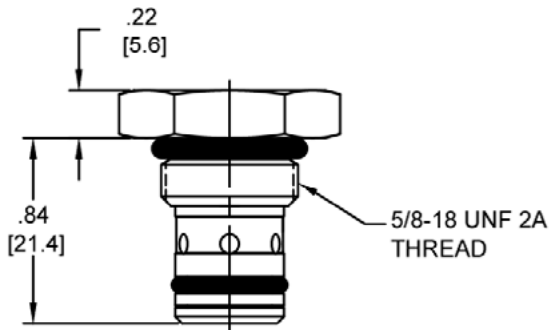
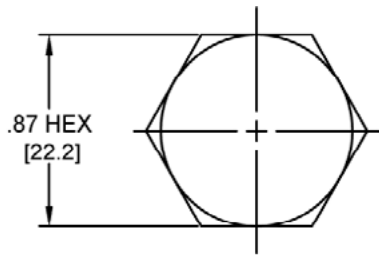


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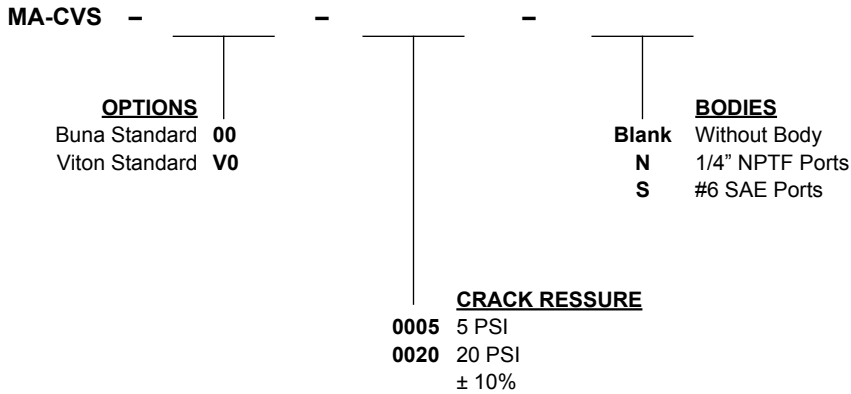
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DIMENSIONS



Body Weight: .29 lbs (.13 kg)

ORDERING INFORMATION



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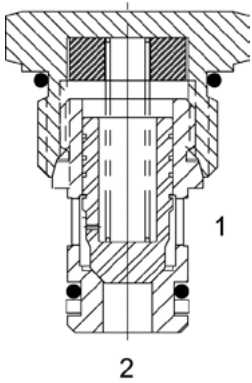


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**PB-CVS DIRECT ACTING CHECK VALVE, SOFT SEAT, POPPET**



**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, direct acting check valve, soft seat, poppet.

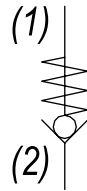
**OPERATION**

The PB-CVS allows free flow passage from (2) to (1), and blocks flow from (1) to (2). The cartridge has a fully guided poppet, which is spring-biased closed, until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

- Soft seat for ultra low leakage.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.

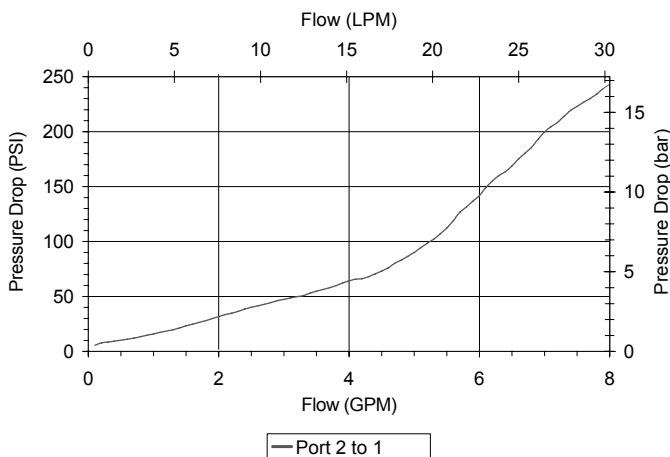
**HYDRAULIC SYMBOL**



*Drop-in Pilot Pistons are NOT RECOMMENDED for this valve.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	5 GPM (19 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	Negligible
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-32° to 120°F (0° to 49°C)
Weight	.09 lbs (.04 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191100

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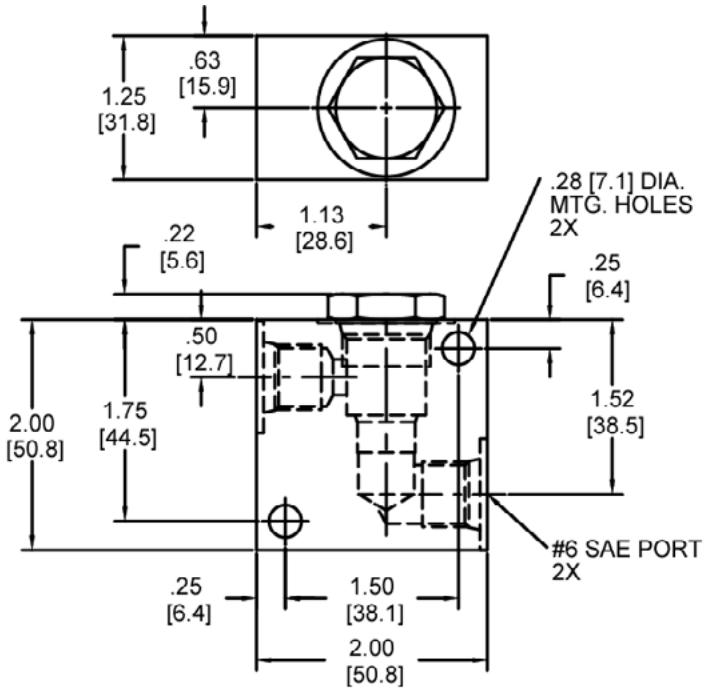
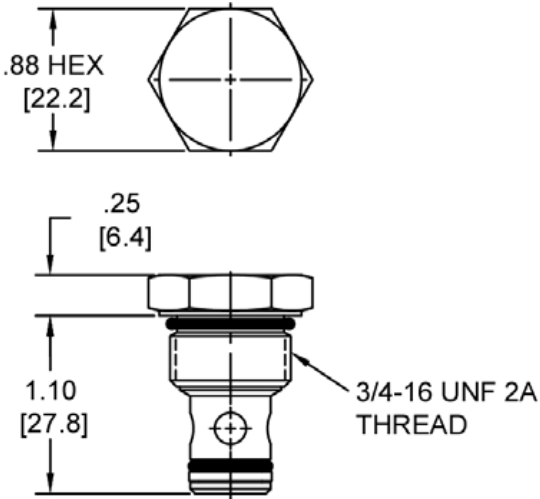


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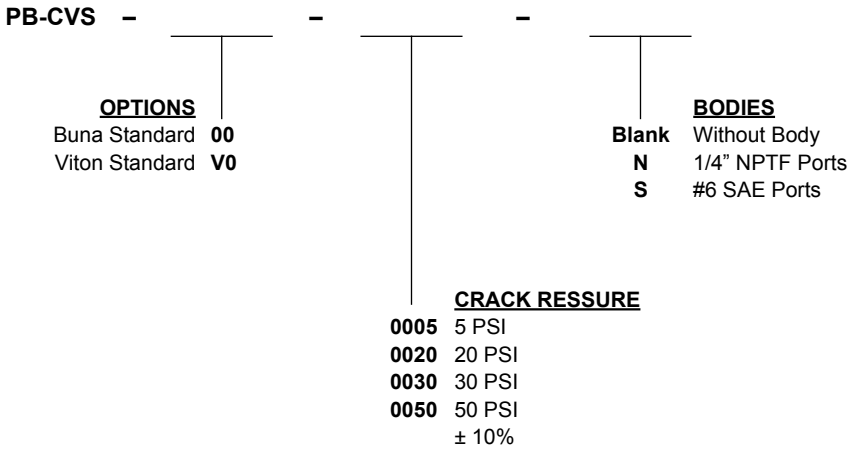
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DIMENSIONS



Body Weight: .39 lbs (.18 kg)

ORDERING INFORMATION



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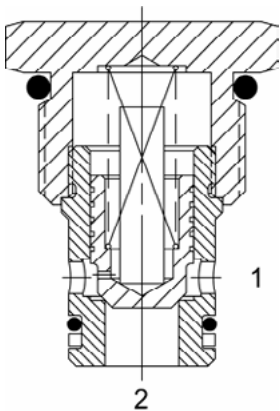


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**DE-CVS DIRECT ACTING CHECK VALVE, SOFT SEAT, POPPET**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, soft seat check valve.

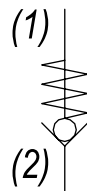
**OPERATION**

The DE-CVS allows flow to pass from (2) to (1) and blocks flow from (1) to (2). The cartridge has a fully guided check poppet, which is spring-biased closed until sufficient pressure is applied at (2) to open to (1).

**FEATURES**

- Soft seat for ultra low leakage.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

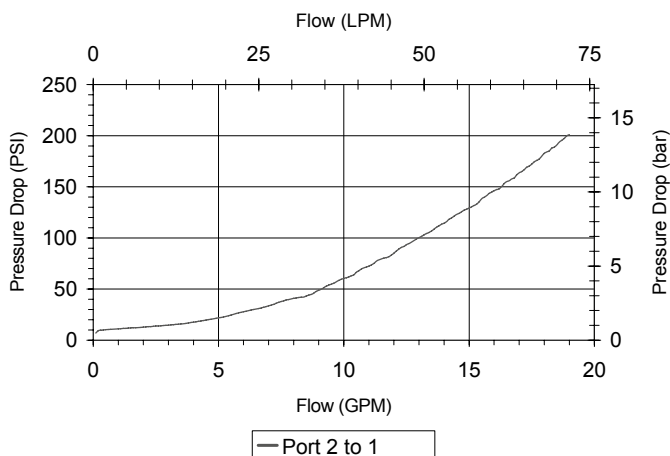
**HYDRAULIC SYMBOL**



*Drop-In pilot pistons are NOT RECOMMENDED for this valve. If you would like to create P.O. Check Valve Function, please use the CVA valve and/or see the Hydraulic Integrated Circuits section for details.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	10 GPM (38 LTR/N)
Rated Operating Pressure	1000 PSI (70 bar)
Typical Internal Leakage (150 SSU)	Negligible
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-32° to 160°F (0° to 70°C)
Weight	.14 lbs (.06 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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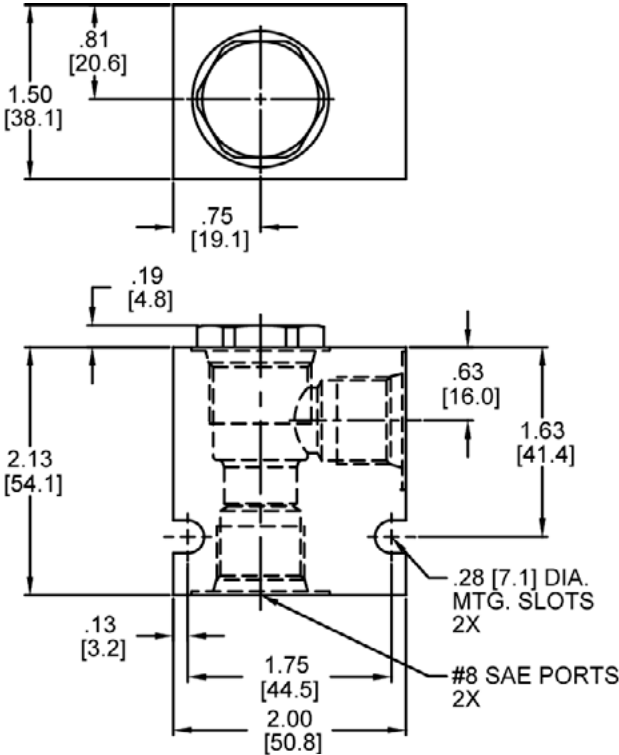
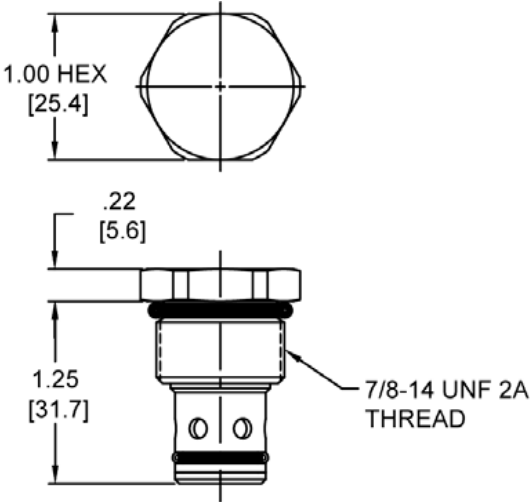


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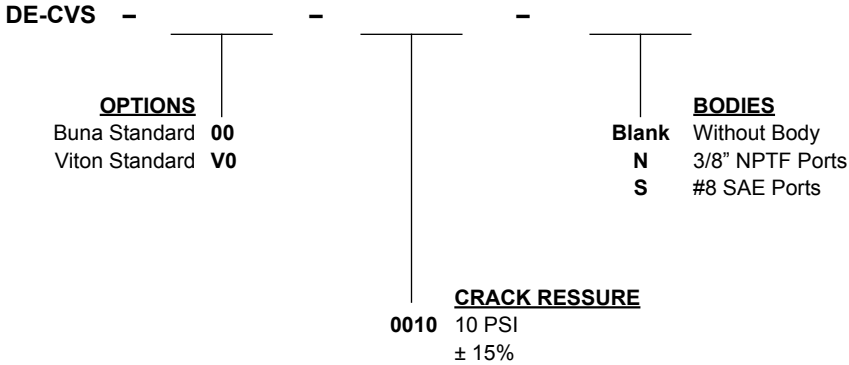
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**DIMENSIONS**



Body Weight: .47 lbs (.21 kg)

**ORDERING INFORMATION**



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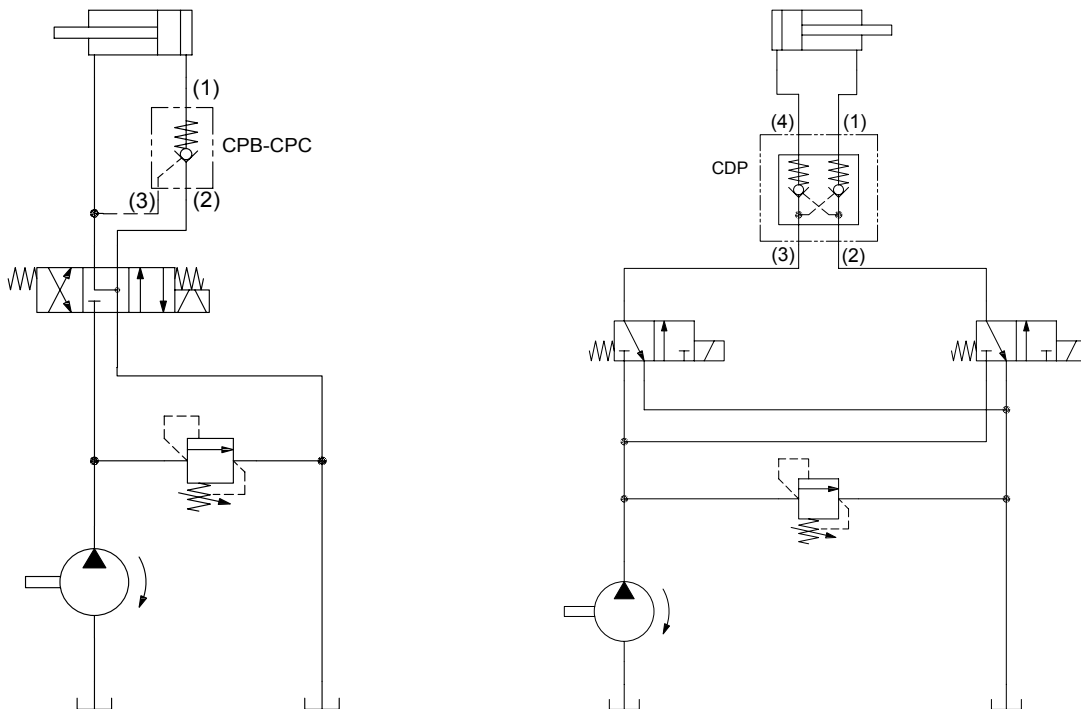
PILOT TO OPEN AND DOUBLE PO CHECK VALVES

PILOT TO OPEN CHECK VALVES	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	6	3500	23	241	3/4-16	PP-CPB	MD34
	8	3500	30	241	7/8-14	DF-CPB	MD36
	10	3500	38	241	7/8-14	DF-CPC	MD38

DOUBLE PO CHECK VALVES	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	3	3000	11	207	5/8-18	MD-CDP	MD40
	5	3000	19	207	3/4-16	PQ-CDP	MD42
	8	3000	30	207	7/8-14	DG-CDP	MD44

TYPICAL SCHEMATIC

Typical application for the CPB and CPC is load holding for a double acting cylinder as shown.



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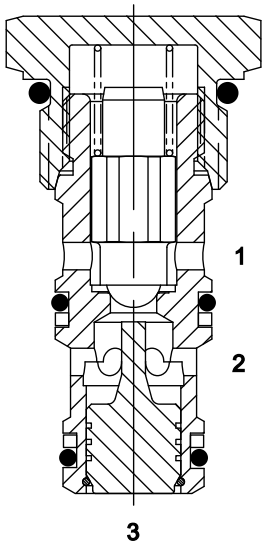


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**PP-CPB PILOT OPERATED CHECK VALVE, GUIDED BALL**



**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, pilot operated, ball check valve.

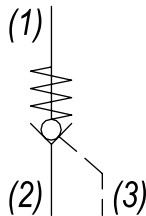
**OPERATION**

The PP-CPB allows free flow to pass from (2) to (1) and blocks flow from (1) to (2). When pilot pressure is applied to port (3) the valve allows free flow from (1) to (2).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

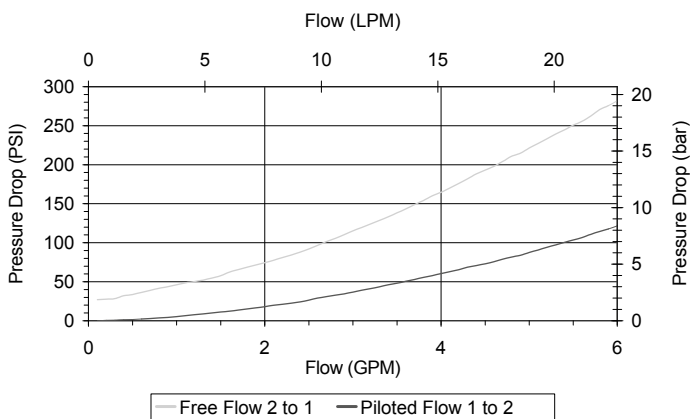
**HYDRAULIC SYMBOL**



For sealed pilot piston consult factory.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	6 GPM (23 LTR/M) from (1) to (2) 4 GPM (15 LTR/M) from (2) to (1)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Pilot Ratio	4:1
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.14 lbs (.06 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 3W
Cavity Form Tool (Finishing)	40500024
Seal Kit	21191108

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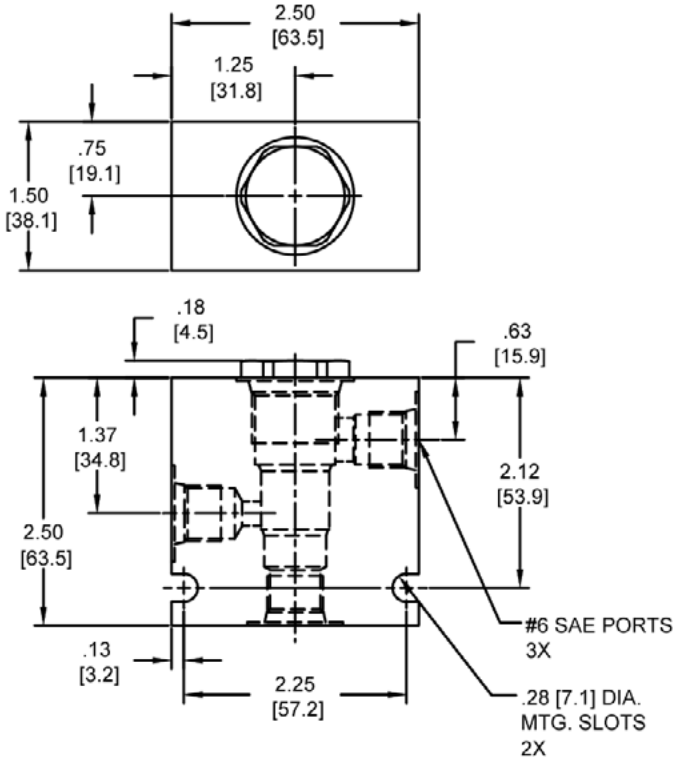
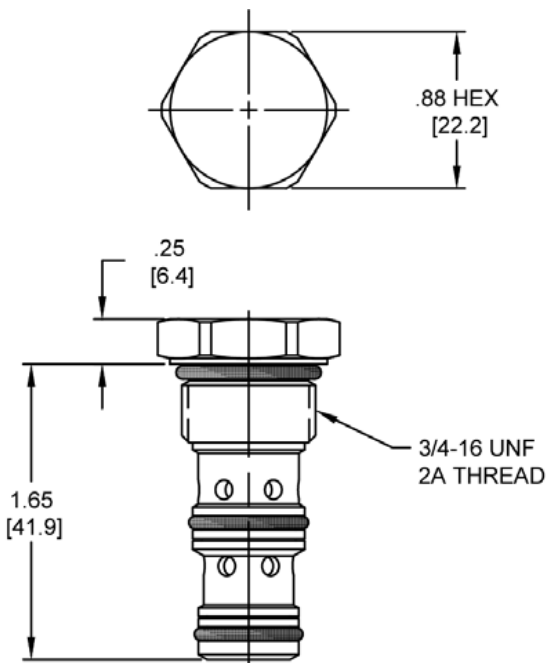


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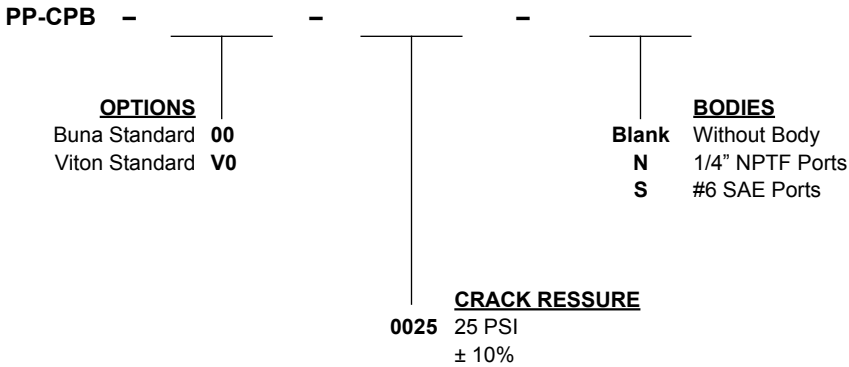


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DIMENSIONS



ORDERING INFORMATION



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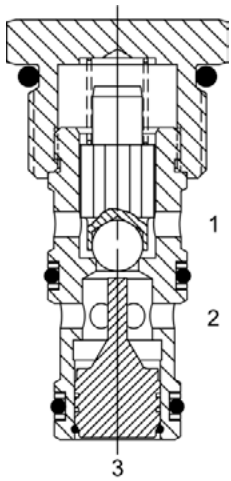


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**DF-CPB PILOT OPERATED CHECK VALVE, GUIDED BALL**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, pilot operated, ball check valve.

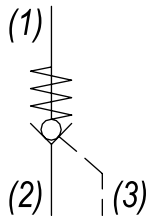
**OPERATION**

The DF-CPB allows free flow to pass from (2) to (1) and blocks flow from (1) to (2). When pilot pressure is applied to port (3) the valve allows free flow from (1) to (2).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

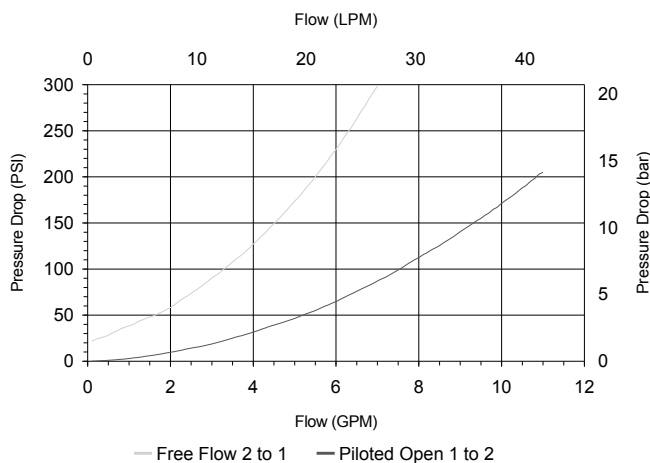
**HYDRAULIC SYMBOL**



For sealed pilot piston consult factory.  
0.030" to 0.060" diameter orifice recommended in the feed line to port #3.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	8 GPM (30 LTR/M) from (1) to (2) 5 GPM (19 LTR/M) from (2) to (1)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Pilot Ratio	4:1
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.19 lbs (.09 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 3W
Cavity Form Tool (Finishing)	40500001
Seal Kit	21191202

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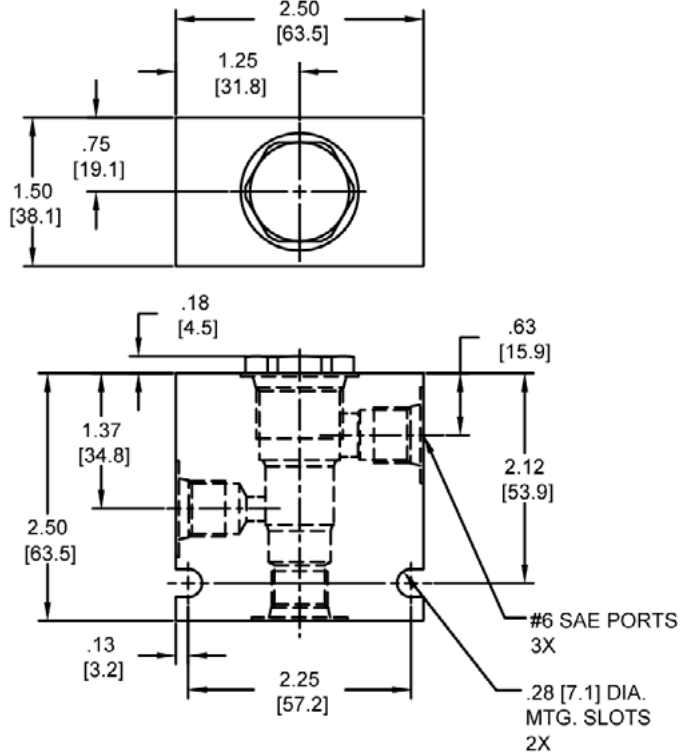
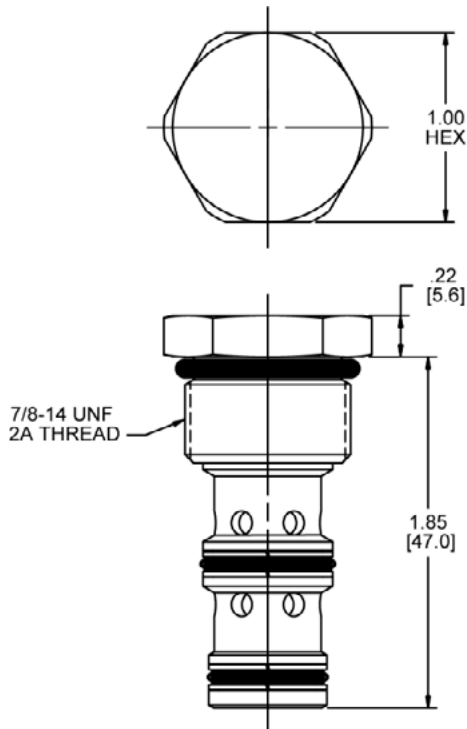


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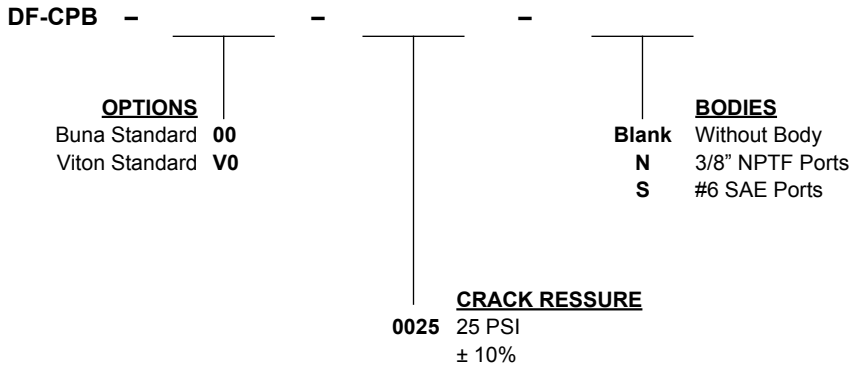


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**DIMENSIONS**



**ORDERING INFORMATION**



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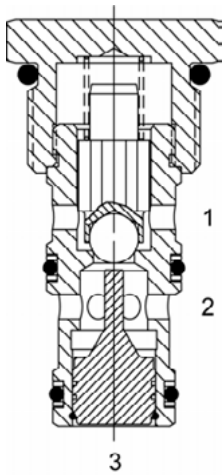


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**DF-CPC PILOT TO OPEN, CHECK VALVE, GUIDED BALL**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, pilot to open, ball check valve.

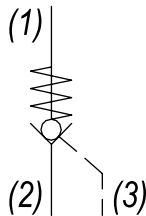
**OPERATION**

The DF-CPC allows free flow to pass from (2) to (1) and blocks flow from (1) to (2). When pilot pressure is applied to port (3) the valve allows free flow from (1) to (2). The cartridge has a 2:1 pilot ratio, meaning that at least one half of the load pressure held at (1) is required at (3) to open the valve. The check is spring biased to assure holding in static or no-load conditions.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

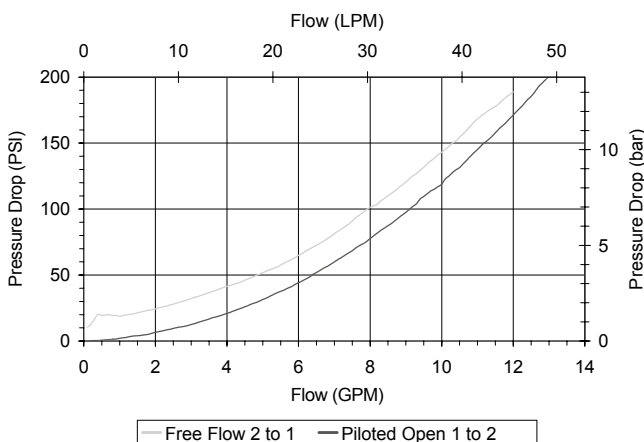
**HYDRAULIC SYMBOL**



*Special higher bias spring values available. Consult factory. For sealed pilot piston consult factory.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	10 GPM (38 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Pilot Ratio	2:1
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.19 lbs (.09 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 3W
Cavity Form Tool (Finishing)	40500001
Seal Kit	21191202

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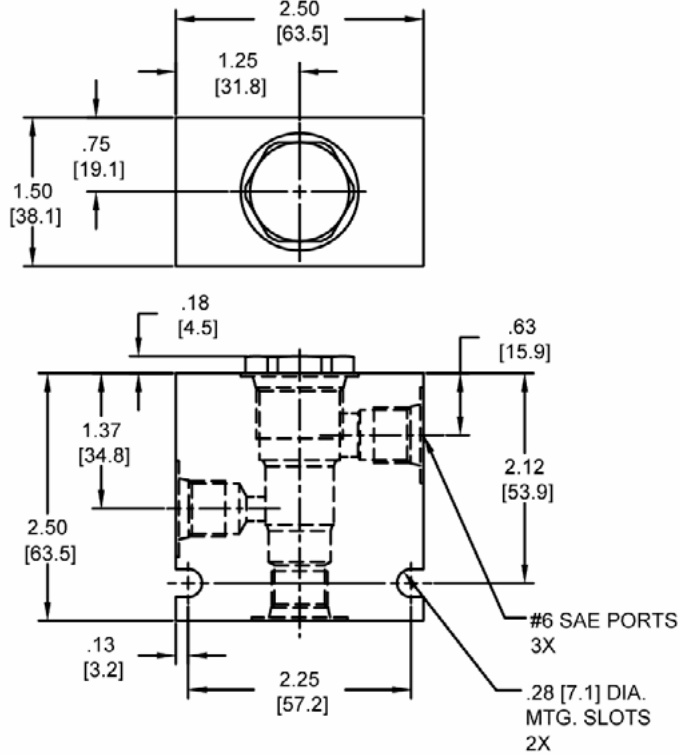
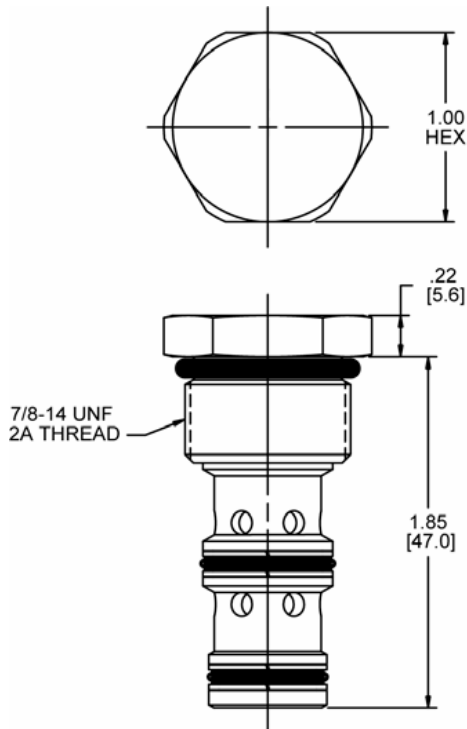


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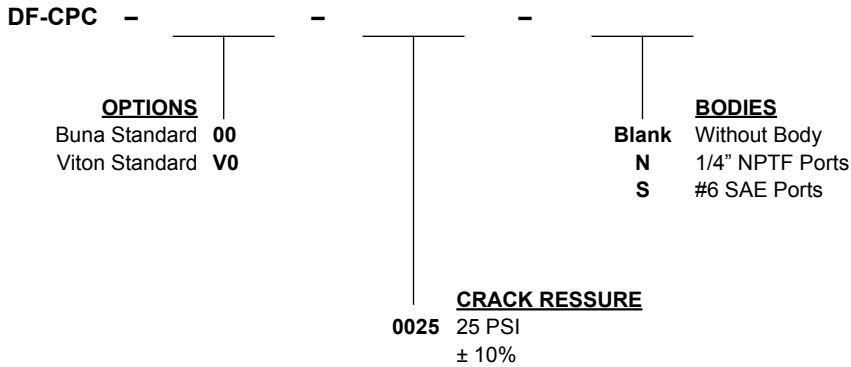


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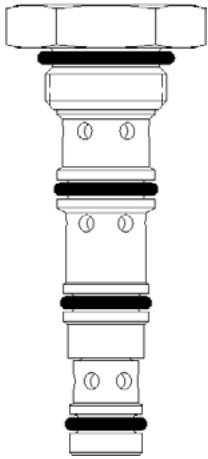


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**MD-CDP DOUBLE PILOT OPERATED CHECK VALVE**



**DESCRIPTION**

7 size, 5/8 -18 thread, "Mini" series, double pilot operated check valve.

**OPERATION**

The MD-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and/or (2) respectively. The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports "ports (4) or (1) respectively" to open the flow passage to allow flow from port (4) or (1) respectively. The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

**FEATURES**

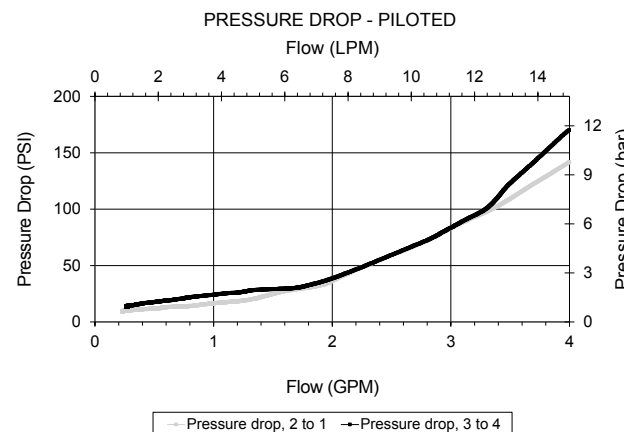
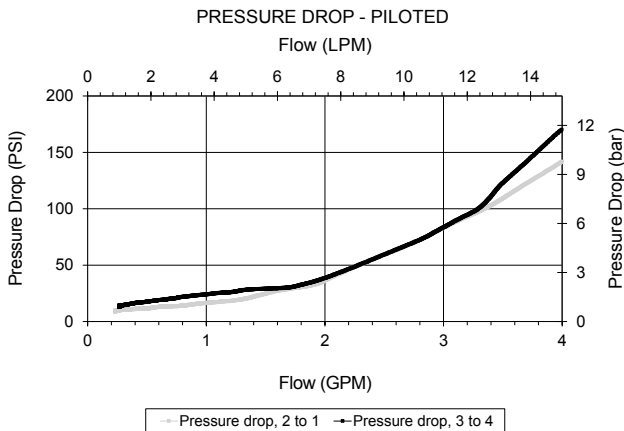
- Hardened parts for long life.
- Industry common cavity.



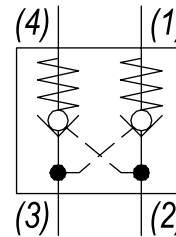
Great for "in Cylinder" use application.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**HYDRAULIC SYMBOL**



**VALVE SPECIFICATIONS**

Nominal Flow	3 GPM (11 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.10 lbs (.05 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	15 ft-lbs (20.3 Nm)
Cavity	MINI 4W
Cavity Form Tool (Finishing)	40500006
Seal Kit	21191010

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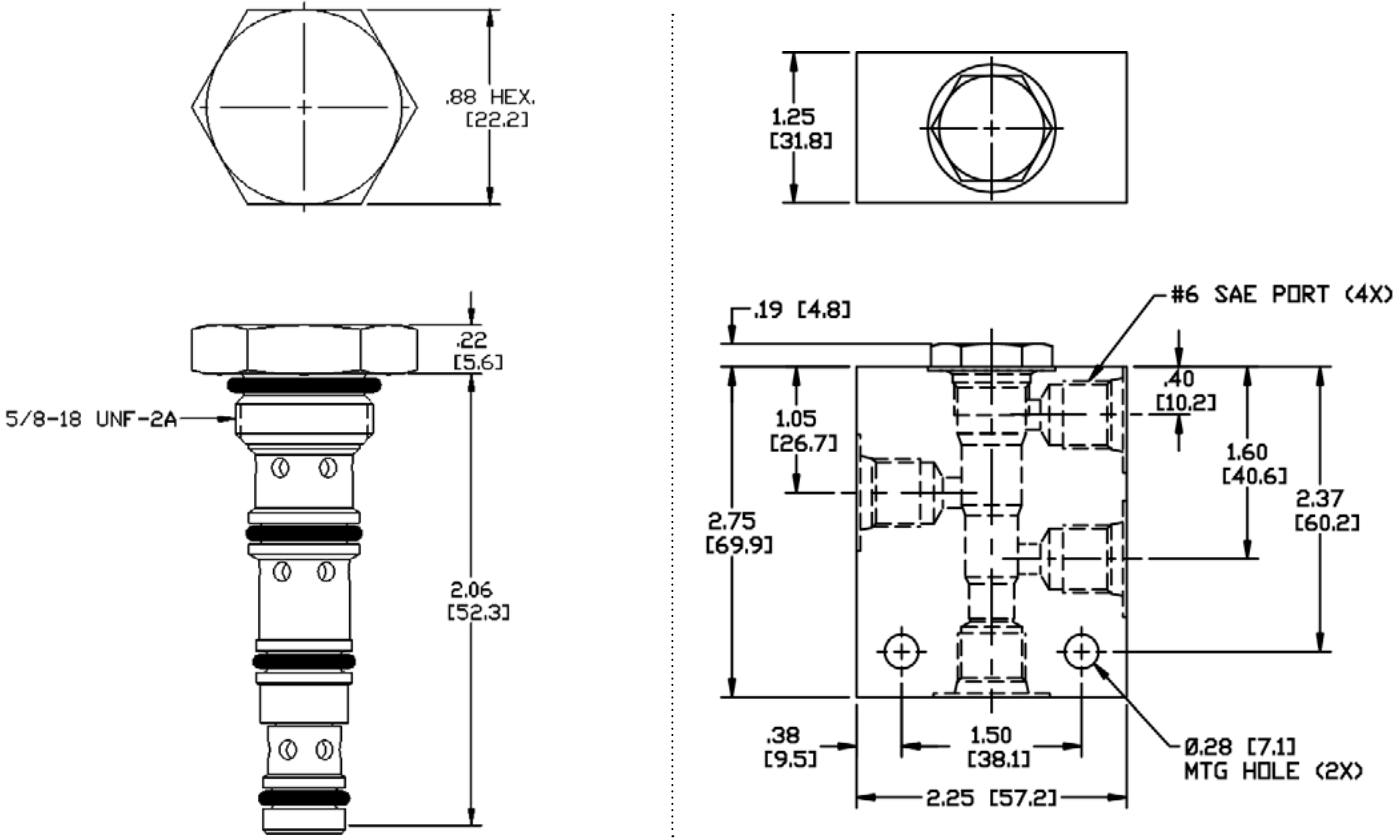
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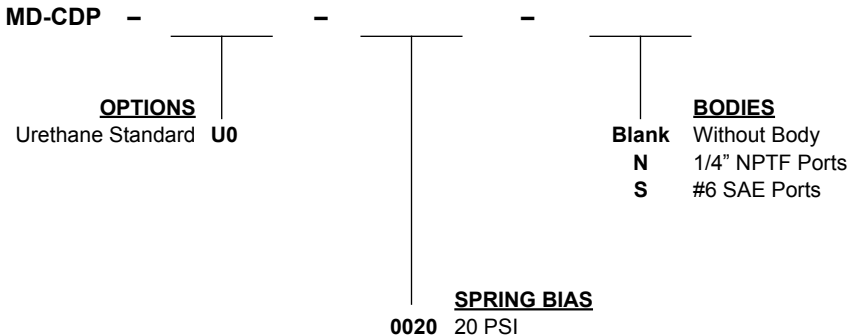
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DIMENSIONS



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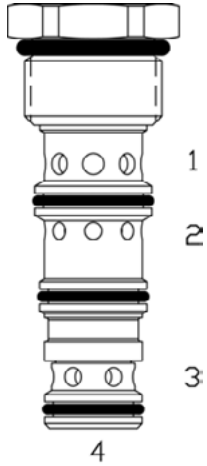


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**PQ-CDP DOUBLE PILOT OPERATED CHECK VALVE**



**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, double pilot operated check valve.

**OPERATION**

The PQ-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and/or (2) respectively. The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports "ports (4) or (1) respectively" to open the flow passage to allow flow from port (4) or (1) respectively. The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

**FEATURES**

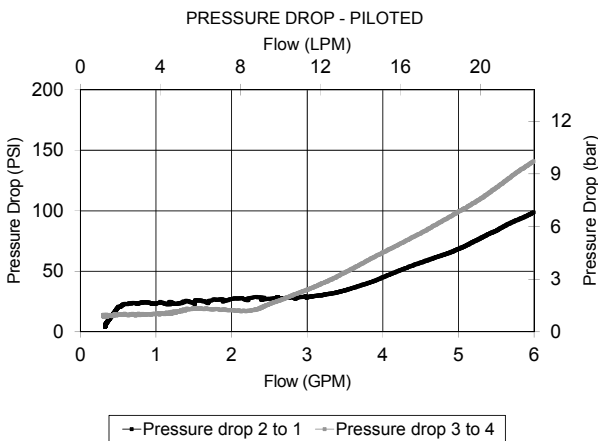
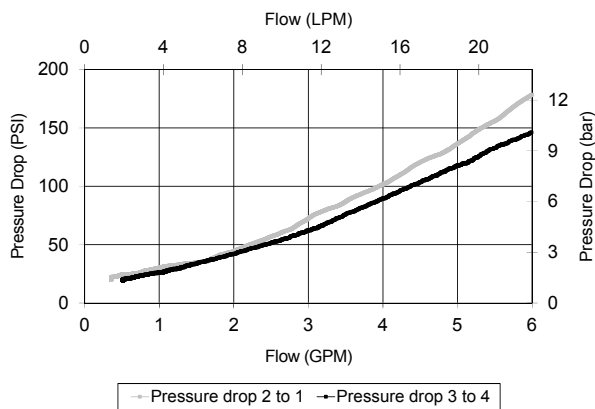
- Hardened parts for long life.
- Industry common cavity.



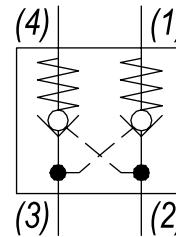
Great for "in Cylinder" use application.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**HYDRAULIC SYMBOL**



**VALVE SPECIFICATIONS**

Nominal Flow	5 GPM (19 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.12 lbs (.05 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 4W
Cavity Form Tool (Finishing)	40500029
Seal Kit	21191112

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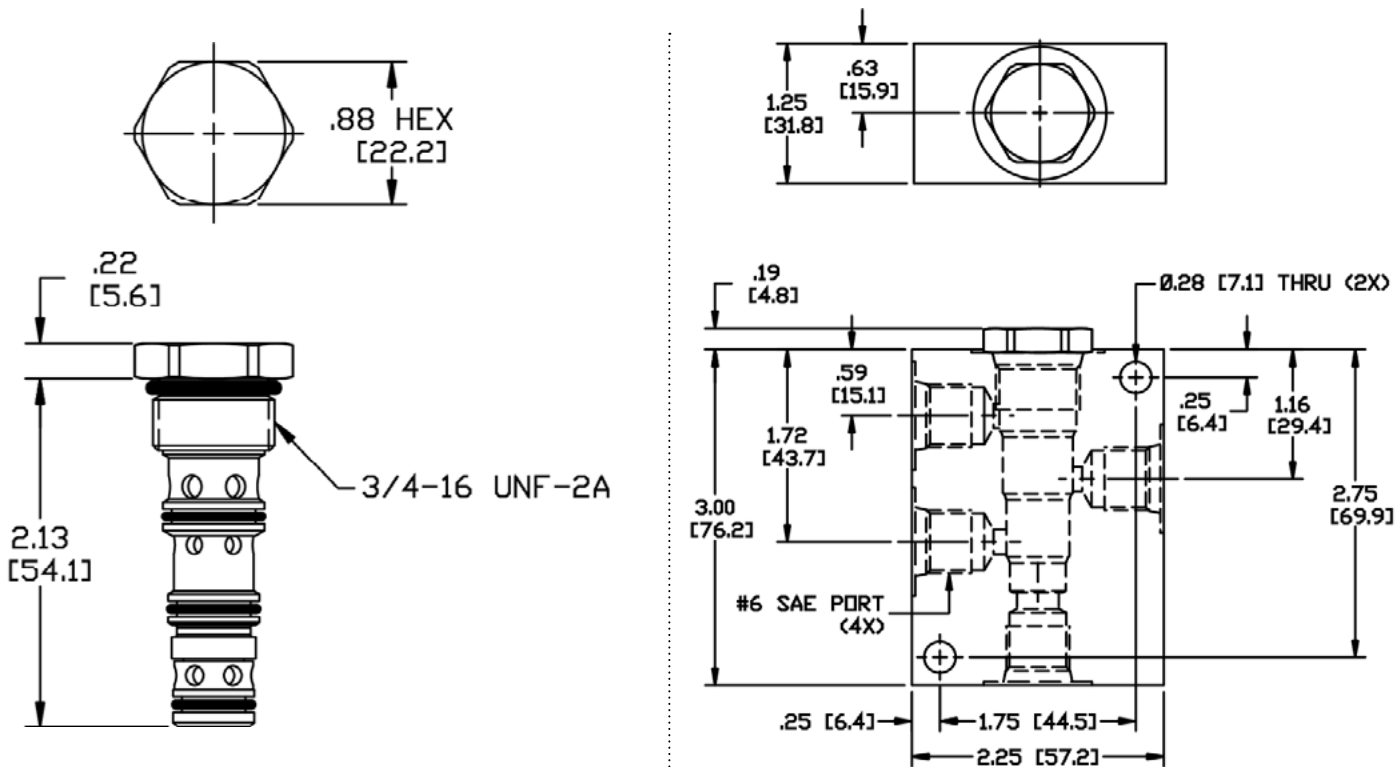


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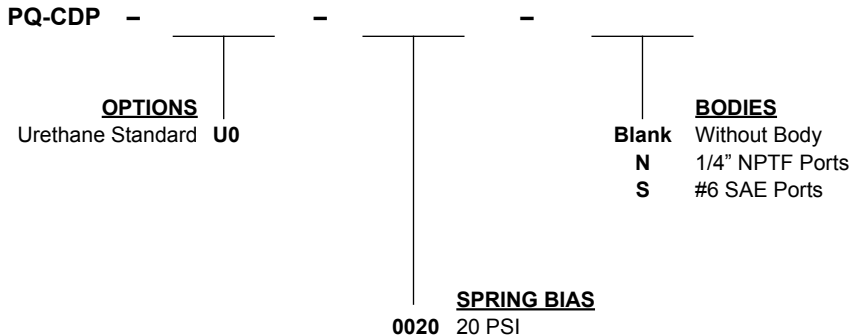


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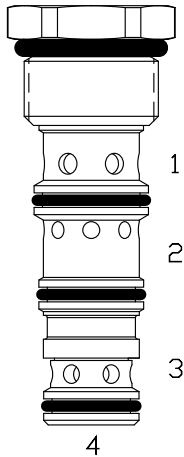


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**DG-CDP DOUBLE PILOT OPERATED CHECK VALVE**



**DESCRIPTION**

10 size, 7/8 -14 thread, "Delta" series, double pilot operated check valve.

**OPERATION**

The DG-CDP allows flow to pass from (3) to (4) and (2) to (1). The valve blocks flow from (4) to (3) and from (1) to (2). Blocked flow is released when pilot pressure is applied to the port opposite of (3) and/or (2) respectively. The valve has a 3:1 pilot ratio, so at least 1/3 of the load pressure at port (4) or (1) is required at the pilot line ports "ports (4) or (1) respectively" to open the flow passage to allow flow from port (4) or (1) respectively. The check spring biased at 20 PSI (1.4 bar) to assure holding in the static or no-load conditions.

**FEATURES**

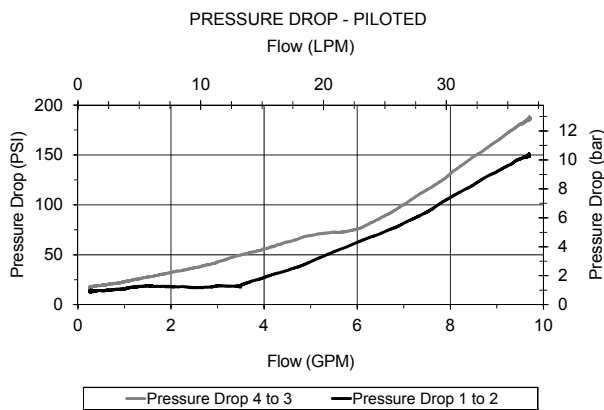
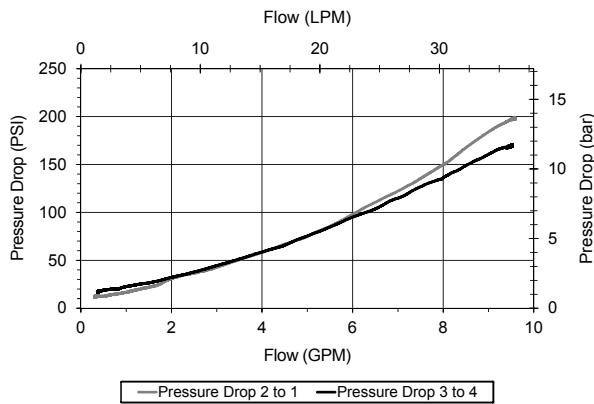
- Hardened parts for long life.
- Industry common cavity.



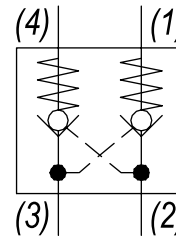
Great for "in Cylinder" use application.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**HYDRAULIC SYMBOL**



**VALVE SPECIFICATIONS**

Nominal Flow	8 GPM (30 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.20 lbs (.09 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 4W
Cavity Form Tool (Finishing)	40500002
Seal Kit	21191216

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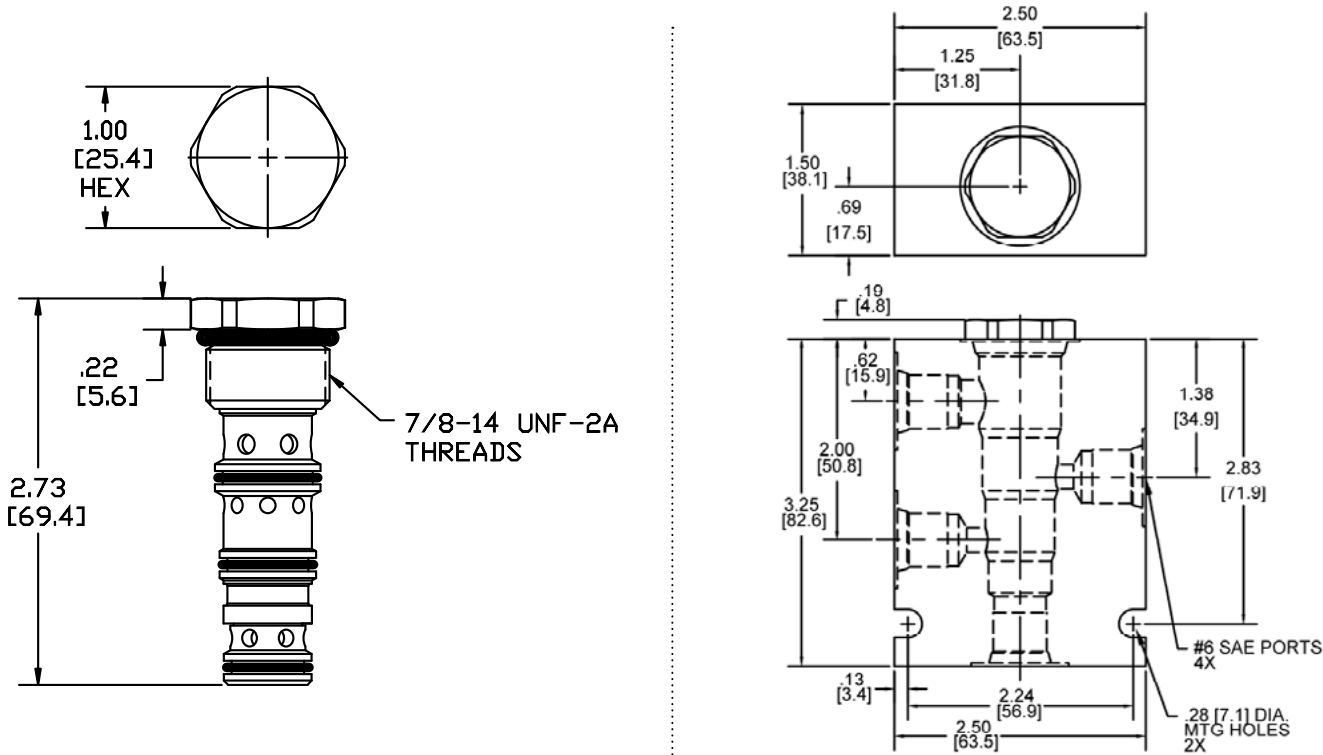


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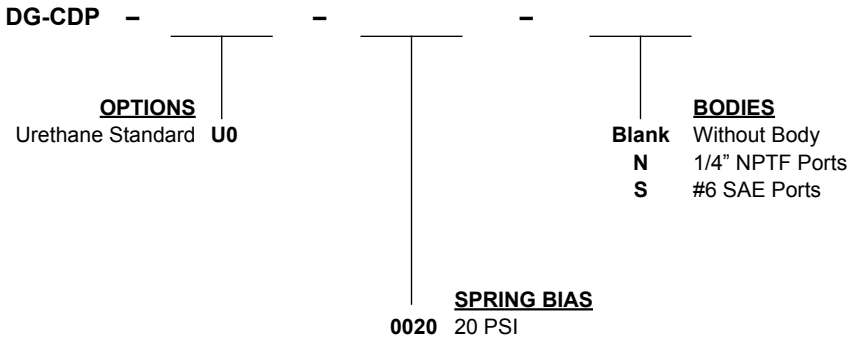
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**DIMENSIONS**



Body Weight: .99 lbs (.45 kg)

**ORDERING INFORMATION**



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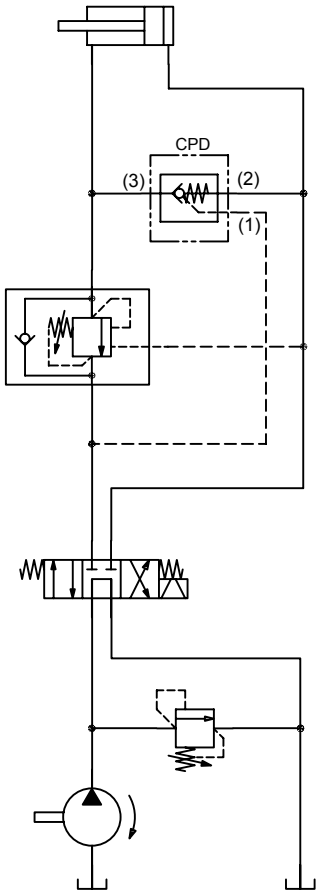
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**PILOT TO CLOSE CHECK VALVES**

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	10	3500	38	241	7/8-14	<b>DF-CPD</b>	MD48
	20	3500	76	241	1 5/16-12	<b>SL-CPD</b>	MD50

**TYPICAL SCHEMATIC**

Typical application for the CPD is in a regenerative circuit such as a refuse compactor. The valve allows flow from the rod end of the cylinder to regenerate with pump flow to increase cylinder extend speed.



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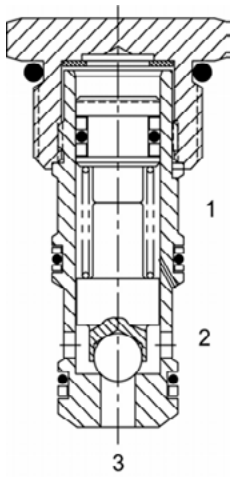


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**DF-CPD PILOT TO CLOSE CHECK VALVE, GUIDED BALL**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, pilot to close, ball check valve.

**OPERATION**

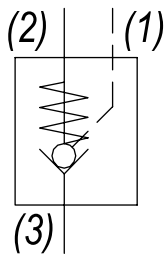
The DF-CPD allows free flow from (3) to (2), and blocks flow from (2) to (3). Flow will be blocked from (3) to (2) when sufficient pressure is applied at (1). The cartridge has various "pilot ratios" (see options).

Example: 1/4 for 4:1 of the load pressure held at (3) is required at (1) to close the valve. The check is spring biased to assure holding in static or no-load conditions.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

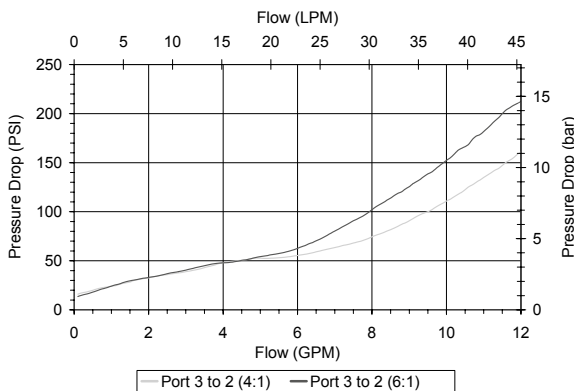
**HYDRAULIC SYMBOL**



Consult chart for flow operation of each model. Special higher bias spring values available. Consult factory.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Maximum Flow	10 GPM (38 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	50 drops/min from (2) to (3) 5 drops/min from (3) to (2) when port (1) is piloted
Pilot Ratio	(see options)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.20 lbs (.09 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 3W
Cavity Form Tool (Finishing)	40500001
Seal Kit	21191202

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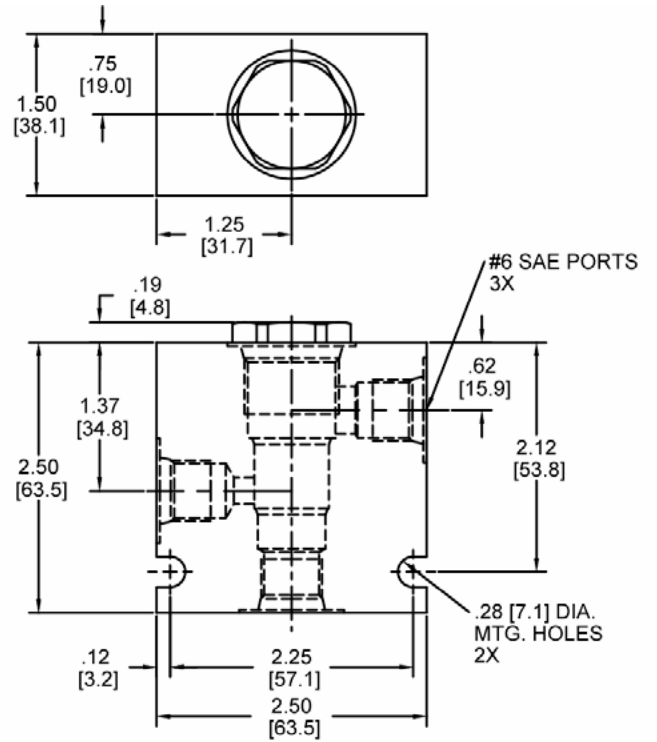
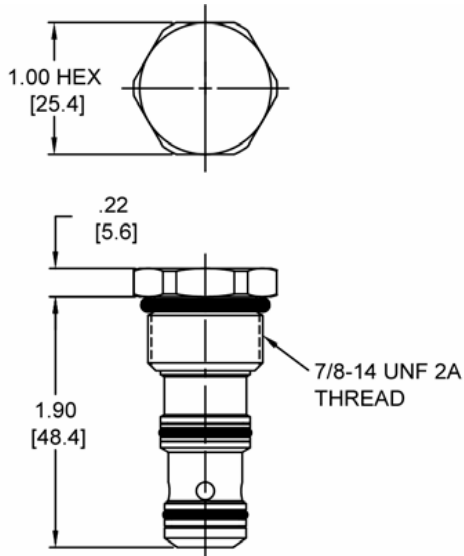
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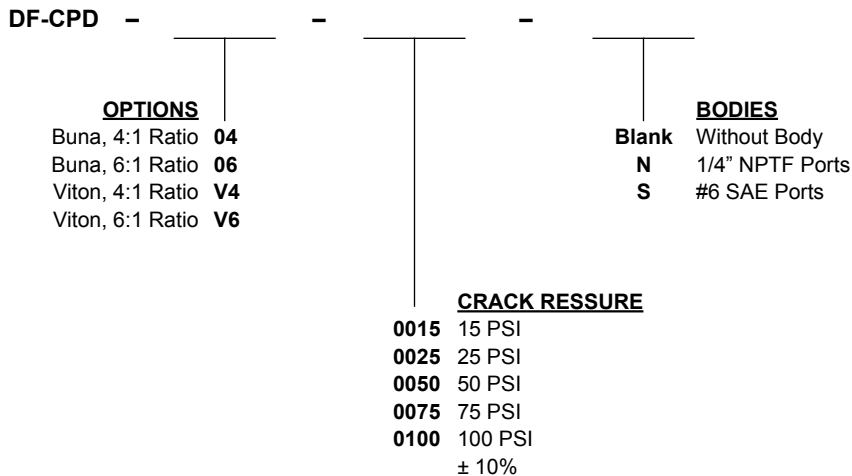


**DIMENSIONS**



Body Weight: .76 lbs (.35 kg)

**ORDERING INFORMATION**



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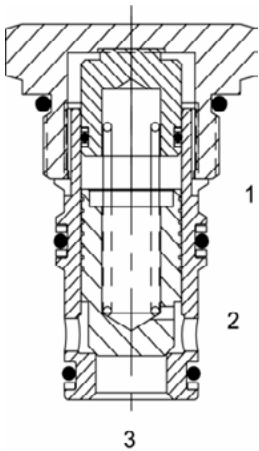


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**SL-CPD PILOT TO CLOSE CHECK VALVE, POPPET**



**DESCRIPTION**

16 size, 1 5/16-12 thread, "Super" series, pilot to close, poppet check valve.

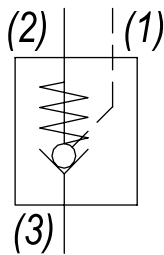
**OPERATION**

The SL-CPD allows free flow from (3) to (2), and blocks flow from (2) to (3). Flow will be blocked from (3) to (2) when sufficient pressure is applied at (1). The cartridge has a 2:1 pilot ratio, meaning that at least one half of the load pressure held at (3) is required at (1) to close the valve. The check is spring biased to assure holding in static or no-load conditions.

**FEATURES**

- Hardened seat for long life.
- Industry common cavity.

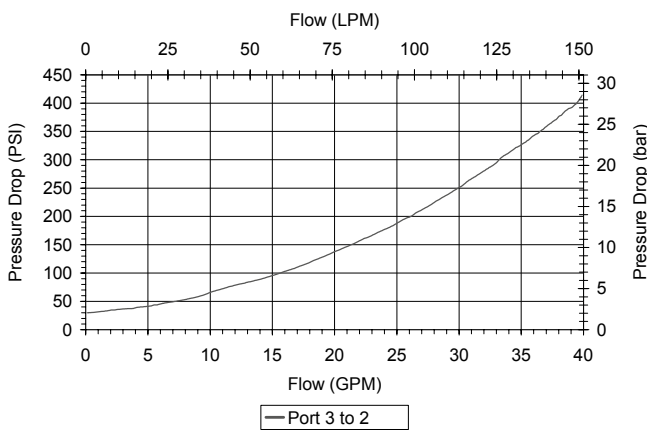
**HYDRAULIC SYMBOL**



*Special higher bias spring values available. Consult factory.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	20 GPM (76 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	5 drops/min
Pilot Ratio	2:1
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.68 lbs (.31 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	90 ft-lbs (122 Nm)
Cavity	SUPER 3WS
Cavity Form Tool (Finishing)	40500021
Seal Kit	21191404

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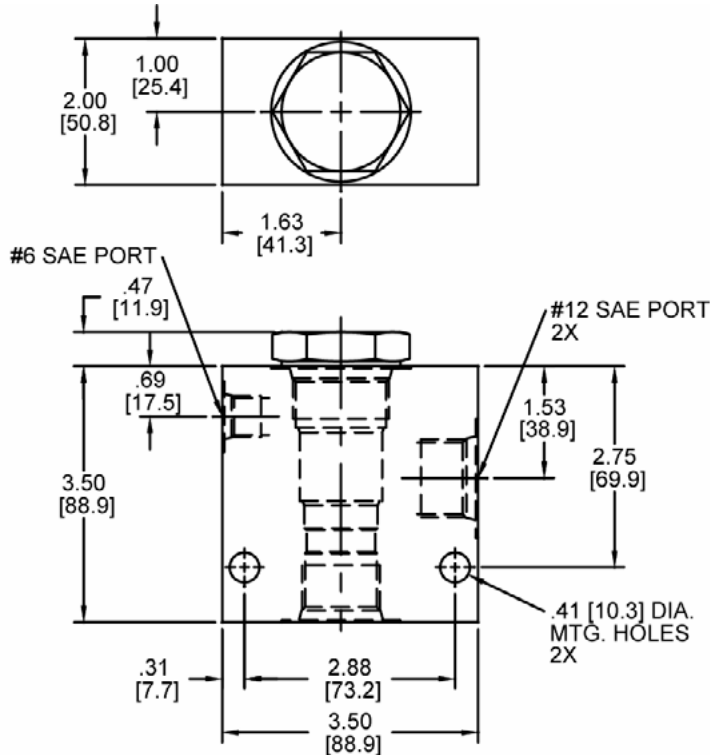
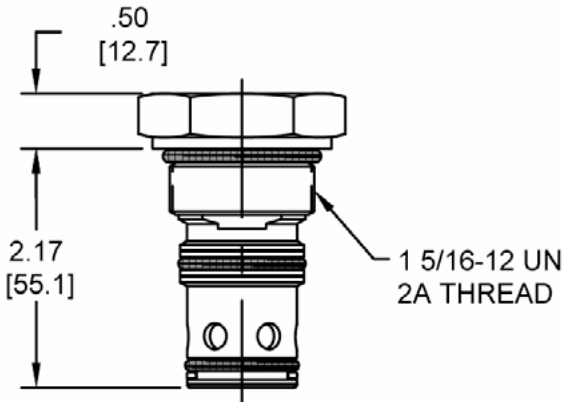
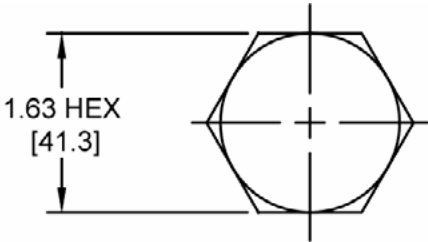


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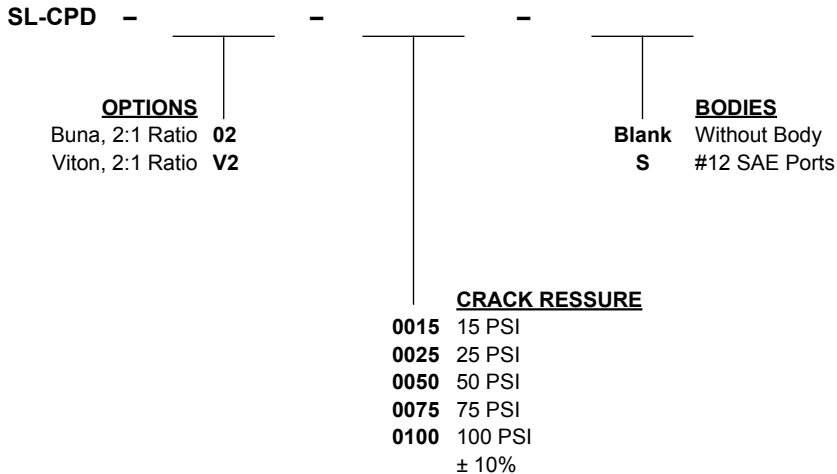
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**DIMENSIONS**



Body Weight: 1.89 lbs (.86 kg)

**ORDERING INFORMATION**



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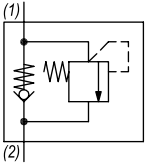


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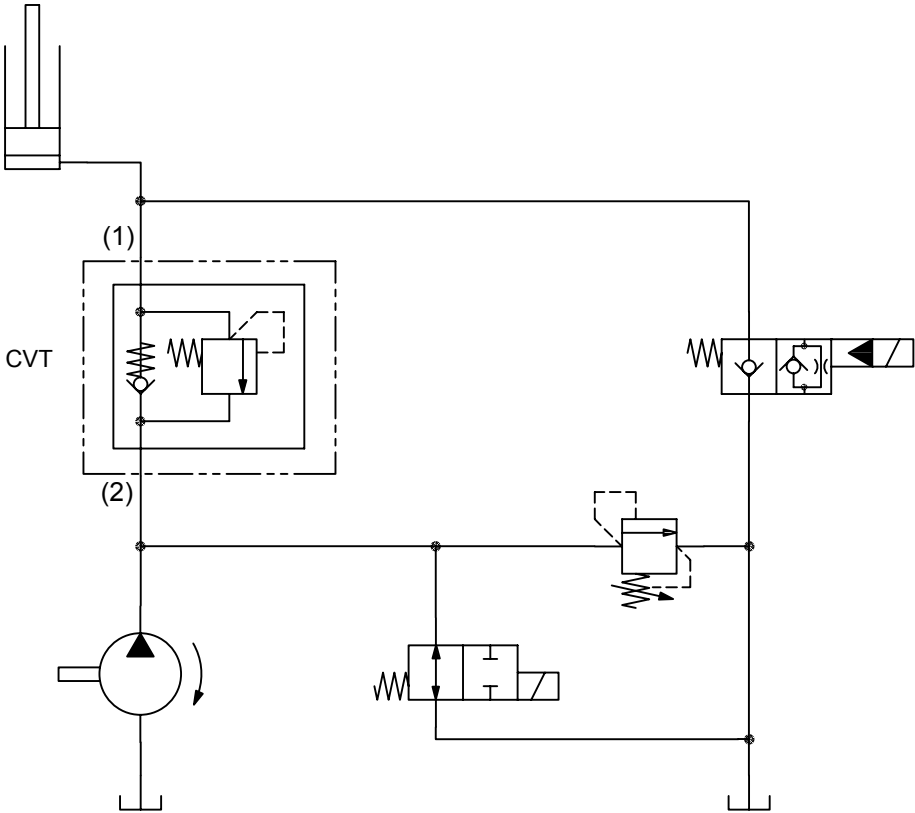
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**CHECK VALVES WITH THERMAL RELIEF**

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	15	4000	57	276	7/8-14	DE-CVT	MD54

**TYPICAL SCHEMATIC**

Typical application for the CVT is a relief to protect system from damage due to thermal expansion on load holding circuits.



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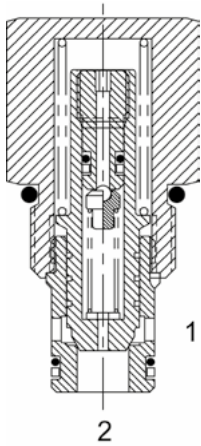


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**DE-CVT DIRECT ACTING CHECK VALVE THERMAL RELIEF, POPPET**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, direct acting check valve with thermal relief.

**OPERATION**

The DE-CVT allows free flow passage from (2) to (1), and blocks flow from (1) to (2). If the pressure at (1) exceeds the thermal relief valve setting, a small amount of oil will be allowed to pass from (1) to (2), preventing cylinder damage from excessive pressure. The cartridge has a fully guided poppet, which is spring biased closed until sufficient pressure is applied at (2) to open to (1).

Note: the relief valve feature is not intended for use in dynamic pressure limiting applications. Consult factory.

**FEATURES**

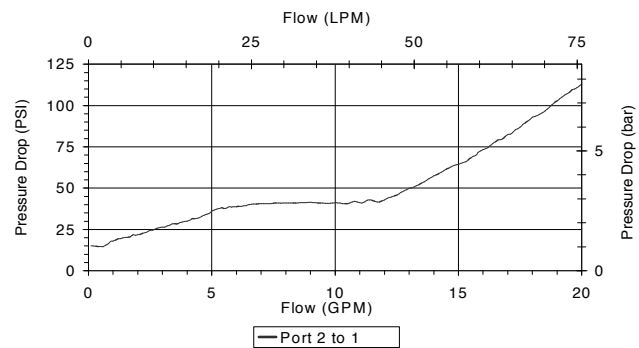
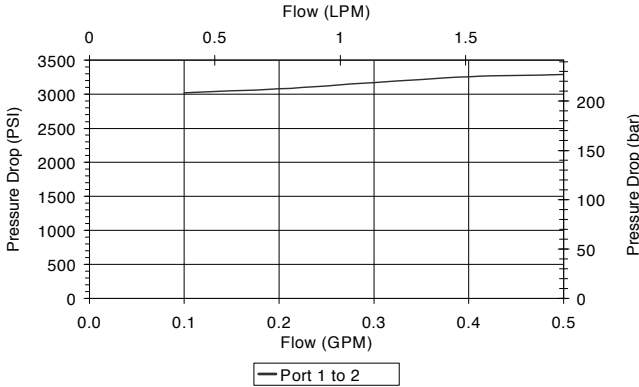
- Hardened parts for long life.
- Optional bias springs for backpressure application flexibility.
- Fully guided poppet assembly.
- Industry common cavity.



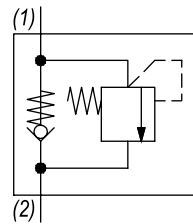
Nominal flow rating is 15 GPM for free flow port (2) to (1). Consult chart for free flow differential pressure. Thermal relief is cyclic rated to 0.1 GPM. Port (1) to (2) chart demonstrates override characteristics for a typical thermal relief application.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**HYDRAULIC SYMBOL**



**VALVE SPECIFICATIONS**

Nominal Flow	15 GPM (57 LPM)
Rated Operating Pressure	4000 PSI (276 bar)
Typical Internal Leakage (150 SSU)	0-10 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.31 lbs (.14 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

**WARNING:** the specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.

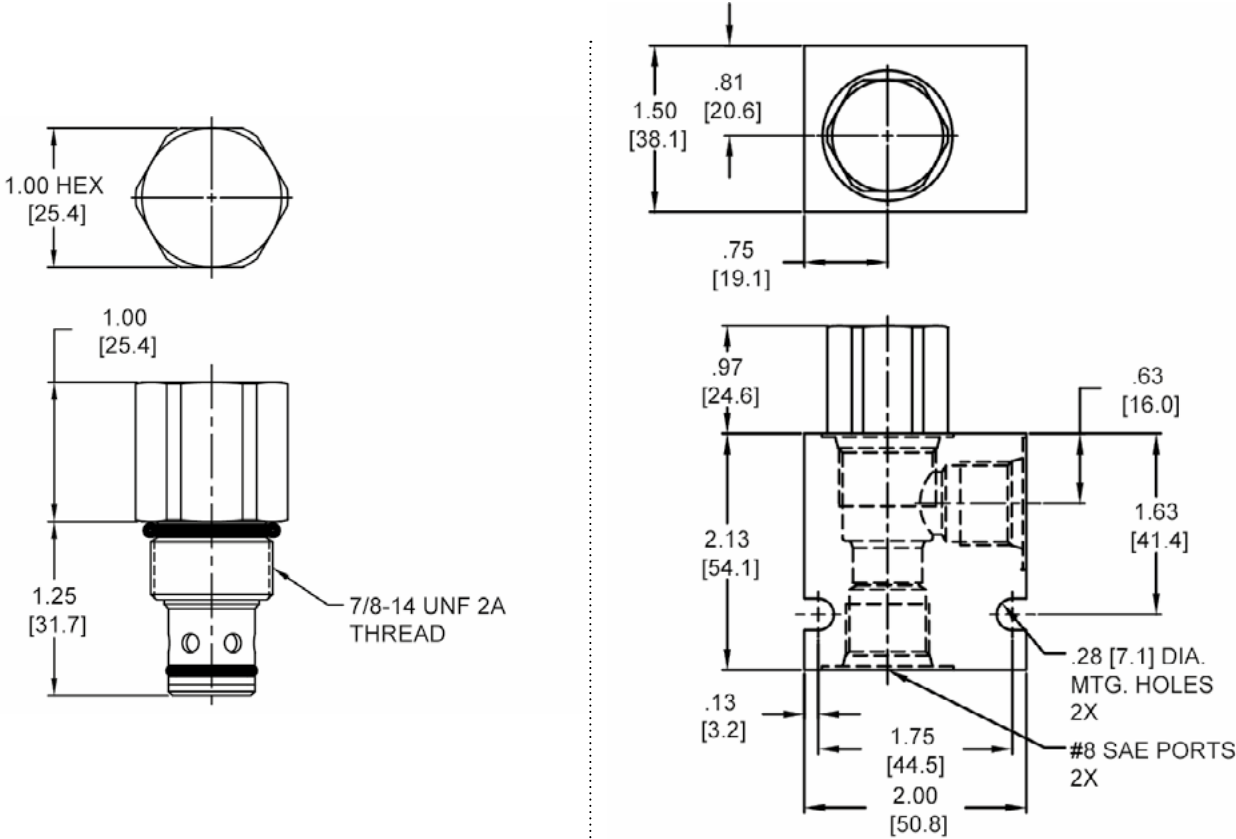


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DIMENSIONS



Body Weight: .47 lbs (.21 kg)

ORDERING INFORMATION

DE-CVT - - - -	
<p><b>OPTIONS</b></p> <p>Buna Standard <b>00</b></p> <p>Viton Standard <b>V0</b></p>	<p><b>BODIES</b></p> <p>Blank Without Body</p> <p><b>N</b> 3/8" NPTF Ports</p> <p><b>S</b> #8 SAE Ports</p>
<p><b>PRESSURE SETTING</b></p> <p>1000 PSI <b>1</b></p> <p>2000 PSI <b>2</b></p> <p>3000 PSI <b>3</b></p> <p>4000 PSI <b>4</b></p>	<p><b>VOLTAGE</b></p> <p><b>0020</b> 20 PSI</p> <p><b>0100</b> 100 PSI</p> <p>± 10%</p>

**WARNING**  
DO NOT USE ALUMINUM BODY  
HIGH PRESSURE (4000 PSI) PRODUCT

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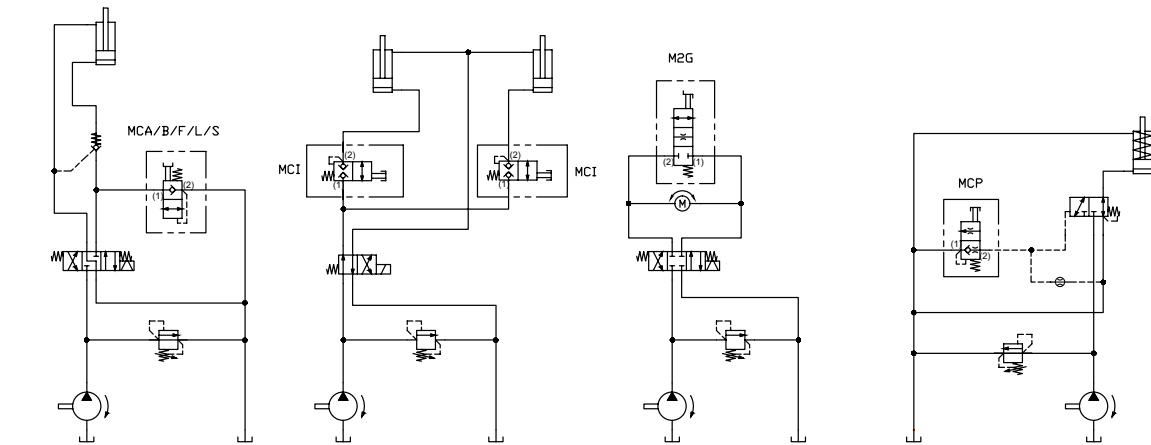


2 WAY 2 POSITION MANUAL VALVES

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	12	3500	45	241	3/4-16	<b>PB-MCA</b>	MD58
	15	3500	57	241	7/8-14	<b>DE-MCA</b>	MD60
	20	1500	76	103	7/8-14	<b>DE-MCF</b>	MD62
	20	3500	76	241	7/8-14	<b>DE-MCS</b>	MD64
	20	3500	76	241	7/8-14	<b>DE-MCB</b>	MD66
	8	3500	30	241	3/4-16	<b>PB-MCI</b>	MD68
	8	3500	30	241	3/4-16	<b>PB-MCL</b>	MD70
	15	3500	57	241	7/8-14	<b>DE-MCL</b>	MD72
	20	3000	76	207	7/8-14	<b>DE-M2G</b>	MD74
	1	4000	4	276	3/4-16	<b>HB-MCP</b>	MD76

TYPICAL SCHEMATIC

Typical application for MCA, MCB, MCF, MCL, and MCS is an emergency lowering device. Typical application for the MCI is a selector circuit when load holding is required in both directions. Typical application for the M2G is adjustable speed control or full bypass of fluid motor. Typical application for the MCP is a pilot dump valve.



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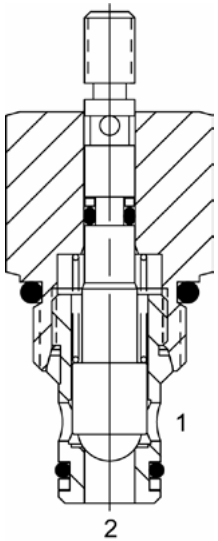


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**PB-MCA** MANUAL POPPET VALVE, 2 WAY NORMALLY CLOSED, PULL TYPE



**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, manual poppet, 2 way normally closed, pull type valve.

**OPERATION**

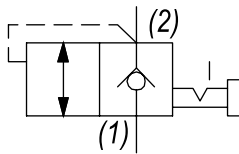
The PB-MCA blocks flow from (1) to (2) until an operator pulls the shaft outward. The bias spring (see option page for pressure) allows for backpressure at (2) before the valve will open.

Note: pressure at port (2) will act directly on the poppet and spring. Port (2) is intended to be a tank port only.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.

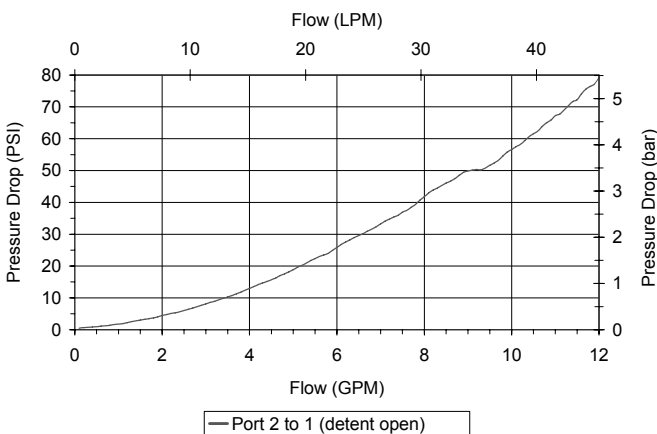
**HYDRAULIC SYMBOL**



75 PSI bias provides comfortable effort where return line is near zero. 150 PSI option may be difficult to pull, if tank pressure is near zero. Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	12 GPM (45 LTR/M)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.21 lbs (.10 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191100

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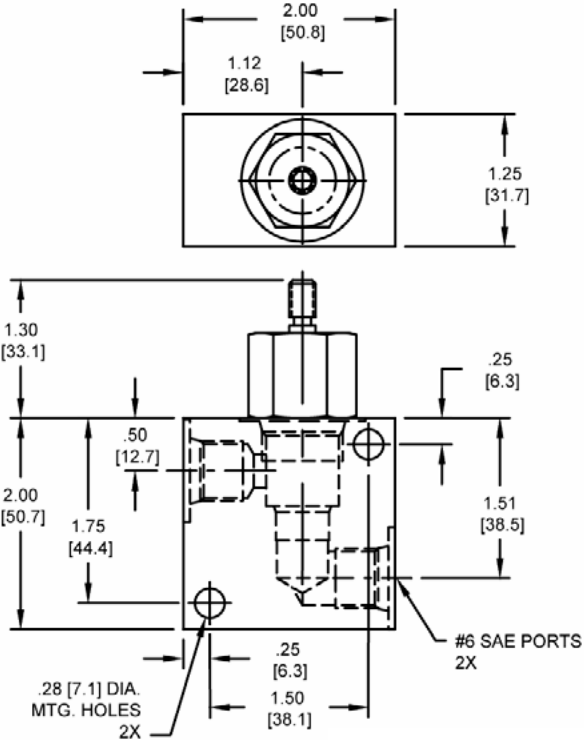
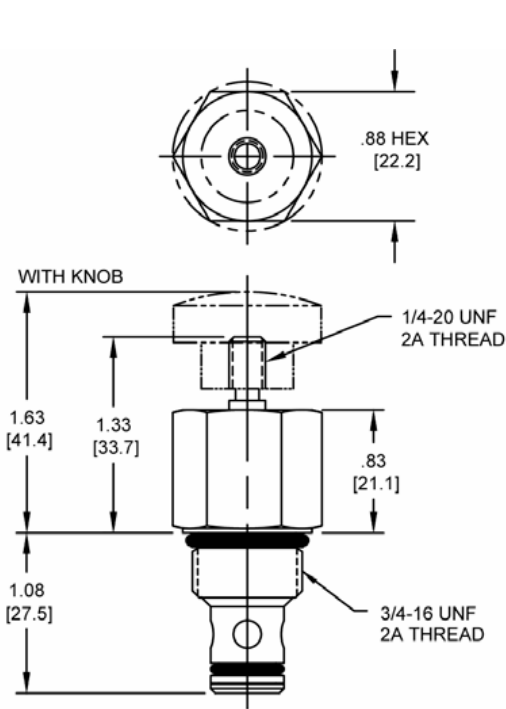


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**DIMENSIONS**



Body Weight: .39 lbs (.18 kg)

**ORDERING INFORMATION**

<b>PB-MCA</b>		-	-	-	-
<b>OPTIONS</b>					
Buna Standard	<b>00</b>				
Viton Standard	<b>V0</b>				
Buna, Screen	<b>A0</b>				
Viton, Screen	<b>W0</b>				
Buna, Knob	<b>0K</b>				
Viton, Knob	<b>VK</b>				
Buna, Knob, Screen	<b>AK</b>				
Viton, Knob, Screen	<b>WK</b>				
Buna, Detent	<b>0D</b>				
Viton, Detent	<b>VD</b>				
Buna, Screen, Detent	<b>AD</b>				
Viton, Screen, Detent	<b>WD</b>				
Buna, Knob, Detent	<b>1D</b>				
Viton, Knob, Detent	<b>2D</b>				
Buna, Knob, Screen, Detent	<b>3D</b>				
Viton, Knob, Screen, Detent	<b>4D</b>				
<b>BODIES</b>					
Blank	Without Body				
<b>N</b>	1/4" NPT Ports				
<b>S</b>	#6 SAE Ports				
<b>SPRING BIAS PRESSURE</b>					
<b>0075</b>	75 PSI				
<b>0150</b>	150 PSI				

**Note: pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.**

**Note: use screen only if flow direction is from (1) to (2).**

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**DE-MCA** MANUAL POPPET VALVE, 2 WAY NORMALLY CLOSED, PULL TYPE

**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, manual poppet valve, 2 way normally closed, pull type.

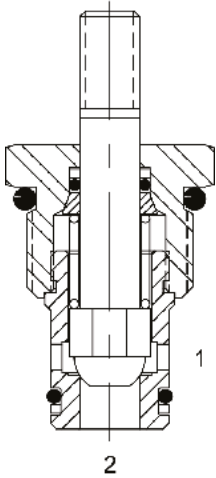
**OPERATION**

The DE-MCA blocks flow from (1) to (2) until an operator pulls the shaft outward. The bias spring allows for backpressure at (2) before the valve will open (see option page for pressure).

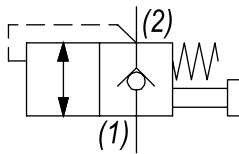
Note: pressure at port (2) will directly act on the poppet and spring. Port (2) is intended to be a tank port only.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.



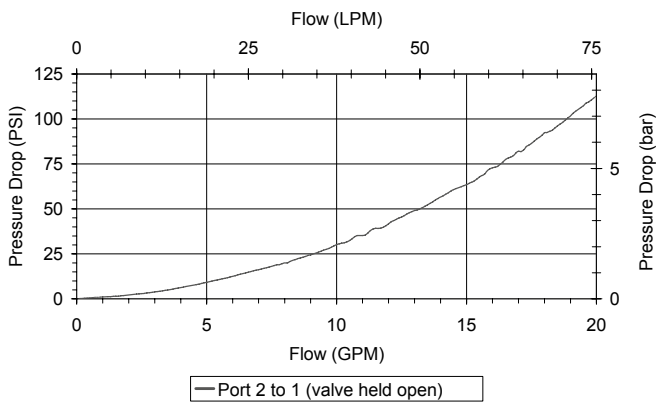
**HYDRAULIC SYMBOL**



65 PSI bias provides comfortable effort where return line is near zero. 160 PSI option may be difficult to pull, if tank pressure is near zero.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	15 GPM (57 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.18 lbs (.08 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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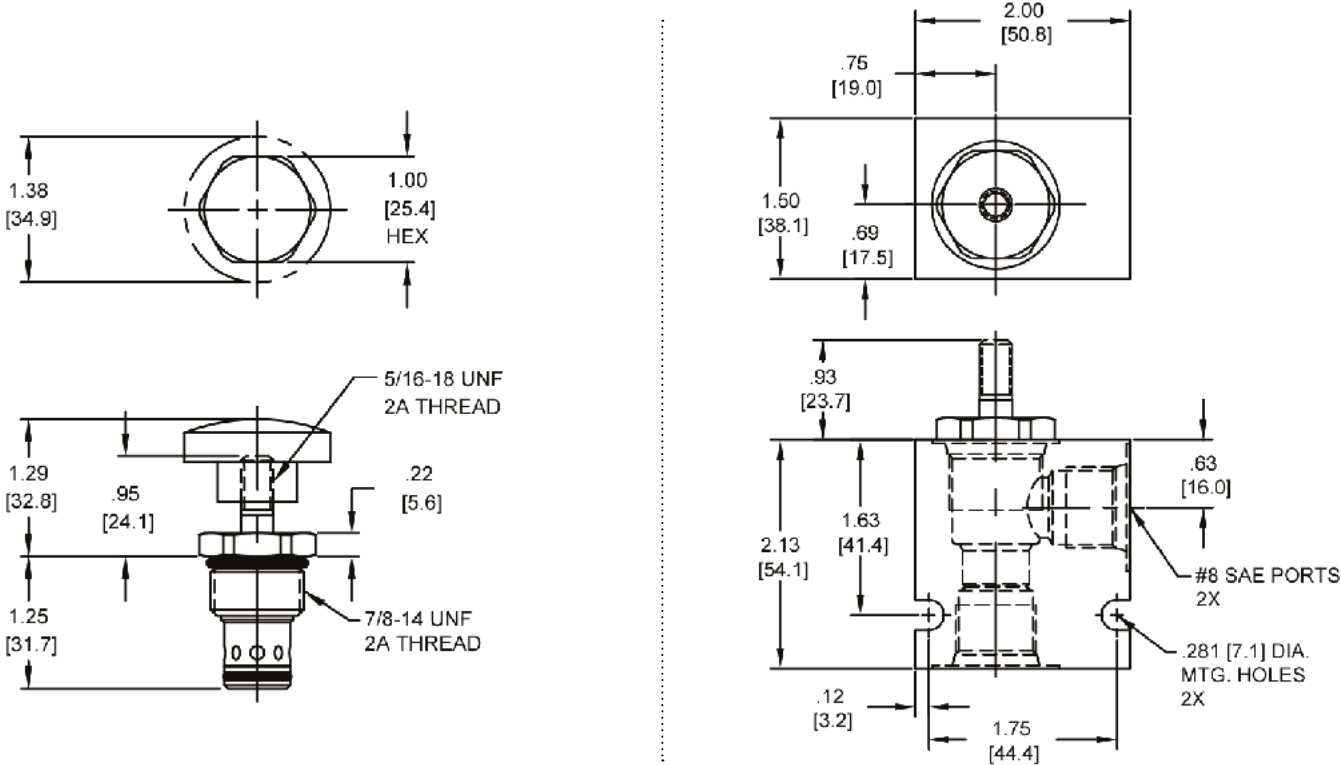


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**DIMENSIONS**



Body Weight: .47 lbs (.21 kg)

**ORDERING INFORMATION**

<p><b>DE-MCA</b> -</p> <p><b>OPTIONS</b></p> <p>Buna Standard <b>00</b></p> <p>Viton Standard <b>V0</b></p> <p>Buna, Screen <b>A0</b></p> <p>Viton, Screen <b>W0</b></p> <p>Buna, Knob <b>OK</b></p> <p>Viton, Knob <b>VK</b></p> <p>Buna, Knob, Screen <b>AK</b></p> <p>Viton, Knob, Screen <b>WK</b></p>	<p><b>BODIES</b></p> <p>Blank Without Body</p> <p><b>N</b> 3/8" NPTF Ports</p> <p><b>S</b> #8 SAE Ports</p>
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**SPRING BIAS PRESSURE**

- 0065** 65 PSI
- 0160** 160 PSI

Note: use screen only if flow direction is from (1) to (2).

Note: pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

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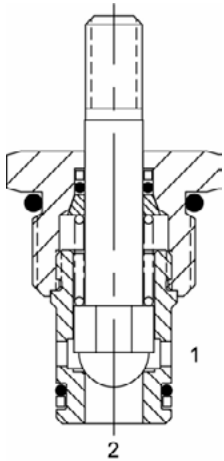


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**DE-MCF** MANUAL POPPET VALVE, 2 WAY NORMALLY CLOSED, PULL TYPE, SOFT SEAT



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, manual poppet valve, 2 way normally closed, pull type, soft seat.

**OPERATION**

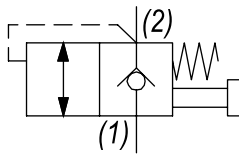
The DE-MCF blocks flow from (1) to (2) until an operator pulls the shaft outward. The bias spring allows for backpressure at (2) before the valve will open (see option page for pressure).

Note: pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

**FEATURES**

- Soft seat for ultra low leakage.
- Industry common cavity.

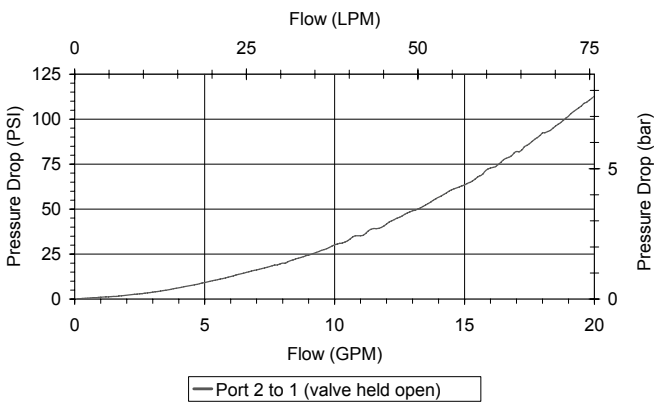
**HYDRAULIC SYMBOL**



Pressure above **SPRING BIAS PRESSURE** at port (2) may cause valve to self open.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	20 GPM (76 LPM)
Rated Operating Pressure	1500 PSI (103 bar)
Typical Internal Leakage (150 SSU)	Negligible
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-32° to 160°F (0° to 70°C)
Weight	.14 lbs (.06 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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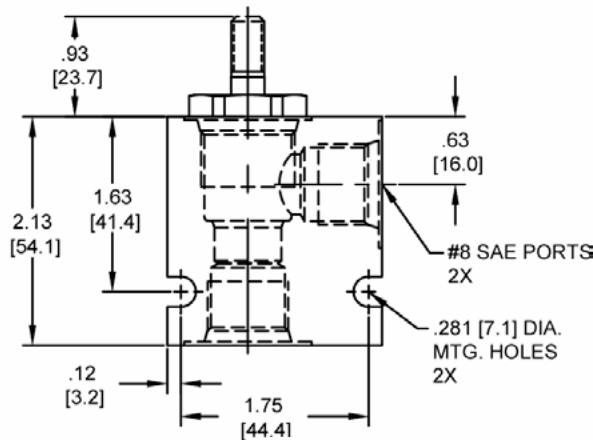
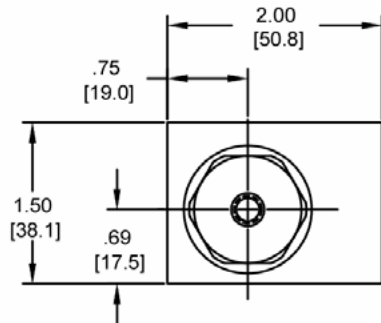
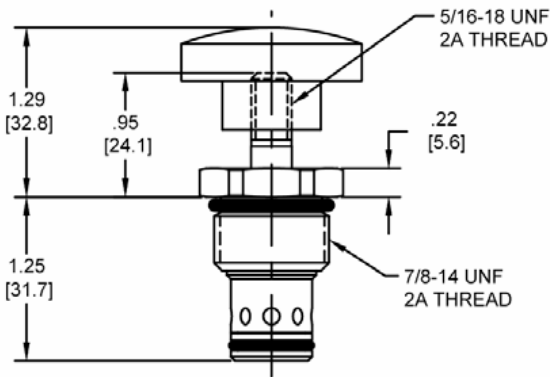
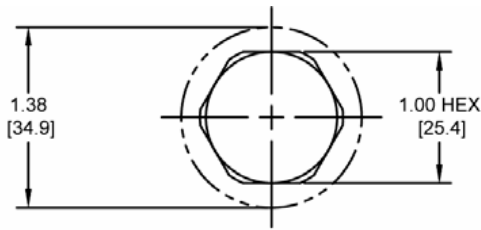


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**DIMENSIONS**



Body Weight: .47 lbs (.21 kg)

**ORDERING INFORMATION**

<p><b>DE-MCF</b> -</p> <p><b>OPTIONS</b></p> <p>Buna Standard <b>00</b></p> <p>Viton Standard <b>V0</b></p> <p>Buna, Screen <b>A0</b></p> <p>Viton, Screen <b>W0</b></p> <p>Buna, Knob <b>0K</b></p> <p>Viton, Knob <b>VK</b></p> <p>Buna, Knob, Screen <b>AK</b></p> <p>Viton, Knob, Screen <b>WK</b></p>	<p>-</p> <p>-</p> <p>-</p>	<p><b>BODIES</b></p> <p>Blank Without Body</p> <p><b>N</b> 3/8" NPTF Ports</p> <p><b>S</b> #8 SAE Ports</p>
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**SPRING BIAS PRESSURE**

**0065** 65 PSI

**Note: use screen only if flow direction is from (1) to (2).**

**Note: pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.**

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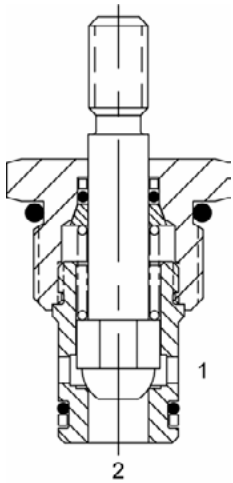


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**DE-MCS MANUAL POPPET VALVE, 2 WAY NORMALLY CLOSED, PULL TYPE, CORROSION RESISTANT**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, manual poppet valve, 2 way normally closed, pull type, corrosion resistant.

**OPERATION**

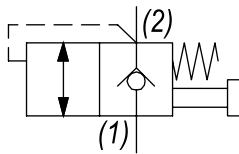
The DE-MCS blocks flow from (1) to (2) until an operator pulls the shaft outward. The bias spring allows for backpressure at (2) before the valve will open (see option page for pressure).

Note: pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.
- Corrosion resistant.
- Optional bias springs for backpressure application flexibility.

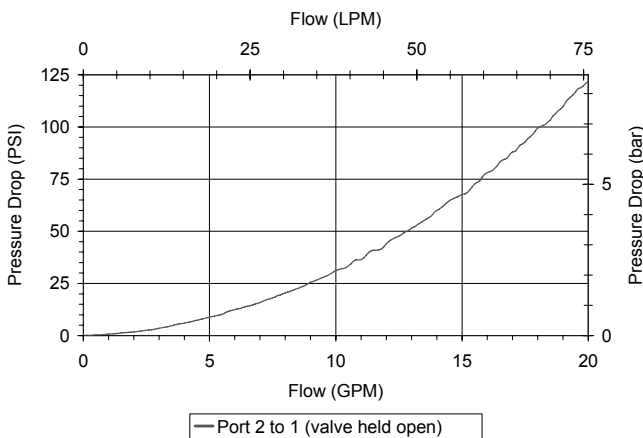
**HYDRAULIC SYMBOL**



*65 PSI bias provides comfortable effort where return line is near zero. 160 PSI option may be difficult to pull, if tank pressure is near zero. Stainless Steel Shaft. Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.*

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	20 GPM (76 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.75 lbs (.34 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

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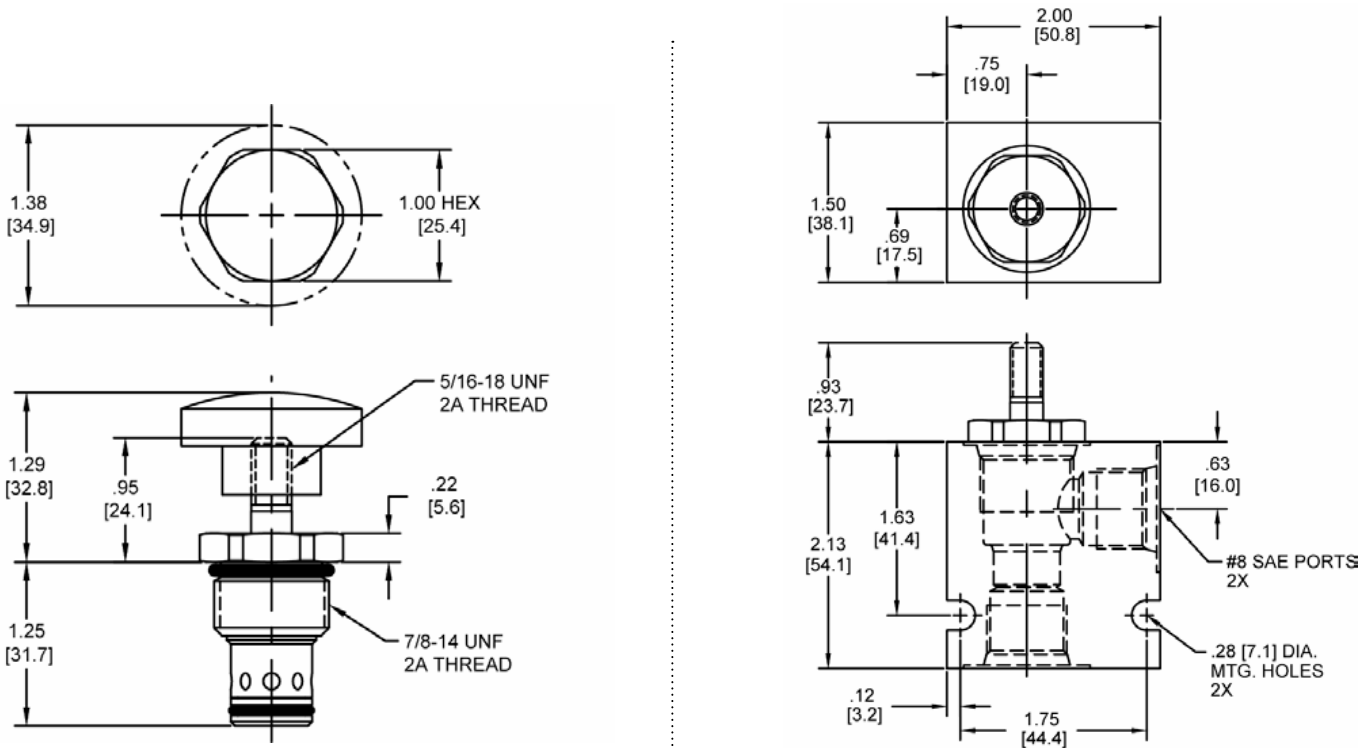
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**DIMENSIONS**



Body Weight: .47 lbs (.21 kg)

**ORDERING INFORMATION**

DE-MCS - - -

**OPTIONS**

- Buna Standard **00**
- Viton Standard **V0**
- Buna, Screen **A0**
- Viton, Screen **W0**
- Buna, Knob **0K**
- Viton, Knob **VK**
- Buna, Knob, Screen **AK**
- Viton, Knob, Screen **WK**

**BODIES**

- Blank Without Body
- N** 3/8" NPTF Ports
- S** #8 SAE Ports

**SPRING BIAS PRESSURE**

- 0065** 65 PSI
- 0160** 160 PSI

Note: use screen only if flow direction is from (1) to (2).

Note: pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

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**DE-MCB** MANUAL POPPET VALVE, 2 WAY NORMALLY CLOSED, PULL, DETENT

**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, manual poppet valve, 2 way normally closed, pull with detent.

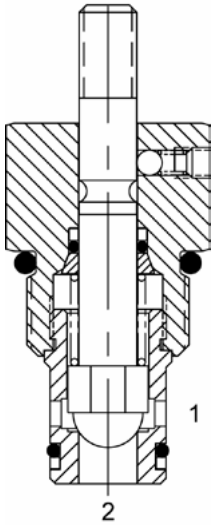
**OPERATION**

The DE-MCB blocks flow from (1) to (2) until an operator pulls the shaft outward. The bias spring allows for backpressure at (2) before the valve will open (see option page for pressure).

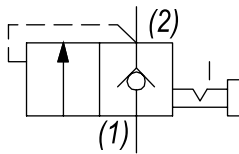
Note: pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.
- Optional bias springs for backpressure application flexibility.



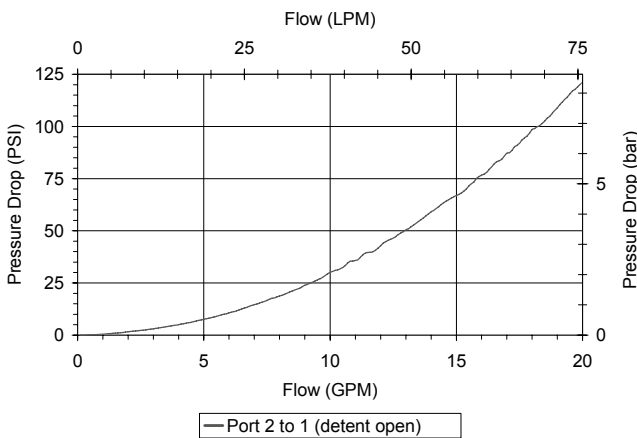
**HYDRAULIC SYMBOL**



65 PSI bias provides comfortable effort where return line is near zero. 160 PSI option may be difficult to pull, if tank pressure is near zero. Pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	20 GPM (76 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.28 lbs (.13 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191200

**WARNING:** the specifications/application data shown in our catalogs and data sheets are intended only as a general guide for the product described (herein). Any specific application should not be undertaken without independent study, evaluation, and testing for suitability.



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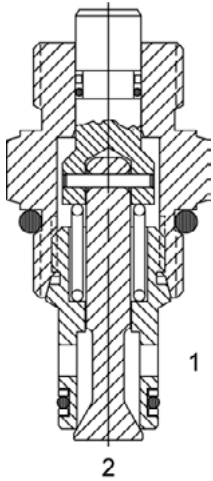
**PB-MCI** MANUAL POPPET VALVE, 2 WAY NORMALLY CLOSED, PUSH TYPE

**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, manual poppet, 2 way normally closed, push type valve.

**OPERATION**

The PB-MCI blocks flow from (2) to (1) until sufficient force is applied to button to overcome spring bias and load force.



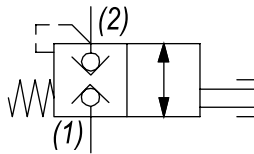
Actuation Force Required	
No Pressure	7 lbs
Side Pressure	7 + (P1 x .009)
Nose Pressure	7 + (P1 x .076)

Note: (Ø .437) cavity predrill depth must be 1.312 minimum from spotface.

**FEATURES**

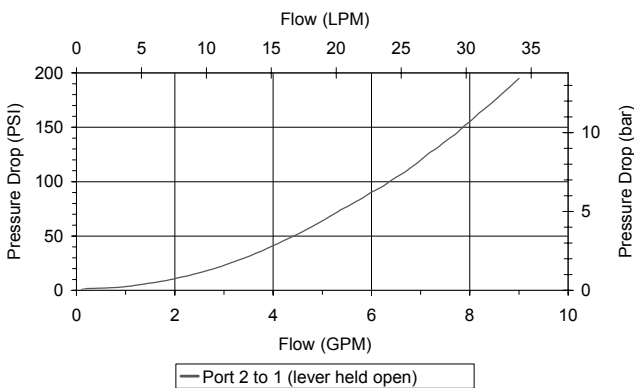
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	8 GPM (30 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	Consult Factory
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.26 lbs (.12 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191102

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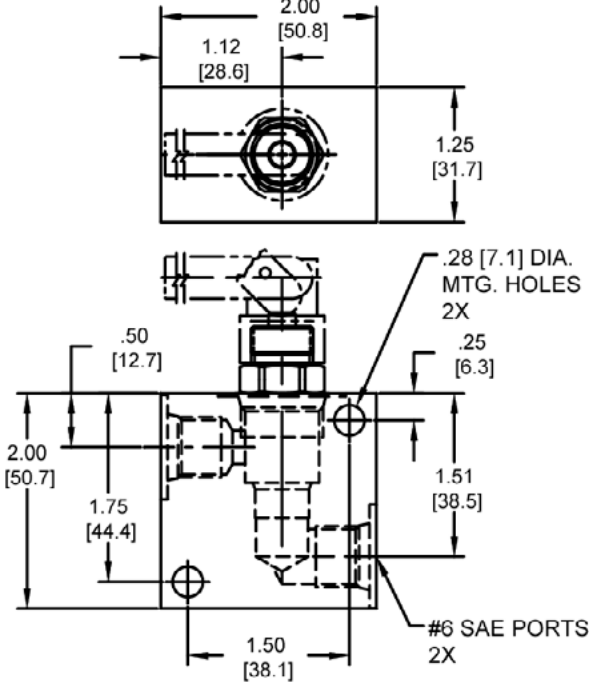
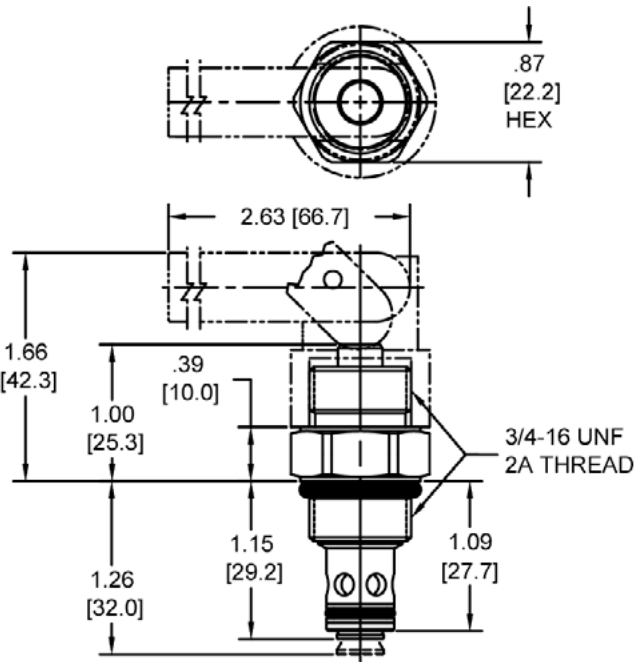


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DIMENSIONS



Body Weight: .39 lbs (.18 kg)

ORDERING INFORMATION

<b>PB-MCI</b> -		-	-
	<b>OPTIONS</b>		<b>BODIES</b>
	Buna Standard	<b>00</b>	<b>Blank</b> Without Body
	Viton Standard	<b>V0</b>	<b>N</b> 1/4" NPTF Ports
	Buna, Screen	<b>A0</b>	<b>S</b> #6 SAE Ports
	Viton, Screen	<b>W0</b>	
	Buna, Lever	<b>0L</b>	
	Viton, Lever	<b>VL</b>	
	Buna, Screen, Lever	<b>AL</b>	
	Viton, Screen, Lever	<b>WL</b>	

Note: use screen only if flow direction is from (1) to (2).

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**PB-MCL** MANUAL POPPET VALVE, 2 WAY NORMALLY CLOSED, PULL TYPE, LEVER

**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, manual poppet, 2 way normally closed, pull type valve with lever.

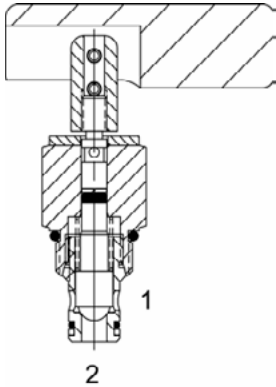
**OPERATION**

The PB-MCL blocks flow from (1) to (2) until an operator pulls the handle upward. The bias spring (see option page for pressure) allows for backpressure at (2) before the valve will open.

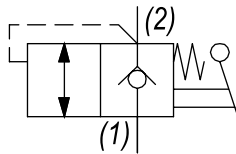
Note: Pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.



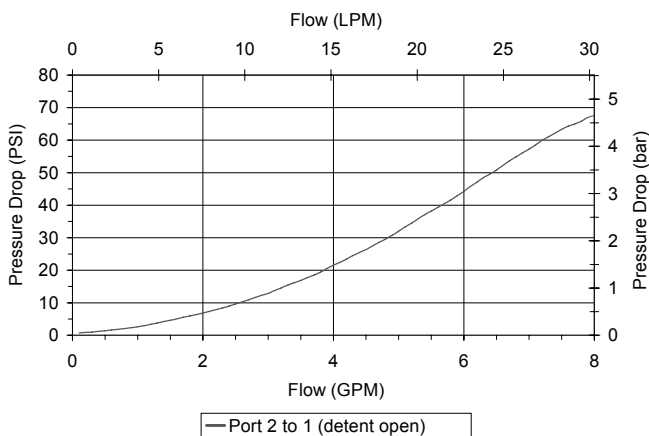
**HYDRAULIC SYMBOL**



Pressure above *SPRING BIAS PRESSURE* at port (2) may cause valve to self open.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	8 GPM (30 LTR/M)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	0-5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.33 lbs (.15 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191101

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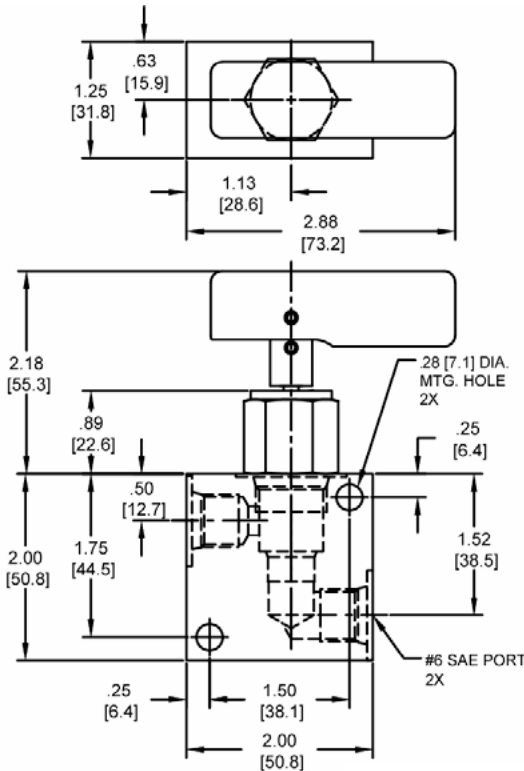
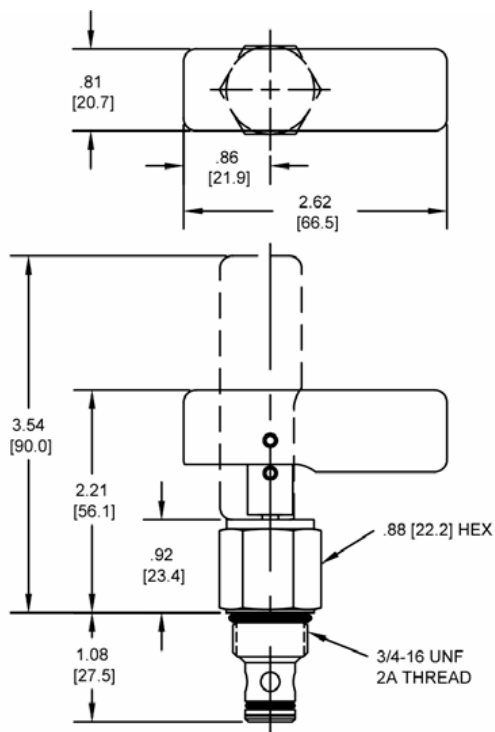


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**DIMENSIONS**



Body Weight: .39 lbs (.18 kg)

**ORDERING INFORMATION**

<p><b>PB-MCL</b> -</p> <p style="text-align: center;"><u>OPTIONS</u></p> <p>Buna Standard <b>00</b>          Viton Standard <b>V0</b>          Buna, Screen <b>A0</b>          Viton, Screen <b>W0</b></p>	<p style="text-align: center;"><u>BODIES</u></p> <p>Blank Without Body  <b>N</b> 1/4" NPT Ports  <b>S</b> #6 SAE Ports</p>
<p style="text-align: center;"><u>SPRING BIAS PRESSURE</u></p> <p><b>0075</b> 75 PSI  <b>0150</b> 150 PSI</p>	

Note: use screen only if flow direction is from (1) to (2).

Note: pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

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**DE-MCL** NORMALLY CLOSED MANUAL, PULL VALVE

**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, normally closed, manual pull valve.

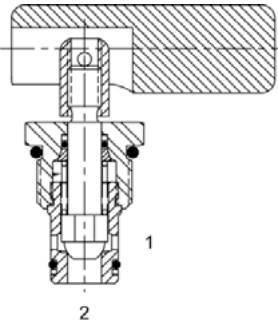
**OPERATION**

The DE-MCL blocks flow from (1) to (2) until an operator pulls the shaft outward. The bias spring allows for backpressure at (2) before the valve will open (see option page for pressure).

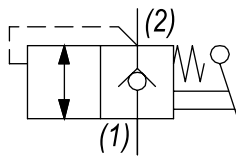
Note: pressure at port (2) will directly act on the spool and spring. Port (2) is intended to be a tank port only. The cartridge offers smooth transition in response to load changes in common hydraulic circuits.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.



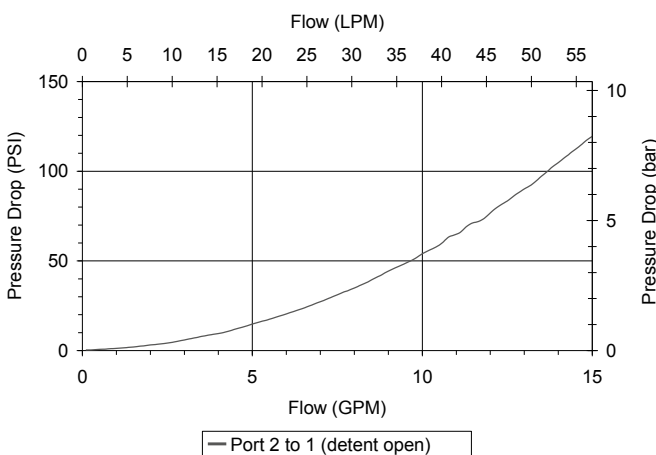
**HYDRAULIC SYMBOL**



Pressure above *SPRING BIAS PRESSURE* at port (2) may cause valve to self open.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	15 GPM (57 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	5 drops/min (82 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.15 lbs (.07 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191201

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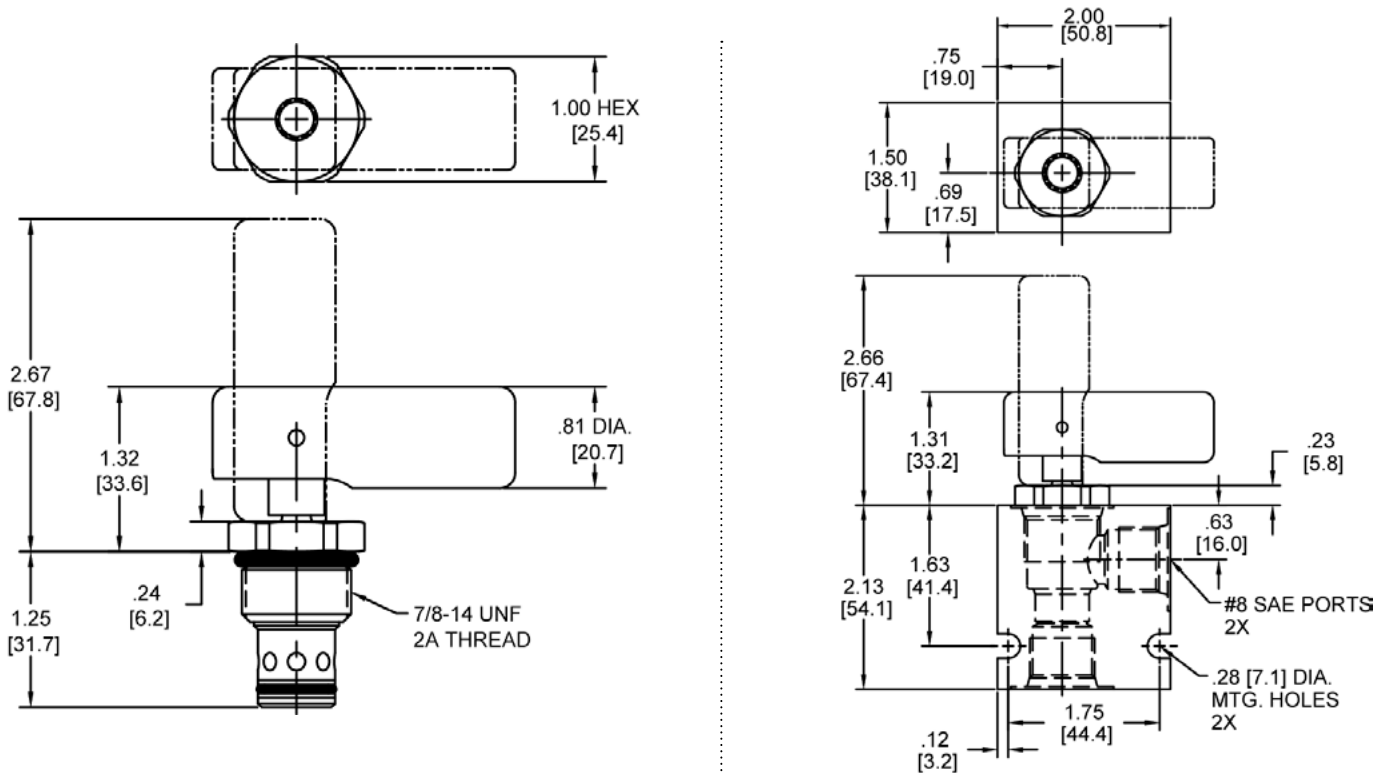
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**DIMENSIONS**



Body Weight: .47 lbs (.21 kg)

**ORDERING INFORMATION**

<p><b>DE-MCL</b> - - - -</p> <p style="text-align: center;"><u>OPTIONS</u></p> <p>Buna Standard <b>00</b></p> <p>Viton Standard <b>V0</b></p> <p>Buna, Screen <b>A0</b></p> <p>Viton, Screen <b>W0</b></p>	<p style="text-align: center;"><u>BODIES</u></p> <p>Blank Without Body</p> <p><b>N</b> 3/8" NPTF Ports</p> <p><b>S</b> #8 SAE Ports</p>
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Note: use screen only if flow direction is from (1) to (2).

**SPRING BIAS PRESSURE**

- 0065** 65 PSI
- 0160** 165 PSI

Note: pressure above SPRING BIAS PRESSURE at port (2) may cause valve to self open.

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**DE-M2G** MANUAL ROTARY SPOOL VALVE, 2 WAY NORMALLY CLOSED

**DESCRIPTION**

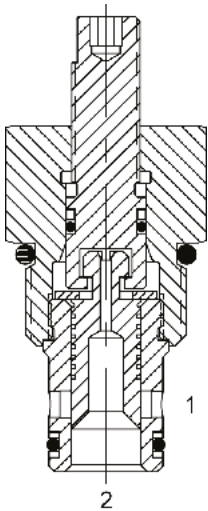
10 size, 7/8-14 thread, "Delta" series, manual rotary spool valve, 2 way normally closed.

**OPERATION**

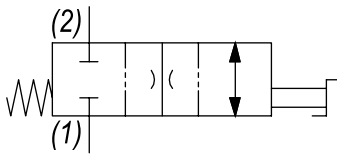
The DE-M2G when rotated clockwise (fully closed position) blocks flow from (1) to (2) and (2) to (1). When rotated counterclockwise (fully open position), the cartridge allows flow from (1) to (2) and (2) to (1).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.



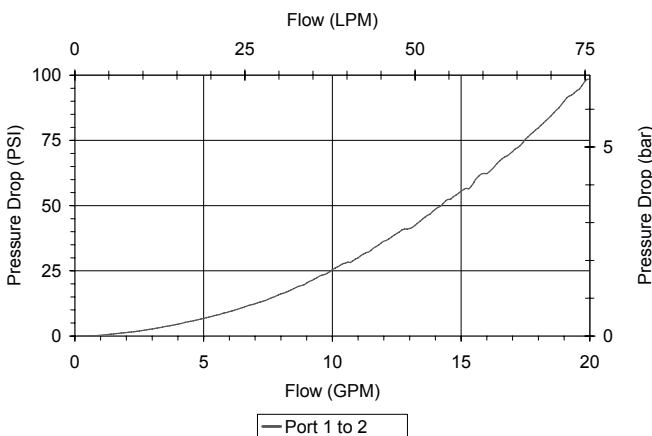
**HYDRAULIC SYMBOL**



May be used as a metering product. Valve has approximately 3.5 turns of adjustment from fully open to fully closed. See Chart for fully open pressure drop.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	20 GPM (76 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	5 cu/in per min (82 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.27 lbs (.12 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 2W
Cavity Form Tool (Finishing)	40500000
Seal Kit	21191202

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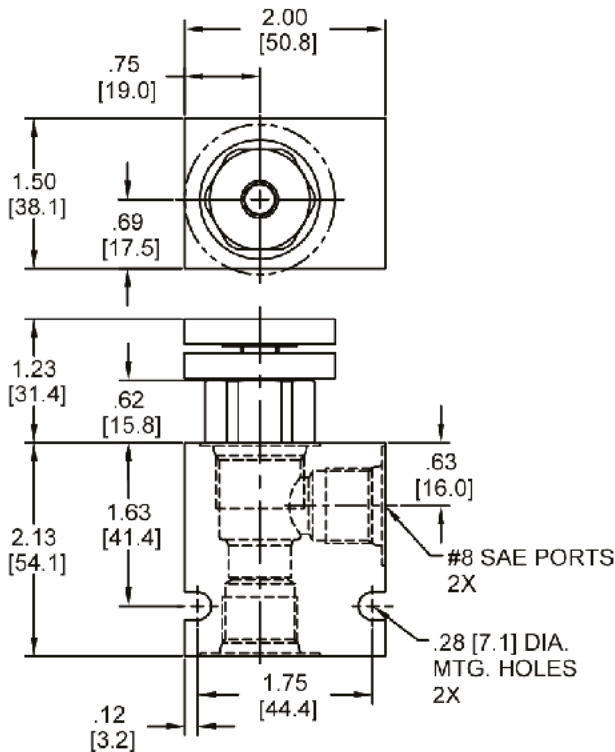
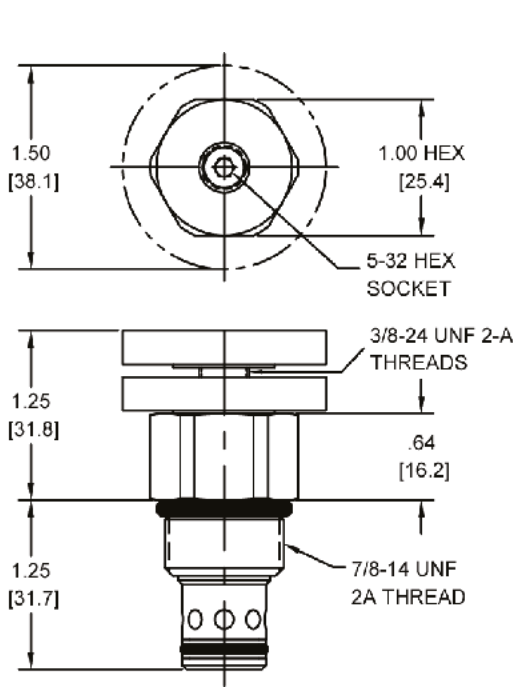


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DIMENSIONS



Body Weight: .47 lbs (.21 kg)

ORDERING INFORMATION

<b>DE-M2G</b> - -	
<b>OPTIONS</b>	<b>BODIES</b>
Buna Standard <b>00</b>	<b>Blank</b> Without Body
Viton Standard <b>V0</b>	<b>N</b> 3/8" NPTF Ports
Buna, Screen <b>A0</b>	<b>S</b> #8 SAE Ports
Viton, Screen <b>W0</b>	
Buna, Knob <b>OK</b>	
Viton, Knob <b>VK</b>	
Buna, Knob, Screen <b>AK</b>	
Viton, Knob, Screen <b>WK</b>	

Note: use screen only if flow direction is from (1) to (2).

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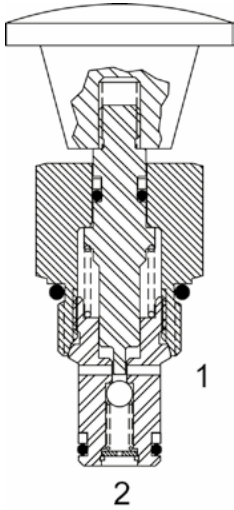


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**HB-MCP 2 WAY MANUAL VALVE, NORMALLY CLOSED, PUSH TYPE**



**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, manual valve, 2 way normally closed, push type.

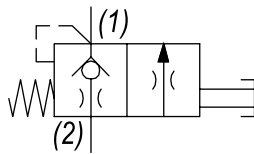
**OPERATION**

The HB-MCP blocks flow from (2) to (1) until an operator pushes the knob in allowing pressure at port #2 to drop to port #1 pressure.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

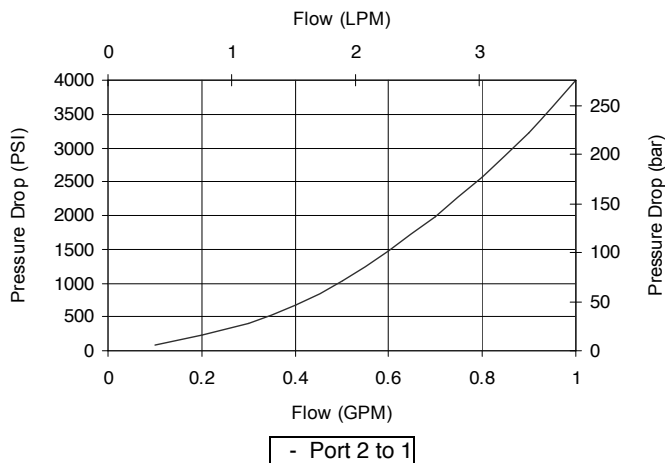
**HYDRAULIC SYMBOL**



Good as a pilot dump valve. Port #1 should be limited to <500 PSI to allow actuation (50 lbs), Port #2 actuation load at 4000 PSI (50 lbs).

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	1 GPM (4 LPM)
Max. Operating Pressure	4000 PSI (276 bar)
Typical Internal Leakage (150 SSU)	5 drops/min
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	32° to 160°F (0° to 70°C)
Weight	.14 lbs (.06 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 2W
Cavity Form Tool (Finishing)	40500005
Seal Kit	21191100

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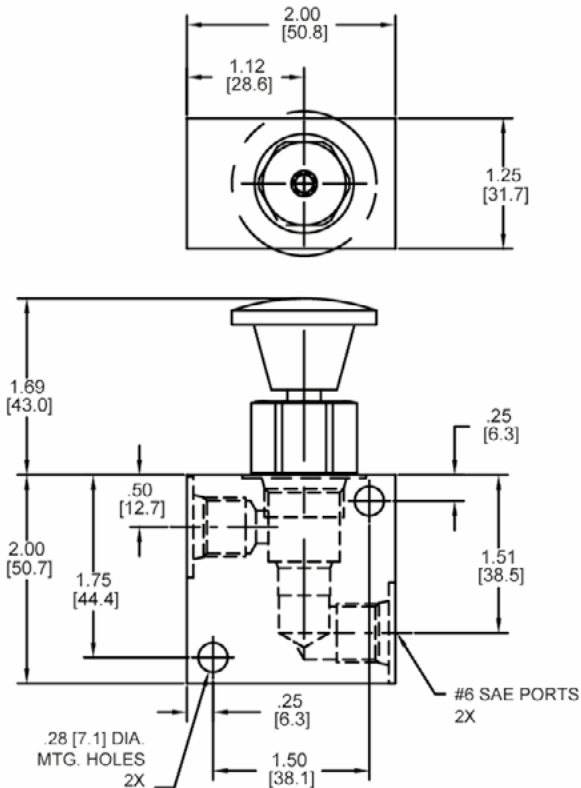
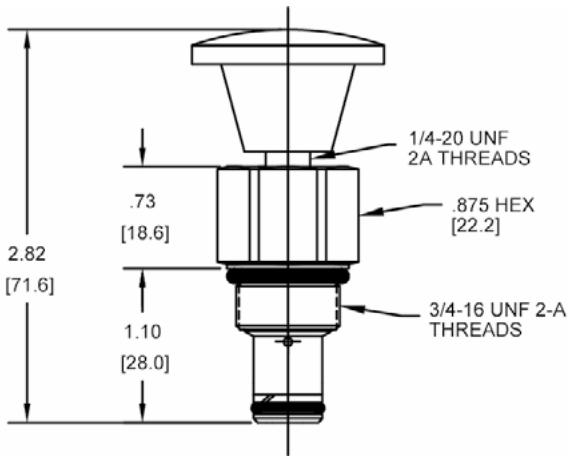


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DIMENSIONS



Body Weight: .39 lbs (.18 kg)

ORDERING INFORMATION

<p><b>HB-MCP</b> -</p> <p style="text-align: center;"> </p> <p style="text-align: center;"> </p> <p style="text-align: center;"> </p> <p style="text-align: center;"> </p>	<p><b>OPTIONS</b></p> <p>Buna, Knob <b>OK</b></p> <p>Viton, Knob <b>VK</b></p>	<p style="text-align: center;">-</p> <p style="text-align: center;"> </p> <p style="text-align: center;"> </p> <p style="text-align: center;"> </p> <p style="text-align: center;"> </p>	<p><b>BODIES</b></p> <p>Blank Without Body</p> <p><b>N</b> 1/4" NPTF Ports</p> <p><b>S</b> #6 SAE Ports</p>
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**Note: aluminum NOT durability rated for 4000 PSI. Consult factory for options.**

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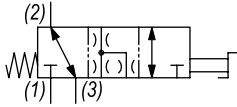


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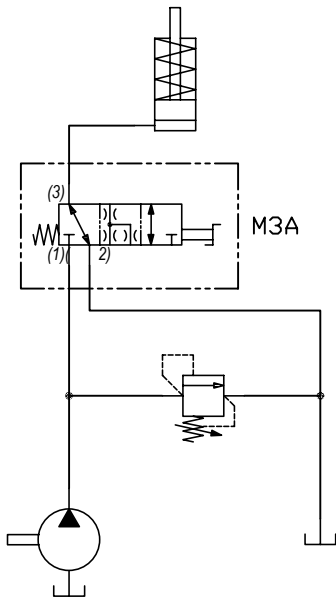
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3 WAY 2 POSITION MANUAL VALVES

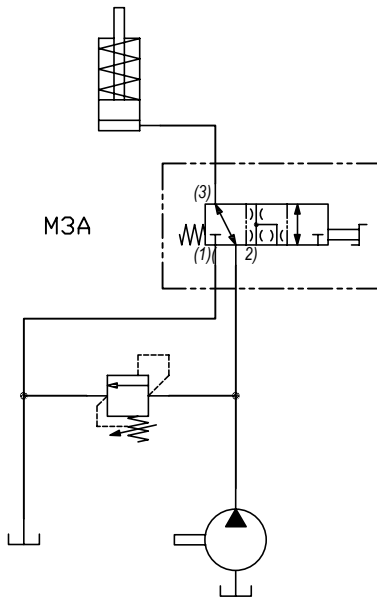
	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	12	3000	45	207	7/8-14	DF-M3A	MD80

TYPICAL SCHEMATIC

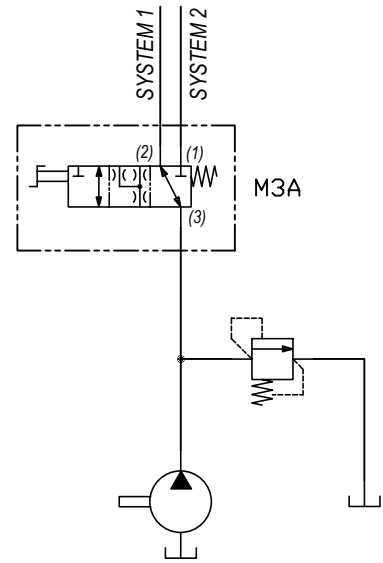
Typical applications for an M3A include manual activation of an actuator or selection between two functions as shown.



PORTING OPTION 1



PORTING OPTION 2



PORTING OPTION 3

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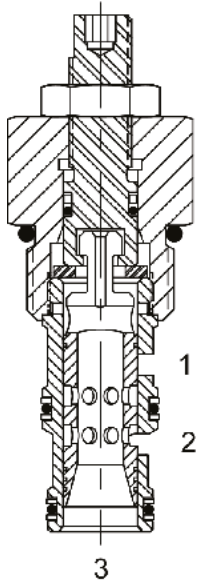


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**DF-M3A** MANUAL ROTARY SPOOL VALVE, 3 WAY 2 POSITION



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, 3 way 2 position, manual rotary spool valve.

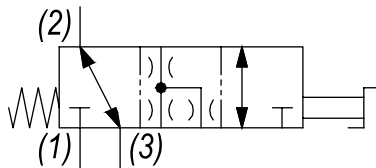
**OPERATION**

The DF-M3A when rotated fully to the clockwise position, the cartridge directs flow from (3) to (2) or (2) to (3) and blocks flow at (1). When rotated fully to the counterclockwise position, the cartridge directs flow from (1) to (3) or (3) to (1) and blocks flow at (2). All ports are closed in transition.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

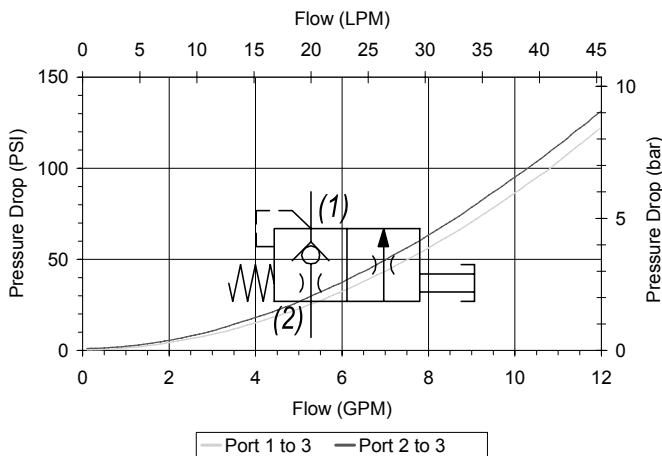
**HYDRAULIC SYMBOL**



May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions. See chart for pressure drop in both positions.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	12 GPM (45 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	5 cu in/min (82 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.49 lbs (.22 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 3W
Cavity Form Tool (Finishing)	40500001
Seal Kit	21191210

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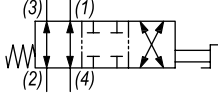
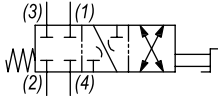
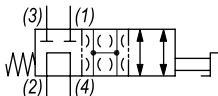


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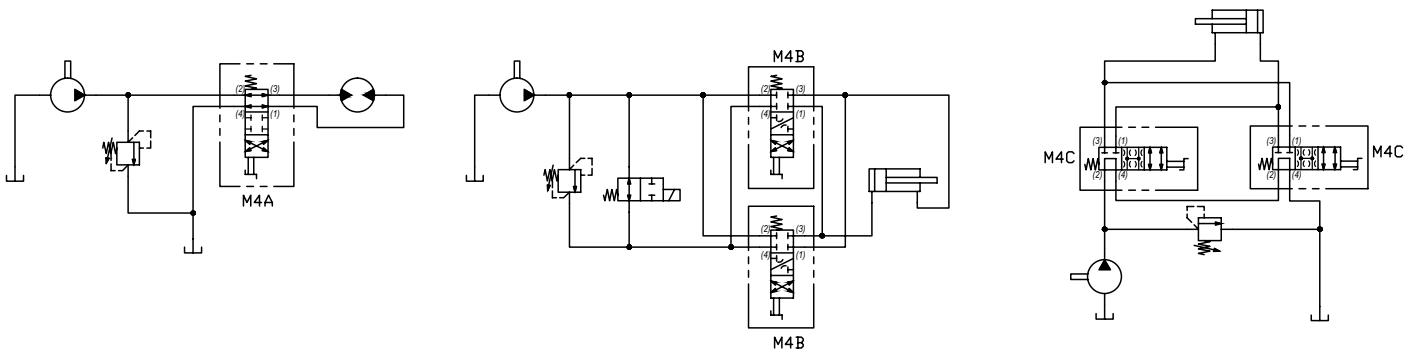
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4 WAY 2 POSITION MANUAL VALVES

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	10	3000	38	207	7/8-14	DG-M4A	MD84
	15	3000	57	207	7/8-14	DG-M4B	MD86
	12	3000	45	207	7/8-14	DG-M4C	MD88

TYPICAL SCHEMATIC

Typical application for the M4A is directional motor or cylinder control. Typical application for the M4B is directional control in a parallel circuit. Typical application for the M4C is directional control in a series circuit.



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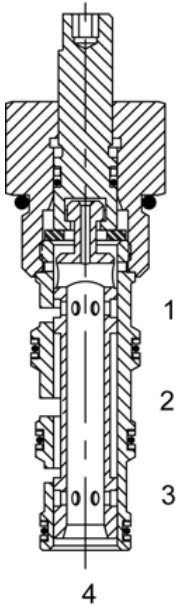


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**DG-M4A** MANUAL SPOOL ROTARY VALVE, 4 WAY 2 POSITION, CRISS CROSS



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, manual rotary spool valve, 4 way 2 position, criss cross.

**OPERATION**

The DG-M4A, when rotated fully to clockwise position, the cartridge directs flow between (2) to (3) and (1) to (4). When rotated fully to counterclockwise position, the cartridge directs flow between (3) to (4) and (1) to (2). All ports are closed in transition.

**FEATURES**

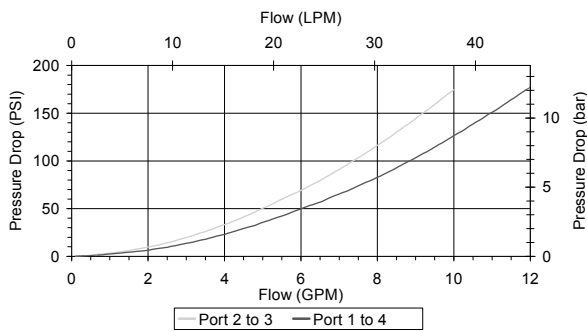
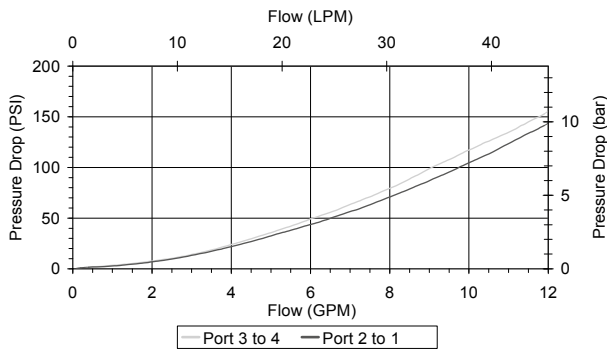
- Hardened parts for long life.
- Industry common cavity.



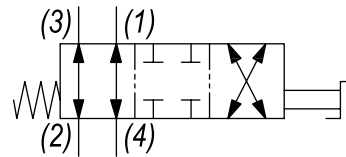
May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions. See chart for pressure drop in both positions.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**HYDRAULIC SYMBOL**



**VALVE SPECIFICATIONS**

Nominal Flow	10 GPM (38 LPM)
	8 GPM (30 LPM) from (2) to (3)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	5 cu in/min (82 ml/min) per path
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.32 lbs (.15 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 4W
Cavity Form Tool (Finishing)	40500002
Seal Kit	21191214

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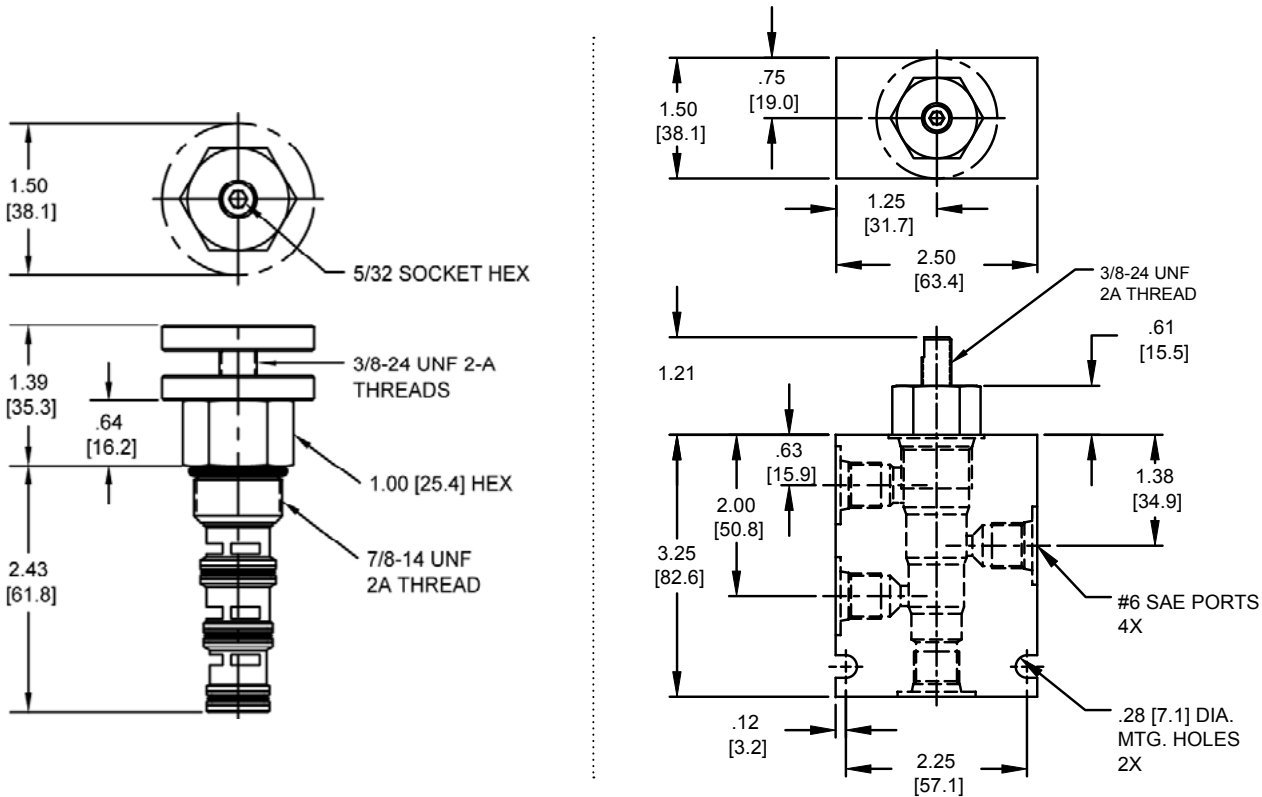


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DIMENSIONS



Body Weight: .99 lbs (.45 kg)

ORDERING INFORMATION

<b>DG-M4A</b>		-	-
	<b>OPTIONS</b>		<b>BODIES</b>
Buna, Standard	<b>00</b>		<b>Blank</b> Without Body
Viton, Standard	<b>V0</b>		<b>N</b> 1/4" NPTF Ports
Buna, Knob	<b>0K</b>		<b>S</b> #6 SAE Ports
Viton, Knob	<b>VK</b>		

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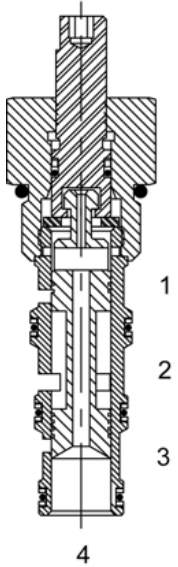


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**DG-M4B** MANUAL ROTARY SPOOL VALVE, 4 WAY 2 POSITION, CLOSED CENTER



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, 4 way 2 position, manual rotary spool valve, closed center.

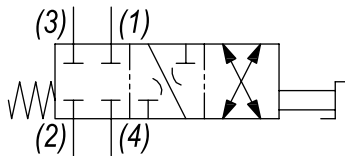
**OPERATION**

The DG-M4B when rotated fully to clockwise position, this valve blocks flow at all ports. When rotated fully to counterclockwise position, the cartridge directs flow between (2) and (1), as well as (3) and (4).

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

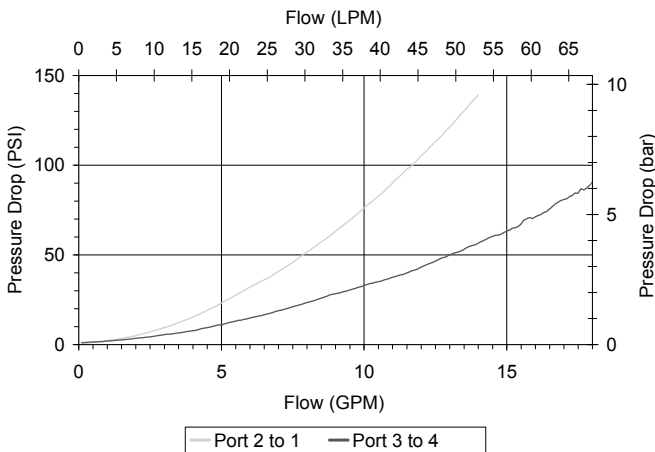
**HYDRAULIC SYMBOL**



May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions. See chart for pressure drop.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	15 GPM (57 LPM)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	5 cu in/min (82 ml/min) per path
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.33 lbs (.15 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 4W
Cavity Form Tool (Finishing)	40500002
Seal Kit	21191214

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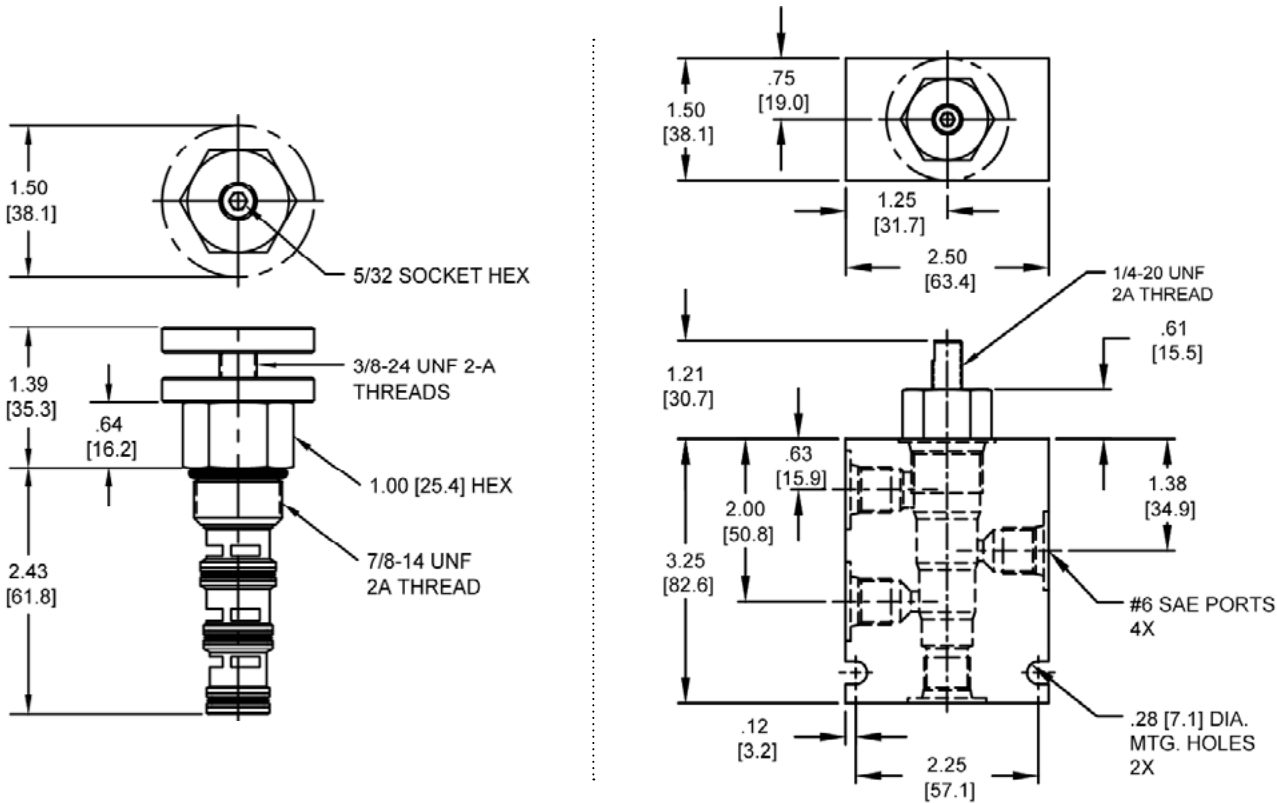


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DIMENSIONS



Body Weight: .99 lbs (.45 kg)

ORDERING INFORMATION

<b>DG-M4B</b>		-	-
	<b>OPTIONS</b>		<b>BODIES</b>
Buna, Standard	<b>00</b>		Blank
Viton, Standard	<b>V0</b>		Without Body
Buna, Knob	<b>0K</b>		<b>N</b> 1/4" NPTF Ports
Viton, Knob	<b>VK</b>		<b>S</b> #6 SAE Ports

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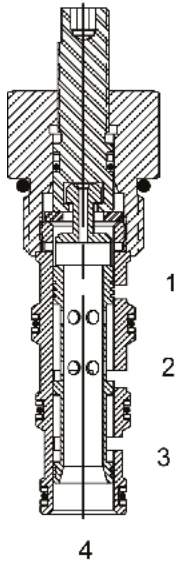


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**DG-M4C** MANUAL ROTARY SPOOL VALVE, 4 WAY 2 POSITION, TANDEM CENTER



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, 4 way 2 position, manual rotary spool valve tandem center.

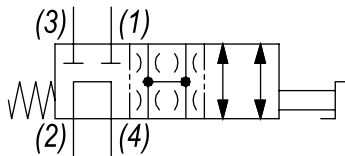
**OPERATION**

The DG-M4C when rotated fully to clockwise position, the cartridge allows flow from (2) to (4) and blocks flow at (1) and (3). When rotated fully total counterclockwise position, the cartridge allows flow between (2) and (3) and between (1) and (4). All ports are closed in transition.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

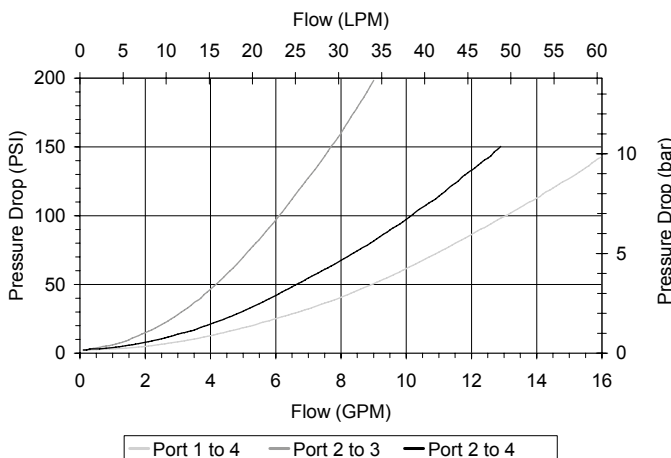
**HYDRAULIC SYMBOL**



May be used as metering product. Valve has approximately 3.5 turns adjustment from extreme clockwise fully to counterclockwise positions. See chart for fully open and fully closed pressure drop.

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	12 GPM (45 LPM)
	8 GPM (30 LPM) from (2) to (3)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	5 cu in/min (82 ml/min) per path
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.52 lbs (.23 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 4W
Cavity Form Tool (Finishing)	40500002
Seal Kit	21191214

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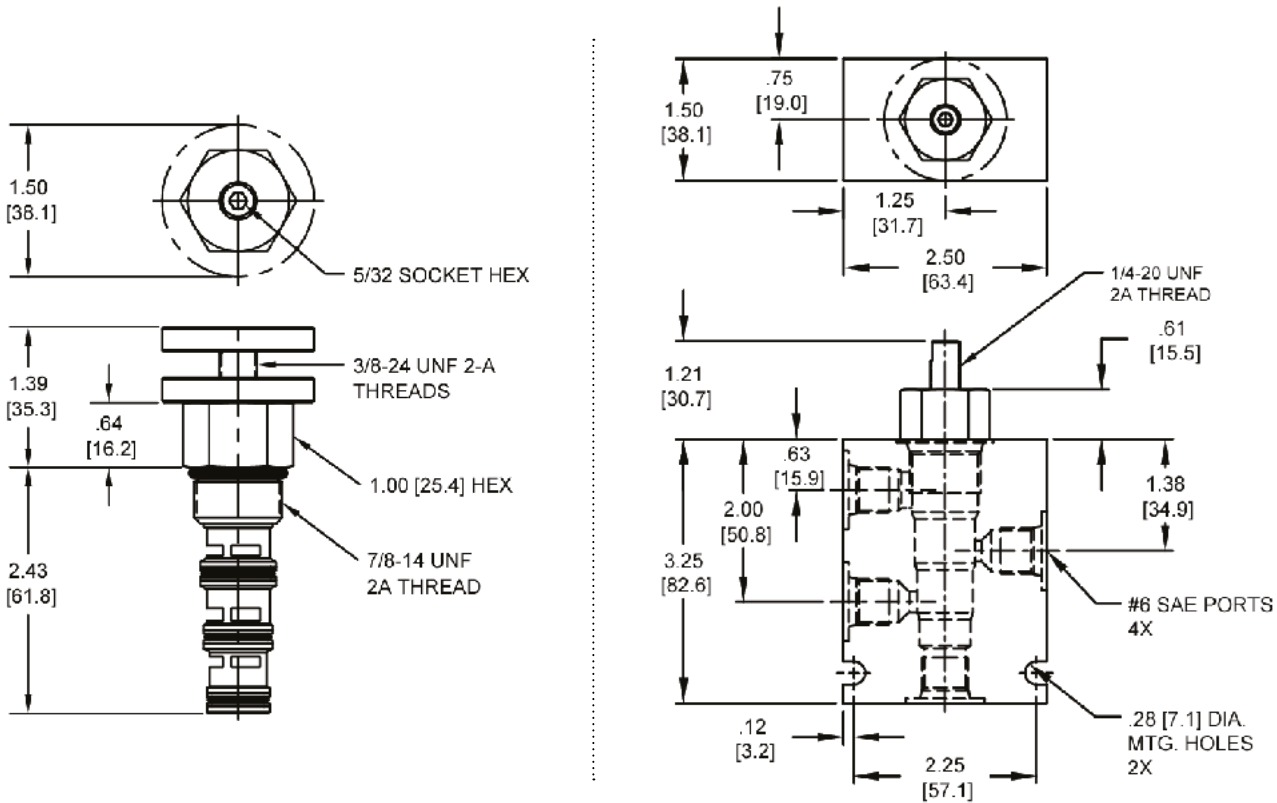
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DIMENSIONS



Body Weight: .99 lbs (.45 kg)

ORDERING INFORMATION

<b>DG-M4C</b>		-	-
	<b>OPTIONS</b>		<b>BODIES</b>
Buna, Standard	<b>00</b>		Blank
Viton, Standard	<b>V0</b>		Without Body
Buna, Knob	<b>0K</b>		<b>N</b> 1/4" NPTF Ports
Viton, Knob	<b>VK</b>		<b>S</b> #6 SAE Ports

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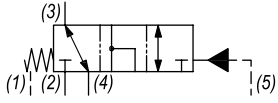
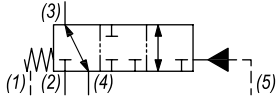


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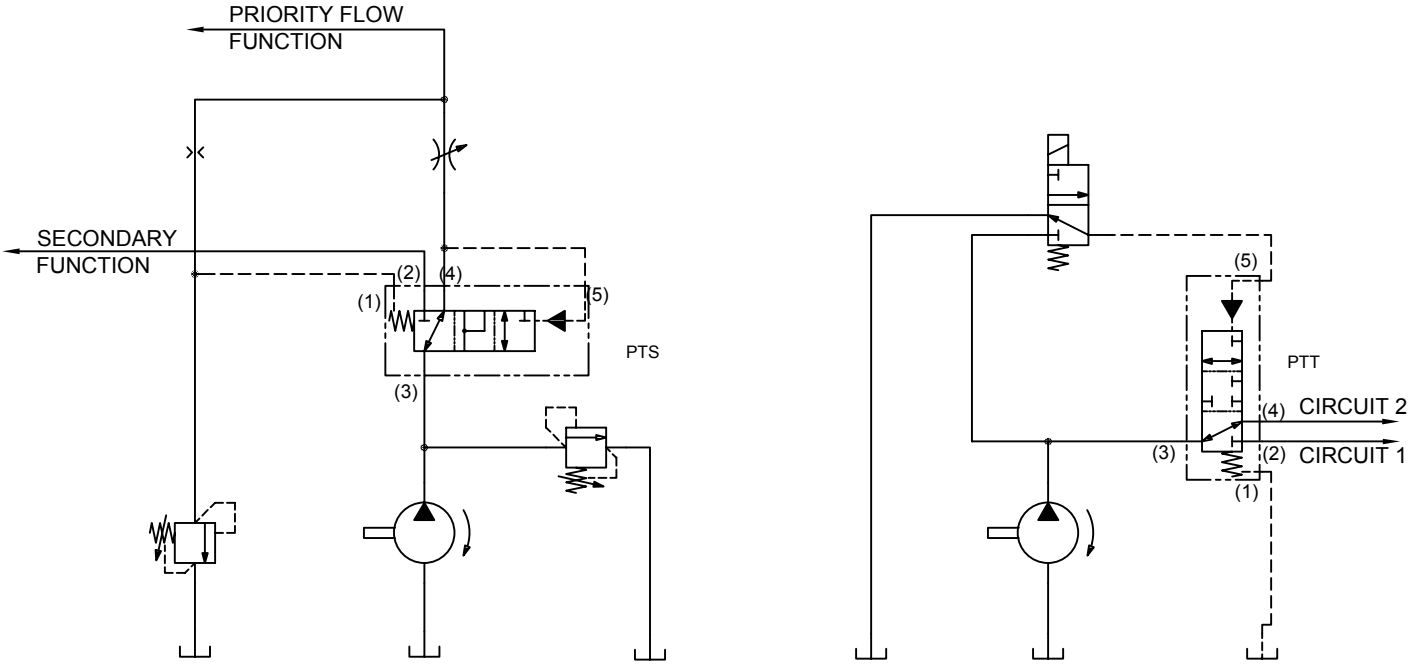
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**PILOT TO SHIFT VALVES**

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	40	3500	151	241	1 5/16-12	<b>SO-PTS</b>	MD92
	40	3500	151	241	1 5/16-12	<b>SO-PTT</b>	MD94

**TYPICAL SCHEMATIC**

Typical application for the PTS is a high flow priority flow control. Typical application for the PTT is a high flow selector valve.



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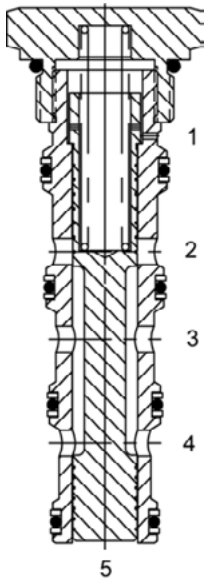


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**SO-PTS PILOT TO SHIFT, 3 WAY VALVE, OPEN TRANSITION**



**DESCRIPTION**

16 size, 1 5/16 -12 thread, "Super" series, pilot to shift, 3 way valve, open transition.

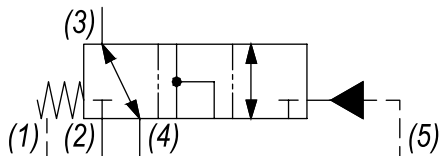
**OPERATION**

In neutral the SO-PTS allows flow between ports (3) and (4), port (2) is blocked. With application of a remote pilot signal at (5), the valve's spool shifts to allow flow between ports (2) and (3), while port (4) is blocked. During transition ports (2), (3), and (4) are open. The spring chamber is vented to the tank through port (1). The vented spring chamber allows the valve to be fully pressurized at ports (2), (3), and (4) without affecting required pilot pressure. Pressure at (1) will affect required pilot pressure.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

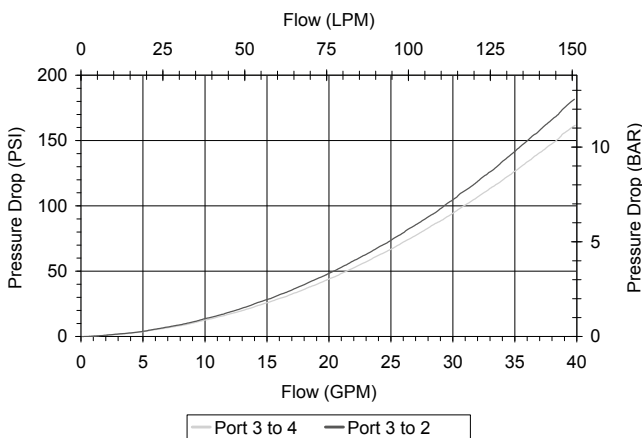
**HYDRAULIC SYMBOL**



A rate limiting orifice less than .060" diameter is recommended at port (5).

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	40 GPM (151 LTR/M)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	10 cu in/min (164 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	1.11 lbs (.50 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	90 ft-lbs (122 Nm)
Cavity	SUPER 5W SHORT
Cavity Form Tool (Finishing)	40500020
Seal Kit	21191410

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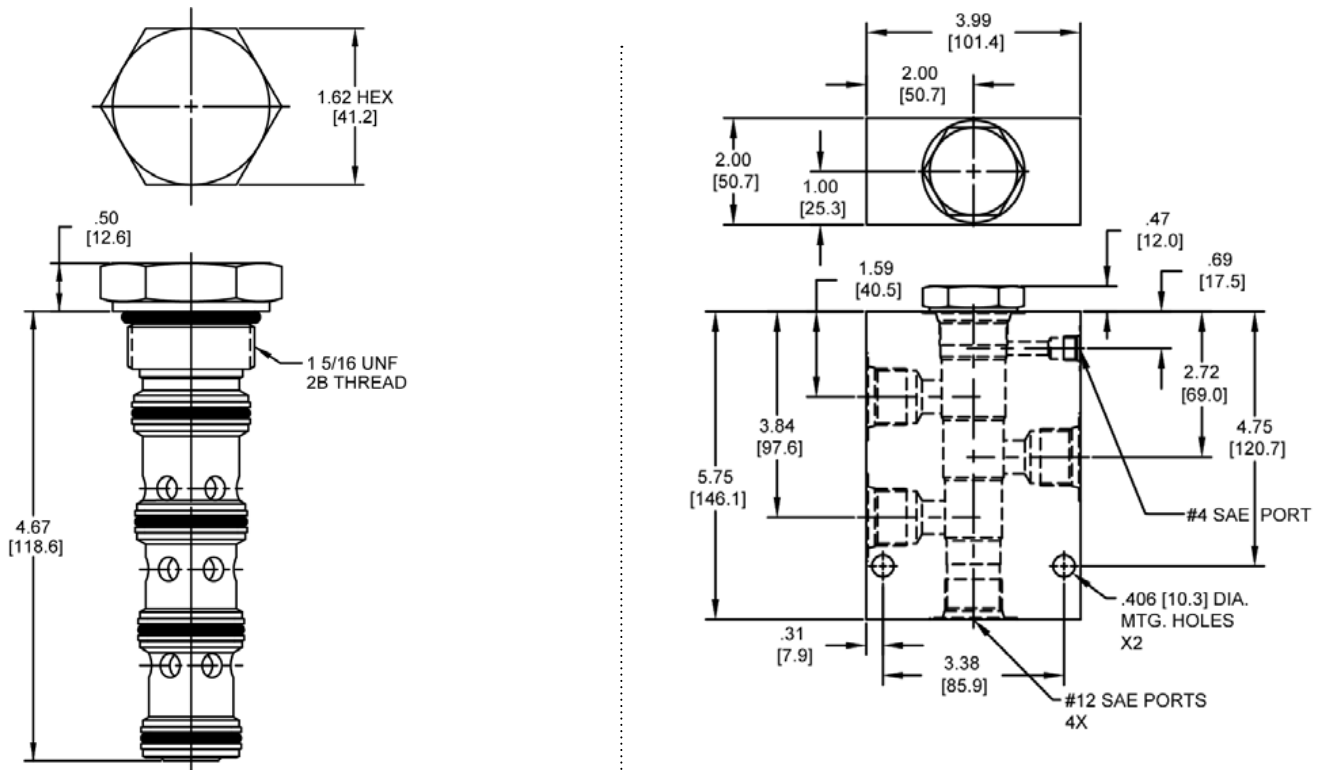


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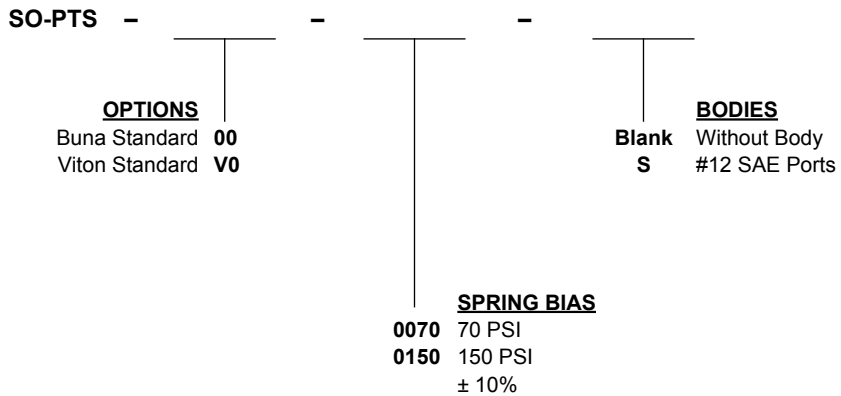
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**DIMENSIONS**



Body Weight: 3.76 lbs (1.62 kg)

**ORDERING INFORMATION**



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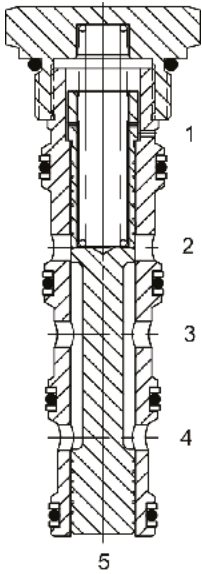


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**SO-PTT PILOT TO SHIFT, 3 WAY VALVE, CLOSED TRANSITION**



**DESCRIPTION**

16 size, 1 5/16 -12 thread, "Super" series, pilot to shift, 3 way valve, closed transition.

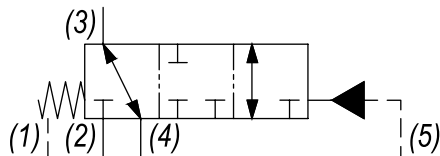
**OPERATION**

In neutral the SO-PTT allows flow between ports (3) and (4), port (2) is blocked. With application of a remote pilot signal at (5), the valve's spool shifts to allow flow between ports (2) and (3), while port (4) is blocked. During transition all ports are closed. The spring chamber is vented to the tank through port (1). The vented spring chamber allows the valve to be fully pressurized at ports (2), (3), and (4) without affecting required pilot pressure. Pressure at (1) will affect required pilot pressure.

**FEATURES**

- Hardened parts for long life.
- Industry common cavity.

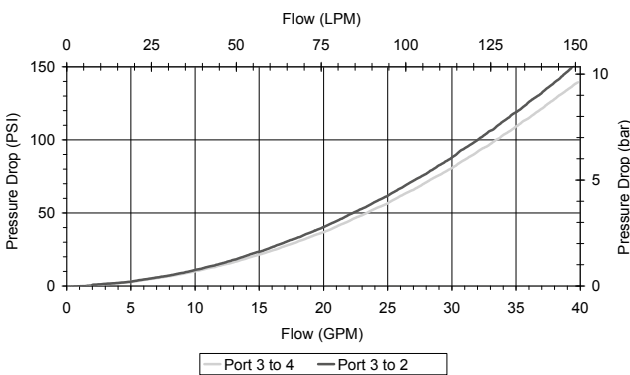
**HYDRAULIC SYMBOL**



A rate limiting orifice less than .060" diameter is recommended at port (5).

**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	40 GPM (151 LTR/M)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	10 cu in/min (164 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	1.08 lbs (.49 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	90 ft-lbs (122 Nm)
Cavity	SUPER 5W SHORT
Cavity Form Tool (Finishing)	40500020
Seal Kit	21191410

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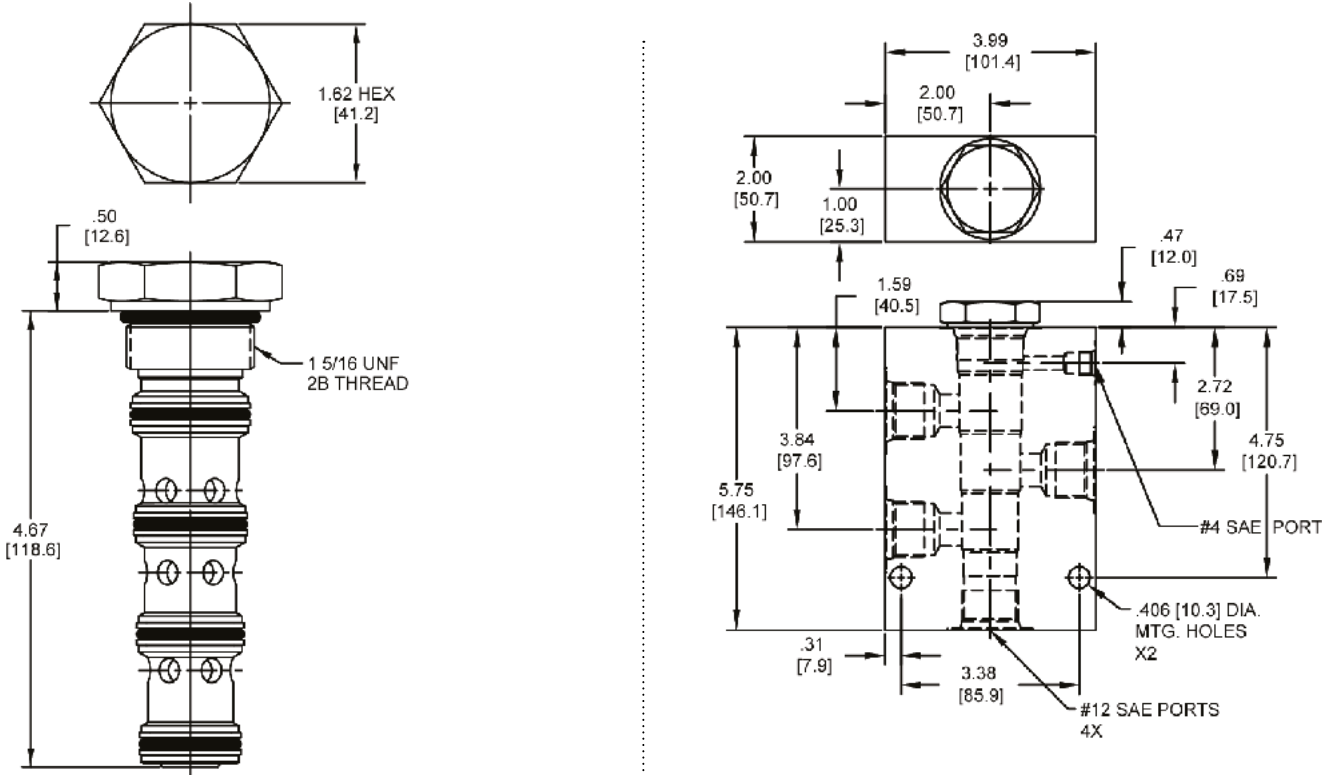


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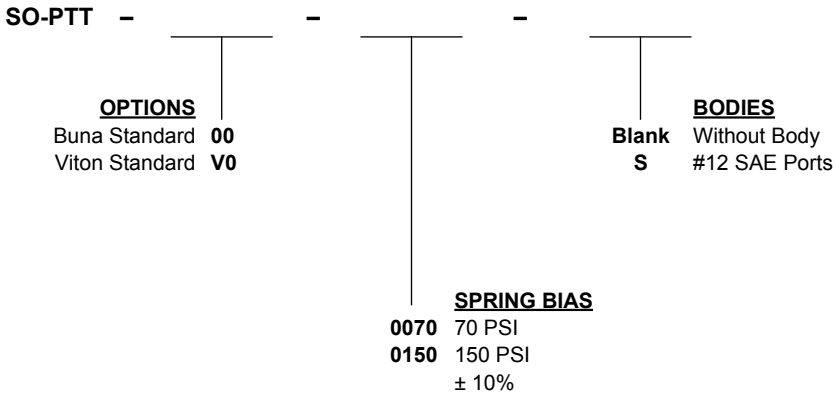
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**DIMENSIONS**



Body Weight: 3.76 lbs (1.62 kg)

**ORDERING INFORMATION**



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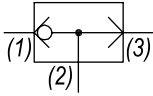
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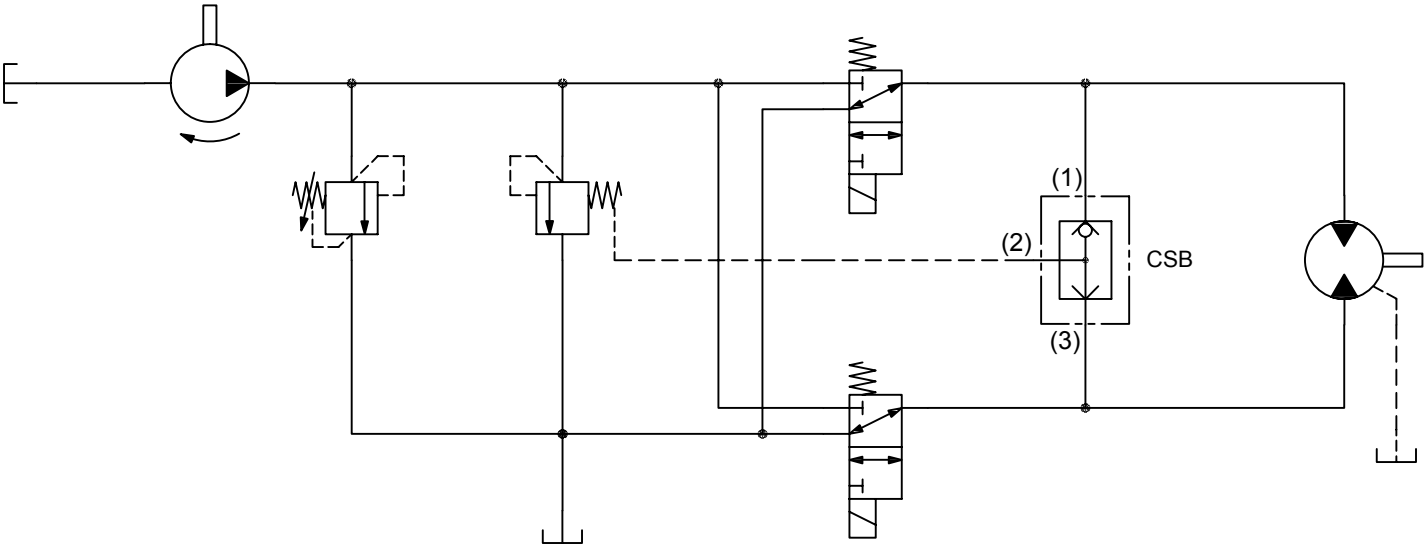


SHUTTLE VALVES

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	6	3500	23	241	3/4-16	PP-CSB	MD98
	8	3500	30	241	7/8-14	DF-CSB	MD100

TYPICAL SCHEMATIC

Typical application for the CSB is to provide load sense to a pressure compensator valve.



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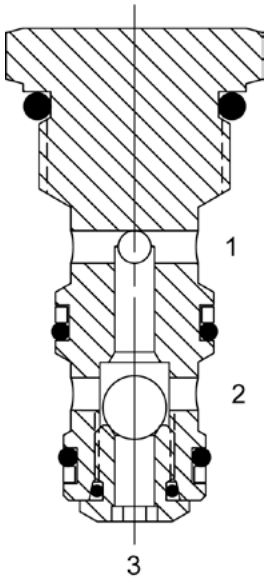


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**PP-CSB SHUTTLE VALVE**



**DESCRIPTION**

8 size, 3/4-16 thread, "Power" series, shuttle valve.

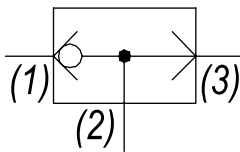
**OPERATION**

The PP-CSB allows flow from the higher pressure of (1) or (3) to (2). The valve is commonly used as a load sense to direct oil from the pressure side of a bidirectional hydraulic motor to a pressure released hydraulic brake.

**FEATURES**

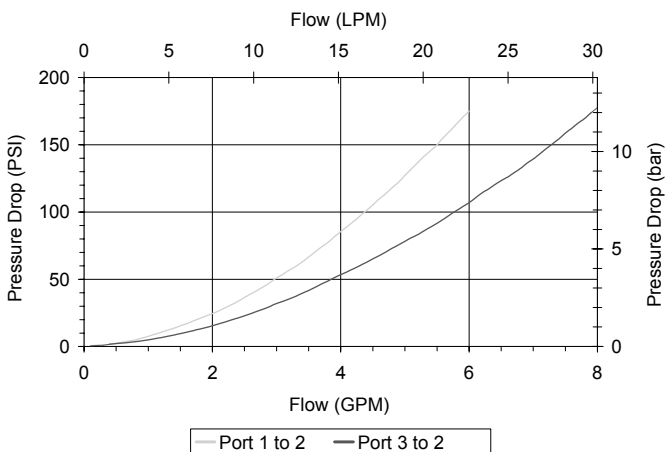
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	6 GPM (23 LTR/M)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	1 cu in/min (16 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.16 lbs (.07 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	25 ft-lbs (34 Nm)
Cavity	POWER 3W
Cavity Form Tool (Finishing)	40500024
Seal Kit	21191104

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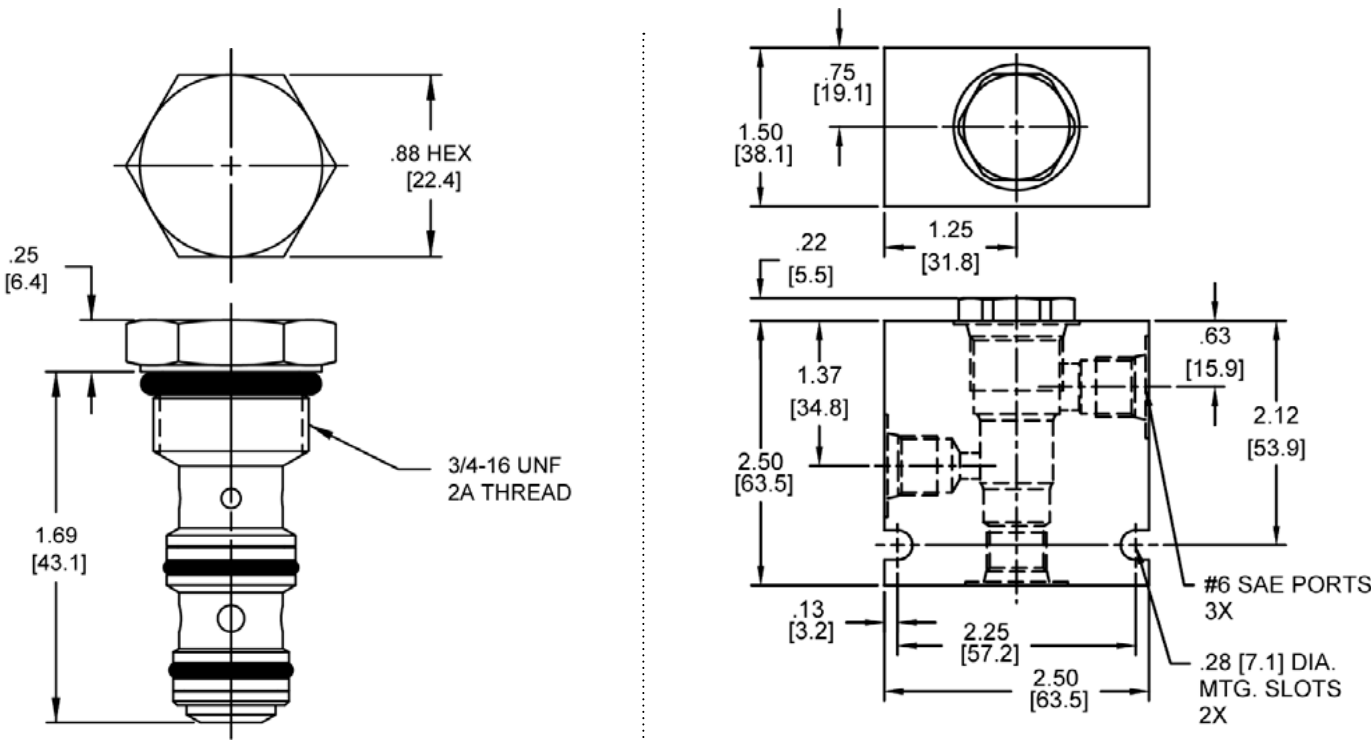


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DIMENSIONS



Body Weight: .56 lbs (.25 kg)

ORDERING INFORMATION

PP-CSB -		-	
<b>OPTIONS</b>		<b>BODIES</b>	
Buna, Standard	<b>00</b>	Blank	Without Body
Viton, Standard	<b>V0</b>	<b>N</b>	1/4" NPTF Ports
		<b>S</b>	#6 SAE Ports

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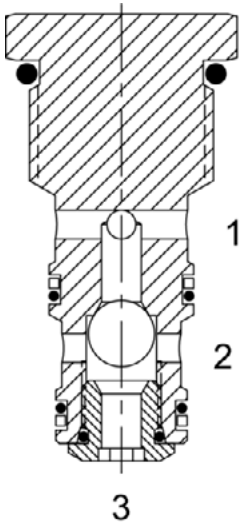


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**DF-CSB SHUTTLE VALVE**



**DESCRIPTION**

10 size, 7/8-14 thread, "Delta" series, shuttle valve.

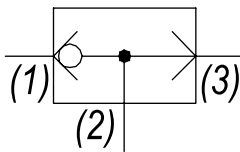
**OPERATION**

The DF-CSB allows flow from the higher pressure of (1) or (3) to (2). The valve is commonly used as a load sense to direct oil from the pressure side of a bidirectional hydraulic motor to a pressure-released hydraulic brake.

**FEATURES**

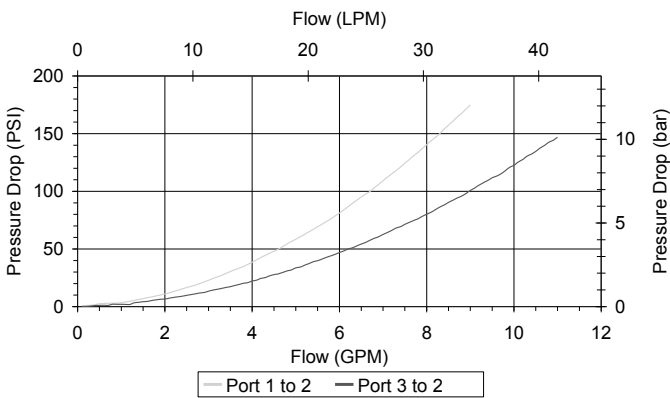
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	8 GPM (30 LPM)
Rated Operating Pressure	3500 PSI (241 bar)
Typical Internal Leakage (150 SSU)	1 cu in/min (16 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	.22 lbs (.10 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	30 ft-lbs (40.6 Nm)
Cavity	DELTA 3W
Cavity Form Tool (Finishing)	40500001
Seal Kit	21191206

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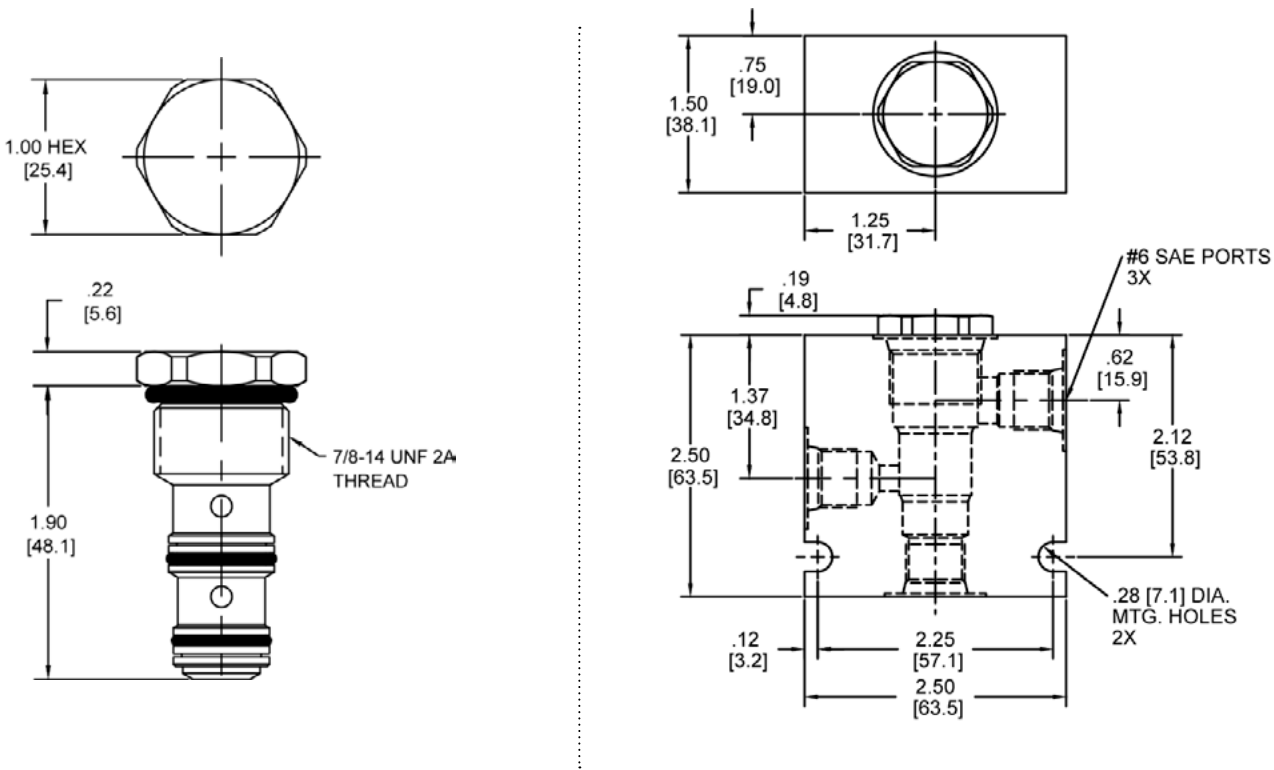


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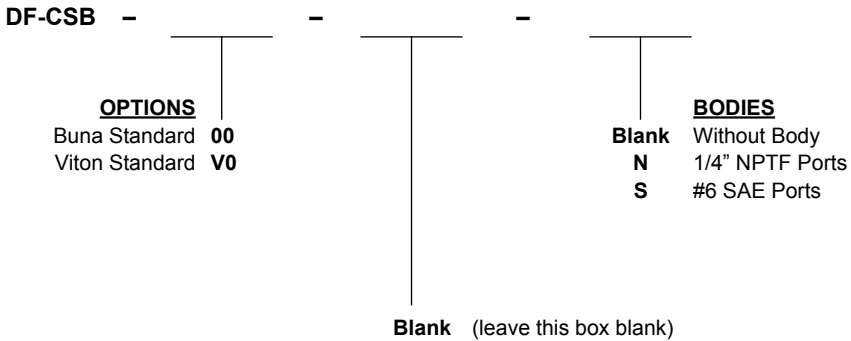
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DIMENSIONS



Body Weight: .76 lbs (.35 kg)

ORDERING INFORMATION



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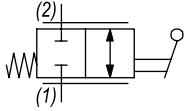


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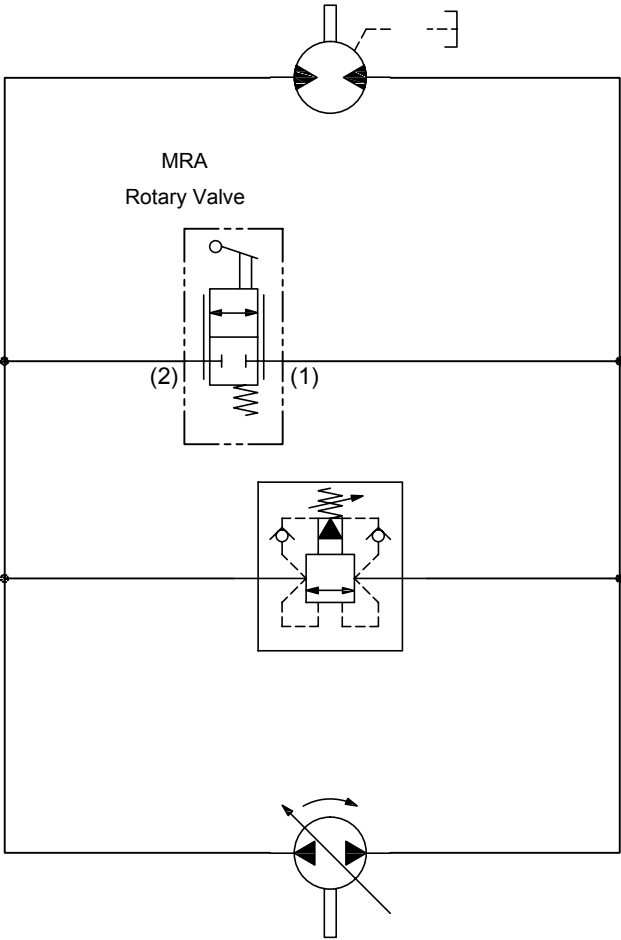
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ROTARY VALVES

	GPM	PSI	LPM	BAR	CAVITY	MODEL	PAGE
	40	3000	151	207	1 5/16-12	SJ-MRA	MD104

TYPICAL SCHEMATIC

Typical application for the MRA is as a hydraulic motor by-pass valve for vehicle towing or maintenance.



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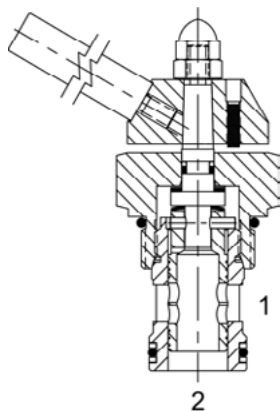


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**SJ-MRA** MANUAL ROTARY SPOOL VALVE, 2 WAY



**DESCRIPTION**

16 size, 1 5/16-12, "Super" series, manual rotary spool valve.

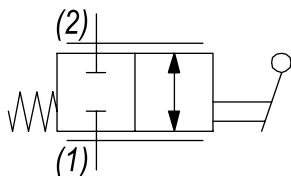
**OPERATION**

The SJ-MRA regulates flow from (1) to (2) or (2) to (1). Counter-clockwise Rotation of 90° adjusts valve from fully closed to fully open.

**FEATURES**

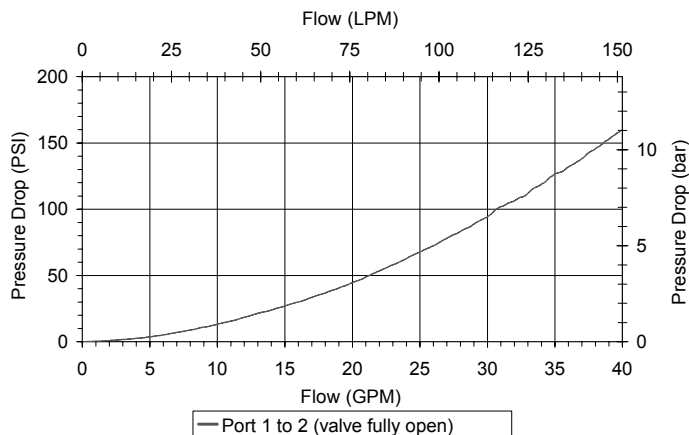
- Hardened parts for long life.
- Industry common cavity.

**HYDRAULIC SYMBOL**



**PERFORMANCE**

Actual Test Data (Cartridge Only)



**VALVE SPECIFICATIONS**

Nominal Flow	40 GPM (151 LTR/M)
Rated Operating Pressure	3000 PSI (207 bar)
Typical Internal Leakage (150 SSU)	15 cu in/min (246 ml/min)
Viscosity Range	36 to 3000 SSU (3 to 647 cSt)
Filtration	ISO 18/16/13
Media Operating Temp. Range	-40° to 250°F (-40° to 120°C)
Weight	1.13 lbs (.51 kg)
Operating Fluid Media	General Purpose Hydraulic Fluid
Cartridge Torque Requirements	90 ft-lbs (122 Nm)
Cavity	SUPER 2W
Cavity Form Tool (Finishing)	40500017
Seal Kit	21191402

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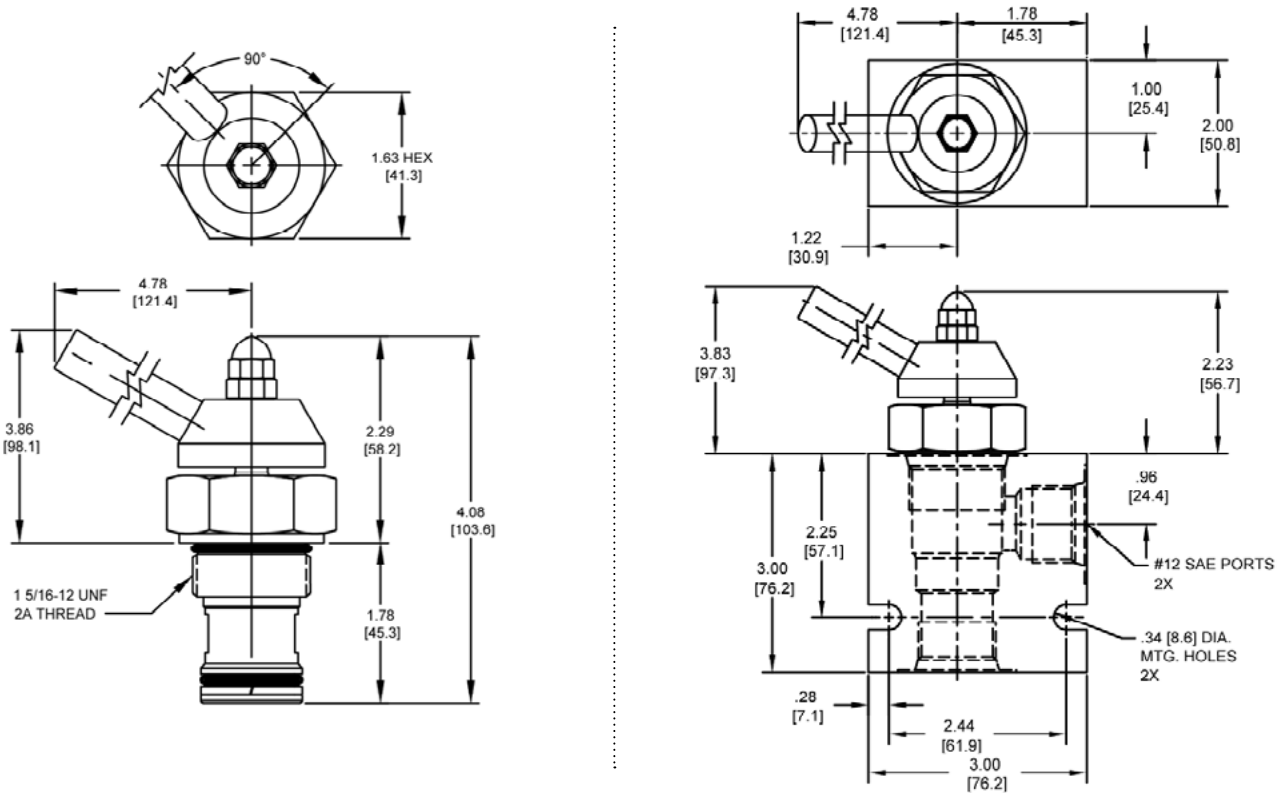
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DIMENSIONS



Body Weight: 1.29 lbs (.59 kg)

ORDERING INFORMATION

SJ-MRA		-	-
		—	—
<b>OPTIONS</b>			<b>BODIES</b>
Buna, Standard	00	Blank	Without Body
Viton, Standard	V0	N	3/4" NPTF Ports
		S	#12 SAE Ports

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