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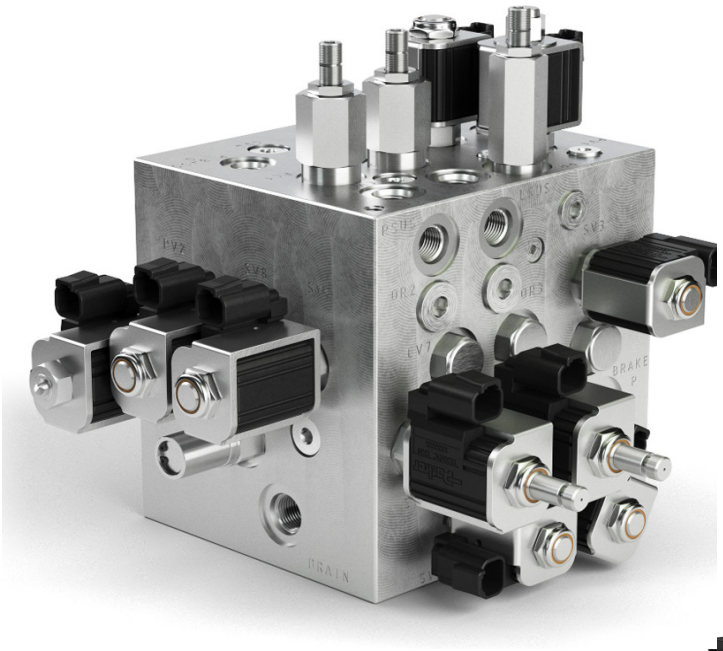

Hydraulic Cartridge Systems

Threaded Cartridge Valves and Integrated Hydraulic Products

Parker

ENGINEERING YOUR SUCCESS.

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⚠ WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

OFFER OF SALE

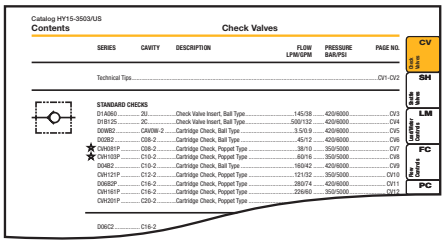
The items described in this document are hereby offered for sale by Parker-Hannifin Corporation, its subsidiaries or its authorized distributor. This offer and its acceptance are governed by the provisions stated in the detailed “Offer of Sale” elsewhere in this document.

PLEASE READ

How to use this catalog...

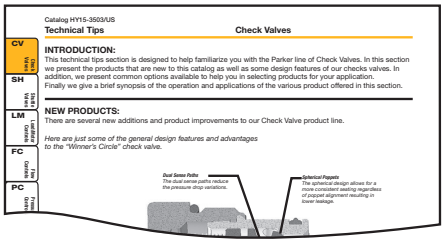
• Product Index

Each product tab has it's own product index for that particular section. Basic product specifications are shown along with catalog page numbers and product symbols. Further detail can be found on the specific catalog pages.



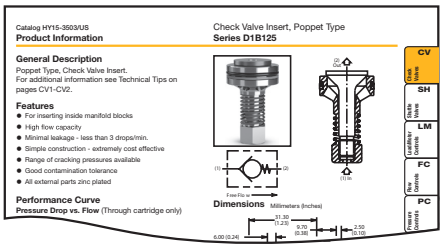
• Technical Tips

At the beginning of each product section, we have a series of **Technical Tip** pages. These pages describe, in detail, the application and operational parameters of our cartridge valves. If you have any application or specification questions that cannot be answered by this section, please contact your local Parker representative or give us a call.



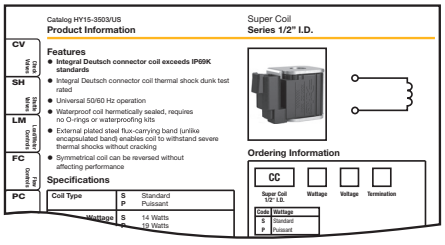
• Product Pages

The individual product catalog pages detail fully the product specifications and operating parameters of each valve. Additionally, dimensional information, as well as a complete model code for ordering product is shown.



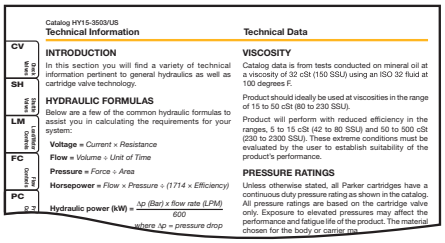
• Coil and Body

There are 2 sections in this catalog that assist you in selecting the proper valve body or solenoid coil for your particular application. Also, the cavity details are shown for all Parker and Sterling cavities currently in use.



• Technical Data

The Technical Data section outlines various hydraulic guidelines such as ratings, torques, limitations in use, seals, and hydraulic fluid/filtration information.



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10SLC2-A	Normally Closed, Pilot to Close	LE10
10SLC2-B	Normally Closed, Vent to Open	LE13
10SLC3-A	Normally Open, Vent to Close	LE16
10SLC3-B	Normally Open, Vent to Close	LE18
16SLC1-A	Normally Closed, Pilot to Close	LE8
16SLC2-A	Normally Closed, Pilot to Close	LE11
16SLC2-B	Normally Closed, Vent to Open	LE14
16SLC3-A	Normally Open, Vent to Close	LE17
16SLC3-B	Normally Open, Vent to Close	LE19
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☆CVH103P	Cartridge Check, Poppet Type	CV9
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☆ *Denotes New Winner's Circle Product Line.*

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The HCSD Story . . .

The Hydraulic Cartridge Systems Division (HCSD), headquartered in Lincolnshire, Illinois, was “born” as a Parker manufacturing division on July 1st, 2000. Through several acquisitions, Parker has assembled a line-up of respected cartridge valve manufacturers, including; Sterling Hydraulics, Waterman Hydraulics, Fluid Power Systems (FPS), Gresen, and CEC. Through this assembly of products, Parker’s product offering is now one of the most extensive in the industry.

The objective and mission of HCSD:

“The Hydraulic Cartridge Systems Division of Parker Hannifin is a world leader in the manufacture of hydraulic cartridge products and integrated systems. We will provide the best quality and value to our Customers by delivering Premier Customer Service, rapid application support, advanced technology products, and value-based engineering solutions.”

The division currently has two locations, each providing various aspects of cartridge valve manufacturing, assembly, test, as well as manifold machining and other secondary operations. Each location is supported by a local management team, along with an experienced and well-trained work force. Parker believes the best in efficient manufacturing and Premier Customer Service cannot be achieved unless the process of continuous improvement is in place. We are continuously measuring our progress to exceed the expectation of the market through Kaizen events, Lean initiatives, 5 “S” quality programs, and other continuous improvement programs.

Lincolnshire operations . . .

The division head-quarters is located in Lincolnshire,Illinois, which is approximately 15 miles north of Chicago, and a 20 minute drive north of O’Hare airport. This location houses many of the primary division functions such as Marketing, Product Management, Engineering, Customer Service, Accounting, Quality Engineering, and Research & Development. In addition to the office headquarters, the 85,000 sq. ft. building features a newly remodeled plant space for the assembly and test of cartridge valves and manifold products. With its experienced, dedicated work force, Parker is proud to present Lincolnshire as the assembly and test home for the new Winner’s Circle product line. This location serves as the primary contact point for customers, distributors, and Parker sales representatives.

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Monterrey operations . . .

The Monterrey cartridge valve assembly and test operations are housed in a well-equipped modern manufacturing facility, just 2 hours west of McAllen, Texas. Parker began operations in this new facility in 1998. This location focuses primarily on the assembly and test of cartridge valves.
HCSD actually shares this facility with other Parker divisions in order to maximize the efficiency of the assembly and support processes.

All Parker facilities are ISO 9000 registered, ensuring complete customer satisfaction.

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Contents

Check Valves

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	D1B125	2C	Check Valve Insert, Ball Type	500/132	420/6000	CV5
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	CVH121P	C12-2	Cartridge Check, Poppet Type	121/32	350/5000	CV11
	D06B2P	C16-2	Cartridge Check, Poppet Type	280/74	420/6000	CV12
	CVH161P	C16-2	Cartridge Check, Poppet Type	226/60	350/5000	CV13
	CVH201P	C20-2	Cartridge Check, Poppet Type	303/80	350/5000	CV14
	D06C2	C16-2	Cartridge Check, Poppet Type 2 to 1 Flow Path	500/132	420/6000	CV15
	PILOT OPERATED CHECKS					
	CP084P	C08-3	Single P.O. Check, Pilot on Port 1	19/5	207/3000	CV16
☆	CPH104P	C10-3	Single P.O. Check, Pilot on Port 1	30/8	350/5000	CV17
	CPH124P	C12-3	Single P.O. Check, Pilot on Port 1	75/20	350/5000	CV18
	DUAL PILOT OPERATED CHECKS					
☆	CPDH103		Dual P.O. Check Package	60/16	350/5000	CV19-CV20
	CPD084P	C08-4	Dual P.O. Check Cartridge	19/5	207/3000	CV21
	CHECK WITH RELIEF					
	D04F2	C10-2	Check With Thermal Relief, Relieving Port 2 to 1	130/40	420/6000	CV22

☆ *Denotes Winner's Circle Product Line.*

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

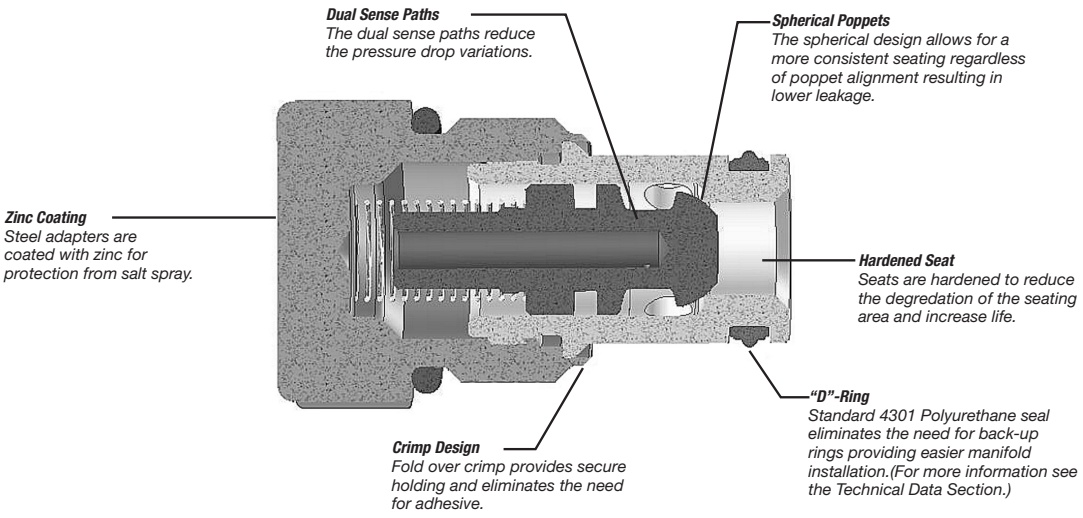
INTRODUCTION:

This technical tips section is designed to help familiarize you with the Parker line of Check Valves. In this section we present the products that are new to this catalog as well as some design features of our checks valves. In addition, we present common options available to help you in selecting products for your application. Finally we give a brief synopsis of the operation and applications of the various product offered in this section.

NEW PRODUCTS:

There are several new additions and product improvements to our Check Valve product line.

Here are just some of the general design features and advantages to the "Winner's Circle" check valve.



COMMON OPTIONS:

Since check valves and shuttles are fairly simple components, there are very few options. Here are the standard options you will find.

Seals: The Winner's Circle products feature a standard 4301 Polyurethane "D"-Ring. The "D"-Ring eliminates the need for back-up rings. The majority of the products are available in Nitrile or Fluorocarbon Seals. You should match the seal compatibility to the temperature and fluid being used in your application.

Crack Pressure: Parker offers a number of standard crack pressure options for each valve. Check the model code pages for these options. The crack pressure is defined as the minimum amount of pressure that is needed to unseat the poppet. In pilot operated check applications, you may want to go with a slightly higher cracking pressure to keep the piston weight, friction, and drag from accidently unseating the poppet.

Pilot Piston Seal: On the pilot piston style pilot operated check valves, Parker offers the option to place a seal on the piston to reduce the leakage across the piston. ***Note***: Sealing the pilot piston does not decrease the leakage across the poppet. In other words, if you are trying to reduce the leakage from the actuator port, sealing the piston will not help. While most applications do not require a seal on the piston, it can be advantageous in applications with very small pump flows where the lost fluid would have a high impact on actuator speed.

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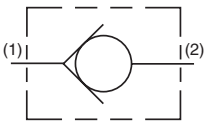
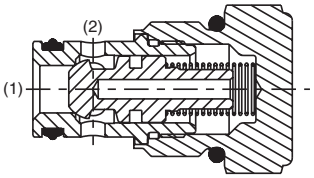
PRODUCT TYPES / APPLICATIONS

Check Valve - Poppet Type

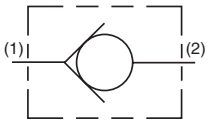


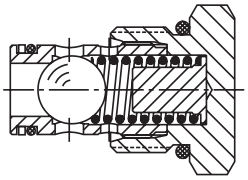


Check valves are poppet style elements that allow free flow in one direction while preventing flow in the reverse direction. They can be used to isolate portions of a hydraulic circuit or to provide a free flow path around a restrictive valve.

OPERATION - Pressure on the inlet (port 1) of the check valve creates a force against the poppet, pushing it off its seat and permitting free flow to port 2. Reverse flow through the check is blocked by the poppet.

Check Valve - Ball Type

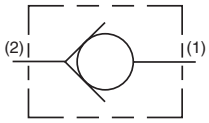


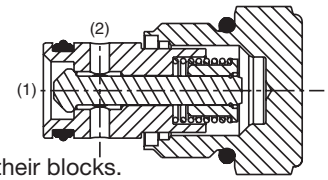


Ball type check valves are check valves that use a hardened steel ball to seal against the valve seat as opposed to a poppet. They are simple in their design and provide low leakage over the life of the system.

OPERATION - Pressure on the inlet (port 1) of the check valve creates a force on the steel ball pushing it off of it's seat and permitting free flow to port 2. Reverse flow through the check is blocked by the steel ball on the seat.

Side to Nose Check Valve

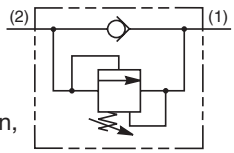


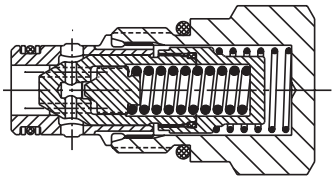


Side to nose check valves are a special type of check valve where the free flow path is from the side of the cartridge valve to the nose. They functionally are the same as the standard check valve. Side to nose check valves are occasionally used by manifold designers to simply the flow path design of their blocks.

OPERATION - Pressure on the inlet (port 1) of the check valve creates a force on the steel ball pushing it off of it's seat and permitting free flow to port 2. Reverse flow through the check is blocked by the steel ball on the seat.

Check Valve With Thermal Relief





The check valve with thermal relief performs the same function as a standard check valve. It allows free flow in one direction. In the opposite direction, it performs as a normal check valve preventing flow, while also venting excess pressure caused by the thermal expansion of fluid. This type of valve can be used with an external pilot piston to provide a pilot operated valve that will vent trapped pressure due to thermal expansion. These valves work best when used in conjunction with a control valve that vents the valve ports to tank when centered.

OPERATION - The check valve is a guided poppet design. As the pressure on the inlet exceeds the spring rate, the poppet is pushed off of its seat allowing flow to pass. Once the pressure on the inlet side drops below the spring force, the spring then pushes the poppet back on its seat blocking flow from the outlet to the inlet of the check valve. If the pressure on the outlet side of the check valve (when it is in a load holding function) rises (through thermal expansion), the direct acting relief will vent the excess pressure caused by the thermal expansion to the inlet side of the check.

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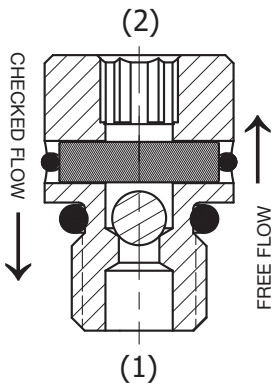
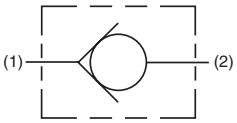
General Description

Cartridge Style Sense Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

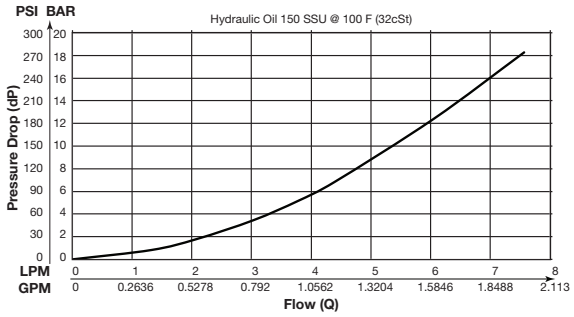
- Rapid response to load direction changes
- Hardened precision parts for durability
- **Insert style design for location within manifolds under SAE-6 or larger port**



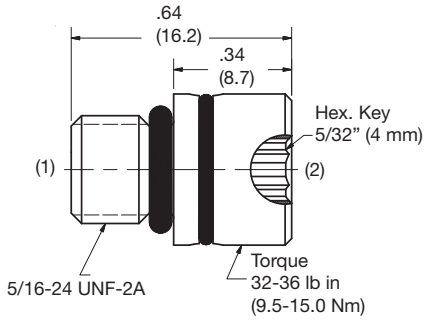


Performance Curve

Pressure Drop vs. Flow



Dimensions Millimeters (Inches)



Specifications

Rated Flow	3.8 LPM (1 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	15 ml/min.
Cartridge Material	Steel operating parts hardened steel ball.
Operating Temp. Range/Seals	-26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.02 kg (0.045 lbs.)

Ordering Information

CVH021

Sense Check Valve

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

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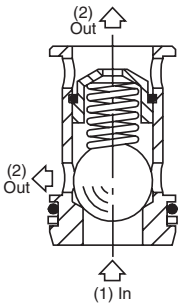
Check Valve Insert, Ball Type
Series D1A060

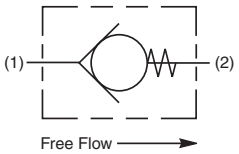
General Description

Ball Type, Check Valve Insert.
For additional information see Technical Tips on pages CV1-CV2.

Features

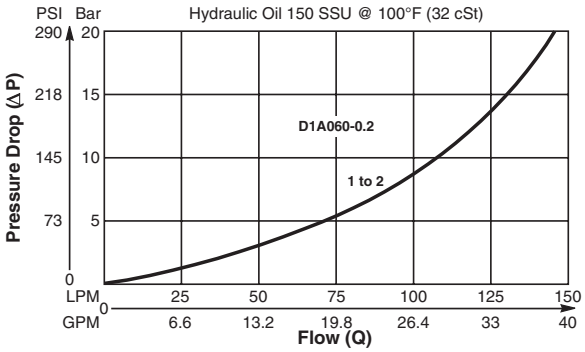
- For inserting inside manifold blocks
- High flow capacity
- Minimal leakage - less than 3 drops/min.
- Simple construction - extremely cost effective
- Range of cracking pressures available
- Good contamination tolerance
- All external parts zinc plated





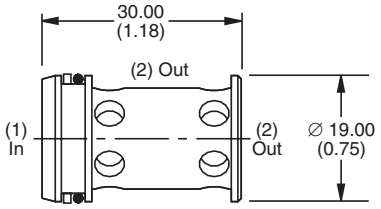
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	145 LPM (38 GPM)
Nominal Flow @ 7 Bar (100 PSI)	90 LPM (24GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	Less than 3 drops/min.
Cartridge Material	Steel operating parts hardened steel ball.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.85 kg (0.19 lbs.)
Cavity	2U (See BC Section for more details)

Ordering Information

D1A060 – ☐ ☐

Check Valve Insert | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
0.2	**0.2 Bar (3 PSI) Std.**
1.0	**1.0 Bar (15 PSI)**
2.0	**2.0 Bar (30 PSI)**
3.0	**3.0 Bar (45 PSI)**
5.0	5.0 Bar (72 PSI)
7.0	7.0 Bar (100 PSI)
10.0	10.0 Bar (145 PSI)

Code	Seals / Kit No.
N	**Nitrile Buna-N / (SK30019N-1)**
V	Fluorocarbon / (SK30019V-1)

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

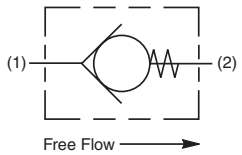
Check Valve Insert, Poppet Type
Series D1B125

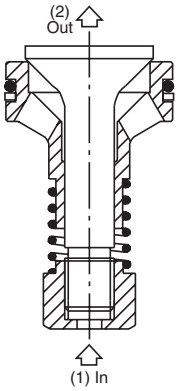
General Description

Poppet Type, Check Valve Insert.
For additional information see Technical Tips on pages CV1-CV2.

Features

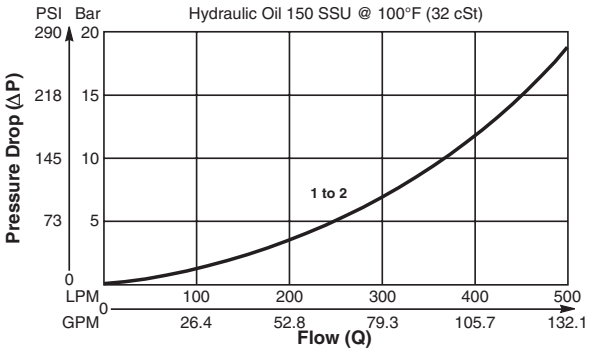
- For inserting inside manifold blocks
- High flow capacity
- Minimal leakage - less than 3 drops/min.
- Simple construction - extremely cost effective
- Range of cracking pressures available
- Good contamination tolerance
- All external parts zinc plated





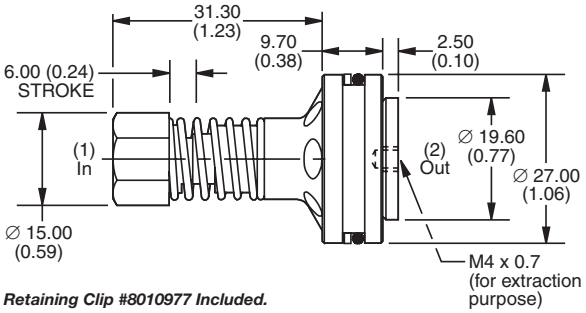
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Retaining Clip #8010977 Included.

Specifications

Rated Flow	500 LPM (132 GPM)
Nominal Flow @ 7 Bar (100 PSI)	300 LPM (79GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	Less than 3 drops/min.
Cartridge Material	Steel operating parts hardened steel poppet.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.6 kg (0.13 lbs.)
Cavity	2C (See BC Section for more details)

Ordering Information

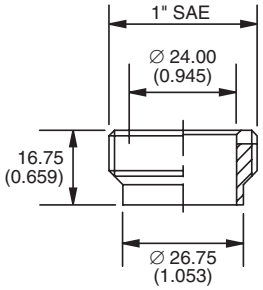
D1B125	–		
Check Valve Insert		Cracking Pressure	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
0.0	0 Bar
0.1	**0.1 Bar (1.5 PSI)**
0.2	**0.2 Bar (3 PSI)**
1.0	**1.0 Bar (15 PSI) Std.**
2.0	**2.0 Bar (30 PSI)**
3.0	**3.0 Bar (45 PSI)**
5.0	**5.0 Bar (72 PSI)**

Code	Seals / Kit No.
N	**Nitrile Buna-N / (SK30014N-1)**
V	Fluorocarbon / (SK30014V-1)

Retainer



Note: *Valve is supplied with retention round wire circlip. As an alternative to circlip retention of the check valve insert, the threaded retainer shown here can be used to lock the insert beneath 1" SAE ports and should be ordered separately. For 1" SAE order as RT10002. Torque to 85 Nm (63 lb. ft.)*

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Hydraulic Cartridge Systems Division

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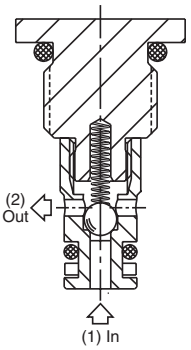
Miniture Ball Type Check Valve
Series D0WB2

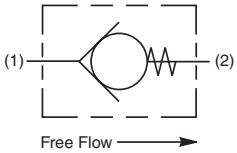
General Description

Miniature Ball Type Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

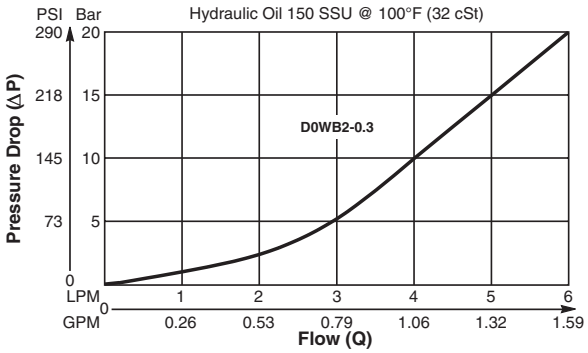
- Low leakage - less than 3 drops/min.
- Ball type construction for cost effective design
- Extremely compact
- Good contamination tolerance
- All external parts zinc plated





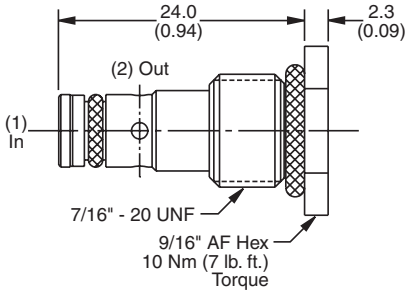
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	6 LPM (1.6 GPM)
Nominal Flow @ 7 Bar (100 PSI)	3.5 LPM (0.9GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	Less than 3 drops/min.
Cartridge Material	Steel operating parts hardened steel ball.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.012 kg (0.026 lbs.)
Cavity	CAV0W-2 (See BC Section for more details)

Ordering Information

D0WB2 – [ ] [ ]

Check Valve | Cracking Pressure | Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
0.3	**0.3 Bar (5 PSI)**
1.0	1.0 Bar (15 PSI)

Code	Seals / Kit No.
N	**Nitrile Buna-N / (SK30519N-1)**
V	Fluorocarbon / (SK30519V-1)

Order Bodies Separately
See section BC

LB10 – [ ] – [ ]

Line Body | Porting | Body Material

Code	Porting / Body Material
795S	1/4" SAE / Steel (5000 PSI)
795A	1/4" SAE / Aluminium (3000 PSI)

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

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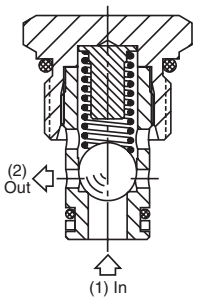
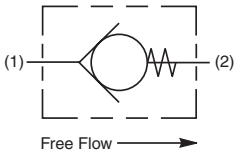
General Description

Ball Type Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

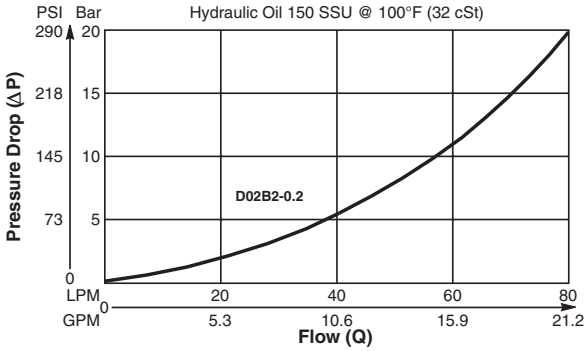
- Low leakage - less than 3 drops/min.
- Ball type construction for cost effective design
- Single and dual pilot pistons available to create pilot to open check
- Range of cracking pressures available - up to 25 Bar (362 PSI)
- Good contamination tolerance
- All external parts zinc plated





Performance Curve

Pressure Drop vs. Flow (Through cartridge only)

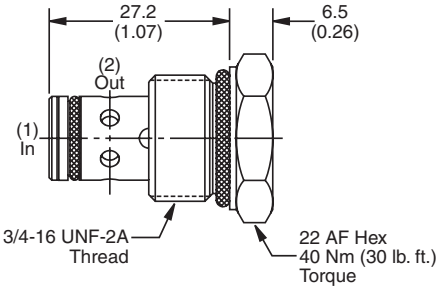


Specifications

Rated Flow	80 LPM (21 GPM)
Nominal Flow @ 7 Bar (100 PSI)	45 LPM (12GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	Less than 3 drops/min.
Cartridge Material	Steel operating parts hardened steel ball.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.05 kg (0.11 lbs.)
Cavity	C08-2 (See BC Section for more details)

Dimensions

Millimeters (Inches)



Ordering Information

D02B2 – ☐ ☐

Ball Type Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
0.0	0.0 Bar (0 PSI)
0.2	**0.2 Bar (3 PSI) Std.**
1.0	**1.0 Bar (15 PSI)**
1.5	**1.5 Bar (22 PSI)**
2.1	**2.1 Bar (30 PSI)**
2.5	**2.5 Bar (36 PSI)**
3.4	**3.4 Bar (50 PSI)**
4.0	4.0 Bar (58 PSI)
6.0	**6.0 Bar (87 PSI)**
6.9	6.9 Bar (100 PSI)
10.0	**10.0 Bar (145 PSI)**
17.0	17.0 Bar (247 PSI)
20.0	20.0 Bar (290 PSI)
25.0	25.0 Bar (362 PSI)

Code	Seals / Kit No.
N	**Nitrile Buna-N / (SK30515N-1)**
V	Fluorocarbon / (SK30515V-1)

Order Bodies Separately
See section BC

B08 – 2 – ☐

08 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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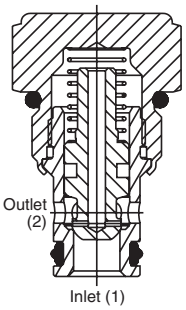
Check Valve
Series CVH081P

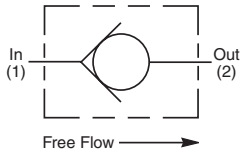
General Description

Cartridge Style Check Valve.
For additional information see
Technical Tips on pages CV1-CV2.

Features

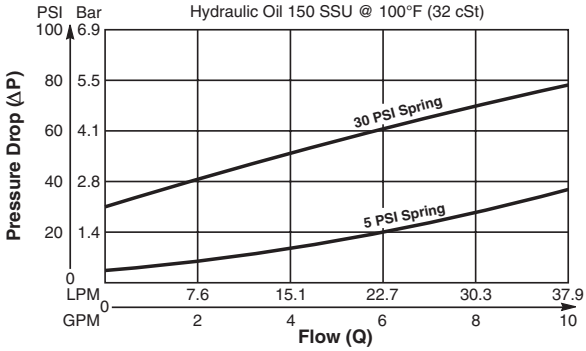
- Spherical poppet for low leakage
- "D"-Ring eliminates back-up rings
- Dual sense paths for reduced ΔP
- All external parts zinc plated





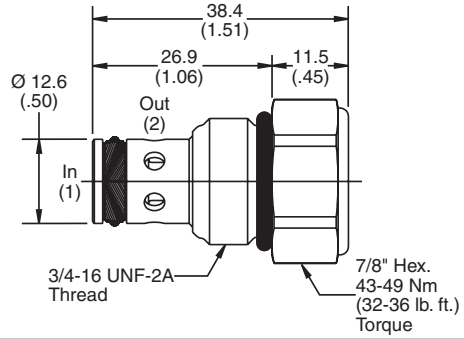
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	38 LPM (10 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	2 drops/min. (0.13 cc/min) at 350 Bar (5000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.10 kg (0.2 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Ordering Information

CVH081P – ☐ ☐

08 Size Check Valve	Cracking Pressure	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
Omit	0.3 Bar (5 PSI)
10	0.7 Bar (10 PSI)
30	2.1 Bar (30 PSI)
65	4.5 Bar (65 PSI)
100	6.9 Bar (100 PSI)
150	10.4 Bar (150 PSI)

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-2)
N	Nitrile / (SK08-2)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08 – 2 – ☐

08 size	2-Way Cavity	Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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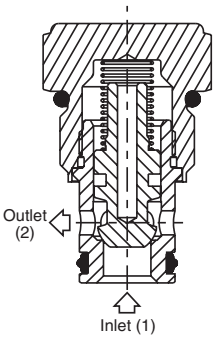
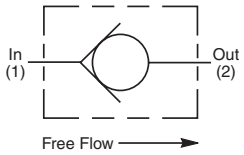
General Description

Cartridge Style Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

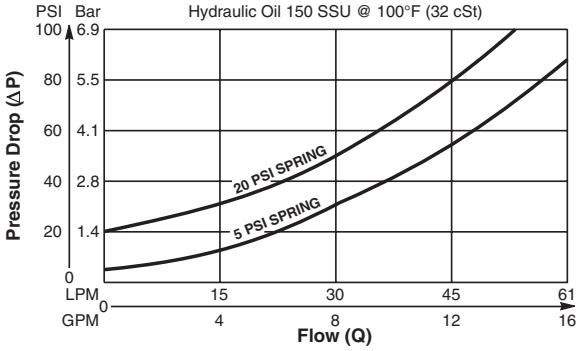
- Spherical poppet for low leakage
- "D"-Ring eliminates back-up rings
- Dual sense paths for reduced ΔP
- All external parts zinc plated





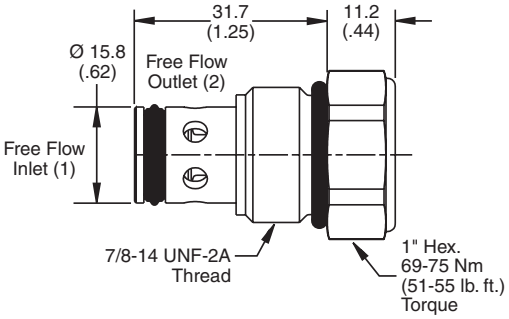
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	60 LPM (16 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	2 drops/min. (0.13 cc/min) at 350 Bar (5000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.9 kg (0.2 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Ordering Information

CVH103P – [ ] [ ]

10 Size Check Valve | Cracking Pressure | Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
Omit	0.3 Bar (5 PSI)
20	1.4 Bar (20 PSI)
50	3.5 Bar (50 PSI)
65	4.5 Bar (65 PSI)
80	5.5 Bar (80 PSI)
100	6.9 Bar (100 PSI)

Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-2)
N	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10 – 2 – [ ]

10 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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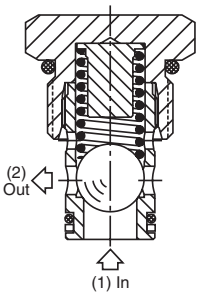
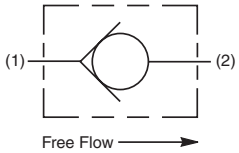
General Description

Ball Type Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

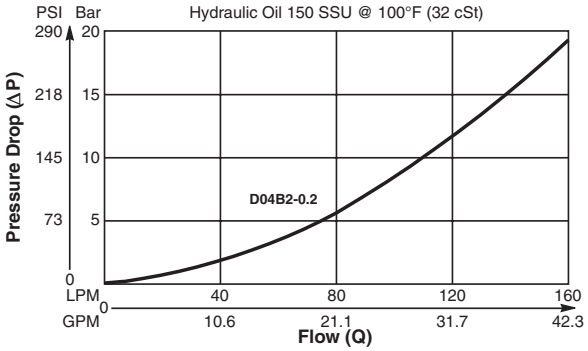
- Low leakage - less than 3 drops/min.
- Ball type construction for cost effective design
- Single and dual pilot pistons available to create pilot to open check
- Range of cracking pressures available
- Good contamination tolerance
- All external parts zinc plated





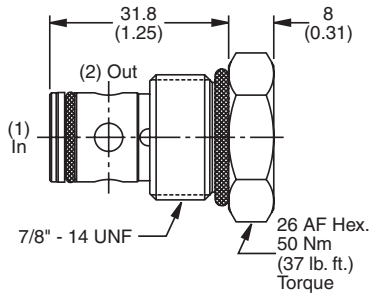
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	160 LPM (42 GPM)
Nominal Flow @ 7 Bar (100 PSI)	90 LPM (24 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	3 drops/min.
Cartridge Material	Steel operating parts, hardened steel ball.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.18 lbs.)
Cavity	C10-2 (See BC Section for more details)

Ordering Information

D04B2 – [ ] [ ]

Ball Type Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
0.0	0.0 Bar (0 PSI)
0.2	**0.2 Bar (3 PSI) Std.**
1.0	**1.0 Bar (15 PSI)**
2.1	**2.1 Bar (30 PSI)**
3.4	3.4 Bar (50 PSI)
6.9	6.9 Bar (100 PSI)
10.0	**10.0 Bar (145 PSI)**
15.0	15.0 Bar (217 PSI)

Code	Seals / Kit No.
N	**Nitrile, Buna-N / (SK30516N-1)**
V	Fluorocarbon / (SK30516V-1)

Order Bodies Separately
See section BC

B10 – 2 – [ ]

10 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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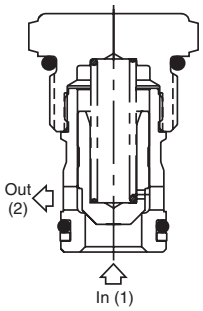
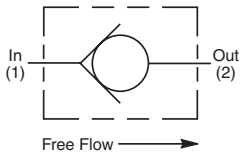
General Description

Cartridge Style Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

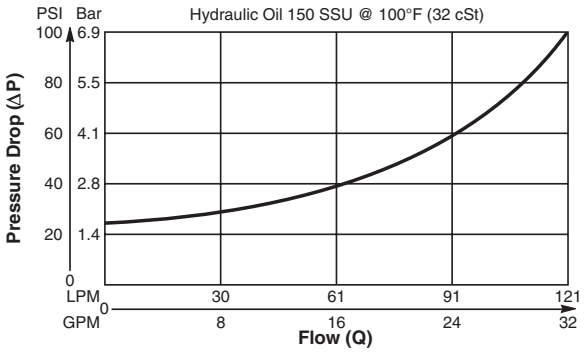
- Hardened, precision ground parts for durability
- Fully guided poppet for smooth operation
- All external parts zinc plated





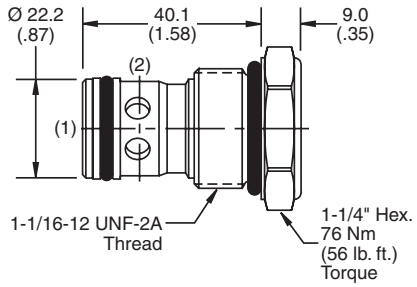
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	121 LPM (32 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) at 350 Bar (5000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.14 kg (0.30 lbs.)
Cavity	C12-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT12-2F

Ordering Information

CVH121P – [ ] [ ]

12 Size Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
Omit	**1.7 Bar (25 PSI)**
03	0.2 Bar (3 PSI)
05	0.35 Bar (5 PSI)
65	4.5 Bar (65 PSI)

Code	Seals / Kit No.
Omit	**Nitrile / (SK12-2)**
V	Fluorocarbon / (SK12-2V)

Order Bodies Separately
See section BC

B12 – 2 – [ ]

12 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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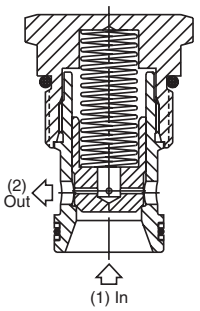
Poppet Type Check Valve
Series D06B2P

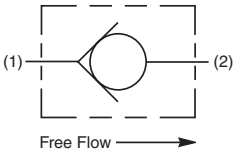
General Description

Poppet Type Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

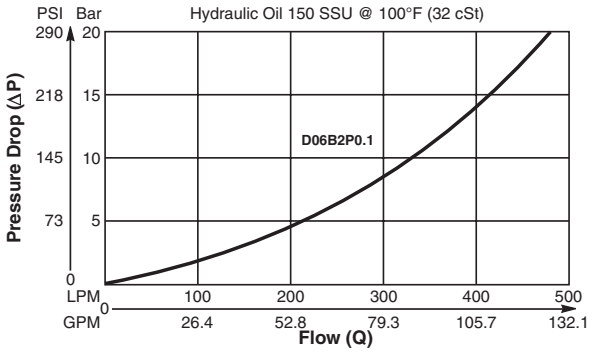
- Extra low pressure drop capability for systems up to 250 Bar
- Poppet type construction for minimal leakage - less than 3 drops/min.
- Hardened poppet for maximum durability
- Good contamination tolerance
- All external parts zinc plated





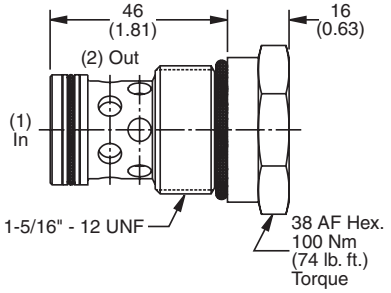
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	500 LPM (132 GPM)
Nominal Flow @ 7 Bar (100 PSI)	280 LPM (74 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	Less than 3 drops/min.
Cartridge Material	Steel operating parts, hardened steel poppet.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.27 kg (0.60 lbs.)
Cavity	C16-2 (See BC Section for more details)

Ordering Information

D06B2P – ☐ ☐

16 Size Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
0.0	0.0 Bar (0 PSI)
0.1	**0.1 Bar (1.5 PSI) Std.**
1.0	**1.0 Bar (15 PSI)**
2.1	**2.1 Bar (30 PSI)**
3.4	**3.4 Bar (50 PSI)**
4.1	**4.1 Bar (60 PSI)**
7.5	7.5 Bar (109 PSI)

Code	Seals / Kit No.
N	**Nitrile, Buna-N / (SK30507N-1)**
V	Fluorocarbon / (SK30507V-1)

Order Bodies Separately See section BC

B16 – 2 – ☐

16 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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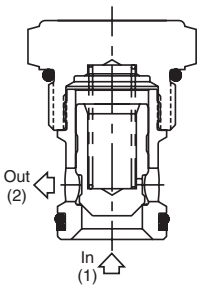
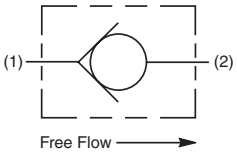
General Description

Cartridge Style Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

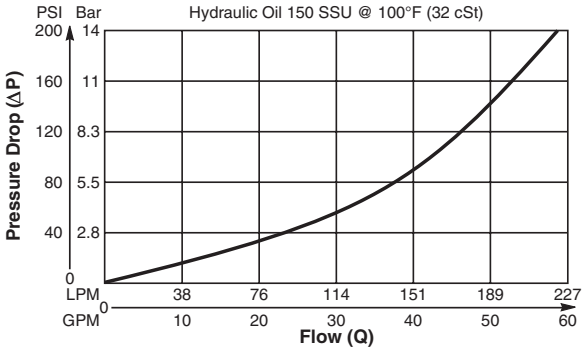
- Hardened, precision ground parts for durability
- Fully guided poppet for smooth operation
- All external parts zinc plated





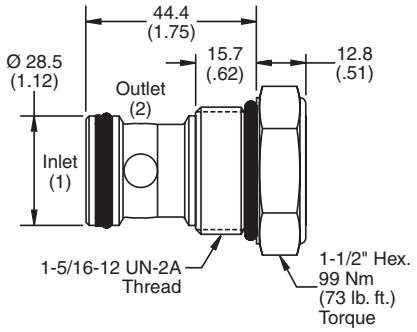
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	225 LPM (60 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) at 350 Bar (5000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.27 kg (0.60 lbs.)
Cavity	C16-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT16-2F

Ordering Information

CVH161P – [ ] [ ]

16 Size Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
Omit	**0.3 Bar (5 PSI)**
20	**1.4 Bar (20 PSI)**
65	**4.5 Bar (65 PSI)**
125	8.6 Bar (125 PSI)
175	12.1 Bar (175 PSI)

Code	Seals / Kit No.
Omit	**Nitrile / (SK16-2)**
V	Fluorocarbon / (SK16-2V)

Order Bodies Separately
See section BC

B16 – 2 – [ ]

16 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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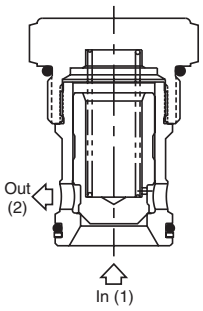
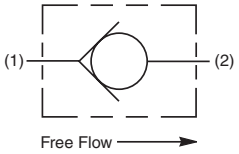
General Description

Cartridge Style Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

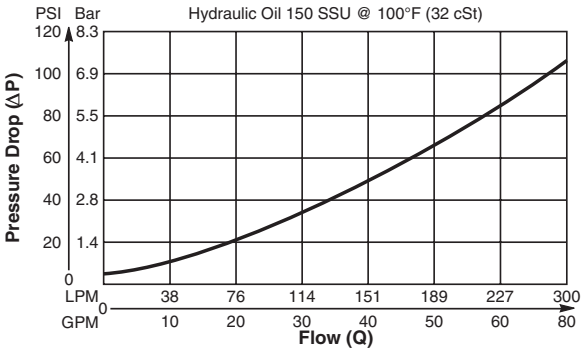
- Hardened, precision ground parts for durability
- Fully guided poppet for smooth operation
- All external parts zinc plated





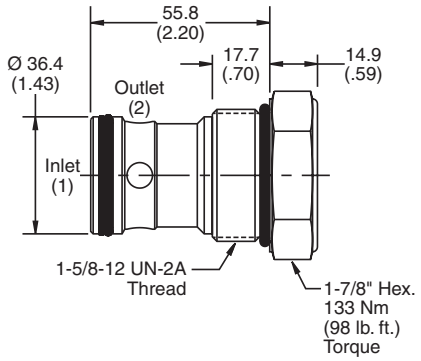
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	303 LPM (80 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) at 350 Bar (5000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.27 kg (0.60 lbs.)
Cavity	C20-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT20-2F

Ordering Information

CVH201P – [ ] [ ]

20 Size Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
Omit	0.3 Bar (5 PSI)
20	1.4 Bar (20 PSI)
65	4.5 Bar (65 PSI)

Code	Seals / Kit No.
Omit	Nitrile / (SK20-2)
V	Fluorocarbon / (SK20-2V)

Order Bodies Separately See section BC

B20 – 2 – [ ]

20 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
20T	SAE-20 / Steel (5000 PSI)
A20T	SAE-20 / Aluminium (3000 PSI)

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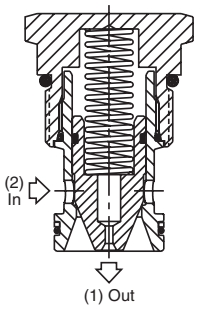
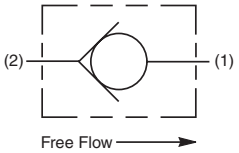
General Description

Poppet Type Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

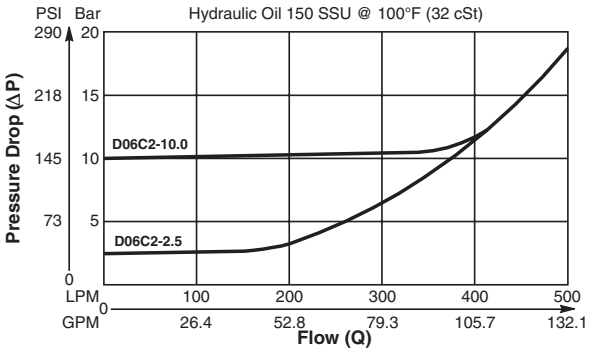
- High flow capacity
- Poppet type construction for minimal leakage - less than 3 drops per minute
- Hardened poppet for maximum durability
- Good contamination tolerance
- All external parts zinc plated





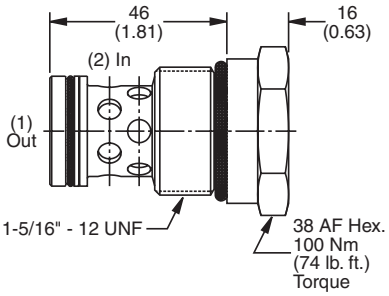
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	500 LPM (132 GPM)
Nominal Flow @ 7 Bar (100 PSI)	300 LPM (79 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	Less than 3 drops/min.
Cartridge Material	Steel operating parts, hardened steel poppet.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.26 kg (0.57 lbs.)
Cavity	C16-2 (See BC Section for more details)

Ordering Information

D06C2 – [ ] [ ]

16 Size Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
2.5	2.5 Bar (36 PSI) Std.
3.4	3.4 Bar (50 PSI)
6.9	6.9 Bar (100 PSI)
10.0	10.0 Bar (145 PSI)

Code	Seals / Kit No.
N	Nitrile, Buna-N / (SK30514N-1)
V	Fluorocarbon / (SK30514V-1)

Order Bodies Separately
See section BC

B16 – 2 – [ ]

16 size | 2-Way Cavity | Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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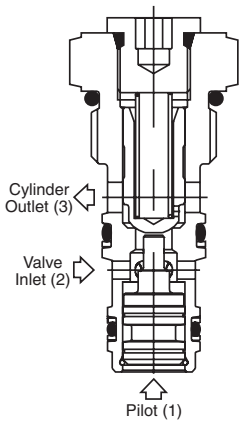
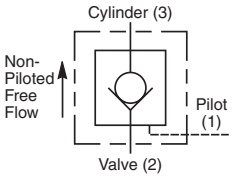
General Description

Cartridge Style Pilot Operated Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

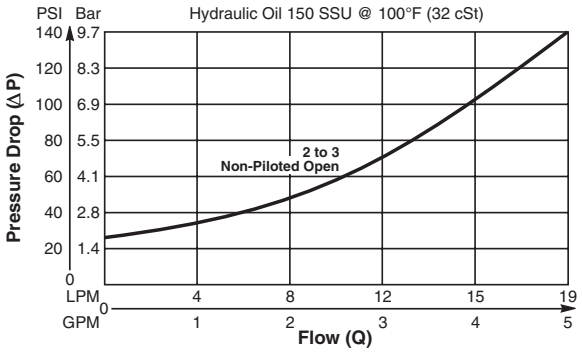
- Hardened, precision ground parts for durability
- Internal pilot position simplifies manifold design
- All external parts zinc plated





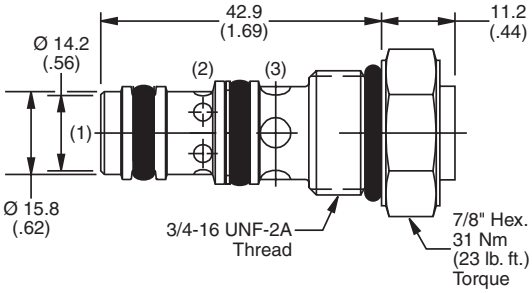
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	19 LPM (5 GPM)
Maximum Inlet Pressure	207 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) at 207 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.05 kg (0.11 lbs.)
Cavity	C08-3 (See BC Section for more details)
Form Tool	Rougher NFT08-3R Finisher NFT08-3F

Ordering Information

CP084P – [ ] [ ]

08 Size P.O. Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
Omit	1.7 Bar (25 PSI)
85	5.9 Bar (85 PSI)

Code	Seals / Kit No.
Omit	**Nitrile / (SK08-3)**
V	Fluorocarbon / (SK08-3V)

Order Bodies Separately See section BC

B08 – 3 – [ ]

08 size | 3-Way Cavity | Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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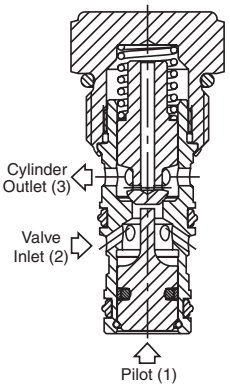
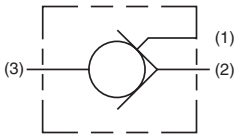
General Description

Cartridge Style Pilot Operated Check Valve. For additional information see Technical Tips on pages CV1-CV2.

Features

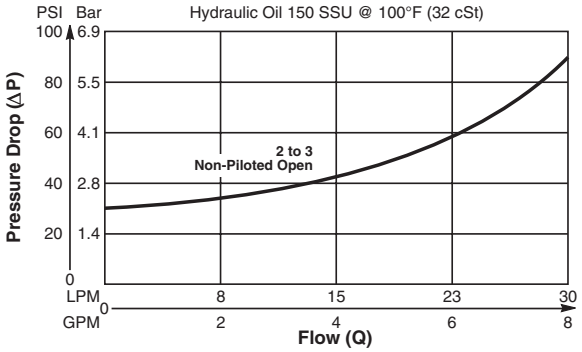
- Hardened, precision ground parts for durability
- Internal pilot position simplifies manifold design
- All external parts zinc plated





Performance Curve

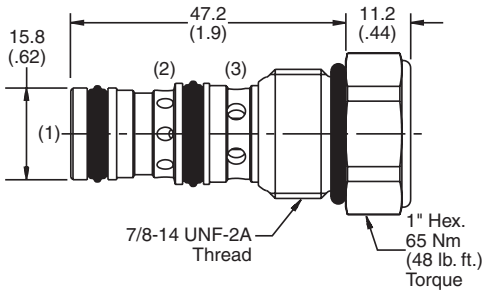
Pressure Drop vs. Flow (Through cartridge only)



Specifications

Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	2 drops/min. (0.13 cc/min) at 350 Bar (5000 PSI)
Pilot Ratio	4:1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.9 kg (0.2 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Dimensions Millimeters (Inches)



Ordering Information

CPH104P – ☐ ☐

10 Size Check Valve | **Cracking Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
15	1.0 Bar (15 PSI)
Omit	**1.4 Bar (20 PSI)**
50	**3.5 Bar (50 PSI)**

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Order Bodies Separately
See section BC

B10 – 3 – ☐

10 size | 3-Way Cavity | Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

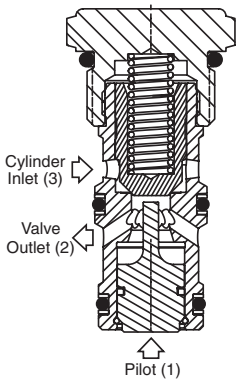
Pilot Operated Check Valve
Series CPH124P

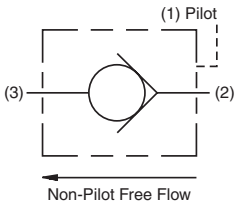
General Description

Cartridge Style Pilot Operated Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

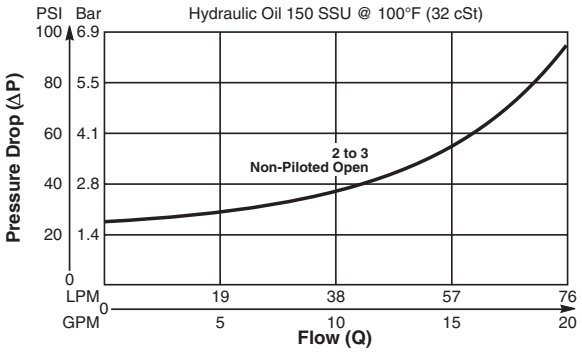
- Hardened, precision ground parts for durability
- Internal pilot position simplifies manifold design
- All external parts zinc plated





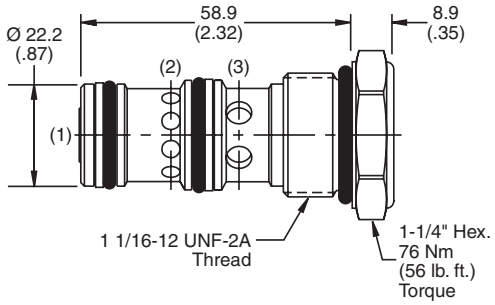
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	75 LPM (20 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) at 350 Bar (5000 PSI)
Pilot Ratio	3:1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.2 kg (0.44 lbs.)
Cavity	C12-3 (See BC Section for more details)
Form Tool	Rougher NFT12-3R Finisher NFT12-3F

Ordering Information

CPH124P – ☐ ☐

12 Size P.O. Check Valve	Cracking Pressure	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking Pressure
Omit	1.7 Bar (25 PSI)

Code	Seals / Kit No.
Omit	Nitrile / (SK12-3)*
V	Fluorocarbon / (SK12-3V)*

* 2.5 size b/u rings

Order Bodies Separately
See section BC

B12 – 3 – ☐

12 size	3-Way Cavity	Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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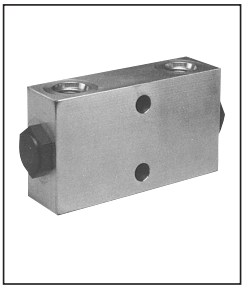
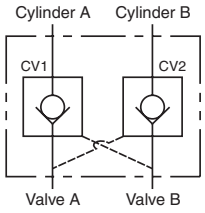
General Description

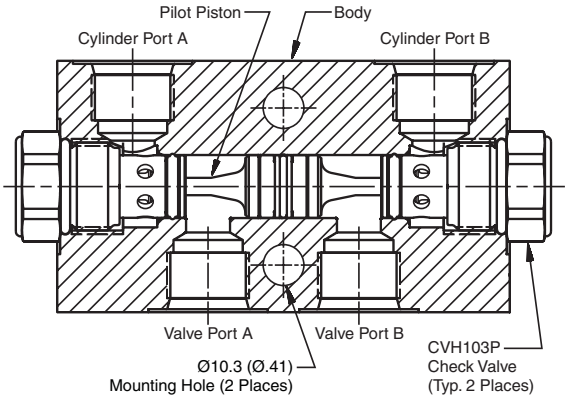
Pilot Piston Style Dual Pilot Operated Check Valve.
For additional information see Technical Tips on pages CV1-CV2.

Features

- Spherical poppet for low leakage
- "D" -Ring eliminates back-up rings
- Optional sealed pilot piston





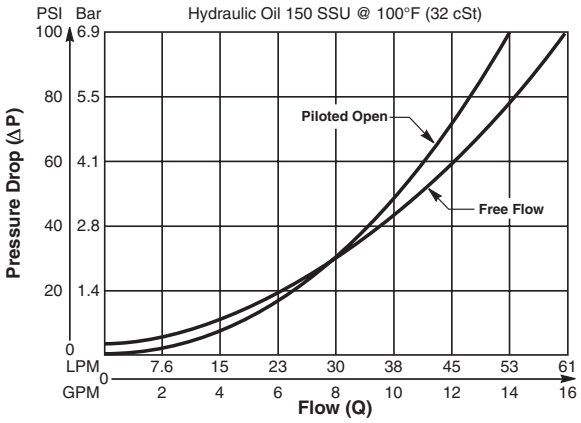


Specifications

Maximum Flow	56 LPM (15 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI) - CDPH103
Leakage Across Check 150 SSU (32 cSt)	2 drops/min. (0.13 cc/min.)
Leakage Across Pilot Piston (No Seals)	312 cc/min. 0.3 LPM (.08 GPM)
Pilot Ratio	4:1
Pilot Piston Part Numbers	No Seal - 717917 Nitrile Seal - 717917N Fluorocarbon Seal - 717917V
Cartridge Material	All parts steel. All operating parts hardened steel.
Body Material	Steel - CDPH103
Operating Temp. Range (Ambient)	-45°C to +132°C ("D"-Ring) (-50°F to +270°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	1.59 kg (3.5 lbs.)

Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



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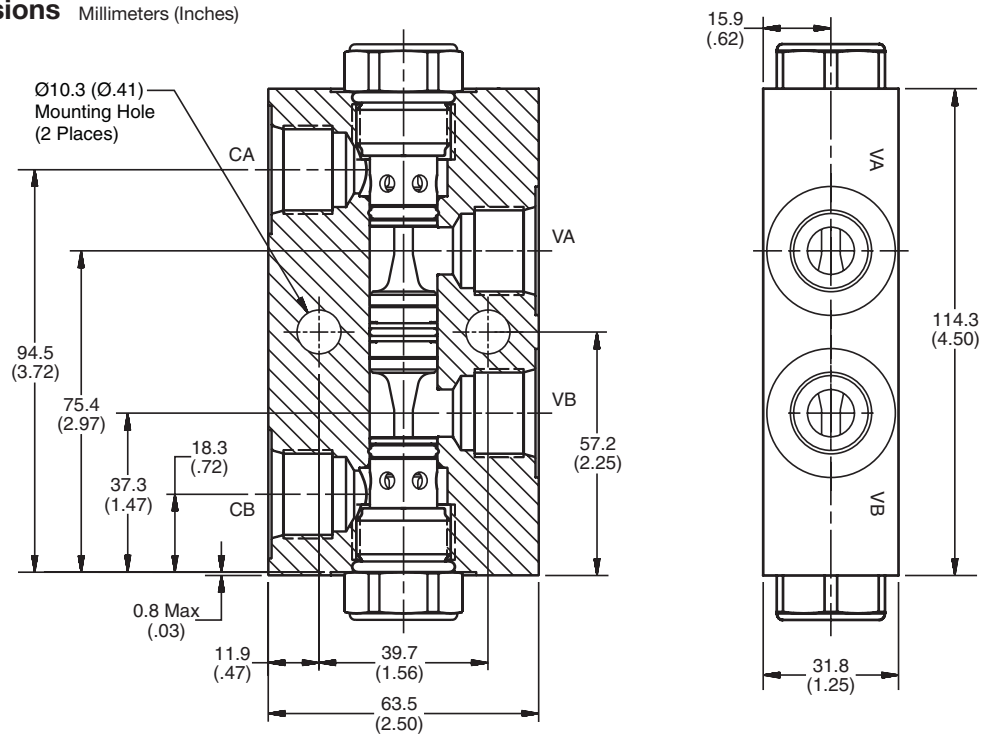
Dimensions Millimeters (Inches)



Ordering Information

CDP	H103				–	
10 Size Dual Pilot Piston P.O. Check Valve	Model Desc.	Piston Type	Cracking Pressure	Seals		Port Size

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Model Description
H103	**5000 PSI Series**

Code	Cracking Pressure
*Omit	0.3 Bar (5 PSI)
20	1.4 Bar (20 PSI)
50	3.5 Bar (50 PSI)
65	4.5 Bar (65 PSI)
100	6.9 Bar (100 PSI)

Not available with "A" option.

Code	Port Size / Body Material
8T	SAE-8 (CDPH103 Only) / Steel (5000 PSI)

Code	Piston Type
P	Pilot Piston without seal
A	Pilot Piston with seal Note: Requires 1.4 Bar (20 PSI) crack minimum.

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

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General Description

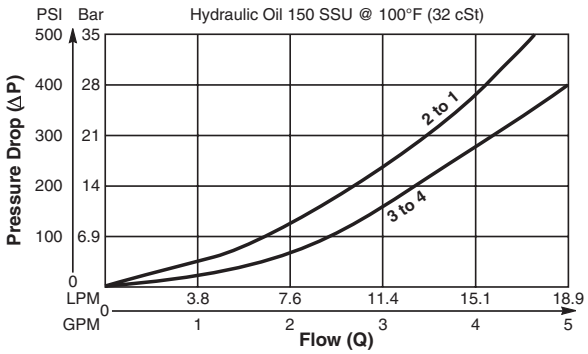
Cartridge Style Dual Pilot Operated Check Valve. For additional information see Technical Tips on pages CV1-CV2.

Features

- Hardened, precision ground parts for durability
- Cost effective-replaces two cartridges
- Internal pilot position
- Common cavity
- All external parts zinc plated

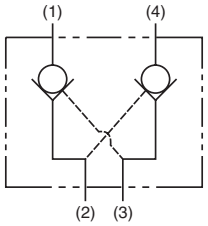
Performance Curve

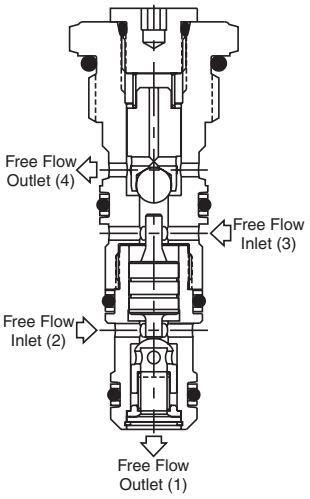
Pressure Drop vs. Flow (Through cartridge only)



Specifications

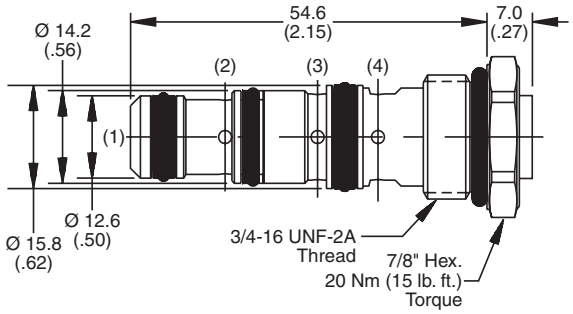
Rated Flow	19 LPM (5 GPM)
Maximum Inlet Pressure	207 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) at 350 Bar (5000 PSI)
Pilot Ratio	3:1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.05 kg (0.11 lbs.)
Cavity	C08-4 (See BC Section for more details)
Form Tool	Rougher NFT08-4R Finisher NFT08-4F





Dimensions

Millimeters (Inches)



Ordering Information

CPD084P — **08 Size Dual P.O. Check Valve**

□ — **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Seals / Kit No.
Omit	Nitrile / (SK08-4)
V	Fluorocarbon / (SK08-4V)*

Order Bodies Separately
See section BC

B08 – 4 – □

08 size	4-Way Cavity	Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

General Description

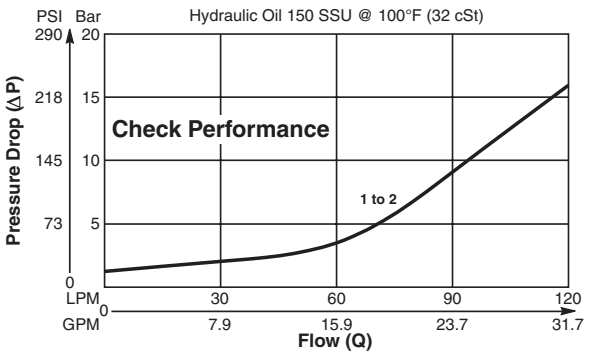
Poppet Type Check Valve with Relief Feature.
For additional information see Technical Tips on pages CV1-CV2.

Features

- Poppet type for minimal leakage - less than 3 drops/min.
- Relief feature to give thermal and shock relief protection
- Compact space saving design
- Hardened working parts for maximum durability
- Single and dual pilot pistons available to create pilot to open check
- Good contamination tolerance
- All external parts zinc plated

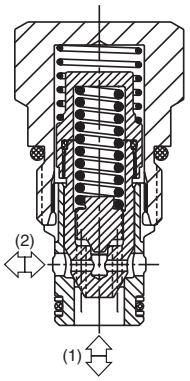
Performance Curve

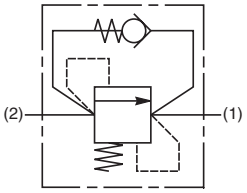
Pressure Drop vs. Flow (Through cartridge only)



Specifications

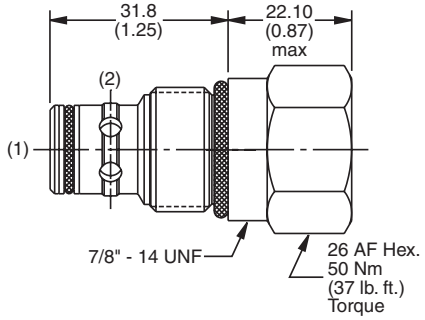
Rated Flow	130 LPM (40 GPM)
Nominal Flow @ 7 Bar (100 PSI)	72 LPM (19 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Leakage at 150 SSU (32 cSt)	Less than 3 drops/min.
Cartridge Material	Steel operating parts, hardened steel poppet.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.13 kg (0.29 lbs.)
Cavity	C10-2 (See BC Section for more details)





Dimensions

Millimeters (Inches)



Ordering Information

D04F2	–		–		
Check Valve		Cracking Pressure (Check)		Cracking Pressure (Relief)	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Cracking (Check)
2.5	**2.5 Bar (36 PSI)**
7.0	7.0 Bar (102 PSI)

Code	Cracking (Relief)
35	35 Bar (507 PSI)
90	90 Bar (1305 PSI)
245	**245 Bar (3553 PSI)**
276	**276 Bar (4000 PSI)**

Code	Seals / Kit No.
N	**Nitrile, Buna-N / (SK30503N-1)**
V	Fluorocarbon / (SK30503V-1)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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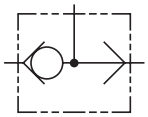
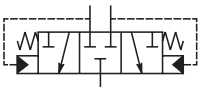
Contents

Shuttle Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	Technical Tips					SH1-SH2
	KSWA3	SW-3	Ball Insert Type	9.5/2.5	420/6000	SH3
	CSH041 ***(NEW)***	C04-3	Cartridge Shuttle	3.8/1.0	345/5000	SH4
	ASH-04		In-Line Shuttle, -4 Male JIC	11/3	207/3000	SH5-SH6
	ASH-06		In-Line Shuttle, -6T	22/6	207/3000	SH5-SH6
	CSH101B	C10-3	Cartridge Shuttle	38/10	207/3000	SH7
	K04C3	C10-4	Spool Type, Spring Centered, All Ports Closed	100/26	420/6000	SH8

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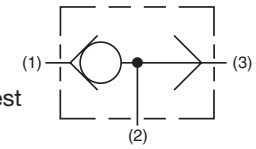
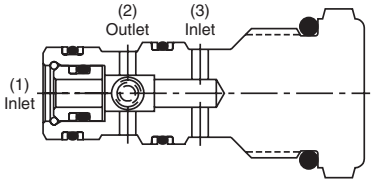
INTRODUCTION:

Shuttle valves accept flow from two different sources and divert the highest pressure to a single outlet port. Shuttle valves are commonly used in Load Sensing circuits as well as Brake circuits. Parker offers many different types of shuttles, including ball type, poppet type, spool type. There are a number of configurations available such as cartridge type, insert type, and an in-line version.

Ball Type - Cartridge Style

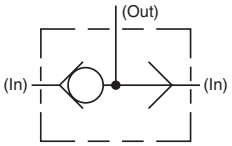
The valve consists of a steel ball that can seal against one of two adjacent seats, providing a path from the highest pressure signal to another function. When one inlet port is pressurized, the ball or poppet is forced against the opposite seat, blocking that inlet and providing a flow path to the outlet port.

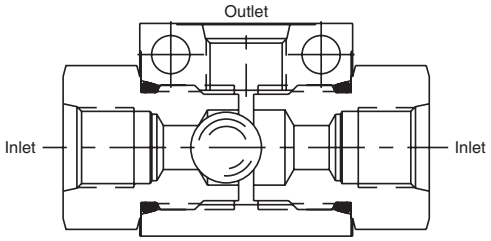




In-Line Type

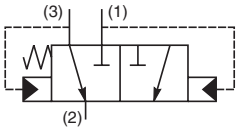
This shuttle variant performs the same function in a self-contained body. It can be mounted anywhere on the machine.

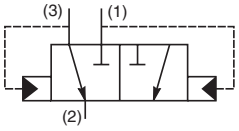


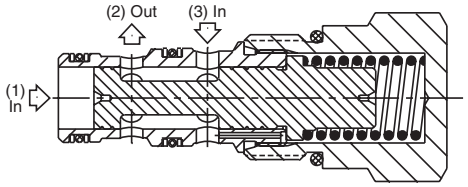


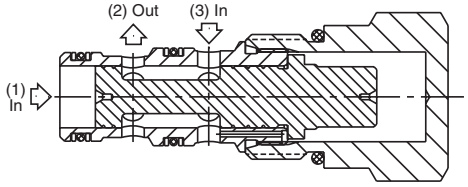
Spool Type - Centered or Spring Offset

The spool type shuttle allows for higher flow rates. These are 2 position valves.









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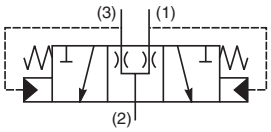
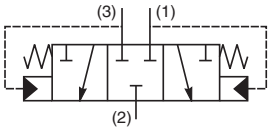
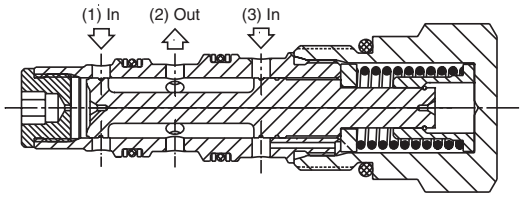
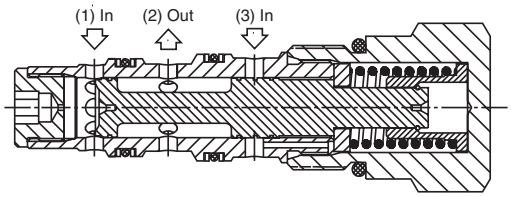
3 Way 2 Position Spool type shuttles are designed to direct flow in such a way as to allow higher pressure signals to open the lower pressure port and connect it to the common outlet port. These spring centered valves will shift when pressure at either end of the spool exceed the spring setting. These are typically used in transmission hot oil shuttle circuits.









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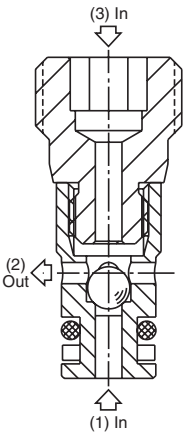
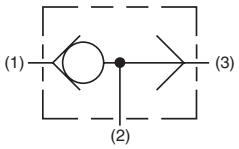
General Description

Ball Type, Two Position, Three Way Shuttle Valve. For additional information see Technical Tips on pages SH1-SH2.

Features

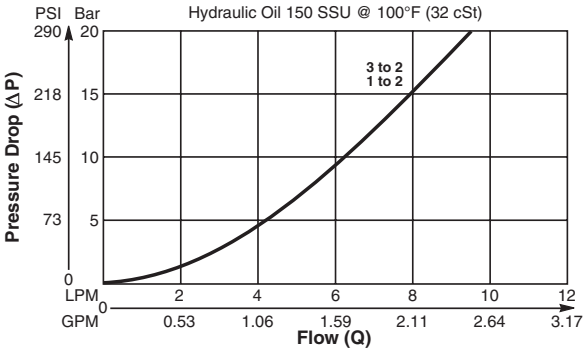
- Compact, cost effective design
- Ball type construction for maximum durability
- Minimal leakage - less than 10 drops/min.
- Contamination tolerant
- Hardened working parts for maximum durability
- All external parts zinc plated





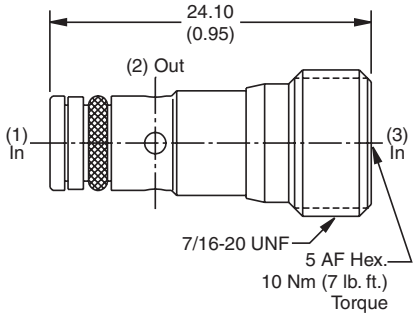
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)

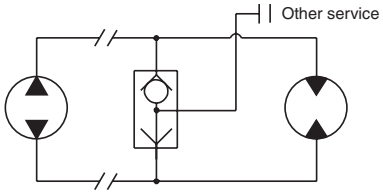


Dimensions

Millimeters (Inches)



Application



Selects highest pressure from either line.

Specifications

Rated Flow	9.5 LPM (2.5 GPM)
Nominal Flow @ 7 Bar (100 PSI)	5 LPM (1.32 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Cartridge Material	All parts steel. All operating parts, hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.1 kg (0.02 lbs.)
Cavity	CAVSW-3 (See BC Section for more details)

Ordering Information

KSWA3	
Shuttle Valve	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Seals / Kit No.
N	**Nitrile Buna-N / (SK30523N-1)**
V	Fluorocarbon / (SK30523V-1)

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

Catalog HY15-3503/US
Product Information

NEW

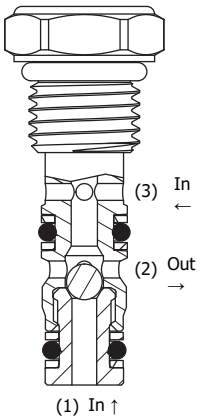
Shuttle Valve
Series CSH041

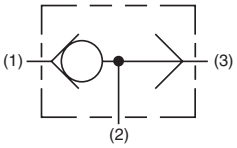
General Description

Cartridge Style Shuttle Valve.
For additional information see Technical Tips on pages SH1-SH2.

Features

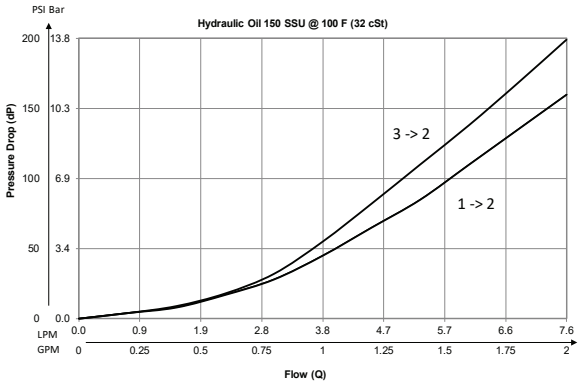
- Hardened working parts for maximum durability
- Rapid response to load direction changes
- All external parts zinc plated





Performance Curve

Pressure Drop vs. Flow (Through cartridge only)

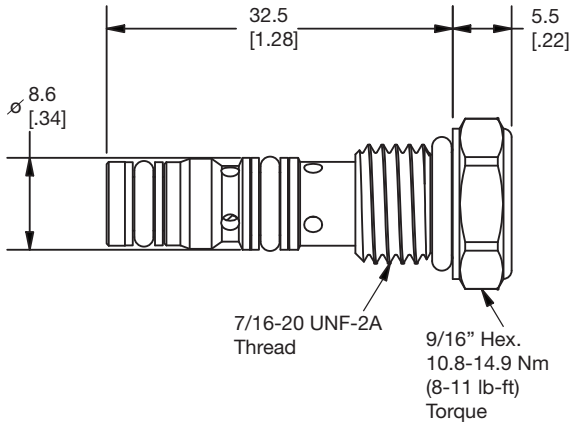


Specifications

Rated Flow	3.8 LPM (1 GPM)
Nominal Flow @ 7 Bar (100 PSI)	345 Bar (5000 PSI)
Leakage at 150 SSU (32cSt)	5 drops/min. (0.33 cc/min.)
Cartridge Material	All parts steel. All operating parts, hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.2 kg (0.045 lbs.)
Cavity	C04-3 (See BC Section for more details)
Form Tool	Rougher NFT04-3R Finisher NFT04-3F

Dimensions

Millimeters (Inches)



Ordering Information

CSH041	
04 Size Shuttle Valve	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Seals / Kit No.
Omit	Nitrile / (SK04-3)
V	Fluorocarbon / (SK04-3V)

Order Bodies Separately
See section BC

B04	–	3	–	
04 size		3-Way Cavity		Port Size

Code	Porting / Body Material
4T	SAE-8 / Steel (5000 PSI)
A4T	SAE-8 / Aluminium (3000 PSI)

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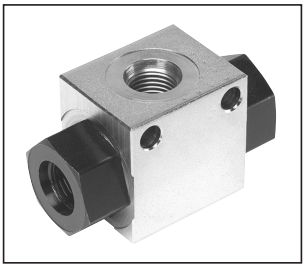
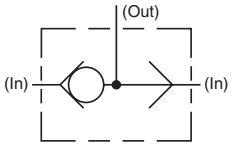
General Description

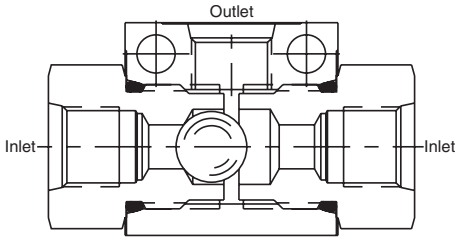
In-Line Style Shuttle Valve.
For additional information see Technical Tips on pages SH1-SH2.

Features

- Compact in size
- In-line mounting
- Easily adaptable to various applications
- All external parts zinc plated





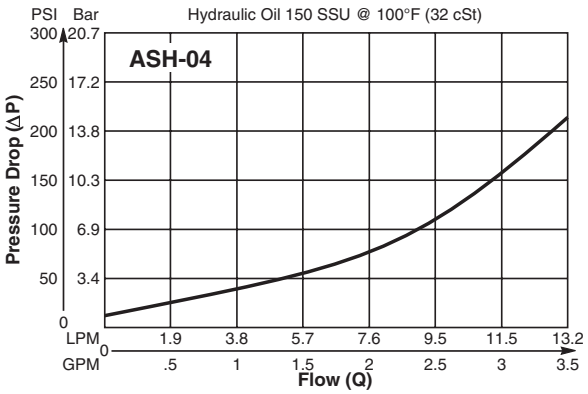


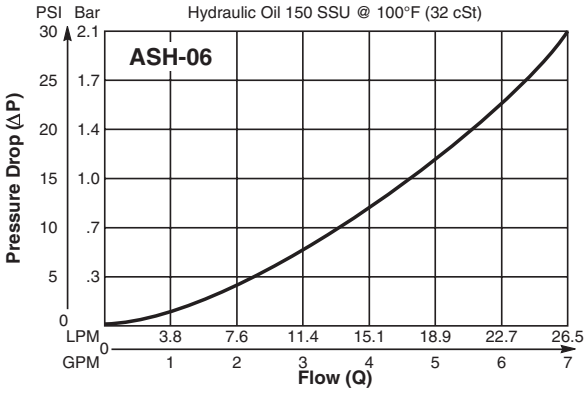
Specifications

Rated Flow	**ASH-04-3** 11 LPM (3 GPM) **ASH-06-2** 22 LPM (6 GPM)
Maximum Inlet Pressure	207 Bar (3000 PSI)
Leakage at 150 SSU (32cSt)	5 drops/min. (0.33 cc/min.) at 172 Bar (3000 PSI)
Body Material	Steel, zinc plated.
Operating Temp. Range/Seals	-34°C to +121°C (-30°F to +250°F) (Nitrile Seals Only)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	**ASH-04-3** 0.36 kg (0.8 lbs.) **ASH-06-2** 0.45 kg (1.0 lb.)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)





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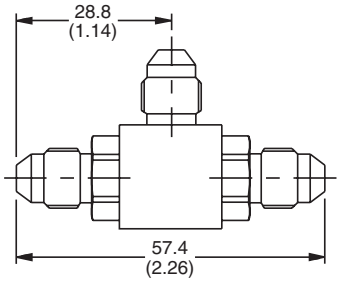
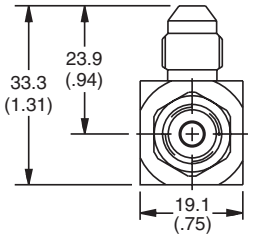
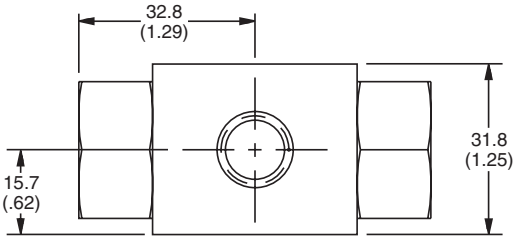
Dimensions Millimeters (Inches)

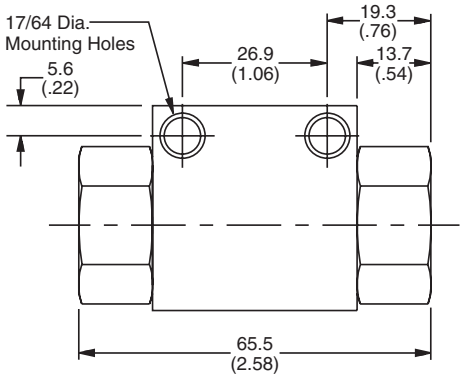
ASH-04-3

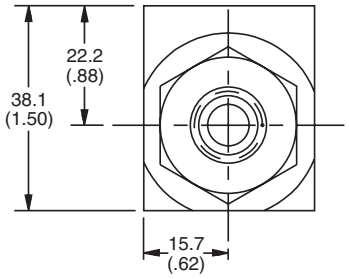




ASH-06-2







Ordering Information

ASH	–		–	
In-Line Shuttle Valve		Port Size		Port Type

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Port Size
04	1/4" JIC
06	**SAE-6**

Code	Port Type
2	**SAE (ASH-06 & AS-12 only)**
03	Male JIC (1/4" only)

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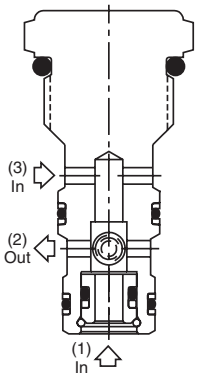
General Description

Cartridge Style Shuttle Valve.
For additional information see Technical Tips on pages SH1-SH2.

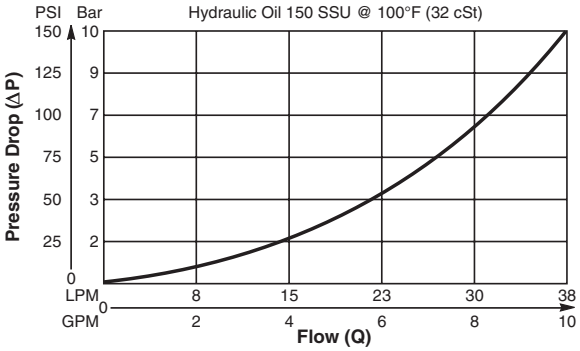
Features

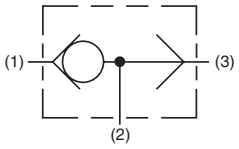
- Hardened precision ground parts for durability
- 5000 PSI rated
- All external parts zinc plated



Performance Curve

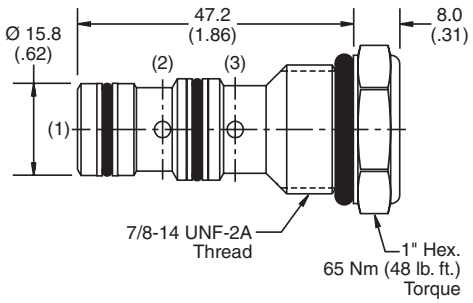
Pressure Drop vs. Flow (Through cartridge only)





Dimensions

Millimeters (Inches)



Specifications

Rated Flow	38 LPM (10 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32cSt)	10 drops/min. (0.67 cc/min.) at 350 Bar (5000 PSI)
Cartridge Material	All parts steel. All operating parts, hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.14 kg (0.3 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Ordering Information

CSH101B | ☐

10 Size Shuttle Valve | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Seals / Kit No.
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Order Bodies Separately
See section BC

B10 – 3 – ☐

10 size | 3-Way Cavity | Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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General Description

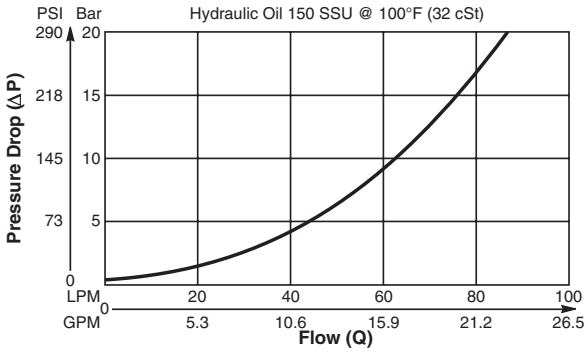
Two Position, Three Way, Spring Centered Shuttle Valve. For additional information see Technical Tips on pages SH1-SH2.

Features

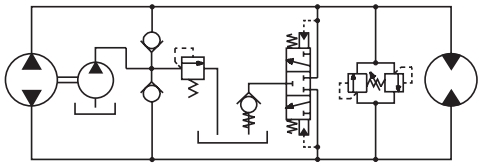
- High flow capacity
- Various switching pressures available
- Use as purge valve in transmission systems
- Hardened working parts for maximum durability
- All external parts zinc plated

Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



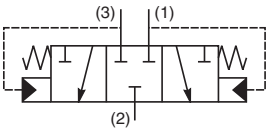
Application

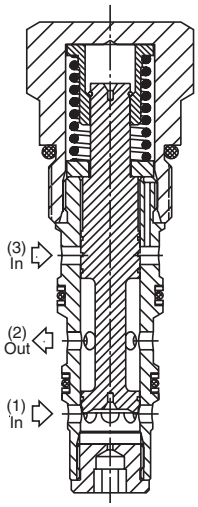


Purge valve in transmission circuit

Specifications

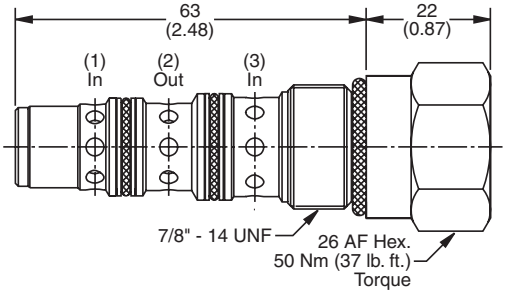
Rated Flow	100 LPM (26 GPM)
Nominal Flow @ 7 Bar (100 PSI)	55 LPM (15 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Cartridge Material	All parts steel. All operating parts, hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.17 kg (0.37 lbs.)
Cavity	C10-4 (See BC Section for more details)





Dimensions

Millimeters (Inches)



Ordering Information

K04C3	–		
Shuttle Valve		Switching Pressure	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Seals / Kit No.
N	**Nitrile Buna-N / (SK30504N-1)**
V	Fluorocarbon / (SK30504V-1)

Code	Cracking Pressure
0.0	0.0 Bar (0 PSI)
2.5	2.5 Bar (36 PSI)
5.0	**5.0 Bar (73 PSI) Std.**
10.0	**10.0 Bar (145 PSI)**
15.0	15.0 Bar (218 PSI)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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Contents

Load and Motor Control Valves

SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
Technical Tips					LM1-LM4
STANDARD PILOT ASSISTED					
CB101	C10-3	load Control Cartridge Valve	45/12	380/5500	LM5-LM6
MHC-010-S***	CDD-1010	Load Control Cartridge Valve	37/10	350/5000	LM7-LM8
MHC-022-S***	CDD-1036	Load Control Cartridge Valve	94/25	350/5000	LM9-LM10
MHB-015-L***		Load Control Cartridge Valve	56/15	207/3000	LM11-LM13
MHB-030-L***		Load Control Cartridge Valve	113/30	207/3000	LM14-LM16
E2*020	53-1	Load Control Cartridge Valve	20/5.3	420/6000	LM17-LM18
E2*040	68-1	Load Control Cartridge Valve	60/16	350/5000	LM19-LM20
E2*060	3C	Load Control Cartridge Valve	120/32	350/5000	LM21-LM22
E2*125	3M	Load Control Cartridge Valve	200/53	350/5000	LM23-LM24
E2*300	3K Flange	Load Control Cartridge Valve	350/92	350/5000	LM25-LM26
INDEPENDENT OF BACK-PRESSURE, VENTED TO ATMOSPHERE					
E6B020	53-1	Load Control Cartridge Valve, 4.5:1 Ratio	20/5.3	350/5000	LM27-LM28
E6K020	53-1	Load Control Cartridge Valve, 15:1 Ratio	20/5.3	420/6000	LM29-LM30
E6B040	68-1	Load Control Cartridge Valve, 3:1 Ratio	60/16	350/5000	LM31-LM32
E6B060*409	3C	Load Control Cartridge Valve, 3:1 Ratio	180/48	350/5000	LM33-LM34

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Introduction

Counterbalance valves are one of the most misunderstood products in the hydraulic industry. Many people tend to complicate the task of selecting a counterbalance valve and as such avoid opportunities. The goal of this Technical Tips Section is to hopefully eliminate some of this confusion and help you chose the correct valve for your application. It is only a guide! It is not meant to be your only method of input, nor is it meant to replace good hydraulic common sense and reasoning.

Application

DO I NEED A COUNTERBALANCE VALVE?

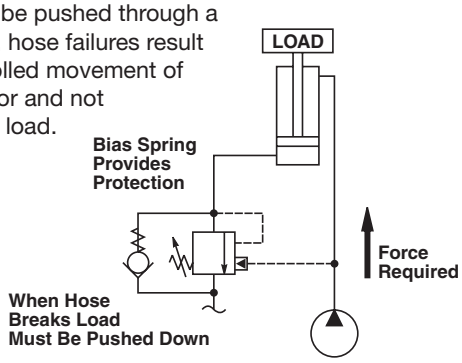
A counterbalance is generally used for one or more of the following purposes:

Control an Overrunning Load – It restricts the flow from an actuator, thus forcing the load to be pushed through the restriction and providing control of the potential runaway load. This also helps in the prevention of cavitation.

Control in Critical Metering Applications – The outward restriction also helps to gain control of systems with varying loads and speeds.

Holding a Load – Much like a pilot operated check valve, a load is held in one direction until the appropriate pilot pressure is available unseat the check and pass fluid.

Help Protect Against Hose Failures – Since the fluid must be pushed through a restriction, hose failures result in a controlled movement of the actuator and not a runaway load.



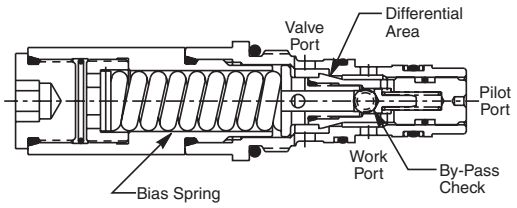
***NOTE**: Counterbalance Valves are only needed if the application calls for varying loads or varying speeds. If the load and speed are fixed, flow control valves and pilot operated check valves may be substituted at generally a lower cost.*

Operation

An understanding of the general operation of a counterbalance valve is required before proceeding further into valve selection.

The counterbalance valve is a pressure control device and functions as follows: Pressure is developed at the Work Port of the holding valve when the actuator is pressurized. This pressure acts on the differential area, and the force generated is counteracted by the bias spring. When there is sufficient pressure present to overcome the spring setting, the poppet begins to shift, allowing fluid to pass through the valve port to tank via the control valve.

To assist in the shifting of the poppet, an external pressure source (generally the opposite side of the actuator) is connected to the pilot port of the counterbalance valve. This pressure is applied to the pilot area and assists the differential area in opening the valve. The pilot assist reduces load pressure required to open the valve, and allows for a reduction in the horsepower required to move the load. If the load attempts to “run away” (move faster than the pump can supply flow), the pilot signal will diminish and the piston will begin to close restricting flow to tank and thus controlling the load. The counterbalance piston will maintain a position that maintains a positive pilot signal and will control the descent of the load.



An added feature of the counterbalance valve is its built-in thermal relief characteristic. A temperature rise can cause thermal expansion of the hydraulic fluid trapped between the actuator and the counterbalance valve’s poppet. As the pressure increases and reaches the bias spring setting, the poppet unseats and a few drops of oil are allowed to escape through the valve port of the counterbalance valve. This relieves the thermal expansion of oil, allowing the counterbalance valve to continue holding the load in the same position.

When the flow is reversed to the actuator, then pressure unseats the built-in bypass check portion of the counterbalance valve allowing flow to pass from the valve port to the work port. When no pressure is applied to either port of the counterbalance valve, the load is held in place.

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Valve Series

Parker offers the four series of products outlined below:

MHC – The MHC series is a threaded cartridge style counterbalance valve. This series is ideal for incorporating into an integrated manifold or for installation directly into the port of the actuator. There are various flow rates and pilot ratios available for the MHC Series.

CB101 – The CB101 is also a threaded cartridge style counterbalance valve. It also is ideal for incorporating into an integrated manifold or for installation directly into the port of the actuator. The CB101 has an industry common cavity (C10-3) and is available in three pilot ratios.

E2 Series – The E2 Series valves are threaded cartridge style counterbalance valves. They are available in standard and Vented configurations. In the Vented configurations, the valves maintain their settings regardless of backpressure. There are various flow rates and pilot ratios available.

E2A020

MHC-010

CB101

E6B060

Selecting Options

Below is a brief description of the options available on the ordering information pages and a brief explanation of when each would be used.

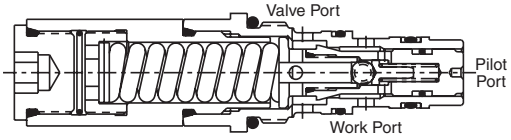
Flow Selection – Generally the counterbalance valve is sized according to the actual flow the valve will see and not the system flow. Note that the ordering information callout is the nominal flow rate and not the maximum. In other words, refer to the pressure drop curves when sizing the valves. For example: A MHC-010 can flow 25 GPM, but is rated as a 10 GPM valve. It is possible to oversize a counterbalance valve! If the counterbalance is oversized, the annulus between the poppet and the seat is too large, thus the poppet opens too far causing instability. Remember you are gaining control by causing a restriction. If you oversize the counterbalance valve, the restriction is reduced and so is the control.

Vented versus Non-Vented – With a standard counterbalance valve, the bias spring is internally vented to tank. This means any pressure on the tank line is sensed in the bias spring chamber and additive to the setting. Thus, the pressure at the work port now must be greater than the bias spring plus the tank pressure before the counterbalance poppet will shift allowing flow.

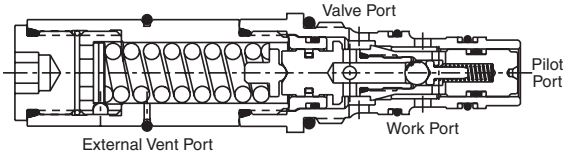
A vented style counterbalance valve relieves the bias spring chamber to atmosphere. Thus, the spring chamber is in no way related to the tank chamber of the counterbalance valve. So, if the pressure on the tank line is high, or if the pressure setting is critical, then a vented style counterbalance valve would be required.

Parker's counterbalance valves are externally vented. This means no extra porting or manifold costs are incurred when a vented counterbalance is needed.

MHC-010-S*S* Non-Vented Counterbalance Adjustable



MHC-010-V*S* Vented Counterbalance Adjustable



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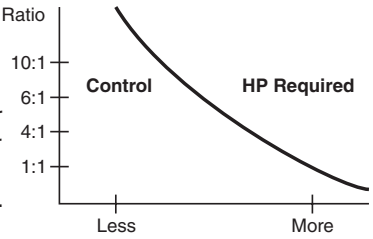
Selection Options (Continued)

Pilot Ratio – The pilot ratio is the ratio of the pilot area versus the differential area poppet. Thus, the higher the pilot ratio, the less pressure that is needed to assist the load pressure in unseating the poppet. This means there is less restriction to the overrunning load, resulting in less horsepower required and more control of the load. So higher pilot ratio equates to less restriction to the overrunning load, less control and less horsepower required. Lower ratio equates to more restriction to the overrunning load, more control and more horse-power required. The pilot ratio decision is one of Horsepower versus Control. For reference the most popular ratio is 3:1.



Sample Ratios:

10:1
Primary function is motor control and hose break protection
Loads moving at fast speeds and positioning is not critical

7.5:1, 6:1 and 5:1
Most popular starting ratio

4:1 and 3:1
Positioning is critical such as a pick and place application
Greater stability

1:1 Motor control application

ADJUSTMENT TYPE

Parker offers counterbalance valves with adjustable and non-adjustable pressure settings. The non-adjustable or shimmed version is recommended for most applications as it prevents tampering or improper adjustment by uneducated end users.

SELECTING SETTINGS

There are three basic settings to consider before finalizing a counterbalance valve for your application.

Holding Setting – The holding setting is sometimes referred to as the counterbalance setting. It is the maximum load setting you expect the counterbalance to hold. Note that the counterbalance valve should be set for the absolute maximum hold pressure required. Also note that counterbalance valves are restrictive type devices and as such are not ideal for low pressure applications, such as those below 750 psi. The holding setting is the setting you choose when selecting a counterbalance valve.

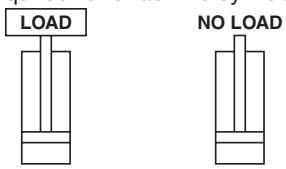
Thermal Setting – Counterbalance valves have a built-in thermal relief valve that compensates for the expansion of oil, due to temperature, by bleeding off excess pressure. In other words, the thermal setting is the pressure that the counterbalance will unload at if no pressure is present at the pilot port. Obviously, this setting should be above the holding setting. The Parker **MHC** counterbalance valves are automatically set 1000 psi above the holding setting of the valve. ***You do not specify this setting, only the holding setting.***
For the **CB101** Series, you do specify the Thermal/Crack setting in the model code. The holding setting (maximum load induced pressure) is 70% of that specified setting. Example: Hold at 3000 psi, crack at 4285 psi. For the **E2** Series, you specify the Thermal/Crack setting in the model code. The crack setting (maximum load induced pressure) should be 1.3 times the hold. Example: Hold at 210 Bar, crack at 273 Bar.

Pilot Area – The pilot pressure required to lower the cylinder when fully loaded and unloaded can also be determined before applying the valve. The pilot pressure can be determined by the below equation:

$$P_P = (T_S - L) / R_P$$

P_P = Pilot Pressure
T_S = Thermal Setting
L = Induced Load
R_P = Pilot Ratio

Example:
The maximum load is 3000 psi. A 6:1 Pilot Ratio was chosen and the thermal relief setting is the standard 1000 psi over load setting. What is the pilot pressure required to retract the cylinder if it is fully loaded? What pilot pressure is required to retract the cylinder if there is no load?



FULLY LOADED:

P_P = (4000 psi – 3000 psi) / 6
P_P = 1000 psi / 6
P_P = 167 psi

Thus, any time the pilot line sees at least 167 psi, the cylinder could lower the load.

UNLOADED:

P_P = (4000 psi – 0 psi) / 6
P_P = 4000 psi / 6
P_P = 667 psi Bar

Thus, at least 667 psi will be needed to lower the cylinder when it is unloaded.

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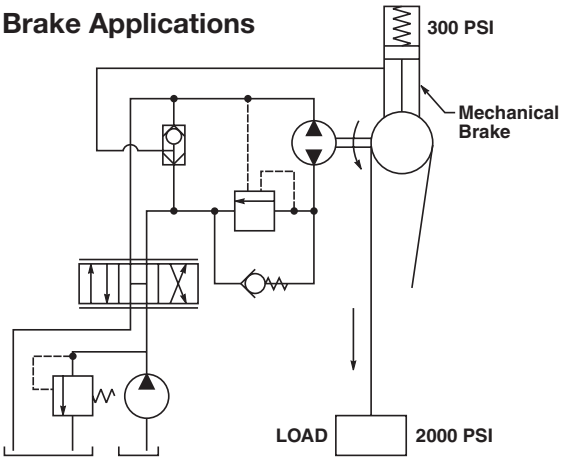
Motor Controls

Counterbalance valves are used in motor circuits to stop overrunning loads and prevent cavitation. Since hydraulic motors leak internally, the counterbalance valve by itself cannot be used to hold the load. So, a mechanical brake is used to hold the load on the motor in place, as shown below. Some typical applications include winches, swing drives, conveyor control and traction drives. For applications in closed loop motor circuits, vented spring cavities are required.

Operation

Free flow to the motor is allowed through the internal check valve. In the controlled flow direction, the oil passes across a metering poppet. The position of the metering poppet is determined by an external pilot signal from the other side of the motor. In an open loop motor circuit, this pilot signal will be a 1:1 ratio. The reason an equal ratio pilot signal is utilized is to provide positive control as well as to release mechanical brakes (when used in a braking circuit). In applications where the motor will see overrunning loads in both directions (such as a traction drive circuit), a dual MMB or two single MMB valves must be used.

Brake Applications



When the directional control valve is shifted, hydraulic pressure (usually 300 psi) releases the mechanical brake and allows the load to be moved. The counterbalance valve needs to provide adequate back pressure to open the brake, then immediately counterbalance the load. Ideally, the brake will be disengaged before the motor begins to rotate. If this sequence is not achieved, the motor will try to rotate against the applied brake reducing the life of the brake. This would be the equivalent of trying to drive with your emergency brake applied. Remember that hydraulic motors are equal area devices. So, in an effort to avoid the movement of the motor prior to the release of the brake, an equal area ratio counterbalance is used. To demonstrate let's look again at the above example with a 10:1 Ratio Counterbalance valve installed and a maximum thermal setting of 3000 psi.

10:1 Example

NO LOAD

$P_P = (T_S - L) / R_P$
$P_P = (3000 \text{ psi} - 0 \text{ psi}) / 10$
$P_P = 3000 \text{ psi} / 10$
$P_P = 300 \text{ psi}$

2000 PSI LOAD

$P_P = (T_S - L) / R_P$
$P_P = (3000 \text{ psi} - 2000 \text{ psi}) / 10$
$P_P = 1000 \text{ psi} / 10$
$P_P = 100 \text{ psi}$

Thus, when there is no load on the motor, the counterbalance opens at 300 psi, or just as the brake is being released. When there is a 2000 psi load on the motor, the counterbalance will start to open with a pilot pressure of 100 psi. The brake requires 300 psi, so the motor can start to rotate before the brake is released, causing wear on the brake. To offset this problem, you could increase the maximum thermal setting to 5000 psi, but this is very inefficient.

1:1 (Equal Area) Example

Equal area counterbalance valves are used primarily in brake applications to avoid the wear problem described above. With an Equal Area counterbalance valve, there is no thermal relief valve, and there is no differential area to work on. In other words, the counterbalance valve only opens when the pilot pressure is greater than the valve setting. The applied load has nothing to do with the pilot pressure required. Thus you will want to choose a pressure setting for the equal area counterbalance valve that is just slightly above the brake release pressure (usually 350 psi).
In our example, the valve would be set at 350 psi. This would allow the brake to release before the counterbalance allows the load to move. Since the equal counterbalance valve always opens at 350 psi pilot pressure and is not dependent on the load, it is the best valve for brake applications.

Large Pressure Spike Application – Keep in mind that equal area counterbalance valves do not have a built-in thermal relief valve. As such, if there are large pressure spikes caused by the stopping of heavy loads, then a ratioed counterbalance, such as a 10:1 should be used. In most cases these are non-brake type applications.

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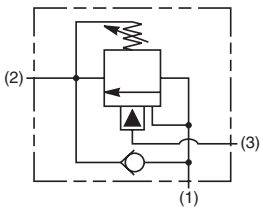
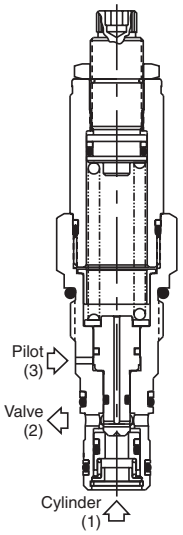
General Description

Cartridge Style Counterbalance Valve.
For additional information see Technical Tips on pages LM1-LM4.

Features

- Sealed spool type design for improved stability and accuracy as well as low leakage
- Low leakage poppet-type check valve for reliable load holding
- All external parts zinc plated
- Parker cartridge design for ease of installation and maintenance
- Compact size for reduced space requirements



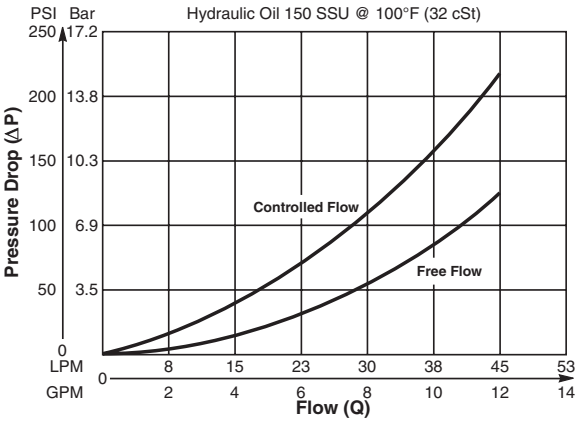


Specifications

Rated Flow	45 LPM (12 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI) - Steel 210 Bar (3000 PSI) - Aluminium
Maximum Setting Pressure	350 Bar (5000 PSI) - Steel 210 Bar (3000 PSI) - Aluminium
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) @ 80% of thermal crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.5 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curve

Flow vs. Pressure Drop
(Through cartridge only)



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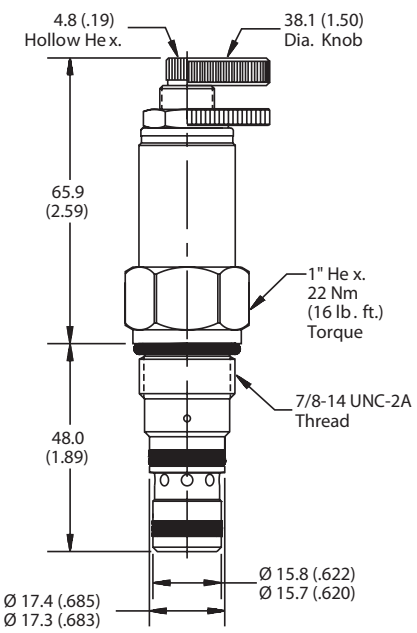
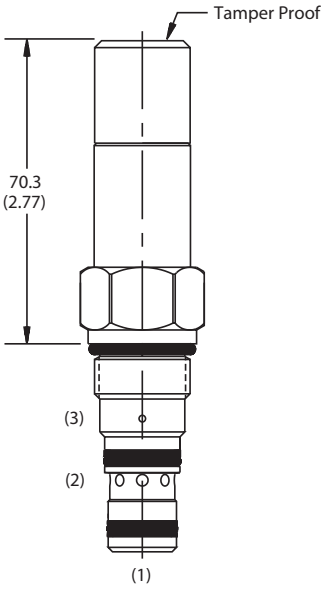
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

CB101				
Counterbalance Cartridge Valve	Pilot Ratio	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
A	3 : 1
B	4.5 : 1
C	7 : 1

Code	Adjustment Style
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Pressure Range
10	**34.5 to 103.4 Bar (500 to 1500 PSI) Standard Setting: 69 Bar (1000 PSI) @ 11.3 LPM (3 GPM)**
20	69 to 172.4 Bar (1000 to 2500 PSI) Standard Setting: 138 Bar (2000 PSI) @ 11.3 LPM (3 GPM)
30	**166 to 350 Bar (2400 to 5000 PSI) Standard Setting: 210 Bar (3000 PSI) @ 11.3 LPM (3 GPM)**

Code	Seals / Kit No.
Omit	**Nitrile / (SK10-3)**
V	Fluorocarbon / (SK10-3V)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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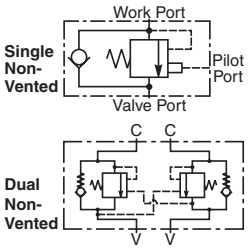
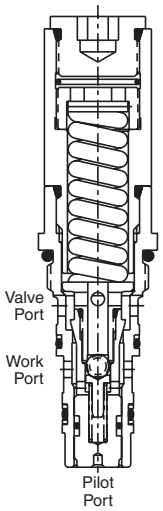
General Description

Threaded Cartridge Style Counterbalance Valve. For additional information see Technical Tips on pages LM1-LM4.

Features

- Conical Poppet design provides longer metering stroke for stable operation
- Hardened seat provides reliable load holding
- External vent option available for high back pressure applications
- Tamper resistant cap for added safety and security
- Various pilot ratios available for application flexibility
- Unique cavity prevents other valves from being "accidentally" installed





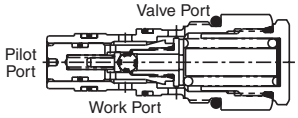
MHC-010-S*S* Non-Vented Counterbalance Adjustable

Specifications

Rated Flow	37.5 LPM (10 GPM)
Maximum Inlet Pressure	350 Bar (5500 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) @ 80% of thermal crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.38 kg (0.88 lbs.)
Cavity	CDD-1010 (See BC Section for more details)
Form Tool	FR-0500

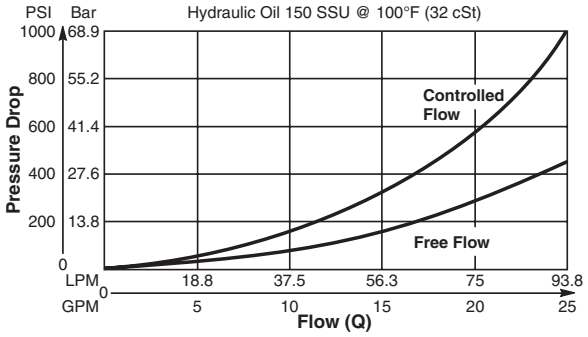
Construction

MHC-010-S*N* Non-Vented Counterbalance Non-Adjustable



Performance Curve

Flow vs. Pressure Drop (Through cartridge only)



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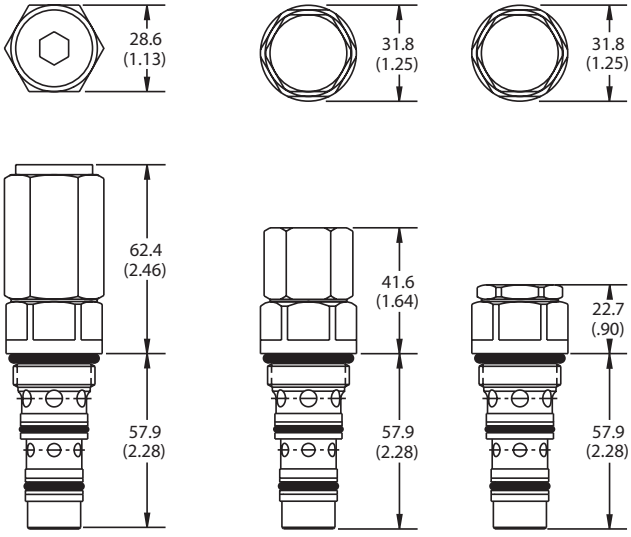
Dimensions Millimeters (Inches)



MHC-010-S*S*

MHC-010-S*N*
(4:1)
MHC-010-S*NK
(7:1 and 10:1)

MHC-010-S*N*
(3000 PSI
Maximum "H")
(7:1 and 10:1)

THIRD-ANGLE PROJECTION

Torque Values
68-75 Nm (50-55 lb. ft.)
Typical for all

Ordering Information

MHC	–	010	–					–	
Counterbalance Cartridge Valve		Nominal Flow Rating		Vent Type	Pilot Ratio	Design	Holding Pressure		Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Nominal Flow Rating
010	37.5 LPM (10 GPM)

Code	Vent Type
S	Standard (non-vented)

Code	Pilot Ratio
B	4 : 1
F	7 : 1 (Standard)
J	10 : 1

Code	Design
S	Standard (adjustable)
N	Shimmed (non-adjustable)

Code	Holding Pressure
D	69 Bar (1000 PSI) Shim adjustable version only
F	140 Bar (2000 PSI)
H	210 Bar (3000 PSI) Standard version
K	350 Bar (5000 PSI) Standard Setting: 7:1 and 10:1 only Shim version only

Code	Seals / Kit No.
00B	Nitrile / 711922
00F	Fluorocarbon / 711825

Order Bodies Separately
See section BC

MHC	–	010	–		–	53
Counterbalance Cartridge Valve		Nominal Flow Rating		Body Type		Port Size

Code	Body Type
A	Single
D	Dual

Code	Port Size
53	SAE-10 through port

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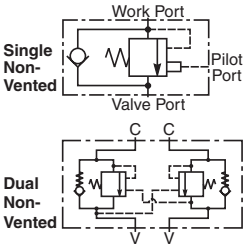
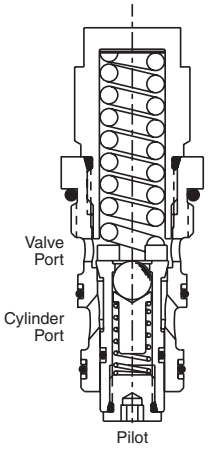
General Description

Threaded Cartridge Style Counterbalance Valve. For additional information see Technical Tips on pages LM1-LM4.

Features

- Conical Poppet design provides longer metering stroke for stable operation
- Hardened seat provides reliable load holding
- External vent option available for high back pressure applications
- Tamper resistant cap for added safety and security
- Various pilot ratios available for application flexibility
- Unique cavity prevents other valves from being "accidentally" installed





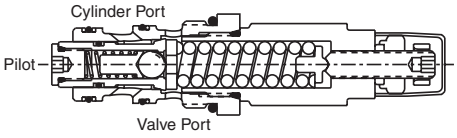
MHC-022-S*N*
Non-Vented
Counterbalance
Non-Adjustable

Specifications

Rated Flow	93.75 LPM (25 GPM)
Maximum Inlet Pressure	350 Bar (5500 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) @ 80% of thermal crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.44 kg (1.0 lbs.)
Cavity	CDD-1036 (See BC Section for more details)
Form Tool	FR-0501

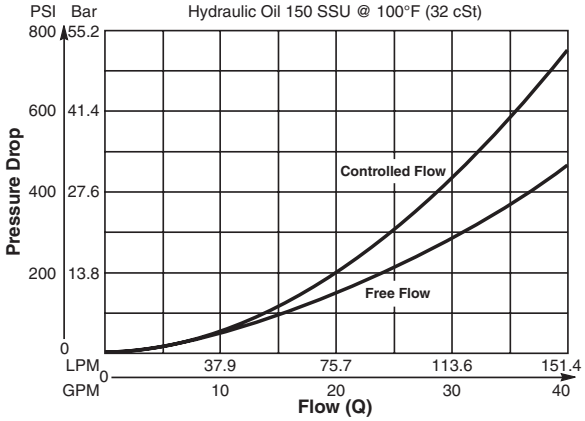
Construction

MHC-022-S*S* Non-Vented Counterbalance Adjustable



Performance Curve

Flow vs. Pressure Drop (Through cartridge only)



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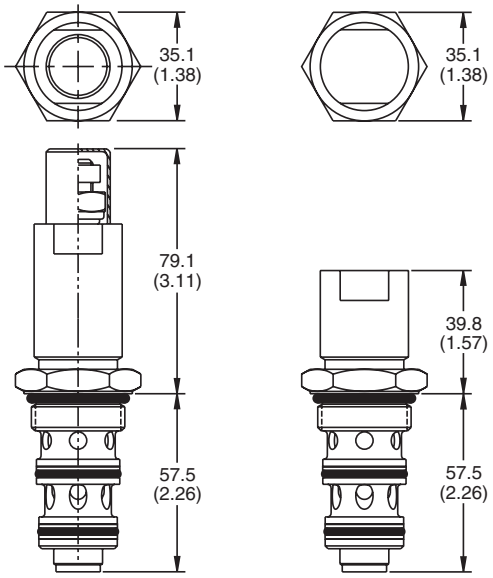
Dimensions Millimeters (Inches)



MHC-022-S*S* MHC-022-S*N*

THIRD-ANGLE PROJECTION

Torque Values
102-108 Nm (75-80 lb. ft.)
Typical for all

Ordering Information

MHC	–	022	–	S				–	
Counterbalance Cartridge Valve		Nominal Flow Rating		Vent Type	Pilot Ratio	Design	Holding Pressure		Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Nominal Flow Rating
022	**93.75 LPM (25 GPM)**

Code	Vent Type
S	**Standard (non-vented)**

Code	Pilot Ratio
C	5 : 1 (Standard)
J	10 : 1

Code	Design
S	**Standard with tamper resistant cap (adjustable)**
N	Shimmed (non-adjustable)

Code	Holding Pressure
H	**210 Bar (3000 PSI) Standard version**
K	**350 Bar (5000 PSI) 10:1 only**

Code	Seals / Kit No.
00B	**Nitrile / 712226**
00F	Fluorocarbon / 718077

Order Bodies Separately
See section BC

MHC	–	022	–		–	53
Counterbalance Cartridge Valve		Nominal Flow Rating		Body Type		Port Size

Code	Body Type
A	Single
D	Dual

Code	Port Size
53	SAE-10 through port

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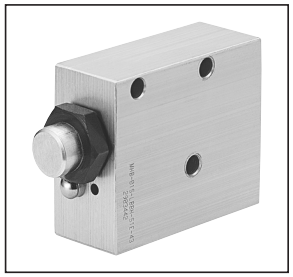
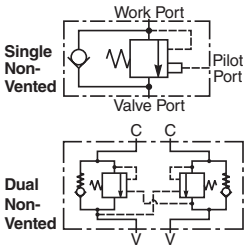
General Description

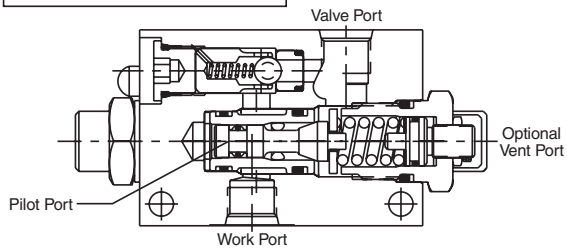
Body Style Counterbalance Valve.
For additional information see Technical Tips on pages LM1-LM4.

Features

- Conical Poppet design provides longer metering stroke for stable operation
- Hardened seat provides reliable load holding
- External vent option available for high back pressure applications
- Tamper resistant cap for added safety and security
- Various pilot ratios available for application flexibility





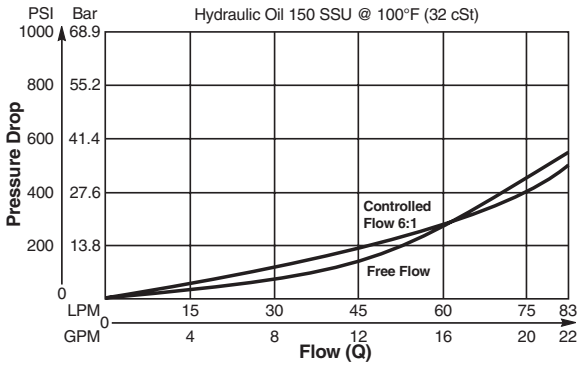


Specifications

Rated Flow	56 LPM (15 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) @ 80% of thermal crack pressure
Valve Material	All parts steel. All operating parts hardened steel.
Body Material	Aluminium
Operating Temp. Range/Seals	-26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	**Single** 0.68 kg (1.5 lbs.) **Double** 1.36 kg (3.0 lbs.)

Performance Curve

Flow vs. Pressure Drop (Through cartridge only)



Ordering Information

MHB	–	015	–	L					–		
Counterbalance Parts In Body		Nominal Flow Rating		Vent Setting	Pilot Ratio	Body Style	Holding Pressure		Porting		Pilot Port

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Nominal Flow Rating
015	46.3 LPM (15 GPM)

Code	Vent Setting
L	Non-vented

Code	Pilot Ratio
B	3 : 1
E	6 : 1

Code	Body Style
A	Single Inline
B	Single Gasket
D	Double Inline
E	Double Gasket

Seal Kit No.	
Single	711708
Double	711709

Code	Holding Pressure
E	34.5 to 103.4 Bar (500 to 1500 PSI)
H	105 to 210 Bar (1500 to 3000 PSI)

Code	Porting
51	SAE-6

Code	Pilot Port
N	Internal Pilot (Dual valve only)
E	SAE-6 (Code 51 & 52 bodies only)

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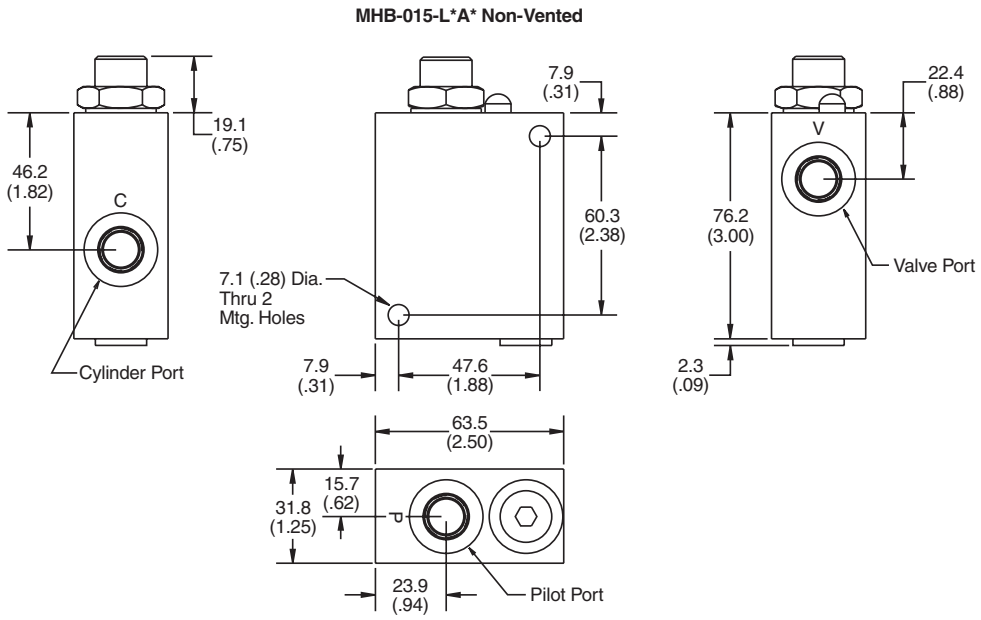
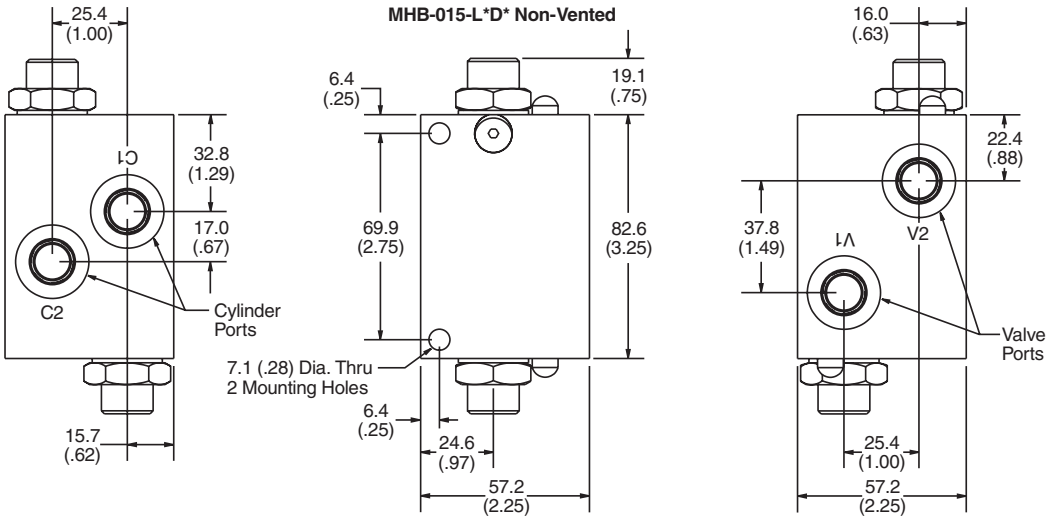
*Inch equivalents for millimeter dimensions are shown in (**)

Series MHB-015-L*A* Single Counterbalance, Non-Vented, In-line Mount



Series MHB-015-L*D* Dual Counterbalance, Non-Vented, In-line Mount



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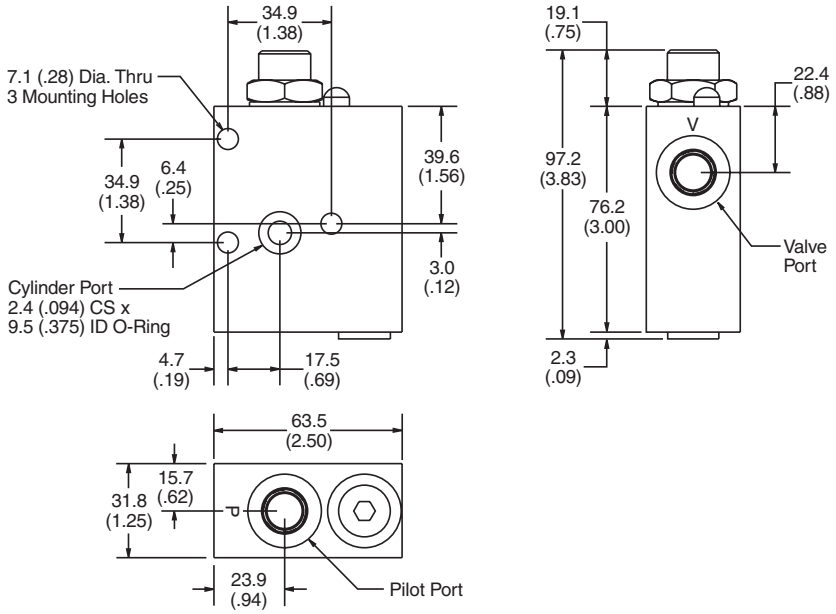
*Inch equivalents for millimeter dimensions are shown in (**)

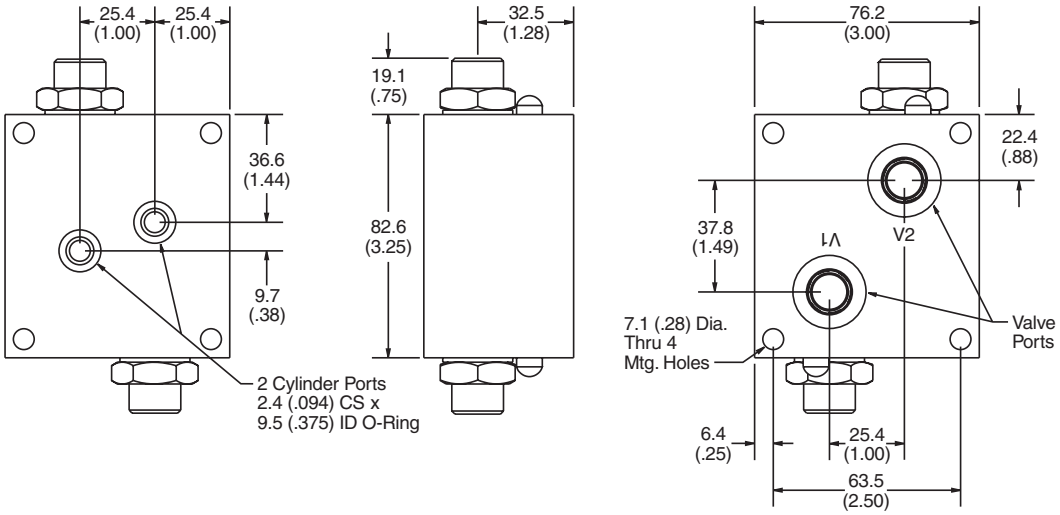
Series MHB-015-L*B* Single Counterbalance, Non-Vented, Gasket Mount

MHB-015-L*B* Non-Vented



Series MHB-015-L*E* Dual Counterbalance, Non-Vented, Gasket Mount

MHB-015-L*E* Non-Vented



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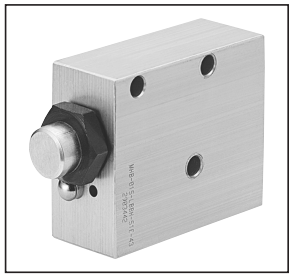
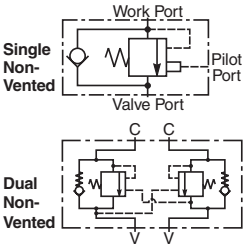
General Description

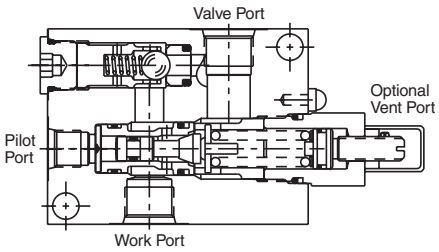
Body Style Counterbalance Valve.
For additional information see Technical Tips on pages LM1-LM4.

Features

- Conical Poppet design provides longer metering stroke for stable operation
- Hardened seat provides reliable load holding
- External vent option available for high back pressure applications
- Tamper resistant cap for added safety and security
- Various pilot ratios available for application flexibility





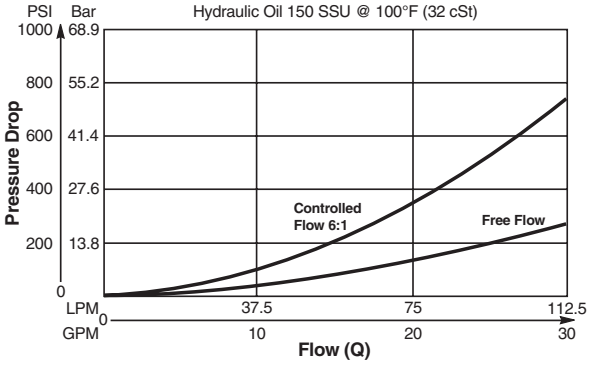


Specifications

Rated Flow	112.5 LPM (30 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (0.33 cc/min) @ 80% of thermal crack pressure
Valve Material	All parts steel. All operating parts hardened steel.
Body Material	Aluminium
Operating Temp. Range/Seals	-26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	**Single** 1.13 kg (2.5 lbs.) **Double** 2.05 kg (4.5 lbs.)

Performance Curve

Flow vs. Pressure Drop (Through cartridge only)



Ordering Information

MHB	–	030	–	L				–	52	
Counterbalance Parts In Body		Nominal Flow Rating		Vent Setting	Pilot Ratio	Body Style	Holding Pressure		Porting	Pilot Port

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Nominal Flow Rating
030	112.5 LPM (30 GPM)

Code	Vent Setting
L	Non-vented

Code	Pilot Ratio
B	3 : 1
E	6 : 1

Code	Body Style
A	Single Inline
B	Single Gasket
D	Double Inline

Seal Kit No.	
Single	711654
Double	711655

Code	Holding Pressure
E	34.5 to 103.4 Bar (500 to 1500 PSI)
H	105 to 210 Bar (1500 to 3000 PSI)

Code	Porting
52	SAE-8

Code	Pilot Port
N	Internal Pilot (Dual valve only)
E	SAE-8 (Code 52 & 53 bodies only)

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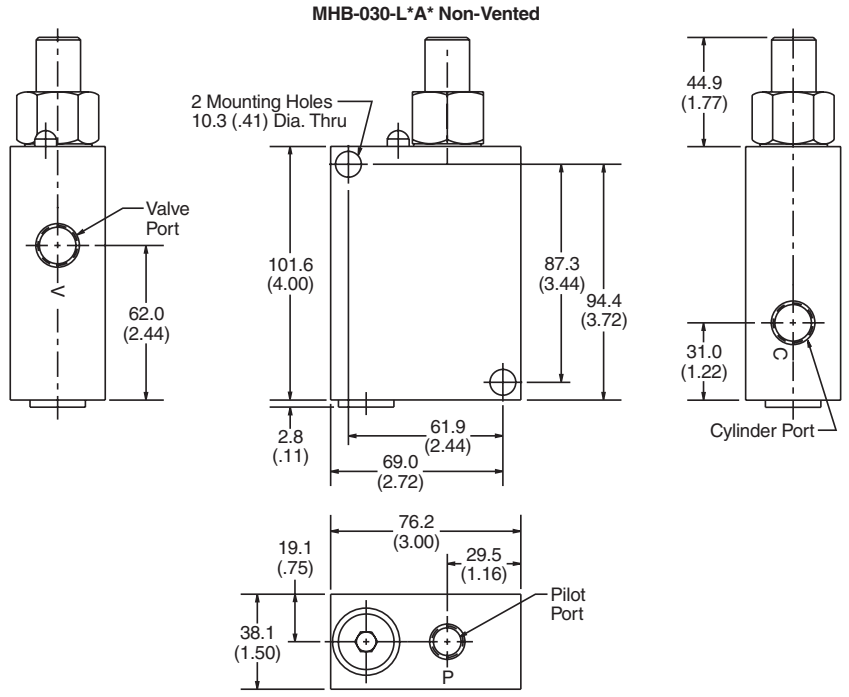
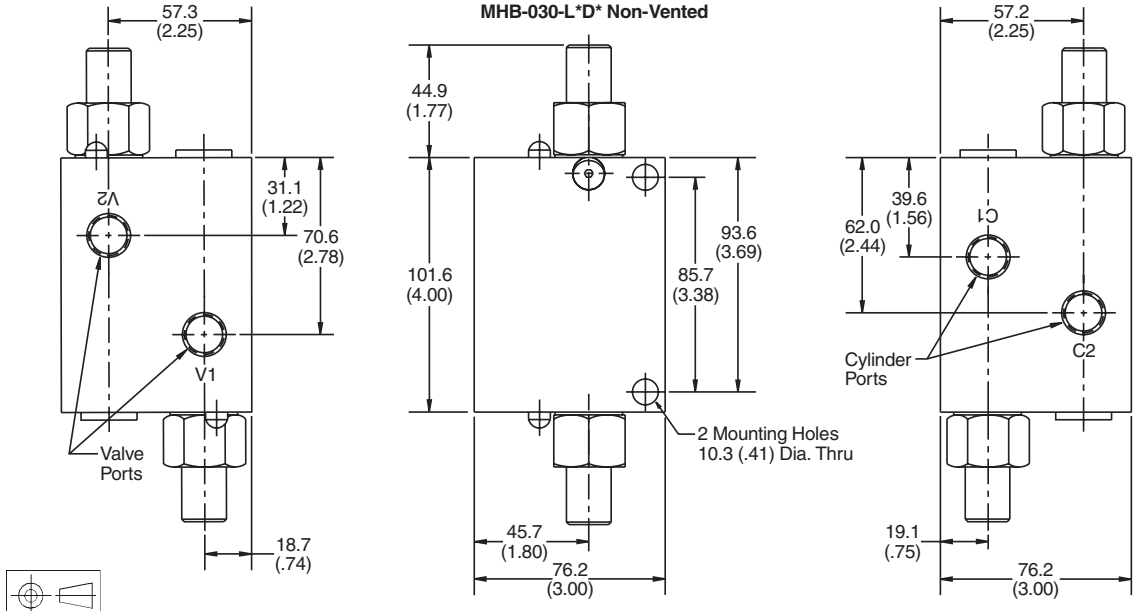
*Inch equivalents for millimeter dimensions are shown in (**)

Series MHB-030-L*A* Single Counterbalance, Non-Vented, In-Line Mount



Series MHB-030-L*D* Dual Counterbalance, Non-Vented, In-Line Mount



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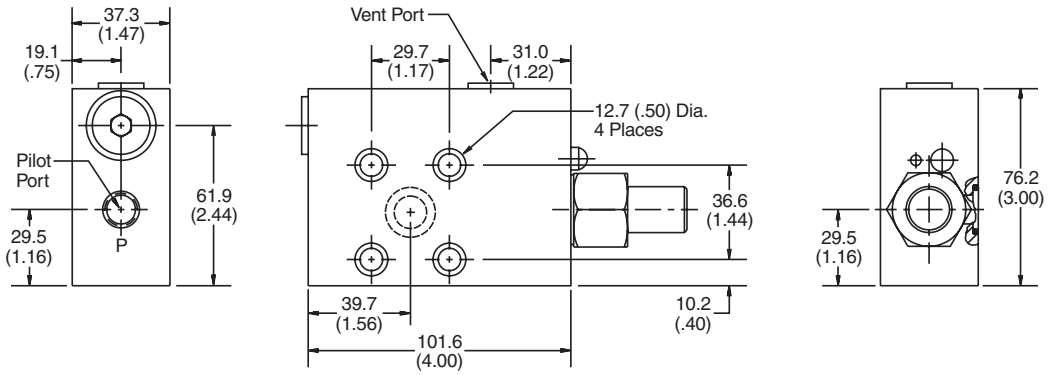
*Inch equivalents for millimeter dimensions are shown in (**)

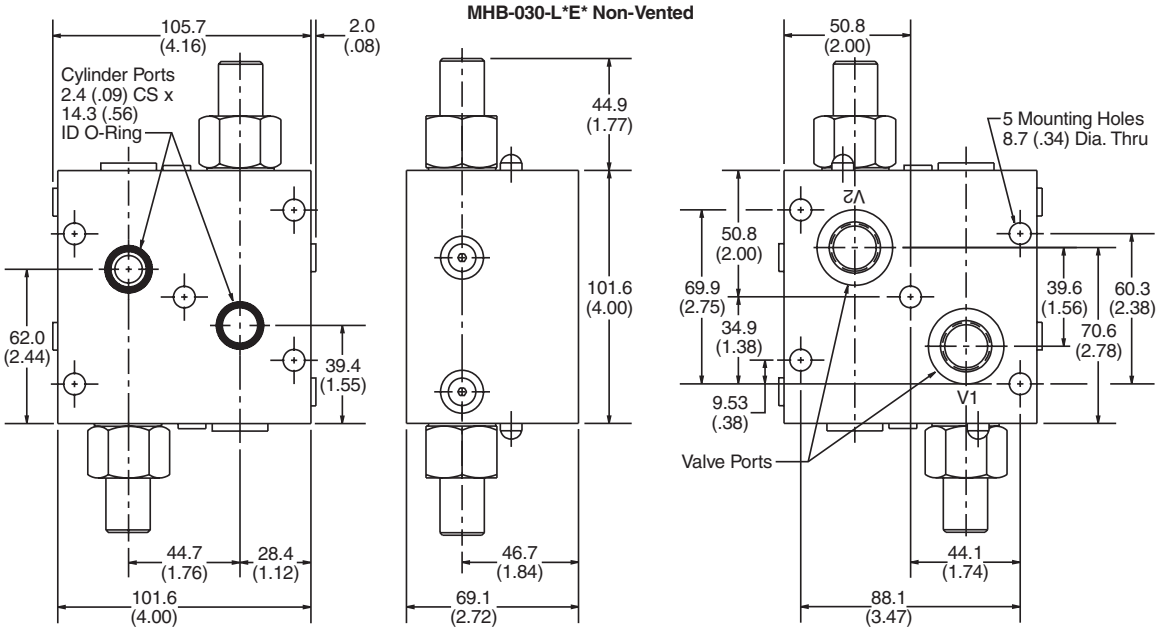
Series MHB-030-L*B* Single Counterbalance, Non-Vented, Gasket Mount

MHB-030-L*B* Non-Vented



Series MHB-030-L*E* Dual Counterbalance, Non-Vented, Gasket Mount

MHB-030-L*E* Non-Vented



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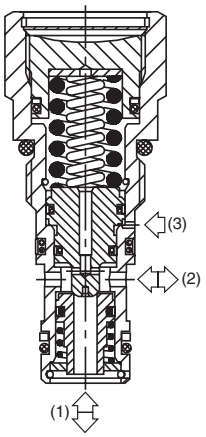
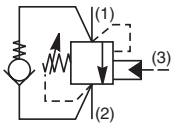
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.

Features

- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection
- Includes reverse check valve within body, saving space and minimizing installation cost
- Can be directly mounted into cylinder eliminating requirement for manifold block
- Fully sealed pilot for high efficiency and accurate pilot ratio
- Two pilot ratios available, 4.5:1 for cylinders and 8:1 for motor control
- Adjustable and tamper resistant versions available
- Preset version is tamper resistant and compact
- All external parts zinc plated



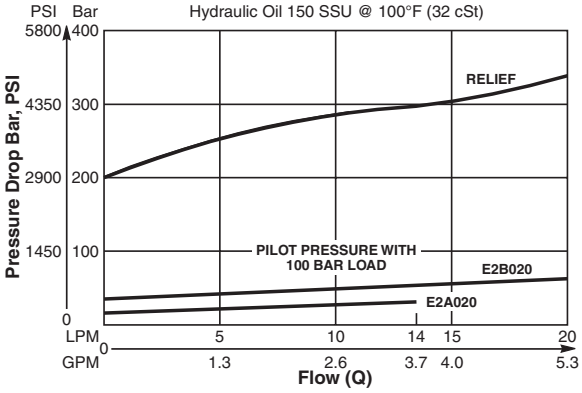


Specifications

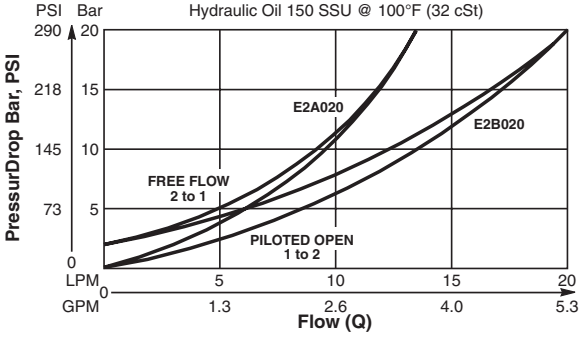
Rated Flow	**E2A020** 14 LPM (3.7 GPM) **E2B020** 20 LPM (5.3 GPM)
Pressure	50 to 420 Bar (725 to 6000 PSI)
Sensitivity: Pressure / Turn	**E2A020** 113 Bar (1640 PSI) **E2B020** 84 Bar (1220 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.17 lbs.)
Cavity	53-1 (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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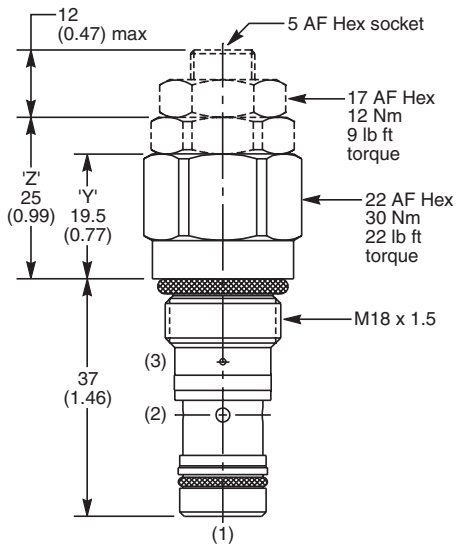
Dimensions Millimeters (Inches)



Ordering Information

E2		020	Z	
Load Control Valve	Pilot Ratio		Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
A	8 : 1
B	4.5 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30087N-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
318	3/8″ SAE (main) 1/4″ SAE (aux)
319	3/8″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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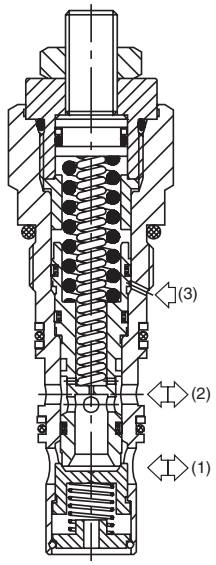
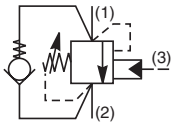
Load Control Valve
Series E2A040, E2B040, E2H040

General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.





Features

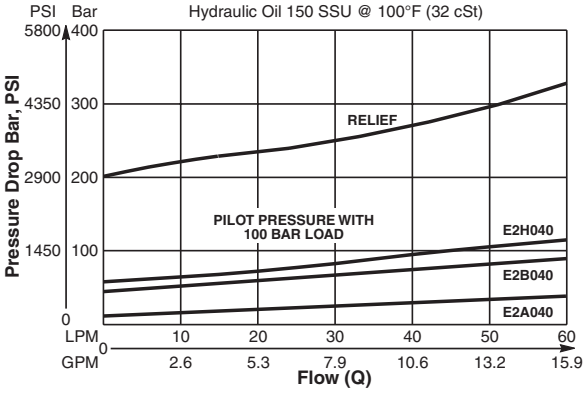
- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection
- Includes reverse check valve within body, saving space and minimizing installation cost
- Excellent control and very good stability
- Three pilot ratios available, 1.75:1 and 3:1 for cylinders and 8:1 for motor control
- Hardened working parts for maximum durability
- Adjustable, preset and tamper resistant versions available
- Preset version is tamper resistant and compact
- All external parts zinc plated

Specifications

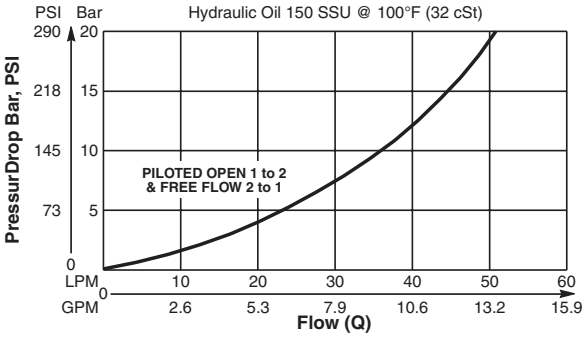
Rated Flow	60 LPM (15.9 GPM)
Pressure	50 - 350 Bar (725 - 5000 PSI)
Sensitivity: Pressure / Turn	99 Bar (1435 PSI)
Pilot Ratio	**E2A040** - 8 : 1 **E2B040** - 3 : 1 **E2H040** - 1.75 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.27 kg (0.6 lbs.)
Cavity	68-1 (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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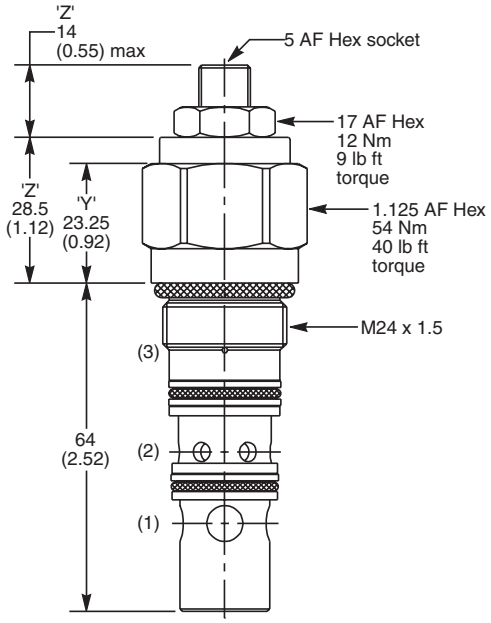
Dimensions Millimeters (Inches)



Ordering Information

E2		040	Z	N
Load Control Valve	Pilot Ratio		Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
A	8 : 1
B	3 : 1
H	1.75 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30059N-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
253	1/2″ SAE (main) 1/4″ SAE (aux)
261	1/2″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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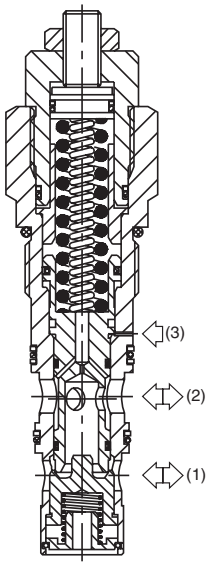
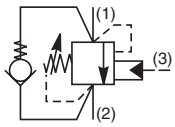
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.





Features

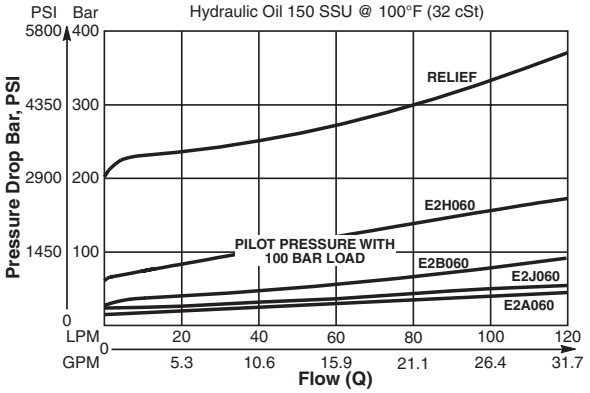
- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection
- Includes reverse check valve within body, saving space and minimizing installation cost
- Excellent control and very good stability
- Three pilot ratios available, 1.75:1 and 3:1 and 5:1 for cylinders and 8:1 for motor control
- Hardened working parts for maximum durability
- Adjustable and tamper resistant versions available
- Preset version is tamper resistant and compact
- All external parts zinc plated

Specifications

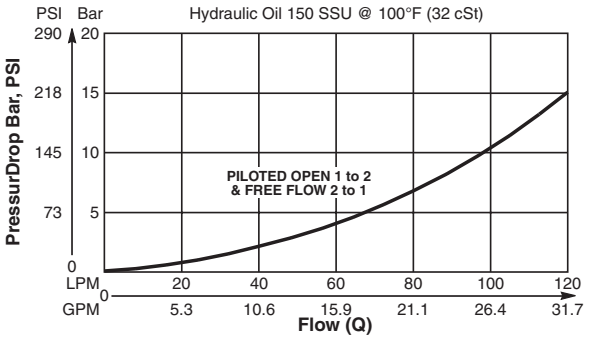
Rated Flow	120 LPM (32 GPM)
Pressure	50 - 350 Bar (725 - 5000 PSI)
Sensitivity: Pressure / Turn	44 Bar (640 PSI)
Pilot Ratio	**E2A060** - 8 : 1 **E2B060** - 3 : 1 **E2H060** - 1.75 : 1 **E2J060** - 5 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.54 kg (1.19 lbs.)
Cavity	3C (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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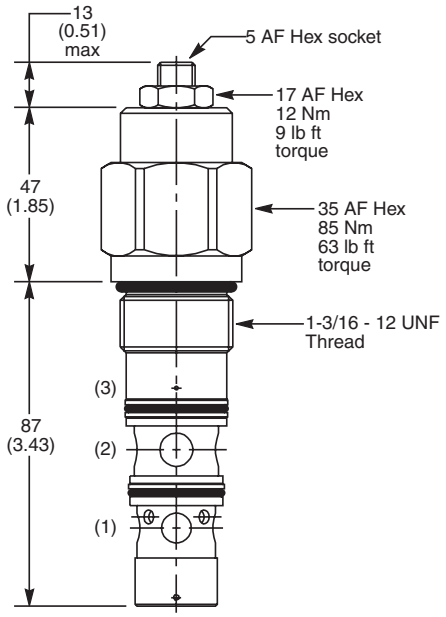
Dimensions Millimeters (Inches)



Ordering Information

E2		060	Z	N
Load Control Valve	Pilot Ratio		Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
A	8 : 1
B	3 : 1
H	1.75 : 1
J	8 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30008N-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
069	1″ SAE (main) 1/4″ SAE (aux)
234	3/4″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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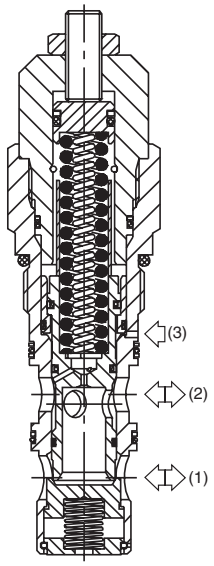
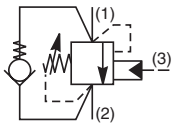
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.





Features

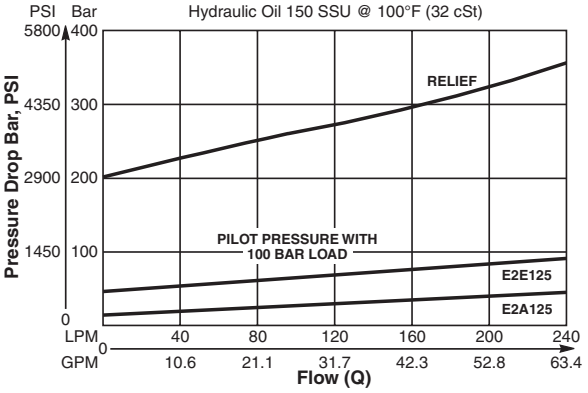
- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection, and reverse check valve, saving space and minimizing installation cost
- Two pilot ratios available, 3:1 for cylinders and 8:1 for motor control
- Hardened working parts for maximum durability
- Adjustable and tamper resistant versions also available
- All external parts zinc plated

Specifications

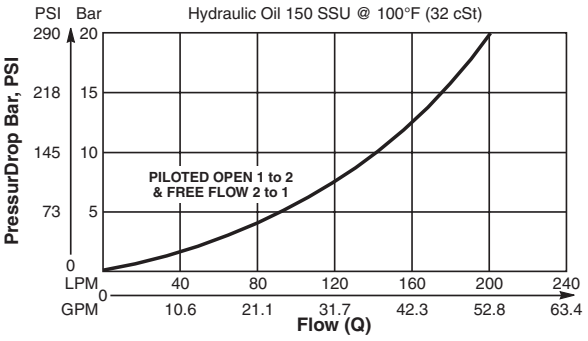
Rated Flow	200 LPM (53 GPM)
Pressure	50 - 350 Bar (725 - 5000 PSI)
Sensitivity: Pressure / Turn	34 Bar (493 PSI)
Pilot Ratio	**E2A125** - 8 : 1 **E2E125** - 3 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.75 kg (1.65 lbs.)
Cavity	3M (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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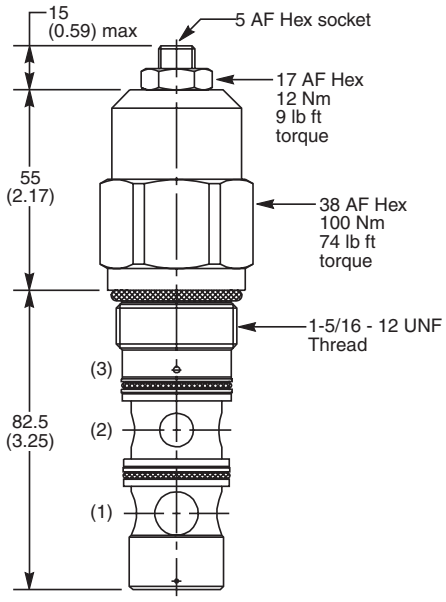
Dimensions Millimeters (Inches)



Ordering Information

E2		125	Z	N
Load Control Valve	Pilot Ratio		Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
A	8 : 1
E	3 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30035N-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
078	1″ SAE (main) 1/4″ SAE (aux)
105	1″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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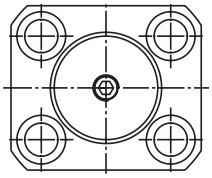
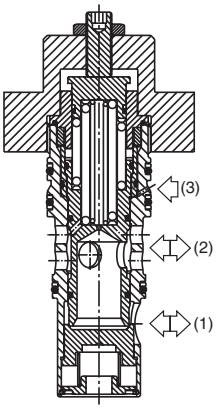
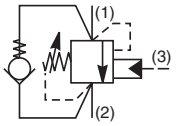
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.







Features

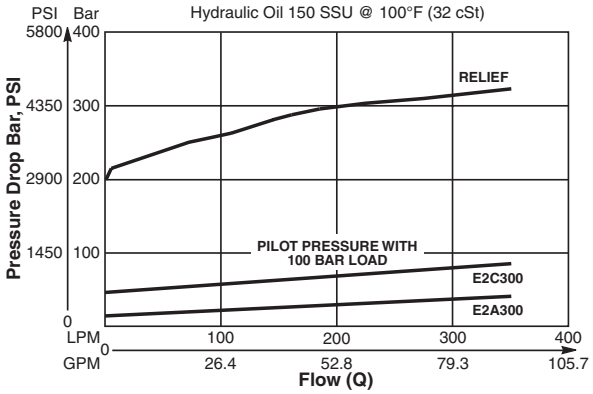
- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection, and reverse check valve, saving space and minimizing installation cost
- Two pilot ratios available, 3:1 for cylinders and 8:1 for motor control
- Hardened working parts for maximum durability
- Adjustable and tamper resistant versions also available
- All external parts zinc plated

Specifications

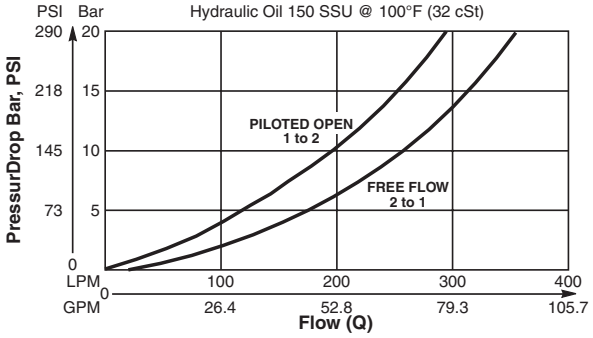
Rated Flow	350 LPM (92 GPM)
Pressure	50 to 350 Bar (725 to 5000 PSI)
Sensitivity: Pressure / Turn	45 Bar (653 PSI)
Pilot Ratio	**E2A300** - 8 : 1 **E2C300** - 3 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	1.44 kg (3.17 lbs.)
Cavity	3K (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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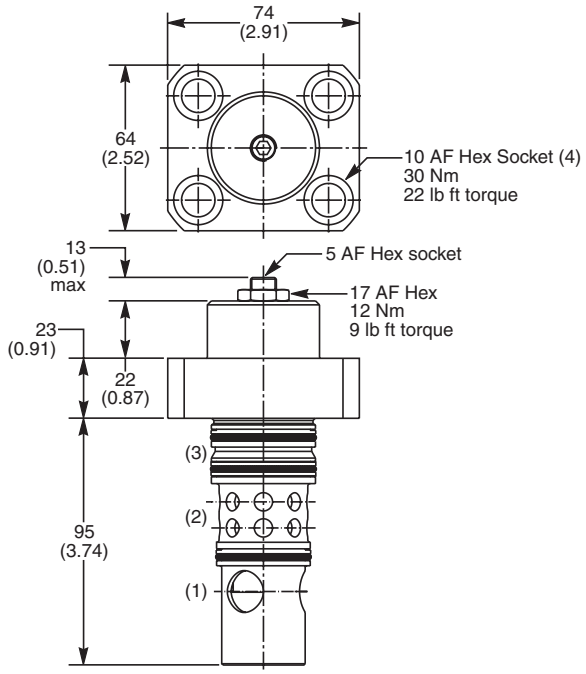
Dimensions Millimeters (Inches)



Ordering Information

E2		300	Z	N	MK2
Load Control Valve	Pilot Ratio		Adjustment Style	Seals	

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
A	8 : 1
C	3 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30022N-1)

Order Bodies Separately
See section BC

LB10	089	
Line Body	Porting	Body Material

Code	Porting
089	1-1/4" BSP (main) 1/4" BSP (aux)

Code	Body Material
S	Steel
A	Aluminium

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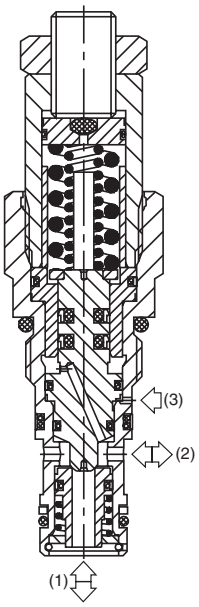
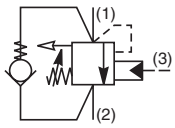
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.

Features

- Spring chamber isolated from system backpressure by double seal, eliminating vent port leakage and need for separate drain line
- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection
- Includes reverse check valve within body
- Small and compact, can be fitted directly into cylinder
- Adjustable and tamper resistant versions available
- All external parts zinc plated



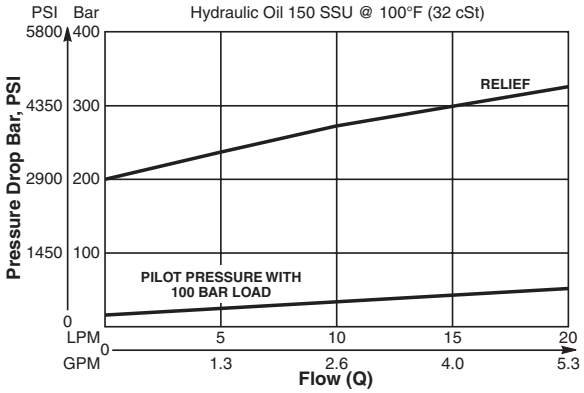


Specifications

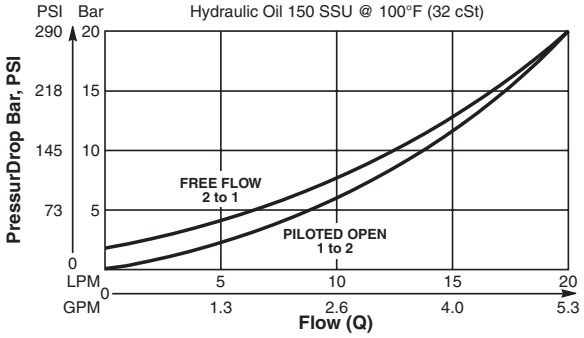
Rated Flow	20 LPM (5.3 GPM)
Pressure	50 to 420 Bar (725 to 6000 PSI)
Sensitivity: Pressure / Turn	84 Bar (1220 PSI)
Pilot Ratio	4.5 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.18 lbs.)
Cavity	53-1 (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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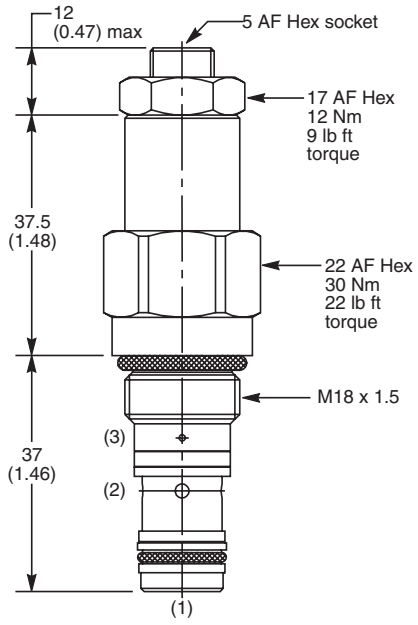
Dimensions Millimeters (Inches)



Ordering Information

E6	B	020	Z	N
Load Control Valve	Pilot Ratio		Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
B	4.5 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30087N-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
318	3/8″ SAE (main) 1/4″ SAE (aux)
319	3/8″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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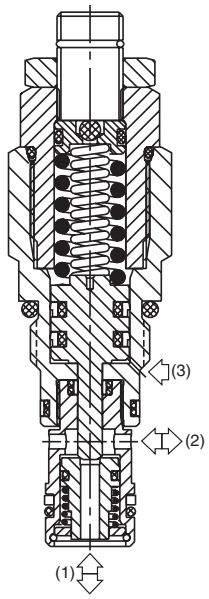
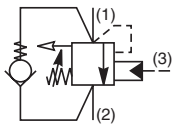
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.





Features

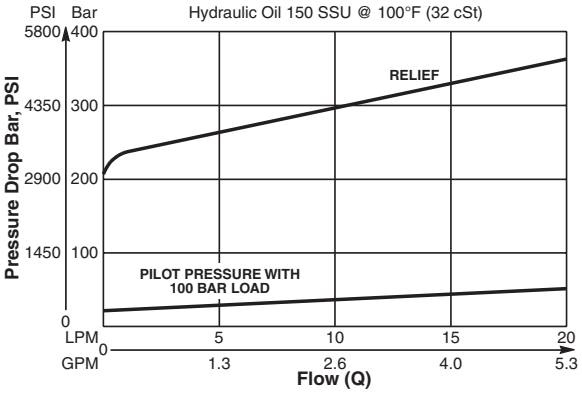
- Spring chamber isolated from system backpressure by double seal, eliminating vent port leakage and need for separate drain line
- Poppet construction for minimal leakage
- Suitable for remote pilot controlled boomlock applications as per ISO8463
- Incorporates direct acting relief valve for overload protection
- Includes reverse check valve within body
- Hardened working parts for maximum durability
- Adjustable and tamper resistant versions available
- All external parts zinc plated

Specifications

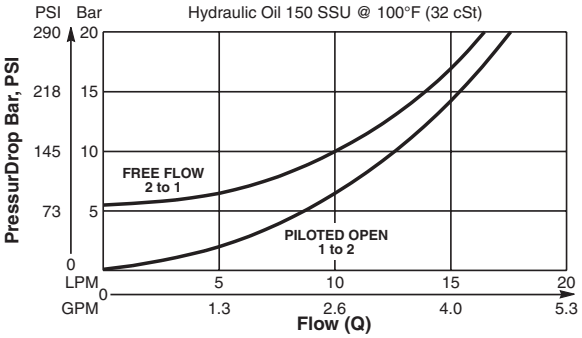
Rated Flow	20 LPM (5.3 GPM)
Pressure	100 - 350 Bar (1450 - 5075 PSI)
Sensitivity: Pressure / Turn	114 Bar (1650 PSI)
Pilot Ratio	15 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.18 lbs.)
Cavity	53-1 (See BC Section for more details)

Performance Curves

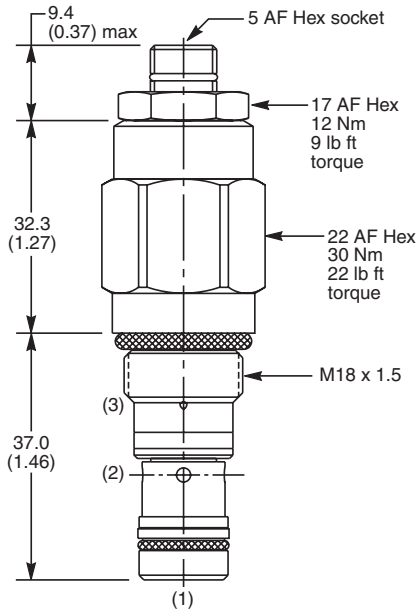
Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



Dimensions Millimeters (Inches)



Ordering Information

E6	K	020	Z	N
Load Control Valve	Pilot Ratio		Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
K	15 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30087N-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
318	3/8″ SAE (main) 1/4″ SAE (aux)
319	3/8″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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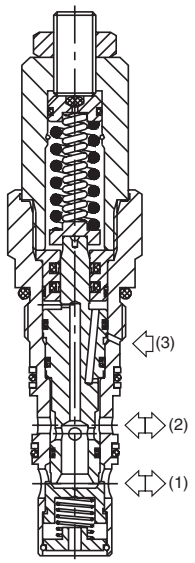
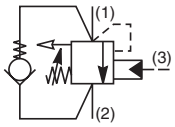
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.





Features

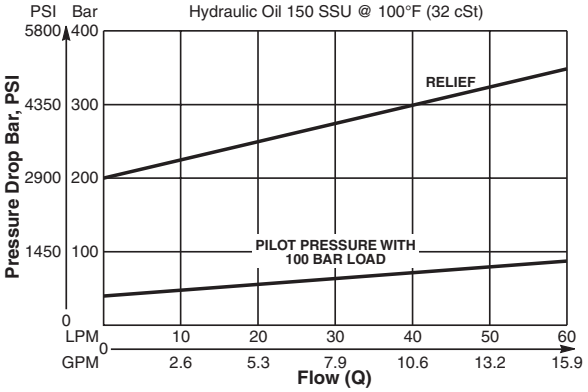
- Spring chamber isolated from system backpressure by double seal, eliminating vent port leakage and need for separate drain line
- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection
- Includes reverse check valve within body, saving space and minimizing installation cost
- Hardened working parts for maximum durability
- Adjustable and tamper resistant versions available
- All external parts zinc plated

Specifications

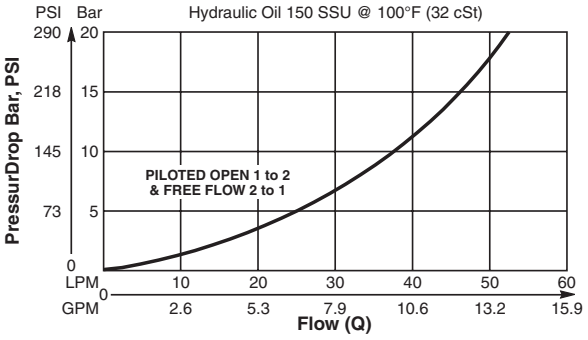
Rated Flow	60 LPM (15.9 GPM)
Pressure	50 to 350 Bar (725 to 5075 PSI)
Sensitivity: Pressure / Turn	92 Bar (1335 PSI)
Pilot Ratio	3 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.33 kg (0.73 lbs.)
Cavity	68-1 (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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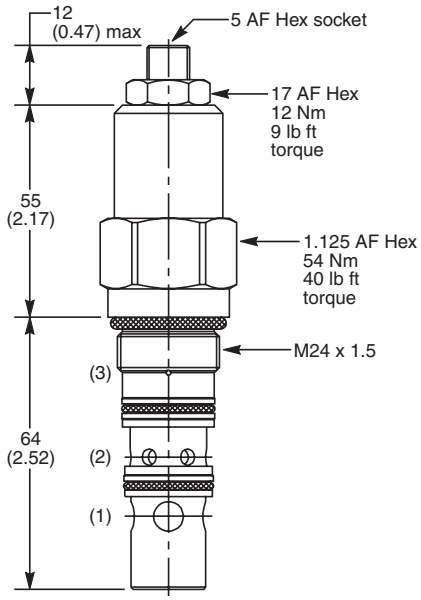
Dimensions Millimeters (Inches)



Ordering Information

E6	B	040	Z	N	MK3
Load Control Valve	Pilot Ratio		Adjustment Style	Seals	

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
B	3 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30059N-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
253	1/2″ SAE (main) 1/4″ SAE (aux)
261	1/2″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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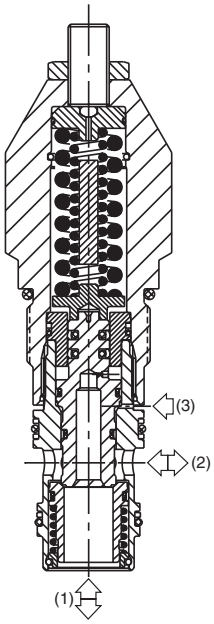
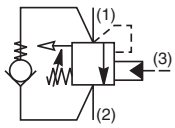
General Description

Threaded Cartridge Style Counterbalance Valve. Pilot assisted, designed for motion control applications
For additional information see Technical Tips on pages LM1-LM4.





Features

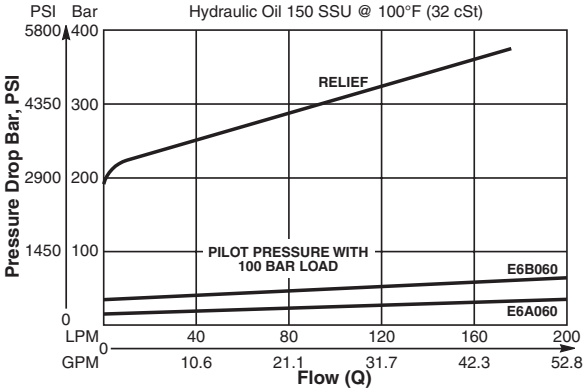
- High flow design with extra dampening
- Spring chamber isolated from system backpressure by double seal, eliminating vent port leakage and need for separate drain line
- Poppet construction for minimal leakage
- Incorporates direct acting relief valve for overload protection
- Includes reverse check valve within body, saving space and minimizing installation cost
- Hardened working parts for maximum durability
- Adjustable and tamper resistant versions available
- All external parts zinc plated

Specifications

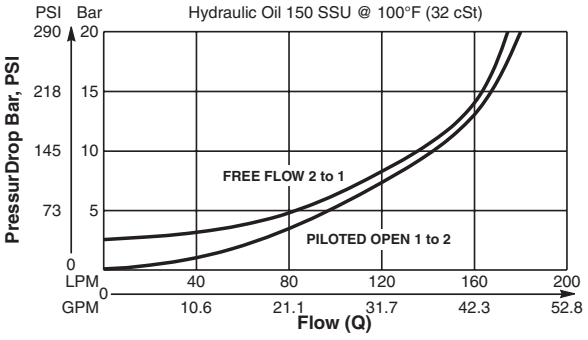
Rated Flow	180 LPM (48 GPM)
Pressure	50 to 350 Bar (725 to 5000 PSI)
Sensitivity: Pressure / Turn	50 Bar (725 PSI)
Pilot Ratio	3 : 1
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.53 kg (1.17 lbs.)
Cavity	3C (See BC Section for more details)

Performance Curves

Relief & Pilot Performance 1 to 2



Pressure Drop vs Flow



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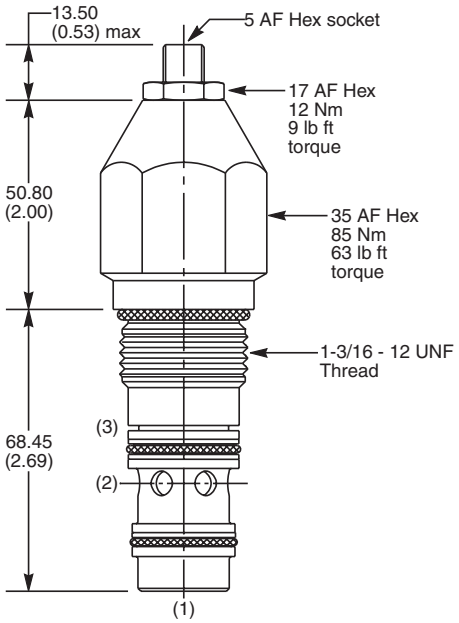
Dimensions Millimeters (Inches)



Ordering Information

E6	B	060	Z	N	409
Load Control Valve	Pilot Ratio		Adjustment Style	Seals	Suffix Number

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Pilot Ratio
B	3 : 1

Code	Adjustment Style
Z	Screw Adjust (Standard)

Code	Seals / Kit No.
N	Nitrile, Buna-N (Std.) / (SK30008N-1)

Code	Suffix Number
409	High flow design with extra dampening

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
069	1″ SAE (main) 1/4″ SAE (aux)
234	3/4″ SAE Dual Cavity

Code	Body Material
S	Steel
A	Aluminium

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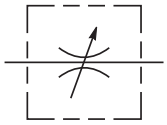
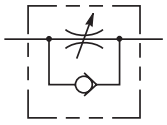
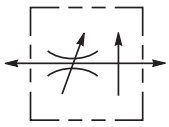
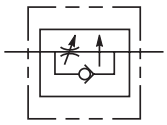
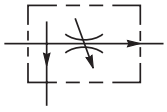
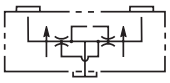
Catalog HY15-3503/US

Contents

Flow Control Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	Technical Tips					FC1-FC4
	**NEEDLE VALVES**					
☆	NVH081	C08-2	Needle Valve, Cartridge Type	38/10	380/5500	FC5-FC6
☆	NVH101	C10-2	Needle Valve, Cartridge Type	60/16	380/5500	FC7-FC8
	FV101	C10-2	Needle Valve with Reverse Check, 1 to 2 Free Flow	45/12	210/3000	FC9-FC10
	FV102	C10-2	Needle Valve with Reverse Check, 1 to 2 Free Flow	23/6	210/3000	FC9-FC10
	**PRESSURE COMPENSATED FLOW CONTROLS**					
	FR101	C10-2	Restrictive Flow Control, Tuneable	26/7	245/3500	FC11-FC12
	FA101	C10-2	Restrictive Flow Control, Reverse Check, Adjustable	21/5.5	210/3000	FC13-FC14
	FC101	C10-2	Restrictive Flow Control, Reverse Check, Tuneable	56/15	210/3000	FC15-FC16
	**PRESSURE COMPENSATED PRIORITY FLOW CONTROLS**					
	FP101	C10-3	Priority Type, with Bypass	56/15	245/3500	FC17-FC18
	**FLOW DIVIDERS/COMBINERS**					
	FDC101	C10-4	Flow Divider/Combiner	45/12	245/3500	FC19-FC20

☆ *Denotes Winner's Circle product line.*

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INTRODUCTION

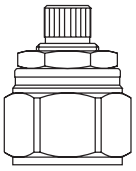
This technical tips section is designed to help familiarize you with the Parker line of Flow Control Valves. In this section we present common options available as well as a brief synopsis of the operation and applications of the various product offered in this section. The intent of this section is to help you in selecting the best products for your application.

COMMON OPTIONS

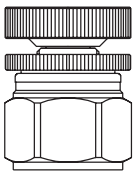
As you will see, Parker offers a variety of Flow Control products. As such, some of the options mentioned below may not be available on all valve models. Consult the model coding and dimensions of each valve for specifics. Here are some of the common options available.

Adjustment Types: Parker offers four primary types of adjustments for most of the flow control products. Samples of these types are shown below. Please note all options may not be available for all valves. Consult the individual catalog pages for more details.

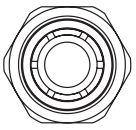
Screw Adjustment - Valve can be adjusted with an allen wrench. Lock nut included to maintain desired setting after adjustment. This is the most common adjustment option available on most Parker products.

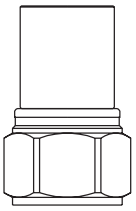


Knob Adjustment - An aluminum knob is added to the standard screw adjustment. A lock knob is provided to help maintain the desired setting after adjustment. Parker offers knob conversion kits for most flow control valves. For kit numbers consult the individual valve pages.

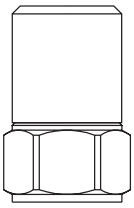


Fixed Style - In most cases, the Fixed Style product is a screw adjustable product with a steel collet threaded over the adjustment. These valves are preset at the factory. Should the valve need to adjusted, the star washer and aluminum plate can be removed from the top of the assembly exposing the adjustment.





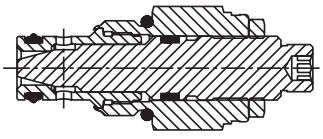
Tamper Resistant - The tamper resistant option is a screw adjustable valve with a steel cap installed to conceal the adjustment. The cap is designed so the internal edges clamp into the groove of the valve adapter. Once the cap is installed, it cannot be removed without damaging the cap and the valve. When a valve is ordered with the tamper resistant option, it will be preset at the factory, and the cap will be included in a separate plastic bag to allow for fine tuning at the customer site. Parker offers tamper re-sistant cap conversion kits for most flow control valves. For kit numbers consult the individual valve pages.



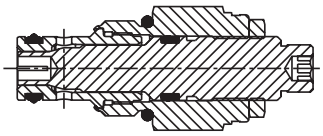
Seals: The Winner's Circle products feature a standard 4301 Polyurethane "D"-Ring. The "D"-Ring eliminates the need for backup rings.The majority of the products are available in Nitrile or Fluorocarbon Seals. You should match the seal compatibility to the temperature and fluid being used in your application.

Fine Meter Options: Fine meter needles are offered on some needle valve series. When this option is specified, the standard needle is replaced by a slotted needle. The slotted needle restricts substantially more flow giving you finer control in the small flow ranges. Obviously, the maximum flow capacity of the needle valve is decreased with the fine meter option.

Coarse Needle



Fine Needle



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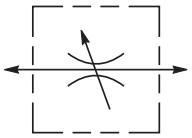
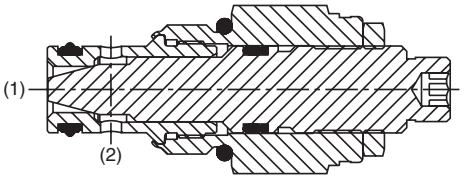
PRODUCT TYPES / APPLICATIONS

Needle Valve

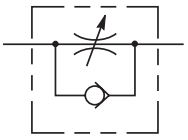


Needle valves provide uncompensated adjustable flow control of a desired function. They are ideal for applications where general control of hydraulic flow is needed, like in a bleed off circuit. When used with a compensator spool, a pressure compensated system can be obtained.

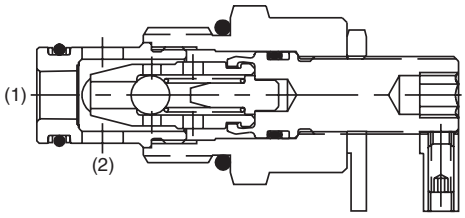


OPERATION - The valve acts as a fixed orifice in a hydraulic circuit. The effective size of the orifice increases as the tapered needle is opened. Shutoff is provided when fully closed. While a needle valve will meter flow regardless of the flow path, flow from port 2 to 1 is preferred. When you flow in the reverse direction (1 to 2), pressure forces work on the nose of the needle in an effort to drive it off of its seat. As such, all leakage conditions found in the catalog are based on flow from side to nose (port 2 to port 1). In addition, the adjustment will be harder to turn due to the added force.

Needle with a Reverse Check

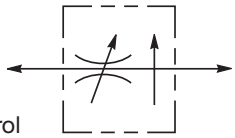


Needle valves with reverse check functions are sometimes also referred to as flow control valves. As the name implies, these valves provide uncompensated adjustable speed control in one direction and allow free flow in the opposite direction. When used with a compensator spool, a pressure compensated system can be obtained.

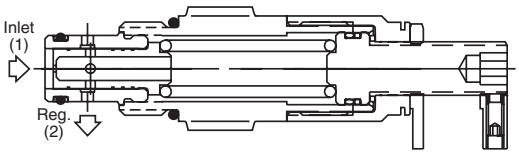


OPERATION - With flow entering the side of the cartridge (port 2), the needle acts as a fixed orifice. The effective size of this orifice is increased as the needle is opened controlling the output flow to port 1. With flow entering the nose (port 1), the check ball inside the needle is unseated allowing free flow to port 2.

P.C. Flow Regulator



Pressure compensated flow regulators maintain a regulated flow regardless of changes in load or inlet pressure. They are commonly used to accurately control an actuator function. They can be used in meter-in or meter-out applications.



OPERATION - The valve consists of a control orifice within a normally open, spring biased compensator spool. Flow through the control orifice produces a pressure drop across the compensator spool. When inlet flow exceeds the flow setting of the valve, the force produced by the pressure differential across the spool exceeds the spring force and shifts the compensator spool to throttle or restrict flow; thus maintaining consistent flow through the valve. In the reverse direction, flow is metered, but not pressure compensated.

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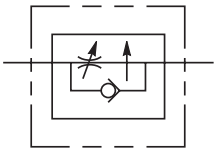
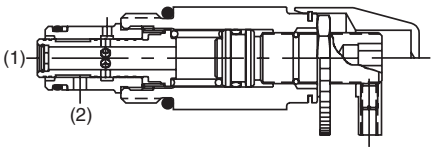
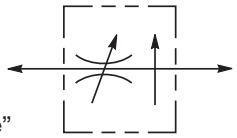
P.C. Flow Control

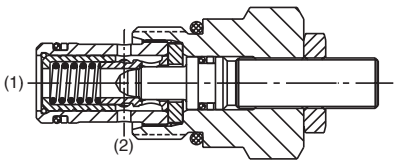




Pressure compensated flow controls are pressure compensated regulators with a reverse flow check valve. They provide constant regulated flow in the one direction regardless of changes in load pressure. Flow in the reverse direction is non-regulated, free flow. They can be used in meter-in or meter-out applications.

Adjustable Flow Controls

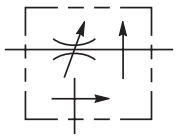


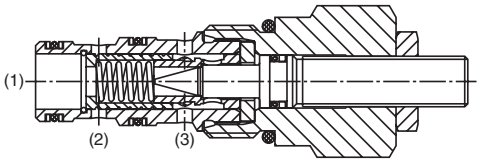


Most adjustable pressure compensated flow controls have a limited adjustment range. You will see in our catalog that we use the term “tuneable” for the FR101 and FC101 valves.
This means they are only adjustable within a pre-set range.
The FA101, J02E2, J04E2 and J04C2 are fully adjustable.
Keep this adjustment capability in mind when you select a flow control.

OPERATION - When flow enters the nose (port 1) of the cartridge, it passes through a control orifice. This control orifice creates a pressure differential across the regulating spool. As the inlet flow increases, the pressure differ-ential across the regulating spool increases, allowing the regulating spool to overcome its spring force and begin to shift. As it shifts, it throttles to maintain a constant flow. When used in conjunction with a fixed displacement pump, a relief valve between pump and valve is needed. Full flow is allowed in the reverse direction (port 2 to 1).

Priority Style P.C. Flow Regulator





Priority style pressure compensator regulators maintain constant priority flow to one leg of the circuit regardless of changes in load or inlet pressure. Once this priority flow requirement is satisfied, the excess flow is diverted and can be used in another leg of the circuit. These valves are usually used in meter-in applications.

OPERATION - The valve consists of a control orifice within a spring biased compensator spool. The priority port is normally open while the bypass port is normally closed. As flow enters the inlet of the cartridge and passes through the control orifice, a pressure differential is created across the compensator spool. When the inlet flow exceeds the setting of the valve, the force produced by this pressure differential exceeds the spring force and shifts the compensator spool; opening up the bypass port, and bypassing the excess flow. If load pressure at the bypass port is greater than the load pressure at the priority port, the compensator spool will further shift restricting the priority flow to that of the valve setting. ***Caution:*** If the priority line is blocked so that no flow can pass through the control orifice, the compensator spool will shift, blocking the bypass port and allowing inlet pressure to go to full system relief pressure. These valves do not provide a pressure relieving function, so it is common to place an external relief valve downstream of port 3 to prevent a no flow condition.

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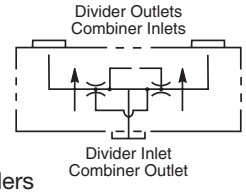
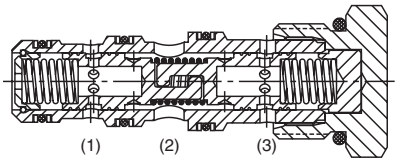
Flow Divider / Combiner

Flow divider / combiner valves are used to proportion the flow from a single source into two actuators. In the reverse mode, the valve takes the flow from the two sources and combines it into one flow. When attempting to synchronize two cylinders with a flow/divider combiner valve, please consider that the flow accuracy is +10%. A crossover relief can be used to help re-synchronize the cylinders by bottoming them out after several cycles.





OPERATION - When flow enters the divider inlet port, it will pass through orifices in each of the interconnected spools. The flow passing through the orifices creates a pressure drop which pulls the two spools away from each other. The flow then passes to the two divider outlet ports. The division of flow (i.e. 50-50, 60-40, 66-33, etc.) is determined by the orifice sizes in the two spools.When flow is being combined, it enters the valve through two combiner inlets. The pressure drop across the orifices pulls the two spools together. The combined flow then passes through the combiner outlet.

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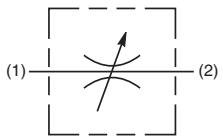
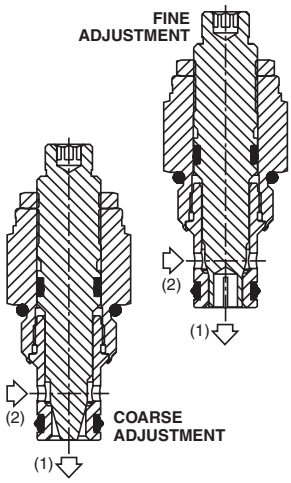
General Description

Cartridge Style Needle Valve.
For additional information see Technical Tips on pages FC1-FC4.

Features

- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- Fine adjustment needle option available for precise adjustment
- Polyurethane "D"-Ring eliminates backup rings and prevents hydrolysis
- Valve meters flow in either direction, but (2 to 1) is the preferred direction for lowest leakage at shut off
- All external parts zinc plated



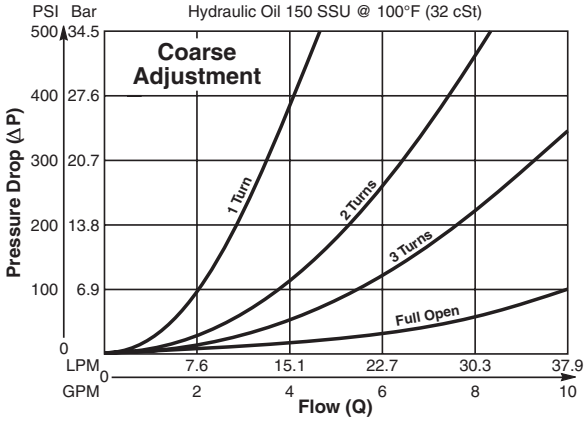


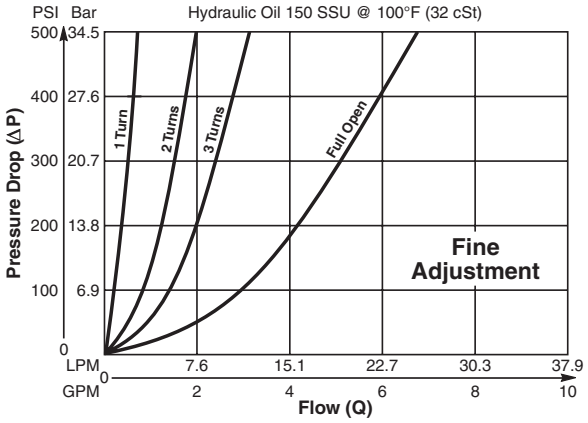
Specifications

Rated Flow	Fixed 37.9 LPM (10 GPM) Adjusted
Maximum Inlet Pressure	380 Bar (5500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.10 kg (0.20 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Performance Curves

Flow vs. Inlet Pressure (Through cartridge only)





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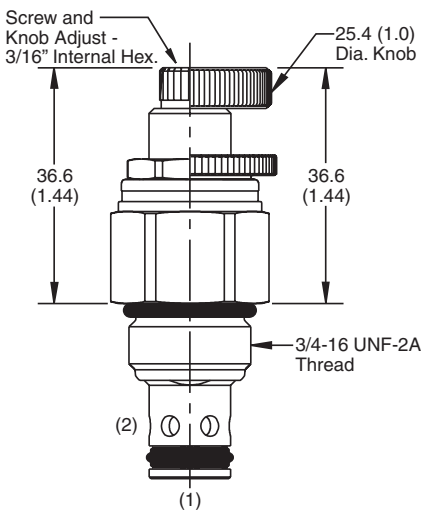
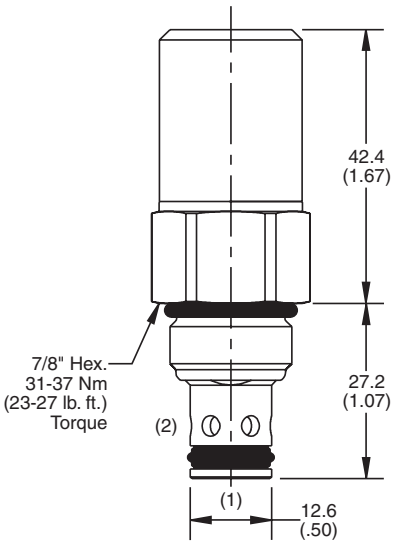
Hydraulic Cartridge Systems Division

Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

NVH081			
08 Size Needle Valve	Flow Needle	Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Flow Needle
Omit	**Coarse**
F	Fine

Code	Adjustment Style / Kit No.
S	**Screw Adjust**
K	Knob Adjust (717784-10)
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile / (SK08-2)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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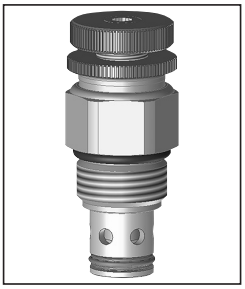
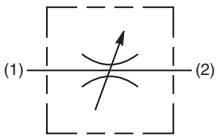
General Description

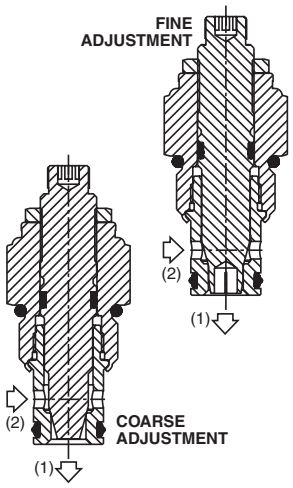
Cartridge Style Needle Valve. For additional information see Technical Tips on pages FC1-FC4.

Features

- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- Fine adjustment needle option available for precise adjustment
- Polyurethane "D"-Ring eliminates backup rings and prevents hydrolysis
- Valve meters flow in either direction, but (2 to 1) is the preferred direction for lowest leakage at shut off
- All external parts zinc plated





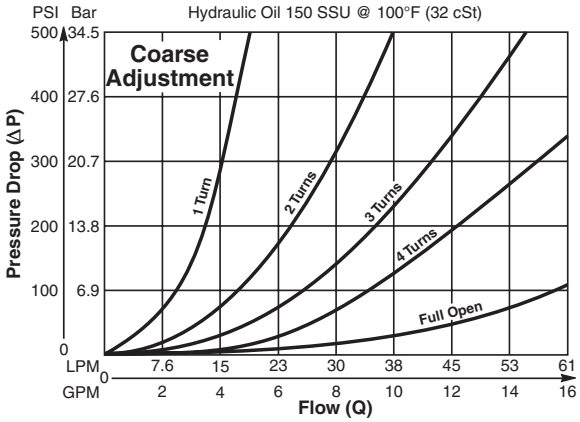


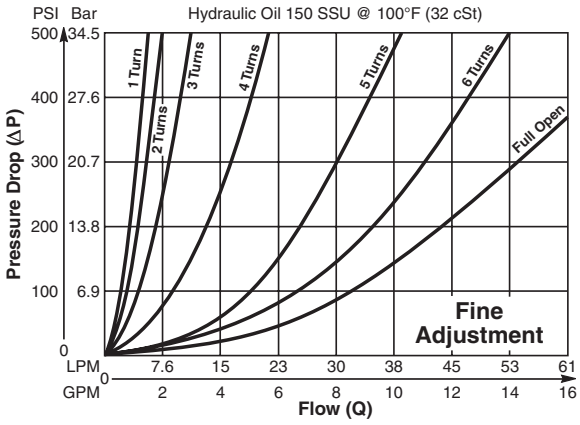
Specifications

Rated Flow	Fixed 60 LPM (16 GPM) Adjusted 60 LPM (16 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.18 kg (0.40 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curves

Flow vs. Inlet Pressure (Through cartridge only)





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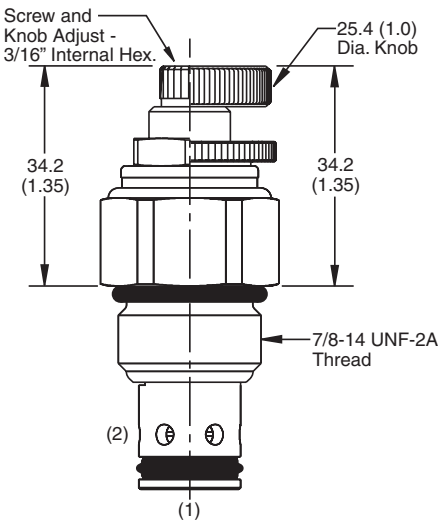
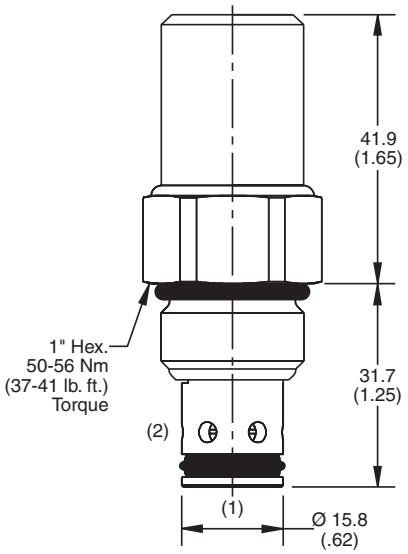
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

NVH101			
10 Size Needle Valve	Flow Needle	Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Flow Needle
Omit	**Coarse**
F	Fine

Code	Adjustment Style / Kit No.
S	**Screw Adjust**
K	Knob Adjust (717784-10)
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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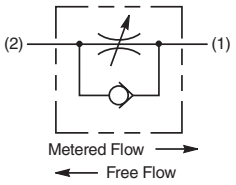
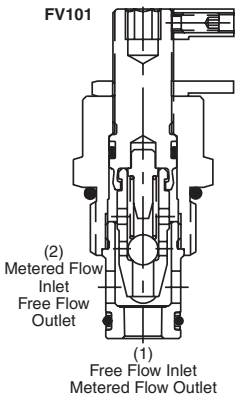
General Description

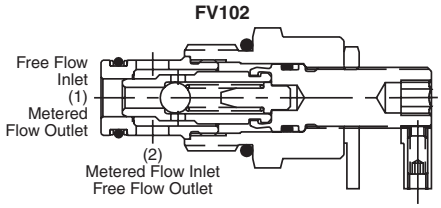
Needle Valve with a Reverse Check. Also known as a Flow Control Valve. For additional information see Technical Tips on pages FC1-FC4.

Features

- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- Fine thread needle option available for precise adjustment
- All external parts zinc plated



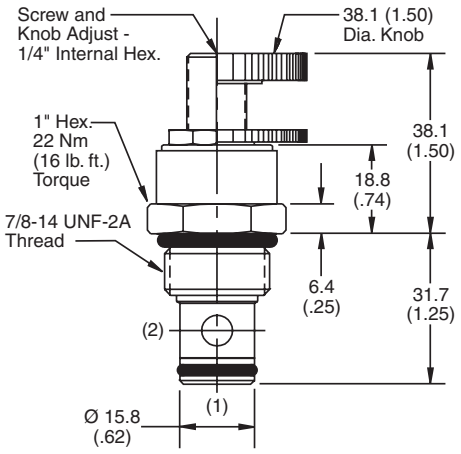




Specifications

Rated Flow	**FV101** 45 LPM (12 GPM) **FV102** 23 LPM (6 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Dimensions Millimeters (Inches)



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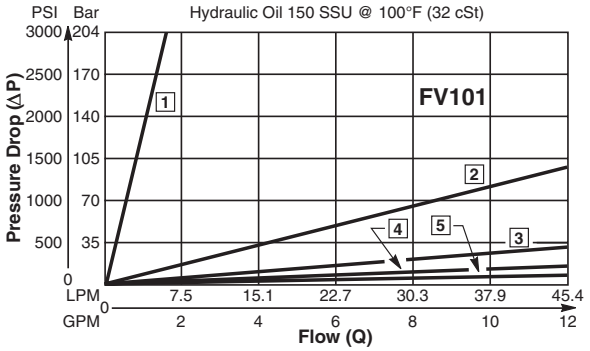
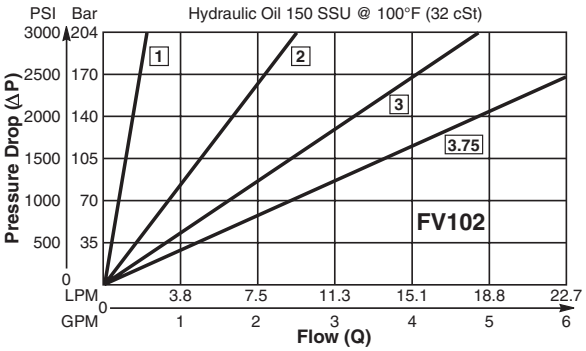
Performance Curves

Metered Flow vs. Pressure Drop (Through cartridge only)



☐ = **No. of Turns CCW From Fully Closed.**

The number on each curve indicates the number of complete turns of the knob or screw adjustment from fully closed. When the metered flow is 22.5 LPM (6 GPM) and the adjustment is two complete turns from closed, the pressure drop will be 13.8 Bar (200 PSI). When the metered flow is 22.5 LPM (6 GPM) and the adjustment is five complete turns from closed, the pressure drop will be 3.5 Bar (50 PSI).



☐ = **No. of Turns CCW From Fully Closed.**

The number on each curve indicates the number of complete turns of the knob or screw adjustment from fully closed (non-metered flow). When the metered flow is 7.5 LPM (2 GPM) and the adjustment is two complete turns from closed, the
pressure drop will be 156.9 Bar (2275 PSI). When the metered flow is 7.5 LPM (2 GPM) and the adjustment is 3.75 turns from closed, the pressure drop will be 56.6 Bar (820 PSI).

Ordering Information

FV10	☐	☐	☐
10 Size Flow Control Valve	Style	Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Style
1	**Coarse Flow**
2	Fine Flow

Code	Adjustment Style / Kit No.
K	**Knob Adjust (840208K)**
S	Screw Adjust

Code	Seals / Kit No.
Omit	**Nitrile / (SK10-2)**
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	☐
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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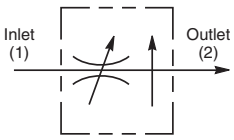
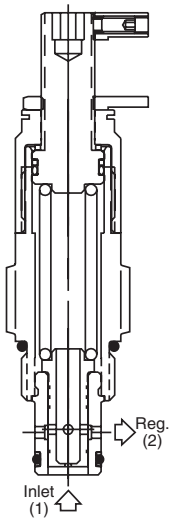
General Description

Pressure Compensated Flow Regulator Valve.
NOTE: When used with a fixed displacement pump, pressure to the cartridge must be controlled by a relief valve located between the pump and the FR101 cartridge. For additional information see Technical Tips
on pages FC1-FC4.



Adjustable Style



Features

- Hardened, precision ground parts for durability
- Cartridge design
- Acts as a fixed orifice in reverse flow condition
- All external parts zinc plated

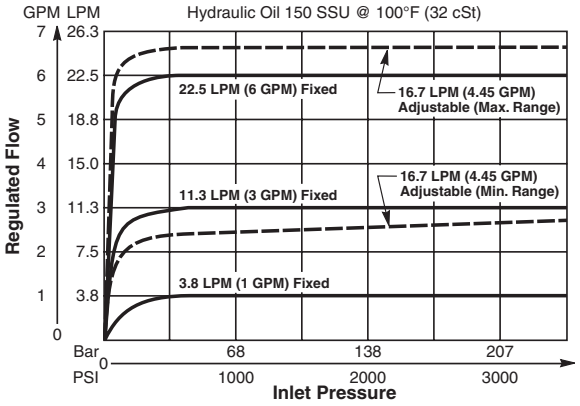
Specifications

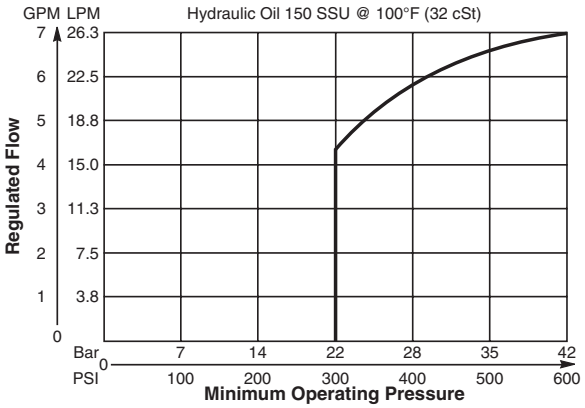
Rated Flow	**Fixed** 22.5 LPM (6 GPM) **Adjusted** 26.5 LPM (7 GPM)
Maximum Inlet Pressure	245 Bar (3500 PSI)
Accuracy (Fixed)	3.8 LPM (1 GPM) ±20% 7.5 - 11.3 LPM (2-3 GPM) ±15% 15 - 22.5 LPM (4-6 GPM) ±10%
Adjustment Range (Adj. Version)	±30% Nominal
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curves

Regulated Flow vs. Pressure

(Through cartridge only)





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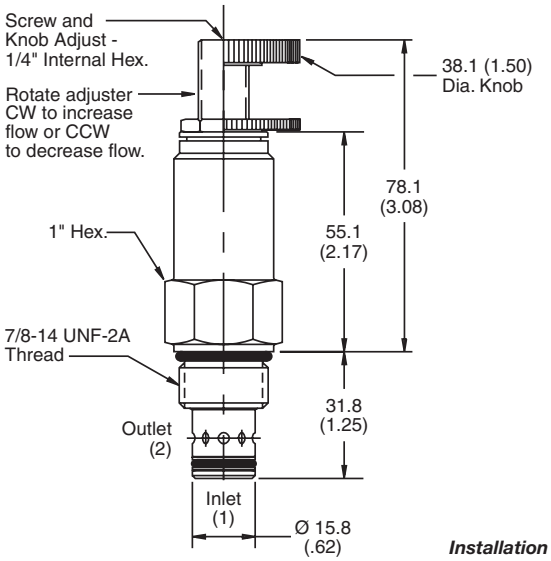
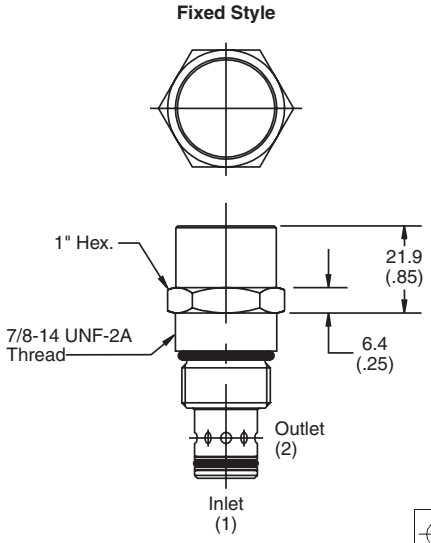
Dimensions Millimeters (Inches)





Installation Torque

Aluminum	22 Nm (16 lb. ft.)
Steel	65 Nm (48 lb. ft.)

Ordering Information

FR101			
10 Size Pressure Compensated Flow Regulator (Restrictive)	**Adjustment Style**	**Flow Setting/ Range**	**Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style
F	Fixed Style present at factory
K	**Knob Adjust**
S	**Screw Adjust**

Code	Fixed Style Flow
100	3.8 LPM (1 GPM)
200	7.5 LPM (2 GPM)
300	11.3 LPM (3 GPM)
400	15 LPM (4 GPM)
500	18.8 LPM (5 GPM)
600	22.5 LPM (6 GPM)

Code	Knob/Screw Style Flow Range
065	1.9-3.0 LPM (0.5-0.8 GPM)
095	3.0-4.5 LPM (0.8-1.2 GPM)
135	4.1-6.4 LPM (1.1-1.7 GPM)
185	6.0-8.3 LPM (1.6-2.2 GPM)
260	7.9-11.6 LPM (2.1-3.1 GPM)
375	11.3-16.9 LPM (3.0-4.5 GPM)
550	16.1-25.1 LPM (4.3-6.7 GPM)

Code	Seals / Kit No.
Omit	**Nitrile / (SK10-2)**
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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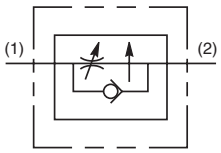
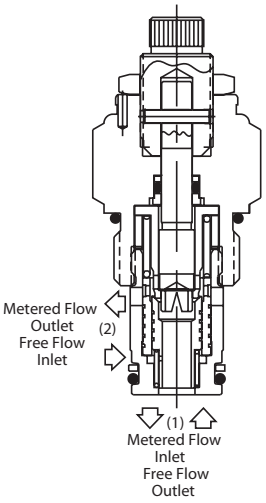
General Description

Fully Adjustable, Pressure Compensated Flow Control Valve. For additional information see Technical Tips on pages FC1-FC4.





Features

- Fully adjustable from 0.75 LPM (0.2 GPM) to 20.6 LPM (5.5 GPM)
- Hardened, precision ground parts for durability
- All external parts are zinc plated
- Compact size for reduced space requirements

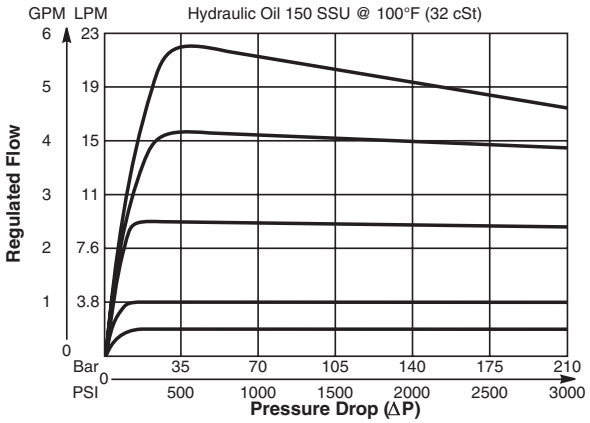
Specifications

Rated Flow	0.75 LPM (0.2 GPM) 20.6 LPM (5.5 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curves

Regulated Flow vs. Pressure Drop

(Through cartridge only)



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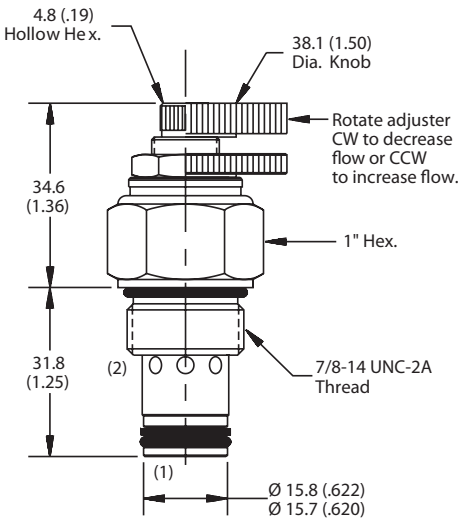
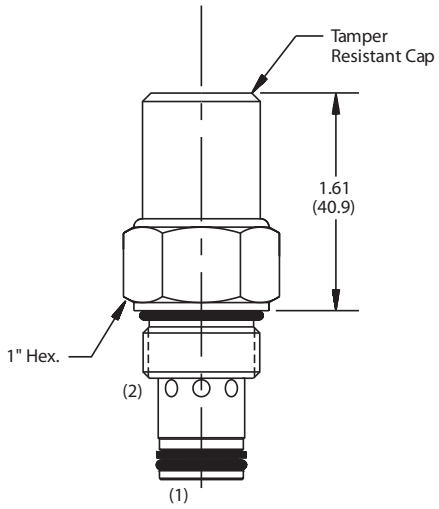
Dimensions Millimeters (Inches)





Installation Torque

Aluminum	22 Nm (16 lb. ft.)
Steel	65 Nm (48 lb. ft.)

THIRD-ANGLE PROJECTION

Ordering Information

FA101		
10 Size Pressure Compensated Flow Control Valve	Adjustment Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	Screw Adjust
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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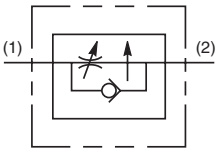
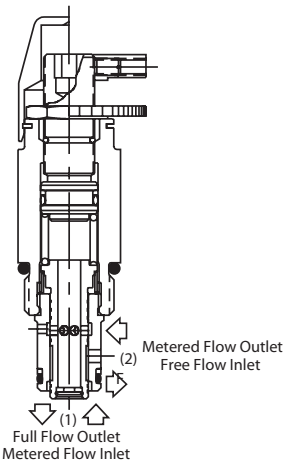
General Description

Pressure Compensated Flow Control. For additional information see Technical Tips on pages FC1-FC4.





Features

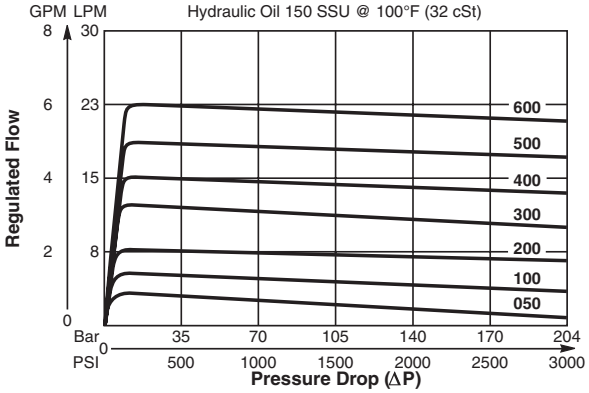
- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- Free flow in reverse condition
- All external parts zinc plated

Specifications

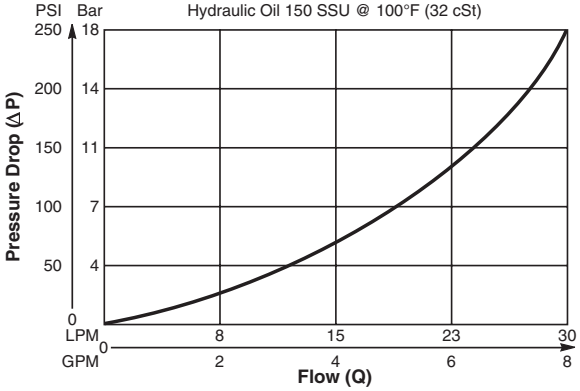
Rated Flow	56 LPM (15 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curves

Regulated Flow vs. Pressure Drop
(Through cartridge only)



Pressure Drop vs. Flow (Through cartridge only)



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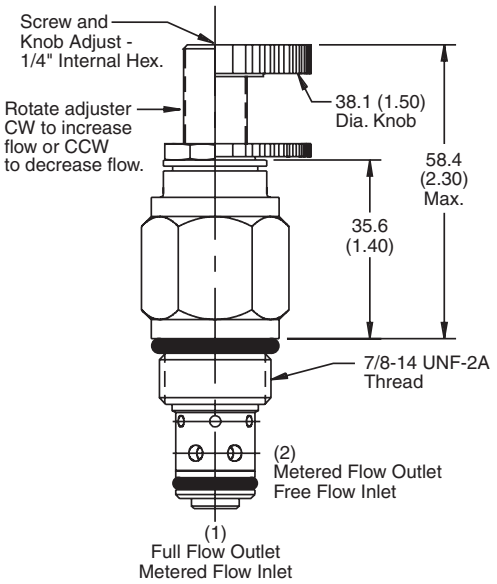
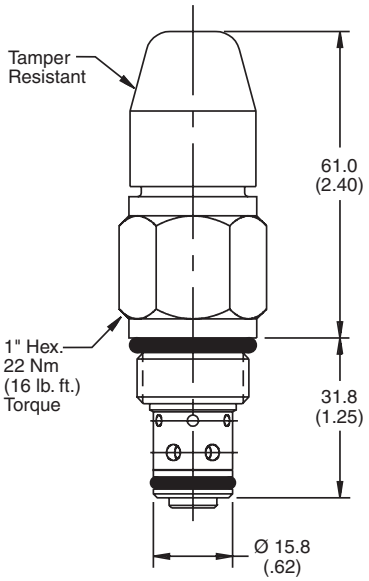
Dimensions Millimeters (Inches)





Ordering Information

FC101			
10 Size Pressure Compensated Flow Control	Adjustment Style	Flow Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (840208K)
S	Screw Adjust
T	Tamper Resistant Cap (717783)

Code	Flow Range and Standard Setting
050	1.1-3.8 LPM (.30-1.0 GPM) (1.9 LPM (.5 GPM) @ 69 Bar (1000 PSI) ΔP)
100	2.8-8.3 LPM (.75-2.2 GPM) (3.8 LPM (1 GPM) @ 69 Bar (1000 PSI) ΔP)
300	7.5-16.9 LPM (2.0-4.5 GPM) (11.3 LPM (3 GPM) @ 69 Bar (1000 PSI) ΔP)
600	15-30 LPM (4.0-8.0 GPM) (22.5 LPM (6 GPM) @ 69 Bar (1000 PSI) ΔP)

Code	Seals / Kit No.
Omit	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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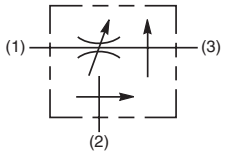
General Description

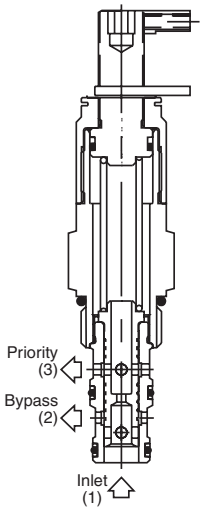
Pressure Compensated Priority Flow Regulator Valve. For additional information see Technical Tips on pages FC1-FC4.

Caution: If the priority line is blocked so that no flow can pass through the control orifice; the compensator spool will shift, blocking the bypass port and allowing inlet pressure to go to full system relief pressure. The FP101 cartridge does not provide a pressure relieving function.

Features

- Hardened, precision ground parts for durability
- Cartridge design
- Acts as a fixed orifice in reverse flow condition (Priority line only)
- All external parts zinc plated

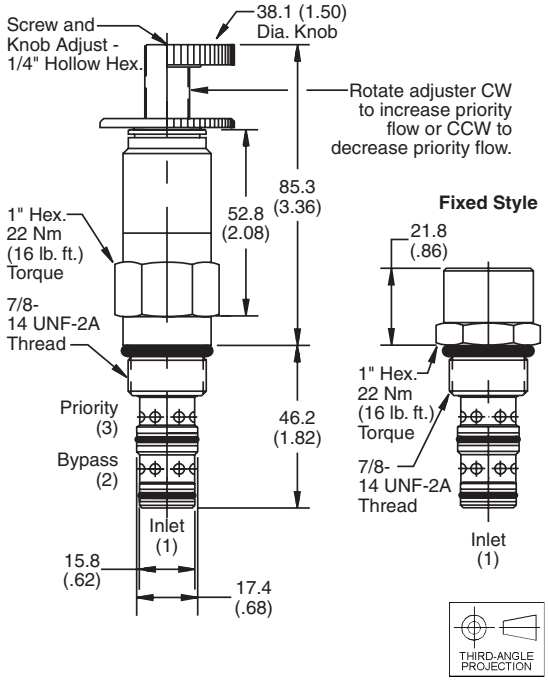




Specifications

Maximum Priority Flow	**Fixed** 30.0 LPM (8 GPM) **Adjusted** 33.8 LPM (9 GPM)
Maximum Inlet Flow	56.3 LPM (15 GPM)
Minimum Inlet Flow	See Valve Performance Curves
Maximum Inlet Pressure	245 Bar (3500 PSI)
Minimum Inlet Pressure	See Valve Performance Curves
Accuracy Fixed	±20%
Adjustment Range (Adj. Version)	±20% Nominal
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Dimensions Millimeters (Inches)



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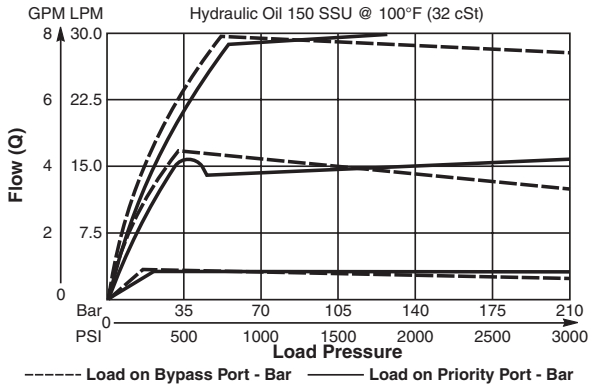
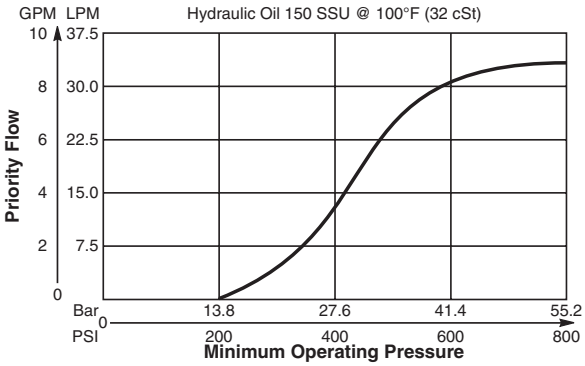
Performance Curves (Through cartridge only)

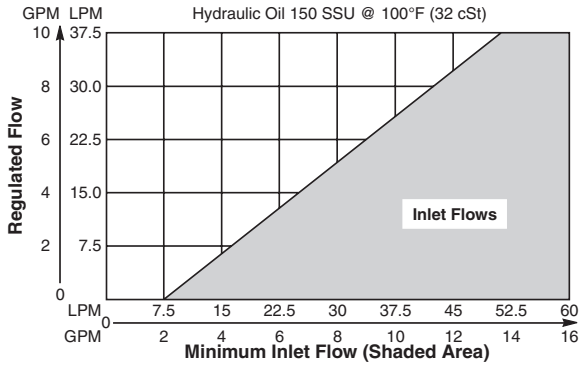
Regulated Flow vs. Load Pressure



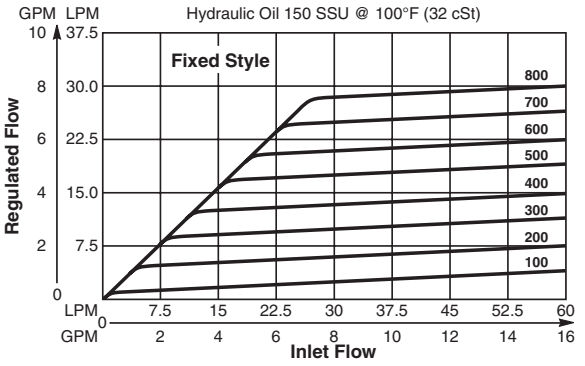
Pressure vs. Priority Flow Minimum Operating Pressure



Minimum Inlet Flow



Inlet Flow vs. Regulated Flow



Ordering Information

FP101				
10 Size Pressure Compensated Flow Regulator	Adjustment Style	Flow Setting/ Range	Seals	

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style
F	Fixed Style present at factory
K	**Knob Adjust**
S	**Screw Adjust**

Code	Fixed Style Flow
100	3.8 LPM (1 GPM)
200	7.5 LPM (2 GPM)
300	11.3 LPM (3 GPM)
400	15 LPM (4 GPM)
500	18.8 LPM (5 GPM)
600	22.5 LPM (6 GPM)
700	26.3 LPM (7 GPM)
800	30 LPM (8 GPM)

Code	Knob/Screw Style Flow Range
085	2.6-3.8 LPM (0.7-1.0 GPM)
110	3.0-5.3 LPM (0.8-1.4 GPM)
155	4.5-7.1 LPM (1.2-1.9 GPM)
220	6.4-10.1 LPM (1.7-2.7 GPM)
295	8.6-13.5 LPM (2.3-3.6 GPM)
405	11.6-18.8 LPM (3.1-5.0 GPM)
575	16.9-26.3 LPM (4.5-7.0 GPM)
780	23.6-34.9 LPM (6.3-9.3 GPM)

Code	Seals / Kit No.
Omit	**Nitrile / (SK10-3)**
V	Fluorocarbon / (SK10-3V)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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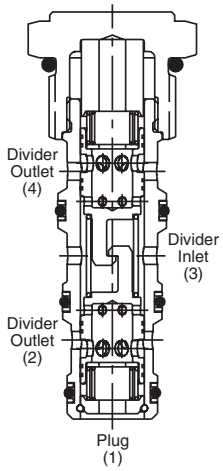
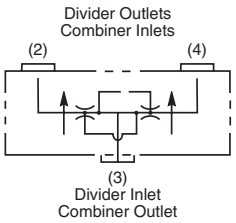
General Description

Flow Divider/Combiner Valve. FDC101 divides flow from a single source proportionally to two actuators. In
the reverse mode, flow from two sources is combined into one flow. When dividing or combining flow to synchronize two cylinders, please consider that the flow accuracy is ±10%. For additional information see Technical Tips on pages FC1-FC4.





Features

- Hardened, precision ground parts for durability
- Cartridge design
- Ratios of 50-50, 60-40 and 66-33 available
- All external parts zinc plated

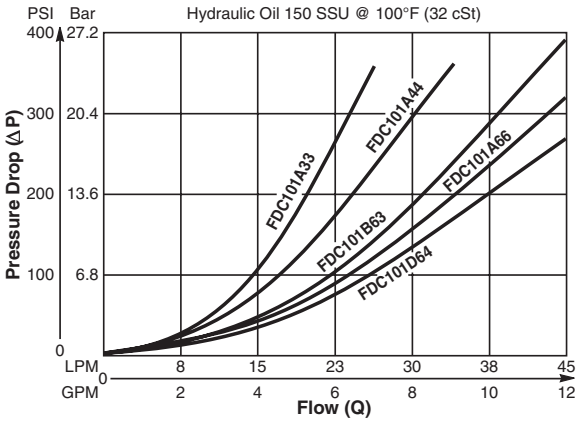
Specifications

Maximum Flow	45 LPM (12 GPM)
Maximum Inlet Pressure	245 Bar (3500 PSI)
Accuracy	±10%
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.14 kg (0.30 lbs.)
Cavity	C10-4 (See BC Section for more details)
Form Tool	Rougher NFT10-4R Finisher NFT10-2F

Note: When machining a manifold using the FDC101, use C10-4 cavity. Do not machine a port that directs flow to the nose of the cavity.

Performance Curve

Flow vs. Pressure Drop
(Through cartridge only)



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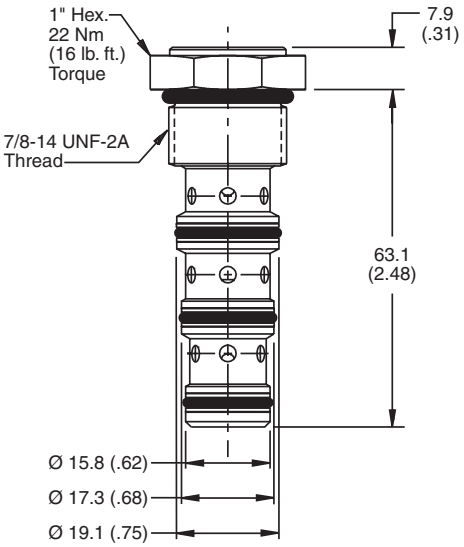
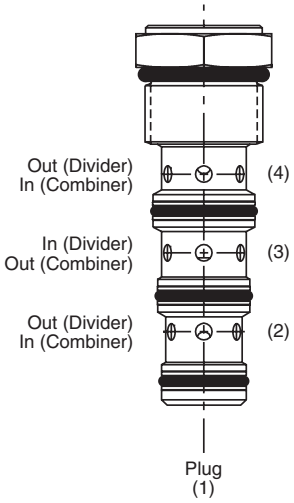
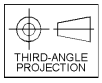
Dimensions Millimeters (Inches)







Ordering Information

FDC101		
10 Size Flow Divider/ Combiner Valve	Flow Division	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Fixed Style Flow
A11	3.80 LPM (1 GPM) min. inlet 11.3 LPM (3 GPM) max. inlet 50% '4' Port and 50% '2' Port
A33	11.3 LPM (3 GPM) min. inlet 22.5 LPM (6 GPM) max. inlet 50% '4' Port and 50% '2' Port
A44	15.0 LPM (4 GPM) min. inlet 30.0 LPM (8 GPM) max. inlet 50% '4' Port and 50% '2' Port
A66	22.5 LPM (6 GPM) min. inlet 45.0 LPM (12 GPM) max. inlet 50% '4' Port and 50% '2' Port

Code	Seals / Kit No.
Omit	Nitrile / (SK10-4)
V	Fluorocarbon / (SK10-4V)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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Contents

Pressure Control Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	Technical Tips					PC1-PC6
RELIEF VALVES			**DIRECT ACTING**			
	RDH042	C04-2	Direct Acting Relief, Poppet Type	3.8/1	350/5000	PC7-PC8
☆	RDH081	C08-2	Direct Acting Relief, Ball Type	1.9/.5	380/5500	PC9-PC10
☆	RDH082	C08-2	Direct Acting Relief, Poppet Type	30/8	380/5500	PC11-PC12
☆	RDH101	C10-2	Direct Acting Relief, Ball Type	1.9/.5	380/5500	PC13-PC14
☆	RD102	C10-2	Direct Acting Relief, Poppet Type	38/10	250/3600	PC15-PC16
			DIFFERENTIAL AREA			
	RDH083	C08-2	Direct Acting Differential Area Relief	45/12	350/5000	PC17-PC18
☆	RDH103	C10-2	Direct Acting Differential Area Relief	75/20	350/5000	PC19-PC20
	RD163	C16-2	Direct Acting Differential Area Relief	151/40	210/3000	PC21-PC22
			PILOT OPERATED			
☆	RAH081	C08-2	Pilot Operated Spool Type	75.8/20	350/5000	PC23-PC24
☆	RAH101	C10-2	Pilot Operated Spool Type	113/30	350/5000	PC25-PC26
	RAH121	C12-2	Pilot Operated Spool Type	190/50	350/5000	PC27-PC28
☆	RAH161 ***(NEW)***	C16-2	Pilot Operated Spool Type	303/80	380/5500	PC29-PC30
	RAH201	C20-2	Pilot Operated Spool Type	379/100	350/5000	PC31-PC32
			VENTABLE			
☆	RAH101V	C10-3	Pilot Operated Vented Relief	68/18	380/5500	PC33-PC34
			CROSS-OVER			
	XR101	C10-2	Direct Acting Cross-over Relief	61/16	245/3500	PC35-PC36
			UNLOADING			
☆	RU104 ***(NEW)***	C10-4	Direct Acting Unloading	1/0.25	250/3600	PC37-PC38
	RU101	C10-3	Direct Acting Unloading	3.75/1	210/3000	PC39-PC40
SEQUENCE VALVES			**PILOT OPERATED**			
☆	SVH081	C08-3	Pilot Operated, Int. Pilot, Ext. Drain	45/12	350/5000	PC41-PC42
☆	SVH101	C10-3	Pilot Operated, Int. Pilot, Ext. Drain	56.3/15	350/5000	PC43-PC44
	SVH161	C16-3	Pilot Operated, Int. Pilot, Ext. Drain	151.6/40	350/5000	PC45-PC46
☆	SVH102	C10-3	Pilot Operated, Ext. Pilot, Int. Drain	56.3/15	350/5000	PC47-PC48
	SVH162	C16-3	Pilot Operated, Ext. Pilot, Int. Drain	151.6/40	350/5000	PC49-PC50

☆ Denotes Winner's Circle product line.

WINNER'S CIRCLE

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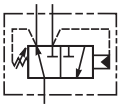
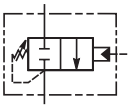
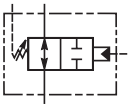
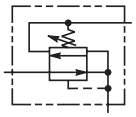
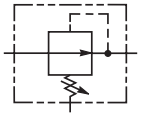
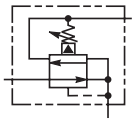
Contents

Pressure Control Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
SEQUENCE VALVES	**DIRECT ACTING**					
	☆ SV103	C10-3	Direct Acting, 2P-3W, Int. Pilot, Ext. Drain	56/15	250/3600	PC51-PC52
	☆ SV105	C10-3	Direct Acting, 2P-2W, NC, Ext. Pilot, Int. Drain	38/10	250/3600	PC53-PC54
	☆ SV104	C10-4	Direct Acting, 2P-2W, NO, Ext. Pilot, Ext. Drain	30/8	250/3600	PC55-PC56
REDUCING VALVES	**DIRECT ACTING**					
	☆ PR103	C10-3	Direct Acting Reducing/Relieving	56/15	210/3000	PC57-PC58
	PILOT OPERATED					
	☆ PRH082	C08-3	Pilot Operated Reducing	30/8	350/5000	PC59-PC60
	☆ PRH102	C10-3	Pilot Operated Reducing	56.3/15	350/5000	PC61-PC62
	PRH122	C12-3	Pilot Operated Reducing	113.7/30	350/5000	PC63-PC64
	PRH162	C16-3	Pilot Operated Reducing	150/40	350/5000	PC65-PC66
	☆ PRH081	C08-3	Pilot Operated Reducing/Relieving	30/8	350/5000	PC67-PC68
	☆ PRH101	C10-3	Pilot Operated Reducing/Relieving	56.3/15	350/5000	PC69-PC70
	PRH121	C12-3	Pilot Operated Reducing/Relieving	113.7/30	350/5000	PC71-PC72
	☆ PRH161 ***(NEW)***	C16-3	Pilot Operated Reducing/Relieving	150/40	350/5000	PC73-PC74

☆ ***Denotes Winner's Circle product line.***

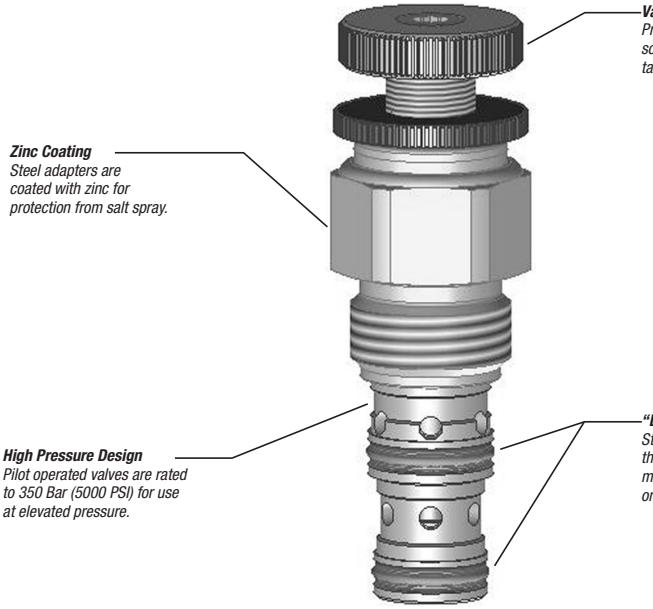
INTRODUCTION

This technical tips section is designed to help familiarize you with the Parker line of Pressure Controls. In this section we highlight new products to this catalog as well as some design features of our pressure control line. In addition we present common options available to help you in selecting products for your application. Finally we give a brief synopsis of the operation and applications of the various product offered in this section.

NEW PRODUCTS

There are several new additions and product improvements to our Pressure Controls product line.

Here are just some of the design features and advantages to the "Winner's Circle" product line.

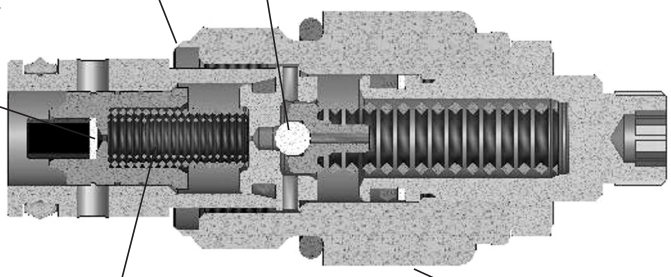


Variety of Adjustments
Pressure controls are offered in screw adjust, knob adjust and tamper resistant configurations.

Zinc Coating
Steel adapters are coated with zinc for protection from salt spray.

High Pressure Design
Pilot operated valves are rated to 350 Bar (5000 PSI) for use at elevated pressure.

"D"-Ring
Standard 4301 Polyurethane Seal eliminates the need for backup rings providing easier manifold installation. (For more information on "D"-Ring see Technical Data Section)



Crimp Design
Fold over crimp provides secure holding and eliminates the need for adhesive.

Guided Pilot
Pilot is fully guided providing a more consistent reseat.

Internal Screen
A small internal screen protects the pilot orifice and spring chamber from debris.

High Rate Bias Spring
Pilot operated reducing and sequence valves are designed with a high rate bias spring pressure, enhancing stability.

Low Profile Adapter
The low profile shape of the pilot operated pressure controls reduces the manifold clearance required.

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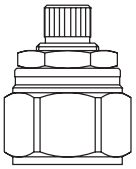
COMMON OPTIONS

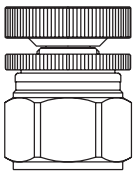
As you will see, Parker offers a variety of Pressure Control products. As such, some of the options mentioned below may not be available on all valves. Consult the model coding and dimensions for each valve for specifics. Here are some of the common options available.

Adjustment Types: Parker offers three primary types of adjustments for most of the pressure control products. Samples of these types are shown below. Please note all options may not be available for all valves. Consult the individual catalog pages for more details.

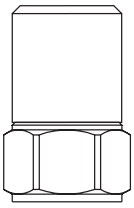
Screw Adjustment - Valve can be adjusted with an allen wrench. Lock nut included to maintain desired setting after adjustment. This is the most common adjustment option available on most Parker products.



Knob Adjustment - An aluminum knob is added to the standard screw adjustment. A lock knob is provided to help maintain the desired setting after adjustment. Parker offers knob conversion kits for most pressure control valves. For kit numbers consult individual valve pages.



Tamper Resistant - The tamper resistant option is a screw adjustable valve with a steel cap installed to conceal the adjustment. The cap is designed so that the internal edges clamp into the groove of the valve adapter. Once the cap is installed, it cannot be removed without damaging the cap and the valve. When a valve is ordered with the tamper resistant option, it will be preset at the factory, and the cap will be included in a separate plastic bag to allow for fine tuning at the customer site. Parker offers tamper resistant cap conversion kits for most pressure control valves. For kit numbers consult individual valve pages.



Seals: The Winner's Circle products feature a standard 4301 Polyurethane "D"-Ring. The "D"-Ring eliminates the need for backup rings. The majority of the products are available in Nitrile or Fluorocarbon Seals. You should match the seal compatibility to the temperature and fluid being used in your application.

Pressure Range: Parker offers a range of spring settings for the Pressure Control product line. You want to choose the setting that best meets the operating range. The model callout is equivalent to the maximum setting (in psi) of the spring divided by 100 (i.e. 50 = 5000 psi).

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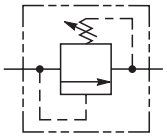
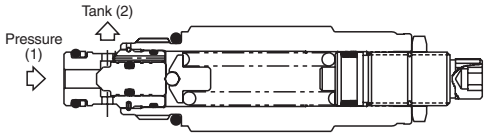
PRODUCT TYPES / APPLICATIONS

Direct Acting Relief Valves

Direct acting relief valves are designed for fast response in intermittent duty applications. They are often used as an economical solution to clip pressure spikes. The poppet design allows for low leakage.

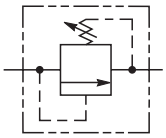


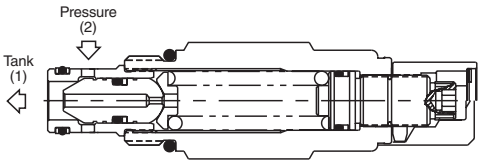


OPERATION - The valve poppet is held against the seat by the spring force. Inlet pressure on the nose (port 1) of the poppet acts against the spring force to unseat the poppet at the valve setting and allow flow to pass to tank. Since the pressure is working directly on the spring, this valve is very fast responding. It is not the best choice for system pressure regulation as it is slightly noisier than pilot operated relief valves and has higher pressure rise.
Note: Any backpressure on port 2 would be additive to the spring setting.

Differential Area Relief Valves

Differential area relief valves also are also best suited for intermittent applications where fast response is critical. These valves are often used as cross-over relief valves to chop pressure spikes. Due to their design, they generally can handle a larger flow rate and have a lower pressure rise than the standard directing acting relief. The poppet design allows for low leakage.

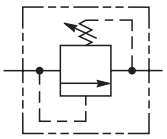


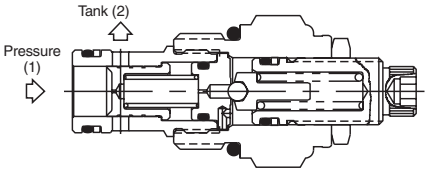


OPERATION - Pressure on the inlet (port 2) of the valve acts on the differential area of the poppet (difference between the O.D. of the poppet and the seat diameter) to produce a force which is opposed by the spring force. When pressure reaches the valve setting, the poppet is pushed off its seat, permitting flow to tank.
Note: Any backpressure on port 1 would be additive to the spring setting.

Pilot Operated Relief

Pilot operated relief valves are designed for continuous duty applications. Due to their stability and low pressure rise, the pilot operated relief is the best option for setting the pressure of a hydraulic system.





OPERATION - When inlet pressure at the nose (port 1) exceeds the valve setting, the pilot ball unseats. The pilot flow creates a pressure imbalance across the main spool causing the spool to move and allowing flow from inlet (port) 1 to tank (port 2.) *Note:* Any backpressure on port 2 would be additive to the spring setting.

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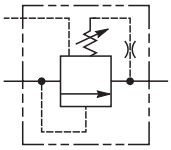
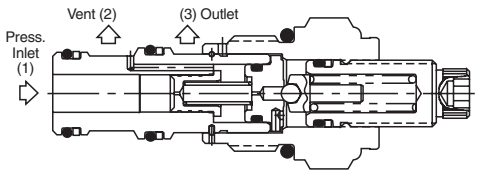
Ventable Pilot Operated Relief

Ventable relief valves are a unique type of pilot operated relief. With this valve, you can control the pressure setting with the internal adjustment as well as via remote circuit. These valves are ideal in cirucits where multiple pressures are needed.

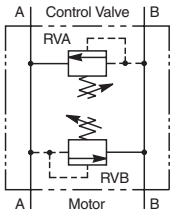


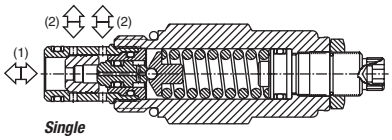


OPERATION - This valve can be controlled by the adjustment setting on the valve, or a remote circuit via the vent line. When the vent line is used, the smaller of the two pressure settings will determine the valve setting. In other words, if the pressure setting of the remote circuit is less than the adjusted setting, then the valve will relieve at the remote setting. If the pressure setting of the remote circuit is greater than the adjusted setting, then the valve will relieve at the adjusted setting. With the vent port (port 2) blocked, the valve operates like a standard pilot operated relief valve. Thus, a solenoid valve could be used on the vent port to select control between this valve another remote valve.

Dual Crossover Relief Valves

Dual crossover relief valves provide pressure surge protection for double acting hydraulic actuators. For best results, you always want to install the valve as close to the actuator as possible.
The dual crossover feature can be achieved in two different methods. One way is to manifold two Differential Area Relief Valves into a single body.





Single Cartridge Style

The advantage gained is higher flows can be pushed through this arrangement. The second method is to combine this dual function into a single cartridge. The single cartridge arrangement reduces cost considerably of the total package. In addition, a standard common cavity line body can be used instead of a special two body arrangement. The operation for the single cartridge style is shown below.

OPERATION - Pressure at port 1 acts on the spool to produce a force which is opposed by the spring setting. When pressure reaches the valve setting, the spool and poppet move relieving flow from port 1 to port 2. When port 2 is pressurized, the pressure acts on the differential area poppet to produce a force which is opposed by the spring force. When the pressure reaches the valve setting, the poppet is pushed off of its seat, relieving flow from port 2 to port 1. *Note:* Due to the construction and flow paths through the valve, the relief pressure settings may vary by approximately 300 psi from one direction to the other.

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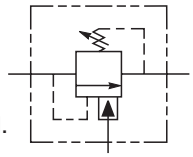
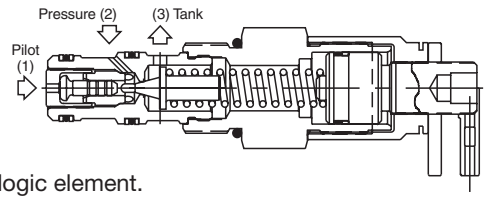
Differential Area Unloading Relief Valve

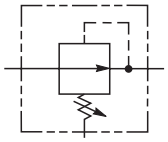


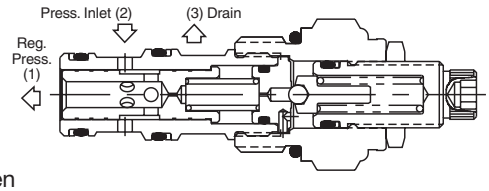


Unloading valves are differential area relief valves that can also be fully dumped or unloaded via a remote signal. They are best suited for low flow accumulator unloading circuits. They provide a fixed percentage between load and unload pressures. This pilot valve would generally be used in conjunction with a logic element.

OPERATION - The fixed differential is provided by the pilot piston which has greater area than the dart seat. With its greater area, the piston is able to hold the dart off its seat, permitting flow from pressure to tank, until pressure on the pilot piston falls below the fixed percentage of the valve settings.

Pilot Operated Reducing Valve





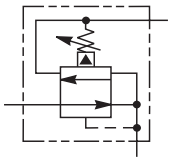
Pilot operated pressure reducing valves can be used to reduce the pressure in a leg of the circuit lower than system pressure. Thus, they can be used to provide protection to downstream components from higher pressures.

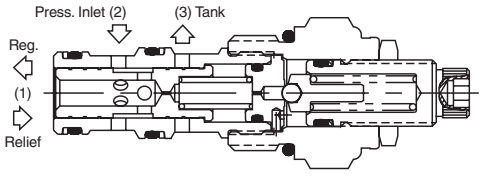
OPERATION - The pilot section controls the valve setting when reducing. As pressure at the regulated port exceeds the valve setting, the pilot ball is unseated. The pilot flow creates a pressure imbalance across the main spool causing the spool to throttle in order to maintain constant downstream pressure. The normally open design will allow flow to pass from inlet to reduced port with the only restriction being the pressure drop.

Pressure Reducing / Relieving Valves

Pressure reducing / relieving valves can be used to reduce the pressure in a leg of the circuit lower than system pressure. The valve also acts as a relief valve, relieving any shocks or surges that occur between the regulated port and the actuator. When the valve is in the relieving mode, the inlet port is blocked. Parker offers pressure reducing/relieving valves in both pilot operated and directing acting styles. The direct acting version is generally used in static applications where response is critical, or leakage is a concern.

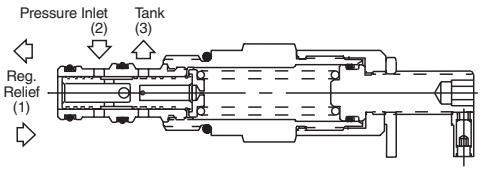
Pilot Operated





OPERATION - The pilot section controls the valve setting when reducing. As pressure at the regulated port exceeds the valve setting, the pilot ball is unseated. The pilot flow creates a pressure imbalance across the main spool causing the spool to throttle in order to maintain constant downstream pressure. A shock or surge at the regulated port shifts the spool, relieving flow to tank.

Direct Acting



OPERATION - As pressure at the regulated port exceeds the valve setting, the valve throttles or closes in order to maintain constant downstream pressure. A shock or surge at the regulated port further shifts the spool, relieving flow to tank. This valve is not intended for rapidly changing flows which could lead to instability.

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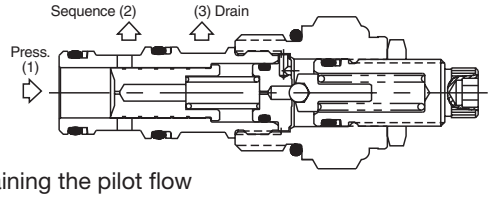
Pilot Operated Sequence Valves

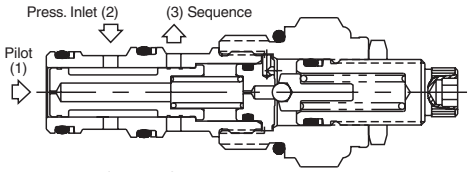
Sequence valves are used to control the sequence of operation of two or more hydraulic actuators. The sequence valve pressure is set higher than the first actuator operation pressure. Once the first actuator has completed its cycle, the sequence valve opens allowing the second actuator to move. Parker's line of pilot operated sequence valves include a series of internally piloted, externally drained valves and a series of externally piloted, internally vented valves. Parker also offers a line of direct acting sequence valves which are ideal for piloting logic elements in steady state applications.

P.O. Sequence (Internally Piloted, Externally Drained)



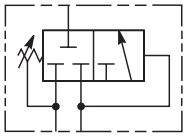
OPERATION - For this valve, the pilot pressure is sensed from the inlet of the valve (port 1). When the pilot pressure exceeds the valve setting, the pilot section opens creating a pressure imbalance across the main spool. This causes the spool to move allowing the flow to pass from the nose of the cartridge (port 1) to the actuator port (port 2). By externally draining the pilot flow directly to tank (port 3), the valve is insensitive to back pressure at the sequence port.

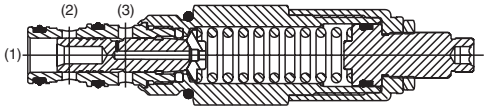
P.O. Sequence (Externally Piloted, Internally Vented)



OPERATION - For this valve, the pilot pressure is obtained from an external source and not from the pressure port. When the external pilot pressure (port 1) exceeds the valve setting, the pilot section opens creating a pressure imbalance across the main spool. This causes the spool to move allowing the flow to pass from the side of the cartridge (port 2) to the actuator port (port 3). Any pressure at port 3 is additive to the pressure setting. It is most common for port 3 to be connected to tank.

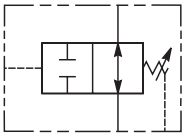
D.A. Sequence (Internally Piloted, Externally Drained)

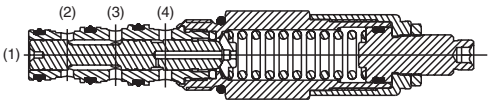




OPERATION - In the steady state condition, all three ports are blocked with the spring chamber drained to port 3. When the pressure at port 1 exceeds the valve setting, the spool moves allowing flow from the nose of the cartridge (port 1) to the actuator port (port 2). By externally draining the spring chamber directly to tank (port 3), the valve is insensitive to back pressure at the sequence port.

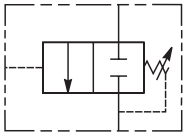
D.A. Sequence, N.O. (Externally Piloted, Externally Drained)

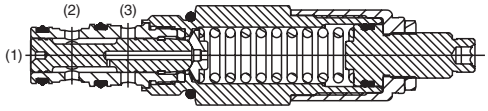




OPERATION - With no pressure at the pilot port (port 1), bi-directional flow is allowed between port 3 and port 2. When the pilot pressure at port 1 exceeds the valve setting the spool moves blocking both port 3 and port 2. By externally draining the spring chamber to tank (port 4), the valve is insensitive to back pressure at the sequencing ports.

D.A. Sequence, N.C. (Externally Piloted)





OPERATION - With no pressure at the pilot port (port 1), both port 3 and port 2 are blocked. When the pilot pressure at port 1 exceeds the valve setting, the spool moves opening a path and allowing flow from port 3 to port 2. This valve internally drains the spring chamber to tank via the sequencing port, thus any backpressure on port 2 would be additive to the spring setting.

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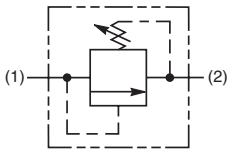
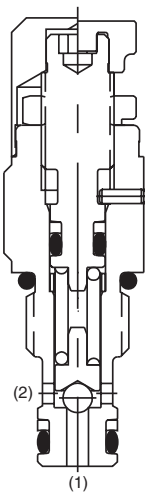
General Description

Direct Acting Ball-Type Relief Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- Low leakage design
- Fast response
- All external parts zinc plated





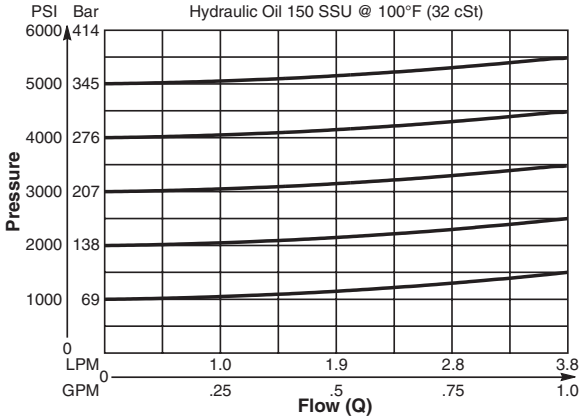
Specifications

Rated Flow	3.8 LPM (1 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**30** 105 Bar (1522 PSI) **50** 118 Bar (1710 PSI)
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	10 drops/min. (.66 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.03 kg (0.07 lbs.)
Cavity	C04-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT04-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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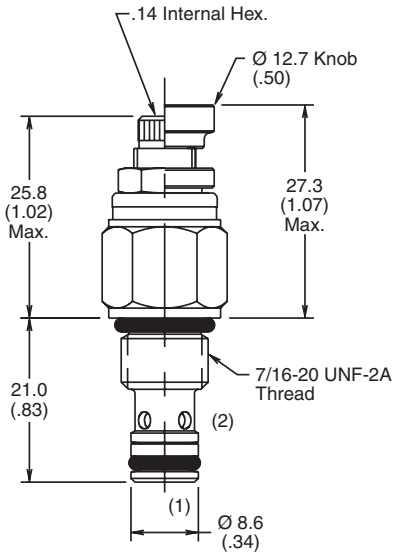
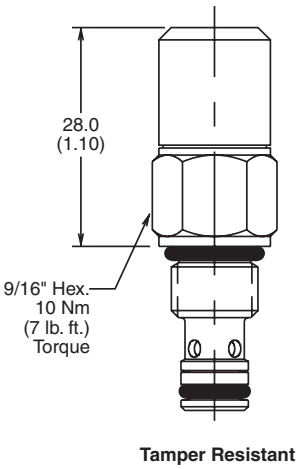
Dimensions Millimeters (Inches)





Tamper Resistant

THIRD-ANGLE PROJECTION

Ordering Information

RDH042			
04 Size Direct Acting Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (852544)
S	**Screw Adjust**
T	Tamper Resistant Cap (852519)

Code	Seals / Kit No.
Omit	**Nitrile / (SK04-2)**
V	Fluorocarbon / (SK04-2V)

Code	Pressure Range
30	**6.9 - 207 Bar (100 - 3000 PSI) Standard Setting: 103 Bar (1500 PSI) @ 1.9 LPM (.5 GPM)**
50*	**103 - 345 Bar (1500 - 5000 PSI) Standard Setting: 172 Bar (2500 PSI) @ 1.9 LPM (.5 GPM)**

**** If using 50 Pressure Range, Steel Body is required.***

Order Bodies Separately
See section BC

B04	–	2	–	
04 size		2-Way Cavity		Port Size

Code	Porting / Body Material
4T	SAE-4 / Steel (5000 PSI)
A4T	SAE-4 / Aluminium (3000 PSI)

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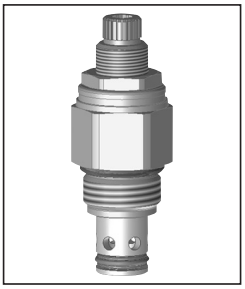
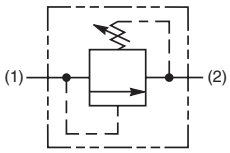
General Description

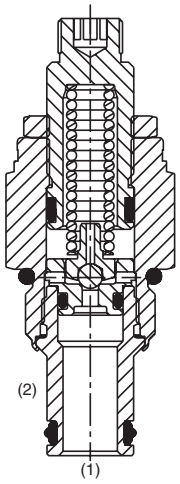
Direct Acting Relief Valve.
This valve is designed for pilot flow circuits.
For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided pilot for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis







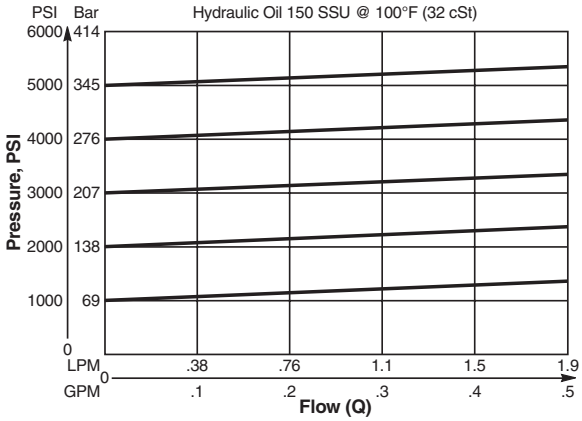
Specifications

Rated Flow	1.9 LPM (0.5 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.09 kg (0.20 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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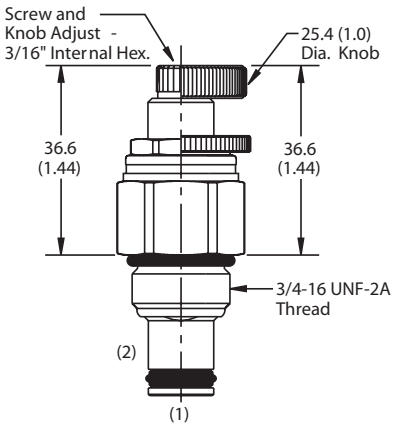
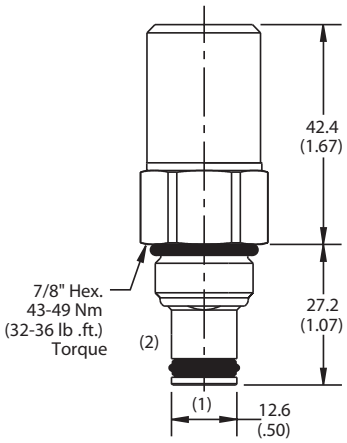
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RDH081			
08 Size Direct Acting Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile / (SK08-2N)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08	–	2	–	
04 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

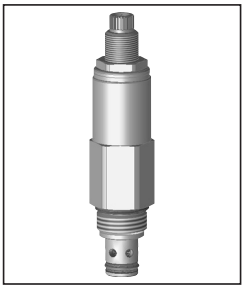
Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ crack pressure, approximately 100 cc/min (6.1 in³/min)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ crack pressure, approximately 100 cc/min (6.1 in³/min)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure, approximately 100 cc/min (6.1 in³/min)**

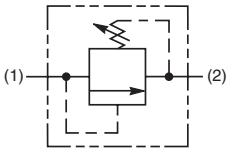
General Description

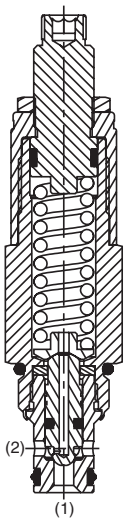
Direct Acting Poppet-Type Relief Valve.
For additional information see
Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Fast response
- Spherical poppets for low leakage
- Internal mechanical stop limits poppet travel eliminating spring solidification
- All external parts zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis







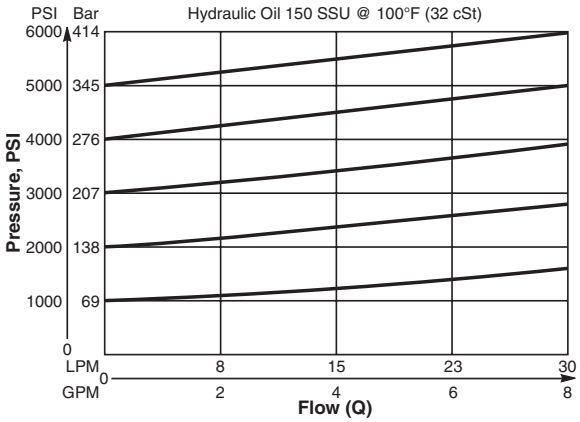
Specifications

Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**15** 19.3 Bar (280 PSI) **30** 35 Bar (508 PSI) **50** 54 Bar (787 PSI
Reseat Pressure	85% of crack pressure
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.18 kg (0.40 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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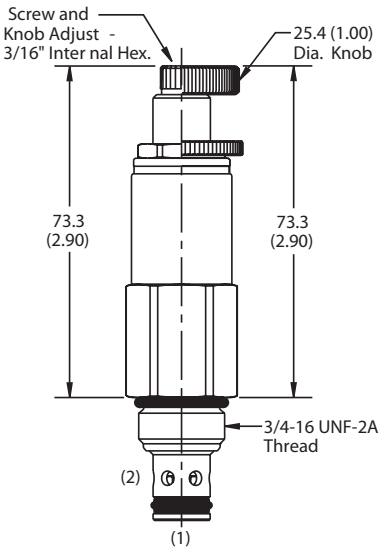
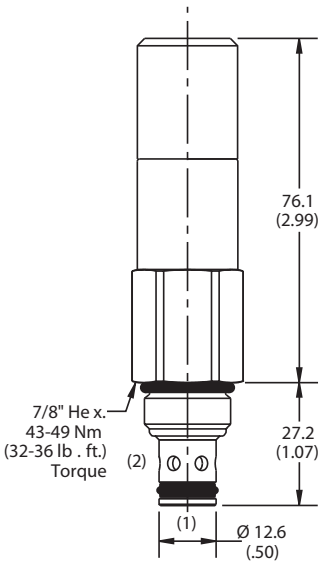
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RDH082			
08 Size Direct Acting Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile / (SK08-2)
V	Fluorocarbon / (SK08-2V)

Code	Pressure Range
15	6.9 - 103 Bar (100 - 1500 PSI) Standard Setting: 51.7 Bar (750 PSI) @ crack pressure approximately .95 LPM (.25 GPM)
30	**17.2 - 207 Bar (250 - 3000 PSI) Standard Setting: 103 Bar (1500 PSI) @ crack pressure approximately .95 LPM (.25 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure approximately .95 LPM (.25 GPM)**

Order Bodies Separately
See section BC

B08	–	2	–	
04 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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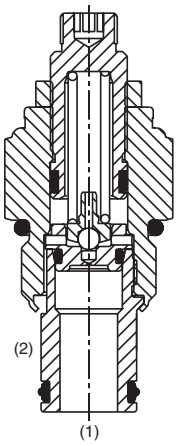
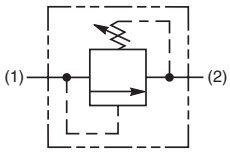
General Description

Direct Acting Relief Valve. This valve is designed for pilot flow circuits. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis





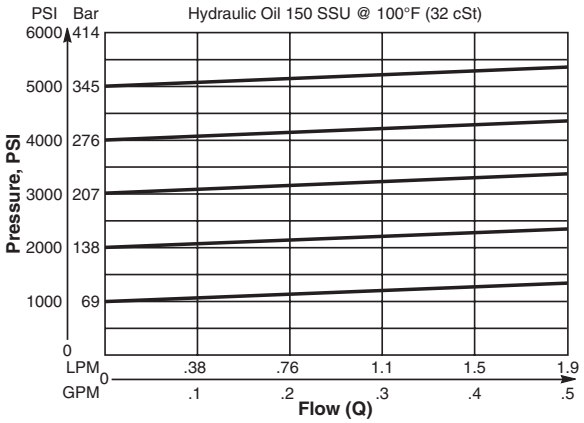
Specifications

Rated Flow	1.9 LPM (0.5 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.18 kg (0.40 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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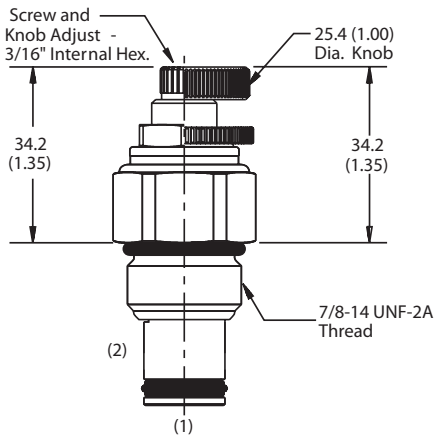
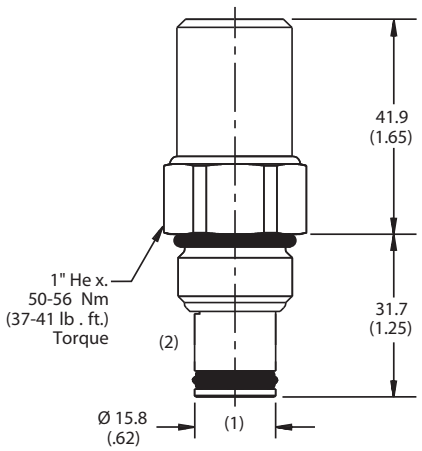
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RDH101			
10 Size Direct Acting Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ crack pressure, approximately 100 cc/min (6.1 in^3/min)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ crack pressure, approximately 100 cc/min (6.1 in^3/min))**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure, approximately 100 cc/min (6.1 in^3/min)**

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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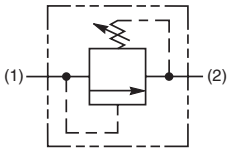
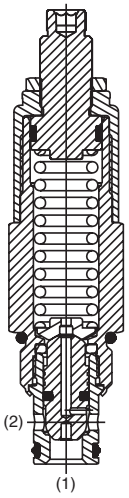
General Description

Direct Acting Poppet-Type Relief Valve.
For additional information see
Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Internal mechanical stop limits poppet travel eliminating spring solidification
- Spherical poppets for low leakage
- "D"-Ring eliminates backup rings
- All external parts zinc plated
- Fast response





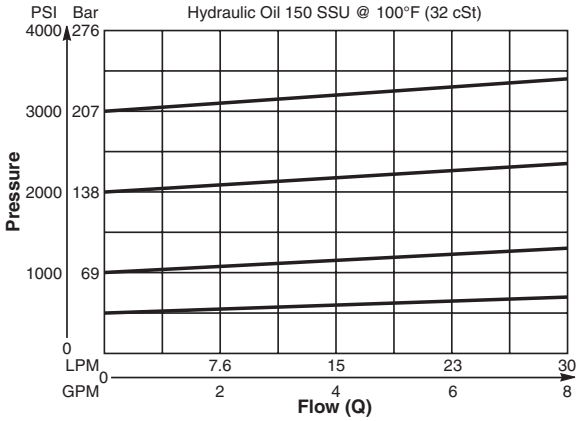
Specifications

Rated Flow	38 LPM (10 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Maximum Pressure Setting	210 Bar (3000 PSI)
Sensitivity: Pressure/Turn	**03** 2.7 Bar (39 PSI) **09** 7.2 Bar (104 PSI) **18** 16 Bar (234 PSI) **30** 103.4 Bar (1500 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Reseat Pressure	85% of crack pressure
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.5 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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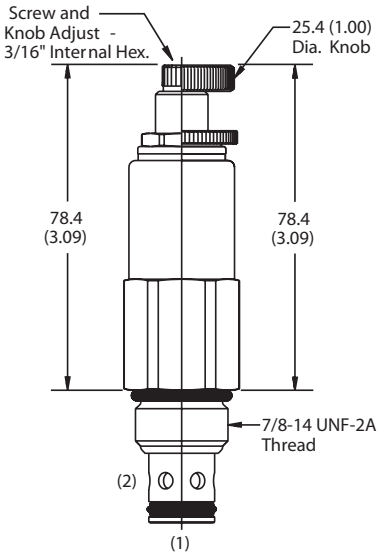
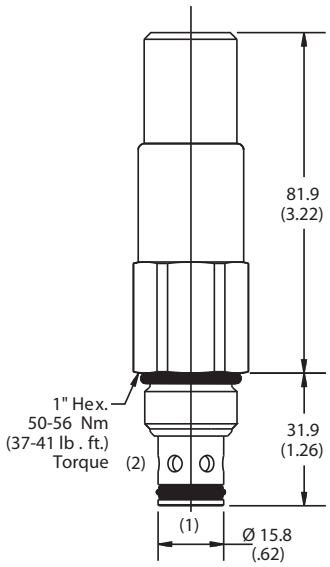
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RD102			
10 Size Direct Acting Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Code	Pressure Range
03	3.5 - 20.7 Bar (50 - 300 PSI) Standard Setting: 10.3 Bar (150 PSI) @ .95 LPM (.25 GPM)
09	7 - 62 Bar (100 - 900 PSI) Standard Setting: 31.0 Bar (450 PSI) @ .95 LPM (.25 GPM)
18	13.8 - 124 Bar (200 - 1800 PSI) Standard Setting: 62.1 Bar (900 PSI) @ .95 LPM (.25 GPM)
30	**41.4 - 207 Bar (600 - 3000 PSI) Standard Setting: 103.4 Bar (1500 PSI) @ .95 LPM (.25 GPM)**

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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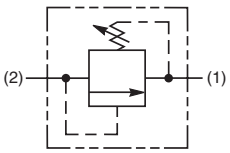
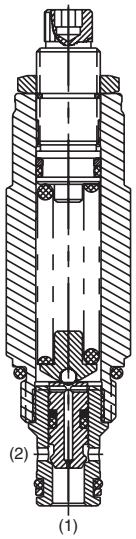
General Description

Differential Area Relief Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Spherical poppets for low leakage
- High flow capacity
- Internal mechanical stop limits poppet travel eliminating spring solidification
- All external parts zinc plated





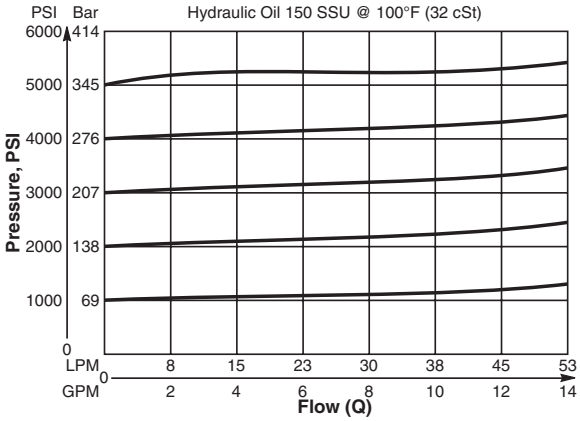
Specifications

Rated Flow	45 LPM (12 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**15** 15 Bar (218 PSI) **30** 27 Bar (396 PSI) **50** 42 Bar (614 PSI)
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	75% of crack pressure
Leakage at 150 SSU (32 cSt)	10 drops/min. (.67 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.19 kg (0.43 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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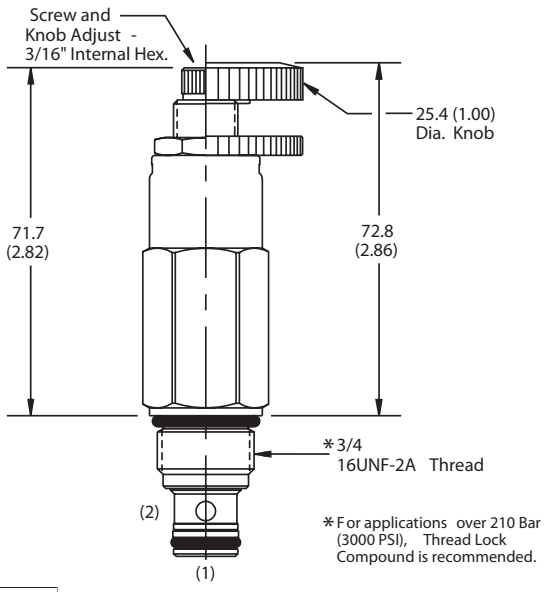
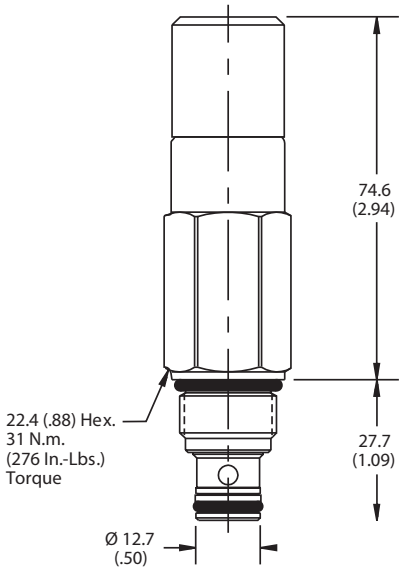
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Screw/Knob Version



Tamper Resistant Version

Ordering Information

RDH083			
08 Size Differential Area Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**Nitrile / (SK08-2)**
V	Fluorocarbon / (SK08-2V)

Code	Pressure Range
15	6.9 - 103 Bar (100 - 1500 PSI) Standard Setting: 51.7 Bar (750 PSI) @ crack pressure approximately .95 LPM (.25 GPM)
30	**69 - 207 Bar (1000 - 3000 PSI) Standard Setting: 103 Bar (1500 PSI) @ crack pressure approximately .95 LPM (.25 GPM)**
50	**138 - 345 Bar (2000 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure approximately .95 LPM (.25 GPM)**

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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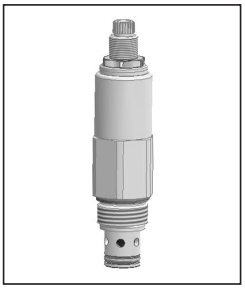
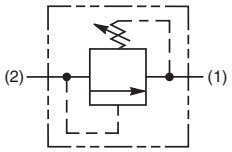
General Description

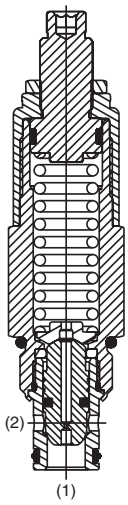
Differential Area Relief Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Internal mechanical stop limits poppet travel eliminating spring solidification
- Spherical poppets for low leakage
- "D"-Ring eliminates backup rings
- All external parts zinc plated
- High flow capacity







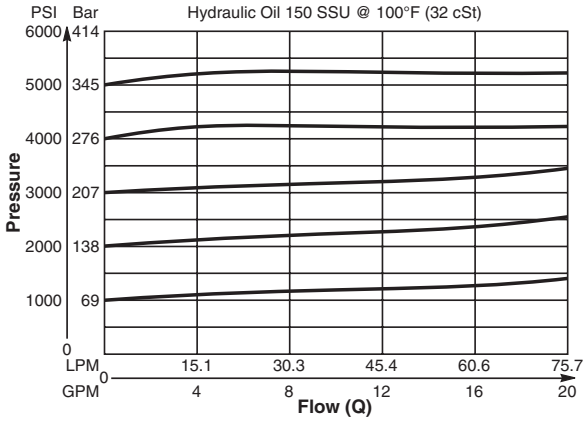
Specifications

Rated Flow	75 LPM (20 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 9.8 Bar (143 PSI) **30** 25.8 Bar (375 PSI) **50** 40.6 Bar (589 PSI
Reseat Pressure	85% of crack pressure
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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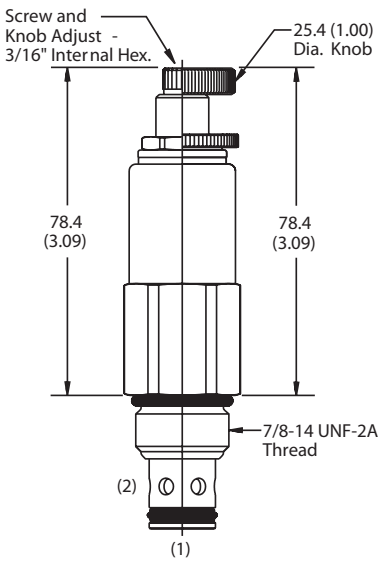
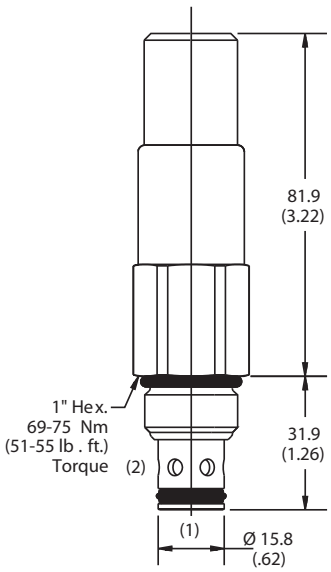
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RDH103			
10 Size Differential Area Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ .95 LPM (.25 GPM)**
30	**34.5 - 207 Bar (500 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ .95 LPM (.25 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ .95 LPM (.25 GPM)**

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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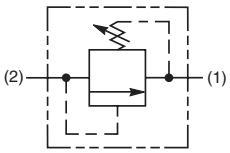
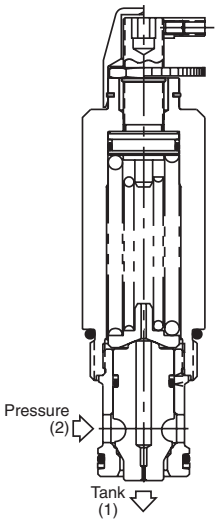
General Description

Differential Area Relief Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- Low leakage design
- Fast response
- All external parts zinc plated





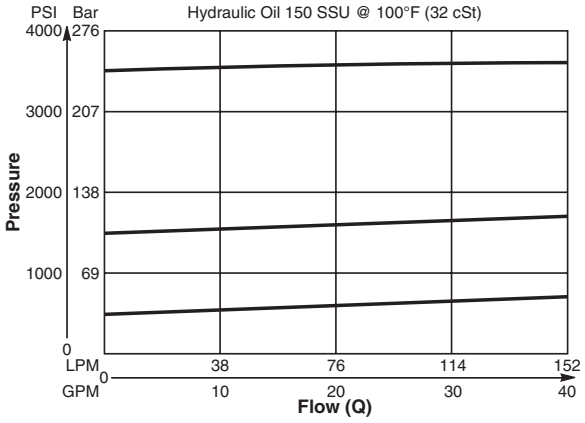
Specifications

Rated Flow	151 LPM (40 GPM)
Maximum Inlet Pressure	240 Bar (3000 PSI)
Maximum Pressure Setting	210 Bar (3000 PSI)
Sensitivity: Pressure/Turn	**10** 7 Bar (104 PSI) **30** 14 Bar (204 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	10 drops/min. (.66 cc/min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C16-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT16-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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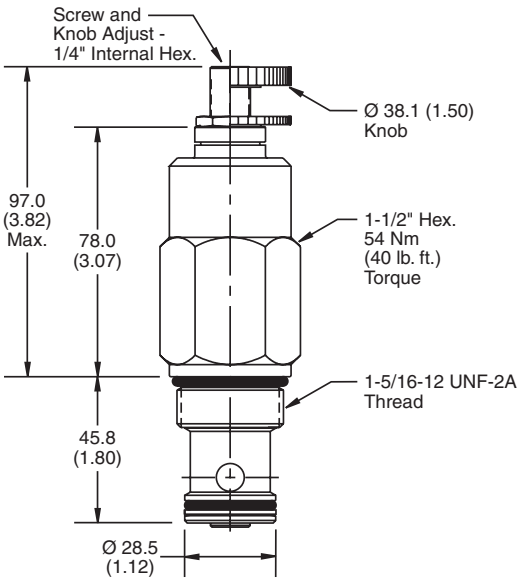
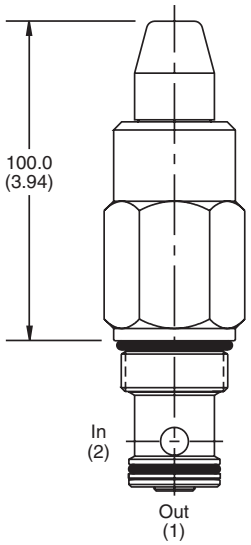
Dimensions



Screw/Knob Version



Tamper Resistant Version

Ordering Information

RD163			
16 Size Differential Area Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (840208K)
S	**Screw Adjust**
T	Tamper Resistant Cap (717783)

Code	Seals / Kit No.
Omit	**Nitrile / (SK16-2)**
V	Fluorocarbon / (SK16-2V)

Code	Pressure Range
10	**13.8 - 69 Bar (200 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ 11.3 LPM (3 GPM)**
30	**41.4 - 207 Bar (600 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ 11.3 LPM (3 GPM)**

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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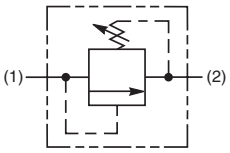
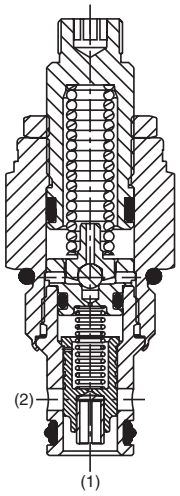
General Description

Pilot Operated Spool-Type Relief Valve.
For additional information see
Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided pilot for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris





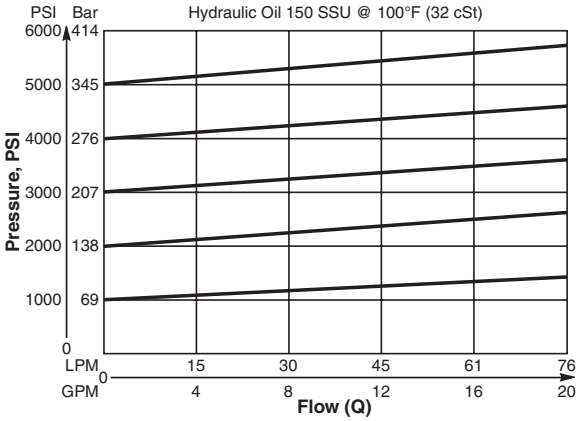
Specifications

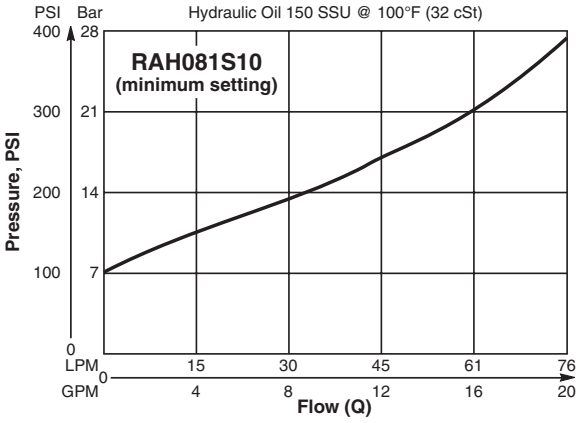
Rated Flow	75.8 LPM (20 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	5 cc per 6.8 Bar (100PSI) setting
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.09 kg (0.20 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Performance Curves

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)





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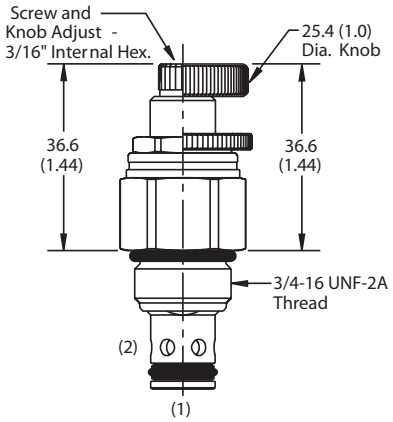
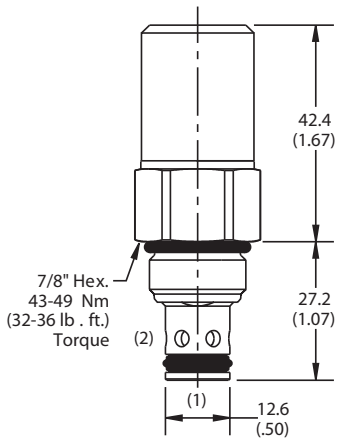
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RAH081			
08 Size Pilot Operated Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile / (SK08-2)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**

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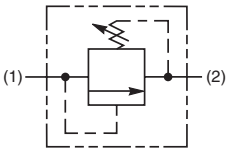
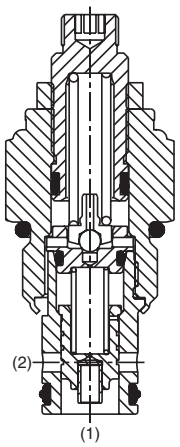
General Description

Pilot Operated Spool-Type Relief Valve. For addition information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris





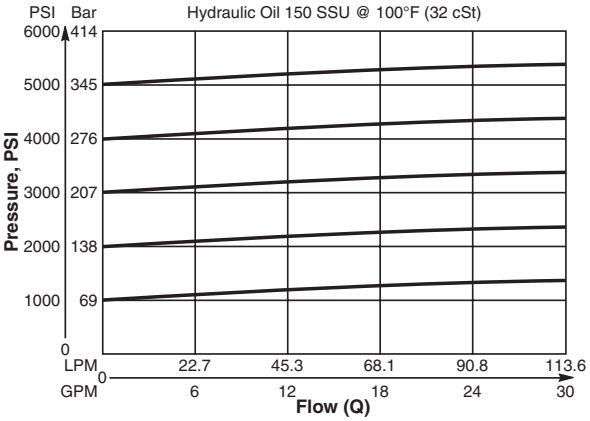
Specifications

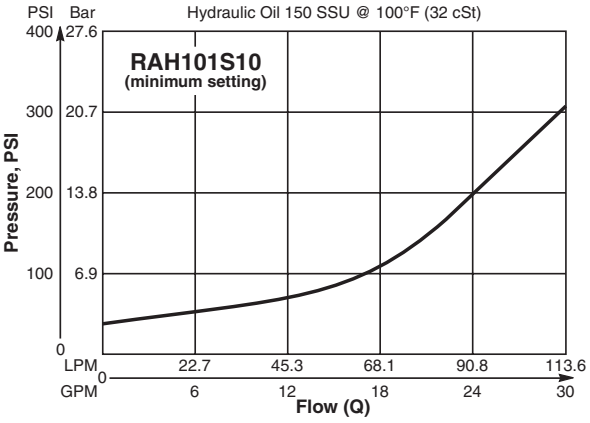
Rated Flow	113 LPM (30 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	5 cc per 6.8 Bar (100 PSI) setting
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curves

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)





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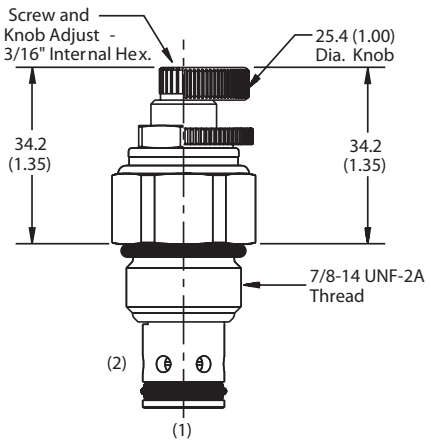
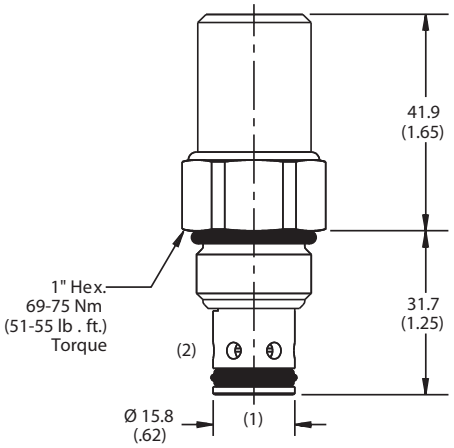
Hydraulic Cartridge Systems Division

Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RAH101			
10 Size Pilot Operated Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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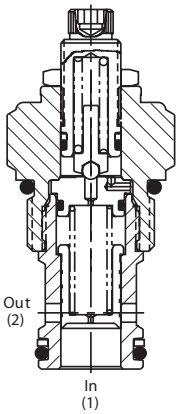
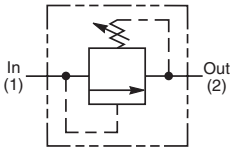
General Description

Pilot Operated Spool-Type Relief Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Low override curve
- Ball-type pilot for added stability
- High accuracy - pilot operated design
- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- All external parts zinc plated





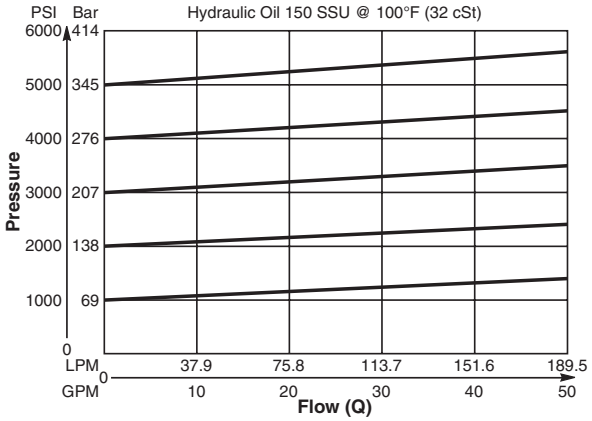
Specifications

Rated Flow	189.5 LPM (50 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 23 Bar (334 PSI) **30** 59.7 Bar (867 PSI) **50** 118 Bar (1711 PSI
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.22 kg (0.48 lbs.)
Cavity	C12-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT12-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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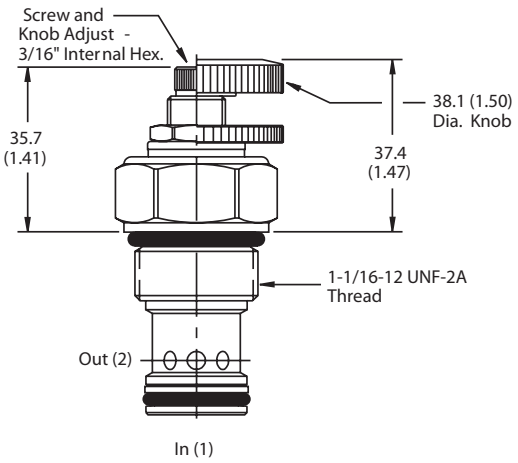
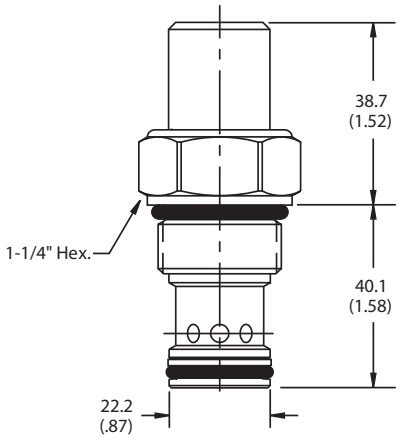
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RAH121			
12 Size Pilot Operated Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK12-2)**
V	Fluorocarbon / (SK12-2V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ 11.3 LPM (3 GPM)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ 11.3 LPM (3 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ 11.3 LPM (3 GPM)**

Order Bodies Separately
See section BC

B12	–	2	–	
12 size		2-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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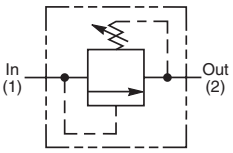
General Description

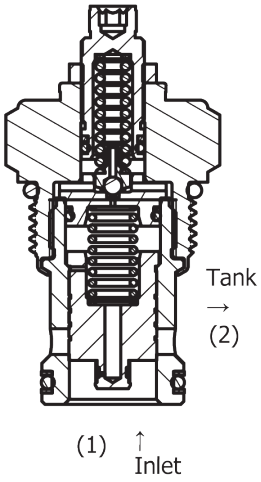
Pilot Operated Spool-Type Relief Valve. For additional information see Technical Tips on pages PC1-PC6.

WINNER'S CIRCLE

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistent reseat
- Internal screening protects pilot seat from debris
- Steel adapters are zinc plated





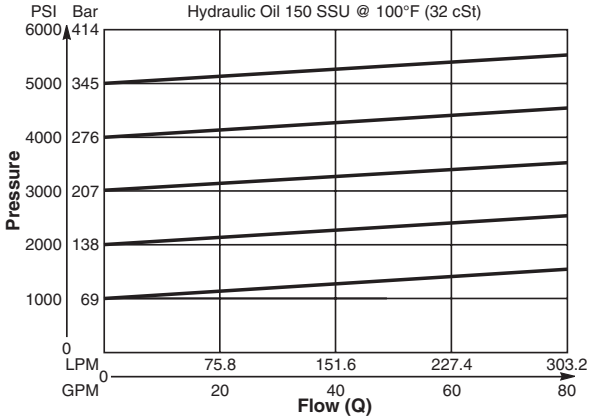
Specifications

Rated Flow	302.8 LPM (80 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **20** 39.3 Bar (570 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	5 cc per 6.8 Bar (100 PSI) setting
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.34 kg (0.75 lbs.)
Cavity	C16-2 (See BC Section for more details)

Performance Curve

Flow vs. Inlet Pressure

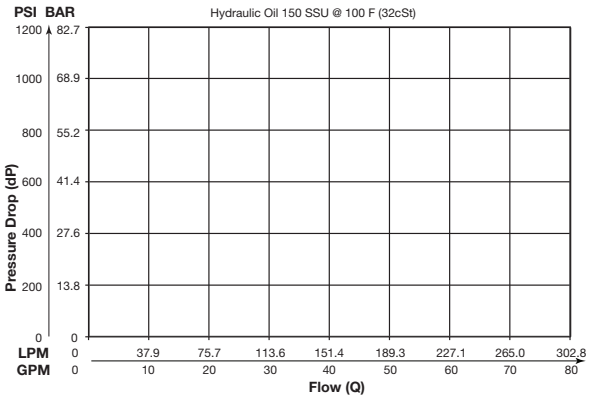
(Pressure rise through cartridge only)



Performance Curve

Regulated Pressure vs. Flow

(Pressure rise through cartridge only)



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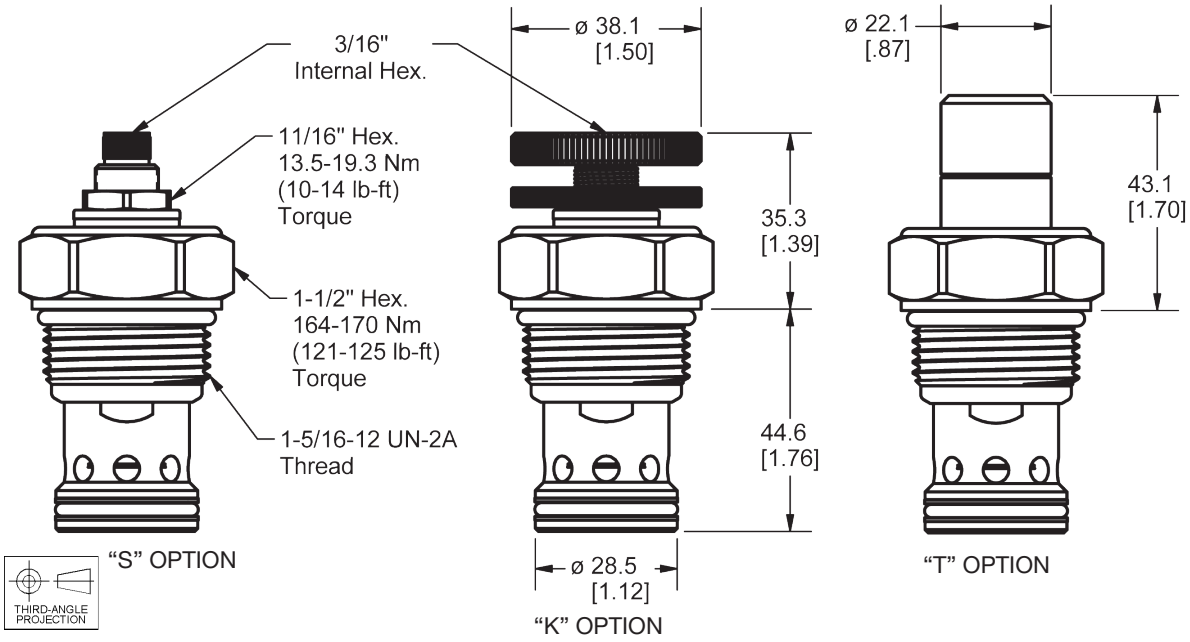
Dimensions Millimeters (Inches)



Ordering Information

RAH161			
16 Size Pilot Operated Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK16-2)**
V	Fluorocarbon / (SK16-2V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ .95 LPM (25 GPM)**
20	**6.9 - 138 Bar (100 - 2000 PSI) Standard Setting: 69 Bar (1000 PSI) @ .95 LPM (25 GPM)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ .95 LPM (25 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ .95 LPM (25 GPM)**

Order Bodies Separately
See section BC

B16	–	2	–	
12 size		2-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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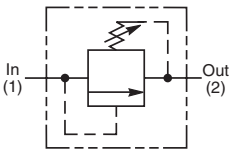
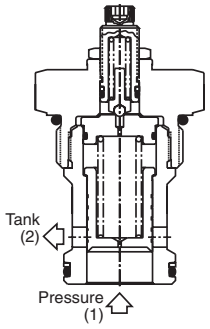
General Description

Pilot Operated Spool-Type Relief Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Low override curve
- Ball-type pilot for added stability
- High accuracy - pilot operated design
- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- All external parts zinc plated





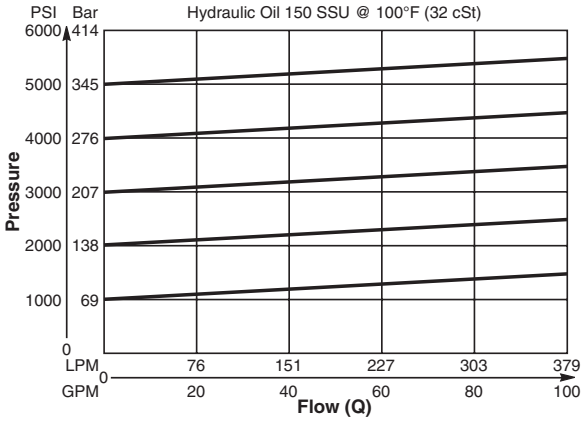
Specifications

Rated Flow	379 LPM (100 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 23 Bar (334 PSI) **30** 59.7 Bar (867 PSI) **50** 118 Bar (1711 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	5 cc per 6.8 Bar (100 PSI) setting
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.9 kg (2.0 lbs.)
Cavity	C20-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT20-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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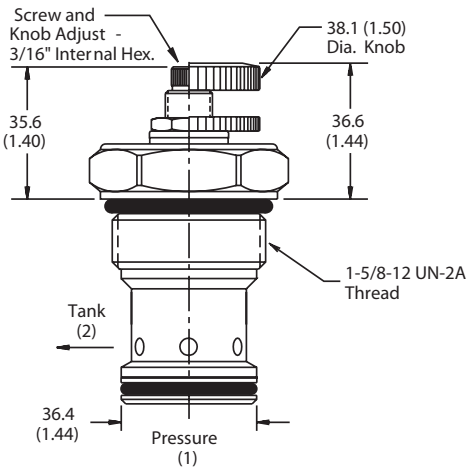
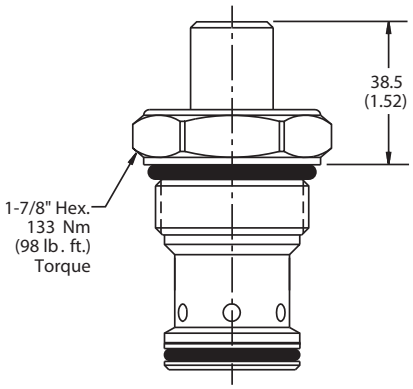
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RAH201			
20 Size Pilot Operated Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK20-2)**
V	Fluorocarbon / (SK20-2V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ 37.5 LPM (10 GPM)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ 37.5 LPM (10 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ 37.5 LPM (10 GPM)**

Order Bodies Separately See section BC

B20	–	2	–	
20 size		2-Way Cavity		Port Size

Code	Porting / Body Material
20T	SAE-20 / Steel (5000 PSI)
A20T	SAE-20 / Aluminium (3000 PSI)

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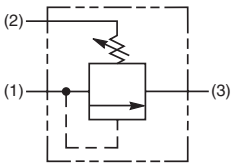
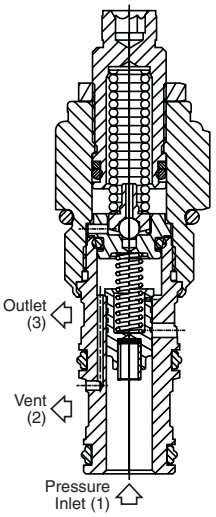
General Description

Ventable Pilot Operated Spool-Type Relief Valve. This valve controls pressure via the internal spring chamber or via an external vent line. For addition information see Technical Tips on pages PC1-PC6.

Features

- Low override curve
- Ball-type pilot for added stability
- High accuracy - pilot operated design
- Hardened, precision ground parts for durability
- Compact size for reduced space requirements
- All external parts zinc plated





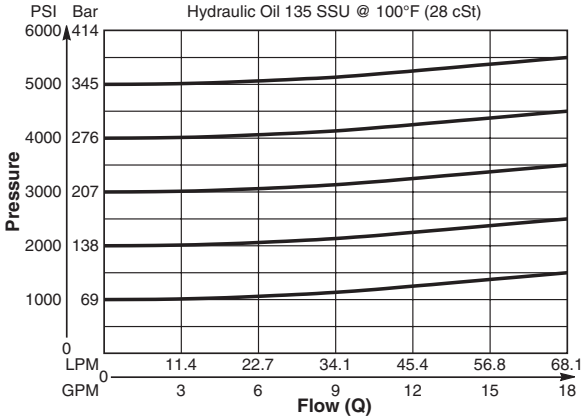
Specifications

Rated Flow	68 LPM (18 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	5 cc per 6.8 Bar (100PSI) setting
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curves

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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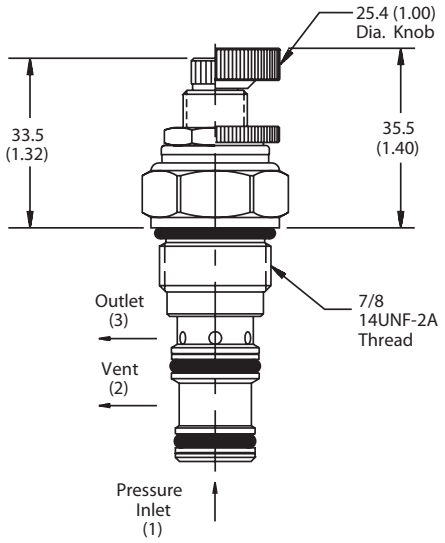
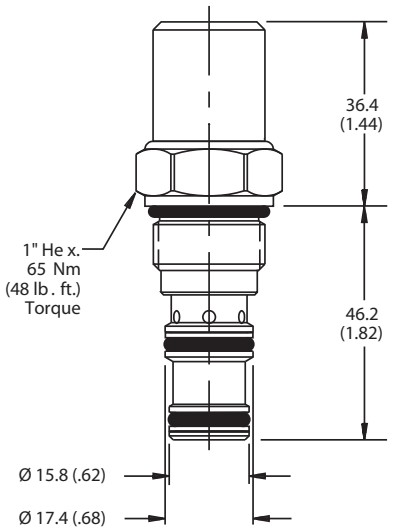
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

RAH101V			
10 Size Ventable Pilot Operated Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ 11.3 LPM (3 GPM)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ 11.3 LPM (3 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ 11.3 LPM (3 GPM)**

Order Bodies Separately See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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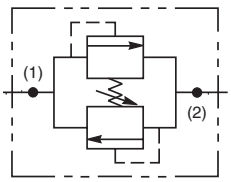
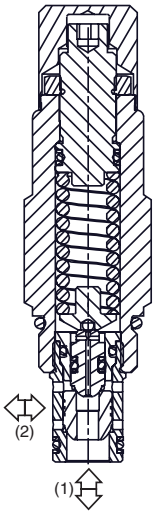
General Description

Dual Cross-Over Relief Valve in a single cartridge. For additional information see Technical Tips on pages PC1-PC6.

Features

- Fast response
- Compact size for reduced space requirements
- Low leakage design
- Single cartridge reduces plumbing, component and manifold costs





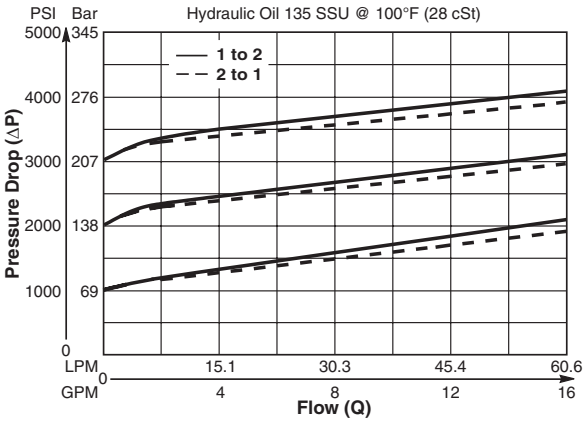
Specifications

Rated Flow	60.6 LPM (16 GPM)
Maximum Inlet Pressure	245 Bar (3500 PSI)
Maximum Pressure Setting	210 Bar (3000 PSI)
Sensitivity: Pressure/Turn	**20** 23 Bar (333 PSI) **30** 29 Bar (425 PSI)
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	10 drops/min. (.66 cc/min.) @ 75% of crack pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.26 kg (0.58 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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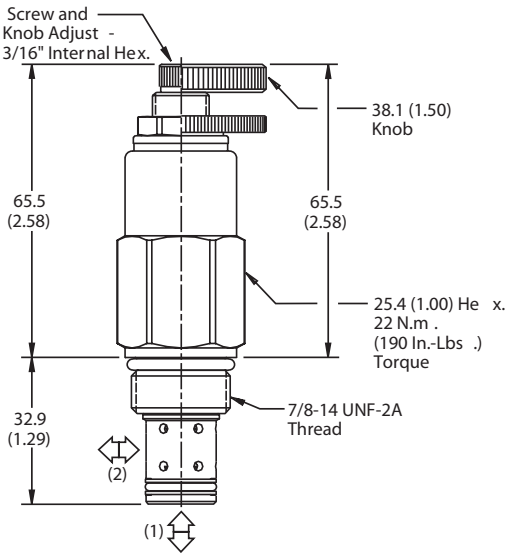
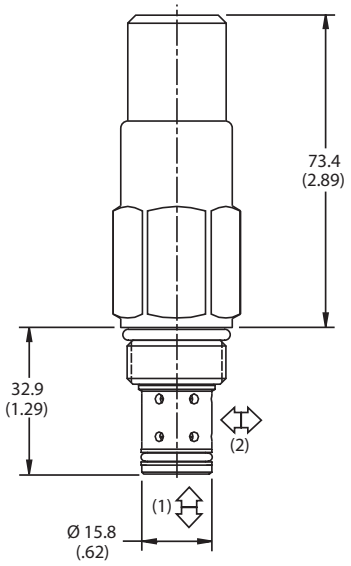
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

Ordering Information

XR101			
10 Size Dual Cross-Over Relief Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK10-2)**
V	Fluorocarbon / (SK10-2V)

Code	Pressure Range
20	6.9 - 138 Bar (100 - 2000 PSI) Standard Setting: 69 Bar (1000 PSI) @ 11.3 LPM (3 GPM)
30	**103 - 207 Bar (1500 - 3000 PSI) Standard Setting: 172 Bar (2500 PSI) @ 11.3 LPM (3 GPM)**

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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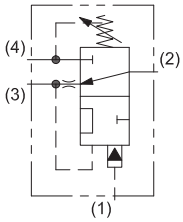
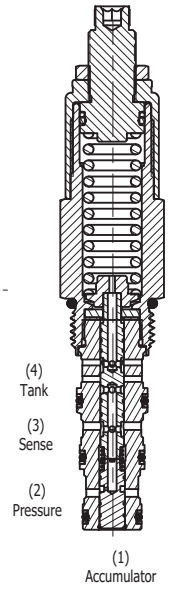
General Description

Pressure Unloading Valve Assembly This valve is best suited for accumulator unloading circuits or can be used as a remote to pilot valves. They provide a fixed percentage between load and unload pressures. For additional information see Technical Tips on pages PC1-PC6.

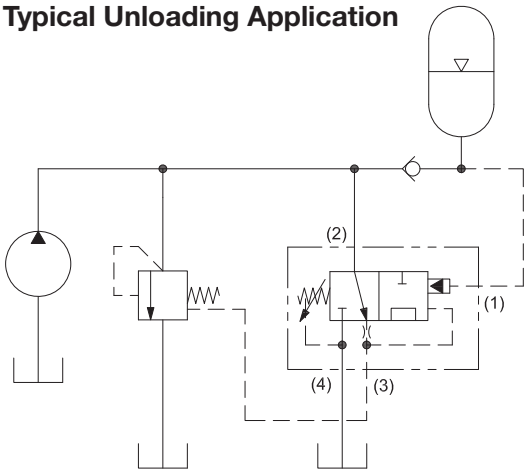




Features

- Low hysteresis
- Cartridge design
- Hardened, precision ground parts for durability
- All external parts zinc plated

Typical Unloading Application

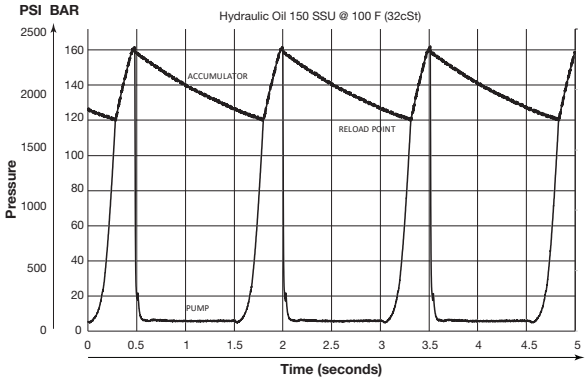


Specifications

Rated Flow	1 LPM (.25 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Maximum Pressure Setting	250 Bar (3600 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	Port 1 leakage 48 ml/min. @207 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C10-4 (See BC Section for more details)
Form Tool	Rougher NFT10-4R Finisher NFT10-4F

Performance Curve

Pump and Accumulator Pressure vs. Time



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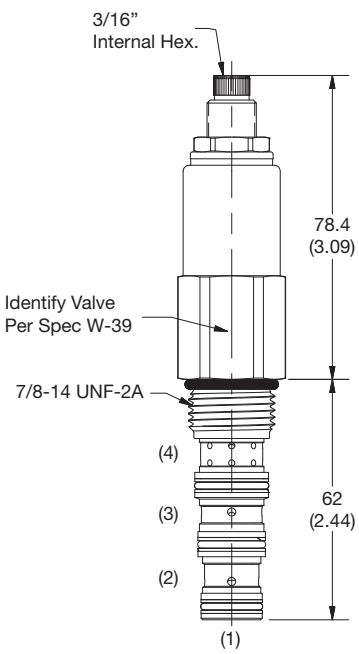
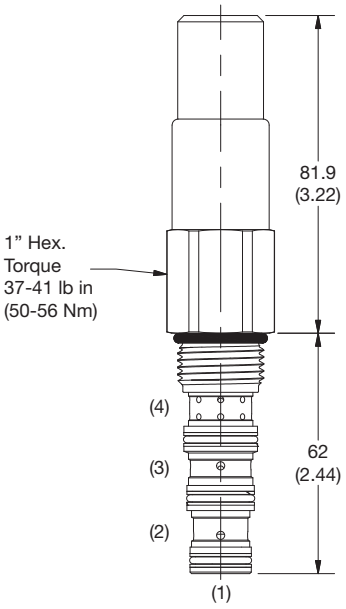


SCREW VERSION



TAMPER RESISTANT VERSION

THIRD-ANGLE PROJECTION

Ordering Information

RU104			B	
10 Size Pressure Unloading Valve	Adjustment Style	Pressure Range	Reload	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
T	Tamper Resistant Cap (717943)
S	**Screw Adjust**

Code	Reload
B	**80% ±5% of Pressure Setting**

Code	Pressure Range
12	**55.2 - 82.7 Bar (800 - 1200 PSI) Standard Setting: 68.9 Bar (1000 PSI) @ 1.1 LPM (.3 GPM)**
24	**68.9 - 165.5 Bar (1000 - 2400 PSI) Standard Setting: 117.2 Bar (1700 PSI) @ 1.1 LPM (.3 GPM)**
36	**120.7 - 248.2 Bar (1750 - 3600 PSI) Standard Setting: 184.4 Bar (2675 PSI) @ 1.1 LPM (.3 GPM)**

Code	Seals / Kit No.
Omit	**"D"-Ring (SK10-4)**
N	Nitrile / (SK10-4)
V	Fluorocarbon / (SK10-4V)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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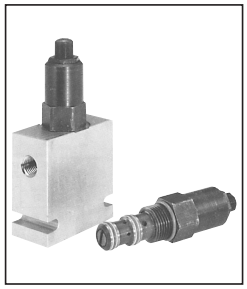
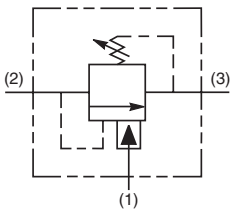
General Description

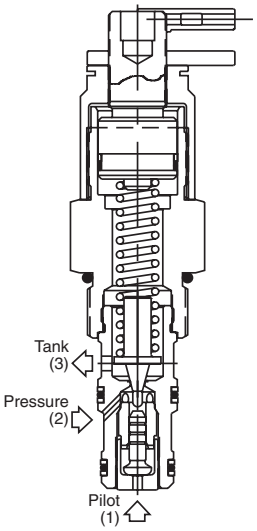
Differential Area Unloading Relief Valve. This valve is best suited for low flow accumulator unloading circuits or can be used as remote pilot valves. They provide a fixed percentage between load and unload pressures. For additional information see Technical Tips on pages PC1-PC6.

Features

- Low hysteresis
- Cartridge design
- All external parts zinc plated







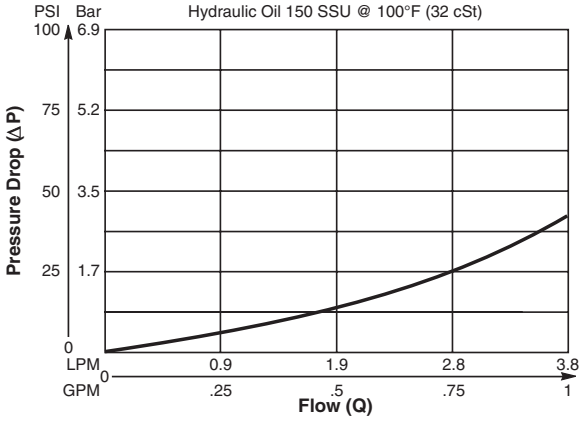
Specifications

Rated Flow	3.75 LPM (1 GPM)
Maximum Pilot Flow	0.94 LPM (0.25 GPM)
Maximum Inlet Pressure	245 Bar (3500 PSI)
Maximum Pressure Setting	210 Bar (3000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	Port 2 to 3 10 drops/min. (0.66 cc/min.) Port 1 to 2 60 drops/min. (3 cc/min.)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.50 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curve

Inlet Flow vs. Pressure Drop

Without pilot assist (Through cartridge only)



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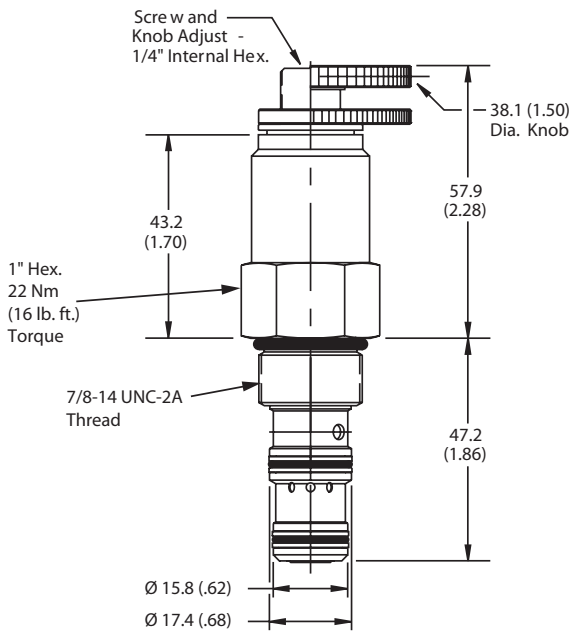
Dimensions Millimeters (Inches)



Screw/Knob Version

Ordering Information

RU101			C	
10 Size Differential Area Unloading Relief Valve	Adjustment Style	Pressure Range	Reload	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (840208K)
S	**Screw Adjust**

Code	Reload
C	**80% ±5% of Pressure Setting**

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ 1.1 LPM (.3 GPM)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ 1.1 LPM (.3 GPM)**

Code	Seals / Kit No.
Omit	**Nitrile / (SK10-3)**
V	Fluorocarbon / (SK10-3V)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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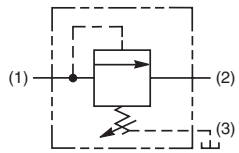
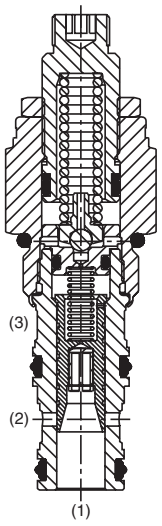
General Description

Pilot Operated Sequence Valve (Internally Piloted, Externally Vented). For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided pilot for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane "D"-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris





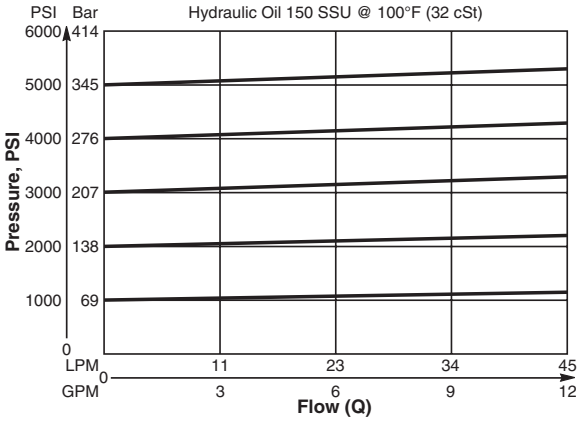
Specifications

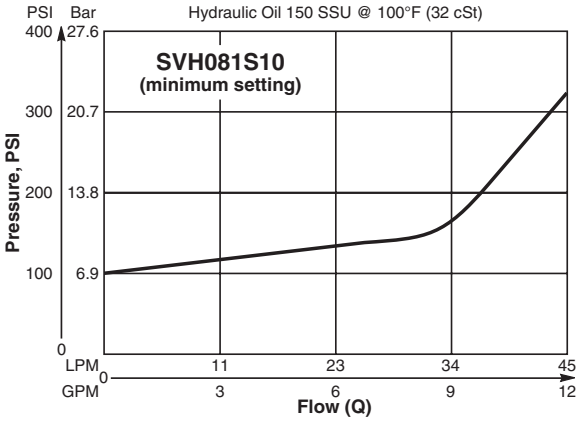
Rated Flow	45 LPM (12 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.56 LPM (0.15 GPM)
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @ 210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.11 kg (0.25 lbs.)
Cavity	C08-3 (See BC Section for more details)
Form Tool	Rougher NFT08-3R Finisher NFT08-3F

Performance Curves

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)





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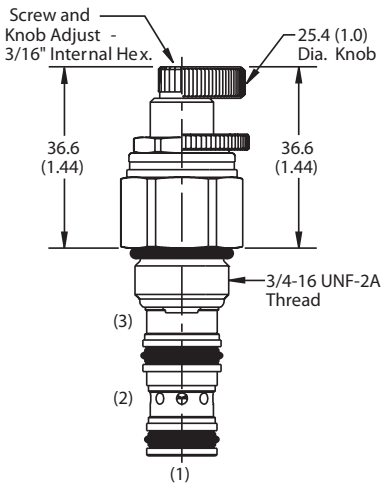
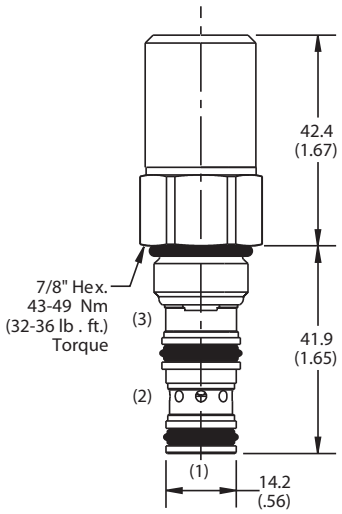
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

SVH081			
08 Size P.O. Sequence Valve (Internal Pilot)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-3)**
N	Nitrile / (SK08-3)
V	Fluorocarbon / (SK08-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**

Order Bodies Separately
See section BC

B08	–	3	–	
08 size		3-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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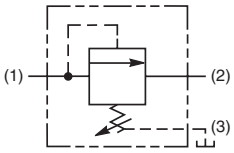
P.O. Sequence Valve (Internal Pilot)
Series SVH101

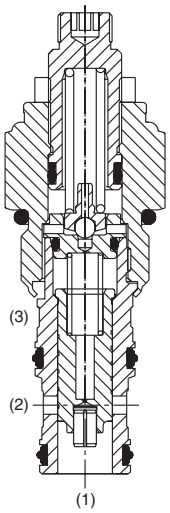
General Description

Pilot Operated Sequence Valve (Internally Piloted, Externally Drained). For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris





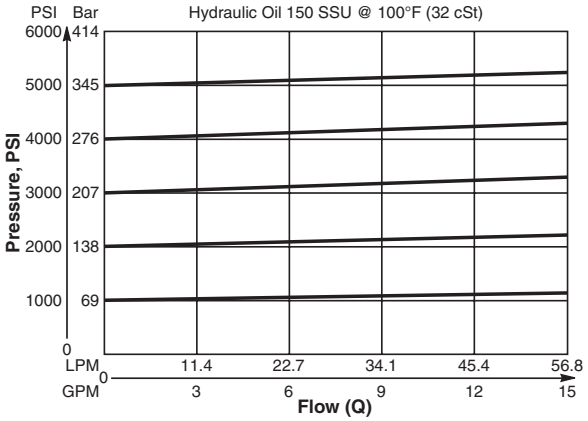
Specifications

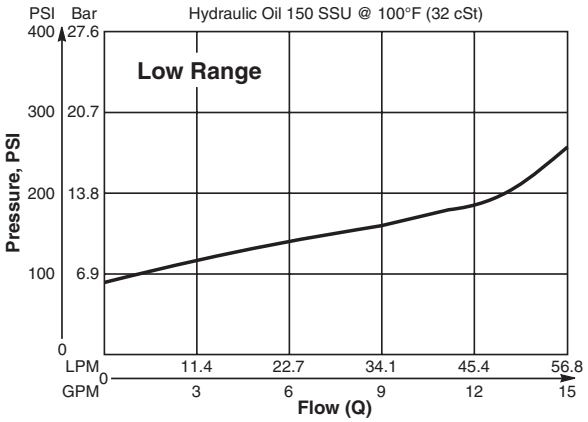
Rated Flow	56.3 LPM (15 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow (Port 3)	0.94 LPM (0.25 GPM)
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @ 210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curves

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)





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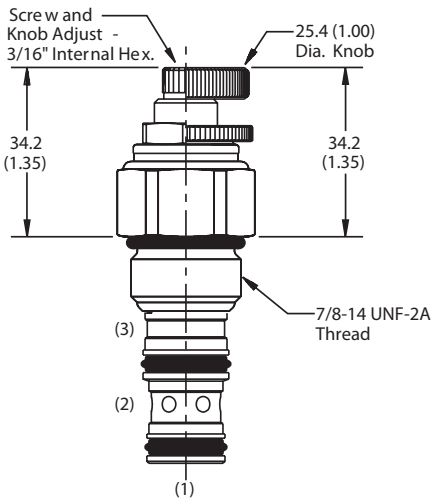
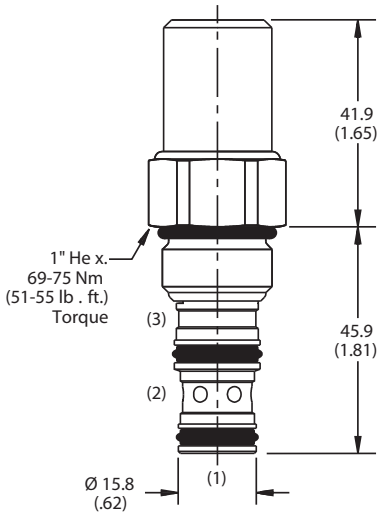
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

SVH101			
10 Size P.O. Sequence Valve (Internal Pilot)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)**

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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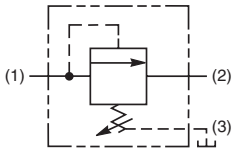
P.O. Sequence Valve (Internal Pilot)
Series SVH161

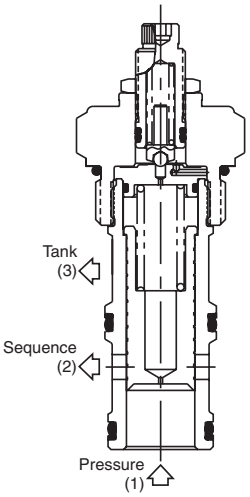
General Description

Pilot Operated Sequence Valve (Internally Piloted, Externally Drained). For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- High accuracy, pilot operation design
- Ball-type pilot for added stability
- All external parts zinc plated





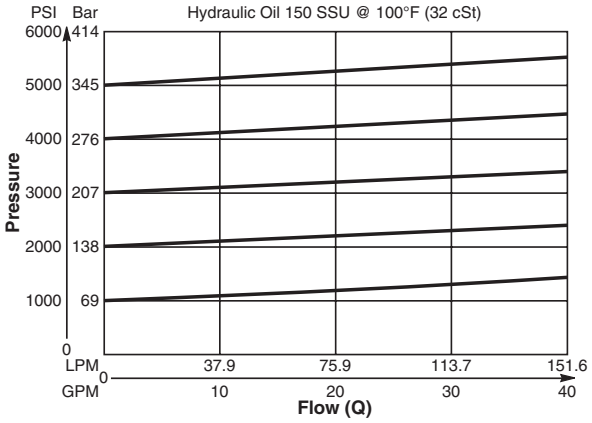
Specifications

Rated Flow	151.6 LPM (40 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 23 Bar (334 PSI) **30** 59.7 Bar (867 PSI) **50** 118 Bar (1711 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	1.9 LPM (0.5 GPM)
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	5 cc per 6.8 Bar (100PSI) setting
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C16-3 (See BC Section for more details)
Form Tool	Rougher NFT16-3R Finisher NFT16-3F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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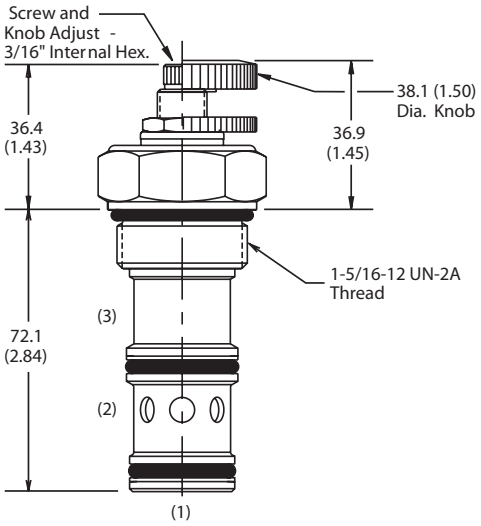
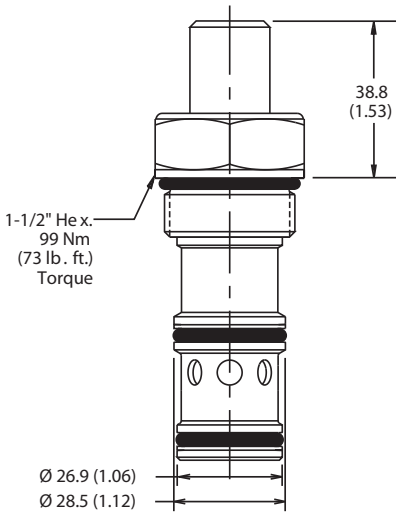
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

SVH161			
16 Size P.O. Sequence Valve (Internal Pilot)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK16-3)**
V	Fluorocarbon / (SK16-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ 11.3 LPM (3 GPM)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ 11.3 LPM (3 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ 11.3 LPM (3 GPM)**

Order Bodies Separately
See section BC

B16	–	3	–	
16 size		3-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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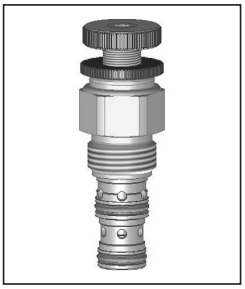
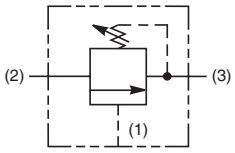
General Description

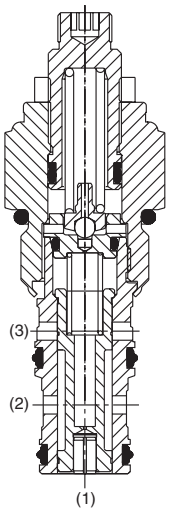
Pilot Operated Sequence Valve (Externally Piloted, Internally Vented). For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris







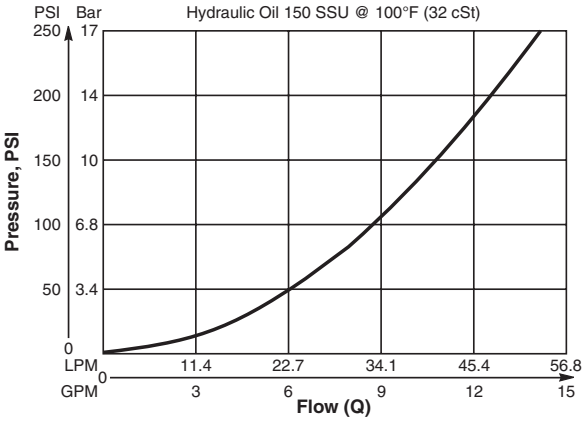
Specifications

Rated Flow	56.3 LPM (15 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	See maximum drain flow chart (Lower right)
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @ 210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



Maximum Drain Flow

P_{PILOT} - $P_{SETTING}$	Drain Flow
6.9 Bar (100 PSI)	0.34 LPM (0.09 GPM)
35 Bar (500 PSI)	0.76 LPM (0.20 GPM)
69 Bar (1000 PSI)	1.08 LPM (0.29 GPM)
138 Bar (2000 PSI)	1.53 LPM (0.40 GPM)
207 Bar (3000 PSI)	1.87 LPM (0.50 GPM)

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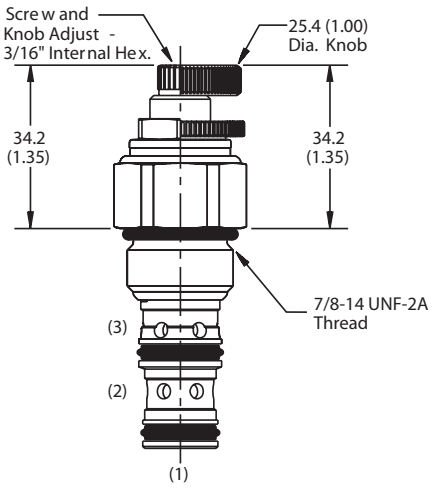
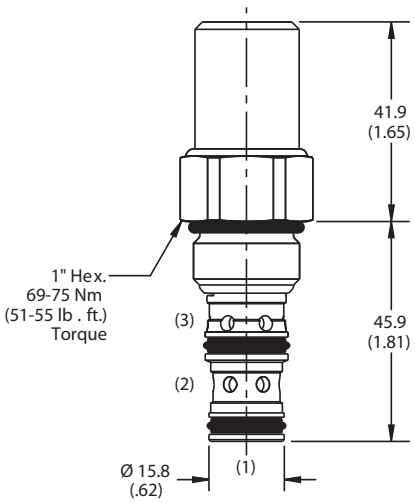
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

SVH102			
10 Size P.O. Sequence Valve (External Pilot)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
10	**20.7 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ crack pressure, approximately 11.3 LPM (3 GPM)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ crack pressure, approximately 11.3 LPM (3 GPM)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ crack pressure, approximately 11.3 LPM (3 GPM)**

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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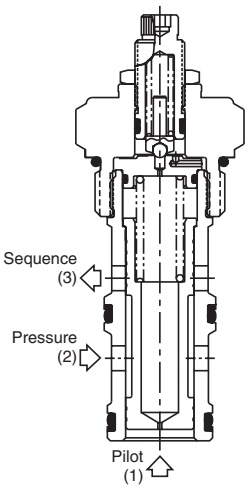
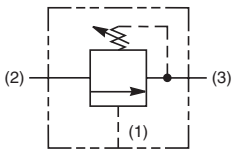
General Description

Pilot Operated Sequence Valve (Externally Piloted, Internally Vented). For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- High accuracy, pilot operation design
- Ball-type pilot for added stability
- All external parts zinc plated





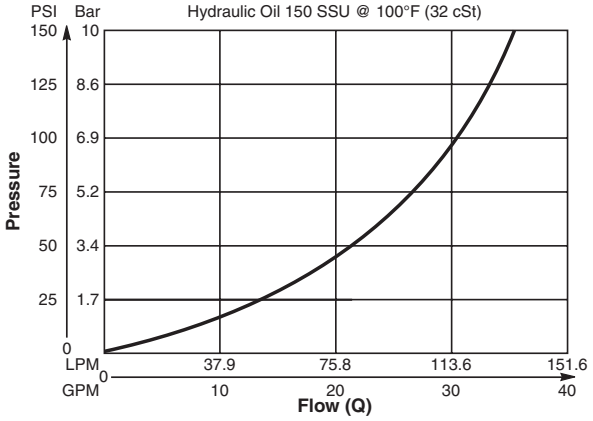
Specifications

Rated Flow	151.6 LPM (40 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 23 Bar (334 PSI) **30** 59.7 Bar (867 PSI) **50** 118 Bar (1711 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	See maximum drain flow chart (Lower right)
Reseat Pressure	80% of crack pressure
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @ 75% of Crack Pressure
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C16-3 (See BC Section for more details)
Form Tool	Rougher NFT16-3R Finisher NFT16-3F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



Maximum Drain Flow

P_{PILOT} - $P_{SETTING}$	Drain Flow
6.9 Bar (100 PSI)	0.69 LPM (0.18 GPM)
35 Bar (500 PSI)	1.55 LPM (0.41 GPM)
69 Bar (1000 PSI)	2.19 LPM (0.58 GPM)
138 Bar (2000 PSI)	3.10 LPM (0.82 GPM)
207 Bar (3000 PSI)	3.79 LPM (1.00 GPM)

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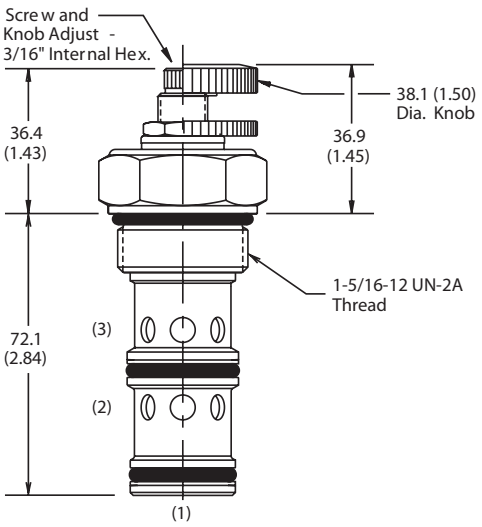
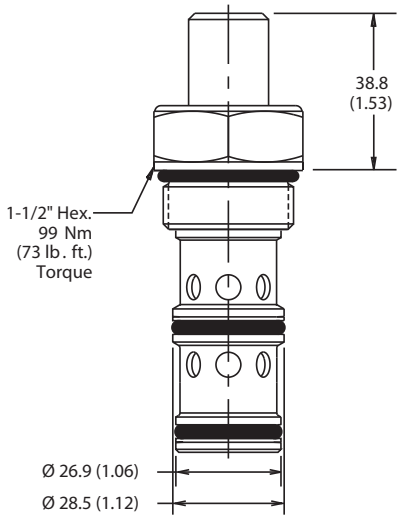
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

Ordering Information

SVH162			
16 Size P.O. Sequence Valve (External Pilot)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK16-3)**
V	Fluorocarbon / (SK16-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI) @ 11.3 LPM (3 GPM)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI) @ 11.3 LPM (3 GPM)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI) @ 11.3 LPM (3 GPM)**

Order Bodies Separately
See section BC

B16	–	3	–	
16 size		3-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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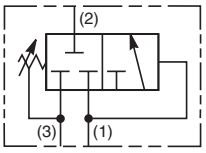
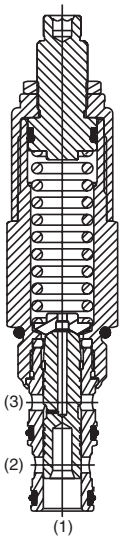
General Description

Direct Acting Sequence Valve (Internally Piloted, Externally Drained). In the steady state condition, all three ports are blocked with the spring chamber drained to port 3. When the pressure at port 1 exceeds the valve setting, the spool moves allowing flow from the nose of the cartridge (port 1) to the actuator port (port 2). By externally draining the spring chamber directly to tank (port 3), the valve is insensitive to back pressure at the sequence port.





Features

- Hardened, precision ground parts for durability
- Internal mechanical stop limits spool travel eliminating spring solidification
- "D"-Ring eliminates backup rings
- All external parts zinc plated
- Fast response

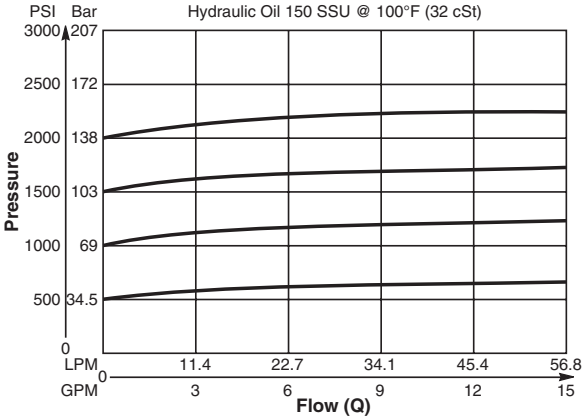
Specifications

Rated Flow	56 LPM (15 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Maximum Pressure Setting	138 Bar (2000 PSI)
Sensitivity: Pressure/Turn	**06** 6.6 Bar (95 PSI) **20** 17.2 Bar (250 PSI
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @ 210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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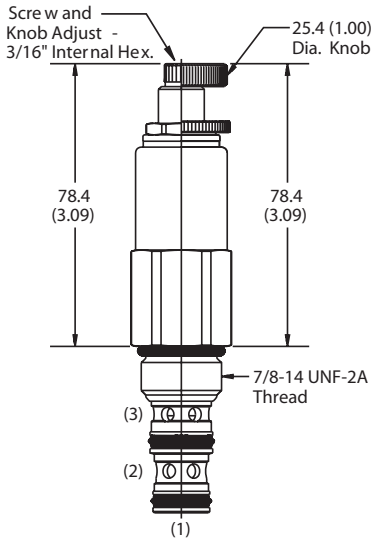
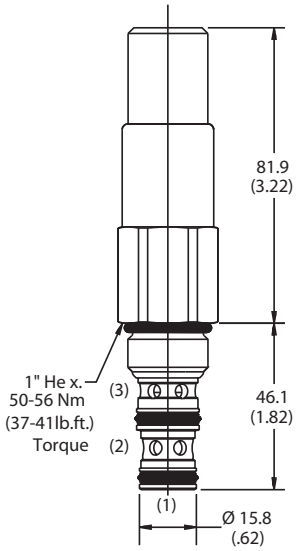
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

SV103			
10 Size D.A. Sequence Valve (Internal Pilot)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
06	6.9 - 42 Bar (100 - 600 PSI) Standard Setting: 21 Bar (300 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)
20	28 - 138 Bar (400 - 2000 PSI) Standard Setting: 69 Bar (1000 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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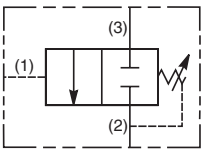
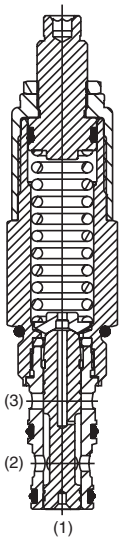
General Description

Direct Acting, Normally Closed Sequence Valve (Externally Piloted). With no pressure at the pilot port (port 1), both port 3 and port 2 are blocked. When the pilot pressure at port 1 exceeds the valve setting, the spool moves opening a path and allowing flow from port 3 to port 2. This valve internally drains the spring chamber to tank via the sequencing port, thus any backpressure on port 2 would be additive to the spring setting.





Features

- Hardened, precision ground parts for durability
- Internal mechanical stop limits spool travel eliminating spring solidification
- "D"-Ring eliminates backup rings
- All external parts zinc plated
- Fast response

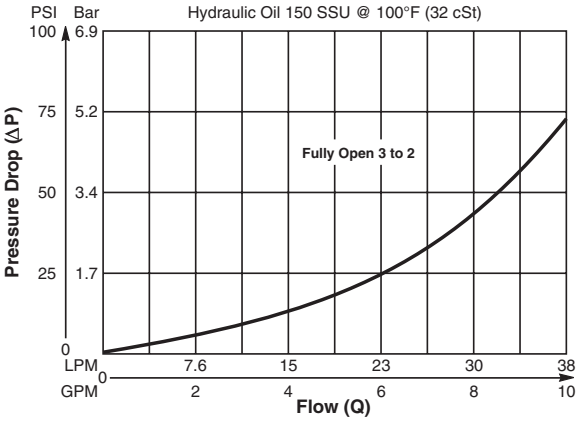
Specifications

Rated Flow	38 LPM (10 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Maximum Pressure Setting	138 Bar (2000 PSI)
Sensitivity: Pressure/Turn	**06** 6.6 Bar (95 PSI) **20** 17.2 Bar (250 PSI
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @ 210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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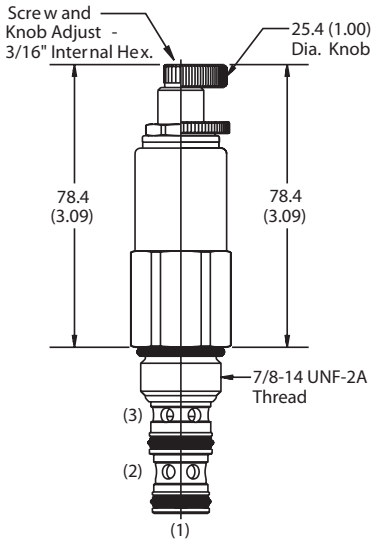
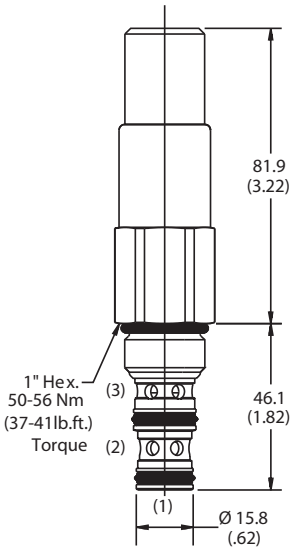
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

SV105			
10 Size, D.A., N.C. Sequence Valve (External Pilot)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
06	6.9 - 42 Bar (100 - 600 PSI) Standard Setting: 21 Bar (300 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)
20	28 - 138 Bar (400 - 2000 PSI) Standard Setting: 69 Bar (1000 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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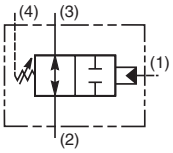
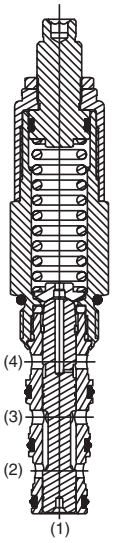
General Description

Direct Acting, Normally Open Sequence Valve (Externally Piloted, Externally Drained). With no pressure at the pilot port (port 1), bi-directional flow is allowed between port 3 and port 2. When the pilot pressure at port 1 exceeds the valve setting the spool moves blocking both port 3 and port 2. By externally draining the spring chamber to tank (port 4), the valve is insensitive to back pressure at the sequencing ports.





Features

- Hardened, precision ground parts for durability
- Internal mechanical stop limits spool travel eliminating spring solidification
- "D"-Ring eliminates backup rings
- All external parts zinc plated
- Fast response

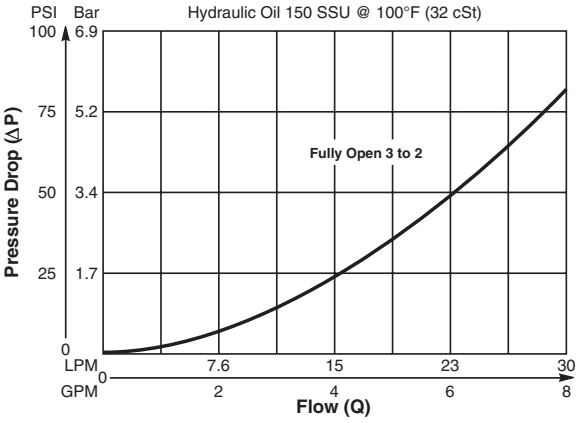
Specifications

Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Maximum Pressure Setting	138 Bar (2000 PSI)
Sensitivity: Pressure/Turn	**06** 6.6 Bar (95 PSI) **20** 17.2 Bar (250 PSI
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 cu. in./min.) @ 210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.45 kg (1.0 lbs.)
Cavity	C10-4 (See BC Section for more details)
Form Tool	Rougher NFT10-4R Finisher NFT10-4F

Performance Curve

Flow vs. Inlet Pressure

(Pressure rise through cartridge only)



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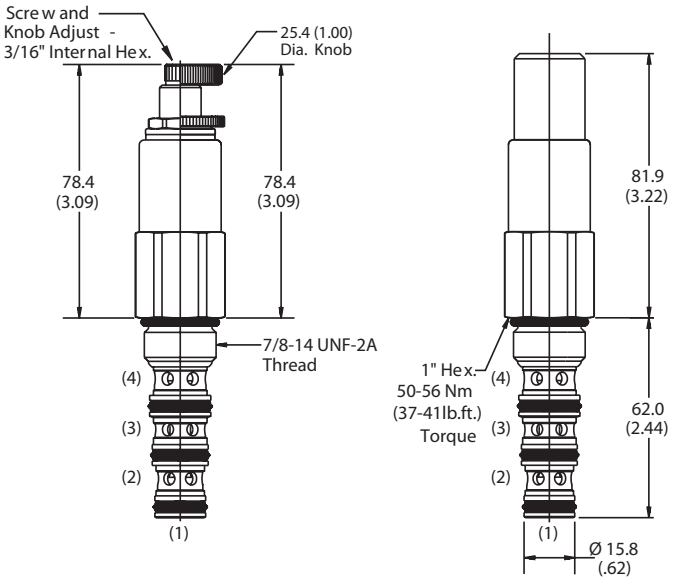
Dimensions Millimeters (Inches)



Screw/Knob Version

Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

SV104			
10 Size, D.A., N.O. Sequence Valve (Ext. Pilot & Drain)	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-4)**
N	Nitrile / (SK10-4)
V	Fluorocarbon / (SK10-4V)

Code	Pressure Range
06	6.9 - 42 Bar (100 - 600 PSI) Standard Setting: 21 Bar (300 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)
20	28 - 138 Bar (400 - 2000 PSI) Standard Setting: 69 Bar (1000 PSI) @ crack pressure, approximately .95 LPM (.25 GPM)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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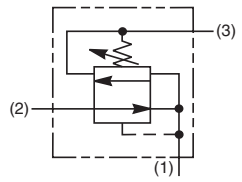
General Description

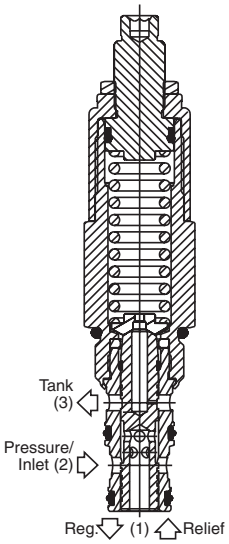
Direct Acting Pressure Reducing/ Relieving Valve. For additional information see Technical Tips on pages PC1-PC6.

Note: The differential between system pressure and pressure setting of the valve can greatly affect the stability of this valve. For best performance, the inlet pressure setting should not exceed 69 Bar (1000 PSI) above the reducing valve setting.

Features

- Hardened, precision ground parts for durability
- Internal mechanical stop limits spool travel eliminating spring solidification
- "D"-Ring eliminates backup rings
- All external parts zinc plated





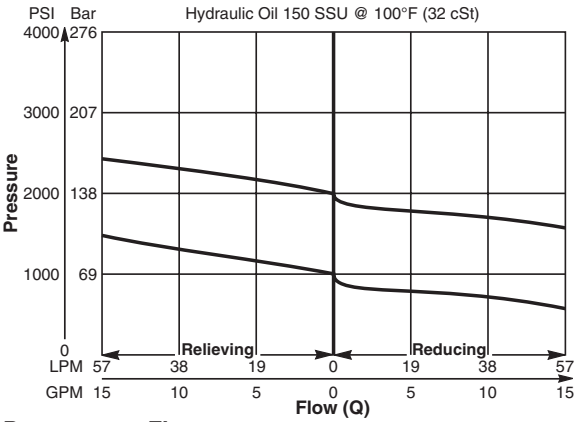
Specifications

Rated Flow	56 LPM (15 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI) 69 Bar (1000 PSI) maximum differential above valve setting for best stability
Maximum Pressure Setting	124 Bar (1800 PSI)
Sensitivity: Pressure/Turn	**12** 11.4 Bar (165 PSI) **20** 17.2 Bar (250 PSI
Maximum Tank Pressure	124 Bar (1800 PSI)
Maximum Drain Flow	120 ml/min. (0.03 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.5 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

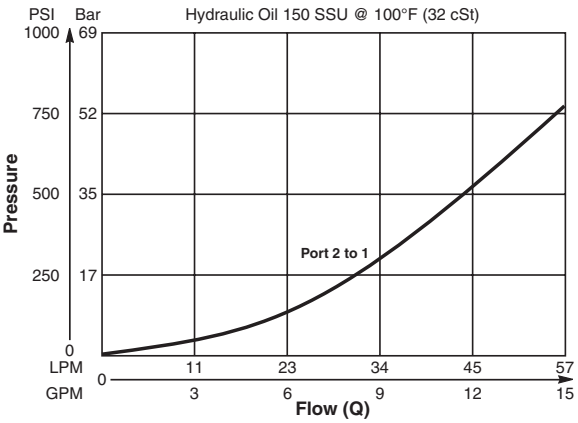
Performance Curves

(Pressure rise through cartridge only)

Flow vs. Regulated Pressure



Pressure vs. Flow



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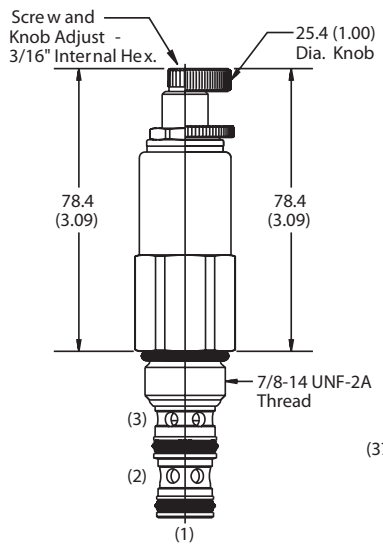
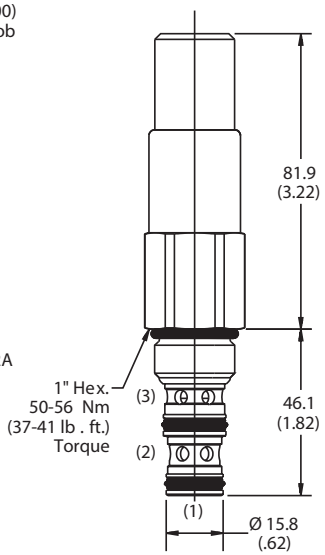
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

PR103			
10 Size D.A. Pressure Reducing/Relieving Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
12	39.3 - 83 Bar (570 - 1200 PSI) Standard Setting: 41.4 Bar (600 PSI) @ .95 LPM (.25 GPM)
21	41.4 - 124.1 Bar (600 - 1800 PSI) Standard Setting: 69 Bar (1000 PSI) @ .95 LPM (.25 GPM)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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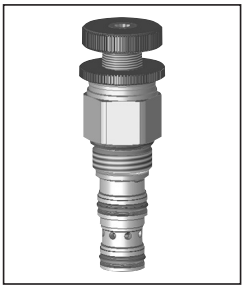
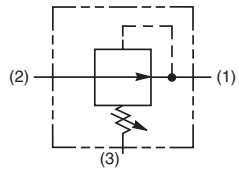
General Description

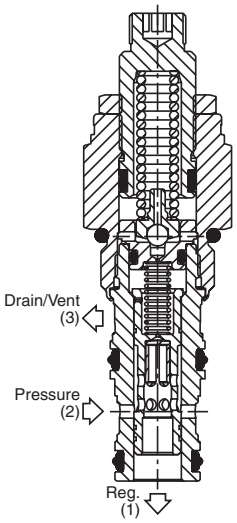
Pilot Operated Pressure Reducing Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided pilot for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris





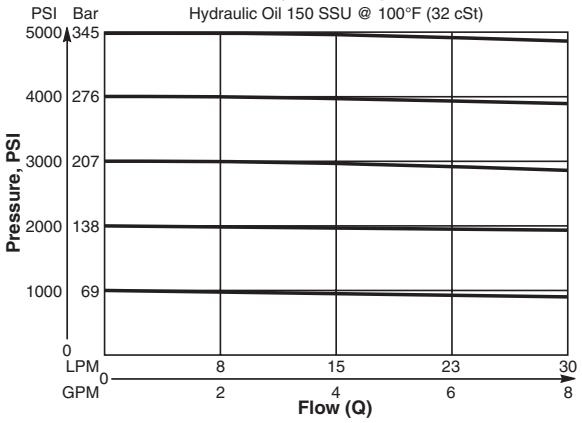


Specifications

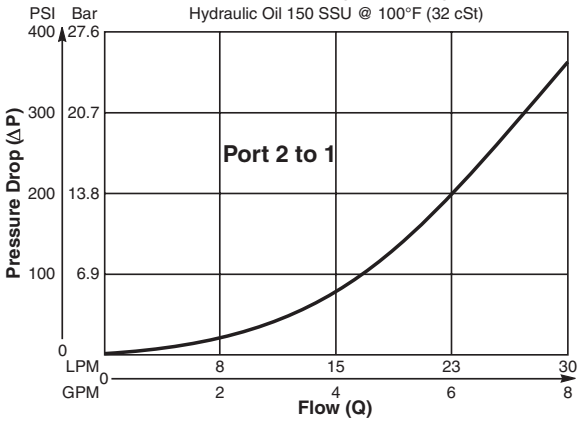
Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 25 Bar (362 PSI) **30** 64.2 Bar (932 PSI) **50** 137 Bar (1987 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.56 LPM (0.15 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.11 kg (0.25 lbs.)
Cavity	C08-3 (See BC Section for more details)
Form Tool	Rougher NFT08-3R Finisher NFT08-3F

Performance Curves

Flow vs. Pressure (Through cartridge only)



Flow vs. Pressure Drop (Through cartridge only)



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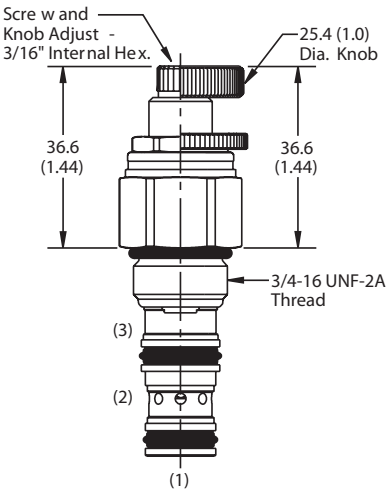
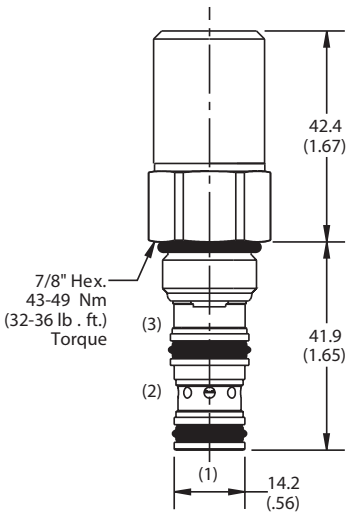
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

PRH082			
08 Size P.O. Pressure Reducing Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-3)**
N	Nitrile / (SK08-3)
V	Fluorocarbon / (SK08-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

NOTE: For settings below 20.7 Bar (300 PSI), flow rating is limited to 11.3 LPM (3 GPM).

Order Bodies Separately
See section BC

B08	–	3	–	
08 size		3-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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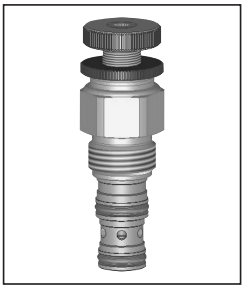
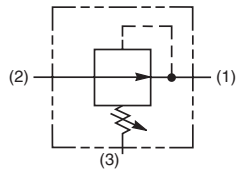
General Description

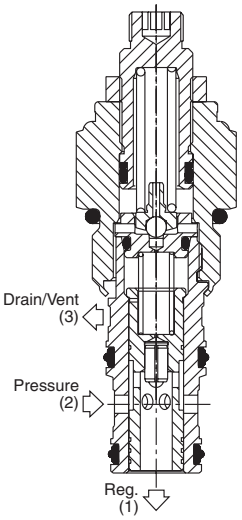
Pilot Operated Pressure Reducing Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris





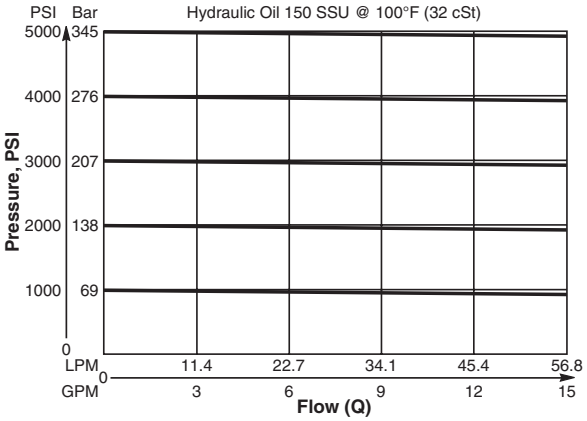


Specifications

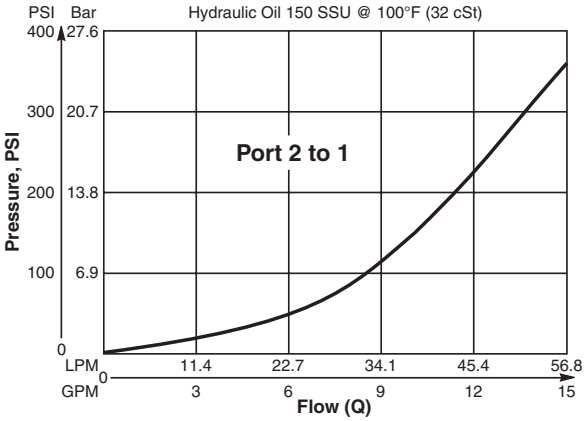
Rated Flow	56.3 LPM (15 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 25.4 Bar (369 PSI) **30** 64.9 Bar (942 PSI) **50** 137.6 Bar (1996 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.94 LPM (0.25 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.5 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curves

Flow vs. Pressure (Through cartridge only)



Pressure vs. Flow (Through cartridge only)



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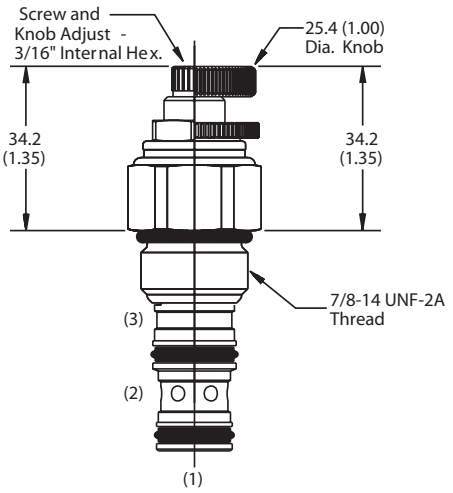
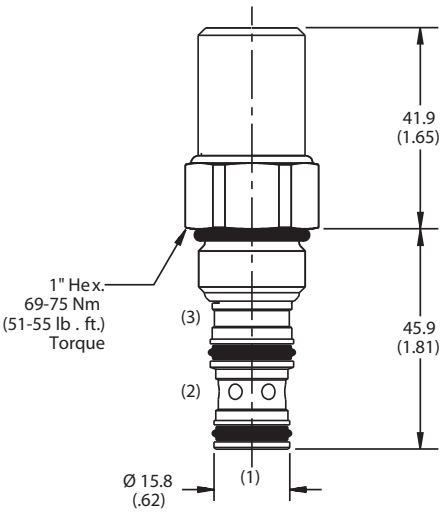
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

PRH102			
10 Size P.O. Pressure Reducing Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
10	**13.7 - 69 Bar (200 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
30	**41.4 - 207 Bar (600 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**82.8 - 345 Bar (1200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

NOTE: For settings below 20.7 Bar (300 PSI), flow rating is limited to 11.3 LPM (3 GPM).

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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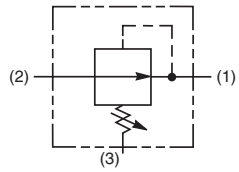
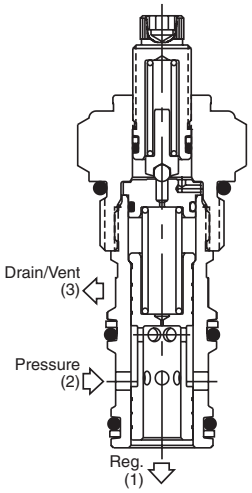
General Description

Pilot Operated Pressure Reducing Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- High accuracy, pilot operation design
- Ball-type pilot for added stability
- All external parts zinc plated





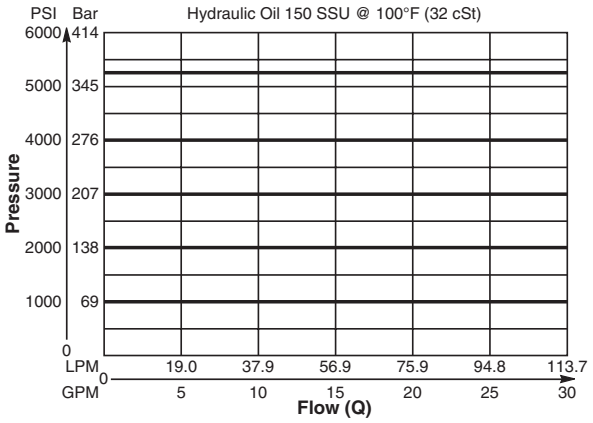
Specifications

Rated Flow	113.7 LPM (30 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 23 Bar (334 PSI) **30** 60 Bar (870 PSI) **50** 118 Bar (1711 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	1.9 LPM (0.5 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.27 kg (0.6 lbs.)
Cavity	C12-3 (See BC Section for more details)
Form Tool	Rougher NFT12-3R Finisher NFT12-3F

Performance Curve

Flow vs. Pressure

(Pressure rise through cartridge only)



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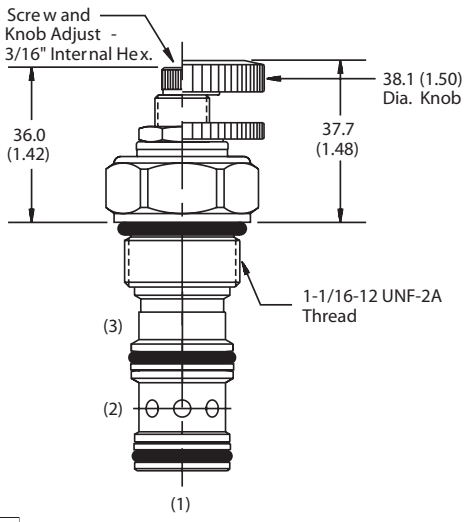
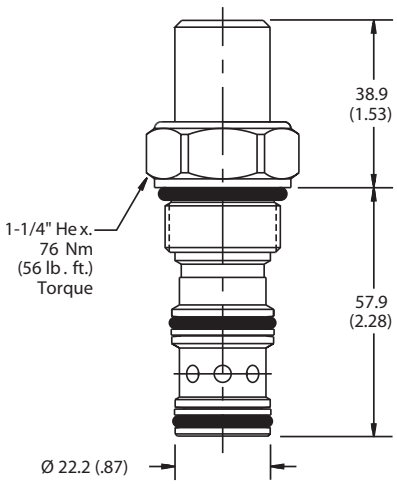
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

PRH122			
12 Size P.O. Pressure Reducing Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK12-3)**
V	Fluorocarbon / (SK12-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

Order Bodies Separately
See section BC

B12	–	3	–	
12 size		3-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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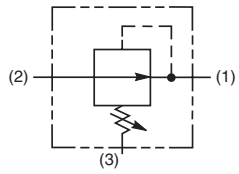
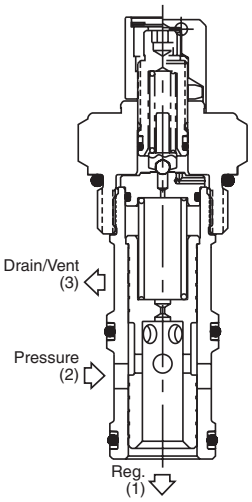
General Description

Pilot Operated Pressure Reducing Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- High accuracy, pilot operation design
- Ball-type pilot for added stability
- All external parts zinc plated





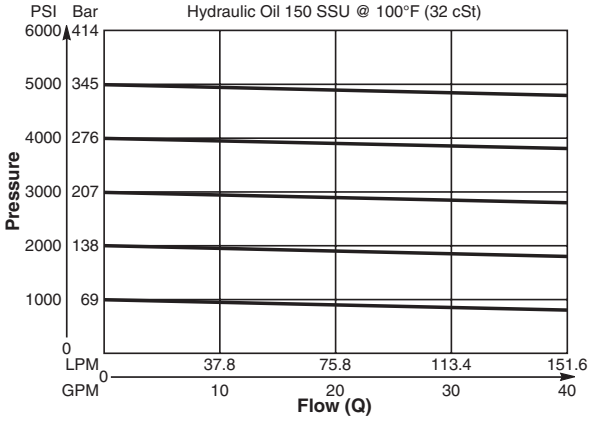
Specifications

Rated Flow	150 LPM (40 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 23 Bar (334 PSI) **30** 60 Bar (870 PSI) **50** 118 Bar (1711 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.94 LPM (0.25 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.9 kg (2.0 lbs.)
Cavity	C16-3 (See BC Section for more details)
Form Tool	Rougher NFT16-3R Finisher NFT16-3F

Performance Curve

Flow vs. Pressure

(Pressure rise through cartridge only)



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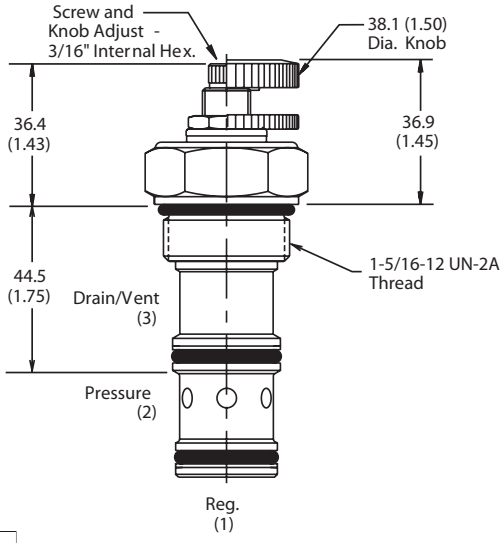
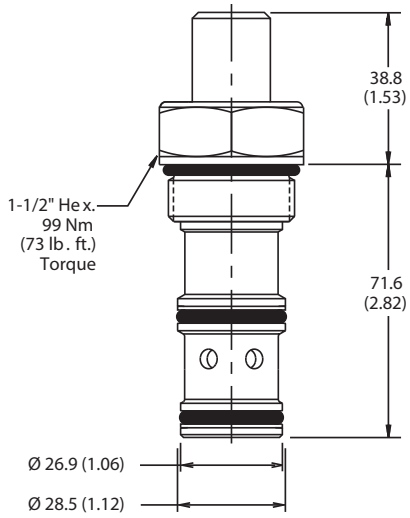
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Screw/Knob Version



Tamper Resistant Version

Ordering Information

PRH162			
16 Size P.O. Pressure Reducing Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK16-3)**
V	Fluorocarbon / (SK16-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

Order Bodies Separately
See section BC

B16	–	3	–	
16 size		3-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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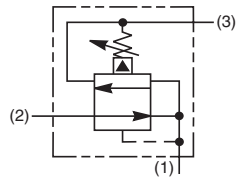
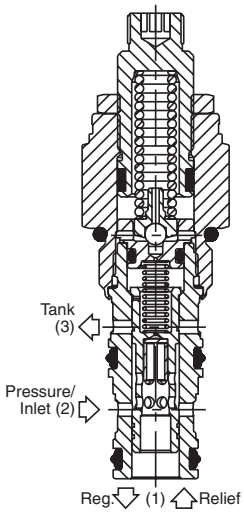
General Description

Pilot Operated Pressure Reducing/ Relieving Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided pilot for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane “D”-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris



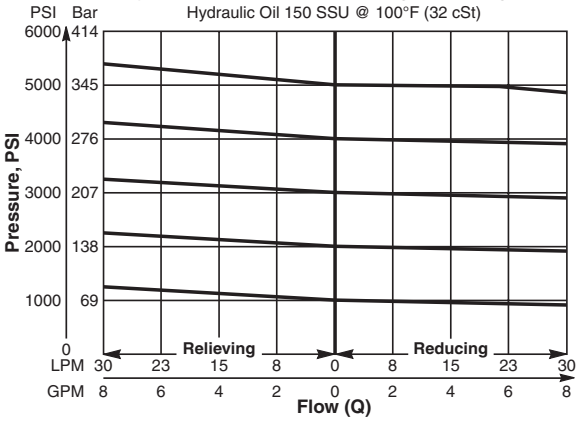


Specifications

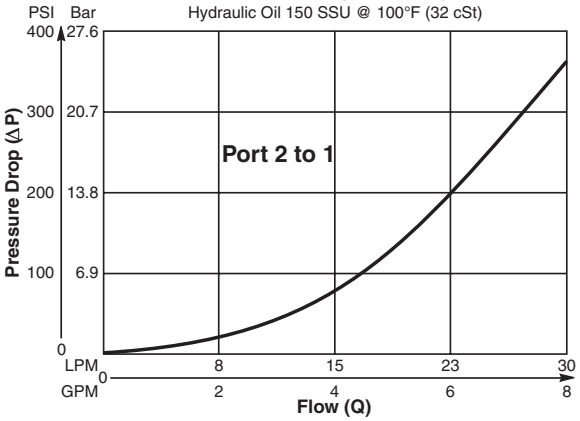
Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.56 LPM (0.15 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.11 kg (0.25 lbs.)
Cavity	C08-3 (See BC Section for more details)
Form Tool	Rougher NFT08-3R Finisher NFT08-3F

Performance Curves

Flow vs. Regulated Pressure (Through cartridge only)



Flow vs. Pressure Drop (Through cartridge only)



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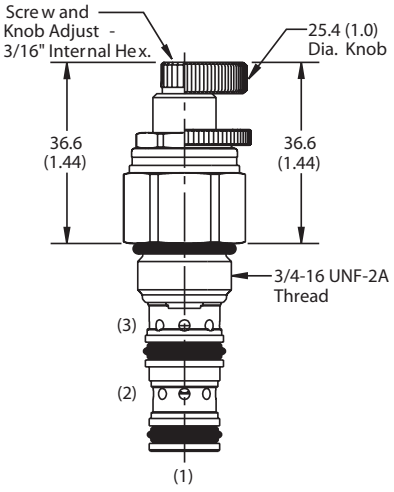
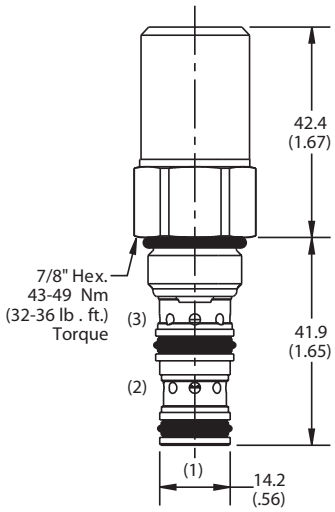
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

PRH081			
08 Size P.O. Pressure Reducing/Relieving Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (717943)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-3)**
N	Nitrile / (SK08-3)
V	Fluorocarbon / (SK08-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
30	**13.8 - 207 Bar (200 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**13.8 - 345 Bar (200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

NOTE: For settings below 20.7 Bar (300 PSI), flow rating is limited to 11.3 LPM (3 GPM).

Order Bodies Separately
See section BC

B08	–	3	–	
08 size		3-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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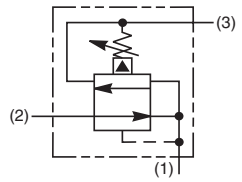
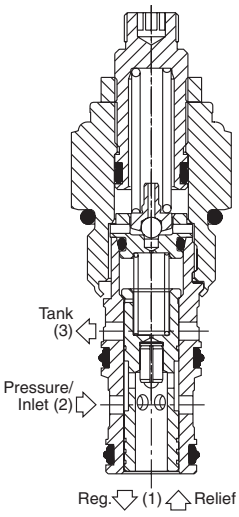
General Description

Pilot Operated Pressure Reducing/ Relieving Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistent reseat
- Steel adapters are zinc plated
- Polyurethane "D"-Ring eliminates backup rings and prevents hydrolysis
- Internal screening protects pilot spring from debris



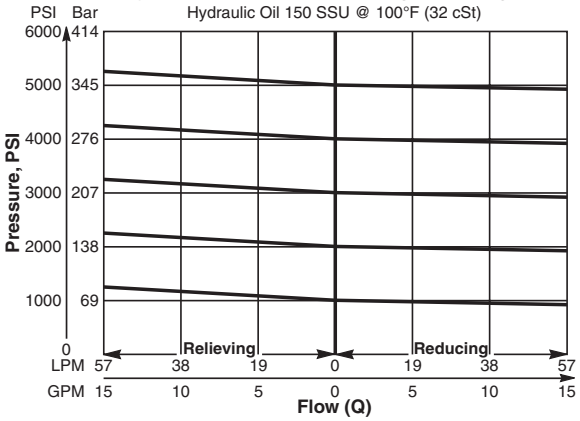


Specifications

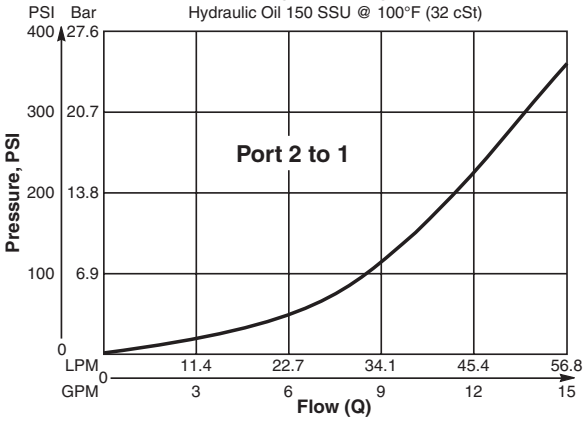
Rated Flow	56.3 LPM (15 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.94 LPM (0.25 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) -35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.5 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curves

Flow vs. Regulated Pressure (Through cartridge only)



Pressure vs. Flow (Through cartridge only)



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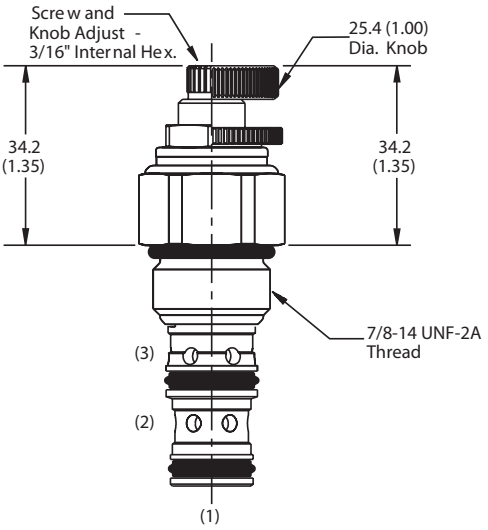
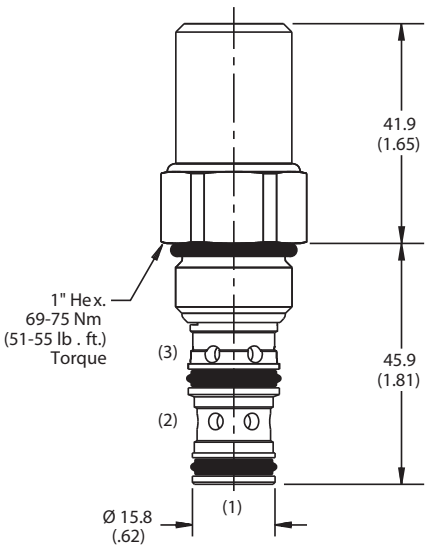
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Screw/Knob Version



Tamper Resistant Version

Ordering Information

PRH101			
10 Size P.O. Pressure Reducing / Relieving Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-10)
S	**Screw Adjust**
T	Tamper Resistant Cap (718083)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Code	Pressure Range
10	**13.7 - 69 Bar (200 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
30	**41.4 - 207 Bar (600 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**82.8 - 345 Bar (1200 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

NOTE: For settings below 20.7 Bar (300 PSI), flow rating is limited to 11.3 LPM (3 GPM).

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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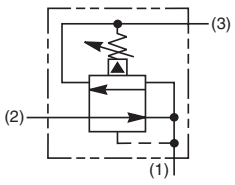
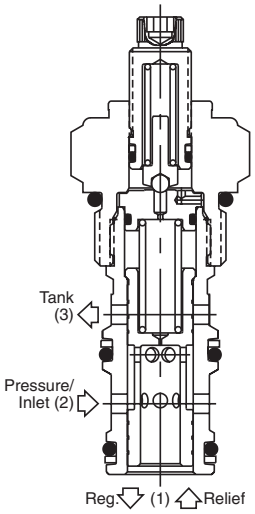
General Description

Pilot Operated Pressure Reducing/Relieving Valve. For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Ball-type pilot for added stability
- Full capacity reducing/relieving
- Performs job of two separate valves in one
- All external parts zinc plated





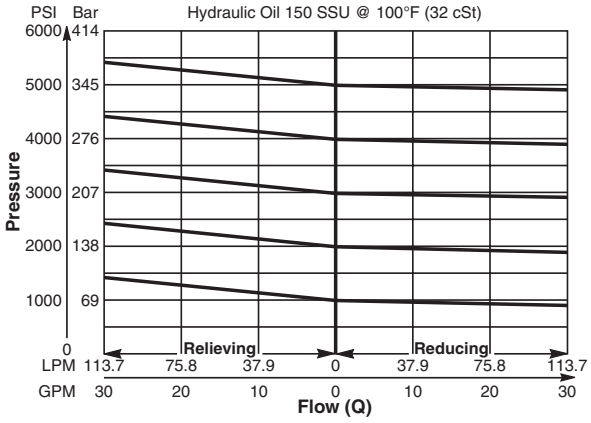
Specifications

Rated Flow	113.7 LPM (30 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 23 Bar (334 PSI) **30** 60 Bar (870 PSI) **50** 118 Bar (1711 PSI
Maximum Tank Pressure	350 Bar (5000 PSI)
Maximum Drain Flow	0.94 LPM (0.25 GPM)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.27kg (0.6 lbs.)
Cavity	C12-3 (See BC Section for more details)
Form Tool	Rougher NFT12-3R Finisher NFT12-3F

Performance Curve

Flow vs. Regulated Pressure

(Pressure rise through cartridge only)



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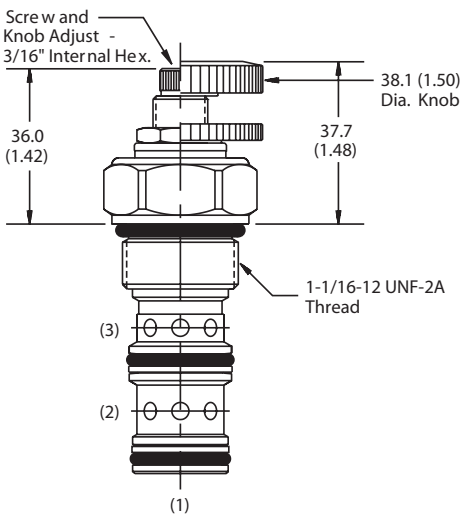
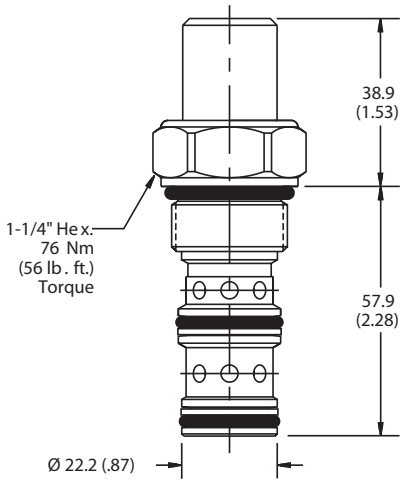
Dimensions Millimeters (Inches)



Screw/Knob Version



Tamper Resistant Version

THIRD-ANGLE PROJECTION

Ordering Information

PRH121			
12 Size P.O. Pressure Reducing/Relieving Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Seals / Kit No.
Omit	**Nitrile / (SK12-3)**
V	Fluorocarbon / (SK12-3V)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

Order Bodies Separately
See section BC

B12	–	3	–	
12 size		3-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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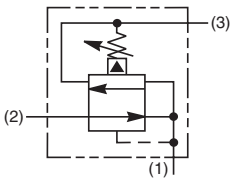
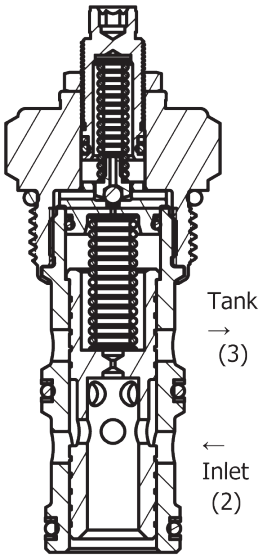
General Description

Pilot Operated Pressure Reducing/Relieving Valve.
For additional information see Technical Tips on pages PC1-PC6.

Features

- Hardened, precision ground parts for durability
- Low profile adapter for minimal space requirements
- Fully guided poppet for more consistant reseat
- All external parts zinc plated





Reg. ↓ (1) ↑ Relief

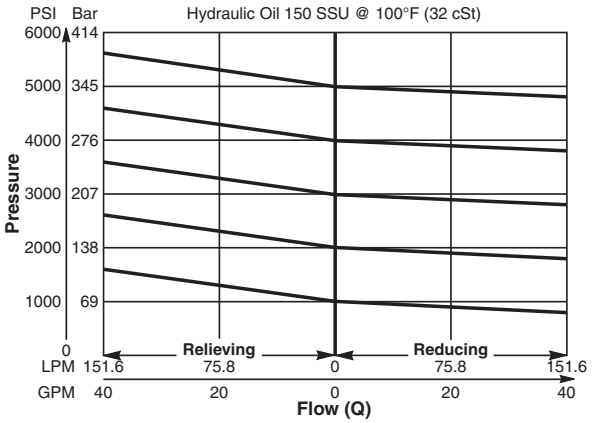
Specifications

Rated Flow	151.4 LPM (40 GPM)
Maximum Inlet Pressure	380 Bar (5500 PSI)
Maximum Pressure Setting	350 Bar (5000 PSI)
Sensitivity: Pressure/Turn	**10** 19.6 Bar (285 PSI) **20** 39.3 Bar (570 PSI) **30** 58.9 Bar (859 PSI) **50** 131.7 Bar (1910 PSI)
Maximum Tank Pressure	350 Bar (5000 PSI)
Reseat Pressure	90% of crack pressure
Leakage at 150 SSU (32cSt)	5cc per 6.8 Bar (100 PSI) setting
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.34kg (0.75 lbs.)
Cavity	C16-3 (See BC Section for more details)

Performance Curve

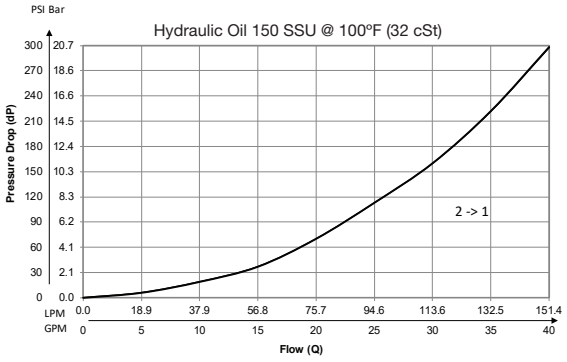
Flow vs. Regulated Pressure

(Pressure rise through cartridge only)



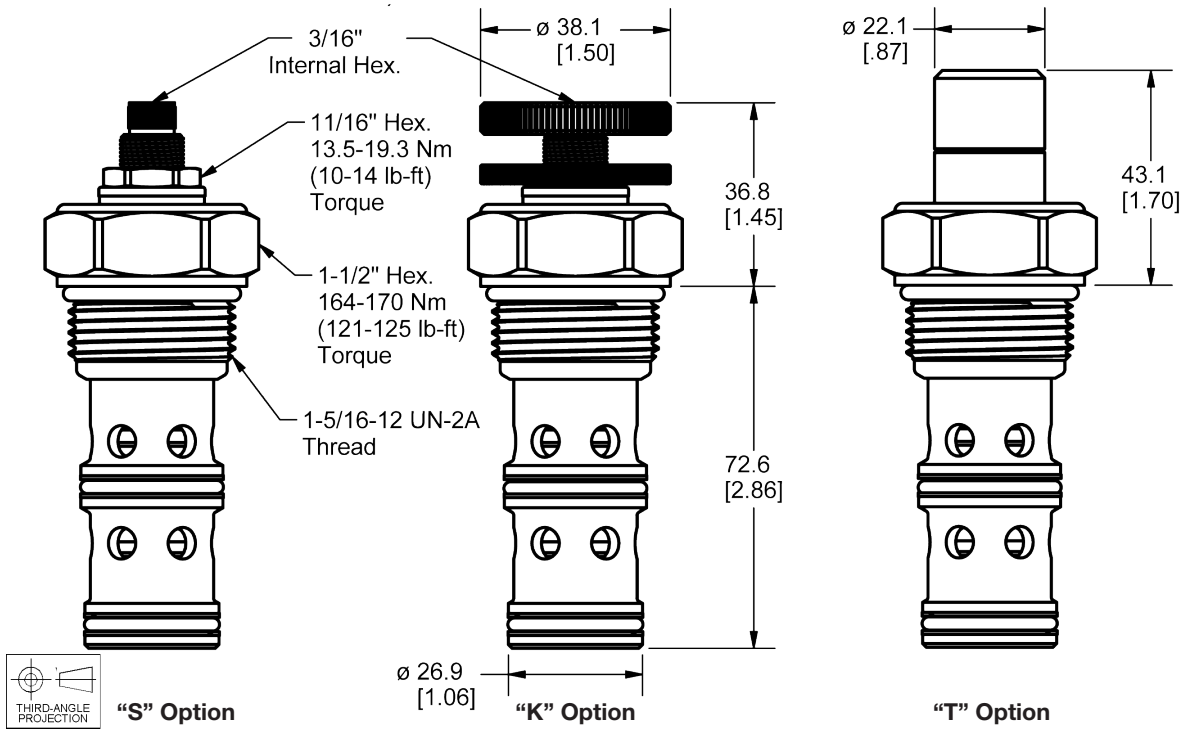
Pressure Drop vs. Flow

(Through cartridge only)



Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

Dimensions Millimeters (Inches)



Ordering Information

PRH161			
16 Size P.O. Pressure Reducing/Relieving Valve	Adjustment Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Adjustment Style / Kit No.
K	Knob Adjust (717784-15)
S	**Screw Adjust**
T	Tamper Resistant Cap (717785)

Code	Pressure Range
10	**6.9 - 69 Bar (100 - 1000 PSI) Standard Setting: 34.5 Bar (500 PSI)**
20	**13.8 - 138 Bar (200 - 2000 PSI) Standard Setting: 69 Bar (1000 PSI)**
30	**20.7 - 207 Bar (300 - 3000 PSI) Standard Setting: 103.5 Bar (1500 PSI)**
50	**34.5 - 345 Bar (500 - 5000 PSI) Standard Setting: 172.4 Bar (2500 PSI)**

Code	Seals / Kit No.
Omit	**Nitrile / (SK16-3)**
V	Fluorocarbon / (SK16-3V)

Order Bodies Separately
See section BC

B16	–	3	–	
16 size		3-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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Contents

Logic Elements

SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
Technical Tips					LE1-LE6
POPPET TYPE					
10SLC1-A	C10-3S	Normally Closed, Pilot to Close	57/15	240/3500	LE7
16SLC1-A	C16-3S	Normally Closed, Pilot to Close	189/50	240/3500	LE8
20SLC1-A	C20-3S	Normally Closed, Pilot to Close	303/80	240/3500	LE9
SPOOL TYPE					
10SLC2-A	C10-3S	Normally Closed, Pilot to Close	57/15	240/3500	LE10
16SLC2-A	C16-3S	Normally Closed, Pilot to Close	189/50	240/3500	LE11
20SLC2-A	C20-3S	Normally Closed, Pilot to Close	303/80	240/3500	LE12
10SLC2-B	C10-3S	Normally Closed, Vent to Open	57/15	240/3500	LE13
16SLC2-B	C16-3S	Normally Closed, Vent to Open	189/50	240/3500	LE14
20SLC2-B	C20-3S	Normally Closed, Vent to Open	303/80	240/3500	LE15
10SLC3-A	C10-3S	Normally Open, Vent to Close	57/15	240/3500	LE16
16SLC3-A	C16-3S	Normally Open, Vent to Close	189/50	240/3500	LE17
10SLC3-B	C10-3S	Normally Open, Vent to Close	57/15	240/3500	LE18
16SLC3-B	C16-3S	Normally Open, Vent to Close	189/50	240/3500	LE19

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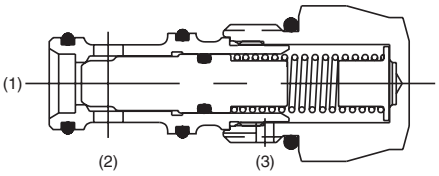
INTRODUCTION:

Parker's logic valves offer system designers a versatile range of screw-in elements that, when used in the proper combinations, can provide flexible design solutions for many common cartridge valve applications. They offer system designers the advantage of applying cartridge valve technology in applications where the flow and pressure conditions may exceed the limits of typical cartridge valves. Logic valves are essentially high flow poppet or spool elements that are controlled by small pilot devices. They can be used to control flow, pressure, or direction, and when applied in the proper arrangements, can perform multi-task control functions. Parker's logic valves offer system designers alternative products that can help reduce the size, cost, and complexity of integrated manifold systems.

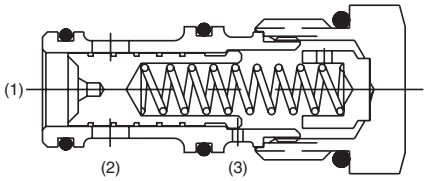
NEW PRODUCTS:

Parker Logic Valves are offered in two basic categories: Poppet and Spool.

Poppet Type - Used for flow switching directional control applications.

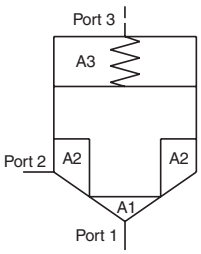


Spool Type - Used for pressure sensing in modulating applications to regulate flow and pressure.



PRODUCT TYPES / APPLICATIONS

POPPET TYPE



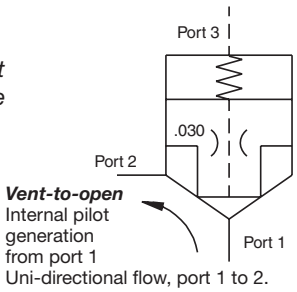
A1 + A2 = A3

Poppet type logic valves are 3 ported, 2-way on/off valves that switch flow between port 1 and port 2. The poppet's on/off action is operated by controlling pilot oil at port 3 of the valve. A small low flow solenoid or pilot valve is an ideal control for this purpose. Parker offers vent-to-open and pilot-to-close style poppet logic valves.

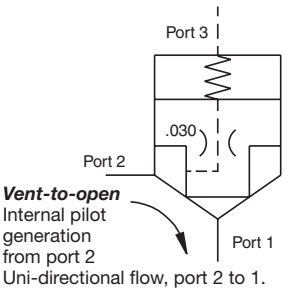
Note: *Poppet logic valves are an unbalanced 2:1 ratio poppet design. The opening and closing of the poppet is dependent on the force balances on the areas of the poppet at port 1, port 2, and port 3.*

Vent-to-open logic valves:

Vent-to-open logic valves are primarily used for uni-directional switching applications. The poppet in the vent-to-open logic valve is spring biased to the closed condition. The pilot oil source that operates the logic element is generated internally by direct pressure from either work port 1 or 2, depending on the option chosen. Venting the pilot oil at port 3 allows the valve to open and pass flow between port 1 and 2 at the bias spring setting. Blocking the pilot at port 3 causes the valve to close. When closed, the 2:1 ratio poppet design provides a positive low leak seal. Because the pilot source is generated internally within the valve, vent-to-open logic valves are best suited for uni-directional applications.



Vent-to-open
Internal pilot generation from port 1
Uni-directional flow, port 1 to 2.



Vent-to-open
Internal pilot generation from port 2
Uni-directional flow, port 2 to 1.

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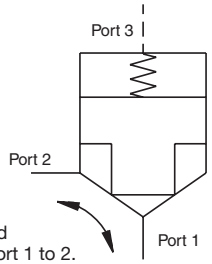
POPPET TYPE *Continued*

Pilot-to-close logic valve:
Pilot-to-close logic elements are primarily used for bi-directional flow switching applications. The poppet in the pilot-to-close logic valve is spring biased to the closed condition. With no pilot signal at port 3, the valve will open allowing flow in either direction between work ports 1 and 2 once pressure at one of the work ports reaches the biased spring setting. Appling a sufficient externally generated pilot force to port 3 of the valve closes the poppet creating a low leak seal between port 1 and port 2.



Pilot-to-close
External pilot required
Bi-directional flow, port 1 to 2.

2-way, 3-way, and 4-way Directional Control:
Poppet logic valves are typically used to perform high flow directional switching operations using small low power pilot valves to control the sequence of the directional operation.

- A single logic valve can be used to control 2-way, on/off switching.
- Multiple elements in a bridge arrangement can control 3-way or 4-way directional switching.
- Since each logic valve is individually controlled, the timing, sequence, and overlap of directional functions can be controlled very precisely.
- Uni-directional or bi-directional flow can be achieved, depending on the valve selected.
- Flows in excess of 80 gpm can be controlled through a single logic element, and more than one logic valve can be used in parallel to control flow in excess of the rated flow of a single element.
- Poppet construction provides a low leak directional control.

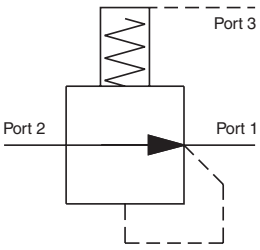
(See circuit examples on pages LE4-LE5)

SPOOL TYPE

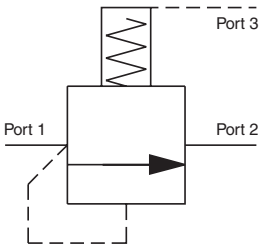
Spool type logic valves can also be used for directional switching, however, they are typically used in modulating applications to control flow or regulate pressure. Virtually any pressure or flow control function can be achieved with a spool type logic valve including; restrictive or priority flow control, pressure relief, pressure reducing, sequencing, and unloading.

The spools in this category of logic valves are balanced designs; the spool area at the work port (port 1) and the pilot port (port 3) are equal (1:1). The spool is held in a biased condition by a spring. Venting the pilot at port 3 creates an unbalanced condition causing the valve spool to modulate open or close, depending on the valve chosen. This spool design makes the valve vary stable because the forces acting to open and close the valve are in balance.

Flow Control / Compensators:
Parker offers two types of logic valves for flow control functions.
1) Normally open spools function as a restrictive type compensator.
2) Normally closed spools function as a priority or by-pass compensator.



Normally open spool



Normally closed spool

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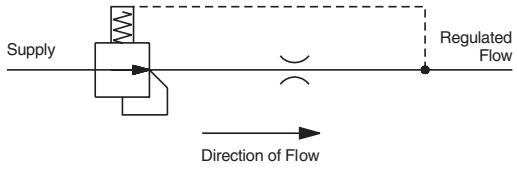
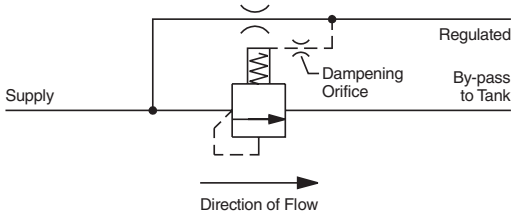
Technical Tips

Logic Elements

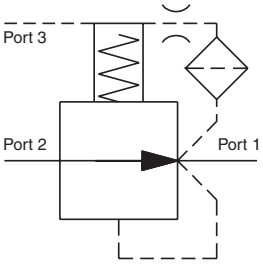
Restrictive Flow Regulator:
Normally open spool type logic elements can be used with an external orifice or valve as a compensator to regulate flow. Used as restrictive compensator, a normally open spool senses the upstream and downstream pressure across an orifice or valve. The spool modulates closed to maintain a constant pressure drop across the controlled device equal to the bias spring in the logic valve, thus maintaining a constant flow rate regardless of changes in upstream or downstream pressure.



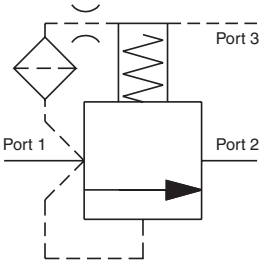
Priority / Bypass Flow Regulator:
A logic valve with a normally closed spool can be used as a priority or by-pass compensator. In this case, the spool modulates open to maintain a constant pressure drop across the controlled orifice or valve, thereby maintaining a constant priority flow regardless of upstream or downstream pressure changes. In a priority arrangement, any oil that doesn't saturate the controlled device is by-passed at load pressure plus the value of the bias spring in the logic valve.



Pressure Control:
Spool type logic valves can be used as the main stage spool in high flow pressure control applications with the logic valve handling the high flow, and a small pilot valve controlling the action of the logic valve spool. Normally open, and normally closed spool options are available enabling virtually all pressure control functions to be achieved. When used in pressure control applications, the logic valve spool modulates open or closed to maintain the pressure setting of the pilot valve communicated to port 3. Pressure control applications require a pilot connection between the control port (port 1 or 2), and the pilot port (port 3). In order to simplify the design, Parker offers spool type logic valves with internal piloting options that can help minimize the number of connections needed. When used in manifold systems, the internal piloting options help to simplify the manifold design by reducing the number of construction drillings in the block. Multiple functions such as relief, pump unloading, and pressure compensation can be performed with one logic valve by communicating multiple pilot devices to the same logic element.



Normally open spool
- Pressure Reducing



Normally closed spool
- Relief
- Sequence
- Unloading

(See circuit examples on page LE6)

Application Note:
This section is as an application guide, and it is intended to illustrate the various ways that logic elements can be used to create a variety of hydraulic control functions. For additional help applying logic valves, contact your Parker Sales Engineer.

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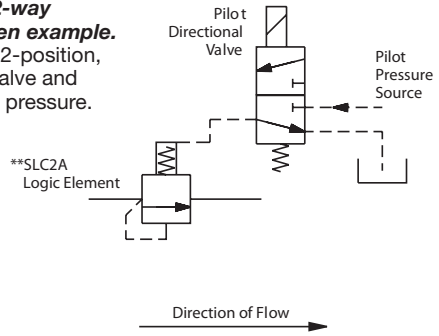
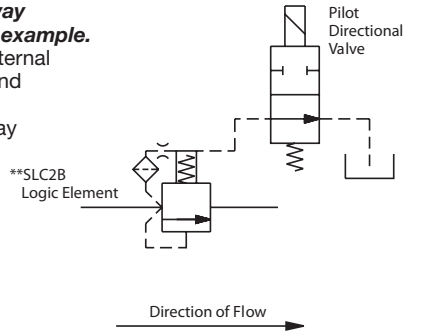
DIRECTIONAL CONTROL EXAMPLES

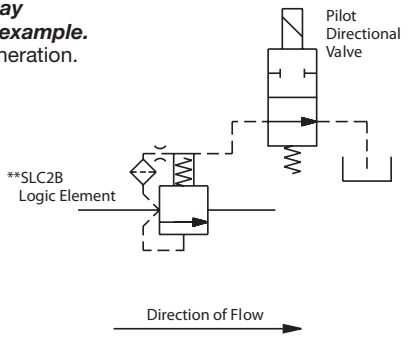
2-position, 2-way normally open example.
Switched by 2-position, 3-way pilot valve and external pilot pressure.



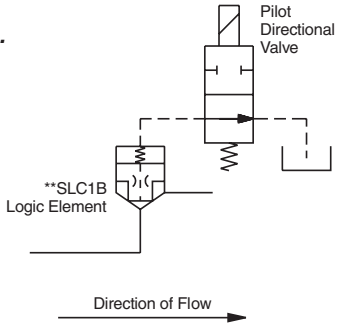
2-position, 2-way normally open example.
Switched by external pilot pressure and vented through 2-position, 2-way pilot valve.



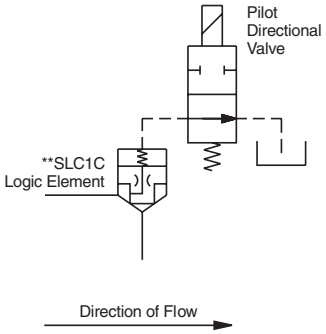
2-position, 2-way normally open example.
Internal pilot generation.



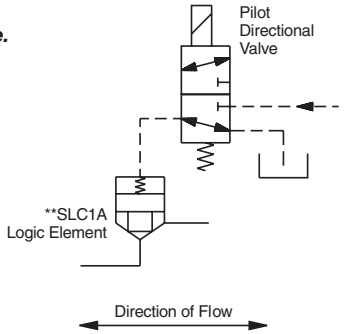
2-position, 2-way normally open example.
Internal pilot generation.



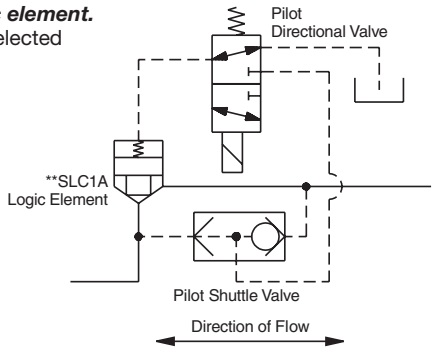
2-position, 2-way normally open example.
Internal pilot generation.



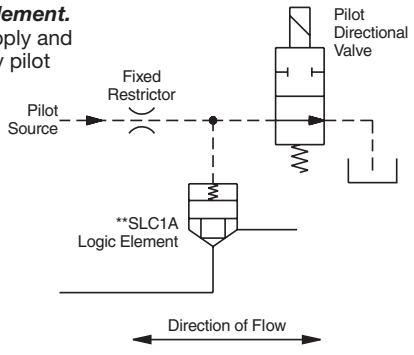
2-position, 2-way normally open example.
Switched by 2-position, 3-way pilot valve and external pilot.



*****SLC1A logic element.***
With shuttle-selected pilot supply.



*****SLC1A logic element.***
External pilot supply and 2-position, 2-way pilot directional valve.



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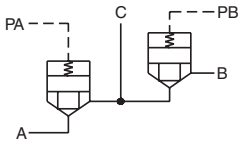
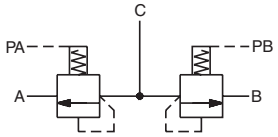
DIRECTIONAL CONTROL EXAMPLES

THREE-WAY BRIDGE CIRCUITS

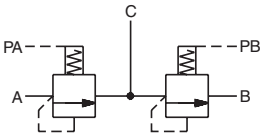
Circuit 1, with **SLC1A poppet logic element.



Circuit 2, with **SLC2A spool logic element.



Circuit 3, with **SLC2A spool logic element.

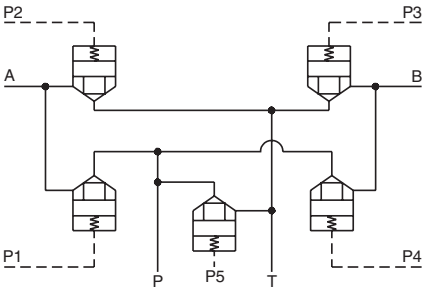


Required Flow Path	Pilot Pressure Applied To		Available From Circuit			Required Flow Path	Pilot Pressure Applied To		Available From Circuit		
	PA	PB	1	2	3		PA	PB	1	2	3
	NO	NO	X	X			NO	YES	X	X	
	YES	NO	X	X	X		NO	YES	X		X

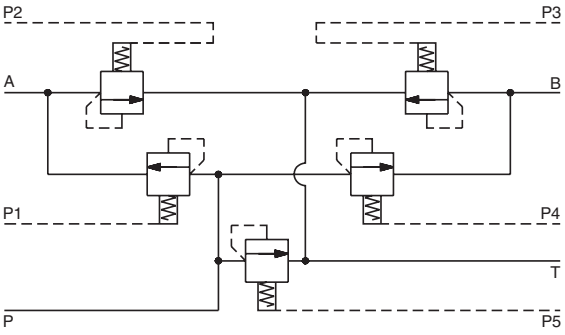
***NOTE:** Pilot pressure must exceed load pressure in order for valve to close.*

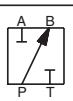
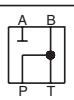
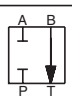
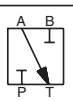
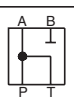
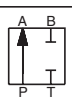
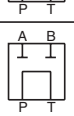
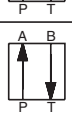
FOUR-WAY BRIDGE CIRCUITS

Circuit 1, with **SLC1A poppet logic elements.



Circuit 2, with **SLC2A spool logic elements.



Required Flow Path	Pilot Pressure Applied To					Required Flow Path	Pilot Pressure Applied To					Required Flow Path	Pilot Pressure Applied To				
	P1	P2	P3	P4	P5		P1	P2	P3	P4	P5		P1	P2	P3	P4	P5
	YES	YES	YES	YES	YES		YES	NO	NO	YES	YES		YES	NO	YES	NO	YES
	NO	NO	NO	NO	NO		NO	YES	YES	NO	YES		YES	YES	YES	NO	YES
	YES	YES	NO	NO	NO		YES	YES	NO	YES	YES		YES	NO	YES	YES	YES
	NO	NO	YES	YES	NO		NO	YES	YES	YES	YES						
	YES	YES	YES	YES	NO		NO	YES	NO	YES	YES						

***NOTE:** Pilot pressure must exceed load pressure in order for valve to close.*

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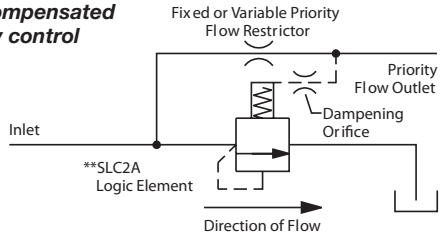
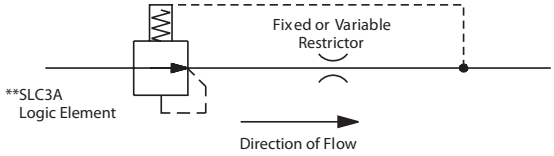
FLOW CONTROL EXAMPLES

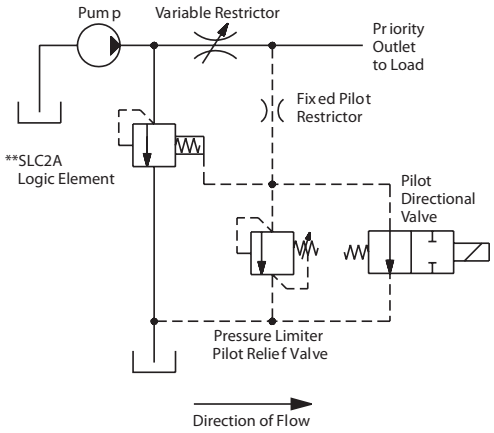
Pressure compensated priority flow control example.



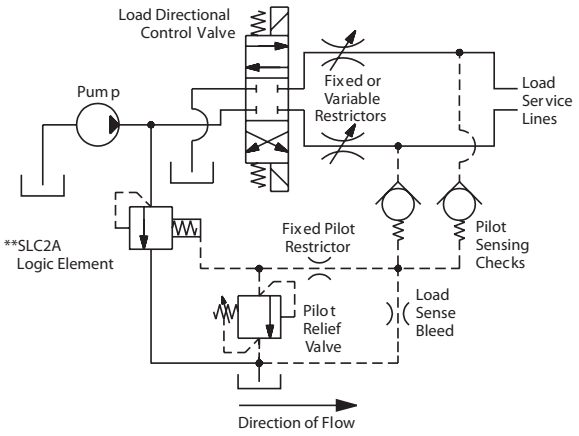
Pressure compensated restrictive flow control example.



Load sensing priority flow control example with pressure limiting and unloading.

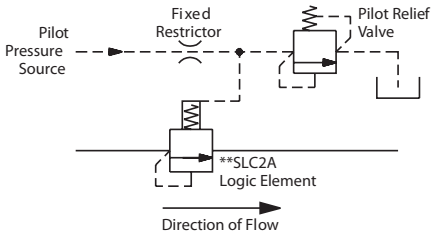


Load sensing priority flow control example with pressure limiter.

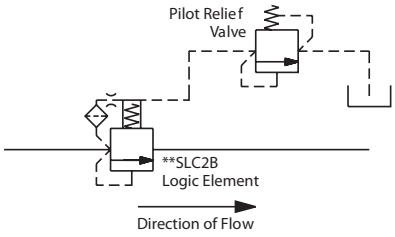


PRESSURE CONTROL EXAMPLES

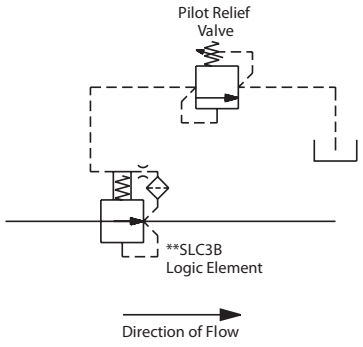
Pressure relief or sequence example with external pilot supply and pilot relief.



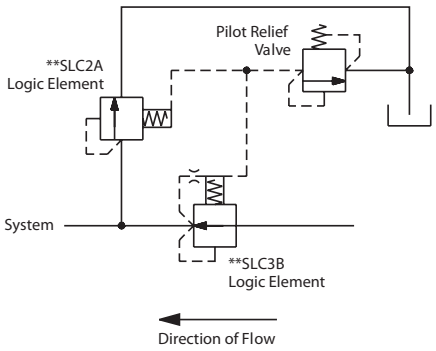
Pressure relief or sequence example with internal pilot supply and pilot relief.



Pressure reducing example, non-relieving type.



Pressure reducing-relieving example.



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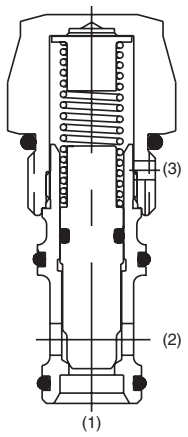
Poppet Type Logic Valve
Series 10SLC1-A

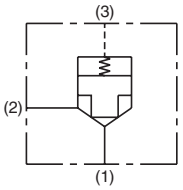
General Description

Poppet Type, Bi-Directional, Normally Closed, Pilot to Close Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

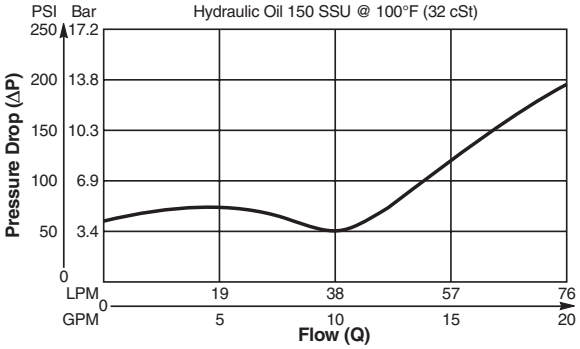
- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated





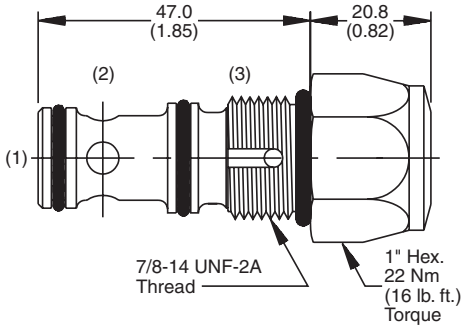
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.30 lbs.)
Cavity	C10-3S (See BC Section for more details)
Form Tool	Rougher NFT10-3SR Finisher NFT10-3SF

Ordering Information

10SLC1	–	A	–		
10 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
100	**6.9 Bar (100 PSI)**
150	**10.3 Bar (150 PSI)**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-10-3S)**
V	Fluorocarbon / (WRK-10-3S-W)

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General Description

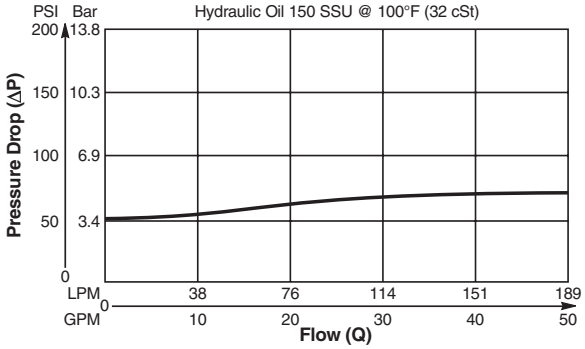
Poppet Type, Bi-Directional, Normally Closed, Pilot to Close Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

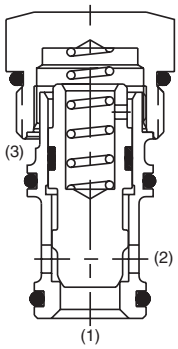
Performance Curve

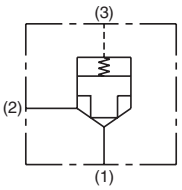
Pressure Drop vs. Flow (Through cartridge only)



Specifications

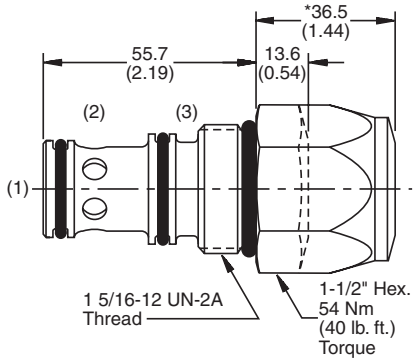
Rated Flow	189 LPM (50 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.33 kg (.78 lbs.)
Cavity	C16-3S (See BC Section for more details)
Form Tool	Rougher NFT16-3SR Finisher NFT16-3SF





Dimensions

Millimeters (Inches)



Ordering Information

16SLC1	–	A	–		
16 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
***100**	**6.9 Bar (100 PSI)**
***150**	**10.3 Bar (150 PSI)**

***Indicates larger cap height, see drawing.**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-16-3S)**
V	Fluorocarbon / (WRK-16-3S-W)

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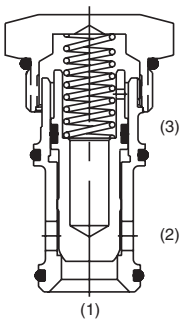
Poppet Type Logic Valve
Series 20SLC1-A

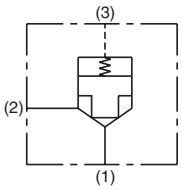
General Description

Poppet Type, Bi-Directional , Normally Closed, Pilot to Close Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

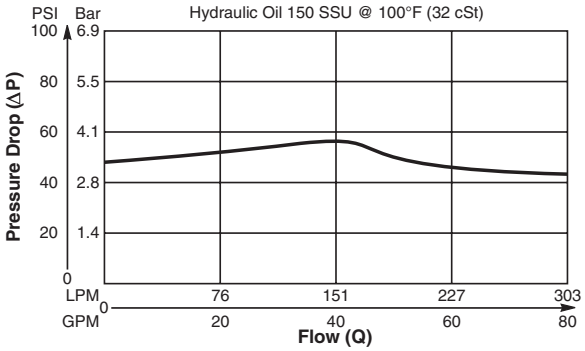
- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated





Performance Curve

Pressure Drop vs. Flow (Through cartridge only)

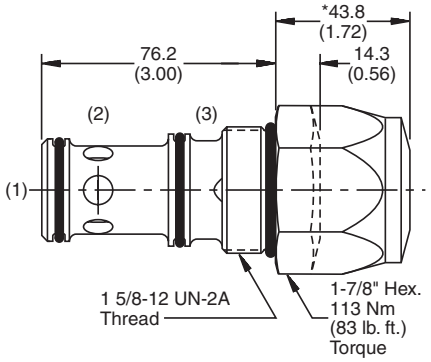


Specifications

Rated Flow	303 LPM (80 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.81 kg (1.78 lbs.)
Cavity	C20-3S (See BC Section for more details)
Form Tool	Rougher NFT20-3SR Finisher NFT20-3SF

Dimensions

Millimeters (Inches)



Ordering Information

20SLC1	–	A	–		
20 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
*75	5.2 Bar (75 PSI)
***100**	**6.9 Bar (100 PSI)**
***150**	**10.3 Bar (150 PSI)**

***Indicates larger cap height, see drawing.**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-20-3S)**
V	Fluorocarbon / (WRK-20-3S-W)

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General Description

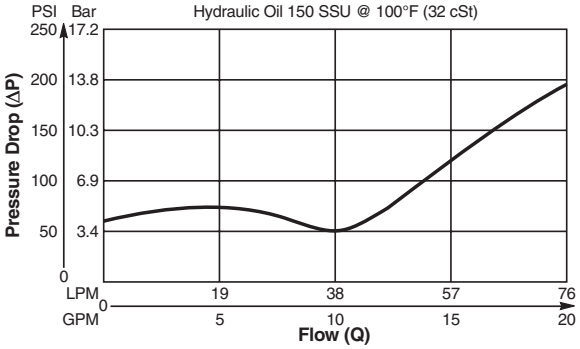
Spool Type, Normally Closed, Pilot to Close Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

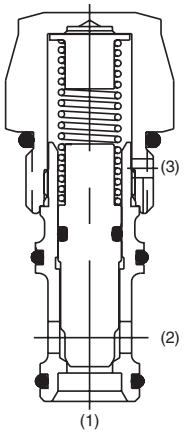
Performance Curve

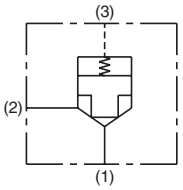
Pressure Drop vs. Flow (Through cartridge only)



Specifications

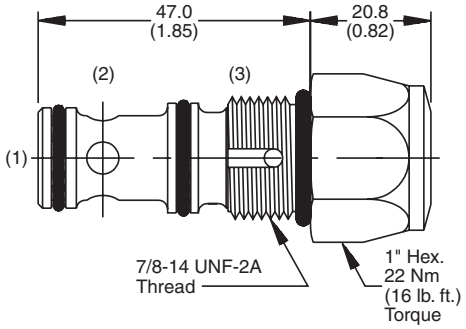
Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.30 lbs.)
Cavity	C10-3S (See BC Section for more details)
Form Tool	Rougher NFT10-3SR Finisher NFT10-3SF





Dimensions

Millimeters (Inches)



Ordering Information

10SLC2	–	A	–		
10 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
100	**6.9 Bar (100 PSI)**
150	**10.3 Bar (150 PSI)**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-10-3S)**
V	Fluorocarbon / (WRK-10-3S-W)

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General Description

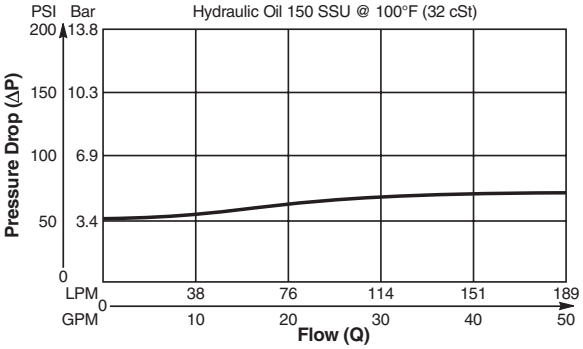
Spool Type, Normally Closed, Pilot to Close Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

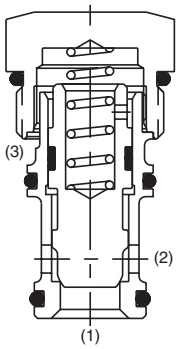
Performance Curve

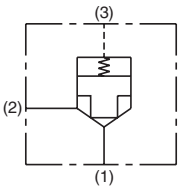
Pressure Drop vs. Flow (Through cartridge only)



Specifications

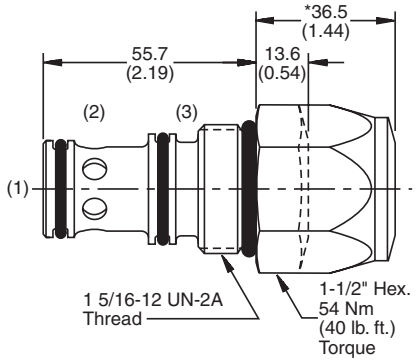
Rated Flow	189 LPM (50 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.33 kg (.78 lbs.)
Cavity	C16-3S (See BC Section for more details)
Form Tool	Rougher NFT16-3SR Finisher NFT16-3SF





Dimensions

Millimeters (Inches)



Ordering Information

16SLC2	–	A	–		
16 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
***100**	**6.9 Bar (100 PSI)**
***150**	**10.3 Bar (150 PSI)**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-16-3S)**
V	Fluorocarbon / (WRK-16-3S-W)

***Indicates larger cap height, see drawing.**

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General Description

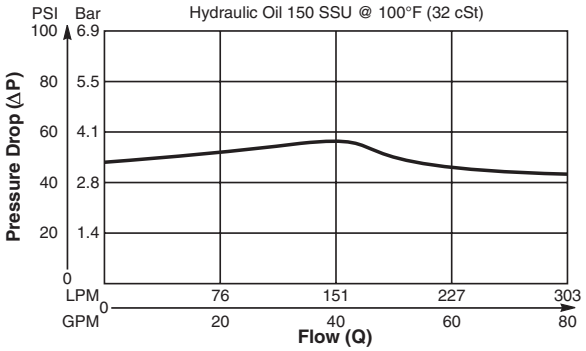
Spool Type, Normally Closed, Pilot to Close Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

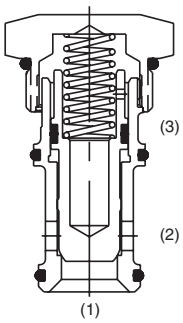
Performance Curve

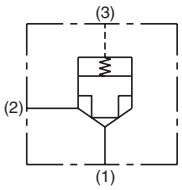
Pressure Drop vs. Flow (Through cartridge only)



Specifications

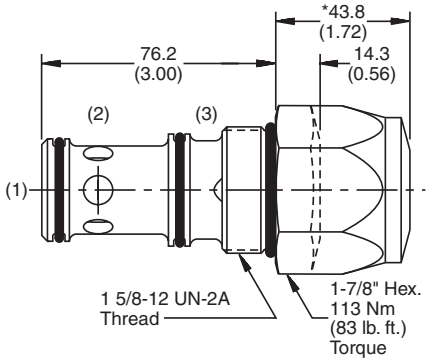
Rated Flow	303 LPM (80 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.81 kg (1.78 lbs.)
Cavity	C20-3S (See BC Section for more details)
Form Tool	Rougher NFT20-3SR Finisher NFT20-3SF





Dimensions

Millimeters (Inches)



Ordering Information

20SLC2	–	A	–		
20 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
*75	5.2 Bar (75 PSI)
***100**	**6.9 Bar (100 PSI)**
***150**	**10.3 Bar (150 PSI)**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-20-3S)**
V	Fluorocarbon / (WRK-20-3S-W)

***Indicates larger cap height, see drawing.**

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General Description

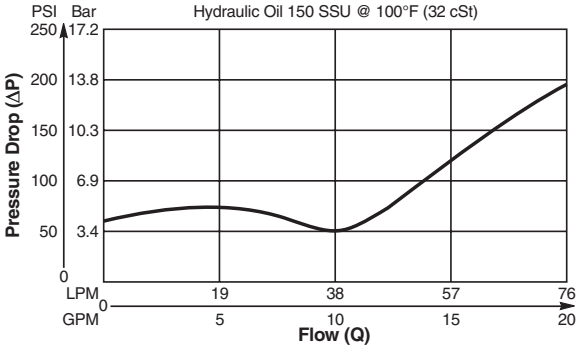
Spool Type, Normally Closed, Vent to Open Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

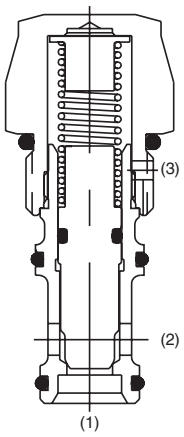
Performance Curve

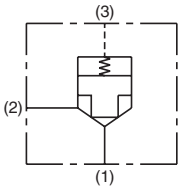
Pressure Drop vs. Flow (Through cartridge only)



Specifications

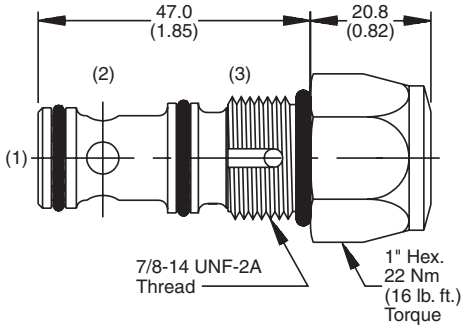
Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.30 lbs.)
Cavity	C10-3S (See BC Section for more details)
Form Tool	Rougher NFT10-3SR Finisher NFT10-3SF





Dimensions

Millimeters (Inches)



Ordering Information

10SLC2	–	B	–		
10 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
100	6.9 Bar (100 PSI)
150	10.3 Bar (150 PSI)

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-10-3S)**
V	Fluorocarbon / (WRK-10-3S-W)

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General Description

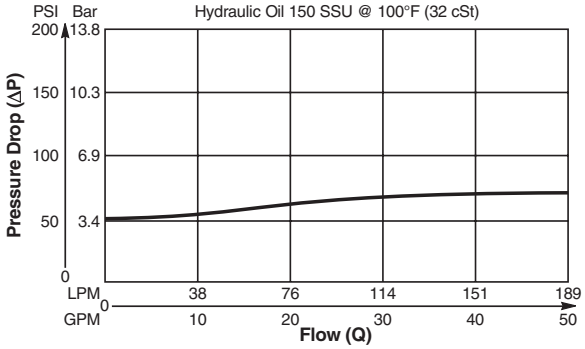
Spool Type, Normally Closed, Vent to Open Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

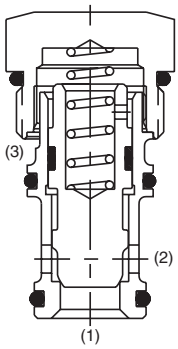
Performance Curve

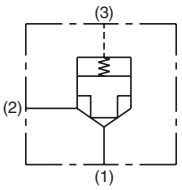
Pressure Drop vs. Flow (Through cartridge only)



Specifications

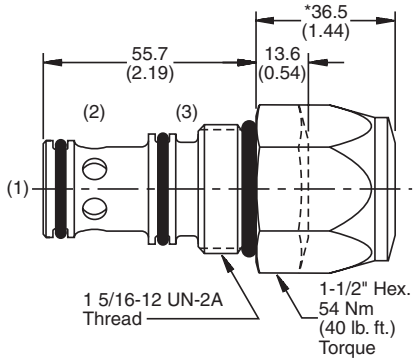
Rated Flow	189 LPM (50 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.33 kg (.78 lbs.)
Cavity	C16-3S (See BC Section for more details)
Form Tool	Rougher NFT16-3SR Finisher NFT16-3SF





Dimensions

Millimeters (Inches)



Ordering Information

16SLC2	–	B	–			
16 Size Logic Element		Poppet Bi-Directional		Bias Spring		Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
*100	6.9 Bar (100 PSI)
*150	10.3 Bar (150 PSI)

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-16-3S)**
V	Fluorocarbon / (WRK-16-3S-W)

***Indicates larger cap height, see drawing.**

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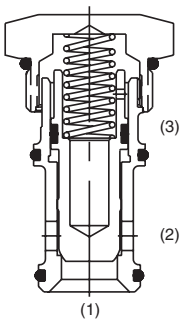
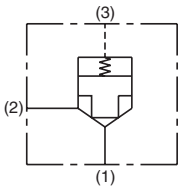
General Description

Spool Type, Normally Closed, Vent to Open Logic Element. For additional information see Technical Tips on pages LE1-LE6.

Features

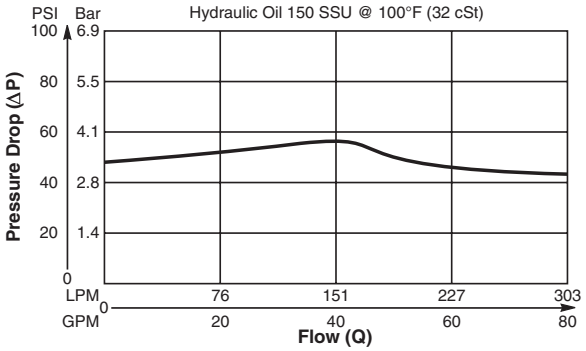
- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated





Performance Curve

Pressure Drop vs. Flow (Through cartridge only)

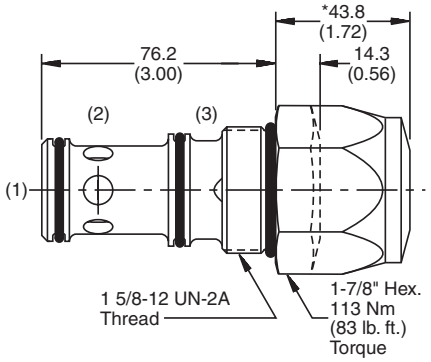


Specifications

Rated Flow	303 LPM (80 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.81 kg (1.78 lbs.)
Cavity	C20-3S (See BC Section for more details)
Form Tool	Rougher NFT20-3SR Finisher NFT20-3SF

Dimensions

Millimeters (Inches)



Ordering Information

20SLC2	–	B	–		
20 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
*75	5.2 Bar (75 PSI)
*100	6.9 Bar (100 PSI)
*150	10.3 Bar (150 PSI)

Code	Seals / Kit No.
Omit	Polyurethane, EPS (Std.)/ (WRK-20-3S)
V	Fluorocarbon / (WRK-20-3S-W)

***Indicates larger cap height, see drawing.**

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General Description

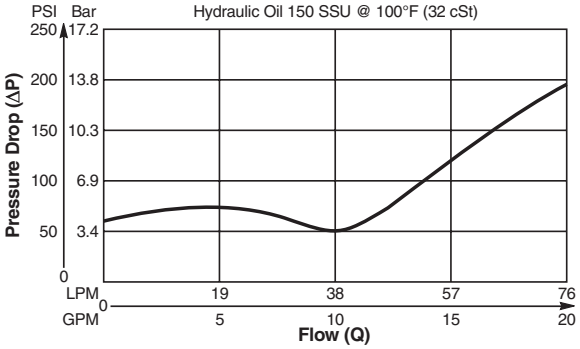
Spool Type, Normally Open, Logic Element. This type is ideal for flow control functions. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

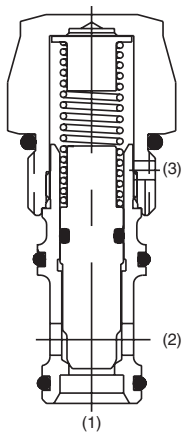
Performance Curve

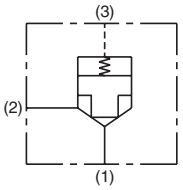
Pressure Drop vs. Flow (Through cartridge only)



Specifications

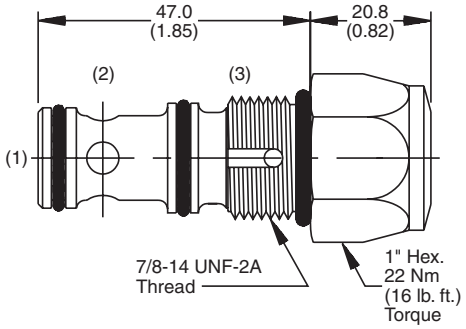
Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.30 lbs.)
Cavity	C10-3S (See BC Section for more details)
Form Tool	Rougher NFT10-3SR Finisher NFT10-3SF





Dimensions

Millimeters (Inches)



Ordering Information

10SLC3	–	A	–		
10 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
100	**6.9 Bar (100 PSI)**
150	**10.3 Bar (150 PSI)**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-10-3S)**
V	Fluorocarbon / (WRK-10-3S-W)

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Spool Type Logic Valve
Series 16SLC3-A

General Description

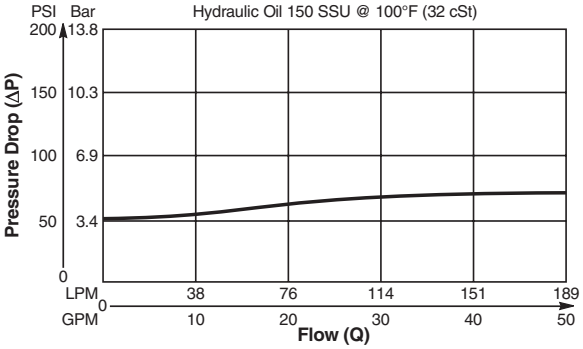
Spool Type, Normally Open Logic Element. This type is ideal for flow control functions. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

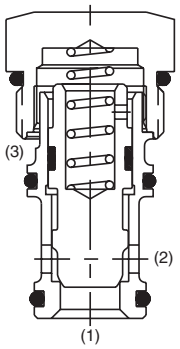
Performance Curve

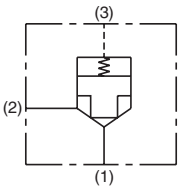
Pressure Drop vs. Flow (Through cartridge only)



Specifications

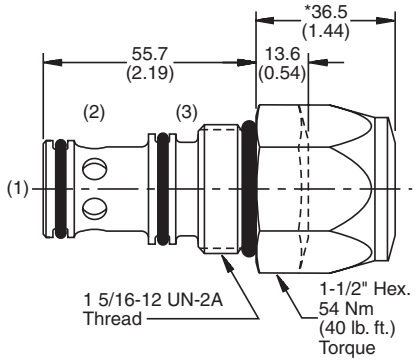
Rated Flow	189 LPM (50 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.33 kg (.78 lbs.)
Cavity	C16-3S (See BC Section for more details)
Form Tool	Rougher NFT16-3SR Finisher NFT16-3SF





Dimensions

Millimeters (Inches)



Ordering Information

16SLC3	–	A	–		
16 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
***100**	**6.9 Bar (100 PSI)**
***150**	**10.3 Bar (150 PSI)**

***Indicates larger cap height, see drawing.**

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-16-3S)**
V	Fluorocarbon / (WRK-16-3S-W)

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General Description

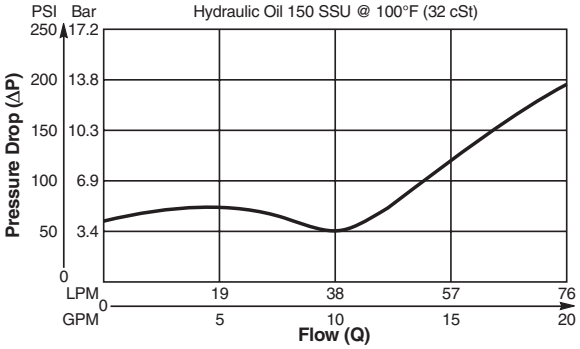
Spool Type, Normally Open, Vent to Close, Logic Element. This type is ideal for pressure reducing functions. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

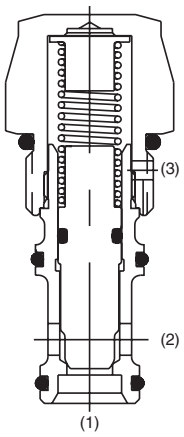
Performance Curve

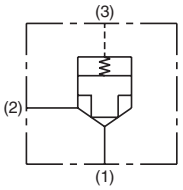
Pressure Drop vs. Flow (Through cartridge only)



Specifications

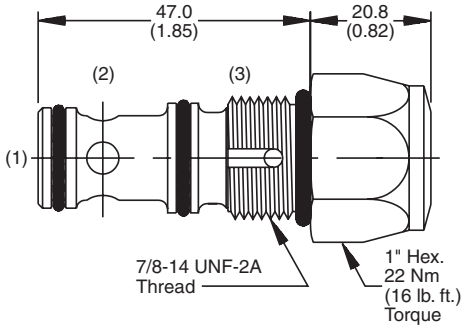
Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.30 lbs.)
Cavity	C10-3S (See BC Section for more details)
Form Tool	Rougher NFT10-3SR Finisher NFT10-3SF





Dimensions

Millimeters (Inches)



Ordering Information

10SLC3	–	B	–		
10 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
100	6.9 Bar (100 PSI)
150	10.3 Bar (150 PSI)

Code	Seals / Kit No.
Omit	**Polyurethane, EPS (Std.)/ (WRK-10-3S)**
V	Fluorocarbon / (WRK-10-3S-W)

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Spool Type Logic Valve
Series 16SLC3-B

General Description

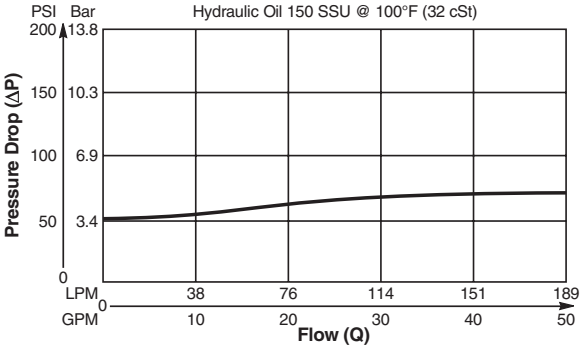
Spool Type, Normally Open, Vent to Close, Logic Element. This type is ideal for pressure reducing functions. For additional information see Technical Tips on pages LE1-LE6.

Features

- Hardened, precision ground parts for durability
- Polyurethane seals only
- No backup rings
- Low leakage design
- All external parts zinc plated

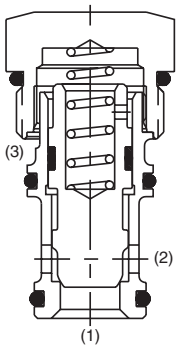
Performance Curve

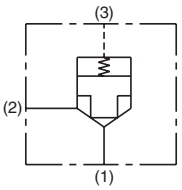
Pressure Drop vs. Flow (Through cartridge only)



Specifications

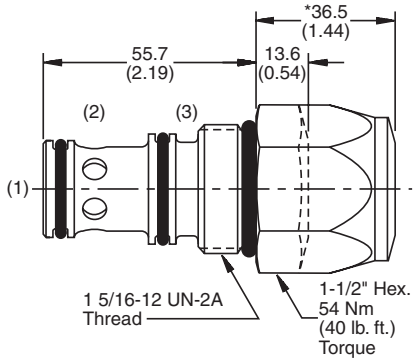
Rated Flow	189 LPM (50 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage @ 150 SSU (32 cst)	Port 1 to 2 5 drops/min. (.33 cc/min.) @ 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +107°C (Polyurethane,EPS) (-35°F to +225°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.33 kg (.78 lbs.)
Cavity	C16-3S (See BC Section for more details)
Form Tool	Rougher NFT16-3SR Finisher NFT16-3SF





Dimensions

Millimeters (Inches)



Ordering Information

16SLC3	–	B	–		
16 Size Logic Element		Poppet Bi-Directional		Bias Spring	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Bias Spring
25	1.7 Bar (25 PSI)
50	3.5 Bar (50 PSI)
75	5.2 Bar (75 PSI)
*100	6.9 Bar (100 PSI)
*150	10.3 Bar (150 PSI)

Code	Seals / Kit No.
Omit	Polyurethane, EPS (Std.)/ (WRK-16-3S)
V	Fluorocarbon / (WRK-16-3S-W)

***Indicates larger cap height, see drawing.**

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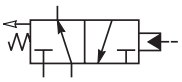
Contents

Directional Control Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	DH103	C10-4	3 Way, External Pilot, Normally Open, Vent to Atmosphere	38/10	240/3500	DC1-DC2
	N5A125	5A	3 Way, 2 Position, External Drain, Open Transition	160/42	420/6000	DC3
	N5A300	100-1	3 Way, 2 Position, External Drain, Open Transition	400/105	420/6000	DC4
	N5B125	5A	3 Way, 2 Position, External Drain, Closed Transition	160/42	420/6000	DC5
	N5B300	100-1	3 Way, 2 Position, External Drain, Closed Transition	400/105	420/6000	DC6

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General Description

3-Way Pilot Operated Spool Valve. The DH103A/B/C Series Valves are used in normally closed or normally open directional control three way circuits requiring remote pilot actuation. The DH103 Series Valves are used to direct flow alternately from either side of a closed loop transmission for cooling or filtering. All external parts are zinc plated.

Operation (pressure at port 4 additive to spring)

DH103A (Normally Open)

- Neutral (Deactivated)
  Port (3) open to port (2), port (4) is blocked.
- Activated with pilot pressure at port (1):
  Port (3) open to port (4), port (2) blocked.
  Note: There is an air breather vent plug in the end cap to allow for air pressure equalization in the spring chamber

DH103B (Normally Closed)

- Neutral (Deactivated)
  Port (4) open to port (3), port (2) is blocked.
- Activated with pilot pressure at port (1):
  Port (3) open to port (2), port (4) blocked.

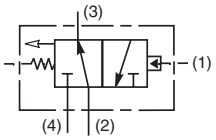
DH103C (Normally Open)

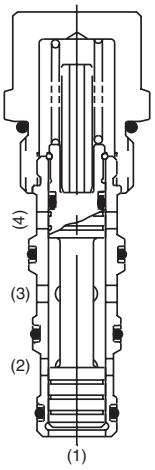
- Neutral (Deactivated)
  Port (3) open to port (2), port (4) is blocked.
- Activated with pilot pressure at port (1):
  Port (3) open to port (4), port (2) blocked.

Specifications

Nominal Flow	38 LPM (10 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Leakage at 150 SSU (32 cSt)	50 cc/min. at 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Fliltration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.5 lbs.)
Cavity	C10-4 (See BC Section for more details)
Form Tool	Rougher NFT10-4R Finisher NFT10-4F

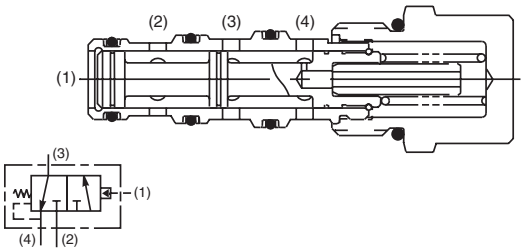
“A” SPOOL – DH103A



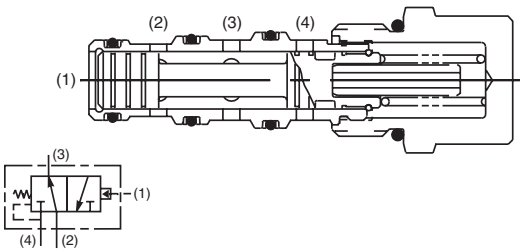


"A" SPOOL — DH103A

"B" SPOOL — DH103B



"C" SPOOL — DH103C



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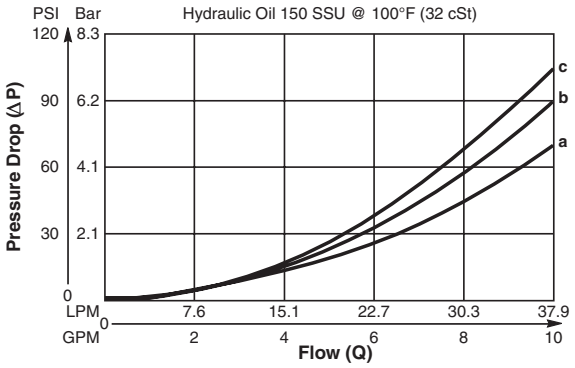
Performance Curve

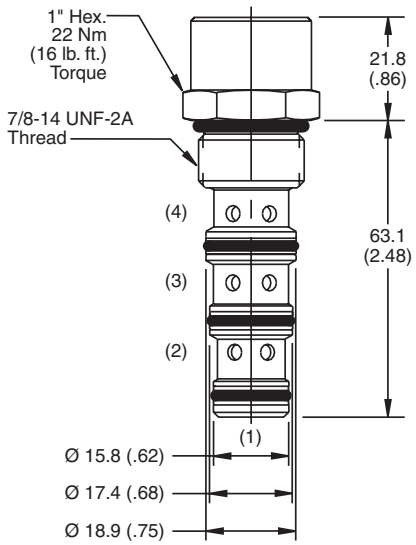
Flow vs. Pressure Drop (Through cartridge only)



FLOW DIRECTION \ SPOOL NO.	A	B	C
SPOOL SHIFTED	3 → 4 c	2 → 3 d	3 → 4 c
SPOOL NEUTRAL	2 → 3 a	3 → 4 b	2 → 3 a

Dimensions

Millimeters (Inches)



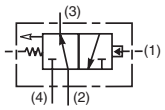
Ordering Information

DH103			
10 Size Pilot Operated Spool Valve	Spool Type	Shifting Pressure	Seals

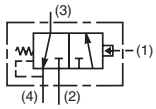
Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code / Spool Type

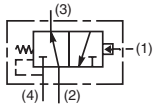
A
Normally open
2 position,
vent to atmosphere.



B
Normally closed
2 position,
internally drain.



C
Normally open,
2 position,
internally drain.



Code	Cracking Pressure
Omit	5.5 Bar (80 PSI)
04	2.8 Bar (40 PSI)
16	11 Bar (160 PSI)

Code	Seals / Kit No.
Omit	Nitrile / (SK10-4)
V	Fluorocarbon / (SK10-4V)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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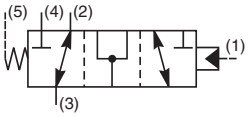
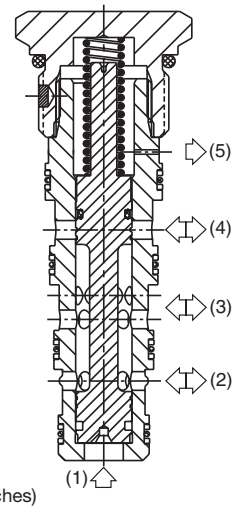
General Description

Pilot Operated Directional Valve, 3-Way, 2 Position, External Drain, Open Transition.

Features

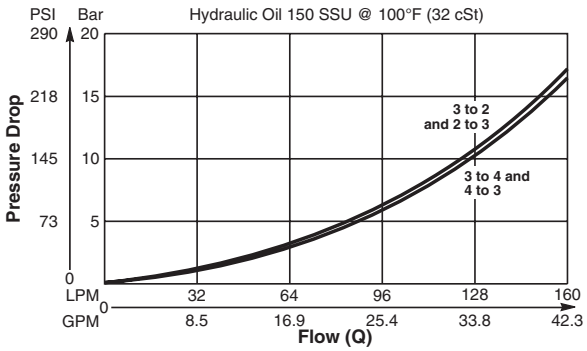
- High flow capacity
- Used as high flow switching or metering element
- Range of spring settings available
- All external parts zinc plated





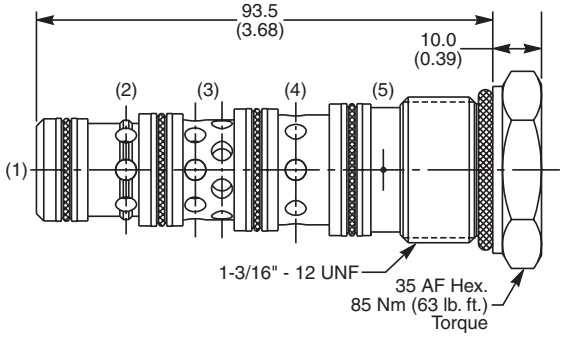
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Rated Flow	160 LPM (42.3 GPM)
Nominal Flow @ 7 Bar (100 PSI)	90 LPM (24 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Pilot Switching Pressure	See ordering information
Cartridge Material	Steel operating parts, hardened steel spool.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.33 kg (.76 lbs.)
Cavity	5A (See BC Section for more details)

Ordering Information

N5A125 – [ ] [ ]

Directional Valve (All Ports Open) | **Pilot Switching Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Switching Pressure
5.0	5.0 Bar (73 PSI)
6.9	**6.9 Bar (100 PSI) Std.**
10.0	**10.0 Bar (145 PSI)**
15.0	15.0 Bar (217 PSI)

If no switching pressure is specified, valve will be supplied as N5A125-6.9N

Code	Seals / Kit No.
N	**Nitrile, Buna-N / (SK30103N-1)**
V	Fluorocarbon / (SK30103V-1)

Order Bodies Separately
See section BC

LB10 Line Body | **321** Porting | [ ] Body Material

Code	Porting
321	3/4" SAE (main) 1/4" SAE (aux)

Code	Body Material
S	Steel (5000 PSI)
A	Aluminium (3000 PSI)

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General Description

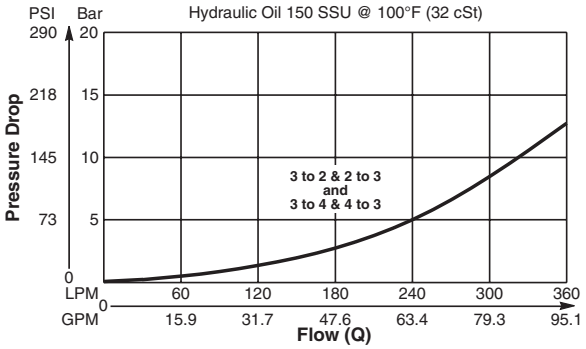
Pilot Operated Directional Valve, 3-Way, 2 Position, External Drain, Open Transition.

Features

- High flow capacity
- Used as high flow switching or metering element
- Range of spring settings available
- All external parts zinc plated

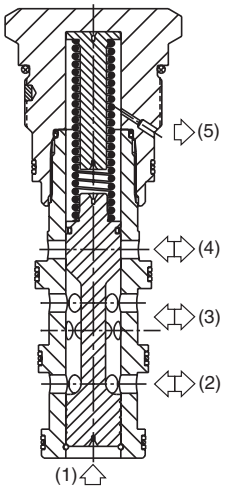
Performance Curve

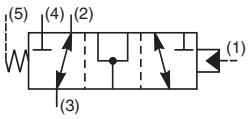
Pressure Drop vs. Flow (Through cartridge only)



Specifications

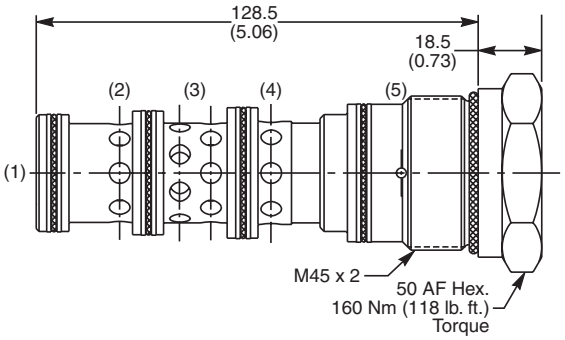
Rated Flow	400 LPM (105 GPM)
Nominal Flow @ 7 Bar (100 PSI)	270 LPM (71 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Pilot Switching Pressure	See ordering information
Cartridge Material	Steel operating parts, hardened steel spool.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	1.00 kg (2.2 lbs.)
Cavity	100-1 (See BC Section for more details)





Dimensions

Millimeters (Inches)



Ordering Information

N5A300	–		
Directional Valve (All Ports Open)		Pilot Switching Pressure	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Switching Pressure
6.9	6.9 Bar (100 PSI) Std.
10.0	10.0 Bar (145 PSI)

If no switching pressure is specified, valve will be supplied as N5A300-6.9N

Order Bodies Separately
See section BC

LB10	317	
Line Body	Porting	Body Material

Code	Porting
317	1-1/4″ SAE (main) 3/8″ SAE (aux)

Code	Seals / Kit No.
N	Nitrile, Buna-N / (SK30065N-1)
V	Fluorocarbon / (SK30065V-1)

Code	Body Material
S	Steel (5000 PSI)
A	Aluminium (3000 PSI)

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General Description

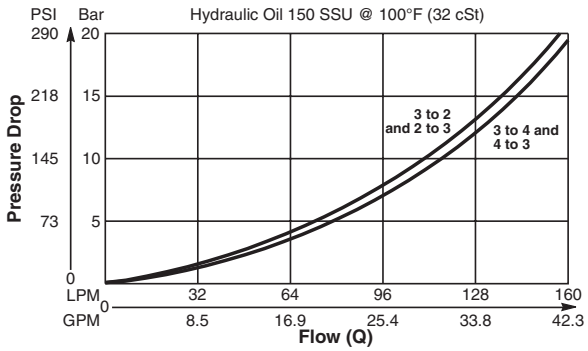
Pilot Operated Directional Valve, 3-Way, 2 Position, External Drain, Closed Transition.

Features

- High flow capacity
- Used as high flow switching or metering element
- Range of spring settings available
- All external parts zinc plated

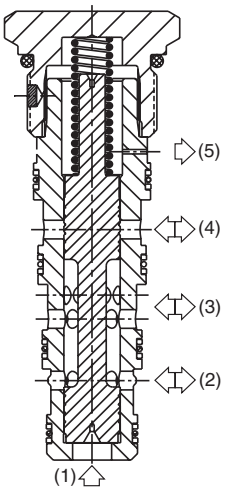
Performance Curve

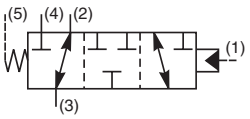
Pressure Drop vs. Flow (Through cartridge only)



Specifications

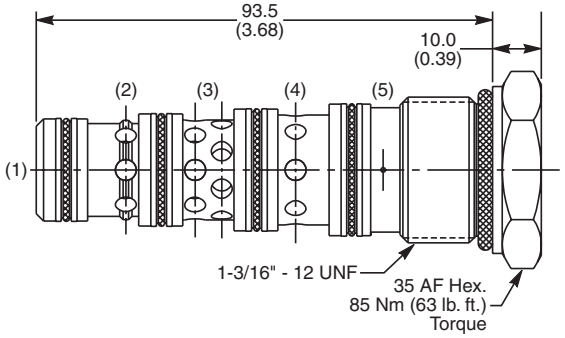
Rated Flow	160 LPM (42.3 GPM)
Nominal Flow @ 7 Bar (100 PSI)	90 LPM (24 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Pilot Switching Pressure	See ordering information
Cartridge Material	Steel operating parts, hardened steel spool.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.33 kg (.76 lbs.)
Cavity	5A (See BC Section for more details)





Dimensions

Millimeters (Inches)



Ordering Information

N5B125 – [ ] [ ]

Directional Valve (All Ports Closed) | **Pilot Switching Pressure** | **Seals**

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Switching Pressure
5.0	**5.0 Bar (73 PSI)**
6.9	**6.9 Bar (100 PSI) Std.**
10.0	10.0 Bar (145 PSI)

If no switching pressure is specified, valve will be supplied as N5B125-6.9N

Code	Seals / Kit No.
N	**Nitrile, Buna-N / (SK30103N-1)**
V	Fluorocarbon / (SK30103V-1)

Order Bodies Separately See section BC

LB10 (Line Body) | 321 (Porting) | [ ] (Body Material)

Code	Porting
321	3/4" SAE (main) 1/4" SAE (aux)

Code	Body Material
S	Steel (5000 PSI)
A	Aluminium (3000 PSI)

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General Description

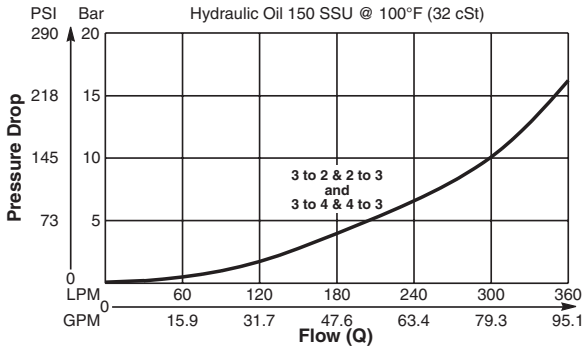
Pilot Operated Directional Valve, 3-Way, 2 Position, External Drain, Closed Transition.

Features

- High flow capacity
- Used as high flow switching or metering element
- Range of spring settings available
- All external parts zinc plated

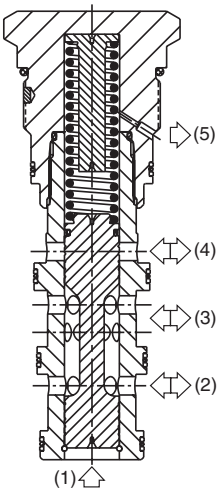
Performance Curve

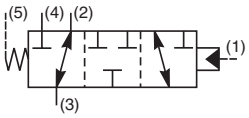
Pressure Drop vs. Flow (Through cartridge only)



Specifications

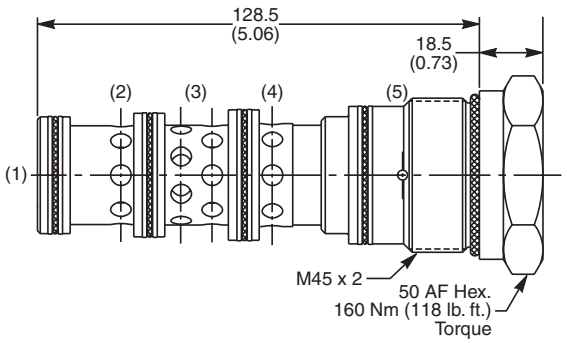
Rated Flow	400 LPM (105 GPM)
Nominal Flow @ 7 Bar (100 PSI)	270 LPM (71 GPM)
Maximum Inlet Pressure	420 Bar (6000 PSI)
Pilot Switching Pressure	See ordering information
Cartridge Material	Steel operating parts, hardened steel spool.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile, Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	1.00 kg (2.2 lbs.)
Cavity	100-1 (See BC Section for more details)





Dimensions

Millimeters (Inches)



Ordering Information

N5B300	–		
Directional Valve (All Ports Closed)		Pilot Switching Pressure	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Switching Pressure
3.0	**3.0 Bar (44 PSI)**
6.9	**6.9 Bar (100 PSI) Std.**
10.0	10.0 Bar (145 PSI)

If no switching pressure is specified, valve will be supplied as N5B300-6.9N

Code	Seals / Kit No.
N	**Nitrile, Buna-N / (SK30065N-1)**
V	Fluorocarbon / (SK30065V-1)

Order Bodies Separately
See section BC

LB10	317	
Line Body	Porting	Body Material

Code	Porting
317	1-1/4" SAE (main) 3/8" SAE (aux)

Code	Body Material
S	Steel (5000 PSI)
A	Aluminium (3000 PSI)

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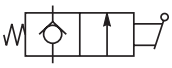
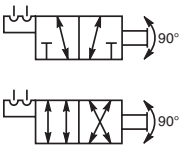
Contents

Manual Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	☆DL081	C08-2	2 Position, 2 Way, N.C. Poppet, Pull to Open	30/8	210/3000	MV1
	DL101	C10-2	2 Position, 2 Way, N.C. Poppet, Pull to Open	49/13	210/3000	MV2
	DM103	C10-3	3 Way, Rotary Spool	22/6	240/3500	MV3-MV4
	DM104	C10-4	4 Way, Rotary Spool	7/2	240/3500	MV5-MV6
	DMH085C1	C08-4	3 Position, 4 Way, Closed Center, Pull to Shift and Push to Shift	17/4.5	350/5000	MV7-MV8
	DMH085C2	C08-4	3 Position, 4 Way, Open Center, Pull to Shift and Push to Shift	15/4	350/5000	MV7-MV8
	DMH085C4	C08-4	3 Position, 4 Way, Float Center, Pull to Shift and Push to Shift	19/5	350/5000	MV7-MV8
	DMH085C9	C08-4	3 Position, 4 Way, Tandem Center, Pull to Shift and Push to Shift	15/4	350/5000	MV7-MV8

☆ *Denotes Winner's Circle Product Line.*

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General Description

2-Way Manual Poppet Valve. The DL081 Series Valves are suited for emergency lowering applications and on-off flow applications.

Operation

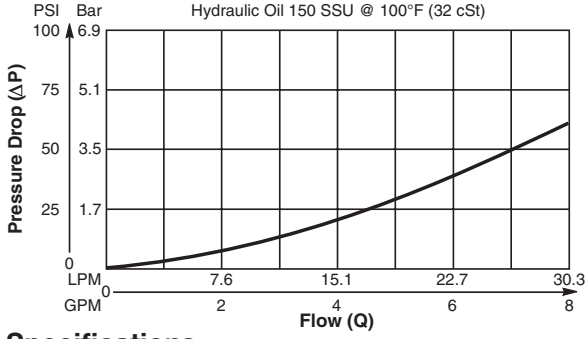
The DL081 Series Valves are mechanically operated check valves. Hydraulic force on the poppet is balanced by having equal area between the poppet seat and the valve stem, allowing the poppet to be manually pulled off the seat. When released, the bias spring will return the valve poppet to its closed position. Back pressure of more than 5.5 Bar (80 PSI) will prevent the bias spring from closing the poppet and must be avoided.

Features

- Low leakage design
- Flip lever, pull handle, or detented pin design
- All external parts zinc plated

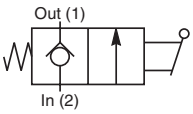
Performance Curve

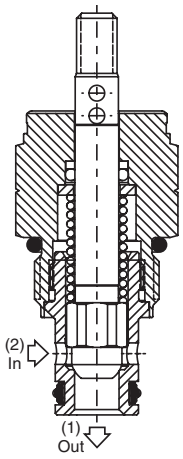
Flow vs. Pressure Drop (Through cartridge only)



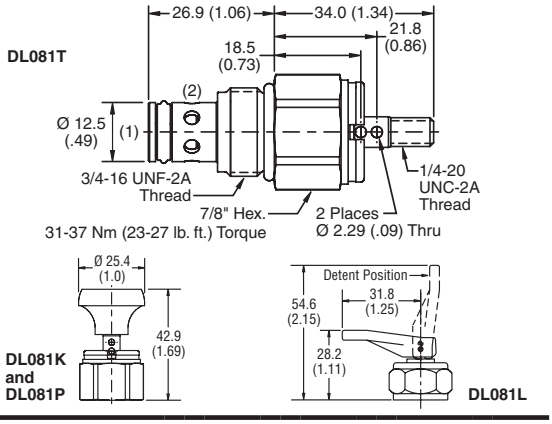
Specifications

Nominal Flow	30 LPM (8 GPM)
Max. Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.) at 210 Bar (3000 PSI)
Max. Allowable Tankline Pressure	5.5 Bar (80 PSI)
Operating Temp. Range (Ambient)	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Cartridge Material	Stem, stainless steel. All other parts hardened steel.
Fliltration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.17 lbs.)
Cavity	C08-2
Form Tool	Rougher None Finisher NFT08-2F





Dimensions Millimeters (Inches)



Ordering Information

DL081	–		
08 size Manual Poppet Valve		Actuator Type	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Actuator Type
K	**Knob (852525)**
T	**Stem**
L	Lever
P	**Lock Pin**

Code	Seals / Kit No.
Omit	**"D" -Ring / (SK08-2)**
N	Nitrile / (SK08-2)
V	Fluorocarbon / (SK08-2V)

NOTE: "D"-Ring for K, T, P only.

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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2-Way Manual Poppet Valve
Series DL101

General Description

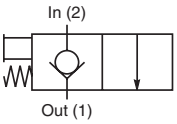
2-Way Manual Poppet Valve. The DL101 Series Valves are suited for emergency lowering applications and on-off flow applications.

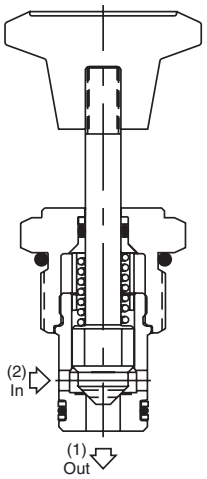
Operation

The DL101 Series Valves are mechanically operated check valves. Hydraulic force on the poppet is balanced by having equal area between the poppet seat and the valve stem, allowing the poppet to be manually pulled off the seat. When released, the bias spring will return the valve poppet to its closed position. Back pressure of more than 17.3 Bar (250 PSI) will prevent the bias spring from closing the poppet and must be avoided.

Features

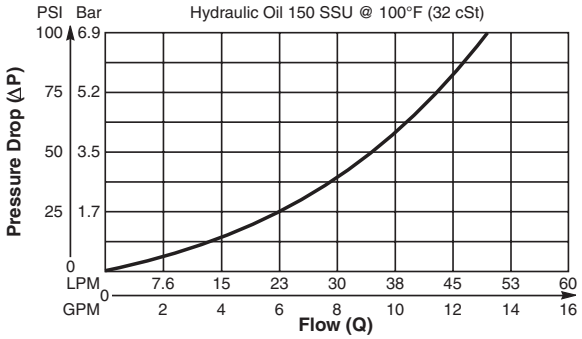
- Low shut-off leakage
- Cartridge design
- Pull-to-Open design
- All external parts zinc plated





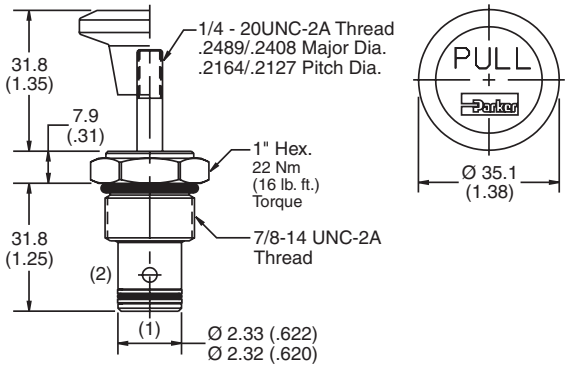
Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



Dimensions

Millimeters (Inches)



Specifications

Nominal Flow	48.8 LPM (13 GPM)
Max. Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.) at 240 Bar (3500 PSI)
Max. Allowable Tankline Pressure	17.3 Bar (250 PSI)
Operating Temp. Range (Ambient)	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Cartridge Material	Stem, stainless steel. All other parts hardened steel.
Fliltration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.09 kg (0.21 lbs.)
Cavity	C10-2
Form Tool	Rougher None Finisher NFT10-2F

Ordering Information

DL101	–		
10 size Manual Poppet Valve		Actuator Type	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code	Actuator Type
K	Knob (850020K)
T	Stem

Code	Seals / Kit No.
Omit	Nitrile / (SK10-2)
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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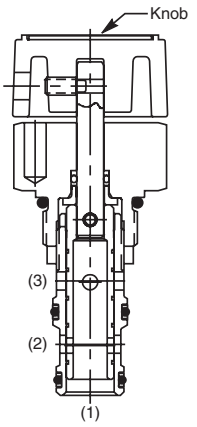
General Description

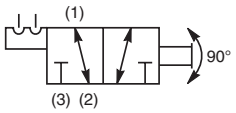
3-Way Rotary Spool Valve. The DM103 Series Valves are suited for any 3-way application (such as a selector function) where manual operation is desired. For additional information see Technical Tips pages MV1-MV2.

Features

- Several lever and knob options available
- Detented versions available
- Serviceable cartridge design
- All external parts zinc plated



DM103LD



Operation

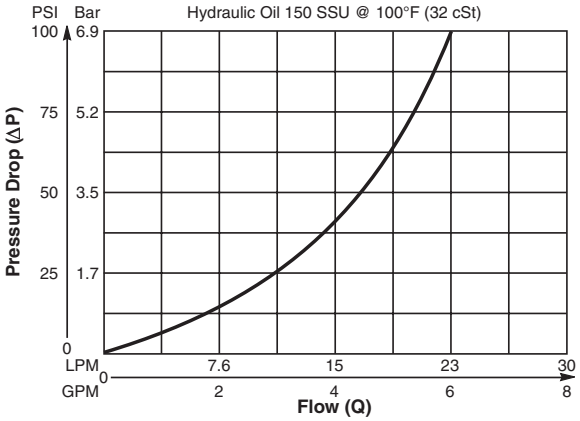
The K, LD, and FKD options require a full 90° rotation to shift the spool from one offset position to the other. The LN and FKN options require a full 45° rotation from center to either offset position. The knob (or lever) position indicator can be positioned anywhere within the 360° circle.

Specifications

Nominal Flow	22.5 LPM (6 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Degrees of Rotation	K, LD, and FKD Styles: 90° from Offset to Offset (2 positions) LN, FKN Style: 45° from center to either Offset (3 positions)
Leakage at 150 SSU (32 cSt)	164 cc/min. at 240 Bar (3500 PSI)
Cartridge Material	Stem, stainless steel. All other parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Fliltration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.11 kg (.30 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

Performance Curve

Flow vs. Pressure Drop
(Through cartridge only)



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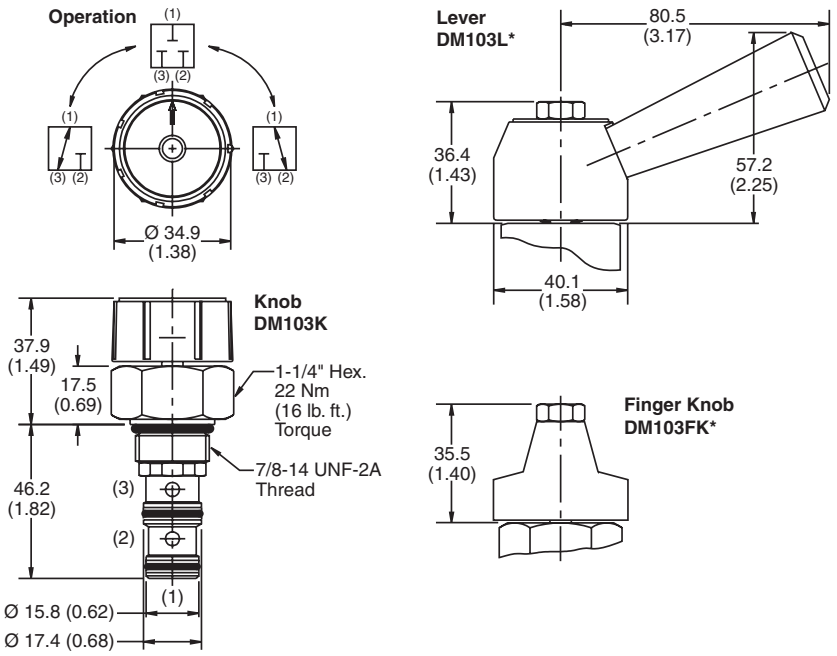
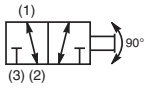
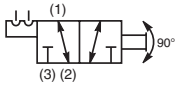
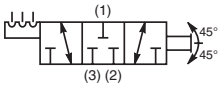
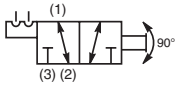
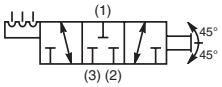
Dimensions Millimeters (Inches)



Ordering Information

DM103		
10 Size Rotary Spool Valve	Actuator Type	Seals

Code / Actuator Type	
K Knob	
LD Lever with 2 position detent	
LN Lever with 3 position detent	
FKD Finger Knob with 2 position detent	
FKN Finger Knob with 3 position detent	

Code	Seals / Kit No.
Omit	Nitrile / (SK10-3)
V	Fluorocarbon / (SK10-3V)

Knob / Lever Kits
Knob Kit - 718126
Lever Kit - 718129

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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4-Way Rotary Spool Valve
Series DM104

General Description

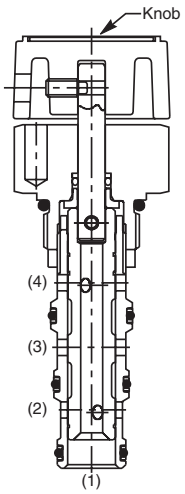
4-Way Rotary Spool Valve. The DM104 Series Valves are suited for all 4-way directional control applications where manual operation is desired.

Features

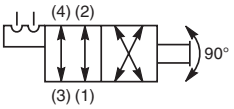
- Several lever and knob options available
- Detented versions available
- Serviceable cartridge design
- All external parts zinc plated

Operation

The K, LD, and FKD options require a full 90° rotation to shift the spool from one offset position to the other. The LN and FKN options require a full 45° rotation from center to either offset position. The knob (or lever) position indicator can be positioned anywhere within the 360° circle.



DM104LD

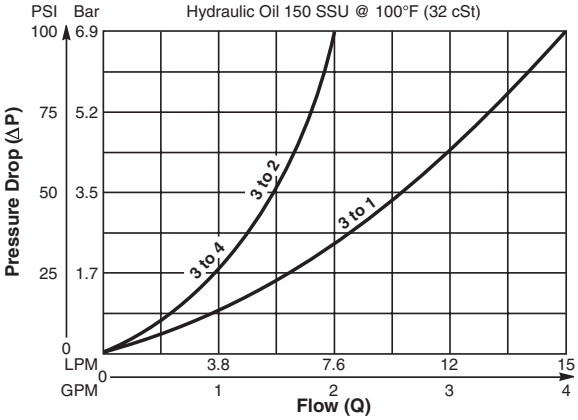


Specifications

Nominal Flow	7.5 LPM (2 GPM)
Maximum Inlet Pressure	240 Bar (3500 PSI)
Degrees of Rotation	K, LD, and FKD Styles: 90° from Offset to Offset (2 positions) LN and FKN Styles: 45° from center to either Offset (3 positions)
Leakage at 150 SSU (32 cSt)	164 cc/min. at 240 Bar (3500 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Fliltration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.11 kg (.30 lbs.)
Cavity	C10-4 (See BC Section for more details)
Form Tool	Rougher NFT10-4R Finisher NFT10-4F

Performance Curve

Flow vs. Pressure Drop
(Through cartridge only)



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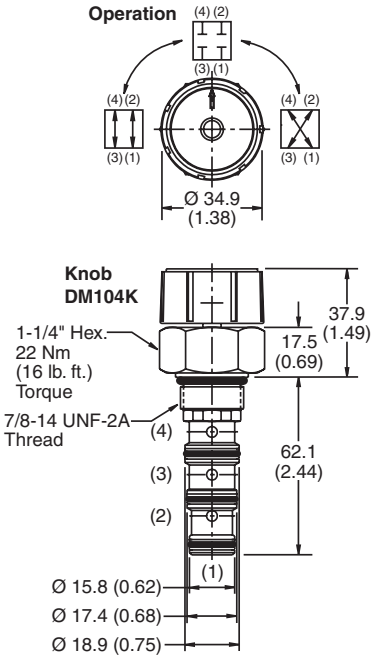
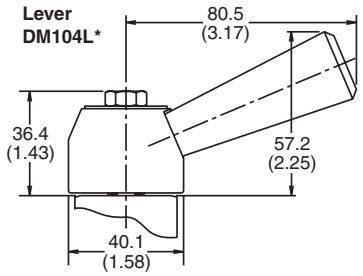
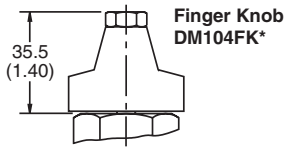
Hydraulic Cartridge Systems Division

Dimensions Millimeters (Inches)



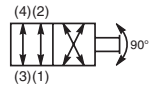
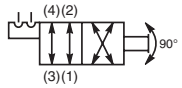
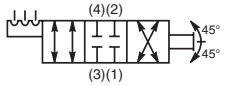
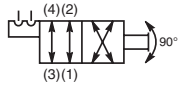
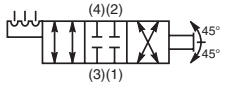




THIRD-ANGLE PROJECTION

Ordering Information

DM104			
10 Size Rotary Spool Valve	Actuator Type	Spool Option	Seals

Code / Actuator Type	
K Knob	
LD Lever with 2 position detent	
LN Lever with 3 position detent	
FKD Finger Knob with 2 position detent	
FKN Finger Knob with 3 position detent	

Code / Spool Option	
1 Closed Center	
8 Tandem Center	

Code	Seals / Kit No.
Omit	Nitrile / (SK10-4)
V	Fluorocarbon / (SK10-4V)

Knob / Lever Kits
Knob Kit - 718126
Lever Kit - 718129

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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General Description

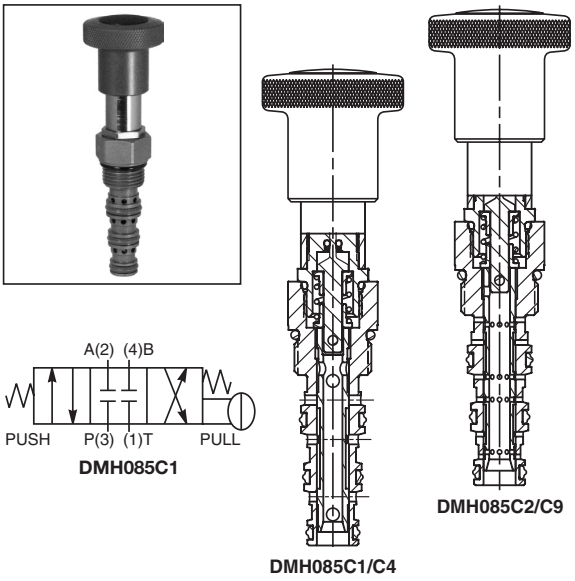
4-Way, 3 Position, Closed Center Manual Spool Valve. Designed to operate double acting cylinders, pilot circuits and bi-directional motors.

Features

- High flow capacity with reduced space requirements
- One piece cartridge housing ensures internal concentricity
- Low mechanical operating force required
- Detented option available
- All external parts zinc plated

Operation

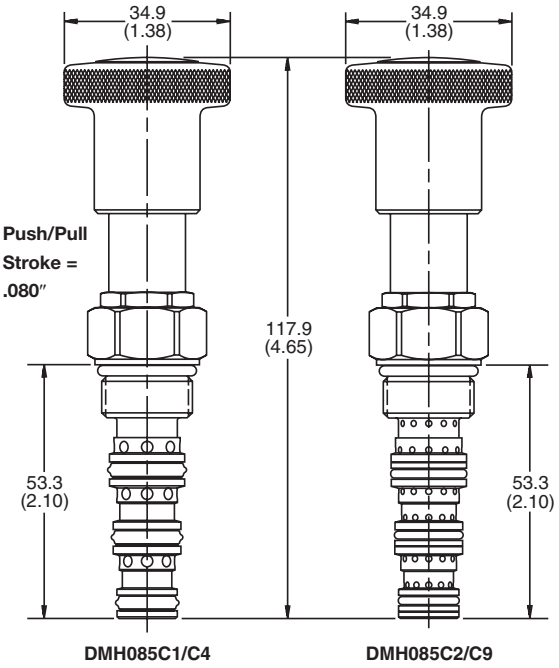
Push to shift for flow 3 to 2 and 4 to 1. Pull to shift for flow 3 to 4 and 2 to 1.



Specifications

Rated Flow	**C1** 17 LPM (4.5 GPM) **C2** 15 LPM (4.0 GPM) **C4** 19 LPM (5.0 GPM) **C9** 15 LPM (4.0 GPM)
Operating Pressure	**Side Ports -** 350 Bar (5000 PSI) **Bottom Port -** 35 Bar (500 PSI)
Max. Operating Pushing or Pulling Force Required	5 kg (11 lbs.)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	.12 kg (.25 lbs.)
Cavity	C08-4 (See BC Section for more details)

Dimensions Millimeters (Inches)



Note: "D"-Rings are standard on all spool configurations, but optional Buna/Fluorocarbon configurations as shown on the C2/C9 drawing are also available.

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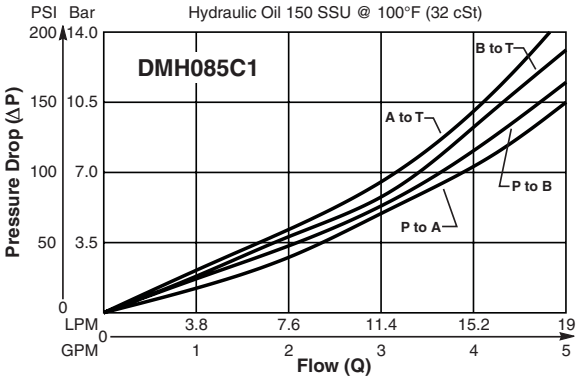
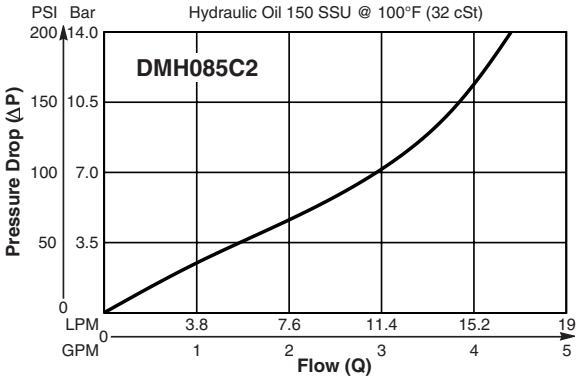
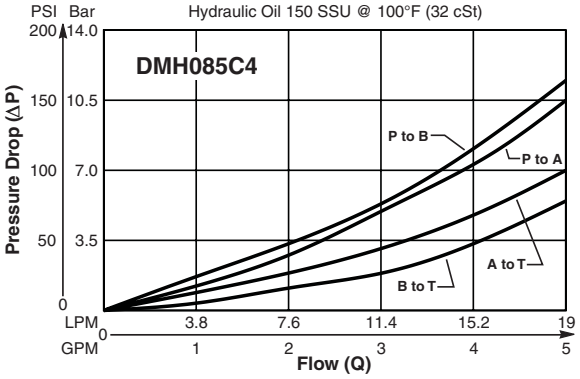
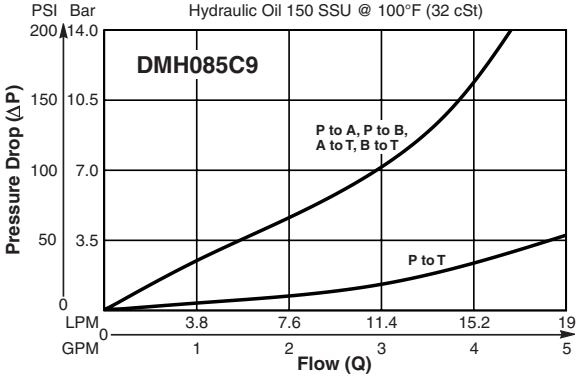
Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



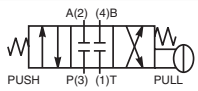
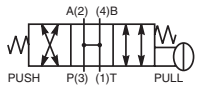
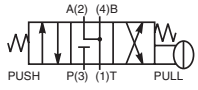
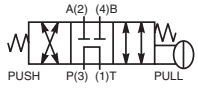






Ordering Information

DMH085			
08 Size, 4-Way Spool Type Manual Valve	Style	Detent Option	Seals

Code	Style
C1	
C2	
C4	
C9	

Code	Detent Option
Omit	Non-Detented (Std.)
D	Detented

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-2)
N	Nitrile / (SK08-2N)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-8 / Steel (5000 PSI)
A6T	SAE-8 / Aluminium (3000 PSI)

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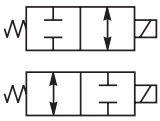
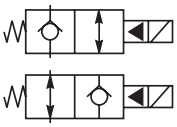
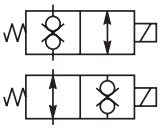
Contents

Solenoid Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	Technical Tips					SV1-SV5
HIGH FLOW VALVE FAMILY			*See individual catalog pages for exact specifications.*			
	**2 WAY SPOOL TYPE**					
	GS02 22*	2X / C09-2	2 Position, 2 Way, N.C. Spool	19/5	350/5000	SV6-SV7
	GS02 27*	2X / C09-2	2 Position, 2 Way, N.O. Spool	19/5	350/5000	SV8-SV9
			*These valves fit the C09-2 Parker cavity.			
	4 WAY, 2 POSITION SPOOL TYPE					
	GS02 42	C08-4	2 Position, 4 Way	19/5	350/5000	SV10-SV11
	**2 WAY POPPET TYPE**					
	☆ DSL081	C08-2	2 Position, 2 Way, N.C. or N.O.	30/8	250/3600	SV12-SV13
	☆ DSH081	C08-2	2 Position, 2 Way, N.C. or N.O.	30/8	350/5000	SV14-SV15
	☆ DSL101	C10-2	2 Position, 2 Way, N.C. or N.O.	60/15	250/3600	SV16-SV17
	☆ DSH101	C10-2	2 Position, 2 Way, N.C. or N.O.	60/15	350/5000	SV18-SV19
	DSH121	C12-2	2 Position, 2 Way, N.C. or N.O.	90/24	350/5000	SV20-SV21
	☆ DSH161	C16-2	2 Position, 2 Way, N.C. or N.O.	150/40	350/5000	SV22-SV23
	☆ DSL201	C20-2	2 Position, 2 Way, N.C. or N.O.	260/70	250/3600	SV24-SV25
	GH02 01	C08-2	2 Position, 2 Way, N.C., with Flow Adj.	11/3	285/4000	SV26-SV27
	GS02 72/73	C08-2	Bi-Directional Poppet, N.C.	1.7/.45	210/3000	SV28-SV29
	GS02 80*/81	C08-2	Bi-Directional Poppet, N.C.	34/9	350/5000	SV30-SV31
	GS04 80*/81	2R	Bi-Directional Poppet, N.C.	68/18	350/5000	SV32-SV33
	GS06 80*/81	C16-2	Bi-Directional Poppet, N.C.	285/75	350/5000	SV34-SV35
	GS02 77/78	C08-2	Bi-Directional Poppet, N.O.	1.7/.45	210/3000	SV36-SV37
	GS02 85*/86	C08-2	Bi-Directional Poppet, N.O.	34/9	350/5000	SV38-SV39
	GS04 85*/86	2R	Bi-Directional Poppet, N.O.	68/18	350/5000	SV40-SV41
	GS06 85*/86	C16-2	Bi-Directional Poppet, N.O.	285/75	350/5000	SV42-SV43
			*210/3000 psi rating			

☆ *Denotes Winner's Circle product line.*

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Catalog HY15-3503/US

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Solenoid Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	2 WAY SPOOL TYPE					
☆	DSL082	C08-2	2 Position, 2 Way	15/4	250/3600	SV44-SV45
☆	DSH082	C08-2	2 Position, 2 Way	15/4	350/5000	SV46-SV47
☆	DSL102	C10-2	2 Position, 2 Way	30/8	250/3600	SV48-SV49
☆	DSH102	C10-2	2 Position, 2 Way	30/8	350/5000	SV50-SV51
	DS162	C16-2	2 Position, 2 Way	75/20	210/3000	SV52-SV53
	3 WAY SPOOL TYPE					
☆	DSL083	C08-3	2 Position, 3 Way	15/4	250/3600	SV54-SV56
☆	DSH083	C08-3	2 Position, 3 Way	15/4	350/5000	SV57-SV59
☆	DSL103	C10-3	2 Position, 3 Way	30/8	250/3600	SV60-SV62
☆	DSH103	C10-3	2 Position, 3 Way	30/8	350/5000	SV63-SV65
	DS163	C16-3	2 Position, 3 Way	57/15	210/3000	SV66-SV67
	4 WAY, 2 POSITION SPOOL TYPE					
☆	DSL084	C08-4	2 Position, 4 Way	15/4	250/3600	SV68-SV69
☆	DSH084	C08-4	2 Position, 4 Way	15/4	350/5000	SV70-SV71
☆	DSL104	C10-4	2 Position, 4 Way	38/10	250/3600	SV72-SV73
☆	DSH104	C10-4	2 Position, 4 Way	38/10	350/5000	SV74-SV75
	DSH164	C16-4	2 Position, 4 Way	113/30	350/5000	SV76-SV77
	4 WAY, 3 POSITION SPOOL TYPE					
	GS02 51	C08-4	3 Position, 4 Way	17/4.5	350/5000	SV78-SV79
	GS02 53	C08-4	3 Position, 4 Way	15/4	350/5000	SV80-SV81
	GS02 57	C08-4	3 Position, 4 Way	13/3.5	350/5000	SV82-SV83
	GS02 59	C08-4	3 Position, 4 Way	13/3.5	350/5000	SV84-SV85
☆	DSL105	C10-4	3 Position, 4 Way	26/7	250/3600	SV86-SV87
	GS04 52D	C10-4	3 Position, 4 Way	42/11	350/5000	SV88-SV89
	GS04 54D	C10-4	3 Position, 4 Way	42/11	350/5000	SV90-SV91
	GS04 57D	C10-4	3 Position, 4 Way	42/11	350/5000	SV92-SV93
	GS04 59D	C10-4	3 Position, 4 Way	42/11	350/5000	SV94-SV95
	DSH125 52	C12-4L	3 Position, 4 Way	57/15	350/5000	SV96-SV97
	DSH125 54	C12-4L	3 Position, 4 Way	57/15	350/5000	SV98-SV99
	DSH125 57	C12-4L	3 Position, 4 Way	57/15	350/5000	SV100-SV101
	DSH125 59	C12-4L	3 Position, 4 Way	57/15	350/5000	SV102-SV103

☆ *Denotes Winner's Circle product line.*

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COMMON OPTIONS

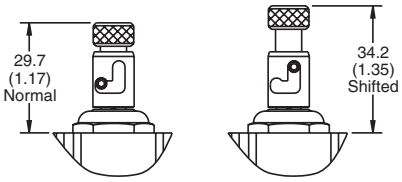
As you will see, Parker offers a variety of solenoid valve products. As such, some of the options mentioned below may not be available on all valves. Consult the model coding and dimensions for each valve for more specifics. Here are some of the common options available.

Seals: The Winner's Circle products feature a standard Polyurethane "D"-Ring. The "D"-Ring eliminates the need for backup rings. For more information on the "D"-Ring see the Technical Data section of the catalog. The majority of the products are available in Nitrile or Fluorocarbon Seals. You should always match the seal compatibility to the temperature and fluid being used in your application.

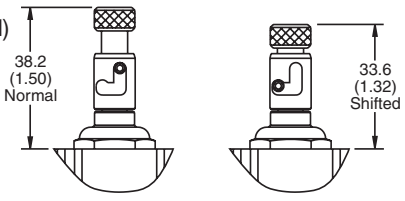
Coils: Coils can be ordered as part of the full assembly or separately. Various terminations and voltages are available. For detailed information on the coil options consult the coil section of the catalog. The ordering information for each valve will direct you to the proper coil.

Manual Overrides: Many of our solenoid valves are also offered with a manual override. The override allows the user to shift the valve when coil force is not available. They provide a means of shifting the solenoid valve due to a loss of power or a coil failure. Overrides are intended for infrequent usage and are not designed to be used as a primary method of valve actuation.

The most common override option for the 2 Position valves is the push & twist style shown below. With a normally closed valve or a pull style tube, the valve is in normal operation (or de-energized) when the pin is seated in the slotted groove at the lowest position. To shift the valve manually, the operator pushes down on the knob and twists it counterclockwise. When the pressure is removed from the knob, an internal spring pushes the pin up the slotted groove to the upper position of the override. With a normally open valve, or push style tube, the actuation is reversed. The valve is in the normal position (or de-energized) when the pin is in the upper position of the override. To shift the valve manually, the operator pushes down on the knob and twists is clockwise. Once the pin is seated in the slotted groove, the operator can remove pressure and the valve will stay actuated.

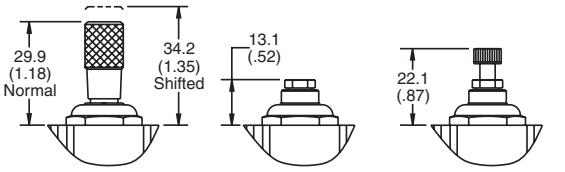


Normally Closed Pull Type Tube



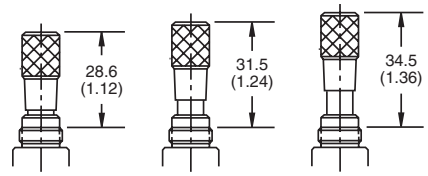
Normally Open Push Type Tube

In addition to the push and twist style override, normally closed (pull style tube) 2 position valves can be ordered with a pull and release override. Normally open (push style) 2 position valves are available with flush style and extended style overrides. These overrides are not detented. Each style is shown below.



Pull and Release Manual Override ***Flush Manual Override*** ***Extended Manual Override***

3 Position valves are offered with a Push / Pull style override. This override is not detented. Springs hold the spool of the valve in the center position of the valve. When the knob is pulled, the spool is moved upward simulating the action of the upper coil. When the override is pushed, the spool moves downward simulating the action of the lower coil. When no pressure is applied to the knob, it centers the spool.



Push Position ***Normal Position*** ***Pull Position***

Screens: 2 way valves can be ordered with a small mesh screen (60 x 60 mesh) placed over the cage of the cartridge valve. This screen is intended for cursory protection of the internal components of the solenoid valve. It should not be used as the primary method of filtration. The mesh catches small pieces of debris that could impede spool or poppet movement. Note that a screen will trap debris from both directions. Thus, any debris coming from the nose of the cartridge would be trapped inside the valve. As such, we recommend that screens be implemented in only applications where hydraulic fluid passes through the cartridge from the side of the cage to the nose. It should also be noted that the pressure drop through the cartridge will be increased slightly due to the small restriction of the mesh. As the screen fills with debris, pressure drop will continue to rise.

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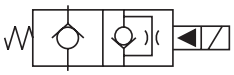
PRODUCT TYPES / APPLICATIONS

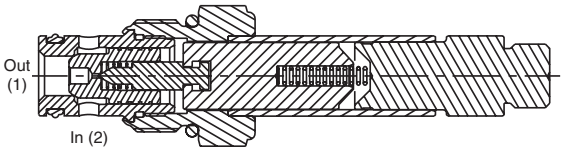
Two Way Poppet Valves

Two way poppet valves are pilot operated, low leakage solenoid actuated valves. Two way poppet valves control the flow of a two way function by blocking flow in one direction (similar to a check valve). They are generally selected due to their low leakage and ability to meet higher flow requirements. Poppet valves are often used on single operation actuators or in unloading functions. They are available in normally closed and normally open types. In addition, free reverse flow and fast response versions are available.

Normally Closed Poppet

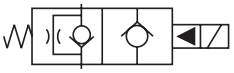


Normally closed two way poppet valves act as a check valve when de-energized, blocking flow from one direction and allowing restricted free flow in the reverse condition. When energized, the poppet lifts allowing free flow from the side to the nose of the cartridge. Should the application require free flow in both directions, the free reverse flow option should be chosen.

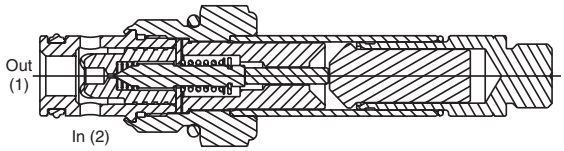


OPERATION - The valve pilot is held on its seat by spring force, blocking pilot flow. This allows pressure at the inlet (port 2) to hold the poppet on its seat, thus, preventing flow through the valve (2-1). If the nose of the cartridge (port 1) is pressurized, the pressure will overcome the spring force, pushing the poppet off of its seat, allowing free flow through the cartridge (1-2). When the coil is energized, the valve pilot is pulled off of its seat. This vents the pressure inside the poppet to port 1, creating a pressure imbalance across the main poppet. This differential lifts the poppet allowing flow from the side to nose (2-1). Since poppet valves are piloted operated, a minimum amount of pressure differential (25-50 psi) and flow between ports 2 and 1 must be present to overcome the spring and lift the poppet.

Normally Open Poppet



Normally open two way poppet valves, when de-energized, allow free flow from the side (port 2) of the cartridge to the nose (port 1). Flow in the reverse direction is restricted. Should free flow be required in both directions, the free reverse flow option should be specified. Once the coil is energized the normally open poppet valve acts as a check valve, blocking flow from one direction and allowing restricted free flow in the reverse condition.



OPERATION - The valve pilot is held off its seat by spring force. Pilot flow is vented to port 1, creating a pressure imbalance that moves the main poppet. This differential lifts the poppet allowing flow from the side to nose (2-1). Since poppet valves are piloted operated, a minimum amount of pressure differential (25-50 psi) between ports 2 and 1 must be present to overcome the spring and lift the poppet. When the coil is energized, the coil force overcomes the spring force to drive the valve pilot and main poppet into their seats, thus blocking flow from port 2-1. If the nose of the cartridge (port 1) is pressurized, the pressure will overcome the spring force and solenoid force, pushing the poppet off of its seat, allowing restricted flow through the cartridge (1-2).

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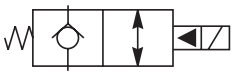
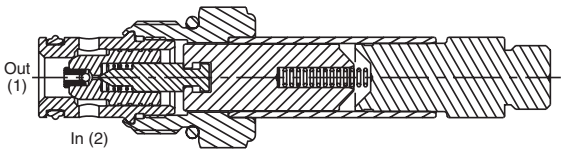
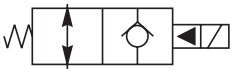
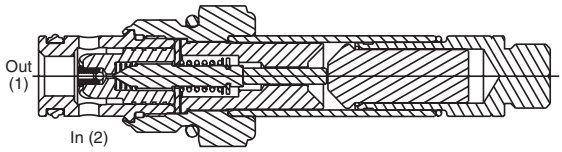
Free Reverse Flow

The free reverse flow versions are available on both the normally closed and normally open poppet valves. As mentioned above, the operation is the same as the standard poppet valve except flow through the reverse direction is not restricted. The free reverse flow option is only needed if the application requires flow to pass through the cartridge valve from the nose to side (port 1 to port 2).









Fast Response

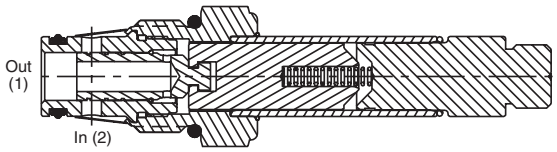
Since poppet valves are pilot operated valves, a few milliseconds are needed to move the pilot and allow the poppet to lift. Should a faster response time be required on normally closed poppet valves, this option can be chosen. The fast response is accomplished by reducing the movement of the pilot. Thus, the flow capacity of the poppet valve is also decreased.

Two Way Spool Valves

Two way spool valves are direct acting, fast responding solenoid actuated valves. Like the poppet valves described earlier, they block the flow of a two way function. Unlike two way poppet valves, spool valves block flow from both the side port and the nose port. They do not have the check like function of the poppet valve, thus they are either open or closed. Spool valves are directed operated, so they respond more quickly to coil voltage than poppet valves. Spool valves operate via a sliding spool, thus, some leakage will be present due to the required spool clearance. Spool valves block flow in both directions, but the preferred flow path is still from the side of the cartridge to the nose due to the flow forces acting on the spool. Two way spool valves are available in normally open and normally closed types.

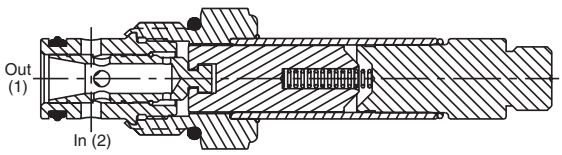
Normally Closed Spool

When de-energized, the spool is positioned by the spring force to cover both the side (2) and nose (1) ports of the valve. Thus, no flow is allowed from either direction. Once the coil is energized, the spool shifts exposing a flow path between the two ports. Flow can then be passed through the valve from either direction.



Normally Open Spool

When de-energized, the spool is positioned by the spring force so that a flow path between the side (2) and nose (1) ports is exposed, allowing flow through the valve from either direction. Once the coil is energized, the spool shifts to cover both the side (2) and nose (1) ports of the valve. Thus, no flow is allowed from either direction.



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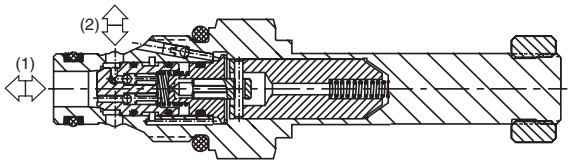
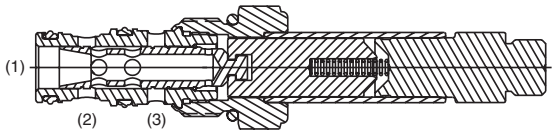
Bi-Directional Poppet Valve

Bi-directional poppet valves combine the dual blocking function of spool valves with the lower leakage capabilities of poppet valves. These valves also have a limited flow capacity compared to standard poppet or spool valves.



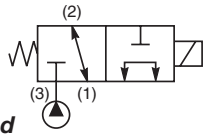
Two Position, Three Way Spool Valve

Three way spool solenoid valves provide directional control of flow. Each three way valve has a special internal spool which connects two of the three valve ports. When actuated, the spool connects a different combination of valve ports. These valves are often used for raise and lower functions of a single acting cylinder, control of a uni-directional motor, or as a circuit selector.

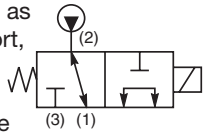


OPERATION - In the de-energized mode, the spool is positioned by spring force. When energized, the coil force directly shifts the spool against the spring, thus changing the flow through the valve. Each spool type can be used as a normally open, normally closed, or selector valve. To explain this we will review the DSL103A which is pictured here. When the valve is de-energized, ports 1 and 2 are open to one another. When energized, ports 1 and 3 are connected.

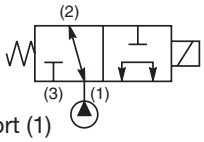
Thus, if we use port 3 as our pressure port, we have a ***normally closed valve***. The pressure port (3) is blocked, while the actuator port (1) is drained to tank (2).



If we use port 2 as our pressure port, we have a ***normally open valve***. The pressure port (2) is connected to the actuator port (1), and the tank port (3) is blocked.



If we use port 1 as our pressure port, we have a ***selector valve***. The pressure port (1) is either connected to port (2) or port (3). Thus, it is "selecting" which port will get the system pressure and flow.



Note that in all three examples, we were using the same valve. The flow forces acting on the spool change depending on which port is pressurized. Thus, if you will be shifting the three way valve under full flow and pressure, it is important to review the shift limit characteristics for the flow paths you have chosen to be sure the coil has enough force to shift the spool. Various spools are available in this catalog to maximize the flow and pressure capacities for the desired flow function.

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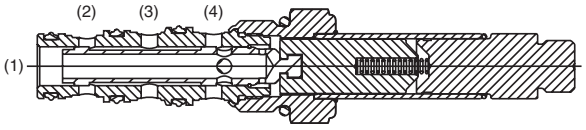
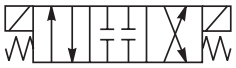
Two Position, Four Way Spool Valve

Four way spool solenoid valves provide directional control of flow. Each four way valve has a special internal spool which connects some combination of the four valve ports together. When actuated, the spool connects a different combination of valve ports. These valves are often used for the raise / lower function of a double acting cylinder, or as a forward / reverse function of bi-directional motors.

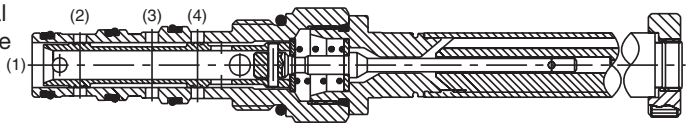


OPERATION - In the de-energized mode, the spool is positioned by spring force. When energized, the coil force directly shifts the spool against the spring, thus changing the flow through the valve. Each spool type is customized to provide the flow combination desired. The flow forces acting on the spool change depending on which port is pressurized. Thus, if you will be shifting the four way valve under full flow and pressure, it is important to review the shift limit characteristics for the flow paths you have chosen to ensure the coil has enough force to shift the spool. Various spools are shown in this catalog to maximize the flow and pressure capacities for the desired flow function.

Three Position, Four Way Spool Valve



Three position, four way spool solenoid valves provide directional control of flow. Each four way valve has a special internal spool which connects some combination of the four ports together. When one coil is actuated, the spool connects a different combination of valve ports. When the other coil is actuated a third combination of valve ports are connected. These valves are often used for the raise / lower function of a double acting cylinder, or as a forward / reverse function of bi-directional motors. The center position can be used to stop the actuator in mid-stroke, or dump the pump flow.



OPERATION - In the de-energized mode, the spool is positioned by spring force. When energized, the coil force directly shifts the against the spring, thus changing the flow through the valve. Each spool type is customized to provide the flow combination desired. The flow forces acting on the spool change depending on which port is pressurized. Thus, if you will be shifting the four way valve under full flow and pressure, it is important to review the shift limit characteristics for the flow paths you chosen to ensure the coil has enough force to shift the spool. Various spools are shown in this catalog to maximize the flow and pressure capacities for the desired flow function.

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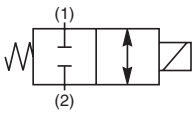
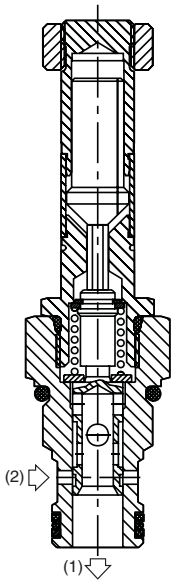
General Description

2-Way, 2 Position, Normally Closed Spool Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.



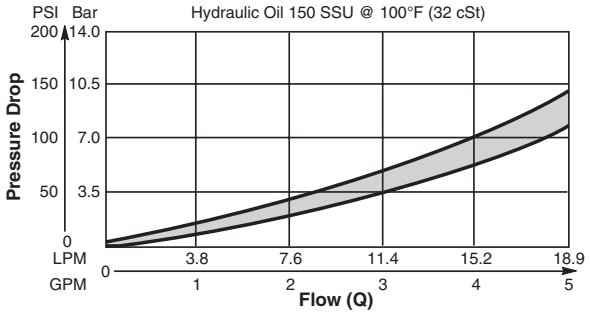


Specifications

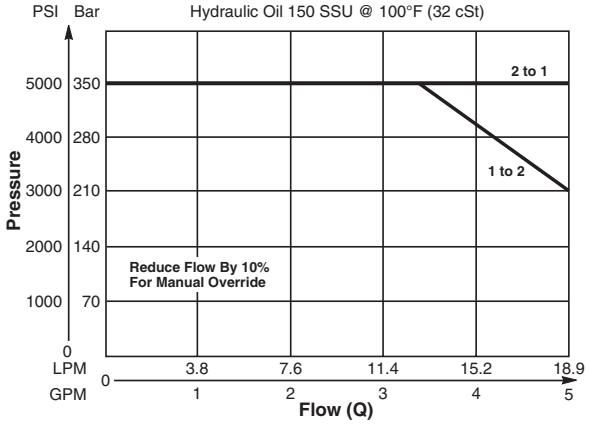
Rated Flow	19 LPM (5 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	82 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.31 lbs.)
Cavity	C09-2 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Opreating Limits (Measured at 75% of Nominal Current)



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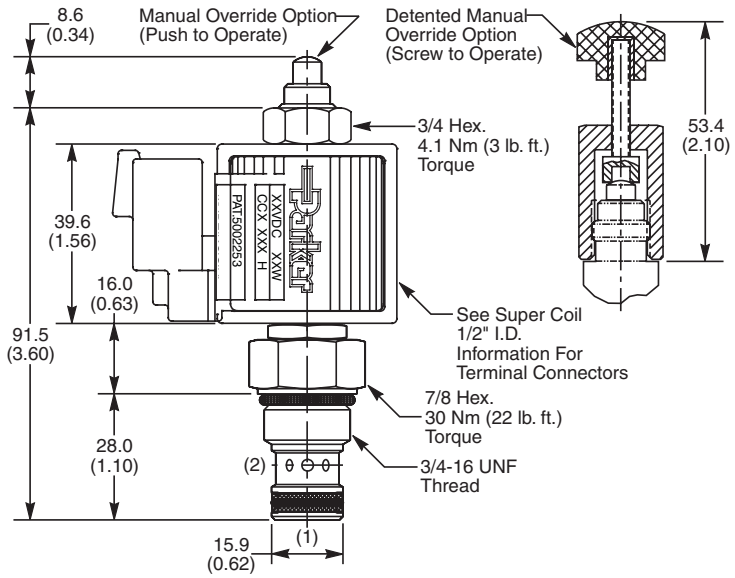
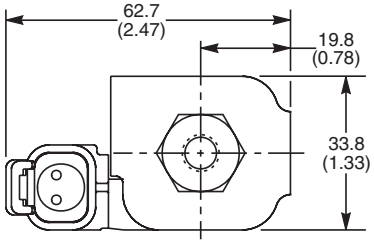
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS02	22		0	
09 Size Solenoid Valve	Style Normally Closed	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
22	**High Pressure ('SP' Coil)**

Code	Screen
0	**None**

Code	Override Options
0	**None**
1	Manual Override
2	Detented Part No. 900690

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30076N-1)**
V	Fluorocarbon / (SK30076V-1)

Order Bodies Separately
See section BC

B09	–	2	–	
09 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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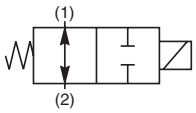
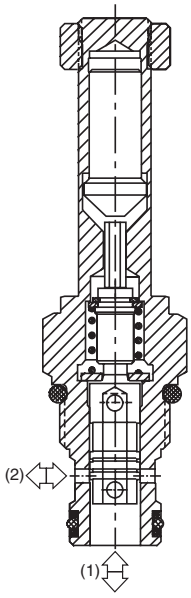
General Description

2-Way, 2 Position, Normally Open Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.



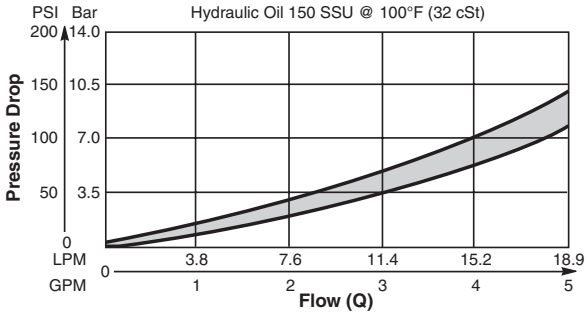


Specifications

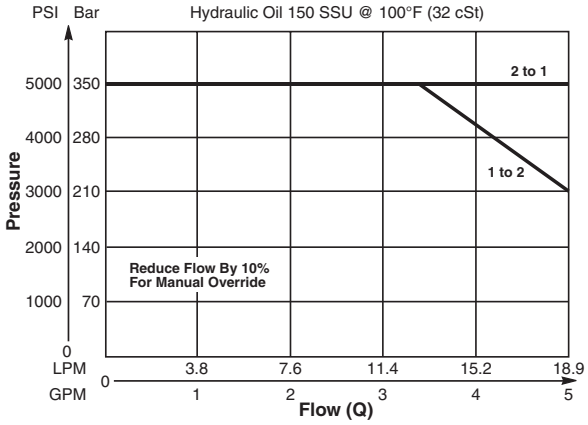
Rated Flow	19 LPM (5 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	82 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.31 lbs.)
Cavity	C09-2 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Opreating Limits (Measured at 75% of Nominal Current)



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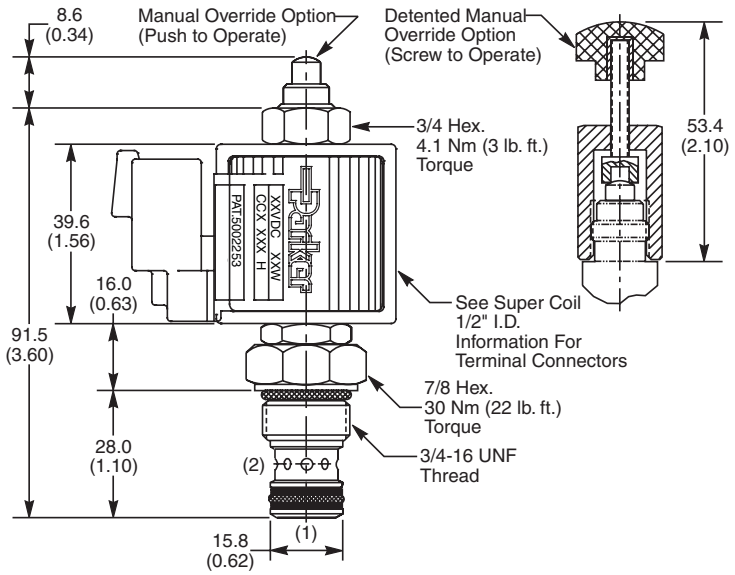
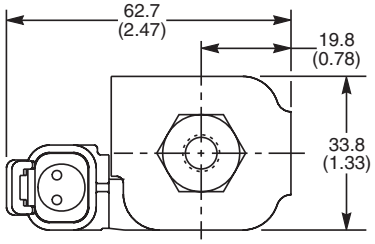
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS02	27		0	
09 Size Solenoid Valve	Style Normally Open	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
27	**High Pressure ('SP' Coil)**

Code	Screen
0	**None**

Code	Override Options
0	**None**
1	Manual Override
2	Detented Part No. 900690

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30076N-1)**
V	Fluorocarbon / (SK30076V-1)

Order Bodies Separately
See section BC

B09	–	2	–	
09 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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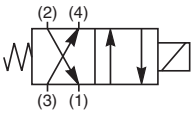
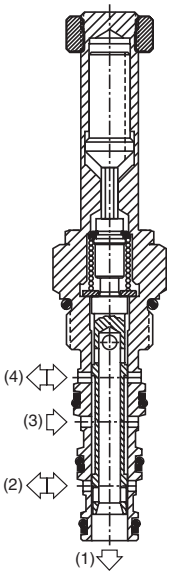
General Description

4-Way, 2 Position, Reversing Spool Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Designed to operate double and single acting cylinders, pilot circuits and bi-directional motors, etc.
- High flow capacity with reduced space requirements
- High pressure capacity to 350 Bar (5000 PSI)
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Manual override available



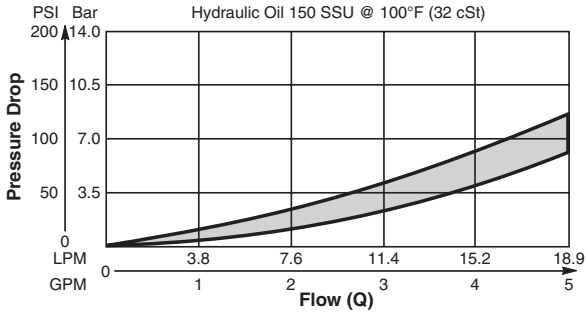


Specifications

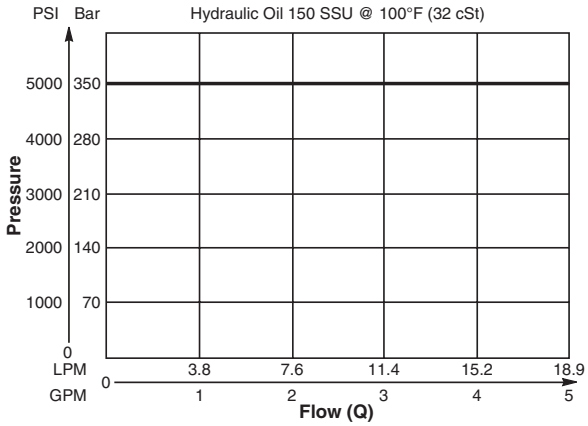
Rated Flow	19 LPM (5 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.30 kg (.66 lbs.)
Cavity	C08-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Opreating Limits (Measured at 75% of Nominal Current)



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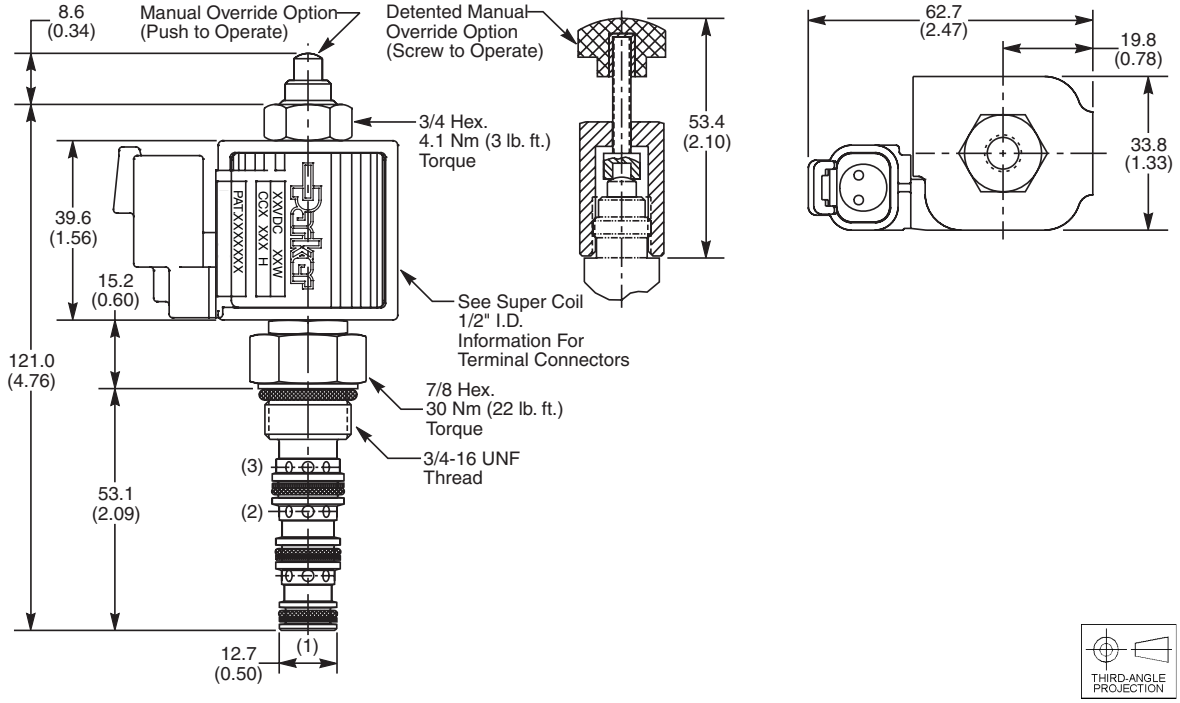
Dimensions Millimeters (Inches)



Ordering Information

GS02	42		0	
08 Size Solenoid Valve	Style	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
42	High Pressure ('SP' Coil)

Code	Screen
0	Not Available

Code	Override Options
0	None
1	Manual Override
2	Detented Part No. 900690

Code	Seals / Kit No.
N	Nitrile / Buna-N (Std.) (SK30078N-1)
V	Fluorocarbon / (SK30078V-1)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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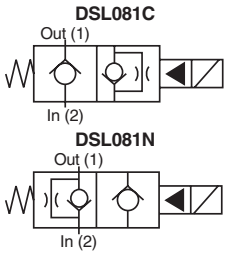
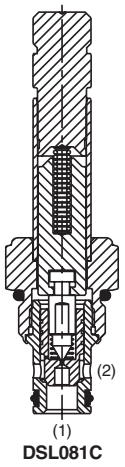
General Description

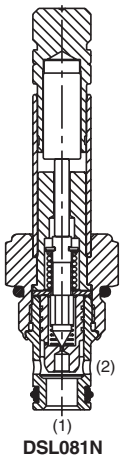
2-Way Poppet Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- Replaceable, one piece encapsulated, coils with minimal amperage draw
- Variety of coil terminations and voltages
- Variety of manual override options available
- Fast response available, (CH and CHR) rated at 15 LPM (4.0 GPM)
- Polyurethane "D"-Ring eliminates need for backup rings
- Spherical poppet for low leakage
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated







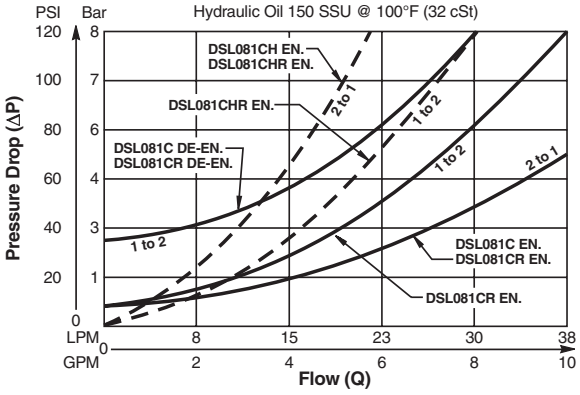
Specifications

Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized / De-Energized** **C, CR** 50 ms / 50 ms **CH, CHR** 30 ms / 50 ms **N, NR** 50 ms / 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-50°F to +200°F) -35°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.11 kg (.25 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

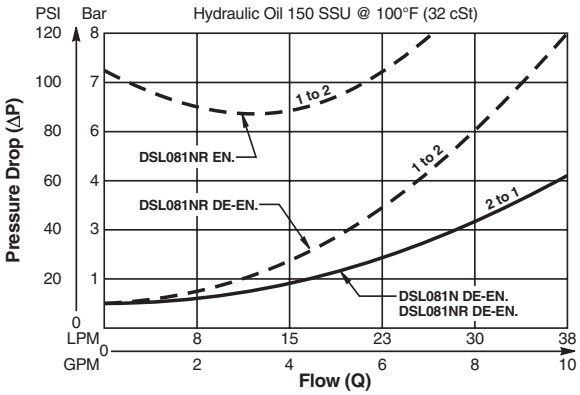
Performance Curves

Pressure Drop vs. Flow (Through cartridge only)

Normally Closed



Normally Open



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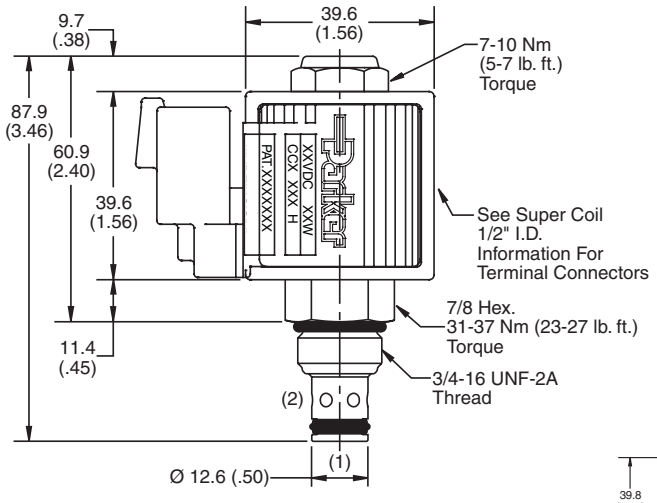
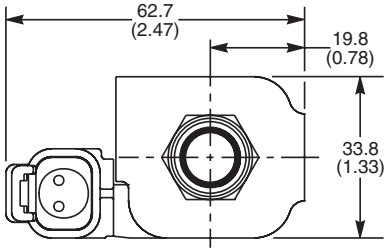
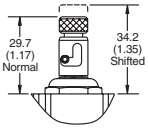
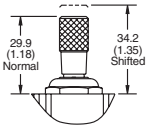
Dimensions Millimeters (Inches)



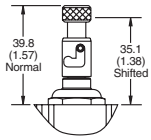




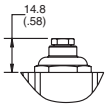
Push and Twist M.O.
(Normally Closed Valves Only)



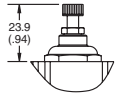
Pull and Release M.O.
(Normally Closed Valves Only)



Push and Twist M.O.
(Normally Open Valves Only)



Flush M.O.
(Normally Open Valves Only)



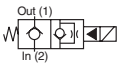
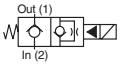
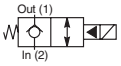
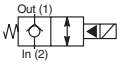
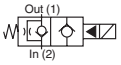
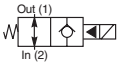
Extended M.O.
(Normally Open Valves Only)

THIRD-ANGLE PROJECTION

Ordering Information

DSL081				
08 Size Solenoid Valve	Style	Override Option	Seals	Screen

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code / Style	
C Normally Closed Metered reverse flow	
CH Normally Closed Metered reverse flow (Fast response)	
CHR Normally Closed Full reverse flow (Fast response)	
CR Normally Closed Free reverse flow	
N Normally Open Metered reverse flow	
NR Normally Open Free reverse flow	

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Override Options
Omit	**None**
E	Push Type with Extended Rod (N.O. Only)
M	Push Type with Flush Rod (N.O. Only)
P	Pull & Release (N.C. Only)
T	Push & Twist (N.C. & N.O.)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile (SK08-2)
V	Fluorocarbon / (SK08-2V)

Code	Screen
Omit	**None**
S	Screen

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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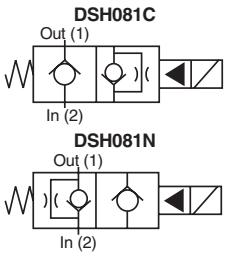
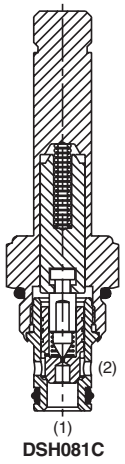
General Description

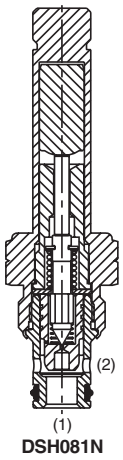
2-Way Poppet Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- Replaceable, one piece encapsulated, coils with minimal amperage draw
- Variety of coil terminations and voltages
- Variety of manual override options available
- Fast response available, (CH and CHR) rated at 15 LPM (4.0 GPM)
- Polyurethane "D"-Ring eliminates need for backup rings
- Spherical poppet for low leakage
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated







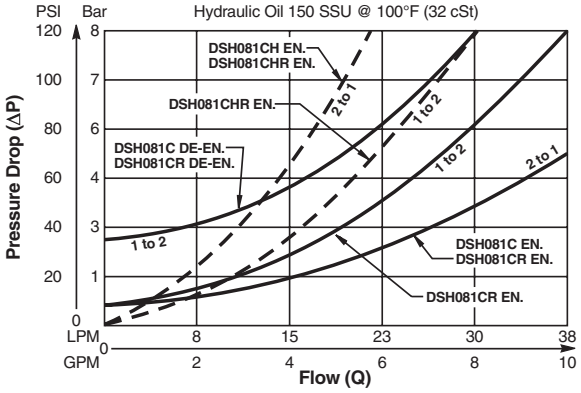
Specifications

Rated Flow	30 LPM (8 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized / De-Energized** **C, CR** 50 ms / 50 ms **CH, CHR** 30 ms / 50 ms **N, NR** 50 ms / 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.11 kg (.25 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

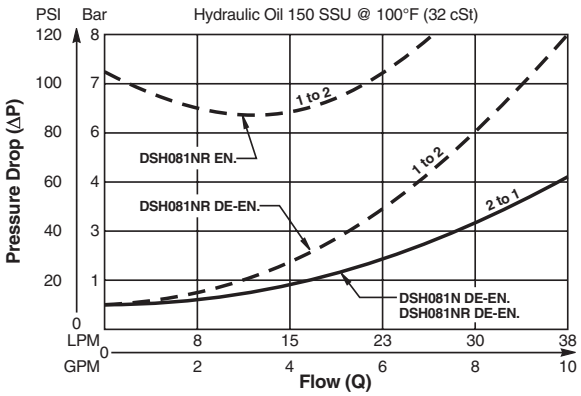
Performance Curves

Pressure Drop vs. Flow (Through cartridge only)

Normally Closed



Normally Open



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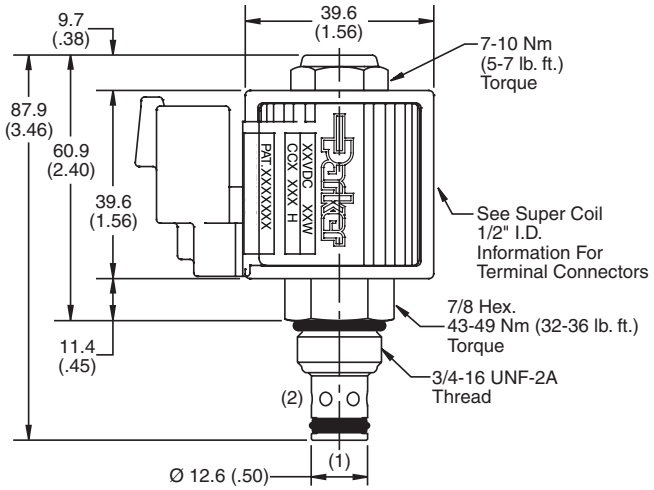
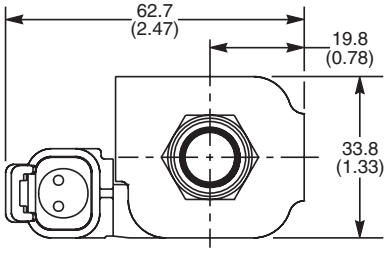
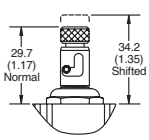
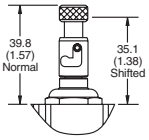
Dimensions Millimeters (Inches)



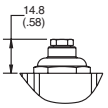




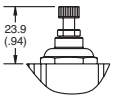
Push and Twist M.O.
(Normally Closed Valves Only)



Push and Twist M.O.
(Normally Open Valves Only)



Flush M.O.
(Normally Open Valves Only)



Extended M.O.
(Normally Open Valves Only)

THIRD-ANGLE PROJECTION

Ordering Information

DSH081				
08 Size Solenoid Valve	Style	Override Option	Seals	Screen

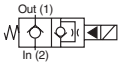
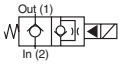
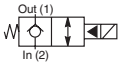
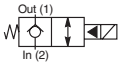
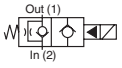
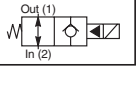
Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

Code / Style	
C Normally Closed Metered reverse flow	
CH Normally Closed Metered reverse flow (Fast response)	
CHR Normally Closed Free reverse flow (Fast response)	
CR Normally Closed Free reverse flow	
N Normally Open Metered reverse flow	
NR Normally Open Free reverse flow	

Code	Override Options
Omit	**None**
E	Push Type with Extended Rod (N.O. Only)
M	Push Type with Flush Rod (N.O. Only)
T	Push & Twist (N.C. & N.O.)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile (SK08-2)
V	Fluorocarbon / (SK08-2V)

Code	Screen
Omit	**None**
S	Screen

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

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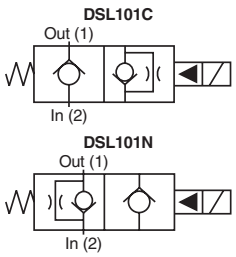
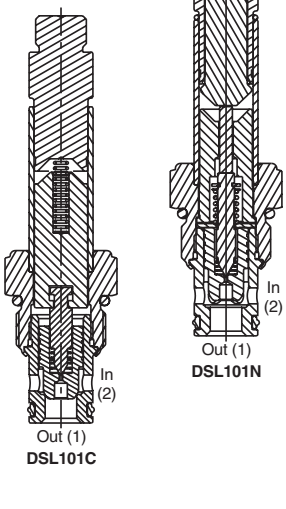
General Description

2-Way Poppet Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- Low hysteresis
- Replaceable, one piece encapsulated coils with minimal amperage draw
- Various coil terminations and voltages
- Various manual override options
- Fast response available, (CH and CHR) rated at 11 LPM (3.0 GPM)
- Polyurethane "D"-Ring
- All external parts zinc plated





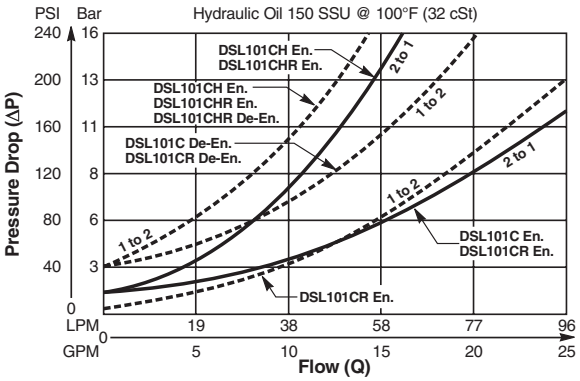
Specifications

Rated Flow	60 LPM (15 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized** / **De-Energized** **C, CR** 80 ms / 150 ms **CH, CHR** 50 ms / 50 ms **N, NR** 35 ms / 175 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-35°C to +93°C ("D"-Ring) (-37°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.20 kg (0.41 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

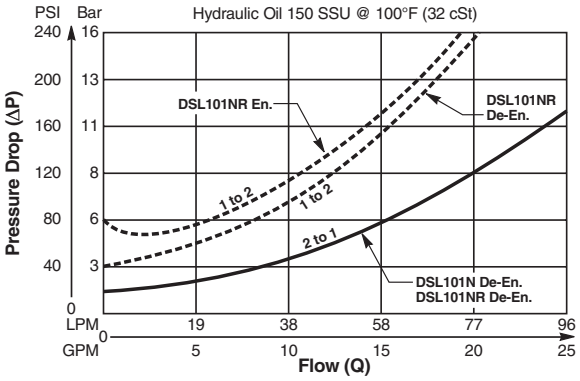
Performance Curves

Pressure Drop vs. Flow (Through cartridge only)

Normally Closed



Normally Open



Parker Hannifin Corporation
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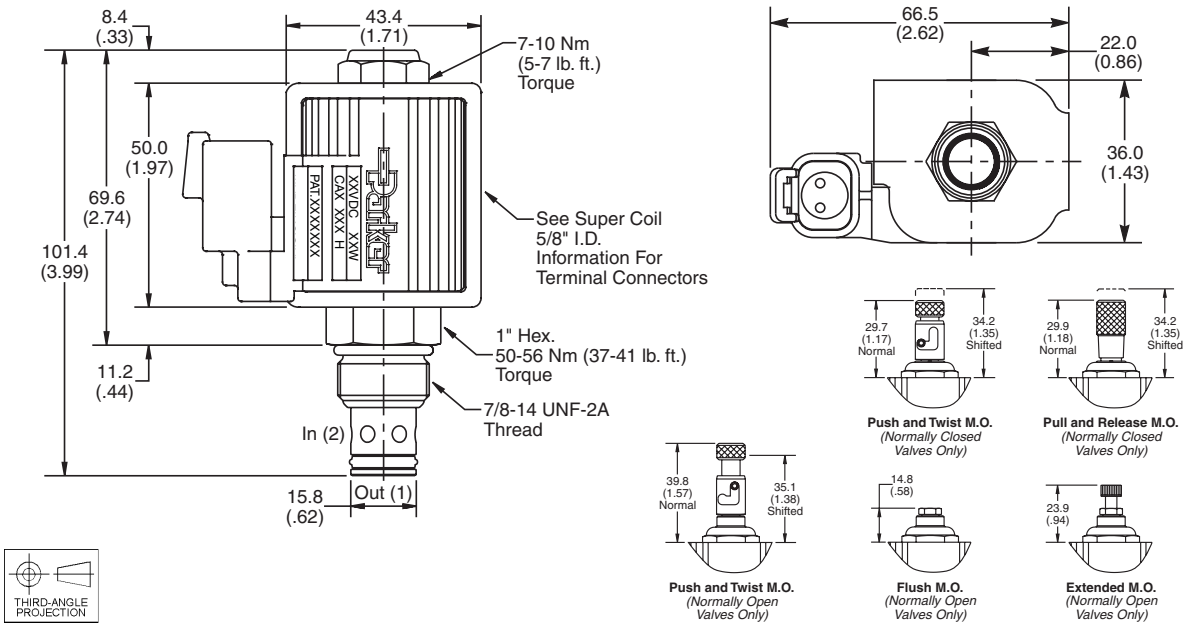
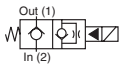
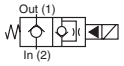
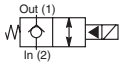
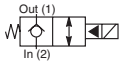
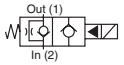
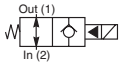
Dimensions Millimeters (Inches)



Ordering Information

DSL101				
10 Size Solenoid Valve	Style	Override Option	Seals	Screen

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code / Style	
C Normally Closed Metered reverse flow	
CH Normally Closed Metered reverse flow (Fast response)	
CHR Normally Closed Free reverse flow (Fast response)	
CR Normally Closed Free reverse flow	
N Normally Open Metered reverse flow	
NR Normally Open Free reverse flow	

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Override Options
Omit	**None**
E	Push Type with Extended Rod (N.O. Only)
M	Push Type with Flush Rod (N.O. Only)
P	Pull & Release (N.C. Only)
T	Push & Twist (N.C. & N.O.)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile (SK10-2)
V	Fluorocarbon / (SK10-2V)

Code	Screen
Omit	**None**
S	Screen

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

Parker Hannifin Corporation
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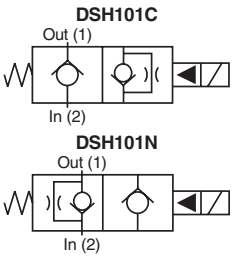
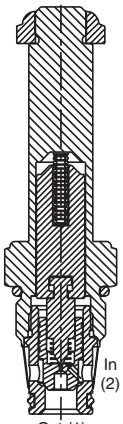
General Description

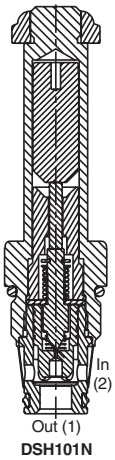
2-Way Poppet Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- Low hysteresis
- Replaceable, one piece encapsulated coils with minimal amperage draw
- Various coil terminations and voltages
- Various manual override options
- Fast response available, (CH and CHR) rated at 30 LPM (8 GPM)
- Polyurethane "D"-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated







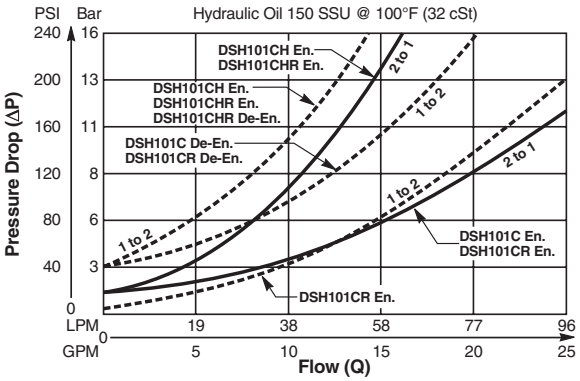
Specifications

Rated Flow	60 LPM (15 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized** / **De-Energized** **C, CR** 80 ms / 150 ms **CH, CHR** 50 ms / 50 ms **N, NR** 70 ms / 35 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.20 kg (0.41 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

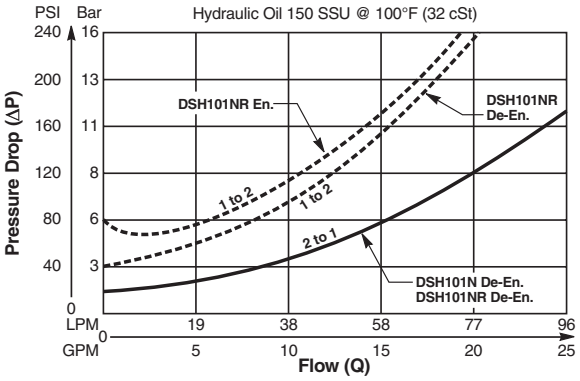
Performance Curves

Pressure Drop vs. Flow (Through cartridge only)

Normally Closed



Normally Open



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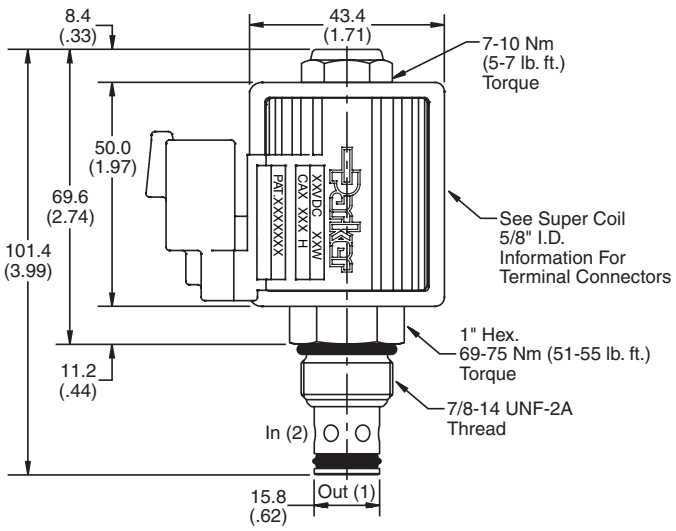
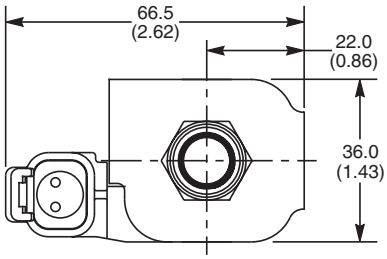
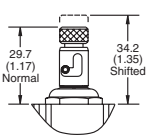
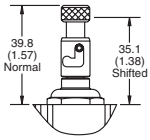
Dimensions Millimeters (Inches)



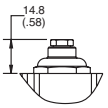




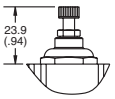
Push and Twist M.O.
(Normally Closed Valves Only)



Push and Twist M.O.
(Normally Open Valves Only)



Flush M.O.
(Normally Open Valves Only)



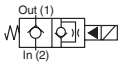
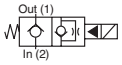
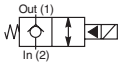
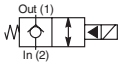
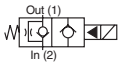
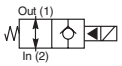
Extended M.O.
(Normally Open Valves Only)

THIRD-ANGLE PROJECTION

Ordering Information

DSH101				
10 Size Solenoid Valve	Style	Override Option	Seals	Screen

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Code / Style	
C Normally Closed Metered reverse flow	
CH Normally Closed Metered reverse flow (Fast response)	
CHR Normally Closed Free reverse flow (Fast response)	
CR Normally Closed Free reverse flow	
N Normally Open Metered reverse flow	
NR Normally Open Free reverse flow	

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Override Options
Omit	**None**
E	Push Type with Extended Rod (N.O. Only)
M	Push Type with Flush Rod (N.O. Only)
T	Push & Twist (N.C. & N.O.)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile (SK10-2)
V	Fluorocarbon / (SK10-2V)

Code	Screen
Omit	**None**
S	Screen

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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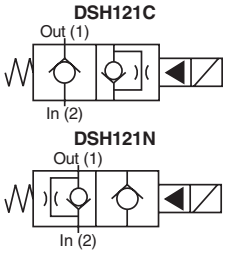
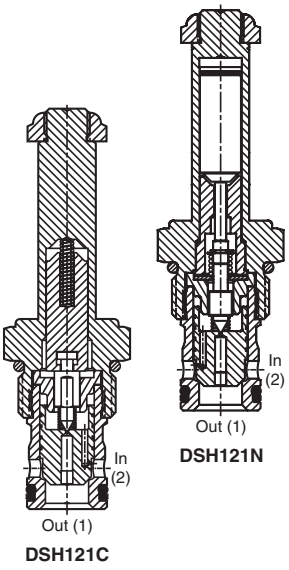
General Description

2-Way Poppet Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- Low hysteresis
- Replaceable, one piece encapsulated coils with minimal amperage draw
- Various coil terminations and voltages
- Various manual override options
- All external parts zinc plated





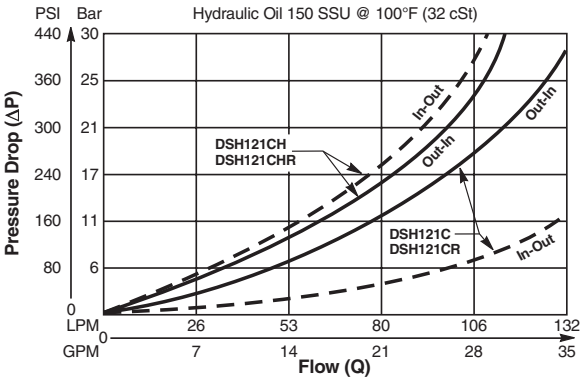
Specifications

Rated Flow	90 LPM (24 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized** / **De-Energized** **C, CR** 100 ms / 150 ms **CH, CHR** 60 ms / 60 ms **N, NR** 70 ms / 150 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.29 kg (.65 lbs.)
Cavity	C12-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT12-2F

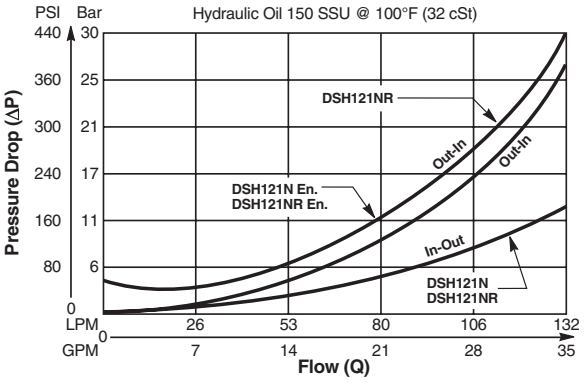
Performance Curves

Pressure Drop vs. Flow (Through cartridge only)

Normally Closed



Normally Open



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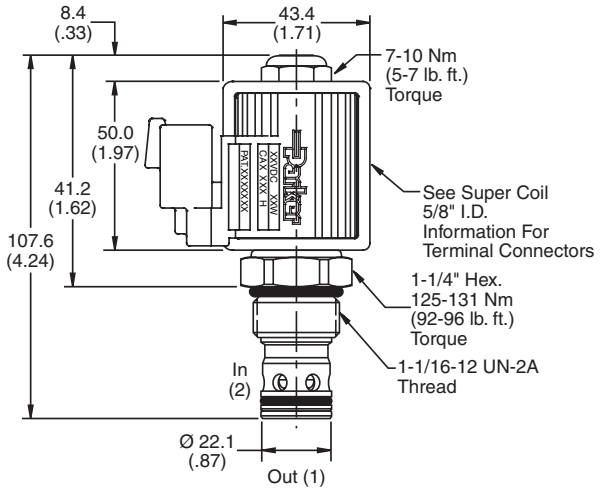
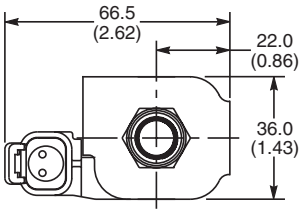
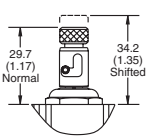
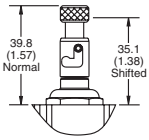
Dimensions Millimeters (Inches)



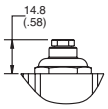




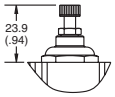
Push and Twist M.O.
(Normally Closed Valves Only)



Push and Twist M.O.
(Normally Open Valves Only)



Flush M.O.
(Normally Open Valves Only)



Extended M.O.
(Normally Open Valves Only)

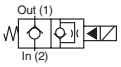
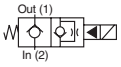
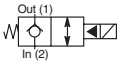
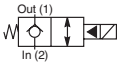
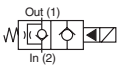
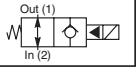
THIRD-ANGLE PROJECTION

Ordering Information

DSH121			
12 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code / Style	
C Normally Closed Metered reverse flow	
CH Normally Closed Metered reverse flow (Fast response)	
CHR Normally Closed Full reverse flow (Fast response)	
CR Normally Closed Free reverse flow	
N Normally Open Metered reverse flow	
NR Normally Open Free reverse flow	

Code	Override Options
Omit	**None**
E	Push Type with Extended Rod (N.O. Only)
M	Push Type with Flush Rod (N.O. Only)
T	Push & Twist (N.C. & N.O.)

Code	Seals / Kit No.
N	**Nitrile (SK12-2)**
V	Fluorocarbon / (SK12-2V)

Order Bodies Separately
See section BC

B12	–	2	–	
12 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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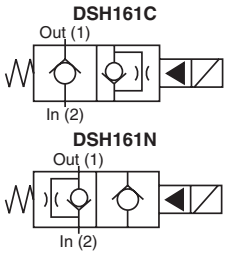
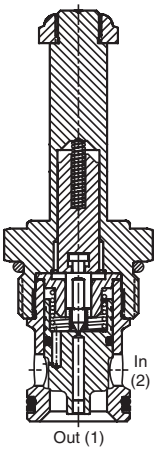
General Description

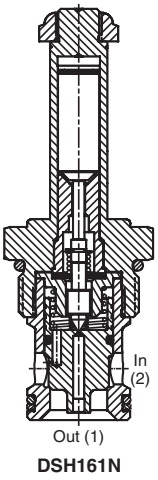
2-Way Poppet Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- Replaceable, one piece encapsulated coils with minimal amperage draw
- Various coil terminations and voltages
- Various manual override options
- All external parts zinc plated
- New 350 Bar (5000 PSI) rating







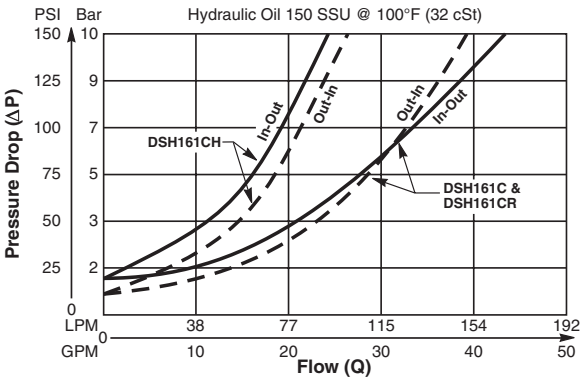
Specifications

Rated Flow	150 LPM (40 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized** / **De-Energized** **C, CR** 50 ms / 130 ms **CH** 40 ms / 60 ms **N, NR** 45 ms / 75 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.34 kg (.75 lbs.)
Cavity	C16-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT16-2F

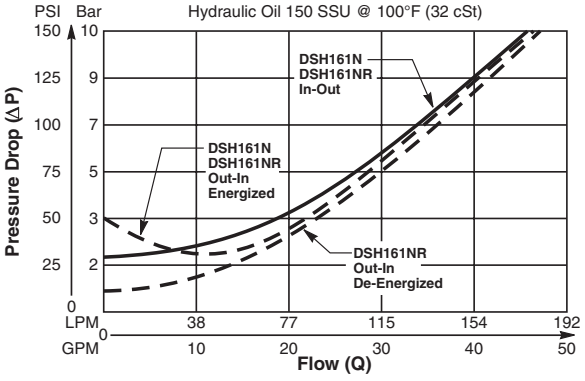
Performance Curves

Pressure Drop vs. Flow (Through cartridge only)

Normally Closed



Normally Open



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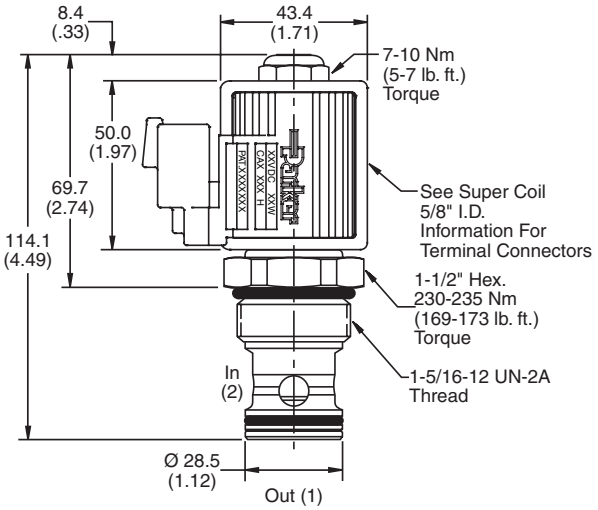
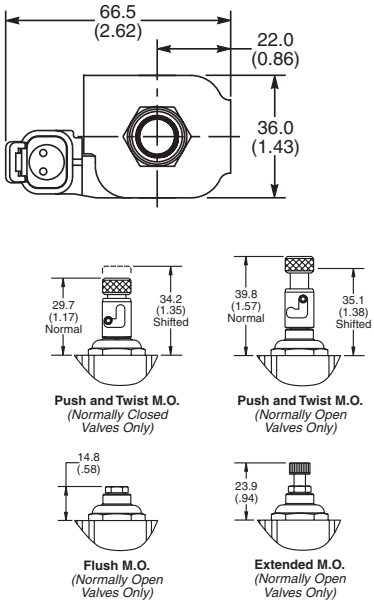
Dimensions Millimeters (Inches)



Normally Closed



THIRD-ANGLE PROJECTION

Ordering Information

DSH161			
16 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code / Style	
C Normally Closed Metered reverse flow	Out (1) / In (2)
CH Normally Closed Metered reverse flow (Fast response)	Out (1) / In (2)
CR Normally Closed Free reverse flow	Out (1) / In (2)
N Normally Open Metered reverse flow	Out (1) / In (2)
NR Normally Open Free reverse flow	Out (1) / In (2)

Code	Override Options
Omit	**None**
E	Push Type with Extended Rod (N.O. Only)
M	Push Type with Flush Rod (N.O. Only)
T	Push & Twist (N.C. & N.O.)

Code	Seals / Kit No.
N	**Nitrile (SK16-2)**
V	Fluorocarbon / (SK16-2V)

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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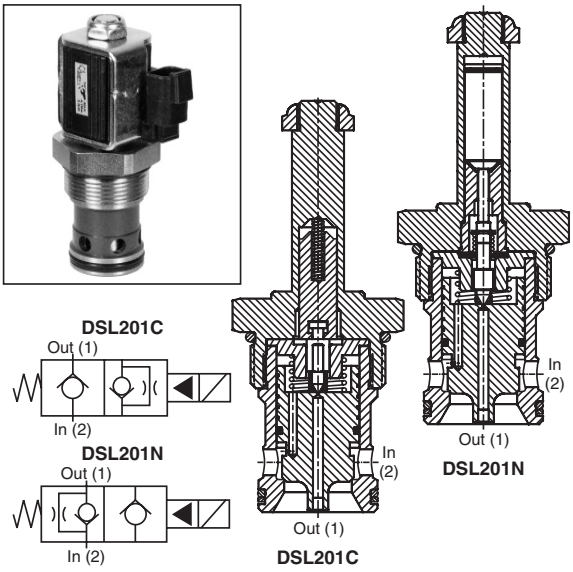
General Description

2-Way Poppet Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- Replaceable, one piece encapsulated coils with minimal amperage draw
- Various coil terminations and voltages
- Various manual override options
- All external parts zinc plated
- New 250 Bar (3600 PSI) rating

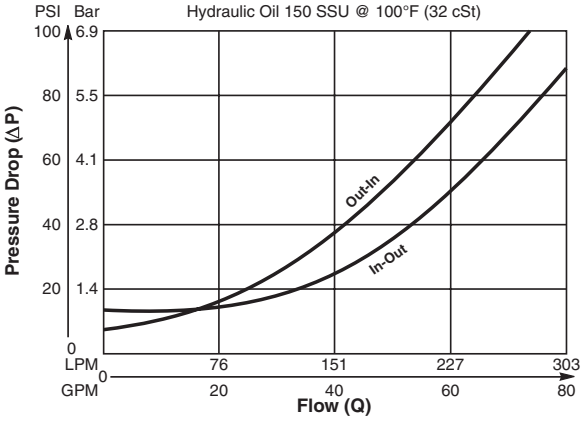


Specifications

Rated Flow	260 LPM (70 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized / De-Energized** **C, CR** 350 ms / 160 ms **N, NR** 300 ms / 45 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.34 kg (.75 lbs.)
Cavity	C20-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT20-2F

Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



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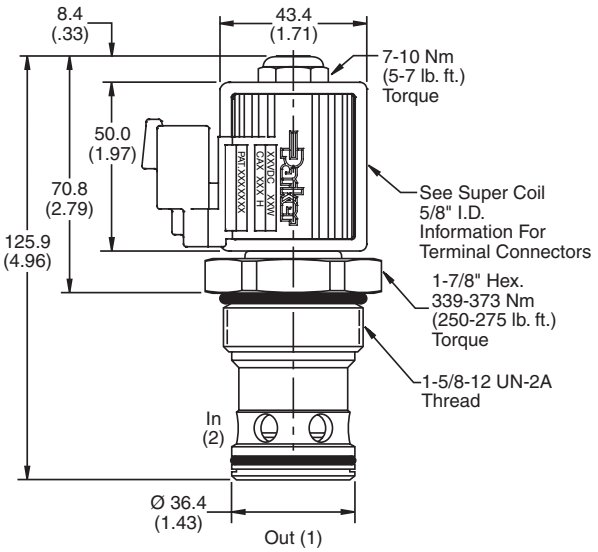
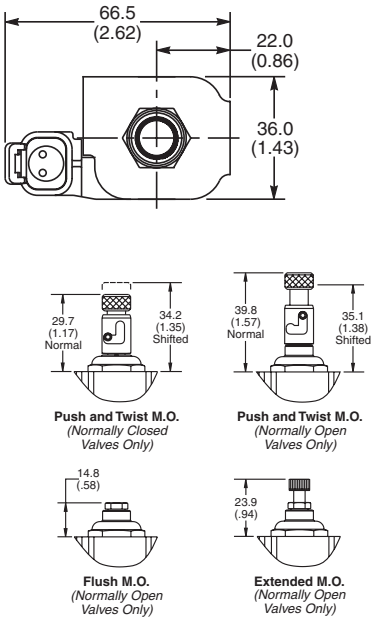
Dimensions Millimeters (Inches)



Normally Closed

THIRD-ANGLE PROJECTION



Ordering Information

DSL201			
20 Size Solenoid Valve	Style	Override Option	Seals

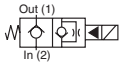
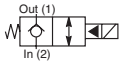
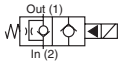
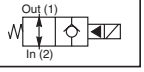
Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Order Bodies Separately
See section BC

B20	–	2	–	
20 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
20T	SAE-20 / Steel (5000 PSI)
A20T	SAE-20 / Aluminium (3000 PSI)

Code / Style	
C Normally Closed Metered reverse flow	
CR Normally Closed Free reverse flow	
N Normally Open Metered reverse flow	
NR Normally Open Free reverse flow	

Code	Override Options
Omit	**None**
E	Push Type with Extended Rod (N.O. Only)
M	Push Type with Flush Rod (N.O. Only)
T	Push & Twist (N.C. & N.O.)

Code	Seals / Kit No.
N	**Nitrile (SK20-2)**
V	Fluorocarbon / (SK20-2V)

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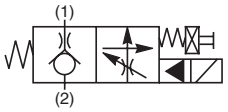
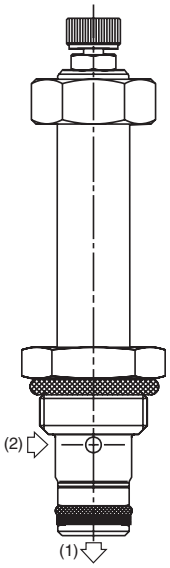
General Description

2-Way, 2 Position, Normally Closed Poppet Valve With Flow Control Adjustment. This valve maintains constant flow at $\Delta P \geq 20$ Bar (300 PSI) regardless of load pressure changes upstream of the valve at port 2.

Features

- Light weight alloy housing with hardened steel moving parts
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 04 and 06 series poppet valves; Symmetrical coil can be reversed without affecting performance.





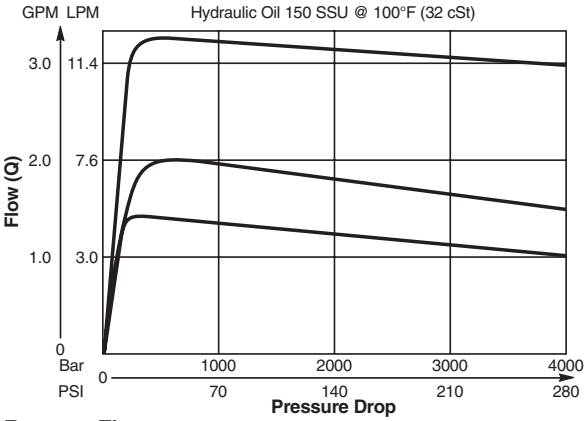
Specifications

Rated Flow	11 LPM (3 GPM)
Maximum Inlet Pressure	**High Pressure** 285 Bar (4000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 20 ms **Close** 25 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.09 kg (.19 lbs.)
Cavity	C08-2 (See BC Section for more details)

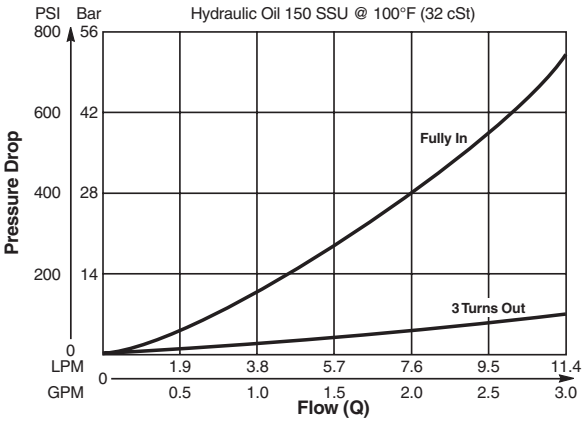
Performance Curves

(Through cartridge only)

Pressure Compensation For Different Flow Settings



Reverse Flow



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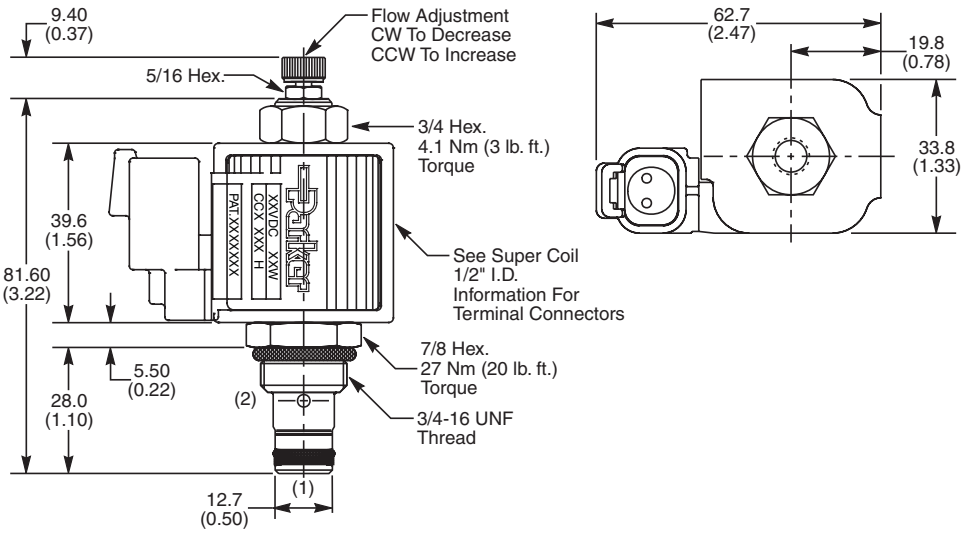
Dimensions Millimeters (Inches)



Ordering Information

GH02	01		
08 Size Solenoid Valve	Style Normally Closed	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
01	**High Pressure ('SP' Coil)**

Code	Screen
0	**None**
1	60 Mesh Screen

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30006N-1)**
V	Fluorocarbon / (SK30006V-1)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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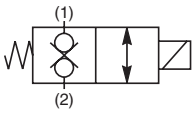
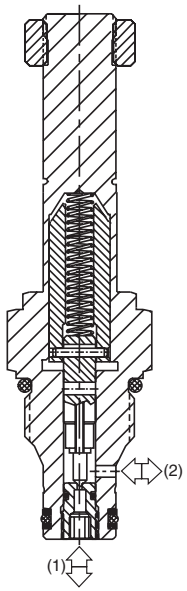
General Description

2-Way, 2 Position, Normally Closed Poppet Valve. Bi-Directional Direct Acting. For additional information see Technical Tips on pages SV1-SV5.

Features

- Fast Response
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 04 and 06 series poppet valves; Symmetrical coil can be reversed without affecting performance.



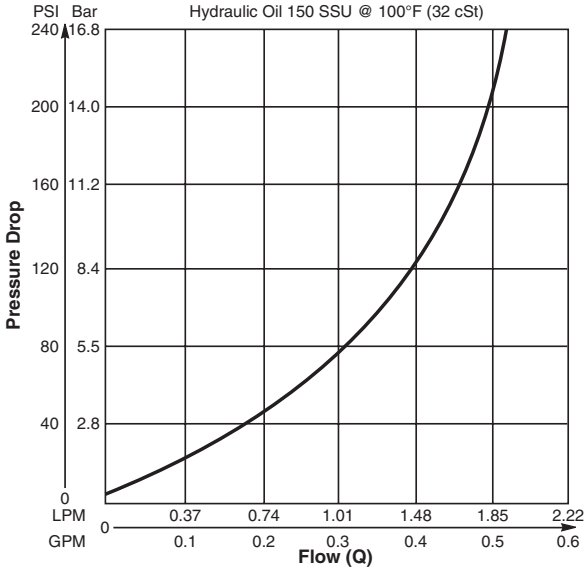


Specifications

Rated Flow	1.7 LPM (0.45 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	**72** 5 drops/min. (.33 cc/min.) **73** Zero Drops Soft (Delrin®) Seat
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 10 ms **Close** 10 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.31 lbs.)
Cavity	C08-2 (See BC Section for more details)

Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



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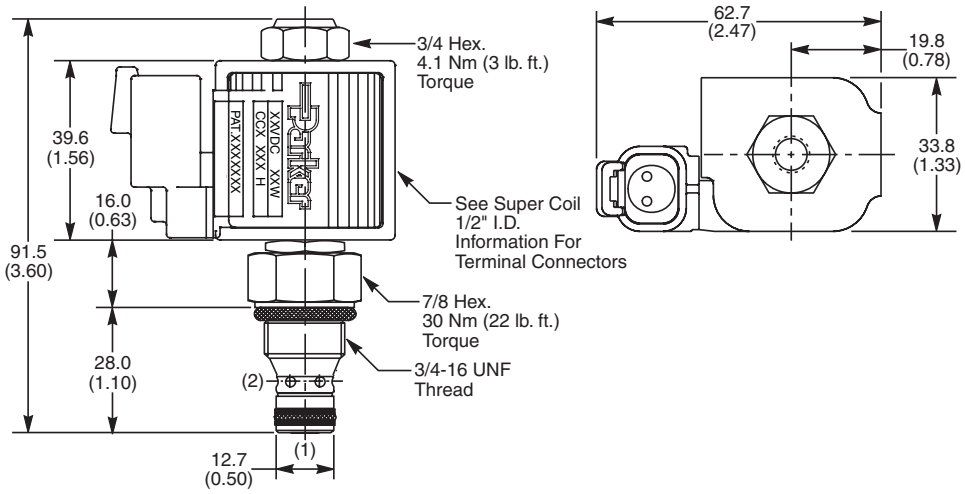
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

GS02		0		
08 Size Solenoid Valve	Style Normally Closed	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
72	**Standard ('SP' Coil)**
01	Zero Drops ('SP' Coil)

Code	Screen
0	**None**
1	60 Mesh Screen

Code	Override Options
0	**None**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30088N-1)**
V	Fluorocarbon / (SK30088V-1)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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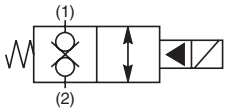
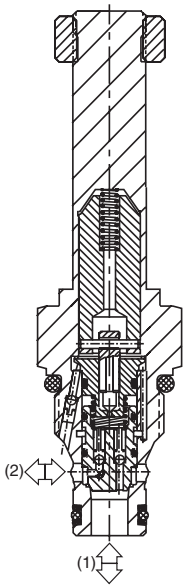
General Description

2-Way, 2 Position, Normally Closed, Bi-Directional Poppet Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Built-in thermal relief set at 36 Bar (500 PSI) above rated pressure
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 04 and 06 series poppet valves; Symmetrical coil can be reversed without affecting performance.



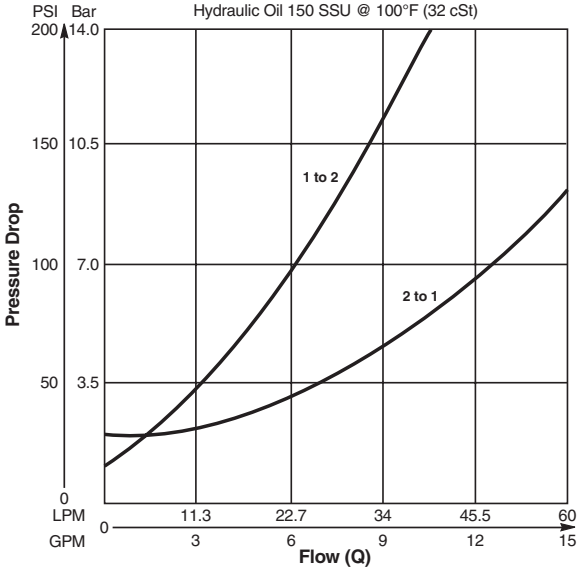


Specifications

Rated Flow	**2 to 1** 34 LPM (9 GPM) **1 to 2** 19 LPM (5 GPM)
Maximum Inlet Pressure	**80** 210 Bar (3000 PSI) **81** 350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 40 ms **Close** 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.31 lbs.)
Cavity	C08-2 (See BC Section for more details)

Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



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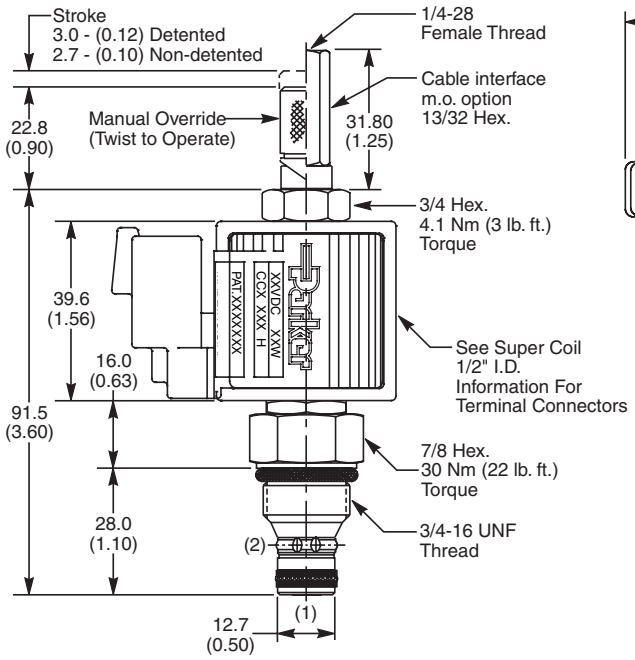
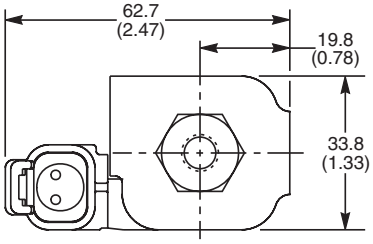
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS02				N
08 Size Solenoid Valve	Style Normally Closed	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
80	**Standard ('SS' Coil)**
81	High Pressure ('SP' Coil)

Code	Screen
0	**None**
1	60 Mesh Screen

Code	Override Options
0	**None**
1	Detented
2	Non-Detented
3	Cable Interface 210 Bar (3000 PSI)

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30088N-1)**

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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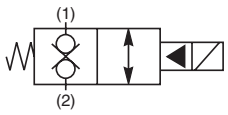
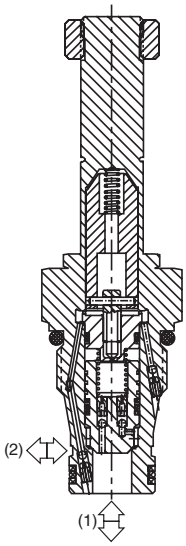
General Description

2-Way, 2 Position, Normally Closed, Bi-Directional Poppet Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Built-in thermal relief set at 36 Bar (500 PSI) above rated pressure
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 02 and 06 series poppet valves; Symmetrical coil can be reversed without affecting performance.



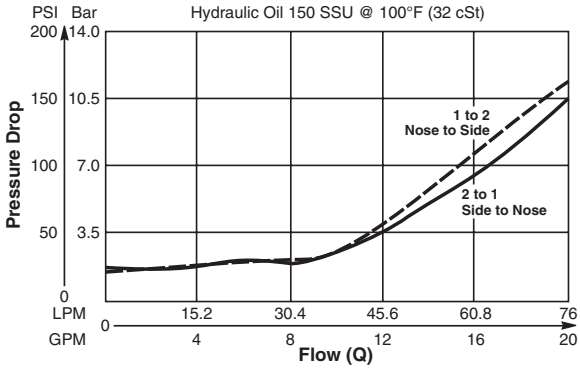


Specifications

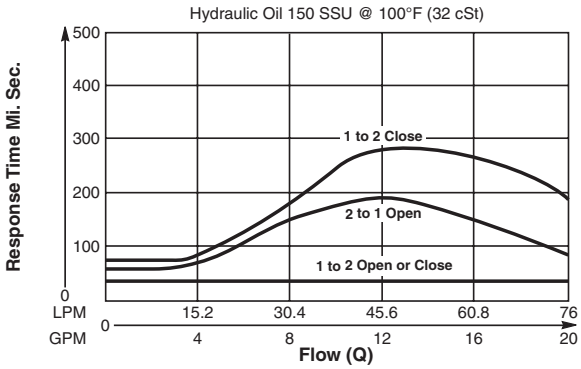
Rated Flow	**2 to 1** 68 LPM (18 GPM) **1 to 2** 46 LPM (12 GPM)
Maximum Inlet Pressure	**80** 210 Bar (3000 PSI) **81** 350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	See Performance Curves
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.17 kg (.37 lbs.)
Cavity	2R (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Response Time vs. Flow



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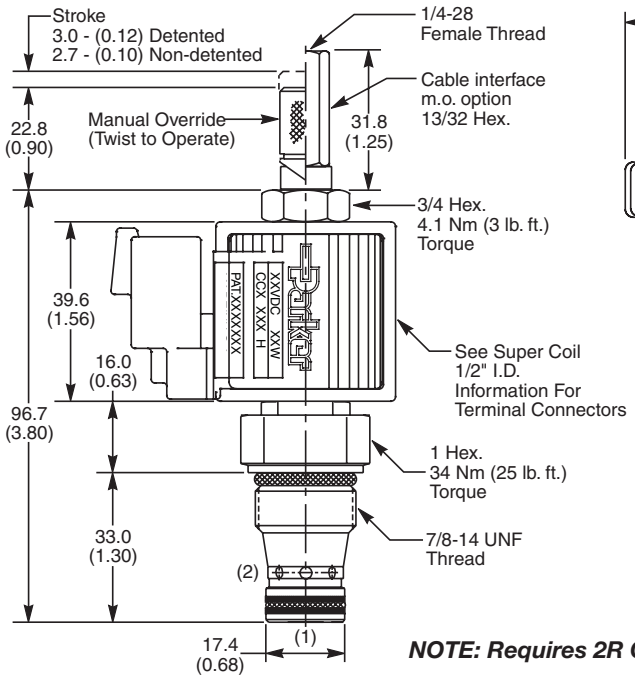
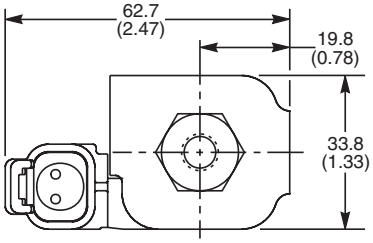
Dimensions Millimeters (Inches)





NOTE: Requires 2R Cavity

THIRD-ANGLE PROJECTION

Ordering Information

GS04			0	N
10 Size Solenoid Valve	Style Normally Closed	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
80	**Standard ('SS' Coil)**
81	High Pressure ('SP' Coil)

Code	Screen
0	**None**

Code	Override Options
0	**None**
1	Detented
2	Non-Detented
3	Cable Interface 210 Bar (3000 PSI)

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30113N-1)**

Order Bodies Separately
See section BC

BW14	–	2	–	
14 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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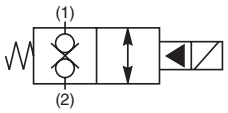
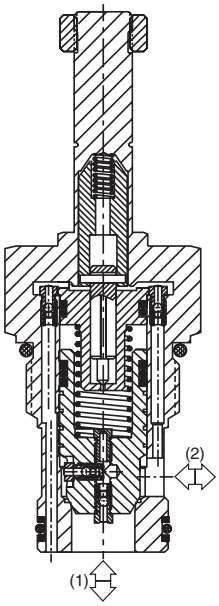
General Description

2-Way, 2 Position, Normally Closed, Bi-Directional Poppet Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Built-in thermal relief set at 36 Bar (500 PSI) above rated pressure
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 02 and 04 series poppet valves; Symmetrical coil can be reversed without affecting performance.



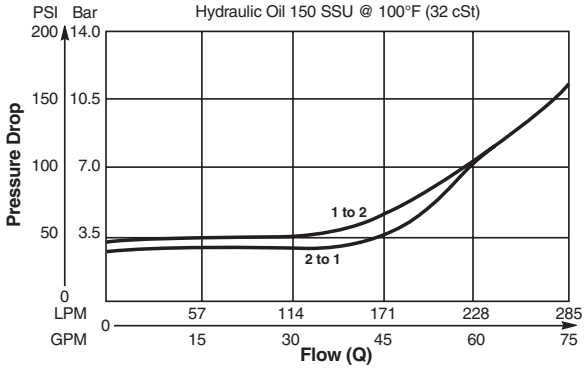


Specifications

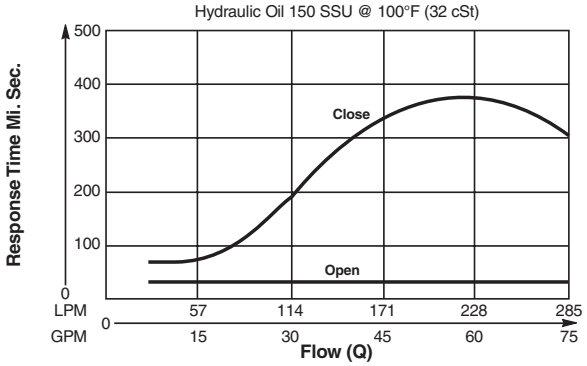
Rated Flow	285 LPM (75 GPM)
Maximum Inlet Pressure	**80** 210 Bar (3000 PSI) **81** 350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	9 drops/min. (.58 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	See Performance Curves
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	0.4 kg (.88 lbs.)
Cavity	C16-2 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Response Time vs. Flow



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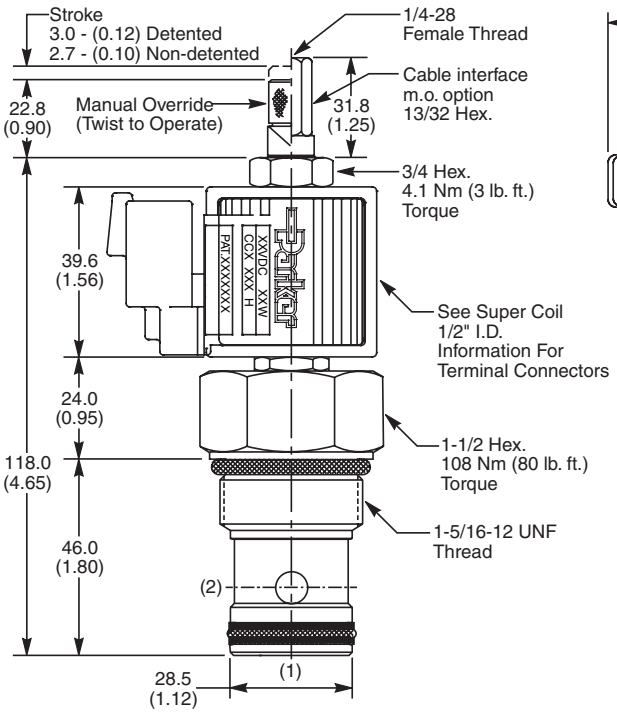
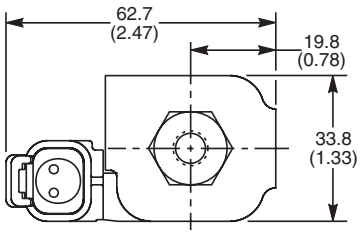
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS06			0	N
16 Size Solenoid Valve	Style Normally Closed	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
80	**Standard ('SS' Coil)**
81	High Pressure ('SP' Coil)

Code	Screen
0	**None**

Code	Override Options
0	**None**
1	Detented
2	Non-Detented
3	Cable Interface 210 Bar (3000 PSI)

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30089N-1)**

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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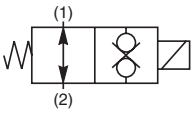
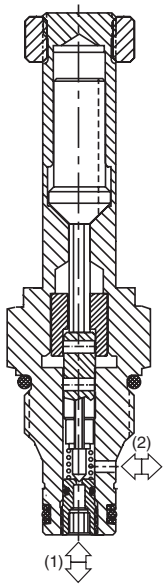
General Description

2-Way, 2 Position, Normally Open Poppet Valve. Bi-Directional Direct Acting. For additional information see Technical Tips on pages SV1-SV5.

Features

- Fast Response
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 04 and 06 series poppet valves; Symmetrical coil can be reversed without affecting performance.



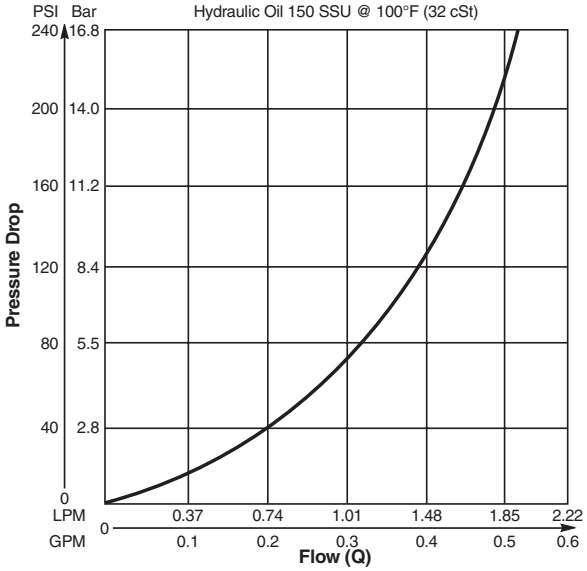


Specifications

Rated Flow	1.7 LPM (0.45 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	**77** 5 drops/min. (.33 cc/min.) **78** Zero Drops Soft (Delrin®) Seat
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 10 ms **Close** 10 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.31 lbs.)
Cavity	C08-2 (See BC Section for more details

Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



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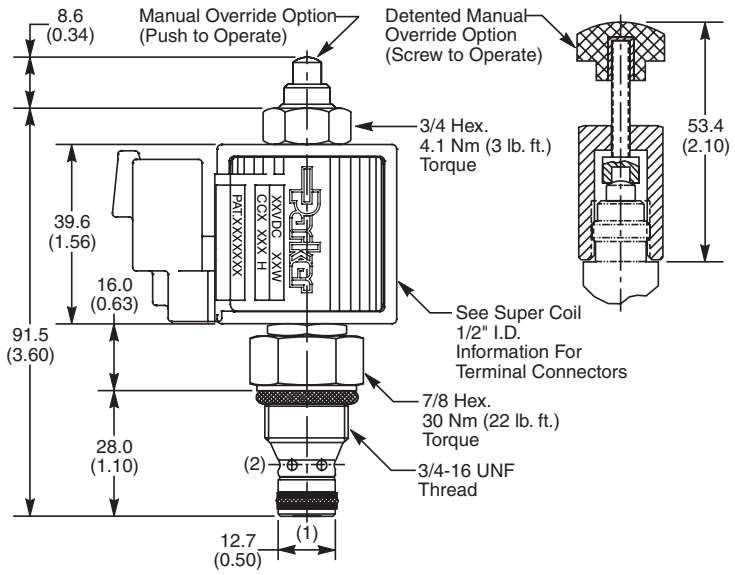
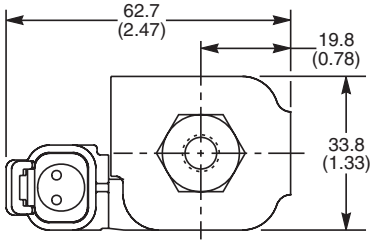
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS02				
08 Size Solenoid Valve	Style Normally Open	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
77	**Standard ('SS' Coil)**
78	High Pressure ('SP' Coil)

Code	Screen
0	**None**
1	60 Mesh Screen

Code	Override Options
0	**None**
1	Manual Override
2	Detented Part No. 900690

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30088N-1)**
V	Fluorocarbon / (SK30088V-1)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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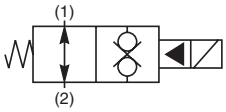
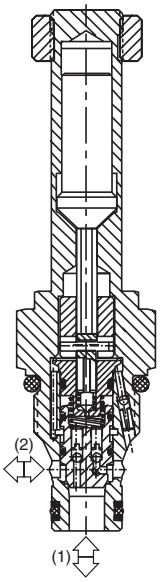
General Description

2-Way, 2 Position, Normally Open, Bi-Directional Poppet Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Built-in thermal relief set at 36 Bar (500 PSI) above rated pressure
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 04 and 06 series poppet valves; Symmetrical coil can be reversed without affecting performance.



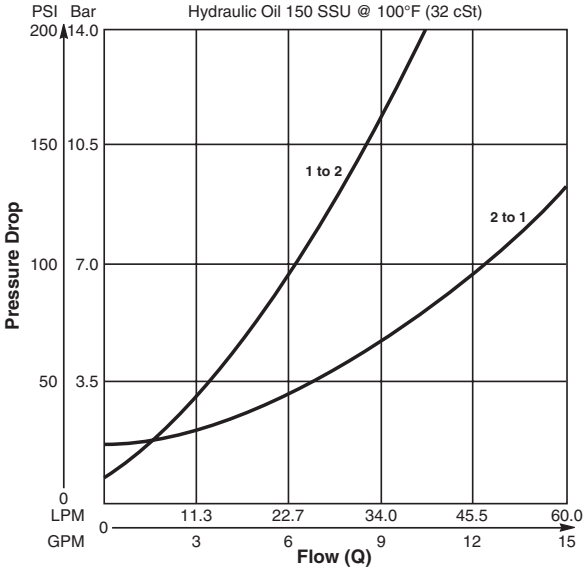


Specifications

Rated Flow	**2 to 1** 34 LPM (9 GPM) **1 to 2** 19 LPM (5 GPM)
Maximum Inlet Pressure	**85** 210 Bar (3000 PSI) **86** 350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 40 ms **Close** 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.14 kg (.31 lbs.)
Cavity	C08-2 (See BC Section for more details)

Performance Curve

Pressure Drop vs. Flow (Through cartridge only)



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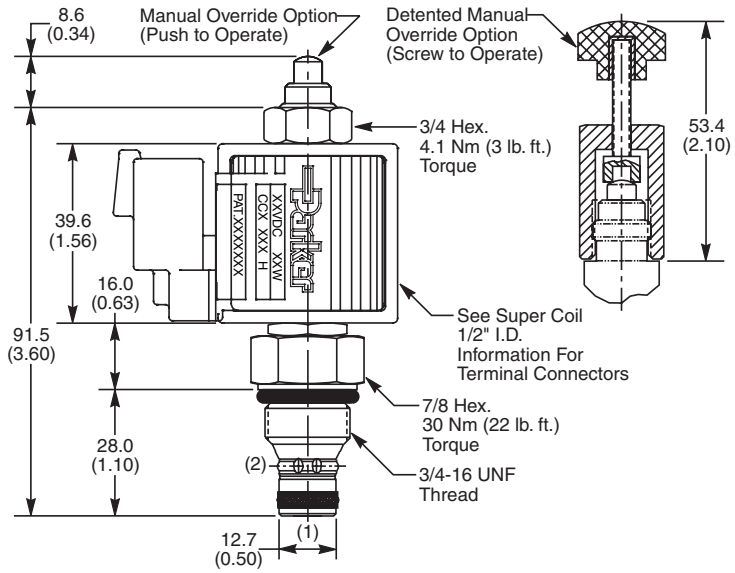
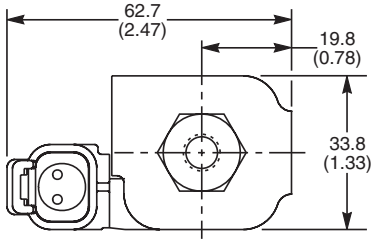
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS02			0	N
08 Size Solenoid Valve	Style Normally Open	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
85	**Standard ('SS' Coil)**
86	High Pressure ('SP' Coil)

Code	Screen
0	**None**

Code	Override Options
0	**None**
1	Manual Override
2	Detented Part No. 900690

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30088N-1)**

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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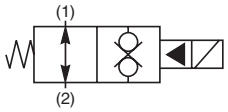
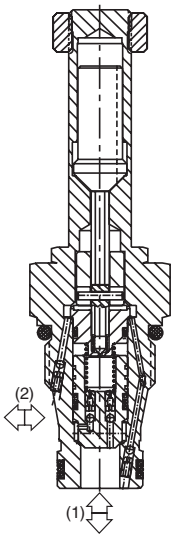
General Description

2-Way, 2 Position, Normally Open, Bi-Directional Poppet Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Built-in thermal relief set at 36 Bar (500 PSI) above rated pressure
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 02 and 06 series poppet valves; Symmetrical coil can be reversed without affecting performance.



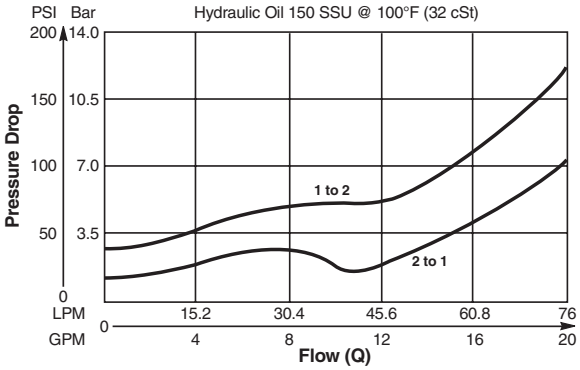


Specifications

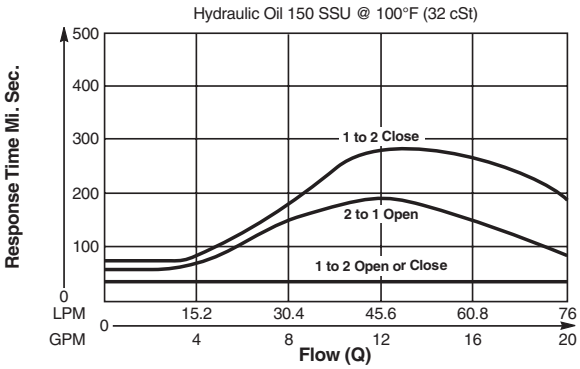
Rated Flow	**2 to 1** 68 LPM (18 GPM) **1 to 2** 46 LPM (12 GPM)
Maximum Inlet Pressure	**85** 210 Bar (3000 PSI) **86** 350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	See Performance Curves
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4404 18/16/13, SAE Class 4
Approx. Weight	.17 kg (.37 lbs.)
Cavity	2R (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Response Time vs. Flow



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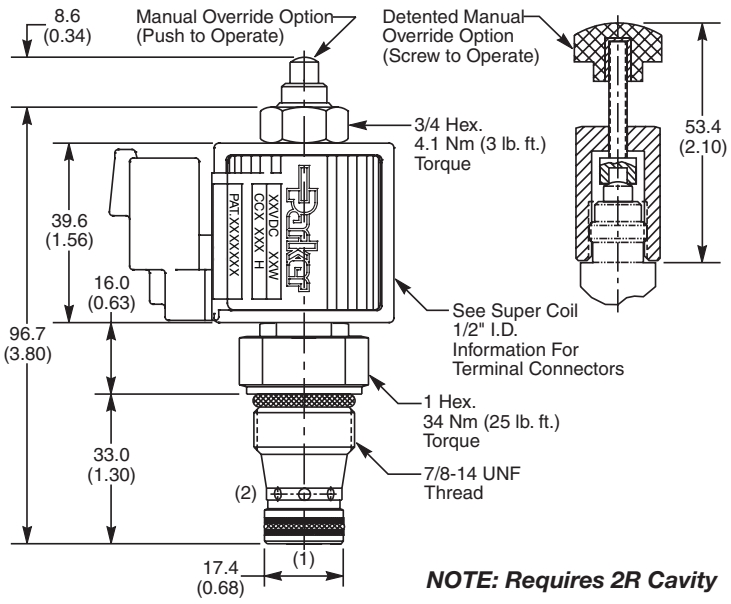
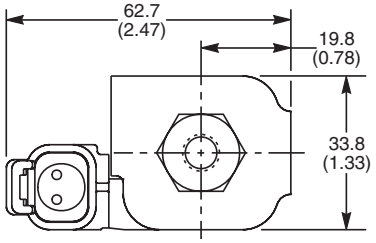
Dimensions Millimeters (Inches)





NOTE: Requires 2R Cavity

THIRD-ANGLE PROJECTION

Ordering Information

GS04			0	N
10 Size Solenoid Valve	Style Normally Open	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
85	**Standard ('SS' Coil)**
86	High Pressure ('SP' Coil)

Code	Screen
0	**None**

Code	Override Options
0	**None**
1	Manual Override
2	Detented Part No. 900690

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30113N-1)**

Order Bodies Separately
See section BC

BW14	–	2	–	
14 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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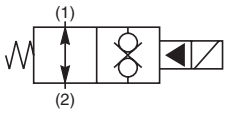
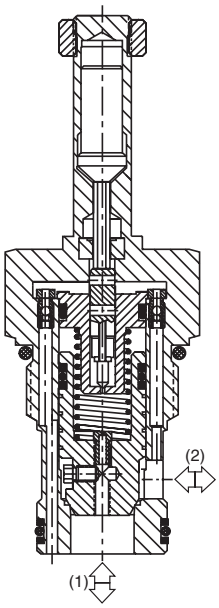
General Description

2-Way, 2 Position, Normally Open, Bi-Directional Poppet Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Built-in thermal relief set at 36 Bar (500 PSI) above rated pressure
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Coil is interchangeable with 02 and 04 series poppet valves; Symmetrical coil can be reversed without affecting performance.



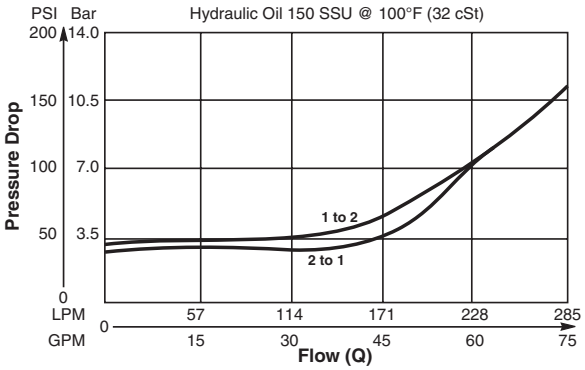


Specifications

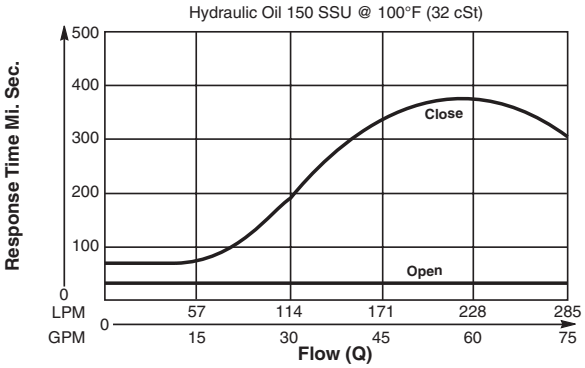
Rated Flow	285 LPM (75 GPM)
Maximum Inlet Pressure	**85** 210 Bar (3000 PSI) **86** 350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	5 drops/min. (.33 cc/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	See Performance Curves
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	0.4 kg (.88 lbs.)
Cavity	C16-2 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Response Time vs. Flow



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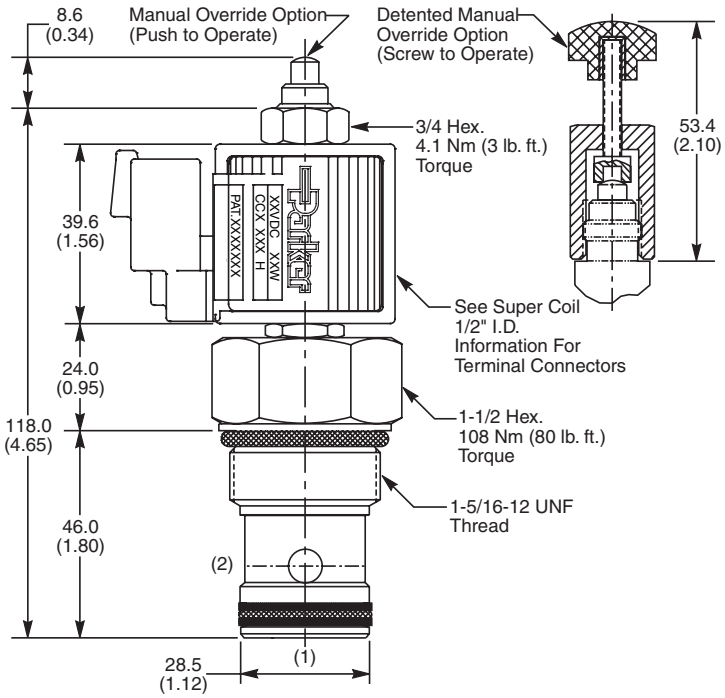
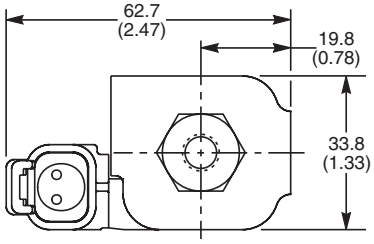
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS06			0	N
16 Size Solenoid Valve	Style Normally Open	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
85	**Standard ('SS' Coil)**
86	High Pressure ('SP' Coil)

Code	Screen
0	**None**

Code	Override Options
0	**None**
1	Detented
2	Detented Part No. 900690

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30089N-1)**

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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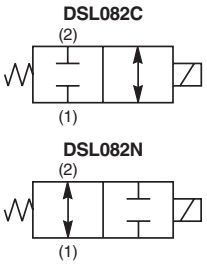
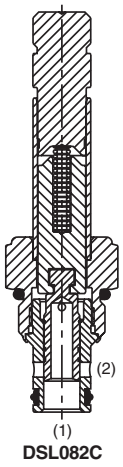
General Description

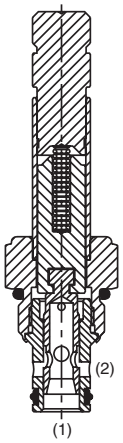
2-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated





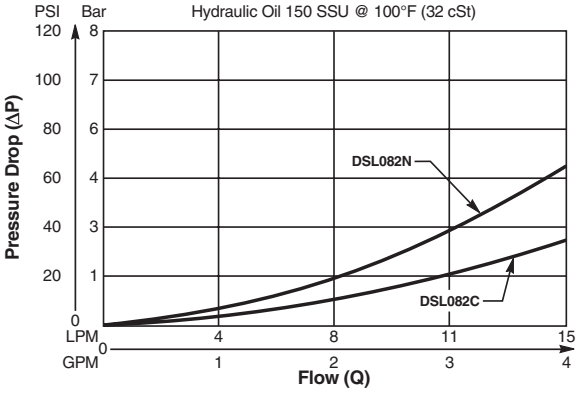


Specifications

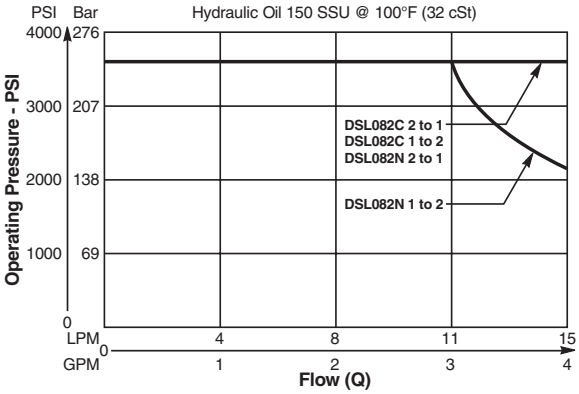
Rated Flow	**C** - 15 LPM (4 GPM) **N** - 11 LPM (3 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32cSt)	120 cc/min. (7.5 in^3/min.) at 250 Bar (3600 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized De-Energized** **C** 40 ms 40 ms **N** 40 ms 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.11 kg (.25 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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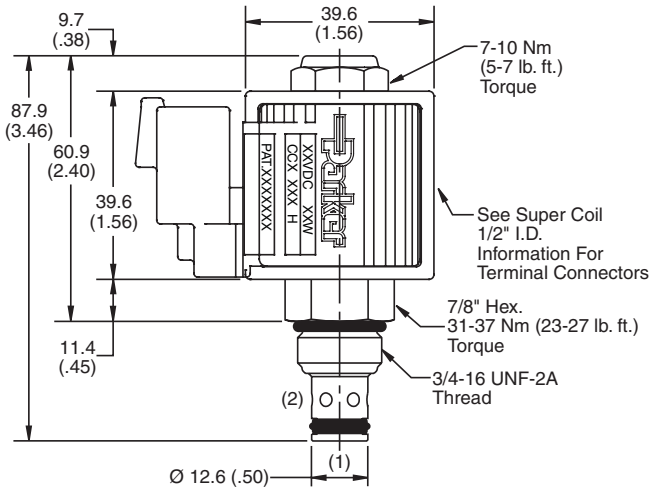
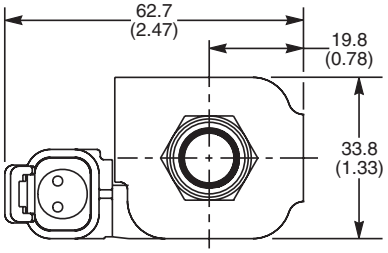
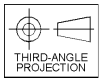
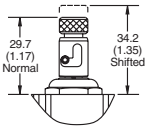
Dimensions Millimeters (Inches)

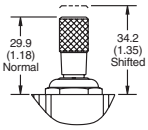








Push and Twist M.O.



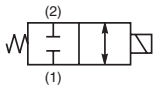
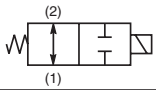
Pull and Release M.O.

Ordering Information

DSL082				
08 Size Solenoid Valve	Style	Override Option	Seals	Screen

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code / Style	
C Normally Closed	
N Normally Open	

Code	Override Options
Omit	**None**
P	Pull and Release
T	Push & Twist

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile (SK08-2)
V	Fluorocarbon / (SK08-2V)

Code	Screen
Omit	**None**
S	Screen

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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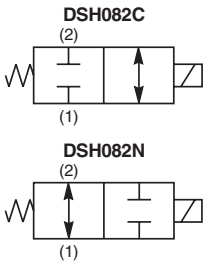
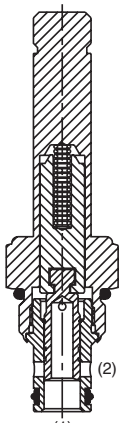
General Description

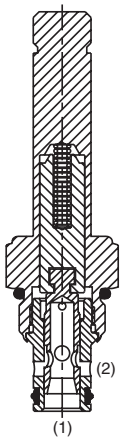
2-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated





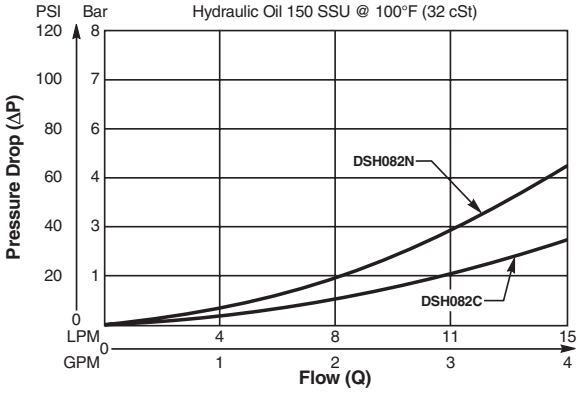


Specifications

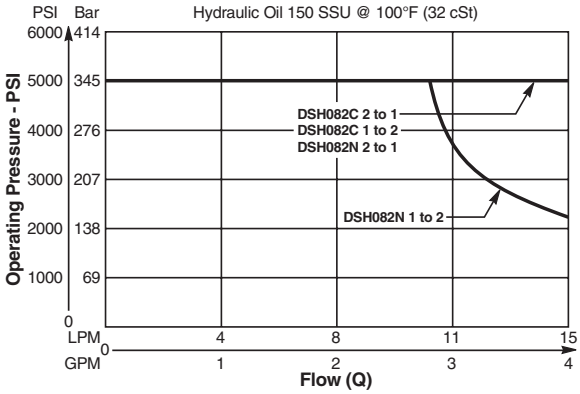
Rated Flow	**C -** 15.0 LPM (4 GPM) **N -** 8.4 LPM (2.8 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min. (10 in^3/min.) at 350 Bar (5000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized De-Energized** **C** 40 ms 40 ms **N** 40 ms 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-35°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.11 kg (.25 lbs.)
Cavity	C08-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT08-2F

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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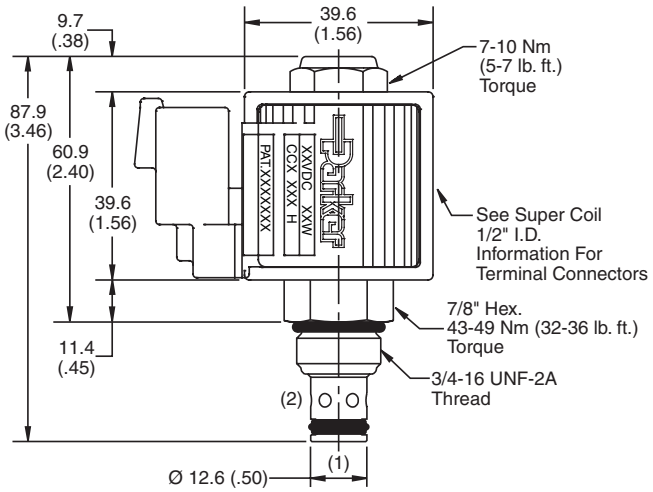
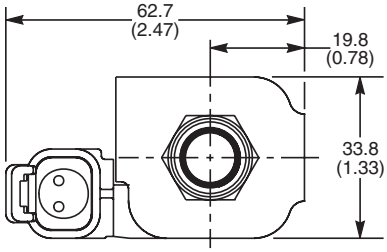
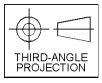
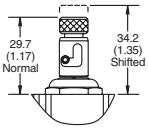
Dimensions Millimeters (Inches)









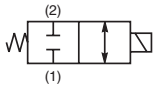
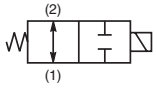
Push and Twist M.O.

Ordering Information

DSH082				
08 Size Solenoid Valve	Style	Override Option	Seals	Screen

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code / Style	
C Normally Closed	
N Normally Open	

Code	Override Options
Omit	**None**
T	Push & Twist* (N.C. & N.O.)

**Requires Super Coil.*

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile (SK08-2)
V	Fluorocarbon / (SK08-2V)

Code	Screen
Omit	**None**
S	Screen

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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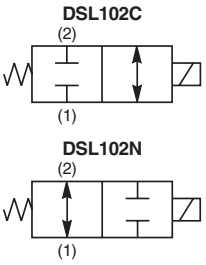
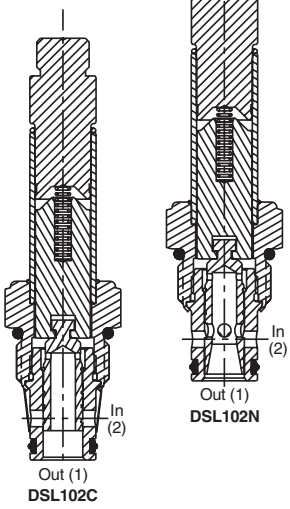
General Description

2-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring
- All external parts zinc plated



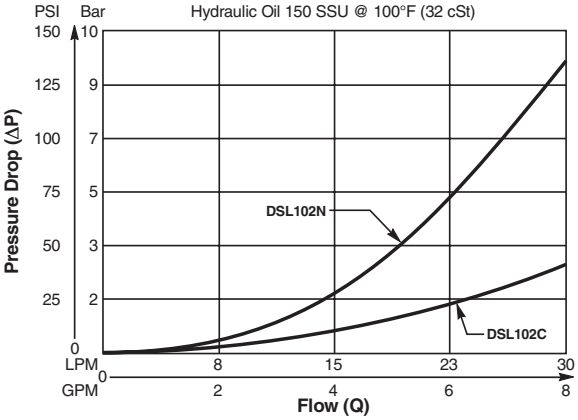


Specifications

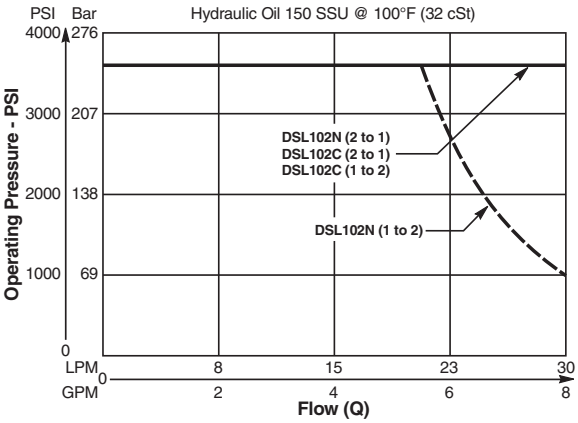
Rated Flow	**C** - 30 LPM (8.0 GPM) **N** - 21 LPM (5.5 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	120 cc/min. (7.5 in^3/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized De-Energized** **C** 30 ms 20 ms **N** 50 ms 25 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.18 kg (.41 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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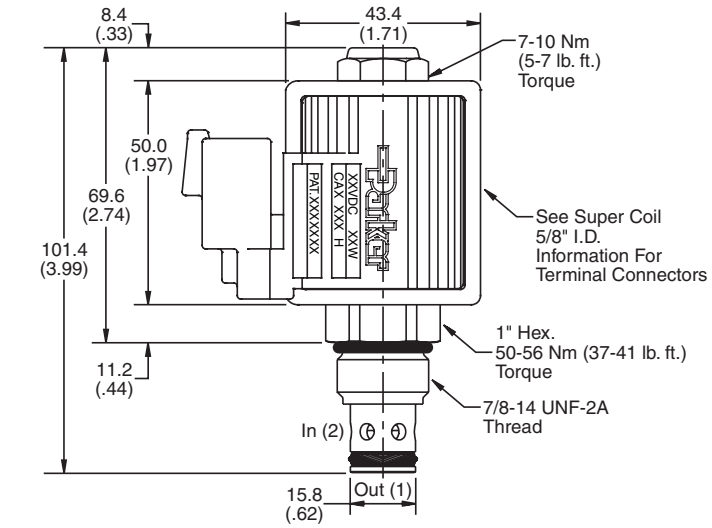
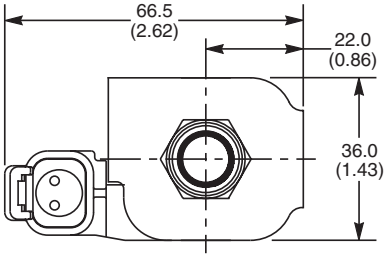
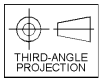
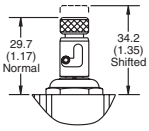
Dimensions Millimeters (Inches)

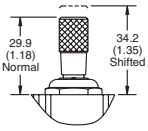








Push and Twist M.O.



Pull and Release M.O.

Ordering Information

DSL102				
10 Size Solenoid Valve	Style	Override Option	Seals	Screen

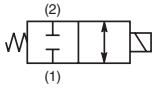
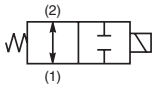
Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

Code / Style	
C Normally Closed	
N Normally Open	

Code	Override Options
Omit	**None**
P	Pull and Release
T	Push & Truck

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile (SK10-2)
V	Fluorocarbon / (SK10-2V)

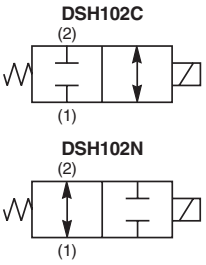
Code	Screen
Omit	**None**
S	Screen

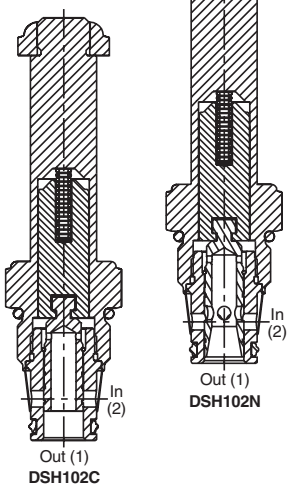
General Description

2-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane “D”-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated



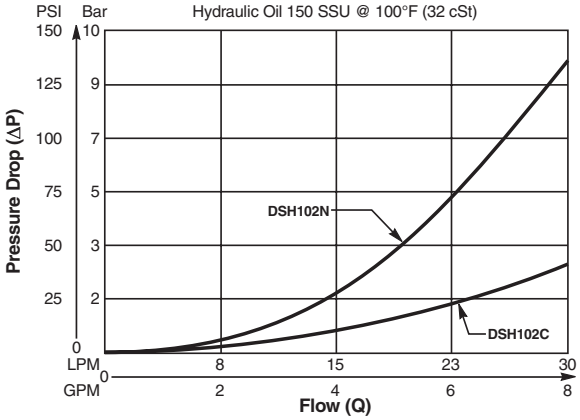


Specifications

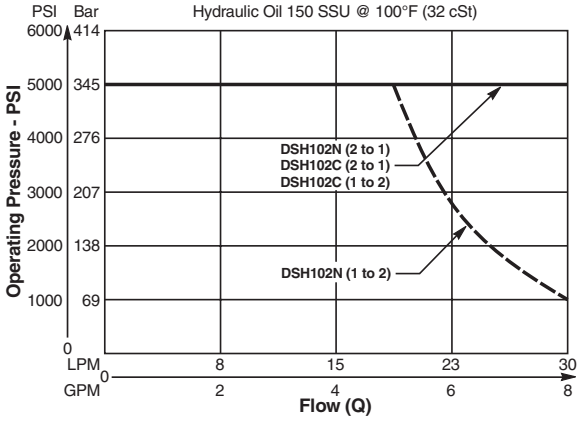
Rated Flow	**C** - 30 LPM (8.0 GPM) **N** - 19 LPM (5.0 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min. (10 in³/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Energized De-Energized** **C** 30 ms 20 ms **N** 50 ms 25 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.18 kg (.40 lbs.)
Cavity	C10-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT10-2F

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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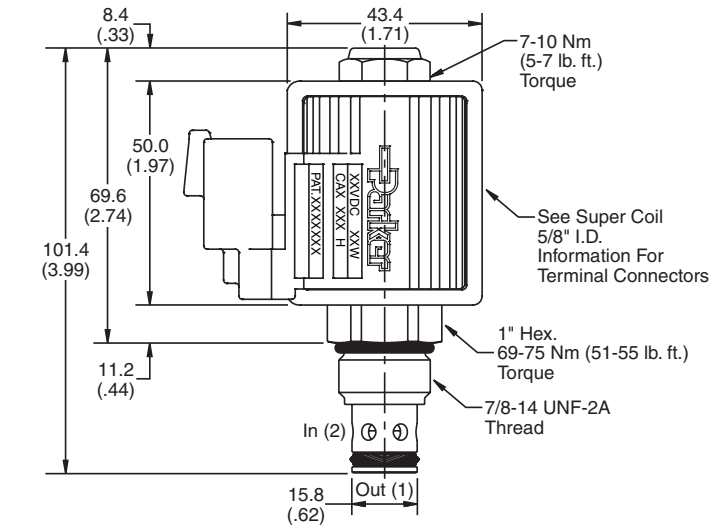
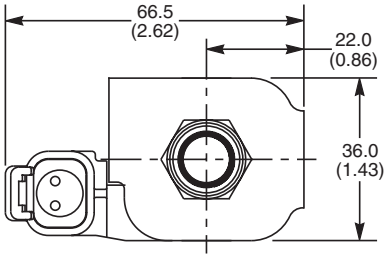
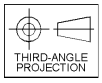
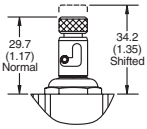
Dimensions Millimeters (Inches)









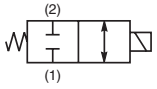
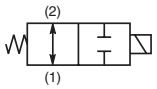
Push and Twist M.O.

Ordering Information

DSH102				
10 Size Solenoid Valve	Style	Override Option	Seals	Screen

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code / Style	
C Normally Closed	
N Normally Open	

Code	Override Options
Omit	**None**
T	Push & Twist* (N.C. & N.O.)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-2)**
N	Nitrile (SK10-2)
V	Fluorocarbon / (SK10-2V)

Code	Screen
Omit	**None**
S	Screen

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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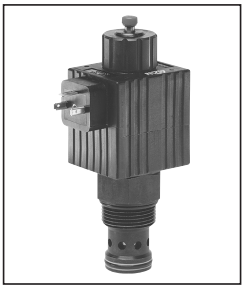
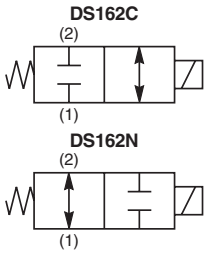
General Description

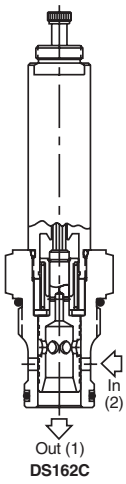
2-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

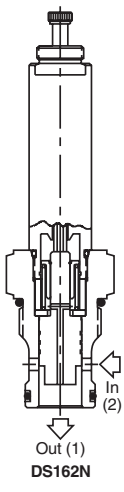
Features

- Low hysteresis
- One-piece encapsulated coil with minimal amperage draw
- Variety of coil terminations and voltages
- Manual override standard (push and release)
- All external parts zinc plated







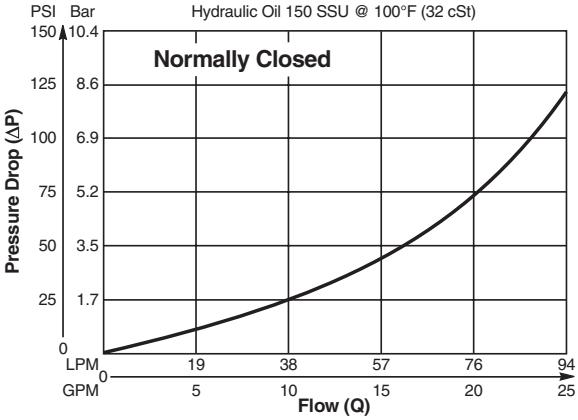


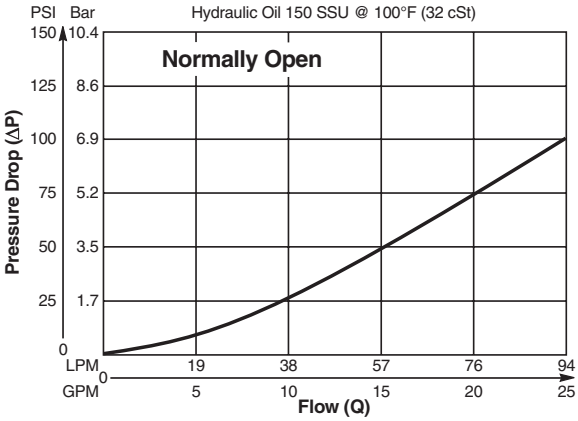
Specifications

Rated Flow	75 LPM (20 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	240 cc/min. (15 in^3/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**C -** 90 ms **N -** 100 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.59 kg (1.3 lbs.)
Cavity	C16-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT16-2F

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)





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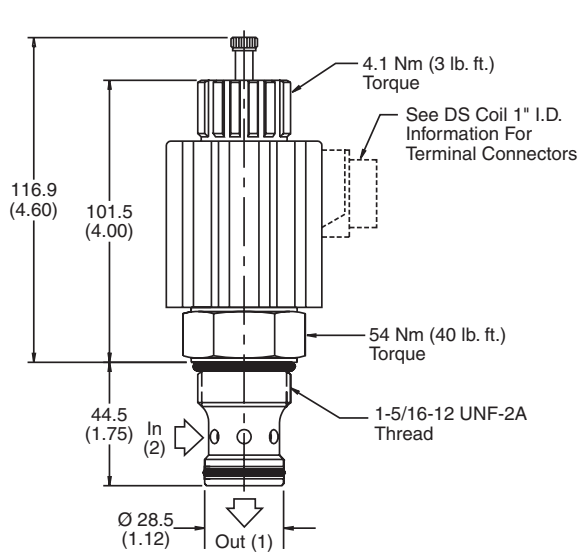
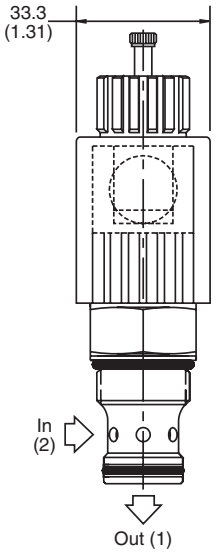
Dimensions Millimeters (Inches)





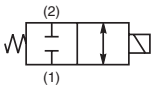
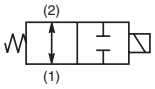
THIRD-ANGLE PROJECTION

Ordering Information

DS162		
16 Size Solenoid Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1" Coil (DS series), for ordering information.

Code / Style	
C Normally Closed	
N Normally Open	

Code	Seals / Kit No.
Omit	Nitrile (SK16-2)
V	Fluorocarbon / (SK16-2V)

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Port Size / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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General Description

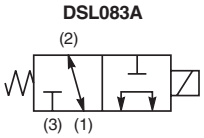
3-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One piece encapsulated coils with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated

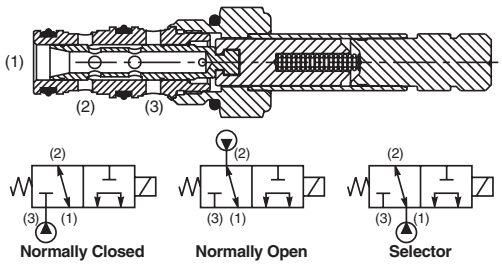
Specifications

Rated Flow	**DSL083A** N.O. 13.2 LPM (3.5 GPM) N.C. 8.4 LPM (2.25 GPM) Selector 8.4 LPM (2.25 GPM) **DSL083B** N.C. 15.0 LPM (4.0 GPM) Selector 15.0 LPM (4.0 GPM) **DSL083C** N.O. 15.0 LPM (4.0 GPM) **DSL083N** N.O. 12.3 LPM (3.25 GPM) Selector 15.0 LPM (4.0 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	120 cc/min. (7.5 in³/min.) at 250 Bar (3600 PSI) DSL083B - 180 cc/min. (11 in³/min.) DSL083N - 180 cc/min. (11 in³/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	50 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.13 kg (.28 lbs.)
Cavity	C08-3 (See BC Section for more details)
Form Tool	Rougher NFT08-3R Finisher NFT08-3F

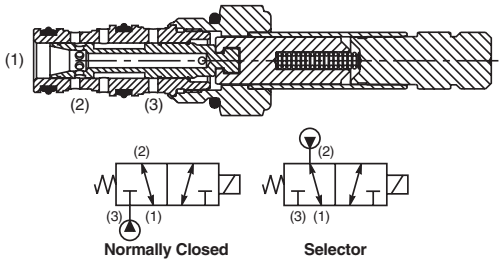


Construction/Symbols

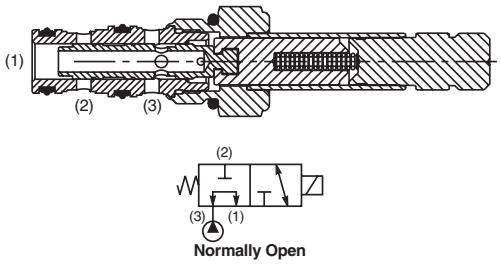
DSL083A



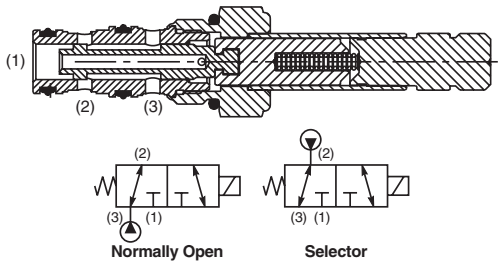
DSL083B



DSL083C



DSL083N



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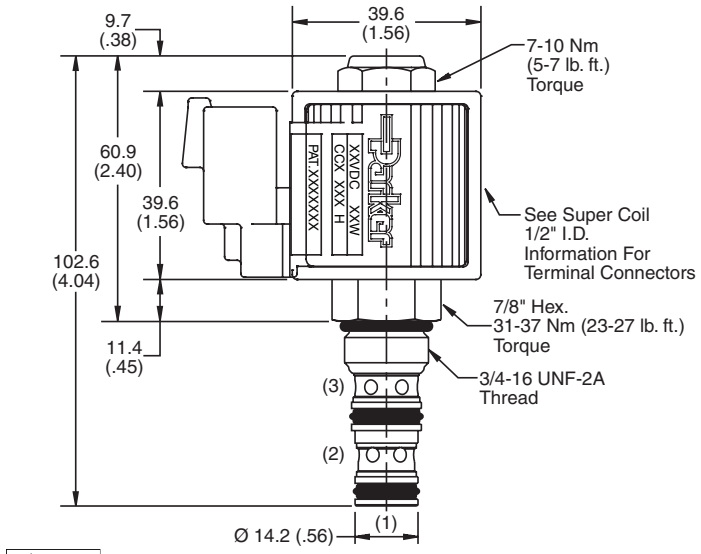
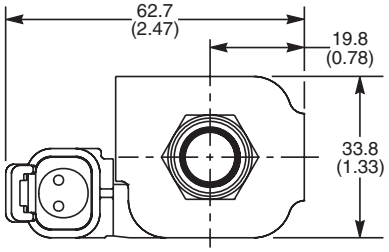
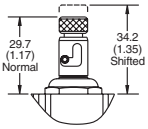
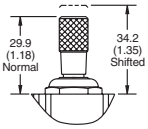
Dimensions Millimeters (Inches)







Push and Twist M.O.



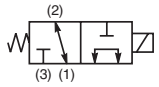
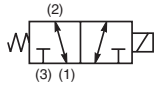
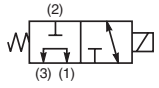
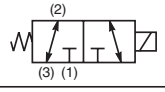
Pull and Release M.O.

Ordering Information

DSL083			
08 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
A	
B	
C	
N	

Code	Override Options
Omit	None
P	Pull and Release
T	**Push & Twist**

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-3)**
N	Nitrile (SK08-3)
V	Fluorocarbon / (SK08-3V)

Order Bodies Separately
See section BC

B08	–	3	–	
08 size		3-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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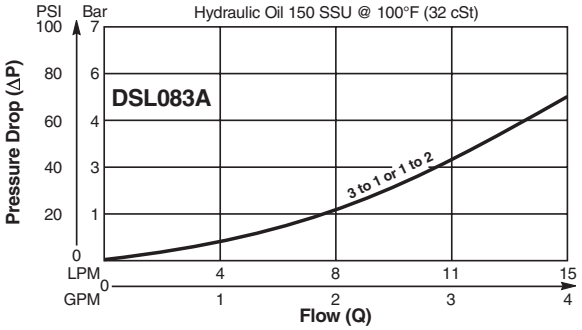
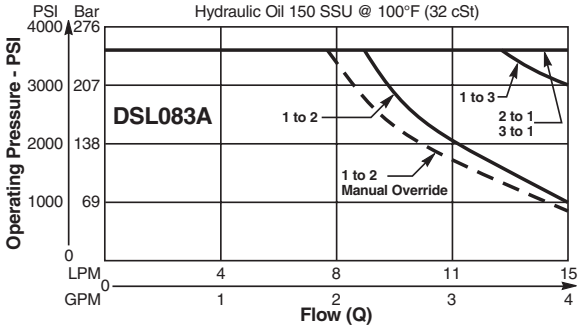
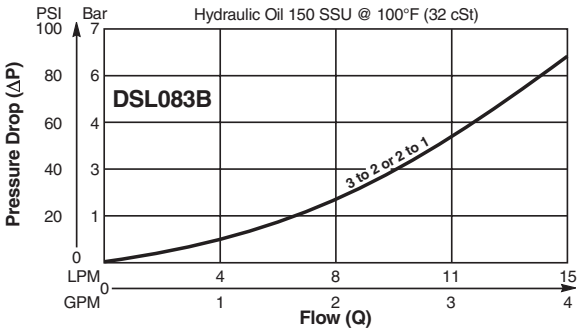
Pressure Drop vs. Flow (Through cartridge only)



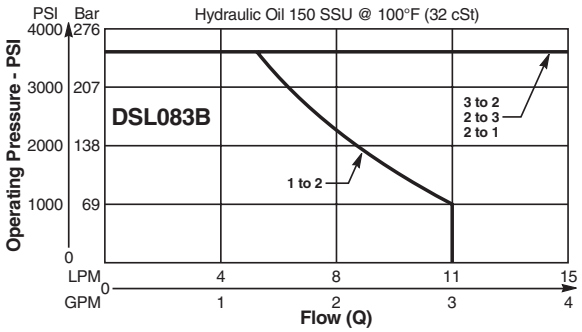
Shift Limit Characteristics (Min. Operating Voltage)



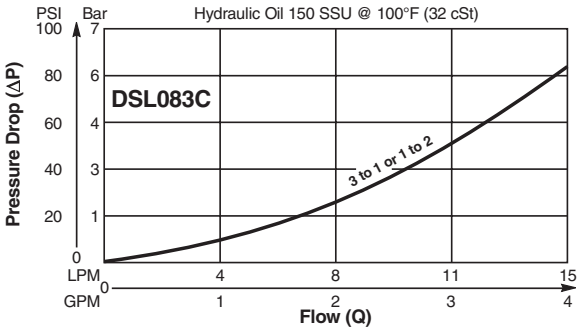
Pressure Drop vs. Flow (Through cartridge only)



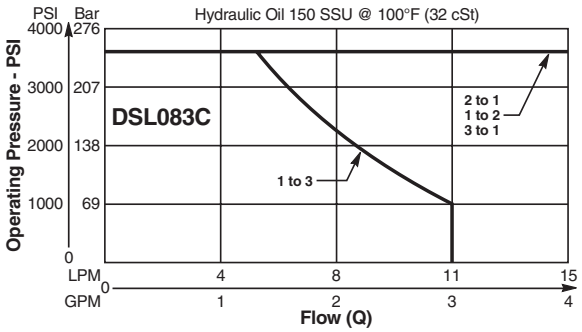
Shift Limit Characteristics (Min. Operating Voltage)



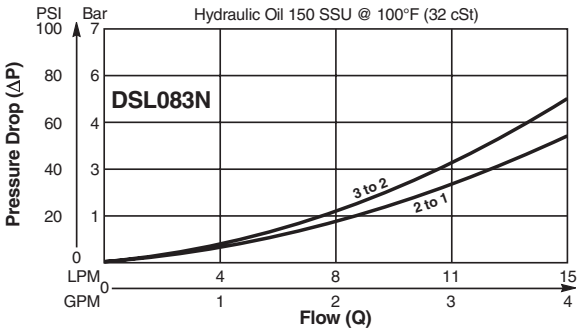
Pressure Drop vs. Flow (Through cartridge only)



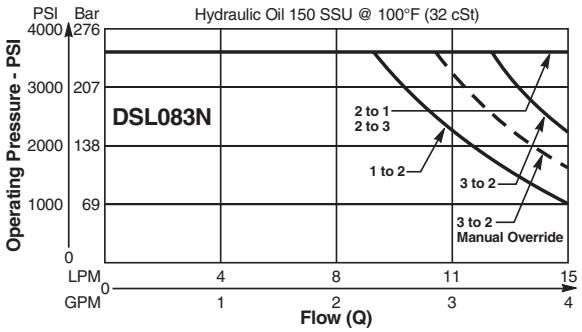
Shift Limit Characteristics (Min. Operating Voltage)



Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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General Description

3-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

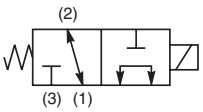
Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One piece encapsulated coils with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane “D”-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated

Specifications

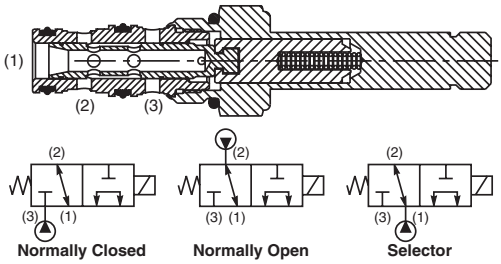
Rated Flow	**DSH083A** N.O. 11.3 LPM (3.0 GPM) N.C. 7.5 LPM (2.0 GPM) Selector 7.5 LPM (2.0 GPM) **DSH083B** N.C. 15.0 LPM (4.0 GPM) Selector 15.0 LPM (4.0 GPM) **DSH083C** N.O. 15.0 LPM (4.0 GPM) **DSH083N** N.O. 11.3 LPM (3.0 GPM) Selector 15.0 LPM (4.0 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min. (10 in³/min.) at 350 Bar (5000 PSI) DSH083B - 250 cc/min. (15 in³/min.) DSH083N - 250 cc/min. (15 in³/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	50 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) (-45°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.13 kg (.28 lbs.)
Cavity	C08-3 (See BC Section for more details)
Form Tool	Rougher NFT08-3R Finisher NFT08-3F

DSH083A

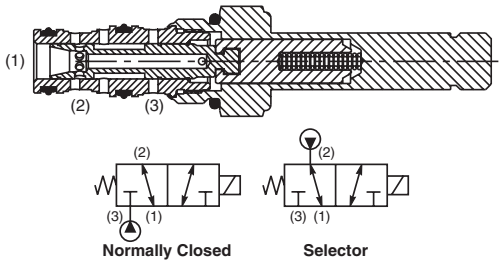


Construction/Symbols

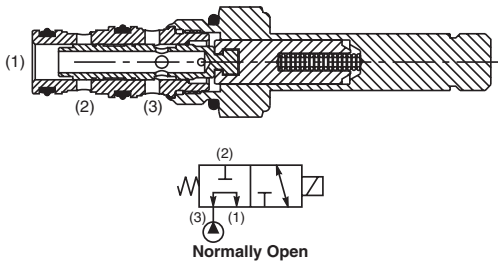
DSH083A



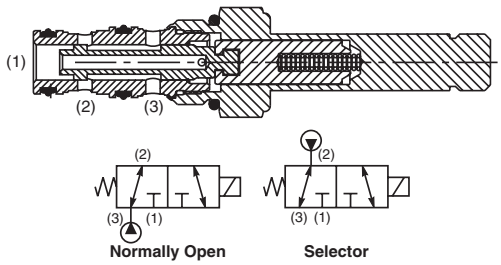
DSH083B



DSH083C



DSH083N



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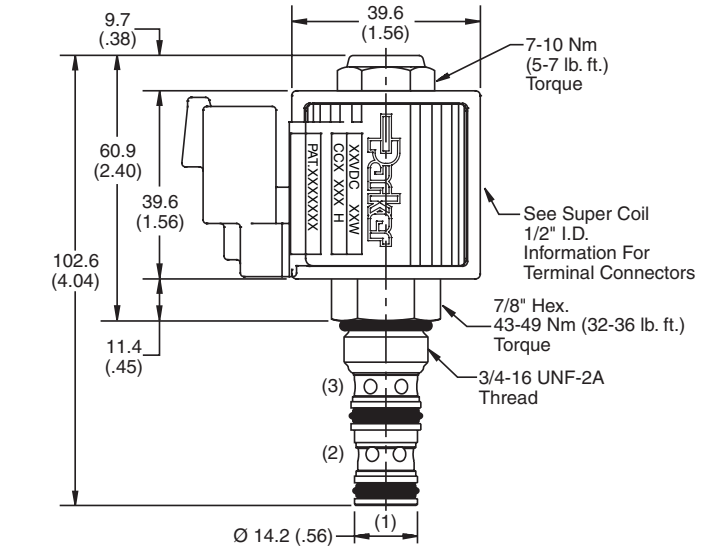
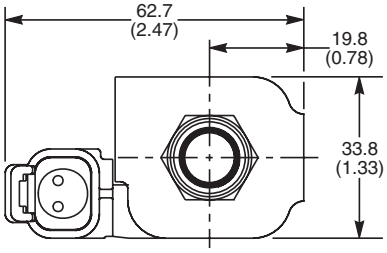
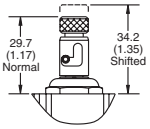
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION



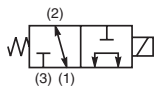
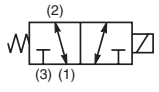
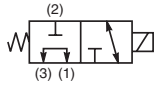
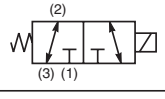
Push and Twist M.O.

Ordering Information

DSH083			
08 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
A	
B	
C	
N	

Code	Override Options
Omit	None
T	Push & Twist* (N.C. & N.O.)

**Requires Super Coil.*

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-3)
N	Nitrile (SK08-3)
V	Fluorocarbon / (SK08-3V)

Order Bodies Separately
See section BC

B08	–	3	–	
08 size		3-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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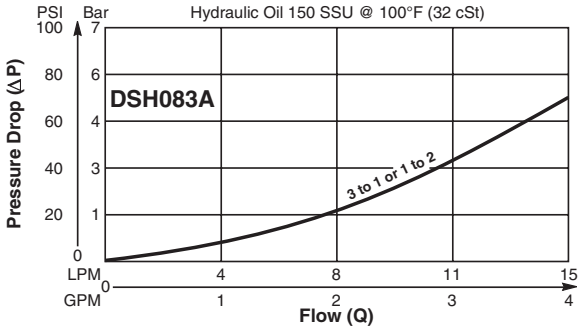
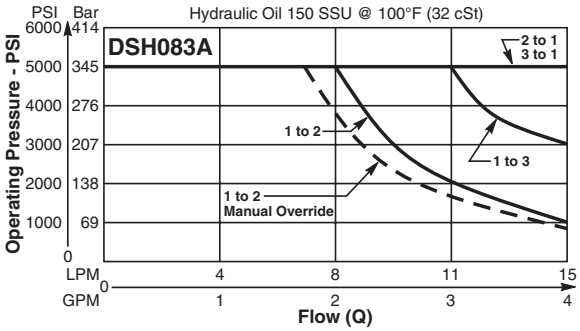
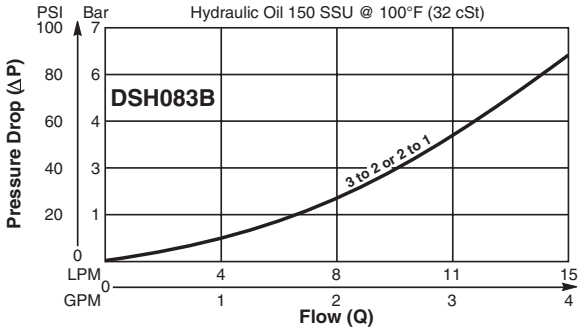
Pressure Drop vs. Flow (Through cartridge only)



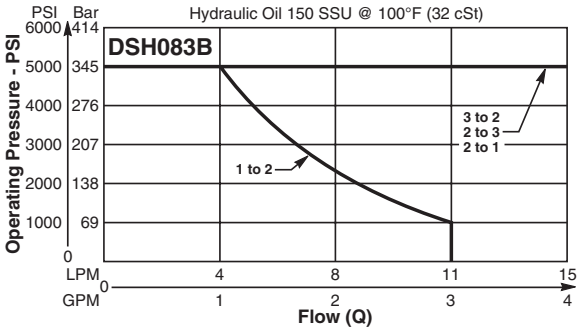
Shift Limit Characteristics (Min. Operating Voltage)



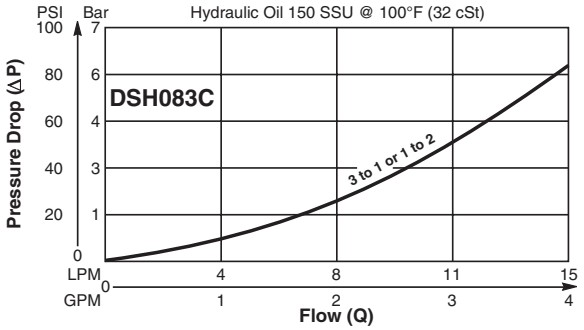
Pressure Drop vs. Flow (Through cartridge only)



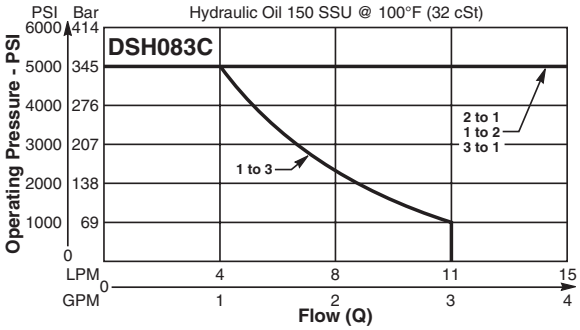
Shift Limit Characteristics (Min. Operating Voltage)



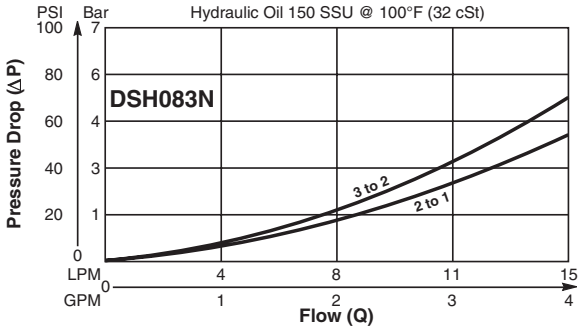
Pressure Drop vs. Flow (Through cartridge only)



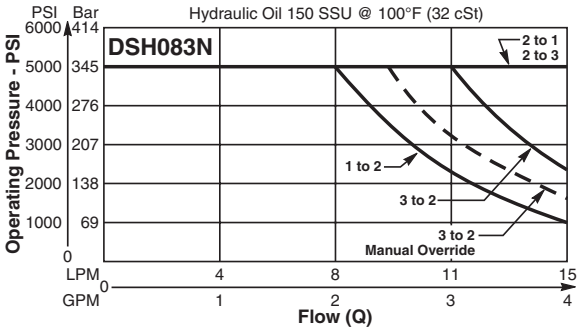
Shift Limit Characteristics (Min. Operating Voltage)



Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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General Description

3-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

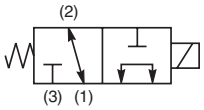
Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane “D”-Ring
- All external parts zinc plated

Specifications

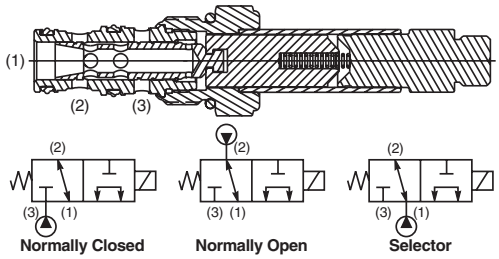
Rated Flow	**DSL103A** N.O. 22.7 LPM (6.0 GPM) N.C. 17.0 LPM (4.5 GPM) Selector 17.0 LPM (4.5 GPM) **DSL103B** N.C. 30.2 LPM (8.0 GPM) Selector 30.2 LPM (8.0 GPM) **DSL103C** N.O. 30.2 LPM (8.0 GPM) **DSL103N** N.O. 18.8 LPM (5.0 GPM) N.C. 18.8 LPM (5.0 GPM) Selector 30.2 LPM (8.0 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	120 cc/min. (7.5 in³/min.) DSL103B - 180 cc/min. (11 in³/min.) DSL103N - 180 cc/min. (11 in³/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	50 ms to 100 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.19 kg (.42 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

DSL103A

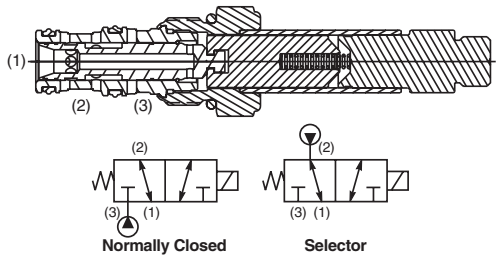


Construction/Symbols

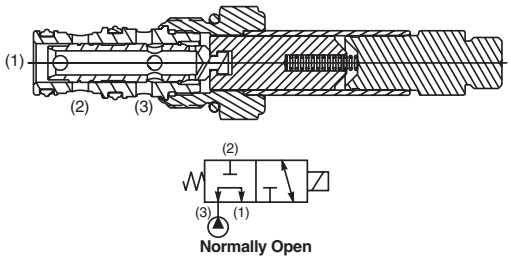
DSL103A



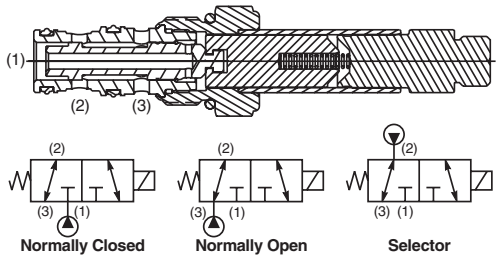
DSL103B



DSL103C



DSL103N



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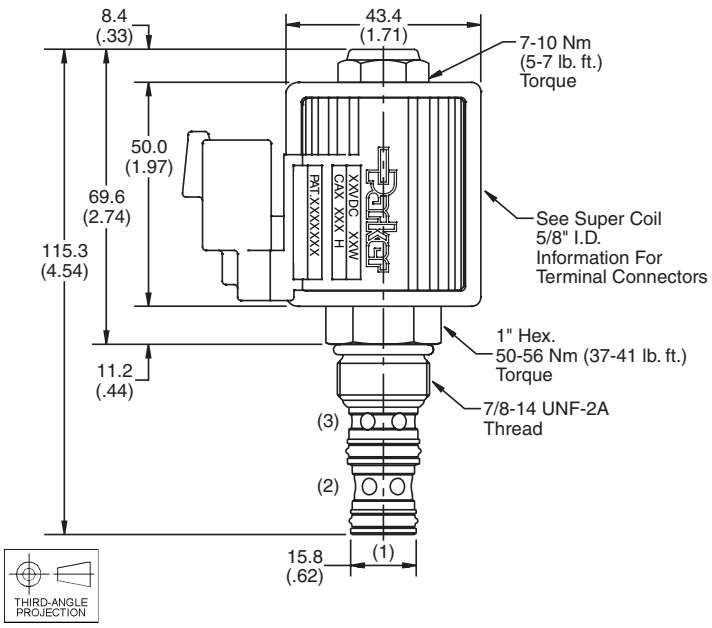
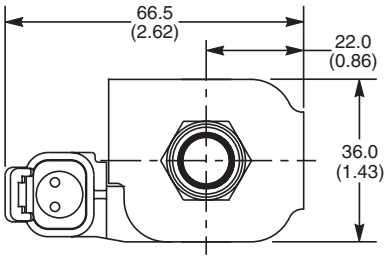
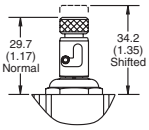
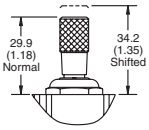
Dimensions Millimeters (Inches)







Push and Twist M.O.



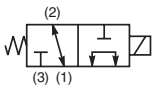
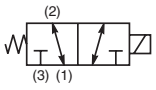
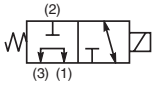
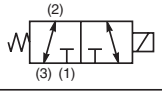
Pull and Release M.O.

Ordering Information

DSL103			
10 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
A	
B	
C	
N	

Code	Override Options
Omit	**None**
P	Pull & Release
T	Push & Twist

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3)**
N	Nitrile (SK10-3)
V	Fluorocarbon / (SK10-3V)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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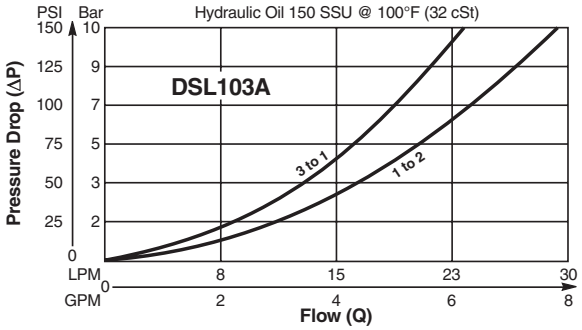
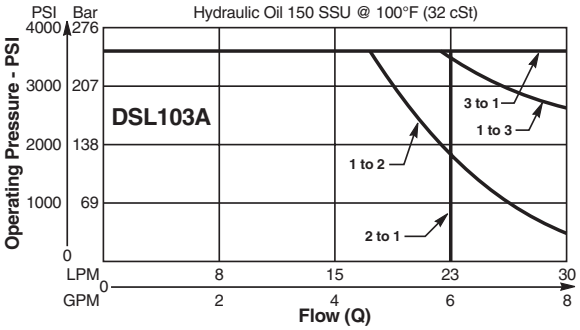
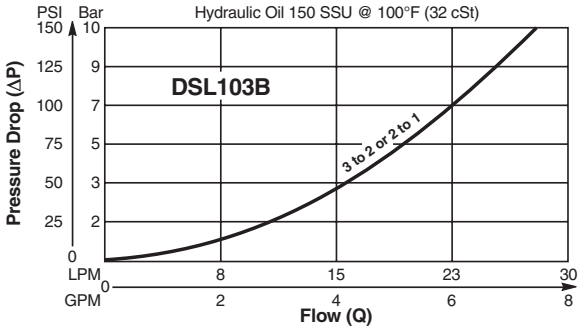
Pressure Drop vs. Flow (Through cartridge only)



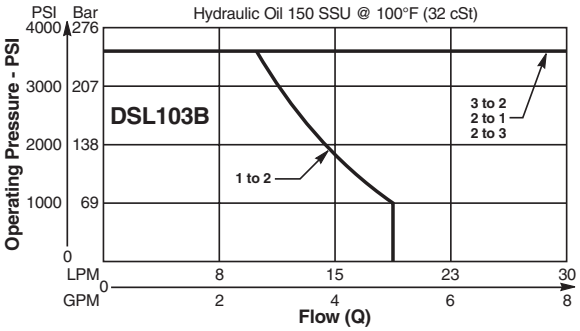
Shift Limit Characteristics (Min. Operating Voltage)



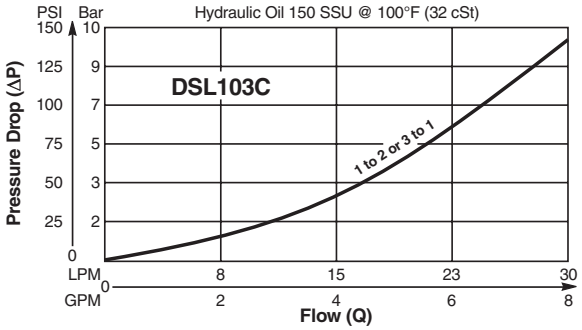
Pressure Drop vs. Flow (Through cartridge only)



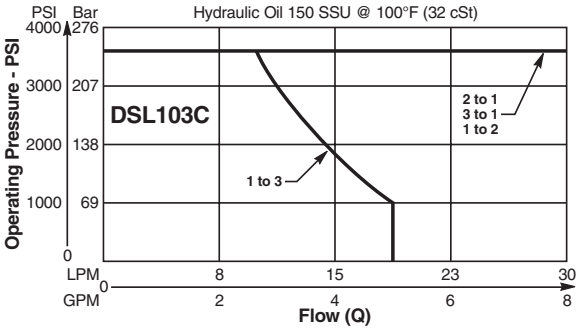
Shift Limit Characteristics (Min. Operating Voltage)



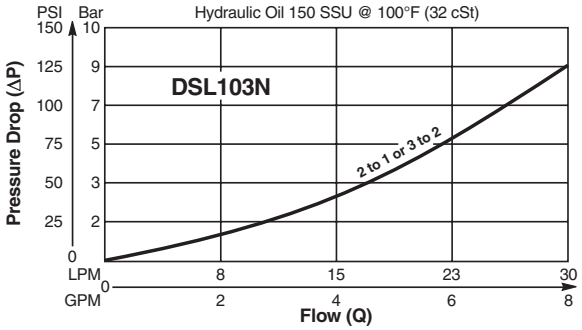
Pressure Drop vs. Flow (Through cartridge only)



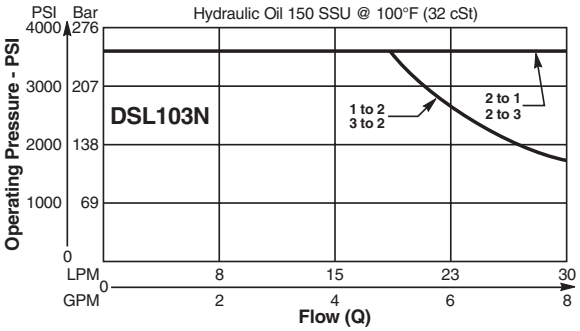
Shift Limit Characteristics (Min. Operating Voltage)



Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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General Description

3-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

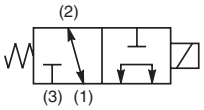
Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane “D”-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated

Specifications

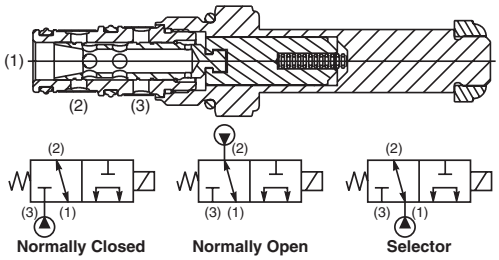
Rated Flow	**DSH103A** N.O. 17.0 LPM (4.5 GPM) N.C. 15.0 LPM (4.0 GPM) Selector 15.0 LPM (4.0 GPM) **DSH103B** N.C. 30.0 LPM (8.0 GPM) Selector 30.0 LPM (8.0 GPM) **DSH103C** N.O. 30.0 LPM (8.0 GPM) **DSH103N** N.O. 15.0 LPM (4.0 GPM) N.C. 15.0 LPM (4.0 GPM) Selector 30.0 LPM (8.0 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min. (10 in³/min.) DSH103B - 250 cc/min. (15 in³/min.) DSH103N - 250 cc/min. (15 in³/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	50 ms to 100 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.19 kg (.42 lbs.)
Cavity	C10-3 (See BC Section for more details)
Form Tool	Rougher NFT10-3R Finisher NFT10-3F

DSH103A

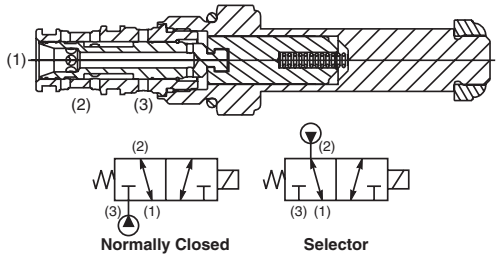


Construction/Symbols

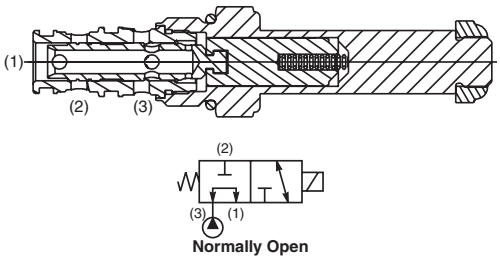
DSH103A



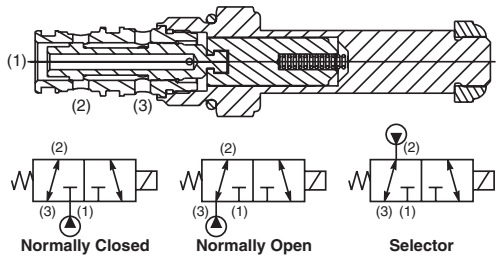
DSH103B



DSH103C



DSH103N



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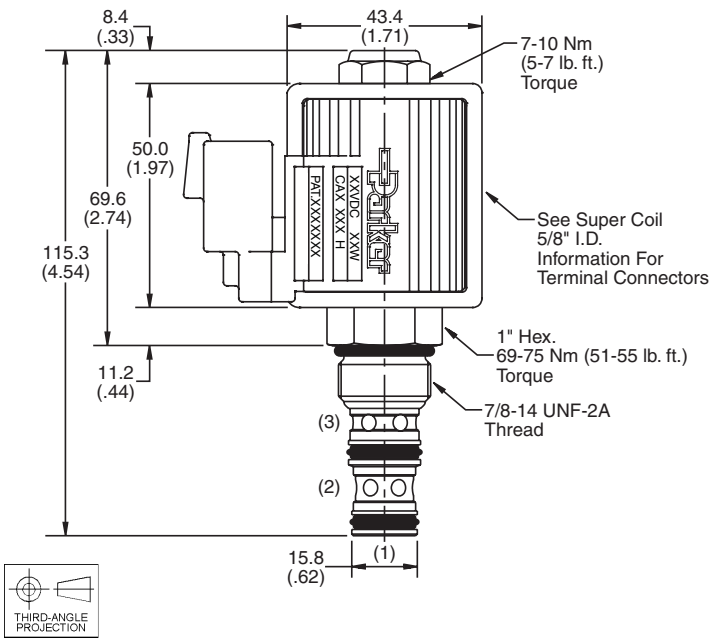
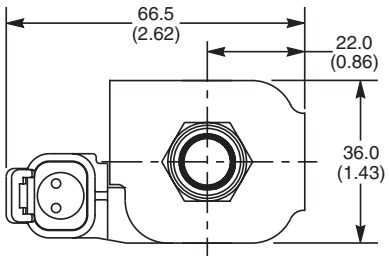
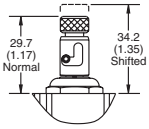
Dimensions Millimeters (Inches)







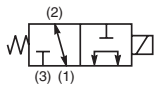
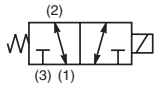
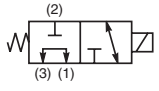
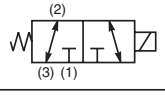
Push and Twist M.O.

Ordering Information

DSH103			
10 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
A	
B	
C	
N	

Code	Override Options
Omit	None
T	Push & Twist (N.C. & N.O.)

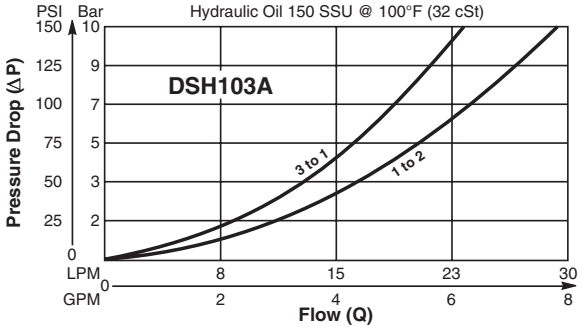
Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-3)
N	Nitrile (SK10-3)
V	Fluorocarbon / (SK10-3V)

Order Bodies Separately
See section BC

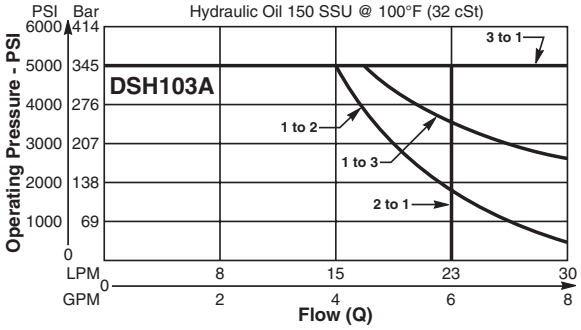
B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

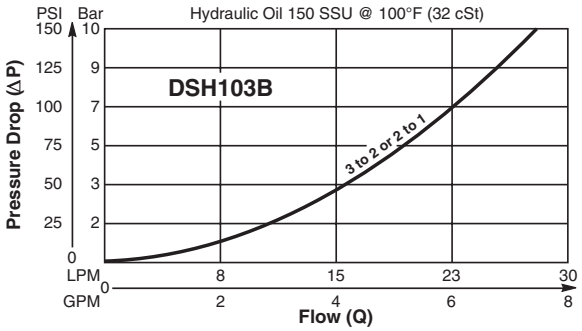
Pressure Drop vs. Flow (Through cartridge only)



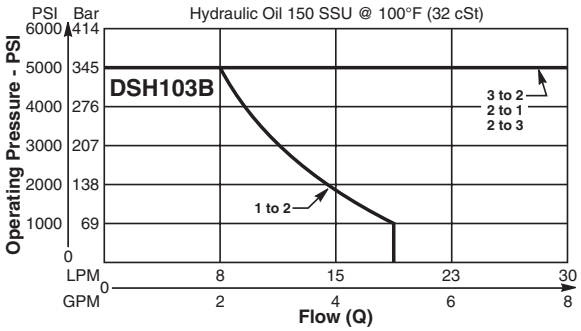
Shift Limit Characteristics (Min. Operating Voltage)



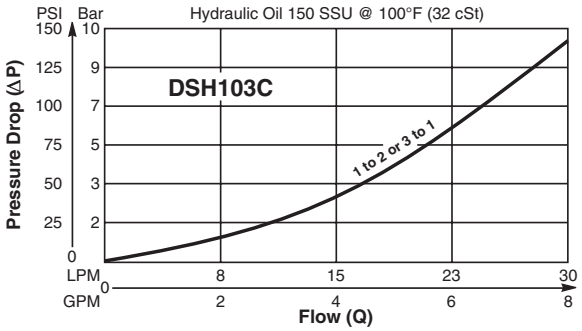
Pressure Drop vs. Flow (Through cartridge only)



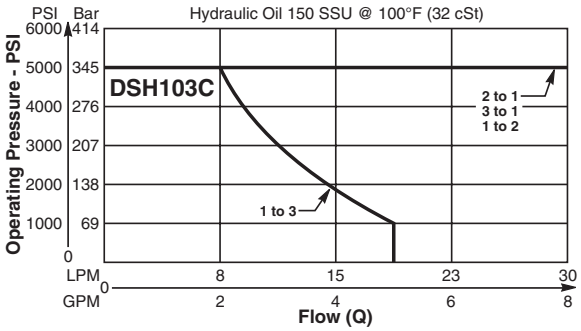
Shift Limit Characteristics (Min. Operating Voltage)



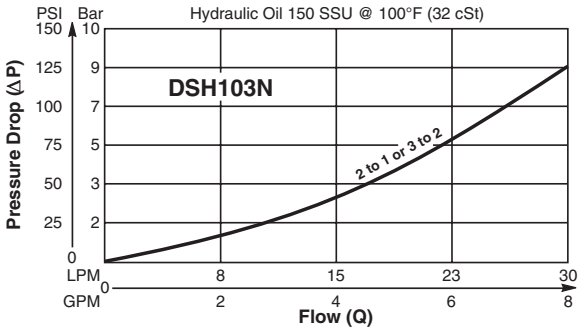
Pressure Drop vs. Flow (Through cartridge only)



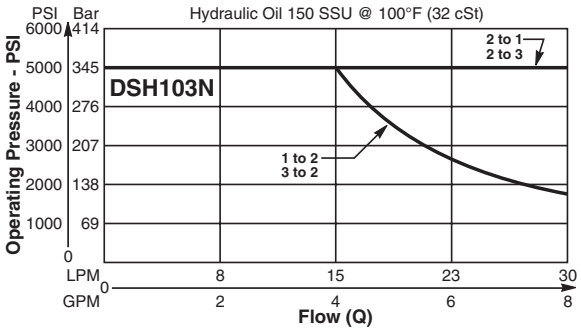
Shift Limit Characteristics (Min. Operating Voltage)



Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)

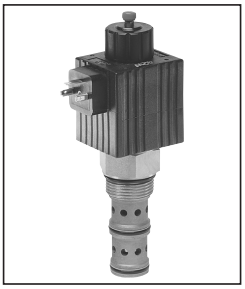


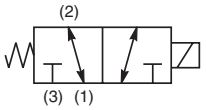
General Description

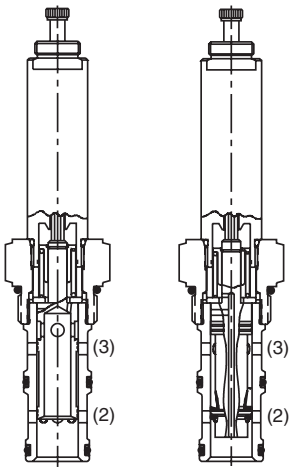
3-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- No dynamic seals
- Variety of coil terminations
- All external parts zinc plated
- Manual override standard



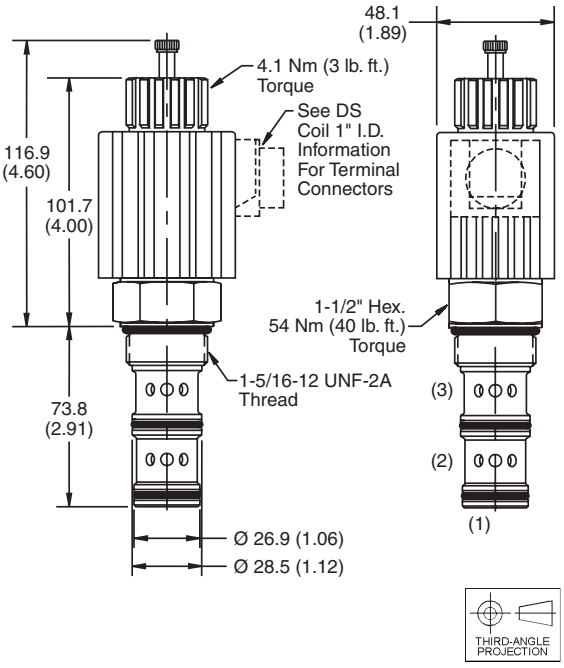




Specifications

Rated Flow	**DS163** N.O. 45.4 LPM (12 GPM) N.C. 49.2 LPM (13 GPM) Selector 41.6 LPM (11 GPM) **DS163B** N.O. 26.5 LPM (7 GPM) N.C. 53.0 LPM (14 GPM) Selector 56.8 LPM (15 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	82 cc/min. (5 in³/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	Normally Closed up to 90 ms Normally Open up to 100 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.59 kg (1.3 lbs.)
Cavity	C16-3 (See BC Section for more details)
Form Tool	Rougher NFT16-3R Finisher NFT16-3F

Dimensions Millimeters (Inches)



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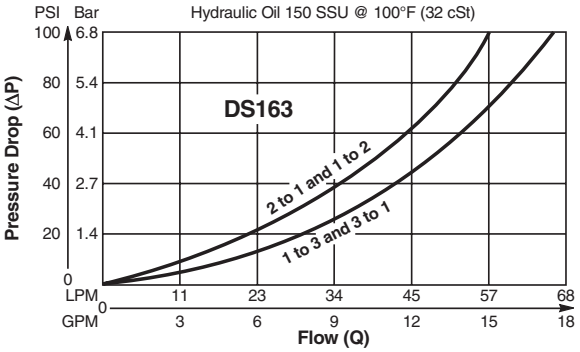
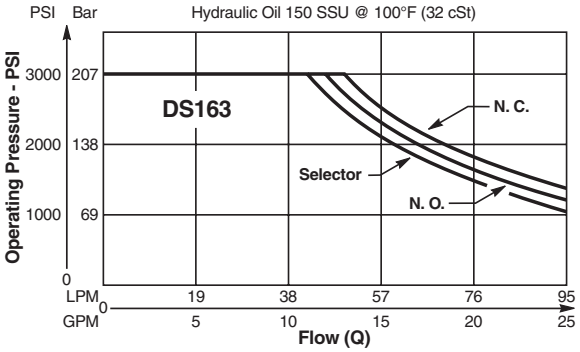
Hydraulic Cartridge Systems Division

Performance Curves

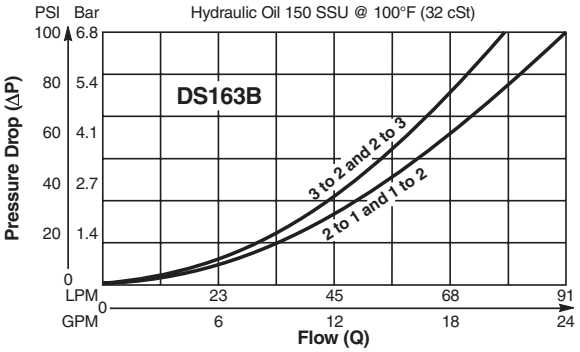
Pressure Drop vs. Flow (Through cartridge only)



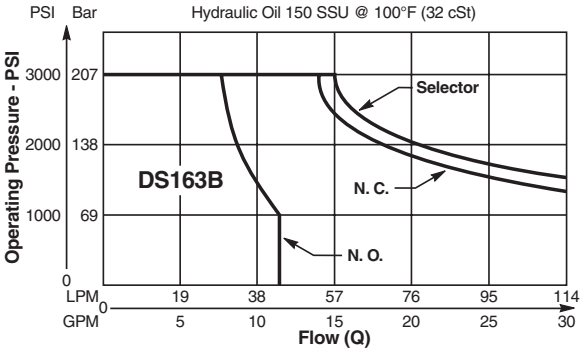
Shift Limit Characteristics (Min. Operating Voltage)



Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)

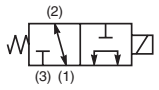
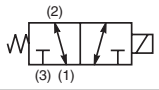


Ordering Information

DS163		
16 Size Solenoid Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1" Coil (DS series), for ordering information.

Code	Style
Omit	
B	

Code	Seals / Kit No.
Omit	Nitrile (SK16-3)
V	Fluorocarbon / (SK16-3V)

Order Bodies Separately
See section BC

B16	–	3	–	
16 size		3-Way Cavity		Port Size

Code	Port Size / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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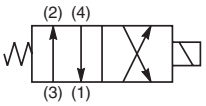
General Description

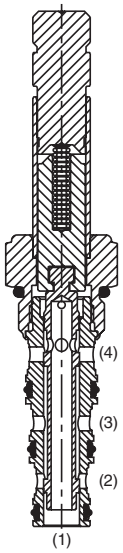
4-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated

DSL084B





DSL084B

Specifications

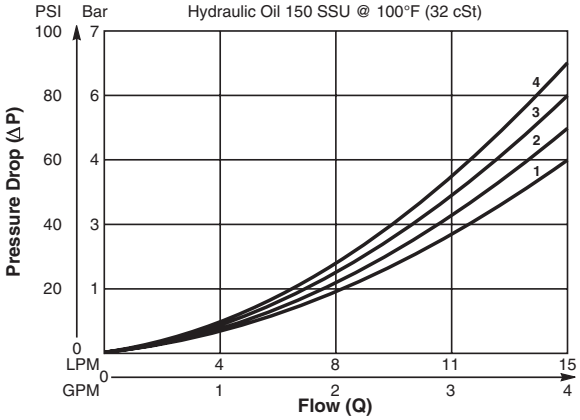
Rated Flow	11-15 LPM (3-4 GPM) See Shift Limit Characteristics
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min. (10 in^3/min.) at 250 Bar (3600 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	Energized - 50 ms De-energized - 30 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.13 kg (.29 lbs.)
Cavity	C08-4 (See BC Section for more details)
Form Tool	Rougher NFT08-4R Finisher NFT08-4F

Curve Selection Chart

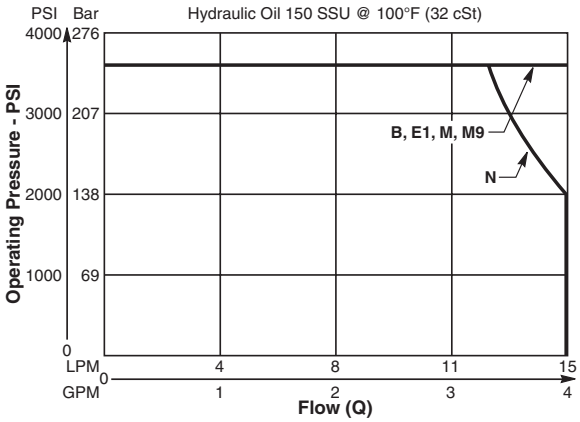
SPOOL CODE	NEUTRAL					SHIFTED				
	4 to 1	3 to 2	2 to 1	3 to 1	3 to 4	4 to 1	3 to 2	2 to 1	3 to 1	3 to 4
B	4	3	—	—	—	—	—	2	—	4
E1	—	—	—	—	—	—	—	2	—	3
M	—	—	3	—	1	—	—	—	—	—
N	—	—	—	—	—	4	3	—	—	—
M9	—	—	3	—	1	—	—	—	4	—

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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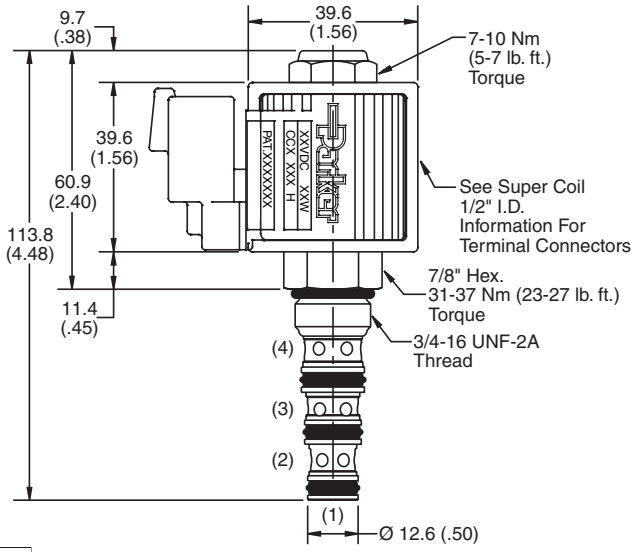
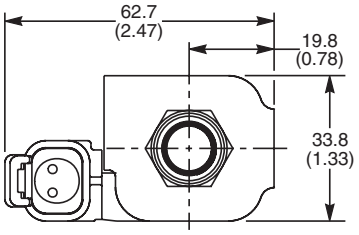
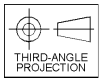
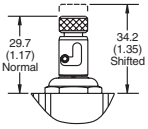
Dimensions Millimeters (Inches)

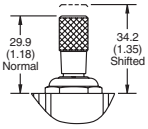








Push and Twist M.O.



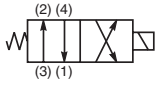
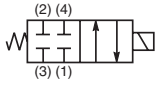
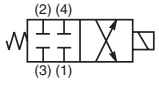
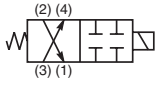
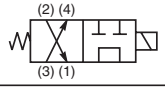
Pull and Release M.O.

Ordering Information

DSL084			
08 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
B	
N	
E1	
M	
M9	

Code	Override Options
Omit	None
P	Pull & Release
T	Push & Twist

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-4)
N	Nitrile (SK08-4)
V	Fluorocarbon / (SK08-4V)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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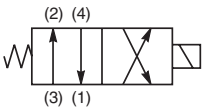
General Description

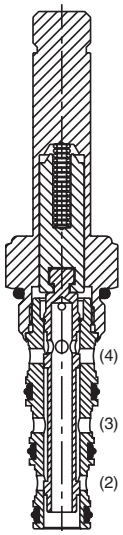
4-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated

DSH084B





DSH084B

Specifications

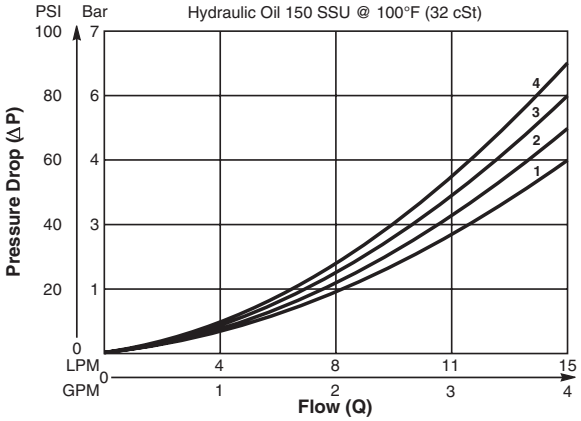
Rated Flow	11-15 LPM (3-4 GPM) See Shift Limit Characteristics
Max. Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min. (10 in^3/min.) at 350 Bar (5000 PSI) DSH084B - 240 cc/min. (15 in^3/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	Energized - 50 ms De-energized - 30 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.13 kg (.29 lbs.)
Cavity	C08-4 (See BC Section for more details)
Form Tool	Rougher NFT08-4R Finisher NFT08-4F

Curve Selection Chart

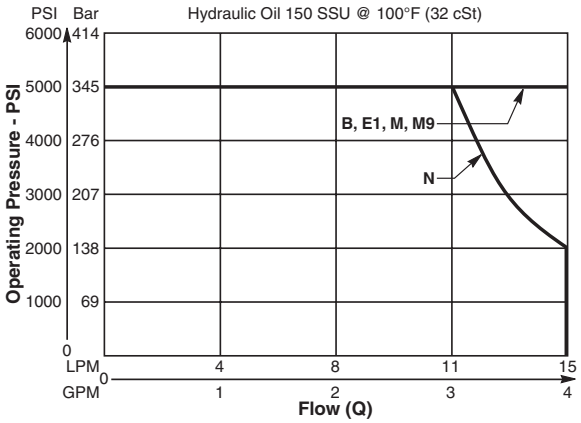
SPOOL CODE	NEUTRAL					SHIFTED				
	4 to 1	3 to 2	2 to 1	3 to 1	3 to 4	4 to 1	3 to 2	2 to 1	3 to 1	3 to 4
B	4	3	—	—	—	—	—	2	—	4
E1	—	—	—	—	—	—	—	2	—	3
M	—	—	3	—	1	—	—	—	—	—
N	—	—	—	—	—	4	3	—	—	—
M9	—	—	3	—	1	—	—	—	4	—

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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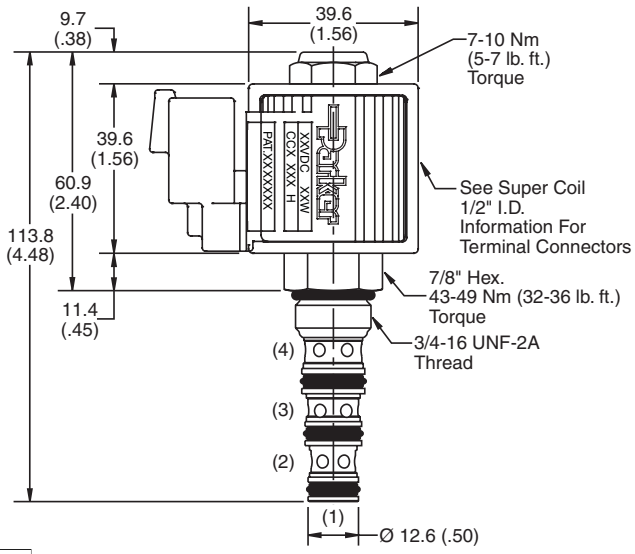
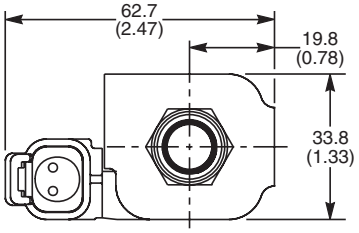
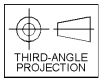
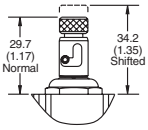
Dimensions Millimeters (Inches)









Push and Twist M.O.

Ordering Information

DSH084			
08 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

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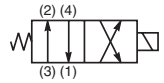
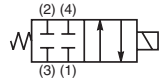
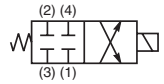
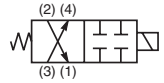
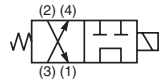
B	
N	
E1	
M	
M9	

Code	Override Options
Omit	None
T	Push & Twist*

**Requires Super Coil.*

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-4)
N	Nitrile (SK08-4)
V	Fluorocarbon / (SK08-4V)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

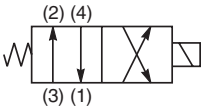
General Description

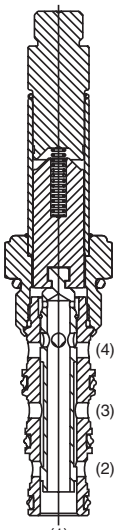
4-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring
- All external parts zinc plated

DSL104B





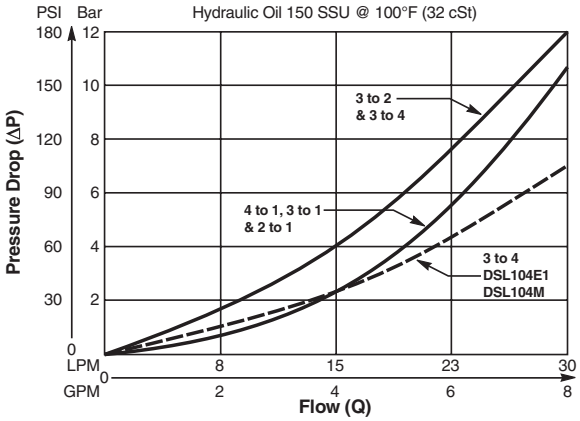
DSL104B

Specifications

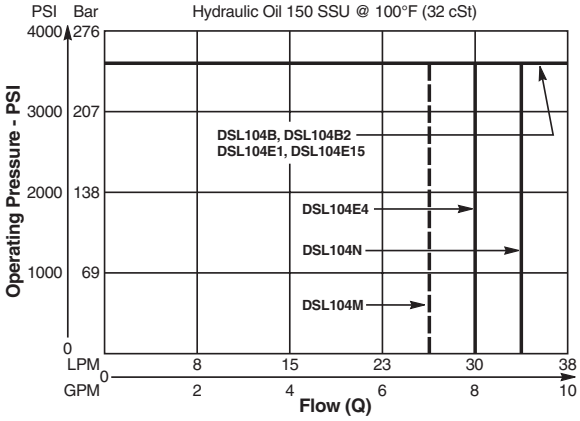
Rated Flow	27-38 LPM (7-10 GPM) See Shift Limit Characteristics
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	230 cc/min (14 in^3/min)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	Energized - 30 - 60 ms De-energized - 30 - 60 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.20 kg (.44 lbs.)
Cavity	C10-4 (See BC Section for more details)
Form Tool	Rougher NFT10-4R Finisher NFT10-4F

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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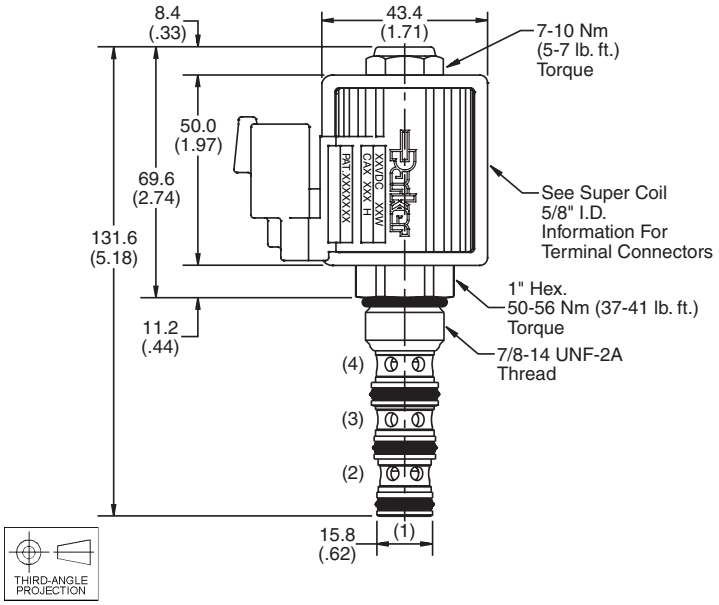
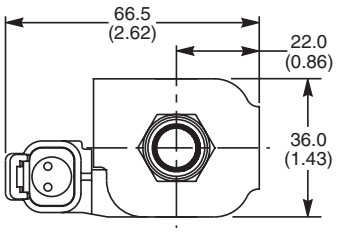
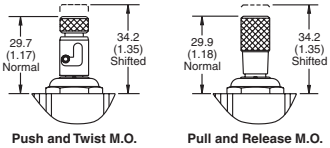
Dimensions Millimeters (Inches)







Ordering Information

DSL104			
10 Size Solenoid Valve	Style	Override Option	Seals

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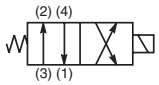
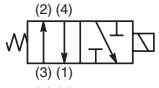
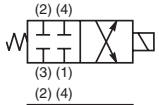
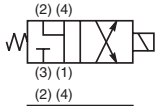
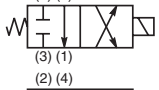
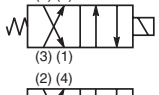
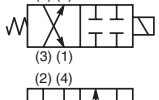
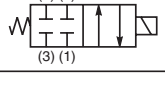
B	
B2	
E1	
E4	
E15	
H	
M	
N	

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Override Options
Omit	**None**
P	Pull & Release
T	Push & Twist

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-4)**
N	Nitrile (SK10-4)
V	Fluorocarbon / (SK10-4V)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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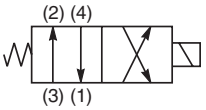
General Description

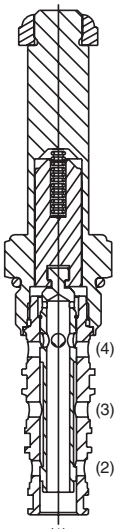
4-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Manual overrides, seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Polyurethane "D"-Ring eliminates need for backup rings
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated

DSH104B





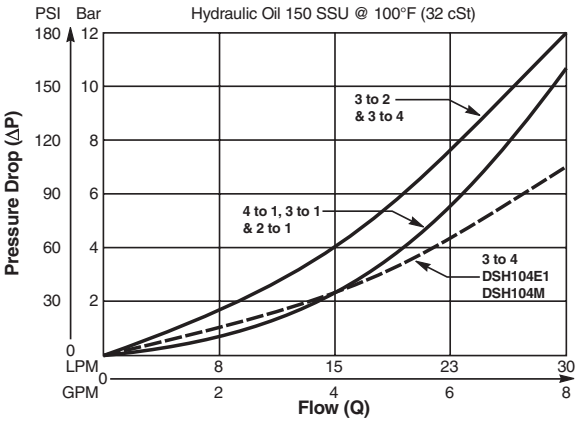
DSH104B

Specifications

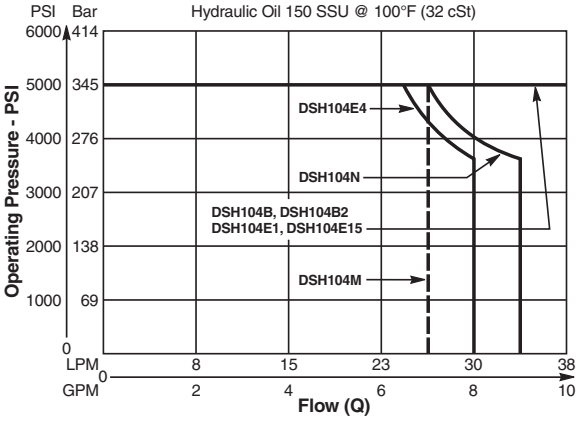
Rated Flow	25 - 38 LPM (6.5 - 10 GPM) See Shift Limit Characteristics
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min (10 in^3/min) DSH104B - 320 cc/min (19.5 in^3/min)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	Energized - 30 - 60 ms De-energized - 30 - 60 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.20 kg (.44 lbs.)
Cavity	C10-4 (See BC Section for more details)
Form Tool	Rougher NFT10-4R Finisher NFT10-4F

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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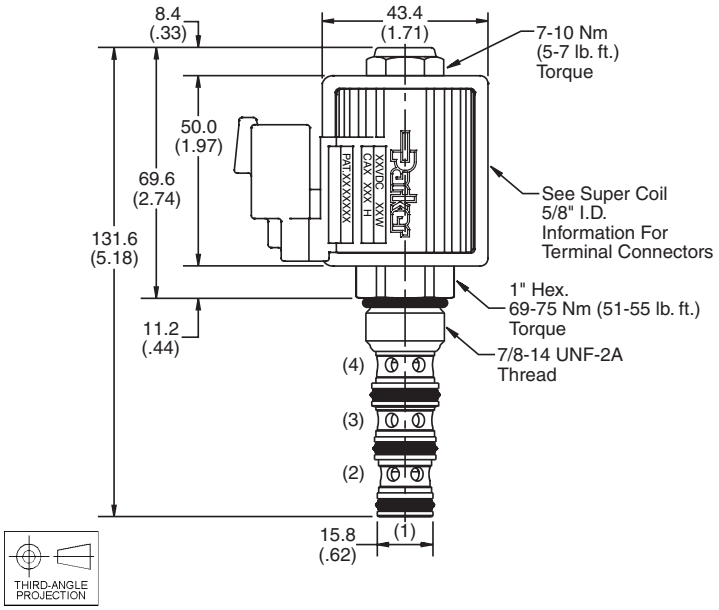
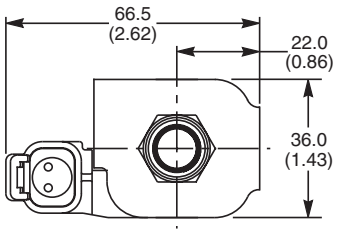
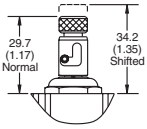
Hydraulic Cartridge Systems Division

Dimensions Millimeters (Inches)



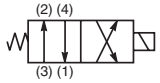
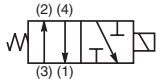
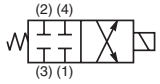
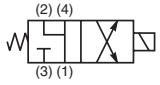
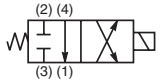
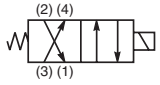
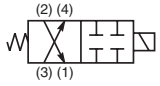
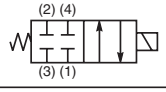




Push and Twist M.O.

Ordering Information

DSH104			
10 Size Solenoid Valve	Style	Override Option	Seals

Code	Style
B	
B2	
E1	
E4	
E15	
H	
M	
N	

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Override Options
Omit	**None**
T	Push & Twist

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-4)**
N	Nitrile (SK10-4)
V	Fluorocarbon / (SK10-4V)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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General Description

4-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

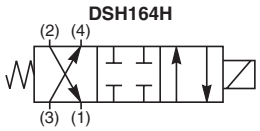
- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- One-piece encapsulated coil with minimal amperage draw
- Seal variations and other options available
- No dynamic seals
- Variety of coil terminations
- Nylon inserted jam-nut provides secure holding in high vibration applications
- All external parts zinc plated

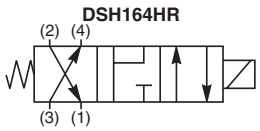
Application Note

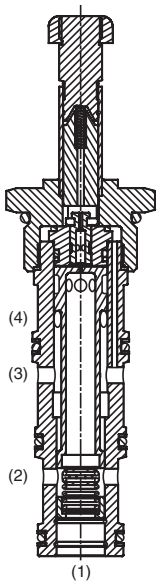
This valve is a pilot operated spool type valve. It does not require a separate pilot supply, but does require that the work port pressure or the inlet pressure is 40-60 psi higher than port 1. In an open flowing condition, with zero load and low flow, it will require a 4-6 gpm flow to create internal pilot pressure to shift. If load pressure or system pressure is 40-60 psi higher than tank, the valve will shift. Ultimately, the valve shifts based upon pressure differential from port 3 to port 1 of 40-60 psi.

Specifications

Rated Flow	113 LPM (30 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Leakage at 150 SSU (32 cSt)	350 cc/min (21 in^3/min) De-Energ. 5.6 LPM (1.5 GPM) Energized Pilot Flow @ 207 Bar (3000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	Pull In - 600 ms Drop Out - 130 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.59 kg (1.3 lbs.)
Cavity	C16-4 (See BC Section for more details)
Form Tool	Rougher NFT16-4R Finisher NFT16-4F

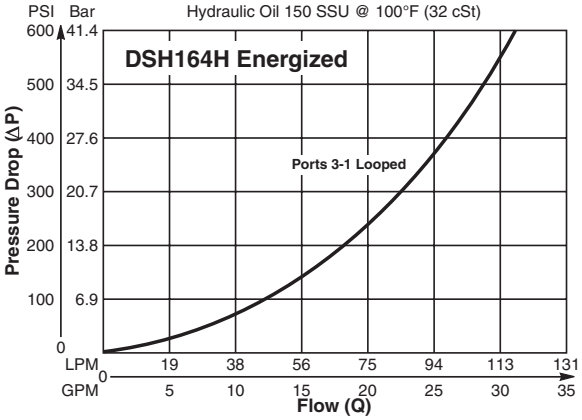




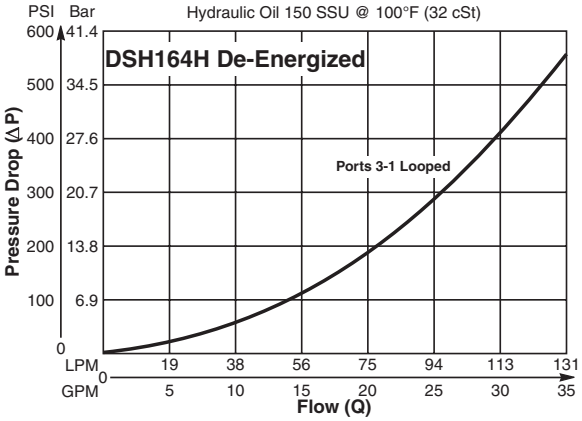


Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Pressure Drop vs. Flow (Through cartridge only)



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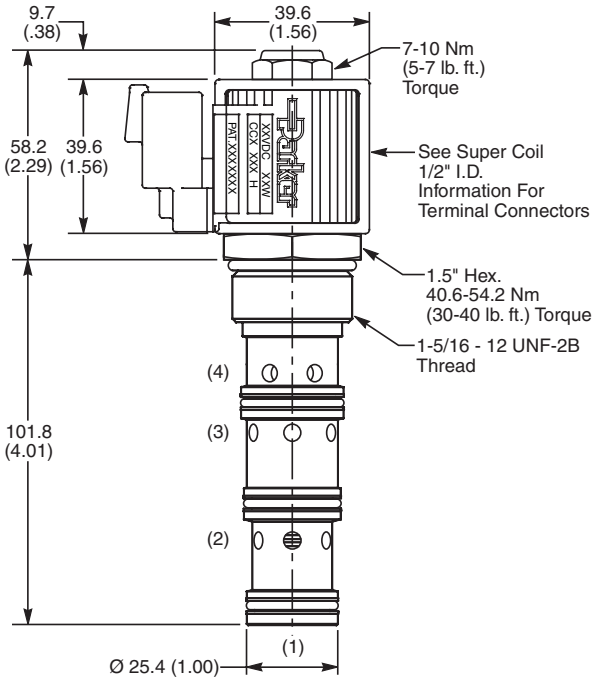
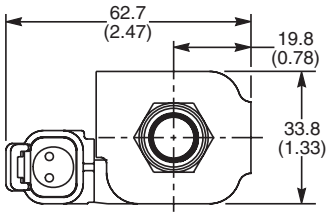
Dimensions Millimeters (Inches)





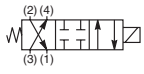
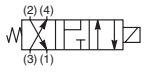
THIRD-ANGLE PROJECTION

Ordering Information

DSH164		
16 Size Solenoid Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
H	
HR	

Code	Seals / Kit No.
Omit	Nitrile (SK16-4)
V	Fluorocarbon / (SK16-4V)

Order Bodies Separately
See section BC

B16	–	4	–	
16 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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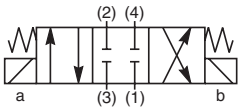
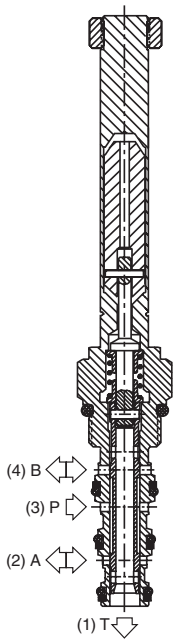
General Description

4-Way, 3 Position, Closed Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Designed to operate double acting cylinders, pilot circuits and bi-directional motors, etc.
- High flow capacity with reduced space requirements
- High pressure capability to 350 Bar (5000 PSI)
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Manual override available



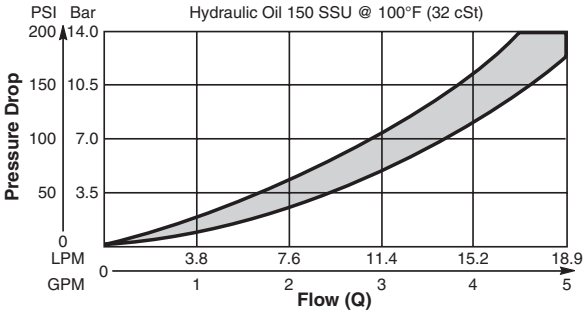


Specifications

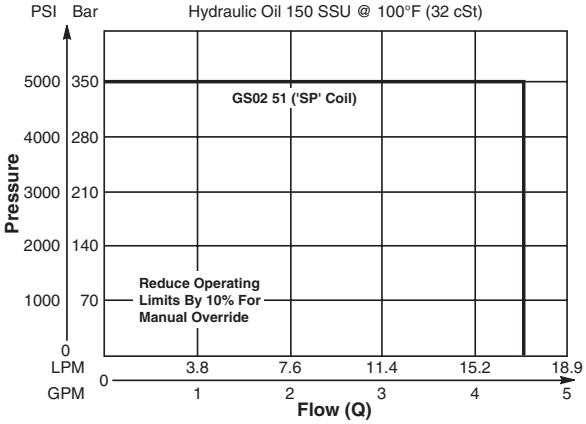
Rated Flow	**High Flow/Pressure ('SP' Coil)** 17 LPM (4.5 GPM)
Maximum Inlet Pressure	**'SP' Coil** 350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Campatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/ 16/13, SAE Class 4
Approx. Weight	.18 kg (.40 lbs.)
Cavity	C08-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



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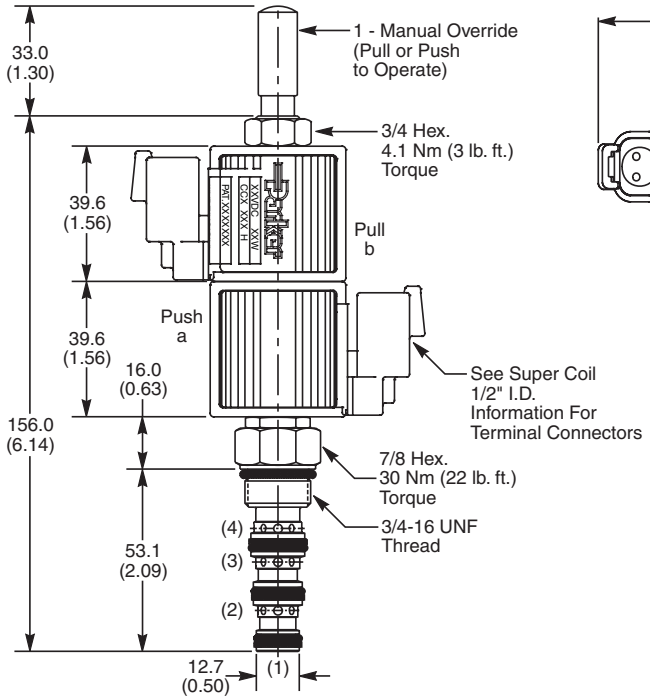
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

GS02	51		0	
08 Size Solenoid Valve	Style	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
51	**High Flow and Pressure ('SP' Coil)**

Code	Override Options
0	**None**
1	Manual Override
2	Detented M.O.

Code	Screen
0	**Not Available**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30078N-1)**
V	Fluorocarbon / (SK30078V-1)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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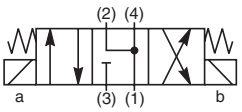
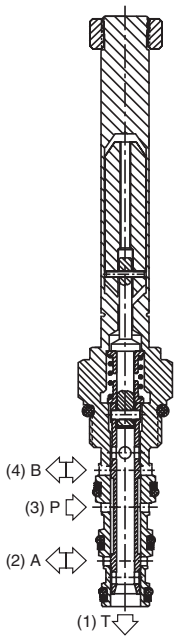
General Description

4-Way, 3 Position, Floating Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Designed to operate double acting cylinders, pilot circuits and bi-directional motors, etc.
- High flow capacity with reduced space requirements
- High pressure capability to 350 Bar (5000 PSI)
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Manual override available



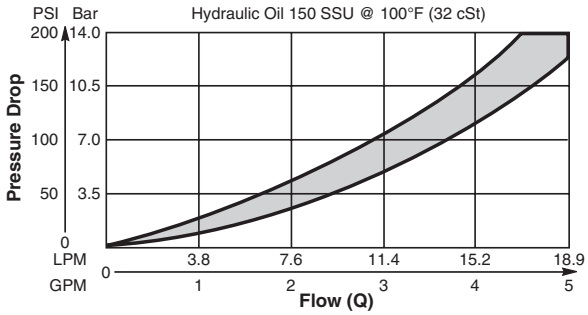


Specifications

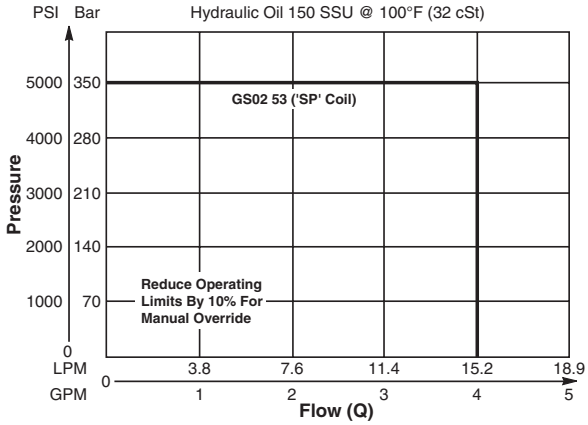
Rated Flow	**High Flow/Pressure ('SP' Coil)** 15 LPM (4.0 GPM)
Maximum Inlet Pressure	**'SP' Coil** 350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.18 kg (.40 lbs.)
Cavity	C08-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



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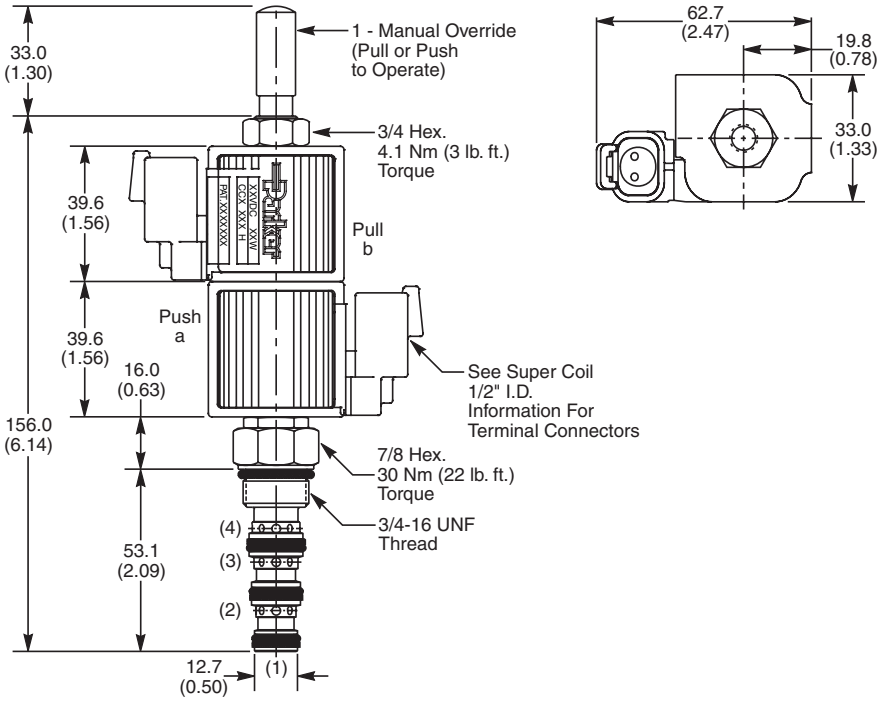
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

GS02	53		0	
08 Size Solenoid Valve	Style	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
53	**High Flow and Pressure ('SP' Coil)**

Code	Override Options
0	**None**
1	Manual Override
2	Detented M.O.

Code	Screen
0	**Not Available**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30078N-1)**
V	Fluorocarbon / (SK30078V-1)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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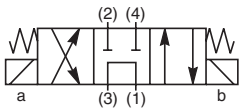
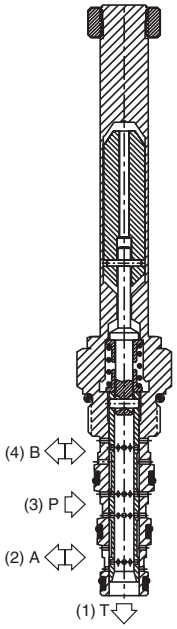
General Description

4-Way, 3 Position, Tandem Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Designed to operate double acting cylinders, pilot circuits and bi-directional motors, etc.
- High flow capacity with reduced space requirements
- High pressure capability
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Manual override available



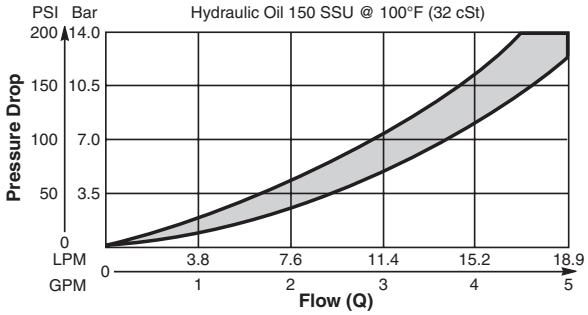


Specifications

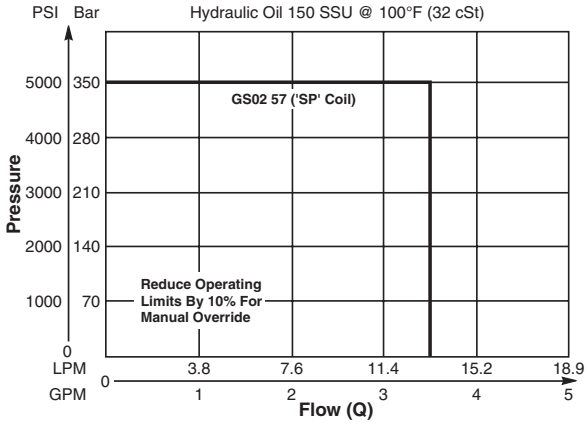
Rated Flow	13 LPM (3.5 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.18 kg (.40 lbs.)
Cavity	C08-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



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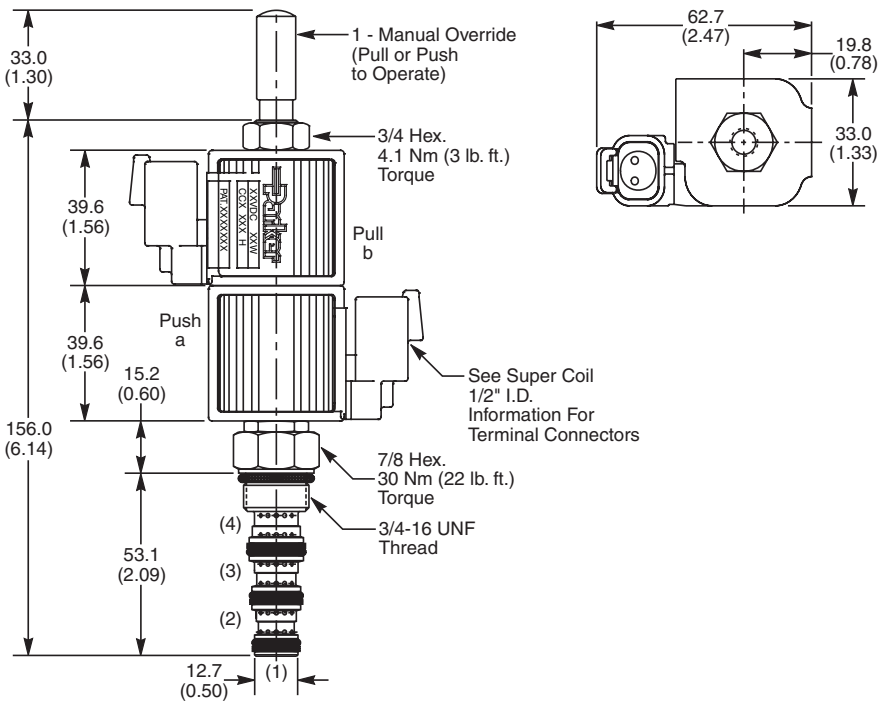
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

GS02	57		0	
08 Size Solenoid Valve	Style	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
57	High Flow ('SP' Coil)

Code	Screen
0	Not Available

Code	Override Options
0	None
1	Manual Override
2	Detented M.O.

Code	Seals / Kit No.
N	Nitrile / Buna-N (Std.) (SK30078N-1)
V	Fluorocarbon / (SK30078V-1)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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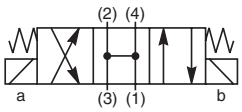
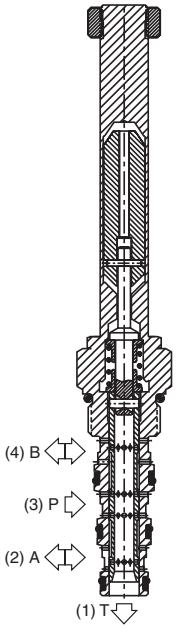
General Description

4-Way, 3 Position, Open Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Designed to operate double acting cylinders, pilot circuits and bi-directional motors, etc.
- High flow capacity with reduced space requirements
- High pressure capability
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Manual override available



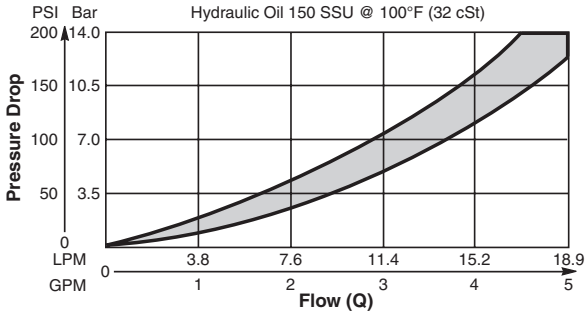


Specifications

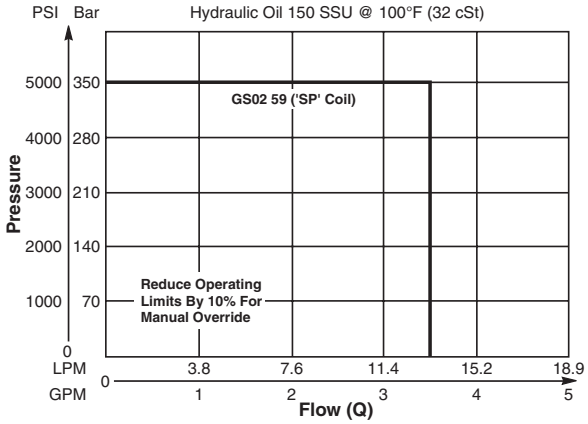
Rated Flow	13 LPM (3.5 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.18 kg (.40 lbs.)
Cavity	C08-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



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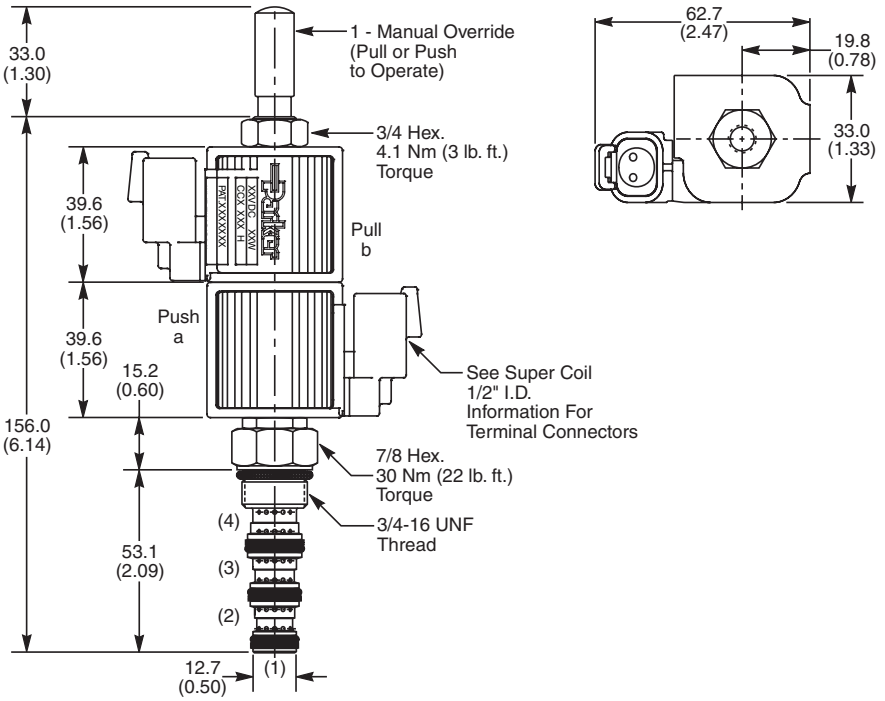
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

GS02	59		0	
08 Size Solenoid Valve	Style	Override Option	Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
59	High Flow ('SP' Coil)

Code	Screen
0	Not Available

Code	Override Options
0	None
1	Manual Override
2	Detented M.O.

Code	Seals / Kit No.
N	Nitrile / Buna-N (Std.) (SK30078N-1)
V	Fluorocarbon / (SK30078V-1)

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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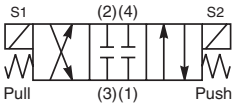
General Description

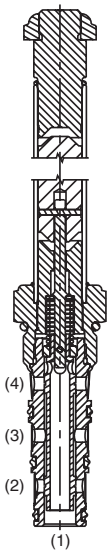
4-Way Spool Valves. For additional information see Technical Tips on pages SV1-SV5.

Features

- High flow capacity with reduced space requirements
- Standard valve bodies and common cavities
- Replaceable, one piece encapsulated coils with minimal amperage draw
- Manual overrides, seal variations and other options available
- Oil immersed armature solenoid, no dynamic seals
- Variety of coil terminations and voltages
- Polyurethane “D”-Ring

DSL105C1





DSL105C1

Specifications

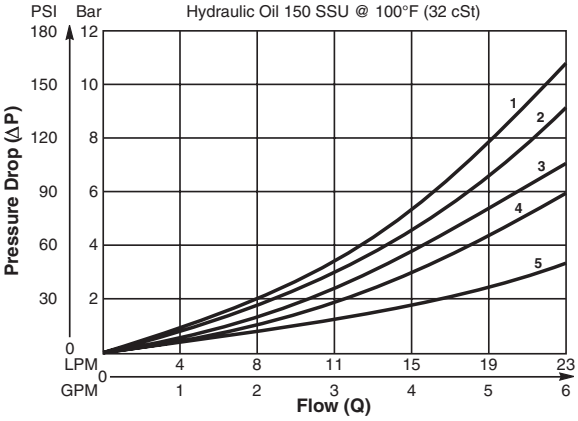
Rated Flow	**C2, C7, C9** 19 LPM (5 GPM) **C1, C4** 26 LPM (7 GPM)
Maximum Inlet Pressure	250 Bar (3600 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min. (10 in^3/min.)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	40 - 150 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C (“D”-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.29 kg (.64 lbs.)
Cavity	C10-4
Form Tool	Rougher NFT10-4R Finisher NFT10-4F

Curve Selection Chart

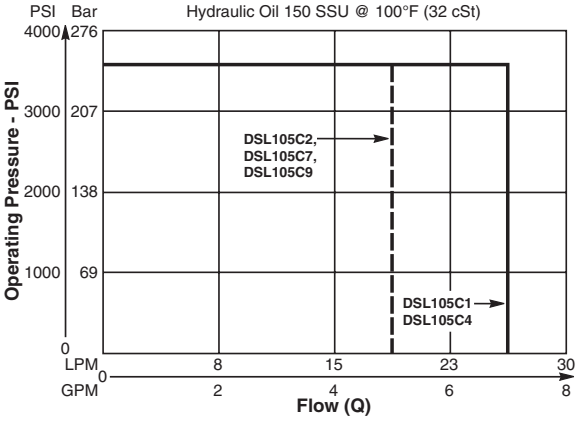
SPOOL CODE	SPOOL SHIFTED				SPOOL CENTERED		
	3 to 2	3 to 4	2 to 1	4 to 1	3 to 1	2 to 1	4 to 1
C1	2	2	4	4	—	—	—
C2	1	1	2	2	5	4	3
C4	2	2	5	5	—	4	4
C7	1	1	2	2	5	—	3
C9	1	1	2	2	5	—	—

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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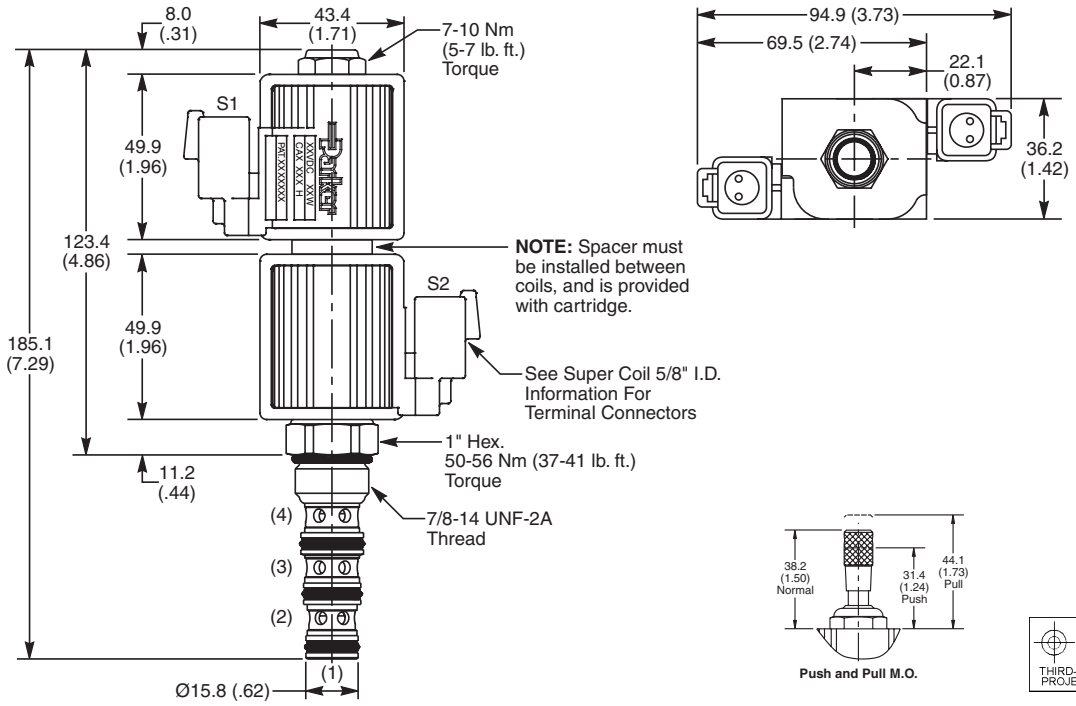
Dimensions Millimeters (Inches)

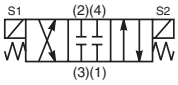
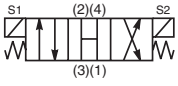
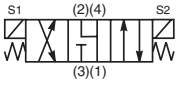
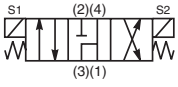
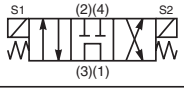


Ordering Information

DSL105			
10 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
C1	
C2	
C4	
C7	
C9	

Code	Override Options
Omit	None
M	Push / Pull

Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-4)
N	Nitrile (SK10-4)
V	Fluorocarbon / (SK10-4V)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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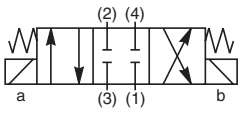
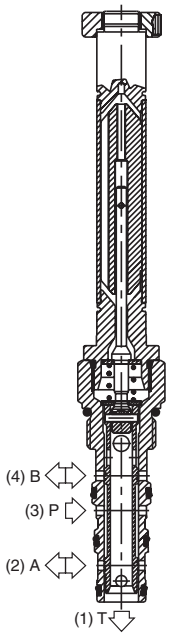
General Description

4-Way, 3 Position, Closed Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way closed center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.



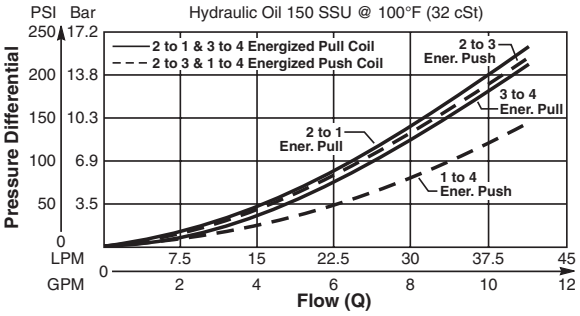


Specifications

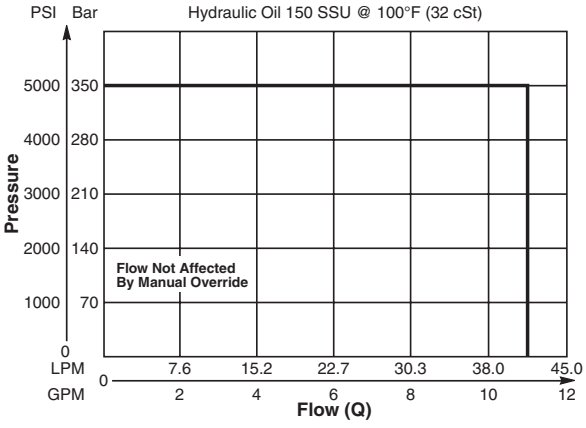
Rated Flow	42 LPM (11 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 30-60 ms **Close** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.26 kg (.58 lbs.)
Cavity	C10-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow Energized - GS045250ND
(Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



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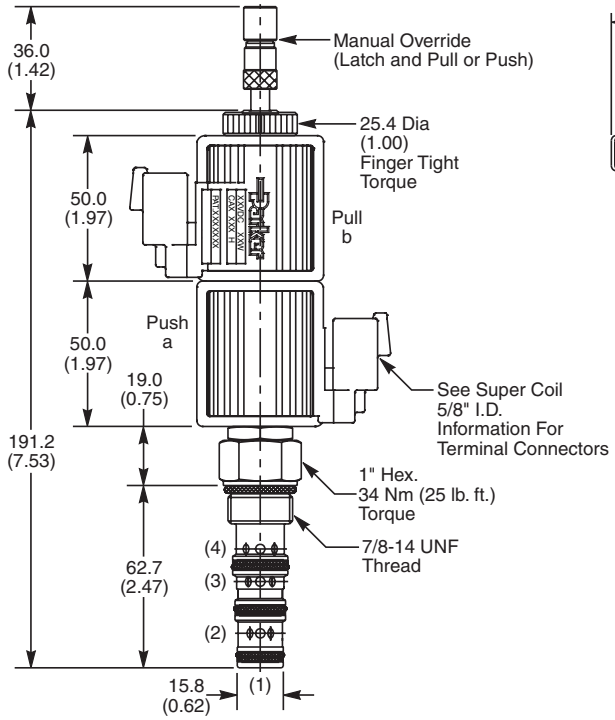
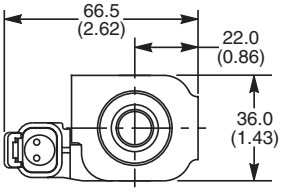
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS04	52		0		D
10 Size Solenoid Valve	Style	Override Option	Screen	Seals	Design Level

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
52	**High Flow and Pressure ('SP' Coil)**

Code	Override Options
0	**None**
5	Standard - Center Detent only, Latch Operated, Push and Pull (*40 nt/9 lbs.)
6	Detented (all positions), Push and Pull

Force to push at 210 Bar (3000 PSI). Less to Pull.

Code	Screen
0	**None (Contact factory for OEM requirements)**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30506N-1)**
V	Fluorocarbon (SK30506V-1)

Code	Design Level
D	**Includes Industry Common Cavity**

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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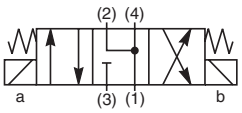
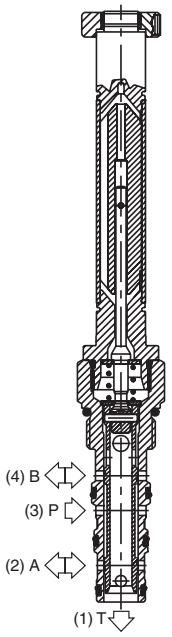
General Description

4-Way, 3 Position, Floating Center Spool Valve. For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way floating center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.



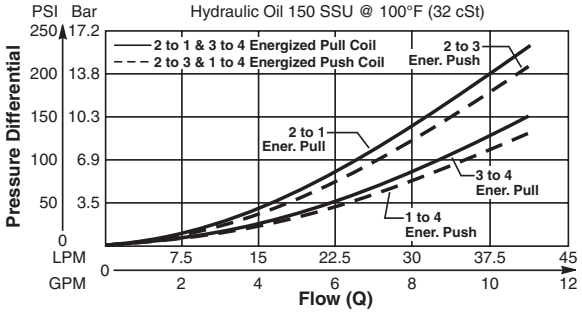


Specifications

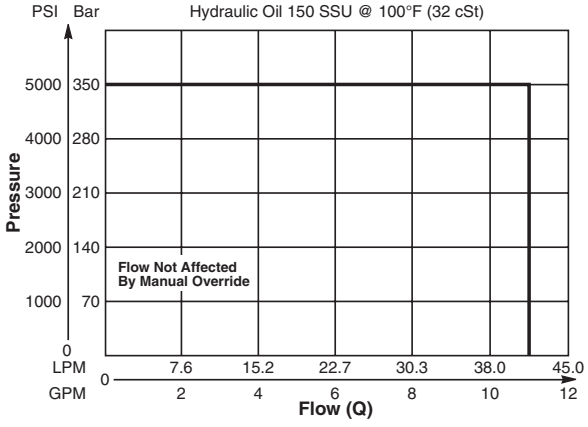
Rated Flow	42 LPM (11 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 30-60 ms **Close** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.26 kg (.58 lbs.)
Cavity	C10-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow Energized - GS045450ND
(Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



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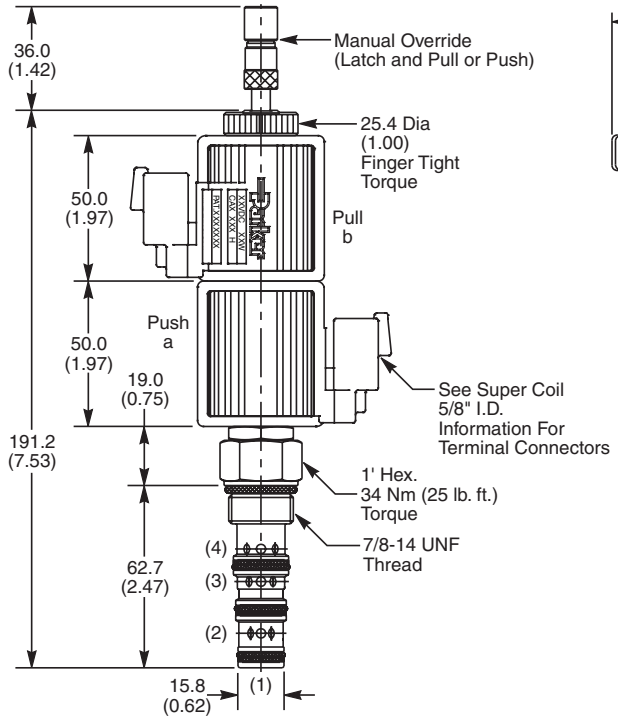
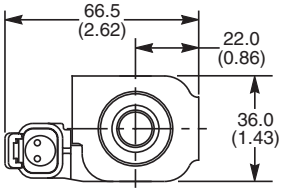
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS04	54		0		D
10 Size Solenoid Valve	Style	Override Option	Screen	Seals	Design Level

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
54	**High Flow and Pressure ('SP' Coil)**

Code	Override Options
0	**None**
5	Standard - Center Detent only, Latch Operated, Push and Pull (*40 nt/9 lbs.)
6	Detented (all positions), Push and Pull

Force to push at 210 Bar (3000 PSI). Less to Pull.

Code	Screen
0	**None (Contact factory for OEM requirements)**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30506N-1)**
V	Fluorocarbon (SK30506V-1)

Code	Design Level
D	**Includes Industry Common Cavity**

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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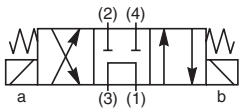
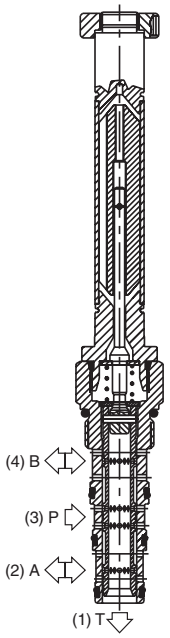
General Description

4-Way, 3 Position, Tandem Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way tandem center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.



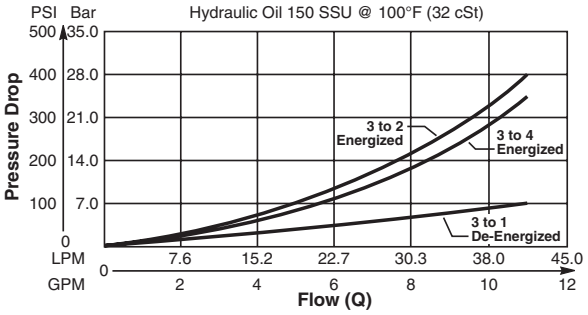


Specifications

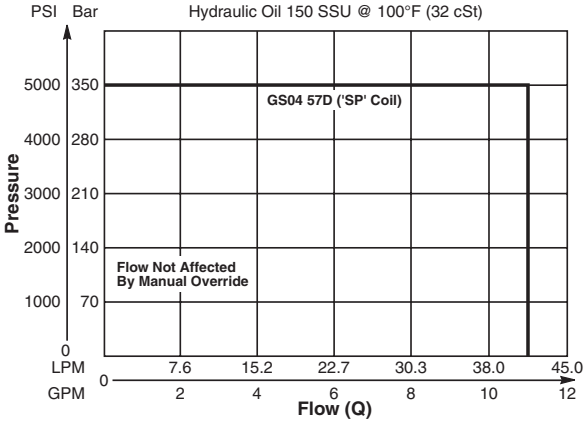
Rated Flow	42 LPM (11 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 30-60 ms **Close** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.26 kg (.58 lbs.)
Cavity	C10-4 (See BC Section for more details)

Performance Curves

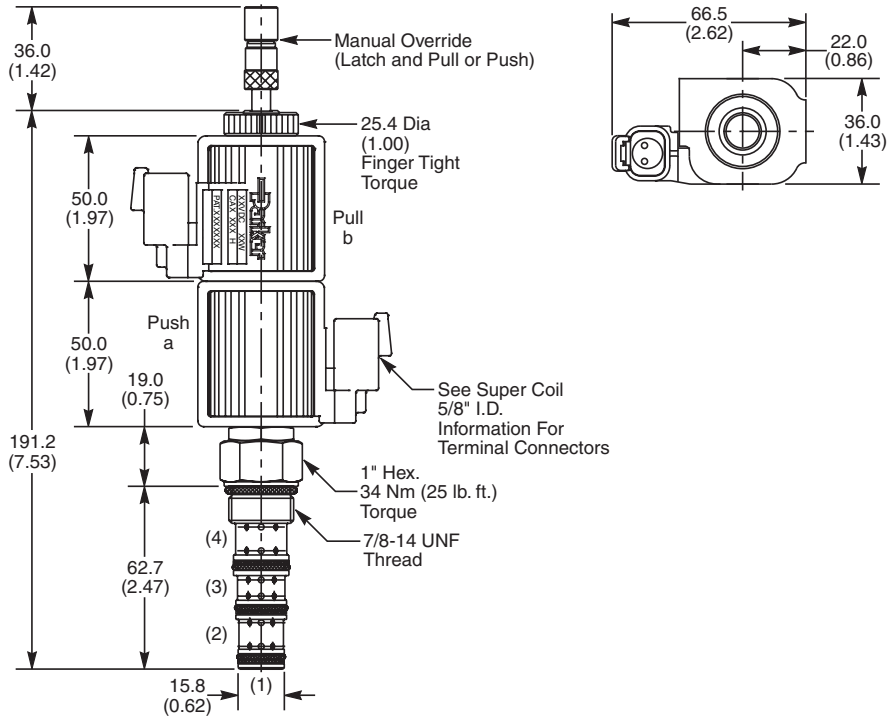
Pressure Drop vs. Flow (Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



Dimensions Millimeters (Inches)



Ordering Information

GS04	57		0		D
10 Size Solenoid Valve	Style	Override Option	Screen	Seals	Design Level

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
57	**High Flow and Pressure ('SP' Coil)**

Code	Override Options
0	**None**
5	Standard - Center Detent only, Latch Operated, Push and Pull (*40 nt/9 lbs.)
6	Detented (all positions), Push and Pull

Force to push at 210 Bar (3000 PSI). Less to Pull.

Code	Screen
0	**None (Contact factory for OEM requirements)**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30506N-1)**
V	Fluorocarbon (SK30506V-1)

Code	Design Level
D	**Includes Industry Common Cavity**

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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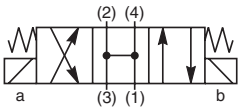
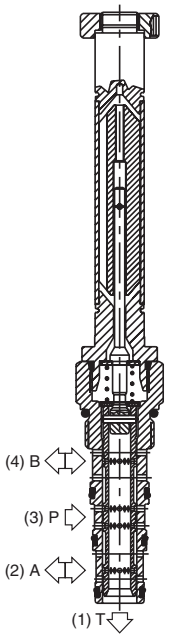
General Description

4-Way, 3 Position, Open Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way open center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.



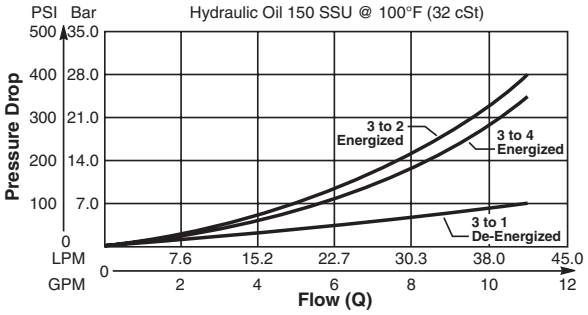


Specifications

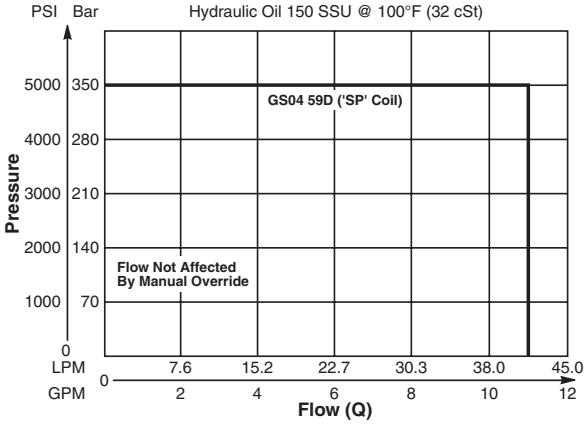
Rated Flow	42 LPM (11 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	85% of rated voltage at 20°C (72°F).
Response Time	**Open** 30-60 ms **Close** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.26 kg (.58 lbs.)
Cavity	C10-4 (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow (Through cartridge only)



Operating Limits (Measured at 75% of Nominal Current)



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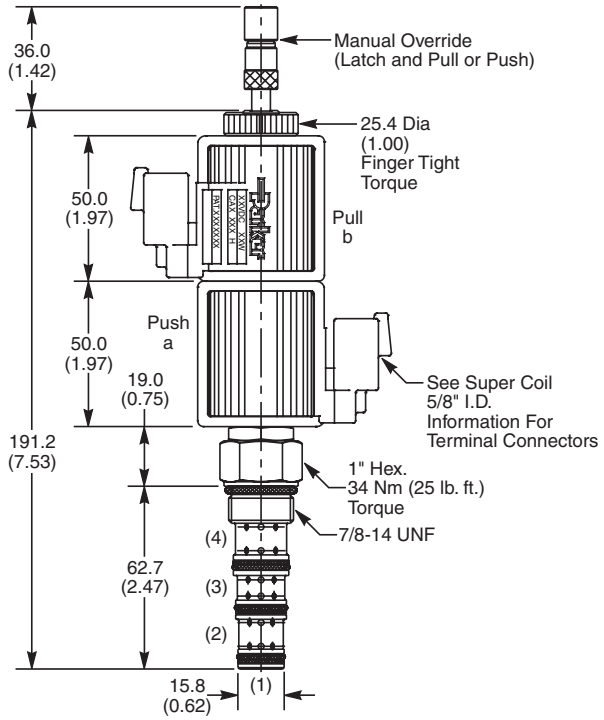
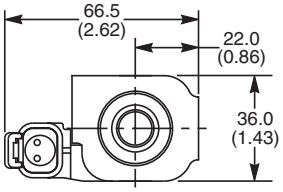
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GS04	59		0		D
10 Size Solenoid Valve	Style	Override Option	Screen	Seals	Design Level

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
59	**High Flow and Pressure ('SP' Coil)**

Code	Override Options
0	**None**
5	Standard - Center Detent only, Latch Operated, Push and Pull (*40 nt/9 lbs.)
6	Detented (all positions), Push and Pull

Force to push at 210 Bar (3000 PSI). Less to Pull.

Code	Screen
0	**None (Contact factory for OEM requirements)**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30506N-1)**
V	Fluorocarbon (SK30506V-1)

Code	Design Level
D	**Includes Industry Common Cavity**

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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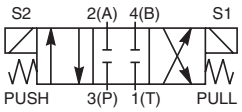
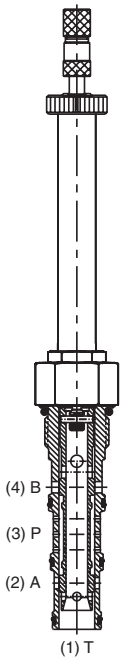
General Description

4-Way, 3 Position, Closed Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way closed center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- All external parts zinc plated



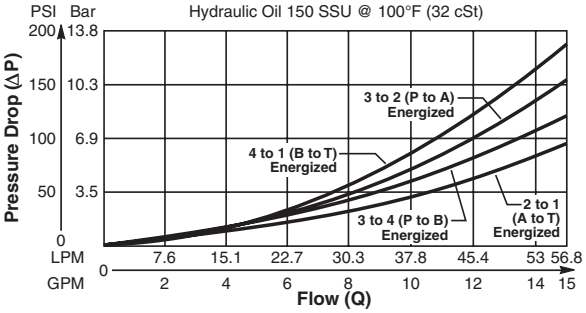


Specifications

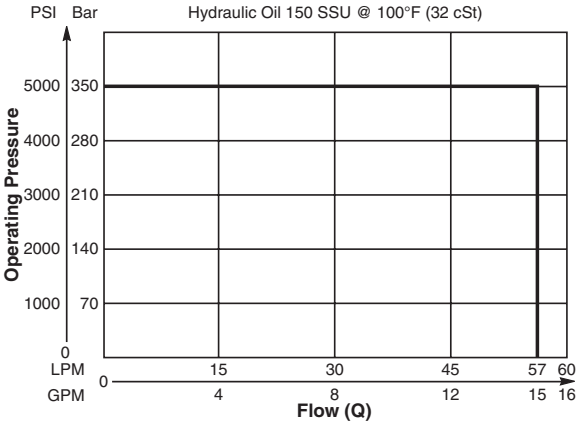
Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	75% of rated voltage at 20°C (72°F).
Response Time	**Energized** 30-60 ms **De-Energized** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.45 kg (1.0 lbs.)
Cavity	C12-4L (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow
(Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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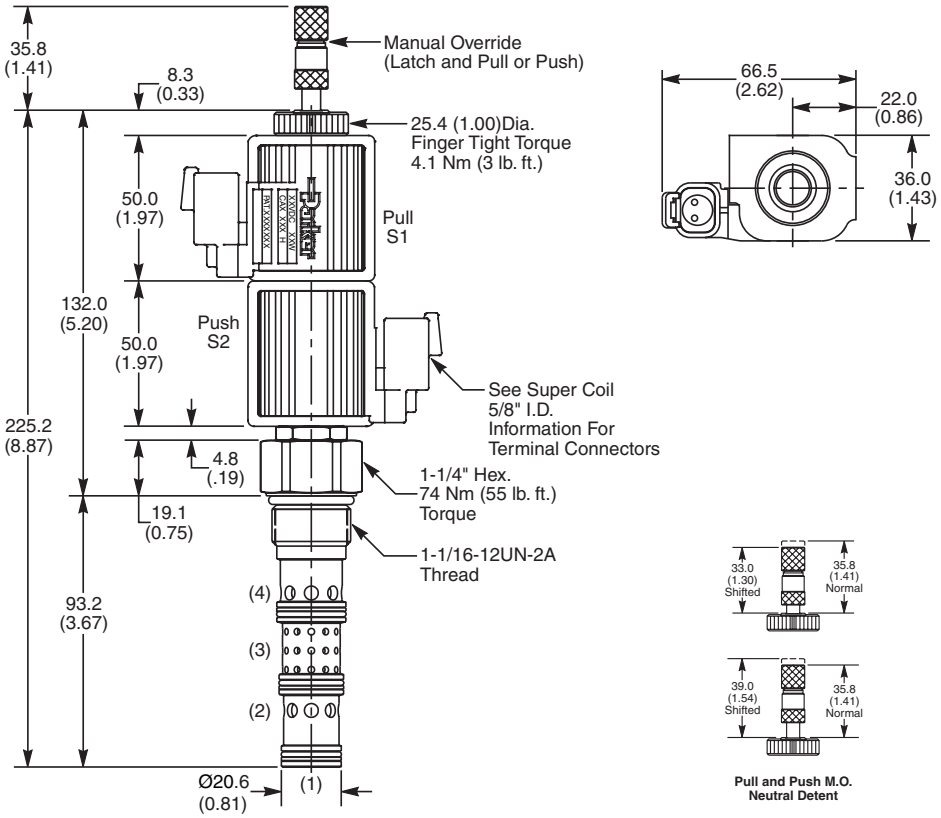
Dimensions Millimeters (Inches)



Ordering Information

DSH125	52		
12 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
52	High Flow ('SP' Coil)

Code	Override Options
0	None
DN	Latch Operated**

***40 nt/9 lbs.**

Code	Seals / Kit No.
N	Nitrile (SK12-4LN)
V	Fluorocarbon / (SK12-4LV)

Order Bodies Separately
See section BC

B12	–	4L	–	
12 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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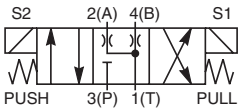
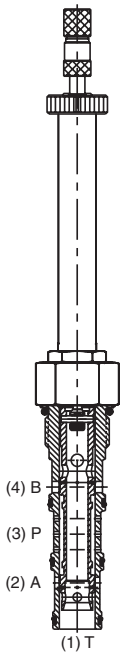
General Description

4-Way, 3 Position, Floating Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way floating center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- All external parts zinc plated



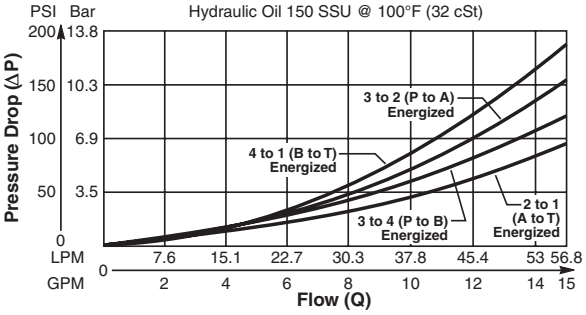


Specifications

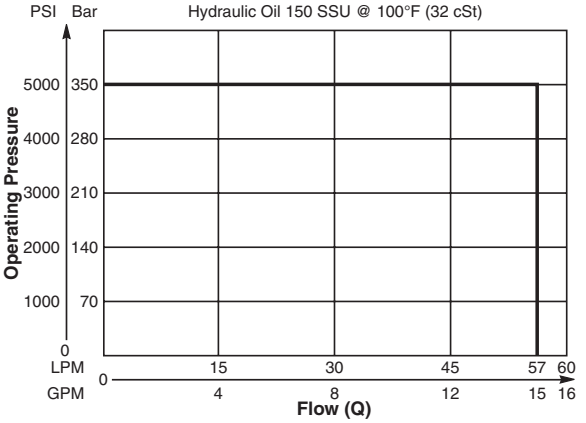
Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	75% of rated voltage at 20°C (72°F).
Response Time	**Energized** 30-60 ms **De-Energized** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.45 kg (1.0 lbs.)
Cavity	C12-4L (See BC Section for more details)

Performance Curves

Pressure Drop vs. Flow
(Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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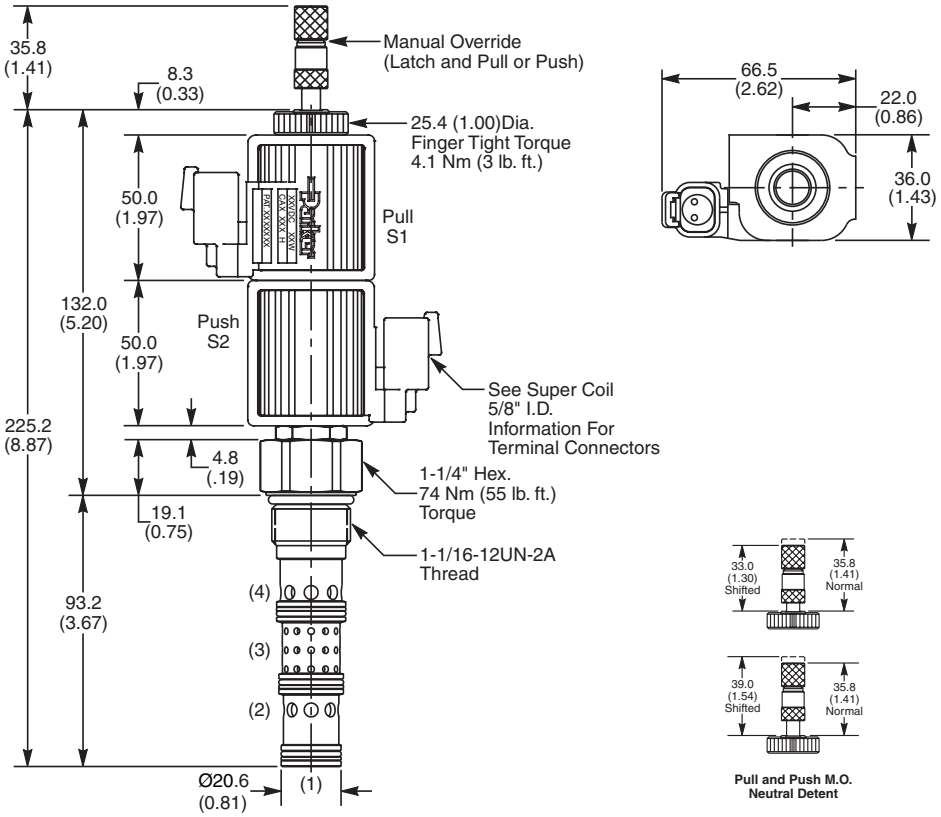
Dimensions Millimeters (Inches)



Ordering Information

DSH125	54		
12 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
54	High Flow ('SP' Coil)

Code	Override Options
0	None
DN	Latch Operated**

40 nt/9 lbs.

Code	Seals / Kit No.
N	Nitrile (SK12-4LN)
V	Fluorocarbon / (SK12-4LV)

Order Bodies Separately
See section BC

B12	–	4L	–	
12 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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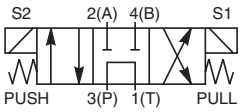
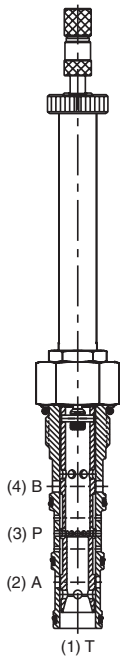
General Description

4-Way, 3 Position, Tandem Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way tandem center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- All external parts zinc plated





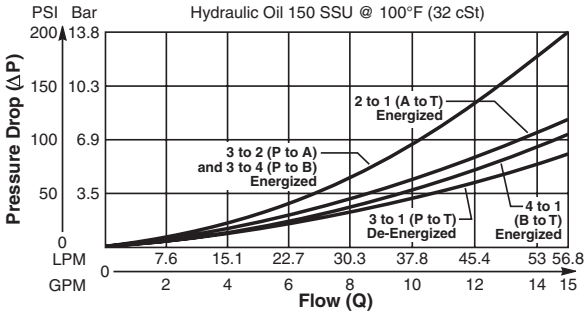
Specifications

Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	75% of rated voltage at 20°C (72°F).
Response Time	**Energized** 30-60 ms **De-Energized** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.45 kg (1.0 lbs.)
Cavity	C12-4L (See BC Section for more details)

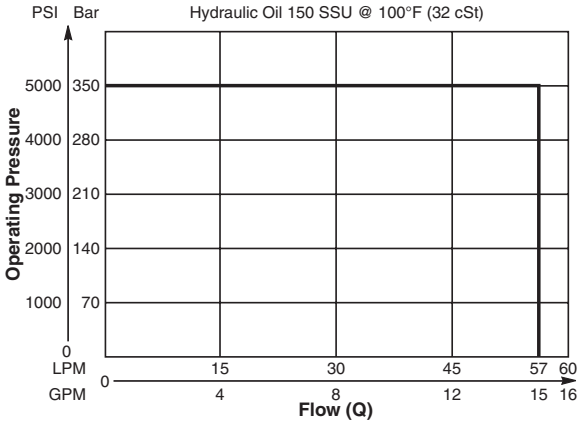
Performance Curves

Pressure Drop vs. Flow

(Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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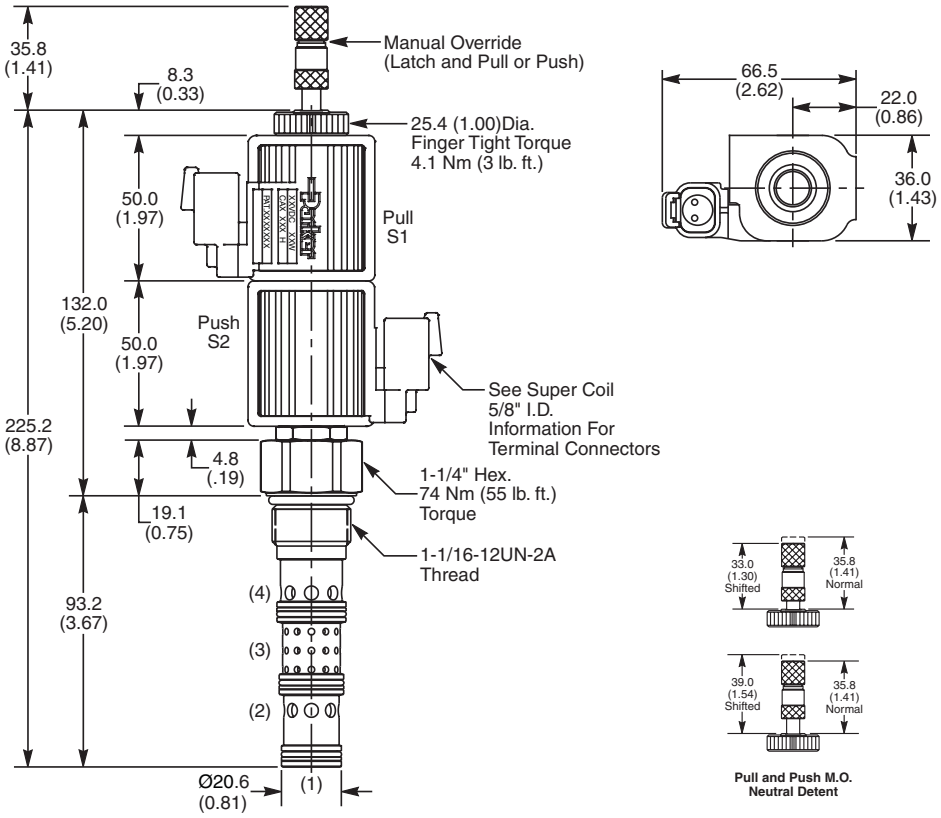
Dimensions Millimeters (Inches)



Ordering Information

DSH125	57		
12 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
57	High Flow ('SP' Coil)

Code	Override Options
0	None
DN	Latch Operated**

40 nt/9 lbs.

Code	Seals / Kit No.
N	Nitrile (SK12-4LN)
V	Fluorocarbon / (SK12-4LV)

Order Bodies Separately
See section BC

B12	–	4L	–	
12 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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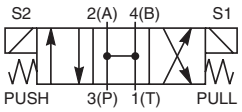
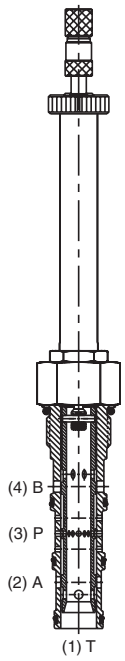
General Description

4-Way, 3 Position, Open Center Spool Valve.
For additional information see Technical Tips on pages SV1-SV5.

Features

- Four way open center valve designed to operate double acting cylinders and bi-directional motors, etc.
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- All external parts zinc plated





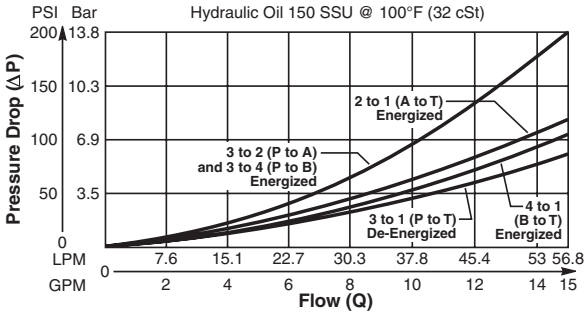
Specifications

Rated Flow	57 LPM (15 GPM)
Maximum Inlet Pressure	350 Bar (5000 PSI)
Maximum Tank Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	160 cc/min @ 210 Bar (3000 PSI)
Minimum Operating Voltage	75% of rated voltage at 20°C (72°F).
Response Time	**Energized** 30-60 ms **De-Energized** 20-40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO 4406 18/16/13, SAE Class 4
Approx. Weight	.45 kg (1.0 lbs.)
Cavity	C12-4L (See BC Section for more details)

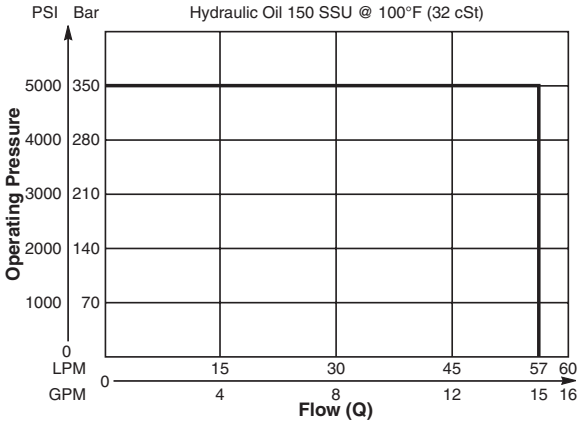
Performance Curves

Pressure Drop vs. Flow

(Through cartridge only)



Shift Limit Characteristics (Min. Operating Voltage)



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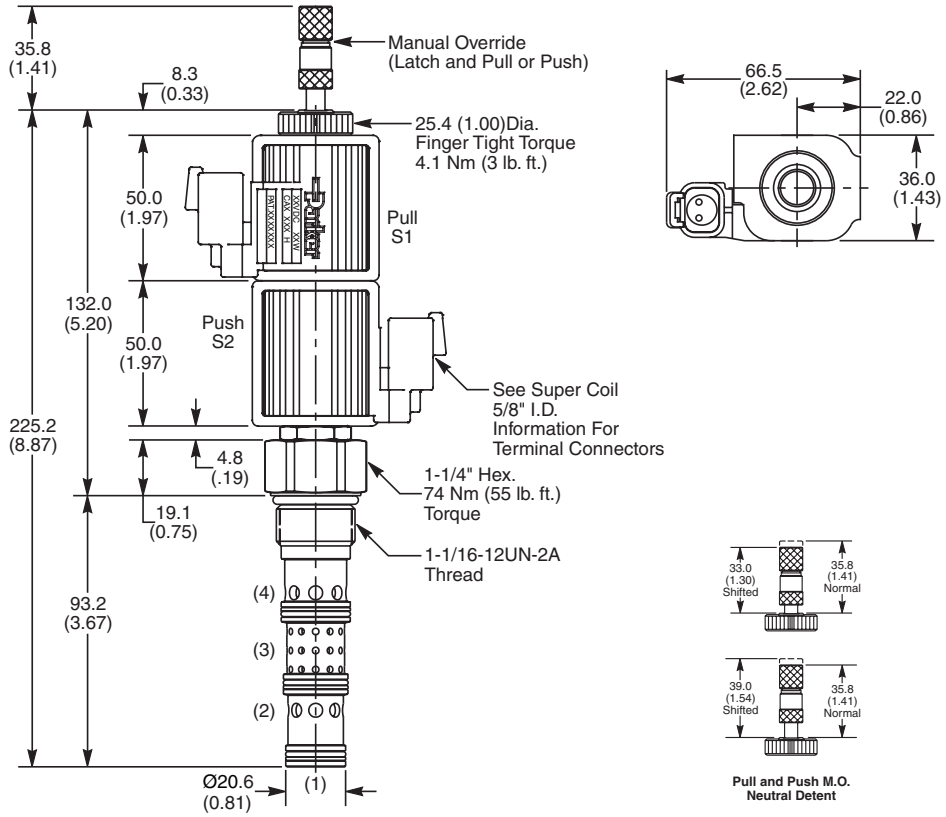
Dimensions Millimeters (Inches)



Ordering Information

DSH125	59		
12 Size Solenoid Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style
59	High Flow ('SP' Coil)

Code	Override Options
0	None
DN	Latch Operated**

40 nt/9 lbs.

Code	Seals / Kit No.
N	Nitrile (SK12-4LN)
V	Fluorocarbon / (SK12-4LV)

Order Bodies Separately
See section BC

B12	–	4L	–	
12 size		4-Way Cavity		Port Size

Code	Port Size / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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Catalog HY15-3503/US

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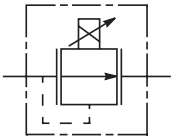
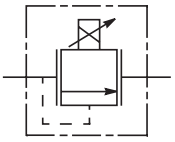
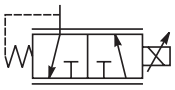
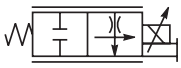
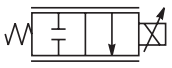
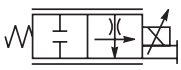
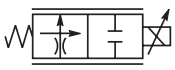
	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	Technical Tips					PV1-PV5
	**PRESSURE RELIEVING**					
	AP02B2YP	C08-2	Increase Pressure/Increase Current	5.3/1.4	350/5000	PV7-PV8
	AP04G2YP	C10-2	Increase Pressure/Increase Current	95/25	350/5000	PV9-PV10
	AP02B2YR	C08-2	Decrease Pressure/Increase Current	5.3/1.4	350/5000	PV11-PV12
	AP04G2YR	C10-2	Decrease Pressure/Increase Current	95/25	350/5000	PV13-PV14
	**PRESSURE REDUCING**					
	GP01 30	54-1	Pressure Reducing Valve	1.9/5	210/3000	PV15-PV16
	GTP02 34	C08-3	Pressure Reducing Valve	19/5	210/3000	PV17-PV18
☆	EPR083R ***(NEW)***	C08-3L	Pressure Reducing/Relieving Valve	22.7/6	345/5000	PV19-PV20
	EPR111C	C10-3L	Pressure Reducing/Relieving Valve	37.5/10	350/5000	PV21-PV22
	**FLOW CONTROLS, 2-WAY**					
	DF122C	C12-2	Flow Control, N.C.	53/14	210/3000	PV23-PV24
	DF161C	C16-2	Flow Control, N.C.	150/40	210/3000	PV25-PV26
	DF201C	C20-2	Flow Control, N.C.	227/60	210/3000	PV27-PV28
	JP02C	C08-3	Flow Control, N.C.	23/6	210/3000	PV29-PV30
	JP04C 21	3X	Flow Control, N.C.	36/9.5	210/3000	PV31-PV32
	JP02P	C08-3	Flow Control, N.O.	19/5	210/3000	PV33-PV34
	JP04P	3X	Flow Control, N.O.	36/9.5	210/3000	PV35-PV36
	DF122N	C12-2	Flow Control, N.O.	53/14	210/3000	PV37-PV38

☆ ***Denotes Winner's Circle product line.***

WINNER'S CIRCLE

Parker

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

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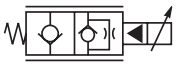
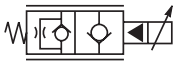
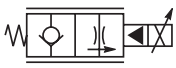
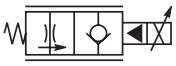
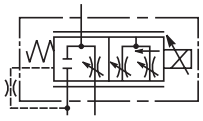
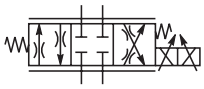
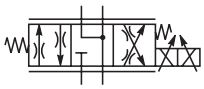
Proportional Valves

	SERIES	CAVITY	DESCRIPTION	FLOW LPM/GPM	PRESSURE BAR/PSI	PAGE NO.
	**POPPET TYPE, 2-WAY**					
	FAP081C	C08-2	2 Way, Normally Closed	27/7	210/3000	PV39-PV40
	FAP101C	C10-2	2 Way, Normally Closed	40/10.5	210/3000	PV41-PV42
	FAP121C	C12-2F	2 Way, Normally Closed	81.5/21.5	210/3000	PV43-PV44
	FAP161C	C16-2	2 Way, Normally Closed	106/28	210/3000	PV45-PV46
	FAP081N	C08-2	2 Way, Normally Open	40/10.5	210/3000	PV47-PV48
	FAP101N	C10-2	2 Way, Normally Open	55/14.5	210/3000	PV49-PV50
	FAP121N	C12-2F	2 Way, Normally Open	98.5/26	210/3000	PV51-PV52
	FAP161N	C16-2	2 Way, Normally Open	117/31	210/3000	PV53-PV54
	**POPPET TYPE, PRESSURE COMPENSATED, 2-WAY**					
	FAPC101C	3X	2 Way, Normally Closed	38/10	210/3000	PV55-PV56
	FAPC121C	C12-3L	2 Way, Normally Closed	57/15	210/3000	PV57-PV58
	FAPC161C	C16-3	2 Way, Normally Closed	83/22	210/3000	PV59-PV60
	FAPC101N	3X	2 Way, Normally Open	38/10	210/3000	PV61-PV62
	FAPC121N	C12-3L	2 Way, Normally Open	57/15	210/3000	PV63-PV64
	FAPC161N	C16-3	2 Way, Normally Open	83/22	210/3000	PV65-PV66
	**FLOW CONTROLS, 3-WAY**					
	JP04C 31	4C	Priority Flow Control, N.C.	30/8	210/3000	PV67-PV68
	**DIRECTIONAL CONTROL**					
	GP02 51	C08-4	4 Way, 3 Pos - Closed Center	21/5.5	350/5000	PV69-PV70
	GP02 53	C08-4	4 Way, 3 Pos - Float Center	17/4.5	350/5000	PV71-PV72
	DSP105C1	C10-4	4 Way, 3 Pos - Closed Center	32/8.5	210/3000	PV73-PV74
	DSP105C4	C10-4	4 Way, 3 Pos - Float Center	32/8.5	210/3000	PV73-PV75

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INTRODUCTION

This technical tips section is designed to help familiarize you with the Parker line of Proportional Valves. In this section we present common options, technical terms, as well as a brief synopsis of the operation and applications of the various products offered in this section. The intent of this section is to help you in selecting the best products for your application.

COMMON OPTIONS

As you will see, Parker offers a variety of Proportional Valve products. As such, some of the options mentioned below may not be available on all valves. Consult the model coding and dimensions for each valve for specifics. Here are some of the common options available.

Seals: The majority of the products are available in Nitrile or Fluorocarbon Seals. The Winner's Circle products feature a standard 4301 Polyurethane "D"-Ring. The "D"-Ring eliminates the need for backup rings. You should match the seal compatibility to the temperature and fluid being used in your application.

Overrides: Overrides are standard on many of the Parker proportional valves. The override is generally a push type that is flush with the end of the tube. Consult the individual catalog pages for more details.

TECHNICAL TERMS

To help in applying our proportional valve line of product, we have listed some technical terms below, as well as some helpful hints in applying our valves.

Ohm's Law: Electrical current is generated as a result of the relationship between input voltage and the resistance to the flow of electrical current. It is represented in equation form by I = V/R (or V=IR), where I is current, V is voltage and R is resistance. This is an important relationship to remember when dealing with any electrically operated valves. Proportional valves allow varying control of flow or pressure, dependant on the current signal provided. As coils heat up, their resistance rises. This means a higher voltage must be available to maintain the same amount of pressure or flow. Thus, the application needs to be designed such that the full on position is about 70% of the initial current draw. On the individual catalog pages a maximum control current is specified to help in applying our proportional valves.

PWM: Pulse Width Modulation (PWM) is the preferred signal for controlling electrical current. PWM is on / off voltage in a square wave form. The percent "on" time or duty cycle provides the average voltage. The valve driver adjusts the duty cycle to obtain current control. We recommend valve drivers with current control for optimum performance. PWM signals also usually provide dither for the proportional valve. Dither is a small back and forth movement of the valve spool around its set position. This rapid movement reduces the friction of the valve and leads to faster, more accurate response.

PWM Frequency: The frequency of a PWM signal is the rate at which the signal is turned on and off. Parker's analog proportional valves are designed to work with low frequency responses between 100-400 Hz. The performance curves on our catalog pages were performed with a PWM signal at 200 Hz.

Hysteresis: Due to various factors, the performance of a proportional valve will show a slightly different performance when the current signal is increasing than it will when the signal is being decreased. This difference is usually expressed as a percentage of total input change and is referred to as the hysteresis of the valve.

Deadband: Cracking or deadband refers to the amount of the control signal that is needed to produce any movement of the spool. Thus, a 20% deadband means that 20% of the control signal is needed before the spool will move.

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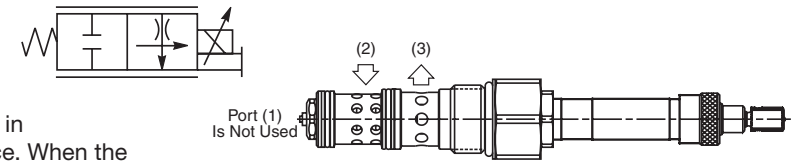
PRODUCT TYPES / APPLICATIONS

Proportional valves are nothing more than electrically adjustable hydraulic valves. They give the operator nearly infinite adjustment control and flexibility. Parker Hannifin offers various types of proportional flow control, pressure reducing, and relief valves.

Proportional Flow Control Valve

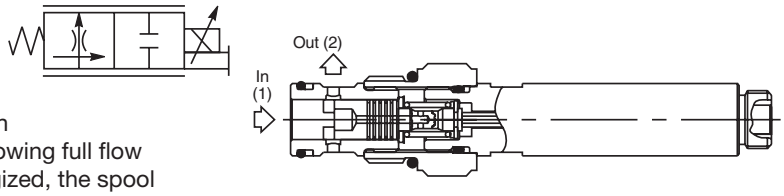
Proportional flow control valves provide pseudo pressure compensation and are used on systems requiring variable electronic control of flow. They allow the operator to vary the control signal to accelerate or decelerate an actuator. A compensator valve can be added to the circuit for enhanced compensation. Some typical applications would include the hoist control for a lift, or the speed control for a winch circuit. Parker offers both normally closed and normally open versions of proportional flow controls.

Normally Closed Proportional Flow Control



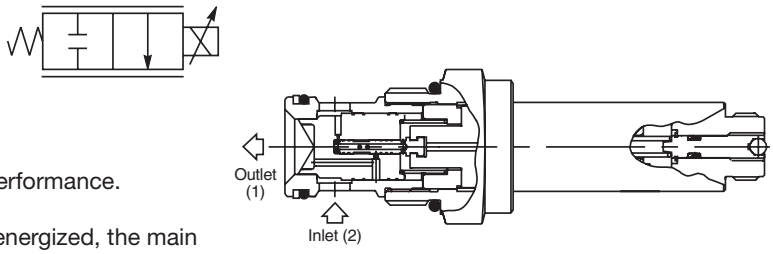
OPERATION - With the solenoid coil de-energized, the spool is held in a closed position by the spring force. When the solenoid coil is energized, the amperage of the signal moves the spool into an open position. The spool is held in this position by a balance between spring force and electrical force. As the current increases, the spools opens further; allowing more flow. As the current decreases, the spool begins closing; allowing less flow. Pseudo compensation is obtained by the pressure drop across the orifices in the spool.

Normally Open Proportional Flow Control



OPERATION - With the solenoid coil de-energized, the spool is held in an open position by spring force; allowing full flow to pass. As the solenoid coil is energized, the spool begins to move away from a full open position; allowing less flow to pass. Once a full electronic signal is given, the spool is held in a closed position; allowing no flow to pass. As the electronic signal is then reduced, the spool begins to open; allowing flow to pass again. Once a constant electronic signal is given, the spool is held in that position by a balance between electronic force and spring force. Pseudo compensation is obtained by the pressure drop across the orifices in the spool.

Normally Closed Proportional Needle Valve



The proportional needle valves are electronic controlled variable needle valves. They are designed specifically for bleed off or unloading circuits as back pressure will affect performance.

OPERATION - With the solenoid de-energized, the main poppet is held in the closed position by spring force. When the solenoid is energized, the sensing spool moves into a partially open position relative to the percentage of rated current flowing through the coil. This action allows the main poppet to move away from the valve seat to a degree that corresponds to sensing spool position. The valve will maintain a fixed amount of opening as long as the electrical current remains constant and will vary proportionally with an increase or decrease in current.

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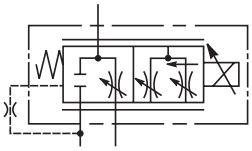
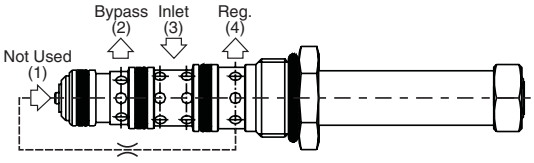
Proportional Priority Bypass Flow Control

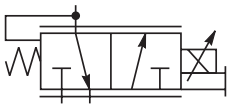


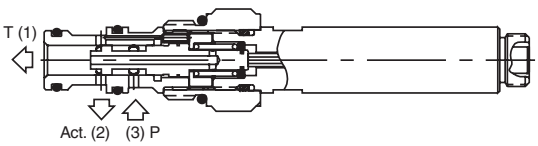


The proportional priority bypass flow controls allow electronic control of the flow setting for the priority flow circuit. The priority flow remains constant regardless of changes in load or pressure. The excess inlet flow is diverted or bypassed to tank. The bypass port must not have any restrictions or performance will be hindered.

OPERATION - Flow enters the valve through port 3. With the coil de-energized, flow is bypassed to port 2. When the coil is energized, the internal orifice is increased allowing pressure compensated flow to the priority port (port 4). The excess flow is bypassed to port 2. As input current is increased, the priority flow increases and the bypass flow decreases. As the current is decreased, priority flow decreases and bypass flow is increased.

Direct Acting, Normally Closed Proportional Pressure Reducing Valve





Direct acting, normally closed proportional pressure reducing valves are used to electronically reduce the inlet pressure to one leg of a hydraulic circuit. This valve is used when a fixed regulated pressure is required regardless of the inlet pressure. This valve could be used as a clutch control for power shift transmissions and PTO, or as a pilot control for directional control valves.

OPERATION - With the solenoid coil de-energized, the spool is held in a closed position by spring force. In this mode, the regulated pressure port is open to tank and the pressure inlet is blocked. As current is applied to the solenoid coil, the spool will begin to travel to a position where the pressure inlet port is connected to the regulated pressure port. At this point, reduced pressure becomes a function of the current signal. As long as the current signal is constant, the reduced pressure at the regulated pressure port will remain fixed regardless of any changes in inlet flow or inlet pressure. As the current signal increases or decreases, the reduced pressure at the regulated pressure port will change with respect to the changes in signal. Once the coil is fully energized, the reduced pressure of the regulated pressure port will be at the maximum reduced pressure for that valve.

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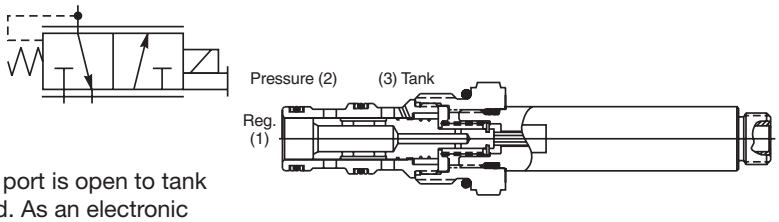
Normally Closed Proportional Pressure Reducing / Relieving Valve

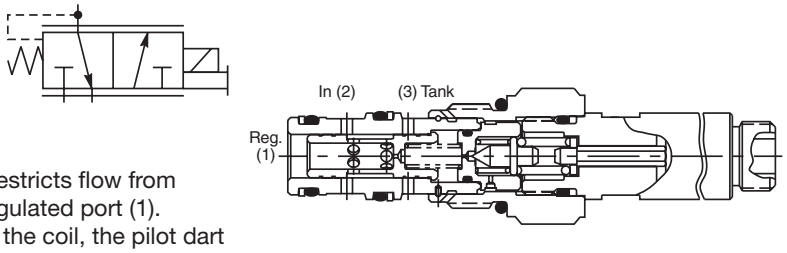
Normally Closed Proportional Pressure Reducing/Relieving Valves are used to electronically reduce the inlet pressure to one leg of a hydraulic circuit. In addition these valves act as a relief valve, relieving any shocks or surges that occur between its regulating port and the actuator. Parker offers direct acting and pilot operated versions of this valve. The direct acting valves are faster responding and generally have lower hysteresis, but are limited to smaller reduced pressures (generally below 800 psi depending on the valve.) Pilot operated are generally slower on response due to the two stage performance, but can have a reduced pressure as high as 3000 psi.

Direct Acting



OPERATION - With the solenoid coil de-energized, the spool is held in a closed position by spring force. In this mode, the regulated pressure port is open to tank and the pressure inlet port is blocked. As an electronic signal is applied to the solenoid coil, the spool will begin to travel to a position where the pressure inlet port is connected to the regulated pressure port. At this point, reduced pressure becomes a function of the voltage signal. As long as the electronic signal is constant, the reduced pressure at the regulated pressure port will remain fixed regardless of any changes in inlet flow or inlet pressure. As the electronic signal increases or decreases, the reduced pressure at the regulated port will change with respect to the change in electronic signal. Once a full signal is given, the reduced pressure of the regulated pressure port will be at the maximum reduced pressure for that valve.

Pilot Operated



OPERATION - With the solenoid coil de-energized, the pilot dart is held open by the spring force. This allows the main spool to close and restricts flow from going from the inlet (2) port to the regulated port (1). As the electronic signal is applied to the coil, the pilot dart is moved towards the pilot seat restricting pilot flow. This restriction raises the effective pressure inside the chamber between the spool and the pilot seat, allowing the spool to travel away from the pilot seat to a position where the pressure at inlet (2) is connected to the regulated pressure port (1). At this point, reduced pressure becomes a function of the electronic signal. As long as the electronic signal is constant, the reduced pressure at the regulated pressure port (2) will remain fixed regardless of any changes in inlet flow or inlet pressure. As the electronic signal increases or decreases, the reduced pressure at port (1) will change with respect to the change in the electronic signal.

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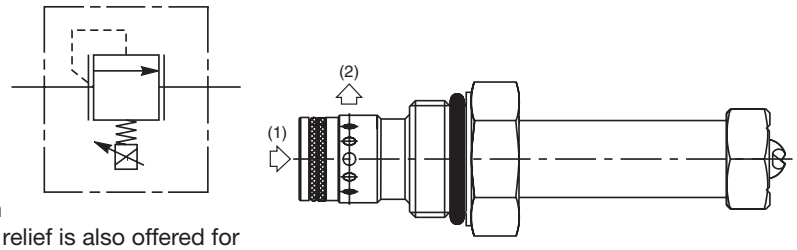
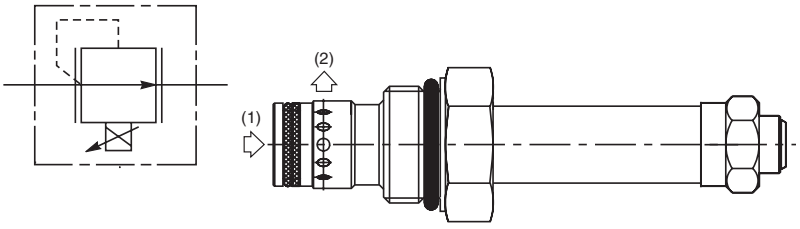
Normally Closed
Proportional Relief Valve



Normally closed proportional relief valves are used to electronically control the system pressure. These valves are ideal for circuits with varying system pressures demands. A small flow pilot version of the normally closed proportional relief is also offered for piloting a larger logic element or vented relief valve. The normally closed relief defaults to a maximum pressure setting (i.e. 3000 psi) when there is no current applied.

OPERATION - With the solenoid coil de-energized, the pilot dart is held closed by the spring. As current is applied to the coil, the pilot dart is moved creating less restriction of the pilot flow. As this restriction is reduced with the increasing current, the pressure setting also decreases. Once a constant electronic signal is given, the pilot dart is held in a given position, holding the pressure setting. This is maintained by the balance between the electronic spring force and the inlet pressure.

Normally Open
Proportional Relief Valve



Normally open proportional relief valves are used to electronically control the system pressure. These valves are ideal for circuits with varying system pressure demands. A small flow pilot version of the normally open proportional relief is also offered for piloting a larger logic element or vented relief valve. The normally open relief defaults to minimum system pressure (i.e. 150 psi) when there is no current applied. Normally closed versions are also available upon request.

OPERATION - With the solenoid coil de-energized, the pilot dart is held open by the spring. This allows the main spool to open at minimum pressure 10.4 Bar (150 psi). As current is applied to the coil, the pilot dart is moved towards the pilot seat restricting pilot flow. This restriction raises the effective pressure setting of the valve. Once a constant electronic signal is given, the pilot dart is held in a given position, holding the pressure setting. This is maintained by a balance between electronic spring force and inlet pressure. As the electronic signal is reduced, the pilot dart is moved away from the pilot seat. This lowers the effective pressure setting of the valve.

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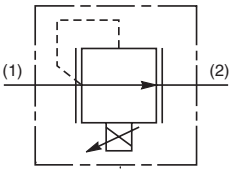
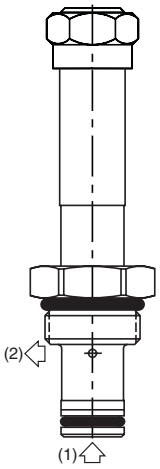
General Description

Proportional Relief Valve. Increasing Pressure With Increasing Current. For additional information see Technical Tips on pages PV1-PV5.

Features

- Analog Proportional Relief Valve regulates pressure proportionally to the solenoid current
- Direct acting poppet design
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.





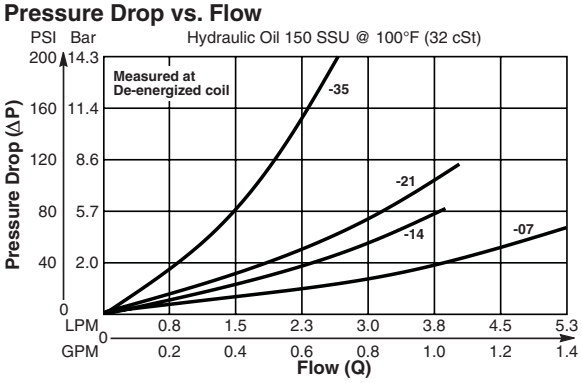
Specifications

Rated Flow (At 70 PSI ΔP)	**07C** 5.3 LPM (1.4 GPM) **14C** 3.4 LPM (0.9 GPM) **21C** 3.0 LPM (0.8 GPM) **35C** 1.3 LPM (.35 GPM)
Max. Pressure At Port 1 @ 75% Input Current	**07C** 70 Bar (1000 PSI) **14C** 140 Bar (2000 PSI) **21C** 210 Bar (3000 PSI) **35C** 350 Bar (5000 PSI)
Hysteresis @ 200 Hz PWM	5%
Cracking Pressure	**07C** 0.7 Bar (1 PSI) **14C** 0.14 Bar (2 PSI) **21C** 0.21 Bar (3 PSI) **35C** 0.35 Bar (5 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +97°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.06 kg (0.14 lbs.)
Cavity	C08-2 (See BC Section for more details)

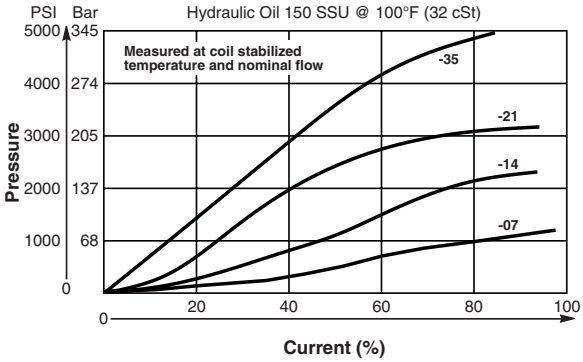
Performance Curves

▲PWM Current Regulator Recommended

Pressure Drop vs. Flow



Pressure vs. Input Signal (Current)



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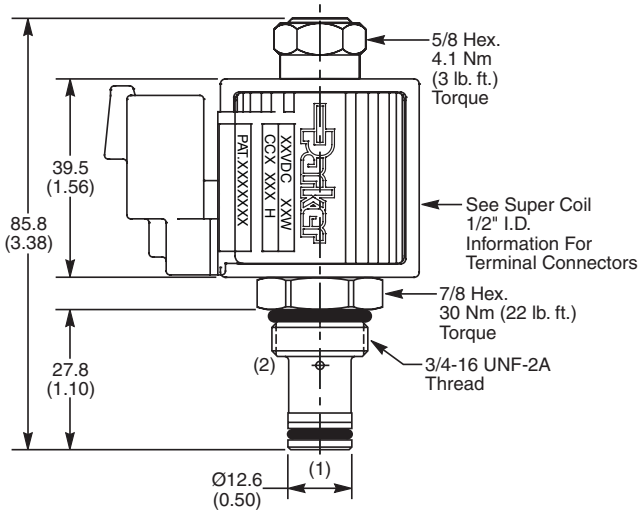
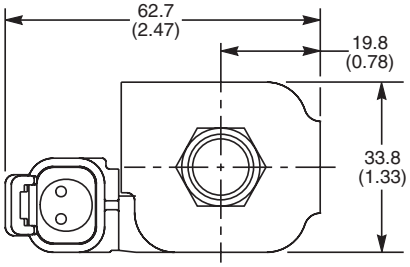
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

AP02B2YP		
08 Size Proportional Relief Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Cracking Pressure
07C	70 Bar (1000 PSI)
14C	140 Bar (2000 PSI)
21C	**210 Bar (3000 PSI)**
35C	**350 Bar (5000 PSI)**

Custom pressure setting available. Consult factory.

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile / Buna-N (SK08-2)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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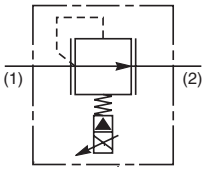
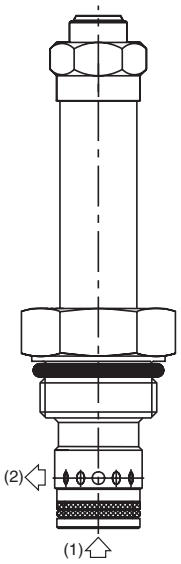
General Description

Proportional Relief Valve. Increasing Pressure With Increasing Current. For additional information see Technical Tips on pages PV1-PV5.

Features

- Pilot operated spool-type design fits industry common cavity (10-2)
- Relieving pressure output is proportional to DC current input
- Precise setting of factory preset pressure in energized mode
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.





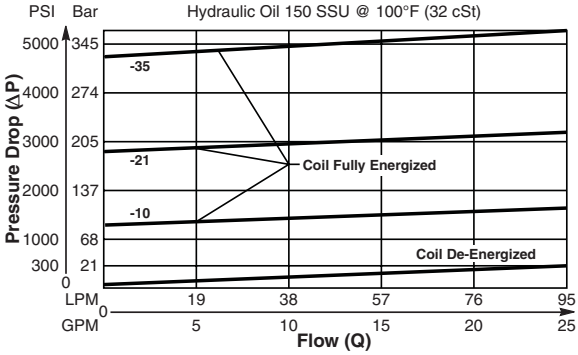
Specifications

Rated Flow (At 300 PSI ΔP) When Coil is Fully De-Energized	95 LPM (25 GPM)
Factory Set Relief Pressure When Coil De-Energized Measured at 45 LPM (12 GPM)	**10C** 103 Bar (1000 PSI) **21C** 210 Bar (3000 PSI) **35C** 350 Bar (5000 PSI)
Hysteresis @ 200 Hz PWM	< 7% of Maximum Pressure Setting
Response Time At 75% of Nominal Voltage Change (Measured To 90% of Press. Change)	**To Unload** 10ms **To Load** **10C** 45 ms **21C** 60 ms **35C** 80 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.14 kg (0.31 lbs.)
Cavity	C10-2 (See BC Section for more details)

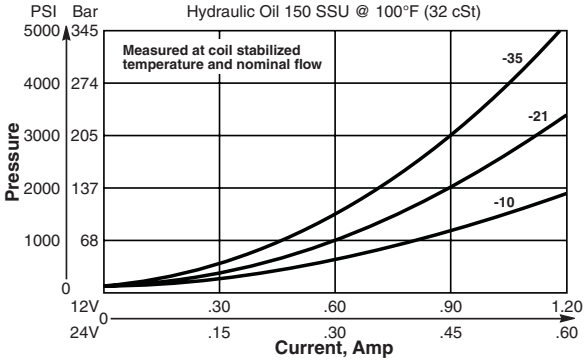
Performance Curves

▲PWM Current Regulator Recommended

Relief Performance



Pressure vs. Input Current



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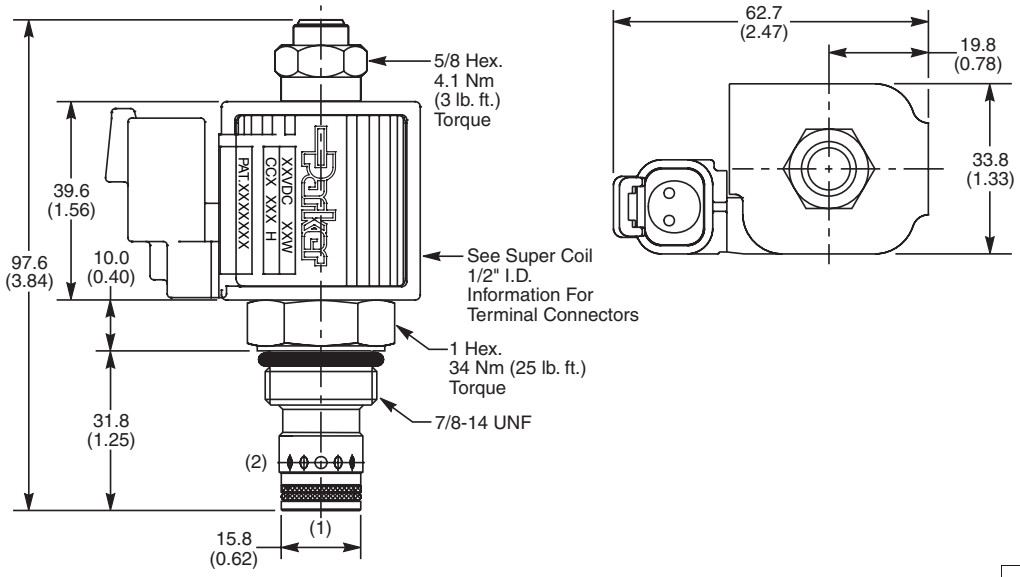
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

AP04G2YP		
10 Size Proportional Relief Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Cracking Pressure
10C	104 Bar (1500 PSI)
21C	**210 Bar (3000 PSI)**
35C	**350 Bar (5000 PSI)**

Custom pressure setting available. Consult factory.

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30503N-1)**
V	Fluorocarbon / (SK30503V-1)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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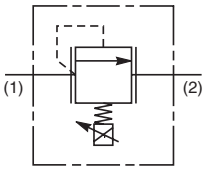
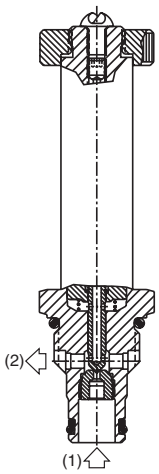
General Description

Proportional Relief Valve. Decreasing Pressure With Increasing Current. For additional information see Technical Tips on pages PV1-PV5.

Features

- Analog Proportional Relief Valve regulates pressure proportionally to the input solenoid current
- Direct acting poppet design
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.





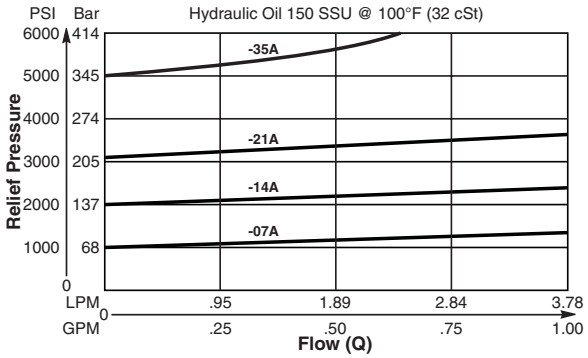
Specifications

Rated Flow (At 70 PSI ΔP)	**07A** 5.3 LPM (1.4 GPM) **14A** 3.4 LPM (0.9 GPM) **21A** 3.0 LPM (0.8 GPM) **35A** 1.3 LPM (.35 GPM)
Factory Set Relief Pressure When De-Energized (±5% -Std. ±2% - Low Variation)	**07A** 70 Bar (1000 PSI) **14A** 140 Bar (2000 PSI) **21A** 210 Bar (3000 PSI) **35A** 350 Bar (5000 PSI)
Hysteresis @ 200 Hz PWM	< 10%
Cracking Pressure	**07C** 0.7 Bar (1 PSI) **14C** 0.14 Bar (2 PSI) **21C** 0.21 Bar (3 PSI) **35C** 0.35 Bar (5 PSI)
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.09 kg (0.19 lbs.)
Cavity	C08-2 (See BC Section for more details)

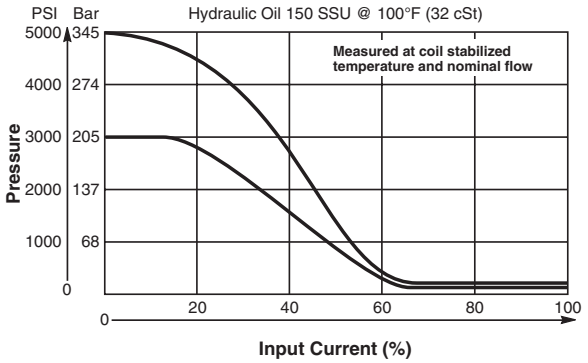
Performance Curves

▲PWM Current Regulator Recommended

Relief Performance



Pressure vs. Input Current



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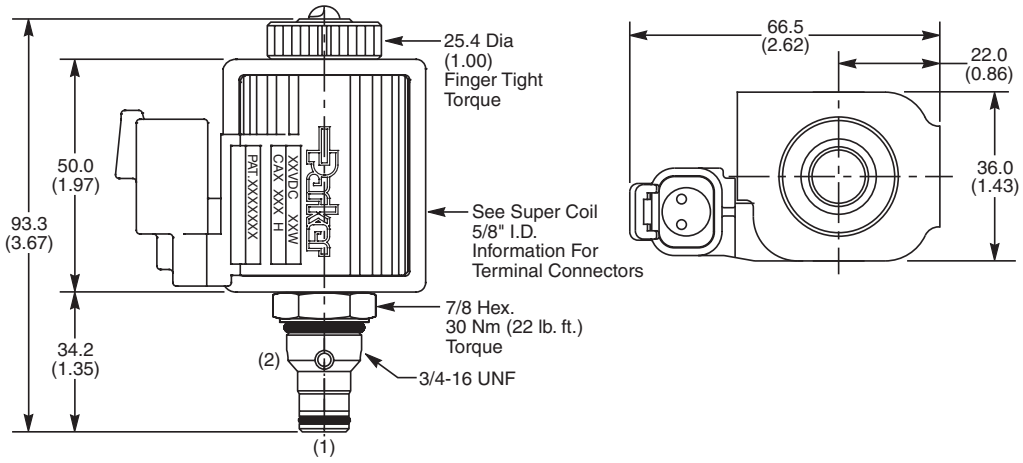
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

AP02B2YR			L
08 Size Proportional Relief Valve	Style	Seals	Low Variation Now Standard

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Cracking Pressure
07A	70 Bar (1000 PSI)
14A	140 Bar (2000 PSI)
21A	**210 Bar (3000 PSI)**
35A	**350 Bar (5000 PSI)**

Custom pressure setting available. Consult factory.

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK08-2)**
N	Nitrile / Buna-N (Std.) (SK08-2)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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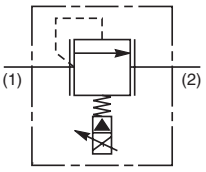
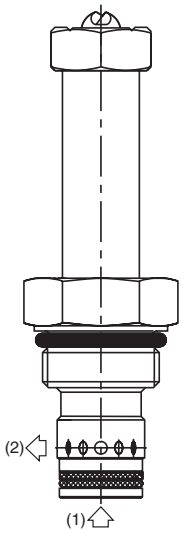
General Description

Proportional Relief Valve. Decreasing Pressure With Increasing Current. For additional information see Technical Tips on pages PV1-PV5.

Features

- Pilot operated spool-type design
- Precise setting of factory preset pressure in de-energized mode
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.





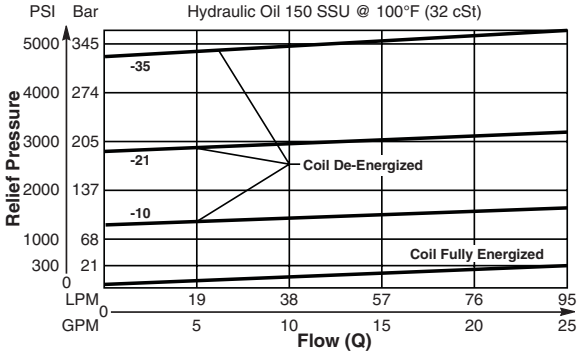
Specifications

Rated Flow (At 300 PSI ΔP) When Coil is Fully Energized	95 LPM (25 GPM)
Factory Set Relief Pressure When Coil De-Energized Measured at 45 LPM (12 GPM)	**10C** 103 Bar (1000 PSI) **21C** 210 Bar (3000 PSI) **35C** 350 Bar (5000 PSI)
Hysteresis @ 200 Hz PWM	< 7% of Maximum Pressure Setting
Response Time At 75% of Nominal Voltage Change (Measured To 90% of Press. Change)	**To Unload** 45ms **To Load** 25 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.14 kg (0.30 lbs.)
Cavity	C10-2 (See BC Section for more details)

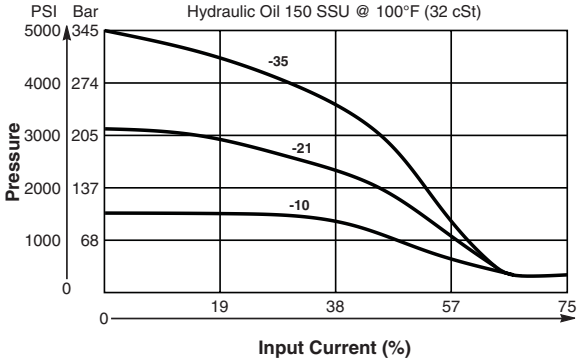
Performance Curves

▲PWM Current Regulator Recommended

Relief Performance



Pressure vs. Input Current



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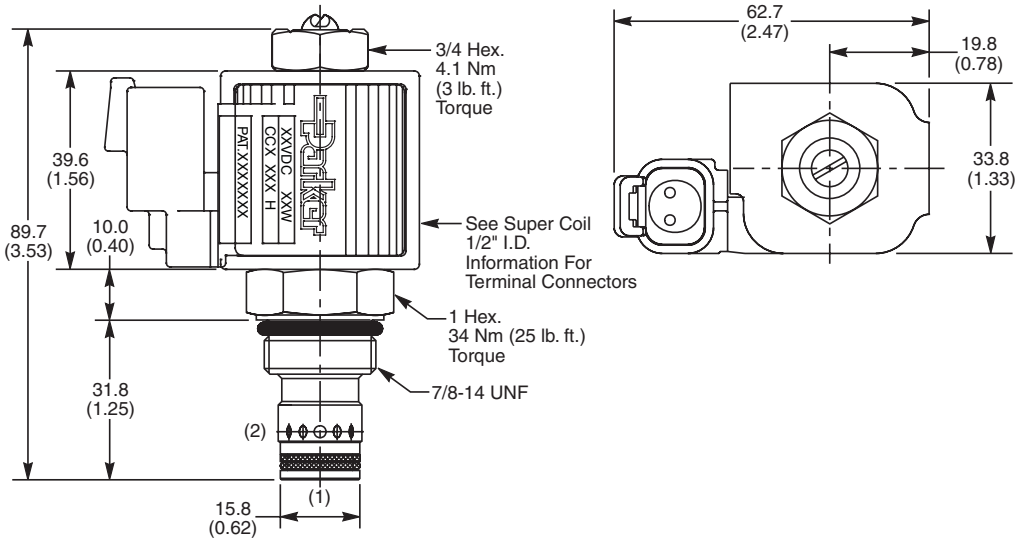
Dimensions Millimeters (Inches)



THIRD-ANGLE PROJECTION

Ordering Information

AP04G2YR		
10 Size Proportional Relief Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Cracking Pressure
10C	104 Bar (1500 PSI)
21C	**210 Bar (3000 PSI)**
35C	**350 Bar (5000 PSI)**

Custom pressure setting available. Consult factory.

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30503N-1)**
V	Fluorocarbon / (SK30503V-1)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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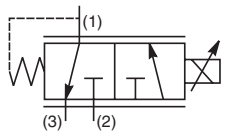
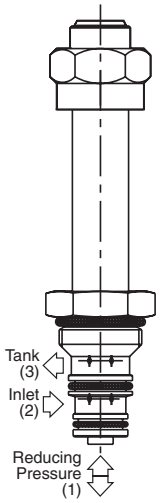
General Description

3 Way, 2 Position, Proportional Pressure Reducing Valve. Bottom Cylinder Port. For additional information see Technical Tips on pages PV1-PV6.

Features

- Designed for pilot control of directional valves
- Low Hysteresis
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.





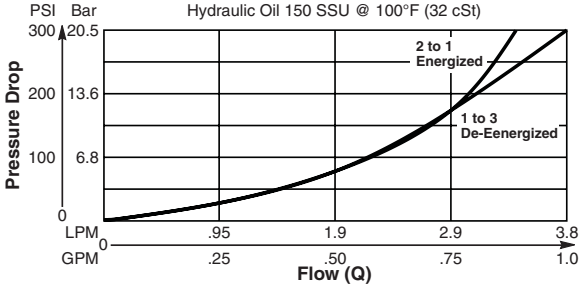
Specifications

Rated Flow (At 70 PSI ΔP)	1.9 LPM (0.5 GPM)
Max. Regulated Pressure @75% Current	**Standard** 17 Bar (250 PSI) **High Pressure** 22 Bar (320 PSI)
Max. Input Pressure At Port 1	210 Bar (3000 PSI)
Max. Tank Pressure	30 Bar (440 PSI)
Max. Drainage Flow in Regulating Zone	5 cc/min. When De-Energized 200 cc/min. In Regulating Zone At 68 Bar (1000 PSI) Input Pressure
Hysteresis @ 120 Hz PWM	2%
Dead End Response Time	t on = 30 ms t off = 10 ms At Step Signal 0 To 75% of Nominal Voltage
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.17 lbs.)
Cavity	54-1 (See BC Section for more details)

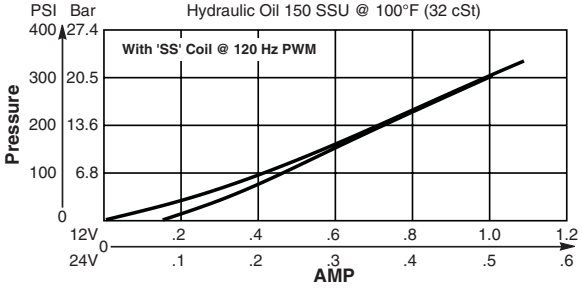
Performance Curves

▲PWM Current Regulator Recommended

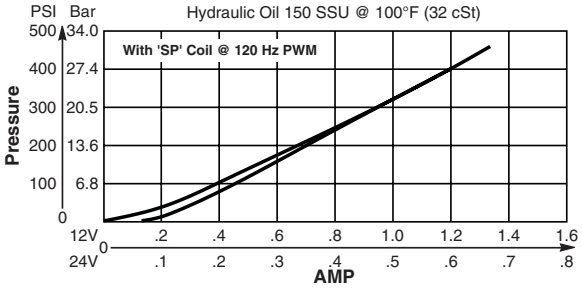
Pressure Drop vs. Flow



Pressure @ Port 1 vs. Input Current



Pressure @ Port 1 vs. Input Current



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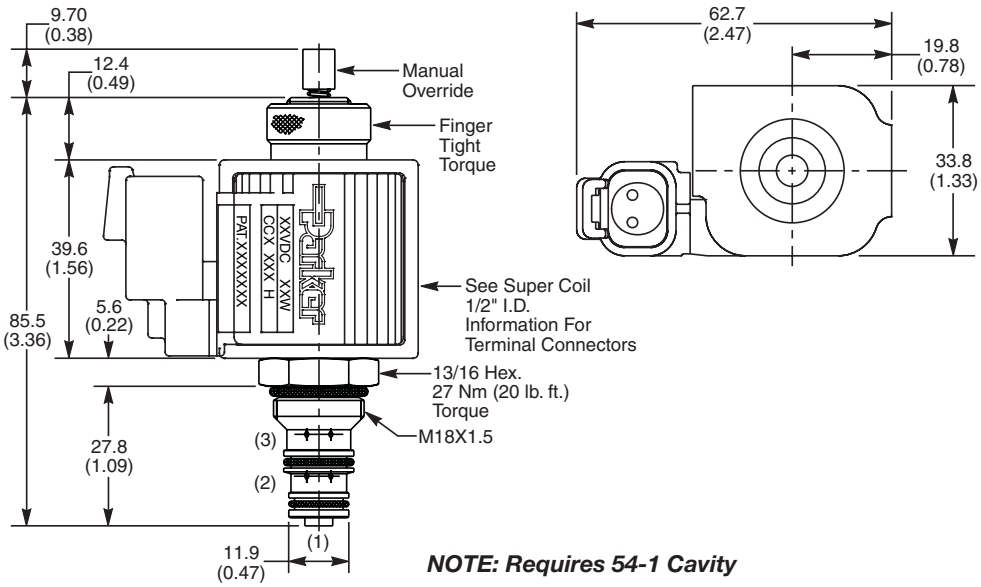
Dimensions Millimeters (Inches)



NOTE: Requires 54-1 Cavity

THIRD-ANGLE PROJECTION

Ordering Information

GP01	30			
08 Size Proportional Valve	Style	Override Option	Filter Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
30	Standard ('SS' Coil)
30	High Pressure ('SP' Coil)

Code	Override Option
Omit	If no M.O.
1	Manual Override

Code	Filter Screen
Omit	Not required
F	60 Mesh Screen on Inlet Port

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30105N-1)**
V	Fluorocarbon / (SK30105V-1)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
591	1/4" SAE

Code	Body Material
S	Steel (5000 PSI)
A	Aluminium (3000 PSI)

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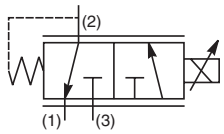
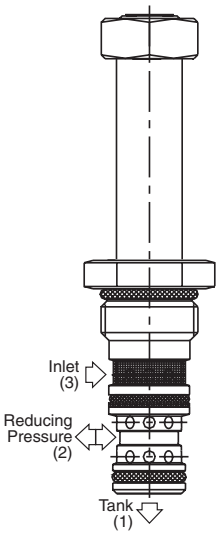
General Description

3 Way, 2 Position, Proportional Pressure Reducing Valve. Side Cylinder Port. For additional information see Technical Tips on pages PV1-PV5.

Features

- Minimal Hysteresis
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Nonmagnetic spool and housing assembly





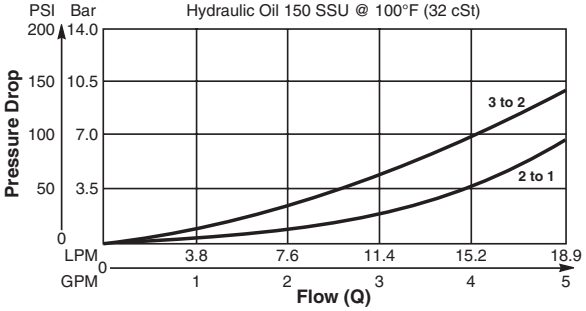
Specifications

Rated Flow (At 70 PSI ΔP)	19 LPM (5 GPM)
Factory Set Relief Pressure When Coil De-Energized Measured at 45 LPM (12 GPM)	**02** 12/17 Bar (180/240 PSI) **03** 19/26 Bar (270/375 PSI) **05** 31/40 Bar (450/580 PSI) **06** 41/51 Bar (600/740 PSI) **09** 65/79 Bar (940/1140 PSI) **18** 114/145 Bar (1650/2100 PSI)
Max. Input Press. At Port 3	210 Bar (3000 PSI)
Max. Drainage Flow In Regulating Zone	100 cc/min. When De-Energized 750 cc/min. In Regulating Zone At 21 Bar (300 PSI) Input Pressure
Hysteresis @ 100 Hz PWM	3.5%
Dead End Response Time	10 ms At Step Signal 0 To 75% of Nominal Voltage
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.17 lbs.)
Cavity	C08-3 (See BC Section for more details)

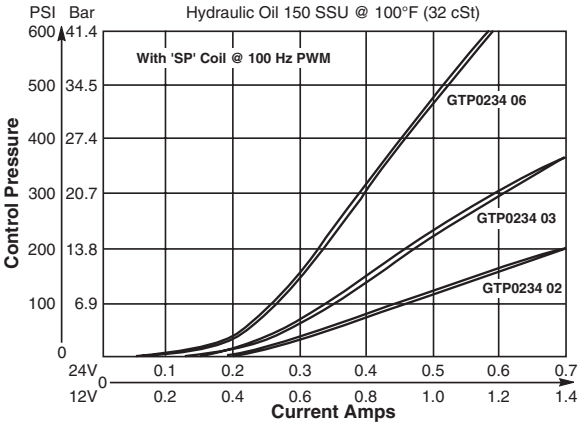
Performance Curves

▲PWM Current Regulator Recommended

Pressure Drop vs. Flow



Pressure @ Port 2 vs. Input Current



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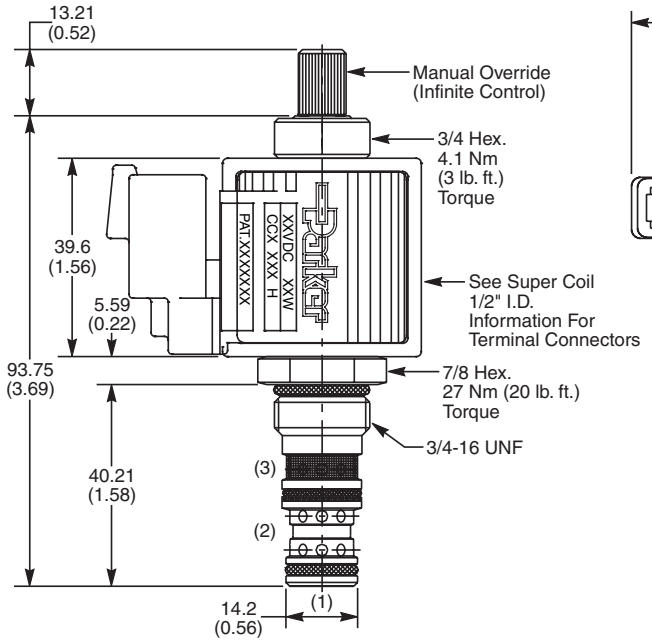
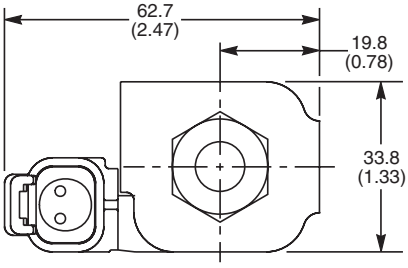
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

GTP0234			1	
08 Size Proportional Valve	Style	Override Option	Filter Screen	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style (Maximum Regulated Pressure Range - SP COIL)
02	12/17 Bar (180/240 PSI)
03	19/26 Bar (270/375 PSI)
05	31/40 Bar (450/580 PSI)
06	41/51 Bar (600/740 PSI)
09	65/79 Bar (940/1140 PSI)
18	114/145 Bar (1650/2100 PSI)

Custom pressure setting available. Consult factory.

Code	Override Option
0	Not Required
5	Infinite Control M.O.

Code	Filter Screen
1	**60 Mesh Screen on Inlet Port**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (Std.) (SK30105N-1)**
V	Fluorocarbon / (SK30105V-1)

Order Bodies Separately
See section BC

B08	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-8 / Steel (5000 PSI)
A6T	SAE-8 / Aluminium (3000 PSI)

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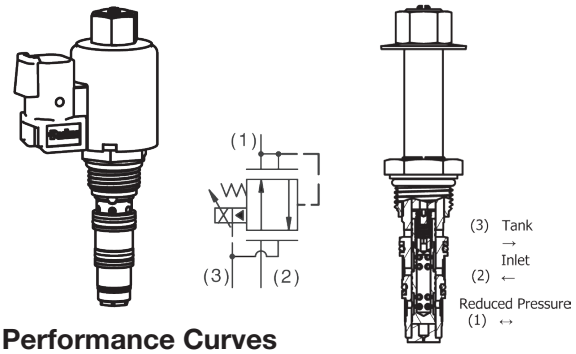
General Description

Pilot Operated, Pressure Increasing with Current Proportional Pressure Reducing/ Relieving Valve.
For additional information see Technical Tips on pages PV1-PV5.



Features

- Low hysteresis
- High flow capacity
- 400 Hz PWM signal preferred
- No dynamic seals
- Screw style manual override standard
- Polyurethane "D"-ring eliminates the need for back-up rings

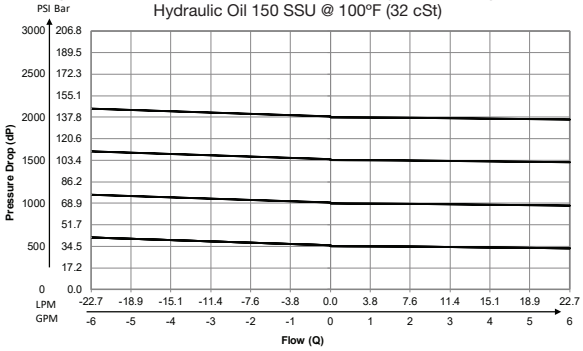
Specifications

Rated Flow	22.7 LPM (6 GPM)
Max. Input Press. At Port 1	345 Bar (5000 PSI)
Max. Internal Leakage De-energised	230 cc/min (14 in^3/min)
Hysteresis @ 400 Hz PWM	4% with 30% to 50% duty cycle
Power Consumption	8.4 Watts at max. reduced pressure
Frequency	200-600 Hz (PWM)
Continuous Duty Control Current	12VDC .730A 24VDC .365A
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +97°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.25 kg (0.55 lbs.) With coil
Cavity	C08-3L (See BC Section for more details)

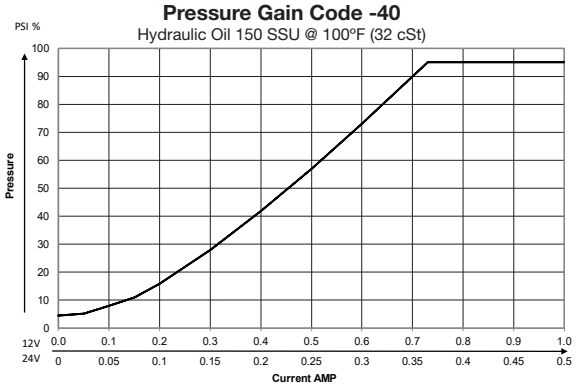
Performance Curves

Current Regulator PWM Recommended

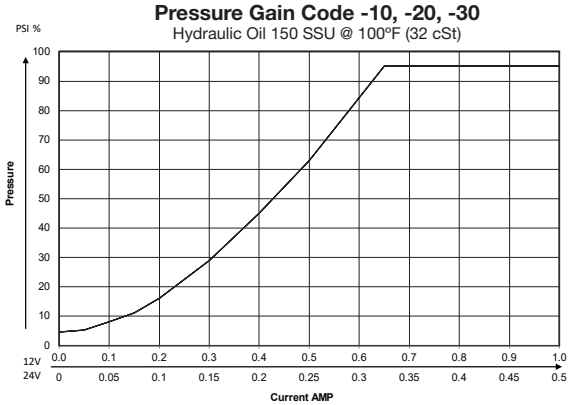
Regulated Pressure vs. Flow (Through Cartridge Only)
Hydraulic Oil 150 SSU @ 100°F (32 cSt)



Pressure Gain Code -40
Hydraulic Oil 150 SSU @ 100°F (32 cSt)



Pressure Gain Code -10, -20, -30
Hydraulic Oil 150 SSU @ 100°F (32 cSt)



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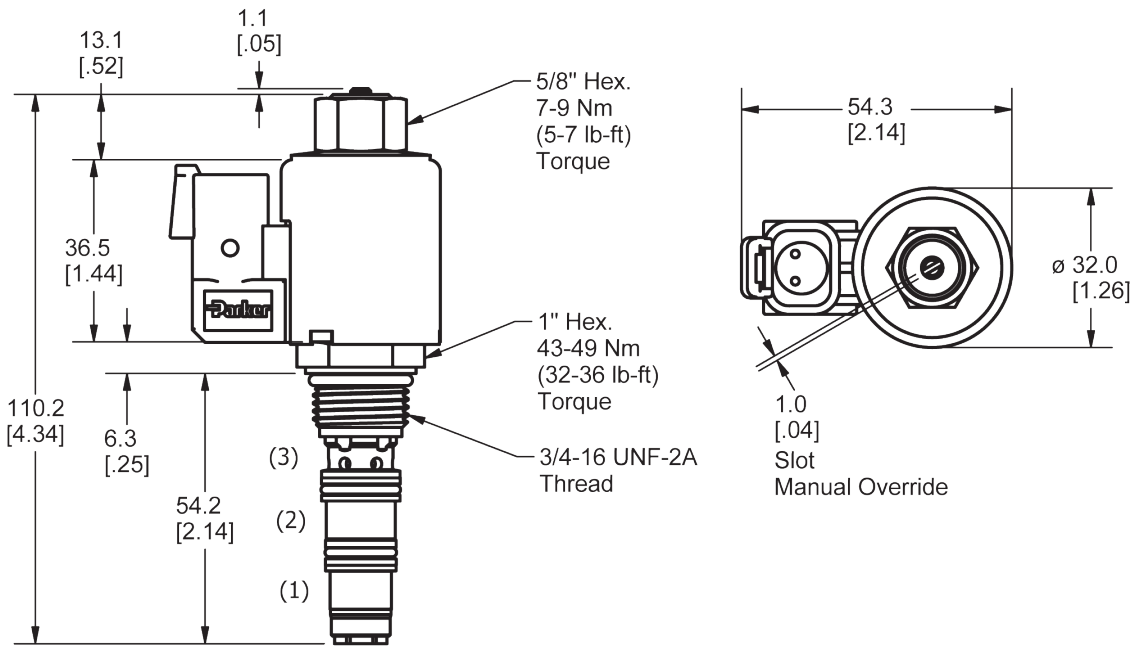
Dimensions Millimeters (Inches)



NOTE: Requires C08-3L Cavity

Ordering Information

EPR083	R		
08 Size Proportional Valve	Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Coil Short Proportional (SW7L series), for ordering information.

Code	Coil Type
R	Pilot operated increasing "rising" pressure

Code	Pressure Range (Output)
10	68.9 Bar (1000 PSI)
20	138 Bar (2000 PSI)
30	207 Bar (3000 PSI)
40	276 Bar (4000 PSI)

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-3)
N	Nitrile / Buna-N (Std.) (SK08-3)
V	Fluorocarbon / (SK08-3V)

Order Bodies Separately
See section BC

B08	–	3L	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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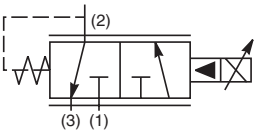
P.O., N.C. Proportional Reduce/Relief Valve
Series EPR111C

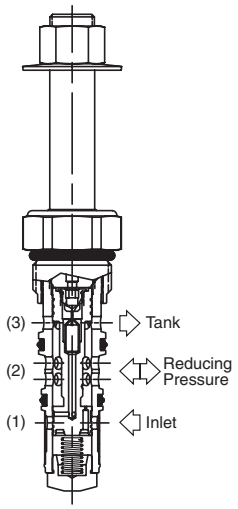
General Description

Pilot Operated, Normally Closed, Proportional Pressure Reducing/Relieving Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- High flow capacity
- Low hysteresis
- 400 Hz PWM signal preferred
- No dynamic seals
- Polyurethane “D”-Ring eliminates need for backup rings





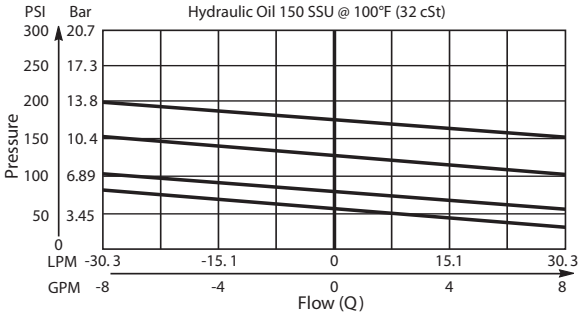
Specifications

Rated Flow	37.5 LPM (10 GPM)
Maximum Input Pressure at Port 2	350 Bar (5000 PSI)
Maximum Internal Leakage	5 LPM (0.13 GPM) @ 20.7 Bar (300 PSI) 0.95 LPM (0.25 GPM) @ 207 Bar (3000 PSI)
Hysteresis @ 400 Hz PWM	4% with 60% duty cycle
Power Consumption	9 watts at max. reduced pressure
Frequency	200-600 Hz (PWM)
Maximum Control Current	**12 VDC** .90A **24 VDC** .45A
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +97°C (“D”-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.59 kg (1.3 lbs.)
Cavity	C10-3L (See BC Section for more details)

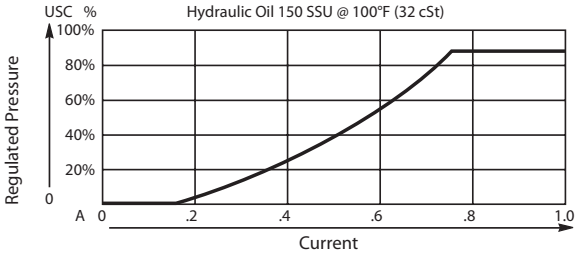
Performance Curves

▲PWM Current Regulator Recommended

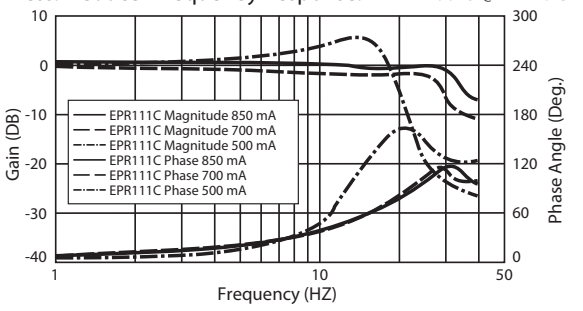
Flow vs. Regulated Pressure



Pressure Gain



Press. Reducer Frequency Response: 290 PSI @ 12 VDC



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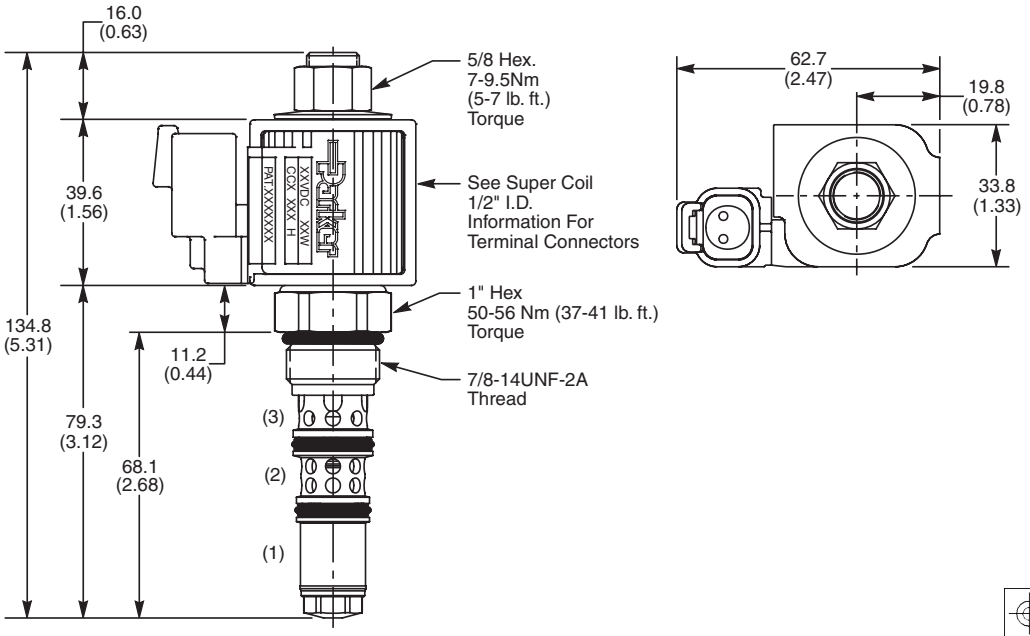
Dimensions Millimeters (Inches)



NOTE: Requires C10-3L Cavity

THIRD-ANGLE PROJECTION

Ordering Information

EPR111	C		
11 Size Proportional Red./Rel. Valve	Style	Pressure Range	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style
C	**Normally Closed, Pilot Operated**

Code	Pressure Range
02	13.8 Bar (200 PSI)
03	20.7 Bar (300 PSI)
05	34.5 Bar (500 PSI)
10	68.9 Bar (1000 PSI)
20	138 Bar (2000 PSI)
30	207 Bar (3000 PSI)
40	276 Bar (4000 PSI)

Code	Seals / Kit No.
Omit	**"D"-Ring / (SK10-3L)**
N	Nitrile / Buna-N (SK10-3LN)
V	Fluorocarbon / (SK10-3LV)

Order Bodies Separately
See section BC

B10	–	3	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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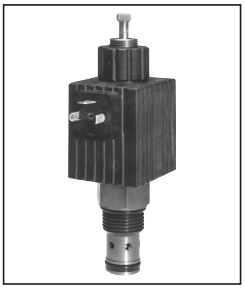
N.C. Proportional Flow Control Valve
Series DF122C

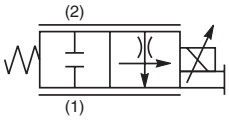
General Description

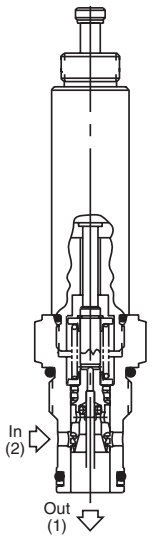
Normally Closed Proportional Flow Control Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- On-off type solenoids
- Low hysteresis
- PWM signal preferred
- Manual override standard
- All external parts zinc plated



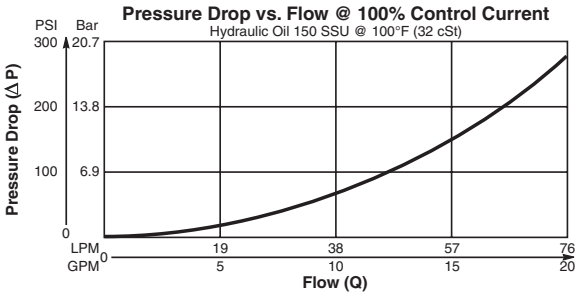


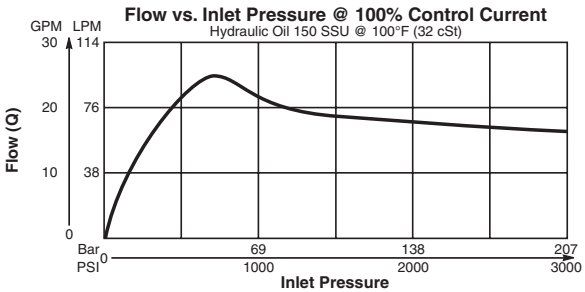


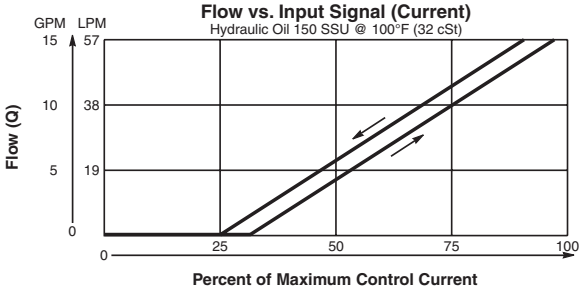
Specifications

Rated Flow Valve Fully Open	53 LPM (14 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Hysteresis @ 200 Hz PWM	4%
Cracking (Dead band)	20% - 30% of Input Signal
Frequency	100 - 400 Hz (200 Hz Preferred)
Maximum Control Current	**12 VDC** 3.53A **24 VDC** 1.79A
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.32 kg (0.7 lbs.)
Cavity	C12-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT12-2F

Performance Curves







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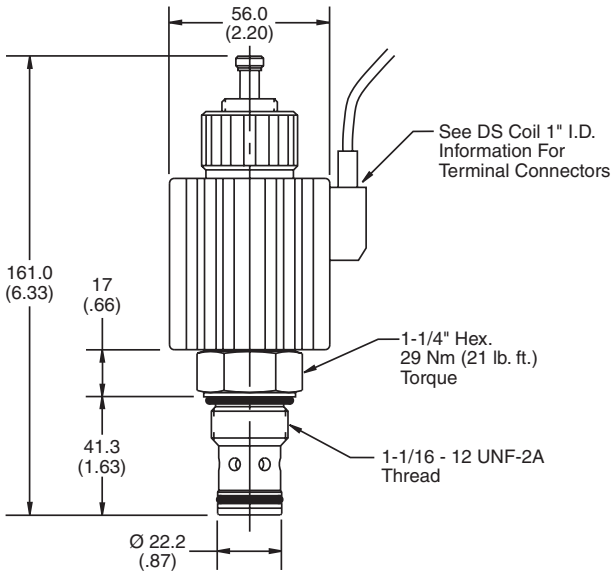
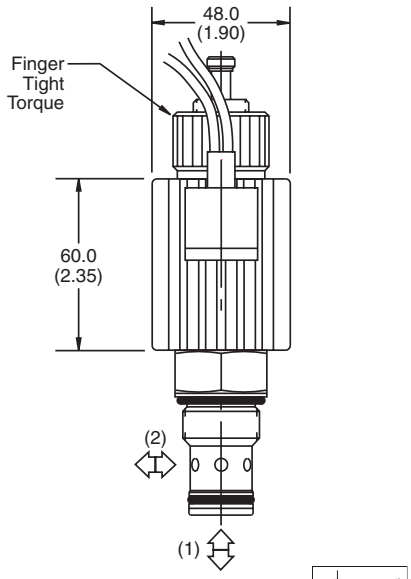
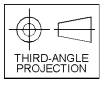
Dimensions Millimeters (Inches)







Ordering Information

DF122C14		
12 Size Normally Closed Proportional Flow Control Valve	Override Options	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1" Coil (DS series), for ordering information.

Code	Override Options
Omit	Push Type with Extended Rod

Code	Seals / Kit No.
N	Nitrile / Buna-N (SK12-2)
V	Fluorocarbon / (SK12-2V)

Order Bodies Separately
See section BC

B12	–	2	–	
12 size		2-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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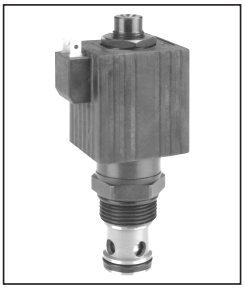
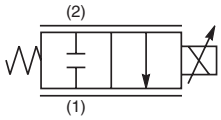
General Description

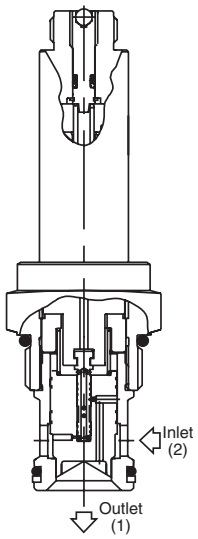
Normally Closed Proportional Needle Valve. This valve is designed specifically for bleed off or unloading circuits. Back pressure will affect performance. For additional information see Technical Tips on pages PV1-PV5.

Features

- On-off type solenoids
- Low hysteresis
- PWM signal preferred
- All external parts zinc plated





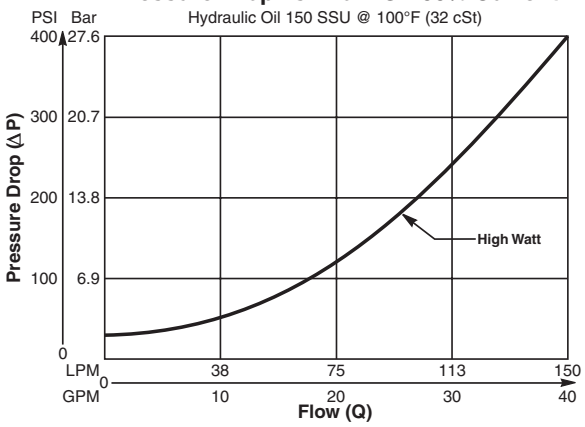


Specifications

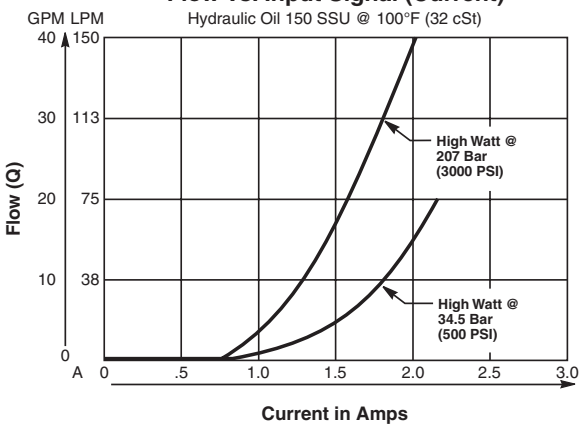
Rated Flow Valve Fully Open	**High Watt Coil** 150 LPM (40 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	125 cc/min. (7.6 in³/min.)
Hysteresis @ 200 Hz PWM	4%
Cracking (Dead band)	20% - 30% of Input Signal
Frequency	100 - 400 Hz (200 Hz Preferred)
Maximum Control Current	**12 VDC** **24 VDC** **High Watt** 3.53A 1.79A
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.34 kg (0.75 lbs.)
Cavity	C16-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT16-2F

Performance Curves

Pressure Drop vs. Flow @ 100% Current



Flow vs. Input Signal (Current)



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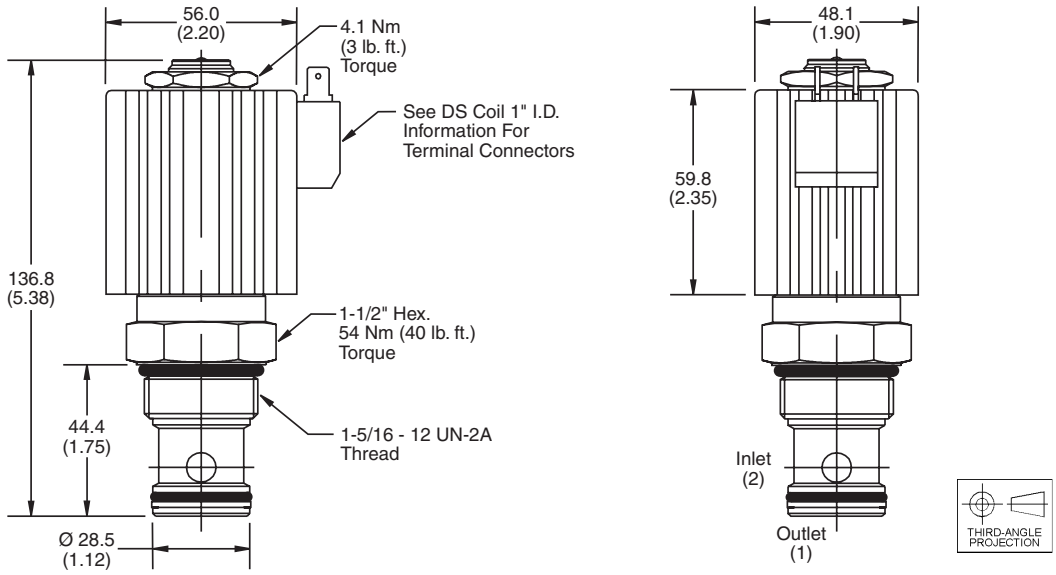
Dimensions Millimeters (Inches)



Ordering Information

DF161C40	
16 Size Normally Closed Proportional Flow Control Valve	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1" Coil (DS series), for ordering information.

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK16-2)**
V	Fluorocarbon / (SK16-2V)

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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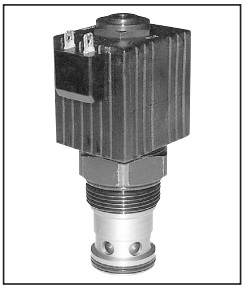
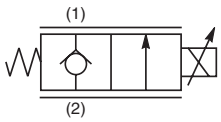
General Description

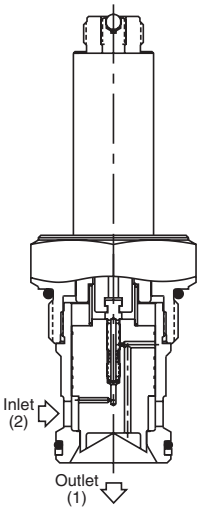
Normally Closed Proportional Needle Valve. This valve is designed specifically for bleed off or unloading circuits. Back pressure will affect performance. For additional information see Technical Tips on pages PV1-PV5.

Features

- On-off type solenoids
- Low hysteresis
- PWM signal preferred
- All external parts zinc plated





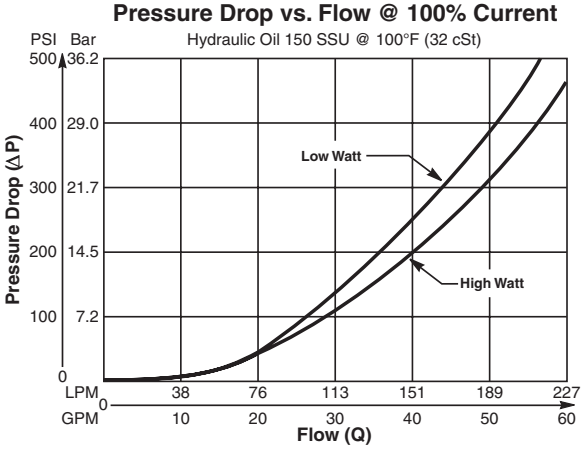


Specifications

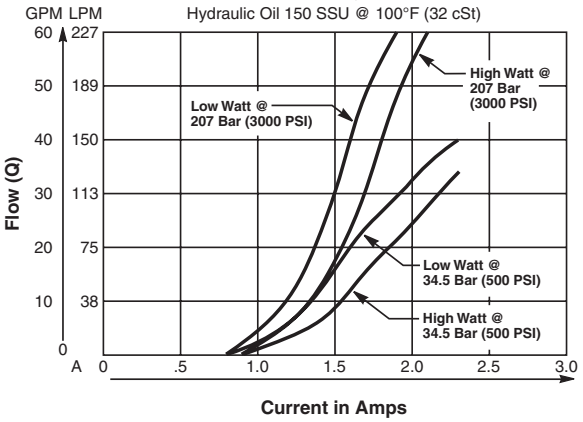
Rated Flow Valve Fully Open	**Low Watt** 180 LPM (48 GPM) **High Watt** 227 LPM (60 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Leakage at 150 SSU (32 cSt)	125 cc/min. (7.6 in^3/min.)
Hysteresis @ 200 Hz PWM	4%
Cracking (Dead band)	20% - 30% of Input Signal
Frequency	100 - 400 Hz (200 Hz Preferred)
Maximum Control Current	**12 VDC** 3.53A **24 VDC** 1.79A
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.34 kg (0.75 lbs.)
Cavity	C20-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT20-2F

Performance Curves

Pressure Drop vs. Flow @ 100% Current



Flow vs. Input Signal (Current)



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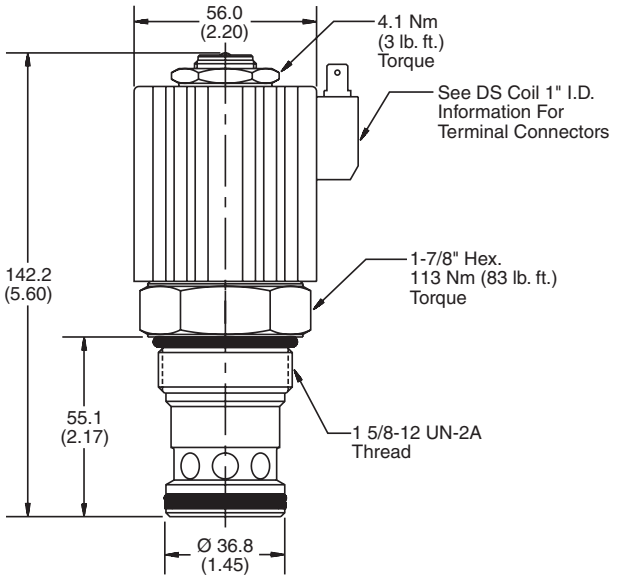
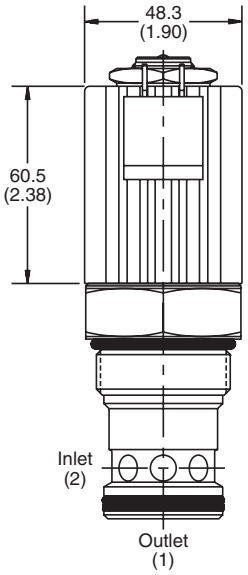
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

DF201C60	
20 Size Normally Closed Proportional Flow Control Valve	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1" Coil (DS series), for ordering information.

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK20-2)**
V	Fluorocarbon / (SK20-2V)

Order Bodies Separately
See section BC

B20	–	2	–	
20 size		2-Way Cavity		Port Size

Code	Porting / Body Material
20T	SAE-20 / Steel (5000 PSI)
A20T	SAE-20 / Aluminium (3000 PSI)

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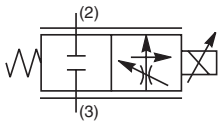
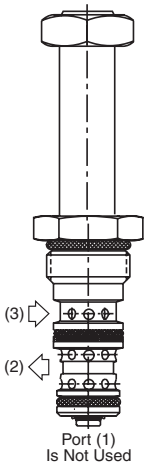
General Description

2 Way, Normally Closed, Proportional Flow Regulator Valve. Pressure Compensated. For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Nonmagnetic spool and housing assembly
- Factory-adjusted low variation option (Model "L") is available for applications where low variation of flow from valve to valve is essential at a given current.





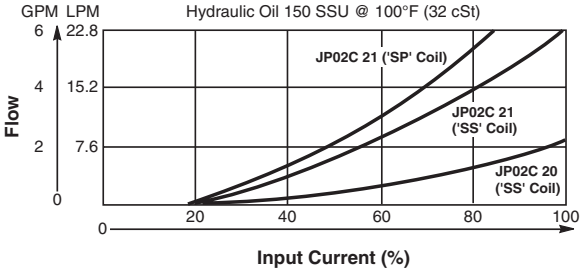
Specifications

Rated Flow	**20** 7.5 LPM (2 GPM) Low Flow ('SS' Coil) **21** 15 LPM (4 GPM) Standard ('SS' Coil) **21** 23 LPM (6 GPM) High Flow ('SP' Coil)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	**20** 6.9 Bar (150 PSI) Low Flow **21** 13.8 Bar (200 PSI) Standard **21** 20.7 Bar (300 PSI) High Flow
Maximum Internal Leakage	570 cc (35 cu. in.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<10% (Low Flow and Standard) <3% (High Flow)
Cracking Pressure	25% of Input Signal
Variation of Flow @ 35% of Rated Current	**Standard Model** Up To ±20% Of Rated Flow **Model "L"** ±7% Of Rated Flow
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.17 lbs.)
Cavity	C08-3 (See BC Section for more details)

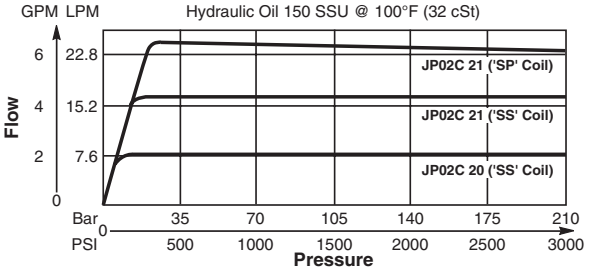
Performance Curves

▲PWM Current Regulator Recommended

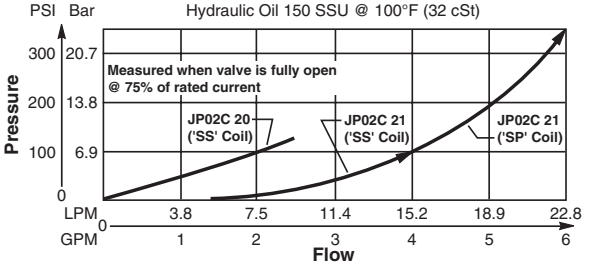
Flow vs. Input Current



Flow Regulation (Measured 75% of Rated Current)



Pressure Drop vs. Flow



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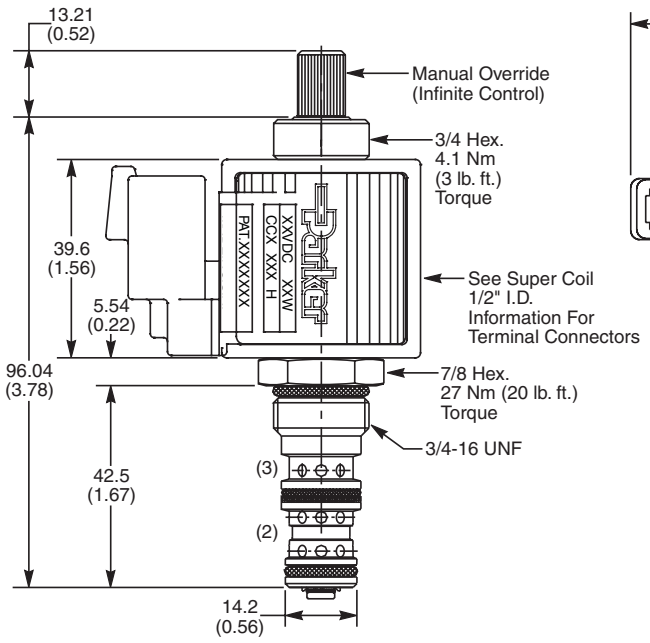
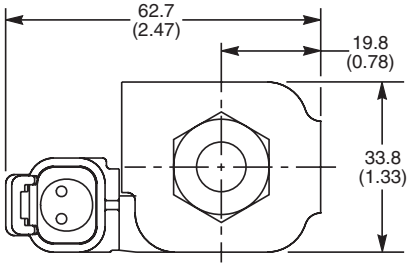
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

JP02C					
08 Size Proportional Valve	Style	Override Option	Filter Screen	Seals	Flow Variation

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style (Maximum Regulated Flow)
20	Low Flow ('SS' Coil) 7.5 LPM (2 GPM)
21	Standard ('SS' Coil) 15 LPM (4 GPM)
21	High Flow ('SP' Coil) 23 LPM (6 GPM)

Code	Override Option
0	Not Required
5	Infinite Control M.O.

Code	Filter Screen
0	Not Available
1	60 Mesh Screen on Inlet Port

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30105N-1)**
V	Fluorocarbon / (SK30105V-1)

Code	Flow Variation
Omit	Standard up to ±20% of Rated Flow
L	Low Variation (±7% of Rated Flow)

Order Bodies Separately
See section BC

B08	–	3	–	
08 size		3-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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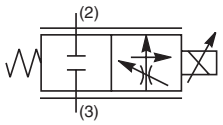
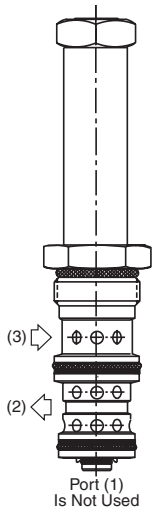
General Description

2 Way, Normally Closed, Proportional Flow Regulator Valve. Pressure Compensated.
For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Nonmagnetic spool and housing assembly
- Factory-adjusted low variation option (Model "L") is available for applications where low variation of flow from valve to valve is essential at a given current.





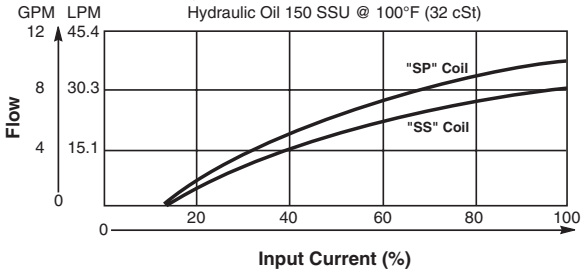
Specifications

Rated Flow	**21** 30 LPM (8 GPM) Standard ('SS' Coil) **21** 36 LPM (9.5 GPM) High Flow ('SP' Coil)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	**21** 13.8 Bar (200 PSI) Standard **21** 20.7 Bar (300 PSI) High Flow
Maximum Internal Leakage	780 cc (46 cu. in.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	7%
Cracking Pressure	25% of Input Signal
Variation of Flow @ 35% of Rated Current	**Standard Model** Up To ±20% Of Rated Flow **Model "L"** ±7% Of Rated Flow
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.13 kg (0.28 lbs.)
Cavity	3X (See BC Section for more details)

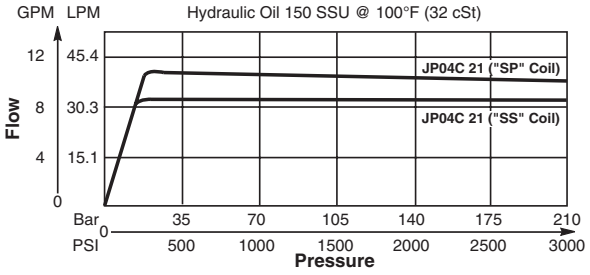
Performance Curves

▲PWM Current Regulator Recommended

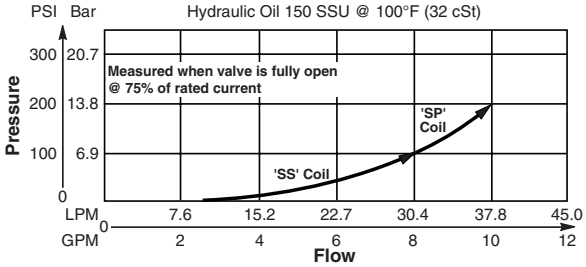
Flow vs. Input Signal



Flow Regulation (Measured 75% of Rated Current)



Pressure Drop vs. Flow



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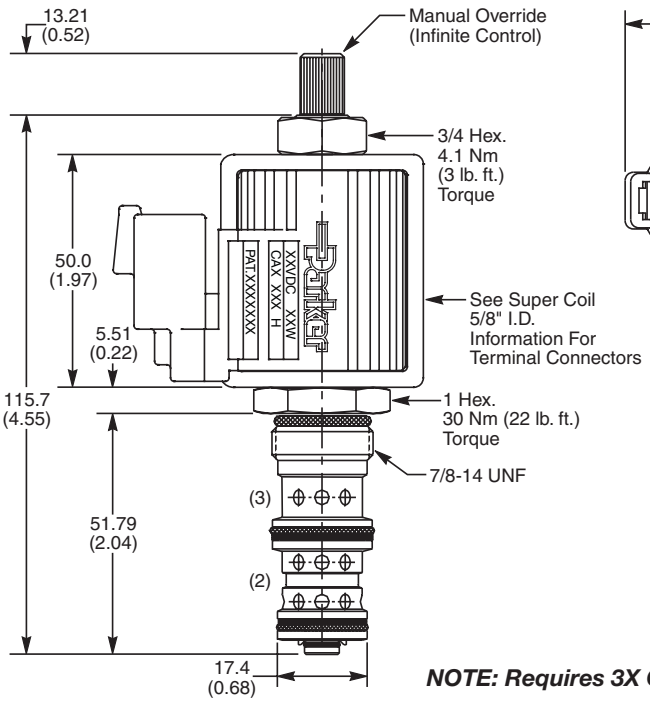
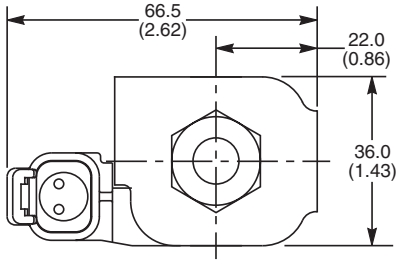
Dimensions Millimeters (Inches)





NOTE: Requires 3X Cavity

THIRD-ANGLE PROJECTION

Ordering Information

JP04C	21				
10 Size Proportional Valve	Style	Override Option	Filter Screen	Seals	Flow Variation

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style (Maximum Regulated Flow)
21	Standard ('SS' Coil) 30 LPM (8 GPM)
21	High Flow ('SP' Coil) 36 LPM (9.5 GPM)

Code	Override Option
0	Not Required
5	Infinite Control M.O.

Code	Filter Screen
0	Not Available
1	60 Mesh Screen on Port 2

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30106N-1)**
V	Fluorocarbon / (SK30106V-1)

Code	Flow Variation
Omit	Standard up to ±20% of Rated Flow
L	Low Variation (±7% of Rated Flow)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
553	1/2" SAE
553	1/2" SAE

Code	Body Material
S	Steel (5000 PSI)
A	Aluminium (3000 PSI)

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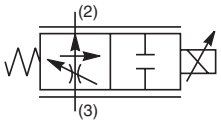
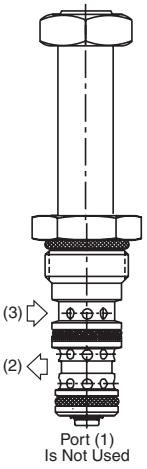
General Description

2 Way, Normally Open, Proportional Flow Regulator Valve. Pressure Compensated.
For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Nonmagnetic spool and housing assembly
- Factory-adjusted low variation option (Model "L") is available for applications where low variation of flow from valve to valve is essential at a given current.





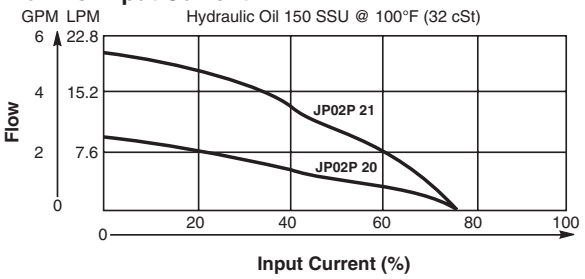
Specifications

Rated Flow	**20** 9.5 LPM (2.5 GPM) Standard ('SS' Coil) **21** 19 LPM (5 GPM) High Flow ('SP' Coil)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	**20** 6.9 Bar (150 PSI) Standard **21** 20.7 Bar (300 PSI) High Flow
Maximum Internal Leakage	570 cc (35 cu. in.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<3%
Cracking Pressure	25% of Input Signal
Variation of Flow @ 35% of Rated Current	**Standard Model** Up To ±20% Of Rated Flow **Model "L"** ±7% Of Rated Flow
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.08 kg (0.17 lbs.)
Cavity	C08-3 (See BC Section for more details)

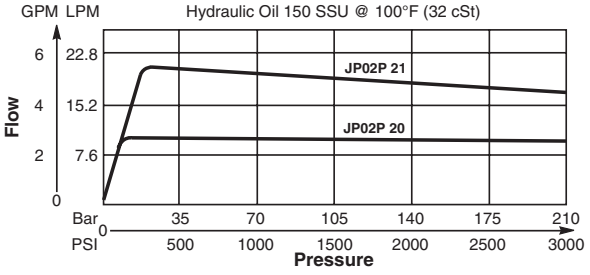
Performance Curves

▲PWM Current Regulator Recommended

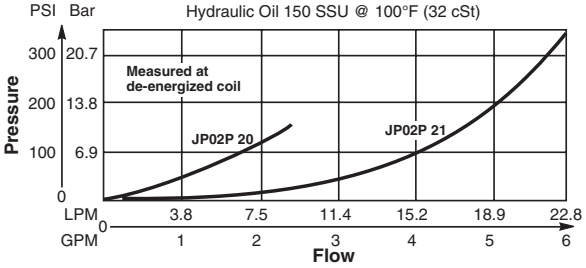
Flow vs. Input Current



Flow Regulation (Measured 75% of Rated Current)



Pressure Drop vs. Flow



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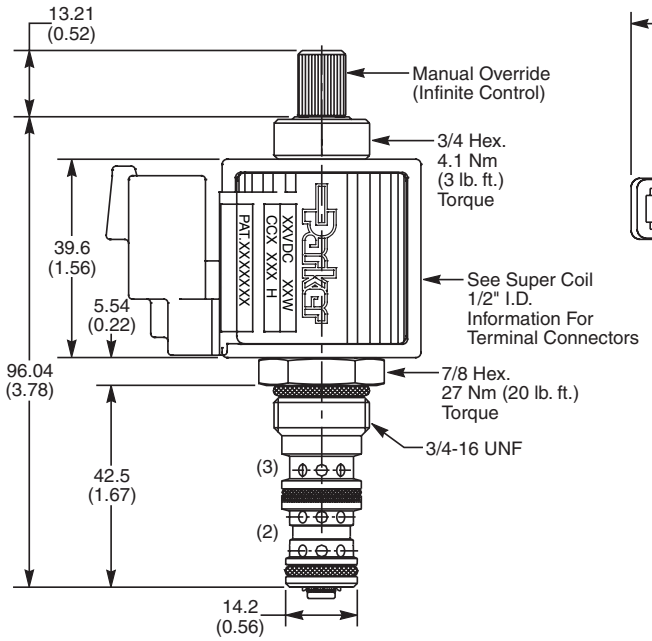
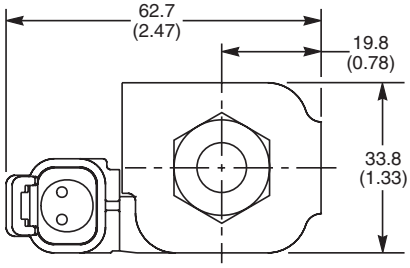
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

JP02P					
08 Size Proportional Valve	Style	Override Option	Filter Screen	Seals	Flow Variation

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style (Maximum Regulated Flow)
20	Standard ('SS' Coil) 9.5 LPM (2.5 GPM)
21	High Flow ('SP' Coil) 19 LPM (5 GPM)

Code	Override Option
0	Not Required
5	Infinite Control M.O.

Code	Filter Screen
0	Not Available
1	60 Mesh Screen on Port 2

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30105N-1)**
V	Fluorocarbon / (SK30105V-1)

Code	Flow Variation
Omit	Standard up to ±20% of Rated Flow
L	Low Variation (±7% of Rated Flow)

Order Bodies Separately
See section BC

B08	–	3	–	
08 size		3-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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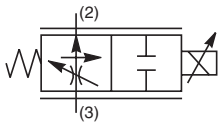
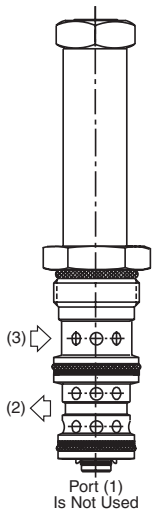
General Description

2 Way, Normally Open, Proportional Flow Regulator Valve. Pressure Compensated. For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Nonmagnetic spool and housing assembly
- Factory-adjusted low variation option (Model "L") is available for applications where low variation of flow from valve to valve is essential at a given current.





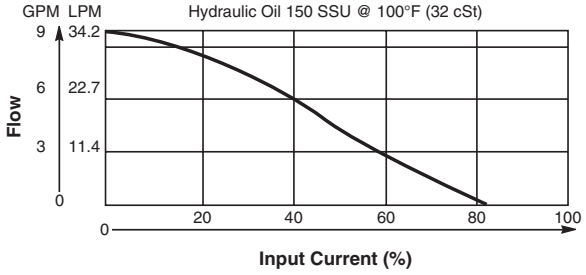
Specifications

Rated Flow	36 LPM (9.5 GPM) High Flow ('SP' Coil)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	14 Bar (200 PSI) High Flow
Maximum Internal Leakage	780 cc (46 cu. in.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	7%
Variation of Flow @ 35% of Rated Current	**Standard Model** Up To ±20% Of Rated Flow **Model "L"** ±7% Of Rated Flow
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.13 kg (0.28 lbs.)
Cavity	3X (See BC Section for more details)

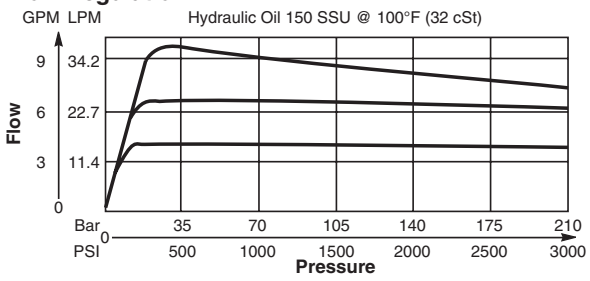
Performance Curves

▲PWM Current Regulator Recommended

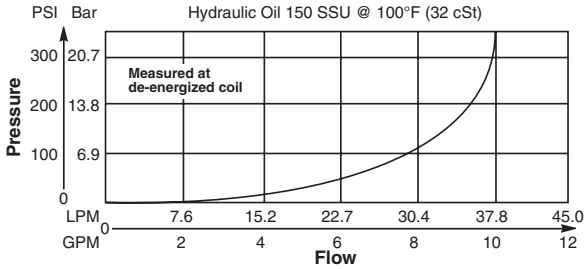
Flow vs. Input Current



Flow Regulation



Pressure Drop vs. Flow



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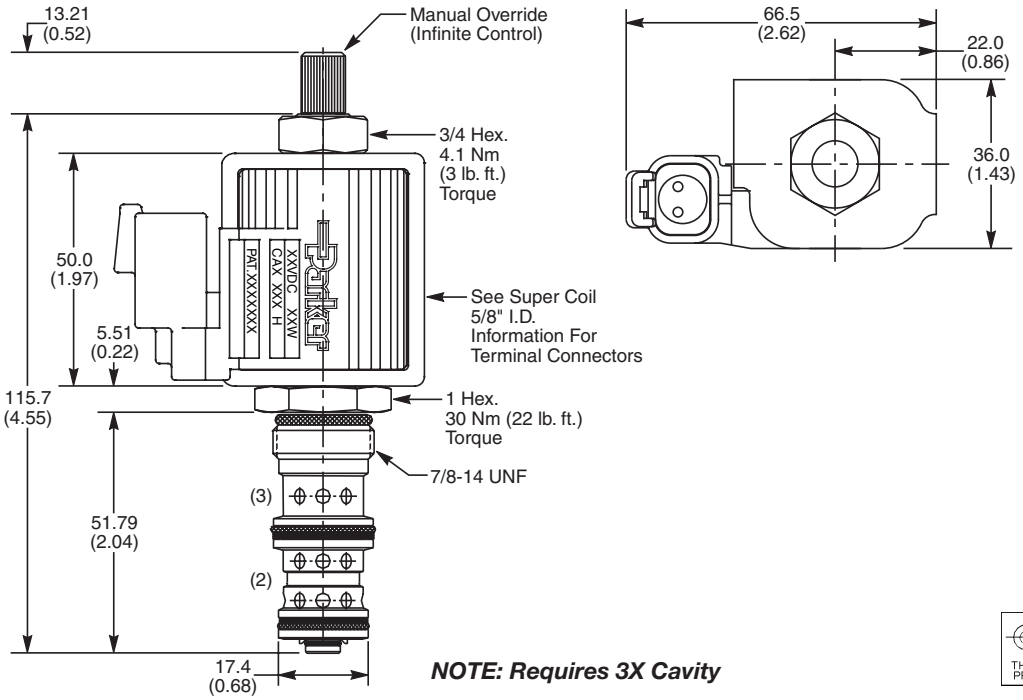
Dimensions Millimeters (Inches)



NOTE: Requires 3X Cavity

THIRD-ANGLE PROJECTION

Ordering Information

JP04P	21				
10 Size Proportional Valve	Style	Override Option	Filter Screen	Seals	Flow Variation

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style (Maximum Regulated Flow)
21	High Flow ('SP' Coil) 36 LPM (9.5 GPM)

Code	Override Option
0	Not Required
5	Infinite Control M.O.

Code	Filter Screen
0	Not Available
1	60 Mesh Screen on Port 2

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30106N-1)**
V	Fluorocarbon / (SK30106V-1)

Code	Flow Variation
Omit	Standard up to ±20% of Rated Flow
L	Low Variation (±7% of Rated Flow)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
553	1/2" SAE
553	1/2" SAE

Code	Body Material
S	Steel (5000 PSI)
A	Aluminium (3000 PSI)

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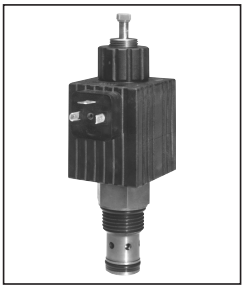
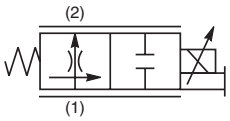
General Description

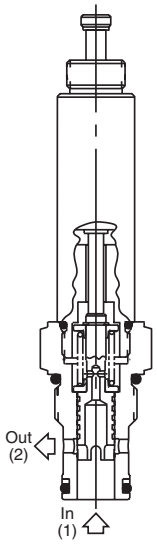
Normally Open Proportional Flow Control Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- On-off type solenoids
- Low hysteresis
- PWM signal preferred
- Manual override standard
- All external parts zinc plated





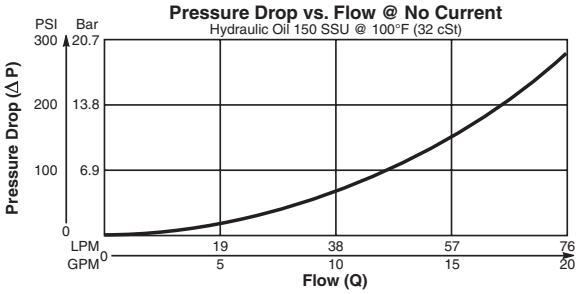


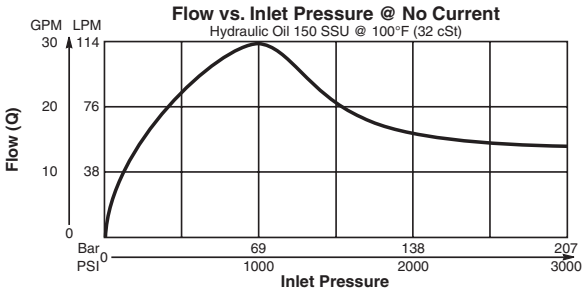
Specifications

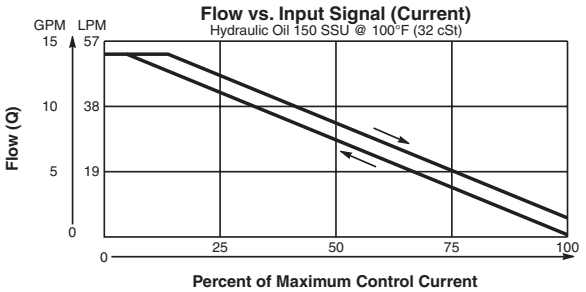
Rated Flow Valve Fully Open	53 LPM (14 GPM)
Maximum Inlet Pressure	210 Bar (3000 PSI)
Hysteresis @ 200 Hz PWM	4%
Frequency	100 - 400 Hz (200 Hz Preferred)
Maximum Control Current	**12 VDC** 3.53A **24 VDC** 1.79A
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.32 kg (0.7 lbs.)
Cavity	C12-2 (See BC Section for more details)
Form Tool	Rougher None Finisher NFT12-2F

Note: 4.1 Bar (60psi) is required at port 1 to fully return Manual override.

Performance Curves







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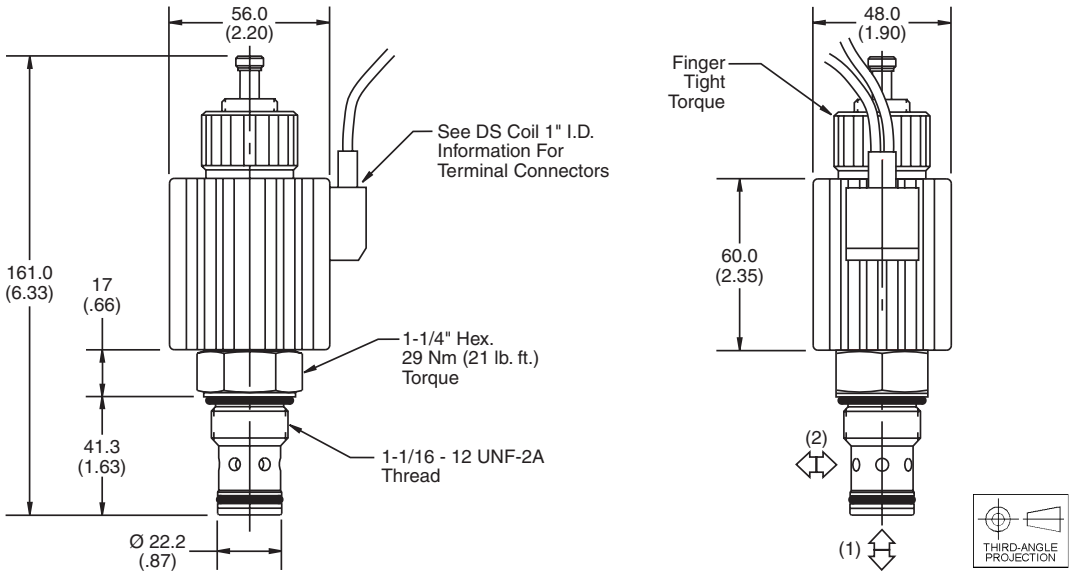
Dimensions Millimeters (Inches)



Ordering Information

DF122N14		
12 Size Normally Open Proportional Flow Control Valve	Override Options	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1" Coil (DS series), for ordering information.

Code	Override Options
Omit	Push Type with Extended Rod

Code	Seals / Kit No.
N	Nitrile / (SK12-2)
V	Fluorocarbon / (SK12-2V)

Order Bodies Separately
See section BC

B12	–	2	–	
12 size		2-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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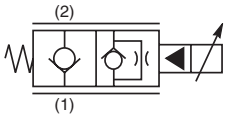
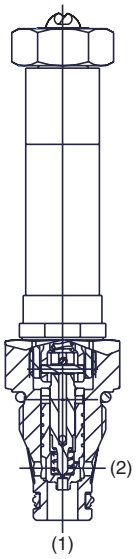
General Description

2 Way, Normally Closed, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





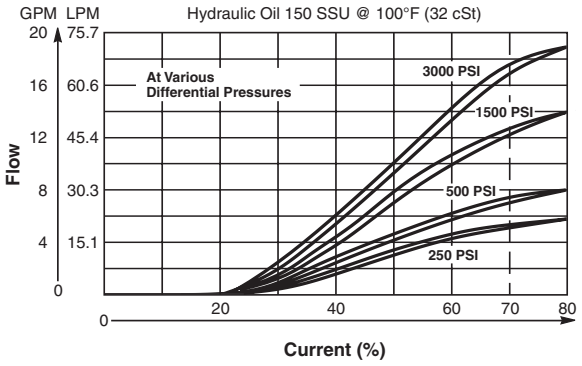
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

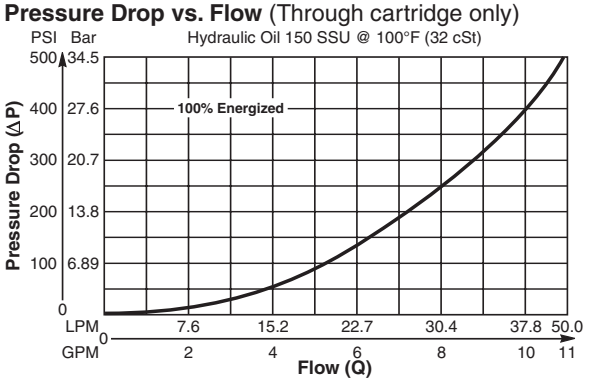
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	27 LPM (7 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.17 kg (0.38 lbs.)
Cavity	C08-2 (See BC Section for more details)

Performance Curves

Flow vs. Input Current



Pressure Drop vs. Flow (Through cartridge only)



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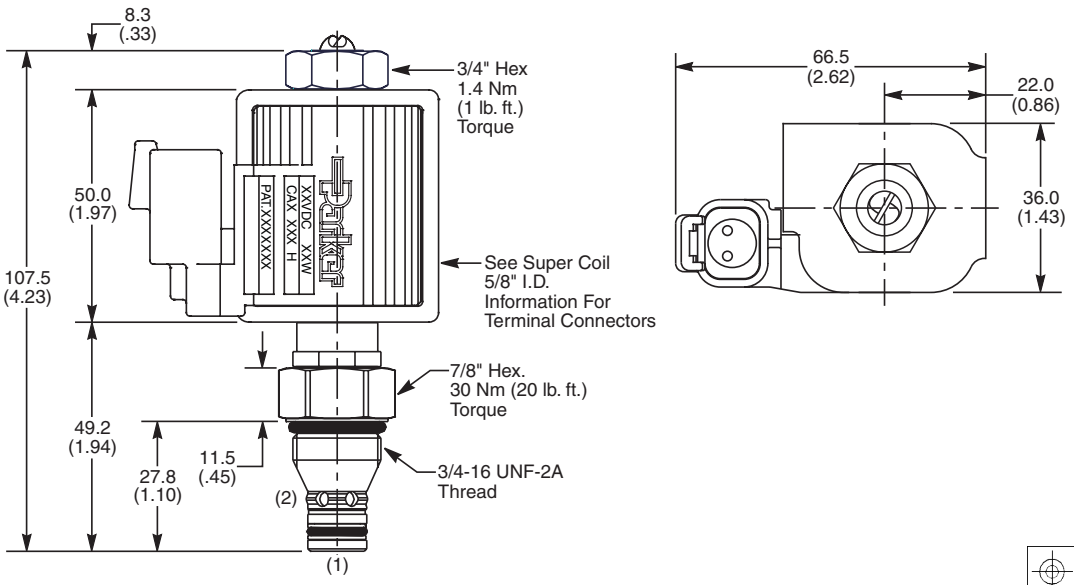
Dimensions Millimeters (Inches)



Ordering Information

FAP081	C	
08 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
C	Normally Closed

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-2)
N	Nitrile / Buna-N (SK08-2)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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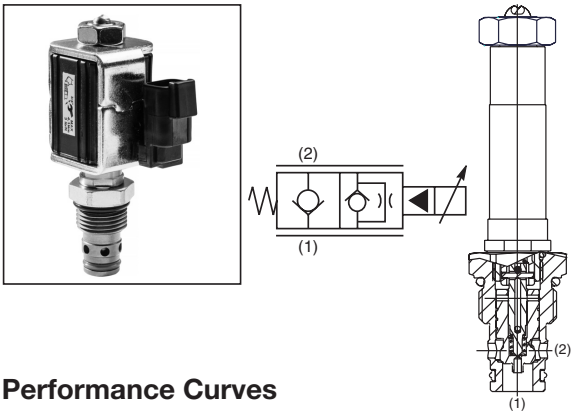
General Description

2 Way, Normally Closed, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity



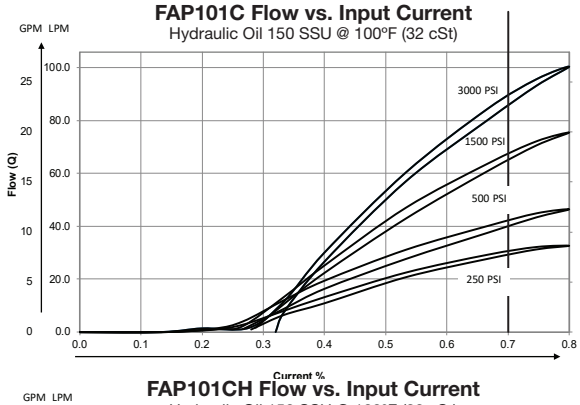
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

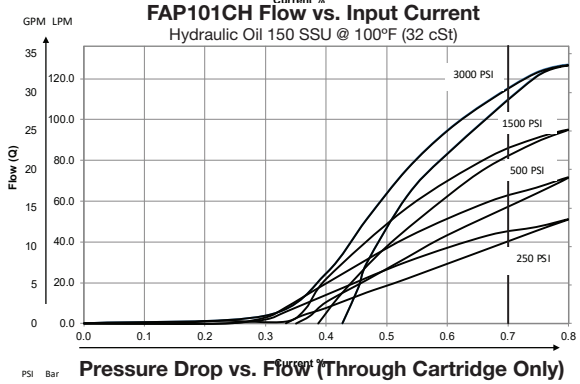
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	FAP101C 40 LPM (10.5 GPM) FAP101CH 45 LPM (13 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile Buna-N) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.19 kg (0.42 lbs.)
Cavity	C10-2 (See BC Section for more details)

Performance Curves

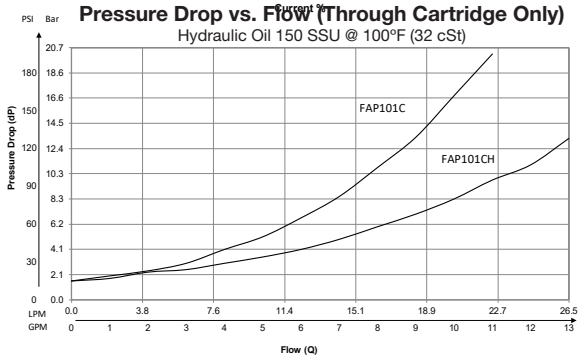
FAP101C Flow vs. Input Current
Hydraulic Oil 150 SSU @ 100°F (32 cSt)



FAP101CH Flow vs. Input Current
Hydraulic Oil 150 SSU @ 100°F (32 cSt)



Pressure Drop vs. Flow (Through Cartridge Only)
Hydraulic Oil 150 SSU @ 100°F (32 cSt)



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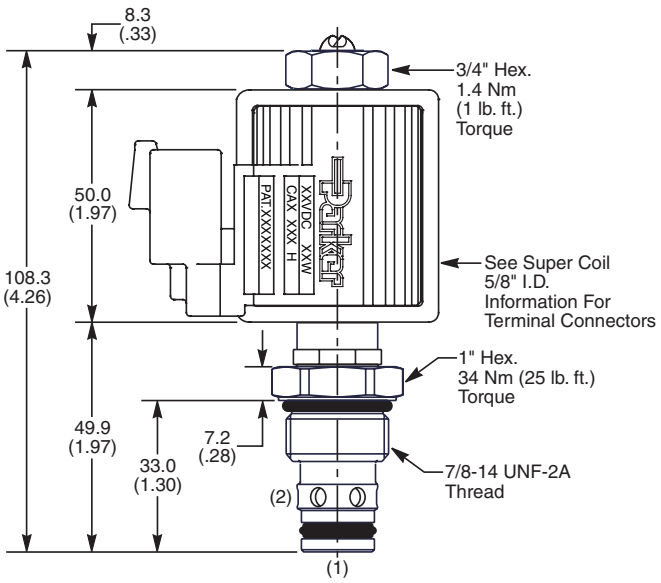
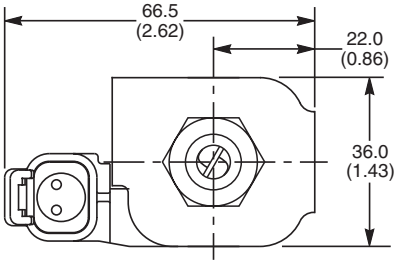
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

FAP101	C			
10 Size Proportional Valve	Style	Flow Option	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Style
C	Normally Closed

Code	Flow Option
Omit	Standard
H	High Flow

Code	Override Option
Omit	Standard
M	Screw Type

Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-2)
N	Nitrile / Buna-N (SK10-2)
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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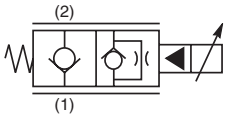
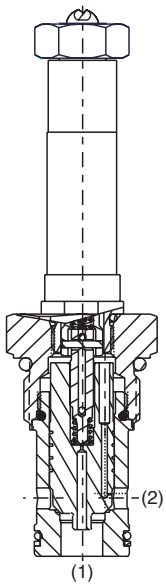
General Description

2 Way, Normally Closed, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





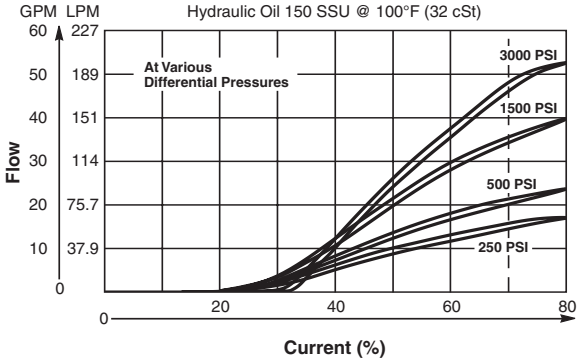
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

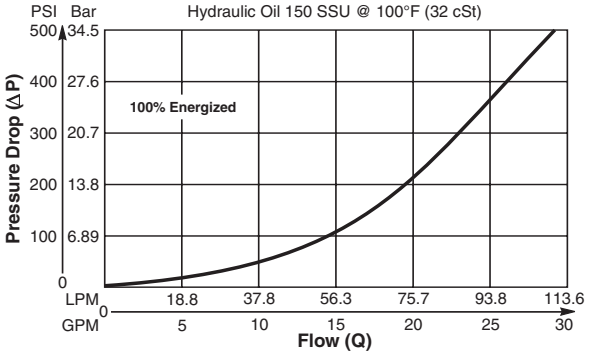
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	81.5 LPM (21.5 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.30 kg (0.65 lbs.)
Cavity	C12-2F (See BC Section for more details)

Performance Curves

Flow vs. Input Current



Pressure Drop vs. Flow (Through cartridge only)



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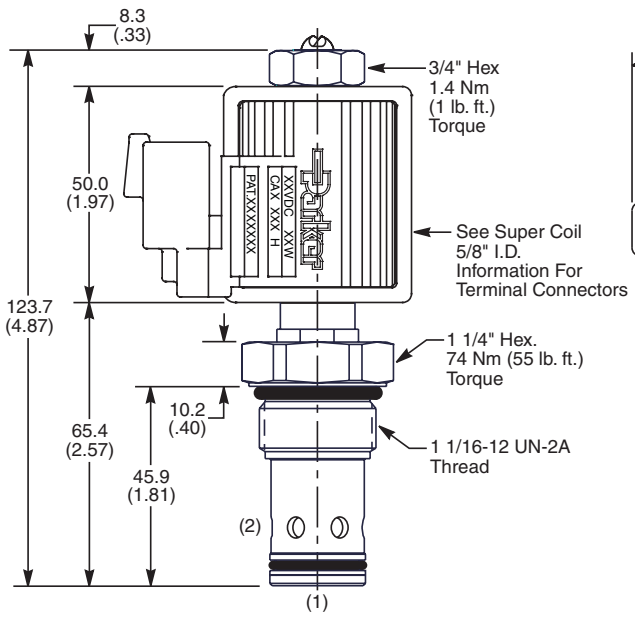
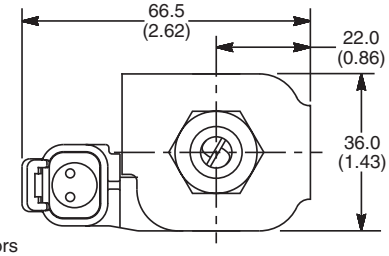
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

FAP121	C	
12 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
C	Normally Closed

Code	Seals / Kit No.
N	Nitrile / Buna-N (SK12-2)
V	Fluorocarbon / (SK12-2V)

Order Bodies Separately
See section BC

B12	–	2F	–	
12 size		2-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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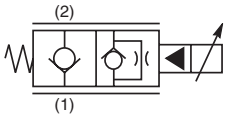
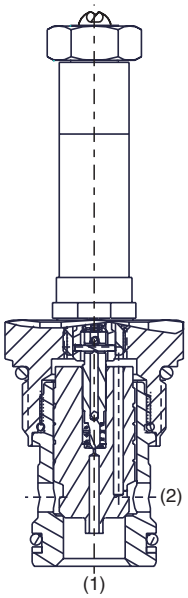
General Description

2 Way, Normally Closed, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





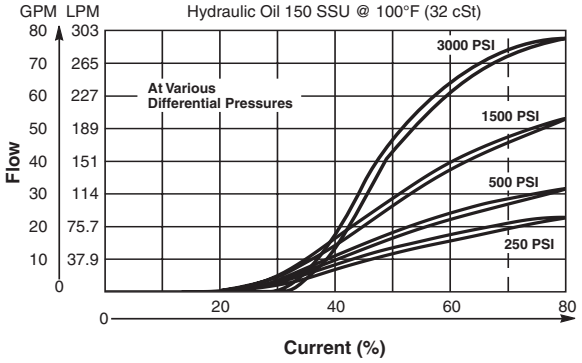
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

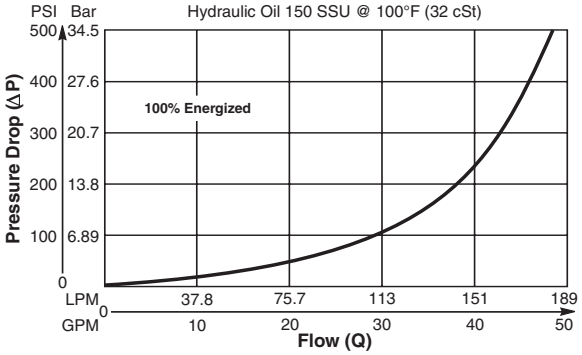
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	106 LPM (28 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.40 kg (0.88 lbs.)
Cavity	C16-2 (See BC Section for more details)

Performance Curves

Flow vs. Input Current



Pressure Drop vs. Flow (Through cartridge only)



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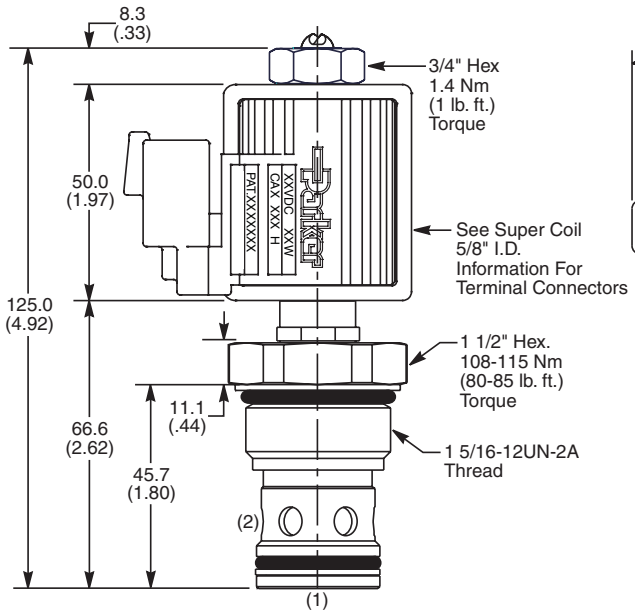
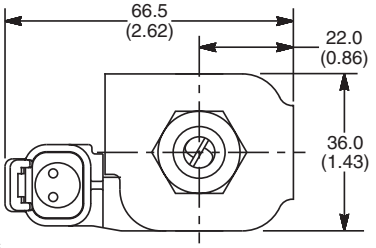
Dimensions Millimeters (Inches)





Ordering Information

FAP161	C	
16 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
C	Normally Closed

Code	Seals / Kit No.
N	Nitrile / Buna-N (SK16-2)
V	Fluorocarbon / (SK16-2V)

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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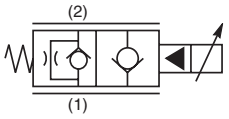
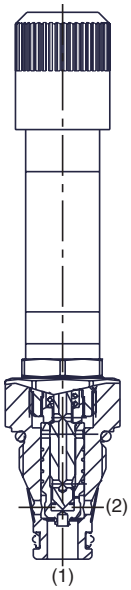
General Description

2 Way, Normally Open, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





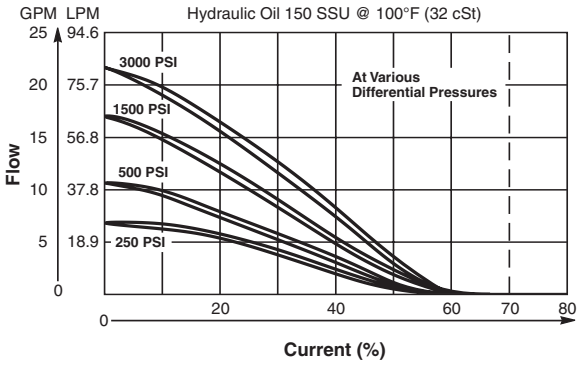
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

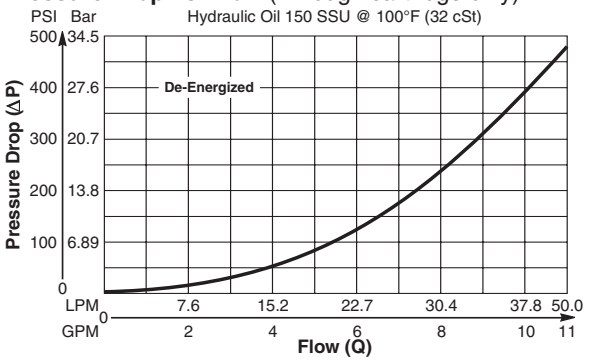
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	40 LPM (10.5 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.22 kg (0.48 lbs.)
Cavity	C08-2 (See BC Section for more details)

Performance Curves

Flow vs. Input Current



Pressure Drop vs. Flow (Through cartridge only)



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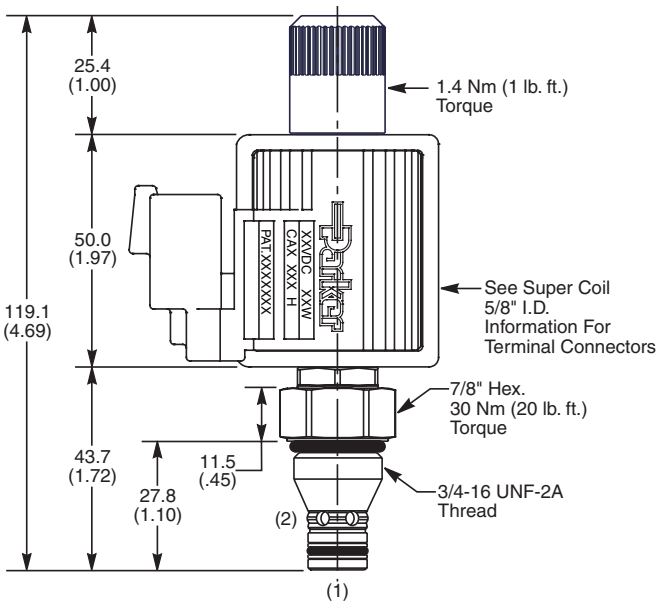
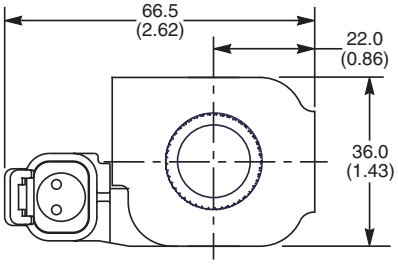
Dimensions Millimeters (Inches)





THIRD-ANGLE PROJECTION

Ordering Information

FAP081	N	
08 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
N	Normally Open

Code	Seals / Kit No.
Omit	"D"-Ring / (SK08-2)
N	Nitrile / Buna-N (SK08-2)
V	Fluorocarbon / (SK08-2V)

Order Bodies Separately
See section BC

B08	–	2	–	
08 size		2-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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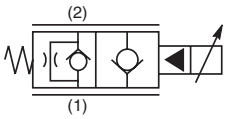
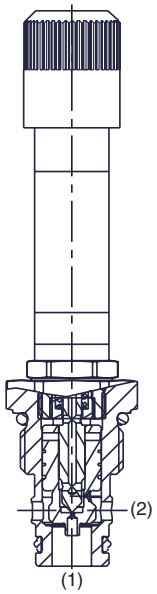
General Description

2 Way, Normally Open, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





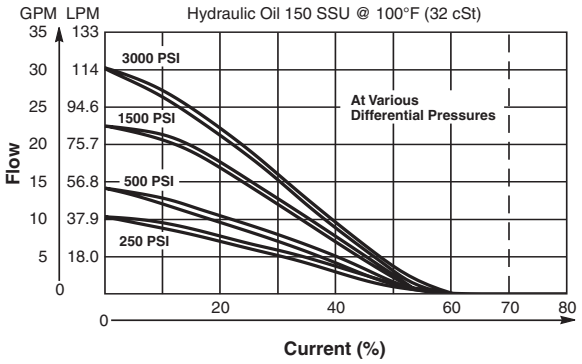
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

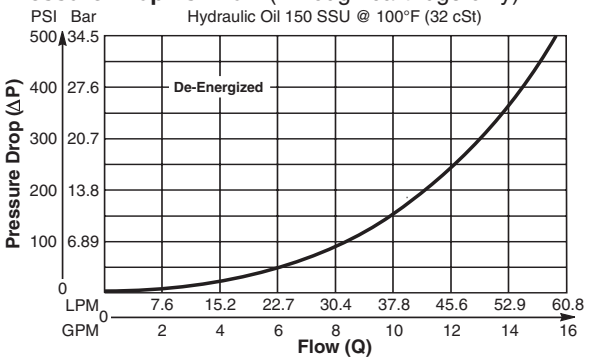
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	55 LPM (14.5 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.23 kg (0.52 lbs.)
Cavity	C10-2 (See BC Section for more details)

Performance Curves

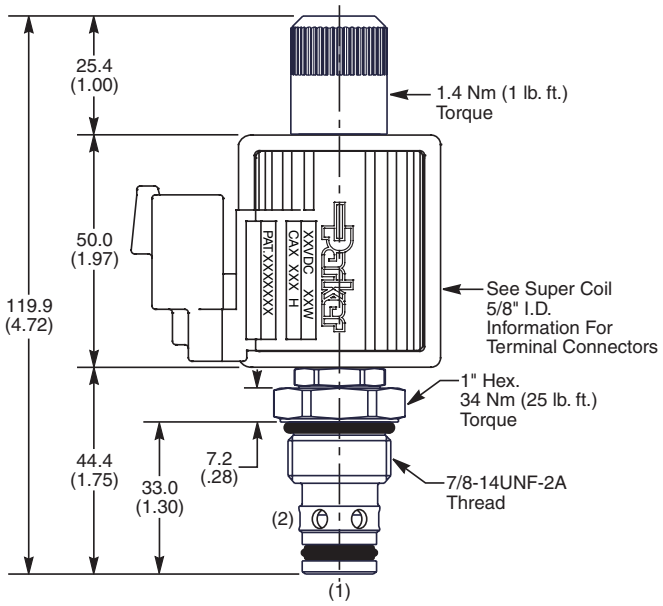
Flow vs. Input Current

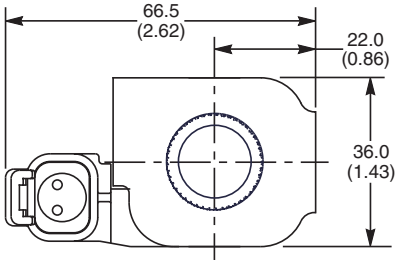


Pressure Drop vs. Flow (Through cartridge only)



Dimensions Millimeters (Inches)





Ordering Information

FAP101	N	
10 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
N	Normally Open

Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-2)
N	Nitrile / Buna-N (SK10-2)
V	Fluorocarbon / (SK10-2V)

Order Bodies Separately
See section BC

B10	–	2	–	
10 size		2-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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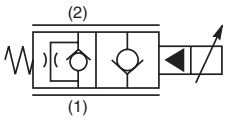
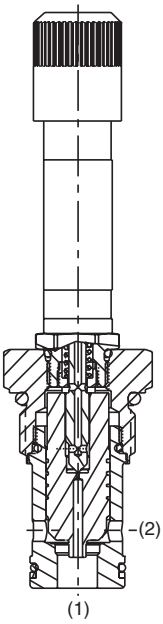
General Description

2 Way, Normally Open, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





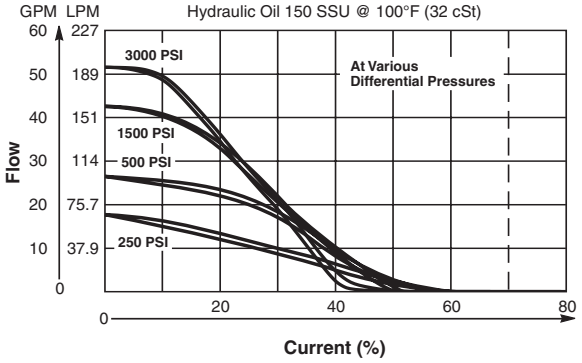
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

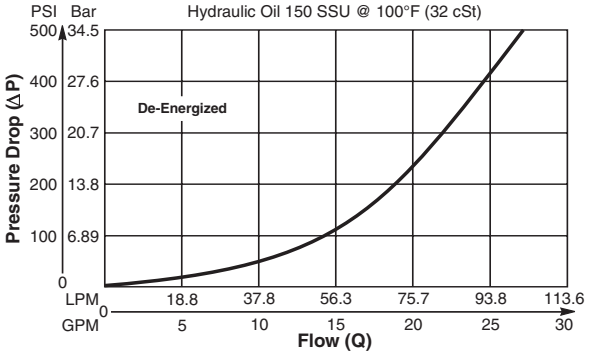
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	98.5 LPM (26 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.31 kg (0.68 lbs.)
Cavity	C12-2F (See BC Section for more details)

Performance Curves

Flow vs. Input Current



Pressure Drop vs. Flow (Through cartridge only)



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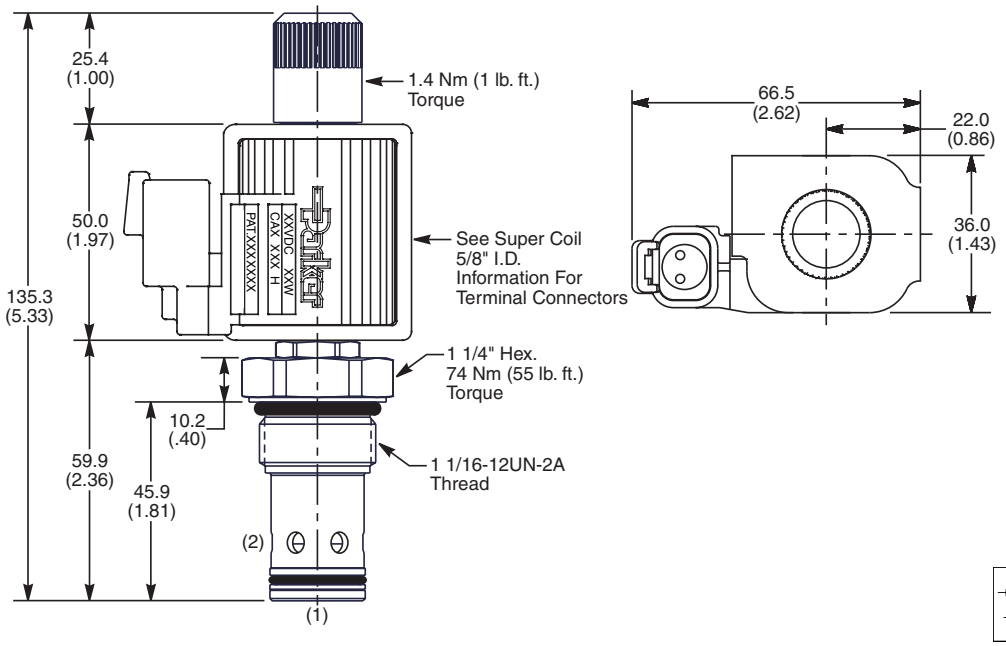
Dimensions Millimeters (Inches)



Ordering Information

FAP121	N	
12 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
N	**Normally Open**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK12-2)**
V	Fluorocarbon / (SK12-2V)

Order Bodies Separately
See section BC

B12	–	2F	–	
12 size		2-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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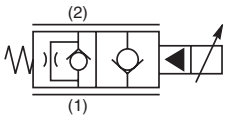
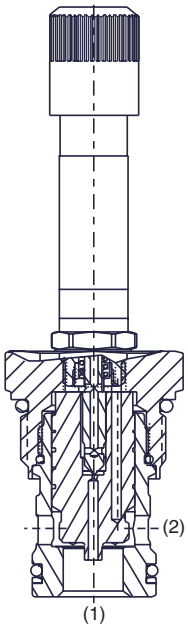
General Description

2 Way, Normally Open, Proportional Poppet Valve. For additional information see Technical Tips on pages PV1-PV5.

Features

- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





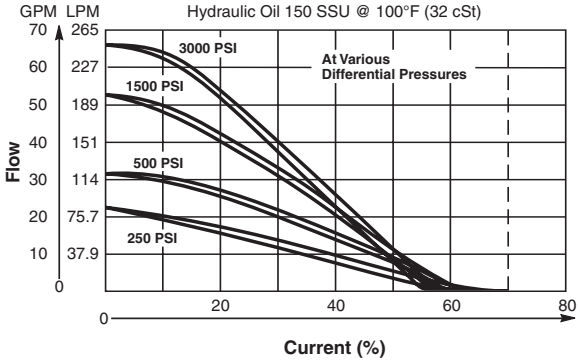
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

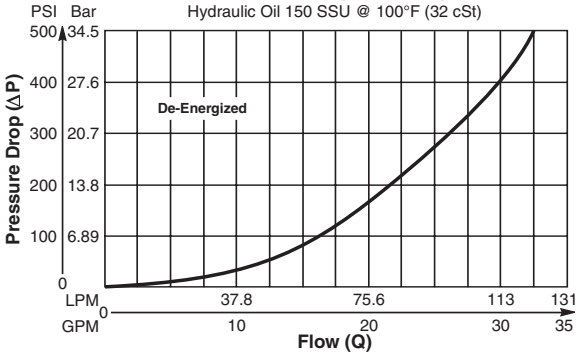
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	117 LPM (31 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	21 Bar (300 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<15% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.41 kg (0.90 lbs.)
Cavity	C16-2 (See BC Section for more details)

Performance Curves

Flow vs. Input Current



Pressure Drop vs. Flow (Through cartridge only)



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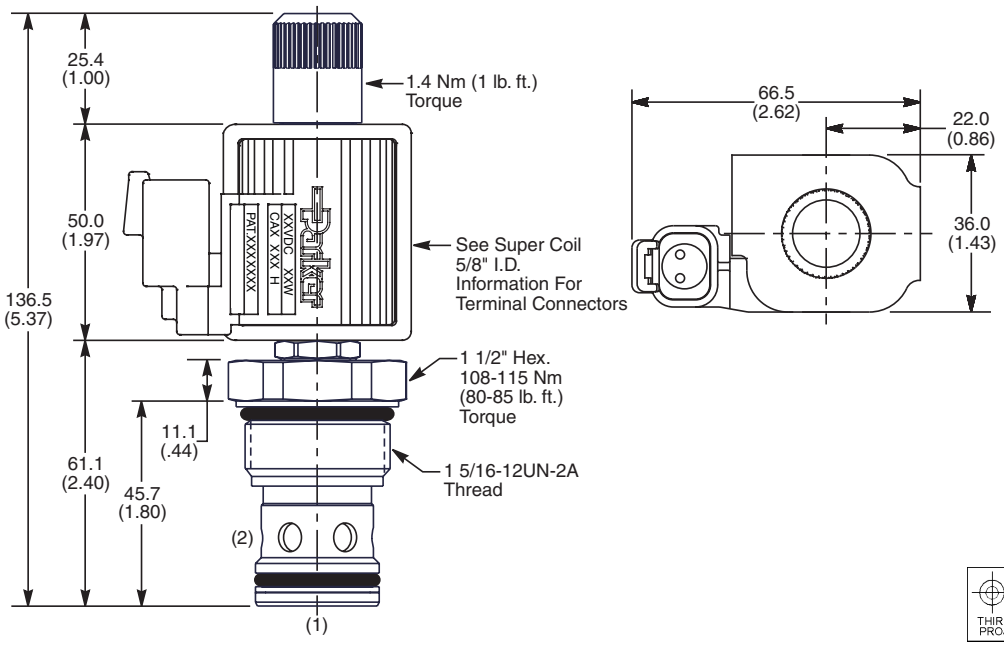
Dimensions Millimeters (Inches)



Ordering Information

FAP161	N	
16 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
N	**Normally Open**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK16-2)**
V	Fluorocarbon / (SK16-2V)

Order Bodies Separately
See section BC

B16	–	2	–	
16 size		2-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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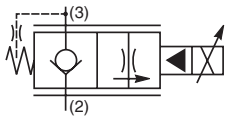
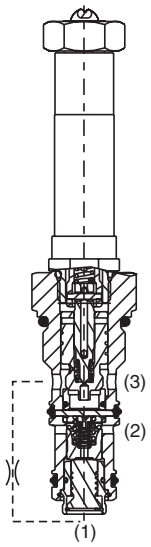
General Description

2 Way, Normally Closed, Proportional Poppet Valve with Pressure Compensation. For additional information see Technical Tips on pages PV1-PV5.

Features

- Low leakage poppet design with no dynamic seal to wear out on the compensator
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- External surfaces plated
- Excellent low flow metering capability





***Note:** Always connect Port (3) to Port (1) through .031" orifice. For FAPC101 only.*

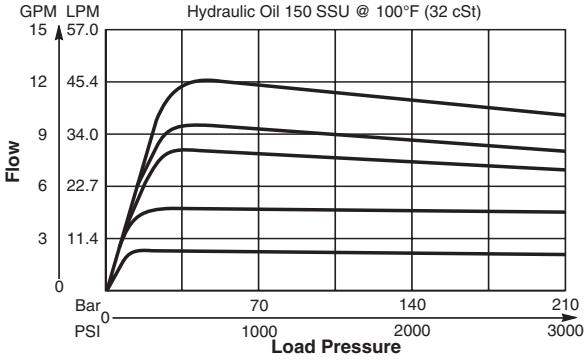
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

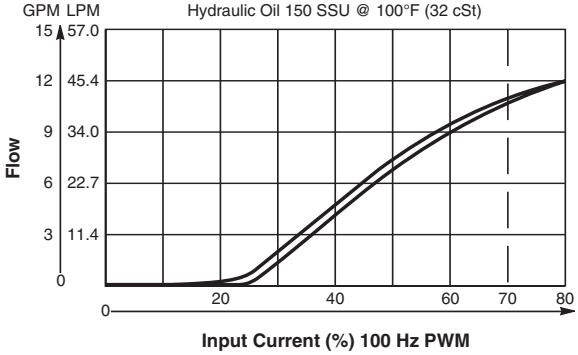
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	38 LPM (10 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	34 Bar (500 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<10% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.24 kg (0.52 lbs.)
Cavity	3X (See BC Section for more details)

Performance Curves

Pressure Compensation of Regulated Flow



Flow vs. Input Current



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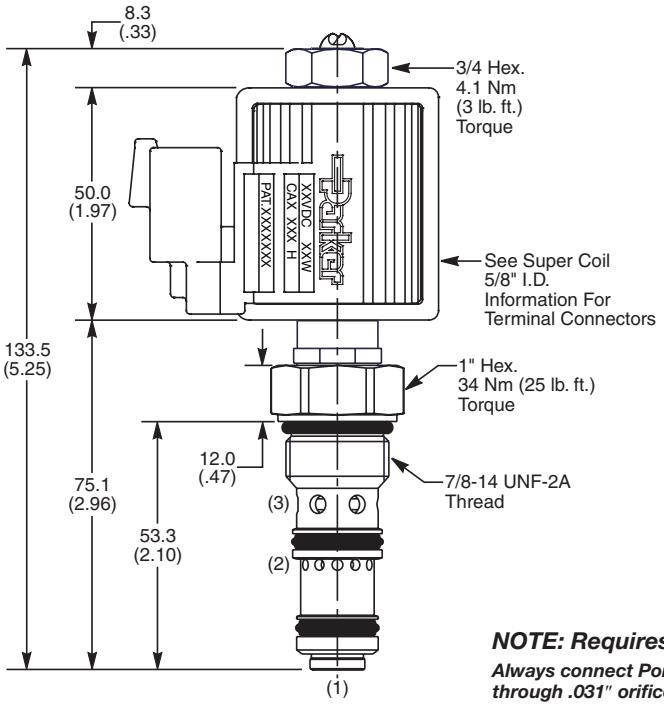
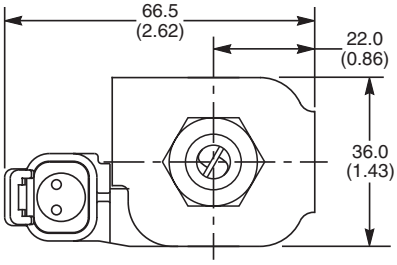
Dimensions Millimeters (Inches)





NOTE: Requires 3X Cavity
Always connect Port (3) to Port (1) through .031" orifice.

THIRD-ANGLE PROJECTION

Ordering Information

FAPC101	C	
10 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
C	Normally Closed

Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-2S)
N	Nitrile / Buna-N (SK10-2XN)
V	Fluorocarbon / (SK10-2SV)

Order Bodies Separately
See section BC

B10	–	3X	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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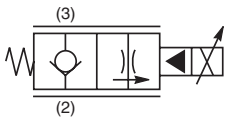
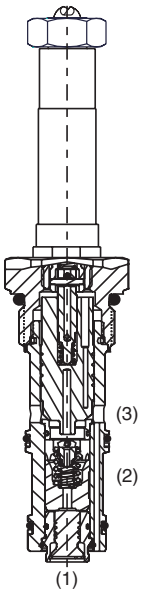
General Description

2 Way, Normally Closed, Proportional Poppet Valve with Pressure Compensation. For additional information see Technical Tips on pages PV1-PV5.

Features

- Low leakage poppet design with no dynamic seal to wear out on the compensator
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- External surfaces plated
- Excellent low flow metering capability





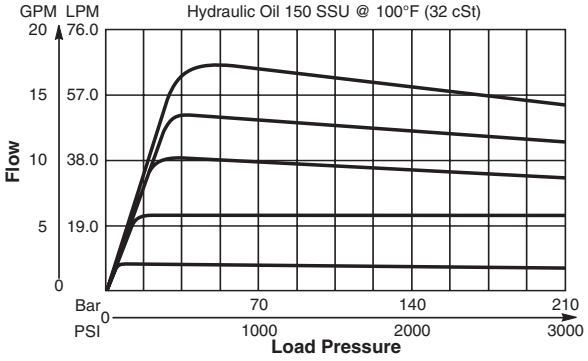
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

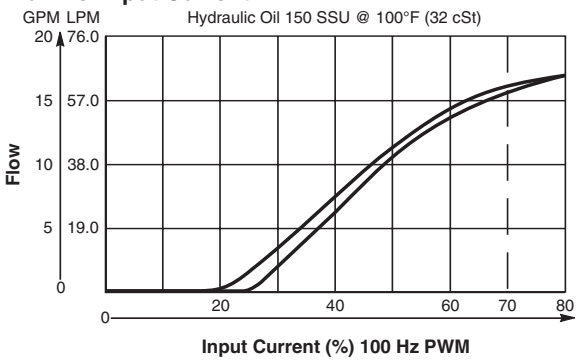
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	57 LPM (15 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	34 Bar (500 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<10% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.36 kg (0.79 lbs.)
Cavity	C12-3L (See BC Section for more details)

Performance Curves

Pressure Compensation of Regulated Flow



Flow vs. Input Current



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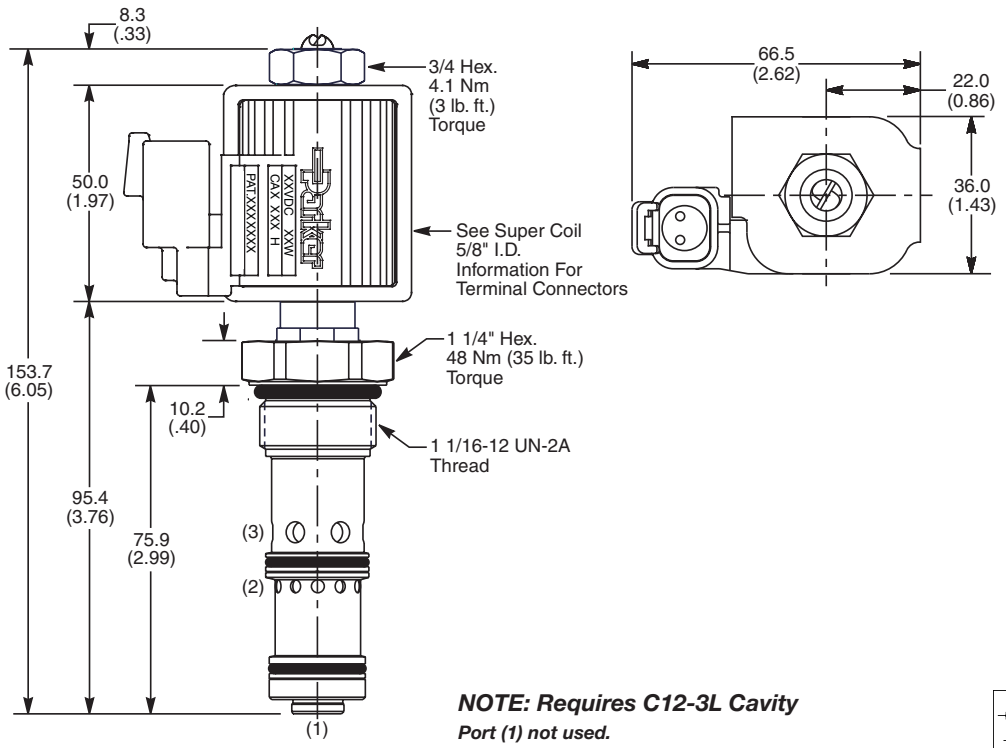
Dimensions Millimeters (Inches)



NOTE: Requires C12-3L Cavity
Port (1) not used.

THIRD-ANGLE PROJECTION

Ordering Information

FAPC121	C	
12 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
C	**Normally Closed**

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK12-3LN)**
V	Fluorocarbon / (SK12-2LV)

Order Bodies Separately
See section BC

B12	–	3L	–	
12 size		3-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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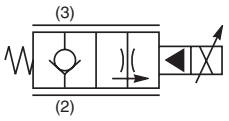
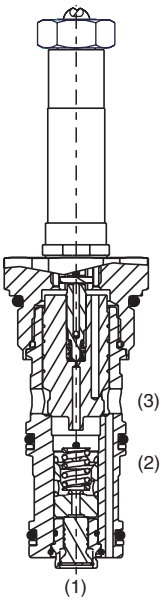
General Description

2 Way, Normally Closed, Proportional Poppet Valve with Pressure Compensation. For additional information see Technical Tips on pages PV1-PV5.

Features

- Low leakage poppet design with no dynamic seal to wear out on the compensator
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





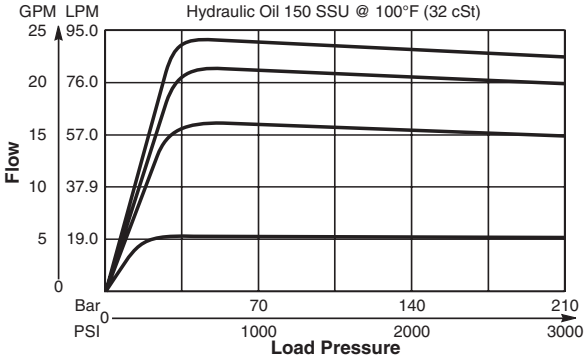
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

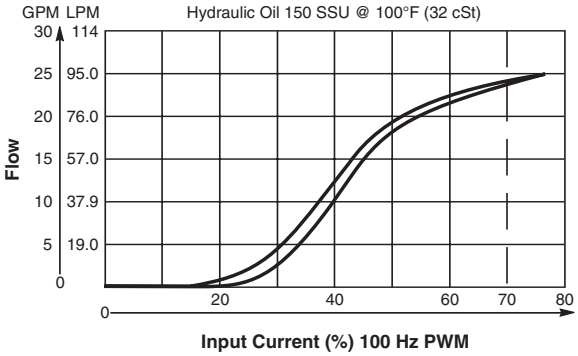
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	83 LPM (22 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	34 Bar (500 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<10% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.48 kg (1.08 lbs.)
Cavity	C16-3 (See BC Section for more details)

Performance Curves

Pressure Compensation of Regulated Flow



Flow vs. Input Current



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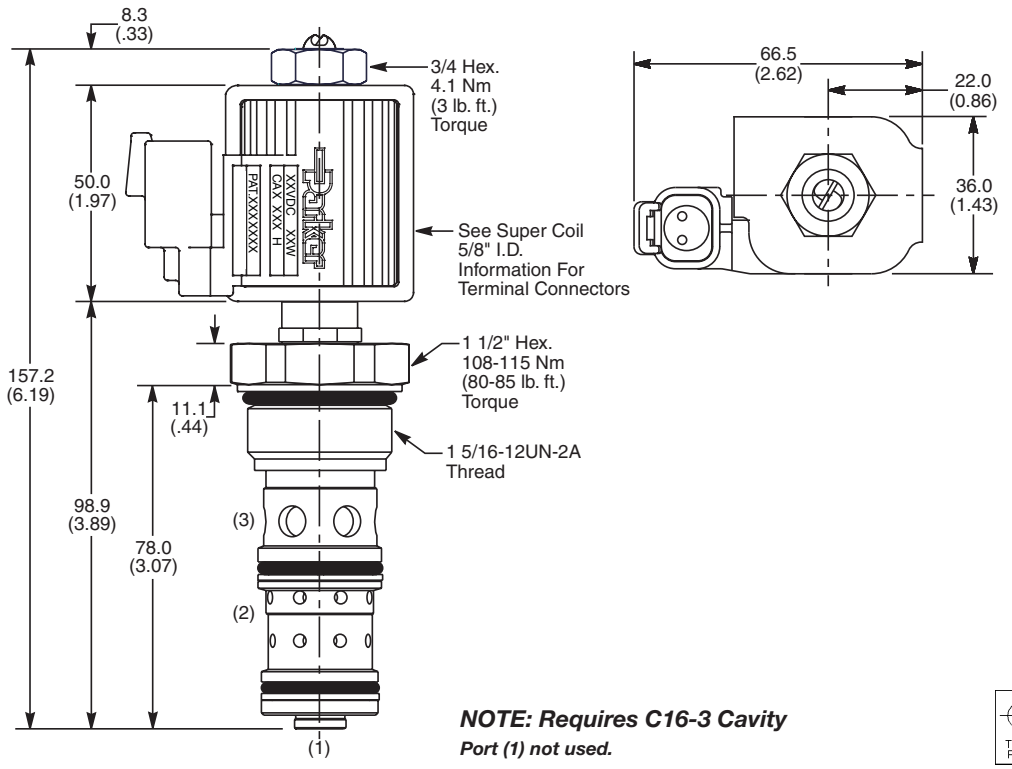
Dimensions Millimeters (Inches)



NOTE: Requires C16-3 Cavity
Port (1) not used.

Ordering Information

FAPC161	C	
16 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
C	Normally Closed

Code	Seals / Kit No.
N	Nitrile / Buna-N (SK16-3)
V	Fluorocarbon / (SK16-3V)

Order Bodies Separately
See section BC

B16	–	3	–	
16 size		3-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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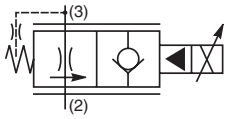
General Description

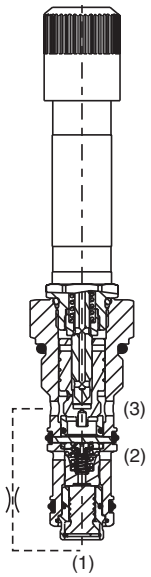
2 Way, Normally Open, Proportional Poppet Valve with Pressure Compensation. For additional information see Technical Tips on pages PV1-PV5.

Features

- Low leakage poppet design with no dynamic seal to wear out on the compensator
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- External surfaces plated
- Excellent low flow metering capability



Note: *Always connect Port (3) to Port (1) through .031" orifice. For FAPC101 only.*



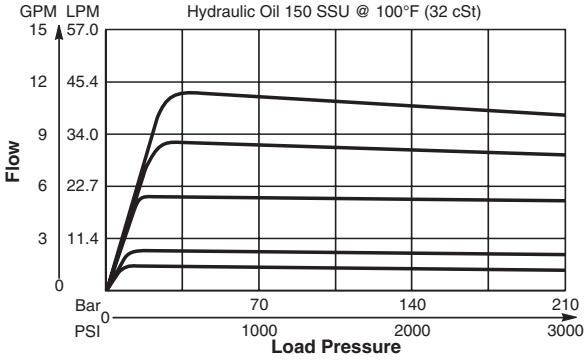
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

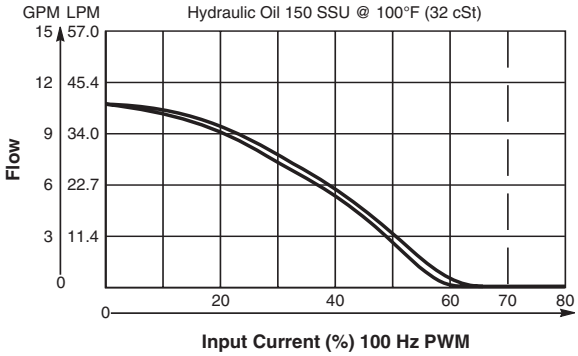
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	38 LPM (10 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	34 Bar (500 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<10% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.24 kg (0.53 lbs.)
Cavity	3X (See BC Section for more details)

Performance Curves

Pressure Compensation of Regulated Flow



Flow vs. Input Current



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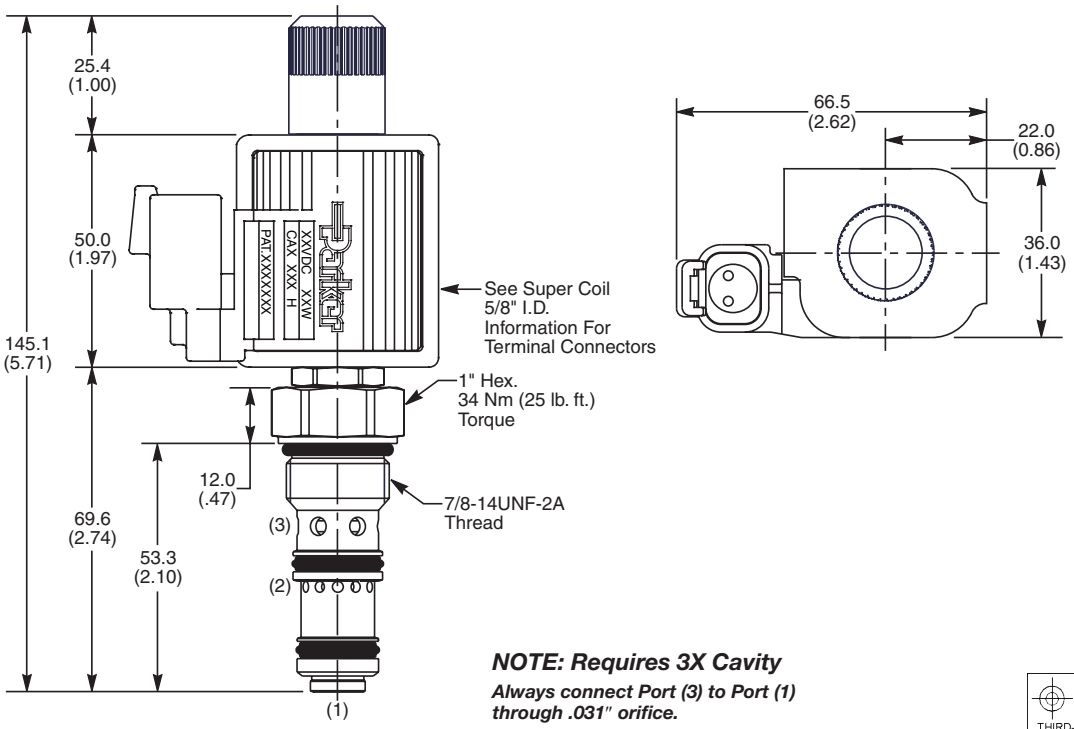
Dimensions Millimeters (Inches)



NOTE: Requires 3X Cavity

Always connect Port (3) to Port (1) through .031" orifice.

Ordering Information

FAPC101	N	
10 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
N	Normally Open

Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-3S)
N	Nitrile / Buna-N (SK10-3XN)
V	Fluorocarbon / (SK10-3SV)

Order Bodies Separately
See section BC

B10	–	3X	–	
10 size		3-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-8 / Steel (5000 PSI)
A8T	SAE-8 / Aluminium (3000 PSI)

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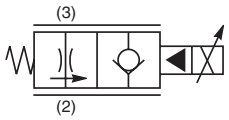
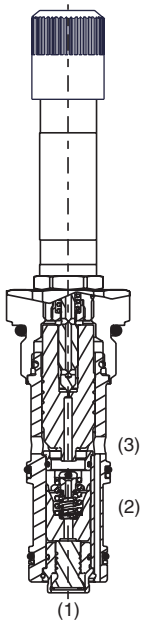
General Description

2 Way, Normally Open, Proportional Poppet Valve with Pressure Compensation. For additional information see Technical Tips on pages PV1-PV5.

Features

- Low leakage poppet design with no dynamic seal to wear out on the compensator
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- External surfaces plated
- Excellent low flow metering capability





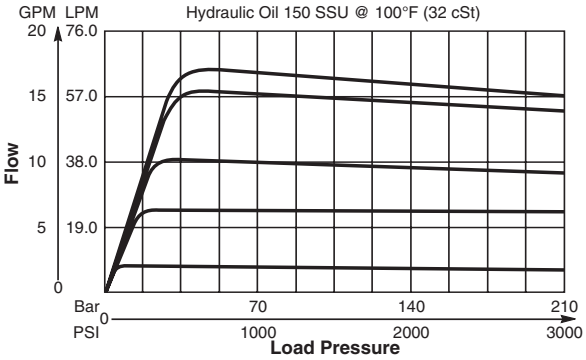
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

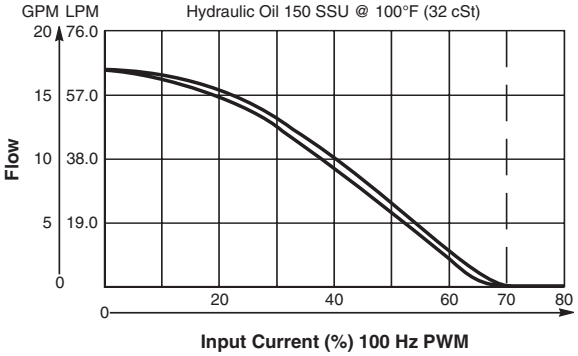
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	57 LPM (15 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	34 Bar (500 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<10% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.36 kg (0.79 lbs.)
Cavity	C12-3L (See BC Section for more details)

Performance Curves

Pressure Compensation of Regulated Flow



Flow vs. Input Current



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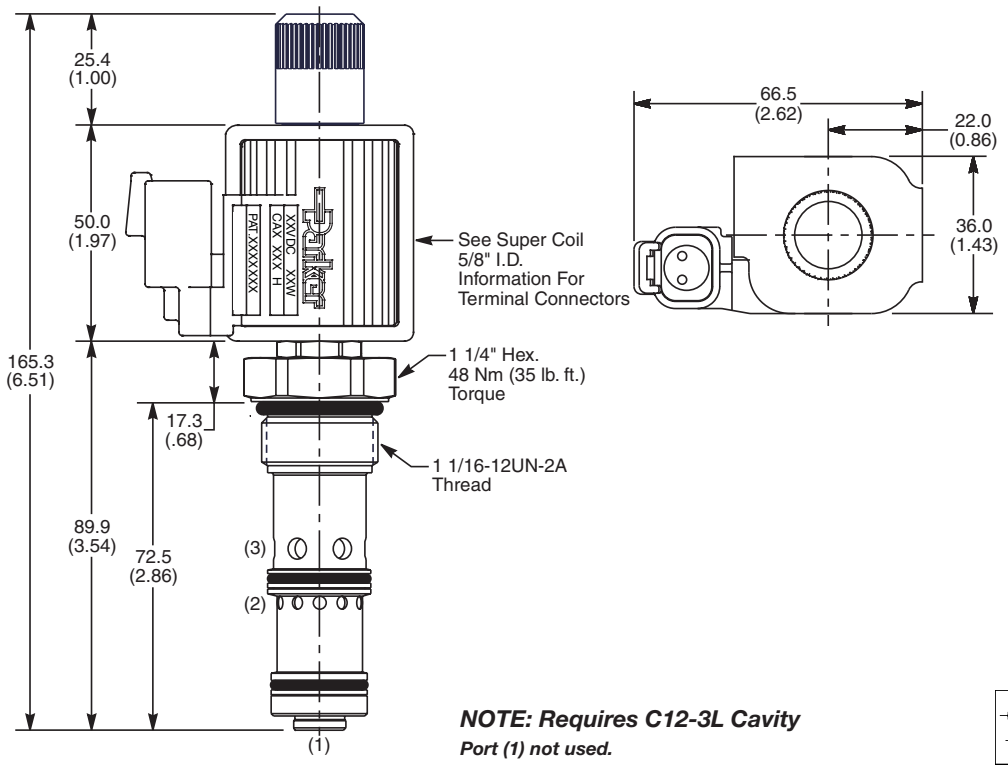
Dimensions Millimeters (Inches)



NOTE: Requires C12-3L Cavity
Port (1) not used.

THIRD-ANGLE PROJECTION

Ordering Information

FAPC121	N	
12 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
N	Normally Open

Code	Seals / Kit No.
N	Nitrile / Buna-N (SK12-3LN)
V	Fluorocarbon / (SK12-3LV)

Order Bodies Separately
See section BC

B12	–	3L	–	
12 size		3-Way Cavity		Port Size

Code	Porting / Body Material
12T	SAE-12 / Steel (5000 PSI)
A12T	SAE-12 / Aluminium (3000 PSI)

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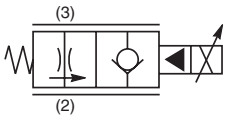
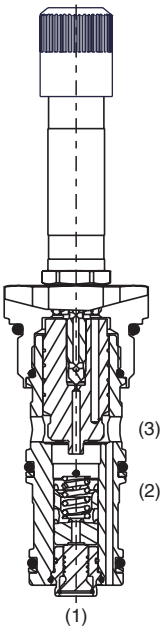
General Description

2 Way, Normally Open, Proportional Poppet Valve with Pressure Compensation. For additional information see Technical Tips on pages PV1-PV5.

Features

- Low leakage poppet design with no dynamic seal to wear out on the compensator
- Adjusted at factory for low variation
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Industry common cavity
- External surfaces plated
- Excellent low flow metering capability





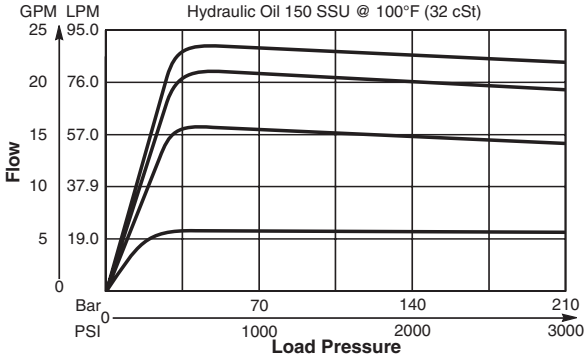
Specifications

All performance data with CAS coil.
Maximum current, 70% recommended.
Hydraulic oil 150 SSU @ 40°C (32 cSt)

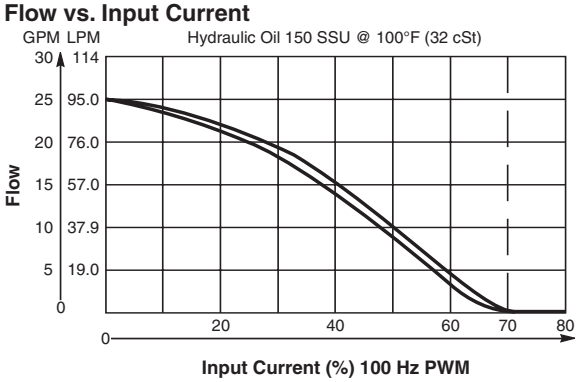
Rated Flow @ 70% of Full Current at ΔP 34.5 Bar (500 PSI)	83 LPM (22 GPM)
Maximum Input Pressure at Port 2	210 Bar (3000 PSI)
Minimum Pressure Differential	34 Bar (500 PSI)
Maximum Internal Leakage	5 drops/min. (.33 cc/min.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<10% NOTE: Current regulated PWM recommended
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.49 kg (1.09 lbs.)
Cavity	C16-3 (See BC Section for more details)

Performance Curves

Pressure Compensation of Regulated Flow



Flow vs. Input Current



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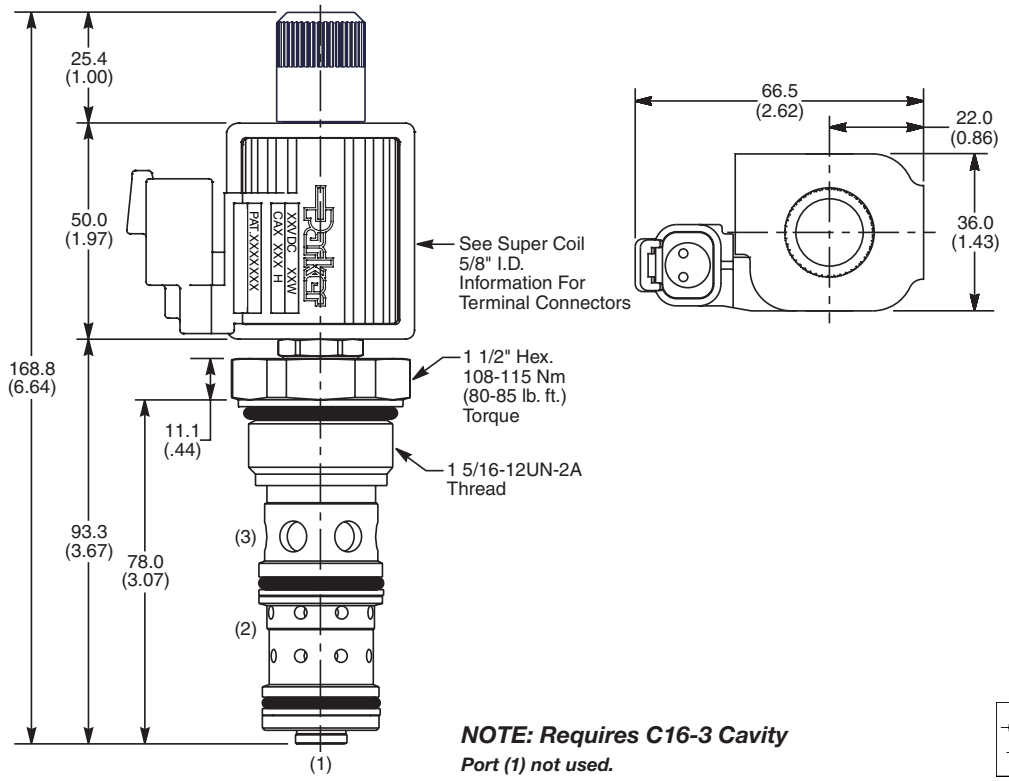
Dimensions Millimeters (Inches)



NOTE: Requires C16-3 Cavity
Port (1) not used.

Ordering Information

FAPC161	N	
16 Size Proportional Valve	Style	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Override Options
N	Normally Open

Code	Seals / Kit No.
N	Nitrile / Buna-N (SK16-3)
V	Fluorocarbon / (SK16-3V)

Order Bodies Separately
See section BC

B16	–	3	–	
16 size		3-Way Cavity		Port Size

Code	Porting / Body Material
16T	SAE-16 / Steel (5000 PSI)
A16T	SAE-16 / Aluminium (3000 PSI)

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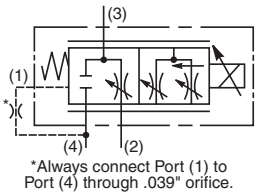
General Description

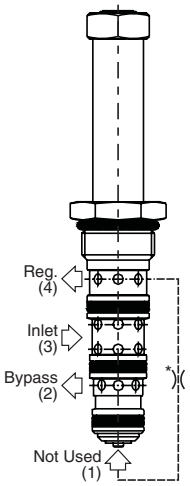
3 Way, Normally Closed, Proportional Flow Regulator Valve. Pressure Compensated. For additional information see Technical Tips on pages PV1-PV5.

Features

- Analog proportional pressure compensated flow control valve regulates flow proportionally to the input solenoid current
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- Nonmagnetic spool and housing assembly
- Factory-adjusted low variation option (Model "L") is available for applications where low variation of flow from valve to valve is essential at a given current.



*Always connect Port (1) to Port (4) through .039" orifice.



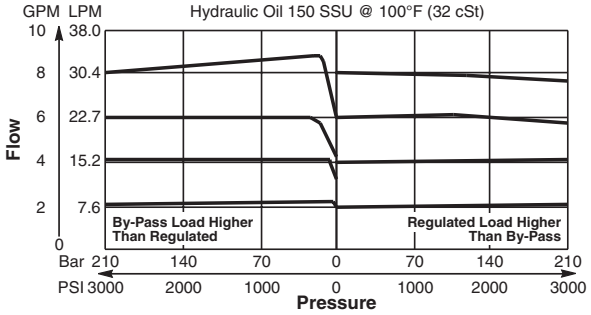
Specifications

Rated Inlet Flow	60 LPM (16 GPM)
Rated Regulated Flow	**31** 26 LPM (7 GPM) Standard ('SS' Coil) **31** 30 LPM (8 GPM) High Flow ('SP' Coil)
Maximum Input Pressure at Port 3	210 Bar (3000 PSI)
Minimum Pressure Differential	**31** 13.8 Bar (200 PSI) Standard **31** 20.7 Bar (300 PSI) High Flow
Maximum Internal Leakage	780 cc (46 cu. in.) @ 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	7%
Opening Point	**Standard** 21% of Nominal Amperage **High Flow** 17% of Nominal Amperage
Variation of Opening Point	**Standard Model** Up To ±50% of Amperage **Model "L"** ±20% of Amperage
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.14 kg (0.31 lbs.)
Cavity	4C (See BC Section for more details)

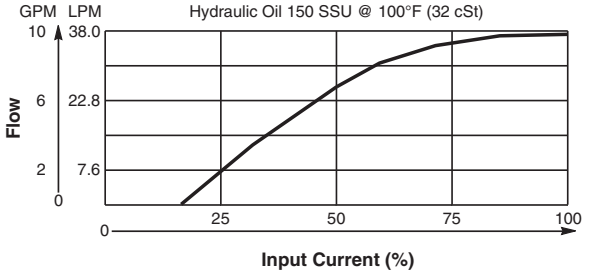
Performance Curves

▲PWM Current Regulator Recommended

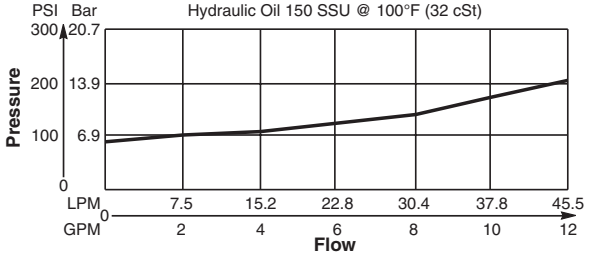
Pressure Compensation of Regulated Flow (Port 4)



Regulated Flow vs. Input Current Stabilized



Pressure Drop vs. Flow at Coil Fully Energized



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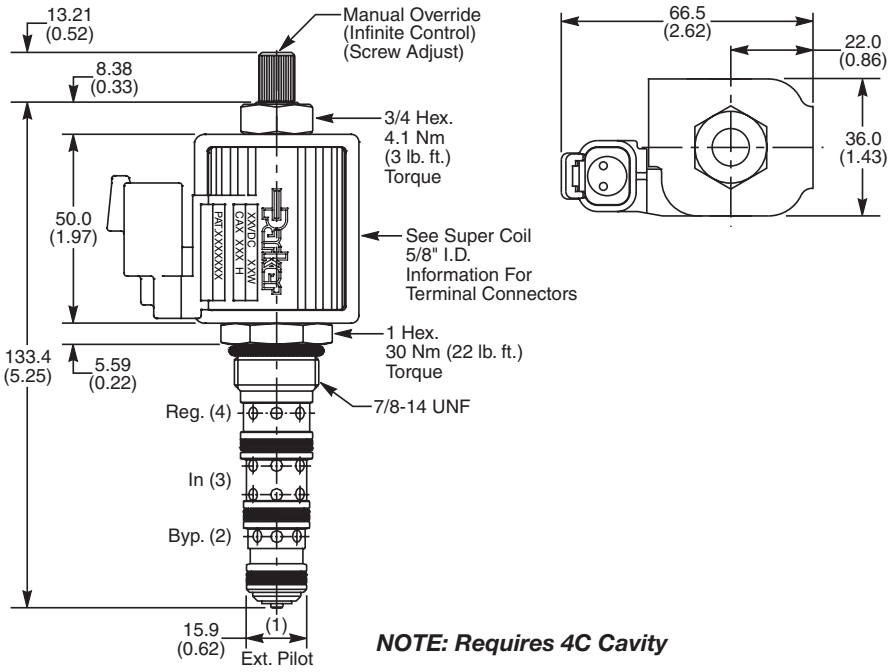
Dimensions Millimeters (Inches)



NOTE: Requires 4C Cavity

THIRD-ANGLE PROJECTION

Ordering Information

JP04C	31				
10 Size Proportional Valve	Style	Override Option	Filter Screen	Seals	Flow Variation

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Super-Coil (CA series), for ordering information.

Code	Style (Maximum Regulated Flow)
31	Standard ('SS' Coil) 26 LPM (7 GPM)
31	High Flow ('SP' Coil) 30 LPM (8 GPM)

Code	Override Option
0	Not Required
5	Screw Adjust (Infinite Control)

Code	Filter Screen
0	Not Available

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30082N-1)**
V	Fluorocarbon / (SK30082V-1)

Code	Flow Variation
Omit	Standard up to ±20% of Rated Flow
L	Low Variation (±7% of Rated Flow)

Order Bodies Separately
See section BC

LB10		
Line Body	Porting	Body Material

Code	Porting
562	1/2" SAE Steel (5000 PSI)
562A	1/2" SAE Aluminium (3000 PSI)

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General Description

4 Way, 3 Position, Proportional Directional Control Valve. Closed Center Spool. For additional information see Technical Tips on pages PV1-PV5.

Features

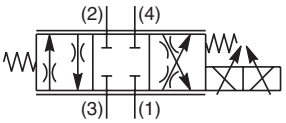
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.

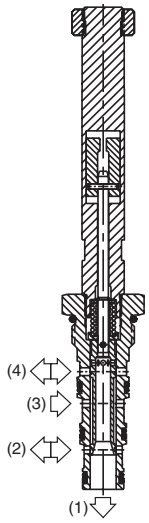
Specifications

Operating Pressure	**Ports 2, 3 and 4** 350 Bar (5000 PSI) **Port 1** 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<6%
Cracking Flow	25% to 30% of Input Signal
Variation of Flow	±15% @ 75% of Nominal Current and Constant ΔP Maintained by Pressure Compensator
Port to Port Leakage	10 cu. in. @ 3000 PSI
Step Response Time at 75% of Amps	On 50 ms Off 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.15 kg (0.34 lbs.)
Cavity	C08-4 (See BC Section for more details)

Typical Performance

SPOOL TYPE AND FLOW	RATED FLOW AT 75% OF NOMINAL CURRENT LPM - (GPM)		SUPER COIL TYPE		Compensator ΔP Bar (PSI)
	'a' SOLENOID PUSH P to A, B to T	'b' SOLENOID PULL P to B, A to T	PUSH	PULL	
51L Low Flow	5.3 - (1.4)	5.3 - (1.4)	SP	SP	10 (150)
	3.4 - (0.9)	3.4 - (0.9)	SS	SS	5 (75)
51 Standard	13.3 - (3.5)	17 - (4.5)	SP	SP	15 (220)
	11.4 - (3.0)	15.2 - (4.0)	SS	SS	15 (220)
52 High Flow	21 - (5.5)	17 - (4.5)	SP	SP	20 (290)
	17.4 - (4.5)	13 - (3.5)	SP	SP	15 (220)

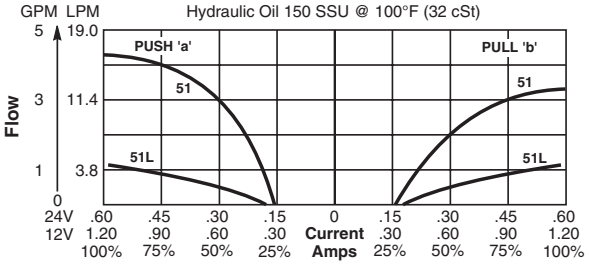




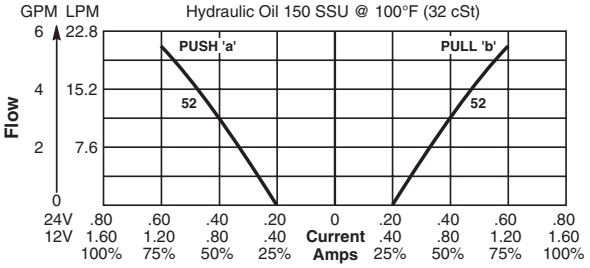
Performance Curves

▲PWM Current Regulator Recommended

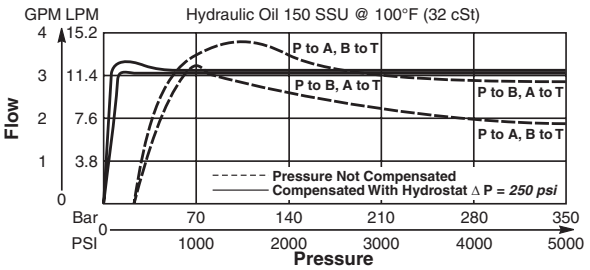
51L With 5 Bar, 75 PSI Compensator
51 With 15 Bar, 220 PSI Compensator and SS Coil



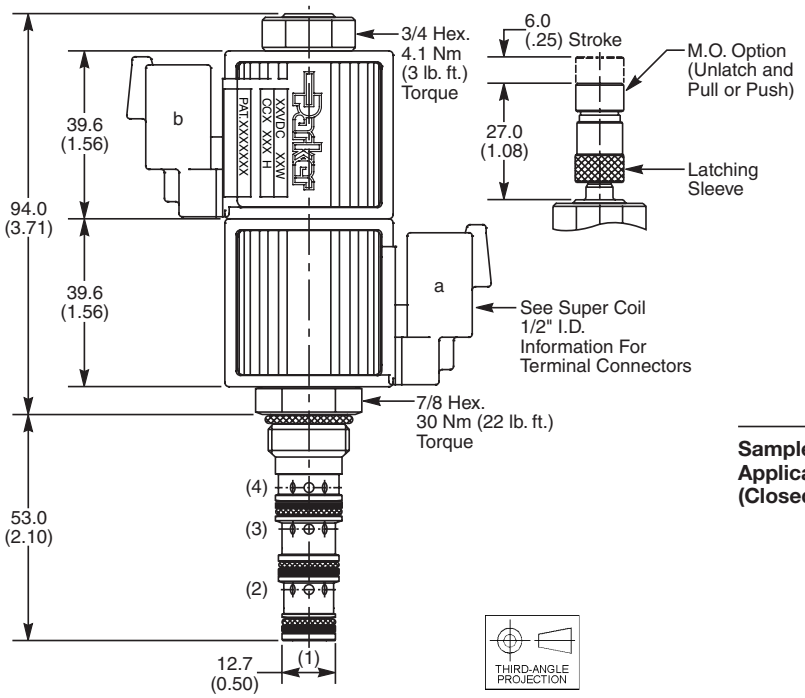
52 With 20 Bar, 290 PSI Compensator and SP Coil

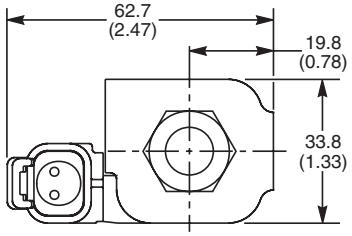


Flow vs. Load

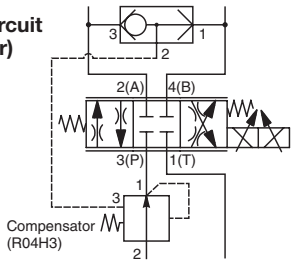


Dimensions Millimeters (Inches)





Sample Application Circuit (Closed Center)



Ordering Information

GP02			
08 Size Proportional Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style - Floating Center (Flow Pressure and Performance)
51	Standard
51L	Low Flow
52	High Flow

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30078N-1)**
V	Fluorocarbon / (SK30078V-1)

Code	Override Option
0	Not Required
1	Manual Override
5	Detented M.O.

Order Bodies Separately
See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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General Description

4 Way, 3 Position, Proportional Directional Control Valve. Floating Center Spool. For additional information see Technical Tips on pages PV1-PV5.

Features

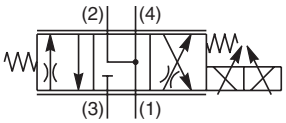
- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.

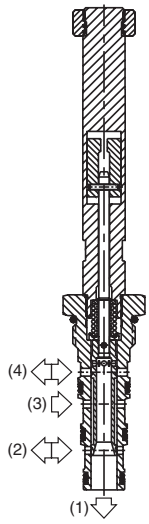
Specifications

Operating Pressure	**Ports 2, 3 and 4** 350 Bar (5000 PSI) **Port 1** 210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<6%
Cracking Flow	25% to 30% of Input Signal
Variation of Flow	±15% @ 75% of Nominal Current and Constant ΔP Maintained by Pressure Compensator
Port to Port Leakage	10 cu. in. @ 3000 PSI
Step Response Time at 75% of Amps	On 50 ms Off 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.15 kg (0.34 lbs.)
Cavity	C08-4 (See BC Section for more details)

Typical Performance

SPOOL TYPE AND FLOW	RATED FLOW AT 75% OF NOMINAL CURRENT LPM - (GPM)		SUPER COIL TYPE		Compensator ΔP Bar (PSI)
	'a' SOLENOID PUSH P to A, B to T	'b' SOLENOID PULL P to B, A to T	PUSH	PULL	
53L Low Flow	5.3 - (1.4)	5 - (1.4)	SP	SP	10 (150)
	4 - (1.0)	4 - (1.0)	SS	SS	5 (75)
53 Standard	14 - (3.8)	15 - (4.0)	SP	SP	10 (150)
	9 - (2.5)	10 - (2.7)	SS	SS	5 (75)
54 High Flow	17 - (4.5)	19 - (5.0)	SP	SP	20 (290)
	15 - (4.0)	15 - (4.0)	SS	SS	15 (220)

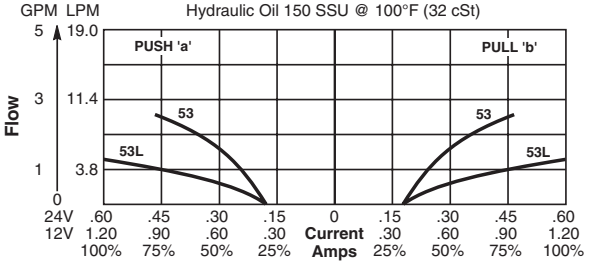




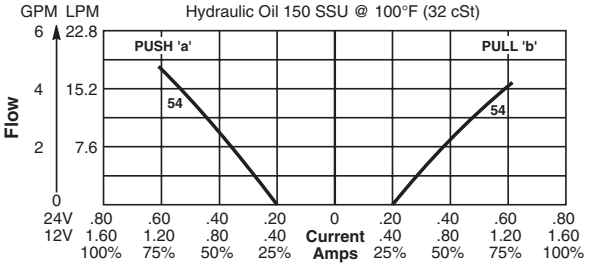
Performance Curves

▲PWM Current Regulator Recommended

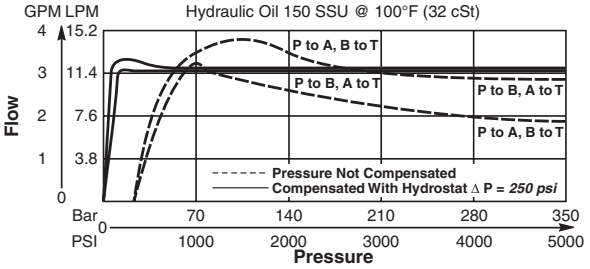
53 and 53L With 5 Bar, 75 PSI Compensator and SS Coil



54 With 20 Bar, 290 PSI Compensator and SP Coil



Flow vs. Load



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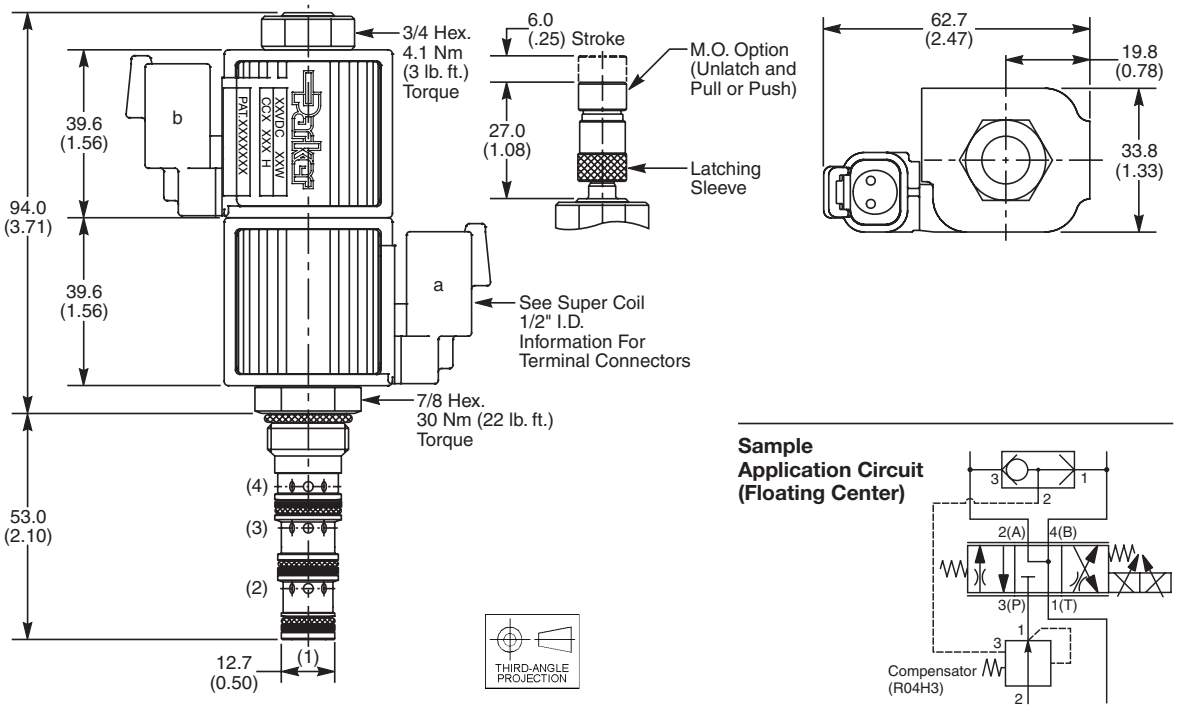
Dimensions Millimeters (Inches)



Sample Application Circuit (Floating Center)

Ordering Information

GP02			
08 Size Proportional Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 1/2" Super-Coil (CC series), for ordering information.

Code	Style - Floating Center (Flow Pressure and Performance)
53	Standard
53L	Low Flow
54	High Flow

Code	Override Option
Omit	Not Required
1	Manual Override
2	Detented M.O.

Code	Seals / Kit No.
N	**Nitrile / Buna-N (SK30078N-1)**
V	Fluorocarbon / (SK30078V-1)

Order Bodies Separately See section BC

B08	–	4	–	
08 size		4-Way Cavity		Port Size

Code	Porting / Body Material
6T	SAE-6 / Steel (5000 PSI)
A6T	SAE-6 / Aluminium (3000 PSI)

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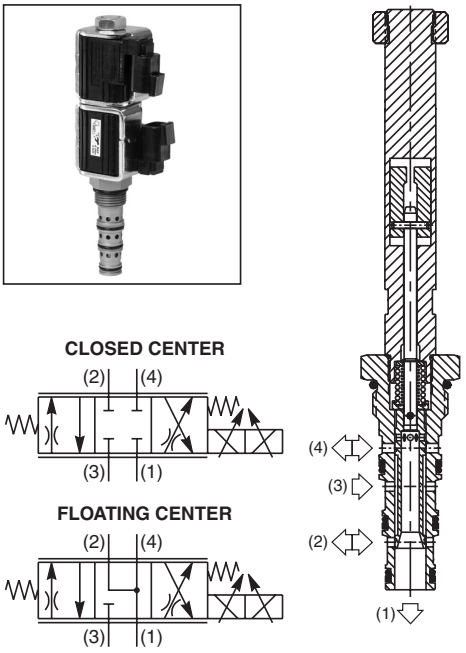
General Description

4 Way, 3 Position, Proportional Directional Control Valve. Closed Center or Floating Center Spool. For additional information see Technical Tips on pages PV1-PV5.

Features

- One piece cartridge housing ensures internal concentricity
- Coil: Waterproof, hermetically sealed, requires no O'Rings; Symmetrical coil can be reversed without affecting performance.
- All external parts zinc plated

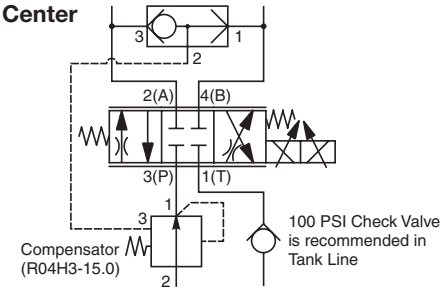


Specifications

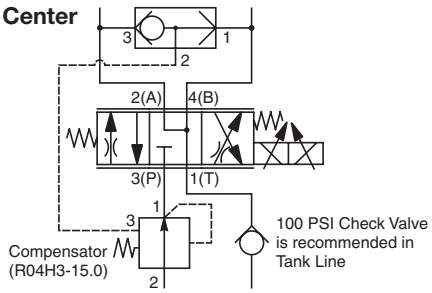
Operating Pressure	210 Bar (3000 PSI)
Hysteresis @ 100 Hz PWM	<6%
Cracking Flow	25% to 30% of Input Signal
Variation of Flow	±15% @ 75% of Nominal Current and Constant ΔP Maintained by Pressure Compensator
Port to Port Leakage	10 cu. in. @ 3000 PSI
Step Response Time at 75% of Amps	On 50 ms Off 40 ms
Cartridge Material	All parts steel. All operating parts hardened steel.
Operating Temp. Range/Seals	-37°C to +93°C ("D"-Ring) (-35°F to +200°F) -34°C to +121°C (Nitrile) (-30°F to +250°F) -26°C to +204°C (Fluorocarbon) (-15°F to +400°F)
Fluid Compatibility/ Viscosity	Mineral-based or synthetic with lubricating properties at viscosities of 45 to 2000 SSU (6 to 420 cSt)
Filtration	ISO-4406 18/16/13, SAE Class 4
Approx. Weight	0.28 kg (0.57 lbs.)
Cavity	C10-4 (See BC Section for more details)

Sample Application Circuit

Closed Center



Floating Center



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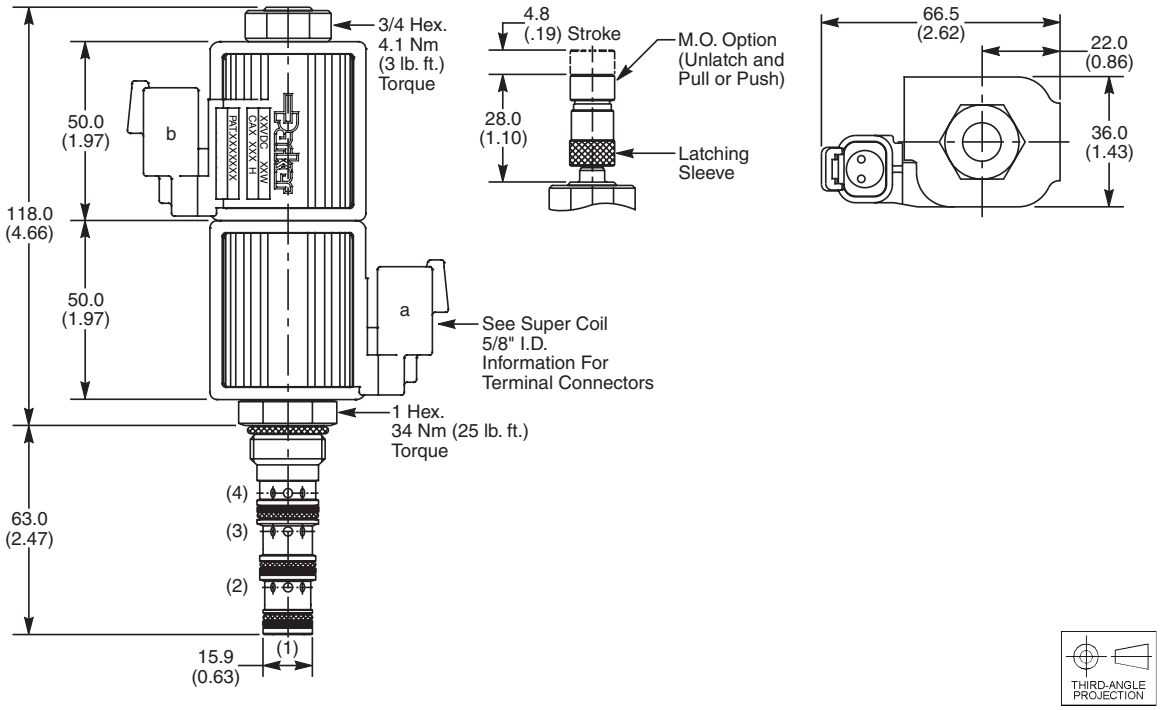
Dimensions Millimeters (Inches)

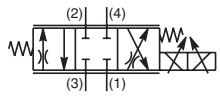
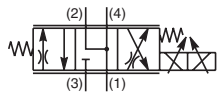


Ordering Information

DSP105			
10 Size Proportional Valve	Style	Override Option	Seals

Highlighted represents preferred options that offer the shortest lead times. Other options may be available, but at extended lead times.

Coil(s) sold separately. Please see section CE of this catalog, 5/8" Coil (CA series), for ordering information.

Code	Style
C1	
C4	

Code	Override Options
Omit	None
M	Push/Pull

Code	Seals / Kit No.
Omit	"D"-Ring / (SK10-4)
N	Nitrile / (SK10-4)
V	Fluorocarbon / (SK10-4V)

Order Bodies Separately
See section BC

B10	–	4	–	
10 size		4-Way Cavity		Port Size

Code	Porting / Body Material
8T	SAE-6 / Steel (5000 PSI)
A8T	SAE-6 / Aluminium (3000 PSI)

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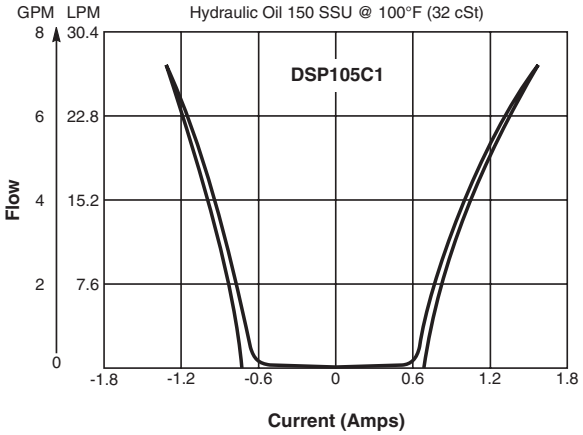
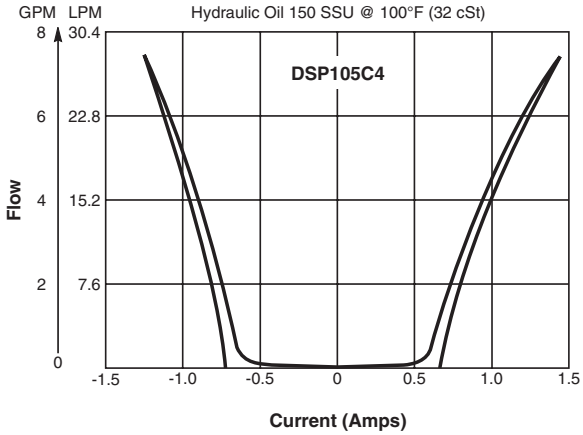
▲PWM Current Regulator Recommended

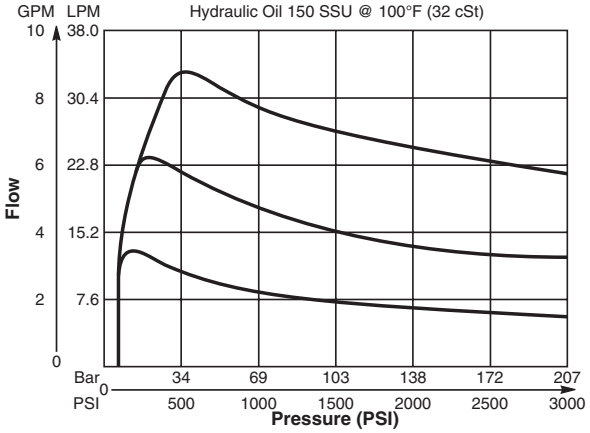
C1 With 15 Bar, 220 PSI Compensator and SP Coil



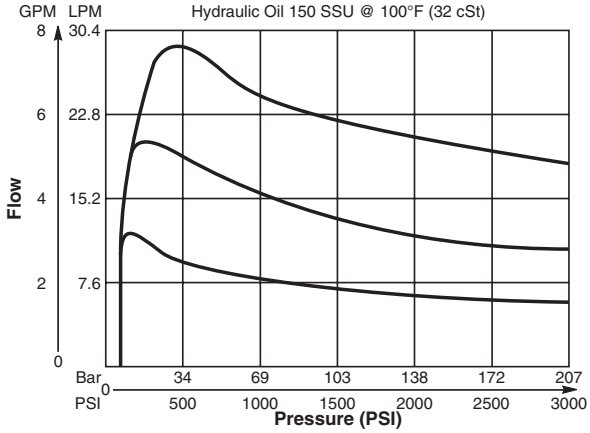
C4 With 15 Bar, 220 PSI Compensator and SP Coil



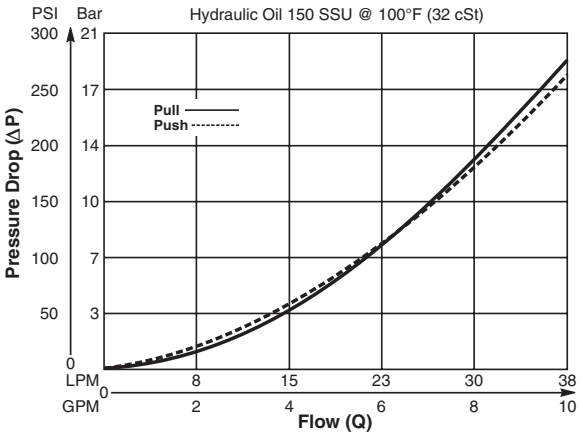
Pressure Compensation Pull Coil Inlet to Work Port



Pressure Compensation Push Coil Inlet to Work Port



C1 Spool Port 3 to 4



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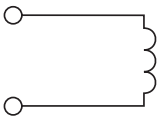
Hydraulic Cartridge Systems Division

Contents

Coils and Electronics

SERIES	DESCRIPTION	PAGE NO.
	Technical Tips	CE1-CE2
	SUPER COILS	
CC	1/2″ Solenoid Tubes	CE3-CE4
CA	5/8″ Solenoid Tubes	CE5-CE6
SW7L	1/2” Solenoid Tube - Short	CE7- CE8
	STANDARD COILS	
DS	1″ Solenoid Tubes	CE8



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INTRODUCTION

This technical tips section is designed to help familiarize you with the Parker line of Coils. In this section we highlight the features and discuss some of the available options.

We also use this section to present some common terminology related to coil and coil technology.

COMMON OPTIONS

Below are some of the common options to the Super Coil product offering.

Continuous Duty: Parker's standard line of coils are rated for continuous duty operation. This means the coil can be left on continuously without fear of the magnet wire insulation breakdown, when used in standard climate conditions.
The Super Coils are made of a high quality Class N magnet wire. This Class N rating signifies the internal wires are rated to 200°C (392°F).

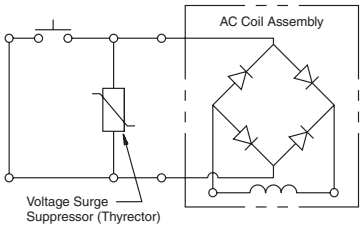
Continuous duty does not mean the coil will have the same amount of power after hours of operation as it had at initial actuation. Coils do heat up during use. This internal heat rise increases the resistance of the coil and thus, decreases the current (V = IR).
The performance curves presented on the solenoid valve pages are based on a coil at room temperature and 85% of voltage. Thus, when using a valve in continuous duty applications, you may need to derate the performance.
In short, the continuous duty rating signifies that while the coil will get hot during use and resistance will increase, it will not generate enough heat to damage the coil.

Terminations: Parker offers a wide variety of coil terminations for all coils to meet the demands of your application. Over the years, the dual lead wire and dual spade offerings have been popular due to their ease of installation and availability. In the past few years, the demand for more secure termination connections has increased.

In addition, the integral connectors reduce cost and improve integrity by reducing the number of connections. As such, the DIN, and Integral Deutsch have increased in popularity.

If you do not find your desired coil termination in our catalog, contact your factory sales representative.

Current Types: Both direct current (DC) and alternating current (AC) versions are available for the Parker line of coils. The AC versions are essentially DC coils with a full wave rectifier integrally molded into the coil. The rectifiers are rated for voltage peaks up to 1000 volts maximum. For voltage transients greater than 1000 volts, a Harris Thyrector is recommended. The AC coils operate at 50/60 cycles (Hz). Since the AC versions are rectified DC coils, there is no inrush current like with "true" AC coils. It also means DC coils and AC coils are interchangeable.



Voltages: Parker has a wide selection of coils available to meet your needs. Most coil terminations are available with our standard voltages of 12V and 24V in DC. Voltages 6V, 10V, 18V, 36V, 48V DC, 120V and 440V AC are also available for many termination types at a slight premium.
Contact your Parker representative should your application call for voltages other than our standard offering.

Wattages: Parker offers a variety of coil wattages to meet the demands of your application. However, when using Parker's 'Winner's Circle' line, please note that all performance curves/values are based on using the higher watt coil. Selecting a lower watt coil could possibly de-rate the performance of the valve.
Contact your Parker representative should your application call for wattages other than our standard offering.

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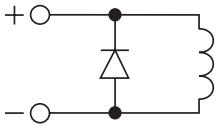
Technical Tips

Diodes: The Parker Coils can be ordered with a diode molded internally. Parker Unicoils use a IN5062 diode. The Super Coils use a IN5627 diode. Diodes are sometimes used to protect sensitive, downstream electrical components from potential surges from the coil. By internally molding the diode into the coil, you can reduce the assembly time and cost associated with externally wiring a diode. One should be careful not to switch the polarity ("+" and "-" terminals), when wiring a coil with an internal diode. If these terminals are switched, the first time voltage is applied to the coil; the short circuit will destroy the diode and render the coil use-less.



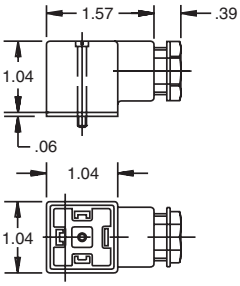
Parker coils with diodes have "+" and "-" molded near the termination outlet to help identify polarity.

Coils and Electronics

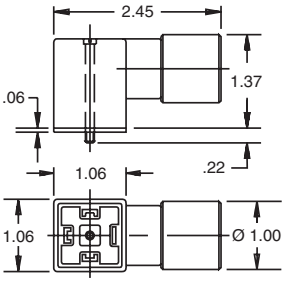
DIN Connectors: Parker does offer connectors for use with the DIN style coils. As shown below, the DIN connectors are available in both rectified and non-rectified forms. The cable gland versions can be ordered for type PG9 or PG11.

Cable Gland

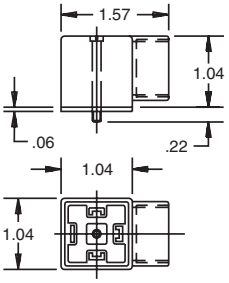
Type	Non-Rectified	Rectified
PG9	710549-00	712126-01
PG11	710549-01	712126-00



Conduit | Rectified: 712704-00



Conduit | Non-Rectified: 710549-02



Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

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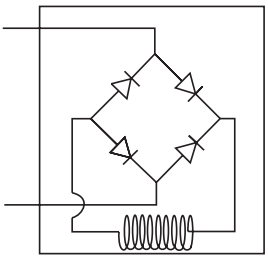
Features

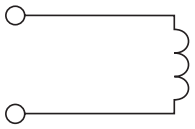
- **Integral Deutsch connector coil exceeds IP69K standards**
- Integral Deutsch connector coil thermal shock dunk test rated
- Universal 50/60 Hz operation
- Waterproof coil hermetically sealed, requires no O-rings or waterproofing kits
- External plated steel flux-carrying band (unlike encapsulated band) enables coil to withstand severe thermal shocks without cracking
- Symmetrical coil can be reversed without affecting performance

Specifications

Coil Type	**S** Standard **P** Puissant
Nominal Wattage (See Ordering Information For Exact Wattage)	**S** 14 Watts **P** 19 Watts
Duty Cycle	Continuous @ 100% voltage
Magnetic Wire Insulation Class	'N' Rated at 200°C (392°F)
Temperature Range	-40°C to +200°C (-40°F to +392°F)
Temperature Rise At Nominal Voltage And Natural Ventilation	**S** 75°C (135°F) **P** 95°C (172°F)
Dielectric Strength Maximum Current Leakage (Amps)	.0005 In dry lab condition at 1000V AC for 30 seconds .001 After being immersed in 23°C (77°F) water with waterproof connector for 24 hours at 500V AC
Encapsulating Material	Glass filled rynite
Color Identification On The Terminal Boss	**S** Black Ring **P** Red Ring
Weight	0.20 kg (0.44 lbs.)

AC Coil Assembly





Ordering Information

CC			
Super Coil 1/2" I.D.	Wattage	Voltage	Termination

Code	Wattage
S	Standard
P	Puissant

Code	Voltage						
		Watts		Amps		Ohms**	
	Volts	S	P	S	P	S	P
012*	12 VDC	14	19	1.15	1.58	10.43	7.58
024*	24 VDC	14	19	0.58	0.79	41.74	30.30
115*	115 VAC	16	19	0.17	0.20	680	576

**Standard Voltages* ***Resistance ±10% at 68°F*

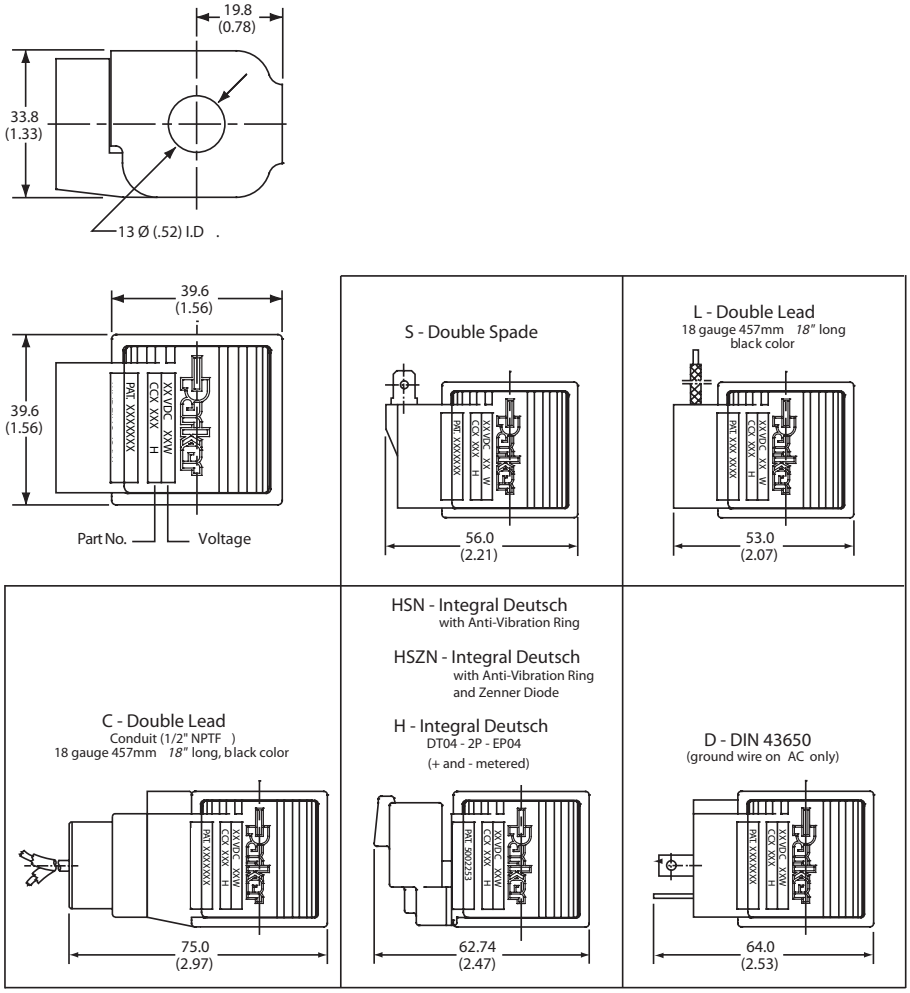
Code	Termination
C	Double Lead Wire with Conduit Connector (AC Only)
*D	DIN 43650 (AC or DC, Supplied without DIN Connector)
H	Integral Deutsch
HSN	Integral Deutsch with Anti-vibration ring
HSZN	Integral Deutsch with Anti-vibration ring and Zener Diode
*L	Double Lead (DC Only)
*S	Double Spade (DC Only)

**UL listed 12/24 VDC only.*

Note: *Additional voltages and other terminals are available. Some coils are UL approved. For details please consult factory.*

DIN Female Mating Connector: See page CE2
Deutsch Mating Connector: # DT06-2S

Terminal Styles and Dimensions



NOTES:
1. The standard A.C. coil includes a molded-in full wave rectifier rated for 800 peak reverse voltage.
2. All P Puissant (high wattage) coils use a red ring as an indiction marker on the terminal boss.

718164 - Wire connector assembly with 36" leads for Super Coils with Integral Deutsch connectors.

Tel: +45 63 12 83 00 | Email: ps@hymatik.com | www.hymatik.com | Hvidkaervej 27a, DK-5250 Odense SV, Denmark

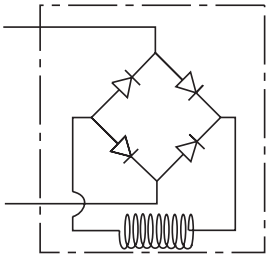
Features

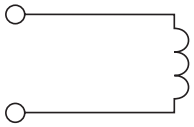
- **Integral Deutsch connector coil exceeds IP69K standards**
- Integral Deutsch connector coil thermal shock dunk test rated
- Universal 50/60 Hz operation
- Coil hermetically sealed, requires no O-rings or waterproofing kits
- External plated steel flux-carrying band (unlike encapsulated band) enables coil to withstand severe thermal shocks without cracking
- Symmetrical coil can be reversed without affecting performance

Specifications

Coil Type	**S** Standard **P** Puissant
Nominal Wattage (See Ordering Information For Exact Wattage)	**S** 18 Watts **P** 28 Watts
Duty Cycle	Continuous @ 100% voltage
Magnetic Wire Insulation Class	'N' Rated at 200°C (392°F)
Temperature Range	-40°C to +200°C (-40°F to +392°F)
Temperature Rise At Nominal Voltage And Natural Ventilation	**S** 75°C (135°F) **P** 95°C (172°F)
Dielectric Strength Maximum Current Leakage (Amps)	.0005 In dry lab condition at 1000V AC for 30 seconds .001 After being immersed in 23°C (77°F) water with waterproof connector for 24 hours at 500V AC
Encapsulating Material	Glass filled rynite
Color Identification On The Terminal Boss	**S** Black Ring **P** Red Ring
Weight	0.29 kg (0.64 lbs.)

AC Coil Assembly





Ordering Information

CA			
Super Coil 5/8" I.D.	Wattage	Voltage	Termination

Code	Wattage
S	Standard
P	Puissant

Code	Voltage						
		Watts		Amps		Ohms**	
	Volts	S	P	S	P	S	P
012*	12 VDC	18	28	1.50	2.33	8.00	5.14
024*	24 VDC	18	28	0.75	1.17	32.0	20.6
115*	115 VAC	18	28	0.20	0.26	554	417

**Standard Voltages* ***Resistance ±10% at 68°F*

Code	Termination
C	Double Lead Wire with Conduit Connector (AC Only)
*D	DIN 43650 (AC or DC, Supplied without DIN Connector)
H	Integral Deutsch
HSN	Integral Deutsch with Anti-vibration ring
HSZN	Integral Deutsch with Anti-vibration ring and Zener Diode
*L	Double Lead (DC Only)
*S	Double Spade (DC Only)

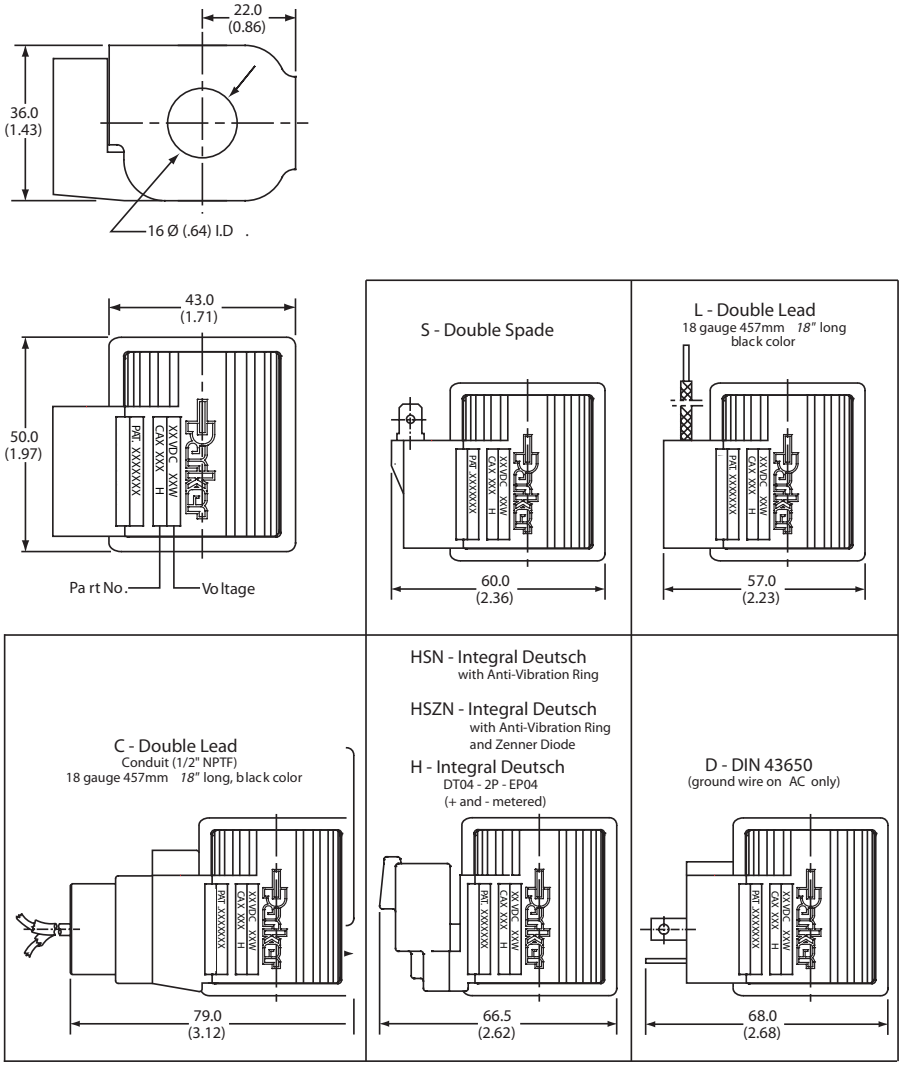
**UL listed 12/24 VDC only.*

Note: *Additional voltages and other terminals are available. Some coils are UL approved. For details please consult factory.*

DIN Female Mating Connector: See page CE2
Deutsch Mating Connector: # DT06-2S

Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

Terminal Styles and Dimensions



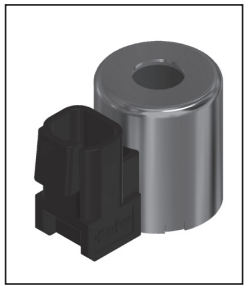
NOTES:
1. The standard A.C. coil includes a molded-in full wave rectifier rated for 800 peak reverse voltage.
2. All P Puissant (high wattage) coils use a red ring as an indiction marker on the terminal boss. (No ring on Integral Deutsch connector.)

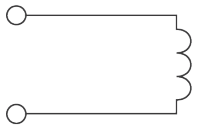
718164 - Wire connector assembly with 36" leads for Super Coils with Integral Deutsch connectors.

Super Coil
Series 1/2" I.D., Short

Features

- **For utilization on EPR083R product only**
- Integral Deutsch connector coil exceeds IP69K standards
- Integral Deutsch connector coil thermal shock dunk test rated
- Coil hermetically sealed, requires no O-rings or waterproofing kits
- Coil shell is zinc plated, low carbon steel
- Symmetrical coil can be reversed without affecting performance





Specifications

Nominal Wattage	**L** 14 Watts
Duty Cycle	Continuous @ 100% voltage
Lead Wire	**(12 VDC)** 22 gauge 24" long **(24 VDC)** 22 gauge 24" long
Magnetic Wire Insulation Class	'N' Rated at 200°C (392°F)
Temperature Range	-40°C to +200°C (-40°F to +392°F)
Encapsulating	Glass-Filled Polyethylene Material Terephthalate (PET)
Weight	0.29 kg (0.64 lbs.)

Ordering Information

SW7	L		
1/2" I.D.	Wattage 14W	Termination	Voltage

Code	Wattage
L	Standard, 14W

Code	Termination
H	Integral Deutsch
W	Double Lead
S	Double Spade

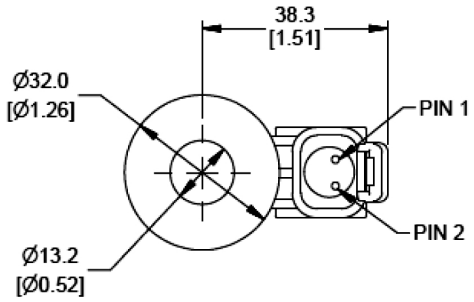
Code	Voltage				
	Volts	Watts (Ref)	Amps (Ref)	Ohms* (Ref)	Lead Wire** Color
D012	12VDC	14.2	1.2	10.1	Red
D024	24VDC	14.5	0.6	39.6	Blue

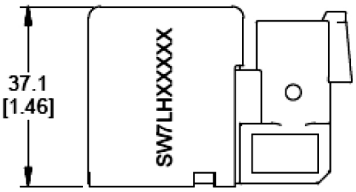
Resistance ±5% at 68°F ***Applicable to W Double LeadTermination***

Note: *Additional voltages and other terminals are available. For details please consult factory.*
Deutsch Mating Connector: # DT06-2S

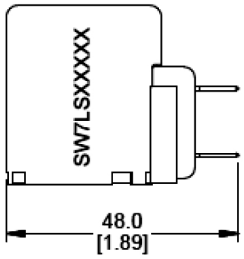
Parker Hannifin Corporation
Hydraulic Cartridge Systems Division

Terminal Styles and Dimensions

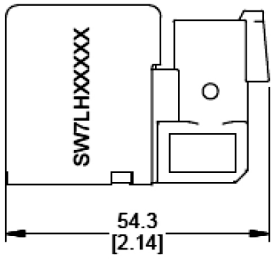




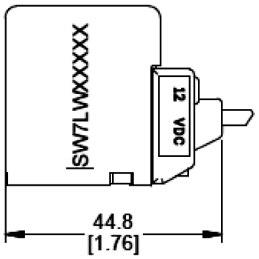
S - Double Spade



H - Integral Deutsch



W - Double Lead



718164 - Wire connector assembly with 36" leads for Super Coils with Integral Deutsch connectors.

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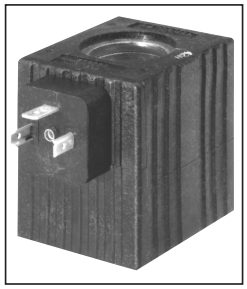
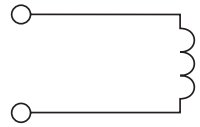
Features

- Compact one piece encapsulated design
- Numerous terminals and voltages
- Heavy gauge color coded lead wire with built-in strain relief
- 200°C Class N wire standard
- U.L. recognized on most DC coils (consult factory)



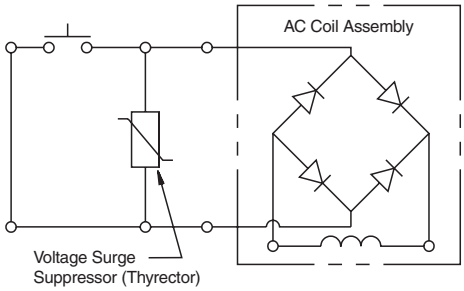


Specifications

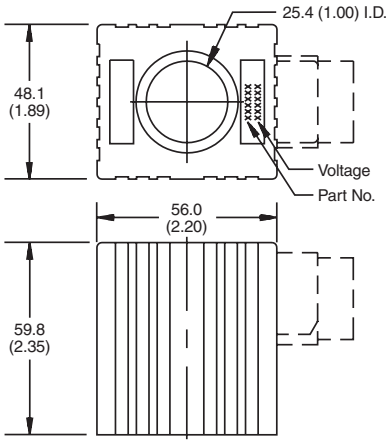
Wattage	42 Watts — Standard 30 Watts — Low Watt
Duty Rating	Continuous @ 100% voltage
Wire Class	Class N for all voltages
Lead Wire	18 gauge 24″ long, 600 volt rating
Lead Wire Strain Relief	34 kg (75 lbs.) @ 21°C (70°F) & 18 kg (40 lbs.) @ 93°C (200°F)
Encapsulating Material	Glass filled nylon, resistant to moisture, caustic solutions, fungus, and temperatures from -40°C (-40°F) to 200°C (392°F)
Color	Black

AC Coil Assembly

No inductive or capacitive loads can be installed between surge suppressor and rectified valves.



Terminal Styles and Dimensions

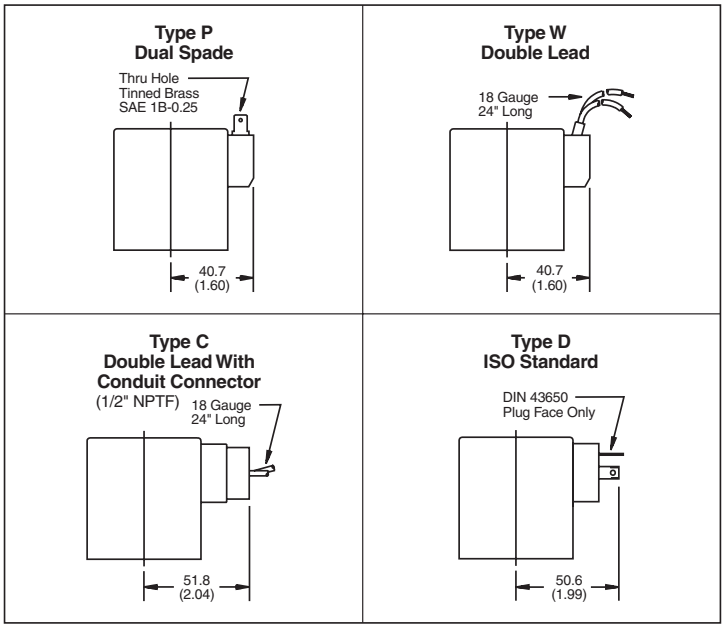


NOTES:

1. Coil to be installed with part number on nut side.

2. For additional terminals, voltages and wattages, consult factory for details.

3. Consult factory for availability. Minimum quantity may apply.



Coil Part Numbers

Wattage	Voltage	Type P Double Spade	Type W Double Lead	Type D ISO STANDARD	Type C Conduit	Amps	Lead Wire Color
42 Watts	12 VDC	851060-012*	851062-012*	851058-012*	-	3.53	Red
42 Watts	24 VDC	851060-024*	851062-024*	851058-024*	-	1.79	Blue
55 Watts	120 VAC	-	-	851058-120	851057-120	48.0	Brown

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Contents

Cartpak Bodies

SERIES	DESCRIPTION	BODY NO.	PAGE NO.
Technical Tips			CP1-CP3

CARTPAK BODIES

			Legacy Codes †	
BD03-PN	P Port Interrupt, 2-Way, Body Only	BD03-PN-*	C3A	CP4
BD03-PN2	P Port Interrupt, 2-Way, Body Only	BD03-PN2-*	C3L	CP5
BD03-PNR	P Port Interrupt, Reducing Function, Body Only	BD03-PNR-*	C3F	CP6
BD03-PNS	P Port Interrupt, Sequencing Function, Body Only	BD03-PNS-*	C3G	CP7
BD03-PT	P to T, Body Only	BD03-PT-*	C3B	CP8
BD03-ABN	A and B Port Interrupt, Body Only	BD03-ABN-*	C3C	CP9
BD03-ABX	A and B Port Crossover, Body Only	BD03-ABX-*	C3E	CP10
BD03-ABT	A and B Ports to Tank, Body Only	BD03-ABT-*	C3D	CP11
BD03-DDX	Ports A and B Drain to Crossover Port, Body Only	BD03-DDX-*	C3H	CP12
BD03-BDA	B Port Drain to A, Body Only	BD03-BDA-*	C3J	CP13
BD03-ADB	A Port Drain to B, Body Only	BD03-ADB-*	C3K	CP14
BD03-POC	Dual P.O. Checks - A and B Ports to Tank	BD03-POC-*		CP15

†Legacy Codes are shown for reference only. DO NOT USE.

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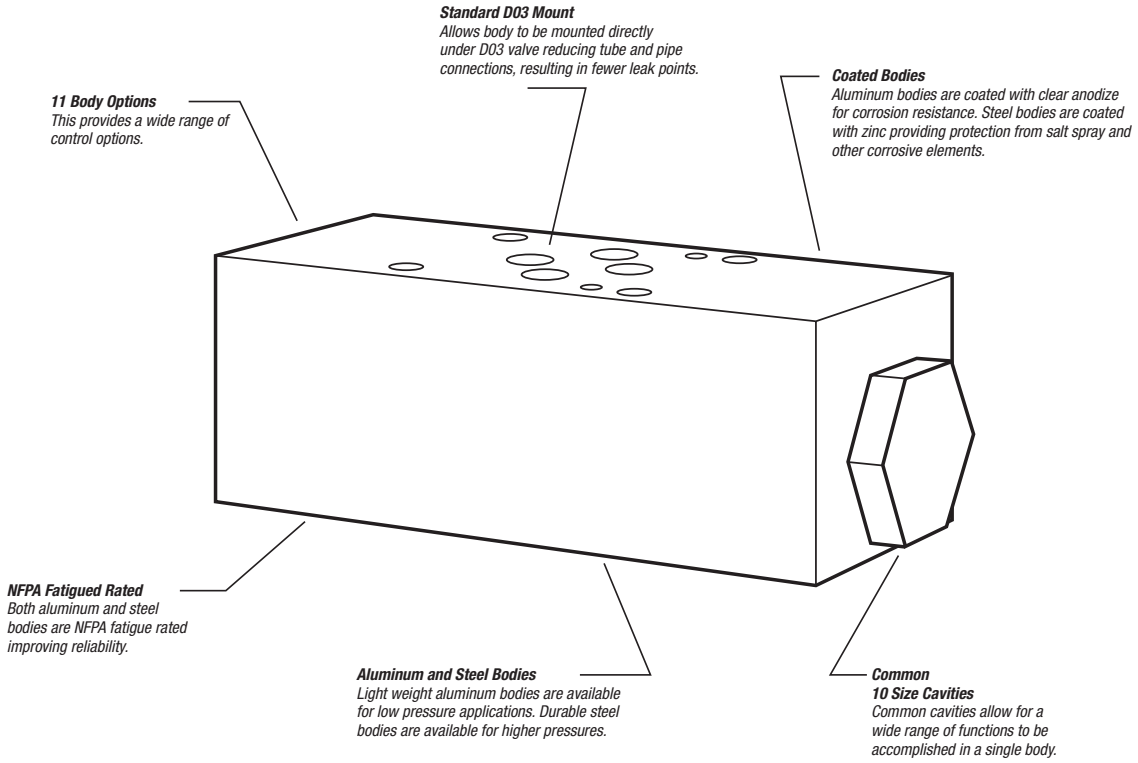
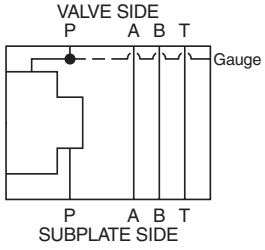
CARTPAK BODIES

Parker Cartpak sandwich mounted bodies are designed to be mounted under a standard ISO 4401-03, NFPA D03, CETOP 3 size valve, and provide a multitude of different functions. The bodies are designed to accept a common 10 size cartridge valve allowing the designer the flexibility to use a single body to provide pressure, directional, flow, or load control. One or more Cartpak bodies may be "sandwiched" underneath a Parker D1 Series directional valve to provide the control functions for all portions of a hydraulic circuit. The ISO standard fatigue rated bodies are available in either aluminum or ductile iron.



Catalog Pages: Each Cartpak catalog page is laid out in a similar format and is designed to help you select the proper body for your application. In the top left corner of the page there is a brief description and body schematic. The body schematic shows the cartridge cavity and the ports connecting to it. This schematic can be used to understand which valves can be used in the body. For instance, in the example shown here, flow from the subplate in port P is directed into the nose of the cartridge. The side port of the cartridge is connected to the valve side of port P. Thus, you want to choose cartridges providing the function desired, and use the nose as the inlet. For instance, a FC101 meters flow from its nose port to its side port and would be ideal for the p-port interrupt body shown.

UPRIGHT



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Technical Tips

In addition to the body schematic, we also provide a hydraulic schematic at the bottom of each catalog page. This schematic shows a variety of Parker cartridge part numbers that can be used with this body. This list is not intended to be comprehensive, but it is intended to show the wide variety of options that can be achieved with each body. You will also note, the product listing shows the orientation of the block (upright or inverted), the cavity for the cartridge, and cavity plugs (when necessary.) Once again, many options can be achieved with each body.

O-Ring Plates: Since many of the Cartpak bodies can be "flipped" to achieve extra functions, the faces of the bodies must be flat. Thus, an o-ring plate with o-rings must be used to seal the mounting surface. One plate with o-rings will be provided with any body that can be inverted.
Below are the kit numbers;
Nitrile Kit - 717939 Fluorocarbon Kit - 717939V

Flipping Cartpaks: As mentioned before, many Cartpak bodies can be flipped to create extra options. The catalog pages show some of the functions that can be achieved by "flipping." The words "upright" and "inverted" are written on the bodies to help you identify which side you are looking at. To invert the body, while facing the long face of the body (in other words, the sides without any ports or cavities), rotate the valve 180 degrees away from your body in an upward fashion. By doing this, you have essentially switched the P port and T port.

Stacking Cartpaks: Cartpak bodies can be stacked on top of one another to provide a number of functions in a single assembly. When stacking Cartpak bodies though, you want to take some care in the order in which the bodies are stacked. In general, flow controls should be stacked as close to the subplate stack as possible, while pilot operated check valves or counterbalance valves should be stacked as close to the D03 valve as possible.
The D03 line of bodies has a common height of 40mm (1.58 in.). Below is a list of bolt kits available from Parker.

UNC Bolt Kits for use with D1V Directional Control Valves & Manapaks/Cartpaks (D1V*-75 Design, Solenoid Operated)					
	Number of Manapaks/Cartpaks @ 1.58" (40mm) thickness				
	0	1	2	3	4
D1V-75	BK209 1.25"	BK243 2.88"	BK225 4.38"	BK244 6.00"	BK245 7.50"
D1V-75 Plus Tapping Plate	BK176 2.25"	BK56 3.81"	BK212 5.38"	BK107 7.00"	BK106 8.50"

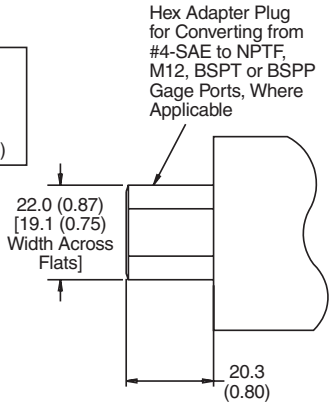
Note: All bolts are SAE grade 8, 10-24 UNC-2A thread, torque to 5.6 N.m. (50 in.-lbs.)

Cartpak Bodies

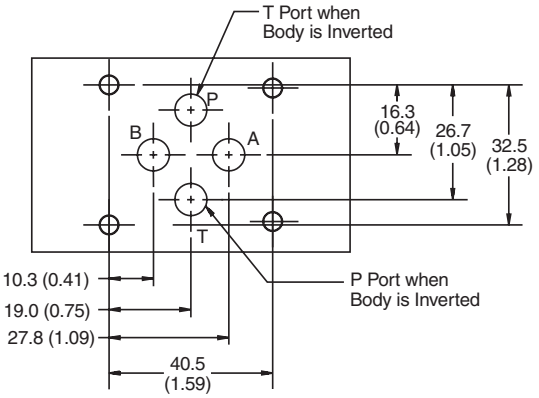
Gauge Ports: Several of the Cartpak bodies are equipped with a SAE #4 gauge port to assist the user during installation and troubleshooting. We offer hex adapter plugs, should your pressure gauge have a different thread type.

Hex Adapter Plug to convert from SAE #4

1830016	BSPP
1830017	BSPT
1830018	NPTF
1830019	Metric (M12)



D03 Pad Dimensions: Below is the common dimensions of the standard D03 mount pad. Since these dimensions are common to all Cartpak bodies, we do not identify them on the individual valve pages.



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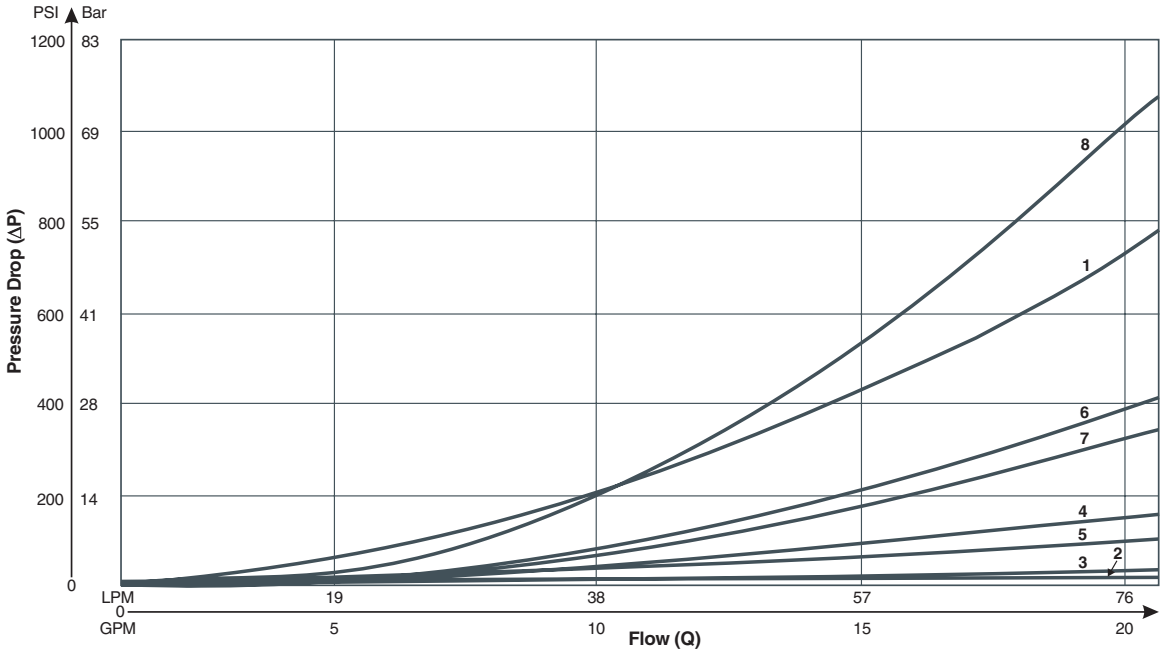
PRESSURE DROP CHART

The following charts outline the pressure drop through the Parker Cartpak bodies.
The pressure drop is minus the cartridge valve.



Body	Orientation	P	T	A	B
BD03-PN	Upright Inverted	1 2	2 1	3 3	3 3
BD03-PT	Upright Inverted	3 3	3 3	3 3	3 3
BD03-ABN	Upright Inverted	3 3	3 3	4 4	4 4
BD03-ABT	Upright Inverted	3 3	3 3	3 3	3 3
BD03-ABX	Upright	5	5	3	3
BD03-PNR	Upright	6	3	3	3
BD03-PNS	Upright	7	3	3	3
BD03-DDX	Upright	3	3	1	1
BD03-BDA	Upright	6	3	3	3
BD03-ADB	Upright	6	3	3	3
BD03-PN2	Upright Inverted	8 3	3 8	3 3	3 3

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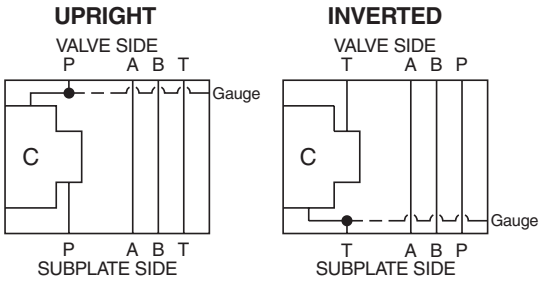
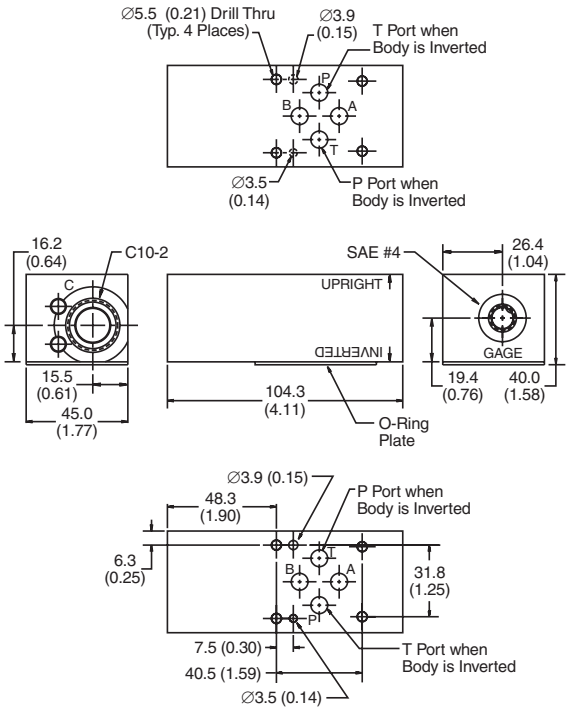
General Description

P Port Interrupt, 2-Way, D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic



Dimensions Millimeters (Inches)



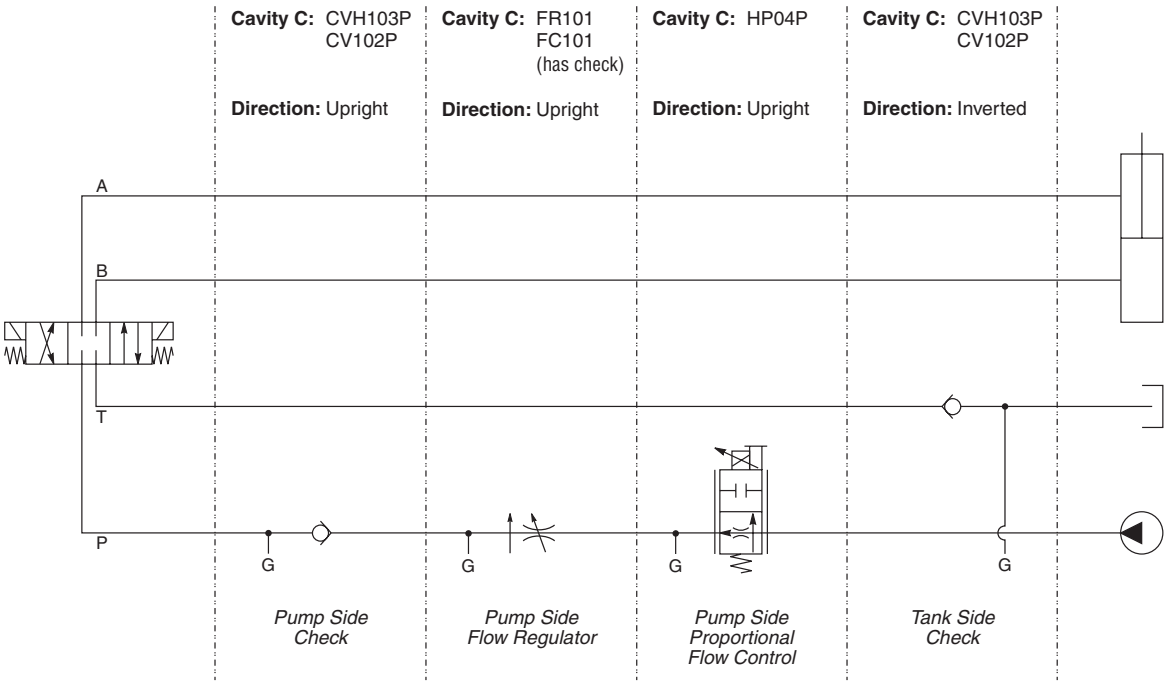
Ordering Information

BD03	—	PN	—		—	
D03 Cartpak Body		P Port Interrupt 2-Way		Plug Seals		Body Material

Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
- Gage Port Plug Installed
- O-Ring Plate, O-Rings and Drive Pin Kit



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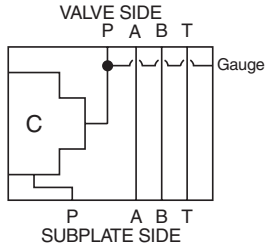
General Description

P Port Interrupt, 2-Way, D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Ordering Information

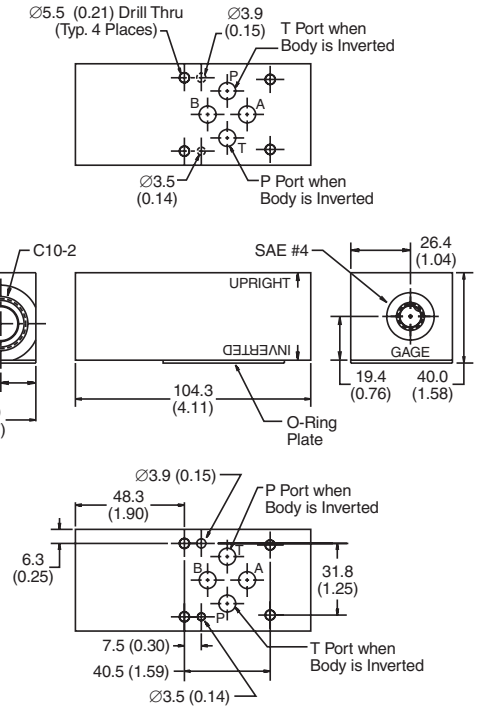
BD03	—	PN2	—			
D03 Cartpak Body		P Port Interrupt 2-Way		Plug Seals		Body Material

Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
- Gage Port Plug Installed
- O-Ring Plate, O-Rings and Drive Pin Kit

Dimensions Millimeters (Inches)

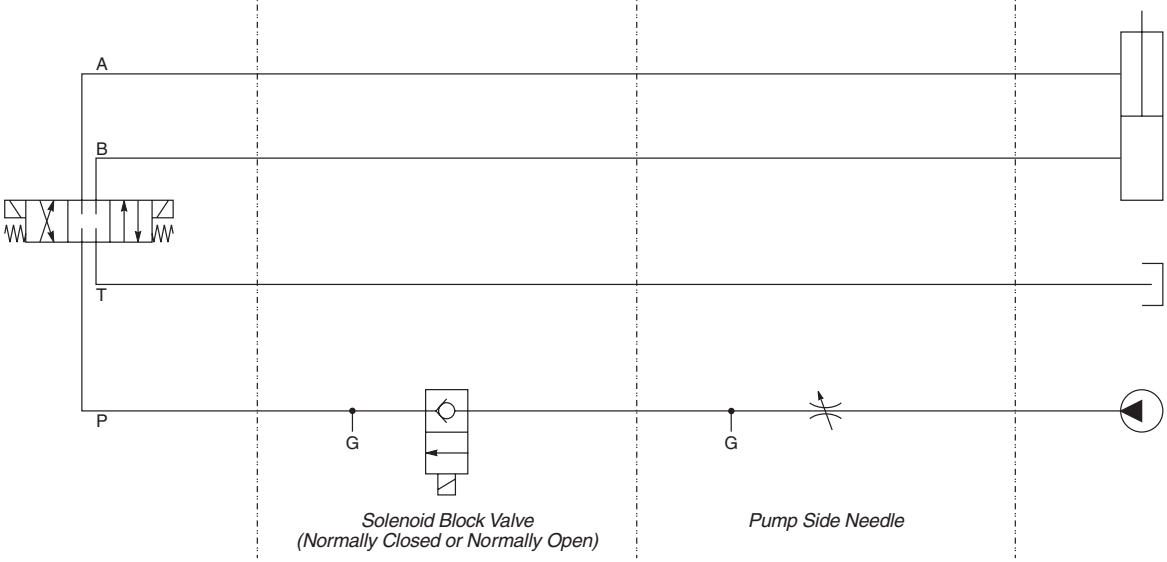


Cavity C: DSL101*
DSH101*

Direction: Upright

Cavity C: NVH101
FV101

Direction: Upright



Solenoid Block Valve (Normally Closed or Normally Open)

Pump Side Needle

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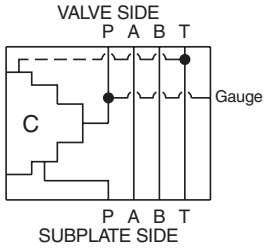
General Description

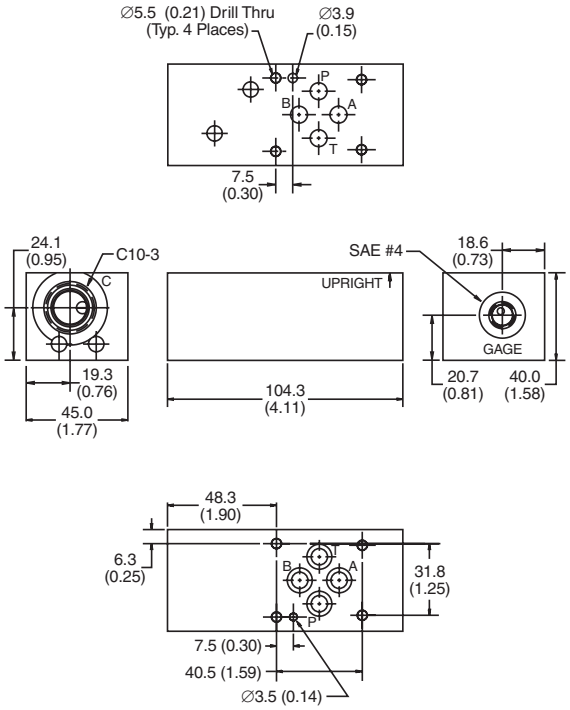
P Port Interrupt, Reducing Function, D03 Cartpak Body. For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Dimensions Millimeters (Inches)



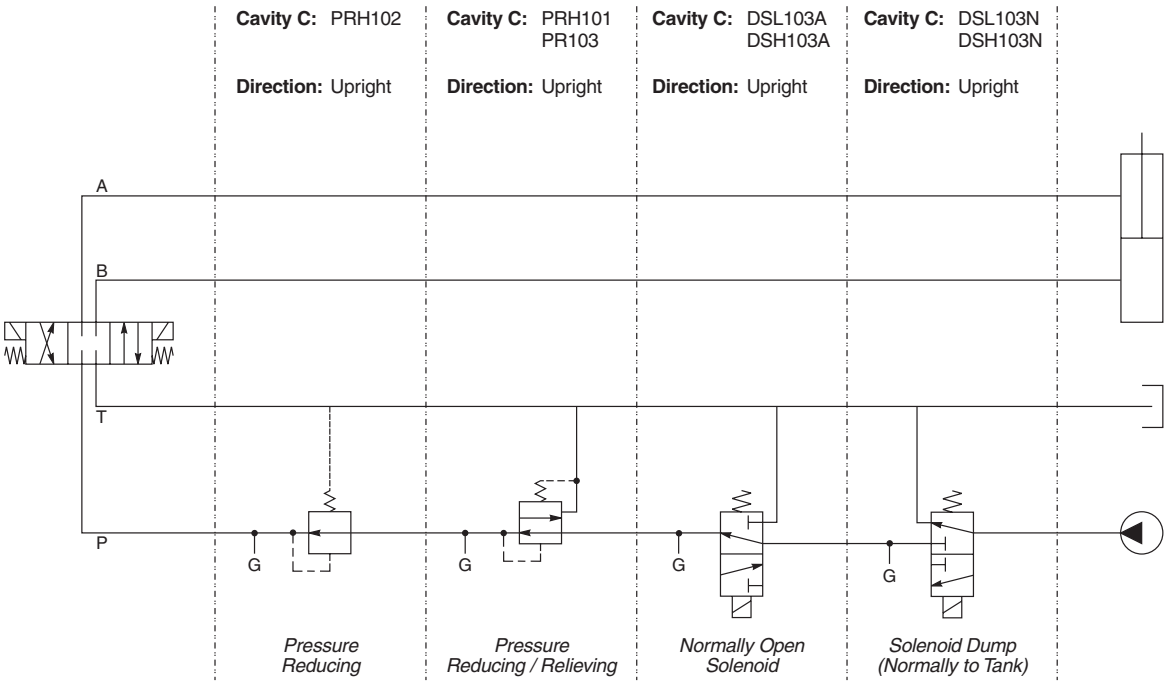
Ordering Information

BD03	—	PNR	—		—	
D03 Cartpak Body		P Port Interrupt Reducing		Plug Seals		Body Material

Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
- Gage Port Plug Installed
- O-Rings and Drive Pin



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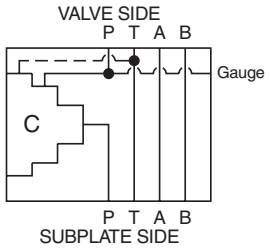
General Description

P Port Interrupt, Sequence Function, D03 Cartpak Body. For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Ordering Information

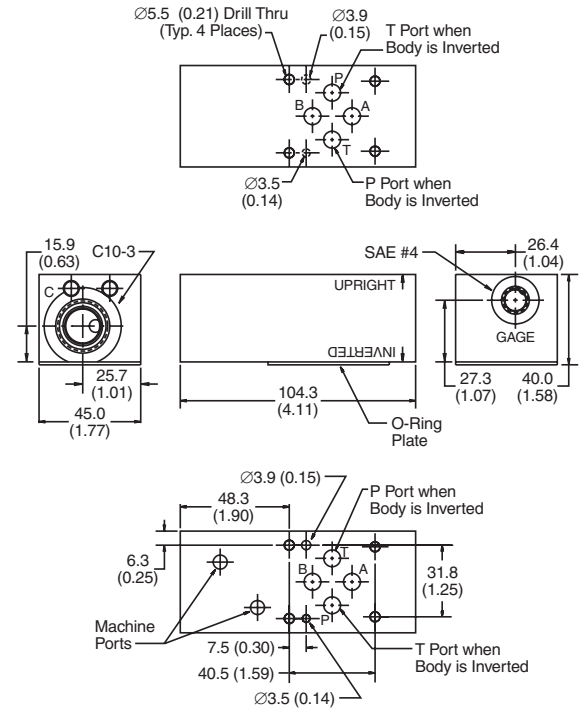
BD03	—	PNS	—			
D03 Cartpak Body		P Port Interrupt Sequence		Plug Seals		Body Material

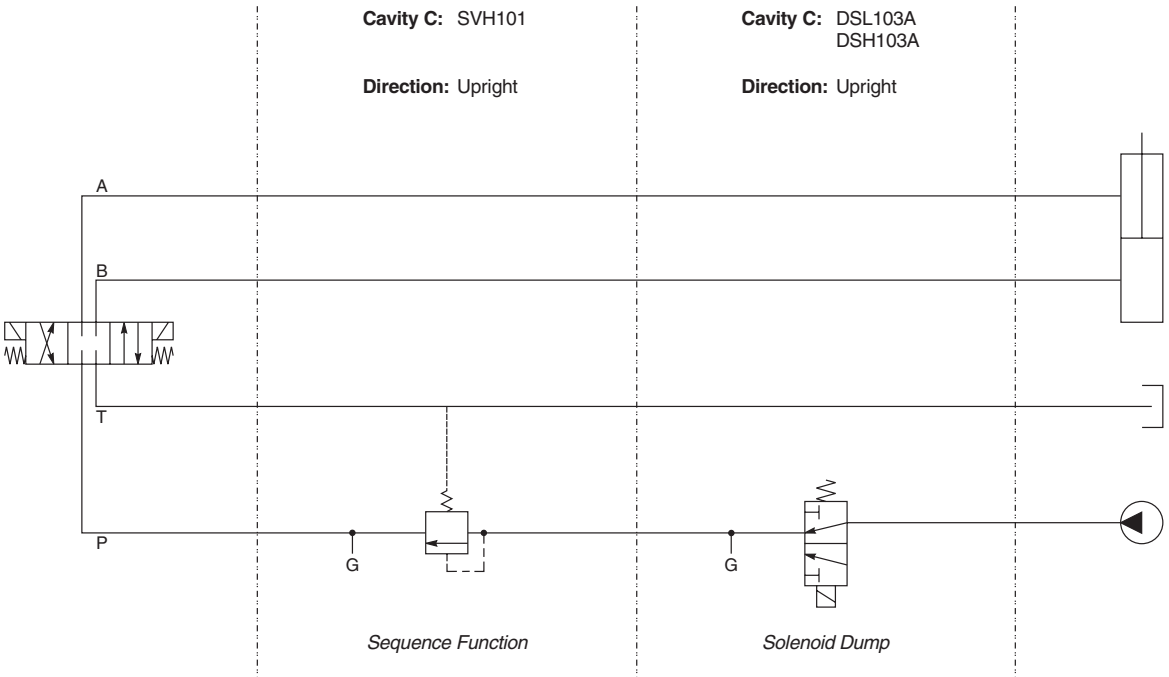
Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
- Gage Port Plug Installed
- O-Ring Plate, O-Rings and Drive Pin Kit

Dimensions Millimeters (Inches)





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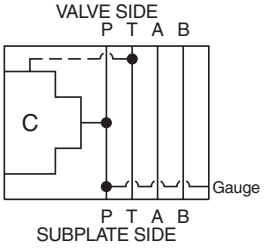
General Description

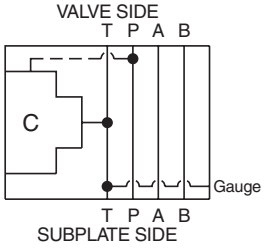
P to T D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



INVERTED



Ordering Information

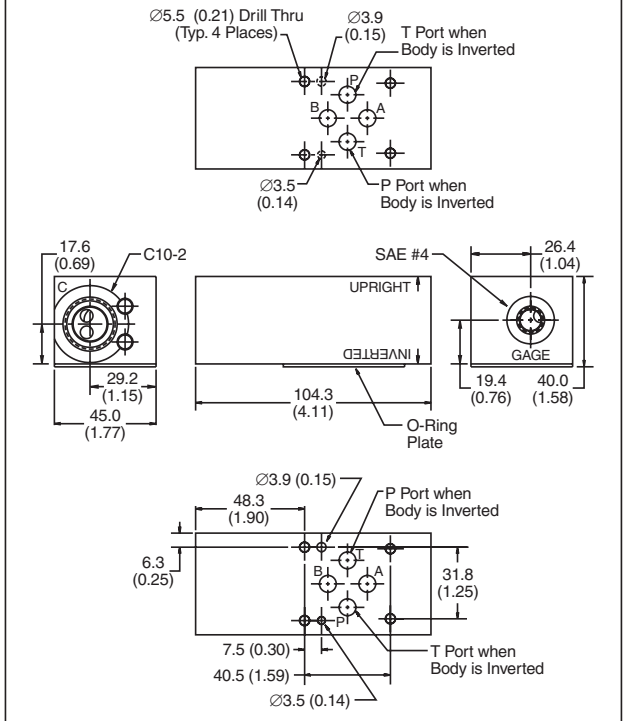
BD03	—	PT	—			
D03 Cartpak Body		P to T		Plug Seals		Body Material

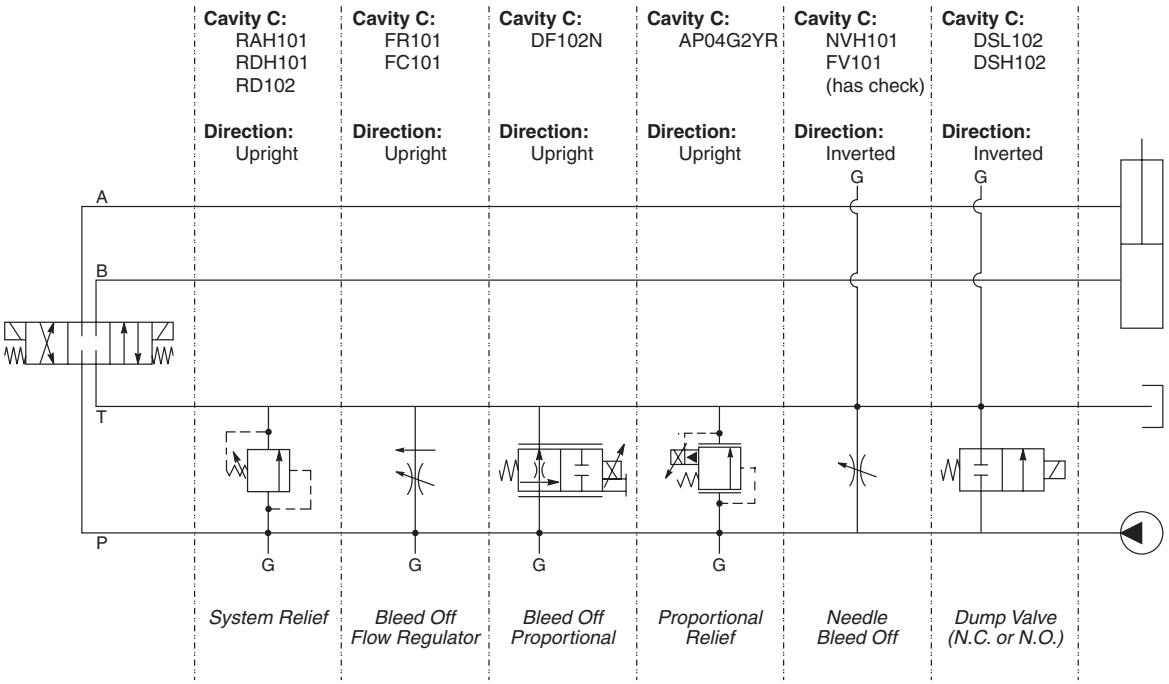
Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
- Gage Port Plug Installed
- O-Ring Plate, O-Rings and Drive Pin Kit

Dimensions Millimeters (Inches)





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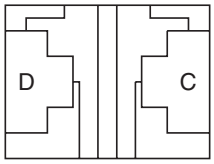
General Description

A and B Port Interrupt D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT

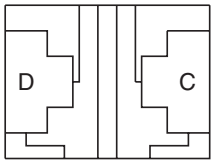
VALVE SIDE
A P T B



A P T B
SUBPLATE SIDE

INVERTED

VALVE SIDE
A P T B



A P T B
SUBPLATE SIDE

Ordering Information

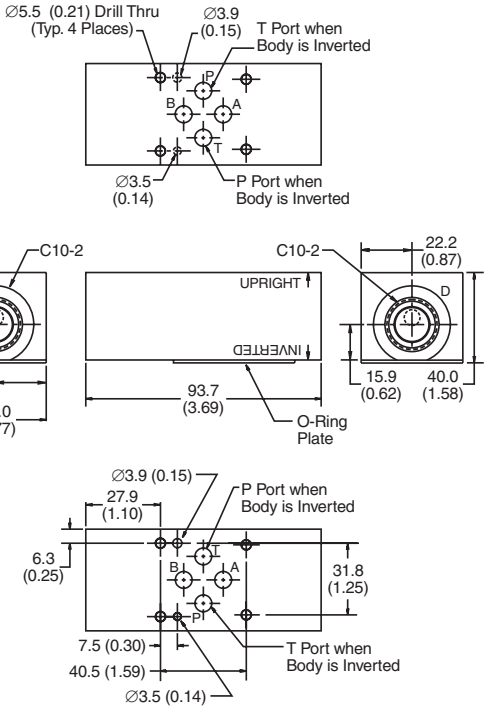
BD03	—	ABN	—			
D03 Cartpak Body		A & B Port Interrupt		Plug Seals		Body Material

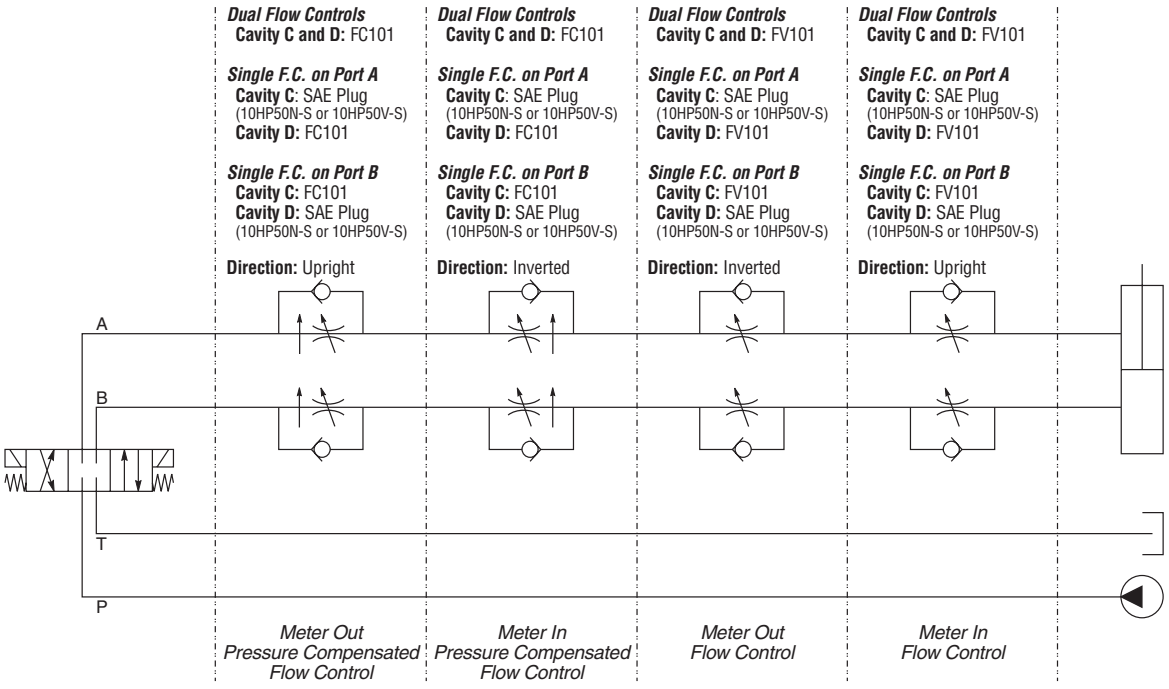
Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
• O-Ring Plate, O-Rings and Drive Pin Kit

Dimensions Millimeters (Inches)





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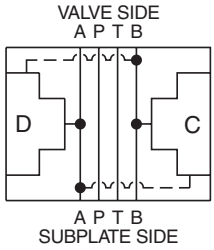
General Description

A and B Crossover D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Ordering Information

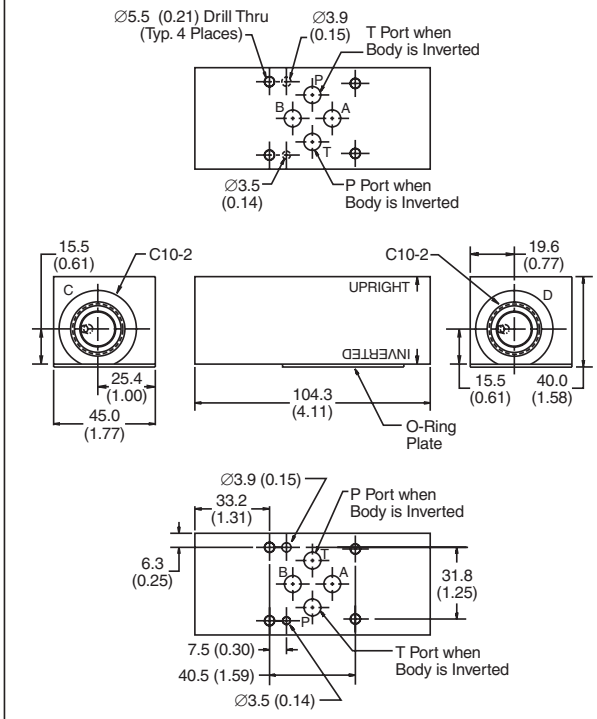
BD03	—	ABX	—			
D03 Cartpak Body		A & B Crossover		Plug Seals		Body Material

Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
• O-Ring Plate, O-Rings and Drive Pin Kit

Dimensions Millimeters (Inches)



Option 1
Cavity C: RAH101, RD102
Cavity D: RAH101, RD102

Option 2
Cavity C: RDH103
Cavity D: RDH103

Direction: Upright

Dual Crossover Relief

Option 1
Cavity C: P10-2
Cavity D: RDH103

Option 2
Cavity C: RAH101, RD102
Cavity D: P10-2

Direction: Upright

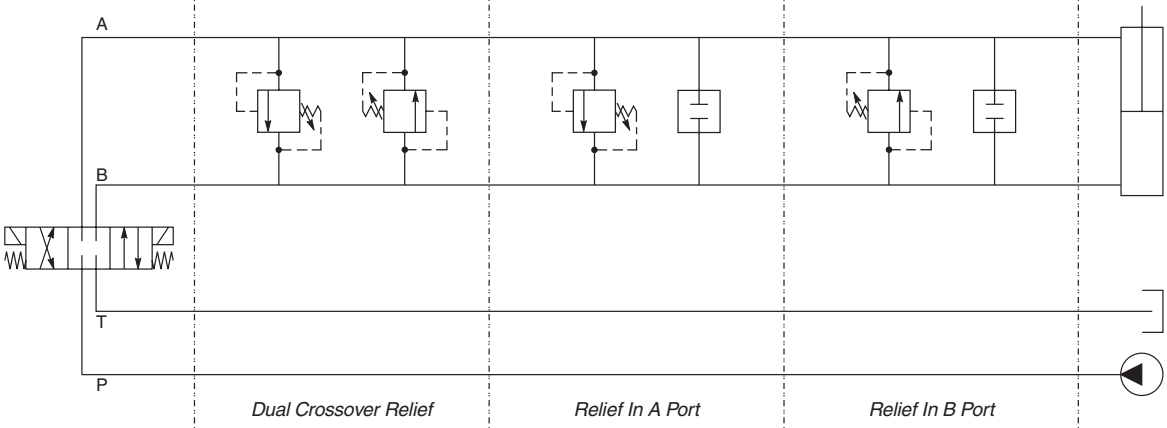
Relief In A Port

Option 1
Cavity C: RDH103
Cavity D: P10-2

Option 2
Cavity C: P10-2
Cavity D: RAH101, RD102

Direction: Upright

Relief In B Port



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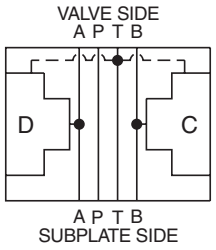
General Description

A and B Ports to Tank D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Ordering Information

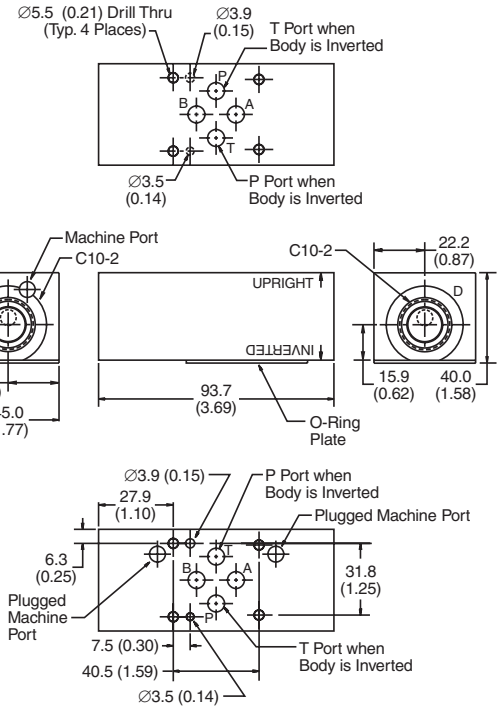
BD03	—	ABT	—			
D03 Cartpak Body		A & B Ports to Tank		Plug Seals		Body Material

Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
• O-Ring Plate, O-Rings and Drive Pin Kit

Dimensions Millimeters (Inches)



Dual Relief
Cavity C and D: RAH101, RD102

Relief on Port A
Cavity C: P10-2
Cavity D: RAH101, RD102

Relief on Port B
Cavity C: RAH101, RD102
Cavity D: P10-2

Direction: Upright

A and B Relief

Dual Makeup Checks
Cavity C and D: CVH104P

Check on Port A
Cavity C: P10-2
Cavity D: CVH104P

Check on Port B
Cavity C: CVH104P
Cavity D: P10-2

Direction: Upright

Makeup Checks

Dual Bleed Off
Cavity C and D: FR101, FC101

Bleed Off on Port A
Cavity C: P10-2
Cavity D: FR101, FC101

Bleed Off on Port B
Cavity C: FR101, FC101
Cavity D: P10-2

Direction: Upright

Flow Control A and B Bleed Off

Dual Relief
Cavity C and D: AP04G2YR

Relief on Port A
Cavity C: P10-2
Cavity D: AP04G2YR

Relief on Port B
Cavity C: AP04G2YR
Cavity D: P10-2

Direction: Upright

Proportional Relief A and B

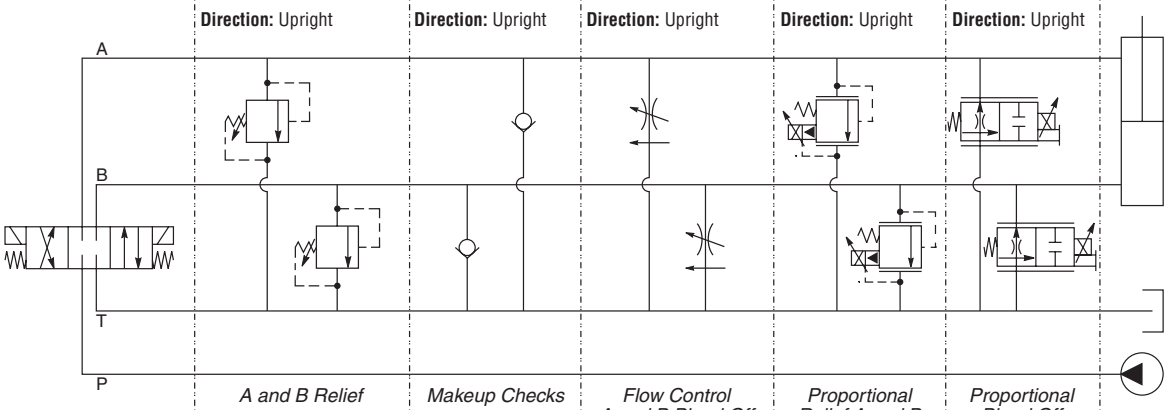
Dual Bleed Off
Cavity C and D: HP04P

Bleed Off on Port A
Cavity C: P10-2
Cavity D: HP04P

Bleed Off on Port B
Cavity C: HP04P
Cavity D: P10-2

Direction: Upright

Proportional Bleed Off



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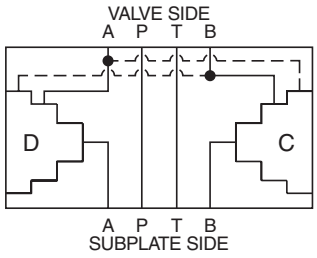
General Description

Dual (Ports A and B) Drain to Crossover Port D03 Cartpak Body. For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Ordering Information

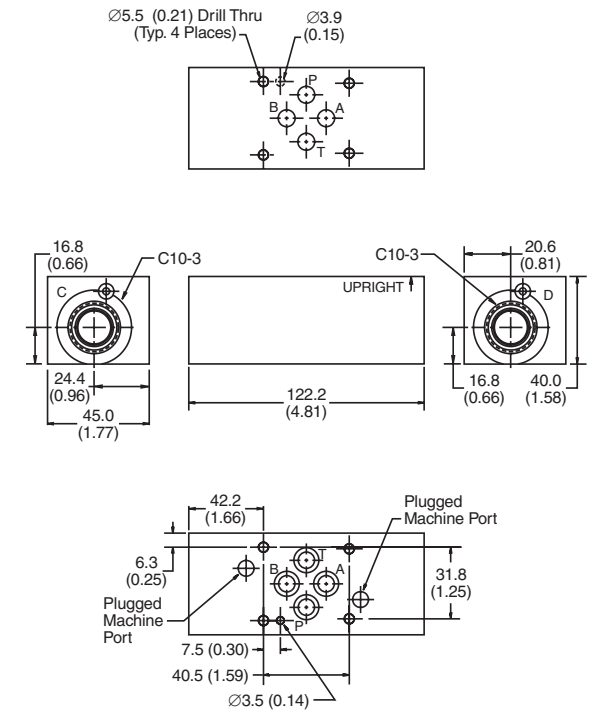
BD03	—	DDX	—			
D03 Cartpak Body		Dual (Ports A & B) Drain to Crossover		Plug Seals		Body Material

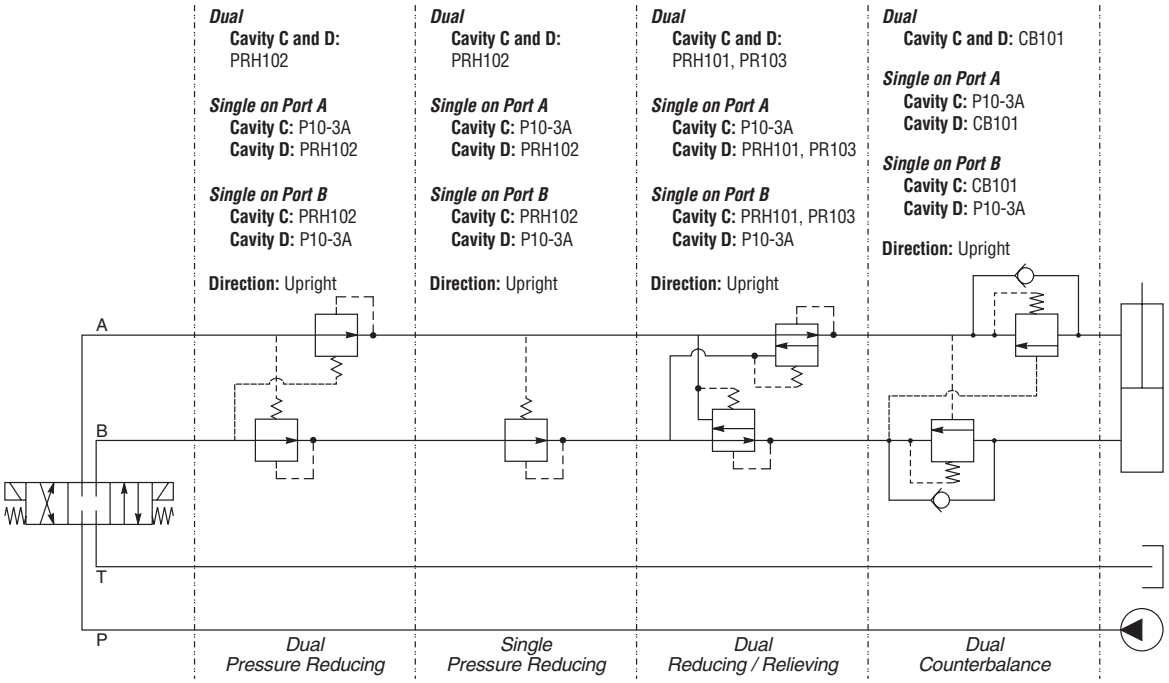
Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
• O-Rings and Drive Pin

Dimensions Millimeters (Inches)





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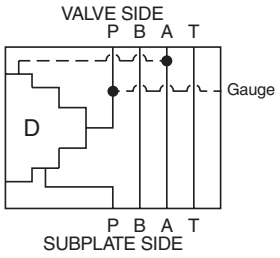
General Description

B Port Drain to A D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Ordering Information

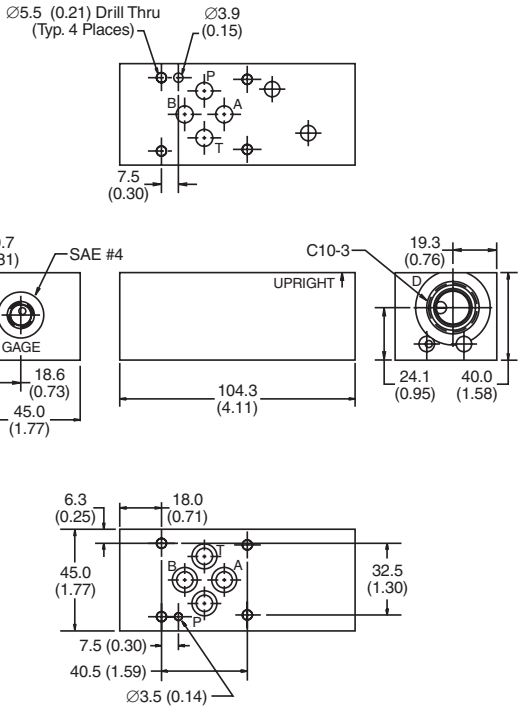
BD03	—	BDA	—			
D03 Cartpak Body		B Port Drain to A		Plug Seals		Body Material

Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
- Gage Port Plug Installed
- O-Rings and Drive Pin

Dimensions Millimeters (Inches)

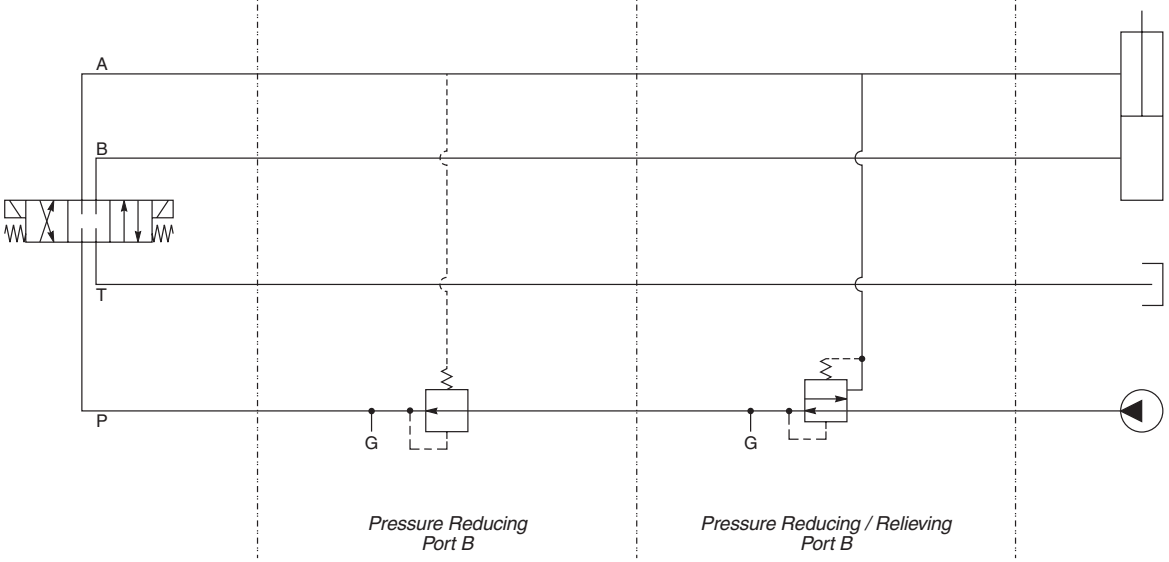


Cavity D: PRH102

Direction: Upright

Cavity D: PRH101
PR103

Direction: Upright



Pressure Reducing Port B

Pressure Reducing / Relieving Port B

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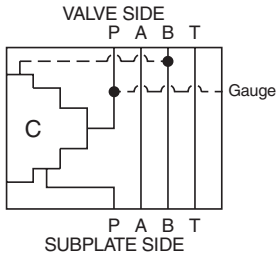
General Description

A Port Drain to B D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic

UPRIGHT



Ordering Information

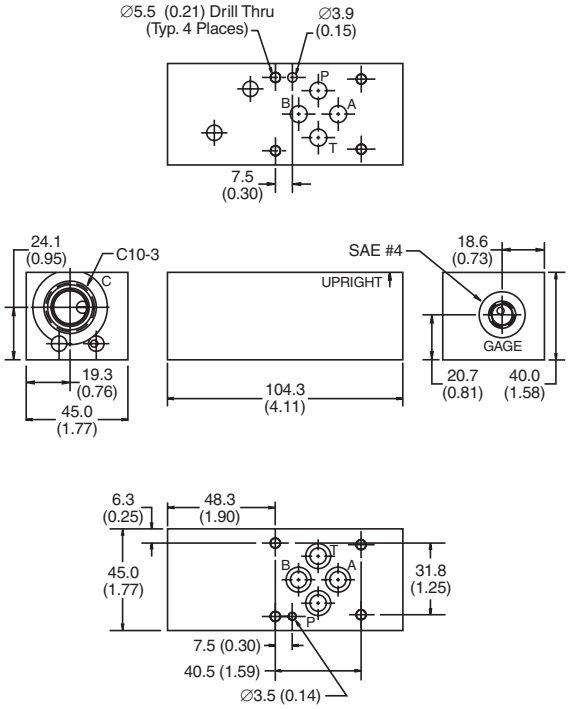
BD03	—	ADB	—		—	
D03 Cartpak Body		A Port Drain to B		Plug Seals		Body Material

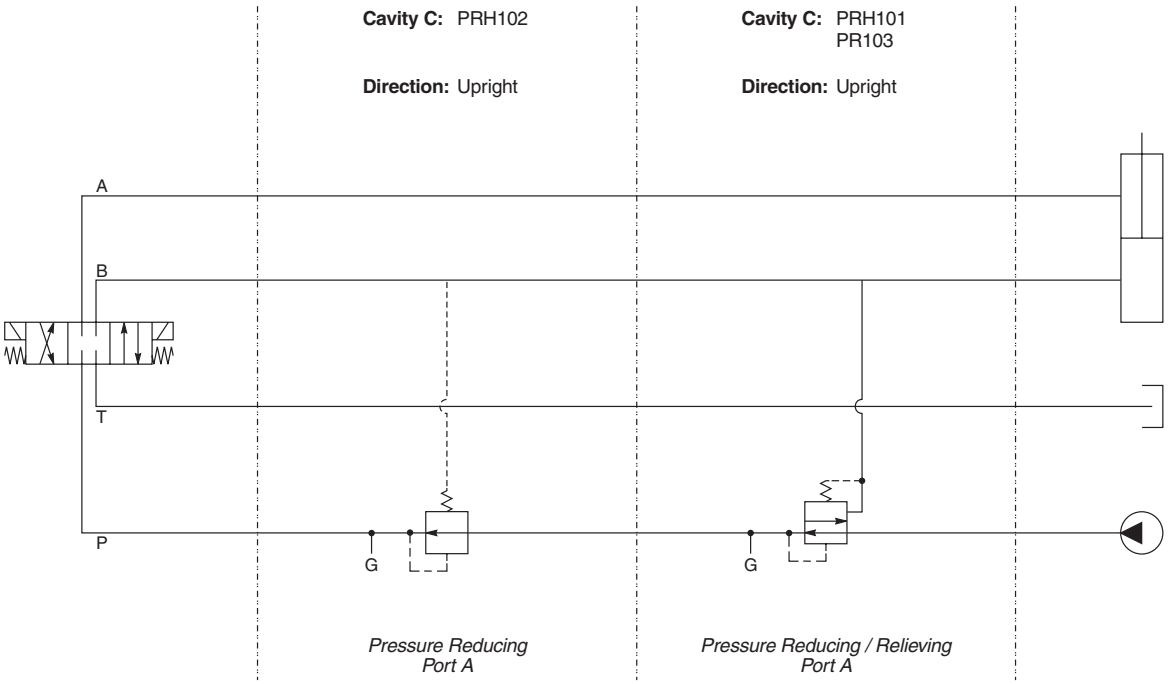
Code	Plug Seals
Omit	Nitrile

Code	Body Material
A	Aluminum
S	Steel (Ductile Iron)

Body supplied with:
- Gage Port Plug Installed
- O-Rings and Drive Pin

Dimensions Millimeters (Inches)





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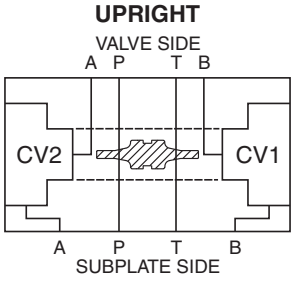
General Description

Dual P.O. Check D03 Cartpak Body.
For additional information see Technical Tips on pages CP1-CP3.

Body Schematic



Ordering Information

BD03	—	POC	—			
D03 Cartpak Body		A & B Ports to Tank		Plug Seals		Body Material

Code	Plug Seals
Omit	Nitrile

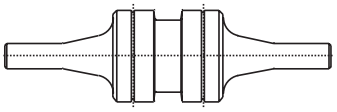
Code	Body Material
A	Aluminum

Body supplied with:
• O-Rings and Drive Pin Kit

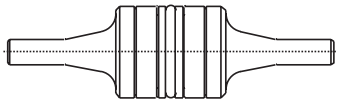
Functional assembly requires:
• CVH103P* - Check Valve - Qty. 2 - Ordered Separately
• 717917† - Pilot Piston - Qty. 1 - Ordered Separately

**** Indicates spring pressure option***
† Indicates seal option

Requires Dual Pilot Piston



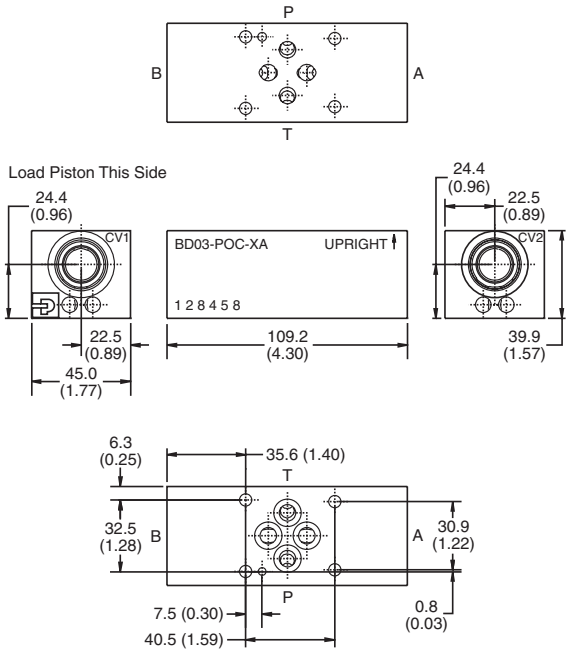
717917 Without Seal

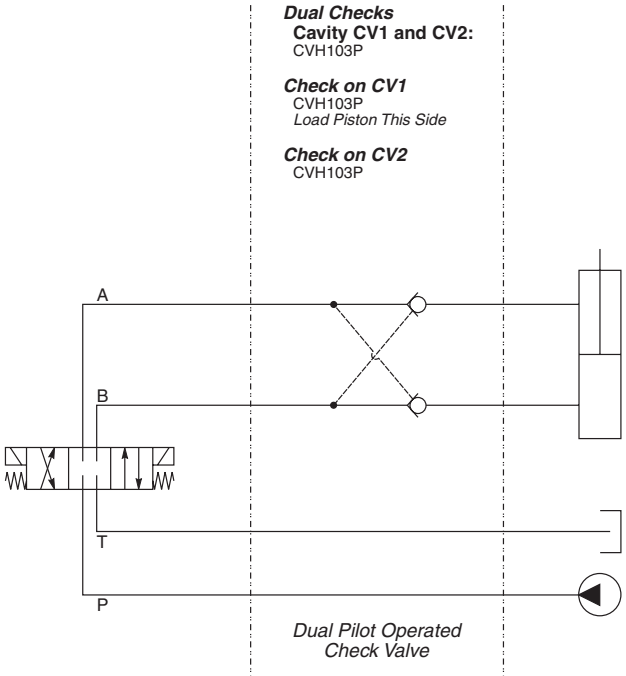


717917N With Buna N Seal

NOTE: *20 PSI check valve or higher recommended with sealed pilot piston.*

Dimensions Millimeters (Inches)





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Catalog HY15-3503/US

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Bodies and Cavities

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Bodies and Cavities

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68-1	3 Port or 4 Port Dual	LB102**	BC43
100-1	5 Port	LB1031*	BC44

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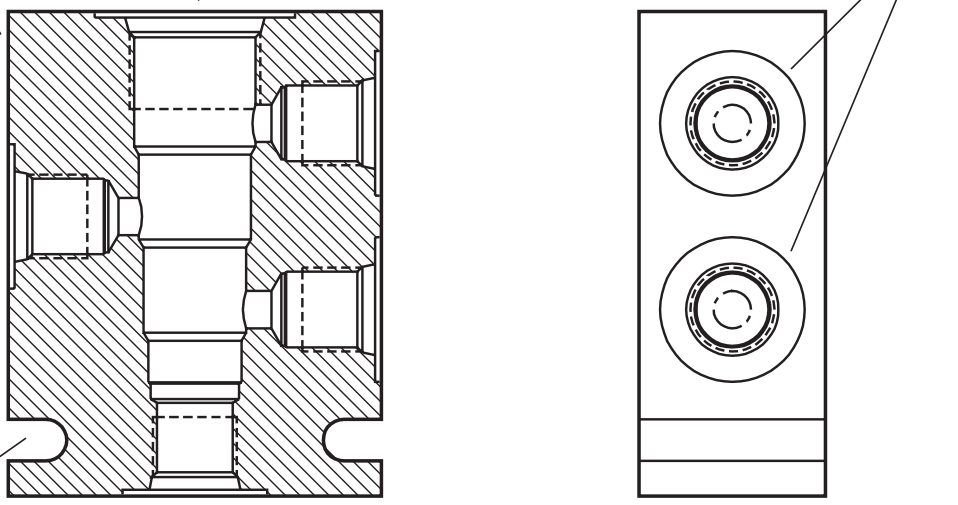
INTRODUCTION

This Technical Tips section is split into two parts; Standard Line Bodies and Cavities. In the standard line bodies section, we highlight the features and options of our standard offering of line bodies. In the cavity section we discuss “common” cavities and form tools.
The Technical Tips are provided to help you become more familiar with Parker Hannifin’s line of product and assist you in applying our product.

STANDARD LINE BODIES

Parker offers standard line bodies for each valve and cavity size.
Below are some of the features of Parker’s standard line bodies.



COMMON OPTIONS & FEATURES

Aluminum vs. Steel: Parker offers standard line bodies in both aluminum and steel. Aluminum bodies are most often used for general applications. They are lightweight and less costly than steel bodies. Parker’s aluminum bodies are coated with a clear anodize to provide a corrosion resistant protection. Aluminum bodies should never be used in applications above 210 bar (3000 psi.) Steel bodies are more durable and heavier than aluminum bodies. They are ideal for applications with elevated pressures or where rugged construction is desired. Steel bodies are suitable for applications up to 350 bar (5000 psi.) Parker’s steel bodies are coated with zinc providing corrosion resistance. Zinc even provides the steel body many hours of protection from salt spray.

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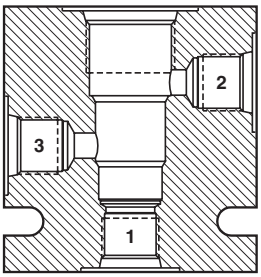
COMMON OPTIONS & FEATURES (Cont.)

Pressure Drop: The pressure drop through a line body is fairly minimal. Each catalog page shows a pressure drop curve. This should be added to the pressure drop through the cartridge when trying to estimate total pressure drop for a function.

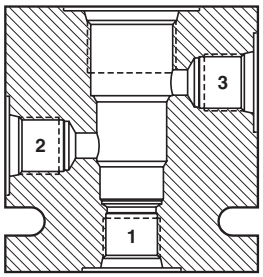
Porting: Parker offers a variety of port sizes and types for each line body. While NPT or pipe ports were once very popular and are still offered, we recommend SAE ports for new applications. SAE ports and fittings provide a more secure connection than pipe ports.

"If using an HY15-3502 or an older catalog, note we have re-numbered the ports on our 3-way line bodies" In the past, three way bodies were numbered with the nose being port 1, the middle port labeled (3), and the top port labeled (2). Over the years, this has caused some confusion, so we have relabeled the ports sequentially from the bottom.

For identification, the current design will be marked with a Parker symbol like the one shown.



Previous Design



Current Design

CAVITIES

The hole that the cartridge valve is screwed into is called a cavity. Many cartridge producers manufacture valves that fit a "common" cavity. With a "common" cavity, a valve theoretically could be removed from a cavity and replaced by another manufacturer's product. One should be careful though to check cross drill ports and thread depths when pursuing this activity. While it is true that many manufacturer's products fit inside another's cavity, the cross drills sometimes expose an o-ring to pressure, causing the o-ring to be extruded.

Valve / Cavity Compatibility Chart: Through acquisition, Parker Hannifin has accumulated a number of manufacturers with "common" cavities. To accommodate all of our product lines, we have released a new cavity for our Winner's Circle product line. The cavities shown in this catalog are considered Winner's Circle Cavities. The Winner's Circle valves are downward and upward compatible with the Parker Series of product. On each catalog page, you will find a chart like the one shown on this page. The purpose of this chart is to help identify if a valve from one acquisition can be replaced by the Winner's Circle valve, or another acquisition. The valves are designated by the columns of the chart and the cavities by the rows. If you have an existing cavity, you find it on the chart and follow across to see which valves you may put in the cavity. For instance, using the chart below, let's say you have an existing manifold in which you had manufactured a FPS cavity (maybe you were using a SV2A-10). By finding the row labeled FPS and following across, you find that you could use the new Winner's Circle product, an FPS product, or a CEC product of the same size in this cavity. A Parker or Waterman valve will not fit in this cavity without modifying the cavity. This chart is provided to help you in converting to the Winner's Circle product line.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS	X			X	X
	CEC	X			X	X

Cavity Tools: On each catalog page, cavity tools are listed for your use in creating special manifolds. More is discussed on manifold construction in the Technical Data section of this catalog. For 3-way and 4-way valves, you will find a roughing and a finishing tool. The rougher is a step drill used to prep the cavity for the finishing tool. The rougher removes the mass of material and is necessary because the finisher is not designed for primary forming. The finisher is a precision tool used to provide the final dimensions of the cavity. No rougher is offered for 2-way cavities because a standard drill bit can be used to remove the mass of material.

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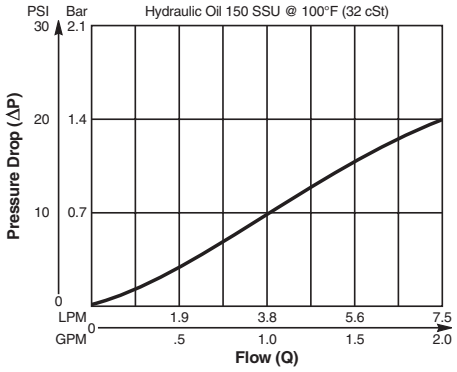
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

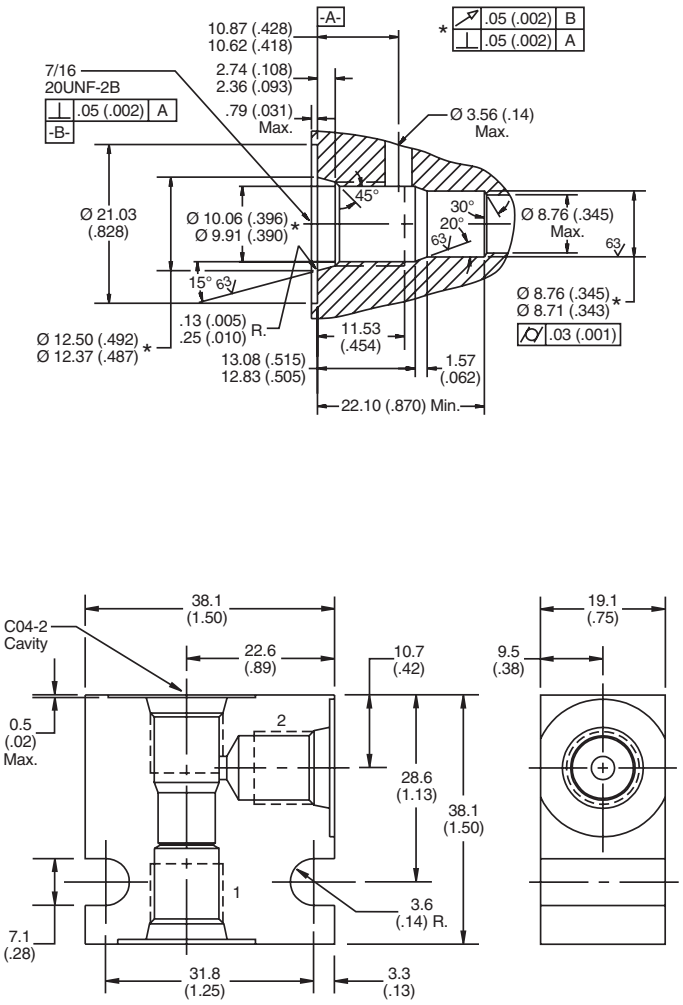
		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X		
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS					
	CEC					

Performance Curve

Pressure Drop vs. Flow



Dimensions Millimeters (Inches)



Ordering Information

B04	—	2	—			
04 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
4T	SAE - 4

Form Tool: Rougher None
Finisher NFT04-2F
Weight: .07 kg (.15 lbs.)

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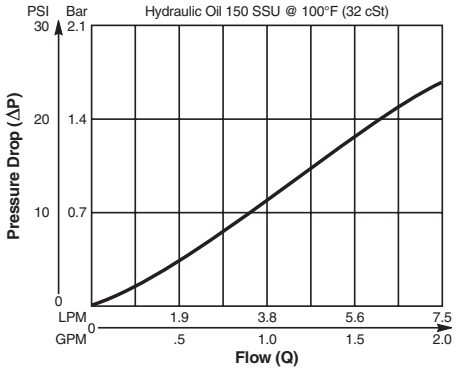
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X		
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS					
	CEC					

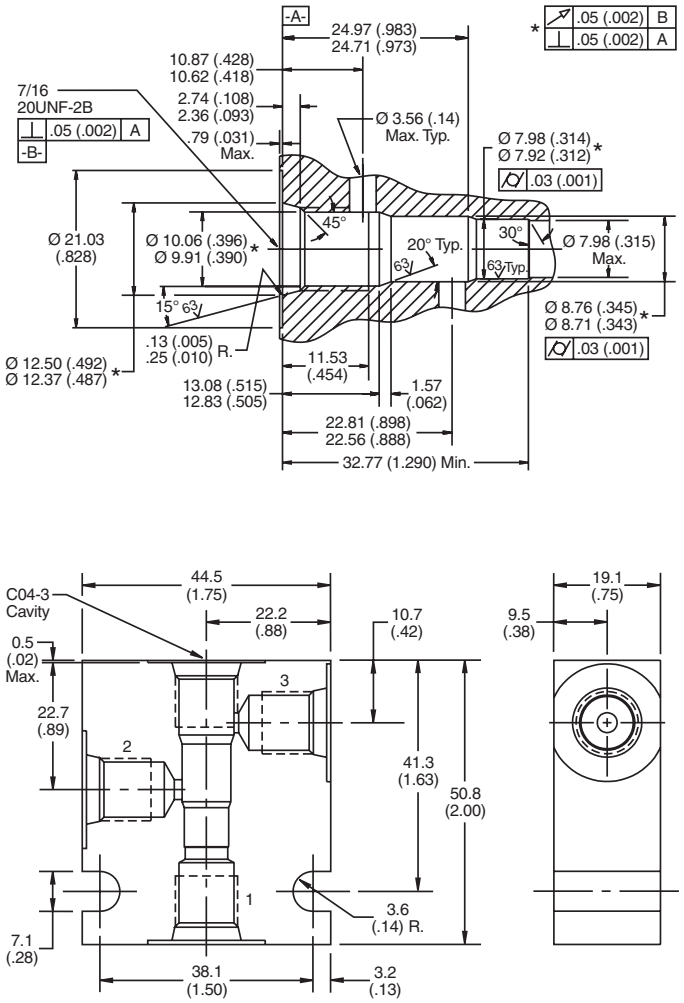
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B04	—	3	—	
04 Size		3-Way Cavity		Port Size

Code	Port Size / Material
4T	SAE-4 Steel
A4T	SAE-4 Aluminum

Form Tool: Rougher NFT04-3R
Finisher NFT04-3F
Weight: .10 kg (.23 lbs.)

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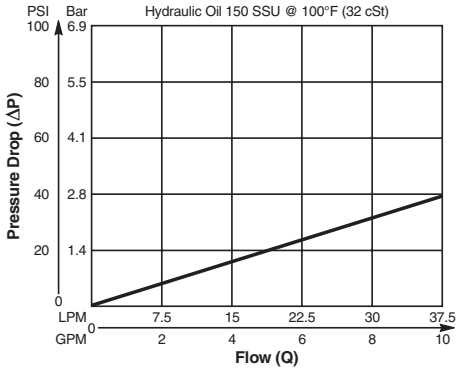
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X	X	X
	Waterman	X	X	X	X	X
	FPS	X	X	X	X	X
	CEC	X	X	X	X	X

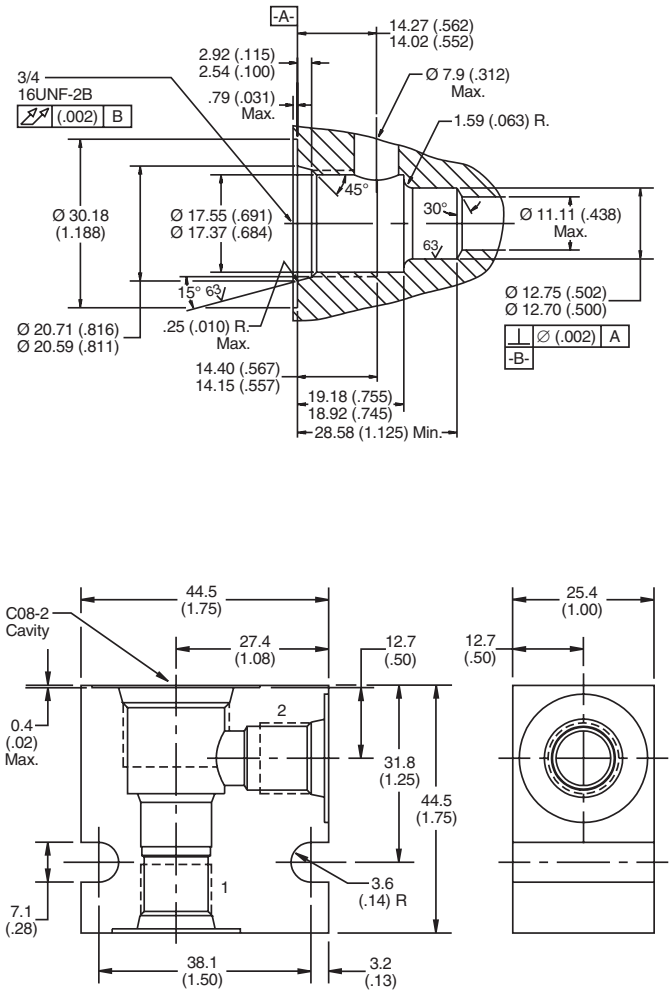
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B08	—	2	—			
08 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
6T	SAE - 6

Form Tool: Rougher None
Finisher NFT08-2F

Weight: .11 kg (.25 lbs.)

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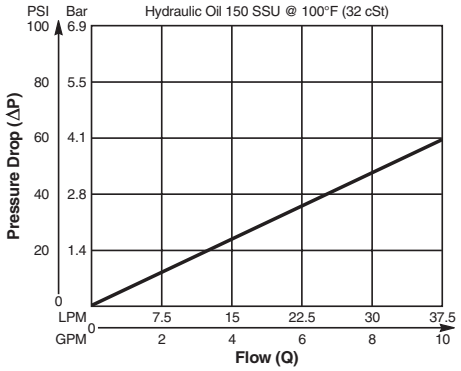
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X		
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS				X	X
	CEC				X	X

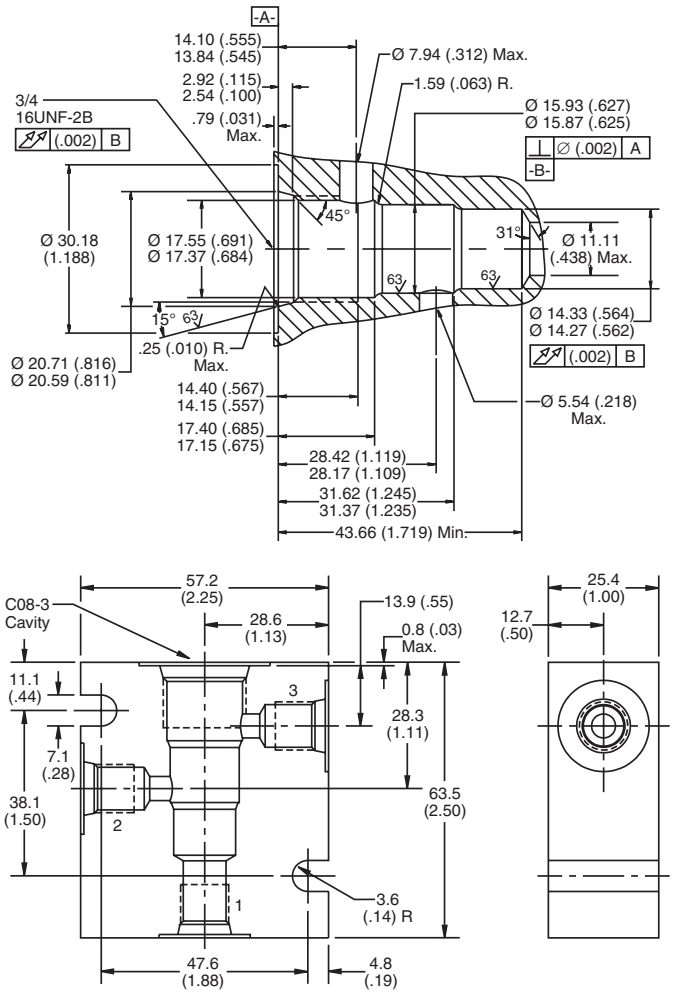
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B08	—	3	—			
08 Size		3-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
6T	SAE - 6

Form Tool: Rougher NFT08-3R
Finisher NFT08-3F

Weight: .27 kg (.60 lbs.)

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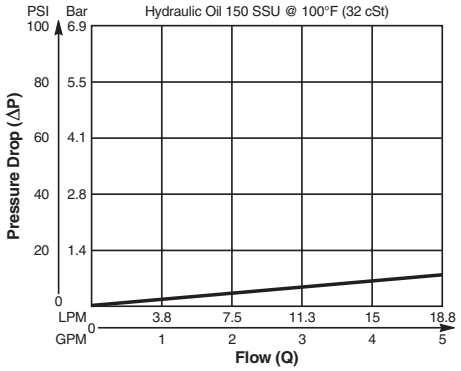
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

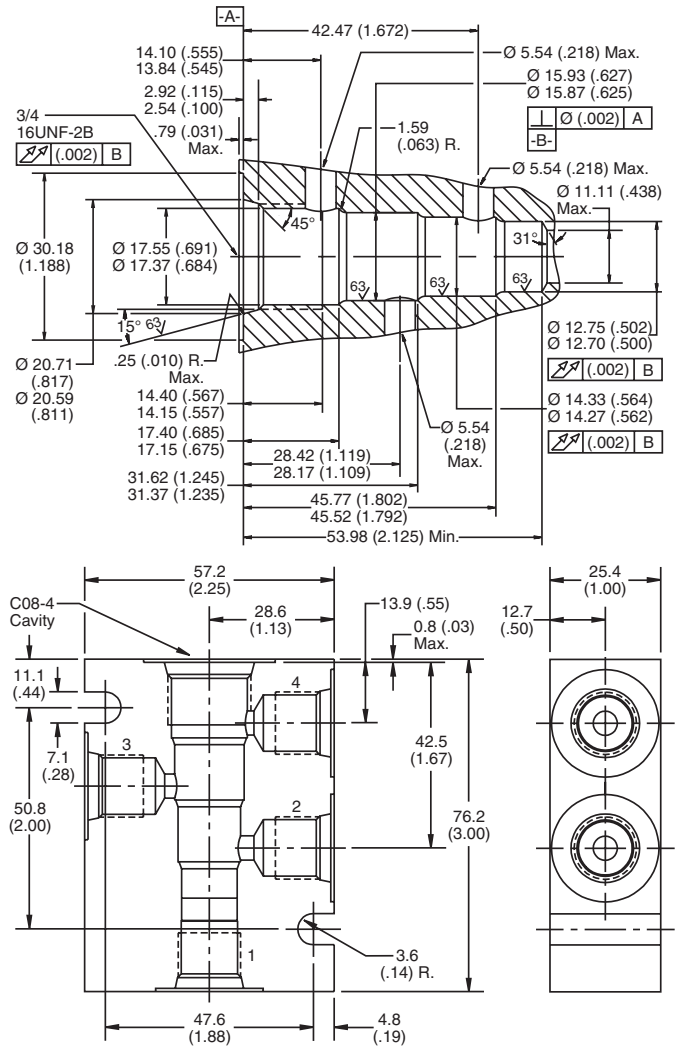
		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X		
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS				X	
	CEC					

Performance Curve

Pressure Drop vs. Flow



Dimensions Millimeters (Inches)



Ordering Information

B08	—	4	—			
08 Size		4-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
6T	SAE - 6

Form Tool: Rougher NFT08-4R
Finisher NFT08-4F
Weight: .45 kg (1.0 lbs.)

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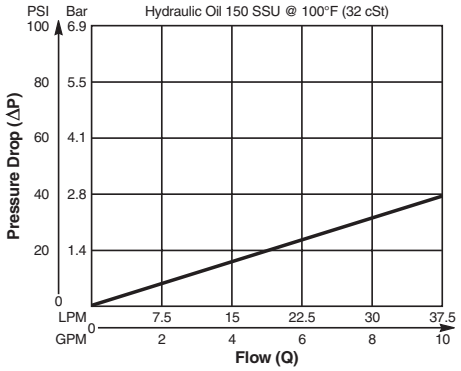
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle					
	Parker		X	X		
	Waterman		X	X		
	FPS					
	CEC					

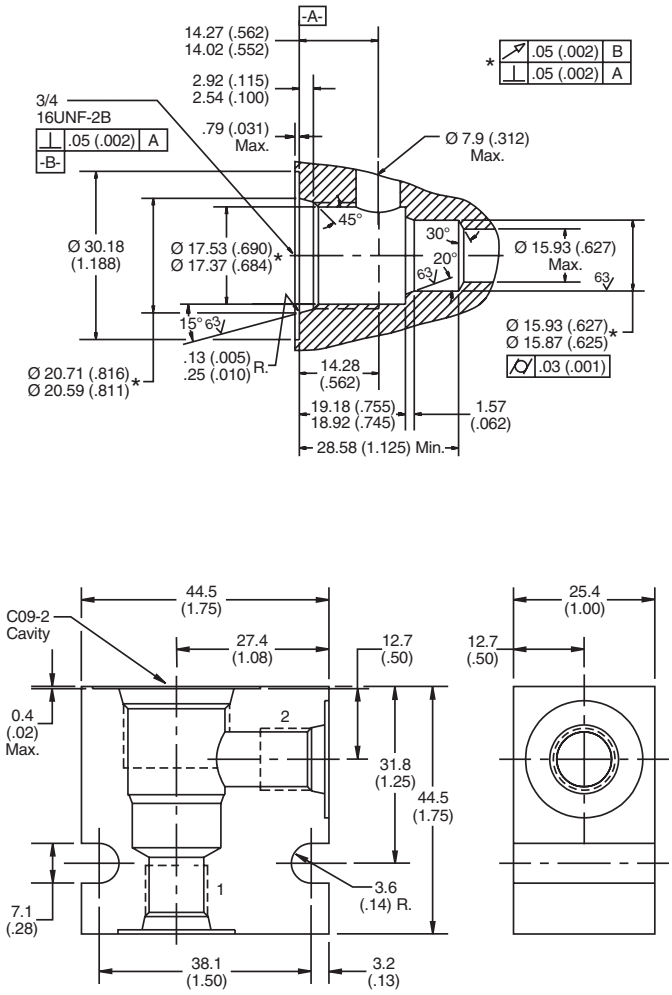
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B09	—	2	—			
09 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
6T	SAE - 6

Form Tool: Rougher None
Finisher FT09-2

Weight: 11 kg (.25 lbs.)

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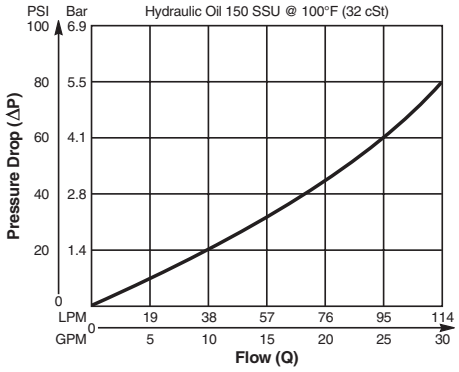
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS	X			X	X
	CEC	X			X	X

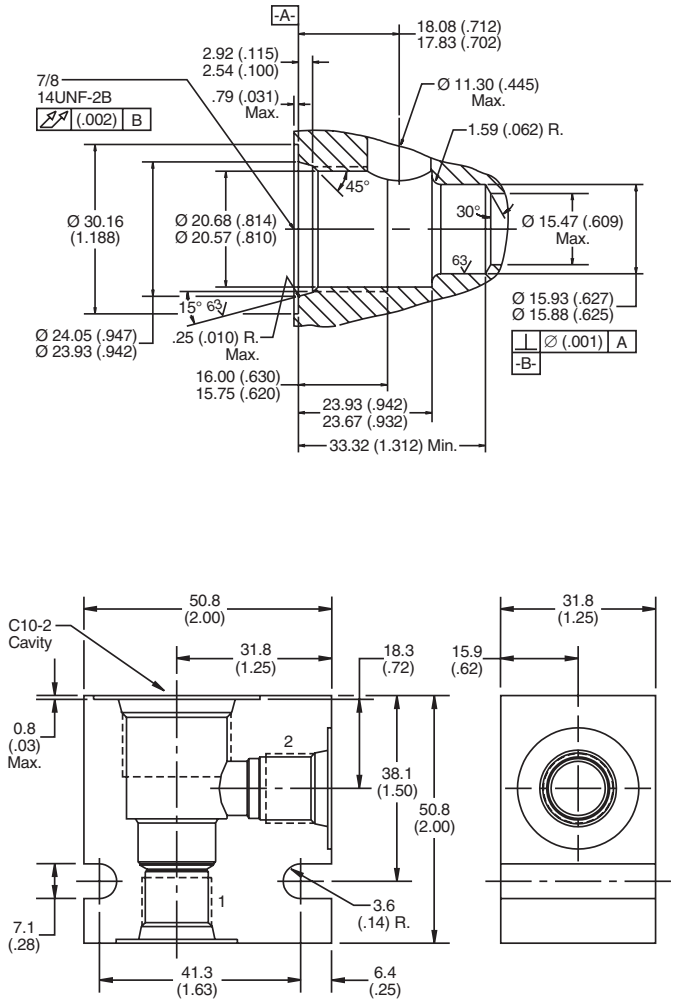
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B10	—	2	—			
10 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
8T	SAE - 8

Form Tool: Rougher None
Finisher NFT10-2F

Weight: .45 kg (1.0 lbs.)

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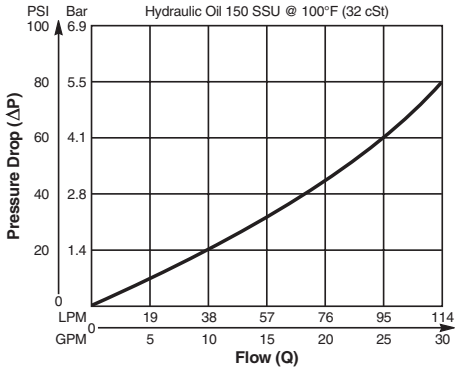
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS	X			X	X
	CEC	X			X	X

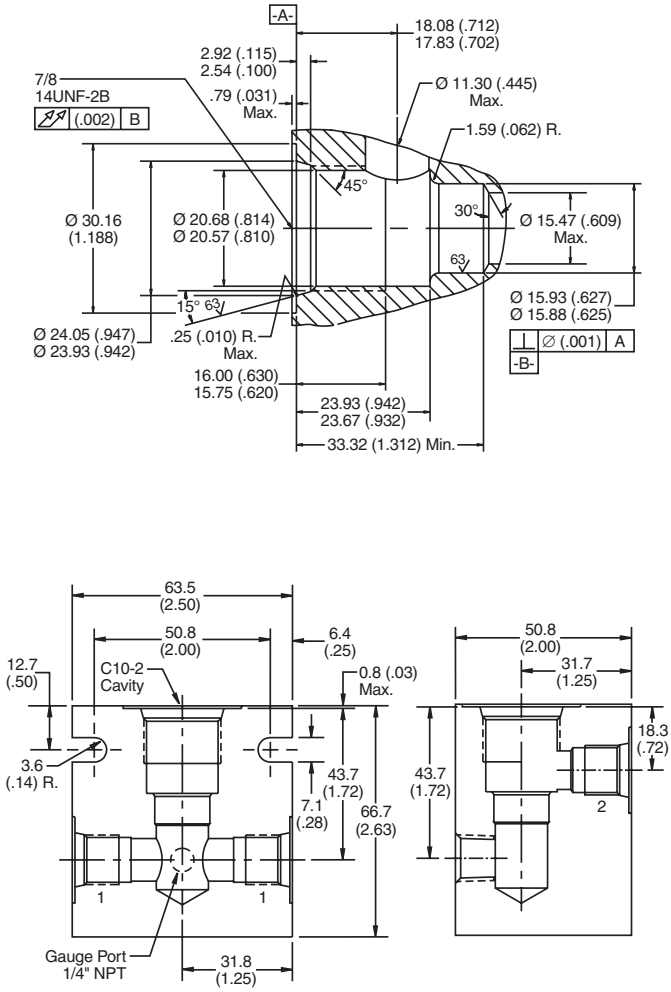
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B10	—	2	—	T8T
10 Size		2-Way Cavity		Port Size

Code	Port Size
T8T	SAE - 8

Form Tool: Rougher None
Finisher NFT10-2F

Weight: 1.4 kg (3.0 lbs.)

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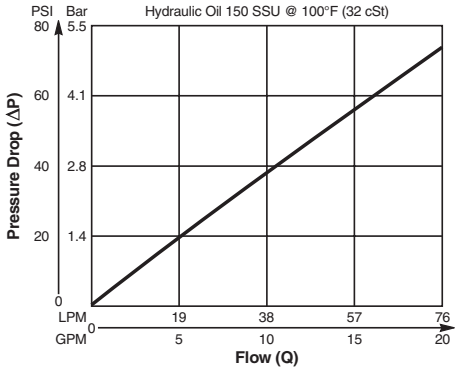
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X	X	X
	Waterman	X	X	X	X	X
	FPS	X	X	X	X	X
	CEC	X	X	X	X	X

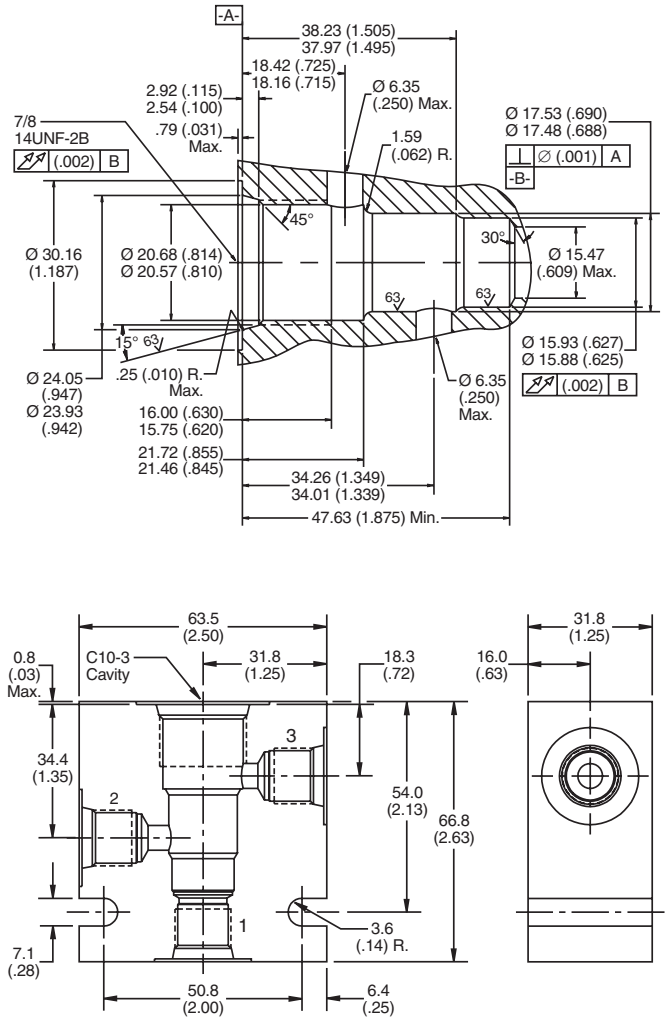
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B10	—	3	—			
10 Size		3-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
8T	SAE - 8

Form Tool: Rougher NFT10-3R
Finisher NFT10-3F
Weight: .77 kg (1.7 lbs.)

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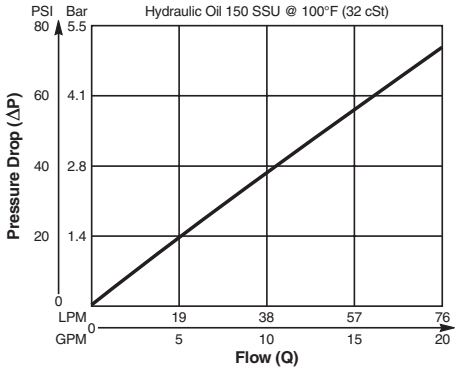
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle					
	Parker		X	X	X	
	Waterman		X	X	X	
	FPS		X	X	X	
	CEC					

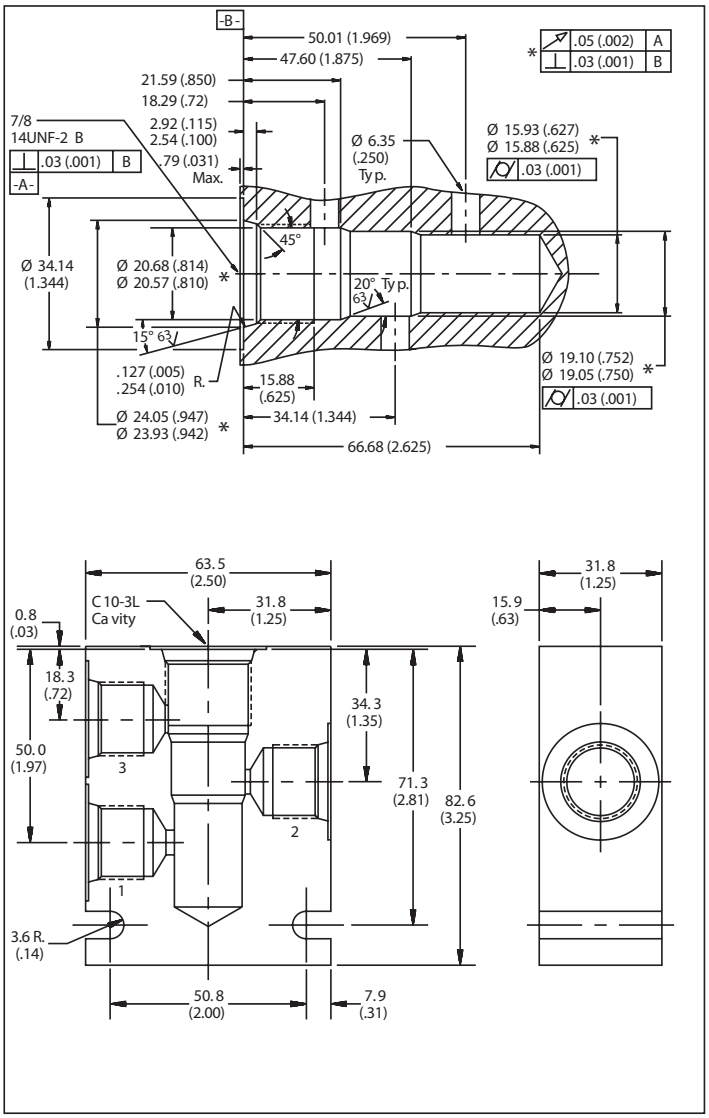
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B10	—	3L	—			
10 Size		3-Way Long Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
8T	SAE - 8

Form Tool: Rougher NFT10L-3R
Finisher NFT10L-3F
Weight: .77 kg (1.7 lbs.)

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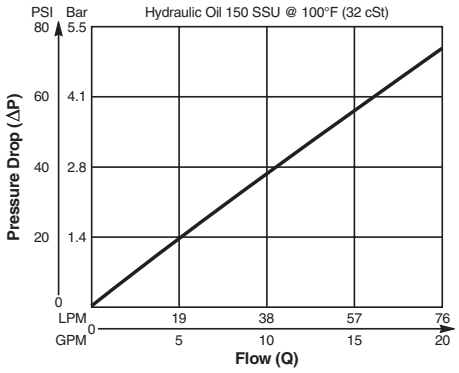
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X			X	X
	Parker					
	Waterman					
	FPS	X			X	X
	CEC	X			X	X

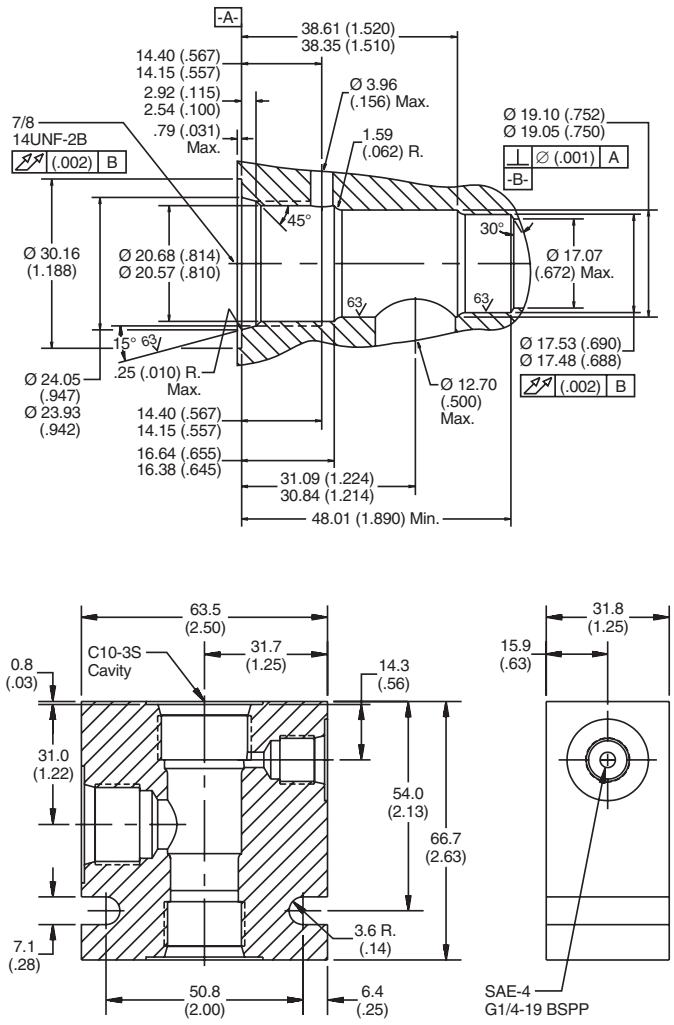
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B10	—	3S	—			
10 Size		3-Way Short Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
8T	SAE - 8

Form Tool: Rougher NFT10S-3R
Finisher NFT10S-3F
Weight: .77 kg (1.7 lbs.)

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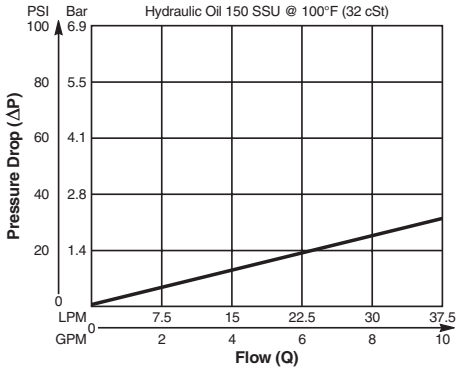
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X	X	X
	Waterman	X	X	X	X	X
	FPS	X	X	X	X	X
	CEC	X	X	X	X	X

Performance Curve

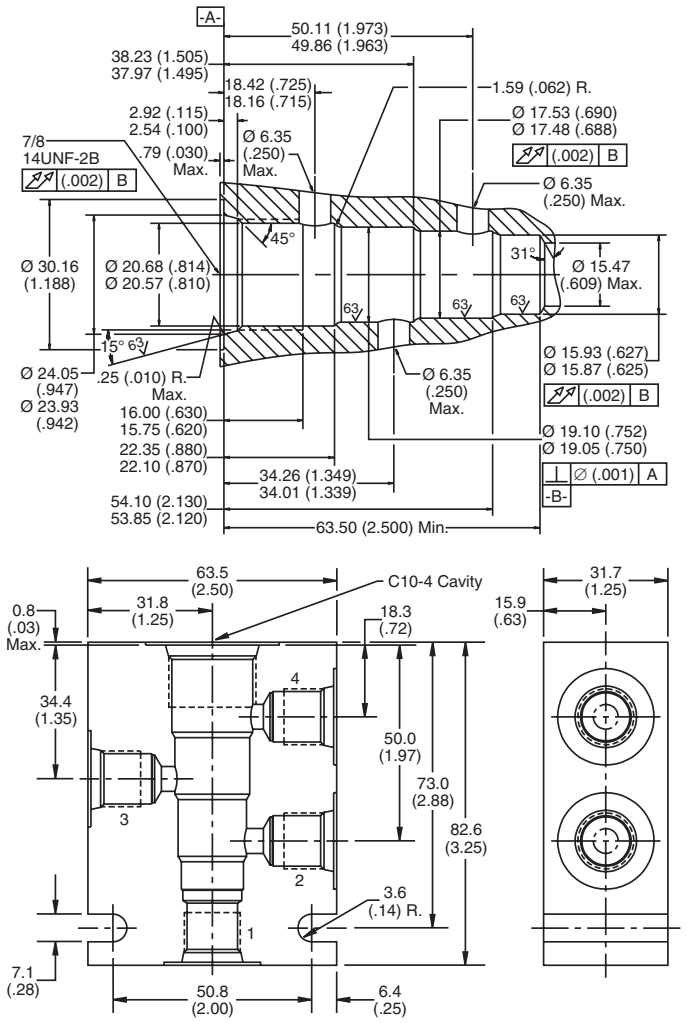
Pressure Drop vs. Flow



NOTE:
When machining for use with DF102P, Ports 1 and 4 must be connected in the manifold/block.

Dimensions

Millimeters (Inches)



Ordering Information

B10	—	4	—			
10 Size		4-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
8T	SAE - 8

Form Tool: Rougher NFT10-4R
Finisher NFT10-4F
Weight: .90 kg (2.0 lbs.)

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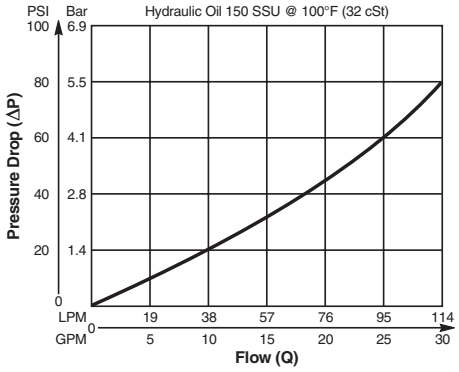
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X		
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS					
	CEC					X

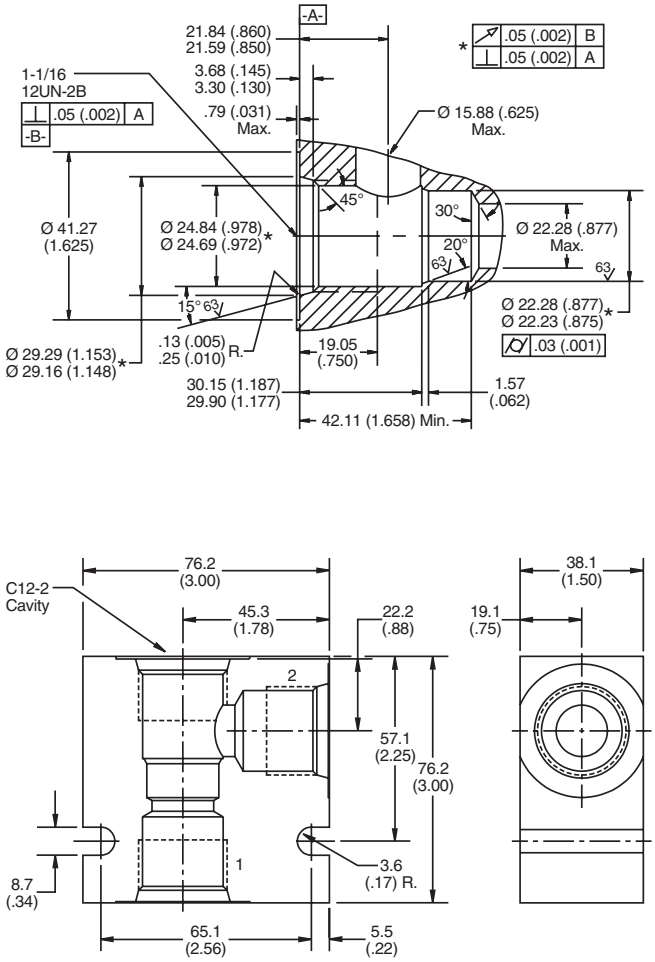
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B12	—	2	—			
12 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
12T	SAE - 12

Form Tool: Rougher None
Finisher NFT12-2F

Weight: .45 kg (1.0 lbs.)

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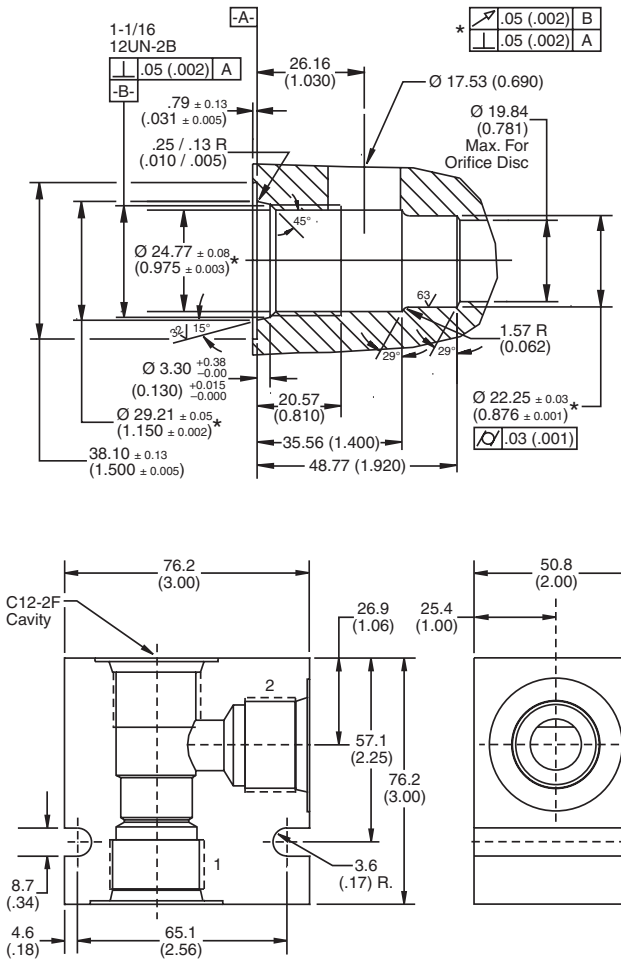
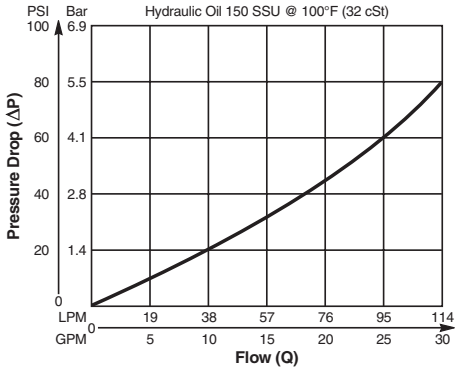
Dimensions Millimeters (Inches)



Performance Curve

Pressure Drop vs. Flow



Ordering Information

B12	—	2F	—			
12 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
12T	SAE - 12

Form Tool: Rougher None
Finisher NFT12-2F
Weight: .30 kg (.65 lbs.)

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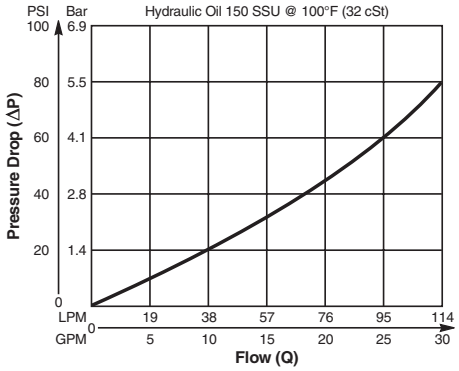
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X		
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS					
	CEC					X

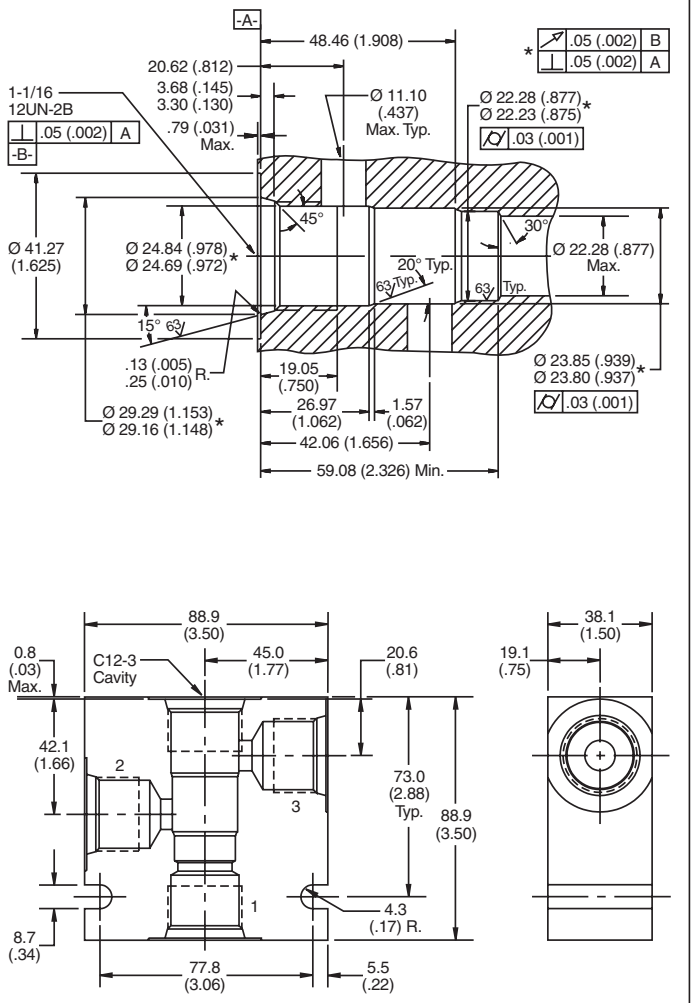
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B12	—	3	—			
12 Size		3-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
12T	SAE - 12

Form Tool: Rougher NFT12-3R
Finisher NFT12-3F
Weight: 2.0 kg (4.5 lbs.)

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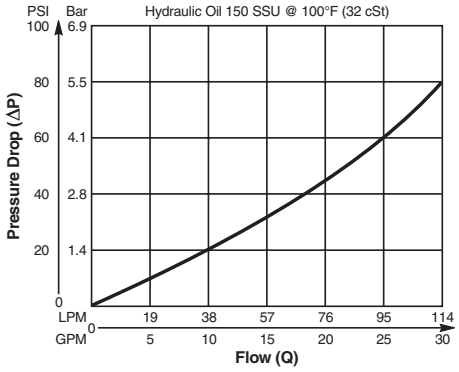
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X		
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS					
	CEC					X

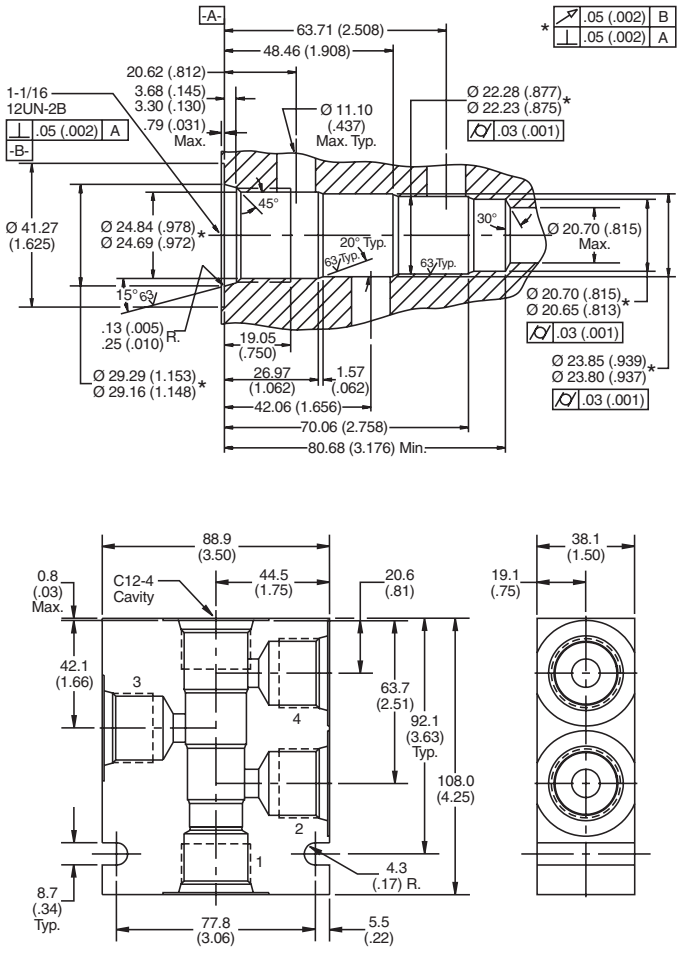
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B12	—	4	—			
12 Size		4-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
12T	SAE - 12

Form Tool: Rougher NFT12-4R
Finisher NFT12-4F
Weight: 3.3 kg (7.3 lbs.)

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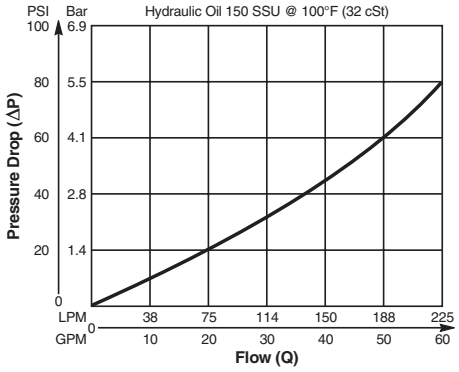
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS	X			X	X
	CEC	X			X	X

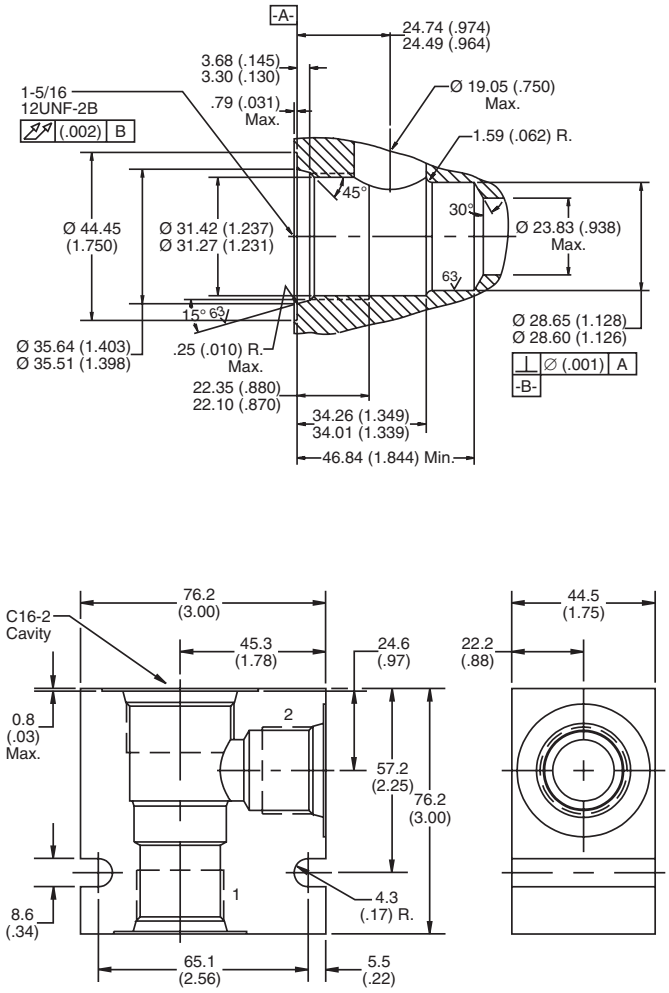
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B16	—	2	—			
16 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
16T	SAE - 16

Form Tool: Rougher None
Finisher NFT16-2F

Weight: 1.5 kg (3.4 lbs.)

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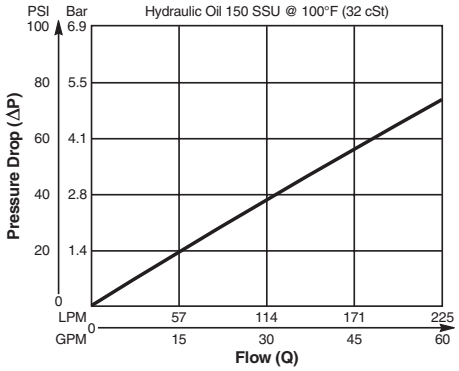
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS	X			X	X
	CEC	X			X	X

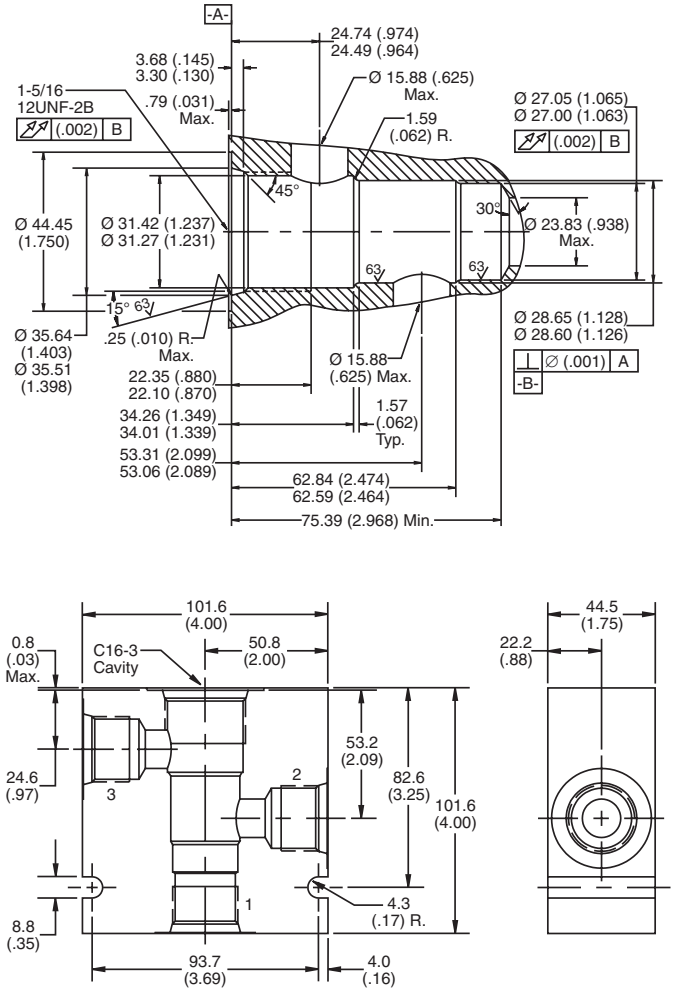
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B16	—	3	—			
16 Size		3-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
16T	SAE - 16

Form Tool: Rougher NFT16-3R
Finisher NFT16-3F

Weight: 3.0 kg (6.5 lbs.)

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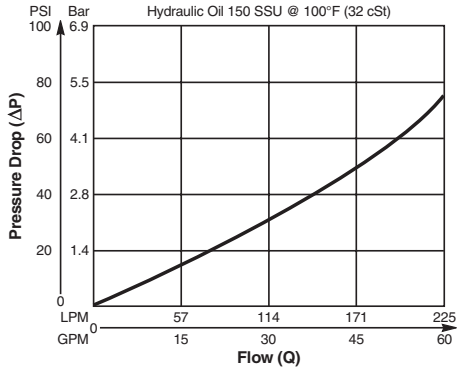
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X	X	X
	Waterman	X	X	X	X	X
	FPS	X	X	X	X	X
	CEC	X	X	X	X	X

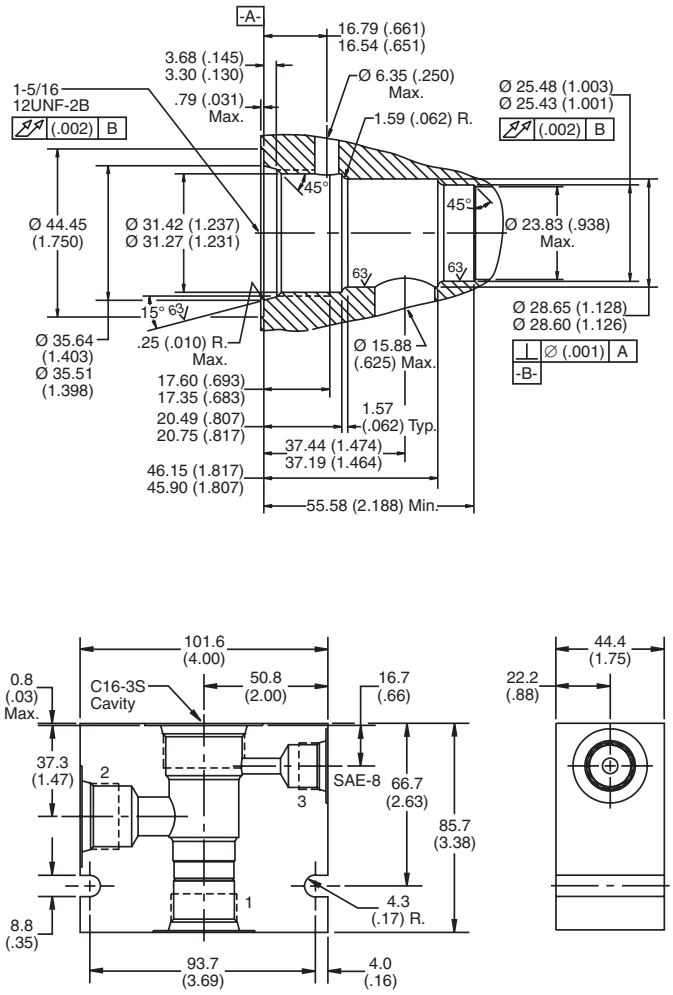
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B16	—	3S	—			
16 Size		3-Way Short Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
16T	SAE - 16

Form Tool: Rougher NFT16S-3R
Finisher NFT16S-3F

Weight: 2.4 kg (5.4 lbs.)

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Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

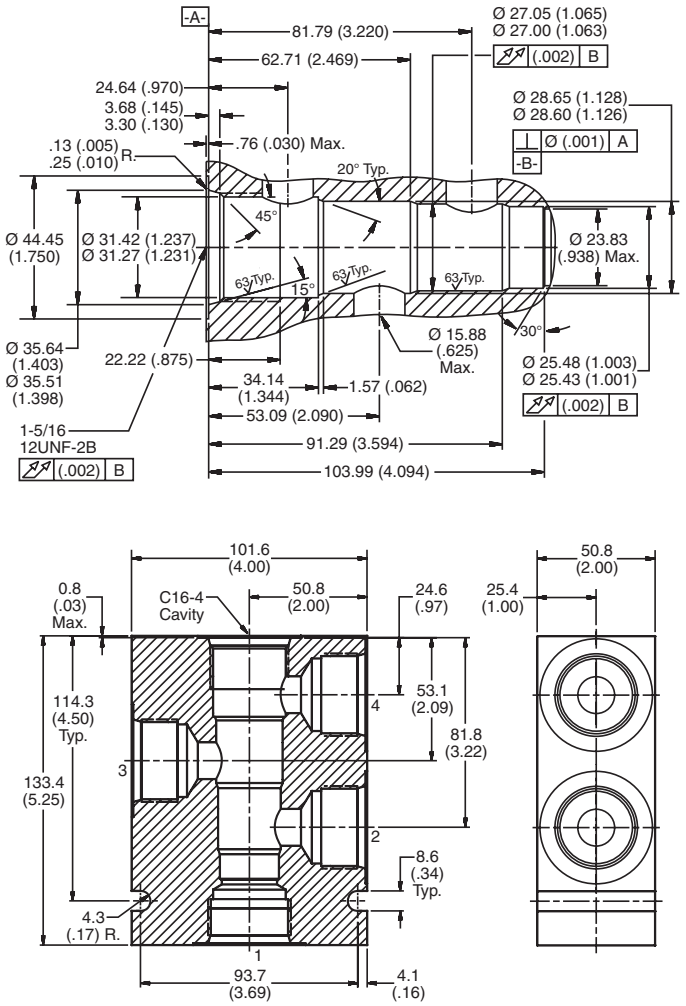
		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X		
	Waterman	X	X	X		
	FPS	X			X	X
	CEC	X			X	X

Performance Curve

Pressure Drop vs. Flow

Dimensions

Millimeters (Inches)



Ordering Information

B16	—	4	—			
16 Size		4-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
16T	SAE - 16

Form Tool: Rougher NFT16-4R
Finisher NFT16-4F

Weight: 3.75 kg (8.125 lbs.)

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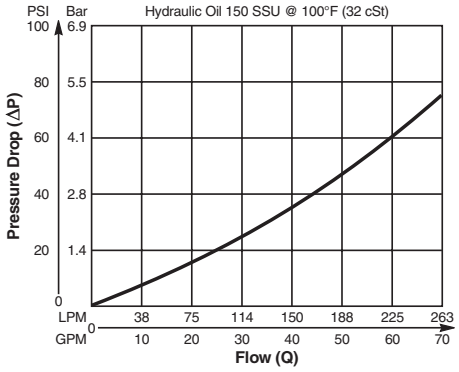
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE				
		Winner's Circle	Parker	Waterman	FPS	CEC
CAVITY	Winner's Circle	X	X	X	X	X
	Parker	X	X	X	X	X
	Waterman	X	X	X	X	X
	FPS	X	X	X	X	X
	CEC	X	X	X	X	X

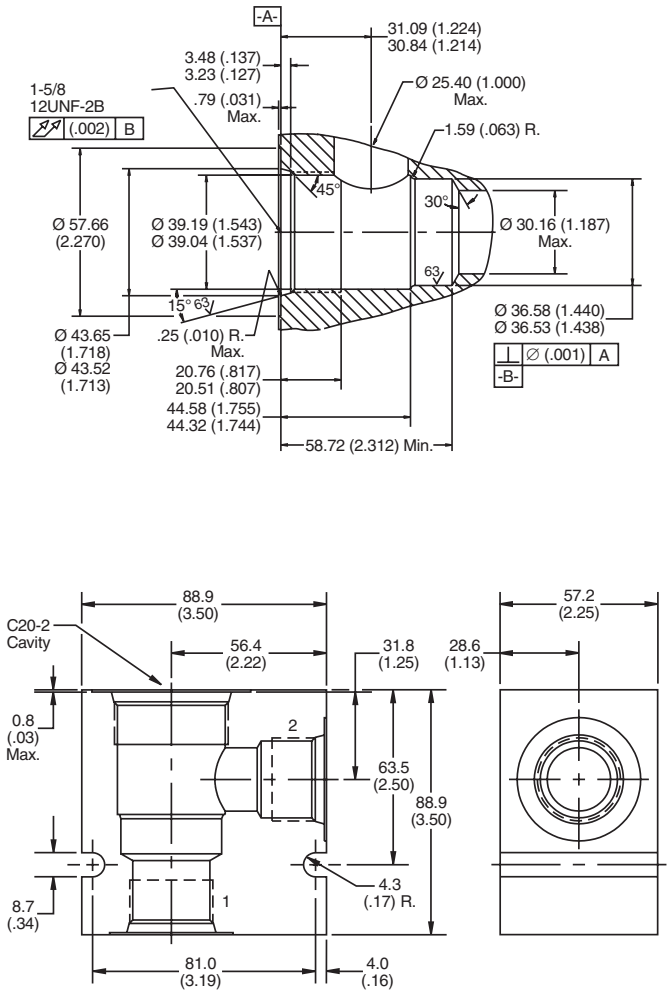
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B20	—	2	—			
20 Size		2-Way Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel
A	Aluminum

Code	Port Size
20T	SAE - 20

Form Tool: Rougher None
Finisher NFT20-2F

Weight: 6.3 kg (14 lbs.)

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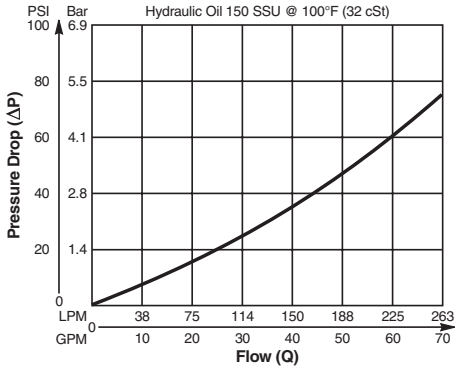
Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

CAVITY	VALVE: Winner's Circle	Parker	Waterman	FPS	CEC
Winner's Circle	X				X
Parker					
Waterman					
FPS					
CEC	X				X

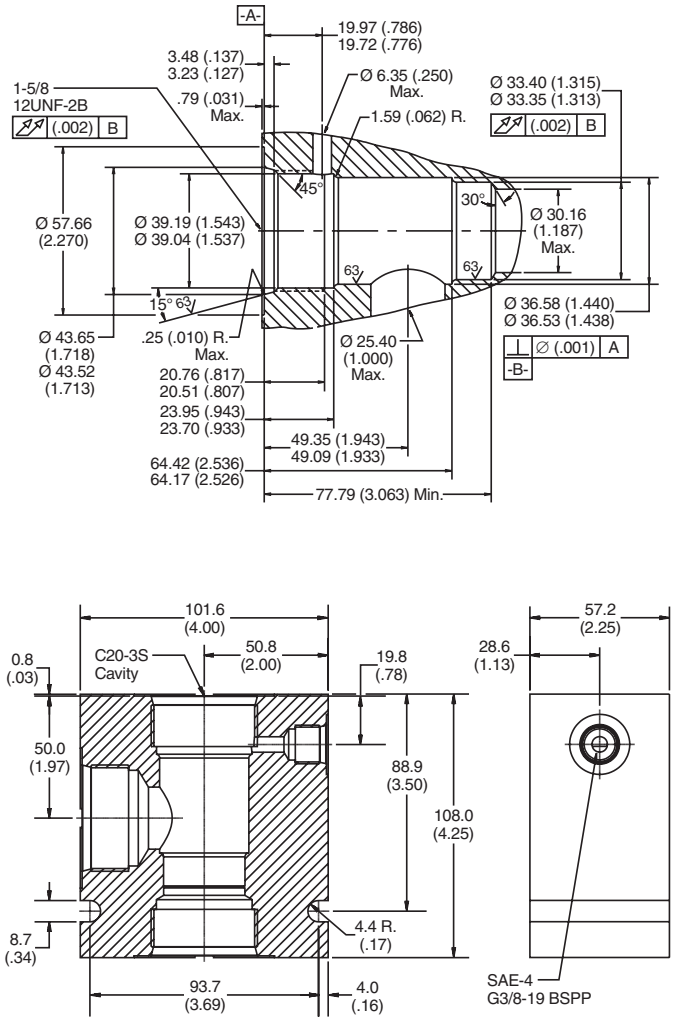
Performance Curve

Pressure Drop vs. Flow



Dimensions

Millimeters (Inches)



Ordering Information

B20	—	3S	—			
20 Size		3-Way Short Cavity		Body Material		Port Size

Code	Body Material
Omit	Steel

Code	Port Size
20T	SAE - 20

Form Tool: Rougher NFT20S-3R
Finisher NFT20S-3F

Weight: 10.8 kg (22.2 lbs.)

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Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE	
		MHC-010	2-N-4*-10
CAVITY	MHC-010	X	X
	2-N-4*-10	X	X

Ordering Information

MHC	010		53
Counterbalance Cartridge Valve	Nominal Flow Rating	Body Type	Port Size

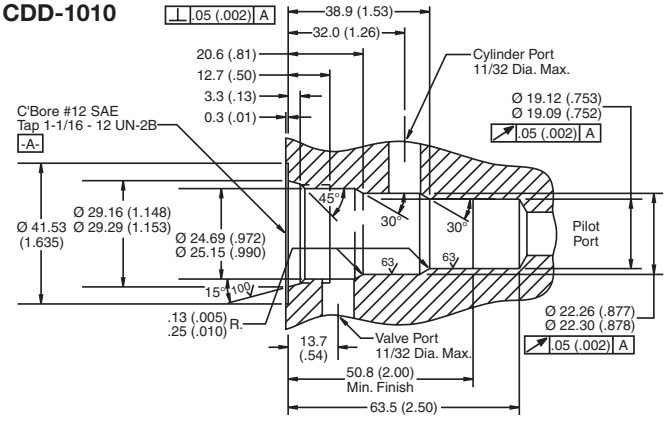
Code	Body Type
A	Single
D	Dual

Code	Port Size
53	SAE-10 through port

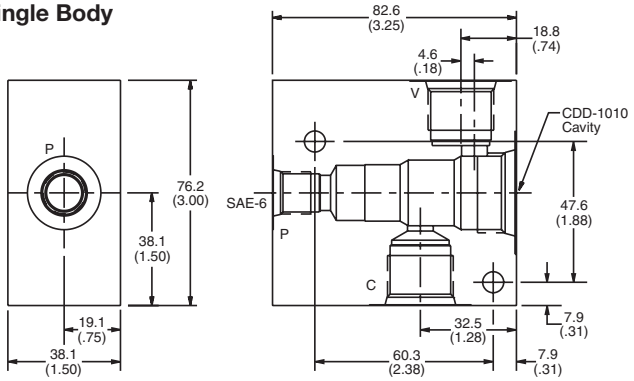
Form Tool: FR-500
Weight: Single 1.1 kg (2.25 lbs.)
Dual 1.9 kg (4.10 lbs.)

Dimensions Millimeters (Inches)

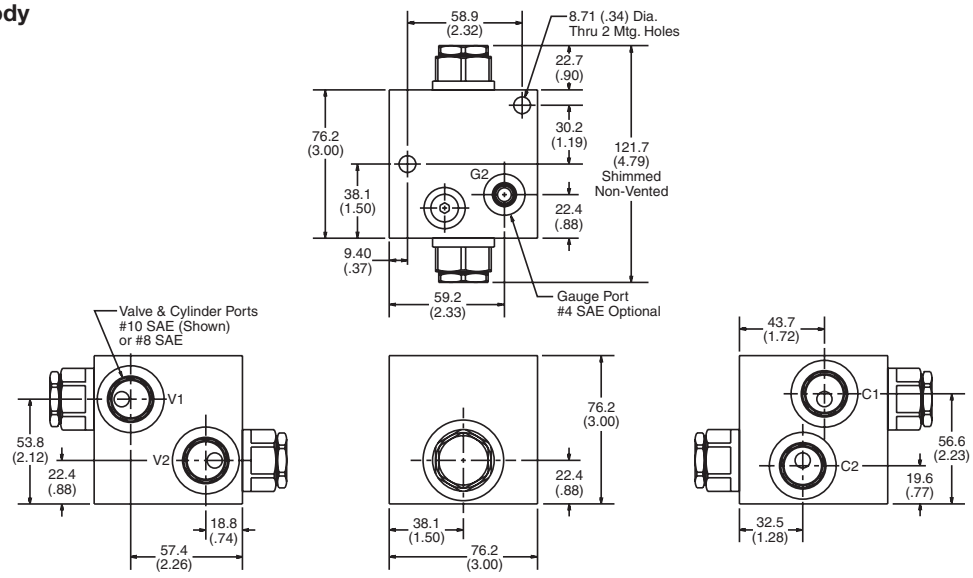
CDD-1010



Single Body



Dual Body



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Valve/Cavity Compatibility

For additional information see Technical Tips on pages BC1-BC2.

		VALVE	
		MHC-022	2-N-4*-25
CAVITY	MHC-022	X	X
	2-N-4*-25	X	X

Ordering Information

MHC	—	022	—		—	53
Counterbalance Cartridge Valve		Nominal Flow Rating		Body Type		Port Size

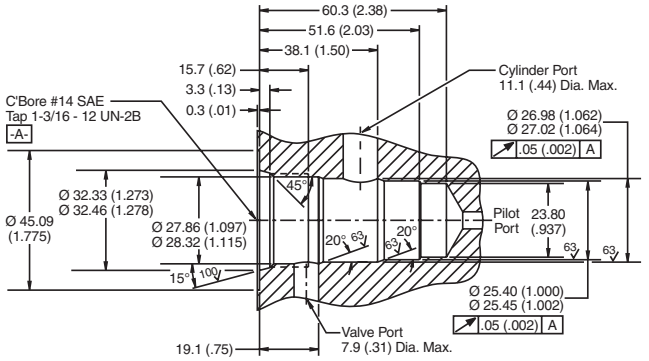
Code	Body Type
A	Single
D	Dual

Code	Port Size
53	SAE-10 through port

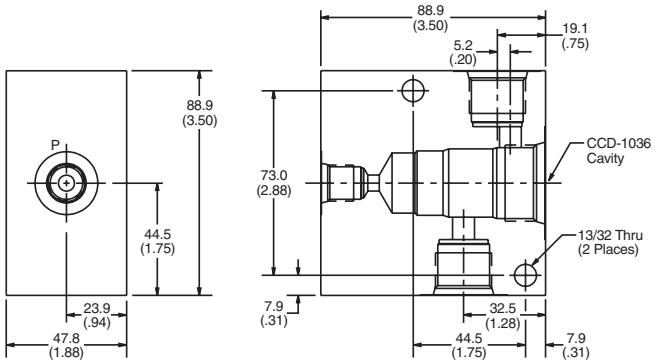
Form Tool: FR-501
Weight: Single 1.7 kg (3.75 lbs.)
Dual 2.7 kg (5.90 lbs.)

Dimensions Millimeters (Inches)

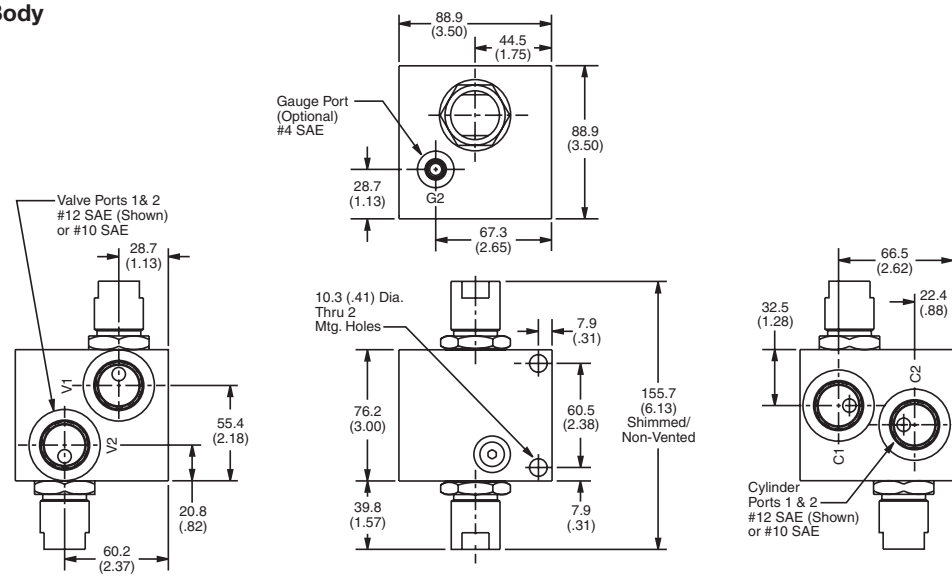
CDD-1036



Single Body



Dual Body



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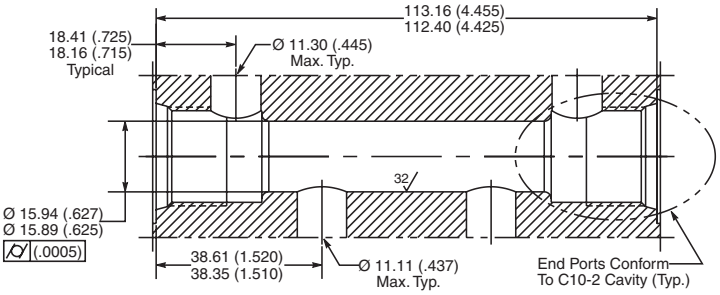
Dimensions Millimeters (Inches)

10 Size Cavity for Dual Check and Pilot Piston

For Check Valves Use 2
CVH103P**

For Pilot Piston Use

717917	No Seal
717917N	Buna-N



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Product Information

Cavity Plugs

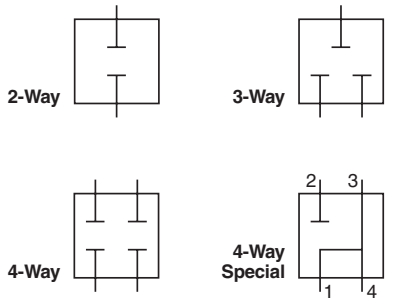
General Description

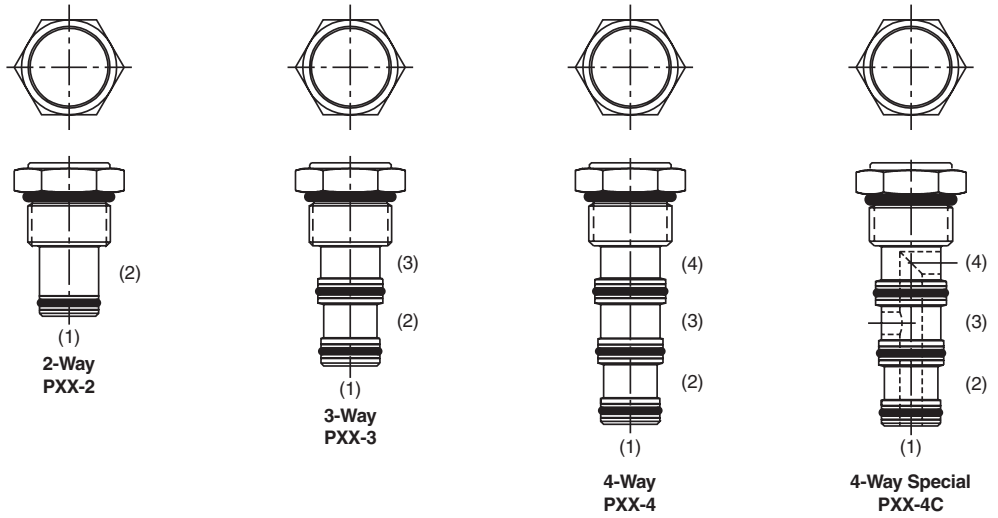
Parker cavity plugs can be used in any Integrated Hydraulic Circuit where one valve serves several machines and/or options. Two machines may have identical circuits except for one having a pressure reducing function, and the other not having this function. The machine that does not require this function can have the pressure reducing function replaced by a cavity plug; thereby utilizing a common body for both machines.

Specifications

Maximum Working Pressure - 350 Bar (5000 PSI)
Material - Steel

Symbols





Ordering Information

P	☐	—	☐	☐	☐
Plug	Cavity Plug Thread Size		Cavity Type	Type	Seals

Code	Cavity Plug Thread Size
08	3/4 - 16
10	7/8 - 14
12	1-1/16 - 12
16	1-5/16 - 12

Consult Factory for Shaded Areas, as some options may not be available.

Code	Cavity Type
2	Two Way
3	Three Way
4	Four Way

	Type								
	Two Way		Three Way			Four Way			
Code	1	2	1	2	3	1	2	3	4
Omit	C	C	C	C	C	C	C	C	C
A			0	0	C	0	0	0	C
B			0	C	0	0	0	C	0
C			C	0	0	0	C	0	0
D						*0	*0	*C	*C
E						C	0	0	C

C = Blocked O = Open
** Only Available In Sizes 08 and 10.*
Consult Factory for Shaded Areas, as some options may not be available.

Code	Seals
Omit	Nitrile
V	Fluorocarbon

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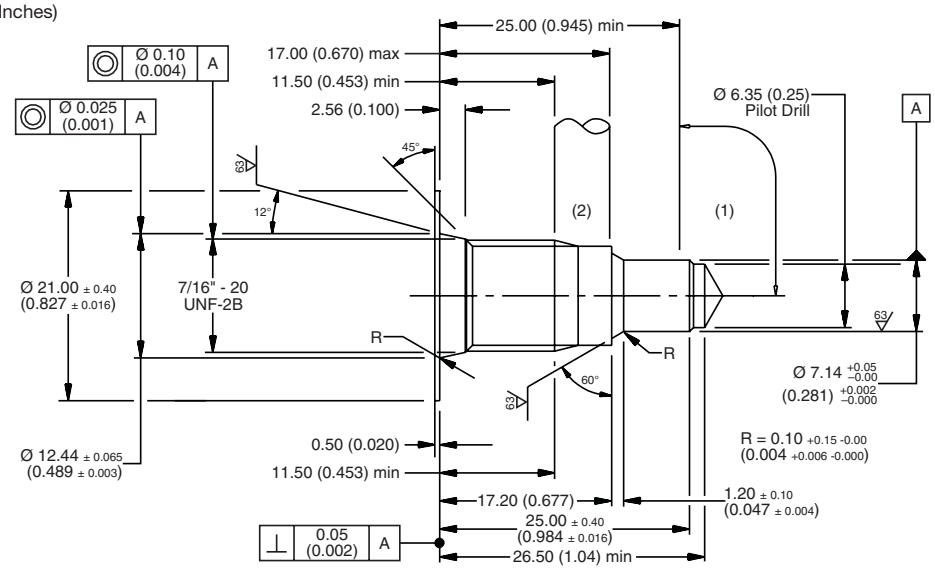
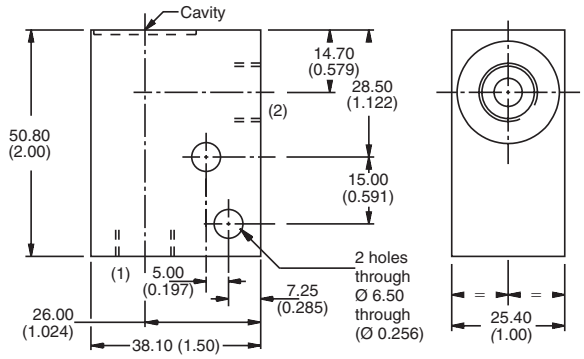
FC Flow Controls
PC Pressure Controls
LE Logic Elements
DC Directional Controls
MV Manual Valves
SV Solenoid Valves
PV Proportional Valves
CE Coils & Electronics
CB Cartpak Bodies
BC Bodies & Cavities
TD Technical Data

For additional information see Technical Tips on pages BC1-BC2.

Dimensions

Millimeters (Inches)





Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
795	1/4 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For CAV0W-2	
Pilot Drill Ø	6.35 (0.25)
Step Drill	8DS31369
Reamer (Alum)	8RM31082A
Reamer (Steel	8RM31082S
Counterbore	—
Tap	8TP31221

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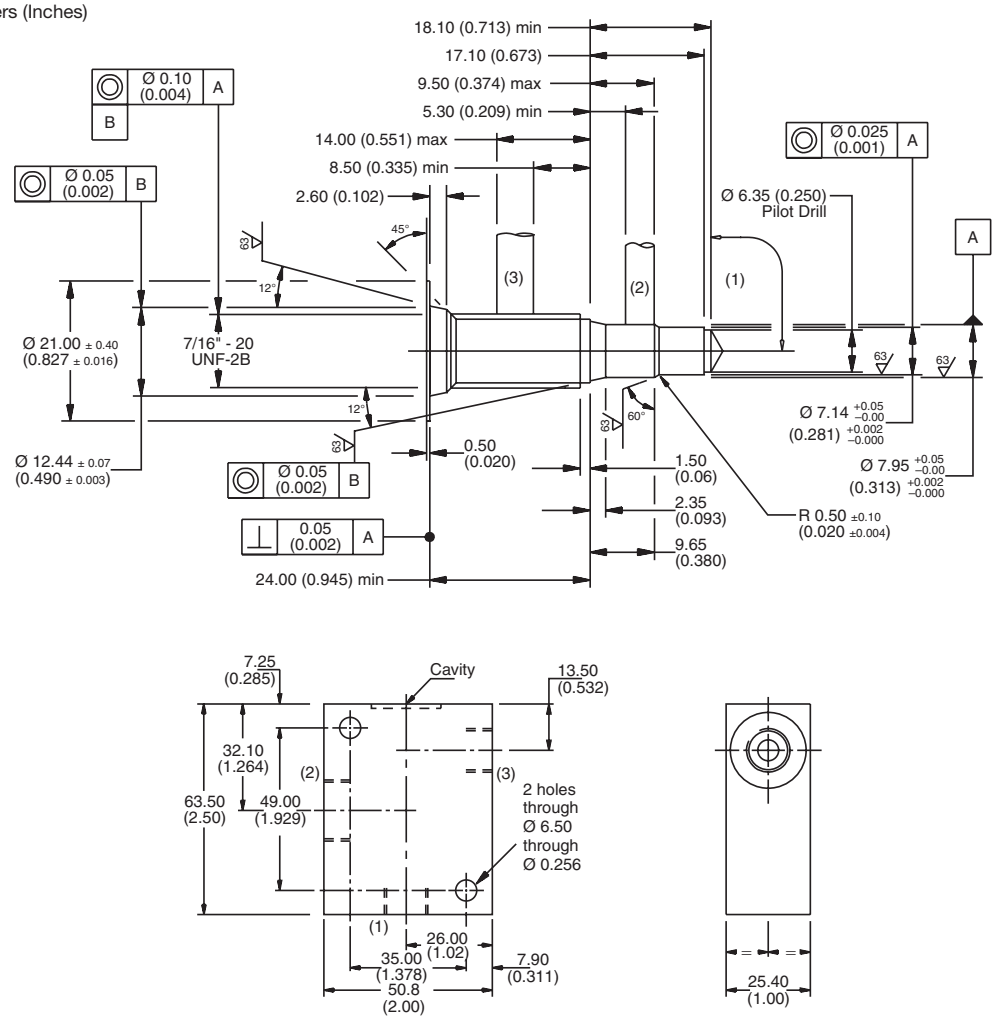
For additional information see Technical Tips on pages BC1-BC2.

Dimensions

Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
815	1/4 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For CAVSW-3	
Pilot Drill Ø	6.35 (0.25)
Step Drill	8DS31378
Reamer (Alum)	8RM31086A
Reamer (Steel	8RM31086S
Counterbore	—
Tap	8TP31221

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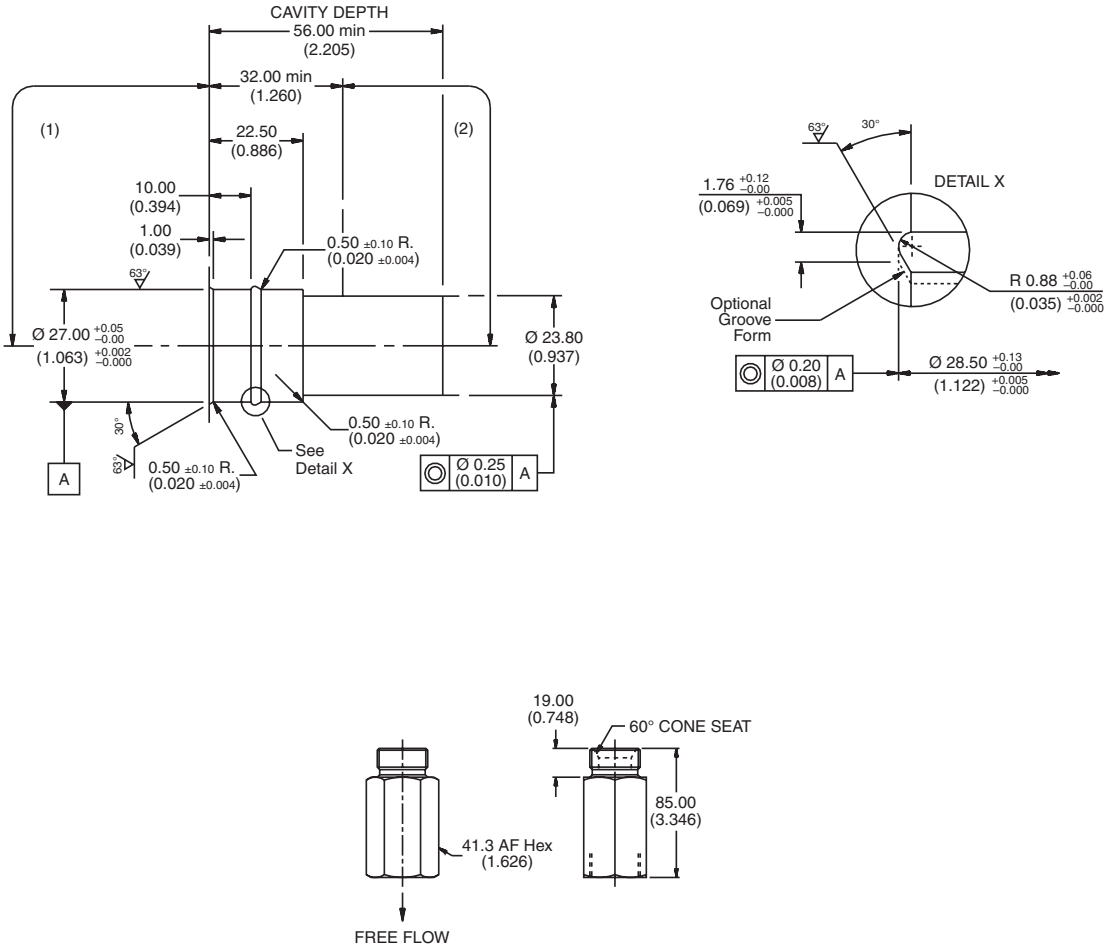
PC Pressure Controls
LE Logic Elements
DC Directional Controls
MV Manual Valves
SV Solenoid Valves
PV Proportional Valves
CE Coils & Electronics
CB Cartpak Bodies
BC Bodies & Cavities
TD Technical Data

For additional information see Technical Tips on pages BC1-BC2.

Dimensions

Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
212	1 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 2C	
Pilot Drill Ø	—
Step Drill	—
Reamer (Alum)	—
Reamer (Steel	—
Counterbore	—
Tap	—

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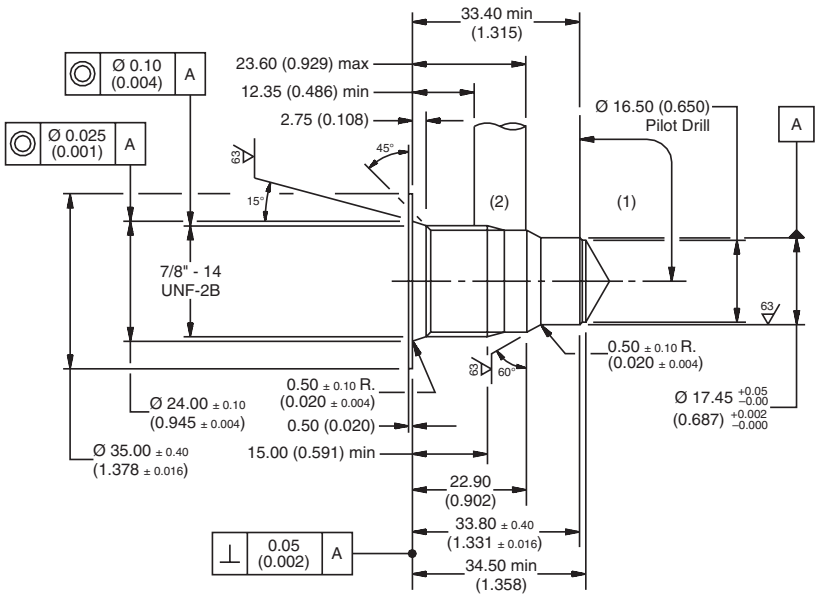
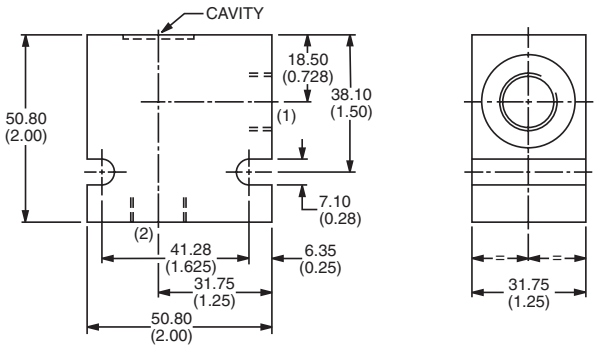
For additional information see Technical Tips on pages BC1-BC2.

Dimensions
Millimeters (Inches)





Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
543	1/2 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 2R
Pilot Drill Ø
Step Drill
Reamer (Alum)
Reamer (Steel
Counterbore
Tap

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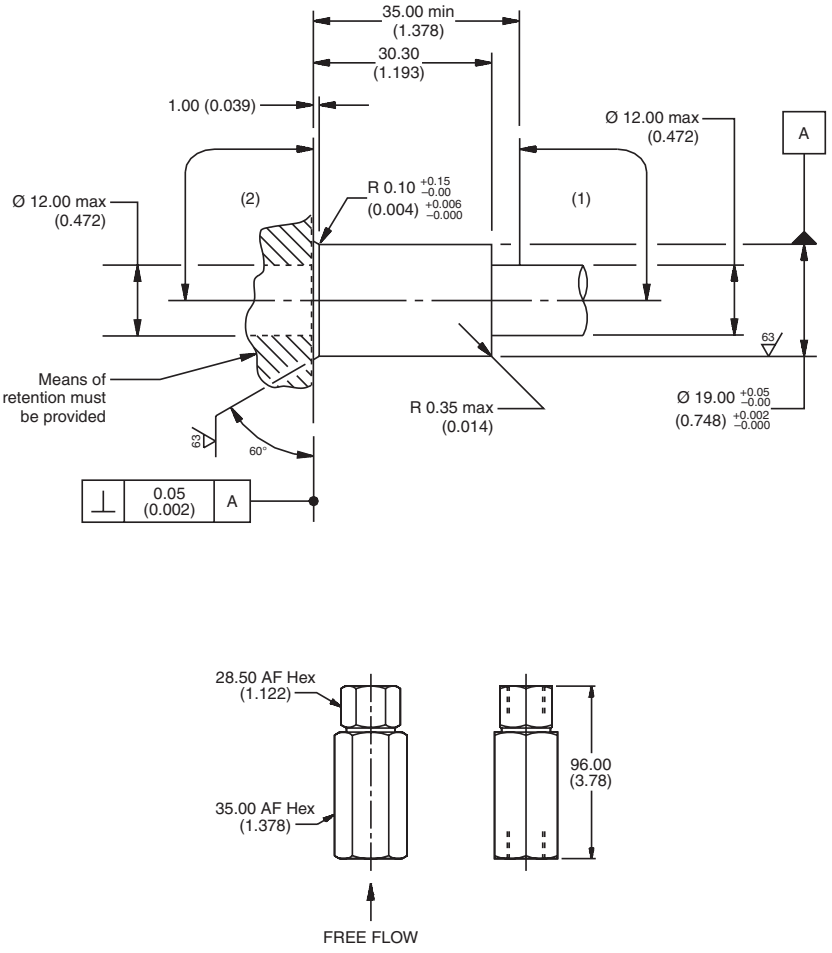
PV Proportional Valves
CE Coils & Electronics
CB Cartpak Bodies
BC Bodies & Cavities
TD Technical Data

For additional information see Technical Tips on pages BC1-BC2.

Dimensions

Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
220	1 SAE

Code	Body Material
S	Steel

Cavity Tooling For 2U	
Pilot Drill Ø	—
Step Drill	—
Reamer (Alum)	—
Reamer (Steel	—
Counterbore	—
Tap	—

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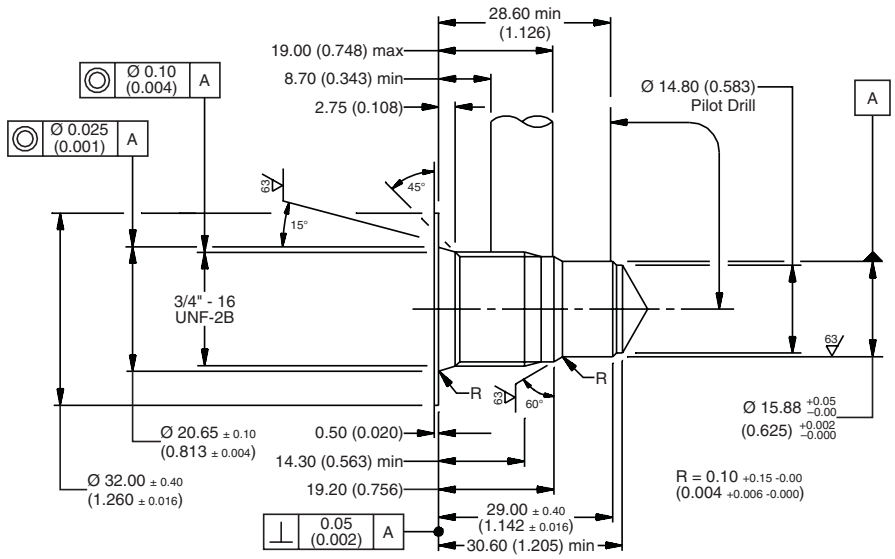
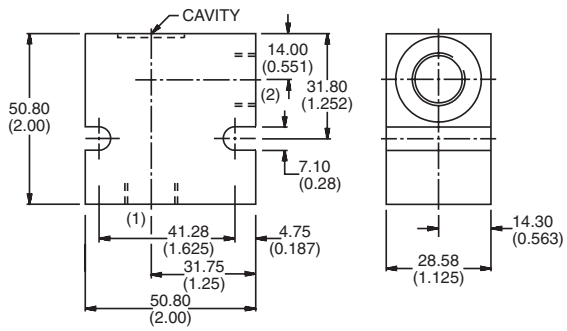
For additional information see Technical Tips on pages BC1-BC2.

Dimensions
Millimeters (Inches)





Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
513	3/8 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 2X	
Pilot Drill Ø	14.80 (0.583)
Step Drill	8DS31344
Reamer (Alum)	8RM31057A
Reamer (Steel	8RM31057S
Counterbore	—
Tap	8TP31202

NOTE:
Use parker C09-2 cavity and body.

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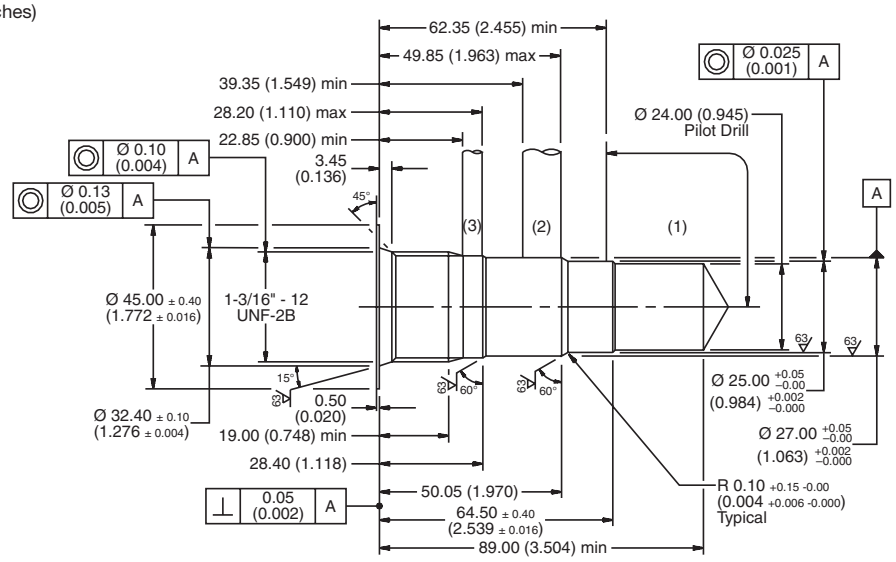
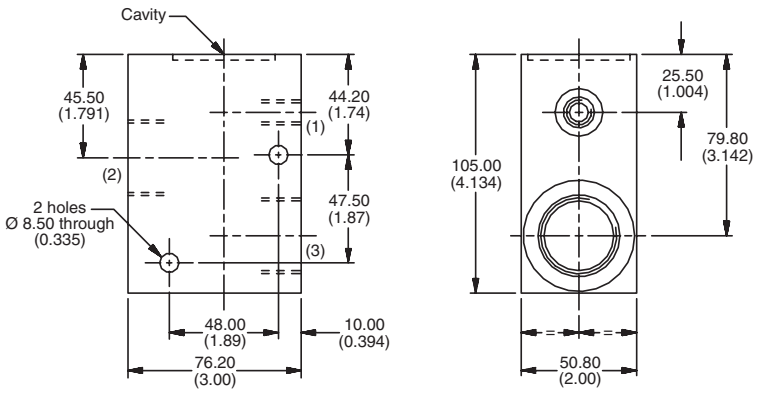
BC Bodies & Cavities
TD Technical Data

For additional information see Technical Tips on pages BC1-BC2.

Dimensions

Millimeters (Inches)





Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
069	1 SAE (Main) 1/4 SAE (Aux.)
234	3/4 SAE Dual Cavity

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 3C	
Pilot Drill Ø	24.00 (0.94)
Step Drill	8DS31305
Reamer (Alum)	8RM31005A
Reamer (Steel	8RM31005S
Counterbore	8CB31100
Tap	8TP31200

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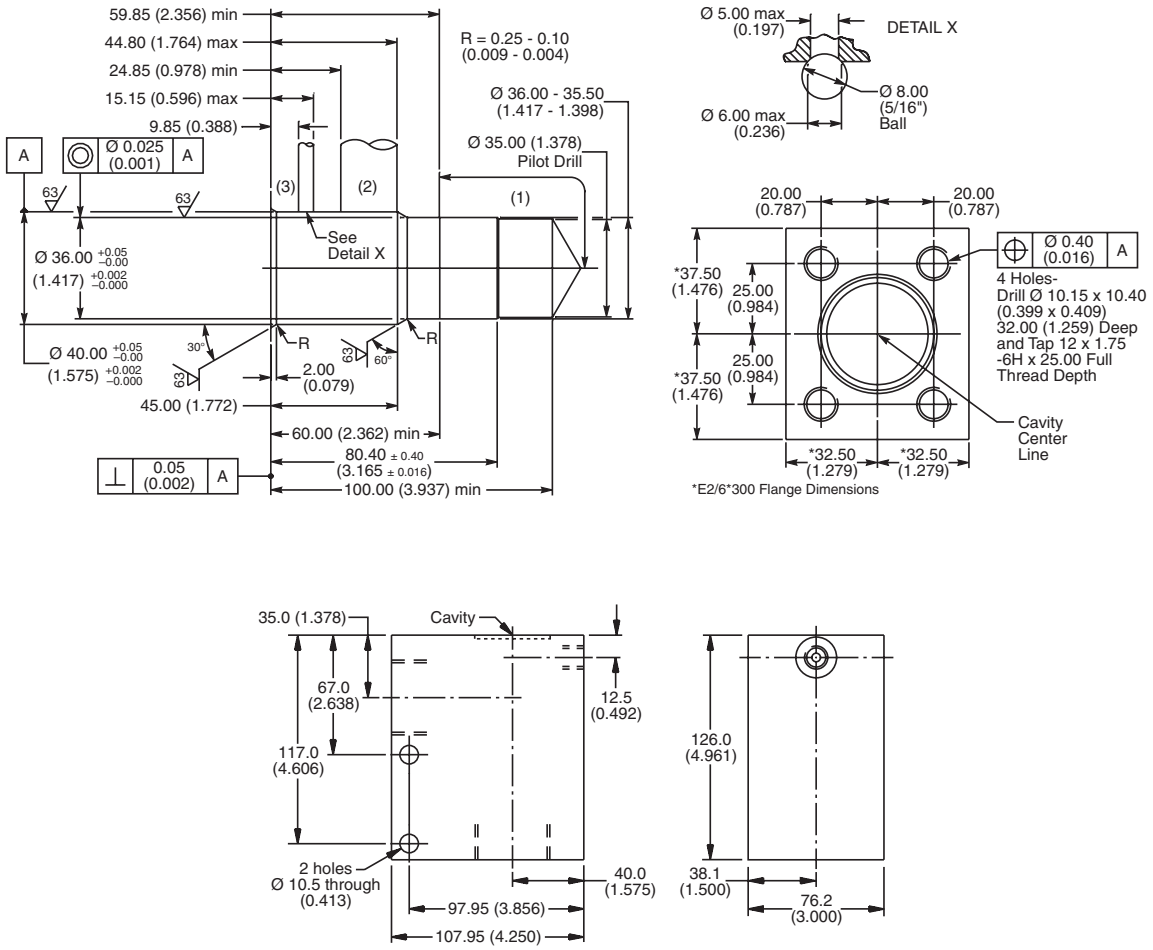
For additional information see Technical Tips on pages BC1-BC2.

Dimensions
Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
089	1-1/4 BSP (Main) 1/4 BSP (Aux)

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 3K	
Pilot Drill Ø	35.00 (1.38)
Step Drill	8DS31310
Reamer (Alum)	8RM31010A
Reamer (Steel	8RM31010S
Counterbore	—
Tap	8TP31215

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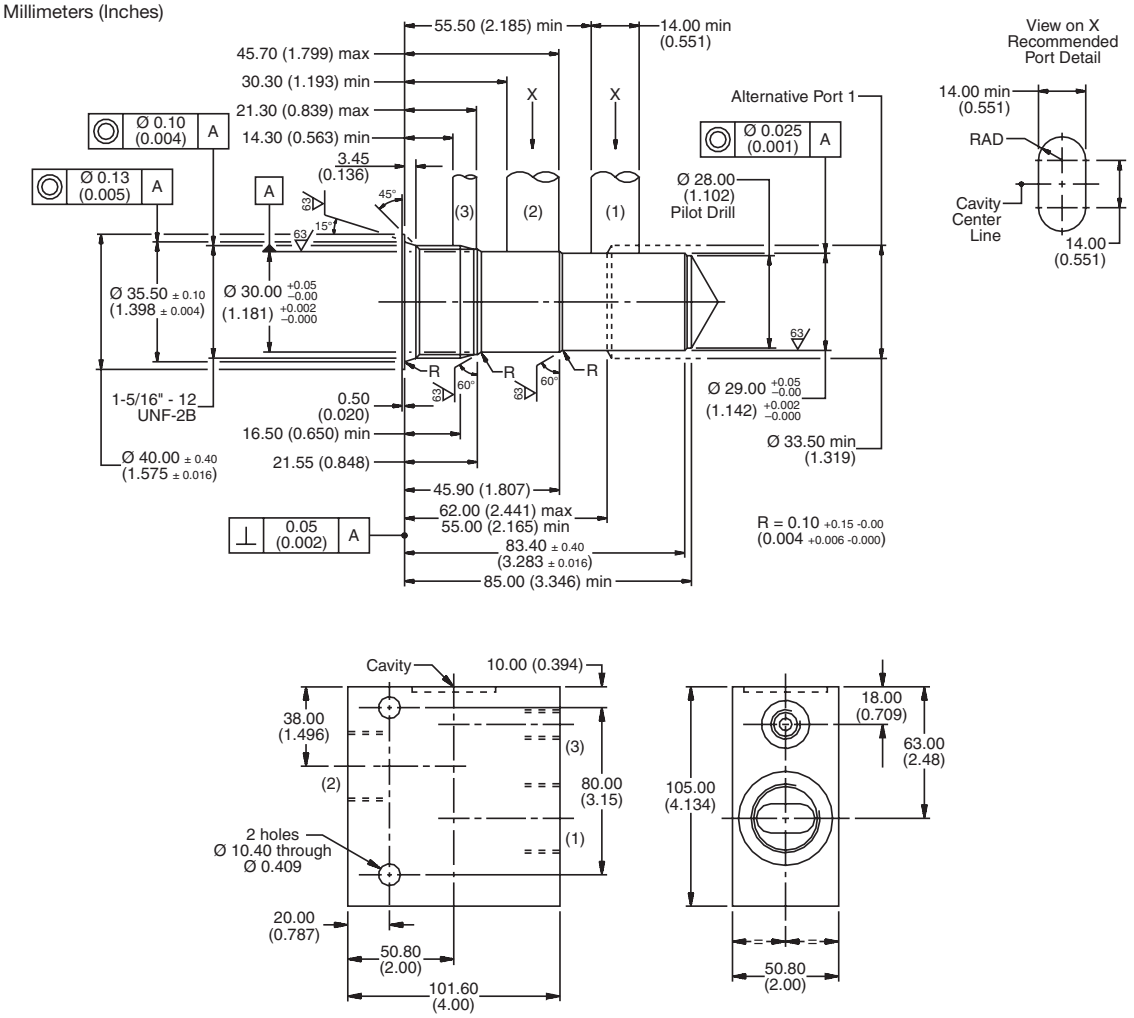
FC Flow Controls
PC Pressure Controls
LE Logic Elements
DC Directional Controls
MV Manual Valves
SV Solenoid Valves
PV Proportional Valves
CE Coils & Electronics
CB Cartpak Bodies
BC Bodies & Cavities
TD Technical Data

For additional information see Technical Tips on pages BC1-BC2.

Dimensions

Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
078	1 SAE (Main) 1/4 SAE (Aux.)
105	1 SAE Dual Cavity

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 3M	
Pilot Drill Ø	28.00 (1.10)
Step Drill	8DS31311
Reamer (Alum)	8RM31011A
Reamer (Steel	8RM31011S
Counterbore	8CB31103
Tap	8TP31203

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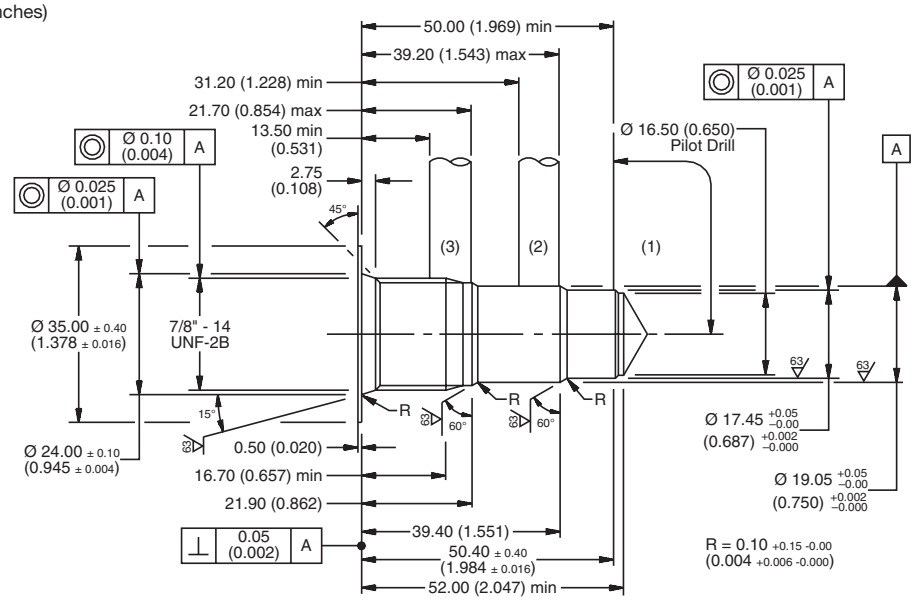
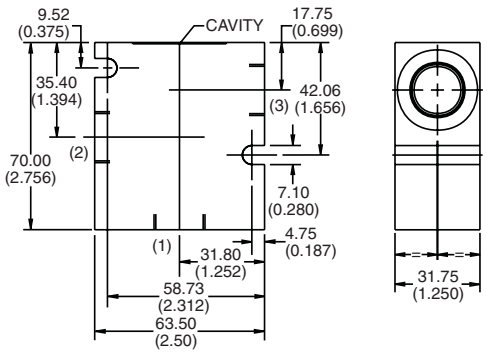
Dimensions

Millimeters (Inches)





Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
553	1/2 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 3X	
Pilot Drill Ø	16.50 (0.650)
Step Drill	8DS31343
Reamer (Alum)	8RM31062A
Reamer (Steel	8RM31062S
Counterbore	—
Tap	8TP31201

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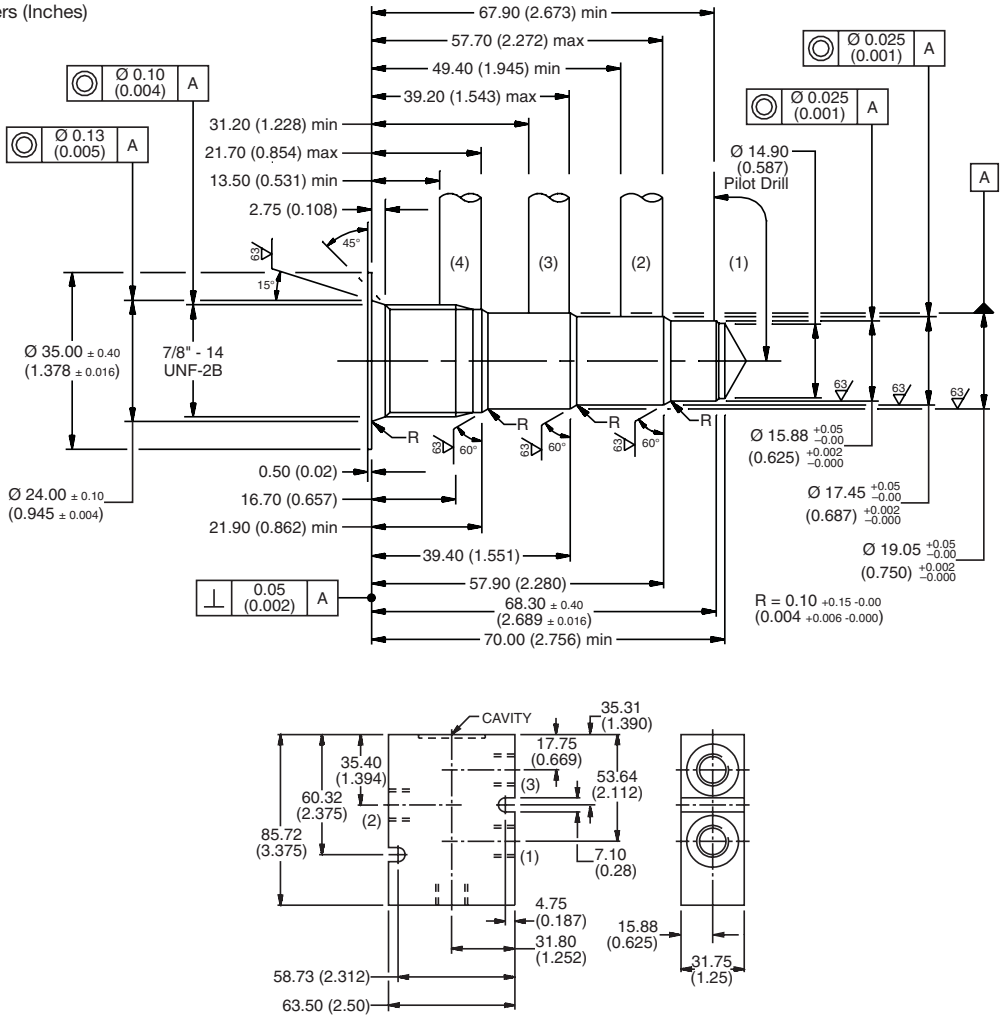
Dimensions

Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
562	1/2 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 4C	
Pilot Drill Ø	14.90 (0.587)
Step Drill	8DS31346
Reamer (Alum)	8RM31063A
Reamer (Steel	8RM31063S
Counterbore	—
Tap	8TP31201

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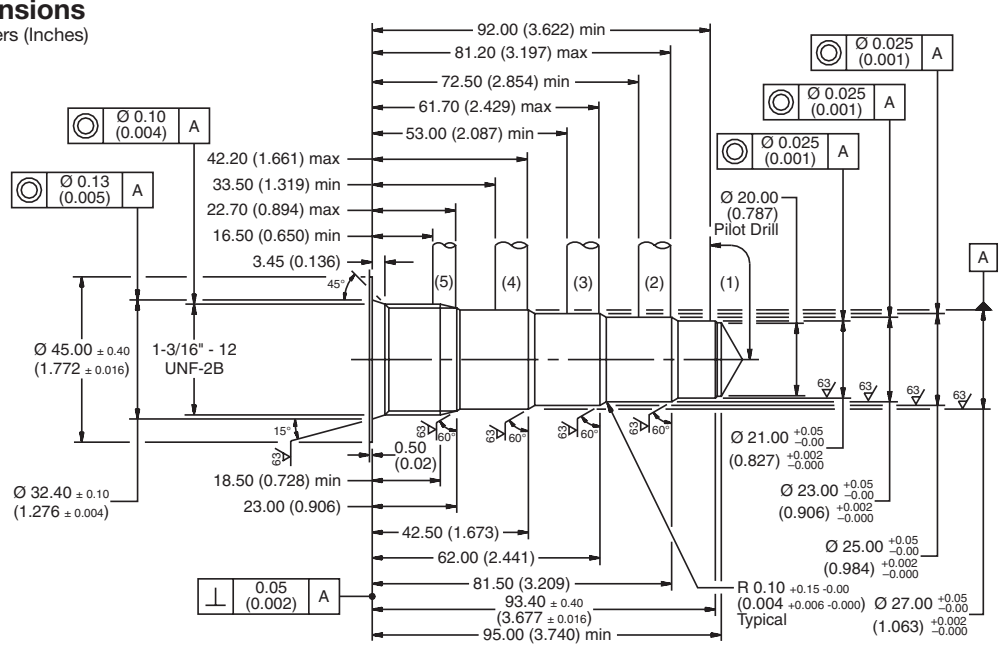
Dimensions

Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
321	3/4 SAE (Main) 1/4 SAE (Aux.)

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 5A	
Pilot Drill Ø	20.00 (0.78)
Step Drill	8DS31353
Reamer (Alum)	8RM31053A
Reamer (Steel	8RM31053S
Counterbore	8CB31100
Tap	8TP31200

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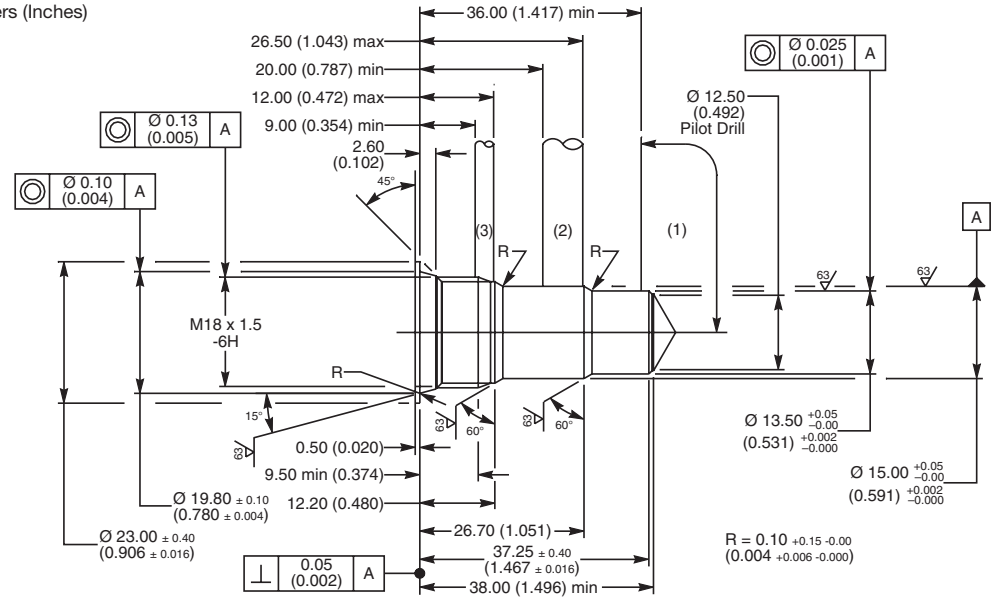
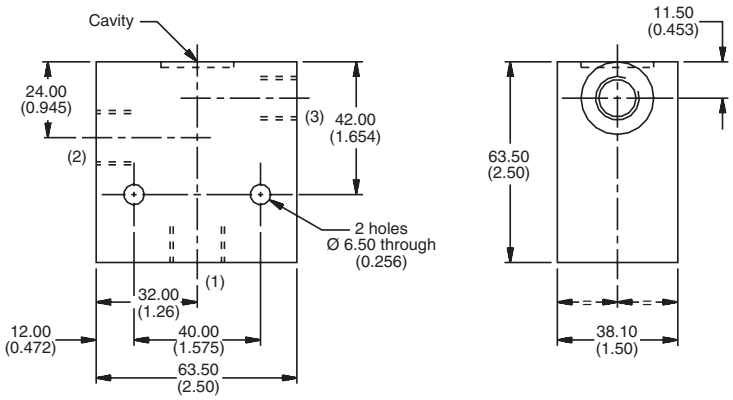
Dimensions

Millimeters (Inches)





Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
318	3/8 SAE (Main) 1/4 SAE (Aux.)

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 53-1	
Pilot Drill Ø	12.50 (0.49)
Step Drill	8DS31349
Reamer (Alum)	8RM31081A
Reamer (Steel	8RM31081S
Counterbore	—
Tap	8TP31207

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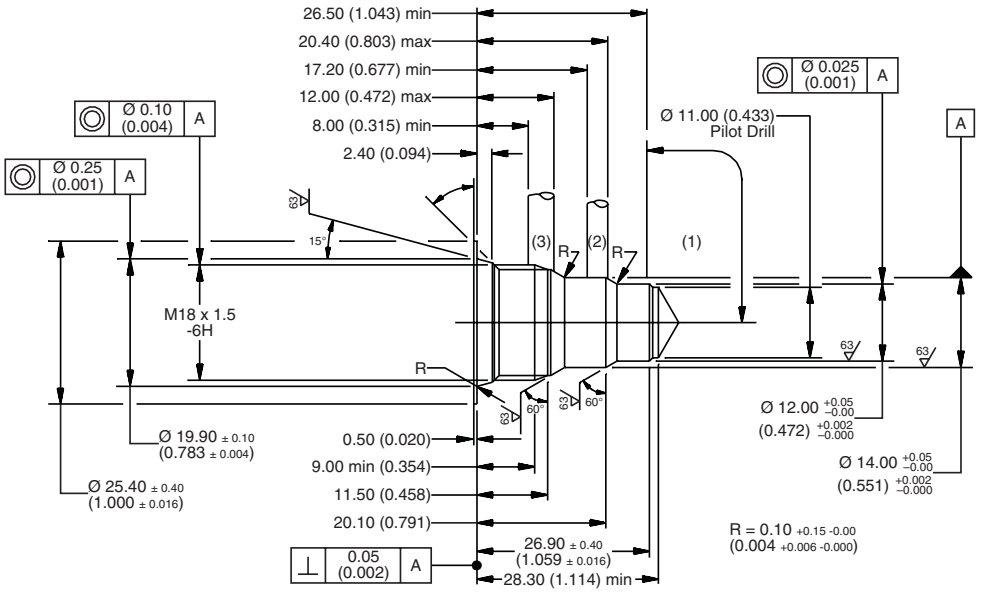
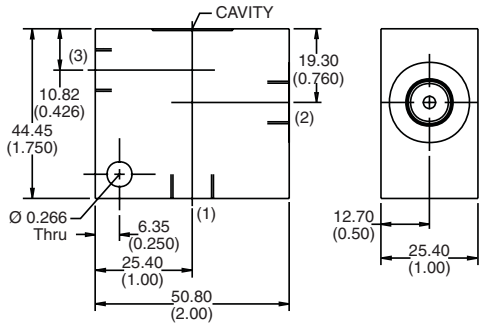
Dimensions

Millimeters (Inches)





Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
591	1/4 SAE

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 54-1	
Pilot Drill Ø	11.00 (0.433)
Step Drill	8DS31379
Reamer (Alum)	8RM31087A
Reamer (Steel	8RM31087S
Counterbore	—
Tap	8TP31207

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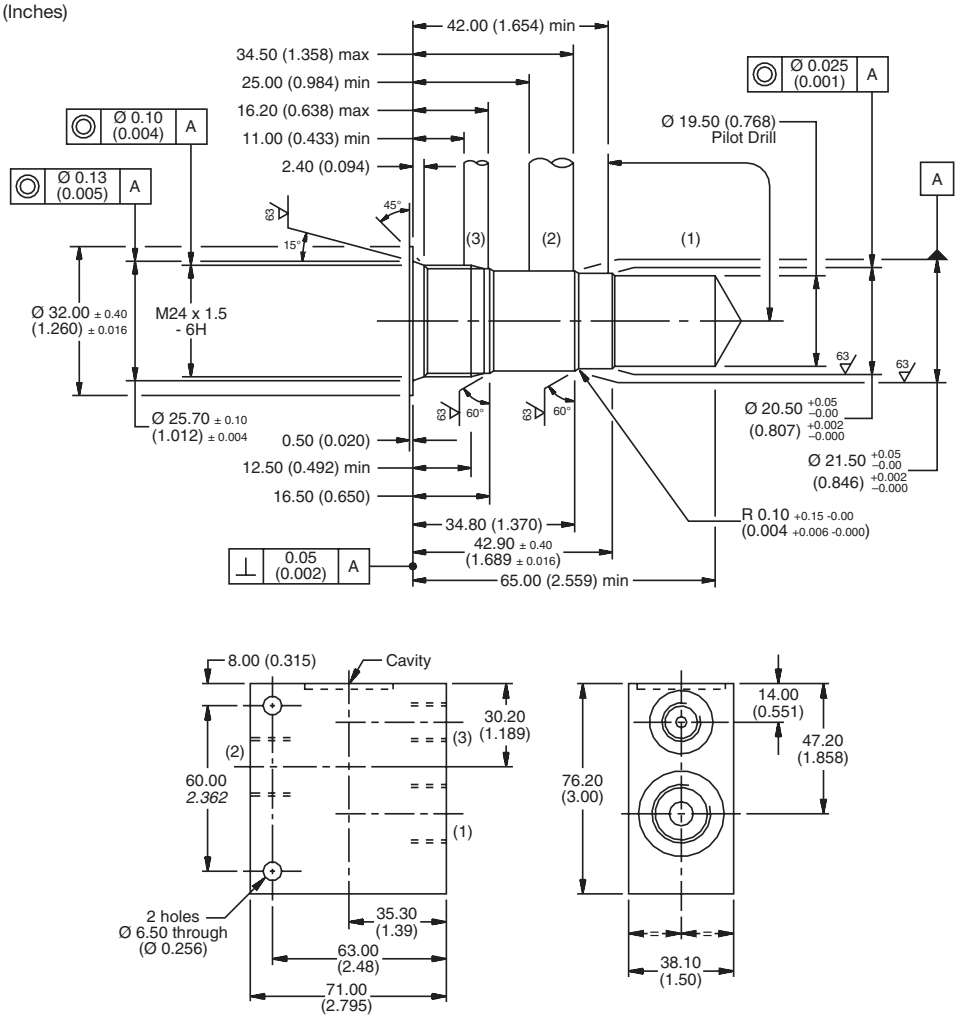
Dimensions

Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
253	1/2 SAE (Main) 1/4 SAE (Aux.)

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling For 68-1	
Pilot Drill Ø	19.50 (0.77)
Step Drill	8DS31341
Reamer (Alum)	8RM31041A
Reamer (Steel	8RM31041S
Counterbore	8CB31116
Tap	8TP31216

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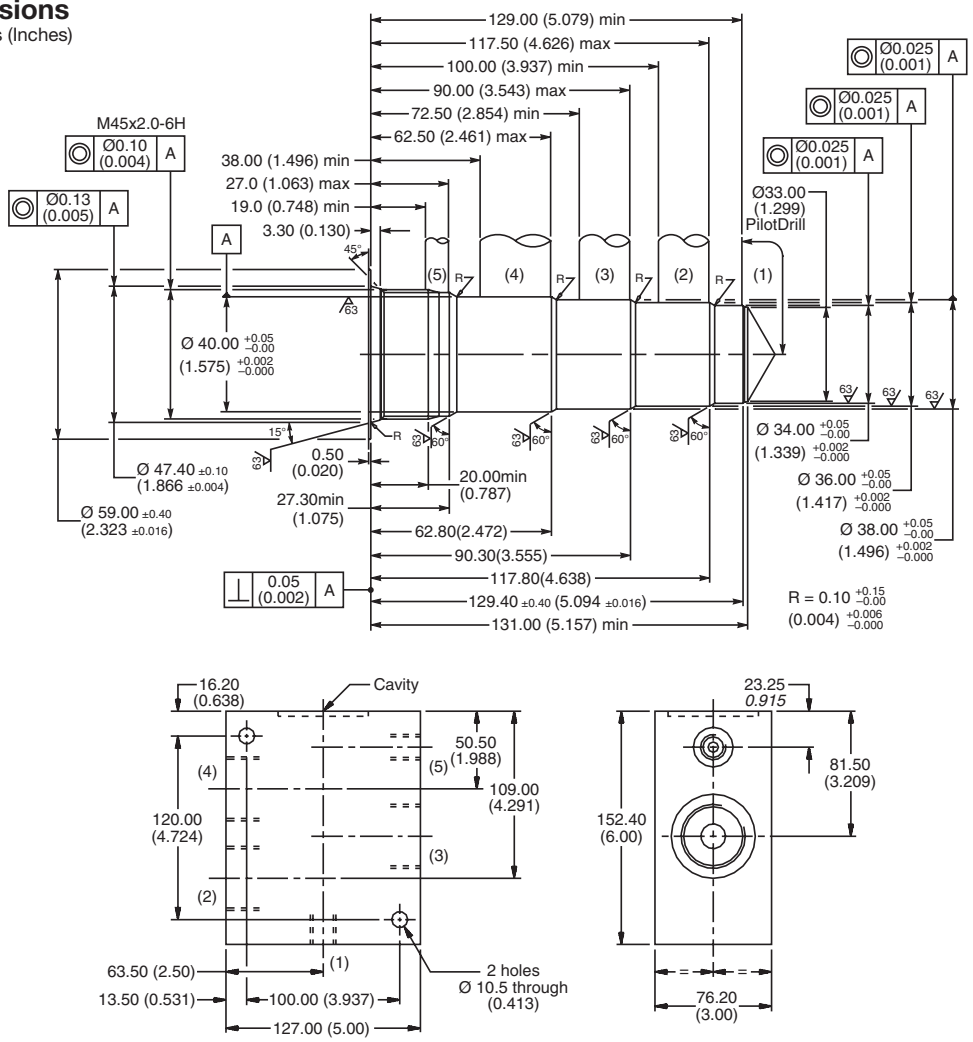
Dimensions
Millimeters (Inches)



Ordering Information

LB10		
Line Body	Port Size	Body Material

Code	Port Size
317	1-1/4 SAE (Main) 3/8 SAE (Aux)

Code	Body Material
A	Aluminum
S	Steel

Cavity Tooling (100-1 Cavity)	
Pilot Drill Ø	33.00 (1.30)
Step Drill	8DS31350
Reamer (Alum)	8RM31050A
Reamer (Steel	8RM31050S
Counterbore	8CB31119
Tap	8TP31218

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INTRODUCTION

In this section you will find a variety of technical information pertinent to general hydraulics as well as cartridge valve technology.

HYDRAULIC FORMULAS

Below are a few of the common hydraulic formulas to assist you in calculating the requirements for your system:

Voltage = *Current × Resistance*

Flow = *Volume ÷ Unit of Time*

Pressure = *Force ÷ Area*

Horsepower = *Flow × Pressure ÷ (1714 × Efficiency)*

$$\textbf{Hydraulic power (kW)} = \frac{\Delta p\ (Bar) \times flow\ rate\ (LPM)}{600}$$

where Δp *= pressure drop*

$$\textbf{Hydraulic power (HP)} = \frac{\Delta p\ (PSI) \times flow\ rate\ (GPM)}{1714}$$

RATINGS & TESTING

All Parker cartridge valve products have been performance tested with the results shown on the individual valve catalog pages. The performance data shown represents typical operation characteristics of the product. In addition, our valves are endurance tested. Validation is conducted by testing or similarity in designs. ***Note:*** Not every cartridge option is endurance tested. In other words, one three way spool is endurance tested, and the others are assumed by similarity.

TEMPERATURE RATINGS

Product operating limits are broadly in the range -30°C to 150°C (-20°F to 300°F) but satisfactory operation within the specification may not be accomplished. Leakage and response will be affected when used at temperature extremes and it is the user's responsibility to determine acceptability at these levels.

Seals used in these products generally have the following temperature limitations:

Nitrile (Buna N)	-34°C to 121°C (-30°F to 250°F)
Fluorocarbon	-26°C to 204°C (-15°F to 400°F)
Hytrel	-54°C to 135°C (-65°F to 275°F)
GTPFE	-30°C to 150°C (-20°F to 300°F)
4301 Polyurethene	-30°C to 150°C (-20°F to 300°F)

VISCOSITY

Catalog data is from tests conducted on mineral oil at a viscosity of 32 cSt (150 SSU) using an ISO 32 fluid at 100 degrees F.

Product should ideally be used at viscosities in the range of 15 to 50 cSt (80 to 230 SSU).

Product will perform with reduced efficiency in the ranges, 5 to 15 cSt (42 to 80 SSU) and 50 to 500 cSt (230 to 2300 SSU). These extreme conditions must be evaluated by the user to establish suitability of the product's performance.

PRESSURE RATINGS

Unless otherwise stated, all Parker cartridges have a continuous duty pressure rating as shown in the catalog. All pressure ratings are based on the cartridge valve only. Exposure to elevated pressures may affect the performance and fatigue life of the product. The material chosen for the body or carrier may affect the pressure rating we recommend. Parker does not recommend the use of cartridge valves in aluminum bodies at pressures above 207 bar (3000 psi).

THERMAL SHOCK

It is unreasonable to expect product to withstand rapid temperature changes - this could affect both performance and life and care should be taken to protect the product from such situations.

SERVICE & COMPONENTS

One of the advantages of integrated hydraulic circuits is their serviceability. Should a valve need to be replaced for any reason, a user only needs to unscrew the valve from the manifold and screw the replacement into the cavity. As such, there are few replacement parts available for the Parker cartridge products. As with any hydraulic system, the operator should bleed off any trapped pressure and consult machine service manuals prior to service. Parker does not offer any service parts for internal components, but external components such as coils, knobs, and seals are available.

LIMITATIONS IN USE

Parker cartridge valves are designed for a wide variety of industrial and mobile applications. Despite their flexibility, Parker Hannifin does not recommend orsupport the use of our cartridge valves in any onhighway or aerospace applications. We also do not recommend our products for use in the transport of explosive products or in hazardous environments.

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SEAL MATERIAL SELECTION

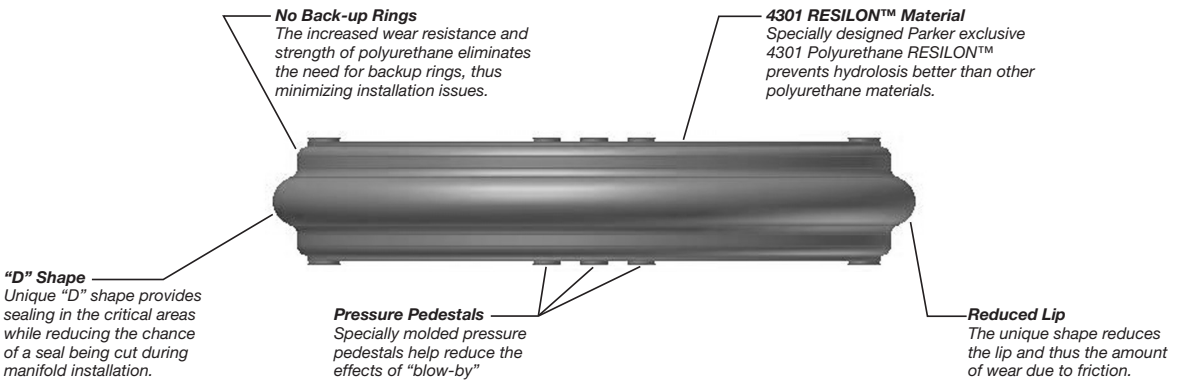
You should match the seal compatibility to the temperature and fluid being used in your application. Parker offers three seal materials to meet your application requirements. Parker's standard material is a 4301 Polyurethane RESILON™ material "D"-Ring. We also offer Fluorocarbon and Nitrile seals. A brief synopsis of each seal material is given below to help you choose the best seal for your application.

"D"-Ring (4301 Polyurethane RESILON™ Material)
The "D"-Ring is the standard seal material on the Winner's Circle threaded cartridge valves. The "D"-Ring is molded of a special 4301 Polyurethane RESILON™. Polyurethane materials exhibit better wear resistance and tensile strength than standard Nitrile or Fluorocarbon material. In addition, it has an excellent resistance to compression set. This increased strength eliminates the need for back-rings and simplifies installation.

The 4301 compound is a Parker exclusive material designed to prevent hydrolysis at high temperatures.

Thus, the "D"-Ring outperforms standard polyurethane o-rings, especially when using high water content fluids at elevated temperatures. The "D"-Ring is compatible with most water-glycol, water/oil emulsions, and high grade petroleum based hydraulic fluids at temperatures between -37°C to +93°C (-35°F to +200°F)

The unique shape of the Parker "D"-Ring also provides a variety of design advantages. The seal is molded into a "D" shape where the seal is higher in the middle and lower on the ends. This prevents the seal edge from folding over on a corner inside the manifold during installation. In addition, this design has a minimal lip, thus, friction is reduced. Another unique feature of the "D"-Ring is its symmetrical design, resulting in no performance degradation from the reverse direction, or worry of backward installation. The "D"-Ring is also equipped with "pressure pedestals" to reduce the effects of "blow-by" common in reverse cycling. The pressure pedestals increase the sealing capability of the "D"-Ring, by reducing the radial pressure forces that compress the sealing face of the o-ring. The drawing below depicts the shape and highlights the features.



Nitrile

Nitrile o-rings are also compatible with most water-glycol, water/oil emulsions, and high grade petroleum based hydraulic fluids. Parker only recommends Nitrile o-rings for temperatures between -34°C to +121°C (-30°F to +250°F). Nitrile o-rings do require a full back-up ring, or two half back-ups.

Fluorocarbon

Fluorocarbon o-rings are compatible with most phosphate ester fluids and phosphate ester blends. Parker only recommends Fluorocarbon seals for temperatures between -26°C to +204°C (-15°F to +400°F). Fluorocarbon o-rings do require a full back-up ring, or two half back-ups.

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1. Terms and Conditions. Seller's willingness to offer Products for sale or accept an order for Products is subject to the terms and conditions contained in this Offer of Sale or any newer version of the same, published by Seller electronically at www.parker.com/saleterms/. Seller objects to any contrary or additional terms or conditions of Buyer's order or any other document or other communication issued by Buyer.

2. Price; Payment. Prices stated on Seller's Quote are valid for thirty (30) days, except as explicitly otherwise stated therein, and do not include any sales, use, or other taxes or duties unless specifically stated. Seller reserves the right to modify prices to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller's facility (INCOTERMS 2010). Payment is subject to credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified by Seller's Credit Department). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

3. Shipment; Delivery; Title and Risk of Loss. All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller's facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferment of shipment at Buyers' request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions.

4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of normal use, whichever occurs first. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the defect is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

6. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

7. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

8. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller retains a security interest in all Products delivered to Buyer and this agreement is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Products; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. Cancellations and Changes. Buyer may not cancel or modify or cancel any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change Product features, specifications, designs and availability.

13. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. Force Majeure. Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. Waiver and Severability. Failure to enforce any provision of this agreement will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. Termination. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate this agreement, in writing, if Buyer: (a) breaches any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.

17. Governing Law. This agreement and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and refund the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller is not liable for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged. The terms contained herein may not be modified unless in writing and signed by an authorized representative of Seller.

20. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards of care, including those of the United Kingdom, the United States of America, and the country or countries in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act") and the U.S. Food Drug and Cosmetic Act ("FDCA"),each as currently amended, and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that it is familiar with the provisions of the U. K. Bribery Act, the FCPA, the FDA, and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller.

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