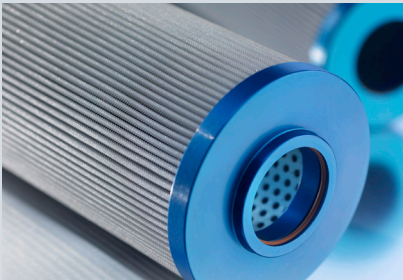
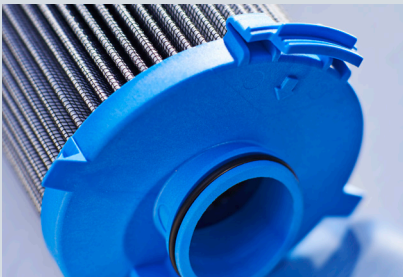




Hydraulic Filtration Product Guide

Spin-ons • Cartridges • In-tank • Low Pressure • Medium Pressure • High Pressure • Duplex • Accessories



Donaldson Delivers Performance Under Any Pressure!

Clean, dry oil is essential for your equipment. Donaldson Company, a leader in filtration for over 100 years, has proven performance in thousands of applications – offering the industry's largest selection of replacement hydraulic, lube and gear oil filtration products for contamination control.

Distributed by:

How Donaldson Displays Filter Flow versus Pressure Loss Data

Pressure Drop (ΔP) Correction Formulae

To properly calculate pressure loss for viscosity and/or specific gravity, use the filter and housing formulae below to determine the clean filter assembly pressure drop.

Filter Correction Calculation

$$\Delta P \text{ Filter} = \Delta P \text{ from graph} \times \frac{\text{New Saybolt Seconds Universal Viscosity (SSU)}}{150} \times \frac{\text{New Specific Gravity (S.G.)}}{.90}$$

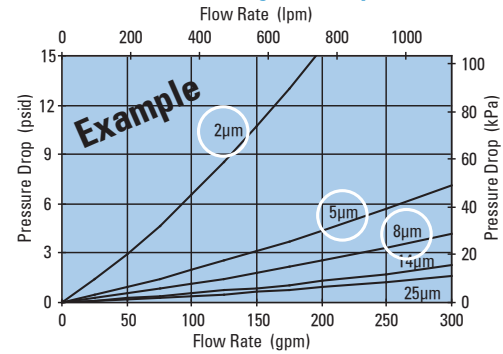
- or -

$$\Delta P \text{ Filter} = \Delta P \text{ from graph} \times \frac{\text{New Centistokes Viscosity (cSt)}}{32} \times \frac{\text{New Specific Gravity (S.G.)}}{.90}$$

Clean Filter Assembly Pressure Drop (ΔP) Calculation

$$\Delta P \text{ Clean Filter Assembly} = \Delta P \text{ head} + \Delta P \text{ filter}$$

Filter, Head or Housing/Assembly Reference



Performance Curve Notes

- All flow measurements were made with 32cSt [150 SSU] hydraulic oil at 100°F (37.7°C), fluid specific gravity of 0.9.
- The performance curves displayed are for the filter, head or housing assembly.
- Filter performance curves will either list media numbers or beta ratings (see circled areas on chart above). These labels correspond with the filter choice tables.

The Importance of Temperature in Determining Pressure Drop

Fluid viscosity plays an important role in restricting the flow through filters. It's crucial to select the proper filter to maintain adequate flow and avoid excessive pressure drops. Measured in centiStokes (cSt) or Saybolt Seconds Universal (SSU or SUS), fluid viscosity is the resistance of a fluid to flow (thickness of fluid). Low viscosity fluids pass through filters with less resistance than high viscosity fluids. Higher fluid viscosities have higher pressure drops due to higher resistance passing through the media. The colder the fluid, the higher the viscosity, so the lowest potential temperature of the fluid is the best measure for calculating pressure drop.

Use the chart below to determine the viscosity of the fluid to be filtered at its lowest potential temperature.

Oil Kinematic Viscosity Combined With Temperature in Centistokes cSt

| SAE Gear Oil | | | 75W | | | 80W | | 85W | | 90 | | | 140 | |
|----------------|-----|--------|-----|-----|-------|-------|-------|--------|--------|--------|--------|--------|--------|--|
| SAE Engine Oil | | | 5W | 10W | | 20 | | 30 | 40 | 50 | | | | |
| ISO Grade | | | 15 | 22 | 32 | 46 | 68 | 100 | 150 | 220 | 320 | 460 | 680 | |
| °F | °C | Diesel | | | | | | | | | | | | |
| 248 | 120 | | | | 4 | 4 | 6 | 7 | 9 | 12 | 13 | 18 | 23 | |
| 230 | 110 | | | | 4 | 6 | 7 | 9 | 12 | 15 | 19 | 24 | 30 | |
| 212 | 100 | | 1 | 5 | 5 | 7 | 9 | 11 | 15 | 19 | 25 | 32 | 41 | |
| 194 | 90 | | 3 | 5 | 7 | 9 | 11 | 15 | 20 | 26 | 34 | 44 | 58 | |
| 176 | 80 | | 5 | 7 | 9 | 11 | 15 | 20 | 27 | 36 | 48 | 63 | 85 | |
| 158 | 70 | | 6 | 9 | 11 | 15 | 20 | 28 | 39 | 52 | 71 | 95 | 130 | |
| 140 | 60 | | 8 | 12 | 15 | 21 | 29 | 40 | 57 | 80 | 110 | 151 | 211 | |
| 122 | 50 | | 11 | 15 | 22 | 30 | 43 | 62 | 99 | 128 | 181 | 254 | 365 | |
| 104 | 40 | 1 | 15 | 22 | 32 | 46 | 68 | 100 | 150 | 220 | 320 | 460 | 680 | |
| 86 | 30 | 2 | 21 | 32 | 51 | 76 | 116 | 175 | 271 | 409 | 613 | 907 | 1,380 | |
| 68 | 20 | 3 | 33 | 51 | 87 | 135 | 214 | 334 | 536 | 838 | 1,290 | 1,980 | 3,130 | |
| 50 | 10 | 4 | 52 | 87 | 162 | 264 | 438 | 711 | 1,190 | 1,920 | 3,070 | 4,870 | 8,020 | |
| 32 | 0 | 5 | 85 | 180 | 340 | 585 | 1,020 | 1,720 | 2,990 | 5,060 | 8,400 | 13,900 | 23,900 | |
| 14 | -10 | 9 | 185 | 375 | 820 | 1,500 | 2,770 | 4,880 | 8,890 | 15,700 | 27,200 | 47,000 | 85,000 | |
| -4 | -20 | 15 | 400 | 800 | 2,350 | 4,650 | 91,20 | 16,800 | 32,300 | 60,000 | | | | |

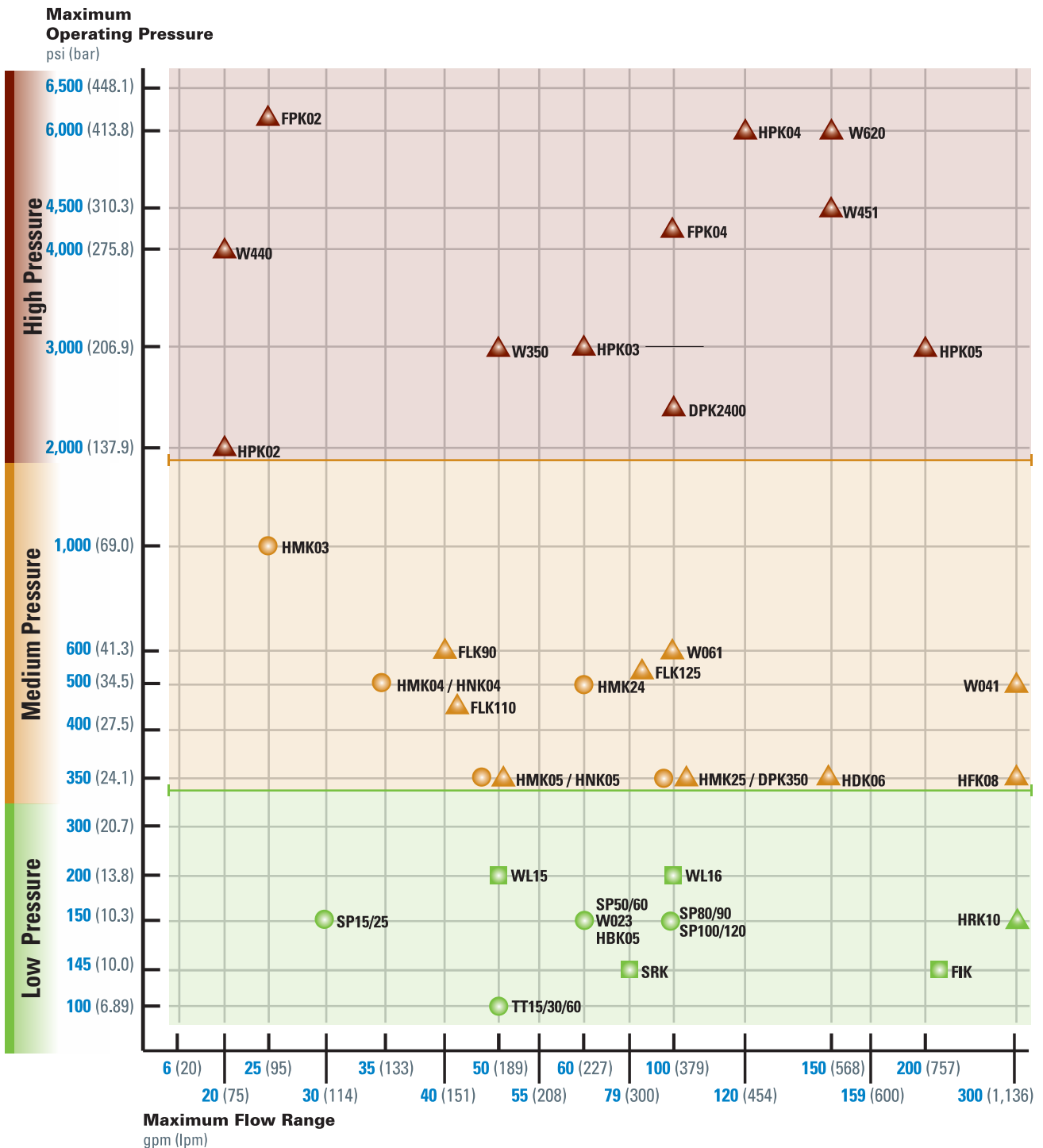
Hydraulic Filter Housing Selection Guide

Locate the Donaldson model closest to the intersection of the maximum operating pressure and maximum flow rate. If there is not a model at the exact intersection, select the nearest series to the right or above the intersection to ensure a filter that is adequate to handle the maximum operating pressure and flow rate has been selected.

Pressure families are color coded in the selection chart for low, medium and high model series. Filter housing styles are identified by their shape.

Filter Housing Style Code

● Spin-on
 ■ In-tank Housing / Cartridge
 ▲ In-line Housing / Cartridge



Selecting the Proper Hydraulic Filter

Sensitive hydraulic circuits are vulnerable to a variety of contaminants that result in inefficiency, downtime and excessive repair costs. It is important to remember that protecting and maintaining the most sensitive components within a circuit will result in effective contamination control.

With the broad range of housing styles and filters available from Donaldson, how do you choose the right filter to reliably protect your systems and equipment? Follow these recommended steps to identify the correct Donaldson filter and parts required for efficient contamination control.

1 Determine the system operating pressure and flow rate

Start by identifying two key factors in the hydraulic system operating environment for the most critical component being protected, such as pumps and motors.

- nominal and maximum operating pressure
- nominal and maximum flow rate

2 Select the filter housing model

Refer to the *Hydraulic Filter Model Series Selection Guide* on the left to select the filter housing that meets your requirements.

- Pressure families are color coded for low, medium and high models.
- Housing styles are identified by their shape code: spin-on, in-tank and in-line
- Porting type options – see page 3 for model series details.

3 Consider application factors when selecting the filter

After the appropriate housing is identified, other application factors must be considered when selecting the appropriate filter. Use the filter choice tables to determine a specific part number.

- components being protected
- ISO Code desired
- fluid type and material compatibility
- oil viscosity (SUS/cSt) & temperature
- vibration/cyclic flow surges
- media type
- flow rate (GPM/LPM)
- maximum allowable pressure drop
- efficiency / beta rating
- seal options
- standard vs. high-performance filters
- servicing and installation convenience

4 Choose the appropriate line and reservoir accessories

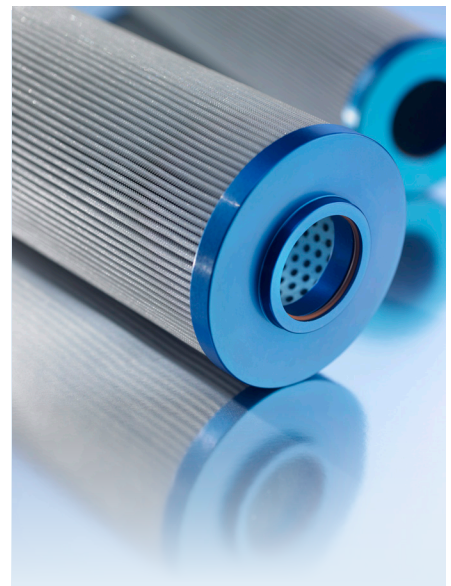
Items such as breathers, suction strainers, and gauges are important parts of an overall hydraulic system.

Refer to the Accessories Section for more information.

5 On-going contamination control practices

To optimize system performance and lengthen component life, new oil should be filtered before being transferred into a reservoir or gearbox. Monitor the condition of fluids and identify wear and contamination with regular fluid analysis.

Refer to the Off-Line Filtration and Fluid Analysis Sections for more information.



Looking for a replacement filter? Finding your Donaldson filter online has never been easier.

catalog.donaldson.com

Application/Cross-Reference/Attribute Search

You told us what you need – and we listened. We've built the ALL NEW **Donaldson DYNAMIC™ Search** to make finding your filter MUCH easier...faster...smarter... MORE flexible...powerful... DYNAMIC!



This publication contains a wide selection of standard and custom hydraulic filtration assemblies for equipment manufacturers – and replacement filters for both Donaldson housings and those produced by other manufacturers. Donaldson assemblies and filters can be used in both mobile and stationary equipment applications. For custom hydraulic filtration systems, please contact your Donaldson supplier.

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PRODUCT INFORMATION



www.donaldsonfilters.com

Product Line Overview

Comprehensive Hydraulic Filtration Solutions

Low Pressure Filtration

Max operating pressure < 350 psi (24 bar)



Low pressure filters are the most commonly used type of filter in hydraulic circuits, used most often in return line applications.

Donaldson low pressure filters are rated for working pressures up to 350 psi (2400 kPa). In-tank and in-line configurations are available to accommodate virtually any application.

Medium Pressure Filtration

Max operating pressure < 2,000 psi (138 bar)



Medium pressure filters can be used in applications up to 2000 psi (13790 kPa). Donaldson offers both spin-on and in-line cartridge-style filters.

Donaldson Duramax® filters are the highest rated medium pressure spin-on filters available. Duramax filters are proven, reliable, long-lived and easy to install.

High Pressure Filtration

Max operating pressure < 6,500 psi (450 bar)



High pressure filters are positioned between pumps and critical components such as cylinders, motors and valves. They help protect these critical components from catastrophic failure.

Donaldson heavy-duty high pressure filters are rated for working pressures up to 6500 psi (44818 kPa). Various porting sizes and types, including manifold style, are available for a wide range of applications.

Product Line Overview

Comprehensive Hydraulic Filtration Solutions

| Model Series | Max Flow gpm (lpm) | Max Pressure psi (kPa) / bar | Porting Size Options | Page No. |
|--------------|-----------------------|---------------------------------|----------------------|----------|
|--------------|-----------------------|---------------------------------|----------------------|----------|

Spin-on Filters

| | | | | |
|------------|-----------|-------------------|--|----|
| SP15/25 | 30 (114) | 150 (1035) / 10.3 | ½", ¾" NPT, SAE-8, -12 O-ring | 30 |
| W023 | 60 (227) | 150 (1035) / 10.3 | 1¼" NPT, SAE-20 O-ring | 34 |
| HBK05 | 60 (227) | 150 (1035) / 10.3 | 1¼" NPT, SAE-20 O-ring | 38 |
| SP50/60 | 60 (227) | 150 (1035) / 10.3 | 1¼" NPT, SAE-20 O-ring | 42 |
| SP80/90 | 100 (379) | 150 (1035) / 10.3 | 1½" NPT, SAE-24 O-ring, 2" SAE 4-Bolt Flange Code 61 | 46 |
| SP100/120 | 100 (379) | 150 (1035) / 10.3 | 1½" NPT | 50 |
| TT15/30/60 | 50 (189) | 100 (689) / 6.89 | ¾", 1½" NPT | 54 |

In-tank Filters

| | | | | |
|-----------|-----------|-------------------|--|----|
| WL15 | 50 (189) | 200 (1379) / 13.8 | SAE-24 O-ring, 1½" SAE 4-Bolt Flange Code 61 | 56 |
| WL16 | 200 (757) | 200 (1379) / 13.8 | 1½" NPT, SAE-24 O-ring, 1½" SAE 4-Bolt Flange Code 61 | 60 |
| FIK | 170 (639) | 145 (1000) / 10.0 | ½" NPT, ¾" NPT, 1" NPT, SAE-8,-12,-16,-20,-24 O-ring, 2" SAE 4-Bolt Flange Code 61 | 64 |
| SRK Combo | 79 (300) | 145 (1000) / 10.0 | Inlet: SAE-16, -20 O-ring, Outlet: SAE-16 O-ring | 74 |

In-line Cartridge Filters

| | | | | |
|-------|------------|-------------------|-----------------------------|----|
| HRK10 | 300 (1136) | 150 (1035) / 10.3 | 4" ANSI Flange, 8-bolt 150# | 76 |
|-------|------------|-------------------|-----------------------------|----|

Spin-on Filters

| | | | | |
|-------|-----------|--------------------|---|----|
| HMK03 | 25 (95) | 1000 (6895) / 69.0 | SAE-12 O-ring | 82 |
| HMK04 | 35 (133) | 500 (3450) / 34.5 | ¾", 1" NPT, SAE-12, -16 O-ring | 86 |
| HNK04 | 35 (133) | 500 (3450) / 34.5 | SAE-12, -16 O-ring | 94 |
| HMK05 | 50 (189) | 350 (2415) / 24.2 | 1¼" NPT, SAE-20 O-ring | 90 |
| HNK05 | 50 (189) | 350 (2415) / 24.2 | SAE-20 O-ring | 94 |
| HMK24 | 60 (227) | 500 (3450) / 34.5 | SAE-20 O-ring, 1¼" SAE 4-Bolt Flange Code 61 | 86 |
| HMK25 | 100 (379) | 350 (2415) / 24.2 | 1½" NPT, SAE-24 O-ring, 1½" SAE 4-Bolt Flange Code 61 | 90 |

In-line Cartridge Filters

| | | | | |
|--------|------------|-------------------|--|-----|
| FLK90 | 40 (151) | 580 (4002) / 40.0 | SAE-12, -16 O-ring | 99 |
| FLK110 | 42 (159) | 435 (3001) / 30.0 | SAE-20 O-ring | 102 |
| FLK125 | 85 (320) | 508 (3505) / 35.1 | 2" SAE 4-Bolt Flange Code 61 | 105 |
| DPK350 | 100 (379) | 350 (2415) / 24.2 | 1½" SAE 4-Bolt Flange Code 61 | 108 |
| W061 | 100 (379) | 600 (4140) / 41.4 | SAE-12, -16, -20 O-ring | 112 |
| HDK06 | 150 (568) | 350 (2415) / 24.1 | 2½" NPT | 116 |
| W041 | 300 (1136) | 500 (3450) / 34.5 | SAE-24 O-ring, 2" or 2½" SAE 4-Bolt Flange Code 61 | 120 |
| HFK08 | 300 (1136) | 350 (2415) / 24.1 | 3" NPT, SAE-20 O-ring | 124 |

In-line Cartridge Filters

| | | | | |
|---------|-----------|----------------------|---|-----|
| HPK02 | 20 (76) | 2000 (13790) / 137.9 | SAE-12 O-ring | 130 |
| DPK2400 | 100 (379) | 2400 (16547) / 165.4 | 1½" SAE 4-Bolt Flange Code 61 | 136 |
| W440 | 20 (76) | 4000 (27580) / 275.8 | SAE-12 O-ring or Manifold Mounting | 140 |
| FPK02 | 25 (95) | 6090 (42021) / 420.0 | SAE-12 O-ring | 144 |
| W350 | 50 (189) | 3000 (20685) / 206.9 | SAE-12, -16 O-ring | 150 |
| HPK03 | 60 (227) | 3000 (20685) / 206.9 | SAE-12, -16 O-ring | 154 |
| FPK04 | 100 (379) | 4350 (30015) / 300.1 | SAE-20 O-ring | 160 |
| HPK04 | 120 (454) | 6000 (41380) / 413.8 | SAE-20 O-ring, 1¼" or 1½" SAE 4-Bolt Flange Code 61 or 62 | 166 |
| W451 | 150 (568) | 4500 (31027) / 310.3 | SAE-24 O-ring, 1½" SAE 4-Bolt Flange Code 61 or 62, Manifold Mounting | 174 |
| W620 | 150 (568) | 6000 (41380) / 413.8 | SAE-16,-20,-24 O-ring, 1¼" SAE 4-Bolt Flange Code 62, 1½" SAE 4-Bolt Flange Code 61 | 178 |
| HPK05 | 200 (757) | 3000 (20685) / 206.9 | 2" SAE 4-Bolt Flange Code 61 | 183 |

Low Pressure Filtration

Pages 29-80

Medium Pressure Filtration

Pages 81-124

High Pressure Filtration

Pages 129-188

Product Line Overview

Comprehensive Hydraulic Filtration Solutions

Off-Line Filtration

The Donaldson Filter Cart, Filter Panel and Filter Buddy™ offer convenient off-line filtration, flushing and fluid transfer. Use them with your industrial and mobile equipment to achieve and maintain proper ISO cleanliness levels.

Filter Cart

Designed with performance, convenience and safety in mind. Includes value-added features to protect your machinery and equipment from breakdowns caused by contamination.

Filter Panel

Provides fixed/mounted offline filtration and a turn-key approach to supplemental filtration.

Filter Buddy™

This handheld portable system provides the capability to kidney loop reservoirs that you normally cannot reach with larger filter carts. Its small size and light weight allow for carrying up and down stairs and access into tight or confined spaces.



Replacement Filters

The Industry's Largest Selection of In-Stock Replacement Filters!

Donaldson offers a complete line of hydraulic filter heads and housings for low, medium, and high pressure applications. Spin-ons and cartridges are available in a wide range of filter medias.

When replacing another filter brand, our comprehensive and up-to-date cross-reference guide, available at catalog.donaldson.com, can guide you through performance improvement possibilities.

Our worldwide network of authorized distributors is ready to serve you with their extensive experience with hydraulic circuits and with Donaldson filters. Most distributors stock our filters and we have quick-ship programs so you can get the filter you need, when you need it.

To find a distributor near you, visit www.buydonaldson.com.



Product Line Overview

Comprehensive Hydraulic Filtration Solutions

Accessories

Accessories for hydraulic circuits, lines and reservoirs that will help you maintain proper ISO cleanliness levels.

Filter Service Indicators

- Service indicators to maximize filter life

Hydraulic Line Accessories

- Pressure gauges for monitoring system pressure
- Hoses and test points for sampling oil and determining ISO cleanliness levels
- Flanges to connect components
- Valves for system control

Reservoir Accessories

- Suction strainers help protect pumps from damage
- Diffusers for reducing aeration, foaming, turbulence and noise caused by return lines
- Sight and level gauges available, including plastic or steel screw-in styles for use in a variety of applications
- Plugs, caps and vents for small power units and gearboxes
- Filler breathers and caps come in chrome, zinc, epoxy-coated weatherproof finishes, and corrosion-resistance techno polymer – lockable, dipsticks and side-mount versions available



T.R.A.P.™ Breather Technology (Thermally Reactive Advanced Protection)

T.R.A.P. breathers provide fast-acting protection against airborne moisture and particulate contamination. They stop solid particulate down to 3 μm at 97% efficiency and prevent moisture from entering the reservoir. Water-holding capacity is regenerated with every oil return phase. This self-regenerating capability enables extended breather life.

Hydraulic Filtration Solutions

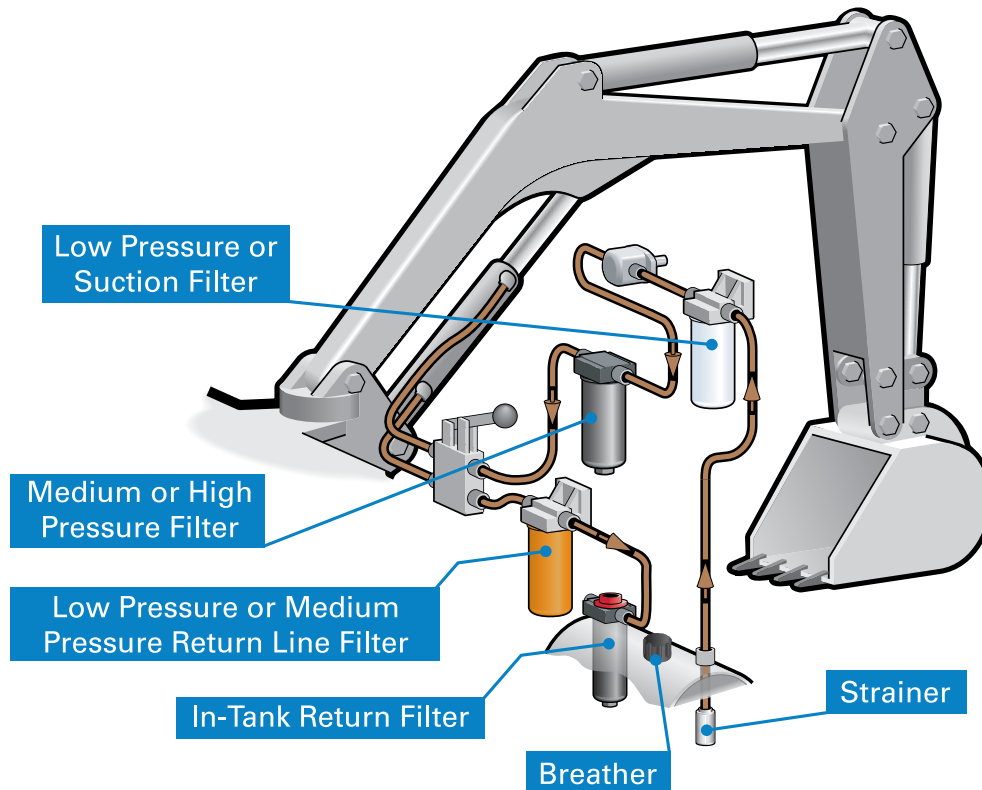
Engineered for Today's Industrial & Mobile Equipment



The best solutions for clean, dry oil.

Count on Donaldson to have the right filters, contamination control products and services to protect critical components in hundreds of applications – in the factory and on heavy-duty mobile equipment.

When you need hydraulic filtration, Donaldson delivers.



Full-Product Range

The industry's largest selection of in-stock filters and accessories – manufactured with consistent, high-quality performance.

Expert Technical Support

Prompt, accessible and knowledgeable customer service experts.

High-Performance Filtration

Increase dirt-holding capacity and lower pressure drop (ΔP) with Donaldson high-performance DT filters.

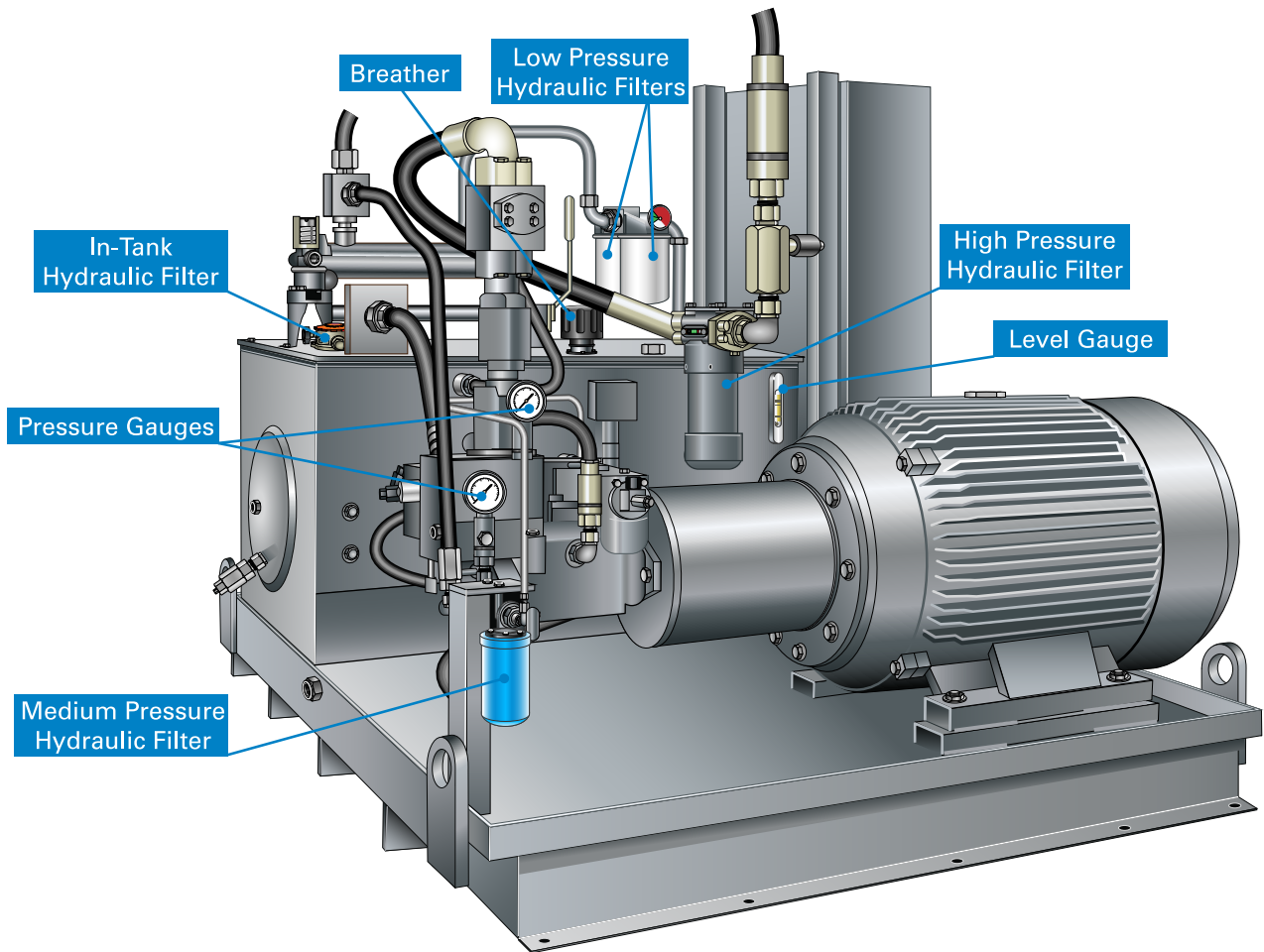
Hydraulic Filtration Solutions

Engineered for Today's Industrial & Mobile Equipment



any Performance Under Pressure

- Low, medium and high pressure filtration
- Spin-on, cartridge and in-tank style filters
- Hydraulic line and reservoir accessories
- T.R.A.P.™ reservoir breather technology



Off-Line Filtration

Filter carts, filter panels and Filter Buddy™ handheld filtration.

Water Removal

Systems and products designed to prevent water ingress and remove entrained water.


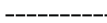
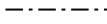

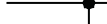
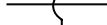
Vacuum Dehydrators & Coalescers

Quick removal of free water, dissolved water, particles and gases.




Common Fluid Power Symbols and Circuit Diagrams

Instrumentation and Pipeline Components

Lines

-  Continuous Line: Flow Line, Symbol Enclosure
-  Dashed Line: Pilot Line, Drain Line
-  System Enclosure: Long and Short Dashes around Two or More Component Symbols
-  Flexible Hose
-  Lines Connecting
-  Lines Crossing



Circular

-  Large Circle: Pump, Motor
-  Small Circle: Measuring Devices
-  Semi-Circle: Rotary Actuator



Square

-  One Square: Pressure Control Function
-  Two or Three Adjacent Squares: Directional Control







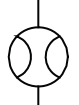
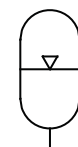
Diamond

-  Diamond: Fluid Conditioner (filter, separator, lubricator, heat exchanger)
-  Diamond with Dashed Line: Filter







Triangle

-  Solid: Direction of Hydraulic Fluid Flow
-  Open: Direction of Pneumatic Flow


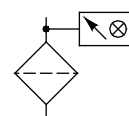
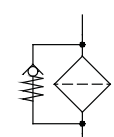
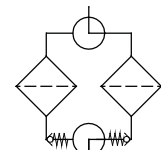
Miscellaneous Symbols

-  Spring
-  Flow Restriction
-  Connections to Tank
-  Temperature Gauge
-  Pressure Gauge
-  Test Point
-  Flow Meter
-  Gas Loaded Accumulator

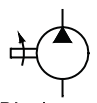

Isolation and Flow Control Valves

-  Isolator (Open)
-  Isolator (Closed)
-  Diverter Valve
-  Orifice (Jet)
-  Throttle Valve
-  Check Valve

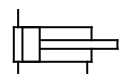

Filters

-  Basic Filter
-  Filter with Visual Clogging Indicator
-  Filter with Bypass Valve
-  Duplex Filter with Check Valve

Pumps and Motors

-  Fixed Displacement Pump
Uni-directional Flow
Anti-clockwise Rotation
-  Fixed Displacement Motor
Anti-clockwise Rotation

Cylinders and Semi-rotary Actuators

-  Double Acting Cylinder
-  Bi-directional
Semi-rotary Actuator

Hydraulic Filter Locations

Comprehensive Selection of Filtration Solutions

Typical Hydraulic Circuit and Filter Locations



Filter in a Circuit Symbol



Pressure Line Filter

Protects high-pressure side components. Helps prevent component wear or failure brought about by debris in the system.



Suction Line Filter

Designed to remove particles in the 5 to 150 micron range. Easy to service and less expensive than other types of filters. Low by-pass valve use recommended to prevent pump starvation.



Reservoir Air Breather

Prevents ingress of airborne contaminants from entering the reservoir tank.



Suction Strainer

Removes large particles or objects built into the system during assembly or introduced during standard maintenance. Prevents catastrophic failure. Also known as a safety filter.



In-Line Accessories

Pressure gauges for monitoring system pressure. Hoses and test points for sampling oil and determining ISO cleanliness levels. Flanges and valves for system control.



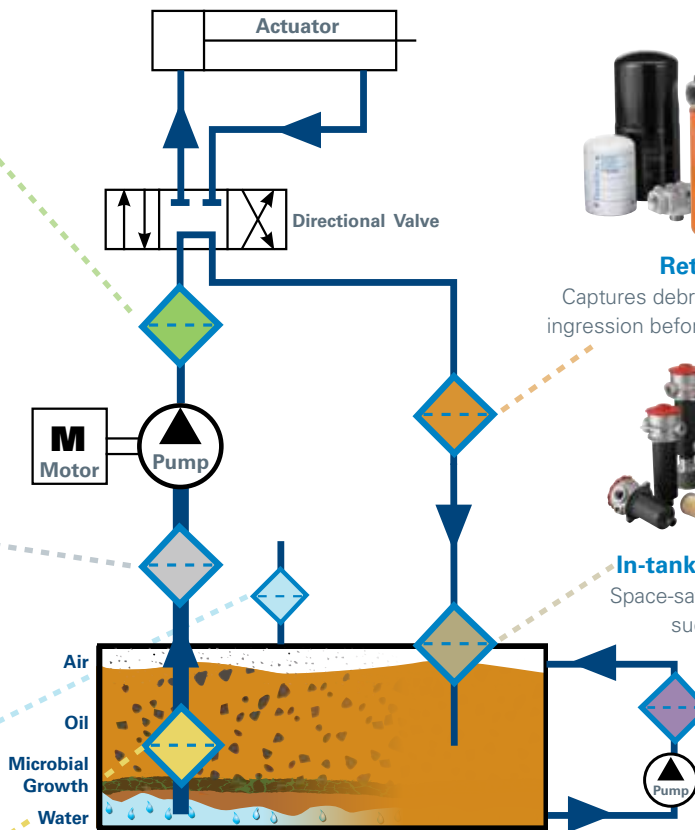
Return Line Filter

Captures debris from component wear or ingestion before it travels into the reservoir.



In-tank Return Line Filter

Space-saving in-tank return and suction line filters.



Reservoir Tank

Water in reservoir tanks is a serious threat to hydraulic systems. Dirt, particles and microbial growth are also common contaminants existing in tanks.



Reservoir Accessories

Sight and level gauges available. Diffusers are used for effectively reducing aeration, foaming, turbulence and noise caused by return lines.



Kidney Loop Filters

Off-line filtration supplements system cleanliness. Use with industrial and mobile equipment to achieve and maintain proper ISO cleanliness levels.

Industry Shaping Technology

Advanced Media Technology for Optimal Filtration Performance

Donaldson Media Formulations Set the Standard for Filtration Performance!

Donaldson offers extensive filter media technology choices for hydraulic filters – over 35 different formulations. These multiple formulations enable our engineers to develop filtration systems that meet or exceed a wide variety of customer specifications.



Synthetic media captures more and smaller contaminants than cellulose media. When an application requires higher efficiency filtration than what cellulose filter media can deliver, Donaldson uses Synteq™ synthetic media technology.

We use a variety of techniques to enhance filter media so it can withstand the high differential pressures found in typical hydraulic systems. Oven-curing, wire backing and multiple layers all contribute to our media integrity.

More detailed information on filtration media is available in the technical reference guide.

Synteq XP™ Filtration Technology

Synteq XP™ is a breakthrough in synthetic filter media technology that takes hydraulic filtration to the next level. It is the next generation of Donaldson Synteq media, designed to increase filter dirt holding capacity and reduce pressure drop.

Synteq XP is the first filter media that delivers high filtration efficiency, high dirt holding capacity and low pressure drop in a single filter for hydraulic filtration applications.

Synteq XP media technology uses a resin-free bonding technique to provide improved filtration characteristics, including:

- Enhanced hydraulic system component protection
- Lower operating pressure drop
- Longer filter life – 2 to 3 times that of traditional cellulose filter media
- Higher filtration efficiency
- Versatile packaging



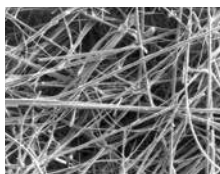
DT Synteq™ Synthetic Media (High-Performance)

DT grades of Synteq media utilize a blend of borosilicate glass fiber whose matrix is bonded together with an epoxy-based resin system. Donaldson filter media scientists found this to provide the best available chemical resistance for the broadest array of hydraulic applications. DT Synteq is ideal for use with phosphate ester and water glycol fluids.



Synteq™ Synthetic Media

This media's uniform synthetic fiber structure delivers higher filtration efficiency and longer filter life. Synteq filter media technology is ideal for synthetic fluids, water glycols, water/oil emulsions, HWCF (high water content fluids) and petroleum -based fluids. The smooth rounded fibers provide low resistance to fluid flow.



Cellulose Media

This media often has lower beta ratings, providing effective filtration for a wide variety of petroleum-based fluids. The smaller pores result in greater flow resistance, in turn causing higher pressure drop.

Water Absorbing Media

This media is formulated with absorbents and resins to remove moisture and condensation from petroleum-based fluids.

Wire Mesh Media

Wire mesh media consists of stainless steel, epoxy-coated wire mesh. This media is used to catch very large, harsh particulate that would rip up a normal filter. This media is also useful as a coarse filter in viscous fluid applications.

Filter Media Design & Development

From traditional cellulose to synthetic – the development of proprietary filtration substrates is at the heart of every Donaldson filtration system. If one of our existing media formulations does not meet our customer's specifications, our scientists use our in-house media development laboratory to develop new formulations that meet or exceed your requirements.

Media Characterization Testing

- Permeability
- Tensile strength
- Mullen burst
- Basis weight
- Pore size
- Thickness
- Gurley stiffness
- LEFS bench
- 3-Point bend

In-House Media Mill

- For application development
- Trial media production runs
- Development of proprietary formulations



Filtration Performance Testing

- Particle counting
- Multi-pass testing
- Water removal efficiency

Industry Shaping Technology

Hydraulic Filtration Trends and Evolution

Hydraulic Filtration System Trends

Today's hydraulic systems are intolerant of corrosion, require higher cleanliness standards, and demand increased filtration performance. Hydraulic-powered vehicles and equipment owners desire the assumption of lower operation and ownership costs – a unique challenge that Donaldson understands.

Unique Filtration Systems

Donaldson continually strives to introduce new and effective filtration technologies that work within your engineering specifications and add customer value.

Low Pressure Systems

- Sensors, valves, and switches in a variety of styles and port sizes
- Unique filtration performance options
- Integrated mounting brackets
- Broad range of package sizes
- Custom design options

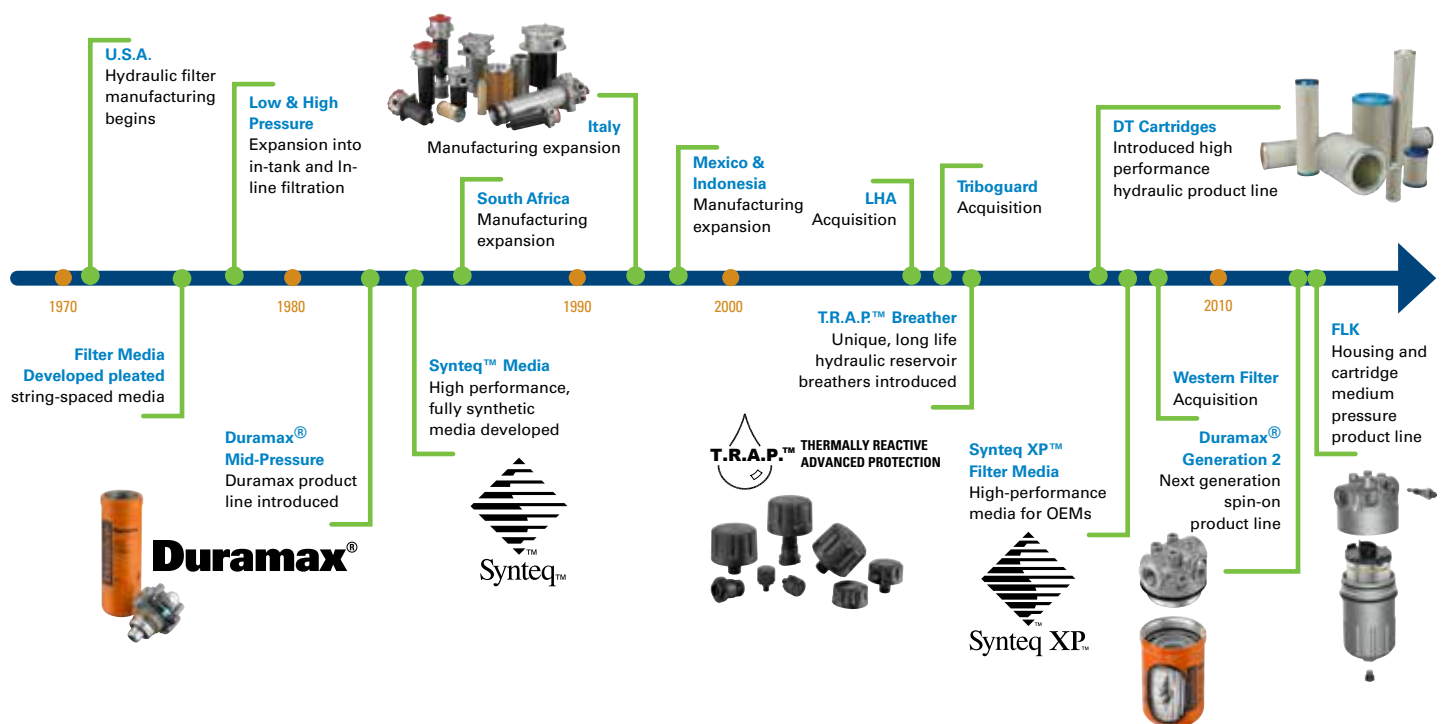
Medium Pressure Systems

- Die-cast and sand-cast custom head assemblies integrated into systems
- Enhanced system component protection
- Customized to existing filter interface – no system modification required

High Pressure Systems

- High-performance media options
- Synteq™ Filtration Media
- Material options - metal or plastic
- Multiple head interfaces

Hydraulic Filtration Design & Manufacturing Experience



Industry Shaping Technology Global Design & Logistic Capabilities

Donaldson has pioneered the use of a wide range of engineering, design and testing tools used during the product development and validation process.

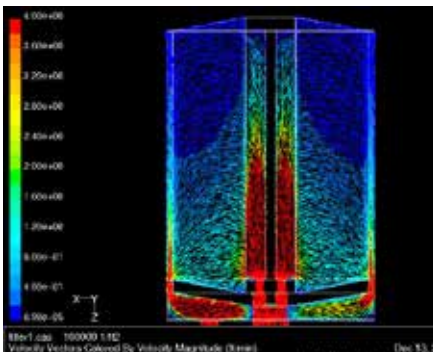
OVERVIEW

Engineering Capabilities Test & Evaluation Tools

- Design centers in three key regions – United States, Asia and Europe

Prediction and Simulation

- CAD
- Media modeling
- Fluid mechanics
- Structural analysis
- Thermal analysis



Structural Analysis

- Per SAE, ISO, and NFPA standards
- Burst
- Collapse
- Pressure impulse and fatigue

Tensile Compression

- Used to test material, component and assembly properties

Environmental Chambers

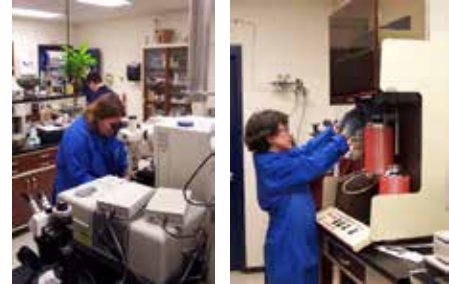
- Allows testing at hot or cold temperature, with humidity control

Flow Test Benches

- Allows measurement of static and dynamic flow and restriction for a device
- Allows calculation of device restriction at varying flows and temperatures
- System simulation

Filtration Performance Testing

- ISO, SAE, NFPA
- Customer standards
- Contaminant (particle or water) removal efficiency
- Contaminant capacity



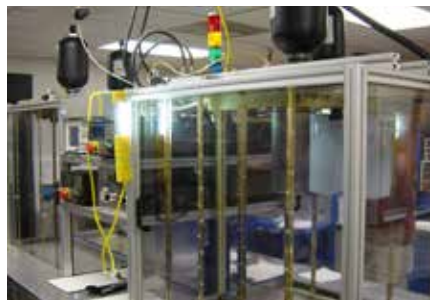
Development and Validation

Filter Durability

- Filtration performance testing per applicable SAE and ISO standards
- Fabrication integrity
- Environmental conditions
 - Salt spray and thermal cycling
- Pressure fatigue
- Flow fatigue
- Hydrostatic burst
- Flow benches
- Vibration benches
- Gravimetric analysis

Rapid Prototyping

- SLA, SLS
- Investment casting
- RTV molding



Analytical Chemistry Laboratory

- Optical microscopy
- Scanning electron microscopy (SEM)
- Chemical analysis
- Fourier transform infrared (FTIR)
- Gas chromatography (GC/MS)
- Thermal analysis (DSC, TGA)
- Liquid chromatography



Design Validation

- Test cell locations in three key regions
 - United States, Asia and Europe
- High viscosity ΔP (pressure drop)
- High temperature
- Flow fatigue
- Used oil analysis
- Component durability
- 24/7 durability testing
- Web-based test cell monitoring access
- Fluid compatibility



Vibration/Shaker

- Multiple benches
- Performance vibration with flow test
- Can apply random, shock or custom variable vibration profiles
- Capable of hot or cold tests

Field Testing

- On and off highway
- Heavy-duty
- Tests conducted on both end user and OEM applications

Field Data Acquisition

- Real time measurements
- Remote communications
- On-line collection tools
- Review daily, weekly and monthly reports to analyze operational trends

Quality Certified

- All facilities are ISO/TS certified

Quality Controls

- Consistent, reliable product
- On-site verification test units and equipment
- Part number specific PLC controls
- Manufacturing dates for tracking and warranty

Manufacturing

Locations for Liquid Filtration

- United States, Canada, Mexico, Europe and Asia-Pacific
- Located strategically with global partners



Base Component Materials

- Built for long-life, durability, corrosion resistance and liquid compatibility
- Metal and non-metal materials
- Methods to enhance media durability include oven-curing, wire backing and multiple layered media



Packaging Options

- Returnable packaging
- Heavy-duty packaging
- Pallets ISPM-15 compliant for international routing

Logistics / Distribution

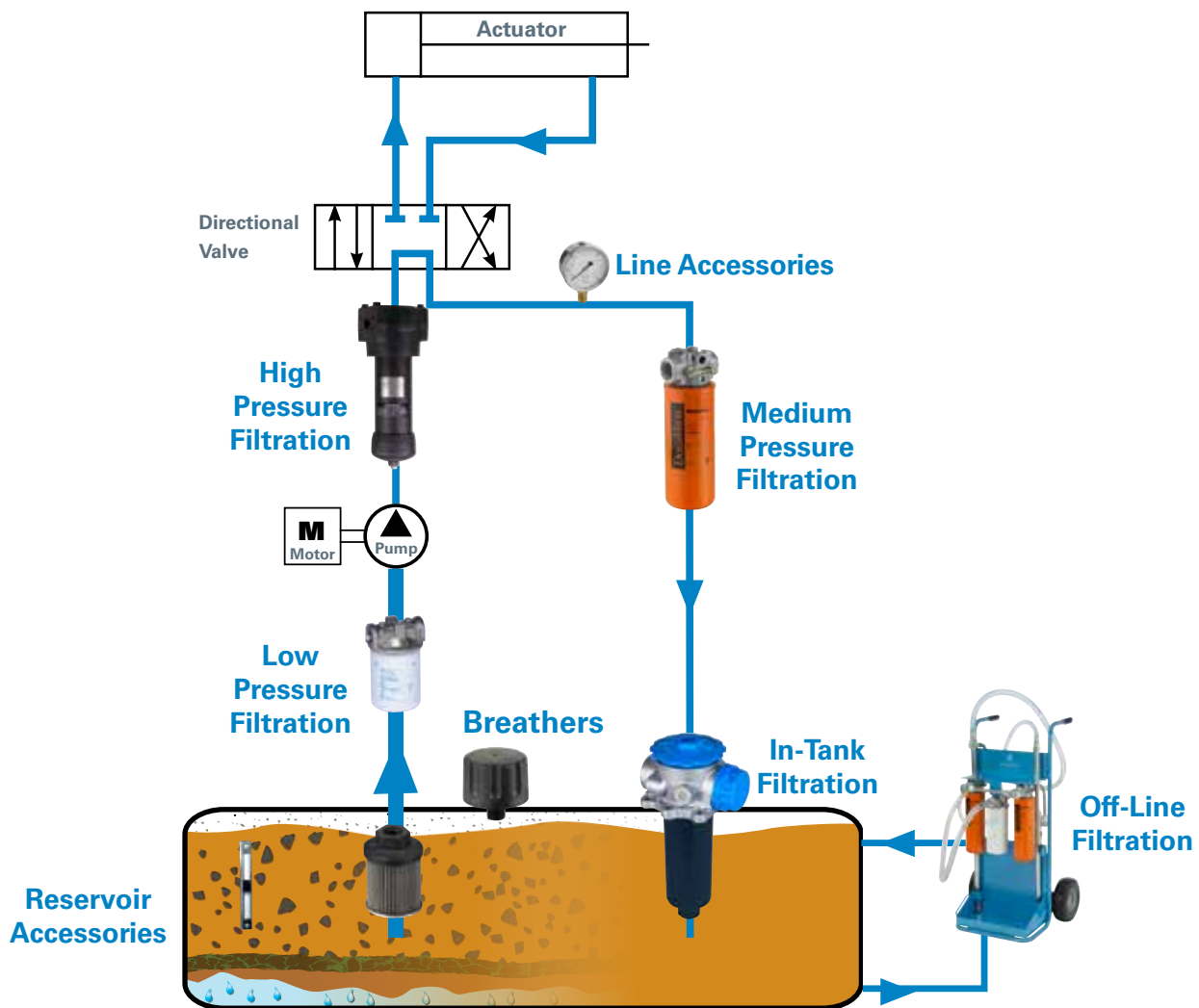
Donaldson has established a global distribution network to serve our customers locally and around the world. We operate as a global company with a network of primary distribution locations that support a mature hub of regional distribution centers and warehouses.

Donaldson distribution centers are strategically located around the globe to quickly and accurately deliver filtration and exhaust products wherever replacement products are needed. We work with a network of transportation, third party logistics companies, consolidators and cross-docking facilities to meet or exceed our customers' requirements.

Customers around the world benefit from our umbrella of distribution centers. We focus our efforts on local support and the capabilities of our staff. We continue to make significant investments in facilities, systems, supply chain relationships and staffing to offer the best order fulfillment options available.

Performance Under ^{any} Pressure

Donaldson hydraulic filters and accessories reduce a broad range of contaminants to keep sophisticated equipment running smoothly, resulting in efficient systems with superior performance. Whether it's located outdoors on equipment or inside a crowded manufacturing plant, hydraulic components need clean hydraulic and lubrication oil for maximum life and optimal productivity.



Tech-Tips for Hydraulic-Powered Vehicles and Equipment Owners

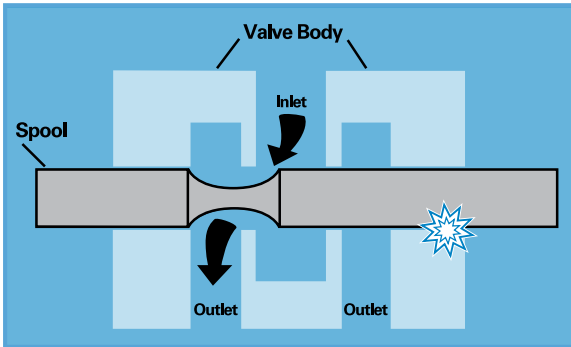
Catch-up on the latest information!

The Shoptalk section contains maintenance tips, cost reduction ideas, product features and benefits.



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Hydraulic Components Need Protection



This illustration of a simple hydraulic valve shows how particles damage components. If a particle lodges between the spool and valve body, it will erode small flakes from the metal surfaces. As these flakes are moved back and forth by the action of the spool, they can roll into a burr that jams the spool and disables the valve.

Protect Precision Parts from Contamination Damage and Hydraulic Failures

Good filtration needs to be an integral part of the hydraulic circuit to ensure long life and the proper operation of pumps, valves and motors. Hydraulic circuits are designed in all shapes and sizes, both simple and complex in design, and they all need protection from damaging contamination. Abrasive particles enter the system and, if unfiltered, damage sensitive components like pumps, valves and motors. It is the job of the hydraulic filter to remove these particles from the oil flow to help prevent premature component wear and system failure. As the sophistication of hydraulic systems increases, the need for reliable filtration protection becomes ever more critical.

Typical Factors in Component Life

Studies show that most (typically 70%) of hydraulic component replacement is necessary because of surface degradation, and most of that (50%) is due to mechanical wear.

Proper filtration of hydraulic fluids can lengthen component life. Don't cut costs by eliminating hydraulic filters. It could cost you more in the long run in major component repair!

70% Surface Degradation

- 50% mechanical wear from:
 - abrasion
 - fatigue
 - adhesion
- 20% corrosion

15% Accidents

15% Obsolescence

Ref: Shoptalk Card F115306

Where does Hydraulic System Contamination Come From?

Sources of Hydraulic System Contamination

New oil out of shipping containers is usually contaminated to a level above what is acceptable for most hydraulic systems. Never assume your oil is clean until it has been filtered.

There are a surprising number of different sources of system contamination in hydraulic filtration.

New Fluid – most new fluid is not acceptable for use in hydraulic systems and must be filtered first. Learn how in the off-line filtration section-

Built-In – contamination introduced into the system during the manufacture, assembly and testing of components

Ingressed – external ingress of atmospheric contamination; air condenses and water is released into the reservoir

Induced – particles introduced during normal maintenance or system operation

In-Operation – wear generation contamination caused by the pump, actuators, cylinder or the hydraulic motor

Rubber and Elastomers – degradation of rubber compounds and elastomers products

High Water Based Fluids – supports biological growth

Replacement of Failed Components – failure to thoroughly clean conductor lines after replacing a failed pump

Types of Contaminant

Many different types of contamination may be present in hydraulic fluid. Contaminants grind and wear at the surface of moving parts, introducing even more particles into the system. These surface degradation contaminants cause more than 70% of all hydraulic system downtime.

- particulate – ingressed and built-in (dust, dirt, sand, rust, fibers, elastomers, paint chips)
- wear metals, silicon, and excessive additives (aluminum, chromium, copper, iron, lead, tin, silicon, sodium, zinc, barium, phosphorous)
- water
- sealant (tape, pastes)
- sludge, oxidation, and other corrosion products
- acids and other chemicals
- biological and microbial



Scratches along the inside surface of a hydraulic cylinder reveal component damage caused by contaminants.

Ref: Shoptalk Card F115305

Understanding the Beta Rating System

This information is provided as an aid to understanding fluid filter efficiency terminology based on current ISO, ANSI and NFPA test standards. It is not proprietary and may be reproduced or distributed in any manner for educational purposes.

What Is Beta Ratio?

Beta ratio (symbolized by β) is a formula used to calculate the filtration efficiency of a particular fluid filter using base data obtained from multi-pass testing.

In a multi-pass test, fluid is continuously injected with a uniform amount of contaminant (i.e., ISO medium test dust) then pumped through the filter unit being tested. Filter efficiency is determined by monitoring fluid contamination levels upstream and downstream of the test filter at specific times. An automatic particle counter is used to determine the contamination level. Through this process an upstream to downstream particle count ratio is developed, known as the beta ratio.

The formula used to calculate the beta ratio is:

$$\text{Beta ratio}_{(x)} = \frac{\text{particle count in upstream fluid}}{\text{particle count in downstream fluid}}$$

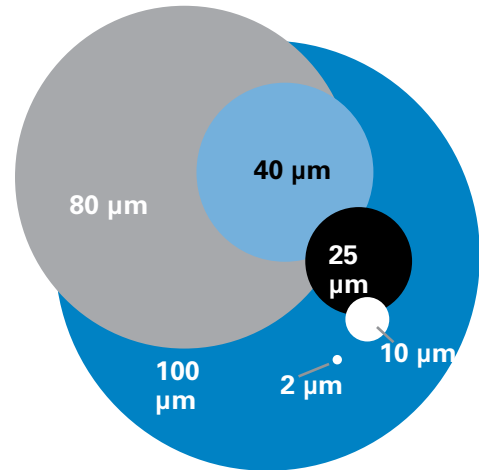
where (x) is a given particle size

Indicates that testing was done with APC's calibrated with NIST fluid

$$\beta_{10(c)} = 1000$$

1000 times more particles upstream than downstream that are 10 μm and larger

How Big is a Micron?



Micron Sizes of Familiar Particles

| | |
|---------------------------|-------------------|
| Grain of table salt | 100 μm |
| Human hair | 80 μm |
| Lower limit of visibility | 40 μm |
| White blood cell | 25 μm |
| Talcum powder | 10 μm |
| Red blood cell | 8 μm |
| Bacteria | 2 μm |
| Silt | <5 μm |

Hydraulic Oil Test Kits

The Advanced Fluid Analysis Kit is designed to monitor component wear, contamination and fluid condition.

Advanced Hydraulic Oil Test Kit

Kit X009330

| |
|---|
| 24 Metals by ICP |
| Water by Karl Fischer, ppm |
| Viscosity at 40°C or 100°C |
| Oxidation/Nitration by FTIR |
| Total Acid Number |
| ISO Particle Count/Particle Quantifier |
| Sample Extraction Pump Part #P176431 |
| Sample Extraction Tubing Part #P176433 |

Our basic hydraulic oil kit reports TAN (total acid number), water in PPM and ISO particle count.

Basic Hydraulic Oil Test Kits

- 1- Basic Use Kit X007374
- 2- Correct Drain and ISO use Kit X007377

| | 1 | 2 |
|--------------------|---|---|
| Metals, ppm by wt | ◆ | ◆ |
| Viscosity, cSt. | ◆ | ◆ |
| Water % | ◆ | |
| TAN (Total Acid #) | | ◆ |
| Water, ppm | | ◆ |
| ISO Particle Count | | ◆ |



Kit X007377 for basic hydraulic oil analysis

Recommended Sampling Interval

Industrial / Stationary

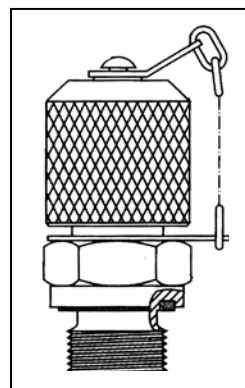
| | |
|---------------|---------------------|
| Transmissions | 500 hours / monthly |
| Geared Drives | 500 hours / monthly |
| Bearings | 500 hours / monthly |
| Hydraulics | 500 hours /monthly |

Oil Sampling Accessories

These accessories can simplify your oil analysis during normal maintenance routines.



Sampling Pump (P176431) & Plastic Tubing (P176433) sold separately in 100 ft. rolls



Quick Sampling Metal Valve for test point. 1/8" NPT (P563212)
Working Pressure
5800 psi / 400 bar

Ref: Shoptalk Card F11523

Watch Out for Dents on Liquid Filters!



Dents in a steel filter canister create a concentration of stress—making the canister more susceptible to fatigue.

Dents May Cause Cracks

Cracked filters can be caused by dents made during improper installation. Filters that are dented prior to or during installation should not be used. Filters dented after installation should be replaced immediately. The cost of replacing a dented filter is much less than the cost of the damages that could result from a dented filter that fails during service.

Filter fatigue results from pressure pulses within the system. Pressure is regulated by a pressure regulating valve. This valve is spring operated and intermittently opens and closes to regulate pressure. Once pressure exceeds the setting of the spring in the regulating valve, the valve will open and relieve pressure until the spring can expand and close the valve. This function is repeated continuously during operation of the system, creating a pulsing effect. Filter canisters are subjected to the same pulsation. However, unlike the spring in the pressure regulating valve, canister material is susceptible to failure after such fatigue.

Filters are designed with a low carbon steel to resist fatigue and are formed so the stress created by the pulses in the system are equalized over the surface area of the canister. A dent provides an area of stress concentration where pressure pulses can greatly shorten the fatigue life of the canister.

If you receive filters that were dented prior to your receipt, you should contact Donaldson customer support for corrective action.

Ref: Shoptalk Card F115275

Watch Out for Old Compression Gaskets!



When changing any filter that has a gasket — use caution as old gaskets may stick!

A compression seal is a means of preventing migration of liquids, gases or solid contaminants across a joint or opening in an assembly or housing. A seal not only prevents the escape of fluid from inside and foreign material from entering the system from outside, but it must provide for easy installation and removal. A new gasket is critical for proper filter function.

Remember ...

- Remove used gaskets and clean the sealing area thoroughly
- Always use a new gasket with a replacement filter
- Over-tightening the filter may damage the head
- Dispose of used filters properly

Ref: Shoptalk Card F115233

How Clean is Your New Oil?

Amount of contaminant in 100 gallons hydraulic oil

Donaldson Hydraulic Filter
Synteq™ Media

Standard Hydraulic Filter
Cellulose Filter Media

New, Unfiltered Hydraulic Oil



ISO 14/9/3
.004 gram dust



ISO 19/17/14
.363 gram dust



ISO 22/21/18
4.73 grams dust

Contamination Levels of Different ISO 4406 Codes Vary Dramatically.*

New, unfiltered hydraulic oil can contain 1,000 times more contaminant than oil that has passed through filter media.

Protect your hydraulic system from costly repairs and downtime with Donaldson hydraulic products with Synteq™ filter media technology – designed to meet equipment filtration requirements and strength needs!

Prevent Catastrophic Damage to Your Expensive Equipment

Hydraulic Pump Exposure to Dirt

Synteq™ Media

Cellulose Media

New Hydraulic Oil

ISO 14/9/3

ISO 19/17/14

ISO 22/21/18

.03 lbs

2.5 lbs

32.5 lbs

12.5 grams

1,125 grams

4,750 grams

Amount of contaminant that passes through a 25 gallon hydraulic reservoir with a 25 gpm pump running for a period of 500 hours.

* Derived from the ISO 16889 test standard with NIST certified on-line automatic particle counters and ISO medium test dust (assumes spherical particle shape and lower bound diameter for test dust).

Achieved with $\beta_{4(c)} \mu\text{m} > 1000$ Synteq™ media. Actual results may vary.

Ref: Shoptalk Card F115284

High-Performance DT Cartridges Deliver Uptime Protection



Using Donaldson Synteq™ media technology, DT filters extend filter life, allow for higher initial cleanliness and provide superior system protection.

Premium Uptime Protection

Every hydraulic system has suspended particles in its fluid. Contaminants grind and wear at the surface of moving parts, introducing even more particles into the system. These contaminants cause more than 70% of all hydraulic system downtime.

Donaldson high-performance DT cartridge filters provide better protection from the particles and contaminants that reduce the effectiveness of lubricant and hydraulic fluid.

DT filters are ideally suited for a variety of demanding applications, including:

- heavy-duty mobile equipment
- in-plant hydraulics
- transmissions
- bearing lube oil systems

DT high-performance hydraulic cartridges provide 73% higher dirt-holding capacity and 47% lower initial pressure drop than traditional filters – with micron ratings down to 2 µm.

Donaldson DT filters are engineered to fit many competitive applications, including Fairey Arlon, Hydac, Pall, Parker, PTI/Mahle and Schroeder.

For a complete list of replacement part numbers, visit www.crossreference.donaldson.com.

Ref: Shoptalk Card F115304

T.R.A.P.™ Moisture Vapor with Breathers for Hydraulic Reservoirs



Water has a way of sneaking into hydraulic circuits, which can cause damage. Minimize moisture with the Donaldson Thermally Reactive Advanced Protection (T.R.A.P.™) Breather.

Features and Benefits

- Minimize water in your system – T.R.A.P. breather strips moisture from the incoming air, allowing only dry air to enter the hydraulic circuits
- Maximize system uptime – T.R.A.P. media regenerates its water holding capacity for longer service life
- Hydraulic reservoir can breathe – the T.R.A.P. doesn't restrict air flow

Fast-acting Breather Eliminates Moisture from Hydraulic Reservoirs

- Extended service life (exhales moisture and refreshes its holding capacity on each cycle)
- Reacts instantly to conditions in the hydraulic circuit, creating a moisture barrier without impeding airflow
- Reduced maintenance costs
- Thermally reactive barrier that removes moisture at relative humidity levels as low as 15%
- Superior moisture blocking and particulate filtration down to 3 µm at 97%
- Will not freeze in winter

Ref: Shoptalk Card F115241

Filter Recycling

Donaldson encourages all individuals and businesses to recycle their used hydraulic filters. Recycling used hydraulic filters helps divert waste from landfills while providing a valuable resource for recycling. We encourage you to check your local disposal regulations for proper disposal and recycling.

Industry Resource: The Filter Manufacturers Council

Established in 1971, the Filter Manufacturers Council represents North American manufacturers of vehicular and industrial filtration products. Initially developed to monitor regulatory and technological developments that affect the industry, the Council has since expanded its activities substantially.



www.filtercouncil.org

The Council has undertaken several environmental initiatives including partnering with states to promote the proper management of used oil filters. In addition, the operation of the hotline and web site provide valuable information regarding state regulations and companies that transport, process and recycle used oil filters.

Donaldson Company is a member of the Filter Manufacturers Council.

Do You Store or Warehouse Filters On-Site?

Whether it's an empty trailer or building, it's important to practice good storage and handling techniques when it comes to filters.

Before installing any filter on a piece of equipment make sure the filter is clean, unused and free of damage.

Filter Storage Tips and Recommendations for Contamination Control

- Never store a filter on a shelf without it being in a box or totally sealed from outside contaminant.
- When you see an open box of filters on the shelf, tape it shut—unless the filters inside the box are individually sealed.
- Handle filters with care to prevent filter damage; for example, don't throw filters into the back of a truck.
- If transporting filters from one job site to another, don't let them roll around on the floorboard or in the back of a truck as it may damage the filter.
- Metal storage shelves may cause condensation to form on filters if sitting directly on metal. Over time the filter may get rusty. This is another good reason to store filters in boxes.
- If a product box has layers of contaminant, take care that the contaminant doesn't get on the new filter as you remove it from the box.
- Practice "first-in, first-out" with your inventory. When possible, always use the oldest inventory first.
- Make sure labels with product information and manufacturing dates are visible to personnel selecting from the shelves.

HRK10 at a Paper Mill



HRK10 Duplex

- Industry:** Paper
- Problem:** Collapsing Competitive Filter Elements on PMO Circuit
- Solution:** Donaldson HRK10 Duplex
Donaldson High-Performance DT Cartridges

Donaldson Company was contacted by an upper Midwestern paper mill. This paper mill called Donaldson and our Distribution Partner for assistance with filter collapse in existing competitive filter housings that resulted in contamination of the main lube circuit. In addition, the filtration system, using 8300 competitive style housings, was inefficient and didn't offer a bypass option. The mill runs a demanding 24/7 operation with minimal shutdown opportunities, but the company had a major maintenance shutdown (20 hours max) scheduled, which provided a narrow window of opportunity for Donaldson and our Distribution Partner to shine.

The mill found a solution in Donaldson's new HRK10 filter housings and Donaldson high-performance DT filters. Four HRK10 units were configured in a duplex arrangement. Donaldson DT B5(c)=1000 filter elements were installed and are currently achieving an ISO cleanliness level of 16/14/11. Routine oil samplings upstream and downstream continue to confirm great results. Through the joint efforts of Donaldson Company and our Distribution Partner, we delivered an economical solution which created a new relationship and happy customer.

T.R.A.P.™ at a Coal Plant



T.R.A.P. Reservoir Breathers

- Industry:** Power Generation
- Problem:** Short Life of Desiccant Breathers and High Maintenance
- Solution:** Donaldson T.R.A.P. Breathers

A coal-fired power plant in northeast Florida is always looking for a better way to protect its equipment and reduce downtime. The desiccant breathers that this around-the-clock operating facility was using to keep water and dirt out of its gearboxes required frequent change-outs. Gearboxes in the hot, humid air of the southeastern United States need robust and reliable protection against atmospheric moisture. The plant needed a breather that would work better and last longer than the desiccant breathers they were using. The plant's Predictive Maintenance Technician found a solution in Donaldson's T.R.A.P. breather – an advanced breather technology that provides unbeatable system protection and lasts longer.

By installing T.R.A.P. breather filters on its gearboxes, the power plant has extended breather filter life by over 50%. "We test our oil frequently, our current breathers are working well, but the T.R.A.P. breathers are working longer," says the PdM Tech. Unlike desiccant breathers that absorb and hold moisture resulting in shorter life, Donaldson's Thermally Reactive Advanced Protection (T.R.A.P.) senses and begins to remove moisture at only 15% relative humidity. Unlike desiccant breathers that require frequent changeouts, a T.R.A.P. breather exhales moisture with every flow cycle, regenerating its water-holding capacity and resulting in longer breather life.

HMK25 at a Gold Mine



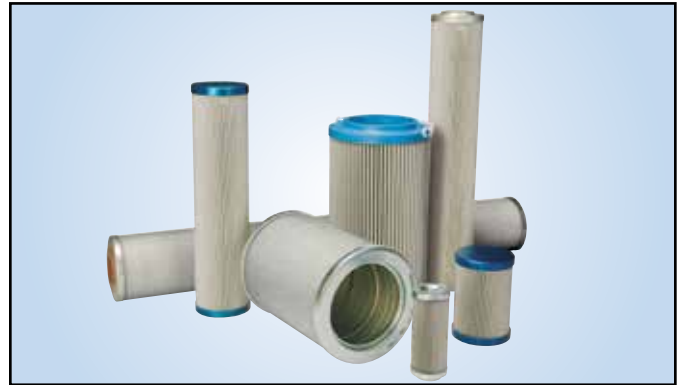
HMK25 Spin-On Filter

- Industry:** Mining
Problem: Gyro Crusher Seizure due to Oil Starvation
Solution: Donaldson HMK Duramax

The relationship between a rock crusher rebuilder and Donaldson began after a 36" Telsmith gyro crusher was reconditioned and put back into service at a South African gold mine. Within weeks of its return (and while still under warranty), the crusher seized. It happened on a cold morning shortly after start-up. There was no warning of any oil pressure problem and no obvious reason for the failure. Oil starvation was quickly identified as the cause of seizure—but what was the cause of the oil starvation? The first part of the investigation determined that a pressure switch was on the pump side of the filter instead of beyond the filter. Donaldson redesigned the entire filtration system.

"We went for a double head HMK25 filter system, 380 lpm at 24 bar. We also dropped the filter media from 60 µm down to 20 µm." The oil used was a non-foaming 150 cSt gear oil. However, at 0°C the viscosity is 2990 cSt. "The viscosity goes up exponentially. On a cold morning, if the guys start up their crusher straight away, that oil is not going through the filters easily." The Donaldson-modified system was implemented and the crusher was successfully put back into service. "It has worked 100% for a year now. They are changing the Donaldson filters at 1000 hour intervals on restriction. Changing the filtering system and the filtering points made all the difference."

DT Filters at an Injection Molder



Donaldson High-Performance DT Filters

- Industry:** Injection Molding
Problem: Short Servo Valve Life
Solution: Donaldson DT High-Performance Filter

Donaldson DT elements were recently installed on injection molding equipment at a Midwestern molder's facility. This molder was running nine machines that make plastic components for the product security industry. Their normal operating procedure included regularly sampling and analyzing their hydraulic oil (ISO VG 46), and they were not satisfied with their ISO cleanliness codes or their short servo valve life. Servo valve life (lasting only a few months) led to a drastic change to their maintenance procedures, including: new oil, moisture removal breathers, side-loop cleanup systems, and Donaldson DT pressure line filters.

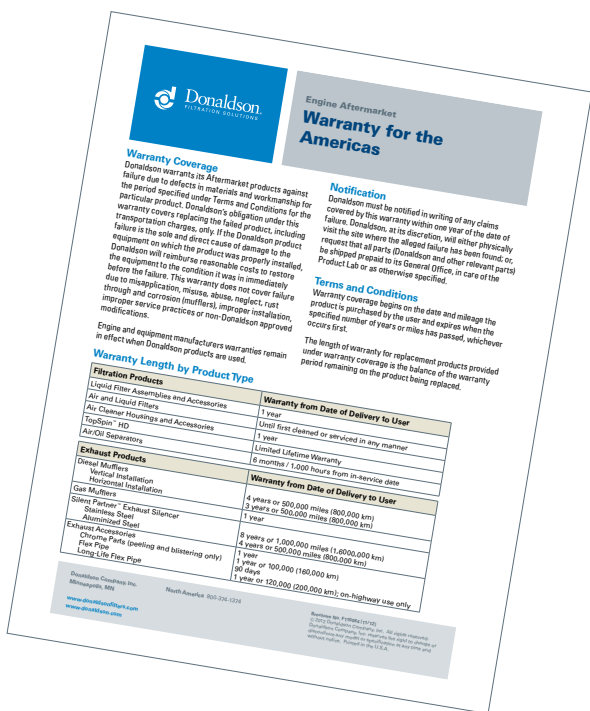
In side-by-side tests the injection molder compared their existing supplier's hydraulic pressure line elements with Donaldson DT <4 µm(c) rated filters. Oil analysis proved that by using the Donaldson DT filters, they could regularly achieve as much as a one to two ISO code improvement in particulate cleanliness over the filters they had used in the past. With a target of 17/14/11, they were regularly able to achieve 14/12/9. At the time of this writing, the injection molder's maintenance manager reported, "we have not had to replace servo valves in over one year." As a result of the change in pressure line filters and their other improved practices, they are expecting extended servo valve life and greater uptime.

Will Using Aftermarket Filters Void My Warranty?

Answer:

Good News! No need to worry about voiding your warranty – you can use aftermarket products! You still need to follow your manufacturer’s recommended maintenance practices, but your warranty is protected under the Magnuson-Moss Warranty Act. Information on the Magnuson-Moss Warranty Act is available at www.ftc.gov/bcp/edu/pubs/business/adv/bus01.shtm#Magnuson-Moss.

In addition, Donaldson warrants its aftermarket products against failure due to defects in materials and workmanship for the period specified under the Terms and Conditions for the particular product. More information is available at www.donaldson.com/en/engine/support/datalibrary/000194.pdf.



Filtration Service Videos now on YouTube®!

www.youtube.com/user/donaldsonengine

Thirty Donaldson Academy filter servicing videos are now available as a resource for understanding filtration selection and maintenance. They cover detailed hydraulic filter service steps and best practices. Air, lube, fuel and coolant training modules are also available.

These videos are easily accessible from smart phones – making them a great tool for mobile training!

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YouTube
SERVICE TRAINING VIDEOS



youtube.com/user/donaldsonengine

Filter Installation and Servicing Icons



Donaldson spin-on filters have pictograms on the sides to define the proper servicing steps.

Maintenance Practices for Contamination Control

Here are recommended practices from Donaldson about hydraulic filter servicing and handling. These steps are universal to many hydraulic systems. This servicing information is provided as a best practices guide. Donaldson recommends that where possible, follow the filter service instructions supplied by your original equipment manufacturer. It is not however intended to replace or supersede the service instructions supplied by your equipment or vehicle manufacturer.

Spin-On Filter Servicing



Check the filter service indicator.

- Check to see that the OEM specified service interval has been reached or that the service indicator shows that the filter is due for servicing.



Turn system off and release pressure.

- Ensure that the hydraulic system is turned off.
- Check that there is no pressure present.



Unscrew and remove old filter and gasket.

- Properly dispose of the filter as may be required by local regulations or recycle it.



Wipe filter head with clean cloth.

- Clean the filter head or cover surfaces
- When performing a hydraulic oil change, it is best to use a clean cloth.



Inspect the new filter for damage.

- Check the new filter you will be installing for any shipping and handling damage.
- Do not install a dented filter since the canister has been weakened.



Lubricate the threads.

- Lubricate threads of filter head.
Failure to do this could result in thread galling



Apply thin film of clean motor oil to gasket.

- Lubricate seal(s) with clean system oil.



Align threads. Spin filter until gasket contacts.

- Spin the new filter on until the top of the gasket first contacts the sealing surface.




Hand tighten the filter.

- Tighten per the guidance of the icons which appear on the filter housing. Do not over-tighten.




Bleed the system and check for leaks.

Cartridge Filter Servicing




Check the filter service indicator.

- Check to see that the OEM specified service interval has been reached or that the service indicator shows that the filter is due for servicing.

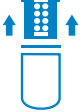


Turn system off and release pressure.

- Ensure that the hydraulic system is turned off.
- Check that there is no pressure present.



Unscrew the cartridge housing.

Remove the used filter and gasket, if applicable.




Clean out the housing seal area and cap.

- Clean out any sediment from the inside of the filter housing.
- Properly dispose of the cartridge according to local regulations.



Inspect the new filter cartridge for damage.

- Check the new filter you will be installing for any shipping and handling damage.



Lubricate seals, gaskets and threads. Install new cartridge.

- Lubricate the o-rings, gaskets, housing seals and threads with clean system oil.



- Install filter into the housing.




Align threads. Spin filter until gasket contacts.

- Fit the housing to the filter head as instructions on the housing.



Hand tighten the filter.

- Tighten per the guidance of the icons which appear on the filter housing.
- Do not over-tighten.



Bleed the system and check for leaks.

In-tank Filter Servicing



Check the filter service indicator.

- Check to see that the OEM specified service interval has been reached or that the service indicator shows that the filter is due for servicing.

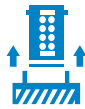


Turn system off and release pressure.

- Ensure that the hydraulic system is turned off.
- Check that there is no pressure present.



Remove the housing cover.



Remove the used filter, gasket and spring, if applicable.

- Remove the filter as gently as possible.
- Avoid contaminant dropping into the clean side of the housing.
- Properly dispose of the cartridge, seal and spring.



Clean the filter mount, cap, inside of the housing and cover.

- Clean out any sediment from the inside of the filter housing.



- Wipe away any sediment on the outside of the filter cover.



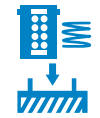
Inspect the new filter cartridge for damage.

- Check the new filter you will be installing for any shipping and handling damage.



Lubricate the filter gasket and cover seal.

- Lubricate the new filter cartridge O-ring and cover seal with clean system oil.



Install new filter and spring, if applicable.



Reinstall the housing cover.

- Refit the cover following any instructions given.



Bleed the system and check for leaks.

Donaldson's Commitment to Quality & Continuous Improvement

Donaldson Quality Commitment

Our employees are committed to providing our Customers with products and services that consistently meet or exceed their expectations.

We will work towards:

- Continuous improvement of products, processes, and services for the benefit of our Customers;
- Complete Customer satisfaction;
- Elimination of waste and variation;
- World-class standards and benchmarks.

We believe in:

- The development and empowerment of our people;
- Standardization of processes and measurement of progress;
- Simplicity, visibility and capability of all activities;
- Continuous improvement in our management and quality systems.

For the long-term success of our company, our first operating priority is the satisfaction of our Customers. Understanding their needs and serving them will benefit both our shareholders and our employees. Our management is responsible for ensuring that this policy is understood, implemented and maintained at all levels of our organization.

Tod Carpenter
Chief Executive Officer (CEO)





Low Pressure Filters

Low pressure filters are the most common type of filter found in hydraulic circuits – used most often in return line applications.

Donaldson low pressure filters are rated for working pressures up to 350 psi (2400 kPa). In-tank and in-line configurations are available to accommodate virtually any application.



Section Index

Max Operating Pressure < 350 psi (24 bar)

Models arranged from low to maximum flow rates

Spin-on Filters

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In-tank Filters

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In-line Cartridge Filters

| | |
|-------------|----|
| HRK10 | 76 |
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SP15/25
Max Flow: 30 gpm (114 lpm)

SP15/25 Spin-On Filters

Maximum Working Pressures to: 150 psi
1035 kPa
10.3 bar

Rated Static Burst to: 375 psi
2590 kPa
25.9 bar

Flow Range To: 30 gpm
114 lpm



Features

The SP15/25 series are economical, low pressure filters with spin-on convenience and a wide range of cleanliness ratings. Filters are available with the bypass ratings of your choice – 25 psi, 15 psi, 5 psi or no bypass. Take advantage of our mix and match system of in-stock heads and filters, so you can get exactly what you need. Choose the media type and configuration that's best for your application. Options include Donaldson's exclusive Synteq™, natural fiber cellulose, stainless steel wire-mesh or water absorbing media.

Beta Rating

- Performance to $\beta_{6(c)} = 1000$

Porting Size Options

- 1/2", 3/4" NPT
- SAE-8, SAE-12 O-ring

Replacement Filter Lengths

- Synteq™ 5.35" / 136 mm
- Synteq™ 7.87" / 200 mm
- Cellulose 5.35" / 136 mm
- Cellulose 7.87" / 200 mm
- Wire Mesh 5.35" / 136 mm
- Water Absorbing 5.35" / 136 mm

Standard Bypass Ratings

- 25 psi / 172.5 kPa / 1.7 bar
- 15 psi / 97 kPa / .97 bar
- 5 psi / 34.5 kPa / .34 bar
- No Bypass

Assembly Weight

- 5.35": 1.6 lbs / .7 kg (approximately)
- 7.87": 2.2 lbs / 1 kg (approximately)

Operating Temperatures

- -22°F to 225°F / -30°C to 107°C

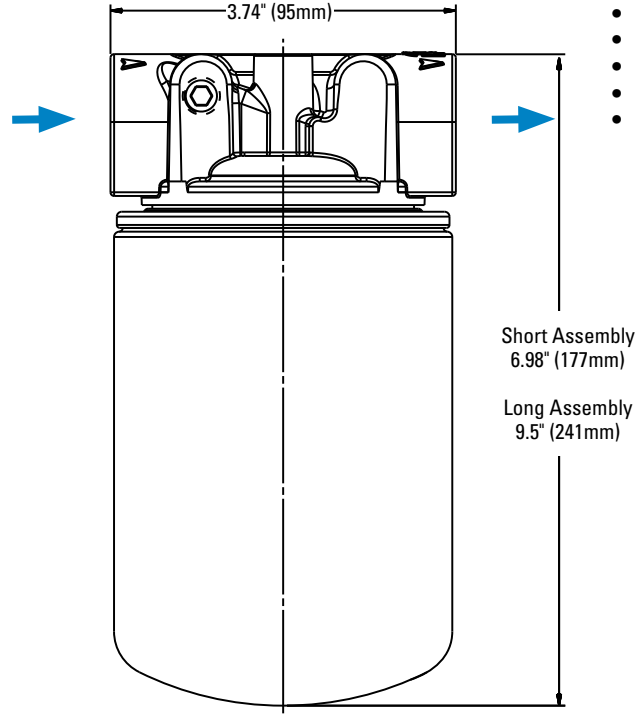
Filter Collapse Ratings

- 100 psid / 690 kPa / 6.9 bar (standard)



SP15/25 Specification Illustrations

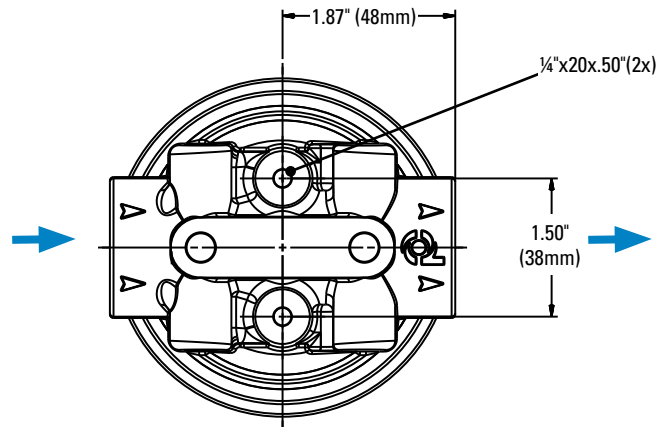
Assembly - Side View



Applications

- Fluid Conditioning Systems
- In-Plant Systems
- Mobile Equipment
- Power Transmissions
- Process Systems

Head - Top View





SP15/25

Max Flow: 30 gpm (114 lpm)



SP15/25 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length in mm | Donaldson Part No. | Comments |
|------------------|---|-----------------------|-----------------|--------------------|--|
| Synteq Synthetic | 6 μ m | 5.35 | 136 | P564967 | |
| | 6 μ m | 7.87 | 200 | P564357 | |
| | 11 μ m | 7.87 | 200 | P179089 | |
| | 11 μ m | 5.35 | 136 | P560693 | |
| | 23 μ m | 5.35 | 136 | P560694 | |
| Cellulose | 5 μ m | 5.35 | 136 | P565061 | |
| | 7 μ m | 5.35 | 136 | P551551 | |
| | 7 μ m | 7.87 | 200 | P565059 | |
| | 17 μ m | 5.35 | 136 | P551553 | |
| | 17 μ m | 7.87 | 200 | P565060 | |
| Water Absorbing | 10 μ m | 5.35 | 136 | P565062 | Absorbs approximately 6 oz/170 ml of water @ 20 psid/1.4 bar |
| Wire Mesh | 150 μ m | 5.35 | 136 | P550274 | 100 mesh |

Filter Notes

* Thread size 1"-12 UNF



Head Choices

| Port Size | Bypass Range | Gauge ports (drill, tap, plug) | Gauge Port Location | Donaldson Part No. |
|-----------|-------------------------------|--------------------------------|---------------------|--------------------|
| ½" NPT | 15 psi / 103.4 kPa / 1.34 bar | (2) 1/8" NPT | upstream side | P563288 |
| ¾" NPT | 25 psi / 172.5 kPa / 1.72 bar | (2) 1/8" NPT | upstream side | P561131 |
| ¾" NPT | 5 psi / 34.5 kPa / .34 bar | (2) 1/8" NPT | downstream side | P561132 |
| ¾" NPT | 25 psi / 172.5 kPa / 1.72 bar | none | na | P561134 |
| ¾" NPT | 5 psi / 34.5 kPa / .34 bar | none | na | P561135 |
| ¾" NPT | none | none | na | P561136 |
| ¾" NPT | 15 psi / 103.4 kPa / 1.34 bar | none | na | P563278 |
| SAE-12 | none | none | na | P561133 |
| SAE-12 | none | (1) SAE-4 | upstream side, LH | P561137 |
| SAE-12 | 5 psi / 34.5 kPa / .34 bar | none | na | P561140 |
| SAE-12 | 25 psi / 172.5 kPa / 1.72 bar | none | na | P561141 |
| SAE-12 | 15 psi / 103.4 kPa / 1.34 bar | none | na | P563279 |
| SAE-12 | 25 psi / 172.5 kPa / 1.72 bar | (2) 1/8" NPT | upstream side | P563280 |
| SAE-8 | 25 psi / 172.5 kPa / 1.72 bar | none | na | P561138 |

Note:

On a return line system the gauge port should be on the upstream side. We suggest a 25 psi bypass. If head is used on a suction line, the gauge port should be on the downstream side very low bypass.

Mix and Match

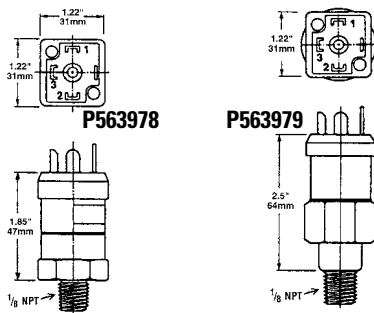
Donaldson's mix and match system provides the great performance and functional advantages of custom engineered filters with the convenience and speedy delivery of in-stock parts. Choose your options and build a filter model to suit your specifications.

Filter Service Gauges - Visual Indicators

| Donaldson Part No. | Pressure Range | Use With Bypass Valve Rating | Type |
|--------------------|-------------------------|---|----------------------------------|
| P563978 | 5 to 30 psi field adj.* | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, electrical |
| P563979 | -5 to 15 in | 5 psi / 34.5 kPa / .34 bar Hg field adj.* or No Bypass | Suction indicator, electrical |
| P563296 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, numeric scale |
| P563297 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar Bypass | Return indicator, color coded |
| P563298 | 0 to 100 psi | 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, color-coded |
| P563299 | 0 to -30 Hg | 5 psi / 34.5 kPa / .34 bar or No Bypass | Suction indicator, numeric scale |



Notes
* NOT PRESET:
Setting adjustable for desired application



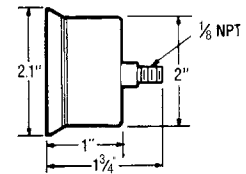
#1 Common; #2 Normally Closed;
#3 Normally Open

Instructions

1. Remove DIN adaptor
2. Remove small brass screw
3. Using 1/8" allen wrench adjust clockwise to increase set point/counter-clockwise to decrease set point
4. NO / NC

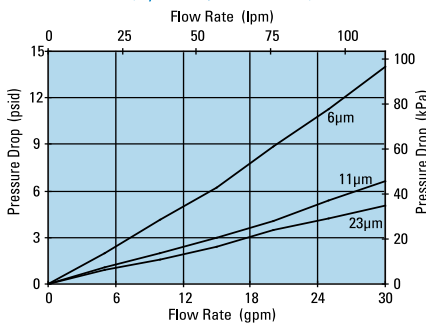
Adjustment screw located in center of electric prongs

P563296 - P563299

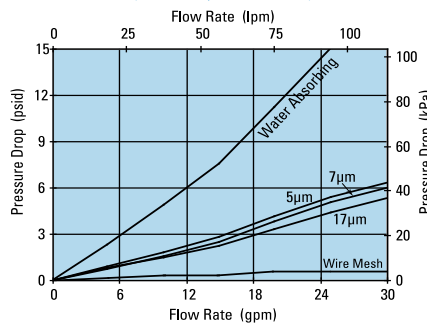


Performance Data

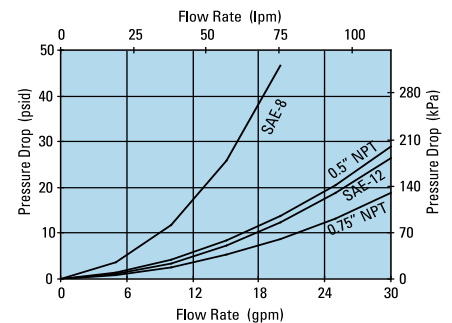
SP15 Filter Only
(Synthetic, 5.35"/136mm)



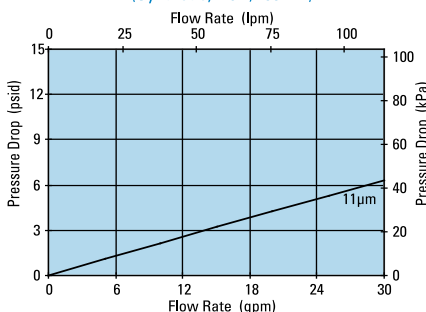
SP15 Filter Only
(Cellulose, 5.35"/136mm)



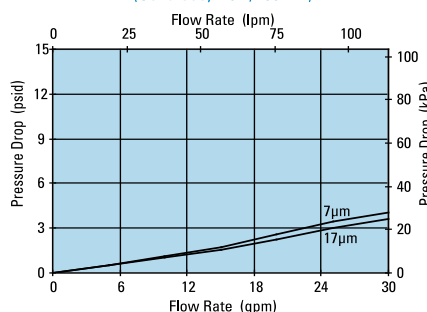
SP15/25 Head Only



SP25 Filter Only
(Synthetic, 7.87"/200mm)



SP25 Filter Only
(Cellulose, 7.87"/200mm)





W023

Max Flow: 60 gpm (227 lpm)



W023 Spin-On Filters

| | |
|------------------------------|---------------------------------|
| Working Pressures to: | 150 psi 1035 kPa 10.3 bar |
|------------------------------|---------------------------------|

| | |
|-------------------------------|---------------------------------|
| Rated Static Burst to: | 250 psi 1725 kPa 17.2 bar |
|-------------------------------|---------------------------------|

| | |
|-----------------------|-------------------|
| Flow Range to: | 60 gpm 227 lpm |
|-----------------------|-------------------|

Applications

- Fluid Conditioning Systems
- In-Plant Systems
- Mobile Equipment
- Power Transmissions
- Process Systems

Features

This versatile spin-on series is an excellent choice for use in high corrosion environments. The gray iron head construction can be ordered with gauge or differential pressure indicator ports. Take advantage of our mix and match system of heads and filters, so you get exactly what you need. You can choose the media type and configurations that's best for your application.



Beta Rating

- Performance to $\beta_{<4(c)}=1000$

Porting Size Options

- 1 1/4" NPT
- SAE-20 O-ring

Replacement Filter Lengths

- 6.7" / 170 mm
- 10.7" / 271 mm

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- No bypass

Assembly Weight

- 7.0lbs / 3.2 kg (short)
- 8.0 lbs / 3.6 kg (long)

Operating Temperatures

- -22°F to 225°F / -30°C to 107°C

Filter Collapse Ratings

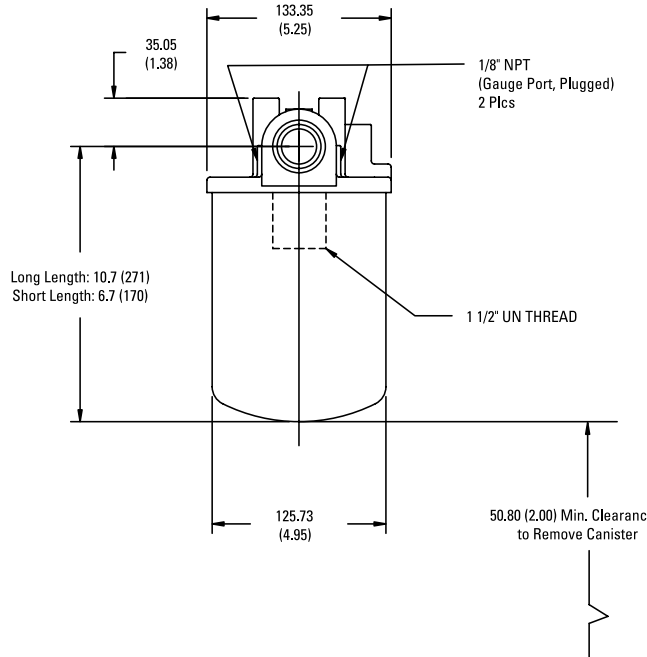
- 100 psid / 690 kPa / 6.9 bar



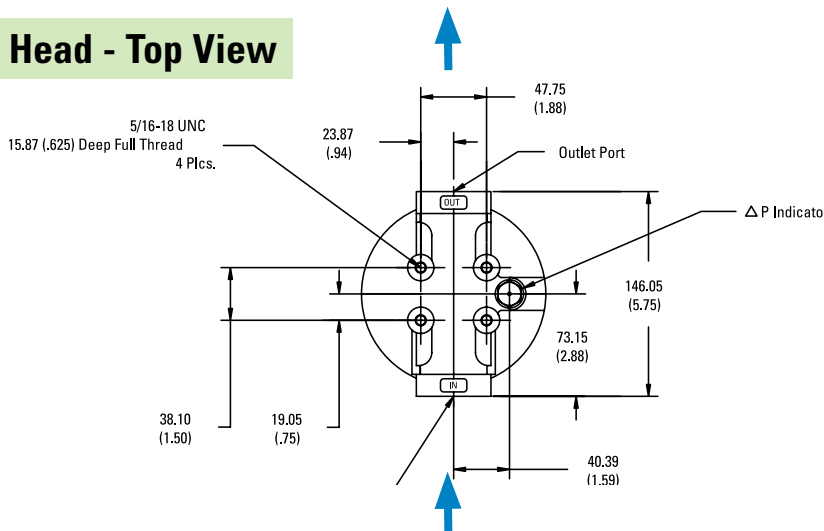
W023 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Top View





W023

Max Flow: 60 gpm (227 lpm)



W023 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------|-----|--------------------|--|
| | | | in | mm | | |
| Synteq Synthetic | <4 μm | | 10.7 | 271 | P167796 | Viton® O-ring & square seal kit |
| | 6 μm | | 6.7 | 170 | P167162 | 3-seal kit |
| | 6 μm | | 10.7 | 271 | P165762 | 3-seal kit |
| | 11 μm | | 6.7 | 170 | P165875 | 3-seal kit |
| | 11 μm | | 10.7 | 271 | P165876 | 3-seal kit |
| | 13 μm | | 6.7 | 170 | P167944 | Viton O-ring & square seal kit |
| | 13 μm | | 10.7 | 271 | P167945 | Viton O-ring & square seal kit |
| | 23 μm | | 6.7 | 170 | P165877 | 3-seal kit |
| | 23 μm | | 10.7 | 271 | P165878 | 3-seal kit |
| | | 50 μm | | 6.7 | 170 | P165879 |
| | 50 μm | | 10.7 | 271 | P165880 | 3-seal kit |
| Cellulose | 5 μm | | 6.7 | 170 | P550386 | 3-seal kit |
| | 5 μm | | 10.7 | 271 | P550250 | 3-seal kit |
| | 7 μm | | 6.7 | 170 | P550388 | 3-seal kit |
| | 7 μm | | 10.7 | 271 | P550251 | 3-seal kit |
| | 17 μm | | 6.7 | 170 | P550387 | 3-seal kit |
| | 17 μm | | 10.7 | 271 | P550252 | 3-seal kit |
| Water Absorbing | 10 μm | | 10.7 | 271 | P561183 | Cellulose media, 3-seal kit. Absorbs 350 ml water. |
| Wire Mesh | 150 μm | | 6.7 | 170 | P550275 | Stainless steel wire mesh, 3-seal kit |
| | 150 μm | | 10.7 | 271 | P550276 | Stainless steel wire mesh, 3-seal kit |

Filter Notes

* All models have 1½-16 UNF threads except where otherwise noted. All models measure 5.0"/127 mm outer diameter.

Head Assembly Choices

| Port Size | Bypass Rating | Seal Material | Indicator Style & Location | Donaldson Part No. |
|---------------|-------------------|---------------|----------------------------|--------------------|
| SAE-20 O-Ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574241 |
| 1-1/4" NPT | None | Buna-N | Port Machined & Plugged | P575930 |

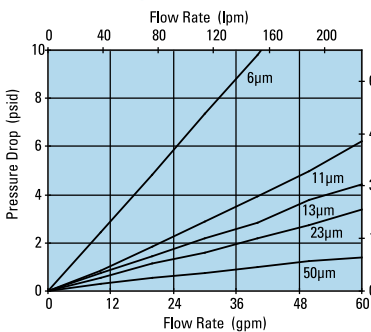


Indicator Choices

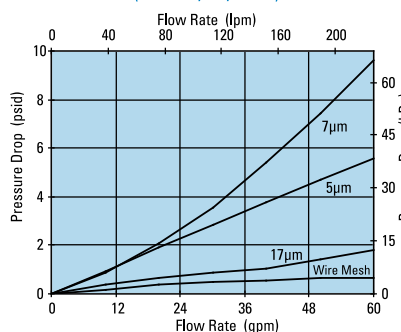
| Indicator | Connector | Seal | Donaldson | Thermal | Surge | Reset |
|-----------------------------------|---------------------|----------|-----------|---------|---------|--------|
| Pressure Setting | Style | Material | Part No. | Lockout | Control | |
| Visual Pop-up Models | | | | | | |
| 15 psi / 103 kPa | N/A | Buna-N | P572345 | No | No | Auto |
| 35 psi / 241 kPa | N/A | Buna-N | P572347 | No | No | Auto |
| 35 psi / 241 kPa | N/A | Buna-N | P572348 | Yes | Yes | Manual |
| 35 psi / 241 kPa | N/A | Viton | P567456 | Yes | Yes | Manual |
| Electrical / Visual Models | | | | | | |
| 15 psi / 103 kPa | Hirschmann | Buna-N | P572323 | No | No | Auto |
| 15 psi / 103 kPa | 3-wire flying leads | Buna-N | P572342 | No | No | Auto |
| 35 psi / 241 kPa | Hirschmann | Buna-N | P572327 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572329 | No | No | Auto |
| 35 psi / 241 kPa | Hirschmann | Buna-N | P572384 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Hirschmann | Viton | P567458 | Yes | Yes | Manual |
| 35 psi / 241 kPa | 3-wire flying leads | Buna-N | P572349 | No | No | Auto |
| Electrical Models | | | | | | |
| 15 psi / 103 kPa | Hirschmann | Buna-N | P572355 | No | No | Auto |
| 35 psi / 241 kPa | Hirschmann | Buna-N | P572359 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572361 | No | No | Auto |

Performance Data

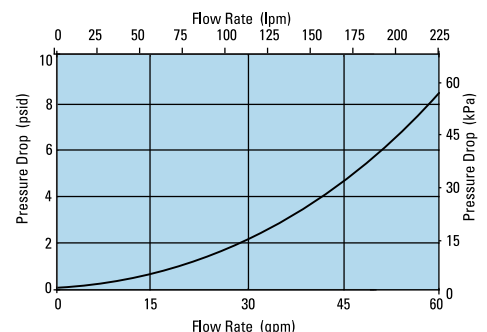
W023 Filter Only
(Synthetic, 6.7"/170mm)



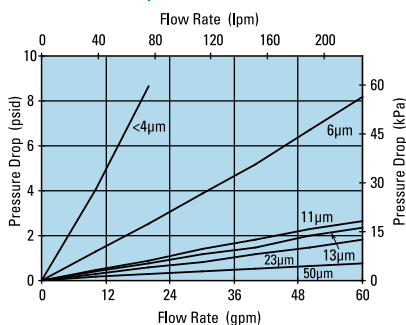
W023 Filter Only
(Cellulose, 6.7"/170mm)



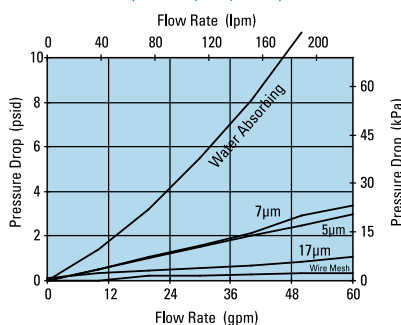
W023 Head Only



W023 Filter Only
(Synthetic, 10.7"/271mm)



W023 Filter Only
(Cellulose, 10.7"/271mm)



Brad Harrison® is a registered trademark of Woodhead Industries, Inc.
Hirschmann® is a registered trademark of Richard Hirschmann of America Inc.
Buna-N® and Viton® are registered trademarks of E. I. DuPont de Nemours and Co.



HBK05

Max Flow: 60 gpm (227 lpm)

HBK05 Spin-On Filters

Working Pressures to: 150 psi
1035 kPa
10.3 bar

Rated Static Burst to: 250 psi
1725 kPa
17.2 bar

Flow Range to: 60 gpm
227 lpm



Features

HBK05 is a strong and durable low pressure filter with a spin-on design that simplifies servicing and reduces maintenance costs. Its heavy-duty steel canister has a rigid steel attachment plate for added strength. The head-to-canister O-ring seal is designed to ensure seal integrity beyond 250 psi/17 bar. The head is made of die-cast aluminum.

Take advantage of our mix and match system of in-stock heads and filters—so you can get exactly what you need, HBK05 is available with your choice of visual or electrical service indicators, and bypass ratings of 50 psi, 25 psi, or 5 psi. The filter media is Synteq™, our proprietary synthetic media specifically designed for liquid filtration.

HBK05 filters ship with "L", square, and O-ring gaskets (unless noted with Viton® seals, then with square and o-ring gaskets). All HBK05 filters are interchangeable with SP50/60, SP80/90 and SP100/120 spin-ons, and have 1½" - 16 UN threads.

Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Beta Rating

- Performance to $\beta_{<4(c)}=1000$

Porting Size Options

- 1¼" NPT
- SAE-20 O-ring

Replacement Filter Lengths

- 6.7" / 170 mm (short)
- 10.7" / 271 mm (long)

Filter Collapse Ratings

- 125 psid / 863 kPa / 8.6 bar

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.4 bar
- 25 psi / 172.5 kPa / 1.7 bar
- 5 psi / 34.5 kPa / .34 bar

Assembly Weight

- 6.9 lbs / 3.1 kg (long)
- 5.7 lbs / 2.6 kg (short)

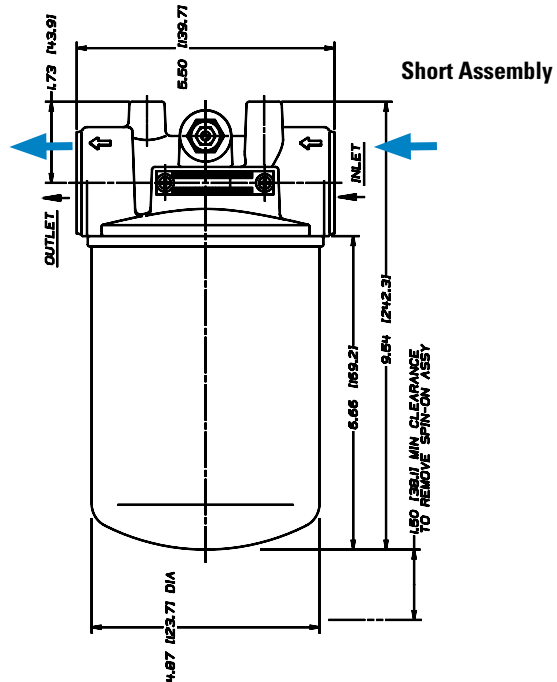
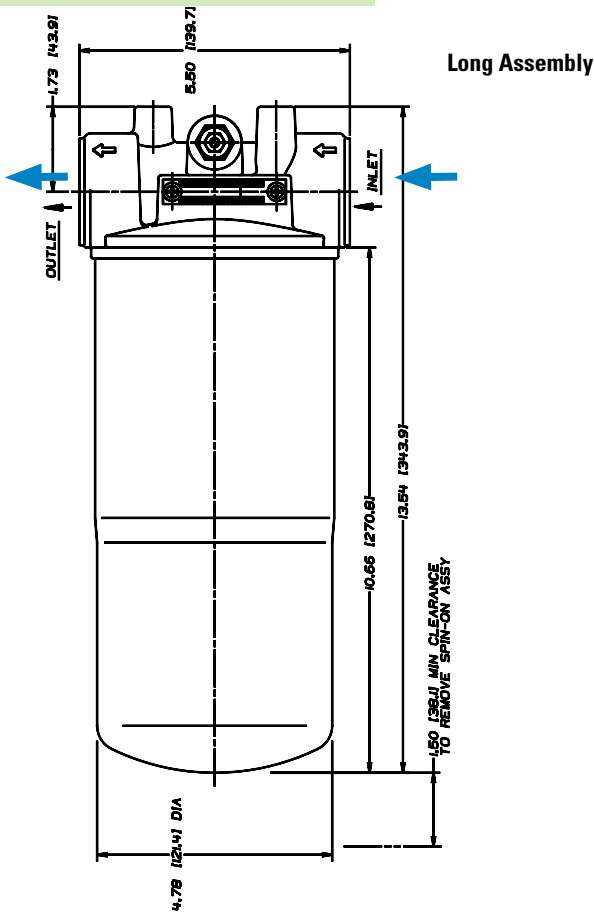
Operating Temperatures

- -22°F to 225°F / -30°C to 107°C

HBK05 Specification Illustrations

All dimensions are shown in inches [millimeters].

Assembly - Side View

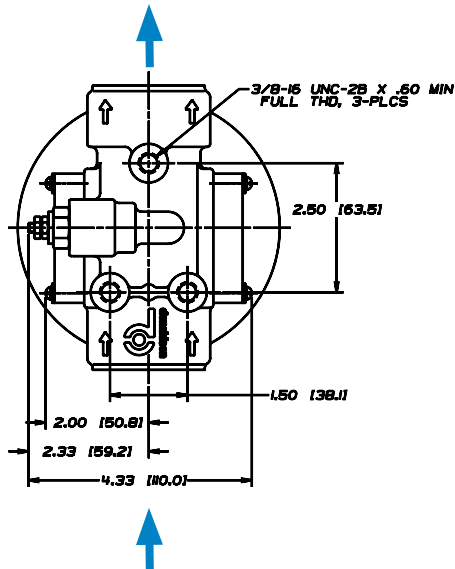


Applications

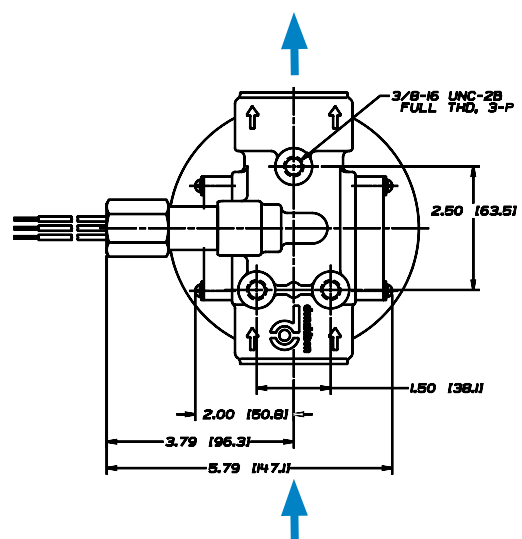
- Cooling Circuits
- Fluid Conditioning Systems
- Hydrostatic Charge Pumps
- Lube Oil Systems
- Power Transmissions
- Return Lines
- Side Loop Systems

Head - Top View

with DC Electrical Service Indicator



with AC/DC Electrical Service Indicator





HBK05
Max Flow: 60 gpm (227 lpm)



HBK05 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(e)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------|---------|--------------------|--|
| | | | in | mm | | |
| Synteq Synthetic | <4 μm | | 10.7 | 271 | P167796 | Viton® Seal |
| | 6 μm | | 6.7 | 170 | P167162 | |
| | 6 μm | | 10.7 | 271 | P165762 | |
| | 11 μm | | 6.7 | 170 | P165875 | |
| | 11 μm | | 10.7 | 271 | P165876 | |
| | 13 μm | | 6.7 | 170 | P167944 | Viton Seal |
| | 13 μm | | 10.7 | 271 | P167945 | Viton Seal |
| | 23 μm | | 6.7 | 170 | P165877 | |
| | 23 μm | | 10.7 | 271 | P165878 | |
| | 50 μm | | 6.7 | 170 | P165879 | |
| 50 μm | | 10.7 | 271 | P165880 | | |
| Water Absorbing | 10 μm | | 10.7 | 271 | P561183 | Cellulose media, 3-seal kit. Absorbs 350 ml water. |

Filter Notes

* Thread size 1"-16 UNF

Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Head Choices

| Port Size | Bypass Rating | Indicator Style & Location | Donaldson Part No. |
|---------------|------------------|----------------------------|--------------------|
| 1¼" NPT | 50 psi / 345 kPa | Visual, Both Sides | P172953 |
| 1¼" NPT | 25 psi / 172 kPa | Visual, Both Sides | P166418 |
| 1¼" NPT | 5 psi / 34 kPa | Visual, Both Sides | P166665 |
| SAE-20 O-Ring | 25 psi / 172 kPa | Visual, Both Sides | P166439 |

Note

* Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port.



Mix and Match

Donaldson's mix and match system provides the great performance and functional advantages of custom-engineered filters with the convenience and speedy delivery of in-stock parts. Choose your options and build an HBK05 filter to suit your specifications.

Service Indicator Options

| Use with Bypass Valve Pressure of: | Indicator Part No. | Style ⁽³⁾ | Description |
|--------------------------------------|--------------------|----------------------|---|
| Electric Models⁽¹⁾ | | | |
| 5 psi / 34.5 kPa | P163642 | A | Single post DC. Normally open. |
| 15 psi / 103 kPa | P163601 | A | Single post DC. Normally open. |
| 25 psi / 172.5 kPa | P163839 | A | Single post DC. Normally closed. |
| 25 psi / 172.5 kPa | P162400 | A | Single post DC. Normally open. |
| 25 psi / 172.5 kPa | P171143 | B | 2-wire with Cannon connector. Normally open. |
| 25 psi / 172.5 kPa | P173944 | C | 3-wire: White = normally open. Red = normally closed. Black = common |
| 50 psi / 276 kPa | P574967 | E | DC 2-wire. Normally closed. Gold contacts. Microprocessor compatible. |

Service Indicator Options

| Use with Bypass Valve Pressure of: | Indicator Part No. | Style ⁽³⁾ |
|------------------------------------|--------------------|----------------------|
| Visual Models⁽²⁾ | | |
| 5 psi / 34.5 kPa | P162694 | D |
| 15 psi / 103 kPa | P162642 | D |
| 25 psi / 172.5 kPa | P162696 | D |
| N/A | P165984 | (blank plate) |
| 25 psi / 172.5 kPa | P575334 | H (Visual pop up) |
| 50 psi / 345 kPa | P575335 | H (Visual pop up) |

Indicator Notes

⁽¹⁾All electric models have a maximum operating temperature of 250°F/ 121°C.

⁽²⁾All visual models have a maximum operating temperature of 180°F/ 82°C.

⁽³⁾See indicator illustrations on facing page.

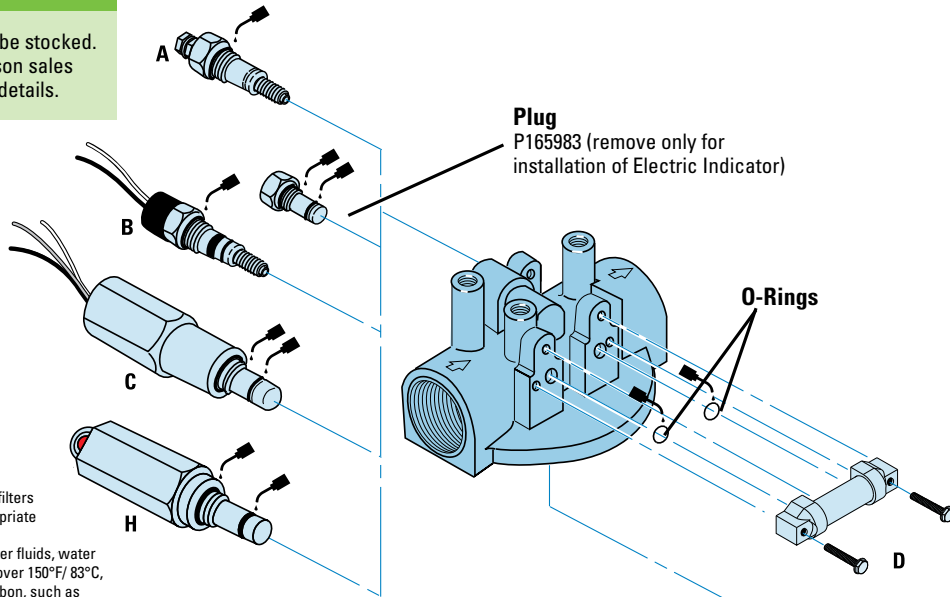
HBK05 Service Parts

SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.

Service Indicator Styles

(See table on opposite page)



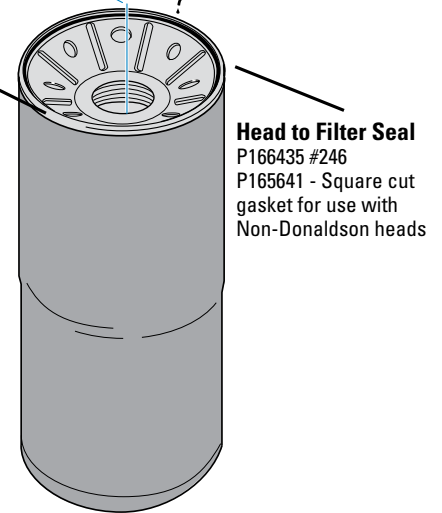
Filter Notes

- If you're filtering petroleum-based oil, filters with seals made of Buna-N® are appropriate for most applications.
 - If you're filtering diester, phosphate ester fluids, water glycol, water/oil emulsions and HWCF over 150°F/ 83°C, use filters with seals made of fluorocarbon, such as Viton® from DuPont Dow Elastomers, or Fluorel® from 3M Company.
 - Refer to the table in the Technical Reference Guide for fluid compatibility with our filter media.
- Viton® and Buna-N® are registered trademarks of E. I. DuPont de Nemours and Company.

Gaskets

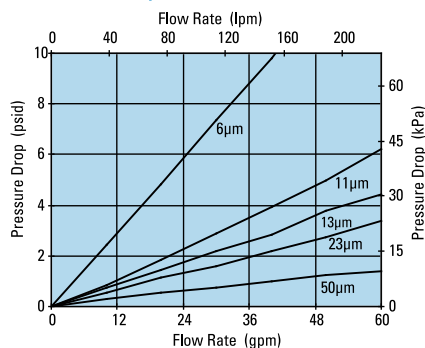
Each filter ships with a 3-seal kit, containing an "L" shaped, a square cut, and an O-ring gasket seal, unless otherwise noted. Use only one of the following seals. Installation instructions can be found in the technical reference section.

- L Shaped**
Use with filter heads with no groove or a wide groove.
- Square Cut**
Use with filter heads with a narrow groove.
- O-Ring -246**
Use with Donaldson HBK05 heads only.

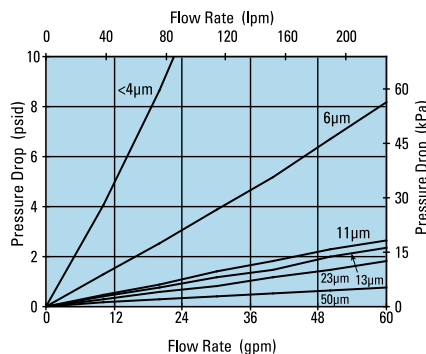


Performance Data

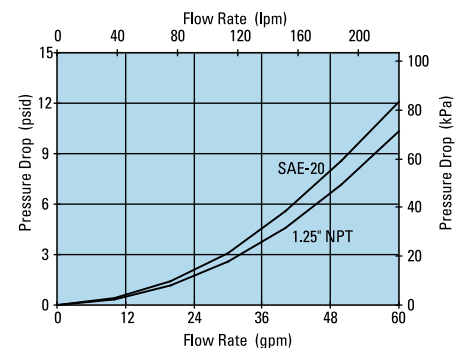
HBK05 Filter Only
(Synthetic, 6.7"/170mm)



HBK05 Filter Only
(Synthetic, 10.7"/271mm)



HBK05 Head Only





SP50/60

Max Flow: 60 gpm (227 lpm)



SP50/60 Spin-On Filters

Working Pressures to: 150 psi
1035 kPa
10.3 bar

Rated Static Burst to: 250 psi
1725 kPa
17.2 bar

Flow Range to: 60 gpm
227 lpm



Features

The SP50/60 spin-on filter is an economical, low-pressure model with a broad selection of media ratings. The die cast aluminum head and steel body ensure strength and durability—perfect for a wide variety of mobile and in-plant applications.

Take advantage of Donaldson’s mix and match system of in-stock heads and filter choices—so you can get exactly what you need. Filter options include: synthetic media, natural-fiber cellulose, water-absorbing cellulose media and wire mesh media. SP50/60 spin-on filters are interchangeable with HBK05 filters.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- 1¼" NPT
- SAE-20 O-ring

Replacement Filter Lengths

- 6.7" / 170 mm
- 7.0" / 178 mm
- 10.7" / 271 mm

Filter Collapse Ratings

- 100 psid / 690 kPa / 6.9 bar

Standard Bypass Ratings

- 25 psi / 172.5 kPa / 1.7 bar
- 15 psi / 103.4 kPa / 1.03 bar
- 5 psi / 34.5 kPa / .34 bar
- 2.5 psi / 17.2 kPa / .17 bar
- No Bypass

Assembly Weight

- 4.7 lbs / 2.1 kg (short)
- 5.6 lbs / 2.5 kg (long)

Operating Temperatures

- -22°F to 225°F / -30°C to 107°C



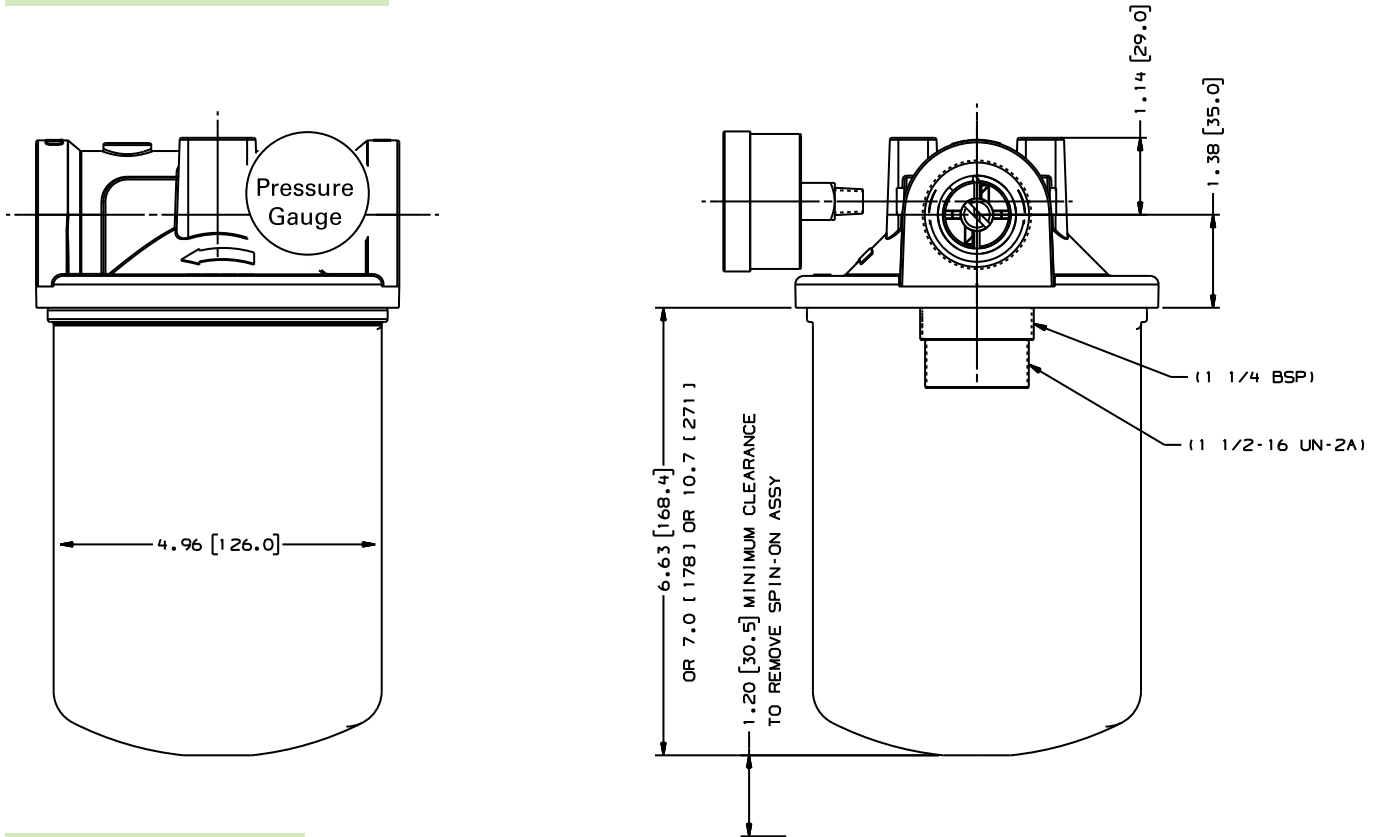
SP50/60 Specification Illustrations

All dimensions are shown in inches [millimeters].

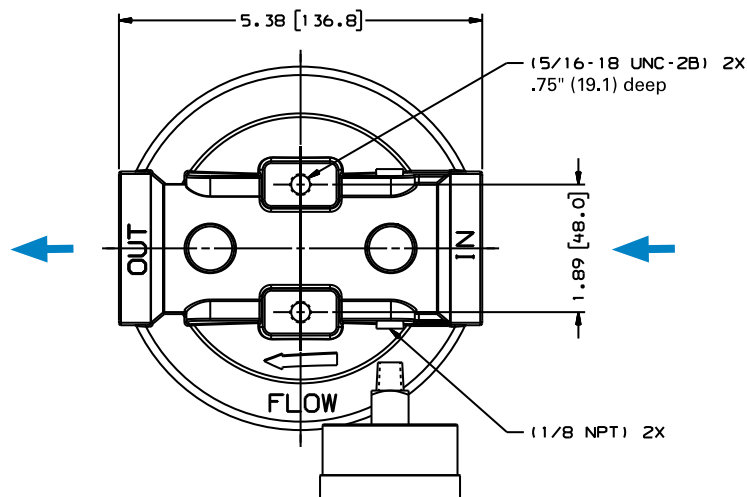
Applications

- Fluid Conditioning Systems
- In-Plant Systems
- Mobile Equipment
- Power Transmissions
- Process Systems

Assembly - Side View



Head - Top View





SP50/60
Max Flow: 60 gpm (227 lpm)



SP50/60 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------|-----|--------------------|--|
| | | | in | mm | | |
| Synteq Synthetic | <4 μm | | 10.7 | 271 | P167796 | Viton® O-ring & square seal kit |
| | 6 μm | | 6.7 | 170 | P167162 | 3-seal kit |
| | 6 μm | | 10.7 | 271 | P165762 | 3-seal kit |
| | 11 μm | | 6.7 | 170 | P165875 | 3-seal kit |
| | 11 μm | | 10.7 | 271 | P165876 | 3-seal kit |
| | 13 μm | | 6.7 | 170 | P167944 | Viton O-ring & square seal kit |
| | 13 μm | | 10.7 | 271 | P167945 | Viton O-ring & square seal kit |
| | 23 μm | | 6.7 | 170 | P165877 | 3-seal kit |
| | 23 μm | | 10.7 | 271 | P165878 | 3-seal kit |
| | | 50 μm | | 6.7 | 170 | P165879 |
| | 50 μm | | 10.7 | 271 | P165880 | 3-seal kit |
| Cellulose | 5 μm | | 6.7 | 170 | P550386 | 3-seal kit |
| | 5 μm | | 10.7 | 271 | P550250 | 3-seal kit |
| | 7 μm | | 6.7 | 170 | P550388 | 3-seal kit |
| | 7 μm | | 10.7 | 271 | P550251 | 3-seal kit |
| | 7 μm | | 7.00 | 178 | P565245 | Square seal kit, 1/4" BSP thread |
| | 17 μm | | 6.7 | 170 | P550387 | 3-seal kit |
| | 17 μm | | 10.7 | 271 | P550252 | 3-seal kit |
| | 27 μm | | 7.00 | 178 | P171616 | Square seal kit, 1/4" BSP thread |
| Water Absorbing | 10 μm | | 10.7 | 271 | P561183 | Cellulose media, 3-seal kit. Absorbs 350 ml water. |
| Wire Mesh | 150 μm | | 6.7 | 170 | P550275 | Stainless steel wire mesh, 3-seal kit |
| | 150 μm | | 10.7 | 271 | P550276 | Stainless steel wire mesh, 3-seal kit |

All models have 1/2-16 UNF threads except where otherwise noted. All models measure 5.0"/127 mm outer diameter. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Head Choices

| Port Size | Bypass Rating | Gauge Ports (drill, tap, plug) | Gauge Port Location | Donaldson Part No. |
|-----------|-------------------------------|--------------------------------|---------------------|--------------------|
| 1/4" NPT | 15 psi / 103.4 kPa / 1.34 bar | (2) 1/8" NPT | upstream side | P563267 |
| 1/4" NPT | 25 psi / 172.5 kPa / 1.72 bar | (2) 1/8" NPT | upstream side | P563268 |
| 1/4" NPT | 5 psi / 34.5 kPa / .34 bar | (2) 1/8" NPT | downstream side | P563269 |
| 1/4" NPT | 15 psi / 103.4 kPa / 1.34 bar | none | na | P563270 |
| 1/4" NPT | No Bypass | (2) 1/8" NPT | downstream side | P561952 |
| 1/4" NPT | 2.5 psi / 17.3 kPa / .17 bar | none | na | P563490 |
| 1/4" NPT | 2.5 psi / 17.3 kPa / .17 bar | (2) 1/8" NPT | downstream side | P563491 |
| 1/4" NPT | 25 psi / 172.5 kPa / 1.72 bar | none | na | P563492 |
| SAE-20 | 5 psi / 34.5 kPa / .34bar | (2) 1/8" NPT | downstream side | P573302 |
| SAE-20 | 15 psi / 103.4 kPa / 1.34 bar | (2) 1/8" NPT | upstream side | P563271 |
| SAE-20 | 25 psi / 172.5 kPa / 1.72 bar | (2) 1/8" NPT | upstream side | P563272 |
| SAE-20 | No Bypass | (2) 1/8" NPT | upstream side | P564147 |

Gaskets

Each filter ships with a 3-seal kit, containing an "L" shaped, a square cut, and an O-ring gasket seal, unless otherwise noted. Use only one of the following seals. Installation instructions can be found in the technical reference section.

L Shaped
Use with filter heads with no groove or a wide groove.

Square Cut
Use with filter heads with a narrow groove.

O-Ring -246
Use with Donaldson HBK05 heads only.

Note:

On a return line system the gauge port should be on the upstream side. We suggest a 25 psi bypass. If head is used on a suction line, the gauge port should be on the downstream side very low bypass.

Optional Filter Service Indicators

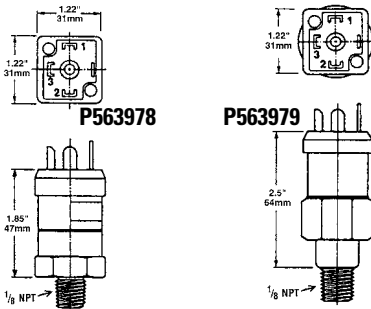
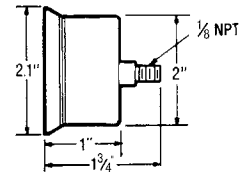
This handy pressure gauge, mounted on the side of an SP50/60 filter head, will tell you when it's time to service the filter.

| Donaldson Part No. | Pressure Range | Use With Bypass Valve Rating | Type |
|--------------------|----------------------------|---|----------------------------------|
| P563978 | 5 to 30 psi field adj.* | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, electrical |
| P563979 | -5 to 15 in Hg field adj.* | 5 psi / 34.5 kPa / .34 bar or No Bypass | Suction indicator, electrical |
| P563296 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, numeric scale |
| P563297 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar Bypass | Return indicator, color coded |
| P563298 | 0 to 100 psi | 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, color-coded |
| P563299 | 0 to -30 Hg | 5 psi / 34.5 kPa / .34 bar or No Bypass | Suction indicator, numeric scale |



Notes
* NOT PRESET:
Setting adjustable for desired application

P563296 - P563299



#1 Common; #2 Normally Closed;
#3 Normally Open

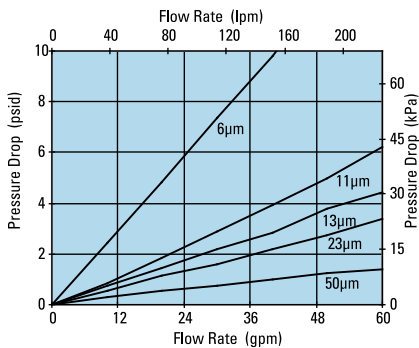
Instructions

1. Remove DIN adaptor
2. Remove small brass screw
3. Using 1/8" allen wrench adjust clockwise to increase set point/counter-clockwise to decrease set point
4. NO / NC

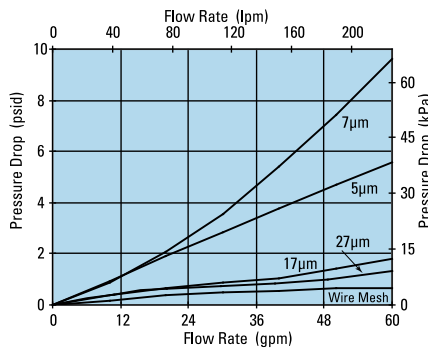
Adjustment screw located in center of electric prongs

Performance Data

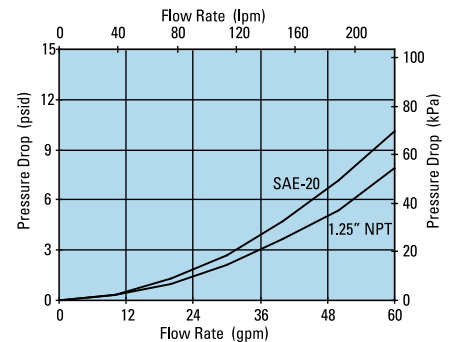
SP50 Filter Only
(Synthetic, 6.7"/170mm)



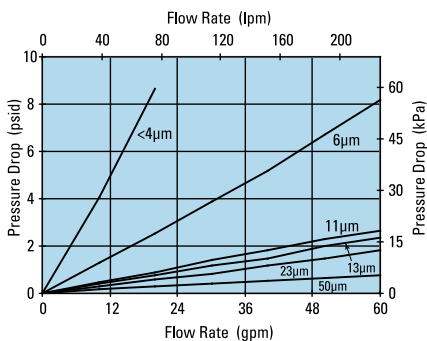
SP50 Filter Only
(Cellulose, 6.7"/170-178mm)



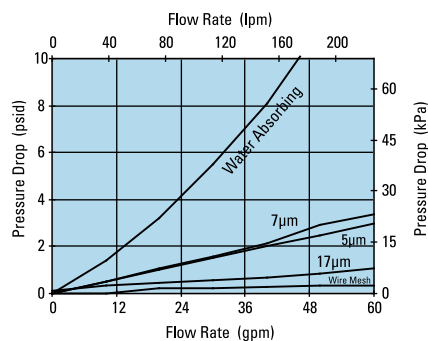
SP50/60 Head Only



SP60 Filter Only
(Synthetic, 10.7"/271mm)



SP60 Filter Only
(Cellulose, 10.7"/271mm)





SP80/90

Max Flow: 100 gpm (379 lpm)



SP80/90 Spin-On Filters

Working Pressures to: 150 psi
1035 kPa
10.3 bar

Rated Static Burst to: 250 psi
1725 kPa
17.2 bar

Flow Range to: 100 gpm
379 lpm



Features

SP80/90 double filter head allows for double the flow capacity, with two filters to hold more contaminant. Aluminum casting and Buna-N® seals standard. SP80/90 filters are interchangeable with SP50/60 filters.

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

Beta Rating

- Performance to $\beta_{<4(c)}=1000$

Porting Size Options

- 1½" NPT
- SAE-24 O-ring
- 2" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 6.7" / 170 mm
- 7.0" / 178 mm
- 10.7" / 271 mm

Filter Collapse Ratings

- 100 psid / 690 kPa / 6.9 bar

Standard Bypass Ratings

- 25 psi / 172.5 kPa / 1.72 bar
- 15 psi / 103.4 kPa / 1.34 bar
- 5 psi / 34.5 kPa / .34 bar
- no bypass

Assembly Weight

- 10.0 lbs / 4.5 kg (short) - approximate
- 11.8 lbs / 5.4 kg (long)

Operating Temperatures

- -22°F to 225°F / -30°C to 107°C

SP80/90 Specification Illustrations

All dimensions are shown in inches [millimeters].

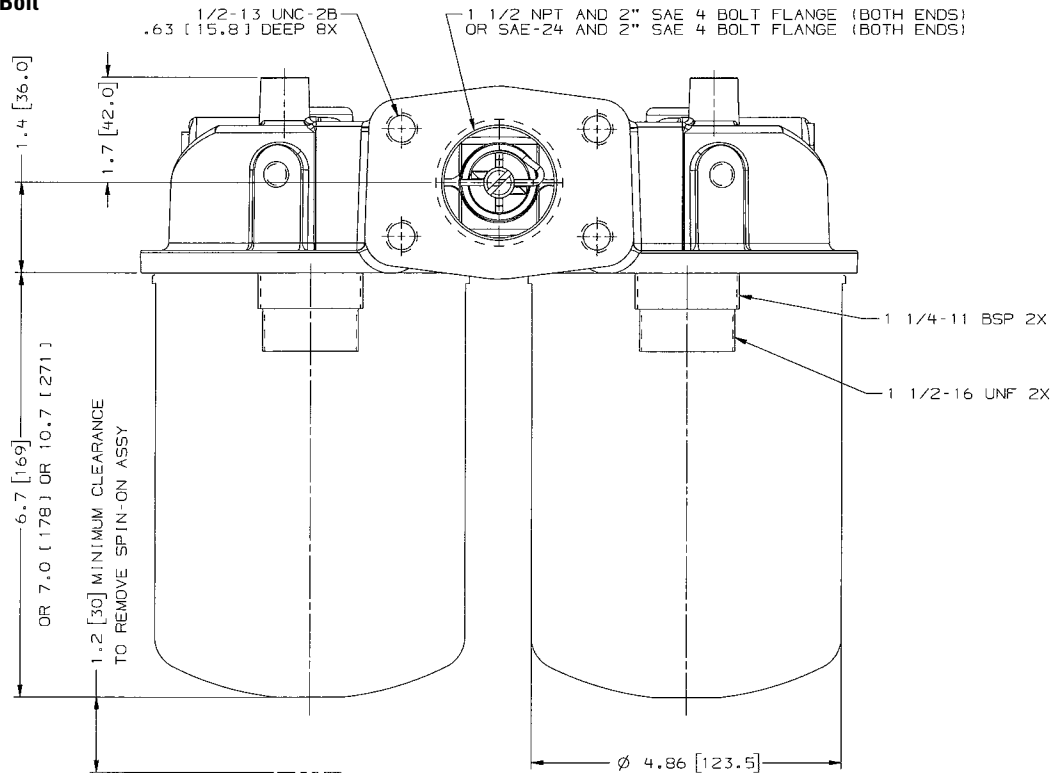
Assembly - Side View

Combination

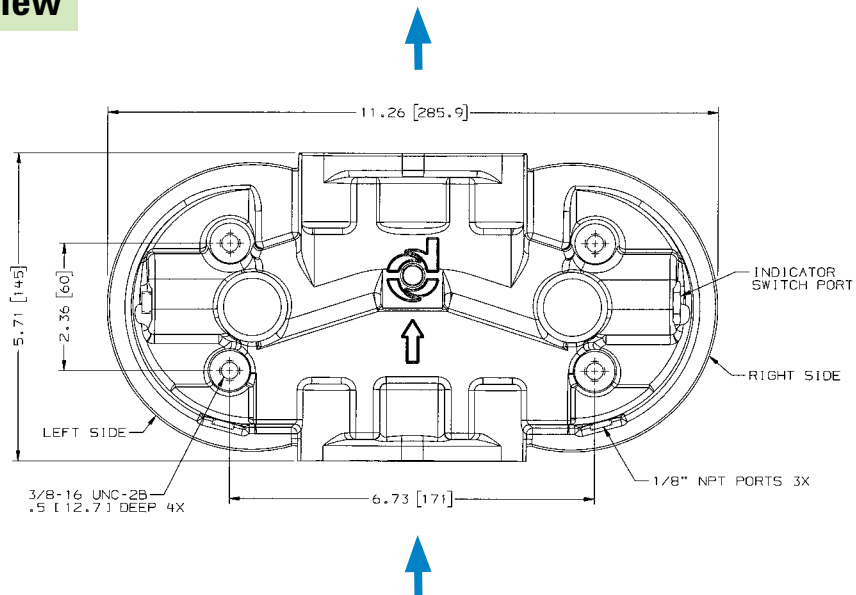
1 1/2" NPT and 2" SAE
4-Bolt Flange (Both Ends) or
SAE-24 & 2" SAE-4 Bolt

Applications

- Fluid Conditioning Systems
- In-Plant Systems
- Mobile Equipment
- Power Transmissions
- Process Systems



Head - Top View





SP80/90
Max Flow: 100 gpm (379 lpm)



SP80/90 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(e)} = 1000$ | Length in | mm | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------------|------|--------------------|--|
| Synteq Synthetic | <4 μm | | 10.7 | 271 | P167796 | Viton® O-ring & square seal kit |
| | 6 μm | | 6.7 | 170 | P167162 | 3-seal kit |
| | 6 μm | | 10.7 | 271 | P165762 | 3-seal kit |
| | 11 μm | | 6.7 | 170 | P165875 | 3-seal kit |
| | 11 μm | | 10.7 | 271 | P165876 | 3-seal kit |
| | 13 μm | | 6.7 | 170 | P167944 | Viton O-ring & square seal kit |
| | 13 μm | | 10.7 | 271 | P167945 | Viton O-ring & square seal kit |
| | 23 μm | | 6.7 | 170 | P165877 | 3-seal kit |
| | 23 μm | | 10.7 | 271 | P165878 | 3-seal kit |
| | | 50 μm | | 6.7 | 170 | P165879 |
| | 50 μm | | 10.7 | 271 | P165880 | 3-seal kit |
| Cellulose | 5 μm | | 6.7 | 170 | P550386 | 3-seal kit |
| | 5 μm | | 10.7 | 271 | P550250 | 3-seal kit |
| | 7 μm | | 6.7 | 170 | P550388 | 3-seal kit |
| | 7 μm | | 10.7 | 271 | P550251 | 3-seal kit |
| | 7 μm | | 7.00 | 178 | P565245 | Square seal kit, 1/4" BSP thread |
| | 17 μm | | 6.7 | 170 | P550387 | 3-seal kit |
| | 17 μm | | 10.7 | 271 | P550252 | 3-seal kit |
| | | 27 μm | | 7.00 | 178 | P171616 |
| Water Absorbing | 10 μm | | 10.7 | 271 | P561183 | Cellulose media, 3-seal kit. Absorbs 350 ml water. |
| Wire Mesh | 150 μm | | 6.7 | 170 | P550275 | Stainless steel wire mesh, 3-seal kit |
| | 150 μm | | 10.7 | 271 | P550276 | Stainless steel wire mesh, 3-seal kit |

All models have 1½-16 UNF threads except where otherwise noted. All models measure 5.0"/127mm outer diameter. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Head Choices

| Port Size | Bypass Rating | Gauge Ports (drill, tap, plug) | Gauge Port Location | Donaldson Part No. |
|-------------------------|-------------------------------|--------------------------------|-----------------------------|--------------------|
| 1½" NPT & 2" SAE 4 Bolt | 15 psi / 103.4 kPa / 1.34 bar | (4) 1/8" NPT | upstream & downstream sides | P563273 |
| 1½" NPT & 2" SAE 4 Bolt | 25 psi / 172.5 kPa / 1.72 bar | (4) 1/8" NPT | upstream & downstream sides | P563274 |
| 1½" NPT & 2" SAE 4 Bolt | No Bypass | (4) 1/8" NPT | upstream & downstream sides | P563275 |
| 1½" NPT & 2" SAE 4 Bolt | 5 psi / 34.5 kPa / .34 bar | (4) 1/8" NPT | upstream & downstream sides | P563276 |
| SAE-24 O-Ring | 25 psi / 172.5 kPa / 1.72 bar | (4) 1/8" NPT | upstream & downstream sides | P564892 |
| SAE-24 | No Bypass | (4) 1/8" NPT | upstream & downstream sides | P573217 |

Note: On a return line system the gauge port should be on the upstream side. We suggest a 25 psi bypass. If head is used on a suction line, the gauge port should be on the downstream side very low bypass.

Gaskets

Each filter ships with a 3-seal kit, containing an "L" shaped, a square cut, and an O-ring gasket seal, unless otherwise noted. Use only one of the following seals. Installation instructions can be found in the technical reference section.

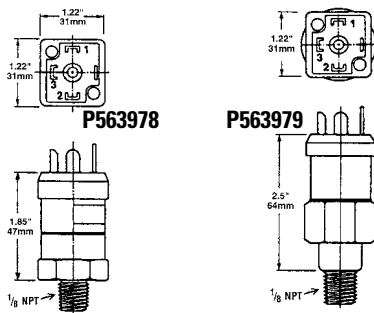
- L Shaped**
Use with filter heads with no groove or a wide groove.
- Square Cut**
Use with filter heads with a narrow groove.
- O-Ring -246**
Use with Donaldson HBK05 heads only.

Optional Filter Service Indicators for Left Side

| Donaldson Part No. | Pressure Range | Use With Bypass Valve Rating | Type |
|--------------------|----------------------------|---|----------------------------------|
| P563978 | 5 to 30 psi field adj.* | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, electrical |
| P563979 | -5 to 15 in Hg field adj.* | 5 psi / 34.5 kPa / .34 bar or No Bypass | Suction indicator, electrical |
| P563296 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, numeric scale |
| P563297 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar Bypass | Return indicator, color coded |
| P563298 | 0 to 100 psi | 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, color-coded |
| P563299 | 0 to -30 Hg | 5 psi / 34.5 kPa / .34 bar or No Bypass | Suction indicator, numeric scale |



Notes
* NOT PRESET:
Setting adjustable for desired application



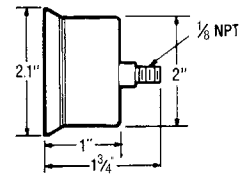
#1 Common; #2 Normally Closed;
#3 Normally Open

Instructions

1. Remove DIN adaptor
2. Remove small brass screw
3. Using 1/8" allen wrench adjust clockwise to increase set point/counter-clockwise to decrease set point
4. NO / NC

Adjustment screw located in center of electric prongs

P563296 - P563299

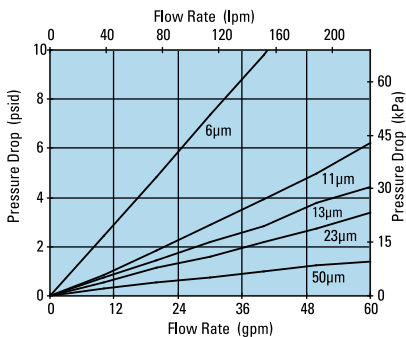


Optional Filter Service Indicators for Right Side

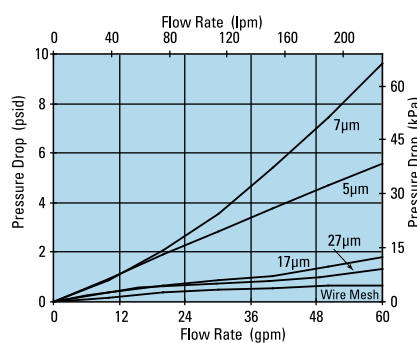
Refer to page 189 in the accessories section for right side electrical filter service indicator options.

Performance Data

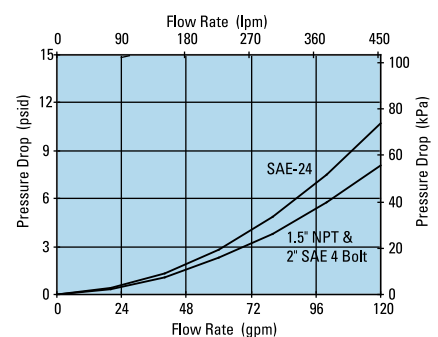
SP80 Filter Only
(Synthetic, 6.7"/170mm)



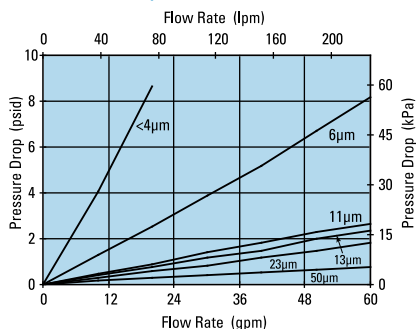
SP80 Filter Only
(Cellulose, 6.7"/170-178mm)



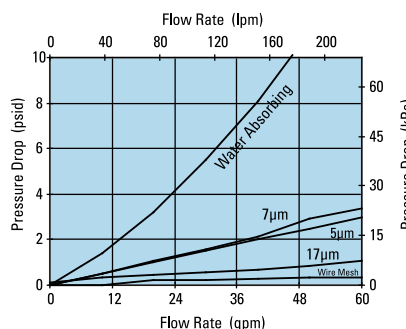
SP80/90 Head Only



SP90 Filter Only
(Synthetic, 10.7"/271mm)



SP90 Filter Only
(Cellulose, 10.7"/271mm)





SP100/120

Max Flow: 100 gpm (379 lpm)



LOW PRESSURE FILTERS

SP100/120 Spin-On Filters

| | |
|------------------------------|---------------------------------|
| Working Pressures to: | 150 psi 1035 kPa 10.3 bar |
|------------------------------|---------------------------------|

| | |
|-------------------------------|---------------------------------|
| Rated Static Burst to: | 250 psi 1725 kPa 17.2 bar |
|-------------------------------|---------------------------------|

| | |
|-----------------------|--------------------|
| Flow Range to: | 100 gpm 379 lpm |
|-----------------------|--------------------|

Features

SP100/120 double filter head allows for double the flow capacity and a unique, space-saving configuration. Aluminum casting and Buna-N® seals standard. SP100/120 filters are interchangeable with SP50/60 filters.

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- 1½" NPT

Replacement Filter Lengths

- 6.7" / 170 mm
- 7.0" / 178 mm
- 10.7" / 271 mm

Standard Bypass Ratings

- 25 psi / 172.5 kPa / 1.72 bar

Assembly Weight

- 7.0 lbs / 3.2 kg (short)
- 8.8 lbs / 4.0 kg (long)

Operating Temperatures

- -22°F to 225°F / -30°C to 107°C

Filter Collapse Ratings

- 100 psid / 690 kPa / 6.9 bar



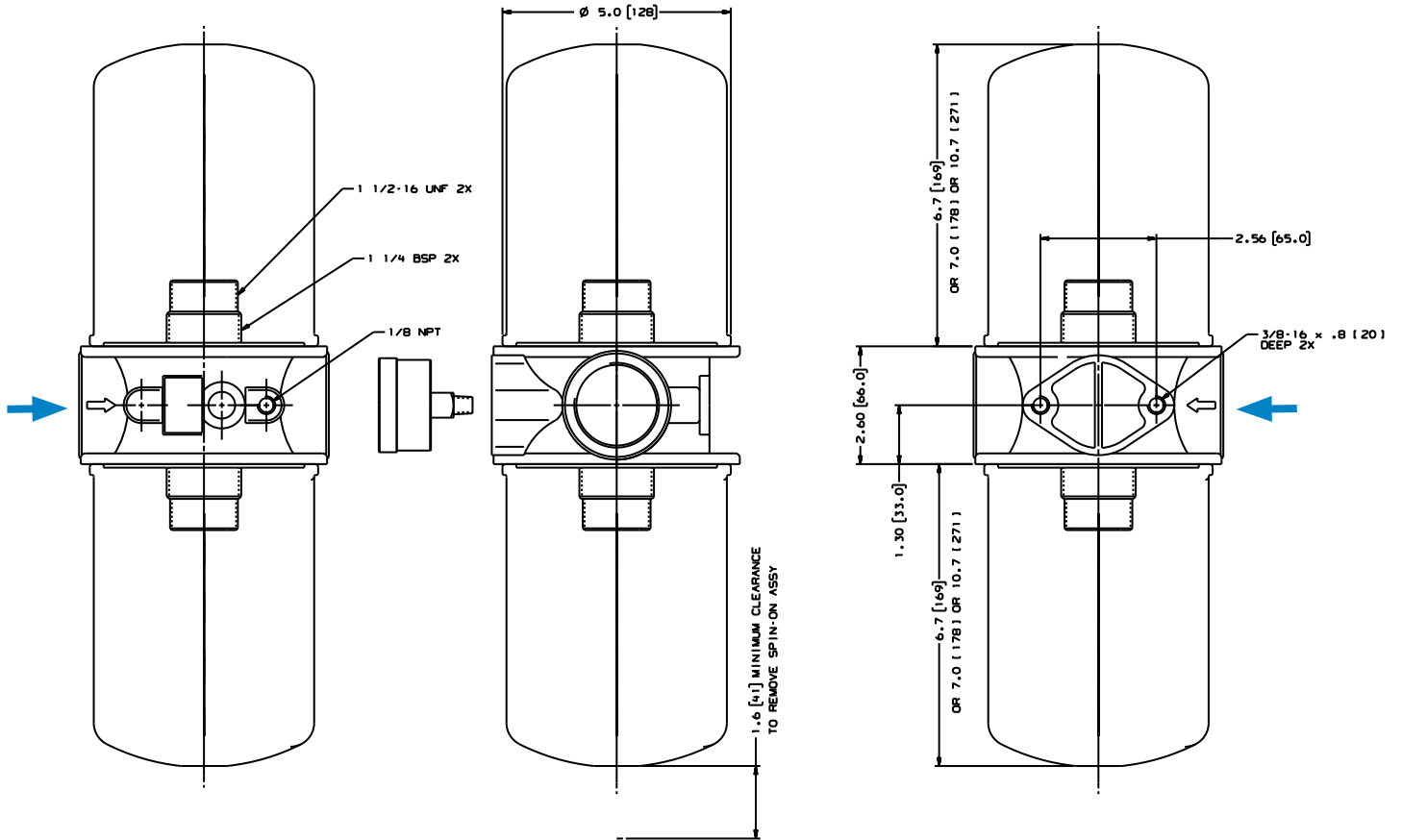
SP100/120 Specification Illustrations

All dimensions are shown in inches [millimeters].

Assembly - Side View

Applications

- Fluid Conditioning Systems
- In-Plant Systems





SP100/120

Max Flow: 100 gpm (379 lpm)



SP100/120 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length in | mm | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------------|-----|--------------------|--|
| Synteq Synthetic | <4 μm | | 10.7 | 271 | P167796 | Viton® O-ring & square seal kit |
| | 6 μm | | 6.7 | 170 | P167162 | 3-seal kit |
| | 6 μm | | 10.7 | 271 | P165762 | 3-seal kit |
| | 11 μm | | 6.7 | 170 | P165875 | 3-seal kit |
| | 11 μm | | 10.7 | 271 | P165876 | 3-seal kit |
| | 13 μm | | 6.7 | 170 | P167944 | Viton O-ring & square seal kit |
| | 13 μm | | 10.7 | 271 | P167945 | Viton O-ring & square seal kit |
| | 23 μm | | 6.7 | 170 | P165877 | 3-seal kit |
| | 23 μm | | 10.7 | 271 | P165878 | 3-seal kit |
| | | 50 μm | | 6.7 | 170 | P165879 |
| | 50 μm | | 10.7 | 271 | P165880 | 3-seal kit |
| Cellulose | 5 μm | | 6.7 | 170 | P550386 | 3-seal kit |
| | 5 μm | | 10.7 | 271 | P550250 | 3-seal kit |
| | 7 μm | | 6.7 | 170 | P550388 | 3-seal kit |
| | 7 μm | | 10.7 | 271 | P550251 | 3-seal kit |
| | 7 μm | | 7.00 | 178 | P565245 | Square seal kit, 1/4" BSP thread |
| | 17 μm | | 6.7 | 170 | P550387 | 3-seal kit |
| | 17 μm | | 10.7 | 271 | P550252 | 3-seal kit |
| | 27 μm | | 7.00 | 178 | P171616 | Square seal kit, 1/4" BSP thread |
| Water Absorbing | 10 μm | | 10.7 | 271 | P561183 | Cellulose media, 3-seal kit. Absorbs 350 ml water. |
| Wire Mesh | 150 μm | | 6.7 | 170 | P550275 | Stainless steel wire mesh, 3-seal kit |
| | 150 μm | | 10.7 | 271 | P550276 | Stainless steel wire mesh, 3-seal kit |

All models have 1½-16 UNF threads except where otherwise noted. All models measure 5.0"/127 mm outer diameter. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Head Choice

| Port Size | Bypass Rating | Gauge Ports (drill, tap, plug) | Gauge Port Location | Donaldson Part No. |
|-----------|-------------------------------|--------------------------------|-----------------------------|--------------------|
| 1½" NPT | 25 psi / 172.5 kPa / 1.72 bar | (2) 1/8" NPT | upstream & downstream sides | P563277 |


Note:

On a return line system the gauge port should be on the upstream side. We suggest a 25 psi bypass. If head is used on a suction line, the gauge port should be on the downstream side very low bypass.

Gaskets

Each filter ships with a 3-seal kit, containing an "L" shaped, a square cut, and an O-ring gasket seal, unless otherwise noted. Use only one of the following seals. Installation instructions can be found in the technical reference section.

 L Shaped
Use with filter heads with no groove or a wide groove.

 Square Cut
Use with filter heads with a narrow groove.

 O-Ring -246
Use with Donaldson HBK05 heads only.

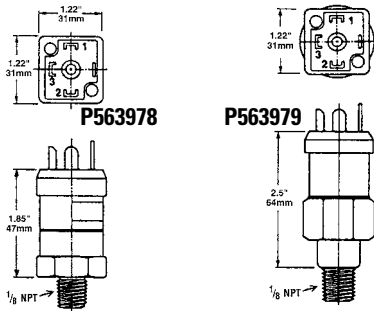
Optional Filter Service Indicators

This handy pressure gauge, mounted on the side of an SP100/120 filter head, will tell you when it's time to service the filter.

| Donaldson Part No. | Pressure Range | Use With Bypass Valve Rating | Type |
|--------------------|----------------------------|---|----------------------------------|
| P563978 | 5 to 30 psi field adj.* | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, electrical |
| P563979 | -5 to 15 in Hg field adj.* | 5 psi / 34.5 kPa / .34 bar or No Bypass | Suction indicator, electrical |
| P563296 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar or 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, numeric scale |
| P563297 | 0 to 100 psi | 15 psi / 103.4 kPa / 1.34 bar Bypass | Return indicator, color coded |
| P563298 | 0 to 100 psi | 25 psi / 172.5 kPa / 1.72 bar or No Bypass | Return indicator, color-coded |
| P563299 | 0 to -30 Hg | 5 psi / 34.5 kPa / .34 bar or No Bypass | Suction indicator, numeric scale |



Notes
* NOT PRESET:
Setting adjustable for desired application



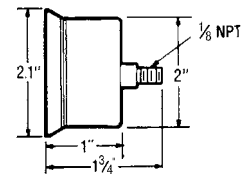
#1 Common; #2 Normally Closed;
#3 Normally Open

Instructions

1. Remove DIN adaptor
2. Remove small brass screw
3. Using 1/8" allen wrench adjust clockwise to increase set point/counter-clockwise to decrease set point
4. NO / NC

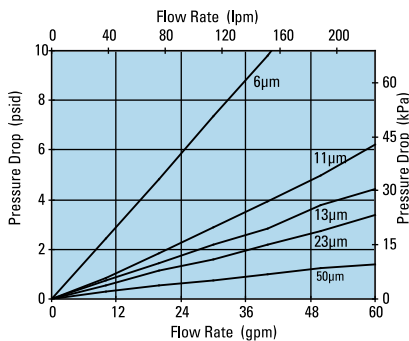
Adjustment screw located in center of electric prongs

P563296 - P563299

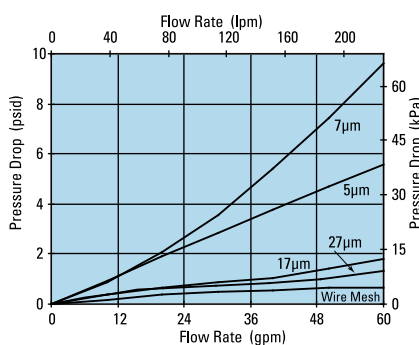


Performance Data

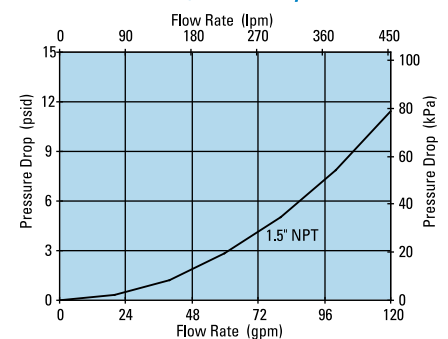
SP100 Filter Only
(Synthetic, 6.7\"/>



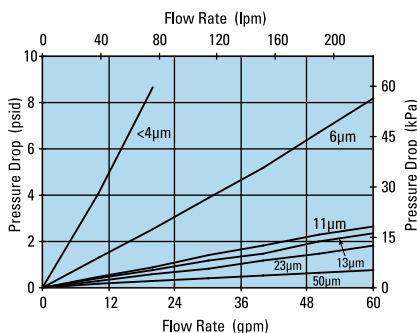
SP100 Filter Only
(Cellulose, 6.7\"/>



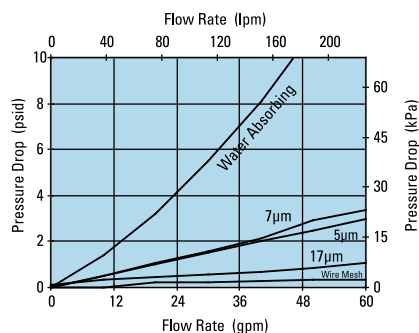
SP100/120 Head Only



SP120 Filter Only
(Synthetic, 10.7\"/>



SP120 Filter Only
(Cellulose, 10.7\"/>





TT15/30/60

Max Flow: 50 gpm (189 lpm)



TT15/30/60 Tank Top Return Spin-On Filters

Working Pressures to: 100 psi
690 kPa
6.9 bar

Rated Static Burst to: 250 psi
1725 kPa
17.2 bar

Flow Range to: 50 gpm
189 lpm

Applications

- In-Plant Systems
- Mobile Equipment
- Return Lines



Features

TT15/30/60 Tank Top filters are designed for industrial service. Aluminum casting and Buna-N® seals standard. Used with mineral and synthetic based fluids, these return filters conveniently mount to tank tops with four screws. Common holes are used to mount the filter head to the reservoir without welding. A down pipe is attached to a threaded port and the gasket surface provides a watertight seal. Each filter provides a new bypass valve and anti-drainback valve for easy filter change. Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

Beta Rating

- Performance to $\beta_{7(c)}=2$

Porting Size Options

- 3/4", 1 1/2" NPT

Replacement Filter Lengths

- 5.83" / 148mm TT15
- 7.05" / 179mm TT30
- 9.29" / 236mm TT60

Filter Collapse Ratings

- 250 psid / 1725 kPa / 17.2 bar

Standard Bypass Ratings

- 22 psi / 150 kPa / 1.5 bar

Assembly Weight

- 2.0 lbs / 0.9 kg TT15
- 4.3 lbs / 2.0 kg TT30
- 5.2 lbs / 2.4 kg TT60

Operating Temperatures

- -22°F to 225°F / -30°C to 107°C

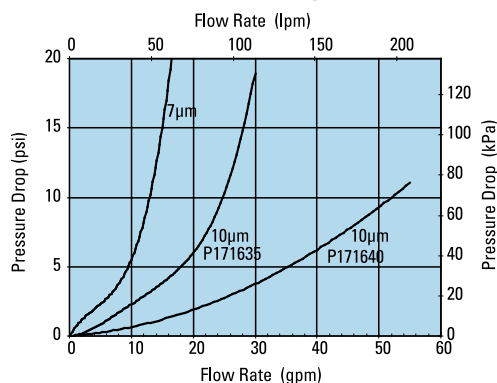
TT15/30/60 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | Length in mm | Donaldson Part No. | Comments |
|------------|---|-----------------|--------------------|-------------|
| Cellulose | 7µm | 5.36 136 | P565242 | TT15 Series |
| | 10 µm | 7.05 179 | P171635 | TT30 Series |
| | 10 µm | 9.29 236 | P171640 | TT60 Series |

Performance Data

TT Filters Only





Head Choices

| Port Size | Bypass Rating* | Gauge Ports (drill, tap, plug) | Gauge Port Location | Donaldson Part No. | Description | Head to Tank** Seal Part No. |
|------------|----------------------------|--------------------------------|---------------------|--------------------|----------------|------------------------------|
| 3/4" NPT | 22 psi / 150 kPa / 1.5 bar | (2) 1/8" NPT | upstream side | P564038 | TT15 Series | P563975 |
| 1 1/2" NPT | 22 psi / 150 kPa / 1.5 bar | (2) 1/8" NPT | upstream side | P563973 | TT30/60 Series | P563976 |

Note

* Bypass valve is integral part of replacement filter. ** Included with head.

On a return line system the gauge port should be on the upstream side. We suggest a 25 psi bypass. If head is used on a suction line, the gauge port should be on the downstream side very low bypass.

Optional Filter Service Indicators

| Donaldson Part No. | Pressure Range | Use With Series | Type |
|--------------------|-------------------------|-----------------|-------------------------------|
| P563300 | 0 to 30 psi | TT15/30/60 | Return indicator, color-coded |
| P563978 | 5 to 30 psi field adj.* | TT15/30/60 | Return indicator, electrical |
| P563298 | 0 to 100 psi | TT15/30/60 | Return indicator, color-coded |

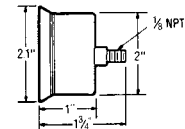
Notes

* NOT PRESET: Setting adjustable for desired application

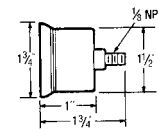
1/8" - 27 NPTF threads

- Built in snubber to minimize damage caused by pressure surges
- Compatible with petroleum and mineral-based fluids
- Anti-splash

P563298



P563300

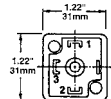


Instructions

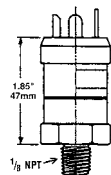
1. Remove DIN adaptor
2. Remove small brass screw
3. Using 1/8" allen wrench adjust clockwise to increase set point/counter-clockwise to decrease set point
4. NO / NC



- #1 Common;
- #2 Normally Closed;
- #3 Normally Open



P563978

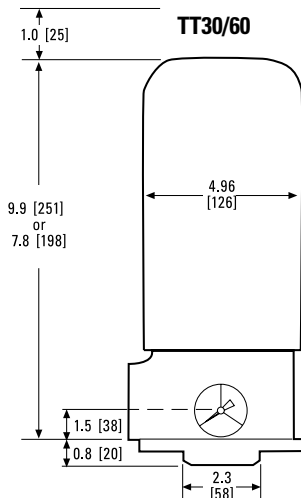
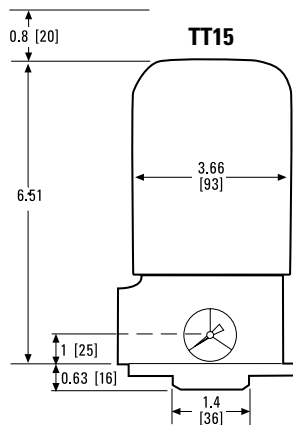


Adjustment screw located in center of electric prongs

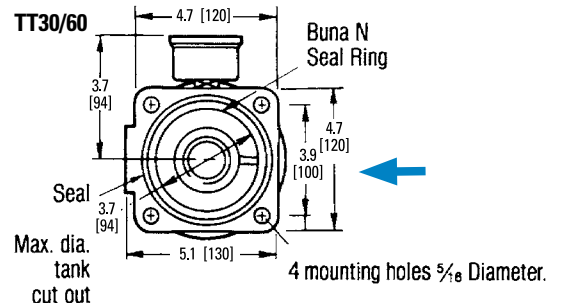
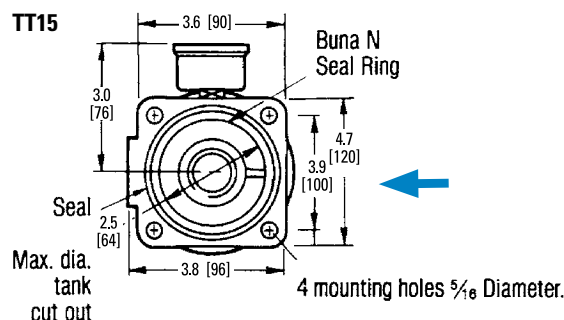
TT 15 & 30/60 Specification Illustrations

All dimensions are shown in inches [millimeters].

Assembly - Side View



Head - Top View





WL15
Max Flow: 50 gpm (189 lpm)



WL15 In-Tank Filters

Working Pressures to: 200 psi
1380 kPa
13.8 bar

Rated Static Burst to: 300 psi
2070 kPa
207 bar

Flow Range to: 50 gpm
189 lpm



Applications

- Cooling Circuits
- Fluid Conditioning Systems
- Lube Oil Systems
- Meets HF4 Specification
- Process Systems
- Return Lines
- Side Loop Systems

Features

WL15 in-tank filter meets HF4 automotive standard. The quick disconnect cover allows for easy and efficient filter change outs. An optional secondary inlet port offers the use of a second return line. DT high-performance replacement filters are available in five different media grades to fit any application.

Beta Rating (per ISO 16889)

- Performance to $\beta_{5(c)}=1000$

Porting Size Options

- SAE-24 O-ring
- 1½" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 9.04" / 230 mm

Filter Collapse Ratings

- 150 psi / 1035 kPa / 10.3 bar

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- 25 psi / 172.5 kPa / 1.72 bar

Assembly Weight

- Code 3: 5.25 lbs / 2.38 kg
- Code 9 (with 11" extension tube): 6.25 lbs / 2.84kg

Operating Temperatures

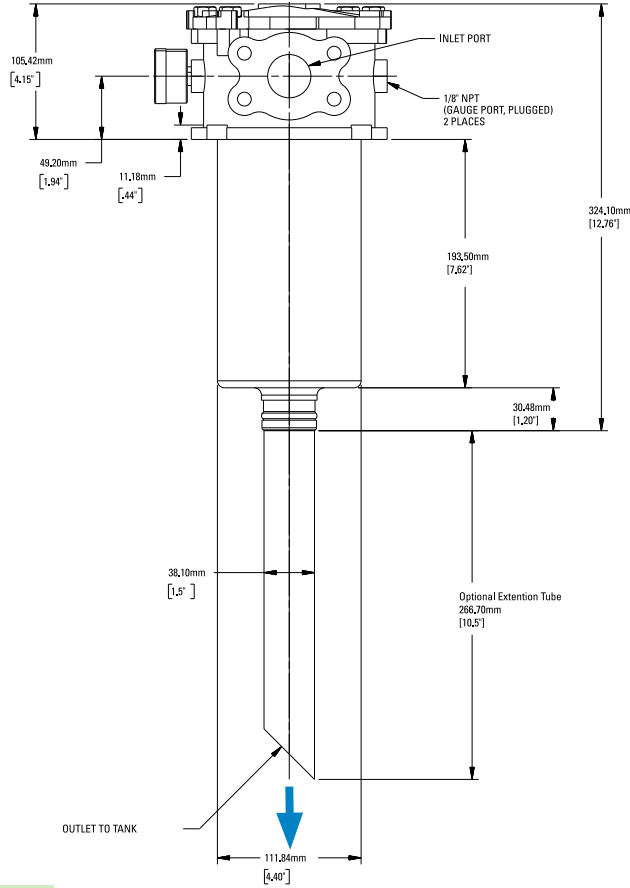
- -45° to 250°F (-43° to 121°C)



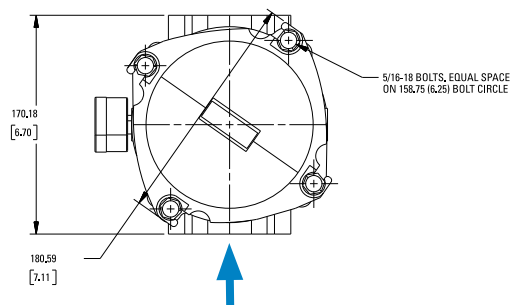
WL15 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Top View





WL15
Max Flow: 50 gpm (189 lpm)



WL15 Components

High-Performance DT Filter Choices

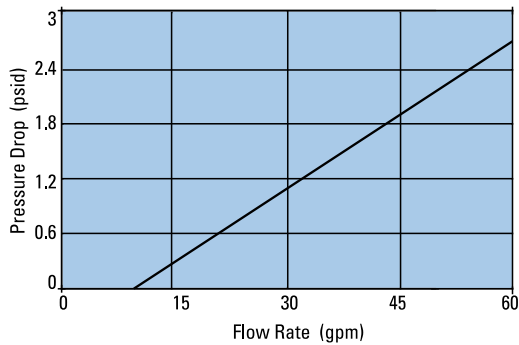
| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|---------------------|--|--------|-----|--------------------|---------------|
| | | in | mm | | |
| DT Synteq Synthetic | 5 μm | 9.04 | 230 | P566270 | DT-HF4-9-5UM |
| | 8 μm | 9.04 | 230 | P566271 | DT-HF4-9-8UM |
| | 12 μm | 9.04 | 230 | P566272 | DT-HF4-9-14UM |
| | 23 μm | 9.04 | 230 | P566273 | DT-HF4-9-25UM |

All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT filters are potted with epoxy-based adhesives. Standard collapse designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. Viton® seals are standard on all Donaldson DT filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.



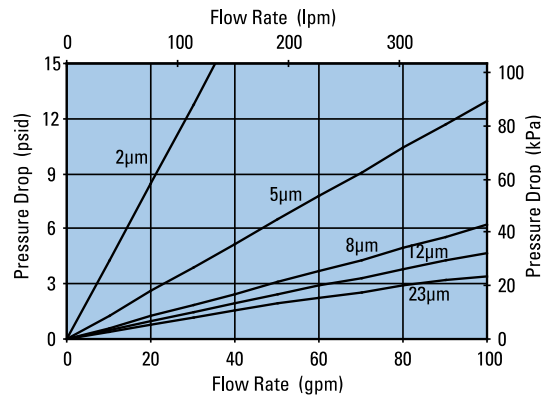
Performance Data

WL15 Housing Only



WL15 9" DT Filter Only

DT-HF-9, 9"/229mm



Filter Assembly Choices

| Port Size | Bypass Rating | Seal Material | Indicator Style & Location | Housing Length | Assembly Length | Donaldson Part No. |
|----------------------------------|-------------------|---------------|----------------------------|---|------------------|--------------------|
| SAE-24 O-ring | 25 psi / 1.72 bar | Buna-N | Port Machined & Plugged | 9" (228.6mm) | 12.76" (324.1mm) | P574231 |
| SAE-24 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 9" (228.6mm) | 12.76" (324.1mm) | P575923 |
| SAE-24 O-ring | 25 psi / 1.72 bar | Buna-N | Port Machined & Plugged | 9" (228.6mm) w/ 11" (279.4mm) extension | 24.88" (631.9mm) | P575924 |
| 1-1/2" SAE 4 Bolt Flange Code 61 | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 9" (228.6mm) w/ 11" (279.4mm) extension | 24.88" (631.9mm) | P575925 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Donaldson Part No. |
|--|-----------------|--------------------|
| Visual Pressure Gauges, 0-60 psi | | |
| 25 psi / 172 kPa | NA | X011059 |
| 50 psi / 345 kPa | NA | X011075 |
| Visual Pressure Gauges, 0-200 psi | | |
| 50 psi / 345 kPa | NA | X011060 |
| Electrical Service Indicator | | |
| 18 psi / 124 kPa | Hirschman | X011061 |
| 35 psi / 241 kPa | Hirschman | X011064 |
| 18 psi / 124 kPa | Brad Harrison | X011065 |
| 35 psi / 241 kPa | Brad Harrison | X011066 |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011140 | Buna |
| X011141 | Viton |



WL16

Max Flow: 200 gpm (757 lpm)



WL16 In-Tank Filters

Working Pressures to: 200 psi
1380 kPa
13.8 bar

Rated Static Burst to: 300 psi
2070 kPa
20.7 bar

Flow Range to: 200 gpm
757 lpm



Features

WL16 in-tank filters meet the HF4 automotive standard. The quick disconnect cover allows for easy and efficient filter change-outs. An optional secondary inlet port offers the use of a second return line. These units can be top or side reservoir mounted. Use the optional anti-backflow valve (X011053) when installing this filter assembly to the side of a reservoir. DT high-performance replacement filters are available in five different media grades to fit any application.

- Head Material: aluminum
- Housing Material: Steel

Beta Rating

- Performance to $\beta_{5(c)} = 1000$

Porting Size Options

- SAE-24 O-ring
- 1½" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 9.04" / 230 mm
- 18.08" / 459 mm
- 27.51" / 699 mm

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- 25 psi / 172.5 kPa / 1.72 bar

Assembly Weight

- Single Length, 5.25 lbs / 2.3 kg
- Double Length, 16 lbs / 7.3 kg
- Triple Length, 23 lbs / 10 kg

Operating Temperatures

- -45° to 250°F (-43° to 121°C)

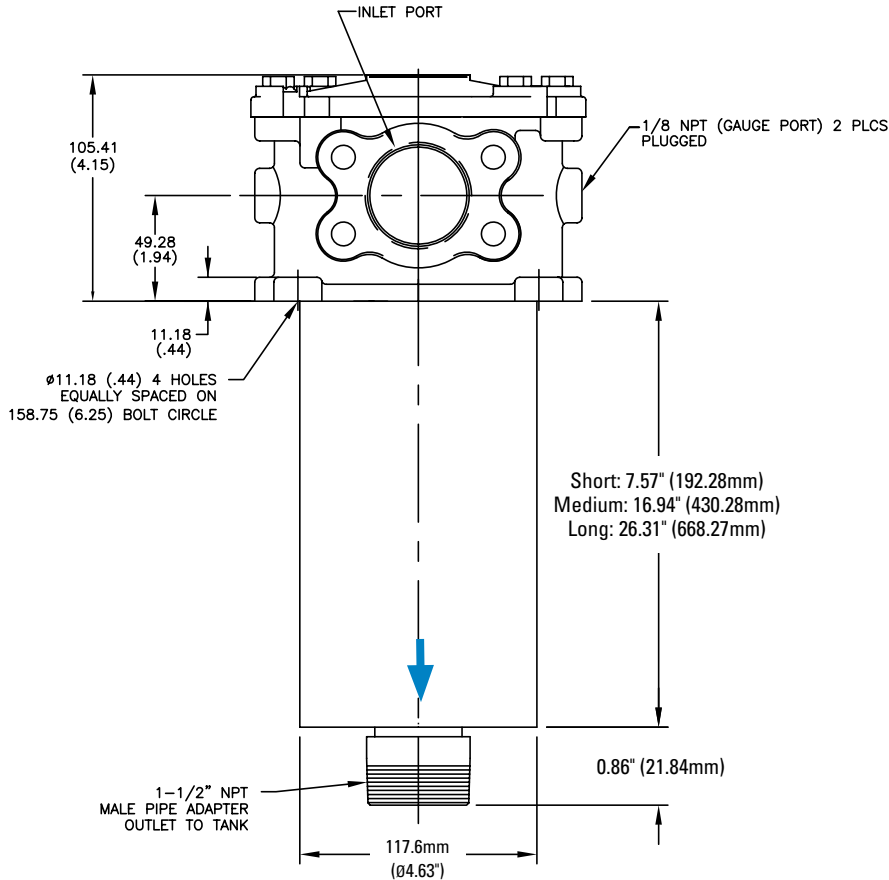
Filter Collapse Ratings

- 150 psid / 1035 kPa / 10.3 bar

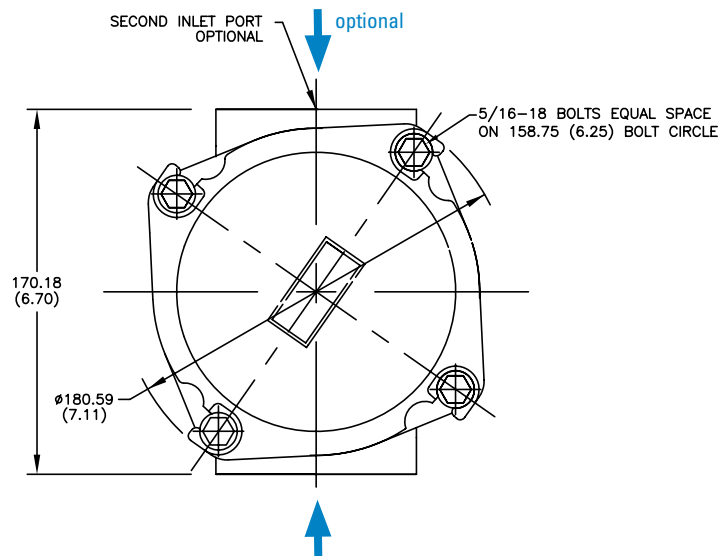
WL16 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Top View



Applications

- Cooling Circuits
- Fluid Conditioning Systems
- Lube Oil Systems
- Meets HF4 Specification
- Process Systems
- Return Lines
- Side Loop Systems



WL16

Max Flow: 200 gpm (757 lpm)



WL16 Components

High-Performance DT Filter Choices

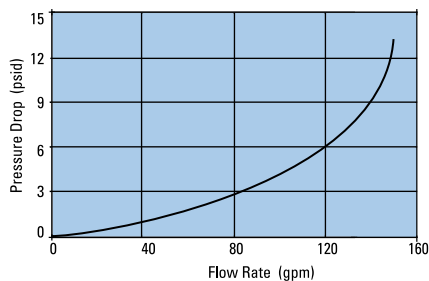
| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|---------------------|--|--------|-----|--------------------|----------------|
| | | in | mm | | |
| DT Synteq Synthetic | 2 μ m | 9.04 | 230 | P568816 | DT-HF4-9-2UM |
| | 5 μ m | 9.04 | 230 | P566270 | DT-HF4-9-5UM |
| | 8 μ m | 9.04 | 230 | P566271 | DT-HF4-9-8UM |
| | 12 μ m | 9.04 | 230 | P566272 | DT-HF4-9-14UM |
| | 23 μ m | 9.04 | 230 | P566273 | DT-HF4-9-25UM |
| | 2 μ m | 18.19 | 232 | P568817 | DT-HF4-18-2UM |
| | 5 μ m | 18.08 | 459 | P566274 | DT-HF4-18-5UM |
| | 8 μ m | 18.08 | 459 | P566275 | DT-HF4-18-8UM |
| | 12 μ m | 18.08 | 459 | P566276 | DT-HF4-18-14UM |
| | 23 μ m | 18.08 | 459 | P566277 | DT-HF4-18-25UM |
| | 2 μ m | 27.47 | 698 | P568818 | DT-HF4-27-2UM |
| | 5 μ m | 27.51 | 699 | P566278 | DT-HF4-27-5UM |
| | 8 μ m | 27.51 | 699 | P566279 | DT-HF4-27-8UM |
| | 14 μ m | 27.51 | 699 | P566280 | DT-HF4-27-14UM |
| | 25 μ m | 27.51 | 699 | P566281 | DT-HF4-27-25UM |



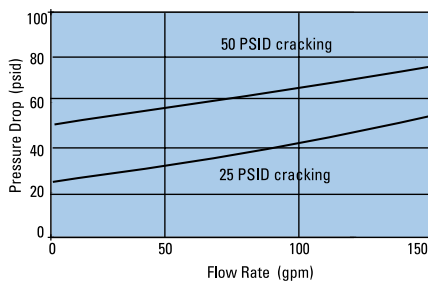
All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT filters are potted with epoxy-based adhesives. Standard collapse designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. Viton® seals are standard on all Donaldson DT filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Performance Data

WL16 Housing Only

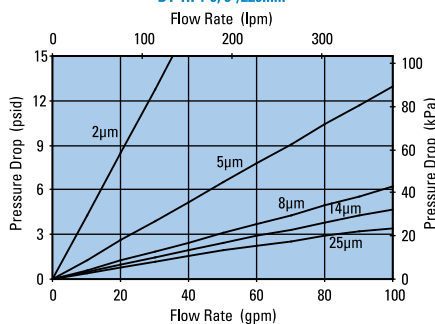


WL16 Bypass Valve



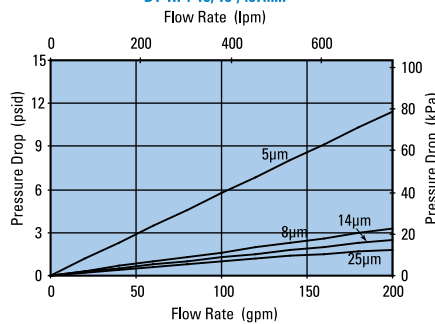
WL16 9" DT Filter Only

DT-HF4-9, 9"/229mm



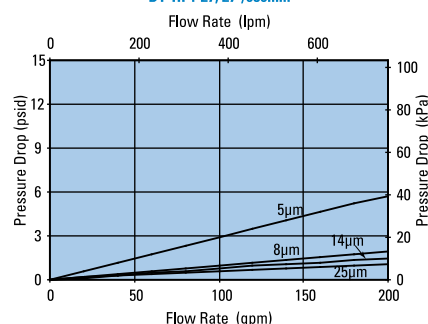
WL16 18" DT Filter Only

DT-HF4-18, 18"/457mm



WL16 27" DT Filter Only

DT-HF4-27, 27"/686mm





Filter Assembly Choices

| Port Size | Bypass Rating | Seal Material | Indicator Style & Location | Housing Length | Assembly Length | Donaldson Part No. |
|--------------------------------------|-------------------|---------------|----------------------------|----------------|------------------|--------------------|
| (2) SAE-24 O-ring | 25 psi / 1.72 bar | Buna-N | Port Machined & Plugged | 9" (228.6mm) | 12.76" (324.1mm) | P574232 |
| (2) SAE-24 O-ring | 25 psi / 1.72 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 21.09" (535.6mm) | P574233 |
| (2) SAE-24 O-ring | 25 psi / 1.72 bar | Buna-N | Port Machined & Plugged | 27" (685.8mm) | 30.46" (773.6mm) | P574234 |
| (2) 1-1/2" SAE 4 Bolt Flange Code 61 | 25 psi / 1.72 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 21.09" (535.6mm) | P574235 |
| (1) 1-1/2" SAE 4 Bolt Flange Code 61 | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 21.09" (535.6mm) | P574236 |
| (1) 1-1/2" SAE 4 Bolt Flange Code 61 | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 27" (685.8mm) | 30.46" (773.6mm) | P574237 |
| (2) SAE-24 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 21.09" (535.6mm) | P575922 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Donaldson Part No. |
|--|-----------------|--------------------|
| Visual Pressure Gauges, 0-60 psi | | |
| 25 psi / 172 kPa | NA | X011059 |
| 50 psi / 345 kPa | NA | X011075 |
| Visual Pressure Gauges, 0-200 psi | | |
| 50 psi / 345 kPa | NA | X011060 |
| Electrical Service Indicator | | |
| 18 psi / 124 kPa | Hirschman | X011061 |
| 35 psi / 241 kPa | Hirschman | X011064 |
| 18 psi / 124 kPa | Brad Harrison | X011065 |
| 35 psi / 241 kPa | Brad Harrison | X011066 |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011140 | Buna |
| X011141 | Viton |

Outlet Check Valve

| Donaldson Part No. |
|--------------------|
| X011053 |

Diffuser

| Donaldson Part No. |
|--------------------|
| X011919 |



FIK

Max Flow: 170 gpm (644 lpm)

FIK In-Tank Filters

Working Pressures to: 145 psi
1000 kPa
10 bar

Rated Static Burst to: 217 psi
1500 kPa
15 bar

Flow Range to: 170 gpm
644 lpm



Features

FIK in-tank filters are economical, space-saving units offering a variety of options including aluminum or plastic access covers, mounting options, and breathers. FIK filters, featuring a die-cast aluminum head and a steel or plastic canister are designed to handle heavy-duty applications. The head (and the inlet) sit above the tank, while the housing remains inside the tank, offering design-in flexibility. Optional air breather featuring T.R.A.P.™ technology are available with style A and B, designed to allow the breather to be mounted directly in the FIK filter head, thus eliminating the cost associated with an additional penetration to the hydraulic tank for breather installation. FIK filters offer three service indicators to choose from: pressure gauge, visual indicator and electrical indicator. FIK filter assemblies are shipped from the factory with cellulose or Synteq™ synthetic filter media, and replacement cartridges are offered in a range of media types and performance ratings.

Beta Rating

- Performance to $\beta_{8(c)} = 1000$

Porting Size Options

- 1/2", 3/4", 1" NPT
- SAE-8, SAE-12, SAE-16, SAE-20, SAE-24 O-ring
- 2" SAE 4-Bolt Flange Code 61

Standard Bypass Ratings

- 22 psi / 150 kPa / 1.5 bar

Operating Temperatures

- -4°F to 194°F / -20°C to 90°C

Collapse Ratings

- 145 psid / 1000 kPa / 10 bar

Redesigned with Features for Application Flexibility, Improved Servicing and Enhanced Filtration Performance

STYLE B Shown Below

Applications

- Cooling Circuits
- Fluid Conditioning Systems
- Lube Oil Systems
- Process Systems
- Return Lines
- Side Loop Systems

Multifunctional Ports (custom)

Contact your Donaldson sales representative for details

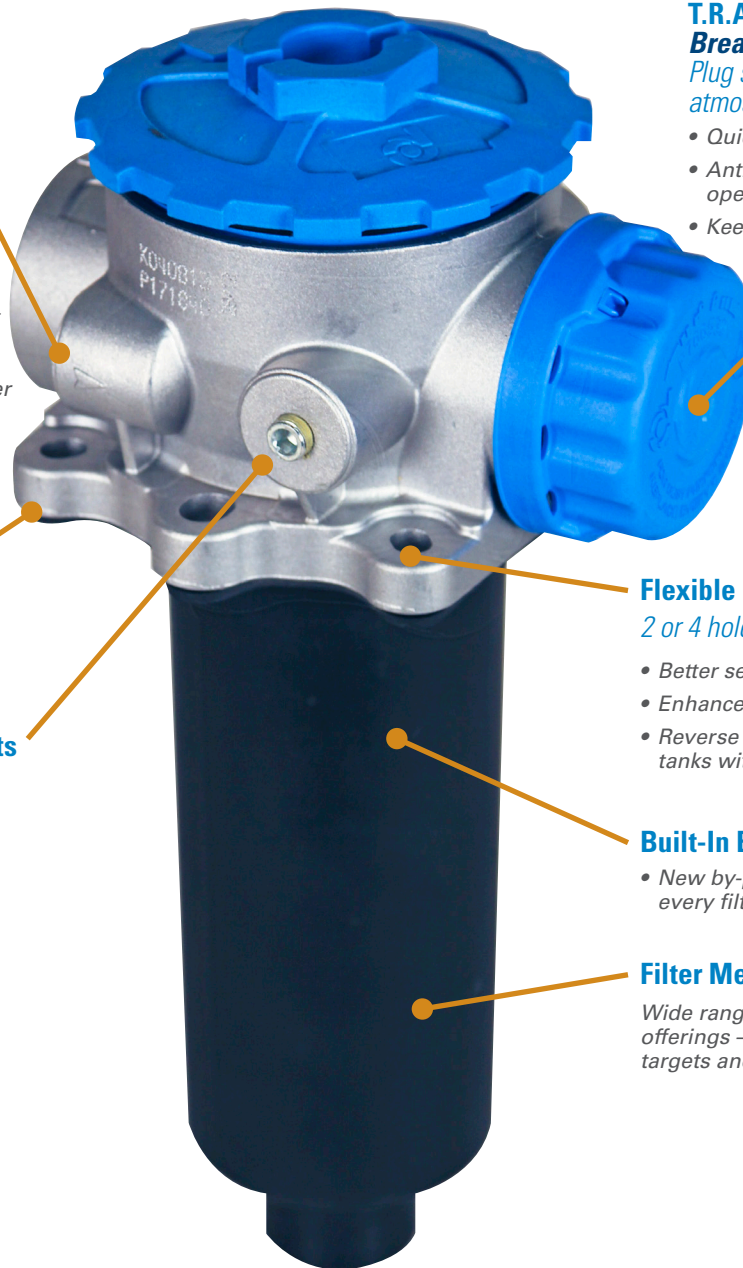
- Can be converted into auxiliary inlet ports
- The two secondary inlet ports can be used in conjunction with the main inlet port for higher flow rates

Flat Gasket Design

- For leak-tight operation

Service Indicator Ports

- Electrical, visual or pressure gauge options



T.R.A.P.™ Breather Technology Breather ordered separately Plug ships standard. Pressurized & atmospheric breathers available.

- Quick fit connection
- Anti-splash design allows smooth operation under tilt conditions
- Keeps reservoir free from condensation

Flexible Mounting Configurations

2 or 4 hole mounting option

- Better sealing and stability
- Enhanced stability on plastic tanks
- Reverse compatible – retrofit existing tanks with the new hole configuration

Built-In By-Pass Valve

- New by-pass valve installed with every filter replacement

Filter Media Technology

Wide range of Donaldson media offerings – to meet various performance targets and cleanliness standards



FIK

Max Flow: 170 gpm (644 lpm)

FIK Specification Illustrations

Low Flow Assemblies

< 32 gpm (120 lpm)

STYLE A
K030319



STYLE B
K040811
K040812
K040813
K041782



Improved Design Feature

- 2 or 4 hole mounting options
- Built-in by-pass valve in the cartridge
- Improved seal design
- Anti-splash air flow path
- Optional mini T.R.A.P. breather

Improved Design Feature

- 2 or 4 hole mounting options
- Built-in by-pass valve in the cartridge
- Improved seal design
- Anti-splash air flow path
- Optional mini T.R.A.P. breather
- Multifunctional ports for accessories

High Flow Assemblies

5 - 170 gpm (18 - 643 lpm)

STYLE C, D, E

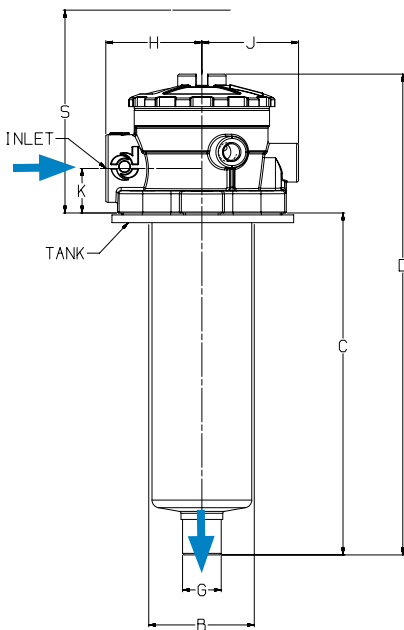
Assembly part numbers on following page

Improved Design Feature

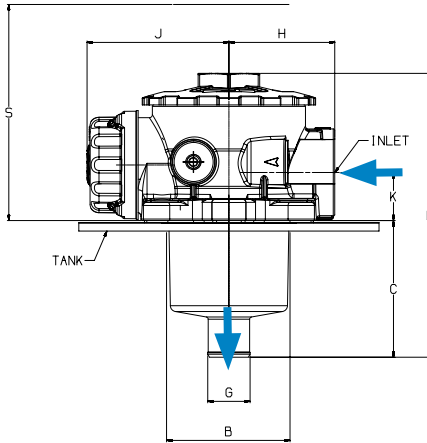
- Improved seal design
- Built-in by-pass valve in the cartridge

Assembly - Side Views

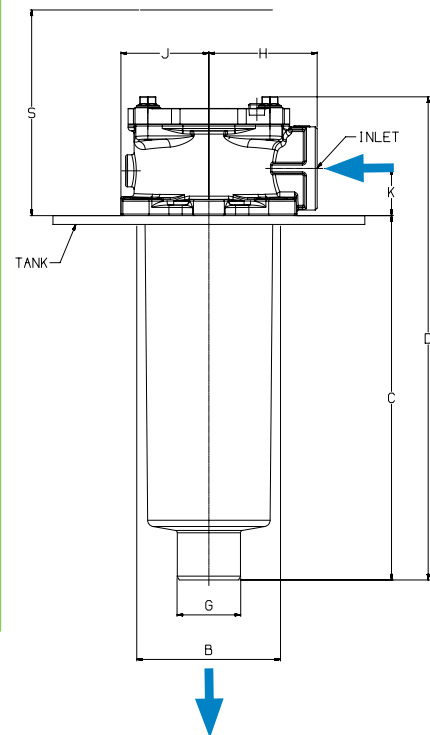
STYLE A



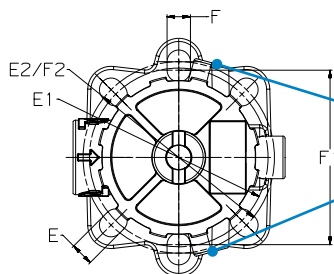
STYLE B



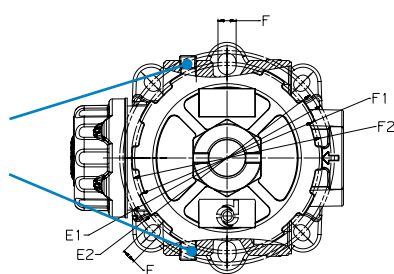
STYLE C, D, E



Head - Top Views



Ports for service indicator



High Flow Assemblies

5 - 170 gpm (18 - 643 lpm)

STYLE C

K041770 K041774
K041771 K040799
K041772 K040798
K041773
K031027 (2 point mount only)



Improved Design Feature

- 2 or 4 hole mounting options

STYLE D

K070248 K070250
K071001 K071003
K070249
K071002



Design Feature

- 4 hole mounting

STYLE E

K051204
K052053

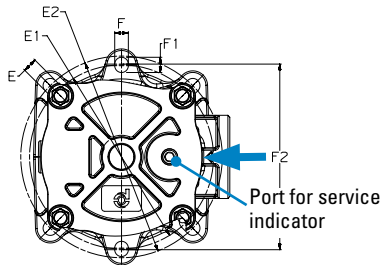


Design Feature

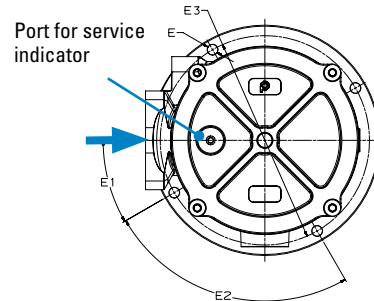
- 3 hole mounting

Head - Top Views

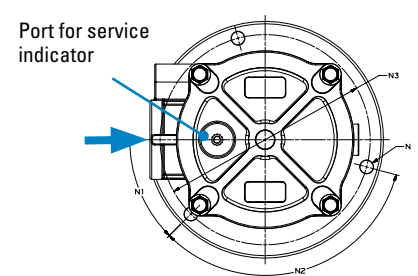
STYLE C



STYLE D



STYLE E



Dimensions

| ASSEMBLY DIMENSIONS | ASSEMBLY PART NUMBER | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------|----------------------|---------|---------|--------------------|-----------------------------------|---------|---|---------|--------------------|--------------------|--------------------|--------------------|---------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| | STYLE A | | STYLE B | | | | STYLE C | | | | | | STYLE D | | | | STYLE E | | | | | | | | | |
| | K030319 | K040811 | K040812 | K040813 K041782 | K031027 <i>2 pt mount only</i> | K041770 | K041771 K041772 K041773 K041774 K040799 | K040798 | K070248 K071001 | K070249 K071002 | K070250 K071003 | K051204 K052053 | | | | | | | | | | | | | | |
| mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | mm | in | | | | | |
| C | 176.8 | 6.96 | 91.0 | 3.58 | 141.0 | 5.55 | 218.0 | 8.58 | 78.0 | 3.07 | 99.0 | 3.90 | 149.0 | 5.87 | 227.7 | 8.96 | 242.0 | 9.53 | 290.0 | 11.42 | 434.0 | 17.09 | 224.0 | 8.82 | | |
| D | 248.6 | 9.79 | 189.0 | 7.44 | 239.0 | 9.41 | 316.0 | 12.44 | 132.0 | 5.20 | 173.3 | 6.82 | 223.2 | 8.79 | 301.9 | 11.89 | 348.0 | 13.70 | 395.5 | 15.57 | 539.5 | 21.24 | 313.8 | 12.35 | | |
| S SERVICE CLEARANCE | 220.0 | 8.66 | 180.0 | 7.09 | 220.0 | 8.66 | 305.0 | 12.01 | 149.0 | 5.87 | 170.0 | 6.69 | 220.0 | 8.66 | 299.0 | 11.77 | 320.0 | 12.60 | 365.0 | 14.37 | 515.0 | 20.28 | 305.0 | 12.01 | | |
| G | 20.0 | 0.79 | 27.6 | 1.09 | 27.6 | 1.09 | 39.6 | 1.56 | 25.2 | 0.99 | 27.6 | 1.09 | 27.6 | 1.09 | 39.5 | 1.56 | 50.0 | 1.97 | 63.5 | 2.50 | 63.5 | 2.50 | 40.0 | 1.57 | | |
| B TANK OPENING | 57.0 | 2.24 | 90.0 | 3.54 | 90.0 | 3.54 | 90.0 | 3.54 | 68.6 | 2.70 | 90.0 | 3.54 | 90.0 | 3.54 | 90.0 | 3.54 | 175.0 | 6.89 | 175.0 | 6.89 | 175.0 | 6.89 | 131.0 | 5.16 | | |
| H | 49.7 | 1.96 | 70.5 | 2.78 | 70.5 | 2.78 | 70.5 | 2.78 | 49.0 | 1.93 | 68.0 | 2.68 | 68.0 | 2.68 | 68.0 | 2.68 | 120.0 | 4.72 | 126.0 | 4.96 | 126.0 | 4.96 | 95.0 | 3.74 | | |
| J | 54.2 | 2.13 | 94.5 | 3.72 | 94.5 | 3.72 | 94.5 | 3.72 | 44.0 | 1.73 | 55.0 | 2.17 | 55.0 | 2.17 | 55.0 | 2.17 | 100.0 | 3.94 | 100.0 | 3.94 | 100.0 | 3.94 | 78.0 | 3.07 | | |
| K | 23.0 | 0.91 | 32.0 | 1.26 | 32.0 | 1.26 | 32.0 | 1.26 | 22.0 | 0.87 | 29.5 | 1.16 | 29.5 | 1.16 | 29.5 | 1.16 | 41.0 | 1.61 | 48.5 | 1.91 | 48.5 | 1.91 | 35.0 | 1.38 | | |
| F 2 POINT MOUNT | 11.0 | 0.43 | 11.0 | 0.43 | 11.0 | 0.43 | 11.0 | 0.43 | Ø6.4 | Ø0.25 | 8.5 | 0.33 | 8.5 | 0.33 | 8.5 | 0.33 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | |
| F1 | Ø82 | Ø3.23 | Ø112 | Ø4.41 | Ø112 | Ø4.41 | Ø112 | Ø4.41 | 90.0 | 3.54 | 9.5 | 0.37 | 9.5 | 0.37 | 9.5 | 0.37 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | |
| F2 | Ø90 | Ø3.54 | Ø116 | Ø4.57 | Ø116 | Ø4.57 | Ø116 | Ø4.57 | N/A | N/A | 115.0 | 4.53 | 115.0 | 4.53 | 115.0 | 4.53 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | |
| N 3 POINT MOUNT | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Ø11 | Ø0.43 | |
| N1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 45° | 45° | |
| N2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 120° | 120° | |
| N3 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Ø175 | Ø6.89 | |
| E 4 POINT MOUNT | 11.0 | 0.43 | 8.5 | 0.33 | 8.5 | 0.33 | 8.5 | 0.33 | N/A | N/A | 9.0 | 0.35 | 9.0 | 0.35 | 9.0 | 0.35 | Ø10.5 | Ø0.41 | Ø11 | Ø0.43 | Ø11 | Ø0.43 | N/A | N/A | | |
| E1 | Ø84 | Ø3.31 | Ø126 | Ø4.96 | Ø126 | Ø4.96 | Ø126 | Ø4.96 | N/A | N/A | Ø115 | Ø4.53 | Ø115 | Ø4.53 | Ø115 | Ø4.53 | 30° | 30° | 30° | 30° | 30° | 30° | 30° | N/A | N/A | |
| E2 | Ø90 | Ø3.54 | Ø130 | Ø5.12 | Ø130 | Ø5.12 | Ø130 | Ø5.12 | N/A | N/A | Ø126 | Ø4.96 | Ø126 | Ø4.96 | Ø126 | Ø4.96 | 90° | 30° | 90° | 90° | 90° | 90° | 90° | N/A | N/A | |
| E3 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Ø220 | Ø8.66 | Ø220 | Ø8.66 | Ø220 | Ø8.66 | Ø220 | Ø8.66 | N/A | N/A |
| WEIGHT | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg |
| K | 1.8 | 0.8 | 2.1 | 0.95 | 3.2 | 1.45 | 4.1 | 1.86 | 1.1 | 0.5 | 1.8 | 0.8 | 2.1 | 0.95 | 2.43 | 1.1 | 10.0 | 4.5 | 13.1 | 5.9 | 18.6 | 8.4 | 7.0 | 3.2 | | |



FIK

Max Flow: 170 gpm (644 lpm)



FIK Components

Assembly Choices

| Port Size | Bypass Rating* | Assembly Part No. | $\beta_{x(c)}$ = 1000 | Filter Media† | Provided with Filter | Filter Diameter (in./mm) | Filter Length (in./mm) | Flow Range (@~5 psid / 34.5 kPa) |
|-----------|----------------|-------------------|--------------------------|---------------|----------------------|--------------------------|------------------------|----------------------------------|
|-----------|----------------|-------------------|--------------------------|---------------|----------------------|--------------------------|------------------------|----------------------------------|

additional filter choices on following pages to meet various performance requirements

Low Flow Assemblies

STYLE A

| | | | | | | | | |
|--------------|----------------|---------|------------|-----------|---------|-----------|------------|-----------------|
| SAE-8 O-Ring | 22 psi/1.5 bar | K030319 | 36 μ m | Cellulose | P171839 | 1.69 / 43 | 6.38 / 162 | 10 gpm / 38 lpm |
|--------------|----------------|---------|------------|-----------|---------|-----------|------------|-----------------|

STYLE B

| | | | | | | | | |
|---------------|----------------|---------|------------|-----------|---------|-----------|------------|------------------|
| SAE-12 O-Ring | 22 psi/1.5 bar | K040811 | 36 μ m | Cellulose | P171527 | 2.76 / 70 | 3.23 / 82 | 14 gpm / 53 lpm |
| SAE-16 O-Ring | 22 psi/1.5 bar | K040812 | 36 μ m | Cellulose | P171533 | 2.76 / 70 | 5.04 / 128 | 23 gpm / 86 lpm |
| SAE-20 O-Ring | 22 psi/1.5 bar | K040813 | 36 μ m | Cellulose | P171840 | 2.76 / 70 | 8.27 / 210 | 32 gpm / 120 lpm |
| SAE-20 O-Ring | 22 psi/1.5 bar | K041782 | 11 μ m | Synthetic | P171846 | 2.76 / 70 | 8.27 / 210 | 28 gpm / 106 lpm |

High Flow Assemblies

STYLE C

| | | | | | | | | |
|---------------|----------------|---------|------------|-----------|---------|-----------|------------|------------------|
| 1/2" NPT | 22 psi/1.5 bar | K031027 | 36 μ m | Cellulose | P171503 | 2.05 / 52 | 2.64 / 67 | 5 gpm / 18 lpm |
| 1" NPT | 22 psi/1.5 bar | K041770 | 36 μ m | Cellulose | P171527 | 2.76 / 70 | 3.23 / 82 | 15 gpm / 56 lpm |
| 3/4" NPT | 22 psi/1.5 bar | K041771 | 36 μ m | Cellulose | P171533 | 2.76 / 70 | 5.04 / 128 | 18 gpm / 68 lpm |
| 1" NPT | 22 psi/1.5 bar | K041772 | 36 μ m | Cellulose | P171533 | 2.76 / 70 | 5.04 / 128 | 21 gpm / 79 lpm |
| SAE-12 O-Ring | 22 psi/1.5 bar | K041773 | 36 μ m | Cellulose | P171533 | 2.76 / 70 | 5.04 / 128 | 18 gpm / 68 lpm |
| SAE-12 O-Ring | 22 psi/1.5 bar | K041774 | 11 μ m | Synteq | P171531 | 2.76 / 70 | 5.04 / 128 | 13 gpm / 49 lpm |
| SAE-16 O-Ring | 22 psi/1.5 bar | K040799 | 36 μ m | Cellulose | P171533 | 2.76 / 70 | 5.04 / 128 | 21 gpm / 79 lpm |
| SAE-16 O-Ring | 22 psi/1.5 bar | K040798 | 36 μ m | Cellulose | P171840 | 2.76 / 70 | 8.22 / 209 | 32 gpm / 120 lpm |

STYLE D

| | | | | | | | | |
|---------------|----------------|---------|------------|-----------|---------|------------|-------------|-------------------|
| SAE-24 O-Ring | 22 psi/1.5 bar | K070248 | 36 μ m | Cellulose | P171557 | 5.51 / 140 | 7.49 / 203 | 66 gpm / 248 lpm |
| SAE-24 O-Ring | 22 psi/1.5 bar | K071001 | 11 μ m | Synteq | P171555 | 5.51 / 140 | 7.49 / 203 | 44 gpm / 165 lpm |
| 2" SAE 4-Bolt | 22 psi/1.5 bar | K070249 | 36 μ m | Cellulose | P171575 | 5.51 / 140 | 9.84 / 250 | 106 gpm / 399 lpm |
| 2" SAE 4-Bolt | 22 psi/1.5 bar | K071002 | 11 μ m | Synteq | P171573 | 5.51 / 140 | 9.84 / 250 | 74 gpm / 278 lpm |
| 2" SAE 4-Bolt | 22 psi/1.5 bar | K070250 | 36 μ m | Cellulose | P171581 | 5.51 / 140 | 15.75 / 400 | 170 gpm / 643 lpm |
| 2" SAE 4-Bolt | 22 psi/1.5 bar | K071003 | 11 μ m | Synteq | P171579 | 5.51 / 140 | 15.75 / 400 | 120 gpm / 451 lpm |

STYLE E

| | | | | | | | | |
|---------------|----------------|---------|------------|-----------|---------|-----------|------------|------------------|
| SAE-20 O-Ring | 22 psi/1.5 bar | K051204 | 36 μ m | Cellulose | P171539 | 3.74 / 95 | 7.49 / 203 | 47 gpm / 177 lpm |
| SAE-20 O-Ring | 22 psi/1.5 bar | K052053 | 11 μ m | Synteq | P171537 | 3.74 / 95 | 7.49 / 203 | 32 gpm / 120 lpm |

Note

*Bypass valve is an integral part of the replacement filter.
Service indicator port available for all assemblies.

Filter Notes





FIK filters utilize either glass fiber, cellulose, or wire mesh media.
All FIK filters are potted with polyurethane adhesives.
Synteq media designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.
Buna-N® seals are standard on all FIK filters. Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



T.R.A.P.™ Breather Choices

For Redesigned Style A and B Assemblies with 4 Hole Mounting Configurations Only

Note: T.R.A.P. breathers are not compatible on older style assemblies with 2 hole mounting configuration

| Part No. | Description | Efficiency | Fits Assembly Models: |
|---|---------------------------------|-------------|------------------------------------|
| STYLE A | | | |
|  | | | |
| P567392 | Mini T.R.A.P. | 3 µm @ 97% | K030319 |
| STYLE B | | | |
|  | Black | | |
| P766528 | Standard plug (no air exchange) | N/A | K040811, K040812, K040813, K041782 |
|  | Blue | | |
| P766530 | Atmospheric pressure | 10 µm @ 98% | K040811, K040812, K040813, K041782 |
|  | Red | | |
| P766538 | 7.3 psi (½ bar) pressurized | 10 µm @ 98% | K040811, K040812, K040813, K041782 |



STYLE A



STYLE B

Standard Breather Choices

Replacement Breathers for Older Style A and B Assemblies with 2 Hole Mounting Configuration Only

| Part No. | Efficiency | Fits Assembly Models: |
|----------------|------------|---------------------------|
| STYLE A | | |
| P173330 | 10 µm | K030319 |
| STYLE B | | |
| P172434 | 10 µm | K040811, K040812, K040813 |



Service Indicators

Pressure Gauges

P171956

G 1/8"

(center back)



P171953

G 1/8"

(bottom mount)

-14.5 to 72 psi
-1 to +5 bar

DC Electrical Indicator

P171966

17 psi / 1.2 bar

(48V AC/DC)



G 1/8" →

Visual Indicator

P171958

17 psi / 1.2 bar



G 1/8" →



FIK

Max Flow: 170 gpm (644 lpm)



FIK Components

Filter Choices - Low Flow Assemblies

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. |
|------------------|---|-----------------------|--------|-----|--------------------|
| | | | in | mm | |
| STYLE A | | | | | |
| K030319 | | | | | |
| Synteq Synthetic | 6 μ m | | 6.38 | 162 | P569273 |
| | 11 μ m | | 6.38 | 162 | P171845 |
| | 23 μ m | | 6.38 | 162 | P171842 |
| Cellulose | 7 μ m | | 6.38 | 162 | P171839 |
| | 27 μ m | | 6.38 | 162 | P171836 |
| Wire Mesh | 60 μ m | | 6.38 | 162 | P171833 |
| | 90 μ m | | 6.38 | 162 | P171830 |

Filter Choices - Low Flow Assemblies

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. |
|------------------|---|-----------------------|--------|-----|--------------------|
| | | | in | mm | |
| STYLE B | | | | | |
| K040811 | | | | | |
| Synteq Synthetic | 11 μ m | | 3.23 | 82 | P171525 |
| | 23 μ m | | 3.23 | 82 | P171526 |
| Cellulose | 7 μ m | | 3.23 | 82 | P171527 |
| | 27 μ m | | 3.23 | 82 | P171528 |
| Wire Mesh | 60 μ m | | 3.23 | 82 | P171529 |
| | 90 μ m | | 3.23 | 82 | P171524 |
| K040812 | | | | | |
| Synteq Synthetic | 6 μ m | | 5.04 | 128 | P569275 |
| | 11 μ m | | 5.04 | 128 | P171531 |
| | 23 μ m | | 5.04 | 128 | P171532 |
| Cellulose | 7 μ m | | 5.04 | 128 | P171533 |
| | 27 μ m | | 5.04 | 128 | P171534 |
| Wire Mesh | 60 μ m | | 5.04 | 128 | P171535 |
| | 90 μ m | | 5.04 | 128 | P171530 |
| K040813 | | | | | |
| Synteq Synthetic | 6 μ m | | 8.27 | 210 | P569276 |
| | 11 μ m | | 8.27 | 210 | P171846 |
| | 23 μ m | | 8.27 | 210 | P171843 |
| Cellulose | 7 μ m | | 8.27 | 210 | P171840 |
| | 27 μ m | | 8.27 | 210 | P171837 |
| Wire Mesh | 60 μ m | | 8.27 | 210 | P171834 |
| K041782 | | | | | |
| Synteq Synthetic | 6 μ m | | 8.27 | 210 | P569276 |
| | 11 μ m | | 8.27 | 210 | P171846 |
| | 23 μ m | | 8.27 | 210 | P171843 |
| Cellulose | 7 μ m | | 8.27 | 210 | P171840 |
| | 27 μ m | | 8.27 | 210 | P171837 |
| Wire Mesh | 60 μ m | | 8.27 | 210 | P171834 |

High Flow Assemblies

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. |
|--|---|-----------------------|--------|-----|--------------------|
| | | | in | mm | |
| STYLE C | | | | | |
| K031027 | | | | | |
| Synteq Synthetic | 6 μ m | | 2.64 | 67 | P569277 |
| | 11 μ m | | 2.64 | 67 | P171501 |
| | 23 μ m | | 2.64 | 67 | P171502 |
| Cellulose | 7 μ m | | 2.64 | 67 | P171503 |
| | 27 μ m | | 2.64 | 67 | P171504 |
| Wire Mesh | 60 μ m | | 2.64 | 67 | P171505 |
| | 90 μ m | | 2.64 | 67 | P171500 |
| K041770 | | | | | |
| Synteq Synthetic | 11 μ m | | 3.23 | 82 | P171525 |
| | 23 μ m | | 3.23 | 82 | P171526 |
| Cellulose | 7 μ m | | 3.23 | 82 | P171527 |
| | 27 μ m | | 3.23 | 82 | P171528 |
| Wire Mesh | 60 μ m | | 3.23 | 82 | P171529 |
| | 90 μ m | | 3.23 | 82 | P171524 |
| K041771, K041772, K041773, K041774, K040799 | | | | | |
| Synteq Synthetic | 6 μ m | | 5.04 | 128 | P569275 |
| | 11 μ m | | 5.04 | 128 | P171531 |
| | 23 μ m | | 5.04 | 128 | P171532 |
| Cellulose | 7 μ m | | 5.04 | 128 | P171533 |
| | 27 μ m | | 5.04 | 128 | P171534 |
| Wire Mesh | 60 μ m | | 5.04 | 128 | P171535 |
| | 90 μ m | | 5.04 | 128 | P171530 |
| K040798 | | | | | |
| Synteq Synthetic | 6 μ m | | 8.22 | 209 | P569276 |
| | 11 μ m | | 8.22 | 209 | P171846 |
| | 23 μ m | | 8.22 | 209 | P171843 |
| Cellulose | 7 μ m | | 8.22 | 209 | P171840 |
| | 27 μ m | | 8.22 | 209 | P171837 |
| Wire Mesh | 60 μ m | | 8.22 | 209 | P171834 |

High Flow Assemblies

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. |
|-------------------------|---|-----------------------|--------|-----|--------------------|
| | | | in | mm | |
| STYLE D | | | | | |
| K070248, K071001 | | | | | |
| Synteq Synthetic | 6 μ m | | 7.49 | 203 | P569279 |
| | 11 μ m | | 7.49 | 203 | P171555 |
| | 23 μ m | | 7.49 | 203 | P171556 |
| Cellulose | 7 μ m | | 7.49 | 203 | P171557 |
| | 27 μ m | | 7.49 | 203 | P171558 |
| Wire Mesh | 60 μ m | | 7.49 | 203 | P171559 |
| K070249, K071002 | | | | | |
| Synteq Synthetic | 6 μ m | | 9.84 | 250 | P569280 |
| | 11 μ m | | 9.84 | 250 | P171573 |
| | 23 μ m | | 9.84 | 250 | P171574 |
| Cellulose | 7 μ m | | 9.84 | 250 | P171575 |
| | 27 μ m | | 9.84 | 250 | P171576 |
| Wire Mesh | 90 μ m | | 9.84 | 250 | P171572 |
| K070250, K071003 | | | | | |
| Synteq Synthetic | 6 μ m | | 15.75 | 400 | P176749 |
| | 11 μ m | | 15.75 | 400 | P171579 |
| | 23 μ m | | 15.75 | 400 | P171580 |
| Cellulose | 7 μ m | | 15.75 | 400 | P171581 |
| | 27 μ m | | 15.75 | 400 | P171582 |
| Wire Mesh | 60 μ m | | 15.75 | 400 | P171583 |
| | 90 μ m | | 15.75 | 400 | P171578 |
| STYLE E | | | | | |
| K051204, K052053 | | | | | |
| Synteq Synthetic | 6 μ m | | 7.49 | 203 | P569278 |
| | 11 μ m | | 7.49 | 203 | P171537 |
| | 23 μ m | | 7.49 | 203 | P171538 |
| Cellulose | 7 μ m | | 7.49 | 203 | P171539 |
| | 27 μ m | | 7.49 | 203 | P171540 |
| Wire Mesh | 60 μ m | | 7.49 | 203 | P171541 |
| | 90 μ m | | 7.49 | 203 | P171536 |



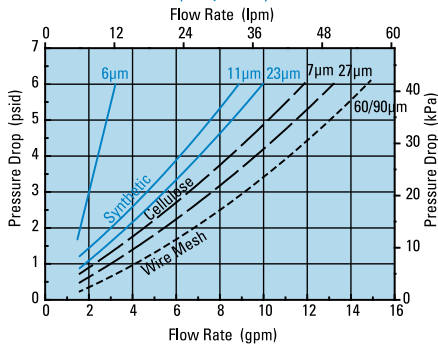
FIK
Max Flow: 170 gpm (644 lpm)



Performance Data

STYLE A

K030319 Assembly
(6.38"/162mm)



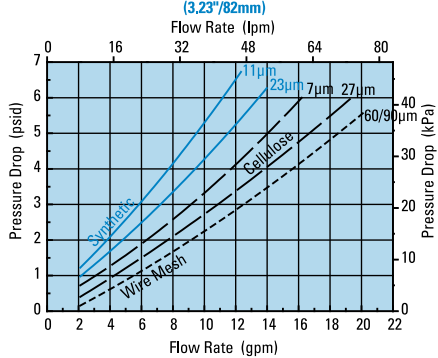
NOTE:

Please note that the line styles used represent different media types

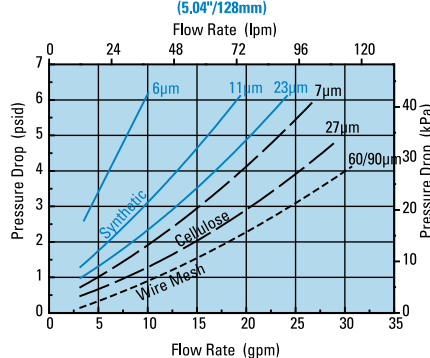
- Synteq Synthetic
- - - Cellulose
- - - Wire Mesh

STYLE B

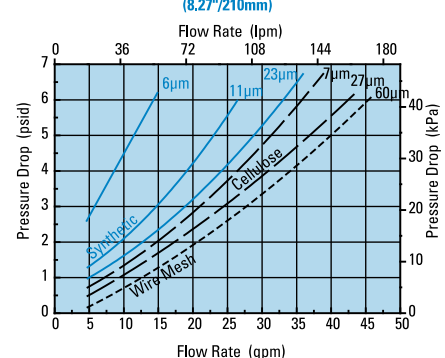
K040811 Assembly
(3.23"/82mm)



K040812 Assembly
(5.04"/128mm)

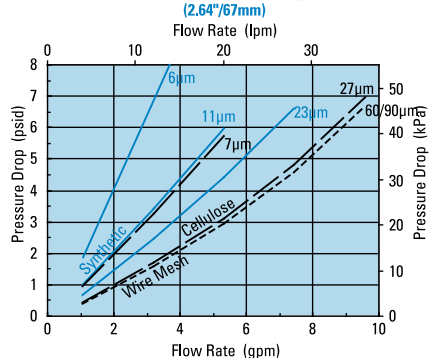


K040813 & K041782 Assemblies
(8.27"/210mm)

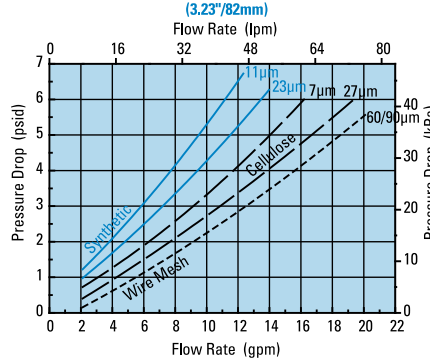


STYLE C

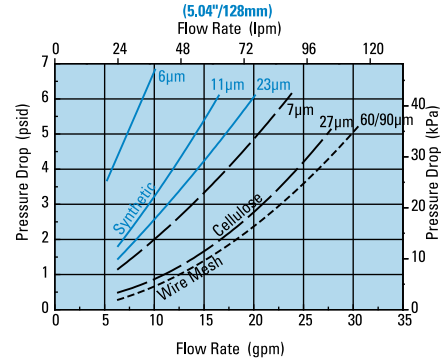
K031027 Assembly
(2.64"/67mm)



K0041770* Assembly
(3.23"/82mm)



K0041771, K041772, K041773**, K041774** & K040799 Assemblies**
(5.04"/128mm)

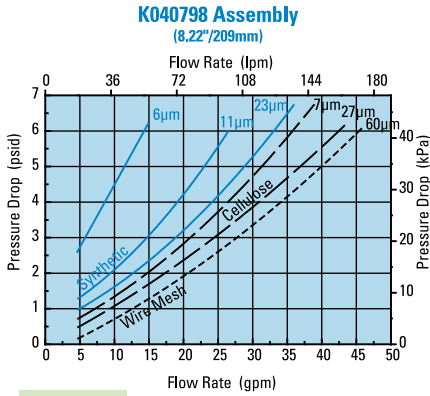


*Subtract 1/2 psi

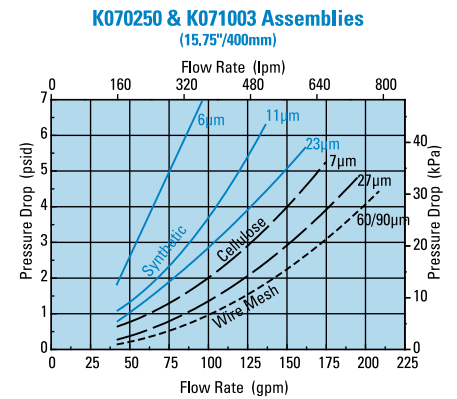
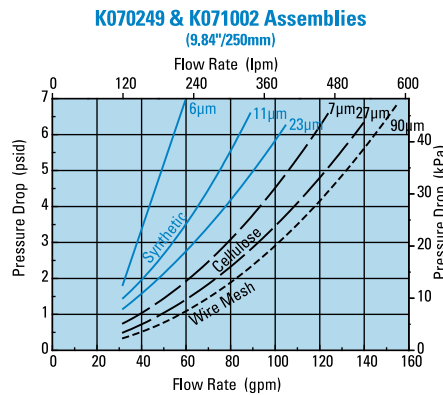
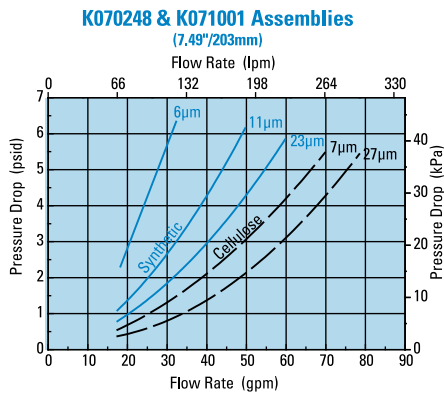
**Add 1/2 psi

Performance Data

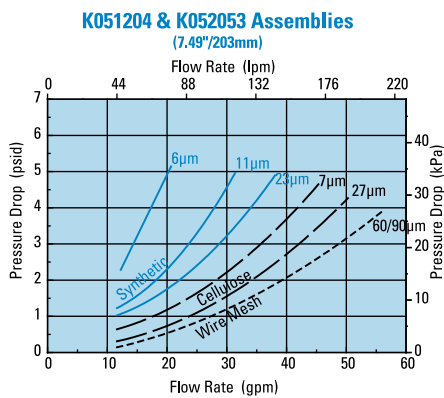
STYLE C, continued



STYLE D



STYLE E





SRK Combo

Max Flow: 79 gpm (300 lpm)



LOW PRESSURE FILTERS

SRK Suction/Return Combination In-Tank Filters

Working Pressures to: 145 psi
1000 kPa
10.0 bar

Rated Static Burst to: 217 psi
1497 kPa
15.0 bar

Flow Range to: 79 gpm
300 lpm

Applications

- Hydrostatic Transmissions
- Mobile Equipment



Features

The SRK tank-mounted suction and return filter is a popular choice for hydrostatic transmissions. The filtered flow is maintained at a slight backpressure to provide clean, pressurized oil, mainly for charge pumps in hydrostatic transmission systems. The pressurized flow is designed to reduce cavitation risks. This patented design uses an integrated main flow and bypass flow filter, which is capable of delivering filtered and pressurized oil, even in bypass situations. Emergency suction flow is also filtered. The SRK operates in a standard flow (outside to inside) configuration. SAE O-Ring ports are standard to meet popular application requirements.

- 4-point mounting
- Housing material: steel
- Buna-N® seals standard
- Head material: aluminum
- Cover material: glass-filled nylon
- Main filters include integrated bypass filters

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

Beta Rating (per ISO 16889)

- Performance to $\beta_{13(c)} = 1000$

Porting Size Options

- Inlet: SAE-16, SAE-20 O-ring
- Outlet: SAE-16 O-Ring

Replacement Filter Lengths

- 18.6" / 472 mm

Standard Bypass Ratings

- 36 psi / 250 kPa / 2.5 bar

Standard Backpressure Ratings

- 7.3 psi / 50 kPa / 0.5 bar

Assembly Weight

- 10.8 lbs / 4.9 kg

Operating Temperatures

- -22°F to 212°F / -30°C to 100°C

Filter Collapse Ratings

- 145 psid / 1000 kPa / 10 bar

Return Flow Rate

- 79 gpm (300 lpm)

Emergency Suction Flow Rate

- 27 gpm (100 lpm)



SRK Filter Assemblies

| Donaldson Part No. | Inlet Port Connections | Outlet Port Connections | Bypass Valve | Emergency Suction | Comments |
|--------------------|------------------------|-------------------------|------------------|-------------------|------------------------|
| K041634 | SAE-20 & SAE-16 | (2) - SAE-16 | 36 psi (2.5 bar) | 125 µm Wire Mesh | Indicator not included |

Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Bypass | Comments |
|------------------|--|--------|-----|--------------------|-------------|--------------------------|
| | | in | mm | | | |
| Synteq Synthetic | 13 µm | 18.6 | 472 | P765457 | 125 µm Wire | For Combo 300 Assemblies |

- Standard collapse designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.
- All SRK filters are standard flow (outside to inside).
- Buna-N seals are standard on all SRK filters.

Suction Filter Choices

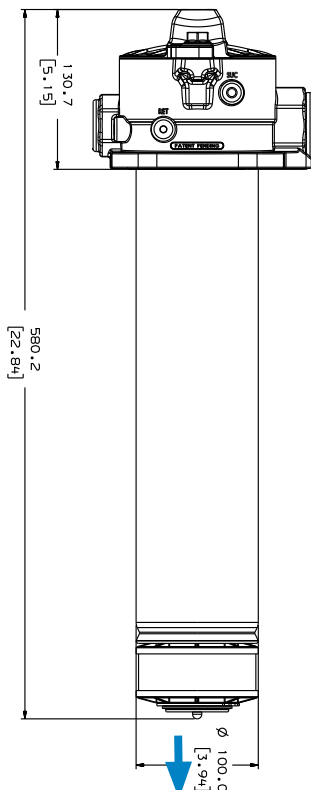
| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | Length | | Donaldson Part No. |
|------------|---|--------|------|--------------------|
| | | in | mm | |
| Wire Mesh | 125 µm | 1.98 | 50.2 | P764183 |

Indicator Options

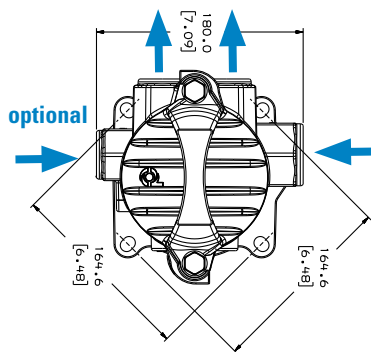
| Donaldson Part No. | Set Point | Style | Connection |
|--------------------|------------------|--------------|------------|
| P764467 | 36 psi (2.5 bar) | 30 VDC, N.O. | G1/8" |
| P764613 | 36 psi (2.5 bar) | 30 VDC, N.C. | G1/8" |
| P764612 | 36 psi (2.5 bar) | Visual | G1/8" |

Assembly - Side View

All dimensions are shown in millimeters [inches].

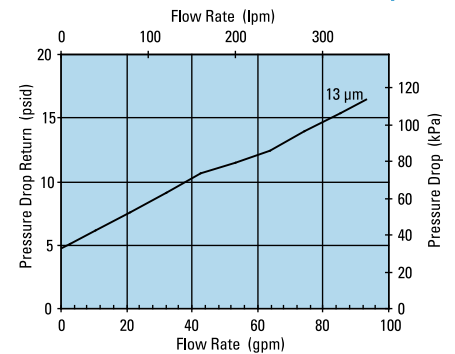


Head - Top View

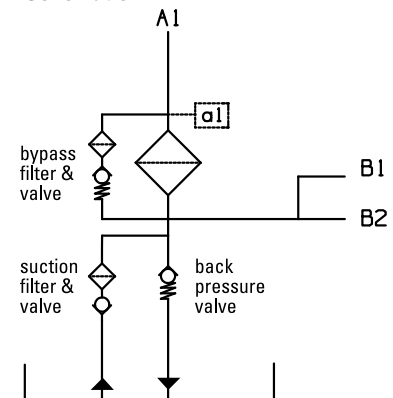


Performance Data

SRK Suction / Return Combo Assembly



Flow Schematic





HRK10

Max Flow: 300 gpm (1135 lpm)



HRK10 In-Line Cartridge Filters



Working Pressures to: 150 psi
1035 kPa
10.3 bar

Rated Static Burst to: 500 psi
3450 kPa
34.5 bar

Flow Range to: 300 gpm
1135 lpm

Features

The HRK10 high flow filter combines the best features of its predecessor, the HEK11: ANSI inlet port options, top cover filter servicing for ease of maintenance, and a selection of service indicators. The HRK10 all-steel housing design provides a strong, durable, and dependable unit. It offers standard features like deep pleat filters for higher dirt holding capacity and standard Donaldson DT 4-layer media filter construction. This technology, combined with many other standard features, is ideal for today's applications in pulp and paper, power generation and steel mill applications. Five standard grades of media are offered. A port for an electrical indicator is incorporated into the differential indicator block.

- Robust "Twist & Lift" cover for simplified servicing
- Multiple bypass valve design assures proper operation
- Wide variety of bypass valve ratings
- Reverse flow (inside to outside) filters for positive contamination containment
- Fluorocarbon seals standard
- Housing & cover material: steel
- Drain plug in bottom
- Bleed valve in cover
- Fill plug in cover

Beta Rating (per ISO 16889)

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- 4" ANSI Flange, 8-bolt 150#

Replacement Filter Lengths

- 21.99" / 559 mm

Filter Collapse Ratings

- 100 psid / 689 kPa / 6.9 bar

Standard Bypass Ratings

- 5 psi / 34.5 kPa / 0.34 bar
- 25 psi / 172 kPa / 1.7 bar
- 50 psi / 345 kPa / 3.4 bar
- No Bypass

Assembly Weight

- 140 lbs / 64 kg

Operating Temperatures

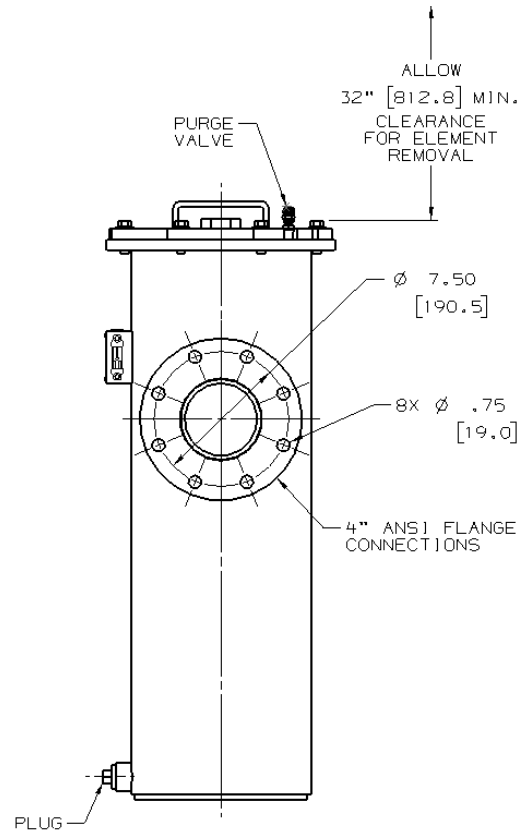
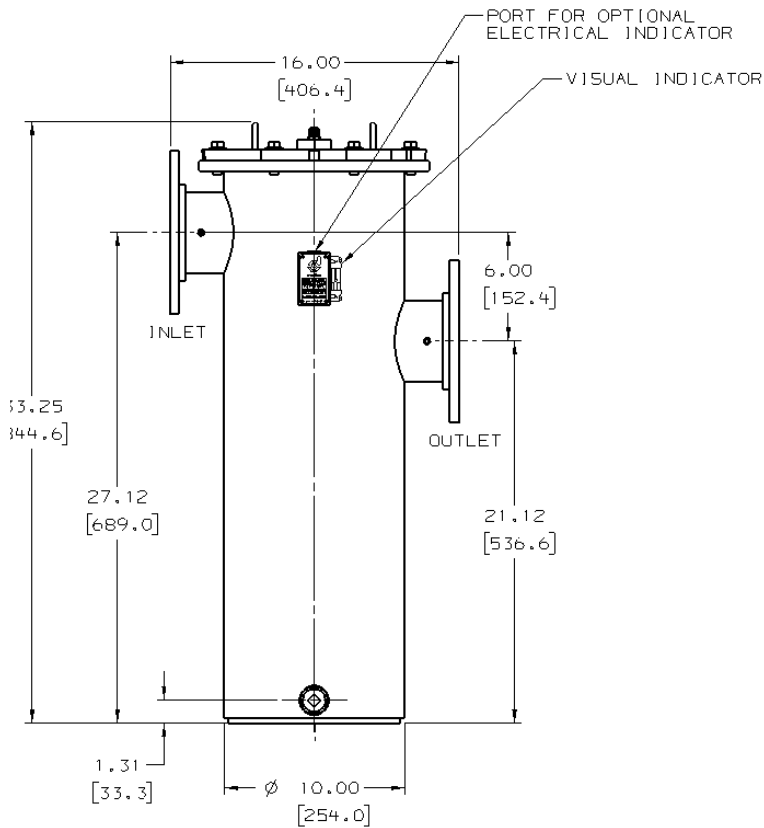
- -20°F to 250°F (-29° to 121°C)



HRK10 Specification Illustrations

All dimensions are shown in inches [millimeters].

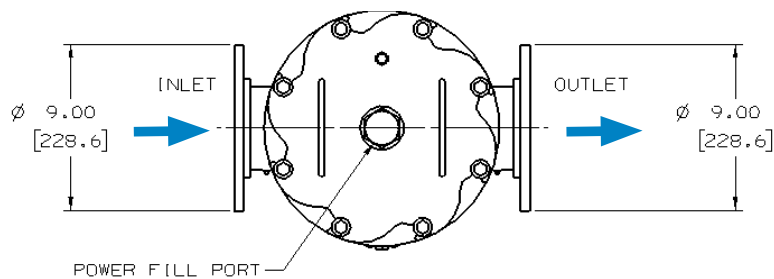
Assembly - Side View



Applications

- Fluid Conditioning Systems
- In-Plant Systems
- Lube Oil Systems
- Side Loop Systems

Head - Top View





HRK10
Max Flow: 300 gpm (1135 lpm)



HRK10 Components

Housing Choices

NOTE: FILTERS ORDERED SEPARATELY. See below for filter options.

| Part No. | Port Connections | Bypass Valve | Indicator Options |
|----------|------------------|-------------------------|--------------------------------------|
| K100001 | 4" ANSI Flange | No bypass | Visual standard, electrical optional |
| K100002 | 4" ANSI Flange | 5 psi (0.34 bar) bypass | Visual standard, electrical optional |
| K100003 | 4" ANSI Flange | 25 psi (1.7 bar) bypass | Visual standard, electrical optional |
| K100004 | 4" ANSI Flange | 50 psi (3.4 bar) bypass | Visual standard, electrical optional |

Electrical Indicator Options

| Part No. | Set Point | Bypass Valve |
|----------|------------------|---------------|
| P173944 | 20 psi (1.4 bar) | AC/DC, 3-wire |
| P174396 | 40 psi (2.8 bar) | AC/DC, 3-wire |

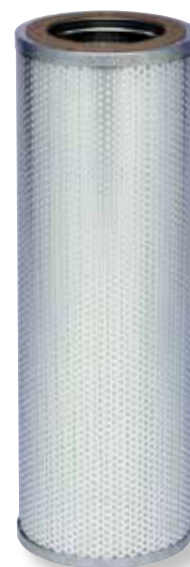
Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length in mm | Donaldson Part No. | Comments |
|------------------|---|-----------------------|-----------------|--------------------|--|
| Synteq Synthetic | | <4 μm | 21.99 559 | P566187 | Replaces old HEK11 filter P163472 |
| | | 5 μm | 21.99 559 | P566188* | |
| | | 8 μm | 21.99 559 | P566189 | Replaces old HEK11 filter P176417** or P176223*** |
| | | 12 μm | 21.99 559 | P566190 | Replaces old HEK11 filter P165449 |
| | | 23 μm | 21.99 559 | P566191 | Replaces old HEK11 filter P164707 |
| Water Absorbing | 10 μm | | 21.99 559 | P569531 | Absorbs approximately 60 oz/1800 ml water @ 25 psid/1.72 bar |
| Wire Mesh | 150 μm | | 21.99 559 | P566192 | Replaces old HEK11 filter P160078 |

Use HRK10 in place of previous HEK11 housings.
For better performance use HRK10 filters in existing HEK11 housings.
* Utilizes DT Synteq synthetic media
** 9 μm rating
*** 10 μm rating

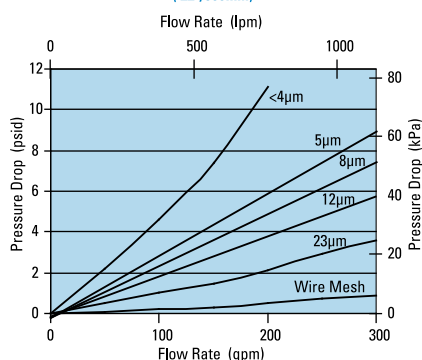
Filter Notes:

All $\beta=1000$ filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.
All Donaldson HRK10 filters are potted with epoxy-based adhesives.
All HRK10 filters are reserve flow (inside to outside), keeping contaminants contained during servicing.
Viton® seals are standard on all HRK10 filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

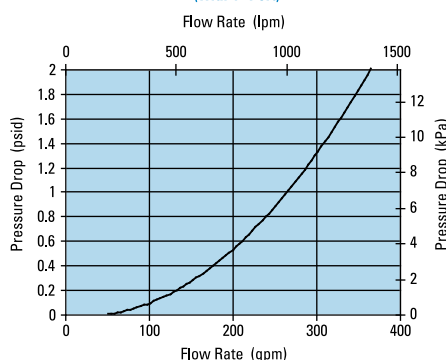


Performance Data

HRK10 Filter Only
(22"/559mm)



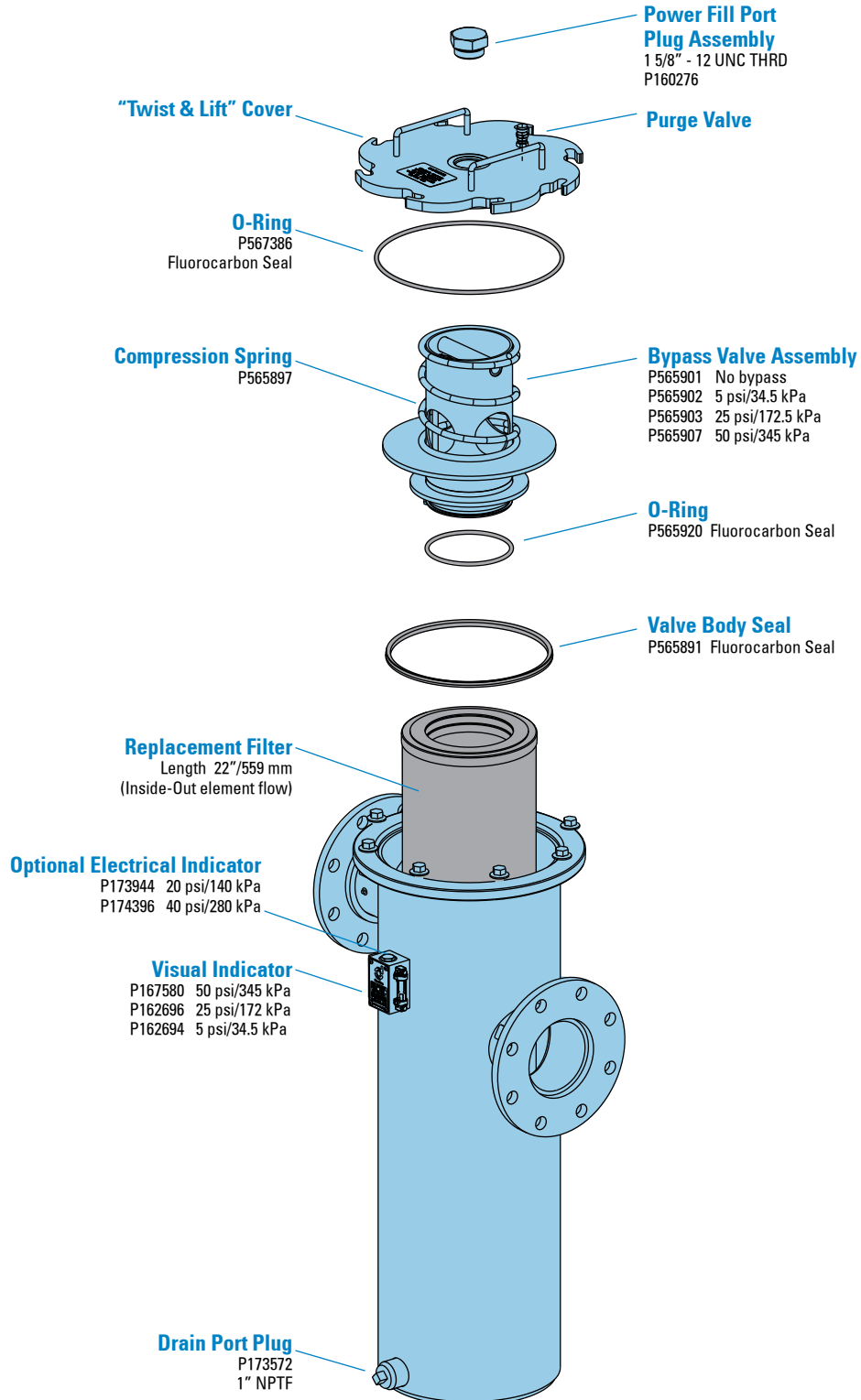
HRK10 Housing Only
(with 4" Port)



HRK10 Service Parts

SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.





Donaldson Delivers
Performance
Under **Any**
Pressure.



www.donaldsonfilters.com

PRODUCT INFORMATION



www.donaldsonfilters.com



Medium Pressure Filters

Medium pressure filters can be used in applications up to 2000 psi (13790 kPa). Donaldson offers both spin-on and in-line cartridge-style filters.

Donaldson Duramax® filters are the highest rated medium pressure spin-on filters available. Duramax filters are proven, reliable, long-lived and easy to install.



Section Index

Max Operating Pressure < 2000 psi (138 bar)

Models arranged from low to maximum flow rates

Spin-on Filters

| | |
|-------------|----|
| HMK03 | 82 |
| HMK04 | 86 |
| HNK04 | 94 |
| HMK05 | 90 |
| HNK05 | 94 |
| HMK24 | 86 |
| HMK25 | 90 |

In-line Cartridge Filters

| | |
|--------------|-----|
| FLK90 | 99 |
| FLK110 | 102 |
| FLK125 | 105 |
| DPK350 | 108 |
| W061 | 112 |
| HDK06 | 116 |
| W041 | 120 |
| HFK08 | 124 |



HMK03

Max Flow: 25 gpm (95 lpm)



HMK03 DURAMAX® Spin-On Filters

Working Pressures to: 1000 psi
6895 kPa
69 bar

Rated Static Burst to: 2000 psi
13,790 kPa
138 bar

Flow Range To: 25 gpm
95 lpm

Features

HMK03 Series Duramax® spin-on filters offer twice the capacity of competitive filters, yet they are physically smaller than traditional housing/cartridge filter assemblies. It features a die cast aluminum head and a unique radial seal O-ring gasket design that eliminates leakage.

Take advantage of Donaldson's mix and match system of in-stock heads, housings and media choices – so you can get exactly what you need. A full range of media options are available, using Donaldson's exclusive Synteq™ synthetic media designed especially for liquid filtration. You can also select the exact indicator types and bypass options to suit your application.



Beta Rating

- Performance to $\beta_{6(c)}=1000$

Porting Size Options

- SAE-12 O-ring

Replacement Filter Lengths

- 5.5" / 140mm
- 9.5" / 242mm

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- No Bypass

Filter Collapse Ratings

- 290 psid / 20 bar

Assembly Weight

- Short: 3.3 lbs / 1.5 kg
- Long: 4.2 lbs / 1.9 kg

Operating Temperatures

- -20°F to 250°F / -29°C to 121°C

Housing Fatigue Strength Ratings*

- 100,000 Cycles:
0-1000 psi / 0-6895 kPa / 68 bar
- 300,000 Cycles:
0-800 psi / 0-5516 kPa / 55 bar
- 1,000,000 Cycles:
0-700 psi / 0-4826 kPa / 48 bar

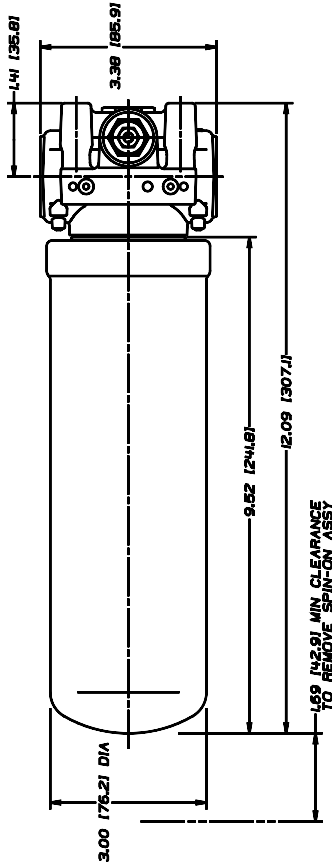


HMK03 Specification Illustrations

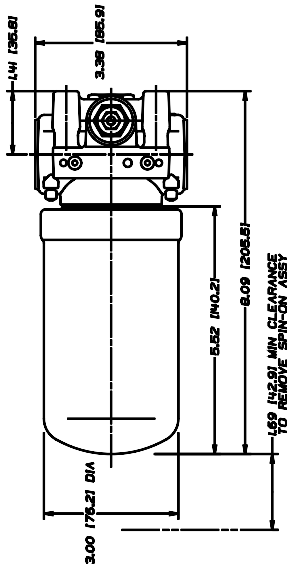
All dimensions are shown in inches [millimeters].

Assembly - Side Views

Long Assembly

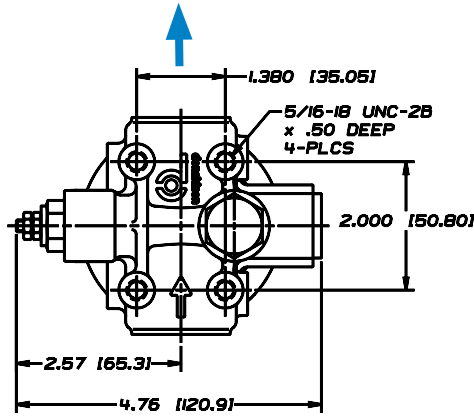


Short Assembly

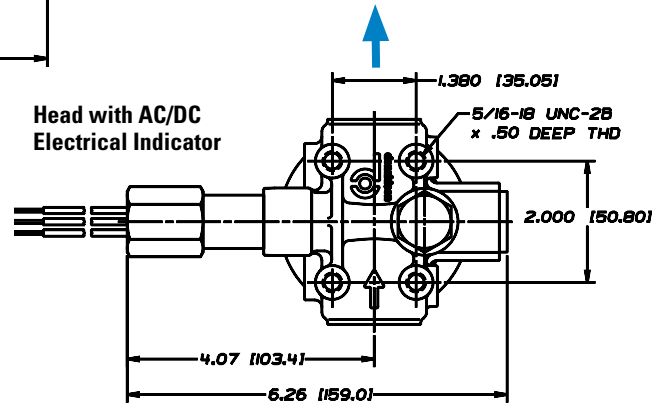


Head - Top View with Indicators

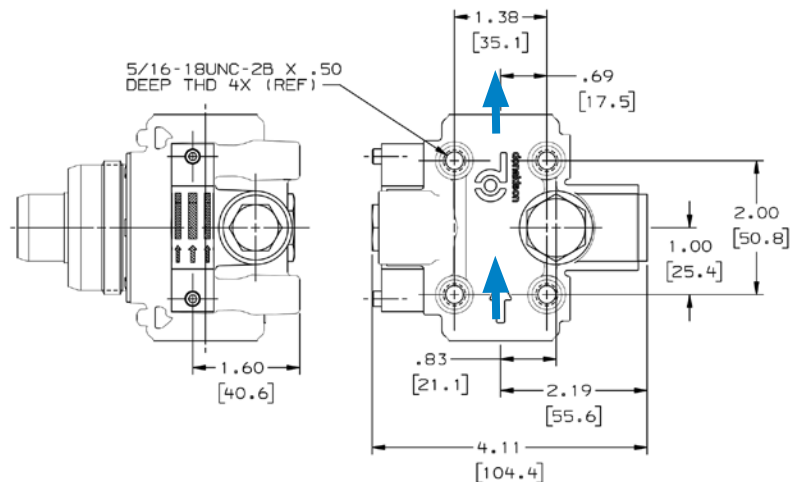
Head with DC Electrical Indicator



Head with AC/DC Electrical Indicator



Head with Visual Indicator



Applications

- Hydrostatic Charge Pumps
- Hydrostatic Transmission
- Pilot Control Circuits
- Refrigeration Compressor Circuits



HMK03

Max Flow: 25 gpm (95 lpm)



HMK03 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------------|--|--------|-----|--------------------|----------|
| | | in | mm | | |
| Synteq Synthetic | 6 μm | 5.5 | 140 | P170308 | Buna-N |
| | 6 μm | 9.5 | 242 | P170309 | Buna-N |
| | 11 μm | 5.5 | 140 | P170310 | Buna-N |
| | 11 μm | 9.5 | 242 | P170311 | Buna-N |
| | 23 μm | 5.5 | 140 | P170312 | Buna-N |
| | 23 μm | 9.5 | 242 | P170313 | Buna-N |

Filter Notes

- Synteq™ filter media is compatible with petroleum based fluids, most phosphate esters, water oil emulsions, and HWCF (high water content fluids)
- All models have 2"-12 threads
- Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



HMK03 Head

| Port Size | Bypass Rating | Indicator | Head Part No. |
|-------------|------------------|-----------|---------------|
| 3/4" SAE-12 | No Bypass | None* | P170327 |
| O-Ring | 50 psi / 345 kPa | None* | P170773 |
| | 50 psi / 345 kPa | Visual* | P179460 |

*Head is machined to accept optional electrical indicators. See Indicator list at right for the available choices.

Oil Service Indicator Choices

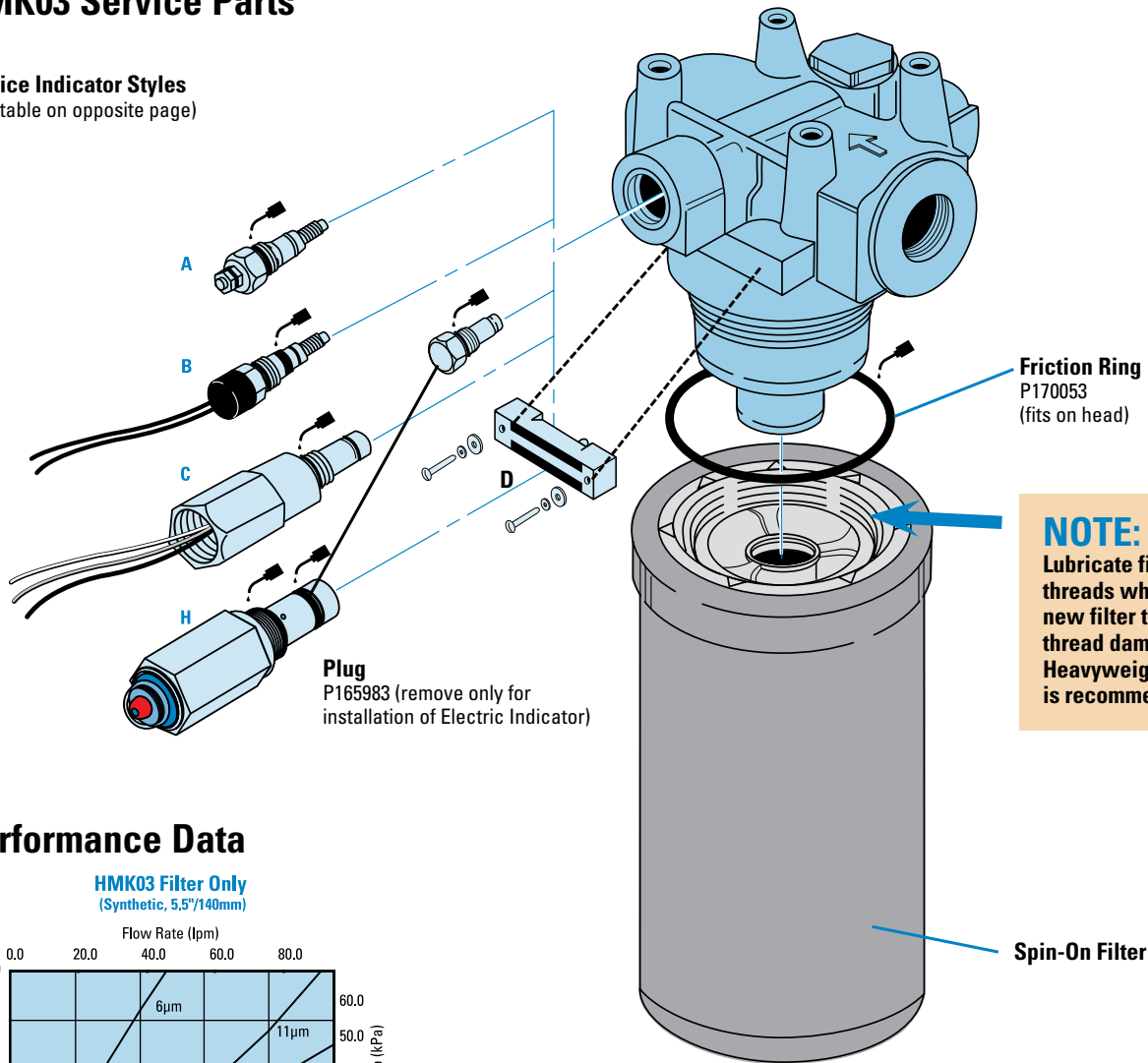
| Use with Bypass Valve Pressure of: | Part No. | Style ² | Description ¹ |
|------------------------------------|----------|--------------------|--------------------------|
| 25 psi / 172.5 kPa | P171143 | B | Electric 2-wire DC |
| | P173944 | C | Electric 3-wire AC/DC |
| | P165965 | D | Visual |
| | P575334 | H | Visual, pop up |
| 50 psi / 345 kPa | P165194 | A | Electric Single post DC |
| | P574968 | B | Electric 2-wire DC |
| | P174396 | C | Electric 3-wire AC/DC |
| | P575335 | H | Visual, pop up |
| | P574967 | E | DC 2-wire. |

¹ All electric models have a maximum operating temperature of 250°F/121°C.

² See illustration of indicator styles on next page and complete details for all parts in the service indicators portion of the accessories section.

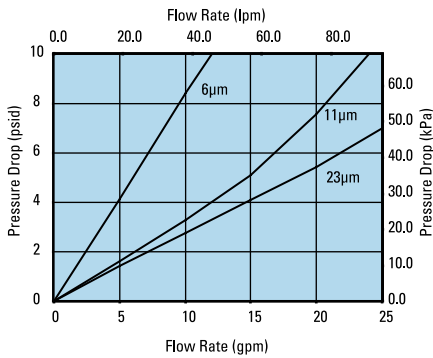
HMK03 Service Parts

Service Indicator Styles
(See table on opposite page)

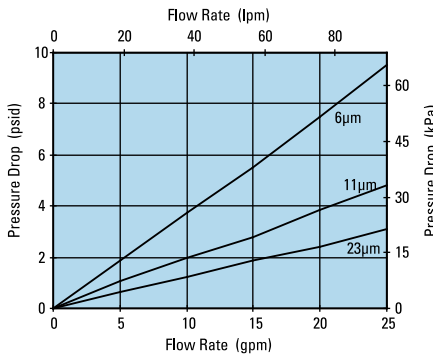


Performance Data

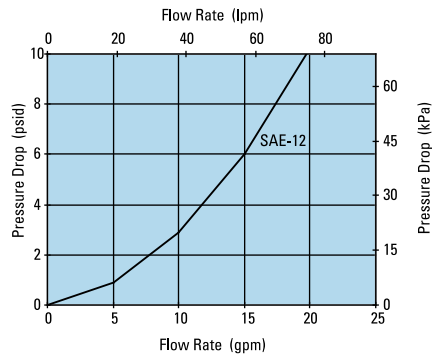
HMK03 Filter Only
(Synthetic, 5.5"/140mm)



HMK03 Filter Only
(Synthetic, 9.5"/242mm)



HMK03 Head Only



SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.



HMK04/24

Max Flow: 35 gpm (133 lpm) / 60 gpm (227 lpm)



HMK04/24 DURAMAX® Spin-On Filters

Working Pressures to: 500 psi
3450 kPa
35 bar

Rated Static Burst to: 1000 psi
6895 kPa
69 bar

| Flow Range To: | HMK04 | HMK24 |
|----------------|-------------------|-------------------|
| | 35 gpm 133 lpm | 60 gpm 227 lpm |



Parallel Flow

Features

HMK04 (single) and HMK24 (double) Duramax® spin-on filters feature a die-cast aluminum head, heavy-duty steel body, and die-cast aluminum top plate for added strength. A special head-to-canister O-Ring seal prevents leakage. Buna-N seals are standard; Viton® seals are available on some models.

Both models use the same replacement filters and feature identical pressure ratings, but the HMK24 handles greater flow capacity. There's no need to inventory two different replacement filters. A full range of media options are available, using Donaldson's exclusive Synteq™ synthetic media. Choose the indicator types and bypass options to suit your application.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- HMK04 ¾", 1" NPT
- HMK04 SAE-12, SAE-16 O-ring
- HMK24 SAE-20, O-ring
- HMK24 1¼" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 5.97" / 152mm
- 9.4" / 240mm

Standard Bypass Ratings

- 25 psi / 173 kPa / 1.73 bar
- 50 psi / 345 kPa / 3.5 bar
- No Bypass

Assembly Weight

- HMK04 with short filter: 3.9 lbs/1.8 kg
- HMK04 with long filter: 4.8 lbs/2.2 kg
- HMK24: with short filter: 7.8 lbs/3.5 kg
- HMK24: with short filter: 9.6 lbs/4.4 kg

Operating Temperatures

- -20°F to 250°F / -29°C to 121°C (synthetic)
- -20°F to 225°F / -29°C to 107°C (cellulose)

Housing Fatigue Strength Ratings*

- 100,000 Cycles: 0-500 psi / 0-3450 kPa / 34.5 bar
- 300,000 Cycles: 0-400 psi / 0-2758 kPa / 27.6 bar
- 1,000,000 Cycles: 0-350 psi / 0-2415 kPa / 24 bar

Filter Collapse Ratings

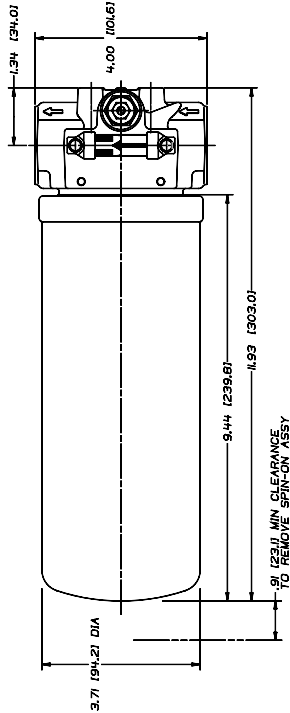
- 150 psid / 10 bar
- 300 psid / 20 bar also available

HMK04/24 Specification Illustrations

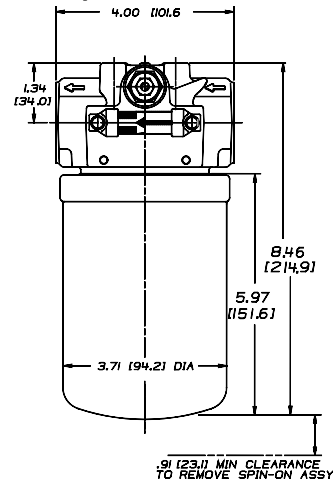
All dimensions are shown in inches [millimeters].

Assembly - Side Views

Long Assembly

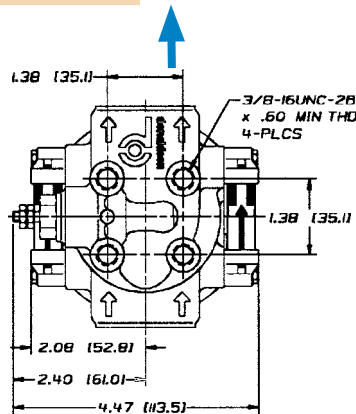


Short Assembly

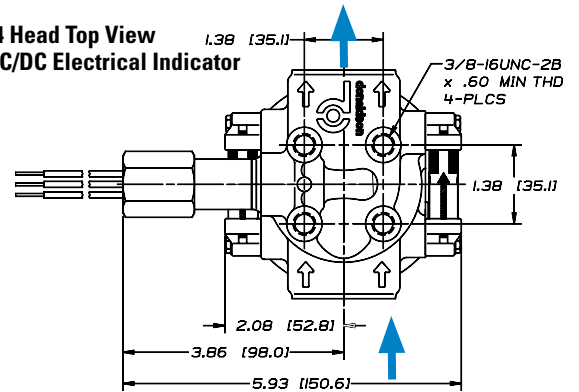


Head - Top & Side Views

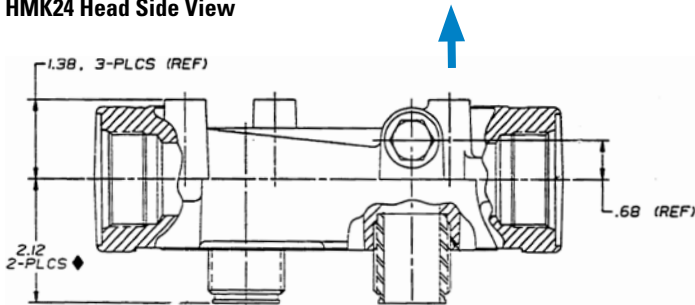
HMK04 Head Top View with DC Electrical Indicator



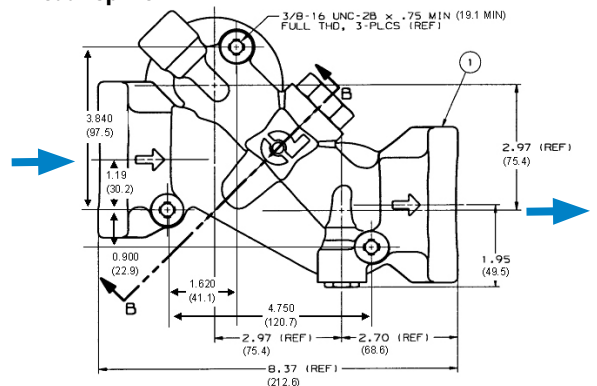
HMK04 Head Top View with AC/DC Electrical Indicator



HMK24 Head Side View



HMK24 Head Top View



Applications

- Case Drains
- Cooling Circuits
- Fluid Conditioning Systems
- Fuel Transfer
- Hydrostatic Charge Pumps
- Lube Oil Systems
- Power Transmissions
- Return Lines
- Side Loop Systems



HMK04/24

Max Flow: 35 gpm (133 lpm) / 60 gpm (227 lpm)



HMK04/24 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|-------------------|---|-----------------------|--------|---------|--------------------|----------------------------|
| | | | in | mm | | |
| Syn-teq Synthetic | <4 μm | 9.4 | 240 | | P165185 | ¹ Viton® O-ring |
| | 6 μm | 5.97 | 152 | | P165354 | |
| | 6 μm | 9.4 | 240 | | P165332 | |
| | 11 μm | 5.97 | 152 | | P163542 | 500 psi collapse |
| | 11 μm | 5.97 | 152 | | P164375 | |
| | 11 μm | 9.4 | 240 | | P164378 | |
| | 13 μm | 9.4 | 240 | | P164056 | ¹ Viton O-ring |
| | 14 μm | 9.4 | 240 | | P177047 | |
| | 22 μm | 9.4 | 240 | | P164059 | ¹ Viton O-ring |
| | 23 μm | 9.4 | 240 | | P163567 | 500 psi collapse |
| | 23 μm | 5.97 | 152 | | P164381 | |
| | 23 μm | 9.4 | 240 | | P164384 | |
| | 50 μm | 5.97 | 152 | | P165335 | |
| 50 μm | 9.4 | 240 | | P165338 | | |
| Water Absorbing | 10 μm | 9.4 | 240 | | P560584 | |
| Wire Mesh | 150 μm | 9.4 | 240 | | P573301 | |



NOTE:
Lubricate filter-to-head threads when installing new filter to prevent thread damage. Heavyweight gear lube is recommended.

Filter Notes

- Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.
 - Standard filter collapse rating is 150 psi, except as noted.
 - Thread size is 1 3/8"-12 UNF-2B
 - ¹ Filters with seals made of Buna-N® are appropriate for most applications involving petroleum oil. Filters with seals made of Viton® (a fluorocopolymer) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions and HWCF (high water content fluids) over 150°F. Donaldson offers both types.
- Buna-N® Viton® are a registered trademarks of E. I. DuPont de Nemours and Company.

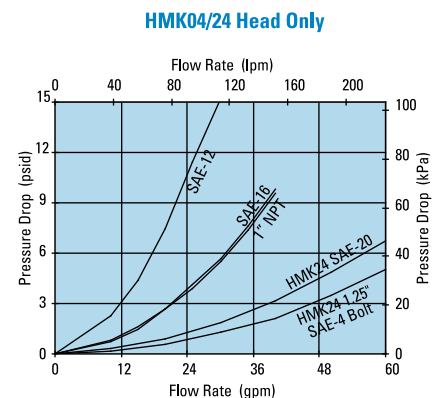
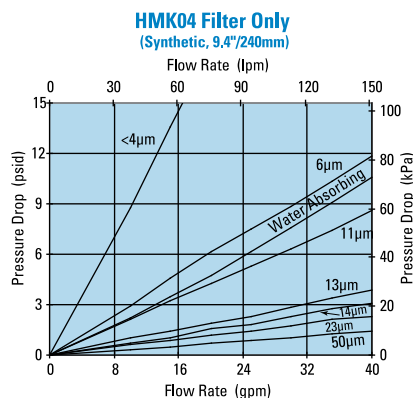
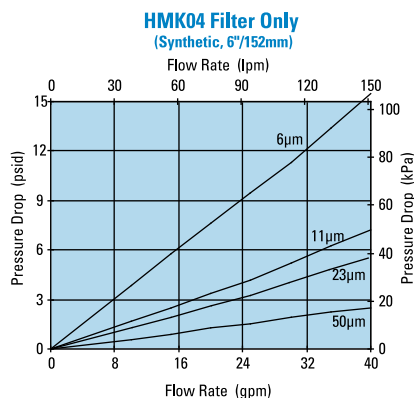
Head Choices for HMK24 (double)



| Port Size | Bypass Rating | Indicator Options ¹ | Part No. |
|---------------------------|---------------|--------------------------------|----------|
| SAE-20 O-Ring | None | A,B,C | P179609 |
| 1 1/4" SAE 4-Bolt Code 61 | 50 psi | A,B,C | P179582 |

¹Reference illustration on next page for service indicator styles.

Performance Data



Head Choices for HMK04 (single)

| Port Size | Bypass Rating | Standard Indicator Style & Location ^{1,2} | Indicator Options | Head Part No. | |
|-------------------------|--------------------------------|--|---------------------------------|---------------|---------|
| 3/4" NPT | 25 psi / 172 kPa | None | None | P169317 | |
| | | D (Visual), Left Side | None | P169310 | |
| SAE-12 O-Ring | 25 psi / 172 kPa | None | None | P167473 | |
| | | D (Visual), Left Side | None | P166387 | |
| | No Bypass | D (Visual), Left Side (25 psi) | None | P169320 | |
| | | None | None | P165434 | |
| No Bypass | D (Visual), Left Side (50 psi) | None | P173750 | | |
| SAE-12 O-Ring (3 ports) | 50 psi / 345 kPa | A (Electrical, P165194) | B, C | P167529 | |
| 1" NPT | 25 psi / 172 kPa | D (Visual), Both Sides | A, B, C | P166086 | |
| | | None | None | P169309 | |
| | | D (Visual), Left Side | None | P166416 | |
| SAE-16 O-Ring | 15 psi / 100 kPa | None | A, B, C, E, F | P176569 | |
| SAE-16 O-Ring | 25 psi / 172 kPa | None | None | P163681 | |
| | | D (Visual), Left Side | None | P166417 | |
| | | D (Visual), Both Sides | A, B, C | P166088 | |
| | | E (Electrical, P177361) | None | P176568 | |
| | | A (Electrical, P162400) | B, C | P165537 | |
| | | No Bypass | D (Visual), Both Sides (25 psi) | A, B, C | P166664 |
| | | | A (Electrical, P162400) | B, C | P166902 |
| | | 50 psi / 345 kPa | D (Visual, Right Side) | All | P179381 |
| | | No Bypass | None | None | P164667 |
| | | 50 psi / 345 kPa | None | None | P167201 |
| A (Electrical, P165194) | B, C | P166862 | | | |
| SAE-16 O-Ring | 5 psi | D (Visual), Both Sides | All | P564850 | |
| 1" NPT | No Bypass | D (Visual), Left Side (25 psi/D) | None | P564484 | |
| 1" NPT | 25 psi / 172 kPa | D (Visual), Left Side (25 psi/D) | None | P564485 | |

NOTE:

Lubricate filter-to-head threads when installing new filter to prevent thread damage. Heavyweight gear lube is recommended.



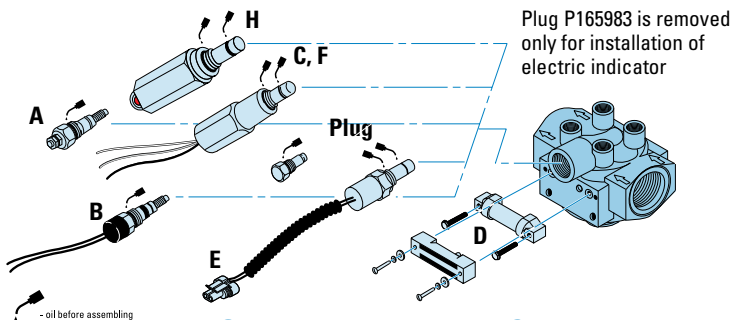
Head Notes

¹Reference illustration below for indicator styles.
²Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port.

3-Port Head for Charge Pumps



The **P167529** head is designed with a 50 psi / 3.45 bar third port bypass valve that diverts all bypass flow back to the reservoir, instead of going straight through the head and into the system as it does in 2-ported heads. Unfiltered fluid is NOT allowed into the system in the case of plugged filters. Designed primarily for charge pump applications.



Service Indicator Choices

| Use with Bypass Valve Pressure of: | Indicator Part No. | Indicator Style ³ |
|---|--------------------|------------------------------|
| Visual Models (non-electric)² | | |
| 15 psi / 103 kPa | P162642 | D |
| 25 psi / 172.5 kPa | P162696 | D |
| 50 psi / 345 kPa | P167580 | D |
| N/A | P165984 | (blank plate) |
| 25 psi / 172.5 kPa | P165965 | D Heavy-Duty |
| 50 psi / 345 kPa | P574177 | D Heavy-Duty |
| 25 psi / 172.5 kPa | P575334 | H Pop up |
| 50 psi / 345 kPa | P575335 | H Pop up |

Indicator Notes

¹All electric models have a maximum operating temperature of 250°F / 121°C.

²All non-electric models have a maximum operating temperature of 180°F / 82°C.

³Complete details on all service indicators can be found in the accessories section.

Service Indicator Choices

| Use with Bypass Valve Pressure of: | Indicator Part No. | Indicator Style ³ | Description |
|------------------------------------|--------------------|------------------------------|----------------------|
| Electric Models¹ | | | |
| 5 psi / 34.5 kPa | P163642 | A | Single post DC. |
| 15 psi / 103 kPa | P163601 | A | Single post DC. |
| 25 psi / 172.5 kPa | P163839 | A | Single post DC. N.C. |
| 25 psi / 172.5 kPa | P162400 | A | Single post DC. N.O. |
| 25 psi / 172.5 kPa | P171143 | B | DC 2-wire. |
| 25 psi / 172.5 kPa | P173944 | C | AC/DC 3-wire. |
| 50 psi / 345 kPa | P165194 | A | Single post DC. N.O. |
| 50 psi / 345 kPa | P574968 | B | DC 2-wire. |
| 50 psi / 345 kPa | P574967 | E | DC 2-wire. |
| 50 psi / 345 kPa | P575549 | F | DC 3-wire. |
| 50 psi / 345 kPa | P174396 | C | AC/DC 3-wire. |



HMK05/25

Max Flow: 50 gpm (189 lpm) / 100 gpm (379 lpm)



HMK05/25 DURAMAX® Spin-On Filters

Working Pressures to: 350 psi
2415 kPa
24.2 bar

Rated Static Burst to: 800 psi
5520 kPa
55.2 bar

| Flow Range To: | HMK05 | HMK25 |
|----------------|-------|-------------------|
| | | 50 gpm 189 lpm |



Parallel Flow

Features

HMK05 (single) and HMK25 (double) Duramax spin-on filters are perfect for high-flow applications, featuring a heavy-duty steel body and die-cast top plate for added strength. A special head-to-canister O-Ring seal prevents leakage. Buna-N® seals are standard. Fluorocarbon Viton® seals are available. Both models use the same replacement filters and have identical pressure ratings, so there's no need to inventory two different replacement filters. The HMK25 double filter head means twice the flow capability, with two filters to hold more contaminant.

Take advantage of Donaldson's mix and match system of in-stock heads, housings and media choices for exactly what you need. Media options include wire mesh and Donaldson's exclusive Synteq™ synthetic media.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- HMK05 1¼" NPT
- HMK05 SAE-20 O-ring
- HMK25 1½" NPT
- HMK25 SAE-24 O-ring
- HMK25 1½" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 7.6" / 193mm
- 11.63" / 295.4mm
- 14.2" / 361mm

Standard Bypass Ratings

- 25 psi / 173 kPa / 1.73 bar
- 50 psi / 345 kPa / 3.5 bar
- No Bypass

Assembly Weight

- 7.5 lbs / 3.4 kg (single)
- 16 lbs / 7.3 kg (double)

Operating Temperatures

- -20°F to 250°F / -29°C to 121°C (synthetic)
- -20°F to 225°F / -29°C to 107°C (cellulose)
- -20°F to 250°F / -29°C to 121°C (wire mesh)

Housing Fatigue Strength Ratings*

- 100,000 Cycles: 0-350 psi / 0-2413 kPa / 24.1 bar
- 300,000 Cycles: 0-300 psi / 0-2068 kPa / 20.7 bar
- 1,000,000 Cycles: 0-250 psi / 0-1734 kPa / 17.3 bar

Filter Collapse Ratings

- 200 psi / 13.8 bar

Filter Head Construction

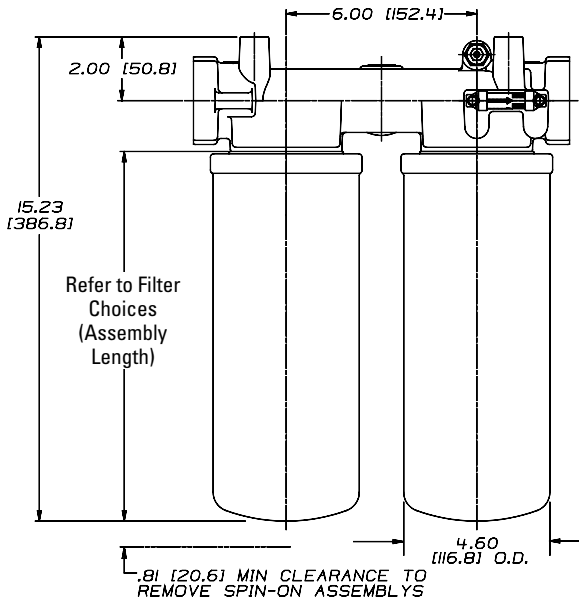
- Standard Head Cast Aluminum
- Ductile Iron Available in HMK25

HMK05/25 Specification Illustrations

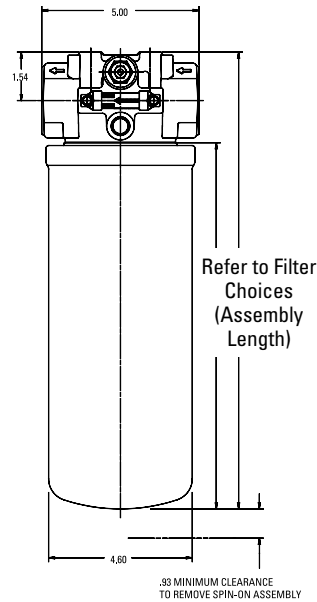
All dimensions are shown in inches [millimeters].

Assembly - Side Views

HMK25



HMK05

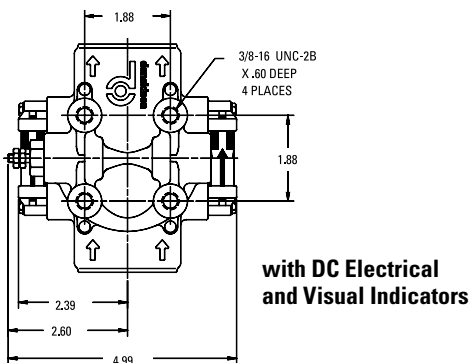
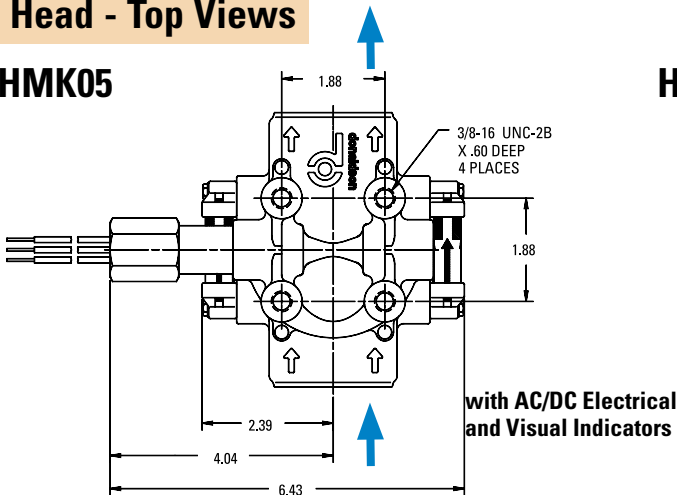


Applications

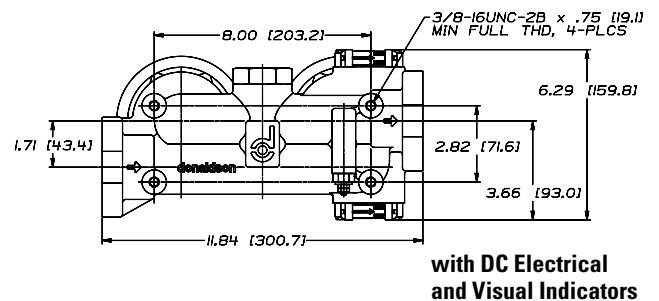
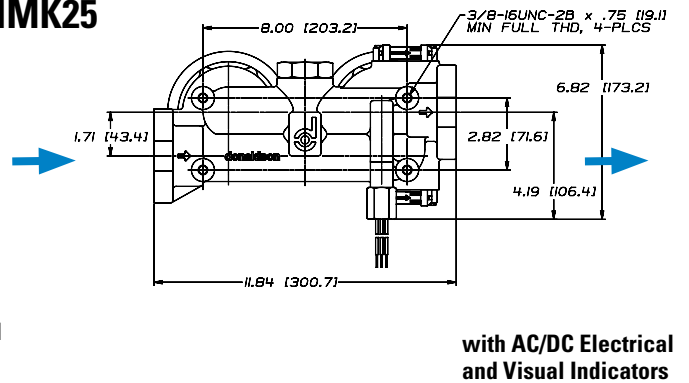
- Case Drains
- Cooling Circuits
- Fluid Conditioning Systems
- Fuel Transfer
- Hydrostatic Charge Pumps
- Lube Oil Systems
- Power Transmissions
- Return Lines
- Side Loop Systems

Head - Top Views

HMK05



HMK25





HMK05/25
 Max Flow: 50 gpm (189 lpm) / 100 gpm (379 lpm)



HMK05/25 Components

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------|---------|--------------------|---------------------------|
| | | | in | mm | | |
| Synteq Synthetic | <4 μm | | 14.2 | 361 | P564468 | ¹ Viton, Epoxy |
| | 6 μm | | 11.6 | 294 | P165675 | |
| | 6 μm | | 11.6 | 294 | P171274 | ¹ Viton, Epoxy |
| | 6 μm | | 14.2 | 361 | P179763 | |
| | 11 μm | | 7.6 | 193 | P176207 | |
| | 11 μm | | 11.6 | 294 | P165659 | |
| | 11 μm | | 11.6 | 294 | P171275 | ¹ Viton, Epoxy |
| | 11 μm | | 14.2 | 361 | P170949 | |
| | 23 μm | | 7.6 | 193 | P176208 | |
| | 23 μm | | 11.6 | 294 | P165569 | |
| | 23 μm | | 11.6 | 294 | P171276 | ¹ Viton Epoxy |
| | 23 μm | | 14.2 | 361 | P173789 | |
| 50 μm | | 11.6 | 294 | P165672 | | |
| 50 μm | | 14.2 | 361 | P573353 | | |
| Water Absorbing | 10 μm | | 11.6 | 294 | P179075 | Absorbs 300 ml water |
| Wire Mesh | 150 μm | | 11.6 | 294 | P173943 | |

Filter Notes

- Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.
- Thread size is 1 3/4"-12 UNF-2B
- Filters with seals made of Buna-N[®] are appropriate for most applications involving petroleum oil. Filters with seals made of Viton[®] (a fluor elastomer) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions and HWCF (high water content fluids) over 150°F. Donaldson offers both types.

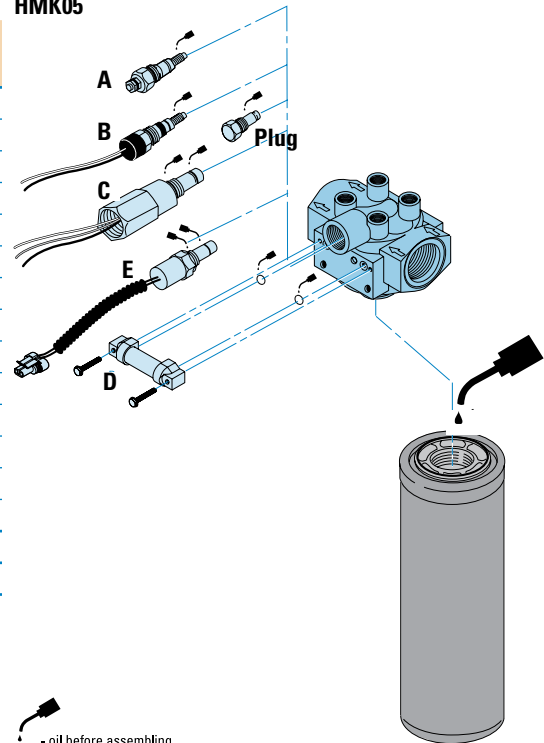
Oil Service Indicator Options

| Use with Bypass Valve Pressure of: | Indicator Part No. | Style ³ | Description |
|------------------------------------|--------------------|--------------------|----------------------|
| Electric Models¹ | | | |
| 5 psi / 34.5 kPa | P163642 | A | Single post DC |
| 15 psi / 103 kPa | P163601 | A | Single post DC. |
| 25 psi / 172.5 kPa | P163839 | A | Single post DC. N.C. |
| 25 psi / 172.5 kPa | P162400 | A | Single post DC. N.O. |
| 25 psi / 172.5 kPa | P171143 | B | DC 2-wire |
| 25 psi / 172.5 kPa | P173944 | C | AC/DC 3-wire |
| 50 psi / 345 kPa | P165194 | A | Single post DC. N.O. |
| 50 psi / 345 kPa | P574968 | B | DC 2-wire |
| 50 psi / 345 kPa | P574967 | E | DC 2-wire |
| 50 psi / 345 kPa | P575549 | F | DC 3-wire |
| 50 psi / 345 kPa | P174396 | C | AC/DC 3-wire |

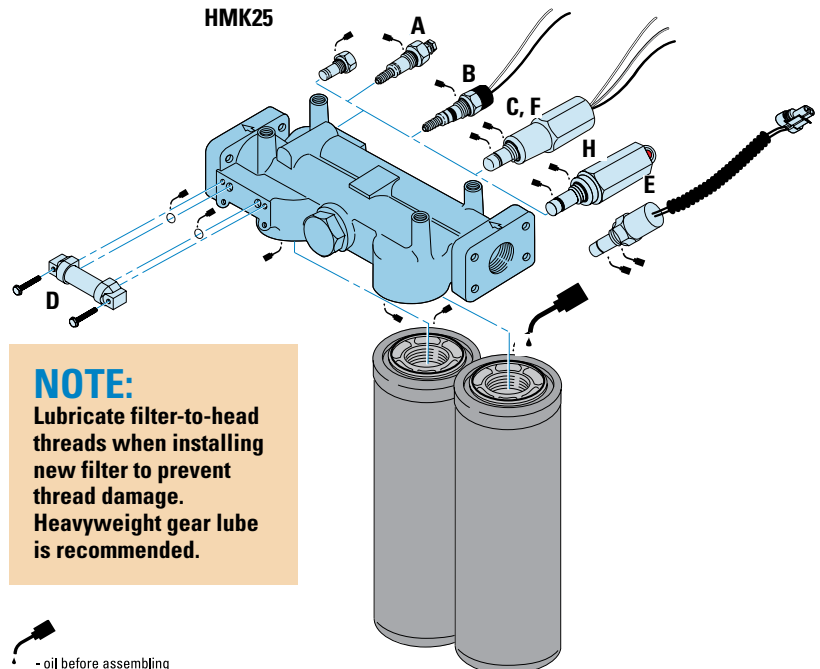
| Use with Bypass Valve Pressure of: | Indicator Part No. | Style ³ |
|---|--------------------|--------------------|
| Visual Models (Non-Electric)² | | |
| 15 psi / 103 kPa | P162642 | D |
| 25 psi / 172.5 kPa | P162696 | D |
| 50 psi / 345 kPa | P167580 | D |
| N/A | P165984 | (blank plate) |
| 25 psi / 172.5 kPa | P165965 | D Heavy-duty |
| 50 psi / 345 kPa | P574177 | D Heavy-duty |
| 25 psi / 172.5 kPa | P575334 | H (Pop up) |
| 50 psi / 345 kPa | P575335 | H (Pop up) |

Service Parts

HMK05



HMK25



NOTE:
 Lubricate filter-to-head threads when installing new filter to prevent thread damage. Heavyweight gear lube is recommended.

Indicator Notes

- ¹All electric models have a maximum operating temperature of 250°F/ 114°C.
 - ²All non-electric models have a maximum operating temperature of 180°F/ 82°C.
 - ³Complete details on all service indicators can be found in the accessories section.
- Buna-N[®] Viton[®] are a registered trademarks of E. I. DuPont de Nemours and Company.

Head Choices for HMK05 (single)

| Port Size | Bypass Rating | Standard Indicator Style & Location ¹ | Indicator Options ² | Part No. |
|---------------|---------------------------------|--|--------------------------------|----------|
| 1¼" NPT | 25 psi / 172 KPa | D (Visual), Both Sides (25 psi) | A, B, C, E, F | P167294 |
| 1¼" NPT | 25 psi / 172 kPa | A (Electrical) (25 psi) | A, B, C, E, F | P167621 |
| | 25 psi / 172 KPa | D (Visual), Left Side (25 psi) | D | P167622 |
| SAE-20 O-Ring | 25 psi / 172 KPa | D (Visual), Both Sides (25 psi) | A, B, C, E, F | P165973 |
| | 25 psi / 172 KPa | None | None | P167619 |
| | 50 psi / 345 KPa | D (Visual), Left Side, Blank Plate Right Side | A, B, C, E, F | P561885 |
| | No Bypass | D (Visual), Both Sides (25 psi) | A, B, C, E, F | P166663 |
| | No Bypass | D (Visual), Right Side (25 psi) | D | P564486 |
| No Bypass | D (Visual), Both Sides (50 psi) | A, B, C, E, F | P564858 | |



Single Head



Dual Head

Head Choices for HMK25 (dual)

| Port Size | Bypass Rating | Indicator Style & Location ¹ | Indicator Options ² | Part No. |
|-----------------------|------------------|---|--------------------------------|----------|
| 1½" NPT | 25 psi / 172 KPa | D (Visual), Left side only | A,B,C,E,F | P169985 |
| 1½" SAE 4-Bolt Flange | 25 psi / 172 kPa | D (Visual), Both sides | A,B,C,E,F | P167296 |
| | No Bypass | D (Visual), Both Sides | A,B,C,E,F | P169984 |
| SAE-24 O-Ring | 25 psi / 172 kPa | D (Visual), Both sides | A,B,C,E,F | P167297 |
| 1½" SAE 4-Bolt Flange | 50 psi / 345 kPa | Visual RH | A,B,C,E,F | P560855* |

* Ductile Iron Construction

NOTE:

Lubricate filter-to-head threads when installing new filter to prevent thread damage. Heavyweight gear lube is recommended.

Head Choice for HMK05 (3rd port return)

| Port Size | Bypass Rating | Indicator Style & Location ¹ | Indicator Options ² | Part No. |
|---|------------------|---|--------------------------------|----------|
| 1¼" SAE 4-Bolt Flange (3rd port: 1" SAE 4-Bolt) | 50 psi / 345 kPa | None | A,B,C,E,F | P561924 |

Head Notes

¹Donaldson uses the inlet port as the reference point. "Left side," for instance, means the indicator mounts on the Left side when you face the inlet port.

²May be purchased separately.

*Complete details on all service indicators can be found in the accessories section.

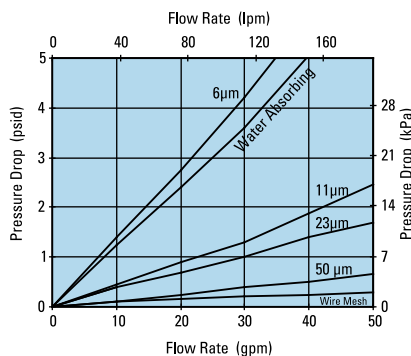
3-Port Head



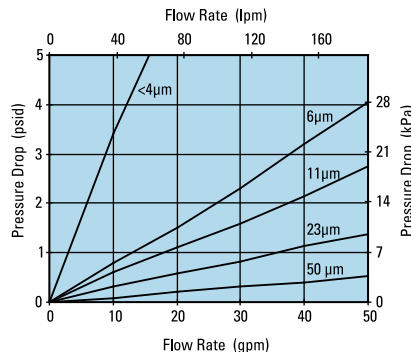
The **P561924** head is designed with a 50 psi / 3.45 bar third port bypass valve that diverts all bypass flow back to the reservoir, instead of going straight through the head and into the system as it does in 2-ported heads. Unfiltered fluid is NOT allowed into the system in the case of plugged filters. Designed primarily for charge pump applications.

Performance Data

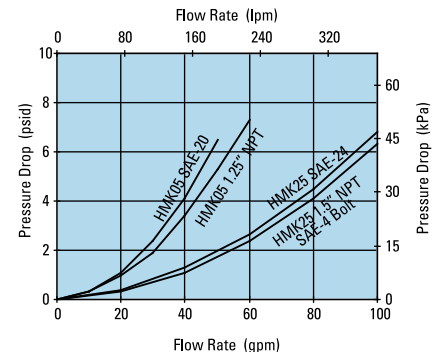
HMK05 Filter Only
(Synthetic, 11.6"/294mm)



HMK05 Filter Only
(Synthetic, 14.2"/361mm)



HMK05/25 Head Only





HNK04/05

Max Flow: 35 gpm (133 lpm) / 50 gpm (189 lpm)

HNK04/05 DURAMAX® Spin-On Filters

| Working Pressures to: | HNK04 | HNK05 |
|-----------------------|----------|----------|
| | 500 psi | 350 psi |
| | 3450 kPa | 2415 kPa |
| | 34.5 bar | 24.1 bar |

| Rated Static Burst to: | 1000 psi | 800 psi |
|------------------------|----------|----------|
| | 6895 kPa | 5515 kPa |
| | 69 bar | 55 bar |

| Flow Range To: | HNK04 | HNK05 |
|----------------|---------|---------|
| | 35 gpm | 50 gpm |
| | 133 lpm | 189 lpm |



Features

HNK Duramax® filters utilize a RadialSeal™ design – making servicing easier and providing a more reliable seal without having to torque to specification.

- Applications include hydrostatic charge side filtration, pilot circuits, power shift transmissions and kidney loop circuits.
- Utilizes Synteq™ filter media for high filtration efficiency and higher dust-holding capacity.
- Improved performance including higher burst, greater fatigue strength and longer filter life.

Beta Rating

- Performance to $\beta_{6(c)} = 1000$

Porting Size Options

- HNK04: SAE-12, SAE-16 O-ring
- HNK05: SAE-20 O-ring

Replacement Spin-On Lengths

- 04 short: 5.97" / 151.7 mm
- 04 long: 9.44" / 239.8 mm
- 05 short: 11.63" / 295.4 mm
- 05 long: 14.24" / 361.7 mm

Assembly Weight

- 04 short: 5.97" length - 3.95 lbs / 1.8 kg
- 04 long: 9.44" length - 4.7 lbs / 2.1 kg
- 05 short: 11.63" length - 7.35 lbs / 3.3 kg
- 05 long: 14.24" length - 8.0 lbs / 3.6 kg

Operating Temperatures

- -20° to 250°F (-29° to 121°C)

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- No Bypass

Filter Collapse Ratings

- 235 psi / 1621 kPa / 16.2 bar

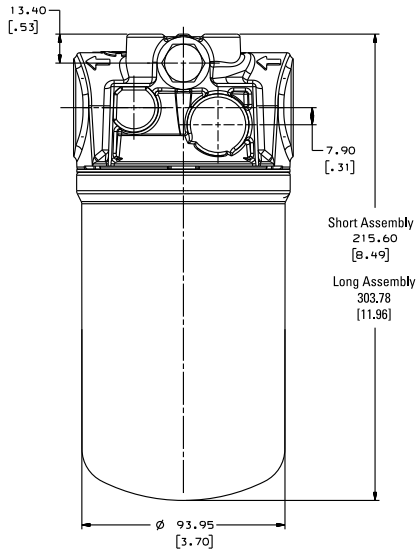
HNK04/05 Specification Illustrations

All dimensions are shown in inches [millimeters].

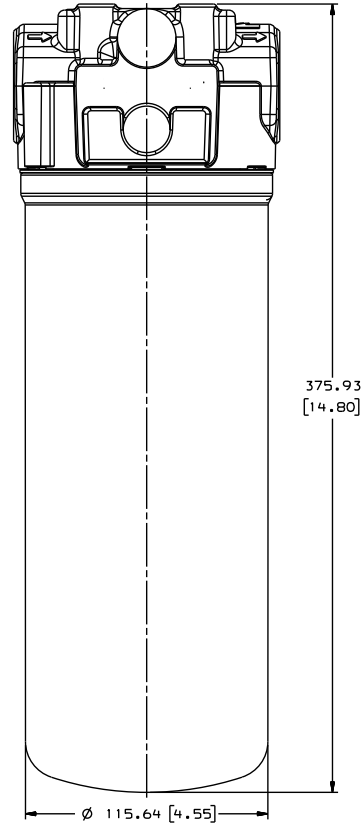
Applications

- Case Drains
- Cooling Circuits
- Fluid Conditioning Systems
- Fuel Transfer
- Hydrostatic Charge Pumps
- Lube Oil Systems
- Power Transmissions
- Return Lines
- Side Loop Systems

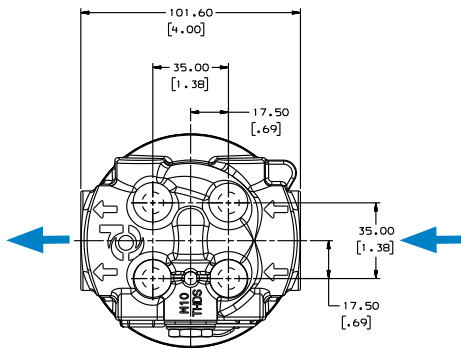
HNK04 Spin-on Assembly - Side View



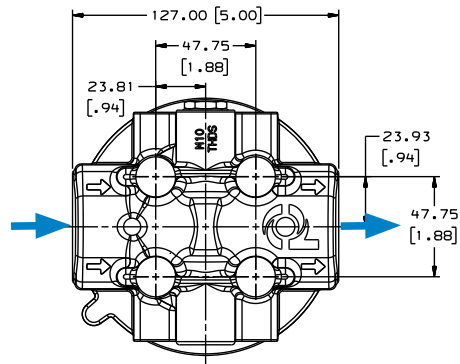
HNK05 Spin-on Assembly - Side View



HNK04 Head - Top View



HNK05 Head - Top View





HNK04/05

Max Flow: 35 gpm (133 lpm) / 50 gpm (189 lpm)



HNK04/05 Components

Head Choices for HNK04

| Port Size | Bypass Rating | Part Number | Indicators | Style | Mounting Threads |
|-----------|------------------|-------------|------------|-----------------|------------------|
| SAE-12 | 50 psi / 3.5 bar | P568856 | none | optional elect. | 3/8"-16 UNC |
| SAE-12 | No bypass | P568857 | none | optional elect. | 3/8"-16 UNC |
| SAE-16 | 50 psi / 3.5 bar | P568858 | none | optional elect. | 3/8"-16 UNC |
| SAE-16 | No bypass | P568859 | none | optional elect. | 3/8"-16 UNC |

Head Choices for HNK05

| Port Size | Bypass Rating | Part Number | Indicators | Style | Mounting Threads |
|-----------|------------------|-------------|------------|-----------------|------------------|
| SAE-20 | 50 psi / 3.5 bar | P568860 | none | optional elect. | 3/8"-16 UNC |
| SAE-20 | No bypass | P568861 | none | optional elect. | 3/8"-16 UNC |

Indicator Choices

| Set Point/Type | Part No. | Description |
|------------------|----------|--------------------------|
| 50 psi / 345 kPa | P165194 | Electric Single post DC |
| 25 psi / 172 kPa | P575334 | Visual Indicator, Pop up |
| 50 psi / 345 kPa | P575335 | Visual Indicator, Pop up |

Filter Choices for HNK04

| Media Type | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. |
|------------------|--|--------|-------|--------------------|
| | | in | mm | |
| Synteq Synthetic | 6 μ m | 5.97 | 151.7 | P569203 |
| | 6 μ m | 9.44 | 239.8 | P569204 |
| | 11 μ m | 5.97 | 151.7 | P569205 |
| | 11 μ m | 9.44 | 239.8 | P569206 |

Filter Choices for HNK05

| Media Type | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. |
|------------------|--|--------|-------|--------------------|
| | | in | mm | |
| Synteq Synthetic | 6 μ m | 11.63 | 295.4 | P569209 |
| | 6 μ m | 14.24 | 361.7 | P569210 |
| | 11 μ m | 11.63 | 295.4 | P569211 |
| | 11 μ m | 14.24 | 361.7 | P569212 |

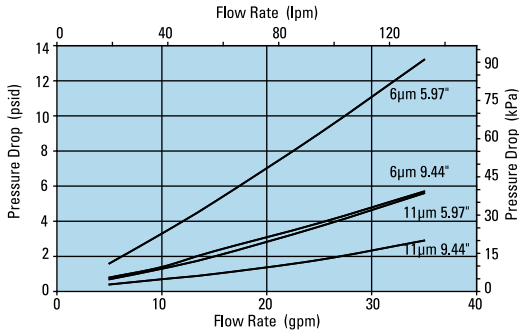
Filter Notes

• Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.

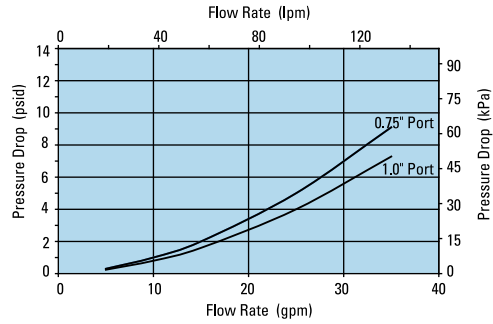


Performance Data

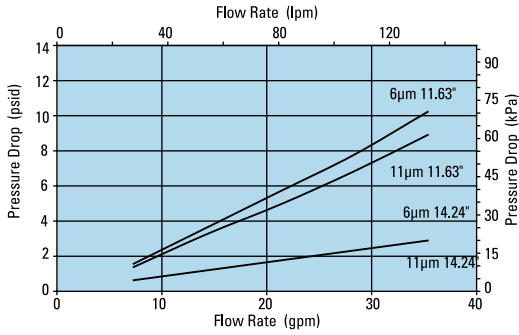
HNK04 Filter Only
(Synthetic, 5.97"/151.7mm & 9.44"/239.8 mm)



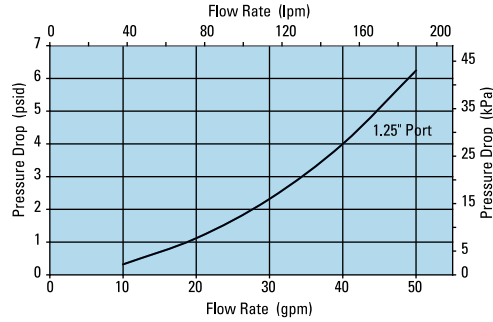
HNK04 Head Only



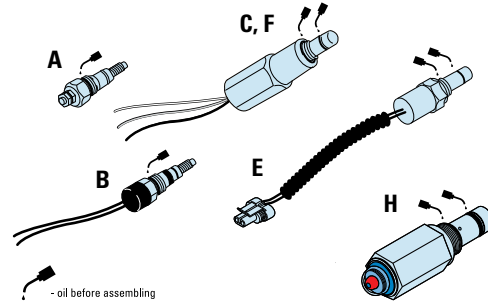
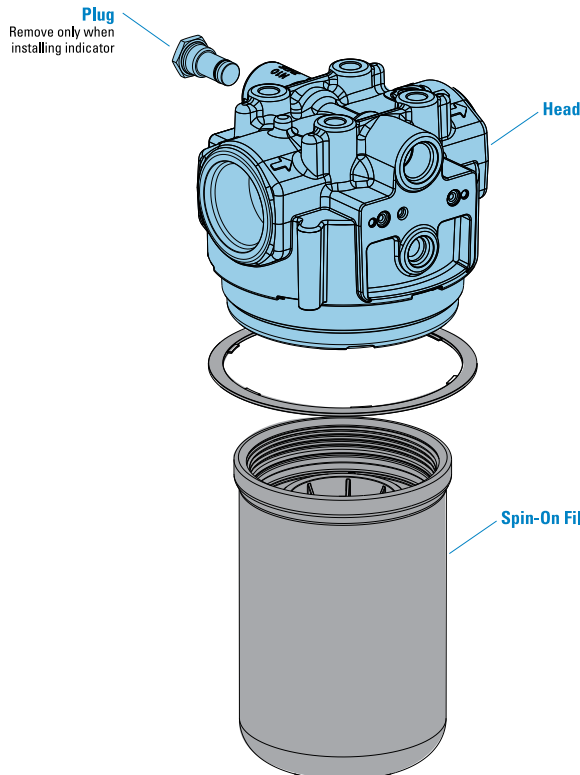
HNK05 Filter Only
(Synthetic, 11.63"/295.4mm & 14.24"/361.7 mm)



HNK05 Head Only



Service Parts



SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.



Our FLK hydraulic filtration systems are packed with innovative features that will deliver cleaner, mistake-proof filter servicing.

Applications

- Hydrostatic Charge Pumps
- Hydrostatic Transmission
- Pilot Control Circuits

Integrated By-pass Valve

Robust, proven design

Unique Head to Cartridge Interface Connection

RadialSeal™ Sealing Technology

- No metal-to-metal contact – downstream flow
- Robust, reliable seal on clean side of filter – prevents cross contamination of oil

Filter Cartridge

- Double wire mesh support on outside of cartridge maintains pleat spacing under high pressure differential
- Locking grab handles makes for cleaner servicing and simplifies filter position during servicing

Industrial Hand Grips

No special servicing tools needed

RadialSeal™ Sealing Technology

- No metal-to-metal contact – upstream flow
- Easy-to-torque, mistake-proof sealing
- Robust, reliable seal

Anti-dust Seal

- Keeps threads free from contamination
- Easier to remove and reassemble during service

Synteq XP Media Technology

Delivers high performance – lower pressure drop, superior cold-start filtration and extended filter life

Closed End Cap

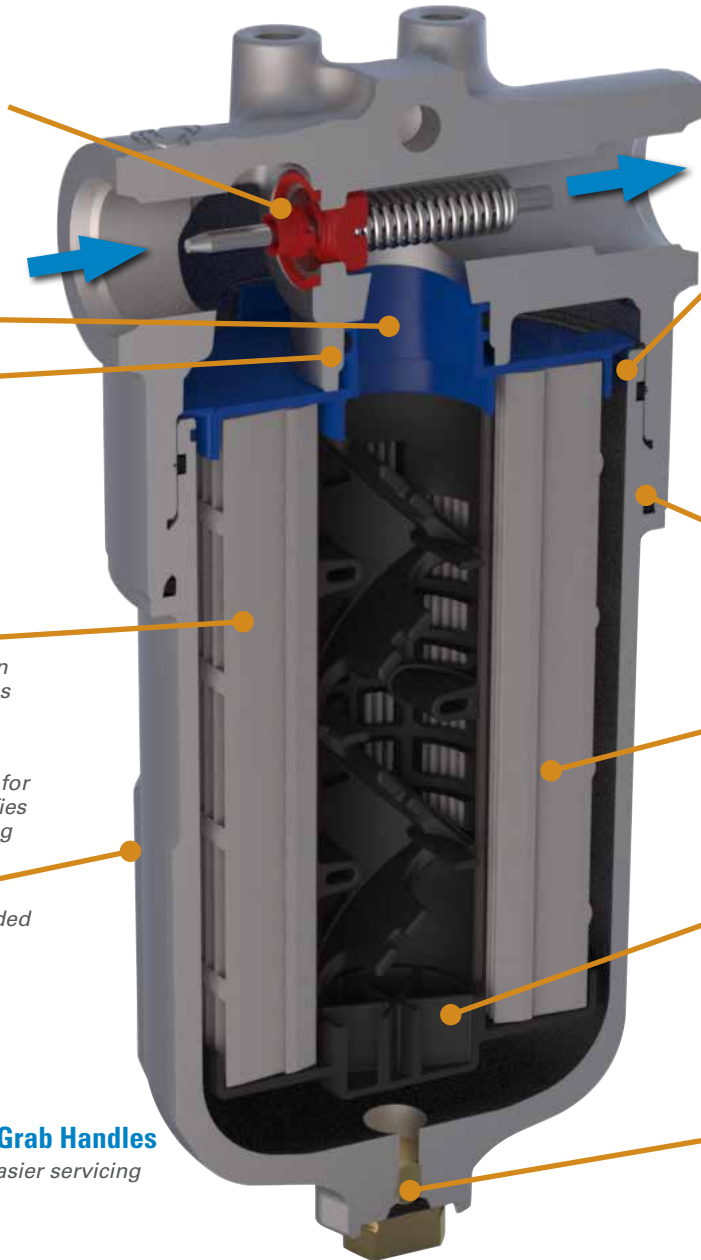
Eliminates the possibility of contamination to clean side of assembly during servicing

Oil Drain Port

Oil drain port used to drain oil during servicing

Locking Grab Handles

Cleaner, easier servicing



IMPORTANT SERVICE INSTRUCTIONS:

To prevent thread damage when installing new filter, fully lubricate the entire thread and o-ring surface with a Molybdenum-containing gear oil or anti-seize paste such as Schaeffer #214S Supreme One 80W-140 gear oil or Dow Corning Molykote P-37 anti-seize past.

FLK90 In-Line Cartridge Filters

Working Pressures to: 580 psi
4002 kPa
40 bar

Rated Static Burst to: 2000 psi
13,790 kPa
138 bar

Flow Range To: 40 gpm
151 lpm



IMPORTANT SERVICE INSTRUCTIONS:

To prevent thread damage when installing new filter, fully lubricate the entire thread and o-ring surface with a Molybdenum-containing gear oil or anti-seize paste such as Schaeffer #214S Supreme One 80W-140 gear oil or Dow Corning Molykote P-37 anti-seize past.

Features

The FLK assembly is a robust, reusable housing and disposable cartridge design. The versatile FLK filter head accommodates multiple housing lengths. Industrial, raised hand grips make it easy to remove the housing from the head without the need for special servicing tools. The oil drain port on the bottom of the housing and the locking grab handles on the filter cartridge allow for cleaner, easier servicing. The filter tabs lock into place – simplifying positioning during reassembly. Short removal clearance is needed for filter replacement means the assembly can easily fit into tight spaces.

These assemblies utilize a unique sealing technology that protects systems from harmful ingressed contaminants and cross contamination of oil. The RadialSeal™ interface increases the surface area which provides a robust connection with superior vibration resistance, a common challenge in today's heavy-duty applications.

The FLK filters are offered with Synteq XP™ media, Donaldson's most advanced media technology. Each filter has extended surface area for advanced filtration performance. Synteq XP delivers better pressure drop and better contaminant holding capacity than standard filter media.

- Robust 4-point mount
- Oil drain port
- Optional 2-point mount
- Heads features: - one side machined/plugged for indicator

Beta Rating

- Performance to $\beta_{<6(c)} = 1000$

Porting Size Options

- SAE-12 O-ring
- SAE-16 O-ring

Replacement Filter Lengths

- 4.21" / 107 mm
- 8.23" / 209 mm

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- No bypass

Assembly Weight

- Long Housing: 2.33 kg / 5.14 lbs
- Short Housing: 1.82 kg / 4.01 lbs

Operating Temperatures

- -40° to 250°F (-40° to 121°C)

Filter Collapse Ratings

- 145 psid / 1000 kPa / 10 bar (standard)

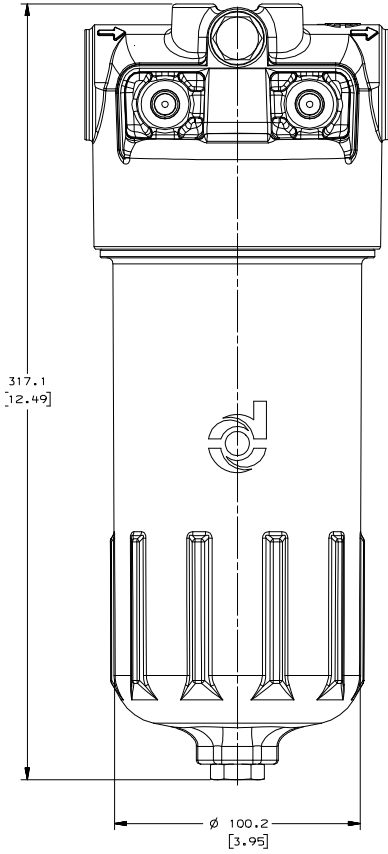


FLK90
Max Flow: 40 gpm (151 lpm)



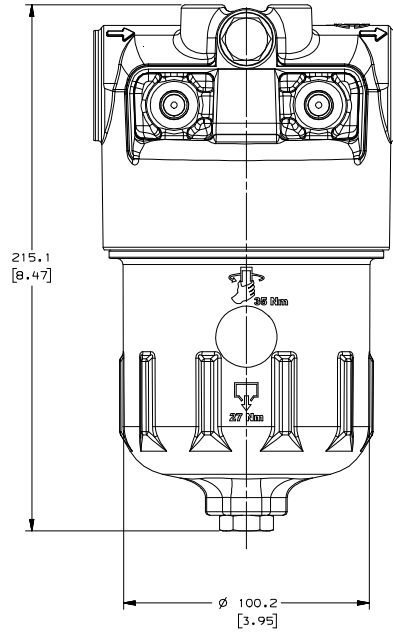
FLK Specification Illustrations

Long Assembly - Side View



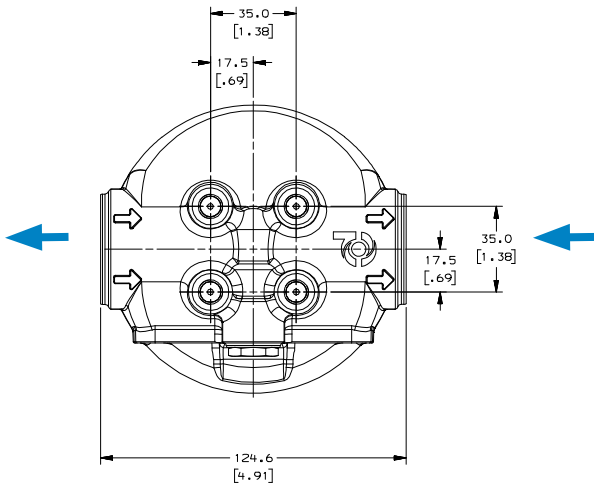
Minimum Service Clearance:
2.56" / 65mm

Short Assembly - Side View



Minimum Service Clearance:
2.56" / 65mm

Head - Top View





FLK90 Components

Head Choices

| Part No. | Port Connections | Bypass Valve |
|----------|------------------|-------------------------|
| P574994 | SAE-12 | 50 psi (3.4 bar) bypass |
| P574995 | SAE-12 | No bypass |
| P574996 | SAE-16 | 50 psi (3.4 bar) bypass |
| P574997 | SAE-16 | No bypass |

Housing Choices

| Part No. | Comments |
|----------|-----------------------|
| P766990 | Short length assembly |
| P766961 | Long length assembly |

Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length in mm | Donaldson Part No. |
|------------------------------|--|-----------------|-----------------------|
| Short Length Assembly | | | |
| Synteq XP | 6 μm | 4.21 107 | P767128 |
| Synthetic | 11 μm | 4.21 107 | P766987 |
| | 15 μm | 4.21 107 | P767129 |
| Long Length Assembly | | | |
| Synteq XP | 6 μm | 8.23 209 | P767130 |
| Synthetic | 11 μm | 8.23 209 | P766959 |
| | 15 μm | 8.23 209 | P767131 |

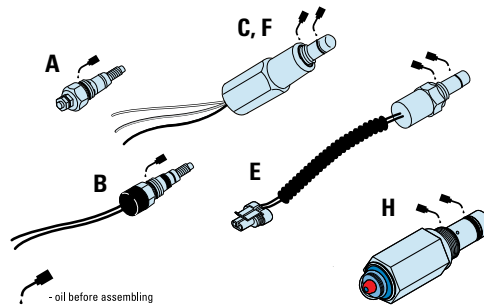
Service Indicator Choices

| Use with Bypass Valve Pressure of: | Indicator Part No. | Style ² | Description |
|------------------------------------|--------------------|--------------------|----------------------|
| Electric Models¹ | | | |
| 50 psi / 345 kPa | P165194 | A | Single post DC. N.O. |
| 50 psi / 345 kPa | P574968 | B | DC 2-wire. |
| 50 psi / 345 kPa | P574967 | E | DC 2-wire. |
| 50 psi / 345 kPa | P575549 | F | DC 3-wire. |
| 50 psi / 345 kPa | P174396 | C | AC/DC 3-wire. |
| 25 psi / 172.5 kPa | P575334 | H | Visual pop up |
| 50 psi / 345 kPa | P575335 | H | Visual pop up |

Indicator Notes

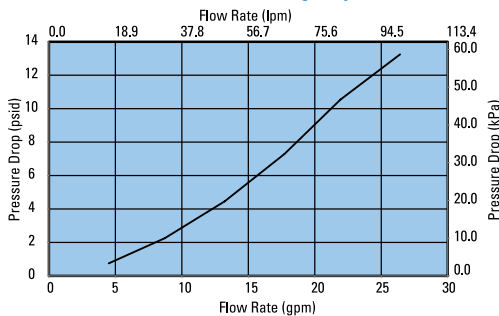
¹All electric models have a maximum operating temperature of 250°F / 121°C.

²Complete details on all service indicators can be found in the accessories section.

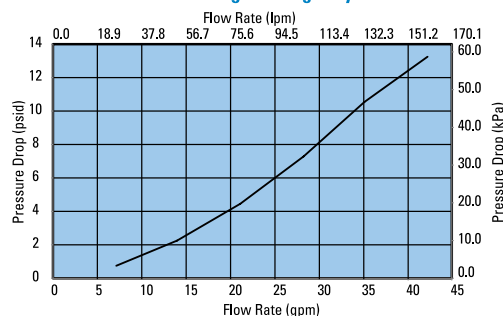


Performance Data

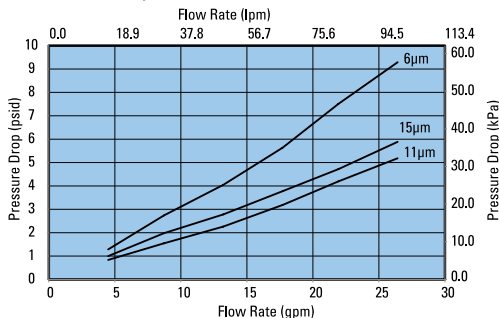
FLK90 Short Housing Only



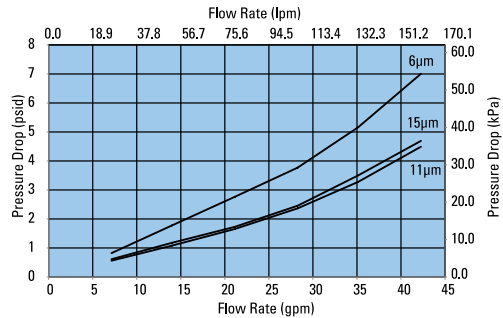
FLK90 Long Housing Only



FLK90 Short Filter only
(Synthetic Media, 10.43"/265mm)



FLK90 Long Filter only
(Synthetic Media, 10.43"/265mm)





FLK110
Max Flow: 42 gpm (159 lpm)



FLK110 In-Line Cartridge Filters

Working Pressures to: 435 psi
3001 kPa
30 bar

Rated Static Burst to: 1300 psi
8970 kPa
90 bar

Flow Range To: 42 gpm
159 lpm



IMPORTANT SERVICE INSTRUCTIONS:

To prevent thread damage when installing new filter, fully lubricate the entire thread and o-ring surface with a Molybdenum-containing gear oil or anti-seize paste such as Schaeffer #214S Supreme One 80W-140 gear oil or Dow Corning Molykote P-37 anti-seize past.

Features

The FLK assembly is a robust, reusable housing and disposable cartridge design. The versatile FLK filter head accommodates multiple housing lengths. Industrial, raised hand grips make it easy to remove the housing from the head without the need for special servicing tools. The oil drain port on the bottom of the housing and the locking grab handles on the filter cartridge allow for cleaner, easier servicing. The filter tabs lock into place – simplifying positioning during reassembly. Short removal clearance is needed for filter replacement means the assembly can easily fit into tight spaces.

These assemblies utilize a unique sealing technology that protects systems from harmful ingressed contaminants and cross contamination of oil. The RadialSeal™ interface increases the surface area which provides a robust connection with superior vibration resistance, a common challenge in today's heavy-duty applications.

The FLK filters are offered with Synteq XP™ media, Donaldson's most advanced media technology. Each filter has extended surface area for advanced filtration performance. Synteq XP delivers better pressure drop and better contaminant holding capacity than standard filter media.

- Robust 4-point mount
- Oil drain port
- Optional 2-point mount
- Heads features: - one side machined/plugged for indicator

Beta Rating

- Performance to $\beta_{<6(c)} = 1000$

Porting Size Options

- SAE-20 O-ring

Replacement Filter Lengths

- 7.4" / 187.9 mm
- 10.43" / 264.9 mm

Filter Collapse Ratings

- 145 psid / 1000 kPa / 10 bar (standard)

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- No bypass

Assembly Weight

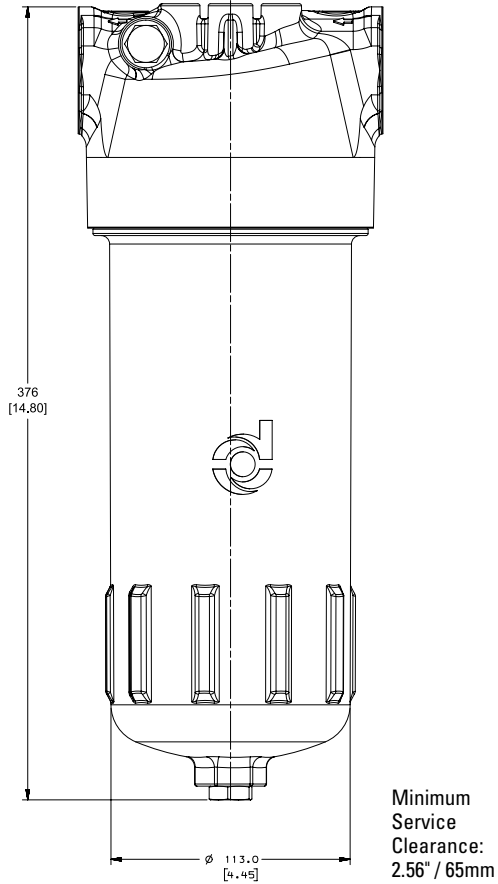
- Long Housing: 1.34 kg / 2.95 lb
- Short Housing: 1.01 kg / 2.22 lb

Operating Temperatures

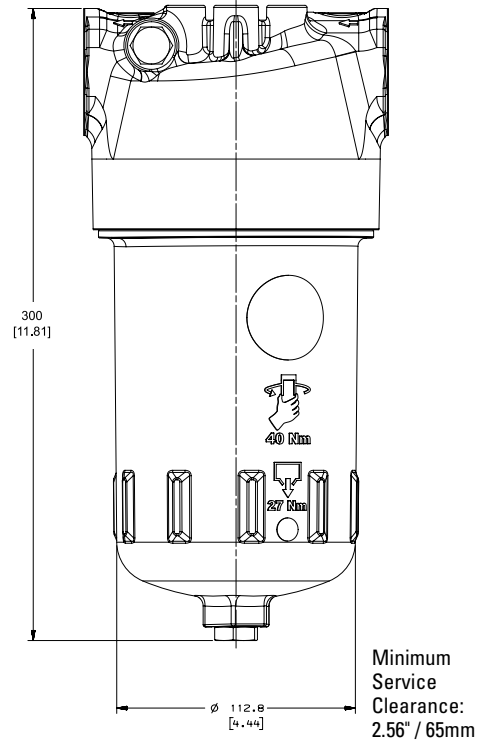
- -40° to 250°F (-40° to 121°C)

FLK Specification Illustrations

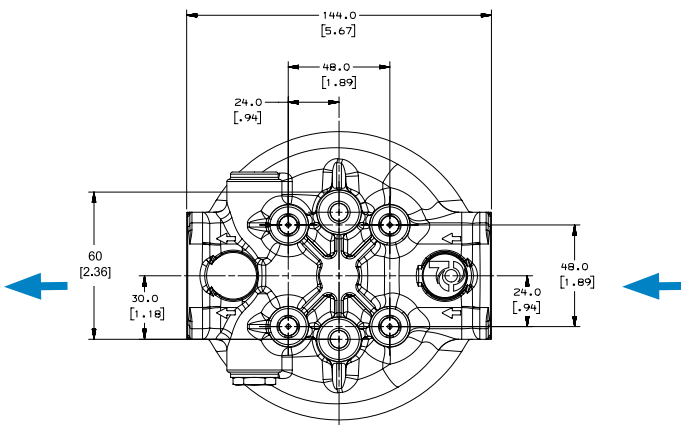
Long Assembly - Side View



Short Assembly - Side View



Head - Top View



Applications

- Hydrostatic Charge Pumps
- Hydrostatic Transmission
- Pilot Control Circuits



FLK110
Max Flow: 42 gpm (159 lpm)



FLK110 Components

Head Choices

| Part No. | Port Connections | Bypass Valve |
|----------|------------------|-------------------------|
| P766831 | SAE-20 | 50 psi (3.4 bar) bypass |
| P767009 | SAE-20 | No bypass |

Housing Choices

| Part No. | Comments |
|----------|-----------------------|
| P766812 | Short length assembly |
| P766810 | Long length assembly |

Filter Choices

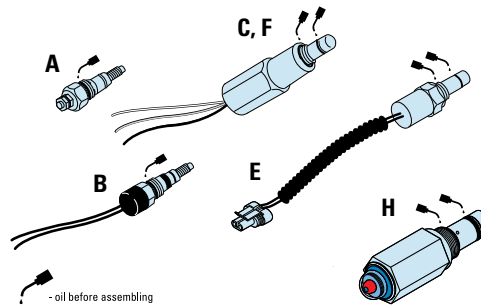
| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. |
|------------------------------|--|--------|-----|--------------------|
| | | in | mm | |
| Short Length Assembly | | | | |
| Synteq XP | 6 μ m | 7.4 | 187 | P766847 |
| Synthetic | 11 μ m | 7.4 | 187 | P766813 |
| | 15 μ m | 7.4 | 187 | P767012 |
| Long Length Assembly | | | | |
| Synteq XP | 6 μ m | 10.43 | 265 | P767010 |
| Synthetic | 11 μ m | 10.43 | 265 | P766811 |
| | 15 μ m | 10.43 | 265 | P767011 |

Service Indicator Choices

| Use with Bypass Valve Pressure of: | Indicator Part No. | Style ² | Description |
|------------------------------------|--------------------|--------------------|----------------------|
| Electric Models¹ | | | |
| 50 psi / 345 kPa | P165194 | A | Single post DC. N.O. |
| 50 psi / 345 kPa | P574968 | B | DC 2-wire |
| 50 psi / 345 kPa | P574967 | E | DC 2-wire |
| 50 psi / 345 kPa | P575549 | F | DC 3-wire |
| 50 psi / 345 kPa | P174396 | C | AC/DC 3-wire |
| 25 psi / 172.5 kPa | P575334 | H | Visual pop up |
| 50 psi / 345 kPa | P575335 | H | Visual pop up |

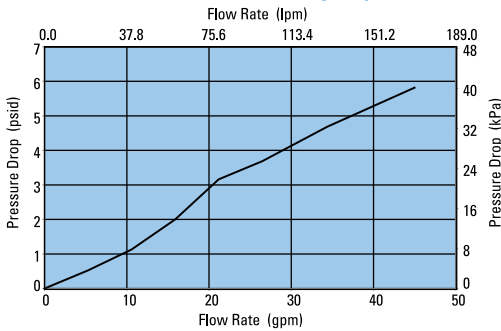
Indicator Notes

¹All electric models have a maximum operating temperature of 250°F / 121°C.
²Complete details on all service indicators can be found in the accessories section.

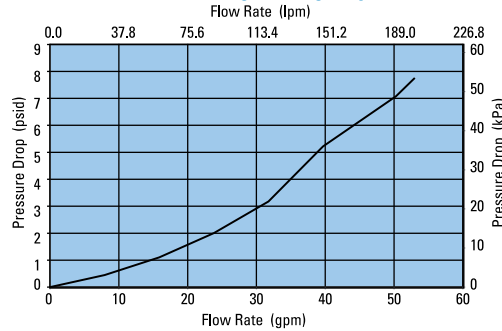


Performance Data

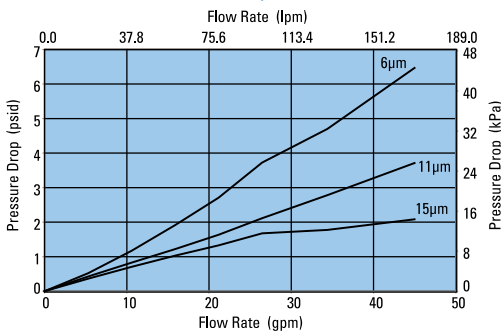
FLK110 Short Housing Only



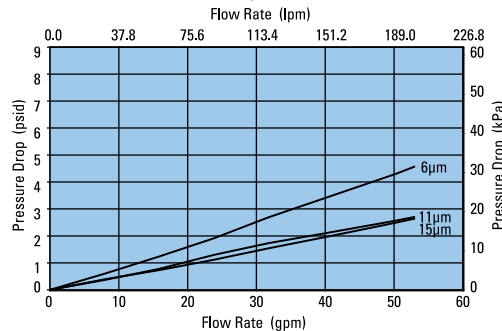
FLK110 Long Housing Only



FLK110 7" Filter Only
(Synthetic Synteq XP, 7.4"/187mm)



FLK110 10" Filter Only
(Synthetic Synteq XP, 10.43"/265mm)



FLK125 In-Line Cartridge Filters

Working Pressures to: 508 psi
3505 kPa
35.1 bar

Rated Static Burst to: 2000 psi
13,790 kPa
138 bar

Flow Range To: 85 gpm
322 lpm

Applications

- Hydrostatic Charge Pumps
- Hydrostatic Transmission
- Pilot Control Circuits



IMPORTANT SERVICE INSTRUCTIONS:

To prevent thread damage when installing new filter, fully lubricate the entire thread and o-ring surface with a Molybdenum-containing gear oil or anti-seize paste such as Schaeffer #214S Supreme One 80W-140 gear oil or Dow Corning Molykote P-37 anti-seize past.

Features

The FLK assembly is a robust, reusable housing and disposable cartridge design. The versatile FLK filter head accommodates multiple housing lengths. Industrial, raised hand grips make it easy to remove the housing from the head without the need for special servicing tools. The oil drain port on the bottom of the housing and the locking grab handles on the filter cartridge allow for cleaner, easier servicing. The filter tabs lock into place – simplifying positioning during reassembly. Short removal clearance is needed for filter replacement means the assembly can easily fit into tight spaces.

These assemblies utilize a unique sealing technology that protects systems from harmful ingressed contaminants and cross contamination of oil. The RadialSeal™ interface increases the surface area which provides a robust connection with superior vibration resistance, a common challenge in today's heavy-duty applications.

The FLK filters are offered with Synteq XP™ media, Donaldson's most advanced media technology. Each filter has extended surface area for advanced filtration performance. Synteq XP delivers better pressure drop and better contaminant holding capacity than standard filter media.

- Robust 4-point mount
- Oil drain port
- Optional 2-point mount
- Heads features: - one side machined/plugged for indicator

Beta Rating

- Performance to $\beta_{-6(c)}=1000$

Porting Size Options

- 2" SAE 4 bolt flange code 61

Replacement Filter Lengths

- 10.85" / 275.7 mm

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar

Assembly Weight

- Long Housing: 4.76 kg / 10.50 lbs

Operating Temperatures

- -40° to 250°F (-40° to 121°C)

Filter Collapse Ratings

- 145 psid / 1000 kPa / 10 bar (standard)

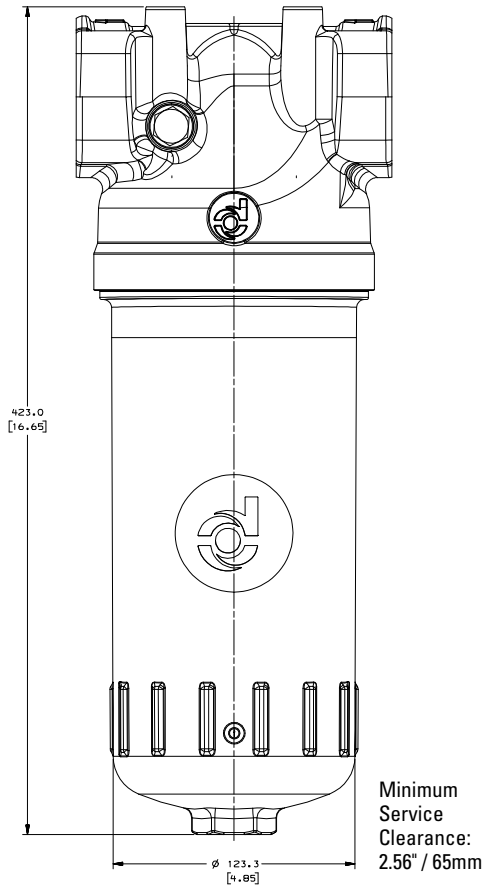


FLK125
 Max Flow: 85 gpm (322 lpm)

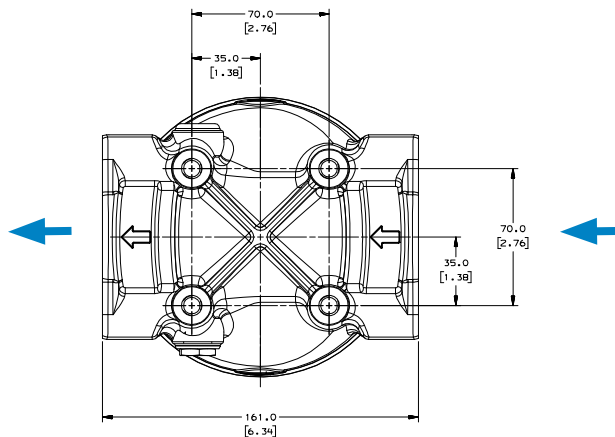


FLK Specification Illustrations

Long Assembly - Side View



Head - Top View





FLK125 Components

Head Choices

| Part No. | Port Connections | Bypass Valve |
|----------|------------------|-------------------------|
| P767095 | 2" SAE 4 bolt | 50 psi (3.4 bar) bypass |

Housing Choices

| Part No. | Comments |
|----------|----------------------|
| P767089 | Long length assembly |

Filter Choices

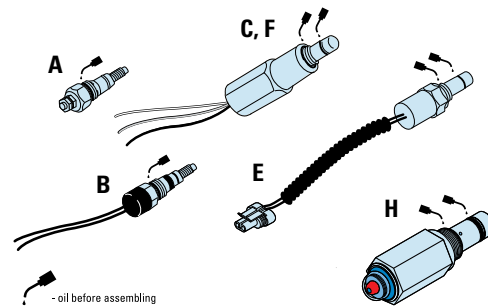
| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. |
|------------|--|--------|-------|--------------------|
| | | in | mm | |
| Synteq XP | 6 μ m | 10.85 | 275.7 | P767084 |
| Synthetic | 11 μ m | 10.85 | 275.7 | P767104 |
| | 15 μ m | 10.85 | 275.7 | P767106 |

Service Indicator Choices

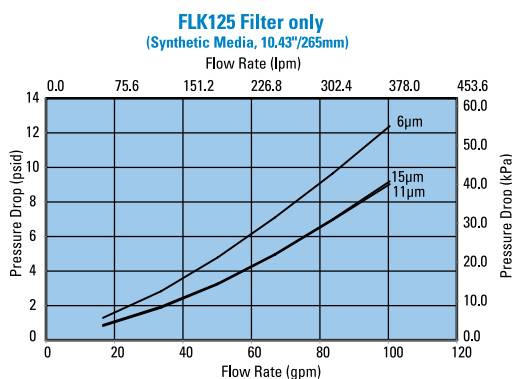
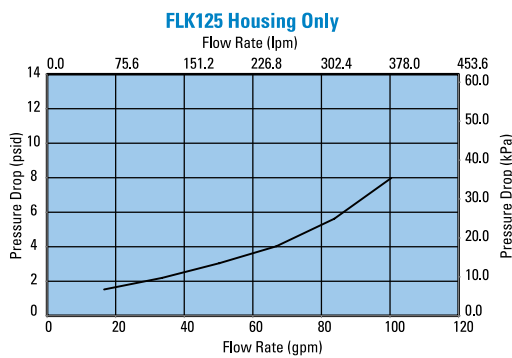
| Use with Bypass Valve Pressure of: | Indicator Part No. | Style ² | Description |
|------------------------------------|--------------------|--------------------|----------------------|
| Electric Models¹ | | | |
| 50 psi / 345 kPa | P165194 | A | Single post DC. N.O. |
| 50 psi / 345 kPa | P574968 | B | DC 2-wire |
| 50 psi / 345 kPa | P574967 | E | DC 2-wire |
| 50 psi / 345 kPa | P575549 | F | DC 3-wire |
| 50 psi / 345 kPa | P174396 | C | AC/DC 3-wire |
| 25 psi / 172.5 kPa | P575334 | H | Visual pop up |
| 50 psi / 345 kPa | P575335 | H | Visual pop up |

Indicator Notes

¹All electric models have a maximum operating temperature of 250°F / 121°C.
²Complete details on all service indicators can be found in the accessories section.



Performance Data





DPK350

Max Flow: 100 gpm (379 lpm)



DPK350 In-Line Cartridge Filters

Working Pressures to: 350 psi
2400 kPa
24 bar

Rated Static Burst to: 700 psi
4800 kPa
48 bar

Flow Range To: 100 gpm
379 lpm



Applications

- In-plant Systems
- Process Fluids
- Lube Oil Systems

Features

DPK350 duplex filter assemblies allow continuous filtration during filter servicing to avoid machine shutdown. The DPK350 duplex design combines lighter weight aluminum heads with durable steel bowls for a high-performance assembly. Choose between optional features such as no by-pass, by-pass valve, visual indicators or combination electrical/visual indicators for a customized assembly that best fits the needs of your specific application. Filter performance ranges from 5 μ to 25 μ at beta 1000 and high collapse elements are available at 5 μ and 27 μ , offering additional flexibility to achieve the filtration level your system requires.

- Head Material: Anodized Aluminum Alloy
- Bowl Material: Steel
- Optional visual and visual / electric indicators
- Self locking transfer valve
- Automatic bleed-over valve

Beta Rating

- Performance to $\beta_{5(c)}=1000$

Assembly Weight

- 44 lbs / 20 kg

Porting Size Options

- 1-1/2" SAE 4-Bolt Flange Code 61

Operating Temperatures

- -40° to 250°F (-40° to 121°C)

Replacement Filter Lengths

- 14.62" / 371 mm

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar

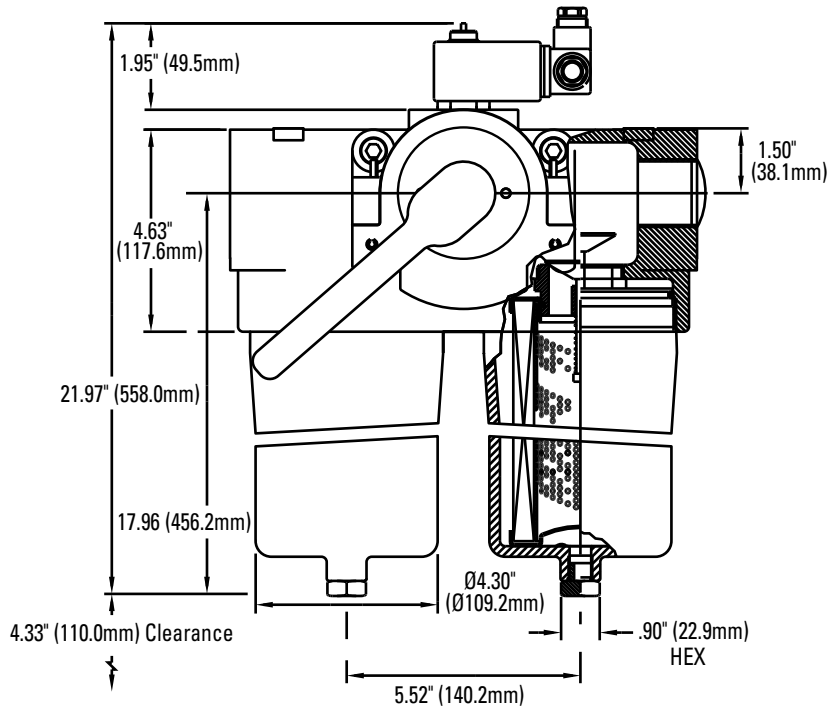
Filter Collapse Ratings

- 300 psid / 207 kPa / 21 bar (standard)
- 3045 psid / 2100 kPa / 210 bar (high collapse)

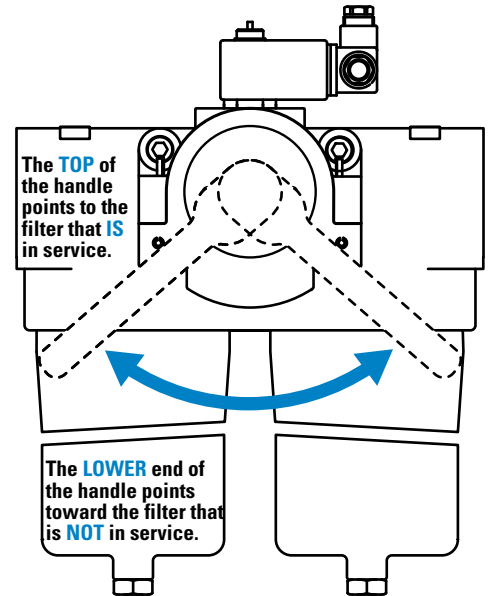
- No bypass

DPK350 Specification Illustrations

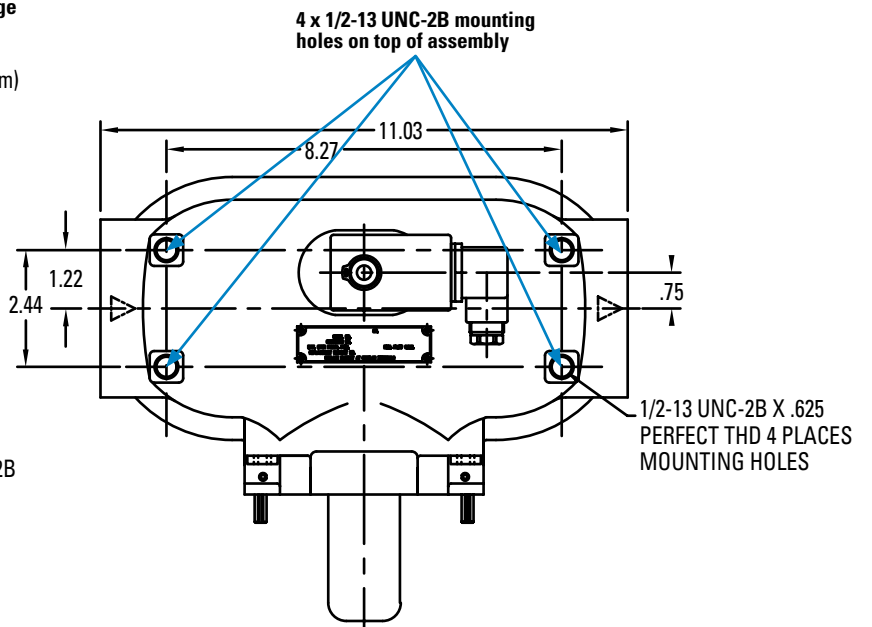
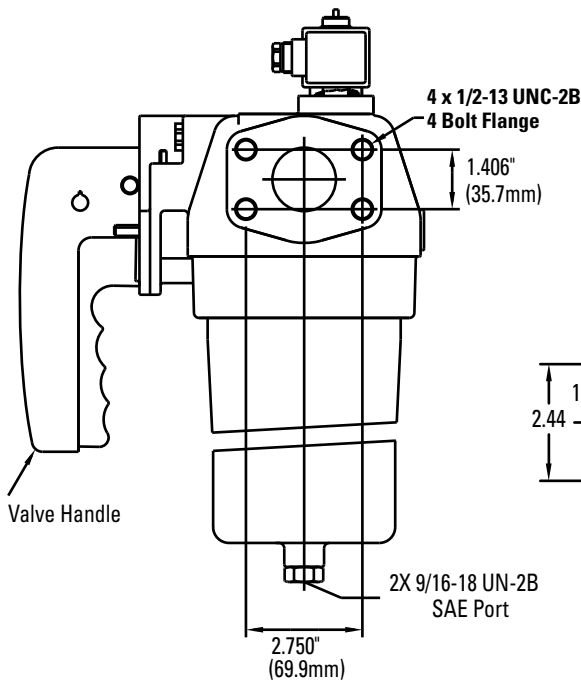
Assembly - Side Views



The handle shifts fluid flow from one filter to the other.



Head - Top View





DPK350
Max Flow: 100 gpm (379 lpm)

DPK350 Components

Assembly Choices

| Part No. | Port Connections | Bypass Valve | Comments |
|----------|--------------------------------|-------------------------|---|
| P577024 | 1-½" SAE 4-bolt flange code 61 | No bypass | Filter elements not included with assembly. Please select filter elements from list below |
| P577025 | 1-½" SAE 4-bolt flange code 61 | 50 psi (3.4 bar) bypass | Filter elements not included with assembly. Please select filter elements from list below |

Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------|--|--------|-----|--------------------|---------------|
| | | in | mm | | |
| DT Synteq | 5 µm | 14.62 | 371 | P567101 | |
| Synthetic | 8 µm | 14.62 | 371 | P567102 | |
| | 13 µm | 14.62 | 371 | P567103 | |
| | 23 µm | 14.62 | 371 | P567104 | |
| | 5 µm | 14.69 | 373 | P560716 | High collapse |
| | 27 µm | 14.69 | 373 | P560718 | High collapse |

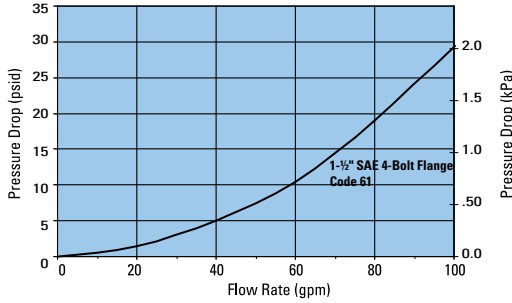
Service Indicator Choices

| Use with Bypass Valve Pressure of: | Indicator Part No. | Seal Material | Connector Style |
|------------------------------------|--------------------|---------------|-----------------|
| Visual / Electric Models | | | |
| 50 psi / 345 kPa | P577029 | Viton seal | Hirschman |
| Visual Models | | | |
| 50 psi / 345 kPa | P577028 | Viton seal | Manual reset |

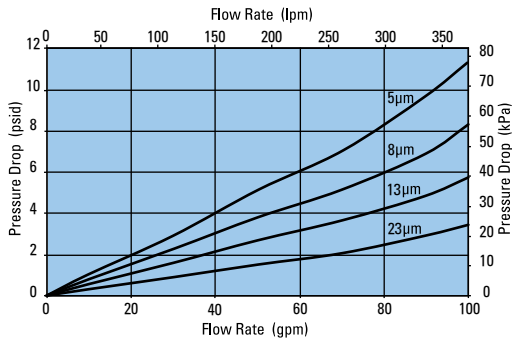


Performance Data

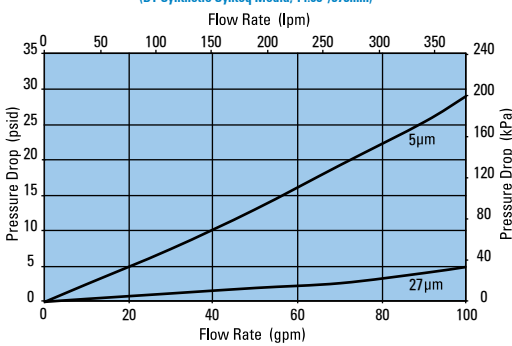
DPK350 Housing Only
Flow Rate (lpm)



DPK350 14" Filter Only
(DT Synthetic Synteq Media, 14.62"/371mm)



DPK350 14" High-Collapse Filter Only
(DT Synthetic Synteq Media, 14.68"/373mm)





W061

Max Flow: 100 gpm (379 lpm)

W061 In-Line Cartridge Filters

Working Pressures to: 600 psi
4140 kPa
41.4 bar

Rated Static Burst to: 1500 psi
10,342 kPa
103 bar

Fatigue Pressure Rating: 300 psi
2070 kPa
21 bar

Flow Range To: 100 gpm
379 lpm



Applications

- In-Plant Systems
- Meets HF3 Specification
- Mobile Equipment

Features

The W061 filter assembly contains the popular HF3 filter. Quick filter change outs are accomplished with the use of our easily serviceable ring assembly. Donaldson DT high-performance 4-layer media is offered in a variety of designs. Five different media grades are offered. Donaldson filters core collapse options range from 150 to 3,000 psi. The differential pressure indicator line is designed to work with a wide assortment of bypass valves. Thermal lockout and surge control are two key features incorporated in many of the differential pressure indicators.

- Assembly length code 2 conforms to HF3 specifications
- Wide range of indicator options
- Three housing length options for design flexibility
- Head material: cast iron
- Housing material: steel
- Bleed plug in head

Beta Rating

- Performance to $\beta_{<4(c)}=1000$

Porting Size Options

- SAE-12, SAE-16 O-ring

Replacement Filter Lengths

- 4.59" / 116.7 mm
- 8.22" / 208.8 mm
- 12.91" / 327.8 mm

Filter Collapse Ratingsz

- 150 psi / 1034 kPa / 10.3 bar (standard)

Standard Bypass Ratings

- 25 psi / 173 kPa / 1.73 bar
- 50 psi / 345 kPa / 3.5 bar
- No Bypass

Assembly Weight

- 4.59": 7.9 lbs / 3.6 kg
- 8.22": 8.9 lbs / 4.0 kg
- 12.91": 10.2 lbs / 4.6 kg

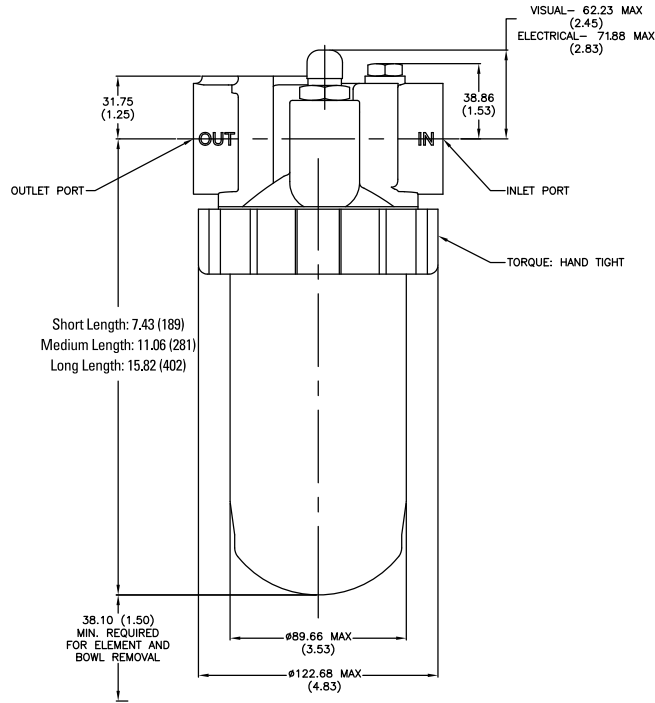
Operating Temperatures

- -20° to 250°F (-29° to 121°C)

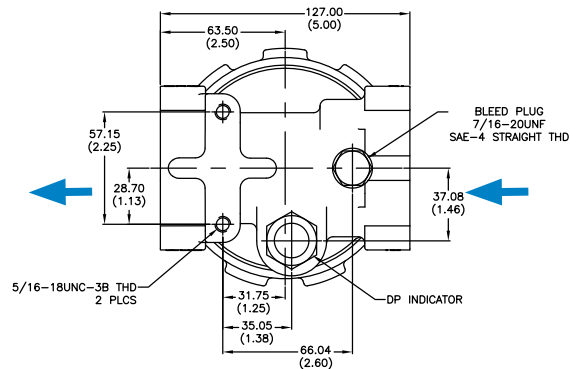
W061 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Top View





W061

Max Flow: 100 gpm (379 lpm)



W061 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length in mm | Donaldson Part No. | Comments |
|---------------------|---|-----------------------|-----------------|-----------------------|--------------------------------|
| DT Synteq Synthetic | <4 μ m | 4.59 | 117 | P566204 | DT-9600-4-2UM |
| | 5 μ m | 4.59 | 117 | P566205 | DT-9600-4-5UM |
| | 8 μ m | 4.59 | 117 | P566206 | DT-9600-4-8UM |
| | 12 μ m | 4.59 | 117 | P566207 | DT-9600-4-14UM |
| | 23 μ m | 4.59 | 117 | P566208 | DT-9600-4-25UM |
| | 5 μ m | 4.59 | 117 | P566364 | DT-9601-4-5UM, High collapse |
| | 12 μ m | 4.59 | 117 | P566365 | DT-9601-4-14UM, High collapse |
| | <4 μ m | 8.22 | 209 | P566209 | DT-9600-8-2UM |
| | 5 μ m | 8.22 | 209 | P566210 | DT-9600-8-5UM |
| | 8 μ m | 8.22 | 209 | P566211 | DT-9600-8-8UM |
| | 12 μ m | 8.22 | 209 | P566212 | DT-9600-8-14UM |
| | 23 μ m | 8.22 | 209 | P566213 | DT-9600-8-25UM |
| | 5 μ m | 8.22 | 209 | P566366 | DT-9601-8-5UM, High collapse |
| | 12 μ m | 8.22 | 209 | P566367 | DT-9601-8-14UM, High collapse |
| | <4 μ m | 8.23 | 209 | P567875 | DX2-9600-8-2UM |
| | 5 μ m | 8.23 | 209 | P565122 | DX2-9600-8-5UM |
| | 8 μ m | 8.23 | 209 | P565123 | DX2-9600-8-8UM |
| | 12 μ m | 8.23 | 209 | P564936 | DX2-9600-8-14UM |
| | <4 μ m | 12.91 | 328 | P566214 | DT-9600-13-2UM |
| | 5 μ m | 12.91 | 328 | P566215 | DT-9600-13-5UM |
| | 8 μ m | 12.91 | 328 | P566216 | DT-9600-13-8UM |
| | 12 μ m | 12.91 | 328 | P566217 | DT-9600-13-14UM |
| | 23 μ m | 12.91 | 328 | P566218 | DT-9600-13-25UM |
| | 5 μ m | 12.87 | 327 | P566368 | DT-9601-13-5UM, High collapse |
| | 12 μ m | 12.87 | 327 | P566369 | DT-9601-13-14UM, High collapse |
| | <4 μ m | 12.87 | 327 | P567876 | DX2-9600-13-2UM |
| | 5 μ m | 12.87 | 327 | P565188 | DX2-9600-13-5UM |
| | 8 μ m | 12.87 | 327 | P565189 | DX2-9600-13-8UM |
| | 12 μ m | 12.87 | 327 | P565187 | DX2-9600-13-14UM |
| Water | 10 μ m | 8.23 | 209 | P569528 | Absorbs 130 ml water @ 25 psid |
| Absorbing | 10 μ m | 12.87 | 327 | P569529 | Absorbs 220 ml water @ 25 psid |



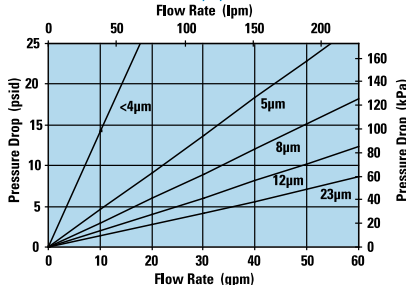
Filter Notes:

- All Donaldson DT and DX2 filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.
- All Donaldson DT and DX2 filters are potted with epoxy-based adhesives.
- Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.
- DT high collapse designs are potted into machined aluminum end caps for greater filter integrity in critical applications.
- Viton® seals are standard on all Donaldson DT and DX2 filters.

Performance Data

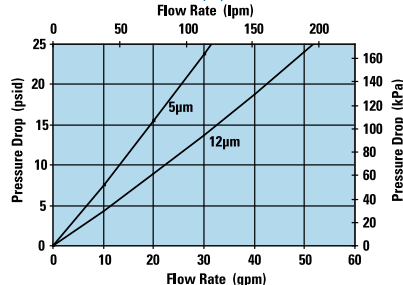
W061 4" DT Filter Only

DT-9600-4, 4"/102mm

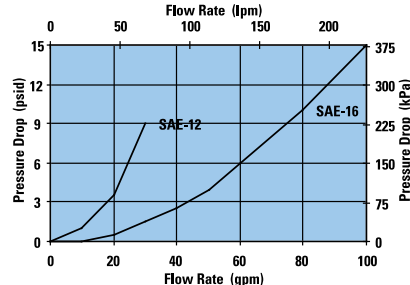


W061 4" DT Filter Only

DT-9601-4, 4"/102mm

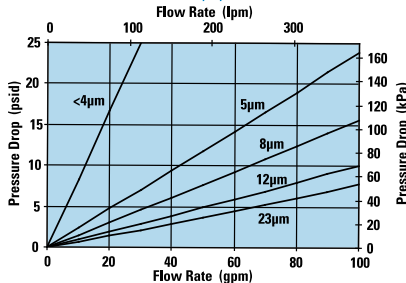


W061 Housing Only



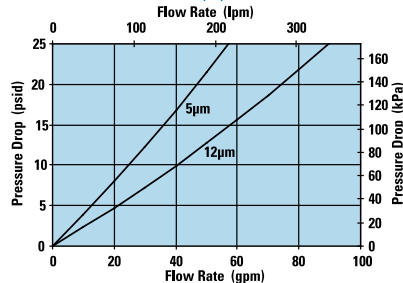
W061 8" DT Filter Only

DT-9600-8, 8"/203mm



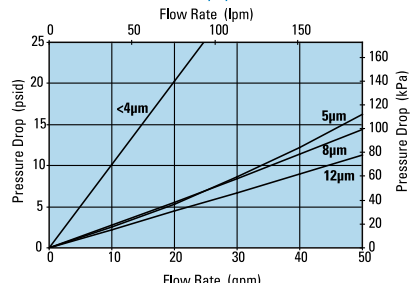
W061 8" DT Filter Only

DT-9601-8, 8"/203mm



W061 8" DX2 Filter Only

DX2-9600-8, 8"/203mm





Head Assembly Choices

| Port Size | Bypass Rating | Seal Material | Indicator Style & Location | Donaldson Part No. |
|---------------|-------------------|---------------|----------------------------|--------------------|
| SAE-12 O-Ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574242 |
| SAE-16 O-Ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574243 |
| SAE-16 O-Ring | 25 psi / 1.72 bar | Viton | Port Machined & Plugged | P575929 |

Housing Choices

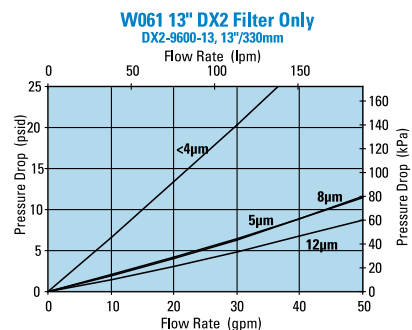
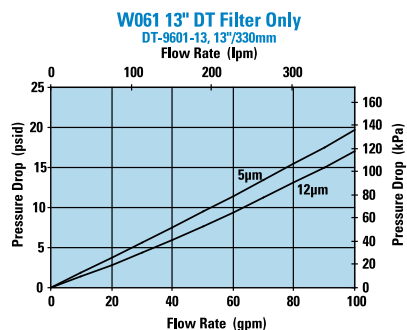
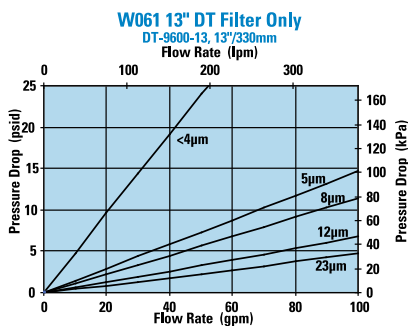
| Housing Length | Seal Material | Donaldson Part No. |
|----------------|---------------|--------------------|
| 4" (101.6mm) | Buna-N | X011115 |
| 8" (203.2mm) | Buna-N | X011111 |
| 13" (330.2mm) | Buna-N | X011117 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Seal Material | Donaldson Part No. | Thermal Lockout | Surge Control | Reset |
|-----------------------------------|---------------------|---------------|--------------------|-----------------|---------------|--------|
| Visual Pop-up Models | | | | | | |
| 15 psi / 103 kPa | NA | Buna-N | P572345 | No | No | Auto |
| 35 psi / 241 kPa | NA | Buna-N | P572347 | No | No | Auto |
| 35 psi / 241 kPa | NA | Buna-N | P572348 | Yes | Yes | Manual |
| 35 psi / 241 kPa | NA | Viton | P567456 | Yes | Yes | Manual |
| Electrical / Visual Models | | | | | | |
| 15 psi / 103 kPa | Hirschman | Buna-N | P572323 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572327 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572329 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572384 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Hirschman | Viton | P567458 | Yes | Yes | Manual |
| 15 psi / 103 kPa | 3 wire flying leads | Buna-N | P572342 | No | No | Auto |
| 35 psi / 241 kPa | 3 wire flying leads | Buna-N | P572349 | No | No | Auto |
| Electrical Models | | | | | | |
| 15 psi / 103 kPa | Hirschman | Buna-N | P572355 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572359 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572361 | No | No | Auto |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011160 | Buna |
| X011161 | Viton |





HDK06

Max Flow: 150 gpm (568 lpm)

HDK06 In-Line/Tank Mount Filters

Working Pressures to: 350 psi
2415 kPa
24.1 bar

Rated Static Burst to: 500 psi
3450 kPa
34.5 bar

Flow Range To: 150 gpm
568 lpm

Features

HDK06 filters come in two styles: In-line and tank mount. Both styles feature a die cast aluminum head and steel body for strength and durability; service is made easier with a single, center retention bolt on top of the head. Filter flow is inside to outside. Buna-N® seals are standard.

HDK06 assemblies come complete with our $\beta_{9(c)} = 1000$ rated Synteq™ filter cartridge. Other ratings are available, depending on your cleanliness requirements. HDK06 comes with an easy-to-read visual service indicator.



In-line model shown

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- 2½" NPT

Replacement Filter Lengths

- 16.00" / 406mm

Standard Bypass Ratings

- 25 psi / 172.5 kPa / 1.7 bar

Assembly Weight

- 39.25 lbs / 18 kg

Operating Temperatures

- -20°F to 250°F
- -29°C to 121°C

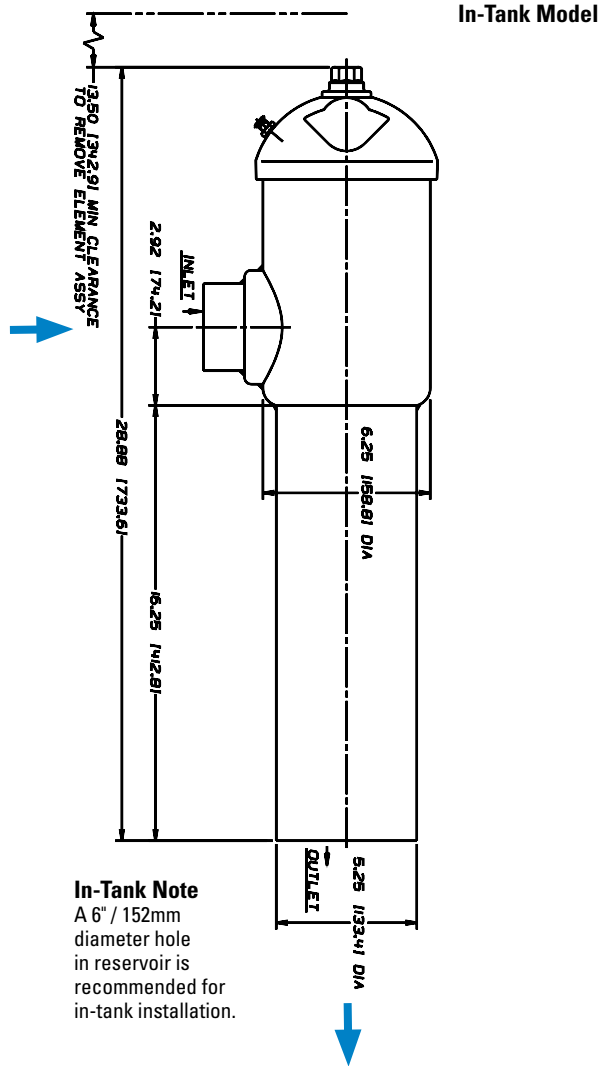
Filter Burst Ratings

- 100 psid / 690 kPa / 6.9 bar

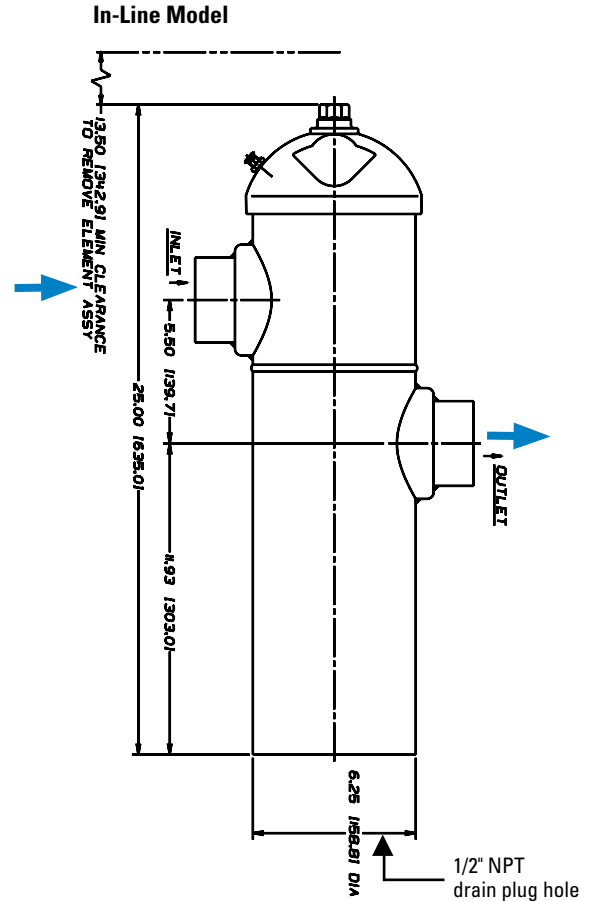
HDK06 Specification Illustrations

All dimensions are shown in inches [millimeters].

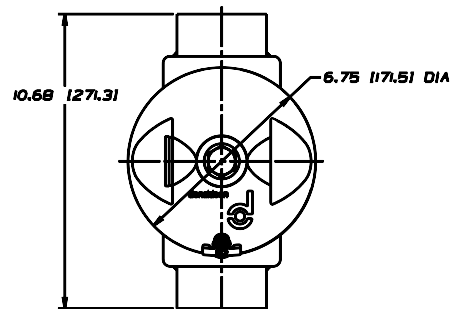
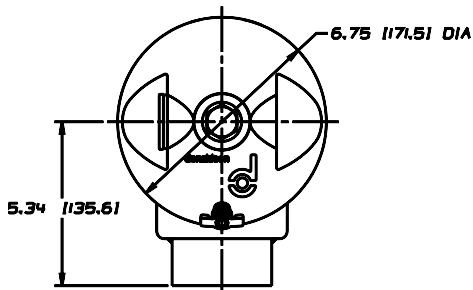
Assembly - Side Views



- Applications**
- Cooling Circuits
 - Fluid Conditioning Systems
 - Lube Oil Systems
 - Return Lines
 - Suction Lines



Head - Top Views





HDK06

Max Flow: 150 gpm (568 lpm)



HDK06 Components

Assembly Choices

| Style | Part No. | Port Size | Bypass Rating | Indicator | Includes Filter Cartridge |
|---------|----------|-----------|--------------------|-----------|---------------------------|
| In-Tank | K060173 | 2½" NPT | 25 psi / 172.5 kPa | Visual | P176221 |
| In-Line | K060160 | 2½" NPT | 25 psi / 172.5 kPa | Visual | P176221 |

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. |
|------------|---|-----------------------|--------|-----|--------------------|
| | | | in | mm | |
| Synteq | | <4 µm | 16.00 | 406 | P161016 |
| Synthetic | | 6 µm | 16.00 | 406 | P165628 |
| | | 11 µm | 16.00 | 406 | P176221 |
| | | 22 µm | 16.00 | 406 | P161571 |
| | | 23 µm | 16.00 | 406 | P164699 |
| | | 50 µm | 16.00 | 406 | P166597 |
| Wire Mesh | 150 µm | | 11.6 | 294 | P160700 |

Filter Notes

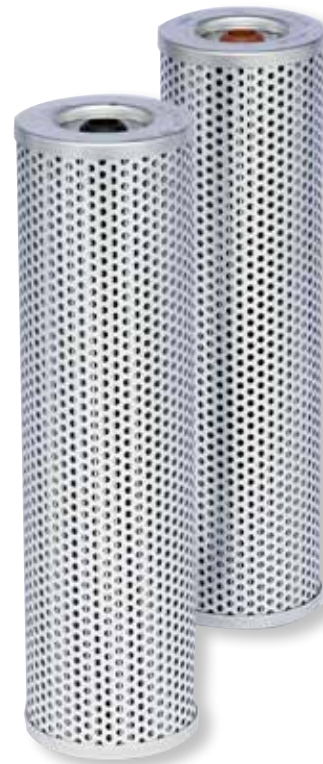
Standard HDK06 replacement filters have Buna-N® seals, which are appropriate for most applications involving petroleum oil. Filters with seals made of fluorocarbon elastomer (such as Viton® and Fluorel®) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F.

HDK06 filters are inside to outside reverse flow 4.39" (112mm) OD.

Refer to the table in the Technical Reference Guide for fluid compatibility with our filter media.

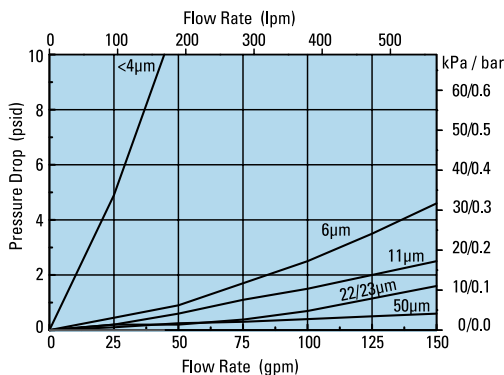
Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Fluorel® is a registered trademark of 3M Company.

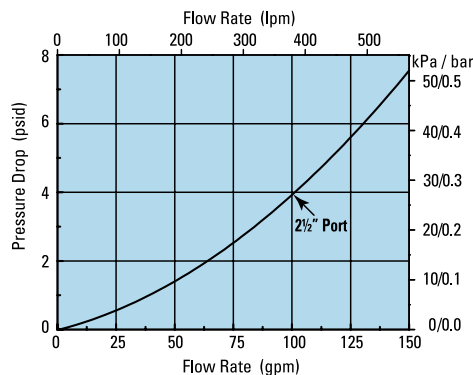


Performance Data

HDK06 Filters Only



HDK06 Head Only





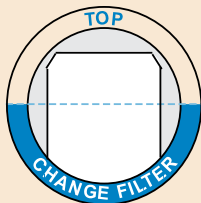
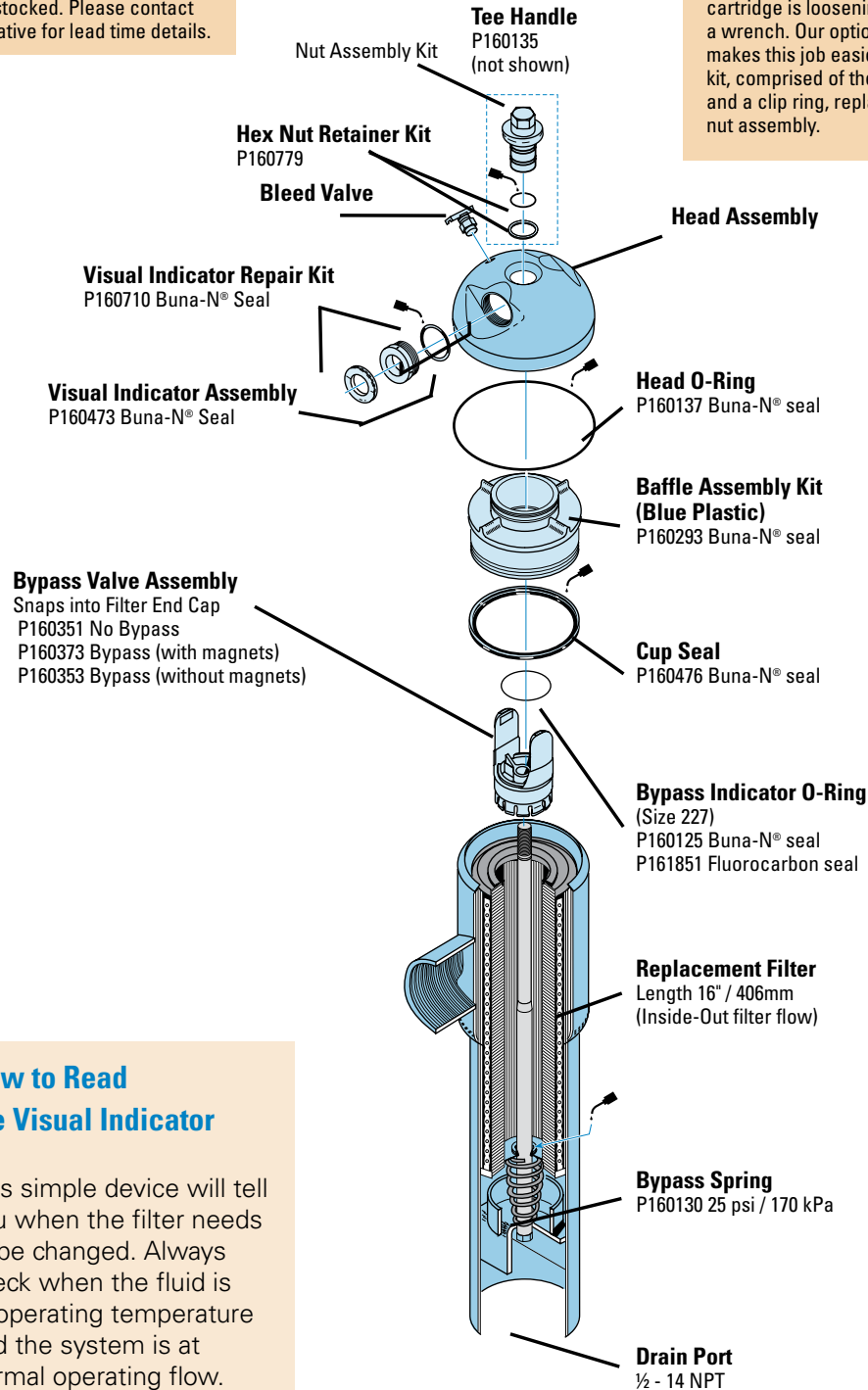
HDK06 Service Parts

SERVICE PARTS NOTE:

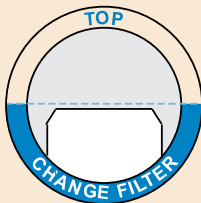
Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.

Optional Tee Handle for Easier Servicing

The first step in changing the HDK06 cartridge is loosening the top nut with a wrench. Our optional tee handle makes this job easier. The P160135 kit, comprised of the handle, an o-ring, and a clip ring, replaces the entire top nut assembly.



Filter OK



Filter Needs Service

How to Read the Visual Indicator

This simple device will tell you when the filter needs to be changed. Always check when the fluid is at operating temperature and the system is at normal operating flow.

If the top of the white panel is below the lower half of the window, the filter needs servicing.



W041

Max Flow: 300 gpm (1135 lpm)

W041 In-Line Cartridge Filters

Working Pressures to: 500 psi
3450 kPa
34.5 bar

Rated Static Burst to: 1500 psi
10,342 kPa
103.5 bar

Flow Range To: 300 gpm
1135 lpm



Applications

- Fluid Conditioning Systems
- In-Plant Systems
- Lube Oil Systems

Features

The W041 high flow filter combines the best features of a base-mounted assembly; several inlet port options, top cover filter servicing for ease of maintenance and a wide selection of service indicators. The W041 all-aluminum head design and plated steel cylinder provides a strong, durable, and dependable unit. We offer standard features like deep pleat filters for higher dirt holding capacity and our standard Donaldson DT 4-layer media filter construction. This technology, combined with many other standard features, is ideal for today's applications in pulp and paper, power generation and steel mill applications. Five standard grades of media are offered. Thermal lockout and surge control are two key features incorporated in many of the differential pressure indicators.

- Large T-handle for fast servicing without tools
- Wide range of indicator options
- Two filter length options for design flexibility
- Base material: aluminum
- Cylinder material: steel
- Cover material: cast iron
- Two drain plugs in base
- Bleed/fill plug in cover

Beta Rating (per ISO 16889)

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- 2" or 2½" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 16.74" / 425.3 mm
- 38.62" / 980.9 mm

Filter Collapse Ratings

- 150 psid / 1034 kPa / 10.3 bar (standard)

Housing Weight

- 16.74": 48.5 lbs / 22.0 kg
- 38.62": 86.2 lbs / 39.2 kg

Operating Temperatures

- -20°F to 250°F / -29° to 121°C

Standard Bypass Ratings

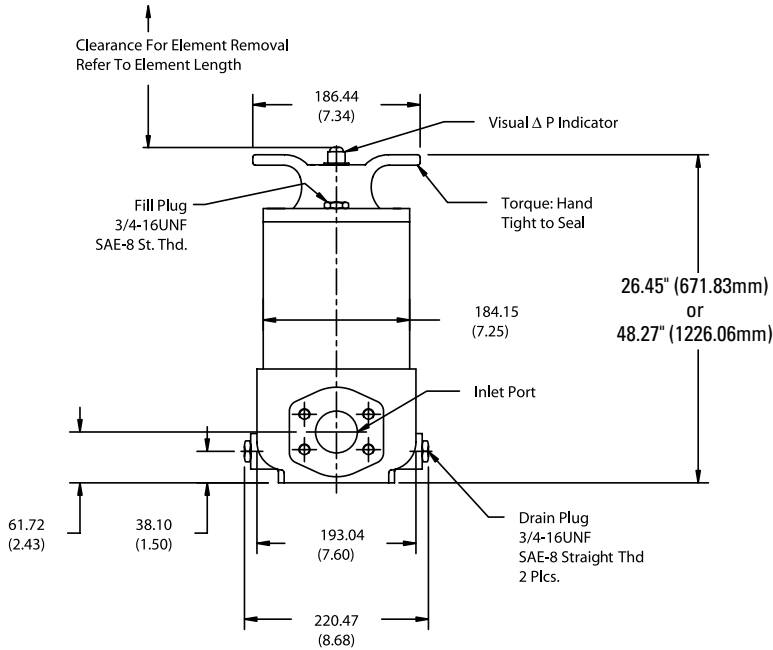
- 50 psi / 345 kPa / 3.5 bar



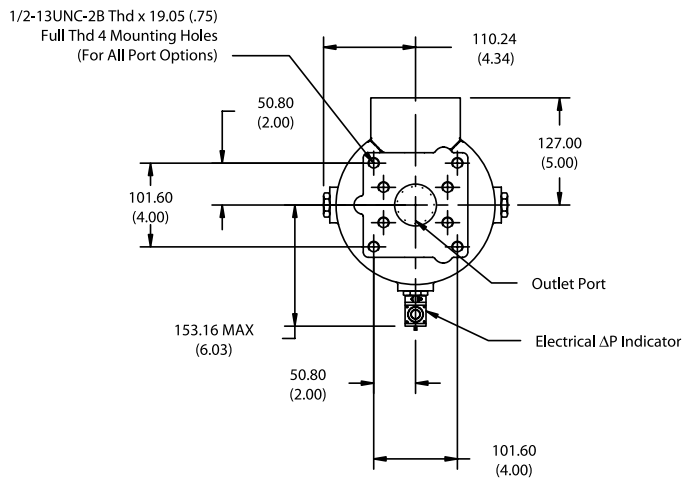
W041 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Bottom View





W041

Max Flow: 300 gpm (1135 lpm)



W041 Components

High-Performance DT Filter Choices

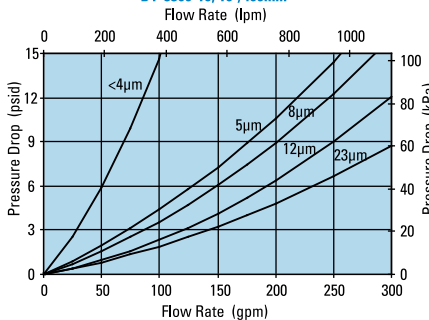
| Media Type | $\beta_{x/c} = 1000$ Rating based on ISO 16889 | Length | | Donaldson | Comments |
|------------|---|--------|-----|-----------|-----------------|
| | | in | mm | Part No. | |
| DT Synteq | <4 μ m | 16.74 | 425 | P566239 | DT-8300-16-2UM |
| Synthetic | 5 μ m | 16.74 | 425 | P566240 | DT-8300-16-5UM |
| | 8 μ m | 16.74 | 425 | P566241 | DT-8300-16-8UM |
| | 12 μ m | 16.74 | 425 | P566242 | DT-8300-16-14UM |
| | 23 μ m | 16.74 | 425 | P566243 | DT-8300-16-25UM |
| | <4 μ m | 38.62 | 981 | P566244 | DT-8300-39-2UM |
| | 5 μ m | 38.62 | 981 | P566245 | DT-8300-39-5UM |
| | 8 μ m | 38.62 | 981 | P566246 | DT-8300-39-8UM |
| | 12 μ m | 38.62 | 981 | P566247 | DT-8300-39-14UM |
| | 23 μ m | 38.62 | 981 | P566248 | DT-8300-39-25UM |
| | <4 μ m | 16.10 | 409 | P566249 | DT-8310-16-2UM |
| | 5 μ m | 16.10 | 409 | P566250 | DT-8310-16-5UM |
| | 8 μ m | 16.10 | 409 | P566251 | DT-8310-16-8UM |
| | 12 μ m | 16.10 | 409 | P566252 | DT-8310-16-14UM |
| | 23 μ m | 16.10 | 409 | P566253 | DT-8310-16-25UM |
| | <4 μ m | 37.94 | 964 | P566254 | DT-8310-39-2UM |
| | 5 μ m | 37.94 | 964 | P566255 | DT-8310-39-5UM |
| | 8 μ m | 37.94 | 964 | P566256 | DT-8310-39-8UM |
| | 12 μ m | 37.94 | 964 | P566257 | DT-8310-39-14UM |
| | 23 μ m | 37.94 | 964 | P566258 | DT-8310-39-25UM |

Filter Notes

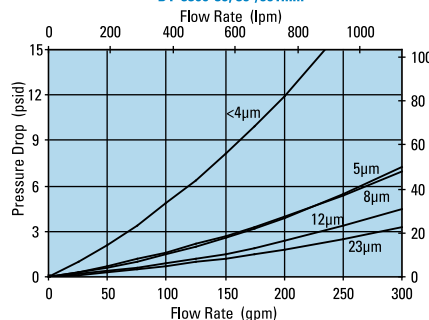
All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT filters are potted and seam-sealed with epoxy-based adhesives. Standard collapse designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. Extended life designs are double wire-backed using epoxy-coated steel mesh. Viton® seals are standard on all Donaldson DT filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Performance Data

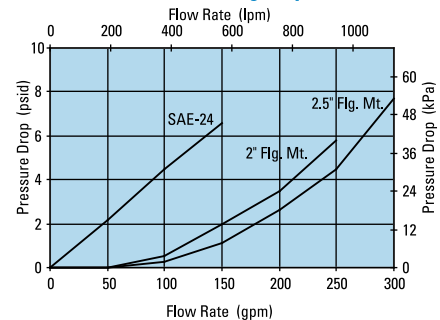
W041 16" DT Filter Only
DT-8300-16, 16"/406mm



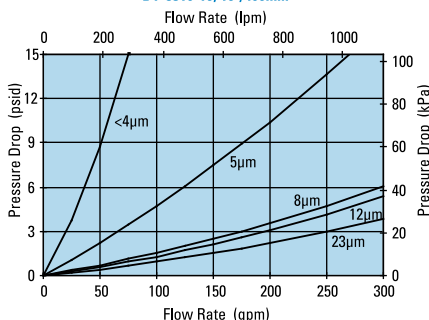
W041 39" DT Filter Only
DT-8300-39, 39"/991mm



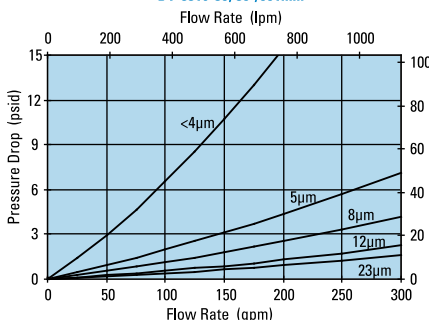
W041 Housing Only



W041 16" DT Filter Only
DT-8310-16, 16"/406mm



W041 39" DT Filter Only
DT-8310-39, 39"/991mm



Filter Assembly Choices

| Size | Rating | Material | & Location | Housing Length | Assembly Length | Part No. |
|----------------------------------|-------------------|----------|-------------------------|----------------|-------------------|----------|
| 2" SAE 4 Bolt Flange Code 61 | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | 16" (406.4mm) | 26.45" (671.8mm) | P574218 |
| 2-1/2" SAE 4 Bolt Flange Code 61 | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | 39" (990.6mm) | 48.27" (1226.1mm) | P574219 |
| 2" SAE 4 Bolt Flange Code 61 | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | 39" (990.6mm) | 48.27" (1226.1mm) | P575920 |
| 2-1/2" SAE 4 Bolt Flange Code 61 | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | 16" (406.4mm) | 26.45" (671.8mm) | P575921 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Seal Material | Donaldson Part No. | Thermal Lockout | Surge Control | Reset |
|-----------------------------------|---------------------|---------------|--------------------|-----------------|---------------|--------|
| Visual Pop-up Models | | | | | | |
| 35 psi / 241 kPa | NA | Buna-N | P572347 | No | No | Auto |
| 35 psi / 241 kPa | NA | Buna-N | P572348 | Yes | Yes | Manual |
| 35 psi / 241 kPa | NA | Viton | P567456 | Yes | Yes | Manual |
| Electrical / Visual Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572327 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572329 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572384 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Hirschman | Viton | P567458 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572385 | Yes | Yes | Manual |
| 35 psi / 241 kPa | 3 wire flying leads | Buna-N | P572349 | No | No | Auto |
| Electrical Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572359 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572361 | No | No | Auto |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011156 | Buna |
| X011157 | Viton |



HFK08

Max Flow: 300 gpm (1135 lpm)

HFK08 In-Line/Tank Mount Filters

Working Pressures to: 350 psi
2415 kPa
24.1 bar

Rated Static Burst to: 500 psi
3450 kPa
34.5 bar

Flow Range To: 300 gpm
1135 lpm

Features

HFK08 is available in two styles: in-line and in-tank. Both styles feature a cast aluminum head and steel body for maximum strength and durability. Its single, center retention bolt simplifies servicing. Flow is from inside to outside of the filter cartridge.

Three in-stock HFK08 models offer our proprietary Synteq™ synthetic media designed especially for liquid filtration. A wider range of filter media is available to purchase separately, as are fluoroelastomer seals. A visual service indicator is built into the HFK08 head.



In-line model shown

Beta Rating

- Performance to $\beta_{<4(c)}=1000$

Porting Size Options

- 3" NPT
- SAE-20 O-ring

Replacement Filter Lengths

- 18.00" / 457mm

Standard Bypass Ratings

- 25 psi / 172.5 kPa / 1.7 bar

Assembly Weight

- 55.4 lbs / 25.12 kg

Operating Temperatures

- -20°F to 250°F
- -29°C to 121°C

Filter Burst Ratings

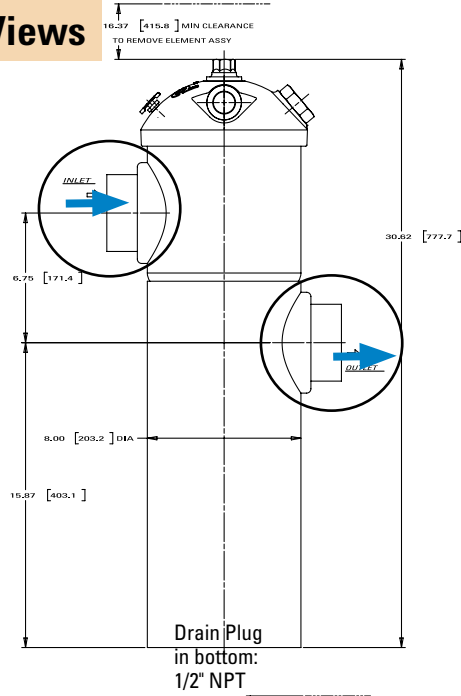
- 75 psi / 517 kPa / 5.2 bar (synthetic)
- 100 psi / 689 kPa / 6.9 bar (wire mesh)

HFK08 Specification Illustrations

All dimensions are shown in inches [millimeters].

Assembly - Side Views

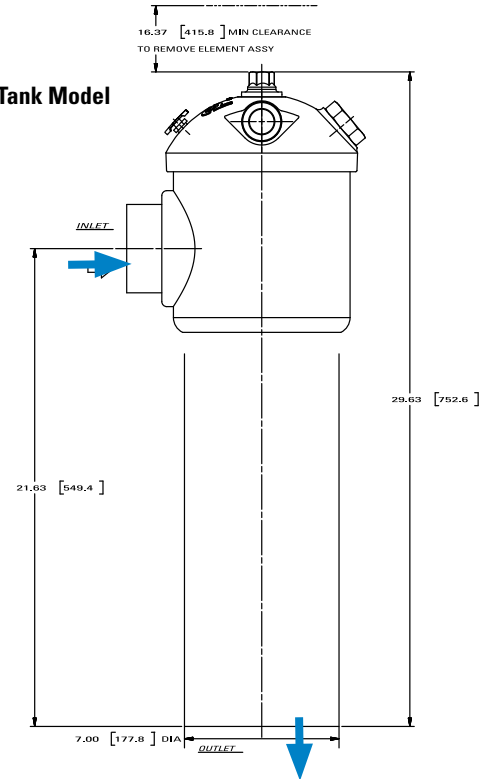
In-Line Model



Applications

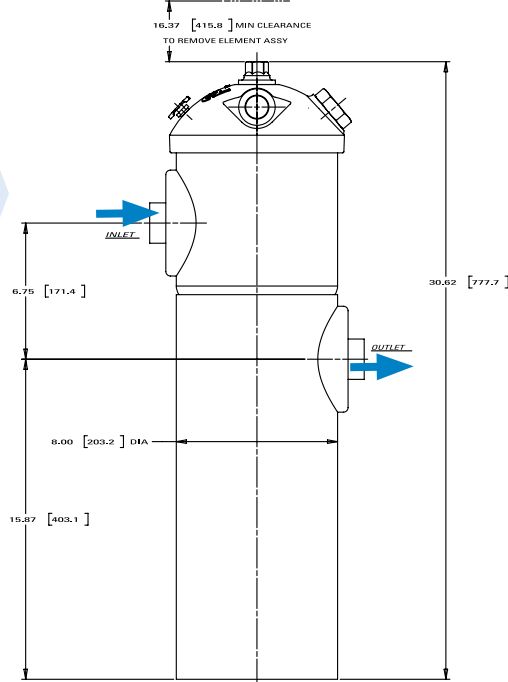
- Fluid Conditioning Systems
- Lube Oil Systems
- Return Lines
- Side Loop Systems
- Suction Lines

In-Tank Model

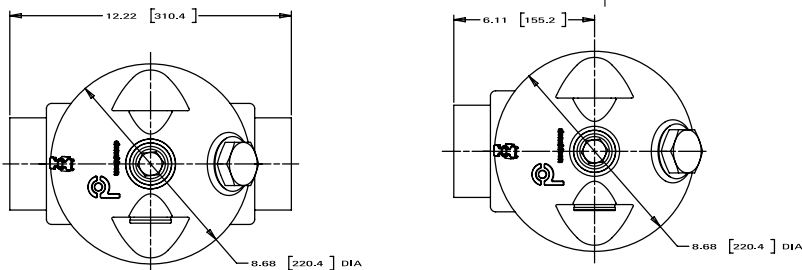


K080087 In-Line Model

Smaller port size (SAE-20) works well for kidney loop filtration.



Head - Top Views





HFK08

Max Flow: 300 gpm (1135 lpm)



HFK08 Components

Filter Assemblies

| Port Size | Bypass Rating | Indicator Style1 & Location | Assembly Part No. | Length (in./mm) | Filter Part No. |
|-----------|--------------------|---|-------------------|-----------------|---------------------|
| 3" NPT | 25 psi / 172.5 kPa | Visual, Left side Visual, Right side | K080051, In-Tank | 18"/457mm | P164703 |
| | | | K080033, In-Line | 18"/457mm | P164703 |
| | | | K080085, In-Line | 18"/457mm | P164407 Viton® Seal |
| SAE-20 | 25 psi / 172.5 kPa | Visual, Right side | K080087, In-Line | 18"/457mm | P164405 |

Assembly Notes

Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port. Viton® is a registered trademarks of E. I. DuPont de Nemours and Company.

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. |
|------------------|---|-----------------------|--------|-----|---------------------|
| | | | in | mm | |
| Synteq Synthetic | | <4 μm | 18.00 | 457 | P164407 Viton® seal |
| | | <4 μm | 18.00 | 457 | P164405 |
| | | 6 μm | 18.00 | 457 | P166462 |
| | | 11 μm | 18.00 | 457 | P176222 |
| | | 23 μm | 18.00 | 457 | P164703 |
| Wire Mesh | 45 μm 150 μm | | 18.00 | 457 | P173573 |
| | | | 18.00 | 457 | P163945 |

Filter Notes

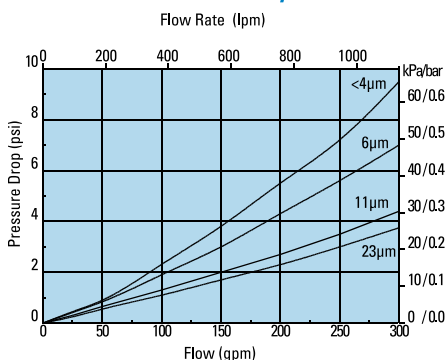
Standard HDK06 replacement filters have Buna-N® seals, which are appropriate for most applications involving petroleum oil. Filters with seals made of fluorocarbon elastomer (such as Viton® and Fluorel®) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F. HDK06 filters are inside to outside reverse flow 4.39" (112mm) OD. Refer to the table in the Technical Reference Guide for fluid compatibility with our filter media. Viton® is a registered trademarks of E. I. DuPont de Nemours and Company. Fluorel® is a registered trademark of 3M Company.



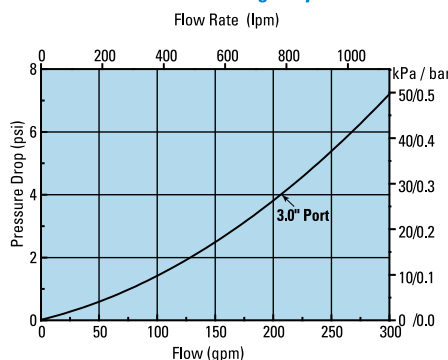
The K080087 model has features that are perfect for kidney loop filtration.

Performance Data

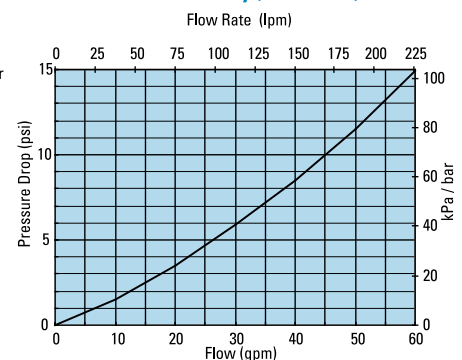
HFK08 Filter Only



HFK08 Housing Only



K080087 Assembly (with Filter)

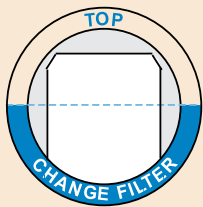
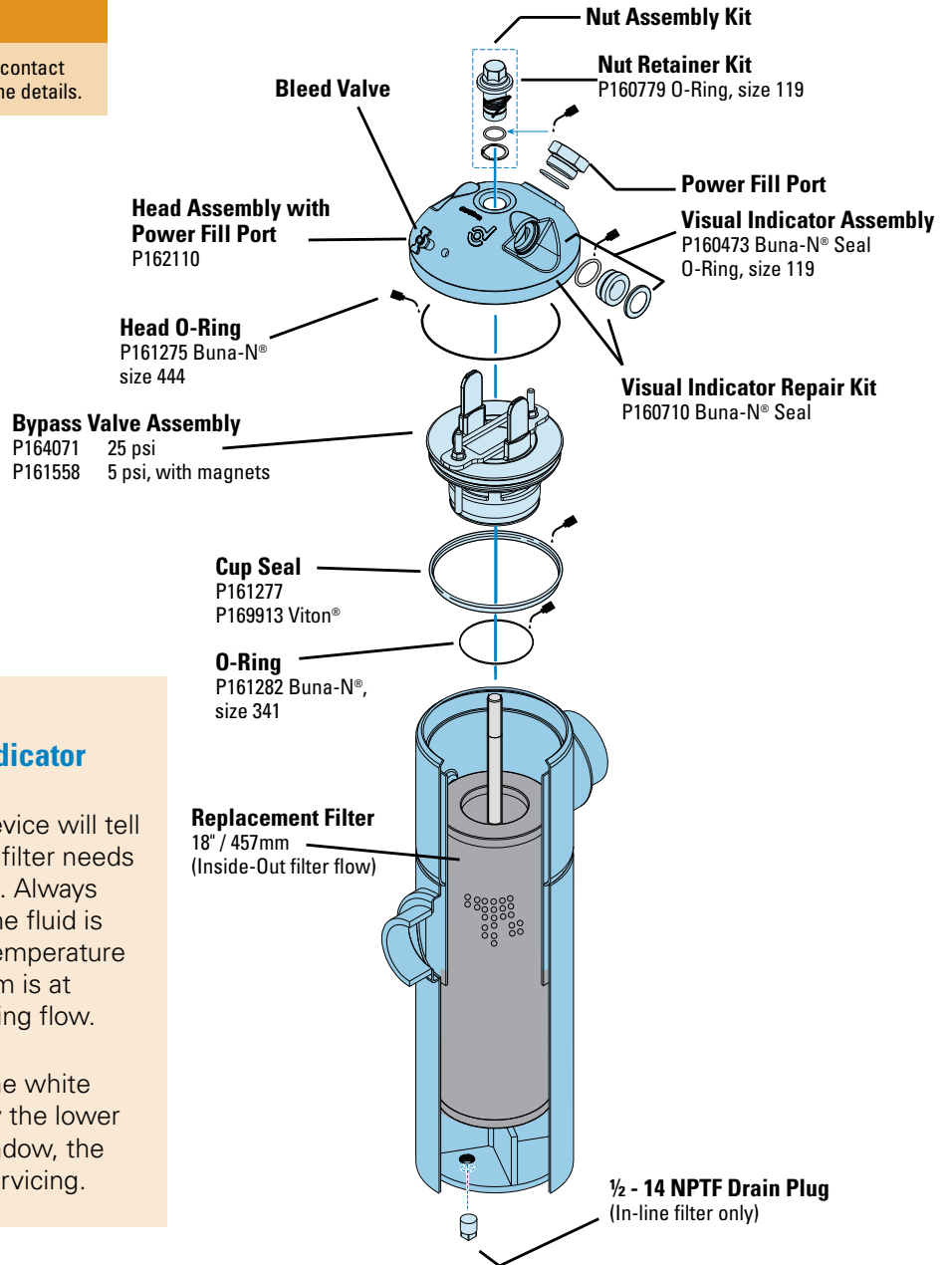




HFK08 Service Parts

SERVICE PARTS NOTE:

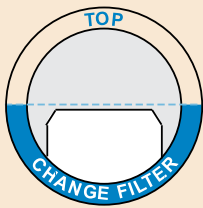
Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.



Filter OK

How to Read the Visual Indicator

This simple device will tell you when the filter needs to be changed. Always check when the fluid is at operating temperature and the system is at normal operating flow.



Filter Needs Service

If the top of the white panel is below the lower half of the window, the filter needs servicing.



HFK08 replacement filters are available with synthetic or wire mesh media.



Donaldson Delivers Performance Under **Any** Pressure.



www.donaldsonfilters.com

PRODUCT INFORMATION



www.donaldsonfilters.com



High Pressure Filters

High pressure filters are positioned between pumps and critical components such as cylinders, motors and valves. They help protect these critical components from catastrophic failure.

Donaldson heavy-duty high pressure filters are rated for working pressures up to 6500 psi (44818 kPa). Various porting sizes and types, including manifold style, are available for a wide range of applications.



Section Index

Max Operating Pressure < 6500 psi (450 bar)

Models arranged from low to maximum flow rates

In-line Cartridge Filters

| | |
|---------------|-----|
| HPK02..... | 130 |
| DPK2400 | 136 |
| W440 | 140 |
| FPK02 | 144 |
| W350 | 150 |
| HPK03..... | 154 |
| FPK04 | 160 |
| HPK04..... | 166 |
| W451 | 174 |
| W620 | 178 |
| HPK05..... | 183 |



HPK02
Max Flow: 20 gpm (76 lpm)

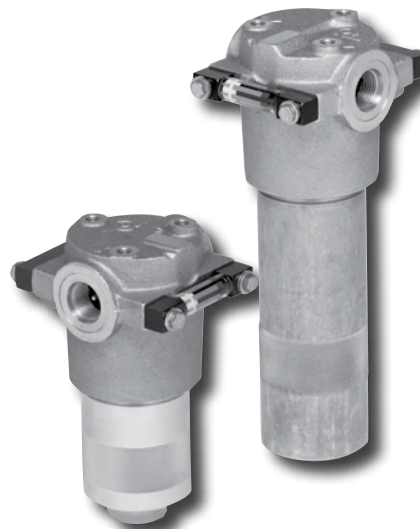


HPK02 In-Line Cartridge Filters

Working Pressures to: 2000 psi
13,790 kPa
137.9 bar

Rated Static Burst to: 4500 psi
31,030 kPa
310.3 bar

Flow Range To: 20 gpm
76 lpm



Features

The HPK02 is a heavy-duty filter built for high pressure applications, with cast aluminum head and impact-extruded aluminum housing for strength and durability at relatively lightweight.

Take advantage of our mix and match system of in-stock heads, housings and cartridges – so you can get exactly what you need. HPK02 is available with your choice of visual or AC/DC electrical indicators. Likewise, choose the bypass option that's right for your application – 50 psi (3.5 bar) bypass, or no bypass. Seals made of fluorocarbon (such as Viton® and Fluorel®) or Buna-N are available with HPK02.

All HF2-sized HPK02 filters contain Synteq™, our synthetic filter media designed especially for hydraulic filtration.

Viton® is a registered trademark of E. I. DuPont de Nemours and Company.
Fluorel® is a registered trademark of 3M Company.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-12 O-ring

Replacement Filter Lengths

- 4.37" / 111mm
- 8.12" / 206mm

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- No Bypass

Assembly Weight

- 4.3 lbs / 1.95 kg (short)
- 5.5 lbs / 2.49 kg (long)

Operating Temperatures

- -45° to 250°F (-43° to 121°C)

Filter Collapse Ratings

- 150 psi / 1035 kPa / 10.6 bar (standard)
- 3000 psi / 20,700 kPa / 206.9 bar (high collapse)

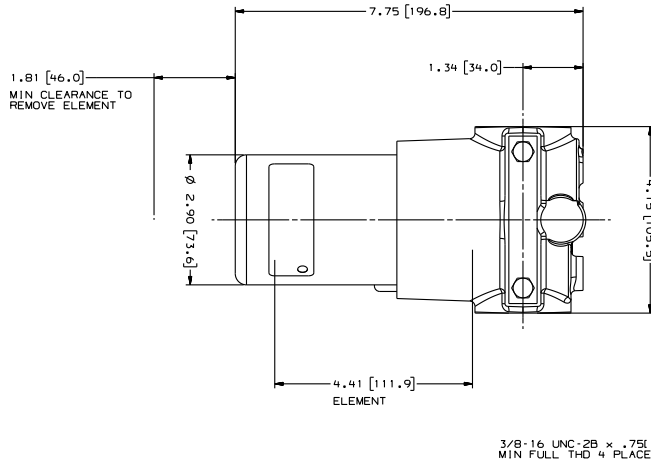
HPK02 Specification Illustrations

All dimensions are shown in inches [millimeters].

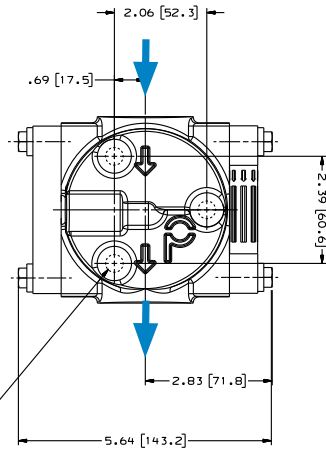
Applications

- High Pressure Circuits
- In-Plant Systems
- Meets HF2 Specification
- Mobile Equipment
- Power Steering Circuits
- Servo Valve Circuits

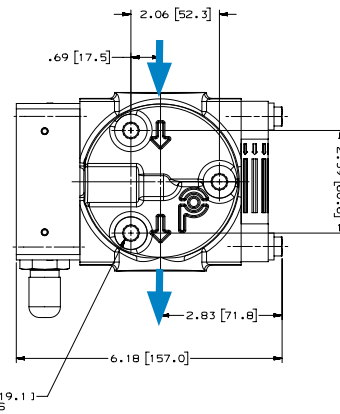
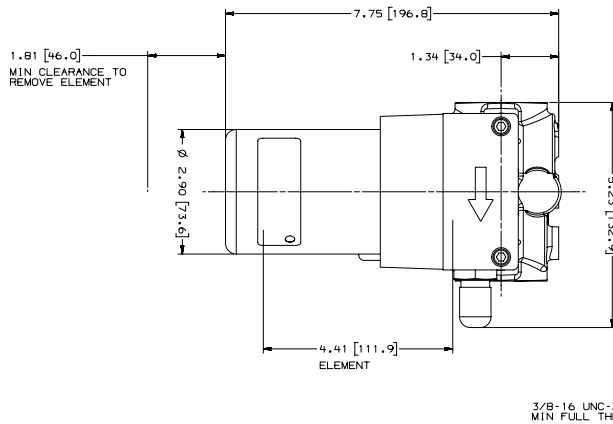
Assembly - Side View



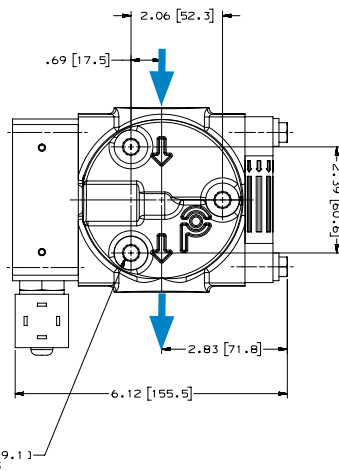
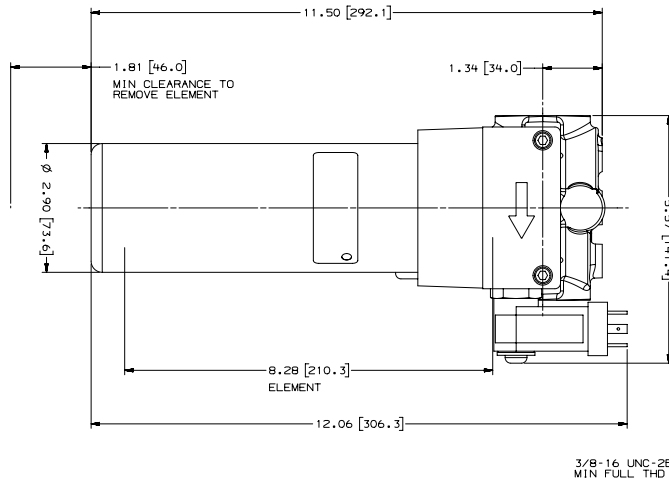
Head - Top View



HPK02 with Visual Service Indicator



HPK02 with AC/DC Electrical Service Indicator





HPK02 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|---------------------|--|--------|-----|--------------------|-------------------------------|
| | | in | mm | | |
| DT Synteq Synthetic | <4 μm | 4.41 | 112 | P566194 | DT-9020-4-2UM |
| | 5 μm | 4.41 | 112 | P566195 | DT-9020-4-5UM |
| | 8 μm | 4.41 | 112 | P566196 | DT-9020-4-8UM |
| | 12 μm | 4.41 | 112 | P566197 | DT-9020-4-14UM |
| | 23 μm | 4.41 | 112 | P566198 | DT-9020-4-25UM |
| | <4 μm | 4.41 | 210 | P566199 | DT-9020-8-2UM |
| | 5 μm | 8.28 | 210 | P566200 | DT-9020-8-5UM |
| | 8 μm | 8.28 | 210 | P566201 | DT-9020-8-8UM |
| | 12 μm | 8.28 | 210 | P566202 | DT-9020-8-14UM |
| | 23 μm | 8.28 | 210 | P566203 | DT-9020-8-25UM |
| | 5 μm | 4.46 | 113 | P566335 | DT-9021-4-5UM, High collapse |
| | 12 μm | 4.46 | 113 | P566336 | DT-9021-4-14UM, High collapse |
| | 5 μm | 8.16 | 207 | P566337 | DT-9021-8-5UM, High collapse |
| | 12 μm | 8.16 | 207 | P566338 | DT-9021-8-14UM, High collapse |

Filter Notes

All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.
All Donaldson DT filters are potted with epoxy-based adhesives.
Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. High collapse designs are double wire-backed using stainless steel mesh.
High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications.
Viton® seals are standard on all Donaldson DT filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Standard Filter Choices

| Media Type | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------------|--|--------|-----|--------------------|----------------------------------|
| | | in | mm | | |
| Synteq Synthetic | 5 μm | 4.37 | 111 | P167180* | Fluorocarbon Seal, High Collapse |
| | 5 μm | 8.12 | 203 | P167182* | Fluorocarbon Seal, High Collapse |
| | 6 μm | 4.37 | 111 | P165041 | Buna-N Seal |
| | 6 μm | 8.12 | 203 | P165043 | Buna-N Seal |
| | 11 μm | 4.37 | 111 | P165006 | Buna-N Seal |
| | 11 μm | 8.12 | 203 | P165015 | Buna-N Seal |
| | 12 μm | 4.37 | 111 | P167181* | Fluorocarbon Seal, High Collapse |
| | 12 μm | 8.12 | 203 | P167183* | Fluorocarbon Seal, High Collapse |
| | 23 μm | 4.37 | 111 | P165136 | Buna-N Seal |
| | 23 μm | 8.12 | 203 | P165138 | Buna-N Seal |

Filter Notes

*Utilizes DT Synteq synthetic media
Refer to the table in the Technical Reference Guide for fluid compatibility with our filter media.
If filtering petroleum-based oil, filters with seals made of Buna-N® are appropriate for most applications.
If filtering diester, phosphate ester fluids, water glycol, water/oil emulsions, or HWCF over 150°F/83°C, use filters with seals made of fluorocarbon, such as Viton®.
Donaldson "high collapse" filters, with their steel end caps and wire-backed media, are rated to withstand up to 3000 psi/ 20,700 kPa before collapsing.
The fluorocarbon seal/high collapse filters also use epoxy potting and media seam seals for added chemical compatibility.
Viton® and Buna-N® registered trademarks of E. I. DuPont de Nemours and Company.





Housing Choices

| Length | Part No. |
|--------|----------|
| Short | P167443 |
| Long | P167452 |

Head Choices

| Port Size | Bypass Rating | Indicators ¹ | Part No. |
|---------------|----------------|-----------------------------|----------|
| SAE-12 O-Ring | 50 psi/3.5 bar | Visual indicator, left side | P167728 |
| SAE-12 O-Ring | No bypass | Visual indicator, left side | P167730 |

Notes on Indicators

¹Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port.

Service Indicator Kits

All kits include indicator with mounting block

| Part No. | Use with Bypass Valve Pressure of: | Description |
|---|------------------------------------|---|
| Visual Service Indicators | | |
| P569632 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button |
| P569633 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit auto reset pop-out button |
| P567988 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button with thermal lockout and surge control |
| P567989 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* auto reset pop-out button with thermal lockout and surge control |
| AC/DC Visual/Electrical Service Indicators | | |
| P569634 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P569635 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P567986 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |
| P567987 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |

Indicator Choices

Replacement Indicator Only

| Part No. | Description |
|---------------------------------|--|
| P567458 | Visual/Electrical indicator with thermal lockout and surge, 35 psid/2.4 bar |
| P567459 | Visual/Electrical indicator, with thermal lockout and surge, 70 psid/4.8 bar |
| P567456 | Pop-Up Visual Indicator, with thermal lockout and surge, 35 psid/2.4 bar |
| P567457 | Pop-Up Visual Indicator, with thermal lockout and surge, 70 psid/4.8 bar |
| P569636 | Pop-Up Visual Indicator, 35 psid/2.4 bar |
| P569637 | Pop-Up Visual Indicator, 70 psid/4.8 bar |
| P569638 | Visual/Electrical Indicator, 35 psid/2.4 bar |
| P569639 | Visual/Electrical Indicator, 70 psid/4.8 bar |
| P164315 | Visual Indicator, bar style, 35 psid/2.4 bar |
| P166603 | Visual Indicator, bar style, 70 psid/4.8 bar |
| P166134 | Blanking plate |
| Indicator Mounting Block | |
| P573495 | Mounting Block Assembly |

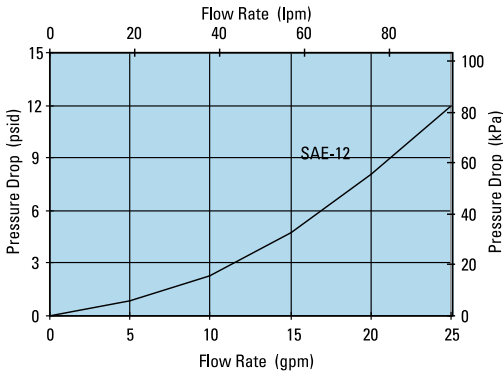


HPK02
Max Flow: 20 gpm (76 lpm)

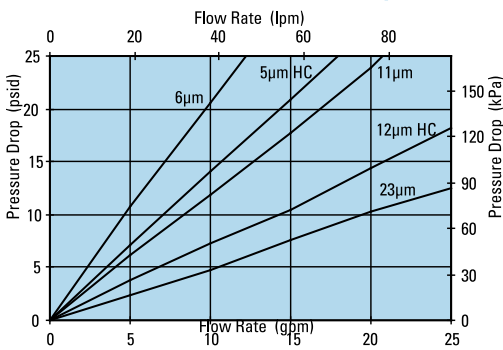


Performance Data

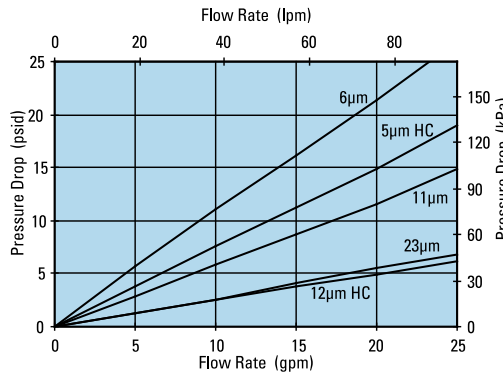
HPK02 Housing Only



HPK02 Standard 4" Filter Only

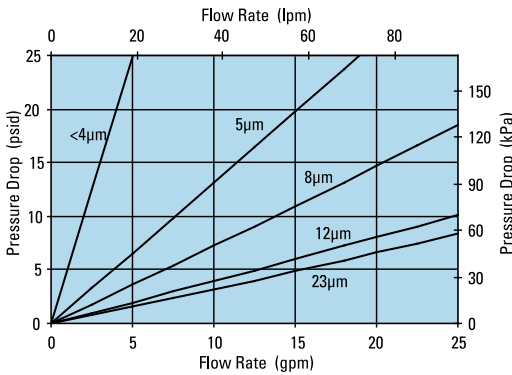


HPK02 Standard 8" Filter Only



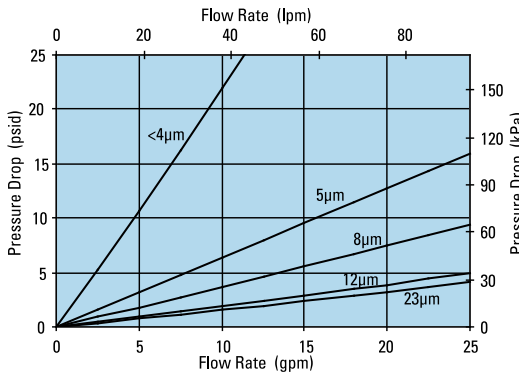
HPK02 4" DT Filter Only

DT-9020-4, 4"/102mm



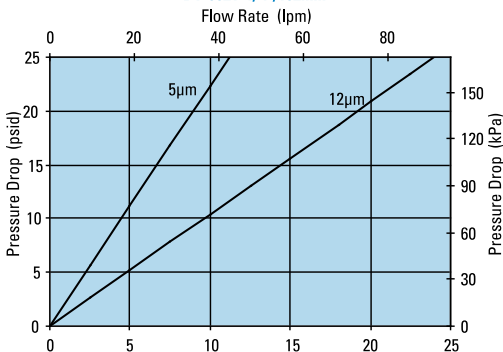
HPK02 8" DT Filter Only

DT-9020-8, 8"/203mm



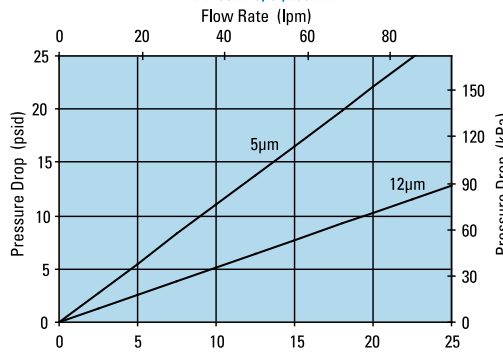
HPK02 4" DT Filter Only

DT-9021-4, 4"/102mm



HPK02 8" DT Filter Only

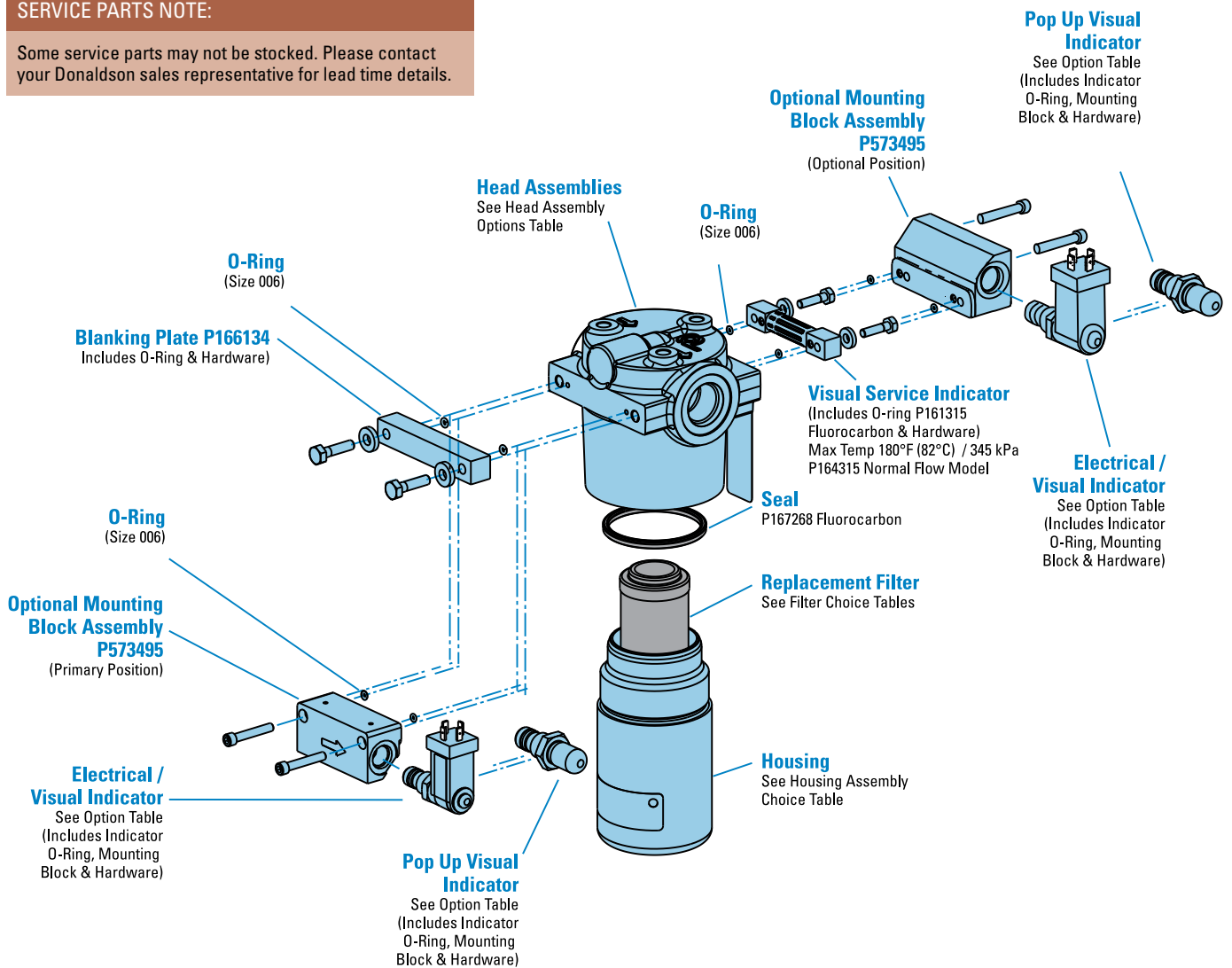
DT-9021-8, 8"/203mm



HPK02 Service Parts

SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.





DPK2400

Max Flow: 100 gpm (379 lpm)

DPK2400 In-Line Cartridge Filters

Working Pressures to: 2400 psi
16547 kPa
165.4 bar

Rated Static Burst to: 8000 psi
55157 kPa
552 bar

Flow Range To: 100 gpm
379 lpm



Applications

- In-plant Systems
- Process Fluids
- Lube Oil Systems

Features

DPK2400 duplex filter assemblies allow continuous filtration during filter servicing to avoid machine shutdown. The DPK2400 duplex design combines durable iron heads and carbon steel bowls for superior, high-strength performance. Choose between optional features such as no bypass, bypass valve, visual indicators or combination electrical/visual indicators for a customized assembly that best fits the needs of your specific application. Filter performance ranges from 5 μ to 25 μ at beta 1000 and high collapse elements are available at 5 μ and 27 μ , offering additional flexibility to achieve the filtration level your system requires.

- Head Material: Durable Iron
- Bowl Material: Carbon Steel
- Optional visual and visual / electric indicators
- Self locking transfer valve
- Automatic bleed-over valve

Beta Rating

- Performance to $\beta_{5(c)} = 1000$

Porting Size Options

- 1-1/2" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 14.62" / 371 mm

Filter Collapse Ratings

- 300 psid / 207 kPa / 20.7 bar (standard)
- 3045 psid / 2100 kPa / 210 bar (high collapse)

Assembly Weight

- 98 lbs / 20 kg

Operating Temperatures

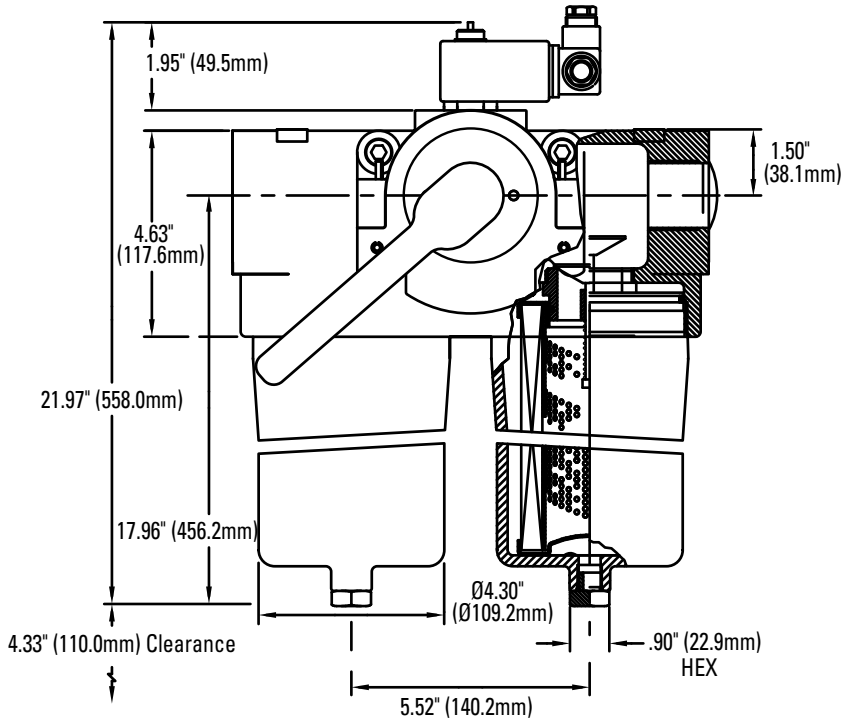
- -40° to 250°F (-40° to 121°C)

Standard Bypass Ratings

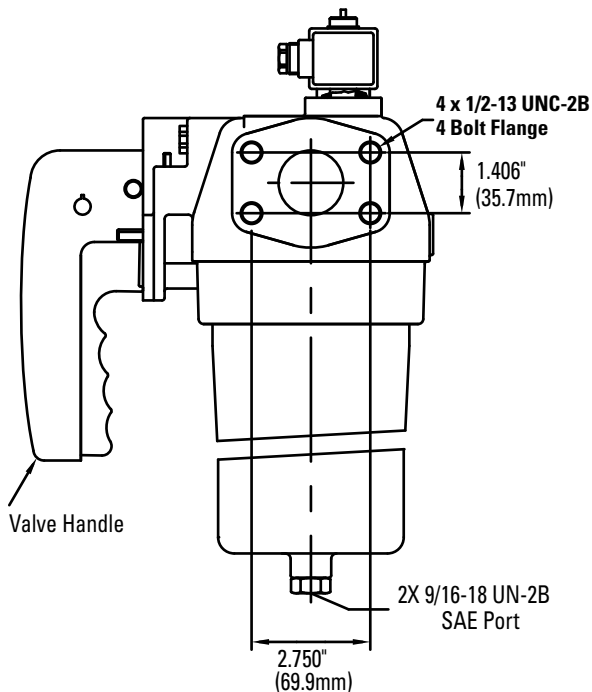
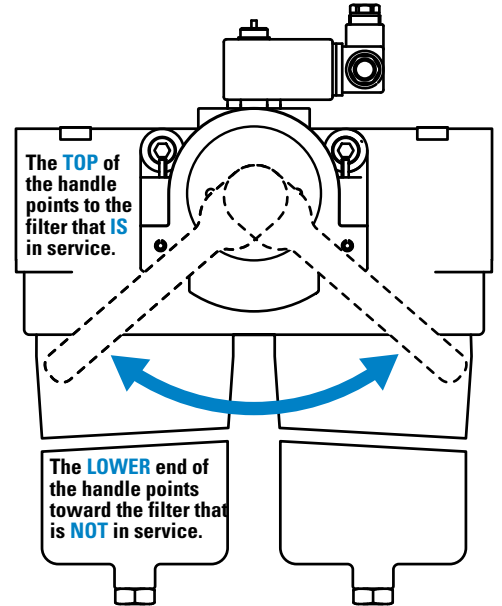
- 100 psi / 690 kPa / 6.9 bar
- No bypass

DPK2400 Specification Illustrations

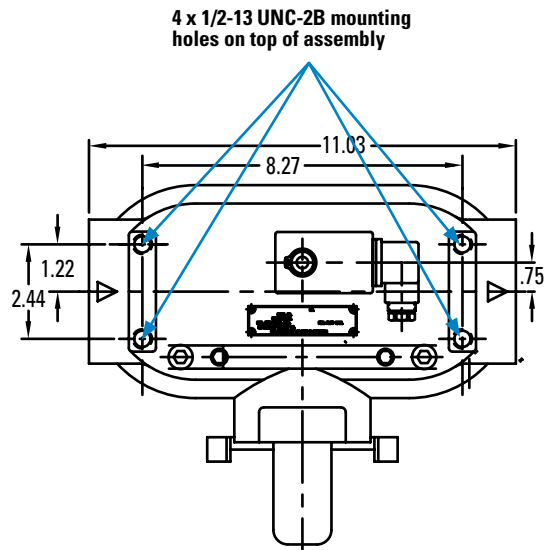
Assembly - Side Views



The handle shifts fluid flow from one filter to the other.



Head - Top View





DPK2400
Max Flow: 100 gpm (379 lpm)



DPK2400 Components

Assembly Choices

| Part No. | Port Connections | Bypass Valve | Comments |
|----------|--------------------------------|--------------------------|---|
| P577026 | 1-½" SAE 4-bolt flange code 61 | No bypass | Filter elements not included with assembly. Please select filter elements from list below |
| P577027 | 1-½" SAE 4-bolt flange code 61 | 100 psi (6.9 bar) bypass | Filter elements not included with assembly. Please select filter elements from list below |

Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------|--|--------|-----|--------------------|---------------|
| | | in | mm | | |
| DT Synteq | 5 µm | 14.62 | 371 | P567101 | |
| Synthetic | 8 µm | 14.62 | 371 | P567102 | |
| | 13 µm | 14.62 | 371 | P567103 | |
| | 23 µm | 14.62 | 371 | P567104 | |
| | 5 µm | 14.69 | 373 | P560716 | High collapse |
| | 27 µm | 14.69 | 373 | P560718 | High collapse |

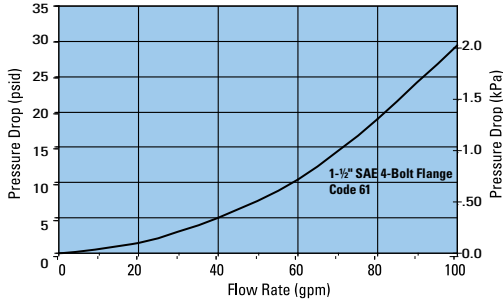
Service Indicator Choices

| Use with Bypass Valve Pressure of: | Indicator Part No. | Seal Material | Connector Style |
|------------------------------------|--------------------|---------------|-----------------|
| Visual / Electric Models | | | |
| 100 psi / 690 kPa | P577030 | Viton seal | Manual reset |
| Visual Models | | | |
| 100 psi / 690 kPa | P577031 | Viton seal | Hirschman |

Performance Data

DPK2400 Housing Only

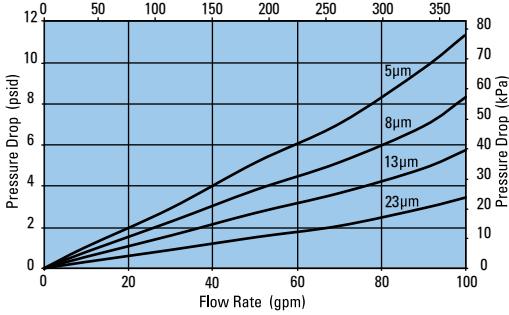
Flow Rate (lpm)



DPK2400 14" Filter Only

(DT Synthetic Synteq Media, 14.62"/371mm)

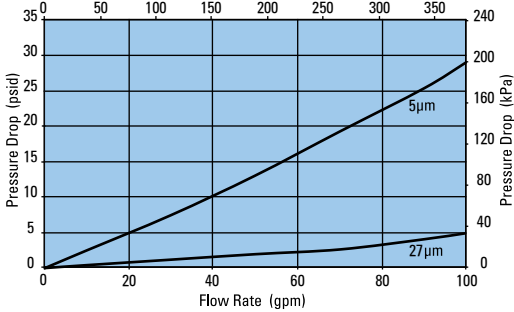
Flow Rate (lpm)



DPK240 14" High-Collapse Filter Only

(DT Synthetic Synteq Media, 14.68"/373mm)

Flow Rate (lpm)





W440
Max Flow: 20 gpm (76 lpm)



W440 In-Line Cartridge Filters

Working Pressures to: 4000 psi
27,600 kPa
276 bar

Rated Static Burst to: 10,000 psi
69,000 kPa
690 bar

Flow Range To: 20 gpm
76 lpm



Applications

- High Pressure Circuits
- In-Plant Systems
- Meets HF2 Specification
- Mobile Equipment

Features

The W440 filter assembly can be manifold mounted to the hydraulic system. The size and material configuration are well-suited for today's demanding proportional and servo valve applications. Our standard housing drain plug helps relieve system pressure during filter change-outs. DT 4-layer media is offered in a variety of designs. Five different media grades are offered. Donaldson filters core collapse options range from 150 to 3,000 psi. The differential pressure indicator line is designed to work with a wide assortment of bypass valves. Thermal lockout and surge control are two key features incorporated in many of the differential pressure indicators.

- Conforms to HF2 specifications
- High collapse filter available for use with non-bypass applications
- Positive sealing poppet bypass for reliability and zero leakage
- Wide range of indicator options
- Compact design for use with servo or proportional valve
- Two housing length options for design flexibility
- Head material: cast iron
- Housing material: steel
- Drain plug in housing

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-12 O-ring
- Manifold mounting

Replacement Filter Lengths

- 4.41" / 111.9mm
- 4.46" / 113.2mm
- 8.16" / 207.2mm
- 8.28" / 210.3mm

Top-ported for subplate mounting

- 0.69" (17.5 mm) holes
- 1.25" (31.8 mm) centers

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- 90 psi / 621 kPa / 6.2 bar
- No Bypass

Assembly Weight

- 4.41": 8.4 lbs / 3.8 kg
- 8.28": 10.6 lbs / 4.8 kg

Operating Temperatures

- -20° to 250°F (-29° to 121°C)

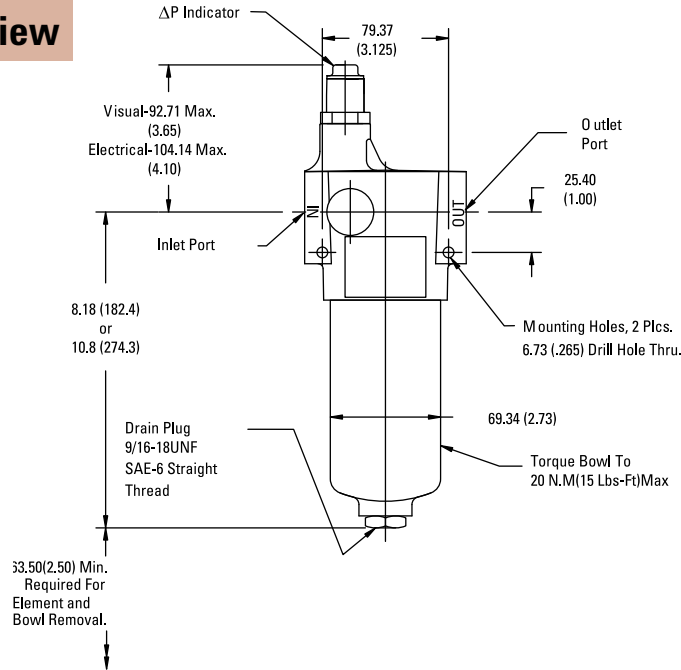
Filter Collapse Ratings

- 150 psi / 1034 kPa / 10.3 bar (standard)
- 3000 psi / 20,700 kPa / 206.8 bar (high collapse)

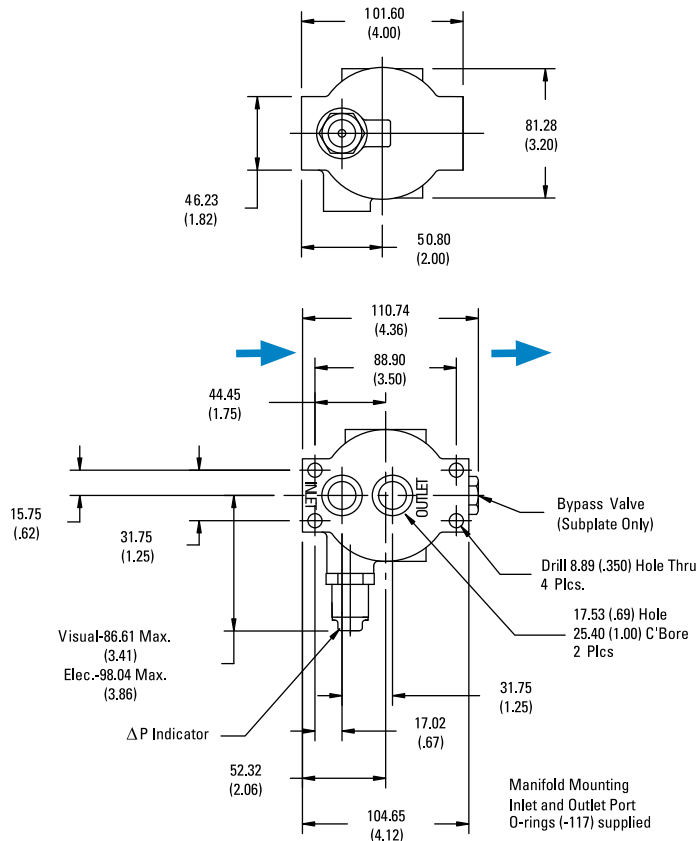
W440 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Top View





W440
Max Flow: 20 gpm (76 lpm)



W440 Components

High-Performance DT Filter Choices

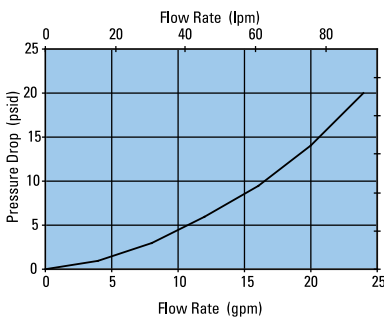
| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|---------------------|--|--------|-----|--------------------|-------------------------------|
| | | in | mm | | |
| DT Synteq Synthetic | <4 μ m | 4.41 | 112 | P566194 | DT-9020-4-2UM |
| | 5 μ m | 4.41 | 112 | P566195 | DT-9020-4-5UM |
| | 8 μ m | 4.41 | 112 | P566196 | DT-9020-4-8UM |
| | 12 μ m | 4.41 | 112 | P566197 | DT-9020-4-14UM |
| | 23 μ m | 4.41 | 112 | P566198 | DT-9020-4-25UM |
| | <4 μ m | 8.28 | 210 | P566199 | DT-9020-8-2UM |
| | 5 μ m | 8.28 | 210 | P566200 | DT-9020-8-5UM |
| | 8 μ m | 8.28 | 210 | P566201 | DT-9020-8-8UM |
| | 12 μ m | 8.28 | 210 | P566202 | DT-9020-8-14UM |
| | 23 μ m | 8.28 | 210 | P566203 | DT-9020-8-25UM |
| | 5 μ m | 4.46 | 113 | P566335 | DT-9021-4-5UM, High collapse |
| | 12 μ m | 4.46 | 113 | P566336 | DT-9021-4-14UM, High collapse |
| | 5 μ m | 8.16 | 207 | P566337 | DT-9021-8-5UM, High collapse |
| | 12 μ m | 8.16 | 207 | P566338 | DT-9021-8-14UM, High collapse |

Filter Notes

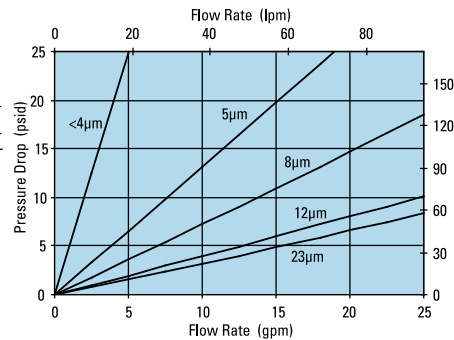
All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT filters are potted with epoxy-based adhesives. Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. High collapse designs are double wire-backed using stainless steel mesh. High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications. Viton® seals are standard on all Donaldson DT filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Performance Data

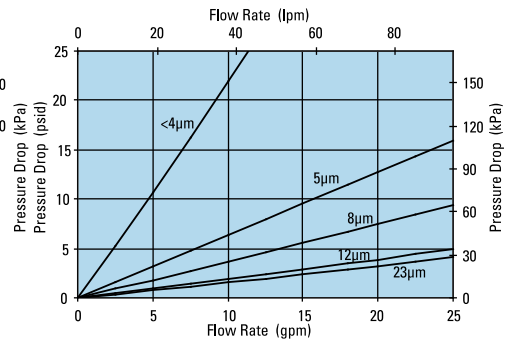
W440 Housing Only



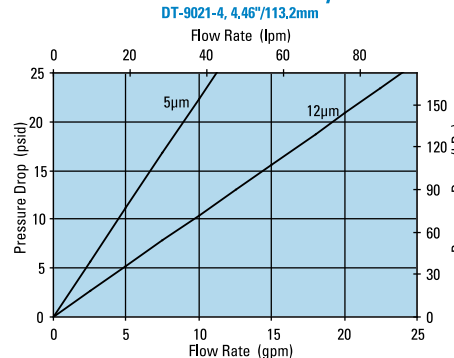
W440 4" DT Filter Only



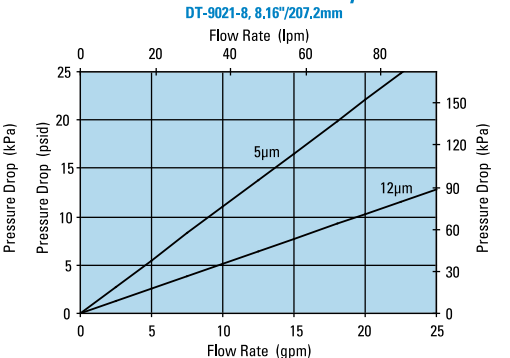
W440 8" DT Filter Only



W440 4" DT Filter Only



W440 8" DT Filter Only





Head Assembly Choices

| Port Size | Bypass Rating | Seal Material Material | Indicator Style & Location | Donaldson Part No. |
|----------------|-------------------|------------------------|----------------------------|--------------------|
| SAE-12 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574248 |
| Manifold Mount | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574249 |
| Manifold Mount | None | Viton | Port Machined & Plugged | P574250 |

Housing Choices

| Housing Length | Seal Material | Donaldson Part No. |
|----------------|---------------|--------------------|
| 4" (101.6mm) | Buna-N | X011125 |
| 8" (203.2mm) | Buna-N | X011126 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Seal Material | Donaldson Part No. | Thermal Lockout | Surge Control | Reset |
|-----------------------------------|---------------------|---------------|--------------------|-----------------|---------------|--------|
| Visual Pop-up Models | | | | | | |
| 35 psi / 241 kPa | NA | Buna-N | P572347 | No | No | Auto |
| 35 psi / 241 kPa | NA | Buna-N | P572348 | Yes | Yes | Manual |
| 35 psi / 241 kPa | NA | Viton | P567456 | Yes | Yes | Manual |
| 70 psi / 482 kPa | NA | Buna-N | P572319 | Yes | Yes | Manual |
| 70 psi / 482 kPa | NA | Viton | P567457 | Yes | Yes | Manual |
| 100 psi / 690 kPa | NA | Buna-N | P572353 | Yes | Yes | Manual |
| 100 psi / 690 kPa | NA | Viton | P572354 | Yes | Yes | Manual |
| Electrical / Visual Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572327 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572329 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572384 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Hirschman | Viton | P567458 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572385 | Yes | Yes | Manual |
| 35 psi / 241 kPa | 3 wire flying leads | Buna-N | P572349 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572320 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Brad Harrison | Buna-N | P567459 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572373 | Yes | No | Manual |
| 70 psi / 482 kPa | Hirschman | Viton | P569639 | Yes | No | Manual |
| 100 psi / 690 kPa | Hirschman | Buna-N | P572387 | Yes | Yes | Manual |
| Electrical Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572359 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572361 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572369 | No | No | Auto |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011172 | Buna |
| X011173 | Viton |



FPK02
Max Flow: 25 gpm (95 lpm)

FPK02 In-Line Cartridge Filters

Working Pressures to: 6090 psi
42,021 kPa
420 bar

Rated Static Burst to: 9135 psi
63,000 kPa
630 bar

Flow Range To: 25 gpm
95 lpm



Features

The FPK02 is built to withstand pressures of over 6000 psi (420 bar). It features a cast iron head and cold-extruded steel housing for ultimate strength and durability. This filter meets the HF2 in-plant automotive specification.

Bypass options include 87 psi/6 bar bypass, bypass with reverse-flow check valve, or no bypass.

Take advantage of our mix and match system of in-stock heads, housings and cartridges, so you can get exactly what you need. You can also choose the media type and configuration that's best for your application. All FPK02 filters contain Synteq™, Donaldson's exclusive synthetic fiber media formulated especially for hydraulic filtration.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-12 O-ring

Replacement Filter Lengths

- 4.41" / 111.9mm
- 4.46" / 113.2mm
- 8.16" / 207.2mm
- 8.28" / 210.3mm

Operating Temperatures

- -20°F to 250°F / -29°C to 120°C

Standard Bypass Ratings

- 87 psi / 600 kPa / 6 bar
- 87 psi Bypass with reverse-flow check valve
- No Bypass

Assembly Weight

- 4.41" Assembly: 9.2 lbs / 4.2 kg
- 8.28" Assembly: 13.2 lbs / 6.0 kg

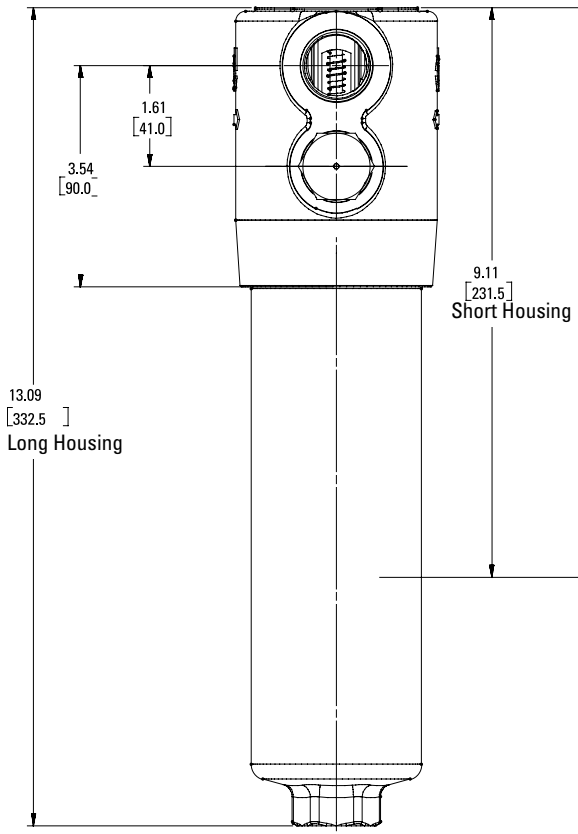
Filter Collapse Ratings

- 290 psi / 2000 kPa / 20 bar (standard)
- 3000 psi / 20,700 kPa / 207 bar (high collapse)

FPK02 Specification Illustrations

All dimensions are shown in inches [millimeters].

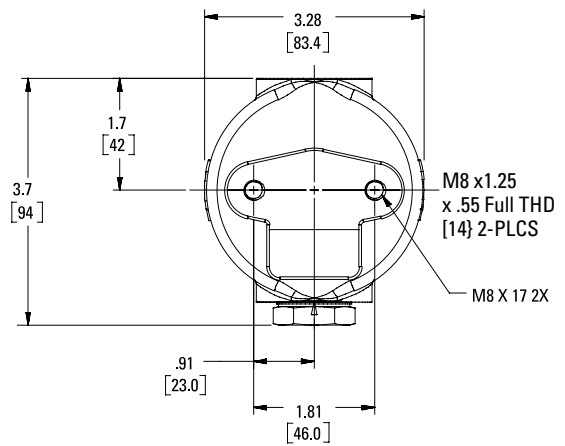
Assembly - Side View



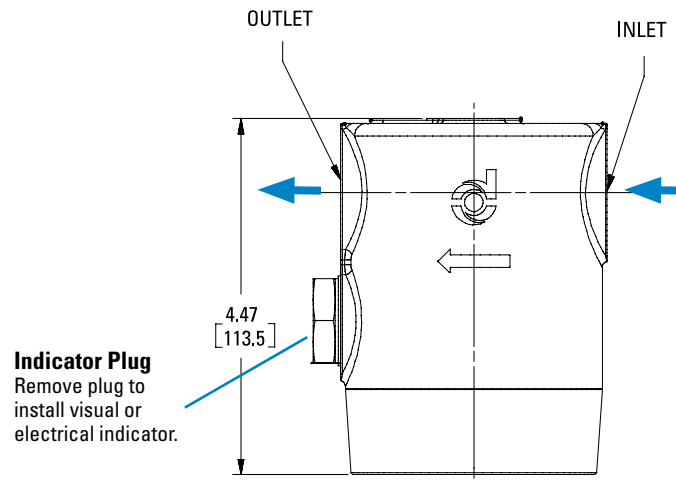
Applications

- High Pressure Circuits
- In-Plant Systems
- Meets HF2 Specification
- Mobile Equipment
- Power Steering Circuits
- Servo Valve Circuits

Head - Top View



Head - Side View



All dimensions above are shown in inches [millimeters]



FPK02
Max Flow: 25 gpm (95 lpm)



FPK02 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|---------------------|--|--------|-----|--------------------|-------------------------------|
| | | in | mm | | |
| DT Synteq Synthetic | <4 μm | 4.41 | 112 | P566194 | DT-9020-4-2UM |
| | 5 μm | 4.41 | 112 | P566195 | DT-9020-4-5UM |
| | 8 μm | 4.41 | 112 | P566196 | DT-9020-4-8UM |
| | 12 μm | 4.41 | 112 | P566197 | DT-9020-4-14UM |
| | 23 μm | 4.41 | 112 | P566198 | DT-9020-4-25UM |
| | <4 μm | 8.28 | 210 | P566199 | DT-9020-8-2UM |
| | 5 μm | 8.28 | 210 | P566200 | DT-9020-8-5UM |
| | 8 μm | 8.28 | 210 | P566201 | DT-9020-8-8UM |
| | 12 μm | 8.28 | 210 | P566202 | DT-9020-8-14UM |
| | 23 μm | 8.28 | 210 | P566203 | DT-9020-8-25UM |
| | 5 μm | 4.46 | 113 | P566335 | DT-9021-4-5UM, High collapse |
| | 12 μm | 4.46 | 113 | P566336 | DT-9021-4-14UM, High collapse |
| | 5 μm | 8.16 | 207 | P566337 | DT-9021-8-5UM, High collapse |
| | 12 μm | 8.16 | 207 | P566338 | DT-9021-8-14UM, High collapse |

Filter Notes

All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT filters are potted with epoxy-based adhesives. Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. High collapse designs are double wire-backed using stainless steel mesh. High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications. Viton® seals are standard on all Donaldson DT filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.



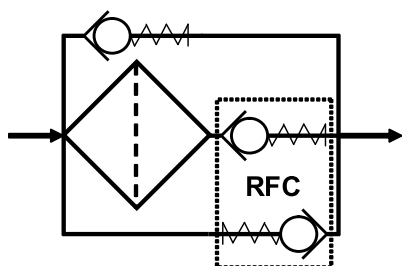
Housing Choices

| Length (in.) | Part No. |
|--------------|----------|
| 4.4" filter | P762769 |
| 8.2" filter | P762770 |

Head Choices

| Port Size | Bypass Rating | Part No. |
|---|----------------|----------|
| SAE-12 O-Ring | 87 psi / 6 bar | P762766 |
| SAE-12 O-Ring with reverse-flow check valve | 87 psi / 6 bar | P762767 |
| SAE-12 O-Ring | No Bypass | P762768 |

NOTE: Indicator port is machined and plugged. Replace plug with indicator of choice: P171945 (visual) or P761056 (electrical).



Reverse Flow Check Schematic



Standard Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------------|--|--------|-----|--------------------|----------------------------------|
| | | in | mm | | |
| Synteq Synthetic | 5 μm | 4.37 | 111 | P167180* | Fluorocarbon Seal, High Collapse |
| | 5 μm | 8.12 | 203 | P167182* | Fluorocarbon Seal, High Collapse |
| | 6 μm | 4.37 | 111 | P165041 | Buna-N Seal |
| | 6 μm | 8.12 | 203 | P165043 | Buna-N Seal |
| | 11 μm | 4.37 | 111 | P165006 | Buna-N Seal |
| | 11 μm | 8.12 | 203 | P165015 | Buna-N Seal |
| | 12 μm | 4.37 | 111 | P167181* | Fluorocarbon Seal, High Collapse |
| | 12 μm | 8.12 | 203 | P167183* | Fluorocarbon Seal, High Collapse |
| | 23 μm | 4.37 | 111 | P165136 | Buna-N Seal |
| | 23 μm | 8.12 | 203 | P165138 | Buna-N Seal |

Filter Notes

*Utilizes DT Synteq synthetic media

Refer to the table in the Technical Reference Guide for fluid compatibility with our filter media.

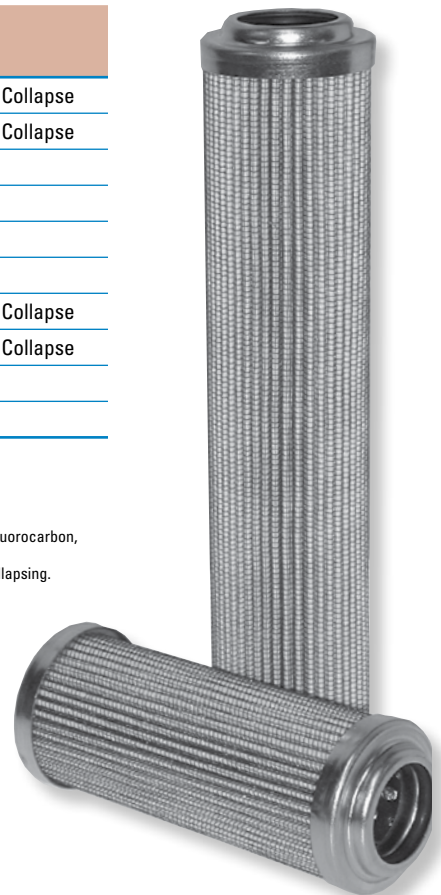
If you're filtering petroleum-based oil, filters with seals made of Buna-N are appropriate for most applications.

If you're filtering diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF over 150°F/83°C, use filters with seals made of fluorocarbon, such as Viton® from DuPont Dow Elastomers, or Fluorel® from 3M Company.

Donaldson "high collapse" filters, with their steel end caps and wire-backed media, are rated to withstand up to 3000 psi/ 20,700 kPa before collapsing.

The fluorocarbon seal/high collapse filters also use epoxy potting and media seam seals for added chemical compatibility.

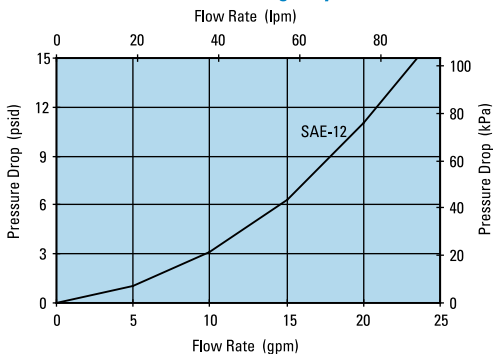
Viton® and Buna-N® registered trademarks of E. I. DuPont de Nemours and Company.





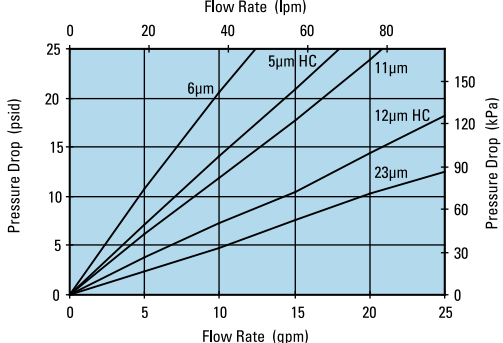
Performance Data

FPK02 Housing Only



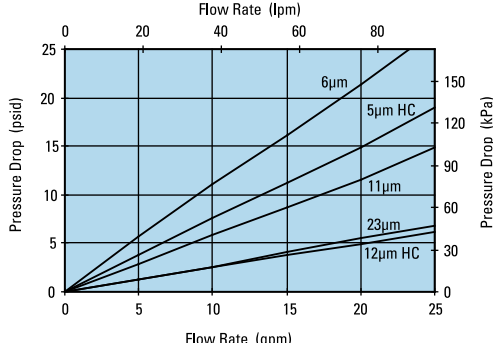
FPK02 Standard 4" Filter Only

4.37"/111mm



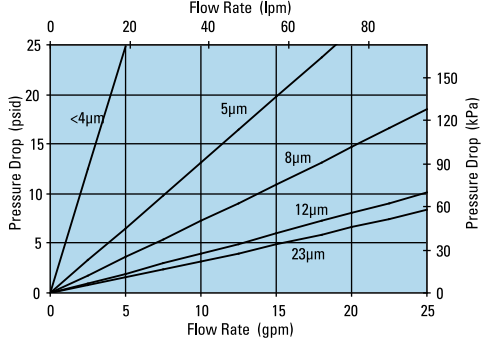
FPK02 Standard 8" Filter Only

8.12"/203mm



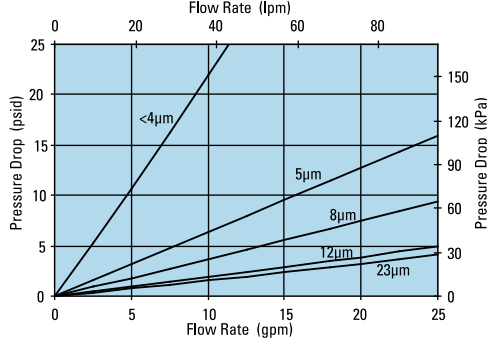
FPK02 4" DT Filter Only

DT-9020-4, 4.41"/111.9mm



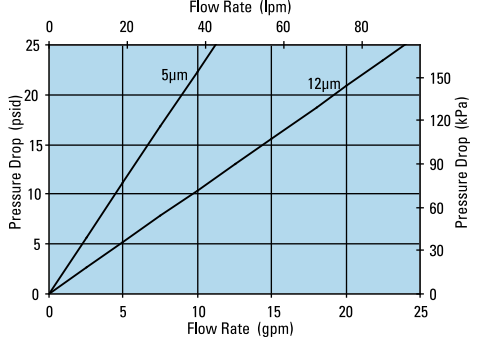
FPK02 8" DT Filter Only

DT-9020-8, 8.28"/210.3mm



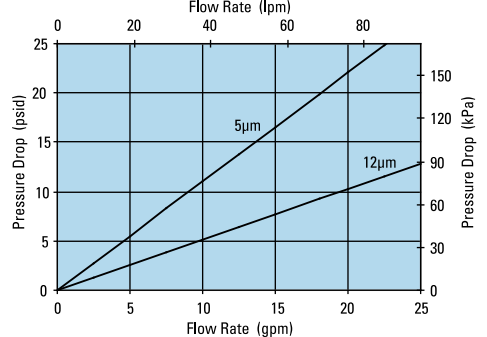
FPK02 4" DT Filter Only

DT-9021-4, 4.46"/113.2mm



FPK02 8" DT Filter Only

DT-9021-8, 8.16"/207.2mm

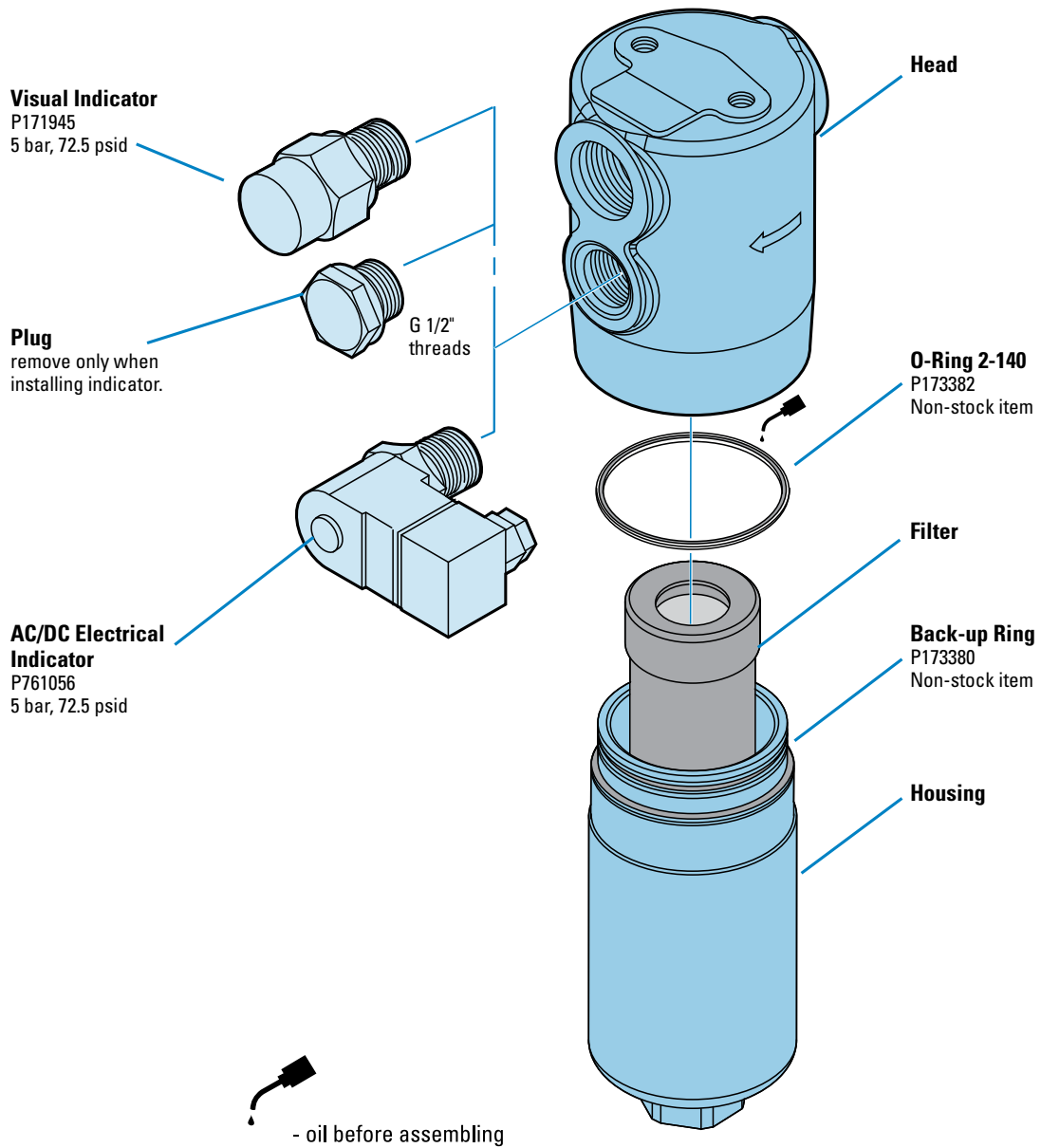


FPK02 Service Parts

When installing the FPK02 housing onto an installed head, torque it to 15 ft-lbs./2.1 kg-m.

SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.





W350

Max Flow: 50 gpm (189 lpm)



W350 In-Line Cartridge Filters

Working Pressures to: 3000 psi
21,000 kPa
210 bar

Rated Static Burst to: 7500 psi
51,700 kPa
517 bar

Fatigue Pressure Rating: 1500 psi
10,000 kPa
100 bar

Flow Range To: 50 gpm
189 lpm



Applications

- High Pressure Circuits
- In-Plant Systems
- Meets HF3 Specification
- Mobile Equipment

Features

The W350 T-type ported series offers flows up to 50 gpm (190 lpm) with 3 bypass options and conforms to the HF3 automotive standard. Our standard housing drain plug helps relieve system pressure during filter changeouts. DT 4-layer media is offered in a variety of designs. Five different media grades are offered. Donaldson filters core collapse options range from 150 to 3,000 psi (10 to 210 bar). The differential pressure indicator line is designed to work with the wide assortment of bypass valves. Thermal lockout and surge control are two key features incorporated in many of the differential pressure indicators.

- Conforms to HF3 specifications
- High collapse filter available for use with non-bypass applications
- Wide range of indicator options
- Two housing length options for design flexibility
- Head material: cast iron
- Housing material: steel
- Drain plug in housing
- Bleed plug in head

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-16 O-ring

Replacement Filter Lengths

- 4.59" / 116.7mm
- 8.22" / 208.8mm

Filter Collapse Ratings

- 150 psi / 1034 kPa / 10.3 bar (standard)
- 3000 psi / 20,700 kPa / 206.8 bar (high collapse)

Standard Bypass Ratings

- 25 psi / 173 kPa / 1.7 bar
- 50 psi / 345 kPa / 3.5 bar
- 90 psi / 621 kPa / 6.2 bar
- No Bypass

Assembly Weight

- 4.59": 20 lbs / 9.07 kg
- 8.22": 26 lbs / 11.79 kg

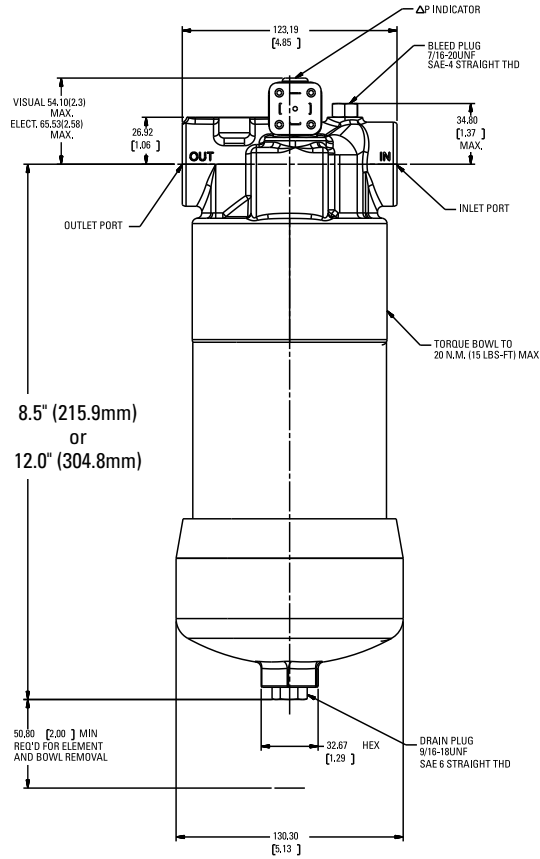
Operating Temperatures

- -20° to 250°F (-29° to 121°C)

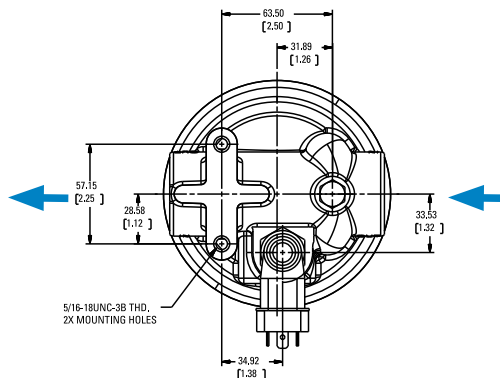
W350 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Top View





W350 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length in mm | Donaldson Part No. | Comments |
|---------------------|---|-----------------------|-----------------|-----------------------|--------------------------------|
| DT Synteq Synthetic | | <4 μm | 4.59 117 | P566204 | DT-9600-4-2UM |
| | | 5 μm | 4.59 117 | P566205 | DT-9600-4-5UM |
| | | 8 μm | 4.59 117 | P566206 | DT-9600-4-8UM |
| | | 12 μm | 4.59 117 | P566207 | DT-9600-4-14UM |
| | | 23 μm | 4.59 117 | P566208 | DT-9600-4-25UM |
| | | 5 μm | 4.56 116 | P566364 | DT-9601-4-5UM, High collapse |
| | | 12 μm | 4.56 116 | P566365 | DT-9601-4-14UM, High collapse |
| | | <4 μm | 8.22 209 | P566209 | DT-9600-8-2UM |
| | | 5 μm | 8.22 209 | P566210 | DT-9600-8-5UM |
| | | 8 μm | 8.22 209 | P566211 | DT-9600-8-8UM |
| | | 12 μm | 8.22 209 | P566212 | DT-9600-8-14UM |
| | | 23 μm | 8.22 209 | P566213 | DT-9600-8-25UM |
| | | 5 μm | 8.19 208 | P566366 | DT-9601-8-5UM, High collapse |
| | | 12 μm | 8.19 208 | P566367 | DT-9601-8-14UM, High collapse |
| | | <4 μm | 8.22 209 | P567875 | DX2-9600-8-2UM |
| | | 5 μm | 8.22 209 | P565122 | DX2-9600-8-5UM |
| | | 8 μm | 8.22 209 | P565123 | DX2-9600-8-8UM |
| | | 14 μm | 8.22 209 | P564936 | DX2-9600-8-14UM |
| Water Absorbing | 10 μm | | 8 209 | P569528 | Absorbs 130 ml water @ 25 psid |

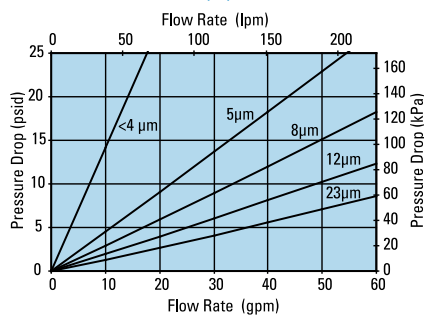


Filter Notes

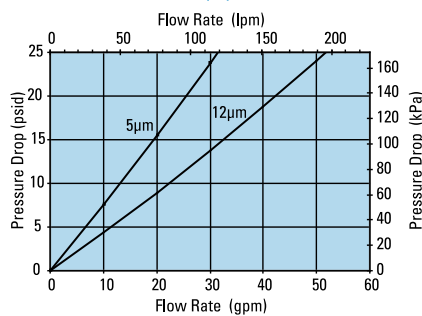
All Donaldson DT and DX2 filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT and DX2 filters are potted with epoxy-based adhesives. Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. High collapse designs are double wire-backed using stainless steel mesh. High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications. Viton® seals are standard on all Donaldson DT and DX2 filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company. DX2 filters utilize nylon mesh for pleat support.

Performance Data

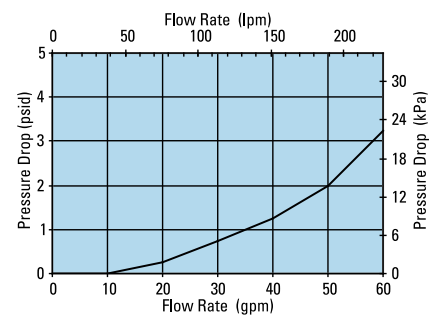
W350 4" DT Filter Only
DT-9600-4, 4"/102mm



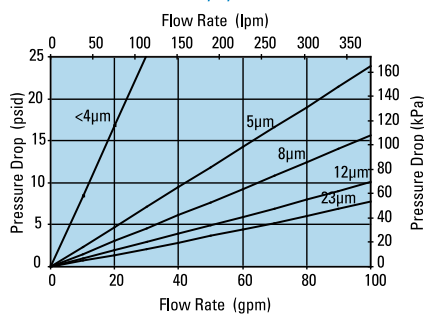
W350 4" DT Filter Only
DT-9601-4, 4"/102mm



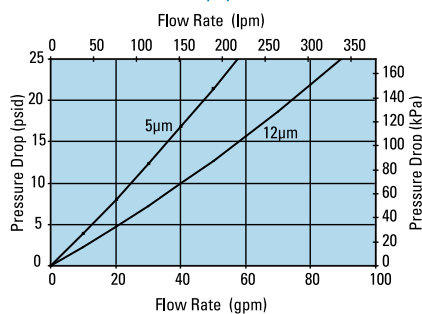
W350 Housing Only



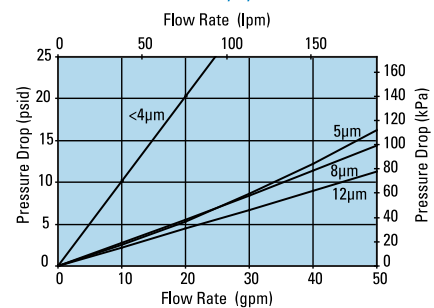
W350 8" DT Filter Only
DT-9600-8, 8"/203mm



W350 8" DT Filter Only
DT-9601-8, 8"/203mm



W350 8" DT Filter Only
DX2-9600-8, 8"/203mm





Head Assembly Choices

| Port Size | Bypass Rating | Seal Material Material | Indicator Style & Location | Donaldson Part No. |
|---------------|-------------------|------------------------|----------------------------|--------------------|
| SAE-16 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574245 |
| SAE-16 O-ring | 90 psi / 6.21 bar | Buna-N | Port Machined & Plugged | P574246 |
| SAE-16 O-ring | None | Buna-N | Port Machined & Plugged | P574247 |

Housing Choices

| Housing Length | Seal Material | Donaldson Part No. |
|----------------|---------------|--------------------|
| 4" (101.6mm) | Buna-N | X011556 |
| 8" (203.2mm) | Buna-N | X011558 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Seal Material | Donaldson Part No. | Thermal Lockout | Surge Control | Reset |
|-----------------------------------|---------------------|---------------|--------------------|-----------------|---------------|--------|
| Visual Pop-up Models | | | | | | |
| 35 psi / 241 kPa | NA | Buna-N | P572347 | No | No | Auto |
| 35 psi / 241 kPa | NA | Buna-N | P572348 | Yes | Yes | Manual |
| 35 psi / 241 kPa | NA | Viton | P567456 | Yes | Yes | Manual |
| 70 psi / 482 kPa | NA | Buna-N | P572319 | Yes | Yes | Manual |
| 70 psi / 482 kPa | NA | Viton | P567457 | Yes | Yes | Manual |
| 100 psi / 690 kPa | NA | Buna-N | P572353 | Yes | Yes | Manual |
| 100 psi / 690 kPa | NA | Viton | P572354 | Yes | Yes | Manual |
| Electrical / Visual Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572327 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572329 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572384 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Hirschman | Viton | P567458 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572385 | Yes | Yes | Manual |
| 35 psi / 241 kPa | 3 wire flying leads | Buna-N | P572349 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572320 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Brad Harrison | Buna-N | P567459 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572373 | Yes | No | Manual |
| 70 psi / 482 kPa | Hirschman | Viton | P569639 | Yes | No | Manual |
| 100 psi / 690 kPa | Hirschman | Buna-N | P572387 | Yes | Yes | Manual |
| Electrical Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572359 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572361 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572369 | No | No | Auto |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011170 | Buna |
| X011171 | Viton |



HPK03
Max Flow: 60 gpm (227 lpm)



HPK03 In-Line Cartridge Filters

Working Pressures to: 3000 psi
20,700 kPa
206.9 bar

Rated Static Burst to: 6000 psi
41,400 kPa
413.8 bar

Flow Range To: 60 gpm
227 lpm



Features

The sturdy HPK03 filter is constructed of ductile iron for durability in high pressure applications. Standard housing drain plug means simplified servicing. Housing includes a fluoroelastomer head-to-housing seal. Meets HF3 specification.

Take advantage of our mix and match system of in-stock heads and cartridges—so you can get exactly what you need. HPK03 is available with your choice of visual or AC/DC electrical indicators. Likewise, choose the bypass option that's right for your application—50 psi (3.5 bar) or no bypass. Seals made of fluorocarbon (such as Viton® and Fluorel®) or Buna-N are available with HPK03.

All HPK03 filters contain Synteq™, our synthetic filter media designed especially for hydraulic filtration. Upgraded Donaldson DT filters are also offered for superior performance.

Viton® is a registered trademark of E. I. DuPont de Nemours and Company.
Fluorel® is a registered trademark of 3M Company.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-12, SAE-16 O-ring

Replacement Filter Lengths

- 8.22" / 208.8mm

Assembly Weight

- 26 lbs / 11.8 kg

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- No Bypass

Operating Temperatures

- -20°F to 250°F / -29°C to 121°C

Filter Collapse Ratings

- 200 psi / 1380 kPa / 13.8 bar (standard)
- 3000 psi / 20,700 kPa / 206.9 bar (high collapse)

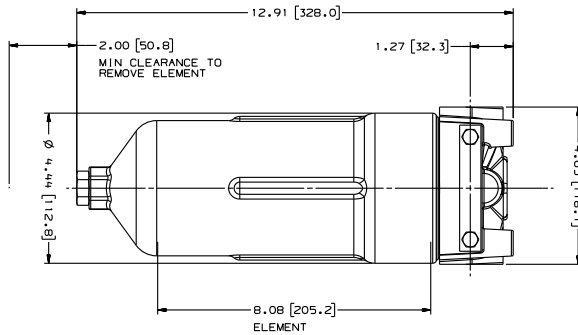
HPK03 Specification Illustrations

All dimensions are shown in inches [millimeters].

Applications

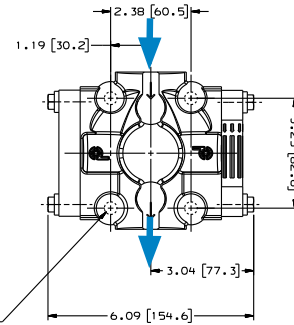
- High Pressure Circuits
- In-Plant Systems
- Meets HF3 Specification
- Mobile Equipment
- Servo Valve Circuits

Assembly - Side View

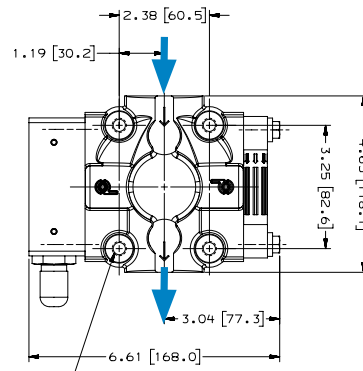
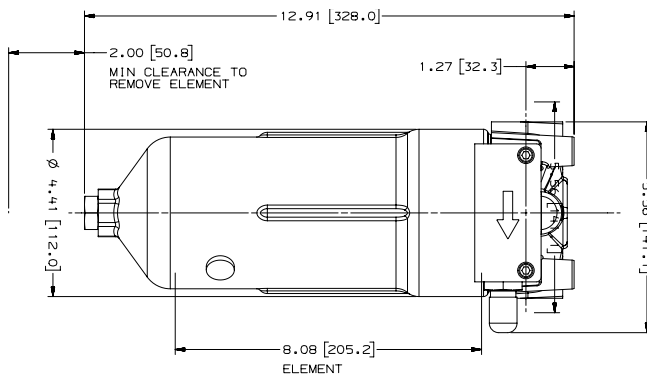


3/8-16 UNC-2B x .69 [17.5]
MIN FULL THD 4 PLACES

Head - Top View

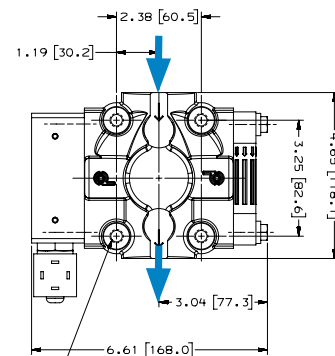
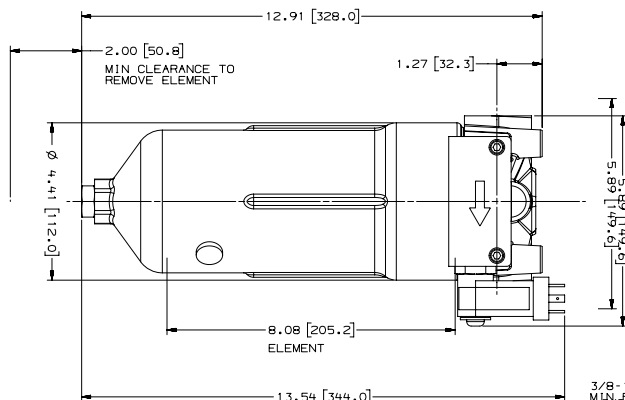


HPK03 with Visual Service Indicator



3/8-16 UNC-2B x .69 [17.5]
MIN FULL THD 4 PLACES

HPK03 with AC/DC Electrical Service Indicator



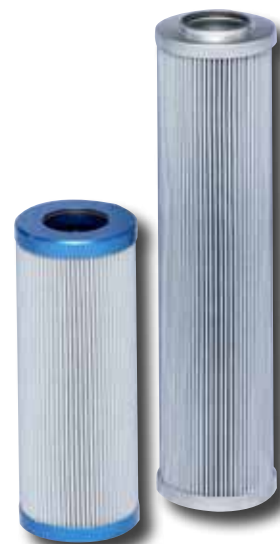
3/8-16 UNC-2B x .69 [17.5]
MIN FULL THD 4 PLACES



HPK03 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------|--|--------|-----|--------------------|-------------------------------|
| | | in | mm | | |
| DT Synteq | <4 μm | 8.22 | 209 | P566209 | DT-9600-8-2UM |
| Synthetic | 5 μm | 8.22 | 209 | P566210 | DT-9600-8-5UM |
| | 8 μm | 8.22 | 209 | P566211 | DT-9600-8-8UM |
| | 12 μm | 8.22 | 209 | P566212 | DT-9600-8-14UM |
| | 23 μm | 8.22 | 209 | P566213 | DT-9600-8-25UM |
| | 5 μm | 8.19 | 208 | P566366 | DT-9601-8-5UM, High collapse |
| | 12 μm | 8.19 | 208 | P566367 | DT-9601-8-14UM, High collapse |
| | <4 μm | 8.22 | 209 | P567875 | DX2-9600-8-2UM |
| | 5 μm | 8.22 | 209 | P565122 | DX2-9600-8-5UM |
| | 8 μm | 8.22 | 209 | P565123 | DX2-9600-8-8UM |
| | 12 μm | 8.22 | 209 | P564936 | DX2-9600-8-14UM |



Filter Notes

All Donaldson DT and DX2 filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT and DX2 filters are potted with epoxy-based adhesives. DX2 filters utilize nylon mesh for pleat support. Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. High collapse designs are double wire-backed using stainless steel mesh. High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications. Viton® seals are standard on all Donaldson DT and DX2 filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Standard Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------|-----|--------------------|--|
| | | | in | mm | | |
| Synteq Synthetic | | 5 μm | 8.22 | 209 | P167185* | Viton®, High collapse for no bypass applications |
| | | 6 μm | 8.22 | 209 | P164594 | Buna-N |
| | | 11 μm | 8.22 | 209 | P164166 | Buna-N |
| | | 12 μm | 8.22 | 209 | P167186* | Viton, High collapse for no bypass applications |
| | | 23 μm | 8.22 | 209 | P164174 | Buna-N |
| | | 50 μm | 8.22 | 209 | P165319 | Buna-N |
| Water Absorbing | 10 μm | | 8.22 | 209 | P569528 | |
| Wire Mesh | 75 μm | | 8.22 | 209 | P162233 | |

Filter Notes

* Utilizes DT Synteq synthetic media
SEALS: Filters with seals made of Buna-N® are appropriate for most applications involving petroleum oil. Filters with seals made of Viton® (a fluor elastomer) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F/83°C. Refer to table in the Technical Reference Guide for fluid compatibility with our filter media. Donaldson high collapse filters are physically designed to withstand up to 3000 psi / 20,700 kPa before collapsing. The Viton® high collapse filter versions also use epoxy potting and media seam seals for added chemical compatibility. Viton® and Buna-N® registered trademarks of E. I. DuPont de Nemours and Company.





Housing Choices

| Length | Part No. |
|------------------------|----------|
| 8.22" (208.8mm) filter | P179579 |

The **P179579** housing is 10.73 inches (273mm) long and accepts the filter that is 8.22 inches (208.8mm) long. It includes a head-to-housing seal.

Head Choices

| Port Size | Bypass Rating | Indicators ¹ | Part No. |
|---------------|------------------|-----------------------------|----------|
| SAE-16 O-Ring | 50 psi / 3.5 bar | Visual indicator, left side | P166353 |
| SAE-12 O-Ring | 50 psi / 3.5 bar | Visual indicator, left side | P170489 |
| SAE-12 O-Ring | No bypass | Visual indicator, left side | P170491 |

Notes

¹Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port.

Service Indicator Kits

All kits include indicator with mounting block

| Part No. | Use with Bypass Valve Pressure of: | Description |
|---|------------------------------------|---|
| Visual Service Indicators | | |
| P569632 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button |
| P569633 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit auto reset pop-out button |
| P567988 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button with thermal lockout and surge control |
| P567989 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* auto reset pop-out button with thermal lockout and surge control |
| AC/DC Visual/Electrical Service Indicators | | |
| P569634 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P569635 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P567986 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |
| P567987 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |

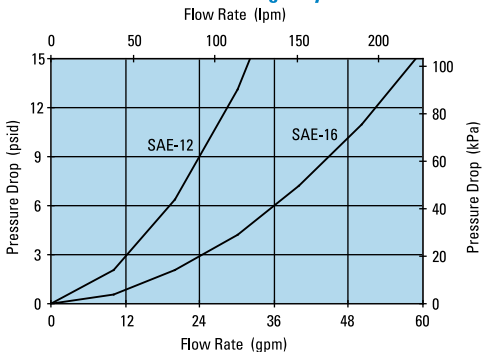
Indicator Choices

| Part No. | Description |
|-----------------------------------|---|
| Replacement Indicator Only | |
| P567458 | Visual/Electrical indicator with thermal lockout and surge, 35 psid/2.4 bar |
| P567459 | Visual/Electrical indicator, with thermal lockout and surge 70 psid/4.8 bar |
| P567456 | Pop-Up Visual Indicator, with thermal lockout and surge 35 psid/2.4 bar |
| P567457 | Pop-Up Visual Indicator, with thermal lockout and surge 70 psid/4.8 bar |
| P569636 | Pop-Up Visual Indicator, 35 psid/2.4 bar |
| P569637 | Pop-Up Visual Indicator, 70 psid/4.8 bar |
| P569638 | Visual/Electrical Indicator, 35 psid/2.4 bar |
| P569639 | Visual/Electrical Indicator, 70 psid/4.8 bar |
| P164315 | Visual Indicator, bar style, 35 psid/2.4 bar |
| P166603 | Visual Indicator, bar style, 70 psid/4.8 bar |
| P166134 | Blanking plate |
| Indicator Mounting Block | |
| P573495 | Mounting Block Assembly |

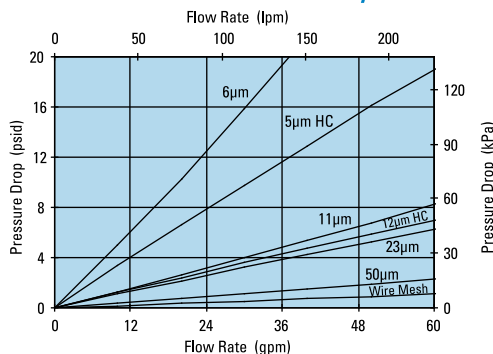


Performance Data

HPK03 Housing Only

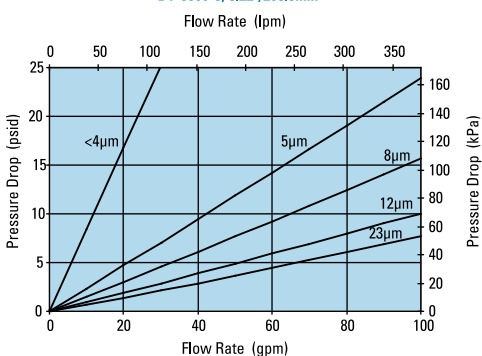


HPK03 8" Standard Filter Only



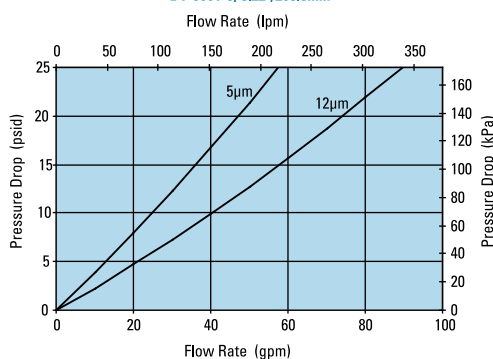
HPK03 8" DT Filter Only

DT-9600-8, 8.22"/208.8mm



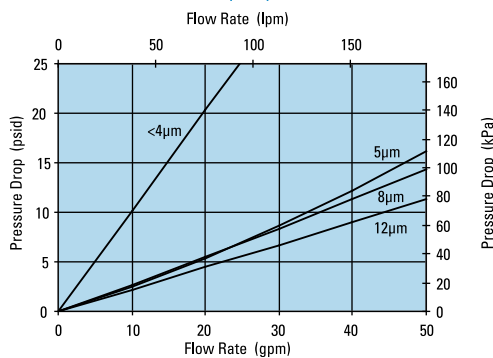
HPK03 8" DT Filter Only

DT-9601-8, 8.22"/208.8mm



W350 8" DX2 Filter Only

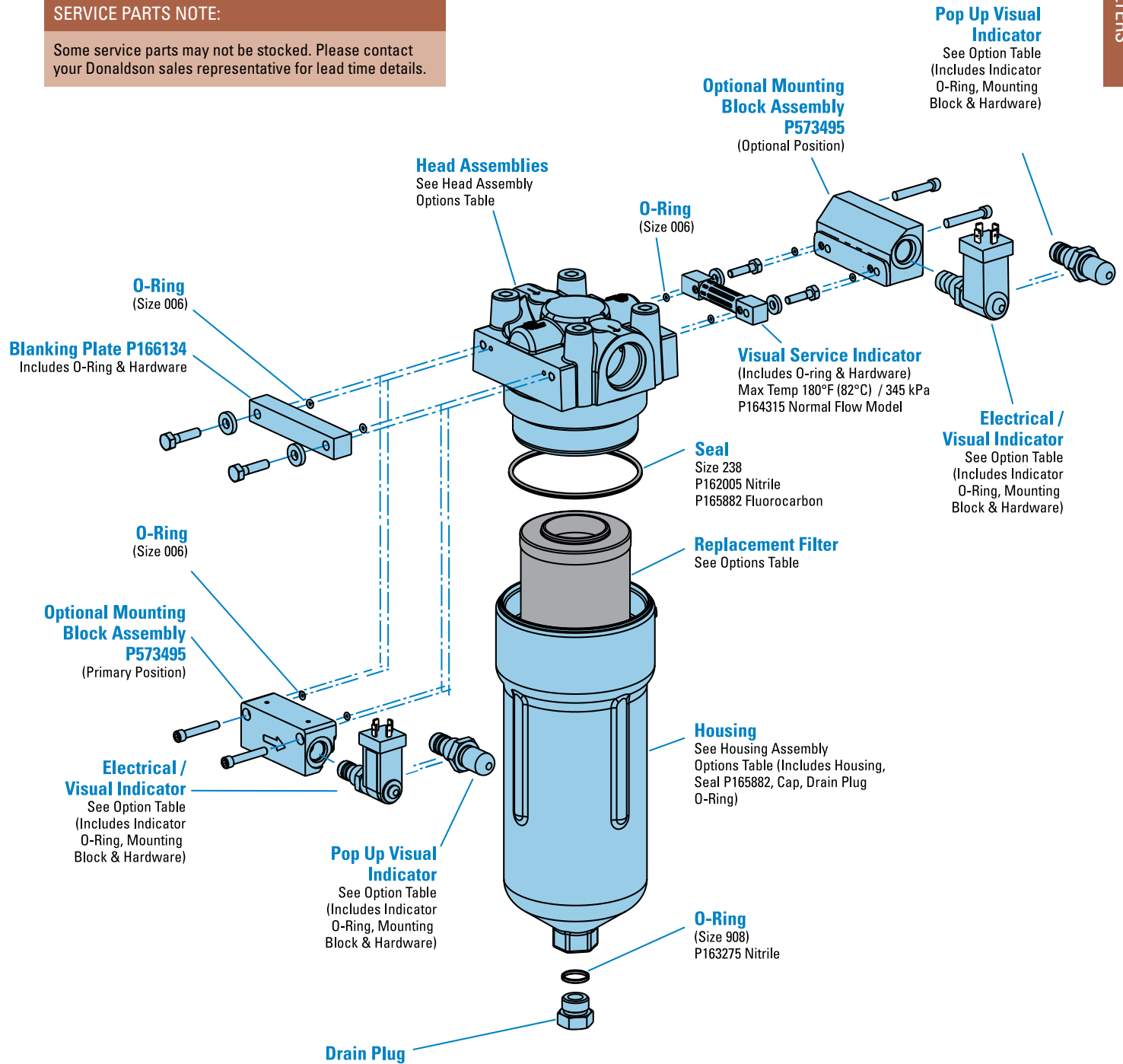
DX2-9600-8, 8.22"/208.8mm



HPK03 Service Parts

SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.





FPK04

Max Flow: 100 gpm (379 lpm)



FPK04 In-Line Cartridge Filters

Working Pressures to: 4350 psi
30,015 kPa
300 bar

Rated Static Burst to: 9135 psi
63,000 kPa
630 bar

Flow Range To: 100 gpm
379 lpm



Features

The FPK04 T-type ported series offers flows up to 100 gpm (379 lpm) with a bypass option and conforms to the HF3 automotive standard.

Donaldson Synteq™ media is offered in a variety of designs. Upgraded Donaldson high-performance DT filters are also offered for superior performance. The differential pressure indicator line is designed to work with the wide assortment of bypass valve options.

- Conforms to HF3 specifications
- High collapse filters available for use with non-bypass applications
- Wide range of indicator options
- Three housing length options for design flexibility
- Buna-N® seals standard, Viton® available
- Head material: cast iron
- Housing material: steel

Viton® and Buna-N® are registered trademarks of E. I. DuPont de Nemours and Company.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-20 O-Ring

Standard Replacement Filter Lengths

- 4.58" / 116.3mm
- 4.62" / 117.3mm
- 8.20" / 208.3mm
- 12.88" / 327.2mm
- 12.93" / 328.4mm

Filter Collapse Ratings

- 150 psi / 1034 kPa / 10.3 bar (standard)
- 3000 psi / 20,700 kPa / 206.8 bar (high collapse)

DT Replacement Filter Lengths

- 4.56" / 116mm
- 4.59" / 117mm
- 8.19" / 208mm
- 8.22" / 209mm
- 8.23" / 209mm
- 12.85" / 326mm
- 12.87" / 327mm
- 12.91" / 328mm

Standard Bypass Ratings

- 87 psi / 600 kPa / 6.0 bar
- No Bypass

Assembly Weight

- 4.59": 26.4 lbs / 12.0 kg
- 8.22": 33 lbs / 15.0 kg
- 12.91": 33 lbs / 15.0 kg

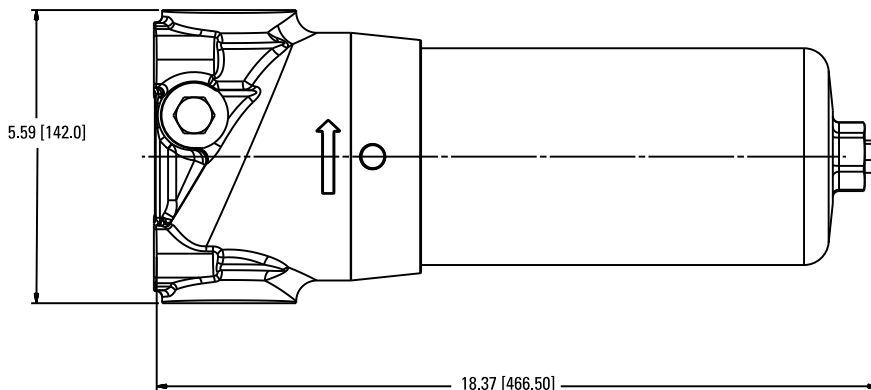
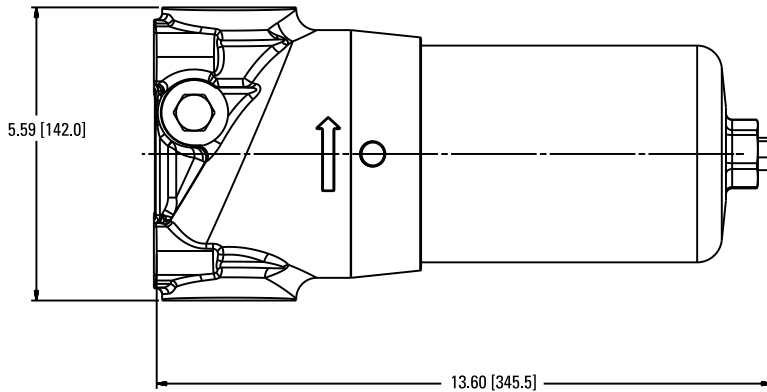
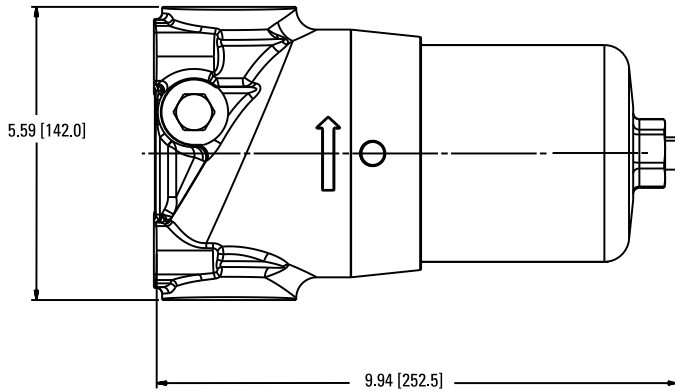
Operating Temperatures

- -4° to 248°F (-20° to 120°C)

FPK04 Specification Illustrations

All dimensions are shown in inches [millimeters].

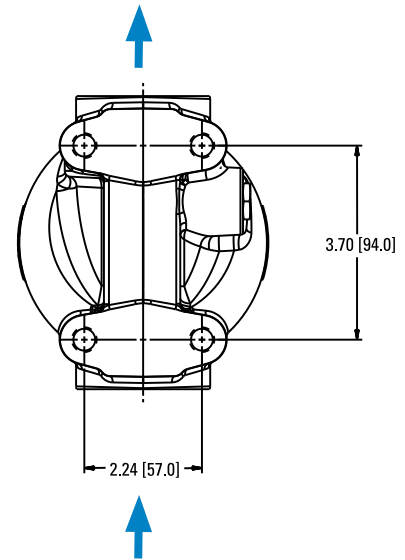
Assembly - Side View



Applications

- High Pressure Circuits
- In-Plant Systems
- Meets HF3 Specification
- Mobile Equipment
- Servo Valve Circuits

Head - Top View





FPK04 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------------|--|--------|---------|--------------------------------|-------------------------------|
| | | in | mm | | |
| DT Synteq | <4 μm | 4.59 | 117 | P566204 | DT-9600-4-2UM |
| Synthetic | 5 μm | 4.59 | 117 | P566205 | DT-9600-4-5UM |
| | 8 μm | 4.59 | 117 | P566206 | DT-9600-4-8UM |
| | 12 μm | 4.59 | 117 | P566207 | DT-9600-4-14UM |
| | 23 μm | 4.59 | 117 | P566208 | DT-9600-4-25UM |
| | 5 μm | 4.56 | 116 | P566364 | DT-9601-4-5UM, High collapse |
| | 12 μm | 4.56 | 116 | P566365 | DT-9601-4-14UM, High collapse |
| | <4 μm | 8.22 | 209 | P566209 | DT-9600-8-2UM |
| | 5 μm | 8.22 | 209 | P566210 | DT-9600-8-5UM |
| | 8 μm | 8.22 | 209 | P566211 | DT-9600-8-8UM |
| | 12 μm | 8.22 | 209 | P566212 | DT-9600-8-14UM |
| | 23 μm | 8.22 | 209 | P566213 | DT-9600-8-25UM |
| | 5 μm | 8.19 | 208 | P566366 | DT-9601-8-5UM, High collapse |
| | 12 μm | 8.19 | 208 | P566367 | DT-9601-8-14UM, High collapse |
| | <4 μm | 8.19 | 208 | P567875 | DX2-9600-8-2UM |
| | 5 μm | 8.23 | 209 | P565122 | DX2-9600-8-5UM |
| | 8 μm | 8.23 | 209 | P565123 | DX2-9600-8-8UM |
| | 12 μm | 8.23 | 209 | P564936 | DX2-9600-8-14UM |
| | <4 μm | 12.91 | 328 | P566214 | DT-9600-13-2UM |
| | 5 μm | 12.91 | 328 | P566215 | DT-9600-13-5UM |
| | 8 μm | 12.91 | 328 | P566216 | DT-9600-13-8UM |
| 12 μm | 12.91 | 328 | P566217 | DT-9600-13-14UM | |
| 23 μm | 12.91 | 328 | P566218 | DT-9600-13-25UM | |
| 5 μm | 12.85 | 326 | P566368 | DT-9601-13-5UM, High collapse | |
| 12 μm | 12.85 | 326 | P566369 | DT-9601-13-14UM, High collapse | |
| 5 μm | 12.87 | 327 | P565188 | DX2-9600-13-5UM | |
| 8 μm | 12.87 | 327 | P565189 | DX2-9600-13-8UM | |
| 12 μm | 12.87 | 327 | P565187 | DX2-9600-13-14UM | |



Filter Notes

All Donaldson DT and DX2 filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.
All Donaldson DT and DX2 filters are potted with epoxy-based adhesives.
Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.
High collapse designs are double wire-backed using stainless steel mesh.
High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications.
Viton® seals are standard on all Donaldson DT and DX2 filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.
DX2 filters utilize nylon mesh for pleat support.

Head Choices

| Port Size | Bypass Rating | Indicators | Part No. |
|-----------|----------------|--------------|----------|
| SAE-20 | 87 psi / 6 bar | plugged only | P568720 |
| SAE-20 | No bypass | plugged only | P568721 |

Housing Choices

| Filter Length | Part No. |
|-----------------|----------|
| 4.6" (116.8mm) | P568722 |
| 8.2" (208.3mm) | P568723 |
| 12.9" (327.7mm) | P568724 |

Notes

Housings include the head to housing seal.

Indicator Choices

| Set Point / Type | Part No. |
|-------------------------|----------|
| 39 psi/2.7 bar ele N.O. | P165194 |

Standard Filter Choices

| Media Type | $\beta_{x(c)} = 2$ | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------|---------------------------|-----------------------|--------|---------|---------------------|--|
| | Rating based on ISO 16889 | | in | mm | | |
| Synteq | | <4 μm | 10.7 | 271 | P167796 | Viton® O-ring & square seal kit |
| Synthetic | | 5 μm | 4.58 | 116.3 | P167184* | 9601 Series, Viton®, High collapse |
| | | 5 μm | 8.20 | 208.3 | P167185* | 9601 Series, Viton, High collapse |
| | | 5 μm | 12.88 | 327.2 | P167411* | 9601 Series, Viton, High collapse |
| | | 6 μm | 4.62 | 117.3 | P164592 | 9600 Series |
| | | 6 μm | 8.20 | 208.3 | P164594 | 9600 Buna-N® |
| | | 6 μm | 12.93 | 328.4 | P164596 | 9600 Buna-N |
| | | 11 μm | 4.62 | 117.3 | P164164 | 9600 Series |
| | | 11 μm | 12.93 | 328.4 | P164168 | 9600 Series, Buna-N |
| | | 12 μm | 4.58 | 116.3 | P167843* | 9601 Series, Viton, High collapse |
| | | 12 μm | 8.20 | 208.3 | P167186* | 9601 Series, Viton, High collapse |
| | | 12 μm | 12.88 | 327.2 | P167412* | 9601 Series, Viton, High collapse |
| | | 23 μm | 4.62 | 117.3 | P164172 | 9600 Series |
| | | 23 μm | 8.20 | 208.3 | P164174 | 9600 Series, Buna-N |
| | | 23 μm | 12.93 | 328.4 | P164176 | 9600 Series, Buna-N |
| | 50 μm | 8.20 | 208.3 | P165319 | 9600 Series, Buna-N | |
| Water | 10 μm | | 8.20 | 208.3 | P569528 | 9600 Absorbs 180 ml of water @ 25 psid |
| Absorbing | 10 μm | | 12.93 | 328.4 | P569529 | 9600 Absorbs 220 ml of water @ 25 psid |
| Wire Mesh | 75 μm | | 8.20 | 208.3 | P162233 | 9600 Buna-N, Wire mesh |

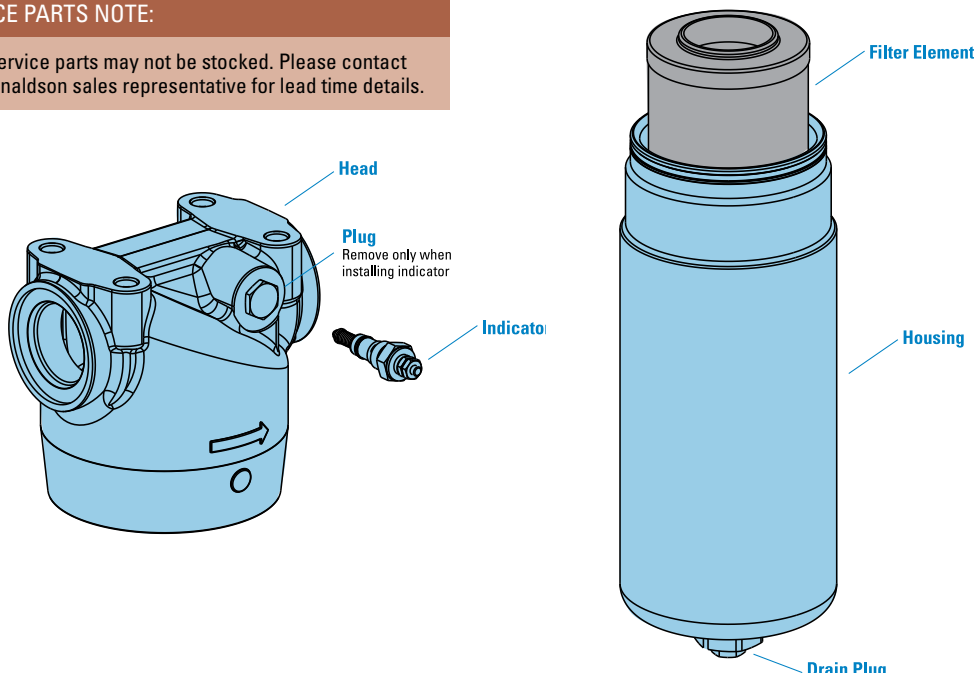
Filter Notes

* Utilizes DT Synteq synthetic media. Refer to the table in the Technical Reference Guide for fluid compatibility with our filter media. If you're filtering petroleum-based oil, filters with seals made of Buna-N are appropriate for most applications. If you're filtering diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCFC over 150°F/83°C, use filters with seals made of fluorocarbon. Donaldson "high collapse" filters, with their steel end caps and wire-backed media, are rated to withstand up to 3000 psi/ 20,700 kPa before collapsing. The fluorocarbon seal/high collapse filters also use epoxy potting and media seam seals for added chemical compatibility. Viton® is a registered trademark of E. I. DuPont de Nemours and Company. Fluorel® is a registered trademark of 3M Company.

FPK04 Service Parts

SERVICE PARTS NOTE:

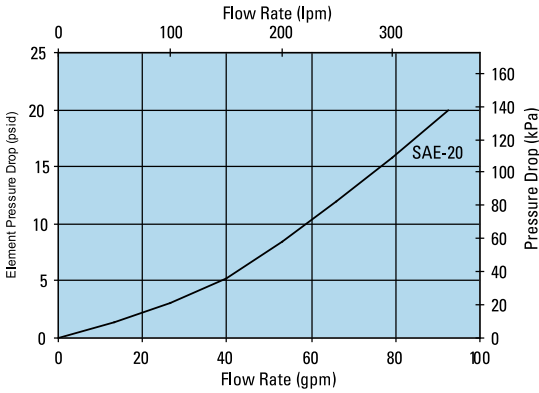
Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.



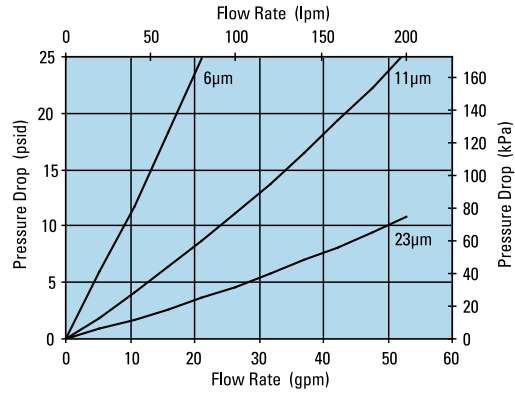


Performance Data

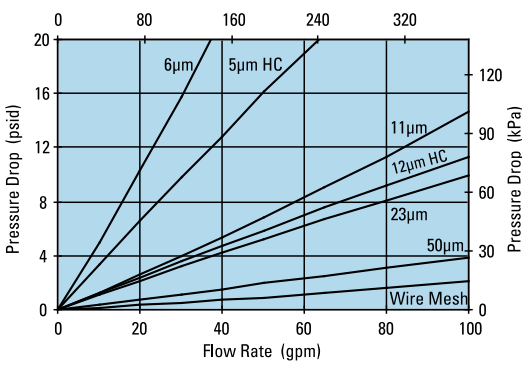
FPK04 Housing Only



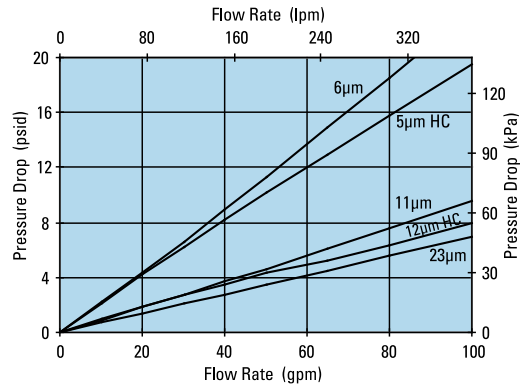
FPK04 4" Standard Filter Only
4.62"/117.3mm



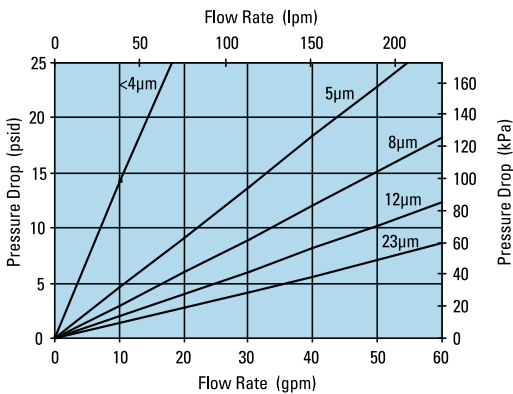
FPK04 8" Standard Filter Only
8.20"/208.3mm



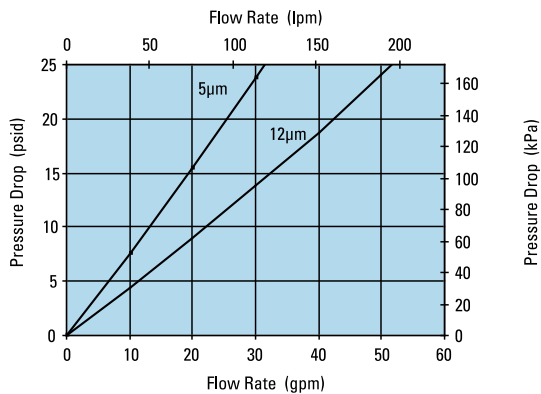
FPK04 13" Standard Filter Only
12.93"/328.4mm



FPK04 4" DT Filter Only
DT-9600-4, 4.59"/116.7mm



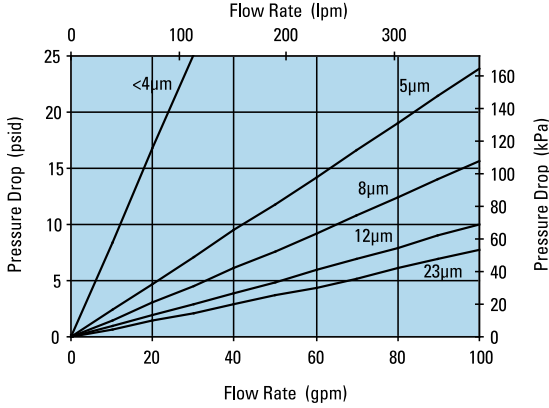
FPK04 4" DT Filter Only
DT-9601-4, 4.57"/116mm



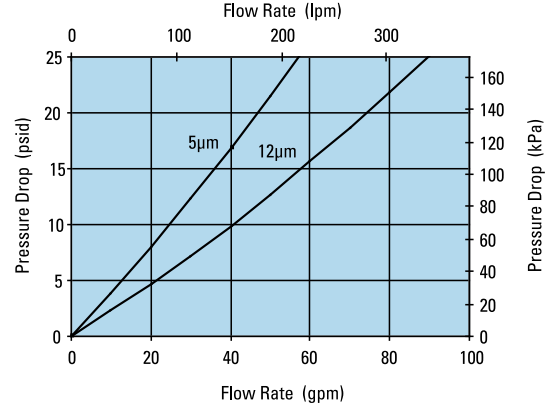


Performance Data

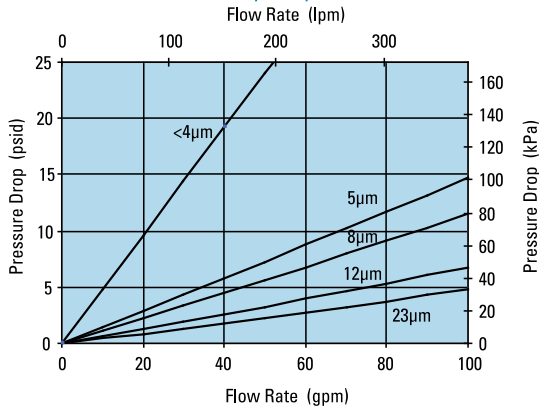
FPK04 8" DT Filter Only
DT-9600-8, 8.22"/208.8mm



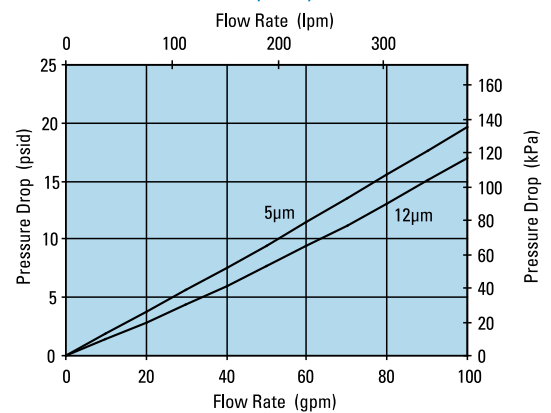
FPK04 8" DT Filter Only
DT-9601-8, 8.19"/208mm



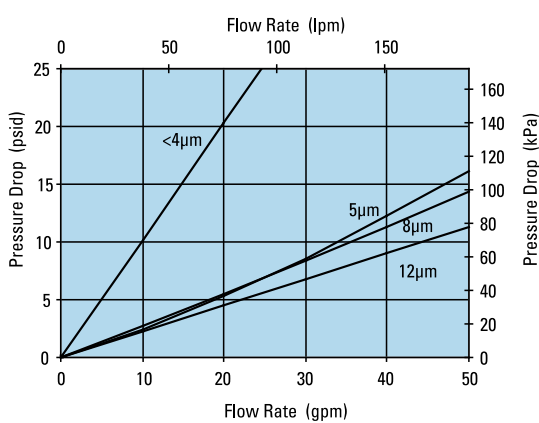
FPK04 13" DT Filter Only
DT-9600-13, 12.91"/327.8mm



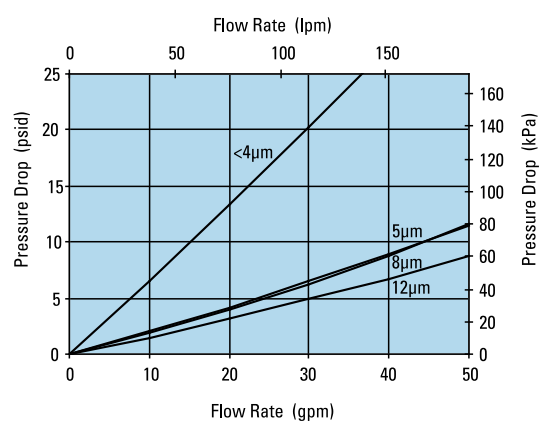
FPK04 13" DT Filter Only
DT-9601-13, 12.91"/327.8mm



FPK04 8" DX2 Filter Only
DX2-9600-8, 8.22"/208.8mm



FPK04 13" DX2 Filter Only
DX2-9600-13, 12.87"/327mm





HPK04
Max Flow: 120 gpm (454 lpm)



HPK04 In-Line Cartridge Filters

Working Pressures to: 6000 psi
41,380 kPa
413.8 bar

Rated Static Burst to: 17000 psi
117,300 kPa
1173 bar

Flow Range To: 120 gpm
454 lpm



Features

The HPK04 high pressure filter series is made of ductile iron and steel for strength and durability. Machined bypass valves are case-hardened at critical points to provide maximum strength and reliability. Reverse flow bypass valve allows bi-directional flow through the filter head, and filter change out is simplified with standard housing drain plug. Meets HF3 specification.

Take advantage of our mix and match system of in-stock heads, housings and cartridges – so you can get exactly what you need. Likewise, choose the media type and configuration that's best for your application. Filter cartridges for HPK04 contain Synteq™, Donaldson's exclusive synthetic fiber media formulated specially for liquid filtration. Upgraded Donaldson high-performance DT filters are also offered for superior performance.

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-20 O-ring
- 1¼" or 1½" SAE 4-Bolt Flange Code 61 or 62

Replacement Filter Lengths

- 8.22" / 203mm
- 12.91" / 328mm
- 16.84" / 406mm

Operating Temperatures

- -20°F to 250°F / -27°C to 121°C

Standard Bypass Ratings

- 60 psi / 414 kPa / 4.1 bar
- 90 psi / 621 kPa / 6.2 bar with reverse-flow check valve
- No Bypass

Assembly Weight

- 8.22" Assembly: 41 lbs / 19 kg
- 12.91" Assembly: 48 lbs / 22 kg
- 16.84" Assembly: 52 lbs / 24 kg

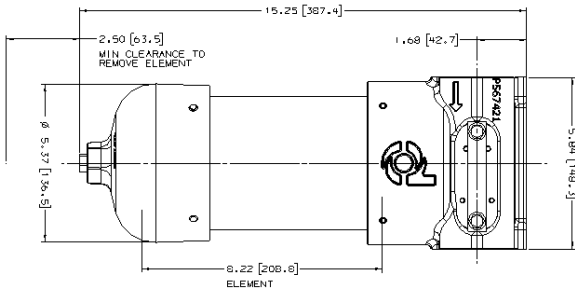
Filter Collapse Ratings

- 200 psi / 1380 kPa / 13.8 bar (standard)
- 3000 psi / 20,700 kPa / 206.9 bar (high collapse)

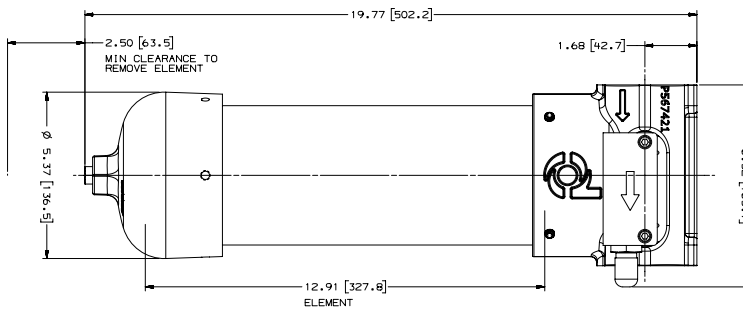
HPK04 Specification Illustrations

All dimensions are shown in inches [millimeters].

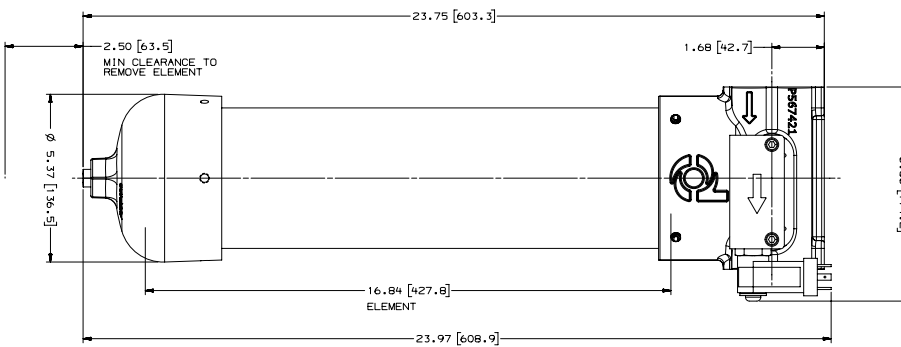
Assembly - Side Views



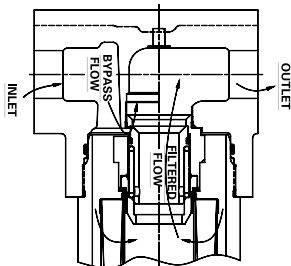
HPK04
with Visual Service Indicator



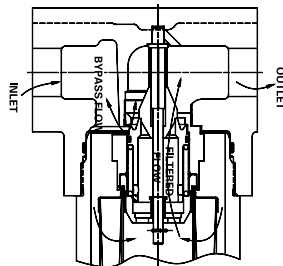
HPK04
with AC/DC Electrical Service Indicator



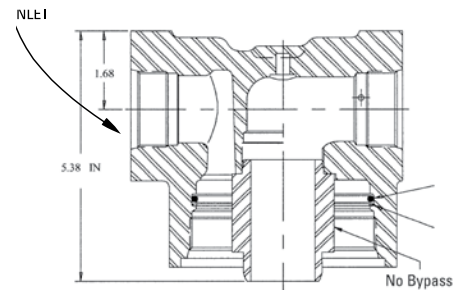
Bypass Valve Alternatives



60 psi / 414 kPa
Bypass Valve



90 psi / 621 kPa
Bypass Valve with
Reverse Flow Check Valve

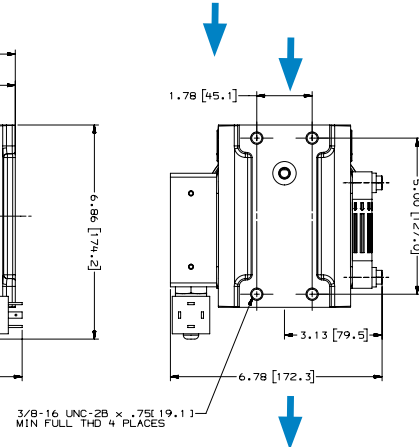
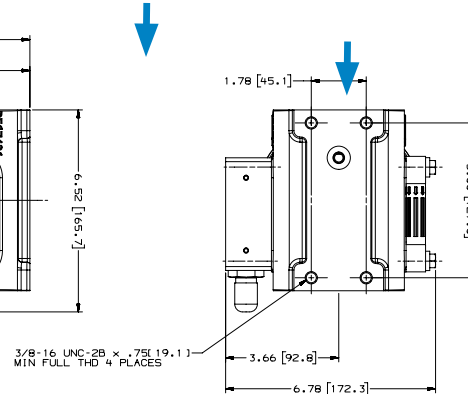
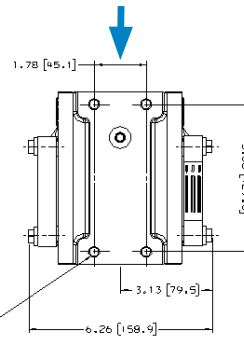


No Bypass

Applications

- High Pressure Circuits
- Hydrostatic Transmission
- Meets HF3 Specification
- Servo Valve Circuits

Head - Top Views





HPK04 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------|--|--------|-----|--------------------|--------------------------------|
| | | in | mm | | |
| DT Synteq | <4 μm | 8.22 | 209 | P566209 | DT-9600-8-2UM |
| Synthetic | 5 μm | 8.22 | 209 | P566210 | DT-9600-8-5UM |
| | 8 μm | 8.22 | 209 | P566211 | DT-9600-8-8UM |
| | 12 μm | 8.22 | 209 | P566212 | DT-9600-8-14UM |
| | 23 μm | 8.22 | 209 | P566213 | DT-9600-8-25UM |
| | 5 μm | 8.19 | 208 | P566366 | DT-9601-8-5UM, High collapse |
| | 12 μm | 8.19 | 208 | P566367 | DT-9601-8-14UM, High collapse |
| | <4 μm | 8.22 | 209 | P567875 | DX2-9600-8-2UM |
| | 5 μm | 8.22 | 209 | P565122 | DX2-9600-8-5UM |
| | 8 μm | 8.22 | 209 | P565123 | DX2-9600-8-8UM |
| | 12 μm | 8.22 | 209 | P564936 | DX2-9600-8-14UM |
| | <4 μm | 12.91 | 328 | P566214 | DT-9600-13-2UM |
| | 5 μm | 12.91 | 328 | P566215 | DT-9600-13-5UM |
| | 8 μm | 12.91 | 328 | P566216 | DT-9600-13-8UM |
| | 12 μm | 12.91 | 328 | P566217 | DT-9600-13-14UM |
| | 23 μm | 12.91 | 328 | P566218 | DT-9600-13-25UM |
| | 5 μm | 12.85 | 326 | P566368 | DT-9601-13-5UM, High collapse |
| | 12 μm | 12.85 | 326 | P566369 | DT-9601-13-14UM, High collapse |
| | <4 μm | 12.91 | 328 | P567876 | DX2-9600-13-2UM |
| | 5 μm | 12.91 | 328 | P565188 | DX2-9600-13-5UM |
| | 8 μm | 12.91 | 328 | P565189 | DX2-9600-13-8UM |
| | 12 μm | 12.91 | 328 | P565187 | DX2-9600-13-14UM |
| | <4 μm | 16.84 | 428 | P566219 | DT-9600-16-2UM |
| | 5 μm | 16.84 | 428 | P566220 | DT-9600-16-5UM |
| | 8 μm | 16.84 | 428 | P566221 | DT-9600-16-8UM |
| | 12 μm | 16.84 | 428 | P566222 | DT-9600-16-14UM |
| | 23 μm | 16.84 | 428 | P566223 | DT-9600-16-25UM |
| | 5 μm | 16.84 | 428 | P566370 | DT-9601-16-5UM, High collapse |
| | 12 μm | 16.84 | 428 | P566371 | DT-9601-16-14UM, High collapse |
| | <4 μm | 16.81 | 427 | P567877 | DX2-9600-16-2UM |
| | 5 μm | 16.81 | 427 | P565196 | DX2-9600-16-5UM |
| | 8 μm | 16.81 | 427 | P565197 | DX2-9600-16-8UM |
| | 12 μm | 16.81 | 427 | P565195 | DX2-9600-16-14UM |



Filter Notes

All Donaldson DT and DX2 filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.

All Donaldson DT and DX2 filters are potted with epoxy-based adhesives.

Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.

High collapse designs are double wire-backed using stainless steel mesh.

High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications.

Viton® seals are standard on all Donaldson DT and DX2 filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

DX2 filters utilize nylon mesh for pleat support.

Standard Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------|---|-----------------------|--------|---------|---------------------|---|
| | | | in | mm | | |
| Synteq | | 5 μ m | 8.20 | 208 | P167185* | 9601 Series, Viton®, High collapse |
| Synthetic | | 5 μ m | 12.88 | 327 | P167411* | 9601 Series, Viton, High collapse |
| | | 5 μ m | 16.83 | 427 | P167187* | 9601 Series, Viton, High collapse |
| | | 6 μ m | 8.20 | 208 | P164594 | 9600 Series, Buna-N® |
| | | 6 μ m | 12.93 | 328 | P164596 | 9600 Series, Buna-N |
| | | 6 μ m | 16.84 | 428 | P164598 | 9600 Series, Buna-N |
| | | 11 μ m | 8.20 | 208 | P164166 | 9600 Series, Buna-N |
| | | 11 μ m | 12.93 | 328 | P164168 | 9600 Series, Buna-N |
| | | 11 μ m | 16.84 | 428 | P164170 | 9600 Series, Buna-N |
| | | 12 μ m | 8.20 | 208 | P167186* | 9601 Series, Viton, High collapse |
| | | 12 μ m | 12.88 | 327 | P167412* | 9601 Series, Viton, High collapse |
| | | 12 μ m | 16.83 | 427 | P167188* | 9601 Series, Viton, High collapse |
| | | 23 μ m | 8.20 | 208 | P164174 | 9600 Series, Buna-N |
| | | 50 μ m | 8.20 | 208 | P165319 | 9600 Series, Buna-N |
| | | 23 μ m | 12.93 | 328 | P164176 | 9600 Series, Buna-N |
| | 23 μ m | 16.84 | 428 | P164178 | 9600 Series, Buna-N | |
| Water | 10 μ m | | 8.20 | 208 | P569528 | 9600 Series, Absorbs 180 ml water @ 25 psid |
| Absorbing | 10 μ m | | 12.93 | 328 | P569529 | 9600 Series, Absorbs 220 ml water @ 25 psid |
| | 10 μ m | | 16.83 | 427 | P569530 | 9600 Series, Absorbs 300 ml water @ 25 psid |
| Wire Mesh | 75 μ m | | 8.20 | 208 | P162233 | 9600 Series, Buna-N |

Filter Notes

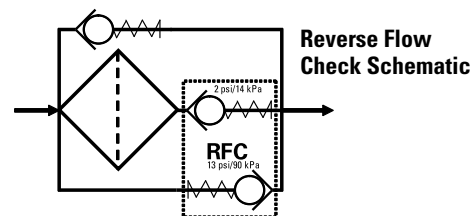
* Utilizes DT Synteq synthetic media
SEALS: Filters with seals made of Buna-N® are appropriate for most applications involving petroleum oil. Filters with seals made of Viton® (a fluoroelastomer) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F/83°C.
The Viton seal, high collapse filters also use epoxy potting and media seam seals for added chemical compatibility.
Donaldson high collapse filters are physically designed to withstand up to 3000 psi/ 20,700 kPa before collapsing.
Viton® and Buna-N® are registered trademarks of E. I. DuPont de Nemours and Company.

Housing Choices

| Length | | Donaldson |
|--------|-----|-----------|
| in | mm | Part No. |
| 8 | 203 | P567650 |
| 13 | 330 | P567649 |
| 16 | 406 | P567648 |



Head assemblies include head to housing seal.



Head Choices

| Port Size | Working Pressure | Bypass Rating | Indicators ¹ | Part No. |
|---|------------------|--|--|----------|
| 1½" SAE 4-Bolt (Code 61) with SAE-20 O-Ring | 3000 psi/207 bar | 60 psi/4.1 bar | Visual left side, blank plate right side | P567639 |
| 1½" SAE 4-Bolt (Code 61) with SAE-20 O-Ring | 3000 psi/207 bar | 90 psi/6.2 bar with reverse flow check valve | Visual left side, blank plate right side | P567640 |
| 1½" SAE 4-Bolt (Code 61) with SAE-20 O-Ring | 3000 psi/207 bar | no bypass | Visual left side, blank plate right side | P567641 |
| 1½" SAE 4-Bolt (Code 62) | 6000 psi/414 bar | 60 psi/4.1 bar | Visual left side, blank plate right side | P567642 |
| 1½" SAE 4-Bolt (Code 62) | 6000 psi/414 bar | 90 psi/6.2 bar with reverse flow check valve | Visual left side, blank plate right side | P567643 |
| 1¼" SAE 4-Bolt (Code 62) | 6000 psi/414 bar | 90 psi/6.2 bar with reverse flow check valve | Visual left side, blank plate right side | P567644 |
| 1¼" SAE 4-Bolt (Code 62) | 6000 psi/414 bar | 90 psi/6.2 bar with reverse flow check valve | Blank left side, blank plate right side | P574189 |

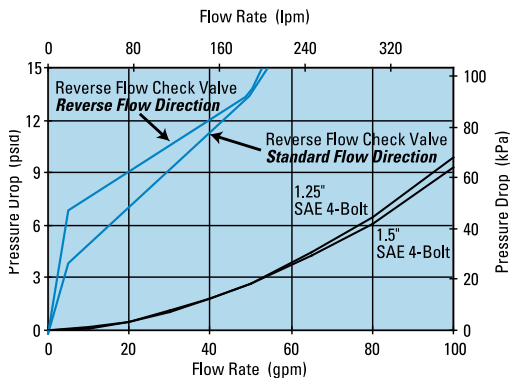
Notes on Indicators

¹Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port.

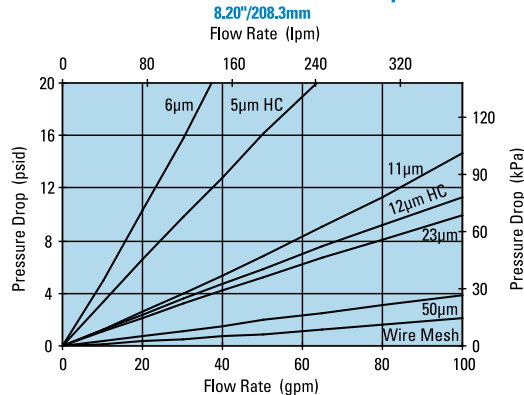


Performance Data

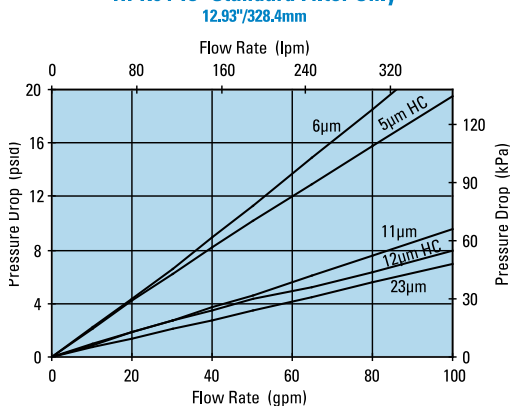
HPK04 Housing Only



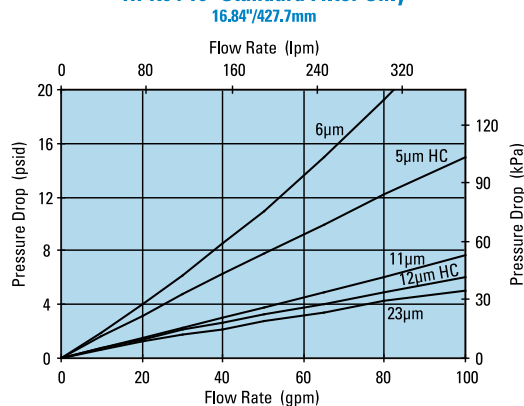
HPK04 8" Standard Filter Only



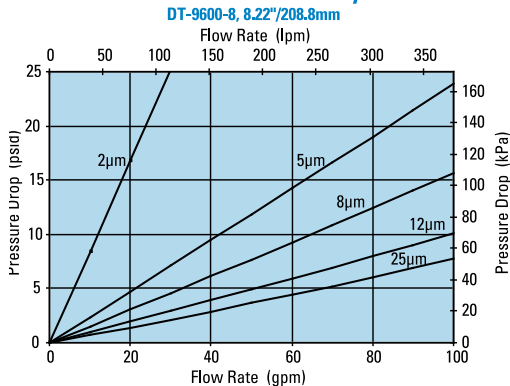
HPK04 13" Standard Filter Only



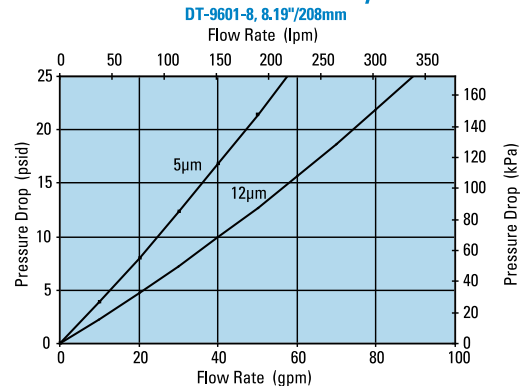
HPK04 16" Standard Filter Only



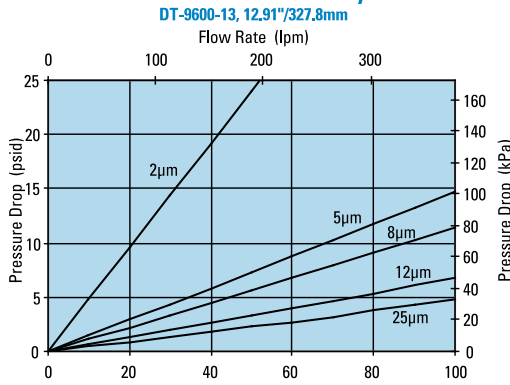
HPK04 8" DT Filter Only



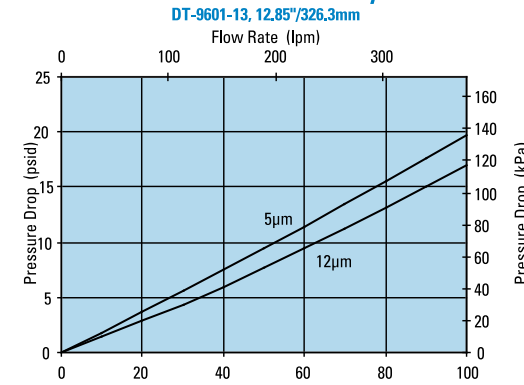
HPK04 8" DT Filter Only



HPK04 13" DT Filter Only



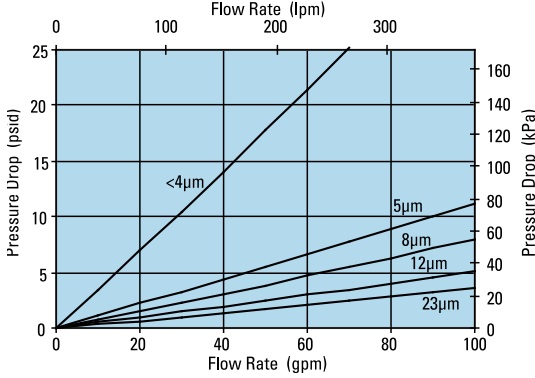
HPK04 13" DT Filter Only



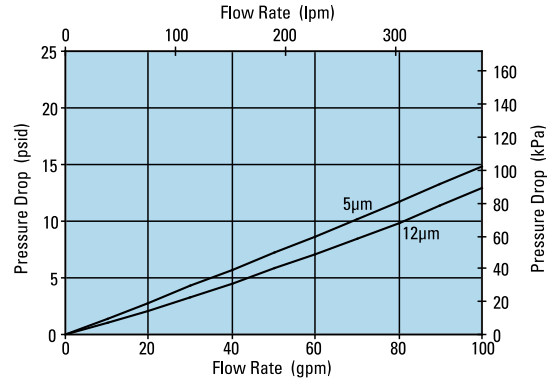


Performance Data

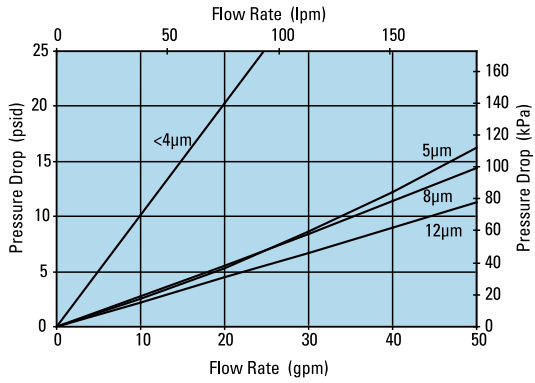
HPK04 16" DT Filter Only
DT-9600-16, 16.84"/427.8mm



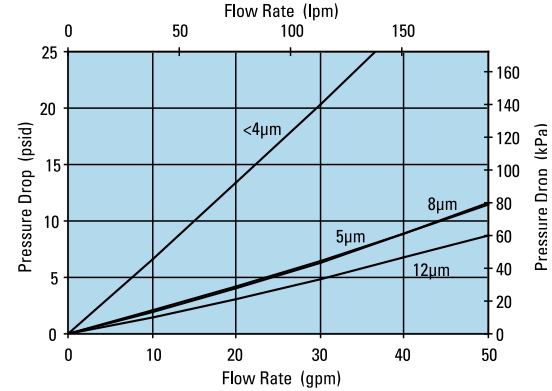
HPK04 16" DT Filter Only
DT-9601-16, 16.82"/427.1mm



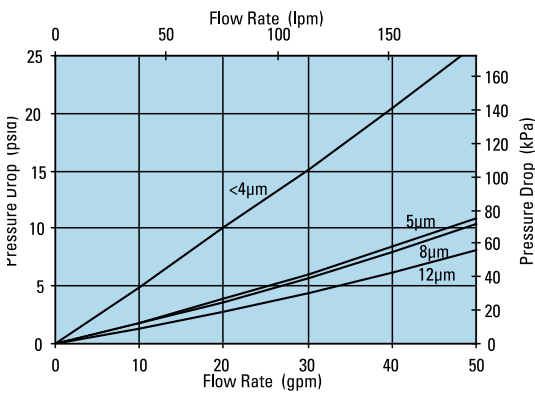
HPK04 8" DX2 Filter Only
DX2-9600-8, 8.19"/208mm



HPK04 13" DX2 Filter Only
DX2-9600-13, 12.87"/327mm



HPK04 16" DX2 Filter Only
DX2-9600-16, 16.81"/427mm





HPK04
Max Flow: 120 gpm (454 lpm)



HPK04 Components

Service Indicator Kits

All kits include indicator with mounting block

| Part No. | Use with Bypass Valve Pressure of: | Description |
|---|------------------------------------|---|
| Visual Service Indicators | | |
| P569632 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button |
| P569633 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit auto reset pop-out button |
| P567988 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button with thermal lockout and surge control |
| P567989 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* auto reset pop-out button with thermal lockout and surge control |
| AC/DC Visual/Electrical Service Indicators | | |
| P569634 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P569635 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P567986 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |
| P567987 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |

Indicator Choices

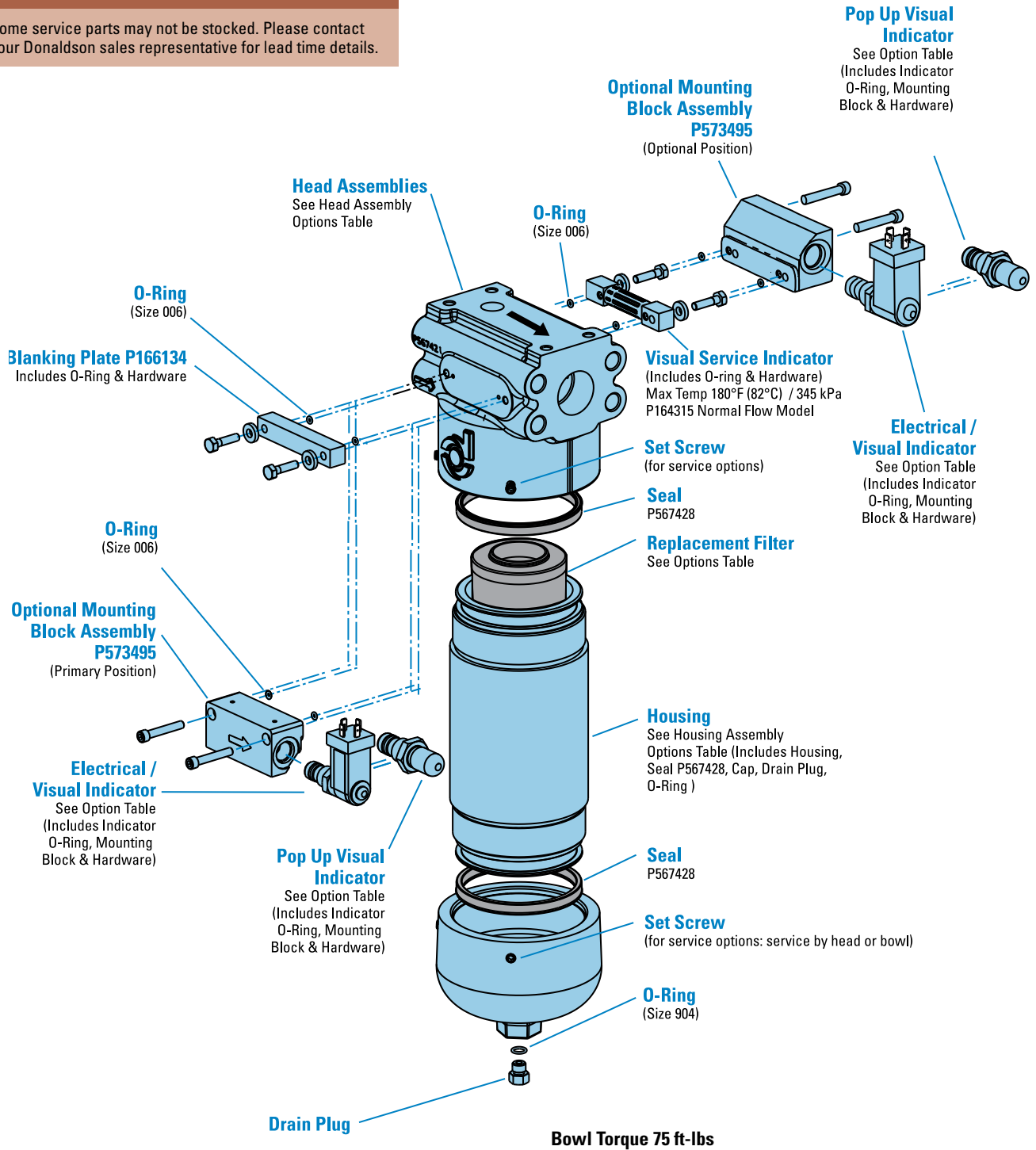
Replacement Indicator Only

| Part No. | Description |
|---------------------------------|--|
| P567458 | Visual/Electrical indicator with thermal lockout and surge, 35 psid/2.4 bar |
| P567459 | Visual/Electrical indicator, with thermal lockout and surge, 70 psid/4.8 bar |
| P567456 | Pop-Up Visual Indicator, with thermal lockout and surge, 35 psid/2.4 bar |
| P567457 | Pop-Up Visual Indicator, with thermal lockout and surge, 70 psid/4.8 bar |
| P569636 | Pop-Up Visual Indicator, 35 psid/2.4 bar |
| P569637 | Pop-Up Visual Indicator, 70 psid/4.8 bar |
| P569638 | Visual/Electrical Indicator, 35 psid/2.4 bar |
| P569639 | Visual/Electrical Indicator, 70 psid/4.8 bar |
| P164315 | Visual Indicator, bar style, 35 psid/2.4 bar |
| P166603 | Visual Indicator, bar style, 70 psid/4.8 bar |
| P166134 | Blanking plate |
| Indicator Mounting Block | |
| P573495 | Mounting Block Assembly |

HPK04 Service Parts

SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.





W451
Max Flow: 150 gpm (568 lpm)



W451 In-Line Cartridge Filters

Working Pressures to: 4,500 psi
31,027 kPa
310 bar

Rated Static Burst to: 13,500 psi
93,100 kPa
931 bar

Fatigue Pressure Rating: 3000 psi
20,700 kPa
207 bar

Flow Range To: 150 gpm
568 lpm

Applications

- High Pressure Circuits
- In-Plant Systems
- Meets HF4 Specification
- Mobile Equipment



Features

The W451 base-mounted filter series provides for easy servicing featuring top cover access for filter changeout. The ductile iron filter head design provides for SAE ports along with optional space saving manifold mounting. This product features the popular HF4 automotive filter. DT 4-layer media is offered in a variety of designs. Four different media grades are offered. Filter core collapse options range from 150 to 3,000 psi. The differential pressure indicator line is designed to work with the wide assortment of bypass valves. Thermal lockout and surge control are two key features available in many of the differential pressure indicators.

- Conforms to HF4 specifications
- High collapse filter available for use with non-bypass applications
- Wide range of indicator options
- Three housing length options for design flexibility
- Base & cover material: cast iron
- Cylinder material: steel
- Drain plug in base
- Bleed/fill plug in cover

Beta Rating

- Performance to $\beta_{5(c)} = 1000$

Porting Size Options

- SAE-24 O-ring
- 1½" SAE 4-Bolt Flange Code 61 or 62
- Manifold Mounting

Replacement Filter Lengths

- 9.12" / 231.8mm
- 18.20" / 462.3mm
- 27.66" / 702.5mm

Operating Temperatures

- -45° to 250°F (-43° to 121°C)

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- 90 psi / 621 kPa / 6.2 bar
- No Bypass

Assembly Weight

- 9.28": 56 lbs / 25.4 kg
- 18.32": 82 lbs / 37.5 kg
- 27.75": 109 lbs / 49.5 kg

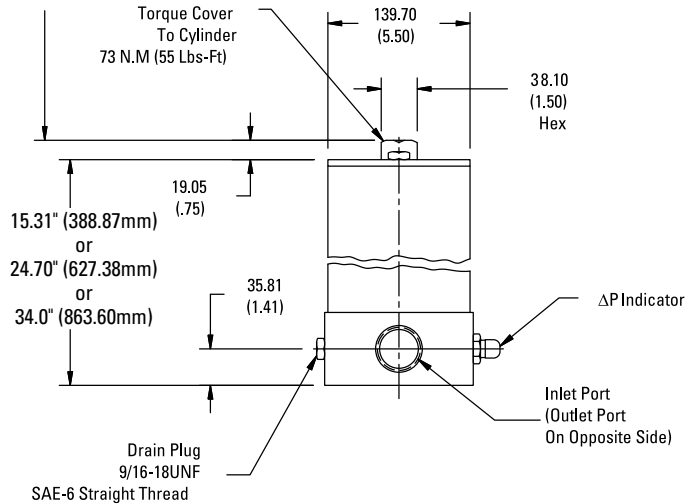
Filter Collapse Ratings

- 150 psi / 1034 kPa / 10.3 bar (standard)
- 3000 psi / 20,700 kPa / 206.8 bar (high collapse)

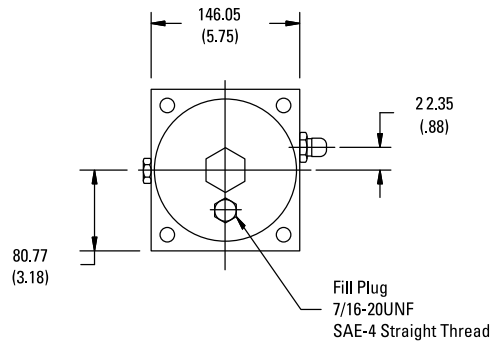
W451 Specification Illustrations

All dimensions are shown in millimeters [inches].

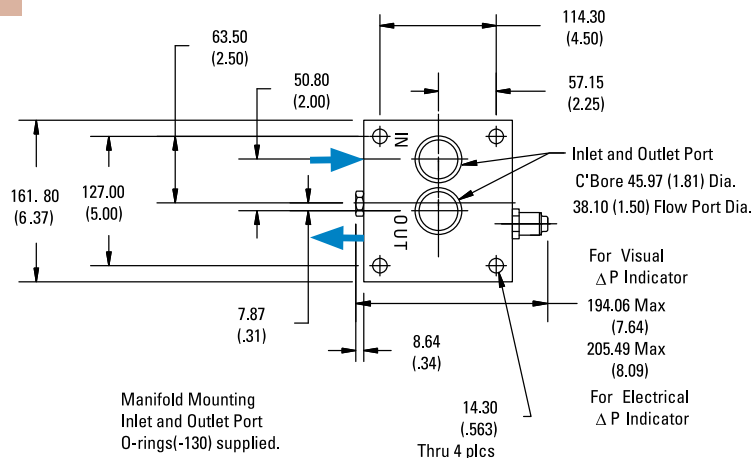
Assembly - Side View



Head - Side View



Head - Bottom View





W451
Max Flow: 150 gpm (568 lpm)



W451 Components

High-Performance DT Filter Choices

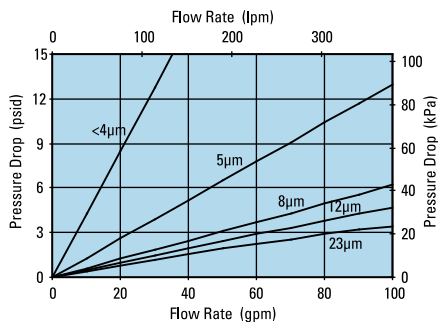
| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length in mm | Donaldson Part No. | Comments |
|------------------|---|-----------------------|-----------------|---------------------------------|---------------------------------|
| DT Synteq | <4 μm | 9.04 | 230 | P568816 | DT-HF4-9-2UM |
| Synthetic | 5 μm | 9.28 | 236 | P566270 | DT-HF4-9-5UM |
| | 8 μm | 9.28 | 236 | P566271 | DT-HF4-9-8UM |
| | 12 μm | 9.28 | 236 | P566272 | DT-HF4-9-14UM |
| | 23 μm | 9.28 | 236 | P566273 | DT-HF4-9-25UM |
| | 5 μm | 9.27 | 229 | P566412 | DT-HF4HC-9-5UM, High collapse |
| | 12 μm | 9.27 | 229 | P566413 | DT-HF4HC-9-14UM, High collapse |
| | <4 μm | 18.19 | 232 | P568817 | DT-HF4-18-2UM |
| | 5 μm | 18.32 | 465 | P566274 | DT-HF4-18-5UM |
| | 8 μm | 18.32 | 465 | P566275 | DT-HF4-18-8UM |
| | 12 μm | 18.32 | 465 | P566276 | DT-HF4-18-14UM |
| | 23 μm | 18.32 | 465 | P566277 | DT-HF4-18-25UM |
| | 5 μm | 18.60 | 472 | P572309 | DT-HF4HC-18-5UM, High collapse |
| | 12 μm | 18.60 | 472 | P572310 | DT-HF4HC-18-14UM, High collapse |
| | <4 μm | 27.47 | 698 | P568818 | DT-HF4-27-2UM |
| | 5 μm | 27.75 | 705 | P566278 | DT-HF4-27-5UM |
| 8 μm | 27.75 | 705 | P566279 | DT-HF4-27-8UM | |
| 12 μm | 27.75 | 705 | P566280 | DT-HF4-27-14UM | |
| 23 μm | 27.75 | 705 | P566281 | DT-HF4-27-25UM | |
| 5 μm | 27.93 | 709 | P572311 | DT-HF4HC-27-5UM, High collapse | |
| 12 μm | 27.93 | 709 | P572312 | DT-HF4HC-27-14UM, High collapse | |
| Water Absorbing | 10 μm | 9.27 | 236 | P569527 | Absorbs 250 ml water @ 25 psid |

Filter Notes

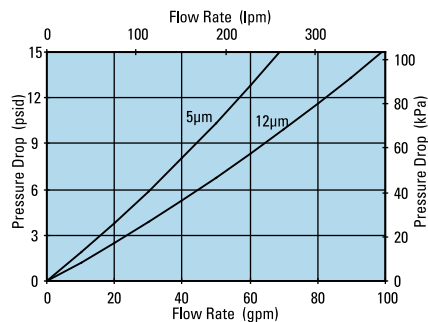
All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility. All Donaldson DT filters are potted with epoxy-based adhesives. Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity. High collapse designs are double wire-backed using stainless steel mesh. High collapse designs are also potted into machined aluminum end caps for greater filter integrity in critical applications. May be stacked with two or three 9" long filters (P167324). Viton® seals are standard on all Donaldson DT filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Performance Data

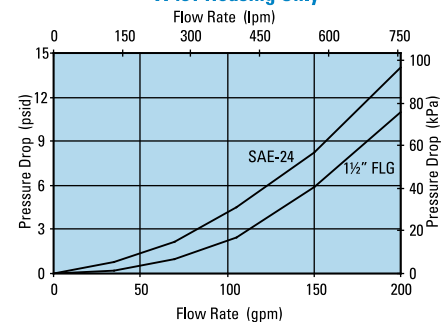
W451 9" DT Filter Only
DT-HF-9, 9.13"/231.8mm



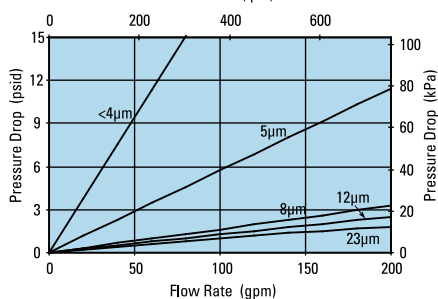
W451 9" DT High Collapse Filter Only
DT-HF4HC-9, 9.19"/233.5mm



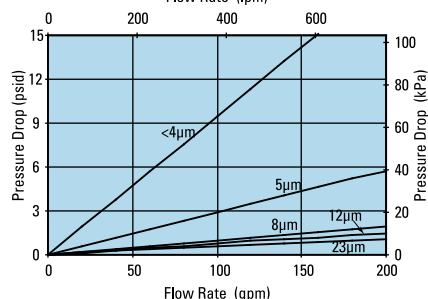
W451 Housing Only



W451 18" DT Filter Only
DT-HF4-18, 18.20"/462.3mm



W451 27" DT Filter Only
DT-HF4-27, 27.66"/702.5mm





Filter Assembly Choices

| Port Size | Bypass Rating | Seal Material | Indicator Style & Location | Housing Length | Assembly Length | Donaldson Part No. |
|-----------------------------------|-------------------|---------------|----------------------------|----------------|------------------|--------------------|
| SAE-24 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 9" (228.6mm) | 15.31" (338.9mm) | P574220 |
| SAE-24 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P574221 |
| SAE-24 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 27" (685.8mm) | 34.0" (863.6mm) | P574222 |
| 1-1/2" SAE 4 Bolt Flange, Code 61 | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P574223 |
| 1-1/2" SAE 4 Bolt Flange, Code 61 | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 27" (685.8mm) | 34.0" (863.6mm) | P574224 |
| 1-1/2" SAE 4 Bolt Flange, Code 61 | 90 psi / 6.21 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P574225 |
| 1-1/2" SAE 4 Bolt Flange, Code 62 | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P574226 |
| Manifold Mount | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P574227 |
| Manifold Mount | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | 27" (685.8mm) | 34.0" (863.6mm) | P574228 |
| Manifold Mount | None | Buna-N | Port Machined & Plugged | 9" (228.6mm) | 15.31" (338.9mm) | P574229 |
| Manifold Mount | None | Buna-N | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P574230 |
| SAE-24 O-ring | None | Viton | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P575915 |
| SAE-24 O-ring | None | Viton | Port Machined & Plugged | 27" (685.8mm) | 34.0" (863.6mm) | P575916 |
| SAE-24 O-ring | None | Viton | Port Machined & Plugged | 9" (228.6mm) | 15.31" (338.9mm) | P575917 |
| 1-1/2" SAE 4 Bolt Flange, Code 61 | None | Viton | Port Machined & Plugged | 18" (457.2mm) | 24.7" (627.3mm) | P575918 |
| 1-1/2" SAE 4 Bolt Flange, Code 61 | 90 psi / 6.21 bar | Viton | Port Machined & Plugged | 9" (228.6mm) | 15.31" (338.9mm) | P575919 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Seal Material | Donaldson Part No. | Thermal Lockout | Surge Control | Reset |
|-----------------------------------|---------------------|---------------|--------------------|-----------------|---------------|--------|
| Visual Pop-up Models | | | | | | |
| 35 psi / 241 kPa | NA | Buna-N | P572347 | No | No | Auto |
| 35 psi / 241 kPa | NA | Buna-N | P572348 | Yes | Yes | Manual |
| 35 psi / 241 kPa | NA | Viton | P567456 | Yes | Yes | Manual |
| 70 psid / 482 kPa | NA | Buna-N | P572319 | Yes | Yes | Manual |
| 70 psid / 482 kPa | NA | Viton | P567457 | Yes | Yes | Manual |
| 100 psid / 690 kPa | NA | Buna-N | P572353 | Yes | Yes | Manual |
| 100 psid / 690 kPa | NA | Viton | P572354 | Yes | Yes | Manual |
| Electrical / Visual Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572327 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572329 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572384 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Hirschman | Viton | P567458 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572385 | Yes | Yes | Manual |
| 35 psi / 241 kPa | 3 wire flying leads | Buna-N | P572349 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572320 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Brad Harrison | Buna-N | P567459 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572373 | Yes | No | Manual |
| 70 psi / 482 kPa | Hirschman | Viton | P569639 | Yes | No | Manual |
| 100 psi / 690 kPa | Hirschman | Buna-N | P572387 | Yes | Yes | Manual |
| Electrical Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572359 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572361 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572369 | No | No | Auto |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011174 | Buna |
| X011175 | Viton |



W620
Max Flow: 150 gpm (568 lpm)



W620 In-Line Cartridge Filters

Working Pressures to: 6000 psi
41,380 kPa
413.8 bar

Rated Static Burst to: 15,000 psi
103,400 kPa
1034 bar

Fatigue Pressure Rating: 3000 psi
20,700 kPa
207 bar

Flow Range To: 150 gpm
568 lpm



Applications

- High Pressure Circuits
- In-Plant Systems
- Meets HF3 Specification
- Mobile Equipment

Features

The W620 filter assembly contains the popular HF3 filter. It offers a reverse flow bypass valve option available for hydrostatic transmissions. Donaldson DT high-performance 4-layer media is offered in five different media grades. The differential pressure indicator line is designed to work with the wide assortment of bypass valves. Thermal lockout and surge control are two key features incorporated in many of the differential pressure indicators.

- Conforms to HF3 specifications
- Housing material: steel
- Head material: cast iron
- Reverse flow bypass valve option available

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- SAE-16, SAE-20, SAE-24 O-ring
- 1¼" SAE 4-Bolt Flange Code 62
- 1½" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 8.22" / 203.2mm
- 12.91" / 330.2mm
- 16.84" / 406.4mm

Operating Temperatures

- -20° to 250°F (-29° to 121°C)

Standard Bypass Ratings

- 50 psi / 345 kPa / 3.5 bar
- 90 psi / 621 kPa / 6.2 bar
- No Bypass

Assembly Weight

- 12.91": 33 lbs / 14.97 kg
- 19.48": 42 lbs / 19.05 kg
- 22.00": 48 lbs / 21.77 kg

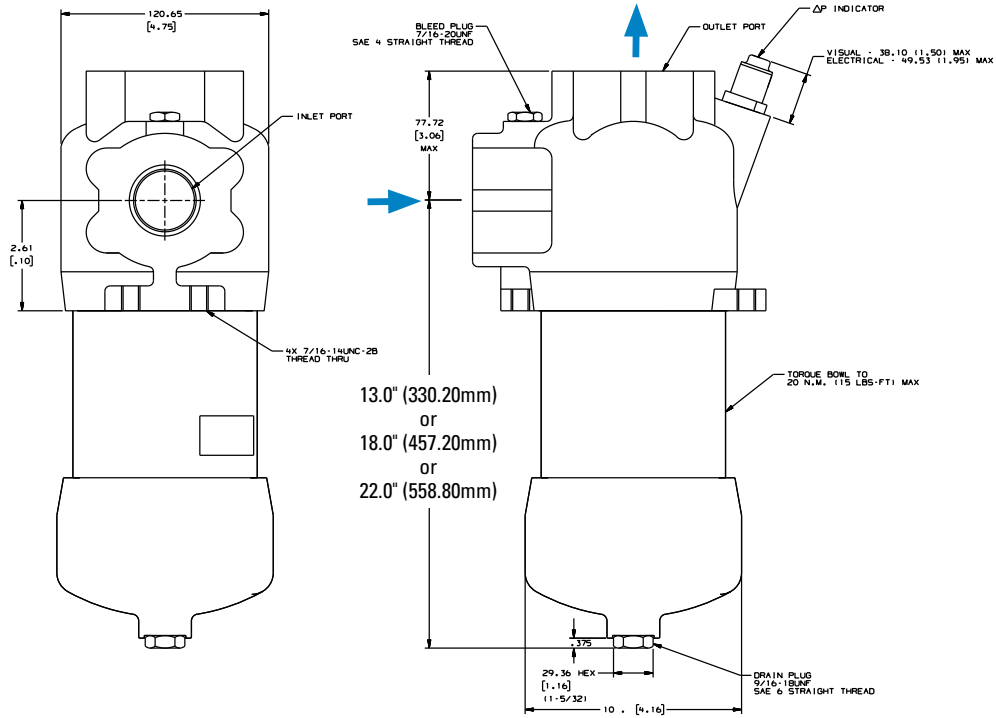
Filter Collapse Ratings

- 150 psi / 1034 kPa / 10.3 bar (standard)
- 3000 psi / 20,700 kPa / 206.8 bar (high collapse)

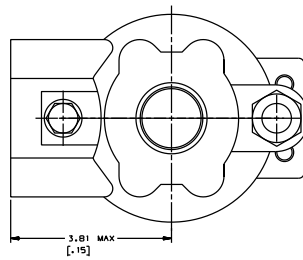
W620 Specification Illustrations

All dimensions are shown in millimeters [inches].

Assembly - Side View



Head - Top View





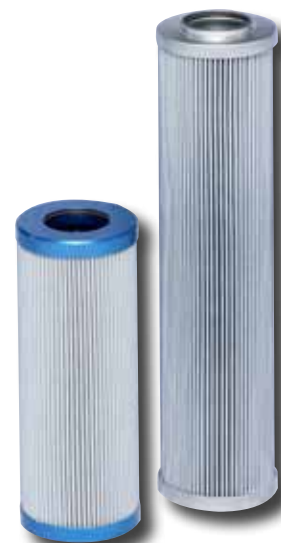
W620
Max Flow: 150 gpm (568 lpm)



W620 Components

High-Performance DT Filter Choices

| Media Type | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------------|--|--------|---------|--------------------------------|--------------------------------|
| | | in | mm | | |
| DT Synteq | <4 μm | 8.22 | 209 | P566209 | DT-9600-8-2UM |
| Synthetic | 5 μm | 8.22 | 209 | P566210 | DT-9600-8-5UM |
| | 8 μm | 8.22 | 209 | P566211 | DT-9600-8-8UM |
| | 12 μm | 8.22 | 209 | P566212 | DT-9600-8-14UM |
| | 23 μm | 8.22 | 209 | P566213 | DT-9600-8-25UM |
| | 5 μm | 8.19 | 208 | P566366 | DT-9601-8-5UM, High collapse |
| | 12 μm | 8.19 | 208 | P566367 | DT-9601-8-14UM, High collapse |
| | <4 μm | 8.22 | 209 | P567875 | DX2-9600-8-2UM |
| | 5 μm | 8.22 | 209 | P565122 | DX2-9600-8-5UM |
| | 8 μm | 8.22 | 209 | P565123 | DX2-9600-8-8UM |
| | 12 μm | 8.22 | 209 | P564936 | DX2-9600-8-14UM |
| | <4 μm | 12.91 | 328 | P566214 | DT-9600-13-2UM |
| | 5 μm | 12.91 | 328 | P566215 | DT-9600-13-5UM |
| | 8 μm | 12.91 | 328 | P566216 | DT-9600-13-8UM |
| | 12 μm | 12.91 | 328 | P566217 | DT-9600-13-14UM |
| | 23 μm | 12.91 | 328 | P566218 | DT-9600-13-25UM |
| | 5 μm | 12.85 | 326 | P566368 | DT-9601-13-5UM, High collapse |
| | 12 μm | 12.85 | 326 | P566369 | DT-9601-13-14UM, High collapse |
| | <4 μm | 12.91 | 328 | P567876 | DX2-9600-13-2UM |
| | 5 μm | 12.91 | 328 | P565188 | DX2-9600-13-5UM |
| | 8 μm | 12.91 | 328 | P565189 | DX2-9600-13-8UM |
| 12 μm | 12.91 | 328 | P565187 | DX2-9600-13-14UM | |
| <4 μm | 16.84 | 428 | P566219 | DT-9600-16-2UM | |
| 5 μm | 16.84 | 428 | P566220 | DT-9600-16-5UM | |
| 8 μm | 16.84 | 428 | P566221 | DT-9600-16-8UM | |
| 12 μm | 16.84 | 428 | P566222 | DT-9600-16-14UM | |
| 23 μm | 16.84 | 428 | P566223 | DT-9600-16-25UM | |
| 5 μm | 16.84 | 428 | P566370 | DT-9601-16-5UM, High collapse | |
| 12 μm | 16.84 | 428 | P566371 | DT-9601-16-14UM, High collapse | |
| <4 μm | 16.81 | 427 | P567877 | DX2-9600-16-2UM | |
| 5 μm | 16.81 | 427 | P565196 | DX2-9600-16-5UM | |
| 8 μm | 16.81 | 427 | P565197 | DX2-9600-16-8UM | |
| 12 μm | 16.81 | 427 | P565195 | DX2-9600-16-14UM | |



Filter Notes

All Donaldson DT and DX2 filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.

All Donaldson DT and DX2 filters are potted with epoxy-based adhesives.

Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.

High collapse designs are double wire-backed using stainless steel mesh.

High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications.

Viton® seals are standard on all Donaldson DT and DX2 filters. Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

DX2 filters utilize nylon mesh for pleat support.



Head Assembly Choices

| Port Size | Bypass Rating | Seal Material | Indicator Style & Location | Donaldson Part No. | Comments |
|-----------------------------------|-------------------|---------------|----------------------------|--------------------|---------------------------|
| SAE-16 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574252 | |
| SAE-24 O-ring | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574253 | |
| 1-1/2" SAE 4 Bolt Flange, Code 61 | 50 psi / 3.45 bar | Buna-N | Port Machined & Plugged | P574254 | 3000 PSI Maximum Pressure |
| 1-1/4" SAE 4 Bolt Flange, Code 62 | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | P575931 | Reverse flow check valve |
| 1-1/4" SAE 4 Bolt Flange, Code 62 | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | P575932 | |
| SAE-16 O-ring | 90 psi / 6.21 bar | Viton | Port Machined & Plugged | P575933 | |
| SAE-20 O-ring | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | P575934 | |
| SAE-20 O-ring | 50 psi / 3.45 bar | Viton | Port Machined & Plugged | P575935 | Reverse flow check valve |

Housing Choices

| Housing Length | Seal Material | Donaldson Part No. |
|----------------|---------------|--------------------|
| 4" (101.1mm) | Buna-N | X011557 |
| 8" (203.2mm) | Buna-N | X011559 |
| 13" (330.2mm) | Buna-N | X011554 |
| 16" (406.4mm) | Buna-N | X011555 |

Indicator Choices

| Indicator Pressure Setting | Connector Style | Seal Material | Donaldson Part No. | Thermal Lockout | Surge Control | Reset |
|-----------------------------------|---------------------|---------------|--------------------|-----------------|---------------|--------|
| Visual Pop-up Models | | | | | | |
| 35 psi / 241 kPa | NA | Buna-N | P572347 | No | No | Auto |
| 35 psi / 241 kPa | NA | Buna-N | P572348 | Yes | Yes | Manual |
| 35 psi / 241 kPa | NA | Viton | P567456 | Yes | Yes | Manual |
| 70 psid / 482 kPa | NA | Buna-N | P572319 | Yes | Yes | Manual |
| 70 psid / 482 kPa | NA | Viton | P567457 | Yes | Yes | Manual |
| Electrical / Visual Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572327 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572329 | No | No | Auto |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572384 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Hirschman | Viton | P567458 | Yes | Yes | Manual |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572385 | Yes | Yes | Manual |
| 35 psi / 241 kPa | 3 wire flying leads | Buna-N | P572349 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572320 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Brad Harrison | Buna-N | P567459 | Yes | Yes | Manual |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572373 | Yes | No | Manual |
| 70 psi / 482 kPa | Hirschman | Viton | P569639 | Yes | No | Manual |
| Electrical Models | | | | | | |
| 35 psi / 241 kPa | Hirschman | Buna-N | P572359 | No | No | Auto |
| 35 psi / 241 kPa | Brad Harrison | Buna-N | P572361 | No | No | Auto |
| 70 psi / 482 kPa | Hirschman | Buna-N | P572369 | No | No | Auto |

Head/Bowl/Housing Seal Kits

| Donaldson Part No. | Material |
|--------------------|----------|
| X011182 | Buna |
| X011183 | Viton |

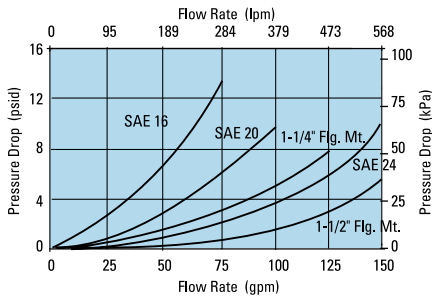


W620
Max Flow: 150 gpm (568 lpm)

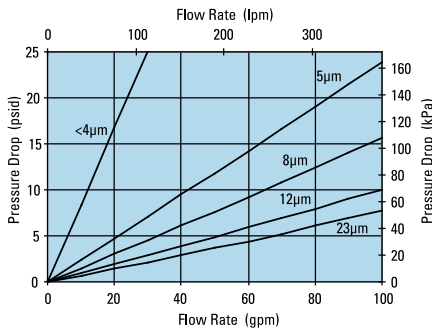


Performance Data

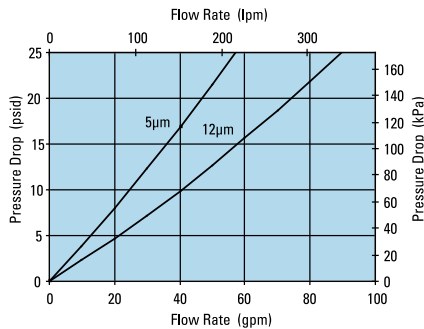
W620 Housing Only



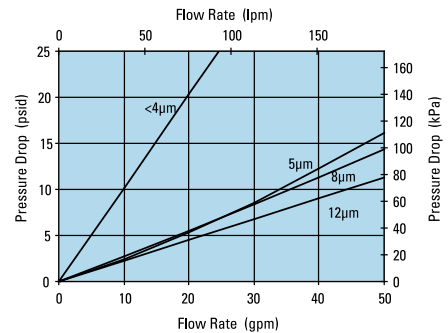
W620 8" DT Filter Only
DT-9600-8, 8.22"/208.8mm



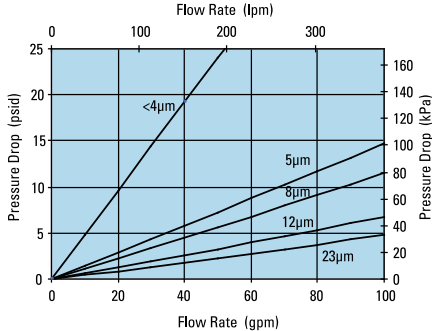
W620 8" DT Filter Only
DT-9601-8, 8.19"/208mm



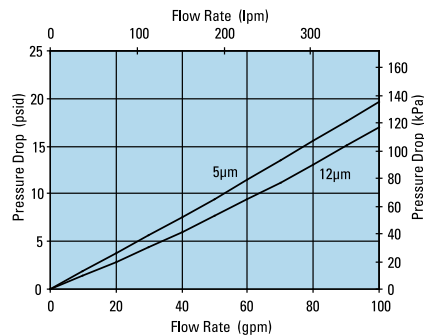
W620 8" DX2 Filter Only
DX2-9600-8, 8.19"/208mm



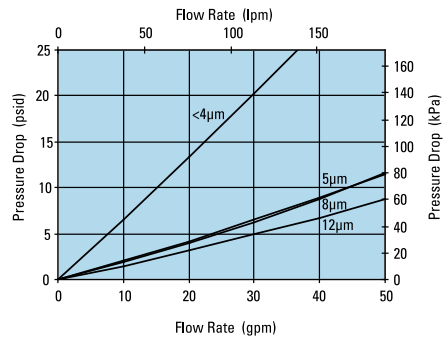
W620 13" DT Filter Only
DT-9600-13, 12.91"/327.8mm



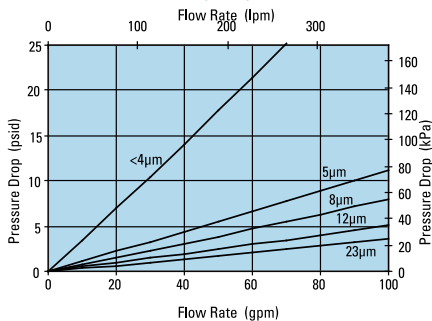
W620 13" DT Filter Only
DT-9601-13, 12.85"/326.3mm



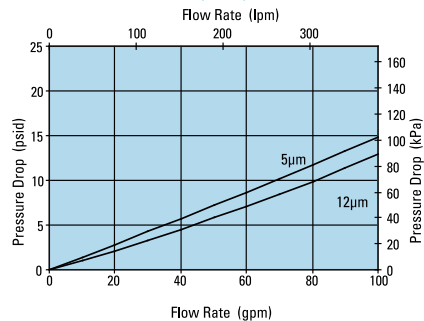
W620 13" DX2 Filter Only
DX2-9600-13, 12.87"/327mm



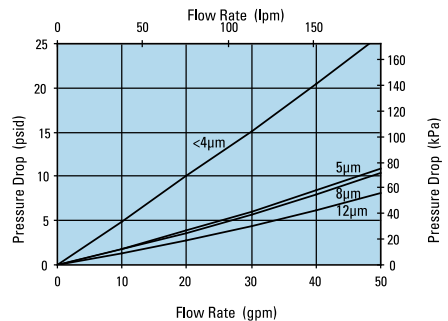
W620 16" DT Filter Only
DT-9600-16, 16.84"/427.8mm



W620 16" DT Filter Only
DT-9601-16, 16.82"/427.1mm



W620 16" DX2 Filter Only
DX2-9600-16, 16.81"/427mm



HPK05 In-Line Cartridge Filters

Working Pressures to: 3000 psi
20,700 kPa
206.9 bar

Rated Static Burst to: 6000 psi
41,400 kPa
413.8 bar

Flow Range To: 200 gpm
757 lpm

Features

The HPK05 high pressure filter series is made of ductile iron and steel for strength and durability. Machined bypass valves are case-hardened at critical points to provide maximum strength and reliability.

Reverse flow bypass valve allows bi-directional flow through the filter head, with head-up or head-down mounting capabilities. Available with your choice of visual or AC/DC electrical service indicator; choose Viton® or Buna-N® seals. The HPK05 filters contain Synteq™, Donaldson's exclusive synthetic fiber media formulated especially for hydraulic filtration. Upgraded Donaldson high-performance DT filters are also offered for superior performance.

Viton® and Buna-N® are registered trademarks of E. I. DuPont de Nemours and Company.



Applications

- High Pressure Circuits
- Hydrostatic Transmission
- In-Plant Systems
- Lube Oil Systems
- Mobile Equipment

Beta Rating

- Performance to $\beta_{<4(c)} = 1000$

Porting Size Options

- 2" SAE 4-Bolt Flange Code 61

Replacement Filter Lengths

- 25.53"/648mm
- 25.9"/657.9mm

Operating Temperatures

- -20°F to 250°F / -29°C to 121°C

Standard Bypass Ratings

- 60 psi / 414 kPa / 4.1 bar with reverse-flow check valve
- No Bypass

Assembly Weight

- 63 lbs / 28.5

Filter Collapse Ratings

- 200 psi / 1380 kPa / 13.8 bar (standard)
- 3000 psi / 20,700 kPa / 206.9 bar (high collapse)



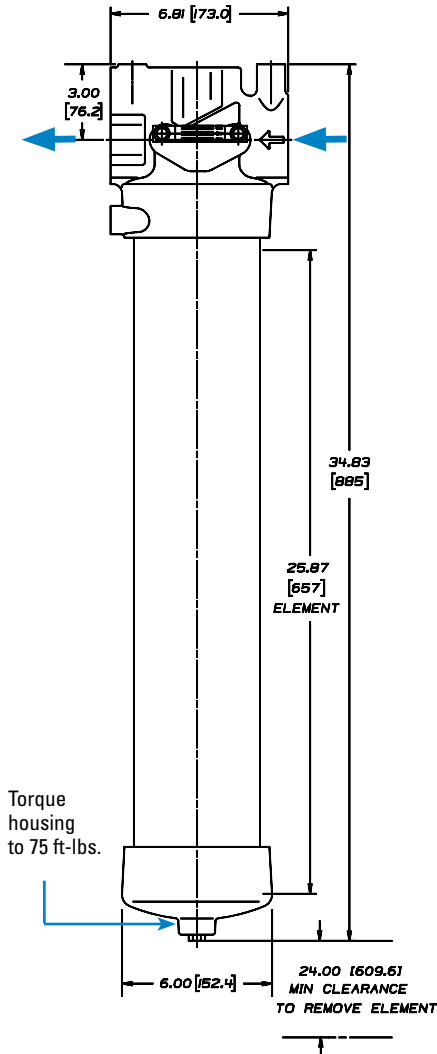
HPK05
Max Flow: 200 gpm (757 lpm)



HPK05 Specification Illustrations

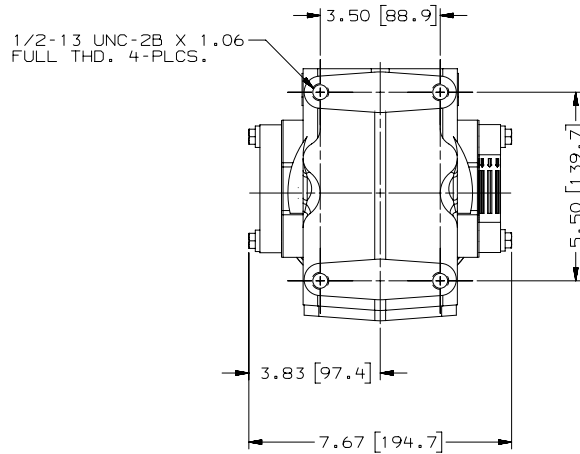
All dimensions are shown in inches [millimeters].

Assembly - Side View

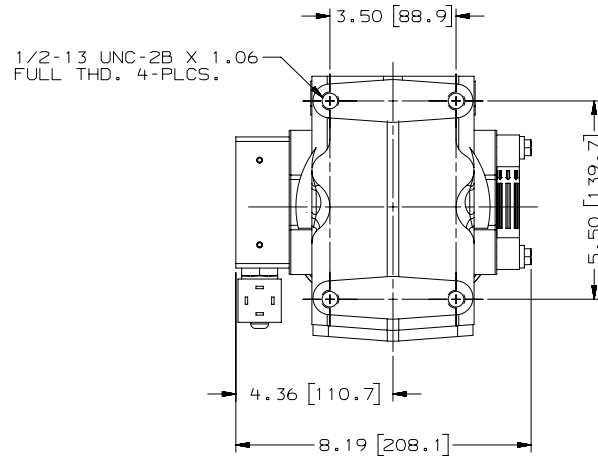


Head - Top View

HPK05 with Visual Service Indicator

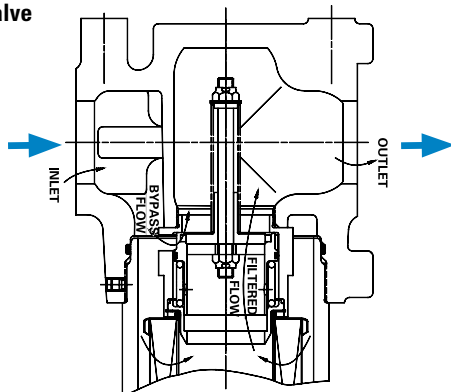


HPK05 with AC/DC Electrical Service Indicator

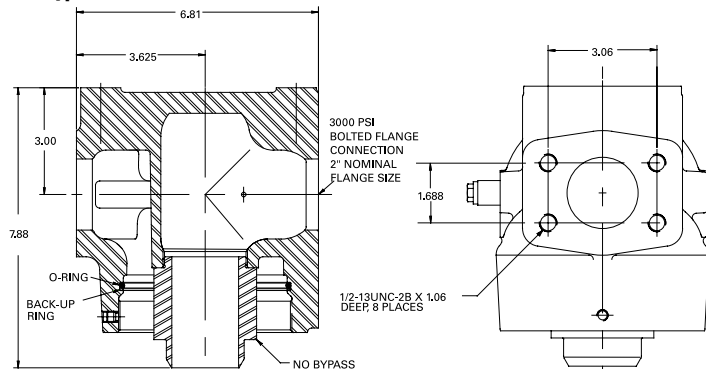


Bypass Valve Alternatives

60 psi / 414 kPa Bypass Valve with Reverse Flow Check Valve



No Bypass



HPK05 Components

Assembly Choices

Includes Standard Filter

| Port Size | Bypass Rating | Indicator Style/Location ¹ | Assembly Number | Filter Part No. |
|--------------------------------|----------------------------|---------------------------------------|-----------------|----------------------|
| 2" SAE 4-Bolt Flange (Code 61) | 60 psi / 414 kPa / 4.1 bar | Reverse flow check valve | K052024 | P164229 |
| | No Bypass | Visual & Electrical ² | K052039 | P171037 ³ |

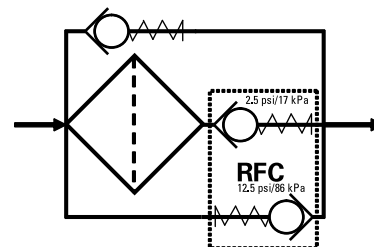
Assembly Notes

¹Donaldson uses the inlet port as the reference point. "Left side," for instance, means that the indicator mounts on the side of the filter head that is on your left when you face the inlet port.

²Visual indicator is mounted on left side of the head; electrical indicator (P173929- 72 psid) is mounted on the right side.

³Rated as high collapse (3000 psi / 20700 kPa); has Viton® seals.

Reverse Flow Check Schematic



High-Performance DT Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------|--|--------|-----|--------------------|--------------------------------|
| | | in | mm | | |
| DT Synteq | <4 μm | 25.9 | 658 | P566449 | DT-9400-26-2UM |
| Synthetic | 5 μm | 25.9 | 658 | P566450 | DT-9400-26-5UM |
| | 8 μm | 25.9 | 658 | P566451 | DT-9400-26-8UM |
| | 12 μm | 25.9 | 658 | P566452 | DT-9400-26-14UM |
| | 23 μm | 25.9 | 658 | P566453 | DT-9400-26-25UM |
| | 5 μm | 25.9 | 658 | P566642 | DT-9901-26-5UM, High collapse |
| | 12 μm | 25.9 | 658 | P566643 | DT-9901-26-14UM, High collapse |

Filter Notes

All Donaldson DT filters utilize glass fiber media with an epoxy-based resin system for the ultimate in chemical compatibility.

All Donaldson DT filters are potted with epoxy-based adhesives.

Standard collapse DT designs are double wire-backed using epoxy-coated steel mesh for maximum pleat support and dirt capacity.

High collapse designs are double wire-backed using stainless steel mesh.

High collapse designs are also potted into machined aluminum endcaps for greater filter integrity in critical applications

Viton® seals are standard on all Donaldson DT filters.

Standard Filter Choices

| Media Type | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length | | Donaldson Part No. | Comments |
|------------|--|--------|-----|--------------------|--------------|
| | | in | mm | | |
| Synteq | 6 μm | 25.5 | 648 | P164585 | Buna-N® Seal |
| Synthetic | 11 μm | 25.5 | 648 | P164227 | Buna-N Seal |
| | 23 μm | 25.5 | 648 | P164229 | Buna-N Seal |

Filter Notes

Filters with seals made of Buna-N are appropriate for most applications involving petroleum oil. Filters with seals made of fluoroelastomer (such as Viton® or Fluorel®) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F/83°C.

Donaldson high collapse filters, with their steel end caps and reinforcing wire-backed media, are rated to withstand up to 3000 psi / 20,700 kPa before collapsing.

Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.

Buna-N® and Viton® are registered trademarks of E. I. DuPont de Nemours and Company.



HPK05
Max Flow: 200 gpm (757 lpm)



HPK05 Components

Service Indicator Kits

All kits include indicator with mounting block

| Part No. | Use with Bypass Valve Pressure of: | Description |
|---|------------------------------------|---|
| Visual Service Indicators | | |
| P569632 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button |
| P569633 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit auto reset pop-out button |
| P567988 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit auto reset pop-out button with thermal lockout and surge control |
| P567989 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* auto reset pop-out button with thermal lockout and surge control |
| AC/DC Visual/Electrical Service Indicators | | |
| P569634 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P569635 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit Hirschmann receptacle 115 VAC/28 VDC, 2 amps |
| P567986 | 60 psi / 4.1 bar | 35 psi/2.4 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |
| P567987 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 |

Indicator Choices

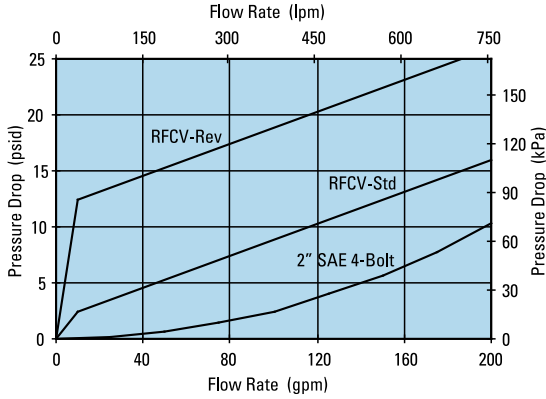
Replacement Indicator Only

| Part No. | Description |
|---------------------------------|--|
| P567458 | Visual/Electrical indicator with thermal lockout and surge, 35 psid/2.4 bar |
| P567459 | Visual/Electrical indicator, with thermal lockout and surge, 70 psid/4.8 bar |
| P567456 | Pop-Up Visual Indicator, with thermal lockout and surge, 35 psid/2.4 bar |
| P567457 | Pop-Up Visual Indicator, with thermal lockout and surge, 70 psid/4.8 bar |
| P569636 | Pop-Up Visual Indicator, 35 psid/2.4 bar |
| P569637 | Pop-Up Visual Indicator, 70 psid/4.8 bar |
| P569638 | Visual/Electrical Indicator, 35 psid/2.4 bar |
| P569639 | Visual/Electrical Indicator, 70 psid/4.8 bar |
| P164315 | Visual Indicator, bar style, 35 psid/2.4 bar |
| P166603 | Visual Indicator, bar style, 70 psid/4.8 bar |
| P166134 | Blanking plate |
| Indicator Mounting Block | |
| P573495 | Mounting Block Assembly |

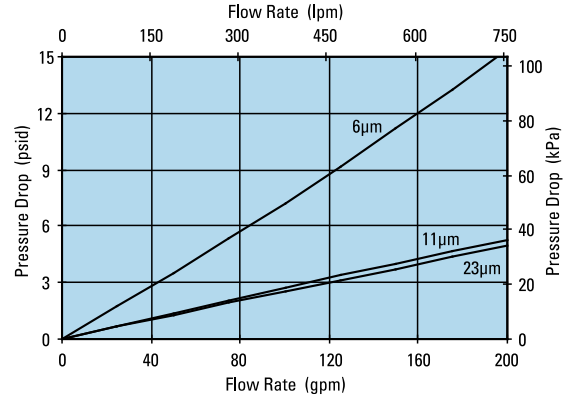


Performance Data

HPK05 Housing Only

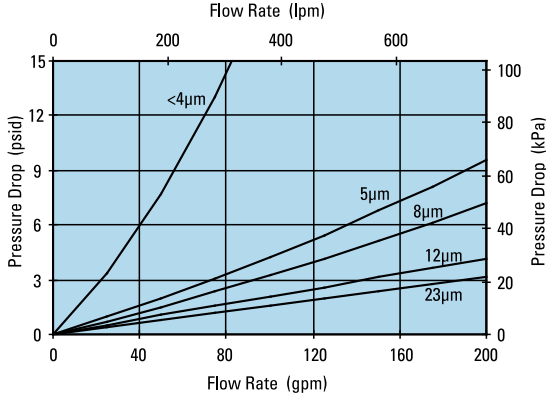


HPK05 26" Standard Filter Only



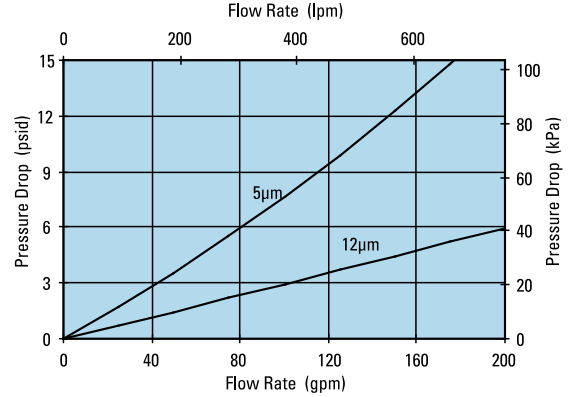
HPK05 26" DT Filter Only

DT-9400-26, 26"/660mm



HPK05 26" DT Filter Only

DT-9901-26, 26"/660mm





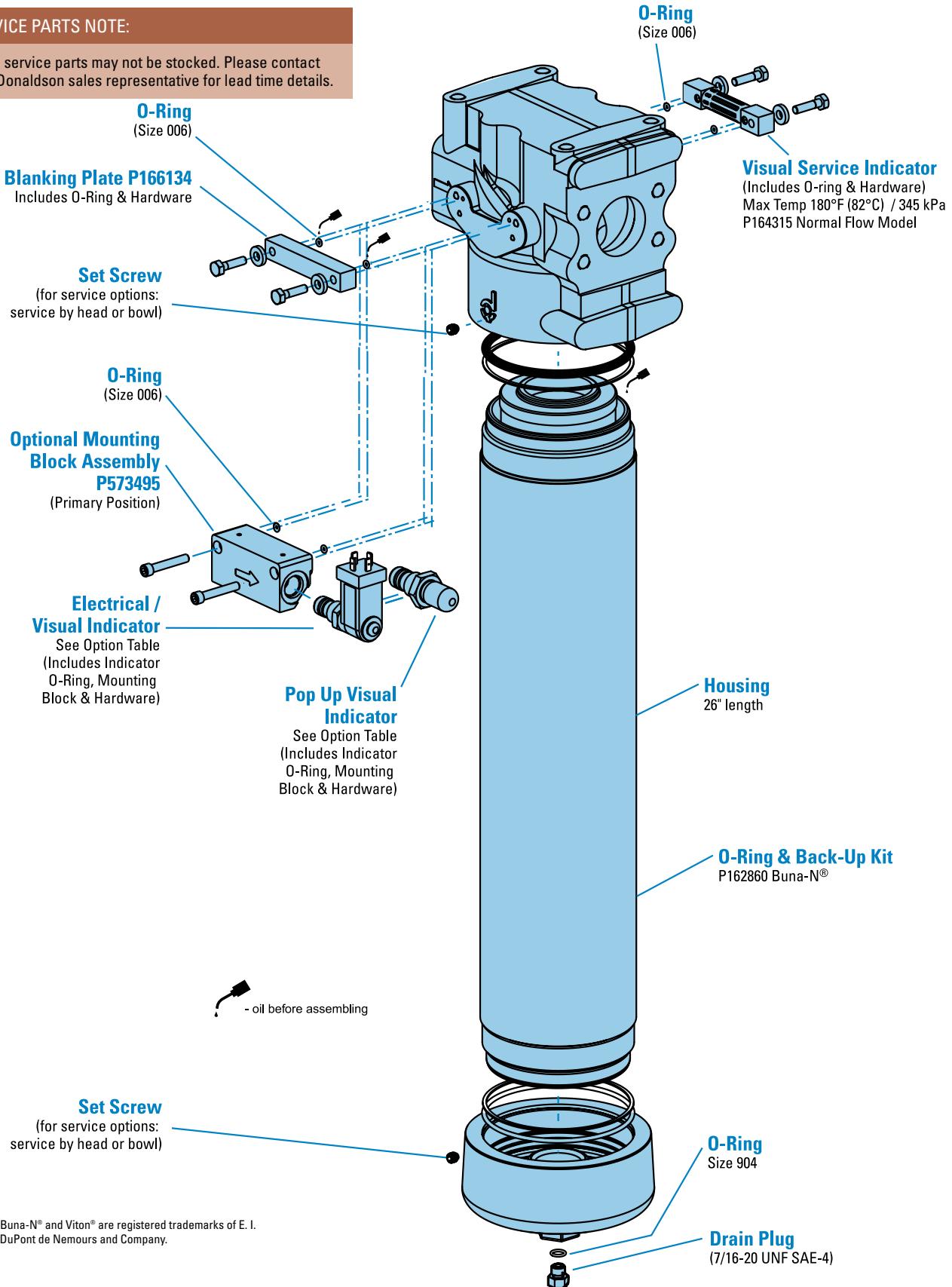
HPK05
Max Flow: 200 gpm (757 lpm)



HPK05 Service Parts

SERVICE PARTS NOTE:

Some service parts may not be stocked. Please contact your Donaldson sales representative for lead time details.



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High-Performance DT Hydraulic Cartridges

Using Donaldson Synteq™ media technology, DT filters extend filter life, allow higher initial cleanliness and provide superior system protection.



Donaldson Blue™ Hydraulic Cartridges

The Donaldson Company has been releasing and supporting Donaldson Blue premium product in our Air, Clean Solutions and Liquid filtration product categories. Now, we're extending the same high quality coverage to our hydraulic offering with the first ever, **Donaldson Blue Hydraulic** filters.

Donaldson Blue Hydraulic filters deliver:

- Superior efficiency
- Longer filter life
- Reduced flow restriction

Donaldson Blue hydraulic filters deliver better system protection and performance.



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| Donaldson Blue Hydraulic Cartridges | 189 |
| DT High-Performance Cartridges | 190 |
| How it Works | 191 |
| Popular DT Filters | 192 |
| Pall SRT Replacement Cartridges | 194 |

Cross Reference

| Donaldson Blue | Schroeder® | Hydac® | Pall® | Parker® | Hy-Pro® |
|----------------|------------|---------|-----------------------|----------|-------------|
| DBH6018 | KZ5 | 2060529 | HC9700FKN9H or CN9H | HF4L10VQ | HPKL9-6MB |
| DBH6019 | KZ10 | 2060530 | HC9700FKS9H or CS9H | HF4L15VQ | HPKL9-12MB |
| DBH6020 | KKZ5 | 2060431 | HC9700FKN18H or CN18H | 932678Q | HPKL18-6MB |
| DBH6138 | KKZ10 | 2060432 | HC9700FKS18H or CS18H | 932679Q | HPKL18-12MB |
| DBH6139 | 27KZ5 | 2065004 | HC9700FKN27H or CN27H | 933487Q | HPKL27-6MB |
| DBH6140 | 27KZ10 | 2065005 | HC9700FKS27H or CS27H | 933488Q | HPKL27-12MB |

Schroeder® is a registered trademark of Schroeder Industries, LLC. Hydac® is a registered trademark of Hydac Technology GmbH. Pall® is a registered trademark of Pall Corporation. Parker®/Parker-Hannifin is a registered trademark of Parker Intangibles, LLC. Hy-Pro® is a registered trademark of Hy-Pro Filtration.



High-performance DT filters provide superior hydraulic system protection.

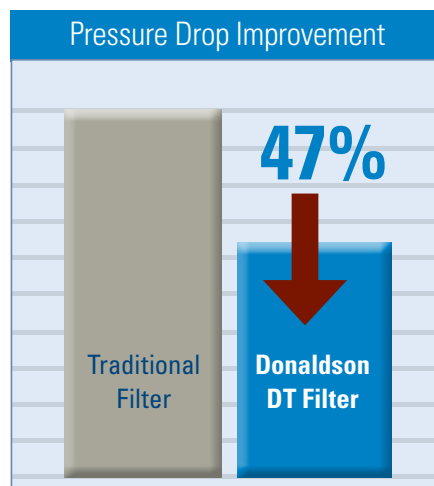
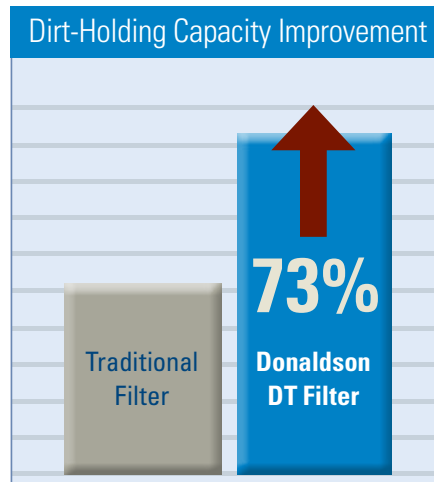
Premium Uptime Protection

Every hydraulic system has suspended particles in its fluid. Contaminants grind and wear at the surface of moving parts, introducing even more particles into the system. These contaminants cause more than 70% of all hydraulic system downtime.

Donaldson high-performance DT cartridge filters provide better protection from the particles and contaminants that reduce the effectiveness of lubricant and hydraulic fluid. Using Donaldson Synteq™ media technology, these filters extend filter life, allow higher initial cleanliness and provide superior system protection.

Donaldson DT filters are ideally suited for a variety of demanding applications, including:

- heavy-duty mobile equipment
- in-plant hydraulics
- transmissions
- bearing lube oil systems

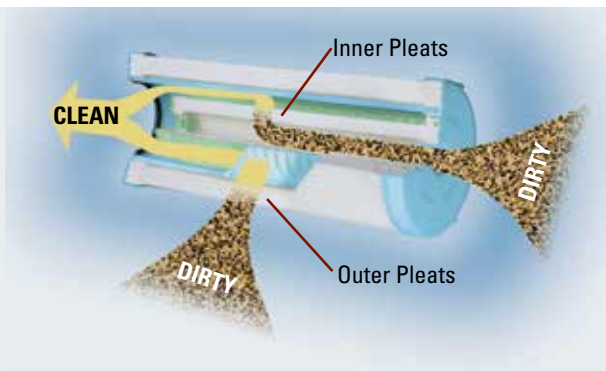


Donaldson DT filters are stocked and ready to ship!

DT DX2 Coreless Filters

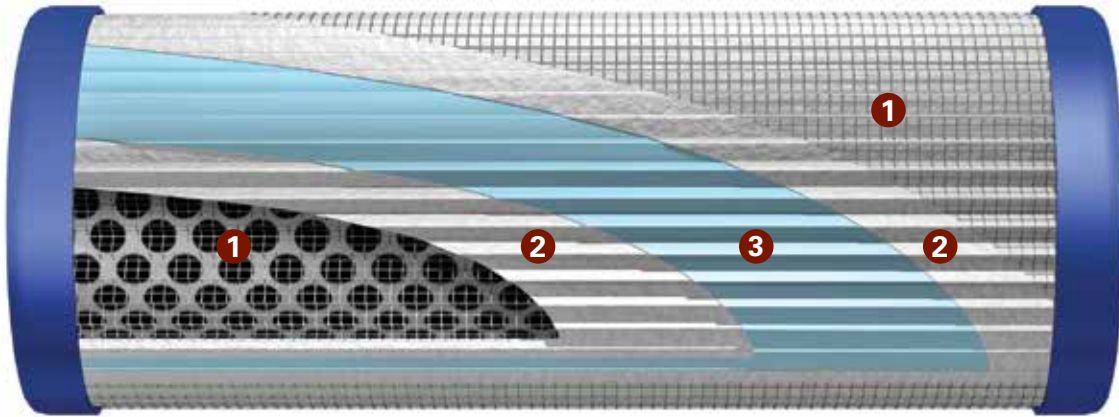
Unlike traditional filters, this high-performance filtration solution features an innovative 2-in-1 filter design that increases dirt-holding capacity by 91% compared to traditional filters. It has all the features of a coreless design –without the expense of housing modifications. These filters are environmentally friendly and fully disposable – reducing waste and disposal costs. Increased dirt holding capacity extends filter life and reduces maintenance costs.

DX2 filters are available in HF3 (9600) style filters.



See How Donaldson DT Filters Work

DT cartridge filters feature an advanced pleat pack design that provides higher initial cleanliness and dirt holding capacity.



1 Epoxy-Coated Steel Support Mesh

(Upstream and Downstream Sides)

- Provides excellent pleat support and spacing, which allows for maximum effective media area
- Protects against media damage during handling and installation

2 Media Support Layers

(Upstream and Downstream Sides)

- Optimizes media support
- Protects media during pressure surges

3 Synteq™ Media Technology

Donaldson-developed Synteq synthetic filter media has smooth, rounded fibers for low resistance to fluid flow. Synteq media is ideal for filtering synthetic fluids, water glycols, water/oil emulsions, HWCF (high water content fluids) and petroleum-based fluids.



- High-efficiency media grades with performance to $\beta < 4(c) = 1000$ (per ISO 16889)
- Exceptionally low flow resistance
- Consistent performance throughout filter life
- Excellent fluid compatibility

Donaldson DT replacement filters are engineered to fit many competitive applications, including:

DIN* Standard 400, 630, 1000 Series

Fairey Arlon 170, 270, 370

Hydac 0030D, 0500R, 0060D/R, 0075D, 0110D/R, 0140D, 0160D/R, 0240D/R, 0280D, 0330D/R, 0660D/R, 0850R, 0950R, 1300R, 2600R

Pall 2544, 8200, 8300, 8310, 8314, 8800, 8900, 8904, 9020, 9021, 9024, 9100, 9101, 9104, 9400, 9404, 9600, 9601, 9604, 9650, 9651, 9800, 9801, 9804, 9901

Parker 15/40/80 CN, 25P, 31P, 61P, RF2/IL2

Porous Media LG Series

PTI/Mahle 015/Pi X105, 025/Pi X108, 030/Pi X111, 050/Pi X115, 080/Pi X130, 120/Pi X145, PTI RP83

Schroeder A, K, KK, KKK, N, NN, V

For a complete list of replacement part numbers, visit crossreference.donaldson.com.

* DIN - Deutsches Institut für Normung E.V., the German Institute for Standardization



Popular DT Filters for Heavy-Duty Equipment and Industrial Hydraulic Applications



| Donaldson | Description | Pall | Hydac | Parker | Schroeder |
|----------------|----------------|------------------|---------------|--------|---------------------|
| P566658 | DT-0110-D-5UM | HC2206FKP6H or Z | 0110D003BN4HC | PR3085 | SBF-0110D-Z3B or V |
| P566659 | DT-0110-D-8UM | HC2206FKN6H or Z | 0110D005BN4HC | PR3086 | SBF-0110D-Z5B or V |
| P566660 | DT-0110-D-14UM | HC2206FKS6H or Z | 0110D010BN4HC | PR3087 | SBF-0110D-Z10B or V |
| P566965 | DT-0110-R-5UM | HC2196FKP6H or Z | 0110R003BN4HC | PR3256 | SBF0110RZ3B or V |
| P566966 | DT-0110-R-8UM | HC2196FKN6H or Z | 0110R005BN4HC | PR3257 | SBF0110RZ5B or V |
| P566967 | DT-0110-R-14UM | HC2196FKS6H or Z | 0110R010BN4HC | PR3258 | SBF0110RZ10B or V |
| P566968 | DT-0110-R-25UM | HC2196FKT6H or Z | 0110R020BN4HC | PR3259 | SBF0110RZ25B or V |
| P566666 | DT-0160-D-5UM | HC2216FKP4H or Z | 0160D003BN4HC | PR3114 | SBF-0160D-Z3B or V |
| P566667 | DT-0160-D-8UM | HC2216FKN4H or Z | 0160D005BN4HC | PR3115 | SBF-0160D-Z5B or V |
| P566668 | DT-0160-D-14UM | HC2216FKS4H or Z | 0160D010BN4HC | PR3116 | SBF-0160D-Z10B or V |
| P566969 | DT-0160-R-5UM | HC2226FKP4H or Z | 0160R003BN4HC | PR3273 | SBF0160RZ3B or V |
| P566970 | DT-0160-R-8UM | HC2226FKN4H or Z | 0160R005BN4HC | PR3274 | SBF0160RZ5B or V |
| P566971 | DT-0160-R-14UM | HC2226FKS4H or Z | 0160R010BN4HC | PR3275 | SBF0160RZ10B or V |
| P566972 | DT-0160-R-25UM | HC2226FKT4H or Z | 0160R020BN4HC | PR3276 | SBF0160RZ25B or V |
| P566670 | DT-0240-D-5UM | HC2216FKP6H or Z | 0240D003BN4HC | PR3143 | SBF-0240D-Z3B or V |
| P566671 | DT-0240-D-8UM | HC2216FKN6H or Z | 0240D005BN4HC | PR3144 | SBF-0240D-Z5B or V |
| P566672 | DT-0240-D-14UM | HC2216FKS6H or Z | 0240D010BN4HC | PR3145 | SBF-0240D-Z10B or V |
| P566977 | DT-0240-R-5UM | HC2226FKP6H or Z | 0240R003BN4HC | PR3290 | SBF0240RZ3B or V |
| P566978 | DT-0240-R-8UM | HC2226FKN6H or Z | 0240R005BN4HC | PR3291 | SBF0240RZ5B or V |
| P566979 | DT-0240-R-14UM | HC2226FKS6H or Z | 0240R010BN4HC | PR3292 | SBF0240RZ10B or V |
| P566980 | DT-0240-R-25UM | HC2226FKT6H or Z | 0240R020BN4HC | PR3293 | SBF0240RZ25B or V |
| P566674 | DT-0280-D-5UM | NA | 0280D003BN4HC | NA | SBF-0280D-Z3B OR V |
| P566675 | DT-0280-D-8UM | NA | 0280D005BN4HC | NA | SBF-0280D-Z5B OR V |
| P566676 | DT-0280-D-14UM | NA | 0280D010BN4HC | NA | SBF-0280D-Z10B OR V |
| P566677 | DT-0280-D-25UM | NA | 0280D020BN4HC | NA | SBF-0280D-Z25B OR V |
| P566678 | DT-0330-D-5UM | HC2233FKP6H or Z | 0330D003BN4HC | PR3172 | SBF-0330D-Z3B or V |
| P566679 | DT-0330-D-8UM | HC2233FKN6H or Z | 0330D005BN4HC | PR3173 | SBF-0330D-Z5B or V |
| P566680 | DT-0330-D-14UM | HC2233FKS6H or Z | 0330D010BN4HC | PR3174 | SBF-0330D-Z10B or V |
| P566681 | DT-0330-D-25UM | HC2233FKT6H or Z | 0330D020BN4HC | PR3175 | SBF-0330D-Z25B or V |
| P566981 | DT-0330-R-5UM | HC2246FKP6H or Z | 0330R003BN4HC | PR3307 | SBF0330RZ3B or V |
| P566982 | DT-0330-R-8UM | HC2246FKN6H or z | 0330R005BN4HC | PR3308 | SBF0330RZ5B or V |



| Donaldson | Description | Pall | Hydac | Parker | Schroeder |
|----------------|-----------------|-------------------|-------------------|----------|----------------------|
| P566983 | DT-0330-R-14UM | HC2246FKS6H or Z | 0330R010BN4HC | PR3309 | SBF0330RZ10B or V |
| P566984 | DT-0330-R-25UM | HC2246FKT6H or Z | 0330R0220BN4HC | PR3310 | SBF0330RZ25B or V |
| P566195 | DT-9020-4-5UM | HC9020FKP4H or Z | H9020-4-003BN4HC | 932610Q | SBF-9020-4Z3B or V |
| P566196 | DT-9020-4-8UM | HC9020FKN4H or Z | H9020-4-005BN4HC | 933239Q | SBF-9020-4Z5B or V |
| P566197 | DT-9020-4-14UM | HC9020FKS4H or Z | H9020-4-010BN4HC | 925580Q | SBF-9020-4Z10B or V |
| P566200 | DT-9020-8-5UM | HC9020FKP8H or Z | H9020-8-003BN4HC | 925602Q | SBF-9020-8Z3B or V |
| P566201 | DT-9020-8-8UM | HC9020FKN8H or Z | H9020-8-005BN4HC | 933246Q | SBF-9020-8Z5B or V |
| P566202 | DT-9020-8-14UM | HC9020FKS8H or Z | H9020-8-010BN4HC | 925600Q | SBF-9020-8Z10B or V |
| P566210 | DT-9600-8-5UM | HC9600FKP8H or Z | H9600-8-003BN4HC | 926697Q | SBF-9600-8Z3B or V |
| P566212 | DT-9600-8-14UM | HC9600FKS8H or Z | H9600-8-010BN4HC | 926837Q | SBF-9600-8Z10B or V |
| P566215 | DT-9600-13-5UM | HC9600FKP13H or Z | H9600-13-003BN4HC | 926698Q | SBF-9600-13Z3B or V |
| P566216 | DT-9600-13-8UM | HC9600FKN13H or Z | H9600-13-006BN4HC | 926845Q | SBF-9600-13Z5B or V |
| P566217 | DT-9600-13-14UM | HC9600FKS13H or Z | H9600-13-010BN4HC | 926839Q | SBF-9600-13Z10B or V |
| P566220 | DT-9600-16-5UM | HC9600FKP16H or Z | H9600-16-003BN4HC | 926699Q | SBF-9600-16Z3B or V |
| P566221 | DT-9600-16-8UM | HC9600FKN16H or Z | H9600-16-005BN4HC | 926890Q | SBF-9600-16Z5B or V |
| P566222 | DT-9600-16-14UM | HC9600FKS16H or Z | H9600-16-010BN4HC | 926888Q | SBF-9600-16Z10B or V |
| P566373 | DT-9604-8-5UM | HC9604FKP8H or Z | NA | NA | SBF-9604-8Z3B OR V |
| P566374 | DT-9604-8-8UM | HC9604FKN8H or Z | NA | NA | SBF-9604-8Z5B OR V |
| P566375 | DT-9604-8-14UM | HC9604FKS8H or Z | NA | NA | SBF-9604-16Z10B OR V |
| P566378 | DT-9604-13-5UM | HC9604FKP13H or Z | NA | NA | SBF-960413Z3B OR V |
| P566379 | DT-9604-13-8UM | HC9604FKN13H or Z | NA | NA | SBF-9604-13Z5B OR V |
| P566380 | DT-9604-13-14UM | HC9604FKS13H or Z | NA | NA | SBF-9604-13Z10B OR V |
| P566383 | DT-9604-16-5UM | HC9604FKP16H or Z | NA | NA | SBF-9604-16Z3B OR V |
| P566384 | DT-9604-16-8UM | HC9604FKN16H or Z | NA | NA | SBF-9604-16Z5B OR V |
| P566385 | DT-9604-16-14UM | HC9604FKS16H or Z | NA | NA | SBF-9604-16Z10B OR V |
| P566270 | DT-HF4-9-5UM | HC9700FKP9H or Z | HK003BN4HC | HF4L3VQ | KZ3 |
| P566271 | DT-HF4-9-8UM | HC9700FKN9H or Z | HK005BN4HC | HF4L10VQ | KZ5 |
| P566272 | DT-HF4-9-14UM | HC9700FKS9H or Z | HK010BN4HC | HF4L15VQ | KZ10 |
| P566274 | DT-HF4-18-5UM | HC9700FKP18H or Z | H2K003BN4HC | 932677Q | KKZ3 |
| P566275 | DT-HF4-18-8UM | HC9700FKN18H or Z | H2K005BN4HC | 932678Q | KKZ5 |
| P566276 | DT-HF4-18-14UM | HC9700FKS18H or Z | H2K010BN4HC | 932679Q | KKZ10 |



Pall® Ultipleat® SRT Replacement Filters

Cartridge Replacements for SRT 219, 319 and 619 Housings



CARTRIDGE FILTERS



Donaldson replacement filters for Pall Ultipleat SRT 219, 319 and 619 style housings provide protection from particles and contaminants that reduce the effectiveness of lubricant and hydraulic fluid. Using Donaldson DT Synteq™ media technology, these filters have long life and provide excellent system protection.

These filters feature an advanced pleat pack design that provides high initial cleanliness and efficient dirt holding capacity.

Double wire backed with an epoxy-coated steel mesh for excellent pleat support and spacing, which allows for maximum media area and excellent protection during operating pressure surges

Utilizes glass fiber DT Synteq media with an epoxy-based resin system and is potted with epoxy-based adhesives Viton® O-ring seals for excellent compatibility with a wide range of fluid types

Electrostatic Discharge (ESD) Reduction

Donaldson SRT replacement filters are designed to resist charge generation and reduce the occurrence of electrostatic discharges induced by the flow of fluids through the filter media – a known industry problem which can result in damage to the filter and degraded performance.

Utilizing DT Synteq™ Media Technology

Donaldson invented DT Synteq synthetic filter media has smooth, rounded fibers for low resistance to fluid flow. Synteq media is ideal for filtering synthetic fluids, water glycols, water/oil emulsions, petroleum-based and high water content fluids (HWCF).

| Length | Beta x _(c) = 1000 Rating | Part No. | Competitive Cross Reference | | |
|--------------------|--|----------------|-----------------------------|-------------------|-------------------------|
| | | | Pall | Hy-Pro | Hydac |
| 219 SERIES | | | | | |
| 4" (102mm) | < 4 µm | P573085 | UE219AZ04H or Z | HP219L41EB or V | N/A |
| | 5 µm | P573086 | UE219AP04H or Z | HP219L43EB or V | N/A |
| | 8 µm | P573087 | UE219AN04H or Z | HP219L46EB or V | N/A |
| | 12 µm | P573088 | UE219AS04H or Z | HP219L412EB or V | N/A |
| | 23 µm | P573089 | UE219AT04H or Z | HP219L422EB or V | N/A |
| 8" (203mm) | < 4 µm | P573090 | UE219AZ08H or Z | HP219L81EB or V | N/A |
| | 5 µm | P573091 | UE219AP08H or Z | HP219L83EB or V | N/A |
| | 8 µm | P573092 | UE219AN08H or Z | HP219L86EB or V | N/A |
| | 12 µm | P573093 | UE219AS08H or Z | HP219L812EB or V | N/A |
| | 23 µm | P573094 | UE219AT08H or Z | HP219L822EB or V | N/A |
| 13" (330mm) | < 4 µm | P573095 | UE219AZ13H or Z | HP219L131EB or V | N/A |
| | 5 µm | P573096 | UE219AP13H or Z | HP219L133EB or V | N/A |
| | 8 µm | P573097 | UE219AN13H or Z | HP219L136EB or V | N/A |
| | 12 µm | P573098 | UE219AS13H or Z | HP219L1312EB or V | N/A |
| | 23 µm | P573099 | UE219AT13H or Z | HP219L1322EB or V | N/A |
| 20" (508mm) | < 4 µm | P573100 | UE219AZ20H or Z | HP219L201EB or V | N/A |
| | 5 µm | P573101 | UE219AP20H or Z | HP219L203EB or V | N/A |
| | 8 µm | P573102 | UE219AN20H or Z | HP219L206EB or V | N/A |
| | 12 µm | P573103 | UE219AS20H or Z | HP219L2012EB or V | N/A |
| | 23 µm | P573104 | UE219AT20H or Z | HP219L2022EB or V | N/A |
| 319 SERIES | | | | | |
| 8" (203mm) | < 4 µm | P573105 | UE319AZ08H or Z | HP319L81EB or V | 1297074 or 1.21.08D03RT |
| | 5 µm | P573106 | UE319AP08H or Z | HP319L83EB or V | 1296464 or 1.21.08D05RT |
| | 8 µm | P573107 | UE319AN08H or Z | HP319L86EB or V | 1296465 or 1.21.08D07RT |
| | 12 µm | P573108 | UE319AS08H or Z | HP319L812EB or V | 1297075 or 1.21.08D12RT |
| | 23 µm | P573109 | UE319AT08H or Z | HP319L822EB or V | N/A |
| 13" (330mm) | < 4 µm | P573110 | UE319AZ13H or Z | HP319L131EB or V | 1297076 or 1.21.13D03RT |
| | 5 µm | P573111 | UE319AP13H or Z | HP319L133EB or V | 1296466 or 1.21.13D05RT |
| | 8 µm | P573112 | UE319AN13H or Z | HP319L136EB or V | 1296467 or 1.21.13D07RT |
| | 12 µm | P573113 | UE319AS13H or Z | HP319L1312EB or V | 1297077 or 1.21.13D12RT |
| | 23 µm | P573114 | UE319AT13H or Z | HP319L1322EB or V | N/A |
| 20" (508mm) | < 4 µm | P573115 | UE319AZ20H or Z | HP319L201EB or V | 1297078 or 1.21.20D03RT |
| | 5 µm | P573116 | UE319AP20H or Z | HP319L203EB or V | 1296468 or 1.21.20D05RT |
| | 8 µm | P573117 | UE319AN20H or Z | HP319L206EB or V | 1296469 or 1.21.20D07RT |
| | 12 µm | P573118 | UE319AS20H or Z | HP319L2012EB or V | 1297079 or 1.21.20D12RT |
| | 23 µm | P573119 | UE319AT20H or Z | HP319L2022EB or V | N/A |
| 40" (107mm) | < 4 µm | P573120 | UE319AZ40H or Z | HP319L401EB or V | 1297080 or 1.21.40D03RT |
| | 5 µm | P573121 | UE319AP40H or Z | HP319L403EB or V | 1296665 or 1.21.40D05RT |
| | 8 µm | P573122 | UE319AN40H or Z | HP319L406EB or V | 1296666 or 1.21.40D07RT |
| | 12 µm | P573123 | UE319AS40H or Z | HP319L4012EB or V | 1297083 or 1.21.40D12RT |
| | 23 µm | P573124 | UE319AT40H or Z | HP319L4022EB or V | N/A |
| 619 SERIES | | | | | |
| 20" (508mm) | < 4 µm | P573125 | UE619AZ20H or Z | HP619L201EB or V | 1297084 or 1.22.20D03RT |
| | 5 µm | P573126 | UE619AP20H or Z | HP619L203EB or V | 1296470 or 1.22.20D05RT |
| | 8 µm | P573127 | UE619AN20H or Z | HP619L206EB or V | 1296471 or 1.22.20D07RT |
| | 12 µm | P573128 | UE619AS20H or Z | HP619L2012EB or V | 1297085 or 1.22.20D12RT |
| | 23 µm | P573129 | UE619AT20H or Z | HP619L2022EB or V | N/A |
| 40" (107mm) | < 4 µm | P573130 | UE619AZ40H or Z | HP619L401EB or V | 1297086 or 1.22.40D03RT |
| | 5 µm | P573131 | UE619AP40H or Z | HP619L403EB or V | 1296472 or 1.22.40D05RT |
| | 8 µm | P573132 | UE619AN40H or Z | HP619L406EB or V | 1296473 or 1.22.40D07RT |
| | 12 µm | P573133 | UE619AS40H or Z | HP619L4012EB or V | 1297087 or 1.22.40D12RT |
| | 23 µm | P573134 | UE619AT40H or Z | HP619L4022EB or V | N/A |

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Accessories

Donaldson offers an extensive line of accessories for hydraulic circuits, lines and reservoirs that will help you maintain proper ISO cleanliness levels.



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T.R.A.P.™ Breather Technology (Thermally Reactive Advanced Protection)

T.R.A.P. breathers provide fast-acting protection against airborne moisture and particulate contamination. It stops solid particulate down to 3 µm at 97% efficiency as well as prevents moisture from entering the reservoir. Water-holding capacity is regenerated with every oil return phase for long service life. Its self-regenerating capability enables extended life.

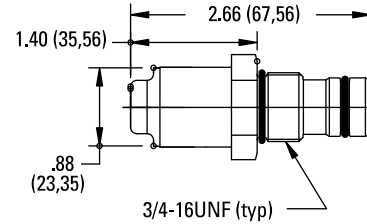
Visual Service Indicator Kits

Visual Service Indicator Kit Choices

| Part No. | Use with Bypass Valve Pressure of: | Description | Where Used |
|----------|------------------------------------|--|----------------------------|
| P569632 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit* auto reset pop-out button | HPK02, HPK03, HPK04, HPK05 |
| P569633 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* auto reset pop-out button | HPK02, HPK03, HPK04, HPK05 |
| P567988 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit* auto reset pop-out button with thermal lockout and surge control | HPK02, HPK03, HPK04, HPK05 |
| P567989 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* auto reset pop-out button with thermal lockout and surge control | HPK02, HPK03, HPK04, HPK05 |

* Note: Above kits include indicator and P573495 mounting block.

Visual (Mechanical) Indicators (with auto reset pop-out button)

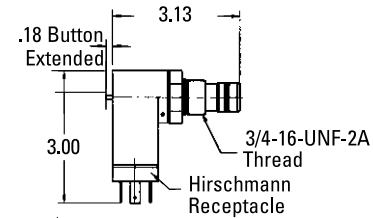


Visual/Electrical Service Indicator Kit Choices

| Part No. | Use with Bypass Valve Pressure of: | Description | Where Used |
|----------|------------------------------------|--|----------------------------|
| P569634 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit* Hirschmann receptacle 115 VAC/28 VDC, 2 amps | HPK02, HPK03, HPK04, HPK05 |
| P569635 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* Hirschmann receptacle 115 VAC/28 VDC, 2 amps | HPK02, HPK03, HPK04, HPK05 |
| P567986 | 50 psi / 3.5 bar | 35 psi/2.4 bar indicator kit* with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 | HPK02, HPK03, HPK04, HPK05 |
| P567987 | 90 psi / 6.2 bar | 70 psi/4.8 bar indicator kit* with thermal lockout and surge control, Hirschmann receptacle, 115 VAC/28 VDC, 2 amps, 4 pin DIN 43650 | HPK02, HPK03, HPK04, HPK05 |

* Note: Above kits include indicator and P573495 mounting block.

AC/DC Electrical Indicators (with aluminum electrical housing)



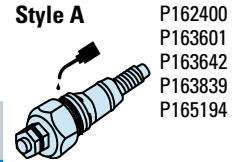
Electrical Service Indicators

Electrical Service Indicator Choices

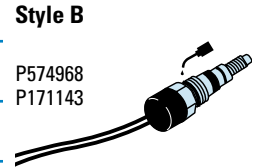
All electric models have a maximum operating temperature of 250°F/ 114°C.

| Part No. | Use with Bypass Valve Pressure of: | Description | Where Used | Illustration |
|----------|--|---|--|-------------------|
| P162400 | 25 psi/ 172 kPa | DC/single post. Normally open. | HBK04, HBK05, HMK04/24, HMK05/25, SP80/90 | Style A |
| P163601 | 15 psi/ 103 kPa | DC/single post. Normally open. | HBK04, HBK05, HMK04/24, HMK05/25, SP80/90 | Style A |
| P163642 | 5 psi/ 34 kPa | DC/single post. Normally open. | HBK04, HBK05, HMK04/24, HMK05/25, SP80/90 | Style A |
| P163839 | 25 psi/ 172 kPa | DC/single post. Normally closed. | HBK04, HBK05, HMK04/24, HMK05/25, SP80/90 | Style A |
| P165194 | 50 psi/ 345 kPa | DC/single post. Normally open. | HMK03, HMK04/24, HMK05/25, FPK04, SP80/90 | Style A |
| P574967 | 50 psi/ 276 kPa | DC 2-wire. Normally closed. Gold contacts. Microprocessor compatible. | HBK05, HMK03, HMK04/24, HMK05/25, SP80/90, FLK90/110/125 | Style E |
| P574968 | 50 psi/ 345 kPa | DC 2-wire. Packard Weatherpack connector. Normally open. | HMK03, HMK04/24, HMK05/25, SP80/90, FLK90/110/125 | Style B |
| P171143 | 25 psi/ 172 kPa | DC 2-wire. Cannon connector. Normally open. | HBK04, HBK05, HMK03, HMK04/24, HMK05/25, SP80/90 | Style B |
| P171966 | 22 psi/ 150 kPa | AC/DC. 0.5A resistive, 0.2A inductive. Normally open. | FIK | at right |
| P575549 | 50 psi/ 345 kPa | DC 3-wire. Gold alloy contacts. Microprocessor compatible. White: normally open; Red: normally closed; Black: common. | HMK04/24, HMK05/25, SP80/90 | Style F |
| P173944 | 25 psi/ 172 kPa | AC/DC 3-wire. Silver alloy contacts. White: normally open; Red: normally closed; Black: common. | HBK04, HBK05, HMK03, HMK04/24, HMK05/25, SP80/90 | Style C |
| P174396 | 50 psi/ 345 kPa | AC/DC 3-wire. Silver alloy contacts. White: normally open; Red: normally closed; Black: common. | HMK03, HMK04/24, HMK05/25, SP80/90 | Style C |
| P761056 | 87 psi/ 592 kPa | AC/DC Normally open or closed. 30 VAC or 30 VDC max. 0.5A resistive, 0.2A inductive. | FPK02 | see FPK02 section |
| P563978 | 15 psi/103.4 kPa or 25 psi / 172.5 kPa | Return indicator, field adj.* or No Bypass | SP15/25, SP50/60, SP80/90, SP100/120, TT15/30/60 | at right |
| P563979 | 5 psi / 34.5 kPa / .34 bar | Suction indicator, Hg field adj.* or No Bypass | SP15/25, SP50/60, SP80/90, SP100/120, TT15/30/60 | at right |

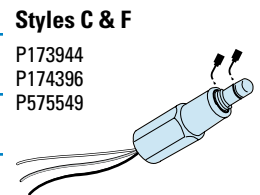
* NOT PRESET: Setting adjustable for desired application



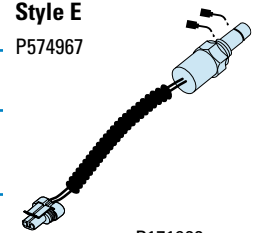
Style A
P162400
P163601
P163642
P163839
P165194



Style B
P574968
P171143



Styles C & F
P173944
P174396
P575549



Style E
P574967

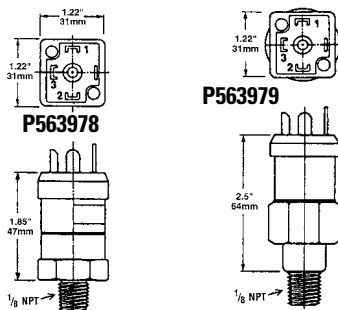
P171966



P563978
P563979



#1 Common; #2 Normally Closed;
#3 Normally Open

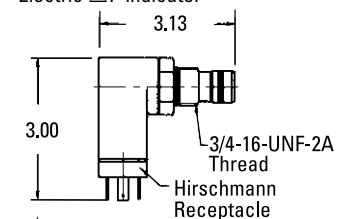


Instructions

1. Remove DIN adaptor
2. Remove small brass screw
3. Using 1/8" allen wrench adjust clockwise to increase set point/counter-clockwise to decrease set point
4. NO / NC

Adjustment screw located in center of elec. prongs

Electric ΔP indicator



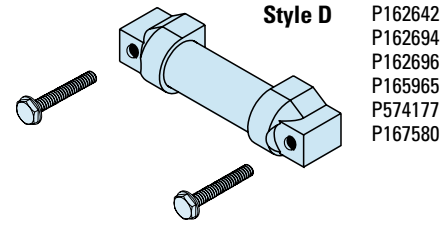
Electric ΔP indicator with pop-up visual button and manual reset

Visual Service Indicators

Visual Service Indicator Choices

All non-electric models have a maximum operating temperature of 180°F/ 82°C.

| Part No. | Use with Bypass Valve Pressure of: | Where Used | Illustration |
|----------|------------------------------------|---|---------------------|
| P162642 | 15 psi/103 kPa | HBK04, HBK05, HMK04/24, HMK05/25 | Style D |
| P162694 | 5 psi/34 kPa | HBK04, HBK05 | Style D (old style) |
| P162696 | 25 psi/172 kPa | HBK04, HBK05, HMK04/24, HMK05/25 | Style D |
| P164315 | 50 psi/345 kPa | HPK02, HPK03, HPK04, HPK05 | see HPK02 section |
| P165965 | 25 psi/345 kPa | HMK03, HMK04/24, HMK05/25 | Style D |
| P574177 | 50 psi / 345 kPa | HMK03, HMK04/24 | Style D |
| P166603 | 50 psi/345 kPa (reverse flow) | HPK04 | see HPK04 section |
| P167580 | 50 psi/345 kPa | HMK04/24, HMK05/25 | Style D |
| P171958 | 17 psi/116 kPa | FIK | at left |
| P171945 | 72 psi/493 kPa | FPK02 | see FPK02 section |
| P575334 | 25 psi/172 kPa | HBK05, HMK03, HMK05/25, HNK04/05, HMK04/24, FLK90, FLK110, FLK125 | Style H |
| P575335 | 50 psi/345 kPa | HBK05, HMK03, HMK05/25, HNK04/05, HMK04/24, FLK90, FLK110, FLK125 | Style H |



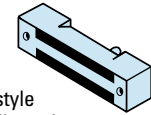
Style D

- P162642
- P162694
- P162696
- P165965
- P574177
- P167580

NOTE on Style D Indicators:

Our old square-style visual indicator has been improved in a design revision. If you have this style and order a replacement, you will receive the new rounded Style D shown above.

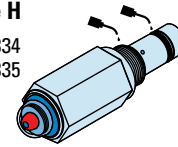
Exception: P162694 is still made per the old style.
Bar style visual indicators not for use with phosphate ester applications.



P171958

Style H

- P575334
- P575335



Indicators

Indicator Choices

| Indicator Pressure Setting | Connector Style | Donaldson Part No. | Where Used |
|---|-----------------|--------------------|------------|
| Pressure Gauge, 0 - 60 psi Models | | | |
| 25 psi / 172 kPa | NA | X011059 | WL15, WL16 |
| 50 psi / 345 kPa | NA | X011075 | WL15, WL16 |
| Pressure Gauge, 0 - 200 psi Models | | | |
| 50 psi / 345 kPa | NA | X011060 | WL15, WL16 |

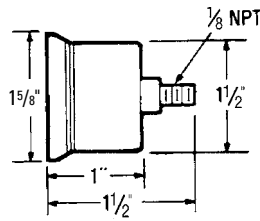
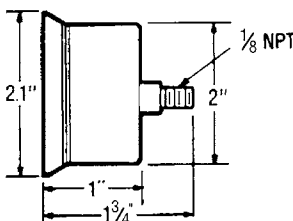
Indicator Choices

| Indicator Pressure Setting | Connector Style | Donaldson Part No. | Where Used |
|----------------------------|-----------------|--------------------|------------|
| Electrical Models | | | |
| 18 psi / 124 kPa | Hirschman | X011061 | WL15, WL16 |
| 35 psi / 241 kPa | Hirschman | X011064 | WL15, WL16 |
| 18 psi / 124 kPa | Brad Harrison | X011065 | WL15, WL16 |
| 35 psi / 241 kPa | Brad Harrison | X011066 | WL15, WL16 |

Visual Pressure Gauges

Visual Pressure Gauge Choices

| Part No. | Pressure Range | Function |
|----------|-----------------------------------|----------|
| P563296 | 0 to 100 PSI Numeric Scale | Return |
| P563297 | 0 to 100 PSI Color Coded (15 PSI) | Return |
| P563298 | 0 to 100 PSI Color Coded (25 PSI) | Return |
| P563299 | 0 to -20 Hg | Suction |
| P563300 | 0 to 30 PSI Color Coded (15 PSI) | Return |



P171953
G 1/8

P171956 for FIK series
-1 to +5 bar
14.5 to 72.5 psi
-100 to +500 kPa

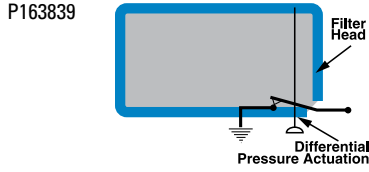
Replacement Indicators (Visual, Electrical and Visual / Electrical)

Replacement Indicator Choices

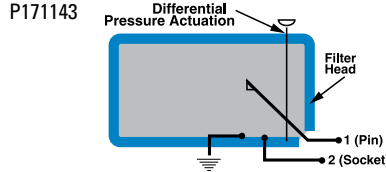
| Part No. | Use with Bypass Valve Pressure of | Connector Style | Seal Material | Thermal Lockout | Surge Control | Where Used |
|---------------------------------------|-----------------------------------|---------------------|---------------|-----------------|---------------|--|
| Electrical Indicators | | | | | | |
| P572355 | 15 psid/1.04 bar | Hirschman | Buna-N | No | No | W023, W061 |
| P572359 | 35 psid/2.41 bar | Hirschman | Buna-N | No | No | W023, W061, W041, W440, W350, W451, W620 |
| P572361 | 35 psid/2.4 bar | Brad Harrison | Buna-N | No | No | W023, W061, W041, W440, W350, W451, W620 |
| P572369 | 70 psid/4.8 bar | Hirschman | Buna-N | No | No | W041, W440, W350, W451, W620 |
| Visual / Electrical Indicators | | | | | | |
| P572323 | 15 psid/1.04 bar | Hirschman | Buna-N | No | No | W023, W061 |
| P572342 | 15 psid/1.04 bar | 3-wire flying leads | Buna-N | No | No | W023, W061 |
| P572327 | 35 psid/2.41 bar | Hirschman | Buna-N | No | No | W023, W061, W041, W440, W350, W451, W620 |
| P569638 | 35 psid/2.4 bar | Hirschman | Viton | Yes | No | HPK02, HPK03, HPK04, HPK05 |
| P572329 | 35 psid/2.4 bar | Brad Harrison | Buna-N | No | No | W023, W061, W041, W440, W350, W451, W620 |
| P572349 | 35 psid/2.4 bar | 3-wire flying leads | Buna-N | No | No | W023, W061, W041, W440, W350, W451, W620 |
| P572384 | 35 psid/2.4 bar | Hirschman | Buna-N | Yes | Yes | W023, W061, W041, W440, W350, W451, W620 |
| P572385 | 35 psid/2.4 bar | Brad Harrison | Buna-N | Yes | Yes | W041, W440, W350, W451, W620 |
| P567458 | 35 psid/2.4 bar | Hirschman | Viton | Yes | Yes | W023, W061, W041, W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05 |
| P569639 | 70 psid/4.8 bar | Hirschman | Viton | Yes | No | W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05 |
| P567459 | 70 psid/4.8 bar | Brad Harrison | Buna-N | Yes | Yes | W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05 |
| P572320 | 70 psid/4.8 bar | Hirschman | Buna-N | Yes | Yes | W440, W350, W451, W620 |
| P572373 | 70 psid/4.8 bar | Hirschman | Buna-N | Yes | No | W440, W350, W451, W620 |
| P572387 | 100 psid/6.89 bar | Hirschman | Buna-N | Yes | Yes | W440, W350, W451 |
| Visual Indicators | | | | | | |
| P572345 | 15 psid/1.04 bar | N/A | Buna-N | No | No | W023, W061 |
| P572347 | 35 psid/2.41 bar | N/A | Buna-N | No | No | W023, W061, W041, W440, W350, W451, W620 |
| P572348 | 35 psid/2.41 bar | N/A | Buna-N | Yes | Yes | W023, W061, W041, W440, W350, W451, W620 |
| P567456 | 35 psid/2.4 bar | N/A | Buna-N | Yes | Yes | W023, W061, W041, W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05 |
| P572319 | 70 psid/4.8 bar | N/A | Buna-N | Yes | Yes | W440, W350, W451, W620 |
| P567457 | 70 psid/4.8 bar | N/A | Viton | Yes | Yes | W440, W350, W451, W620, HPK02, HPK03, HPK04, HPK05 |
| P572353 | 100 psid/6.9 bar | N/A | Buna-N | Yes | No | W440, W350, W451 |
| P572354 | 100 psid/6.89 bar | N/A | Viton | Yes | Yes | W440, W350, W451 |
| P569636 | 35 psid/2.4 bar | N/A | Viton | No | No | HPK02, HPK03, HPK04, HPK05 |
| P569637 | 70 psid/4.8 bar | N/A | Viton | No | No | HPK02, HPK03, HPK04, HPK05 |

Electrical Schematics

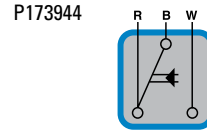
Style A: Single Post DC Indicator (Maximum: 200 mA DC @ 30 VDC)



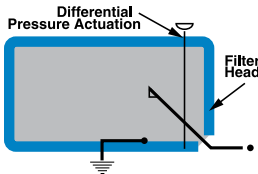
Style B: DC 2-Wire Indicator (Maximum: 200 mA DC @ 30 VDC)



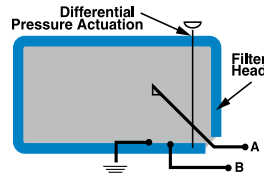
Style C, F: AC/DC 3-Wire Indicator (Maximums: 2 amps @ 24 VDC or 2 amps @ 110 VAC)



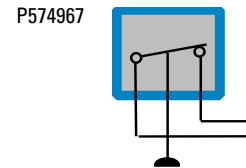
P162400
P163601
P163642
P165194



P574968



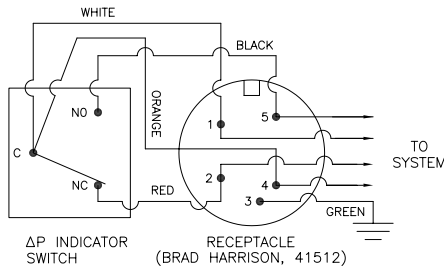
Style E: DC 2-Wire Indicator (Maximum: 100 mA DC @ 30 VDC)



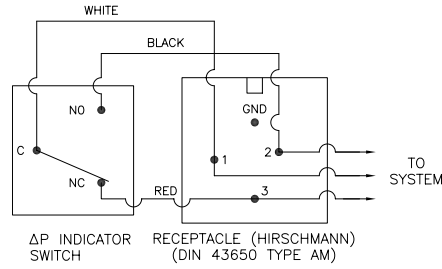
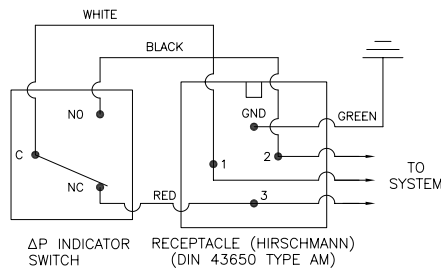
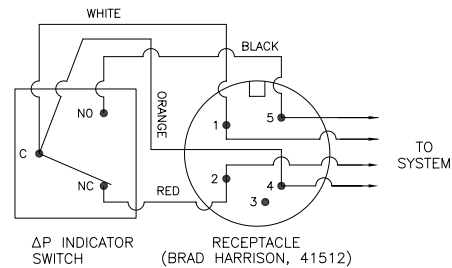
All dimensions are shown in millimeters [inches].

Indicator Switch Schematic Wiring Diagram

Aluminum Electrical Housings



Plastic Electrical Housings



Note: The female plug (connector) is to be furnished by customer.

Note: The female plug (connector) is to be furnished by customer.

Differential Indicators:

Indicators are designed to actuate at approximately 80% of bypass valve cracking pressure. It is recommended that an indicator with a bypass setting of 100 psid is used with a non-bypass housing.

Surge Control:

This optional feature is used to dampen pressure surges or spikes to avoid premature actuation of the indicator. Surge control delays the indicator response.

Thermal Lockout:

The Thermal Lockout prevents premature signaling of a bypass condition created by viscous fluid during cold start-ups. Normal indicator actuation capability is resumed once the operating temperature of the fluid reaches approximately 80° F.

In-Line Accessories

- Pressure gauges for monitoring system pressure
- Hoses and test points for sampling oil and determining ISO cleanliness levels
- Flanges to connect components
- Valves for system control



In-Line Pressure Gauges

Specifications

- Stainless steel (304SS)
- Phosphor bronze bourdon tube
- Acrylic lenses
- Built-in snubber
- Glycerin Filled



Features

Donaldson Pressure Gauge Liquid-filled (PGL) series gauges are mechanical bourdon tube pressure gauges. Each gauge has a glycerin filled stainless steel bezel and case that is robust and will not discolor or rust. The bourdon tube and movement is constructed from brass and bronze alloys. PGL series gauges are easy to install for continuous readings with face diameters of 2½" (63 mm) and 4" (100 mm).

Operating Temperatures

- 30°F to 160°F (-1°C to 71°C)

Accuracy

- +/- 3% of full scale

Scale

- psi
- bar

Dial Sizes

- 2½" (63 mm) and 4" (100 mm)

Mounting

- Stem, Panel, Front Flange

Thread Type

- 2½" size
- 4"
- ¼" NPT, ¼" SAE, ¼" BSP
- ½" NPT

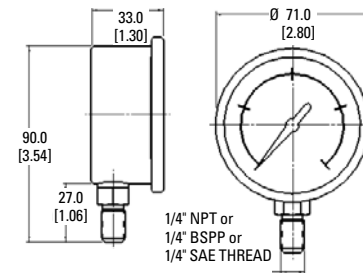
In-Line Pressure Gauges

Pressure Range Options

| PGL-A | 30 Hg-20 psi | 0-30 in. Hg | 0-30 psi | 0-60 psi | 0-100 psi | 0-160 psi | 0-300 psi | 0-500 psi | 0-600 psi | 0-1000 psi | 0-1500 psi | 0-2000 psi | 0-3000 psi | 0-4000 psi | 0-5000/345 psi | 0-6000 psi | 0-10000 psi |
|--------------|--------------|-------------|----------|----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|----------------|------------|-------------|
| 2½" Stem | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 2½" SAE Stem | | | | | | | • | • | • | • | • | • | • | • | • | • | • |
| 2½" Panel | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| 4" Stem | | | | | | | • | • | • | • | • | • | • | • | • | • | • |
| 4" Panel | | | | | | | • | • | • | • | • | • | • | • | • | • | • |

2½" Diameter Gauges

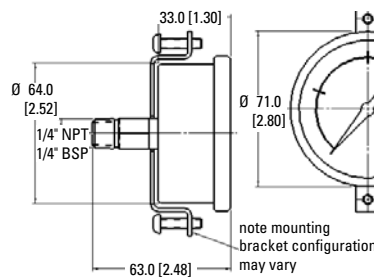
Stem Mount



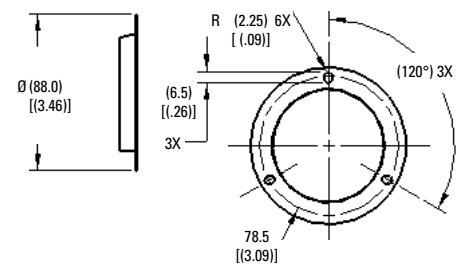
Front Flange Options

| Donaldson Part No. | Description | Dial Size |
|--------------------|--------------|----------------|
| P562699 | PGL-A-63-FF | 2-1/2" (63 mm) |
| P562671 | PGL-A-100-FF | 4" (100 mm) |

Panel Mount



With Front Flange



2½" Stem Mount

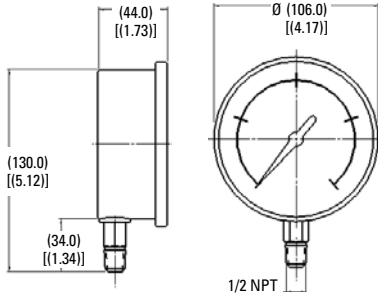
| Donaldson Part No. | Description | Pressure Range (psi/bar) | Thread Type |
|--------------------|-------------------------|--------------------------|-------------|
| P562718 | PGL-A-63-N-B-30-CS | -30" Hg + 20/1 | 1/4" NPT |
| P562719 | PGL-A-63-N-B-30-S | 0 - 30/2 | 1/4" NPT |
| P562721 | PGL-A-63-N-B-30-VS | 0 - 30" Hg Vac | 1/4" NPT |
| P562733 | PGL-A-63-N-B-60-S | 0 - 60/4 | 1/4" NPT |
| P562705 | PGL-A-63-N-B-100-S | 0 - 100/7 | 1/4" NPT |
| P562709 | PGL-A-63-N-B-160-S | 0 - 160/11 | 1/4" NPT |
| P562717 | PGL-A-63-N-B-300-S | 0 - 300/20 | 1/4" NPT |
| P562727 | PGL-A-63-N-B-500-S | 0 - 500/35 | 1/4" NPT |
| P562731 | PGL-A-63-N-B-600-S | 0 - 600/40 | 1/4" NPT |
| P562703 | PGL-A-63-N-B-1000-S | 0 - 1,000/70 | 1/4" NPT |
| P562707 | PGL-A-63-N-B-1500-S | 0 - 1,500/100 | 1/4" NPT |
| P562711 | PGL-A-63-N-B-2000-S | 0 - 2,000/125 | 1/4" NPT |
| P562713 | PGL-A-63-N-B-3000-S | 0 - 3,000/200 | 1/4" NPT |
| P562723 | PGL-A-63-N-B-4000-S | 0 - 4,000/275 | 1/4" NPT |
| P562725 | PGL-A-63-N-B-5000/345-S | 0 - 5,000/350 | 1/4" NPT |
| P562729 | PGL-A-63-N-B-6000-S | 0 - 6,000/400 | 1/4" NPT |
| P562701 | PGL-A-63-N-B-10,000-S | 0 - 10,000/700 | 1/4" NPT |
| P562696 | PGL-A-63-B-B-1500-S | 0 - 1,500/100 | 1/4" BSP |
| P562739 | PGL-A-63-S-B-500-S | 0 - 500/35 | 1/4" SAE |
| P562734 | PGL-A-63-S-B-1000-S | 0 - 1,000/70 | 1/4" SAE |
| P562735 | PGL-A-63-S-B-1500-S | 0 - 1,500/100 | 1/4" SAE |
| P562736 | PGL-A-63-S-B-2000-S | 0 - 2,000/125 | 1/4" SAE |
| P562737 | PGL-A-63-S-B-3000-S | 0 - 3,000/200 | 1/4" SAE |
| P562738 | PGL-A-63-S-B-5000/345-S | 0 - 5,000/350 | 1/4" SAE |
| P562740 | PGL-A-63-S-B-6000-S | 0 - 6,000/400 | 1/4" SAE |

2½" Panel Mount

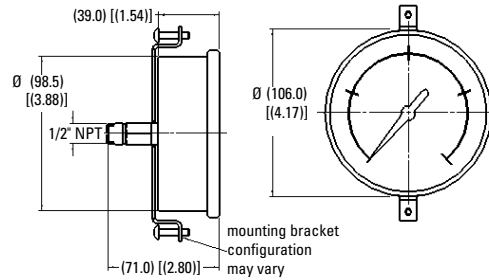
| Donaldson Part No. | Description | Pressure Range (psi/bar) | Thread Type |
|--------------------|-------------------------|--------------------------|-------------|
| P562720 | PGL-A-63-N-B-30-VP | 0 - 30" Hg Vac | 1/4" NPT |
| P562732 | PGL-A-63-N-B-60-P | 0 - 60/4 | 1/4" NPT |
| P562704 | PGL-A-63-N-B-100-P | 0 - 100/7 | 1/4" NPT |
| P562708 | PGL-A-63-N-B-160-P | 0 - 160/11 | 1/4" NPT |
| P562716 | PGL-A-63-N-B-300-P | 0 - 300/20 | 1/4" NPT |
| P562726 | PGL-A-63-N-B-500-P | 0 - 500/35 | 1/4" NPT |
| P562730 | PGL-A-63-N-B-600-P | 0 - 600/40 | 1/4" NPT |
| P562702 | PGL-A-63-N-B-1000-P | 0 - 1,000/70 | 1/4" NPT |
| P562706 | PGL-A-63-N-B-1500-P | 0 - 1,500/100 | 1/4" NPT |
| P562710 | PGL-A-63-N-B-2000-P | 0 - 2,000/125 | 1/4" NPT |
| P562712 | PGL-A-63-N-B-3000-P | 0 - 3,000/200 | 1/4" NPT |
| P562722 | PGL-A-63-N-B-4000-P | 0 - 4,000/275 | 1/4" NPT |
| P562724 | PGL-A-63-N-B-5000/345-P | 0 - 5,000/350 | 1/4" NPT |
| P562728 | PGL-A-63-N-B-6000-P | 0 - 6,000/400 | 1/4" NPT |
| P562700 | PGL-A-63-N-B-10,000-P | 0 - 10,000/700 | 1/4" NPT |
| P562697 | PGL-A-63-B-B-3000-P | 0 - 3,000/200 | 1/4" BSP |
| P562698 | PGL-A-63-B-B-4000-P | 0 - 4,000/275 | 1/4" BSP |

4" Diameter Gauges

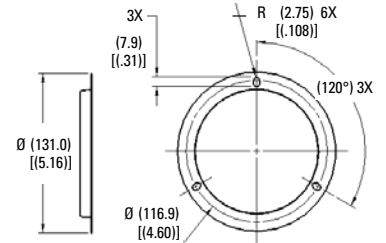
Stem Mount



Panel Mount



With Front Flange



4" Stem Mount

| Donaldson Part No. | Description | Pressure Range (psi/bar) | Thread Type |
|--------------------|------------------------|--------------------------|-------------|
| P562683 | PGL-A-100-N-B-300-S | 0 - 300/20 | 1/2" NPT |
| P562688 | PGL-A-100-N-B-600-S | 0 - 600/40 | 1/2" NPT |
| P562675 | PGL-A-100-N-B-1000-S | 0 - 1,000/70 | 1/2" NPT |
| P562677 | PGL-A-100-N-B-1500-S | 0 - 1,500/100 | 1/2" NPT |
| P562679 | PGL-A-100-N-B-2000-S | 0 - 2,000/125 | 1/2" NPT |
| P562681 | PGL-A-100-N-B-3000-S | 0 - 3,000/200 | 1/2" NPT |
| P562685 | PGL-A-100-N-B-5000 | 0 - 5,000/350 | 1/2" NPT |
| P562686 | PGL-A-100-N-B-6000-S | 0 - 6,000/400 | 1/2" NPT |
| P562673 | PGL-A-100-N-B-10,000-S | 0 - 10,000/700 | 1/2" NPT |

4" Panel Mount

| Donaldson Part No. | Description | Pressure Range (psi/bar) | Thread Type |
|--------------------|------------------------|--------------------------|-------------|
| P562682 | PGL-A-100-N-B-300-P | 0 - 300/20 | 1/2" NPT |
| P562687 | PGL-A-100-N-B-600-P | 0 - 600/40 | 1/2" NPT |
| P562674 | PGL-A-100-N-B-1000-P | 0 - 1,000/70 | 1/2" NPT |
| P562676 | PGL-A-100-N-B-1500-P | 0 - 1,500/100 | 1/2" NPT |
| P562678 | PGL-A-100-N-B-2000-P | 0 - 2,000/125 | 1/2" NPT |
| P562680 | PGL-A-100-N-B-3000-P | 0 - 3,000/200 | 1/2" NPT |
| P562684 | PGL-A-100-N-B-5000 | 0 - 5,000/350 | 1/2" NPT |
| P562672 | PGL-A-100-N-B-10,000-P | 0 - 10,000/700 | 1/2" NPT |

Test Points

Specifications

- Working Pressure: 9000 psi /630 bar
- Seals: Buna-N®
- Caps: Plastic or metal
- Leak-free connection at full pressure

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Features

Test points can be used as a connection into the hydraulic system on the suction side, pressure side or return. They allow connection for pressure transducers and provide ports for fluid sampling (so you can monitor cleanliness and keep your system operating optimally). If you have filters installed in hard-to-access locations, test points and hose assemblies can be used to plumb up a bulkhead to read pressure differentials.

Styles

- Pressure

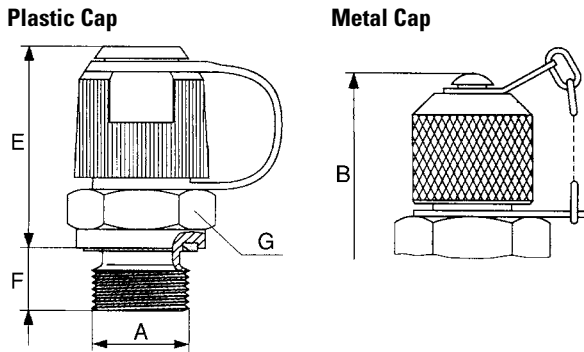
Applications

- Fluid or gas

Temperature Range

- Metal cap: -22°F to 248°F / -30°C to 120°C
- Plastic cap: -22°F to 212°F / -30°C to 100°C

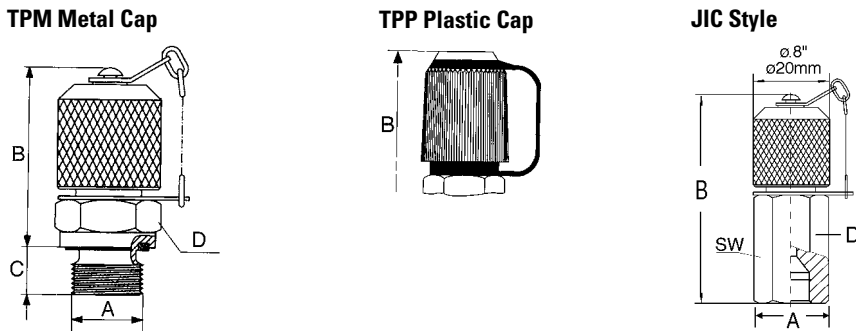
TPM/TPP-1215 Assembly Views M12x1.5 Thread



Test Point Choices

| Donaldson Part No. | Description | Working Pressure psi/bar | A Thread Type | E (in./mm) | F (in./mm) | G (in./mm) | Cap |
|--------------------|--------------|--------------------------|-----------------------|------------|------------|------------|---------|
| P563192 | TPM-1215-04G | 9000/630 | 1/4" BSPP, Form G | 1.30/33 | .33/8.5 | 0.55/14 | Metal |
| P563197 | TPP-1215-02N | 5800/400 | 1/8" NPTF | 1.14/29 | .47/12 | 0.55/14 | Plastic |
| P563193 | TPM-1215-04N | 9000/630 | 1/4" NPTF | 1.14/29 | .59/15 | 0.55/14 | Metal |
| P563199 | TPP-1215-03S | 9000/630 | 3/8"-24 UNF (#3 SAE) | 1.42/36 | .39/10 | 0.87/22 | Plastic |
| P563206 | TPP-1215-04S | 9000/630 | 7/16"-20 UNF (#4 SAE) | 1.26/32 | .35/9 | 0.67/17 | Plastic |
| P563207 | TPP-1215-06S | 9000/630 | 9/16"-18 UNF (#6 SAE) | 1.22/31 | .39/10 | 0.75/19 | Plastic |

TPM/TPP-1620 Assembly Views M16x2 Thread



Test Point Choices

| Donaldson Part No. | Description | Working Pressure psi/bar | A Thread Type | B (in./mm) | C (in./mm) | D (mm) | Cap |
|--------------------|--------------|--------------------------|-----------------------|------------|------------|--------|-------|
| P563210 | TPM-1620-02B | 5800/400 | ISO 228-G 1/8" BSPP | 1.5/38 | 0.31/8 | 17 | Metal |
| P563215 | TPM-1620-04B | 9000/630 | ISO 228-G 1/4" BSPP | 1.42/36 | 0.39/10 | 19 | Metal |
| P563987 | TPM-1620-06B | 9000/630 | ISO 228-G 3/8" BSPP | 1.42/36 | 0.39/10 | 22 | Metal |
| P563219 | TPM-1620-04J | 8100/600 | #4 37° JIC Female | 2.17/55 | — | 17 | Metal |
| P563231 | TPM-1620-06J | 4500/315 | #6 37° JIC Female | 2.26/57.5 | — | 19 | Metal |
| P563212 | TPM-1620-02N | 5800/400 | 1/8" NPTF | 1.3/33 | 0.51/13 | 17 | Metal |
| P563220 | TPM-1620-04N | 9000/630 | 1/4" NPTF | 1.3/33 | 0.65/16.5 | 17 | Metal |
| P563224 | TPM-1620-04S | 9000/630 | 7/16"-20 UNF (#4 SAE) | 1.46/37 | 0.35/9 | 17 | Metal |
| P563232 | TPM-1620-06S | 9000/630 | 9/16"-18 UNF (#6 SAE) | 1.42/36 | 0.39/10 | 19 | Metal |

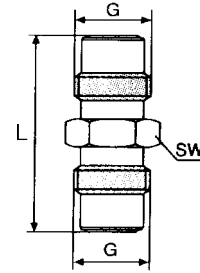
Test Point Adapters



A variety of adapters to suit your application.

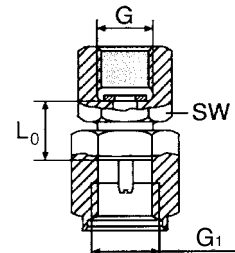
Hose Union Gauge

| Donaldson Part No. | Description | G Thread | psi/bar | L (in./mm) | SW (in./mm) |
|--------------------|-------------|-----------|----------|------------|-------------|
| P563263 | AHU-1215 | M12 x 1.5 | 9000/630 | 1.14/29 | .55/14 |
| P563264 | AHU-1620 | M16 x 2 | 9000/630 | 1.65/42 | .67/17 |



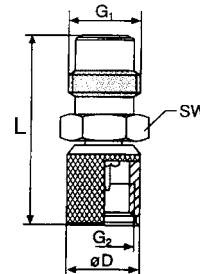
Direct Gauge Adapter

| Donaldson Part No. | Description | G Int. Thread | G1 Thread | psi/bar | L0 (in./mm) | SW (in./mm) |
|--------------------|--------------|---------------|-----------|----------|-------------|-------------|
| P563808 | ADG-1215-04N | 1/4" NPT | M12 x 1.5 | 9000/630 | 1.14/29 | .55/14 |
| P563809 | ADG-1620-04N | 1/4" NPT | M16 x 2 | 9000/630 | .55/14 | .75/19 |



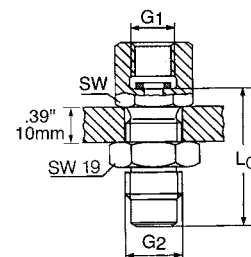
Series Converter

| Donaldson Part No. | Description | G1 Thread | G2 Thread | ØD (in./mm) | L (in./mm) | SW (in./mm) |
|--------------------|-------------|-----------|-----------|-------------|------------|-------------|
| P563265 | ASC-1215 | M16 x 2 | M12 x 1.5 | .67/17 | 1.30/33 | .67/17 |
| P563266 | ASC-1620 | M12 x 1.5 | M16 x 2 | .79/20 | 1.04/26.5 | .67/17 |



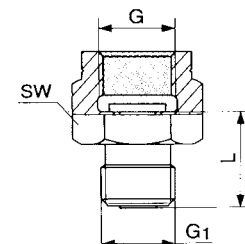
Bulkhead Gauge Adaptor

| Donaldson Part No. | Description | G1 Thread | G2 Thread | L (in./mm) | SW (in./mm) |
|--------------------|--------------|-----------|----------------|------------|-------------|
| P563800 | ABH-1215-04N | 1/4" NPT | 1215M 12 x 1.5 | 1.52/39.5 | .75/27 |
| P563807 | ASC-1620-04N | 1/4" NPT | 1620/M16 x 2 | 1.52/38.5 | .75/19 |



Pressure Gauge Connection

| Donaldson Part No. | Description | G Thread | G1 Thread | psi/bar | L (in./mm) | SW (in./mm) |
|--------------------|--------------|----------|-----------|----------|------------|-------------|
| P563262 | AHG-1215-04N | 1/4" NPT | M12 x 1.5 | 9000/630 | .71/18 | .74/19 |



Test Point Hose Assemblies

Specifications

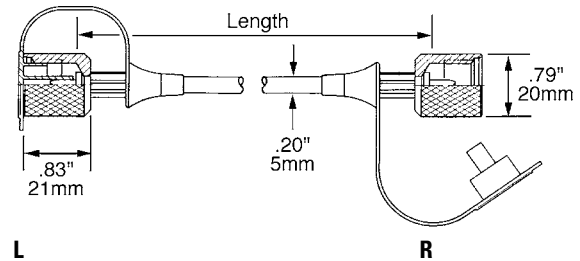
- Working Pressure to: 9000 psi / 630 bar
- Temperature Range: -4°F to 212°F / -20°C to 100°C
- Length: 12" to 180" / 305 to 4570



Features

Donaldson test point hoses are made of Polyamide II core with polyester braid reinforcement and Polyamid11 cover. They are suitable for use with petroleum-based fluids. Hoses are standard straight on both ends and include plastic dust caps.

For hydraulic filters installed in hard-to-access locations, hose assemblies and test points can be used to plumb up a bulkhead to read pressure differentials.



1215 Series M12x1.5 Thread

| Donaldson Part No. | Description | Length (in/mm) |
|--------------------|-------------------|----------------|
| P563240 | H-1215-B-0101-012 | 12/305 |
| P563243 | H-1215-B-0101-024 | 24/610 |
| P563244 | H-1215-B-0101-036 | 36/915 |
| P563245 | H-1215-B-0101-048 | 48/1220 |
| P563246 | H-1215-B-0101-072 | 72/1830 |
| P563247 | H-1215-B-0101-096 | 96/2440 |
| P563248 | H-1215-B-0101-120 | 120/3050 |
| P563249 | H-1215-B-0101-180 | 80/4570 |

1620 Series M16x2 Thread

| Donaldson Part No. | Description | Length (in/mm) |
|--------------------|-------------------|----------------|
| P563250 | H-1620-B-0101-012 | 12/305 |
| P563251 | H-1620-B-0101-018 | 18/460 |
| P563252 | H-1620-B-0101-024 | 24/610 |
| P563254 | H-1620-B-0101-036 | 36/915 |
| P563255 | H-1620-B-0101-048 | 48/1220 |
| P563256 | H-1620-B-0101-072 | 72/1830 |
| P563257 | H-1620-B-0101-096 | 96/2440 |
| P563259 | H-1620-B-0101-120 | 120/3050 |
| P563260 | H-1620-B-0101-144 | 144/3660 |
| P563261 | H-1620-B-0101-180 | 180/4570 |

In-Line Check Valves

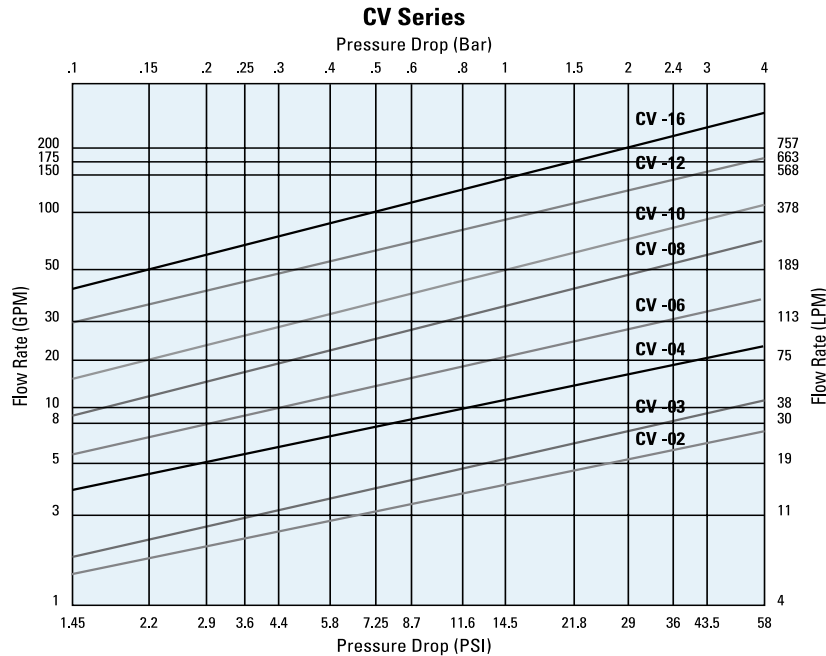
Specifications

- Working Pressure to: 4350 psi / 300 bar
- Flow Range: 200 gpm 757 lpm



Features

Steel constructed check valves are compatible with all non-corrosive liquids. Valves contain no elastomeric seals. Restricted orifice (.062) option available on some models.



The above chart is based on
Hydraulic Oil 100 SUS, S.G. = 0.86

Sizes

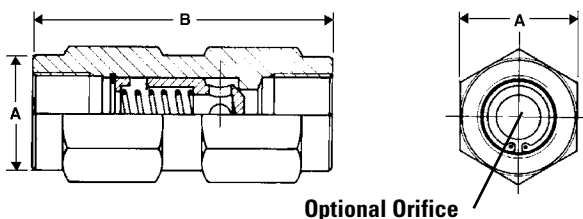
- 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2" NPT
- #4, #6, #8, #12, #16, #20, #24 and #32 SAE

Opening Pressure (Cracking

- 5 psi / 0.34 bar or 65 psi / 4.5 bar

In-Line Check Valve Options

| Donaldson Part No. | Reference | Max Working Pressure (psi/bar) | Max. Rated Flow Flow (gpm/lpm) | Opening Pressure (psi/bar) | Port | A (in./mm) | B (in./mm) |
|--------------------|-----------|--------------------------------|--------------------------------|----------------------------|------------|------------|------------|
| P562297 | CV-02P-5 | 4350/300 | 6/23 | 5/0.34 | 1/4" NPT | 0.75/19 | 2.17/55 |
| P562298 | CV-02P-65 | 4350/300 | 6/23 | 65/4.5 | 1/4" NPT | 0.75/19 | 2.17/55 |
| P562299 | CV-02S-5 | 4350/300 | 6/23 | 5/0.34 | #4 SAE | 0.75/19 | 2.17/55 |
| P562301 | CV-03P-5 | 4350/300 | 10/38 | 5/0.34 | 3/8" NPT | 0.98/25 | 2.68/68 |
| P562302 | CV-03P-65 | 4350/300 | 10/38 | 65/4.5 | 3/8" NPT | 0.98/25 | 2.68/68 |
| P562303 | CV-03S-5 | 4350/300 | 10/38 | 5/0.34 | #6 SAE | 0.75/19 | 2.29/58 |
| P562305 | CV-04P-5 | 4350/300 | 16/60 | 5/0.34 | 1/2" NPT | 1.06/27 | 2.95/75 |
| P562306 | CV-04P-65 | 4350/300 | 16/60 | 65/4.5 | 1/2" NPT | 1.06/27 | 2.95/75 |
| P562307 | CV-04S-5 | 4350/300 | 16/60 | 5/0.34 | #8 SAE | 0.98/25 | 2.72/69 |
| P562308 | CV-04S-65 | 4350/300 | 16/60 | 65/4.5 | #8 SAE | 0.98/25 | 2.72/69 |
| P562309 | CV-06P-5 | 4350/300 | 25/94 | 5/0.34 | 3/4" NPT | 1.38/35 | 3.48/88 |
| P562311 | CV-06P-65 | 4350/300 | 25/94 | 65/4.5 | 3/4" NPT | 1.38/35 | 3.48/88 |
| P562312 | CV-06S-5 | 4350/300 | 25/94 | 5/0.34 | #12 SAE | 1.38/35 | 3.48/88 |
| P562313 | CV-06S-65 | 4350/300 | 25/94 | 65/4.5 | #12 SAE | 1.38/35 | 3.48/88 |
| P562314 | CV-08P-5 | 4350/300 | 45/169 | 5/0.34 | 1" NPT | 1.61/41 | 4.33/110 |
| P562316 | CV-08P-65 | 4350/300 | 45/169 | 65/4.5 | 1" NPT | 1.61/41 | 4.33/110 |
| P562317 | CV-08S-5 | 4350/300 | 45/169 | 5/0.34 | #16 SAE | 1.61/41 | 4.33/110 |
| P563307 | CV-08S-65 | 4350/300 | 45/169 | 65/4.5 | #16 SAE | 1.61/41 | 4.33/110 |
| P562319 | CV-10P-5 | 4350/300 | 95/357 | 5/0.34 | 1-1/4" NPT | 2.16/55 | 4.72/120 |
| P562320 | CV-10P-65 | 4350/300 | 95/357 | 65/4.5 | 1-1/4" NPT | 2.16/55 | 4.72/120 |
| P562321 | CV-10S-5 | 4350/300 | 95/357 | 5/0.34 | #20 SAE | 2.16/55 | 4.72/120 |
| P562322 | CV-10S-65 | 4350/300 | 95/357 | 65/4.5 | #20 SAE | 2.16/55 | 4.72/120 |
| P562323 | CV-12P-5 | 4350/300 | 130/489 | 5/0.34 | 1-1/2" NPT | 2.56/65 | 5.43/138 |
| P562324 | CV-12P-65 | 4350/300 | 130/489 | 65/4.5 | 1-1/2" NPT | 2.56/65 | 5.43/138 |
| P562325 | CV-12S-5 | 4350/300 | 130/489 | 5/0.34 | #24 SAE | 2.56/65 | 5.43/138 |
| P562326 | CV-12S-65 | 4350/300 | 130/489 | 65/4.5 | #24 SAE | 2.56/65 | 5.43/138 |
| P562327 | CV-16P-5 | 2900/200 | 200/752 | 5/0.34 | 2" NPT | 2.56/65 | 5.43/138 |
| P562328 | CV-16P-65 | 2900/200 | 200/752 | 65/4.5 | 2" NPT | 2.56/65 | 5.43/138 |

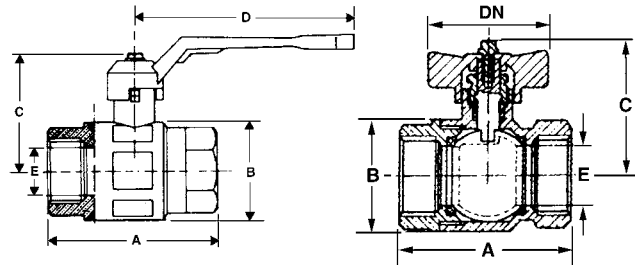
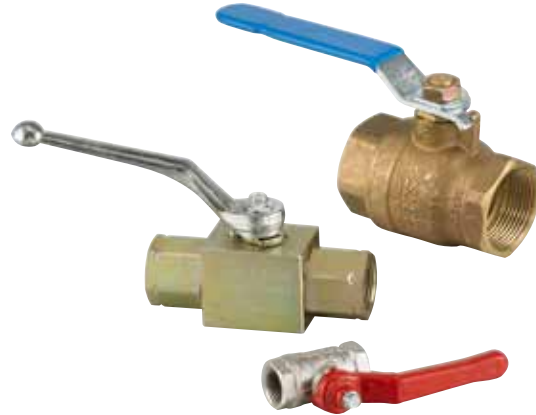


Ball Valves - Low Pressure

Specifications

- Hot pressed brass body and ball OT 58
- Materials (ball and body): BV Series chromium plated
- Steel handle
- Teflon® seals (ball and stem)

Teflon® is a registered trademark of E. I. DuPont de Nemours and Company.



Features

Low pressure ball valves are rated for water, oil or gas (WOG) applications. Two-way/two-position, quarter turn operation. Full-ported sizes from 1/4" to 2" NPT. T-handle available on some models. Suitable for temperatures from -22°F to 350°F (-30°C to 162°C).

Ball Valve Options

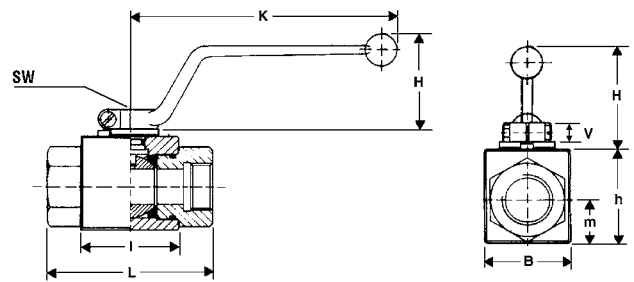
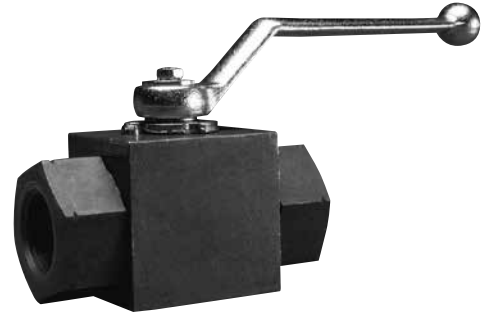
| Donaldson Part No. | Description | Max. Working Pressure (psi/bar) | Port Thread | A (in./mm) | B (in./mm) | C (in./mm) | D (in./mm) | E (in./mm) |
|--------------------|-------------|---------------------------------|-------------|------------|------------|------------|------------|------------|
| P562331 | BV-04-N | 710/49 | 1/4" NPT | 1.89/48 | 0.98/25 | 1.69/43 | 3.15/80 | 0.40/10 |
| P562333 | BV-06-N | 710/49 | 3/8" NPT | 1.89/48 | 0.98/25 | 1.69/43 | 3.15/80 | 0.40/10 |
| P562336 | BV-08-N | 710/49 | 1/2" NPT | 2.00/51 | 1.22/31 | 1.77/45 | 3.15/80 | 0.60/15 |
| P563311 | BV-12-N | 570/39 | 3/4" NPT | 2.24/57 | 1.46/37 | 2.36/60 | 4.44/113 | 0.80/20 |
| P562338 | BV-16-N | 570/39 | 1" NPT | 2.75/70 | 1.81/46 | 2.48/63 | 4.44/113 | 1.00/25 |
| P562339 | BV-20-N | 430/30 | 1-1/4" NPT | 3.15/80 | 2.24/57 | 3.11/79 | 5.43/138 | 1.25/32 |
| P562341 | BV-24-N | 430/30 | 1-1/2" NPT | 3.66/93 | 2.75/70 | 3.27/83 | 5.43/138 | 1.57/40 |
| P562343 | BV-32-N | 360/25 | 2" NPT | 4.41/112 | 3.31/84 | 3.94/100 | 6.22/158 | 1.97/50 |
| P562345 | BV-40-N | 260/18 | 2-1/2" NPT | 5.31/135 | 3.82/97 | 3.98/101 | 7.75/197 | 2.12/54 |
| P562346 | BV-48-N | 230/16 | 3" NPT | 6.25/159 | 4.80/122 | 5.08/129 | 9.84/250 | 2.56/65 |

Ball Valves - Medium/High Pressure

Specifications

- Steel body
- Brass ball with chrome plating (MBV-04 thru MBV-16)
- Steel ball with chrome plating (HBV, MBV-20 thru MBV-32)
- Steel zinc stem (MBV)
- Delrin ball seal
- Stem seal: Buna-N® (MBV); Viton (HBV)
- Aluminum handles on HBV larger sizes

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Features

Medium duty (MBV) and high pressure (HBV) ball valves are compatible with petroleum-based fluids. Two-way, two-position valves are suited for on/off control. Optional locking tabs provide added safety. Valves come standard with bent handles; straight handles are available for some models. Operating temperatures from -22°F to 212°F / -30°C to 100°C.

Medium Duty Ball Valves - MBV

| Donaldson Part No. | Description | Port Thread | Pressure (psi/bar) | L (in./mm) | I (in./mm) | B (in./mm) | H (in./mm) | h (in./mm) | m (in./mm) | V (in./mm) | SW (in./mm) | K (in./mm) |
|--------------------|-------------|----------------|--------------------|------------|------------|------------|------------|------------|------------|------------|-------------|------------|
| P562387 | MBV-04-N | 1/4" NPT | 7250/500 | 2.7/69 | 1.4/36 | 1.0/26 | 1.7/43 | 1.3/32 | 0.5/12.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562388 | MBV-04-S | 7/16"-20 SAE | 7250/500 | 2.7/69 | 1.4/36 | 1.0/26 | 1.7/43 | 1.3/32 | 0.5/12.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P563308 | MBV-06-N | 3/8" NPT | 7250/500 | 3.1/79 | 1.7/43 | 1.3/32 | 1.7/43 | 1.5/38 | 0.7/17.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562389 | MBV-06-S | 9/16"-18 SAE | 7250/500 | 3.1/79 | 1.7/43 | 1.3/32 | 1.7/43 | 1.5/38 | 0.7/17.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562390 | MBV-08-N | 1/2" NPT | 7250/500 | 4.1/104 | 1.9/48 | 1.4/35 | 1.7/43 | 1.6/40 | 0.75/19 | 0.4/11 | 0.4/9 | 4.6/118 |
| P563309 | MBV-08-S | 3/4"-16 SAE | 7250/500 | 4.1/104 | 1.9/48 | 1.4/35 | 1.7/43 | 1.6/40 | 0.75/19 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562391 | MBV-12-N | 3/4" NPT | 5800/400 | 4.3/109 | 2.4/62 | 1.9/49 | 2.3/58 | 2.2/57 | 1.0/24.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562392 | MBV-12-S | 1-1/16"-12 SAE | 5800/400 | 4.3/109 | 2.4/62 | 1.9/49 | 2.3/58 | 2.2/57 | 1.0/24.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562394 | MBV-16-N | 1" NPT | 4500/310 | 4.6/117 | 2.6/66 | 2.3/58 | 2.3/58 | 2.6/65 | 1.2/29.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562395 | MBV-16-S | 1-5/16"-12 SAE | 4500/310 | 4.6/117 | 2.6/66 | 2.3/58 | 2.3/58 | 2.6/65 | 1.2/29.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562396 | MBV-20-N | 1-1/4" NPT | 4500/310 | 4.3/110 | 3.2/80 | 3.0/76 | 2.3/58 | 3.3/84 | 1.5/38 | 0.6/15 | 0.7/17 | 8.5/218 |
| P562397 | MBV-20-S | 1-5/8"-12 SAE | 4500/310 | 4.3/110 | 3.2/80 | 3.0/76 | 2.3/58 | 3.3/84 | 1.5/38 | 0.6/15 | 0.7/17 | 8.5/218 |
| P562398 | MBV-24-N | 1-1/2" NPT | 3625/250 | 5.1/130 | 3.3/85 | 3.6/92 | 2.3/58 | 3.9/99 | 1.8/46 | 0.6/15 | 0.7/17 | 8.5/218 |
| P563310 | MBV-24-S | 1-7/8"-12 SAE | 3625/250 | 5.1/130 | 3.3/85 | 3.6/92 | 2.3/58 | 3.9/99 | 1.8/46 | 0.6/15 | 0.7/17 | 8.5/218 |
| P562399 | MBV-32-N | 2" NPT | 3625/250 | 5.5/140 | 3.9/100 | 4.2/106 | 2.3/58 | 4.4/111 | 2.1/53 | 0.6/15 | 0.7/17 | 8.5/218 |

High Pressure Ball Valves

High Pressure Ball Valve Options

| Donaldson Part No. | Description | Port Thread | Pressure (psi/bar) | L (in./mm) | I (in./mm) | B (in./mm) | H (in./mm) | h (in./mm) | m (in./mm) | V (in./mm) | SW (in./mm) | K (in./mm) |
|--------------------|-------------|----------------|--------------------|------------|------------|------------|------------|------------|------------|------------|-------------|------------|
| P562356 | HBV-04-N | 1/4" NPT | 7250/500 | 2.7/69 | 1.4/36 | 1.0/26 | 1.7/43 | 1.3/32 | 0.5/12.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562357 | HBV-04-S | 7/16"-20 SAE | 7250/500 | 2.7/69 | 1.4/36 | 1.0/26 | 1.7/43 | 1.3/32 | 0.5/12.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562358 | HBV-06-N | 3/8" NPT | 7250/500 | 3.1/79 | 1.7/43 | 1.3/32 | 1.7/43 | 1.5/38 | 0.7/17.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562359 | HBV-06-S | 9/16"-18 SAE | 7250/500 | 3.1/79 | 1.7/43 | 1.3/32 | 1.7/43 | 1.5/38 | 0.7/17.5 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562360 | HBV-08-N | 1/2" NPT | 7250/500 | 4.1/104 | 1.9/48 | 1.4/35 | 1.7/43 | 1.6/40 | 0.75/19 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562361 | HBV-08-S | 3/4"-16 SAE | 7250/500 | 4.1/104 | 1.9/48 | 1.4/35 | 1.7/43 | 1.6/40 | 0.75/19 | 0.4/11 | 0.4/9 | 4.6/118 |
| P562362 | HBV-12-N | 3/4" NPT | 5800/400 | 4.3/109 | 2.4/62 | 1.9/49 | 2.3/58 | 2.2/57 | 1.0/24.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562363 | HBV-12-S | 1-1/16"-12 SAE | 5800/400 | 4.3/109 | 2.4/62 | 1.9/49 | 2.3/58 | 2.2/57 | 1.0/24.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562364 | HBV-16-N | 1" NPT | 4500/310 | 4.6/117 | 2.6/66 | 2.3/58 | 2.3/58 | 2.6/65 | 1.2/29.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562365 | HBV-16-S | 1-5/16"-12 SAE | 4500/310 | 4.6/117 | 2.6/66 | 2.3/58 | 2.3/58 | 2.6/65 | 1.2/29.5 | 0.6/14 | 0.6/14 | 7.2/182 |
| P562368 | HBV-20-N | 1-1/4" NPT | 4500/310 | 4.3/110 | 3.2/80 | 3.0/76 | 2.3/58 | 3.3/84 | 1.5/38 | 0.6/15 | 0.7/17 | 8.5/218 |
| P562369 | HBV-20-S | 1-5/8"-12 SAE | 4500/310 | 4.3/110 | 3.2/80 | 3.0/76 | 2.3/58 | 3.3/84 | 1.5/38 | 0.6/15 | 0.7/17 | 8.5/218 |

Replacement Parts for High Pressure Ball Valves

| Donaldson Part No. | Description | Style | Valve Size |
|--------------------|-------------|-------------|------------|
| Handles | | | |
| P562376 | HBVH-040608 | Bent Handle | 04, 06, 08 |
| P562377 | HBVH-1216 | Bent Handle | 12, 16 |
| P562378 | HBVH-202432 | Bent Handle | 20, 24, 32 |

Lock Device Kits

| Donaldson Part No. | Description | Valve Size |
|--------------------|-------------|------------|
| P562332 | LD-1 | 04, 06, 08 |
| P562335 | LD-2 | 12, 16 |
| P562340 | LD-3 | 20, 24, 32 |

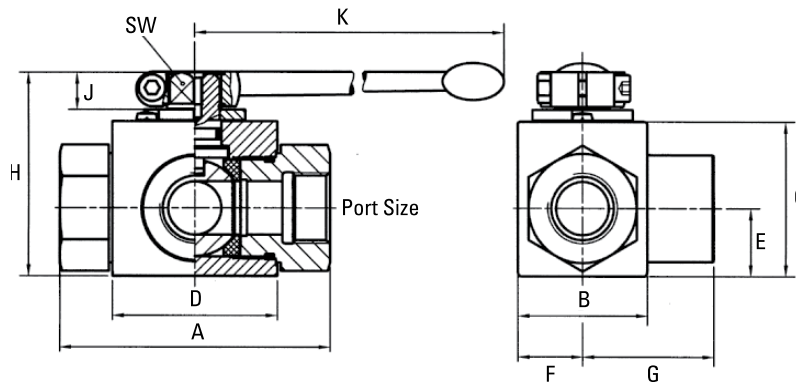
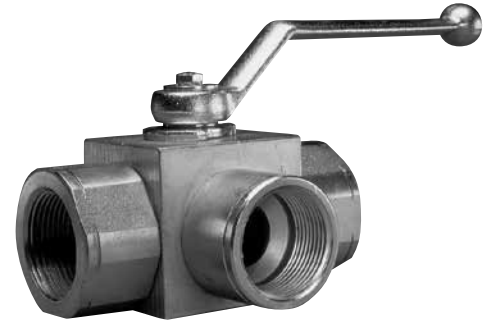
For use on MBV, HBV and 3W-HBV

| Donaldson Part No. | Description | Valve Size |
|--------------------|-------------|------------|
| Seal Kit | | |
| P562379 | HBV-SK-04 | 04 |
| P562380 | HBV-SK-06 | 06 |
| P562629 | HBV-SK-08 | 08 |
| P562630 | HBV-SK-12 | 12 |
| P562381 | HBV-SK-16 | 16 |
| P562382 | HBV-SK-20 | 20 |

Three-Way Selector Ball Valve

Specifications

- Maximum pressure 7250 psi / 500 bar
- Steel construction
- Operating temperature
-22°F to 212°F / -30°C to 100°C

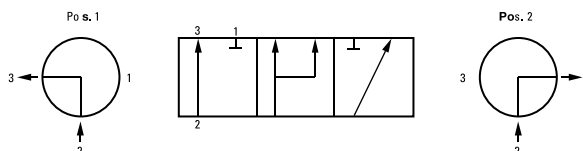


| Donaldson Part No. | Reference | Port Size | Max Pressure | A (in./mm) | B (in./mm) | C (in./mm) | D (in./mm) | E (in./mm) | F (in./mm) | G (in./mm) | H (in./mm) | J (in./mm) | K (in./mm) | SW (in./mm) |
|--------------------|-------------|------------|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| P562342 | 3W-HBV-08-N | 1/2" NPT | 7250 psi | 4.09 | 1.50 | 1.57 | 1.89 | 0.75 | 0.69 | 1.63 | 2.13 | 0.43 | 4.53 | 0.3 |
| | | | 50000 kPa | 104 | 38 | 40 | 48 | 19 | 17.5 | 41.5 | 54 | 11 | 115 | 9 |
| P562344 | 3W-HBV-12-N | 3/4" NPT | 4500 psi | 4.02 | 2.05 | 2.24 | 2.44 | 0.96 | 0.96 | 1.87 | 2.95 | 0.55 | 7.87 | 0.55 |
| | | | 31028 kPa | 102 | 52 | 57 | 62 | 24.5 | 24.5 | 47.5 | 75 | 14 | 200 | 14 |
| P562404 | 3W-HBV-16-N | 1" NPT | 4500 psi | 4.69 | 2.40 | 2.56 | 2.60 | 1.16 | 1.14 | 2.22 | 3.27 | 0.55 | 7.87 | 0.55 |
| | | | 31028 kPa | 119 | 61 | 65 | 66 | 29.5 | 29 | 56.5 | 83 | 14 | 200 | 14 |
| P562405 | 3W-HBV-16-S | SAE-16 | 4500 psi | 4.72 | 2.80 | 3.33 | 3.19 | 1.54 | 1.54 | 2.36 | 4.17 | 0.65 | 12.60 | 0.67 |
| | | | 31028 kPa | 120 | 71 | 84.5 | 81 | 39 | 39 | 60 | 106 | 16.5 | 320 | 17 |
| P562406 | 3W-HBV-20-N | 1-1/4" NPT | 5000psi | 4.72 | 2.80 | 3.33 | 3.19 | 1.54 | 1.54 | 2.36 | 4.17 | 0.65 | 12.60 | 0.67 |
| | | | 34500 kPa | 120 | 71 | 84.5 | 81 | 39 | 39 | 60 | 106 | 16.5 | 320 | 17 |

Operation:

Open cross-over (no zero position)

Pressure inlet only from port 2

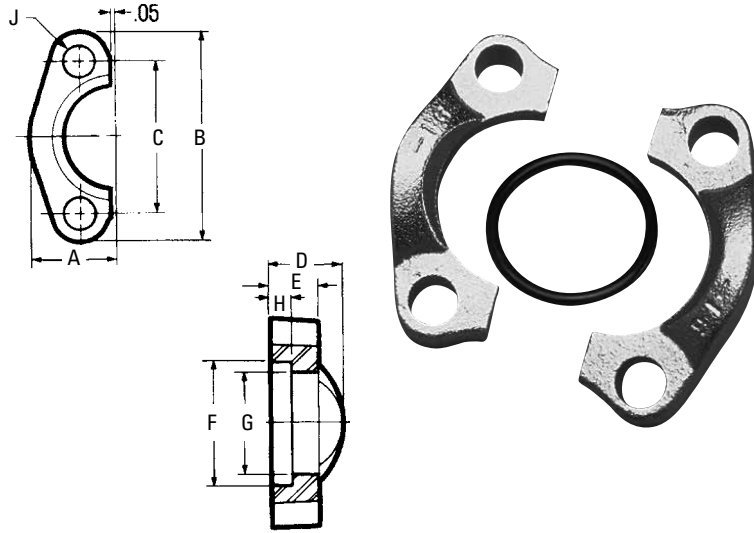


Split Flanges

Specifications

- Code 61 and Code 62
 - Buna-N® O-Ring
- Each kit includes:
- 2 split flange halves
 - 4 hex head mounting bolts and lock washers
 - 1 Buna-N® O-Ring

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Code 61

| Donaldson Part No. | Flange Reference | Flange Size | Dimensions (in./mm) | | | | | | | | Mounting Hardware | | Maximum Working Pressure | |
|--------------------|------------------|-------------|---------------------|------|-------|------|------|-------|-------|-------|-------------------|--------|--------------------------|--------------------|
| | | | A | B | C | D | E | F | G | H | J (Dia.) | O-Ring | | Hex Head Cap Screw |
| P563042 | L-12SF-3 | 0.75 | 0.98 | 2.56 | 1.875 | 0.88 | 0.56 | 1.531 | 1.265 | 0.245 | 0.406 | -214 | 3/8"-16x11/4 | 5000 |
| | | 19 | 25 | 65 | 48 | 22 | 14 | 39 | 32 | 6 | 10 | | | 34500kPa |
| P563044 | L-16SF-3 | 1.00 | 1.11 | 2.75 | 2.062 | 0.94 | 0.62 | 1.781 | 1.515 | 0.295 | 0.406 | -219 | 3/8"-16x11/4 | 5000 |
| | | 25 | 28 | 70 | 52 | 24 | 16 | 45 | 38 | 7 | 10 | | | 34500kPa |
| P563047 | L-20SF-3 | 1.25 | 1.39 | 3.12 | 2.312 | 0.88 | 0.56 | 2.031 | 1.720 | 0.295 | 0.469 | -222 | 7/16"-14x11/2 | 4000 psi |
| | | 32 | 35 | 79 | 59 | 22 | 14 | 52 | 44 | 7 | 12 | | | 27580 kPa |
| P563050 | L-24SF-3 | 1.50 | 1.58 | 3.69 | 2.750 | 1.00 | 0.62 | 2.406 | 2.000 | 0.295 | 0.531 | -225 | 1/2"-13x11/2 | 3000 psi |
| | | 38 | 40 | 94 | 70 | 25 | 16 | 61 | 51 | 8 | 13 | | | 20685 kPa |
| P563053 | L-32SF-3 | 2.00 | 1.86 | 4.00 | 3.062 | 1.03 | 0.62 | 2.844 | 2.470 | 0.355 | 0.531 | -228 | 1/2"-13x11/2 | 3000 psi |
| | | 51 | 47 | 102 | 78 | 26 | 16 | 72 | 63 | 9 | 13 | | | 20685 kPa |
| P563056 | L-40SF-3 | 2.50 | 2.09 | 4.50 | 3.500 | 1.50 | 0.75 | 3.344 | 2.950 | 0.355 | 0.531 | -232 | 1/2"-13x13/4 | 2500 psi |
| | | 64 | 53 | 114 | 89 | 38 | 19 | 85 | 75 | 9 | 13 | | | 17240 kPa |

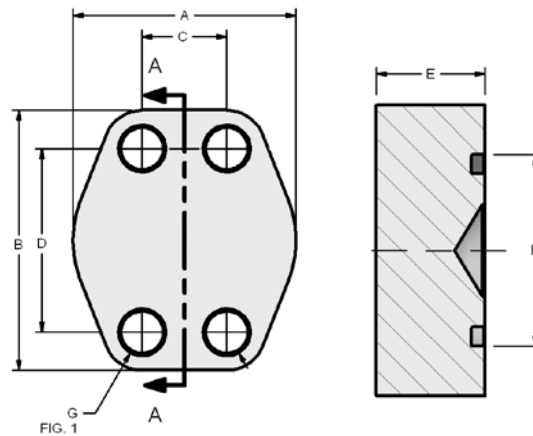
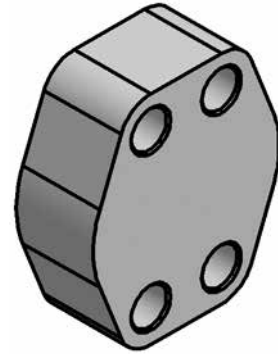
Code 62 Mounting Hardware

| Donaldson Part No. | Flange Reference | Flange Size | Dimensions (in./mm) | | | | | | | | Mounting Hardware | | Maximum Working Pressure | |
|--------------------|------------------|-------------|---------------------|------|-------|------|------|-------|-------|-------|-------------------|--------|--------------------------|--------------------|
| | | | A | B | C | D | E | F | G | H | J (Dia.) | O-Ring | | Hex Head Cap Screw |
| P563046 | L-16SFX-6 | 1.00 | 1.33 | 3.19 | 2.250 | 1.31 | 0.94 | 1.906 | 1.530 | 0.355 | 0.469 | -219 | 7/16"-14x13/4 | 6000 psi |
| | | 25 | 34 | 81 | 57 | 33 | 24 | 48 | 39 | 9 | 12 | | | 41370kPa |
| P563049 | L-20SFX-6 | 1.25 | 1.48 | 3.75 | 2.625 | 1.50 | 1.06 | 2.156 | 1.750 | 0.385 | 0.531 | -222 | 1/2"-13x13/4 | 6000 psi |
| | | 32 | 38 | 95 | 67 | 38 | 27 | 55 | 44 | 10 | 13 | | | 41370kPa |
| P563051 | L-24SFX-6 | 1.50 | 1.83 | 4.44 | 3.125 | 1.69 | 1.19 | 2.531 | 2.030 | 0.475 | 0.656 | -225 | 5/8"-11x21/4 | 6000 psi |
| | | 38 | 46 | 113 | 79 | 43 | 30 | 64 | 52 | 12 | 17 | | | 41370kPa |
| P563054 | L-32SFX-6 | 2.00 | 2.20 | 5.25 | 3.812 | 2.06 | 1.44 | 3.156 | 2.660 | 0.475 | 0.781 | -228 | 3/4"-10x23/4 | 6000 psi |
| | | 51 | 56 | 133 | 97 | 52 | 37 | 80 | 68 | 12 | 20 | | | 41370kPa |

Blanking Flanges

Specifications

- Code 61 and 62
- O-Ring



Blanking Flanges, Code 61

| Donaldson Part No. | Reference | Pad Size | Dimensions (in./mm) | | | | | | | Mounting Hardware | |
|-----------------------|--------------|-------------|---------------------|-----------|----------|----------|---------|----------|----------|-------------------|---------------|
| | | | A | B | C | D | E | F | G | O-Ring | SHCS |
| P563061 | LIB-16-16-30 | 1"/25mm | 2.313/59 | 2.750/70 | 1.031/26 | 2.063/52 | 0.88/22 | 1.560/40 | 0.406/10 | -219 | 3/8"-16x1.75 |
| P563063 | LIB-20-20-30 | 1-1/4"/32mm | 2.875/73 | 3.125/79 | 1.188/30 | 2.313/59 | 0.94/24 | 1.750/44 | 0.469/12 | -222 | 7/16"-14x1.75 |
| P563065 | LIB-24-24-30 | 1-1/2"/38mm | 3.250/83 | 3.688/94 | 1.406/36 | 2.750/70 | 1.19/30 | 2.115/54 | 0.531/13 | -225 | 1/2"-13x2.25 |
| P563067 | LIB-32-32-30 | 2"/51mm | 3.813/97 | 4.000/102 | 1.688/43 | 3.063/78 | 1.44/37 | 2.490/63 | 0.531/13 | -228 | 1/2"-13x2.50 |

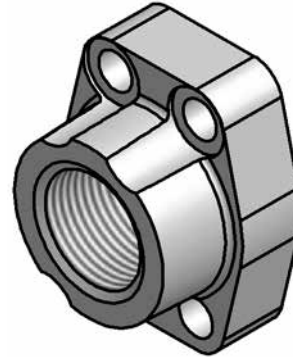
Blanking Flanges, Code 62

| Donaldson Part No. | Reference | Pad Size | Dimensions (in./mm) | | | | | | | Mounting Hardware | |
|-----------------------|--------------|-------------|---------------------|----------|----------|----------|---------|----------|----------|-------------------|--------------|
| | | | A | B | C | D | E | F | G | O-Ring | SHCS |
| P563064 | LIB-20-20-60 | 1-1/4"/32mm | 3.060/78 | 3.750/95 | 1.250/32 | 2.625/67 | 1.43/36 | 1.750/44 | 0.531/13 | -222 | 1/2"-13x2.50 |

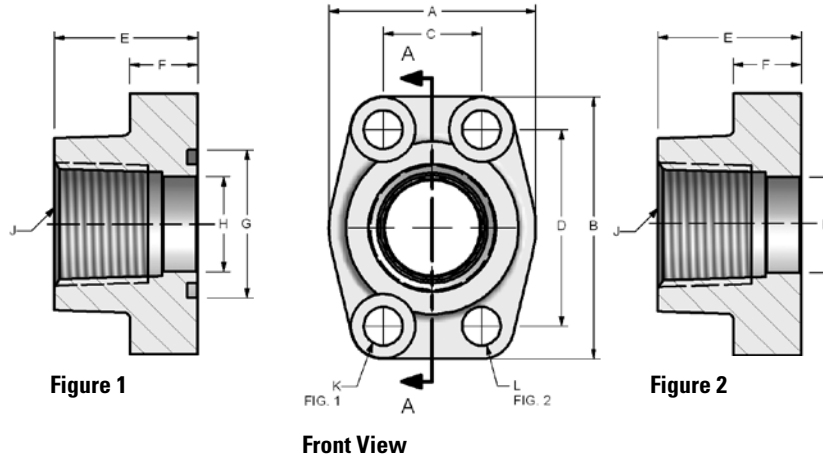
4-Bolt NPTF Threaded Flange

Specifications

- Code 61 and 62
- NPT Thread
- Buna-N® O-Ring
- Mounting hardware and O-Ring included on O-Ring models
- Maximum temperature with O-Ring 250°F / 121°C



Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Code 61 NPTF Thread, O-Ring (Figure 1)

| Donaldson Part No. | Desc. | Port Size | Pad Size | Dimensions (in./mm) | | | | | | | | J NPTF | K (dia.) Drill | Mounting Hardware | |
|--------------------|--------------|-----------|----------|---------------------|------|-------|-------|------|------|-------|-------|-------------|----------------|-------------------|-----------------|
| | | | | A | B | C | D | E | F | G | H | | | O-Ring | SHCS |
| P563088 | LI-12-12P-30 | 0.75 | 0.75 | 1.97 | 2.56 | 0.875 | 1.875 | 1.42 | 0.71 | 1.250 | 0.752 | 3/4"-14 | 0.406 | -214 | 3/8"-16 x 1.25 |
| | | 19 | 19 | 50 | 65 | 22 | 48 | 36 | 18 | 32 | 19 | 10 | | | |
| P563093 | LI-16-16P-30 | 1.00 | 1.00 | 2.17 | 2.75 | 1.031 | 2.062 | 1.50 | 0.71 | 1.560 | 1.002 | 1"-11.5 | 0.406 | -219 | 3/8"-16 x 1.50 |
| | | 25 | 25 | 55 | 70 | 26 | 52 | 38 | 18 | 40 | 25 | 10 | | | |
| P563100 | LI-20-20P-30 | 1.25 | 1.25 | 2.68 | 3.12 | 1.188 | 2.312 | 1.61 | 0.83 | 1.750 | 1.252 | 1-1/4"-11.5 | 0.469 | -222 | 7/16"-14 x 1.50 |
| | | 32 | 32 | 68 | 79 | 30 | 59 | 41 | 21 | 44 | 32 | 12 | | | |
| P563107 | LI-24-24P-30 | 1.50 | 1.50 | 3.07 | 3.66 | 1.406 | 2.750 | 1.77 | 0.98 | 2.115 | 1.502 | 1-1/2"-11.5 | 0.531 | -225 | 1/2"-13 x 1.75 |
| | | 38 | 38 | 78 | 93 | 36 | 70 | 45 | 25 | 54 | 38 | 13 | | | |
| P563113 | LI-32-32P-30 | 2.00 | 2.00 | 3.54 | 4.00 | 1.688 | 3.062 | 1.77 | 0.98 | 2.490 | 2.002 | 2"-11.5 | 0.531 | -228 | 1/2"-13 x 1.75 |
| | | 51 | 51 | 90 | 102 | 43 | 78 | 45 | 25 | 63 | 51 | 13 | | | |
| P563117 | LI-40-40P-30 | 2.50 | 2.50 | 4.09 | 4.49 | 2.000 | 3.500 | 1.97 | 0.98 | 2.995 | 2.502 | 2-1/2"-8 | 0.531 | -232 | 1/2"-13 x 2.25 |
| | | 64 | 64 | 104 | 114 | 51 | 89 | 50 | 25 | 76 | 64 | 13 | | | |
| P563118 | LI-48-48P-30 | 3.00 | 3.00 | 4.88 | 5.28 | 2.438 | 4.188 | 1.97 | 1.06 | 3.615 | 3.002 | 3"-8 | 0.656 | -237 | 5/8"-11 x 2.50 |
| | | 76 | 76 | 124 | 134 | 62 | 106 | 50 | 27 | 92 | 76 | 17 | | | |

4-Bolt NPTF Threaded Flange

Code 61 NPTF Thread, Flat Face (Figure 2)

| Donaldson Part No. | Description | Port Size | Pad Size | Dimensions (in./mm) | | | | | | | | J NPTF | L Tap UNC-2B |
|--------------------|---------------|-----------|----------|---------------------|------|-------|-------|------|------|-------|-------|-------------|--------------|
| | | | | A | B | C | D | E | F | G | H | | |
| P563163 | LIC-16-16P-30 | 1.00 | 1.00 | 2.17 | 2.75 | 1.031 | 2.062 | 1.50 | 0.71 | 1.560 | 1.002 | 1"-11.5 | 3/8"-16 |
| | | 25 | 25 | 55 | 70 | 26 | 52 | 38 | 18 | 40 | 25 | | |
| P563166 | LIC-20-20P-30 | 1.25 | 1.25 | 2.68 | 3.12 | 1.188 | 2.312 | 1.61 | 0.83 | 1.750 | 1.252 | 1-1/4"-11.5 | 7/16"-14 |
| | | 32 | 32 | 68 | 79 | 30 | 59 | 41 | 21 | 44 | 32 | | |
| P563171 | LIC-32-32P-30 | 2.00 | 2.00 | 3.54 | 4.00 | 1.688 | 3.062 | 1.77 | 0.98 | 2.490 | 2.002 | 2"-11.5 | 1/2"-13 |
| | | 51 | 51 | 90 | 102 | 43 | 78 | 45 | 25 | 63 | 51 | | |

Code 62 NPTF Thread, O-Ring (Figure 1)

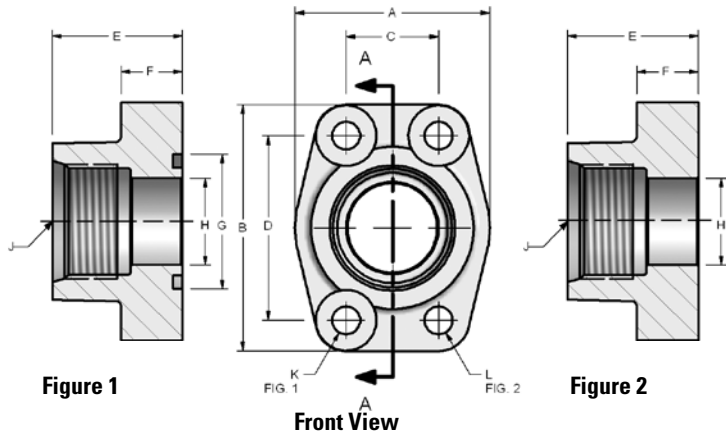
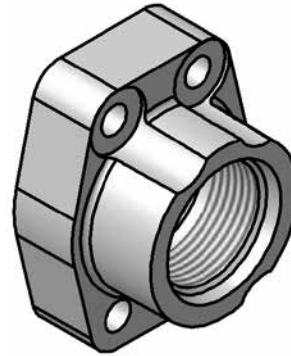
| Donaldson Part No. | Description | Port Size | Pad Size | Dimensions (in./mm) | | | | | | | | J NPTF | K (Dia.) Drill | Mounting Hardware | |
|--------------------|--------------|-----------|----------|---------------------|------|-------|-------|------|------|-------|-------|------------|----------------|-------------------|-----------------|
| | | | | A | B | C | D | E | F | G | H | | | O-Ring | SHCS |
| P563094 | LI-16-16P-60 | 1.00 | 1.00 | 2.56 | 3.19 | 1.093 | 2.250 | 1.65 | 0.98 | 1.560 | 1.002 | 1-11.5 | 0.492 | -219 | 7/16"-14 x 1.50 |
| | | 25 | 25 | 65 | 81 | 28 | 57 | 42 | 25 | 40 | 25 | | 12 | | |
| P563101 | LI-20-20P-60 | 1.25 | 1.25 | 3.07 | 3.75 | 1.250 | 2.625 | 1.77 | 1.06 | 1.750 | 1.252 | 1-1/4-11.5 | 0.531 | -222 | 1/2"-13 x 1.50 |
| | | 32 | 32 | 78 | 95 | 32 | 67 | 45 | 27 | 44 | 32 | | 13 | | |
| P563108 | LI-24-24P-60 | 1.50 | 1.50 | 3.70 | 4.41 | 1.437 | 3.125 | 1.97 | 1.18 | 2.115 | 1.502 | 1-1/2-11.5 | 0.656 | -225 | 5/8"-11 x 1.75 |
| | | 38 | 38 | 94 | 112 | 36 | 79 | 50 | 30 | 54 | 38 | | 17 | | |

4-Bolt SAE Threaded Flange

Specifications

- Code 61 and 62
- SAE Straight Thread
- Buna-N® O-Ring
- Mounting hardware and O-Ring included on O-Ring models
- Maximum temperature with O-Ring 250°F/ 121°C

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Code 61 Straight Thread, O-Ring (Figure 1)

| Donaldson Part No. | Port Reference | Port Size | Pad Size | Dimensions (in./mm) | | | | | | | | J UN/UNF-2B | K (Dia.) Drill | Mounting Hardware O-Ring SHCS | |
|--------------------|----------------|-----------|----------|---------------------|----------|----------|----------|---------|---------|----------|----------|-------------|----------------|-------------------------------|-----------------|
| | | | | A | B | C | D | E | F | G | H | | | | |
| P563090 | LI-12-12S-30 | 0.75/19 | 0.75/19 | 1.97/50 | 2.56/65 | 0.875/22 | 1.875/48 | 1.42/36 | 0.71/18 | 1.250/32 | 0.752/19 | 1 1/16"-12 | 0.406/10 | -214 | 3/8"-16 x 1.25 |
| P563095 | LI-16-16S-30 | 1.00/25 | 1.0/25 | 2.17/55 | 2.75/70 | 1.031/26 | 2.062/52 | 1.50/38 | 0.71/18 | 1.560/40 | 1.002/25 | 1 5/16"-12 | 0.406/10 | -219 | 3/8"-16 x 1.50 |
| P563102 | LI-20-20S-30 | 1.25/32 | 1.25/32 | 2.68/68 | 3.12/79 | 1.188/30 | 2.312/59 | 1.61/41 | 0.83/21 | 1.750/44 | 1.252/32 | 1 5/8"-12 | 0.469/12 | -222 | 7/16"-14 x 1.50 |
| P563109 | LI-24-24S-30 | 1.50/38 | 1.50/38 | 3.07/78 | 3.66/93 | 1.406/36 | 2.750/70 | 1.77/45 | 0.98/25 | 2.115/54 | 1.502/38 | 1 7/8"-12 | 0.531/13 | -225 | 1/2"-13 x 1.75 |
| P563115 | LI-32-32S-30 | 2.00/51 | 2.00/51 | 3.54/90 | 4.00/102 | 1.688/43 | 3.062/78 | 1.77/45 | 0.98/25 | 2.490/63 | 2.002/51 | 2 1/2"-12 | 0.531/13 | -228 | 1/2"-13 x 1.75 |

Code 61 Straight Thread, Flat Face (Figure 2)

| Donaldson Part No. | Port Reference | Port Size | Pad Size | Dimensions (in./mm) | | | | | | | | J UN/UNF-2B | L Tap UNC-2B |
|--------------------|----------------|-----------|----------|---------------------|---------|----------|----------|---------|---------|----------|----------|-------------|--------------|
| | | | | A | B | C | D | E | F | G | H | | |
| P563162 | LIC-12-12S-30 | 0.75/19 | 0.75/19 | 1.97/50 | 2.56/65 | 0.875/22 | 1.875/48 | 1.42/36 | 0.71/18 | 1.250/32 | 0.752/19 | 1 1/16"-12 | 3/8"-16 |
| P563165 | LIC-16-16S-30 | 1.00/25 | 1.00/25 | 2.17/55 | 2.75/70 | 1.031/26 | 2.062/52 | 1.50/38 | 0.71/18 | 1.560/40 | 1.002/25 | 1 5/16"-12 | 3/8"-16 |
| P563168 | LIC-20-20S-30 | 1.25/32 | 1.25/32 | 2.68/68 | 3.12/79 | 1.188/30 | 2.312/59 | 1.61/41 | 0.83/21 | 1.750/44 | 1.252/32 | 1 5/8"-12 | 7/16"-14 |

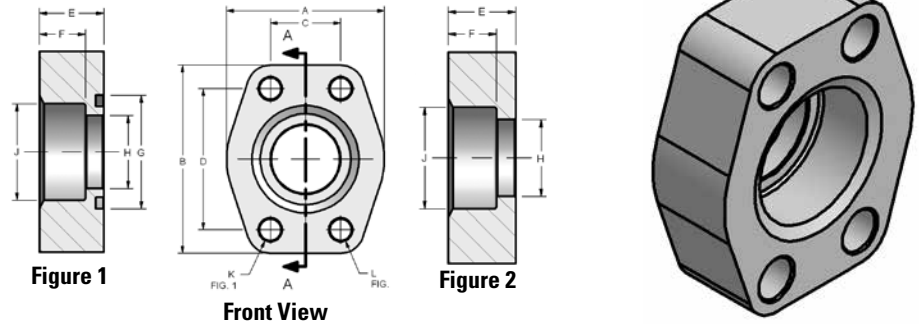
Code 62 Straight Thread, O-Ring (Figure 1)

| Donaldson Part No. | Port Reference | Port Size | Pad Size | Dimensions (in./mm) | | | | | | | | J UN/UNF-2B | K (Dia.) Drill | Mounting Hardware O-Ring SHCS | |
|--------------------|----------------|-----------|----------|---------------------|----------|----------|----------|---------|---------|----------|----------|-------------|----------------|-------------------------------|-----------------|
| | | | | A | B | C | D | E | F | G | H | | | | |
| P563096 | LI-16-16S-60 | 1.00/25 | 1.00/25 | 2.56/65 | 3.19/81 | 1.093/28 | 2.250/57 | 1.65/42 | 0.98/25 | 1.560/40 | 1.002/25 | 1 5/16"-12 | 0.492/12 | -219 | 7/16"-14 x 1.50 |
| P563103 | LI-20-20S-60 | 1.25/32 | 1.25/32 | 3.07/78 | 3.75/95 | 1.250/32 | 2.625/67 | 1.77/45 | 1.06/27 | 1.750/44 | 1.252/32 | 1 5/8"-12 | 0.531/13 | -222 | 1/2"-13 x 1.75 |
| P563110 | LI-24-24S-60 | 1.50/38 | 1.50/38 | 3.70/94 | 4.41/112 | 1.437/36 | 3.125/79 | 1.97/50 | 1.18/30 | 2.115/54 | 1.502/38 | 1 7/8"-12 | 0.656/17 | -225 | 5/8"-11 x 2.25 |

Flat Socket Weld Flange

Specifications

- Code 61 and 62



Code 61, O-Ring (Figure 1)

| Donaldson Part No. | Pipe Desc. | Pipe Size | Pad Size | Dimensions (in./mm) | | | | | | | | | | Mounting Hardware | |
|--------------------|--------------|-----------|----------|---------------------|-----------|----------|-----------|---------|----------|----------|----------|----------|----------|-------------------|---------------|
| | | | | A | B | C | D | E | F | G | H | J | K | O-Ring | SHCS |
| P563119 | LI-08-08W-30 | 0.50/13 | 0.50/13 | 1.813/46 | 2.125/54 | 0.688/17 | 1.500/38 | 0.75/19 | 0.560/14 | 1.000/25 | 0.502/13 | 0.855/22 | 0.344/9 | -210 | 5/16"-18x1.5 |
| P563120 | LI-12-12W-30 | 0.75/19 | 0.75/19 | 2.063/52 | 2.563/65 | 0.875/22 | 1.875/48 | 0.75/19 | 0.560/14 | 1.250/32 | 0.752/19 | 1.062/27 | 0.406/10 | -214 | 3/8"-16x1.5 |
| P563121 | LI-16-16W-30 | 1.00/25 | 1.00/25 | 2.313/59 | 2.750/70 | 1.031/26 | 2.063/52 | 0.88/22 | 0.630/16 | 1.560/40 | 1.002/25 | 1.328/34 | 0.406/10 | -219 | 3/8"-16x1.75 |
| P563122 | LI-20-20W-30 | 1.25/32 | 1.25/32 | 2.875/73 | 3.125/79 | 1.188/30 | 2.313/59 | 0.94/24 | 0.690/18 | 1.750/44 | 1.252/32 | 1.672/42 | 0.469/12 | -222 | 7/16"-14x1.75 |
| P563123 | LI-24-24W-30 | 1.50/38 | 1.50/38 | 3.250/83 | 3.688/94 | 1.406/36 | 2.750/70 | 1.19/30 | 0.750/19 | 2.115/54 | 1.502/38 | 1.922/49 | 0.531/13 | -225 | 1/2"-13x2.25 |
| P563124 | LI-32-32W-30 | 2.00/51 | 2.00/51 | 3.813/97 | 4.000/102 | 1.688/43 | 3.063/78 | 1.38/35 | 0.875/22 | 2.495/63 | 2.002/51 | 2.406/61 | 0.531/13 | -228 | 1/2"-13x2.5 |
| P563127 | LI-48-48W-30 | 3.00/76 | 3.00/76 | 5.156/131 | 5.313/135 | 2.438/62 | 4.188/106 | 2.12/54 | 1.250/32 | 3.615/92 | 3.002/76 | 3.547/90 | 0.656/17 | -237 | 5/8"-11x3.5 |

Code 61, Flat Face (Figure 2)

| Donaldson Part No. | Pipe Desc. | Pipe Size | Pad Size | Dimensions (in./mm) | | | | | | | | | | L |
|--------------------|---------------|-----------|----------|---------------------|-----------|----------|----------|---------|----------|----------|----------|----------|-----------|----------|
| | | | | A | B | C | D | E | F | G | H | J | UNC-2B | |
| P563176 | LIC-12-12W-30 | 0.75/19 | 0.75/19 | 2.063/52 | 2.563/65 | 0.875/22 | 1.875/48 | 0.75/19 | 0.560/14 | 1.250/32 | 0.752/19 | 1.062/27 | 1.328/34 | 3/8"-16 |
| P563177 | LIC-16-16W-30 | 1.00/25 | 1.00/25 | 2.313/59 | 2.750/70 | 1.031/26 | 2.063/52 | 0.88/22 | 0.630/16 | 1.560/40 | 1.002/25 | 1.328/34 | 1.672/42 | 3/8"-16 |
| P563178 | LIC-20-20W-30 | 1.25/32 | 1.25/32 | 2.875/73 | 3.125/79 | 1.188/30 | 2.313/59 | 0.94/24 | 0.690/18 | 1.750/44 | 1.252/32 | 1.672/42 | 2.406/61 | 7/16"-14 |
| P563179 | LIC-24-24W-30 | 1.50/38 | 1.50/38 | 3.250/83 | 3.688/94 | 1.406/36 | 2.750/70 | 1.19/30 | 0.750/19 | 2.115/54 | 1.502/38 | 1.922/49 | 2.906/74 | 1/2"-13 |
| P563180 | LIC-32-32W-30 | 2.00/51 | 2.00/51 | 3.813/97 | 4.000/102 | 1.688/43 | 3.063/78 | 1.38/35 | 0.875/22 | 2.490/63 | 2.002/51 | 2.406/61 | 3.547/90 | 1/2"-13 |
| P563181 | LIC-40-40W-30 | 2.50/64 | 2.50/64 | 4.281/109 | 4.500/114 | 2.000/51 | 3.500/89 | 1.75/44 | 1.000/25 | 2.995/76 | 2.502/64 | 2.906/74 | 4.188/106 | 1/2"-13 |

Reservoir Accessories

- Suction strainers protect pumps from damage
- Diffusers for effectively reducing aeration, foaming, turbulence and noise caused by return lines
- Sight and level gauges available, including standard length, screw-in styles in plastic and steel for use in a variety of applications
- Plugs, caps and vents for small power units and gearboxes
- Filler breathers and caps in chrome, zinc epoxy-coated weatherproof finishes and corrosion-resistance technopolymer – lockable, dipsticks and side-mount versions available



T.R.A.P.™ Breather Technology (Thermally Reactive Advanced Protection)

T.R.A.P. breathers provide fast-acting protection against airborne moisture and particulate contamination. It stops solid particulate down to 3 µm at 97% efficiency as well as prevents moisture from entering the reservoir. Water-holding capacity is regenerated with every oil return phase for long service life. Its self-regenerating capability enables extended life.

Suction Strainers

Flow Range: 0-300 gpm / 0-1,140 lpm

Outlet Port Size: 3/8" NPT to 4" NPT

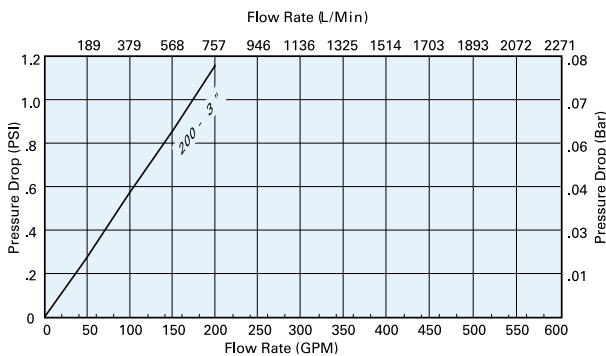
- Stainless Steel Mesh
- Steel or nylon fittings
- Operating temperatures:
Steel fitting to 250°F / 121°C
Nylon fitting to 210°F / 100°C
- Relief valve available



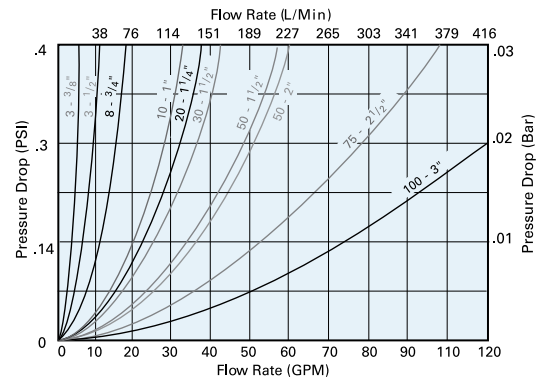
Features

Donaldson suction strainers are zinc-plated, with stainless steel mesh screens and rugged steel core centers epoxy bonded to heavy gauge connector and end caps. Suction strainers filter petroleum-based hydraulic fluids, phosphate esters, water glycols, lubricating oils, coolants, and fuels in fluid reservoirs, sumps and similar applications. They are cleanable and reusable. Clean by swishing in non-caustic solvent, then blow dry from inner diameter to outer diameter with compressed air.

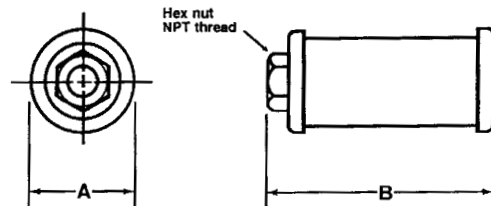
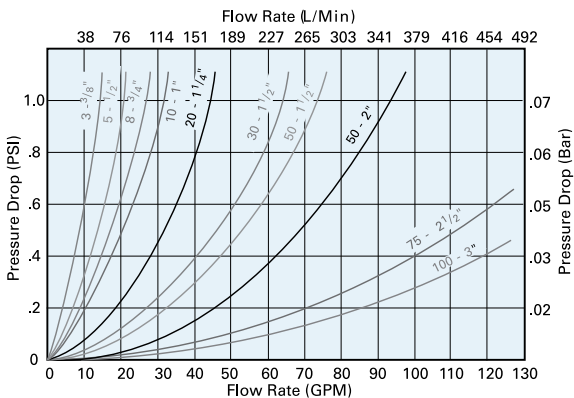
SEC (Steel Fitting) 200-300



PEC (Nylon Fitting) 3-100



SEH/SEC (Steel Fitting) 3-100



Note:

PEC and SEH model strainers have hex nut style outlet fittings. SEC model strainers have pipe coupling style (round) outlet fittings. All styles have NPT threads inside. Mount a minimum of 4" from the reservoir bottom.

Suction Strainer Choices

| Donaldson Part No. | Description | Relief Valve Setting | Outlet Pipe Size | Wire Mesh Size | Dim. A (in./mm) | Dim. B (in./mm) | Screen Area (sq. in./sq. cm) | Max. Flow (gpm/lpm) |
|--------------------|----------------------|----------------------|------------------|----------------|-----------------|-----------------|------------------------------|---------------------|
| P562235 | PEC-3-3/8-100 | n/a | 3/8" NPT | 100 | 1.9/48 | 2.7/69 | 20/129 | 3/11 |
| P562240 | PEC-5-1/2-100 | n/a | 1/2" NPT | 100 | 1.9/48 | 4.3/109 | 25/161 | 5/19 |
| P562245 | PEC-8-3/4-100 | n/a | 3/4" NPT | 100 | 2.7/69 | 4.3/109 | 40/258 | 8/30 |
| P562246 | PEC-8-3/4-100-RV3 | 3 psid/0.2 bar | 3/4" NPT | 100 | 2.7/69 | 4.3/109 | 40/258 | 8/30 |
| P562244 | PEC-8-1-100 | n/a | 1" NPT | 100 | 2.7/69 | 4.3/109 | 40/258 | 8/30 |
| P562226 | PEC-10-1-100 | n/a | 1" NPT | 100 | 2.7/69 | 5.6/142 | 70/452 | 10/38 |
| P562227 | PEC-10-1-100-RV3 | 3 psid/0.2 bar | 1" NPT | 100 | 2.7/69 | 5.6/142 | 70/452 | 10/38 |
| P562228 | PEC-20-1.1/4-100 | n/a | 1-1/4" NPT | 100 | 3.4/86 | 5.6/142 | 128/826 | 20/75 |
| P562229 | PEC-20-1.1/4-100-RV3 | 3 psid/0.2 bar | 1-1/4" NPT | 100 | 3.4/86 | 5.6/142 | 128/826 | 20/75 |
| P562231 | PEC-20-1.1/4-200 | n/a | 1-1/4" NPT | 200 | 3.4/86 | 5.6/142 | 128/826 | 20/75 |
| P562232 | PEC-30-1.1/2-100 | n/a | 1-1/2" NPT | 100 | 3.4/86 | 5.6/142 | 128/826 | 30/113 |
| P562233 | PEC-30-1.1/2-100-RV3 | 3 psid/0.2 bar | 1-1/2" NPT | 100 | 3.4/86 | 5.6/142 | 128/826 | 30/113 |
| P562236 | PEC-50-1.1/2-100 | n/a | 1-1/2" NPT | 100 | 4/102 | 8/203 | 200/1290 | 50/188 |
| P562237 | PEC-50-1.1/2-100-RV3 | 3 psid/0.2 bar | 1-1/2" NPT | 100 | 4/102 | 8/203 | 200/1290 | 50/188 |
| P562238 | PEC-50-2-100 | n/a | 2" NPT | 100 | 4/102 | 10.4/264 | 200/1290 | 50/188 |
| P562239 | PEC-50-2-100-RV3 | 3 psid/0.2 bar | 2" NPT | 100 | 4/102 | 10.4/264 | 200/1290 | 50/188 |
| P562242 | PEC-75-2.1/2-100 | n/a | 2-1/2" NPT | 100 | 5.2/132 | 8.5/216 | 316/2039 | 75/282 |
| P562243 | PEC-75-2.1/2-100-RV3 | 3 psid/0.2 bar | 2-1/2" NPT | 100 | 5.2/132 | 8.5/216 | 316/2039 | 75/282 |
| P562223 | PEC-100-3-100 | n/a | 3" NPT | 100 | 5.2/132 | 11.5/292 | 379/2445 | 100/376 |
| P562224 | PEC-100-3-100-RV3 | 3 psid/0.2 bar | 3" NPT | 100 | 5.2/132 | 11.5/292 | 379/2445 | 100/376 |
| P562225 | PEC-100-3-100-SST | n/a | 3" NPT | 100 | 5.2/132 | 11.5/292 | 379/2445 | 100/376 |
| P562221 | SEH-3-3/8-100 | n/a | 3/8" NPT | 100 | 1.9/48 | 2.5/64 | 34/219 | 3/11 |
| P169012 | SEH-5-1/2-100 | n/a | 1/2" NPT | 100 | 2.63/67 | 3.1/79 | 62/400 | 5/19 |
| P563305 | SEH-5-1/2-100-RV3 | 3 psid/0.2 bar | 1/2" NPT | 100 | 2.7/69 | 3.1/79 | 62/400 | 5/19 |
| P169013 | SEH-8-3/4-100 | n/a | 3/4" NPT | 100 | 2.63/67 | 3.55/90 | 68/439 | 8/30 |
| P173910 | SEH-8-3/4-100-RV3 | 3 psid/0.2 bar | 3/4" NPT | 100 | 2.63/67 | 3.55/90 | 68/439 | 8/30 |
| P169014 | SEH-10-1-100 | n/a | 1" NPT | 100 | 2.63/67 | 5.35/136 | 110/710 | 10/38 |
| P173911 | SEH-10-1-100-RV3 | 3 psid/0.2 bar | 1" NPT | 100 | 2.63/67 | 5.35/136 | 110/710 | 10/38 |
| P169015 | SEH-20-1.1/4-100 | n/a | 1-1/4" NPT | 100 | 3.38/86 | 6.85/174 | 162/1045 | 20/75 |
| P173912 | SEH-20-1.1/4-100-RV3 | 3 psid/0.2 bar | 1-1/4" NPT | 100 | 3.38/86 | 6.85/174 | 162/1045 | 20/75 |
| P169016 | SEH-30-1.1/2-100 | n/a | 1-1/2" NPT | 100 | 3.38/86 | 8.01/203 | 225/1452 | 30/113 |
| P173913 | SEH-30-1.1/2-100-RV3 | 3 psid/0.2 bar | 1-1/2" NPT | 100 | 3.38/86 | 8.01/203 | 225/1452 | 30/113 |
| P169017 | SEH-50-1.1/2-100 | n/a | 1-1/2" NPT | 100 | 3.94/100 | 9.8/249 | 340/2194 | 50/188 |
| P173914 | SEH-50-1.1/2-100-RV3 | 3 psid/0.2 bar | 1-1/2" NPT | 100 | 3.94/100 | 9.8/249 | 340/2194 | 50/188 |
| P562222 | SEH-50-1.1/2-60 | n/a | 1-1/2" NPT | 60 | 3.94/100 | 9.8/249 | 340/2194 | 50/188 |
| P169018 | SEH-50-2-100 | n/a | 2" NPT | 100 | 3.94/100 | 9.8/249 | 340/2194 | 50/188 |
| P173915 | SEH-50-2-100-RV3 | 3 psid/0.2 bar | 2" NPT | 100 | 3.94/100 | 9.8/249 | 340/2194 | 50/188 |
| P169019 | SEC-75-2.1/2-100 | n/a | 2-1/2" NPT | 100 | 5.12/130 | 10.1/257 | 400/2581 | 75/282 |
| P173916 | SEC-75-2.1/2-100-RV3 | 3 psid/0.2 bar | 2-1/2" NPT | 100 | 5.12/130 | 10.1/257 | 400/2581 | 75/282 |
| P169020 | SEC-100-3-100 | n/a | 3" NPT | 100 | 5.12/130 | 11.78/299 | 500/3226 | 100/376 |
| P173917 | SEC-100-3-100-RV3 | 3 psid/0.2 bar | 3" NPT | 100 | 5.12/130 | 11.78/299 | 500/3226 | 100/376 |
| P562211 | SEC-100-3-60 | n/a | 3" NPT | 60 | 5.12/130 | 11.78/299 | 500/3226 | 100/376 |
| P562212 | SEC-100-3-60-RV3 | 3 psid/0.2 bar | 3" NPT | 60 | 5.12/130 | 11.78/299 | 500/3226 | 100/376 |
| P562213 | SEC-200-3-100 | n/a | 3" NPT | 100 | 8.1/206 | 11.3/287 | 965/6226 | 200/752 |
| P562214 | SEC-300-4-100 | n/a | 4" NPT | 100 | 8.1/206 | 15/381 | 1370/8839 | 300/1128 |
| P171861 | FIOA 20 | n/a | G3/8" | 90 | 2.05/52 | 3.03/77 | 29/184 | 2.7/10 |
| P171869 | FIOA 50 | n/a | G3/4" | 90 | 2.95/75 | 3.74/95 | 54/348 | 6.6/25 |
| P171877 | FIOA 90 | n/a | G1" | 90 | 2.95/75 | 5.55/141 | 86/554 | 12.0/45 |
| P171885 | FIOA 130 | n/a | G1 1/4" | 90 | 3.74/95 | 7.24/184 | | 17.3/65 |
| P171889 | FIOA 175 | n/a | G1 1/2" | 90 | 5.51/140 | 4.45/113 | 183/1178 | 22.6/85 |

NYLON FITTING

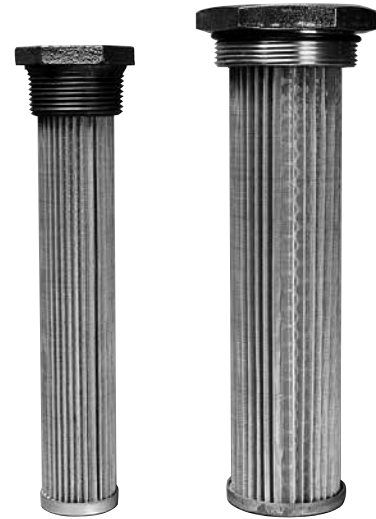
STEEL FITTING

Tank Mounted Strainers

Flow Range: 0-100 gpm / 0-380 lpm

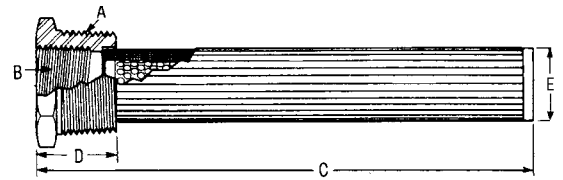
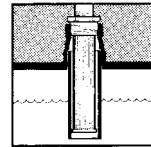
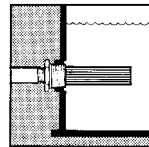
Outlet Port Size: 3/8" NPT to 1 1/4" NPT
or SAE-8 to SAE-20

- 140 Micron Stainless Steel Mesh
- Steel SAE bushing
- Cast iron NPT bushing
- Operating temperatures to 250°F / 121°C
- Relief valve available



Features

Tank mounted strainers offer easy installation. Access to reservoir interior is not needed. You can mount these units through a sidewall or through the tank top and into a standpipe.



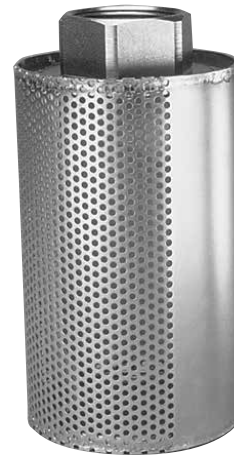
| Donaldson Part No. | Description | Relief Valve Setting | Wire Mesh Size | Dim. A | Dim. B | Dim. C | Dim. D | Dim. E | Screen Area (sq. in./sq. cm) | Max. Flow (gpm/lpm) |
|--------------------|----------------|----------------------|----------------|------------------|------------------|----------|---------|---------|------------------------------|---------------------|
| P562270 | TM-3-100 | n/a | 100 | 3/4" NPT | 1/2" NPT | 4/102 | 0.97/25 | 0.87/22 | 29/187 | 3/11 |
| P562274 | TM-5-100 | n/a | 100 | 1" NPT | 1/2" NPT | 5.34/136 | 1.06/27 | 1.17/30 | 35/226 | 5/19 |
| P562275 | TM-5-100-RV5 | 5 psid/0.35 bar | 100 | 1" NPT | 1/2" NPT | 5.34/136 | 1.06/27 | 1.17/30 | 35/226 | 5/19 |
| P562256 | TM-10-100 | n/a | 100 | 1-1/4" NPT | 3/4" NPT | 8.17/208 | 1.2/30 | 1.36/35 | 64/413 | 10/38 |
| P562257 | TM-10-100-RV5 | 5 psid/0.35 bar | 100 | 1-1/4" NPT | 3/4" NPT | 8.17/208 | 1.2/30 | 1.36/35 | 64/413 | 10/38 |
| P562259 | TM-10-60-RV5 | 5 psid/0.35 bar | 60 | 1-1/4" NPT | 3/4" NPT | 8.17/208 | 1.2/30 | 1.36/35 | 64/413 | 10/38 |
| P562260 | TM-15-100 | n/a | 100 | 1-1/2" NPT | 1" NPT | 8.2/208 | 1.22/31 | 1.66/42 | 86/555 | 15/56 |
| P562264 | TM-15-100-RV5 | 5 psid/0.35 bar | 100 | 1-1/2" NPT | 1" NPT | 8.2/208 | 1.22/31 | 1.66/42 | 86/555 | 15/56 |
| P562266 | TM-25-100 | n/a | 100 | 2" NPT | 1-1/4" NPT | 9.04/230 | 1.35/34 | 2.12/54 | 125/806 | 25/94 |
| P562267 | TM-25-100-RV5 | 5 psid/0.35 bar | 100 | 2" NPT | 1-1/4" NPT | 9.04/230 | 1.35/34 | 2.12/54 | 125/806 | 25/94 |
| P562269 | TM-25-200-RV5 | 5 psid/0.35 bar | 200 | 2" NPT | 1-1/4" NPT | 9.04/230 | 1.35/34 | 2.12/54 | 125/806 | 25/94 |
| P562271 | TM-50-100 | n/a | 100 | 3" NPT | 2" NPT | 9.7/246 | 1.7/43 | 3/76 | 260/1677 | 50/188 |
| P562272 | TM-50-100-RV3 | 3 psid/0.2 bar | 100 | 3" NPT | 2" NPT | 9.7/246 | 1.7/43 | 3/76 | 260/1677 | 50/188 |
| P562273 | TM-50-100-RV5 | 5 psid/0.35 bar | 100 | 3" NPT | 2" NPT | 9.7/246 | 1.7/43 | 3/76 | 260/1677 | 50/188 |
| P563306 | TM-100-100 | n/a | 100 | 4" NPT | 3" NPT | 11.3/287 | 1.8/46 | 4/102 | 315/2032 | 100/376 |
| P562255 | TM-100-100-RV5 | 5 psid/0.35 bar | 100 | 4" NPT | 3" NPT | 11.3/287 | 1.8/46 | 4/102 | 315/2032 | 100/376 |
| P562253 | STM-5-100 | n/a | 100 | 1-5/16" -- 12 UN | 3/4" -- 16 UN | 5.34/136 | 1.06/27 | 1.17/30 | 35/226 | 5/19 |
| P562254 | STM-5-100-RV5 | 5 psid/0.35 bar | 100 | 1-5/16" -- 12 UN | 3/4" -- 16 UN | 5.34/136 | 1.06/27 | 1.17/30 | 35/226 | 5/19 |
| P562247 | STM-10-100 | n/a | 100 | 1-5/8" -- 12 UN | 1-1/16" -- 12 UN | 8.17/208 | 1.2/30 | 1.36/35 | 64/413 | 10/38 |
| P562248 | STM-10-100-RV5 | 5 psid/0.35 bar | 100 | 1-5/8" -- 12 UN | 1-1/16" -- 12 UN | 8.17/208 | 1.2/30 | 1.36/35 | 64/413 | 10/38 |
| P562249 | STM-15-100 | n/a | 100 | 1-7/8" -- 12 UN | 1-5/16" -- 12 UN | 8.2/208 | 1.22/31 | 1.66/42 | 86/555 | 15/56 |
| P562250 | STM-15-100-RV5 | 5 psid/0.35 bar | 100 | 1-7/8" -- 12 UN | 1-5/16" -- 12 UN | 8.2/208 | 1.22/31 | 1.66/42 | 86/555 | 15/56 |
| P562251 | STM-25-100 | n/a | 100 | 2-1/2" -- 12 UN | 1-5/8" -- 12 UN | 9.04/230 | 1.35/34 | 2.12/54 | 125/806 | 25/94 |
| P562252 | STM-25-100-RV5 | 5 psid/0.35 bar | 100 | 2-1/2" -- 12 UN | 1-5/8" -- 12 UN | 9.04/230 | 1.35/34 | 2.12/54 | 125/806 | 25/94 |

Diffusers

Specifications

- Perforated Steel
- Cast iron bushings (TMD-tank mount)
- Zinc-plated steel (DFD-return line)
- Operating temperatures to 250°F / 121°C

Flow Range: 0-450 gpm / 0-1,710 lpm



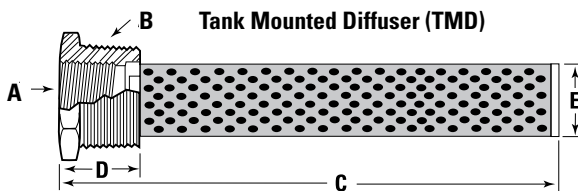
DFD



TMD

Features

Diffusers are highly effective in reducing aeration, foaming, turbulence and noise caused by return lines. Reservoir baffles can usually be eliminated, provided that the holes in the tube are positioned facing away from the pump suction inlet and below the reservoir oil level. Can be vertically or horizontally mounted with discharge side directed away from suction and preferably toward a tank wall or bottom.

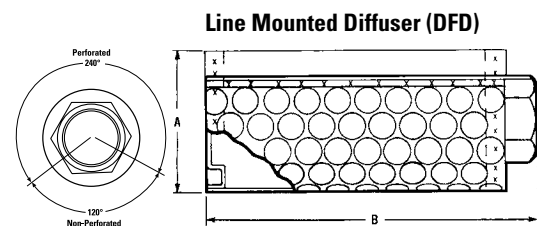


TMD - Tank Mount Diffusers

| Donaldson Part No. | Desc. | Rated Flow gpm/l/min | Dim. A Pipe Size | Dim. B Pipe Size | C (in./mm) | D (in./mm) | E (in./mm) |
|--------------------|--------|----------------------|------------------|------------------|------------|------------|------------|
| P562281 | TMD-5 | 5/19 | 1/2" NPT | 1" NPT | 5.34/135 | 1.06/28 | 1.17/29 |
| P562282 | TMD-10 | 10/38 | 3/4" NPT | 1-1/4" NPT | 8.17/207 | 1.2/30 | 1.36/34 |
| P562283 | TMD-15 | 15/59 | 1" NPT | 1-1/2" NPT | 8.2/208 | 1.22/31 | 1.66/42 |
| P562284 | TMD-25 | 25/95 | 1-1/4" NPT | 2" NPT | 9.04/229 | 1.35/34 | 2.12/53 |
| P562285 | TMD-50 | 50/189 | 2" NPT | 3" NPT | 9.7/246 | 1.7/43 | 3.0/76 |

DFD - Line Mount Diffusers

| Donaldson Part No. | Desc. | Rated Flow gpm/l/min | Pipe Size | A (in./mm) | B (in./mm) |
|--------------------|---------|----------------------|------------|------------|------------|
| P562287 | DFD-30 | 33/125 | 3/4" NPT | 3.4/86.3 | 3.0/76 |
| P562288 | DFD-60 | 53/201 | 1" NPT | 3.4/86.3 | 4.2/107 |
| P562289 | DFD-90 | 93/342 | 1-1/4" NPT | 3.4/86.3 | 6.5/165 |
| P562290 | DFD-120 | 126/479 | 1-1/2" NPT | 4.5/114.3 | 6.6/168 |
| P562291 | DFD-200 | 209/794 | 2" NPT | 4.5/114.3 | 10.3/262 |
| P562292 | DFD-250 | 300/1140 | 2-1/2" NPT | 5.25/133.4 | 13.0/330 |
| P562293 | DFD-300 | 450/1748 | 3" NPT | 5.25/133.4 | 15.5/394 |



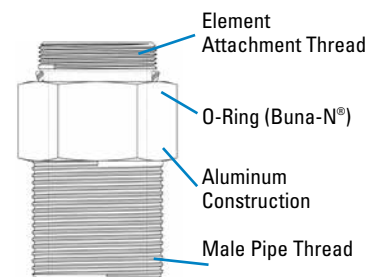
Breathers

Breathers are available in a variety of styles, materials and sizes. Breathers provide clean airflow into reservoirs and other storage containers where there is an exchange of air during changing fluid levels. In high moisture sites or applications with large changes in machine environments, breather caps with pressure relief and vacuum breakers limit air exchange and provide a positive suction head at the pump inlet.



Threaded Adapters for Creating Tank Breathers

| Donaldson Part No. | LHA Part No. | Male Pipe Thread | Element Attachment Thread | Length (in./mm) | Material |
|--------------------|--------------|------------------|---------------------------|-----------------|---------------|
| P173544 | GBF-15 | 3/4" NPT | 1"-12 UN | 2.50/64 | Aluminum |
| P173545 | GBF-50/60 | 1-1/4" NPT | 1-1/2"-16 UN | 3.00/76 | Aluminum |
| P562627 | GBF-10 | 3/4" NPT | 1-1/8"-16 UN | 1.65/42 | Steel |
| P562628 | ABGBA | Bayonet Fitting | 1-1/8"-16 UN | 1.36/35 | Technopolymer |
| P570353 | NA | Bayonet Fitting | 1-1/2"-16 UN | 2.74/70 | Technopolymer |



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Direct Replacements for Schroeder Breathers

A replacement for Schroeder part ABF-3/10 is available as a breather+adapter set. For other Schroeder replacements and as an alternative on the ABF-3/10, you may purchase adapters and spin-on filters as separate items.

| Schroeder Part No. | Donaldson Spin-On Breather + Adapter Set | Adapter | Spin-On Breather |
|--------------------|--|---------|------------------|
| ABF-3/10 | P564425 | P562627 | P564424 |
| ABF-3/10-F | NA | P562628 | P564424 |
| MBF-3-M-P20 | NA | P173545 | P550386 |
| MBF-10-M-P20 | NA | P173545 | P550388 |

Replacement for Schroeder ABF3/10

P564425 Spin-On Breather & Adapter

P564424 Spin-On Breather only

Specifications:

Diameter: 3.69" / 93.7mm

Height: 3.6" / 91mm

Threads on adaptor: 3/4"-14 NPT



Spin-On Breather Filters

| Donaldson Part No. | Use with Adapter | Micron Rating | Length (in./mm) | Diameter (in./mm) | Flow (scfm/gpm/lpm) |
|--------------------|--------------------|----------------|-----------------|-------------------|---------------------|
| P564424 | P562627 or P562628 | 10 micron nom. | 3.6/91 | 3.7/94 | 15/112/421 |
| P556005 | P562627 or P562628 | 10 micron nom. | 5.4/137 | 3.7/94 | 23/172/647 |
| P551551 | P173544 | 10 micron nom. | 5.4/137 | 3.7/94 | 23/172/647 |
| P560693 | P173544 | 10 micron abs. | 5.4/137 | 3.7/94 | 23/172/647 |
| P564357 | P173544 | 5 micron abs. | 7.9/200 | 3.7/94 | 28/216/812 |
| P179089 | P173544 | 10 micron abs. | 7.9/200 | 3.7/94 | 28/216/812 |
| P550386 | P173545 | 3 micron nom. | 6.7/170 | 5.0/127 | 35/262/985 |
| P550250 | P173545 | 3 micron nom. | 10.7/272 | 5.0/127 | 42/314/1181 |
| P167162 | P173545 | 5 micron abs. | 6.7/170 | 5.0/127 | 59/440/1654 |
| P165762 | P173545 | 5 micron abs. | 10.7/272 | 5.0/127 | 64/479/1801 |
| P550388 | P173545 | 10 micron nom. | 6.7/170 | 5.0/127 | 59/440/1654 |
| P550251 | P173545 | 10 micron nom. | 10.7/272 | 5.0/127 | 64/479/1801 |
| P165875 | P173545 | 10 micron abs. | 6.7/170 | 5.0/127 | 59/440/1654 |
| P165876 | P173545 | 10 micron abs. | 10.7/272 | 5.0/127 | 64/479/1801 |

T.R.A.P.™ Breather

Flow Rates to: 45 cfm
1270 lpm

Particulate Removal to: 3 μm

Moisture Removal: Reversible Adsorption



Features

Donaldson breathers with Thermally Reactive Advanced Protection (T.R.A.P.™) provide fast-acting protection for hydraulic reservoirs against airborne moisture and particulate contamination. Donaldson T.R.A.P. technology strip moisture vapor from intake air and expel the moisture back to the atmosphere. Moisture is prevented from entering and is actually “pumped” out with each flow cycle. T.R.A.P. media regenerates its water-holding capacity, which leads to longer service life – 3 to 4 times the life of conventional desiccant breathers.

- Electronic Indicator**
 Actuated by pressure differential, flashes red to indicate changeout is needed. Indicator setting, 1 psid/6.9 kPa. Indicator power source: 3V lithium battery CR2032.
- Mechanical Indicator Kits**
 Install kit between reservoir and T.R.A.P. breather. Lock-up style indicator with manual reset. Highly visible, bright red band shows when restriction limit is reached. Indicator setting, 20" H₂O/5.0 kPa.
- Oil Splash and Mist Containment**
 Keeps oil inside reservoir.
- Easy To Install**
 Lightweight—simply hand tighten.
- Rugged Design**
 Effective to -40°F (-40°C). Robust housing protects media. Because it withstands high vibration, T.R.A.P. is suitable for both stationary and mobile applications.

Operating Temperature

- -40°F to 200°F / -40°C to 93°C
- Intermittent operation to 250°F / 121°C

Particulate Removal Efficiency

- 3 μm at 97%

Connection Sizes

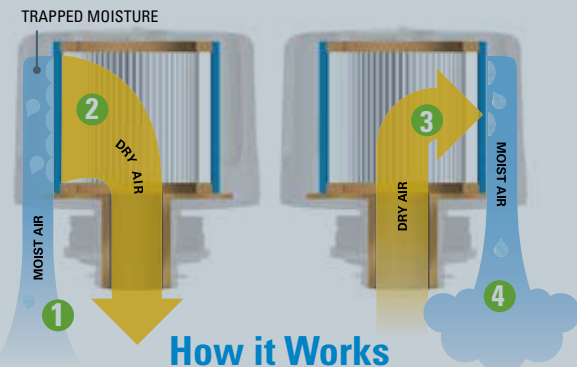
- 1" and 3/4" NPT, 3/4" BSP Bayonet
- 1/4" and 3/8" NPT, 9/16"-18UN

Flow Rates

- 45 cfm / 1274 lpm
- 25 cfm / 708 lpm
- 3 cfm / 85 lpm

Indicator Setpoint

- 1 psid / 6.9 kPa



INTAKE CYCLE (INHALATION)

- 1 The circuit “breathes in” air containing moisture vapor.
- 2 The T.R.A.P. breather strips moisture and particulate from the incoming air, allowing only clean, dry air to enter the circuit.

OUTFLOW CYCLE (EXHALATION)

- 3 During the “exhalation” cycle, the T.R.A.P. breather allows unrestricted airflow outward.
- 4 The outflow of dry air picks up the moisture collected by the T.R.A.P. breather during intake, and “blows it back out” – fully regenerating the breather’s water-holding capacity.

Self-Regenerating T.R.A.P. Breather Choices

• Refer to the FIK section for additional T.R.A.P. breather options specific to those assembly models only.

T.R.A.P. Breather Sizing

| Trap Model | Hydraulic System (gal/l) | In-plant Lube (gal/l) | Outside (gal/l) |
|------------|--------------------------|-----------------------|-----------------|
| Standard | 100/375 | 500/1875 | 250/938 |
| Metal | 40/150 | 200/750 | 100/375 |
| Mini | 4/15 | 20/75 | 10/38 |



Standard



Medium Metal



Mini

| Part No. | Connection | Maximum Flow (cfm/lpm) | Indicator | Moisture Removal |
|--|-----------------------|------------------------|----------------|-------------------|
| Standard ABS Plastic Breathers with Oil/Splash Containment | | | | |
| P566151* | 1" NPT | 45/1274 | opt mechanical | Yes indicator kit |
| P564669 | 1" NPT | 45/1274 | electronic** | Yes |
| P566156 | Bayonet | 45/1274 | none | Yes |
| P565616 | Bayonet | 45/1274 | electronic** | Yes |
| Medium Epoxy Coated Steel Breathers with Oil/Splash Containment | | | | |
| P565857* | 3/4" NPT | 25/708 | opt mechanical | Yes indicator kit |
| P565858 | Bayonet | 25/708 | none | Yes |
| P566037 | 3/4" BSP | 25/708 | none | Yes |
| P575077 | Bayonet with Lock Tab | 25/708 | none | Yes |

**LED indicators not rated for fuel.

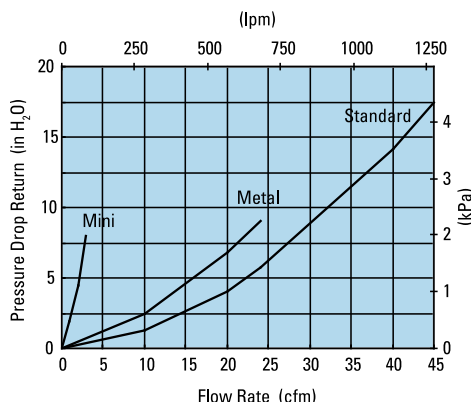
| Part No. | Connection | Maximum Flow (cfm/lpm) | Indicator | Moisture Removal |
|---|--------------|------------------------|-----------|------------------|
| Mini Nylon Breathers with Oil/Splash Containment | | | | |
| P566174 | 9/16"-18 UNF | 3/85 | none | Yes |
| P567390 | 3/8" NPT | 3/85 | none | Yes |
| P567392 | 1/4" NPT | 3/85 | none | Yes |

| Part No. | Connection | Maximum Flow (cfm/lpm) | Indicator | Moisture Removal |
|--|------------|------------------------|-----------|------------------|
| Mini Particulate Only Breathers with Oil Splash Containment | | | | |
| P567932 | 3/8" NPT | 3/85 | none | No |
| P567933 | 1/4" NPT | 3/85 | none | No |

| Part No. | Connection | Indicator |
|--|-----------------|--------------------------|
| *Mechanical Indicator Kit - For use with P566151 & P565857 (*requires customer-supplied 3/4"x1" NPT reducer bushing) | | |
| P566168 | 1" NPT coupling | 20" H2O/5 kPa trip point |

| Part No. | Description | Connection |
|---|---|-------------------------|
| Bayonet Style Filler Basket - For use with bayonet style T.R.A.P. Breathers | | |
| P566321 | 3" Stainless steel basket | 6-bolt 2.81/71.4 circle |
| P575080 | 6" Stainless steel basket with Lock Tab | 6-bolt 2.81/71.4 circle |
| P563874 | 4" Nylon Basket | 6-bolt 2.81/71.4 circle |
| P563453 | 6" Stainless steel basket | 6-bolt 2.81/71.4 circle |
| P570353 | Bayonet Breather Adaptor | 6-bolt 2.74/69.6 circle |

T.R.A.P. Performance Data



Activation Instructions for T.R.A.P. Breathers with Electronic Indicator

The T.R.A.P. breather has a service indicator that will indicate when it is time to replace the T.R.A.P. This indicator should be activated before the T.R.A.P. is put into service. Before the T.R.A.P. is activated, it is in a sleep mode to conserve the battery. The T.R.A.P. can remain in a sleep mode for over 6 months without detriment to the battery. While in sleep mode, the LED light will not flash until it is activated.

Activation

- 1 Remove the T.R.A.P. from the box and turn it upside down - with the neck and thread up.
- 2 Using a forefinger, insert into the neck of the T.R.A.P. and press on the plastic screen until the LED light begins to flash. The light will flash three times with a shortflash followed by a long flash and then another short flash.
- 3 Release pressure from the switch immediately after the light begins flashing.

The T.R.A.P. is now activated.

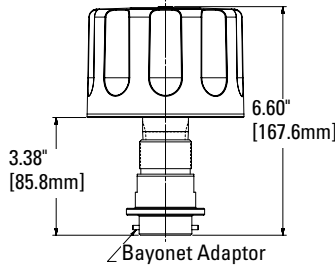
Replacement

Replace T.R.A.P. with a new one when the light begins to blink.

T.R.A.P.™ Breather Specifications

Standard **P565616** (electronic indicator) Bayonet connection
P566156 (no indicator version) Bayonet connection

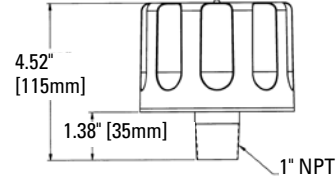
Bayonet connection



Top View

Ø4.50" [114mm]

P564669 (optional mechanical) 1" NPT connection
P566151 (no indicator version) 1" NPT connection

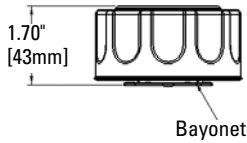


Metal **P565858**
Bayonet connection

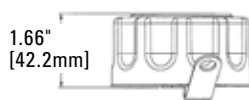
P575077 Bayonet connection with Lock Tab
P570353 Bayonet Breather Adaptor

P565857 (3/4" NPT connection, optional mechanical indicator)

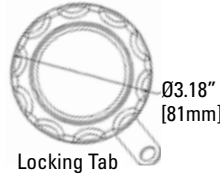
P566037 (3/4" BSP connection)



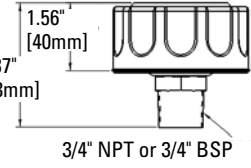
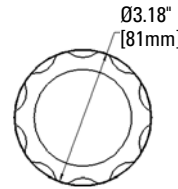
Bayonet



Top View

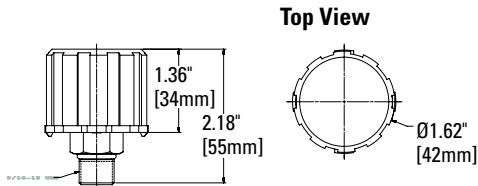


Locking Tab



3/4" NPT or 3/4" BSP

Mini **P566174** 9/16-18 UNF
P567390 3/8" NPT
P567392 1/4" NPT



Top View

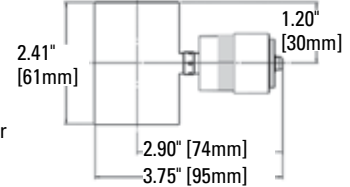
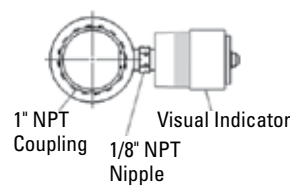
Mechanical Indicator Kit

P566168

Suitable for use with **P566151** and **P565857***

*Requires additional 3/4" x 1" reducer bushing (supplied by customer)

Top View



Bayonet Style Filler Basket/Flange Kits

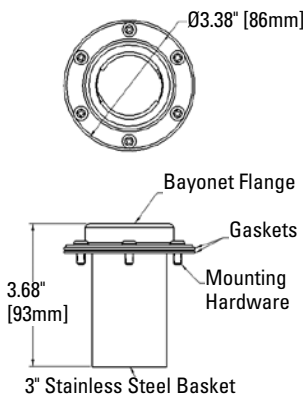
Use with any bayonet style T.R.A.P. Breather

P566321

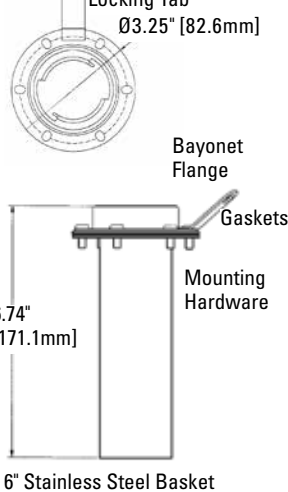
P575080

P563874

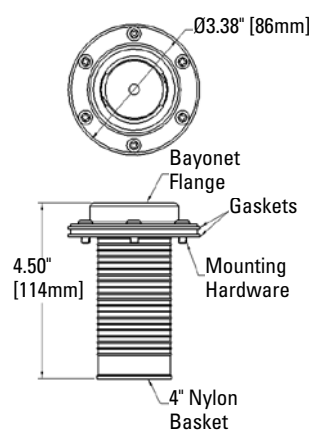
P563453



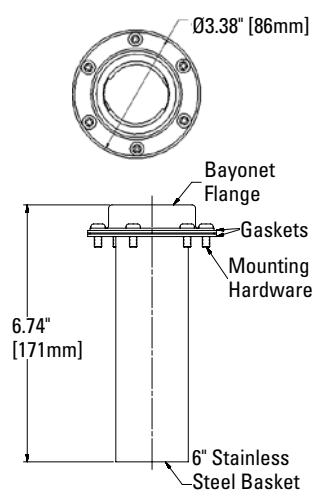
3" Stainless Steel Basket



6" Stainless Steel Basket



4" Nylon Basket



6" Stainless Steel Basket

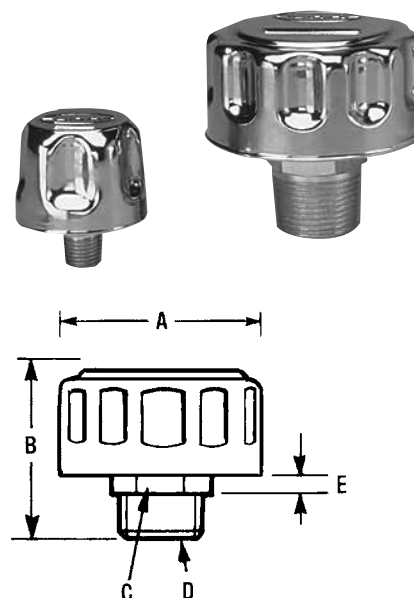
ABS, MBS Series

Specifications

- Chrome plated, epoxy coated or zinc plated steel cap
- Airflow to 30 cfm/850 lpm
- Compatible with petroleum based fluids
- Temperature to 212°F / 100°C
- 1/2", 3/4" and 1" NPT on ABS
- 1/4" and 3/8" NPT on MBS

Options

- 3, 10 and 40 micron (ABS),
10 and 40 micron (MBS)
- Zinc and epoxy coated weather-proof cap versions



| Donaldson Part No. | Reference | Micron Rating | Airflow Capacity (cfm/lpm) | A (in./mm) | B (in./mm) | C (in./mm) | D | E (in./mm) | Finish |
|--------------------|--------------|---------------|----------------------------|------------|------------|------------|----------|------------|--------------------|
| P562510 | MBS-10-N04 | 10 µm | 10/283 | 1.85/47 | 2.0/51 | .75/19 | 1/4" NPT | .2/5 | Chrome Plated |
| P562511 | MBS-10-N06 | 10 µm | 10/283 | 1.85/47 | 2.0/51 | .75/19 | 3/8" NPT | .2/5 | Chrome Plated |
| P562512 | MBS-40-N04 | 40 µm | 10/283 | 1.85/47 | 2.0/51 | .75/19 | 1/4" NPT | .2/5 | Chrome Plated |
| P562514 | MBS-40-N06 | 40 µm | 10/283 | 1.85/47 | 2.0/51 | .75/19 | 3/8" NPT | .2/5 | Chrome Plated |
| P562516 | MBS-Z-10-N06 | 10 µm | 10/283 | 1.85/47 | 2.0/51 | .75/19 | 3/8" NPT | .2/5 | Zinc Plated |
| P562517 | ABS-03-N12 | 3 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" NPT | .5/13 | Chrome Plated |
| P562518 | ABS-10-B12 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" BSP | .5/13 | Chrome Plated |
| P562519 | ABS-10-N08 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1/2" NPT | .5/13 | Chrome Plated |
| P562520 | ABS-10-N12 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" NPT | .5/13 | Chrome Plated |
| P562521 | ABS-10-N16 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1" NPT | .5/13 | Chrome Plated |
| P562522 | ABS-40-N08 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1/2" NPT | .5/13 | Chrome Plated |
| P562523 | ABS-40-N12 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" NPT | .5/13 | Chrome Plated |
| P562524 | ABS-40-N16 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1" NPT | .5/13 | Chrome Plated |
| P562525 | ABS-W-03-N12 | 3 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" NPT | .5/13 | Epoxy Coated Black |
| P562526 | ABS-W-10-N08 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1/2" NPT | .5/13 | Epoxy Coated Black |
| P562527 | ABS-W-10-N12 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" NPT | .5/13 | Epoxy Coated Black |
| P562528 | ABS-W-10-N16 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1" NPT | .5/13 | Epoxy Coated Black |
| P563901 | ABS-W-40-B12 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" BSP | .5/13 | Epoxy Coated Black |
| P562529 | ABS-W-40-N12 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" NPT | .5/13 | Epoxy Coated Black |
| P562530 | ABS-W-40-N16 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1" NPT | .5/13 | Epoxy Coated Black |
| P562531 | ABS-Z-10-N16 | 10 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1" NPT | .5/13 | Zinc Plated |
| P562532 | ABS-Z-40-N08 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 1/2" NPT | .5/13 | Zinc Plated |
| P562533 | ABS-Z-40-N12 | 40 µm | 30/850 | 3.15/80 | 2.8/71 | 1.18/30 | 3/4" NPT | .5/13 | Zinc Plated |

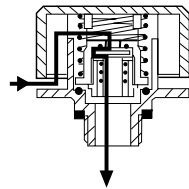
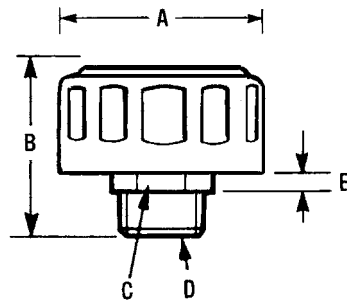
PBS Series Pressure Filler Breather Cap - Screw In Style

Specifications

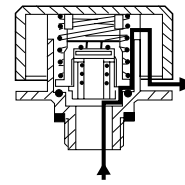
- Chrome plated or epoxy coated steel cap
- Air intake valve opens at 0.435 psi/3 kPa
- Compatible with petroleum based fluids
- Temperature range: -22°F to +240°F / -30°C to 115°C
- Buna-N® gaskets standard
- 10 and 40 micron available
- Relief valve settings at 5 psi / 0.34 bar or 10 psi / 0.69 bar full rate flow



Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

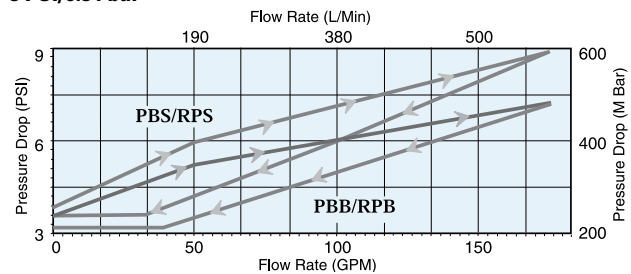


Air intake in the reservoir through vacuum breaker when pressure decreases (.435 psi)

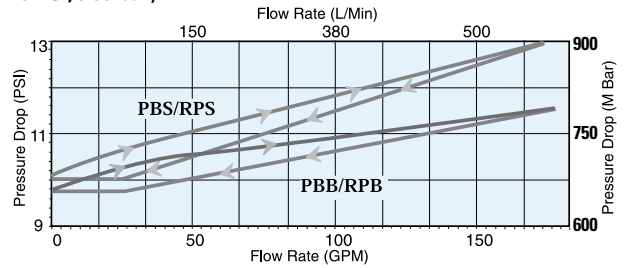


Venting to atmosphere through relief valve to maintain a 5 or 10 psi full rated flow

5 PSI/0.34 bar



10 PSI/0.69 bar



| Donaldson Part No. | Description | Micron Rating | Airflow Capacity (cfm/lpm) | Relief Valve Setting (psi/bar) | Dimensions (in./mm) | | | | | Finish |
|--------------------|-----------------|---------------|----------------------------|--------------------------------|---------------------|----------|-----------|----------|---------|--------------------|
| | | | | | Dim. A | Dim. B | Dim. C | Dim. D | Dim. E | |
| P563362 | PBS-10-10-N12 | 10 µm | 30/850 | 10/0.69 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 3/4" NPT | .5 / 13 | Chrome Plated |
| P563363 | PBS-10-10-N16 | 10 µm | 30/850 | 10/0.69 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 1" NPT | .5 / 13 | Chrome Plated |
| P563365 | PBS-10-5-N12 | 10 µm | 30/850 | 5/0.34 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 3/4" NPT | .5 / 13 | Chrome Plated |
| P563366 | PBS-10-5-N16 | 10 µm | 30/850 | 5/0.34 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 1" NPT | .5 / 13 | Chrome Plated |
| P563367 | PBS-40-10-N12 | 40 µm | 30/850 | 10/0.69 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 3/4" NPT | .5 / 13 | Chrome Plated |
| P563368 | PBS-40-5-N12 | 40 µm | 30/850 | 5/0.34 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 3/4" NPT | .5 / 13 | Chrome Plated |
| P563369 | PBS-40-5-N16 | 40 µm | 30/850 | 5/0.34 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 1" NPT | .5 / 13 | Chrome Plated |
| P563370 | PBS-W-10-5-N12 | 10 µm | 30/850 | 5/0.34 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 3/4" NPT | .5 / 13 | Epoxy Coated Black |
| P563371 | PBS-W-40-10-N12 | 40 µm | 30/850 | 10/0.69 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 3/4" NPT | .5 / 13 | Epoxy Coated Black |
| P563372 | PBS-W-40-5-N12 | 40 µm | 30/850 | 5/0.34 | 3.15 / 80 | 2.8 / 71 | 1.18 / 30 | 3/4" NPT | .5 / 13 | Epoxy Coated Black |

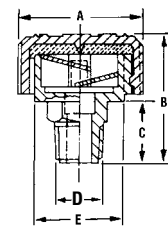
Filler Breather Caps

Specifications

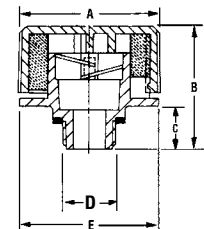
- High impact-resistant technopolymer construction
- Cap diameters 1.22"/31mm, 1.65"/42 mm, 2.24"/57 mm and 2.75"/70 mm
- Compatible with petroleum and water based fluids
- Temperature range
-22°F to +240°F / -30°C to +115°C
- Displacements to 250 gpm/9461 lpm without baffle
- Displacements to 144 gpm/547 lpm with anti-splash baffle



CPS / DPS / LPS



BPS / RPS

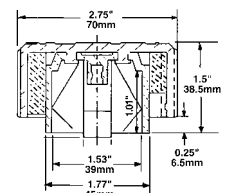


| Donaldson Part No. | Description* | Micron Rating | Airflow Capacity (cfm/lpm) | Relief Valve Setting (psi/bar) | Dimensions (in./mm) | | | | |
|--------------------|--------------|---------------|----------------------------|--------------------------------|---------------------|---------|--------|----------|---------|
| | | | | | Dim. A | Dim. B | Dim. C | Dim. D | Dim. E |
| P562494 | DPS-40-N04 | 40 µm | 4.9/139 | n/a | 1.65/42 | 2.05/52 | .71/18 | 1/4" NPT | 1.2/30 |
| P562495 | DPS-40-N04-A | 40 µm | 2.1/59 | n/a | 1.65/42 | 2.05/52 | .71/18 | 1/4" NPT | 1.2/30 |
| P563614 | DPS-40-N06 | 40 µm | 11.7/331 | n/a | 1.65/42 | 2.05/52 | .71/18 | 3/8" NPT | 1.2/30 |
| P562497 | DPS-40-N06-A | 40 µm | 5/142 | n/a | 1.65/42 | 2.05/52 | .71/18 | 3/8" NPT | 1.2/30 |
| P562502 | DPS-40-N12 | 40 µm | 12.5/354 | n/a | 1.65/42 | 2.05/52 | .71/18 | 3/4" NPT | 1.2/30 |
| P562503 | DPS-40-N12-A | 40 µm | 5.4/153 | n/a | 1.65/42 | 2.05/52 | .71/18 | 3/4" NPT | 1.2/30 |
| P562483 | CPS-40-N12 | 40 µm | 27/765 | n/a | 2.24/57 | 1.85/47 | .87/22 | 3/4" NPT | 1.53/39 |
| P562484 | CPS-40-N12-A | 40 µm | 13.5/382 | n/a | 2.24/57 | 1.85/47 | .87/22 | 3/4" NPT | 1.53/39 |
| P562480 | BPS-10-N12-A | 10 µm | 19.3/547 | n/a | 2.75/70 | 2.48/63 | .83/21 | 3/4" NPT | 2.68/68 |
| P562481 | BPS-40-N12 | 40 µm | 33.4/946 | n/a | 2.75/70 | 2.48/63 | .83/21 | 3/4" NPT | 2.68/68 |
| P562482 | BPS-40-N12-A | 40 µm | 19.3/547 | n/a | 2.75/70 | 2.48/63 | .83/21 | 3/4" NPT | 2.68/68 |
| P562492 | RPS-40-5-N12 | 40 µm | 30/850 | 5/0.34 | 2.75/70 | 2.48/63 | .83/21 | 3/4" NPT | 2.68/68 |

* -A = anti-splash

| Donaldson Part No. | Desc. | Micron Rating | Airflow Capacity (cfm/lpm) | Dimensions (in./mm) | | | | Comment |
|--------------------|--------|---------------|----------------------------|---------------------|--------|--------|---------|-------------------------|
| | | | | Dim. A | Dim. B | Dim. C | Dim. D | |
| P562476 | ABO-10 | 10 µm | 30/850 | 2.75/70 | 1.5/39 | .25/7 | 1.77/45 | Fits over 1.50" OD tube |
| P562477 | ABO-40 | 40 µm | 30/850 | 2.75/70 | 1.5/39 | .25/7 | 1.77/45 | Fits over 1.50" OD tube |

ABO



Filler Breather Assemblies

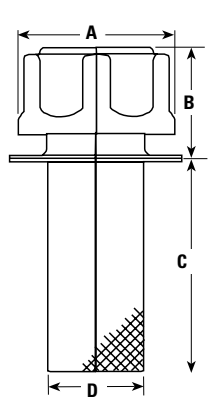
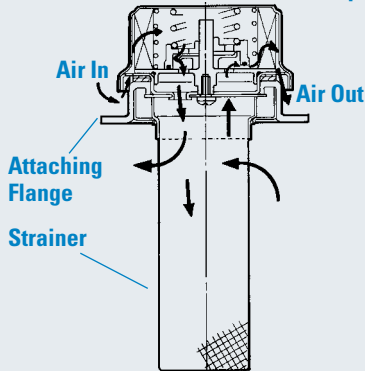
Features

- Removable 500 µm mesh strainer. (Except model P171848, which has a non-removable strainer.)
- 10 µm air breather/filter.
- Models P171855 & P171848 include drilled flanges with attaching screws.

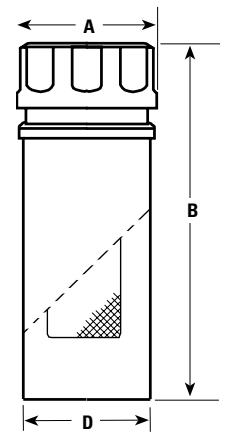
How it Works

As fluid levels rise and fall inside the reservoir, air flows in and out through the strainer and breather as shown below. The breather filter inside the cap removes contaminants as small as 10 µm from the air to keep airborne contaminant from entering the fluid. The strainer removes large particles from fluid as it is added to the reservoir.

Breather Filter is inside cap



P171848
P171855
P171856



P171859
P171860

Filler Breather Specifications

| Part No. | Outer Dia. (in./mm) | FLANGE SPECIFICATIONS | | | Flow (gpm/lpm) | FILLER BREATHER SPECIFICATIONS | | | |
|-----------|---------------------|-----------------------|--------------------|-------------|----------------|--------------------------------|----------|----------|---------|
| | | No. of Holes | Hole Dia. (in./mm) | Bolt Circle | | A | B | C | D |
| P171848 | 2.01/51 | 3 | .22/5.5 | 1.61/41 | 70/270 | 1.81/45 | 1.38/35 | 2.48/63 | 1.1/28 |
| P171855 | 3.31/84 | 6 | .22/5.5 | 2.88/73 | 124/470 | 2.76/70 | 1.81/46 | 3.94/100 | 1.5/38 |
| P171856 | 3.31/84 | n/a | n/a | | 124/470 | 2.76/70 | 1.81/46 | 3.94/100 | 1.15/38 |
| P171859 | | n/a - weldable | | | 124/470 | 2.76/70 | 7.09/180 | 2.50/64 | |
| P171860 * | | n/a - weldable | | | 124/470 | 2.76/70 | 7.09/180 | 2.50/64 | |

* For pressurized reservoirs at 5.8 psi/0.4 bar relief pressure.

Filler Cap Only (Replacement)

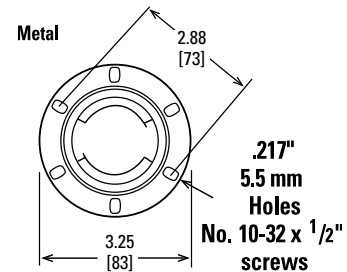
P173292 --- fits P171855, P171856, P171859

P173364 for pressurized reservoir --- fits P171860

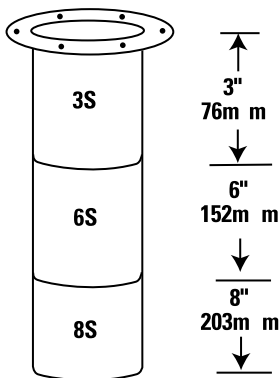
ABB Series Filler Breathers - Bayonet Style

Specifications

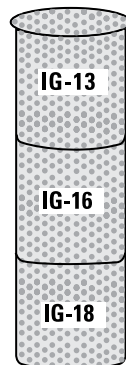
- Chrome plated, epoxy coated or zinc plated steel caps
- Airflow to 30 cfm/850 lpm
- Compatible with petroleum based fluids
- 30 mesh technopolymer basket
- Self tapping screws for flange mount
- Cork gaskets
- 3, 10, or 40 micron



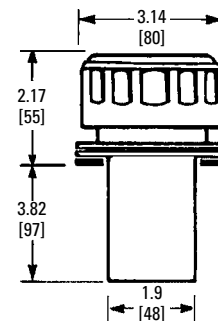
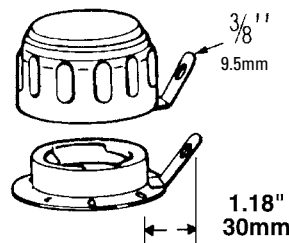
30 MESH STAINLESS STEEL BASKETS



INNER GUARDS



LOCKING TABS (AB ONLY)

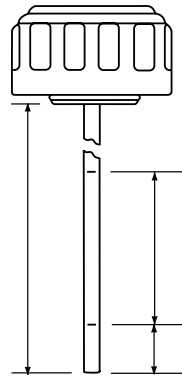
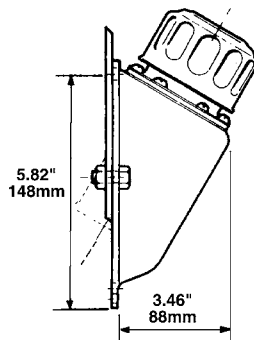


| Donaldson Part No. | Reference | Features | Micron Rating | Finish |
|--------------------|----------------|----------------------------------|---------------|---------------------|
| P562610 | ABB-W-03-8S-IG | 8" STAINLESS BASKET, INNER GUARD | 3 µm | Epoxy Coated, Black |
| P562611 | ABB-W-10-3S | 3" STAINLESS BASKET | 10 µm | Epoxy Coated, Black |
| P562612 | ABB-W-10-3S-LT | 3" STAINLESS BASKET, LOCK TAB | 10 µm | Epoxy Coated, Black |
| P562614 | ABB-W-10-N | NYLON BASKET | 10 µm | Epoxy Coated, Black |
| P562616 | ABB-W-10-N-R | NYLON BASKET, BUNA-N® GASKET | 10 µm | Epoxy Coated, Black |
| P562618 | ABB-W-40-3S | 3" STAINLESS BASKET | 40 µm | Epoxy Coated, Black |
| P562619 | ABB-W-40-6S | 6" STAINLESS BASKET | 40 µm | Epoxy Coated, Black |
| P562620 | ABB-W-40-N | NYLON BASKET | 40 µm | Epoxy Coated, Black |
| P562623 | ABB-Z-40-3S | 3" STAINLESS BASKET | 40 µm | Zinc Plated |
| P562624 | ABB-Z-40-3S-LT | 3" STAINLESS BASKET, LOCK TAB | 40 µm | Zinc Plated |
| P562625 | ABB-Z-40-N | NYLON BASKET | 40 µm | Zinc Plated |
| P562626 | ABB-Z-40-N-R | NYLON BASKET, BUNA-N GASKET | 40 µm | Zinc Plated |

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

Side Mount

P563609 Side Mount Kit
Can be used with all Bayonet and Threaded Flange Breathers (except MBB & Pressurized Breathers). Maximum torque for fastening 112 in. lbs. with washers.



Dipsticks available for some models. See Features section on assembly tables.

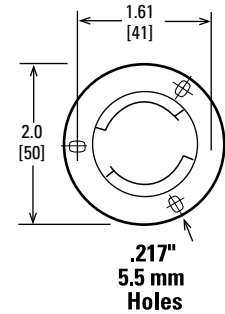
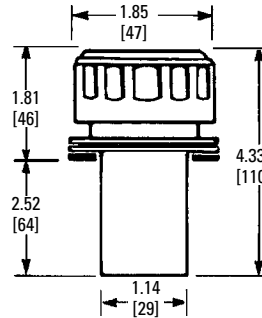
Chrome ABB Series Filler Breathers - Bayonet Style

Airflow to 30 cfm/850 lpm

| Donaldson Part No. | Description | Features | Micron Rating |
|--------------------|----------------|--|---------------|
| P562573 | ABB-03-N | NYLON BASKET | 3 µm |
| P562574 | ABB-10 | FLANGE, SCREWS & GASKET, NO BASKET | 10 µm |
| P562575 | ABB-10-3S | 3" STAINLESS BASKET | 10 µm |
| P562576 | ABB-10-3S-LT | 3" STAINLESS BASKET, LOCK TAB | 10 µm |
| P562577 | ABB-10-3S-R | 3" STAINLESS BASKET, BUNA-N GASKET | 10 µm |
| P562578 | ABB-10-3S-SMB | 3" STAINLESS BASKET, SIDE MOUNT KIT | 10 µm |
| P562579 | ABB-10-6S | 6" STAINLESS BASKET | 10 µm |
| P562580 | ABB-10-6S-LT | 6" STAINLESS BASKET, LOCK TAB | 10 µm |
| P562581 | ABB-10-6S-R | 6" STAINLESS BASKET, BUNA-N GASKET | 10 µm |
| P562582 | ABB-10-8S | 8" STAINLESS BASKET | 10 µm |
| P562583 | ABB-10-8S-D-IG | 8" STAINLESS BASKET, DIPSTICK, INNER GUARD | 10 µm |
| P562584 | ABB-10-N | NYLON BASKET | 10 µm |
| P562585 | ABB-10-N-LT | NYLON BASKET, LOCK TAB | 10 µm |
| P562587 | ABB-10-N-R | NYLON BASKET, BUNA-N GASKET | 10 µm |
| P562589 | ABB-40 | FLANGE, SCREWS & GASKET, NO BASKET | 40 µm |
| P562590 | ABB-40-3S | 3" STAINLESS BASKET | 40 µm |
| P562592 | ABB-40-3S-R | 3" STAINLESS BASKET, BUNA-N GASKET | 40 µm |
| P562593 | ABB-40-3S-SMB | 3" STAINLESS BASKET, SIDE MOUNT KIT | 40 µm |
| P562594 | ABB-40-6S | 6" STAINLESS BASKET | 40 µm |
| P562595 | ABB-40-6S-D | 6" STAINLESS BASKET, DIPSTICK | 40 µm |
| P562596 | ABB-40-6S-LT | 6" STAINLESS BASKET, LOCK TAB | 40 µm |
| P562598 | ABB-40-8S | 8" STAINLESS BASKET | 40 µm |
| P562599 | ABB-40-8S-D | 8" STAINLESS BASKET, DIPSTICK | 40 µm |
| P562600 | ABB-40-8S-LT | 8" STAINLESS BASKET, LOCK TAB | 40 µm |
| P562601 | ABB-40-CWOF | CAP ONLY | 40 µm |
| P562602 | ABB-40-LT | LOCK TAB, NO BASKET | 40 µm |
| P562603 | ABB-40-N | NYLON BASKET | 40 µm |
| P562605 | ABB-40-N-LT | NYLON BASKET, LOCK TAB | 40 µm |
| P562608 | ABB-40-N-R | NYLON BASKET, BUNA-N GASKET | 40 µm |
| P562609 | ABB-40-N-SMB | NYLON BASKET, SIDE MOUNT KIT | 40 µm |

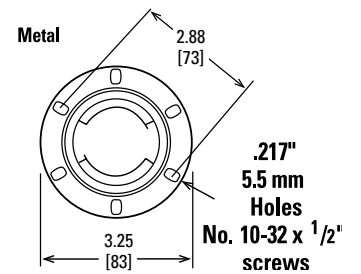
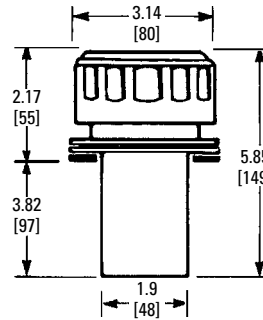
Mini Filler Breather

| Donaldson Part No. | Description | Micron Rating | Airflow Capacity (cfm/lpm) | Finish |
|--------------------|-------------|---------------|----------------------------|--------|
| P562561 | MBB-10-N | 10 μ m | 10/283 | Chrome |
| P562562 | MBB-40-N | 40 μ m | 10/283 | Chrome |



Non-Vent Filler Cap, Bayonet

| Donaldson Part No. | Description | Feature | Finish |
|--------------------|-------------|---------------------------------------|---------------------|
| P562563 | NVB-00-3S | FILLER CAP ASSY W/3" STAINLESS BASKET | Chrome |
| P562564 | NVB-00-N | FILLER CAP ASSY W/ NYLON BASKET | Chrome |
| P562565 | NVB-W-00-8S | FILLER CAP ASSY W/8" STAINLESS BASKET | Epoxy coated, Black |



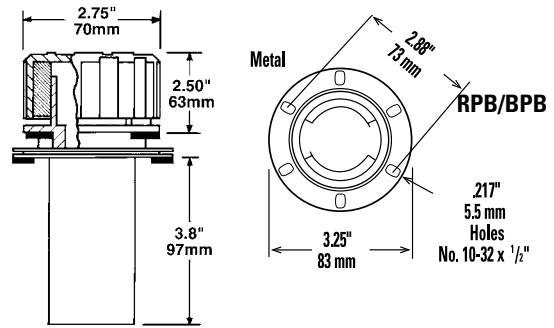
Filler Breathers

Specifications

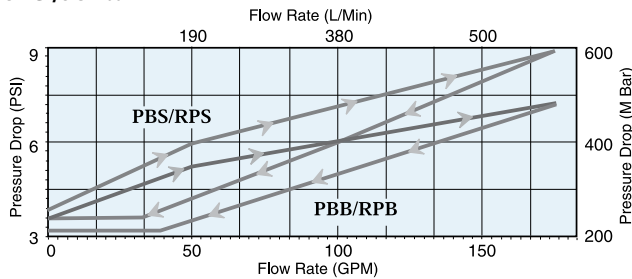
- High impact black technopolymer
- Temperature range
-22°F to +240°F / -30°C to +115 °C
- 2.75" diameter cap
- Available with bayonet or threaded flange
- Airflow to 30 cfm/850 lpm
- Compatible with petroleum and water based fluids
- 30 mesh technopolymer basket

Options

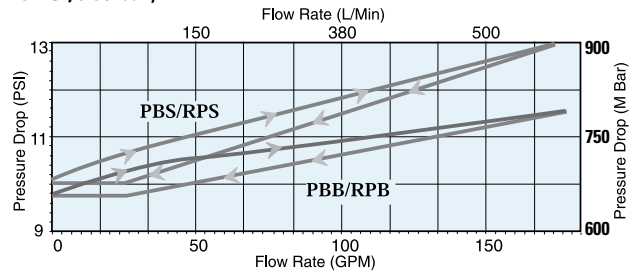
- Dipstick
3"/76 mm, 6"/152 mm and 8"/ 203 mm stainless steel baskets



5 PSI/0.34 bar



10 PSI/0.69 bar



Bayonet Style (RPB) (BPB)

| Donaldson Part No. | Description | Feature | Micron Rating | Airflow Capacity (cfm/lpm) | Relief Valve Setting (psi/bar) |
|--------------------|-------------------|-----------------------------|---------------|----------------------------|--------------------------------|
| P562554 | RPB-40-5-3S | 3" STAINLESS BASKET | 40 μm | 30/850 | 5/0.34 |
| P562555 | RPB-40-5-6S | 6" STAINLESS BASKET | 40 μm | 30/850 | 5/0.34 |
| P562556 | RPB-40-5-N | NYLON BASKET | 40 μm | 30/850 | 5/0.34 |
| P562534 | BPB-10-A CAP ONLY | BREATHER CAP | 10 μm | 30/850 | N/A |
| P562536 | BPB-10-N-A | BREATHER | 10 μm | 30/850 | N/A |
| P563813 | BPB-40 CAP ONLY | BREATHER CAP | 40 μm | 30/850 | N/A |
| P562537 | BPB-40-3S | BREATHER W/3" STEEL BASKET | 40 μm | 30/850 | N/A |
| P562538 | BPB-40-3S-A | BREATHER | 40 μm | 30/850 | N/A |
| P562539 | BPB-40-6S-D | FILLER BREATHER W/DIP STICK | 40 μm | 30/850 | N/A |
| P562541 | BPB-40-N | BREATHER | 40 μm | 30/850 | N/A |
| P562542 | BPB-40-N-A | BREATHER | 40 μm | 30/850 | N/A |
| P562544 | BPB-40-N-SMB | BREATHER W/SIDE MOUNT KIT | 40 μm | 30/850 | N/A |

PBB Series Pressure Filler Breather Cap - Bayonet Style

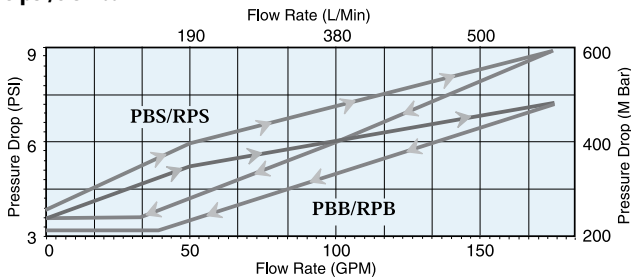
Specifications

- Chrome plated, epoxy coated or zinc plated steel cap
- Air intake valve opens at 0.435 psi/3 kPa
- Compatible with petroleum based fluids
- Temperature range
-22°F to +240°F / -30°C to 115°C
- Buna-N® gaskets standard
- 10 and 40 micron available
- Relief valve settings at 5 or 10 psi/0.34 or 0.69 bar full rate flow

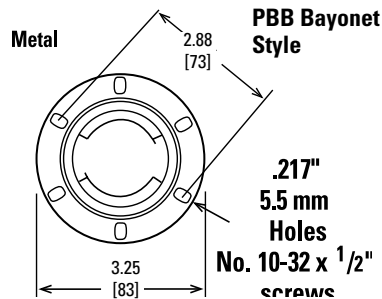
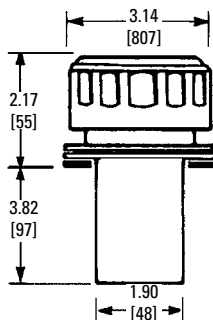
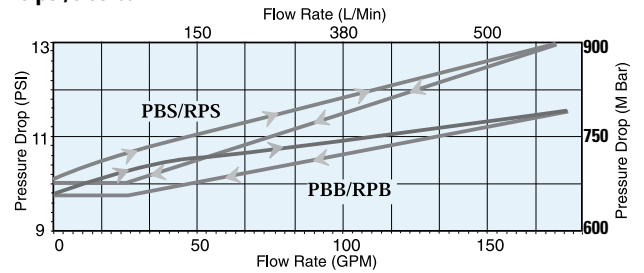


Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

5 psi/0.34 bar



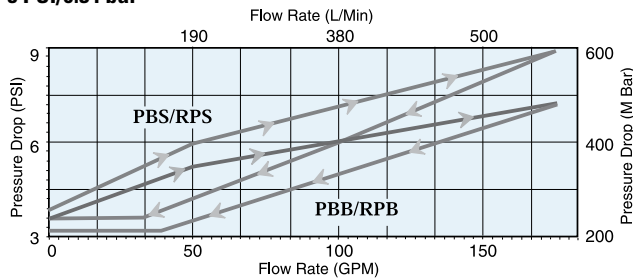
10 psi/0.69 bar



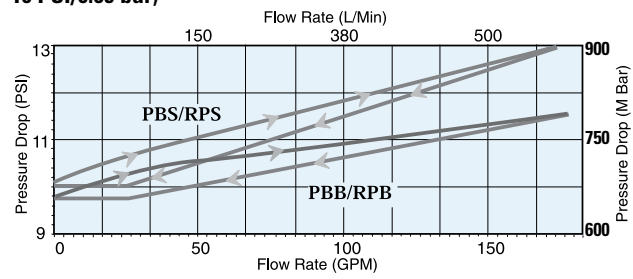
PBB Series Pressure Filler Breather Cap - Bayonet Style

| Donaldson Part No. | Description | Feature | Micron Rating | Airflow Capacity (cfm/lpm) | Relief Valve Setting (psi/mm) | Finish |
|--------------------|-----------------|------------------------------------|---------------|----------------------------|-------------------------------|---------------------|
| P563346 | PBB-10-5-3S | 3" STAINLESS BASKET | 10 µm | 30/850 | 5/0.34 | Chrome |
| P563347 | PBB-10-5-6S | 6" STAINLESS BASKET | 10 µm | 30/850 | 5/0.34 | Chrome |
| P563348 | PBB-10-5-N | NYLON BASKET | 10 µm | 30/850 | 5/0.34 | Chrome |
| P563349 | PBB-10-5-N-LT | NYLON BASKET, LOCK TAB | 10 µm | 30/850 | 5/0.34 | Chrome |
| P563350 | PBB-40-10-N | NYLON BASKET | 40 µm | 30/850 | 10/0.69 | Chrome |
| P563351 | PBB-40-5 | FLANGE, SCREWS & GASKET, NO BASKET | 40 µm | 30/850 | 5/0.34 | Chrome |
| P563352 | PBB-40-5-3S | 3" STAINLESS BASKET | 40 µm | 30/850 | 5/0.34 | Chrome |
| P563353 | PBB-40-5-6S | 6" STAINLESS BASKET | 40 µm | 30/850 | 5/0.34 | Chrome |
| P563354 | PBB-40-5-8S | 8" STAINLESS BASKET | 40 µm | 30/850 | 5/0.34 | Chrome |
| P563355 | PBB-40-5-N | NYLON BASKET | 40 µm | 30/850 | 5/0.34 | Chrome |
| P563356 | PBB-W-10-5-N | NYLON BASKET | 10 µm | 30/850 | 5/0.34 | Epoxy Coated, Black |
| P563357 | PBB-W-10-5-N-LT | NYLON BASKET, LOCK TAB | 10 µm | 30/850 | 5/0.34 | Epoxy Coated, Black |
| P563358 | PBB-W-40-5-3S | 3" STAINLESS BASKET | 40 µm | 30/850 | 5/0.34 | Epoxy Coated, Black |
| P563361 | PBB-Z-10-5-N | NYLON BASKET | 10 µm | 30/850 | 5/0.34 | Zinc Plated |
| P563326 | | 3" STAINLESS BASKET ONLY | | | | |
| P563465 | | 6" STAINLESS BASKET ONLY | | | | |
| P563466 | | 8" STAINLESS BASKET ONLY | | | | |
| P563322 | | 4" NYLON BASKET ONLY | | | | |

5 PSI/0.34 bar

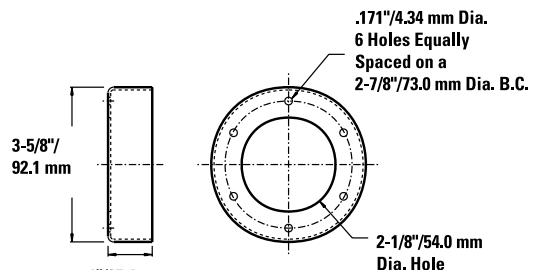


10 PSI/0.69 bar



Weld Risers for Filler Breathers

| Donaldson Part No. | Description | Height (in./mm) |
|--------------------|-------------|-----------------|
| P562668 | WR-5565 | 1/25.4 |



- Steel stamped construction
- Predrilled holes align with standard breather tank flanges
- Provides for easy installation of filler breathers

Reservoir Air Dryer

Water/moisture in fluid tanks and reservoirs is a big problem. It creates corrosion, pump cavitation, viscosity changes, additive dropout, oxidation and a host of other major system issues. Our new Reservoir Air Dryer removes damaging water, while eliminating the need to continually replace conventional desiccant breathers, or to dry fluids with vacuum dehydration units.

How it works. The Reservoir Air Dryer combats ambient ingress of moisture by introducing a steady flow of clean, dry air to the reservoir/tank. This flow of air keeps the relative humidity low in the headspace, driving moisture from the fluids and preventing condensation.

Easy Installation. With no electrical hookups, installation is easy. Just connect compressed air to the inlet and the outlet to the top of the reservoir. A coalescing pre-filter (the only part that needs servicing – takes seconds to replace) and outlet regulator are pre-installed.

Don't Forget The T.R.A.P.[™]. When you combine the Reservoir Air Dryer with a T.R.A.P. Breather – the complete system keeps moisture and contamination out, even if fluid flow rate out of the tank surpasses the Reservoir Air Dryer flow rate into the tank. The Reservoir Air Dryer also regenerates the T.R.A.P. Breather, increasing life and reducing the total cost of ownership.

If you've got a water problem in your reservoirs or storage tanks, or would like to prevent moisture from entering your system, contact your Donaldson distributor or representative for a complete site audit or for more information.



Reservoir Air Dryer

Features

- Designed to operate with Standard Plant Air — instrument quality air is not required!
- Submicron Coalescing Air Filter — collects oil and water droplets and fine particles present in the inlet air.
- Automatic Drain — purges captured liquid. No intervention required
- Visual Indicator — monitors filter condition
- Membrane Air Dryer — reduces the plant air dew point by as much as 150°F (66°C)
- Pressure Regulator — depressurizes the air and ensures that the proper volume of air is introduced into the reservoir
- The Clean Dry Air Sweep dehydrates the reservoir headspace and removes dissolved moisture from exposed oils and fuels*



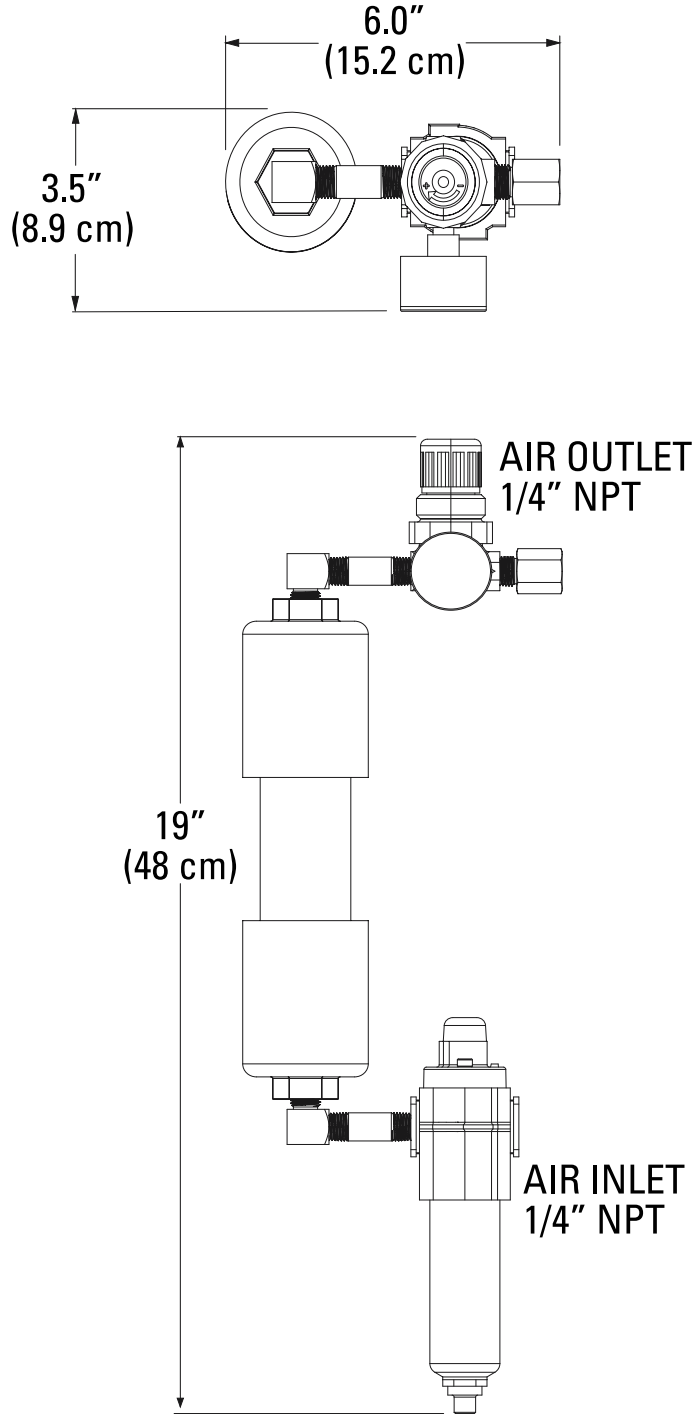
*The Reservoir Air Dryer is not recommended for use on gasoline holding tanks, or for the head space of any flammable liquid (Flash Point below 100°F / 38°C)

P575852 Reservoir Air Dryer Specifications

| | |
|---|--|
| Efficiency | Reduces dew point as much as 150°F (66°C)* |
| Fluid Compatibility | Petroleum and Phosphate Ester Fluids, Diesel Fuels |
| Outlet Flow Volume @100 psi and dew point suppression | 0.5 scfm (14.2 slpm) maximum |
| Inlet Air required @ 100 psi | 0.8 scfm (22.7 slpm) maximum |
| Inlet/Outlet | ¼" NPT |
| Pre-Filter Condition | Visual Indicator (Green/Red) |
| Pressure Regulator | Dial Gauge |
| Drain Plug | ¼" NPT |
| Coalescer Drain | Automatic Float Type |
| Electrical | N/A |
| Max Working Pressure | 116 psi (800 kPa / 8.00 bar) |
| Max Operating Temperature | 125°F (52°C) |
| Mounting Bracket | 3/8" - 16 UN Threaded Nut |
| Weight | <5 lbs (<3kgs) |

*The Reservoir Air Dryer is not recommended for use on gasoline holding tanks, or for the head space of any flammable liquid (Flash Point below 100°F / 38°C)

Reservoir Air Dryer



Sight Glasses

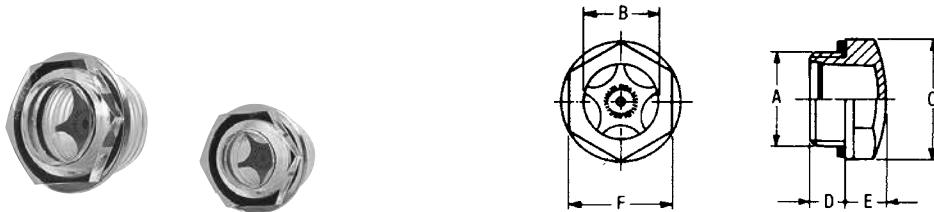
Specifications

- Working pressure: 29 psi / 200 kPa / 2 bar
- Transparent polyamid construction
- Shock resistant
- Anodized aluminum reflector
- Operating temperature range:
-20°F to 210°F / -29°C to 100°C
- Buna-N® seal
- For use with mineral, petroleum and water-based fluids
- Any contact with alcohol or solvents must be avoided
- Design HFTX

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.

Features

Leak-free sight glasses come in plastic or metal with a variety of threads, seals and lenses. In low visibility areas, prism lens sight glasses are a good solution for quick and accurate readings. In applications involving high pressure or temperatures, steel sight glasses are preferred. Locking nuts provide mounting into sheet metal with minimum thickness and without welding.



| Donaldson Part No. | Description | A - Thread Size | B | C | Dimensions (in./mm) | | |
|--------------------|-------------|-----------------|---------|---------|---------------------|--------|---------|
| | | | | | D | E | F |
| P562419 | SG-04 | 1/4" BSP | .35/9 | .71/18 | .28/7 | .24/6 | .59/15 |
| P562420 | SG-06 | 3/8" BSP | .43/11 | .87/22 | .32/8 | .28/7 | .75/19 |
| P562421 | SG-08 | 1/2" BSP | .55/14 | 1.02/26 | .32/8 | .32/8 | .87/22 |
| P562423 | SG-08-S | 3/4" - 16 UN | .51/13 | 1.02/26 | .59/15 | .32/8 | .87/22 |
| P562426 | SG-12 | 3/4" BSP | .79/20 | 1.22/31 | .35/9 | .39/10 | 1.06/27 |
| P562427 | SG-12-S | 1-1/16" - 12 UN | .75/19 | 1.38/35 | .59/15 | .39/10 | 1.18/30 |
| P562430 | SG-20 | 1-1/4" BSP | 1.18/30 | 1.85/47 | .47/12 | .51/13 | 1.61/41 |

Prism Sight Glasses

Specifications

- Prism lenses: special translucent polyamide technopolymer
- For low light applications
- Body: special black polyamide technopolymer
- Available in 3/4" and 1" NPT sizes
- Resistant to solvents, oils, greases, alkaline acids
- Avoid alcohol and detergents containing alcohol
- Flat Buna-N[®] seal

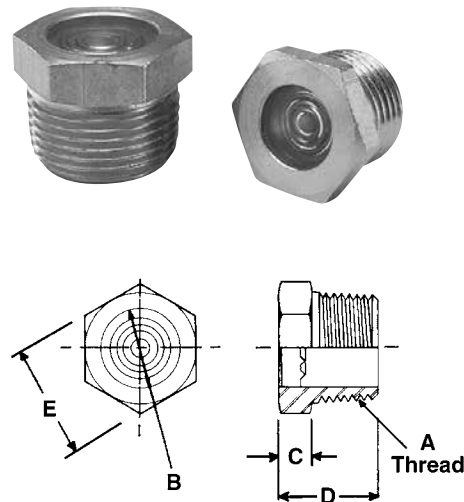
Buna-N[®] is a registered trademark of E. I. DuPont de Nemours and Company.



| Donaldson Part No. | Description | A - Thread Size | Dimensions (in./mm) | | | | |
|--------------------|-------------|-----------------|---------------------|---------|---------|----------|---------|
| | | | B | C | D | E | F |
| P562417 | PSG-12 | 3/4" NPT | 0.70/18 | 1.38/35 | 0.40/10 | 0.33/8.5 | 1.26/32 |
| P562418 | PSG-16 | 1" NPT | 0.90/23 | 1.70/43 | 0.43/11 | 0.36/9 | 1.50/38 |

Specifications

- Working pressure: 500 psi / 3,450 kPa / 34.5 bar
- All nickel-plated steel construction
- Glass prism lenses hermetically sealed
- Leak-proof service
- Greater mechanical strength
- Easy installation
- Reflects light in the presence of any liquid
- Maximum operating temp. 500°F / 260°C
- Suitable for petroleum and water based fluids



| Donaldson Part No. | Description | A - Thread Size | Dimensions (in./mm) | | | |
|--------------------|-------------|-----------------|---------------------|---------|---------|---------|
| | | | B | C | D | E |
| P562408 | SVM-04 | 1/4" NPT | 0.34/8 | 0.19/5 | 0.44/11 | 0.63/16 |
| P562409 | SVM-06 | 3/8" NPT | 0.44/11 | 0.22/6 | 0.5/13 | 0.75/19 |
| P562410 | SVM-08 | 1/2" NPT | 0.56/14 | 0.22/6 | 0.56/14 | 0.94/24 |
| P562411 | SVM-12 | 3/4" NPT | 0.75/19 | 0.31/8 | 0.63/16 | 1.06/27 |
| P562412 | SVM-16 | 1" NPT | 0.94/24 | 0.31/8 | 0.94/24 | 1.38/35 |
| P562413 | SVM-20 | 1-1/4" NPT | 1.19/30 | 0.41/10 | 0.81/21 | 1.75/44 |
| P562414 | SVM-24 | 1-1/2" NPT | 1.44/37 | 0.41/10 | 0.81/21 | 2.00/51 |
| P562415 | SVM-32 | 2" NPT | 1.88/48 | 0.41/10 | 0.88/22 | 2.50/64 |

Fluid Level Gauges

Specifications

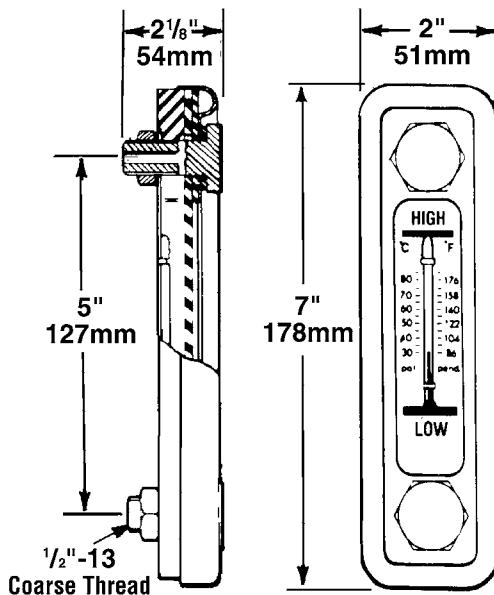
- Steel frame
- Acrylic lens
- Steel zinc plated bolts
- 5" (127 mm) mounting bolt centers
- Maximum wall thickness: 1/2"/12.7 mm
- Maximum temperature:
SLT 225°F / 107°C; SLG 180°F / 80°C

Features

Donaldson offers a wide variety of fluid level gauges that let you accurately measure fluid levels in your tanks and reservoirs. Gauges are made with transparent lens material and are suitable for lubricants, mineral, petroleum and water based fluids. They offer 180° visibility of fluid level.



SLT-1214
P562433



| Donaldson Part No. | Desc. | Feature | Seals |
|--------------------|----------|--|----------|
| P562433 | SLT-1214 | 5"/127 mm Level Gauge w/ Red Thermometer, Chrome Steel Frame | Neoprene |

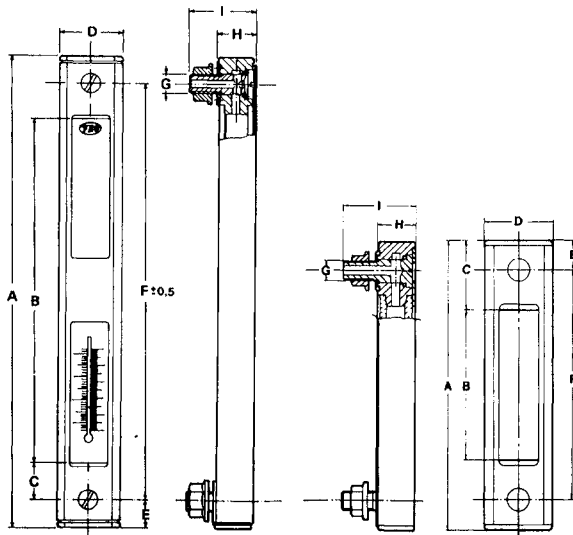
Bolt torque: 15 ft.-lbs./20 Nt-m. Do not exceed 20 ft.-lbs./27 Nt-m.

Fluid Level Gauges

Specifications

- Transparent lens material
- Buna-N® seals
- Maximum working pressure for pressurized tanks:
14.5 psi / 1 bar / 100 kPa.
- Oil level and temperature or oil level only
- Temperature scale:
35° to 210°F / 0° to 100°C.

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Bolt torque: 10 ft.-lbs/Nt-m.
Inside nut for tightening directly on the tank. Suggested mounting hole diameter: 11mm or 13mm.

(shown above left)

Oil Level/Temperature Gauge Specifications (35° - 210°F / 0° - 100°C)

| Part No. | Dimensions (in./mm) | | | | | | | | |
|----------|---------------------|----------|----------|---------|----------|--------|------------|--------|---------|
| | A | B | C | D | E | F | G-Thread | H | I |
| P171920 | 6.22/158 | 3.22/82 | .89/22.5 | 1.57/40 | .61/15.5 | 5/127 | M12 x 1.75 | .78/20 | 1.57/40 |
| P171922 | 11.22/285 | 8.23/209 | .89/22.5 | 1.57/40 | .61/15.5 | 10/254 | M12 x 1.75 | .78/20 | 1.57/40 |

(shown above right)

Oil Level Gauge Specifications

| Part No. | Dimensions (in./mm) | | | | | | | | |
|----------|---------------------|---------|----------|---------|----------|-------|------------|--------|---------|
| | A | B | C | D | E | F | G-Thread | H | I |
| P171918 | 6.22/158 | 3.23/82 | .89/22.5 | 1.57/40 | .61/15.5 | 5/127 | M12 x 1.75 | .78/20 | 1.57/40 |
| P171913 | 4.21/107 | 1.22/31 | .89/22.5 | 1.57/40 | .61/15.5 | 3/76 | M10 x 1.5 | .78/20 | 1.57/40 |

Fluid Level Gauges

Specifications

- Ultrasonically welded polyamide
- Suitable for pressurized reservoirs
- Operating temperature range:
-20°F to 212°F / -29°C to 100°C
- Scale: 32°F to 212°F / 0°C to 100°C
- Maximum wall thickness:
- LG-3 - 1/2"/12.7 mm
- LG-5/LG-10 - 3/8"/8.3 mm
- Buna-N® O-ring seals
- Zinc plated bolts
- Metric bolts

Note:

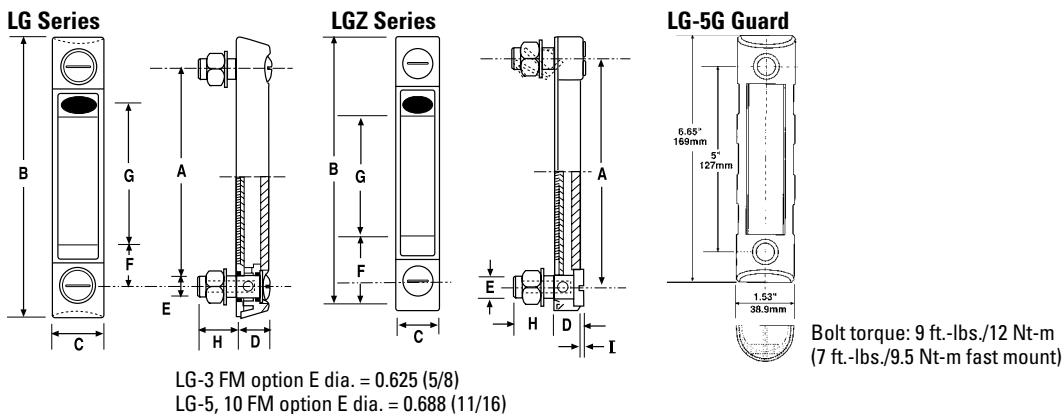
Any contact with alcohol, alcohol-based washing fluids, or petroleum distillates must be avoided. Do not chamfer tank mounting holes. Not for water-glycol applications

Buna-N® is a registered trademark of E. I. DuPont de Nemours and Company.



Options:

- 1/2"-13 bolts (LG-5)
- Protective guard (LG-5)
- Viton seals
- Red and blue thermometers
- Alcohol resistant version
- Fast mount kit (requires no internal access or threads to mount)



Fluid Level Gauge Guard (LG-5 Series only)

| Donaldson Part No. | Description | Feature | Bolt Center A (in./mm) | B (in./mm) | C (in./mm) | D (in./mm) |
|--------------------|-------------|-----------------------------|------------------------|------------|------------|------------|
| P562453 | LG-G | 5"/127 mm Level Gauge Guard | 5.00/127 | 6.65/169 | 1.53/39 | .98/25 |

Transparent Polyamide Fluid Level Gauges

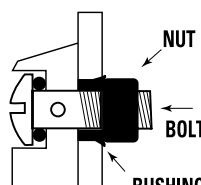
Level Gauge Choices

| Donaldson Part No. | Description | Feature | Dimensions (in./mm) | | | | | | | | | | |
|--------------------|-------------|--|---------------------|-----------|---------|-----------|-----------|---------------|-----------|-----------|--------|----------|---|
| | | | Bolt Center | | | Hole Dia. | | | Bolt Size | F | G | H | I |
| | | | A | B | C | D | E | | | | | | |
| P562438 | LG-3 | 3" Level Gauge | 3.00/76 | 4.17/106 | 1.06/27 | .63/16 | .42/10 | M10 x 1.5 | .71/18 | 1.31/33 | .83/21 | | |
| P562440 | LG-3-FM | 3" Level Gauge w/ Fast Mount kit | 3.00/76 | 4.17/106 | 1.06/27 | .63/16 | .625/16 | M10 x 1.5 | .71/18 | 1.31/33 | .83/21 | | |
| P562441 | LG-3-T | 3" Level Gauge w/ Red Thermometer | 3.00/76 | 4.17/106 | 1.06/27 | .63/16 | .42/10 | M10 x 1.5 | .71/18 | 1.31/33 | .83/21 | | |
| P562442 | LG-3-TB | 3" Level Gauge w/ Blue Thermometer | 3.00/76 | 4.17/106 | 1.06/27 | .63/16 | .42/10 | M10 x 1.5 | .71/18 | 1.31/33 | .83/21 | | |
| P562454 | LG-Z-3 | 3" Level Gauge | 3.00/76 | 3.90/99 | .90/22 | .57/14.5 | .42/10 | M10 x 1.5 | .70/18 | 1.30/33.6 | .90/23 | 0.06/1.5 | |
| P562444 | LG-5 | 5" Level Gauge | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .47/12 | M12 x 1.75 | .90/23 | 2.91/74 | .90/23 | | |
| P562445 | LG-5-13 | 5" Level Gauge w/ 1/2" -13 bolt kit | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .50/13 | 1/2" - 13 UNC | .90/23 | 2.91/74 | .90/23 | | |
| P562447 | LG-5-FM | 5" Level Gauge w/ Fast Mount kit | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .688/17.5 | M12 x 1.75 | .90/23 | 2.91/74 | .90/23 | | |
| P562448 | LG-5-T | 5" Level Gauge w/ Red Thermometer | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .47/12 | M12 x 1.75 | .90/23 | 2.91/74 | .90/23 | | |
| P562449 | LG-5-T-13 | 5" Level Gauge w/ Red Thermometer & 1/2"-13 bolt kit | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .50/13 | 1/2" - 13 UNC | .90/23 | 2.91/74 | .90/23 | | |
| P562450 | LG-5-TB | 5" Level Gauge w/ Blue Thermometer | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .47/12 | M12 x 1.75 | .90/23 | 2.91/74 | .90/23 | | |
| P562451 | LG-5-T-FM | 5" Level Gauge w/ Red Thermometer & Fast Mount kit | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .688/17.5 | M12 x 1.75 | .90/23 | 2.91/74 | .90/23 | | |
| P563913 | LG-5-T-G | 5" Level Gauge w/ Red Thermometer & Guard | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .47/12 | M12 x 1.75 | .90/23 | 2.91/74 | .90/23 | | |
| P562452 | LG-5-T-SS | 5" Level Gauge w/ Red Thermometer, Stainless Bolt kit | 5.00/127 | 6.34/161 | 1.22/31 | .71/18 | .47/12 | M12 x 1.75 | .90/23 | 2.91/74 | .90/23 | | |
| P562456 | LG-Z-5 | 5" Level Gauge | 5.00/127 | 5.9/150 | .90/22 | .57/14.5 | .47/12 | M12 x 1.75 | .93/23.5 | 2.90/73.7 | .90/23 | 0.06/1.5 | |
| P562458 | LG-Z-5-V | 5" Level Gauge w/ Viton seals | 5.00/127 | 5.9/150 | .90/22 | .57/14.5 | .47/12 | M12 x 1.75 | .93/23.5 | 2.90/73.7 | .90/23 | 0.06/1.5 | |
| P562434 | LG-10 | 10" Level Gauge | 10.00/254 | 11.42/290 | 1.38/35 | .71/18 | .47/12 | M12 x 1.75 | 1.02/26 | 7.60/193 | .90/23 | | |
| P562435 | LG-10-LF | 10" Level Gauge w/ Level Float | 10.00/254 | 11.42/290 | 1.38/35 | .71/18 | .47/12 | M12 x 1.75 | 1.02/26 | 7.60/193 | .90/23 | | |
| P562436 | LG-10-T | 10" Level Gauge w/ Red Thermometer | 10.00/254 | 11.42/290 | 1.38/35 | .71/18 | .47/12 | M12 x 1.75 | 1.02/26 | 7.60/193 | .90/23 | | |
| P562437 | LG-10-TB | 10" Level Gauge w/ Blue Thermometer | 10.00/254 | 11.42/290 | 1.38/35 | .71/18 | .47/12 | M12 x 1.75 | 1.02/26 | 7.60/193 | .90/23 | | |
| P563909 | LG-10-TB-SS | 10" Level Gauge w/ Blue Thermometer & Stainless Bolt kit | 10.00/254 | 11.42/290 | 1.38/35 | .71/18 | .47/12 | M12 x 1.75 | 1.02/26 | 7.60/193 | .90/23 | | |

Fast-Mount Kits

| Donaldson Part No. | Description |
|--------------------|-----------------|
| P563513 | LG-3/3T |
| P563514 | LG-5/5T, 10/10T |

Fast Mount Assembly Instructions



Installation: Tighten nuts on bolts to the point where nuts are snug against bushings. Apply one drop of thread lock to last exposed thread at end of bolts. Mount on tank and tighten to 7 ft.-lbs./1kg-m. **(DO NOT OVER-TIGHTEN).**

Removal: Loosen bolts and remove. **(IMPORTANT: THREAD LOCK PREVENTS OVER-LOOSENING OF BOLTS TO POINT WHERE NUTS DROP OFF INTO TANK.)**

What Can Fluid Analysis Do For You?

Fluid analysis is a snapshot of what is happening inside your equipment. It summarizes the condition of your oil and identifies component wear and contamination in virtually any application.

- Identify opportunities for optimizing filtration performance
- Safely extend drain intervals
- Minimize downtime by identifying minor problems before they become major failures
- Maximize asset reliability
- Extend equipment life



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Suggested Sampling Intervals and Methods

Fluid analysis is most effective when samples are representative of typical operating conditions. Always take samples at regularly scheduled intervals and from the same sampling point each time. How critical a piece of equipment is to production should be a major consideration for determining sampling frequency.

| | | |
|-------------|-------------------------------------|---|
| Hydraulic | 250-500 hours | By vacuum pump through oil fill port of system reservoir at mid-level |
| Gearboxes | 750 hours | By vacuum pump through oil level plug or dipstick retaining tube |
| Compressors | Monthly or at least every 500 hours | By vacuum pump through oil fill port of system reservoir at mid-level |
| Turbines | Monthly or at least every 500 hours | By vacuum pump through oil level plug or dipstick retaining tube |

Test Kits and Sampling Products Outside of North America: The fluid sampling program featured in this section is used by North American customers. If you're located outside of North America, we recommend you contact your local Donaldson distributor to discuss availability.

Fluid Analysis Program

The Donaldson Advanced Fluid Analysis Kit is designed to monitor component wear, contamination and fluid condition.

Benefits

- Partnership with a total filtration solutions provider
- High quality testing by an ISO 17025 A2LA accredited laboratory
- Results available immediately upon sample processing completion
- Innovative data management tools that will help you affect change in daily maintenance practices.

How Send Samples to the Laboratory

STEP A | Sample Information

First-time users need to establish a Horizon® account, and new components (sample point) need to be added to your account. Go to this address: www.eoilreports.com/login

Next, fill out the QR code label with the corresponding Component ID and Sample Date. Attach the label to the sample jar and retain the other label for your records.

To improve accuracy and ensure faster processing, use the Sample Submission feature in Horizon to send the sample information to the laboratory. Once the information is submitted online, the QR code will contain all required sample information needed for processing.

NOTE: Provide the laboratory with as much detailed equipment and fluid information as possible. More in-depth analysis is possible when the analyst knows the time on both the unit and fluid and whether the fluid and/or filter have been changed since last sampled.

STEP B | Laboratory Locations

A list of available laboratory locations is included on the form. Label your package with the laboratory address of your choice and ship it using a trackable shipping service, such as UPS or FedEx.

STEP C | Online Access

If the sample information cannot be submitted online, complete the simple form on the right, detach the form and submit it to the laboratory with the sample.

IMPORTANT: Samples will be placed on hold if the component ID does not match an ID in your account and no component information is included on the paper form. Components can be added to your account online via Horizon or by contacting Customer Service. Samples placed on hold for more than 30 days will be disposed.



| Fluid Sampling Products | Part No. |
|--------------------------|----------|
| Fluid Analysis Kit | X009330 |
| Sample Extraction Pump | P176431 |
| Sample Extraction Tubing | P176433 |

Test Points, Adapters and Hose Assemblies

If you have filters installed in hard-to-access locations, test points, adapters and hose assemblies can be used to plumb up a bulkhead to read pressure differentials.

See Accessories Section for complete offering!



Test Results / Reports from Your Sample

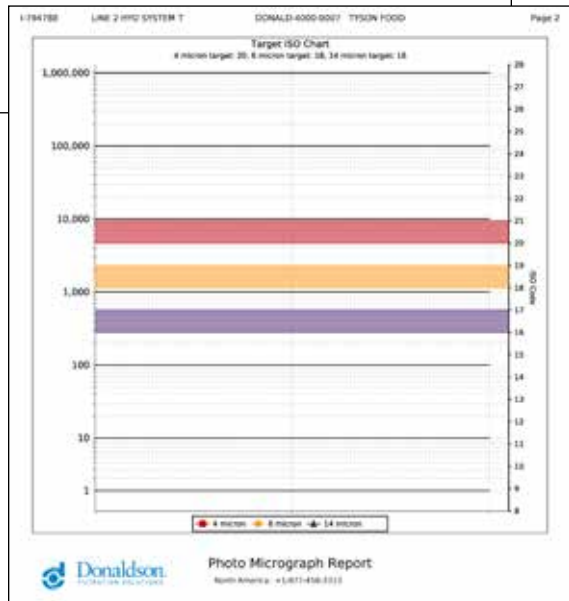
Your Donaldson test report color codes individual results by severity for a better understanding of the overall severity of the report. It also provides a graphical representation of the cleanliness level of the fluid with a photo micropatch accompanied by the Target ISO Chart done on each sample.



With Donaldson, you're also on track for total program management with problem summary reports, sample processing turnaround tracking and data mining capabilities that allow you to affect positive change in your daily maintenance practices.

- Get test results almost immediately – online
- Identify significant trends in fluid cleanliness
- Use management reports to pinpoint problems with critical units
- Identify bottlenecks in sample turnaround time
- Influence equipment purchasing decisions
- Access your information from anywhere there is an internet connection

| Lubricant Analysis Report | | North America • +1.877.458.5313 | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|---------------------------------|-----------------------------|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
| Identification: | Lubricant Information: | Sample Information: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DAVID-4000-0007 TISON FOOD FRENCH 15 CULBERT AVE W HOLLAND, PA US 15053439 | Component ID: LINE 2 HYD SYSTEM T Secondary ID: Component Type: HYDRAULIC Manufacturer: INFORMATION REQUESTED Model: INFORMATION REQUESTED Application: PLANT INDUSTRIAL Name Capacity: 5 gal | Tracking Number: 01212600133 Lab Number: 11794789 Lab Location: Indianapolis Date Analyzed: 09/08 Sampled: 23 Nov 2018 Received: 08 Nov 2018 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Location: | Microchemical Information: | Product Information: | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Machine Required: | Filter Part#: NOT IDENTIFIED | Product Manufacturer: INFORMATION REQUESTED Product Name: INFORMATION REQUESTED Product Code: INFORMATION REQUESTED | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Comments: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Check for source of water contamination (SEALS, BREWERS, FILL POINTS). Water is at a SOURCE LEVEL. Targeted Testing System. Lower particle count results may be invalid or unable to be tested due to water contamination. 2. Microchemical results may be skewed due to excess water. Targeted testing analysis may be skewed due to excessive water contamination. In order to properly compare data to the correct standards, please provide COMPONENT MANUFACTURE and MODEL, and the FLUID MANUFACTURE, PRODUCT TYPE, and VISCOSITY GRADE. Please provide filter type and color coding to allow for proper particle count evaluation. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sample # | Micro Patch Layer | Conditioned Patch Layer | Multi-Source Patch Layer | Analysis Patch Layer | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| Secondary Information: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lab Sampled | Date Received | Lab Time | Lab Change | Lab Address | | | | | | | | | | | | | | | | | | | | | | | | |
| 11/23/2018 | 11/08/2018 | 11:00 AM | 01 | INDIANAPOLIS | | | | | | | | | | | | | | | | | | | | | | | | |
| Additional Testing | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ISO Code | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |



How to Read the Donaldson Fluid Analysis Report

Reading a fluid analysis report can be an overwhelming and sometimes seemingly impossible task without an understanding of the basic fundamentals for interpreting laboratory results and recommendations. Referring to the report descriptions and explanations below will help you better understand your results and, ultimately, better manage a productive, cost-saving reliability program.

Customer, Equipment and Sample Information

The information submitted with a sample is as important to who is reading the report as it is to the analyst interpreting the test results and making recommendations. Know your equipment and share this information with your laboratory. Accurate, thorough and complete lube and equipment information not only allows for in-depth analysis, but can eliminate confusion and the difficulties that can occur when interpreting results.

Account Information
 Account Number: DONALD-4000-0007
 Company Name: TYSON FOOD
 Contact: JEFF KRIEDER
 Address: 403 S CUSTER AVE
 NEW HOLLAND, PA US
 Phone Number: 717-355-5459

Component Information
 Component ID: LINE 2 HYD SYSTEM T
 Secondary ID:
 Component Type: HYDROSTATIC TRANSMISSION
 Manufacturer: Information Requested
 Model: Information Requested
 Application: PLANT/INDUSTRIAL
 Sump Capacity: 0 gal

Sample Information
 Tracking Number: 16325E00733
 Lab Number: 1794788
 Lab Location: Indianapolis
 Data Analyst: RNM
 Sampled: 22-Nov-2016
 Received: 30-Nov-2016
 Completed: 06-Dec-2016

Filter Information
 Filter Type: Information Requested
 Micron Rating: 0

Miscellaneous Information
 Filter Part#: NOT IDENTIFIED

Product Information
 Product Manufacturer: Information Requested
 Product Name: Information Requested
 Viscosity Grade: Information Requested

Comments
 Check for source of water contamination (SEALS, BREATHERS, FILL PORTS). Water is at a SEVERE LEVEL. Suggest flushing system. Laser particle count results may be invalid or unable to be tested due to water contamination. IR (OXIDATION/NITRATION) RESULTS may be skewed due to excess water. Suspect spectrometals analysis may be skewed due to extreme water contamination. In order to properly compare data to the correct standards, please provide COMPONENT MANUFACTURER and MODEL, and the FLUID MANUFACTURER, PRODUCT NAME, and VISCOSITY GRADE. Please provide filter type and micron rating to allow for proper particle count evaluation.

Wear Metals (ppm)
 Chromium, Manganese, Iron, Lead, Copper, Cadmium, Silver, Vanadium, Molybdenum, Potassium, Sodium, Magnesium, Calcium, Barium, Phosphorus, Zinc

Sample Information
 Date Sampled: 22-Nov-2016
 Date Received: 30-Nov-2016
 Lube Type: Hydraulic Oil
 Lube Grade: ISO 100
 Lube Change: 100%
 Lube Added: 0 gal
 Filter Change: 0
 Fuel Dilution: 0% Vol
 % Vol: 0% Vol
 % Vol: 0% Vol
 Viscosity (cSt @ 100°C): 100
 Viscosity (cSt @ 150°C): 68.4
 Ash: 0.02
 Sulfur: 0.01
 Oxidation: 0.02
 Severe: 0.88
 Critical: 0.88

Particle Count (particles/cc)
 ISO Code: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50

Additional Testing
 Water by Karl Fischer (ppm), Water by Gravimetric (ppm), Oxidation (ppm), Nitration (ppm)

Unit, Lube, Turnaround Time and Account information are listed on the left side of the report emphasizing the data most critical to laboratory processing and data interpretation. Details such as what kind of compressor, gearbox, engine, etc. influences flagging parameters and depth of analysis.

Second ID is each customer's opportunity to uniquely identify units being tested and their location.

Severity is represented on a sliding scale and is color-coded so that critical units are more apparent at first glance. Overall severity is based on report Comments—not individually flagged results.

- 0—Normal
- 1—At least one or more items have violated initial flagging points yet are still considered minor.
- 2—A trend is developing.
- 3—Simple maintenance and/or diagnostics are recommended.
- 4—Failure is eminent if maintenance not performed. Occasionally, a test result can violate the S4 excursion level. But, if there is no supporting data or a clear indicator of what is actually happening within the unit, maintenance action may not be recommended.

Manufacturer and Model can also identify metallurgies involved as well as the OEM's standard maintenance guidelines and possible wear patterns to expect.

Filter Types and their Micron Ratings are important in analyzing particle count—the higher the micron rating, the higher the particle count results.

Application identifies in what type of environment the equipment operates and is useful in determining exposure to possible contaminants.

Sump Capacity identifies the total volume of oil (in gallons) in which wear metals are suspended and is critical to trending wear metal concentrations.

Lube Manufacturer, Type and Grade identifies a lube's properties and its viscosity and is critical in determining if the right lube is being used.

The laboratory at which testing was completed is denoted by an **I** for **Indianapolis** and an **H** for **Houston**. The following Lab # is assigned to the sample upon entry for processing and should be the reference number used when notifying the lab with questions or concerns.

Data Analyst Initials

Make note of the difference between the Date Sampled and the Date Received by the lab. Turnaround issues may point to storing samples too long before shipping or shipping service problems.

Recommendations

A data analyst's job is to explain and, if necessary, recommend actions for rectifying significant changes in a unit's condition. Reviewing comments before looking at the actual test results will provide a roadmap to the report's most important information. Any actions that need to be taken are listed first in order of severity. Justifications for recommending those actions immediately follow.

Comments Check for source of water contamination (SEALS, BREATHERS, FILL PORTS). Water is at a SEVERE LEVEL. Suggest flushing system; Laser particle count results may be invalid or unable to be tested due to water contamination. IR (OXIDATION/NITRATION) RESULTS may be skewed due to excess water; Suspect spectrometals analysis may be skewed due to extreme water contamination; In order to properly compare data to the correct standards, please provide COMPONENT MANUFACTURER and MODEL, and the FLUID MANUFACTURER, PRODUCT NAME, and VISCOSITY GRADE. Please provide filter type and micron rating to allow for proper particle count evaluation.

| Sample # | Wear Metals (ppm) | | | | | | | | | | Contaminant Metals (ppm) | | | Multi-Source Metals (ppm) | | | | | Additive Metals (ppm) | | | | | |
|----------|-------------------|----------|--------|----------|--------|------|-----|---------|--------|----------|--------------------------|--------|-----------|---------------------------|------------|----------|-----------|---------|-----------------------|-----------|---------|--------|------------|------|
| | Iron | Chromium | Nickel | Aluminum | Copper | Lead | Tin | Cadmium | Silver | Vanadium | Silicon | Sodium | Potassium | Titanium | Molybdenum | Antimony | Manganese | Lithium | Boron | Magnesium | Calcium | Barium | Phosphorus | Zinc |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 0 | 0 | 1 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 9 | 0 |

| Sample # | Sample Information | | | | | | | Contaminants | | | Fluid Properties | | | | | |
|----------|--------------------|---------------|-----------|-----------|-------------|------------|---------------|---------------|-------|-------|------------------|------------------|-------------|-------------|-----------|------------|
| | Date Sampled | Date Received | Lube Time | Unit Time | Lube Change | Lube Added | Filter Change | Fuel Dilution | Soot | Water | Viscosity 40°C | Viscosity 100 °C | Acid Number | Base Number | Oxidation | Nitration |
| | | | h | h | | gal | | % Vol | % Vol | % Vol | cSt | cSt | mg KOH/g | mg KOH/g | abs/cm | abs/0.1 mm |
| 1 | 22-Nov-2016 | 30-Nov-2016 | 0 | 0 | Unk | 0 | Unk | | | | 44.4 | | 0.02 | | 102 | 134 |

"Highlighted" numbers denote test results the analyst has flagged because they exceed pre-set warning parameters and warrant closer examination or require action. Individual results are flagged by severity color to better explain the overall severity assigned to the sample.

Elemental Analysis

Elemental Analysis, or Spectroscopy, identifies the type and amount of wear particles, contamination and additives. Determining metal content can alert you to the type and severity of wear occurring in the unit. Measurements are expressed in parts per million (ppm).

Combinations of these Wear Metals can identify components within the machine that are wearing. Knowing what metals a unit is made of can greatly influence an analyst's recommendations and determine the value of elemental analysis.

Knowledge of the environmental conditions under which a unit operates can explain varying levels of Contaminant Metals. Excessive levels of dust and dirt can be abrasive and accelerate wear.

Additive and Multi-Source Metals may turn up in test results for a variety of reasons. Molybdenum, antimony and boron are additives in some oils. Magnesium, calcium and barium are often used in detergent/dispersant additives. Phosphorous is used as an extreme pressure additive in gear oils. Phosphorous, along with zinc, are used in anti-wear additives (ZDP).

| Sample # | Wear Metals (ppm) | | | | | | | | | | Contaminant Metals (ppm) | | | Multi-Source Metals (ppm) | | | | | Additive Metals (ppm) | | | | | |
|----------|-------------------|----------|--------|----------|--------|------|-----|---------|--------|----------|--------------------------|--------|-----------|---------------------------|------------|----------|-----------|---------|-----------------------|-----------|---------|--------|------------|------|
| | Iron | Chromium | Nickel | Aluminum | Copper | Lead | Tin | Cadmium | Silver | Vanadium | Silicon | Sodium | Potassium | Titanium | Molybdenum | Antimony | Manganese | Lithium | Boron | Magnesium | Calcium | Barium | Phosphorus | Zinc |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 0 | 0 | 1 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 9 | 0 |

Test Data

Test results are listed according to age of the sample—oldest to most recent, top to bottom—so that trends are apparent. Significant changes are flagged and printed in the gray areas of the report.

Samples* appear in an oldest to newest **numbered sequence** so that results are easily associated with them throughout the report and depth of analysis.

Water in oil decreases lubricity, prevents additives from working and furthers oxidation. Its presence can be determined by crackle or FTIR and is reported in % of volume. Water by Karl Fischer determines the **amount** of water present. These results appear in the Special Testing section of your report.

Viscosity measures a lubricant's resistance to flow at temperature and is considered its most important physical property. Depending on lube grade, it is tested at 40 and/or 100 degrees Centigrade and reported in centistokes.

| Sample Information | | | | | | | | Contaminants | | | Fluid Properties | | | | | |
|--------------------|--------------|---------------|-----------|-----------|-------------|------------|---------------|---------------|-------|-------|------------------|-----------------|-------------|-------------|-----------|------------|
| Sample # | Date Sampled | Date Received | Lube Time | Unit Time | Lube Change | Lube Added | Filter Change | Fuel Dilution | Soot | Water | Viscosity 40°C | Viscosity 100°C | Acid Number | Base Number | Oxidation | Nitration |
| | | | h | h | | gal | | % Vol | % Vol | % Vol | cSt | cSt | mg KOH/g | mg KOH/g | abs/cm | abs/0.1 mm |
| 1 | 22-Nov-2016 | 30-Nov-2016 | 0 | 0 | Unk | 0 | Unk | | | | 44.4 | | 0.02 | | 102 | 134 |

| Particle Count (particles/mL) | | | | | | | | | | Additional Testing | | |
|-------------------------------|-----------------|--------|--------|---------|---------|---------|---------|---------|----------|--------------------|-------------------------------|------------------|
| Sample # | ISO Code | > 4 µm | > 6 µm | > 10 µm | > 14 µm | > 21 µm | > 38 µm | > 70 µm | > 100 µm | Test Method | Water by Karl Fischer - 6304C | Photo Micrograph |
| | Based On 4/6/14 | | | | | | | | | | ppm | |
| 1 | WA/WA/WA | WAT | WAT | WAT | WAT | WAT | WAT | WAT | WAT | Laser | 257338 | CMPLT |

Comments are advisory only and are based on the assumption that the sample and data submitted are valid. Missing fluid or component information limits the evaluation. No warranty is expressed or implied.

| # | Date | 4 micron | 6 micron | 14 micron | ISO Code | Lab Number |
|---|-------------|----------|----------|-----------|----------|------------|
| 1 | 22-Nov-2016 | WAT | WAT | WAT | WA/WA/WA | I-794788 |

The **ISO Code** is an index number that represents a range of particles within a specific micron range, i.e. 4, 6, 14. Each class designates a range of measured particles per one ml of sample. The particle count is a cumulative range between 4 and 6 microns. This test is valuable in determining large particle wear in filtered systems.

Fuel and Soot results are all reported in % of volume. High fuel dilution decreases unit load capacity. Excessive soot is a sign of reduced combustion efficiency.

Oxidation measures the breakdown of a lubricant due to age and operating conditions. Oxidation prevents additives from working and therefore promotes increased acid content, as well as increased viscosity. **Nitration** is an indication of excessive "blow-by" from cylinder walls and/or compression rings and indicates the presence of nitric acid, which speeds up oxidation. Too much disparity between oxidation and nitration can indicate air to fuel ratio problems. As Oxidation/Nitration increases, TAN will also increase and TBN will begin to decrease.

Special Testing

Special testing is often done when additional, or more specific, information is needed. For example, an Analytical Ferrograph might be requested when a ferrous metal larger than 5 microns has been detected by Direct Read Ferrography. The AF can determine actual size of the particle, its composition—iron, copper, etc.—and the type of wear it's creating—rubbing, sliding, cutting, etc. Additional special testing could include, Water by Karl Fischer and RPVOT (Rotating Pressure Vessel Oxidation Test).

Photo Micropatch

A photo Micropatch is included with each test report and provides digital imagery of the wear debris, contamination and/or filter media particles found in each fluid sample. It is taken at a 100x magnification and includes the sample's ISO code and a 10 micrometer scale for particle size comparison.

I-794788

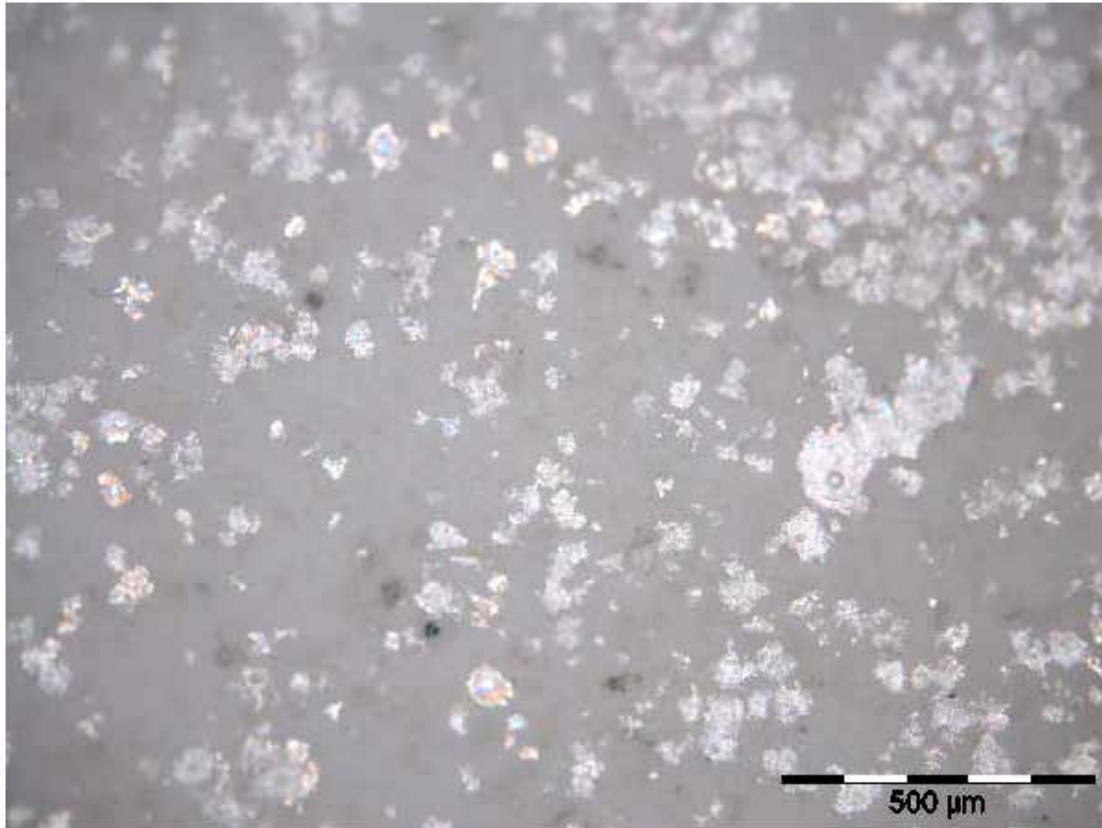
LINE 2 HYD SYSTEM T

DONALD-4000-0007 TYSON FOOD

Page 3

ISO Code: WA / WA / WA
Magnification: 100x

Volume: 10mL

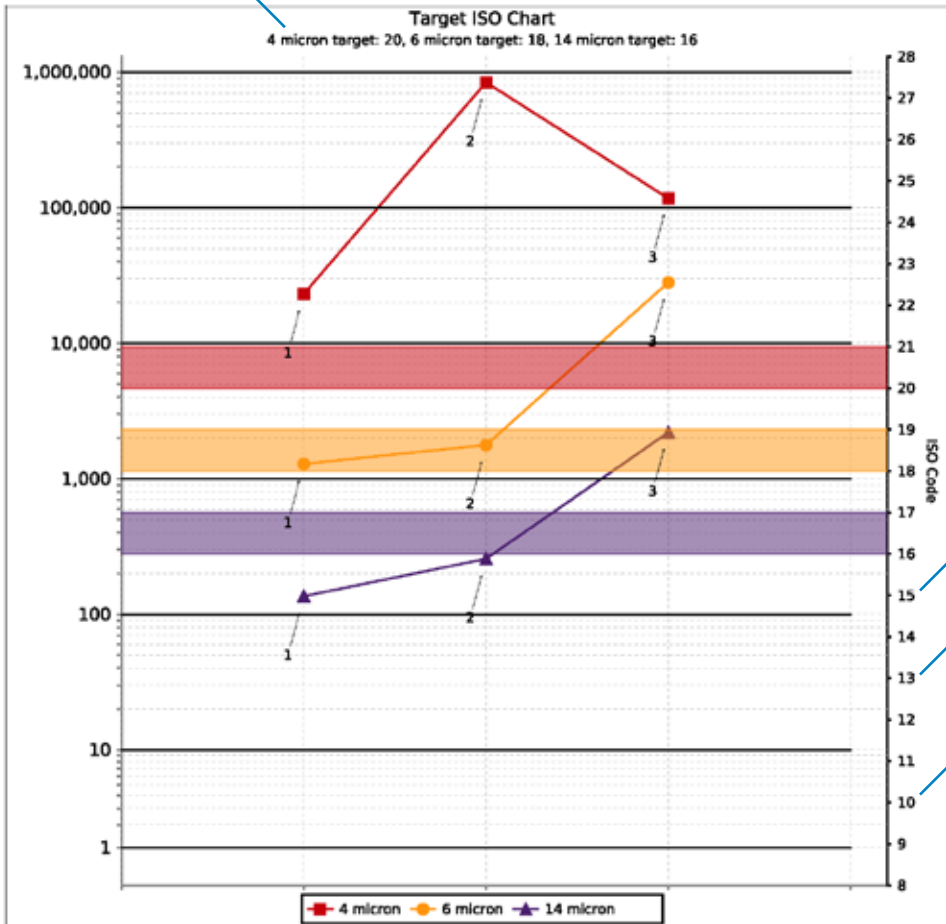


500 micrometer scale

Target ISO Chart

If target ISO codes are provided on the Component Registration Form, it will appear above the unit ID.

I-782287 64044 NL DONALD-4136-0000 WL GORE (CHERRY HILL) Page 2



Particle count results are reported in particles per milliliter or particles per 100 milliliters at a given size (microns) and ISO Cleanliness Code. When sampling units for the first time, you must include on the Component Registration Form the target ISO Cleanliness Codes specific to each of your applications. These unit-specific codes will then pre-fill on each test report. If target ISO codes are not provided, the target ISO field will be determined by the type of hydraulics and pressure rating listed on the Component Registration Form. The 4, 6 and 14 micron particle ranges are then graphed for each sample tested.

The ISO 4406 standard utilizes a three number system to classify system cleanliness — The first number represents the number of particles present measuring greater than 4 μm. The second represents particles greater than 6 μm and the third represents those greater than 14 μm.

expressed or implied.

| # | Date | 4 micron | 6 micron | 14 micron | ISO Code | Lab Number |
|---|-------------|----------|----------|-----------|----------|------------|
| 1 | 22-Nov-2016 | WAT | WAT | WAT | WA/WA/WA | I-794788 |

Each of the ISO Code's three numbers represents an ISO range. For example, the ISO Cleanliness Code for the most recent sample in this report is 19/18/15. Because the number of 4μm particles is between 2,500 and 5,000, the corresponding ISO code is 19. Because the number of 6μm particles is between 1,300 and 2,500, the corresponding ISO code is 18. Because the number of 14 μm particles is between 160 and 320, the corresponding ISO code is 15.

Portable Fluid Analysis Kit

Fluid analysis is a snapshot of what is happening inside your equipment. It tells you the condition of the lubricant and identifies component wear and contamination in virtually any application. The Donaldson Portable Fluid Analysis Kit (**Part No. X009329**) allows you to conduct immediate on-site particulate analysis in as little as ten minutes.

Using the patch test method, you can quickly and reliably assign a three-digit cleanliness code per ISO 4406-1999 to a given fluid sample. Simply pull a 25 ml fluid sample through a patch membrane filter and compare oil sample particle distribution with the Fluid Cleanliness Comparison Guide (included) to assign an ISO Cleanliness Code.

- Use this kit to determine which systems need improved filtration.
- When improvements are made, use it to monitor the cleanliness status of the system.
- A great alternative to expensive, portable electronic devices.

Kit content details on the next page.



The **Donaldson Portable Fluid Analysis Kit** includes enough supplies for 100 fluid samples. All apparatus is securely packaged and well-protected with laser-etched foam in a sturdy carrying case.

Benefits

- Easy to use
- Results in as little as 10 minutes
- Measures particulate levels
- Provides reliable results

Kit Content and Physical Size:

Case Size:

Height: 14.5"/368.3mm **Width:** 19.25"/489mm **Depth:** 7.75"/197mm **Case Weight:** 9.95 lbs./4.51 kg

Kit Part Number X009329



*Contact Donaldson for digital microscope option

Basic Steps for Use

Kit includes detailed operating instructions and visual comparison guide.

1. Assemble the pump and funnel assembly and screw on empty sample bottle.
2. Place solvent dispensing bottle filter on spout of solvent dispensing bottle.
3. Wash funnel with solvent* and pull solvent through assembly with hand-operated vacuum pump.
4. Place a patch membrane in the funnel assembly.
5. Pour the fluid sample into the funnel and fill to the 25 ml level.
6. Pull sample through patch membrane with hand-operated vacuum pump.
7. Wash funnel with solvent and pull through patch membrane with hand-operated vacuum pump.
8. When sample passes completely through patch membrane, remove membrane with forceps, place on clean index card and immediately cover with adhesive analysis lamination cover.
9. View patch membrane through microscope and compare sight screen from 100x microscope to various pictures shown in the Fluid Cleanliness Comparison Guide (included in kit) to assign the appropriate ISO cleanliness code.

* Odorless mineral spirits



Off-Line Filtration:

Where and Why Used

The Donaldson Filter Cart, Filter Panel and Filter Buddy™ offer convenient off-line filtration, flushing and fluid transfer.* Use them with your in-plant machinery and mobile hydraulic equipment to achieve and maintain proper ISO cleanliness levels.

*Not for use with diesel fuel or gasoline.



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New oil isn't clean oil.

To optimize system performance and lengthen component life, new oil should be filtered before being transferred into a reservoir or gearbox.

| Typical Fluid Applications | Viscosity | Target ISO Cleanliness & Photo Micropatch | |
|---|---------------|---|--|
| Hydraulic Oil Transmission Oil Glycols (<150°F) Hydraulic Based Water Emulsions | 0-500 cSt | 16/14/11 | ISO 22/21/18 Typical Cleanliness of New, Delivered Fluids |
| Gear Oils Glycols Phosphate Esters | 0-6000 cSt | 18/16/13 | |

Recommended Storage Practices

Donaldson Filter Carts, Filter Buddy™, and Panels include electric motors and indoor storage is required. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

Reference document no. F110064 at www.donaldson.com/en/engine/support/datalibrary/000194.pdf

Calculating the Time Required to Filter All Your Fluid Once

When using offline filtration the fluid will need to pass through the filter cart approximately seven times to filter all your fluid once. Use to following formula to calculate the amount of time needed to filter all your fluid once:

$$(Reservoir\ Size\ x\ 7) / Flow\ Rate = Time^*$$

For example: if you have a 50 gallon reservoir, it will take approximately 35* minutes to filter all your fluid once.

$$(50\ gallons\ x\ 7) / 10\ gpm = 35\ minutes$$

*Times will vary depending on initial cleanliness of oil, system ingress, choice of media grades and other variables.

Custom Product Configurations

The following pages highlight Donaldson’s stocked off-line filtration offering for quick access and convenient ordering. If an appropriate solution is not available, Donaldson is able to configure a custom solution to meet most specifications requirements. Please be prepared to provide the following information prior to contacting our qualified solutions partner. Note: product lead times will vary.

Operating Conditions

Flow Rate: _____ gpm

Temperature: ° C or ° F

Ambient _____ Normal Operating _____

Fluid Type:

- Mineral Hydraulic Oil Water-glycol
- Synthetic Hydraulic Oil HWBF
- Synthetic Gear Oil Turbine Oil
- Industrial Gear Oil Food Grade Oil
- Phosphate-ester Other _____

Viscosity: (2 required)

_____ cSt or Ssu @ 40° C Temp

_____ cSt or Ssu @ 100° C Temp

Brand of Fluid: _____

Target ISO Cleanliness

In the chart to the right, circle the target cleanliness for the most stringent component in the circuit.

Beta_{x(c)} = 1000: _____ μm

Current ISO Level: _____ (18/16/13)

Capacity of Reservoir: _____ gallons/liters

Application: _____ (power unit)

Filter Media: Synthetic Cellulose Wire Mesh

Electrical

115 Volt 230 Volt

Use and Storage

Indoor Outdoor

| Pumps | ISO Ratings |
|---------------------------------|-------------|
| Fixed Gear Pump | 19/17/15 |
| Fixed Vane Pump | 19/17/14 |
| Fixed Piston Pump | 18/16/14 |
| Variable Vane Pump | 18/16/14 |
| Variable Piston Pump | 17/15/13 |
| Valves | |
| Directional (solenoid) | 20/18/15 |
| Pressure (modulating) | 19/17/14 |
| Flow Controls (standard) | 19/17/14 |
| Check Valves | 20/18/15 |
| Cartridge Valves | 20/18/15 |
| Load-sensing Directional Valves | 18/16/14 |
| Proportional Pressure Controls | 18/16/13 |
| Proportional Cartridge Valves | 18/16/13 |
| Servo Valves | 16/14/11* |
| Actuators | |
| Cylinders | 20/18/15 |
| Vane Motors | 19/17/14 |
| Axial Piston Motors | 18/16/13 |
| Gear Motors | 20/18/15 |
| Radial Piston Motors | 19/17/15 |

Filter Cart

The Donaldson Filter Cart provides a convenient portable mode of off-line/kidney loop filtration, flushing and fluid transfer. Use it with your in-plant machinery and hydraulic equipment to achieve and maintain proper ISO cleanliness levels.

Dual in-series HMK05 pressure filters can provide coarse/fine particle removal or, install a water absorbing filter to obtain particulate and water removal. A SP50/60 suction filter is required to protect the pump. The powerful one horsepower motor won't bog down and when coupled with a gear pump, it provides efficient fluid transfer and filtration. Convenient features include a rear mounted motor for better balance, a removable angled drip tray and clear braided hoses.

Notice

Donaldson Filter Carts include electric motors and indoor use is recommended. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

Reference the aftermarket warranty: document no. F110064.

Fluid Compatibility

Not for use with diesel fuel or gasoline. For fuel solutions, please contact the Donaldson Clean Solutions team at clean.solutions@donaldson.com or 800-518-7784.



Applications

- Transferring New Oil
- Cleaning Stored Oil
- System Draining
- Line Flushing
- Hose Cleaning
- Kidney Loop Filtration
- Repairs & Equipment Rebuild Flushing
- Flushing During Equipment Commissioning

| Features | Benefits |
|----------------------------------|--|
| Rugged and durable frame | Enables long service life |
| High efficiency media | Cost effective filtration |
| Two pressure filters | Two-stage filtration – coarse/fine or particulate/water |
| Safety relief valve | Prevents over pressurizing and damage to pump, hoses and filters |
| Overload protected switch | Prevents motor from overheating |

| Applications | |
|---------------------------|--|
| Filter new fluid | New fluids are usually above the recommended ISO cleanliness levels |
| Offline filtration | Filter cart can be used to supplement existing filtration |
| Water removal | Using Donaldson water removal filters to remove free water from the system. |
| Transferring fluid | Fluid is transferred from a storage container (tote, drum, tank, etc.) to a machine's reservoir |
| Flushing | After repairs & builds machines need to be flushed thoroughly before returning to service. During equipment commissioning, new machines have original fabrication debris and dirt that has ingressed during transport and storage. |

Filter Cart Features

Stainless steel wands

- Will not break, corrosion resistant

Differential pressure indicators

- Lets you know when to change filters

Two pressure filters mounted in series

- Allows for particulate/water removal or coarse/fine particle removal

Removable angled drip tray

- Easy clean up, fluid will not leak out when tipped back

Clear braided hoses

- Visually shows fluid flowing
- 85 psi working pressure

Suction filter

- Protects pump



Oil sampling valve

- Monitors filter performance and cleanliness of oil

Motor/Pump

- Industrial brand
10 gpm / 38 lpm flow

Motor mounted on back

- Better balance
- Fluid will not drip on motor when changing filters

Overload protected switch

- Protects motor from overheating

Integrated safety relief valve

- Protects against over pressurizing
- Set at 85 psi



Foam filled tires

- Tires will not go flat

Filter Cart Assembly Choices

NOTE: FILTERS ORDERED SEPARATELY

The Importance of Temperature When Selecting a Filter Cart

Consider operating temperature ranges when determining the proper viscosity filtration solution. It's crucial to select the proper viscosity option to maintain adequate flow and avoid restriction. Refer to the oil viscosity with temperature chart located on the front cover of the catalog.

Example: ISO Grade 32 Hydraulic Oil @ 68°F = 86.7 (cSt)

| Assembly Part No. | Low Viscosity | High Viscosity |
|-------------------------------|--|--|
| | Max Viscosity 500 SUS (108 cSt)* Filters ordered separately X011297[‡] | Max Viscosity 8000 SUS (1700 cSt)* Filters ordered separately X011298[‡] |
| Operating Temperature Range: | ----- -10° F to 160° F (-23° C to 71° C) ----- | |
| Filter Bypass Valve Settings: | Suction – 5 psid/0.34 bar | Suction – Y strainer |
| | Pressure – 25 psid/1.7 bar | Pressure – 25 psid/1.7 bar |
| Electrical Service: | ----- 115 volts: 14 amp, single phase, 60 Hz ----- | |
| Cord Length: | ----- 7 ft. /2.1 m cord with storage for 50 ft./15 m ----- | |
| Gear Pump Flow Rate*: | 10.4 gpm/38 lpm | 2 gpm/8 lpm |
| TEFC** Motor: | 1 hp, 1800 RPM | 1 hp, 1200 RPM |
| Fluid Compatibility: | ----- Mineral-based fluids, water glycols, polyol esters ----- | |
| Dry Weight: | Approximately 140 lbs. (63.5 kg) | Approximately 175 lbs. (79.38 kg) |
| Dimensions: | Height: 47" (1194 mm) Width: 24" (610 mm) Length: 23" (585 mm) | |
| | ----- Hose/Wand assembly length: 10' (3.05 m) ----- | |
| Filter Notes: | Requires 3 filters: 2 pressure, 1 suction | Requires 4 pressure filters |



[‡]These part numbers now have relief valves in the pump. The relief valve setting is: 10.3 bar (150 PSI)

Pressure Filter Choices

| Media Type | $\beta_{x(e)} = 2$ Rating based on ISO 16889 | $\beta_{x(e)} = 1000$ Rating based on ISO 16889 | Length in mm | Donaldson Part No. | Comments |
|------------------|---|--|-----------------|----------------------|----------------------|
| Synteq Synthetic | <4 μ m | 14.2 | 361 | P564468 | |
| | 6 μ m | 11.6 | 294 | P165675 | |
| | 6 μ m | 11.6 | 294 | P171274 ¹ | |
| | 6 μ m | 14.2 | 361 | P179763 | |
| | 11 μ m | 7.6 | 193 | P176207 | |
| | 11 μ m | 11.6 | 294 | P165659 | |
| | 11 μ m | 11.6 | 294 | P171275 ¹ | |
| | 11 μ m | 14.2 | 361 | P170949 | |
| | 23 μ m | 7.6 | 193 | P176208 | |
| | 23 μ m | 11.6 | 294 | P165569 | |
| | 23 μ m | 11.6 | 294 | P171276 ¹ | |
| | 23 μ m | 14.2 | 361 | P173789 | |
| | 50 μ m | 11.6 | 294 | P165672 | |
| 50 μ m | 14.2 | 361 | P573353 | | |
| Water Absorbing | 10 μ m | 11.6 | 294 | P179075 | Absorbs 300 ml water |

¹Viton® O-ring, Epoxy

Suction Filter Choices

| Media Type | $\beta_{x(e)} = 2$ Rating based on ISO 16889 | Length in mm | Donaldson Part No. |
|------------|---|-----------------|--------------------|
| Wire Mesh | 150 μ m | 6.7 170 | P550275 |
| | 150 μ m | 10.7 271 | P550276 |

***Contact Donaldson for special order options**

**Totally Enclosed Fan-Cooled

Filter Notes

- Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.
- Thread sizes are 1 3/4"-12 UNF-2B (HMK05) and 1 1/2"-16 UN-2B (suction filter)
- Filters with seals made of Viton® (a fluoroelastomer) are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions, and HWCF (high water content fluids) over 150°F. Filters with seals made of Buna-N® are appropriate for most applications involving petroleum oil.
- Viton® is a registered trademark of E. I. DuPont de Nemours and Company.

Filter Buddy™ Handheld Portable Filtration System

The Donaldson Filter Buddy™ is a handheld portable system allowing you to kidney loop reservoirs that you normally cannot with larger filter carts. Its small size and light weight allows carrying up and down stairs and into tight or confined spaces. It also fits on top of a drum for convenient transferring and filtering from a drum to a reservoir.

The Filter Buddy features dual HMK04 filtration utilizing Donaldson's exclusive high efficiency Synteq™ media. The filters are plumbed in series giving you the option of coarse/fine particle removal or install a water absorbing filter for water/ particle removal.

Notice

Donaldson Filter Buddys include electric motors and indoor use is recommended. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

Reference the aftermarket warranty: document no. F110064.

Fluid Compatibility

Not for use with diesel fuel or gasoline. For fuel solutions, please contact the Donaldson Clean Solutions team at clean.solutions@donaldson.com or 800-518-7784.

Applications

- Transferring New Oil
- Cleaning Stored Oil
- System Draining
- Line Flushing
- Hose Cleaning
- Kidney Loop Filtration
- Repairs and Equipment Rebuild Flushing
- Flushing During Equipment Commissioning



| Features | Benefits |
|------------------------------|--|
| Rugged and durable frame | Enables long service life |
| Compact size | Allows filtration in hard to reach locations |
| High efficiency media grades | Cost effective filtration |
| Dual stage filtration | Coarse/fine or water/particulate removal |
| Overload protected switch | Prevents motor from overheating |
| Sample ports | Enables system cleanliness measurements |

Applications

| | |
|--------------------|--|
| Fluid transfer | Ensure that the fluid you are transferring from a drum or tote is clean. |
| Offline filtration | Supplement existing filtration to achieve target ISO cleanliness levels. |
| Water removal | Using Donaldson water removal filters to remove free water from the system. |
| Filter new fluid | Clean up new fluids because they are usually highly contaminated. Don't contaminate your equipment with new fluids. Protect your equipment with proper filtration. |

Filter Buddy™ Assembly Choices

NOTE: FILTERS ORDERED SEPARATELY

The Importance of Temperature When Selecting a Filter Cart

Consider operating temperature ranges when determining the proper viscosity filtration solution. It's crucial to select the proper viscosity option to maintain adequate flow and avoid restriction. Refer to the oil viscosity with temperature chart located on the front cover of the catalog.

Example: ISO Grade 32 Hydraulic Oil @ 68°F = 86.7 (cSt)

| Assembly Part No. | Low Viscosity Max Viscosity 900 SUS (200 cSt)* Filters ordered separately | High Viscosity Max Viscosity 8000 SUS (1700 cSt)* Filters ordered separately | |
|---|---|--|-------------------------------|
| | X011303 [‡] | X011304 [‡] | X011305 [‡] |
| Operating Temperature Range: | ----- -10° F to 160° F (-23° C to 71° C) ----- | | |
| Electrical Service: | 115 volts: 8.4 amp, single phase, 60 Hz | | |
| Gear Pump Flow Rate*: | 2 gpm (7.6 lpm) | 1.8 gpm (6.8 lpm) | 5 gpm (18.9 lpm) |
| TEFC** Motor: Totally Enclosed Fan-Cooled | 1/2 hp, 1725 rpm | 3/4 hp, 1725 rpm | 1 1/2 hp, 1725 rpm |
| Compatibility: | ----- Mineral-based fluids, water glycols, polyol esters ----- | | |
| Hose: terminated with male NPT connections | Suction: 4' (1.2m) Length, 3/4" (1.9 cm) OD | Suction: 4' (1.2m) Length, 1" (2.5cm) OD | |
| | Discharge: 7' (2.1m) Length, 1/2" (1.3 cm) OD | Discharge: 7' (2.1m) Length, 3/4" (1.9 cm) OD | |
| P573154 Stainless Steel Wand Kit (optional): | ----- Suction: 40" (1.0 m) Length Discharge 20" (.5 m) Length ----- | | |
| Dry Weight: | Approximately 55 lbs. (25 kg) | Approximately 65 lbs. (29 kg) | Approximately 90 lbs. (40 kg) |
| Dimensions: | Height: 21" (533 mm) | Height: 25" (635 mm) | |
| | Width: 13" (330 mm) | Width: 13" (330 mm) | |
| | Length: 26" (660 mm) | Length: 26" (660 mm) | |
| Filter Notes: | ----- Requires 2 Filters ----- | | |

*These part numbers now have relief valves in the pump. The relief valve setting is: 10.3 bar (150 PSI)

Filter Choices for X011303 and X011304

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length in | mm | Donaldson Part No. |
|------------------|---|--|--------------|----------------------|--------------------|
| Synteq Synthetic | <4 μm | 9.4 | 240 | P165185 ¹ | |
| | 6 μm | 5.97 | 152 | P165354 | |
| | 6 μm | 9.4 | 240 | P165332 | |
| | 11 μm | 5.97 | 152 | P163542 ² | |
| | 11 μm | 5.97 | 152 | P164375 | |
| | 11 μm | 9.4 | 240 | P164378 | |
| | 13 μm | 9.4 | 240 | P164056 ¹ | |
| | 14 μm | 9.4 | 240 | P177047 | |
| | 22 μm | 9.4 | 240 | P164059 ¹ | |
| | 23 μm | 9.4 | 240 | P163567 ² | |
| | 23 μm | 5.97 | 152 | P164381 | |
| | 23 μm | 9.4 | 240 | P164384 | |
| | 50 μm | 5.97 | 152 | P165335 | |
| | 50 μm | 9.4 | 240 | P165338 | |
| Water Absorbing | 10 μm | 9.4 | 240 | P560584 | |

Filter Choices for X011305

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ Rating based on ISO 16889 | Length in | mm | Donaldson Part No. | Comments |
|------------------|---|--|--------------|----------------------|----------------------|----------|
| Synteq Synthetic | <4 μm | 14.2 | 361 | P564468 | | |
| | 6 μm | 11.6 | 294 | P165675 | | |
| | 6 μm | 11.6 | 294 | P171274 ¹ | | |
| | 6 μm | 14.2 | 361 | P179763 | | |
| | 11 μm | 7.6 | 193 | P176207 | | |
| | 11 μm | 11.6 | 294 | P165659 | | |
| | 11 μm | 11.6 | 294 | P171275 ¹ | | |
| | 11 μm | 14.2 | 361 | P170949 | | |
| | 23 μm | 7.6 | 193 | P176208 | | |
| | 23 μm | 11.6 | 294 | P165569 | | |
| | 23 μm | 11.6 | 294 | P171276 ¹ | | |
| | 23 μm | 14.2 | 361 | P173789 | | |
| | 50 μm | 11.6 | 294 | P165672 | | |
| | 50 μm | 14.2 | 361 | P573353 | | |
| Water Absorbing | 10 μm | 11.6 | 294 | P179075 | Absorbs 300 ml water | |

¹Viton® O-rings are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions and HWCF (high water content fluids) over 150°F.

²500 psi collapse

Filter Notes: • Standard filter collapse rating is 150 psi, except as noted.
• X011303 and X011304 thread sizes: 1 3/8"-12 UNF-2B (HMK04)
• X011305 thread size: 1 3/4"-12 UNF-2B (HMK05)
• Refer to table in the Technical Reference Guide for fluid compatibility with our filter media.

Filter Panels

Fixed-Mounted Off-Line Filtration

Donaldson Filter Panels provide fixed-mount offline/ kidney loop filtration and a turnkey approach to supplemental filtration for your in-plant machinery and hydraulic equipment – helping to reduce costs and achieve and maintain proper ISO cleanliness levels.

Donaldson filter panels are offered with 4 different pump flow rates. Reservoir size, fluid viscosity and fluid temperature will help determine the correct flow rate. Filter panels feature dual HMK05 filtration utilizing Donaldson’s exclusive high efficiency Synteq™ media. The filters are plumbed in series giving you the option of coarse/fine particle removal or install a water absorbing filter for water/particle removal.

Notice

Donaldson Filter Panels include electric motors and indoor installation is recommended. Exposure to rain, snow and other elements may cause electric motors to fail. Failures that result from misapplication, improper use or storage are not covered by the Donaldson warranty.

Reference the aftermarket warranty: document no. F110064.

Fluid Compatibility

Not for use with diesel fuel or gasoline. For fuel solutions, please contact the Donaldson Clean Solutions team at clean.solutions@donaldson.com or 800-518-7784.



Applications

- Transferring New Oil
- Cleaning Stored Oil

| Features | Benefits |
|------------------------------------|--|
| High efficiency media grades | Cost effective filtration |
| Dual-stage filtration | Coarse/Fine or Water/Particulate removal |
| Differential pressure indicators | Alerts you when to change filters |
| Optional overload protected switch | Prevents motor from overheating |
| Sample port | Enables system cleanliness measurements |
| Applications | |
| Offline filtration | Supplement existing filtration to achieve target ISO cleanliness levels. |
| Water removal | Using Donaldson water removal filters to remove free water from the system. |
| Filter new fluid | Clean up new fluids because they are usually highly contaminated. Don't contaminate your equipment with new fluids. Protect your equipment with proper filtration. |

Filter Panel Assembly Choices

NOTE: FILTERS ORDERED SEPARATELY

The Importance of Temperature When Selecting a Filter Cart

Consider operating temperature ranges when determining the proper viscosity filtration solution. It's crucial to select the proper viscosity option to maintain adequate flow and avoid restriction. Refer to the oil viscosity with temperature chart located on the front cover of the catalog.

Example: ISO Grade 32 Hydraulic Oil @ 68°F = 86.7 (cSt)

| Assembly Part No. | Low Viscosity Max Viscosity 500 SUS (108 cSt)* Filters ordered separately | | | High Viscosity Max Viscosity 8000 SUS (1700 cSt)* Filters ordered separately |
|--|---|----------------------|----------------------|--|
| | X011299 [‡] | X011300 [‡] | X011301 [‡] | X011302 [‡] |
| Operating Temperature: | ----- -10° F to 160° F (-23° C to 71° C) ----- | | | |
| Gear Pump Flow Rate*: | 3 gpm (11.4 lpm) | 5 gpm (18.9 lpm) | 10 gpm (37.9 lpm) | 2 gpm (7.57 lpm) |
| TEFC** Motor: | 1/2 hp, 1800 rpm | 3/4 hp, 1800 rpm | 1 hp, 1800 rpm | 1 hp, 1200 rpm |
| Fluid Compatibility: | ----- Mineral-based fluids, water glycols, polyol esters ----- | | | |
| Connections | Inlet (pump) : SAE 12 O-Ring Outlet: SAE 20 O-Ring | | | Inlet (pump) : SAE 12 O-Ring Outlet: SAE 20 O-Ring |
| Electrical Service: 115 volts, 60 Hz single phase | 8.4 amp | 14 amp | 14 amp | 14 amp |
| Dry Weight: | Approx. 95 lbs. (43 kg) | | | Approx. 120 lbs. (54 kg) |
| Dimensions: | Height: 20" (508 mm) | | Width: 36" (915 mm) | Depth: 8" (203 mm) |
| Filter Notes: | Requires 2 Filters | | | Requires 4 Filters |

**Totally Enclosed Fan-Cooled

[‡]These part numbers now have relief valves in the pump. The relief valve setting is: 10.3 bar (150 PSI)

Filter Choices

| Media Type | $\beta_{x(c)} = 2$ Rating based on ISO 16889 | $\beta_{x(c)} = 1000$ | Length | | Donaldson Part No. | Comments |
|------------------|---|-----------------------|--------|-----|----------------------|----------------------|
| | | | in | mm | | |
| Synteq Synthetic | <4 μ m | | 14.2 | 361 | P564468 | |
| | 6 μ m | | 11.6 | 294 | P165675 | |
| | 6 μ m | | 11.6 | 294 | P171274 ¹ | |
| | 6 μ m | | 14.2 | 361 | P179763 | |
| | 11 μ m | | 7.6 | 193 | P176207 | |
| | 11 μ m | | 11.6 | 294 | P165659 | |
| | 11 μ m | | 11.6 | 294 | P171275 ¹ | |
| | 11 μ m | | 14.2 | 361 | P170949 | |
| | 23 μ m | | 7.6 | 193 | P176208 | |
| | 23 μ m | | 11.6 | 294 | P165569 | |
| | 23 μ m | | 11.6 | 294 | P171276 ¹ | |
| | 23 μ m | | 14.2 | 361 | P173789 | |
| | 50 μ m | | 11.6 | 294 | P165672 | |
| | 50 μ m | | 14.2 | 361 | P573353 | |
| Water Absorbing | 10 μ m | | 11.6 | 294 | P179075 | Absorbs 300 ml water |

¹Viton® O-ring, Epoxy are required when using diester, phosphate ester fluids, water glycol, water/oil emulsions and HWCF (high water content fluids) over 150°F.

VDOPS Vacuum Dehydration Oil Purification System

Features

- Variable frequency drive to improve inlet condition and performance
- Claw vacuum pump for superior performance and long life
- All controls and system function viewable from the front
- Alarm when filter is plugged and needs to be changed
- Upstream & downstream oil sample ports
- Custom options
- Space efficient
- High water extraction rates



Example Model Number: VDOPS-50VFD-840X-64kW-AWD-480-N4-V

| Classification | Code | Description |
|------------------------|-------|--|
| Product Type | VDOPS | Vacuum Dehydration Oil Purification System |
| Flow Rate | 50VFD | 50 GPM (189 lpm) Variable Frequency Drive (Variable Flow) |
| Housing Size and Style | 840X | 840X Carbon Steel Filter Housing |
| Heater Size | 64kW | 64 Kilowatt Heater |
| Optional Equipment | AWD | Auto Water Drain |
| Electrical Requirement | 480 | 480 Volts |
| NEMA Rating | N4 | NEMA 4 |
| Seal Material | V | Viton |

Installation Requirements

| | |
|-------------------------------|-------------------------|
| Input Voltage | 480 V / 3 Phase / 60 Hz |
| Designed FLA (Full Load Amps) | 98 AMPS |
| Inlet Connection Size | 2" Female Camlock |
| Outlet Connection Size | 2" Male Camlock |

Electrical Operating Specifications

| | |
|-------------------|--------------------|
| Oil Pump Motor | (Nameplate Rating) |
| Vacuum Pump Motor | (Nameplate Rating) |

Mechanical Operating Specifications

| | |
|---------------------------------|--------------------|
| Flow Rate | 50 GPM (189 lpm) |
| Maximum Discharge Pressure | 100 PSI (6.9 bar) |
| Normal Discharge Press | 30 PSI (2.1 bar) |
| Maximum Vacuum Setting | 27" Hg (686 mm Hg) |
| Minimum Vacuum Setting | 15" Hg (381 mm Hg) |
| Normal Heater Set Point Setting | 150° F (66° C) |
| Maximum Oil Viscosity | 1500 SSU (323 cSt) |
| Seal Material | Viton |

IMPORTANT Product Restriction

The **Vacuum Dehydration Oil Purification System** should never be used to remove particulates from volatile fluids such as gasoline since the pump cannot be used for solvents with low lubricity. In addition, the unit should not be used on liquids with a flash point below 200°F (93°C).

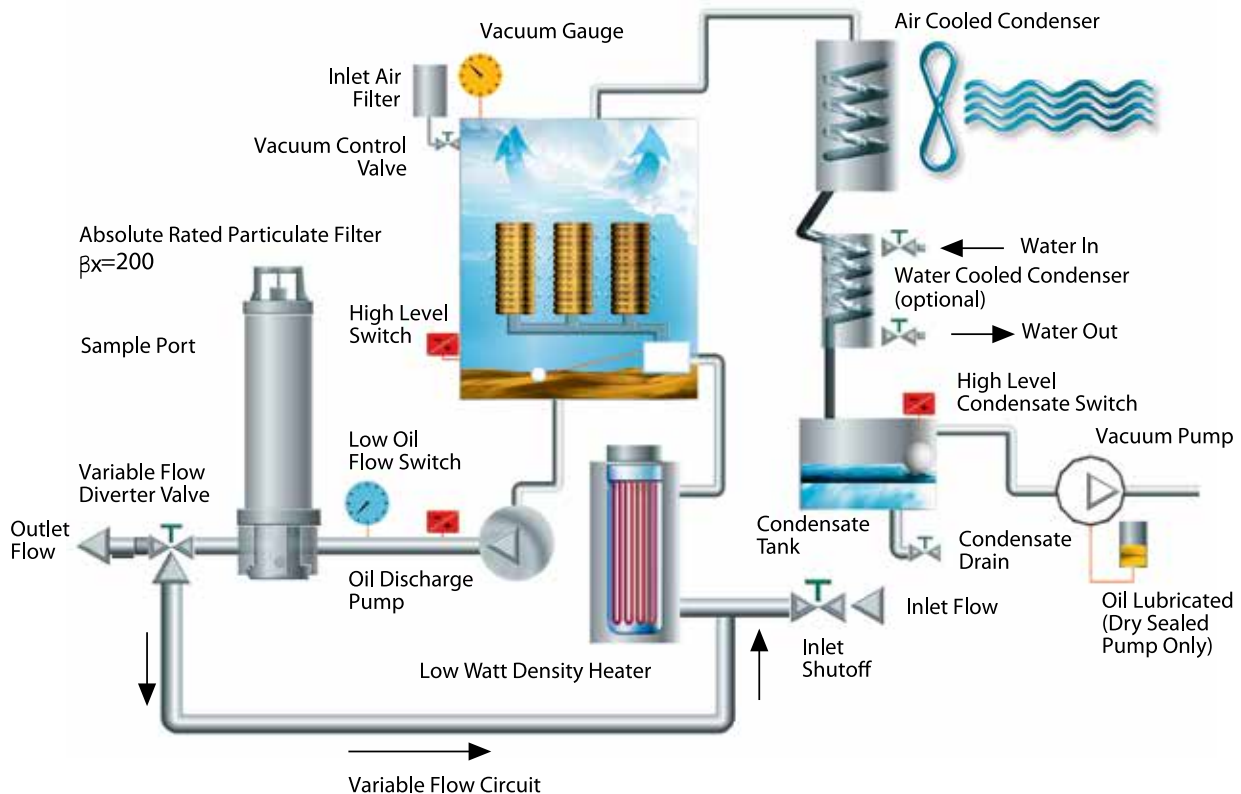
LEAD TIME NOTE:

This product is configured with the specifications and features of your choice. Please contact your Donaldson sales representative for lead time details.

Vacuum Dehydrators

The ultimate piece of equipment to effectively remove particulate, water and dissolved gases from petroleum and synthetically based fluids. This system removes 100% of free and emulsified water from oils, and 90% of dissolved water from oils to as low as 20 ppm. It also removes particulate to as low as ISO 12/10/9. In addition, this system removes 90% of dissolved gases. It is available in flow rates from 1-200 gpm (4-760 lpm), NEMA 4 and 7 Explosion Proof with custom options.

VDOPS Schematic



The water removal principle used in the Vacuum Dehydrators dependably removes water well below the oil saturation point, even when tightly bound in an emulsion. A vacuum pump draws fluid into the unit where it is heated and then flows through dispersal filters inside the vacuum tower. Contaminated oil flows through the pores of these filters, is exposed to the vacuum and dehydrated. Dried oil is removed, filtered and pumped back into the reservoir.

COPS Coalescer Oil Purification System

Features

- Variable frequency drive to improve inlet condition and performance
- Positive displacement pump for superior performance
- All controls and system function viewable from the front
- Auto mode for auto water drain
- Upstream and downstream oil sample ports
- Custom options
- Space efficient
- High free water extraction rates



Coalescers

Designed to rapidly remove free water and particulates from diesel fuel, fuel oil and most other hydraulic/lubricating oils. Coalescing technology outperforms centrifuges, are simpler to use, cost less to maintain and are lower in initial purchase price. Designed to run continuously in an outdoor environment, virtually no mechanical maintenance is needed. Flow rates available from 20-275 gpm (76-1041 lpm).

Example Model Number: COPS-20VFD-840X/2-24kW-480-TS-N4-B

| Classification | Code | Description |
|------------------------|--------|--------------------------------------|
| Product Type | COPS | Coalescer Oil Purification System |
| Flow Rate | 20VFD | 20 GPM (76 lpm), Variable Flow Drive |
| Housing Size and Style | 840X/2 | Qty (2) 840X Housings in Series |
| Heater Size | 24kW | 24 kilowatts |
| Electrical Requirement | 480 | 480 / 3 Phase / 60 Hz |
| Optional Equipment | TS | Touch Screen |
| NEMA Rating | N4 | NEMA 4 |
| Seal Material | B | Buna-N |

Installation Requirements

| | |
|-------------------------------|-----------------------|
| Input Voltage | 480 / 3 Phase / 60 Hz |
| Designed FLA (Full Load Amps) | 35 AMPS |
| Inlet Connection Size | 2" Flanged |
| Outlet Connection Size | 1-1/2" Flanged |

Mechanical Operating Specifications

| | |
|----------------------------|--------------------|
| Flow Rate | 20 GPM (76 lpm) |
| Maximum Discharge Pressure | 100 PSI (6.9 bar) |
| Maximum Oil Viscosity | 1500 SSU (323 cSt) |
| Seal Material | Buna-N® |

IMPORTANT Product Restriction

The **Coalescer Oil Purification System** should never be used to remove particulates from volatile fluids such as gasoline since the pump cannot be used for solvents with low lubricity.

LEAD TIME NOTE:

This product is configured with the specifications and features of your choice. Please contact your Donaldson sales representative for lead time details.

Fluid Purification Systems

LTC Transformer Filtration

Bolt this system onto a transformer and continuously remove particulate (carbon) and water contamination, maintaining high dielectric values. Ideally suited for kidney loop filtration applications.



Bearing Lubrication

This system will remove particulate and heat from bearing lube oils to increase bearing life. It will achieve particulate removal from fluids to as low as ISO 12/10/9. It is available with optional flow and temperature monitoring devices.

High Flow Filter Skids

This system is ideal for rapidly removing particulate contamination from large reservoirs. Furthermore, this system creates turbulent flows in piping for oil flushing and efficiently removes particulate contamination to as low as ISO 12/10/9 levels. Flow rates are available from 50–2000 gpm (190-7600 lpm) with many quality features and additional options to increase its capabilities.



Common Fluid Purification Applications:

Turbine Lube Oil / Petro-Chemical Compressors / Diesel and Gas Fired Engines /
 Substation Maintenance Transformer Oil / EHC Speed Control Systems /
 Hydraulic Power Units for All Industries



The Donaldson Filter Buddy™ in use – cleaning up dirty oil in a small power unit.

Donaldson Delivers *any*
Performance Under Pressure





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Achieve More.





Donaldson Delivers
Superior Bulk Fluid Filtration

- Lower Total Cost of Ownership
- Avoid Unplanned Downtime
- Maximize Fuel Efficiency
- Low Installation Costs
- Custom Designs
- Modular Solutions
- Compact Installation
- Low Inventory Costs
- Easily Shipped
- Easily Serviced



Clean.

Donaldson single-pass filtration on the inlet removes contamination before it can enter your storage tank and contaminate it.

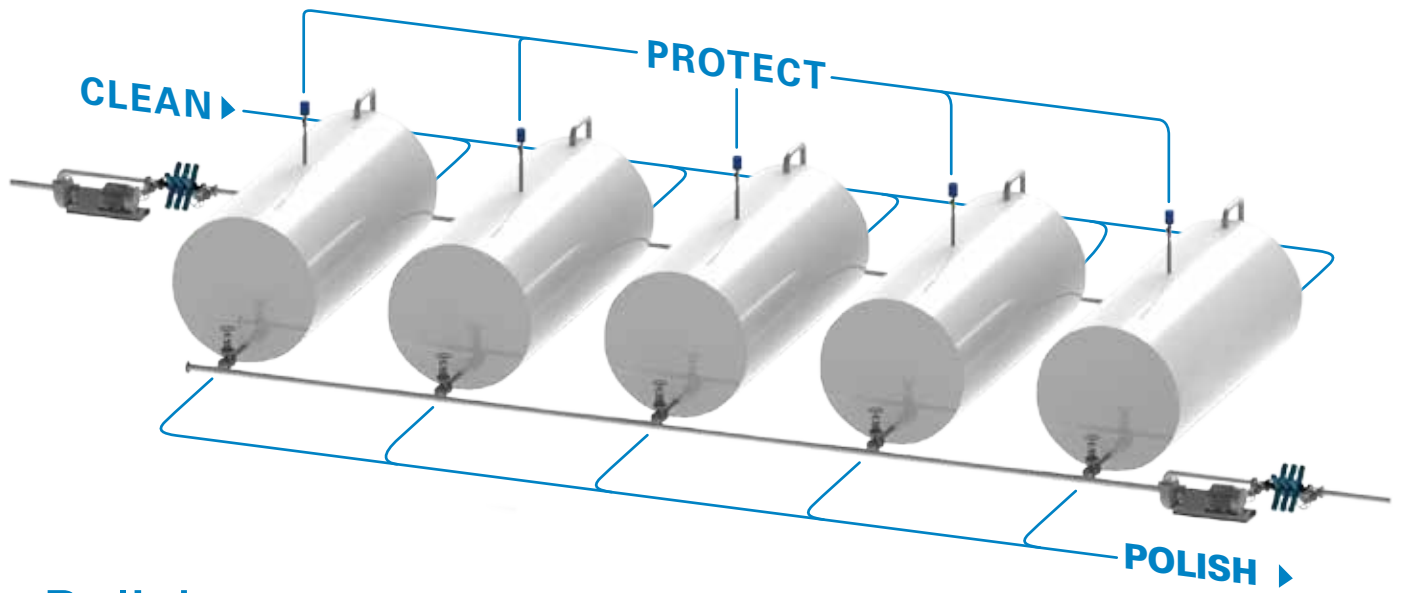
Compact and easy to replace, Donaldson filters are an important line of defense in maintaining fluid quality and can be configured for high flow rates while minimizing pressure drop.



Protect.

Water absorbing filters, T.R.A.P.[™] Breathers and Reservoir Air Dryers reduce the risk of moisture and contaminants entering a bulk storage tank so fluids are kept clean and dry. Used together, they'll help guard fluids from free water, airborne contamination and microbial growth for as long as they stay in storage.





Polish.

Unstable fluids and the tank itself can be a source of contamination. Final filtration on the outlet with Donaldson filters ensures that targeted ISO cleanliness levels are achieved before fluids are pumped into your system.

Achieve More.





Filters

Max. Working Pressure: 350 psi/2413 kPa/24.1 bar

Rated Static Burst: 800 psi/5516 kPa/55.2 bar

| Part Number | Fluid Type | Max. Flow Range | Target ISO Cleanliness | Filter Efficiency |
|-------------|---------------------------------|-----------------|------------------------|-----------------------|
| DBB5333 | All diesel fuels | 32 gpm/121 lpm | 14/13/11 | 4 micron @ Beta 2000 |
| DBB7733 | All diesel fuels | 32 gpm/121 lpm | 16/14/11 | 7 micron @ Beta 2000 |
| DBB8666 | All diesel fuels | 65 gpm/246 lpm | 14/13/11 | 4 micron @ Beta 2000 |
| DBB8777 | All diesel fuels | 65 gpm/246 lpm | 16/14/11 | 7 micron @ Beta 2000 |
| DBB8664 | Engine and gear oils | 65 gpm/246 lpm | 18/16/13 | 25 micron @ Beta 2000 |
| DBB8665 | Transmission and hydraulic oils | 65 gpm/246 lpm | 16/14/11 | 7 micron @ Beta 2000 |
| DBB0248 | Ethanol-free fluids* | 65 gpm/246 lpm | N/A | N/A |

*Designed with expanding, water-absorbing media that prevents water from entering storage or equipment tanks.

Filter Heads

Max. Working Pressure: 350 psi/2413 kPa/24.1 bar

Rated Static Burst: 800 psi/5516 kPa/55.2 bar

| Part Number | Filter Qty | Mounting Connection | Max. Flow Range | Bypass |
|-------------|------------|---------------------|-----------------|--------|
| P570329 | 1 | SAE-20 O-ring | 65 gpm/246 lpm | No |
| P570330 | 1 | 1 1/4" NPTF | 65 gpm/246 lpm | No |
| P568583 | 2 | 1 1/2" SAE 4-Bolt | 125 gpm/473 lpm | No |



Pictured with Direct Gauge Adapter: P563809
Gauge: P562709
Use test points and direct gage adapters.

Filter Manifolds

| Part Number | Filter Qty | Mounting Connection | Max. Flow Range |
|-------------|------------|---------------------|------------------|
| P561880 | 4 | 2" ANSI 150 Flange | 250 gpm/946 lpm |
| P568932 | 8 | 4" ANSI 150 Flange | 500 gpm/1893 lpm |
| P568933 | 10 | 4" ANSI 150 Flange | 600 gpm/2271 lpm |
| DFF1012 | up to 12 | 4" ANSI 150 Flange | 700 gpm/2650 lpm |



T.R.A.P.™ Breathers

T.R.A.P. breathers protect the fluids in your storage tank from airborne particulate moisture contamination and ambient moisture.

| Assembly Part Number | Mounting Connection | Max. Flow Range | Filter Efficiency | Replacement Part Number |
|----------------------|---------------------|------------------|-------------------|-------------------------|
| X920006 | 1-1/2 in NPT Female | 400 gpm/1500 lpm | 97% @ 3 micron | P923075 |



Reservoir Air Dryer

The Reservoir Air Dryer combats ambient ingress of moisture by introducing a steady flow of clean, dry air to the reservoir. No electrical requirements.

| Part Number | Outlet Flow Volume @100 psi & dew point suppression | Inlet Air required @ 100 psi | Inlet/Outlet |
|-------------|---|------------------------------|--------------|
| P575852 | 0.5 scfm (14.2 slpm) | 0.8 scfm (22.7 slpm) | 1/4" NPT |



DEF Filter and Housing

Max. Working Pressure: 300 psi/2068 kPa/20.7 bar

| Part Number | Filter Element* | Mounting Connection | Max. Flow Range | Efficiency |
|-------------|-----------------|---------------------|-----------------|-------------------------------|
| P575057 | P575059 | 1" NPT | 10 gpm/38 lpm | 1 micron @ Beta 5000 (99.98%) |
| P575058 | P575059 | 1" BSPT | | |

*Filter element sold separately.



Bulk hP Filters

Designed for higher pressure delivery systems out of bulk storage tanks, typically on air pump fed hose reels in lube shops, mobile service trucks and other refer pressure single pass applications.

Element Collapse Rating: 300 psi/2068 kPa/20.7 bar

Max. Working Pressure: 1000 psi/6895 kPa/68.9 bar

Rated Static Burst: 2200 psi/15168 kPa/151.7 bar

| Part Number | Fluid Type | Max. Flow Range | Target ISO Cleanliness | Filter Efficiency |
|-------------|---------------------|-----------------|------------------------|-----------------------|
| P565184 | Petroleum based oil | 50 gpm/189 lpm | 14/13/11 | 4 micron @ Beta 2000 |
| P565185 | Petroleum based oil | 50 gpm/189 lpm | 16/14/11 | 8 micron @ Beta 2000 |
| P565183 | Petroleum based oil | 50 gpm/189 lpm | 18/16/13 | 14 micron @ Beta 2000 |

Plastic filter cartridges and metal housings are easily separated for recycling.

Bulk hP Filter Heads

Max. Working Pressure: 1000 psi/6895 kPa/68.9 bar

| Part Number | Filter Qty | Mounting Connection | Max. Flow Range | Bypass Valve |
|-------------|------------|---------------------|-----------------|--------------|
| P566023 | 1 | SAE-16 O-ring | 50 gpm/189 lpm | No |
| P566024 | | | | 50 PSI |



For more information about bulk filtration systems, contact Donaldson:

Email: clean.solutions@donaldson.com

Web: mycleandiesel.com

Phone: 855-518-7784

More detailed product information can be found in the **F111500 Bulk Filtration Product Guide.**

Donaldson provides this technical reference as a short course in “Hydraulic Filtration 101” — for those who want to gain a better understanding of hydraulic filtration.

In industrial and mobile applications at factories all over the world, we too often see hydraulic circuits that don’t include proper fluid filtration, or include it as an afterthought. Good filtration needs to be an integral part of the hydraulic circuit to ensure the long life and proper operation of the pumps, valves and motors. A \$100 filter protects your \$100,000 equipment.

This section is offered to aid in choosing the filter that will help you achieve the ideal cleanliness levels and longest life for your critical components.

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Symbols Used

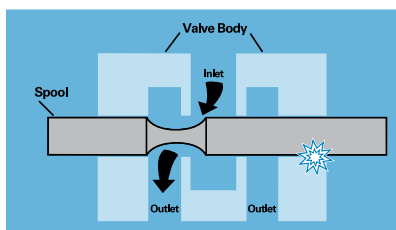
| | |
|------------|--|
| β | Beta Ratio |
| cSt | Centistokes |
| ΔP | Pressure Drop or Differential Pressure |
| ISO | International Standards Organization |
| μm | Micron or micrometer |
| ppm | Parts per million |
| SSU | Saybolt Seconds Universal |
| SUS | |

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Why Hydraulic Components Need Protection

Fluid power circuits are designed in all shapes and sizes, both simple and complex in design, and they all need protection from damaging contamination. Abrasive particles enter the system and, if unfiltered, damage sensitive components like pumps, valves and motors. It is the job of the hydraulic filter to remove these particles from the oil flow to help prevent premature component wear and system failure. As the sophistication of hydraulic systems increases, the need for reliable filtration protection becomes ever more critical.

How Contamination Damages Precision Parts



This illustration of a simple hydraulic valve illustrates how particles damage components. In normal operation, the spool slides back and forth in the valve

body, diverting oil to one side of the valve or the other. If a particle lodges between the spool and valve body, it will erode small wear particles from the metal surfaces. As these wear particles are moved back and forth by the action of the spool, they can roll into a burr that jams the spool and disables the valve.



Component Damage

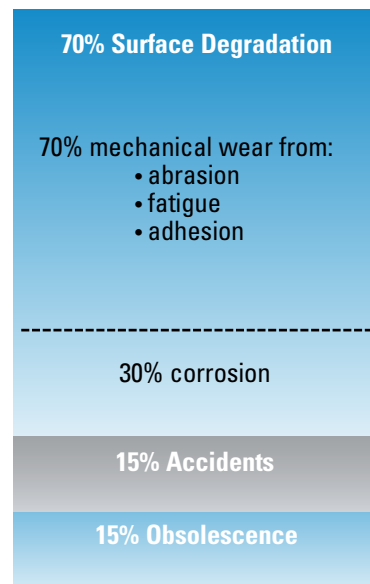
Looking down the barrel of an hydraulic cylinder, we can see the scratches along the inside surface. Don't cut costs by eliminating hydraulic filters. It could cost you more in the long run in major component repairs.

Types of Contaminant

- Many different types of contamination may be present in hydraulic fluid, causing various problems. Some are:
- Particulate (dust, dirt, sand, rust, fibers, elastomers, paint chips)
- Wear metals, silicon, and excessive additives (aluminum, chromium copper, iron, lead, tin, silicon, sodium, zinc, barium, phosphorous)
- Water
- Sealants (Teflon[®]* tape, pastes)
- Sludge, oxidation, and other corrosion products
- Acids and other chemicals
- Biological, microbes (in high water based fluids)

Typical Factors in Component Life

Studies show that most (typically 70%) of hydraulic component replacement is necessary because of surface degradation, and most of that is due to mechanical wear. Proper filtration of hydraulic fluids can lengthen component life.



Disaster Strikes

When filters are not a main component of the hydraulic circuit, disaster awaits. Here, piston rings were eaten away by contaminants.

* Teflon is a registered trademark of E.I. DuPont de Nemours & Co., Inc.

Where Contamination Comes From

There are a surprising number of contaminated sources in a hydraulic system or circuit.

New Hydraulic Fluid

Adding new fluid can be a source; even though it's fresh from the drum, new hydraulic fluid isn't clean. (It may look clean, but, remember, the human eye can only see a particle the size of about 40 μm .) Oil out of shipping containers is usually contaminated to a level above what is acceptable for most hydraulic systems: typically, new fluid has a cleanliness level about the same as ISO Code 23/21/19, and water content is typically 200 to 300 ppm. Never assume your oil is clean until it has been filtered. One very effective way of ensuring thorough fluid conditioning is with a dedicated off-line circulation loop, or "kidney" loop filtration.

Built-In

Built-in contamination, also called primary contamination, is caused during the manufacture, assembly and testing of hydraulic components. Metal filings, small burrs, pieces of Teflon tape, sand and other contaminants are routinely found in initial clean up filtration of newly manufactured systems.

Ingressed

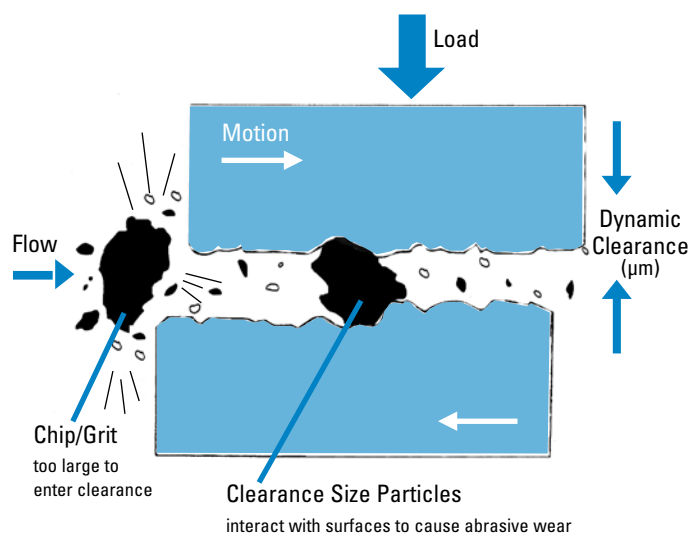
Ingressed or external contamination comes from the environment surrounding the system. Dirt can enter the hydraulic fluid supply through leaking seals, reservoir breather caps, and worn cylinder rod seals. Ingressed moisture, particularly, can cause long-term problems. As a hot system cools at night, cool moisture-laden air can be drawn into the reservoir; as the air condenses, water is released into the reservoir. Water in excess of 0.5% by volume in a hydrocarbon-based fluid accelerates the formation of acids, sludge and oxidation that can attack internal components, cause rust, and adversely affect lubrication properties. The severity of ingress and type of contaminant are dictated by the applications and environment.

Induced

Maintenance procedures can introduce contamination into the system. Opening the system allows airborne particles to enter. Leaving the system open during operation provides continuous ambient particle ingress. Keep your system closed as much as possible.

In-Operation

The major source of contamination are the pump and actuators, the hydraulic cylinder, or the hydraulic motor. Wear-generated contaminants are a hazard during normal hydraulic system operation. The circuit actually generates additional particles as the fluid comes into contact with the precision machined surfaces of valves, motors and pumps. Contaminant levels can keep doubling with every new particle generated. The result can be catastrophic if these contaminants are not properly filtered out of the system.



Rubber & Elastomers

Due to temperature, time, and high-velocity fluid streams, rubber compounds and elastomers degrade — thus releasing particulates into the fluid. This may be from hoses, accumulator bladders, seals, or other elastomer products.

High Water Based Fluids

The water in HWBF tends to support biological growth and generate organic contamination and microbes.

Replacement of Failed Components

Failure to thoroughly clean fluid conductor lines after replacing a failed hydraulic pump will cause premature catastrophic failure.

Donaldson recommends frequent oil sampling to ensure proper contamination control. Sample test points should be close to hydraulic pumps and at other key locations that provide safe, reliable access to the fluid while under full system pressure.

Fluid Conditioning

Fluid Conditioning is the term for the overall conditioning of the fluid in the hydraulic system, and encompasses particulate removal via filters along with other various methods for removing silt, air, water, heat, acid, sludge or chemicals.

Particulate Removal

Particulate removal is usually done with mechanical filters. A well designed reservoir that allows settling will also help in keeping particulates out of the mainstream fluid. For ferrous particulates and rust, reservoir magnets or strainer band magnets can also be used. Other methods such as centrifuging or electrostatic filtration units can also be used, particularly in continuous batch processing and fluid reclamation.

Removal of Silt

Silt, defined as very fine particulate under 5 µm in size, requires very fine filtration or “oil polishing.”

Air Removal

Getting air out of the system is best done by adding 100 mesh screen in the reservoir, approximately 30° from horizontal to coalesce entrained air and allow larger bubbles to rise to the surface when reservoir velocities are low.

Water Removal

A number of techniques exist to prevent water or moisture ingress or to remove water once it is present in a hydraulic or lube oil system. The best choice of technique for removal is dependent on the whether or not the water exists as a separate phase (dissolved or free), and also on the quantity of water present. For example, the presence of water or moisture can be reduced or prevented from entering a fluid reservoir through the use of absorptive breathers or active venting systems. However once free water is present in small quantities, water absorbing filters or active venting systems usually provide adequate removal means.

Water Prevention and Removal Techniques

| | Usage | Prevents Humidity Ingression | Removes Dissolved Water | Removes Free Water | Removes Large Quantities of Free Water | Limit of Water Removal |
|----------------------------------|------------------------|------------------------------|-------------------------|--------------------|--|-------------------------|
| Adsorptive Passive Breather | prevention | Y | | | | n/a |
| Active Venting System | prevention and removal | Y | Y | Y | | down to <10% saturation |
| Water Absorbing Cartridge Filter | removal | | | Y | | only to 100% saturation |
| Centrifuge | removal | | | Y | Y | only to 100% saturation |
| Coalescer | removal | | | Y | Y | only to 100% saturation |
| Vacuum Dehydrator | removal | | Y | Y | Y | down to ~20% saturation |

For large quantities of water, vacuum dehydration, coalescence, and centrifuges are appropriate techniques for its removal. However, as each of these techniques operates on different principles, they have various levels of water removal effectiveness. The chart below provides comparative information on these techniques and their relative effectiveness. Care should be taken to apply the best technique to a given situation and its demands for water removal.

Chemical Removal

Removal of acids, sludge, gums, varnishes, soaps, oxidation products and other chemicals generally requires an adsorbent (active) filter with Fuller Earth, active type clays, charcoal, or activated alumina.

Heat Removal

Removing heat is important to maintain viscosity and prevent fluid breakdown. Usually performed with heat exchangers, including air-to-oil and water-to-oil types, finned coolers, or refrigerated units.

Heat Addition

Added heat is used for cold temp start-up to get fluid viscosities within operational limits. Use heaters, immersion or in-line.

Kidney Loop Filtration

One very effective way of ensuring thorough fluid conditioning is with a dedicated off-line circulation loop, or “kidney” loop. This system uses a separate circulation pump that runs continuously, circulating and conditioning the fluid. Multiple stages and types of filters can be included in the circuit, as well as heat exchangers and in-line immersion heaters.

HYDRAULIC FILTRATION TECHNICAL REFERENCE

Proper Filter Application

When selecting a new filter assembly or replacement filter, it's important to first answer some basic questions about your application. Where will the filter be used? What is the required cleanliness level (ISO code) of your system? What type of oil are you filtering? Are there specific problems that need to be addressed?

It's also important to think about the viscosity of the fluid in your system. In some machinery lubrication applications, for example, the oil is very thick and has a tougher time passing through the layer of media fibers. Heating techniques and the addition of polymers can make the liquid less viscous and therefore easier to filter. Another option is to install a filter with larger media surface area, such as the Donaldson W041 or HRK10 low pressure filters, that can accommodate more viscous fluids.

Next, think about duty cycle and flow issues. Working components such as cylinders often create wide variations in flow—also called pulsating flow—that can be problematic for filters with higher efficiency ratings. On the other hand, dedicated off-line filtration (also called “kidney loop”) produces a very consistent flow, so it makes sense to use a more efficient filter.

Filters used in applications with steady, continuous operation at lower pressures will last longer than filters that must endure cycles of high pressure pulsating flow. Generally, the lower the micron rating of a filter, the more often it needs to be changed since it is trapping more particles.

Finally, it's wise to ask yourself, “How much is my equipment worth?” Calculate how much it would cost to replace the equipment in your system, in case of component failure, and make sure those areas are well protected with proper filtration. (For example, high performance servo valves are very sensitive, costly components that need to be protected with finer filtration media.)

Minimizing maintenance costs through good contamination control practices requires proper filter application based on the specific contamination problems. Good contamination control means cost-effective filtration. When looking for a filter, first assess the needs of your system and any problem areas.

Characteristics to Consider When Specifying a Filtration System

- 1) Oil Viscosity
- 2) Flow
- 3) Pressure
- 4) What Components will be protected by the filter
- 5) Cleanliness level required (expressed in ISO code)
- 6) Type of oil/fluid
- 7) Environment (the system, the surrounding conditions, etc.)
- 8) Duty cycle
- 9) Operating Temperature

Fluid Properties

Lubricity The property of the fluid that keeps friction low and maintains an adequate film between moving parts.

Viscosity The thickness of the fluid as measured by resistance to flow. The fluid must be thin enough to flow freely, heavy enough to prevent wear and leakage. Hydraulic fluids thicken when they cool and thin out as they heat up. Because some hydraulic systems work under wide temperature extremes, viscosity can be an important factor.

Viscosity Index (VI) The rate of viscosity change with temperature: the higher the index, the more stable the viscosity as temperature varies. VI can sometimes be improved by additives, usually polymers.

Rust Resistance Rust inhibiting chemicals in hydraulic fluids help overcome the effects of moisture from condensation.

Oxidation Resistance Oxidation inhibitors delay the sludgy/acidic effects of air, heat, and contamination in the system.

Foaming Resistance Although control of foaming depends largely on reservoir design, anti-foaming additives in the fluid also help.

Types of Hydraulic Fluid

There are many kinds of fluids used for power, but they can basically be called petroleum-based fluids, biodegradable fluids, and fire-resistant fluids. A brief description of some of the types in each category are listed below; for details on these or others, consult your filter supplier or refer to a reputable manual on hydraulics, such as the *Lightning Reference Handbook*, published by Berendsen Fluid Power, Whittier, CA 90601.

Petroleum Based (Hydrocarbon)

These are the most commonly used fluids in hydraulic systems. Their major advantages are low cost, good lubricity, relatively low/non-toxicity, and common availability. This type of fluid is not just plain oil; rather, it is a special formulation with additives that make it suitable for hydraulic systems. Mostly, the additives inhibit or prevent rust, oxidation, foam and wear.

Variations:

- Straight oils: same as petroleum-based oil but without the additives.
- Automatic transmission fluids (ATF): excellent low temp viscosity and very high VI.
- Military hydraulic fluids (ie: MIL-H-5606 and MIL-H-83282): also called 'red oil' because of the color. Low viscosity, good for cold temp operations, but may have to be modified for pumps.

Fire Resistant Fluids

There are two types of fire-resistant fluids commonly used in hydraulic applications: Phosphate Esters and High Water Based Fluids (HWBF). Although generally not as viscous at cold temperatures as petroleum-based fluids, they are fire resistant due to their high content of noncombustible material. Very useful in overcoming the likelihood of fire caused by a broken hydraulic line spraying petroleum fluid into a pit of molten metal, onto a hot manifold, into a heat-treating furnace, or other ignition source.

Some types of HWBF:

- Oil-in-water emulsions (HFA): typically 95% water and 5% oil, with the oil droplets dispersed throughout the water. Provide some fire resistance, but due to oil content, other fluids are superior.
- Water-in-oil emulsions (invert emulsion HFB): typically 40% water and 60% oil, with the water dispersed in the oil. Provide some fire resistance, but due to oil content, other fluids are superior.
- Water-glycol (HFC): typically 40% water and 60% glycol. Excellent fire resistance. Since glycol is an antifreeze, water-glycol can be used at lower temps.

NOTE: HWBF may require reduced pressure rating of pumps and other components.

HFD Fluids

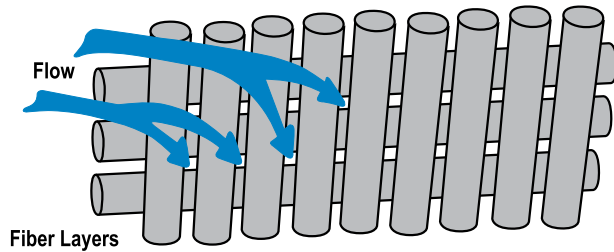
The HFD group is a classification given to several different types of synthetic products that do not contain petroleum oil or water. Phosphate ester fluids were the first HFD fluids and are the most fire resistant within the HFD family. Not as popular today, their use declined due to poor environmental performance, limited compatibility, and high cost. Certain phosphate esters have very high auto-ignition temperatures and are still used in specific applications, such as aircraft and power generation. A common brand is known as Sydol® (registered trademark of Solution, Inc.). Sydol requires EPR seal for chemical compatibility. Today most phosphate esters have been replaced by polyol esters. Based on organic esters, polyol esters are the most common HFD fluids used today. They offer good inherent fire resistance, good compatibility with system materials, excellent hydraulic fluid performance, and easy conversion from petroleum oil. In addition, the organic nature of these fluids gives them good environmental performance in biodegradability and aquatic toxicity. Another type of synthetic, fire resistant fluids have been formulated for certain niche markets. Water free polyalkylene glycols (PAGs) feature extended fluid life and good environmental performance. Technically an HFD fluid, PAGs (also known as polyalphaolefins (PAOs) are more often used for their biodegradability and overall environmental friendliness. This group also contains the synthetic silicone (siloxane) oils, known for their anti-foaming properties.

Biodegradable

With increasing concern about the environmental impact of hydraulic system leaks and spills, biodegradable fluids are receiving expanded usage, particularly in Europe. There are two types of common biodegradable hydraulic fluids: 1) vegetable-based oils, such as sunflower or rapeseed oils, and 2) synthetic oils like diesters, etc. Generally, systems using biodegradable fluids are derated for maximum and minimum temperatures. Users who replace standard hydraulic oils with biodegradable oils must check with filtration component manufacturers to confirm that the fluid and components are compatible.

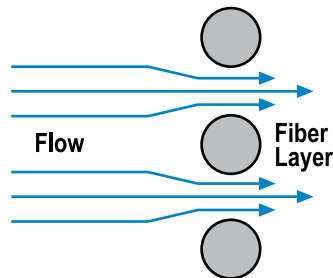
How Filter Media Functions In a Filtration System

The job of the media is to capture particles and allow the fluid to flow through. For fluid to pass through, the media must have holes or channels to direct the fluid flow and allow it to pass. That's why filter media is a porous mat of fibers that alters the fluid flow stream by causing fluid to twist, turn and accelerate during passage.



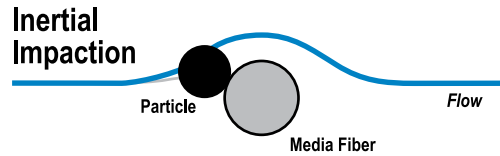
The fluid changes direction as it comes into contact with the media fibers, as illustrated above. As the fluid flows through the media, it changes direction continuously as it works its way through the maze of media fibers. As it works its way through the depths of the layers of fibers, the fluid becomes cleaner and cleaner. Generally, the thicker the media, the greater the dirt-holding capacity it has.

Looking at a cross-section view of the fibers, we can see how the flowstream is accelerated as it flows into the spaces between the fibers.

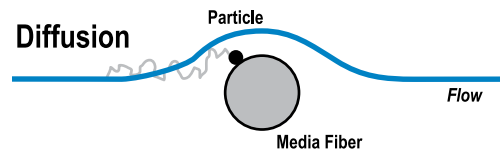


How Filter Media Collects Particles There are four basic ways media captures particles.

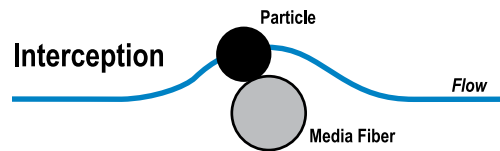
The first, called **inertia**, works on large, heavy particles suspended in the flow stream. These particles are heavier than the fluid surrounding them. As the fluid changes direction to enter the fiber space, the particle continues in a straight line and collides with the media fibers where it is trapped and held.



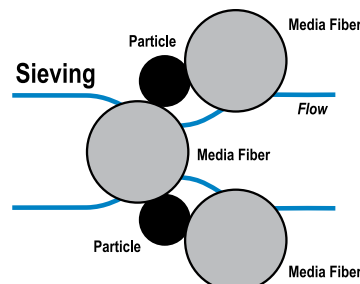
The second way media can capture particles is by **diffusion**. Diffusion works on the smallest particles. Small particles are not held in place by the viscous fluid and diffuse within the flow stream. As the particles traverse the flow stream, they collide with the fiber and are collected.



The third method of particle entrapment is called **interception**. Direct interception works on particles in the mid-range size that are not quite large enough to have inertia and not small enough to diffuse within the flow stream. These mid-sized particles follow the flow stream as it bends through the fiber spaces. Particles are intercepted or captured when they touch a fiber.



The fourth method of capture is called **sieving** and is the most common mechanism in hydraulic filtration. As shown at right, this is when the particle is too large to fit between the fiber spaces.



Basic Types of Hydraulic Filter Media

Filter Media

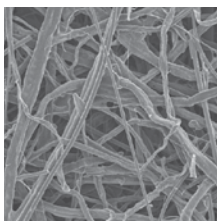
Media is a term used to describe any material used to filter particles out of a fluid flow stream. There are six basic types used to remove contamination in hydraulic applications:

Cellulose Media (Traditional)

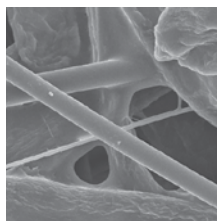
Cellulose fibers are actually wood fibers, microscopic in size and held together by resin. Fibers are irregular in both shape and size. Cellulose often has lower beta ratings, which means there are smaller pores in the media. Smaller media pores cause more flow resistance, resulting higher pressure drop.

While cellulose provides effective filtration for a wide variety of petroleum-based fluids, in certain applications it results in poor filtration performance as compared to synthetic media.

SEM 100X



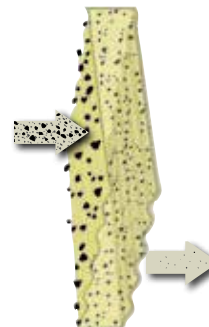
SEM 600X



MEDIA IMAGE



HOW IT WORKS



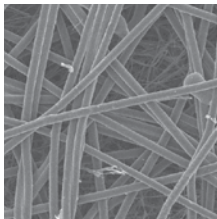
Synteq™ Media (Full Synthetic)

Synthetic fibers are man-made, smooth, rounded and provide the least resistance to flow. Their consistent shape allows for control of the fiber size and distribution pattern throughout the media mat to create the smoothest, least inhibited fluid flow. Consistency of fiber shape allows the maximum amount of contaminant-catching surface area and specific pore size control. The result is media with predictable filtration efficiencies removing specified contaminants and maximum dirt holding capacity.

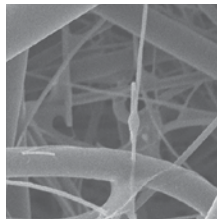
The low resistance of synthetic media to fluid flow makes it ideal for use with synthetic fluids, water glycols, water/oil emulsions, HWCF and petroleum-based fluids.



SEM 100X



SEM 600X



MEDIA IMAGE



HOW IT WORKS



Synteq XP™ Media (Synthetic & Cellulose)

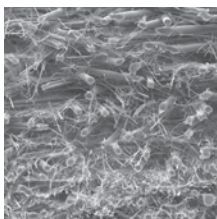
High-performance Synteq XP media was developed specifically to overcome the evolving challenges of today's fuels. This ground-breaking filter media takes fuel filtration performance to a whole new level by providing enhanced engine and system component protection options including:

- Higher efficiency for optimal engine protection, or
- Extended filter life (up to 2 to 3 times that of traditional filter media)

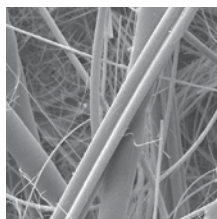
Versatile and smaller filter packaging configuration options are available for secondary fuel filtration.



SEM 100X



SEM 600X



MEDIA IMAGE



HOW IT WORKS

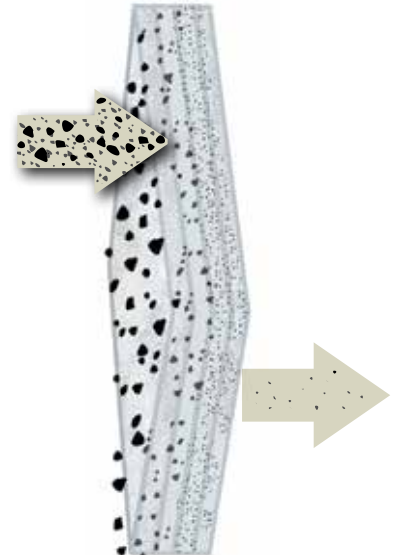


DT Synteq™ Media (High-Performance)

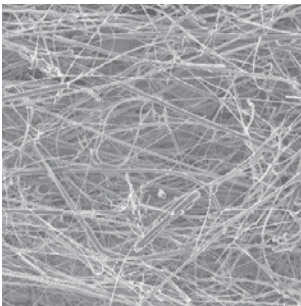
Donaldson high-performance DT grades of Synteq media utilize a blend of borosilicate glass fiber whose matrix is bonded together with an epoxy-based resin system. Donaldson filter media scientists found this to provides the best available chemical resistance for the broadest array of hydraulic applications.

DT Synteq is ideal for use with phosphate ester and water glycol fluids.

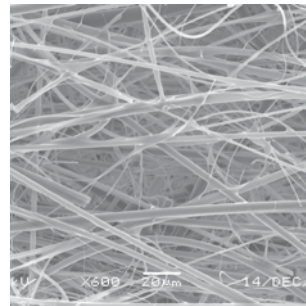
HOW IT WORKS



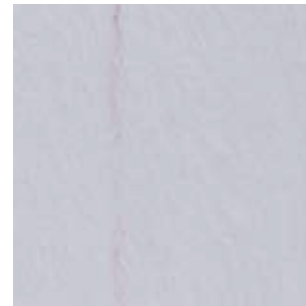
SEM 100X



SEM 600X



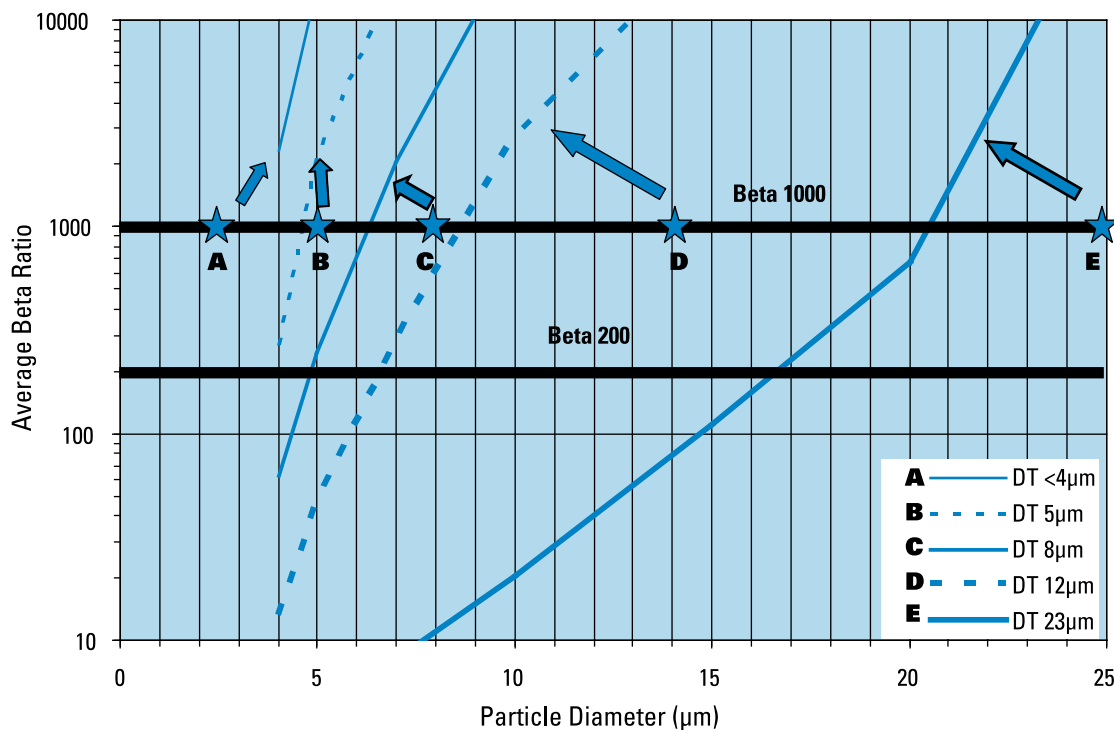
MEDIA IMAGE



The chemical and thermal compatibility of fluid filters is an increasingly difficult design challenge due to the complex variety of fluid systems. Today's fluid systems are often tailored towards the special needs fire resistance, biodegradability, and electrical insulating ability. Fortunately, there are chemical solutions available to meet these challenges.

Donaldson DT grades of Synteq media utilize a blend of borosilicate glass fiber whose matrix is bonded together with an epoxy-based resin system. Donaldson filter media scientists found this to provide the best available chemical resistance for the broadest array of hydraulic, fuel, and lube oil filtration applications.

Donaldson DT Synteq™ Media



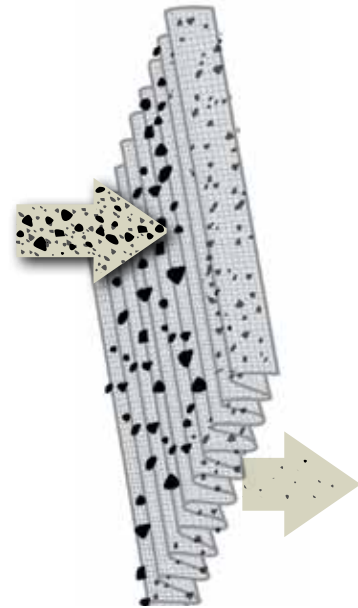
Wire Mesh Media

Wire mesh media consists of stainless steel, epoxy-coated wire mesh available in 3 mesh sizes:

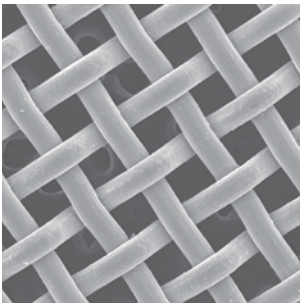
- 100 mesh yields 150 μm filtration
- 200 mesh yields 74 μm filtration
- 325 mesh yields 44 μm filtration

Typically wire-mesh filters will be applied to catch very large, harsh particulate that would rip up a normal filter. You may also find this media useful as a coarse filter in viscous fluid applications.

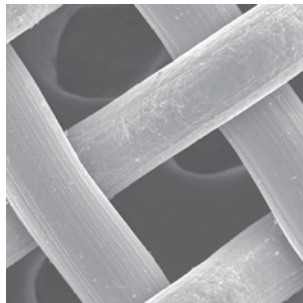
HOW IT WORKS



SEM 60X



SEM 100X



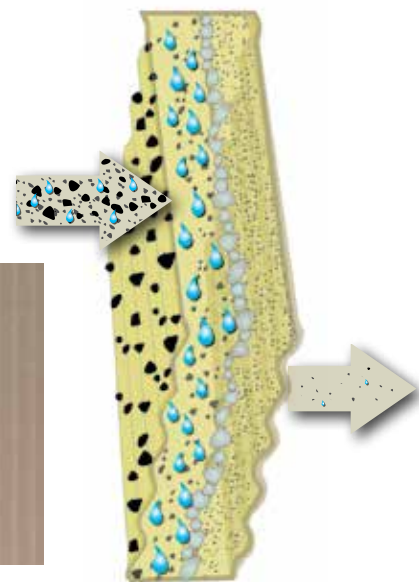
MEDIA IMAGE



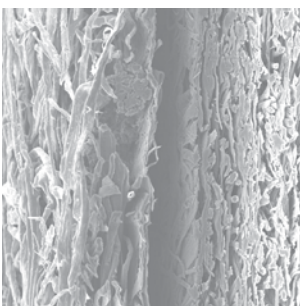
Water Absorbing Media

Water absorption media quickly and effectively removes free water from hydraulic systems. Using super-absorbent polymer technology with a high affinity for water absorption, this media alleviates many of the problems associated with water contamination found in petroleum-based fluids.

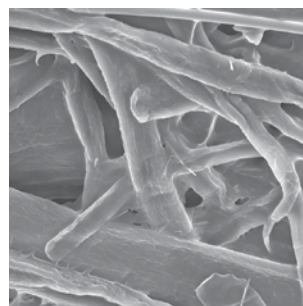
HOW IT WORKS



SEM 100X



SEM 600X



MEDIA IMAGE



Donaldson Filter Media Efficiency Ratings per ISO 16889 Test Standards

ISO 16889 is the international standard for Multi-Pass Testing to determine the efficiency (beta rating or beta ratio) and the dirt-holding capacity of the filter. It replaced the ISO 4572 test standard.

Donaldson filter media has been re-tested per the new standard and the current beta ratios are shown at right. New beta ratios are shown at 2, 200 and 1000, with a (c) to indicate test adherence to the ISO 16889 standard and traceability to NIST test dust.

| Fluid to be Filtered | Recommended Media |
|--|--------------------------|
| Petroleum-based..... | Synteq or Cellulose |
| Phosphate Ester | DT Synteq |
| Diester | Synteq |
| Water Glycol | DT Synteq |
| Water-Oil Emulsion | Synteq |
| Biodegradable Fluid | Synteq |
| HWCF (high water content fluids) | Synteq |
| Coarse Filtration..... | Wire Mesh |

Donaldson Filter Media Efficiency Ratings Per ISO 16889 Test Standards

$\beta_{x(c)} = 2$ $\beta_{x(c)} = 200$ $\beta_{x(c)} = 1000$

Donaldson DT Synteq Synthetic Media

| $\beta_{x(c)} = 2$ | $\beta_{x(c)} = 200$ | $\beta_{x(c)} = 1000$ |
|--------------------|----------------------|-----------------------|
| <4 µm | <4 µm | <4 µm |
| <4 µm | 4 µm | 5 µm |
| <4 µm | 6 µm | 8 µm |
| <4 µm | 9 µm | 12 µm |
| 7 µm | 18 µm | 23 µm |

Donaldson Synteq XP™ Synthetic Media

| $\beta_{x(c)} = 2$ | $\beta_{x(c)} = 200$ | $\beta_{x(c)} = 1000$ |
|--------------------|----------------------|-----------------------|
| <4 µm | 4 µm | 6 µm |
| <4 µm | 8 µm | 11 µm |
| <4 µm | 11 µm | 15 µm |

Donaldson Synteq™ Synthetic Media

| $\beta_{x(c)} = 2$ | $\beta_{x(c)} = 200$ | $\beta_{x(c)} = 1000$ |
|--------------------|----------------------|-----------------------|
| <4 µm | <4 µm | <4 µm |
| 5 µm | 10 µm | 13 µm |
| 6 µm | 16 µm | 22 µm |
| 7 µm | 18 µm | 23 µm |
| 14 µm | >42 µm | 50 µm |

Donaldson Cellulose Media

| $\beta_{x(c)} = 2$ | $\beta_{x(c)} = 200$ | $\beta_{x(c)} = 1000$ |
|--------------------|----------------------|-----------------------|
| 5 µm | 18 µm | 24 µm |
| 7 µm | 19 µm | 23 µm |
| 17 µm | >40 µm | >40 µm |
| 27 µm | >40 µm | >40 µm |

Donaldson Water Absorbing Media

| |
|-------|
| 10 µm |
|-------|

Donaldson Wire Mesh Media

| |
|--------|
| 45 µm |
| 60 µm |
| 75 µm |
| 90 µm |
| 125 µm |
| 150 µm |

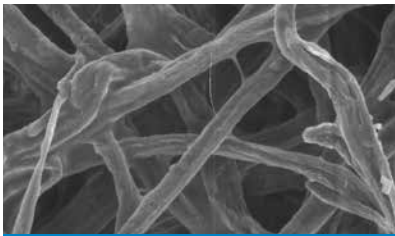
Hydraulic Filtration Pressure Drop

The difference between the inlet pressure and the outlet pressure is called pressure drop or differential pressure. It's symbolized by ΔP . ΔP is an irrecoverable loss of total pressure caused by the filter, and is mostly due to frictional drag on the fibers in the media.

Differential drop may increase as the particulate rating or efficiency of the filter (as expressed by its beta ratio) gets better. ΔP also increases as the filter is being loaded with contaminant.

Four Major Factors Contribute to Pressure Drop

1. Filter Media

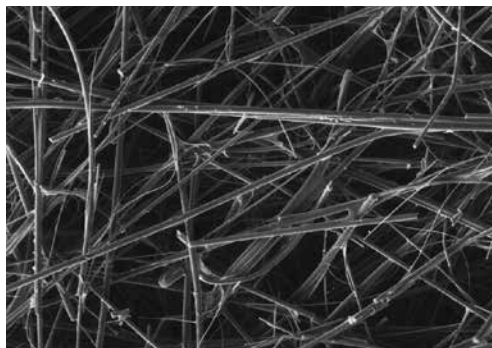


Natural Fiber Cellulose media, as seen under the scanning electron microscope.

Media is, of course, the main factor influencing pressure drop; indeed, it causes pressure drop. That's why having a low-friction, high-flowing media is so important. The natural cellulose or paper fibers (shown at left) typically used

in filtration are large, rough, and as irregular as nature made them.

Donaldson developed a synthetic media with smooth, rounded fibers, consistently shaped so that we can control the fiber size and distribution pattern throughout the media mat, and still allow the smoothest, least inhibited fluid flow. Our synthetic media is named Synteq™.



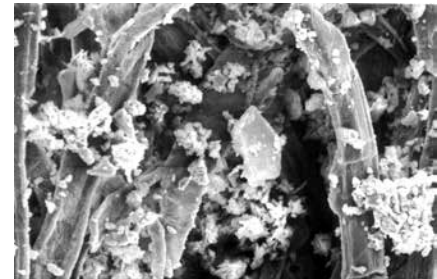
Donaldson's synthetic Synteq filter media — photo from scanning electron microscope — magnified hundreds of times.

Synteq fibers offer the least amount of resistance to fluid passing through the media. Consistency of fiber shape allows the maximum amount of contaminant-catching surface area and specific pore size control. The result is media with predictable filtration efficiencies at removing specified contaminants (e.g., 4 μm) and maximum dirt holding capacity. Natural cellulose fibers are larger than synthetic fibers and jagged in shape, so controlling size of the pores in the media mat is difficult and there is less open volume. In most applications this results in higher ΔP as compared to synthetic filters. Higher beta ratings mean there are smaller pores in the media; smaller media pores cause more flow resistance, in turn causing higher pressure drop.

2. Dirt, Contaminant

As dirt gets caught in the media, it eventually begins to build up and fill the pore openings. As the pore openings shrink, the differential pressure (pressure drop) increases. This is called restriction. This photo from our scanning electron microscope shows actual dirt particles building up in the media pores.

Excessive dirt in the media can cause dirt migration or even filter failure. Dirt migration occurs when the restriction is so great that the differential



pressure pushes dirt deeper into the media and, eventually, through the media and back into the system. Filter failure occurs when the restriction becomes so high that the filter cartridge collapses (outside-in flow) or bursts (inside-out flow) to relieve the upstream pressure.

To avoid such catastrophe, use of a filter service indicator is recommended. It measures the pressure drop across the filter, then signals when the filter is 'full' and needs to be changed.

HYDRAULIC FILTRATION TECHNICAL REFERENCE

3. Flow

Higher flows create higher pressure drop. With fast moving fluid, there will be more friction causing higher pressure drop across the media.

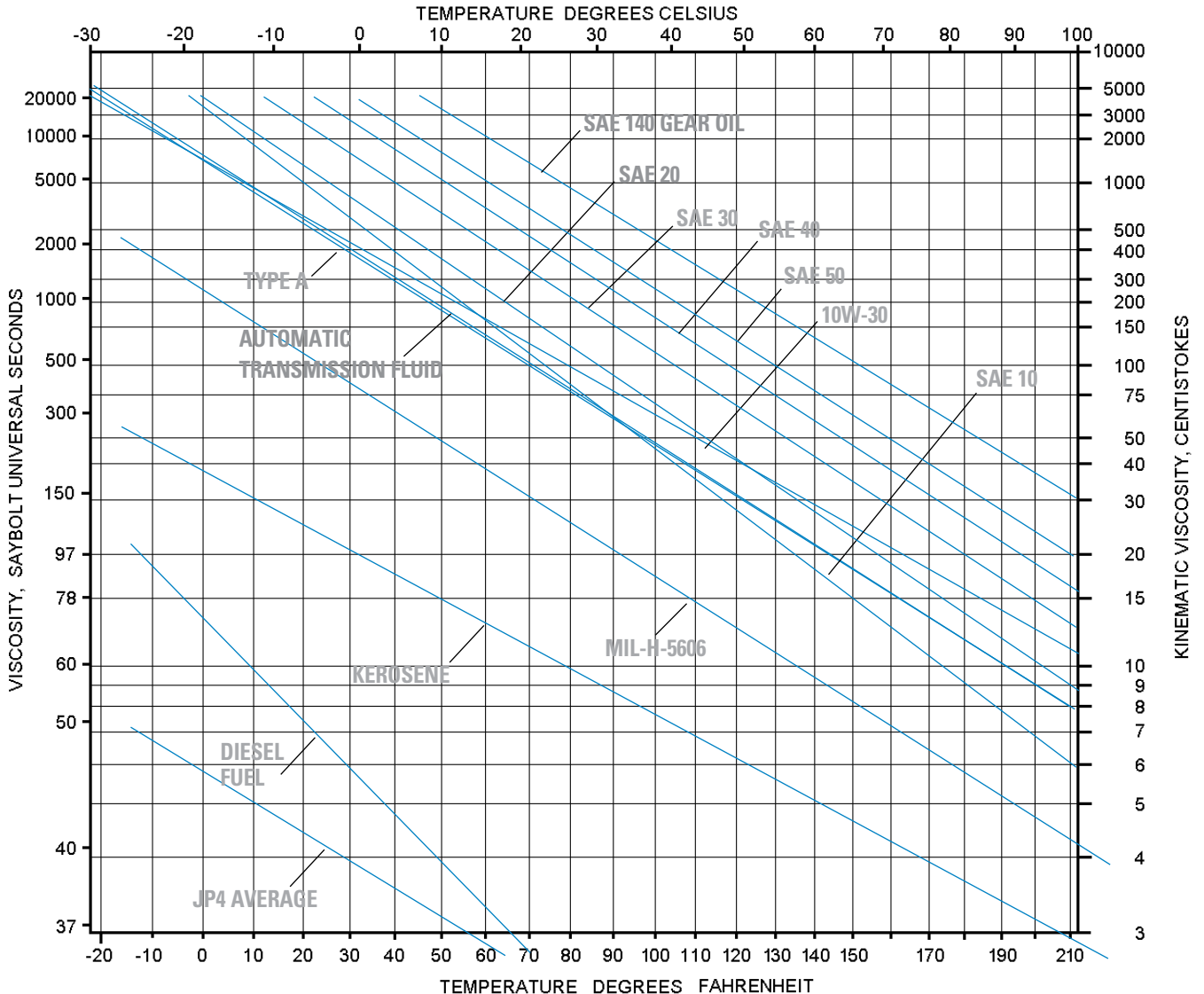
4. Fluid Viscosity

Measured in centistokes (cSt) or Saybolt Seconds Universal (SSU or SUS), fluid viscosity is the resistance of a fluid to flow. As fluid viscosity increases, the cSt rating increases. Higher fluid viscosities also mean higher pressure drop because the thicker oil has a tougher time passing through the layer of media fibers. Cold start fluid is a good example of highly viscous fluid. See chart below.

Filter media, amount of contamination, the flow rate, and fluid viscosity are all factors in the importance of sizing the filter for the system requirements. Filters that are too small won't be able to handle the system flow rate and will create excessive pressure drop from the start. The results could be filter operation in the bypass mode, filter failure, component malfunction, or catastrophic system failures. Filters that are too large for the system can be too costly. Oversized filters require more system oil and higher cost replacement filters. Optimal sizing is best.

Viscosity/Temperature Chart

A.S.T.M. Standard Viscosity-Temperature Chart for Liquid Petroleum Products (D 341-43) Saybolt Universal Viscosity



Filter Design and Construction

There are two main differences in a filter. The first is the design of the filter itself, and the second is the type of media that is used in the filter.

Filter

Filters have some attributes that are immediately obvious to the casual observer, such as height, inside diameter, outside diameter, media concentration, type of liner, seal design, and the way the media and components are glued or potted together.

Liners

Liners must be structurally sturdy to withstand pressure variance, yet open enough to allow good flow.

Seals

The top seal design must be leak-free, with a gasket or sealing device that ensures a good seal throughout the life of the filter. Standard seals are made of Buna-N® material, which is fine for most applications. However, if the filtered fluid is diester or phosphate ester fluid, you'll need a seal made of a fluoroelastomer such as Viton®.

Buna-N® and Viton® are registered trademarks of E. I. DuPont de Nemours and Company.

Media Potting

Media potting is key since it holds the media in place in between the end caps (not visible). Not only should the potting be fully around the ends of the media to prevent leaks, it should also be of a material that can withstand the application. For instance, epoxy potting should be used in filters that must perform in higher temperature environments, phosphate ester fluids and some high water based fluids.



Inside the filter, the media can vary in thickness, pleat depth and pleat concentration.

For example, Donaldson hydraulic filters are generally equipped with either white ("Synteq™" our synthetic material) or natural brown (paper or cellulose material) media. ***It is important to note that media colors vary according to each manufacturer—it should not be assumed that any white-colored media is made of synthetic material.***

Some of the most important characteristics of filter media (structure, fiber diameter, volume solidity, basis weight, thickness, layering) can only be detected under a microscope.

Damaged Equipment

Damage happens when key filtration points are ignored! The pistons in this pump are severely damaged from contamination in the oil.



Combining the ISO Rating and Filter Performance Ratings

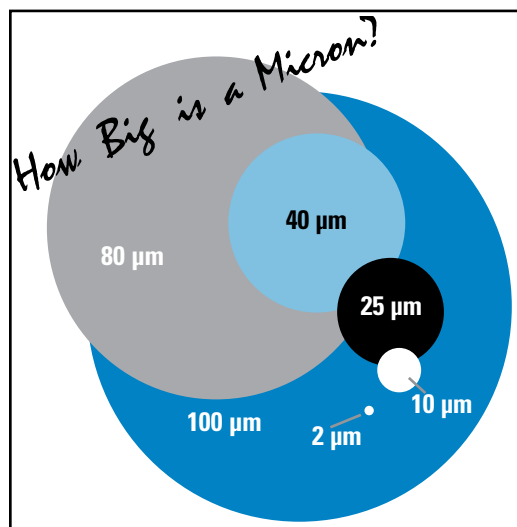
While filter manufacturers publish beta ratings for filter media to describe efficiency performance levels, a direct connection between the beta rating scale and the ISO rating scale cannot be made.

The solution is monitoring filter media performance at removing particles in the 4 µm, 6 µm, and 14 µm ranges. Fluid analysis and field monitoring are the only ways to get these measurements. Combine data from several tests to form a range of performance. Remember, actual filter performance will vary between applications.

Here's how to determine which filter media will best protect your hydraulic components: plot any media performance range on the Application Guide to Donaldson Filter Media, then connect the dots to make a line. On the same graph, plot your component requirement. (Reference chart below for some popular components, or ask your supplier for the recommended ISO rating.) If the line of the media falls below the ISO line, or if the bottom line of the filtration range does not intersect the ISO line, the component will be protected.

Micron Sizes of Familiar Particles

| | |
|---------------------------|--------|
| Grain of table salt | 100 µm |
| Human hair | 80 µm |
| Lower limit of visibility | 40 µm |
| White blood cell | 25 µm |
| Talcum powder | 10 µm |
| Red blood cell | 8 µm |
| Bacteria | 2 µm |
| Silt | <5 µm |



Typical ISO Cleanliness

Here are some typical ISO cleanliness recommendations from component manufacturers. (These are guidelines; always check the ratings specified by the manufacturer of your specific components.)

| Pressure | <3000 PSI ≤210 Bar | >3000 PSI >210 Bar |
|---------------------------------|-----------------------|-----------------------|
| Pumps | --- ISO RATINGS --- | |
| Fixed Gear Pump | 19/17/15 | 18/16/13 |
| Fixed Vane Pump | 19/17/14 | 18/16/13 |
| Fixed Piston Pump | 18/16/14 | 17/15/13 |
| Variable Vane Pump | 18/16/14 | 17/15/13 |
| Variable Piston Pump | 17/15/13 | 16/14/12 |
| Valves | | |
| Directional (solenoid) | 20/18/15 | 19/17/14 |
| Pressure (modulating) | 19/17/14 | 19/17/14 |
| Flow Controls (standard) | 19/17/14 | 19/17/14 |
| Check Valves | 20/18/15 | 20/18/15 |
| Cartridge Valves | 20/18/15 | 19/17/14 |
| Load-sensing Directional Valves | 18/16/14 | 17/15/13 |
| Proportional Pressure Controls | 18/16/13 | 17/15/12* |
| Proportional Cartridge Valves | 18/16/13 | 17/15/12* |
| Servo Valves | 16/14/11* | 15/13/10* |
| Actuators | | |
| Cylinders | 20/18/15 | 20/18/15 |
| Vane Motors | 19/17/14 | 18/16/13 |
| Axial Piston Motors | 18/16/13 | 17/15/12 |
| Gear Motors | 20/18/15 | 19/17/14 |
| Radial Piston Motors | 19/17/15 | 18/16/13 |

* Requires precise sampling practices to verify cleanliness levels.
Source: Vickers

Media Application Guide and ISO Rating System

The Application Guide for Donaldson Filter Media on the next page provides a data format for rating fluid contamination level and plotting filter media performance.

The vertical numbers on the left side of the chart represent particle counts in a logarithmic progression of ten: .01, .1, 1, 10, 102, 103, 104, 105 and 106. (This represents the number of particle in the oil sample at the given size.) The numbers across the bottom of the chart represent particle size in microns.

Donaldson media efficiency performance levels are derived from the ISO 16889 test standard with NIST-certified on-line automatic particle counters and ISO medium test dust. The Donaldson media efficiency performance levels shown are based on test averages under steady flow conditions. Actual performance levels may vary by application, viscosity, flow variance and contamination differences. Contact Donaldson or your Donaldson distributor for specific application calculations. The international rating system for fluid contamination levels is called the ISO contamination code and it is detailed in the ISO 4406 document. Most component manufacturers publish filtration level recommendations using the ISO code. The ISO code, located on the right side of the media application guide on the next page, is easy to use if you remember the 4 μm , 6 μm and 14 μm numbers along the bottom of the chart.

Manufacturer's ISO contamination levels are based on controlling the particle counts of 4 μm , 6 μm and 14 μm particles in hydraulic system oil. This level is identified by measuring the number of particles 4 μm and greater, 6 μm and greater, and 14 μm and greater in one milliliter of the system hydraulic oil sample.

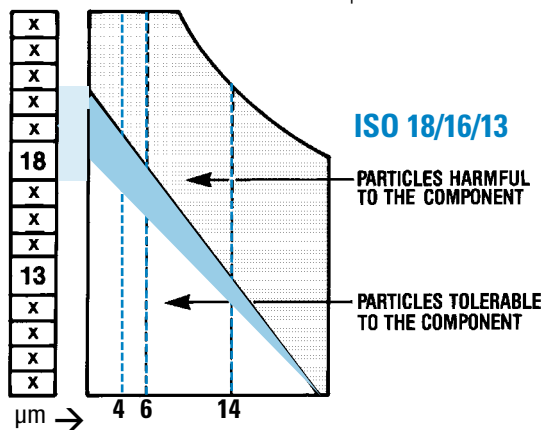
How to Use the ISO Rating

Example: A cartridge valve manufacturer recommends an ISO cleanliness level of 18/16/13.

- 1) On the Application Guide for Donaldson Filter Media on the next page, place a dot on the vertical 4 μm line, horizontally even with the 18 box of the ISO code.
- 2) Place a dot on the vertical 6 μm line horizontally even with the 16 box of the ISO code.
- 3) Place a dot on the vertical 14 μm line horizontally even with the 13 box of the ISO code.
- 4) Connect the dots to get the ISO cleanliness level 18/16/13.

As illustrated below, particle counts falling on and above the 18/16/13 line are damaging to the component and exceed the 18/16/13 specification set by the manufacturer.

Select a Donaldson media that falls below 18/16/13 to achieve cleanliness level tolerable to the component.



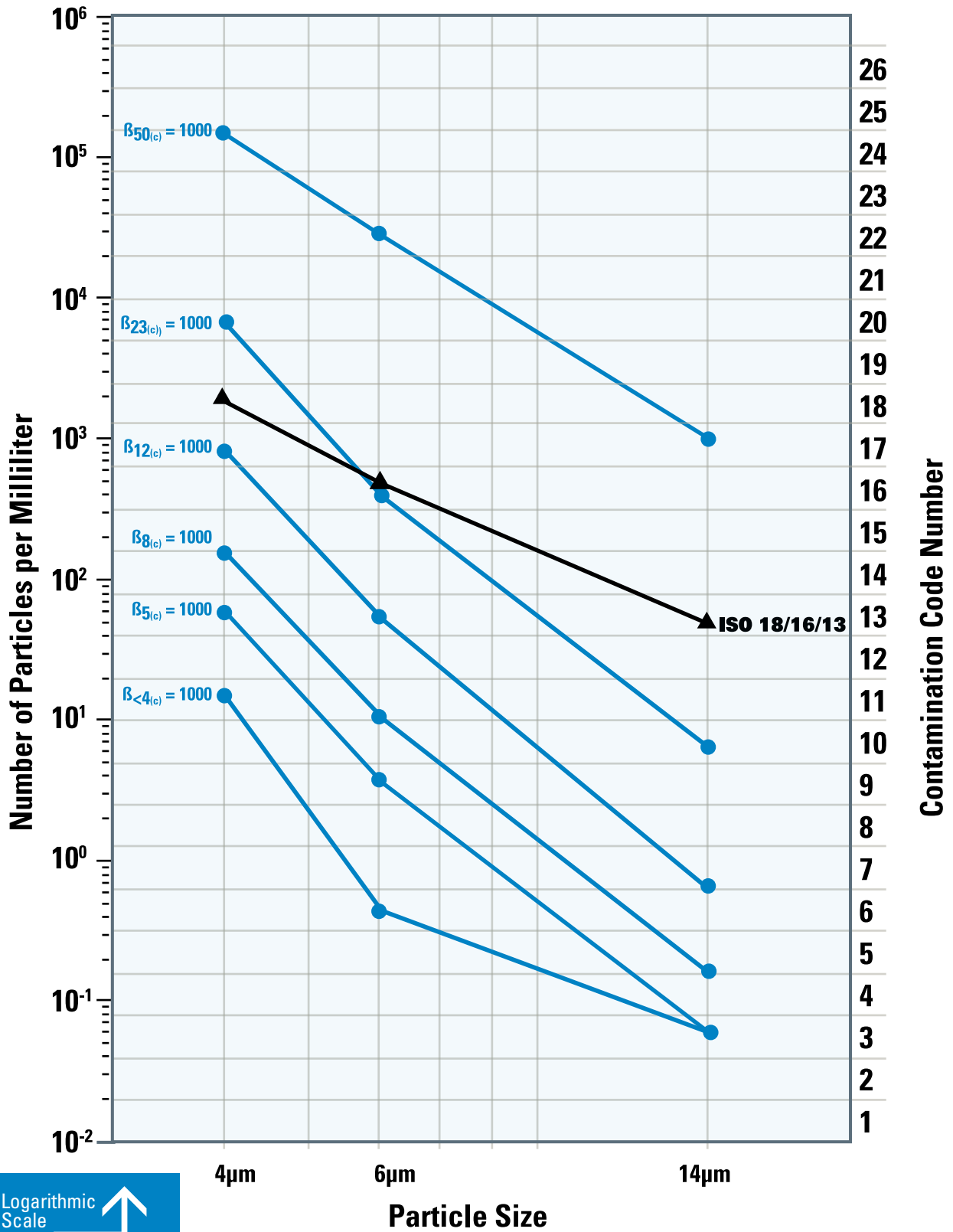
ISO 4406 Contamination Code


This correlates to the numbers in the boxes along the right side of the graph on the next page.

Range of number of particles per milliliter:

| Code | More Than | Up to & Including | Code | More Than | Up to & Including |
|------|-----------|-------------------|------|-----------|-------------------|
| 24 | 80,000 | 160,000 | 14 | 80 | 160 |
| 23 | 40,000 | 80,000 | 13 | 40 | 80 |
| 22 | 20,000 | 40,000 | 12 | 20 | 40 |
| 21 | 10,000 | 20,000 | 11 | 10 | 20 |
| 20 | 5,000 | 10,000 | 10 | 5 | 10 |
| 19 | 2,500 | 5,000 | 9 | 2.5 | 5 |
| 18 | 1,300 | 2,500 | 8 | 1.3 | 2.5 |
| 17 | 640 | 1,300 | 7 | .64 | 1.3 |
| 16 | 320 | 640 | 6 | .32 | .64 |
| 15 | 160 | 320 | | | |

Application Guide for Donaldson Synthetic Filter Media



Logarithmic Scale 
 This represents the number of particles at a given size in the oil sample

Filter Efficiency Standards

Understanding the Beta Rating System

This information is provided as an aid to understanding fluid filter efficiency terminology based on current ISO, ANSI and NFPA test standards. It is not proprietary and may be reproduced or distributed in any manner for educational purposes.

What is Beta Ratio?

Beta ratio (symbolized by β) is a formula used to calculate the filtration efficiency of a particular fluid filter using base data obtained from multi-pass testing.

In a multi-pass test, fluid is continuously injected with a uniform amount of contaminant (i.e., ISO medium test dust), then pumped through the filter unit being tested. Filter efficiency is determined by monitoring oil contamination levels upstream and downstream of the test filter at specific times. An automatic particle counter is used to determine the contamination level. Through this process an upstream to downstream particle count ratio is developed, known as the beta ratio. The formula used to calculate the beta ratio is:

$$\text{Beta ratio}_{(x)} = \frac{\text{particle count in upstream oil}}{\text{particle count in downstream oil}}$$

where (x) is a given particle size

Indicates that testing was done with APC's calibrated with NIST fluid

$\beta_{10(c)} = 1000$

1000 times more particles upstream than downstream that are 10 μm and larger

Why the Efficiency Rating Test Standard was Updated

The International Industry Standard (ISO) for multi-pass testing provides a common testing format for filter manufacturers to rate filter performance. This standardization gives you the ability to reliably compare published filter ratings among different brands of filters.

ISO test standards were updated in 1999 to reflect the improved technology available in particle counters and other test equipment. The newer particle counters provide more precise counting and greater detail—reflecting a truer indication of filter performance.

The National Fluid Power Association (NFPA), the National Institute of Standards & Technology (NIST), and industry volunteers, including several engineers from Donaldson, helped revise the ISO standard. ISO 16889 has been in force since late 1999 and ISO 4572 is officially discontinued.

Better Test Dust

The old test dust (AC fine test dust or ACFTD) was “ball milled,” which produced dust particles of varying size and shape. Particle distribution was often different from batch to batch. The accuracy of ACFTD distribution and previous APC calibration procedure was questioned by industry, due to lack of traceability and certification. ACFTD hasn't been produced since 1992.

Now, the new test dust (ISO medium test dust) is “jet milled” to produce consistent particle size, shape, and distribution from batch to batch. See dust size comparison chart on the next page.

Liquid Automatic Particle Counters (APC's)

In the old test standard (ISO 4572), fluid samples obtained in bottles and off-line particle counting were allowed. Now, in the updated standard ISO 16889, on-line, laser-based automatic particle counters, especially made for measuring liquids, are required and bottle counting methods are disallowed, as illustrated on next page.

Find further information on ISO 16889 at www.NFPA.com or your ISO document source. Ask for ISO/TR16386: 1999 “The Impact of Changes in ISO Fluid Power Particle Counting—Contamination Control and Filter Test Standards.”

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The old particle counter calibration was based on only one dimension of an irregularly-shaped particle (the longest cord). Today, the particle counter calibration is based on equivalent spherical area of an irregularly-shaped particle.

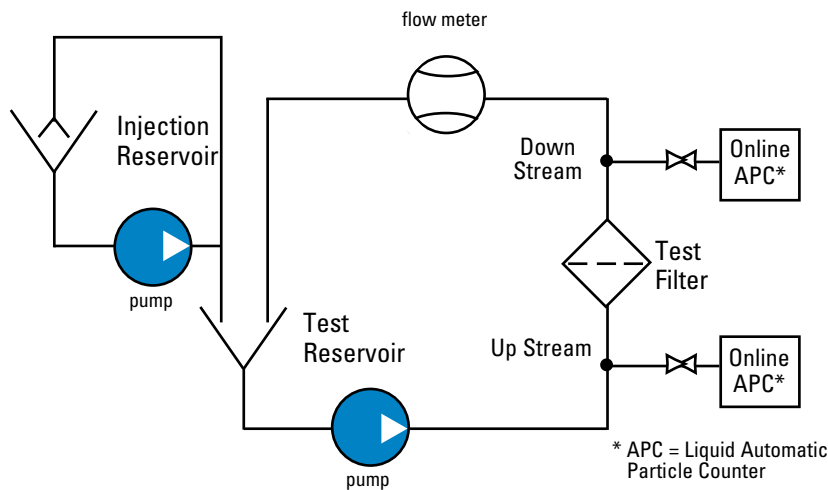
NIST provides calibration suspension, which is certified with X number of particles at a certain size. This is verified by NIST. The new way to list beta ratios includes a subscript (c) to indicate NIST certified test suspension and assures you of traceability and repeatability.

Overall, you can have strong confidence in filter ratings resulting from tests per ISO 16889, as they are highly accurate. As always, keep in mind that beta ratings are laboratory measurements under steady flow conditions with artificial contaminants – the real proof of the performance is how clean the filter keeps the fluids in the application. A good oil analysis program that checks the cleanliness of the oil periodically will verify that the proper filters are being used.

Test Dust Size Comparisons

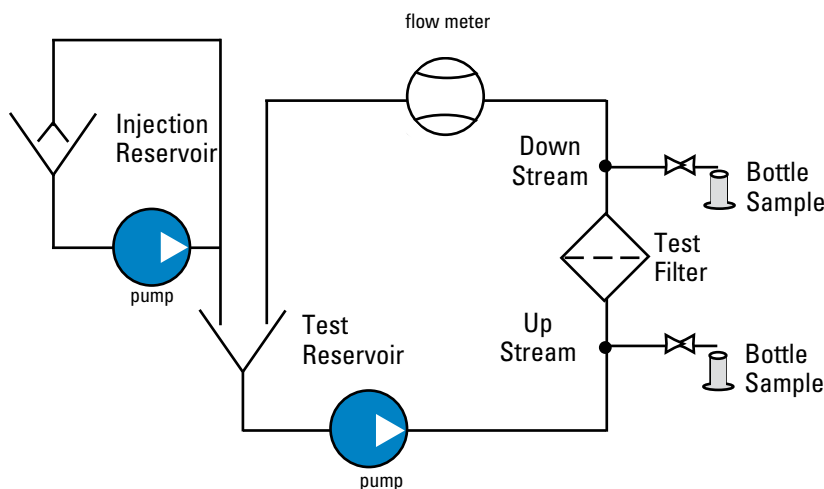
ACFTD calibrated size (µm) per ISO 4402 corresponds to a NIST-calibrated size [µm_(c)] per ISO 11171

| | | | | | | | | | | | | | | | | | |
|--------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| ACFTD | 0.8 | 1 | 2 | 2.7 | 3 | 4.3 | 5 | 7 | 10 | 12 | 15 | 15.5 | 20 | 25 | 30 | 40 | 50 |
| NIST | 4 | 4.2 | 4.6 | 5 | 5.1 | 6 | 6.4 | 7.7 | 9.8 | 11.3 | 13.6 | 14 | 17.5 | 21.2 | 24.9 | 31.7 | 38.2 |



ISO 16889

- In-Line Liquid Automatic Particle Counters (APC) are now required for proper testing.
- APC calibration follows ISO 11171 procedures
- ISO 11171 uses NIST (National Institute of Standards & Technology) certified calibration fluid



ISO 4572 (Discontinued)

- Either bottle samples or APC's were allowed.
- APC calibration followed ISO4402 ACFTD (Discontinued)

Highlights of ISO 16889

- ISO 4572 is now replaced by ISO 16889 as the international standard for Multi-Pass Tests to determine the efficiency (beta rating or beta ratio) and the dirt-holding capacity of the filter.
- The test bench for ISO 16889 must have On-Line Liquid Automatic Optical Particle Counters (APC) calibrated using NIST (National Institute of Standards & Technology)-certified calibration fluid. This includes added enhancements to APC's, to allow for better resolution, accuracy, repeatability and reproducibility.
- ISO 12103-1,A3 (ISO Medium, 5µm-80µm)
- Test Dust was selected as replacement dust for calibration and testing procedures.
- APC's are calibrated by passing a sample of calibration fluid with a known particle size distribution and producing a calibration curve to match the known count distribution.
- NIST used the Scanning Electron Microscope analysis and statistical analysis techniques to certify the particle size distribution.
- Particle counts, upstream and downstream, are taken every minute of the test.
- Beta ratios are reported with (c) to designate NIST traceability.

ISO 16889 recommends reporting beta ratings at:

| Rating | Efficiency |
|-----------|------------|
| 2..... | 50% |
| 10..... | 90% |
| 75..... | 98.7% |
| 100..... | 99% |
| 200..... | 99.5% |
| 1000..... | 99.9% |

Example: $\beta_{4(c)}=200$ signifies that there are 200 times as many particles that are 4 µm and larger upstream as downstream. This is **99.5% efficiency**.

Example: $\beta_{5(c)}=1000$ indicates that there are 1000 times as many particles that are 5 µm and larger upstream as downstream. This is **99.9% efficiency**.

Donaldson Hydraulic Filter Media Beta Ratings

Donaldson hydraulic filter media beta ratings are average ratings obtained from multi-pass tests performed per the new ISO 16889 standard.

According to the ISO standard, each filter manufacturer can test a given filter at a variety of flow rates and terminal pressure drop ratings that fit the application, system configuration and filter size. Your actual performance may vary depending on the configuration of the filter tested and test conditions.

Donaldson Filter Media Efficiency Ratings Per ISO 16889 Test Standards

$\beta_{x(c)} = 2$ $\beta_{x(c)} = 200$ $\beta_{x(c)} = 1000$

Donaldson DT Synteq Synthetic Media

| $\beta_{<4(c)} = 2$ | $\beta_{<4(c)} = 200$ | $\beta_{<4(c)} = 1000$ |
|---------------------|-----------------------|------------------------|
| <4 µm | <4 µm | <4 µm |
| <4 µm | 4 µm | 5 µm |
| <4 µm | 6 µm | 8 µm |
| <4 µm | 9 µm | 12 µm |
| 7 µm | 18 µm | 23 µm |

Donaldson Synteq XP™ Synthetic Media

| $\beta_{<4(c)} = 2$ | $\beta_{<4(c)} = 200$ | $\beta_{<4(c)} = 1000$ |
|---------------------|-----------------------|------------------------|
| <4 µm | 4 µm | 6 µm |
| <4 µm | 8 µm | 11 µm |
| <4 µm | 11 µm | 15 µm |

Donaldson Synteq™ Synthetic Media

| $\beta_{<4(c)} = 2$ | $\beta_{<4(c)} = 200$ | $\beta_{<4(c)} = 1000$ |
|---------------------|-----------------------|------------------------|
| <4 µm | <4 µm | <4 µm |
| 5 µm | 10 µm | 13 µm |
| 6 µm | 16 µm | 22 µm |
| 7 µm | 18 µm | 23 µm |
| 14 µm | >42 µm | 50 µm |

Donaldson Cellulose Media

| $\beta_{<4(c)} = 2$ | $\beta_{<4(c)} = 200$ | $\beta_{<4(c)} = 1000$ |
|---------------------|-----------------------|------------------------|
| 5 µm | 18 µm | 24 µm |
| 7 µm | 19 µm | 23 µm |
| 17 µm | >40 µm | >40 µm |
| 27 µm | >40 µm | >40 µm |

Donaldson Water Absorbing Media

| |
|-------|
| 10 µm |
|-------|

Donaldson Wire Mesh Media

| |
|--------|
| 45 µm |
| 60 µm |
| 75 µm |
| 90 µm |
| 125 µm |
| 150 µm |

Cleanliness Level Correlation Table

Conversion of cleanliness specifications to filter performance is not an exact science because the contamination level in a hydraulic system is a function of the ingress and generation rate as well as the filter performance.

Factors That Affect Cleanliness Levels in a Hydraulic System

- Abrasive wear in space between adjacent moving surfaces of components.
- Erosive wear at component edges or direction changes where there is high fluid velocity.
- Fatigue wear by particles trapped between moving surfaces.

Identification of the Most Sensitive Component

- Required cleanliness level is dominated by the component with smallest clearances and/or highest loading on the lubricating film.
- Best source for determining this level is the specification published by the component manufacturer.
- Higher pressures reduce component life, unless contamination level is decreased accordingly.
- Operating at half the rated pressure of component will increase its life by more than four times.
- Percent of operating time at maximum pressure depends on individual machines and application.

| ISO Code | Particles Per Milliliter >10 microns | ISO FTD* Gravimetric Level (mg/l) | Mil Std 1236A (1967) | NAS 1638 (1964) | SAE Level (1963) |
|----------|--------------------------------------|-----------------------------------|----------------------|-----------------|------------------|
| 30/26/23 | 140,000 | 1000 | | | |
| 29/25/23 | 85,000 | | 1000 | | |
| 26/25/20 | 14,000 | 100 | 700 | | |
| 23/21/18 | 4,500 | | | 12 | |
| 2220/18 | 2,400 | | 500 | | |
| 22/20/17 | 2,300 | | | 11 | |
| 21/20/17 | 1,400 | 10 | | | |
| 21/19/16 | 1,200 | | 10 | | |
| 20/18/15 | 580 | | | 9 | 6 |
| 19/17/14 | 280 | | 300 | 8 | 5 |
| 18/16/13 | 140 | 1 | | 7 | 4 |
| 17/15/12 | 70 | | | 6 | 3 |
| 16/14/12 | 40 | | 200 | | |
| 16/14/10 | 35 | | | 5 | 2 |
| 15/13/10 | 14 | 0.1 | | 4 | 1 |
| 14/12/9 | 9 | | | 3 | 0 |
| 13/11/8 | 5 | | | 2 | |
| 12/10/8 | 3 | | 100 | | |
| 12/10/7 | 2.3 | | | 1 | |
| 11/10/6 | 1.4 | 0.01 | | | |
| 11/9/6 | 1.2 | | | 0 | |
| 10/8/5 | 0.6 | | | 0 | |
| 9/7/5 | 0.3 | | 50 | | |
| 8/6/3 | 0.14 | 0.001 | | | |
| 7/5/2 | 0.04 | | 25 | | |
| 6/2/8 | 0.01 | | 10 | | |

* SAE Fine Test Dust — ISO approved test and calibration contaminant.
Source: Milwaukee School of Engineering Seminar, Contamination & Filtration of Hydraulic Systems

Compatibility of Donaldson Filter Media with Hydraulic Fluids

While Donaldson has developed many formulations of media, they can be divided into two broad categories: natural fibers, usually cellulose, and synthetic or man-made fibers.

| Fluid Type | Recommended Filter Media | | |
|---|--------------------------|--------|-----------|
| | Cellulose | Synteq | DT Synteq |
| Petroleum-Based (Hydrocarbon) Fluids | | | |
| Straight oils | Yes | Yes | Yes |
| ATFs | Yes | Yes | Yes |
| Military hydraulic fluids | Yes | Yes | Yes |
| #2 Diesel fuel | Yes | Yes | Yes |
| Gasoline | Yes | Yes | Yes |
| E85 (85/15 Ethanol/Gasoline) | No | No | Yes |
| Fire Resistant Fluids | | | |
| HFA - Oil-in-water emulsion | No | <150°F | Yes |
| HFB - Water-in-oil emulsion | No | <150°F | Yes |
| HFC - Water glycol | No | <150°F | Yes |
| HFD Synthetics - Polyol esters, Esters, Diesters, & blends | No | Yes | Yes |
| HFD Synthetics - Phosphate esters | No | No | Yes |
| HFD Synthetics - Polyalkylene glycols (PAG), Polyalphaolefins (PAO), & blends | No | Yes | Yes |
| HFD Synthetics - Silicone (siloxane) oil | No | Yes | Yes |
| Biodegradable Fluids | | | |
| Vegetable-based oils - sunflower, rapeseed oils | No | Yes | Yes |
| Synthetic oils - PAG / PAO | No | Yes | Yes |
| Synthetic oils - Esters, Diesters | No | Yes | Yes |



Piston Pump Damage

The severe score marks on the piston slippers leave no question about why good hydraulic filtration is important.

HYDRAULIC FILTRATION TECHNICAL REFERENCE

A Note on Seals

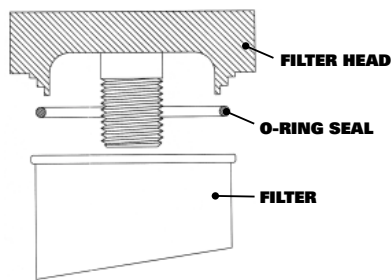
- Filters with seals made of Buna-N® are appropriate for most applications involving petroleum oil and some high water content fluids. Filters with seals made of Viton® or Fluorel® (both fluoroelastomers) are required when using diesters, phosphate ester fluids. Donaldson offers both types. EPR (ethylene propylene rubber) seals are required for use with Skydrol® and Skydrol 500 fluids.

Buna-N® and Viton® are registered trademarks of E. I. DuPont de Nemours and Company. Skydrol is a registered trademarks of Solutin, Inc.

- In Donaldson filters with fluorocarbon elastomer seals, epoxy potting is used to accommodate higher temperature environments and for compatibility with fluids such as phosphate ester, diesters, and high water based fluids. The plastisol (heat cured) and urethane (self curing) potting materials used in other filters perform well with petroleum-based fluids.

Seal Installation Instructions

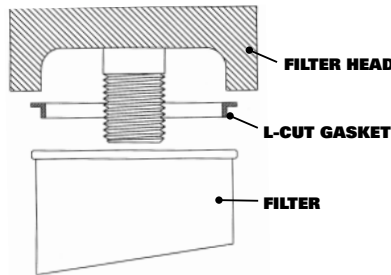
- Use only one of the following seals and the corresponding installation method. Dispose of used filter properly.
- Over-tightening filter may damage head.
- Dispose of used filter properly



O-Ring Seal

For use with filter heads with stepped profiles.

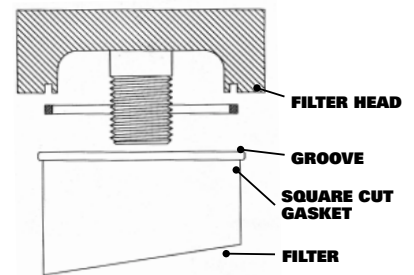
1. Remove used o-ring and clean sealing surface. Apply clean oil to new o-ring.
2. Install new o-ring on inside lip of filter.
3. Spin on new filter until o-ring makes contact. Tighten filter until top edge makes metal to metal contact with filter head – approximately 1½ additional turns.



L-Cut Gasket

For use with filter heads with no groove or wide groove.

1. Remove used gasket and clean sealing surface. Apply clean oil to new gasket surfaces.
2. Install new gasket on inside lip of filter or groove in filter head.
3. Spin on new filter until gasket makes contact. Tighten filter element an additional ¾ turn.



Square-Cut Gasket

For use with filter heads with narrow groove.

1. Remove used gasket and clean groove in filter head. Apply clean oil to new gasket surfaces.
2. Install new gasket into groove in filter head.
3. Spin on new filter until gasket makes contact. Tighten filter element an additional ¾ turn.

How to Best Position Filters in Your Hydraulic Circuit

Within every hydraulic circuit there are many possible places for filters.

The best systems are strategically engineered to ensure that oil is filtered properly at each stage of its journey through the circuit. Ideally, filtration should occur in the following places:

- In the Reservoir
- Before/After the Pump
- In the Return-line System
- Off-line

In reality, many companies have to make tough decisions about which filters they can afford and which ones they'll have to live without.

Much depends on the cleanliness level requirements of the components, environment, duty cycle of the equipment and other variables that can vary from application to application.

This diagram shows how various types of filters can be used in hydraulic circuits.



Portable Kidney Loop Filter Cart

Kidney Loop Filters

Benefit: High

Sometimes referred to as “off-line” filters, kidney loop filters achieve very fine filtration by maintaining steady-state flow, independent of the hydraulic circuit.

With this type of filtration, the entire hydraulic system can keep operating while the kidney loop filter is being serviced.

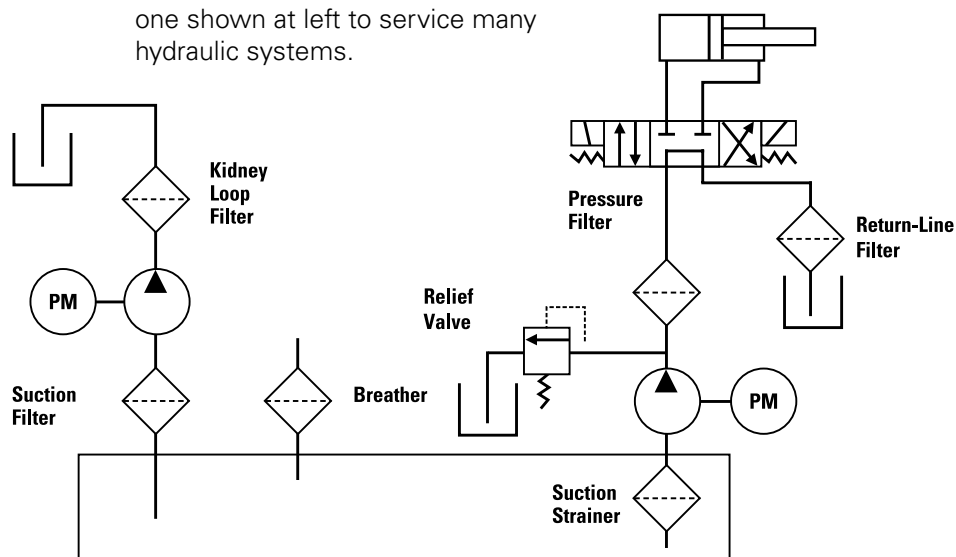
A kidney loop filter utilizes low-pressure housings that are easily accessible and serviceable. These filters can either be integrated into the main hydraulic reservoir, or used in mobile filter carts like the one shown at left to service many hydraulic systems.

Note that kidney loop filters do not directly protect components — rather, their main function is to polish the oil to a very clean condition. It's also important to remember that an additional pump and motor will be required.

Filler / Breather

Benefit: High

Tank breathers are placed on hydraulic reservoirs to prevent atmospheric contamination from entering and to allow for sufficient air movement inside the reservoir. Breathers should prevent particles larger than 3 microns from entering the system. This is a sensible, affordable solution for any hydraulic system, but by all means cannot be the only filter on a hydraulic system.



Suction Filter

Benefit: Medium

Normally placed between the reservoir and the pump, suction filters are designed to remove particles in the 5 to 150 micron range. They are easier to service and less expensive than many other types of filters—but because restriction in the suction line must be kept very low, filter housing size tends to be larger than similar flow return or pressure filter housings.

The most popular application for suction filters is with variable-speed hydrostatic pumps commonly found in off-road mobile applications and industrial variable-speed drives. They are also often used in harsh environments and charge pump applications.

Suction Strainer

Benefit: Low

Suction strainers, or sump-type filters, are often used in hydraulic fluid reservoirs. Their only real use is to keep cigarette butts, moths, nuts & bolts and the like out of the pump. Instead, such contaminants can easily be eliminated by keeping the reservoir sealed and by using a Filler/Breather and Return-Line Filter.

Return-Line Filter

Benefit: High

The advantages of return-line filters are many. They are usually low-pressure housings, which are less typically expensive. Their purpose is to collect the dirt from around the circuit as the oil returns to the reservoir. Much like the kidney loop, the return-line filter provides ultimate flexibility in positioning — it can perform almost anywhere within the return line circuit, either mounted inline or built into the reservoir.



Downsides are few, but worth noting: return-line filters can be subject to flow surges (which contribute to poor filter performance) and they do not filter the drain lines.

Note regarding return-line and kidney-loop filtration:

If you're looking for a great value filter that's easy to maintain and with lots of media choices, this is a wise investment. Although these filters are very common, one downside is that there are very few standards of consistency from one manufacturer to the next, so replacement cartridges are not necessarily interchangeable.

Pressure Filter

Benefit: High

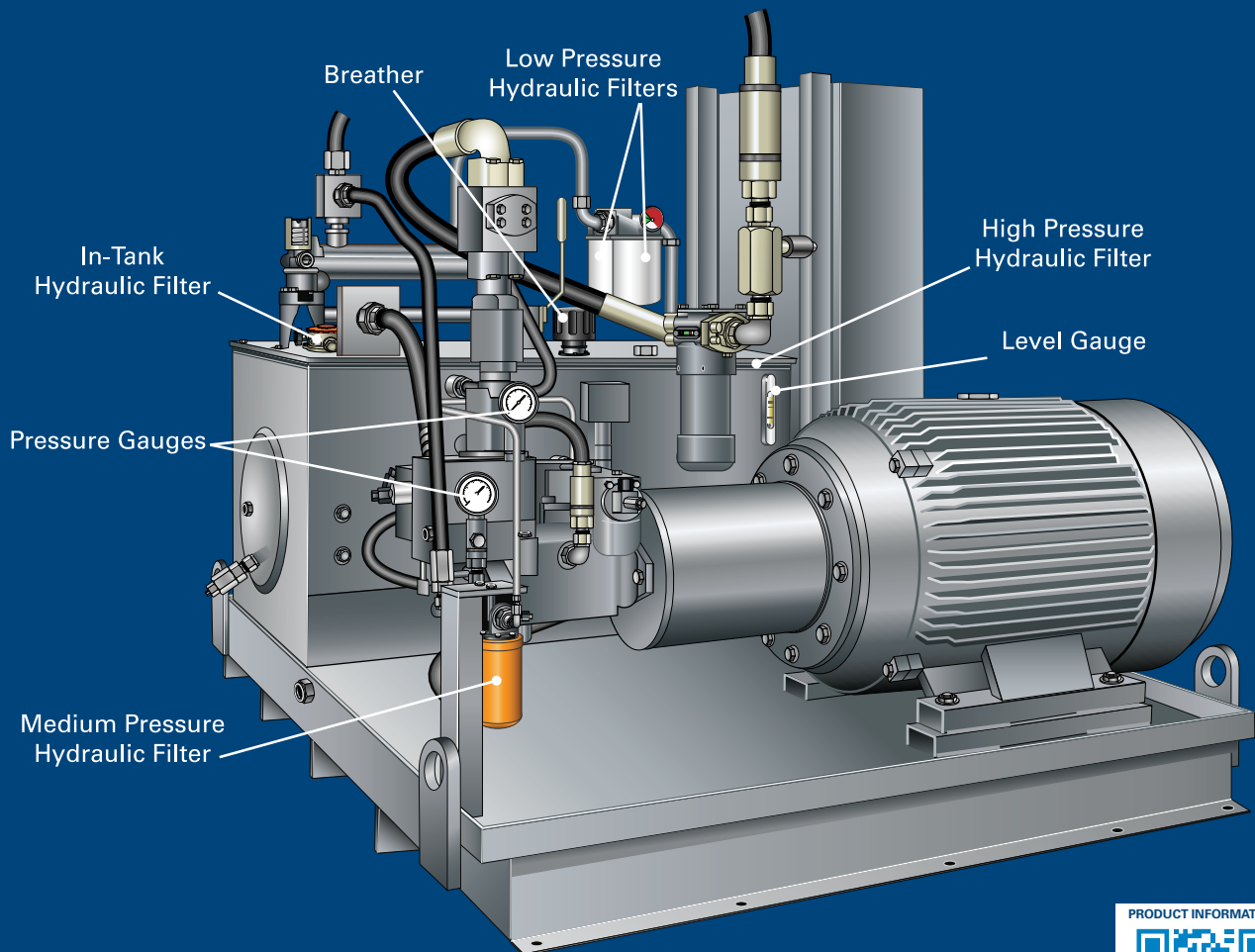
This is also known as “last-chance” filtration. High pressure filters keep clean the oil that comes directly from the pump so that the more expensive downstream components (such as valves and actuators) are protected. Pressure line filters offer protection from catastrophic pump failure. They are a worthwhile investment for high-value systems — as are found in the aircraft industry, paper and steel mills, plastic injection molding, and in die-casting machines.



One downside to high pressure filters is, ironically, the high pressure. The entire system must be stopped in order to service a high-pressure filter — unless a duplex configuration is used. When oil is shooting out of a pump at 6000+ psi, it will take out anything in its way! By nature, a high-pressure pump is a prime mover of fluids, so it will experience significant wear over time. Service can also be more difficult because of its heavy-duty construction—as anyone who's ever tried to change a slippery, 200-pound cast-iron filter can attest.



Donaldson Delivers Performance Under **Any** Pressure.



www.donaldsonfilters.com

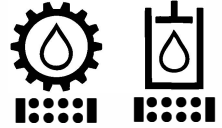
PRODUCT INFORMATION



www.donaldsonfilters.com



HYDRAULIC FILTRATION FOR VEHICLES/EQUIPMENT APPLICATION DESIGN WORKSHEET



For proper development/design engineering solution, we ask you to provide details about your engine, project due dates, hydraulic or transmission system and performance (mechanical and filtration), system mounting, service, final packaging and product markings.

When completed, please forward to Donaldson.
Email: engine@donaldson.com
Fax: 952-887-3502

| | | | |
|--|-------------|------------------------------|--|
| Customer Name: | | Revision: | |
| Project Name: | | | |
| Contact Name: | | Title: | |
| Phone: | Fax: | Email: | |
| Current Donaldson Model Used: (if applicable) | | Customer Part Number: | |
| Target Cost: | | | |

Project Details

Type of Vehicle/Machine: _____
Units Per Year: _____
Key Project Dates:
 Design Proposal: _____
 Quote: _____
 Sample Delivery: _____
 Design Freeze: _____
 PPAP: _____
 Start of Production: _____

Application Information

Components That Need Protection

Pump (type?): _____
 Circuit: Hydraulic Pilot
 Transmission: Hydrostatic Powershift

Filter Location:

Suction Pressure Return
 Side Loop Charge Sump
 Other: _____

Port Size & Type:

NPT: 1/2" 3/4" 1-1/4" 1-1/2" 2-1/2"
SAE O-ring: -8 -12 -16 -20 -24
4 Bolt Flange: 2" SAE 3" SAE 4" ANSI
 2" Code 61 2-1/2" Code 61
BSP: 1/2" 3/4" 1"

Other: _____

Mounting Requirements:

Operating Conditions

Flow Rates: lpm or gpm
 Minimum _____ Normal _____ Maximum _____
Oil System Pressure (psi/kPa):
 Minimum _____ Normal _____ Maximum _____
Temperature: °C or °F
 Fluid: Min _____ Normal _____ Max _____
 Ambient: Min _____ Normal _____ Max _____

Fluid Type:

Petroleum Water-glycol
 Phosphate-ester HWBF
 Other _____

Viscosity: (2 required)

_____ cSt or Ssu @ _____ °C Temp
 _____ cSt or Ssu @ _____ °C Temp

Filtration Performance

ISO Contamination Level Required: _____

Beta_{x(c)} = 1000: _____ μm
 Filter Media: Synthetic Cellulose Wire Mesh
 Capacity:
 _____ gms ISO Medium @ _____ flow to _____ psid/kPaD

Pressure Drop Limits:

| Limits | psid/kPaD | | Flow (gpm/lpm) | | Viscosity |
|--------|-----------|---|----------------|---|-----------|
| 1 | | @ | | @ | |
| 2 | | @ | | @ | |
| 3 | | @ | | @ | |

Structural Performance**Hydrostatic Pressure Resistance (Burst):**

Test Method: _____

Minimum Value: _____ psi / kPa

Collapse Pressure:

Test Method: _____

Minimum Value: _____ psid / kPaD

Pressure Testing:

| | Min. Cycles | Range (psid) | Frequency (Hz) |
|--------------|-------------|--------------|----------------|
| Hydrodynamic | | to | |
| Flow Fatigue | | to | |
| Vibration | | to | |

By-Pass Cracking Pressure

Test Method: _____

Minimum Value: _____ psid / kPa

By-pass Valve: In Head In Filter

Setting: _____ psi / kPa

Leak Testing

Test Method: _____

Minimum Value: _____ psid / kPa

Initial Product Cleanliness

Specification/Requirement: _____

Additional Information**Filter Service**Indicator Type: Electric Visual

Type: _____

Indicator Level: _____ psid/kPaD

Filter Change Interval:_____ km or miles or hoursDo you require installation, service or maintenance recommendations from Donaldson? Yes No**Packaging****Do you have any special packaging requirements?** Yes No If yes, please check all that apply:Protective caps: on inlet on outlet on port**Final Assembly:** Bulk / Bagged Bulk/Individual Boxes Other _____**Product Markings/Identity****Do you have any product marking requirements?**Head Assembly? Yes NoFilters? Yes No

If yes, artwork it is assumed customer will provide artwork for filter markings. Donaldson can provide marking area for artwork design. Standard installation icons are available from Donaldson.

Special Requirements or Application Notes

Use this area to provide additional information that will assist Donaldson engineering.

For Donaldson Use Only

Date Received: _____

Request From: Catalog Web
 Other _____**Assigned to:**

Business Unit: _____

Product Manager: _____

Account Manager: _____

Engineer: _____

Donaldson Company, Inc.
PO Box 1299
Minneapolis, MN 55440-1200

Hydraulic Applications Engineering

Doc. No. F115354 Rev.2

August 2013
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Donaldson Company, Inc., PO Box 1299, Minneapolis, MN 55440-1299

Use this section to help guide you to the proper page in this product guide to find more information and details about a individual part. The descriptions shown are, in most cases, abbreviated. Please note: a number of part numbers, such as indicators, are displayed in multiple product family pages.

| Part No. | Page No. | Product Description |
|----------|--------------------|---------------------|
| DBB0248 | 276 | Filter |
| DBB5333 | 276 | Filter |
| DBB7733 | 276 | Filter |
| DBB8664 | 276 | Filter |
| DBB8665 | 276 | Filter |
| DBB8666 | 276 | Filter |
| DBB8777 | 276 | Filter |
| DBH6018 | 189 | Filter Cartridge |
| DBH6019 | 189 | Filter Cartridge |
| DBH6020 | 189 | Filter Cartridge |
| DBH6138 | 189 | Filter Cartridge |
| DBH6139 | 189 | Filter Cartridge |
| DBH6140 | 189 | Filter Cartridge |
| DF1012 | 276 | Filter Manifold |
| K030319 | 66, 67, 68, 69, 70 | In-tank Assembly |
| K031027 | 67, 68, 71 | In-tank Assembly |
| K040798 | 67, 68, 71 | In-tank Assembly |
| K040799 | 67, 68, 71 | In-tank Assembly |
| K040811 | 66, 67, 68, 69, 70 | In-tank Assembly |
| K040812 | 66, 67, 68, 69, 70 | In-tank Assembly |
| K040813 | 66, 67, 68, 69, 70 | In-tank Assembly |
| K041634 | 75 | Assembly |
| K041770 | 67, 68, 71 | In-tank Assembly |
| K041771 | 67, 68, 71 | In-tank Assembly |
| K041772 | 67, 68, 71 | In-tank Assembly |
| K041773 | 67, 68, 71 | In-tank Assembly |
| K041774 | 67, 68, 71 | In-tank Assembly |
| K041782 | 66, 67, 68, 69, 70 | In-tank Assembly |
| K051204 | 67, 68, 71 | In-tank Assembly |
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| K052039 | 185 | Head Assembly |
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| K060160 | 118 | In-line Assembly |
| K060173 | 118 | In-tank Assembly |
| K070248 | 67, 68, 71 | In-tank Assembly |
| K070249 | 67, 68, 71 | In-tank Assembly |
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| K071001 | 67, 68, 71 | In-tank Assembly |
| K071002 | 67, 68, 71 | In-tank Assembly |

| Part No. | Page No. | Product Description |
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| K071003 | 67, 68, 71 | In-tank Assembly |
| K080033 | 126 | In-line Assembly |
| K080051 | 126 | In-tank Assembly |
| K080085 | 126 | In-line Assembly |
| K080087 | 125, 126 | In-line Assembly |
| K100001 | 78 | Head Assembly |
| K100002 | 78 | Head Assembly |
| K100003 | 78 | Head Assembly |
| K100004 | 78 | Head Assembly |
| P160078 | 78 | Filter |
| P160125 | 119 | O-Ring, Bypass Indicator |
| P160130 | 119 | Bypass Spring |
| P160135 | 119 | Top Handle |
| P160137 | 119 | Head, O-ring |
| P160293 | 119 | Baffle Assembly Kit |
| P160351 | 119 | Valve Assembly |
| P160353 | 119 | Bypass Valve Assembly |
| P160373 | 119 | Valve Assembly |
| P160473 | 119, 127 | Visual Indicator Kit |
| P160476 | 119 | Cup Seal |
| P160700 | 118 | Filter Cartridge |
| P160710 | 119, 127 | Visual Indicator Repair Kit |
| P160779 | 119, 127 | Hex Nut Retainer Kit |
| P161016 | 118 | Filter Cartridge |
| P161275 | 127 | Head, O-ring |
| P161277 | 127 | Cup Seal |
| P161282 | 127 | O-Ring |
| P161558 | 127 | Valve Assembly |
| P161571 | 118 | Filter Cartridge |
| P161851 | 119 | O-Ring, Bypass Indicator |
| P162005 | 159 | O-Ring |
| P162110 | 127 | Head Assembly |
| P162233 | 156, 163, 169 | Filter Cartridge |
| P162400 | 40, 89, 92, 197, 200 | Electric Indicator |
| P162642 | 40, 89, 92, 198 | Visual indicator |
| P162694 | 40, 198 | Visual indicator |
| P162696 | 40, 89, 92, 198 | Visual indicator |
| P162860 | 188 | O-Ring Kit |
| P163275 | 159 | O-Ring |

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| P163472 | 78 | Filter Cartridge |
| P163542 | 88, 265 | Spin-on Filter |
| P163567 | 88, 265 | Spin-on Filter |
| P163601 | 40, 89, 92, 197, 200 | Electric Indicator |
| P163642 | 40, 89, 92, 197, 200 | Electric Indicator |
| P163681 | 89 | Head Assembly |
| P163839 | 40, 89, 92, 197, 200 | Electric Indicator |
| P163945 | 126 | Filter Cartridge |
| P164056 | 88, 265 | Spin-on Filter |
| P164059 | 88, 265 | Spin-on Filter |
| P164071 | 127 | Valve Assembly |
| P164164 | 163 | Filter Cartridge |
| P164166 | 156, 169 | Filter Cartridge |
| P164168 | 163, 169 | Filter Cartridge |
| P164170 | 169 | Filter Cartridge |
| P164172 | 163 | Filter Cartridge |
| P164174 | 156, 163, 169 | Filter Cartridge |
| P164176 | 163, 169 | Filter Cartridge |
| P164178 | 169 | Filter Cartridge |
| P164227 | 185 | Filter Cartridge |
| P164229 | 185 | Filter Cartridge |
| P164315 | 137, 139, 157, 159, 172, 173, 186, 188, 198 | Visual Electric Indicator |
| P164375 | 88, 265 | Spin-on Filter |
| P164378 | 88, 265 | Spin-on Filter |
| P164381 | 88, 265 | Spin-on Filter |
| P164384 | 88, 265 | Spin-on Filter |
| P164405 | 126 | Filter Cartridge |
| P164407 | 126 | Filter Cartridge |
| P164585 | 185 | Filter Cartridge |
| P164592 | 163 | Filter Cartridge |
| P164594 | 156, 163, 169 | Filter Cartridge |
| P164596 | 163, 169 | Filter Cartridge |
| P164598 | 169 | Filter Cartridge |
| P164667 | 89 | Head Assembly |
| P164699 | 118 | Filter Cartridge |
| P164703 | 126 | Filter Cartridge |
| P164707 | 78 | Filter Cartridge |
| P165006 | 136, 147 | Filter Cartridge |

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| P165015 | 136, 147 | Filter Cartridge |
| P165041 | 136, 147 | Filter Cartridge |
| P165043 | 136, 147 | Filter Cartridge |
| P165136 | 136, 147 | Filter Cartridge |
| P165138 | 136, 147 | Filter Cartridge |
| P165185 | 88, 265 | Spin-on Filter |
| P165194 | 84, 89, 92, 96, 101, 104, 111, 162, 197, 200 | Electrical Indicator |
| P165319 | 156, 163, 169 | Filter Cartridge |
| P165332 | 88, 265 | Spin-on Filter |
| P165335 | 88, 265 | Spin-on Filter |
| P165338 | 88, 265 | Spin-on Filter |
| P165354 | 88, 265 | Spin-on Filter |
| P165434 | 89 | Head Assembly |
| P165449 | 78 | Filter Cartridge |
| P165537 | 89 | Head Assembly |
| P165569 | 92, 263, 265, 267 | Spin-on Filter |
| P165628 | 118 | Filter Cartridge |
| P165641 | 41 | Gasket |
| P165659 | 92, 263, 265, 267 | Spin-on Filter |
| P165672 | 92, 263, 265, 267 | Spin-on Filter |
| P165675 | 92, 263, 265, 267 | Spin-on Filter |
| P165762 | 36, 40, 44, 48, 52, 225 | Spin-on Filter |
| P165875 | 36, 40, 44, 48, 52, 225 | Spin-on Filter |
| P165876 | 36, 40, 44, 48, 52, 225 | Spin-on Filter |
| P165877 | 36, 40, 44, 48, 52 | Spin-on Filter |
| P165878 | 36, 40, 44, 48, 52 | Spin-on Filter |
| P165879 | 36, 40, 44, 48, 52 | Spin-on Filter |
| P165880 | 36, 40, 44, 48, 52 | Spin-on Filter |
| P165882 | 159 | O-Ring |
| P165965 | 84, 89, 92, 198 | Visual Indicator |
| P165973 | 93 | Head Assembly |
| P165983 | 41, 85, 89 | Plug |
| P165984 | 40, 89, 92 | Visual Indicator |
| P165984 | 40, 89, 92 | Visual Indicator |
| P166086 | 89 | Head Assembly |
| P166088 | 89 | Head Assembly |
| P166134 | 137, 157, 159, 172, 173, 186, 188 | Blanking Plate |
| P166353 | 157 | Head Assembly |
| P166387 | 89 | Head Assembly |
| P166416 | 89 | Head Assembly |
| P166417 | 89 | Head Assembly |
| P166418 | 40 | Head Assembly |
| P166435 | 41 | Gasket, O-ring |
| P166439 | 40 | Head Assembly |
| P166462 | 126 | Filter Cartridge |
| P166597 | 118 | Filter Cartridge |
| P166603 | 137, 157, 172, 186, 198 | Visual Electric Indicator |
| P166663 | 93 | Head Assembly |
| P166664 | 89 | Head Assembly |
| P166665 | 40 | Head Assembly |
| P166862 | 89 | Head Assembly |
| P166902 | 89 | Head Assembly |

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| P167162 | 36, 40, 44, 48, 52, 225 | Spin-on Filter |
| P167180 | 136, 147 | Filter Cartridge |
| P167181 | 136, 147 | Filter Cartridge |
| P167182 | 136, 147 | Filter Cartridge |
| P167183 | 136, 147 | Filter Cartridge |
| P167184 | 163 | Filter Cartridge |
| P167185 | 156, 163, 169 | Filter Cartridge |
| P167186 | 156, 163, 169 | Filter Cartridge |
| P167187 | 169 | Filter Cartridge |
| P167188 | 169 | Filter Cartridge |
| P167201 | 89 | Head Assembly |
| P167268 | 139 | Seal |
| P167294 | 93 | Head Assembly |
| P167296 | 93 | Head Assembly |
| P167297 | 93 | Head Assembly |
| P167324 | 176 | Filter Cartridge |
| P167411 | 163, 169 | Filter Cartridge |
| P167412 | 163, 169 | Filter Cartridge |
| P167443 | 137 | Filter Housing |
| P167452 | 137 | Filter Housing |
| P167473 | 89 | Head Assembly |
| P167529 | 89 | Head Assembly |
| P167580 | 89, 92, 198 | Visual Indicator |
| P167619 | 93 | Head Assembly |
| P167621 | 93 | Head Assembly |
| P167622 | 93 | Head Assembly |
| P167728 | 137 | Head Assembly |
| P167730 | 137 | Head Assembly |
| P167796 | 36, 40, 44, 48, 52, 163 | Spin-on Filter |
| P167843 | 163 | Filter Cartridge |
| P167944 | 36, 40, 44, 48, 52 | Spin-on Filter |
| P167945 | 36, 40, 44, 48, 52 | Spin-on Filter |
| P169012 | 222 | Reservoir Suction Strainer |
| P169013 | 222 | Reservoir Suction Strainer |
| P169014 | 222 | Reservoir Suction Strainer |
| P169015 | 222 | Reservoir Suction Strainer |
| P169016 | 222 | Reservoir Suction Strainer |
| P169017 | 222 | Reservoir Suction Strainer |
| P169018 | 222 | Reservoir Suction Strainer |
| P169019 | 222 | Reservoir Suction Strainer |
| P169020 | 222 | Reservoir Suction Strainer |
| P169309 | 89 | Head Assembly |
| P169310 | 89 | Head Assembly |
| P169317 | 89 | Head Assembly |
| P169320 | 89 | Head Assembly |
| P169913 | 127 | Cup Seal |
| P169984 | 93 | Head Assembly |
| P169985 | 93 | Head Assembly |
| P170053 | 85 | Friction Ring |
| P170308 | 84 | Spin-on Filter |
| P170309 | 84 | Spin-on Filter |
| P170310 | 84 | Spin-on Filter |
| P170311 | 84 | Spin-on Filter |
| P170312 | 84 | Spin-on Filter |

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| P170313 | 84 | Spin-on Filter |
| P170327 | 84 | Head Assembly |
| P170489 | 157 | Head Assembly |
| P170491 | 157 | Head Assembly |
| P170773 | 84 | Head Assembly |
| P170949 | 92, 263, 265, 267 | Spin-on Filter |
| P171143 | 40, 84, 89, 92, 197, 200 | Electrical Indicator |
| P171274 | 92, 263, 265, 267 | Spin-on Filter |
| P171275 | 92, 263, 265, 267 | Spin-on Filter |
| P171276 | 92, 263, 265, 267 | Spin-on Filter |
| P171500 | 71 | Filter Cartridge |
| P171501 | 71 | Filter Cartridge |
| P171502 | 71 | Filter Cartridge |
| P171503 | 68, 71 | Filter Cartridge |
| P171504 | 71 | Filter Cartridge |
| P171505 | 71 | Filter Cartridge |
| P171524 | 70, 71 | Filter Cartridge |
| P171525 | 70, 71 | Filter Cartridge |
| P171526 | 70, 71 | Filter Cartridge |
| P171527 | 68, 70, 71 | Filter Cartridge |
| P171528 | 70, 71 | Filter Cartridge |
| P171529 | 70, 71 | Filter Cartridge |
| P171530 | 70, 71 | Filter Cartridge |
| P171531 | 68, 70, 71 | Filter Cartridge |
| P171532 | 70, 71 | Filter Cartridge |
| P171533 | 68, 70, 71 | Filter Cartridge |
| P171534 | 70, 71 | Filter Cartridge |
| P171535 | 70, 71 | Filter Cartridge |
| P171536 | 71 | Filter Cartridge |
| P171537 | 68, 71 | Filter Cartridge |
| P171538 | 71 | Filter Cartridge |
| P171539 | 68, 71 | Filter Cartridge |
| P171540 | 71 | Filter Cartridge |
| P171541 | 71 | Filter Cartridge |
| P171555 | 68, 71 | Filter Cartridge |
| P171556 | 71 | Filter Cartridge |
| P171557 | 68, 71 | Filter Cartridge |
| P171558 | 71 | Filter Cartridge |
| P171559 | 71 | Filter Cartridge |
| P171572 | 71 | Filter Cartridge |
| P171573 | 68, 71 | Filter Cartridge |
| P171574 | 71 | Filter Cartridge |
| P171575 | 68, 71 | Filter Cartridge |
| P171576 | 71 | Filter Cartridge |
| P171578 | 71 | Filter Cartridge |
| P171579 | 68, 71 | Filter Cartridge |
| P171580 | 71 | Filter Cartridge |
| P171581 | 68, 71 | Filter Cartridge |
| P171582 | 71 | Filter Cartridge |
| P171583 | 71 | Filter Cartridge |
| P171616 | 44, 48, 52 | Spin-on Filter |
| P171635 | 54 | Spin-on Filter |
| P171640 | 54 | Spin-on Filter |

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| P171830 | 70 | Filter Cartridge |
| P171833 | 70 | Filter Cartridge |
| P171834 | 70, 71 | Filter Cartridge |
| P171836 | 70 | Filter Cartridge |
| P171837 | 70, 71 | Filter Cartridge |
| P171839 | 68, 70 | Filter Cartridge |
| P171840 | 68, 70, 71 | Filter Cartridge |
| P171842 | 70 | Filter Cartridge |
| P171843 | 70, 71 | Filter Cartridge |
| P171845 | 70 | Filter Cartridge |
| P171846 | 68, 70, 71 | Filter Cartridge |
| P171848 | 232 | Filler Breather Assemblies |
| P171855 | 232 | Filler Breather Assemblies |
| P171856 | 232 | Filler Breather Assemblies |
| P171859 | 232 | Filler Breather Assemblies |
| P171860 | 232 | Filler Breather Assemblies |
| P171861 | 222 | Reservior Suction Strainer |
| P171869 | 222 | Reservior Suction Strainer |
| P171877 | 222 | Reservior Suction Strainer |
| P171885 | 222 | Reservior Suction Strainer |
| P171889 | 222 | Reservior Suction Strainer |
| P171913 | 246 | Fluid Level Gauge |
| P171918 | 246 | Fluid Level Gauge |
| P171920 | 246 | Fluid Level & Temp Gauge |
| P171922 | 246 | Fluid Level & Temp Gauge |
| P171945 | 146, 149, 198 | Visual Indicator |
| P171953 | 69, 198 | Pressure Gauge |
| P171956 | 69, 198 | Pressure Gauge |
| P171958 | 69, 198 | Visual Indicator |
| P171966 | 69, 197 | Electrical Indicator |
| P172434 | 69 | In-tank Breather |
| P172953 | 40 | Head Assembly |
| P173292 | 232 | Filler Breather Replacement Cap |
| P173330 | 69 | In-tank Breather |
| P173364 | 232 | Filler Breather Replacement Cap |
| P173380 | 149 | O-Ring |
| P173382 | 149 | O-Ring |
| P173544 | 225 | Breather |
| P173545 | 225 | Breather |
| P173573 | 126 | Filter Cartridge |
| P173750 | 89 | Head Assembly |
| P173789 | 92, 263, 265, 267 | Spin-on Filter |
| P173910 | 222 | Reservior Suction Strainer |
| P173911 | 222 | Reservior Suction Strainer |
| P173912 | 222 | Reservior Suction Strainer |
| P173913 | 222 | Reservior Suction Strainer |
| P173914 | 222 | Reservior Suction Strainer |
| P173915 | 222 | Reservior Suction Strainer |
| P173916 | 222 | Reservior Suction Strainer |
| P173917 | 222 | Reservior Suction Strainer |
| P173943 | 92 | Spin-on Filter |
| P173944 | 40, 78, 84, 89, 92, 197, 200 | Electrical Indicator |

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| P174396 | 78, 84, 89, 92, 101, 104, 111, 197 | Electrical Indicator |
| P176207 | 92, 263, 265, 267 | Spin-on Filter |
| P176208 | 92, 263, 265, 267 | Spin-on Filter |
| P176221 | 118 | Filter Cartridge |
| P176222 | 126 | Filter Cartridge |
| P176223 | 78 | Filter Cartridge |
| P176417 | 78 | Filter Cartridge |
| P176431 | 250, 258 | Sampling Pump |
| P176433 | 250, 258 | Plastic Tubing |
| P176568 | 89 | Head Assembly |
| P176569 | 89 | Head Assembly |
| P176749 | 71 | Filter Cartridge |
| P177047 | 88, 265 | Spin-on Filter |
| P179075 | 92, 263, 265, 267 | Spin-on Filter |
| P179089 | 32, 225 | Spin-on Filter |
| P179381 | 89 | Head Assembly |
| P179460 | 84 | Head Assembly |
| P179579 | 157 | Filter Housing |
| P179582 | 88 | Head Assembly |
| P179609 | 88 | Head Assembly |
| P179763 | 92, 263, 265, 267 | Spin-on Filter |
| P550250 | 36, 44, 48, 52, 225 | Spin-on Filter |
| P550251 | 36, 44, 48, 52, 225 | Spin-on Filter |
| P550252 | 36, 44, 48, 52 | Spin-on Filter |
| P550274 | 32 | Spin-on Filter |
| P550275 | 36, 44, 48, 52, 263 | Spin-on Filter |
| P550276 | 36, 44, 48, 52, 263 | Spin-on Filter |
| P550386 | 36, 44, 48, 52, 225 | Spin-on Filter |
| P550387 | 36, 44, 48, 52 | Spin-on Filter |
| P550388 | 36, 44, 48, 52, 225 | Spin-on Filter |
| P551551 | 32, 225 | Spin-on Filter |
| P551553 | 32 | Spin-on Filter |
| P556005 | 225 | Spin-on Filter |
| P560584 | 88, 265 | Spin-on Filter |
| P560693 | 32, 225 | Head Assembly |
| P560694 | 32 | Head Assembly |
| P560716 | 110, 138 | Filter |
| P560718 | 110, 138 | Filter |
| P560855 | 93 | Head Assembly |
| P561131 | 32 | Head Assembly |
| P561132 | 32 | Head Assembly |
| P561133 | 32 | Head Assembly |
| P561134 | 32 | Head Assembly |
| P561135 | 32 | Head Assembly |
| P561136 | 32 | Head Assembly |
| P561137 | 32 | Head Assembly |
| P561138 | 32 | Head Assembly |
| P561140 | 32 | Spin-on Filter |
| P561141 | 32 | Head Assembly |
| P561183 | 36, 40, 44, 48, 52 | Head Assembly |
| P561880 | 276 | Filter Manifold |
| P561885 | 93 | Head Assembly |
| P561924 | 93 | Reservior Suction Strainer |

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| P562211 | 222 | Reservior Suction Strainer |
| P562212 | 222 | Reservior Suction Strainer |
| P562213 | 222 | Reservior Suction Strainer |
| P562214 | 222 | Reservior Suction Strainer |
| P562221 | 222 | Reservior Suction Strainer |
| P562222 | 222 | Reservior Suction Strainer |
| P562223 | 222 | Reservior Suction Strainer |
| P562224 | 222 | Reservior Suction Strainer |
| P562225 | 222 | Reservior Suction Strainer |
| P562226 | 222 | Reservior Suction Strainer |
| P562227 | 222 | Reservior Suction Strainer |
| P562228 | 222 | Reservior Suction Strainer |
| P562229 | 222 | Reservior Suction Strainer |
| P562231 | 222 | Reservior Suction Strainer |
| P562232 | 222 | Reservior Suction Strainer |
| P562233 | 222 | Reservior Suction Strainer |
| P562235 | 222 | Reservior Suction Strainer |
| P562236 | 222 | Reservior Suction Strainer |
| P562237 | 222 | Reservior Suction Strainer |
| P562238 | 222 | Reservior Suction Strainer |
| P562239 | 222 | Reservior Suction Strainer |
| P562240 | 222 | Reservior Suction Strainer |
| P562242 | 222 | Reservior Suction Strainer |
| P562243 | 222 | Reservior Suction Strainer |
| P562244 | 222 | Reservior Suction Strainer |
| P562245 | 222 | Tank Mounted Strainer |
| P562246 | 222 | Tank Mounted Strainer |
| P562247 | 223 | Tank Mounted Strainer |
| P562248 | 223 | Tank Mounted Strainer |
| P562249 | 223 | Tank Mounted Strainer |
| P562250 | 223 | Tank Mounted Strainer |
| P562251 | 223 | Tank Mounted Strainer |
| P562252 | 223 | Tank Mounted Strainer |
| P562253 | 223 | Tank Mounted Strainer |
| P562254 | 223 | Tank Mounted Strainer |
| P562255 | 223 | Tank Mounted Strainer |
| P562256 | 223 | Tank Mounted Strainer |
| P562257 | 223 | Tank Mounted Strainer |
| P562259 | 223 | Tank Mounted Strainer |
| P562260 | 223 | Tank Mounted Strainer |
| P562264 | 223 | Tank Mounted Strainer |
| P562266 | 223 | Tank Mounted Strainer |
| P562267 | 223 | Tank Mounted Strainer |
| P562269 | 223 | Tank Mounted Strainer |
| P562270 | 223 | Tank Mounted Strainer |
| P562271 | 223 | Tank Mounted Strainer |
| P562272 | 223 | Tank Mounted Strainer |
| P562273 | 223 | Tank Mounted Strainer |
| P562274 | 223 | Tank Mounted Diffuser |
| P562275 | 223 | Tank Mounted Diffuser |
| P562281 | 224 | Tank Mounted Diffuser |
| P562282 | 224 | Tank Mounted Diffuser |
| P562283 | 224 | Tank Mounted Diffuser |

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| P562284 | 224 | Line Mounted Diffuser |
| P562285 | 224 | Line Mounted Diffuser |
| P562287 | 224 | Line Mounted Diffuser |
| P562288 | 224 | Line Mounted Diffuser |
| P562289 | 224 | Line Mounted Diffuser |
| P562290 | 224 | Line Mounted Diffuser |
| P562291 | 224 | Line Mounted Diffuser |
| P562292 | 224 | In line Check Valve |
| P562293 | 224 | In line Check Valve |
| P562297 | 209 | In line Check Valve |
| P562298 | 209 | In line Check Valve |
| P562299 | 209 | In line Check Valve |
| P562301 | 209 | In line Check Valve |
| P562302 | 209 | In line Check Valve |
| P562303 | 209 | In line Check Valve |
| P562305 | 209 | In line Check Valve |
| P562306 | 209 | In line Check Valve |
| P562307 | 209 | In line Check Valve |
| P562308 | 209 | In line Check Valve |
| P562309 | 209 | In line Check Valve |
| P562311 | 209 | In line Check Valve |
| P562312 | 209 | In line Check Valve |
| P562313 | 209 | In line Check Valve |
| P562314 | 209 | In line Check Valve |
| P562316 | 209 | In line Check Valve |
| P562317 | 209 | In line Check Valve |
| P562319 | 209 | In line Check Valve |
| P562320 | 209 | In line Check Valve |
| P562321 | 209 | In line Check Valve |
| P562322 | 209 | In line Check Valve |
| P562323 | 209 | In line Check Valve |
| P562324 | 209 | In line Check Valve |
| P562325 | 209 | In line Check Valve |
| P562326 | 209 | In line Check Valve |
| P562327 | 209 | Ball Valve |
| P562328 | 209 | Ball Valve |
| P562331 | 210 | Ball Valve |
| P562332 | 212 | Ball Valve Lock Device |
| P562333 | 210 | Ball Valve |
| P562335 | 212 | Ball Valve |
| P562336 | 210 | Ball Valve |
| P562338 | 210 | Ball Valve Lock Device |
| P562339 | 210 | Ball Valve |
| P562340 | 212 | Ball Valve |
| P562341 | 210 | Ball Valve |
| P562342 | 213 | Ball Valve |
| P562343 | 210 | Ball Valve |
| P562344 | 213 | Ball Valve |
| P562345 | 210 | Ball Valve |
| P562346 | 210 | Ball Valve |
| P562356 | 212 | Ball Valve |
| P562357 | 212 | Ball Valve |
| P562358 | 212 | Ball Valve |
| P562359 | 212 | Ball Valve |

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| P562360 | 212 | Ball Valve |
| P562361 | 212 | Ball Valve |
| P562362 | 212 | Ball Valve |
| P562363 | 212 | Ball Valve |
| P562364 | 212 | Ball Valve |
| P562365 | 212 | Ball Valve |
| P562368 | 212 | Ball Valve Handle |
| P562369 | 212 | Ball Valve Handle |
| P562376 | 212 | Ball Valve Handle |
| P562377 | 212 | Ball Valve Seal Kit |
| P562378 | 212 | Ball Valve Seal Kit |
| P562379 | 212 | Ball Valve Seal Kit |
| P562380 | 212 | Ball Valve Seal Kit |
| P562381 | 212 | Ball Valve Seal Kit |
| P562382 | 212 | Ball Valve |
| P562387 | 211 | Ball Valve |
| P562388 | 211 | Ball Valve |
| P562389 | 211 | Ball Valve |
| P562390 | 211 | Ball Valve |
| P562391 | 211 | Ball Valve |
| P562392 | 211 | Ball Valve |
| P562394 | 211 | Ball Valve |
| P562395 | 211 | Ball Valve |
| P562396 | 211 | Ball Valve |
| P562397 | 211 | Ball Valve |
| P562398 | 211 | Ball Valve |
| P562399 | 211 | Ball Valve |
| P562404 | 213 | Ball Valve |
| P562405 | 213 | Ball Valve |
| P562406 | 213 | Sight Glass |
| P562408 | 244 | Sight Glass |
| P562409 | 244 | Sight Glass |
| P562410 | 244 | Sight Glass |
| P562411 | 244 | Sight Glass |
| P562412 | 244 | Sight Glass |
| P562413 | 244 | Sight Glass |
| P562414 | 244 | Sight Glass |
| P562415 | 244 | Sight Glass |
| P562417 | 244 | Sight Glass |
| P562418 | 244 | Sight Glass |
| P562419 | 243 | Sight Glass |
| P562420 | 243 | Sight Glass |
| P562421 | 243 | Sight Glass |
| P562423 | 243 | Sight Glass |
| P562426 | 243 | Sight Glass |
| P562427 | 243 | Sight Glass |
| P562430 | 243 | Fuel Level Gauge |
| P562433 | 245 | Fuel Level Gauge |
| P562434 | 248 | Fluid Level & Temp Gauge |
| P562435 | 248 | Fluid Level & Temp Gauge |
| P562436 | 248 | Fuel Level Gauge |
| P562437 | 248 | Fuel Level Gauge |
| P562438 | 248 | Fluid Level & Temp Gauge |
| P562440 | 248 | Fluid Level & Temp Gauge |

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| P562441 | 248 | Fuel Level Gauge |
| P562442 | 248 | Fluid Level & Temp Gauge |
| P562444 | 248 | Fuel Level Gauge |
| P562445 | 248 | Fluid Level & Temp Gauge |
| P562447 | 248 | Fluid Level & Temp Gauge |
| P562448 | 248 | Fluid Level & Temp Gauge |
| P562449 | 248 | Fluid Level & Temp Gauge |
| P562450 | 248 | Fluid Level & Temp Gauge |
| P562451 | 248 | Fuel Level Gauge |
| P562452 | 248 | Fuel Level Gauge |
| P562453 | 247 | Fuel Level Gauge |
| P562454 | 248 | Fuel Level Gauge |
| P562456 | 248 | Filler Breather Cap |
| P562458 | 248 | Filler Breather Cap |
| P562476 | 231 | Filler Breather Cap |
| P562477 | 231 | Filler Breather Cap |
| P562480 | 231 | Filler Breather Cap |
| P562481 | 231 | Filler Breather Cap |
| P562482 | 231 | Filler Breather Cap |
| P562483 | 231 | Filler Breather Cap |
| P562484 | 231 | Filler Breather Cap |
| P562492 | 231 | Filler Breather Cap |
| P562494 | 231 | Filler Breather Cap |
| P562495 | 231 | Filler Breather Cap |
| P562497 | 231 | Filler Breather Cap |
| P562502 | 231 | Breather |
| P562503 | 231 | Breather |
| P562510 | 229 | Breather |
| P562511 | 229 | Breather |
| P562512 | 229 | Breather |
| P562514 | 229 | Breather |
| P562516 | 229 | Breather |
| P562517 | 229 | Breather |
| P562518 | 229 | Breather |
| P562519 | 229 | Breather |
| P562520 | 229 | Breather |
| P562521 | 229 | Breather |
| P562522 | 229 | Breather |
| P562523 | 229 | Breather |
| P562524 | 229 | Breather |
| P562525 | 229 | Breather |
| P562526 | 229 | Breather |
| P562527 | 229 | Breather |
| P562528 | 229 | Breather |
| P562529 | 229 | Breather |
| P562530 | 229 | Breather |
| P562531 | 229 | Breather |
| P562532 | 229 | Filter Breather |
| P562533 | 229 | Filter Breather |
| P562534 | 236 | Filter Breather |
| P562536 | 236 | Filter Breather |
| P562537 | 236 | Filter Breather |
| P562538 | 236 | Filter Breather |
| P562539 | 236 | Filter Breather |

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| P562541 | 236 | Filler Breather |
| P562542 | 236 | Filler Breather |
| P562544 | 236 | Fillter Breather |
| P562554 | 236 | Fillter Breather |
| P562555 | 236 | Filler Mini Breather |
| P562556 | 236 | Filler Mini Breather |
| P562561 | 235 | Filler Breather |
| P562562 | 235 | Filler Breather |
| P562563 | 235 | Filler Breather |
| P562564 | 235 | Filler Breather |
| P562565 | 235 | Filler Breather |
| P562573 | 234 | Filler Breather |
| P562574 | 234 | Filler Breather |
| P562575 | 234 | Filler Breather |
| P562576 | 234 | Filler Breather |
| P562577 | 234 | Filler Breather |
| P562578 | 234 | Filler Breather |
| P562579 | 234 | Filler Breather |
| P562580 | 234 | Filler Breather |
| P562581 | 234 | Filler Breather |
| P562582 | 234 | Filler Breather |
| P562583 | 234 | Filler Breather |
| P562584 | 234 | Filler Breather |
| P562585 | 234 | Filler Breather |
| P562587 | 234 | Filler Breather |
| P562589 | 234 | Filler Breather |
| P562590 | 234 | Filler Breather |
| P562592 | 234 | Filler Breather |
| P562593 | 234 | Filler Breather |
| P562594 | 234 | Filler Breather |
| P562595 | 234 | Filler Breather |
| P562596 | 234 | Filler Breather |
| P562598 | 234 | Filler Breather |
| P562599 | 234 | Filler Breather |
| P562600 | 234 | Filler Breather |
| P562601 | 234 | Filler Breather |
| P562602 | 234 | Filler Breather |
| P562603 | 234 | Filler Breather |
| P562605 | 234 | Filler Breather |
| P562608 | 234 | Filler Breather |
| P562609 | 234 | Filler Breather |
| P562610 | 233 | Filler Breather |
| P562611 | 233 | Filler Breather |
| P562612 | 233 | Filler Breather |
| P562614 | 233 | Filler Breather |
| P562616 | 233 | Filler Breather |
| P562618 | 233 | Filler Breather |
| P562619 | 233 | Filler Breather |
| P562620 | 233 | Filler Breather |
| P562623 | 233 | Filler Breather |
| P562624 | 233 | Filler Breather |
| P562625 | 233 | Breather |
| P562626 | 233 | Breather |
| P562627 | 225 | Ball Valve Seal Kit |

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| P562628 | 225 | Ball Valve Seal Kit |
| P562629 | 212 | Filler Breather |
| P562630 | 212 | Pressure Gauge |
| P562668 | 238 | Pressure Gauge |
| P562671 | 202 | Pressure Gauge |
| P562672 | 203 | Pressure Gauge |
| P562673 | 203 | Pressure Gauge |
| P562674 | 203 | Pressure Gauge |
| P562675 | 203 | Pressure Gauge |
| P562676 | 203 | Pressure Gauge |
| P562677 | 203 | Pressure Gauge |
| P562678 | 203 | Pressure Gauge |
| P562679 | 203 | Pressure Gauge |
| P562680 | 203 | Pressure Gauge |
| P562681 | 203 | Pressure Gauge |
| P562682 | 203 | Pressure Gauge |
| P562683 | 203 | Pressure Gauge |
| P562684 | 203 | Pressure Gauge |
| P562685 | 203 | Pressure Gauge |
| P562686 | 203 | Pressure Gauge |
| P562687 | 203 | Pressure Gauge |
| P562688 | 203 | Pressure Gauge |
| P562696 | 202 | Pressure Gauge |
| P562697 | 202 | Pressure Gauge |
| P562698 | 202 | Pressure Gauge |
| P562699 | 202 | Pressure Gauge |
| P562700 | 202 | Pressure Gauge |
| P562701 | 202 | Pressure Gauge |
| P562702 | 202 | Pressure Gauge |
| P562703 | 202 | Pressure Gauge |
| P562704 | 202 | Pressure Gauge |
| P562705 | 202 | Pressure Gauge |
| P562706 | 202 | Pressure Gauge |
| P562707 | 202 | Pressure Gauge |
| P562708 | 202 | Pressure Gauge |
| P562709 | 202, 276 | Pressure Gauge |
| P562710 | 202 | Pressure Gauge |
| P562711 | 202 | Pressure Gauge |
| P562712 | 202 | Pressure Gauge |
| P562713 | 202 | Pressure Gauge |
| P562716 | 202 | Pressure Gauge |
| P562717 | 202 | Pressure Gauge |
| P562718 | 202 | Pressure Gauge |
| P562719 | 202 | Pressure Gauge |
| P562720 | 202 | Pressure Gauge |
| P562721 | 202 | Pressure Gauge |
| P562722 | 202 | Pressure Gauge |
| P562723 | 202 | Pressure Gauge |
| P562724 | 202 | Pressure Gauge |
| P562725 | 202 | Pressure Gauge |
| P562726 | 202 | Pressure Gauge |
| P562727 | 202 | Pressure Gauge |
| P562728 | 202 | Pressure Gauge |
| P562729 | 202 | Pressure Gauge |

| Part No. | Page No. | Product Description |
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| P562730 | 202 | Pressure Gauge |
| P562731 | 202 | Pressure Gauge |
| P562732 | 202 | Pressure Gauge |
| P562733 | 202 | Pressure Gauge |
| P562734 | 202 | Pressure Gauge |
| P562735 | 202 | Pressure Gauge |
| P562736 | 202 | Pressure Gauge |
| P562737 | 202 | Pressure Gauge |
| P562738 | 202 | Pressure Gauge |
| P562739 | 202 | Flange |
| P562740 | 202 | Flange |
| P563042 | 214 | Flange |
| P563044 | 214 | Flange |
| P563046 | 214 | Flange |
| P563047 | 214 | Flange |
| P563049 | 214 | Flange |
| P563050 | 214 | Flange |
| P563051 | 214 | Flange |
| P563053 | 214 | Flange |
| P563054 | 214 | Flange |
| P563056 | 214 | Flange |
| P563061 | 215 | Flange |
| P563063 | 215 | Flange |
| P563064 | 215 | Flange |
| P563065 | 215 | Flange |
| P563067 | 215 | Flange |
| P563088 | 216 | Flange |
| P563090 | 218 | Flange |
| P563093 | 216 | Flange |
| P563094 | 217 | Flange |
| P563095 | 218 | Flange |
| P563096 | 218 | Flange |
| P563100 | 216 | Flange |
| P563101 | 217 | Flange |
| P563102 | 218 | Flange |
| P563103 | 218 | Flange |
| P563107 | 216 | Flange |
| P563108 | 217 | Flange |
| P563109 | 218 | Flange |
| P563110 | 218 | Flange |
| P563113 | 216 | Flange |
| P563115 | 218 | Flange |
| P563117 | 216 | Flange |
| P563118 | 216 | Flange |
| P563119 | 219 | Flange |
| P563120 | 219 | Flange |
| P563121 | 219 | Flange |
| P563122 | 219 | Flange |
| P563123 | 219 | Flange |
| P563124 | 219 | Flange |
| P563127 | 219 | Flange |
| P563162 | 218 | Flange |
| P563163 | 217 | Flange |
| P563165 | 218 | Flange |

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| P563166 | 217 | Flange |
| P563168 | 218 | Flange |
| P563171 | 217 | Flange |
| P563176 | 219 | Flange |
| P563177 | 219 | Flange |
| P563178 | 219 | Flange |
| P563179 | 219 | Flange |
| P563180 | 219 | Test Point |
| P563181 | 219 | Test Point |
| P563192 | 205 | Test Point |
| P563193 | 205 | Test Point |
| P563197 | 205 | Test Point |
| P563199 | 205 | Test Point |
| P563206 | 205 | Test Point |
| P563207 | 205 | Test Point |
| P563210 | 205 | Test Point |
| P563212 | 205 | Test Point |
| P563215 | 205 | Test Point |
| P563219 | 205 | Test Point |
| P563220 | 205 | Test Point |
| P563224 | 205 | Test Point |
| P563231 | 205 | Test Point + Hose |
| P563232 | 205 | Test Point + Hose |
| P563240 | 207 | Test Point + Hose |
| P563243 | 207 | Test Point + Hose |
| P563244 | 207 | Test Point + Hose |
| P563245 | 207 | Test Point + Hose |
| P563246 | 207 | Test Point + Hose |
| P563247 | 207 | Test Point + Hose |
| P563248 | 207 | Test Point + Hose |
| P563249 | 207 | Test Point + Hose |
| P563250 | 207 | Test Point + Hose |
| P563251 | 207 | Test Point + Hose |
| P563252 | 207 | Test Point + Hose |
| P563254 | 207 | Test Point + Hose |
| P563255 | 207 | Test Point + Hose |
| P563256 | 207 | Test Point + Hose |
| P563257 | 207 | Test Point + Hose |
| P563259 | 207 | Test Point + Hose |
| P563260 | 207 | Test Point Adapter |
| P563261 | 207 | Test Point Adapter |
| P563262 | 206 | Test Point Adapter |
| P563263 | 206 | Test Point Adapter |
| P563264 | 206 | Test Point Adapter |
| P563265 | 206 | Head Assembly |
| P563266 | 206 | Head Assembly |
| P563267 | 44 | Head Assembly |
| P563268 | 44 | Head Assembly |
| P563269 | 44 | Head Assembly |
| P563270 | 44 | Head Assembly |
| P563271 | 44 | Head Assembly |
| P563272 | 44 | Head Assembly |
| P563273 | 48 | Head Assembly |
| P563274 | 48 | Head Assembly |

| Part No. | Page No. | Product Description |
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| P563275 | 48 | Head Assembly |
| P563276 | 48 | Head Assembly |
| P563277 | 52 | Head Assembly |
| P563278 | 32 | Head Assembly |
| P563279 | 32 | Head Assembly |
| P563280 | 32 | Head Assembly |
| P563288 | 32 | Pressure Gauge |
| P563296 | 33, 45, 49, 53, 198 | Pressure Gauge |
| P563297 | 33, 45, 49, 53, 198 | Pressure Gauge |
| P563298 | 33, 45, 49, 53, 55, 198 | Pressure Gauge |
| P563299 | 33, 45, 49, 53, 198 | Reservoir Suction Strainer |
| P563300 | 55, 198 | Pressure Gauge |
| P563305 | 222 | In line Check Valve |
| P563306 | 223 | Ball Valve |
| P563307 | 209 | Ball Valve |
| P563308 | 211 | Ball Valve |
| P563309 | 211 | Ball Valve |
| P563310 | 211 | Filler Breather |
| P563311 | 210 | Filler Breather |
| P563322 | 238 | Filler Breather |
| P563326 | 238 | Filler Breather |
| P563346 | 238 | Filler Breather |
| P563347 | 238 | Filler Breather |
| P563348 | 238 | Filler Breather |
| P563349 | 238 | Filler Breather |
| P563350 | 238 | Filler Breather |
| P563351 | 238 | Filler Breather |
| P563352 | 238 | Filler Breather |
| P563353 | 238 | Filler Breather |
| P563354 | 238 | Filler Breather |
| P563355 | 238 | Filler Breather |
| P563356 | 238 | Filler Breather |
| P563357 | 238 | Filler Breather |
| P563358 | 238 | Filler Breather |
| P563361 | 238 | Filler Breather Cap |
| P563362 | 230 | Filler Breather Cap |
| P563363 | 230 | Filler Breather Cap |
| P563365 | 230 | Filler Breather Cap |
| P563366 | 230 | Filler Breather Cap |
| P563367 | 230 | Filler Breather Cap |
| P563368 | 230 | Filler Breather Cap |
| P563369 | 230 | Filler Breather Cap |
| P563370 | 230 | Filler Breather Cap |
| P563371 | 230 | T.R.A.P.™ Breather |
| P563372 | 230 | Filler Breather |
| P563453 | 227 | Filler Breather |
| P563465 | 238 | Head Assembly |
| P563466 | 238 | Head Assembly |
| P563490 | 44 | Head Assembly |
| P563491 | 44 | Head Assembly |
| P563492 | 44 | Head Assembly |
| P563513 | 248 | Filler Breather Cap |
| P563514 | 248 | Test Point Adapter |
| P563609 | 234 | Side Mount Kit |

| Part No. | Page No. | Product Description |
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| P563614 | 231 | Test Point Adapter |
| P563665 | 248 | Bolt Kit |
| P563800 | 206 | Test Point Adapter |
| P563807 | 206 | Test Point Adapter |
| P563808 | 206 | Filter Breather |
| P563809 | 206 | T.R.A.P.™ Breather |
| P563813 | 236 | Breather |
| P563874 | 227, 228 | Fuel Level & Temp Gauge |
| P563901 | 229 | Fuel Level & Temp Gauge |
| P563909 | 248 | Head Assembly |
| P563913 | 248 | Head to Tank Seal |
| P563973 | 55 | Head to Tank Seal |
| P563975 | 55 | Visual Electrical Indicator |
| P563976 | 55 | Visual Electrical Indicator |
| P563978 | 33, 45, 49, 53, 55, 197 | Visual Electrical Indicator |
| P563979 | 33, 45, 49, 53, 197 | Head Assembly |
| P563987 | 205 | Head Assembly |
| P564038 | 55 | Spin-on Filter |
| P564147 | 44 | Spin-on Breather Filter |
| P564357 | 32, 225 | Spin-on Filter |
| P564424 | 225 | Head Assembly |
| P564425 | 225 | Spin-on breather |
| P564468 | 92, 263, 265, 267 | Head Assembly |
| P564484 | 89 | Head Assembly |
| P564485 | 89 | T.R.A.P.™ Breather |
| P564486 | 93 | Head Assembly |
| P564669 | 227, 228, 240 | Head Assembly |
| P564850 | 89 | Head Assembly |
| P564858 | 93 | Head Assembly |
| P564892 | 48 | Spin-on Filter |
| P564936 | 114, 152, 156, 162, 168, 180 | Spin-on Filter |
| P564967 | 32 | Spin-on Filter |
| P565059 | 32 | Spin-on Filter |
| P565060 | 32 | Spin-on Filter |
| P565061 | 32 | Spin-on Filter |
| P565062 | 32 | Spin-on Filter |
| P565122 | 114, 152, 156, 162, 168, 180 | Filter Cartridge |
| P565123 | 114, 152, 156, 162, 168, 180 | Filter Cartridge |
| P565183 | 276 | Filter |
| P565184 | 276 | Filter |
| P565185 | 276 | Filter |
| P565187 | 114, 162, 168, 180 | Filter Cartridge |
| P565188 | 114, 162, 168, 180 | Filter Cartridge |
| P565189 | 114, 162, 168, 180 | Filter Cartridge |
| P565195 | 168, 180 | Filter Cartridge |
| P565196 | 168, 180 | Filter Cartridge |
| P565197 | 168, 180 | Filter Cartridge |
| P565242 | 54 | Spin-on Filter |
| P565245 | 44, 48, 52 | Spin-on Filter |
| P565616 | 227, 228 | T.R.A.P. Breather |
| P565857 | 227, 228 | T.R.A.P. Breather |
| P565858 | 227, 228 | T.R.A.P. Breather |

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| P566023 | 278 | Head Assembly |
| P566024 | 278 | Head Assembly |
| P566037 | 227, 228 | T.R.A.P. TM Breather |
| P566151 | 227, 228 | T.R.A.P. Breather |
| P566156 | 227, 228 | T.R.A.P. Breather |
| P566168 | 227, 228 | T.R.A.P. Mechanical Indicator Kit |
| P566174 | 227, 228 | T.R.A.P. Breather |
| P566187 | 78 | Filter Cartridge |
| P566188 | 78 | Filter Cartridge |
| P566189 | 78 | Filter Cartridge |
| P566190 | 78 | Filter Cartridge |
| P566191 | 78 | Filter Cartridge |
| P566192 | 78 | Filter Cartridge |
| P566194 | 136, 142, 146 | Filter Cartridge |
| P566195 | 136, 142, 146, 193 | Filter Cartridge |
| P566196 | 136, 142, 146, 193 | Filter Cartridge |
| P566197 | 136, 142, 146, 193 | Filter Cartridge |
| P566198 | 136, 142, 146 | Filter Cartridge |
| P566199 | 136, 142, 146 | Filter Cartridge |
| P566200 | 136, 142, 146, 193 | Filter Cartridge |
| P566201 | 136, 142, 146, 193 | Filter Cartridge |
| P566202 | 136, 142, 146, 193 | Filter Cartridge |
| P566203 | 136, 142, 146 | Filter Cartridge |
| P566204 | 114, 152, 162, 180 | Filter Cartridge |
| P566205 | 114, 152, 162, 180 | Filter Cartridge |
| P566206 | 114, 152, 162, 180 | Filter Cartridge |
| P566207 | 114, 152, 162, 180 | Filter Cartridge |
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| P566214 | 114, 162, 168, 180 | Filter Cartridge |
| P566215 | 114, 162, 168, 180, 193 | Filter Cartridge |
| P566216 | 114, 162, 168, 180, 193 | Filter Cartridge |
| P566217 | 114, 162, 168, 180, 193 | Filter Cartridge |
| P566218 | 114, 162, 168, 180 | Filter Cartridge |
| P566219 | 168, 180 | Filter Cartridge |
| P566220 | 168, 180, 193 | Filter Cartridge |
| P566221 | 168, 180, 193 | Filter Cartridge |
| P566222 | 168, 180, 193 | Filter Cartridge |
| P566223 | 168, 180 | Filter Cartridge |
| P566239 | 122 | Filter Cartridge |
| P566240 | 122 | Filter Cartridge |
| P566241 | 122 | Filter Cartridge |
| P566242 | 122 | Filter Cartridge |

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| P566243 | 122 | Filter Cartridge |
| P566244 | 122 | Filter Cartridge |
| P566245 | 122 | Filter Cartridge |
| P566246 | 122 | Filter Cartridge |
| P566247 | 122 | Filter Cartridge |
| P566248 | 122 | Filter Cartridge |
| P566249 | 122 | Filter Cartridge |
| P566250 | 122 | Filter Cartridge |
| P566251 | 122 | Filter Cartridge |
| P566252 | 122 | Filter Cartridge |
| P566253 | 122 | Filter Cartridge |
| P566254 | 122 | Filter Cartridge |
| P566255 | 122 | Filter Cartridge |
| P566256 | 122 | Filter Cartridge |
| P566257 | 122 | Filter Cartridge |
| P566258 | 122 | Filter Cartridge |
| P566270 | 58, 62, 176, 193 | Filter Cartridge |
| P566271 | 58, 62, 176, 193 | Filter Cartridge |
| P566272 | 58, 62, 176, 193 | Filter Cartridge |
| P566273 | 58, 62, 176 | Filter Cartridge |
| P566274 | 62, 176, 193 | Filter Cartridge |
| P566275 | 62, 176, 193 | Filter Cartridge |
| P566276 | 62, 176, 193 | Filter Cartridge |
| P566277 | 62, 176 | Filter Cartridge |
| P566278 | 62, 176 | Filter Cartridge |
| P566279 | 62, 176 | Filter Cartridge |
| P566280 | 62, 176 | T.R.A.P. Breather |
| P566281 | 62, 176 | Filter Cartridge |
| P566321 | 227, 228 | T.R.A.P. Breather |
| P566335 | 136, 142, 146 | Filter Cartridge |
| P566336 | 136, 142, 146 | Filter Cartridge |
| P566337 | 136, 142, 146 | Filter Cartridge |
| P566338 | 136, 142, 146 | Filter Cartridge |
| P566364 | 114, 152, 162, 180 | Filter Cartridge |
| P566365 | 114, 152, 162, 180 | Filter Cartridge |
| P566366 | 114, 152, 156, 162, 168, 180 | Filter Cartridge |
| P566367 | 114, 152, 156, 162, 168, 180 | Filter Cartridge |
| P566368 | 114, 162, 168, 180 | Filter Cartridge |
| P566369 | 114, 162, 168, 180 | Filter Cartridge |
| P566370 | 168, 180 | Filter Cartridge |
| P566371 | 168, 180 | Filter Cartridge |
| P566373 | 193 | Filter Cartridge |
| P566374 | 193 | Filter Cartridge |
| P566375 | 193 | Filter Cartridge |
| P566378 | 193 | Filter Cartridge |
| P566379 | 193 | Filter Cartridge |
| P566380 | 193 | Filter Cartridge |
| P566383 | 193 | Filter Cartridge |
| P566384 | 193 | Filter Cartridge |
| P566385 | 193 | Filter Cartridge |
| P566412 | 176 | Filter Cartridge |
| P566413 | 176 | Filter Cartridge |

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| P566449 | 185 | Filter Cartridge |
| P566450 | 185 | Filter Cartridge |
| P566451 | 185 | Filter Cartridge |
| P566452 | 185 | Filter Cartridge |
| P566453 | 185 | Filter Cartridge |
| P566642 | 185 | Filter Cartridge |
| P566643 | 185 | Filter Cartridge |
| P566658 | 192 | Filter Cartridge |
| P566659 | 192 | Filter Cartridge |
| P566660 | 192 | Filter Cartridge |
| P566666 | 192 | Filter Cartridge |
| P566667 | 192 | Filter Cartridge |
| P566668 | 192 | Filter Cartridge |
| P566670 | 192 | Filter Cartridge |
| P566671 | 192 | Filter Cartridge |
| P566672 | 192 | Filter Cartridge |
| P566674 | 192 | Filter Cartridge |
| P566675 | 192 | Filter Cartridge |
| P566676 | 192 | Filter Cartridge |
| P566677 | 192 | Filter Cartridge |
| P566678 | 192 | Filter Cartridge |
| P566679 | 192 | Filter Cartridge |
| P566680 | 192 | Filter Cartridge |
| P566681 | 192 | Filter Cartridge |
| P566965 | 192 | Filter Cartridge |
| P566966 | 192 | Filter Cartridge |
| P566967 | 192 | Filter Cartridge |
| P566968 | 192 | Filter Cartridge |
| P566969 | 192 | Filter Cartridge |
| P566970 | 192 | Filter Cartridge |
| P566971 | 192 | Filter Cartridge |
| P566972 | 192 | Filter Cartridge |
| P566977 | 192 | Filter Cartridge |
| P566978 | 192 | Filter Cartridge |
| P566979 | 192 | Filter Cartridge |
| P566980 | 192 | Filter Cartridge |
| P566981 | 192 | Filter Cartridge |
| P566982 | 192 | Filter Cartridge |
| P566983 | 193 | Filter Cartridge |
| P566984 | 193 | Filter Cartridge |
| P567101 | 110, 138 | Filter |
| P567102 | 110, 138 | Filter |
| P567103 | 110, 138 | Filter |
| P567104 | 110, 138 | Filter |
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| P567459 | 137, 143, 153, 157, 172, 177, 181, 186, 199 | Visual Electric Indicator |

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| P567933 | 227 | T.R.A.P. Mini Breather |
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| P568817 | 62, 176 | Filter Cartridge |
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| P568857 | 96 | Head Assembly |
| P568858 | 96 | Head Assembly |
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| P568933 | 276 | Filter Manifold |
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| P569204 | 96 | Spin-on Filter |
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| P574995 | 101 | Head |

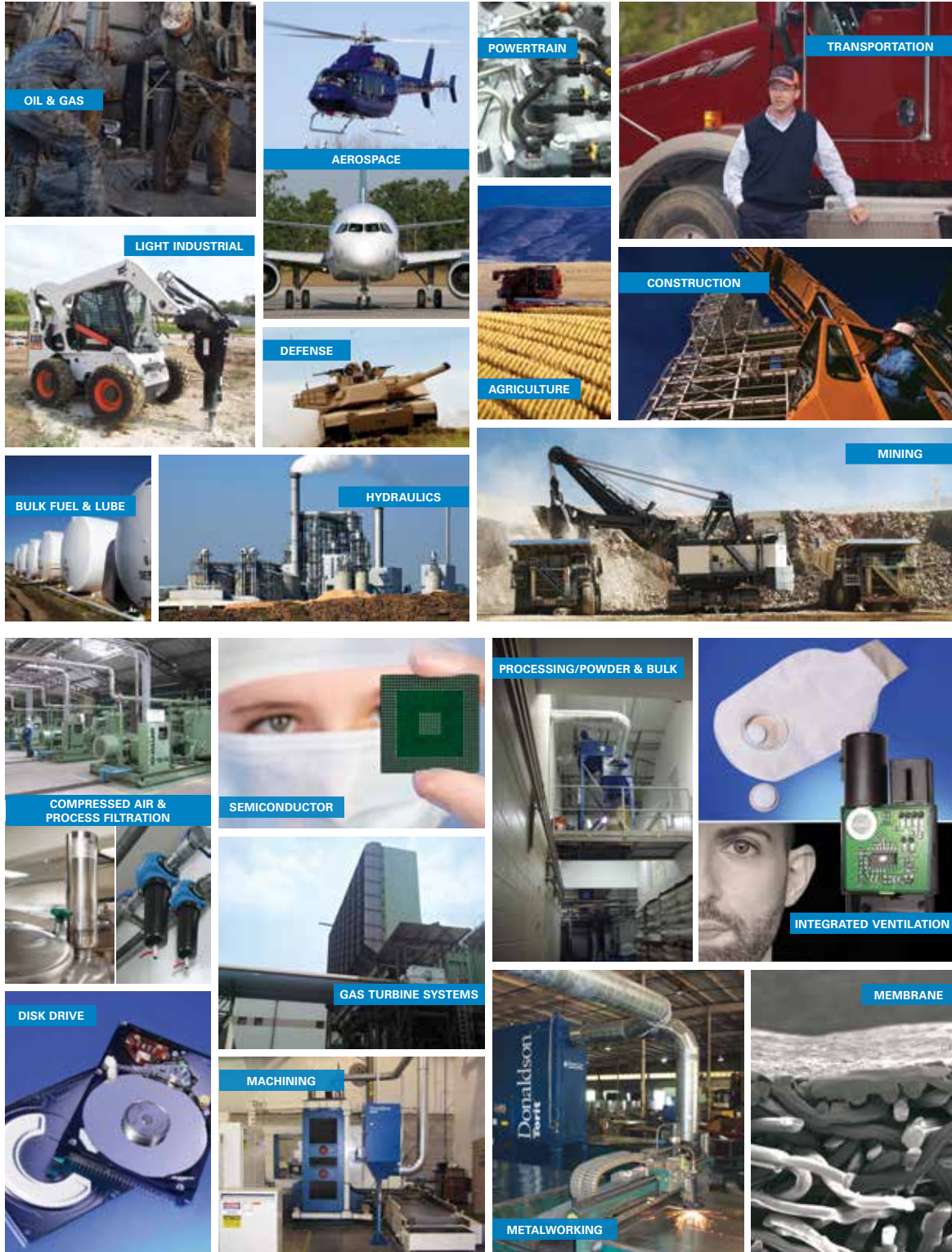
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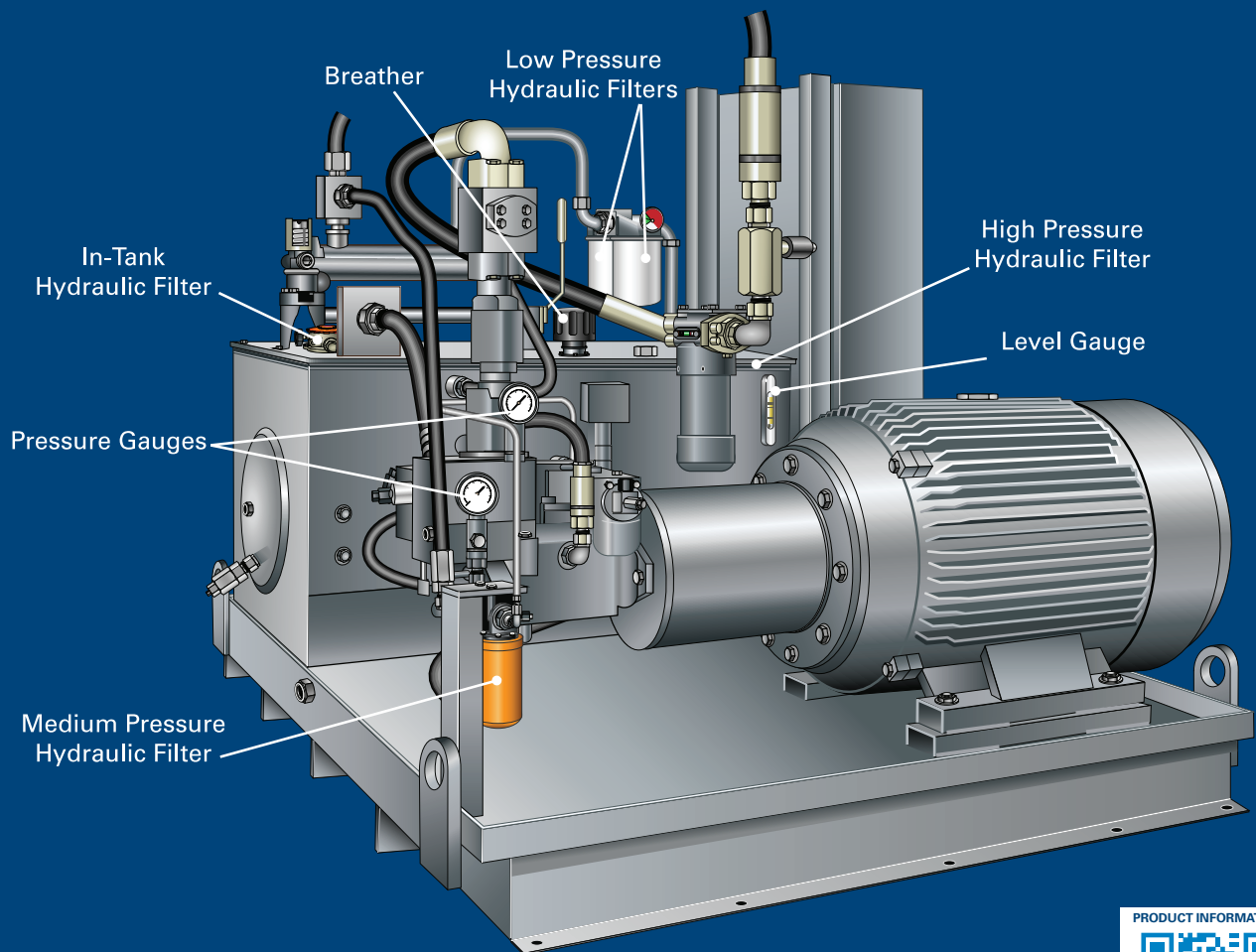
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