Donaldson FILTRATION SOLUTIONS

Diesel Engine Fuel Filtration Requirements

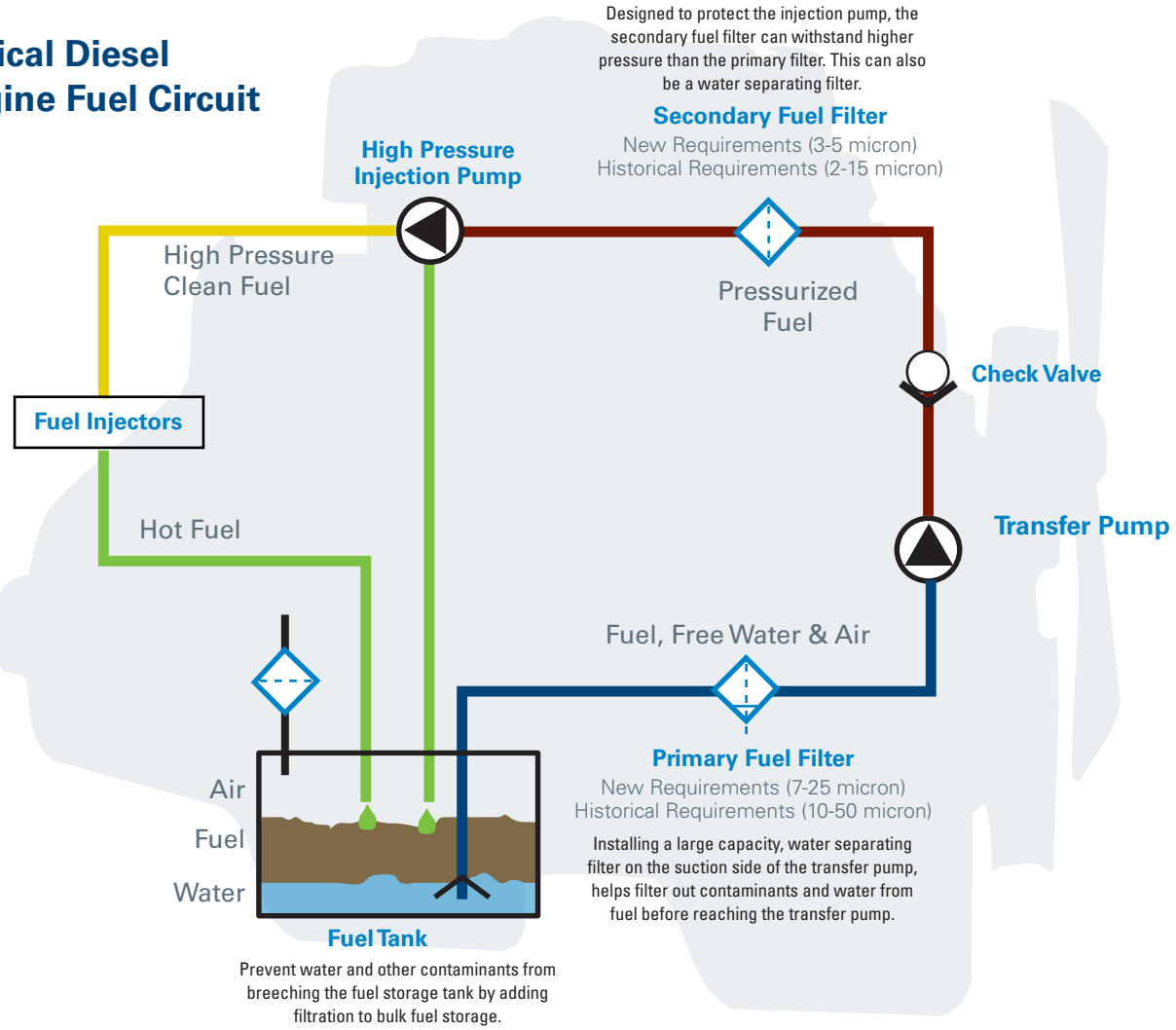
Diesel fuel and diesel fuel systems are ever-changing technologies. Over the past decade, numerous emission standards and engineering achievements provided some of the most advanced, clean, and flexible engine designs, yet the advancements have also included the acceptance of alternative forms of fuels such as biodiesel. The next decade is likely to see more change and improvements as diesel engines remain the work horse behind today's industrialized world.

Fuel filter performance and technology have also been challenged by these rapid changes. Today it is common to demand secondary filtration of 3-5 µm absolute efficiency, while matching with an upstream primary filter of 7-25 µm. These changes come with the expectation that water separation, filtration life, and packaging space remain constant or are improved upon. Donaldson engineers have proven to be up to this challenge through the advancement of media technologies.

Fuel filtration today is an integral part of the complete fuel system. A well designed fuel system takes contamination control into account from the beginning. Water separation, particulate and non-traditional contaminants need to be controlled. Engineers must be conscious of the relationship between the fuel circuit design and overall system cleanliness.

Finally, companies must understand global fuel quality concerns and end user needs. Documentation such as the World Wide Fuel Charter exists to promote convergence of various regional practices. Auxiliary user needs such as design type, preferred alternate fuel base stocks, and maintenance practices must be taken into account during the design process. Providing lasting, high quality fuel filtration solutions to our customers is our goal at Donaldson.

Typical Diesel Engine Fuel Circuit



Trends Driving Fuel System Technology Changes

Higher injection pressures
Fuel temperature management
Fuel recirculated with high return flows
Lower sulfur & biodiesel fuels
Fuels used as coolant and lubricant
Fuel storage
= New Fuel Filtration Systems

Harmful Contaminants Found in Fuel Systems

Particulate & Debris
Enters when fuel is transferred between storage tanks. Particulates in fuel can disrupt engine combustion and cause wear to the injectors.

Water
Water in the fuel can cause corrosion and reduces the lubricity of fuel. It can negatively affect the combustion process and consequently damage system components. Water enters fuel from storage tanks.

Wax/Paraffin
Drop out of fuel in cold weather conditions.

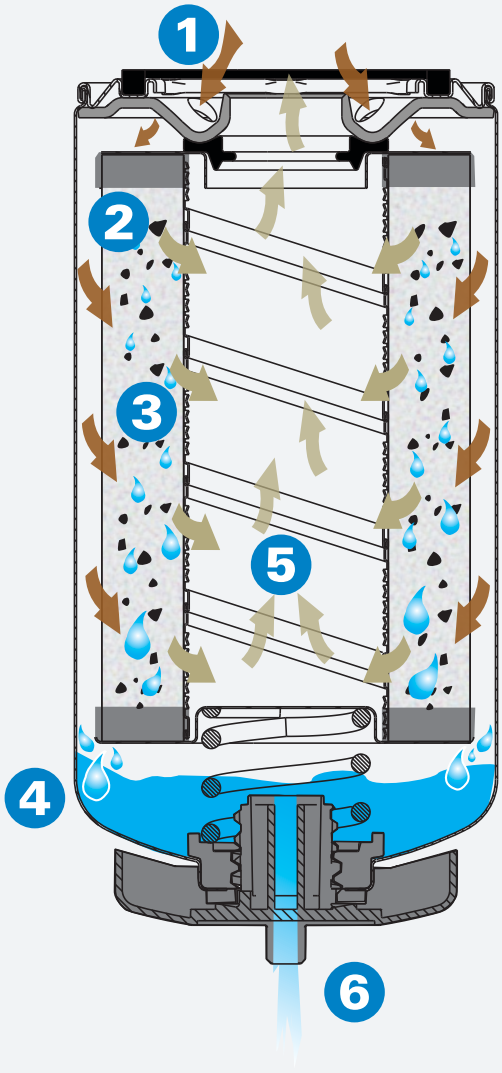
Microbes (Bacteria)
Can grow in the water at the fuel interface.

Fuel Degradation Products (FDP)
Fuel by-products result from the thermal and oxidative instability of fuel prior to combustion.

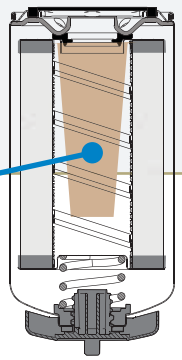
Asphaltenes
Found naturally in crude oil and can be found in refined fuel.

Air
Enters the system from leaks in the fuel line or system connections.

How Particulates and Water are Removed



1. Dirty fuel enters the filter through holes in the baffle or thread plate.
2. Contaminants and debris are removed from the fuel as they pass through the filter.
3. Specialized filter media removes water from the fuel.
4. The captured water coalesces into large drops that drain into a lower cavity of the spin-on unit or bowl.
5. Clean fuel exists the filter through the center tube.
6. The collected water should be drained by the operator daily. Choice of manual or water-in-fuel (WIF) sensors available.



What is a Standpipe?
Found in some applications, a standpipe is built in to the filter to prevent loss of system prime – preventing air from reaching the fuel injection system.

Donaldson FILTRATION SOLUTIONS

Filter Media

Filtration media represents the foundation of any filter design. Mastering the science of media creation is a key focus at Donaldson. While our customers may not share this same level of understanding, some basics are always helpful. The media representations below highlight some of the more commonly used media types in this evolving industry.

Today's engines are built with more stringent specifications and finer tolerances. Fuel systems, pumps and injectors require cleaner fuel to achieve better combustion and lower emissions. That's why the latest advances in filter media can make the difference between engine power and engine problems.

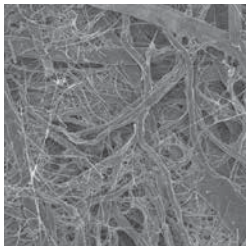
Cellulose (traditional media)

Fuel filter media is most commonly a pleated cellulose base material. This media is tested for compatibility with a variety of diesel fuels, including biodiesel and ULSD.

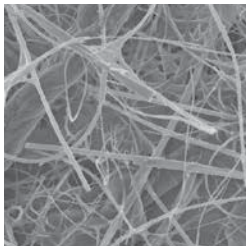
Larger particulates are trapped on outer layer, while finer particles are captured deeper in the media.

How it Works

SEM 100x



SEM 600x



Media Image

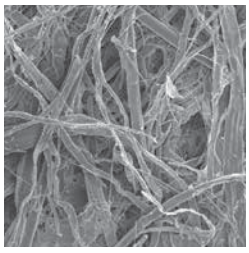
Treated Cellulose Media (Fuel Filter Water Separator)

This fuel filter water separator media is a cellulose base material. Treating a cellulose media with a silicone based treatment allows for effective water separation. Typically, this media is used on the suction side of the fuel system to remove harmful water and coarse particulate contaminant.

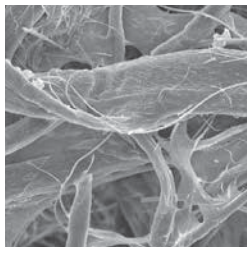
Water coalesces on media and drains to bottom of can or water collection bowl. Particulate is trapped and held in media.

How it Works

SEM 100x



SEM 600x



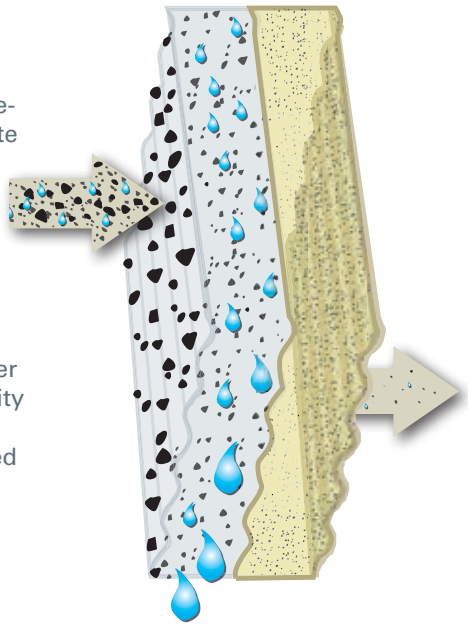
Media Image

Synteq™ Fuel Water Separator Media (Meltblown & Cellulose)

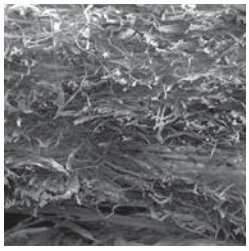
Donaldson's third generation of Synteq fuel filter water separator media uses both cellulose and a meltblown synthetic layer to achieve the highest levels of fuel filtration performance. This double-layered media increases particulate holding capacity and is a high performance water separator. It has the ability for high efficiency emulsified water separation and can be used in both suction and pressure sides of fuel systems.

The polyester layer improves water separation and dirt holding capacity performance. This media is ideal for critical applications or extended service intervals.

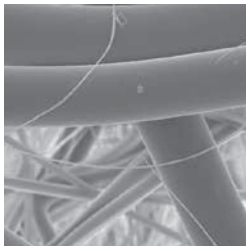
How it Works



SEM 100x



SEM 600x



Media Image

Synteq™

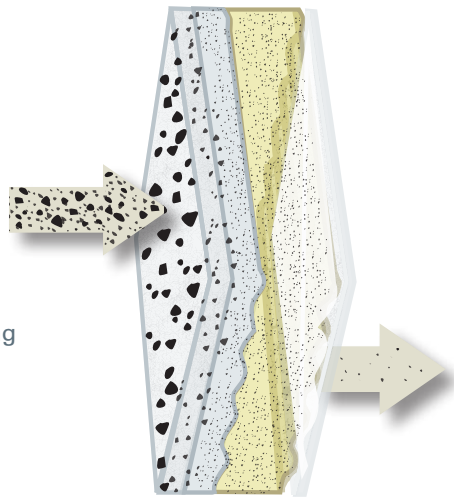
Synteq XP™ Media (Synthetic & Cellulose)

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:

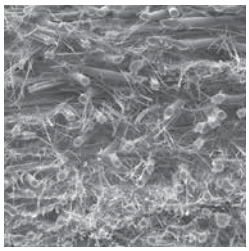
- Higher efficiency for optimal engine protection, or
- Extended filter life (up to 2 to 3 times that of traditional filter media)

Versatile and smaller filter packaging configuration options are available for secondary fuel filtration.

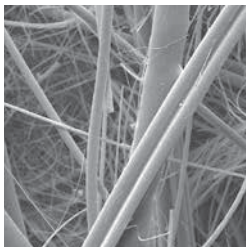
How it Works



SEM 100x



SEM 600x



Media Image

Synteq XP™

Fuel Filtration
Overview

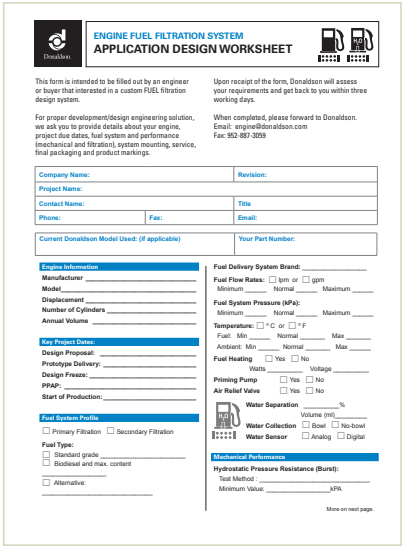
Fuel System Profile

At the end of this publication is a "tear-out" profile form for you to use to convey your system needs to our engineers.

The system profile has a list of all the design considerations required for proper engineering review to determine which Donaldson fuel system would be the optimum solution.

- Fuel System Characteristics - fuel grade, reservoir capacity, fuel flow rates, and temperature
- Filter change interval
- System functions - including water separation, fuel heating, drain, priming pumps, and venting
- Mechanical performance requirements - pressure, fatigue and vibration
- Filtration performance and test conditions
- Fitting and servicing considerations

As with most manufacturers, custom solutions require minimum annual production volumes and a design and development phase. See page 141 for our fuel filtration system design worksheet.



ENGINE FUEL FILTRATION SYSTEM
APPLICATION DESIGN WORKSHEET

This form is intended to be filled out by an engineer or buyer that interested in a custom FUEL filtration design system.

For proper development/design engineering solution, we ask you to provide details about your engine, project due dates, fuel system and performance (mechanical and filtration), system mounting, service, final packaging and product markings.

Upon receipt of the form, Donaldson will assess your requirements and get back to you within three working days.

When completed, please forward to Donaldson.
Email: engine@donaldson.com
Fax: 952-887-3059

Company Name:	Revision:
Project Name:	
Contact Name:	Title
Phone: / Fax:	Email:
Current Donaldson Model Used: (if applicable)	Your Part Number:

Engine Information
Manufacturer
Model
Displacement
Number of Cylinders
Annual Volume

Key Project Dates:
Design Proposal:
Prototype Delivery:
Design Freeze:
PPAP:
Start of Production:

Fuel System Profile
☐ Primary Filtration ☐ Secondary Filtration
Fuel Type:
☐ Standard grade
☐ Biodiesel and max. content
☐ Alternative:

Fuel Delivery System Brand:
Fuel Flow Rates: ☐ lpm or ☐ gpm
Minimum Normal Maximum
Fuel System Pressure (kPa):
Minimum Normal Maximum
Temperature: ☐ °C or ☐ °F
Fuel: Min Normal Max
Ambient: Min Normal Max
Fuel Heating ☐ Yes ☐ No
Watts Voltage
Priming Pump ☐ Yes ☐ No
Air Relief Valve ☐ Yes ☐ No
Water Separation %
Volume (ml)
Water Collection ☐ Bowl ☐ No-bowl
Water Sensor ☐ Analog ☐ Digital

Mechanical Performance
Hydrostatic Pressure Resistance (Burst):
Test Method:
Minimum Value: kPA

More on next page.

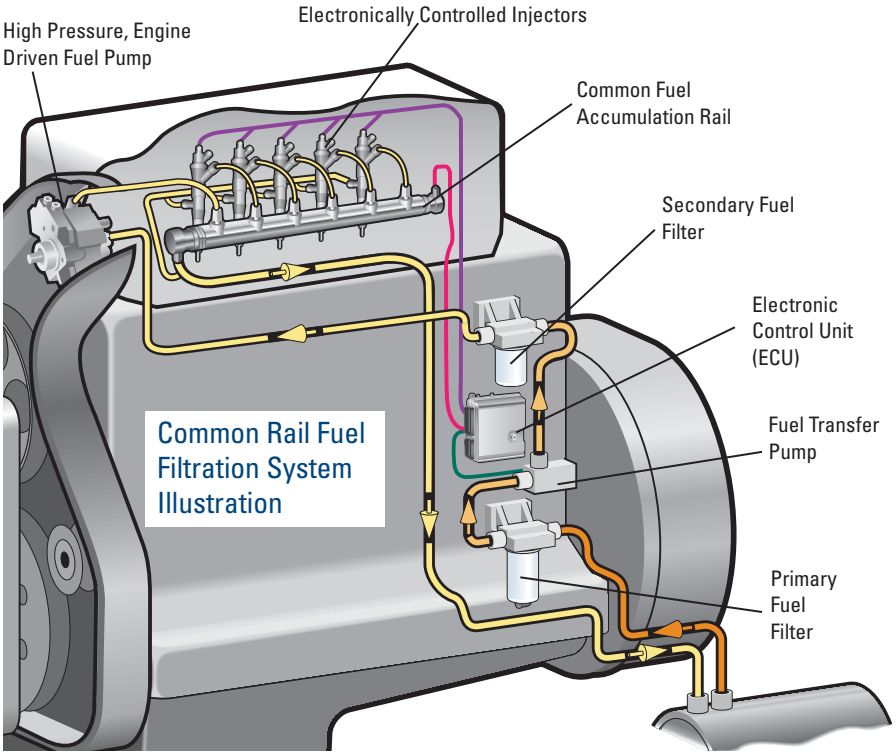
Fuel Filtration Design Considerations

To properly apply fuel filter systems there must be careful consideration of many different factors. There needs to be an understanding of what is being protected and what level of protection is required. Also, there needs to be a general understanding of the fuel system, where the filters are going to be placed and what the operating parameters are. Most fuel filters used in the engine fuel market are located in one of two positions, primary (pre-filter) or secondary (main filter). The illustration below shows the location and function of these two separate filters. When applying fuel filters to an engine, the filters need to be thought of as a system and how they work together instead of two stand-alone parts.

Primary filters are commonly utilized on the suction side of the fuel transfer pump. This placement allows for protection of the pump while simultaneously taking advantage of easier fuel water separation conditions. Water is typically in larger droplets in the suction side of the system (called coarse water).

If water travels through the transfer pump it becomes mixed in with the fuel in smaller droplets (called emulsified water). Typical micron (µm) ratings for suction side primary filters vary over a wide range. Depending on the vehicle, engine and operating environment, primary filters rated as low as 7µm, or as high as to over 25µm, may be employed. The efficiency of the primary filter is determined by the pump requirements, but is usually selected to help balance filter system life.

Secondary filters are usually placed between the transfer and high pressure injection pump. These filters protect the high pressure fuel pump and sensitive fuel injection components from damage due to particulate wear and erosion. Typical ratings for secondary filters in high pressure common rail fuel systems are in the 4-7µm range.



What's Right for your Engine?

As you develop the future design of your engine or application, it is important to consider the filtration system. Depending on your objectives, it may be beneficial to choose a catalog offering or to partner with Donaldson for a filtration solution tailored to your specific needs.

Reasons to Select a Standard System

- Low budget for engineering collaboration, development time or cost of component tooling
- Prefer to have parts readily available – want to avoid manufacturing lead times and not interested in warehousing service parts
- Have a need for mix and match head assemblies with various filter performance choices
- End users who prefer an established brand for filtration

Reasons to Consider a Custom System

- Engine design team is integrating new components that require a higher degree of filtration
- Looking for a system that does more; may include sensors, pumps, and/or heaters
- Have budget for engineering collaboration, development time/cost
- Interest in component / supplier consolidation – solutions that bridge a wide range of engine/vehicles
- Offering a unique solution with ease of maintenance

Liquid Filter Selection Process

Donaldson offers a full line of engine liquid products for a wide variety of applications and operating environments. There are different considerations depending on if you're looking for a filtration system for a new application or if you are looking to upgrade or improve on an existing application.

New System

The following pages feature our catalog heads and filter families that can be used to select standard line products. Choose the product to best suit your requirements and considerations

1. Determine flow range requirements.
2. Determine port size requirements.
3. Determine application filtration efficiency requirements.
4. Evaluate other system design considerations (refer to the application design worksheet on page 141).

Existing Application

Filter application selection for an existing application is best determined by OEM part number cross reference or OEM application make and model. Follow these steps only if the OEM part number or make and model catalog record is not available.

1. Determine filter category e.g. Lube, Fuel.
2. Determine filter type e.g. spin on, cartridge.
3. Determine family e.g. spin-on 93mm diameter, cartridge or competitive housing.
4. Determine other characteristics e.g. spin on thread size, inline fuel inlet/outlet diameter
5. Determine other requirements e.g. anti drain, bypass valve and it's opening pressure.
6. Determine available gasket sealing diameter dimensions.
7. Verify filtration efficiency requirements.

Fuel Filtration
FAQs

Donaldson FILTRATION SOLUTIONS

Frequently Asked Questions

Q1: Please explain the differences between the primary and secondary fuel filters in terms of the type of medium used, micron rating, and so forth.

Differences between primary and secondary filters vary from system to system, but in general, primary filters are used to separate water and larger particles (7-25 µm efficiency). Secondary filters are for final filtration (3-5 µm efficiency). Primary filters usually will have treated media to provide water separation performance. This can be either cellulose or a multi-layered synthetic media called melt-blown coupled with cellulose like Donaldson's Synteq™ media. Secondary filters have untreated, multi-layered cellulose or purely synthetic media. These differences mainly have to do with the water separation requirements placed on primary fuel filters.

Q2: Have micron (µm) ratings become smaller and smaller as injection technology has advanced? When replacing filters, how do you make sure you have the micron rating that's appropriate for your generation of engine and its injection system?

As injection technology has advanced and injection system pressures have increased the filtration requirements have become more demanding. These systems have required filtration technology to be more and more efficient. When replacing your filters be sure you use an OEM approved replacement or a direct cross from a reputable filter manufacture to ensure you are using a filter that is appropriate for your engine.

Q3: Some truckers used to use a fine primary filter to avoid changing the secondary, while the original equipment concept was to use a coarse primary (on the suction side) and a fine secondary (on the pressure side). This took extra changes, but they liked the idea of avoiding changing the secondary. Is doing this impractical on modern engines?

Primary and secondary filters are usually balanced to provide the required engine protection and the optimum filter life. Placing a fine filter in a primary (suction) filter location is impractical because they can not tolerate as much pressure drop and will need to be changed very often. Generally, fine filters do not contain the required water separation in a primary filter.

Q4: How have new engine designs affected fuel filtration?

In the past, diesel engines had either mechanical fuel injectors or unit injectors. The drive to develop engine that meet emissions regulations has led to the application of common rail fuel injection systems. The higher pressures of common rail systems enables more precise control of fuel delivery and control of the combustion process. The goal of the new technology is to reduce the particulate matter and NOx coming out of an engine system, thereby reducing the burden on after treatment systems.

The very high pressures in the common rail systems require tighter tolerances, elevating the requirements for cleanliness and efficiency on new and future fuel systems. This has created the need for increasingly better fuel filtration technology. Donaldson offers a range of products for those demanding conditions and is developing solutions for tomorrow's requirements.

Q5: Will common rail systems bring any changes in terms of fuel filter requirements? If so, can you say what will they be?

Most fuel injection systems today are already common rail or close derivatives. The technology itself does not drive specific changes, the injection pressures and desired filter service intervals are more influential.

Q6: How important is filtering fuel stored in bulk tanks?

It's becoming very important and can reduce future vehicle maintenance downtime. If you're using a bulk fuel tank, filtering the fuel BEFORE putting in your vehicle is another great practice that can reduce contaminant and water from the fuel before refilling your vehicle tank. Over time, tanks can corrode, water condensation can build up, contaminant could enter the tank opening during fills.

Q7: I've been handling my diesel the same way for years. Why should I change the way I store fuel?

With the exception of reducing sulfur content, fuel standards have not changed substantially in over a decade. Engines, however, have changed dramatically. In order for new equipment to run trouble-free, they require much cleaner fuel. This means an increased need for filtration. Manufacturers are insistent that damage caused by fuel contaminants is not a factory defect. Therefore, it is in your best interest to filter your fuel prior to use.

Q8: Shouldn't it be my fuel supplier's responsibility to deliver clean diesel?

More than likely, your supplier is delivering perfectly in-spec diesel. The problem is that diesel cleanliness specifications are woefully out of date when compared to the needs of the modern engine. Some distributors are starting to go the extra yard and filter diesel prior to delivery, but this is not an industry requirement. An additional note of caution: the term "clean diesel" can also be used when referring to ultra-low sulfur diesel. This is not the same as reduced contamination levels or fuel "cleanliness".

Q9: My fuel filters are plugging up really quickly. Should I change brands?

It is important to use high quality fuel filters to protect your engine. In most cases changing filter brands will NOT solve your fuel problems. Remember, a plugged filter did its job. Rapid filter plugging is an indication that there is a problem with the fuel, not the filter. The key to resolving rapid plugging issues is to determine how filterable solids are getting into or forming inside your fuel tank, and then fixing the root cause. Switching to a lower efficiency filter, regardless of brand, will simply spread the problem throughout your fleet.

Q10: The injectors and fuel pumps on my new equipment keep failing; what can I do?

The first step is to speak with your Original Equipment supplier. If you suspect that dirty fuel is behind the problems, a simple test can verify your fuel cleanliness level. Make sure you put the cleanest fuel possible into your equipment and protect your engine with a high-efficiency fuel filter. This should eliminate injector and fuel pump problems due to dirty fuel.

Q11: Diesel is diesel, right? Why not buy from the cheapest source?

As with anything, you typically get what you pay for. Diesel is expensive, so it is tempting to minimize operating expenses by purchasing the cheapest fuel possible. While this fuel may meet minimum industry standards, that may not be adequate. Small differences in handling practices can have a huge impact on overall fuel quality and cleanliness. Saving a few pennies on your fuel bill may end up costing you far more in downtime, lost production and equipment repairs. Partnering with a good supplier is one of your best defenses against unforeseen fuel quality issues.

Biodiesel – What You Should Know

Biodiesel is a clean burning, renewable, alternative fuel specifically designed for diesel engines. It's produced from domestic renewable sources, including animal fats and plant oils.

Biodiesel blends are created by combining biodiesel with petroleum diesel - allowing it to be used in most diesel engines without any modifications. The blend percentage can vary quite drastically between regions. For example, diesel fuel purchased in Illinois is commonly 11% biodiesel where other states are in the 2% to 5% range. The U.S. Federal Trade Commission (FTC) does not require percentage disclosure to the public for biodiesel blends less than 5%. This may be important for customers experiencing fuel filter life issues.

While biodiesel has many good qualities, it can be a challenge as it relates to filtration. Biodiesel acts as a solvent, so it tends to clean the infrastructure when first introduced, putting a stress on existing filtration. Biodiesel begins to gel or solidify at much higher temperatures than petro diesel, making it difficult to flow and filter in colder climates. And finally, biodiesel contains glycerin, which even in small quantities can contribute to rapid filter plugging. Your best strategy is to remove any solidified glycerin before it reaches your equipment.

All biodiesels are not created equal.

Know your suppliers and ensure they are providing quality biodiesel. The adoption of biodiesel is still in its infancy. Fuel stations are learning how to specify and store biodiesel properly. Industry specifications ASTM 6751, BQ-9000 and EN 14214 exist for your protection, but alone these do not ensure proper storage. Consider keeping a fuel log to trace issues to specific suppliers.

First time users are often most affected. Older equipment may have built up deposits or certain contaminants throughout the vehicle's fuel system (i.e. tanks, lines, etc.). Even quality biodiesel blends will tend to act as a system solvent. The first time user may experience a period of cleaning and short filter life due to this effect. Be assured that these filters are removing harmful contaminants and the plugging will subside. The most harmful thing one can do during this period is find a more "open" filter that would allow the filter to last longer but would let larger contaminant to pass through to fuel injectors.

Fuel Filtration FAQs

Donaldson FILTRATION SOLUTIONS

Continued,

Biodiesel – What You Should Know

When switching from ordinary diesel to biodiesel, flush or clean system first.

When first used in an engine, biodiesel has a cleaning effect. The hydrocarbon deposits that have accumulated throughout your fuel system will be flushed out. These deposits will be trapped in your fuel filter - shortening overall filter life. This issue will resolve itself as you continue to use biodiesel blends.

We recommend cleaning areas of the fuel system located downstream of the filters. There is no filtration protection for the injectors if a deposit breaks free after the secondary filter system. This type of cleaning is similar to changing to organic coolant. For example, all scale will flush away and often end up with leaks.

All Donaldson fuel filters can be used with up to 20% biodiesel blends (B20). For more information about our fuel filters, contact your Donaldson Representative or our Customer Support Team.

Key Points – Impact on Fuel Filtration

- Fuel filters used today are generally compatible with biodiesel blends up to B20
- Most plugging problems can be traced back to the fuel quality
- Recommendations to minimize plugging problems include:
  - Applying bulk filtration on storage tanks.
  - Implementing a preventative maintenance program.
  - Requesting compliance documentation from your fuel supplier.
  - Adding a fuel water separator to older vehicles not already equipped.

Common Causes of Fuel Filter Plugging and Shortened Filter Life

Using the wrong fuel for your operating climate will also shorten filter life. Fuels used in cold climates contain additives to help counteract the effects of the temperature. When using a fuel not intended for a cold climate, the fuel can gel or thicken, plugging the filter and greatly reducing filter life.

Fuel Filter Problems in Cold Weather

Encountering poor quality or unconditioned fuel is inevitable, so some precautions should be made when operating in cold weather. Depending on the severity of winter operating conditions, many operators may choose to protect their equipment through the use of fuel additives, fuel heaters, and fuel water separators.

Q: I use a good cold flow improver, so why do I continue to have so many problems in the winter?

Cold flow improvers, by design, stop small diesel fuel crystals from growing into large diesel fuel crystals (also known as gelling). This in turn lowers the temperature at which the diesel can still flow and be used in the fuel system. With today's HPCR engines, filters are becoming more efficient, and the smaller diesel crystals that used to pass through filters now get trapped just as particulates do. This can cause premature plugging of the filter and decreased life.

Most fuel related winter problems can be avoided using a #1 diesel or a winterized diesel blend.

Engine Power Loss

Diesel engine power loss during winter operation is a common occurrence. Unless there is a component failure within the engine, the problem can usually be traced back to paraffin crystal formation in the fuel which restricts the flow through fuel filters. Freezing temperatures can also cause emulsified water to form a fuel/ice slush, further restricting filters. Often, fuel filters are blamed for the problem when, in fact, the problem is caused by the effect of cold weather on grade #2 diesel fuel.

Cloud Point

The Cloud Point is the temperature at which paraffin or wax, which is naturally present in diesel fuel, begin to form cloudy wax crystals. When the fuel temperature reaches the cloud point, wax crystals flowing with the fuel coat the filter and quickly reduce the fuel flow, starving the engine. Typical cloud point temperatures range from -18°F (-28°C) to +20°F (-7°C), but may occasionally be as high as +40°F (4.4°C).

Grade #1 diesel fuel (or kerosene) contains very little paraffin, and therefore has a cloud point near -40°F (-40°C).

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Clean Fuel Carts Filter Anywhere

Compact, mobile carts are great for fuel transfers and kidney looping. Use it in your workshop, with in-plant machinery, or with mobile equipment to achieve and maintain the ISO cleanliness standards of your fuel.

X011407 AC Clean Fuel Cart
The X011407 features a high-quality 120V-AC PIUSI Panther® 56 pump for up to 15 gpm/56 lpm single-pass or kidney-looped filtration.

X011431 24-volt Clean Fuel Cart
The X011431 features a high-quality 24/12V DC PIUSI® Panther pump for up to 21 gpm/80 lpm single-pass or kidney-looped filtration.

X011408 12-volt DC Clean Fuel Cart
The X011408 features a high-quality 12V DC PIUSI Panther® pump for up to 16 gpm/60 lpm single-pass or kidney-looped filtration.

MyCleanDIESEL.com

You depend on diesel for the success of your operations.
You want to understand solutions before you see problems.

Visit MyCleanDiesel.com to learn how clean diesel can help you Achieve More™.

- Learn the essentials of "clean diesel":
  - What is clean diesel?
  - Why is clean diesel needed?
  - How do I get clean diesel?
- Learn how to Achieve More™
  - Reduce unplanned downtime
  - Meet or exceed service intervals
  - Optimize fuel efficiency, power, and emissions
  - Prevent rapid filter plugging
- Understand global emissions regulations and why they matter
- Engine technologies such as high pressure common rail (HPCR)
- Understand additives are typically added to diesel and why?
- Learn how fuel is delivered from the refinery to your tank and why it matters
- Find relevant, diverse, new case studies
- Find up to date reference information/websites
- Discover FAQs from people like you who depend diesel for the success of their operation
- Find a solution for your problem
- Understand the solutions before you see the problems
- Contact the global Clean Fuels team in your area-get almost immediate responses
- Recognize and solve your diesel-related problems
- Find relevant how-to information
  - Taking good samples
  - Patch testing to measure cleanliness
  - Changing filters

Fuel Filtration
Clean Diesel Kits

Donaldson FILTRATION SOLUTIONS

Clean Diesel Kits Clean Fuel In Minutes

Donaldson Clean Diesel Kits are the answer to all your fuel cleanliness worries. You can't always control the cleanliness of diesel fuel delivered to you, but you can control how clean it is when you pump into your vehicles and equipment.

Donaldson Clean Diesel Kits are easy to install on any fuel dispenser and come with everything needed to filter out even the finest contaminants *before* they enter your equipment's fuel system. With the included easy-to-follow, step-by-step instructions, you'll have effective, efficient filtration in minutes.

Every Clean Diesel Kit helps protect your engines, reduce your maintenance costs and prevent unplanned and costly downtime.

Additionally, each kit:

- Provides filtration to ISO 14/13/11 diesel cleanliness in a single pass
- Is recommended for all diesel and biodiesel blends

X011448
Basic Kit includes single head, high efficiency diesel filter and pressure gauge.
For flow rates up to 65 GPM / 246 LPM

X011450
High Capacity Kit includes dual head, high efficiency diesel filters (2), pressure gauge and flange adaptors.
For flow rates up to 125 GPM / 473 LPM

X011449
Clean & Dry Kit includes single head (2), high efficiency diesel filter, water absorbing filter, pressure gauge (2) and T.R.A.P.™ breather.
For flow rates up to 50 GPM / 189 LPM

Filtration Systems – Standard or Modular Designs

The following pages are Donaldson's catalog product offering for Fuel Assemblies with and without water separation. Within each range there are multiple head assembly and filter choices - including performance and water removal/drain options. Consult Donaldson for a custom solutions.

Use the matrix below to determine the filtration system that best matches your fuel flow requirements, key design requirements and mounting configuration on your engine.

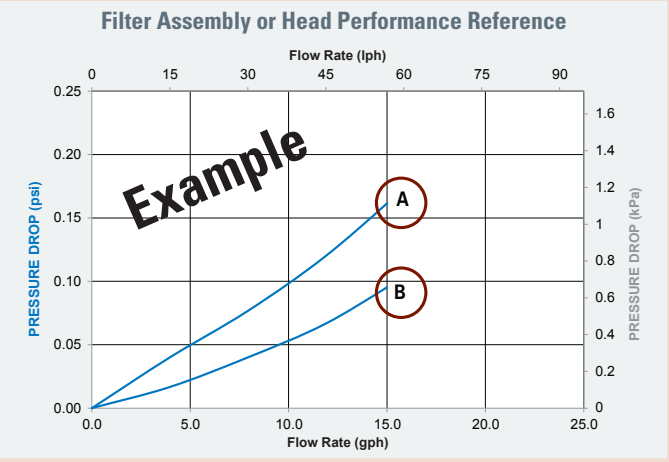
There are multiple filter choices (with and without water separation) within each product families. The flow range values are for fuel filter water separator filtration systems. The flow range will be higher if applying a non-water separating filter. Families identified as "modular" should be considered if you're interested in priming pumps and other add-on components.

Donaldson recommends multiple assemblies in parallel for engine applications with higher flow ranges and horsepower (kilowatt).

Fuel Filtration System Application Matrix

Mix and Match Fuel Filter Systems		
Families by Filter Diameter ϕ	Flow Range Note: flow ranges listed are for water separating applications. Non-water separating designs will go higher.	Features
76 mm / 3.00"	up to 30 gph / 114 lph	Standard design, side mount, single port heads, spin-on filters
80 mm / 3.15"	up to 60 gph / 227 lph	*Modular design, side mount, dual port heads, spin-on filters*
93 mm / 3.54"	up to 90 gph / 341 lph	*Modular design, side mount, dual port heads, spin-on filters*
		Standard design, top mount, single port heads, spin-on filters
	up to 160 gph / 606 lph	Standard design, side mount, single port head, spin-on filter (no water sep)
108 mm / 4.25"	up to 180 gph / 881 lph	Standard design, side mount, three port head, spin-on filters
118 mm / 4.65"	up to 250 gph / 946 lph	Standard design, side mount, single port heads, spin-on filters

How Donaldson Displays Filter Flow versus Pressure Loss Data



Performance Curve Notes

- Pressure loss was tested per the ISO 3968 standards.
- All flow measurements were made with Ultra Low Sulfur Diesel (ULSD at 80°F (26.6°C).
- Test conducted with a sample size of three filters.
- Filter performance curves will list an alpha reference (see circled areas on chart). These labels correspond with the filter choice tables.

Fuel Filtration
Filter Dia. 76 MM (3.0") x M16-1.5

Flow Range: up to 30 gph / 114 lph

Operating Pressure
0-100 psi (690 kPa) without bowl

Temperature Range
-40° to 250°F (-40° to 121°C)

Flow Rate
Up to 30 gph / 114 lph

See table for filter flow rates

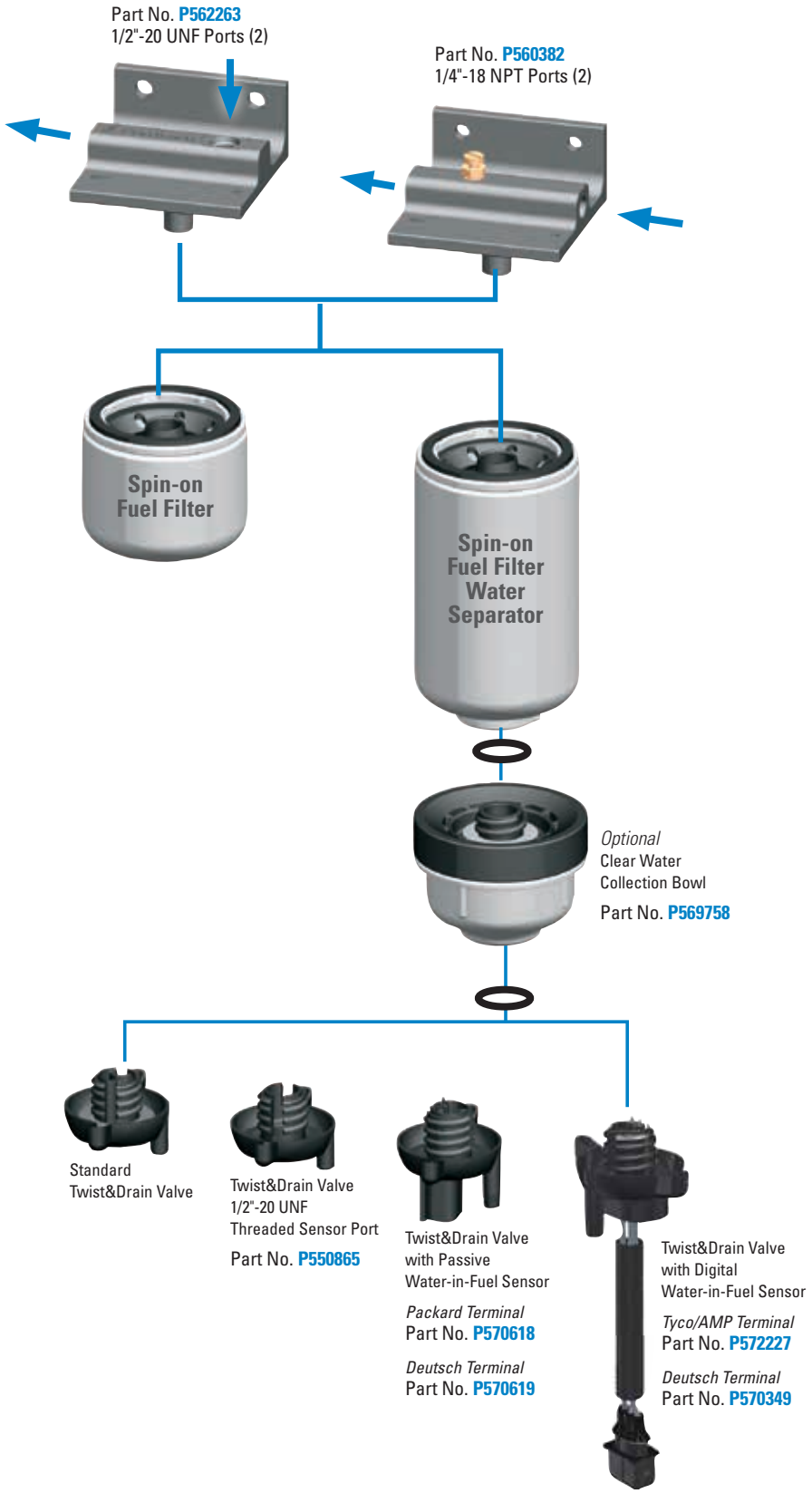
Fuel Compatibility
#1 or #2 Diesel, Kerosene, Biodiesel up to B20 and JP8

Mounting
Engine or Chassis

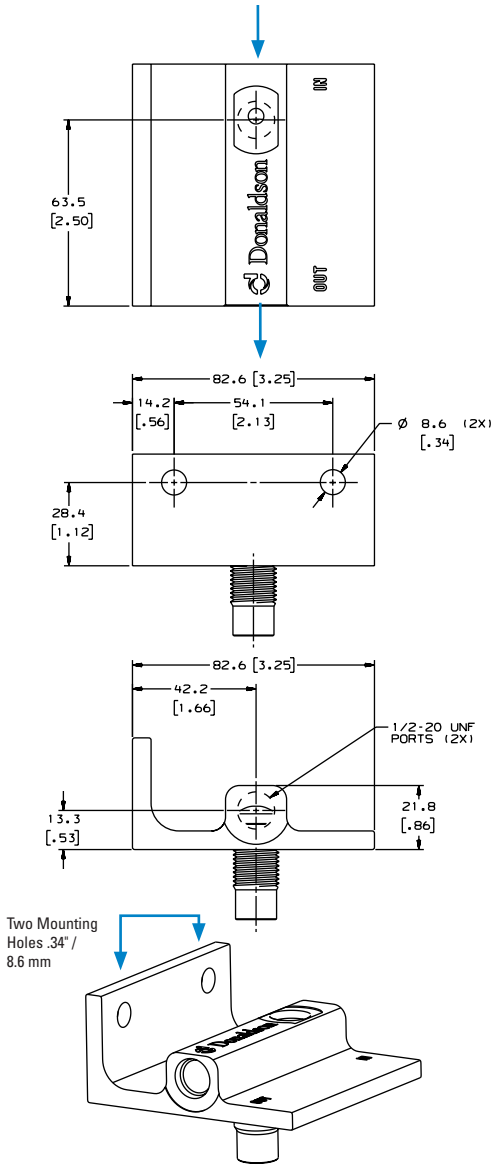
Water Removal @ Recommended Flow Rate
SAE J1488 Emulsified: 95% efficiency

SAE J1839 Free Water: 95% efficiency

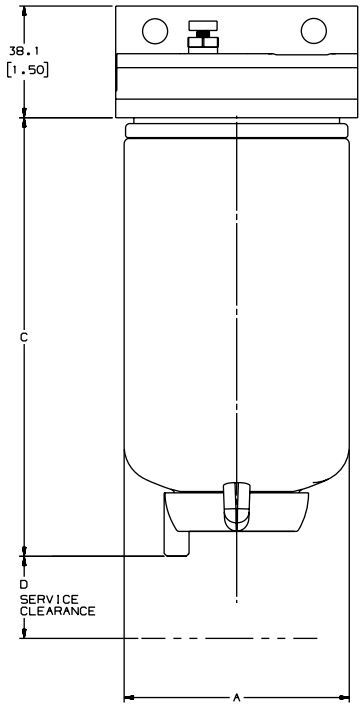
Air Bleed Vent
Bleed options available



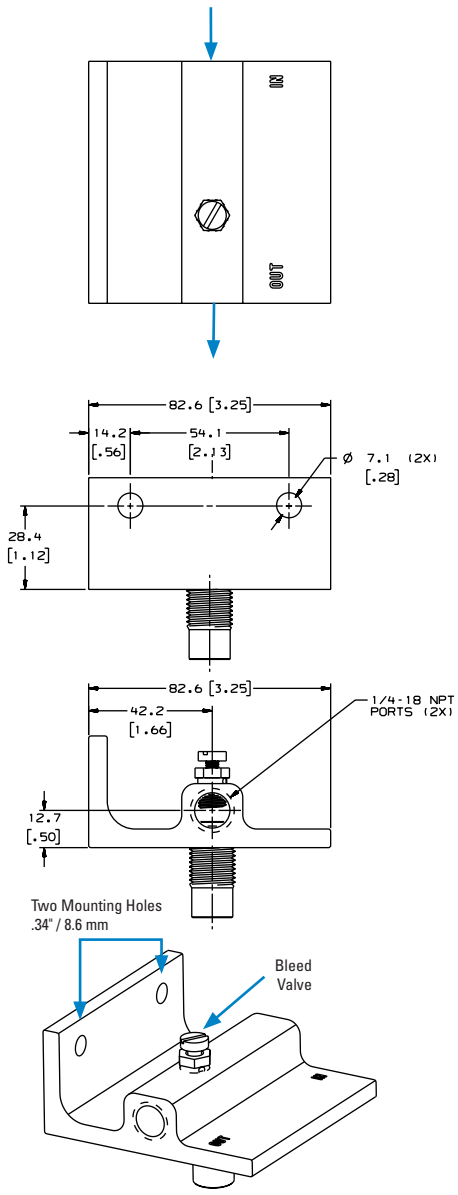
Specification Illustrations



Part No. P562263
1/2"-20 UNF Ports (2)



76 mm / 3.00"



Part No. P560382
1/4"-18 NPT Ports (2)

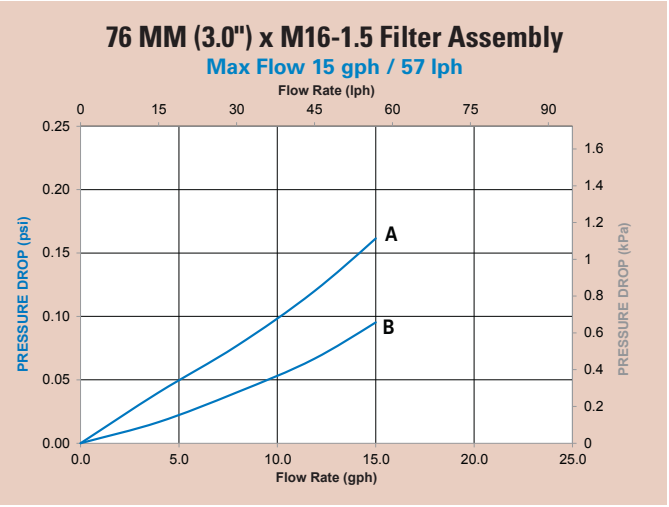
Fuel Filtration
Filter Dia. 76 MM (3.0") x M16-1.5

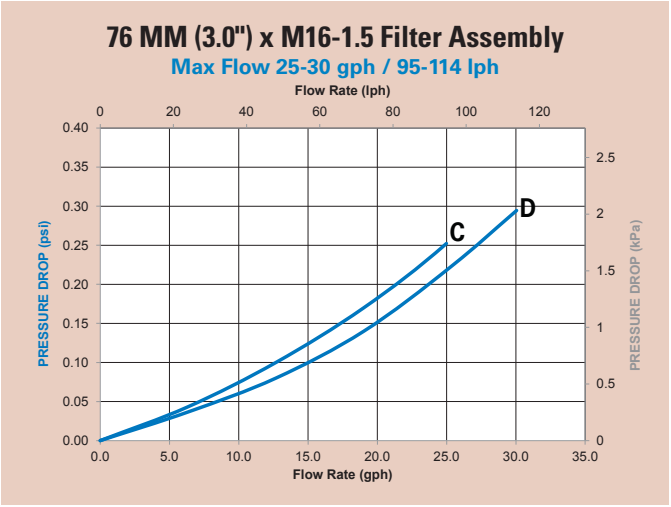
Filter Selection Chart

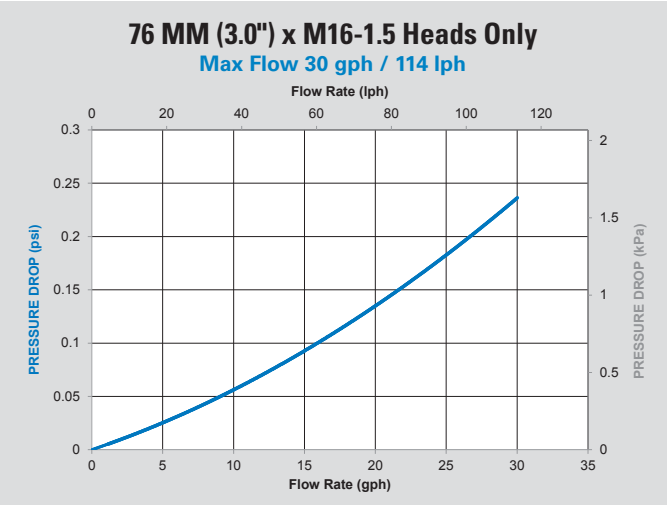
Filter Style	Max. Recommended Flow Rate		(C) Filter Length*		Media Type	Efficiency @ Micron	Stand Tube	Part Number	Performance Curve	(D) Service Clearance	
	gph	lph	in	mm						in	mm
Standard Drain 	15	57	4.01	102	Treated Cellulose	99% @ 15	No	P551039	B	.93	24
	30	114	5.81	148	Treated Cellulose	99% @ 11	No	P550588	C		
					Synteq	99% @ 3	No	P551615	N/A		
					Treated Cellulose	99% @ 15	Yes	P550248	C		
No Drain 	15	57	3.26	83	Cellulose	99% @ 16	No	P550345	B		
					Cellulose	99% @ 9	No	P555095	A		
	25	95	4.72	120	Cellulose	99% @ 16	Yes	P553004	C		
					Cellulose	99% @ 9	No	P550943	C		
	30	114	4.72	120	Cellulose	99% @ 16	Yes	P550440	D		

* Water Collection Bowl (part no. P569758) adds 1.98" / 50 mm to filter length.

Performance Curves







Flow Range: up to 60 gph / 227 lph

Operating Pressure*
0-14.5 psi (100 kPa) with hand pump

Temperature Range
-40° to 250°F (-40° to 121°C)

Flow Rate
Up to 60 gph / 227 lph

Note: Maximum flow rate may be exceeded (up to 400 lph) for non water-separating applications

Fuel Compatibility
#1 or #2 Diesel, Kerosene
Biodiesel up to B100

Mounting
Engine or Chassis

Clean Pressure Drop (Restriction)
At recommended flow rate without check-valve and priming pump

Water Removal
SAE J1488 Emulsified: 95% efficiency

SAE J1839 Free Water: 95% efficiency

Air Bleed Valve
Automatic or manual

Electric Heating Options
12V or 24V

Thermocouple heater rod, or PTC (Positive Temperature Coefficient) heater plate

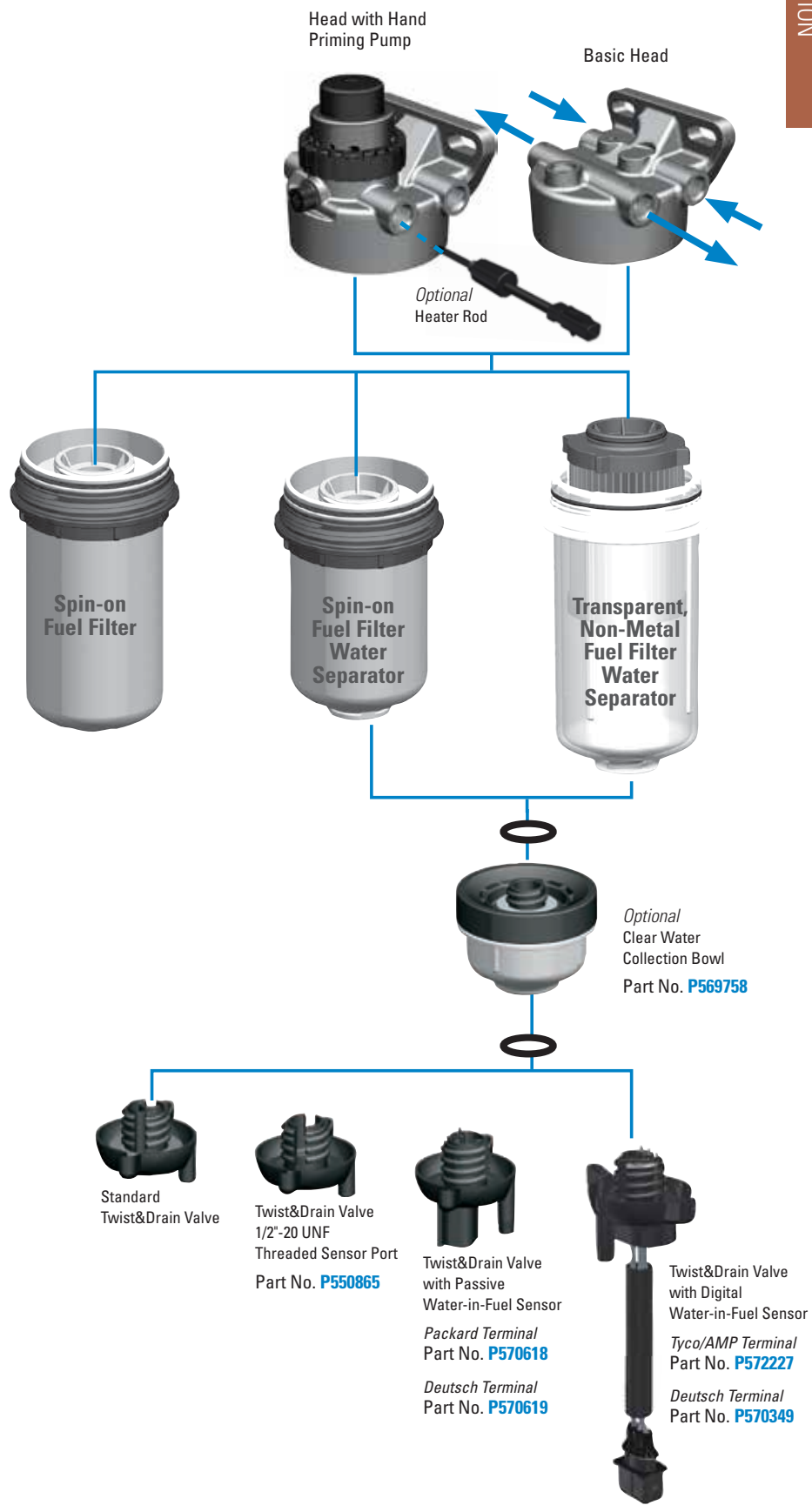
Porting Size Options
Custom port configuration options:
- 1/2 - 20 SAE
- 9/16 - 18 SAE
- M14x1.5 mm

Pump Options
Electronic Transfer Pump:
- 12V or 24V
- brushed or brushless motor types

Hand Priming Pump

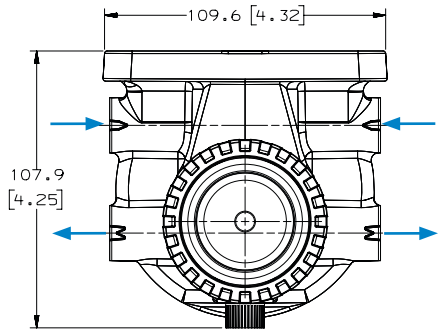
Media Options
Custom performance packaging with advanced Synteq XP media technology, Synteq or standard cellulose media

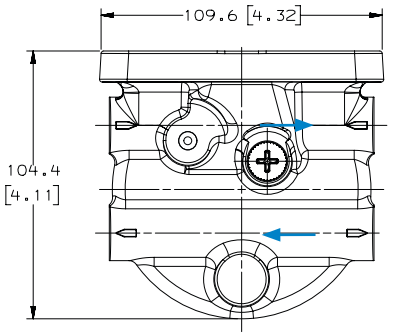
* Dependent on application and configuration

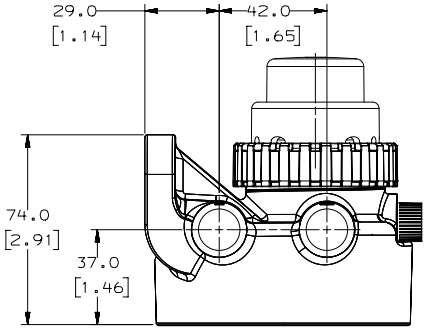


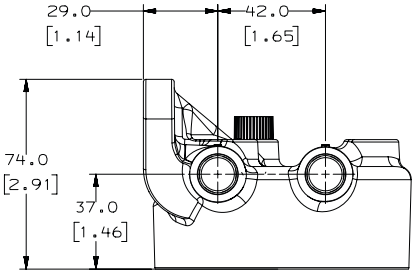
Fuel Filtration
Filter Dia. 80 MM (3.15") x M94-3

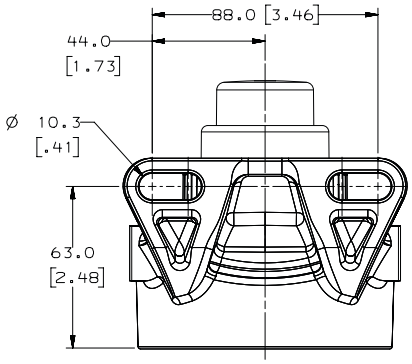
Specification Illustrations

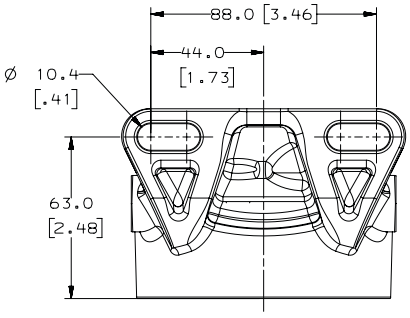


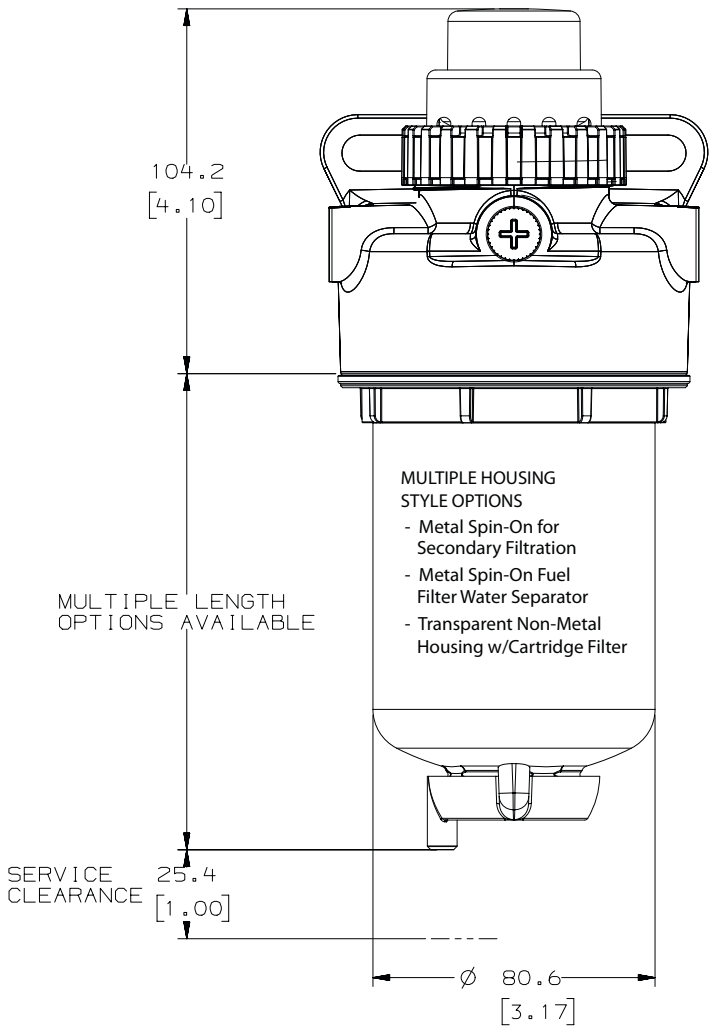












Lead Time Note

This product is configured with the specifications and features of your choice.

Please contact your Donaldson representative for more details.

Fuel Filtration

Filter Dia. 93 mm / 3.54 in. x 1 in.-14

Flow Range: Up to 420 lph / 111 gph

Operating Pressure
210 kPa / 0-30 psi (primary)
690 kPa / 0-100 psi (secondary)

Temperature Range
-40° to 121 °C / -40 °F to 250 °F

Flow Rate
Up to 420 lph / 111 gph
See table for filter flow rates

Fuel Compatibility
#1 or #2 Diesel, Kerosene,
Biodiesel up to B20 and JP8

Priming Pump Head*
M12 x 1.5 Ports
PART NO. P576612
M14 x 1.5 Ports
PART NO. P576614

Basic Head*
M12 x 1.5 Ports
PART NO. P576712
M14 x 1.5 Ports
PART NO. P576714

Spin on Fuel Filter
Water Separator

Spin on
Fuel Filter

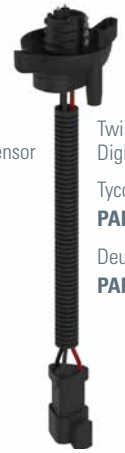
**OPTIONAL*
Filter indicators and switches available.
See following page for options.

OPTIONAL
Clear Water
Collection Bowl
PART NO. P569758

Standard
Twist&Drain™
Valve

Twist&Drain™ Valve
1/2 in.-20 UNF
Threaded Sensor Port
PART NO. P550865

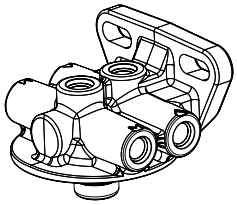
Twist&Drain™ Valve with
Passive Water-in-Fuel Sensor
Packard Terminal
PART NO. P570618
Deutsch Terminal
PART NO. P570619

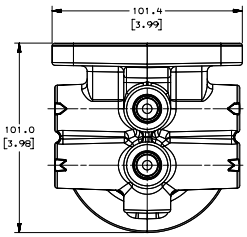


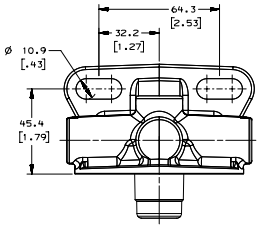
Twist&Drain™ Valve with
Digital Water-in-Fuel Sensor
Tyco/AMP Terminal
PART NO. P572227
Deutsch Terminal
PART NO. P570349

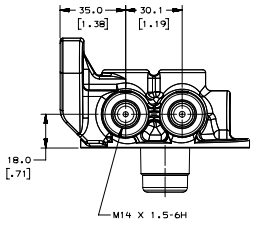
Specification Illustrations

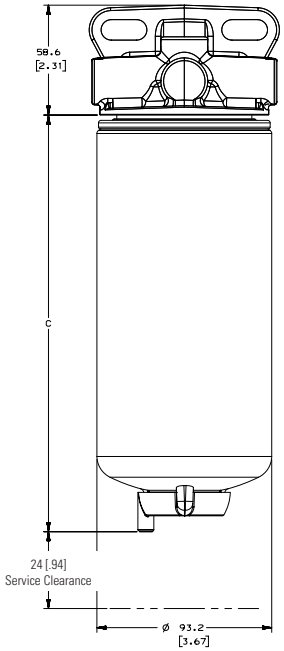
BASIC HEAD

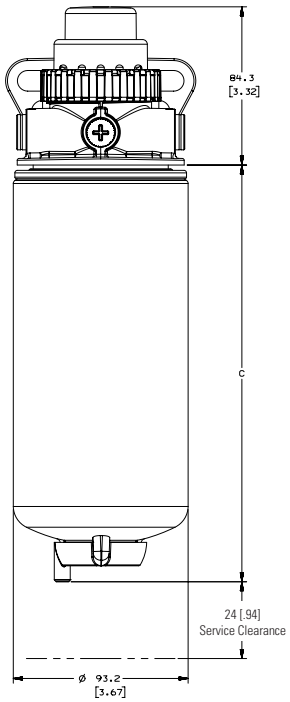






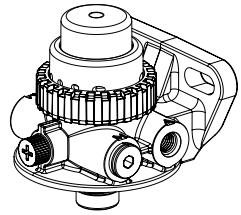


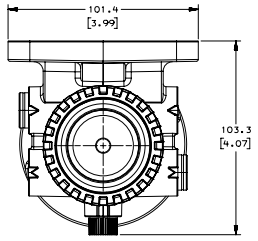


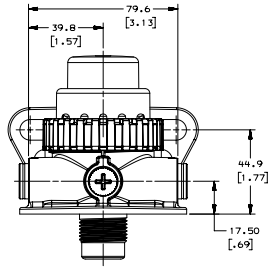


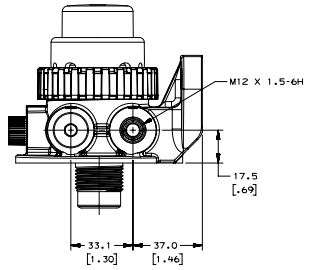
* Water Collection Bowl (**PART NO.** P569758) adds 50 mm / 1.98 in. to filter length.

PRIMING PUMP HEAD









Fuel Filtration
Filter Dia. 93 mm / 3.54 in. x 1 in.-14

Filter Selection Chart

Filter Style	Maximum Recommended Flow Rate lph	gph	(C) Filter Length* mm	in	Media Type	Efficiency @ 99%	Stand Tube	Part Number	Performance Curve
Standard Drain 	341	90	187	7.38	Synteq	10 µm	No	P550847	E
					Treated Cellulose	15 µm	No	P558000	E
			193	7.61	Treated Cellulose	3 µm	No	P553203	E
	379	100	195	7.68	Synteq	10 µm	Yes	P551001	M
			219	8.64	Synteq	10 µm	No	P553201	M
					Treated Cellulose	3 µm	No	P553207	F
					Treated Cellulose	35 µm	No	P553204	N
	420	111	246	9.70	Synteq	10 µm	Yes	P551000	K
			247	9.71	Treated Cellulose	7 µm	Yes	P550901	K
Drain Valve for Deutsch WIF Sensor 	379	100	213	8.40	Synteq	10 µm	No	P550848	H
			239	9.40	Synteq	10 µm	Yes	P551103	K
No Drain 	150	40	107	4.22	Cellulose	25 µm	No	P550104	B
	227	60	136	5.35	Cellulose	17 µm	No	P552251	C
					Cellulose	25 µm	No	P550105	C
	303	80	174	6.85	Cellulose	9 µm	No	P557440	A
					Cellulose	25 µm	No	P553854	D
	379	100	177	6.95	Cellulose	3 µm	No	P551313	F
			188	7.40	Cellulose	25 µm	No	P550106	M
			200	7.87	Cellulose	9 µm	No	P555627	F
	420	111	221	8.69	Cellulose	15 µm	No	P552253	K
			240	9.43	Cellulose	3 µm	No	P551311	I
					Cellulose	9 µm	No	P551712	J

Indicator Selection Chart

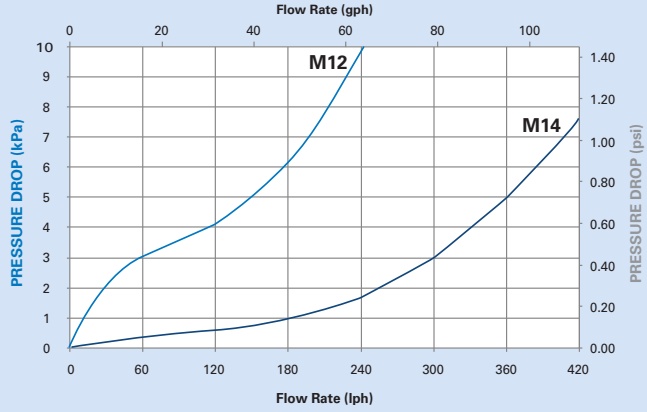
Type / Material	Setting	Thread	Part Number
VISUAL / MECHANICAL INDICATORS			
ENi Plated Steel Thread / Chemical Resistant Nylon	10 inHg	M12x1.5 Male	JG56501-00410
ELECTRICAL SWITCHES			
ZnNi Plated Steel Thread	10 inHg	M12x1.5 male	JG56389-00610*
WIRE HARNESS ADAPTORS			
Packard for Switches / Flying Leads	N/A	N/A	P633875

* Lead times apply. Please contact your Donaldson sales representative for lead time details.

Performance Curves

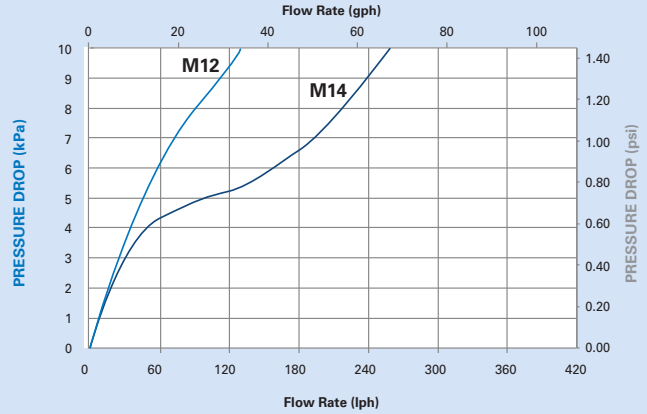
93 mm / 3.54 in. Basic Head

Max Flow 420 lph / 111 gph



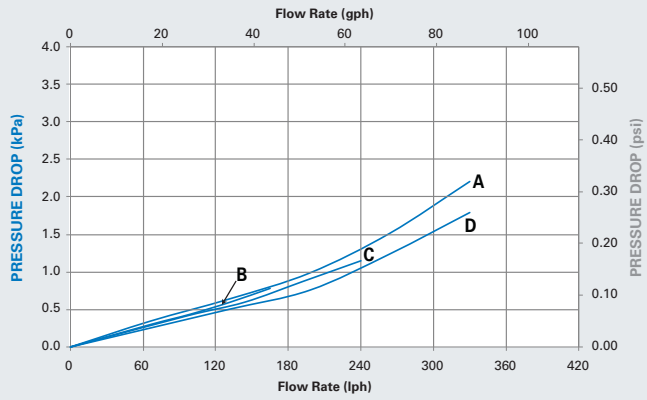
93 mm / 3.54 in. Hand Priming Pump Head

Max Flow 420 lph / 111 gph



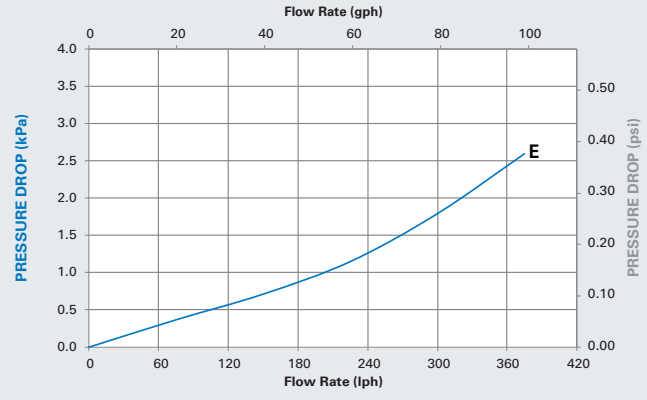
93 mm / 3.54 in. x 1 in.-14 Filter Assembly

Max Flow 151-303 lph / 40-80 gph



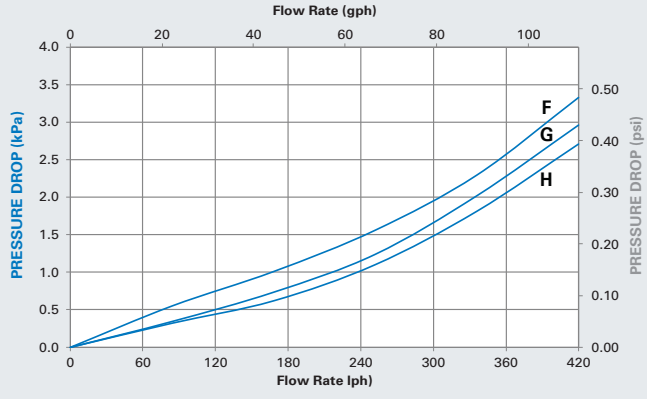
93 mm / 3.54 in. x 1 in.-14 Filter Assembly

Max Flow 341 lph / 90 gph



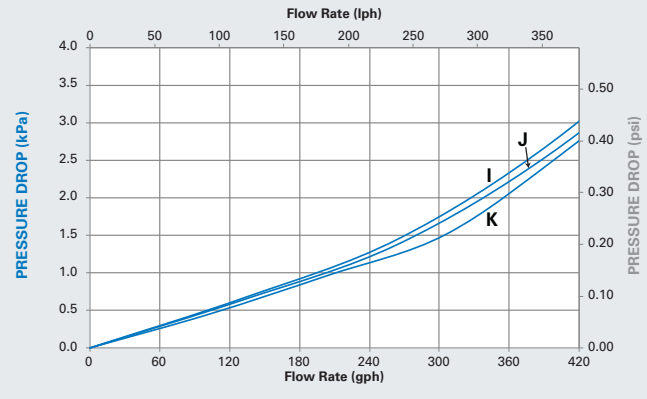
93 mm / 3.54 in. x 1 in.-14 Filter Assembly

Max Flow 379 lph / 100 gph



93 mm / 3.54 in. x 1 in.-14 Filter Assembly

Max Flow 454-606 lph / 120-160 gph



Flow Range: up to 180 gph / 681 lph

Operating Pressure
0-100 psi (690 kPa) without bowl

Temperature Range
-40° to 250°F (-40° to 121°C)

Flow Rate
Up to 180 gph / 681 lph

See table for filter flow rates

Fuel Compatibility
#1 or #2 Diesel, Kerosene, Biodiesel up to B20 and JP8

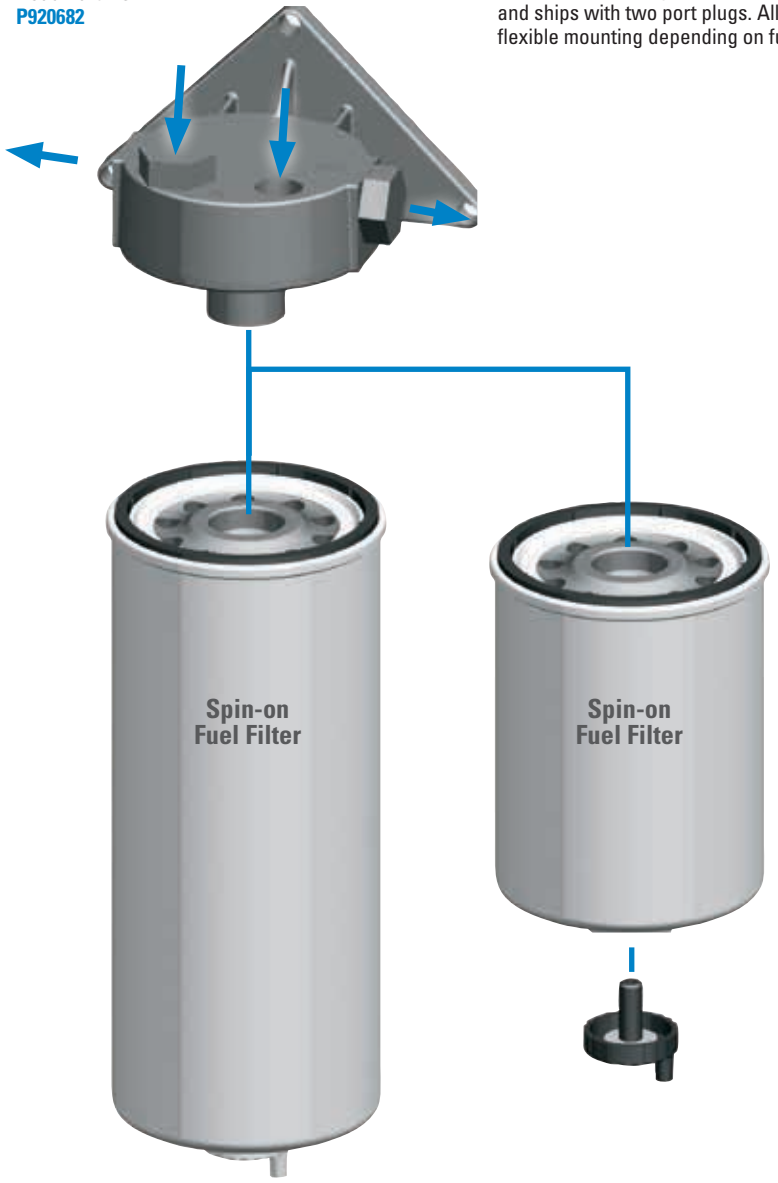
Mounting
Engine or Chassis

Water Removal @ Recommended Flow Rate
SAE J1488 Emulsified: 95% efficiency

SAE J1839 Free Water: 95% efficiency

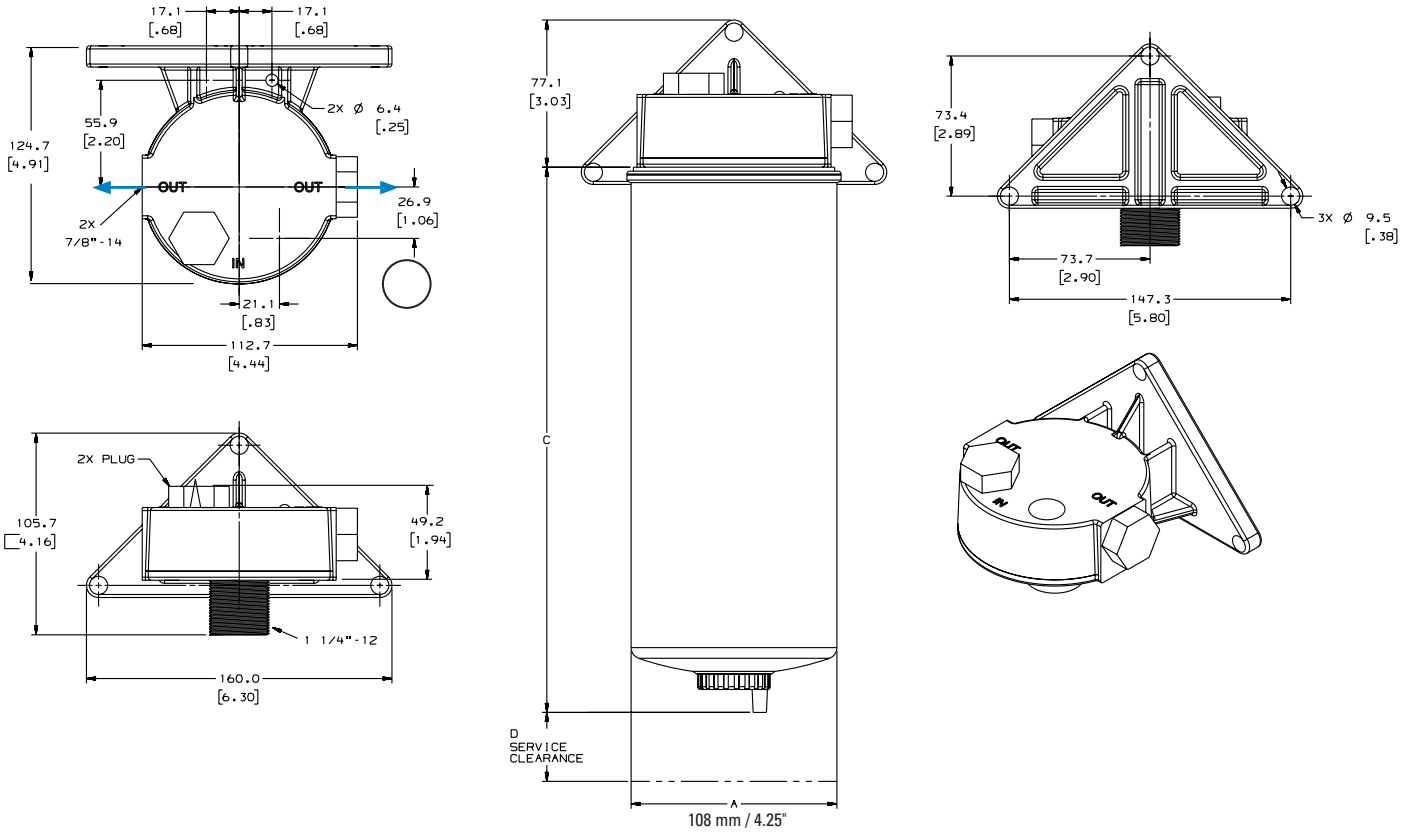
Head Part No.
P920682

Head has two inlet ports and two outlet ports and ships with two port plugs. Allows for flexible mounting depending on fuel source.



Fuel Filtration
Filter Dia. 108 MM (4.25") x 1 1/4"-12

Specification Illustrations

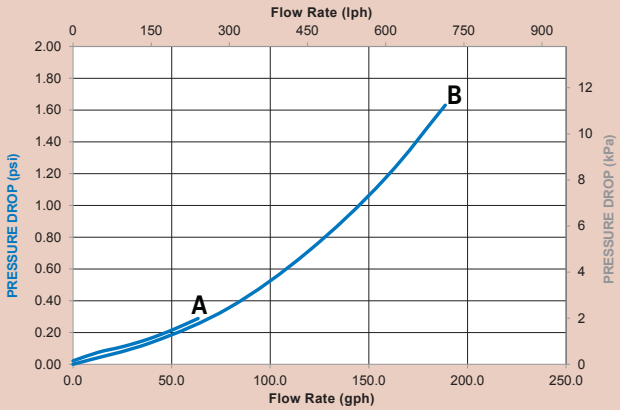


Filter Selection Chart

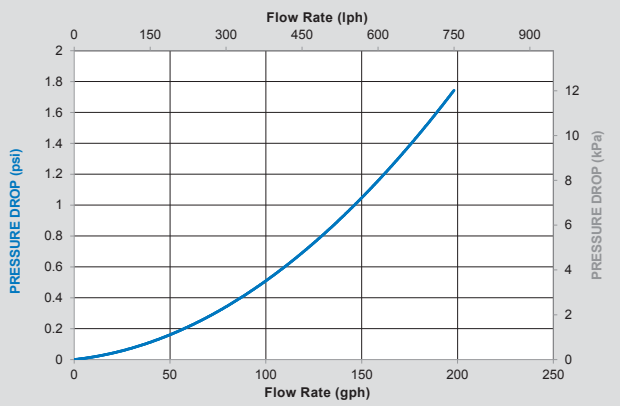
Filter Style	Max. Recommended Flow Rate		(C) Filter Length*		Media Type	Efficiency @ Micron	Stand Tube	Part Number	Performance Curve	(D) Service Clearance	
	gph	lph	in	mm						in	mm
Standard Drain 	60	227	7.44	189	Treated Cellulose	99% @ 15	No	P920711	A	1.03	26
	180	681	11.75	298	Treated Cellulose	99% @ 15	No	P920683	B		

Performance Curves

108 MM (4.25") x 1 1/4"-12 Filter Assembly
Max Flow 60-180 gph / 227-681 lph



108 MM (4.25") x 1 1/4"-12 Head Only
Max Flow 180 gph / 681 lph



Flow Range: up to 250 gph / 946 lph

Operating Pressure
0-100 psi (690 kPa) without bowl

Temperature Range
-40° to 250°F (-40° to 121°C)

Flow Rate
Up to 230 gph / 946 lph

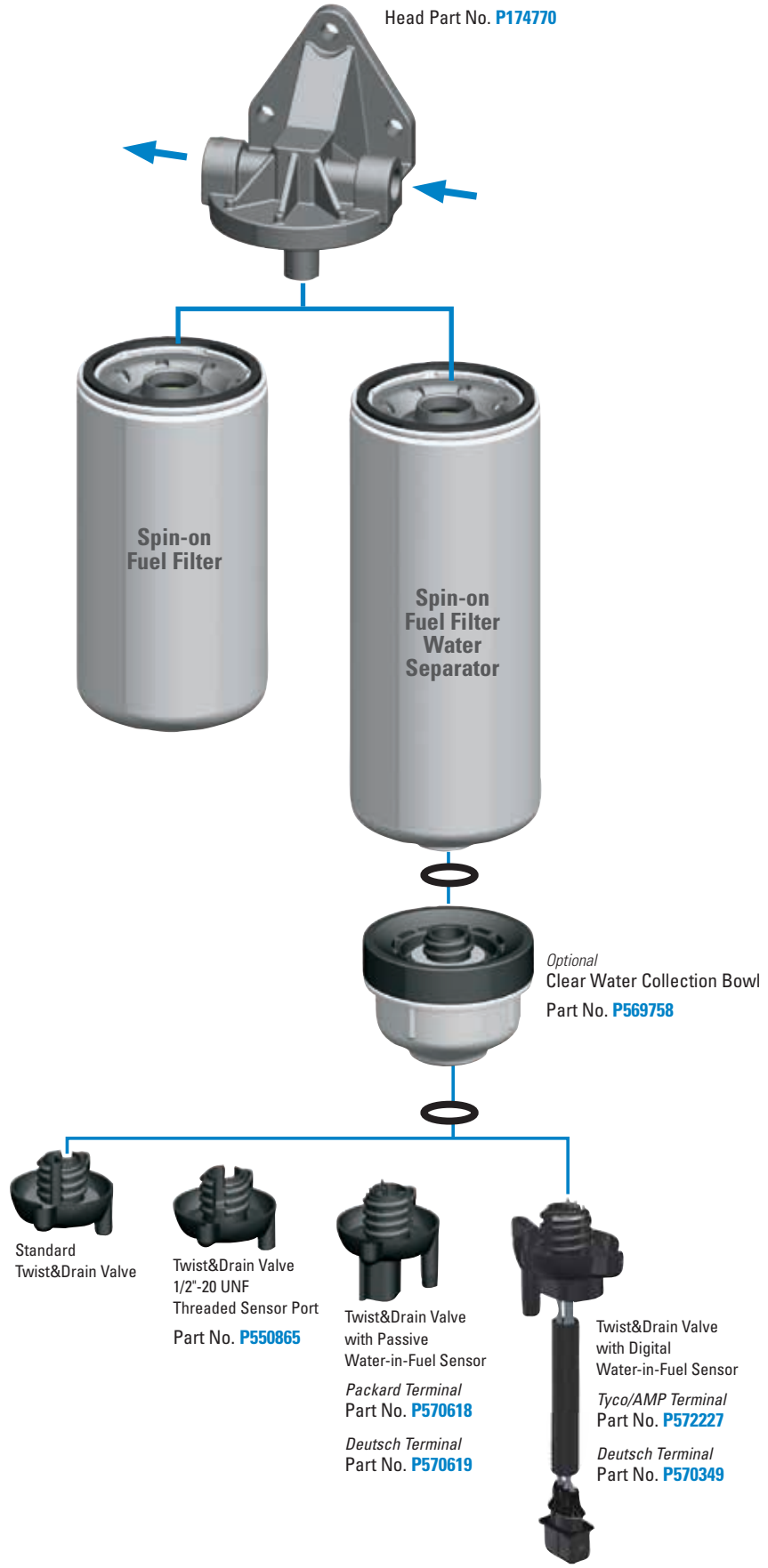
See table for filter flow rates

Fuel Compatibility
#1 or #2 Diesel, Kerosene, Biodiesel up to B20 and JP8

Mounting
Engine or Chassis

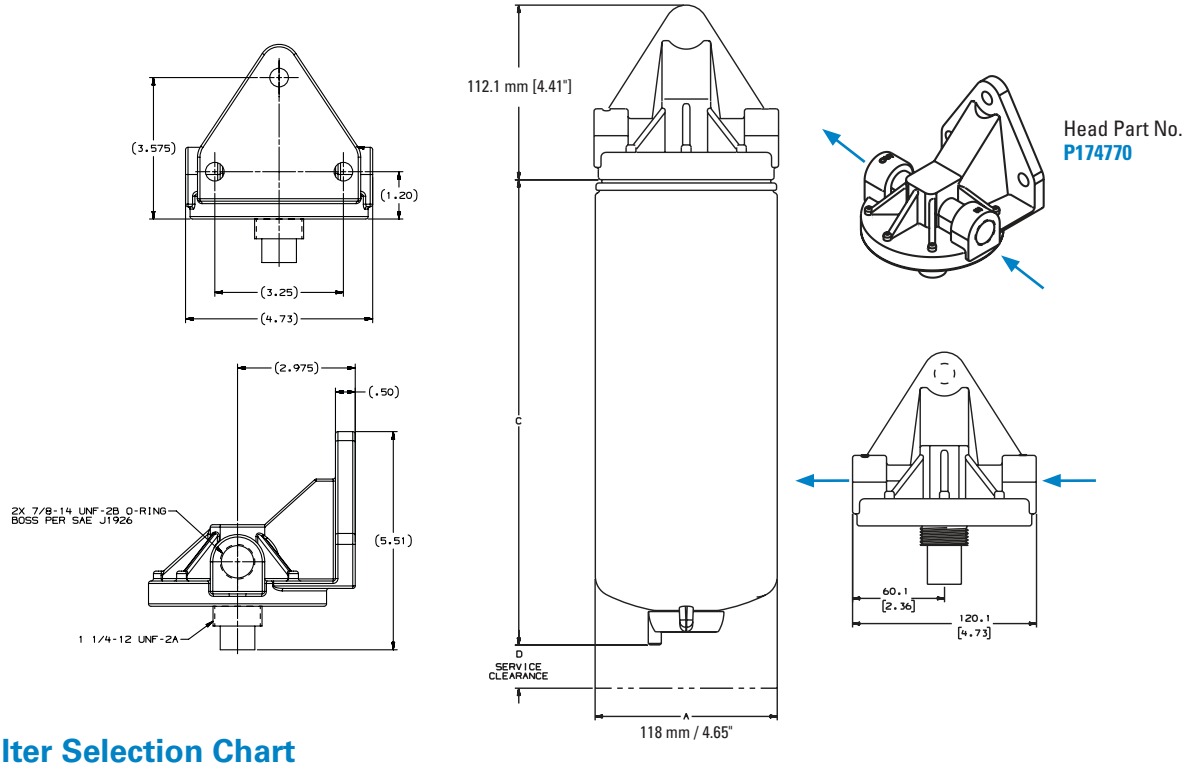
Water Removal @ Recommended Flow Rate
SAE J1488 Emulsified: 95% efficiency

SAE J1839 Free Water: 95% efficiency



Fuel Filtration
Filter Dia. 118 MM (4.65") x 1 1/4"-12

Specification Illustrations



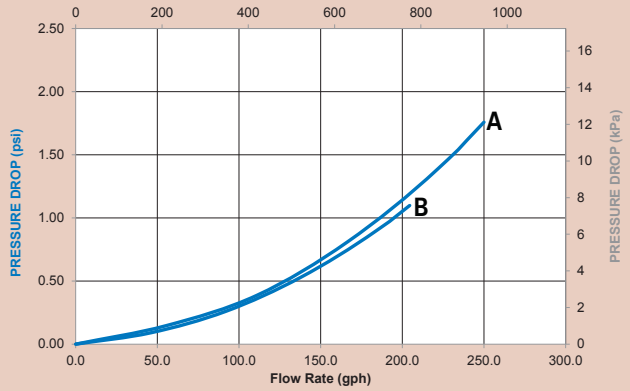
Filter Selection Chart

Filter Style	Max. Recommended Flow Rate		(C) Filter Length*		Media Type	Efficiency @ Micron	Stand Tube	Part Number	Performance Curve	(D) Service Clearance	
	gph	lph	in	mm						in	mm
Standard Drain 	205	776	12.24	311	Treated Cellulose	99% @ 25	No	P552216	B	1.57	40
					Synteq	99% @ 9	No	P550937	B		
					Synteq	99% @ 10	Yes	P552006	B		
No Drain 	250	946	8.94	227	Cellulose	99% @ 30	No	P550958	A		
			10.24	260	Cellulose	99% @ 9	No	P550202	A		

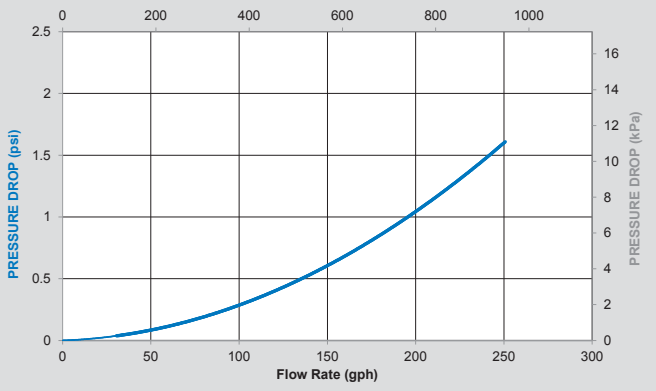
* Water Collection Bowl (part no. P569758) adds 1.98" / 50 mm to filter length.

Performance Curves

118 MM (4.25") x 1 1/4"-12 Filter Assembly
Max Flow 205-250 gph / 776-946 lph



118 MM (4.65") x 1 1/4"-12 Head Only
Max Flow 250 gph / 946 lph



Water Drain Valves, Sensors & Bowl

For water drain flexibility, Donaldson Twist&Drain™ spin-on filters have a connection that can accommodate multiple drain valve types and a clear water collection bowl (80ml capacity). All Twist&Drain filters ship with a specific drain valve and one seal. When purchasing a water collection bowl, one seal will be included. Drain valves can be ordered separately and will include a replacement seal. The water collection bowl is a separate add-on component.

P569758
Water Collection Bowl
Capacity: 80ml
Bowl adds 1.98" / 50 mm to length
Does not include a drain valve

Standard Twist&Drain™ Valve
Included with replacement filter

P570349
Twist&Drain Valve with
Digital Water-In-Fuel Sensor
Deutsch Terminal
Deutsch terminal can add up to:
10.16" / 258 mm

P572227
Twist&Drain Valve with
Digital Water-In-Fuel Sensor
Tyco/AMP Terminal
Tyco/AMP terminal can add up to:
9.43" / 239.5 mm

P570618
Twist&Drain Valve with
Passive Water-In-Fuel Sensor
Packard Terminal
Packard sensor adds: .35" / 8.8 mm

P570619
Twist&Drain Valve with
Passive Water-In-Fuel Sensor
Deutsch Terminal
Deutsch sensor adds: .35" / 8.8 mm

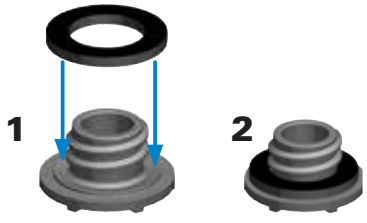
P550865
Twist&Drain Valve with
1/2"-20 UNF
Threaded Port Sensor
Threaded sensor port adds no length

Installation Torque for Twist&Drain™ [M24 X 5] Threads

Component		TIGHTENING TORQUE	
		LB-FT (in-lbs)	NEWTON-METERS (N-M)
Twist&Drain Valve *with or without WIF sensor*	With external lube applied	3.3 ± 0.8 (40 ± 9.6)	4.5 ± 1.1
	Without external lube applied	4.2 ± 0.8 (50.4 ± 9.6)	5.7 ± 1.1
Water Collection Bowl		6.0 ± 0.9 (72 ± 10.8)	(8.1 ± 1.2)

Seal Replacement

1. Push seal down onto thread stem.
2. Ensure seal is fully seated.



Replacement Seals

If seals show signs of wear or deterioration they should be replaced. The placement of the seals are between the threaded connections of the filter, water collection bowl, and Twist&Drain valve. When purchasing a water collection bowl or a Twist&Drain valve, one seal will be included.

P570771
Replacement seal kits are available in packages of 12.

O.D. 1.38" / 35 mm
ID: .86" / 22 mm
Thickness: .13" / 3.2mm

Water & Draining Fuel Filters

Most primary fuel filters have drains that allow the operator to drain the water that has been separated by the filter. The frequency with which the primary fuel filter needs to be drained is ultimately dependent on the quality of fuel that is being used. Most OEMs recommend draining your water separator daily. It is also recommended to pay attention to how much water is removed at each drain and adjust the frequency of servicing accordingly.

Why Remove Water in Fuel?

Water in fuel can prematurely wear and oxidize the steel components within the fuel injectors, leading to:

- Rusting and corrosion of components
- Governor/metering component failure
- Sticky metering components (both pump and nozzle)
- Injection component wear and seizure

Free or emulsified water must be removed from the fuel to prevent corrosion and damage to the fuel system. Fuel additives may claim they remove water, when really they dissolve the water. Which in turn, will pass through the filter and enter fuel injectors.

Types of water contamination in diesel fuel:

1) Emulsified water: water suspended in the fuel
2) Free water: water separated from the fuel and generally collected at the bottom of the fuel or the fuel storage tank
3) Dissolved water: water chemically dissolved in the fuel

Maintenance Recommendations & Guidelines

- Drain water from your primary filter daily when refueling
- Carry a spare set of fuel filters in case you receive a "bad" load of fuel
- Never switch to more open filter to get longer filter life, you are trading away fuel pump and injector life
- Never use fuel to lube the gasket. Fuel isn't as slick as oil and if you use fuel it could cause gaskets to bunch or pinch when it is tightened, causing the filter to leak.
- If using biodiesel:
  - make sure your fuel supplier meets current fuel standards
  - make sure your engine is compatible with the concentration (or percent) biodiesel you wish to use
- When using your own fuel storage tank, remember that removing contaminants before they reach the vehicle is the best practice. Ensure you have effective bulk storage tank filtration.

Water-in-Fuel Sensors (WIFs)

Water-In-Fuel (WIF) sensors are typically chosen and installed by the engine manufacturer.

The WIF sensors connect to the fuel filter and route to a display on the dashboard. A WIF sends an electrical signal to the in-cab display and alerts the operator when water is in the fuel and should be drained from the filter. WIF sensors are more common in newer common rail injection systems.

During filter service, WIF sensors are disconnected and reused on the new filter. Sensors are likely to be replaced if connectors are damaged or wires are frayed.

The most common WIF sensors are either Packard or Deutsch styles. Donaldson offers digital Tyco/AMP and Deutsch WIF sensors – as well as passive Packard or Deutsch WIF sensors that are integrated into the Twist&Drain valve.

Twist&Drain™ Icons Installation & Water Drain

Installation

Filter will indicate if you should fill with fuel before installation.

Apply a thin film of clean motor oil to the new gasket. Do not use grease.

Line up the filter threads to the threaded port carefully. Screw on and tighten until gasket makes contact with base.

For final tightening of the filter, turn the can to the number of turns (+) indicated on the can.

Reconnect the WIF sensor.

Water Draining

Three easy steps with standard drain valve.

Donaldson FILTRATION SOLUTIONS

Twist&Drain™ Filter Kits

Each filter kit contains all the components you need to change over to a Donaldson Twist&Drain fuel filter water separating system – with coverage for over 400 on- and off-road vehicle applications.

Note

For complete manufacturer and application cross reference, see Brochure F111383 on DonaldsonFilters.com

Twist&Drain™ Kit Contents

- Water separating fuel filter with standard Twist&Drain valve
- Water collection bowl for easy visual inspection
- Alternative Twist&Drain valve with water-in-fuel (WIF) sensor or threaded port

Twist&Drain FUEL KITS SERVICE TRAINING VIDEO

YouTube youtube.com/user/donaldsonengine

Kit with Clear Water Collection Bowl and Standard Drain Valve

Kit Contents:
Fuel Filter Water Separator with Standard Drain Valve
P569758 Water Collection Bowl - Adds 1.98" (50mm) length

P559117 Filter Kit
P551026 Fuel Filter
Filter Length: 9.60" (244mm)
Efficiency: 99% @ 9µm

Kit with Clear Water Collection Bowl and Packard WIF Sensor

Kit Contents:
Fuel Filter Water Separator
P569758 Water Collection Bowl - Adds 1.98" (50mm) length
P570618 Packard WIF Sensor - Adds .35" (8.8mm) length

P559119 Filter Kit
P551026 Fuel Filter
Filter Length: 9.60" (244mm)
Efficiency: 99% @ 9µm

Kits with Clear Water Collection Bowl and Deutsch WIF Sensor

Kit Contents:
Fuel Filter Water Separator - Varies by Kit
P569758 Water Collection Bowl - Adds 1.98" (50mm) length
Deutsch WIF Sensors - Adds .71" (18.1mm) length

P559121 Filter Kit
P551026 Fuel Filter
Filter Length: 9.60" (244mm)
P570619 (Cummins WIF)
Efficiency: 99% @ 9µm

P559122 Filter Kit
P551026 Fuel Filter
Filter Length: 9.60" (244mm)
P573413 (John Deere WIF)
Efficiency: 99% @ 9µm

Kits with Clear Water Collection Bowl and 1/2"-20 UNF Threaded Sensor Port

Compatible with OEM WIF Sensor

Kit Contents:
Fuel Filter Water Separator - Varies by Kit
P569758 Water Collection Bowl - Adds 1.98" (50mm) length
P550865 Threaded Sensor Port - Adds no length

P559111 Filter Kit
P551065 Fuel Filter
Filter Length: 6.82" (173mm)
Efficiency: 99% @ 4µm

P559114 Filter Kit
P551075 Fuel Filter
Filter Length: 9.60" (244mm)
Efficiency: 99% @ 4µm

P559118 Filter Kit
P551026 Fuel Filter
Filter Length: 9.60" (244mm)
Efficiency: 99% @ 9µm

P559109 Filter Kit
P551056 Fuel Filter
Filter Length: 5.80" (147mm)
Efficiency: 99% @ 9µm

P559112 Filter Kit
P551066 Fuel Filter
Filter Length: 6.82" (173mm)
Efficiency: 99% @ 9µm

P559115 Filter Kit
P551076 Fuel Filter
Filter Length: 9.60" (244mm)
Efficiency: 99% @ 9µm

P559108 Filter Kit
P551055 Fuel Filter
Filter Length: 5.80" (147mm)
Efficiency: 99% @ 4µm

P559110 Filter Kit
P551057 Fuel Filter
Filter Length: 5.8" (147mm)
Efficiency: 99% @ 25µm

P559113 Filter Kit
P551067 Fuel Filter
Filter Length: 6.82" (173mm)
Efficiency: 99% @ 25µm

P559116 Filter Kit
P551077 Fuel Filter
Filter Length: 9.6" (244mm)
Efficiency: 99% @ 25µm

Diesel Fuel Filter Kits

Available in Australia Only

Contaminated fuel can lead to equipment and vehicle downtime resulting in costly repairs. Donaldson's range of Diesel Fuel Filter Kits have you covered from overhead and portable tanks, light to medium trucks and common rail applications.

Note

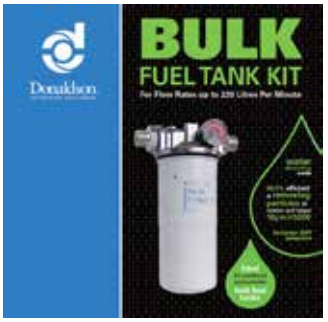
Product featured on this page is available in Australia.
Contact Donaldson Australasia Customer Service on 1800 345 837 to find a distributor near you.
Further information can be found on www.donaldsontoolbox.com.au

Bulk Fuel Tank Kit

For low flow applications. Ideal solution for overhead and portable tanks

Features and Benefits

- Simple spin-on design for ease of service
- Filtration efficiency 99.5% removal of particles 10 micron or larger ($ß_{10}$=200)
- Water absorbing media
- T.R.A.P. breather included with kit to help remove moisture and airbourne contaminant, replaces desiccant and silica gel style breathers
- Kit includes adapters for head and breather to connect to connect to BSP fittings



Kit Part Number P902973

See pages 34 for additional diesel tank filtration kits.

Chassis Mount Diesel Fuel Filter Kit

For diesel platforms with flow rates up to 379LPH

Features and Benefits

- Ideal for ligh to medium trucks
- Filtration efficiency 99% removal of particle 3 micron or larger ($ß_3$=100)
- Water separating filter and drain bowl
- Includes additional filter element

Kit Part Number P903074

Available in Australia Only

Common Rail Diesel Fuel Filter Kit

For diesel platforms with flow rates up to 114LPH

Features and Benefits

- Ideal for many 4WD applications
- Filtration efficiency 99% removal of particle 11 micron or larger ($ß_{11}$=100)
- Water separating filter and drain bowl
- Includes additional filter element

Kit Part Number P902976

High Efficiency Diesel Fuel Filter Kit

For diesel platforms with flow rates up to 114LPH

Features and Benefits

- Ideal for many 4WD applications
- Filtration efficiency 99% removal of particles 3 micron or larger ($ß_3$=200)
- Water separating filter and drain bowl
- Includes additional filter element

Kit Part Number P903316

Clean and Dry Diesel Filter Kit

For diesel fuel applications up to 189LPM

Features and Benefits

- Ideal for service vehicles, mobile tanks, fixed bulk tanks
- Maxium working pressure 350 psi
- Includes single head (2), high efficiency diesel filter, water absoring filter, pressure gauge (2)

Kit Part Number P506073

Fuel Filtration
Donaldson Blue™ Filters for Cummins® QSX Engines

Donaldson FILTRATION SOLUTIONS

Donaldson BLUE®

DBF5782 Cross Reference			
Cummins	Fleetguard	Baldwin	Wix
4964234	FF5782	BF7932	33944

Donaldson Blue™ DBF5782 for **Cummins® QSK engines** consistently retains particles under high pressure common rail fuel system dynamics (engine vibration), protecting your hard-working equipment and maximizing your uptime.

PERFORMANCE UNDER ENGINE VIBRATION AND PARTICLE RETENTION

Compared to the competition's best product, the Donaldson Blue DBF5782 with Synteq XP media averages **4x CLEANER** under heavy-duty vibration testing over the life of the filter. Lower particle release means less micro-contamination is flowing downstream to the fuel injectors.

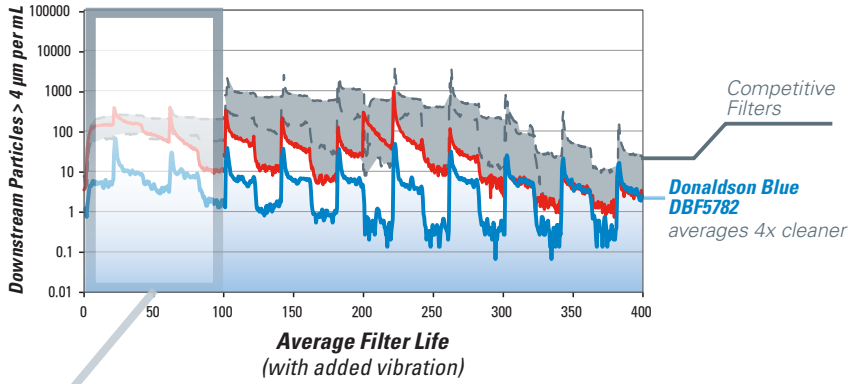
START TO FINISH

4x cleaner fuel
THAN THE BEST COMPETITIVE FILTER

Donaldson Blue DBF5782 averages 4x lower particle concentration than the competition's best product.

Particle retention was tested under SAE J1985 single-pass test standards with added vibration. Test conducted March - April 2013 with a sample size of six filters per manufacturer.

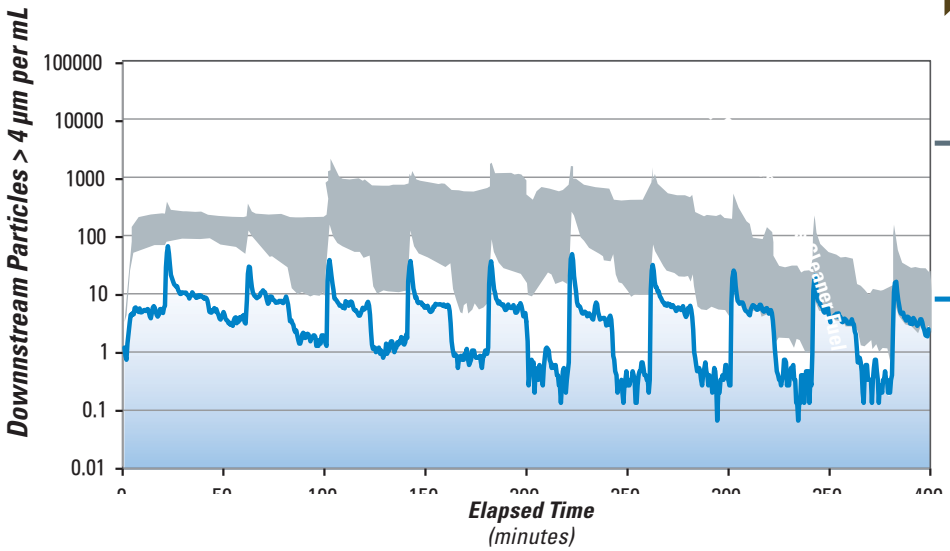
Donaldson Blue DBF5782
provides cleaner fuel over the life of the filter



Donaldson Blue DBF5782
provides much cleaner fuel when first installed

Upstream particle concentration tested at >100,000 @ >4µm per mL

ISO 24
DIRTY FUEL IN



ISO 14 -16
COMPETITIVE FILTERS
Fuel cleanliness range of competitive filters

ISO 11
CLEAN FUEL OUT
Under these test conditions, **Donaldson Blue DBF5782** can deliver fuel cleanliness down to ISO 11. Competitor filters need to load with contaminant before reaching peak efficiency. Donaldson filters average 20x cleaner over the first portion of the filter's life.

Donaldson Blue™ DBF5782 Fuel Filters Deliver Clean Fuel

UNDERSTANDING DIESEL FUEL CLEANLINESS

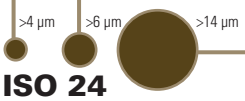
ISO 4406 contamination codes consist of three numbers corresponding to the number of particles 4 microns (µm) and larger, 6 microns and larger, and 14 microns and larger present in the fuel. Determining fuel cleanliness requirements includes measuring both the particle size and count.

The following chart illustrates what it means to start with heavily contaminated fuel levels of ISO 24/22/18 and how the **Donaldson Blue DBF5782** delivers exceptionally clean fuel. These results are based on SAE J1985 single-pass test standards with added vibration to simulate dynamic engine operating conditions.

ISO 4406 Contamination Codes

Code	More Than*	Up to & Including*
24	80,000	160,000
23	40,000	80,000
22	20,000	40,000
21	10,000	20,000
20	5,000	10,000
19	2,500	5,000
18	1,300	2,500
17	640	1,300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	.64	1.3
6	.32	.64
5	.16	.32
4	.08	.16
3	.04	.08
2	.02	.04
1	.01	.02

*Number of particles per milliliter



ISO 24

ISO 24 / 22 / 18

DIRTY FUEL IN

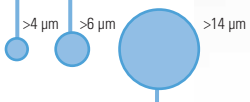
Highly contaminated fuel upstream of the filter

INTERPRETING THE ISO CODES

Example: ISO 24 / 22 / 18

ISO ● / ● / ●

>4 µm >6 µm >14 µm



ISO 11

ISO 11 / 8 / 2

CLEAN FUEL OUT

Donaldson Blue DBF5782

The low particle count downstream of the filter makes the DBF5782 the best in its class.

Donaldson BLUE™

Liquid Filtration Solutions

For Selective Catalytic Reduction (SCR) Systems

Denox 1.0 and 2.0 AdBlue® Filter Kits

Available in Europe and Australia Only

Note

Product featured on this page is available in Europe and Australia.

For other regions, please contact your Donaldson representative for availability.

In order to meet current and future Exhaust Emission Regulation, Selective Catalytic Reduction (SCR) are fitted with liquid AdBlue® (urea) injection systems which require high performance and reliable filtration.

Compressible devices in the Donaldson filter absorb urea volume expansion at low temperatures (≤-11°C/ 12°F), adapting to extreme freezing conditions.

- They will not wear down or deteriorate during the filter's useful service life
- They are compatible with AdBlue® liquid as well as diesel fuel and other types of engine liquids

Bosch® Denoxtronics 1.0 Urea Injection System

Primary Application: DAF 1819795

Overall Dimensons: 69mm OD, 75mm Long

Kit Part No. X770733

Competitive Cross References

Name	Part No.
BALDWIN	PE5270
BOSCH	F00BH40012
BOSCH	F00BH40096
CUMMINS	3967874
DAF	1649425
DAF	1674458
DAF	1674485
DAF	1789050
DAF	1815766
DAF	1819795
DAF	18819795
DAF	42553548
DAF	649425
HENGST	E101UD178
IVECO	42553548
IVECO	42561571
IVECO	42562233
JURA FILTRATION	SN70332
MAN	81154036015
MAN	81154036089
MANN & HUMMEL	U6202XKIT, U6202YKIT
	U6203YKIT, U6204XKIT
NEOPLAN	81154036015
NISSAN/UD	20421NY00J
SCANIA	1545482
SCANIA	1761034
SCANIA	1795459
SCANIA	1852188
SCANIA	1907422
SF-Filter	SAB540SET
SOLARIS BUS (PL)	0120322535
SOLARIS BUS (PL)	120322535
VOLVO	20713630
VOLVO	20713636

Bosch® Denoxtronics 2.0 Urea Injection System

Primary Application:

Volvo Truck FE, FH, FL, FM Series, 20876498

Overall Dimensons: 68mm OD, 96mm Long

Kit Part No. X770734

Competitive Cross References

Name	Part No.
AGCO	V837062993
BALDWIN	PE5271
DEUTZ	2934622
CUMMINS	3986767
HENGST	E100UD160
IVECO	2997594
IVECO	42555073
IVECO	42555548
IVECO	42561605
JURA FILTRATION	SN70318
MANN & HUMMEL	U630XKIT
NEW HOLLAND	84254852
RENAULT VI	7420877950
RENAULT VI	7420877953
RENAULT VI	7421333098
SF-Filter	SAB541
VOLVO	20876498
VOLVO	20876502
VOLVO	21333097
VOLVO	21333097