

HYDAC INTERNATIONAL

Fuel Filtration

Fuel Products and Systems
for Bulk and Mobile Applications





Components, Systems and Service. All from one Company.

Our fluid engineering solutions are defined by the scope and complexity of our customers' requirements.

Our products range from individually designed components in the fields of fluid engineering, hydraulics and electronics right up to complete systems for specific functions.

All components and systems are conceived and designed in-house. Experienced industrial and product specialists develop innovative products and efficient solutions for high-quality, cost-effective production. Throughout the globe, our production facilities share one common goal: quality. We take great pride in both our products and solutions.

Industries and Applications



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NOTE

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Diesel fuel injection systems are changing dramatically to provide cleaner combustion and meet Tier 4 requirements

OFF-ROAD DIESEL MANDATE EXPOSES NEED: CLEANER FUEL

By Aaron Keck and Rob Sabo

New diesel engines used in off-road equipment for construction, agriculture and power generation must be "Tier 4" compliant by 2018 to meet Environmental Protection Agency (EPA) emissions standards that reduce the allowable levels of particulate matter and nitrogen oxides (NO_x). The Tier 4 standards have been required since 2011 for diesel trucks and buses on U.S. and European highways. (Europe's version of the standards is known as "Stage IV.")

This article, along with other fuel filtration publications can be found on the HYDAC website: www.HYDAC-NA.com click on

Products & Services > Products > Fuel Filtration > Tools



A The New World of Advanced Diesel Filtration

OVERVIEW OF FUEL FILTRATION

Advanced Fluid Conditioning Solutions®: When Cleanliness is Mission Critical

HYDAC, an ISO 9001:2008 certified company, is focused on developing ADVANCED FLUID CONDITIONING SYSTEMS AND PRODUCTS, and we have done so over the last sixty years. The designs in this catalog are the result of thousands of hours of laboratory research, field testing and decades of experience. HYDAC pioneered the development of micron filtration, helping to set performance standards in industrial fluid power systems. As a result, HYDAC is now a leader in almost all liquid filtration and fluid conditioning applications. Proof that our expertise lies in our broad mix of unsurpassed cleanliness products.

Our mission statement reflects our continuing commitment to excellence.

Our MISSION is to expand and retain our customer base by understanding and meeting their expectations. To achieve this MISSION we continually improve our products, business processes and work environment in order to meet our corporate goals.

Partnerships - We design solutions for industry and for the success of our customers by:

- Optimizing the use of technology with applications
- Using an efficient, timely customization process to fill specific customer needs
- Increasing manufacturing capacity and streamlining operations
- Preserving our reputation for reliability
- Expanding globally to support our customers and stay current with technologies
- Leveraging and sharing our knowledge to meet challenges openly
- Nurturing a creative, cooperative culture committed to the individual and to providing the best solutions for our customers

Our goal is to be your filtration partner. Our expertise in filtration technology, our superior filter and element manufacturing capabilities, and our dedication to customer service and product support are the reasons we are considered "The Filter Company." We are committed to providing the best available filter products to meet necessary cleanliness levels at a competitive price. As a cost-effective quality producer, we can work with your purchasing department to supply contamination control technology or develop long-range pricing programs that can improve your company's bottom line.

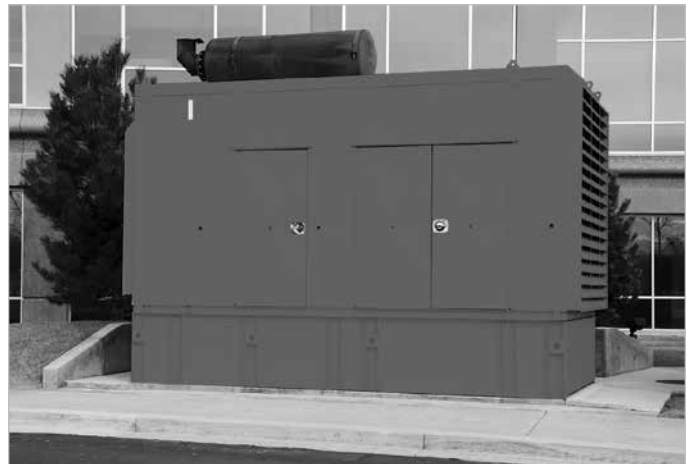


Requirements Have Changed! (The Need)

How Clean and Dry is Your Fuel?

Because many people assume they're buying quality fuel that meets the required specifications, the cleanliness of diesel fuel is seldom questioned. That has changed, and with the cleanliness requirements mandated by the Tier 4 injection systems it is now time to ask "How clean does my fuel need to be?" From the 2µm tolerances in the 30,000+ psi injection systems to compliance with the warranty requirements of the injector manufacturers, this question will in reality become the new benchmark. The game has changed and in the following pages we will clearly define how today's fuel, fuel systems and new emissions requirements MANDATE that both OEM's and END USERS use only the best filtration.

Ten years ago a diesel engine did not require anything close to the level of filtration provided by HYDAC. With poor quality filters the engine would still run, maybe not efficiently, but it would run. But with today's engines, both the particulate and the coalescing filters must be of only the highest quality. Be assured the results of poor filtration are no longer just black smoke and a lack of horsepower. No, with Tier 4 engines, poor filtration will likely mean lost revenue due to downtime as the operator pays to replace a failed injector. These problems are both manageable and should not add cost. With quality filtration installed at the fill point and at the engine the diesel engine will run more efficiently and continuously, but the filters used and the higher level of filtration required can no longer be an afterthought. It must become the focal point of any fleet manager or operator. Filtration quality and the profitable operation of any Tier 4 engine will become one in the same.

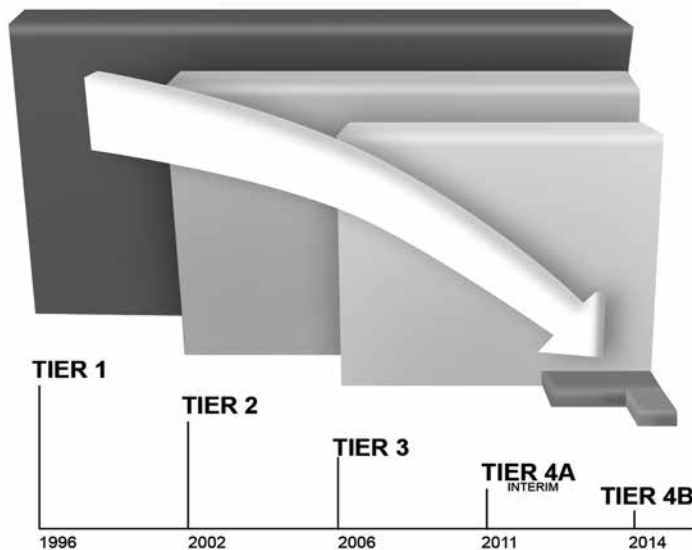


Tier 4 Requirements Demand a Sophisticated Approach and the Highest Quality Filtration

The Tier 4 engine is a technology shift and when compared to Tier 1-3 engines, Tier 4 engines require a completely superior level of filtration to run, much less to run reliably and efficiently. Tier 4 diesel engines will now react more violently if the injectors are constantly bombarded by contamination. To put this into perspective newly delivered bulk diesel fuel typically has an ISO cleanliness level of ISO 22/20/18 to ISO 21/19/17 but today's injectors need to see fluid with a cleanliness level of below ISO 11/8/6 (typical aerospace cleanliness).

As we have and continue to transition into the new world of Tier 4 requirements, the answer to the question "How clean does my fuel need to be" will be – ISO 11/8/6 or better and the most cost effective way to consistently achieve this is through the use of the highest capacity, highest quality, particulate and coalescing filtration at the point of use (at the bulk tank and on the engine itself). The engine filter can no longer be the only solution. There is simply not enough room in the engine and the cost to address the cleanliness only at the engine will become too high. Now going forward, bulk fuel filtration must be ground zero and it must be of the highest quality. The filtration performance specifications are now important and users must pay attention to the specifications and mandate only the best.

It's against this emissions reduction backdrop that HYDAC has developed its series of bulk / on-board, fuel-specific filtration products. From an environmental, economic and regulatory viewpoint we defined the critical elements our products needed to meet customer requirements, and in doing so we have laid the ground work now and for the future. While our competitors approach with yesterday's technology, HYDAC is focused on being a world leader in the fuels filtration field by being positioned to real issues of today.



The Tier 4 Emissions Regulations established by the U.S. Environmental Protection Agency (EPA) and Canadian Environmental Protection Agency (CEPA) are getting tougher. In 1996, the first off-highway diesel emissions standard began with the implementation of Tier 1 regulations. Since then, standards have continued to be raised and will end with Tier 4B/Final in 2014.

High Pressure Common Rail System

This diesel fuel injection technology is built to more stringent specifications than ever before. High operating pressure in excess of 30,000 psi and 2-5 micron injector tolerances make diesel fuel injection systems vulnerable to contamination levels that were not an issue in the past. While the High Pressure Common Rail System does provide improved power, fuel efficiency and lower exhaust emissions it, at the same time requires a new level of fuel cleanliness and care. This cleanliness requirement for the fuel is now mission critical to system operation. OEM engine and injection makers are requiring that fuel used in the engine meet tight guidelines before warranty claims are accepted. Today's requirements call for diesel fuel cleanliness at the fuel injection system of ISO 11/8/6 and a water level of <200 ppm water, both of which are harder to obtain with the additives for lubricity found in today's ULSD.



Ultra Low Sulfur Diesel | ULSD

Fuel requirements changed from Low Sulfur Diesel (LSD) to Ultra Low Sulfur Diesel or (ULSD). This change was mandated between 2006-2010 in North America and Europe. The purpose of moving to ULSD was to reduce the sulfur content from 500 ppm to 15 ppm, this in turn reduced exhaust emission by more than 90% from the engine. To achieve this much of the lubricity agents in Low Sulfur Diesel fuel are now stripped out in the production process. Not only is much of the sulfur removed, but so are some of the original fuels and built in lubricity. The result is an ultra-clean fuel where additives must be introduced to provide the needed lubricity. Diesel engines depend on the lubricity of the fuel to keep moving parts from wearing prematurely. Lubricity additives, enhancers and anti-wear additives have also in some fuels been replaced with biodiesel blended into the diesel. ULSD15 is generally hydrophobic (does not like to hold water) with a 25-110 ppm water saturation point at room temp. Unlike traditional LSD the biodiesel blends are hydrophilic (they like to hold water). For this reason when biodiesel is added, the diesel fuels' saturation points can rise to 250 ppm (B2), 500 ppm (B5), and 1,600 ppm (B20). This water is dissolved, which is OK, but the user must understand that there is more water in the fuel and that this water can become free water when the temps decrease. More free water in storage tanks means more free water at the injector and more free water molecules in the combustion chamber. None of which are good for the engine or its performance. Water must be eliminated and this is now even more difficult when the Interfacial Tension (IFT) between the water and the Diesel with surfactants and/or biodiesel blends is lower making it harder to separate the water in ULSD fluids than it was in the past. A coalescing filter that in the past was >90% efficient in traditional diesel is typically now only, 66% efficient at removing water in the new ULSD fuels.

OVERVIEW OF FUEL FILTRATION

Biodiesel Addition to ULSD15 as a Blend

The EPA requirement under Renewable Fuel Standard 2 required that renewable fuel, such as biodiesel, for diesel be blended into the fuels. The goal is to reduce dependence on carbon-heavy fuels and contribute to the goal of reducing carbon pollution 17 percent below 2005 levels by 2020. In 2008, this involved 9 billion gallons and is expected to increase to 36 billion gallons by 2022.

An additional challenge is the bulk tank and water from condensation and the delivered fuel itself. In hundreds of thousands of bulk tanks that exist in North America and around the world today exists water, microbes, and bacteria. Most bulk tanks have not been designed to help meet the cleanliness requirements of Tier 4. Many traditional bulk storage reservoirs are open to their surrounding atmospheres. Almost all have some volume of free water caused by temperature changes, ingress and delivered fuel quality. More importantly current tank design makes the complete removal of all free water nearly impossible. Free water in diesel fuel accelerates corrosion and fuel degradation. It can also create an ideal growth environment for microbial contamination. Bacteria can grow in the water at the fuel interface, and can cause the liquid fuels to breakdown and involves all grades. The results can be the accelerated corrosion of metals, especially iron and steel along with plugged fuel systems and clogged filters and lines. Bacteria grows better in warm climates and with favorable conditions, meaning that they can double their population every 20 minutes; 8 Billion bacteria per gallon have no effect on fuel clarity! Fungus tends to grow on solid surfaces, like filters, and in piping. Once established, the fungal biomass will grow faster than a bacterial biomass. It can grow over a wide range of temperatures but grows quicker in summer with the higher temperature, increased airborne contaminants and higher fluid temperature.



Previously acceptable “industry standard” filtration solutions won’t make the grade in Tier 4 engines

Against this backdrop, HYDAC developed its series of bulk diesel fuel specific filter products. The critical needs are defined and our desiccant breathing systems, our series of bulk housings and skids and our specially engineered patent-pending coalescing elements provide the world with the right portfolio of products to meet almost any of today’s bulk fuel requirements. We are focused on being a world leader in diesel fuel filtration by being positioned to address the needs of customers with the following experience and forward thinking technologies.

Past Practice

Separation of emulsified water from diesel fuel is a long standing requirement for diesel engine operation. Water removal has been traditionally performed by a fuel-water separation filter mounted in the engine fuel system or, in tough operating environments



where downtime has been managed by implementing best practice fluid maintenance, as part of the bulk tanks staged filtration at the dispensing system. The most typical filtration media found in such separators is a single resin impregnated hydrophobic barrier, such as silicone treated cellulose. This media separates water on its water repellent surface. Water in the fuel is rejected and beads up on the upstream side of the barrier media. As more water is rejected, beads coalesce into large drops, and drain into a collection cup while the fuel passes through a port located above the sump.

There are often unintended outcomes when a process or specification change is made. The changes to diesel engines and diesel fuels provide no exception to this rule. The transition to ultra-low sulfur diesel (ULSD) provides a specific example.

In order to meet mandated sulfur levels, ULSD is subjected to refining processes that removes not only the sulfur but also the inherent lubricity of the original higher sulfur diesel. The result is the ultra-clean fuel. Unfortunately, it is an ultra-clean fuel that has been stripped of its native lubricity. Fuel lubricity is critical as it is the fuel’s lubricity that is one characteristic needed for protecting the injection systems from catastrophic wear and precise control of combustion. A fuel system must hold pressure in order to inject fuel into the cylinder. Wear induced leaks can lead to engine failure.

As lubricity deficiencies were surfacing with early ULSD adoption, biodiesel production and the push to use biodiesel began to take hold in the North American diesel market. Biodiesel improved ULSD lubricity, and as a result, generated some independent motivation for its use as a blended lubricity component of diesel fuel. The additional perceived need for a domestic or “green” fuel supply, and pressure to minimize fossil carbon emissions have prompted governments mandate a percent of biodiesel in diesel blends.

Just as the processing of ULSD produced unforeseen side effects in diesel fuel lubricity, the failure of existing fuel-water separators to react to the changing needs became apparent. With the lubricity additives the ULSD blends containing biodiesel, created conditions where the industry standard commercial fuel-water separators failed to remove 40-100% of fuel-entrained water. The side effect is now typically 40% more water downstream of the filters that in the past worked at a 90% efficiency. Meanwhile there is no way for an operator to know it is happening unless the effects are drastic and observed and questions asked. Unlike particle filters, which generate pressure differentials prior to by-pass alerting the operator to the end of the element life, there is nothing that communicates to the operator that the fuel-water separator is not removing water. Fuel-water separators rely on an operator or auto-valve to empty a water to a collection chamber when the housing is partially full. If the collection chamber does not fill up, it is not an indicator of fuel-water separator failure; rather it is an indicator of dry fuel. The result is the fuel-water separator can be passing the water continuously into the injection system without the operator’s knowledge.

Fuel Surfactant and ULSD15

The root cause of fuel-water separator failure in ULSD-biodiesel blends is a decrease in interfacial tension due to increased levels of surfactants in the fuel. Although given separate titles to address the lubricity issue, lubricity enhancers, anti-wear additives, and biodiesel all contain compounds that are considered surfactants. Fuel and water are classes that normally do not dissolve into one another; if forced to coexist, they are most stable as separate layers, with the fuel layer on top of the water layer. The degree to which these layers repel is measurable as the interfacial tension (IFT). If mixed, an emulsion is formed, where water briefly exists as suspended drops in the fuel. Surfactants are molecules unique in that they form strong associations with both fuel and water. When surfactants are in a fuel, they associate with water, and increase fuel-water compatibility. The increased compatibility is reflected in a lower IFT between the two fluids. This unique surfactant behavior allows more water to dissolve into the fuel.

Surfactants create sufficiently small water drops (because they do not want to coalesce into larger drops) that will often pass through the media without encountering it. Surfactants also stabilize the emulsion from separation so that drops that do impact the media are less likely to fall out of the fuel at the barrier media. Also, drops that impact other drops resist coalescing into the larger drops necessary for successful separation. Collectively, the result of blending additives and biodiesel into ULSD is a significant reduction of the fuel-water separation process efficiency and finally the escape of water into the injector circuit.

You may be asking “How this can take place and nobody knew?” Testing in obsolete fuels is the reply! Today’s fuel-water separating devices must prove efficacy in standardized industry tests like SAE J1488 (pressure side = smaller water droplets). Water separation tests involve mixing a precise amount of water into fuel and passing the resulting emulsion through the separating device. Water content in the fuel upstream and downstream of the device is measured at regular intervals and time-weighted average water removal efficiency for the device is calculated. Water removal testing is very much all or nothing, with most end users requiring at least 95% average water removal efficiency for any commercial device.

At the same time another unforeseen consequence of the mandated fuel change surfaced: A lack of correlation of the tests with actual field performance. The result, the end user is largely unaware of the alarming failure consistency of fuel dewatering systems in ULSD-biodiesel blends. This is the case because the time required for a legislative body to mandate 2% biodiesel inclusion in diesel is fleeting relative to the time needed to adapt proven standardized industry tests for the new fuel. Regardless of the procedure selected, there are currently key differences between fuels surfactants / emulsifications found in the field versus the tests that are still specified to measure and rate water separator performance. Until resolved, the result is a disconcerting overestimation of a separator’s fuel water separation performance and capability as measured using aging standardized testing methods.

Tier 4 Fuel Quality Requirements

Organization	Particulate ISO 4406	Water
Bosch	11/8/6 at Injector	<200 ppm
CAT	18/16/13 at storage	<500 ppm
CUMMINS	18/16/13 at storage 11/8/3 at injector	<200 ppm
Worldwide Fuel Charter	18/16/13	No free or emulsified, dissolved <200 ppm

Most diesel storage tank owners, maintenance staff and company buyers are not knowledgeable of these guidelines.

HYDAC and Advanced Tier 4 Ready Diesel Fuel Filtration Solutions:

Particulate and fuel water separation filtration solutions for today fuels used in today’s engines- Job matched filtration; At the bulk tank, at the point of fuel dispense, and at the engine.

HYDAC is committed to delivering the solutions to allow OEM’s and users meet today’s diesel filtration requirements. We offer a series of diesel fuel filtration products working in-line and or in a fuel conditioning circuit with flow rates from 1.5 gpm to 1000 gpm. We offer condensation management solutions for the tank and the diagnostic tools such as particle counters and water sensors to measure the results.



FCU1315 Portable Contamination Monitoring Unit

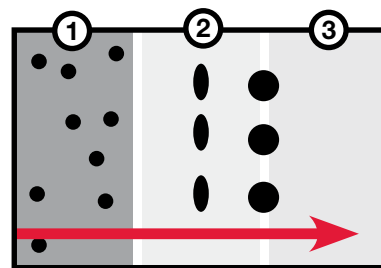
OVERVIEW OF FUEL FILTRATION

Design Principles of HYDAC Particulate Removal Filters & Elements

Our design standard is to provide the highest quality particulate removal filtration with the best combination of dirt holding capacity, low element delta P, the highest beta stability throughout the service life of the element at all of the available micron sizes applied to achieve and maintain the target cleanliness level for each application. We can provide contamination removal efficiencies from $1\mu\text{m} > \text{Beta}1000$ to as open as $150\mu\text{m}$ metal mesh. Most importantly, when filtering diesel fuel we use these filters and elements upstream to protect and extend the life of the downstream dedicated coalescing elements. We do this because testing shows that with our patent-pending materials of construction, our coalescing elements can and will outperform the competition because they will, by their materials and design, last for years if protected from premature contamination related loading using the right upstream particulate filter. In short, HYDAC offers an entirely new level of coalescing performance, one that has an associated cost, but one, when used correctly, mandates total cost to use our solution to be the lowest over time. The technical details and the design principals of our particulate elements can be found in our elements literature.



Design principles of the water removal (Water Coalescing) filters and Elements - Inside-Out flow to optimize coalescing effect, 5 micron synthetic pre-filter pleat pack to protect the downstream media, a depth tube coalesces water which creates large droplets that drain to the bottom. Downstream, a 25 micron treated hydrophobic barrier sleeve traps droplets $<25\mu$. This 3 elements in one pre-filter, coalescing, and separation (most competitors have separate elements for each function) = smaller size! Tested per SAE J1488 (pressure side = smaller water droplets), with fuel down to 12 dynes/cm IFT to replicate performance with more difficult fuels.

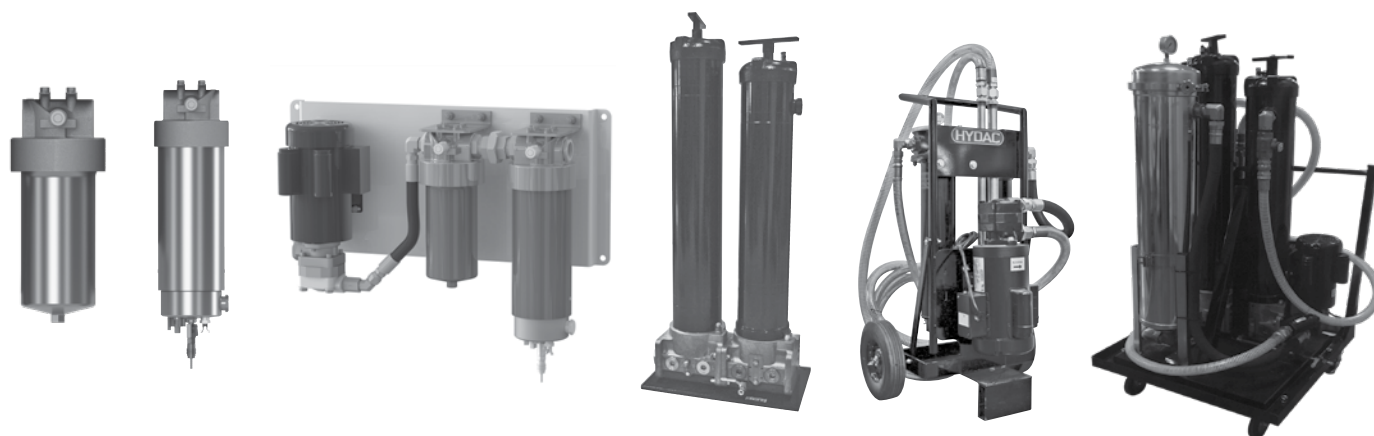


Contaminated fuel enters the element with the fuel passing through a 3 or 5 micron synthetic media pleat pack. Wet fuel then passes through the coalescing layer. Water collects and drains from the element forming large droplets, the fuel then passes through the downstream hydrophobic barrier. Water droplets are repelled by barrier and fall to bottom of the element, which is collected into the filter housing sump. Through the union of particulate filtration with our coalescing media, the element provides the perfect balance to collect and trap both water and contaminants in a single element. The three phase element has been developed with greater than 99% water removal capability in all but the highest surfactant ULSD or ULSD-biodiesel blends. Our fuels product lines cover a range of particle removal efficiencies and dirt holding capacities, giving the end user flexibility in pairing flow requirements to their need. This coalescing media provides a minimum of 95% water removal efficiency from biodiesel blends (B5).

Design Principals for Diesel Fuel Skids and Carts for specific Fuel applications

HYDAC has developed many of the core diesel products into turnkey filtration solutions with integrated pump motor dispense functions for almost every diesel application from gen sets to fleet fueling tanks to the ag tank at a farm. All are designed to address the challenges of fuel in its environment.

In the balance of this catalog, we trust you will find the products you require to meet your demanding needs.



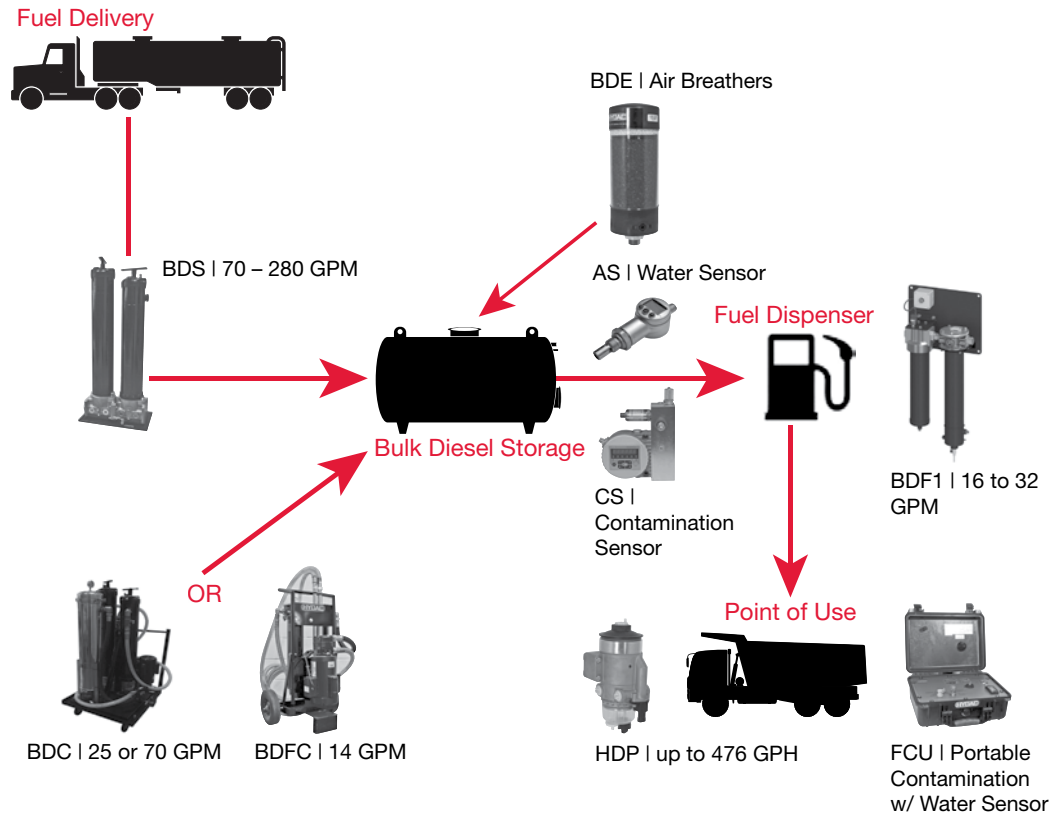
The Cost of Dirty Fuel

All new off-road diesel engines now must meet Tier 4 regulations. In order to achieve Tier 4 requirements, manufacturers of engines and injector systems have gone to high pressure, common rail, injection systems. The pressures can exceed 30,000 psi and might go even higher in the future. Particulates left in the fuel under the high pressure, combined with very small injector nozzle clearances as small as 2µm, can cause premature failure of nozzles or system components.

Failures of the injection system caused by particulates and water could result in repair costs of around \$1,500 per injector. The associated costs for a failure due to parts damage, repair & down time, loss of production and image loss of the operation could add up to ten-thousands of dollars per incident!

Traditional on-board engine filtration & fuel water separation is no longer enough to insure performance. Instead, a comprehensive filter strategy is required to assure proper fuel quality for trouble free engine operation:

Comprehensive Fuel Filtration Strategy by Application and by Products



Element Technical Data

Performance Specifications / Filtration Rating

HYDAC filter elements meet a wide variety of requirements in today's workplace, from the simplest to the most sophisticated fluid power systems. Established industry standards enable users to select the optimal filter element for any application.

Filter elements are rated on the basis of their ability to remove contaminants of specific targeted sizes from a fluid, under specific operating conditions. Filtration ratings can be measured by analyzing three areas of performance:

- (1) efficiency or filter element Beta rating and resulting percent efficiency,
- (2) dirt holding capacity (DHC), and
- (3) the pressure drop across the element over a range of flow conditions (PQ).

The Multi-Pass Test

Filter element efficiency ratings and capacities are determined by conducting a multi-pass test under controlled laboratory conditions. This is a standard industry test with procedure published by the International Standards Organization (ISO), the American National Standards Institute (ANSI), and the National Fluid Power Association (NFPA). The multi-pass test yields reproducible test data for appraising the filtration performance of a filter element including its particle removal efficiency under ideal conditions. These test results enable the user to: (1) compare the Beta efficiency, dirt holding capacity, and Beta stability characteristics of elements offered by various filter element suppliers and (2) helps one to select the proper filter element when also evaluating the structural integrity and pleat support system designed to obtain the optimal contamination control level for any particular system under dynamic operating conditions.

Hydraulic fluid (*Mil. Spec. 5606*) is circulated through a system containing the filter element to be tested. Additional fluid contaminated with ISO MTD Test Dust is introduced upstream of the element being tested. The fluid is monitored upstream and downstream of the test element to determine the element contamination removal efficiency.

$$\beta_{x(c)} = \frac{\text{number of particles upstream/}}{\text{number of particles downstream}}$$

Dirt holding capacity is defined as the total grams of ISO MTD Test Dust added to the system to bring the test filter element to terminal pressure drop. (*Alarm Trip Point*)

Filtration Ratio (Beta) ISO 4572 vs. ISO 16889

Due to the changes in the way particles are measured and the fact that a new test dust (ISO MTD) is now utilized, a new standard for multi-pass testing was necessary. This now current standard, ISO 16889, replaces the old Multi-Pass Test Standard, ISO 4572.

The filtration ratio (*more commonly referred to as the Beta ratio*) is, in fact, a measure of the particle capture efficiency of a filter element.

ISO 4572 (Old)

$$\beta_x = \frac{\text{number of particles upstream } \geq x \text{ microns}}{\text{number of particles downstream } \geq x \text{ microns}}$$

where x is a specified particle size (*in microns*).

ISO 16889 (Current 1999)

$$\beta_{x(c)} = \frac{\text{number of particles upstream } \geq x(c) \text{ microns}}{\text{number of particles downstream } \geq x(c) \text{ microns}}$$

where x(c) is a specified particle size (*in microns*).

$$\text{Example: } \beta_{10(c)} = \frac{7500}{100} = 75$$

This particle capture efficiency can also be expressed as a percent by subtracting the number 1 from the Beta value, dividing by Beta value and multiplying the result by 100:

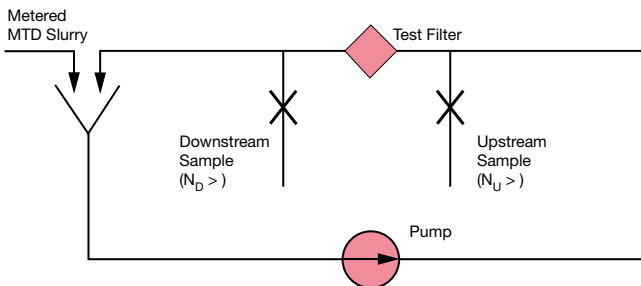
$$\text{Beta}_{10(c)} \text{ efficiency} = 75 = \frac{(\beta - 1)}{\beta} \times 100$$

$$\text{Beta}_{10(c)} \text{ efficiency} = \frac{(75 - 1)}{75} \times 100 = 98.667\%$$

The example is read as "Beta ten is equal to 75, where 7500 particles, 10 microns and larger, were counted upstream of the test filter (*before*) and 100 particles, 10 microns and larger, were counted downstream of the test filter (*after*)."

The filter element tested was 98.667% efficient in removing particles 10 microns and larger.

Figure 5. Multi-Pass Test Schematic



Percent Efficiency

To calculate a filter element's percent efficiency, subtract 1 from the Beta, divide that answer by the Beta, then multiply by 100.

Table 7. Filter Element Percent Efficiency

Example Per ISO 4572 (old):	Example Per ISO 16889 (new):
Step 1: $\beta_{10} \geq 75$	$\beta_{10(c)} \geq 75$
Step 2: $75 - 1 = 74$	$75 - 1 = 74$
Step 3: $74 \div 75 = 0.987$	$74 \div 75 = 0.987$
Step 4: $0.987 \times 100 = 98.7\%$	$0.987 \times 100 = 98.7\%$

Using a calculator with a % key, you can use the shortcut version.

Example Per ISO 4572 (old):	Example Per ISO 16889 (new):
Step 1: $\beta_{10} \geq 200$	$\beta_{10(c)} \geq 200$
Step 2: $200 - 1 = 199$	$200 - 1 = 199$
Step 3: $199 \div 200 = 99.5\%$	$199 \div 200 = 99.5\%$

Filter Beta Rating

ISO 16889 replaces ISO 4572 as the International Standard for Multi-pass Testing. It provides a common testing format for filter manufacturers to rate filter element performance. For convenience, Betas are shown in this catalog for both old and new Multi-pass standards (*ISO 4572 and 16889, respectively.*)

According to ISO 16889, each filter manufacturer can test a given filter element at a variety of flow rates and terminal pressure drop ratings that fit the application, system configuration and filter element size. Results may vary depending on the configuration of the filter element tested and the test conditions.

Currently, there is no accepted ISO, ANSI, or NFPA standard regarding "absolute" ratings. Filter manufacturers have generally adopted an industry standard using $\beta_{x(c)} \geq 75$ (98.7% efficiency) as a minimum efficiency to rate an element as a high efficiency depth filter media. Filter manufacturers generally rate their high efficiency elements as $\beta_{x(c)} \geq 100$ (99.0% efficiency), $\beta_{x(c)} \geq 200$ (99.5% efficiency), or $\beta_{x(c)} \geq 1000$ (99.9% efficiency). Performance of HYDAC elements is typically a minimum rating of $\beta_{x(c)} \geq 1000$, with high dirt holding capacities and lower pressure drops in optimum balance to meet the dynamics and stresses of all applications.

Dirt Holding Capacity

Dirt holding capacity (DHC) is the amount of contaminant (*expressed in grams*) the element will retain before it goes into alarm (*terminal pressure*). All other factors being equal, an element's DHC can provide indication of how long the element will last until full. This characteristic, taken into context with a structural and pleat support evaluation will provide good indication of what element should last longer in system operation.

Dirt holding capacity, sometimes called "apparent capacity," is a very important and often overlooked factor in selecting the right element for the application. The dirt holding capacity of an element is measured in grams of ISO medium test dust contaminant as determined from the multi-pass test (*ISO 16889*), and measured at the terminal ΔP (*alarm point*). When selecting filter elements, it is beneficial to compare the dirt holding capacities of elements with similar particle removal efficiencies and good structural and pleat support characteristics.

Pressure Drop

When sizing a filter, it is important to consider the initial differential pressure (ΔP) across the element and the housing. Elements offering a lower pressure drop at a high Beta efficiency are better than elements with a high ΔP at the same efficiency. At every level of filtration, HYDAC Betamicron® media elements offer a superior combination of high efficiency, high dirt holding capacity, and low pressure drop with the media support design that provides the highest levels of performance under dynamic fluid conditions.

Collapse Rating

The collapse rating of a filter (*determined by ISO 2941/ANSI B93.25*) represents the differential pressure across the element that causes the media to fail. The collapse rating of an element should be on the order of 3 times higher than the filter bypass setting. The collapse rating for filter elements used in filter housings with no bypass valve should be at least the same as the setting of the system relief valve upstream of the high collapse element. When a collapsed element becomes clogged with contamination all functions downstream of the filter will become inoperative due to the release of high levels of contamination to the critical hydraulic components - loss of protection.

Element Selection

The Right Media for the Right Application = Job Matched Filtration

Filtration Application Guidelines

Selecting the proper HYDAC media for your application is easy if you follow these simple guidelines.

- Step 1.** Remember that the key to cost effective contamination control is to maintain the system's cleanliness at the tolerance level of the system's most sensitive component. So, the first step is to identify the most sensitive component.
- Step 2.** Determine the desired cleanliness level (ISO Code) for that component by referring to Table 5 (*in this Overview*) by reference to the customer's component manuals or by contacting the component manufacturer directly.
- Step 3.** Referring to Table 8 identify the HYDAC filter medium that will meet or exceed the desired cleanliness level.
- Step 4.** Remember to regularly check the effectiveness of the selected media through the use of contamination monitoring tools and equipment.

Table 8. HYDAC Element Media Recommendations
Oil cleanliness to ISO 4406
Filtration rating x ($\beta_{x(e)} \geq 200$)

Desired Cleanliness Levels (ISO Code 4406)	HYDAC Media
19/16/13 to 22/19/16	25 μm
18/15/12 to 21/18/15	20 μm
17/14/11 to 20/17/14	15 μm
15/12/9 to 19/16/13	10 μm
12/9/6 to 17/14/11	5 μm
10/7/4 to 13/10/7	3 μm

Effect of Dirt Ingression

Filter element life varies with the true dirt holding capacity of the element under dynamic flow conditions and the amount of dirt introduced into the circuit. The rate of this dirt ingression in combination with the desired cleanliness level should be considered when selecting the media to be used for a particular application.

The amount of dirt introduced can vary from day to day and hour to hour, generally making it difficult to predict when an element will become fully loaded. This is why we recommend specifying a filter indicator.

Filter indicators provide a vital measure of protection for your system by indicating when the filter element needs to be changed or cleaned. HYDAC filters are available with visual, electrical and electrical-visual combination filter indicators. These indicators may also be purchased as separate items.

Amount of Fluid Filtered

To obtain the desired cleanliness level (ISO Code) using the suggested HYDAC filter medium, it is recommended that a minimum of one-third of the total fluid volume in the system pass through the filter per minute. If fluid is filtered at a higher flow rate, better results may be achieved. If only a lesser flow rate can be filtered, a more efficient media may be required.

Systems operating in a clean environment, with efficient air-breather filters and effective cylinder rod wiper seals, may achieve the desired results at a lower turnover rate. Systems operating in a severe environment or under minimal maintenance conditions should have a higher turnover. Turnover must be considered when selecting the location of the system's filter(s).

Sizing a Filter Element

Since the pressure drop versus flow data contained in our filter catalog is for fluids with a viscosity of 141 SUS (30 cSt), and a specific gravity of 0.86, we are often asked how to size a filter with a viscosity other than 141 SUS (30 cSt) or a specific gravity other than 0.86. In those instances where the viscosity or specific gravity is significantly higher, it may be necessary to use a larger element. To make this determination, we need to calculate the life of the element, using the following equation:

$$EL = IA - (H + E)$$

Where:

- EL = Element Life (expressed in psi)
- H = Housing pressure drop
- IA = Indicator Alarm trip point
- E = Element pressure drop

- The housing pressure drop can be read directly from a graph. This value is not significantly affected by viscosity or the number of elements in the housing, since housing flow is turbulent.
- The element pressure drop is directly proportional to viscosity, influenced by high pressure since element flow is laminar.

A "rule of thumb" for element life, as calculated from the above equation, is to work towards a filter assembly differential pressure drop that is typically no greater than 20% of alarm trip setting.

Table 9. Typical Pressure Drop Maximum Targets for Filter sizing:

Max. Pressure Drop	Type
10 – 15 psid	Pressure Filters
4 – 8 psid	Return Filters
2 – 6 psid	Lube Systems

Filter assembly differential pressure should never exceed 50% alarm trip point even in most demanding applications.

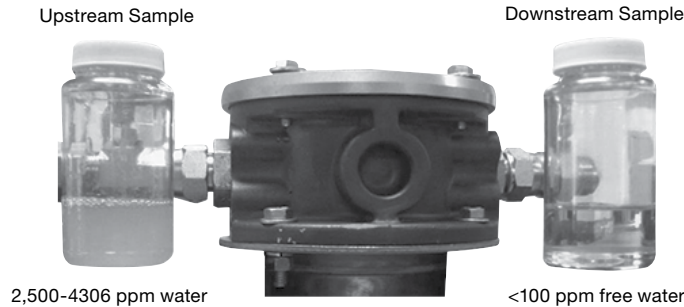
The interval between element change-outs can be extended by increasing the total filter element area. Many HYDAC filters can be furnished with one, two, or three elements or with larger elements. By selecting a filter with additional element area, the time between servicing can be extended for minimal additional cost.

Bulk Diesel Coalescing Filtration Fundamentals

Prepare for Tier 4 Off-Highway Engine Requirements

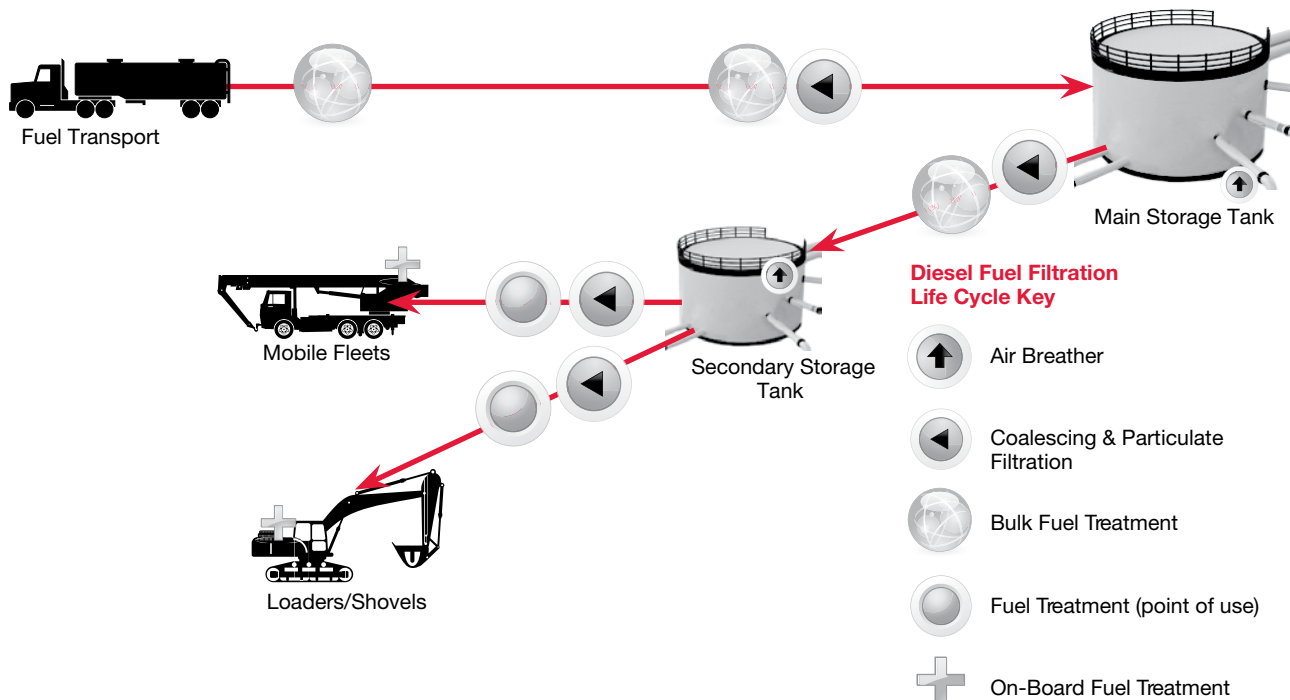
- Fuel injectors operate at high pressures to achieve emissions standards (30,000+ psi)
- Injector nozzles openings as small as 2 µm (for perspective 40 µm is visibility limit with human eye)
- Requirements for diesel fuel based on ISO Code cleanliness levels (18/16/13 storage, 12/9/6 or better at the injector)
- Requirements for water removal from fuel (levels down to 50 ppm)

HYDAC's Bulk Diesel Filters and systems provide exceptional, ≥ 99.5% single-pass diesel purification to protect the latest in high pressure, common-rail, fuel injection systems that require fuel with particulate filtration down to 1 µm.



Why is highly efficient particulate and coalescing fuel filtration a critical requirement in today's application?

- 2004: U.S. Environmental Protection Agency announced rules to reduce emissions from on- and off-road diesel engines by more than 90% over 11 years (Tier 3 & 4)
- 2011: Ultra Low Sulfur Diesel (ULSD15) became standard for all diesel fuel in the US, Canada & Europe
- 2013-2014 & Beyond: Tier 4 and Tier 4 final Engines are being shipped with fuel cleanliness requirements and enhanced water level removal needs
- Fuel cleanliness and ppm levels that were acceptable in Tier 3 and lower engines will most likely cause significant issues in today's Tier 4 Final engines. Injector manufacturers advise: No warranty coverage due to improper fuel filtration



Application Introduction: Better Bulk Fuel Filtration is now a critical competence in achieving cost effective engine performance

Coalescing filtration can be a highly effective method to remove water from diesel fuels. Water is typically introduced into the fuel supply by condensation or water ingestion during delivery or transfer. Water in a vehicle's fuel system can reduce lubricity causing seizure of close tolerance parts, increased TAN, reduced lubricity at the injector, lower burn efficiency, reduced power or emissions violations and corrosion. Water in fuel storage tanks causes rust and promotes microbial growth. Microbial growth in fuel storage systems begins in free water at the tank bottom and can quickly migrate through the fuel. In warm weather, microbial "blooms" can quickly overwhelm and bypass fuel filters causing contamination to reach the fuel injectors. Today's high pressure 36,000+ psi (2,800bar) common-rail, Tier 4 fuel injection systems have tighter tolerances and require water removal of less than 200 ppm to minimize wear related failures.

OVERVIEW OF FUEL FILTRATION

We test to SAE J1488 and ISO16332 - Fuel Standards. Below are examples of HYDAC tests and results of third-party product testing.

SAE J1488 is a fuel/water separation test with continuous water injection of .25% of the fuel flow rate. The test is performed with the water injected upstream (suction side) of the pump resulting in emulsified or finely dispersed water droplets.

SAE J11839 is a fuel/water separation test with continuous water injection of .25% of the fuel flow rate. The test is performed with the water injected downstream (pressure side) of the pump resulting in larger water droplets.

ISO 16332 is a fuel/water separation test with continuous water injection of .15% of the fuel flow rate. The test is performed with the water injected either downstream (pressure side) or upstream (suction side) of the pump resulting in emulsified/finely dispersed or larger water droplets, respectively.

Third-party testing show the performance of the HYDAC ICF rated for 16 gpm and a competitor product rated for 25 gpm at a test flow rate of 10 gpm. HYDAC product is fully synthetic where competitor's is a combination of systolic and cellulose. As the test goes on, the competitor's element loses separation efficiency. The result is a clear sump sample (Figure 3) versus a cloudy sump sample with fuel and water (Figure 2).



Figure 1

Test Circuit Sample of UNFILTERED Sump Discharge:

(Tested without the coalescing element installed at 16 gpm flow) 0% removal efficiency and the unfiltered sump sample is milky and filled with fuel.

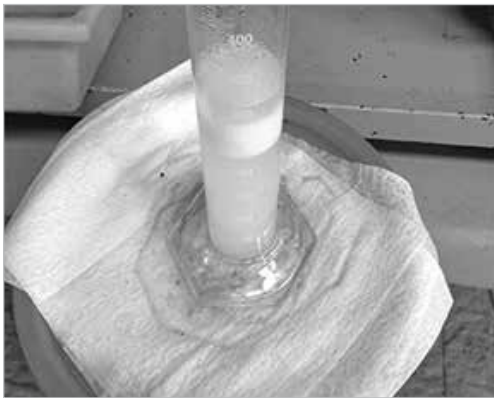


Figure 2

Competitive Fuel Filter:

Sample of Drain Discharge after Coalescing filtration at 16 gpm at an average efficiency of 61%. The sample is a mixture of fuel and water due to poor separation efficiency.



Figure 3

HYDAC ICF Coalescing Element:

Water removal performance at 25 gpm is 97.7% efficiency and as a result the sump drain output sample is clean and free of visible fuel. NOTE: for comparison, competitor's filter efficiency at only 16 gpm is 61% and testing of the competitors unit at 25 gpm provided downstream results that were too saturated to measure on a Karl Fischer, showing reduced separation efficiency.

Cellulose vs Fully Synthetic Medium

Independent Testing (Sept. 2014)
at Southwest Research Institute® (SwRI)

- SAE J1488
- In-line fuel coalescing filter (ICF)
- Flow rate 16 gpm
- Water feed rate: 152 ml/min (2,500 ppm)
- Test Duration 150 minutes

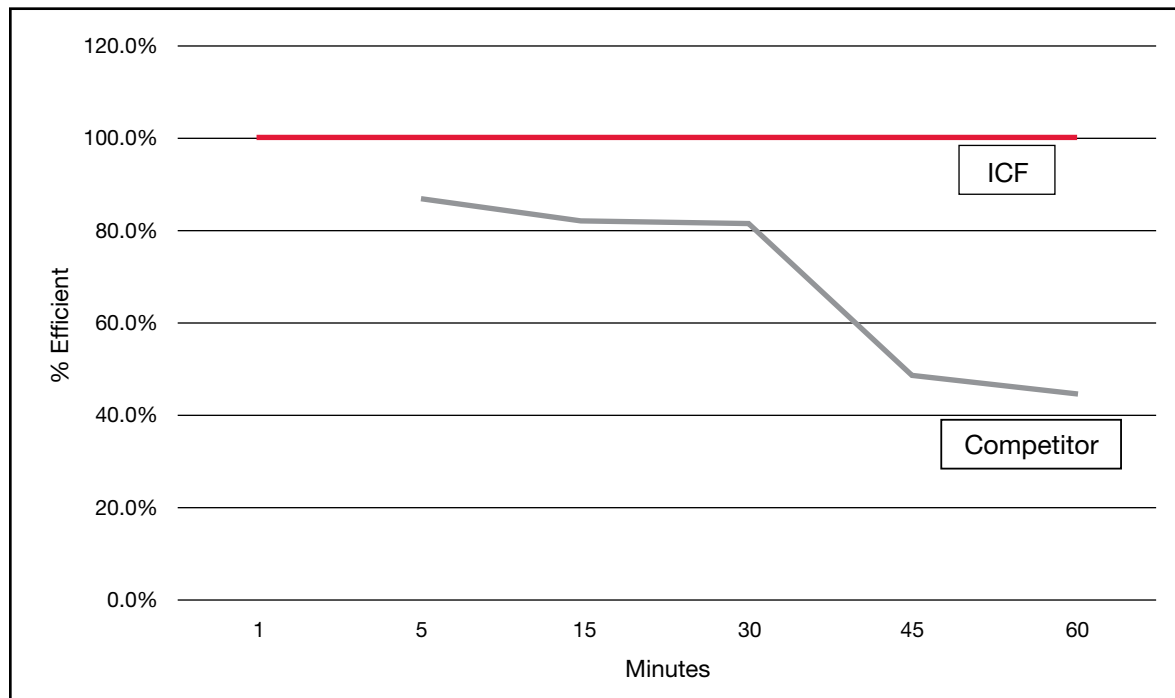
HYDAC Coalescing Technology: the Difference in Performance

Equipment:

- MPT Multipurpose Stand
- 10 Gallon Reservoir
- Coulometric Karl Fischer Unit
- Controlled Environmental Conditions

ICF vs Competition Efficiency Testing

Flow Rate 10 gpm



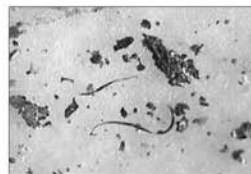
OVERVIEW OF FUEL FILTRATION

Diesel Fuel Filtration in the Engine – Why it Matters

Tier 4 Rail Injection Engine - Cutaway



Bacterial Growth



Blocked Fuel Filter



Clogged Fuel Injectors



Damaged Fuel Pump



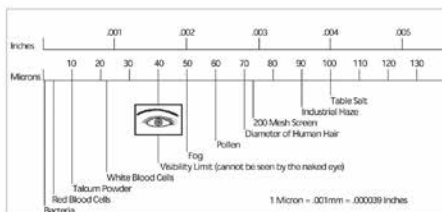
Oil Degradation/ Leakages



Seal Failures



Unseen Particles



B Particulate Filtration

PARTICULATE FILTRATION

GHPF Series

GeoSeal® High-Flow Particulate Filter
150 psi • up to 100 gpm



Model No. of filter in photograph is:
GHPFG03VS24VMR

Description

The GHPF is a high flow, compact particulate filter for use where superior performance is needed in fuel transfer, kidney-loop, or dispensing applications. The filter assembly uses a performance optimized synthetic filter media along with the GeoSeal® element interface to ensure quality filtration with every replacement. The filter dimensions allow for installations where spin-on filters are commonly used.

Features

- Diesel fuel particulate filter for dispensing, transfer or polishing filtration applications
- Uses patented GeoSeal® elements
- All-aluminum filter housing is fully compatible with diesel and biodiesel
- Minimal clearance needed for element service, ideal for enclosure installations
- Cartridge style element improves performance and reduces waste compared to spin-on solutions
- Port to port and mounting pattern dimensions match standard spin-on assembly

Applications

- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

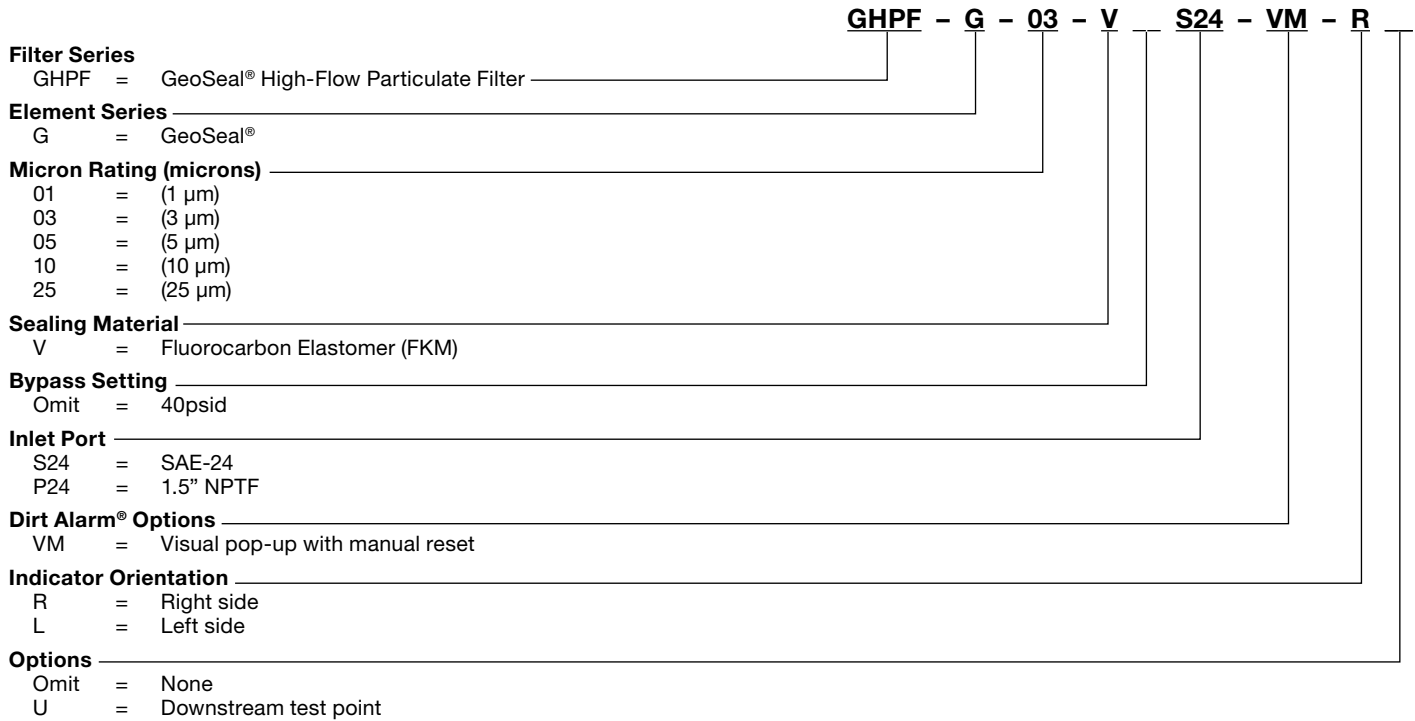
Technical Specifications

Flow Rating	Up to 100 gpm (380 l/min)
Max. Operating Pressure	150 psi (10.3 bar)
Min. Yield Pressure	2600 psi (179 bar)
Temperature Range	-20°F to 225°F (-29°C to 107°C)
Bypass Setting	Cracking: 40 psi (2.8 bar)
Porting Head Element Case	Cast Aluminum, Anodized Aluminum, Anodized
Weight GHPF	7.64 lbs. (3.47 kg)
Element Change Clearance	2" (51 mm)

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Model Code



Element Performance Information

Media Type	Element	Filtration Ratio Per ISO 16889 Using automated particle counter (APC) calibrated per ISO 11171	
		$\beta_x(c) \geq 200$	$\beta_x(c) \geq 1000$
Betamicon® Media	5.40.11 D 01 BN4 /-V-G	<4.0	4.5
	5.40.11 D 03 BN4 /-V-G	4.6	5.8
	5.40.11 D 05 BN4 /-V-G	5.9	7.8
	5.40.11 D 10 BN4 /-V-G	11.4	13.2
	5.40.11 D 25 BN4 /-V-G	15.8	17.5

Dirty Holding Capacity

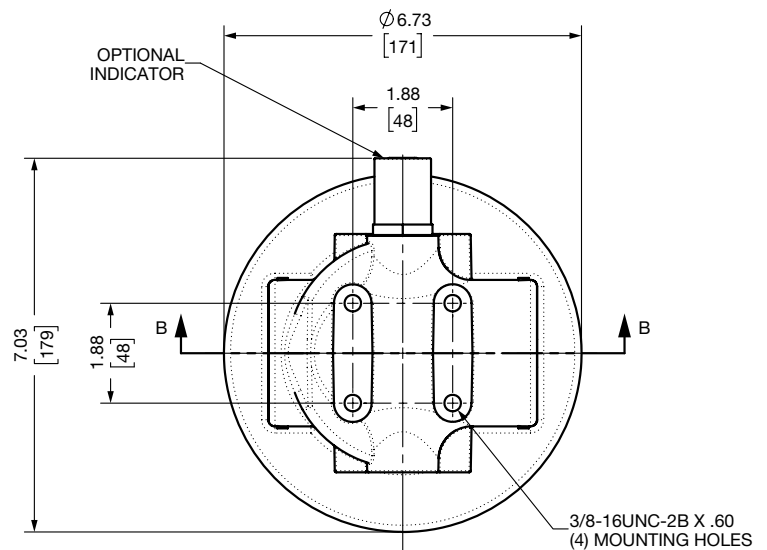
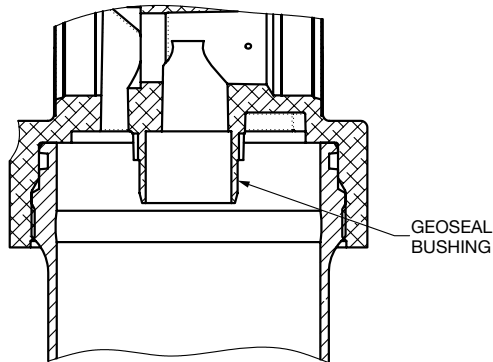
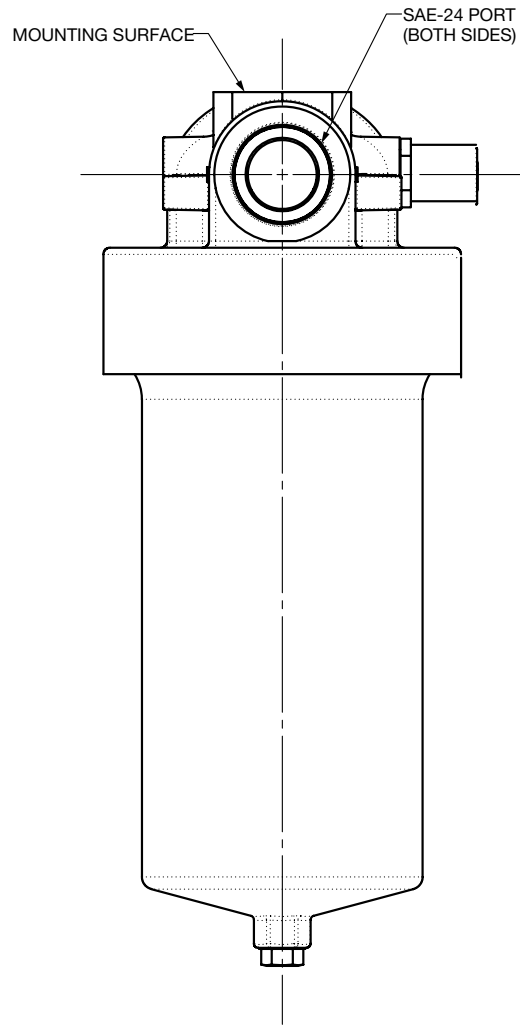
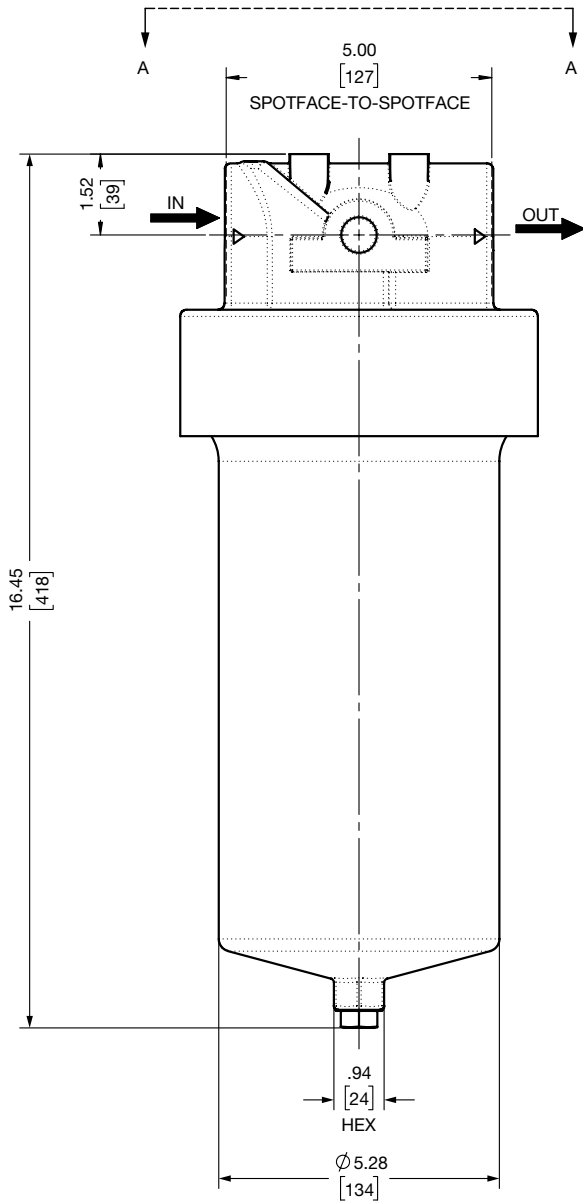
Media Type	Element	DHC (gm)
Betamicon® Media	5.40.11 D 01 BN4 /-V-G	172
	5.40.11 D 03 BN4 /-V-G	148
	5.40.11 D 05 BN4 /-V-G	174
	5.40.11 D 10 BN4 /-V-G	165
	5.40.11 D 25 BN4 /-V-G	164

Element Collapse Rating: 150 psid (10.3 bar) for standard and non-bypassing elements

Flow Direction: Outside In
Element Nominal Dimensions: 5" (127 mm) O.D. x 11" (305 mm) long

PARTICULATE FILTRATION

Dimensions GHPF



Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

Fluid Compatibility

Diesel Fuel and Biodiesel (B100).

For other Distillate Petroleum, Contact Factory.

Element Selection

Pressure	Element		Element selections are predicated on the use of 37 SUS (3 cSt) Diesel Fuel and Biodiesel (B100), SAE-24 porting, and a 40 psi (2.8 bar) bypass valve.					
	Series	Micron Rating						
To 150 psi (10.3 bar)	5.40.11 D xx BN4	1	5.40.11 D 01 BN4					
		3	5.40.11 D 03 BN4					
		5	5.40.11 D 05 BN4					
		10	5.40.11 D 10 BN4					
		25	5.40.11 D 25 BN4					
Flow		gpm (L/min)	0	20	40	60	80	100
			0	50	150	250	380	

Sizing Information

Total pressure loss through the filter is as follows:

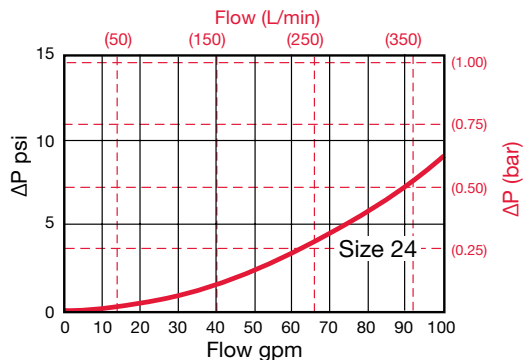
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve

Pressure loss through housing is as follows:

Housing ΔP = Housing Curve ΔP \times $\frac{\text{Actual Specific Gravity}}{0.86}$

Housing Pressure Drop GHPF



Element K Factors

ΔP Elements = Elements (K) Flow Factor \times Flow Rate (gpm) \times $\frac{\text{Actual Viscosity (SUS)}}{37 \text{ SUS}}$ \times $\frac{\text{Actual Specific Gravity}}{0.86}$

Betamicron Size	5.40.11 D xx BN4				
	1 μ	3 μ	5 μ	10 μ	25 μ
5.40.11 D XX BN4	0.074	0.052	0.049	0.049	0.039

PARTICULATE FILTRATION

QF5 Series

In-Line Filter

500 psi • up to 300 gpm



Model No. of filter in photograph is QF539QZ10P32.



For applications requiring higher flow rates of 300 to 600 gpm, or increased contamination holding capacity for flow rates of up to 300 gpm, please contact the factory regarding the 2QF5 solution.

Description

A versatile, base ported high flow particulate filter housing for use with diesel fuel. The QF5 can be configured in a single housing assembly to support 300 gpm of flow, or expand the capacity by choosing the 2QF5 assembly configured in parallel.

Features

- Element changeout from the top minimizes fuel spillage
- For fuel filtration applications, the ECOmicron® is chosen as standard with FKM seals.
- Offered in pipe, SAE straight thread, and flange porting
- Optional inlet and outlet test points
- Various element service indicator options

Applications

- Industrial
- Automotive manufacturing
- Machine tool
- Steel making
- Mining technology
- Power generation
- Pulp & paper
- Bulk fuel filtration

Technical Specifications

Flow Rating	Up to 300 gpm (1135 L/min) for 150 SUS (32 cSt) fluids
Max. Operating Pressure	500 psi (35 bar)
Min. Yield Pressure	2500 psi (172 bar), per NFPA T2.6.1-R1-2005
Rated Fatigue Pressure	Contact Factory
Temperature Range	-20°F to 212°F (-29°C to 100°C)
Bypass Setting	Cracking: 30 psi (2.1 bar) Full Flow: 55 psi (3.8 bar)
Porting Head Element Case	Cast Aluminum Steel
Cap:	Ductile Iron
Weight of QF539	185 lbs. (84 kg)
Element Change Clearance	39Q 33.8" (859 mm)

Model Code

QF5 - 39 - Q - 03 V P32 - - VM

Filter Series

QF5 = In-Line Filter

Element Length (in)

39

Element Style

Q

Micron Rating

03 = 3 µm ECOmicron®

05 = 5 µm ECOmicron®

10 = 10 µm ECOmicron®

Housing Seal Material

Omit = Buna N

V = Fluorocarbon elastomer (FKM)

Porting

P32 = 2" NPTF

P40 = 2 1/2" NPTF

P48 = 3" NPTF

S32 = SAE -32 o-ring boss

F32 = -32 (2") SAE 4-bolt flange Code 61

F40 = -40 (2 1/2") SAE 4-bolt flange Code 61

F48 = -48 (3") SAE 4-bolt flange Code 61

Bypass Setting

Omit = 30 psi cracking

Differential Pressure Clogging Indicator Options

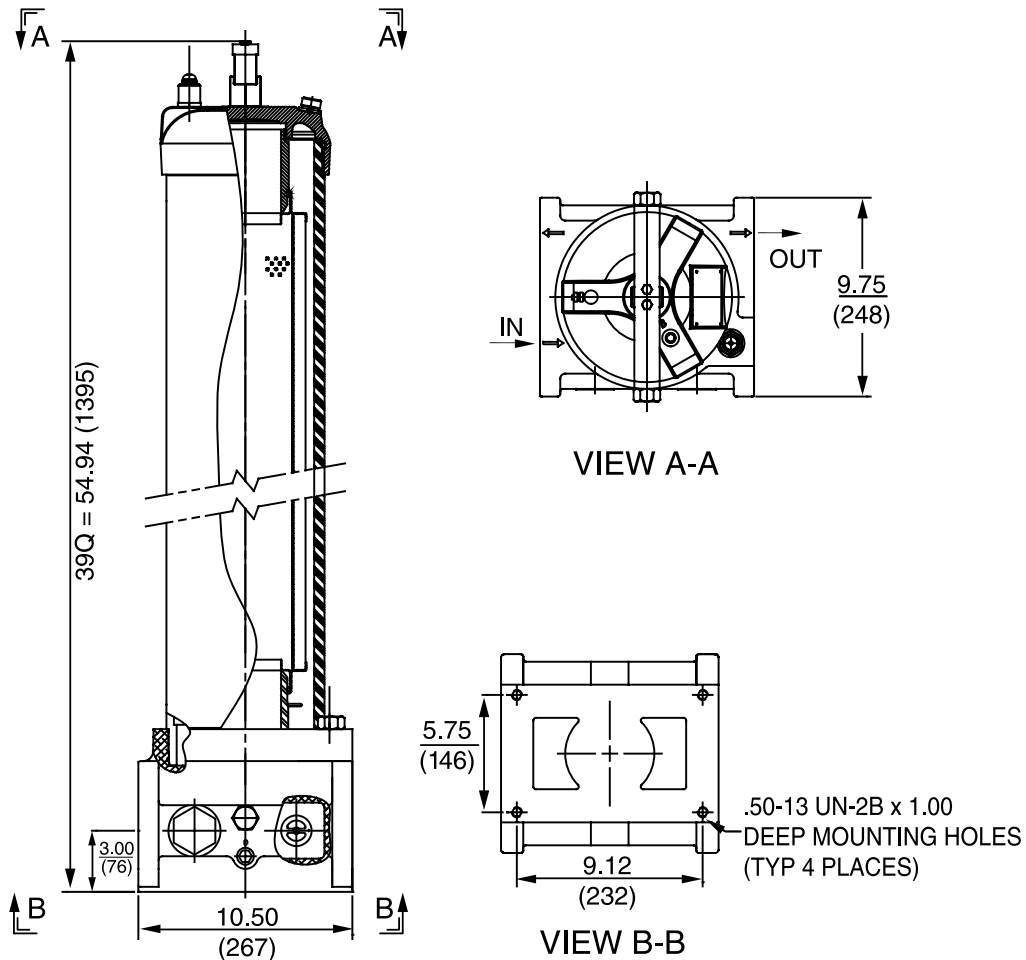
Omit = None

VM = Visual pop-up, manual reset

*for electrical indicators, contact factory

PARTICULATE FILTRATION

Dimensions QF5



Element Performance Information

Element		Filtration Ratio Per ISO 4572/NFPA T3.10.8.8 Using automated particle counter (APC) calibrated per ISO 4402			Filtration Ratio per ISO 16889 Using APC calibrated per ISO 11171	
		$\beta_x \geq 75$	$\beta_x \geq 100$	$\beta_x \geq 200$	$\beta_x(c) \geq 200$	$\beta_x(c) \geq 1000$
39Q	03	<1.0	<1.0	<2.0	<4.0	4.8
	05	2.5	3.0	4.0	4.8	6.3
	10	7.4	8.2	10.0	8.0	10.0

Dirt Holding Capacity

Element	DHC (gm)	
39Q	03	1293
	05	1302
	10	1214

Element Collapse Rating: ECOmicron: 145 psid (10 bar)
Flow Direction: Outside In

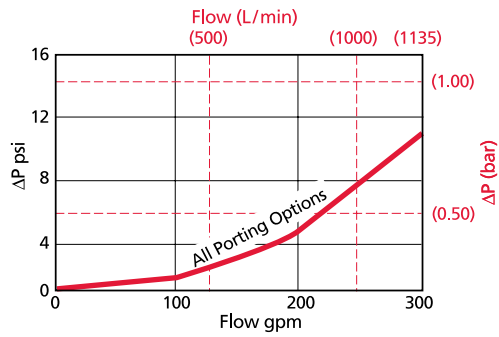
Element Nominal Dimensions: Q: 6.0" (150 mm) O.D. x 40.0"
(1016 mm) long

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

Fluid Compatibility

Compatible Fluid Types
Diesel Fuel
Biodiesel (with FKM seals)

Housing Pressure Drop QF5



sp gr = specific gravity

Sizing of elements should be based on element flow information provided in the Element Selection chart above.

$$\Delta P_{\text{element}} = \text{flow} \times \text{element } \Delta P \text{ factor} \times \text{viscosity factor}$$

EI. ΔP factors @ 150 SUS (32 cSt):

16QCLQFZ3	.05	Q03	.02
16QCLQFZ5	.05	Q05	.02
16QCLQFZ10	.04	Q10	.01

If working in units of bars & L/min, divide above factor by 54.9.

Viscosity factor: Divide viscosity by 150 SUS (32 cSt).

PARTICULATE FILTRATION

LVHF Series

High Flow | Low Viscosity Housing Filter
150 psi • up to 211-951 gpm



Model no. of filter in photograph is:
LVHF340NVBRFZZA

Features

- Excellent filtration performance in a single pass
- Low pressure loss due to innovative element technology
- Easy to service thanks to intelligent element design
- Easy to adapt to filter housings for the removal of the fine particles in diesel
- The Low Viscosity-Housing Filter LVH-F is mainly used to filter low-viscosity fluids. It is especially suitable for applications with large amounts of dirt that need to be removed in just a single pass
- The Optimicron® filter elements used here ensure that both the required cleanliness and a long service life are achieved.
- Available in various sizes, the filters can be optimally integrated into new or existing systems.
- The filters are designed according to ASME Code Section VIII rules and regulations for pressure vessels as well as the ability to certify to other global standards upon request.

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

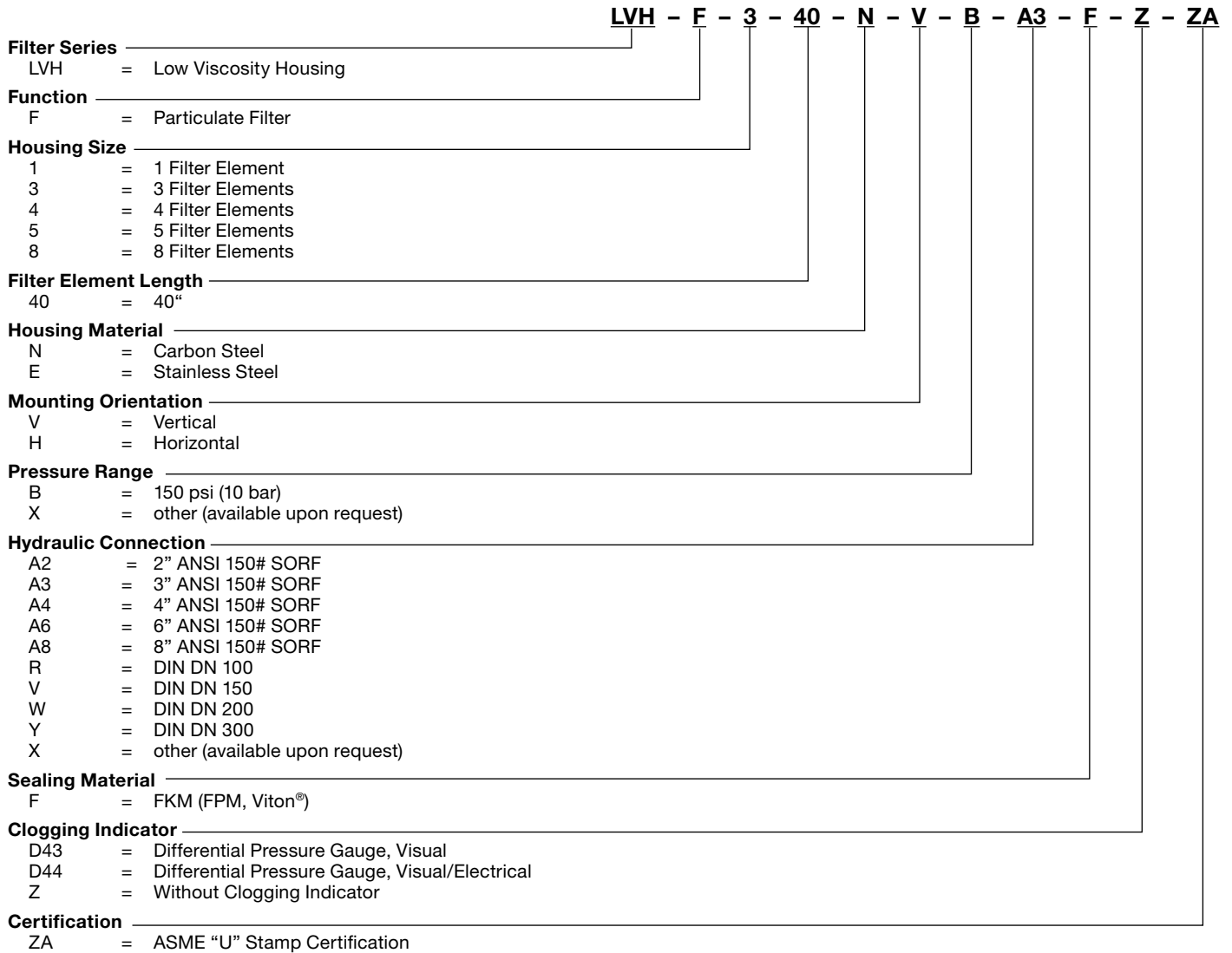
Markets

- Industrial
- Bulk Fuel Filtration
- Marine
- Mining Technology
- Agriculture
- Power Generation

Technical Specifications

Flow Rating	211-951 gpm (799-3600 L/min)
Inlet/Outlet Connection	ANSI 150#: 2"-12" DIN: DN50-DN300
Max. Operating Pressure	150 psi (10 bar)
Max. Ambient Temperature	122°F (50°C)
Max. Operating Temperature	158°F (70°C)
Material Housing	Stainless Steel or Carbon Steel

Model Code



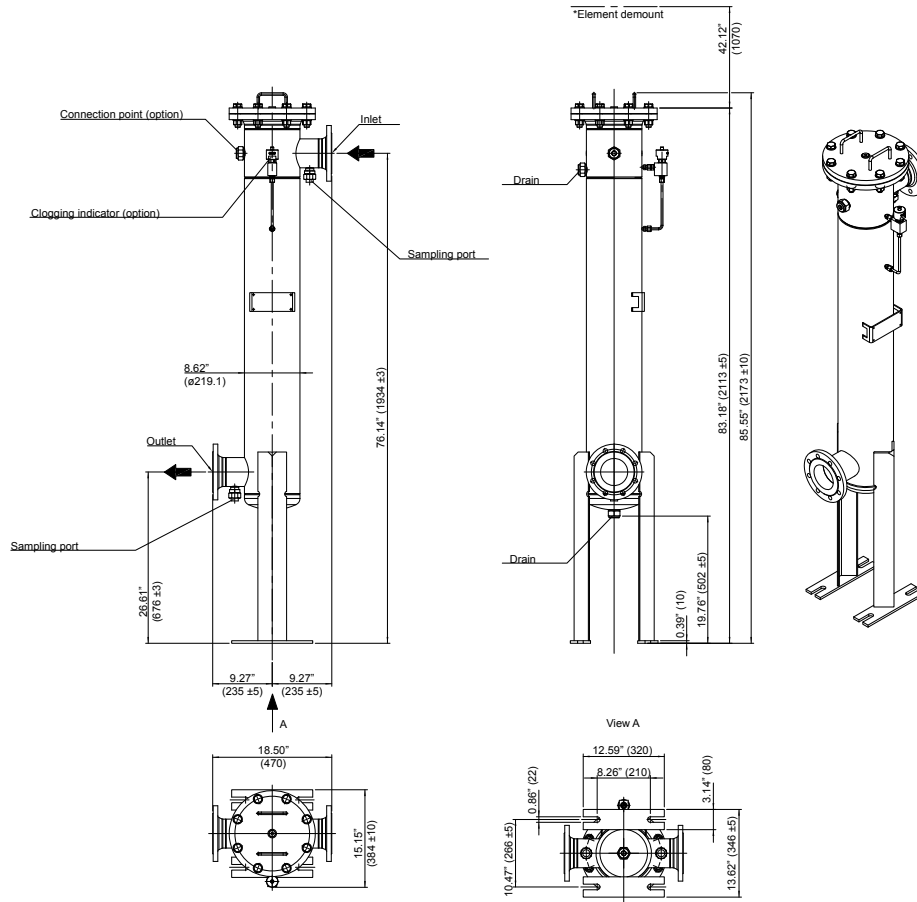
Notes: Filter elements must be ordered separately and installed before initial operation on site

Fuel Oils

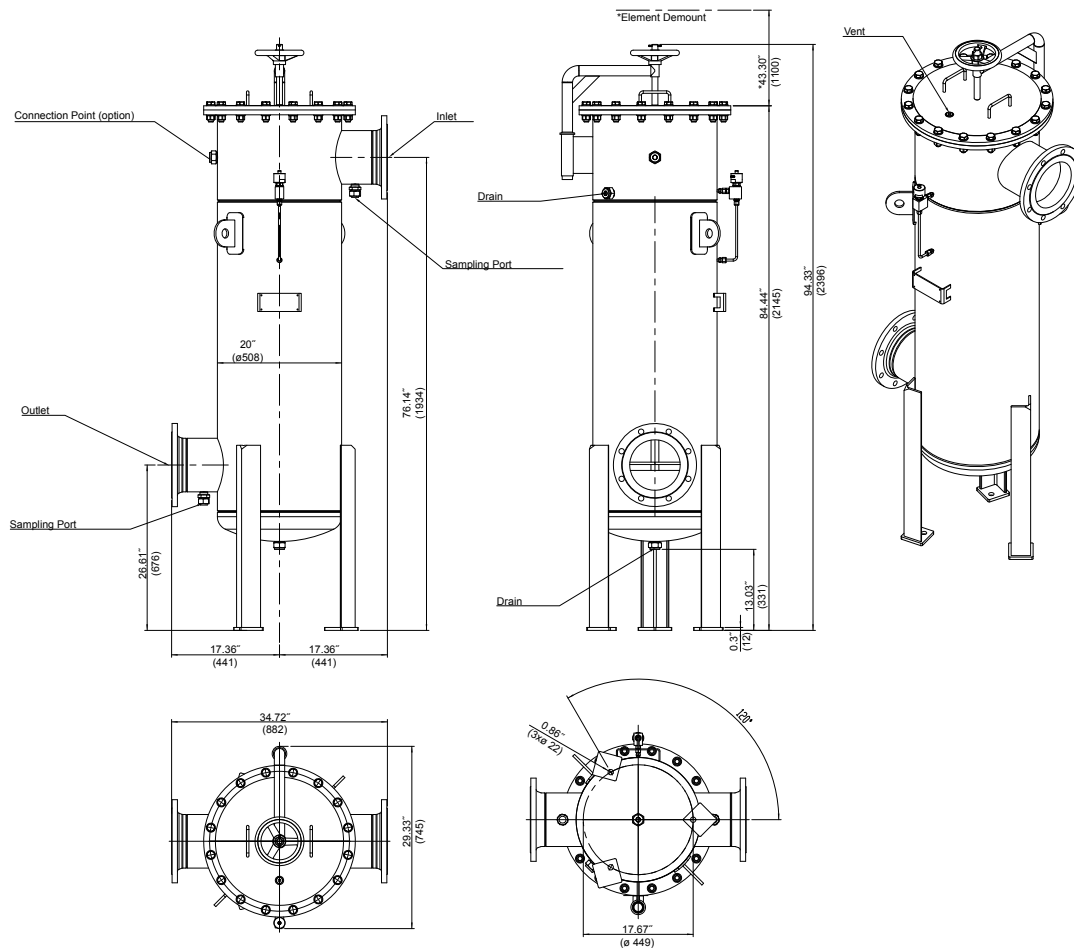
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

PARTICULATE FILTRATION

Dimensions LVH-F1



LVH-F8

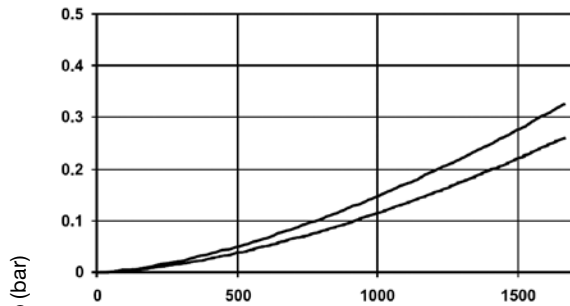


Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

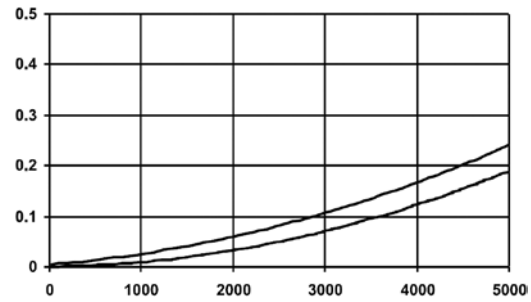
Pressure Drop LVHF

The lower curve applies to diesel at 20°C (the upper curve is for mineral oil with viscosity to 30 cSt for comparison).

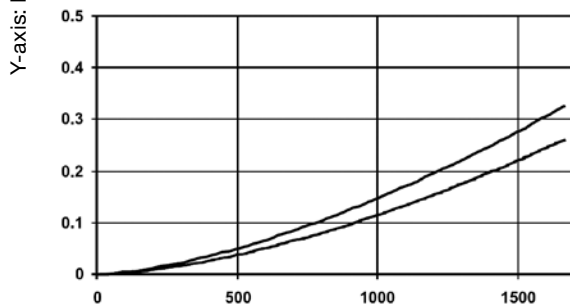
LVH-F 140



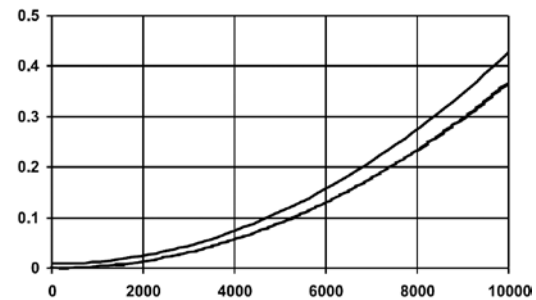
LVH-F 440



LVH-F 340



LVH-F 840



X-axis: Flow Rate (L/min)

Filter Calculation

Filter Size (Model)	Maximum Flow Rate	Number of Filter Elements
LVH-F-1 40	211 gpm	1 pc.
LVH-F-3 40	317 gpm	3 pcs.
LVH-F-4 40	476 gpm	4 pcs.
LVH-F-5 40	632 gpm	5 pcs.
LVH-F-8 40	951 gpm	8 pcs.

Filter Element Selection

Element	Designation	Part No.
Filter Element 40"	N42ON-DF003-FA40F	3965085
	N42ON-DF005-FA40F	3916691
	N42ON-DF010-FA40F	4055947

* Contact Factory for More Details

C Coalescing Filtration

COALESCING FILTRATION

ICF Series

In-line Bulk Fuel Coalescing Filter

150 psi • up to 16 gpm



Features and Benefits

- Patent-pending, three-phase, particulate and fuel/water separation media technology
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today's ultra-low sulfur diesel (ULSD) fluids
- Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from bulk fuel tanks to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today's ULSD fluids
- Housing design allows for field upgrade of any available option
- HYDAC Stat-Free media is standard for all coalescing elements
- Pressure bypass indicator setting at 36 psi, with bypass valve cracking at 40 psi, allows for early indication before by-pass of filter for advanced time for maintenance
- In application >32°F (0°C) complete automation is achievable with fail-safe auto-drain feature using a remote 5 gallon (18L) or 20 gallon (75L) sump with alarm and auto shutdown

Applications

- Fleet fill or bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop or recirculation
- Point of use fuel dispensing

Technical Specifications

Flow Rating	Up to 16 gpm (60 L/min) for ULSD15
Inlet / Outlet Pressure	1 1/2" NPTF (standard), -16 (ORB) SAE J1926 (optional)
Max. Operating Pressure	150 psi (10 bar)
Min. Yield Pressure	450 psi (31 bar)
Rated Fatigue Pressure	90 psi (6 bar), per NFPA T2.6.1-2005
Temp. Range	32°F to 165°F (0°C to 74°C) (standard) and AWD option -20°F to 165°F (-29°C to 74°C) H (optional)
Bypass Indication	36 psi (2.5 bar) (lower indication options available)
Bypass Valve Cracking	40 psi (2.8 bar)
Porting Head/Cap: Element Bowl:	Aluminum (Coating Option - see Box 7) Steel - Epoxy paint w/high-phos electroless nickel plating (standard)
Filter Housing Weight	15 lbs (6.8 kg) (base unit w/o options or element)
Element Change Clearance	18" (457.2mm) (access from top, remove cap) 2.5" (63.5mm) (access from below, remove bowl)
Housing Sump	32 oz. (0.95 L)
Optional	External water sump and non-immersion heater (power 120VAC, 235W), sight glass, bracket, water in fuel sensor w/ or w/o remote mount light & 6 ft. lead

Note: Other electrical options, contact factory, element sold separately

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Model Code

ICF - V - P24 - L - B - S-I - EP-A - H - AWD5 -

Filter Series _____
ICF = In-line Coalescing Filter

Seals _____
V = FKM

Port Configuration _____
P24 = 1 1/2" NPTF (standard)
S16 = 1" SAE -16 Straight Thread O-ring Boss

Element Change Indicator _____
L = in cap bar indicator

Mounting Option _____
Omit = None
B = Bracket (Element top loading)
R = Bracket (Element bottom loading)

Sump Level Indicator Option* _____
Omit = None
S = Sight glass
I = Water in fuel sensor w/ remote light indicator & 6 ft. lead for use in factory supplied control panel
T = Water in fuel sensor w/o remote light for use in customer supplied control panel

Coating Option* _____
EP = Epoxy painting and plating (standard)
A = Anodized cap & head (optional)

Heating Option _____
Omit = None
H = Filter Sump Heater

Automatic Drain Option _____
Omit = None
AWD5 = Auto water drain 5 gal. tank w/failsafe (only offered for applications above 32°F (0°C) & units ordered w/o heater)
AWD20 = Auto water drain 20 gal. tank w/failsafe (only offered for applications above 32°F (0°C) & units ordered w/o heater)

Optional Sump for Manual Drain _____
Omit = None
S5 = 5 gal. sump tank
S20 = 20 gal. sump tank

Note: Unless automatic drain option is specified, ICF units will come standard with manual drain.

Coalescing element sold separately.

*Only Options that allow a combination.

Filter sump heater option only available when ordered w/out automatic water drain (AWD5 or AWD20)

AWD assembly is shown on next page

Element Water Coalescing Performance

Coalescing Element	Recommended Flow	Single Pass Water Removal Efficiency*
C184Z5V	16 gpm	> 99.5%*
C184Z3V		
C184Z7VE		Contact HYDAC for Economy Element Data

Flow Direction: Inside Out
Element Nominal Dimensions: 4.0" (102 mm) O.D. x 18.5" (470 mm) long

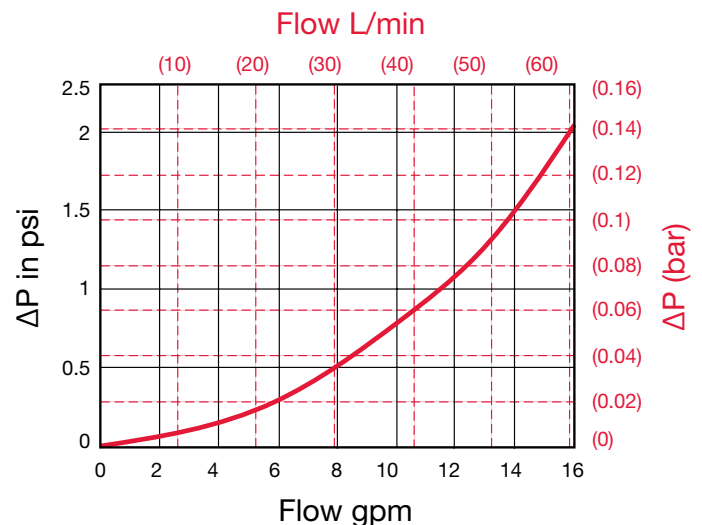
*HYDAC Stat-Free media is standard

Note: Efficiency based on ULSD15 with 27 Dynes/CM surface tension and 0.25% (2500 PPM) water injection. Discharge water concentration of <100 PPM free and emulsified water.

Fuel Oils

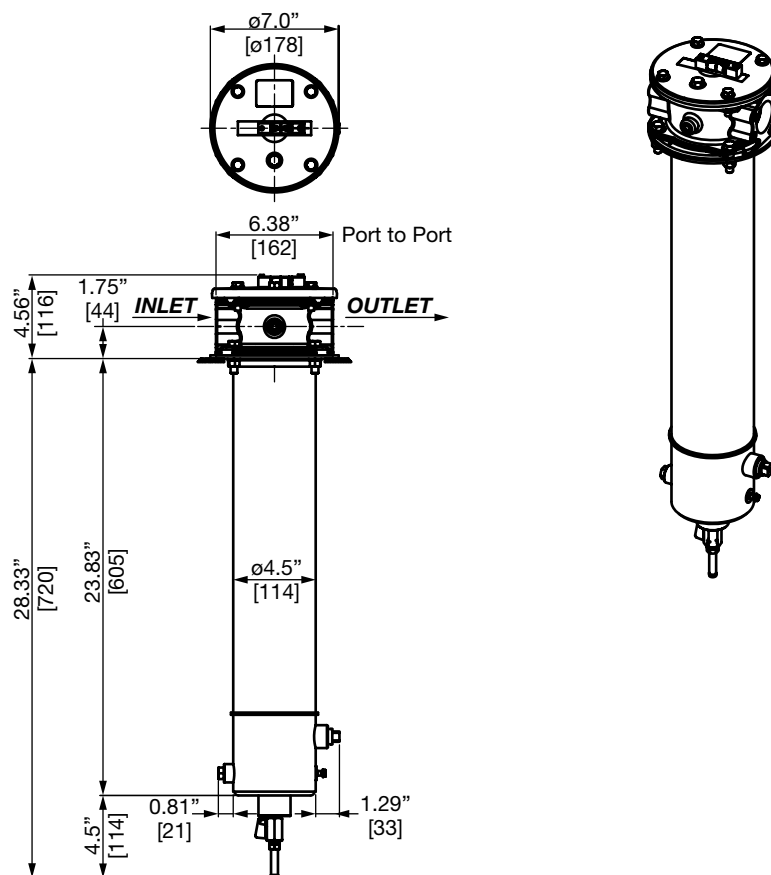
- ULSD15, low and high sulfur diesels
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil & heating oil

Pressure Drop



COALESCING FILTRATION

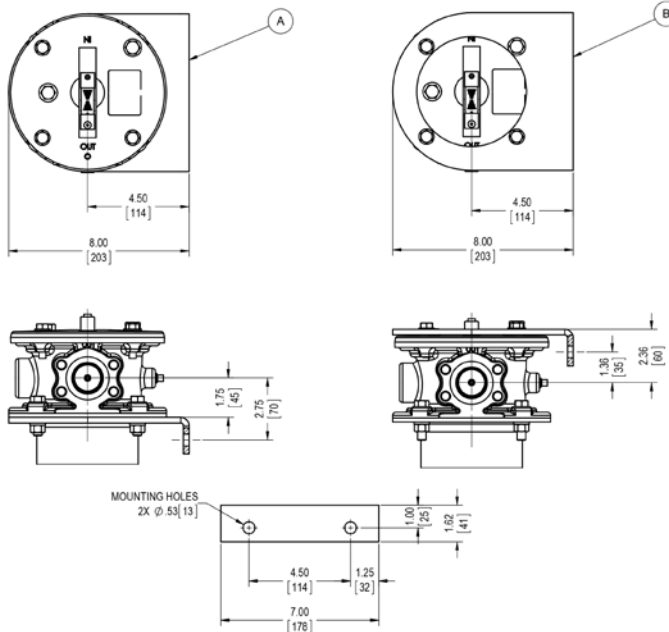
Dimensions ICF



Optional Brackets:

Element top loading Option
'B'

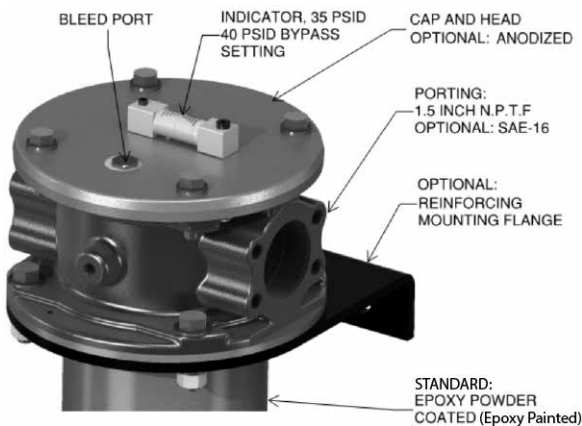
Element bottom loading Option
'R'



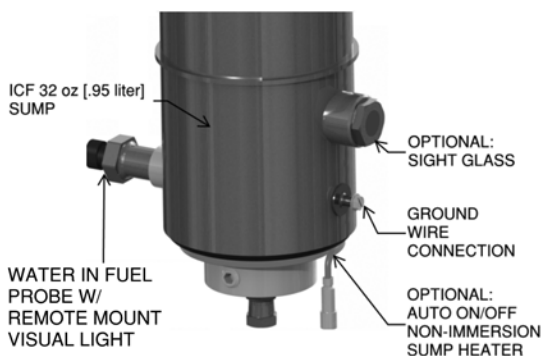
MOUNTING BRACKET HOLE DIMENSIONS

Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

ICF Options Filter Cap Assembly

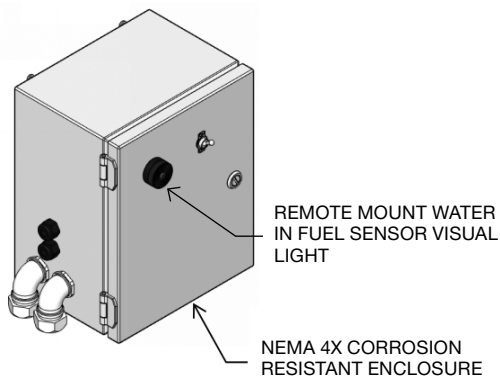


Reservoir Available Options



Note: Water in fuel sensor (WIF) supplied with or w/o remote mount indicator light to show full filter housing sump
 T Option = WIF sensor only w/out filter housing sump full indication light or control panel
 I Option = WIF sensor w/ remote mount filter housing sump full indicator light and NEMA 4X control panel supplied

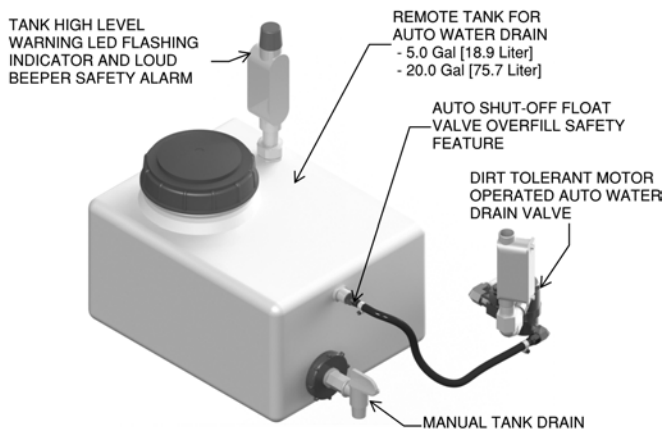
Automatic Drain w/ Redundant Safety Features



Notes: Filter Sump Heater Control Panel dimension:
 6.5" W x 5.5" H x 6.5" D
 (165 W x 140 H x 165 D)
 Automatic Water Drain Control Panel dimension:
 10" W x 8" H x 12" D
 (254 W x 203.20 H x 304.80 D)
 *For use above 32°F (0°C) only
 Electrical cable length (Control Panel to ICF): 4 ft.
 (1.22m)
 Hose length for Automatic Water Drain feature
 (ICF to Tank): 6 ft.(1.83m)
 All control panels "NEMA 4X" rated

Metric dimensions in ().

Automatic or Manual Remote Sump



Note: Remote Tank dimension:
 5 Gallon Tank: 22" W x 9.25" L x 7.125" H
 (558.80 W x 234.95 L x 180.97 H)
 20 Gallon Tank: 15" W x 11" L x 31" H
 (381 W x 279.40 L x 787.40 H)
 Power supply for tank high level LED light: 9 VDC (battery included) Supplied w/ 9 VDC terminal for customer wiring provided.

Metric dimensions in ().

COALESCING FILTRATION

GHCF Series

GeoSeal® High-Flow Coalescing Filter

150 psi • up to 25 gpm



Model No. of filter in photograph is:
GHCF5VS24VMRTH

Description

The GHCF is a high flow, compact coalescing filter for use where superior performance is needed in fuel transfer, kidney-loop, or dispensing applications. The filter assembly uses a patent-pending coalescing filter media along with the GeoSeal® element interface to ensure quality filtration with every replacement. The GHCF can be used alone to provide superior particulate and water removal, or in conjunction with a high efficiency particulate filter to provide additional performance with reduced maintenance costs.

Features

- Diesel fuel coalescing filter for dispensing, transfer or polishing filtration applications
- Uses patented GeoSeal® elements
- All-aluminum filter housing is fully compatible with diesel and biodiesel
- Minimal clearance needed for element service, ideal for enclosure installations
- Cartridge style element improves performance and reduces waste compared to spin-on solutions
- A compact design with reduced dimensions compared to similar cartridge filter and spin-on solutions on the market

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Technical Specifications

Flow Rating	Up to 25 gpm (95 l/min)
Max. Operating Pressure	150 psi (10.3 bar)
Min. Yield Pressure	2600 psi (179 bar)
Temperature Range	32°F to 225°F (0°C to 107°C) Standard; -20°F to 225°F (-29°C to 107°C) Heater Option
Bypass Setting	40 psi (2.8 bar)
Porting Head Element Case Sump	Cast Aluminum, Anodized Aluminum, Anodized Cast Aluminum, Anodized
Weight GHPF	19.45 lbs. (8.82 kg)
Element Change Clearance	4.5" (114 mm)

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Model Code

GHCF - CG5 - V S24 VM - R

Filter Series

GHCF = GeoSeal® High-Flow Coalescing Filter

Coalescing Filtration

CG5 = C125GZ5V Coalescing Element

Sealing Material

V = Fluorocarbon Elastomer (FKM)

Bypass Setting

Omit = 40psid

Inlet Port

S24 = SAE-24

P24 = 1.5" NPTF

Indicator Options

VM = Visual pop-up with manual reset

Indicator Orientation

R = Right side

L = Left side

Sump Options

Omit = Sight Glass (standard)

U = Downstream test point

T = WIF Sensor Only

I = WIF Sensor with Indicator Lamp

H = Sump Heat (74W)

AWD5 = Auto Water Drain with 5 gallon Collection Tank

AWD20 = Auto Water Drain with 20 gallon Collection Tank

Element Performance Information

Coalescing Element	Pressure Side Coalescing	
	Recommended Flow	Single Pass Water Removal Efficiency
C125GZ5	25 gpm	≥ 95%

Flow Direction: Inside Out
 Element Nominal Dimensions: 5.0" (127 mm) O.D. x 12" (305 mm) long

*Element Collapse Rating 150 psid (10.3 bar) for standard and non-bypassing element

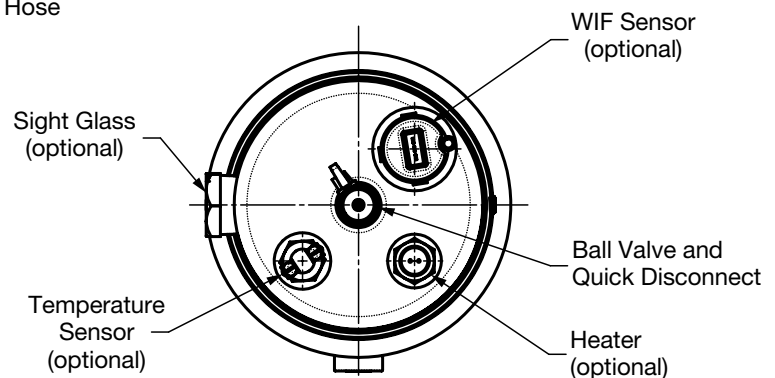
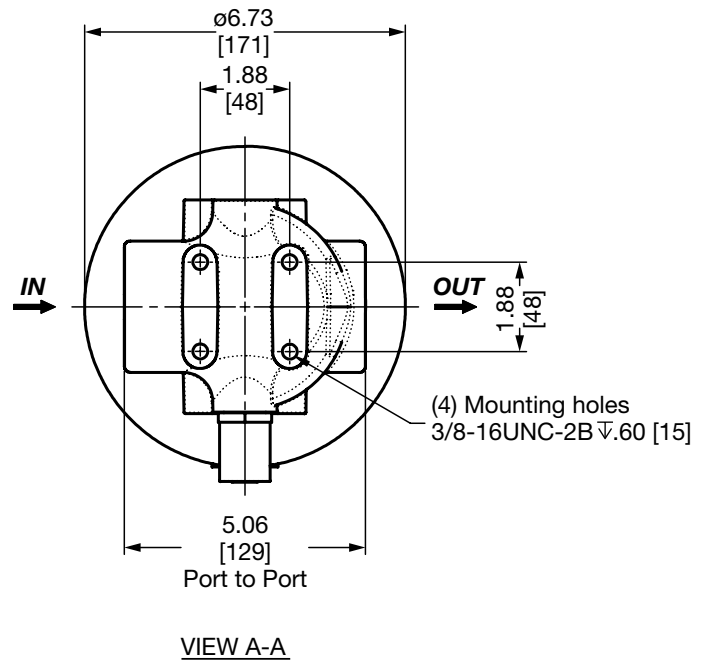
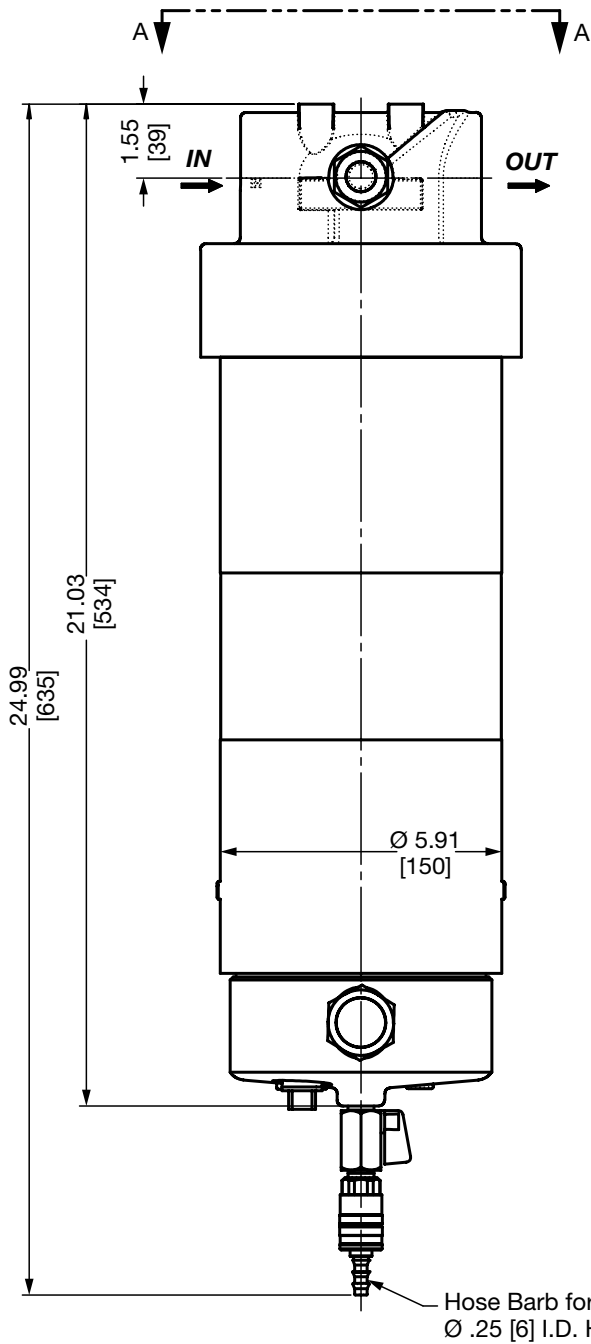
Note: Efficiency based on ULSD15 with 27 Dynes/CM surface tension and 0.25% (2500 PPM) water injection. Discharge water concentration of <100 PPM free and emulsified water.

Fuel Compatibility

- Diesel Fuel and Biodiesel (B100).
- For other Distillate Petroleum, Contact Factory.

COALESCING FILTRATION

Dimensions GHCF



Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

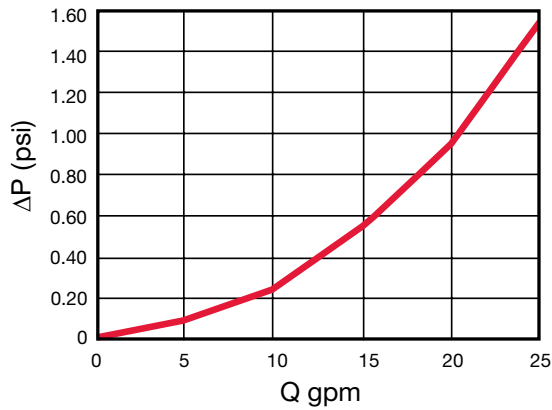
$$\text{Assembly } \Delta P = \text{Housing } \Delta P + \text{Element } \Delta P$$

Housing Curve

Pressure loss through housing is as follows:

$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Housing Pressure Drop GHCF



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{37 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

$$C125GZ5V = 0.09$$

COALESCING FILTRATION

QCF Series

Bulk Diesel Fuel Coalescing Filter

100 psi • up to 70 gpm



Model no. of filter
in photograph is:
QCFC5VS24VM

Description

Application Introduction:

The Reason for Better Bulk Fuel Filtration:

Advances in diesel engine fuel injection systems have been instrumental in complying with future emission standards. Higher pressure fuel injectors produce a finer mist of fuel, which burns cleaner. Common rail injection systems run at higher pressures and allow more injections per combustion cycle improving fuel economy, engine performance with lower noise. Higher pressure fuel injector systems have tighter tolerances and require the highest efficiency, single-pass particulate and water removal to minimize wear related failures.

Features

- Patent-pending, three-phase, particulate and fuel/water separation media technology
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today's ultra-low sulfur diesel (ULSD) fluids
- Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the bulk fuels tanks to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today's ULSD fluids
- Complete automation is achievable with fail-safe auto-drain feature using a remote 5 gallon (18L) or 20 gallon (75L) sump with alarm and auto shutdown in application above 32°F (0°C)

Technical Specifications

Flow Rating	Up to 70 gpm (265 l/min) for ULSD15
Inlet/Outlet Connection	-24 (ORB) SAE J1926
Drain Connection Upper	1/4" NPT Ball Valve
Drain Connection Lower	1/4" NPT Ball Valve
Max. Operating Pressure	100 psi (7 bar)
Min. Yield Pressure	400 psi (27.6 bar) without sight glass
Rated Fatigue Pressure	Contact Factory
Temperature Range	32°F to 165°F (0°C to 74°C) (standard) -20°F to 165°F (-29°C to 74°C) (with optional sump heater)
Bypass Indication	25 psi (1.7 bar) (Lower indication options available)
Bypass Valve Cracking	30 psi (2 bar)
Materials of Construction	Porting Base: Anodized Aluminum Element Bowl: Epoxy Paint w/ High-phos Electroless Nickel Plating (Standard) Cap: Nickel Coated Ductile Iron
Weight	155 Lbs. (77 kg)
Element Change Clearance	33.8" (858 mm)

Note: Element is sold with housing

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Model Code

QCF - C - 5 - V - S24 - VM - S

Filter Series

QCF = High Flow Coalescing Filter

Element Series

C = Coalescing

Element Media

5 = 5 µm High Efficiency Coalescing

Sealing Material

V = Fluorocarbon Elastomer (FKM)

Port Configuration

S24 = 1 1/2" SAE -24 Straight Thread O-ring Boss

Element Change Indicator

VM = Visual Pop-Up w/ Manual Reset

Options

Omit = None

S = Sight Glass

H = Filter Sump Heater, 120 VAC 60 Hz Single Phase

AWD5 = Auto water drain 5 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)

AWD20 = Auto water drain 20 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)

Note: Optional AWD's for use only >32° F (0°C)

Element Water Coalescing Performance

Coalescing Element	Pressure Side Coalescing	
	Max Flow	Single Pass Efficiency
C396Z5V	70 gpm	> 99.5%

Note: Based on ULSD15 with 27 Dyne/cm surface tension and 0.25% (2500 PPM) water injection

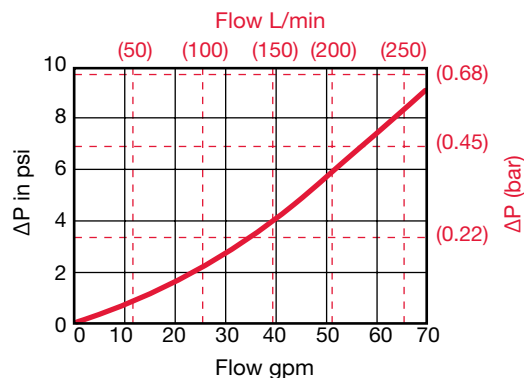
Flow Direction: Inside Out

Element Nominal Dimensions: 6.4" (163mm) x 39.4" (1001mm) long

Fuel Oils

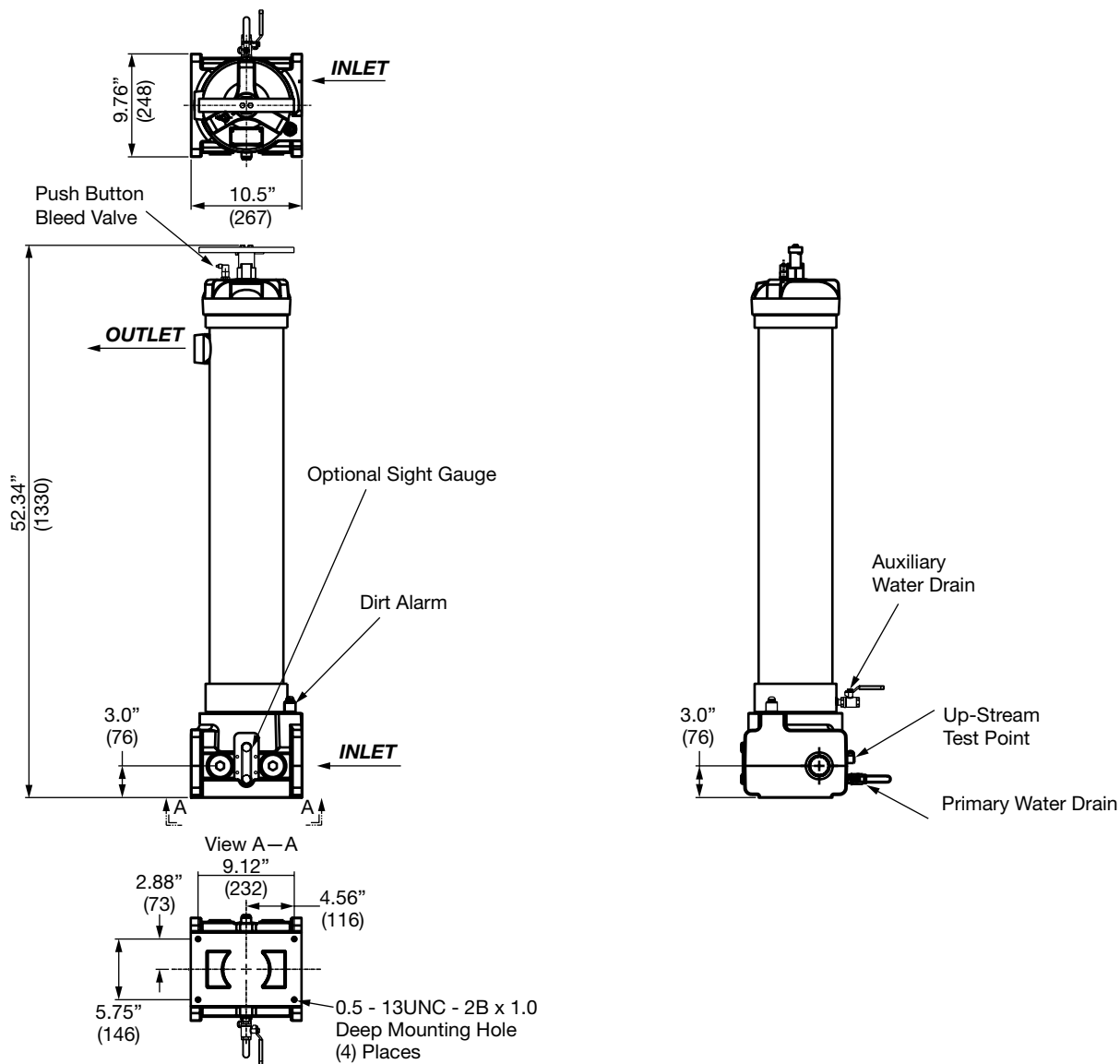
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Pressure Drop QCF



COALESCING FILTRATION

Dimensions QCF



Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

LVHCD Series

High Flow | Low Viscosity Housing Coalescer
150 psi • up to 211-476 gpm



Model no. of filter in photograph
is: LVHCD440NVBTFZZA

Features

- Excellent filtration performance in a single pass
- Low pressure loss due to innovative element technology
- Easy to service thanks to intelligent element design
- The Low Viscosity-Housing Coalescer LVH-C is mainly used for dewatering of diesel, making it especially suitable for applications with large amounts of water that need to be removed in just a single pass
- The Optimicron® filter elements used ensure that both the required cleanliness and long service life are achieved.
- Available in various sizes, the filters can be optimally integrated into new or existing systems.
- The filters are designed according to the ASME Code Section VIII rules and regulations for pressure vessels as well as the ability to certify to other global standards upon request.

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets

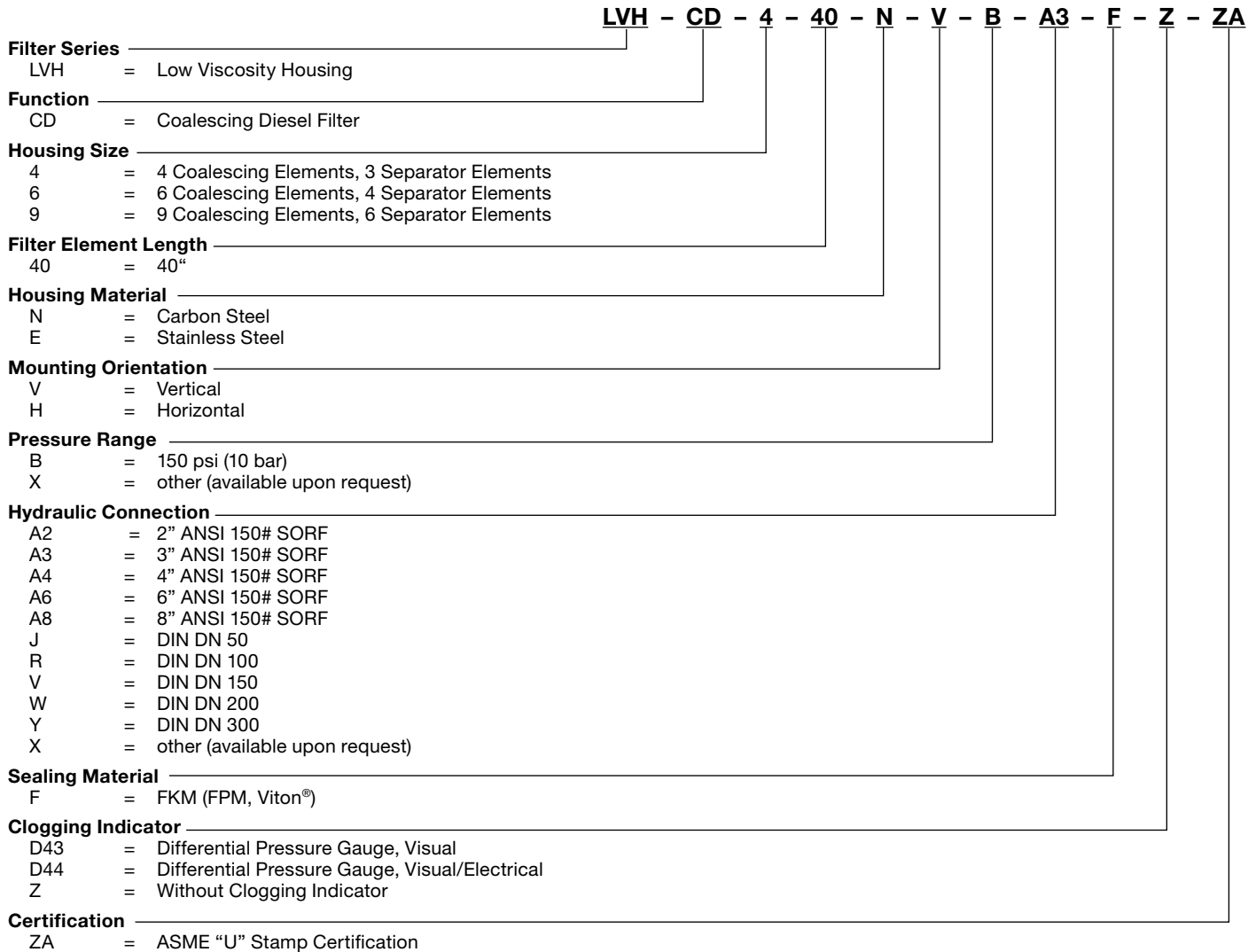
- Industrial
- Bulk Fuel Filtration
- Marine
- Mining Technology
- Agriculture
- Power Generation

Technical Specifications

Flow Rating	211-476 gpm (799-1802 L/min)
Inlet/Outlet Connection	ANSI 150#: 2"-12" DIN: DN50-DN300
Max. Operating Pressure	150 psi (10 bar)
Max. Ambient Temperature	122°F (50°C)
Max. Operating Temperature	122°F (50°C)
Material Housing	Stainless Steel or Carbon Steel

COALESCING FILTRATION

Model Code

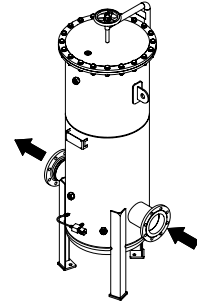
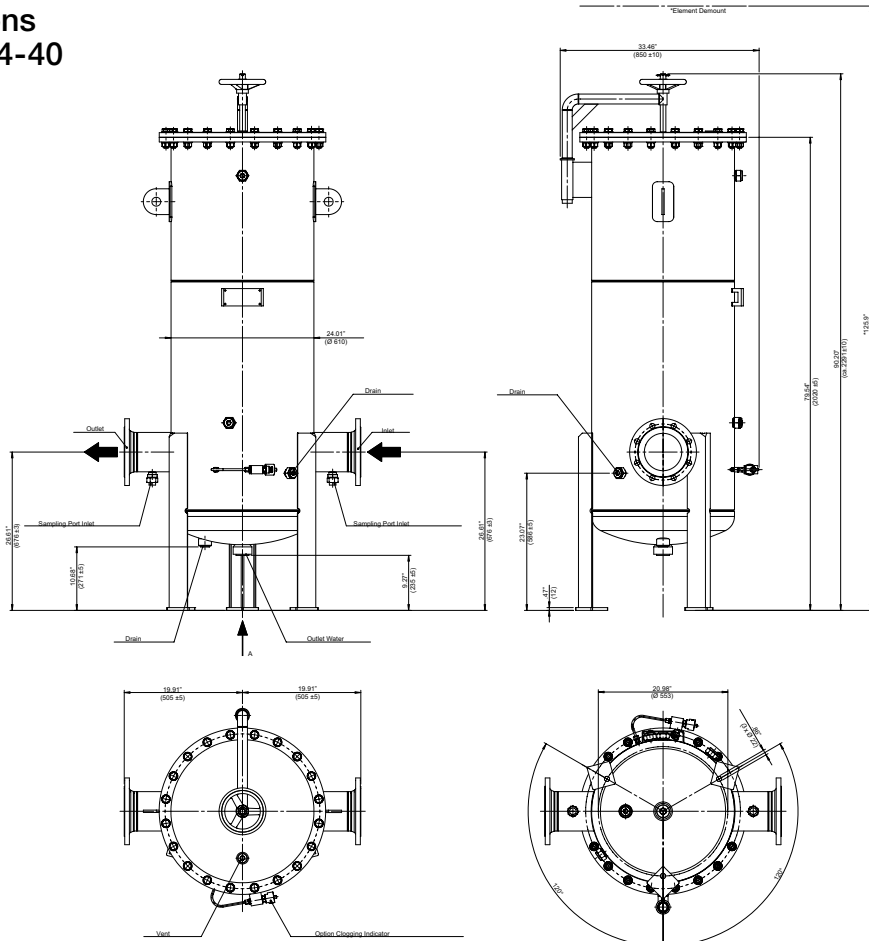


Notes: Filter elements must be ordered separately and installed before initial operation on site

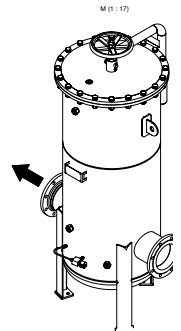
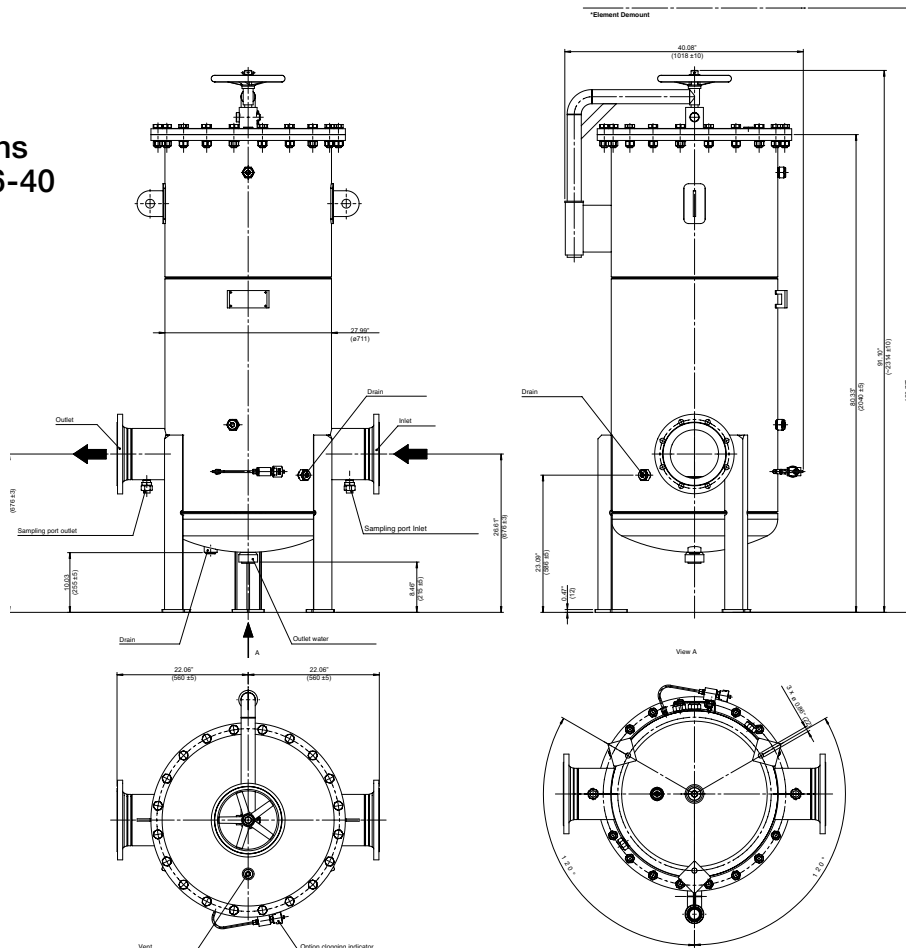
Fuel Oils

- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Dimensions LVH-CD-4-40



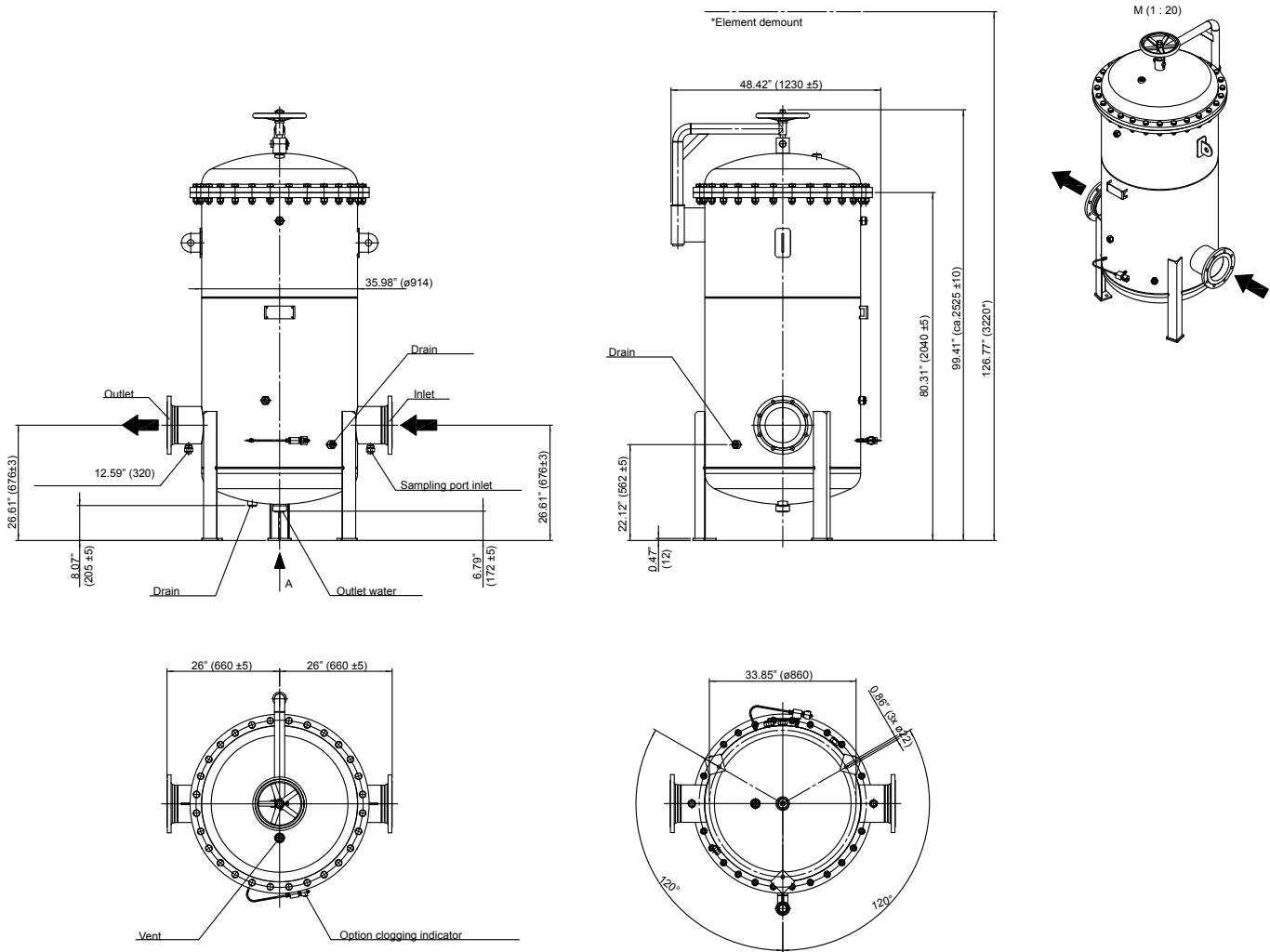
Dimensions LVH-CD-6-40



Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

COALESCING FILTRATION

Dimensions LVH-CD-9-40



Filter Calculation

Filter Size (Model)	Maximum Flow Rate	Number of Coalescing Elements	Number of Separator Elements
LVH-CD-4 40	211 gpm	4 pc.	3 pcs.
LVH-CD-6 40	317 gpm	6 pcs.	4 pcs.
LVH-CD-9 40	476 gpm	9 pcs.	6 pcs.

Filter Element Selection

Element	Model Code	Part No.
Separation Element 30"	N32ON-DSZ-SA80F	3910259
Coalescing Element 40"	N42ON-DCZ-CA60F	3910257

Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

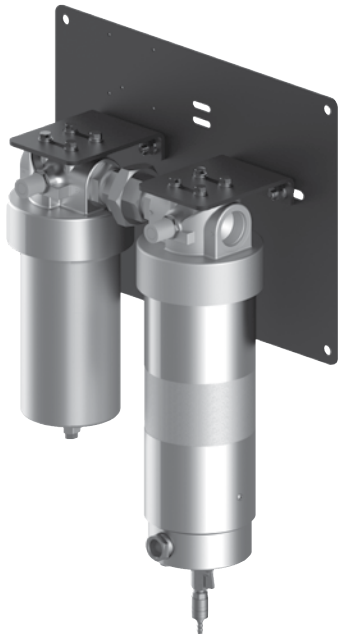
D Particulate & Coalescing

PARTICULATE & COALESCING

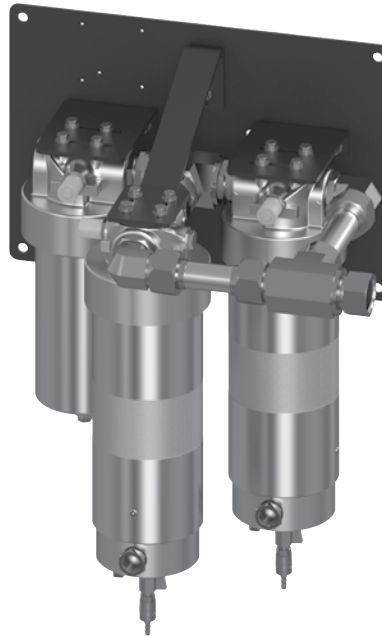
BDF1 & BDF2 Series

Bulk Diesel Filter

150 psi • up to 25 - 50 gpm



Model no.
BDF1G03CG5VVM



Model no.
BDF2G03CG5VVM

Features and Benefits

- Designed with integrated particulate removal pre-filtration for maximum coalescing filter element life in the down stream housing
- Updated BDF design incorporates GHPF and GHCF filter housings for a reduced cost, improved function, and increased capacity
- Fuel dispensing and transfer filtration solution with choice of integral or blocked bypass to suit application
- Routine element change is only needed on the particulate filter which saves time and money
- Particulate filtration at 1 or 3 microns utilizing element for contamination control
- Optional electrical with amber colored particulate element change indicator light
- Patented, three-phase, particulate and fuel/water separation media technology and GeoSealR element sealing interface ensure quality performance with every element replacement
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today's ultra-low sulfur diesel (ULSD) fluids
- Protects expensive engine components against failures caused by particulate and water transferred from the bulk fuel tank to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today's ULSD fluids
- HYDAC Stat-Free media is standard for all coalescing elements
- Bypass indication at 35 psi, with bypass cracking at 40 psi, allows for early indication before bypass of filter for advanced time for maintenance
- Complete automation is achievable with a HYDAC Stat-Free® media sensor and auto-drain feature using a remote 5 gallons (18L) or 20 gallons (75L) sump with alarm and auto shutdown, in application >32°F (0°C)
- Easy mounting and element service

Technical Specifications

Flow Rating	BDF1: up to 25 gpm (95 L/min) BDF2: up to 50 gpm (189 L/min)	
Inlet/Outlet Connection	-24 (ORB) SAE J1926	
Max. Operating Pressure	150 psi (10 bar)	
Temperature Range	-20°F to 225°F (-29°C to 107°C) w/ optional water sump heater 32°F to 225°F (-29°C to 107°C) standard with AWD options	
	Particulate Filter	Coalescing Filter
Bypass Indication	35 psi (2.4 bar)	36 psi (2.5 bar)
Bypass Valve Cracking	40 psi (2.8 bar)	40 psi (2.8 bar)
Materials of Construction	Porting Head: Cast Aluminum, Anodized Element Case: Aluminum, Anodized	Porting Head: Cast Aluminum, Anodized Element Case: Aluminum, Anodized Sump: Cast Aluminum, Anodized
Element Change Clearance	2" (51 mm)	4.5" (114 mm)
Weight	BDF1: 46.5 lbs; BDF2: 89 lbs	
Optional Water Sump Heater	120VAC, BDF1: 1 x 74W / BDF2: 2 x 74W	
Optional Remote Mount Visual Electrical Indicator	120VAC	

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Model Code

BDF - 1 - G01 - X - CG5 - X - V - VM -

Filter Series

BDF = Bulk Diesel Filter

Flow Rate

1 = 25 gpm
2 = 50 gpm

Particulate Filtration

G01 = 1 μ m
G03 = 3 μ m

Particulate Bypass

(omit) = 40 psi
X = Blocked Bypass

Coalescing Filtration

CG5 = C125GZ5V Coalescing Element

Coalescing Bypass

(omit) = 40 psi
X = Blocked Bypass

Sealing Material

V = Fluorocarbon Elastomer (FKM)

Particulate Element Change Indicator

VM = Visual Pop-Up w/ Manual Reset (standard)

Options

(omit) = Included sight glass and manual water drain valves
U = Downstream test point
T = Water-In-Fuel (WIF) (sensor only)
I = WIF sensor w/ remote mount light indicator
H = Coalescing sump heater
S5 = 5 gal. remote tank
S20 = 20 gal. remote tank
AWD5 = Auto water drain w/ 5 gal. remote tank
AWD20 = Auto water drain w/ 20 gal. remote Tank

Note: Unless automatic drain option is specified, BDF units will come standard with manual drain.

Element Particulate Performance

Element	DHC (gm)	Filtration Ratio Per ISO 16889 Using APC calibrated per ISO 11171	
		$\beta_x(c) \geq 200$	$\beta_x(c) \geq 1000$
5.40.11 D 01 BN4 /-V-G	172	<4.0	4.5
5.40.11 D 03 BN4 /-V-G	148	4.6	5.8

Element Water Coalescing Performance

Element	Pressure Side Coalescing	
	Recommended Flow	Single Pass Water Removal Efficiency
C125GZ5	25 gpm	$\geq 95\%$

Particulate Element

Flow Direction: Outside In
Element Nominal Dimensions: 5.0" (27 mm) O.D. x 11" (279 mm) L

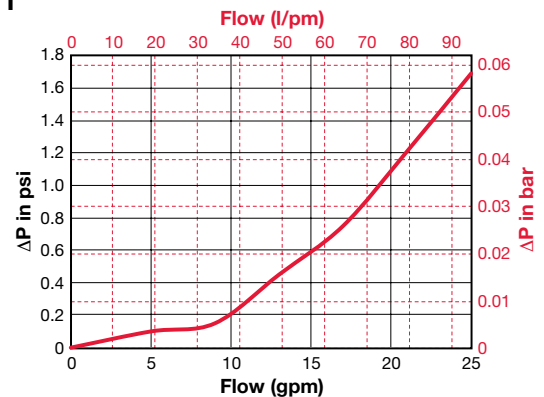
Coalescing Element

Flow Direction: Inside Out
Element Nominal Dimensions: 5.0" (27 mm) O.D. x 12" (305 mm) L

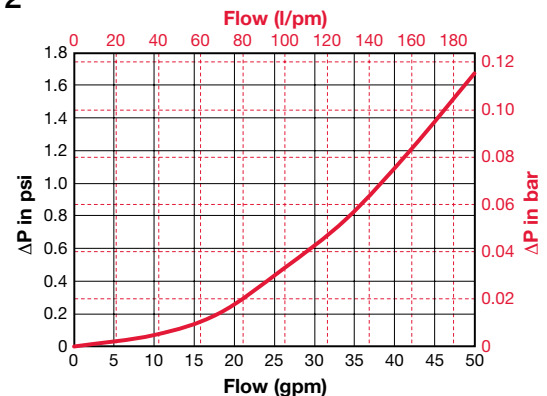
Fuel Oils

- ULSD15 and similar petroleum diesels
- Biodiesel and blends
- Synthetic diesel and blends

Pressure Drop BDF1

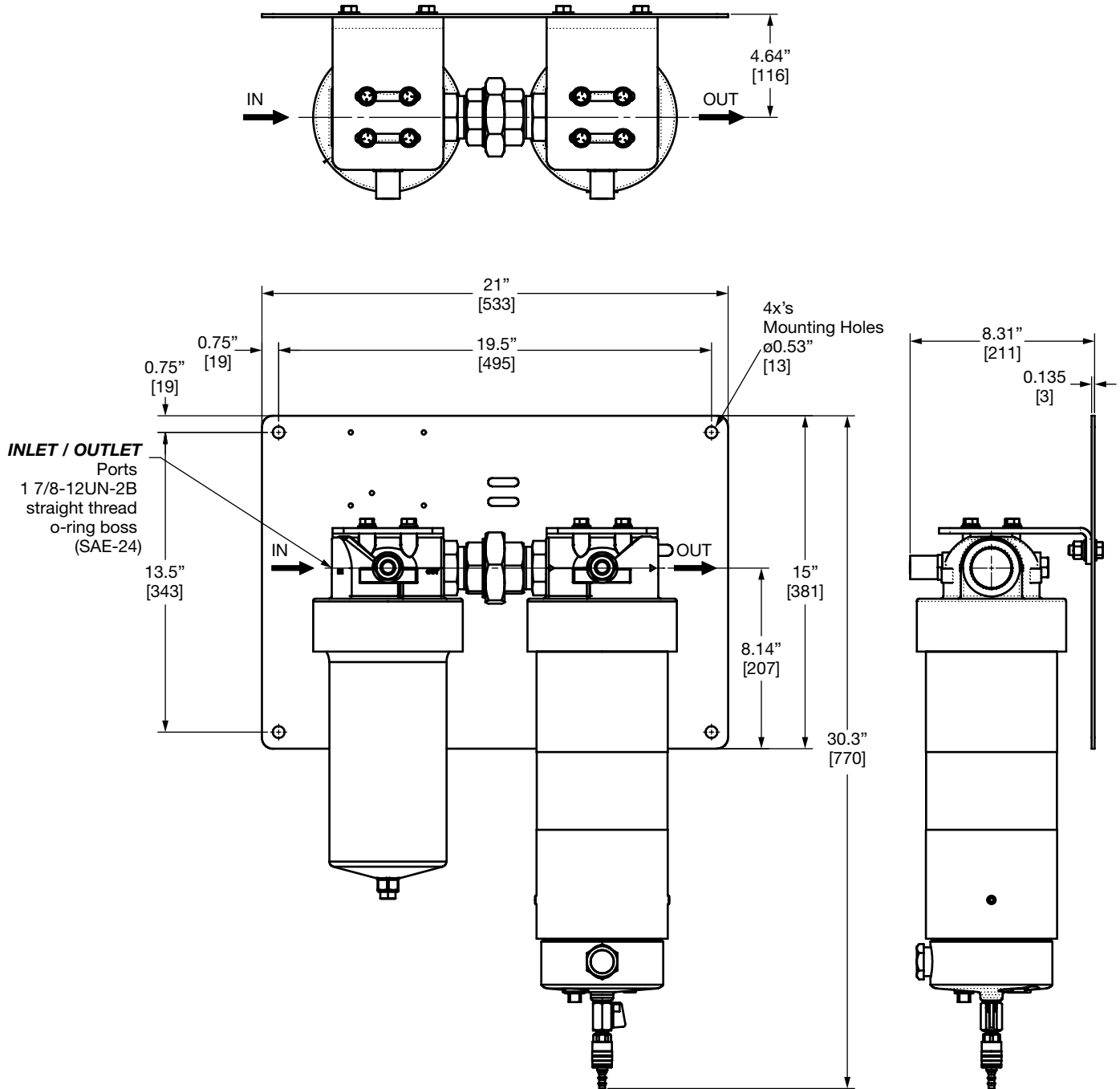


BDF2



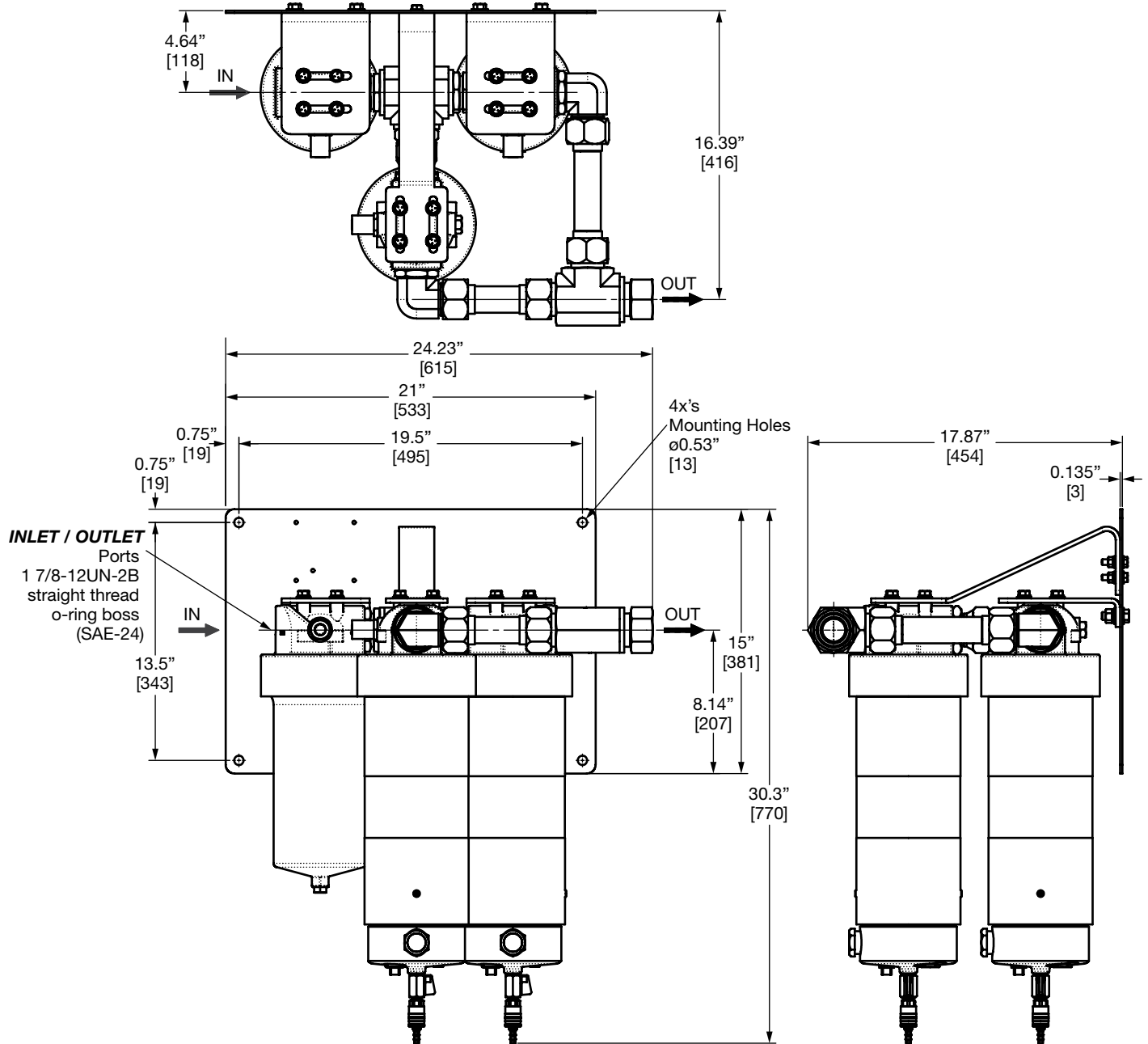
PARTICULATE & COALESCING

Dimensions BDF1



Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

Dimensions BDF2



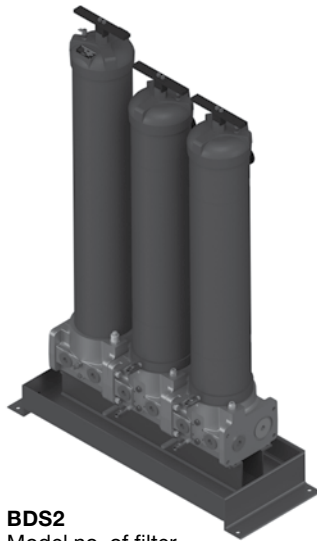
Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

BDS Series

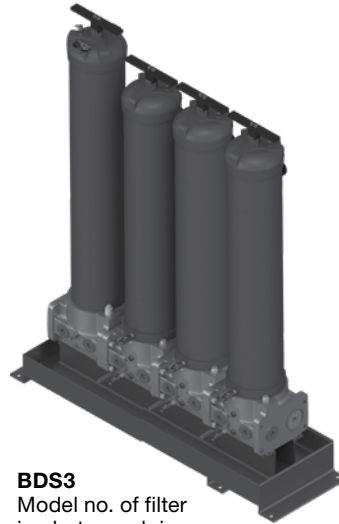
Bulk Diesel Fuel Skid/ Bulk Diesel Multi-Skid
100 psi • up to 70-280 gpm



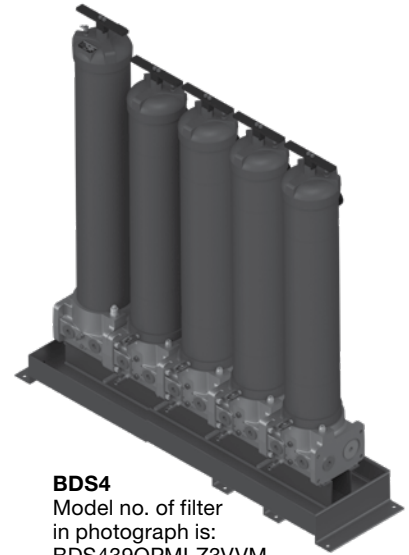
BDS1
Model no. of filter
in photograph is:
BDS39QPMLZ3VVM



BDS2
Model no. of filter
in photograph is:
BDS239QPMLZ3VVM



BDS3
Model no. of filter
in photograph is:
BDS339QPMLZ3VVM



BDS4
Model no. of filter
in photograph is:
BDS439QPMLZ3VVM

Features

- Designed with integrated particulate removal pre-filtration for maximum coalescing filter element life in the downstream housing
- Sized for high flow or highly contaminated fluid applications
- Routine element change is only needed on Pre-filter (the particulate filter) which saves time and money
- Patent-pending, three-phase, particulate and fuel/water separation media technology
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today's ultra-low sulfur diesel (ULSD) fluids
- Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the bulk fuel tank to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Previously acceptable industry standard products no longer provide the high-efficiency separation needed in today's ULSD fluids
- In applications >32°F (0°C) complete automation is achievable with a water in fuel sensor and fail-safe auto-drain feature using a remote 5 gallons (18L) or 20 gallons (75L) sump with alarm and auto shutdown
- HYDAC Stat-Free media is standard for all coalescing elements

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Technical Specifications

Flow Rating	BDS1: Up to 70 gpm (265 l/min) for ULSD15 BDS2: Up to 140 gpm (530 l/min) for ULSD15 BDS3: Up to 140 gpm to 210 gpm (530 to 795 l/min) for ULSD15 BDS4: From 210 gpm to 280 gpm (795 to 1060 L/min) for ULSD15	
Inlet/Outlet Connection	BDS1: -24 (ORB) SAE J1926 BDS2, BDS3, BDS4: -32 (ORB) SAE J1926	
Drain Connection Upper	1/4" NPT Ball Valve	
Drain Connection Lower	1/4" NPT Ball Valve	
Max. Operating Pressure	100 psi (7 bar)	
Min. Yield Pressure	400 psi (27.6 bar) without sight glass <i>(Contact factory for use with sight gauge)</i>	
Rated Fatigue Pressure	Contact Factory	
Temperature Range	-20°F to 165°F (-29°C to 74°C) <i>(standard)</i> 32°F to 165°F (0°C to 74°C) <i>(with optional sight gauge or AWD option)</i>	
Bypass Indication: (Lower indication options available)	Particulate Filter Particulate: 15 psi (1.03 bar)	Coalescing Filter Coalescing: 25 psi (1.7 bar)
Bypass Valve Cracking	Particulate Filter Particulate: 20 psi (1.37 bar)	Coalescing Filter Coalescing: 30 psi (2 bar)
Materials of Construction	Particulate Filter Porting Base: Anodized Aluminum Element Bowl: Epoxy Paint w/ High-phos Electroless Nickel Plating (Standard) Cap: Plated Steel	Coalescing Filter Porting Base: Anodized Aluminum Element Bowl: Epoxy Paint w/ High-phos Electroless Nickel Plating (Standard) Cap: Plated Steel
Weight	BDS1: 441 lbs (200 kg) BDS2: 596 lbs. (270 kg) BDS3: 751 lbs. (341 kg) BDS4: 906 lbs. (411 kg)	
Element Change Clearance	33.8" (858 mm)	

*Note: Elements are sold with the housing

PARTICULATE & COALESCING

Model Code

BDS - 4 - Q3 - V - VM -

Filter Series

BDS = Bulk Diesel Skid

Number of Coalescing Filters

Omit = 1 Coalescing Filter at 70 gpm
 2 = 2 Coalescing Filter at 140 gpm
 3 = 3 Coalescing Filter at 210 gpm
 4 = 4 Coalescing Filter at 280 gpm

Particulate Filtration Rating

Q1 = 1 µm
 Q3 = 3 µm

Sealing Material

V = Fluorocarbon Elastomer (FKM)

Element Change Indicator

VM = Visual Pop-Up w/ Manual Reset

Options

Omit = None
 S = Sight Glass
 H = Filter Sump Heater, 120 VAC 60 Hz Single Phase
 AWD5* = Auto water drain 5 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)
 AWD20* = Auto water drain 20 gal. tank w/failsafe valve (only offered for applications above 32°F (0°C) and units ordered without heater)

*Note: Optional and AWD's for use only >32° F (0°C)

Element Particulate Performance

Particulate Elements	Filtration Ratio Per ISO 16889 Using automated particle counter (APC) calibrated per ISO 11171		
	DHC	$\beta_x(c) \geq 200$	$\beta_x(c) \geq 1000$
1.14.39D01ECON2 / -V	1259 grams	<4.0	4.2
1.14.39D03ECON2 / -V	1293 grams	<4.0	4.8

Element Water Coalescing Performance

Element	Pressure Side Coalescing	
	Max Flow	Single Pass Water Removal Efficiency
C396Z5V	70 gpm	≥ 99.5%

Flow Direction: Inside Out

Element Nominal Dimensions: ø6.4" (ø163mm) x 39.4" (1001mm) long

Note: Based on ULSD15 with 27 Dyne/cm surface tension and 0.25% (2500 PPM) water injection

Particulate Element

Flow Direction: Outside In
 Element Nominal Dimensions: 6.0" (150 mm) O.D. x 37.80" (960 mm) long

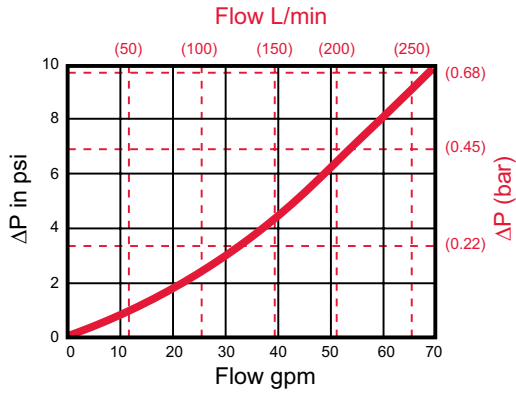
Coalescing Element

Flow Direction: Inside Out
 Element Nominal Dimensions: 6.4" (163 mm) O.D. x 39.4" (1001 mm) long

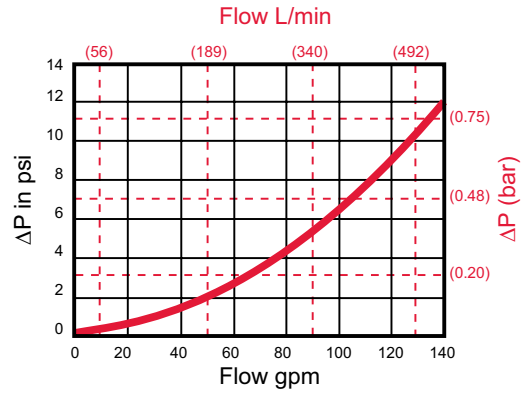
Fuel Oils

- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Pressure Drop BDS1

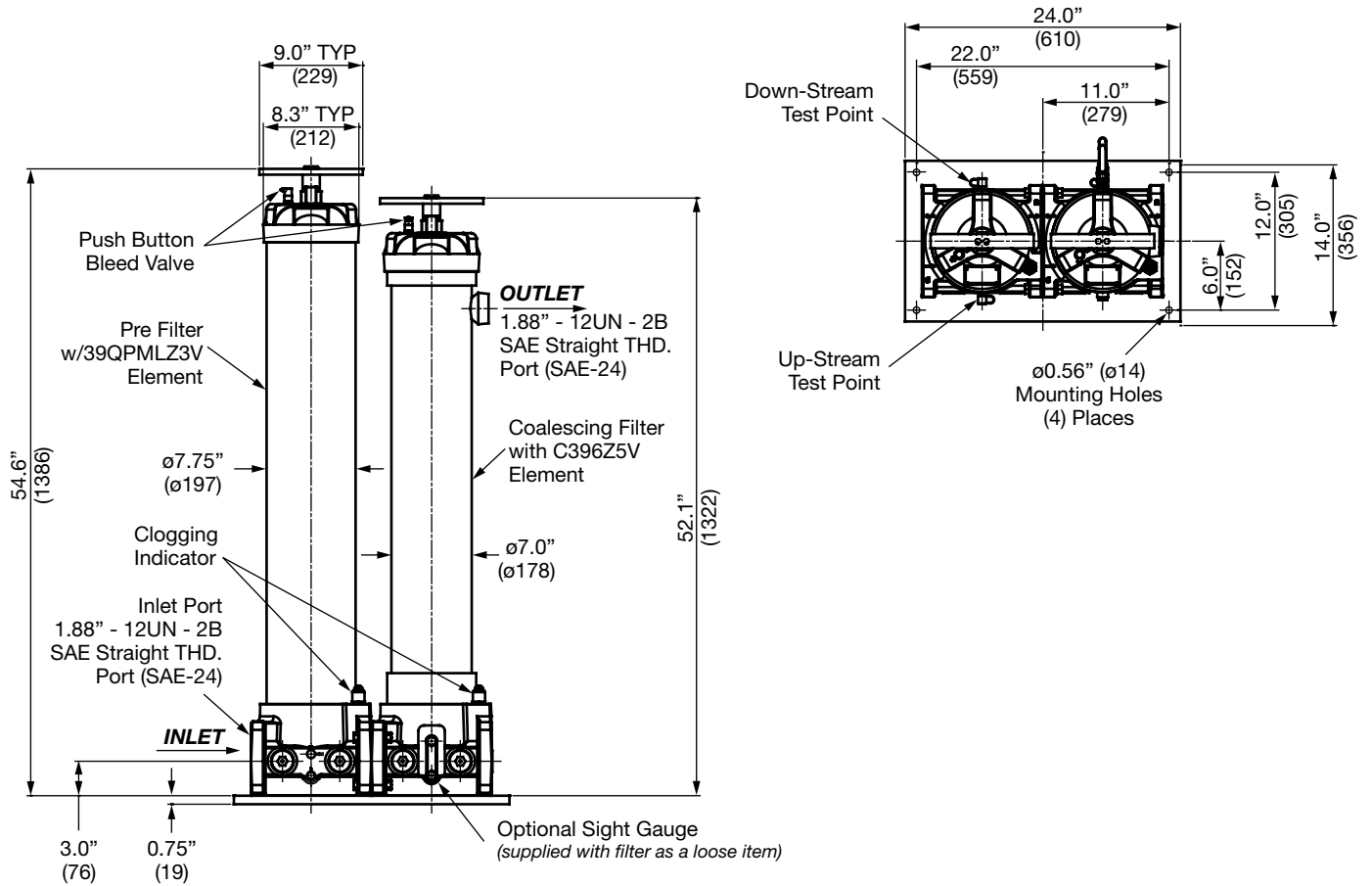


BDS2



Note: For BDS3 and BDS4 pressure curve information, contact factory.

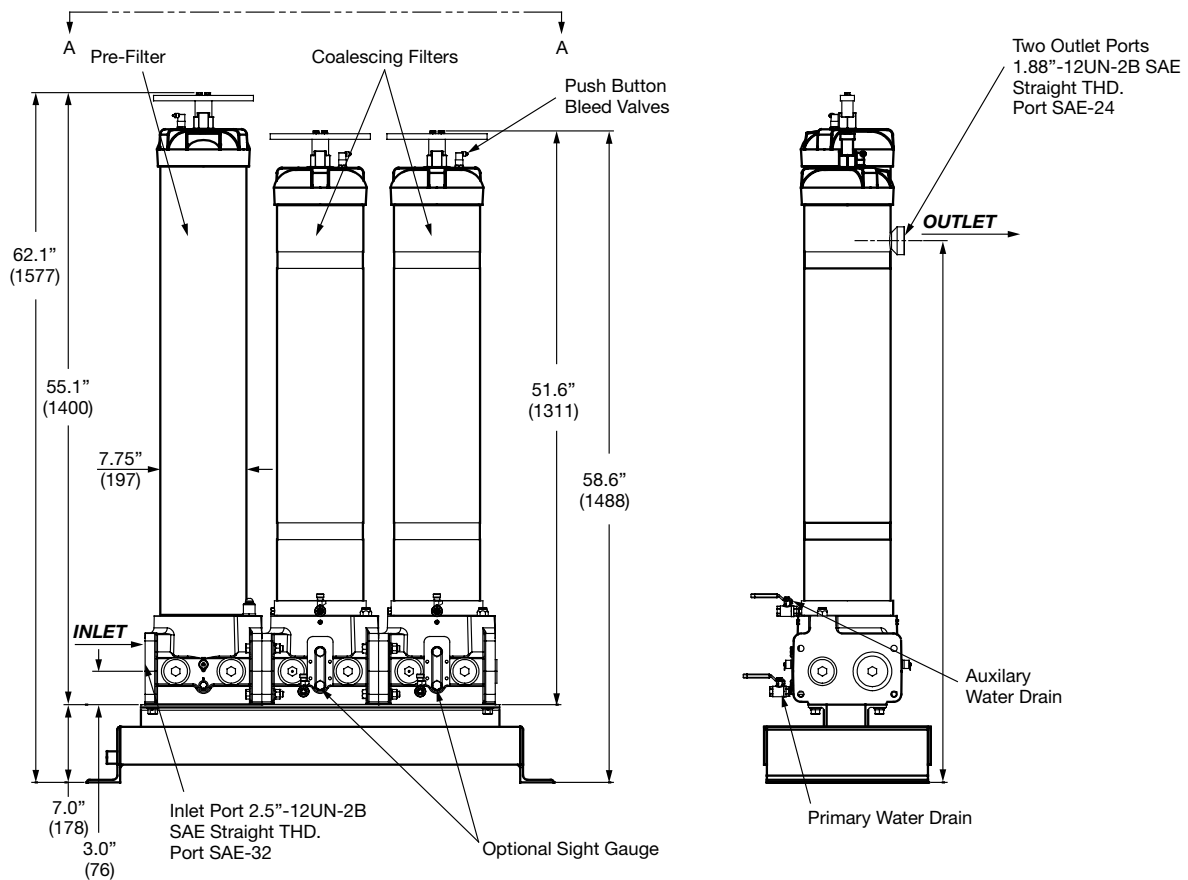
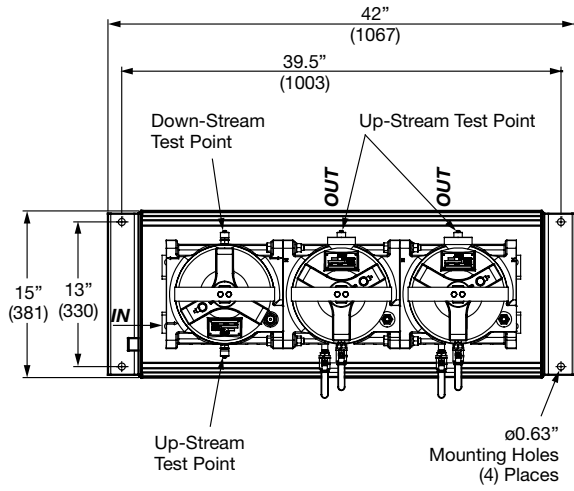
Dimensions BDS1



Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

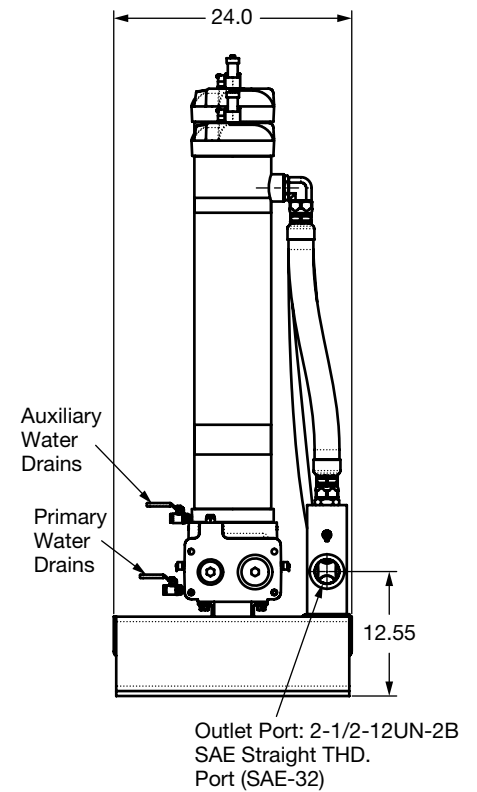
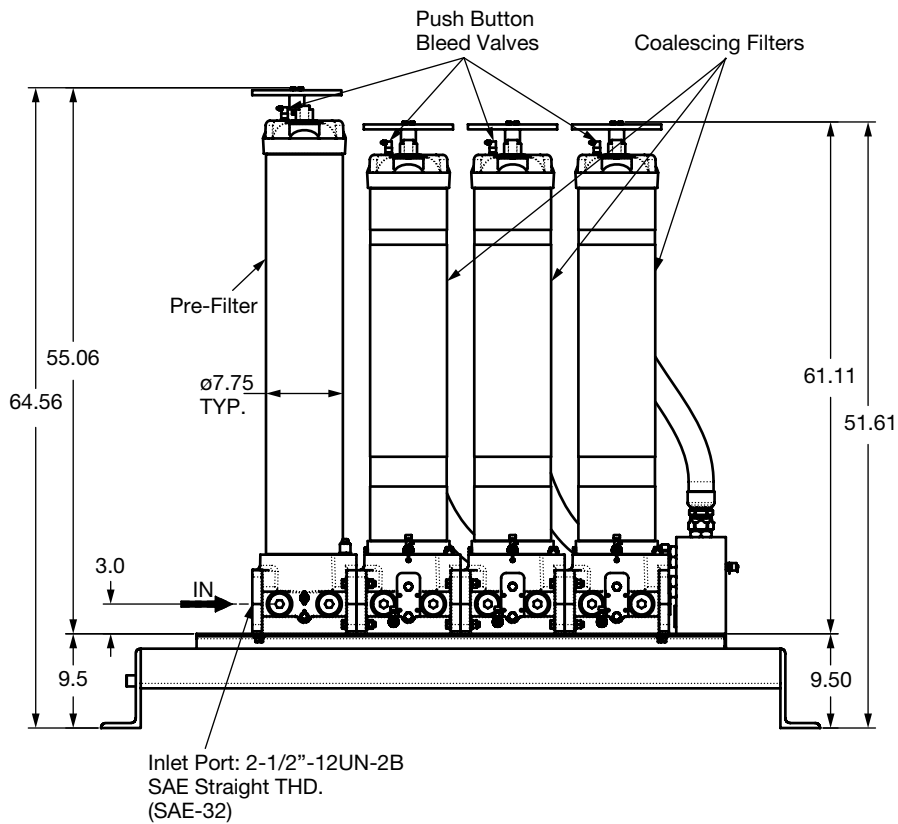
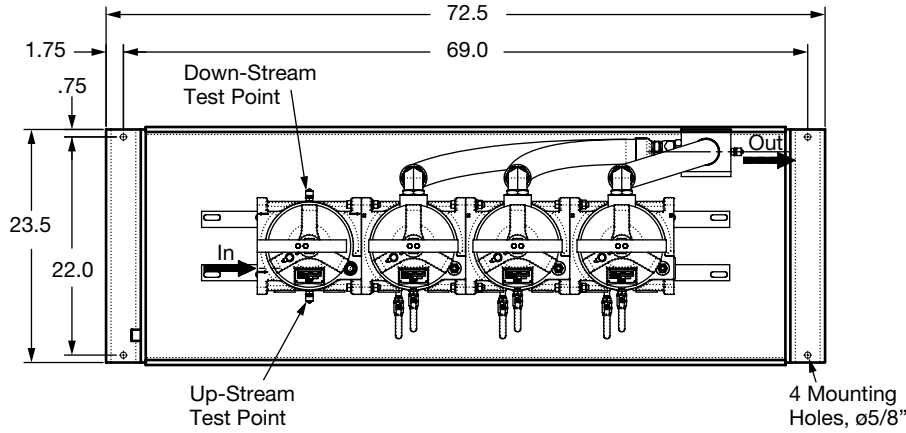
PARTICULATE & COALESCING

Dimensions BDS2



Dimensions shown are inches (mm) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

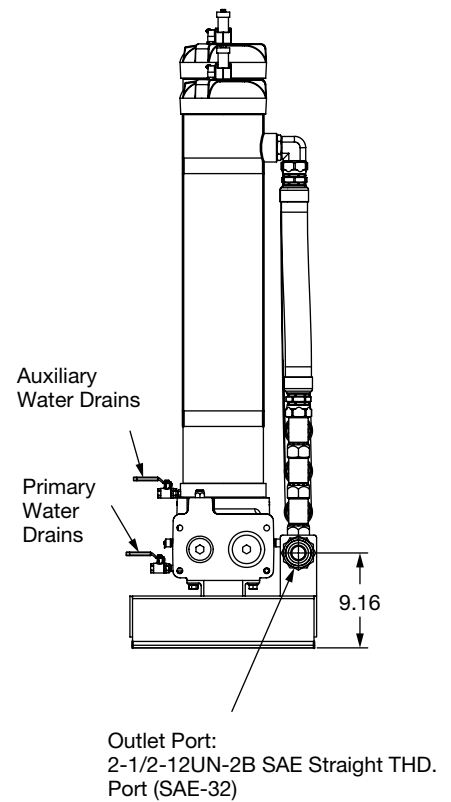
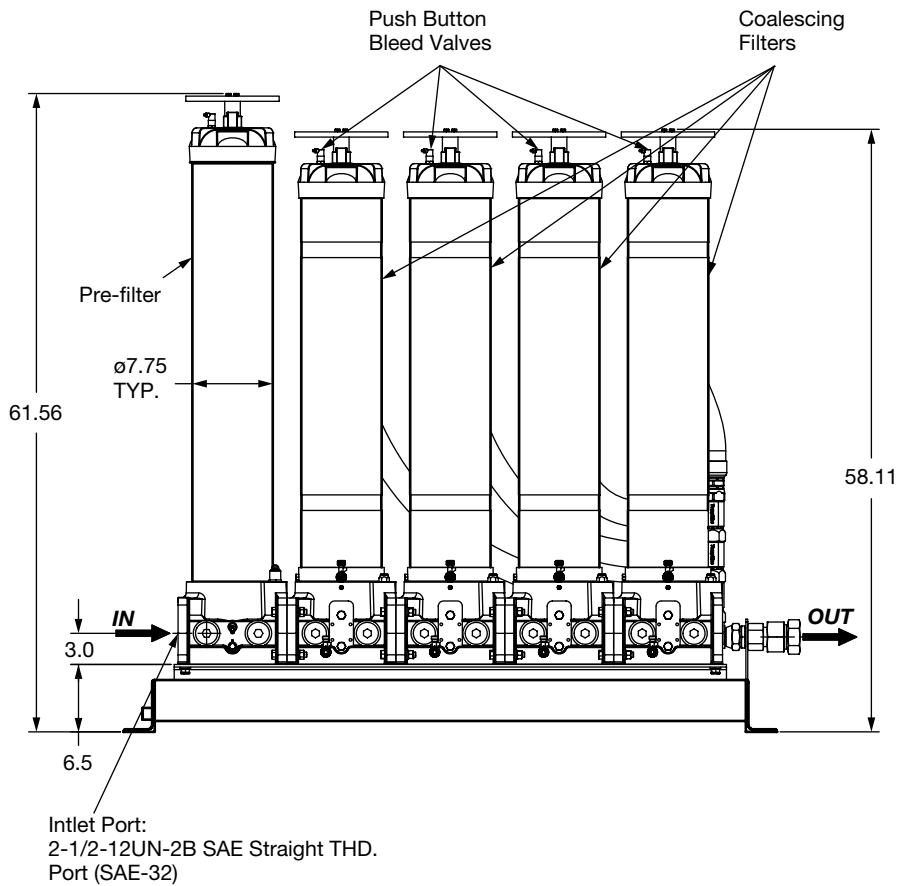
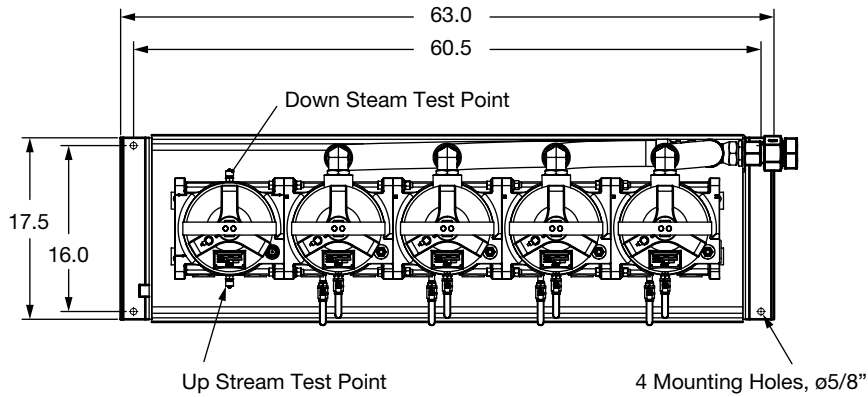
Dimensions BDS3



Dimensions shown are inches and for general information only. For complete dimensions please contact HYDAC to request a certified print.

PARTICULATE & COALESCING

Dimensions BDS4



Dimensions shown are inches and for general information only. For complete dimensions please contact HYDAC to request a certified print.



**Fuel Products & Systems
for Bulk & Mobile
Applications**

FUEL FILTRATION SYSTEMS

Bulk Diesel Mobile Filtration Units

Mobile units provide a fuel filtration solution that address the particulate contamination and water removal in an easy to use package. Because of its mobility, it can be deployed in remote sites or moved between different bulk diesel storage tanks in a facility.

Bulk Diesel Tanks containing contaminated diesel fuel can jeopardize all of the efforts put into cleaning the new fuel being transferred into those tanks. Over time, fuel in bulk diesel storage tanks can ingress particulate and water contamination from the environment.

Water provides an ideal environment for organic growth such as bacteria and/or fungus. Bacteria or fungus can cause rapid filter clogging, as well as increased rust, corrosion or emissions problems. The effects can be accelerated as the fuel ages and the level of acidity and oxidation can be shown with the Total Acid Number TAN (mg KOH/g) Acid Number.

Natural Gas Drilling Site Example

A bulk diesel fuel storage tank on a remote Natural Gas Drilling site, used to fuel the generator was found with heavy sludge buildup. The sludge and dirt caused loss of production (generator not running) and damage to diesel engine components totaling over \$100,000 in lost production in one hour.

Due to the severe contamination, the fuel was pumped into another, clean tank by the BDC bulk diesel filter cart and cleaned in a single pass. With this single pass. Particulate and free water were removed in one step. The first stage Bag Filter on the BDC was ideal for the gross removal of microbial bloom/growth, rust and large particulates from the fuel. With the addition of a bag housing, the BDC can handle the high dirt loads often found in on-site service tanks.

After the original tank was emptied, the sludge at the bottom of the tank (pictured) was removed and the tank was thoroughly cleaned to have it ready for the next delivery of fuel. To maintain a clean tank and clean fuel, the BDC is ideal as a kidney loop system that polishes the fuel on a regular basis or can be permanently installed.



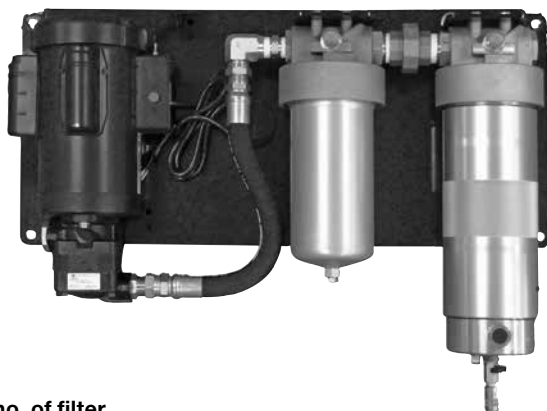
Fuel Contamination types:

Contamination Type:	Sources	Effects	Solutions
Particulates:	<ul style="list-style-type: none"> Contaminated fuel delivery Missing tank breather Tank corrosion Debris left from tank installation 	<ul style="list-style-type: none"> Wear and tear of diesel engine components Premature failure 	<ul style="list-style-type: none"> Fuel Filtration Periodic tank cleaning/fuel polishing Add desiccant breathers Filtration at each stage of fuel movement
Water:	<ul style="list-style-type: none"> Contaminated fuel delivery Ambient humidity Leaks and outside influences 	<ul style="list-style-type: none"> Engine combustion and/or injector problems Corrosion Clogged/saturated filters Organic/Biological growth 	<ul style="list-style-type: none"> Fuel Filtration Close any openings on tank Periodic tank cleaning/fuel polishing
Organic Growth:	<ul style="list-style-type: none"> Generated by presence of water 	<ul style="list-style-type: none"> Clogs filters, engine components Increased TAN number (corrosive effect) 	<ul style="list-style-type: none"> Periodic tank cleaning/fuel polishing Prevent water from entering tank Use desiccant breathers

BDFP Series

Bulk Diesel Filtration Panel

Up to 25 gpm



Model no. of filter in photograph is: BDFPG03CG5VVM14

Description:

A simple turn key stationary fuel filtration system

The BDFP provides a simple turn key stationary fuel filtration system for exceptional fuel transfer, polishing, and dispensing applications. Both filters combine HYDAC's fully synthetic filter media in a particulate pre-filter, the GHPF, with our patent-pending coalescing water removal filter, the GHCF, to fully protect vital diesel engine components from dirt and water. The BDFP provides premium filtration in a simple system which can easily be integrated into new and existing fuel storage systems.

Features

- Turn key coalescing and filtration system, for use as a fuel transfer, polishing, and dispensing solution
- Incorporates high-efficiency particulate and water removal filtration into a stationary mounted system with pump
- Available with either electrical or air operated pump options for more system flexibility
- GHPF and GHCF filter housings use patented GeoSeal® elements
- All-aluminum filter housings are fully compatible with diesel and biodiesel
- Minimal clearance needed for element service, ideal for enclosure installations
- Routine element change only needed on GHPF particulate filter, reducing operating cost
- Patent-pending, three-phase particulate, coalescing and fuel/water separation media technology
- A revolutionary element designed for the highest single-pass water and particulate removal efficiencies in today's ultra-low sulfur diesel (ULSD) fluids
- Protects expensive Tier 3 and Tier 4 engine components against failures caused by particulate and water transferred from the fuel storage tanks to the equipment
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs

Applications:

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Technical Specifications

Flow Rating	Electric Motor Option: 14 gpm or 25 gpm (53 or 95 L/min) Air Operated Option: 16 or 25 gpm (53 or 95 L/min)	
Fluid Temp. Range	32°F to 104°F (0°C to 40°C) Standard -20°F to 104°F (-29°C to 40°C) Heater Option	
Bypass Indication	Particulate Filter Electric Motor: 35 psi (2.4 bar) Air Operated: 25 psi (1.7 bar)	Coalescing Filter Electric Motor: 35 psi (2.4 bar) Air Operated: 15 psi (1.0 bar)
Bypass Cracking	Particulate Filter Electric Motor: 40 psi (2.8 bar) Air Operated: 30 psi (2.1 bar)	Coalescing Filter Electric Motor: 40 psi (2.8 bar) Air Operated: 20 psi (1.4 bar)
Materials of Construction	Particulate Filter Porting Head: Cast Aluminum, Anodized Element Bowl: Aluminum, Anodized	Coalescing Filter Porting Head: Cast Aluminum, Anodized Element Bowl: Aluminum, Anodized Sump: Cast Aluminum, Anodized
Weight	130 - 150 lbs. (59 - 68 kg)	
Element Change Clearance	GHPF: 2" (51 mm) GHCF: 4.5" (114 mm)	
Operating Frequency	60 Hz	
Operating Phase	Single	
Full Load Amperage @ Operating Voltage	13.4 A @ 115 VAC 7.2-6.7 A @ 208-230 VAC	
Service Factor Amperage @ Operating Voltage	15.2 A @ 115 VAC 8.1-7.6 A @ 208-230 VAC	

Markets:

- Industrial
- Power Generation
- Bulk Fuel Filtration
- Mining Technology
- Railroad
- Marine
- Fleet
- Mobile Vehicles
- Agriculture
- Common Rail Injector Systems

FUEL FILTRATION SYSTEMS

Model Code

BDF - P - Gxx - CG5 - V - VM - H - 14

Filter Series
BDF = Bulk Diesel Particulate and Coalescing Filtration

Configuration
P = Plate Mounted

Particulate Filtration
G01 = 1 µm Betamicron
G03 = 3 µm Betamicron

Coalescing Filtration
CG5 = C125GZ5V Coalescing Element

Sealing Material
V = Fluorocarbon Elastomer (FKM)

Element Change Indicator
VM = Visual Pop-up, Manual Reset

Options
Omit = Sight Glass (standard)
U = Downstream test point
T = WIF Sensor Only
I = WIF Sensor with Indicator Lamp
H = Sump Heat
S5 = Manual Water Drain with 5 gallon Collection Tank
S20 = Manual Water Drain with 20 gallon Collection Tank
AWD5 = Auto Water Drain w/ 5 Gallon Collection Tank
AWD20 = Auto Water Drain w/ 20 Gallon Collection Tank

Pump/Motor Configuration
14 = 14 gpm 120VAC 60Hz Single Phase
25 = 25 gpm 120VAC 60Hz Single Phase
16A = 16 gpm Air Driven Pump
25A = 25 gpm Air Driven Pump

Element Particulate Performance

Particulate Elements	DHC	Filtration Ratio Per ISO 16889 Using automated particle counter (APC) calibrated per ISO 11171	
		$\beta_x(c) \geq 200$	$\beta_x(c) \geq 1000$
5.40.11 D 01 BN4 /-V-G	172 grams	<4.0	4.2
5.40.11 D 03 BN4 /-V-G	148 grams	<4.0	4.8

Element Water Coalescing Performance

Coalescing Element	Pressure Side Coalescing	
	Max Flow	Single Pass Water Removal Efficiency
C125GZ5V	25 gpm	≥ 95%

Note: Based on ULSD15 with 27 Dynes/cm surface tension and 0.25% (2500 ppm) water injection

Particulate Element

Flow Direction: Outside In
Element Nominal Dimensions: 5.0" (27 mm) O.D. x 11" (279 mm) long

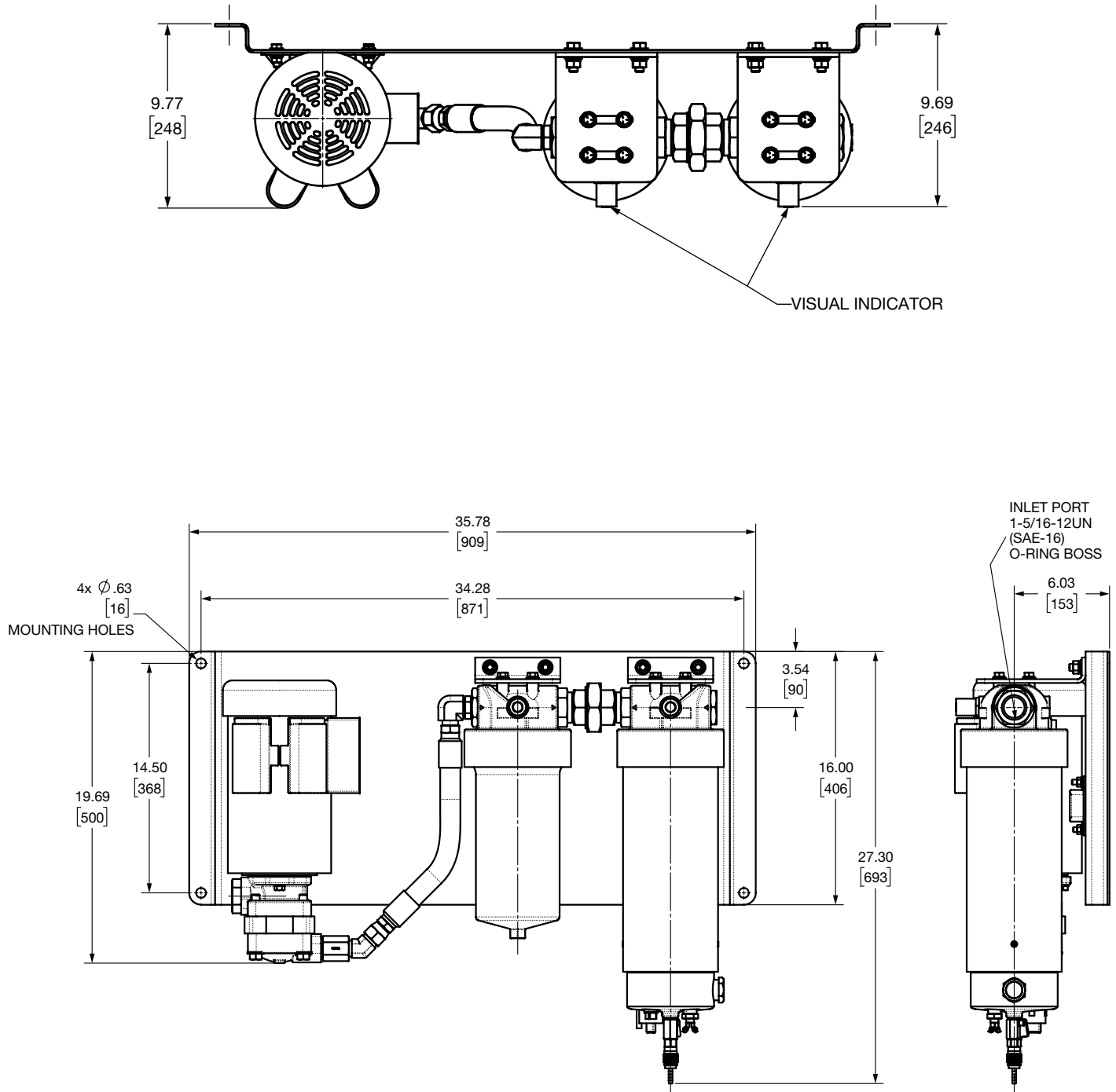
Coalescing Element

Flow Direction: Inside Out
Element Nominal Dimensions: 5.0" (27 mm) O.D. x 12" (305 mm) long

Fuel Oils

- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Dimensions BDFP - Electric Motor Option

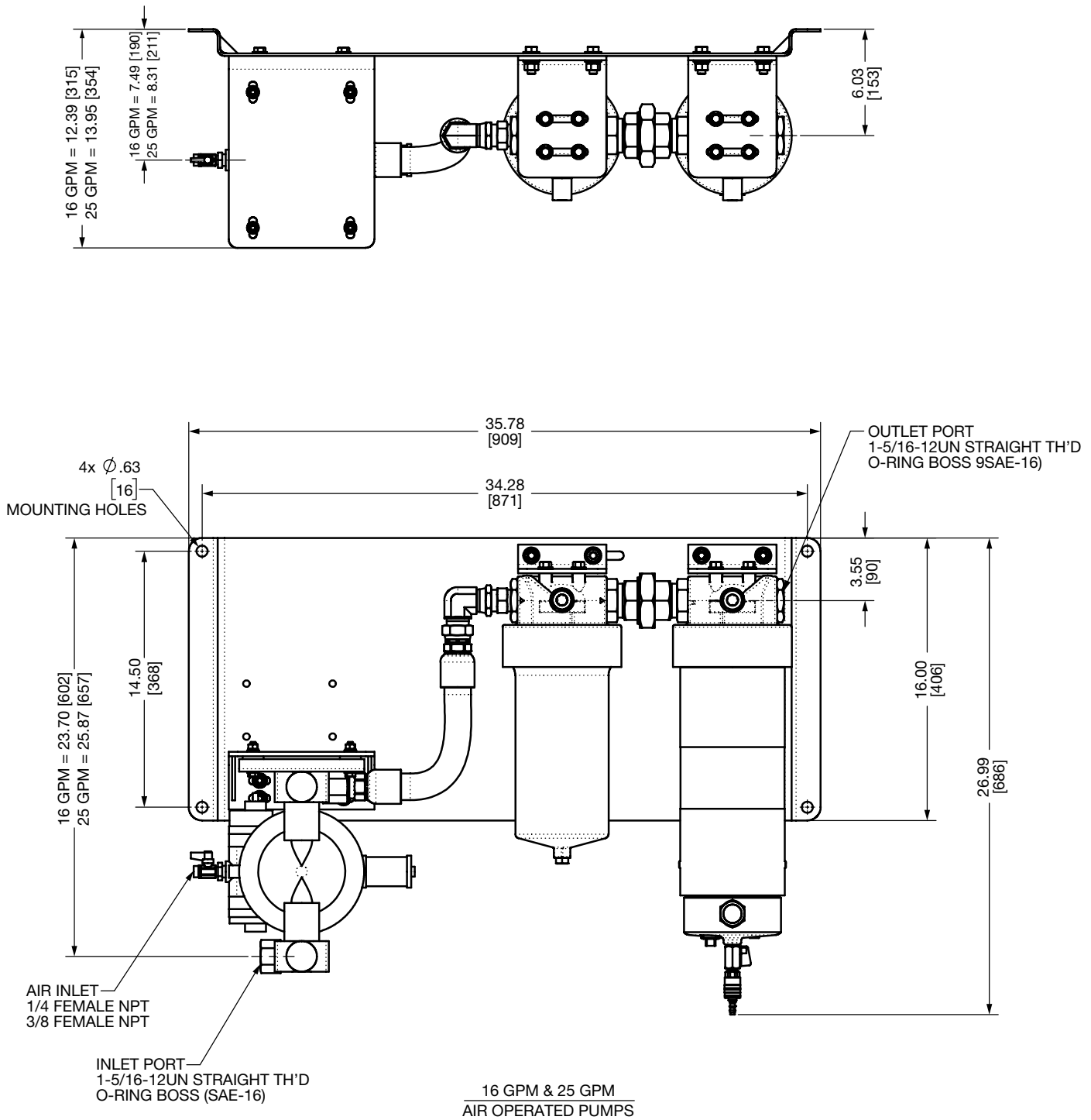


Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

FUEL FILTRATION SYSTEMS

Dimensions

BDFP - Air Operated Option



Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

BDFC Series

Bulk Diesel Fuel Filter Cart
14 or 25 gpm



Model no. of filter
in photograph is:
BDFCG03CG5VVM25

Description

The BDFC is ideal for those wanting to maintain clean fuel in their bulk storage tanks. The new BDFC provides exceptional particulate filtration and continuous water removal with higher flow rates. The GHPF particulate pre-filter and GHCF coalescing water removal filters feature our patented GeoSeal® aftermarket solution, ensuring quality replacement elements are used with every element change. These elements use fully synthetic Betamicon® media and revolutionary coalescing media to fully protect vital diesel engine components from debris and water.

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Features

- Designed with integrated particulate removal pre-filtration for maximum coalescing filter element life in the downstream housing
- Routine element change only needed on GHPF particulate filter, keeping operating costs low
- Patented GeoSeal® elements designed to provide consistent consistent quality with the highest single-pass water and particulate removal efficiencies in today's ultra-low sulfur diesel (ULSD) fuels
- All-aluminum filter housings and plumbing components are fully compatible with diesel and biodiesel
- Protects expensive High Pressure Common Rail (HPCR) engine components against failures caused by particulate and water transferred from the bulk fuels tanks to the vehicle
- Allows users to achieve or exceed the particulate and water removal specifications of the injection system OEMs
- Sight glass, Y-strainer, and upstream/downstream test points included
- HYDAC Stat-free media is standard for all coalescing elements
- 15' clear suction hose and rubber discharge hose with cam-and-groove connections and 3' wands
- At just under 28" wide, this cart will fit through standard doorways
- Electric pump motor is 120VAC with resettable overload and 7' power cord
- Latching, resettable pressure indicators trip at 5 psi before bypass valve cracking providing early warning to the operator of when to change the filter element

Technical Specifications

Flow Rating	Electric Motor Option: 14 gpm or 25 gpm (53 L/min or 95 L/min) Air Operated option: 16 gpm or 25 gpm (61 L/min or 95 L/min)	
Ambient Environment Temp. Range	-20°F to 104°F (-29°C to 40°C)	
Bypass Indication	Particulate Filter Electric Motor: 35 psi (2.4 bar) Air Operated: 15 psi (1.0 bar)	Coalescing Filter Electric Motor: 35 psi (2.4 bar) Air Operated: 15 psi (1.0 bar)
Bypass Valve Cracking	Particulate Filter Electric Motor: 40 psi (2.8 bar) Air Operated: 30 psi (2.1 bar)	Coalescing Filter Electric Motor: 40 psi (2.8 bar) Air Operated: 20 psi (1.4 bar)
Materials of Construction	Particulate Filter Head: Cast Aluminum, Anodized Element Case: Aluminum, Anodized	Coalescing Filter Head: Cast Aluminum, Anodized Element Case: Aluminum, Anodized Sump: Cast Aluminum, Anodized
Weight	Consult factory	
Operating Frequency	60 Hz	
Operating Phase	Single	
Full Load Amperage @ Operating Voltage	13.4 A @ 115 VAC 7.2-6.7 A @ 208-230 VAC	
Service Factor Amperage @ Operating Voltage	15.2 A @ 115 VAC 8.1-7.6 A @ 208-230 VAC	

FUEL FILTRATION SYSTEMS

Model Code

BDFC - G03 - CG5 - V - VM - - 25

Filter Series

BDFC = Bulk Diesel Filter Cart

Particulate Filtration Rating

G01 = 1 µm

G03 = 3 µm

Coalescing Filtration

CG5 = C125GZ5V Coalescing Element

Sealing Material

V = Fluorocarbon Elastomer (FKM)

Element Change Indicator

VM = Visual Pop-Up w/ Manual Reset

Options

(omit) = Included Sight Glass, Y-Strainer & Upstream / Downstream Test Points

I = Water-In-Fuel (WIF) Sensor w/ Indicator Light

Pump Sizing and Configuration

14 = 14 gpm 120VAC 60 Hz Single-Phase

25 = 25 gpm 120VAC 60 Hz Single-Phase

16A = 16 gpm Air Driven

25A = 25 gpm Air Driven

Notes: For 50Hz applications, contact factory,

"I" option is only available with electric motor configurations Pump Sizing and Configuration

Element Particulate Performance

Particulate Elements	DHC	Filtration Ratio Per ISO 16889 Using automated particle counter (APC) calibrated per ISO 11171	
		$\beta_x(c) \geq 200$	$\beta_x \geq 1000$
5.40.11 D 01 BN4 /-V-G	172 grams	<4.0	4.5
5.40.11 D 03 BN4 /-V-G	148 grams	4.6	5.8

Element Water Coalescing Performance

Coalescing Element	Pressure Side Coalescing	
	Max Flow	Single Pass Water Removal Efficiency
C125GZ5V	25 gpm	≥ 95%

Note: Based on ULSD15 with 27 Dyne/cm surface tension and 0.25% (2500 PPM) water injection

Particulate Element

Flow Direction: Outside In

Element Nominal Dimensions: 5.0" (27 mm) O.D. x 11" (279 mm) long

Coalescing Element

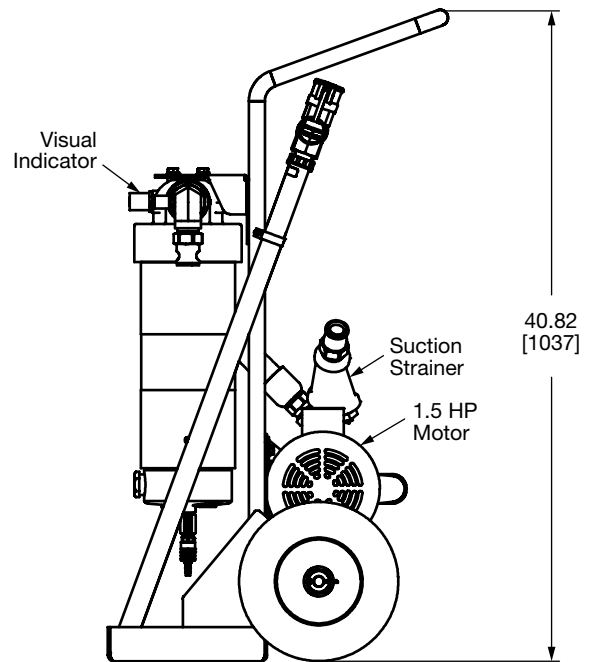
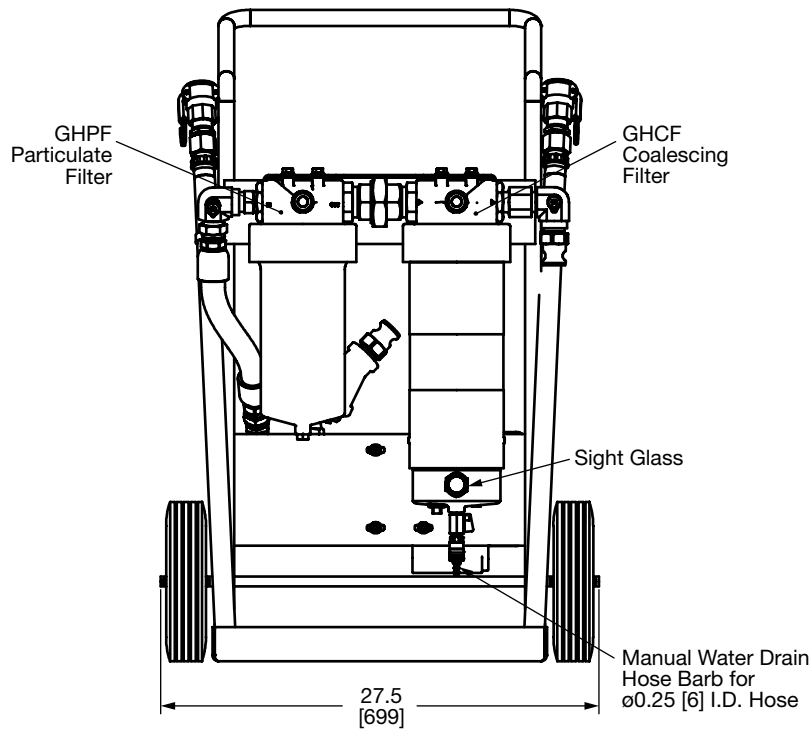
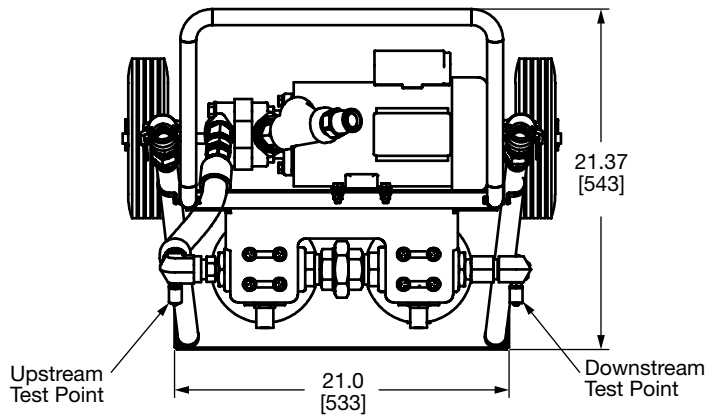
Flow Direction: Inside Out

Element Nominal Dimensions: 5.0" (27 mm) O.D. x 12" (305 mm) long

Fuel Oils

- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Dimensions BDFC

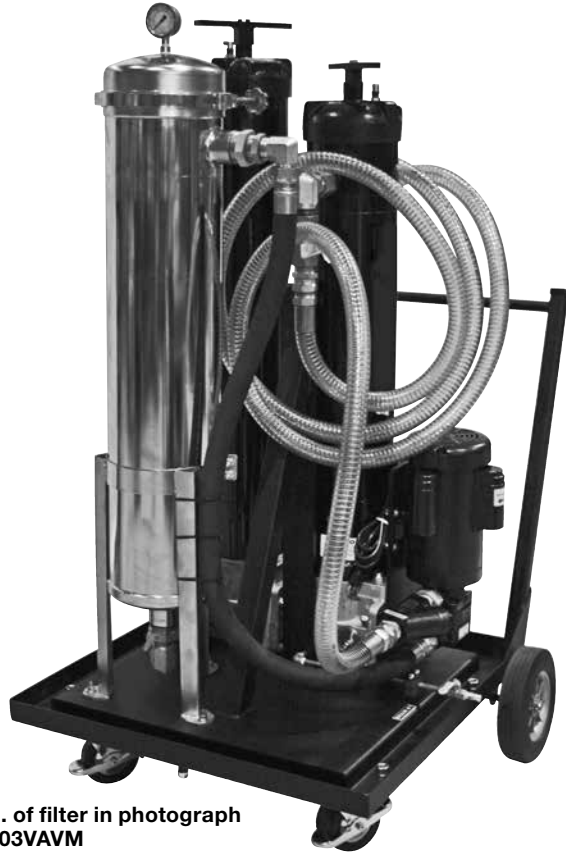


Dimensions shown are inches [millimeters] and for general information only. For complete dimensions please contact HYDAC to request a certified print.

FUEL FILTRATION SYSTEMS

BDC Series

Bulk Diesel Fuel Filter Cart
25 or 70 gpm



Model no. of filter in photograph is: BDCQ03VAVM

Description

Application Introduction:

The Reason for Better Bulk Fuel Filtration

The BDC provides exceptional single pass or kidney loop diesel particulate filtration and continuous water removal. All 3 filters combine HYDAC's synthetic media and patent-pending fuel water separation technology. The BDC is ideal for fuel maintenance operations.

Applications

- Point of use fuel dispensing
- Fleet fill/bulk fuel transfer
- Bulk fuel unloading
- Protection for high-flow fuel injection systems
- Bulk tank kidney loop/recirculation

Markets

- Industrial
- Mobile Vehicles
- Marine
- Mining Technology
- Agriculture
- Power Generation
- Common Rail Injector Systems
- Fleet
- Railroad
- Bulk Fuel Filtration

Features

- Great for kidney loop clean-up of highly contaminated reservoirs and single pass transfer
- Incorporates a bag element pre-filter down to 5 micron, for gross removal of microbial bloom contamination and rust
- Fuel and water separation media technology in a three-phase element construction for high efficiency, single-pass removal of emulsified and free-water in Ultra-low Sulfur Diesel (ULSD) and blends
- Designed because prior generation coalescing products no longer provide high-efficiency separation in ULSD and Biofuels
- Pump motor is 115VAC with resettable overload and 7' power cord for 25 gpm models and available as 220V Single Phase, 230V Three Phase, or 460V Three Phase for 70 gpm models
- Helps protect expensive, vital engine components against failures caused by water contaminated fuel
- Manual water drains and up and downstream test points

Technical Specifications

Flow Rating	Up to 25 gpm (95 L/min) or 70 gpm (265 L/min) for ULSD15 & biodiesel blends	
Fluid Temp. Range	-20°F to 165°F (-29°C to 74°C) (with heater option) 32°F to 165°F (0°C to 74°C) (standard, with sight gauge option, or with automatic water drain option)	
Ambient Environment Temp. Range	-20°F to 104°F (-29°C to 40°C) 32°F to 165°F (0°C to 74°C) (standard, with sight gauge option, or with automatic water drain option)	
Bypass Indication	Particulate Filter 15 psi (1.03 bar)	Coalescing Filter 25 psi (1.7 bar)
Bypass Valve Cracking	Particulate Filter 20 psi (1.37 bar)	Coalescing Filter 30 psi (2 bar)
Materials of Construction	Porting Base: Anodized Aluminum Cap: Plated Steel Bag Housing: Stainless Particulate Filter Housing: Epoxy Paint with High-phos Electroless Nickel Plating Coalescing Filter Housing: Epoxy Paint with High-phos Electroless Nickel Plating	
Weight	25 gpm model - 785 lbs. (356 kg), 70 gpm model - contact factory	
Element Change Clearance	33.8" (858 mm)	
For 25 GPM Models:		
Operating Frequency	60 Hz	
Operating Phase	Single	
Full Load Amperage @ Operating Voltage	13.4 A @ 115 VAC 7.2-6.7 A @ 208-230 VAC	
Service Factor Amperage @ Operating Voltage	15.2 A @ 115 VAC 8.1-7.6 A @ 208-230 VAC	
For 70 GPM Models:		
Contact Factory		

Model Code

BDC - Q03 - V - A - VM - AW - 70A

Filter Series

BDC = Bulk Diesel Cart

Filtration Rating

Q01 = 1 µm

Q03 = 3 µm

Sealing Material

V = Fluorocarbon Elastomer (FKM)

Bag Element Micron Rating

A = 5 µm

B = 25 µm

C = 50 µm

D = 100 µm

Element Change Indicator

VM = Visual Pop-Up w/ Manual Reset

Options

H = Sump Heater

AW = Automatic Water Drain w/ 5 gal Tank

70A = 70 gpm 230VAC Single Phase 60 Hz

70B = 70 gpm 230VAC Three Phase 60 Hz

70C = 70 gpm 460VAC Three Phase 60 Hz

Notes: AWD for use only >32°F (0°) For 50Hz applications, contact factory

Element Particulate Performance

Particulate Elements	DHC	Filtration Ratio Per ISO 16889 Using automated particle counter (APC) calibrated per ISO 11171	
		$\beta_x(c) \geq 200$	$\beta_x \geq 1000$
1.14.39D01ECON2 /-V	1259 grams	<4.0	<4.2
1.14.39D03ECON2 /-V	1293 grams	<4.0	<4.8

Element Water Coalescing Performance

Coalescing Element	Pressure Side Coalescing	
	Max Flow	Single Pass Water Removal Efficiency
C396Z5V	70 gpm	≥ 99.5%

Note: Based on ULSD15 with 27 Dyne/cm surface tension and 0.25% (2500 PPM) water injection

Coalescing Element

Flow Direction: Inside Out

Element Nominal Dimensions: 6.4" (163 mm) O.D. x 39.4" (1001 mm) long

Particulate Element

Flow Direction: Outside In

Element Nominal Dimensions: 6.0" (150 mm) O.D. x 37.8" (960 mm) long

Fuel Oils

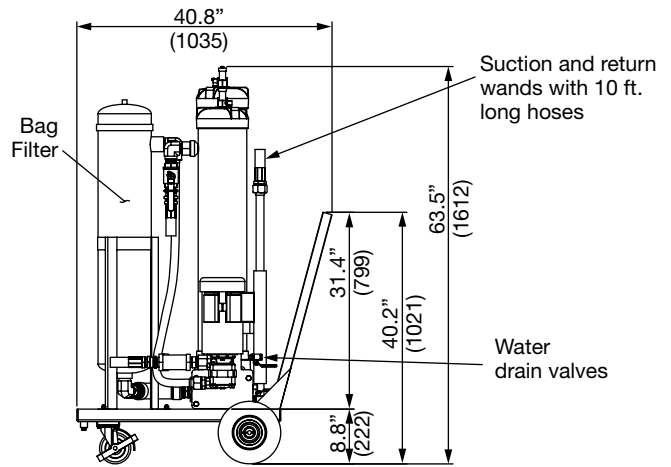
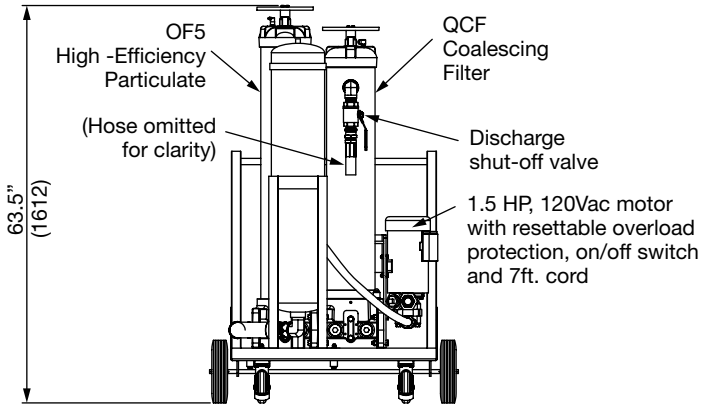
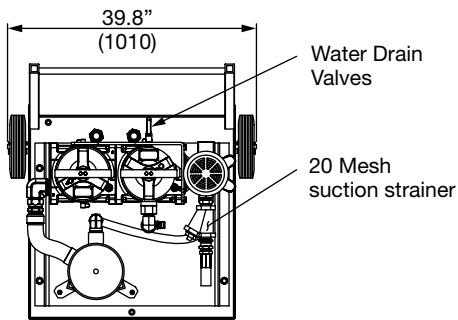
- ULSD15, low sulfur diesel and high sulfur diesel
- Biodiesel blends
- Synthetic diesel and blends
- No. 2 fuel oil and heating oil

Replacement Elements

Part Number	Description	Micron Rating	Elements Per Case
C396Z5V	Coalescing Element	5 µm	1
1.14.39D01ECON2 /-V	Particulate Element	1 µm	1
1.14.39D03ECON2 /-V	Particulate Element	3 µm	1
PEF5P2PH	Bag Element	5 µm	50
PEF25P2PH	Bag Element	25 µm	50
PEF50P2PH	Bag Element	50 µm	50
PEF100P2PH	Bag Element	100 µm	50

FUEL FILTRATION SYSTEMS

Dimensions BDC



Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

F **On-Board Fuel Filtration
Products**
(Particulate and Coalescing)

ON-BOARD FUEL FILTRATION PRODUCTS

Why is On-Board Diesel Filtration Required?

Mobile machines and commercial vehicles are subject to the toughest working conditions all over the world. To ensure smooth running vehicles and to protect both the engine and the whole drive system from damage, optimum diesel fuel conditioning is particularly important. With its HDP On-Board diesel coalescing/particulate filter, HYDAC offers a modern system for diesel filtration which protects vehicle manufacturers and operators from failures, breakdowns and expensive service interventions. The HYDAC HDP On-Board Filter is a cartridge filter system available in two versions: automatic drain (HDP-HT) and manual drain (HDP-BC).

HYDAC's HDP on-board Diesel Coalescing Filters provide the industry's best engine fuel filtration to ensure that your injectors never see poor quality fuel, and you never see the bill for expensive engine failures. All of HYDAC's fuel filters are compatible up to B100.

In addition, all Tier 4 diesel engines (on- or off-road) now require a fuel cleanliness level of 12/9/6 at injector or better. The typical spin-on type, on-board fuel filters were not designed to filter to this level. HYDAC fuel filtration on-board diesel coalescing/particulate filters provide this level of filtration.

With all of the various additives and biodiesel now added to ULSD 15 diesel fuel to regain lubricity, compensate for seasonal differences, minimize microbial growth, and prevent gelling, additional filter clogging problems have arisen compared to fuels used in the past.

Filter clogging leads to reduced power or complete breakdown due to filters being run in bypass mode (no filtration). This can lead to common-rail fuel injector failure which will cost in the thousands of dollars to fix. The use of HYDAC's HDP filters is imperative to remove all of the clogging elements.

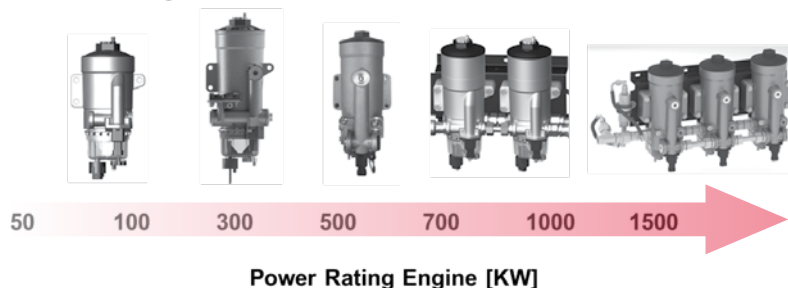
The HYDAC HDP On-Board Filter's product benefits are:

- Low investment costs due to cost-optimized design.
- Small installation space required, since lower section of filter does not have to be accessible
- Great flexibility with regard to installation position since inlet and outlet can be in either direction
- Consistent dewatering over the entire life of the filter element since water is separated on the clean side
- Robust design thanks to aluminum housing.
- Economical and technically reliable operation as a result of long element service life
- High Tech design: Reliable dewatering thanks to automatic water discharge, even during suction side operation
- Simple adaptation to the on-board power supply through the use of independently controlled water discharge
- Low residues of diesel left in the filter element in the event of service
- Reliable radial seal with captive seal design
- Visual analysis of the contamination possible (Rust, metallic swarf, unusual deposits which require further investigation)
- Water sensor and fuel preheating available as options

The HYDAC HDP On-Board Filter results in reliable machine availability:

- From first-class contamination retention
- Due to highly effective and stable water separation on the clean-side for the entire life of the filter element
- Life-long efficiency, because at element change, the water separation stage is also replaced at the same time
- Due to the excellent water separation (achieved by using first class materials) of >95 % to ISO CD 16332

Engine Sizes vs. HDP On-Board Filter Solutions



HDP 240 Series

On-Board Diesel Fuel Coalescing Filter
up to 63 gph (240 lph) • <14.5 psia (<1 bar absolute)



Model No.: HDP KF1 240 BC1 xx W
1.1 /-AS16-H3L-PH4R-DLO-TR



Model No.: HDP KF1 240 BC1 xx W
1.1 /-PH4L-DOO

Description

Mobile machines and commercial vehicles are subject to the toughest working conditions. To ensure smooth operation of vehicles, and to protect both the engine and exhaust aftertreatment from damage, optimum diesel fuel conditioning is particularly important. The new HDP 240 BC expands the HYDAC product portfolio in the field of fuel filtration on modern diesel engines. While formerly a flow volume from 90 to 476 gph (340 to 1800 lph) has been covered, this new product complements the lower engine power range with fuel system flow rates up to 63 gph (240 lph).

Features

- Our new 63 gph fuel filter is designed with compact off-highway equipment in mind
- Our high performance, dual function diesel filtration and water separation uses the same two-stage element design found in our larger filters
- Dual function: Diesel filtration and water separation through the two-stage element designs
- High performance stability due to an efficient water separation on clean side over the entire service life
- Simple and fast element replacement makes servicing the HDP 240 easy
- Easy installation and flexibility due to various porting configurations options
- Guaranteed quality as the filter can only be operated with use of quality replacement elements
- Modular porting, priming pump, and heater options make for easy installation and servicing in tight spaces

Options Available

- Transparent or black bowl
- Fuel pre-heater
- Water-in-fuel sensor (necessary with black bowl)
- Hand priming pump
- Various Inlet/Outlet port configuration options
(consult factory for special requests)

Technical Specifications

Flow Rating	up to 63 gph (up to 240 lph)
Operating Pressure	<14.5 psia, (<1 bar absolute) suction side application
Temperature Range	-40°F to 194°F (-40°C to 90°C)
Nominal Voltage	WIF: 12/24VDC Heater: 12VDC
Fuel Preheater Rated Power	175W
Weight of included element	240 BC: approx. 2.7 lbs (1.2 kg.)
Water Separation Efficiency	>95% to ISO CD 16332
Porting Thread	M16 x 1.5, SAE-06 ORB

ON-BOARD FUEL FILTRATION PRODUCTS

Model Code *(also order example)*

HDP KF1 240 BC1 7 W 1 . X / - AS17 - HL3 - PH4R - DOO - TR - 6

Filter Series

HDP = HYDAC Diesel PreCare

Filter Material

KF1 = Dieselmicron®

Size

240 = 63 gph (240 lph)

Evolution Stage

BC1 = Manual Drain Configuration

Filtration Rating

7 = 7µm

Type of Clogging Indicator

W = no clogging indicator

Type Code

1

Modification Number

X = latest version number always supplied

Options

AS16 = WIF sensor w/ integral drain

AS17 = Cummins-ready WIF sensor w/ integral drain

H3L = Integrated fuel pre-heater (12 VDC) Left inlet port orientation

PH4R = Hand Priming Pump. Right-handed operation

Port Orientation

DOO = Inlet top, outlet top

DLO = Inlet left, outlet top

Bowl Option

(omit) = Black *(requires WIF sensor)*

TR = Transparent

Port Size

(omit) = M16 x 1.5

6 = SAE-06 J1926 ORB

Notes: For other options or configurations not listed below, please contact factory

- Porting orientation not listed in model code builder

- SAE J2044 Quick Connect Porting

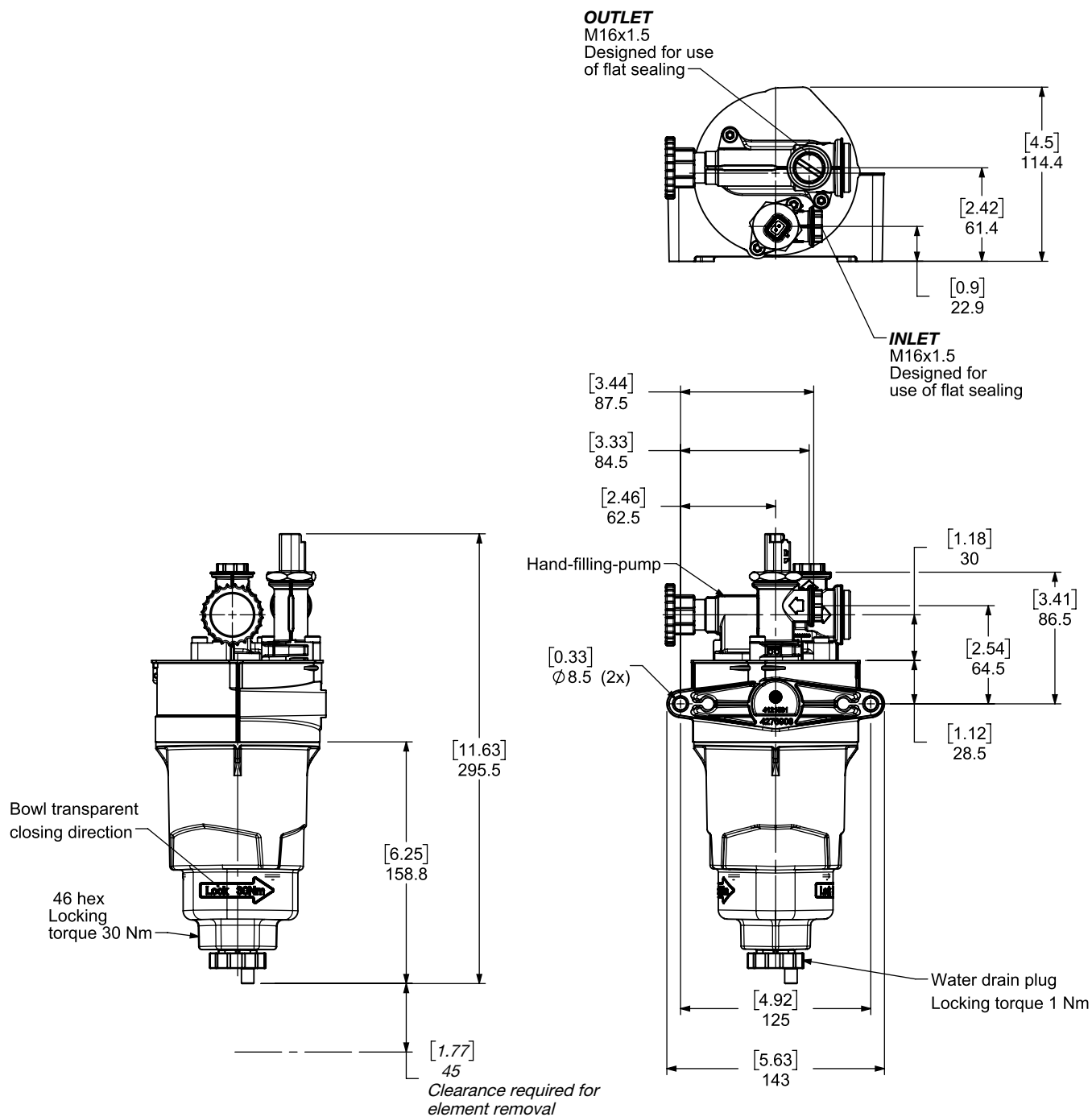
- Other OEM-ready Water-in-Fuel (WIF) sensor options

Replacement Elements

Size	Evolution Stage	Filtration Rating	Filter Material
0240	BC1	007	KF1

ON-BOARD FUEL FILTRATION PRODUCTS

Dimensions HDP 240



Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

HDP-BC Series

Heavy-Duty Diesel PreCare - Manual Water Drain
up to 1800 l/h



Model No. of filter in photograph is: HDP KF1 600 BC1 10 W 1.1



Model No. of filter in photograph is: HDP KF1 600 BC1 10 W 1.1 /-H2-PE2

Description

Mobile machines and commercial vehicles are subject to the toughest working conditions. To ensure smooth running of vehicles, and to protect both the engine and the drive system from damage, optimum diesel fuel conditioning is particularly important. HYDAC Fuel Filtration On-Board Diesel Coalescing filter offers a modern cartridge filter system design available in a manual water drain configuration to protect equipment operators from failures, breakdowns and expensive service interventions

Features

- Manual water drain
- Optional fuel pre-heater, Water-In-Fuel (WIF) sensor, and hand priming pump
- Small envelope size offers greater flexibility in mounting locations
- Low investment cost due to the economical design
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Easy adaption of accessories to the on-board power supply
- Unsurpassed water removal for ULSD

Technical Specifications

Flow Rating:	up to 476 gph (up to 1800 lph)
Operating Pressure:	<14.5 psia, (<1 bar absolute) suction side application
Temperature Range:	BC: -40°F to 194°F (-40°C to 90°C) *for extended ranges, contact factory
Nominal Voltage:	WIF: 12/24VDC Heater: 24VDC, 12VDC is optional
Rated Power Fuel Preheating:	300W
Weight of incl. Element:	340 BC: 5.1 lbs (2.3 kg) 600 BC: 6.8 lbs (3.1 kg) *other models available upon request
Water Separation Efficiency:	>95% to ISO CD 16332
Porting Thread:	340 BC: M22x1.5 600 BC: M27x2.0, SAE -12 ORB (optional)

ON-BOARD FUEL FILTRATION PRODUCTS

Model Code (also order example)

HDP KF1 600 BC1 10 W 1 . X / -AS1

Filter Series

HDP = HYDAC Diesel PreCare

Filter Material

KF1 = Dieselmicron®

Size

340 = 90 gph (340 lph)
 600 = 160 gph (600 lph)
 1200 = 317 gph (1200 lph)
 1800 = 476 gph (1800 lph)

Evolution Stage

BC1 = Manual Drain Configuration

Filtration Rating

7 = 7 µm
 10 = 10 µm
 30 = 30 µm

Type of Clogging Indicator

W = No Clogging Indicator

Type Code

1

Modification Number

X = latest version number always supplied

Options

-AS1 = Water-In-Fuel Sensor (12/24 VDC)
 -AS3 = Cummins® Ready Water-In-Fuel Sensor
 -H1 = Fuel Pre-Heater (12 VDC)
 -H2 = Fuel Pre-Heater (24 VDC)
 -PH3 = Hand Priming Pump (600, 1200, or 1800 BC1 only)
 -PE1 = Integral Electric Pump (12 VDC)
 -PE2 = Integral Electric Pump (24 VDC)

Porting

Omit = M22 x 1.5 (340 size)
 M27 x 2.0 (600 size)
 -08 = SAE -08 ORB (340 size only)
 -12 = SAE -12 ORB (600 size only)

Bowl Material

Omit = Polyamide Bowl
 -ALU = Aluminum Bowl

Notes: For other options or configurations not listed, please contact factory

Element Particulate Performance

Particulate Elements	Filtration Ratio Per ISO 19438	Dirt Retention Per ISO 19438
	n > 10 µm (c)	to DP
10 µm	> 99%	300 mbar m > 42g

Element Water Coalescing Performance

Coalescing Element	Suction Side Coalescing Per ISO CD 16332	
	Max Flow	Single Pass Water Removal Efficiency
10 µm	160 gal/h	> 95%

Flow Direction: Outside In
 Element Nominal Dimensions: 3.8" (95.6 mm) O.D. x 7.0" (177.2 mm) long - 340 Size
 3.8" (95.6 mm) O.D. x 9.4" (238.2 mm) long - 600 Size

Note: For additional HDP performance information, please contact the factory

Fuel Oils

- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

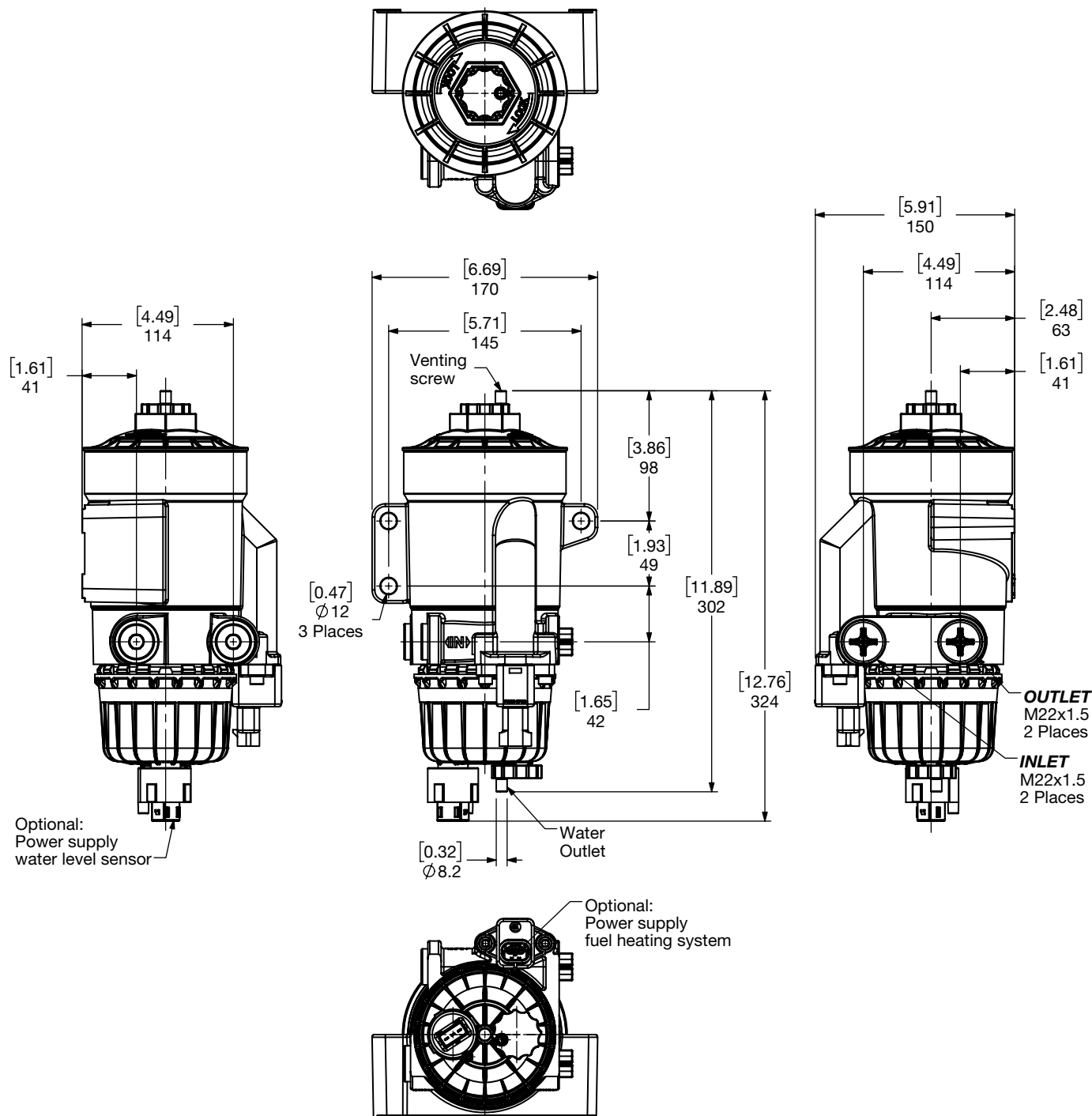
Note: For Flow and Pressure information, please contact the factory

Replacement Elements

Size	Evolution Stage	Filtration Rating	Filter Material
0340	BC1	007	KF1
0600		010	
		030	

ON-BOARD FUEL FILTRATION PRODUCTS

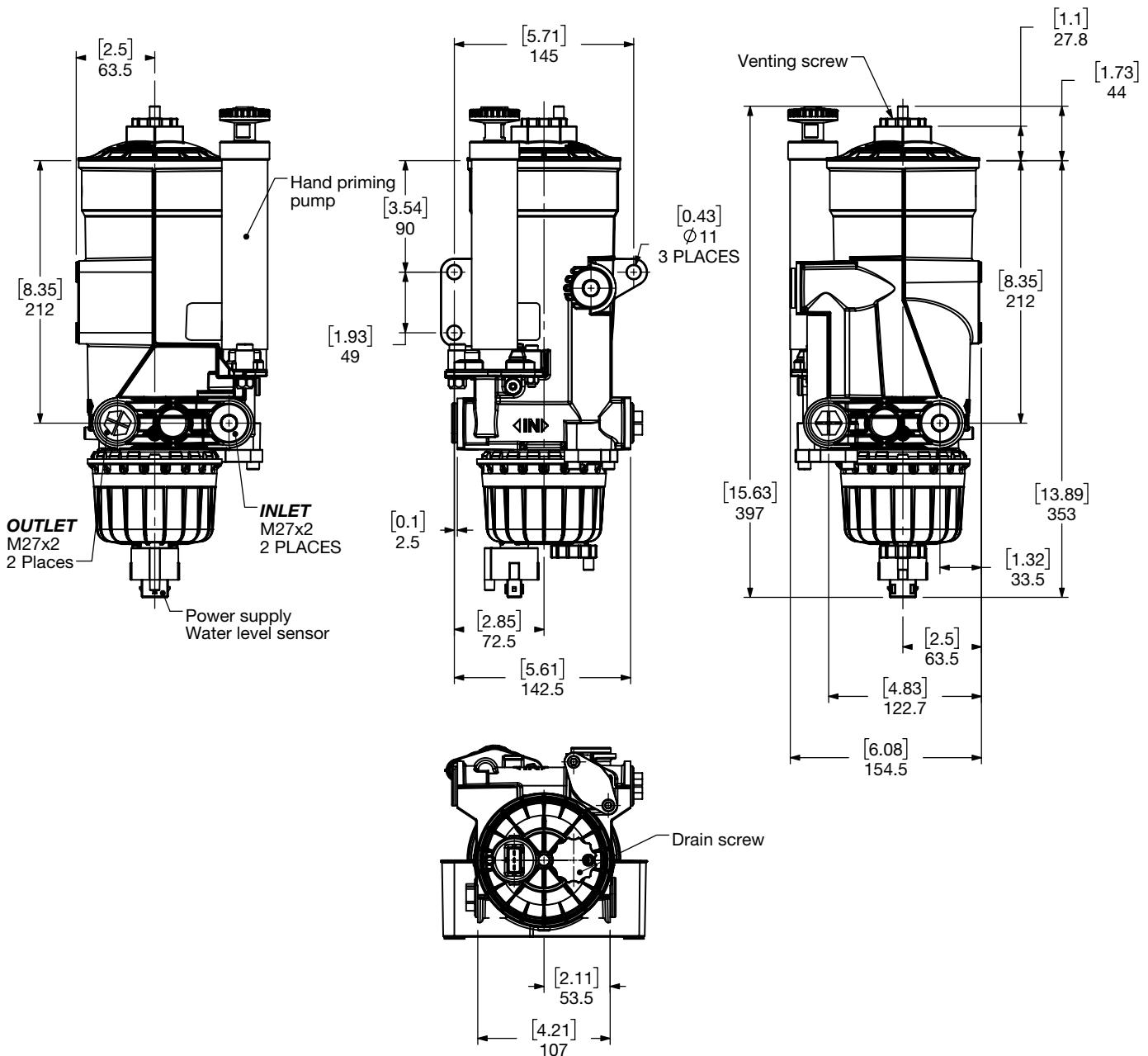
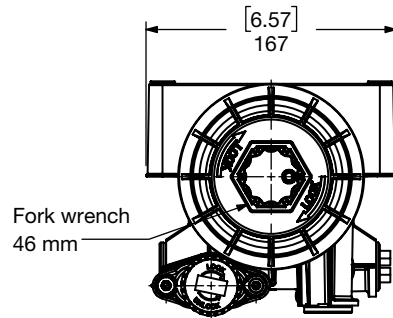
Dimensions HDP-BC 340



Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

ON-BOARD FUEL FILTRATION PRODUCTS

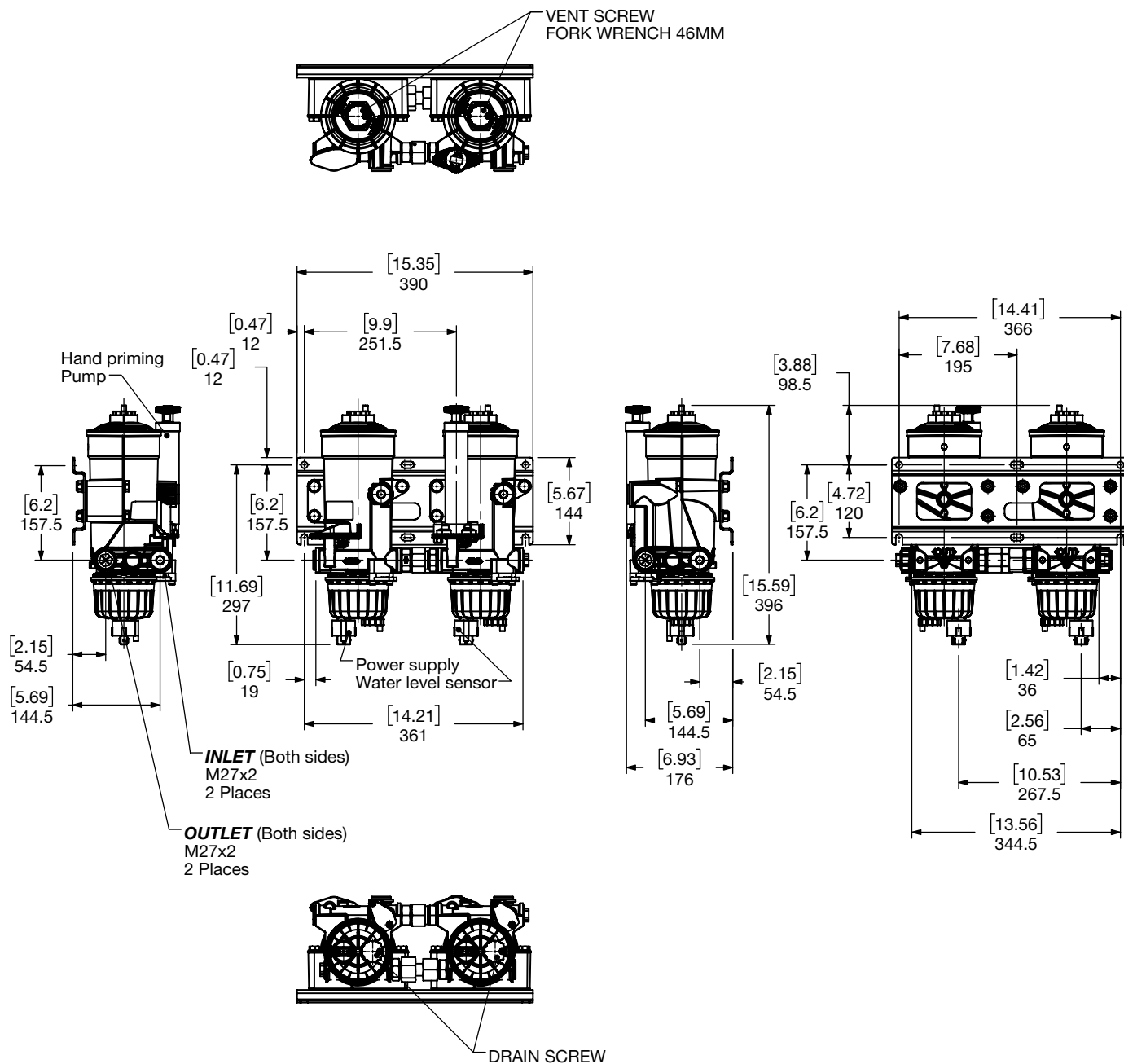
Dimensions
HDP-BC 600



Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

ON-BOARD FUEL FILTRATION PRODUCTS

Dimensions HDP-BC 1200



Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

HDP	340 BC	600 BC	1200 BC	1800 BC
Weight incl. element lbs. (kg)	5.1 (2.3)	6.8 (3.1)	20.1 (9.1)	30.9 (14.0)

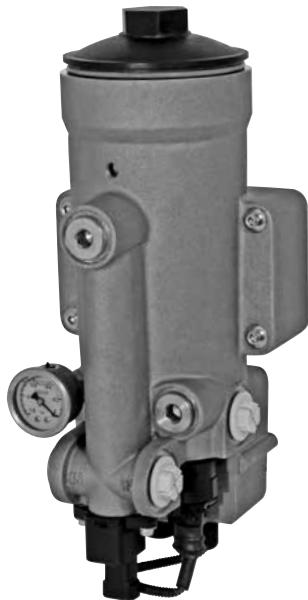
For drawing of configurations not shown, contact factory

ON-BOARD FUEL FILTRATION PRODUCTS

HDP-HT Series

Heavy-Duty Diesel PreCare - Automatic Water Drain

14.5 psia • up to 476 gph



Model No. of filter in photograph is: HDP KF1 600 HT1 XX UED 1.1 /-AS1-H2

Description

Mobile machines and commercial vehicles are subject to the toughest working conditions. To ensure smooth running of vehicles, and to protect both the engine and the drive system from damage, optimum diesel fuel conditioning is particularly important. HYDAC Fuel Filtration On-Board Diesel Coalescing filter offers a modern cartridge filter system design available in a fully automated water drain configuration, in order to minimize operator intervention and protect equipment from failures, breakdowns and expensive service interventions

Features

- Fully Automatic water drain
- Optional fuel pre-heater and standard Water-In-Fuel (WIF) sensor
- Small envelope size offers greater flexibility in mounting locations
- Low investment cost due to the economical design
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Easy adaption to the on-board power supply
- Unsurpassed water removal for ULSD

Technical Specifications

Flow Rating:	up to 476 gph (up to 1800 lph)
Operating Pressure:	<14.5 psia, (<1 bar absolute) suction side application
Temperature Range:	HT: -4°F to 194°F (-20°C to 90°C) *for extended ranges, contact factory
Nominal Voltage:	24V DC (12V DC is optional for heater)
Rated Power Fuel Preheating:	300W
Weight of incl. Element:	600 HT: 9.4 lbs (4.25 kg) *other models available upon request
Water Separation Efficiency:	>95% to ISO CD 16332
Porting Thread:	600 HT: G 3/4" (BSPP)

ON-BOARD FUEL FILTRATION PRODUCTS

Model Code (also order example) **HDP KF1 600 HT1 10 A 1 . X / -AS1**

Filter Series _____
 HDP = HYDAC Diesel PreCare

Filter Material _____
 KF1 = Dieselmicron®

Size _____
 600 = 160 gph (600 lph)
 1200 = 317 gph (1200 lph)
 1800 = 476 gph (1800 lph)

Evolution Stage _____
 HT1 = Auto Drain Configuration

Filtration Rating _____
 7 = 7 µm
 10 = 10 µm
 30 = 30 µm

Type of Clogging Indicator _____
 A = Blanking Plug In Indicator Port
 UED = Vacuum Gauge

Type Code _____
 1

Modification Number _____
 X = Latest version number always supplied

Options _____
 -AS1 = Water-In-Fuel Sensor (standard)
 -H1 = Fuel Pre-Heater (12 VDC)
 -H2 = Fuel Pre-Heater (24 VDC)

Notes: For other options or configurations not listed, please contact factory

Element Particulate Performance

Particulate Elements	Filtration Ratio Per ISO 19438 n > 10 µm (c)	Dirt Retention Per ISO 19438 to DP
10 µm	> 99%	300 mbar m > 42g

Element Water Coalescing Performance

Coalescing Element	Suction Side Coalescing Per ISO CD 16332	
10 µm	Max Flow	Single Pass Water Removal Efficiency
	160 gal/h	> 95%

Flow Direction: Outside In
 Element Nominal Dimensions: 3.8" (95.6 mm) O.D. x 7.0" (177.2 mm) long - 340 Size
 3.8" (95.6 mm) O.D. x 9.4" (238.2 mm) long - 600 Size

Note: For additional HDP performance information, please contact the factory

Fuel Oils

- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

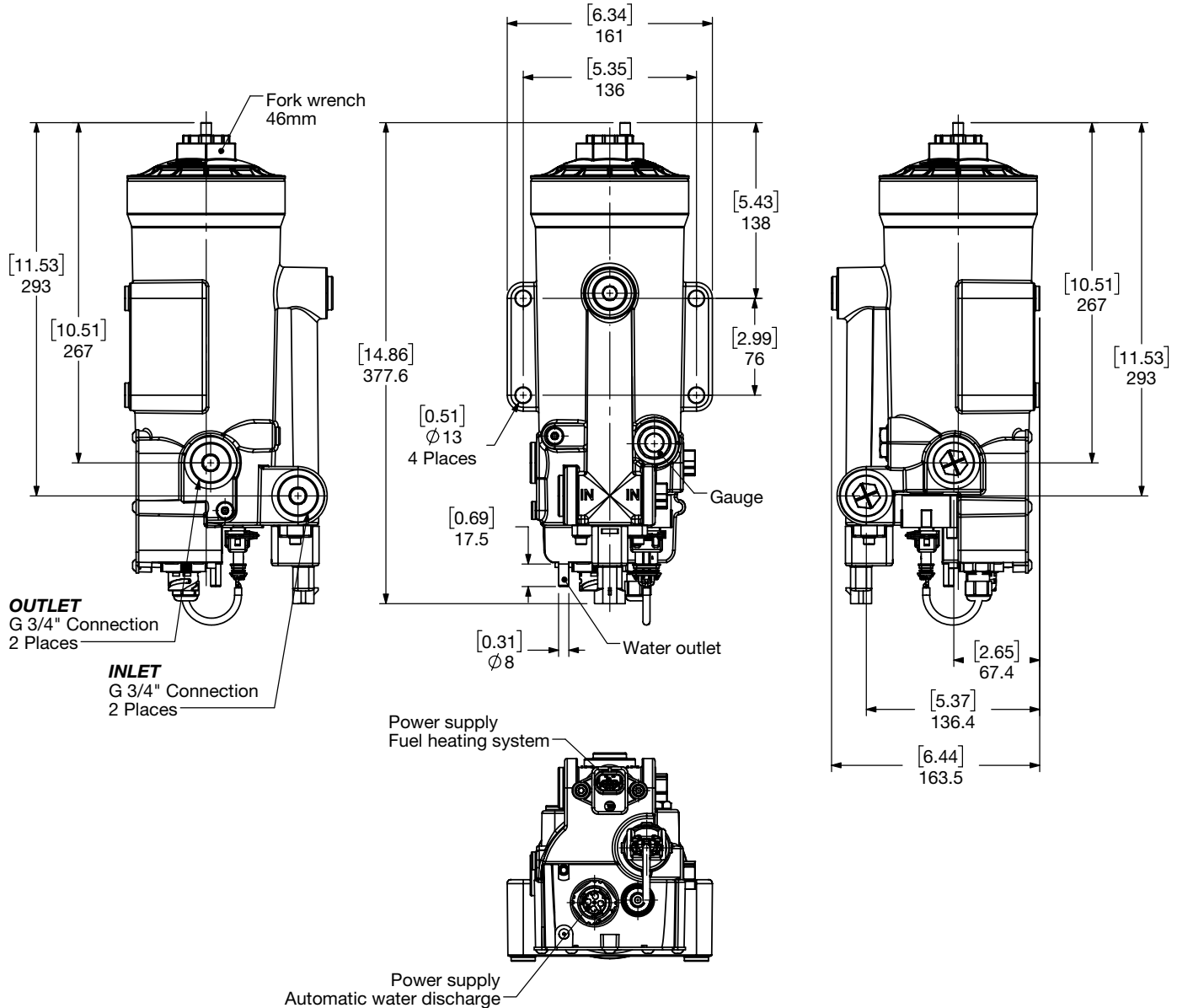
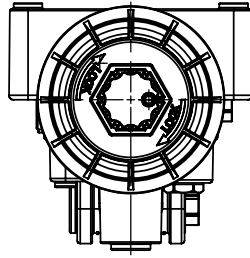
Note: For Flow and Pressure information, please contact the factory

Replacement Elements

Size	Evolution Stage	Filtration Rating	Filter Material
0600	HT1	007	KF1
		010	
		030	

ON-BOARD FUEL FILTRATION PRODUCTS

Dimensions HDP-HT 600



Dimensions shown are [inches] millimeters and for general information only. For complete dimensions please contact HYDAC to request a certified print.

HDP	600 HT	1200 HT	1800 HT
Weight incl. element lbs. (kg)	9.5 (4.3)	24.3 (11.0)	37.5 (17.0)

For drawing of configurations not shown, contact factory

HDPD-BC Series

Heavy-Duty Diesel PreCare Duplex Filter
 14.5 psia • up to 476 gph



Model No. of filter in photograph is:
 HDPD KF1 600 BC1 10 UED 1.1/-PH3

Description

The Heavy-Duty Diesel PreCare Duplex Filter is an advanced system for diesel pre-filtration which protects equipment OEMs and operators from costly service calls and downtime. The duplex configuration consists of an assembly with multiple filter housings, which are connected by a change-over ball valve with a simple, single lever operation. The HDPD is available in the familiar BC (manual drain) or HT (auto drain) version.

Features

- Simple, single-lever change-over ball valve for seamless operation and service
- Manual or fully automatic Water-In-Fuel (WIF) sensor
- Optional fuel pre-heater and water sensor
- Small envelope size offers greater flexibility in mounting locations
- Low investment cost due to the economical design
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Easy adaption to the on-board power supply
- Unsurpassed water removal for ULSD

Technical Specifications

Flow Rating	up to 476 gph (up to 1800 lph)
Operating Pressure	<14.5 psia, (<1 bar absolute) suction side application
Temperature Range	BC: -40°F to 194°F (-40°C to 90°C) *for extended ranges, contact factory
Nominal Voltage	24V DC (12V DC is optional for heater or water sensor)
Rated Power Fuel Preheating	300W
Weight	contact factory for your specific model code weight
Water Separation Efficiency	>95% to ISO CD 16332
Porting Thread	340 BC: M22x1.5 600 BC: M27x2.0, SAE -12 ORB (optional) 600 HT: G 3/4" (BSPP)

ON-BOARD FUEL FILTRATION PRODUCTS

Model Code (also order example) **HDPD KF1 600 BC1 10 UED 1 . X / -AS1-H2-PH3**

Filter Series = HYDAC Diesel PreCare, Duplex

Filter Material = Dieselmicron®

Size
 340 = 90 gph (340 lph)
 600 = 160 gph (600 lph)
 1200 = 317 gph (1200 lph)
 1800 = 476 gph (1800 lph)

Evolution Stage
 BC1 = Manual Drain Configuration HT1 = Auto Drain Configuration

Filtration Rating
 7 = 7 µm 10 = 10 µm 30 = 30 µm

Type of Clogging Indicator
 W = No Clogging Indicator (BC1 only)
 A = Blanking Plug In Indicator Port (HT1 only)
 UED = Vacuum Gauge (HT1 only)

Type Code
 1

Modification Number
 X = Latest version number always supplied

Options
 -AS1 = Water-In-Fuel Sensor (12/24 VDC) (standard on 600 HT1)
 -AS3 = Cummins® Ready Water-In-Fuel Sensor
 -H1 = Fuel Pre-Heater (12 VDC)
 -H2 = Fuel Pre-Heater (24 VDC)
 -PH3 = Hand Priming Pump (600 BC1 only)

Porting
 Omit = M22 x 1.5 (340 size)
 M27 x 2.0 (600 size)
 -08 = SAE -08 ORB (340 size only)
 -12 = SAE -12 ORB (600 size only)

Bowl Material
 Omit = Polyamide Bowl
 -ALU = Aluminum Bowl

Notes: For other options or configurations not listed, please contact factory

Element Particulate Performance

Particulate Elements	Filtration Ratio Per ISO 19438 n > 10 µm (c)	Dirt Retention Per ISO 19438 to DP
10 µm	> 99%	300 mbar m > 42g

Element Water Coalescing Performance

Coalescing Element	Suction Side Coalescing Per ISO CD 16332	
	Max Flow	Single Pass Water Removal Efficiency
10 µm	160 gal/h	> 95%

Note: For additional HDP performance information, please contact the factory

Flow Direction: Outside In
 Element Nominal Dimensions: 3.8" (95.6 mm) O.D. x 7.0" (177.2 mm) long - 340 Size
 3.8" (95.6 mm) O.D. x 9.4" (238.2 mm) long - 600 Size

Fuel Oils

- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

Note: For Flow and Pressure information, please contact the factory

Replacement Elements

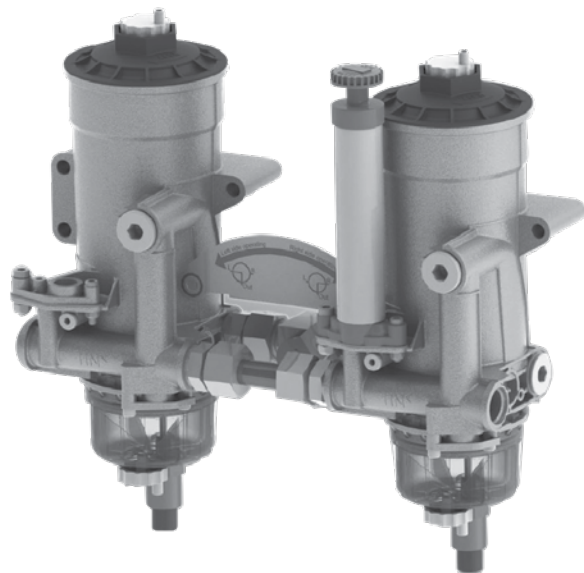
Size	Evolution Stage	Filtration Rating	Filter Material
0340	BC1	007	KF1
0600		010	
		030	

HDPD	340 BC	600 BC	1200 BC	1800 BC
Weight incl. element lbs. (kg)	19.8 (9.0)	24.3 (11.0)	43.2 (19.6)	66.1 (30)

For drawing of configurations, contact factory

HDPD-HT Series

Diesel PreCare
up to 1800 l/h



Model No. of filter in photograph is:
HDPD KF1 600 BC1 xx W 1.1 /-AS1-PH3

Description

The Heavy-Duty Diesel PreCare Duplex Filter is an advanced system for diesel pre-filtration which protects equipment OEMs and operators from costly service calls and downtime. The duplex configuration consists of an assembly with multiple filter housings, which are connected by a change-over ball valve with a simple, single lever operation. The HDPD is available in the familiar BC (manual drain) or HT (auto drain) version.

Features

- Simple, single-lever change-over ball valve for seamless operation and service
- Manual or fully automatic Water-In-Fuel (WIF) sensor
- Optional fuel pre-heater and water sensor
- Small envelope size offers greater flexibility in mounting locations
- Low investment cost due to the economical design
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Easy adaption to the on-board power supply
- Unsurpassed water removal for ULSD

Technical Specifications

Flow Rating	up to 476 gph (up to 1800 lph)
Operating Pressure	<14.5 psia, (<1 bar absolute) suction side application
Temperature Range	HT: -4°F to 194°F (-20°C to 90°C) *for extended ranges, contact factory
Nominal Voltage	24V DC (12V DC is optional for heater or water sensor)
Rated Power Fuel Preheating	300W
Weight	contact factory for your specific model code weight
Water Separation Efficiency	>95% to ISO CD 16332
Porting Thread	340 BC: M22x1.5 600 BC: M27x2.0, SAE -12 ORB (optional) 600 HT: G 3/4" (BSPP)

ON-BOARD FUEL FILTRATION PRODUCTS

Model Code *(also order example)*

HDPD KF1 600 HT1 10 UED 1 . X / -AS1-H2-PH3

Filter Series

HDPD = HYDAC Diesel PreCare, Duplex

Filter Material

KF1 = Dieselmicron®

Size

600 = 160 gph (600 lph)
 1200 = 317 gph (1200 lph)
 1800 = 476 gph (1800 lph)

Evolution Stage

HT1 = Auto Drain Configuration

Filtration Rating

7 = 7 µm
 10 = 10 µm
 30 = 30 µm

Type of Clogging Indicator

A = Blanking Plug In Indicator Port (600 HT1 only)
 UED = Vacuum Gauge (600 HT1 only)

Type Code *(Latest Version Number Always Supplied)*

1

Modification Number

X =

Options

-AS1 = Water-In-Fuel Sensor (12/24 VDC) (standard on 600 HT1)
 -H1 = Fuel Pre-Heater (12 VDC)
 -H2 = Fuel Pre-Heater (24 VDC)

Notes: For other options or configurations not listed, please contact factory

Element Particulate Performance

Particulate Elements	Filtration Ratio Per ISO 19438 n > 10 µm (c)	Dirt Retention Per ISO 19438 to DP
10 µm	> 99%	300 mbar m > 42g

Element Water Coalescing Performance

Coalescing Element	Suction Side Coalescing Per ISO CD 16332	
10 µm	Max Flow	Single Pass Water Removal Efficiency
	158 gal/h	> 95%

Note: For additional HDP performance information, please contact the factory

Flow Direction: Outside In
 Element Nominal Dimensions: 3.8" (95.6 mm) O.D. x 7.0" (177.2 mm) long - 340 Size
 3.8" (95.6 mm) O.D. x 9.4" (238.2 mm) long - 600 Size

Fuel Oils

- ULSD15 and similar petroleum diesels
- Biodiesel blends
- Synthetic diesel and blends

Note: For Flow and Pressure information, please contact the factory

Replacement Elements

Size	Evolution Stage	Filtration Rating	Filter Material
0600	HT1	007	KF1
		010	
		030	

HDPD	600 HT	1200 HT	1800 HT
Weight incl. element lbs. (kg)	44.1 (20.0)	88.2 (40.0)	132.3 (60.0)

For drawing of configurations, contact factory

HDPD Marine Series

Heavy-Duty Diesel PreCare Duplex - Marine Series

238 gph (900 l/h) per side, 476 gph (1800 l/h) in dual operation



Model No. of filter in photograph is:
HDPD KF2 1800 UC1 XX HDA 1.X /-AS8

Description

The Heavy-Duty Diesel PreCare Duplex Filter - Marine Configuration is an advanced system for diesel pre-filtration which is specifically designed for marine applications needing to meet the SOLAS guidelines. Providing safety in redundancy, the duplex configuration consists of an assembly with two filter housings, which are connected by a single change-over valve which can isolate the housings or operate them in parallel. The ductile iron construction also meets the high melting point requirements.

Features

- Simple, single-lever change-over ball valve for seamless operation and service
- Ductile iron construction, with no aluminum or plastic components to meet fire safety requirements
- Optional water sensor available with 10 marine approval certificates.
- ATEX pressure transducers available
- Long service life of the element yields low operating costs
- Easy installation due to various porting configurations
- Unsurpassed water removal for ULSD

Technical Specifications

Flow Rating	up to 238 gph (900 l/h) per side, 476 gph (1800 l/h) in dual operation
Operating Pressure	<22 psia, (<1.5 bar absolute) suction side application
Environmental Temperature Range	-13°F to 185°F (-25°C to 85°C) *for extended ranges, contact factory
Nominal Voltage	24V DC *for other requirements, contact factory
Weight	contact factory for your specific model code weight
Water Separation Efficiency	>95% to ISO CD 16332
Porting Thread	M33x2.0 (ISO 6149-1) *for other porting, contact factory

ON-BOARD FUEL FILTRATION PRODUCTS

Model Code *(also order example)*

HDPD KF2 1800 UC1 7 UED 1 . X / -AS1-H2-PH3

Filter Series

HDPD = HYDAC Diesel PreCare, Duplex

Filter Material

KF2 = Dieselmicron®

Size

1800 = 238 gph (900 l/h) per side, 476 gph (1800 l/h) dual operation

Evolution Stage

UC1 = Marine Filter Configuration

Filtration Rating

7 = 7 µm

Type of Clogging Indicator

A = Blanking Plug In Indicator Port (600 HT1 only)

Type Code

1

Modification Number

X = Latest version number always supplied

Options

-AS8 = Water-In-Fuel Sensor with Marine Approvals (contact factory for details)

Notes: For other options, configurations, drawings or approvals not listed, please contact factory

G Contamination Monitors

CONTAMINATION MONITORS

FCU 1315

Fluid Control Units - Portable Models



Description

The Fluid Control Unit FCU 1315 series combines the advantages of the portable contamination measurement units with the measurement technology of the TestMate® Contamination Monitor (TCM) and TWS (TestMate® Water Sensor), in a portable, field-ready package for diesel fuel applications.

The FCU 1315 is a portable service unit and is designed for temporary measurement of solid particle contamination and water saturation in diesel storage, diesel transfer and diesel filling applications.

The FCU 1315 will measure contamination levels of diesel fuel, as well as mineral based hydraulic oils compatible with Viton® seals. The FCU 1315 is not compatible with water glycol fluids.

The integrated pump and the hoses with test point connections, which are included with the FCU 1315, allow operation on diesel fuel storage tanks and transfer circuits, as well as on hydraulic reservoirs, control circuits, and pressure circuits.

To ensure safe operation with diesel fuel, the FCU 1315 is equipped with a grounding wire, along with an integral temperature monitoring system to ensure the device switches off when operated above the critical temperature of diesel fuel (113°F, 45°C).

Features

- Particulate contamination is detected with an optical measurement cell
- Automatic measurement and display of cleanliness ratings as ISO 4406:1999; SAE AS 4059, and NAS 1638
- Measurement Accuracy +/- 1/2 ISO code
- Supply voltage 24 VDC
- Integrated pump for automatic control of oil flow
- Viscosity range: 33 to 1622 SUS (2 to 350 cSt)
- Water saturation (0 - 100%)

Applications

- Diesel Storage
- Diesel Transfer and Filling
- Diesel Service and Maintenance

Technical Specifications

General Data	
Self-diagnosis	Continuously with error indication via status LED and display
Measured Value	ISO code/ SAE Class / NAS Class / Saturation Level / Temperature
Measuring Range	Display from ISO code 9/8/7 (MIN) to ISO code 25/24/23 (MAX) Calibrated within the range ISO 13/11/10 to 23/21/18 Saturation level 0 to 100% / Temperature -13° to 212°F (-25 to 100°C)
Accuracy	±1/2 ISO class in the calibrated range / ± 2 % Full scale max for Water Sat. and Temp
Seal Material	FPM seals
Ambient Temperature Range	32 to 113°F (0 to 45°C)
Storage Temperature Range	-40 to 176°F (-40 to 80°C)
Dimensions (cover closed)	9.06" H x 16.14" L x 13"D
IP class	IP50 in operation IP67 closed
Weight	approx. 29 lbs (13 kg) without accessories
With Diesel According to ASTM D975 4-D or DIN EN 590	IN: 0 psi (0 bar) OUT: 0 psi (0 bar)
Hydraulic Data	
Hydraulic Fluid Operating Pressure	in: -7.25 to 650 psi (-0.5 to 45 bar) out: 0 to 7.5 bar (0 to .5 psi)
with Adaptor for Pressure Lines	in: 15 to 345 bar / 217 to 5000 psi out: 0 to 0.5 bar / 0 to 7.5 psi
Pressure Max.	5000 psi (345 bar)
Permissible Viscosity Range	3 to 1622 SUS (1.5 to 350 cSt)
Fluid Temperature Range	32 to 158°F (0 to 70°C), or up to 113°F (45°C) for diesel fuel
Electrical Data	
Power Supply Voltage	24 VDC ±20%, residual ripple < 10%
Max. Power / Current Consumption	100 Watt / 4 A
Interface	Plug connection, 5-pole, male, M12x1 and USB

We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions please contact our technical department. All details are subject to technical changes.

Model Code

FCU 1 3 1 5 - 4 - U - AS - 1

Type	FCU = Fluid Control Unit
Series	1 = 1000 Series, 4 Particle Size Channels
Contamination Codes	3 = ISO 4406:1987; NAS 1638 / 2-5 µm, 5-15 µm, 15-25 µm, > 25 µm; can be switched to ISO 4406:1999; SAE AS 4059 (D) / > 4 µm(c), > 6 µm(c), > 14 µm(c), > 21 µm(c)
Housing	1 = For Mobile Use (Plastic Case with Appending Bag for Hoses and Cables)
Fluids	5 = Diesel Fuel According to ASTM D975 4-D / DIN EN 590, as well as Hydraulic and Lubrication Fluids Based on Mineral Oils
Options	4 = With Integrated Pump
Supply Voltage	U = 24 V DC
Integral Sensor	AS = AquaSensor AS 1000
Power Supply Adapter	1 = 100 to 240 V AC / 50/60 Hz / Single Phase

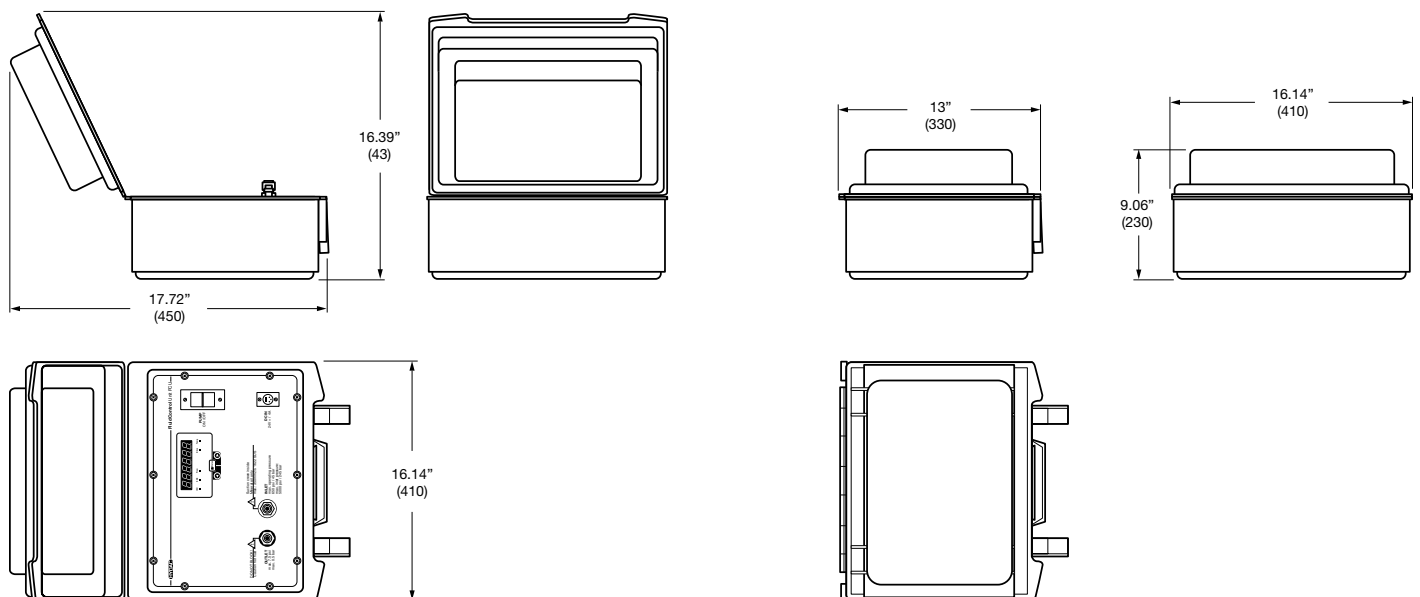
Scope of Delivery

We do not guarantee the accuracy or completeness of this information. The information is based on average working conditions. For exceptional operating conditions, please contact our technical department. All details are subject to technical changes.

Items supplied with FCU 1315-4-U-AS-1 include:

- Fluid Control Unit (FCU 1315)
- Power supply AC adapter with connecting cables to supply voltage for Europe, USA/Canada, UK, Australia, and Japan
- Adapter for pressure lines
- Adapter for clear suction hose
- Inlet pressure hose with screw connection for 1620 test point, length = 2 meters (approx. 79 inches)
- Inlet suction pipe (metallic) for bottle sampling
- 2x suction/return hoses, clear, quick couple terminations, 1 meter (approx. 39 inches)
- Operation Manual & Calibration Certificate
- CD Rom of FluMoS Light Software
- USB Flash Drive (which includes Operation and Maintenance Instructions in other languages)
- Grounding Terminal
- Accessories:
- Battery Pack (approx. 5 hours of use) Part No. 3504605
- Field Verification Startup Kit - Part No. 3443253
- Field Verification Kit (fluid only) - Part No. 3443249

Dimensions



Dimensions shown are inches (millimeters) and for general information only. For complete dimensions please contact HYDAC to request a certified print.

CONTAMINATION MONITORS

Diesel Fuel Quality Analysis Kits

Fuel analysis can identify potential causes for fuel filter plugging, smoking, loss of power, poor injector performance, malfunctioning throttle position sensors and sticking valves. Testing also confirms a diesel fuel's sulfur content, biodiesel content and compliance with manufacturer specifications and standards for cleanliness that could affect equipment warranty requirements.

HYDAC offers Troubleshooting and Diesel fuel quality test packages. All packages include pre-paid testing and the required number of fuel containers for sample.

***Total sample volume 32 oz required for all tests listed below**

Complete Fuel Quality and fuel filter ability | Fuel Stability Bio Content Test

Troubleshooting Test Packages

Complete Diesel Fuel Analysis	Includes	
<ul style="list-style-type: none"> Complete fuel quality, fuel filter-ability, fuel stability and <i>bio</i> content test (8 critical ASTM tests with a single comprehensive relational summary) <p>NOTE: Test 02098012 only can be run with as little as 14 oz. (402 mL) sample</p>	Filter Plugging Free Contamination	Computability Loss of Power
	Filter Plugging Injector Scoring Corrosion	Flowability Filterability Di or Tri Glyceride Fall Out
	All Cultures of Microbes	Microscopic Composition
	Filter Plugging Injector Scoring Microbial Promoting Cause of Water	Biodiesel Content
Contamination Tests	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies contamination from external sources - oil, biological growth, water, sediment Identifies contamination to be the result of a change in the fuel's physical properties - low thermal stability may require use of an asphaltene conditioner 	ICP	2mL
	Flash Point	200mL
	Thermal Stability	120mL
	Water and Sediment	200mL
	Bacteria, Fungi, Mold	120mL
Smoking Tests	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies low cetane index or water contamination - loss of power, white smoke Identifies excessive sulfur content - black smoke 	Sulfur	50mL
	Cetane Index	100mL
	API Gravity	400mL
	Distillation	200mL
	Water and Sediment	200mL
Filter Plugging Tests	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies contamination from external sources specific to filter plugging - high particle count, biological growth Identifies contamination due to a change in the fuel's physical properties - low thermal stability or insufficient cold weather capability for operating environment 	Thermal Stability	120mL
	Bacteria, Fungi, Mold	120mL
	Pour Point	100mL
	Cloud Point	100mL
	Cold Filter Plug Point	100mL
	Particle Count	80mL
Cleanliness Tests	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies water contamination - can lead to smoking, biological growth and corrosion Identifies particulate contamination - can result in extreme wear in high pressure fuel systems which may cause premature injector failure 	Karl Fischer	10mL
	Particle Count	80mL
Wear Prevention Tests	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies cause of wear - water contamination, excessive particles or insufficient lubricity 	Karl Fischer	10mL
	Particle Count	80mL
	Lubricity	20mL

Fuel Quality Test Packages

Summer Tests	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies contamination from external sources - oil, biological growth, water, sediment Identifies contamination to be the result of a change in the fuel's physical properties - low thermal stability may require use of an asphaltene conditioner 	Flash Point	200mL
	Water and Sediment	200mL
	Kinematic Viscosity	2mL
	Sulfur	50mL
	Cetane Index	100mL
	API Gravity	400mL
	Distillation	200mL
	Thermal Stability	120mL
	ICP	2mL
Winter Tests	Includes	Sample Amount
<ul style="list-style-type: none"> Identifies low cetane index or water contamination - loss of power, white smoke Identifies excessive sulfur content - black smoke 	Flash Point	200mL
	Water and Sediment	200mL
	Kinematic Viscosity	2mL
	Sulfur	50mL
	Cetane Index	100mL
	API Gravity	400mL
	Distillation	200mL
	Thermal Stability	120mL
	Pour Point	100mL
	Cloud Point	100mL
	Bacteria, Fungi, Mold	120mL
	ICP	2mL

H BetterFit® Fuel
Elements

Betterfit® Elements



Description

The filter elements in the Betterfit Diesel filter element series are particularly suitable for removing particles of dirt from diesel fuels. In this process, the Optimicron® diesel material with Helios pleated geometry is applied, which was developed especially for use with diesel fuels.

- Kaydon
- Parker
- Facet
- Gulfgate
- Murphy
- Racor
- Velcon
- And others

* Contact Factory for Crossovers not listed.

Features and Benefits

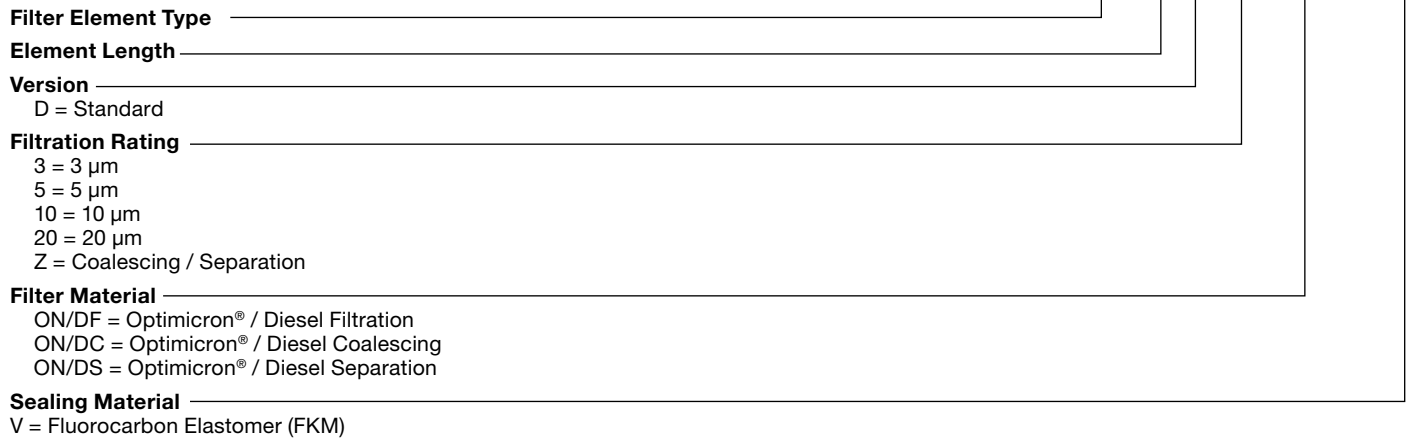
- Good price/performance ratio
- Lower maintenance costs due to longer service life
- Significant reduction in pressure loss and integrated pleat stabilization due to Helios pleated geometry
- High level of fluid cleanliness due to graduated structure of depth filter
- High contamination retention due to large depth effect of the filter material
- High media compatibility
- Filter element geometry suitable for use in housings made by other manufacturers

Technical Specifications

Differential Pressure Rating	Up to 75 psid <i>(dependent on part number)</i>
Maximum Operating Temperature Range	225°F (°C)
End Cap Material	Plated Aluminum <i>(Threaded base elements have injection-molded, glass filled nylon end caps)</i>
Center Tube Material (when included)	Plated Steel
Seal Material	Buna N <i>(other materials available upon request)</i>
Filter Element Length, Typical	20", 40", 60" <i>(others on request)</i>
Filtration Rating	5, 10, 20 µm <i>(others on request)</i>
Degree of Separation	> 99.5%
Permissible Fluid temperature	14°F to 176°F (-10°C to 80°C)

Model Code

1.25 40 D 05 ON/DF - V



Note: Use the HYDAC Betterfit Cross Reference Tool to Identify The Appropriate Model Code

Part Number	Model Code	Competitor	Competitor Code
Contact Factory	1.25.20 D 03 ON/DF /-V	Pall	HFU620GF020H13
Contact Factory	1.25.20 D 05 ON/DF /-V	Pall	HFU620GF060H13
Contact Factory	1.25.20 D 10 ON/DF /-V	Pall	HFU620GF100H13
Contact Factory	1.25.40 D 03 ON/DF /-V	Pall	HFU640GF020H13
3829783	1.25.40 D 05 ON/DF /-V	Pall	HFU640GF060H13
3877700	1.25.40 D 10 ON/DF /-V	Pall	HFU640GF100H13
3882380	1.25.40 D 20 ON/DF /-V	Pall	HFU640GF200H13
3828184	1.25.60 D 05 ON/DF /-V	Pall	HFU660GF060H13
3877699	1.25.60 D 19 ON/DF /-V	Pall	HFU660GF100H13
3952283	1.25.60 D 20 ON/DF /-V	Pall	HFU660GF200H13
3875491	1.32.20 D Z ON/DC /-V	Pall	LCS2H1AH
3875488	1.32.40 D Z ON/DC /-V	Pall	LCS4H1AH
3875110	1.33.20 D Z ON/DS /-V	Pall	LSS2F2H
3872179	15.01.29 D 05 ON/DF /-V	Velcon	DFO-629PLF6
3907748	15.03.44 D Z ON/DC /-V	Velcon	I-6444 TB
3907750	15.04.29 D Z ON/DS /-V	Velcon	SO-629PLF3
3866983	4.15.28 D 05 ON/DF /-V	Parker	HFS-28605-S
3907751	4.17.43 D Z ON/DC /-V	Parker	HCP-43601-TB
3907752	4.18.33 D Z ON/DS /-V	Parker	HSP-33605-S
3907754	45.01.33 D Z ON/DC /-V	Faudi	A.4-842
3907753	45.02.40 D Z ON/DS /-V	Faudi	60.644-1012

BETTERFIT FUEL ELEMENTS

Betterfit® Elements For Compressed Natural Gas (CNG) Applications Replaces Parker Finite® J-Series



Model Code

	4.25	.05	D	0.01	ZC
Filter Element Type	4.25 = Parker Finite® J-Series, B Size 4.26 = Parker Finite® J-Series, C Size 4.27 = Parker Finite® J-Series, D or E Size				
Element Length	05 = B Size 07 = C Size 10 = D Size 14 = E Size				
Version	D = Standard				
Filtration Rating (microns)	0.01 = 0.01 001 = 1 µm 100 = 100 µm				
Filter Material	ZC = Synthetic Microglass MC = Stainless Steel Mesh				

Description

HYDAC provides the *Betterfit* replacement element series for the Parker Finite J-Series high pressure CNG filter housings. The *Betterfit* elements are equivalent in form, fit, and function using a pleated filter media design.

The *Betterfit* elements are designed for use in Compressed Natural Gas (CNG) applications. The offering provides replacement elements in a range of housing sizes from B through E, available with performance equivalents to the 4C, 10C, and WS media grades. Each element kit includes a set of replacement head and bowl o-rings, as well as a tube of lubricant.

Features and Benefits

- Robust & high-performance pleated coalescing media design
- Coalescing media efficiencies of 99% to 99.995%
- Standard element retention clip design for element stability
- 75+ PSID burst rating
- Integrated element standoff for optimum liquid contaminant

Technical Specifications

Differential Pressure Rating	75+ PSID
Max. Operating Temperature Range	300°F (149°C)
End Cap Material	Glass Reinforced Nylon
Center Tube Material	Plated Steel
Seal Material	Fluorocarbon, FKM
Micron Rating	0.01, 1, 100 µm (per ISO 12500-4)
Coalescing Efficiency	99% to 99.995% (per ISO 12500-3)

Parker Finite® PN	HYDAC Betterfit® PN	Sealing OD (inches)	Nom. Length (inches)	Coalescing Efficiency	Micron Rating (µm)	Media Composition	Dry Pressure Drop (PSID)
4CJBK	4.25.05 D 0.01 ZC	1.36	8.66	99.995%	0.01	Synthetic Microglass	0.4
10CJBK	4.25.05 D 001 ZC	1.36	8.66	95%	1	Synthetic Microglass	0.2
WSJBK	4.25.05 D 100 MC	1.36	8.66	99+% Water Removal	100	Stainless Steel Mesh	<0.2
4CJCK	4.26.07 D 0.01 ZC	1.66	9.73	99.995%	0.01	Synthetic Microglass	0.4
10CJCK	4.26.07 D 001 ZC	1.66	9.73	95%	1	Synthetic Microglass	0.2
WSJCK	4.26.07 D 100 MC	1.66	9.73	99+% Water Removal	100	Stainless Steel Mesh	<0.2
4CJDK	4.27.10 D 0.01 ZC	2.44	12.73	99.995%	0.01	Synthetic Microglass	0.4
10CJDK	4.27.10 D 001 ZC	2.44	12.73	95%	1	Synthetic Microglass	0.2
WSJDK	4.27.10 D 100 MC	2.44	12.73	99+% Water Removal	100	Stainless Steel Mesh	<0.2
4CJEK	4.27.14 D 0.01 ZC	2.44	16.56	99.995%	0.01	Synthetic Microglass	0.4
10CJEK	4.27.14 D 001 ZC	2.44	16.56	95%	1	Synthetic Microglass	0.2
WSJEK	4.27.14 D 100 MC	2.44	16.56	99+% Water Removal	100	Stainless Steel Mesh	<0.2

Betterfit® Elements For Particulate and Water Removal Replaces Parker FBO Series



Model Code

	4.19	10	R	05	ON/DF	-/V
Filter Element Type	4.19 = Parker FBO					
Element Length	10 = 10 in. 14 = 14 in.					
Version	R = Standard					
Filtration Rating (microns)	1 = 1 µm 3 = 3 µm 5* = 5 µm 10 = 10 µm 25 = 25 µm					
Filter Material	ON/DF = Optimicron® / Diesel Filtration ON/DC = Optimicron® / Diesel Coalescing					
Sealing Material	V = Fluorocarbon Elastomer (FKM)					

Note: *The coalescing element is only available in a 5 µm filtration rating configuration

Description

HYDAC has developed the Betterfit replacement element series based upon the Parker FBO Series of filters. Our Betterfit design allows for our particulate and proven coalescing water removal filtration technology to be used within the Parker FBO Series filters found in the field today, providing improvements in water removal efficiency*, improvement in particulate retention** and filter element service life. The Betterfit particulate design incorporates the same advantages our synthetic media brings to fuel filtration with improved particulate removal efficiency and capacity. Along with improved performance comes a design that incorporates components that prevent degradation and eliminate the potential for corrosion.

*Water removal efficiency tested at 15 gpm according to fuel/water separation test procedure SAE J1488:2010

**Particulate retention was determined according to multi-pass test method ISO 16889:2008(E)

Features and Benefits

- HYDAC Betterfit Coalescing elements use proven, three stage coalescing filtration technology
- HYDAC Betterfit Particulate elements use fully synthetic, multi-layered filtration technology
- Synthetic filtration media eliminates degradation due to high water content fuel
- Stainless steel and polymer material of construction provide a robust and corrosion-resistant structure
- The coalescing element provides 1.88x the filtration surface of the OEM design
- Our proven three stage coalescing filtration technology for improvements in water removal efficiency and capacity
- Use of stainless steel support structure and polymer components prevent corrosion from high water content exposure
- Direct fitment into existing installations allow for immediate performance improvements with no system modifications
- Coalescing technology can provide a significant reduction in operating costs in comparison to absorbing technology, due to the benefit of “bottomless” water removal capacity.

Technical Specifications

Dif. Pressure Rating	75+ PSID
End Cap Material	Plastic
Center Tube Material	Stainless Steel
Seal Material	Fluoroelastomer (FKM)
Element Length, Typical	10 in., 14 in.
Filtration Rating	1, 3, 5, 10, 25 µm
Degree of Separation	>95%

Parker PN	Model Code	HYDAC PN
FBO 60331	4.19.10 R 05 ON/DF -/V	2214833
FBO 60334	Consider 4.19.10 R 05 ON/DC -/V	2214831
FBO 60328	4.19.10 R 05 ON/DC -/V	2214831
FBO 60354	4.19.10 R 10 ON/DF -/V	2214835
FBO 60355	Consider 4.19.10 R 05 ON/DC -/V	2214831
FBO 60353	Consider 4.19.10 R 05 ON/DC -/V	2214831
FBO 60332	4.19.10 R 25 ON/DF -/V	2214837
FBO 60335	Consider 4.19.10 R 05 ON/DC -/V	2214831
FBO 60329	Consider 4.19.10 R 05 ON/DC -/V	2214831
FBO 60340	4.19.14 R 05 ON/DF -/V	2214834
FBO 60343	Consider 4.19.14 R 05 ON/DC -/V	2214832
FBO 60337	4.19.14 R 05 ON/DC -/V	2214832
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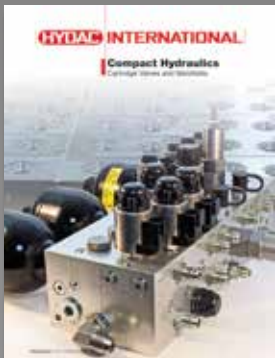
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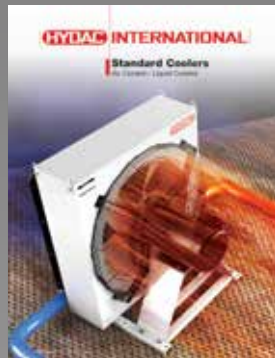
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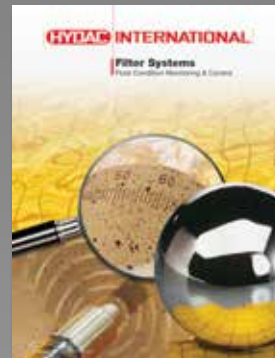
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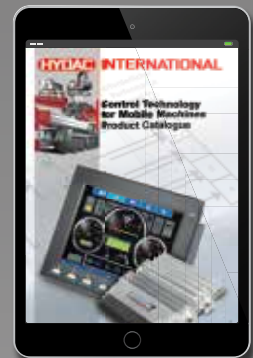
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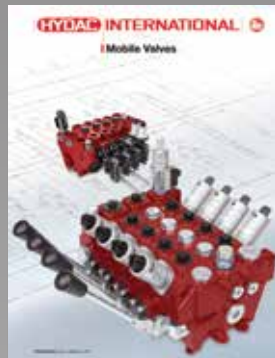
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