HYDAC INTERNATIONAL

Filters

Hydraulic & Lube Oil

PN#02081318 / 07.19 / FIL1907-2109

HYDAC

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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*For specific details on each filter assembly, please refer to the “Quick Reference Guide” - Section A.

HYDAC

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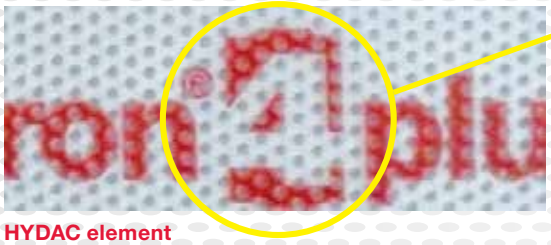
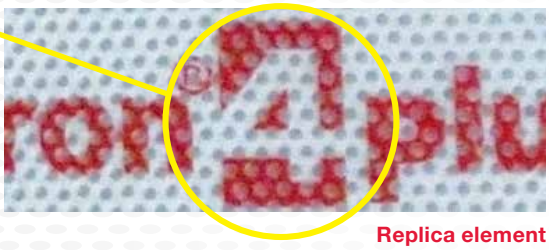
NOTE

Can You Spot The Difference?



HYDAC element

The frame of the “4” in the replica element is rectangular, whereas in the wrap which is used by HYDAC, the frame of the “4” is designed in the form of a filter element.



Replica element

Buy Only Genuine HYDAC

HYDAC multi-layer mesh-pack design with ultrasonic welded seam.

How to Spot the Difference

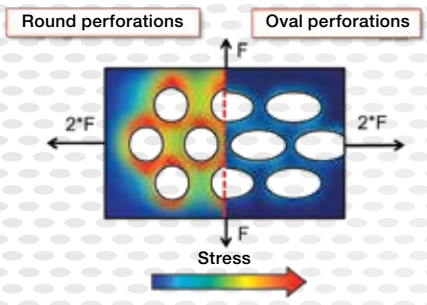
Here, notice the difference in the outer wrap: the perforation pattern and the red border around the “4”. Not visible, the pirated element had less filtration layers of lower quality and a glued seam (a HYDAC seam is typically welded). In addition, the end cap identification was inkjet printed (a genuine HYDAC element is laser etched) and the dates on the end cap and its packaging did not match. Last, subtle misspellings were noticed (Beta**rn**icron instead of Beta**m**icron and des**l**gned instead of des**i**gned).

It seems that everyone is in the replacement element business, but “Buyer Beware!”. There are suppliers—pirates—who have no concern for quality. Their mission is simply to capitalize on a brand’s reputation for quality engineering. Pirates will offer rock bottom prices, but remember: design differences result in performance differences. Keep in mind that “you get what you pay for”. Don’t end up paying the ultimate price – component failure, production down time and costly repair - by using a cheap, imitation, low-performing element.

The housing pictured right shows evidence of competitor element failure—bypass springs and pieces of the end cap in the outlet side. Application—gearbox. Using Genuine HYDAC products is imperative for optimal performance.

Winning the War

HYDAC has introduced a new outer wrap design to further differentiate our elements. This exclusive outer wrap both improves performance and provides you quality protection. It features a unique oval-shaped perforation that improves diffusion flow. This is a one-of-a-kind design, so if your element includes this feature, you are assured it is a HYDAC quality original and not an imitation. It is standard on all HYDAC elements.



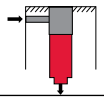
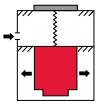
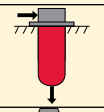
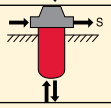
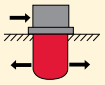
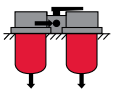
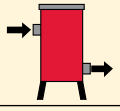
Identifying Genuine **HYDAC** could mean the difference between Success and Failure!

A

Quick Reference Guide

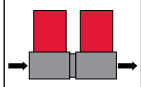
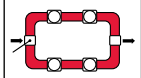
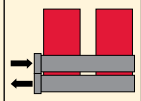
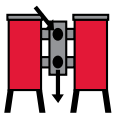
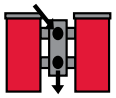
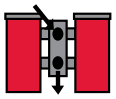
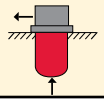
Quick Reference is an easy one-stop general selection guide. Broken down by operating pressure (low, medium, high), filter type (inside-tank, in-tank, inline, duplex, manifold-mount, etc.), maximum flow rate, port size, and flow path; Quick Reference narrows down the selection into one or more filter series suitable for the application. Catalog page numbers are also provided so that the desired filter series data sheet can be found with ease.

Low Pressure Filters

Filter Type	Maximum Pressure psi (bar)	Maximum Flow gpm (l/min)	Port Size Range (in)	Flow Path	Indicator D = Diff. S = Static	Filter Model Page	Features
Inside Tank	145 (10)	43 (165)	2 (outlet)		S	RFM...S*** page H2	Unique design places entire filter inside of the reservoir tank. Consult Factory.
	145 (10)	132 (500)	1.26 (outlet)		S	RFM...Set*** page H2	Unique design places entire filter inside of the reservoir tank plenum. Consult Factory. Ideal for low tank top clearances and multiple inlets to reservoir.
	145 (10)	317 (1200)	shroud		S	RKT*** page H12	Optimized system size and performance through air separation technology and versatile return flow options.
	145 (10)	317 (1200)	shroud		S	RKB*** page H24	Optimized system size and performance in large return flow applications, through air separation technology and versatile return flow options.
In-Tank	360 (25)	343 (1300)	1/2 - 4		S D-size 660 & up with DE option	RF page D2	HYDAC standard in-tank/in-line filters. Threaded or flanged outlets and one piece casting enable in-line use. Robust design.
	360 (25)	450 (1700)	4		S (in-tank; 1.x) D (in-line; 2.x)	NF** page D72	Configurable for in-tank or in-line applications. Low weight, water tolerant aluminum alloy-high flow capability.
	145 (10)	300 (1100)	3/4 - 2 1/2		S	RFM page D20	In-tank low cost high performance mobile filters – Sizes 75, 90, 150, 165, & 185 have a built-in breather option. All sizes allow oil filling through element.
	100 (7)	26 (100)	1" hose barb			RFMP*** page H8	In-tank return filter made of polyamide-housing and plastic lid-low cost.
	100 (7)	100 (378)	1 1/2		S	HF4R page D36	Meets HF4 automotive specs and uses industry standard-size HF4 spec elements. Threaded outlet permits in-line use.
	145 (10)	211 (800)	3/4 - 2 1/2		S & Vac.	RKM page D40	Single filter functions as return line and charge pump filter in single housing. *(up to two charge pumps)*
	145 (10)	634 (2400)	1 1/2 - 4 (inlet)		S	RFT*** page H30	Top-tank filtration with air separation technology, designed for small and large return flow applications.
	145 (10)	158 (600)	1 3/8 (inlet)		S	RFB*** page H46	Optimized system size and performance through air separation technology and versatile return flow options.
In-Tank Duplex	360 (25)	343 (1300)	3/4 - 4		S	RFD page D12	For return lines in continuously operating systems; tank mounting or in-line due to one piece casting.
	360 (25)	450 (1700)	4		S (1.x) D (2.x)	NFD page D86	For return lines in continuously operating systems; tank mounting (1.x) and in-line (2.x).
In-Line	360 (25)	350 (1325)	3, 4		D	RFL Cast page D145	Back Mount single filter with metric threads.
	145 / 232 (10 / 16)	3963 (15000)	2 - 12		D	RFL Welded page D155	Floor mounted. Holds up to ten 2600 high capacity elements. ASME and CRN versions available. For High flow applications.
	360 (25)	105 (400)	1 1/4		D	FLN (DIN) page D64	HYDAC standard DIN low pressure filter. Low weight, water-tolerant aluminum alloy.
	500 (34.5)	450 (1700)	4		D	NFH (modular) page D94	Filters can be manifolded for high viscosity applications. Housings designed for high flow up to 450 gpm, and/or high viscosity fluid *(e.g. in lube systems)*.

**For a Set version of this filter, refer to Set Series section of the catalog. ***Special Order Filter. Refer to catalog information for details.

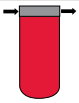
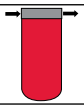
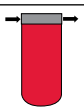
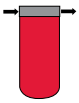
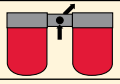
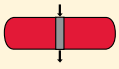
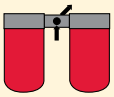
Low Pressure *(cont.)*

Filter Type	Maximum Pressure psi (bar)	Maximum Flow gpm (l/min)	Port Size Range (in)	Flow Path	Indicator D = Diff. S = Static	Filter Model Page	Features
In-Line Staged	360 (25)	300 (1136)	2 - 4		D	NF...UHE page D110	Ultra-high efficiency staged filter combinations to increase separation efficiencies far above levels achieved by single elements, for cleaning fluids and transferring.
	360 (25)	300 (1136)	4		D	NFD...UHE page D125	Ultra-high efficiency staged filter combinations to increase separation efficiencies far above levels achieved by single elements, for cleaning fluids and transferring.
In-Line Modular Manifold-Parallel	360 (25)	1350 (5110)	4		D	NF MMP page D133	In-line manifolded modular parallel filter assemblies for high flow and high viscosity applications particularly in primary metals and pulp and paper applications. Fully isolatable in maintenance mode-element changeout.
In-Line Duplex	(360 / 580) (25 / 40)	343 (1300)	1 - 4		D	RFLD Cast page D149	Back mounted duplex filter with metric threads. Ball valve changeover.
	145 / 232 (10 / 16)	3900 (14,763)	2 - 8		D	RFLD Welded page D165	Floor mounted. Holds up to ten 2600 high capacity elements per side. ASME and CRN versions available. For high flow applications. Large ball valve changeovers available.
	145 (10)	793 (3000)	2 - 6		D	RFLDH Welded*** page H54	Floor mounted. Holds up to 5 high cap. elements/side. ASME standard; Ball valve changeover. Carbon & stainless steel.
	232 (16)	634 (2400)	1 - 6		D	AFLD (API)*** page H64	In-line duplex filter series which are API 614 compliant. These filters are available with CRN, AS1210 and GOST certifications. Material certificate is standard.
	360 (25)	105 (400)	1 1/4 - 1 1/2		D	FLND (DIN) page D68	Integrated equalization valve with transfer valve. Light weight. CRN available. Water tolerant aluminum alloy.
	500 (34.5)	450 (1700)	4		D	NFHD (modular) page D102	Filters can be manifolded for high flow/ viscosity applications in continuously operating systems.
In-Tank Suction	360 (25)	30 (114)	3/4 - 2		Mechanical Bypass In Element	SF*** page H74	Mounts in-tank. Modified vacuum gauge indicators are available.

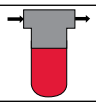
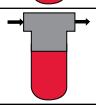
**For a Set version of this filter, refer to Set Series section of the catalog. ***Special Order Filter. Refer to catalog information for details.

QUICK REFERENCE

Spin-on Filters

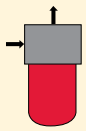
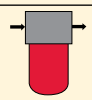
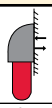
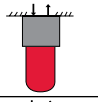
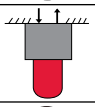
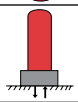
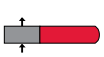
Filter Type	Maximum Pressure psi (bar)	Maximum Flow gpm (l/min)	Port Size Range (in)	Flow Path	Indicator D = Diff. S = Static	Filter Model Page	Features
Spin-On Single Element *(available in BSPP ports)*	120 (8.3)	7 (26.5)	3/8		N/A	MF 40 page D54	Standard length element. Not available with 3 µm Betamicron elements.
	120 (8.3)	15 (57)	3/4 - 1		S	MF 80 page D54	Standard length element. Not available with 3 µm Betamicron elements.
	120 (8.3)	25 (95)	3/4 - 1		S	MF 85 page D54	Extended length element. Same head as size 80. 10 µm paper elements only. 25 psid bypass standard.
	120 (8.3)	30 (113)	1 1/4 - 1 1/2		S	MF 160 page D54	Standard length element.
	120 (8.3)	60 (227)	1 1/4 - 1 1/2		S	MF 180 page D54	Extended length element. Same head as size 160.
	120 (8.3)	30 (113)	1 1/4 - 1 1/2		D	MF 190 page D54	Standard length element. ΔP Sensing Indicators for applications where tank not vented to atmosphere.
	120 (8.3)	60 (227)	1 1/4 - 1 1/2		D	MF 195 page D54	Extended length element. Same head as size 190. ΔP Sensing Indicators for applications where tank not vented to atmosphere.
	250 (17)	15 (57)	3/4 - 1		D	MF 90 page D54	Standard length element. 250 psi rating minimizes leakage in case of flow surges. ΔP sensing indicators. Not available in 3 µm or 25 µm paper elements.
	250 (17)	25 (95)	3/4 - 1		D	MF 95 page D54	Extended length element. 250 psi rating minimizes leakage in case of flow surges. Same head as size 90. ΔP sensing indicators. 20 µm Betamicron or 25 µm paper elements not available.
Spin-On Dual Elements	120 (8.3)	60 (227)	1 1/2		S	MFD 160 page D54	Parallel flow through two standard length elements mounted end to end.
	120 (8.3)	60 (227)	1 1/2 - 2		S	MFDS 160 page D54	Parallel flow through two standard length elements mounted side by side.
	120 (8.3)	120 (454)	1 1/2		S	MFD 180 page D54	Parallel flow through two extended length elements mounted end to end. Same head as MFD 160.
	120 (8.3)	120 (454)	1 1/2 - 2		S	MFDS 180 page D54	Parallel flow through two extended length elements mounted side by side. Same head as MFDS 160.

Medium Pressure Filters

Filter Type	Maximum Pressure psi (bar)	Maximum Flow gpm (l/min)	Port Size Range (in)	Flow Path	Indicator D = Diff. S = Static	Filter Model Page	Features
In-Line	750 (52)	90 (341)	1 1/2		D	HF4RL page E2	In -line top loaded simplex filter which meets HF4 automotive, specification requirements and performance.
	725 (50)	74 (280)	1/2 - 1 1/4		D	LPF** page E6	Multiple uses: pressure lines, returns, off-line loops, and lube lines. Aluminum for low weight and water tolerance.
	1450 (100)	174 (660)	1/2 - 1 1/2		D	LF** page E12	HYDAC standard filter. Aluminum for low weight and water tolerance.
	500 (34)	112 (425)	1 1/2		D	LPFH** page E16	Cost effective, high performance alternative to spin-on filters with integrated retrofit protection.
	725 (50)	35 (130)	3/4 - 1		D	MFX** page E20	ECO-friendly, cost effective high performance alternative to spin-on filters.

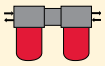
**For a Set version of this filter, refer to Set Series section of the catalog. ***Special Order Filter. Refer to catalog information for details.

High Pressure Filters

Filter Type	Maximum Pressure psi (bar)	Maximum Flow gpm (l/min)	Port Size Range (in)	Flow Path	Indicator D = Diff. S = Static	Filter Model Page	Features
In-Line	6090 (420)	200 (757)	1/2 - 2		D	DF** page F2	HYDAC standard high pressure filter. Wide choice of models and elements, and optional features.
	6090* / 4060 (420/ 280)	250 (946)	2		D	DF/DFF 1500 page F10	HYDAC high pressure filter, available in bi-directional and single-flow configurations.
	6090 (420)	160 (606)	2		D	DFFX*** page H80	In-line high flow ΔP optimized forward and reverse flow high pressure filter. High Flow and low differential pressure are prominent features.
	4060 (280)	100 (378.5)	1 - 1 1/2		D	HDF/HDFF*** page H88	In-line forward and reverse flow capable "L" ported, high pressure filter which utilizes competitive "9600" geometry filter elements. Available with and without bypass valves. Low and high collapse elements available.
	4000 (276)	25 (95)	3/4		D	HF2P page F18	Meets HF2 automotive specifications and uses industry standard-size elements. In-line configuration.
	6090 (420)	120 (454)	1 - 2		D	HF3P page F24	Meets HF3 automotive specifications and uses industry standard-size elements. In-line configuration.
	5000 (345)	120 (454)	1 1/2		D	HF4P page F28	Meets HF4 automotive specifications and uses industry standard-size elements. Top loading in-line configuration.
	4060 (280)	25 (95)	3/4		D	MFM** page F34	Low cost in-line high pressure filter *(efficient design and construction).*
	5800 (400)	37 (140)	1		D	HFM page F40	In-line high pressure filter.
Manifold Mount	4568 (315)	110 (416.4)	0.551 - 1.181		D	DF...QE page F64	Side mount to manifold; upper inlet, lower outlet. Size (30-280). Lower inlet, upper outlet sizes ≥ 330.
	4568 (315)	125 (473)	0.689 - 1.181		D	DFP page F70	HYDAC standard manifold filter. Ports at top.
	4000 (276)	25 (95)	0.689		D	HF2-P page F18	Meets HF2 automotive specifications and uses industry standard-size elements. Manifold configuration.
	5000 (345)	120 (454)	1.25		D	HF4-P page F28	Meets HF4 automotive specifications and uses industry standard-size elements. Manifold configuration.
Manifold Cartridge	3000 (207)	25 (95)	(1) SAE-16, (1 1/4) SAE-20		NA	CF page F82	Disposable, high pressure manifold cartridge filter. Low weight, water-tolerant aluminum alloy.
	3000 (207)	12 (45)	(1) SAE-16		NA	CP-C16 page F86	Circuit protector, high pressure manifold cartridge filter. Back-up protection for upstream pressure filters. Fits into standard C16-2 manifold port.
	6090 (420)	30 (113)	(5/8) SAE-10, (1) SAE-16, (1 1/2) SAE-24		NA	CP-SAE page F90	Circuit protector, high pressure manifold cartridge filter. Back-up protection for upstream pressure filters. Fits into standard SAE o-ring port.
Modular Stacking In-line	4568 (315)	10 (38)	D03/D05 Patterns (0.25 / 0.44)		D	DFZ page F76	Cartridge valve sandwich mount. Bowl on right side (standard) or left (optional).

*Good to 300,000 cycles. **For a Set version of this filter, refer to Set Series section of the catalog. ***Special Order Filter. Refer to catalog information for details.

High Pressure *(cont.)*

Filter Type	Maximum Pressure psi (bar)	Maximum Flow gpm (l/min)	Port Size Range (in)	Flow Path	Indicator D = Diff. S = Static	Filter Model Page	Features
Duplex	3045 (210)	106 (400)	1 1/4 - 1 1/2		D	FMND page F44	HYDAC standard DIN duplex high pressure filter. Right to left flow option available.
	4568 (315)	90 (340)	3/4 - 2		D	DFDK page F48	HYDAC standard industrial duplex for continuously operating systems.
	4568 (315)	90 (340)	2		D	HFDK4P*** page H92	Meets automotive specifications and uses HF4 standard-size elements. Top loading duplex configuration.
	4568 (315)	90 (340)	2		D	HFDK3P*** page H96	Specifically designed for the Pulp and Paper market.
In-line Reverse Flow	6090 (420)	100 (378.5)	1 1/4 - 2		D	DFFH page F56	Filters in one direction;bypasses in reverse. Common use: hydrostatic circuit.
In-line Bi-Directional Flow	6090 (420)	100 (378.5)	1 1/4 - 2 Flange Only		D	DFFHM page F64	Filters in both directions (bi-directional filtration and flow). Common use: hydrostatic circuit. See DFFH/DFFHM filter brochure.

**For a Set version of this filter, refer to Set Series section of the catalog. ***Special Order Filter. Refer to catalog information for details.

Betterfit® Elements

Description	Types of Elements
HYDAC supplies a wide range of elements that are dimensionally interchangeable with elements of other manufacturers. Elements are of the same media and quality construction as HYDAC proprietary elements. A list of available interchanges can be found under “Betterfit Element Selector” at www.hydac-na.com.	• High efficiency depth filtration, pressure and return • Surface filtration (wire mesh or paper) nominal, low pressure • Tank air-breather filters • Suction Strainers

B Overview of Filters

Note to the Reader

The objective of our catalog is to provide the information and guidance you'll need to make informed and appropriate choices for your filtration needs.

Illustrated and easy to understand, Section 1 - Contamination Control Fundamentals serves as an effective "primer" on contamination control. In the following sections, we also provide filtration information and guidance for selecting the optimal filter and element media for your application.

Section 1 explains recent changes in industry standards regarding how fluid cleanliness is defined and measured. Recent technological advancements in the measurement of microscopic particles, coupled with the establishment of a new standard test dust for calibration purposes, necessitated these changes. Although the new standards may seem confusing at first, they enable more accurate sizing of dirt particles and reduce variability in output among different automatic particle counters. The end result is more reliable data for the user.

Section 2 details element technical data and selection criteria. Performance and element testing is described. Element selection to fit the application is addressed.

Section 3 details filter selection considerations and provides procedures for selecting and sizing filters for system applications.

Section 4 provides a detailed overview of HYDAC elements and their performance specifications.

Section 5 you'll find extensive technical data on HYDAC's comprehensive collection of high efficiency depth (absolute) filter medias, which combine high efficiency performance with low pressure drop and exceptional dirt holding capacity. HYDAC's design engineers have also given special attention to developing more environmentally friendly products, such as Ecomicron® elements. These elements contain little or no metal and are made of fully recyclable materials for environmentally safe disposal.

Visit Us Online...

HYDAC's web site, ***www.hydac-na.com***, now offers our Online Cross-Reference Guide to Betterfit® replacement elements titled **Betterfit Element Selector**. With this user-friendly guide you can match filter elements from many other manufacturers with appropriate HYDAC Betafit® replacements.

ISO Certification

HYDAC is a worldwide leader in hydraulics. We have earned that role by emphasizing quality, innovation, and excellence in everything we manufacture. As an ISO 9001:2008 registered company, HYDAC is committed to maintaining high standards of quality and services.

WARNING!

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

This document and other information from HYDAC, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

HYDAC does not assume the risk of and shall not be liable for failure due to fire. HYDAC offers fire safety devices and recommends their use.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by HYDAC Corporation and its subsidiaries at any time without notice.

Corporate Overview

HYDAC focuses on the filtration needs of our customers in the fluid power industry and is proud of our proven track record of providing quality filtration products over the last thirty years. The designs you see in this catalog are the result of thousands of hours of field testing, laboratory research and decades of experience.

HYDAC is a leader in filtration and fluid conditioning and the proof of our expertise lies in our broad mix of quality products.

HYDAC's 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 leaders in the Filtration Supply Industry.

We are committed to providing the best available filter products to meet system and component mandatory cleanliness levels at a competitive price. As a cost-effective quality producer, we can work with your applicable department to supply contamination control technology or develop long-range supply and pricing programs that can improve your company's bottom line.

HYDAC's products, technical expertise, commitment to research and development, and ongoing improvements in manufacturing enable us to provide products and services that improve performance and efficiency in many major industries, including:

Capabilities

HYDAC has in place a strategically positioned international distribution network, supported by our professional and experienced sales and marketing team. Distributor personnel are trained in the important aspects of filter application by HYDAC in training sessions held at our factory and around the globe. The effectiveness of our product and service support is multiplied by utilizing HYDAC's extensive distributor network.

Products

HYDAC's products are continually tested using the latest ISO, ANSI and NFPA test procedures in our contamination control lab. Our dynamic test stands are in constant operation, subjecting our filter housings to cyclic pressure to verify their rated fatigue pressures per NFPA Standard T2.6.1 or other international standards. Statistically sampled elements are tested to ensure fabrication integrity in the manufacturing process. They are also tested for efficiency, stability and dirt-holding capacity in a multi-pass test facility, equipped with characterization instruments with in-line particle counting capabilities, which are calibrated to ANSI standards. In addition, a flat media multi-pass test is used in our ongoing filter media development program.

Extensive testing is conducted to ensure compatibility with various hydraulic fluids, including the newest fire-resistant fluids, per ISO 2943 Standard. Flow fatigue tests are run to evaluate the structural strength of elements, per ISO 3724 Standard.

HYDAC Standard Tests Design and Testing Standards of HYDAC Filter Housings

Description	Standard
Burst Pressure Test	NFPA/T-2.6.1
Fatigue Testing	NFPA/T-2.6.1
Pressure Drop vs. Flow	NFPA/T-3.10.14

Design and Testing Standards of HYDAC High Efficiency Elements

Description	Standard
Element Collapse (Burst)	ISO 2941
Fabrication Integrity	ISO 2942
Material Compatibility	ISO 2943
Element Flow Fatigue	ISO 3724
Pressure Drop/Flow Rate	ISO 3968
Multi-Pass	ISO 16889

All HYDAC element manufacturing facilities have newly upgraded multi-pass test facilities capable of dynamic element performance testing to better simulate actual application cyclic flow variations.

Section 1: Contamination Control Fundamentals

Why Filter?

Seventy to ninety percent of all hydraulic system failures are caused by contaminants in the fluid. Even when no immediate failures occur, high contamination levels can sharply decrease operating efficiency.

Contamination is defined as any substance which is foreign to a fluid system and degrades its optimum performance. Contamination can exist as a gas, liquid or solid. Solid contamination, generally referred to as particulate contamination, comes in all sizes and shapes and is normally abrasive.

High contaminant levels accelerate component wear and decrease service life. Worn components, in turn, contribute to inefficient system operation, seizure of parts, higher fluid temperatures, leakage, and loss of control. All of these phenomena are the result of direct mechanical action between the contaminants and the system components. Contamination can also act as a catalyst to accelerate oxidation of the fluid and spur the chemical breakdown of its constituents.

Filtering a system's fluid can remove many of these contaminants and extend the life of system components.
Filtration = System Protection / Management

How a System Gets Contaminated

Contaminants come from two basic sources: they either enter the system from outside (ingression) or are generated from within. New systems often have contaminants left behind from manufacturing and assembly operations. Unless they are filtered as they enter the circuit, both the original fluid and make-up fluid are likely to contain more contaminants than the system can tolerate. Most systems ingest contaminants through such components as inefficient air breathers and worn cylinder rod seals during normal operation. Airborne contaminants are likely to gain admittance during routine servicing or maintenance. Also, friction and heat can produce internally generated contamination.

Size of Solid Contaminants

The size of solid particle contaminants is commonly measured in micrometers, µm, (usually referred to as microns, µm). A micron is a unit of length equal to one millionth of a meter or about 0.00004 inch. Particles that are less than 40 µm cannot be detected by the human eye.

Figure 2 shows the sizes of some common substances. To gain some perspective, consider the diameters of the following substances:

Substance	Microns	Inches
Grain of table salt	100 µm	0.0039”
Human hair	80 µm	0.0027”
Talcum powder	10 µm	0.00039”
Bacteria (average)	2 µm	0.000078”

A micron rating identifies the size of particles that a particular filtration media is designed to remove. For instance, HYDAC 3 µm Betamicron® filter media is rated at ß3 ≥ 1000 (also equivalent to the filter media average pore size), meaning that it can remove particles of 3 µm and greater at 99.9% efficiency.

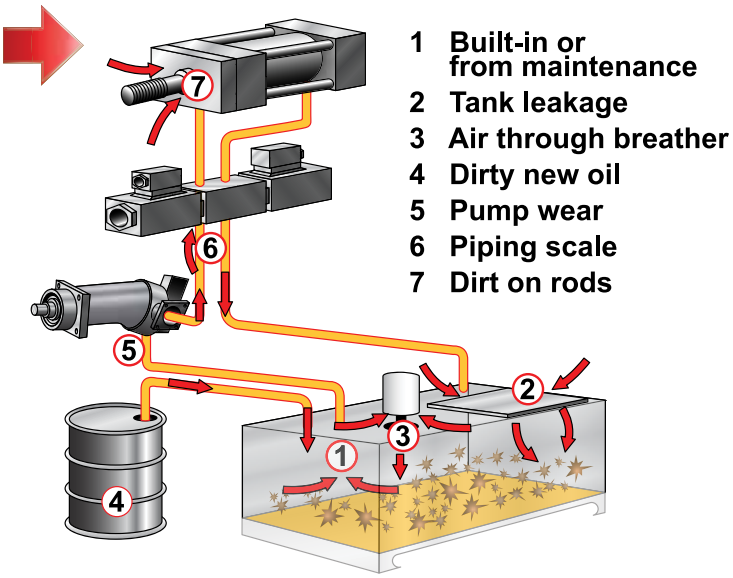


Figure 1. Typical Examples of Wear Due to Contamination

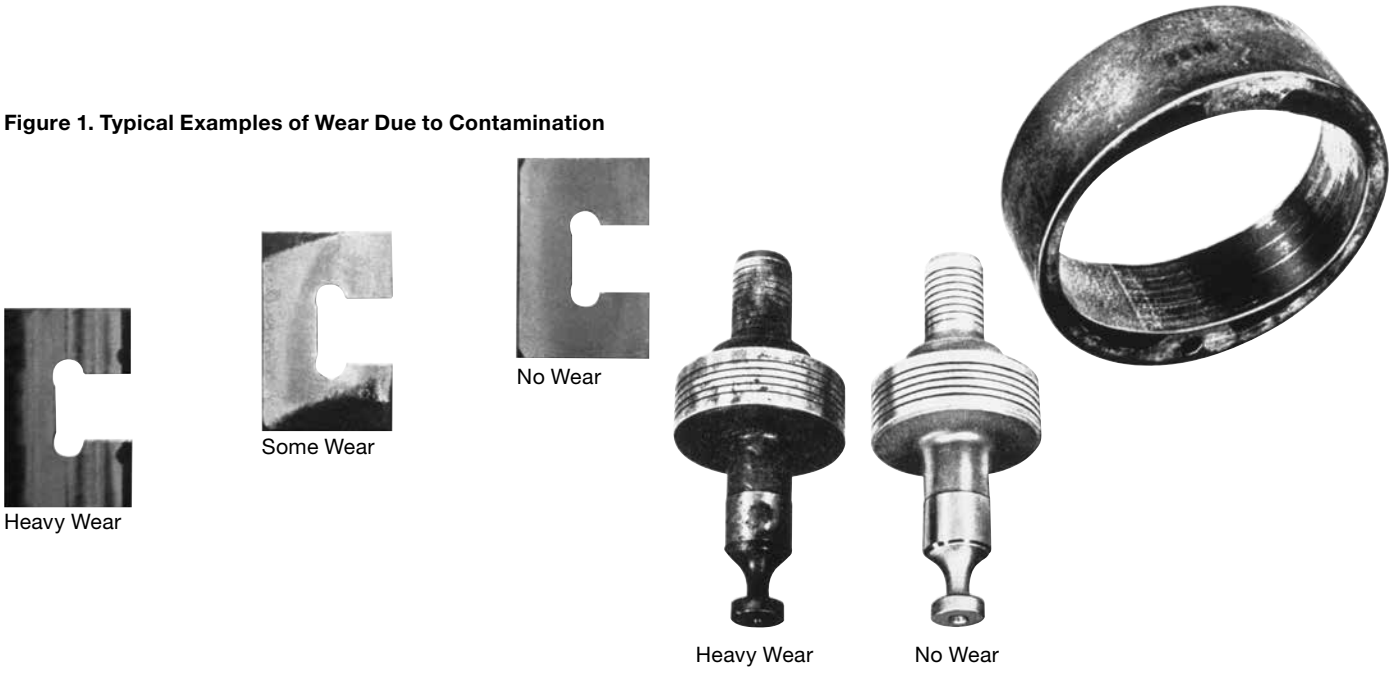


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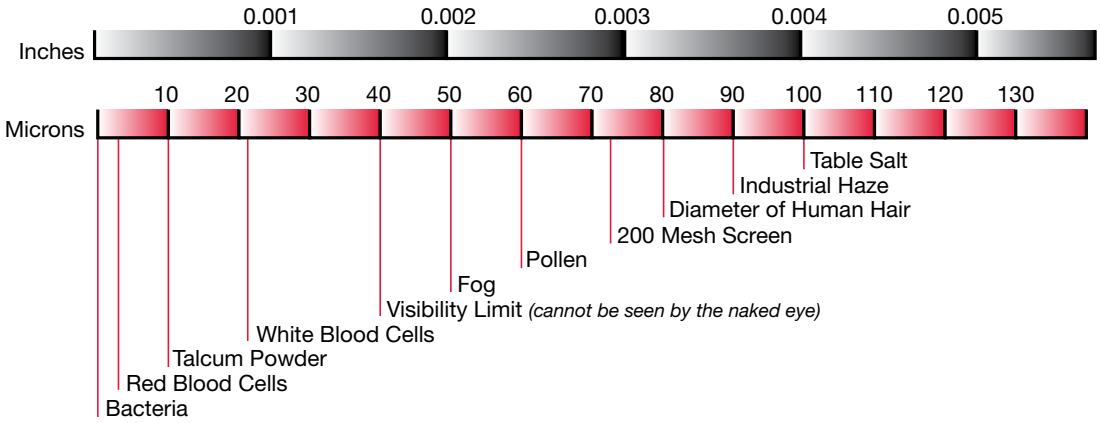
Figure 2. Sizes of known Particles in Inches and Microns



How Contaminants are Measured and Reported - Changes in the Industry

In hydraulic fluid power systems, power is transmitted and contained through a liquid under pressure within an enclosed circuit. These fluids all contain a certain amount of solid particle contaminants. The amount of particulate contaminants present in a hydraulic or lubrication system's fluid is commonly referred to as its cleanliness level.

In 1999, the International Standards Organization (ISO) introduced a series of new fluid cleanliness standards that reflect changes in measuring and defining the cleanliness of fluid systems and the way the size and amount of solid contaminants are reported. These standards are summarized in Table 1.

Table 1. Changes in Industry Standards

Previous	Current 1999	Description
ISO 4406	ISO 4406:1999	ISO Range Code
ISO 4402	ISO 11171	Automatic Particle Counter *(APC)* calibration procedures *(ACFTD to ISO MTD)*
ISO 4572	ISO 16889	Multi-pass test reports

The change in calibration procedures (ISO 4402 to ISO 11171) occurred for two reasons. First, the industry developed a new standard test dust for calibration fluid. This new ISO Medium Test Dust (ISO MTD) replaced the previously used AC Fine Test Dust (ACFTD), which is no longer available. Secondly, there has been a change in how particle sizes are measured. By way of newer technologies, particles are now measured in two dimensions, whereas in the past they had been measured using the largest dimension (chord). Older technology was not as precise as it is today, and particle sizes reported were less accurate. Table 2 shows that what used to be classified as a 2 µ particle is now classified as a 4.6 µ(c) particle. The (c) denotes that particle size measurements are certified using an Automatic Particle Counter (APC) which has been calibrated in accordance with ISO 11171.

ISO 11171 calls for the use of ISO MTD dust and changes the way we report the number of particles based on the new distribution of particles in the new standard reference material (SRM2806). Today, the ISO Medium Test Dust and the new calibration standard (11171) are used to synchronize all APC's. This change was made in an effort to reduce variability in tests conducted in different laboratories around the world.

How will these changes affect you?

In comparing the old standards to the new, the following have not changed:

- The amount and the size of solid contamination in your system is still the same!
- The filters still work the same way!

What has changed:

The way particle size is specified has changed.

The new standards and reporting methods "move the measuring stick" to correct for the inaccurate calibration assumptions made.

Particle Size Definitions - ISO 4402 vs. ISO 11171

This change in the way contaminants are measured had the net effect of changing the classification of the size of the particle.

Table 2. A Comparison of Particle Size Classification

ISO 4402 (ACFTD)	ISO 11171 (ISO MTD)
< 1.0 µm	4.0 µm(c)
1.0 µm	4.2 µm(c)
2 µm	4.6 µm(c)
3 µm	5.1 µm(c)
5 µm	6.4 µm(c)
10 µm	9.8 µm(c)
15 µm	13.6 µm(c)
20 µm	17.5 µm(c)
25 µm	21.2 µm(c)
Previous Size per ISO 4402	Current Size per ISO 11171

Note that the size of the particles is reported differently; i.e., a particle 1.0 µm in size under ISO 4402 is now considered to be 4.2 µm(c) in size. **Keep in mind that the particles are actually the same size they have always been; we are just using a different ruler.**

ISO Scale Numbers - ISO 4406 vs. ISO 4406:1999

ISO 4406:1999 provides guidelines for defining the level of contamination present in a fluid sample in terms of an ISO rating. Due to the change in the specification of particle sizes shown in Table 2, the definition of the ISO scale (or range) numbers needed to be redefined. Tables 3(a) and 3(b) provide a comparison of ISO scale numbers under ISO 4406 and 4406:1999, respectively.

Another change involved the addition of a third scale number to define an ISO rating. Under the old ISO 4406, the ISO scale numbers represented the number of particles greater than or equal to 5 µm and 15 µm in size. The new ISO 4406:1999 uses three scale numbers, representing the number of particles greater than or equal to 4 µm(c), 6 µm(c), and 14 µm(c) in size.

Figure 3(a) shows the graph used to plot particle counts per ISO 4406. When the count of particles ≥5 µm and ≥15 µm in size are plotted, the corresponding ISO rating can be determined graphically. Two micron (2 µm) levels are optional, as they are not a required part of the old ISO 4406 standard.

Similarly, Figure 3(b) shows the graph used to plot particle counts per ISO 4406:1999. This figure shows how 4406:1999 is different from the old ISO 4406 in that it plots the cleanliness level based on the number of particles at the 4 µm(c)/6 µm(c)/14 µm(c) sizes per 1 mL of fluid.

Also, filter companies previously measured the number of particles per 100 mL of sample fluid. Under ISO 4406:1999, we now report the number of particles per 1 mL of sample fluid.

It is important to note that net effect of all these changes keeps the ISO rating relatively unchanged.

Figure 3(a). Graphing Particle Counts per ISO 4406

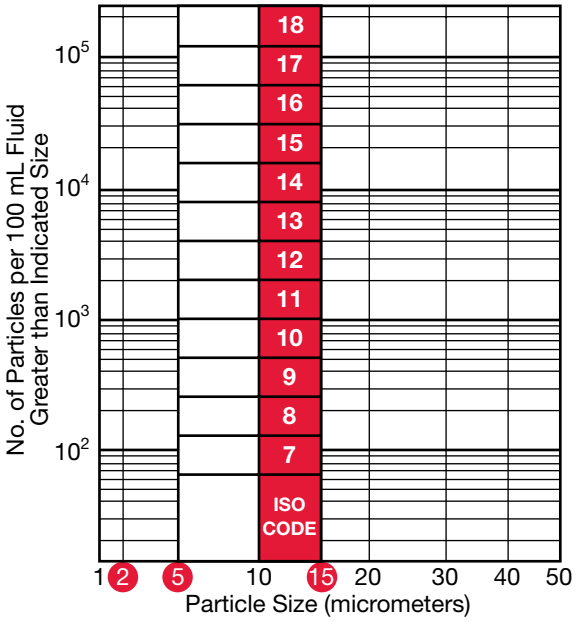
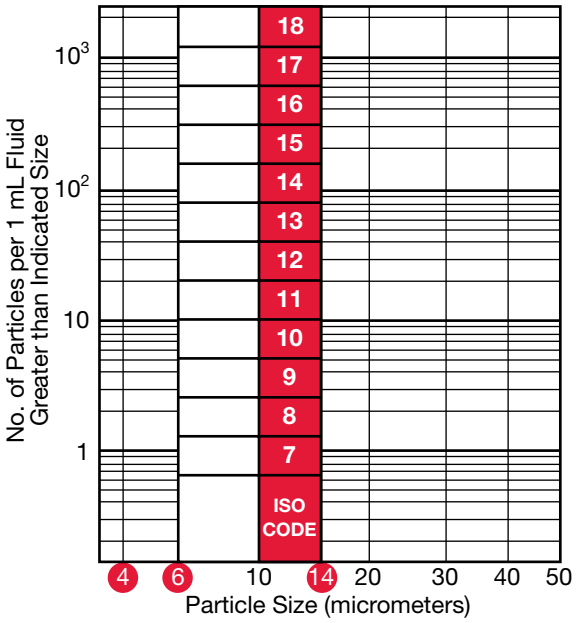


Figure 3(b). Graphing Particle Counts per ISO 4406:1999



Particle Size Diameter Comparison

1 µm = 0.001 mm = 0.000039 in.

The human eye can only see particles sized down to 40 microns.

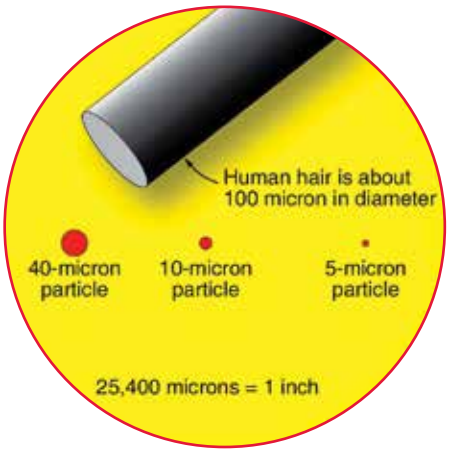


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Table 3(a). ISO Code 4406 Hydraulic Fluid Power–Solid Contamination Code

Number of Particles per 100 mL of Fluid		Scale Number
More Than	Up to and Including	
8,000,000	16,000,000	24
4,000,000	8,000,000	23
2,000,000	4,000,000	22
1,000,000	2,000,000	21
500,000	1,000,000	20
250,000	500,000	19
130,000	250,000	18
64,000	130,000	17
32,000	64,000	16
16,000	32,000	15
8,000	16,000	14
4,000	8,000	13
2,000	4,000	12
1,000	2,000	11
500	1,000	10
250	500	9
130	250	8
64	130	7
32	64	6
16	32	5
8	16	4
4	8	3
2	4	2
1	2	1

Previous ISO codes are commonly made up of 2 scale numbers representing the number of particles ≥5 µm and ≥15 µm. Showing a third scale number, ≥2 µm is optional. The left number will always be larger. The scale numbers are defined such that each successive scale is generally a doubling of the previous scale. The particle count can be expressed as the number of particles per mL or per 100 mL, but the ISO range numbers and the ISO codes do not change.

Table 3(b). ISO 4406:1999 Hydraulic Fluid Power–Solid Contamination Code (New)

Number of Particles per 1 mL of Fluid		Scale Number
More Than	Up to and Including	
1,300,000	2,500,000	28
640,000	1,300,000	27
320,000	640,000	26
160,000	320,000	25
80,000	160,000	24
40,000	80,000	23
20,000	40,000	22
10,000	20,000	21
5,000	10,000	20
2,500	5,000	19
1,300	2,500	18
640	1,300	17
320	640	16
160	320	15
80	160	14
40	80	13
20	40	12
10	20	11
5	10	10
2.5	5	9
1.3	2.5	8
0.64	1.3	7
0.32	0.64	6
0.16	0.32	5
0.08	0.16	4
0.04	0.08	3
0.02	0.04	2
0.01	0.02	1
0.00	0.01	0

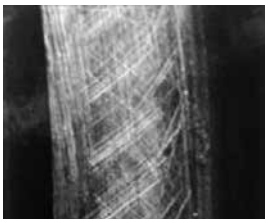
Current ISO codes are made up of 3 numbers representing the number of particles ≥4 µm(c), ≥6 µm(c) and ≥14 µm(c). The particle count is expressed as the number of particles per mL.

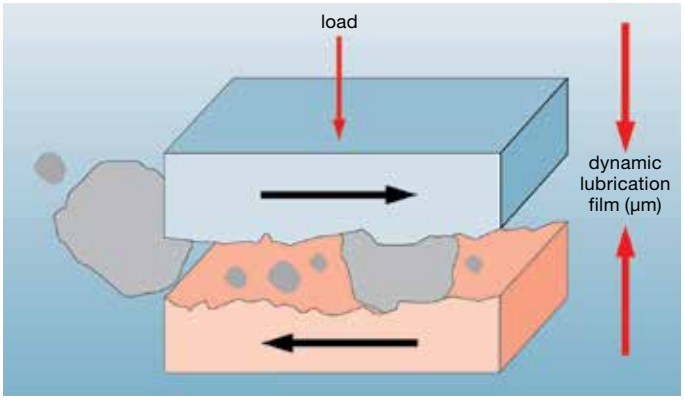
What types of wear are there?

1. **Abrasion** caused by particles between reciprocating surfaces.
2. **Erosion** caused by particles and high fluid velocity.
3. **Adhesion** caused by metal-to-metal friction (loss of fluid).
4. **Surface fatigue** surfaces damaged by particles are subjected to repeated stress.
5. **Corrosion** caused by water or chemicals.

Example Effects of Abrasion:

- Changes to tolerances
- Leakage
- Reduced efficiency
- Particles produced in the system create more wear!





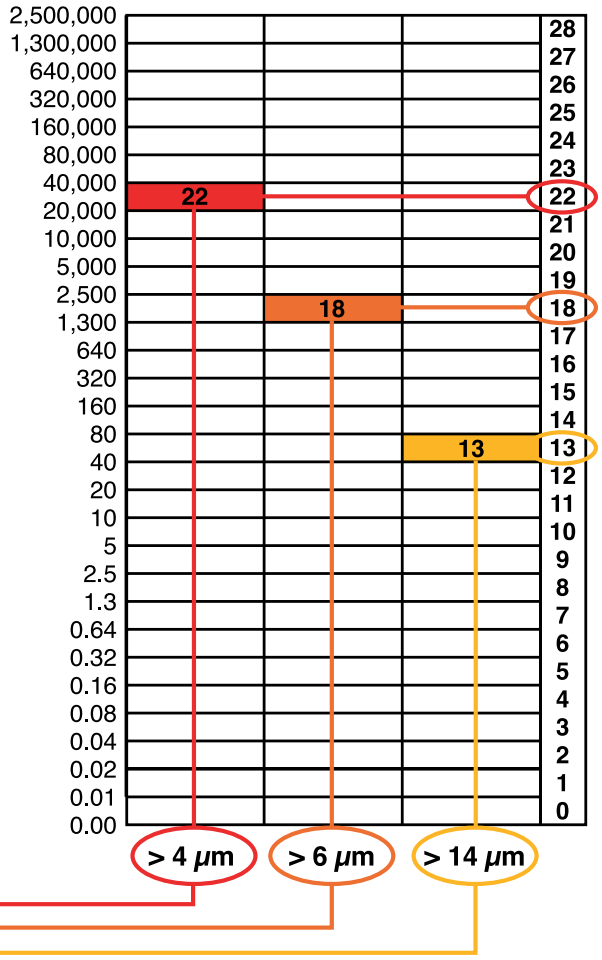
ISO 4406 Code

Cleanliness levels are defined by three numbers divided by slashes (/.) These numbers correspond to 4, 6, and 14 micron, in that order. Each number refers to an ISO Range Code, which is determined by the number of particles for that size (4,6, & 14µm) and larger present in 1 ml of fluid. Each range is double the range below. Refer to the chart below to see the actual ranges.

Example:

larger than 4µm = 22,340
larger than 6µm = 1,950
larger than 14µm = 43

ISO Code = 22 / 18 / 13



Achieving the appropriate cleanliness level in a system

The only way to achieve and maintain the appropriate cleanliness level in a hydraulic or lubrication system, is to implement a comprehensive filtration program. HYDAC offers all of the products that are needed to monitor and control component and system cleanliness—they include:

Solid Contamination

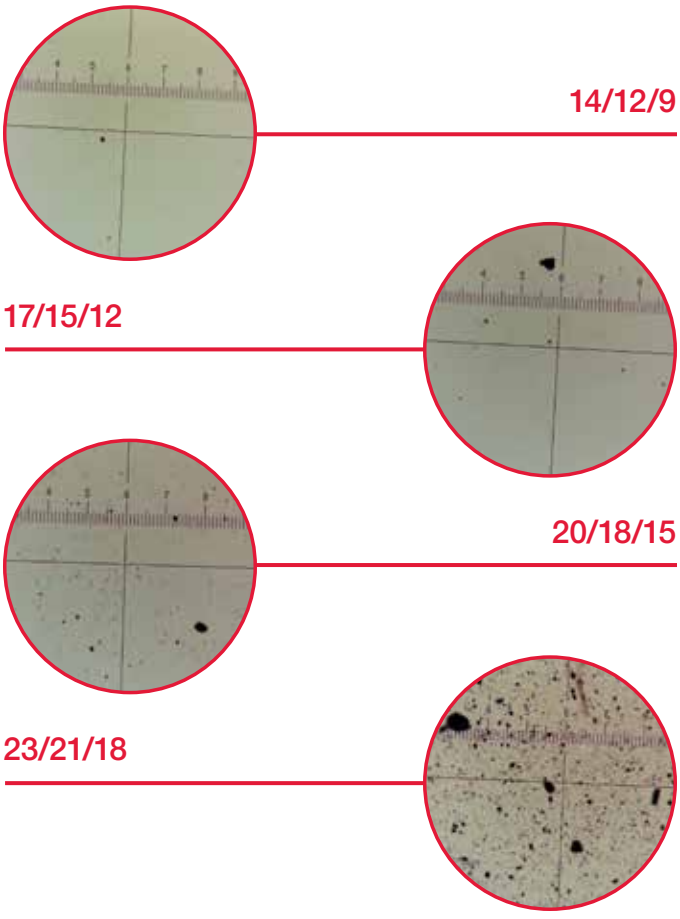
- pressure filters
- return line filters
- offline filtration loops
- oil transfer units for precleaning new oil
- portable and online contamination monitors
- reservoir breathers and filler/breathers

Water Content

- water content sensors
- reservoir breathers with silica gel desiccant
- vacuum dehydration water removal units
- water removal elements

Fluid Analysis

- bottle sampling kits
- complete analysis kits



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Cleanliness Levels - ISO 4406 vs. ISO 4406:1999

The following example shown in Figures 4(a) and 4(b) compares the cleanliness level, or ISO rating, of a typical petroleum-based fluid sample using both the previous ISO Code 4406 and the current ISO Code 4406:1999 rating systems.

The fluid sample contains a certain amount of solid particle contaminants, in various shapes and sizes. Figure 4(a) shows a 100 mL sample that contains 300,000 particles greater than 2 µm in size, 20,000 particles greater than 5 µm in size, and 1,500 particles greater than 15 µm in size.

Since the particle count for contaminants size 2 µm and greater falls between 250,000 and 500,000, the first *(optional)* ISO range *(or scale)* number is 19 using Table 3(a). The particle count falls between 16,000 and 32,000 for particles greater than 5 µm, so the second ISO range number is 15. The particle count falls between 1,000 and 2,000 for particles greater than 15 µm, so the third ISO range number is 11. Thus, the cleanliness level for the fluid sample shown in Figure 4(a) per ISO 4406 is ISO 19/15/11.

In Figure 4(b), note that 1 mL of fluid (not per 100 mL) is measured per ISO 4406:1999. Also, the amount of particles at the 4 µm(c)/6 µm(c)/14 µm(c) levels are measured instead of at the 2 µm/5 µm/15 µm levels.

The number of 4 µm(c) particles falls between 2500 and 5000, so the first ISO range number is 19 using Table 3(b). The count for 6 µm(c) particles falls between 160 and 320 particles, so the second ISO range number is 15. The 14 µm(c) particle counts falls between 10 and 20, so the third range number is 11. Therefore, the cleanliness level for the fluid sample shown in Figure 4(b) per ISO 4406:1999 is 19/15/11.

Although the ranges for the scale numbers have changed, the resulting ISO Code has not changed.

Figure 4(a). Determining the ISO Rating of a Fluid Using ISO 4406 **Previous**

Sample Fluid **100 mL**

Particle Size	Number of Particles
≥ 2 µm	300,000
≥ 5 µm	20,000
≥ 10 µm	4,000
≥ 15 µm	1,500
≥ 20 µm	1,000
≥ 30 µm	0.3

If Particle Count Falls Between	Scale Number is*
250,000-500,000	19
16,000-32,000	15
1,000-2,000	11

*Source: ISO/DIS 4406

The Sample Fluid is ISO 19/15/11.

optional

Figure 4(b). Determining the ISO Rating of a Fluid Using ISO 4406:1999 **Current 1999**

Sample Fluid **1 mL**

Particle Size	Number of Particles
≥ 4 µm(c)	3,000
≥ 5 µm(c)	700
≥ 6 µm(c)	200
≥ 10 µm(c)	
≥ 14 µm(c)	15
≥ 15 µm(c)	
≥ 20 µm(c)	10
≥ 30 µm(c)	3

If Particle Count Falls Between	Scale Number is*
2,500-5,000	19
160-320	15
10-20	11

*Source: ISO 4406:1999

The Sample Fluid is ISO 19/15/11.

Required Cleanliness Levels

The pressure of a hydraulic system provides the starting point for determining the cleanliness level required for efficient operation. Table 4 provides general guidelines for recommended cleanliness levels based on pressure.

Low pressure: 0-500 psi (35 bar)
Medium pressure: 500-1500 psi (35-100 bar)
High pressure: 1500 psi (100 bar) and above

Table 4. Cleanliness Level Guidelines Based on Pressure

System Type	Recommended Cleanliness Levels (ISO Code)
Low pressure – manual control	20/18/15 or better
Low to medium pressure – electro-hydraulic controls	19/17/14 or better
High pressure – servo controlled	16/14/11 or better

A second consideration is the type of components present in the hydraulic system. The amount of contamination that any given component can tolerate is a function of many factors, such as clearance between moving parts, frequency and speed of operation, operating pressure, and materials of construction. Tolerances for contamination range from that of low pressure gear pumps, which normally will give satisfactory performance with cleanliness levels typically found in new fluid (ISO 19/17/14), to the more stringent requirements for servo-control valves, which need oil that is eight times cleaner (ISO 16/14/11).

For your convenience, Table 5 provides a cross reference showing the approximate correlation between several different scales or levels used in the marketplace to quantify contamination. The table shows the code levels used for National Aerospace Standard (NAS)1638 and Military Standard 1246A, as well as the new SAE AS4059 standard.

Table 5. ISO Cleanliness Level Correlation

ISO Code 4 µ(c)/6 µ(c)/14 µ(c)	NAS 1638 (1967)	Mil Std. 1246A (1967)	ACFTD Gravimetric Level–mg/L	SAE AS4059 Standard
21/19/16	10			11
20/18/15	9			10
19/17/14	8	300		9
18/16/13	7		1	8
17/15/12	6			7
16/14/12		200		
16/14/11	5			6
15/13/10	4		0.1	5
14/12/9	3			4
13/11/8	2			3
12/10/8		100		
11/10/7	1			2

Finding the cleanliness level required by a system

Today, many fluid power component manufacturers are providing cleanliness level *(ISO code)* recommendations for their components. They are often listed in the manufacturer's component product catalog or can be obtained by contacting the manufacturer directly. Their recommendations may be expressed in desired filter element ratings or in system cleanliness levels *(ISO codes or other codes)*. Some typically recommended cleanliness levels for components are provided in table below.

1. Starting at the left hand column, select the most sensitive component used in the system.
2. Move to the right to the column that describes the system pressure and conditions.
3. Here you will find the recommended ISO class level, and recommended element micron rating.

Table 6. Cleanliness Level Required by a System

	Low/Medium Pressure Under 2000 psi (moderate conditions)		High Pressure 2000 to 2999 psi (low/medium with severe conditions[1])		Very High Pressure 3000 psi and over (high pressure with severe conditions[1])	
	ISO Target Levels	Micron Ratings	ISO Target Levels	Micron Ratings	ISO Target Levels	Micron Ratings
Pumps						
Fixed Gear or Fixed Vane	20/18/15	20	19/17/14	10	18/16/13	5
Fixed Piston	19/17/14	10	18/16/13	5	17/15/12	3
Variable Vane	18/16/13	5	17/15/12	3	not applicable	not applicable
Variable Piston	18/16/13	5	17/15/12	3	16/14/11	3[2]
Valves						
Check Valve	20/18/15	20	20/18/15	20	19/17/14	10
Directional (solenoid)	20/18/15	20	19/17/14	10	18/16/13	5
Standard Flow Control	20/18/15	20	19/17/14	10	18/16/13	5
Cartridge Valve	19/17/14	10	18/16/13	5	17/15/12	3
Proportional Valve	17/15/12	3	17/15/12	3	16/14/11	3[2]
Servo Valve	16/14/11	3[2]	16/14/11	3[2]	15/13/10	3[2]
Actuators						
Cylinders, Vane Motors, Gear Motors	20/18/15	20	19/17/14	10	18/16/13	5
Piston Motors, Swash Plate Motors	19/17/14	10	18/16/13	5	17/15/12	3
Hydrostatic Drives	16/15/12	3	16/14/11	3[2]	15/13/10	3[2]
Test Stands	15/13/10	3[2]	15/13/10	3[2]	15/13/10	3[2]
Bearings						
Journal Bearings	17/15/12	3	not applicable	not applicable	not applicable	not applicable
Industrial Gearboxes	17/15/12	3	not applicable	not applicable	not applicable	not applicable
Ball Bearings	15/13/10	3[2]	not applicable	not applicable	not applicable	not applicable
Roller Bearings	16/14/11	3[2]	not applicable	not applicable	not applicable	not applicable

1. Severe conditions may include high flow surges, pressure spikes, frequent cold starts, extremely heavy duty use, or the presence of water
2. Two or more system filters of the recommended rating may be required to achieve and maintain the desired Target Cleanliness Level.

Section 2: 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

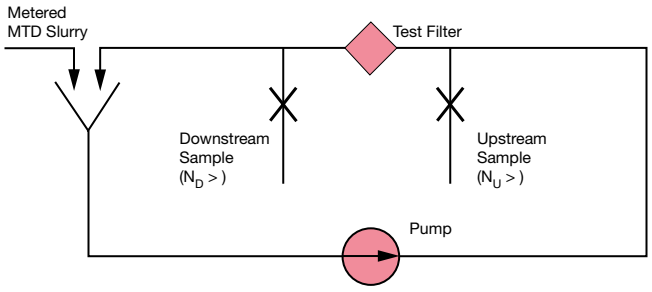
Filter element efficiency ratings and capacities are determined by conducting a multi-pass test under controlled laboratory conditions. This is a standard industry test with procedure published by the International Standards Organization (ISO), the American National Standards Institute (ANSI), and the 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.

$\beta_{x(c)}$ = number of particles upstream/ 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)*

Figure 5. Multi-Pass Test Schematic



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)

β_x = number of particles upstream ≥ x microns / number of particles downstream ≥ x microns

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

ISO 16889 (Current 1999)

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

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

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.

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 ÷ 75 = 0.987	74 ÷ 75 = 0.987
Step 4:	0.987 x 100 = 98.7%	0.987 x 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 ÷ 200 = 99.5%	199 ÷ 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 ($\beta_{x(c)}$ >=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

1. 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.
2. 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.

Fluid Compatibility: Fire Resistant Fluids

HYDAC filters have been used successfully to filter a variety of fire resistant fluids. Filtering these fluids requires careful attention to filter selection and application. Your fluid supplier should be the final source of information when using these fluids. The supplier should be consulted for recommendations regarding limits of operating conditions, material and seal compatibility, and other requirements peculiar to the fluid being used within the conditions specified by the fluid supplier.

High Water Content Fluids

High water base fluids consist primarily of two types: water and soluble mineral base oil, and water with soluble synthetic oil. The oil proportion is usually 5%, but may vary from as low as 2% to as high as 10%.

Standard HYDAC US manufactured Betamicron® elements are compatible with both (HFA & HFC) types of high water content fluids. Filter sizing is accomplished the same as it is done with other mineral based hydraulic fluids. Some special factors that need to be considered in the selection process include the following:

- All aluminum in the filter housing should be high water based tolerant or anodized.
- Buna N or Viton seals are recommended, subject to manufacturer stated compatibility.
- The high specific gravity and low vapor pressure of these fluids create a potential for severe cavitation problems. Suction filters or strainers should not be used with these fluids.

Invert Emulsions

Invert emulsions consist of a mixture of petroleum based oil and water. Typical proportions are 60% oil to 40% water. Standard HYDAC filters with 10 µm and 25 µm media elements are satisfactory for use with these fluids. Filters should be sized conservatively for invert emulsions. These fluids are non-Newtonian - their viscosity is a function of shear. We recommend up to twice the normal element area be used as space and other conditions permit.

Some special factors that need to be considered in the selection process include the following:

- Potential exists for cavitation problems with invert emulsions similar to high water based fluids.
- Buna N or Viton seals are recommended, subject to manufacturer stated compatibility.

Water Glycols

Water glycols consist of a mixture of water, glycol, and various additives. HYDAC Betamicron® filter elements are compatible for use with these fluids. Some special factors that need to be considered in the selection process include the following:

- All aluminum in the filter should be water tolerant or anodized.
- Potential exists for cavitation problems with water glycols similar to high water based fluids.
- Buna N or Viton seals are recommended, subject to manufacturer stated compatibility.

Phosphate Esters

Phosphate esters are classified as synthetic fluids. All HYDAC filters and elements can be used with most of these fluids. Sizing should be the same as with mineral based oils of similar viscosity. Some special factors that need to be considered in the selection process include the following:

- Use any Betamicron® media with EPR or Viton seals if required by fluid manufacturer for phosphate esters.
- Use S0103H *(low collapse)* or S0155H *(high collapse)*.

Pressure Drop Correction for Specific Gravity (filter housing)

Filter housing pressure drop curves shown in this catalog are predicated on the use of petroleum based fluid with a specific gravity of 0.860. The various fire resistant fluids discussed in this section have a specific gravity higher than 0.860, which affects pressure drop. Use the following formula to compute the correct pressure drop for the higher specific gravity:

Corrected pressure drop =

$$\frac{\text{Fluid specific gravity}}{0.860} \times \text{Catalog pressure drop}$$

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Section 3: Filter Selection Considerations

Filter Location

Pressure filtration: Pressure filters usually produce the lowest system contamination levels to assure clean fluid for sensitive high-pressure components and provide protection of downstream components in the event of catastrophic failures. Systems with high intermittent return line flows may need only be sized to match the output of the pump, where the return line may require a much larger filter for the higher intermittent flows. See Figure 6(a).

Return line filtration: Return line filters are often considered when initial cost is a major concern. A special concern in applying return line filters is sizing for flow. Large rod cylinders and other components can cause return line flows to be much greater than pump output. Return lines can have substantial pressure surges, which need to be taken into consideration when selecting filters and their locations. See Figure 6(b).

Re-circulating (kidney loop) filtration: While usually not utilized as a system's primary filtration, re-circulating, or off-line, filtration is often used to supplement in-line filters when adequate turnover cannot be obtained with the inline filter. It is also often an ideal location in which to use a water removal filter. See Figure 6(c).

Suction filtration: High efficiency suction filters are not recommended for open-loop circuits. The cavitation these filters can cause far outweighs any advantage obtained by attempting to clean the fluid in this part of the system.

Breather filtration: Efficient filter breathers are required for effective contamination control on nonpressurized reservoirs and should complement the liquid filtration component.

Multiple filtration: For systems incorporating large total fluid volumes, it may be necessary to employ filters in more than one location. Multiple pressure filters, pressure and return line filters, and recirculating filters are examples of multiple filtration applications.

Figure 6(a). Pressure Filtration Circuit

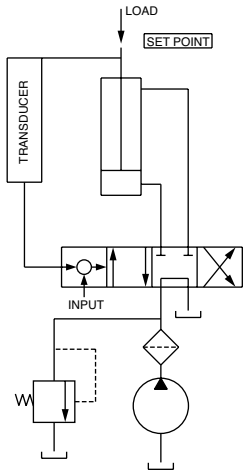


Figure 6(b). Return Line Filtration Circuit

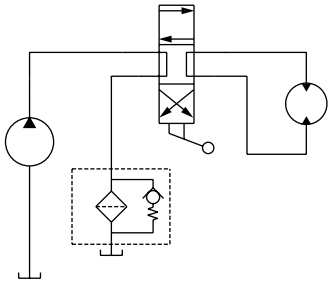


Figure 6(c). Re-circulating Filtration Circuit

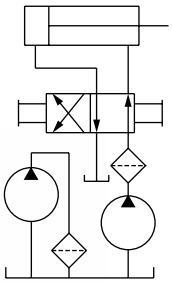
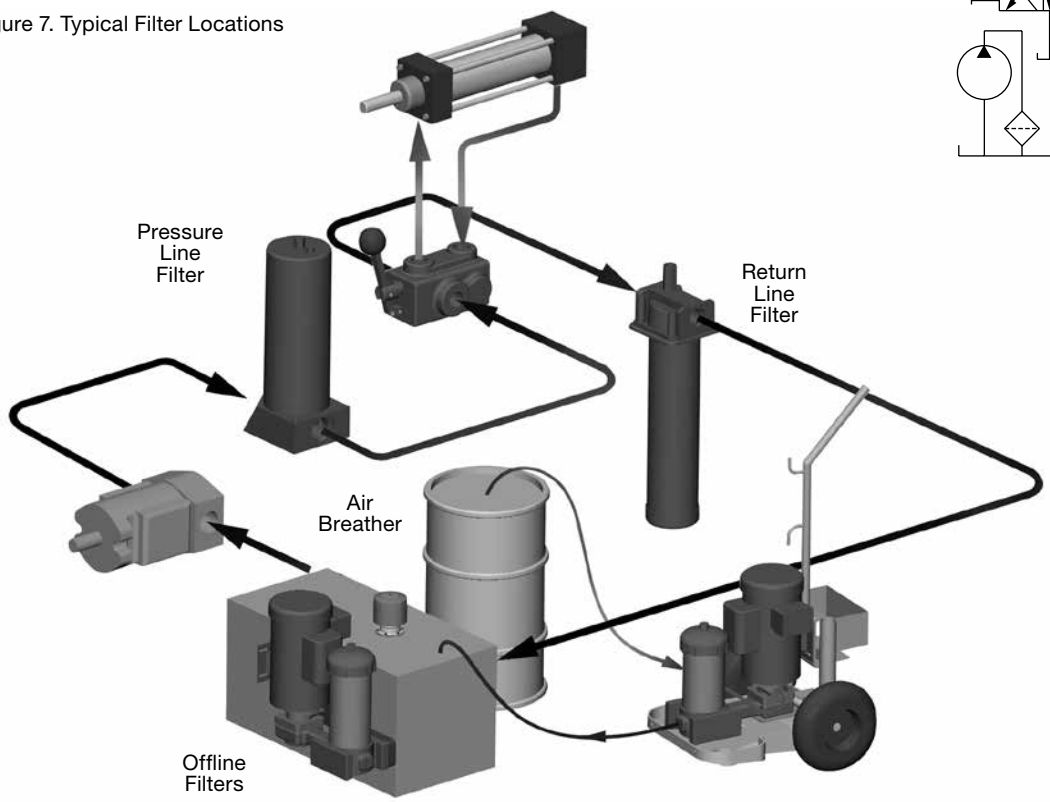


Figure 7. Typical Filter Locations



Seven Steps to Selecting a Filter

It is important to keep in mind that all system components have some tolerance for contamination. The key to cost effective contamination control is to maintain the system's cleanliness level at the tolerance level of the most sensitive component. Once the desired cleanliness level (ISO code) is determined, designing and selecting a cost effective filtration system can be readily accomplished.

1. Determining desired cleanliness level

Step 1. Determine the most sensitive component in the system. Then, determine the desired cleanliness level *(ISO code)* by using Tables 4 and 5 *(in this Overview)*, review of component manuals or by contacting the component manufacturer directly.

Operating pressure levels and system environmental conditions also have a bearing on cleanliness requirements.

2. Selecting correct medium

Step 2. Using Table 9 *(in this Overview, respectively)*, identify the proper HYDAC filter media rating to employ.

3. Where to filter

Step 3. Determine where to locate the filters, using the information on "Filter Location" *(Section 3, in this Overview)*.

4. Selecting filter housing

Step 4. Refer to Filter Products in the Table of Contents or the Quick Reference Guide and the individual filter catalog pages to select the specific filter housing that will meet the requirements set forth in Steps 2 and 3 above, as well as the pressure and flow parameters where the particular filter will be located.

Consideration should also be given to installation convenience for your particular application. Use the filter selection charts shown on the catalog pages to determine the specific filter model number for the desired media rating at the required flow rate.

5. Selecting filter breather

Step 5. For nonpressurized reservoirs, refer to the HYDAC Accessories Catalog to select the appropriate filter breather.

6. Contamination control practices

Step 6. Implement the appropriate manufacturing, assembly, and maintenance contamination control procedures. Effective contamination control is achieved through the conscientious use of sound manufacturing and maintenance practices. Some examples are: filtering make-up oil; controlling contamination ingestion during manufacturing, assembly, maintenance, and repair processes; and properly maintaining cylinder wiper seals.

7. Verifying results

Step 7. Check all filtration systems to determine if the results expected are obtained and maintained during system operation, as operating conditions and maintenance practices may not remain constant. Take periodic fluid samples on a regular basis to monitor cleanliness, water content and variations on amounts of wear metals. HYDAC distributors and field representatives have access to contamination monitoring equipment that can determine the exact cleanliness level *(ISO code)* of your system on the spot. Contact your HYDAC distributor or phone us for complete details.

Rated Fatigue Pressure

The application of individual filters should take fatigue ratings into consideration when there are flow or pressure variations creating pressure peaks and shock loads.

Typical hydraulic systems that use highly repetitive operations include plastic injection molding machines, die-cast machines, and forging and stamping press systems. In these and other similar applications, rated fatigue pressure should be considered when selecting a filter.

The National Fluid Power Association has introduced a method *(NFPA T2.6.1)* for verifying the fatigue pressure rating of the pressure-containing envelope of a metal fluid power component. In this method, components are cycled from 0 to test pressure for 1 million cycles *(10 million cycles is optional)*. The rated fatigue pressure *(RFP)* is verified by testing. We establish the desired RFP from design, then we calculate the cycle testing pressure *(CTP)*, and then conduct tests at CTP per 1,000,000 cycles.

The T2.6.1 Pressure Rating document is available from the National Fluid Power Association, 3333 N. Mayfair Road, Milwaukee, WI 53222-3219.

The NFPA has established that the maximum allowable Work Pressure is equal to the Rated Fatigue Pressure (RFP).

Sizing HYDAC Filter Assemblies

To properly size and calculate the pressure drop across a filter for a particular application the following procedures should be strictly followed:

Assembly pressure drop (ΔP) is the sum of the ΔP across the filter housing plus the ΔP across the filter element.
This simple formula is shown below:

ΔP Filter Assembly = ΔP Housing + ΔP Clean Element

To calculate a filter assembly ΔP we must first know the specifics of the application.

To calculate the ΔP across the housing we must know the flow rate and specific gravity of the fluid we wish to filter. A chart is provided in each of the product pages that provides a curve outlining the pressure drop across the housing based upon the flow in GPM *(gallons per minute)*. This data must then be adjusted if the specific gravity is at a lower or higher point than the test Hydraulic Fluid (0.86). The formula for calculation of the housing ΔP is shown as follows:

$$\Delta P \text{ Housing} = \Delta P \text{ (From Curve in catalog)} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

To calculate the ΔP across the element additional information is required. This will include the **viscosity** of the fluid *(at operating temperature)*, required **filtration rating in µm** *(microns)*, **type of element** *(High collapse -BH or Low collapse -BN)*, and **K** *(coefficient)* factor from the attached conversion tables. With this information the following formula is used to calculate ΔP across the element. Again the specific gravity and viscosity *(standard hydraulic fluid figured at a viscosity of 141 SSU - Saybolt Universal Seconds - 30 centistrokes)* will change the ΔP.

$$\Delta P \text{ Clean Element} = \frac{\text{Flow Rate GPM X Element K factor}}{\text{or } (\Delta P \text{ from element curve})} \times \frac{\text{Actual Specific Gravity}}{0.86} \times \frac{\text{Actual Viscosity in SSU}}{141}$$

EXAMPLE - an application with the following criteria would be sized as shown.

Conditions:	**Fluid** – Hydraulic Oil (ISO-32)	**Flow Rate** – 30 GPM
	Specific Gravity – 0.86	**Max. Operating Pressure** – 4,500 psi
	Viscosity – 141 SSU	**Normal Operating Pressure** – 4,000 psi
	Micron Rating - 10µm	**Bypass** - YES *(Low collapse element)*
	Fluid Temperature - 104˚F normal	**Viscosity** = 141 SUS @ 104˚F

Filter Type Selected - Pressure Filter

HYDAC Model No. DF ON 240 TE 10 D 1.0 / 12 V -B6

HOUSING

$$\Delta P \text{ Housing} = \Delta P \text{ Calculation (From Curve in catalog)} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

$$\Delta P \text{ Housing} = 1.5 \text{ psid} \times \frac{0.86}{0.86} = 1.5 \text{ psid}$$

ELEMENT

$$\Delta P \text{ Clean Element} = \Delta P \text{ Calculation} \times \frac{\text{Actual Specific Gravity}}{0.86} \times \frac{\text{Actual Viscosity}}{141 \text{ SSU}}$$

$$\Delta P \text{ Clean Element} = 30 \text{ GPM} \times 0.175 \times \frac{0.86}{0.86} \times \frac{141 \text{ SSU}}{141 \text{ SSU}}$$

$$\Delta P \text{ Clean Element} = 5.25 \times 1 \times 1 = 5.25 \text{ psid}$$

FILTER ASSEMBLY

ΔP Filter Assembly = ΔP Housing + ΔP Clean Element
1.5 psid + 5.25 psid = 6.75 psid

Clean assembly ΔP is less than 10 – 15 psid per “Typical Targets” on Table 9 *(in this Overview)*

NOTE:
A change in the fluid can make a significant difference in the pressure drop across a filter assembly. A second calculation for the element (ΔP) should be done at the lowest temperature condition (cold start) to determine how the filter will operate under these severe conditions with significantly higher viscosity.

See the next page for Cold Start Calculation.

EXAMPLE - an application with the following criteria would be sized as shown. *(Cold Start Condition)*

Conditions:

Fluid – Hydraulic Oil (ISO 32)
Specific Gravity – 0.86
Viscosity – 400 SSU
Micron Rating - 10µm
Fluid Temperature - 32˚F cold

Flow Rate – 30 GPM
Max. Operating Pressure – 4,500 psi
Normal Operating Pressure – 4,000 psi
Bypass - YES *(Low collapse element)*
Viscosity @ Cold Start = 1350 SUS @32˚F

Filter Type Selected

HYDAC Model No. DF ON 240 TE 10 D 1.0 / 12 V - B6

HOUSING

$$\Delta P \text{ Housing} = \Delta P \text{ Calculation } \textit{(From Curve in catalog)} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

$$\Delta P \text{ Housing} = 1.5 \text{ psid} \times \frac{0.86}{0.86} \text{ or } (1.0) = 1.5 \text{ psid}$$

ELEMENT

$$\Delta P \text{ Clean Element} = \Delta P \text{ Calculation} \times \frac{\text{Actual Specific Gravity}}{0.86} \times \frac{\text{Actual Viscosity}}{141 \text{ SSU}}$$

$$\Delta P \text{ Clean Element} = 30 \text{ GPM} \times 0.175 \times \frac{0.86}{0.86} \times \frac{1350 \text{ SSU}}{141 \text{ SSU}}$$

$$\Delta P \text{ Clean Element} = 5.25 \times 1.0 \times 9.6 = 50.40 \text{ psid}$$

FILTER ASSEMBLY

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

$$1.5 \text{ psid} + 50.40 \text{ psid} = 51.90 \text{ psid}$$ *(Almost 8 times normal clean assembly ΔP)*

NOTE:
When the element is partially loaded with some contamination and the system is cold started, the indicator may trip or possibly go into bypass, until the fluids in the system warm up. This information is relative and important for our customers to understand as they operate their systems under diverse conditions. This additional performance data helps our customers to define their system operating procedures, assist in component selection and finalize design.

Additional Filter Sizing Considerations for Industrial Machines by Flow Rate

1. Initial filter assembly clean differential pressure drop <20 - 30% of indicator trip pressure at average flow

EXAMPLE - DF 330: Indicator Trip Pressure is 72 psid
♑max assembly pressure drop with clean element: 72 psid x 0.25 = 18 psid

2. Check pressure drop at maximum flow (especially when cylinders used)

If pressure drop at maximum flow is >50% of indicator trip pressure use one size larger.
Check again if pressure drop is now <50%.

3. Check behavior under cold start conditions

If you have a lot of cold starts or work with cold oil chose one size larger.

4. Make sure that the port size is large enough to handle the flow

Suction	Return Line	Pressure <1,500 psi	Pressure <4000 psi	Pressure <6000 psi
15 ft/sec	15 ft/sec	15 ft/sec	26 ft/sec	40 ft/sec

5. Always contact Product Management to double check

Additional Filter Sizing Considerations for Mobile Machines by Flow Rate

1. Initial filter assembly clean differential pressure drop <20-30% of indicator trip pressure at average flow

EXAMPLE - RFM 270: Indicator Trip Pressure is 29 psi
♑max assembly pressure drop with clean element: 29 psi x 0.25 = 7.25 psi

2. Check pressure drop at maximum flow (especially when cylinders are used)

If pressure drop at maximum flow is >50% of indicator trip pressure use one size larger.
Check again if pressure drop is now <50%.

3. Check behavior under cold start conditions

If you have a lot of cold starts or work with cold oil choose one size larger.

4. Make sure that the port size is large enough to handle the flow

Return Line	Pressure <1,500 psi	Pressure <4000 psi	Pressure <6000 psi
15 ft/sec	15 ft/sec	26 ft/sec	40 ft/sec

5. Always contact Product Management to double check

Filter Applications Worksheet

*Name: _____ *Title: _____

*Company: _____ *Email: _____

*Address: _____ State: _____ Zip: _____

*Phone: _____ Mobile: _____ Fax: _____

End User System Application

*System Critical Components
(i.e. Servo's, Proportional Valves)

*Fluid Operating Temperature Range

From:	°F
To:	°F

*Ingested Dirt Levels *(check one)*

◯ Heavy ◯ Medium ◯ Light

*Clean Filter Differential Pressure Limit

psid
(typically 40%-50% Indicator trip setting)

*ISO/NAS Cleanliness Target Level

*Maximum Operating Pressure

psi

*Nominal Operating Pressure

psi

*Filter Flow Rate Nominal / Maximum

gpm nominal

gpm maximum

*Hydraulic Fluid

Manufacturer		Type
Designation		
Viscosity @ nominal	SUS	Cs
Viscosity @ cold start	SUS	Cs
Specific Gravity		

*Special Operating Requirements
(reverse flow, bidirectional flow duplex, or other special requirements)

Mounting Orientation & Port Configuration

Inlet
Outlet

Inlet/Outlet Configuration
(i.e. inline, side inlet/bottom outlet)

Filter Changeout Access *(i.e. top or bottom)*

Bypass Requirements

◯ 87 ◯ 43 ◯ 25 ◯ 15 ◯ 3 (psid) ◯ Non Bypass KB

*Indicator Requirements *(check one)*

◯ B ◯ BM ◯ C ◯ D ◯ E/ES ◯ F ◯ G ◯ GC
◯ GW ◯ H ◯ J ◯ J4 ◯ K ◯ LE ◯ LZ ◯ UE
◯ UF ◯ UG ◯ V ◯ Other

Supply Voltage *(LED for D Indicators)*:

◯ Diff. Pressure ◯ Static ◯ Vacuum Indication
(check one)

*Filtration Rating Requirements

Micron Rating
Depth / Surface
Element Media
ISO Cleanliness Target

System Maintenance Comments
(Sampling/changeout frequency, maintenance practices)

*Required Information to properly quote.

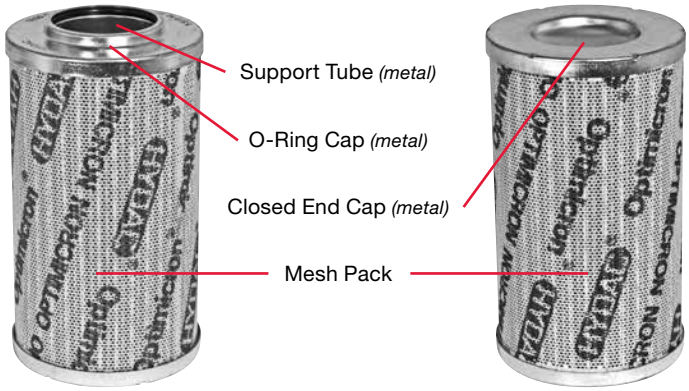
C Overview of Elements

Overview of Elements

Optimicron® Elements

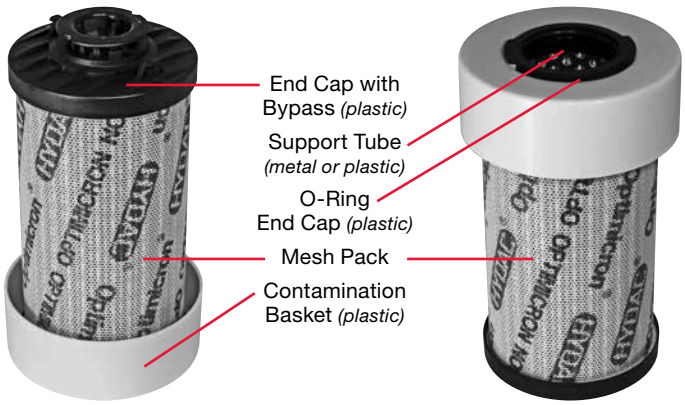
- ON - code designation
- Glass fiber, multi-layered with support
- Collapse rating - 290 psid (20 bar)
- 1, 3, 5, 10, 15, 20 micron
- Filtration Rating $\beta_{x(c)} \geq 1000$
- Depth Filtration
- Pressure and Return elements available
- Disposable - single use element
- Plastic outerwrap

Optimicron® Pressure Element

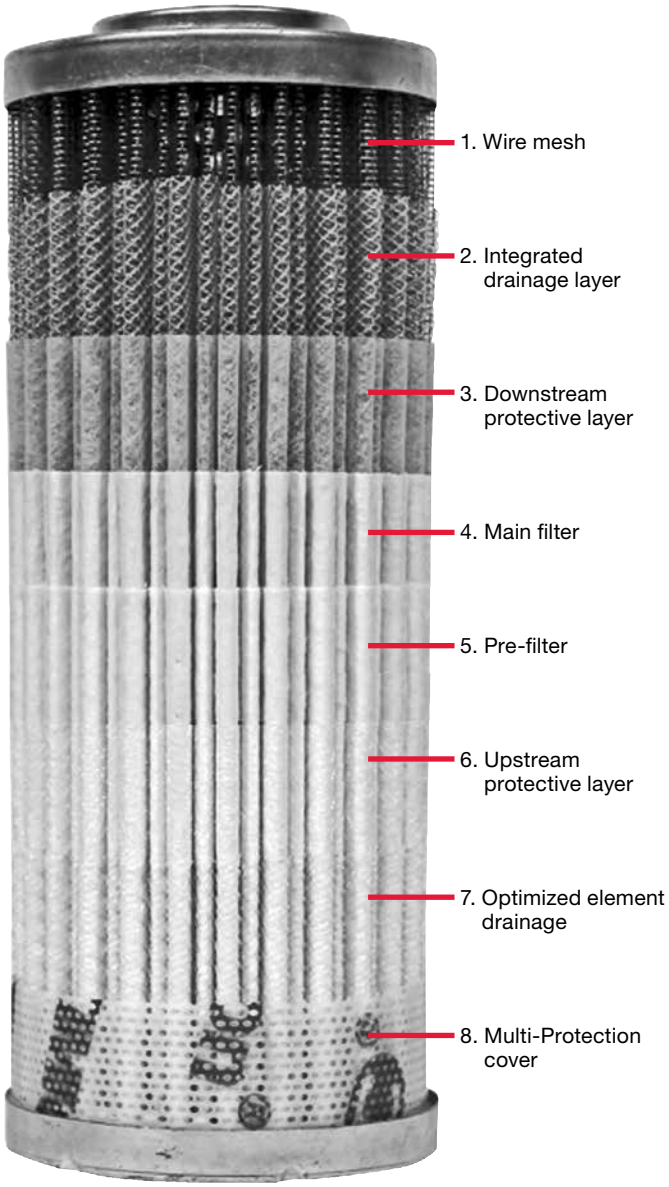


Optimicron® Return Element

Return filters include Bypass in the endcap - insures proper bypass operation at all times.



Element Construction

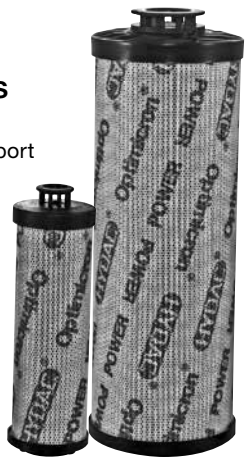


Optimicron®

Optimicron® Power

Optimicron® Power Elements

- ON/PO - code designation
- Synthetic Fiber, multi-layered with support
- All Plastic Construction
- Collapse Rating - 145 psid
- 3, 5, 10, 20 micron
- Stat-Free Technology included
- Depth Filtration
- Disposable - single use element
- Plastic outerwrap
- API 614 Approved



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Betamicron® Elements

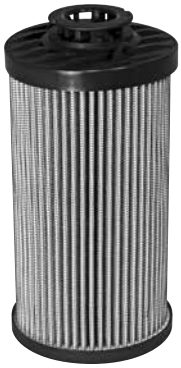
- BN4HC - Low Collapse (290 psid)
- BH4HC - High Collapse (3045 psid)

- code designation

- Fiberglass, Non-Woven
- 1, 3, 5, 10, & 20 micron
- Filtration Rating $ß_{x(c)} \geq 1000$
- High Beta Stability
- Structurally Designed for Dynamic Flow Conditions
- Collapse Rating 290 psid
- Depth Filtration
- Disposable

Betamicron® / Aquamicron® Combination Elements

- BN4AM - code designation
- Collapse Rating - 145 psid
- Undissolved (free) **Water Removal ONLY!**
- 3 & 10 micron
- Filtration Rating $ß_{x(c)} > 200$
- Depth Filtration
- Disposable



ECOmicron® Elements

- ECON2 - code designation
- Fiberglass
- All Plastic Construction
- Collapse Rating - 145 psid
- 3, 5, 10, & 20 micron
- Filtration Rating $ß_{x(c)} \geq 1000$
- Depth Filtration
- Disposable

Aquamicron® Elements

- AM - code designation
- Collapse Rating - 145 psid
- Undissolved (free) **Water Removal ONLY!**
- 40 micron
- Surface filtration
- Disposable

Wire Mesh Elements

- W/HC - code designation
- Wire Mesh
- Collapse Rating - 290 psid
- 25, 50, 100, 200 micron
- Surface Filtration
- Cleanable
- Corrosion protection - Stainless Steel filter media and Tin/Nickel plated hardware

Polyester Elements

- P/HC - code designation
- Polyester media - plastic coating eliminates swelling
- Collapse Rating - 145 psid
- 10 & 20 micron
- Surface Filtration
- Disposable
- Higher contamination retention than cellulose
- Low flow resistance = low ΔP/Q
- Media supported by wire mesh

Metal Fiber Elements

- V - code designation
- Stainless Steel media; Tin plated steel hardware
- Collapse Rating - 3045 psid
- 3, 5, 10, & 20 micron
- High Efficiency Rated available on request 1, 3, 5, 10, & 20 micron *(Depth filtration optional)*
- Surface Filtration *(standard)*
- Cleanable
- High filtration efficiency curve even under extreme dynamic loads
- Low flow resistance = low ΔP/Q

Mobilemicron Elements

- MM - code designation
- Melt blown - Fiberglass
- Extremely low clean element ΔP / flow rate for cold start applications
- Filtration Efficiency Rating $ß_{x(c)} \geq 200$
- 8, 10, 15 micron
- Good Beta Stability
- Good Dirt Holding Capacity
- Collapse Rating - 145 psid
- Depth Filtration
- Disposable

Optimicron® Series

Energy efficient filtration

Optimicron®

Description

The Optimicron filter elements have been optimized with respect to filtration performance and energy efficiency. These elements offer the best optimization of separation efficiency, service life and differential pressure versus flow rate.

As a complete element package, the innovative characteristics of the HYDAC technology has a very positive impact on the differential pressure of the elements and high degree of filtration efficiency and performance.

Features

- Unique HELIOS pleat geometry – optimizes media area open to flow to calm the flow in areas between pleats reducing ΔP.
- Outer wrap perforations insure optimized flow onto the filter pleats and help to minimize pressure losses.
- Outer wrap perforations also help to distribute the fluid incidence stresses evenly in the axial and radial directions and thus increase tear resistance.

Technical Specifications

Collapse Rating	290 psid (20 bar)
Temperature range	-22°F to 212°F (-30°C to 100°C)
Flow direction	outside to inside
Category	Disposable - single use
Bypass Cracking Pressure R *(only)* = 43 psid (3 bar) *(standard, others available)*	

“D” Pressure Elements Model Code

0660 D 010 ON / V SFREE

Size
0030, 0035, 0055, 0060, 0075, 0095, 0110, 0140, 0160, 0240, 0260, 0280, 0300, 0330, 0450, 0500, 0650, 0660, 0900, 0990, 1320, 1500

Type
D = Pressure line element

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20

Element Media
ON = Optimicron®

Seal
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SFREE = Element specially designed to minimize electrostatic charge generation

“R” Return Elements Model Code

0330 R 005 ON / V B6 SFREE

Size
0030, 0060, 0075, 0090, 0110, 0150, 0160, 0165, 0185, 0195, 0210, 0240, 0270, 0280, 0330, 0450, 0500, 0580, 0600, 0606, 0750, 0850, 0950, 1300, 1700, 2600

Type
R = Return line element

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20

Element Media
ON = Optimicron®

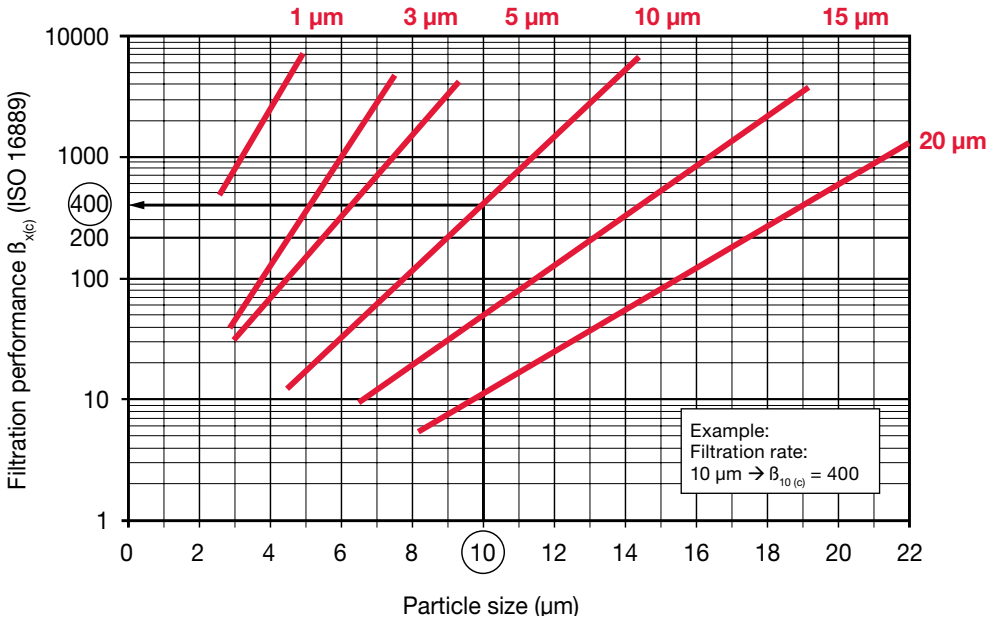
Seal
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B2 = 29 psid (2 bar) *(HYDAC optional return)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = No bypass *(flushing systems)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SFREE = Element specially designed to minimize electrostatic charge generation

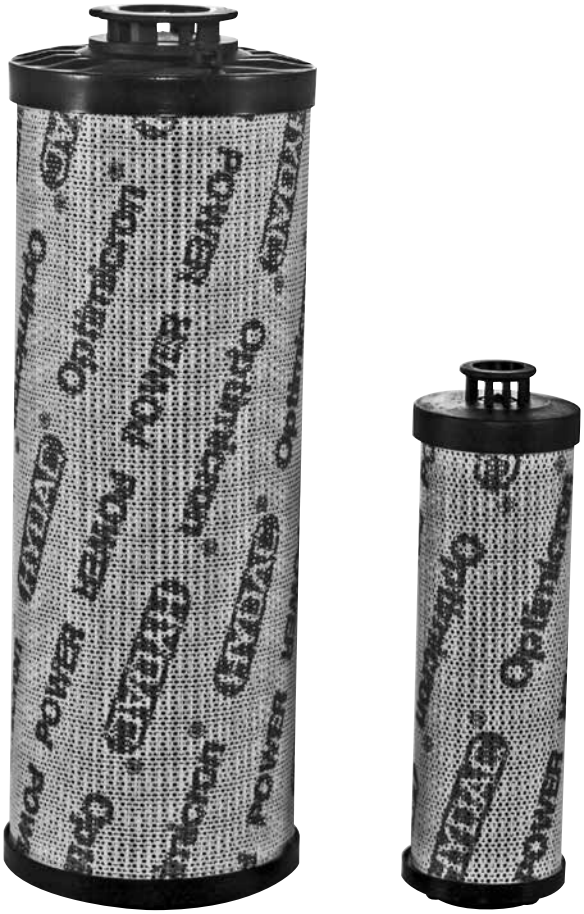
Model Codes Containing Red are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Beta Ratio (ß) Values for Optimicron



Optimicron® Power Series

Optimized Elements in Power Stations



Optimicron® Power

Description

Optimicron Power elements have been developed to both meet the heavy demands of power plant applications and comply with API-614 specifications. The elements are designed to meet stringent requirements of applications such as turbine lubrication, hydraulic turbine lift systems, and rotary compressors. Key considerations for this type of filtration are low resistance to flow (low differential pressures through the elements) and safety with regard to electrostatic discharge. This element incorporates Stat-Free® technology which safeguards and inhibits the dangerous generation of static electricity (ESD) which can cause fires and destroy sensitive electronic components and sensors.

As a complete element package, the innovative characteristics of this new technology provide low energy losses, and the compact nature of the element assures better conditioning of the flow. This homogenous flow results in better access to the contaminates and more efficient usage of the surface areas to better filter the contamination.

Features

- API 614 compliant
- Glass fiber media, single-layer with support
- Innovative outer wrap with increased strength & better diffuser effect = homogenous flow
- Integrated Stat-Free® technology
- Low collapse only - 145 psid (10 bar)

Technical Specifications

Collapse Rating	145 psi (10 bar)
Temperature range	-22°F to 212°F (-30°C to 100°C)
Flow direction	outside to inside
Filtration Rating	5, 10, 20 µm
Category	Disposable - single use
Compatibility with hydraulic fluids Mineral oils: Test criteria to ISO 2943 Lubricating oils: Test criteria to ISO 2943	
Bypass Cracking Pressure No bypass *(standard per API 614)* 43 psid (3 bar) *(optional)* - Others available for non-API applications	

Model Code

2600 A 010 ON/PO / _ _

Size
0110, 0120, 0230, 0240, 0330, 0500, 0540, 0880, 1400, 2600, 2700 = A
0110, 0240, 0330, 0500, 0660, 0850, 0950, 1300, 1700, 2600, 2700 = R

Type
A = API-614 compliant (10 µm ≥ 10)
R = Return line power (5, 10, 20 µm)

Filtration Rating *(microns)*
5, 10, 20

Element Media
ON/PO = Optimicron® Power

Seal
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve
(omit) = No bypass *(standard per API 614)*
B3 = 43 psid (3 bar) *(non-compliant to API-614)*
B6 = 87 psid (6 bar)
KB = No bypass
R element only

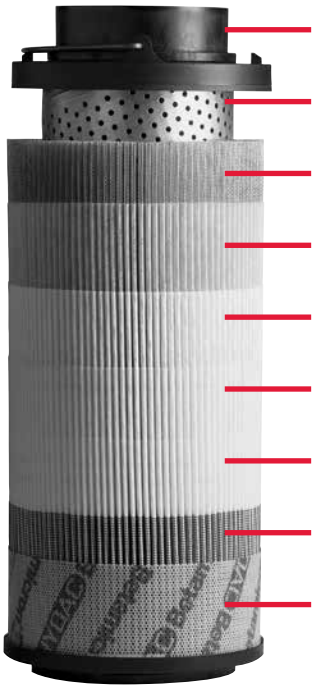
Supplementary Details
Optimicron® Power was developed including integrated Stat-Free® technology. It will replace all elements labeled with G/HC/-SFREE. This change also applies to filter housings currently using G/HC/-SFREE elements.

Model Codes Containing Red are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Betamicron® Series

High Pressure and Return Filter Elements

Element Construction



1. Conductive plastic end caps
2. Seam support tube
3. Inner screen to stabilize deep pleats
4. Support layer to back up active media layers
5. Final active depth layer to remove fine particles
6. Pre-filter depth layer to remove coarse particles
7. Diffusion layer to equalize flow across surface
8. Outer screen to stabilize pleats *(under cover)*
9. Multi-protection cover *(for high pressure elements)*

Description

Betamicron® filter elements have been optimized with respect to filtration performance, in fluid cleanliness, lower ΔP/Q, pleat and element protection while handling and operating, and high stability level throughout its life. These elements offer a superior level of optimization of separation efficiency, service life and differential pressure versus flow rate.

As a complete element package, the innovative characteristics of this technology have a very positive impact on the differential pressure of the elements and a high degree of filtration efficiency and performance.

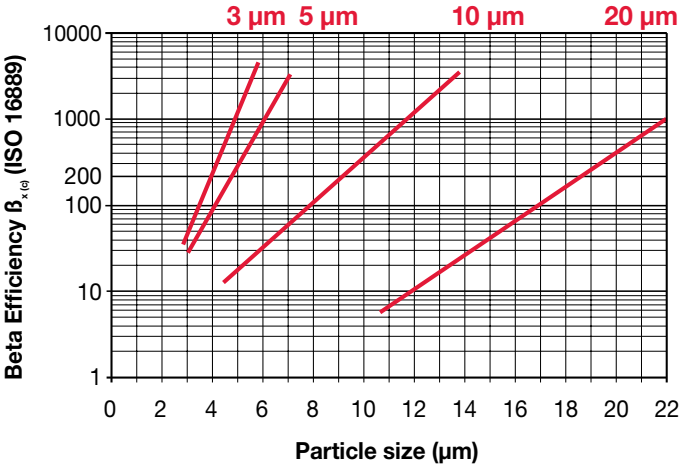
Features

- Optimized mesh pack structure maximizes the media area available to capture dirt particles and minimizes resistance to fluid flow. Optional SFREE mesh pack insures that static electricity will not be generated to dangerous levels where arcing can result.
- Improved performance *(optimized Beta efficiency, contamination retention, ΔP/Q characteristics and Beta stability)* and lowered weight due to plastic spiral lock seam support tubes.
- All plastic end caps and support tubes are carbon impregnated to conduct electricity, which ensures that static electricity will not be generated to levels high enough to arc.
- Element outer wraps are made of plastic (polyester) to reduce environment a impact and improve fatigue resistance.
- Zinc-free construction prevents zinc soaping.

Technical Specifications

Collapse Rating	290 psid (20 bar) *(R/RN, BN4HC, D/DN, BN4HC)* 3045 psid (210 bar) *(D, BH/HC)*
Temp. range	-22°F to 212°F (-30°C to 100°C)
Flow direction	outside to inside
Filtration Rating	3, 5, 10, 20 µm
Category	Disposable - single use
Bypass Cracking Pressure R *(only)* = 43 psid (3 bar) *(standard, others available)* D…BN = 87 psid (6 bar) *(standard, others available)* D…BH = No bypass *(standard)*	

Beta Ratio (ß) Values for Betamicron



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“D / DN” Pressure Elements Model Code

0660 D 005 BH4HC / V SO263

Size
- D = 0030, 0035, 0055, 0060, 0075, 0095, 0110, 0140, 0160, 0240, 0280, 0330, 0500, 0660, 0990, 1320, 1500
- DN = 0040, 0063, 0100, 0160, 0250, 0400, 0630, 1000

Pressure Element Type
- D = HYDAC pressure element
- DN = DIN Spec. 24550 pressure element

Filtration Rating *(micron)*
- 3, 6, 10, 25 = BN4/HC *(DN only)*
- 3, 5, 10, 20 = BH4HC

Element Media
- BN4HC = Betamicron®-N element *(Low Collapse)*
- BH4HC = Betamicron®-H element *(High Collapse)*

Seals
- *(omit)* = Nitrile rubber (NBR) *(standard)*
- V = Fluorocarbon elastomer (FKM)
- EPR = Ethylene propylene rubber (EPR)

Supplementary Details
- SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
- SFREE = Element specially designed to minimize electrostatic charge generation

“R / RN” Return Elements Model Code

1300 R 005 BN4HC / _ B6 SO263

Size
- R = 0030, 0060, 0050, 0075, 0090, 0110, 0150, 0160, 0165, 0185, 0210, 0240, 0270, 0330, 0500, 0660, 0850, 0950, 1300, 1700, 2600, 2700
- RN = 0040, 0063, 0100, 0160, 0250, 0400, 0630, 1000

Return Element Type
- R = HYDAC low pressure return element
- RN = DIN Spec. 24550 return element

Filtration Rating *(micron)*
- 3, 5, 10, 20 = BN4HC

Element Media
- BN4HC = Betamicron® *(Low Collapse)* high efficiency depth element

Seals
- *(omit)* = Nitrile rubber (NBR) *(standard)*
- V = Fluorocarbon elastomer (FKM)
- EPR = Ethylene propylene rubber (EPR)

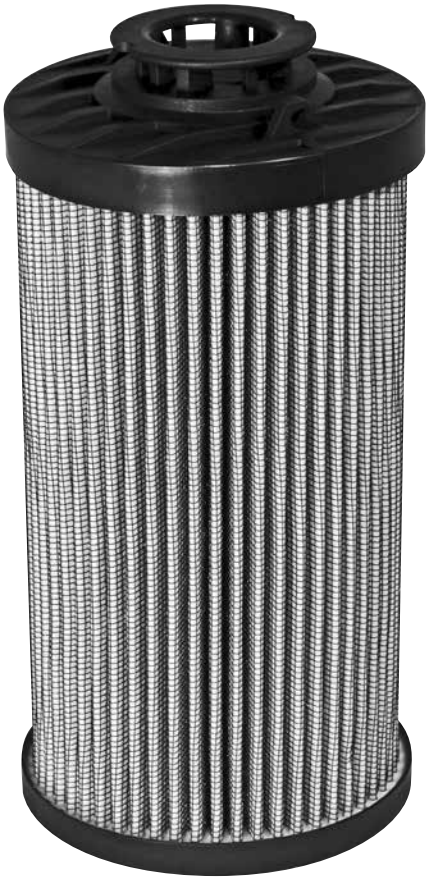
Bypass Cracking Pressure
- *(omit)* = 43 psid (3 bar) *(standard)*
- B1 = 14.5 psid (1 bar) *(lube or coolant)*
- B2 = 29 psid (2 bar) *(HYDAC optional return)*
- B6 =87 psid (6 bar) *(return line extended life)*
- KB = No bypass *(flushing systems)*

Supplementary Details
- SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
- SFREE = Element specially designed to minimize electrostatic charge generation

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Betamicron® / Aquamicron® Series

Combination Filter Elements



Description

BN/AM filter elements are specifically designed to absorb water and achieve high efficiency filtration of solid particles from mineral oils, HFD-R oils, and rapidly biodegradable oils. A super absorber reacts with the water present in the fluid and expands to form a gel from which the water can no longer be extracted, even by increasing the system pressure. These filter elements do not remove dissolved water below the saturation level of the hydraulic fluid. Solid particle filtration *(3 µm, 10 µm absolute)* is achieved due to the Betamicron® element construction.

Features

- High water retention capacity
- High dirt holding capacity
- Filtration rating $\beta_{x(c)} \geq 200$
- Stable β_x values over a wide differential pressure range *(high Beta stability)*

General

The presence of water in a hydraulic system causes many problems, such as the jamming of valves and rod components in fluid power systems. These problems are often incorrectly attributed to excessive levels of solid particle contamination. Sometimes these problems are caused by the build-up of rust and the reduction of the lubrication required for proper operation of bearings and slides. This can cause considerable degradation in the functioning of fluid power systems. In other words, along with solid particles, water is a serious "contaminant" in hydraulic systems.

Since methods usually employed to extract water often prove to be uneconomical when compared to the purchase price of a water removal system, HYDAC BN4AM technology has been developed to provide an economically sound and effective method of separating free water from hydraulic fluid. At the same time, these elements provide absolute filtration of solid particles down to 3 or 10 micron levels.

Technical Specifications

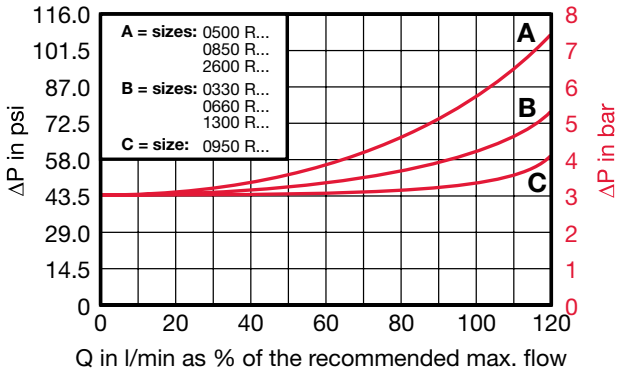
Collapse Pressure Rating	145 psid/10 bar
Temperature range:	32°F to 160°F (0°C to 71°C)
Compatibility with hydraulic media	Test criteria to ISO 2943
Flow fatigue resistance to ISO 3724	High fatigue resistance due to solid filter material supports on both sides and high inherent stability of the filter materials.
Opening pressure of bypass valve	ΔP0 = 43 psid + 10% (3 bar + 10%)

Principles of the BN4AM combined filter elements.

- BN4AM disposable elements are designed with inorganic and water-absorbent fibers
- Highly efficient absorption of free water from mineral oils with the aid of a "super absorber" embedded in the filter material
- Excellent adsorption of fine contamination particles over a wide differential pressure range *(3 µm, 10 µm absolute)*
- Excellent Beta stability over a wide differential pressure range
- High balanced dirt holding and water retention capacities
- Excellent fluid compatibility due to the use of epoxy resins for impregnation and bonding
- Dynamic Element integrity as a result of a high burst pressure resistance design *(e.g. during cold starts and dynamic differential pressure surges)*

Bypass Valve Curves

The bypass valve curves apply to mineral oils with a specific gravity of 0.86. The differential pressure of the valve changes proportionally with the specific gravity.



PN#02081318 / 07.19 / FIL1907-2109

Model Code

0660 R 010 BN4AM / V

Size
0160, 0240, 0270, 0330, 0500, 0660, 0750, 0850, 0950, 1300, 1700, 2600

Type
R

Filtration Rating *(microns)*
003
010

Element Media
BN4AM = combined Betamicron®/Aquamicron®

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B6 = 87 psid (6 bar)
KB = no bypass

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Water retention - Quick sizing table

Size	Recommended Filter flow rate in gpm / lpm	Water retention capacity* cm3 / qt
0330	3.4 / 13	190 / 0.2008
0660	7.4 / 28	400 / 0.4227
0950	10.3 / 39	560 / 0.5918
1300	14.3 / 54	790 / 0.8349
2600	28.8 / 109	1570 / 1.6592

*in cm3/qt when Δp = 2.5 bar / 36 psid and viscosity = 30 mm2 /s / 141 SUS

Filtration rating	Specification	Typical measured results *(when Δp = 2.5 bar / 36 psid)*
3 µm	ß3(c) ≥ 100	ß3(c) ≥ 500
10 µm	ß10(c) ≥ 100	ß10(c) ≥ 500

ECOmicron® Series

Environmentally Compatible

Features

- All plastic construction
  Note: Bypass valve in the end cap contains a metal spring for efficient operation. The spring can be removed if the element is crushed.
- Standard HYDAC elements sizes 1300R and 2600R with absolute ratings of 3 and 10 micron are available
- (Light weight) for ease of handling during shipment and maintenance
- 43 psi (3 bar) bypass valve setting
- 145 psi (10 bar) element collapse rating

Benefits

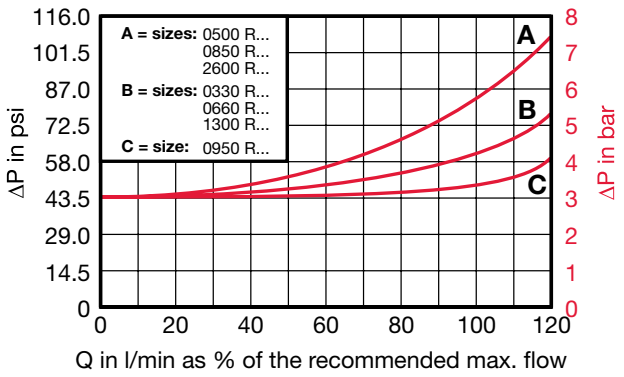
- Compatible with most hydraulic and lubrication fluids. Please consult factory for synthetic fluid use.
- Compatible for high water based fluid application use.
- Media seam welded with patented HYDAC ultrasonic welding process, which prevents media migration.
- $B_{x(c)} \geq 1000$ absolute filtration rating

Technical Specifications

Collapse Pressure Rating	145 psid (10 bar)
Temperature Range	-22°F to 212°F (-30°C to 100°C)
Flow fatigue stability to ISO 3724/76	High fatigue resistance due to solid filter material supports on both sides and high inherent stability of filter materials.
Opening Pressure of Bypass Valve	ΔP0 = 43 psid ± 7 psi (3 bar ± 0.5 bar)

Bypass Valve Curves

The by-pass valve curves apply to mineral oils with a specific gravity of 0.86. The differential pressure of the valve changes proportionally with the specific gravity.



PN#02081318 / 07.19 / FIL1907-2109

Model Code

1300 R 03 ECON2 / V

Element Size
0040, 0090, 0110, 0150, 0160, 0165, 0185, 0240, 0330, 0660, 0850, 0950, 1300, 1700, 2600

Type
R

Filtration Rating *(micron)*

03	=	3 µm
05	=	5 µm
10	=	10 µm
20	=	20 µm

Element Media

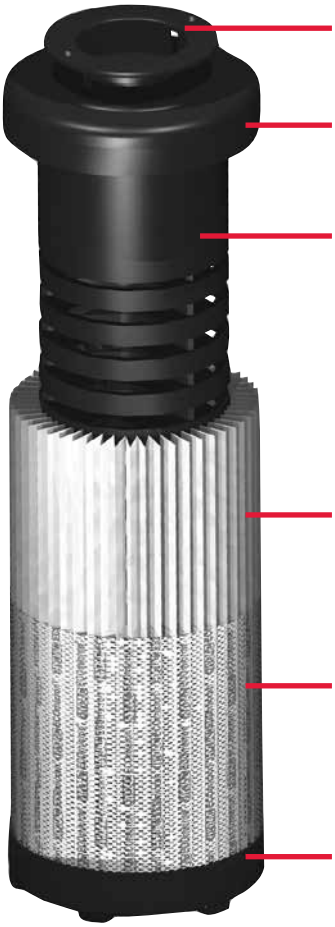
ECON2	=	ECOmicron®

Seals

(omit)	=	Nitrile rubber (NBR) *(standard)*
V	=	Fluorocarbon elastomer (FKM)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Element Construction



1. Bypass Valve with Metal Spring *(can be easily removed when crushed)*
2. Plastic Endcap
3. Plastic Support Tube
4. Fiberglass Media
5. Plastic Outer Wrap
6. Plastic End Cap

Aquamicron® Series

Water Removal Elements

Description

Aquamicron® filter elements are specially designed to separate free water from mineral oils. They are only supplied in the dimensions of HYDAC return line filter elements from size 330 and larger. This means that they can be installed in all HYDAC filter housings from size 330 which are fitted with return line filter elements.

The increasing pressure drop in a filter element which is being saturated with water indicates, by means of standard clogging indicators, that it is time to change the element. When the Aquamicron® technique is employed, particle contaminants are also separated from the hydraulic medium as a by-product. This means that the Aquamicron® element doubles as a safety filter.

In order to guarantee the greatest efficiency, it is recommended that these elements be installed in an off-line recirculation loop configuration.

Note: All Aquamicron® elements are disposable.

How Water Damages Systems and Components

The presence of water in hydraulic systems causes many problems. Examples would be the saturation of very fine filters or the jamming of valves and rod components. These problems are often wrongly attributed to high levels of particle contamination. Added to this, the build-up of rust and the reduction in lubricating properties on bearings and slides can lead to considerable impairment in the effective functioning of a system. This shows that water, too, represents a serious “contaminant” in a hydraulic system.

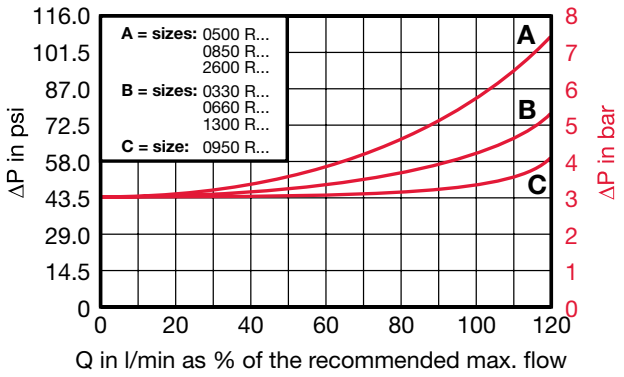
Previously, methods commonly used for extraction of water have proven to be uneconomical in relation to the purchase price of a water removal system. The HYDAC Aquamicron® technique offers an economically sound and yet an effective method of separating free water from hydraulic fluids.

Technical Specifications

Collapse Rating	145 psid (10 bar)
Temperature range	32°F to 212°F (0°C to 100°C)
Compatibility with hydraulic media	Mineral oils: Test criteria to ISO 2943 Lubricating oils: Test criteria to ISO 2943 Other media available on request
Opening pressure of by-pass valves	ΔP0 = 43 psid ±7 psi (3 bar ±0.5 bar)
Bypass valve curves	The bypass valve curves apply to mineral oils with a specific gravity of 0.86. The differential pressure of the valve changes proportionally with the specific gravity.

Bypass Valve Curves

The bypass valve curves apply to mineral oils with a specific gravity of 0.86. The differential pressure of the valve changes proportionally with the specific gravity.



PN#02081318 / 07.19 / FIL1907-2109

Model Code

0330 R 040 AM / __

Size
0330, 0500, 0660, 0850, 0950, 1300, 2600

Type
R = Return Line Element

Filtration Rating *(microns)*
040

Element Media
AM = Aquamicron® water removal

Seal
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Model Codes Containing Red are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Aquamicron® Element Size Recommendations

Size	Recommended Flow rate	Water retention capacity Cw at ΔP = 36 psi (2.5 bar) with an oil viscosity of 141 SUS (30mm2/sec)	Part No.
0330	3.4 gpm (13 l/min) advised 26.4 gpm (100 l/min) max.	0.27 quarts (260cm³) 0.19 quarts (180cm³)	00315268
0500	5 gpm (19 l/min) advised 40.9 gpm (155 l/min) max.	0.42 quarts (400cm³) 0.30 quarts (280cm³)	00315355
0660	7.4 gpm (28 l/min) advised 67.4 gpm (255 l/min) max.	0.60 quarts (570cm³) 0.42 quarts (400cm³)	00315356
0850	9.2 gpm (35 l/min) advised 75.6 gpm (286 l/min) max.	0.77 quarts (730cm³) 0.55 quarts (520cm³)	00315357
0950	10.3 gpm (39 l/min) advised 83 gpm (314 l/min) max.	0.85 quarts (800cm³) 0.60 quarts (570cm³)	00315358
1300	14.3 gpm (54 l/min) advised 115.4 gpm (437 l/min) max.	1.18 quarts (1120cm³) 0.83 quarts (790cm³)	00315269
2600	28.2 gpm (109 l/min) advised 229.9 gpm (870 l/min) max.	2.36 quarts (2230cm³) 1.66 quarts (1570cm³)	00316102

Mobilemicron® Series

Mobile filtration - low cold start ΔP

Description

The HYDAC Mobilemicron® filter elements are designed to efficiently handle applications in the demanding mobile industry. Applications utilizing these elements will experience safe, reliable operation of the mobile device.

The Mobilemicron® is characterized by an especially low pressure drop which makes them particularly suitable for use wherever high viscosity fluids are employed, especially at low temperatures producing cold start behavior. Under these conditions, this element exhibits far lower pressure drops then competitive depth elements resulting in lower energy requirements to operate the hydraulic systems.

This filter element is also a prime candidate for gear lubrication systems using high viscosity oils with high temperature variations during operations.

Features

- Unique filter media has a very low resistance to fluid flow – thus, reducing element ΔP.
- Synthetic fiber media, multi-layered with support
- Low collapse – 10 bar (145 psid)
- For use in HYDAC RF, RFD, RFL, RFLD, RFM, RKM, MFX Filters

Technical Specifications

Collapse Rating	145 psid (10 bar) *(...R...MM)*
Temperature range	-22°F to 212°F (-30°C to 100°C)
Flow direction	outside to inside
Filtration Rating	8, 10, 15 µm
Category	Disposable - single use
Bypass Cracking Pressure R = 43 psid (3 bar) *(standard)* RK = 50.75 psid (3.5 bar) MX = 50.75 psid (3.5 bar)	

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“R” Return Elements Model Code

0210 R 015 MM / V

Size
0075, 0090, 0150, 0165, 0185, 0195, 0210, 0270, 0330, 0500, 0660, 0850

Filtration Rating *(microns)*
8, 10, 15

Element Media
MM = Mobilemicron® 145 psid (10 bar) *(Low collapse)*

Seal
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B6 = 87 psid (6 bar) *(return line extended life)*

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation

“RK” RKM Element Model Code

0300 RK 015 MM / V

Size
0080, 0100, 0120, 0151, 0201, 0251, 0300, 0350, 0400, 0800

Filtration Rating *(micron)*
8, 10, 15

Element Media
MM = Mobilemicron 145 psid (10 bar) *(Low collapse)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation

“MX” Element Model Code

0200 MX 015 MM / V

Size
0100, 0200

Filtration Rating *(micron)*
8, 10, 15

Element Media
MM = Mobilemicron 290 psid (20 bar) *(Low collapse)*

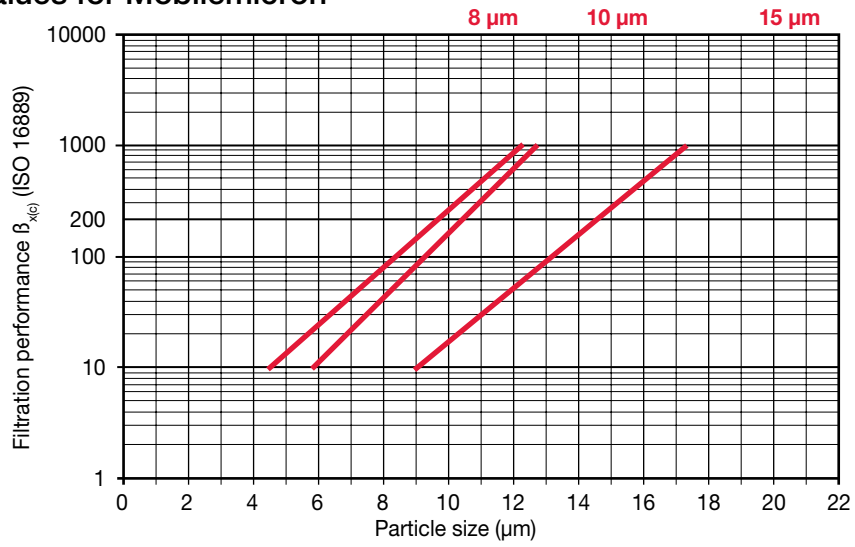
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve
B3.5 = 50.75 psid (3.5 bar) *(standard)*
B1.7 = 25 psid (1.7 bar) *(optional)*

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation

Model Codes Containing Red are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Beta Ratio (ß) Values for Mobilemicron



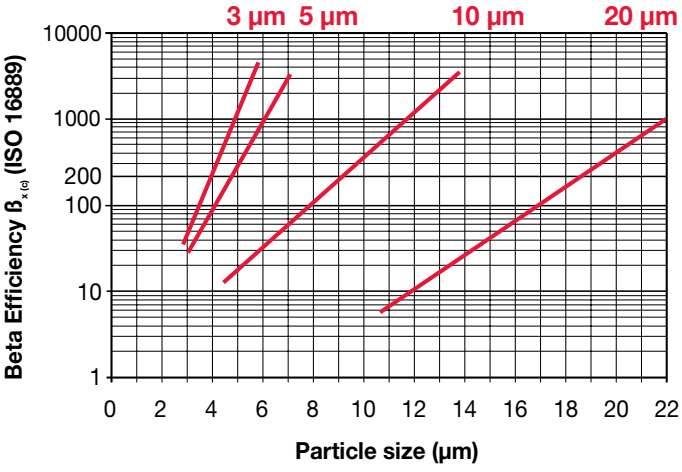
MA & MG Series

Spin-On Elements

Features

- HYDAC Betamicron® elements are available with Multi-Layer Betamicron® media with absolute ratings of 3, 5, 10, and 20 microns.
- Proper support of the filter media provides high Beta Ratio values (particle removal efficiency) even at high differential pressures. The efficiency of many competitive elements drastically deteriorates as the element clogs and differential pressure increases.
- Betamicron® filter media is firmly supported to achieve flow fatigue resistance during significant pressure flow pulsations.
- High quality adhesive is used to bond the seam of the media and the endcaps to the media.
- Heavy gauge perforated support tubes are used to provide proper flow distribution and protection against element collapse.

Beta Ratio (ß) Values for Betamicron



Technical Specifications

Construction Materials	Steel
Flow Capacity	
40	7 gpm (26 lpm)
80	15 gpm (57 lpm)
85	25 gpm (95 lpm)
90	15 gpm (57 lpm)
95	25 gpm (95 lpm)
160/190	30 gpm (114 lpm)
180/195	60 gpm (227 lpm)
Housing Pressure Rating	
Max. Operating Pressure	120 psi (8 bar)/250 psi (17 bar) (MF90/95)
Proof Pressure	180 psi (12.4 bar)/375 psi (25.8 bar) (MF90/95)
Fatigue Pressure	Contact HYDAC
Burst Pressure	Contact HYDAC
Element Collapse Pressure Rating	
BN, P, AM	80 psid (5.5 bar)
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)
Consult HYDAC for applications below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all petroleum oils rated for use with Nitrile rubber (NBR) seals.	
Bypass Valve Cracking Pressure	
ΔP = 3 psid (0.2 bar) + 10% *(for suction applications)*	
ΔP = 25 psid (1.7 bar) + 10% *(standard for nominal filters)*	
ΔP = 43 psid (3 bar) + 10% *(standard for absolute [BN] filters)*	
ΔP = 50 psid (3.4 bar) + 10% *(standard for absolute [BN] filters, MF 90/95/190/195)*	

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Model Code

0080 MA 005 BN

Size

0040, 0080, 0090 = Standard Length Elements *(not available with 3 µm BN elements)*
0085 *(not available with BN or AM elements)*
0095 *(not available with 20 µm BN elements)*
0160
0180

Extended Length Elements

Type

MA = UN Tap Plate Thread *(standard)*

Size	Thread
0040	3/4" - 16 UN-2B
0080/0085	1"-12 UN-2B
0090/0095	1 1/2"-16UN-2B
0160/0180	1 1/2"-16UN-2B

MG = BSPP Tap Plate Thread *(special)*

Size	Thread
0080	3/4" BSPP
0160	1 1/4" BSPP

Not required for BSPP ported heads produced in the USA, MA elements used on USA port codes "1.0"

Filtration Rating *(microns)*

3, 5, 10, 20 = BN Filtration Rating ($\beta_{x(c)} \geq 200$)
040 = AM

3, 10, 25 = P

Element Media

BN = Betamicron® *(Low Collapse)*
P = Paper
AM = Aquamicron® Water Removal *(not available 0085)*

Supplementary Details

Bypass size 0040 only *(bypass in element)*
B1.3 = 18 PSID Bypass
B1.7 = 25 PSID Bypass

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Element K-Factors

K-Factors (gradient coefficients) for Filter Elements: These K-factors in (psi/gpm) apply to hydraulic and lubricating fluids with kinematic viscosity of 141 SSU/(30mm2/S). The pressure drop changes proportionally to the change in viscosity.

Optimicron® "D…ON" Pressure Elements

Optimicron	...D...ON (Pressure Element)						
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm	Wgt. (lbs.)
0030 D XXX ON	4.27	3.507	2.376	1.251	0.768	0.62	0.19
0035 D XXX ON	2.755	1.169	0.938	0.752	0.549	0.408	0.26
0055 D XXX ON	1.427	0.675	0.543	0.434	0.284	0.211	0.37
0060 D XXX ON	2.936	1.427	1.004	0.664	0.537	0.347	0.23
0075 D XXX ON	0.916	0.461	0.37	0.296	0.183	0.136	0.49
0095 D XXX ON	0.724	0.37	0.296	0.238	0.144	0.105	0.59
0110 D XXX ON	1.416	0.735	0.527	0.333	0.254	0.164	0.54
0140 D XXX ON	1.092	0.631	0.406	0.24	0.194	0.126	0.44
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175	0.58
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115	0.78
0260 D XXX ON	0.449	0.272	0.212	0.127	0.1	0.079	0.71
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064	1.75
0300 D XXX ON	0.801	0.488	0.391	0.268	0.154	0.143	0.66
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067	1.13
0450 D XXX ON	0.401	0.244	0.193	0.131	0.077	0.069	1.36
0500 D XXX ON	0.277	0.141	0.114	0.068	0.052	0.041	1.50
0650 D XXX ON	0.245	0.148	0.121	0.081	0.047	0.044	2.04
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031	2.53
0900 D XXX ON	0.185	0.115	0.092	0.06	0.036	0.035	2.56
0990 D XXX ON	0.138	0.07	0.057	0.033	0.026	0.02	3.29
1320 D XXX ON	0.102	0.053	0.042	0.025	0.019	0.015	8.39
1500 D XXX ON	0.09	0.053	0.038	0.026	0.02	0.015	10.44

Optimicron® "R…ON" Return Elements

Optimicron	...R...ON (Return Element - Low Pressure)						
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm	Wgt. (lbs.)
0030 R XXX ON	4.928	3.754	2.409	1.471	0.922	0.807	0.142
0060 R XXX ON	2.59	1.295	0.944	0.539	0.494	0.376	0.286
0075 R XXX ON	1.405	1.065	0.735	0.401	0.263	0.241	0.508
0090 R XXX ON	1.235	0.719	0.521	0.333	0.236	0.176	0.364
0110 R XXX ON	1.224	0.719	0.487	0.296	0.234	0.178	0.46
0150 R XXX ON	0.735	0.428	0.31	0.198	0.14	0.105	0.502
0160 R XXX ON	0.878	0.439	0.312	0.177	0.148	0.182	0.682
0165 R XXX ON	0.774	0.518	0.404	0.221	0.123	0.133	0.77
0185 R XXX ON	0.571	0.408	0.315	0.161	0.091	0.077	0.873
0195 R XXX ON	0.42	0.301	0.232	0.119	0.067	0.057	1.115
0210 R XXX ON	0.311	0.18	0.14	0.084	0.055	0.048	1.684
0240 R XXX ON	0.571	0.284	0.201	0.125	0.101	0.077	0.848
0270 R XXX ON	0.201	0.116	0.091	0.054	0.036	0.031	2.358
0280 R XXX ON	0.28	0.141	0.114	0.078	0.058	0.044	1.763
0330 R XXX ON	0.444	0.204	0.15	0.081	0.07	0.056	1.54
0450 R XXX ON	0.347	0.174	0.126	0.077	0.055	0.047	1.798
0500 R XXX ON	0.289	0.143	0.104	0.06	0.046	0.038	2.28
0580 R XXX ON	0.137	0.068	0.049	0.029	0.022	0.019	3.975
0600 R XXX ON	0.129	0.068	0.06	0.033	0.023	0.019	3.321
0660 R XXX ON	0.196	0.093	0.066	0.037	0.031	0.025	3.488
0750 R XXX ON	0.116	0.061	0.05	0.029	0.019	0.018	4.764
0850 R XXX ON	0.152	0.072	0.055	0.032	0.024	0.020	4.328
0950 R XXX ON	0.131	0.057	0.043	0.026	0.021	0.017	5.076
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012	9.188
1700 R XXX ON	0.074	0.035	0.029	0.015	0.014	0.010	7.564
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006	11.964

Optimicron® Power "ON/PO" Elements

Optimicron Power	...A...ON			
Size	5 µm	10 µm	20 µm	Wgt. (lbs.)
0110 R XXX ON/PO	0.199	0.169	0.111	0.562
0240 R XXX ON/PO	0.072	0.061	0.040	0.873
0330 R XXX ON/PO	0.044	0.038	0.024	2.12
0500 R XXX ON/PO	0.029	0.025	0.016	2.372
0660 R XXX ON/PO	0.019	0.016	0.010	3.697
0850 R XXX ON/PO	0.015	0.013	0.009	5.357
0950 R XXX ON/PO	0.010	0.012	0.008	7.317
1300 R XXX ON/PO	0.010	0.008	0.005	7.848
1700 R XXX ON/PO	0.007	0.006	0.004	10.02
2600 R XXX ON/PO	0.004	0.004	0.003	15.18
2700 R XXX ON/PO	0.004	0.004	0.003	21.94

Optimicron Power	API Compliant	
Size	10 µm	Wgt. (lbs.)
0110 A XXX ON/PO	0.169	0.259
0120 A XXX ON/PO	0.075	0.937
0230 A XXX ON/PO	0.037	2.731
0240 A XXX ON/PO	0.061	1.011
0330 A XXX ON/PO	0.038	1.671
0500 A XXX ON/PO	0.025	2.447
0540 A XXX ON/PO	0.018	6.15
0880 A XXX ON/PO	0.008	9.034
1400 A XXX ON/PO	0.005	16.18
2600 R XXX ON/PO	0.004	16.73
2700 A XXX ON/PO	0.004	20.61

Element K-Factors

Betamicron® “D…BN4HC” Pressure Elements

Betamicron	...D...BN4HC (Low Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0030 D XXX BN4HC	3.507	2.376	1.251	0.620	0.19
0035 D XXX BN4HC	1.295	1.043	0.812	0.510	0.26
0055 D XXX BN4HC	0.752	0.604	0.444	0.263	0.37
0060 D XXX BN4HC	1.586	1.119	0.724	0.433	0.23
0075 D XXX BN4HC	0.510	0.411	0.290	0.170	0.49
0095 D XXX BN4HC	0.411	0.329	0.225	0.132	0.59
0110 D XXX BN4HC	0.818	0.587	0.362	0.203	0.54
0140 D XXX BN4HC	0.702	0.450	0.263	0.159	0.44
0160 D XXX BN4HC	0.719	0.483	0.252	0.192	0.58
0240 D XXX BN4HC	0.450	0.335	0.198	0.126	0.78
0280 D XXX BN4HC	0.220	0.170	0.093	0.071	1.75
0300 D XXX BN4HC 1.11.04DXXBN	0.582	0.445	0.291	0.159	0.66
0330 D XXX BN4HC	0.296	0.214	0.165	0.093	1.13
0450 D XXX BN4HC 1.11.08DXXBN	0.291	0.220	0.143	0.077	1.36
0500 D XXX BN4HC	0.181	0.132	0.082	0.060	1.50
0650 D XXX BN4HC 1.11.13DXXBN	0.176	0.137	0.088	0.049	2.04
0660 D XXX BN4HC	0.137	0.099	0.060	0.044	2.53
0900 D XXX BN4HC 1.11.16DXXBN	0.137	0.104	0.066	0.038	2.56
0990 D XXX BN4HC	0.088	0.066	0.038	0.027	3.29
1320 D XXX BN4HC	0.066	0.049	0.027	0.022	8.39
1500 D XXX BN4HC	0.060	0.044	0.033	0.022	10.44

Betamicron® “D…BH4HC” Pressure Elements

Betamicron	...D...BH4HC (High Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0030 D XXX BH4HC	5.005	2.782	1.992	1.043	0.30
0060 D XXX BH4HC	3.216	1.789	0.993	0.670	0.58
0110 D XXX BH4HC	1.394	0.818	0.489	0.307	0.76
0140 D XXX BH4HC	1.092	0.620	0.445	0.236	0.79
0160 D XXX BH4HC	0.922	0.571	0.324	0.241	1.23
0240 D XXX BH4HC	0.582	0.373	0.214	0.159	1.82
0280 D XXX BH4HC	0.313	0.187	0.099	0.088	2.55
0300 D XXX BH4HC 1.11.04DXXBH	0.878	0.488	0.390	0.181	1.83
0330 D XXX BH4HC	0.423	0.247	0.154	0.110	2.26
0450 D XXX BH4HC 1.11.08DXXBH	0.428	0.236	0.187	0.088	2.61
0500 D XXX BH4HC	0.230	0.143	0.082	0.066	3.60
0650 D XXX BH4HC 1.11.13DXXBH	0.258	0.143	0.115	0.055	3.64
0660 D XXX BH4HC	0.181	0.104	0.055	0.049	4.05
0900 D XXX BH4HC 1.11.16DXXBH	0.192	0.110	0.088	0.038	4.66
0990 D XXX BH4HC	0.120	0.071	0.044	0.033	7.38
1320 D XXX BH4HC	0.088	0.055	0.033	0.022	9.82
1500 D XXX BH4HC	0.077	0.044	0.033	0.027	11.56

Indicates PALL 9600 geometry element.

All Element K Factors in psi / gpm.

Element K-Factors

"D…W/HC" Pressure Elements

Wire Mesh	…D…W/HC	
Size	25, 50, 100, 200 µm	Wgt. (lbs.)
0030 D XXX W/HC	0.166	0.32
0060 D XXX W/HC	0.042	0.53
0110 D XXX W/HC	0.023	0.83
0140 D XXX W/HC	0.018	0.69
0160 D XXX W/HC	0.016	1.22
0240 D XXX W/HC	0.010	1.17
0280 D XXX W/HC	0.005	2.37
0330 D XXX W/HC	0.008	2.40
0500 D XXX W/HC	0.005	2.20
0660 D XXX W/HC	0.004	3.50
0990 D XXX W/HC	0.003	5.19
1320 D XXX W/HC	0.002	6.03

"D…V" Pressure Elements

Metal Fiber	…D…V				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0030 D XXX V	1.011	0.740	0.411	0.200	0.18
0060 D XXX V	0.877	0.511	0.296	0.183	0.25
0110 D XXX V	0.452	0.304	0.182	0.118	0.40
0140 D XXX V	0.320	0.261	0.172	0.126	1.08
0160 D XXX V	0.251	0.177	0.123	0.079	0.73
0240 D XXX V	0.169	0.137	0.093	0.062	1.16
0280 D XXX V	0.126	0.093	0.064	0.041	1.65
0330 D XXX V	0.121	0.097	0.065	0.043	2.37
0500 D XXX V	0.081	0.065	0.044	0.028	4.38
0660 D XXX V	0.063	0.050	0.034	0.021	4.69
0990 D XXX V	0.043	0.034	0.023	0.015	8.81
1320 D XXX V	0.032	0.026	0.018	0.012	6.77
1500 D XXX V	0.016	0.011	0.011	0.005	7.97

All Element K Factors in psi / gpm.

Element K-Factors

"DN" Pressure Elements

Betamicron	...DN...BN/HC (Low Collapse)				
Size	3 µm	6 µm	10 µm	25 µm	Wgt. (lbs.)
0040 DN XXX BN4HC	1.312	0.818	0.472	0.362	2.161
0063 DN XXX BN4HC	0.895	0.543	0.330	0.252	0.331
0100 DN XXX BN4HC	0.653	0.362	0.220	0.176	0.507
0160 DN XXX BN4HC	0.434	0.280	0.187	0.143	N/A*
0250 DN XXX BN4HC	0.280	0.176	0.115	0.099	1.411
0400 DN XXX BN4HC	0.176	0.110	0.071	0.055	2.161

Wire Mesh	...DN...W/HC (Low Collapse)				
Size	25µm	50 µm	100 µm	200 µm	Wgt. (lbs.)
0160 DN XXX W/HC	0.009	0.009	0.009	0.009	1.26
0250 DN XXX W/HC	0.006	0.006	0.006	0.006	1.41
0400 DN XXX W/HC	0.004	0.004	0.004	0.004	2.16

Betamicron	...DN...BH/HC (High Collapse)				
Size	3 µm	6 µm	10 µm	25 µm	Wgt. (lbs.)
0040 DN XXX BH4HC	2.217	1.361	0.900	0.598	0.57
0063 DN XXX BH4HC	1.591	0.999	0.642	0.417	0.84
0100 DN XXX BH4HC	1.043	0.642	0.423	0.291	1.01
0160 DN XXX BH4HC	0.439	0.280	0.209	0.137	1.86
0250 DN XXX BH4HC	0.296	0.187	0.154	0.104	2.90
0400 DN XXX BH4HC	0.187	0.115	0.093	0.060	4.28

Pressure Elements for the Automotive Industry

Autospec HF4	5.03.XXDXXBN (Low Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
5.03.09DXXBN	0.168	0.141	0.079	0.044	1.67
5.03.18DXXBN	0.080	0.067	0.038	0.021	3.03
5.03.27DXXBN	0.052	0.043	0.024	0.014	4.50

Autospec HF4	5.03.XXDXXBH (High Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
5.03.09DXXBH	0.207	0.146	0.089	0.047	4.57
5.03.18DXXBH	0.097	0.068	0.041	0.022	8.19
5.03.27DXXBH	0.063	0.044	0.027	0.014	12.16

Autospec HF4 Wire Mesh	5.03.XXDXXW	
Size	25, 50, 100, 200 µm	Wgt. (lbs.)
5.03.09DXXW	0.007	1.71
5.03.18DXXW	0.004	3.29
5.03.27DXXW	0.002	N/A*

Autospec HF3	1.11.08DXXBN (Low Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
1.11.04DXXBN	0.590	0.500	0.266	0.153	0.69
1.11.08DXXBN	0.289	0.241	0.135	0.076	1.02
1.11.13DXXBN	0.175	0.146	0.082	0.046	1.51
1.11.16DXXBN	0.132	0.110	0.062	0.035	1.89

Autospec HF3	1.11.08DXXBH (High Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
1.11.04DXXBH	0.937	0.660	0.401	0.210	1.83
1.11.08DXXBH	0.460	0.321	0.195	0.102	2.61
1.11.13DXXBH	0.274	0.193	0.117	0.615	3.64
1.11.16DXXBH	0.206	0.145	0.089	0.046	4.66

Autospec HF2	1.07.08DXXBN (Low Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
1.07.04DXXBN	2.046	1.735	0.925	0.531	0.26
1.07.08DXXBN	0.975	0.815	0.457	0.257	0.39

Autospec HF2	1.07.08DXXBH (High Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
1.07.04DXXBH	2.400	1.690	1.027	0.538	0.51
1.07.08DXXBH	1.165	0.820	0.499	0.262	0.85

* Not Available at the time of publication. Please contact HYDAC for latest information.

All Element K Factors in psi / gpm.

Element K-Factors

Betamicron® "R…BN4HC" Return Elements

Betamicron	...R...BN4HC (Low Collapse)				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0030 R XXX BN4HC	3.754	2.409	1.471	0.807	0.142
0060 R XXX BN4HC	1.471	1.004	0.598	0.379	0.286
0075 R XXX BN4HC	1.207	0.779	0.445	0.241	0.508
0110 R XXX BN4HC	0.818	0.516	3.293	0.176	0.46
0150 R XXX BN4HC	0.489	0.329	0.220	0.104	0.68
0160 R XXX BN4HC	0.521	0.324	0.209	0.159	0.682
0165 R XXX BN4HC	0.615	0.428	0.247	0.132	0.77
0185 R XXX BN4HC	0.488	0.335	0.181	0.099	0.882
0210 R XXX BN4HC	0.214	0.143	0.099	0.060	1.684
0240 R XXX BN4HC	0.340	0.209	0.143	0.099	0.848
0270 R XXX BN4HC	0.137	0.093	0.060	0.038	2.358
0280 R XXX BN4HC	0.170	0.121	0.088	0.055	1.76
0330 R XXX BN4HC	0.232	0.150	0.093	0.066	1.54
0500 R XXX BN4HC	0.164	0.104	0.071	0.044	2.28
0660 R XXX BN4HC	0.104	0.066	0.044	0.027	3.488
0750 R XXX BN4HC	0.071	0.049	0.033	0.022	4.764
0850 R XXX BN4HC	0.082	0.055	0.038	0.022	4.328
0950 R XXX BN4HC	0.066	0.044	0.027	0.022	5.076
1300 R XXX BN4HC	0.044	0.033	0.022	0.016	9.188
1700 R XXX BN4HC	0.038	0.027	0.016	0.011	7.564
2600 R XXX BN4HC	0.022	0.016	0.011	0.005	11.964
2700 R XXX BN4HC	0.022	0.016	0.011	0.005	16.5

Betamicron®/Aquamicron® "R…BN4AM"

Betamicron/ Aquamicron	...R...BN4AM		
Size	3 µm	10 µm	Wgt. (lbs.)
0330 R XXX BN4AM	0.477	0.165	1.596
0500 R XXX BN4AM	0.313	0.11	2.266
0660 R XXX BN4AM	0.192	0.066	1.991
0750 R XXX BN4AM	0.126	0.044	4.760
0850 R XXX BN4AM	0.154	0.049	5.225
0950 R XXX BN4AM	0.132	0.044	5.85
1300 R XXX BN4AM	0.088	0.033	6.946
1700 R XXX BN4AM	0.071	0.027	7.452
2600 R XXX BN4AM	0.055	0.016	10.211
2700 R XXX BN4AM	0.055	0.016	16.445

Aquamicron "AM"

Aquamicron	...AM	
Size	40 µm	Wgt. (lbs.)
0330 R XXX AM	0.115	0.740
0500 R XXX AM	0.076	1.023
0660 R XXX AM	0.051	1.580
0750 R XXX AM	0.030	1.855
0850 R XXX AM	0.040	1.990
0950 R XXX AM	0.036	2.900
1300 R XXX AM	0.026	3.550
1700 R XXX AM	0.020	5.661
2600 R XXX AM	0.013	6.210
2700 R XXX AM	0.014	6.356

All Element K Factors in psi / gpm.

Element K-Factors

ECOmicron® "R…ECON2" Return Elements

ECOmicron	...R...ECON2				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0075 R XXX ECON2	1.207	0.779	0.445	0.241	0.115
0090 R XXX ECON2	0.818	0.554	0.368	0.176	0.126
0110 R XXX ECON2	0.818	0.516	0.329	0.176	0.332
0150 R XXX ECON2	0.488	0.329	0.220	0.104	0.385
0160 R XXX ECON2	0.521	0.324	0.209	0.159	0.398
0165 R XXX ECON2	0.615	0.428	0.247	0.132	0.422
0185 R XXX ECON2	0.488	0.335	0.181	0.099	0.586
0195 R XXX ECON2	0.362	0.247	0.132	0.071	0.702
0240 R XXX ECON2	0.340	0.209	0.143	0.099	0.711
0280 R XXX ECON2	0.170	0.121	0.088	0.055	0.954
0330 R XXX ECON2	0.230	0.148	0.093	0.066	1.069
0500 R XXX ECON2	0.165	0.104	0.071	0.044	2.118
0660 R XXX ECON2	0.104	0.066	0.044	0.027	4.389
0750 R XXX ECON2	0.071	0.049	0.033	0.022	4.855
0850 R XXX ECON2	0.082	0.055	0.038	0.022	5.211
0950 R XXX ECON2	0.066	0.044	0.027	0.022	4.400
1300 R XXX ECON2	0.044	0.033	0.022	0.016	5.290
1700 R XXX ECON2	0.038	0.027	0.016	0.011	11.31
2600 R XXX ECON2	0.022	0.016	0.011	0.005	9.544

ECOmicron Fit	1.14.XXDXXECO/N			
SIZE	3 µm	6 µm	12 µm	25 µm
1.14.16DXXECO/N	0.046	0.041	0.022	0.015
1.14.39DXXECO/N	0.017	0.016	0.008	0.006

Wire Mesh "R…W/HC" Return Elements

Wire Mesh	...R...W/HC	
Size	25, 50, 100, 200 µm	Wgt. (lbs.)
0030 R XXX W/HC	0.110	0.08
0060 R XXX W/HC	0.055	0.328
0075 R XXX W/HC	0.043	0.687
0110 R XXX W/HC	0.030	0.588
0160 R XXX W/HC	0.021	0.86
0165 R XXX W/HC	0.020	0.52
0240 R XXX W/HC	0.015	1.174
0330 R XXX W/HC	0.010	1.844
0500 R XXX W/HC	0.007	1.876
0660 R XXX W/HC	0.005	4.138
0850 R XXX W/HC	0.004	2.535
0950 R XXX W/HC	0.003	5.674
1300 R XXX W/HC	0.003	4.61
1700 R XXX W/HC	0.002	11
2600 R XXX W/HC	0.001	8.3

Polyester "R…P/HC" Return Elements

Polyester	...R...P/HC		
Size	10 µm	20 µm	Wgt. (lbs.)
0030 R XXX P/HC	0.458	0.458	0.154
0060 R XXX P/HC	0.255	0.255	0.308
0075 R XXX P/HC	0.156	0.156	0.701
0110 R XXX P/HC	0.128	0.128	0.488
0160 R XXX P/HC	0.077	0.077	0.692
0165 R XXX P/HC	0.086	0.086	0.816
0240 R XXX P/HC	0.049	0.049	0.978
0330 R XXX P/HC	0.037	0.037	1.536
0500 R XXX P/HC	0.024	0.024	2.142
0660 R XXX P/HC	0.016	0.016	3.278
0850 R XXX P/HC	0.012	0.012	4.320
0950 R XXX P/HC	0.010	0.010	5.838
1300 R XXX P/HC	0.007	0.007	6.944
1700 R XXX P/HC	0.006	0.006	8.721
2600 R XXX P/HC	0.003	0.003	12.166

All Element K Factors in psi / gpm.

Element K-Factors

Mobilemicron® “R…MM” Return Elements

Mobilemicron R	...RK...MM	
Size	10 µm	Wgt. (lbs.)
0060 R XXX MM	0.420	N/A*
0075 R XXX MM	0.265	N/A*
0090 R XXX MM	0.252	N/A*
0110 R XXX MM	0.199	N/A*
0150 R XXX MM	0.114	N/A*
0160 R XXX MM	0.149	N/A*
0165 R XXX MM	0.146	N/A*
0185 R XXX MM	0.108	N/A*
0210 R XXX MM	0.052	N/A*
0240 R XXX MM	0.095	N/A*
0270 R XXX MM	0.032	N/A*
0330 R XXX MM	0.078	N/A*
0500 R XXX MM	0.052	N/A*
0660 R XXX MM	0.030	N/A*
0850 R XXX MM	0.023	N/A*
0950 R XXX MM	0.023	N/A*
1300 R XXX MM	0.016	N/A*
1700 R XXX MM	0.010	N/A*
2600 R XXX MM	0.008	N/A*

Mobilemicron® “RK” Return Elements

Mobilemicron RK	...RK...MM			
Size	8 µm	10 µm	15 µm	Wgt. (lbs.)
0080 RK XXX MM	0.136	0.136	0.087	0.588
0100 RK XXX MM	0.095	0.095	0.061	0.624
0120 RK XXX MM	0.077	0.077	0.049	0.658
0151 RK XXX MM	0.054	0.054	0.036	0.892
0201 RK XXX MM	0.041	0.041	0.026	1.820
0251 RK XXX MM	0.032	0.032	0.020	1.986
0300 RK XXX MM	0.034	0.034	0.021	2.020
0350 RK XXX MM	0.016	0.016	0.011	2.211
0400 RK XXX MM	0.031	0.031	0.019	2.496
0800 RK XXX MM	0.024	0.024	0.015	4.122

* Not Available at the time of publication. Please contact HYDAC for latest information.

All Element K Factors in psi / gpm.

Element K-Factors

Stainless Steel Wire Mesh “R…V”

SS Wire Mesh	...R...V				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0030 R XXX V	1.065	0.779	0.434	0.209	N/A*
0060 R XXX V	0.873	0.510	0.296	0.181	N/A*
0110 R XXX V	0.417	0.280	0.165	0.110	N/A*
0160 R XXX V	0.269	0.192	0.132	0.082	N/A*
0240 R XXX V	0.176	0.143	0.093	0.066	N/A*
0280 R XXX V	0.077	0.060	0.038	0.027	N/A*
0330 R XXX V	0.115	0.093	0.060	0.044	N/A*
0450 R XXX V	0.093	0.071	0.049	0.033	N/A*
0500 R XXX V	0.082	0.066	0.044	0.027	N/A*
0580 R XXX V	0.038	0.027	0.016	0.016	N/A*
0660 R XXX V	0.055	0.044	0.033	0.022	N/A*
0750 R XXX V	0.033	0.027	0.016	0.011	N/A*
0850 R XXX V	0.044	0.033	0.022	0.016	N/A*
0950 R XXX V	0.038	0.033	0.022	0.011	N/A*
1300 R XXX V	0.027	0.022	0.016	0.011	N/A*
1700 R XXX V	0.022	0.016	0.011	0.005	N/A*
2600 R XXX V	0.016	0.011	0.005	0.005	N/A*
2700 R XXX V	0.011	0.005	0.005	0.005	N/A*

Suction “RS…W” Elements

Suction	...RS...W		
Size	75 µm	125 µm	Wgt. (lbs.)
0060 RS XXX W	0.057	0.030	N/A*
0110 RS XXX W	0.029	0.014	N/A*
0160 RS XXX W	0.020	0.010	N/A*
0240 RS XXX W	0.014	0.007	N/A*
0330 RS XXX W	0.010	0.005	N/A*
0400 RS XXX W	0.011	0.009	N/A*
0500 RS XXX W	0.011	0.009	N/A*
0950 RS XXX W	0.003	0.002	N/A*
1300 RS XXX W	0.003	0.002	N/A*

“RN” Return Elements

Betamicron	...RN...BN4HC				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0040 RN XXX BN4HC	0.779	0.428	0.263	0.143	0.298
0063 RN XXX BN4HC	0.521	0.285	0.187	0.099	0.398
0100 RN XXX BN4HC	0.373	0.181	0.126	0.066	0.606
0160 RN XXX BN4HC	0.198	0.099	0.066	0.027	0.895
0250 RN XXX BN4HC	0.154	0.077	0.049	0.022	2.085
0400 RN XXX BN4HC	0.121	0.088	0.071	0.055	3.122
0630 RN XXX BN4HC	0.115	0.066	0.049	0.038	3.728
1000 RN XXX BN4HC	0.038	0.027	0.022	0.016	6.104

* Not Available at the time of publication. Please contact HYDAC for latest information.

All Element K Factors in psi / gpm.

Element K-Factors

ECOmicron®-fit “R…ECO/N”

ECOmicron-fit	1.14.XXDXXECO/N					
Size	1µm	3 µm	6 µm	12 µm	25 µm	Wgt. (lbs.)
1.14.16DXXECO/N	0.084	0.046	0.041	0.022	0.015	N/A*
1.14.39DXXECO/N	0.032	0.017	0.016	0.008	0.006	N/A*

“MA” Spin-on Elements

Spin-on	…MA…BN				
Size	3 µm	5 µm	10 µm	20 µm	Wgt. (lbs.)
0040 MA XXX BN	1.391	1.780	0.629	0.361	0.73
0080 MA XXX BN	0.522	0.442	0.236	0.135	1.35
0085 MA XXX BN	N/A*	N/A*	N/A*	N/A*	N/A*
0090 MA XXX BN	0.484	0.37	0.345	0.191	1.5
0095 MA XXX BN	0.276	0.211	0.197	0.109	2.04
0160 MA XXX BN	0.237	0.198	0.111	0.063	2.56
0180 MA XXX BN	0.123	0.103	0.058	0.033	3.69

Spin-on	…MA…P			
Size	3 µm	10 µm	25 µm	Wgt. (lbs.)
0040 MA XXX P	7.763	2.348	1.516	0.6
0080 MA XXX P	1.606	0.486	0.314	1.08
0085 MA XXX P	1.161	0.351	0.227	1.42
0090 MA XXX P	1.594	0.482	0.311	1.29
0095 MA XXX P	0.894	0.270	0.174	1.47
0160 MA XXX P	0.839	0.192	0.145	2.15
0180 MA XXX P	0.443	0.134	0.087	2.68

Spin-on	…MA…AM		
Size	10 µm	40 µm	Wgt. (lbs.)
0080 MA XXX AM	0.513	N/A*	1.35
0085 MA XXX AM	N/A*	N/A*	N/A*
0090 MA XXX AM	0.507	N/A*	1.50
0095 MA XXX AM	0.284	N/A*	2.00
0160 MA XXX AM	N/A*	0.233	2.50
0180 MA XXX AM	N/A*	0.136	3.60

* Not Available at the time of publication. Please contact HYDAC for latest information.

All Element K Factors in psi / gpm.

Element Hydraulic Data

Permissible ΔP across element

- Optimicron® (ON) - 290 psid (20 bar)
- Optimicron® Power (ON/PO) - 145 psid (10 bar)
- Betamicron®-H *(high collapse)* (BH4HC) - 3045 psid (210 bar)
- Betamicron®-N *(low collapse)* (BN4HC) - 290 psid (20 bar)
- Betamicron®/Aquamicron® (BN4AM) - 145 psid (10 bar)
- ECOmicron® (ECON2) - 145 psid (10 bar)
- Aquamicron® (AM) - 145 psid (10 bar)
- Wire Mesh (W/HC) - 290 psid (20 bar)
- Polyester (P/HC) - 145 psid (10 bar)
- Metal Fiber (V) - return (R…V) - 435 psid (30 bar); pressure (D…V) - 3045 psid (210 bar)
- Mobilemicron (MM/RK) - 145 psid (10 bar)

Temperature Range

- -22°F to 212°F (-30°C to 100°C)
  Note: Consult HYDAC for applications below 14°F (-10°C)

Compatibility with Hydraulic Media

- Suitable for use with mineral oils, lubrication oils, non-flammable fluids, synthetic and rapidly biodegradable oils.
  Note: For use with water, please contact HYDAC.

Flow Fatigue Stability to ISO 3724

- High fatigue resistance due to solid filter media supports on upstream and downstream sides and high inherent stability of filter elements.

Cracking Pressure of Bypass Valve *(…R only)*

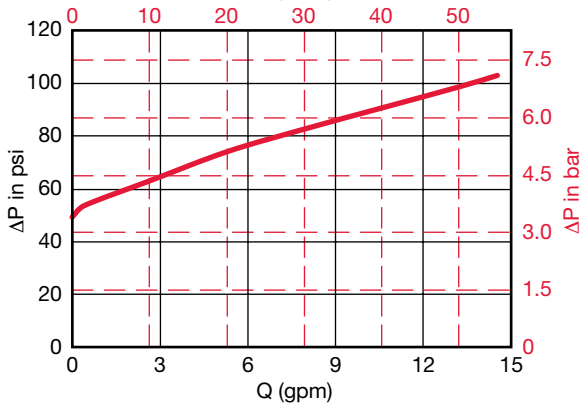
- ΔP = 3 bar + 0.5 bar

Bypass Valve Curves *(…R…ON / …R…BN only)*

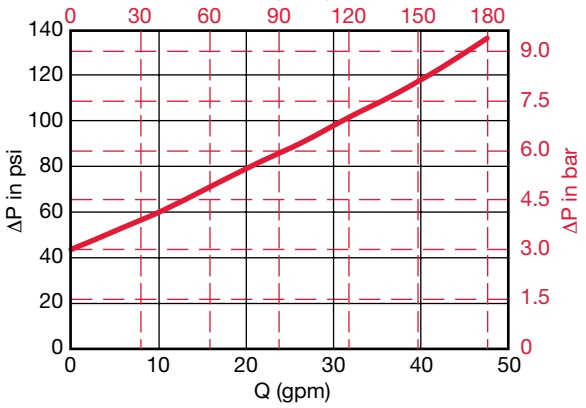
- The bypass valve graphs apply to mineral oils with a density of 0.86 kg/dm³. The differential pressure of the valves changes proportionally to the density. **See graphs below.**

Bypass Valve Curves *(…R…ON / …R…BN only)*

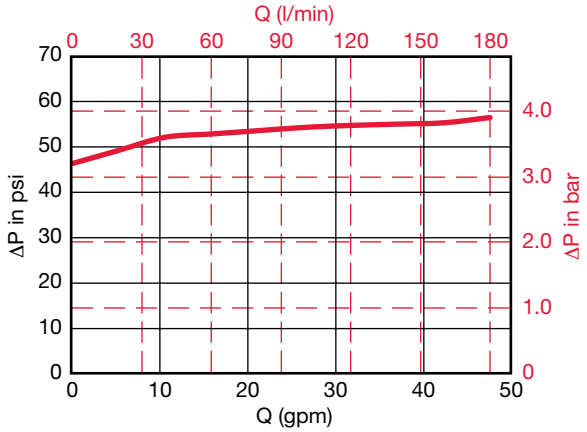
…R…ON / …R…BN
Size 30



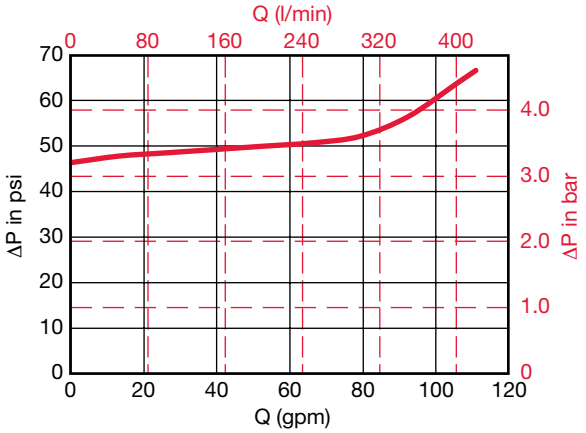
…R…ON / …R…BN
Size 60, 90, 110, 140, 150



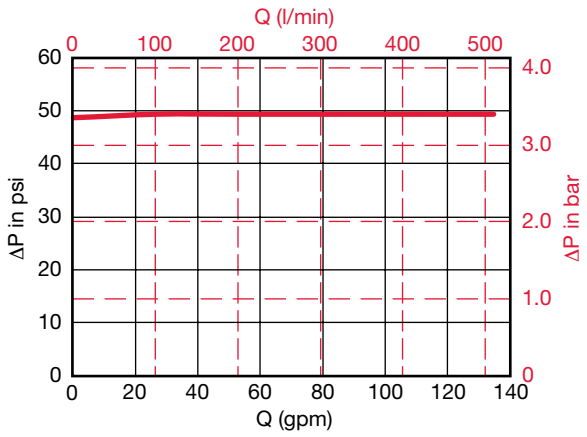
…R…ON / …R…BN
Size 75, 160, 165, 185, 240, 280



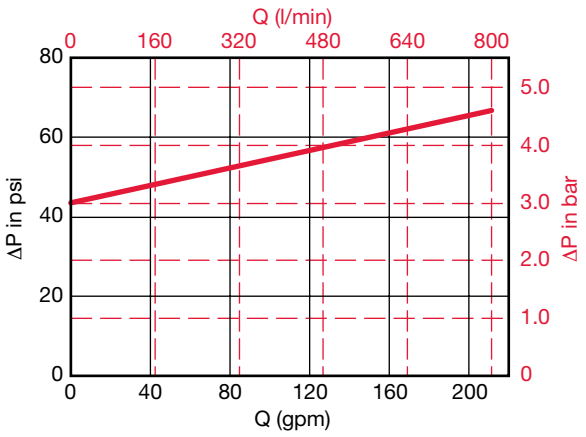
…R…ON / …R…BN
Size 210, 270, 330, 500, 750



…R…ON / …R…BN
Size 660, 850, 1700



…R…ON / …R…BN
Size 950, 1300, 2600



Notes

D

Low Pressure (Return) Filters

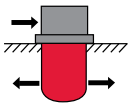
100-600 psi

In-tank, inline, and duplex configurations provide flexibility for use in mobile, industrial, and lube applications. Light weight construction and low ΔP (cold start) options make these filters ideal for agriculture and construction vehicles. Duplex filters allow for uninterrupted operation during element change-out. Modular versions accommodate high flow requirements.

RF Series

In-tank / Inline Filters

360 psi • up to 400 gpm



Features

- RF 30 filters are constructed of polyamide plastic.
- RF 60 - 330 filters are constructed of aluminum material. Aluminum alloy is water tolerant - anodization is not required for high water based fluids (HWBF).
- RF 660 - 1300 filters are constructed of ductile iron.
- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Inlet/outlet port options include NPT, SAE straight thread O-ring boss, and SAE 4-bolt flange to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials (nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water base fluids.
- Bolt-on lid requires minimal clearance for removal.
- Reusable contamination basket prevents loss of retained contaminants into the reservoir during element replacement.
- Single piece casting provides rigidity for inline or in-tank mounting.

Note: This filter is configured with an ..... R .... type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications

Agricultural

Industrial

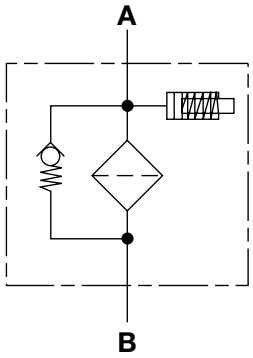
Construction

Gearboxes

Automotive

Steel / Heavy Industry

Hydraulic Symbol



Technical Specifications

Mounting Method	4 Mounting holes - filter housing	
Port Connections	Inlet / Outlet	
30	½" Threaded / 0.71" Dia Smooth	
60/110	SAE-12 / SAE-12; 3/4" NPT / SAE-12	
160/240	SAE-20 / SAE-20; 1 1/4" NPT *(with adapter)* / SAE-20	
330	SAE-20 / 2" NPT *(with flange port adapter)*	
	2" Threaded (NPT/BSPP/SAE) / same as inlet	
	2" SAE Flange, Code 61 / 2" NPT	
660	3" SAE Flange, Code 61 / 3" NPT	
	3" SAE Flange, Code 61 / 3" SAE Flange, Code 61	
950	3-1/2" SAE Flange, Code 61 / 3-1/2" SAE Flange, Code 61	
1300	4" SAE Flange, Code 61 / 4" SAE Flange, Code 61	
Direction of Flow	Inlet: Side	Outlet: bottom
Materials of Construction		
	Housing	**Lid**
30	Polyamide	Polyamide
60-330	Aluminum	Aluminum
660-1300	Ductile Iron	Ductile Iron
Flow Capacity		
30	8 gpm (30 lpm)	
60	16 gpm (60 lpm)	
110	29 gpm (110 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
330	87 gpm (330 lpm)	
660	174 gpm (660 lpm)	
950	251 gpm (950 lpm)	
1300	343 gpm (1300 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	360 psi (25 bar); *(size 30 - 145 psi, 10 bar)*	
Fatigue Pressure	478 psi (33 bar) @ 700,000 cycles;	
Burst Pressure	30	580 psi (40 bar)
	60/110	1080 psi (75 bar)
	160/240	1230 psi (85 bar)
	330	1440 psi (100 bar)
	660-1300	3045 psi (210 bar)
Element Collapse Pressure Rating		
ON, W/HC, ECON2, BN4AM, P/HC, AM		290 psid (20 bar)
V		145 psid (10 bar)
		435 psid (30 bar)
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
P = 29 psi (2 bar) -10% *(standard)*		
P = 72 psi (5 bar) -10% *(optional)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(standard)*		
ΔP = 87 psid (6 bar) +10% *(optional)*		

*Note: All RF Filters MAWP reduce to 7 bar (101.5 psi) when using the following "VMF" and "VR" indicators: B, BM, E, ES, GC, LE, LZ.

Model Code

RF ON 330 D L 10 C 1 . X / 16 - V - B6

Filter Type
RF = Return Line Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Mesh
V = Metal Fiber
BN/AM = Betamicron®/Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Size
30, 60, 110, 160, 240, 330, 660, 950, 1300

Pressure Rating
B = 145 psi (10 bar) *(size 30 only)*
D = 360 psi (25 bar)
V = 101.5 psi (7 bar) when using following " VR" indicators: B, BM, E, ES, GC, LE, LZ

Type of Connection
B = 1/2" Threaded *(size 30 - NPT / BSPP inlet/0.71" Outlet)*
C = 3/4" Threaded *(sizes 60, 110 - NPT / BSPP inlet/3/4" SAE Outlet)*
E = 1 1/4" Threaded Inlet (SAE/NPT) / 1 1/4" threaded outlet *(sizes 160 - 240)* or 2" NPT outlet *(size 330)*
NPT available with Adapter (to size 240)
G = 2" Threaded *(size 330 - NPT / BSPP / SAE Inlet / Outlet - same as inlet)*
L = 2" SAE 32 Flange Inlet / 2" NPT Outlet *(size 330)*
M = SAE 48 Flange Inlet / SAE 48 Flange Outlet *(size 660)*
N = SAE 48 Flange Inlet / 3" NPT Outlet *(size 660)*
O = SAE 56 Flange *(size 950) - Inlet & Outlet*
P = SAE 64 Flange *(size 1300) - Inlet & Outlet*

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
25, 50, 100, 200 = W/HC
3, 10 = BN/AM
10, 20 = P/HC
3, 5, 10, 20 = ECON2
3, 5, 10, 20 = V
40 = AM

Type of Static or ΔP Clogging Indicator
A, B, BM, C, D, E, LE *(Others available upon request, see Clogging Indicators section.)*

Type Number
1 = Standard Connection

Modification Number *(latest version always supplied)*

Inlet Port Configuration
0 = BSPP Straight Thread *(sizes 30 - 330)*
3 = NPT *(sizes 30 - 330)*
12 = SAE Straight Thread Inlet/Outlet Connections *(sizes 60, 110, 160, 240, 330 only)*
16 = SAE Flange Code 61 Inlet Connections *(sizes 330 - 1300)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B2 = 29 psid (2 bar)
B6 = 87 psid (6 bar) *(return line extended life)*
KB = No Bypass *(flushing systems)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
DE = ΔP Indicator - For in-line applications *(sizes 660, 950, 1300)*
T = With tank breather *(size 30 only)*
W = Modification of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0330 R 010 ON / V B6

Size
0030, 0060, 0110, 0160, 0240,
0330, 0660, 0950, 1300

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
10, 20 = P/HC
3, 10 = BN4AM
40 = AM
3, 5, 10, 20 = V

Element Media
ON, ECON2, BN4AM, AM, P/HC, W/HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B2 = 29 psid (2 bar)
B6 = 87 psid (6 bar)
KB = no bypass

Supplementary Details
SO263 = *(same as above)*
W = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VR 5 C . X /

Indicator Prefix
VR = Return Filters
VM = ΔP G 1/2 Indicator *(sz. 660+, w/DE opt.)*
VD = ΔP LE Indicator *(sz. 660+, w/DE opt.)*

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset - static only)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
E = Visual pressure gauge
LE = Electric switch and pop-up

Modification Number

Supplementary Details

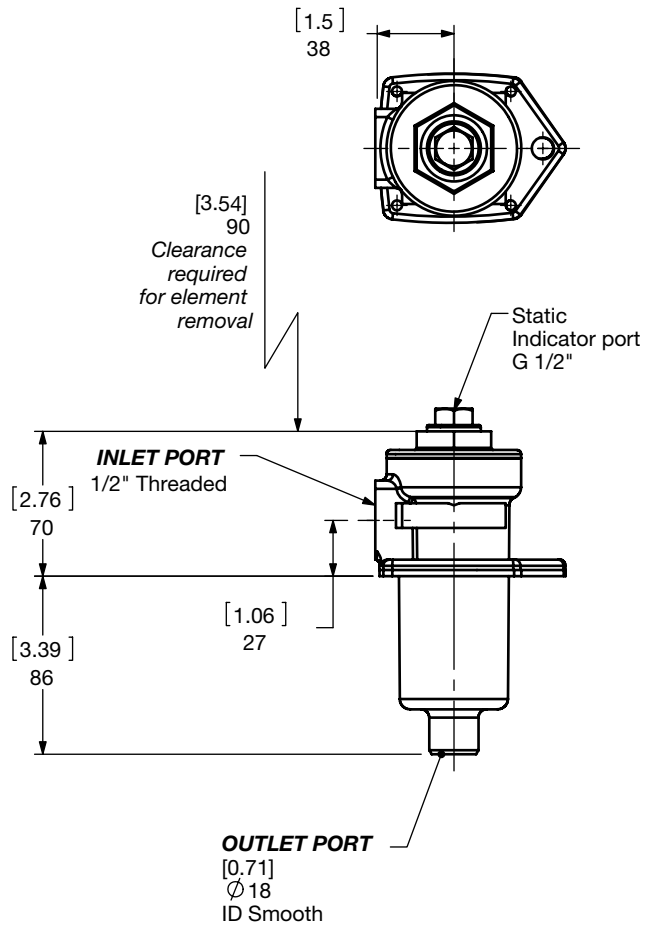
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L48 = 48V L110 = 110V L220 = 220V
(For additional details and options, see Clogging Indicators section.)

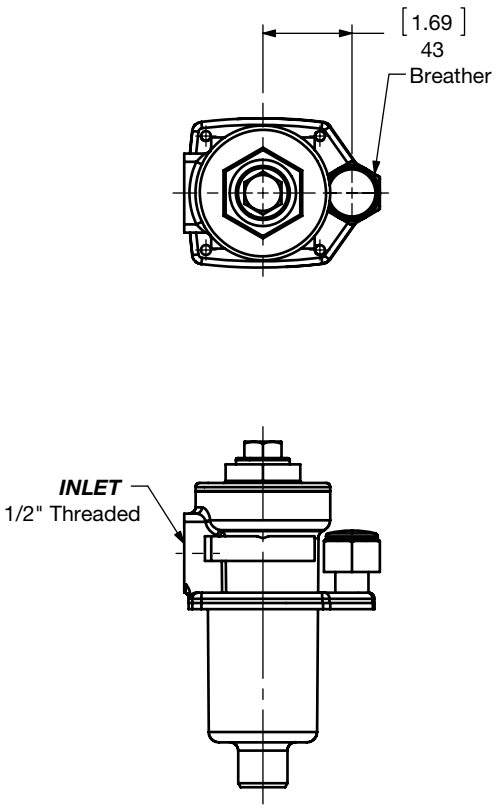
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions

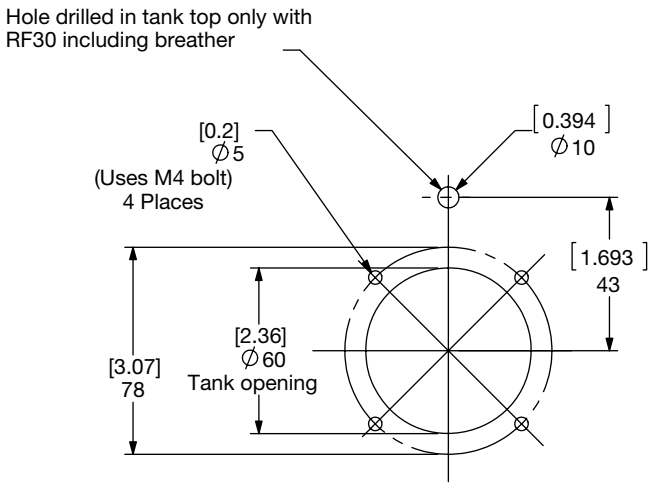
RF 30 (No Breather)



RF 30…T (With Breather)



Front View

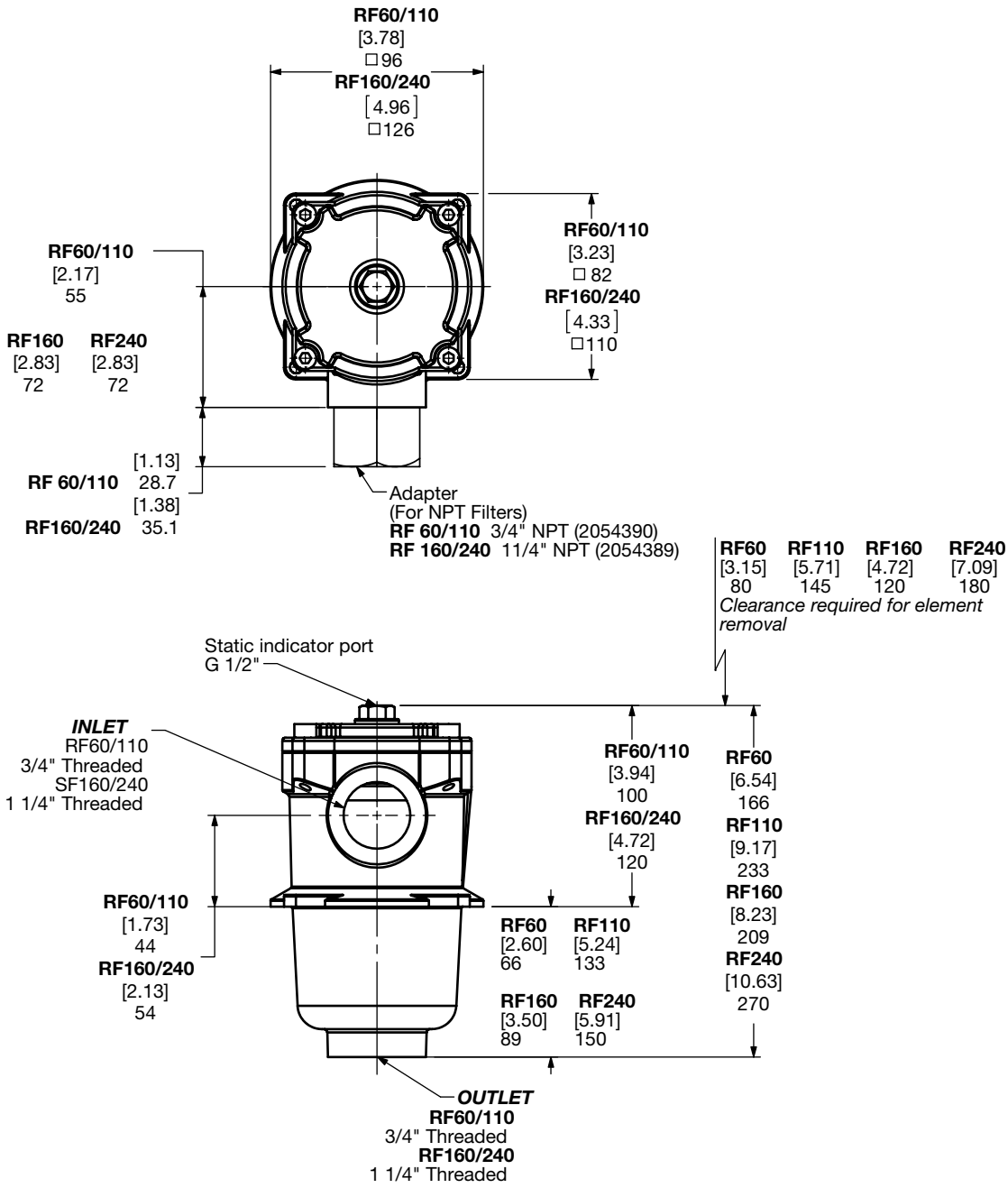


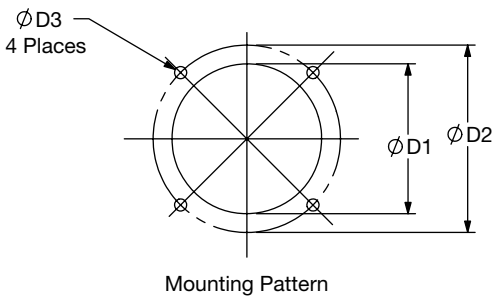
Mounting Pattern

Size	30
Weight (lbs.)	0.9

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RF 60 - 240





Mounting Pattern

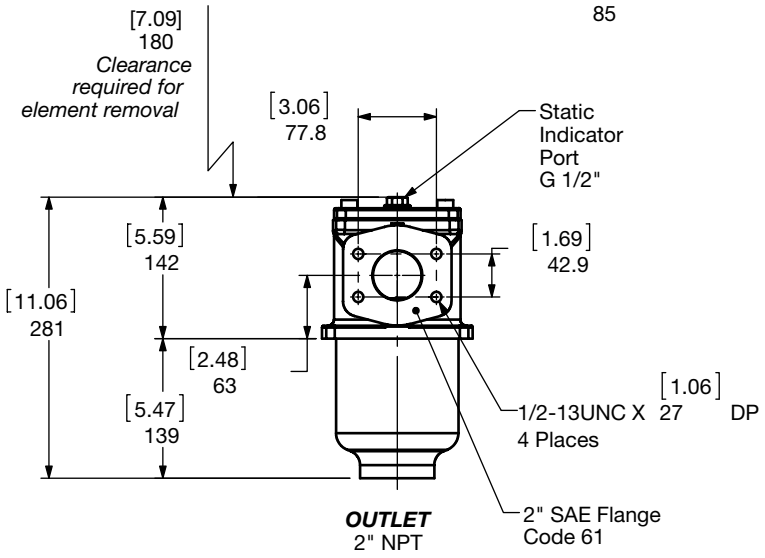
Size	øD1	øD2	øD3	Bolts
60 / 110	3.15” (80mm)	3.94” (100mm)	0.26” (6.5mm)	M5
160 / 240	4.17” (106mm)	5.32” (135mm)	0.30” (7.5mm)	M6

Size	60	110	160	240
Weight (lbs.)	2.0	2.5	4.0	5.0

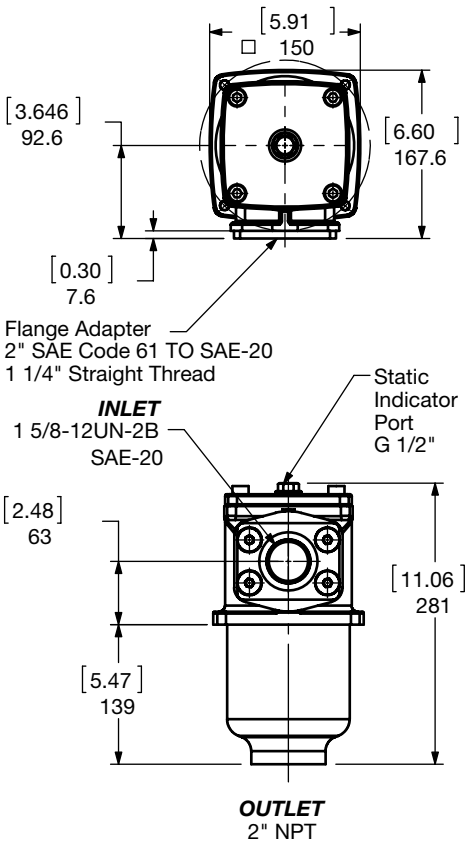
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

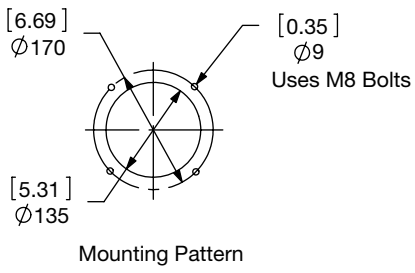
Dimensions
RF 330

RF 330 / 16

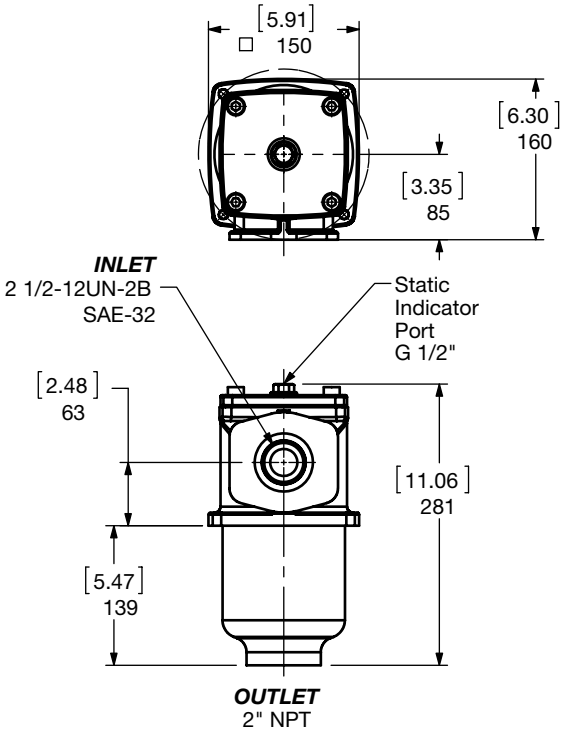


RF 330 /12 (1 1/4")





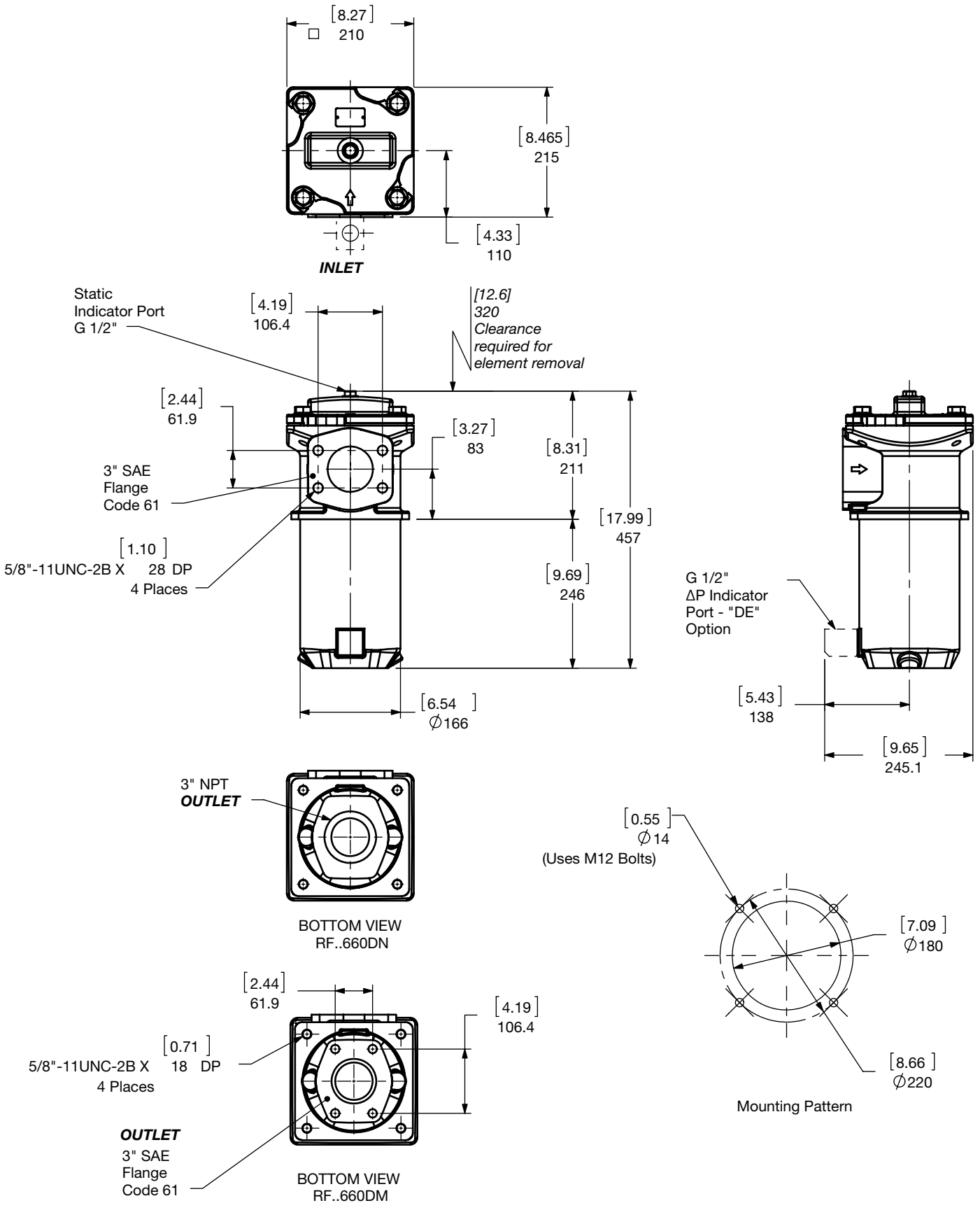
RF 330 /12 (2")



Size	330
Weight (lbs.)	9.0

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RF 660

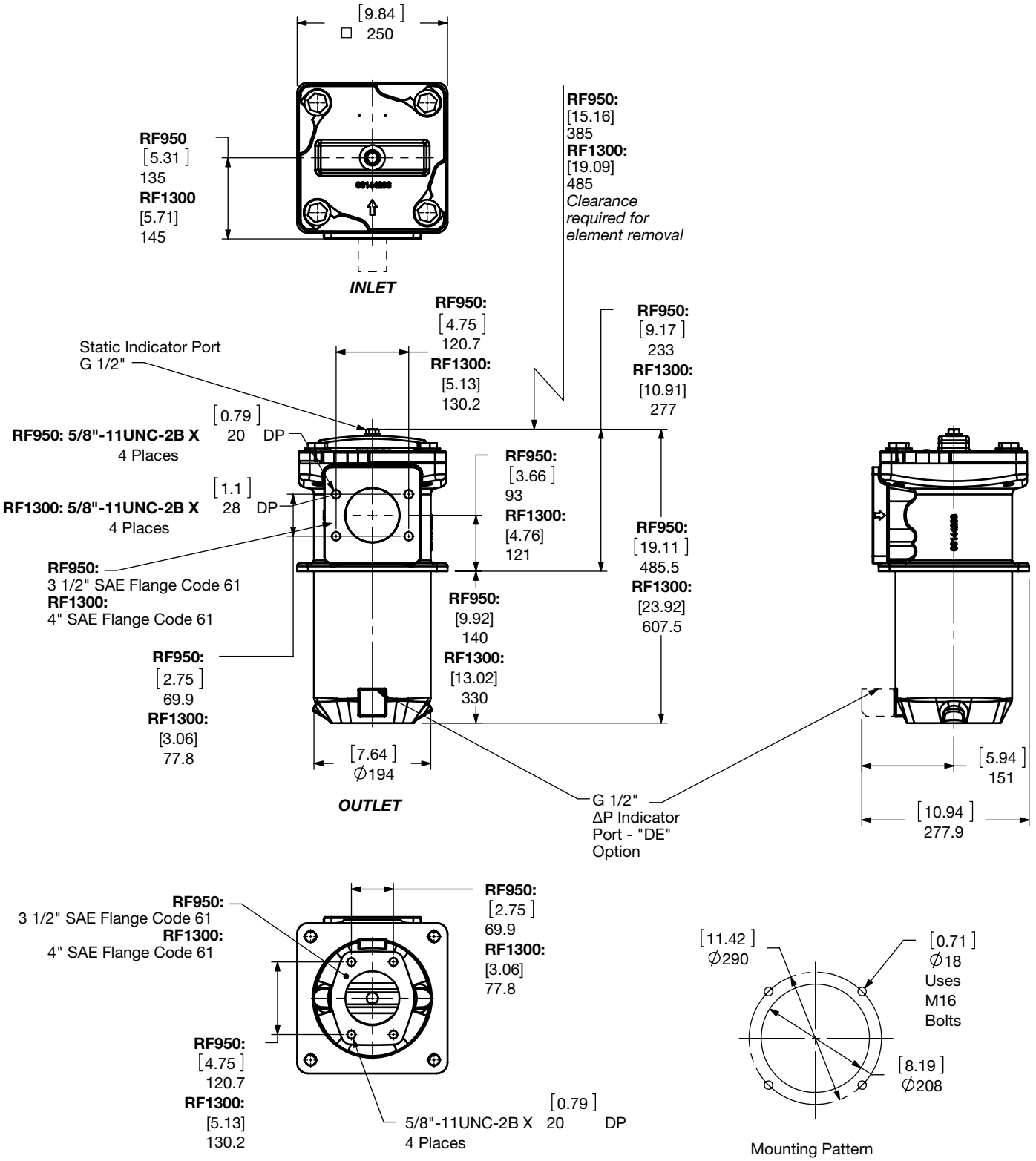


Size	660
Weight (lbs.)	68.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

Dimensions
RF 950 - 1300



Size	950	1300
Weight (lbs.)	98.1	115.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly P = Housing P + Element P

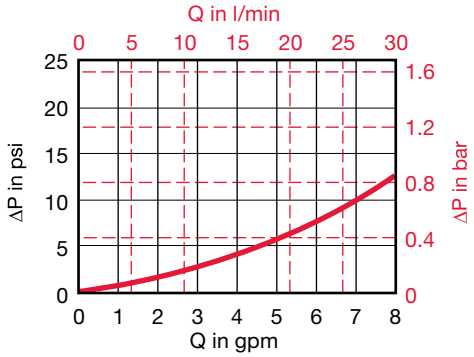
Housing Curve:

Pressure loss through housing is as follows:

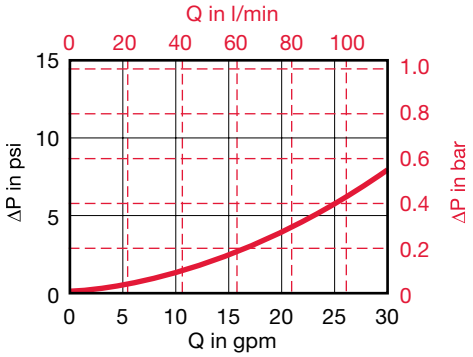
$$\text{Housing P} = \text{Housing Curve P} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

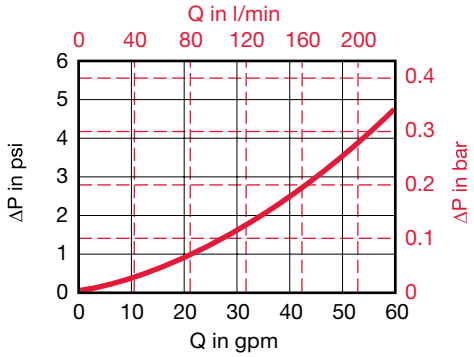
RF 30 HOUSING



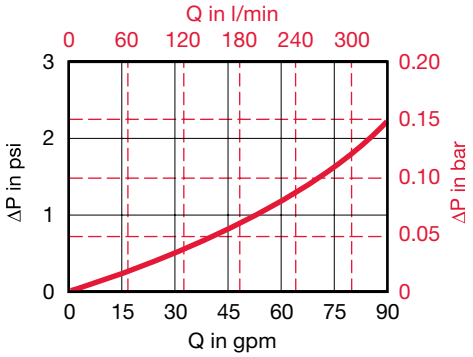
RF 60/110 HOUSING



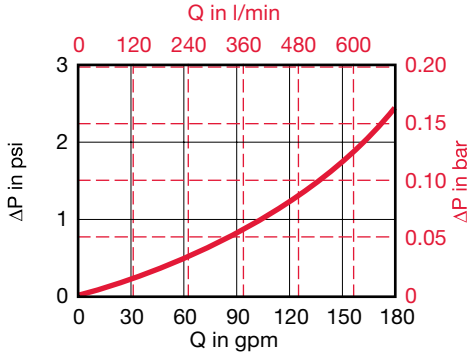
RF 160/240 HOUSING



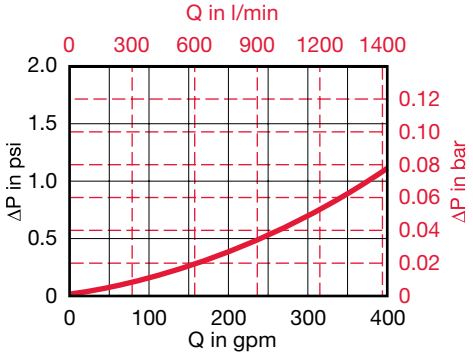
RF 330 HOUSING



RF 660 HOUSING



RF 950/1300 HOUSING



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0030 R XXX ON	4.928	3.754	2.409	1.471	0.922	0.807
0060 R XXX ON	2.59	1.295	0.944	0.539	0.494	0.376
0110 R XXX ON	1.224	0.719	0.487	0.296	0.234	0.178
0160 R XXX ON	0.878	0.439	0.312	0.177	0.148	0.182
0240 R XXX ON	0.571	0.284	0.201	0.125	0.101	0.077
0330 R XXX ON	0.444	0.204	0.15	0.081	0.07	0.056
0660 R XXX ON	0.196	0.093	0.066	0.037	0.031	0.025
0950 R XXX ON	0.131	0.057	0.043	0.026	0.021	0.017
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0160 R XXX ECON2	0.521	0.324	0.209	0.159
0240 R XXX ECON2	0.340	0.209	0.143	0.099
0330 R XXX ECON2	0.230	0.148	0.093	0.066
0660 R XXX ECON2	0.104	0.066	0.044	0.027
0950 R XXX ECON2	0.066	0.044	0.027	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0330 R XXX BN4AM	0.477	0.165
0660 R XXX BN4AM	0.192	0.066
0950 R XXX BN4AM	0.132	0.044
1300 R XXX BN4AM	0.088	0.033

Aquamicron	...R...AM
Size	40 µm
0330 R 040 AM	0.115
0660 R 040 AM	0.051
0950 R 040 AM	0.036
1300 R 040 AM	0.026

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
0030 R XXX W/HC	0.067
0060 R XXX W/HC	0.034
0110 R XXX W/HC	0.016
0160 R XXX W/HC	0.011
0240 R XXX W/HC	0.007
0330 R XXX W/HC	0.011
0660 R XXX W/HC	0.004
0950 R XXX W/HC	0.003
1300 R XXX W/HC	0.002

Polyester	...R...P/HC	
Size	10 µm	20 µm
0030 R XXX P/HC	0.181	0.092
0060 R XXX P/HC	0.092	0.046
0110 R XXX P/HC	0.050	0.025
0160 R XXX P/HC	0.035	0.017
0240 R XXX W/HC	0.023	0.012
0330 R XXX W/HC	0.016	0.008
0660 R XXX W/HC	0.008	0.004
0950 R XXX W/HC	0.006	0.003
1300 R XXX W/HC	0.004	0.002

S.S. Wire Mesh "R"	...R...V US UNITS			
Size	3 µm	5 µm	10 µm	20 µm
0030 R XXX V	1.065	0.779	0.434	0.209
0060 R XXX V	0.873	0.510	0.296	0.181
0110 R XXX V	0.417	0.280	0.165	0.110
0160 R XXX V	0.269	0.192	0.132	0.082
0240 R XXX V	0.176	0.143	0.093	0.066
0330 R XXX V	0.115	0.093	0.060	0.044
0660 R XXX V	0.055	0.044	0.033	0.022
0950 R XXX V	0.038	0.033	0.022	0.011
1300 R XXX V	0.027	0.022	0.016	0.011

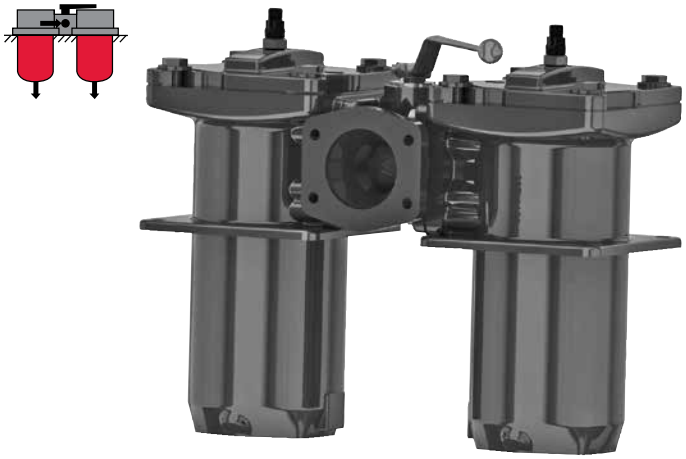
All Element K Factors in psi / gpm.

Notes

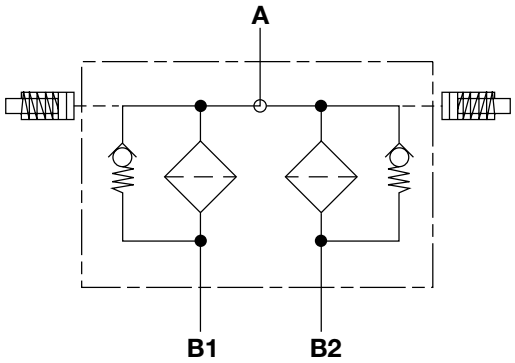
RFD Series

In-Tank / Inline Duplex Filters

360 psi • up to 400 gpm



Hydraulic Symbol



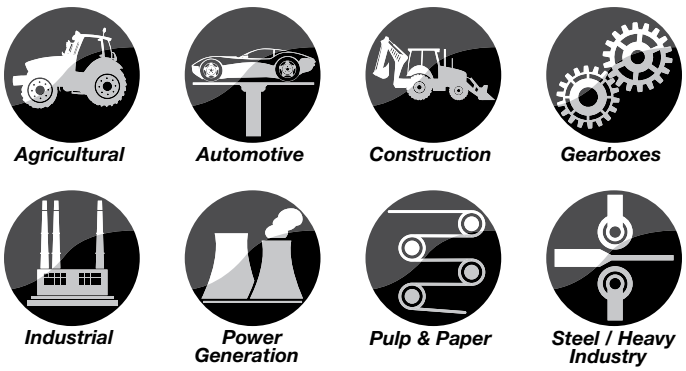
Features

- RFD 110 - 330 filters are constructed of aluminum.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- RFD 660 - 1300 filters are constructed of ductile iron.
- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Inlet/outlet port options include NPT (RFD 110-240 inlet only), SAE straight thread O-ring boss, and SAE 4-bolt flange to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials (nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water base fluids.
- Bolt-on lid requires minimal clearance for removal.
- Reusable contamination basket prevents loss of retained contaminants into the reservoir during element replacement.
- All RFD duplex filters have a ball-type selector valve to provide continuous filtration without system shut-down to change clogged elements.
- Single piece housing castings provide strength and rigidity for in-line or in-tank mounting
- Flange connection bolts included for inlet connection only. Bolts are suitable for use with split flange halves, per ISO6162-1 / SAE J518-1.

Note: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Sizes 60 and 160 have been discontinued. Replacement elements, seal kits and lid assemblies are still available.

Applications



Technical Specifications

Mounting Method	4 Mounting holes in the filter housing		
Port Connections	Inlet / Outlet		
110	SAE-12 / SAE-12; 3/4"NPT (adapter) / SAE-12		
240	SAE-16 (adapter) / G-1-1/4" female; 1"NPT (adapter) / G-1-1/4" female		
330	G2" / G2"; SAE DN 51 Code 61 Flange / G2"		
660	SAE DN 76 Code 61 / SAE DN 76 Code 61 SAE DN 76 Code 61 / SAE DN 89 Code 61		
950	SAE DN 102 Code 61/ SAE DN 89 Code 61		
1300	SAE DN 102 Code 61/ SAE DN 102 Code 61		
Direction of Flow	Side Inlet and Bottom Outlet		
Materials of Construction			
	Housing	**Lid**	**Transfer Valve**
110 - 240	Aluminum	Aluminum	Steel
330	Aluminum	Aluminum	Aluminum
660-1300	Ductile Iron	Ductile Iron	Ductile Iron
Flow Capacity			
110	29 gpm (110 lpm)		
240	63 gpm (240 lpm)		
330	87 gpm (330 lpm)		
660	174 gpm (660 lpm)		
950	251 gpm (950 lpm)		
1300	343 gpm (1300 lpm)		
Housing Pressure Rating			
Max. Allowable Working Pressure*	360 psi (25 bar)		
Fatigue Pressure	360 psi (25 bar) @ 700,000 cycles		
Burst Pressure	110	1080 psi (75 bar)	
	240	1230 psi (85 bar)	
	330	1440 psi (100 bar)	
	660-1300	>1440 psi (100 bar)	
Element Collapse Pressure Rating			
ON, W/HC, ECON2, BN4AM, P/HC, AM	290 psid (20 bar)		
V	145 psid (10 bar) 435 psid (30 bar)		
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)		
Consult HYDAC for applications below 14°F (-10°C)			
Fluid Compatibility			
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.			
Indicator Trip Pressure			
P = 29 psi (2 bar) -10% (standard) P = 72 psi (5 bar) -10% (optional)			
Bypass Valve Cracking Pressure			
ΔP = 43 psid (3 bar) +10% *(standard)* ΔP = 87 psid (6 bar) +10% *(optional)*			

*Note: All RFD Filters MAWP reduce to 7 bar (101.5 psi) when using the following "VMF" and "VR" indicators: B, BM, E, ES, GC, LE, LZ.

PN#02081318 / 07.19 / FIL1907-2109

Model Code

RFD ON 330 D A L 10 D 1 . X / 16 - V - B6

Filter Type
RFD = Duplex In-Tank Return Line Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Mesh
P/HC = Polyester
BN/AM = Betamicron®/Aquamicron®
AM* = Aquamicron® *(*Only available in sz. 330, 660, 950, & 1300)*
V = Metal Fiber

Size
110, 240, 330, 660, 950, 1300

Pressure Rating
D = 360 psi (25 bar)
V = 101.5 psi (7 bar) *(When using the following "VR" indicators: B, BM, E, ES, GC, LE, LZ)*

Type of Changeover Valve
A = Ball Valve

Type of Connection
C = 3/4" Threaded *(size 110)*; SAE-12 or 3/4" NPT (w/adapter) inlet / SAE-12 outlet
D = 1" Threaded Inlet (adapter) / G-1-1/4" female Outlet *(size 240)*; SAE-16 or 1" NPT *(w/adapter)* inlet
G = 2" Threaded *(BSPP only size 330)* – Inlet and Outlet
L = SAE DN 51 Code 61 Flange Inlet / 2" BSPP Outlet *(size 330)*
M = SAE DN 76 Code 61 Flange Inlet / SAE DN 76 Code 61 Flange Outlet *(size 660)*
N = SAE DN 76 Code 61 Flange Inlet / 3" BSPP Outlet *(size 660)*
O = SAE DN 102 Code 61 Flange Inlet / SAE DN 89 Code 61 Flange Outlet *(size 950)*
P = SAE DN 102 Code 61 Flange Inlet / SAE DN 102 Code 61 Flange Outlet *(size 1300)*

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
10, 20 = P/HC
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
3, 10 = BN/AM
3, 5, 10, 20 = V
40 = AM

Type of Static or ΔP Clogging Indicator
A, B, BM, C, D, E *(Others available upon request, see Clogging Indicators section.)* - Note: 2 required

Type Number
1 = Standard Connection

Modification Number *(latest version always supplied)*

Port Configuration
(omit) = SAE DN Flange Inlet Connections *(sizes 330 - 1300 only)*
12 = SAE Straight Thread Inlet/Outlet Connections *(sizes 110, 240)*
0 = BSPP Straight Thread
3 = NPT *(sizes 110, 240)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B2 = 29 psid (2 bar)
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0330 R 010 ON / V B6

Size
0060, 0110, 0160, 0240,
0330, 0660, 0950, 1300

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
3, 10 = BN4AM
40 = AM
10, 20 = P/HC
3, 5, 10, 20 = V

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)* B1 = 14.5 psid (1 bar)
B2 = 29 psid (2 bar) B6 = 87 psid (6 bar) KB = no bypass

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VR 5 D . X / V

Indicator Prefix
VR = Return Filters

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset - static only)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
E = Visual pressure gauge

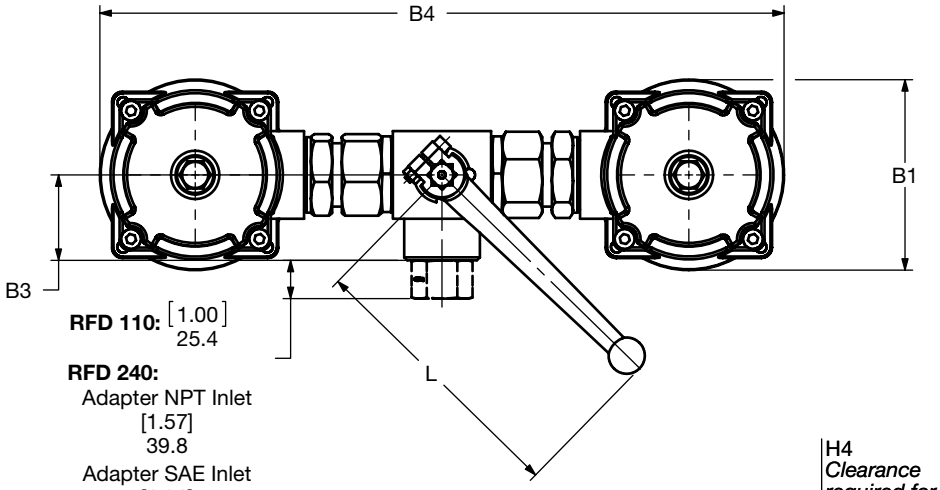
Modification Number

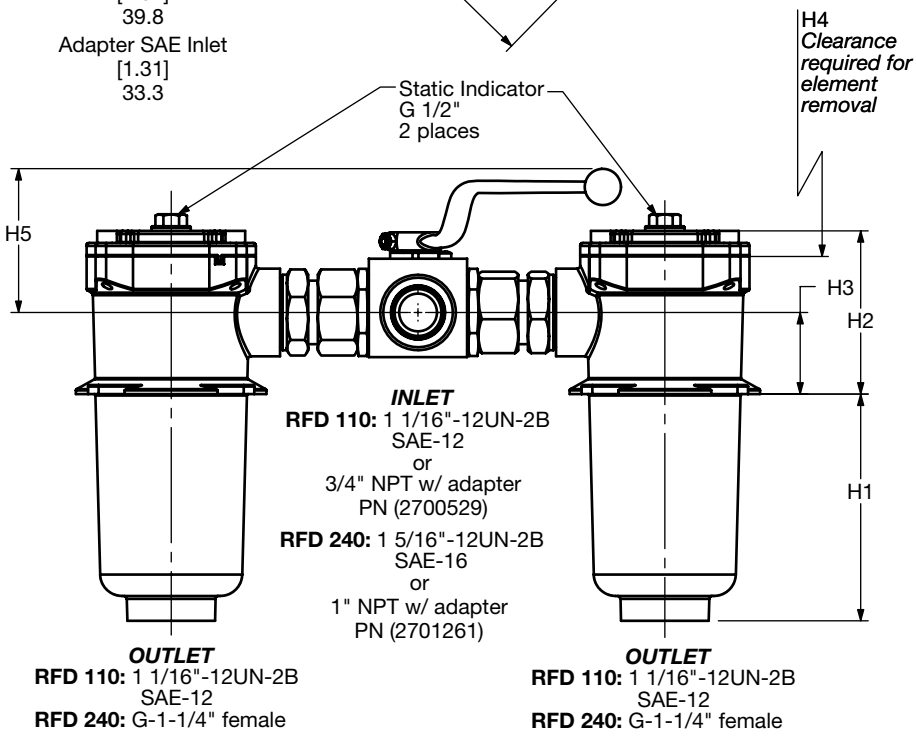
Supplementary Details
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)
Light Voltage *(D type indicators only)*
L24 = 24V L48 = 48V L110 = 110V L220 = 220V

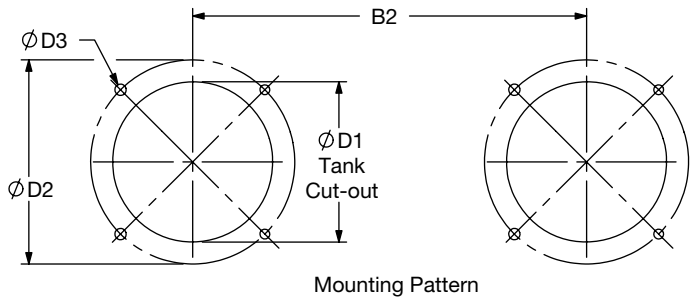
(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
RFD 110 - 240







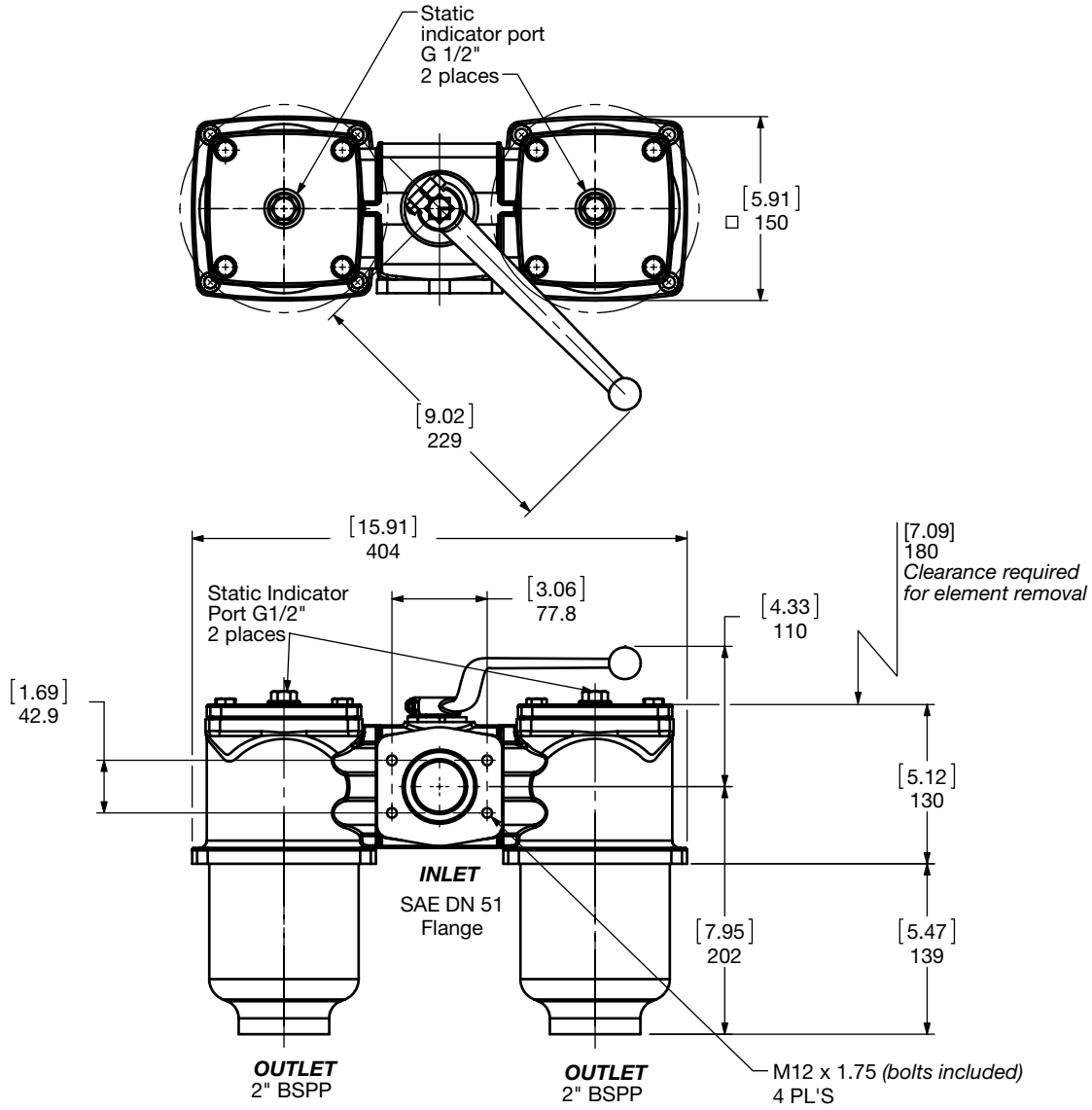
Mounting Pattern

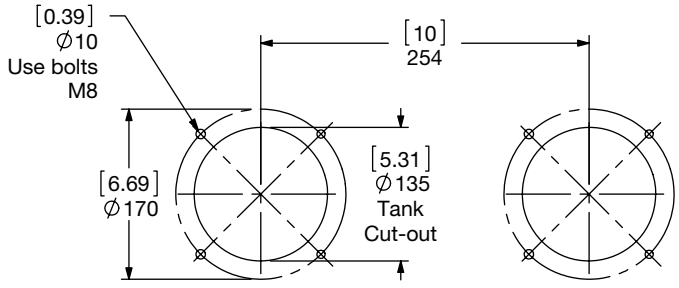
Size	110	240
B1	[3.77] 96	[4.96] 126
B2	[10.26] 260.5	[13.2] 335.5
B3	[1.87] 47.5	[2.22] 56.5
B4	[14] 357	[18.14] 461
D1	[3.15] 80	[4.17] 106
D2	[3.9] 100	[5.3] 135
D3	[0.315] 8	[0.374] 9.5
H1	[5.24] 133	[5.91] 150
H2	[3.46] 88	[4.25] 108
H3	[1.73] 44	[2.13] 54
H4	[5.71] 145	[7.1] 180
H5	[3.62] 92	[3.74] 95
L	[6.81] 173	[6.81] 173
Reservoir bolts	M5	M6

Size	110	240
Weight (lbs.)	8.2	17.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFD 330





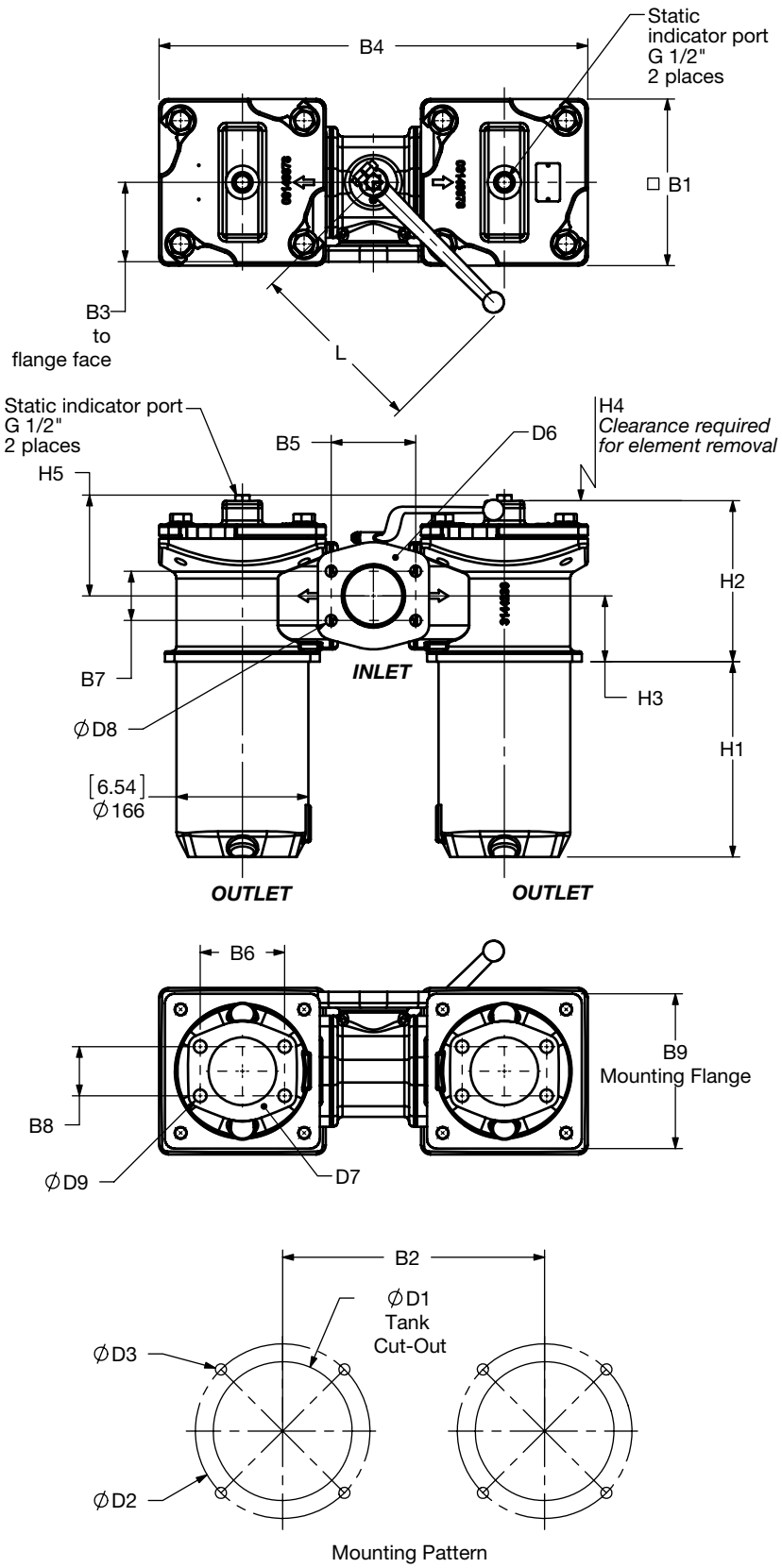
Mounting Pattern

Size	330
Weight (lbs.)	29.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

Dimensions
RFD 660 - 1300



Size	660	950	1300
B1	[8.27] 210	[9.61] 244	[9.61] 244
B2	[12.99] 330	[15.35] 390	[16.14] 410
B3	[3.9] 100	[5.51] 140	[5.51] 140
B4	[21.26] 540	[25.2] 640	[25.98] 660
B5	[4.19] 106.5	[5.13] 130.2	[5.13] 130.2
B6	[4.19] 106.4	[4.75] 120.7	[5.13] 130.2
B7	[2.43] 61.9	[3.06] 77.8	[3.06] 77.8
B8	[2.43] 61.9	[2.75] 69.9	[3.06] 77.8
B9	[7.68] 195	[9.84] 250	[9.84] 250
D1	[7.1] 180	[8.19] 208	[8.19] 208
D2	[8.66] 220	[11.42] 290	[11.42] 290
D3	[0.55] 14	[0.71] 18	[0.63] 16
D6	SAE DN 76 Flange	SAE DN 102 Flange	SAE DN 102 Flange
D7	3” BSPP or SAE DN 76 Flange	SAE DN 89	SAE DN 102
D8	M16 x 2*	M16 x 2*	M16 x 2*
D9	M16 X 2, 18 mm deep	M16 X 2, 20 mm deep	M16 X 2, 20 mm deep
H1	[9.68] 246	[9.94] 252.5	[13.01] 330.5
H2	[7.99] 203	[8.85] 225	[10.6] 269
H3	[3.27] 83	[[3.66] 93	[4.76] 121
H4	[12.6] 320	[15.16] 385	[19.09] 485
H5	[4.48] 114	[6.69] 170	[6.69] 170
L	[9.02] 229	[12.52] 318	[12.52] 318
Bolts**	M12 x 1.75	M16 x 2	M16 x 2

*Bolts included
** Recommended reservoir mounting bolts

Size	660	950	1300
Weight (lbs.)	158.8	231.5	260.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

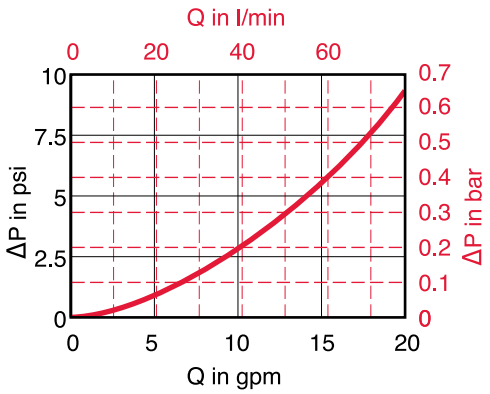
Housing Curve:

Pressure loss through housing is as follows:

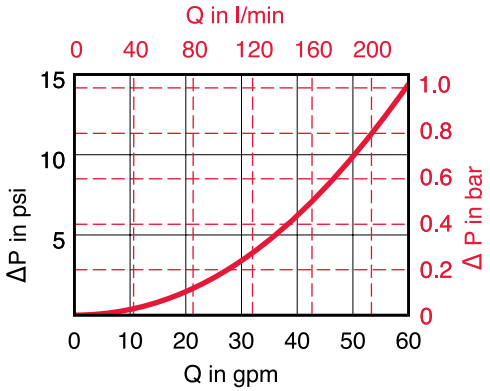
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

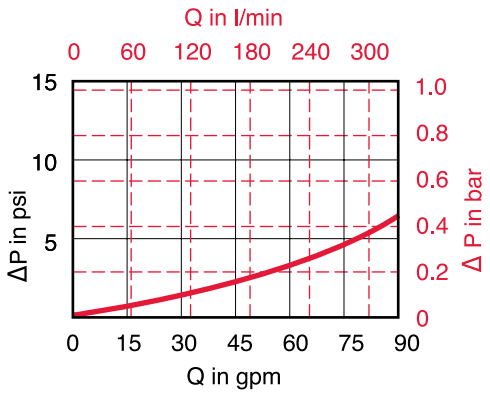
RFD 110 HOUSING & TRANSFER VALVE



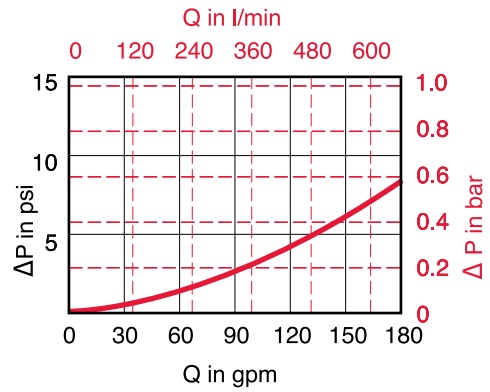
RFD 240 HOUSING & TRANSFER VALVE



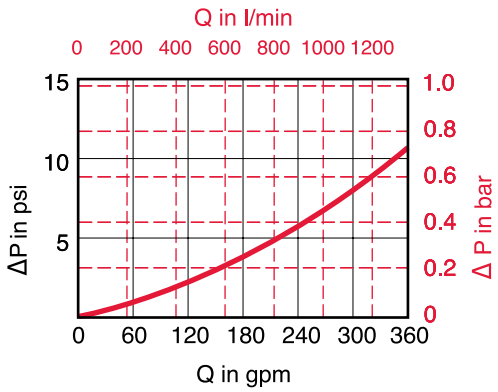
RFD 330 HOUSING & TRANSFER VALVE



RFD 660 HOUSING & TRANSFER VALVE



RFD 950/1300 HOUSING & TRANSFER VALVE



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0110 R XXX ON	1.224	0.719	0.487	0.296	0.234	0.178
0240 R XXX ON	0.571	0.284	0.201	0.125	0.101	0.077
0330 R XXX ON	0.444	0.204	0.15	0.081	0.07	0.056
0660 R XXX ON	0.196	0.093	0.066	0.037	0.031	0.025
0950 R XXX ON	0.131	0.057	0.043	0.026	0.021	0.017
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0240 R XXX ECON2	0.340	0.209	0.143	0.099
0330 R XXX ECON2	0.230	0.148	0.093	0.066
0660 R XXX ECON2	0.104	0.066	0.044	0.027
0950 R XXX ECON2	0.066	0.044	0.027	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0330 R XXX BN4AM	0.477	0.165
0660 R XXX BN4AM	0.192	0.066
0950 R XXX BN4AM	0.132	0.044
1300 R XXX BN4AM	0.088	0.033

Aquamicron	...R...AM
Size	40 µm
0330 R 040 AM	0.115
0660 R 040 AM	0.051
0950 R 040 AM	0.036
1300 R 040 AM	0.026

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
0110 R XXX W/HC	0.016
0240 R XXX W/HC	0.007
0330 R XXX W/HC	0.011
0660 R XXX W/HC	0.004
0950 R XXX W/HC	0.003
1300 R XXX W/HC	0.002

Polyester	...R...P/HC	
Size	10 µm	20 µm
0110 R XXX P/HC	0.050	0.025
0240 R XXX W/HC	0.023	0.012
0330 R XXX W/HC	0.016	0.008
0660 R XXX W/HC	0.008	0.004
0950 R XXX W/HC	0.006	0.003
1300 R XXX W/HC	0.004	0.002

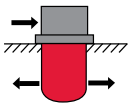
All Element K Factors in psi / gpm.

Notes

RFM Series

In-Tank Return Line Filters

145 psi • up to 224 gpm



Features

- The compact and lightweight design make RFM filters especially suitable for mobile applications.
- RFM filters are constructed of polyamide plastic housing and lid.
- RFM 90/150/210/270 drop in replacement for "Tank Topper" filters.
- Sizes 50 - 851 aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- The filter bowl on models 50 - 270 also serves as a contamination basket - removed to change element.
- Models 330, 500, 661, and 851 have filter elements equipped with separate, reusable contamination baskets.
- Sizes 75/90/150/165/185 available with 4- or 2-bolt tank flange.
- Second inlet optional port available for sizes 75, 165, 185 only with 4-bolt mounting head.
- Sizes 975 & 1100 added for increased flow capacities
- Sizes 50, 975 and 1100 utilize separate bypass assemblies
- Size 50 only available with BN4HC elements

Note: This filter is configured with an .....R.... type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element. *(Exception - sizes 50, 975, 1100)*

Consult HYDAC for applications using RFM50. RFM50 is not a standard offering.

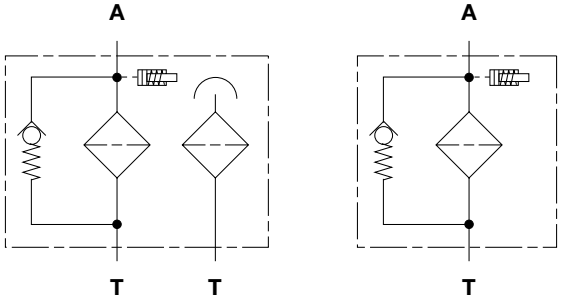
Applications

Agricultural

Automotive

Construction

Hydraulic Symbol



Technical Specifications

Mounting Method			
75/90/150/165/185	2 mounting holes - filter housing		
50/75/90/150/165/185/210/270/330/500/661/851/975/1100	4 mounting holes - filter housing		
Port Connections	Inlet / Outlet		
50	SAE-8 / 0.9"		
90/150	SAE-12 / 1"		
75/165/185	SAE-16 / 1.26" Smooth Port		
210/270	SAE-20 / Open Bottom		
330/500	SAE-24 / 2" NPT 1 1/2" SAE Flange, Code 61 / 2" NPT		
661/851	2 1/2" SAE Flange, Code 61 / G 2		
975/1100	1/2" BSPP 2" SAE Straight Thread / 2" NPT 2 1/2" NPT Threaded / 2" NPT M 2 1/2" SAE Code 61 Flange / 2" NPT M		
Direction of Flow	Side inlet and bottom outlet.		
Mat. of Construc.	Head	Bowl	Lid
50/90/150/75/165/185	Aluminum	Polyamide	Polyamide
210/270	Aluminum	Steel	Polyamide
330/500/661/851	Aluminum	Polyamide	Aluminum
975/1100	Aluminum	Steel	Steel
Flow Capacity			
50 - 13 gpm (50 lpm)	270 - 71 gpm (270 lpm)		
75 - 20 gpm (75 lpm)	330 - 87 gpm (330 lpm)		
90 - 24 gpm (90 lpm)	500 - 132 gpm (500 lpm)		
150 - 40 gpm (150 lpm)	661 - 174 gpm (660 lpm)		
165 - 43 gpm (165 lpm)	851 - 225 gpm (850 lpm)		
185 - 49 gpm (185 lpm)	975 - 258 gpm (950 lpm)		
210 - 55 gpm (210 lpm)	1100 - 300 gpm (1100 lpm)		
Housing Pressure Rating			
Max. Allowable Working Pressure*	145 psi (10 bar), 101.5 psi (7 bar) *(Sizes 975 & 1100)*		
Fatigue Pressure	145 psi (10 bar) @ 1 million cycles		
Burst Pressure	75-500	>580 psi (40 bar)	
	50, 661/851	536 psi (37 bar)	
	975/1100	Consult Factory	
Element Collapse Pressure Rating			
BN4HC *(size 50, 975 & 1100 only)*	145 psid (10 bar)		
ON *(size 50-851 only)*, W/HC	290 psid (20 bar)		
ECON2, BN4AM, AM, P/HC, MM	145 psid (10 bar)		
V	435 psid (30 bar)		
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)		
Consult HYDAC for applications below -22°F (-30°C)			
Fluid Compatibility			
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.			
Indicator Trip Pressure			
P = 20 psi (1.4 bar) - 10% P = 29 psi (2 bar) -10% *(standard)* P = 72 psi (5 bar) -10% *(optional)*			
Bypass Valve Cracking Pressure			
ΔP = 43 psid (3 bar) +10% *(Standard - All sizes except 50, 975, 1100)* ΔP = 87 psid (6 bar) +10% *(Optional - Sizes 50, 975 & 1100 not available)* ΔP = 25 psid (1.7 bar) +10% *(Standard for Sizes 50, 975 & 1100)*			

*Note: All RFM Filters MAWP reduce to 7 bar (101.5 psi) when using the following "VMF" and "VR" indicators: B, BM, E, ES, GC, LE, LZ.

Model Code

RFM ON 330 B F F 3 D 1 . X / 12 - V - _ - L24

Filter Type
RFM = In-Tank Return Line Filter

Element Media
ON = Optimicron® BN/HC = Betamicron® *(Sizes 50, 975, 1100 only)*
BN/AM = Betamicron®/Aquamicron® *(Sizes 330 to 851 only)*
ECON2 = ECOmicron® *(Not for sizes 50, 75, 210, 270)*
AM = Aquamicron® *(Sizes 330 to 851 only)*
W/HC = Wire Mesh *(Sizes 75 to 851)* P/HC = Polyester *(Sizes 330 to 851 only)*
MM = Mobilemicron® *(Sizes 75 to 851)*

Size
50, 75, 90, 150, 165, 185, 210, 270, 330, 500, 661, 851, 975, 1100

Working Pressure
B = 145 psi (10 bar) V = 101.5 psi (7 bar) *(975 & 1100 Standard* - Note previous page)*

Optional Second Inlet Connection
(omit) = no second port
D = 1" Threaded (SAE-16) *(sz. 75, 165, 185)*
F = 1 1/2" Threaded (SAE-24) *(sz. 330, 500 only)*
G = 2" Threaded Port *(sz. 975, 1100 only)*
K = 1 1/2" SAE Flange Code 61 *(sz. 330, 500 only)*
M = 2 1/2" SAE Flange Code 61 *(sz. 661, 851, 975 & 1100 only)*
N = 2 1/2" NPT Threads *(sz. 975, 1100 only)*
V = 2 x 1" (SAE-16) *(sz. 210, 270 only)*

Inlet Connection/Port Size *(1 Inlet)*
B = 1/2" Threaded (SAE-8) *(sz. 50 only)*
C = 3/4" Threaded (SAE-12) *(sz. 90, 150 only)*
D = 1" Threaded (SAE-16) *(sz. 75, 165 & 185 only*
E = 1 1/4" Threaded (SAE-20) *(sz. 210, 270 only)*
F = 1 1/2" Threaded (SAE-24) *(sz. 210, 270, 330, & 500 only)*
G = 2" Threaded Port *(sz. 975 & 1100 only)*
K = 1 1/2" SAE Flange Code 61 *(sz. 330, 500 only)*
M = 2 1/2" SAE Flange Code 61 *(sz. 661, 851, 975 & 1100 only)*
N = 2 1/2" NPT Threads *(sz. 975, 1100 only)*
Z = Customer Specific

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON
40 = AM
3, 5, 10, 20 = BN/HC
25, 50, 100, 200 = W/HC
3, 10 = BN/AM
10, 20 = P/HC
3, 5, 10, 20 = ECON2
10, 15 = MM

Type of Static Clogging Indicator
A, B, BM, C, D, E, F, FD *(Others available upon request, see Clogging Indicators section.)*

Type Number
0 = no indicator, no ports 1-3 = clogging indicator positions *(see chart)*

Modification Number *(latest version always supplied)*

Inlet Port Configuration
0 = BSPP Straight Thread Ports
12 = SAE Straight Thread O-Ring Boss Ports *(sz. 50-500, 975, 1100)*
3 = NPT Ports *(sizes 975, 1100 only)*
16 = SAE Flange Code 61 *(sz. 330-851, 975, 1100)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) lube or coolant
B1.7 = 25 psid (1.7 bar) *(50, 975 & 1100 only setting available for bypass)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing systems)*
not available with ECON2

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T = Filter Breather *(sz. 75, 90, 150, 165, 185, 210, 270 only) - (includes oil separator on 2 bolt versions sizes 75, 165, 185 only)*
C = Outlet check valves *(sizes 975, 1100 only)*
DTxx = Down tube *(xx length in inches - up to 12 inches)*
DSxx = Dip stick *(xx length in inches)*
D = Diffuser *(sizes 75, 165, 185 only)*
G = BSPP threaded outlet
4L = 4 Bolt mounting flange *(sizes 90-185)*
2MO = Indicator with Deutsch Connector *(FD indicator only)*
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0330 R 003 ON / V B6

Size
0050, 0075, 0090, 0150, 0165, 0185, 0210, 0270, 0330, 0500, 0660, 0850, 0975, 1100

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BN4HC *(sz. 50, 975, 1100 only)*
3, 10 = BN4AM
40 = AM
10, 20 = P/HC
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
10, 15 = MM

Element Media
ON, BN4HC, BN4AM, ECON2, AM, W/HC, P/HC, MM

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1.7 = 25 psid (1.7 bar)
KB = no bypass
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)

Supplementary Details
SFREE = *(same as above)*

Clogging Indicator Model Code

VR 2 D . X / _ V

Indicator Prefix
VR = Return Filters *(sizes 330 to 851)*
VMF = Mobile Filters *(sizes 75 to 270)*
VMF/-3= Return Filters *(sizes 975 to 1100)*

Trip Pressure
1.4 = 20 psid (1.4 bar) 2 = 29 psid (2 bar)
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset - static only)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light – SPDT
E = Visual pressure gauge
F = Electric pressure switch
FD = Electric pressure switch w/Deutsch Connector

Modification Number

Supplementary Details
2M0 = Deutsch Connector *(male)*

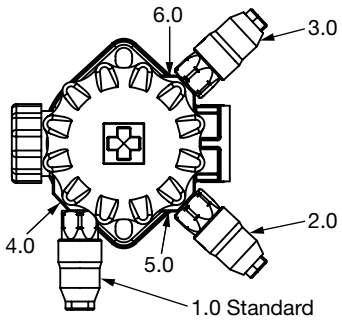
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Clogging Indicator Locations

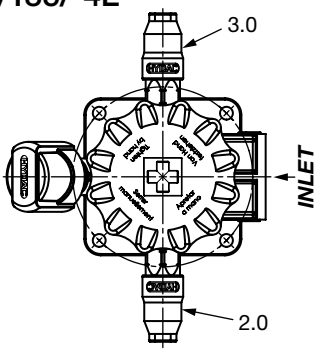
RFM 75/165/185



RFM 75/165/185 (2 Bolt Mount)

Type No.	Location of Clogging Indicator	Indicator Model
1.X	Clogging Indicator left back 90° to Inlet	VMF...
2.X	Clogging Indicator left front 45° to Inlet	VMF...
3.X	Clogging Indicator right front 45° to Inlet	VMF...
4.X	Clogging Indicator left back 135° to Inlet	VMF...
5.X	Clogging Indicator left front 90° to Inlet	VMF...
6.X	Clogging Indicator right front 90° to Inlet	VMF...

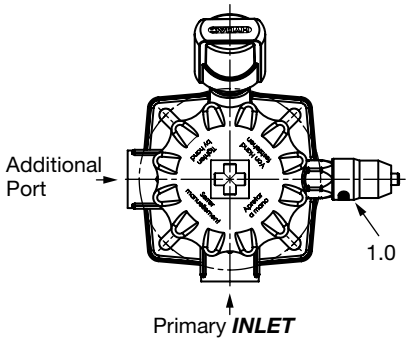
RFM 75/165/185/-4L



RFM 75/165/185 - Single Port (4 Bolt Mount)

Type No.	Location of Clogging Indicator	Indicator Model
2.X	Clogging Indicator left front 90° to Inlet	VMF...
3.X	Clogging Indicator right front 90° to Inlet	VMF...

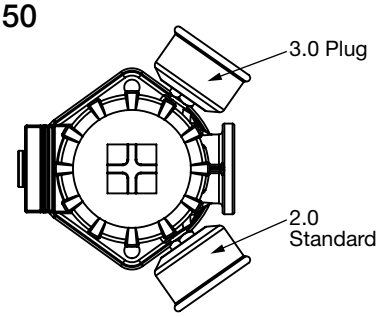
RFM 75/165/185/-4L - Multi-Port



RFM 75/165/185 - Multi-Port (4 Bolt Mount)

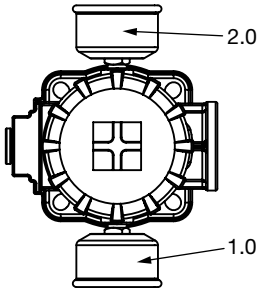
Type No.	Location of Clogging Indicator	Indicator Model
1.X	Clogging Indicator right of primary Inlet, 90° to Inlet	VMF...

RFM 90/150



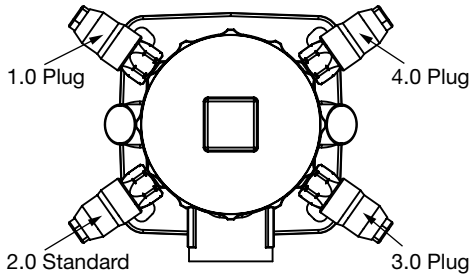
Type No.	Location of Clogging Indicator	Indicator Model
2.X	Clogging Indicator left front 45° to Inlet	VMF...
3.X	Clogging Indicator right front 45° to Inlet	VMF...

RFM 90/150/-4L



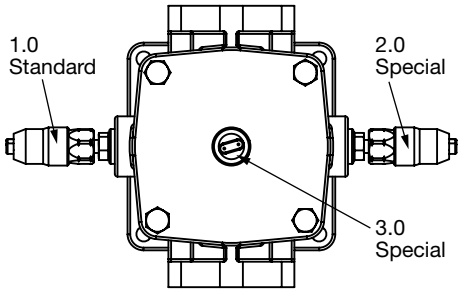
Clogging Indicator Locations (cont'd)

RFM 210/270



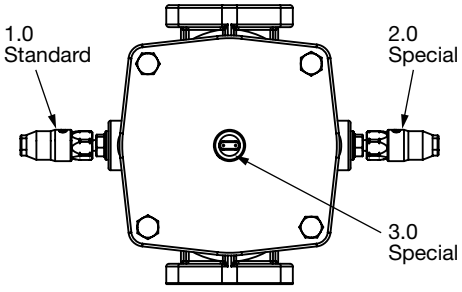
Type No.	Location of Clogging Indicator	Indicator Model
1.X	Clogging Indicator left back 45° to Inlet	VMF...
2.X	Clogging Indicator left front 45° to Inlet	VMF...
3.X	Clogging Indicator right front 45° to Inlet	VMF...
4.X	Clogging Indicator right back 45° to Inlet	VMF...

RFM 330/500



Type No.	Location of Clogging Indicator	Indicator Model
1.X	Clogging Indicator left 90° to Inlet	VR...
2.X	Clogging Indicator right 90° to Inlet	VR...
3.X	Clogging Indicator on Top	VR...

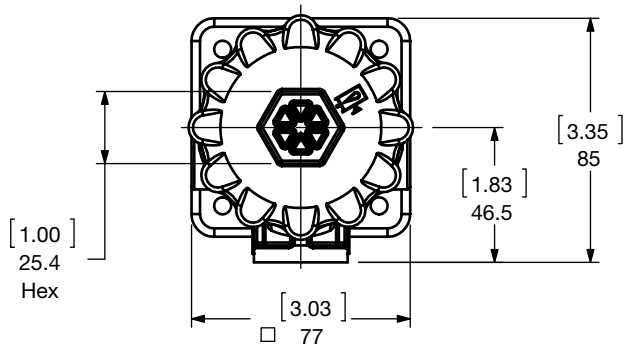
RFM 661/851

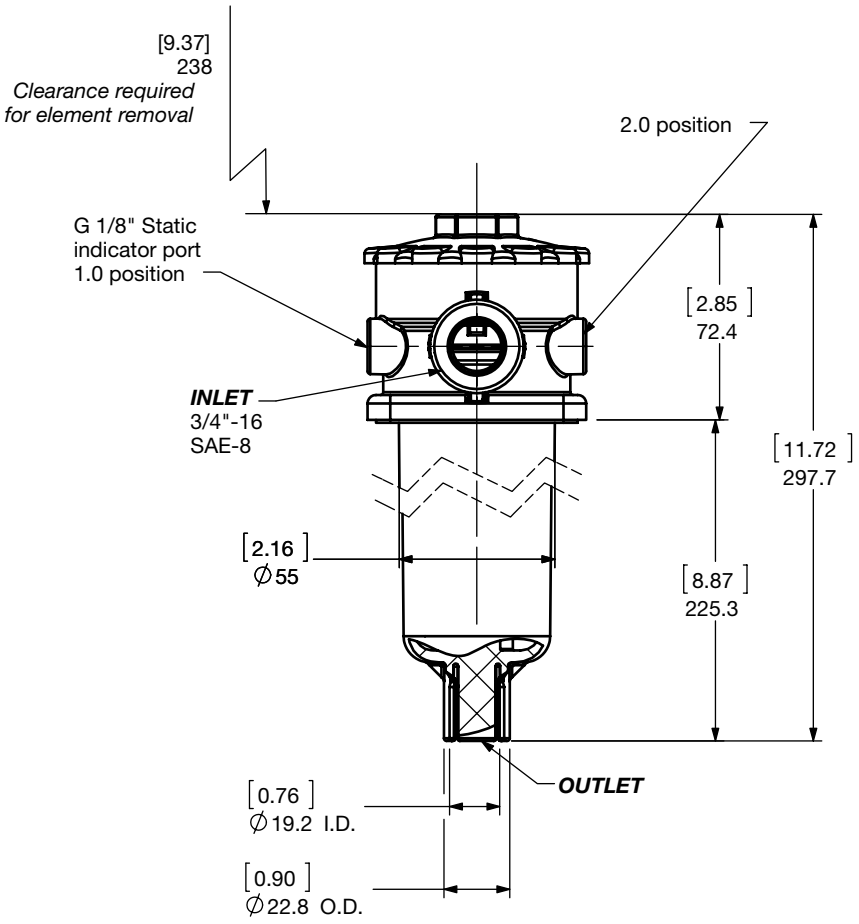


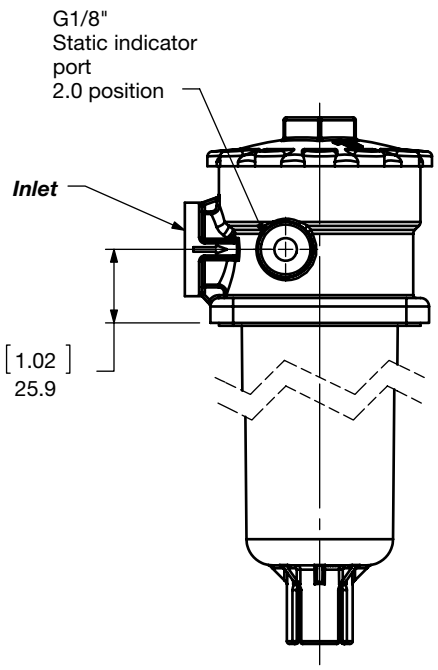
Type No.	Location of Clogging Indicator	Indicator Model
1.X	Clogging Indicator left 90° to Inlet	VR...
2.X	Clogging Indicator right 90° to Inlet	VR...
3.X	Clogging Indicator on Top	VR...

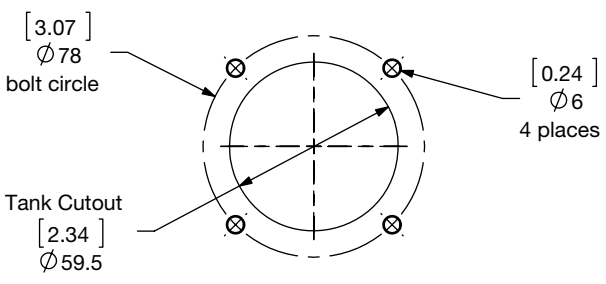
Dimensions

RFM 50 - 4L









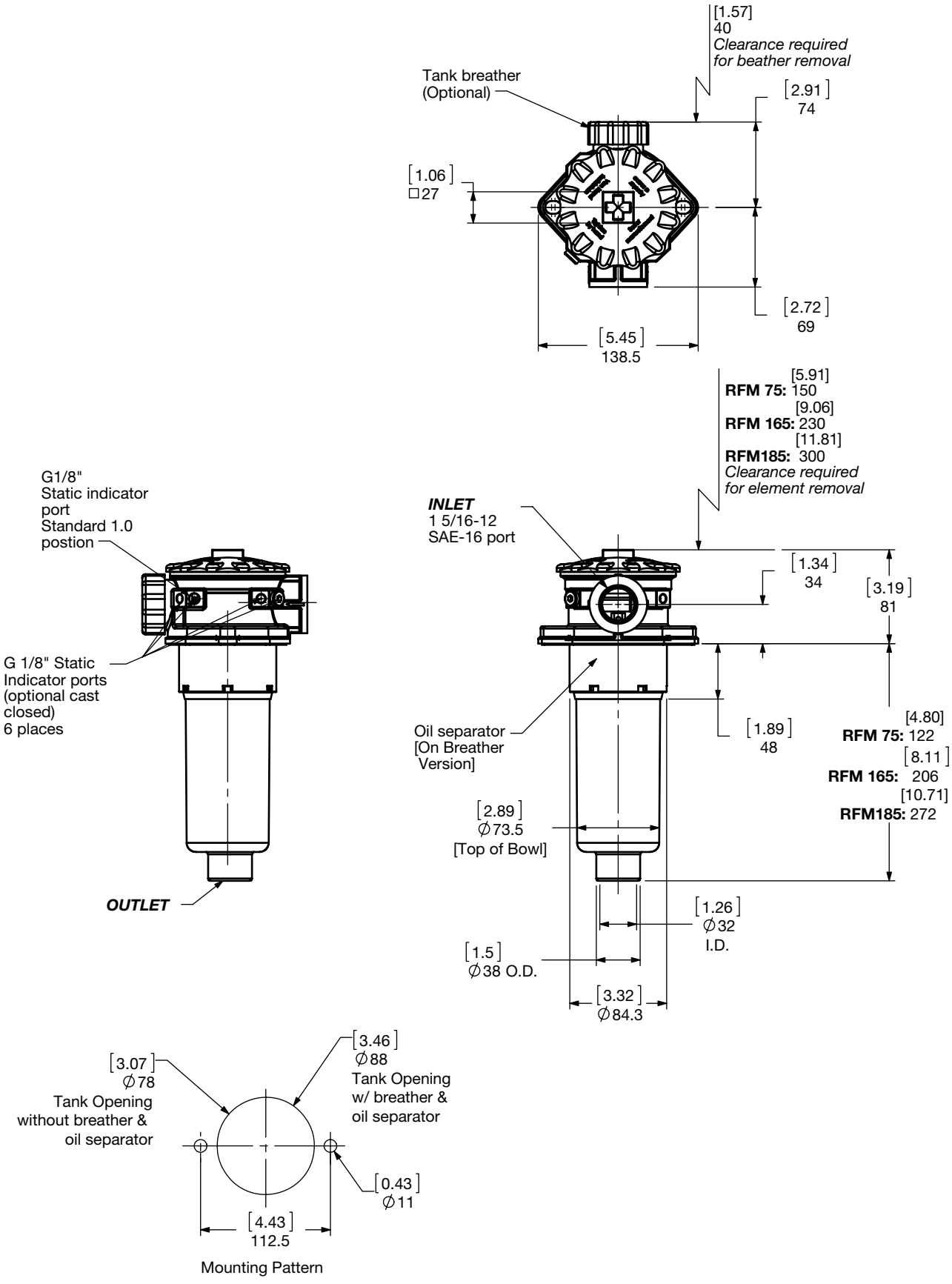
Mounting Pattern

Size	50
Weight (lbs.)	1.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions

RFM 75/165/185 (2 Bolt)

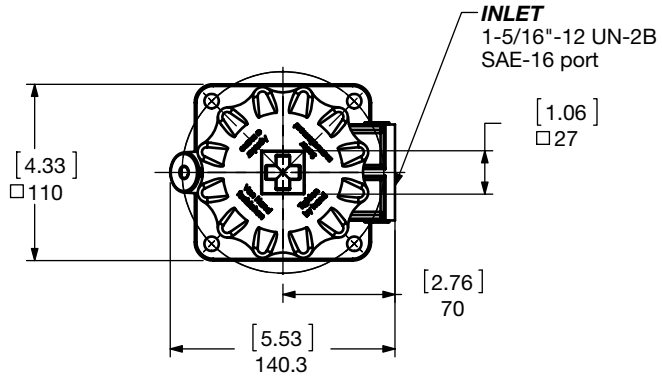


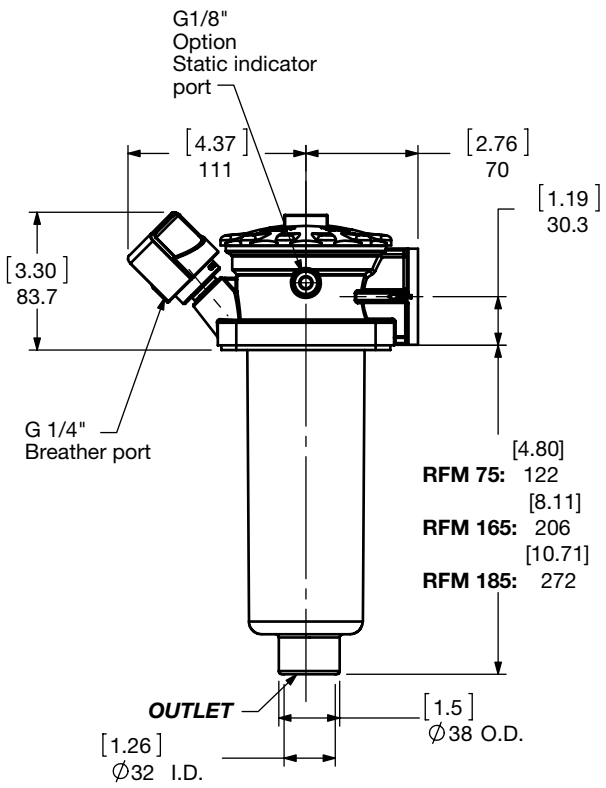
Size	75	165	185
Weight (lbs.)	2.0	2.5	2.6

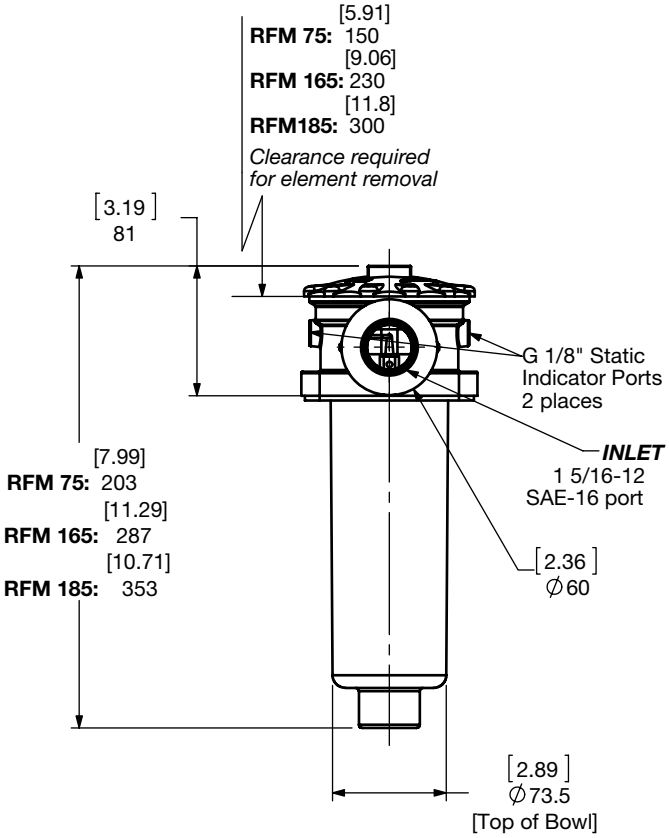
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

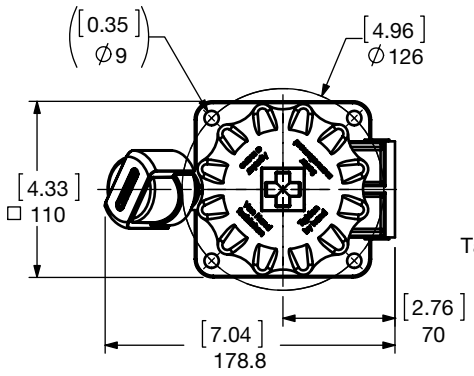
Dimensions

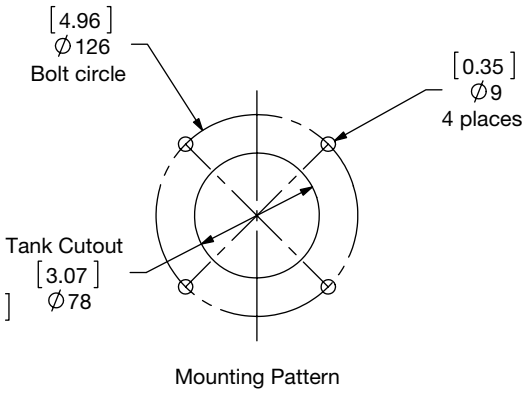
RFM 75/165/185 - 4L Single Port (4 Bolt)











Mounting Pattern

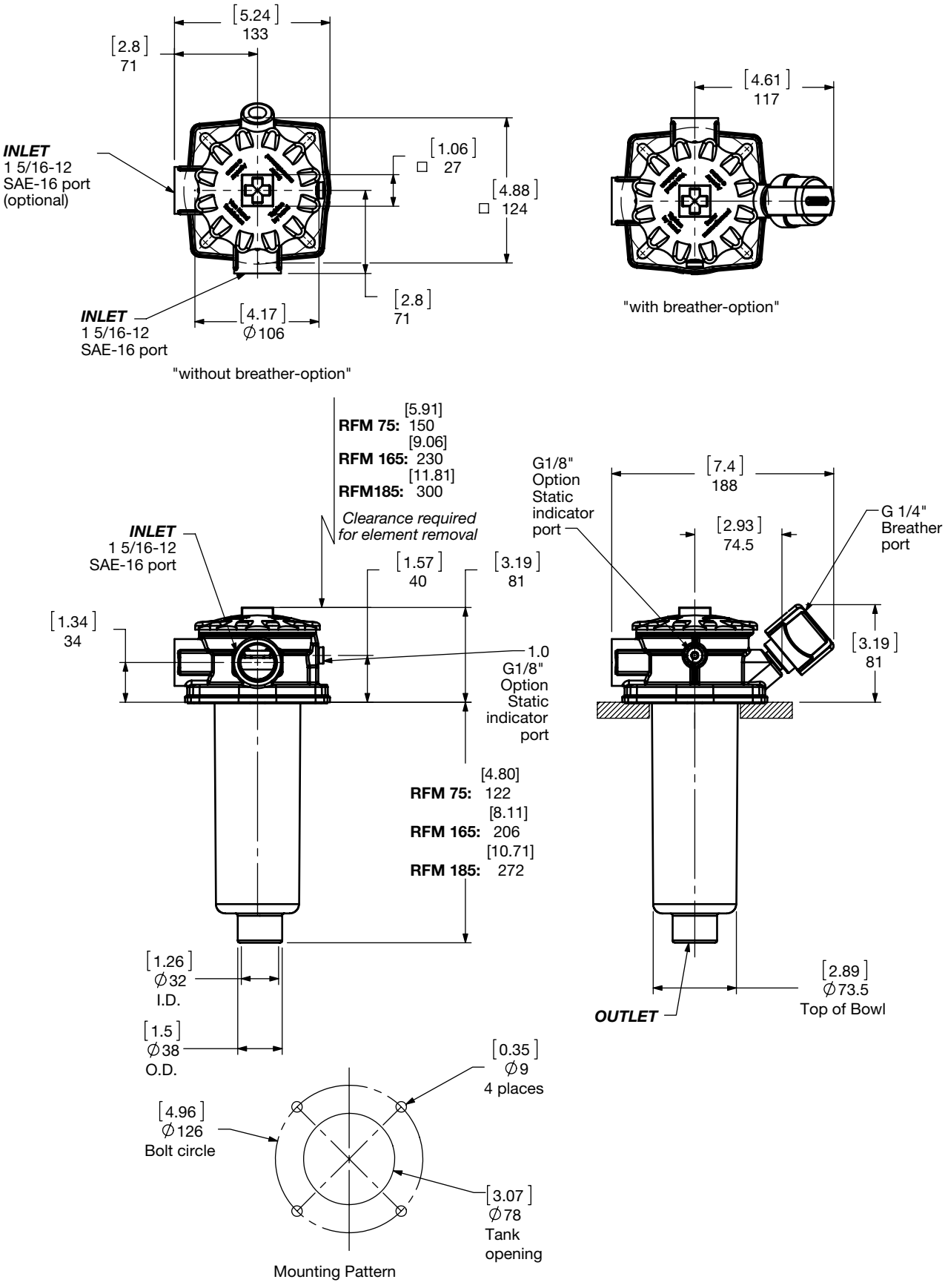
Note: Breather (BF10
With Anti Splash)

Size	75	165	185
Weight (lbs.)	2.0	2.5	2.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions

RFM 75/165/185 - 4L Multi Port (4 Bolt)

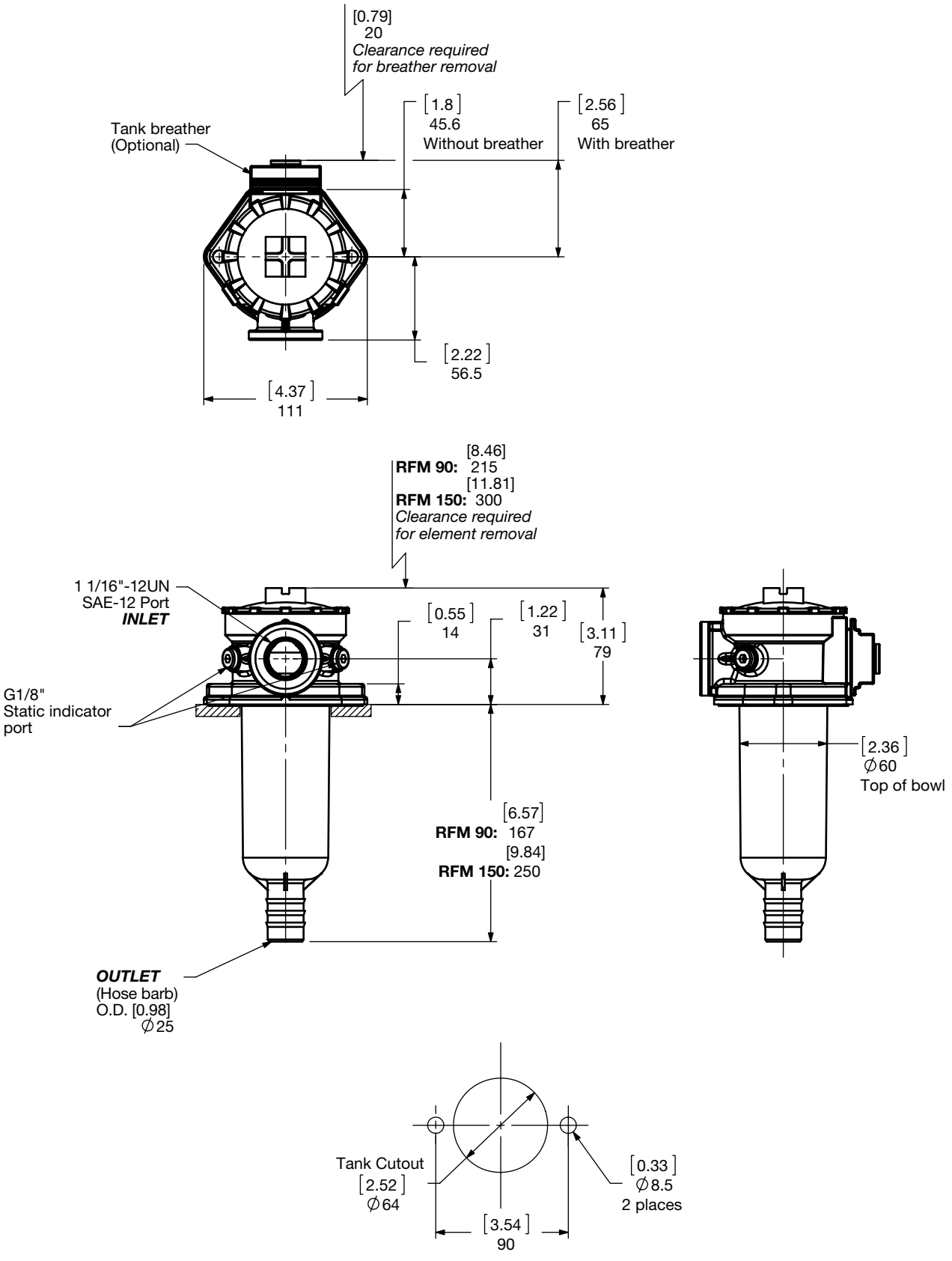


Size	75	165	185
Weight (lbs.)	2.0	2.5	2.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions

RFM 90-150 (2 Bolt)



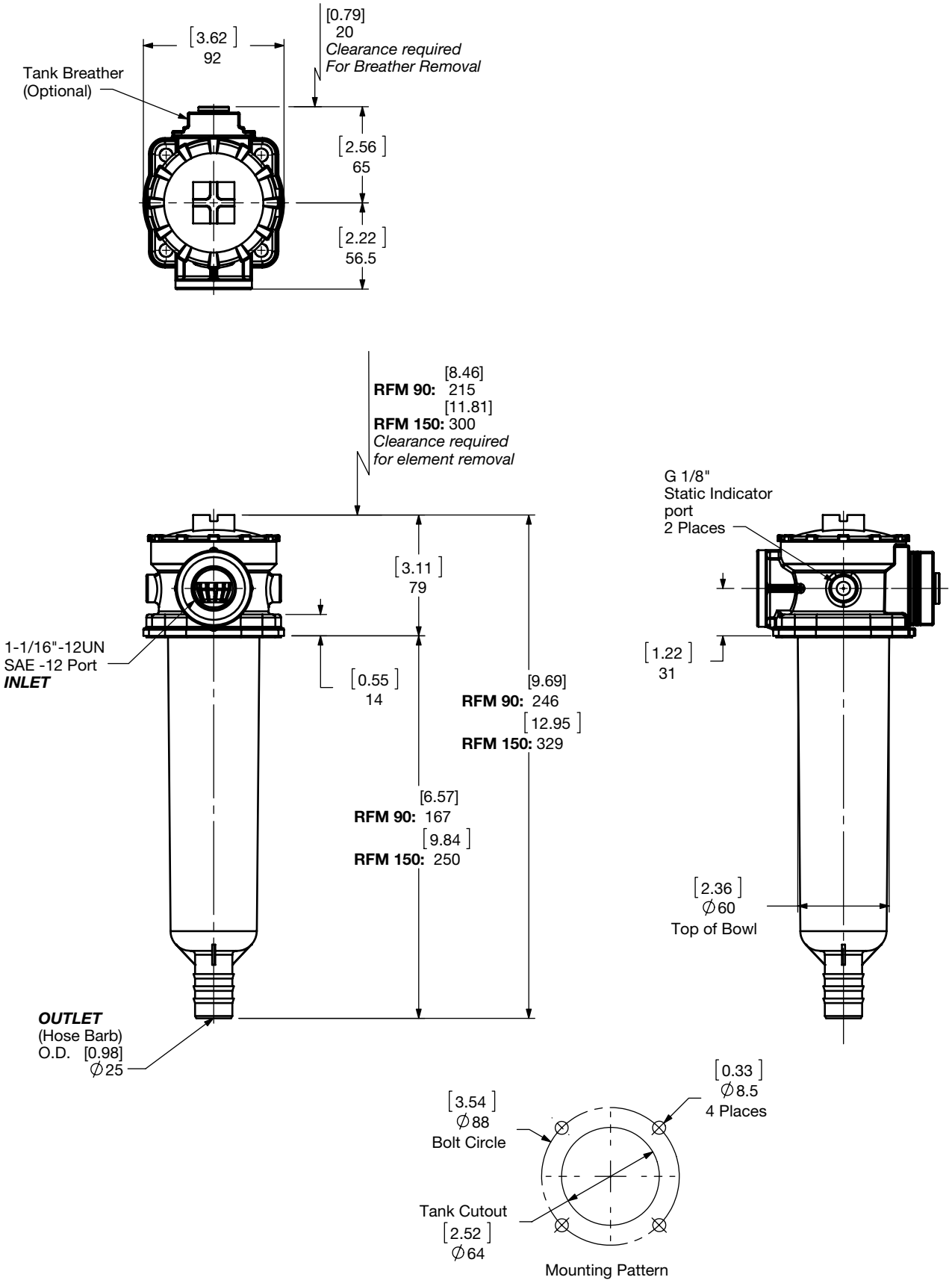
Mounting Pattern

Size	90	150
Weight (lbs.)	1.2	1.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions

RFM 90-150 - 4L (4 Bolt)

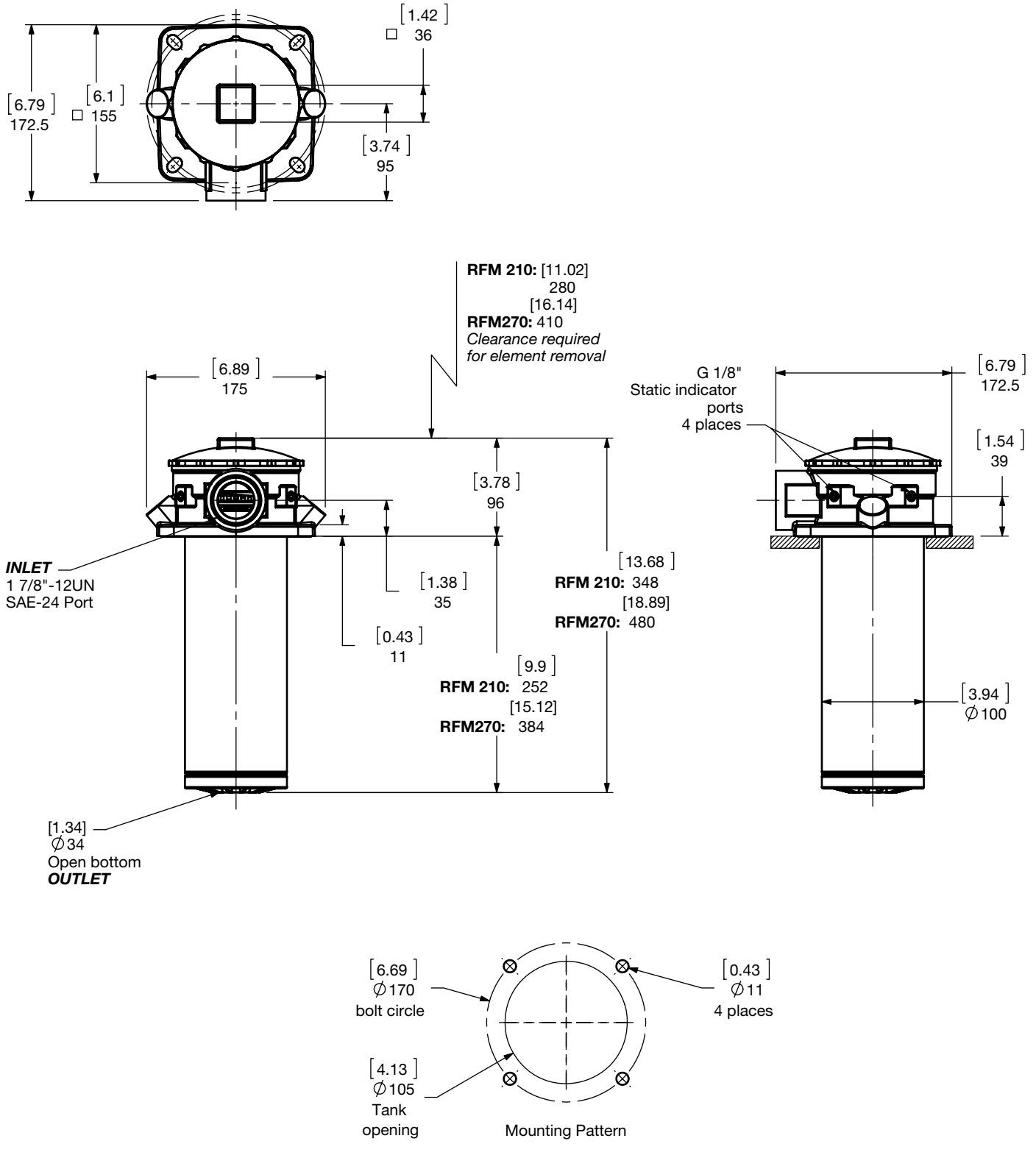


Size	90	150
Weight (lbs.)	1.2	1.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions

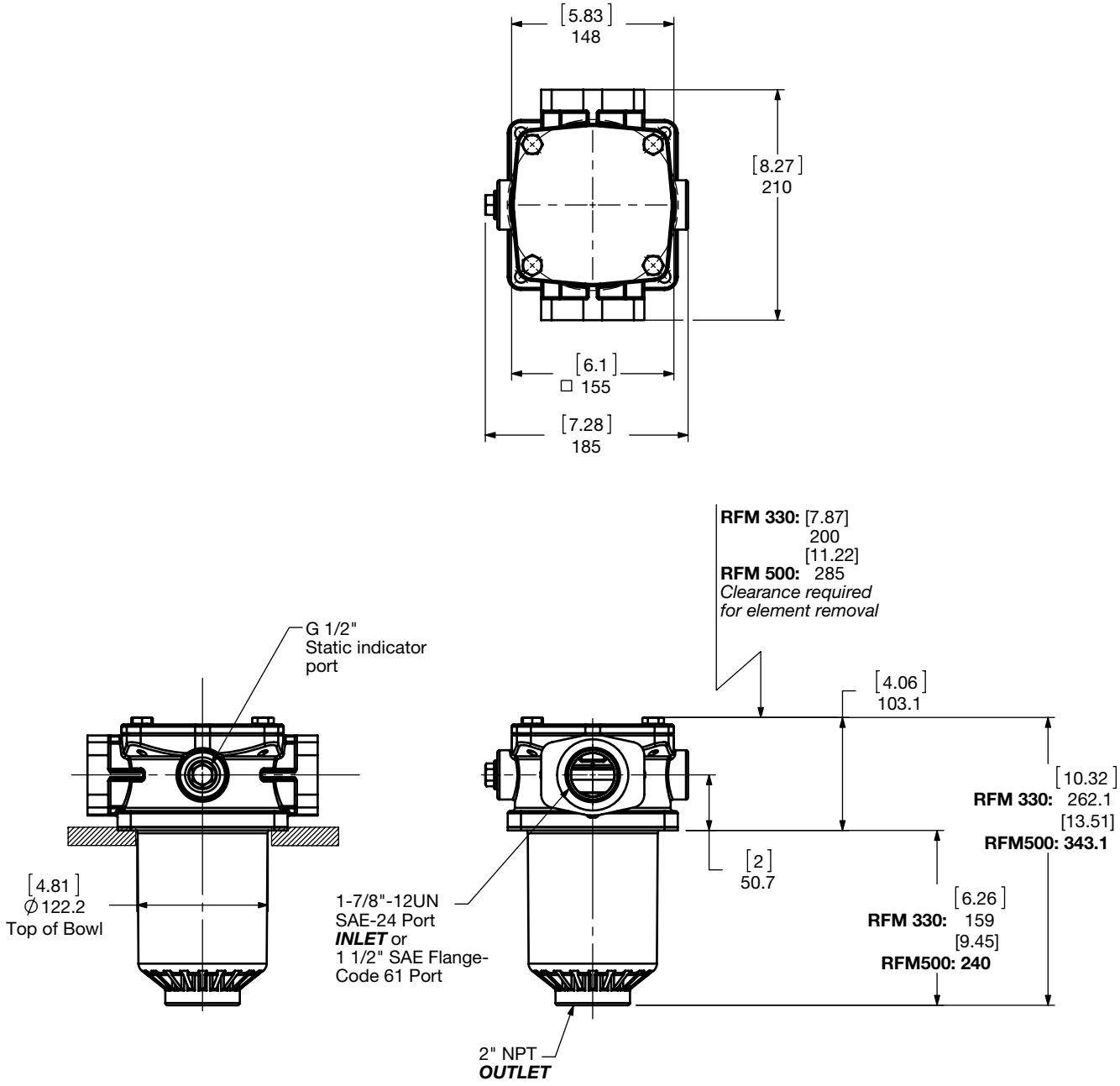
RFM 210/270



Size	210	270
Weight (lbs.)	7	9.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFM 330/500



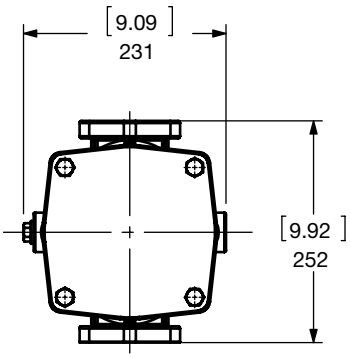
Size	330	500
Weight (lbs.)	8.6	10

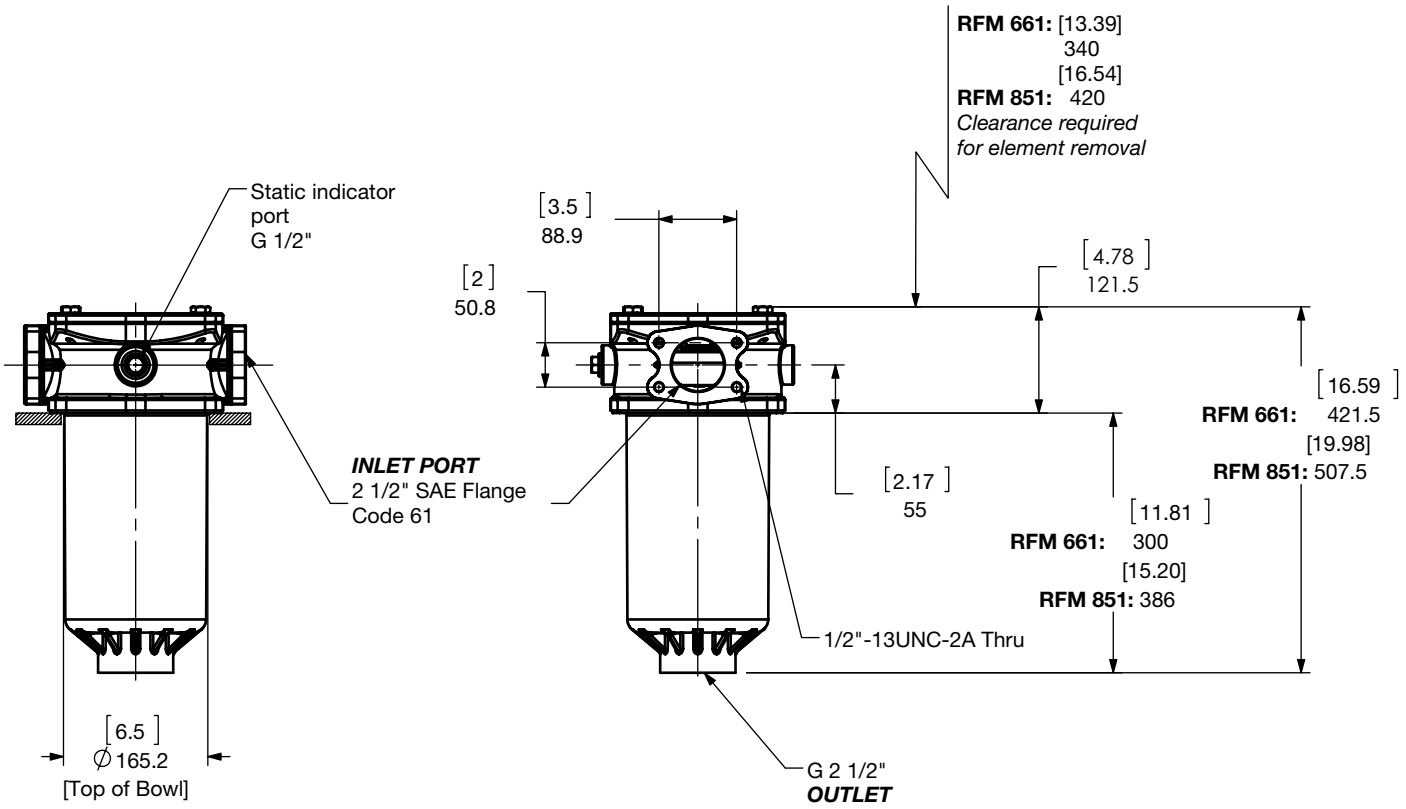
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

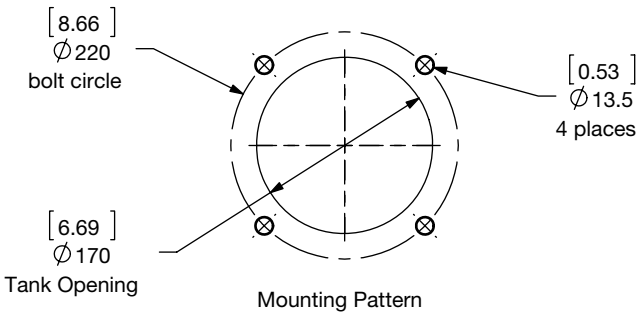
LOW PRESSURE FILTERS

Dimensions

RFM 661/851



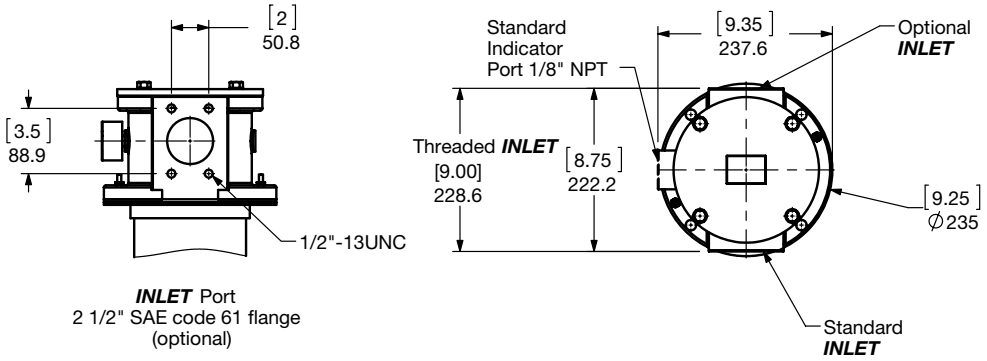


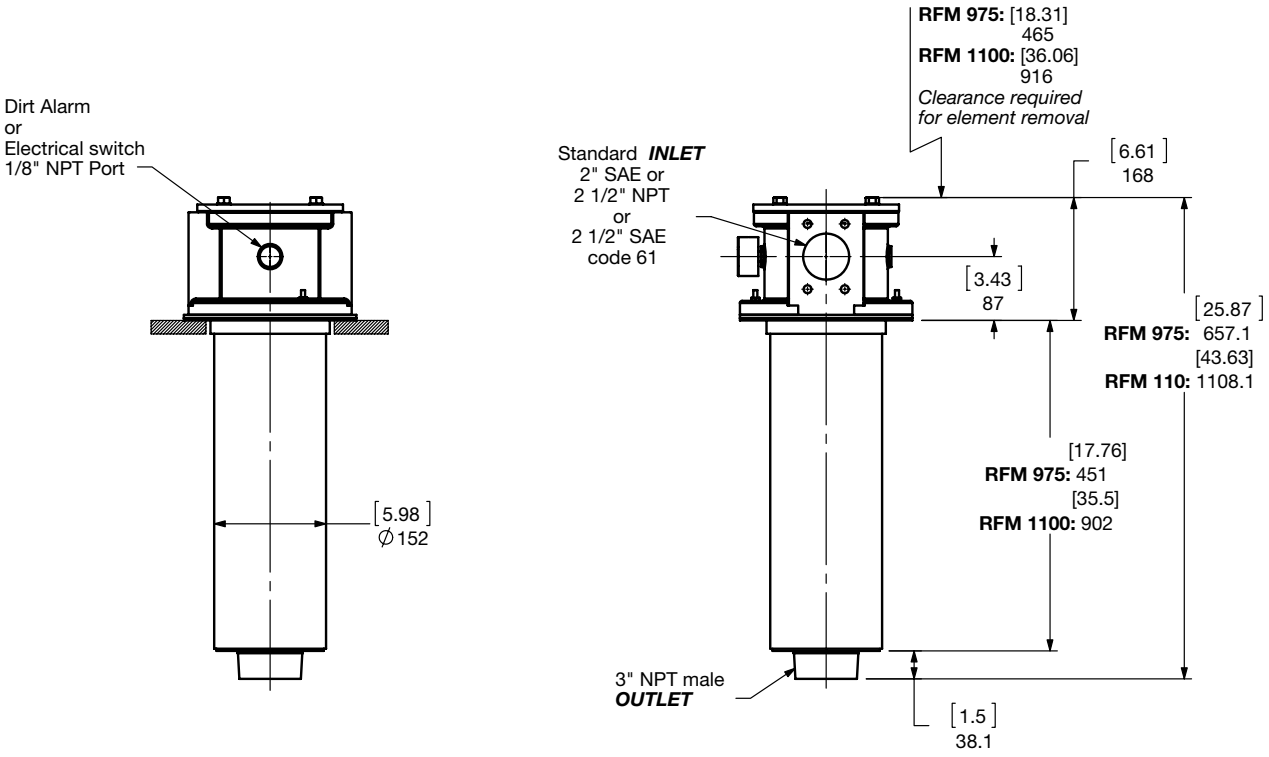


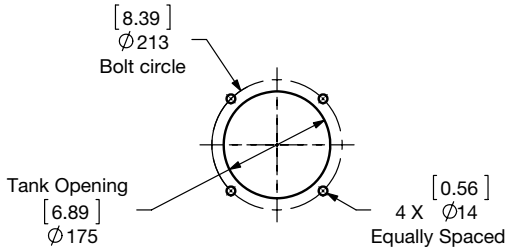
Size	661	851
Weight (lbs.)	19.9	23.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFM 975/1100







Mounting Pattern

Size	975	1100
Weight (lbs.)	37	52

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

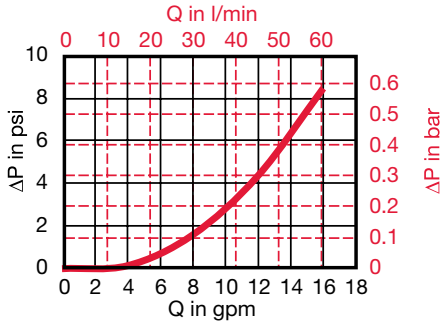
Housing Curve:

Pressure loss through housing is as follows:

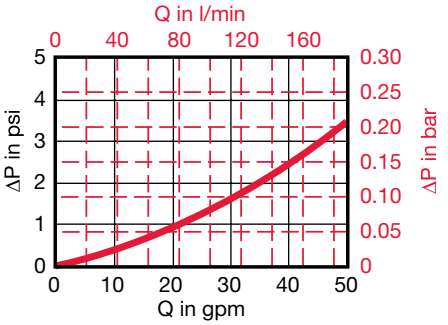
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

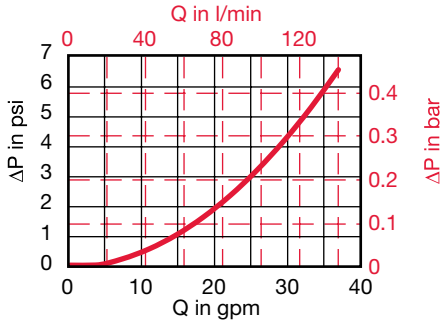
RFM 50/-4L Housing



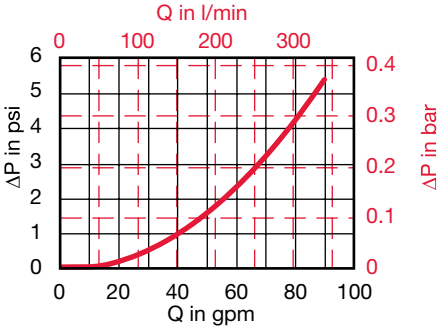
RFM 75/165/185
& RFM 75/165/185/-4L Housing



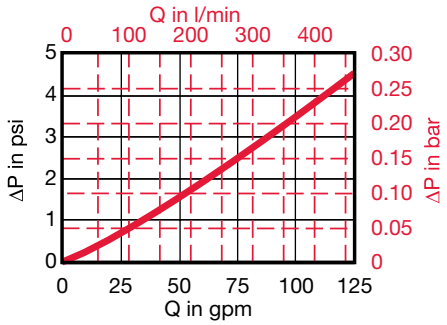
RFM 90/150
& RFM 90/150/-4L Housing



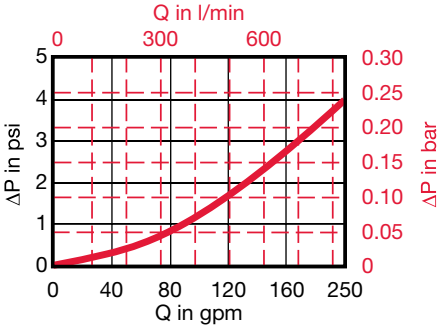
RFM 210 / 270 Housing



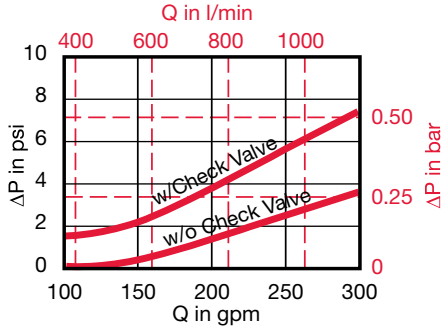
RFM 330/500 Housing



RFM 661/851Housing



RFM 975 / 1100 Housing



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron	...R...BN4HC			
Size	3 µm	5 µm	10 µm	20 µm
0975 R XXX BN4HC	0.050	0.040	0.030	0.020
1100 R XXX BN4HC	0.030	0.020	0.020	0.010

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0050 R XXX ON	N.A.	N.A	N.A.	0.296	N.A.	N.A.
0075 R XXX ON	1.405	1.065	0.735	0.401	0.263	0.241
0090 R XXX ON	1.235	0.719	0.521	0.333	0.236	0.176
0165 R XXX ON	0.774	0.518	0.404	0.221	0.123	0.133
0185 R XXX ON	0.571	0.408	0.315	0.161	0.091	0.077
0210 R XXX ON	0.311	0.18	0.14	0.084	0.055	0.048
0270 R XXX ON	0.201	0.116	0.091	0.054	0.036	0.031
0330 R XXX ON	0.444	0.204	0.15	0.081	0.07	0.056
0500 R XXX ON	0.289	0.143	0.104	0.06	0.046	0.038
0660 R XXX ON	0.196	0.093	0.066	0.037	0.031	0.025
0850 R XXX ON	0.152	0.072	0.055	0.032	0.024	0.02

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0090 R XXX ECON2	0.818	0.554	0.368	0.176
0150 R XXX ECON2	0.488	0.329	0.220	0.104
0165 R XXX ECON2	0.615	0.428	0.247	0.132
0185 R XXX ECON2	0.488	0.335	0.181	0.099
0195 R XXX ECON2	0.362	0.247	0.132	0.071
0330 R XXX ECON2	0.230	0.148	0.093	0.066
0500 R XXX ECON2	0.165	0.104	0.071	0.044
0660 R XXX ECON2	0.104	0.066	0.044	0.027
0850 R XXX ECON2	0.082	0.055	0.038	0.022

Mobilemicron	...R...MM		
Size	8 µm	10 µm	15 µm
0075 R XXX MM	0.265	0.265	0.166
0090 R XXX MM	0.252	0.252	
0150 R XXX MM	0.114	0.114	0.071
0165 R XXX MM	0.146	0.146	0.091
0185 R XXX MM	0.108	0.108	0.068
0210 R XXX MM	0.052	0.052	0.032
0270 R XXX MM	0.032	0.032	0.020
0330 R XXX MM	0.078	0.078	0.049
0500 R XXX MM	0.052	0.052	0.032
0660 R XXX MM	0.030	0.030	0.019
0850 R XXX MM	0.023	0.023	0.014

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0330 R XXX BN4AM	0.477	0.165
0500 R XXX BN4AM	0.313	0.11
0660 R XXX BN4AM	0.192	0.066
0850 R XXX BN4AM	0.154	0.049

Aquamicron	...R...AM
Size	40 µm
0330 R 040 AM	0.115
0500 R 040 AM	0.076
0660 R 040 AM	0.051
0850 R 040 AM	0.040

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
0075 R XXX W/HC	0.020
0090 R XXX W/HC	0.017
0150 R XXX W/HC	0.010
0165 R XXX W/HC	0.011
0185 R XXX W/HC	0.050
0195 R XXX W/HC	0.037
0210 R XXX W/HC	0.004
0270 R XXX W/HC	0.002
0330 R XXX W/HC	0.011
0500 R XXX W/HC	0.007
0660 R XXX W/HC	0.004
0850 R XXX W/HC	0.003

Polyester	...R...P/HC	
Size	10 µm	20 µm
0075 R XXX P/HC	0.071	0.036
0090 R XXX P/HC	0.058	0.029
0150 R XXX P/HC	0.040	0.017
0165 R XXX P/HC	0.033	0.016
0185 R XXX P/HC	0.029	0.016
0195 R XXX P/HC	0.018	0.009
0210 R XXX P/HC	0.018	0.010
0270 R XXX P/HC	0.009	0.004
0330 R XXX P/HC	0.016	0.008
0500 R XXX P/HC	0.011	0.005
0660 R XXX P/HC	0.008	0.004
0850 R XXX P/HC	0.007	0.003

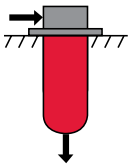
S.S. Wire Mesh "R"	...R...V US UNITS			
Size	3 µm	5 µm	10 µm	20 µm
0330 R XXX V	0.115	0.093	0.060	0.044
0500 R XXX V	0.082	0.066	0.044	0.027
0660 R XXX V	0.055	0.044	0.033	0.022
0850 R XXX V	0.044	0.033	0.022	0.016

All Element K Factors in psi / gpm.

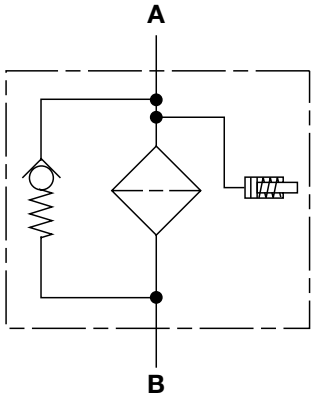
HF4R Series

In-Tank Return Line Filters

100 psi • up to 100 gpm



Hydraulic Symbol



Features

- Designed to meet and comply with HF4 Automotive standard and SAE J2066 standard.
- Inlet port options include SAE straight thread O-ring boss, SAE Flange, BSPP and NPT ports to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. Choice of Nitrile rubber *(NBR)*, or Fluorocarbon elastomer *(FKM)* O-ring material provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and water based fluids.
- In-tank design requires minimal space for installation.
- Provision is made for an additional inlet port to allow two return lines to be connected to the same filter.
- Filters include 1 1/2" threaded NPT outlet connection.

Applications


Agricultural


Automotive


Construction


Gearboxes


Industrial


Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes - filter housing	
Port Connection		
Inlet	SAE-24, 1 1/2" NPT, 1 1/2" BSPP, 1 1/2" Flange, Code 61	
Outlet HF4R 09/18/27	1 1/2" NPT male	
Flow Direction	Inlet	Outlet
HF4R	Side	Bottom
Construction Materials		
Head, Lid	Aluminum	
Bowl	Carbon Steel	
Flow Capacity		
HF4R09	50 gpm (189 lpm)	
HF4R18	75 gpm (378 lpm)	
HF4R27	100 gpm (454 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	100 psi (7 bar)	
Fatigue Pressure	Contact HYDAC	
Burst Pressure	Contact HYDAC	
Element Collapse Pressure Rating		
BN, BN4AM, AM, W, P/HC	145 psid (10 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
All Other Indicators	**Gauges (E / ES)**	
P = 14.5 psi (1 bar) -10%	P = 11.6 psi (0.8 bar)	
P = 29 psi (2 bar) -10%	P = 20 psi (1.4 bar)	
P = 36 psi (2.5 bar) -10%	P = 29 psi (2 bar)	
Bypass Valve Cracking Pressure		
ΔP = 25 psid (1.7 bar) +10% *(optional)*		
ΔP = 40 psid (2.7 bar) +10% *(standard)*		
ΔP = 50 psid (3.4 bar) +10% *(contact factory)*		

*Note: All HF4R Filters MAWP reduce to 101.5 psi (7 bar) when using the following "VR" indicators: B, BM, E, ES, GC, LE, LZ.
Any filters incorporating a VMFXE.X/3 or VMFXES.X/3 static gauge indicator (1/8" NPT thread) will be de-rated to an MAWP of 60 psi (4 bar).

PN#02081318 / 07.19 / FIL1907-2109

Model Code

HF4R BN 09 V F 3 C 1.X / 3 B2.7 C T

Filter Type
HF4R = In-tank return filter

Element Media
BN = Betamicron® *(Low Collapse)* BN/AM= Betamicron® Aquamicron®
AM = Aquamicron® W = Wire Mesh
P = Polyester

Element Length
09 = Single Element Length (9")
18 = Double Element Length (18")
27 = Triple Element Length (27")

Pressure Rating
V = 100 psi (7 bar)
Y = 60 psi (4.1 bar), when "E" type static pressure gauge is used with a B1.7 bypass setting

Type of Connection
F = 1 ½" Threaded (SAE-24 , 1 ½" NPT, or G/BSPP 1 ½")
K = 1 ½" Flanged (1 ½" SAE Code 61)

Filtration Rating *(microns)*
3, 5, 10, 20 = BN 25, 50, 100, 200 = W 3, 10, 25 = P
40 = AM 3, 10 = BN/AM *(9" only)*

Type of Static Clogging Indicator
A, B, BM,
C, D, E, ES, J, J4

Type Code
1 = Single inlet Connection 2 = Dual Inlets *(matching ports only)*

Modification Number *(latest version always supplied)*

Port Configuration
0 = G/BSPP Straight Thread Ports
3 = NPT Tapered Thread Ports
12 = SAE O-Ring Boss Straight Thread Ports
16 = SAE Code 61 Flanges

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve
B1.7 = 25 psid bypass (1.7 bar) B2.7 = 40 psid bypass (2.7 bar) - Standard bypass setting B3.4 = 50 psid bypass (3.4 bar)

Supplementary Details
SFREE= Element specially designed to minimize electrostatic charge generation

Outlet Configuration
C = Outlet check valve *(1/2 psid cracking pressure)* DF = Diffuser DT = 13" Down Tube *(outlet)*
T = Threaded outlet connection *(1 1/2" NPT male) (standard)* LI = Lid-mounted Indicator

Replacement Element Model Code

5 . 03 . 09 D 03 BN / V

Length *(nominal inches)*
09, 18, 27

Type
D = HF4R *(return)*

Filtration Rating *(micron)*
3, 5, 10, 20 = BN 3, 10 = BN4AM *(9" only)*
40 = AM 25, 50, 100, 200 = W
3, 10, 25 = P

Element Media
BN, W , AM, BN4AM, P

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
SFREE = *(same as above)*
Element Stacking Interconnecter (PN2056730)

Clogging Indicator Model Code

VMF 2 C . X / 3 V

Indicator Prefix
VMF = 1/8" NPT Static Indicator
VR = G1/2" Static Indicator *(lid mount)*

Trip Pressure

All Other Indicators	Gauges E/ES
P = 14.5 psi (1 bar)	P = 11.6 psi (0.8 bar)
P = 29 psi (2 bar)	P = 20 psi (1.4 bar)
P = 36 psi (2.5 bar)	P = 29 psi (2 bar)

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset - static only)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
E/ES = Visual pressure gauge
J = Electric switch
(Brad Harrison 5-pin mini connector)
J4 = Electric switch - M12
(Brad Harrison 4-pin micro connector)

Modification Number

Supplementary Details
3 = Includes 1/8" NPT Threads

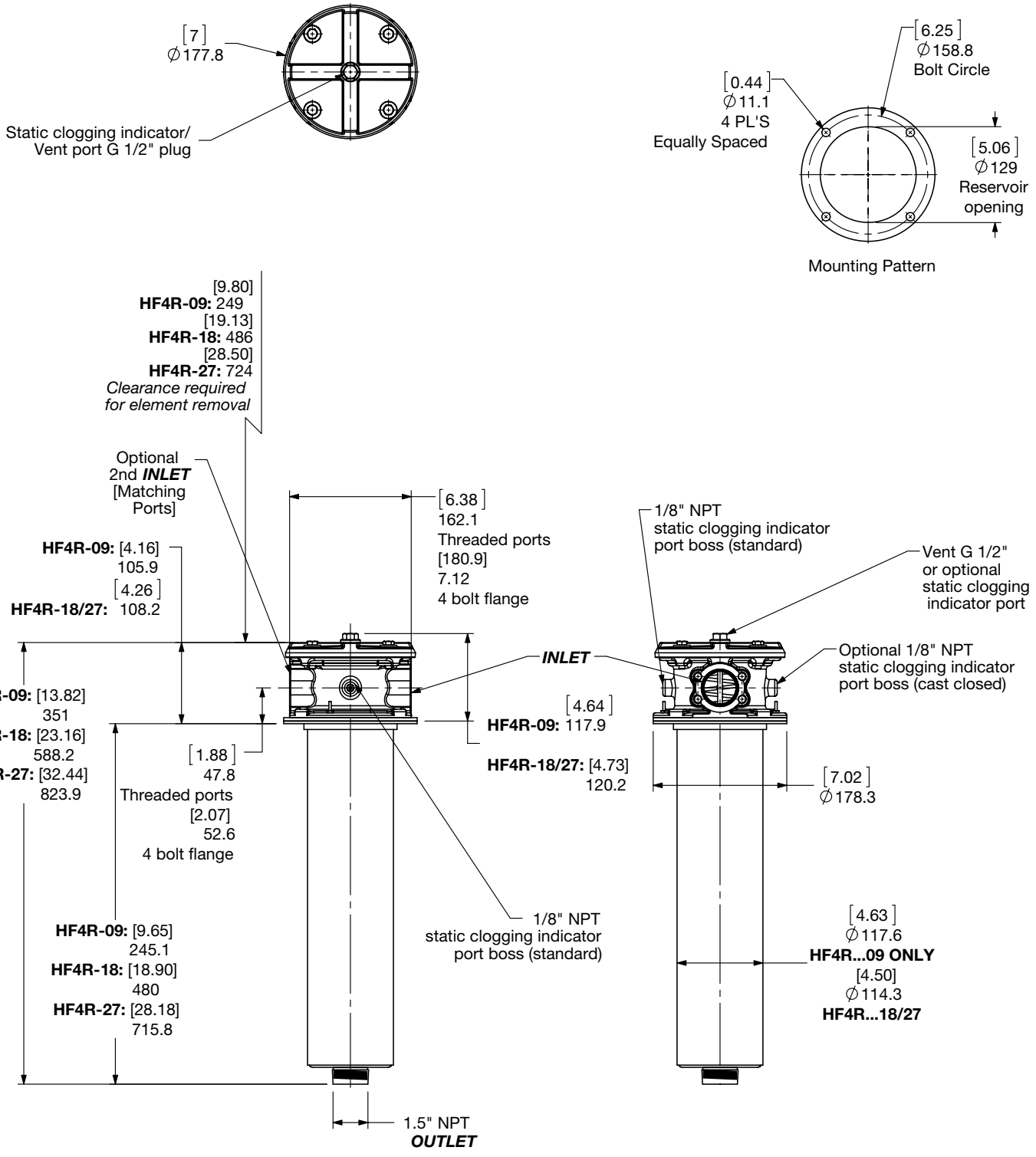
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
HF4R



Size	09	18	27
Weight (lbs.)	13	17.5	23.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

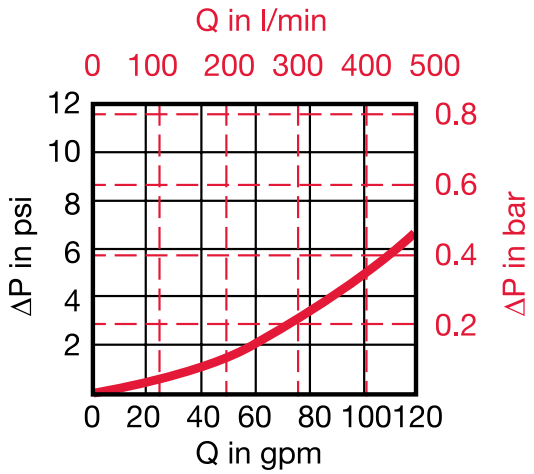
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Autospec HF4 Depth	5.03.XXDXXBN Low Collapse			
Size	3 µm	5 µm	10 µm	20 µm
5.03.09DXXBN	0.168	0.141	0.079	0.044
5.03.18DXXBN	0.080	0.067	0.038	0.021
5.03.27DXXBN	0.052	0.043	0.024	0.014

Autospec HF4 Paper	5.03.XXDXXP Low Collapse		
Size	3 µm	10 µm	25 µm
5.03.09DXXP	0.250	0.120	0.080
5.03.18DXXP	0.090	0.050	0.030
5.03.27DXXP	0.020	0.010	0.010

Autospec HF4 Water	5.03.09DXXAM & BN/AM		
Size	3 µm	10 µm	40 µm
5.03.09DXXAM	N/A	N/A	0.125
5.03.09DXXBN/AM	0.320	0.230	N/A

Notes: Requires stacking for 18" and 27" configurations.
Water retention (per 9" section) 500ml at 2 gpm; 150 ml at 20 gpm

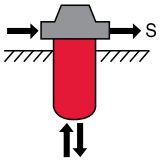
Autospec HF4 Wire Mesh	5.03.XXDXXW
Size	25, 50, 100, 200 µm
5.03.09DXXW	0.007
5.03.18DXXW	0.004
5.03.27DXXW	0.002

All Element K Factors in psi / gpm.

RKM Series

Multi-functional Filters

145 psi • up to 210 gpm



Features

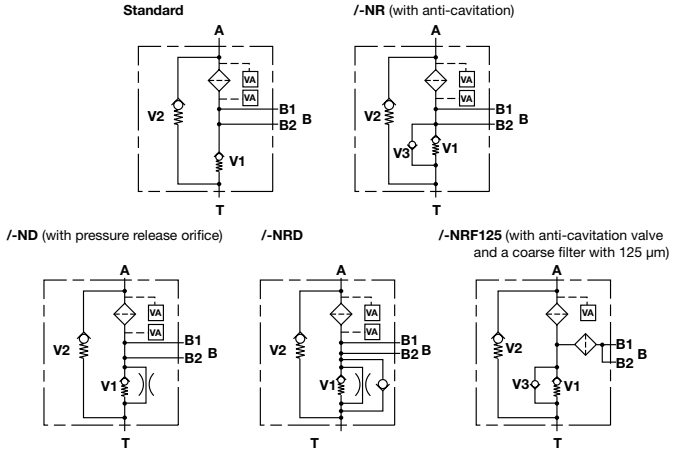
- RKM is a combination open loop return and closed loop suction boost filter in one housing.
- The return line flow of the operating hydraulics is fed to the filter via port A *(inlet)* and is cleaned by the filter element *(full flow return line filtration)*. A pressure (standard = 7 psi) is applied by the back-pressure valve V1. This insures that the filtered, precharged return line flow is available to the hydrostatic feed pump via ports B *(full flow suction boost filtration)*. Excess fluid is drained via the back-pressure valve to the tank *(port T)*.
- A bypass valve V2 *(standard = 36 psi)* is incorporated in the filter housing to relieve excessive back-pressures in the element *(important on cold starts)*. Flow from the tank can be drawn via the anti-cavitation valve V3 to the suction side for a short time *(emergency function)*.
- Full flow finest filtration *(10 µm, 15 µm absolute)* of the return line and hydrostatic feed pump extends the service life of your components.
- Outstanding cold start characteristics due to the precharge via the back pressure valve *(standard = 7 psi)*.
- Due to the advanced RKM element technology and specially developed bypass valves, the lowest back-pressures can be achieved across the filter even at very low temperatures.
- One tank cutout for up to 6 suction and 3 return lines.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- RKM elements do not incorporate bypass in the end cap —the bypass is located in the RKM housing.

Applications

Agricultural

Construction

Hydraulic Symbol



Technical Specifications

Mounting Method	100	2 mounting holes
	201 - 800	4 mounting holes
Port Connection	Return / Suction	
100	SAE-8 / SAE-8	
	SAE-12 / SAE-12	
	SAE-16 / SAE-16	
201/251	SAE-20 / 2 x SAE-16	
300	SAE 1 1/2" CS, Code 61-Split Flange (SF)	
	/ 2 x SAE 1 1/4" CS, Code 61-Split Flange (SF)	
350	SAE-24 / SAE-16	
400/800	R1–2" SAE flange / Cust. specified or	
	R1–2 1/2" SAE flange / Cust. specified	
Flow Direction	Inlet: Side	Outlet: Side & bottom
Construction Materials		
Head	Aluminum	
Housing/Bowl	Steel (100/201/251/350/400/800)	
	Polyamide (300)	
Lid	Polyamide (100/201/251/350)	
	Aluminum (300/400/800)	
Flow Capacity		
100	26 gpm (100 lpm)	
201	52 gpm (200 lpm)	
251	66 gpm (250 lpm)	
300	79 gpm (300 lpm)	
350	92 gpm (350 lpm)	
400	105 gpm (400 lpm)	
800	211 gpm (800 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure*		145 psi (10 bar)
Fatigue Pressure		Contact HYDAC
Burst Pressure		Contact HYDAC
Element Collapse Pressure Rating		
MM	145 psid (10 bar)	
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
P = 29 psi (2 bar) -10% *(standard)*		
P = 72 psi (5 bar) -10% *(optional)*		
Bypass Valve Cracking Pressure		
ΔP = 36 psid (2.5 bar) +10% *(standard)*		
ΔP = 87 psid (6 bar) +10% *(optional)*		
Back Pressure Valve Cracking Pressure		
ΔP = 7 psid (0.5 bar) +10% *(standard)*		
ΔP = 43 psid (3 bar) +10% *(optional)*		

*Note: All RKM Filters MAWP reduce to 7 bar (101.5 psi) when using the following "VR" and "VMF" indicators: B, BM, E, ES, GC, LE, LZ

Model Code

RKM MM 300 B T F 10 E 1 . X / 12 V NR

Filter Type
RKM = Low pressure multifunction

Element Media
MM = Mobilemicron® *(Low Collapse)*

Size
100, 201, 251, 300, 350, 400, 800

Operating Pressure
B = 145 psi
V = 101.5 psi (7 bar) *(*Note previous page)*

Type of Port / Size of Suction Line Port
T = 2 x CS 1 1/4" Code 61 Split Flange *(size 300 only)*
V = 2 x 1" Threaded *(sizes 201 & 251 only)*
X = 1 x 1" Threaded *(size 100 & 350 only)*
Y = 1 x 3/4" Threaded *(size 100 only)*
Z = According to customer specification
For sizes 100 Multiport, 201/251 Multiport & 400/800 - see next page

Type of Port / Size of Return Line Port
C = 3/4" Threaded *(size 100 only)*
D = 1" Threaded *(size 100 only)*
E = 1 1/4" Threaded *(sizes 201 & 251 only)*
F = CS 1 1/2" Code 61 *(size 300 only)*
G = 1 1/2" Threaded *(size 350 only)*
Z = According to customer specification
For sizes 400/800, see below. Other port sizes on request.
For sizes 100 multi-port, 201/251 multi-port & 400/800, port configuration will be specified within the Supplementary Details part of the model code. Use "Z" here when those options are chosen.

Filtration Rating *(microns)*
8, 10, 15 = MM

Type of Static Clogging Indicator
A, E, F

Type Code
0 = no indicator
1-8 = see Clogging Indicator Locations *(next page)*

Modification Number *(the latest version is always supplied)*

Port Configuration
0 = G/BSPP straight thread ports
12 = SAE O-Ring Boss straight thread ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
(omit) = standard *(without anti-cavitation valve; seals in NBR, bypass valve 2.5 bar, back-pressure valve 0.5 bar)*
EV = air bleed valves *(installed in filter lid)*
NR = with anti-cavitation valve
ND = with pressure release orifice
NRD = with anti-cavitation valve and with pressure release valve orifice
NRF125 = with anti-cavitation valve and coarse filter strainer 125 µm
UT = horizontally mounted version *(when mounted below fluid level)*
XXXXX = multi-port option *(sizes 100, 201, 251; see multi-port configuration tables on next page for alphanumeric coding)*
XXXXXXXXX = multi-port option *(standard for sizes 400, 800; see multi-port configuration tables on next page for alphanumeric coding)*
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0300 RK 010 MM / V

Size
0100, 0201, 0251, 0300, 0350, 0400, 0800

Type
RK

Filtration Rating *(micron)*
8, 10, 15 = MM

Supplementary Details
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
SFREE = *(Same as above)*

Clogging Indicator Model Code

VMF 2 E . X / V

Indicator Prefix
VMF = Mobile Filters
VM = Differential pressure indicators *(size 350 - 1.0 position only)*

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
1.7 = 25 psid (1.7 bar) *(optional)*
Note: 15 psid (1 bar) & 3 psid (0.2 bar) also available

Type of Indicator
A = No indicator, plugged port
E = Pressure gauge
F = Pressure switch

Modification Number

Supplementary Details
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Port Configuration - RKM 100, 201, 251 Multiport Head and RKM 400 / 800

Since there are numerous options for machining the ports on the multiport head and the head of the RKM 400 / 800, the general code BZZ is selected here. In order to determine the position and size of the ports, a 5-digit or a 9-digit code is added as a Supplementary Detail. This is determined using the table below. Unused ports are indicated by a “0”.

R = Return line port; S = Suction port

Port Configuration RKM 100 Multiport

Position in code	1	2	3	4	5
Connection	R1	R2	R3	S1	S2
SAE-8		(B)	(B)	B	B
SAE-12	(C)	C	C	(C)	(C)
SAE-16	D				
Port plugged	0	0	0	0	0
Special port	Z	Z	Z	Z	Z

Example: RKM MM 100 BZZ 15 W 1.0 /-CBBCC

Port Configuration RKM 201 / 251 Multiport

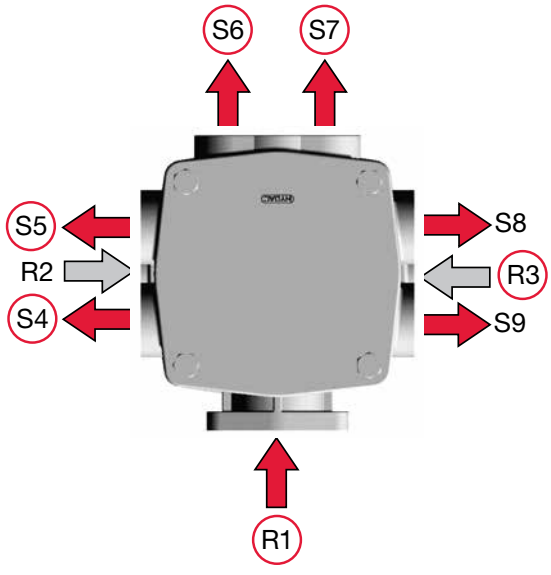
Position in code	1	2	3	4	5
Connection	R1	R2	R3	S1	S2
SAE-12		(C)	(C)	C	C
SAE-16	D	D	D	(D)	(D)
SAE-20	(E)				
Port plugged	0	0	0	0	0
Special port	Z	Z	Z	Z	Z

Example: RKM MM 201 BZZ 15 W 1.0 /-ECCDD

Port Configuration RKM 400 / 800

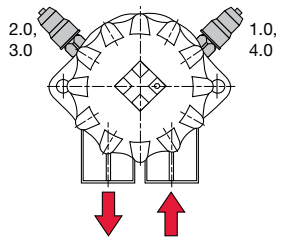
Position in code	1	2	3	4	5	6	7	8	9
Connection	R1	R2	R3	S4	S5	S6	S7	S8	S9
SAE 2” FLG	(1)								
SAE 2 1/2” FLG	2								
SAE-16		1	1	A	A	1	1	A	A
SAE-20		2	(2)	B	B	(2)	(2)	B	B
SAE-24		3	3	(C)	(C)	3	3	C	C
Port plugged		(0)	0	0	0	0	0	(0)	(0)
Special port		Z	Z	Z	Z	Z	Z	Z	Z

Example: RKM MM 400 BZZ 15 A 1.0 /-102CC2200



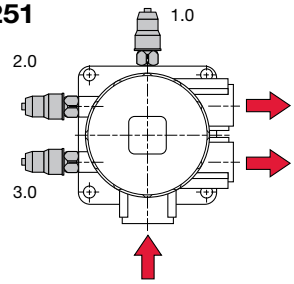
Clogging Indicator Locations

Size 100



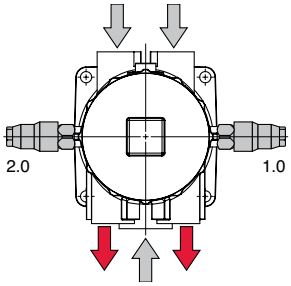
Type Code	Mounting Position of the Clogging Indicator	Type of Clogging Indicator	Measuring
1.0	on the filter inlet – right-hand side, bottom	return line	before the filter element
2.0	on the filter inlet – left-hand side, bottom	return line	before the filter element
3.0	on the filter outlet – right-hand side, top	vacuum	after the filter element
4.0	on the filter outlet – left-hand side, top	vacuum	after the filter element

Size 201/251



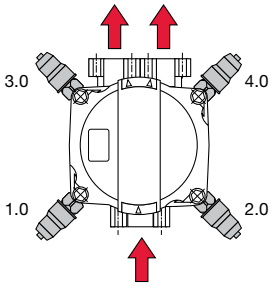
Type Code	Mounting Position of the Clogging Indicator	Type of Clogging Indicator	Measuring
1.0	on the filter inlet – opposite side	return line	before the filter element
2.0	on the filter inlet – left-hand side	return line	before the filter element
3.0	on the filter outlet – right-hand side	vacuum	after the filter element

Size 201/251/-MP1



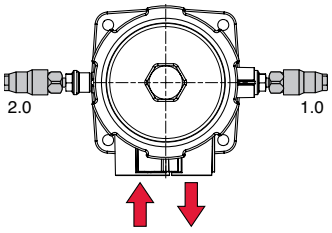
Type Code	Mounting Position of the Clogging Indicator	Type of Clogging Indicator	Measuring
1.0	on the filter outlet – right-hand side	return line	before the filter element
2.0	on the filter outlet – left-hand side	return line	before the filter element

Size 300



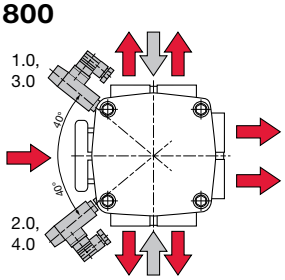
Type Code	Mounting Position of the Clogging Indicator	Type of Clogging Indicator	Measuring
1.0	on the filter inlet – left-hand side	return line	before the filter element
2.0	on the filter inlet – right-hand side	return line	before the filter element
3.0	on the filter outlet – left-hand side	vacuum	after the filter element
4.0	on the filter outlet – right-hand side	vacuum	after the filter element

Size 350



Type Code	Mounting Position of the Clogging Indicator	Type of Clogging Indicator	Measuring
1.0	on the filter inlet – right-hand side	differential pressure	before and after element
2.0	on the filter inlet – left-hand side	return line	before and after element

Size 400 / 800



Type Code	Mounting Position of the Clogging Indicator	Type of Clogging Indicator	Measuring
1.0	on the filter inlet – left-hand side, bottom	return line	before the filter element
2.0	on the filter inlet – right-hand side, bottom	return line	before the filter element
3.0	on the filter inlet – left-hand side, top	vacuum	after the filter element
4.0	on the filter inlet – right-hand side, top	vacuum	after the filter element

For other configurations, please contact HYDAC

HYDAC RKM: Two Filters in One.

A design that saves money.

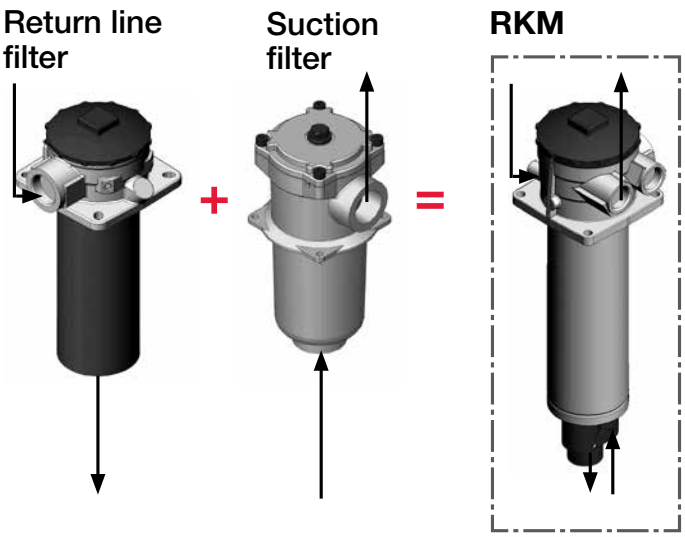
By using a HYDAC Return Line & Suction Boost Filter RKM you will benefit from:

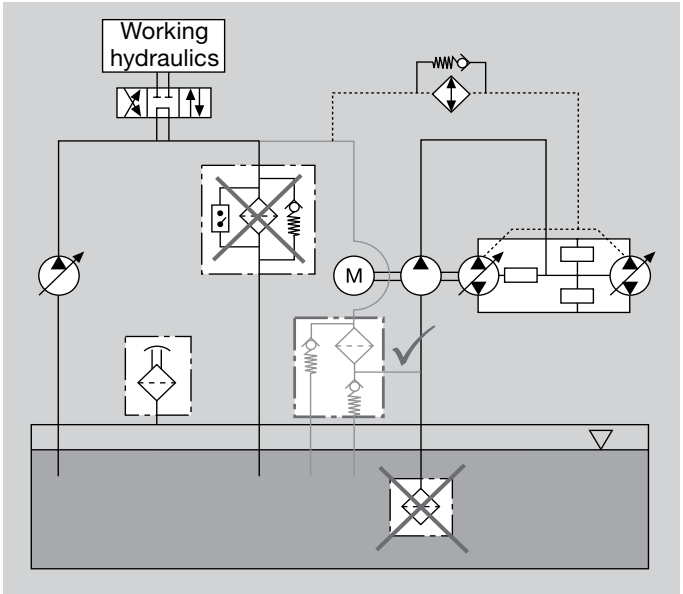
- Space saving
  Just one filter required instead of two
- Easy maintenance
  Half the time required for installation and maintenance
- Cost saving
  Lower investment, storage and service costs
- Increased operating safety
  Cavitation at the pump is reliably prevented and finely filtered oil is supplied even in the suction line.

One filter.
Two functions.
All the advantages.

The RKM combines the advantages of a return line filter with those of a suction filter in a single product!

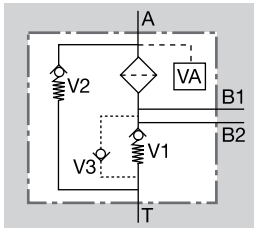
Return line & suction boost filters are particularly suitable for use in machines with two or more circuits, such as mobile working machines with hydrostatic traction drives (wheel loaders, forklifts).





Application example for the RKM in mobile machines.

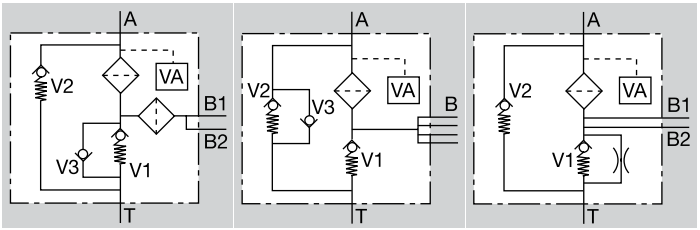
Function.



The return line flow QR is supplied to the element via one or more inlets "A". Once the element has been subjected to flow from the outside to the inside, the back-pressure valve "V1" in the element builds 0.5 bar positive pressure. Particularly in cold start conditions this positive pressure supports the suction characteristics of the pump(s) connected to “B” (e.g. boost pumps). This considerably reduces the risk of cavitation.

To ensure that the return line volume in operating conditions is always greater than the volume which is supplied on the suction side the surplus volume drains to tank via “T”. The bypass valve "V2" is fitted to relieve excessive backpressure. Part of the flow then drains directly to tank, bypassing the element. This configuration of valves ensures that only finely filtered oil reaches the suction port during operation*. The gradual increase of the valve characteristics contributes to keeping the back pressure in the return lines sufficiently low, even with high viscosity levels. With optional valve “V3”, oil can be drawn from the tank for short periods*, e.g. for initial filling and for venting.

Further options:

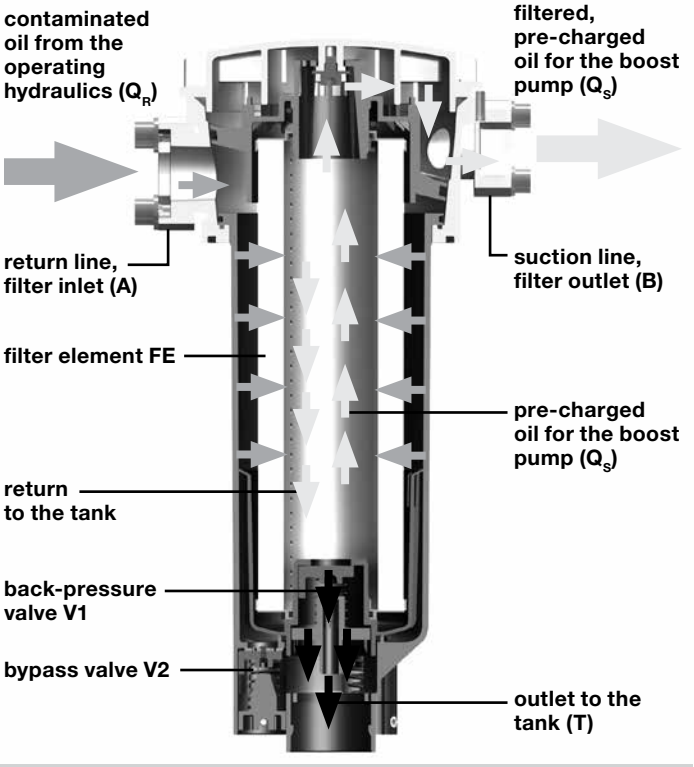


Anti-cavitation valve* with coarse strainer
for filtered oil also in anti-cavitation mode

Anti-cavitation valve* in the element bypass valve “V2”
for finely filtered oil also in anti-cavitation mode

Throttle in back pressure valve “V1”
for reducing pressure and draining oil

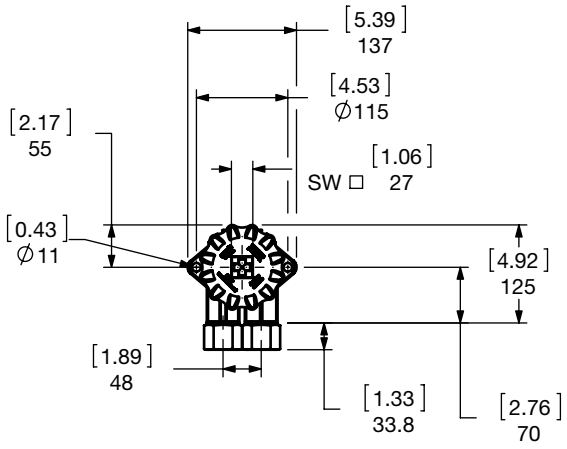
***not for RKM 355**
VA = clogging indicator

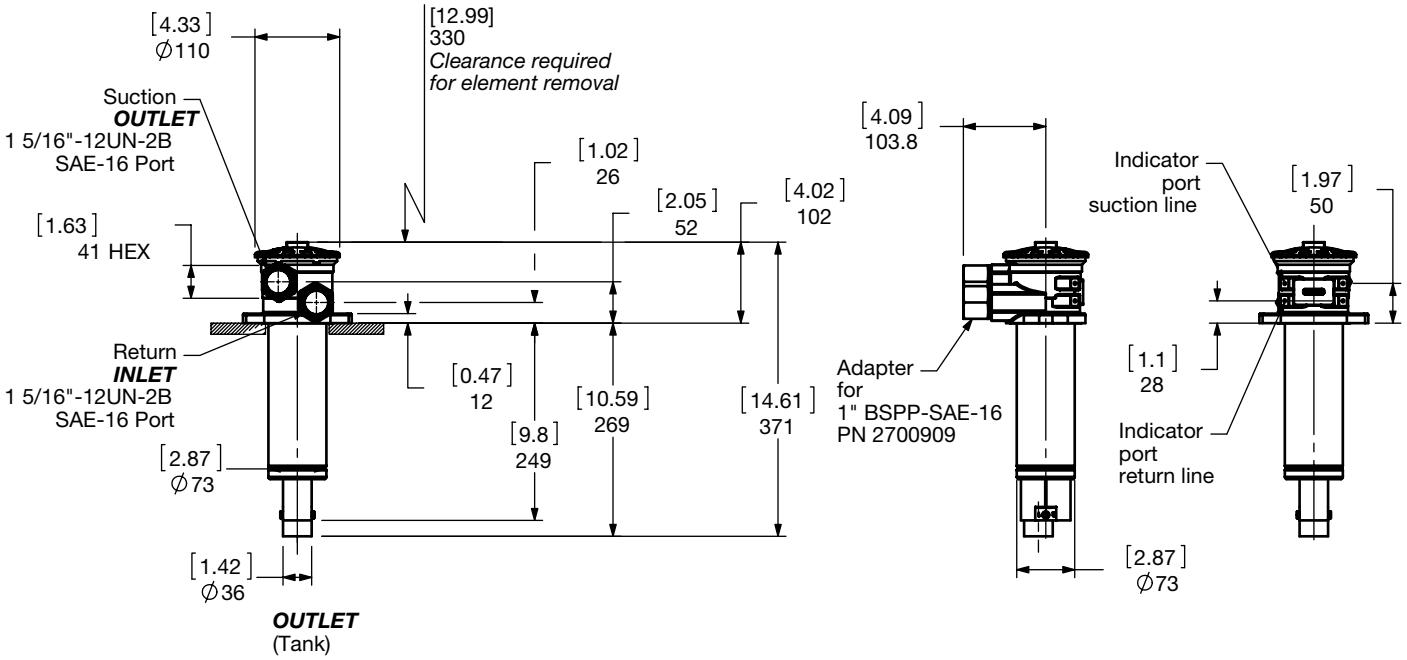


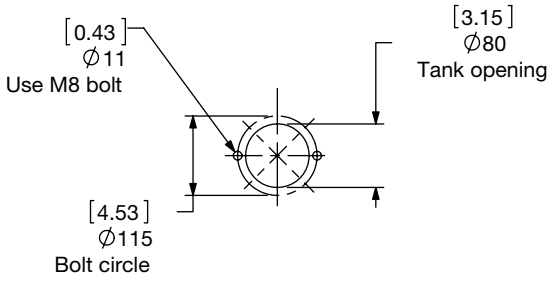
Function of the RKM.

PN#02081318 / 07.19 / FIL1907-2109

Dimensions
RKM 100





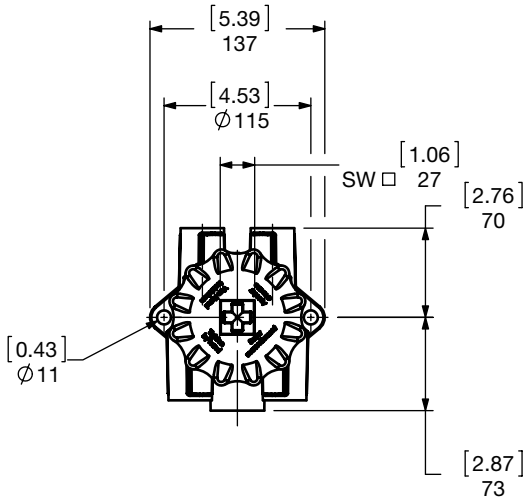


Mounting Pattern

Size	100
Weight (lbs.)	3.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

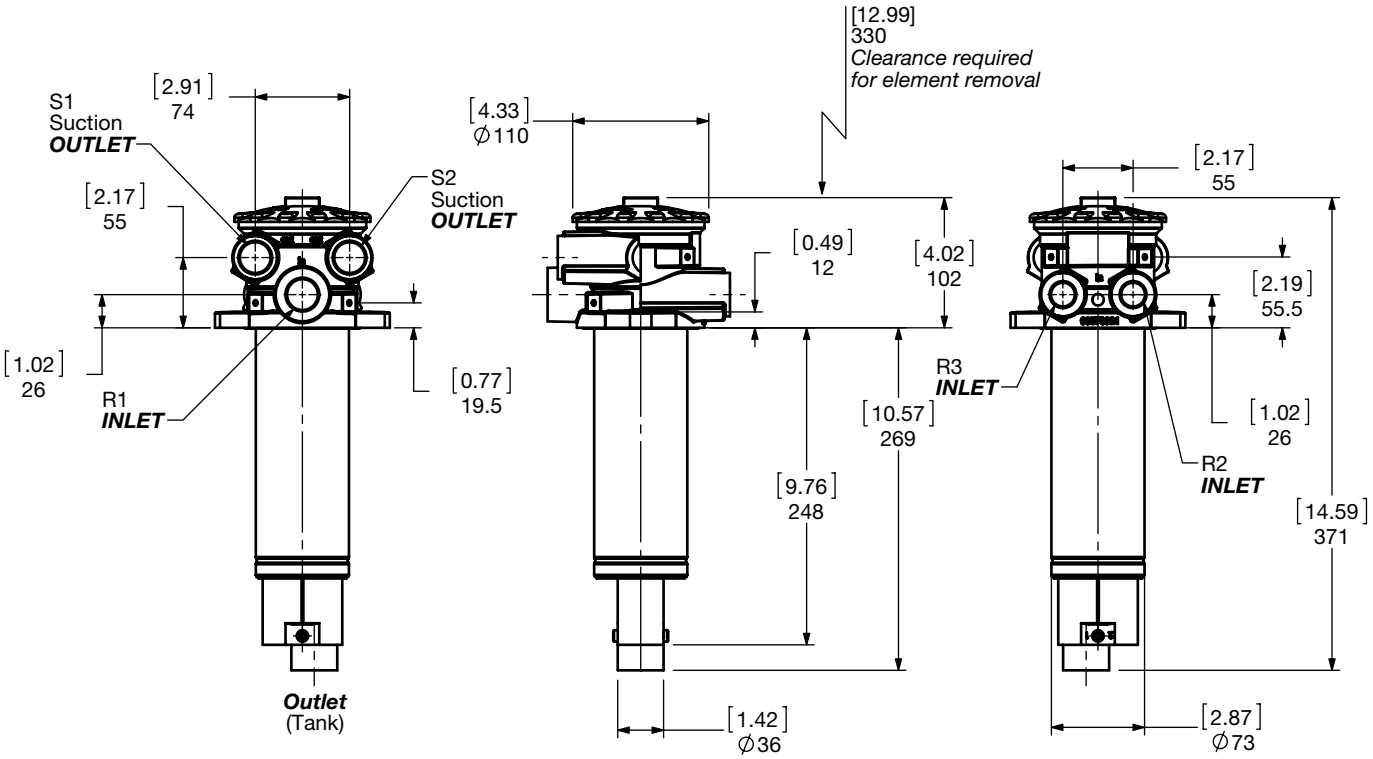
Dimensions
RKM 100 Multiport

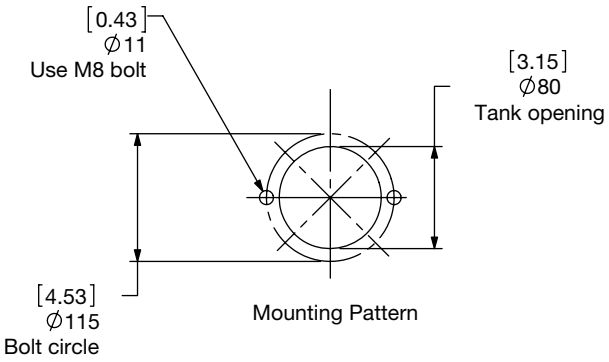


Port Configuration RKM 100 Multiport

Position in code	1	2	3	4	5
Connection	R1	R2	R3	S1	S2
SAE-8		B	B	B	B
SAE-12	C	C	C	C	C
SAE-16	D				
Port plugged	0	0	0	0	0
Special port	Z	Z	Z	Z	Z

Example: RKM MM 100 BZZ 15 W 1.0 /-CBBCC



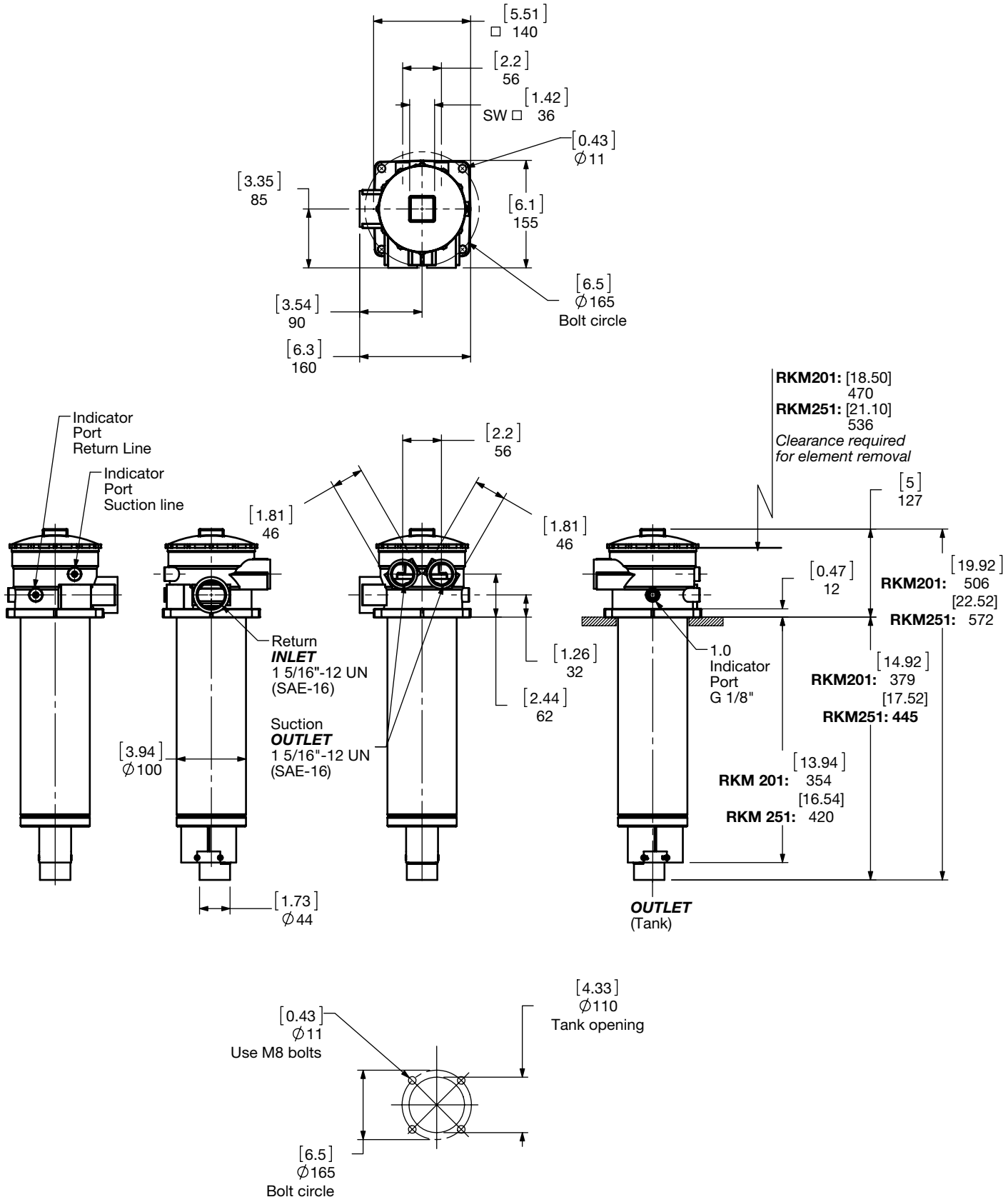


Size	100
Weight (lbs.)	4.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

PN#02081318 / 07.19 / FIL1907-2109

Dimensions
RKM 201 / 251

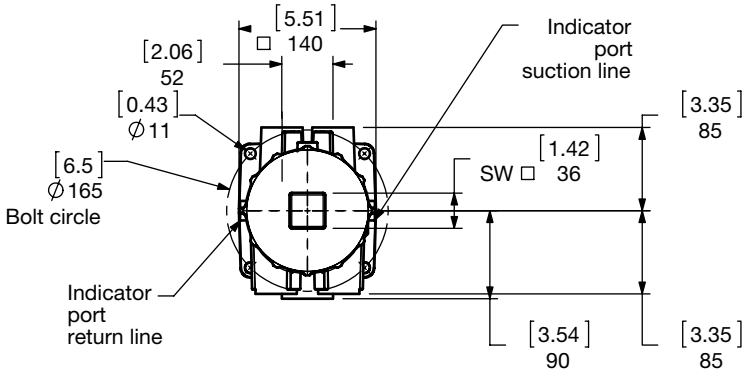


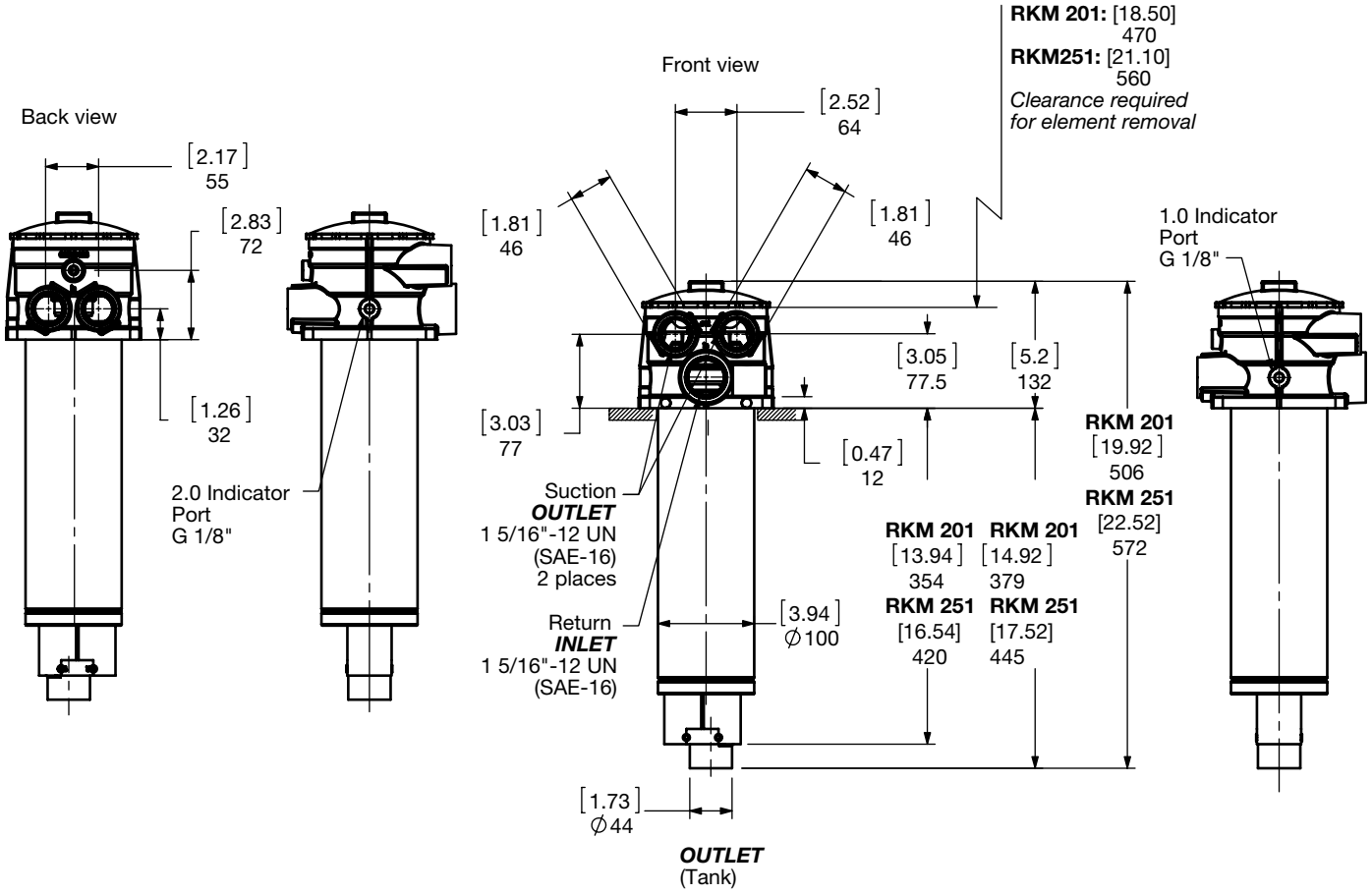
Mounting Pattern

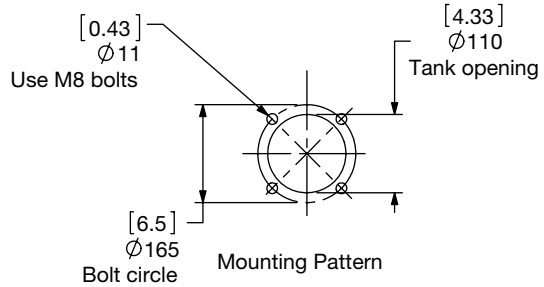
Size	201	251
Weight (lbs.)	8.2	9

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RKM 201 / 251 Multiport







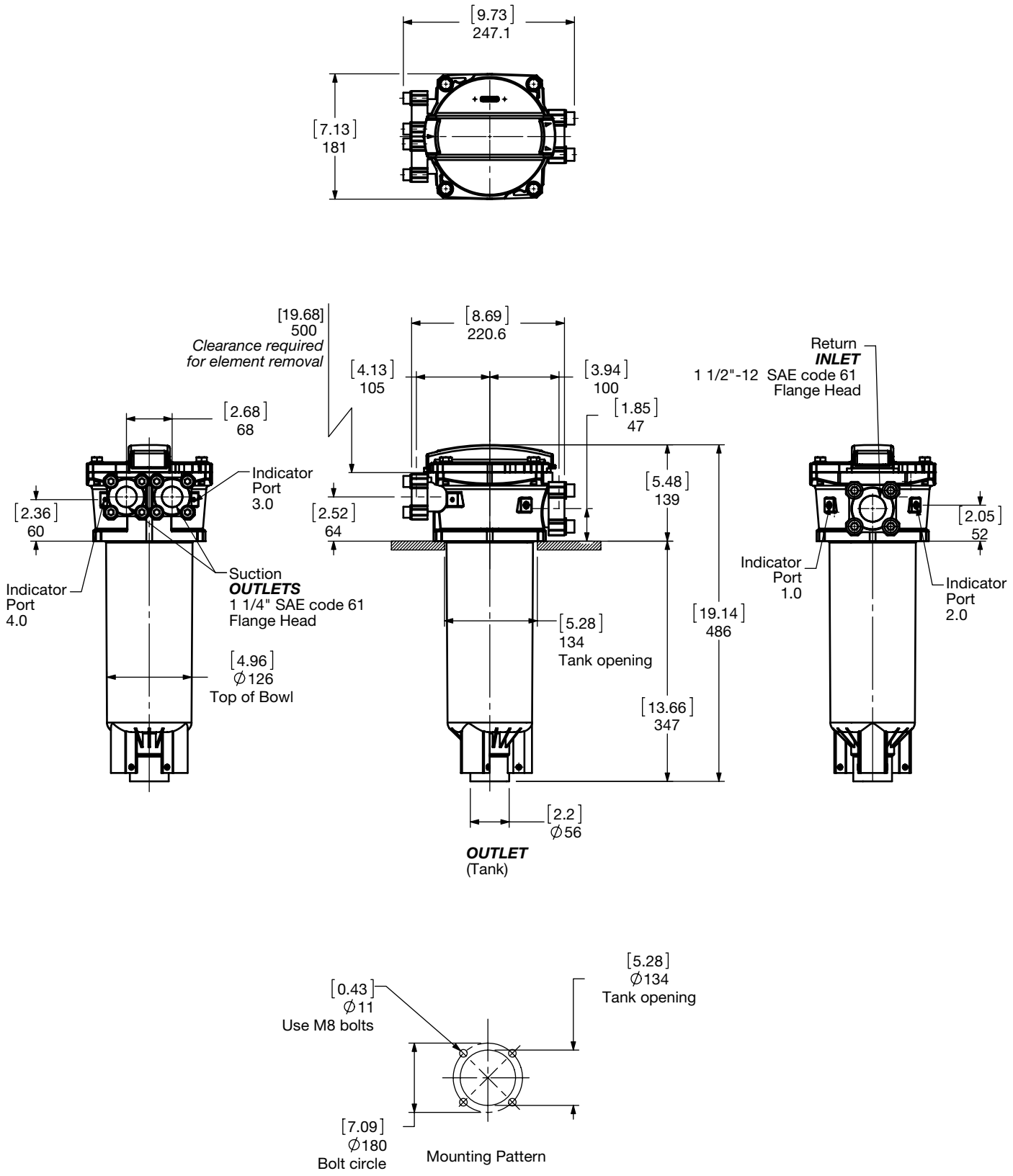
Port Configuration RKM 201 / 251 Multiport

Position in code	1	2	3	4	5
Connection	R1	R2	R3	S1	S2
SAE-12		(C)	(C)	C	C
SAE-16	D	D	D	(D)	(D)
SAE-20	(E)				
Port plugged	0	0	0	0	0
Special port	Z	Z	Z	Z	Z

Size	201	251
Weight (lbs.)	9.3	10

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

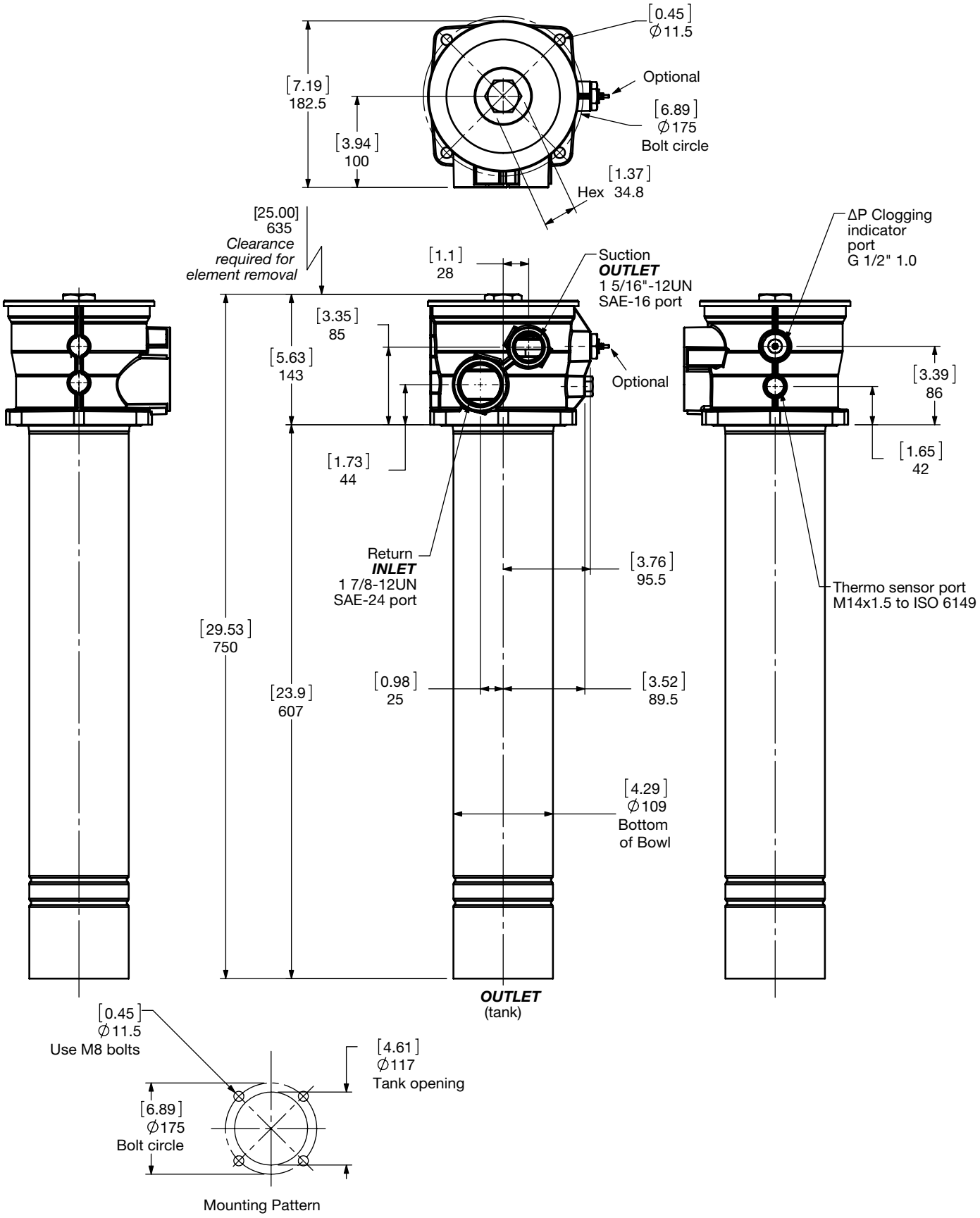
Dimensions
RKM 300



Size	300
Weight (lbs.)	10.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RKM 350



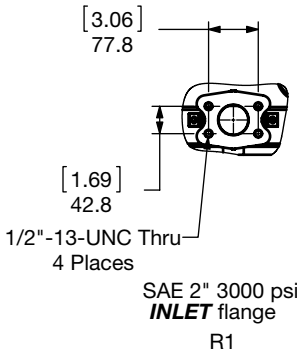
Size	350
Weight (lbs.)	13.9

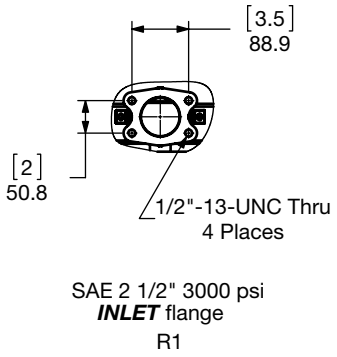
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

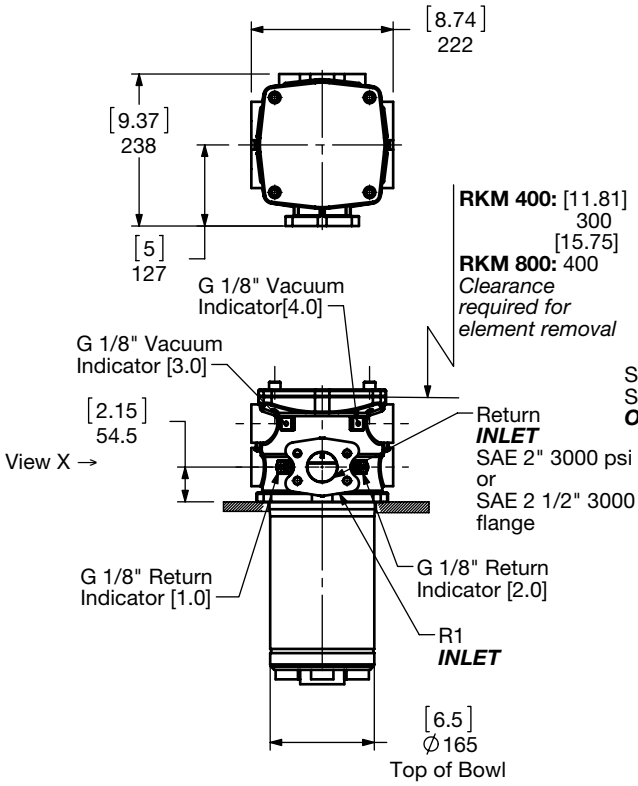
Dimensions
RKM 400 / 800

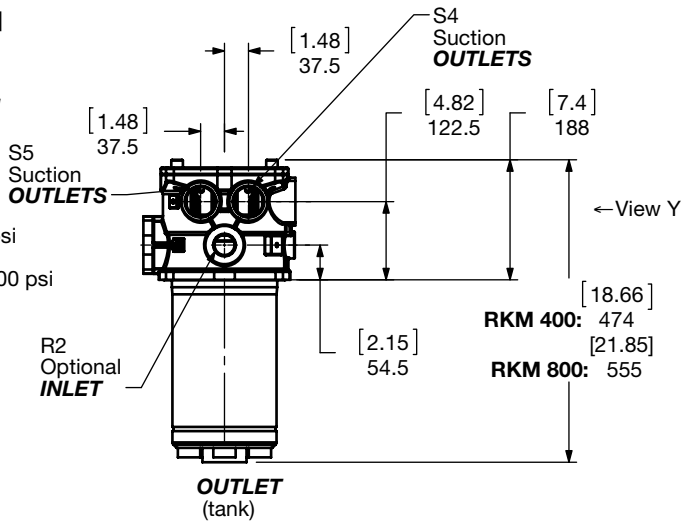
Port Configuration RKM 400 / 800

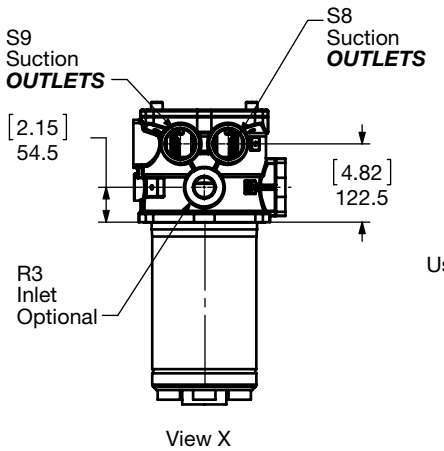
Position in code	1	2	3	4	5	6	7	8	9
Connection	R1	R2	R3	S4	S5	S6	S7	S8	S9
SAE 2” FLG	(1)								
SAE 2 1/2” FLG	2								
SAE-16		1	1	A	A	1	1	A	A
SAE-20		2	(2)	B	B	(2)	(2)	B	B
SAE-24		3	3	(C)	(C)	3	3	C	C
Port plugged		(0)	0	0	0	0	0	(0)	(0)
Special port		Z	Z	Z	Z	Z	Z	Z	Z

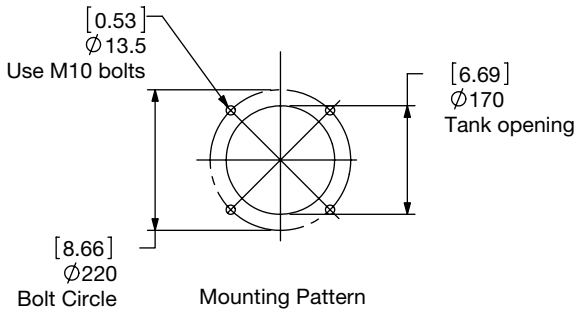


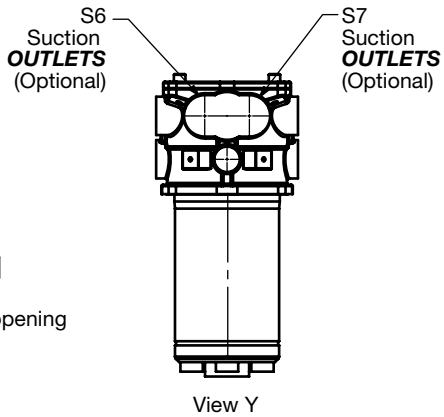












Size	400	800
Weight (lbs.)	14.4	16.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

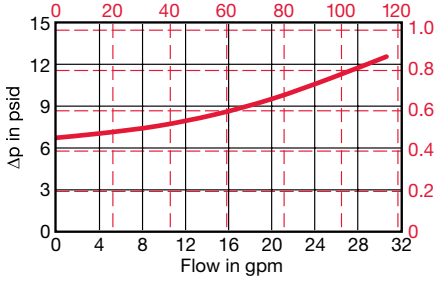
Housing Curve:

Pressure loss through housing is as follows:

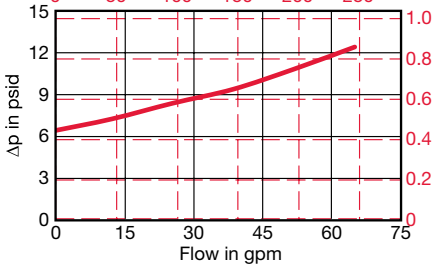
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

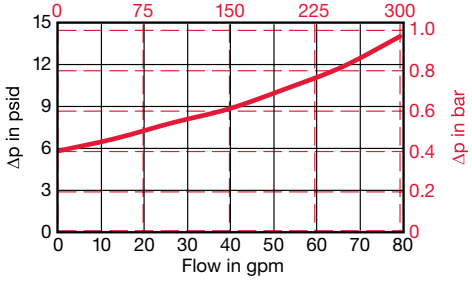
RKM 100



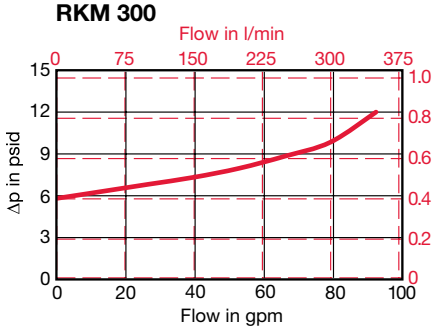
RKM 201 / 201 MP



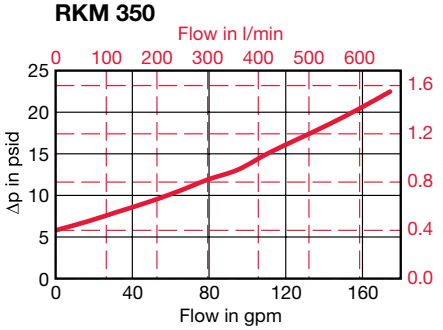
RKM 251 / 251 MP



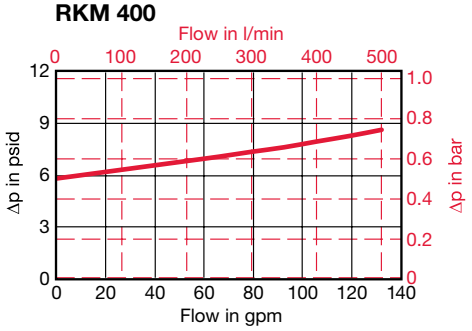
RKM 300



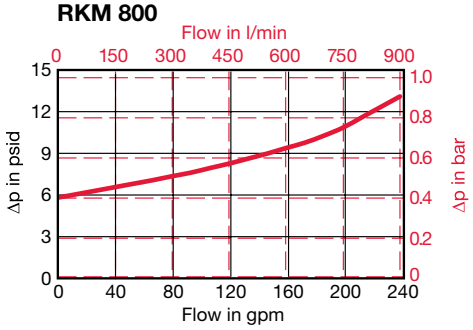
RKM 350



RKM 400



RKM 800



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Mobilemicron RK	...RK...MM		
Size	8 µm	10 µm	15 µm
0100 RK XXX MM	0.095	0.095	0.061
0201 RK XXX MM	0.041	0.041	0.026
0251 RK XXX MM	0.032	0.032	0.020
0300 RK XXX MM	0.034	0.034	0.021
0350 RK XXX MM	0.016	0.016	0.011
0400 RK XXX MM	0.031	0.031	0.019
0800 RK XXX MM	0.024	0.024	0.015

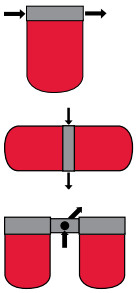
All Element K Factors in psi / gpm.

Notes

MF, MFD, MFDS Series

Spin-On Filters

250 PSI • up to 120 GPM



Features

- MF Filters are manufactured with an aluminum head.
- Choice of NPT, SAE straight thread O-ring boss, and SAE 4-bolt flange porting to allow easy installation without costly adapters.
- Quick easy element changeouts.
- MF Filters are designed to be used with hydrocarbon based fluids only – (not suitable for use with high water based fluids or phosphate esters)
- MF Filters are available in static and differential pressure sensing configurations.
- Static Indication for Mobile/Return Applications - Sizes 40/80/85/160/180
- Differential Indication for Inline Applications - Sizes 90/95/190/195

Applications

Agricultural

Automotive

Construction

Gearboxes

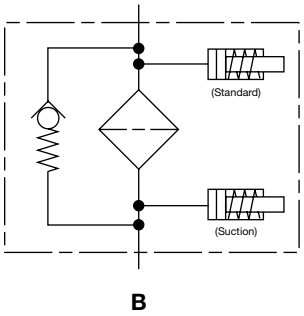
Industrial

Pulp & Paper

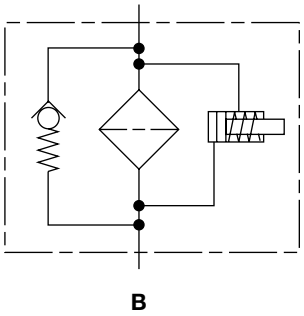
Steel / Heavy Industry

Hydraulic Symbol

MF 80/85/160/180



MF 90/95/190/195



Technical Specifications

Mounting Method		
MF40/80/85	2 mounting holes	
MF90/95	3 mounting holes	
MF160/180	2 or 4 mounting holes	
MF190/195	2 or 3 mounting holes	
MFD	2 mounting holes	
MFDS	4 mounting holes	
Port Connection		
MF40	SAE-6	
MF80/85	3/4" NPT, SAE-12, 1" NPT, SAE-16	
MF90/95	3/4" NPT, SAE-12, 1" NPT, SAE-16	
MF160/180/190/195	1 1/4" NPT, SAE-20, 1 1/2" NPT, SAE-24	
MFD160/180	1 1/2" NPT, SAE-24	
MFDS160/180*	2" SAE Flange Code 61, 1 1/2" NPT Comb. Port	
MFDS190/195*	2" SAE Flange Code 61, 1 1/2" NPT Comb. Port	
**Note: Max. allowable torque for flanged ports is 26 ft-lbs (1/2" - 13 UNC bolts)*		
Flow Direction	Inlet: Side	Outlet: Side
Construc. Materials	Head: Aluminum	Can: Steel
Flow Capacity		
40	7 gpm (26 lpm)	
80	15 gpm (57 lpm)	
85	25 gpm (95 lpm)	
90	15 gpm (57 lpm)	
95	25 gpm (95 lpm)	
160,190	30 gpm (114 lpm) per can	
180,195	60 gpm (227 lpm) per can	
Housing Pressure Rating	MF40/80/85/160/180/190/195	MF90/95
Max. Allowable Working Pressure**	120 psi (8 bar)	250 psi (17 bar)
Fatigue Pressure	Contact HYDAC	
Burst Pressure	Contact HYDAC	
Element Collapse Pressure Rating		
BN, P, AM	80 psid (5.5 bar)	
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all petroleum oils and synthetic fluids rated for use with Nitrile rubber (NBR) seals and aluminum and steel metals		
Indicator Trip Pressure	**ΔP Units *(Differential)***	
20 psid (1.4 bar) -10%	ΔP 14.5 psid (1 bar) - 10%	
25 psid (1.7 bar) -10%	ΔP 22 psid (1.5 bar) - 10%	
40 psid (2.7 bar) *(B3.4 Bypass)*	ΔP 44 psid (3 bar) - 10%	
Vacuum = 2 psid (0.1 bar) *(Suction)*		
Bypass Valve Cracking Pressure		
ΔP = 3 psid (0.2 bar) +10% *(for suction applications)*		
ΔP = 25 psid (1.7 bar) +10% *(standard for nominal/surface type filters)*		
ΔP = 50 psid (3.4 bar) +10% *(standard for absolute/depth filters)* *(standard for absolute/depth type BN filters, MF 80/90/95/160/180/190/195, MFD 160/180, MFDS 160/180)*		

**Note: All MF, MFD, MFDS MAWP reduce to 60 psi (4 bar) when using the following "VMF" indicators: B, BM, E, ES, GC, LE, LZ.

PN#02081318 / 07.19 / FIL1907-2109

Model Code

MF BN 80 A U C 5 A 1 . X / 3 B3.4

Filter Type
- MF = Single Element
- MFD = Dual Filter Heads & Elements *(End to End) (sizes 160, 180, 190, & 195 only)*
- MFDS = Dual Filter Heads & Elements *(Side by Side) (sizes 160, 180, 190, & 195 only)*

Element Media
BN = Betamicron® *(Low Collapse)* P = Paper AM = Water Removal

Size
40*, 80*, 85§, 90†, 95††, 160, 180, 190 *(uses size 160 element)*, 195 *(uses size 180 element)*

Pressure Rating
- A = 120 psi (8.3 bar) *(MF40/80/85/160/180, MFD160/180, MFDS160/180/190/195)*
- C = 250 psi (17.2 bar) *(MF90/95)*
- Y = 60 psi (4.1 bar) *(MF40/80/85/160/180, MFD160/180, MFDS160/180, when "E" type static pressure gauge is used) with a B1.7 bypass setting*
- W = Suction Operation *(when 0.2 bar bypass is specified for Suction Applications)*

Element Connection Type
- U = UN thread

Type of Connection
- A = 3/8" Threaded (SAE-6 or 3/8" NPT) *(MF40)*
- C = ¾" Threaded (SAE-12, ¾" NPT) *(MF80/85/90/95)*
- D = 1" Threaded (SAE-16, 1" NPT) *(MF80/85/90/95)*
- E = 1 ¼" Threaded (SAE-20, 1 ¼" NPT) *(MF160/180/190/195)*
- F = 1 ½" Threaded (SAE-24 MFDS160/180/190/195) , 1 1/2" NPT *(only for MF160/180)*
- LF = 1 ½" Threaded and 2" Flanged Combo (1 ½" NPT & 2" SAE Code 61) *(MFD160/180, MFDS160/180/190/195)*

Filtration Rating *(micron)*
3, 5, 10, 20 = BN/HC 3, 10, 25 = P 40 = AM

Type of Clogging Indicator
A, B, C, E, ES *(Static - sizes 80, 85, 160, 180); (Differential - sizes 90, 95, 190, 195)*

Type Number

Modification Number *(latest version always supplied)*

Port Configuration
- 3 = NPT Tapered Thread Ports
- 12 = SAE O-Ring Boss Straight Thread Ports
- 16-3 = Combination NPT Tapered Thread Ports/SAE Code 61 Flanges *(MFDS160/180/190/195)*

Bypass Valve
- B0.2 = 3 psid/0.2 bar *(For Suction Applications)*
- B1.7 = 25 psid/1.7 bar *(Standard on paper filters sizes 80 - 195 and size 40 BN)*
- KB = No Bypass *(not available with NPT)*
- B1.3 = 18 psid/1.3 bar *(size 40 paper only)*
- B3.4 = 50 psid/3.4 bar *(Standard on BN & AM Series) (sizes MF 80/90/95/160/180/190/195 & MFD 160/180 only)*
- IP2 = Alternate Indicator Position 2 *(sizes MF190/195 or MFDS 190/195)*

Replacement Element Model Code

0080 MA 005 BN

Size
- 0040, 0080 - **(not available with 3 µm BN elements)*
- 0085 - §*(available only with 10 µm P elements)*
- 0090 - †*(not available in 3 µm or 25 µm P medias)*
- 0095 - ††*(not available with 20 µm BN or 25 µm P elements)*
- 0160, 0180 - (*available in all medias)*

Filtration Rating *(microns)*
3, 5, 10, 20 = BN 3, 10, 25 = P
40 = AM *(not available with size 0085)*

Element Media
BN, P, AM

Supplementary Details
Bypass settings for element 0040 only
(bypass valve is inside element can)
- B1.3 = 18 PSID Bypass (P)
- B1.7 = 25 PSID Bypass (BN)

(Spin-on elements available with NBR seals only)

Clogging Indicator Model Code

VMF 2 E . X / 3

Indicator Prefix
- VMF = Static *(sizes 80/85/160/180)*
- B = Differential *(sizes 90/95/190/195)*

Trip Pressure
- 1.4 = 20 psid (1.4 bar) standard
- 1.7 = 25 psid (1.7 bar) *(optional)*
- 2 = 29 psid (2 bar) *(optional)*

(Static)

Differential - Consult HYDAC

Type of Indicator
- A = No indicator - all available with plugged port
- B MF = Pop-up indicator *(auto reset) (ΔP sz. MF 90/95,190/195, MFDS 190/195)*
- C MF = Single terminal electric switch *(ΔP - sz. MF 90/95,190/195, MFDS 190/195)*
- C = 2 terminal electric switch *(Static - sz. MF 80/85, 160/180)*
- E = Visual Pressure Gauge *(Static - sz. MF 80/85, 160/180)*
- ES = Visual Pressure Gauge *(port bottom) (Static - sz. MF 80/85, 160/180)*

Modification Number

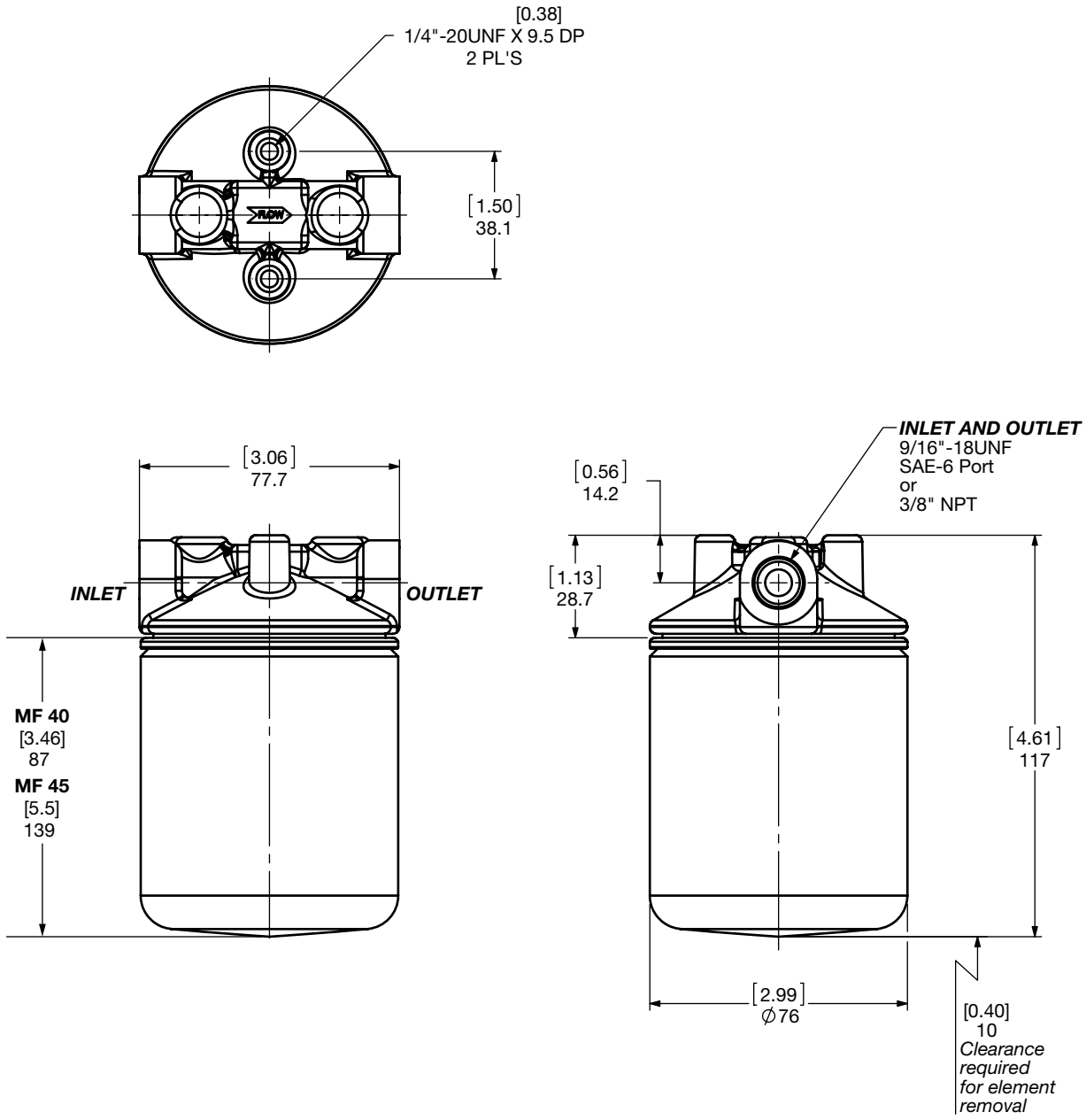
Supplementary Details

Seals
- (omit) = Nitrile rubber (NBR) *(standard)*
- 3 = NPT port adapter

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

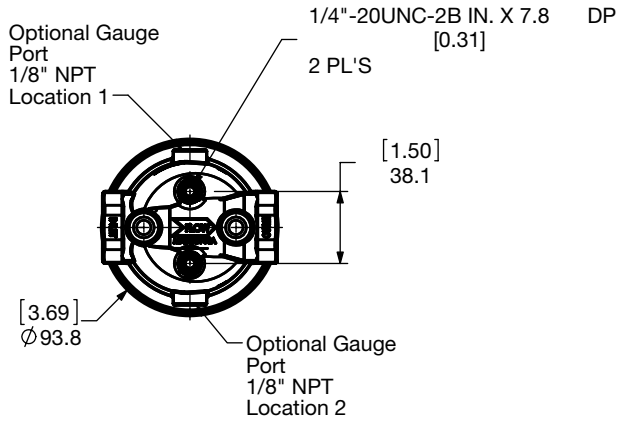
Dimensions
MF 40 / 45

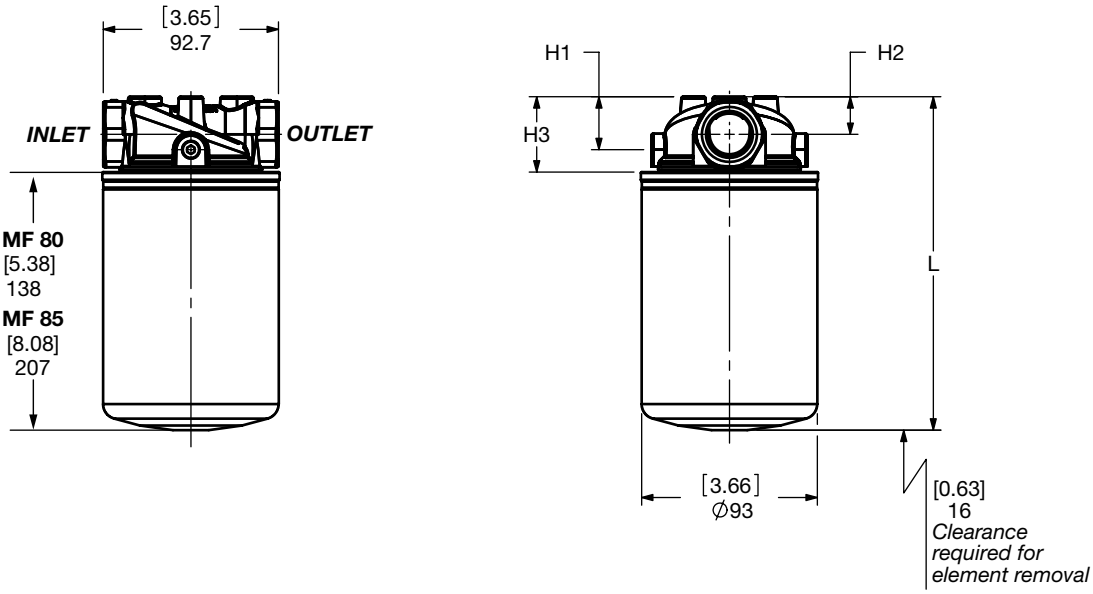


Size	40	45
Weight (lbs.)	1	1.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
MF 80 / 85



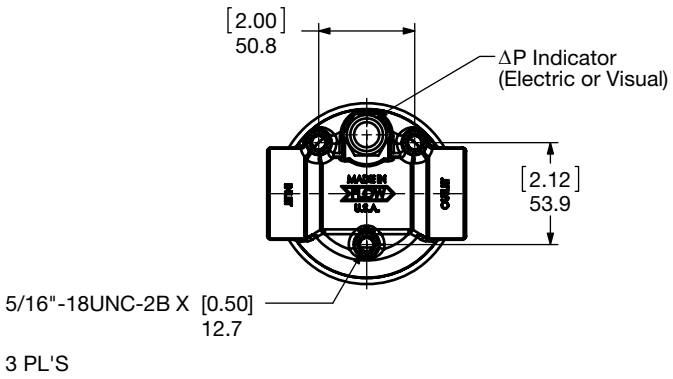


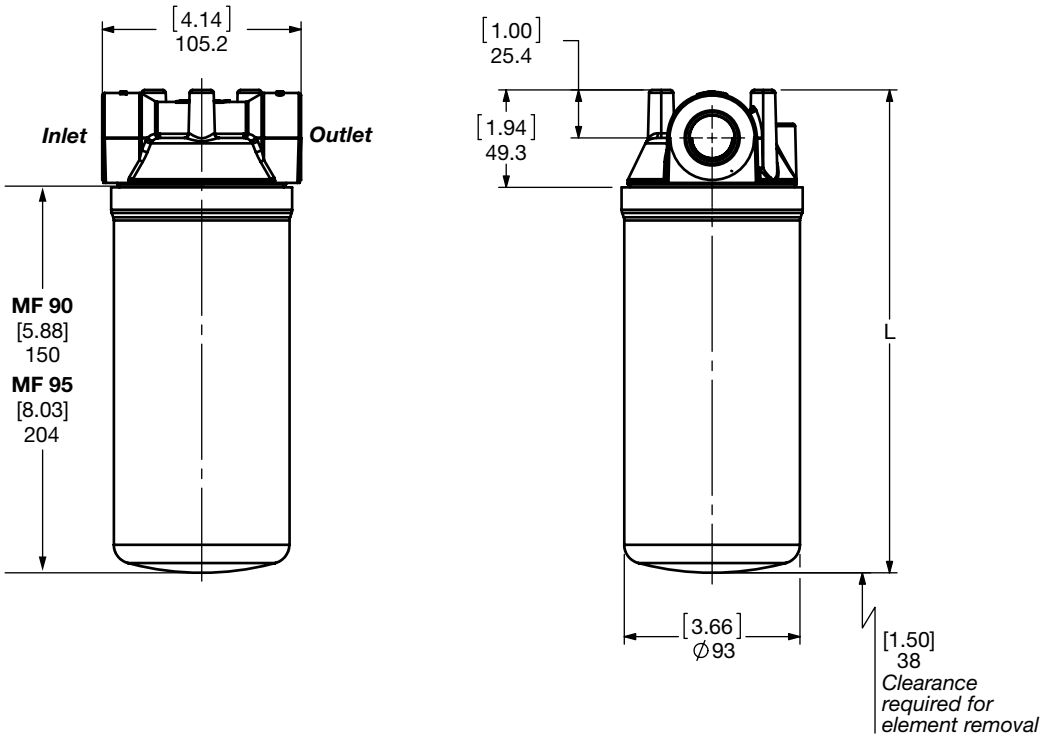
SIZE	PORT SIZE *(INLET & OUTLET)*	H1	H2	H3	L
MF80	3/4" NPT	[1.12] 28.4	[0.79] 20.1	[1.52] 38.6	[6.89] 175
	SAE-12				
	1" NPT	[1.42] 36.1	[1.91] 23.1	[1.83] 46.5	[7.20] 182.9
	SAE-16				
MF85	3/4" NPT	[1.12] 28.4	[0.79] 20.1	[1.52] 38.6	[9.61] 244.1
	SAE-12				
	1" NPT	[1.42] 36.1	[0.91] 23.1	[1.83] 46.5	[9.92] 252
	SAE-16				

Size	80	85
Weight (lbs.)	1.8	2.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
MF 90 / 95



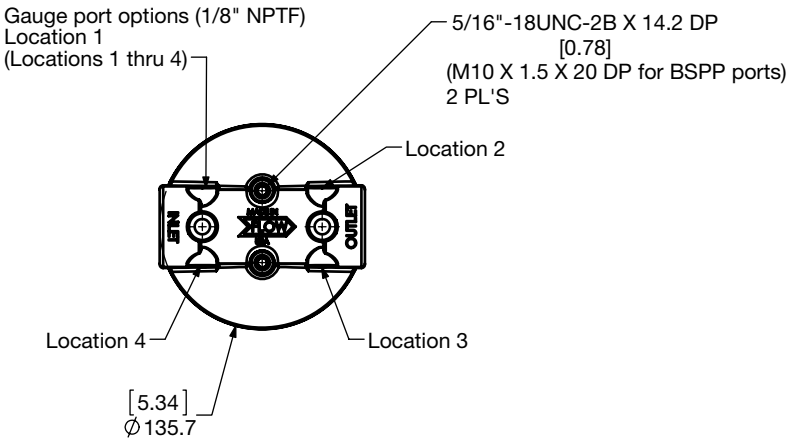


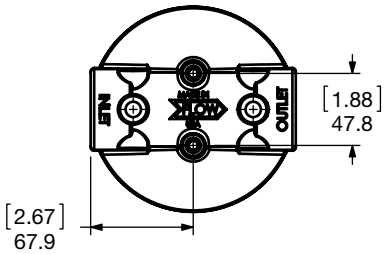
SIZE	PORT SIZE *(INLET & OUTLET)*	L
MF90	3/4" NPT	[5.88] 150
	SAE-12	
	1" NPT	
	SAE-16	
MF95	3/4" NPT	[8.03] 204
	SAE-12	
	1" NPT	
	SAE-16	

Size	90	95
Weight (lbs.)	2.7	3.2

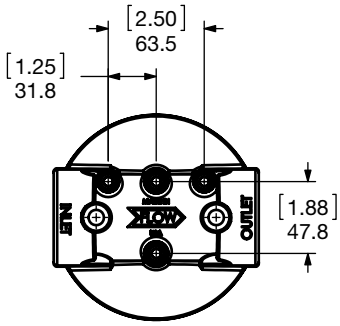
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
MF 160 / 180

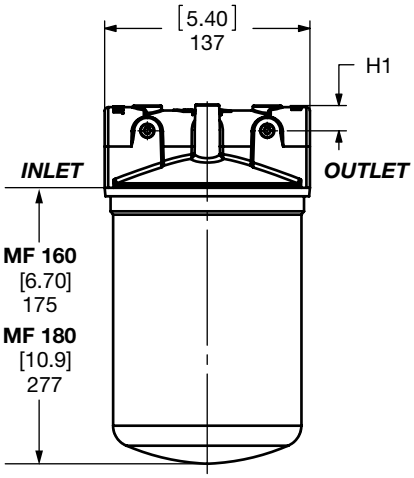


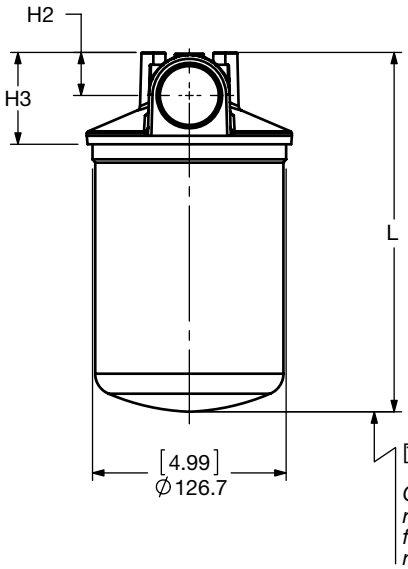


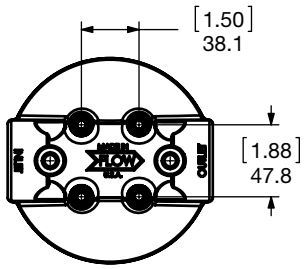
SAE-20
(2 Bolt Mounting)



1 1/2" NPTF
SAE-24
(3 Bolt Mounting)
(Special Order)







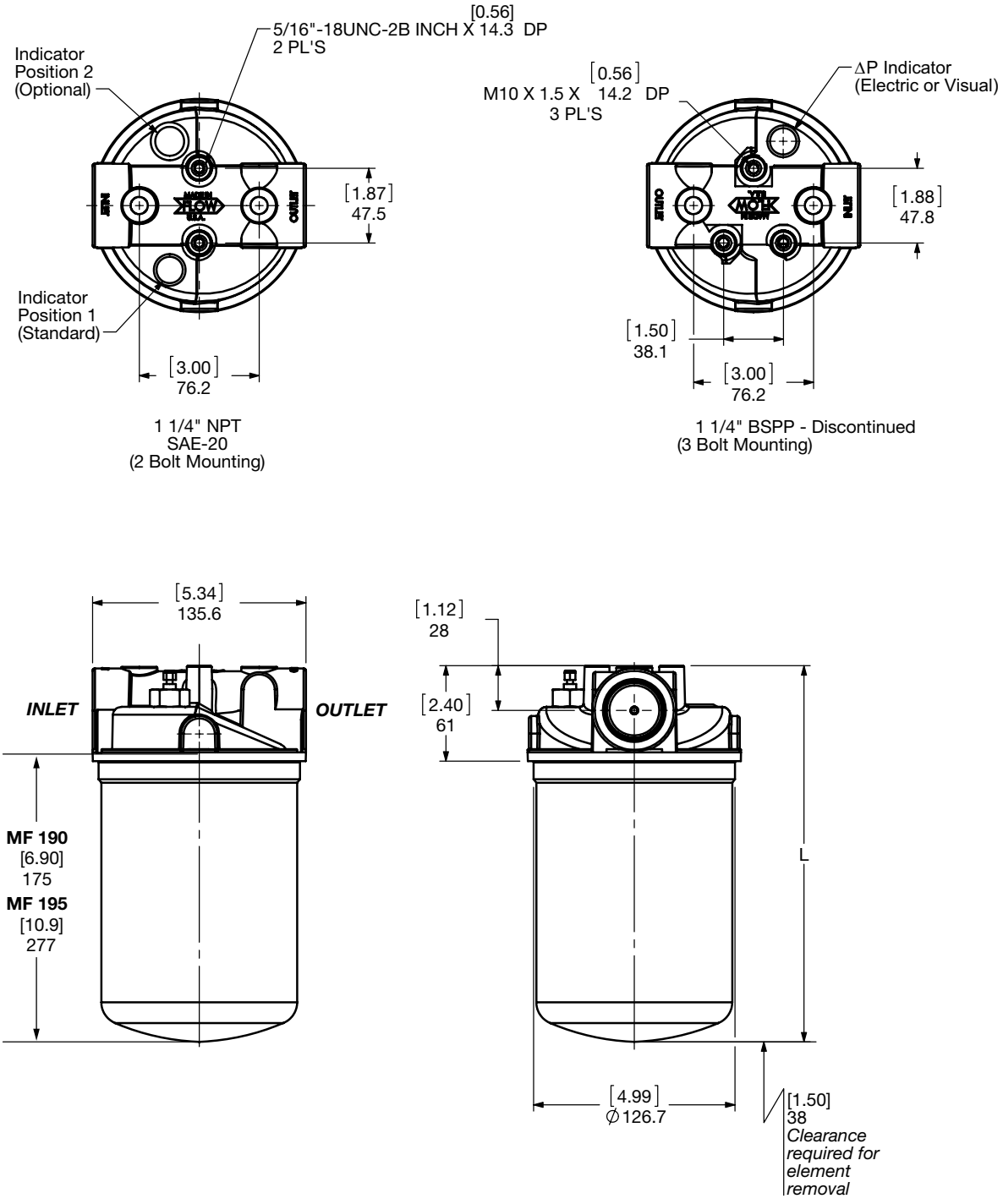
1 1/4" NPTF
SAE-20
(4 Bolt Mounting)

SIZE	PORT SIZE *(INLET & OUTLET)*	H1	H2	H3	L
MF160	1 1/4" NPT	[0.79] 20.1	[1.08] 27.4	[2.35] 59.7	[9.35] 237.5
	SAE-20				
	1 1/2" NPT	[1.10] 27.9	[1.30] 33	[2.80] 71.1	[9.80] 248.9
	SAE-24				
MF180	1 1/4" NPT	[0.79] 20.1	[1.08] 27.4	[2.35] 59.7	[13.35] 339.1
	SAE-20				
	1 1/2" NPT	[1.10] 27.9	[1.30] 33	[2.80] 71.1	[13.80] 350.5
	SAE-24				

Size	160	180
Weight (lbs.)	5.1	7.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

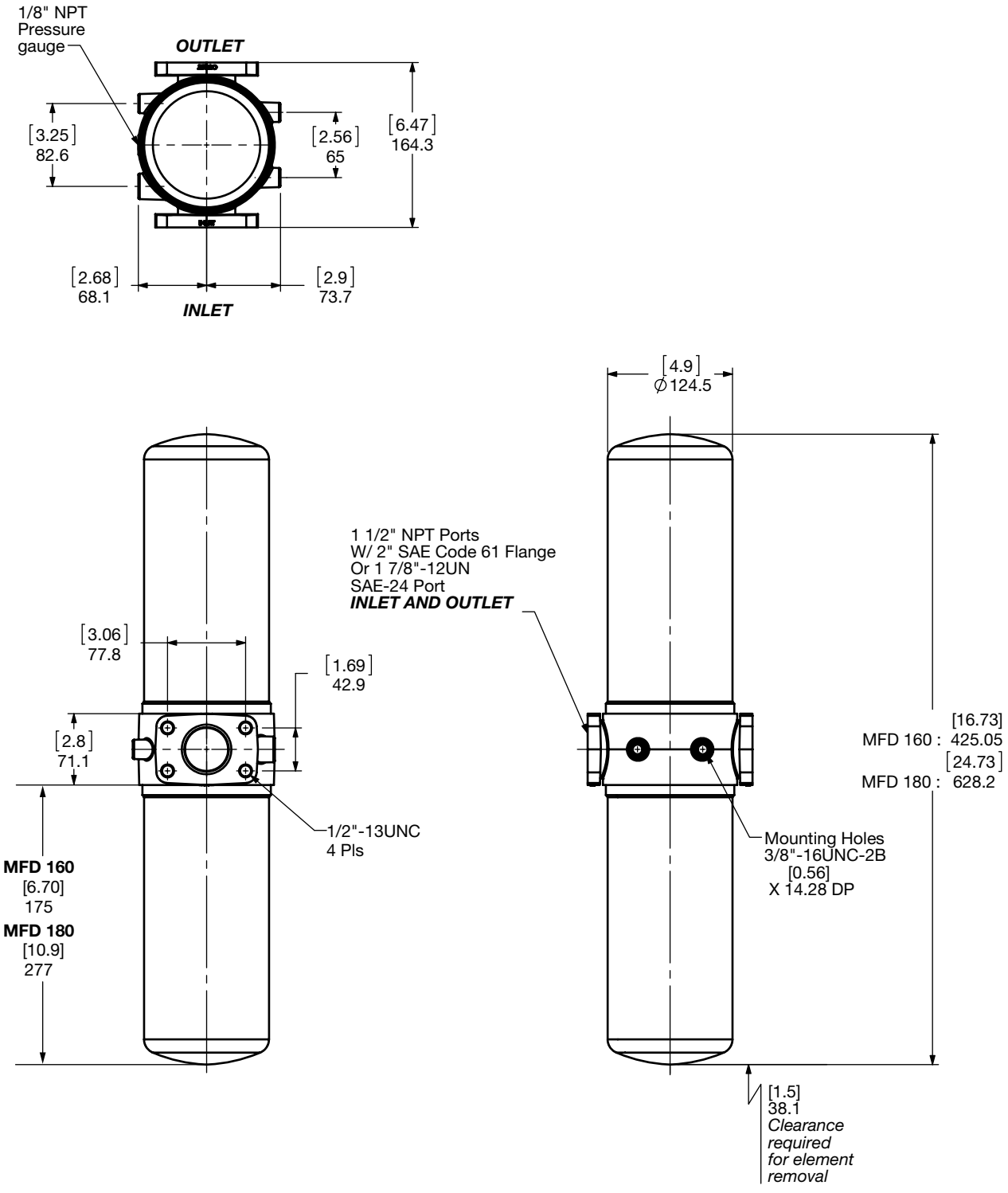
Dimensions
MF 190 / 195



Size	190	195
Weight (lbs.)	4.3	5.4

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

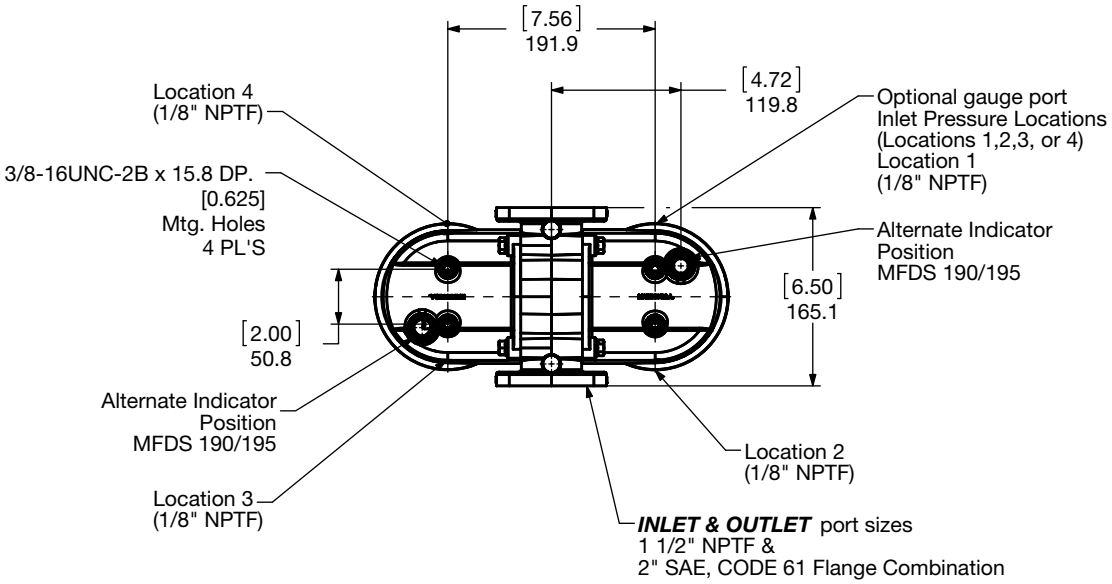
Dimensions
MFD 160 / 180

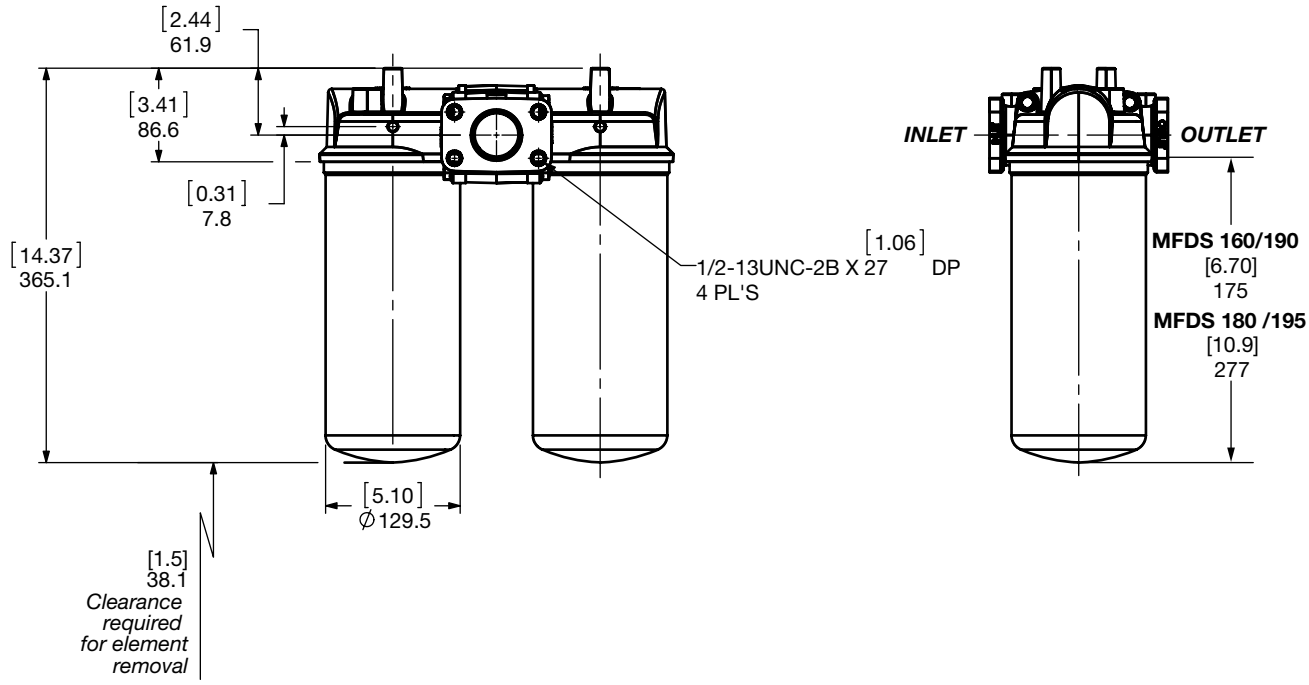


Size	160	180
Weight (lbs.)	8.8	11

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
MFDS 160 / 180 / 190 / 195





Size - MFD	160	180	190	195
Weight (lbs.)	11.6	13.8	8.8	11

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

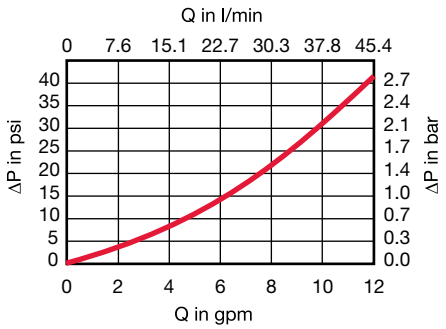
Housing Curve:

Pressure loss through housing is as follows:

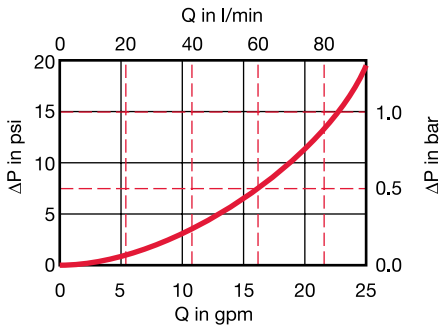
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

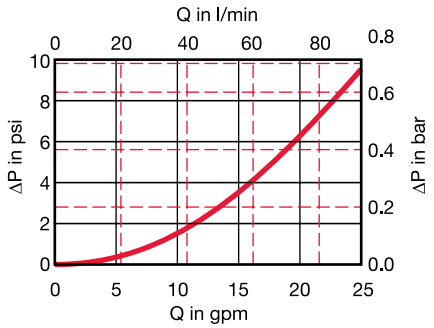
MF 40



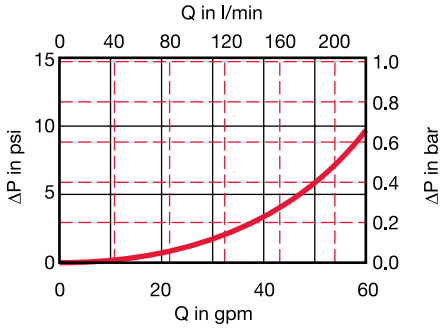
MF 80 / 85



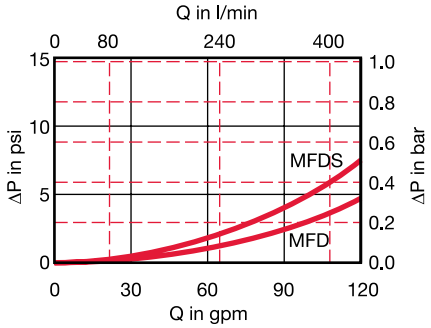
MF 90 / 95



MF 160 / 180 / 190 / 195



MFD / MFDS 160 / 180 / 190 / 195



Aquamicron Water Removal Element Capacity vs. Flow

Spin-On Element	Optimum Flow Rate		Maximum Flow Rate	
	Flow (gpm)	Capacity (quarts)	Flow (gpm)	Capacity (quarts)
0080MA010AM	2	0.12	6	0.08
0090MA010AM	2	0.12	6	0.08
0095MA010AM	4	0.17	8	0.11
0160MA040AM	4	0.23	8	0.16
0180MA040AM	6	0.45	15	0.32

Spin-on Connection Chart

Size	Can Connection Thread		
	MA	MG	MU
0040	3/4" - 16 UN - 2B	—	—
0080	—	3/4" BSPP	—
0080/0085	1" - 12 UN -2B	—	—
0090/0095	1-1/2" - 16 UN - 2B	—	—
0160	—	1-1/4" BSPP	—
0160/0180	1-1/2" - 16 UN - 2B	—	—

MA = UN Tap Plate Thread (standard); MG = BSPP Tap Plate Thread (special); MU = Metric Tap Plate Thread (special - consult HYDAC)

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Size	...MA...BN			
	3 µm	5 µm	10 µm	20 µm
0040	—	1.1799	0.6289	0.3613
0080	—	0.4423	0.2357	0.1354
0090	0.4841	0.3702	0.3451	0.1911
0095	0.2762	0.2112	0.1969	—
0160	0.2372	0.1983	0.1113	0.0625
0180	0.1231	0.1029	0.0577	0.0325

Size	...MA...P		
	3 µm	10 µm	25 µm
0040	7.763	2.348	1.516
0080	1.606	0.486	0.314
0085	—	0.351	—
0090	—	0.482	—
0095	0.894	0.270	—
0160	0.839	0.192	0.145
0180	0.443	0.134	0.087

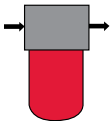
Size	...MA...AM	
	010 µm	040 µm
0080	0.513	—
0085	—	—
0090	0.507	—
0095	0.284	—
0160	—	0.233
0180	—	0.136

All Element K Factors in psi / gpm.

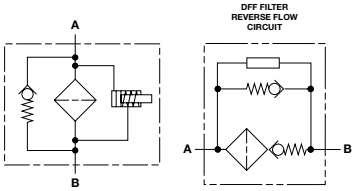
FLN Series

Inline Filters

360 psi • up to 100 gpm



Hydraulic Symbol



Features

- Aluminum alloy is water tolerant - anodization is not required for high water based fluids (HWBF).
- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- SAE straight thread O-ring boss porting to allow easy installation without costly adapters.
- O-ring axial seals are used to provide positive, reliable sealing.
- Screw-in bowl mounted below the filter head requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- Differential Pressure Indicators. HYDAC indicators have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- A poppet-type bypass valve (optional) is mounted in-line between the inlet and outlet ports to provide positive sealing during normal operation and fast opening during cold starts and flow surges.
- This filter can be modified to meet the requirements of DIN 24550* as follows:
  - Filter size 0160 with G 1-1/4" port selection
  - Filter size 0250 with G 1-1/2" port selection
  - Filter size 0400 with SAE-DN 38 1-1/2" Flange
- Bypass versions of FLN filters have the bypass valve located in the filter head.

*Note - QPD design does not meet DIN 24550.

Applications

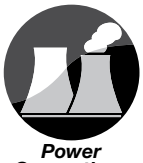

Agricultural


Automotive


Construction


Gearboxes


Industrial


Power Generation


Pulp & Paper

Technical Specifications

Mounting Method	2 mounting holes in the filter head
Port Connection	Inlet / Outlet 1-1/4" Threaded – SAE 20, 1-1/4" BSPP 1-1/2" Threaded – SAE 24, 1-1/2" BSPP 1-1/2" Flange-SAE-DN 38 Code 61
Flow Direction	Inlet: Side Outlet: Opposite Side
Construction Materials	
Head, Bowl	Aluminum
Flow Capacity	
160	43 gpm (160 lpm)
250	66 gpm (250 lpm)
400	105 gpm (400 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure:	360 psi (25 bar)
Fatigue Pressure	360 psi (25 bar)
Burst Pressure	1450 psi (100 bar)
Element Collapse Pressure Rating	
BN4HC, W/HC	290 psid (20 bar)
BH4HC	3045 psid (210 bar)
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)
Consult HYDAC for applications below -22˚F (-30˚C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 36.25 psid (2.5 bar) -10% *(standard)*	
ΔP = 72 psid (5 bar) -10%	
ΔP = 116 psid (8 bar) -10%	
Bypass Valve Cracking Pressure	
ΔP = 50.75 psid (3.5 bar) +10% *(standard)*	
ΔP = 102 psid (7 bar) +10%	

Model Code

FLN BN/HC 250 D E 10 C 1 . X / 12 - V - QPD - B3.5

Filter Type
FLN = Inline filter

Element Media
BH/HC = Betamicron® *(High Collapse)*
BN/HC = Betamicron® *(Low Collapse)* W/HC = Wire Mesh

Size
160, 250, 400

Operating Pressure
D = 360 psi (25 bar)

Port Type / Size
E = 1-1/4" SAE or BSPP Threaded
F = 1-1/2" SAE or BSPP Threaded
K = 1-1/2" Flange-SAE-DN 38 Code 61 Flange

Filtration Rating *(micron)*
3, 6, 10, 25 = BH/HC, BN/HC 25, 50, 100, 200 = W/HC

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(the latest version is always supplied)*

Port Configuration
(omit) = SAE DN Flange
0 = BSPP Threaded
12 = SAE Straight Threaded

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Version
(omit) = meets DIN 24550
QPD = Quality Protection Design

Bypass Valve
(omit) = no bypass *(optional)*
B3.5 = 50.75 psid (3.5 bar) *(standard)*
B7 = 101.5 psid (7 bar) *(optional)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
cRUus = Electrical Indicator with underwriter's approval
SFREE = Element specially designed to minimize electrostatic charge generation
T100 = Indicator lockout under 100˚F

Replacement Element Model Code

0250 DN 010 BN4HC / V QPD

Size
0160, 0250, 0400

Type
DN

Filtration Rating *(micron)*
3, 6, 10, 25 = BH4HC, BN4HC
25, 50, 100, 200 = W/HC

Element Media
BH4HC, BN4HC, W/HC

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Version
(omit) = meets DIN 24550
QPD = Quality Protection Design

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 C . X / V

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2.5 = 36.25 psid (2.5 bar) *(optional)*
5 = 72 psid (5 bar)

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = electric switch - SPDT
D = electric switch & LED light – SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

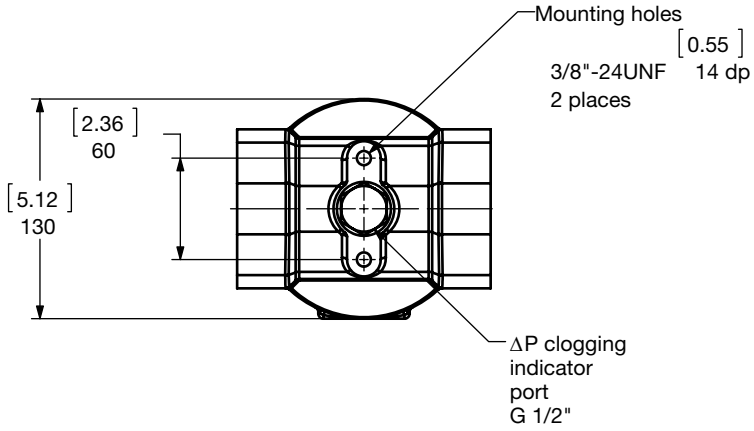
Underwriters Approval *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's approval

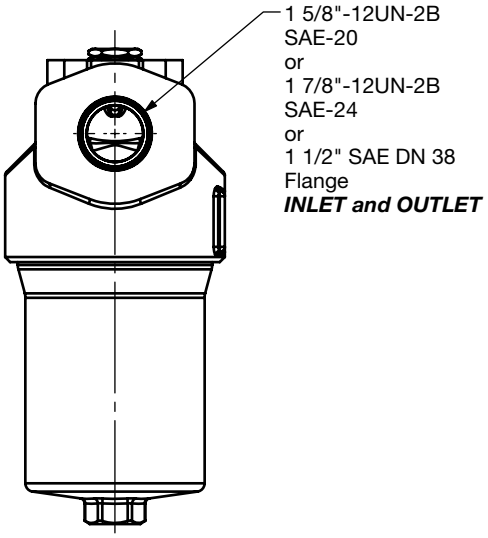
(For additional details and options, see Clogging Indicators section.)

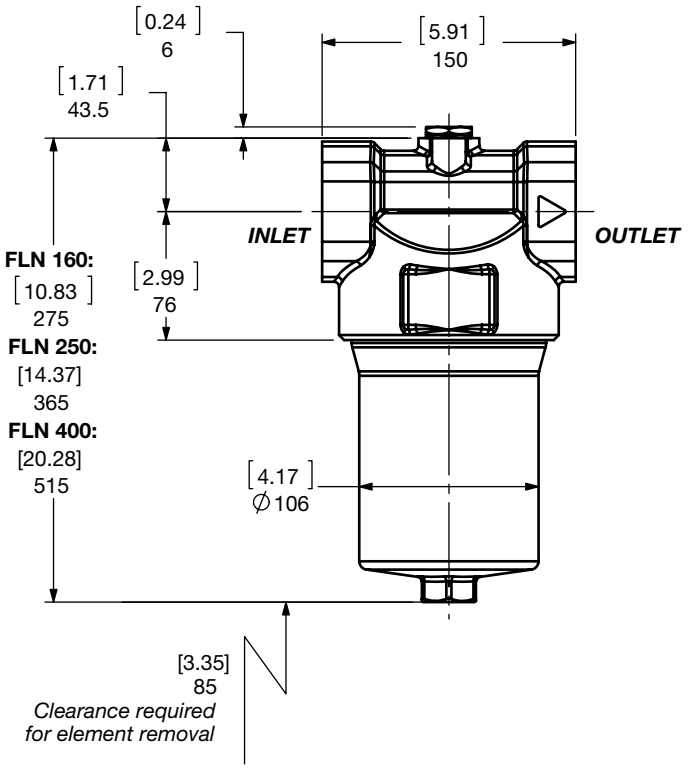
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

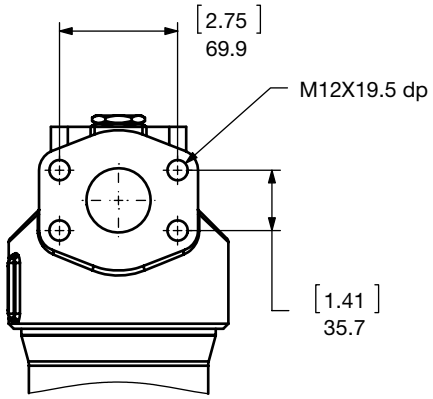
LOW PRESSURE FILTERS

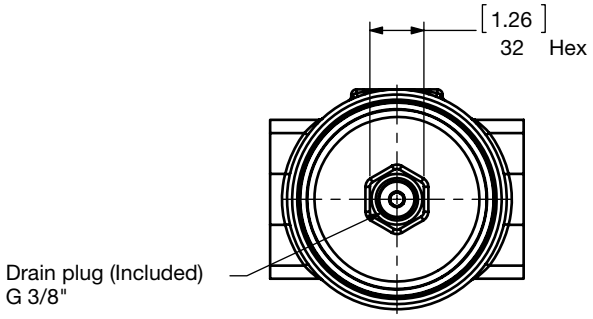
Dimensions
FLN 160 / 250 / 400











1 1/2" SAE DN 38 Flange

Size	160	250	400
Weight (lbs.)	9.5	10.9	13.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

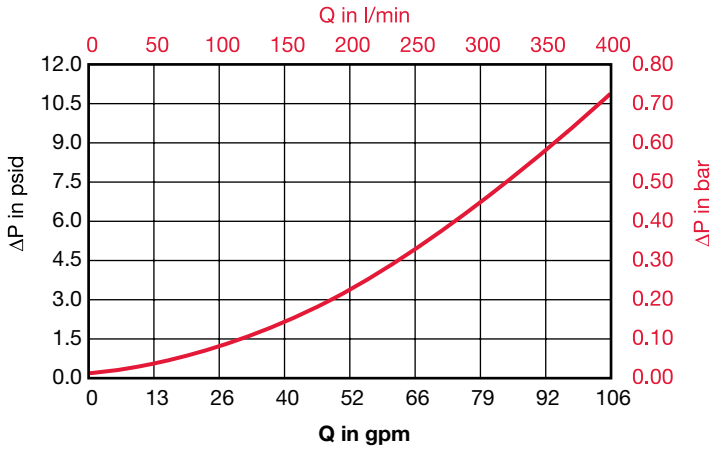
Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

FLN 160 / 250 / 400 Housing



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

BN4HC	...DN...BN4HC (Betamicron Low Collapse)			
Size	**3 µm**	**6 µm**	**10 µm**	**25 µm**
0160 DN XXX BN4HC	0.434	0.280	0.187	0.143
0250 DN XXX BN4HC	0.280	0.176	0.115	0.099
0400 DN XXX BN4HC	0.176	0.110	0.071	0.055

BH4HC	...DN...BH/HC (Betamicron High Collapse)			
Size	**3 µm**	**6 µm**	**10 µm**	**25 µm**
0160 DN XXX BH4HC	0.439	0.280	0.209	0.137
0250 DN XXX BH4HC	0.296	0.187	0.154	0.104
0400 DN XXX BH4HC	0.187	0.115	0.093	0.060

W/HC	...DN...W/HC (Betamicron Low Collapse)			
Size	**25 µm**	**50 µm**	**100 µm**	**200 µm**
0160 DN XXX W/HC	0.009	0.009	0.009	0.009
0250 DN XXX W/HC	0.006	0.006	0.006	0.006
0400 DN XXX W/HC	0.004	0.004	0.004	0.004

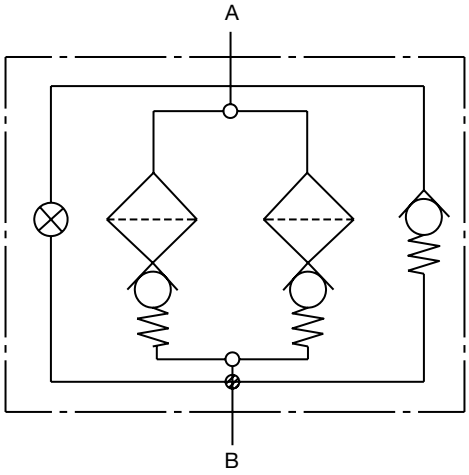
All Element K Factors in psi / gpm.

FLND Series

Inline Duplex Filters

360 psi • up to 100 gpm

Hydraulic Symbol



Features

- Lightweight duplex filter constructed of aluminum.
- Aluminum alloy is water tolerant - anodization is not required for high water based fluids (HWBF).
- The filter housings are designed to withstand pressure surges as well as high static pressure loads.
- The screw-in bowl allows the filter element to be easily removed for replacement or cleaning.
- A visual (pop-up), electrical, electrical/visual (lamp), or electronic differential type clogging indicator are possible.
- The standard model is supplied with vent and drain plugs, and also a connection for differential clogging indicator.
- The pressure is equalized between chambers by raising the change-over lever prior to switching it to the relevant filter side. Thus, the filter contains an integrated equalization valve.
- CRN Approval Available. *(Canadian Registration Number)*
- Bypass versions of FLND filters have the bypass valve located in the filter head.
- This filter can be modified to meet the requirements of DIN 24550* as follows:
  - Filter size 0160 with G 1-1/4" port selection
  - Filter size 0250 with G 1-1/2" port selection
  - Filter size 0400 with SAE-DN 38 1-1/2" Flange

*Note - QPD design does not meet DIN 24550.

Technical Specifications

Mounting Method	4 mounting holes - filter head
Port Connection	Inlet / Outlet 1-1/4" Threaded – SAE 20, 1-1/4" BSPP 1-1/2" Threaded – SAE 24, 1-1/2" BSPP 1-1/2" Flange-SAE-DN 38 Code 61
Flow Direction	Inlet: Side Outlet: Opposite Side
Construction Materials	
Head, Bowl	Aluminum
Flow Capacity	
160	42 gpm (160 lpm)
250	66 gpm (250 lpm)
400	105 gpm (400 lpm)
Housing Pressure Rating	
Max. Operating Pressure	360 psi (25 bar)
Fatigue Pressure	360 psi (25 bar)
Burst Pressure	1450 psi (100 bar)
Element Collapse Pressure Rating	
BN4HC, W/HC	290 psid (20 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14˚F (-10˚C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 36 psid (2.5 bar) -10% ΔP = 72 psid (5 bar) -10% ΔP = 116 psid (8 bar) -10% *(non-bypass)*	
Bypass Valve Cracking Pressure	
ΔP = 50.75 psid (3.5 bar) +10% ΔP = 102 psid (7 bar) +10%	

Applications

PN#02081318 / 07.19 / FIL1907-2109

Model Code

FLND BN/HC 250 D D F 10 B 1 . X / 12 - V - QPD - B3.5

Filter Type
FLND = Inline duplex filter

Element Media
BN/HC = Betamicron® *(Low Collapse)* W/HC = Wire Mesh

Size
160, 250, 400

Operating Pressure
D = 360 psi (25 bar)

Type of Change-Over
D = segment valve

Port Type / Size
E = 1-1/4" SAE or BSPP Threaded
F = 1-1/2" SAE or BSPP Threaded
K = 1-1/2" Flange-SAE-DN 38 Code 61 Flange

Filtration Rating *(micron)*
3, 6, 10, 25 = BN/HC 25, 50, 100, 200 = W/HC

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(latest version is always supplied)*

Port Configuration
(omit) = SAE DN Flange
0 = BSPP Threaded inlet/outlet
12 = SAE straight thread inlet/outlet

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Version
(omit) = meets DIN 24550
QPD = Quality Protection Design

Bypass Valve
(omit) = no bypass *(optional)*
B3.5 = 50.75 psid (3.5 bar) *(standard)*
B7 = 101.5 psid (7 bar) *(optional)*

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
RL = Flow Path reversed - Right inlet/Left outlet
EM = Air Bleed Valves
VKD = Drain Valves
CRN = CRN Approvel
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's approval
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids

Replacement Element Model Code

0250 DN 010 BN4HC / V QPD

Size
0160, 0250, 0400

Type
DN

Filtration Rating *(micron)*
3, 6, 10, 25 = BN4HC
25, 50, 100, 200 = W/HC

Element Media
BN4HC, W/HC

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Version
(omit) = meets DIN 24550
QPD = Quality Protection Design

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2.5 B . X / V

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2.5 = 36 psid (2.5 bar) *(optional)*
5 = 72 psid (5 bar)

Type of Indicator
A = no indicator, plugged port
B = pop-up indicator *(auto reset)*
BM = pop-up indicator *(manual reset)*
C = Electric switch – SPDT
D = Electric switch and light – SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only*
T100 = Lockout below 100°F

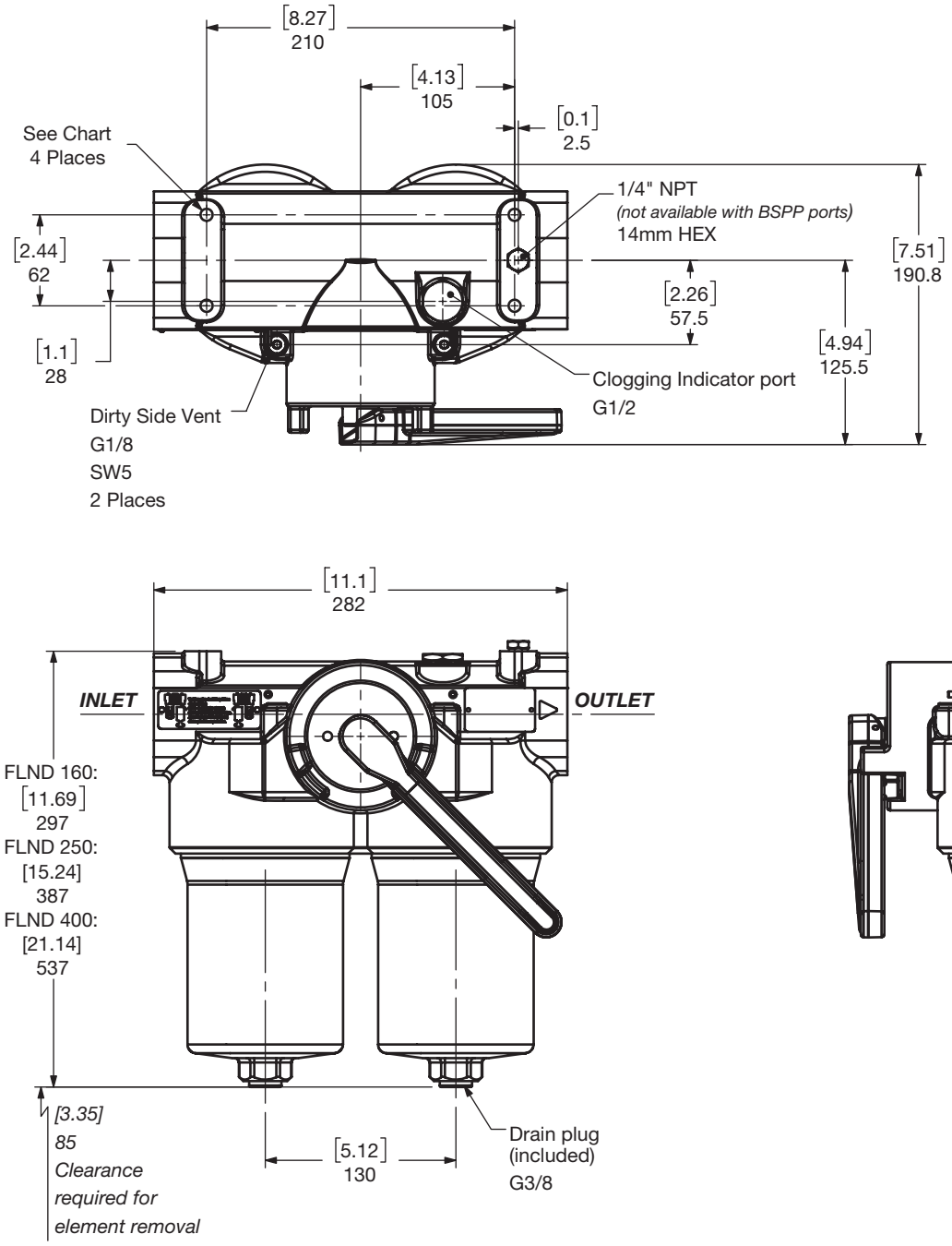
Underwriters Approval *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's approval

(For additional details and options, see Clogging Indicators section.)

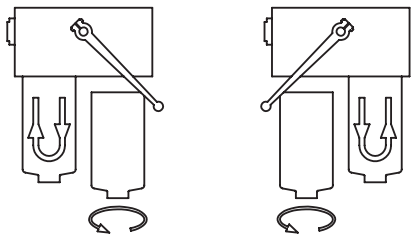
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

LOW PRESSURE FILTERS

Dimensions
FLND



Model	Mounting Hole
FLND160-400DDE	M10-1.5 x 19mm Deep
FLND160-400DDE/12	3/8-24UNF x 14mm Deep
FLND160-400DDF	M10-1.5 x 19mm Deep
FLND160-400DDF/12	3/8-24UNF x 14mm Deep
FLND160-400DDK	M10-1.5 x 19mm Deep



Before changing the element, relieve pressure in the filter housing.

Size	160	250	400
Weight (lbs.)	20.1	21.2	26.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

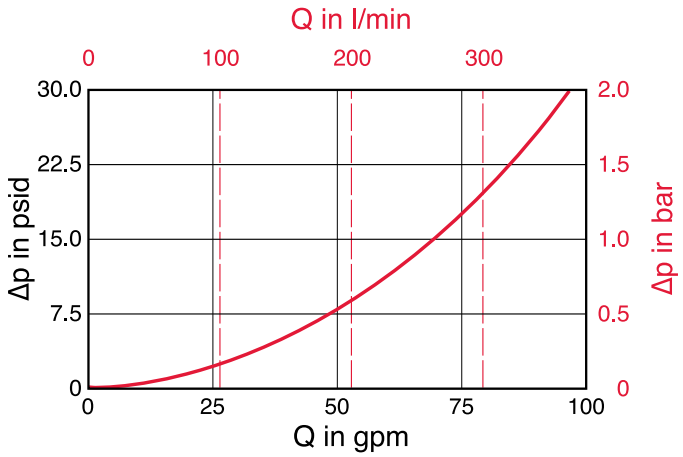
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

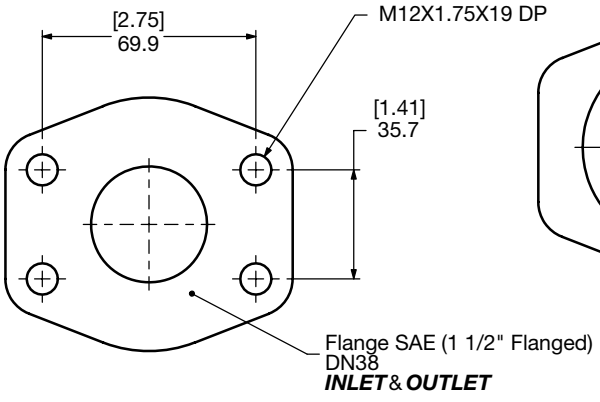
BN4HC	...DN...BN4HC (Betamicron Low Collapse)			
Size	3 µm	6 µm	10 µm	25 µm
0160 DN XXX BN4HC	0.434	0.280	0.187	0.143
0250 DN XXX BN4HC	0.280	0.176	0.115	0.099
0400 DN XXX BN4HC	0.176	0.110	0.071	0.055

W/HC	...DN...W/HC (Betamicron Low Collapse)			
Size	25 µm	50 µm	100 µm	200 µm
0160 DN XXX W/HC	0.009	0.009	0.009	0.009
0250 DN XXX W/HC	0.006	0.006	0.006	0.006
0400 DN XXX W/HC	0.004	0.004	0.004	0.004

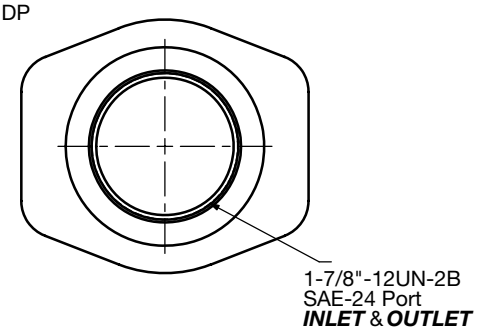
All Element K Factors in psi / gpm.

FLND 160/250/400

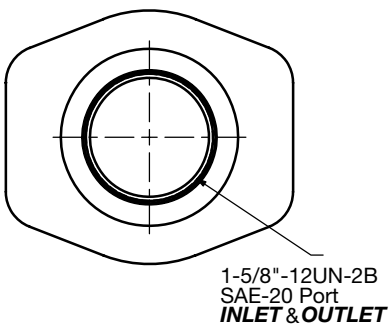
FLND 160/250/400 DDK



FLND 160/250/400 DDF



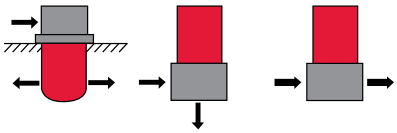
FLND 160/250/400 DDE



NF Series

In-Tank / Inline Filters

360 psi • up to 450 gpm (4” piping)
up to 1350 gpm (6” piping)



1.0 Version

2.0 Version

1350 / 2650

Features

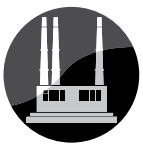
- NF Filters have an extremely large filtration area and flow capacity of 450 gpm *(4” pipe size limitation)*
- NF Filters can be configured for in-tank or in-line applications
- Vent and drain ports are standard
- Aluminum alloy is water tolerant - anodizing is not required for high water based fluids (HWBF)
- Screw-on lid provides easy access to filter element for replacement
- Reusable contamination basket prevents re-entry of retained contaminants into the reservoir during element replacement *(1.0 Version only)*
- Filters can be fitted with clogging indicators to monitor the contamination level of the element
- Flange connection bolts included for all SAE-DIN flange ports

Note: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications

Agricultural

Gearboxes



Industrial

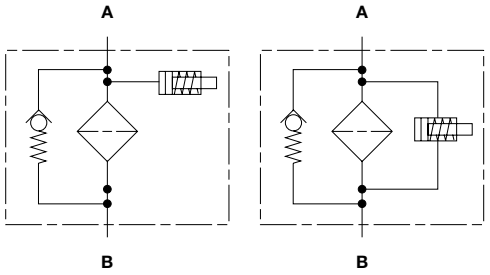
Power Generation

Pulp & Paper

Shipbuilding

Steel / Heavy Industry

Hydraulic Symbol



1.0 Version 2.0 Version

Technical Specifications

Mounting Method	See drawings	
Port Connection		
330 / 500 / 750	SAE DN 38 (1 1/2”) Code 61	
1310 / 2610 1340 / 2640	4” SAE DN 102 Flange Code 61 *(with M16 bolts included) - other options available*	
1350 / 2650	SAE DN 51 (2”) Code 61 SAE DN (2 1/2”) Code 61 SAE DN 76 (3”) Code 61	
Flow Direction		
1.0 version	Inlet: Side	Outlet: Bottom
2.0 version	Inlet: Side	Outlet: Bottom
1350 / 2650	Inlet: Side	Outlet: Side
Construction Materials		
Head, Housing, Lid	Aluminum	
Elbows, Manifolds	Ductile Iron	
Flow Capacity	4” Headers	
330	80 gpm (303 lpm)	
500	132 gpm (500 lpm)	
750	200 gpm (757 lpm)	
1310, 1340, 1350	343 gpm (1300 lpm)	
2610, 2640, 2650, 5240, 7840, 10440	450 gpm (1700 lpm)	
	6” Headers	
5210..D7/D8	900 gpm (3407 lpm)	
7810.. D7/D8	1350 gpm (5110 lpm)	
10410.. D7/D8	1350 gpm (5110 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	360 psi (25 bar)	
Fatigue Pressure	360 psi (25 bar)	
Burst Pressure	1754 psi (121 bar)	
Element Collapse Pressure Rating		
ON, W/HC	290 psid (20 bar)	
ECON2, BN4AM, P/HC, AM	145 psid (10 bar)	
V	435 psid (30 bar)	
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications below -22˚F (-30˚C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10%	1.0 - Static	
ΔP = 72 psid (5 bar) -10%	2.0 - Differential	
Bypass Valve Cracking Pressure		
ΔP = 14.5 psid (1 bar) +10%		
ΔP = 43 psid (3 bar) +10% *(standard)*		
ΔP = 87 psid (6 bar) +10%		

*Note: All NF…1.0 Filters MAWP reduce to 7 bar (101.5 psi) when using the following “VMF” and “VR” indicators: B, BM, E, ES, GC, LE, LZ.

PN#02081318 / 09.22 / FIL1907-2109

Model Code

NF ON 1310 D P 3 BM 1.0 / A V

Filter Type
NF = In-Tank Return Line Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Mesh
V = Metal Fiber
BN/AM = Betamicron®/Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Size
330, 500, 750, 1310, 1340, 1350, 2610, 2640, 2650, 5240, 7840, 10440

Operating Pressure
D = 360 psi (25 bar)
V = 101.5 psi (7 bar) *(When using the following "VR" indicators: B, BM, E, ES, GC, LE, LZ - 1.0 Ver.)*

Type of Connection
P = SAE DN 102 (4") Code 61 flange
K = SAE DN 38 (1 1/2") Code 61 flange *(330/500/750 only)*
7 = 6" ANSI CS 300lb. flange
L = SAE DN 51 (2") Code 61 flange
M = SAE DN 64 (2 1/2") Code 61 flange
N = SAE DN 76 (3") Code 61 flange
(1350/2650 only)

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
10, 20 = P/HC
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
3, 10 = BN4AM
3, 5, 10, 20 = V
40 = AM

Type of Static or ΔP Clogging Indicator
A, B, BM, C, D, LE *(Others available upon request, see Clogging Indicators section.)*

Type Number / Modification Number
1.0 = In-Tank Filter - Static indicator *(1310/2610 only)*
2.0 = Inline Filter - ΔP indicator

Flow Path *(facing Inlet manifold headers)*
(omit) = Sizes 330, 500, 750, 1310 and 2610 only
A = Left inlet, Left outlet
B = Right inlet, Right outlet
(sizes 5240 - 10440 only)
C = Left inlet, Right outlet
D = Right inlet, Left outlet
(sizes 5240 - 10440 only)

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
EM = Manual vent valve set
VKD = Drain manifold
W = Modification of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation
QPG5 = Quality-Protected Design (sizes 1310-10410)

Replacement Element Model Code

1300 R 003 ON / V

Size
330, 500, 750,
1300 - for housings: 1310, 1340, 1350
2600 - for housings: 2610, 2640, 2650, 5240, 7840, 10440

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 10 = BN4AM
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = ECON2
40 = AM
10, 20 = P/HC
3, 5, 10, 20 = V

Element Media
ON, ECON2, BN4AM, AM, P/HC, W/HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)
KB = no bypass

Supplementary Details
SO263 = *(same as above)*
W = *(same as above)*
SFREE = *(same as above)*
QPG5 = Quality-Protected Design (sizes 1300-2600)

Clogging Indicator Model Code

VR 2 BM . X / V

Indicator Prefix
VR = Static Pressure, G 1/2" *(1.0 ver.)*
VM = ΔP G 1/2" 3000 psi *(2.0 ver.)*
VD = ΔP G 1/2" 6000 psi *(2.0 ver. - LE Indicators only)*

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset - static only)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
LE = Electric switch and pop-up

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

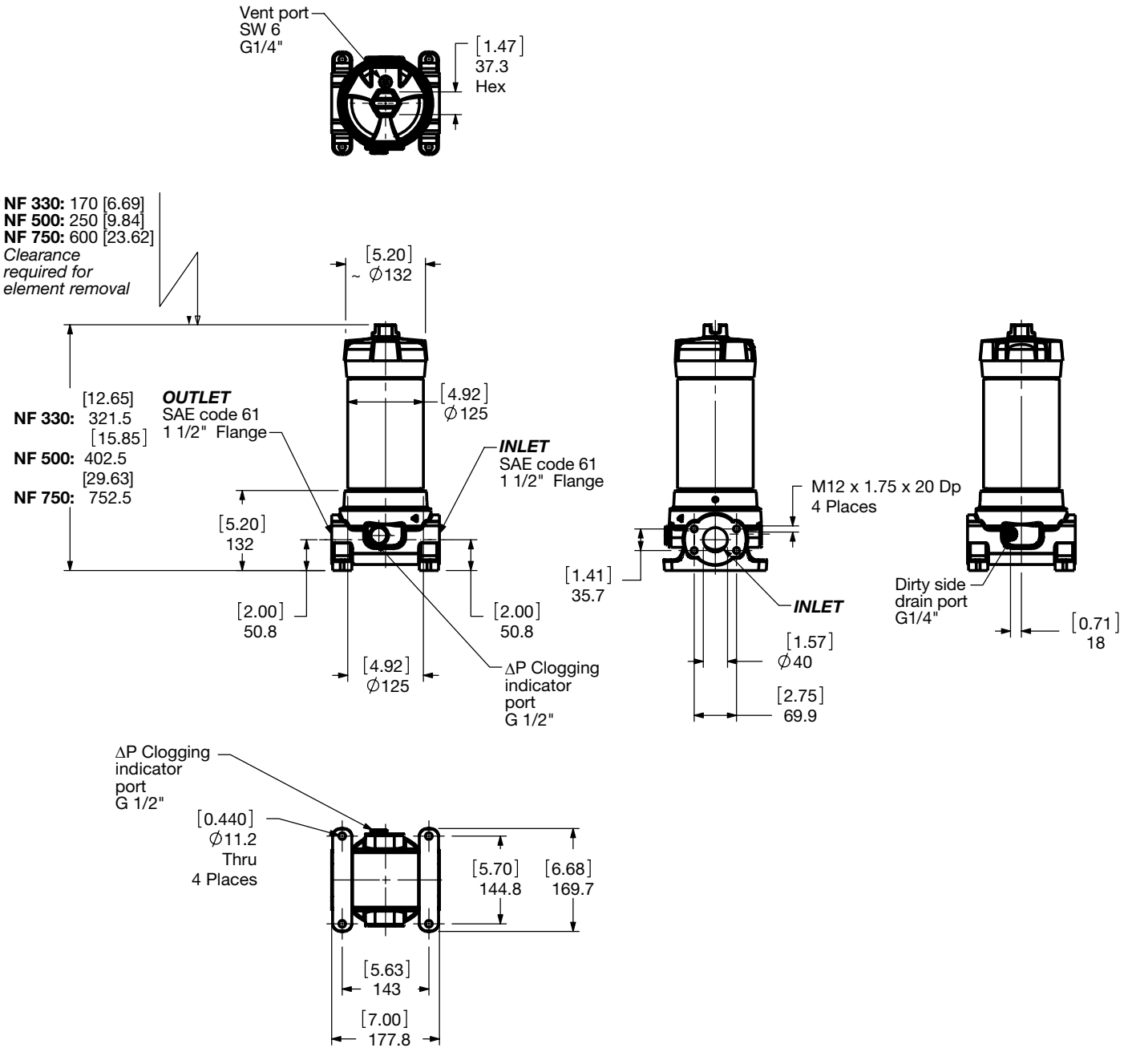
Light Voltage *(D type indicators only)*
L24 = 24V
L110 = 110V

W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators Section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
NF 330 - 750 2.0 Version (In-line)



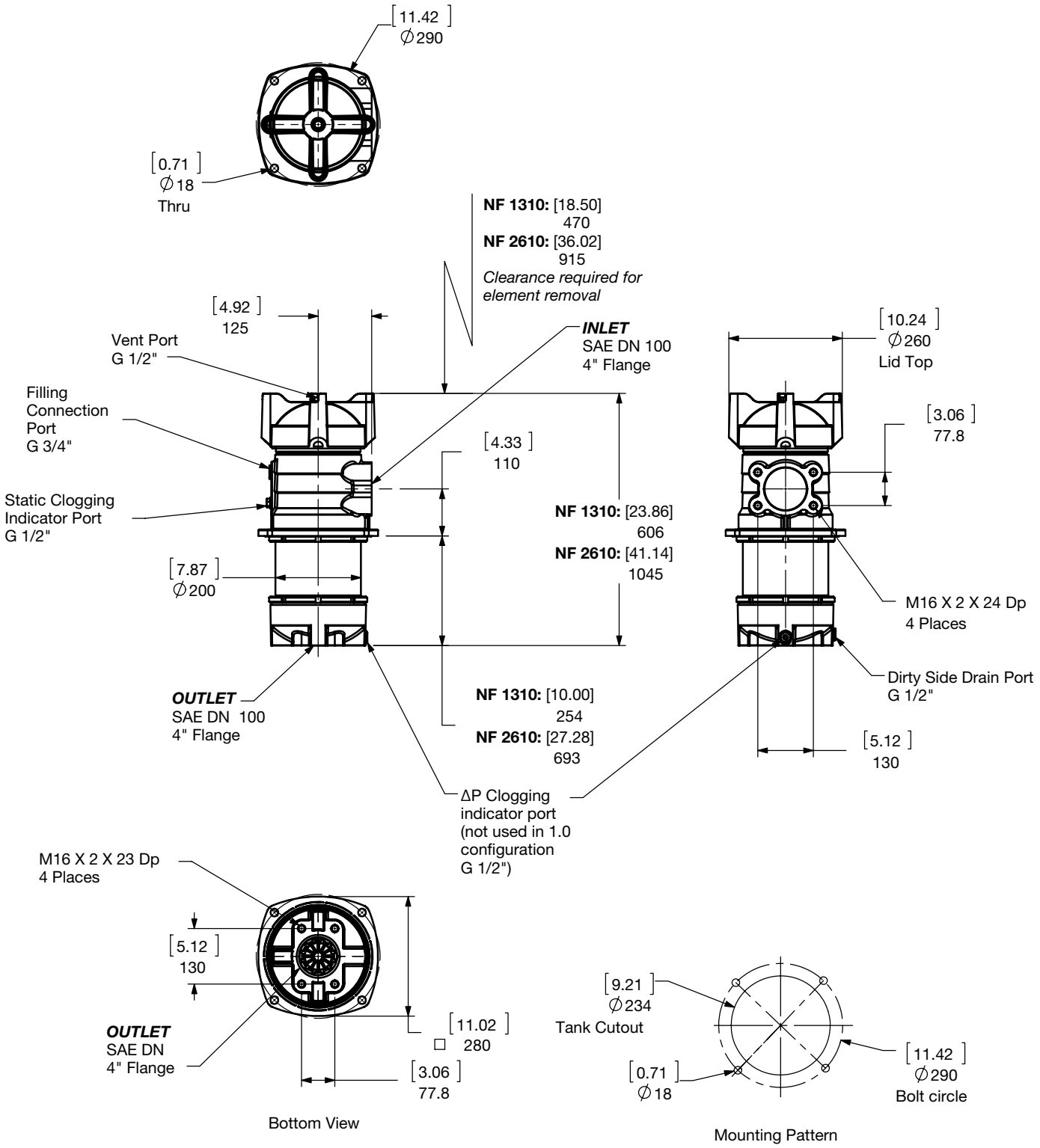
Bottom View

Mounting Pattern

Size	330	500	750
Weight (lbs.)	17.2	19.9	31.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 1310 / 2610 1.0 Version (In-Tank)

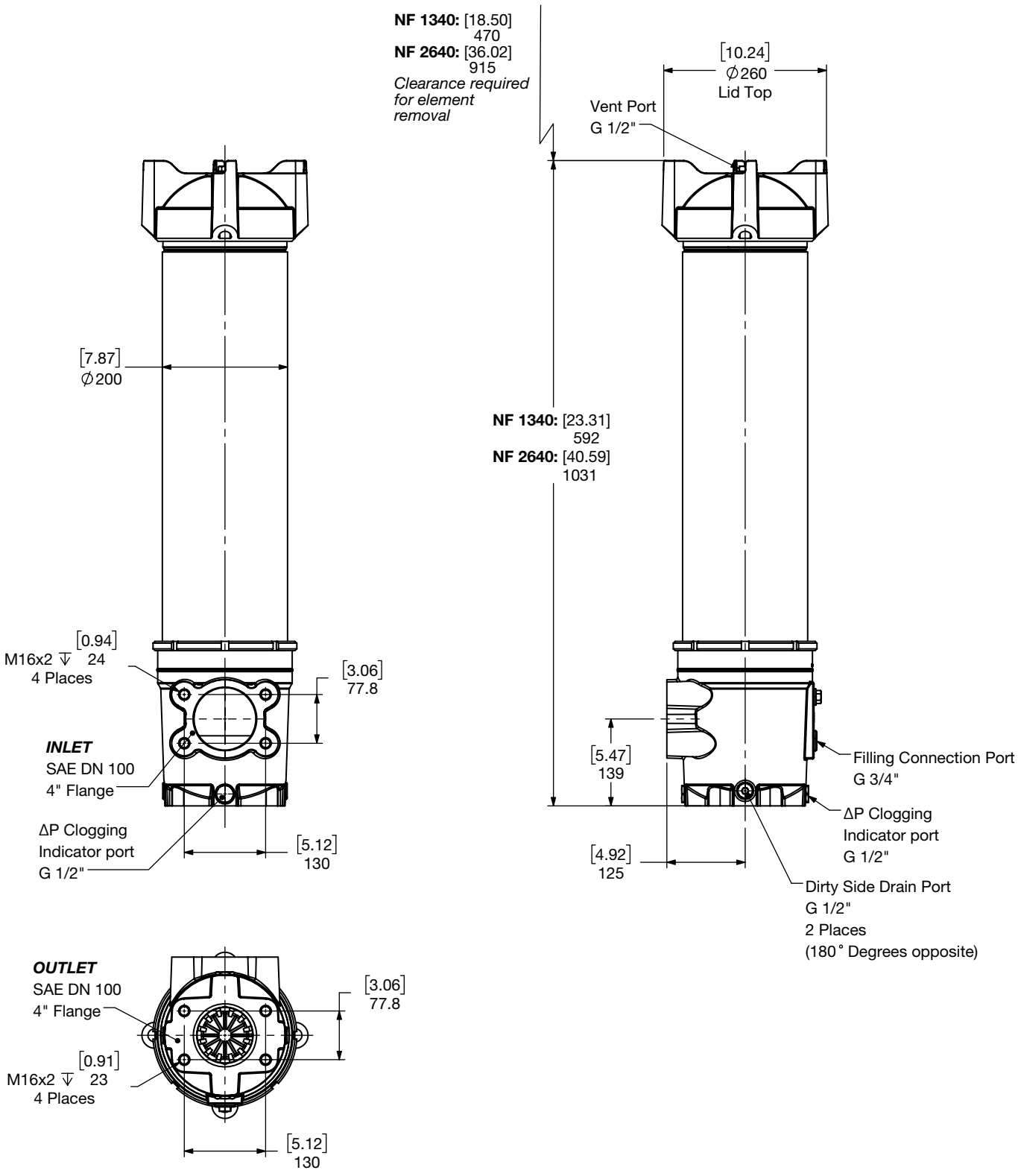


Size	1310	2610
Weight (lbs.)	37.5	50.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

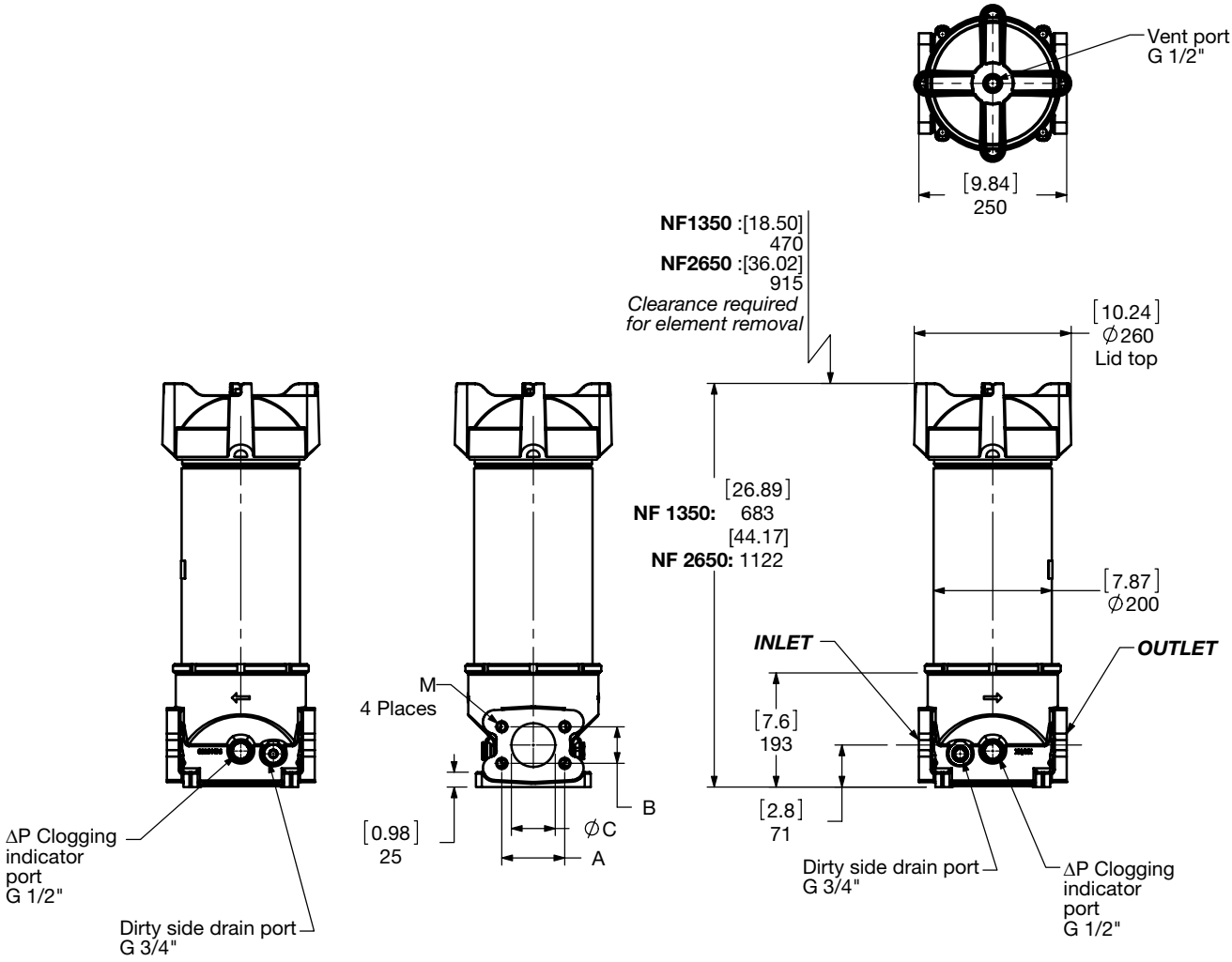
Dimensions:
NF 1340 / 2640 2.0 Version (In-line)



Size	1340	2640
Weight (lbs.)	37.5	50.7

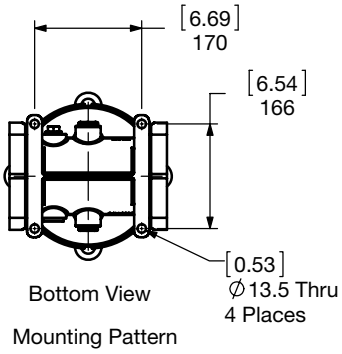
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 1350 / 2650 2.0 Version



Port Connections

Flange	A	B	øC	M
2” SAE-DN 50	77.8	42.9	50	M12 x 1.75 x 19 DP
2 1/2” SAE-DN 65	88.9	50.8	65	M12 x 1.75 x 19 DP
3” SAE-DN 80	106.4	62.9	75	M16 x 2.0 x 24 DP
4” SAE-DN 100	130.2	77.8	100	M16 x 2.0 thru

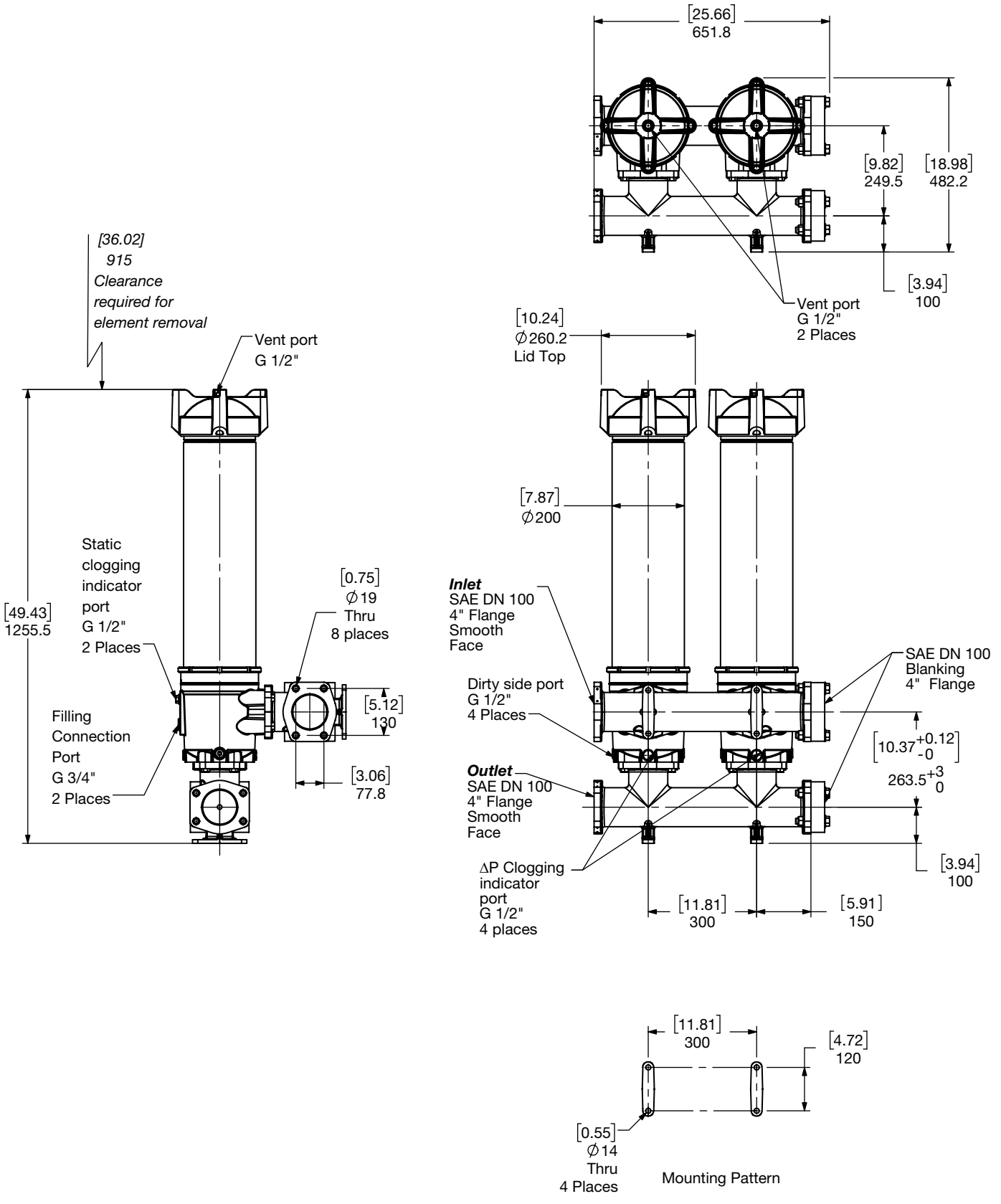


Size	1350	2650
Weight (lbs.)	39.7	55.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

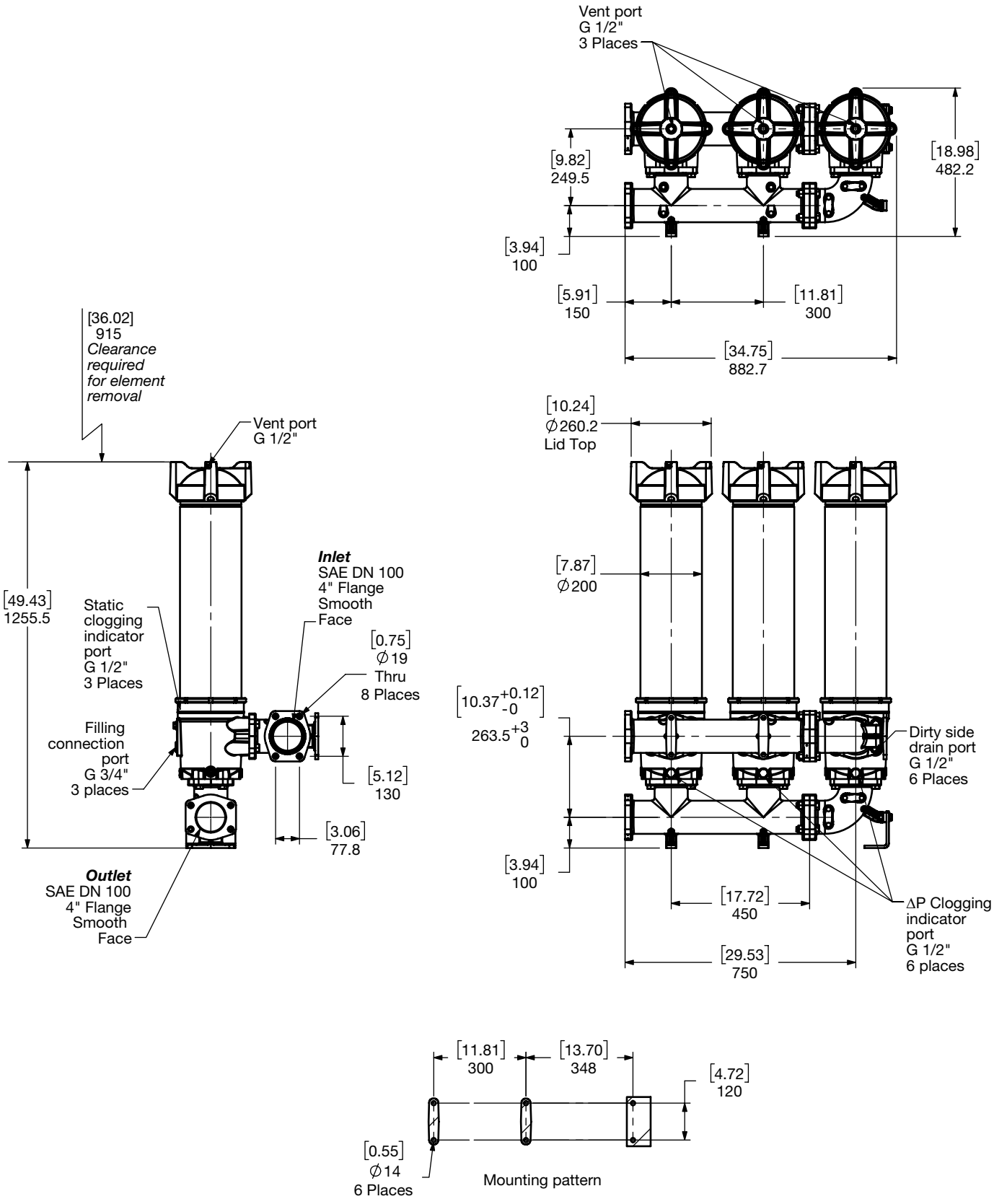
Dimensions:
NF 5240 2.0 Version



Size	5240
Weight (lbs.)	198.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 7840 2.0 Version

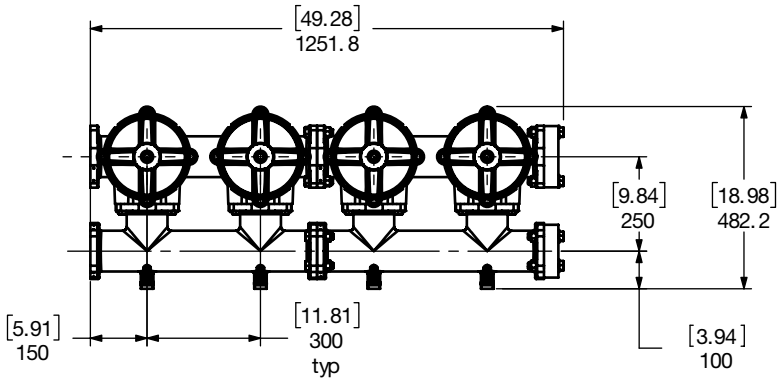


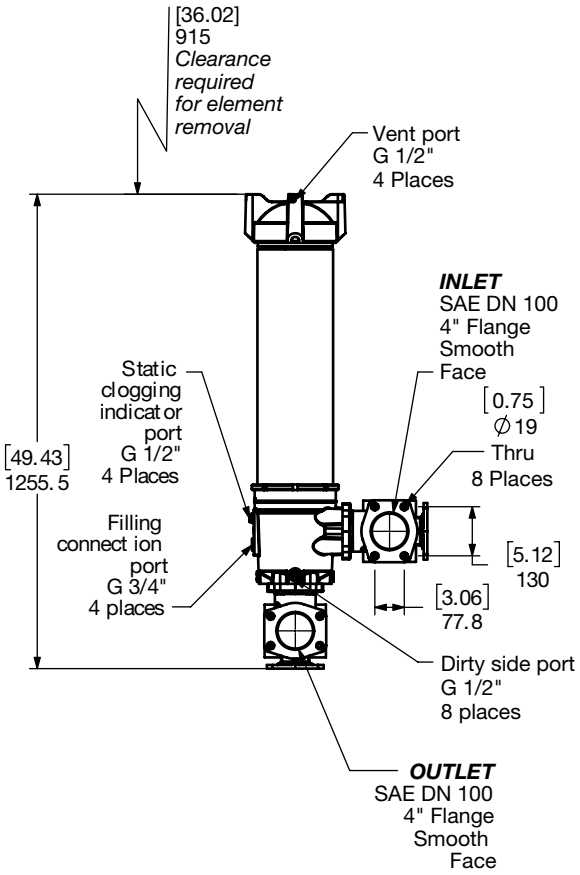
Size	7840
Weight (lbs.)	275.6

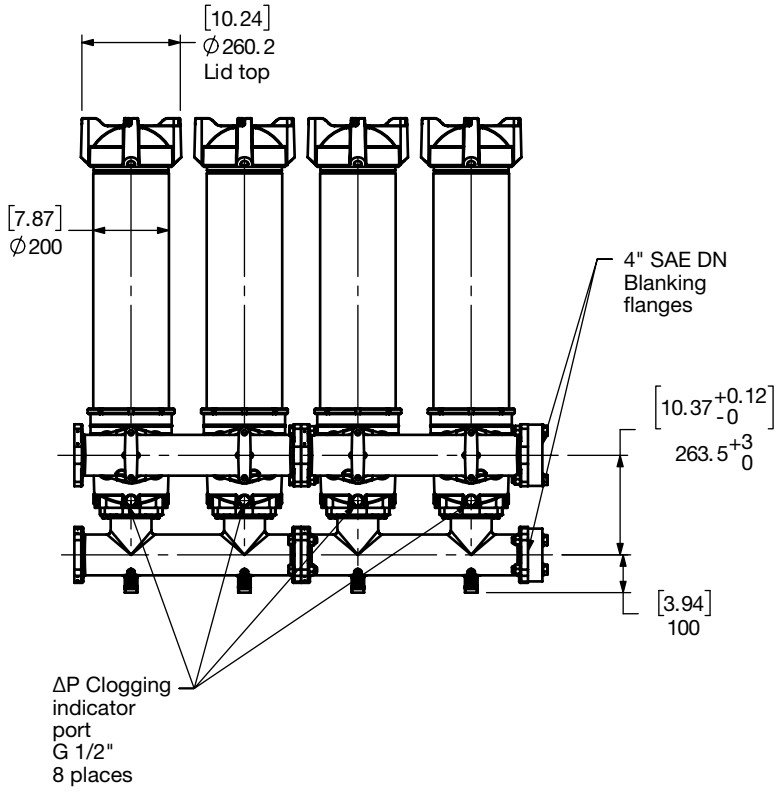
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

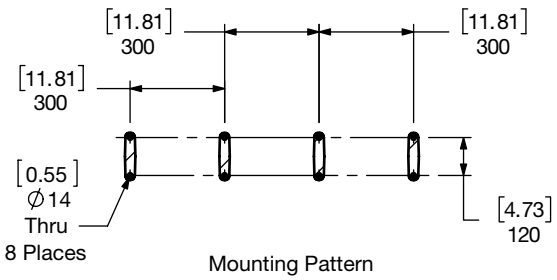
LOW PRESSURE FILTERS

Dimensions:
NF 10440 2.0 Version







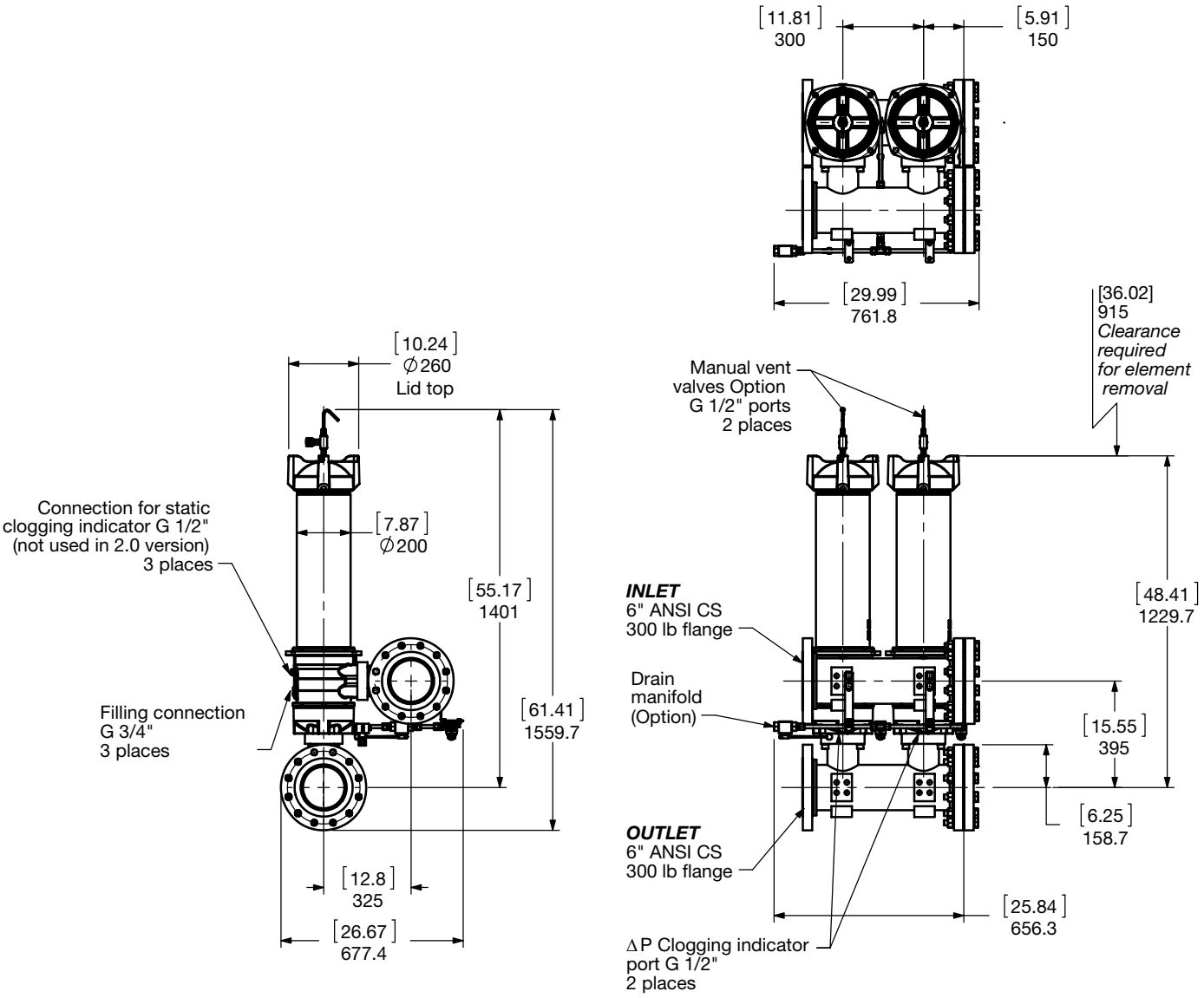


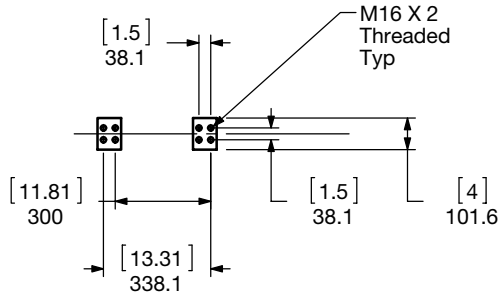
Mounting Pattern

Size	10440
Weight (lbs.)	397

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 5210DC7XX2.0/A EM-VKD (Modular Parallel High Flow)



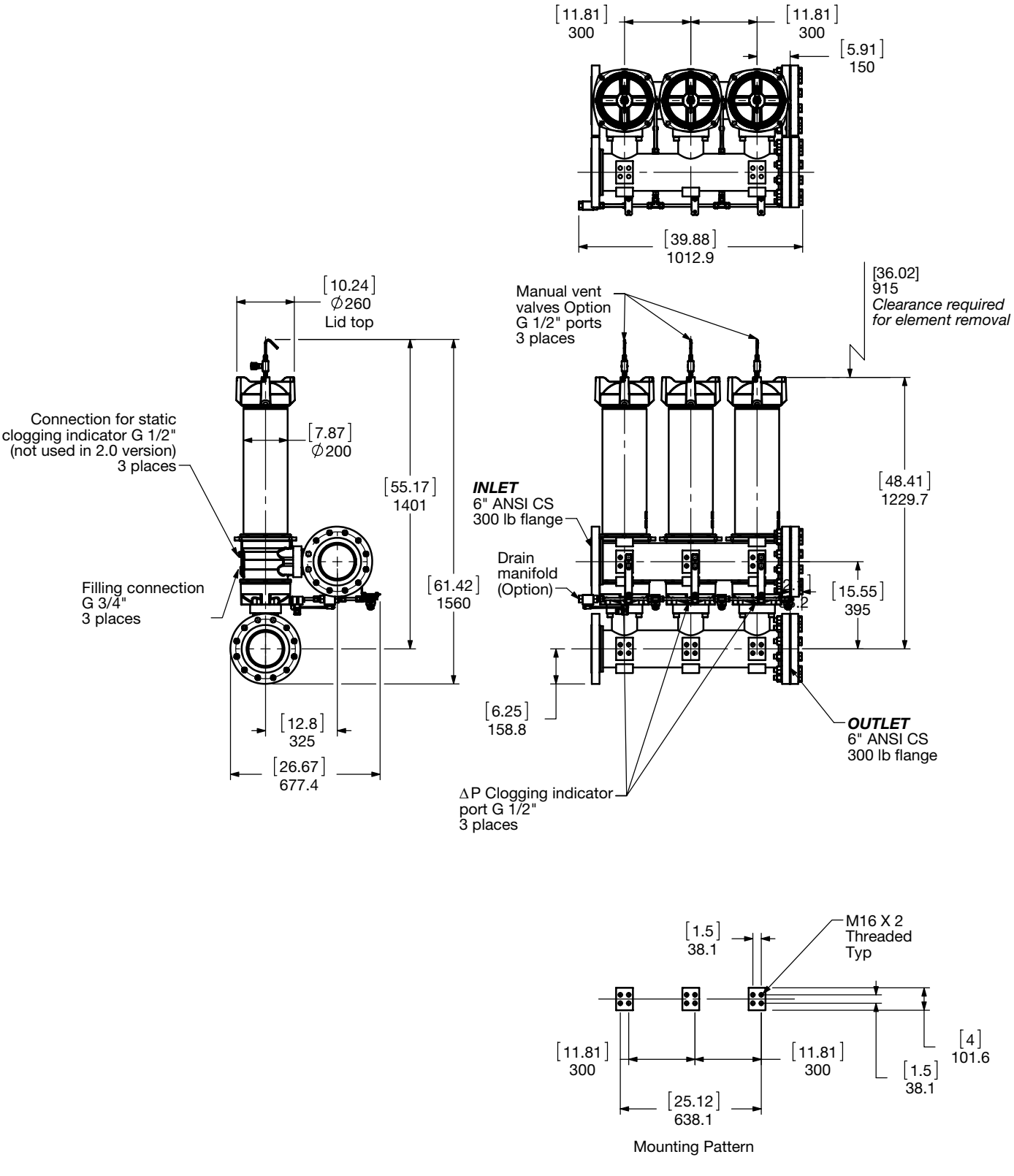


Mounting Pattern

Size	5210DC7XX2.0/A EM-VKD
Weight (lbs.)	485

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
NF 7810DC7XX2.0/A EM-VKD (Modular Parallel High Flow)



Mounting Pattern

Size	7810DC7XX2.0/C EM-VKD
Weight (lbs.)	520

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

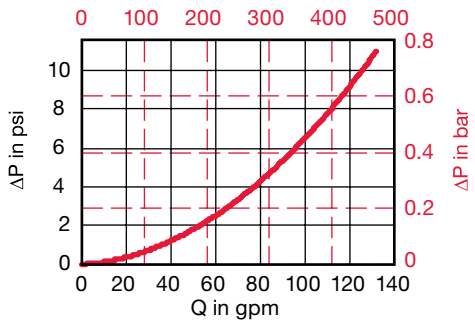
Housing Curve:

Pressure loss through housing is as follows:

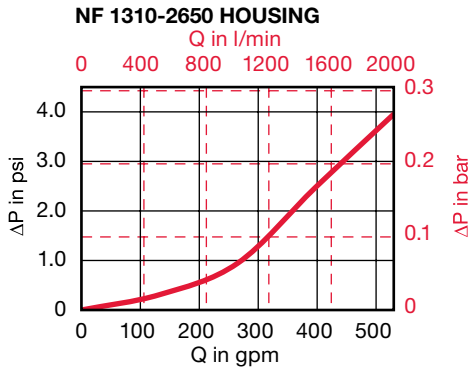
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

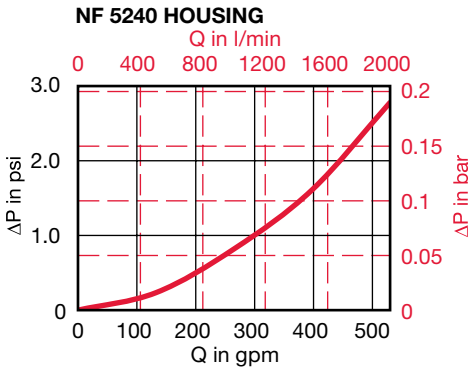
NF 330/500/750 HOUSING



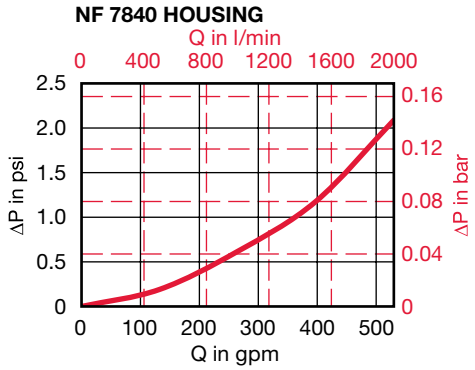
NF 1310-2650 HOUSING



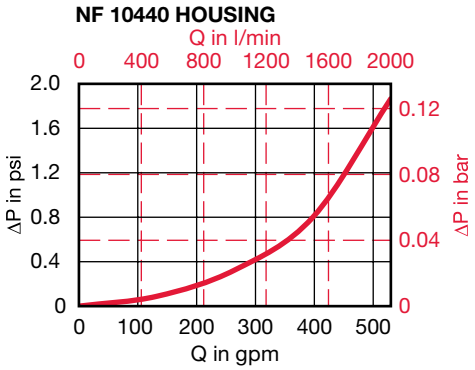
NF 5240 HOUSING



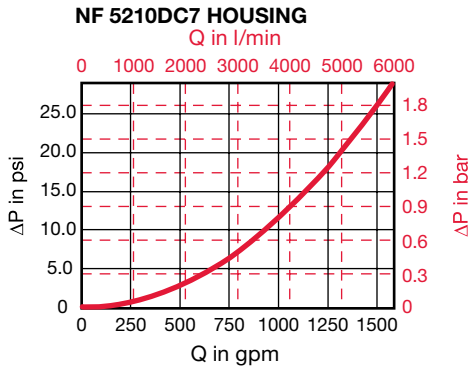
NF 7840 HOUSING



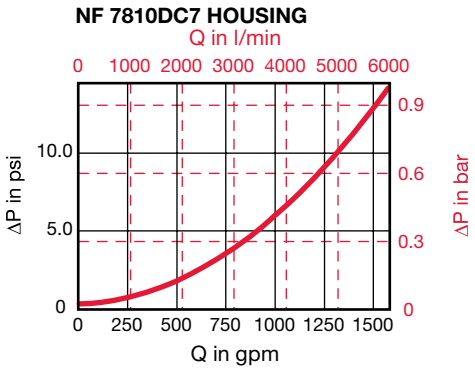
NF 10440 HOUSING



NF 5210DC7 HOUSING



NF 7810DC7 HOUSING



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0330 R XXX ON	0.444	0.204	0.15	0.081	0.07	0.056
0500 R XXX ON	0.289	0.143	0.104	0.06	0.046	0.038
0750 R XXX ON	0.116	0.061	0.05	0.029	0.019	0.018
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0330 R XXX ECON2	0.230	0.148	0.093	0.066
0500 R XXX ECON2	0.165	0.104	0.071	0.044
0750 R XXX ECON2	0.071	0.049	0.033	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0330 R XXX BN4AM	0.477	0.165
0500 R XXX BN4AM	0.313	0.11
0750 R XXX BN4AM	0.126	0.044
1300 R XXX BN4AM	0.088	0.033
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
0330 R 040 AM	0.115
0500 R 040 AM	0.076
0750 R 040 AM	0.030
1300 R 040 AM	0.026
2600 R 040 AM	0.013

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
0330 R XXX W/HC	0.011
0500 R XXX W/HC	0.007
0750 R XXX W/HC	0.003
1300 R XXX W/HC	0.002
2600 R XXX W/HC	0.001

Polyester	...R...P/HC	
Size	10 µm	20 µm
0330 R XXX P/HC	0.016	0.008
0500 R XXX P/HC	0.011	0.005
0750 R XXX P/HC	0.004	0.002
1300 R XXX P/HC	0.004	0.002
2600 R XXX P/HC	0.002	0.001

All Element K Factors in psi / gpm.

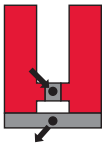
Notes

Type	Port	Filter Size											
		330	500	750	1310	1340	1350	2610	2640	2650	5240	7840	10440
K	SAE DN 38 (1 1/2") Code 61	X	X	X									
L	SAE DN 51 (2") Code 61 flange						X			X			
M	SAE DN 64 (2 1/2") Code 61 flange						X			X			
N	SAE DN 76 (3") Code 61 flange						X			X			
P	SAE DN 102 (4") Code 61 flange				X	X	X	X	X	X	X	X	X
7	6" ANSI CS 300 lb flange										X	X	

NFD Series

Inline Duplex Filters

360 psi • up to 450 gpm



(2.0)

Version 2.0 pictured

Features

- NFD Filters have an extremely large filtration area and flow capacity of 450 gpm *(4" pipe size limitation)*.
- Vent and drain ports are standard
- Aluminum alloy is water tolerant - anodization is not required for high water based fluids (HWBF)
- Screw-on lid provides easy access to filter element for replacement
- Filters can be fitted with clogging indicators to monitor the contamination level of the element
- NFD duplex filters have a ball-type diverter valve to provide continuous filtration and eliminate the need to shut-down the system during element changeout
- Flange connection bolts included for all SAE-DIN flange ports

Note: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications

Agricultural

Automotive

Construction

Gearboxes

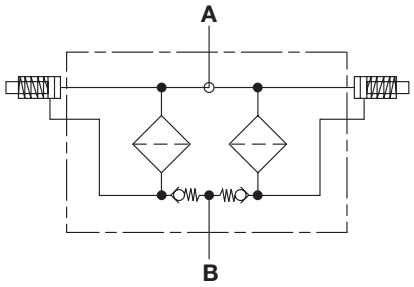
Industrial

Offshore

Power Generation

Pulp & Paper

Hydraulic Symbol



Version 2.0

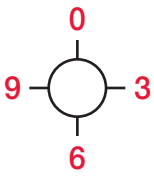
Inlet / Outlet Port Location Configurator

NFD1340/2640 2.X Inlet/Outlet Available Configurations

	03		09
	(33)		39
	93		99

NFD5240/7840/10440 2.X Inlet/Outlet Available Configurations

00	03		09
30	(33)		39
60			69
	93		99



0 = Pointed to Top
3 = Pointed to Front
6 = Pointed to Bottom
9 = Pointed to Back

(33)= Stand Configuration *(not given as supplementary details)*

First Number = Inlet Orientation
Second Number = Outlet Orientation

Technical Specifications

Mounting Method	See drawings	
Port Connection	SAE DN 102 Flange Code 61	
Flow Direction		
2.0 version	Inlet: Side	Outlet: Side
Construction Materials		
Head, Housing, Lid	Aluminum	
Elbows, Manifolds	Ductile Iron	
Flow Capacity		
1340	343 gpm (1300 lpm)	
2640, 5240, 7840, 10440	450 gpm (1700 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	360 psi (25 bar)	
Fatigue Pressure	360 psi (25 bar)	
Burst Pressure	Contact HYDAC office	
Element Collapse Pressure Rating		
ON, W/HC	290 psid (20 bar)	
ECON2, BN4AM, P/HC, AM	145 psid (10 bar)	
V	435 psid (30 bar)	
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications below -22°F (-30°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10%	2.X - Differential	
ΔP = 72 psid (5 bar) -10%		
Bypass Valve Cracking Pressure		
ΔP = 14.5 psid (1 bar) +10%		
ΔP = 43 psid (3 bar) +10% *(standard)*		
ΔP = 87 psid (6 bar) +10%		

*Note: All NFD…1.0 Filters MAWP reduce to 7 bar (101.5 psi) when using the following "VMF" and "VR" indicators: B, BM, E, ES, GC, LE, LZ.

Model Code

NFD ON 1340 D A P 3 B 1.X /

Filter Type
NFD = Duplex In-Tank Return Line Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Mesh
V = Metal Fiber
BN/AM = Betamicron®/Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Size
1340, 2640, 5240, 7840, 10440

Operating Pressure
D = 360 psi (25 bar)
V = 101.5 psi (7 bar) (When using the following "VR" indicators: B, BM, E, ES, GC, LE, LZ)

Type of Change Over
A = Ball valve

Type of Connection
P = SAE DN 102 (4") Code 61 flange

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
25, 50, 100, 200 = W/HC
3, 10 = BN/AM
10, 20 = P/HC
3, 5, 10, 20 = ECON2
3, 5, 10, 20 = V
40 = AM

Type of Static *(1.X Configuration) or ΔP (2.X Configuration)* **Clogging Indicator**
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number / Modification Number
2.X = Inline Filter - ΔP Indicator

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
LED = 2 light emitting diodes for up to 24V DC
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SB = Equalization valve set
EM = Manual vent valve set
VKD = Drain manifold
W = Modification of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation
QPG5 = Quality-Protected Design *(sizes 1340-10440)*

Flow Path
00, 03, 09, 30, 39, 60, 69, 93, 99
(omit) = 33 - Front Inlet/Front Outlet *(standard)*
Note: See previous page of "Inlet / Outlet Port Configurator" for flow path positions.

Replacement Element Model Code

1300 R 003 ON / V

Size
1300 - for housings: 1340
2600 - for housings: 2640, 5240, 7840, 10440

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
10, 20 = P/HC
3, 10 = BN4AM
40 = AM
3, 5, 10, 20 = V

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC, V

Seals
(omit) = standard - Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B6 = 87 psid (6 bar)
B1 = 14.5 psid (1 bar)
KB = no bypass

Supplementary Details
SO263 = *(same as above)*
W = *(same as above)*
SFREE = *(same as above)*
QPG5 = Quality-Protected Design (sizes 1340-2640)
Note: Element contamination retainer = P/N 01204141

Clogging Indicator Model Code

VM 2 B . X /

Indicator Prefix
VM = ΔP Indicators *(2.X version)*

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset - static only - 1.0)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

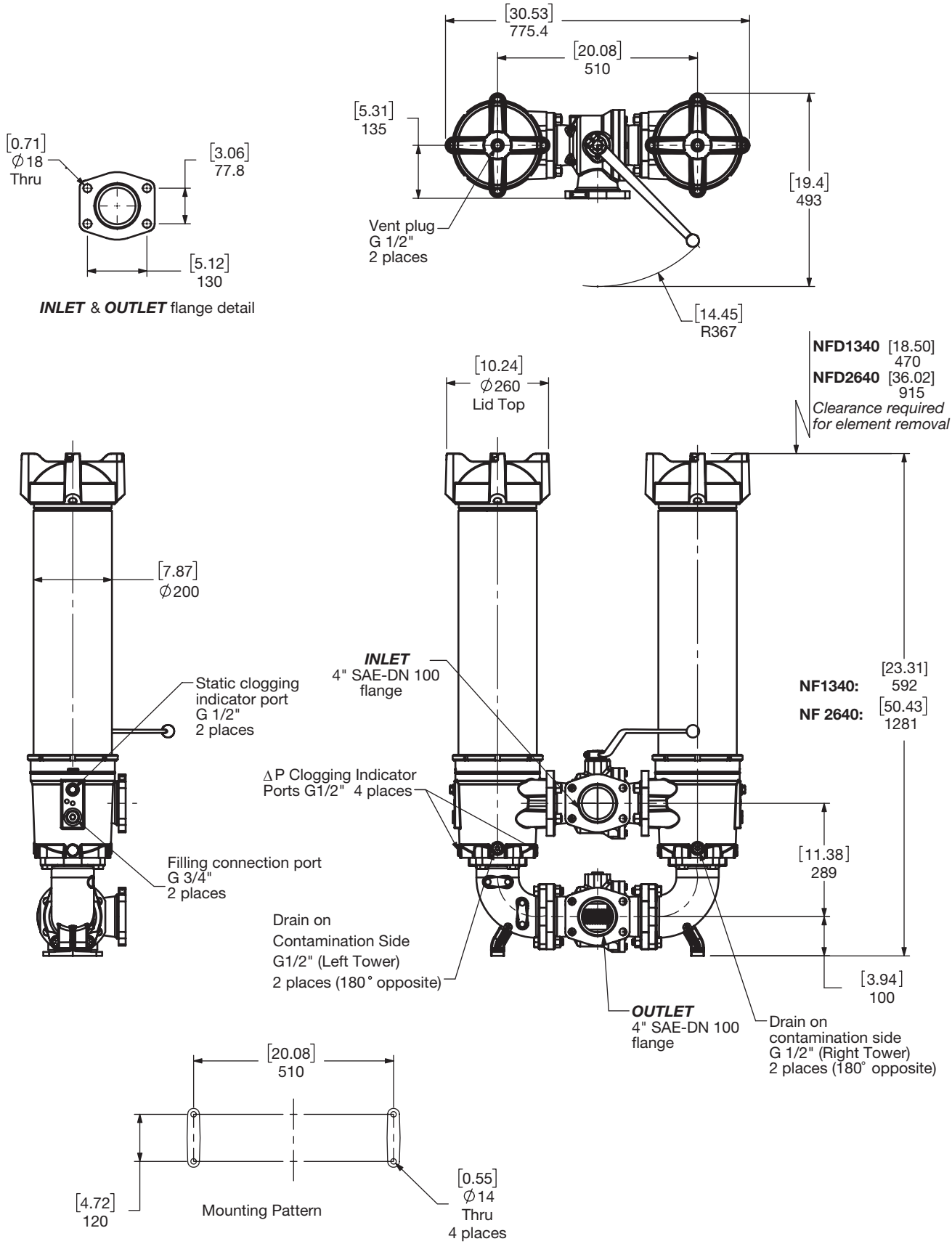
Modification Number

Supplementary Details
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)
Light Voltage *(D type indicators only)*
L24 = 24V
L48 = 48V
L110 = 110V
L220 = 220V
(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

LOW PRESSURE FILTERS

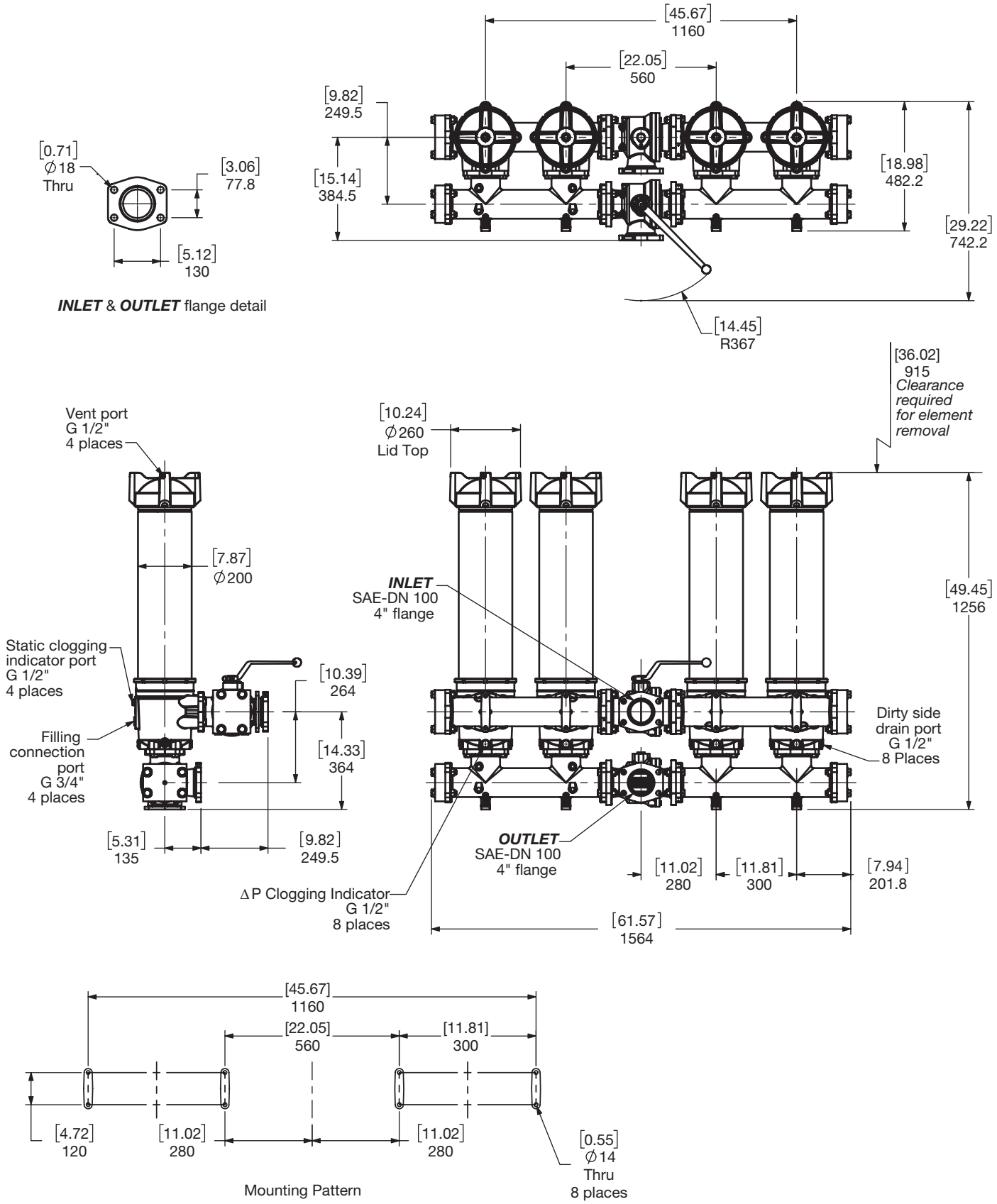
Dimensions
NFD 1340 / 2640 – 2.0 Version



Size	1340 Version 2.0	2640 Version 2.0
Weight (lbs)	187.6	220.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NFD 5240 – 2.0 Version

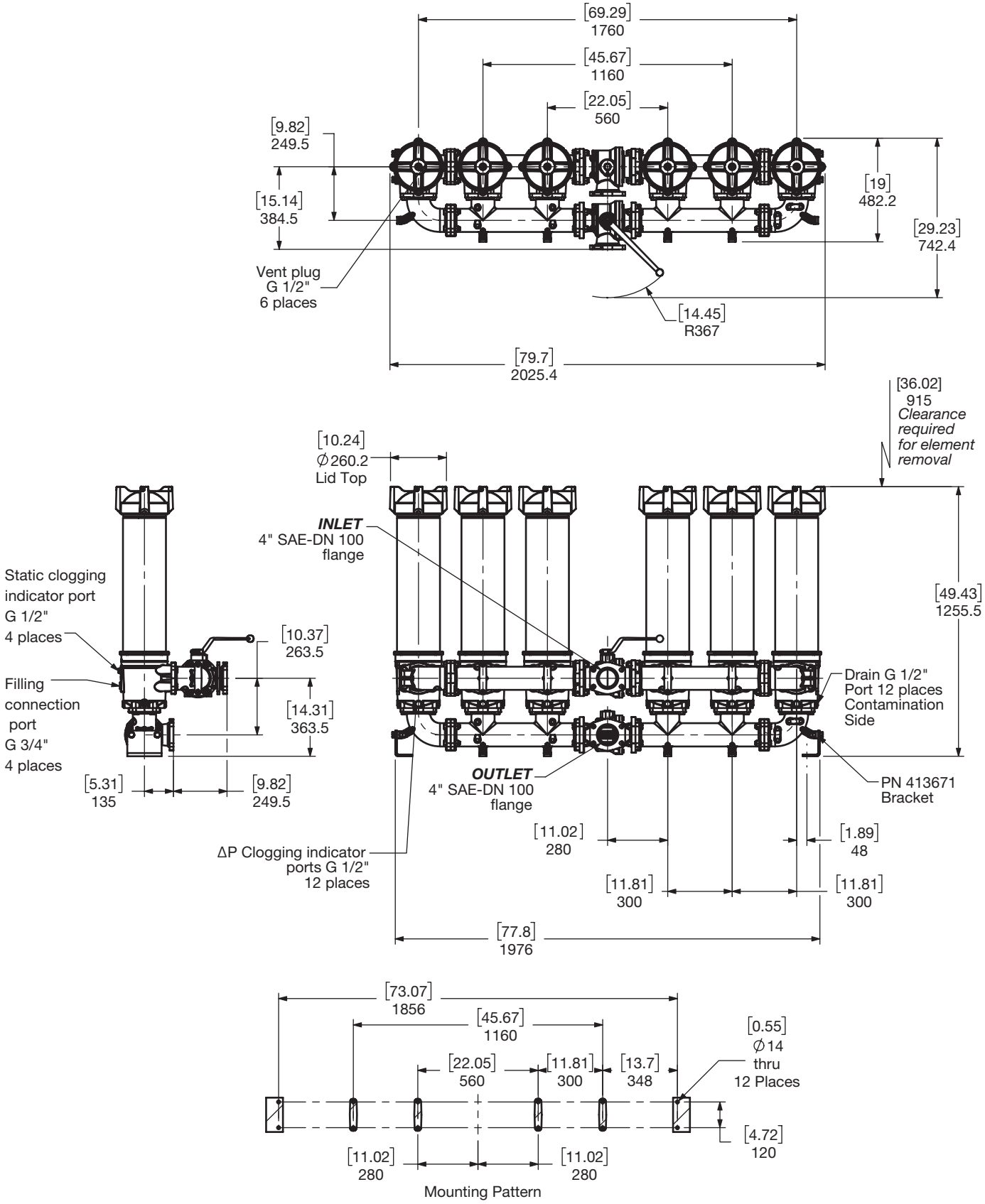


Size	5240 Version 2.0
Weight (lbs.)	590.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

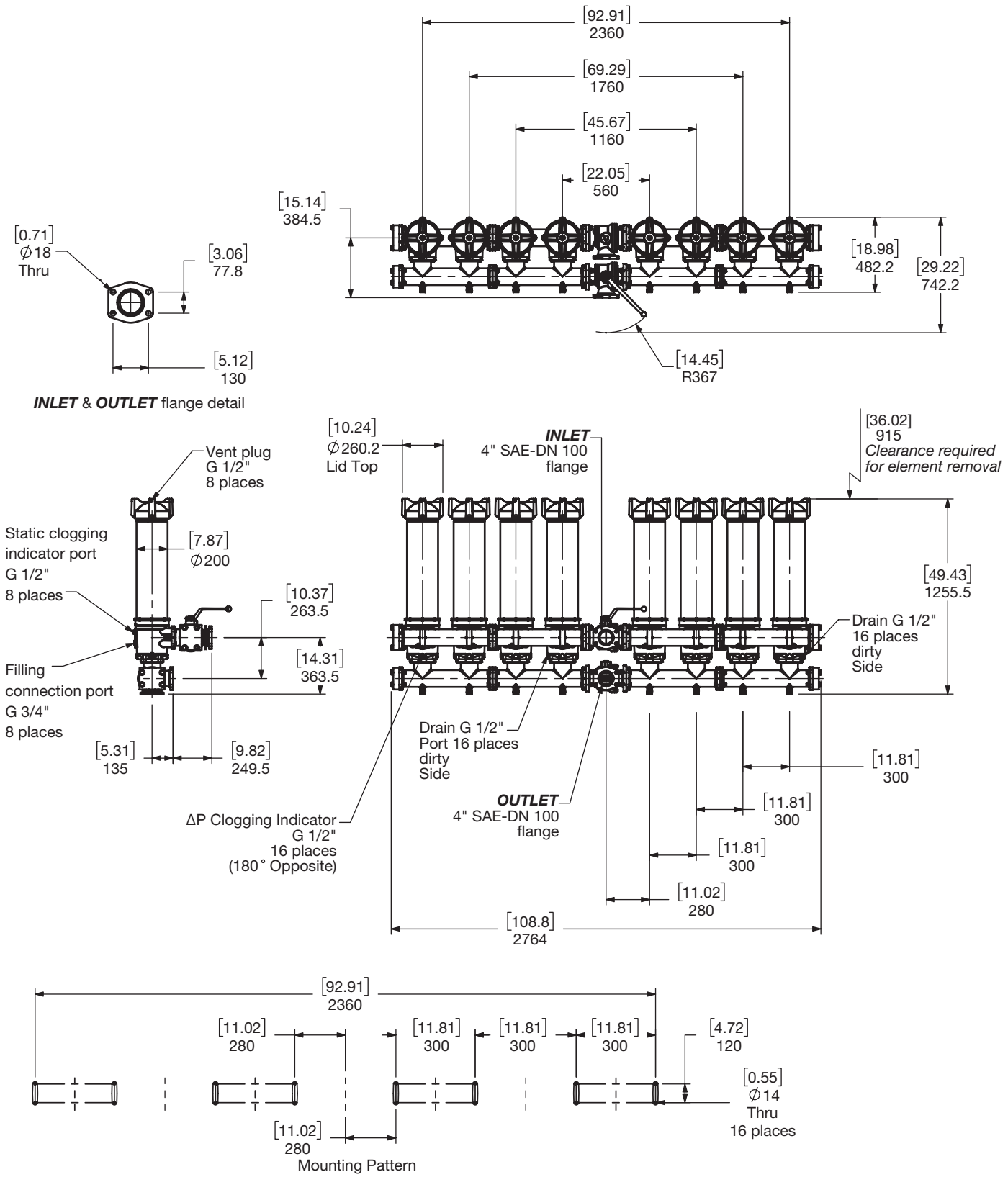
Dimensions:
NFD 7840 – 2.0 Version



Size	7840 Version 2.0
Weight (lbs.)	833.4

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NFD 10440 – 2.0 Version



Size	10440 Version 2.0
Weight (lbs.)	1085.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

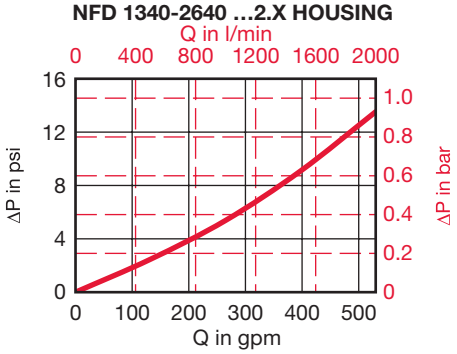
Housing Curve:

Pressure loss through housing is as follows:

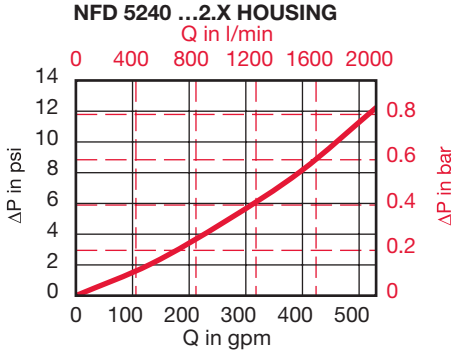
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

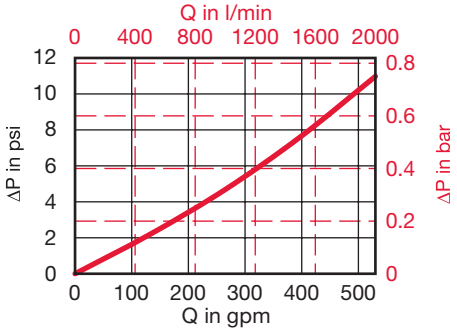
NFD 1340-2640 ...2.X HOUSING



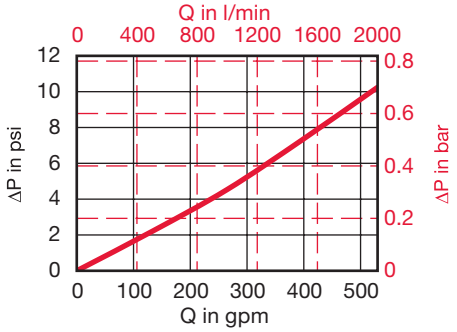
NFD 5240 ...2.X HOUSING



NFD 7840 ...2.X HOUSING



NFD 10440 ...2.X HOUSING



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
1300 R XXX BN4AM	0.088	0.033
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
1300 R 040 AM	0.026
2600 R 040 AM	0.013

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
1300 R XXX W/HC	0.002
2600 R XXX W/HC	0.001

Polyester	...R...P/HC	
Size	10 µm	20 µm
1300 R XXX P/HC	0.004	0.002
2600 R XXX P/HC	0.002	0.001

All Element K Factors in psi / gpm.

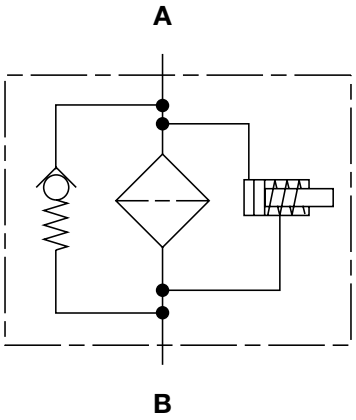
Notes

NFH Series

Modular Inline Return Line Filters

500 psi • up to 450 gpm

Hydraulic Symbol



Features

- Top access for easy element changeout.
- All models have an air bleed valve (vent) installed in the lid.
- Single large element with no leak points for highest efficiency and dirt capacity
- Lid with swing bolts for fast servicing without tools
- Drain port (right side of Inlet Port) SAE 12 (3/4")
- Clogging Indicator for local and/or remote signals
- Easily banked in parallel (manifolded) for high viscosity applications.

Notes: This filter is configured with an .....R.... type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications

Technical Specifications

Mounting Method	
NFH	2 mounting holes - filter head
NFH Manifold	Floor mounting brackets
Port Connection	SAE DN 102 Flange Code 61 *(single tower)* SAE DN 102 *(multi-tower)*
Flow Direction	Inlet: Side Outlet: Bottom
Construction Materials	
Head, Lid, Elbows, Manifolds	Ductile Iron
Housing	Steel
Flow Capacity	
1300	343 gpm (1300 lpm)
2600, 5200, 7800, 10400	450 gpm (1700 lpm) *(Flow limited by 4" pipe size)*
Housing Pressure Rating	
Max. Allowable Working Pressure	500 psi (34.5 bar)
Fatigue Pressure	500 psi (34.5 bar)
Burst Pressure	> 1440 psi (100 bar)
Element Collapse Pressure Rating	
ON, W/HC ECON2, BN4AM, AM, P/HC	290 psid (20 bar) 145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10% *(standard)* ΔP = 72 psid (5 bar) -10% *(optional)*	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10% ΔP = 87 psid (6 bar) +10%	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

NFH ON 5200 E P 5 C 1 . 1 / 16 A V T100

Filter Type
NFH = In-line Return Line Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Mesh
BN/AM = Betamicron® Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Size
1300 = Single NFH
2600 = Single NFH
5200 = Manifold: 2 size 2600 Housings
7800 = Manifold: 3 size 2600 Housings
10400 = Manifold: 4 size 2600 Housings

Operating Pressure
E = 500 psi (34 bar)

Type of Connection
P = SAE DN 102 Code 61 (4") flange

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON
40 = AM
3, 10 = BN/AM
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = ECON2
10, 20 = P/HC

Type of ΔP Clogging Indicator
A, BM, C, D

Type Number
1

Modification Number *(latest version always supplied)*

Port Configuration
16 = SAE-64, (4") Code 61 Flange

Flow Path *(facing connecting manifold)*
(omit) = Sizes 1300 and 2600 only
A = Left inlet, Left outlet
B = Right inlet, Right outlet
(sizes 5200 - 10400 only)
C = Left inlet, Right outlet
D = Right inlet, Left outlet
(sizes 5200 - 10400 only)

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D only)*
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indictor with underwriter's recognition

Replacement Element Model Code

2600 R 005 ON / V

Size
1300, 2600

Type
R

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
10, 20 = P/HC
3, 10 = BN4AM
40 = AM

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B6 = 87 psid (6 bar)
B1 = 14.5 psid (1 bar)
KB = no bypass

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 C . X / V

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2 = 29 psid (2 bar)
5 = 72 psid (5 bar)
(optional)

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene Propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V
L110 = 110V

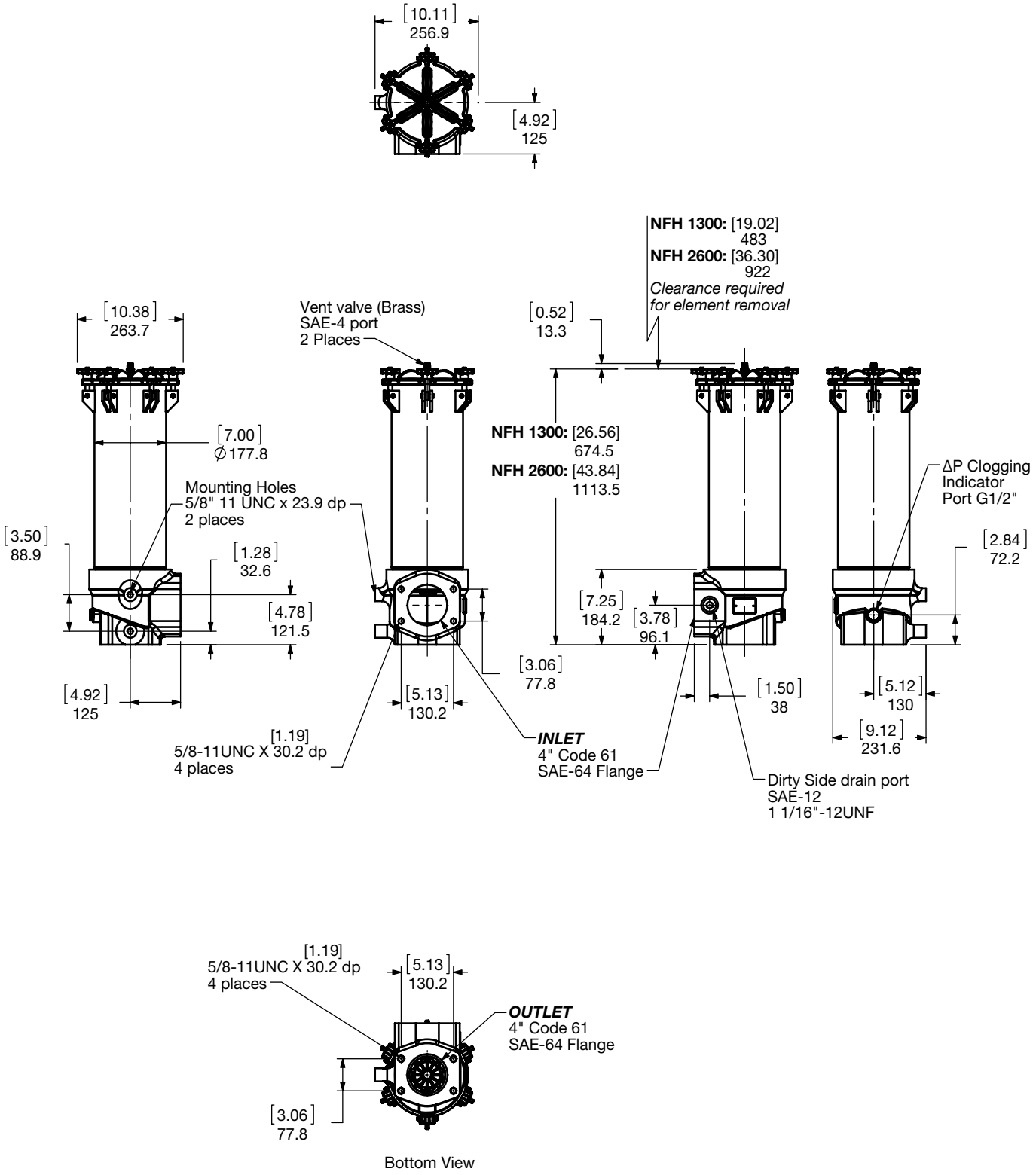
Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Approval *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indictor with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

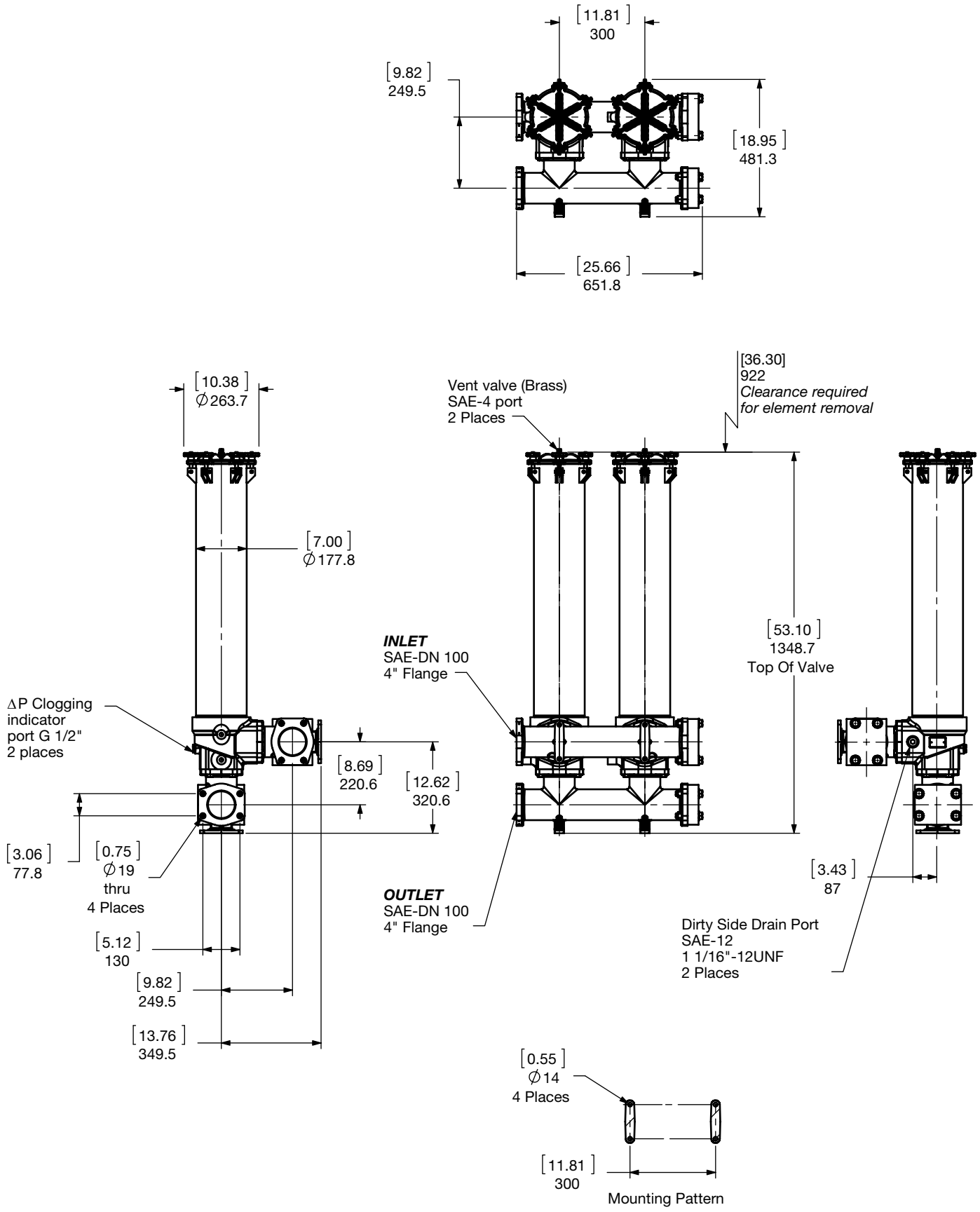
Dimensions
NFH 1300 / 2600



Size	1300	2600
Weight (lbs.)	87.1	115.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

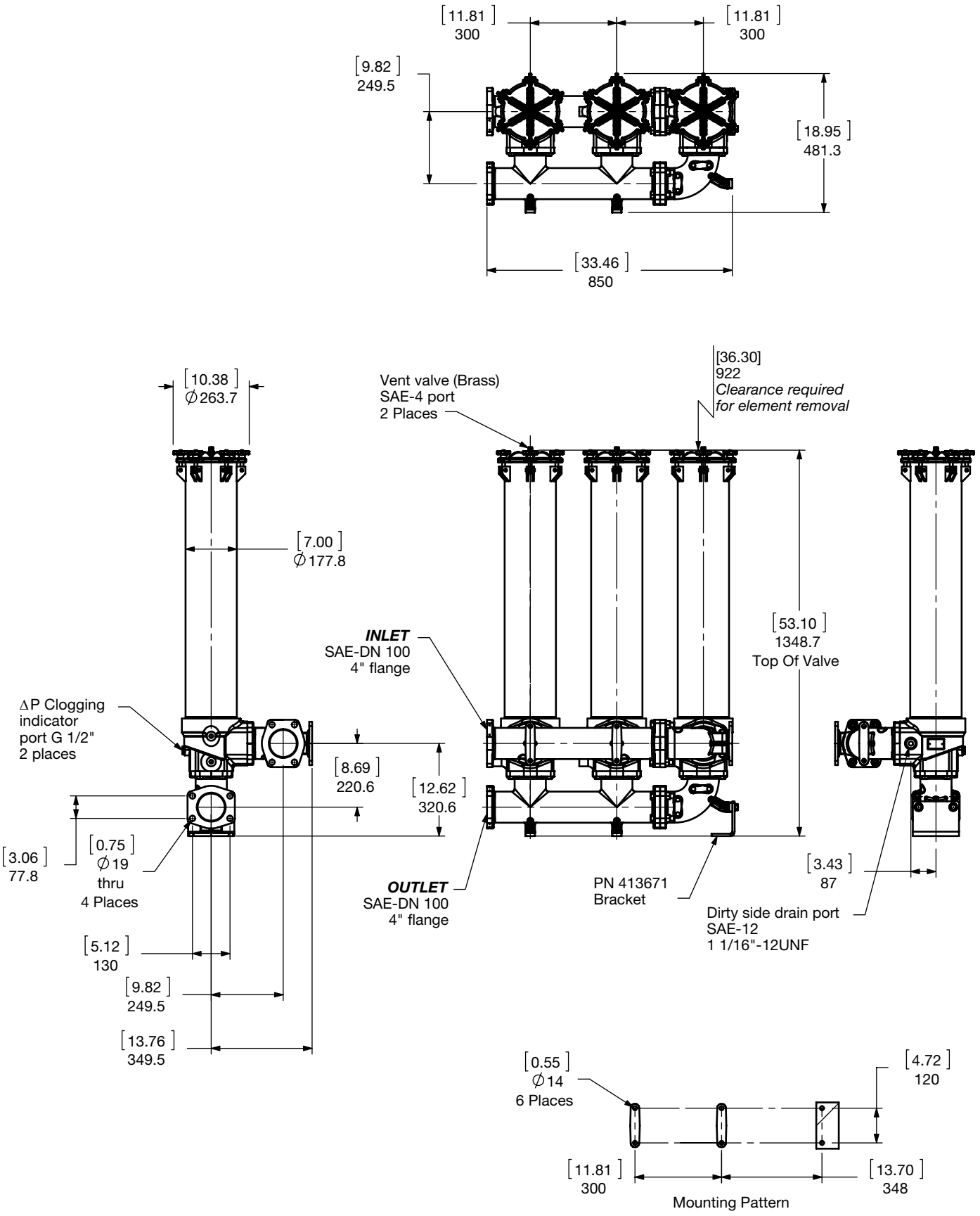
Dimensions
NFH 5200



Size	5200
Weight (lbs.)	356

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

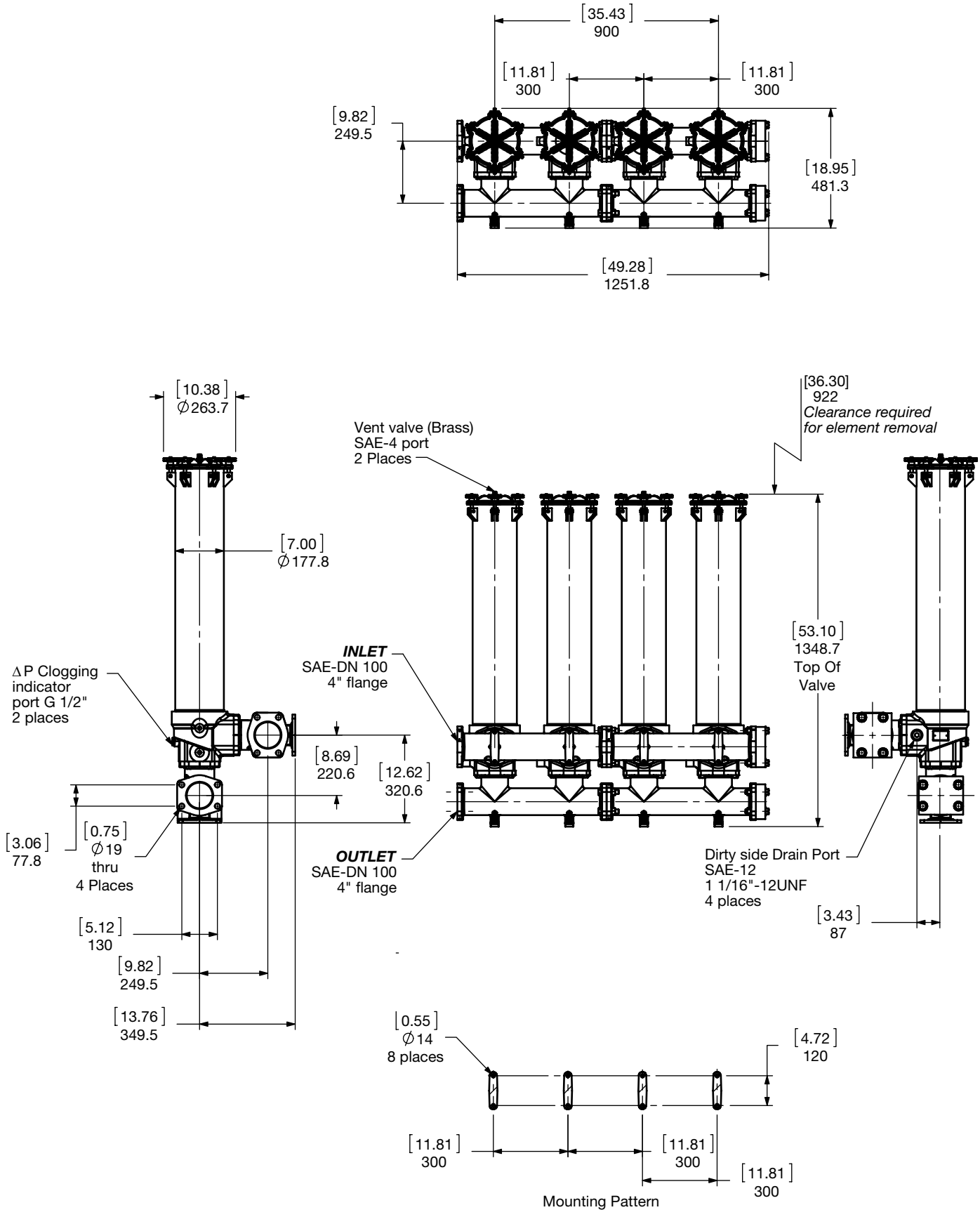
Dimensions
NFH 7800



Size	7800
Weight (lbs.)	477.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
NFH 10400



Size	10400
Weight (lbs.)	684

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

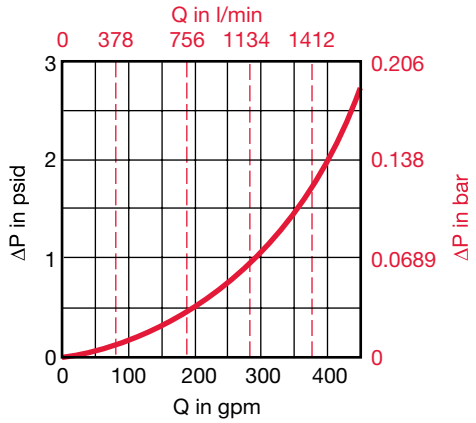
Pressure loss through housing is as follows:

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

The curve below shows the clean ΔP through the housing for a single filter. To determine clean housing ΔP for manifolds with multiple housings, multiply the clean ΔP curve value by the percentage values in the table.

ΔP Housing

NFH 1300 / NFH 2600



NFH System	Multiplier
5200	73%
7800	61%
10400	48%

Example

Conditions
400 gpm flow NFH 5200 manifold specified ΔP Curve = 2 psid ΔP 5200 = 2 psid X 0.73 = 1.5 psid $_{\text{Piping \& Housing}}$
ΔP Total System = 1.5 psid + ΔP Element

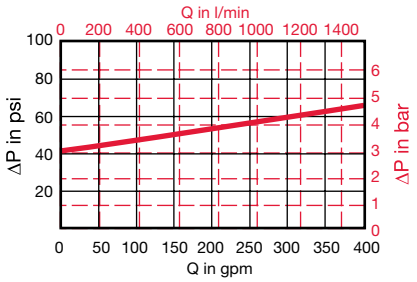
Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

Bypass Valve Curve:

Curves shown are applicable for mineral oil with a specific gravity of 0.86. Differential pressure increases in proportion to the specific gravity of the fluid.

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

1300 / 2600 Bypass Valve



Element ΔP Calculations:

Sizing (K) Flow Factors below show the pressure drops across clean elements *(excluding housings and piping)*. (K) Factors are calculated from mineral based fluid at viscosity of 141 SUS and specific gravity of 0.86. To determine clean ΔP for NFH manifolds with more than one housing, use the appropriate sized single element (K) factor and multiply (total assembly flow rate divided by the number of housings in the manifold), then correct for viscosity.

Example 1: Lube System

Conditions
Viscosity = 500 SUS @ 120˚F Specific gravity = 0.86 Flow = 75 gpm Low pressure drop essential K Factor = 10 µm Optimicron® filter element
Selection - NFH 2600 Filter
An NFH 2600 filter gives an Adjusted Clean Element ΔP as follows: Clean ΔP = 75 gpm x 0.01 = 0.75 psid Clean $\Delta P_{adj.} = 0.75 \times \frac{500}{141} \times \frac{0.86}{0.86} = 2.7$ psid
Housing ΔP = "0" *(negligible)*

Example 2: System Return Filter

Conditions
Viscosity = ISO 68 Fluid 220 SUS @ 120˚F Specific gravity = 0.86 Flow = 350 gpm 3µm Filtration *(depth)* ß *(beta)* = 1000 K Factor = 3 µm Optimicron® filter element = 0.04
Selection - NFH 7800 Filter
Element ΔP = (350 ÷ 3 housings) $\times$ 0.04 $\times \frac{220}{141} \times \frac{0.86}{0.86} = 7.28$ psid
Housing ΔP = 1.05 *(curve)* $\times$ 0.61 $\times \frac{0.86}{0.86} \times = 0.64$ psid
Assembly ΔP = 7.28 psid + 0.64 psid = 7.92 psid

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
1300 R XXX BN4AM	0.088	0.033
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
1300 R 040 AM	0.026
2600 R 040 AM	0.013

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
1300 R XXX W/HC	0.002
2600 R XXX W/HC	0.001

Polyester	...R...P/HC	
Size	10 µm	20 µm
1300 R XXX P/HC	0.004	0.002
2600 R XXX P/HC	0.002	0.001

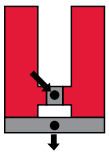
All Element K Factors in psi / gpm.

Notes

NFHD Series

Modular Inline Duplex Filters

500 psi • up to 450 gpm



Features

- Top access for easy element changeout.
- All models have an air bleed valve (vent) installed in the lid.
- Single large element with no leak points for highest efficiency and dirt capacity
- Lid with swing bolts for fast servicing without tools
- Drain port - dirty side (right side of Inlet Port) SAE 12 (3/4")
- Clogging Indicator for local and remote signals
- Easily banked in parallel (manifolded) for high viscosity applications.
- Available with Betterfit elements - consult HYDAC.

Notes: This filter is configured with an .....R.... type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications

Automotive

Gearboxes

Industrial

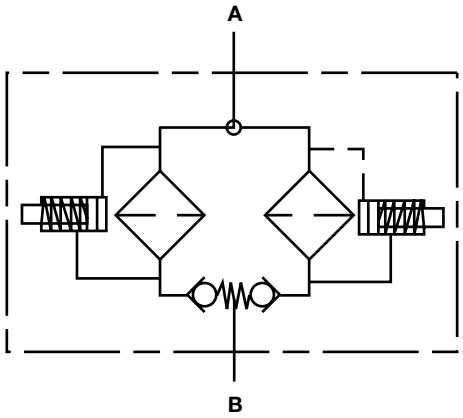
Power Generation

Pulp & Paper

Shipbuilding

Steel / Heavy Industry

Hydraulic Symbol



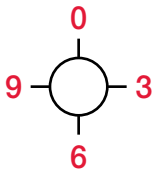
Inlet / Outlet Port Location Configurator

NFHD1300/2600 Inlet/Outlet Available Configurations

	03		09
	33		39
	93		99

NFHD5200/7800/10400 2.X Inlet/Outlet Available Configurations

00	03		09
30	33		39
60			69
	93		99



0 = Pointed to Top
3 = Pointed to Front
6 = Pointed to Bottom
9 = Pointed to Back

First Number = Inlet Orientation
Second Number = Outlet Orientation

Technical Specifications

Mounting Method	Floor mounting brackets
Port Connection	SAE DN 102 Flange Code 61
Flow Direction (Standard)	Inlet: Side Outlet: Side
Construction Materials	
Head, Lid, Elbows, Manifolds	Ductile Iron
Housing	Steel
Flow Capacity	
1300	343 gpm (1300 lpm)
2600, 5200, 7800, 10400	450 gpm (1700 lpm) *(Flow limited by 4" pipe size)*
Housing Pressure Rating	
Max. Allowable Working Pressure	500 psi (34 bar)
Fatigue Pressure	500 psi (34 bar)
Burst Pressure	> 1440 psi (100 bar)
Element Collapse Pressure Rating	
ON, W/HC	290 psid (20 bar)
ECON2, BN4AM, AM, P/HC	145 psid (10 bar)
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10% *(standard)*	
ΔP = 72 psid (5 bar) -10% *(optional)*	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10%	
ΔP = 87 psid (6 bar) +10%	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

NFHD ON 1300 E A P 3 BM 1 . X / 16 V

Filter Type
NFHD = In-line Duplex Return Line Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron® *(Low Collapse)*
W/HC = Wire Mesh
BN/AM = Betamicron®/Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Size
1300, 2600, 5200, 7800, 10400

Operating Pressure
E = 500 psi (34 bar)

Type of Change Over
A = Ball valve

Type of Connection
P = SAE DN 102 (4") Code 61 flange

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
40 = AM
3, 10 = BN/AM
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = BN/HC, ECO/N
10, 20 = P/HC

Type of ΔP Clogging Indicator
A, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1

Modification Number *(latest version always supplied)*

Port Configuration
16 = SAE DN 102, (4") Code 61 Flange

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C & D indicators only)*
cRUus = Electrical Indicator with underwriter's recognition
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SFREE = Element specially designed to minimize electrostatic charge generation
SB = Equalization valve set
EM = Manual vent valve set
VKD = Drain manifold

Flow Path
00, 03, 09, 30, 33, 39, 60, 69, 93.99
Note: For Alternate Connection Flow Path *(i.e. 39 - Inlet Front / Outlet Back)* - See previous page for "Inlet / Outlet Port Configurator."

Replacement Element Model Code

1300 R 003 ON / V

Size
1300 - for housings: 1300
2600 - for housings: 2600, 5200, 7800, 10400

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
3, 10 = BN4AM
40 = AM
10, 20 = P/HC

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)
KB = no bypass

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 BM . X /

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2 = 29 psid (2 bar)
5 = 72 psid (5 bar)
(optional)

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V
L110 = 110V

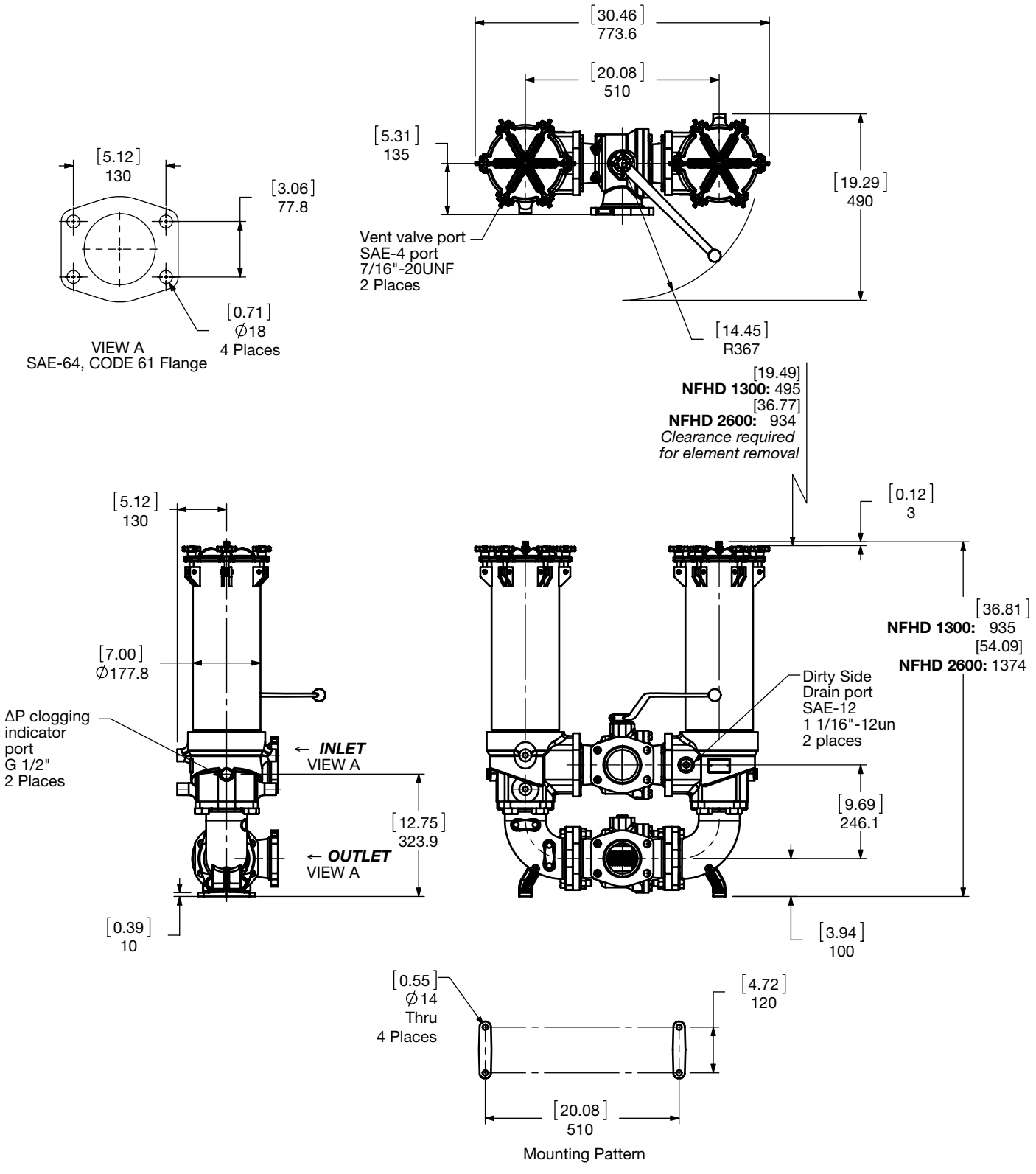
Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Approval *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

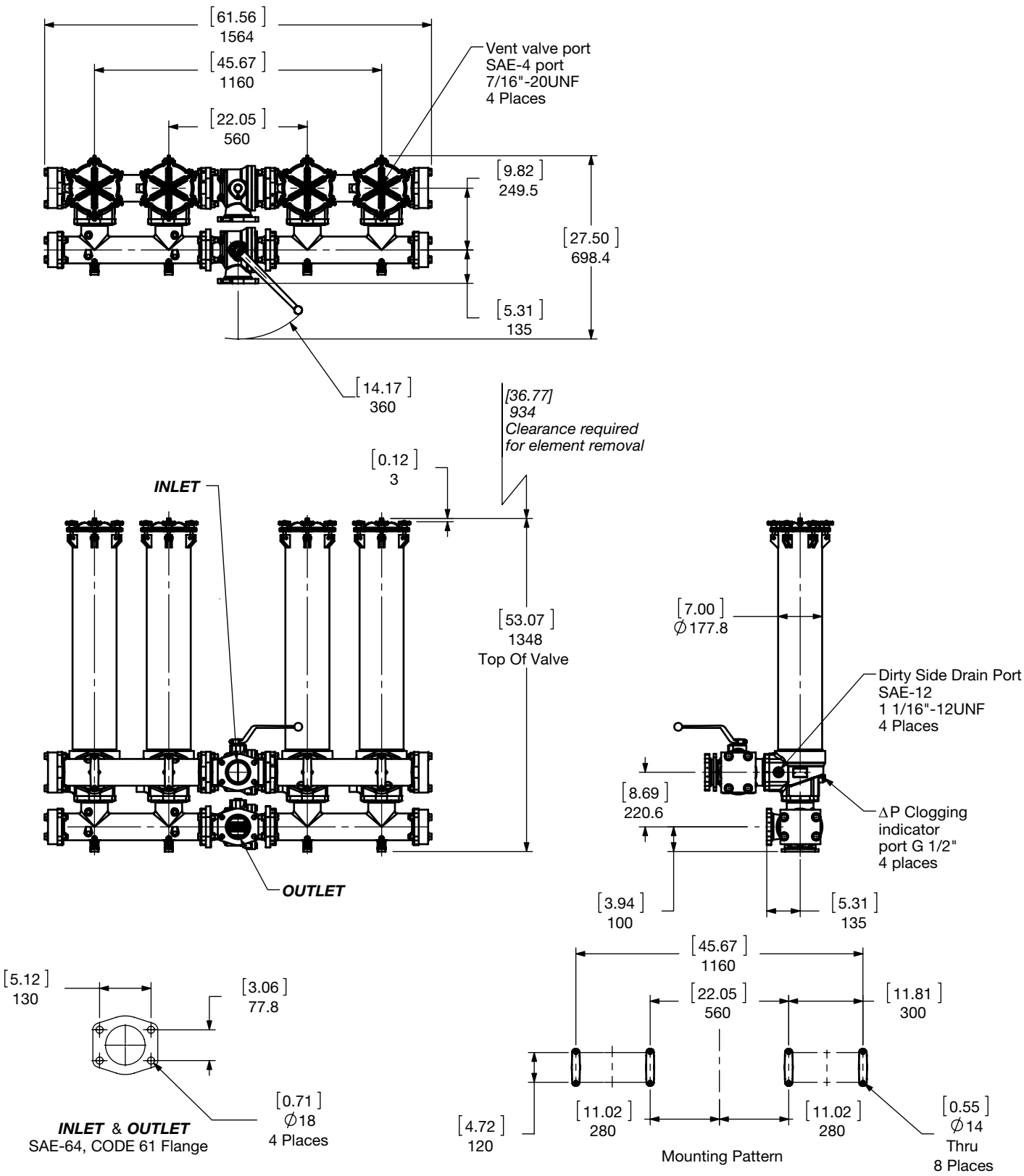
Dimensions
NFHD 1300 / 2600



Size	1300	2600
Weight (lbs.)	302.1	357

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NFHD 5200

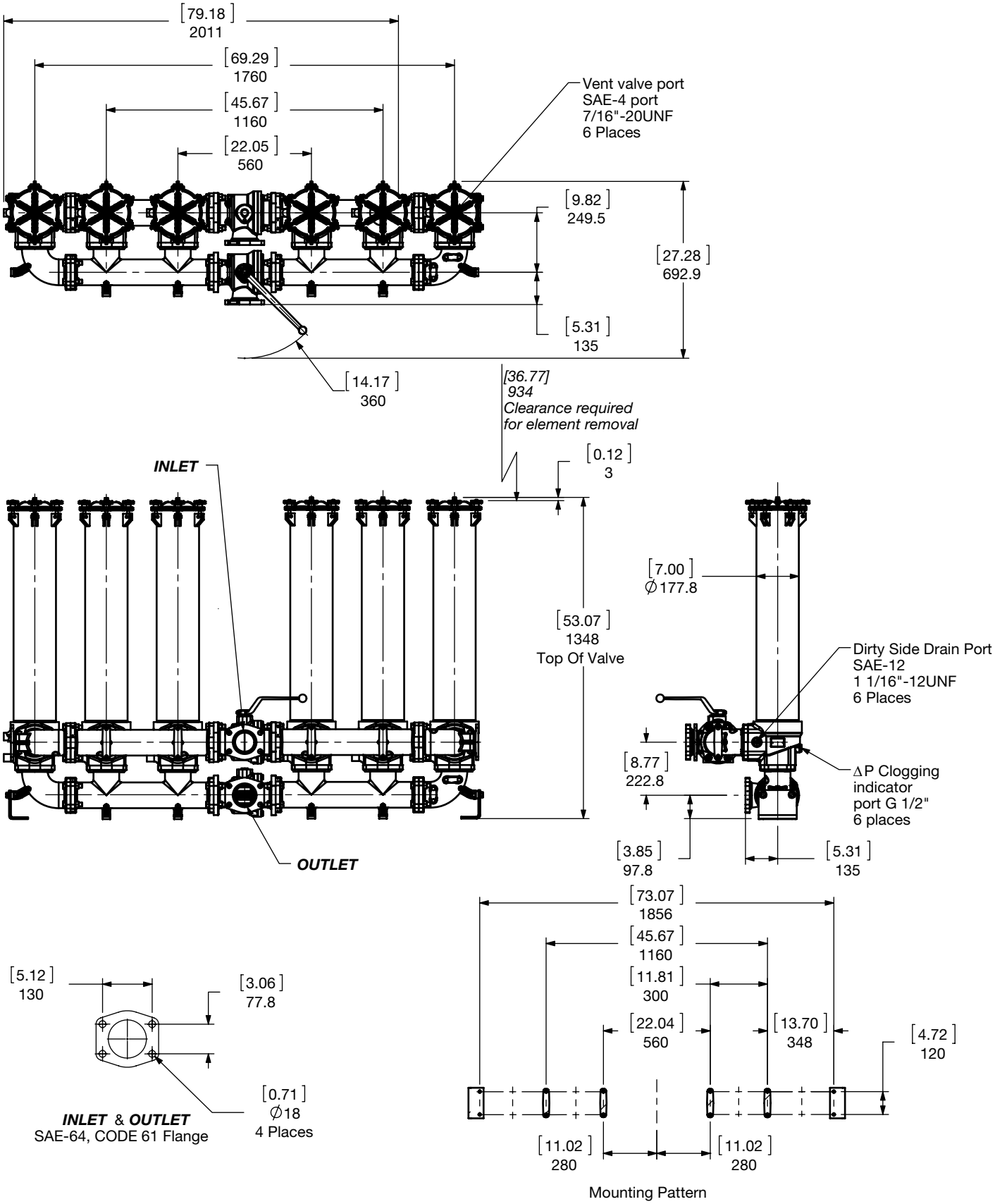


Size	5200
Weight (lbs.)	803

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

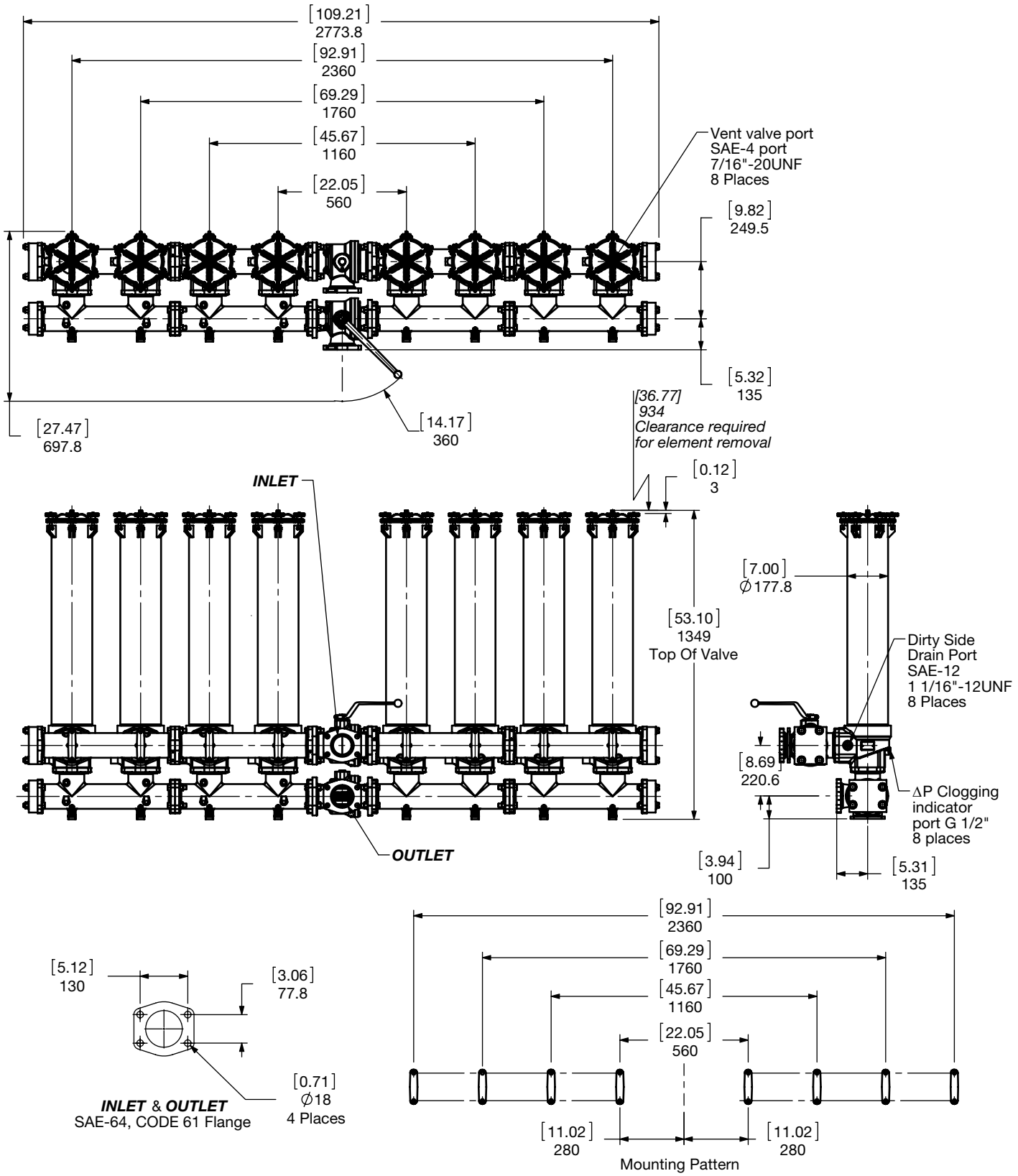
Dimensions:
NFHD 7800



Size	7800
Weight (lbs.)	1008

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NFHD 10400



Size	10400
Weight (lbs.)	1459

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

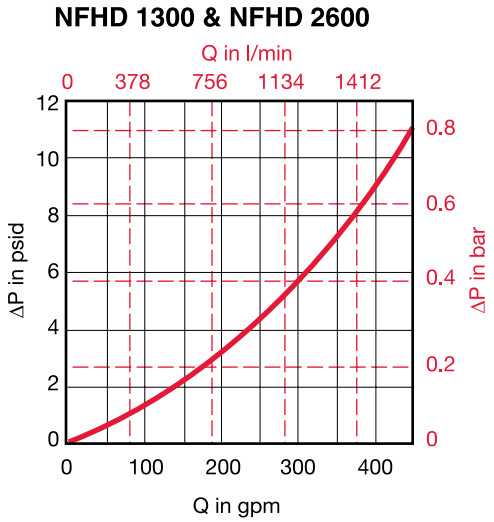
Housing Curve:

Pressure loss through housing is as follows:

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

The curve below shows the clean ΔP through the Housing for a single filter. To determine Clean ΔP for manifolds with multiple housings, multiply the Clean ΔP curve value by the percentage value in the table.

ΔP Housing



NFHD System	Multiplier
5200	93%
7800	83%
10400	74%

Example

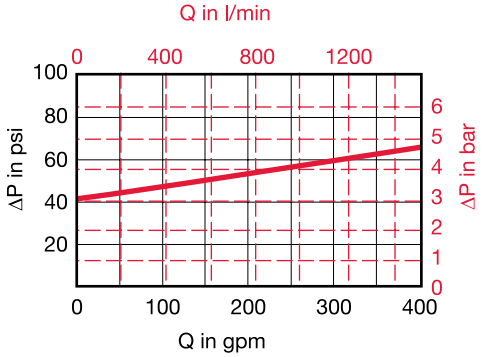
Conditions	
400 gpm flow	
NFHD 10400 manifold specified	= 9 psid
ΔP Curve	= 9 psid X 0.74
$\Delta P_{\text{Piping \& Housing}}$ 10400	= 6.7 psid
Fluid Specific Gr	= .86 psid
ΔP Total System = 6.7 psid ΔP Housing + ΔP Element	

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

Bypass Valve Curve:

Curves shown are applicable for mineral oil with a specific gravity of 0.86. Differential pressure increases in proportion to the specific gravity of the fluid.

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



Element ΔP Calculations:

Sizing (K) Flow Factors below show the pressure drops across clean elements *(excluding housings and piping)*. (K) Factors are calculated from mineral based fluid at viscosity of 141 SUS and specific gravity of 0.86. To determine clean ΔP for NFH manifolds with more than one housing, use the (K) factors below and divide total flow rate by # towers per side.

$$\text{Element } \Delta P = \text{Elements (k) flow Factor} \times \frac{\text{total flow}}{\text{filter towers (on one side)}} \times \frac{\text{Actual Viscosity (SUS)}}{141} \times \frac{\text{Actual Sp Gravity}}{0.86} = 7.09 \text{ psid}$$

Example

Conditions	Selection - NFDH 10400 Filter
Lube system Viscosity of 1,000 SUS Specific gravity 0.86 400 gpm flow Low pressure drop essential 10 µm Optimicron® filter element	An NFHD 10400 filter *(with 4 towers)* gives an Adjusted Clean element ΔP as follows: Clean Assembly ΔP = ΔP Housing & ΔP Element Clean $\Delta P = \frac{400 \text{ gpm}}{4 \text{ towers}} \times 0.01 = 1.0$ psid Clean $\Delta P_{adj.} = 1.0 \times \frac{1000}{141} \times \frac{0.86}{0.86} = 7.09$ psid Clean Assembly ΔP = 6.7 psid (housing) + 7.09 psid (elements) = 13.8 psid

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
1300 R XXX BN4AM	0.088	0.033
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
1300 R 040 AM	0.026
2600 R 040 AM	0.013

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
1300 R XXX W/HC	0.002
2600 R XXX W/HC	0.001

Polyester	...R...P/HC	
Size	10 µm	20 µm
1300 R XXX P/HC	0.004	0.002
2600 R XXX P/HC	0.002	0.001

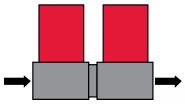
All Element K Factors in psi / gpm.

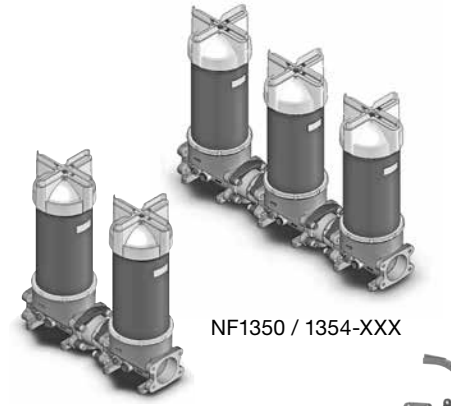
Notes

NF UHE Series

Ultra High Efficiency Inline Simplex Filters

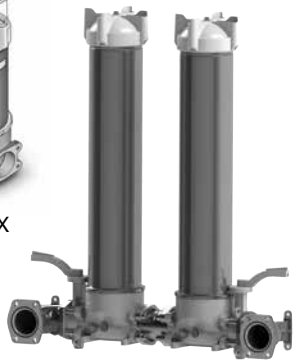
360 psi • up to 450 gpm





NF1350 / 1354-XXX

NF1350 / 1354-XX



NF 1350 CCP

Features

- Multi-pass filtration in a single pass!
- Beta efficiency values > 5000 single pass possible
- Conventional NF housings are piped in series to achieve multi-levels of filtration in one pass.

Note: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Configurations

NF Size 1350, 1354, 2650, 2654, 5250, 5254 - Two Stage

- Fine-Fine Filtration Arrangement
- Coarse-Fine Filtration Arrangement
- Medium-Fine Filtration Arrangement
- Fine Filtration with Water Removal Arrangement
- Customer Defined Arrangement

NF Size 1350, 1354, 2650, 2654, 5250, 5254 - Three Stage

- Fine-Fine Fine Filtration Arrangement
- Coarse-Fine Fine Filtration Arrangement
- Coarse-Medium Fine Filtration Arrangement
- Coarse-Fine with Water Removal Arrangement
- Medium-Fine Fine Filtration Arrangement
- Customer Defined Arrangement

NF Size 1350, 1354, 2650, 2654, 5250, 5254 - with Butterfly valve(s), with filtration options as above

Pulp+Paper Design Option

NF Size 1354, 2654, 5254 - with Butterfly valves(s), Ecomicronfit elements, with filtration options as above

Applications

Agricultural

Gearboxes

Industrial

Power Generation

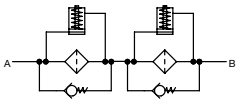
Pulp & Paper

Shipbuilding

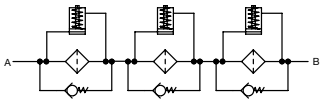
Steel / Heavy Industry

Hydraulic Symbol

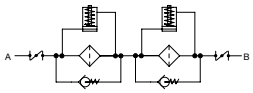
NF 1350/2650 UHE 2 Stage



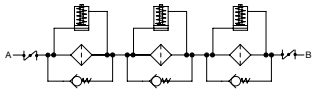
NF 1350/2650 UHE 3 Stage



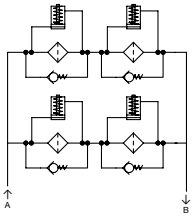
NF 1354/2654 UHE 2 Stage



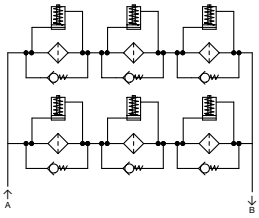
NF 1354/2654 UHE 3 Stage



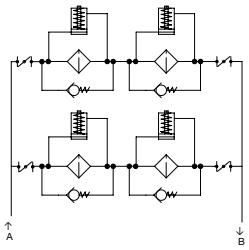
NF 5250 UHE 2 Stage



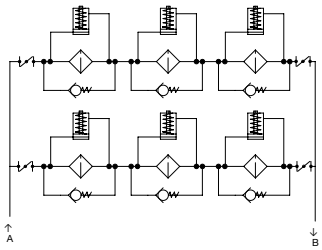
NF 5250 UHE 3 Stage



NF 5254/2654 UHE 2 Stage



NF 5254/2654 UHE 3 Stage



Technical Specifications

Mounting Method	See drawings
Port Connection	4" SAE-DN 102 Code 61 Flange *(with M16 flange connection bolts included)*
Flow Direction	
1350, 1354, 2650, 2654, 5250, 5254	Inlet: Side Outlet: Side *(opp.)*
Construction Materials	
Head, Housing, Lid	Aluminum
Filter Stage Connectors	Carbon Steel
Elbows, Manifolds	Ductile Iron
Flow Capacity	
1350, 1354	343 gpm (1300 lpm)
2650, 2654, 5250, 5254	450 gpm (1700 lpm) *(4" pipe limit)*
Housing Pressure Rating	
Max. Allowable Working Pressure	360 psi (25 bar)
Fatigue Pressure	360 psi (25 bar)
Burst Pressure	Contact HYDAC
Element Collapse Pressure Rating	
ON	290 psid (20 bar)
ECON2, BN4AM, AM	145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10%	ΔP = 72 psid (5 bar) -10%
Bypass Valve Cracking Pressure	
ΔP = 15 psid (1 bar) +10%	ΔP = 87 psid (6 bar) +10%
ΔP = 43 psid (3 bar) +10%	

*Note: All NF…1.0 Filters MAWP reduce to 7 bar (101.5 psi) when using the following "VR" indicators: B, BM, E, ES, GC, LE, LZ.

Model Code

NF ON-ON-AM 1350 D P 5-3-40 BM 2.0 / KB

Filter Type
NF = Return Line Filter

Element Media
ON = Optimicron® BN/AM = Betamicron®/Aquamicron®
ECON2 = ECOmicron® AM = Aquamicron®
2XECON2, 3XECON2 = ECOmicron®-fit (2, 3 towers)
Note: Include filtration media from inlet stage sequence to outlet port.

Size
1350, 2650, 5250 1354, 2654, 5254 *(ECOmicron®-fit)*

Operating Pressure
C = 232 psi (16 bar) *with butterfly valves* D = 360 psi (25 bar)

Type of Isolation Valve
C = Butterfly valves upstream and downstream *(Only available with SAE DN 102 (4") Code 61 flange)*
(omit) = No isolation valves

Type of Connection
P = SAE DN 102 (4") Code 61 Flange *(standard port size)* M = SAE DN 64 (2 1/2") Code 61 Flange
L = SAE DN 51 (2") Code 61 Flange N = SAE DN 76 (3") Code 61 Flange

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON 3, 5, 10, 20 = ECON2 3, 10 = BN/AM 40 = AM
3, 6, 12, 25 = ECON2 *(Ecomicron®-fit)* Note: Include filtration rating from each stage, inlet to output.

Type of ΔP Clogging Indicator
A = No Indicator *(plugged)* BM, C, D, LE *(Others available upon request, see Clogging Indicators section.)*

Type Number / Modification Number
2.0 = Inline Filter - ΔP indicator

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene Propylene (EPDM)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)* B6 = 87 psid (6 bar) *(return line extended life)*
B1 = 14.5 psid (1 bar) *(lube or coolant)* KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
cRUus = Electrical indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation
EM = Manual vent valve set
DBV = Double butterfly valve (standard)
VKD = Drain manifold
DBVL = Double butterfly valve - lockable

Number of Filtration Stages
2 = Two Stages *(2 in a series)* 3 = Three Stages *(3 in a series)*

Replacement Element Model Code

1300 R 003 ON /

Size
1300 - for housings: 1350
2600 - for housings: 2650, 5210

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON 3, 10 = BN4AM
3, 5, 10, 20 = ECON2 40 = AM

Element Media
ON, BN4AM, ECON2, AM

Seals
(omit) = standard - Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)* B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar) KB = no bypass

Supplementary Details
SO263 = *(See above)* SFREE = *(See above)*

Replacement Element Model Code *(ECOmicron®-fit)*

1.14.39D 6 ECON2 - V

Size
1.14.39D = NF 2654, 5254 1.14.16D = NF 1354

Filtration Rating *(micron)*
3, 6, 12, 25 = ECON2

Element Media
ECON2

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Clogging Indicator Model Code

VM 5 BM . X /

Indicator Prefix
VM = ΔP, G 1/2" 3000 psi
VD = ΔP G 1/2" 6000 psi
(2.0 ver. - LE Indicators only)

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
LE = Electric switch and pop-up

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L48 = 48V L110 = 110V L220 = 220V

Thermal Lockout *(VM type C, D, J, J4 only)*
T100 = Lockout below 100°F

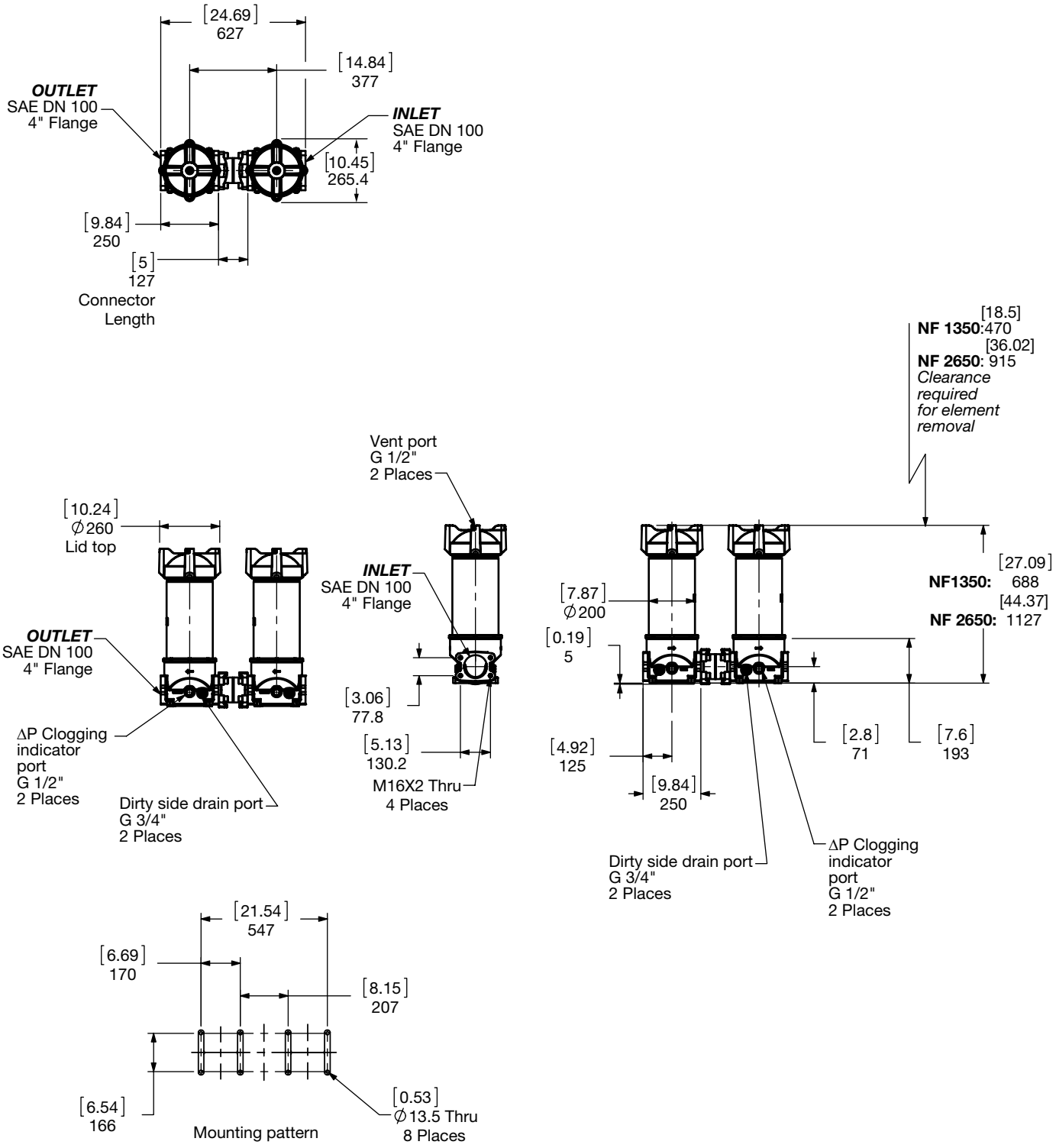
Underwriter's Recognition *(VM type C, D, J, J4 only)*
cRUus = Electrical indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

LOW PRESSURE FILTERS

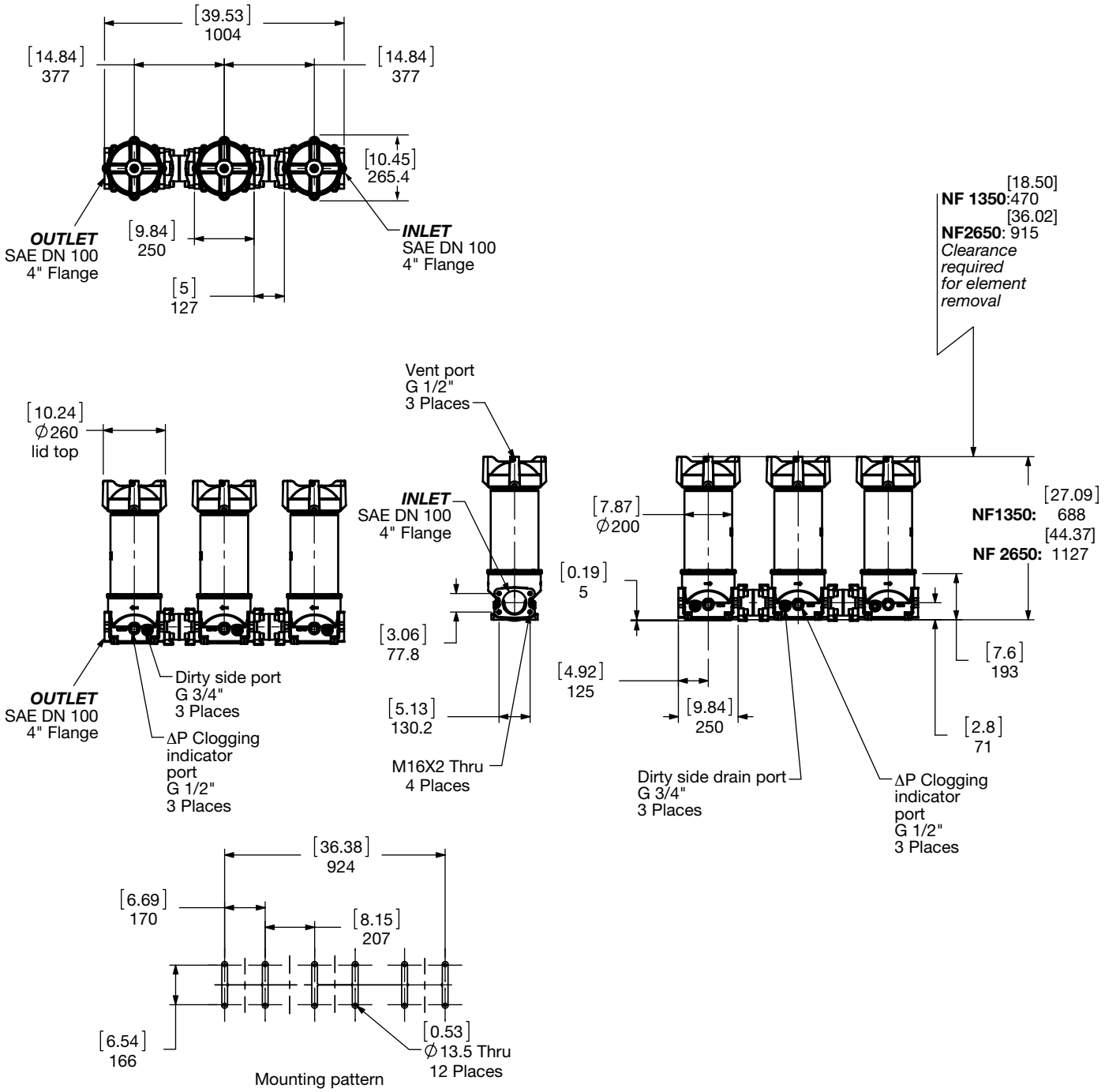
Dimensions
NF 1350 / 2650 - 2 Stage UHE



Size	1350 2 Stage	2650 2 Stage
Weight (lbs.)	90.6	121.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

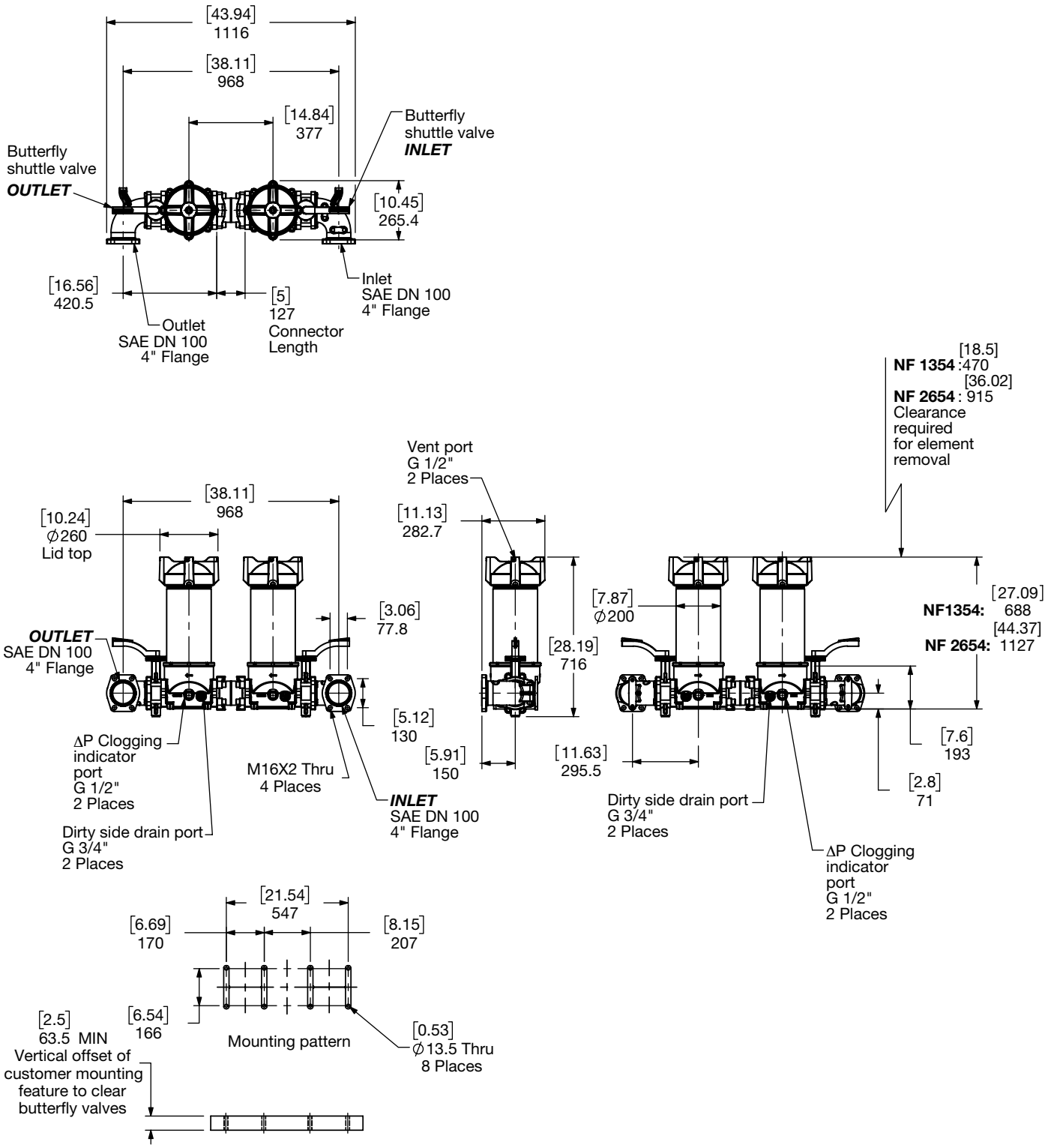
Dimensions:
NF 1350 / 2650 - 3 Stage UHE



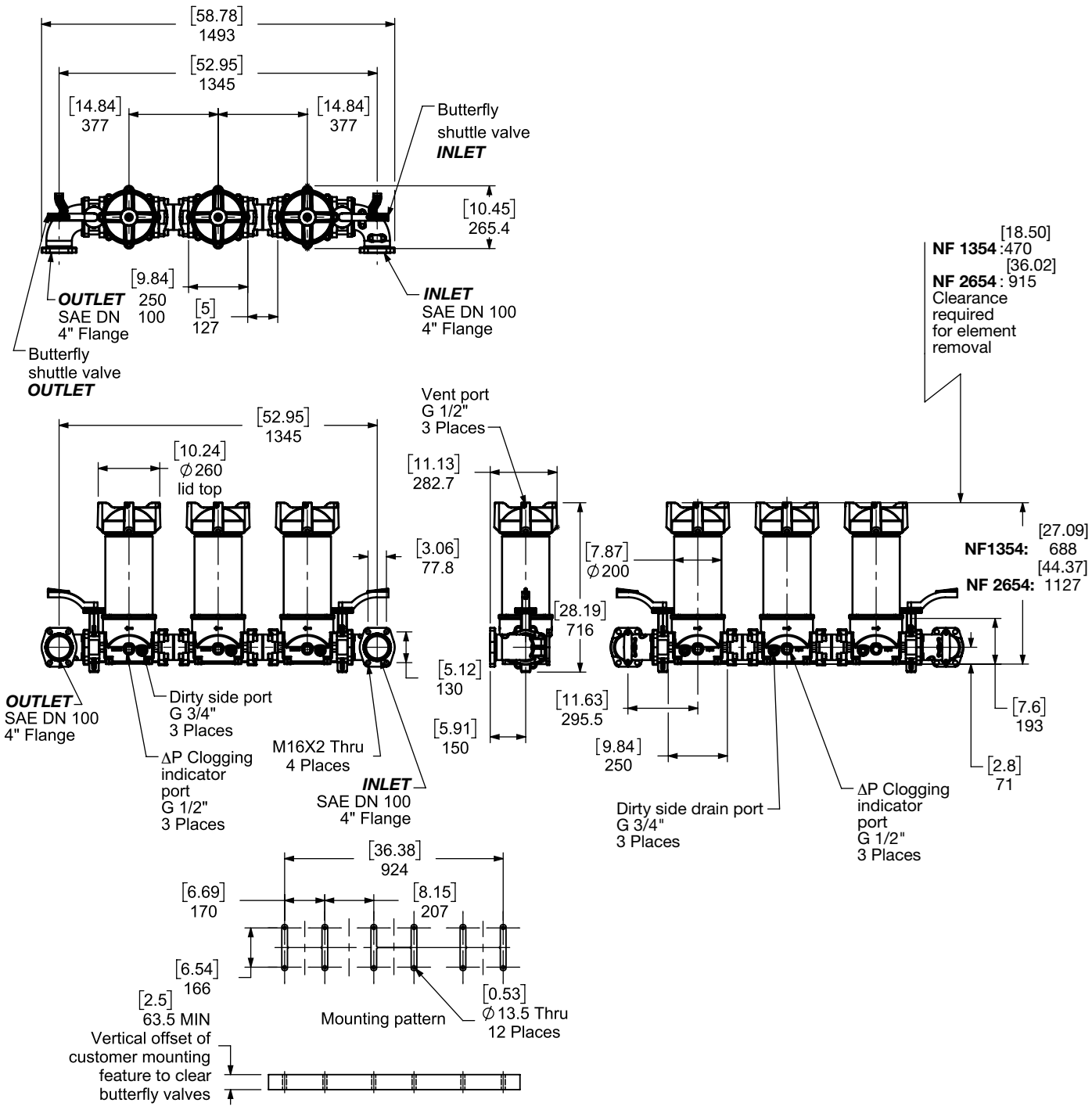
Size	1350 3 Stage	2650 3 Stage
Weight (lbs.)	139.3	185.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
NF 1354 / 2654 - 2 Stage UHE

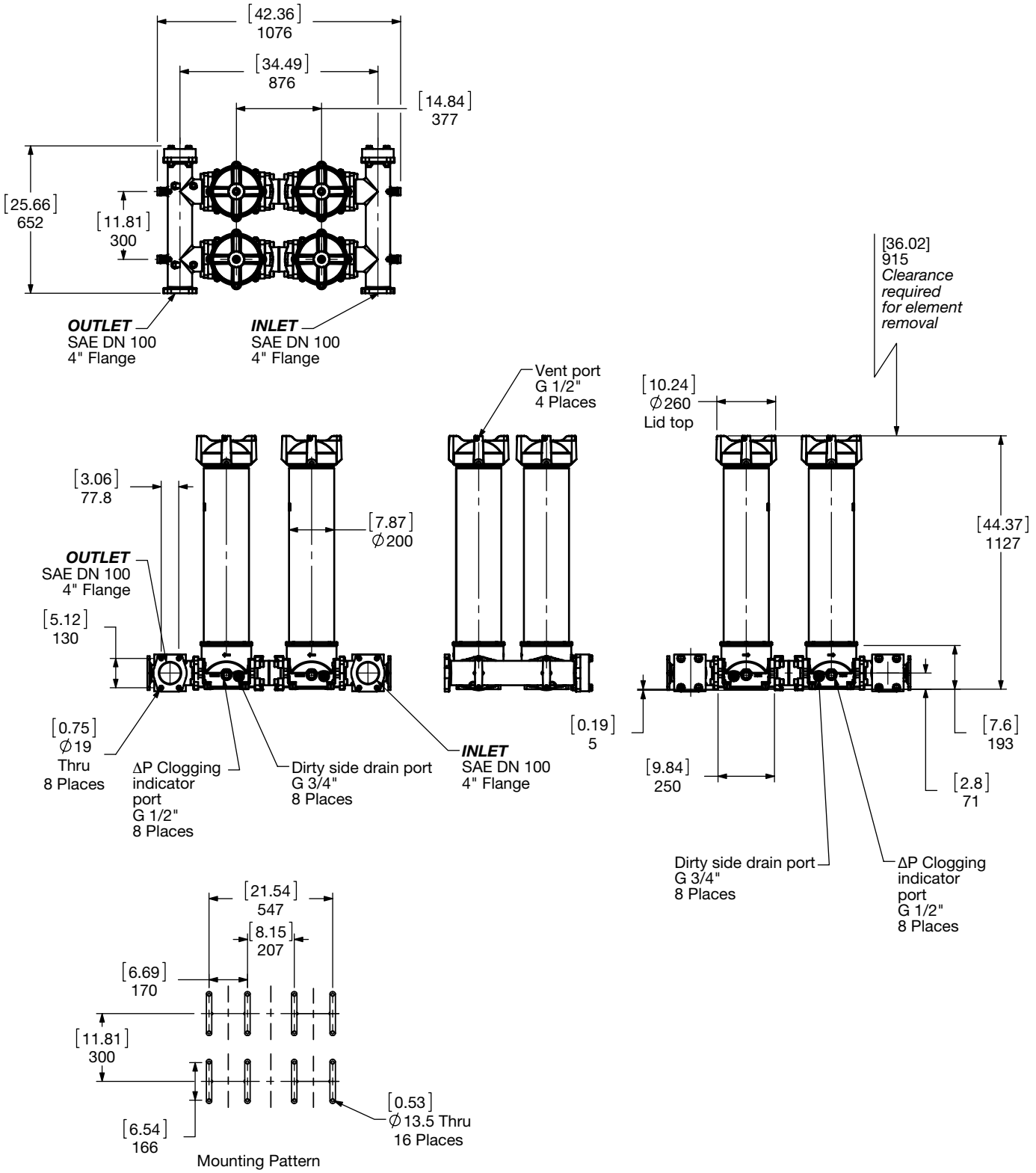


Dimensions:
NF 1354 / 2654 - 3 Stage UHE



LOW PRESSURE FILTERS

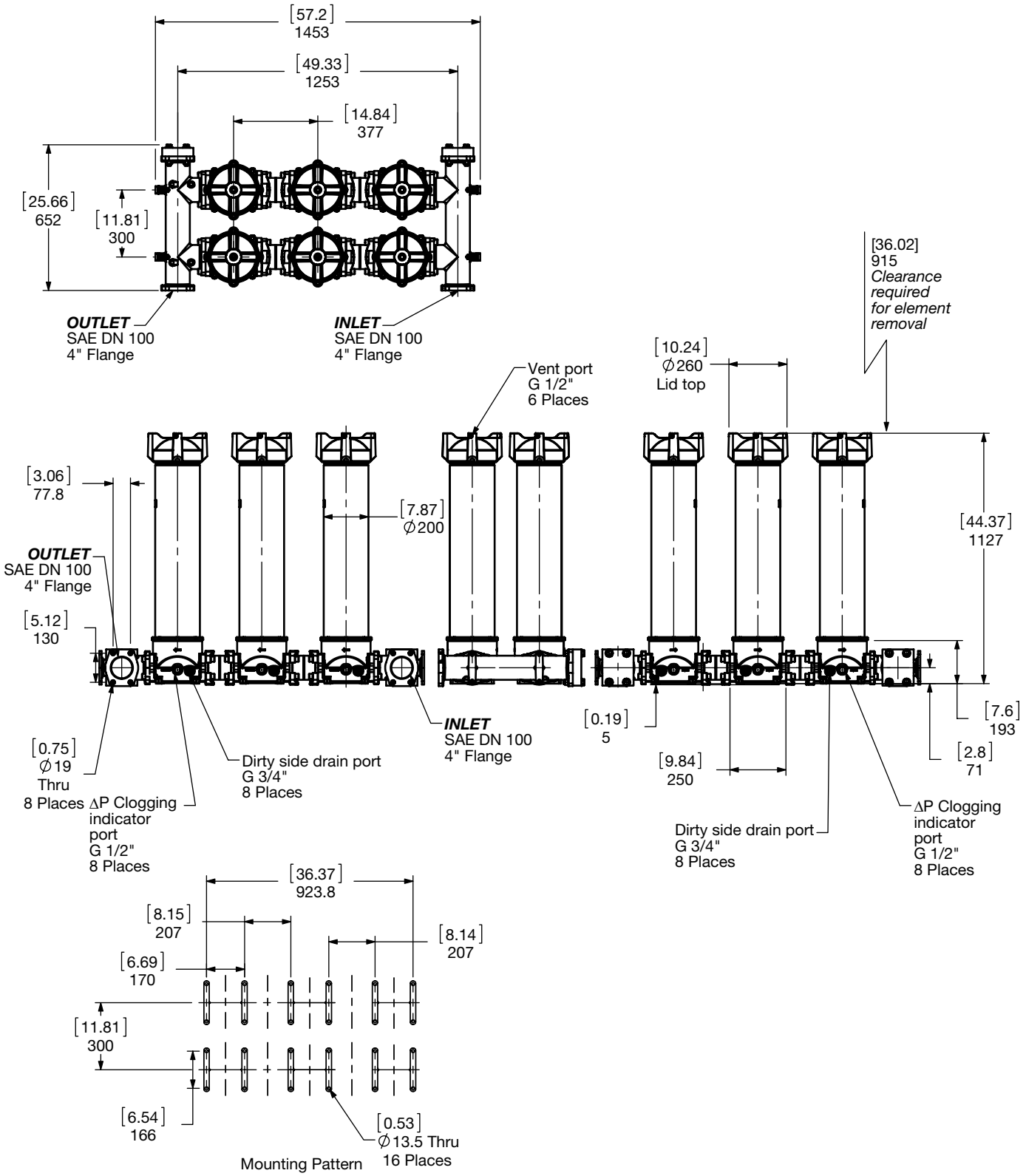
Dimensions:
NF 5250 - 2 Stage UHE



Size	5250 2 Stage
Weight (lbs.)	329

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 5250 - 3 Stage UHE

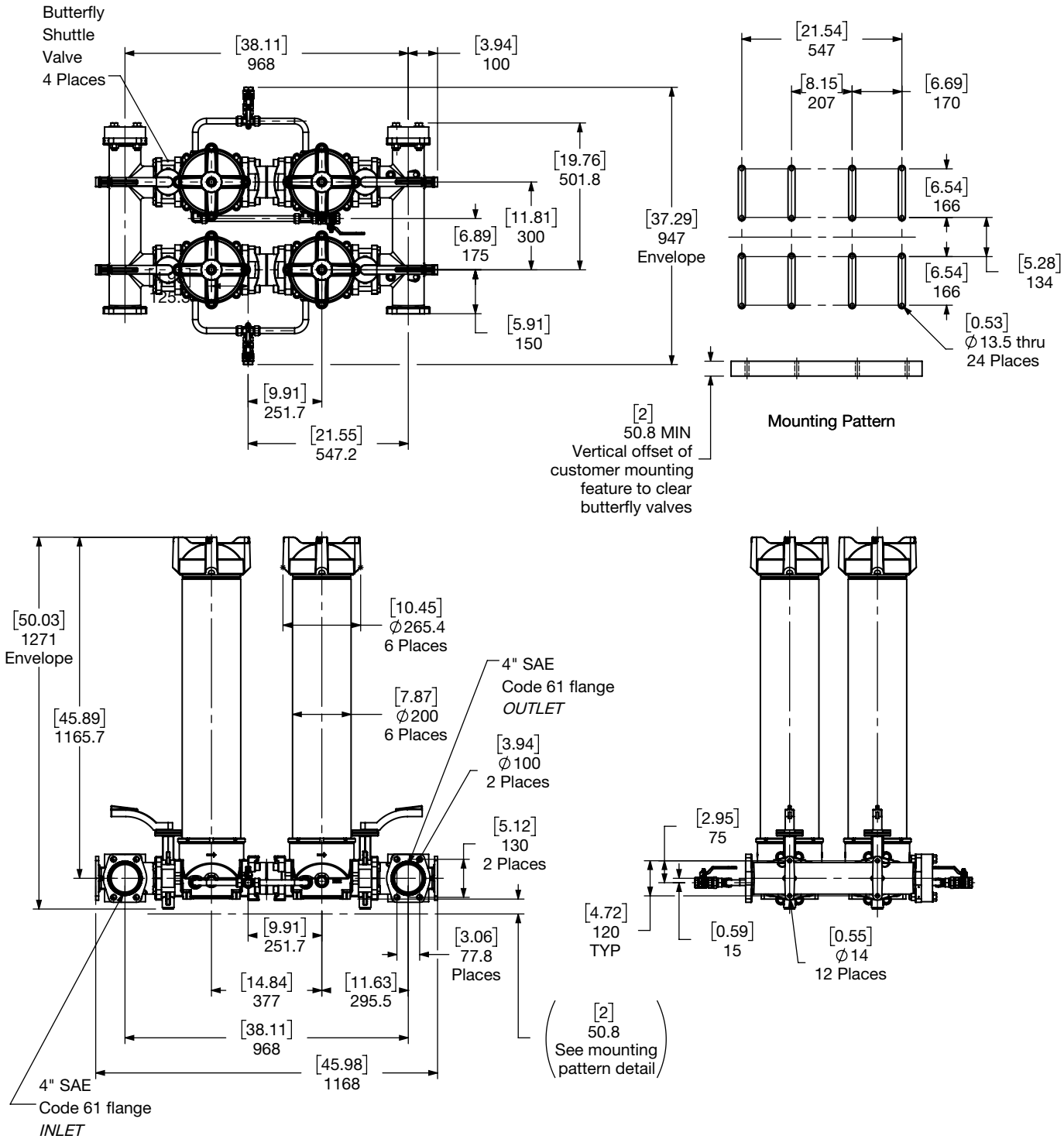


Size	5250 3 Stage
Weight (lbs.)	459.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

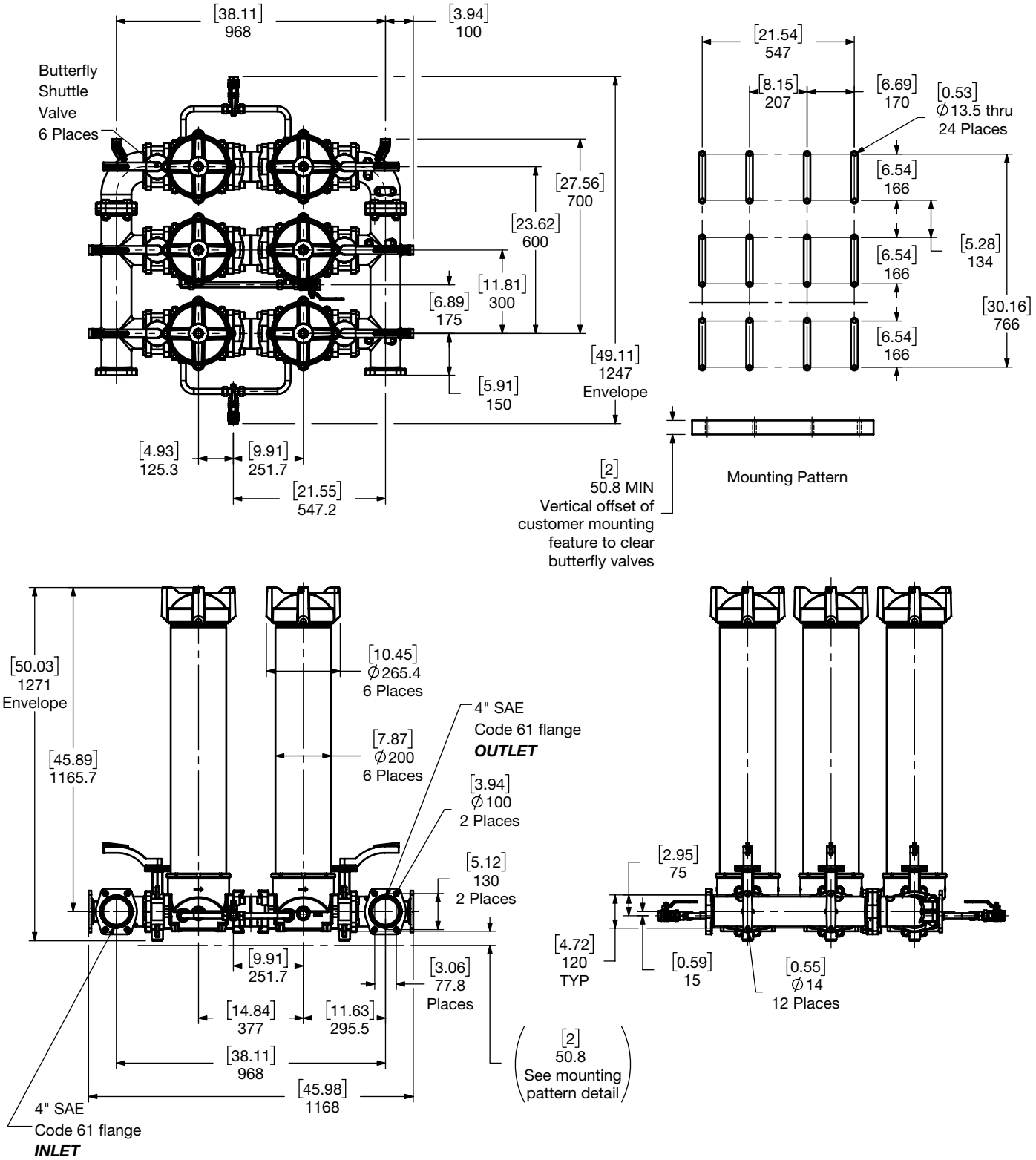
Dimensions:
NF 5254 - 2 Stage UHE



Size	5254 2 Stage
Weight (lbs.)	315

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 7854 - 2 Stage UHE (with butterfly valves showing)

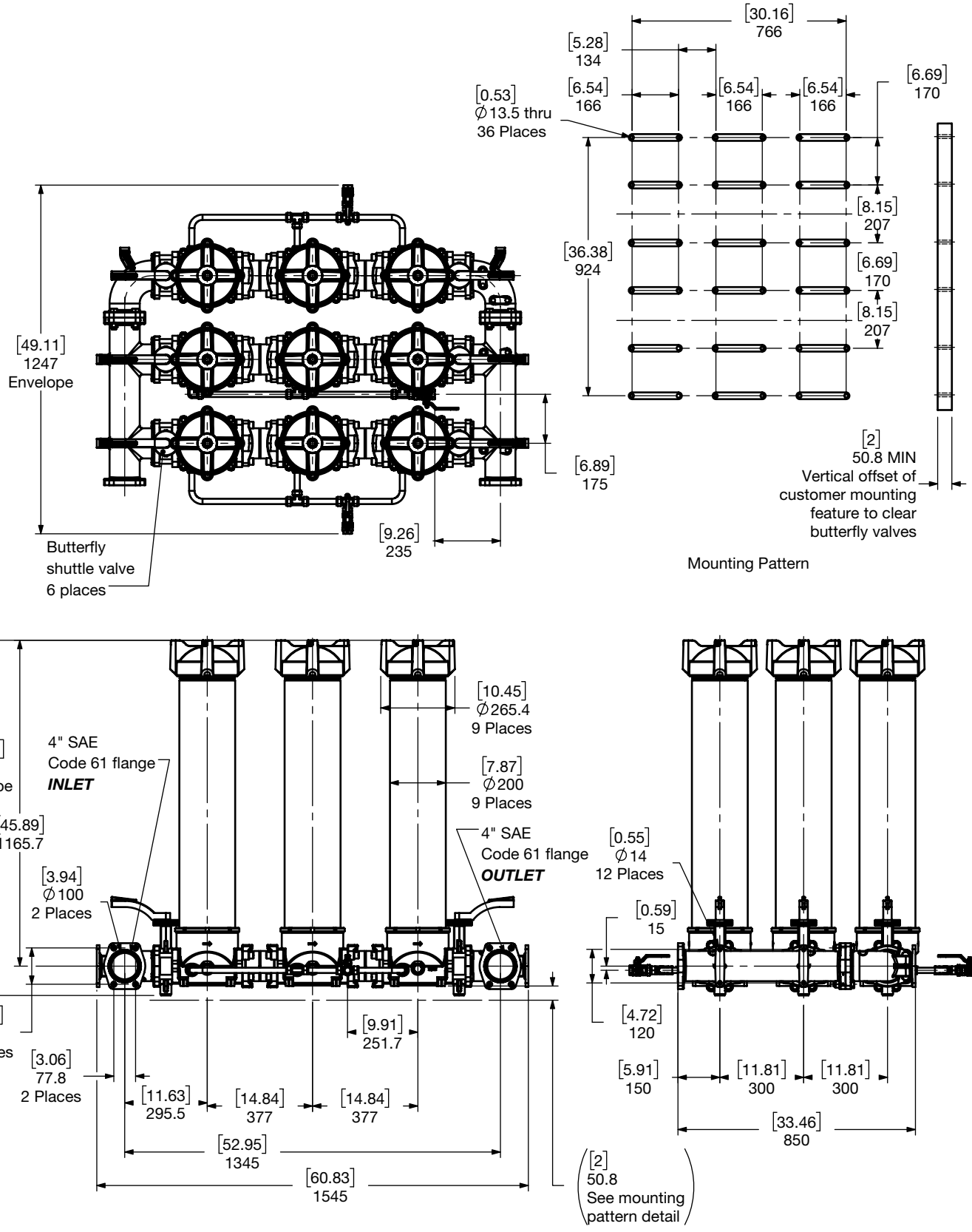


Size	7854 2 Stage
Weight (lbs.)	567

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

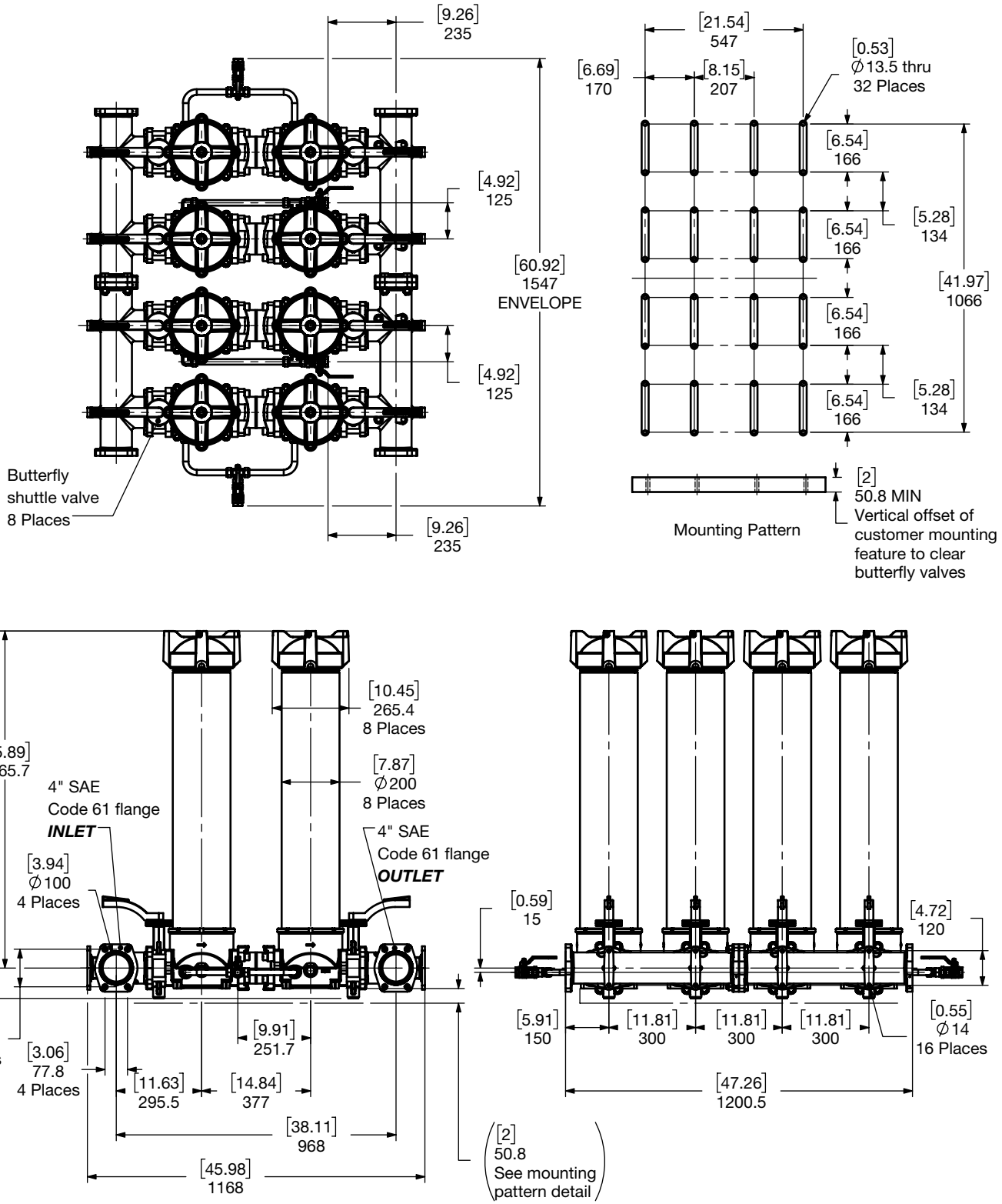
Dimensions:
NF 7854 - 3 Stage UHE (with butterfly valves showing)



Size	7854 3 Stage
Weight (lbs.)	840

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 10454 - 2 Stage UHE (with butterfly valves showing)

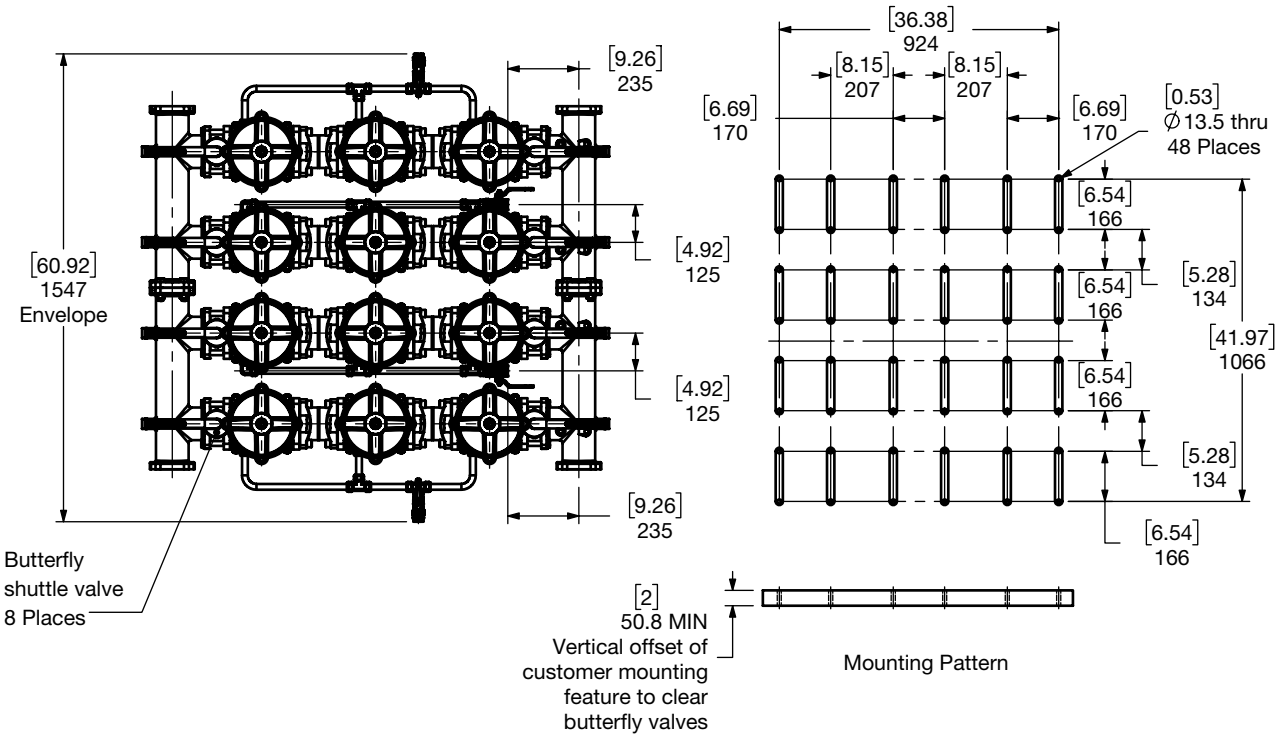


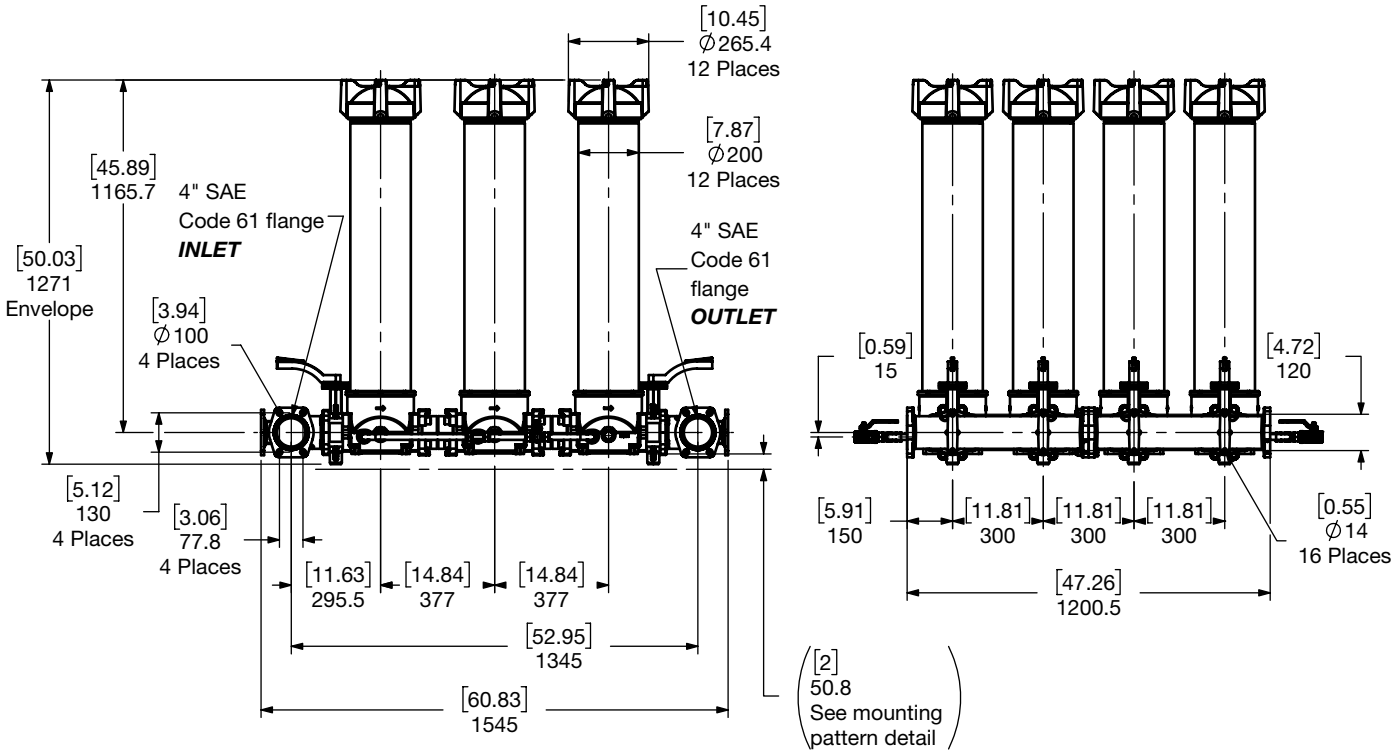
Size	10454 2 Stage
Weight (lbs.)	796

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

Dimensions:
NF 10454 - 3 Stage UHE (with butterfly valves showing)





Size	10454 3 Stage
Weight (lbs.)	1143

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include elements.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

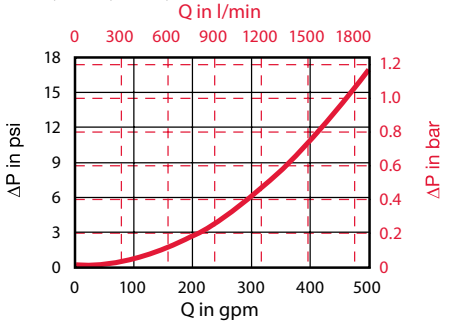
Housing Curve:

Pressure loss through housing is as follows:

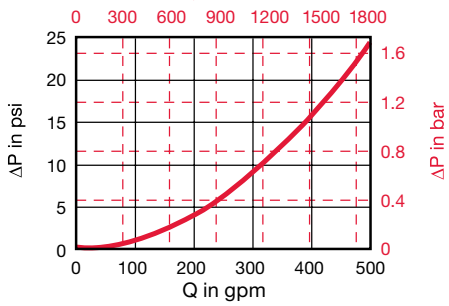
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

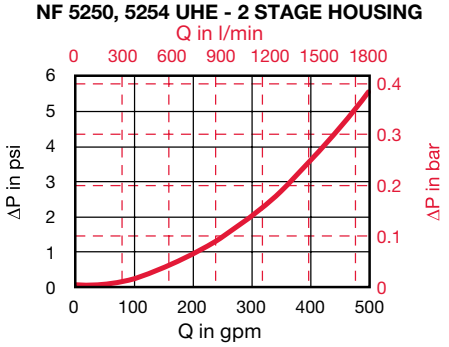
NF 1350, 1354, 2650, 2654 UHE - 2 STAGE HOUSING



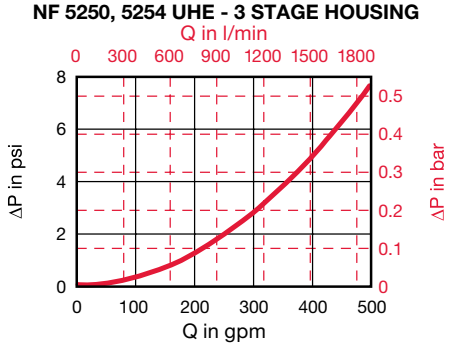
NF 1350, 1354, 2650, 2654 UHE - 3 STAGE HOUSING



NF 5250, 5254 UHE - 2 STAGE HOUSING



NF 5250, 5254 UHE - 3 STAGE HOUSING



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2600 R XXX ECON2	0.022	0.016	0.011	0.005

ECOmicron fit	1.14.XXDXXECO/N			
Size	3 µm	6 µm	12 µm	25 µm
1.14.16DXXECO/N	0.046	0.041	0.022	0.015
1.14.39DXXECO/N	0.017	0.016	0.008	0.006

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
1300 R XXX BN4AM	0.088	0.033
2600 R XXX BN4AM	0.055	0.016

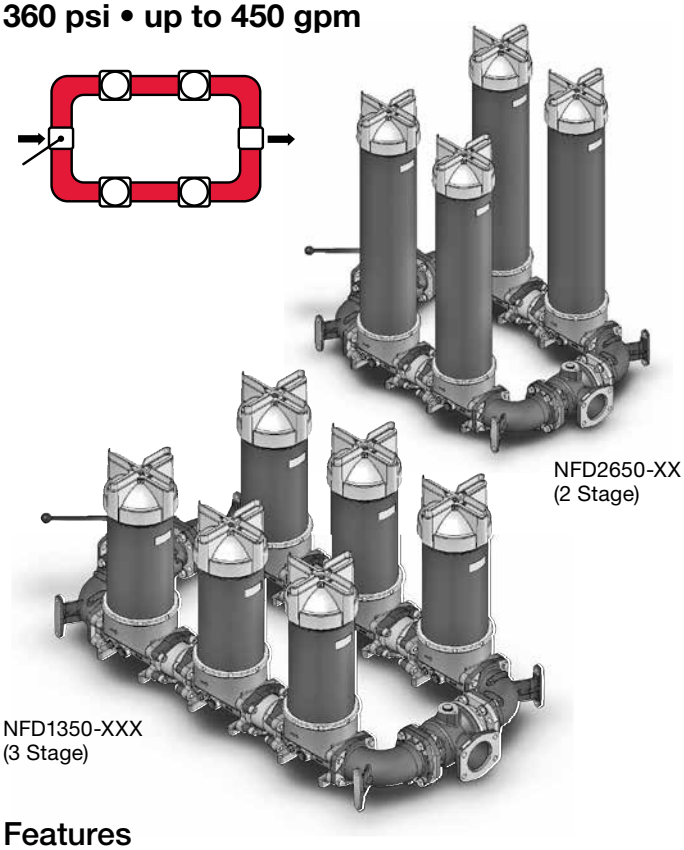
Aquamicron	...R...AM
Size	40 µm
1300 R 040 AM	0.026
2600 R 040 AM	0.013

All Element K Factors in psi / gpm.

NFD UHE Series

Ultra High Efficiency Inline Duplex Filters

360 psi • up to 450 gpm

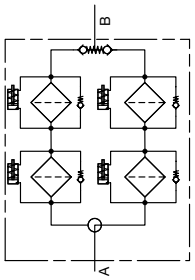


NFD2650-XX
(2 Stage)

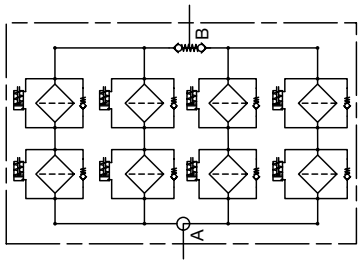
NFD1350-XXX
(3 Stage)

Hydraulic Symbol

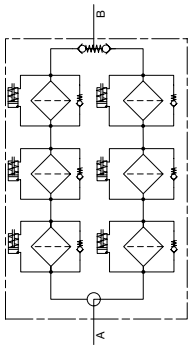
NFD 1350-2650 UHE 2 Stage



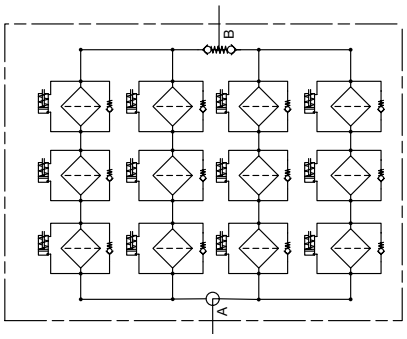
NFD 5250 UHE 2 Stage



NFD 1350-2650 UHE 3 Stage



NFD 5250 UHE 3 Stage



Features

- Multi-pass filtration in a single pass!
- Beta efficiency values > 5000 in a single pass are possible
- Conventional NF housings are piped in a series to achieve multi-levels of filtration in one pass.

Note: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Configurations

NFD Size 1350, 2650, 5250 - Two Stage

- Fine-Fine Filtration in Duplex Arrangement
- Coarse-Fine Filtration in Duplex Arrangement
- Medium-Fine Filtration in a Duplex Arrangement
- Fine Filtration with Water Removal in a Duplex Arrangement
- Customer Defined Arrangement

NFD Size 1350, 2650, 5250 - Three Stage

- Fine-Fine Fine Filtration Arrangement
- Coarse-Medium Fine Filtration Arrangement
- Coarse-Fine with Water Removal Arrangement
- Medium-Fine Fine Filtration Arrangement
- Customer Defined Arrangement

Applications

Technical Specifications

Mounting Method	See drawings	
Port Connection	4" SAE DN 102 Flange Code 61 *(with M16 bolts included)*	
Flow Direction		
1350 / 2650 / 5250	Inlet: Side	Outlet: Side *(opp.)*
Construction Materials		
Head, Housing, Lid	Aluminum	
Filter Stage Connections	Carbon Steel	
Elbows, Manifolds	Ductile Iron	
Flow Capacity		
1350	343 gpm (1300 lpm)	
2650, 5250	450 gpm (1700 lpm) *(4" pipe limit)*	
Housing Pressure Rating		
Max. Allowable Working Pressure	360 psi (25 bar)	
Fatigue Pressure	360 psi (25 bar)	
Burst Pressure	Contact HYDAC	
Element Collapse Pressure Rating		
ON	290 psid (20 bar)	
ECON2, BN4AM, AM	145 psid (10 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
ΔP Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10%		
ΔP = 72 psid (5 bar) -10%		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10%		
ΔP = 87 psid (6 bar) +10%		

PN#02081318 / 07.19 / FIL1907-2109

Model Code

NFD ON-ON-AM 1350 D A P 5-3-40 C 2.0 / V _ _ 3

Filter Type
NFD = Return Line Filter Duplex

Element Media
ON = Optimicron® BN/AM = Betamicron®/Aquamicron®
ECON2 = ECOmicron® AM = Aquamicron®
Note: Include filtration media from each stage, inlet to outlet.

Size
1350, 2650, 5250

Operating Pressure
D = 360 psi (25 bar)

Type of Change Over
A = Ball valve *(diverter)*

Type of Connection
P = SAE DN 102 (4") Code 61 Flange *(Mates with 4" SAE code 61 flange ports with metric connection bolts)*

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON 3, 5, 10, 20 = ECON2 3, 10 = BN/AM 40 = AM
Note: Include filtration rating from each stage, inlet to outlet.

Type of ΔP Clogging Indicator
A = No Indicator *(plugged)* BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number / Modification Number
2.0 = Inline Filter - ΔP indicator

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Number of Filtration Stages
2 = Two Stages *(2 in a series)*
3 = Three Stages *(3 in a series)*

Replacement Element Model Code

1300 R 003 ON / V _ _

Size
1300 - for housings: 1350
2600 - for housings: 2650, 5210

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON 3, 10 = BN4AM
3, 5, 10, 20 = ECON2 40 = AM

Element Media
ON, ECON2, BN4AM, AM

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B6 = 87 psid (6 bar)
KB = no bypass

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 C . X / V _ _ _

Indicator Prefix
VM = ΔP, G 1/2" 3000 psi

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L48 = 48V L110 = 110V L220 = 220V

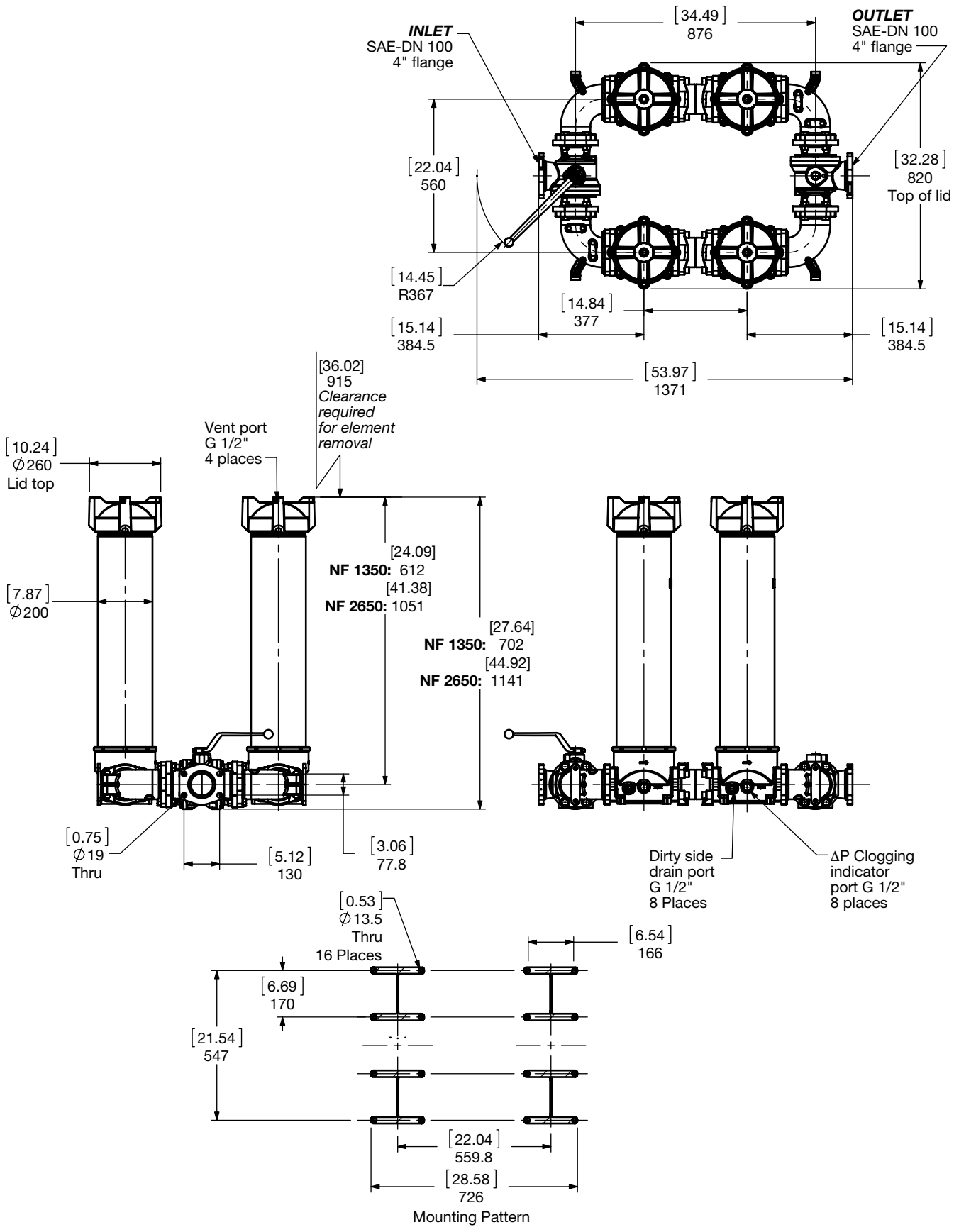
Thermal Lockout *(VM type C, D, J, J4 only)*
T100 = Lockout below 100°F

Underwriter's Recognition *(VM type C, D, J, J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
NFD 1350 / 2650 - 2 Stage Duplex UHE

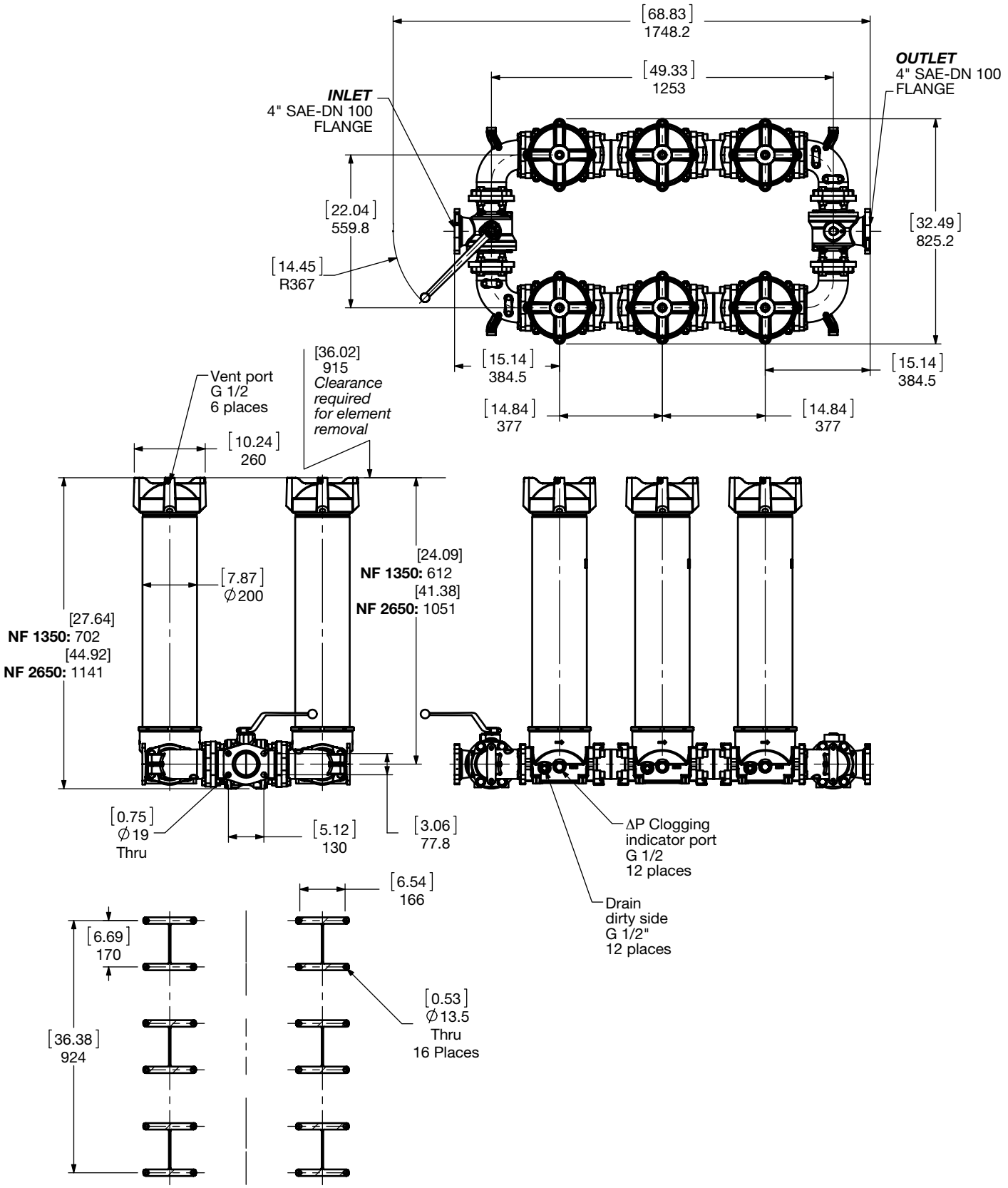


Mounting Pattern

Size	1350	2650
Weight (lbs.)	323.2	433.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NFD 1350 / 2650 - 3 Stage Duplex UHE

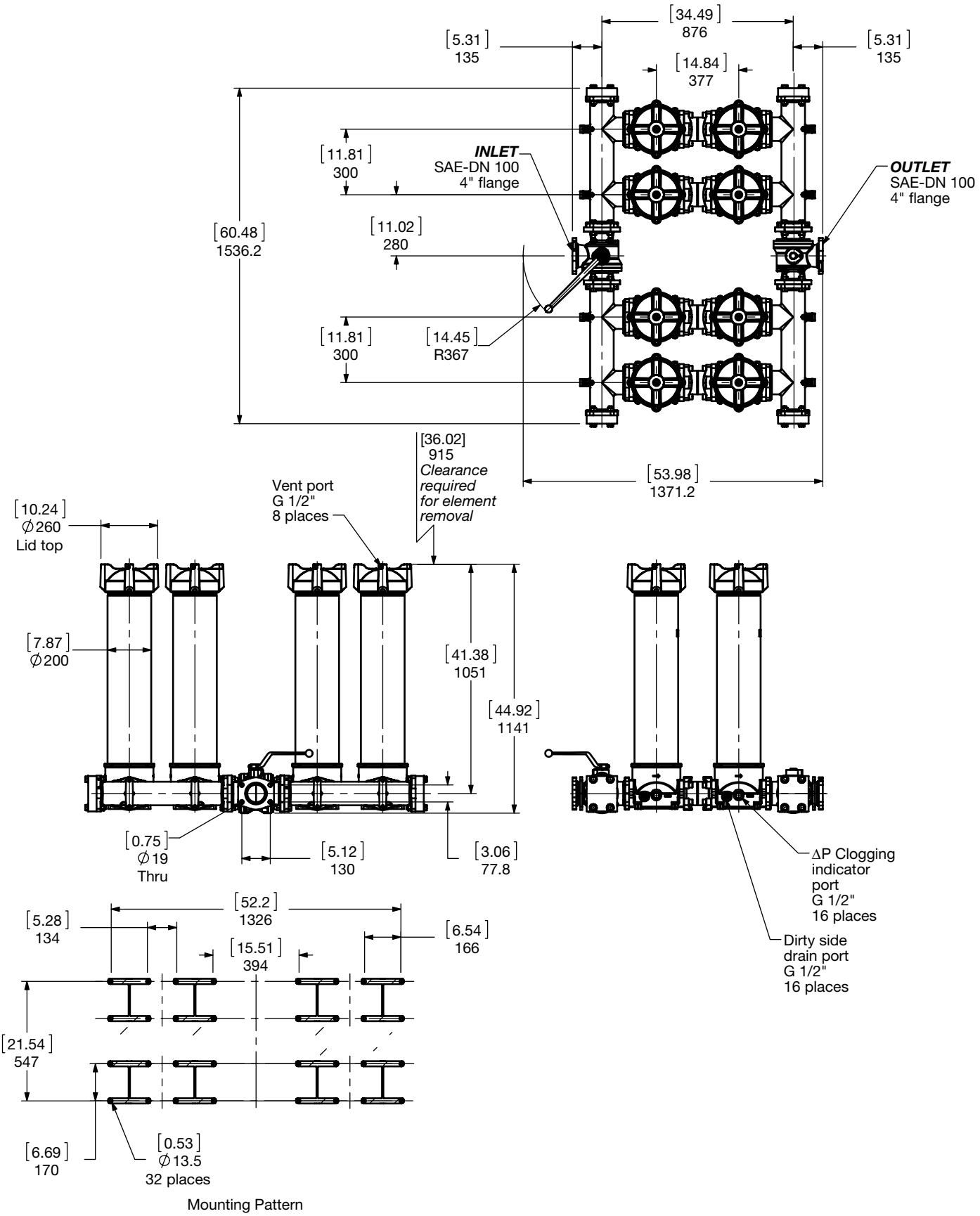


Size	1350	2650
Weight (lbs.)	435.2	584.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

Dimensions:
NFD 5250 - 2 Stage UHE

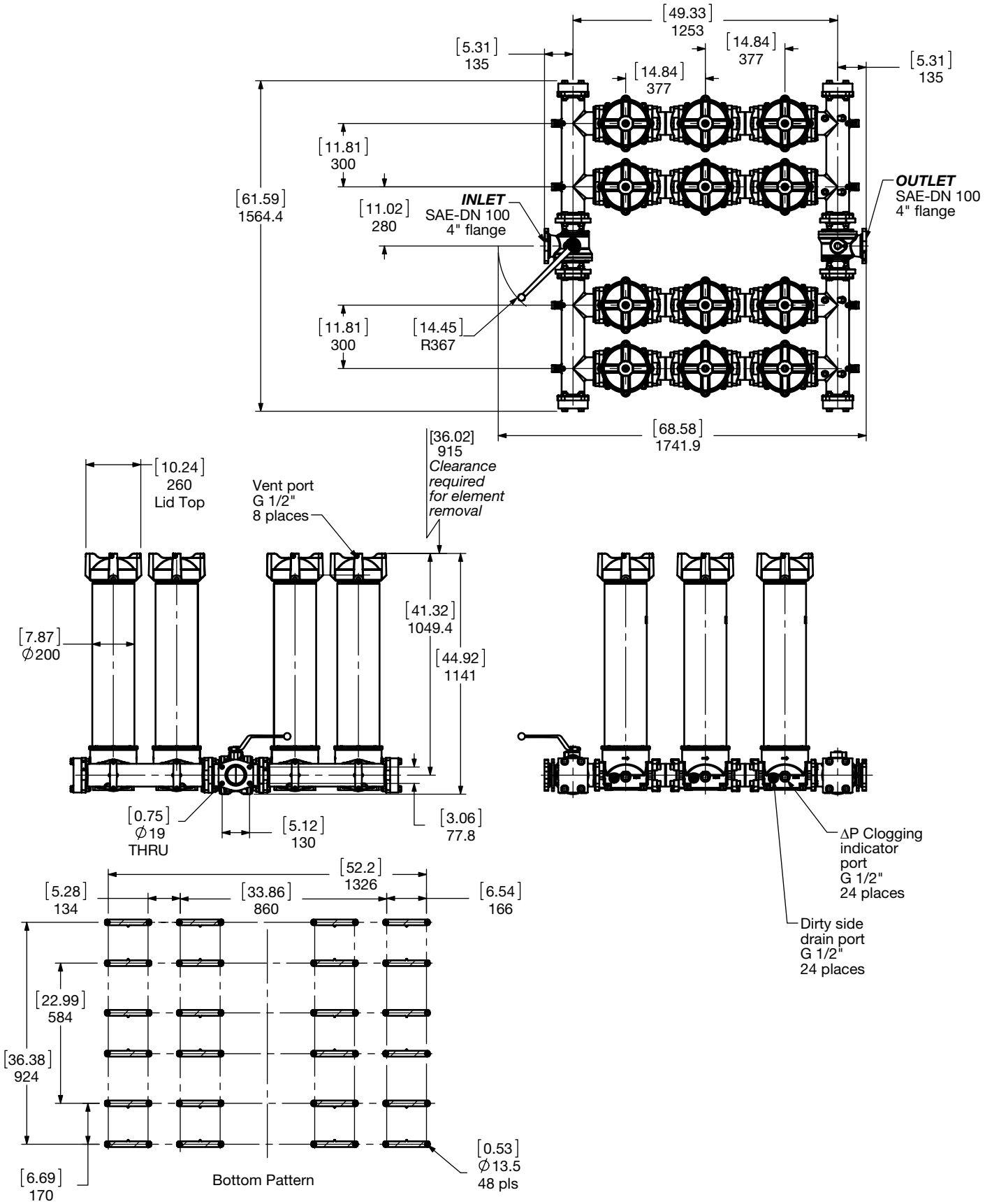


Mounting Pattern

Size	5250
Weight (lbs.)	906.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NFD 5250 - 3 Stage UHE



Size	5250
Weight (lbs.)	1207.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

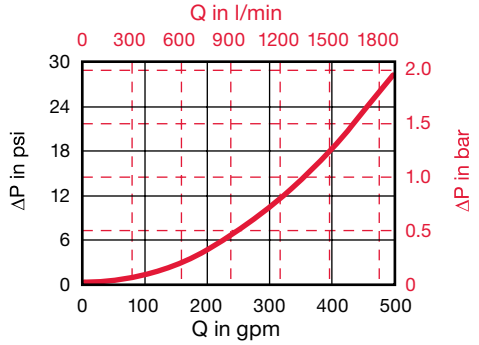
Housing Curve:

Pressure loss through housing is as follows:

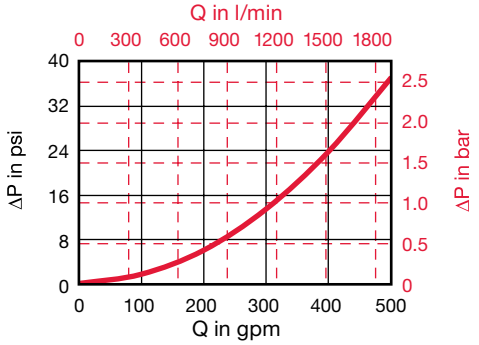
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

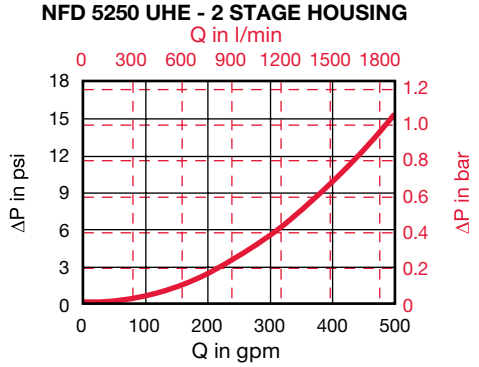
NFD 1350-2650 UHE - 2 STAGE HOUSING



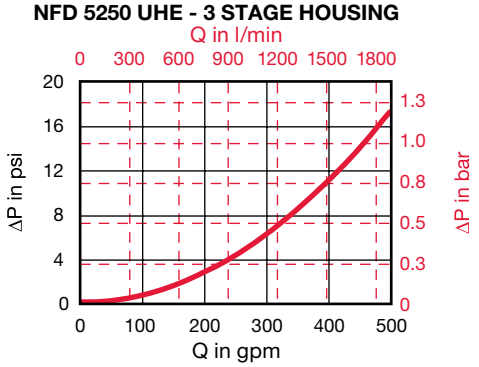
NFD 1350-2650 UHE - 3 STAGE HOUSING



NFD 5250 UHE - 2 STAGE HOUSING



NFD 5250 UHE - 3 STAGE HOUSING



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
1300 R XXX BN4AM	0.088	0.033
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
1300 R 040 AM	0.026
2600 R 040 AM	0.013

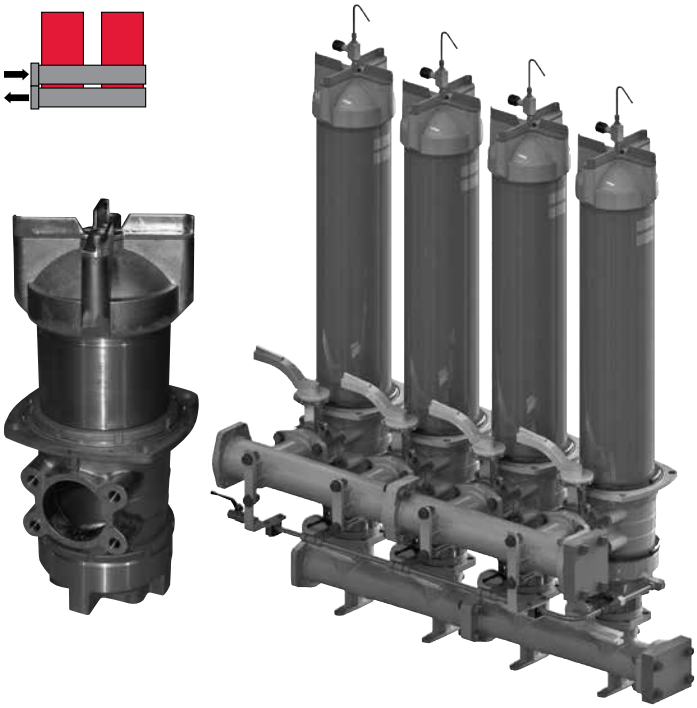
All Element K Factors in psi / gpm.

Notes

NF MMP Series

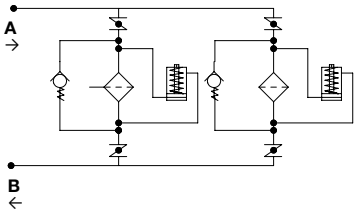
Manifold Modular Parallel Inline Filters - with ECOmicron®-fit option

232 psi • up to 450 gpm (4” header) • up to 1350 gpm (6” header)

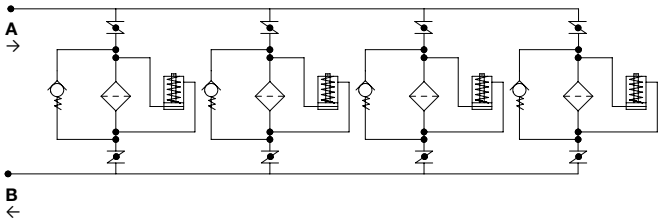


Hydraulic Symbol

NF 52XX Manifold Modular



NF 104XX Manifold Modular



Features

- Less weight/handling - reducing shipping costs
- Towers isolated individually
  (versus NFD 5210 and up, duty-standby arrangement)
- Lower Clean ΔP *(less filters, elements, and piping)*
- Significant Cost Reduction *(less components, smaller footprint)*
- Ease of Operation/Maintenance *(less leakage points)*
- Uses NF Series proven housing and element technology
- Replacement Elements - Optimicron®, ECOmicron®-fit, ECOmicron® *(environmentally friendly, incinerable)*

Configurations

NF Optimicron®, ECOmicron® Size 5210, 7810, 10410

- Bypass located in element endcap

NF ECOmicron®-fit Size 5214, 7814, 10414

- Bypass separate, replaceable component

Applications

Pulp & Paper

Steel / Heavy Industry

Industrial

Technical Specifications

Mounting Method	See drawings	
Port Connection	4” SAE DN 102 Flange Code 61 *(with M16 bolts included)*	
Flow Direction		
2.0 version	Inlet: Side	Outlet: Side
Construction Materials		
Head, Housing, Lid	Aluminum	
6” Piping headers	Carbon Steel	
Elbows, Manifolds	Ductile Iron	
Flow Capacity	DCP... 4” Header Piping	
5210, 5214, 7810, 7814, 10410, 10414	450 gpm (1700 lpm)	
	CC7... 6” Header Piping	
5210, 5214	900 gpm (3406 lpm)	
7810, 7810, 10410, 10414	1350 gpm (5110 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	232 psi (16 bar)	
Fatigue Pressure	232 psi (16 bar)	
Burst Pressure	Contact HYDAC	
Element Collapse Pressure Rating		
ON,	290 psid (20 bar)	
ECON2	145 psid (10 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14˚F (-10˚C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10%		
ΔP = 72 psid (5 bar) -10%	2.0 - Differential	
Bypass Valve Cracking Pressure		
ΔP = 14.5 psid (1 bar) +10%		
ΔP = 43 psid (3 bar) +10% *(standard)*		
ΔP = 87 psid (6 bar) +10%		

PN#02081318 / 07.19 / FIL1907-2109

Model Code

NF ON 5210 C C P 6 D 2.0 / A V B6 EM - DBV

Filter Type
NF = Inline Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®, ECOmicron®-fit

Size
5210, 7810, 10410 = ON, ECON2
5214, 7814, 10414 = ECON2 *(ECOmicron-fit)*

Operating Pressure
C = 232 psi (16 bar)

Type of Isolation Valve
C = Butterfly valves upstream and downstream

Type of Connection
P = SAE DN 102 (4") Flange - Code 61
7 = 6" ANSI CS 300lb. Flange

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON 3, 5, 10, 20 = ECON2
3, 6, 12, 25 = ECON2 *(ECOmicron-fit)*

Type of ΔP Clogging Indicator
A = No Indicator *(plugged)* B, BM, C, D, LE *(Others available upon request, see Clogging Indicators section.)*

Type Number / Modification Number
2.0 = Inline Filter - ΔP indicator

Flow Path *(facing Inlet manifold headers)*
A = Left inlet, Left outlet C = Left inlet, Right outlet
B = Right inlet, Right outlet D = Right inlet, Left outlet

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SFREE = Element specially designed to minimize electrostatic charge generation
EM = Manual vent valve set VKD = Drain manifold
DBV = Double butterfly valve *(standard)* DBVL = Double butterfly valve - lockable
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code *(ON, ECON2)*

2600 R 005 ON / V B6

Size
2600

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON 3, 5, 10, 20 = ECON2

Element Media
ON, ECON2

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene Propylene rubber (EPDM)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)* B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar) KB = no bypass

Supplementary Details
SO263 = *(See above)* SFREE = *(See above)*

Replacement Element Model Code *(ECOmicron-fit)*

1.14.39D 6 ECON2 - V

Size
1.14.39D

Filtration Rating *(micron)*
3, 6, 12, 25 = ECON2

Element Media
ECON2

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Clogging Indicator Model Code

VM 5 BM . X /

Indicator Prefix
VM = ΔP, G 1/2" 3000 psi
VD = ΔP G 1/2" 6000 psi
(2.0 ver. - LE Indicators only)

Trip Pressure
2 = 29 psid (2 bar) *(return filters)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
LE = Electric switch and pop-up

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene Propylene rubber (EPDM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

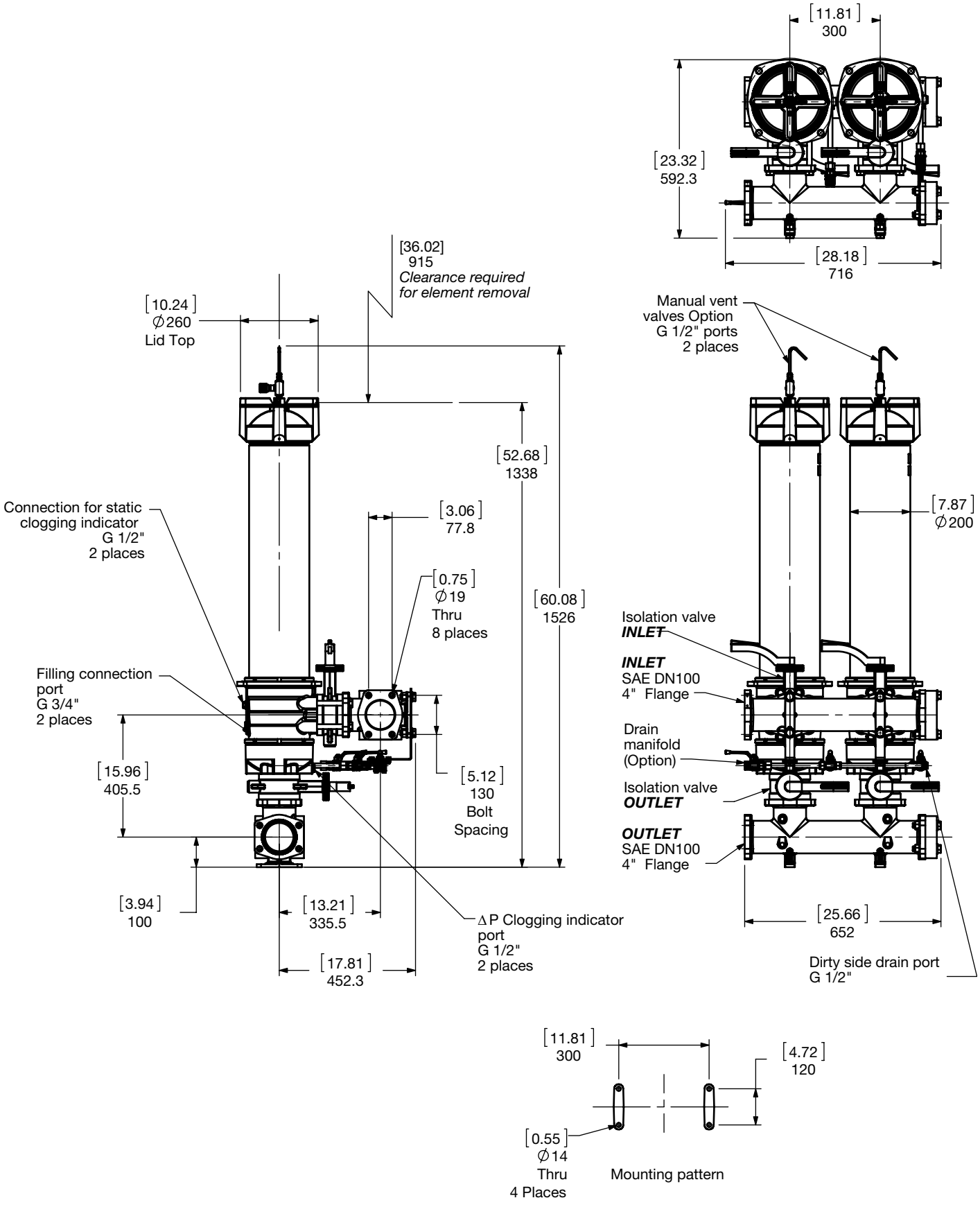
Thermal Lockout *(VM type C, D, J, J4 only)*
T100 = Lockout below 100°F

Underwriter's Approval *(VM type C, D, J, J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

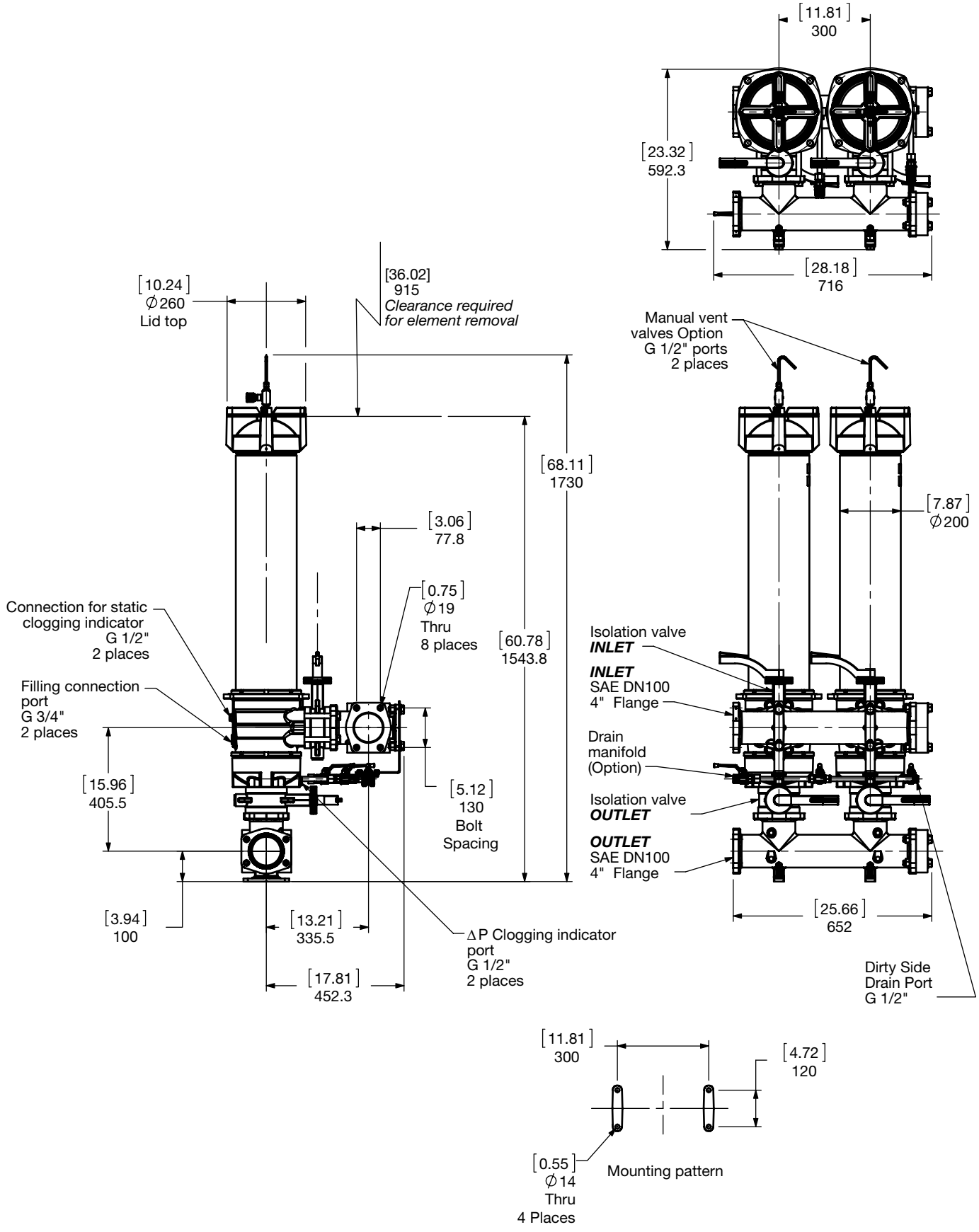
Dimensions
NF 5210 2.0 Version (Modular Parallel)



Size	5210
Weight (lbs.)	287

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 5214 2.0 Version (Modular Parallel)

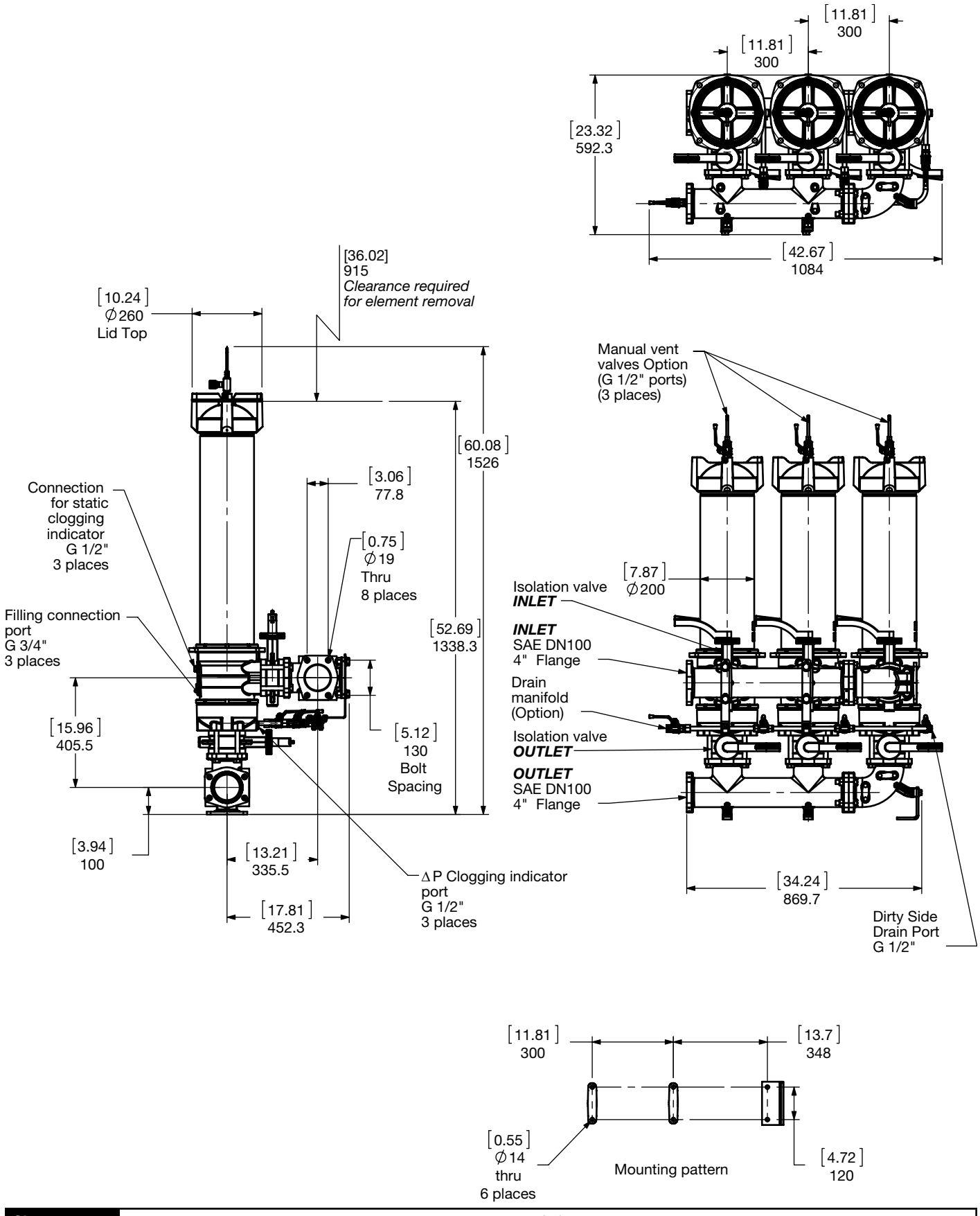


Size	5214
Weight (lbs.)	291

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

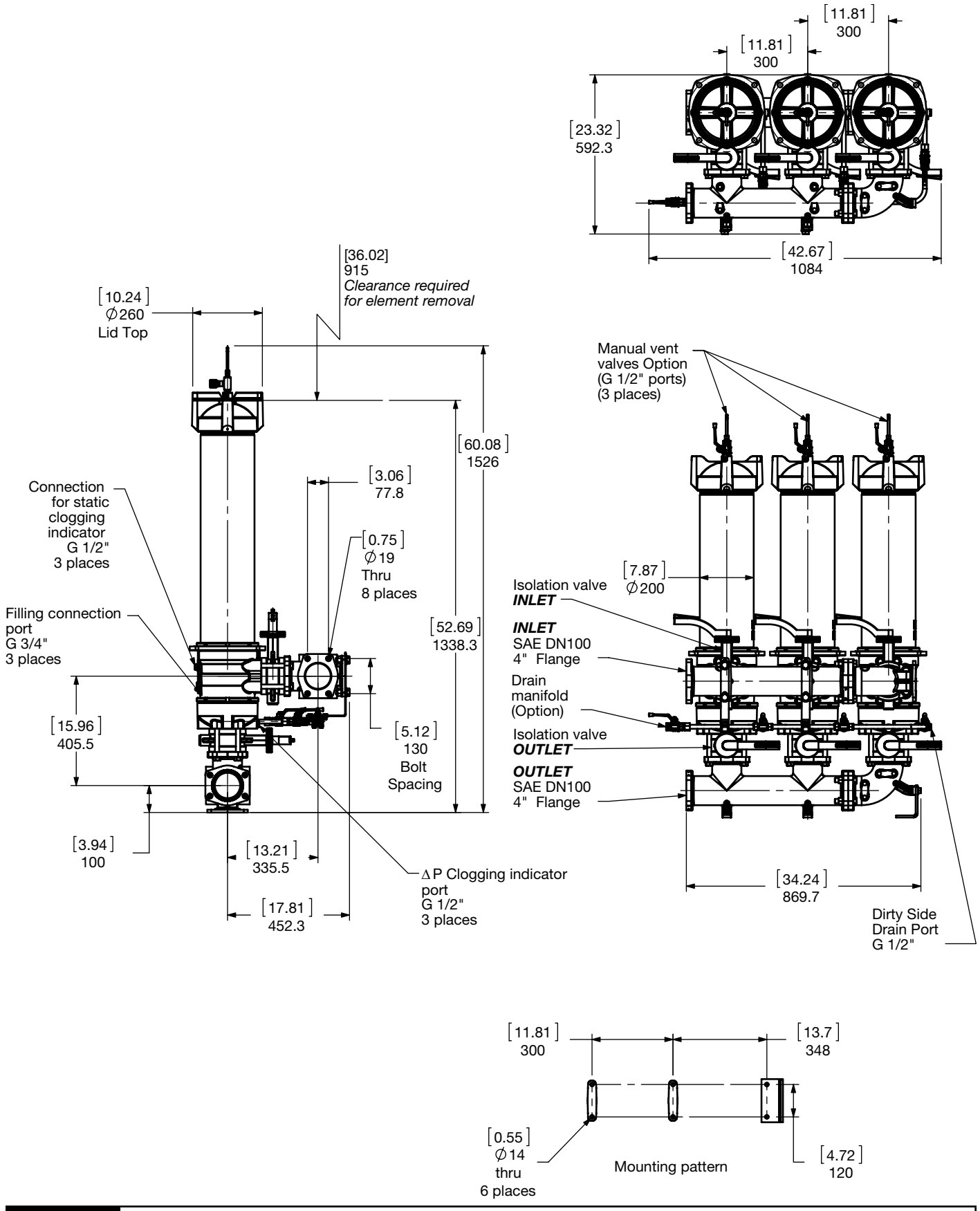
Dimensions:
NF 7810 2.0 Version (Modular Parallel)



Size	7810
Weight (lbs.)	370

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 7814 2.0 Version (Modular Parallel)

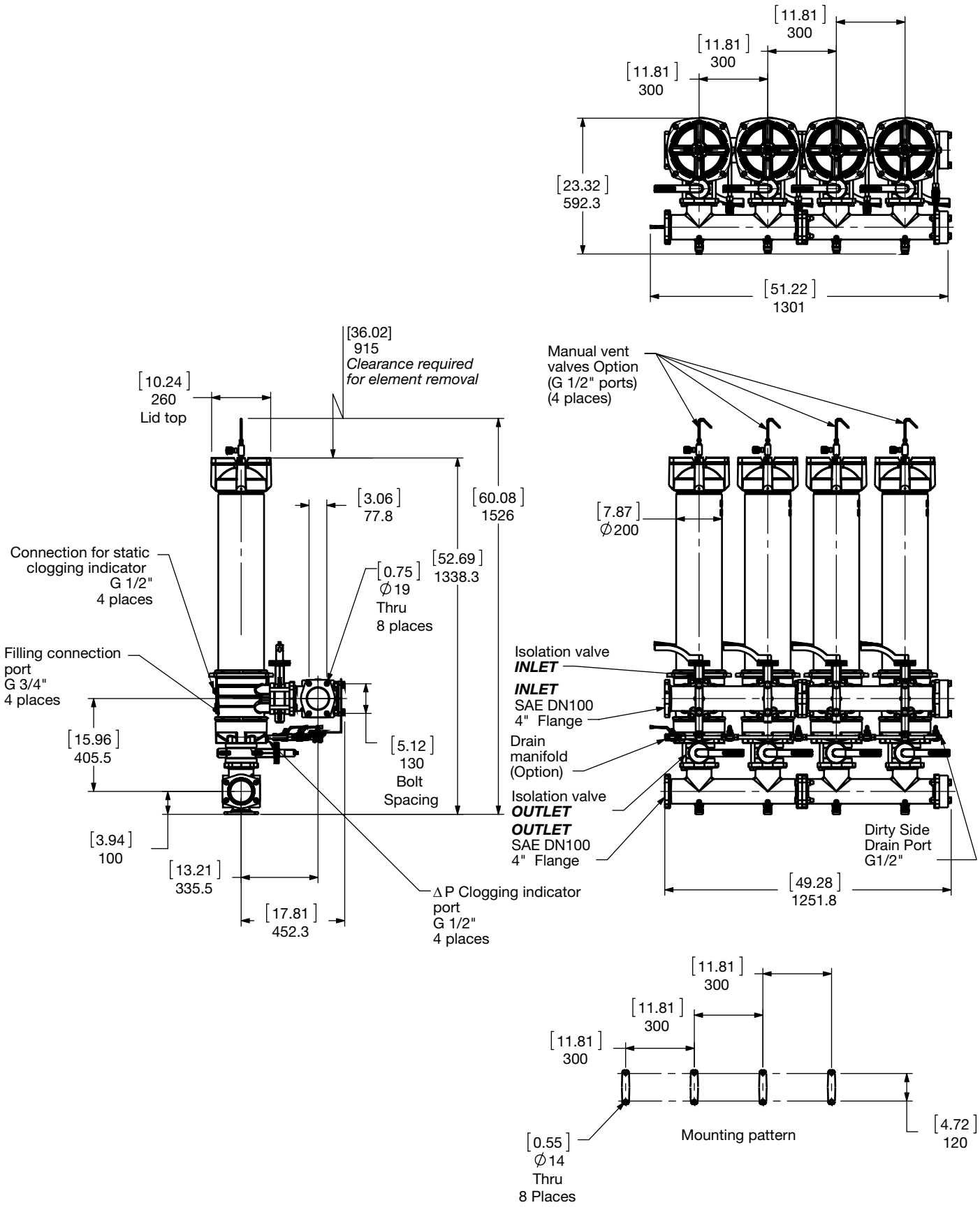


Size	7814
Weight (lbs.)	380

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

LOW PRESSURE FILTERS

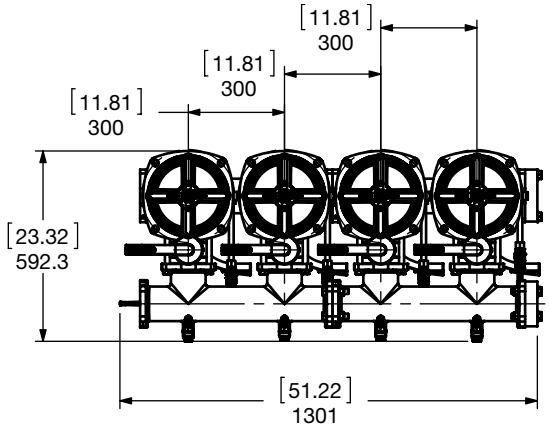
Dimensions:
NF 10410 2.0 Version (Modular Parallel)

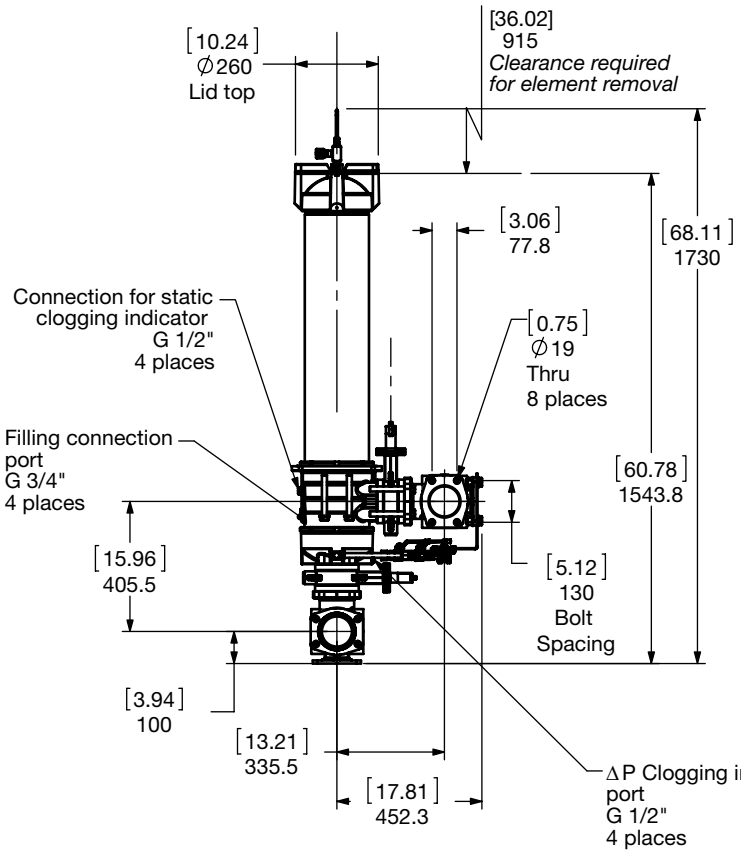


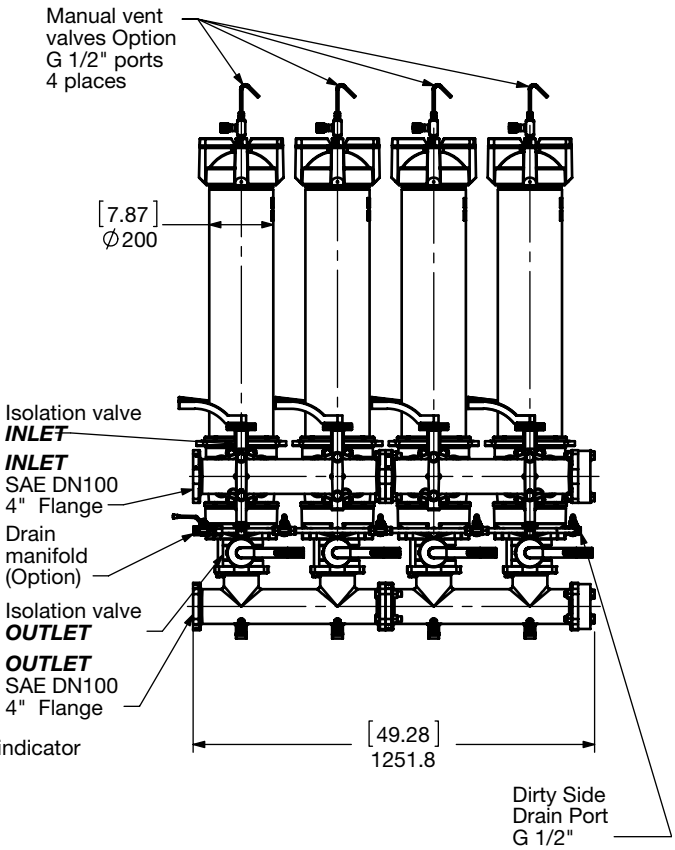
Size	10410
Weight (lbs.)	554

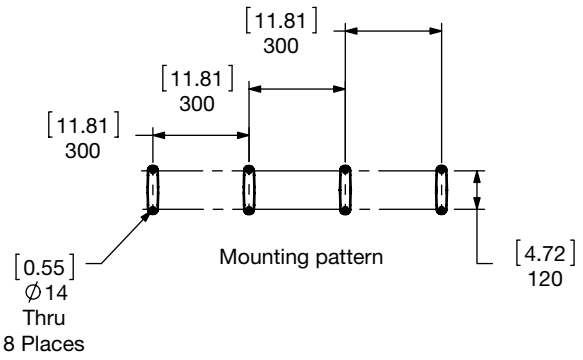
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 10414 2.0 Version (Modular Parallel)







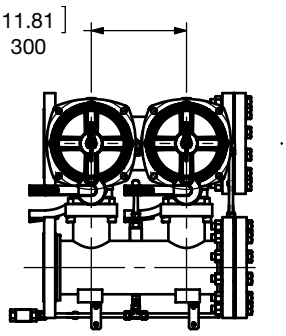


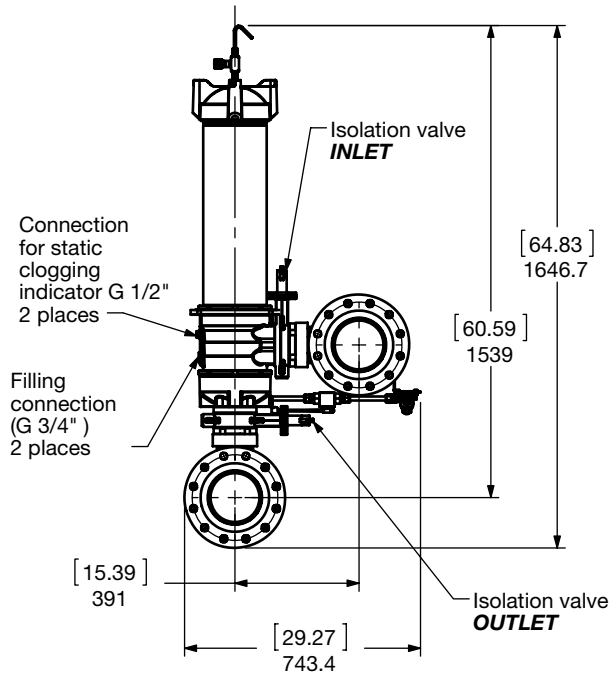
Size	10414
Weight (lbs.)	562

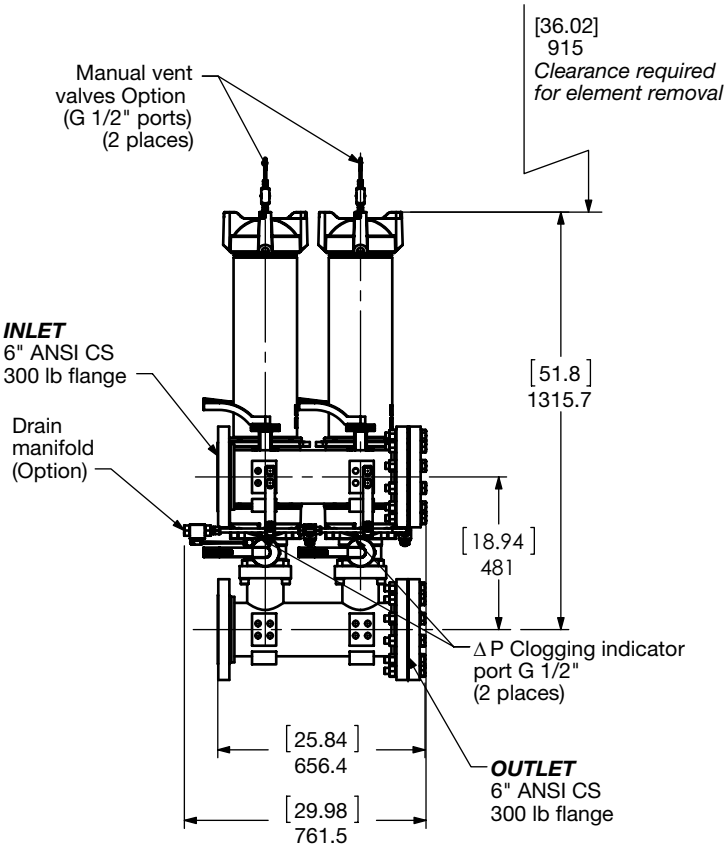
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

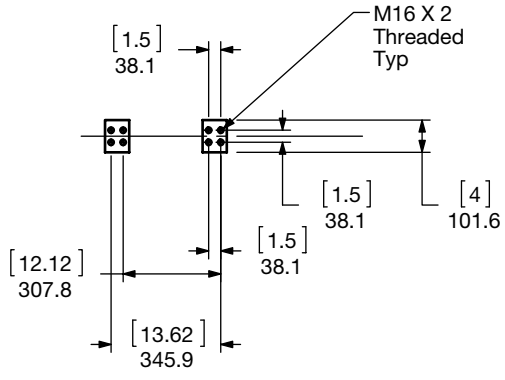
LOW PRESSURE FILTERS

Dimensions:
NF 5210DC7 2.0 Version (Modular Parallel High Flow)







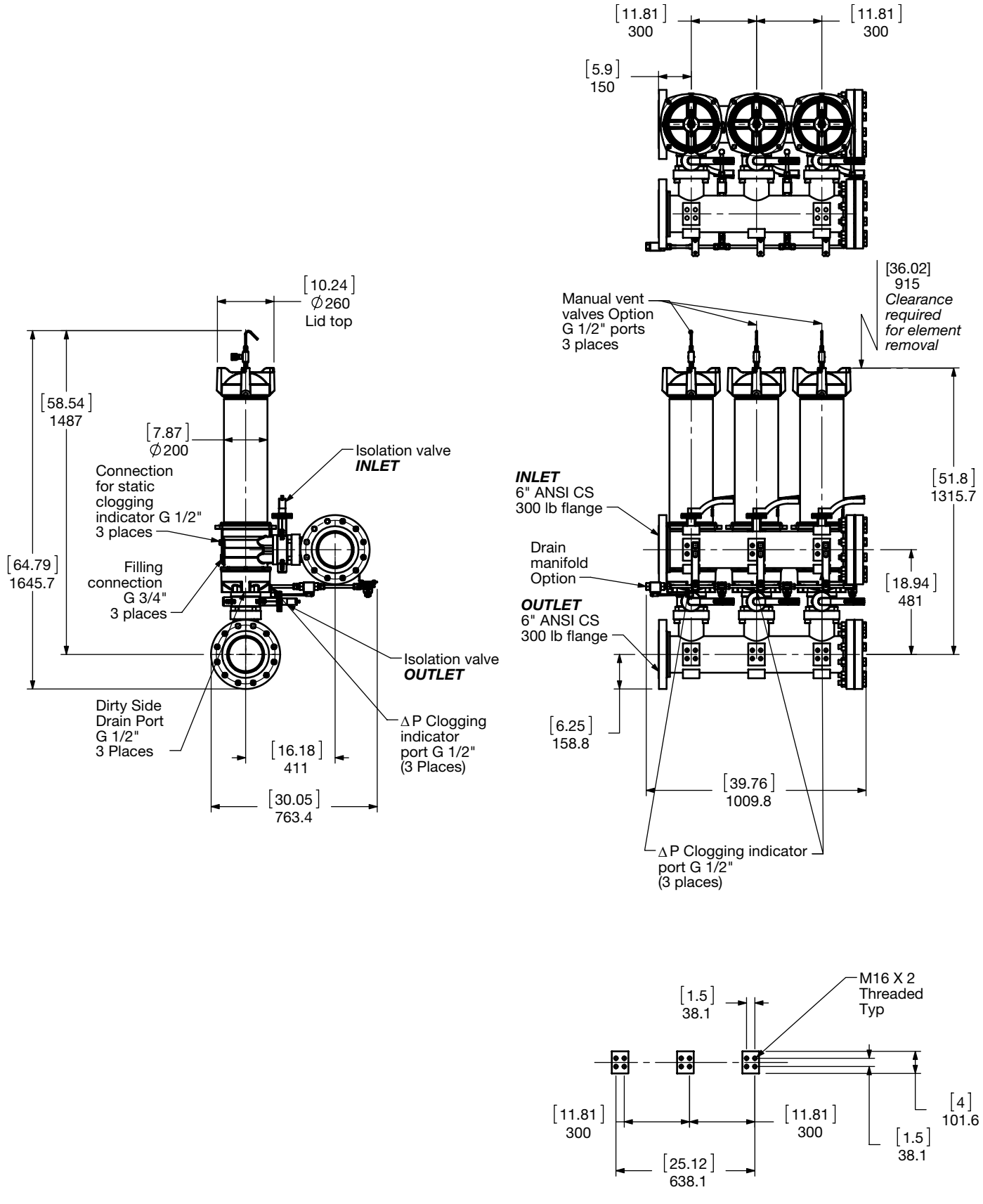


Mounting Pattern

Size	5210DC7
Weight (lbs.)	530

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions:
NF 7810DC7 2.0 Version (Modular Parallel High Flow)



Mounting Pattern

Size	7810DC7
Weight (lbs.)	679

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

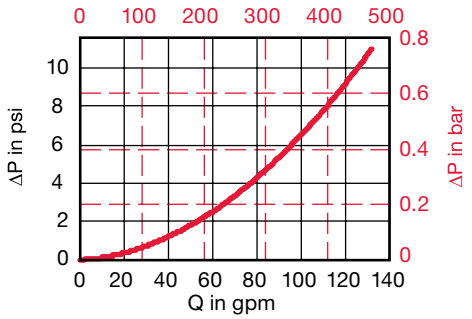
Housing Curve:

Pressure loss through housing is as follows:

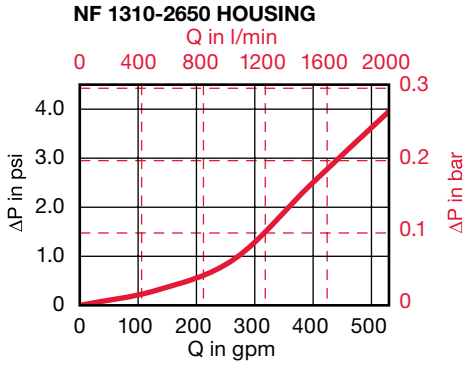
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

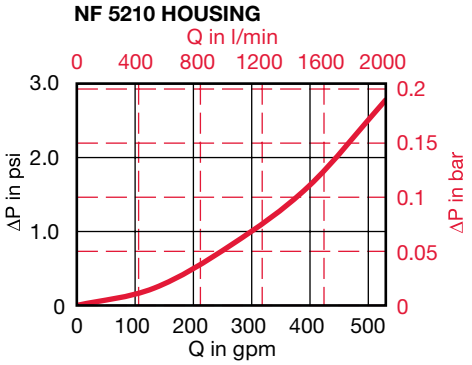
NF 330/500/750 HOUSING



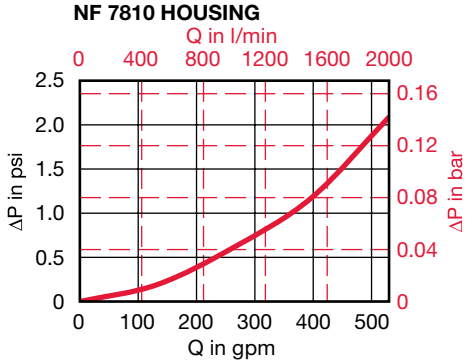
NF 1310-2650 HOUSING



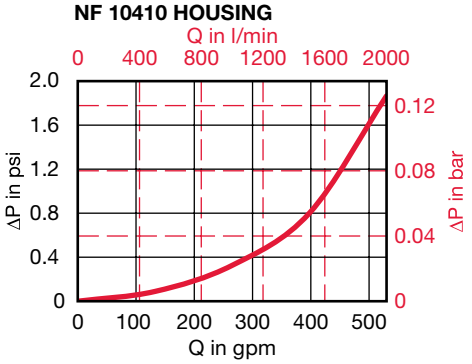
NF 5210 HOUSING



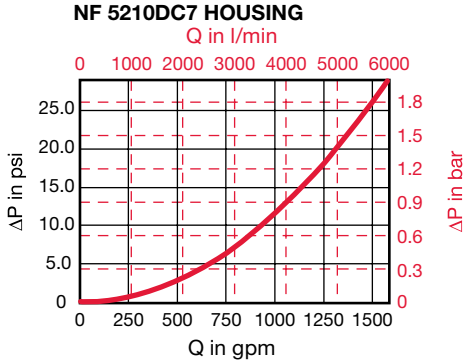
NF 7810 HOUSING



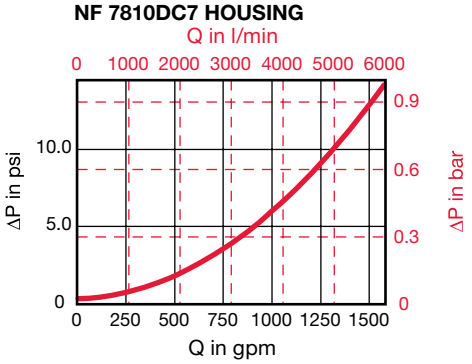
NF 10410 HOUSING



NF 5210DC7 HOUSING



NF 7810DC7 HOUSING



All Element K Factors in psi / gpm.

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2600 R XXX ECON2	0.022	0.016	0.011	0.005

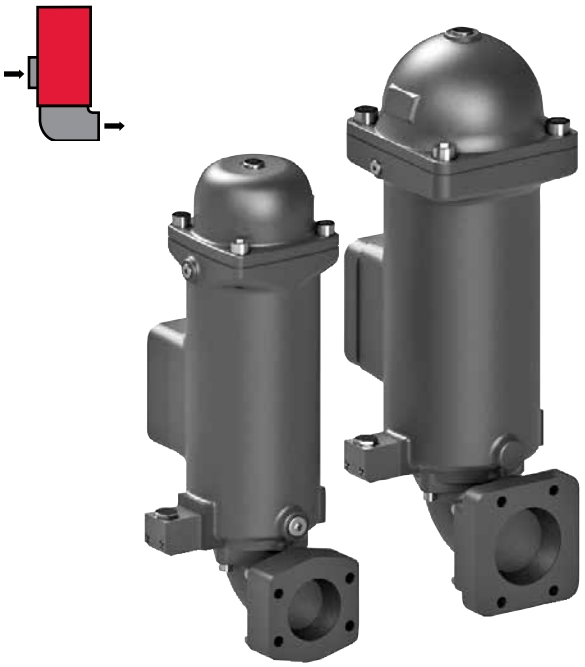
ECOmicron fit	1.14.XXDXXECO/N			
Size	3 µm	6 µm	12 µm	25 µm
1.14.16DXXECO/N	0.046	0.041	0.022	0.015
1.14.39DXXECO/N	0.017	0.016	0.008	0.006

Notes

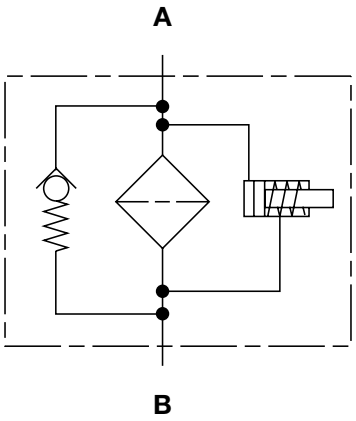
RFL Cast Series

Inline Filters

360 psi • up to 350 gpm



Hydraulic Symbol



Features

- Models 851 and 1301 are made of ductile cast iron and consist of a two part filter housing with bolt-on cast iron lid. The two part construction makes it possible to arrange the inlet and outlet either one above the other on one side or, by turning the base part 180°, on opposite sides of the housing.
- Inlet/outlet ports for models 851 and 1301 comply with SAE 4-bolt flange Code 61 configuration.
- Clogging indicators have no external dynamic seal. High reliability is achieved and magnetic actuation eliminates a leak point.

Note: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications

Technical Specifications

Mounting Method	Support by means of pipe clamps
Port Connection	
851	3” SAE DN 76 Code 61 Flange
1301	4” SAE DN 102 Code 61 Flange
Flow Direction	Inlet: Side Outlet: Side
Construction Materials	
Head, Lid, Elbow	Ductile iron
Flow Capacity	
851	225 gpm (850 lpm)
1301	343 gpm (1300 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	360 psi (25 bar)
Fatigue Pressure	360 psi (25 bar)
Burst Pressure	> 1440 psi (100 bar)
Element Collapse Pressure Rating	
ON, W/HC	290 psid (20 bar)
BN4AM, ECON2, AM, P/HC	145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14˚F (-10˚C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10%	
ΔP = 72 psid (5 bar) -10%	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10%	
ΔP = 87 psid (6 bar) +10%	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

RFL ON 851 D P 3 A 1 . X / V

Filter Type
RFL = Inline Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Screen
BN/AM = Betamicron®/Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Size
851
1301

Operating Pressure
D = 363 psi (25 bar)

Type of Connection
N = SAE DN 76 3"Code 61 *(size 851)*
P = SAE DN 102 4" Code 61 *(size 1301)*
with metric threads

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON
25, 50, 100, 200 = W/HC
3, 10 = BN/AM
10, 20 = P/HC
3, 5, 10, 20 = ECON2
40 = AM

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing systems)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
cRUus = Electrical Indicator with underwriter's approval
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0850 R 010 ON / V B6

Size
0850, 1300

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
3, 10 = BN4AM
40 = AM
10, 20 = P/HC

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)
KB = No Bypass

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 B . X /

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2 = 29 psid (2 bar)
5 = 72 psid (5 bar)
(optional)

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = electric switch - SPDT
D = electric switch & LED light – SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

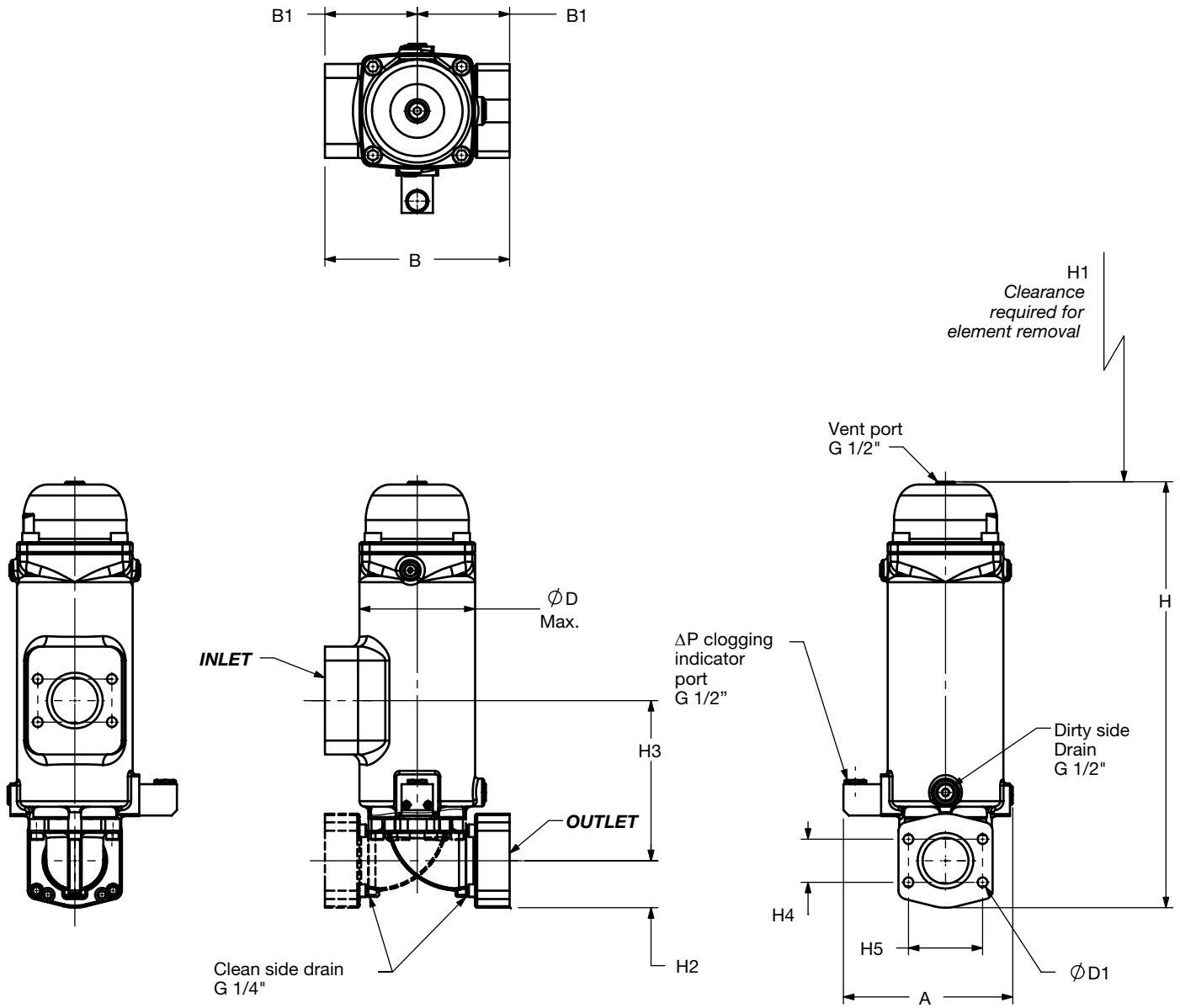
Thermal Lockout *(VM type C, D, J, J4 only)*
T100 = Lockout below 100°F

Underwriter's Approval *(VM type C, D, J, J4 only)*
cRUus = Electrical Indicator with underwriter's approval

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
RFL Cast 851-1301



Size	A	B	B1	H	H1	H2	H3	H4	H5	D	D1	Weight (lbs)
RFL 851	[7.56] 192	[8.78] 266	[5.23] 133	[24.09] 612	[16.54] 420	[2.66] 67.5	[9.05] 230	[2.44] 61.9	[4.19] 106.4	[6.77] 172	M16	84.9
RFL 1301	[8.78] 223	[11.26] 286	[5.63] 143	[27.99] 711	[19.69] 500	[3.05] 77.5	[9.84] 250	[3.06] 77.8	[5.13] 130.2	[8.66] 220	M16	122.4

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

PN#02081318 / 07.19 / FIL1907-2109

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

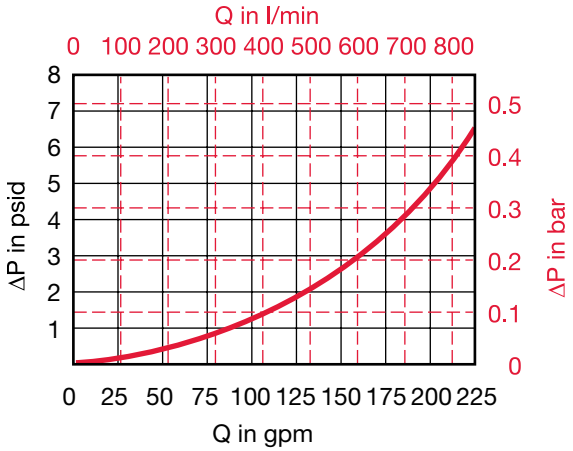
Housing Curve:

Pressure loss through housing is as follows:

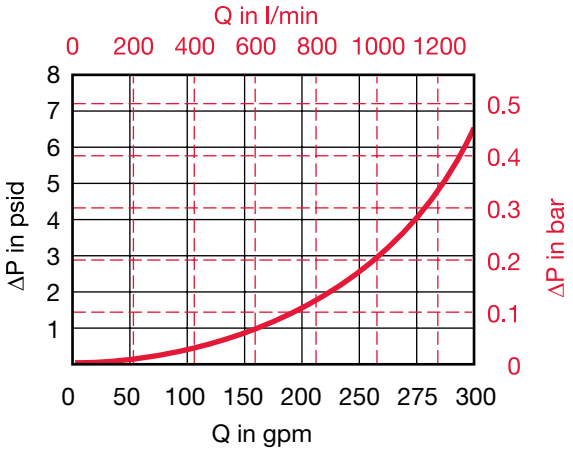
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

RFL 851 HOUSING



RFL 1301 HOUSING



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0850 R XXX ON	0.152	0.072	0.055	0.032	0.024	0.02
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0850 R XXX ECON2	0.082	0.055	0.038	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0850 R XXX BN4AM	0.154	0.049
1300 R XXX BN4AM	0.088	0.033

Aquamicron	...R...AM
Size	40 µm
0850 R 040 AM	0.040
1300 R 040 AM	0.026

Wire Screen	...R...W/HC
Size	25, 50, 100, 200 µm
0850 R XXX W/HC	0.003
1300 R XXX W/HC	0.002

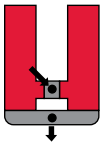
Polyester	...R...P/HC	
Size	10 µm	20 µm
0850 R XXX P/HC	0.007	0.003
1300 R XXX P/HC	0.004	0.002

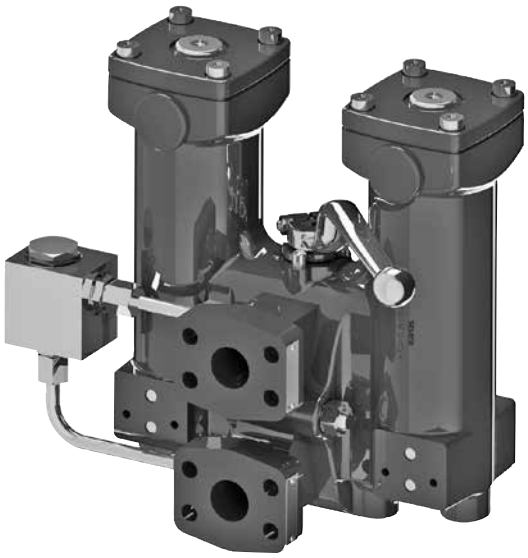
All Element K Factors in psi / gpm.

RFLD Cast Series

Inline Duplex Filters

580 psi • up to 340 gpm





Features

- Inlet and outlet connections are located on the same side of the transfer valve. Inlet on top and the outlet on bottom.
- Transfer valve and pressure equalization line allows easy changeover between filter housings without costly system shutdown. *(standard with 851, 951 & 1301)*
- Clogging indicators have no external dynamic seal. High reliability is achieved and magnetic actuation eliminates a leak point.

Note: This filter is configured with an .....R.... type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications


Automotive


Gearboxes


Industrial


Power Generation

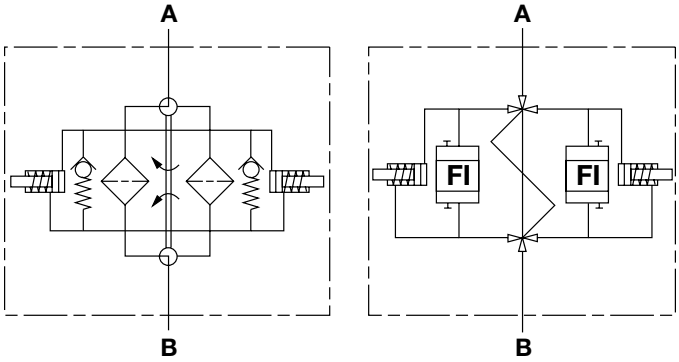

Pulp & Paper


Railways


Shipbuilding


Steel / Heavy Industry

Hydraulic Symbol



Technical Specifications

Mounting Method	Mounting holes on opposite side from Inlet/Outlet port faces	
Port Connection	Flange ports with metric threads	
111	1” SAE DN 25 Code 61	
241	1 1/2” SAE DN 38 Code 61	
331	1 1/2” SAE DN 38 Code 61, 2” SAE DN 51 Code 61	
501	1 1/2” SAE DN 38 Code 61, 2” SAE DN 51 Code 61	
661	2” SAE DN 51 Code 61, 2 1/2” SAE DN 64 Code 61 3” SAE/DIN DN 76 Code 61	
851	2” SAE DN 51 Code 61, 2 1/2” SAE DN 64 Code 61 3” SAE/DIN DN 76 Code 61	
951 1301	3” SAE/DIN DN 76 Code 61, 4” SAE/DIN DN 102 Code 61 3” SAE/DIN DN 76 Code 61, 4” SAE/DIN DN 102 Code 61	
Flow Direction	Inlet: Front Top	Outlet: Front Bottom
Construction Materials		
Head, Lid, Elbow	Ductile iron	
Flow Capacity		
111	29 gpm (110 lpm)	
241	63 gpm (240 lpm)	
331	87 gpm (330 lpm)	
501	132 gpm (500 lpm)	
661	174 gpm (660 lpm)	
851	225 gpm (850 lpm)	
951	251 gpm (950 lpm)	
1301	343 gpm (1300 lpm)	
Housing Press. Rating	**111 - 241**	**501 - 1301**
Max. Allowable Working Pressure	580 psi (40 bar)	360 psi (25 bar)
Fatigue Pressure	580 psi (40 bar)	360 psi (25 bar)
Burst Pressure	>2320 psi (160 bar)	>1440 psi (100 bar)
Element Collapse Pressure Rating		
ON, W/HC		290 psid (20 bar)
ECON2, BN4AM, AM, P/HC		145 psid (10 bar)
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14˚F (-10˚C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(standard)* ΔP = 72 psid (5 bar) -10%		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(standard)* ΔP = 87 psid (6 bar) +10%		

PN#02081318 / 07.19 / FIL1907-2109

Model Code

RFLD ON 1301 D A T 10 D 1 . X / V

Filter Type
RFLD = Duplex Inline Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Mesh
BN/AM = Betamicron®/Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Sizes
111, 241, 331, 501, 661, 851, 951, 1301

Operating Pressure
D = 25 bar *(sizes 331, 501, 661, 851, 951, 1301)*
E = 40 bar *(sizes 111, 241)*

Type of Change-over
A = ball type change-over valve

Type of Connection / Connection Sizes
I = 1" SAE DN 25 Code 61 *(size 111 only)*
K = 1 1/2" SAE DN 38 Code 61 *(sizes 241, 331, 501)*
L = 2" SAE DN 51 Code 61 *(sizes 331, 501, 661, 851)*
M = 2 1/2" SAE DN 64 Code 61 *(sizes 661, 851)*
S = 3" SAE/DIN DN 76 Code 61 *(sizes 661, 851, 951, 1301)*
T = 4" SAE/DIN DN 102 Code 61 *(sizes 951, 1301)*

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON
40 = AM
3, 10 = BN/AM
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = ECON2
10, 20 = P/HC

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing systems)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
cRUus = Electrical Indicator with underwriter's approval
DE = Dual Indicator Option *(one indicator per duplex side)*
SB = Pressure equalization line *(sizes 111 - 661; included standard on larger sizes)*
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0110 R 010 ON / V B6

Size
0110, 0240, 0330, 0500,
0660, 0850, 0950, 1300

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
3, 10 = BN4AM
40 = AM
10, 20 = P/HC

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)
KB = No Bypass

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 B . X / V

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2 = 29 psid (2 bar) *(standard)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = electric switch - SPDT
D = electric switch & LED light – SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM type C, D, J, J4 only)*
T100 = Lockout below 100°F

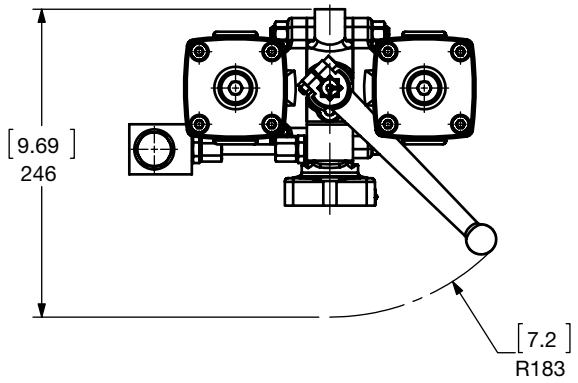
Underwriter's Approval *(VM type C, D, J, J4 only)*
cRUus = Electrical Indicator with underwriter's approval

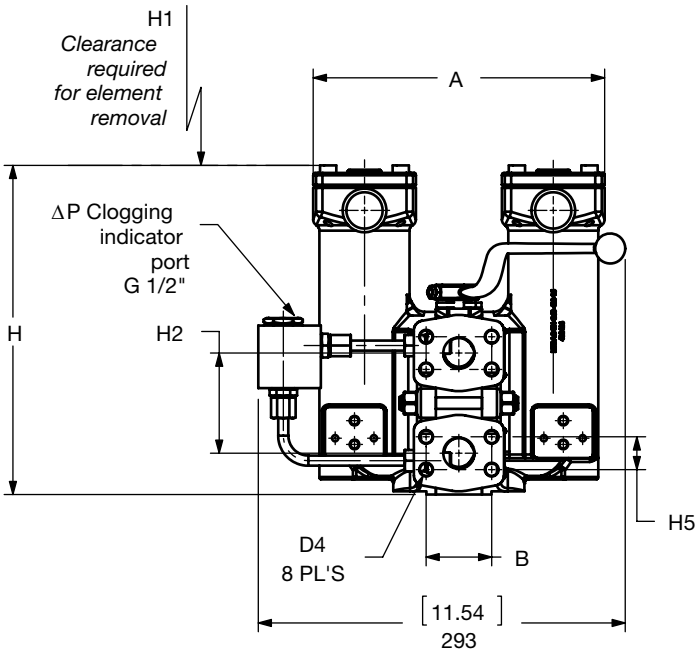
(For additional details and options, see Clogging Indicators section.)

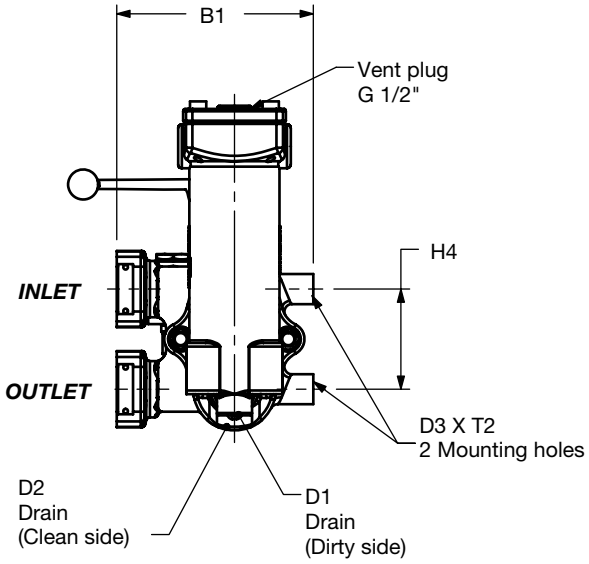
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

LOW PRESSURE FILTERS

Dimensions
RFLD 111 - 1301







Size	A	B	B1	H	H1	H2	H4	H5	D1	D2	D3	D4	T2	Wt. (lbs)
RFLD 111 EAI (DN 25)	[9.17] 233	[2.06] 52.4	[6.18] 157	[10.35] 263	[6.89] 175	[3.15] 80	[3.15] 80	[1.03] 26.2	G 1/4	G 1/4	M12	M10	[0.98] 25	37.4
RFLD 241 EAK (DN 40)	[11.89] 302	[2.75] 69.8	[6.57] 167	[12.28] 312	[8.27] 210	[3.74] 95	[5.51] 140	[1.41] 35.7	G 1/4	G 1/4	M12	M12	[0.71] 18	59.4
RFLD 331 DAL (DN 50)	[14.96] 380	[3.06] 77.8	[7.36] 187	[12.72] 323	[7.87] 200	[4.33] 110	[6.50] 165	[1.69] 42.9	G 1/2	G 1/4	M12	M12	[0.71] 18	81.4
RFLD 501 DAL (DN 50)	[14.96] 380	[3.06] 77.8	[7.36] 187	[15.75] 400	[11.02] 280	[4.33] 110	[6.50] 165	[1.69] 42.9	G 1/2	G 1/4	M12	M12	[0.71] 18	85.8
RFLD 661 DAM (DN 65)	[19.52] 496	[3.50] 88.9	[9.92] 252	[18.58] 472	[13.39] 340	[4.33] 110	[6.50] 165	[2.00] 50.8	G 1/2	G 1/4	M12	M12	[0.71] 18	162.8
RFLD 851 DAS (DN 80)	[19.52] 496	[4.19] 106.4	[8.74] 222	[25.59] 650	[16.54] 420	[9.06] 230	[9.06] 230	[2.44] 61.9	G 1/2	G 1/4	M12	M16	[0.91] 23	193.6
RFLD 951 DAS (DN 80)	[21.57] 548	[4.19] 106.4	[8.74] 222	[23.43] 595	[14.57] 370	[9.06] 230	[9.06] 230	[2.44] 61.9	G 1/2	G 1/4	M12	M16	[0.91] 23	231
RFLD 1301 DAT (DN 100)	[21.85] 555	[5.13] 130.2	[9.76] 248	[29.37] 746	[19.29] 490	[9.84] 250	[9.84] 250	[3.06] 77.8	G 1/2	G 1/4	M16	M16	[0.91] 23	275

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

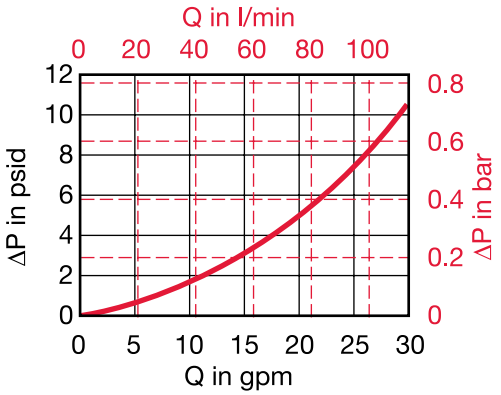
Housing Curve:

Pressure loss through housing is as follows:

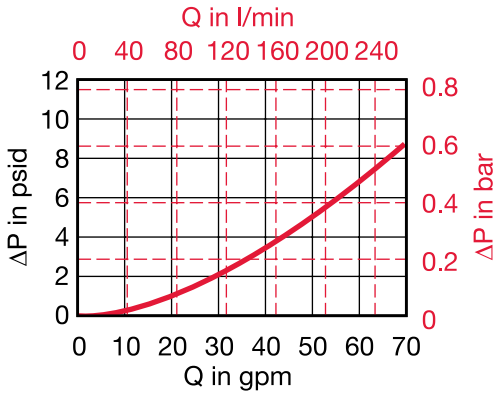
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

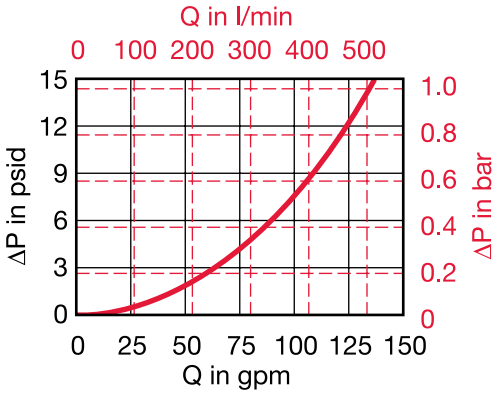
RFLD 111 Housing



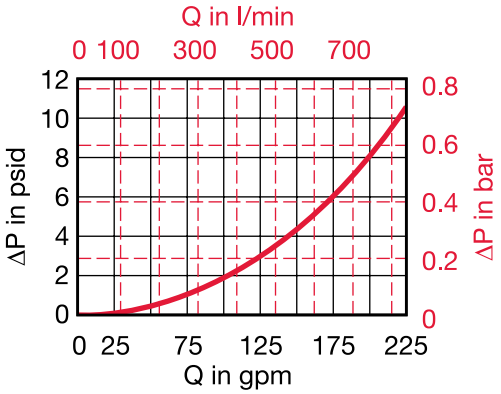
RFLD 241 Housing



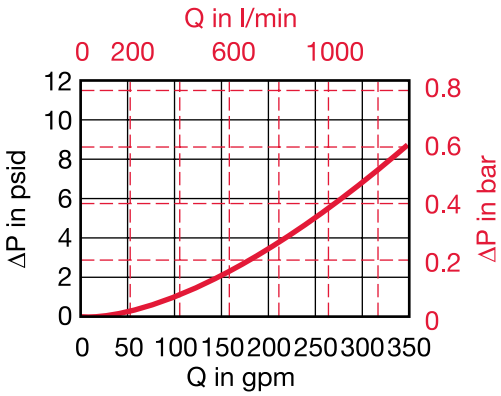
RFLD 331 / 501 Housing



RFLD 661 / 851 Housing



RFLD 951 / 1301 Housing



Required Element Per Housing

Housing Size	Element Size	Elements per Side
111	0110	1
241	0240	1
331	0330	1
501	0500	1
661	0660	1
851	0850	1
951	0950	1
1301	1300	1

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0110 R XXX ON	1.224	0.719	0.487	0.296	0.234	0.178
0240 R XXX ON	0.571	0.284	0.201	0.125	0.101	0.077
0330 R XXX ON	0.444	0.204	0.15	0.081	0.07	0.056
0500 R XXX ON	0.289	0.143	0.104	0.06	0.046	0.038
0660 R XXX ON	0.196	0.093	0.066	0.037	0.031	0.025
0850 R XXX ON	0.152	0.072	0.055	0.032	0.024	0.02
0950 R XXX ON	0.131	0.057	0.043	0.026	0.021	0.017
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0240 R XXX ECON2	0.340	0.209	0.143	0.099
0330 R XXX ECON2	0.230	0.148	0.093	0.066
0500 R XXX ECON2	0.165	0.104	0.071	0.044
0660 R XXX ECON2	0.104	0.066	0.044	0.027
0850 R XXX ECON2	0.082	0.055	0.038	0.022
0950 R XXX ECON2	0.066	0.044	0.027	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0330 R XXX BN4AM	0.477	0.165
0500 R XXX BN4AM	0.313	0.11
0660 R XXX BN4AM	0.192	0.066
0850 R XXX BN4AM	0.154	0.049
0950 R XXX BN4AM	0.132	0.044
1300 R XXX BN4AM	0.088	0.033

Aquamicron	...R...AM
Size	40 µm
0330 R 040 AM	0.115
0500 R 040 AM	0.076
0660 R 040 AM	0.051
0850 R 040 AM	0.040
0950 R 040 AM	0.036
1300 R 040 AM	0.026

Wire Screen	...R...W/HC
Size	25, 50, 100, 200 µm
0110 R XXX W/HC	0.016
0240 R XXX W/HC	0.007
0330 R XXX W/HC	0.011
0500 R XXX W/HC	0.007
0660 R XXX W/HC	0.004
0850 R XXX W/HC	0.003
0950 R XXX W/HC	0.003
1300 R XXX W/HC	0.002

Polyester	...R...P/HC	
Size	10 µm	20 µm
0110 R XXX P/HC	0.050	0.025
0240 R XXX P/HC	0.023	0.012
0330 R XXX P/HC	0.016	0.008
0500 R XXX P/HC	0.011	0.005
0660 R XXX P/HC	0.008	0.004
0850 R XXX P/HC	0.007	0.003
0950 R XXX P/HC	0.006	0.003
1300 R XXX P/HC	0.004	0.002

All Element K Factors in psi / gpm.

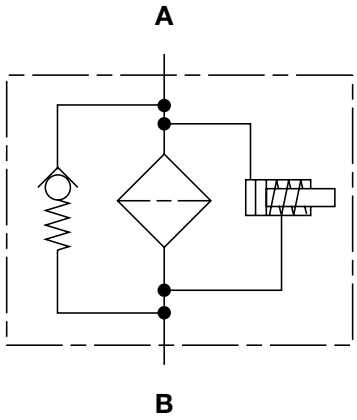
Notes

RFL Welded Series

Inline Filters

230 psi • up to 3900 gpm

Hydraulic Symbol



Features

- Models 1300 to 15000 are made of rolled steel housings with bolt-on steel lids; Stainless steel models are available.
- ANSI flange connections for each filter size provide maximum connection flexibility eliminating additional adapters and intermediate flanges.
- Inlet and outlet connections are located on opposite sides of the housings.
- Clogging indicators have no external dynamic seal. High reliability is achieved and magnetic actuation eliminates a leak point.

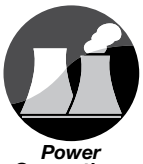
Notes: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Most states and local jurisdictions in the United States require pressure vessels to be ASME stamped. It is the responsibility of the end customer to research and fully understand the ASME code requirements of the jurisdiction this filter will ultimately be installed in, and to fully communicate these requirements to HYDAC.

Applications


Gearboxes


Industrial


Power Generation


Pulp & Paper


Shipbuilding


Steel / Heavy Industry

Technical Specifications

Mounting Method	Floor mounted legs
Port Connection	**Typical Connections**
1300/1320	4” ANSI 150# Flange
2500/2520	6” ANSI 150# Flange
4000/4020	8” ANSI 150# Flange
5200 - 7820	10” ANSI 150# Flange
15000/15020	12” ANSI 150# Flange
Flow Direction	Inlet & Outlet: Side
Construction Materials	
Housing, Lid	Steel
Note: Please contact HYDAC for available stainless steel models.	
Flow Capacity	
1300/1320	350 gpm (1300 lpm)
2500/2520	650 gpm (2500 lpm)
4000/4020	1050 gpm (4000 lpm)
5200/5220	1400 gpm (5200 lpm)
6500/6520	1700 gpm (6500 lpm)
7800/7820	2050 gpm (7800 lpm)
15000/15020	4000 gpm (15000 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	150 psi (10 bar) *(standard)* 232 psi (16 bar) *(optional)*
Fatigue Pressure	Contact HYDAC
Burst Pressure	Contact HYDAC
Element Collapse Pressure Rating	
ON, W/HC	290 psid (20 bar)
ECON2, BN4AM, AM, P/HC	145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14˚F (-10˚C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10% *(standard)* ΔP = 72 psid (5 bar) -10% *(optional)*	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10% *(standard)* ΔP = 87 psid (6 bar) +10% *(optional)*	

Model Code

RFL ON 1300 C T 10 D 1 . X / ZU 150 V __ DH-L110

Filter Type

Element Media
- ON = Optimicron®
- ECON2 = ECOmicron®
- W/HC = Wire Mesh
- BN/AM = Betamicron®/Aquamicron®
- AM = Aquamicron®
- P/HC = Polyester

Size
1300/ 1320/ 2500/ 2520/ 4000/ 4020/ 5200/ 5220/ 6500/ 6520/ 7800/ 7820/ 15000/ 15020

Operating Pressure
- B = 150 psi (10 bar)
- C = 232 psi (16 bar)

Type of Connection

ANSI Flange Ports
- 3 = 2” ANSI Flange *(sz. 1300)*
- 4 = 3” ANSI Flange *(sz. 1300 - 2520)*
- 5 = 4” ANSI Flange *(sz. 1300 - 7820)*
- 7 = 6” ANSI Flange *(sz. 2500 - 7820)*
- 8 = 8” ANSI Flange *(sz. 4000 - 15020)*
- 9 = 10” ANSI Flange *(sz. 5200 - 15020)*
- 10 = 12” ANSI Flange *(sz. 15000 - 15020)*

DIN DN Ports
- L = DIN DN 50 2” Flange *(sz. 1300)*
- Q = DIN DN 80 3” Flange *(sz. 1300 - 2520)*
- R = DIN DN 100 4” Flange *(sz. 1300 - 7820)*
- U = DIN DN 125 5” Flange *(sz. 1320)*
- V = DIN DN 150 6” Flange *(sz. 2500 - 7820)*
- W = DIN DN 200 8” Flange *(sz. 4000 - 15020)*
- X = DIN DN 250 10” Flange *(sz. 5200 - 15020)*
- Y = DIN DN 300 12” Flange *(sz. 15000 - 15020)*

Filtration Rating *(microns)*
- 1, 3, 5, 10, 15, 20 = ON
- 3, 10 = BN/AM
- 3, 5, 10, 20 = ECON2
- 40 = AM
- 25, 50, 100, 200 = W/HC
- 10, 20 = P/HC

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(latest version always supplied)*

Country of Installation
- (omit) = standard *(non coded)*
- ZU = ASME Coded with ”ASME” Stamp

Flange
- (omit) = DIN Flange Connection to DIN 2501/1
- 150 = 150 lbs ANSI Flange

Seals
- (omit) = Nitrile rubber (NBR) *(standard)*
- V = Fluorocarbon elastomer (FKM)

Bypass Valve
- (omit) = 43 psid (3 bar) *(standard)*
- B1 = 14.5 psid (1 bar) *(lubrication or coolant applications)*
- B6 = 87 psid (6 bar) *(return line extended life)*
- KB = No Bypass *(flushing system)*

not available with ECON2

Supplementary Details
- (omit) = Cover Lifting Device *(Handle only)*
- DH = Cover Lifting Device *(Davit lifting mechanism for sizes 4000 and larger, style may vary)*
- W = Indicator with brass piston (for water based fluids)
- SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
- L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
- cRUus = Electrical indicator with underwriter’s approval
- SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

1300 R 010 ON / V B6 __

Size
0850, 1300, 1700, 2600

Filtration Rating *(micron)*
- 1, 3, 5, 10, 15, 20 = ON
- 3, 5, 10, 20 = ECON2
- 25, 50, 100, 200 = W/HC
- 3, 10 = BN4AM
- 40 = AM
- 10, 20 = P/HC

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC

Seals
- (omit) = Nitrile rubber (NBR) *(standard)*
- V = Fluorocarbon elastomer (FKM)

Bypass Valve
- (omit) = 43 psid (3 bar) *(standard)*
- B1 = 14.5 psid (1 bar)
- B6 = 87 psid (6 bar)
- KB = No Bypass

Supplementary Details
- W = *(same as above)*
- SO263 = *(same as above)*
- SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 D . X / V __ __ __

Indicator Prefix
- VM = G 1/2 3000 psi

Trip Pressure
- 2 = 29 psid (2 bar) *(standard)*
- 5 = 72 psid (5 bar) *(optional)*

Type of Indicator
- A = No indicator, plugged port
- B = Pop-up indicator *(auto reset)*
- BM = Pop-up indicator *(manual reset)*
- C = electric switch - SPDT
- D = electric switch & LED light – SPDT

Modification Number

Supplementary Details

Seals
- (omit) = Nitrile (NBR) *(standard)*
- V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
- L24 = 24V
- L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

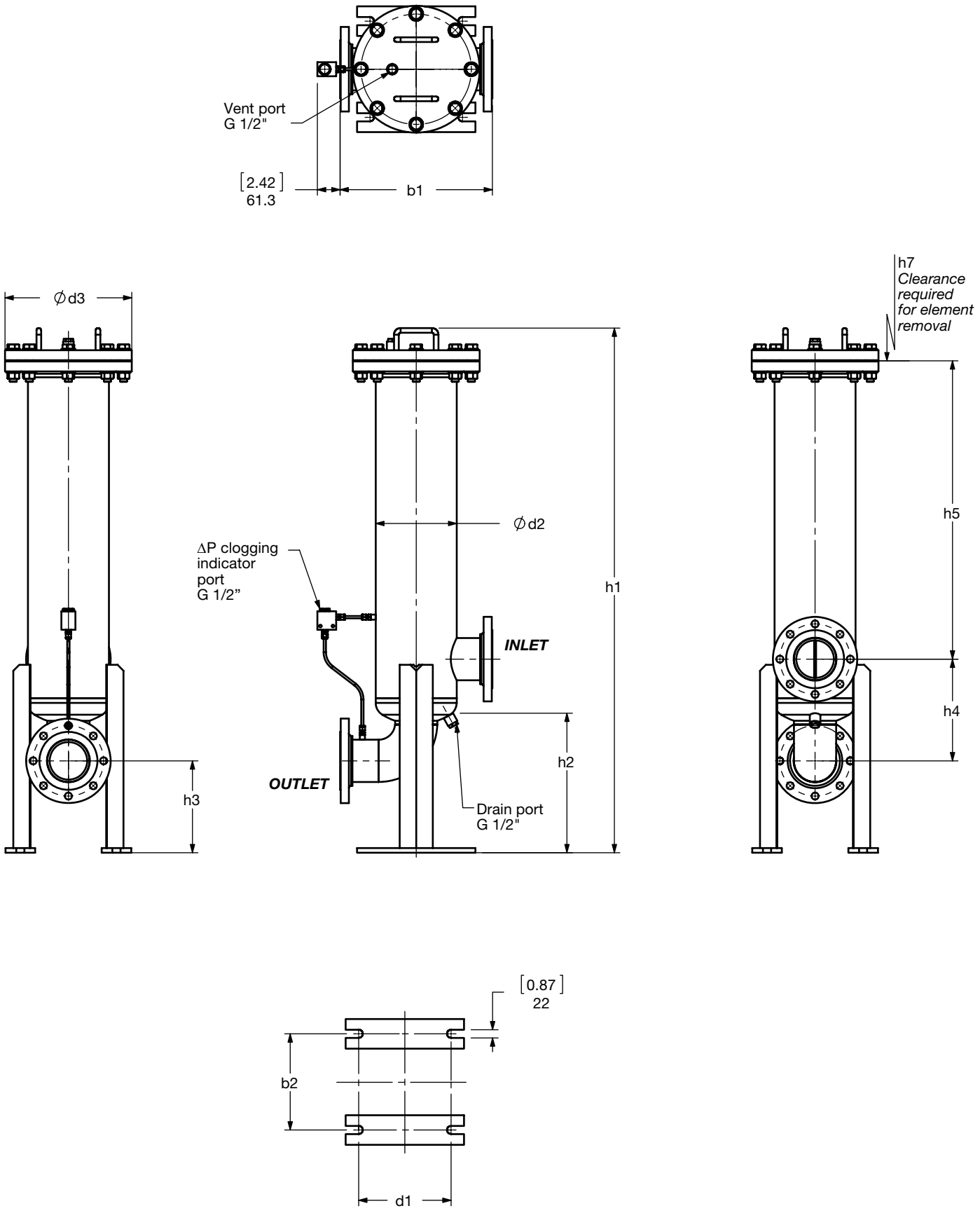
Underwriters Approval *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical indicator with underwriter’s approval

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

LOW PRESSURE FILTERS

Dimensions
RFL 1300 - 2520



Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

PN#02081318 / 07.19 / FIL1907-2109

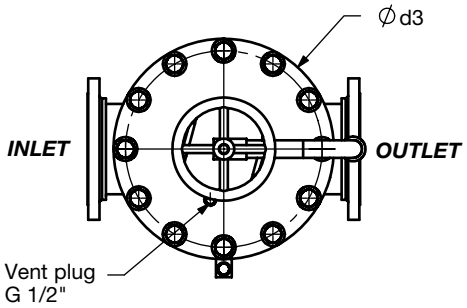
Dimensions
RFL 1300 - 2520

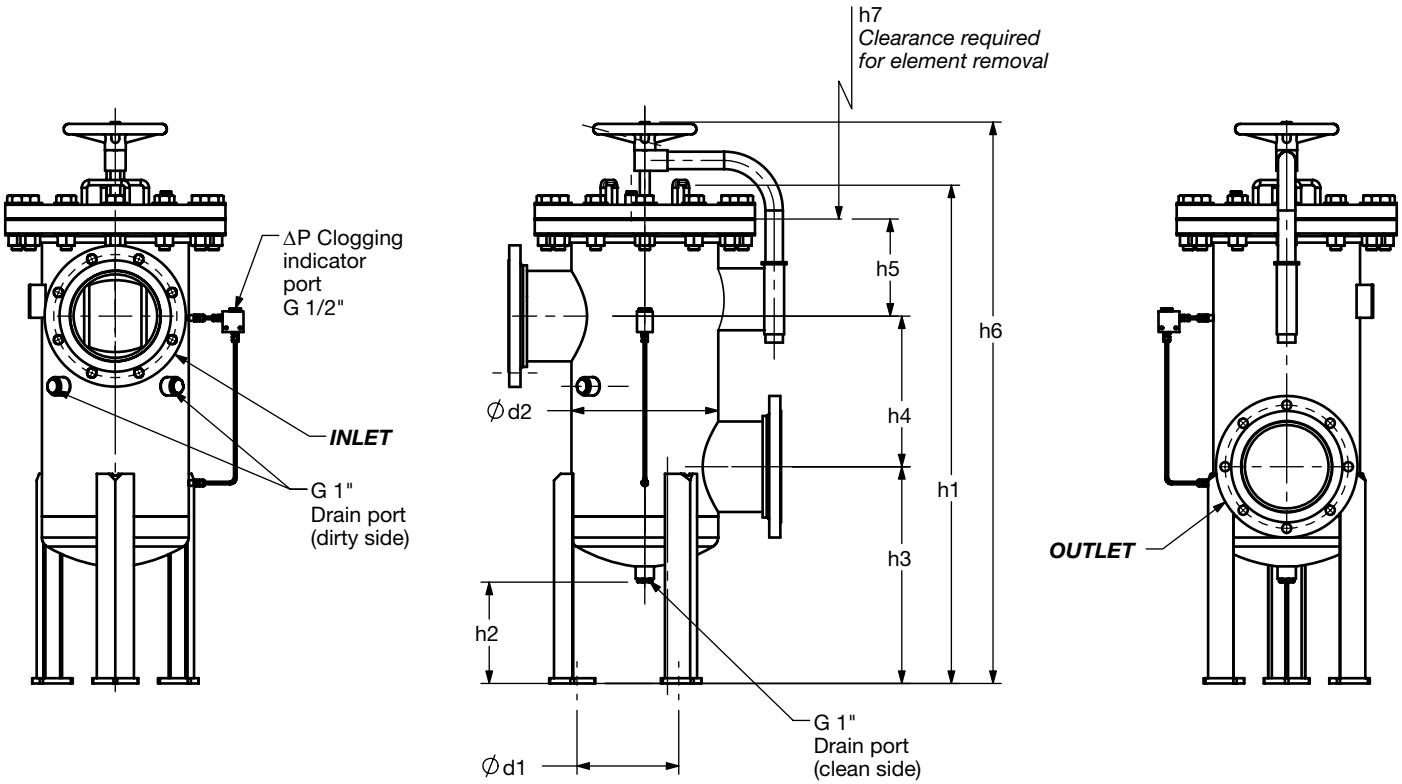
Size	Flange Port	b1	b2	d1	d2	d3	h1	h2	h3	h4	h5	h7	Wt. (lbs)	Use Bolt
RFL 1300	2” ANSI 150 lb RF	[16.22] 412	[10.24] 260	[9.84] 250	[8.63] 219.1	[13.39] 340	[38.72] 972	[14.57] 370	[10.47] 266	[9.45] 240	[15.12] 384	[19.69] 500	141/172	5/8”-11 UNC HEAVY HEX
	DIN DN 50	[16.22] 412	[10.24] 260	[9.84] 250	[8.63] 219.1	[13.39] 340	[38.72] 972	[14.57] 370	[10.47] 266	[9.45] 240	[15.12] 384	[19.69] 500	141/172	M16X2
RFL 1300/1320	3” ANSI 150 lb RF	[16.22] 412	[10.24] 260	[9.84] 250	[8.63] 219.1	[13.39] 340	[38.72] 972 [55.75] 1416	[14.57] 370	[10.47] 266	[9.45] 240	[15.12] 384 [32.44] 824	[19.69] 500 [37.01] 940	148/178	5/8”-11 UNC HEAVY HEX
	DIN DN 80	[16.22] 412	[10.24] 260	[9.84] 250	[8.63] 219.1	[13.39] 340	[38.72] 972 [55.75] 1416	[14.57] 370	[10.47] 266	[9.45] 240	[15.12] 384 [32.44] 824	[19.69] 500 [37.01] 940	148/178	M16X2
	4” ANSI 150 lb RF	[16.22] 412	[10.24] 260	[9.84] 250	[8.63] 219.1	[13.39] 340	[38.72] 972 [55.75] 1416	[14.57] 370	[9.96] 253	[10.83] 275	[14.25] 362 [31.57] 802	[19.69] 500 [37.01] 940	152/183	5/8”-11 UNC HEAVY HEX
	DIN DN 100	[16.22] 412	[10.24] 260	[9.84] 250	[8.63] 219.1	[13.39] 340	[38.72] 972 [55.75] 1416	[14.57] 370	[9.96] 253	[10.83] 275	[14.25] 362 [31.57] 802	[19.69] 500 [37.01] 940	152/183	M16X2
RFL 1320	DIN DN 125	[18.90] 480	[10.24] 260	[9.84] 250	[8.63] 219.1	[13.39] 340	[55.75] 1416	[14.57] 370	[8.46] 215	[11.46] 291	[32.44] 824	[37.01] 940	192	M16X2
RFL 2500/2520	3” ANSI 150 lb RF	[18.35] 466	[12.28] 312	[9.84] 250	[10.50] 273	[14.17] 360	[38.98] 990 [54.33] 1380	[8.66] 220	[15.28] 388	[16.14 410	[4.72] 120 [20.08] 510	[16.54] 420 [31.89] 810	160/192	5/8”-11 UNC HEAVY HEX
	DIN DN 80	[18.35] 466	[12.28] 312	[9.84] 250	[10.50] 273	[14.17] 360	[38.98] 990 [54.33] 1380	[8.66] 220	[15.28] 388	[16.14] 410	[4.72] 120 [20.08] 510	[16.54] 420 [31.89] 810	160/192	M16X2
	4” ANSI 150 lb RF	[18.35] 466	[12.28] 312	[9.84] 250	[10.50] 273	[14.17] 360	[41.34] 1050 [56.69] 1440	[8.66] 220	[17.24] 438	[11.97] 304	[9.29] 236 [24.65] 626	[16.54] 420 [31.89] 810	167/199	5/8”-11 UNC HEAVY HEX
	DIN DN 100	[18.35] 466	[12.28] 312	[9.84] 250	[10.50] 273	[14.17] 360	[41.34] 1050 [56.69] 1440	[8.66] 220	[17.24] 438	[11.97] 304	[9.29] 236 [24.65] 626	[16.54] 420 [31.89] 810	167/199	M16X2
	DIN DN 125	[18.35] 466	[12.28] 312	[9.84] 250	[10.50] 273	[14.17] 360	[41.34] 1050 [56.69] 1440	[8.66] 220	[17.24] 438	[14.96] 380	[6.30] 160 [21.65] 550	[16.54] 420 [31.89] 810	176/208	M16X2
	6” ANSI 150 lb RF	[18.35] 466	[12.28] 312	[9.84] 250	[10.50] 273	[14.17] 360	[41.34] 1050 [56.69] 1440	[8.66] 220	[17.24] 438	[14.37] 365	[6.89] 175 [22.24] 565	[16.54] 420 [31.89] 810	185/217	3/4”-10 UNC HEAVY HEX
	DIN DN 150	[18.35] 466	[12.28] 312	[9.84] 250	[10.50] 273	[14.17] 360	[41.34] 1050 [56.69] 1440	[8.66] 220	[17.24] 438	[14.37] 365	[6.89] 175 [22.24] 565	[16.54] 420 [31.89] 810	185/217	M20X2.5

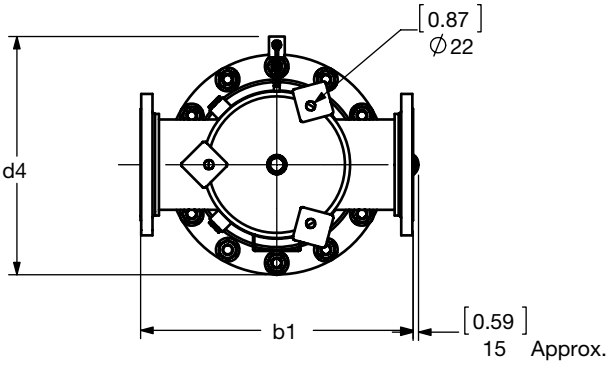
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print..

LOW PRESSURE FILTERS

Dimensions
RFL 4000 - 15020







Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFL 4000 - 15020

Size	Flange Port	b1	d1	d2	d3	d4	h1	h2	h3	h4	h5	h6	h7	Wt. (lbs.)	Use Bolt
RFL 4000/4020	DIN DN 100	[23.62] 600	[12.99] 330	[14.00] 355.6	[18.11] 460	[21.40] 543	[42.48] 1079 [57.83] 1469	[10.47] 266	[18.7] 475	[11.97] 304	[8.70] 221 [26.02] 661	[48.03] 1220 [65.35] 1660	[16.54] 420 [31.89] 810	267 /323	M16X2
	4” ANSI 150 LB RF	[23.62] 600	[12.99] 330	[14.00] 355.6	[18.11] 460	[21.37] 543	[42.48] 1079 [57.83] 1469	[10.47] 266	[18.7] 475	[11.97] 304	[8.70] 221 [26.02] 661	[48.03] 1220 [65.35] 1660	[16.54] 420 [31.89] 810	267 /323	5/8”-11 UNC HEAVY HEX
	DIN DN 125	[23.62] 600	[12.99] 330	[14.00] 355.6	[18.11] 460	[21.37] 543	[46.02] 1169 [57.44] 1459	[10.47] 266	[20.67] 525	[14.96] 380	[7.28] 185 [22.64] 575	[51.57] 1310 [66.93] 1700	[16.54] 420 [31.89] 810	281 /337	M16X2
	6” ANSI 150 LB RF	[23.62] 600	[12.99] 330	[14.00] 355.6	[18.11] 460	[21.37] 543	[46.02] 1169 [61.38] 1559	[10.47] 266	[20.67] 525	[14.96] 380	[7.87] 200 [23.23] 590	[52.17] 1325 [67.52] 1715	[16.54] 420 [31.89] 810	294 /350	3/4”-10 UNC HEAVY HEX
	DIN DN 150	[23.62] 600	[12.99] 330	[14.00] 355.6	[18.11] 460	[21.37] 543	[46.02] 1169 [61.38] 1559	[10.47] 266	[20.67] 525	[14.96] 380	[7.87] 200 [23.23] 590	[52.17] 1325 [67.52] 1715	[16.54] 420 [31.89] 810	294 /350	M20X2.5
	8” ANSI 150 LB RF	[23.62] 600	[12.99] 330	[14.00] 355.6	[18.11] 460	[21.37] 543	[47.4] 1204 [62.76] 1594	[10.47] 266	[20.67] 525	[14.37] 365	[9.25] 235 [24.61] 625	[52.95] 1345 [68.31] 1735	[16.54] 420 [31.89] 810	309 /365	3/4”-10 UNC HEAVY HEX
	DIN DN 200	[23.62] 600	[12.99] 330	[14.00] 355.6	[18.11] 460	[21.37] 543	[47.4] 1204 [62.76] 1594	[10.47] 266	[20.67] 525	[14.37] 365	[9.25] 235 [24.61] 625	[52.95] 1345 [68.31] 1735	[16.54] 420 [31.89] 810	309 /365	M20X2.5
RFL 5200/5220	DIN DN 100	[23.62] 600	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[45.04] 1144 [62.36] 1584	[9.61] 244	[18.31] 465	[11.97] 304	[11.69] 297 [29.02] 737	[50.63] 1286 [67.95] 1726	[19.69] 500 [37.01] 940	353 /450	M16X2
	4” ANSI 150 LB RF	[23.62] 600	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[45.04] 1144 [62.36] 1584	[9.61] 244	[18.31] 465	[11.97] 304	[11.69] 297 [29.02] 737	[50.63] 1286 [67.95] 1726	[19.69] 500 [37.01] 940	353 /450	5/8”-11 UNC HEAVY HEX
	DIN DN 125	[23.62] 600	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[49.45] 1256 [66.77] 1696	[9.61] 244	[20.67] 525	[14.96] 380	[10.67] 271 [27.99] 711	[54.96] 1396 [72.28] 1836	[19.69] 500 [37.01] 940	375 /472	M16X2
	DIN DN 150	[23.62] 600	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[49.45] 1256 [66.77] 1696	[9.61] 244	[20.67] 525	[14.37] 365	[11.26] 286 [28.58] 726	[54.96] 1396 [72.28] 1836	[19.69] 500 [37.01] 940	386 /483	M20X2.5
	6” ANSI 150 LB RF	[23.62] 600	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[49.45] 1256 [66.77] 1696	[9.61] 244	[20.67] 525	[14.37] 365	[11.26] 286 [28.58] 726	[54.96] 1396 [72.28] 1836	[19.69] 500 [37.01] 940	386 /483	3/4”-10 UNC HEAVY HEX
	DIN DN 200	(25.20) 640	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[49.45] 1256 [66.77] 1696	[9.61] 244	[20.67] 525	[14.37] 365	[11.26] 286 [28.58] 726	[54.96] 1396 [72.28] 1836	[19.69] 500 [37.01] 940	395 /492	M20X2.5
	8” ANSI 150 LB RF	(25.20) 640	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[49.45] 1256 [66.77] 1696	[9.61] 244	[20.67] 525	[14.37] 365	[11.26] 286 [28.58] 726	[54.96] 1396 [72.28] 1836	[19.69] 500 [37.01] 940	395 /492	3/4”-10 UNC HEAVY HEX
	DIN DN 250	(25.98) 660	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[52.13] 1324 [69.45] 1764	[9.61] 244	[22.05] 560	[17.72] 450	[9.29] 236 [26.61] 676	[57.72] 1466 [75.04] 1906	[19.69] 500 [37.01] 940	428 /525	M24X3
	10” ANSI 150 LB RF	(25.98) 660	[14.90] 380	[16.00] 406.4	[20.08] 510	[23.35] 593	[52.13] 1324 [69.45] 1764	[9.61] 244	[22.05] 560	[17.72] 450	[9.29] 236 [26.61] 676	[57.72] 1466 [75.04] 1906	[19.69] 500 [37.01] 940	428 /525	7/8”-9UNC HEAVY HEX

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print..

See next pages for other sizes of dimensions.

Dimensions
RFL 4000 - 15020

Size	Flange Port	b1	d1	d2	d3	d4	h1	h2	h3	h4	h5	h6	h7	Wt. (lbs.)	Use Bolt
RFL 6500/6520	DIN DN 100	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[11.97] 304	[13.23] 336 [30.55] 776	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	487/604	M16X2
	4” ANSI 150 LB RF	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[11.97] 304	[13.23] 336 [30.55] 776	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	487/604	5/8”-11UNC HEAVY HEX
	DIN DN 125	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[14.96] 380	[10.24] 260 [27.56] 700	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	496/613	M16X2
	DIN DN 150	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[14.37] 365	[10.83] 275 [28.15] 715	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	507/624	M20X2.5
	6” ANSI 150 LB RF	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[14.37] 365	[10.83] 275 [28.15] 715	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	507/ 624	3/4”-10UNC HEAVY HEX
	DIN DN 200	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[18.11] 460	[9.45] 240 [26.77] 680	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	540/657	M20X2.5
	8” ANSI 150 LB RF	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[18.11] 460	[9.45] 240 [26.77] 680	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	540/657	3/4”-10UNC HEAVY HEX
	DIN DN 250	[30.71] 780	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	562/679	M24X3
	10” ANSI 150 LB RF	[30.71] 780	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	562/679	7/8”-9UNC HEAVY HEX
RFL 7800/7820	DIN DN 100	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[11.97] 304	[13.23] 336 [30.55] 776	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	496/622	M16X2
	4” ANSI 150 LB RF	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[11.97] 304	[13.23] 336 [30.55] 776	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	496/622	5/8”-11UNC HEAVY HEX
	DIN DN 125	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[14.96] 380	[10.24] 260 [27.56] 700	[55.31] 1405 [72.64] 1845	[19.69] 500 [37.01] 940	505/631	M16X2
	6” ANSI 150 LB RF	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[14.37] 365	[10.24] 260 [27.56] 700	[54.72] 1390 [72.05] 1830	[19.69] 500 [37.01] 940	505/631	5/8”-11UNC HEAVY HEX
	DIN DN 150	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[49.61] 1260 [66.93] 1700	[10.04] 255	[21.26] 540	[14.37] 365	[10.83] 275 [28.15] 715	[54.72] 1390 [72.05] 1830	[19.69] 500 [37.01] 940	516/642	M20X2.5
	DIN DN 200	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[18.11] 460	[9.45] 240 [26.77] 680	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	549/675	M20X2.5
	8” ANSI 150 LB RF	[29.13] 740	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[18.11] 460	[9.45] 240 [26.77] 680	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	549/675	3/4”-10UNC HEAVY HEX
	DIN DN 250	[30.71] 780	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	571/697	M24X3
	10” ANSI 150 LB RF	[30.71] 780	[18.90] 480	[20.00] 508	[24.41] 620	[27.51] 699	[54.33] 1380 [71.65] 1820	[10.04] 255	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[60.04] 1525 [77.36] 1965	[19.69] 500 [37.01] 940	571/697	7/8”-9UNC HEAVY HEX

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print..

Dimensions
RFL 4000 - 15020

Size	Flange Port	b1	d1	d2	d3	d4	h1	h2	h3	h4	h5	h6	h7	Wt. (lbs.)	Use Bolt
RFL 15000/ 15020	DIN DN 200	[39.37] 1000	[27.17] 690	[27.99] 711	[32.68] 830	[35.66] 906	[56.1] 1425 [73.43] 1865	[10.35] 263	[25.79] 655	[14.37] 365	[12.99] 330 [30.31] 770	[64.17] 1630 [81.50] 2070	[19.69] 500 [37.01] 940	1047/1254	M20X2.5
	8" ANSI 150 LB RF	[39.37] 1000	[27.17] 690	[27.99] 711	[32.68] 830	[35.66] 906	[56.1] 1425 [73.43] 1865	[10.35] 263	[25.79] 655	[14.37] 365	[12.99] 330 [30.31] 770	[63.98] 1625 [81.50] 2070	[19.69] 500 [37.01] 940	1047/1254	3/4"-10UNC HEAVY HEX
	DIN DN 250	[39.37] 1000	[27.17] 690	[27.99] 711	[32.68] 830	[35.66] 906	[56.1] 1425 [73.43] 1865	[10.35] 263	[25.79] 655	[17.72] 450	[9.65] 245 [26.97] 685	[63.98] 1625 [81.50] 2070	[19.69] 500 [37.01] 940	1074/1280	M24X3
	10" ANSI 150 LB RF	[39.37] 1000	[27.17] 690	[27.99] 711	[32.68] 830	[35.66] 906	[56.1] 1425 [73.43] 1865	[10.35] 263	[25.79] 655	[17.72] 450	[9.65] 245 [26.97] 685	[63.98] 1625 [81.50] 2070	[19.69] 500 [37.01] 940	1074/1280	7/8"-9UNC HEAVY HEX
	DIN DN 300	[39.37] 1000	[27.17] 690	[27.99] 711	[32.68] 830	[35.66] 906	[58.86] 1495 [76.18] 1935	[10.35] 263	[26.38] 670	[20.28] 515	[9.25] 235 [26.57] 675	[66.93] 1700 [84.25] 2140	[19.69] 500 [37.01] 940	1129/1335	M24X3
	12" ANSI 150 LB RF	[39.37] 1000	[27.17] 690	[27.99] 711	[32.68] 830	[35.66] 906	[58.86] 1495 [76.18] 1935	[10.35] 263	[26.38] 670	[20.28] 515	[9.25] 235 [26.57] 675	[66.93] 1700 [84.25] 2140	[19.69] 500 [37.01] 940	1129/1335	7/8"-9UNC HEAVY HEX

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print..

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

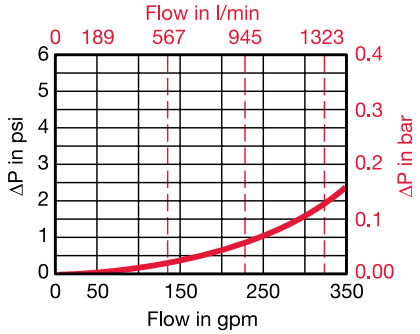
Housing Curve:

Pressure loss through housing is as follows:

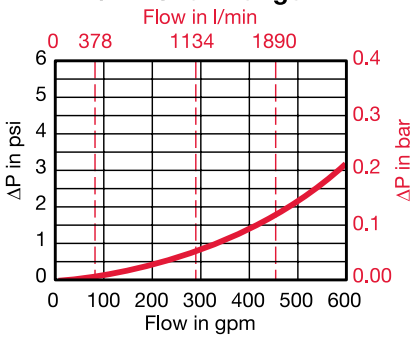
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

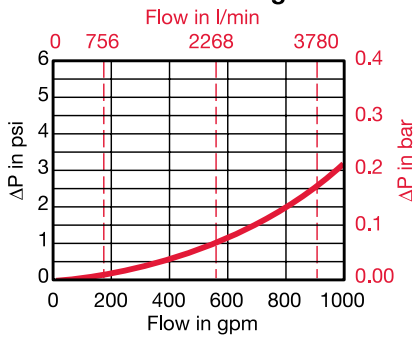
RFL 1300/1320 Housing w/ ANSI 4" Flange



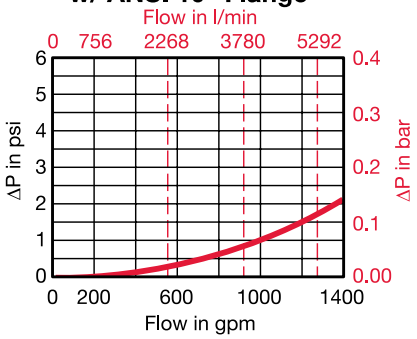
RFL 2500/2520 Housing w/ ANSI 6" Flange



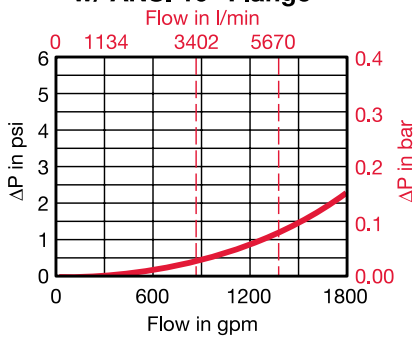
RFL 4000/4020 Housing w/ ANSI 8" Flange



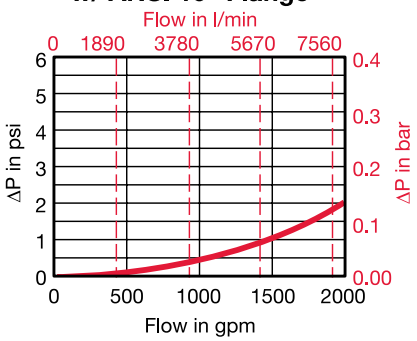
RFL 5200/5220 Housing w/ ANSI 10" Flange



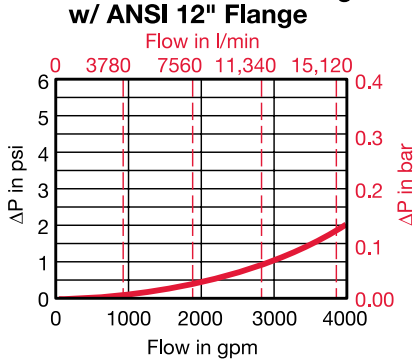
RFL 6500/6520 Housing w/ ANSI 10" Flange



RFL 7800/7820 Housing w/ ANSI 10" Flange



RFL 15000/15020 Housing w/ ANSI 12" Flange



Required Element Per Housing

Housing Size	Element Size	Elements per Side
1300 / 1320	1300 / 2600	1 / 1
2500 / 2520	0850 / 1700	3 / 3
4000 / 4020	0850 / 1700	5 / 5
5200 / 5220	1300 / 2600	4 / 4
6500 / 6520	1300 / 2600	5 / 5
7800 / 7820	1300 / 2600	6 / 6
15000 / 15020	1300 / 2600	10 / 10

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0850 R XXX ON	0.152	0.072	0.055	0.032	0.024	0.02
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
1700 R XXX ON	0.074	0.035	0.029	0.015	0.014	0.01
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0850 R XXX ECON2	0.082	0.055	0.038	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016
1700 R XXX ECON2	0.038	0.027	0.016	0.011
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0850 R XXX BN4AM	0.154	0.049
1300 R XXX BN4AM	0.088	0.033
1700 R XXX BN4AM	0.071	0.027
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
0850 R 040 AM	0.040
1300 R 040 AM	0.026
1700 R 040 AM	0.020
2600 R 040 AM	0.013

Wire Screen	...R...W/HC
Size	25, 50, 100, 200 µm
0850 R XXX W/HC	0.003
1300 R XXX W/HC	0.002
1700 R XXX W/HC	0.001
2600 R XXX W/HC	0.001

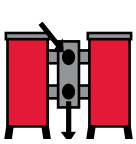
Polyester	...R...P/HC	
Size	10 µm	20 µm
0850 R XXX P/HC	0.007	0.003
1300 R XXX P/HC	0.004	0.002
1700 R XXX P/HC	0.003	0.002
2600 R XXX P/HC	0.002	0.001

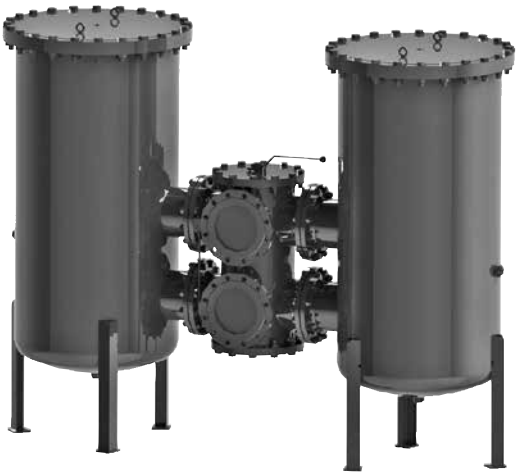
All Element K Factors in psi / gpm.

RFLD Welded Series

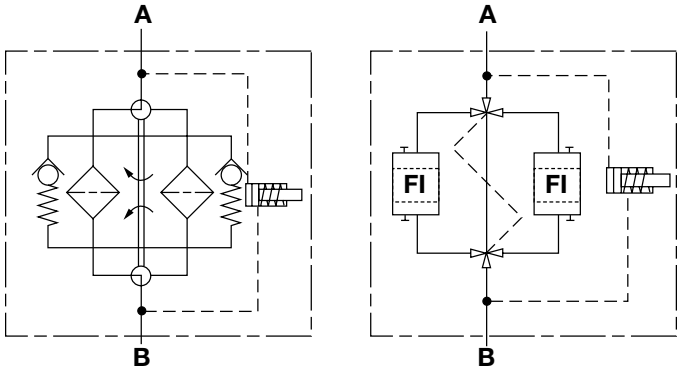
Inline Duplex Filters

230 psi • up to 3900 gpm





Hydraulic Symbol



Features

- Models 1300 to 15020 are made of steel housings with bolt-on steel lids; Stainless steel models are available.
- ANSI flange connections for each filter size provide maximum connection flexibility eliminating additional adapters and intermediate flanges.
- Inlet and outlet connections are located on the same side of the transfer valve.
- Transfer valve and pressure equalization line allow easy changeover between filter housings without costly system shutdown.
- Models 5200 to 15020 use the same filter element size (1300 R) allowing maximum standardization in multiple filter element housings.
- Clogging indicators have no external dynamic seal. High reliability is achieved and magnetic actuation eliminates a leak point.

Notes: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Most states and local jurisdictions in the United States require pressure vessels to be ASME stamped. It is the responsibility of the end customer to research and fully understand the ASME code requirements of the jurisdiction this filter will ultimately be installed in, and to fully communicate these requirements to HYDAC.

Technical Specifications

Mounting Method	Floor mounted legs *(Filters must not be used as pipe support)*
Port Connection	Inlet / Outlet - Transfer Valves *See chart below for details*
Flow Direction	Inlet: Front top Outlet: Front Bottom
Construction Materials	
Head, Lid	Steel
Note: Please inquire to the factory for available stainless steel models.	
Flow Capacity	
1300/1320	350 gpm (1300 lpm)
2500/2520	650 gpm (2500 lpm)
4000/4020	1050 gpm (4000 lpm)
5200/5220	1400 gpm (5200 lpm)
6500/6520	1700 gpm (6500 lpm)
7800/7820	2050 gpm (7800 lpm)
15000/15020	3900 gpm (15000 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	150 psi (10 bar) *(standard)* 232 psi (16 bar) *(optional)*
Fatigue Pressure	Contact HYDAC
Burst Pressure	Contact HYDAC
Element Collapse Pressure Rating	
ON, W/HC	290 psid (20 bar)
ECON2, BN4AM, AM, P/HC	145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10% *(standard)* ΔP = 72 psid (5 bar) -10% *(standard)*	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10% ΔP = 87 psid (6 bar) +10%	

Applications


Automotive


Gearboxes


Industrial


Power Generation


Pulp & Paper


Shipbuilding


Steel / Heavy Industry

Port Connections

Filter	Ball Valve				Segment / Butterfly Valve
Size	ANSI	SAE DN	DIN DN	SAE/DIN DN	DN
1300	2”	50	–	–	–
1320	3”, 4”	–	125	80, 100	–
2500	3”, 4”	–	125, 150	80, 100	150
2520	5”, 6”	–	125, 150, 200	80, 100	150
4000/4020	4”, 6”, 8	–	125, 150, 200	100	150, 200
5200/5220	4”, 6”, 8	–	125, 150, 200	100	150, 200, 250
6500/6520	4”, 6”, 8	–	125, 150, 200	100	150, 200, 250
7800/7820	4”, 6”, 8	–	125, 150, 200	100	150, 200, 250
15000/15020	–	–	–	–	150, 200, 250

PN#02081318 / 07.19 / FIL1907-2109

Model Code

RFLD ON 1300 C A T 3 A 1 . X / ZU 150 V _ DH

Filter Type

Element Media

ON	=	Optimicron®	BN/AM	=	Betamicron®/Aquamicron®
ECON2	=	ECOmicron®	AM	=	Aquamicron®
W/HC	=	Wire Mesh	P/HC	=	Polyester

Size

1300, 1320, 2500, 2520, 4000, 4020, 5200, 5220, 6500, 6520, 7800, 7820, 15000, 15020

Operating Pressure

B = 150 psi (10 bar) C = 230 psi (16 bar)

Type of Change Over Valve

A = Ball Valve (one pc.)– ANSI 2", 3", 4", 6", 8" / DN 50, 80, 100, 125, 150, 200 *(sz. 1300 - 2520)*
B = Segment Valve – ANSI 6", 8", 10", 12" / DN 150, 200, 250, 300 *(sizes 2500 - 15020)*
C = Butterfly – ANSI *(same as Segment sizes)* / DN *(same as Segment sizes) (sizes 2500 - 15020)*
E = Ball Valve (two pc.)– ANSI 8" / DN 200 (sizes 4000 - 15020)

Type of Connection

ANSI Flange Ports

2 = 2" ANSI Flange *(sizes 1300)*
4 = 3" ANSI Flange *(sizes 1300/2500)*
5 = 4" ANSI Flange *(sizes 1320 & 2500)*
7 = 6" ANSI Flange *(sizes 2520 - 7820)*
8 = 8" ANSI Flange *(sizes 2520 - 7820)*
9 = 10" ANSI Flange *(Consult HYDAC)*
10 = 12" ANSI Flange *(Consult HYDAC)*

DIN DN Ports

L = DN 50 *(size 1300)*
S = SAE/DIN DN 80 *(sizes 1300 - 2500)*
T = SAE/DIN DN 100 *(sizes 1300 - 7820)*
U = DIN DN 125 *(sizes 1320 - 7820)*
V = DIN DN 150 *(sizes 2500 - 7820)*
W = DIN DN 200 *(sizes 4000 - 15020)*
X = DIN DN 250 *(sizes 5200 - 15020)*
Y = DIN DN 300 *(sizes 5200 - 15020)*

Filtration Rating *(microns)*

1, 3, 5, 10, 15, 20 = ON | 3, 10 = BN4AM | 3, 5, 10, 20 = ECON2
40 = AM | 25, 50, 100, 200 = W/HC | 10, 20 = P/HC

Type of ΔP Clogging Indicator

A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code

1

Modification Number *(latest version always supplied)*

Country of Installation

(omit) = standard *(non coded)* ZU = ASME Coded with "ASME" Stamp

Flange

(omit) = DIN Flange Connection to DIN 2501/1 150 = 150 lbs ANSI Flange

Seals

(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM)

Bypass Valve

(omit) = 43 psid (3 bar) *(standard)* B1 = 14.5 psid (1 bar) *(lubrication or coolant applications)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = No Bypass *(flushing system)*
not available with ECON2

Supplementary Details

(omit) = Cover Lifting Device *(Handle only)*
DH = Cover Lifting Device *(Davit lifting mechanism for sizes 4000 and larger, style may vary)*
W = Indicator with brass piston (for water base fluids)
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0850 R 010 ON / V B6

Size

0850, 1300, 1700, 2600

Filtration Rating *(micron)*

1, 3, 5, 10, 15, 20 = ON | 3, 10 = BN4AM
3, 5, 10, 20 = ECON2 | 40 = AM
25, 50, 100, 200 = W/HC | 10, 20 = P/HC

Element Media

ON, BN4AM, ECON2, AM, W/HC, P/HC

Seals

(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve

(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)
KB = No Bypass

Supplementary Details

W = *(same as above)*
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 B . X /

Indicator Prefix

VM = G 1/2 3000 psi

Trip Pressure

2 = 29 psid (2 bar) *(standard)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator

A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = electric switch - SPDT
D = electric switch & LED light – SPDT

Modification Number

Supplementary Details

Seals

(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*

L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*

T100 = Lockout below 100°F

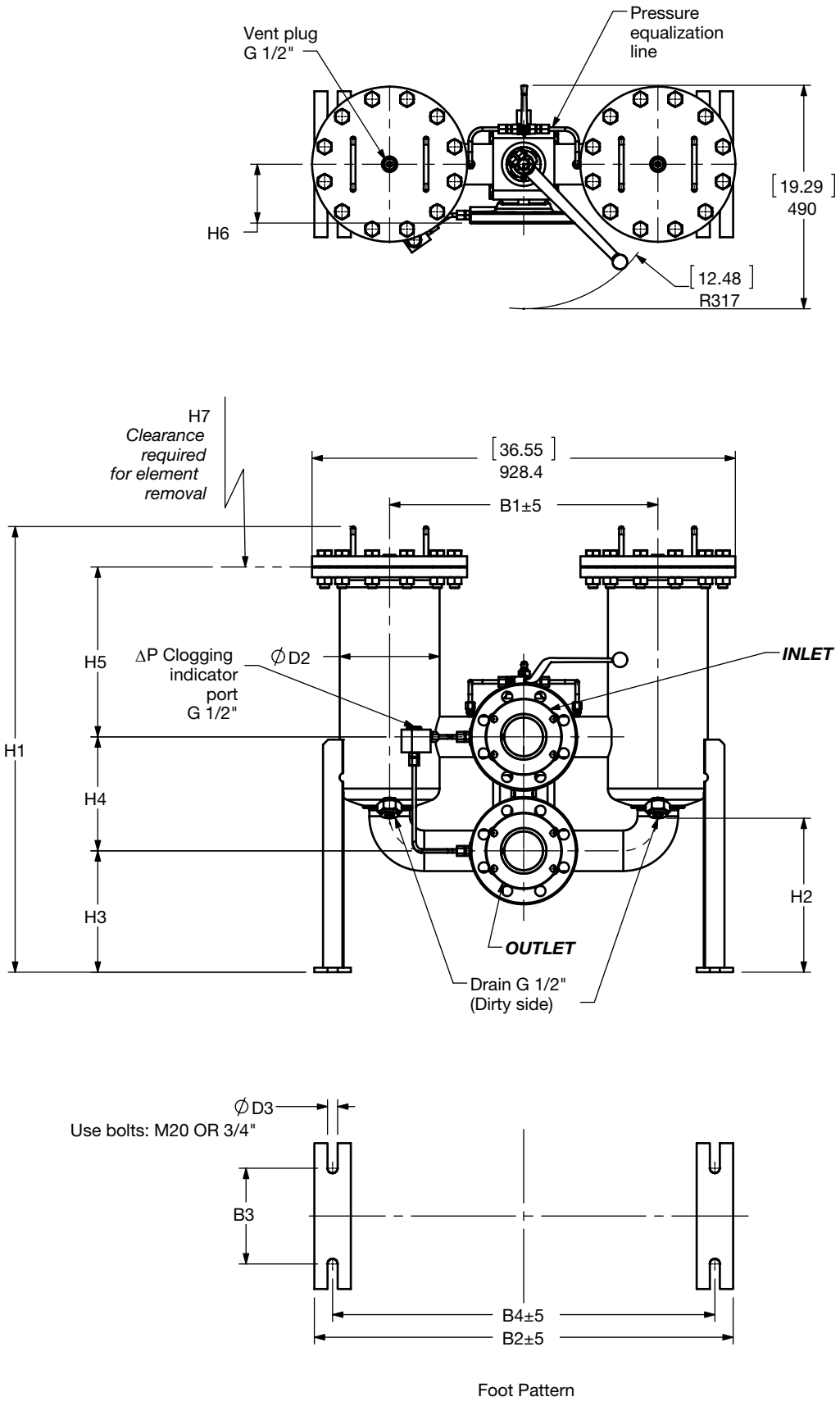
Underwriters Approval *(VM, VD types C, D, J, and J4 only)*

cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
RFLD 1300 / 1320



Foot Pattern

Size	1300	1320
Weight (lbs.)	330.7	460.8

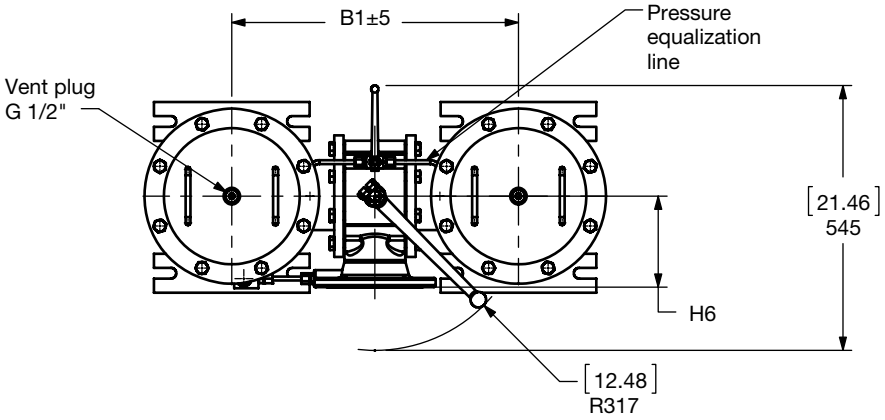
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

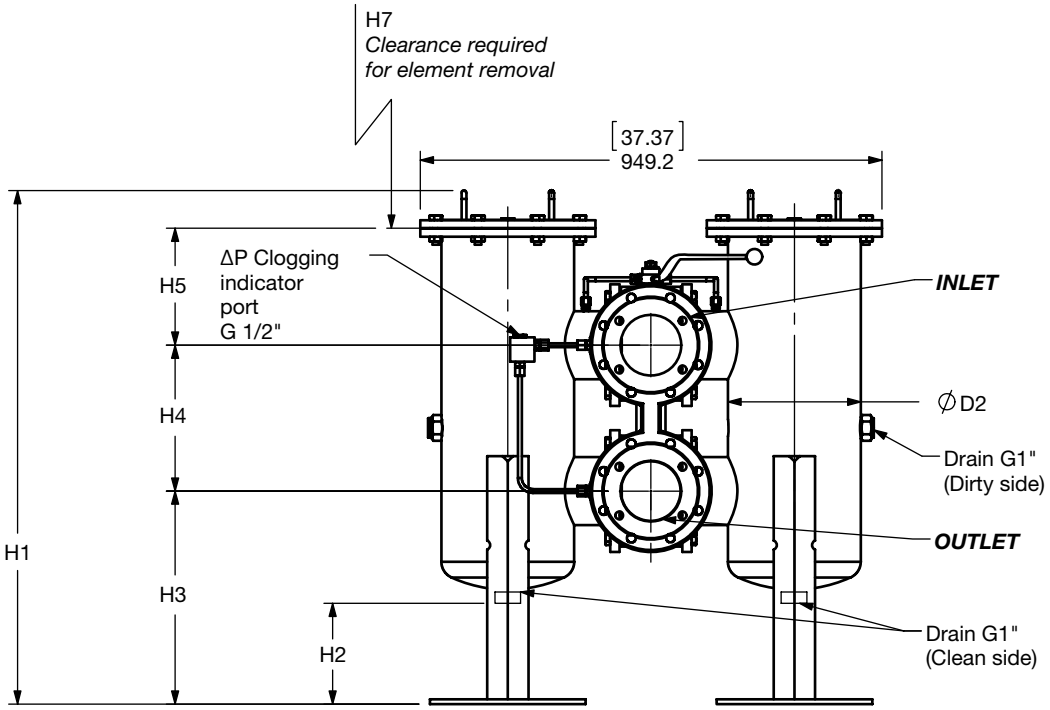
PN#02081318 / 07.19 / FIL1907-2109

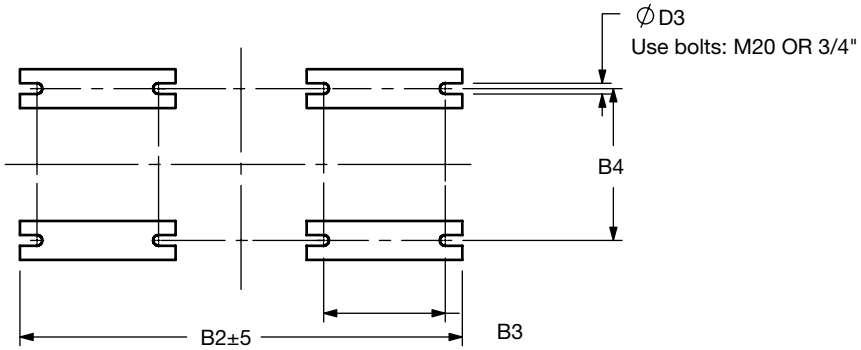
Size	Flange Port	B1	B2	B3	B4	D2	D3	H1	H2	H3	H4	H5	H6	H7	Use Bolt
RFLD 1300	2" ANSI	[19.92] 506	[33.31] 846	[9.84] 250	[30.16] 766	[8.63] 219.1	[0.87] 22	[38.18] 970 [55.51] 1410	[8.27] 210	[12.91] 328	[4.33] 110	[17.79] 452 [35.11] 892	[4.02] 102	[19.68] 500 [37.01] 940	5/8"-11 HEAVY HEX
	SAE DN 50	[19.92] 506	[33.31] 846	[9.84] 250	[30.16] 766	[8.63] 219.1	[0.87] 22	[38.18] 970 [55.51] 1410	[8.27] 210	[12.91] 328	[4.33] 110	[17.79] 452 [35.11] 892	[4.02] 102	[19.68] 500 [37.01] 940	M12
RFLD 1300 / 1320	SAE/DIN DN 80	[20.87] 530	[34.25] 870	[9.84] 250	[31.10] 790	[8.63] 219.1	[0.87] 22	[38.18] 970 [55.51] 1410	[14.57] 370	[10.24] 260	[9.06] 230	[15.75] 400 [33.07] 840	[4.72] 120	[19.68] 500 [37.01] 940	M16/ M16
	3" ANSI	[20.87] 530	[34.25] 870	[9.84] 250	[31.10] 790	[8.63] 219.1	[0.87] 22	[38.18] 970 [55.51] 1410	[14.57] 370	[10.24] 260	[9.06] 230	[15.75] 400 [33.07] 840	[4.72] 120	[19.68] 500 [37.01] 940	5/8"-11 HEAVY HEX
	SAE/DIN DN 100	[23.15] 588	[36.46] 926	[9.84] 250	[33.31] 846	[8.63] 219.1	[0.87] 22	[38.18] 970 [55.51] 1410	[14.76] 375	[10.47] 266	[9.84] 250	[14.72] 374 [32.4] 814	[5.12] 130	[19.68] 500 [37.01] 940	M16 / M20
	4" ANSI	[23.15] 588	[36.46] 926	[9.84] 250	[33.31] 846	[8.63] 219.1	[0.87] 22	[38.18] 970 [55.51] 1410	[14.76] 375	[10.47] 266	[9.84] 250	[14.72] 374 [32.4] 814	[5.12] 130	[19.68] 500 [37.01] 940	5/8"-11 HEAVY HEX
RFLD 1320	DIN DN 125	[23.74] 603	[37.13] 943	[9.84] 250	[33.98] 863	[8.63] 219.1	[0.87] 22	[60.47] 1536	[7.48] 190	[15.16] 385	[11.81] 300	[30.12] 765	[7.4] 188	[19.68] 500 [37.01] 940	M16

Notes

Dimensions
RFLD 2500 / 2520







Foot Pattern

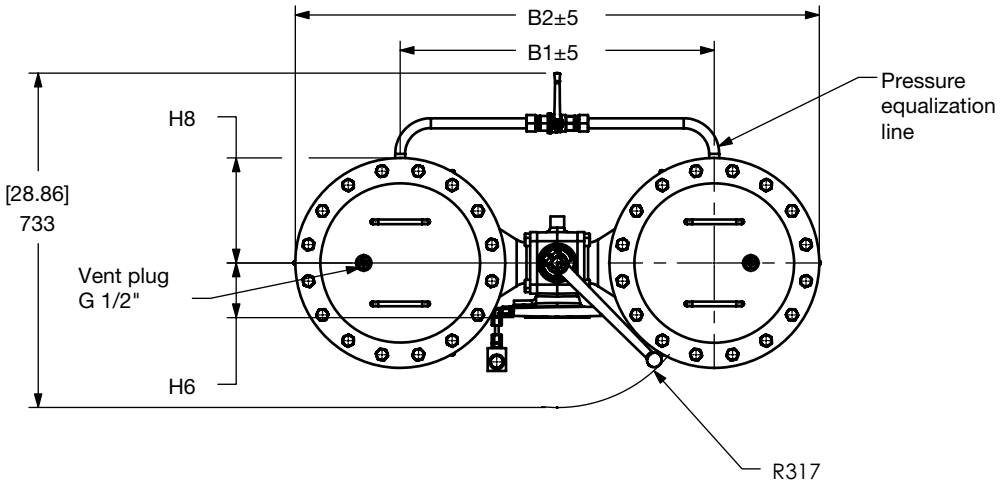
Size	2500	2520
Weight (lbs.)	632.8	721

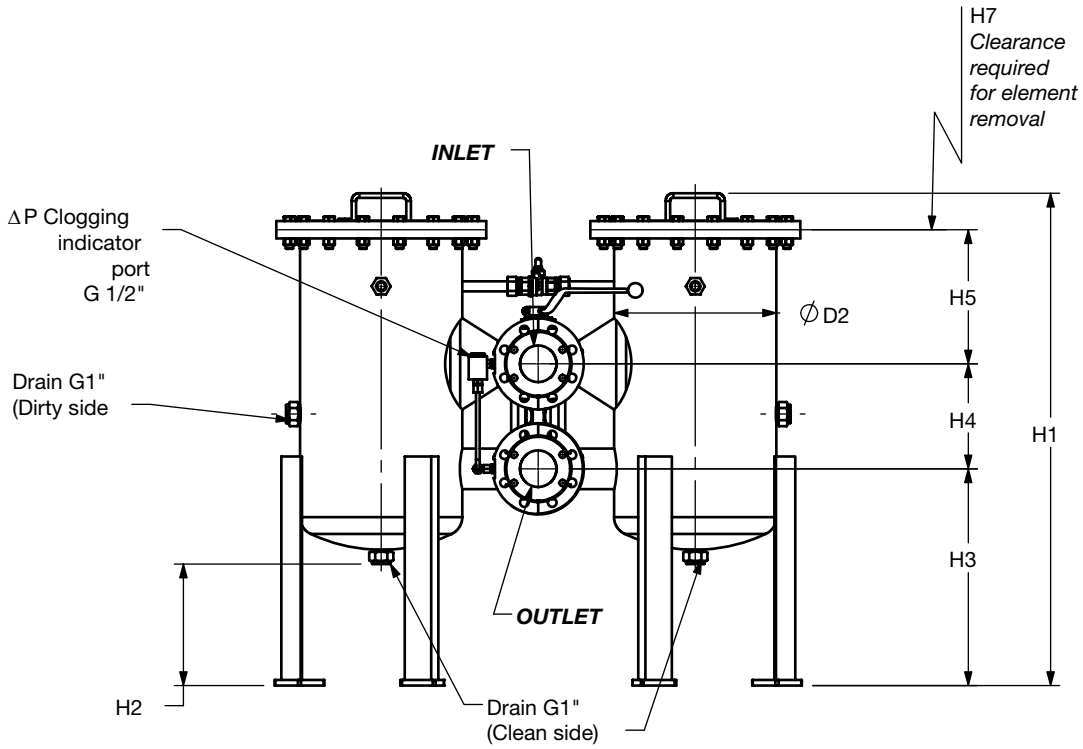
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

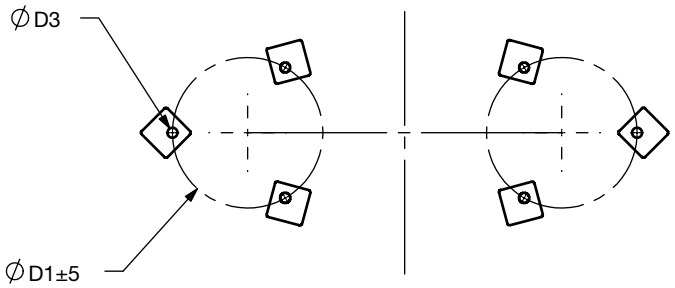
Size	Flange Port	B1	B2	B3	B4	D2	D3	H1	H2	H3	H4	H5	H6	H7	Use Bolt
RFLD 2500	3" ANSI	(22.52) 572	(36.69) 932	(9.84) 250	(12.28) 312	(10.75) 273	(0.87) 22	(38.98) 990 (54.33) 1380	(8.66) 220	(16.06) 408	(9.06) 230	(11.00) 280 (26.38) 670	(4.72) 120	(16.78) 420 (31.89) 810	5/8" - 11 UNC HEAVY HEX
	4" ANSI	(23.15) 588	(37.32) 948	(9.84) 250	(12.28) 312	(10.75) 273	(0.87) 22	(38.98) 990 (54.33) 1380	(8.66) 220	(16.06) 408	(9.84) 250	(11.00) 280 (26.38) 670	(5.12) 130	(16.78) 420 (31.89) 810	5/8" - 11 UNC HEAVY HEX
RFLD 2500 / 2520	SAE / DIN DN 80	(21.57) 548	(35.75) 908	(9.84) 250	(12.28) 312	(10.75) 273	(0.87) 22	(38.98) 990 (54.33) 1380	(8.66) 220	(15.08) 383	(4.33) 110	(11.00) 280 (26.38) 670	(4.02) 102	(16.78) 420 (31.89) 810	M16 / M16
	SAE / DIN DN 100	(21.57) 548	(35.75) 908	(9.84) 250	(12.28) 312	(10.75) 273	(0.87) 22	(38.98) 990 (54.33) 1380	(8.66) 220	(15.08) 383	(9.06) 230	(10.24) 260 (25.59) 650	(6.57) 167	(16.78) 420 (31.89) 810	M16 / M20
	DIN DN 125	(22.52) 572	(36.69) 932	(9.84) 250	(12.28) 312	(10.75) 273	(0.87) 22	(41.34) 1050 (56.69) 1440	(8.66) 220	(16.06) 408	(9.06) 230	(10.24) 260 (25.59) 650	(4.72) 120	(16.78) 420 (31.89) 810	M16
	DIN DN 150	(23.15) 588	(37.32) 948	(9.84) 250	(12.28) 312	(10.75) 273	(0.87) 22	(41.34) 1050 (56.69) 1440	(8.66) 220	(16.06) 408	(9.84) 250	(9.44) 240 (24.80) 630	(5.12) 130	(16.78) 420 (31.89) 810	M20
	6" ANSI	(23.19) 589	(37.36) 949	(9.84) 250	(12.28) 312	(10.75) 273	(0.87) 22	(41.34) 1050 (56.69) 1440	(8.66) 220	(17.24) 438	(11.81) 300	(9.44) 240 (24.80) 630	(7.40) 188	(16.78) 420 (31.89) 810	3/4" - 10 UNC HEAVY HEX

Notes

Dimensions
RFLD 4000 - 7820







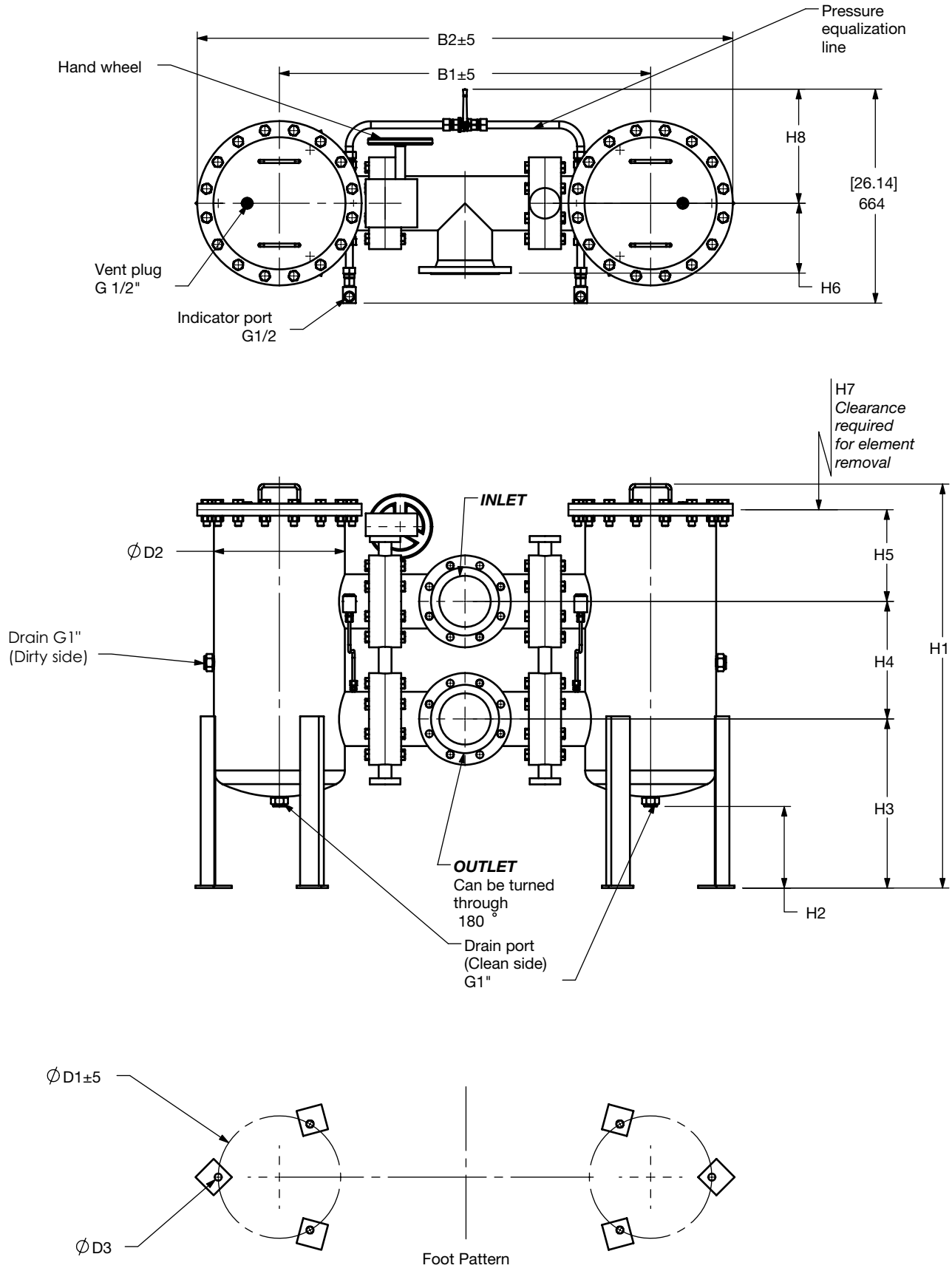
Foot Pattern

Size	4000	4020	5200	5220	6500	6520	7800	7820
Weight (lbs.)	866.5	1111.2	2107.7	2464.8	2471.4	2826.4	2489.1	2861.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Size	Flange Port	B1	B2	D1	D2	D3	H1	H2	H3	H4	H5	H6	H7	H8	Use Bolts
RFLD 4000 / 4020	4" ANSI 150 LB	[27.72] 704	[45.83] 1164	[12.99] 330	[14.02] 356	[0.87] 22	[42.52] 1080 [57.87] 1470	[10.24] 260	[18.70] 475	[9.84] 250	[11.61] 295 [26.97] 685	[5.12] 130	[16.54] 420 [31.89] 810	[9.06] 230	5/8"-11 UNC Heavy Hex
	SAE / DIN DN 100														M16 - 4 Bolt Flange / M20 - Din Flange
	DIN DN 125	[28.46] 723	[46.57] 1183	[12.99] 330	[14.02] 356	[0.87] 22	[46.06] 1170 [61.42] 1560	[10.24] 260	[20.67] 525	[11.81] 300	[10.43] 265 [25.79] 655	[7.40] 188	[16.54] 420 [31.89] 810	[9.06] 230	M16
	DIN DN 150	[30.51] 775	[48.82] 1240	[12.99] 330	[14.02] 356	[0.87] 22	[46.06] 1170 [61.42] 1560	[10.24] 260	[20.67] 525	[11.81] 300	[10.43] 265 [25.79] 655	[7.48] 190	[16.54] 420 [31.89] 810	[9.06] 230	M20
	6" ANSI 150 LB														3/4"-10 UNC Heavy HEX
	DIN DN 200	[34.80] 884	[53.11] 1349	[12.99] 330	[14.02] 356	[0.87] 22	[46.06] 1170 [61.42] 1560	[10.24] 260	[20.67] 525	[19.69] 500	[2.56] 65 [13.98] 355	[10.63] 270	[16.54] 420 [31.89] 810	[9.06] 230	M20
	8" ANSI 150 LB														3/4"-10 UNC Heavy HEX
RFLD 5200 / 5220	4" ANSI 150 LB	[29.29] 744	[49.61] 1260	[14.96] 380	[15.98] 406	[0.87] 22	[45.04] 1144 [62.36] 1584	[9.84] 250	[18.31] 465	[9.84] 250	[13.82] 351 [31.14] 791	[5.12] 130	[19.69] 500 [37.01] 940	[10.04] 255	5/8"-11UNC HEAVY HEX
	SAE / DIN DN 100														M16 - 4 Bolt Flange / M20 - DIN Flange
	DIN DN 125	[30.04] 763	[50.19] 1275	[14.96] 380	[15.98] 406	[0.87] 22	[49.45] 1256 [66.77] 1696	[9.84] 250	[20.67] 525	[11.81] 300	[13.82] 351 [31.14] 791	[7.40] 188	[19.69] 500 [37.01] 940	[10.04] 255	M16
	DIN DN 150	[32.09] 815	[52.36] 1330	[14.96] 380	[15.98] 406	[0.87] 22	[49.45] 1256 [66.77] 1696	[9.84] 250	[20.67] 525	[11.81] 300	[13.82] 351 [31.14] 791	[7.48] 190	[19.69] 500 [37.01] 940	[10.04] 255	M20
	6" ANSI 150 LB														3/4"-10 UNC Heavy HEX
	DIN DN 200	[36.38] 924	[56.61] 1438	[14.96] 380	[15.98] 406	[0.87] 22	[55.63] 1413 [72.95] 1853	[9.84] 250	[20.67] 525	[19.69] 500	[5.94] 151 [23.27] 591	[10.63] 270	[19.69] 500 [37.01] 940	[10.04] 255	M20
	8" ANSI 150 LB														3/4"-10 UNC Heavy HEX
RFLD 6500 / 6520	4" ANSI 150 LB	[40.31] 1024	[64.72] 1644	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[9.84] 250	[15.35] 390 [32.68] 830	[5.12] 130	[19.69] 500 [37.01] 940	[12.20] 310	5/8"-11 UNC Heavy HEX
	SAE / DIN DN 100														M16 - 4 Bolt Flange / M20 - DIN Flange
	DIN DN 125	[33.98] 863	[58.39] 1483	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[11.81] 300	[13.39] 340 [30.71] 780	[7.40] 188	[19.69] 500 [37.01] 940	[12.20] 310	M16
	DIN DN 150	[36.02] 915	[60.43] 1535	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[11.81] 300	[13.39] 340 [30.71] 780	[7.48] 190	[19.69] 500 [37.01] 940	[12.20] 310	M20
	6" ANSI 150 LB														3/4"-10 UNC Heavy HEX
	DIN DN 200	[40.31] 1024	[64.72] 1644	[18.89] 480	[20.00] 508	[0.87] 22	[55.63] 1413 [72.95] 1853	[10.43] 265	[23.62] 600	[19.69] 500	[9.06] 230 [26.38] 670	[10.63] 270	[19.69] 500 [37.01] 940	[12.20] 310	M20
	8" ANSI 150 LB														3/4"-10 UNC Heavy HEX
RFLD 7800 / 7820	4" ANSI 150 LB	[40.31] 1024	[64.72] 1644	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[9.84] 250	[15.35] 390 [32.68] 830	[5.12] 130	[19.69] 500 [37.01] 940	[12.20] 310	3/4"-10 UNC Heavy HEX
	SAE / DIN DN 100														M16 - 4 Bolt Flange / M20 - DIN Flange
	DIN DN 125	[33.98] 863	[58.39] 1483	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[11.81] 300	[13.39] 340 [30.71] 780	[7.40] 188	[19.69] 500 [37.01] 940	[12.20] 310	M16
	DIN DN 150	[36.02] 915	[60.43] 1535	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[11.81] 300	[13.39] 340 [30.71] 780	[7.48] 190	[19.69] 500 [37.01] 940	[12.20] 310	M20
	6" ANSI 150 LB														5/8"-11 UNC Heavy HEX
	DIN DN 200	[40.31] 1024	[64.72] 1644	[18.89] 480	[19.69] 500	[0.87] 22	[55.63] 1413 [72.95] 1853	[10.43] 265	[23.62] 600	[19.69] 500	[13.39] 340 [30.71] 780	[10.63] 270	[19.69] 500 [37.01] 940	[12.20] 310	M20
	8" ANSI 150 LB														3/4"-10 UNC Heavy HEX

Dimensions
RFLD 250X - 1502X Butterfly Version



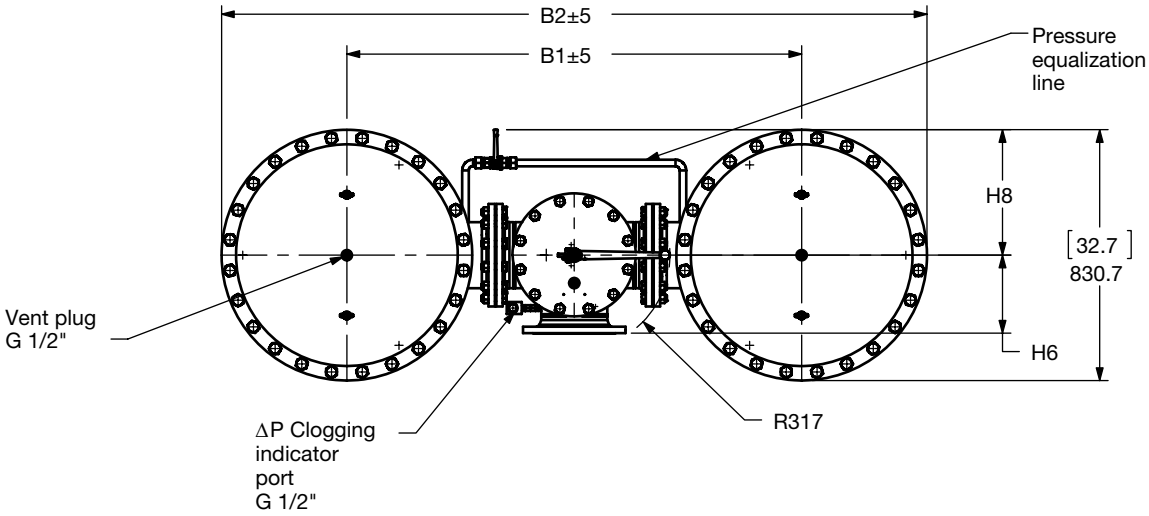
Size	2500	2520	4000	4020	5200	5220	6500	6520	7800	7820	15000	15020
Weight (lbs.)	632.8	721	866.5	1111.2	2107.7	2464.8	2471.4	2826.4	2489.1	2861.6	3278.3	3578.2

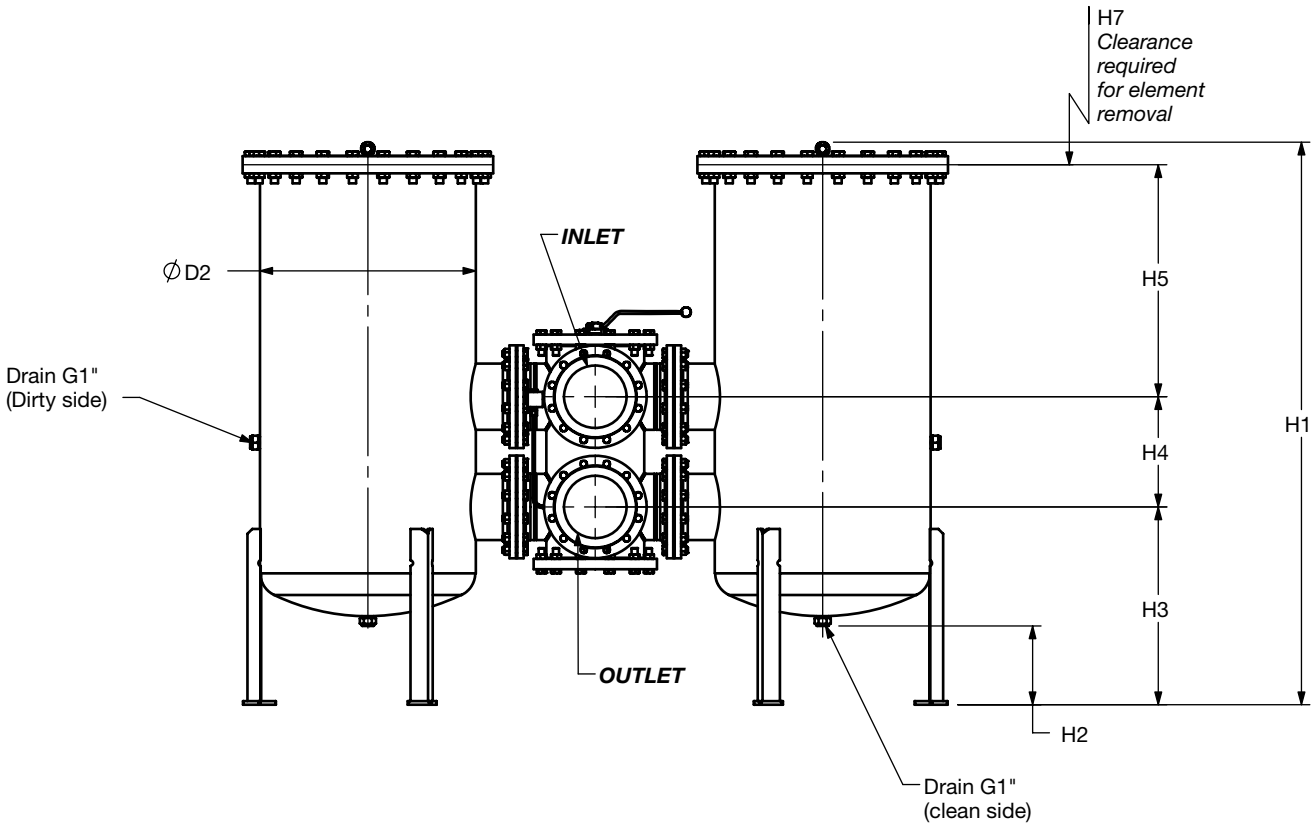
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

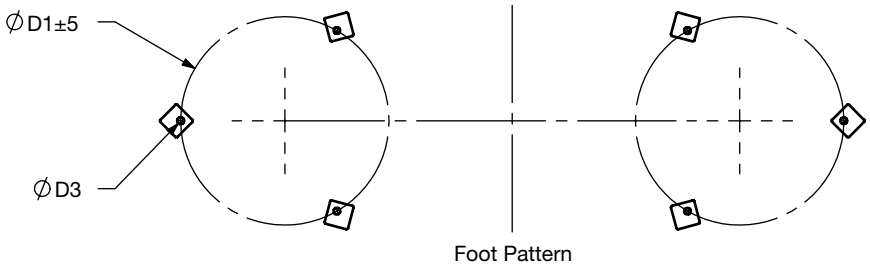
PN#02081318 / 07.19 / FIL1907-2109

Size	Flange Port	B1	B2	D1	D2	D3	H1	H2	H3	H4	H5	H6	H7	H8
RFLD 2500 / 2520	DN 150	[40.08] 1018	[54.25] 1378	[12.99] 330	[10.75] 273	[0.87] 22	[43.62] 1108 [58.98] 1498	[8.66] 220	[18.11] 460	[14.37] 365	[8.31] 211 [23.66] 601	[8.66] 220	[16.54] 420 [31.89] 810	[12.99] 330
RFLD 4000 / 4020	DN 150	[45.35] 1152	[63.62] 1616	[12.99] 330	[14.02] 356	[0.87] 22	[46.06] 1170 [61.42] 1560	[10.24] 260	[20.67] 525	[14.37] 365	[7.87] 200 [23.23] 590	[8.66] 220	[16.54] 420 [31.89] 810	[13.78] 350
	DN 200	[48.82] 1240	[67.87] 1724	[12.99] 330	[14.02] 356	[0.87] 22	[47.44] 1205 [62.79] 1595	[9.84] 250	[20.67] 525	[14.37] 365	[9.25] 235 [24.61] 625	[10.24] 260	[19.69] 500 [37.01] 940	[14.57] 370
RFLD 5200 / 5220	DN 150	[45.35] 1152	[65.59] 1666	[14.96] 380	[15.98] 406	[0.87] 22	[6.14] 156 [66.77] 1696	[9.84] 250	[20.67] 525	[14.37] 365	[11.26] 286 [28.58] 726	[8.66] 220	[19.69] 500 [37.01] 940	[13.78] 350
	DN 200	[50.39] 1280	[70.63] 1794	[14.96] 380	[15.98] 406	[0.87] 22	[49.45] 1256 [66.77] 1696	[9.84] 250	[20.67] 525	[14.37] 365	[11.26] 286 [28.58] 726	[10.24] 260	[19.69] 500 [37.01] 940	[14.57] 370
	DN 250	[58.89] 1496	[79.13] 2010	[14.96] 380	[15.98] 406	[0.87] 22	[52.20] 1326 [69.53] 1766	[10.24] 260	[22.05] 560	[17.72] 450	[9.29] 236 [26.61] 676	[13.78] 350	[19.69] 500 [37.01] 940	[15.75] 400
RFLD 6500 / 6520	DN 150	[50.87] 1292	[75.43] 1916	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[14.37] 365	[10.83] 275 [28.15] 715	[8.66] 220	[19.69] 500 [37.01] 940	[13.78] 350
	DN 200	[54.33] 1380	[78.89] 2004	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[10.24] 260	[23.62] 600	[14.37] 365	[13.19] 335 [30.51] 775	[10.24] 260	[19.69] 500 [37.01] 940	[14.57] 370
	DN 250	[62.44] 1586	[87.01] 2210	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[10.24] 260	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[13.78] 350	[19.69] 500 [37.01] 940	[15.75] 400
RFLD 7800 / 7820	DN 150	[50.87] 1292	[75.43] 1916	[18.89] 480	[20.00] 508	[0.87] 22	[49.61] 1260 [66.93] 1700	[10.24] 260	[21.26] 540	[14.37] 365	[10.83] 275 [28.15] 715	[8.66] 220	[19.69] 500 [37.01] 940	[13.78] 350
	DN 200	[54.33] 1380	[78.89] 2004	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[10.24] 260	[23.62] 600	[14.37] 365	[13.19] 335 [30.51] 775	[10.24] 260	[19.69] 500 [37.01] 940	[14.57] 370
	DN 250	[62.44] 1586	[87.01] 2210	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[10.24] 260	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[13.78] 350	[19.69] 500 [37.01] 940	[15.75] 400
RFLD 15000 / 15020	DN 200	[63.78] 1620	[96.46] 2450	[27.17] 690	[27.99] 711	[0.87] 22	[56.10] 1425 [73.43] 1865	[10.24] 260	[25.79] 655	[14.37] 365	[12.99] 330 [30.31] 770	[10.24] 260	[19.69] 500 [37.01] 940	[14.57] 370
	DN 250	[71.50] 1816	[104.17] 2646	[27.17] 690	[27.99] 711	[0.87] 22	[56.10] 1425 [73.43] 1865	[10.24] 260	[25.79] 655	[17.72] 450	[9.84] 250 [27.17] 690	[13.78] 350	[19.69] 500 [37.01] 940	[15.75] 400
	DN 300	[77.01] 1956	[109.69] 2786	[27.17] 690	[27.99] 711	[0.87] 22	[59.06] 1500 [76.38] 1940	[10.24] 260	[26.38] 670	[20.28] 515	[9.25] 235 [26.57] 675	[15.75] 400	[19.69] 500 [37.01] 940	[16.93] 430

Dimensions
RFLD 4000 - 15020 Segment Version







Size	4000	4020	5200	5220	6500	6520	7800	7820	15000	15020
Weight (lbs.)	866.5	1111.2	2107.7	2464.8	2471.4	2826.4	2489.1	2861.6	3278.3	3578.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

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Size	Flange Port	B1	B2	D1	D2	D3	H1	H2	H3	H4	H5	H6	H7	H8	Use Bolts
RFLD 4000 / 4020	DN 200	[44.25] 1124	[62.59] 1590	[12.99] 330	[14.02] 356	[0.87] 22	[49.21] 1250 [62.79] 1595	[10.24] 260	[20.67] 525	[14.37] 365	[9.25] 235 [24.61] 625	[10.28] 261	[16.54] 420 [31.89] 810	[14.57] 370	M20
RFLD 5200 / 5200	DN 200	[45.91] 1166	[66.14] 1680	[14.96] 380	[15.98] 406	[0.87] 22	[49.80] 1265 [67.13] 1705	[9.84] 250	[20.67] 525	[14.37] 365	[11.26] 286 [28.58] 726	[10.28] 261	[19.69] 500 [37.01] 940	[14.57] 370	M20
	DN 250	[51.65] 1312	[71.85] 1825	[14.96] 380	[15.98] 406	[0.87] 22	[52.13] 1324 [69.45] 1764	[9.84] 250	[22.05] 560	[17.72] 450	[9.29] 236 [26.61] 676	[12.68] 322	[19.69] 500 [37.01] 940	[15.75] 400	M24
RFLD 6500 / 6520	DN 200	[49.84] 1266	[74.25] 1886	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[10.24] 260	[23.62] 600	[14.37] 365	[13.19] 335 [30.51] 775	[10.28] 261	[19.69] 500 [37.01] 940	[14.57] 370	M20
	DN 250	[55.2] 1402	[79.61] 2022	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[9.84] 250	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[12.68] 322	[19.69] 500 [37.01] 940	[15.75] 400	M24
RFLD 7800 / 7820	DN 200	[49.84] 1266	[74.25] 1886	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[10.24] 260	[23.62] 600	[14.37] 365	[13.19] 335 [30.51] 775	[10.28] 261	[19.69] 500 [37.01] 940	[14.57] 370	M20
	DN 250	[55.2] 1402	[79.61] 2022	[18.89] 480	[20.00] 508	[0.87] 22	[54.33] 1380 [71.65] 1820	[10.24] 260	[23.62] 600	[17.72] 450	[9.84] 250 [27.17] 690	[12.68] 322	[19.69] 500 [37.01] 940	[15.75] 400	M24
RFLD 15000 / 15020	DN 200	[59.29] 1506	[91.97] 2336	[27.17] 690	[27.99] 711	[0.87] 22	[56.10] 1425 [73.43] 1865	[10.35] 263	[25.79] 655	[14.37] 365	[12.99] 330 [30.31] 770	[10.28] 261	[19.69] 500 [37.01] 940	[16.34] 415	M20
	DN 250	[64.09] 1628	[96.77] 2458	[27.17] 690	[27.99] 711	[0.87] 22	[56.10] 1425 [73.43] 1865	[10.35] 263	[25.19] 640	[17.72] 450	[10.24] 260 [27.56] 700	[12.68] 322	[19.69] 500 [37.01] 940	[16.34] 415	M24

Notes

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

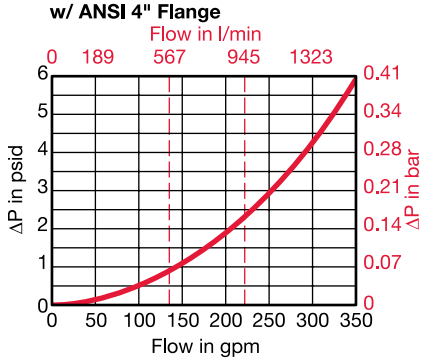
Housing Curve:

Pressure loss through housing is as follows:

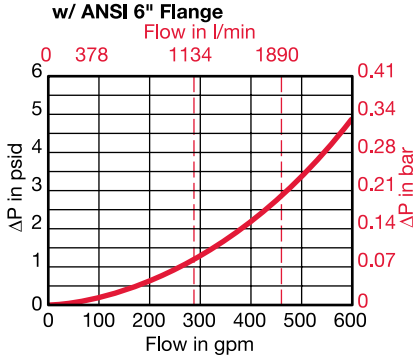
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

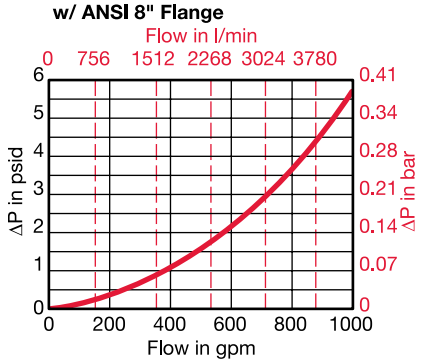
RFLD 1300/1320 Housing w/ ANSI 4" Flange



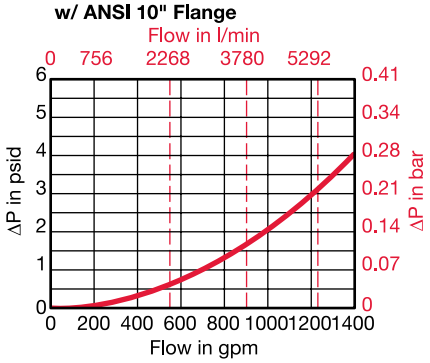
RFLD 2500/2520 Housing w/ ANSI 6" Flange



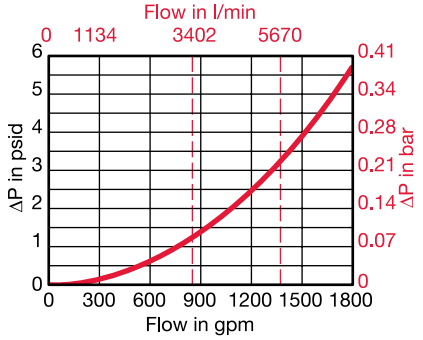
RFLD 4000/4020 Housing w/ ANSI 8" Flange



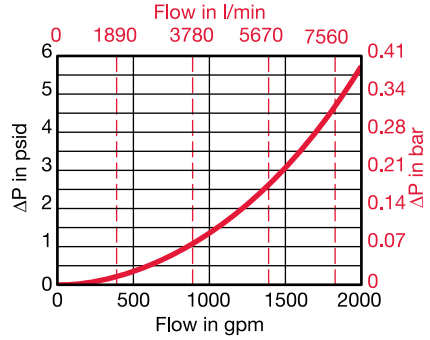
RFLD 5200/5220 Housing w/ ANSI 10" Flange



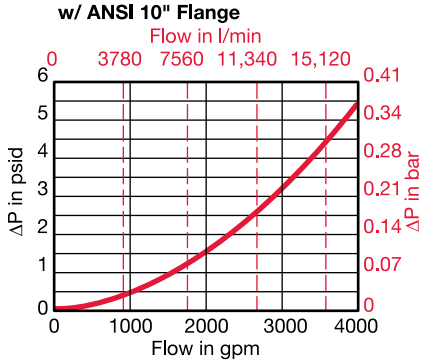
RFLD 6500/6520 Housing w/ ANSI 10" Flange



RFLD 7800/7820 Housing w/ ANSI 10" Flange



RFLD 15000/15020 Housing w/ ANSI 10" Flange



Required Element Per Housing

Housing Size	Element Size	Elements per Side
1300 / 1320	1300 / 2600	1 / 1
2500 / 2520	0850 / 1700	3 / 3
4000 / 4020	0850 / 1700	5 / 5
5200 / 5220	1300 / 2600	4 / 4
6500 / 6520	1300 / 2600	5 / 5
7800 / 7820	1300 / 2600	6 / 6
15000 / 15020	1300 / 2600	10 / 10

Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0850 R XXX ON	0.152	0.072	0.055	0.032	0.024	0.02
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
1700 R XXX ON	0.074	0.035	0.029	0.015	0.014	0.01
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0850 R XXX ECON2	0.082	0.055	0.038	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016
1700 R XXX ECON2	0.038	0.027	0.016	0.011
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0850 R XXX BN4AM	0.154	0.049
1300 R XXX BN4AM	0.088	0.033
1700 R XXX BN4AM	0.071	0.027
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
0850 R 040 AM	0.040
1300 R 040 AM	0.026
1700 R 040 AM	0.020
2600 R 040 AM	0.013

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
0850 R XXX W/HC	0.003
1300 R XXX W/HC	0.002
1700 R XXX W/HC	0.001
2600 R XXX W/HC	0.001

Polyester	...R...P/HC	
Size	10 µm	20 µm
0850 R XXX P/HC	0.007	0.003
1300 R XXX P/HC	0.004	0.002
1700 R XXX P/HC	0.003	0.002
2600 R XXX P/HC	0.002	0.001

All Element K Factors in psi / gpm.

Notes

E

Medium Pressure Filters

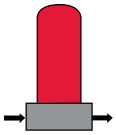
601-2999 psi

Low-cost aluminum construction inline filters, provide flexibility for use in both mobile and industrial applications. Durable and light weight, these filters are ideal for light industrial and demanding agriculture and construction applications. Duplex filters allow for uninterrupted operation during element change-out.

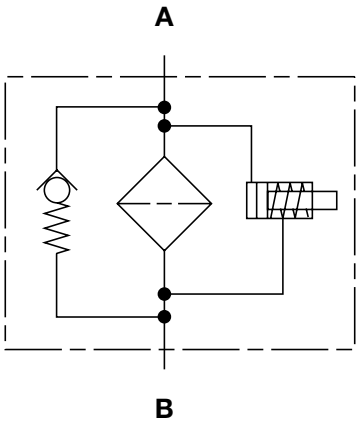
HF4RL Series

Inline Filters

750 psi • up to 90 gpm



Hydraulic Symbol



Features

- Inlet/outlet port options include SAE straight thread O-ring boss, and 1 1/2" SAE 4-bolt flange to allow easy installation without costly adapters.
- Choice of Nitrile rubber or Fluorocarbon elastomer seal material provides compatibility with petroleum oils, and most synthetic fluids, water-glycols, oil/water emulsions, and water based fluids.
- Screw-in cap mounted on top of the filter bowl allows quick and easy element changeout.
- To allow fluid to be drained from the filter before changing the element, a vent plug and a drain plug are provided. Element changes can be made with no mess and minimal loss of fluid.
- Clogging indicators, with and without thermal lockout, are magnetically actuated and have no external dynamic seal. High reliability is achieved and magnetic actuation eliminates leakage.
- A cartridge type bypass valve (optional) is mounted in-line in the filter head between the inlet and outlet port to provide positive sealing during normal operation and fast response during cold starts and flow surges.

Applications


Automotive


Gearboxes


Industrial


Pulp & Paper


Shipbuilding


Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes
Port Connection	SAE-24, 1 1/2" BSPP, SAE-DN 38 Flange Code 61
Flow Direction	
Inlet / Outlet	Side
Construction Materials	
Head, Cap	Cast Aluminum
Housing	Steel
Flow Capacity	
09	50 gpm (190 lpm)
18	70 gpm (265 lpm)
27	90 gpm (341 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	750 psi (52 bar)
Fatigue Pressure	750 psi (52 bar) @ 750,000 cycles
Burst Pressure	3200 psi (221 bar)
Element Collapse Pressure Rating	
BH	3045 psid (210 bar)
BN, W	145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10% *(optional)*	
ΔP = 72 psid (5 bar) -10% *(standard)*	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10% *(optional)*	
ΔP = 87 psid (6 bar) +10% *(standard)*	

Model Code

HF4RL – BN – 09 G F 25 A 1 . 0 / 12 V B6 L110

Filter Type
HF4RL = In-line pressure filter

Element Media
BH = Betamicron® *(High Collapse)* BN = Betamicron® *(Low Collapse)* W = Wire Mesh

Size
09 = 9 inches
18 = 18 inches
27 = 27 inches

Pressure Rating
G = 750 psi (52 bar)

Type of Connection
F = 1 ½" Threaded (SAE-24; G/BSPP 1 1/2")
K = 1 ½" Flanged (SAE DN 38) Code 61

Filtration Rating *(micron)*
3, 5, 10, 20 = BN 3, 5, 10, 20 = BH 25, 50, 100, 200 = W

Type of ΔP Clogging Indicator
A, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1

Modification Number *(latest version always supplied)*

Port Configuration
(omit) = SAE-DN Flange *(standard)*
0 = G/BSPP Straight Thread Ports
12 = SAE O-Ring Boss Straight Thread Ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve
(omit) = without bypass *(BH element recommended)*
B3 = 43 psid / 3 bar *(29 psid indicator setting / 2 bar)*
B6 = 87 psid / 6 bar *(72 psid indicator setting / 5 bar) (standard)*

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SO150H = Anodized for high water based fluids, phosphate esters, and skydrol fluids
W = Modification of "W" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
T100 = Thermal lockout on indicator at 100°F *(standard - C and D type Clogging Indicators only)*
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

5 . 03 . 09 D 03 BN / V

Size
09, 18, 27

Filtration Rating *(micron)*
3, 5, 10, 20 = BH 3, 5, 10, 20 = BN
25, 50, 100, 200 = W

Element Media
BN, BH, W

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
W = *(same as above)* SFREE = *(same as above)*

Clogging Indicator Model Code

VM 5 BM . X / V

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2 = 29 psid (2 bar) *(optional)*
5 = 72 psid (5 bar)

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

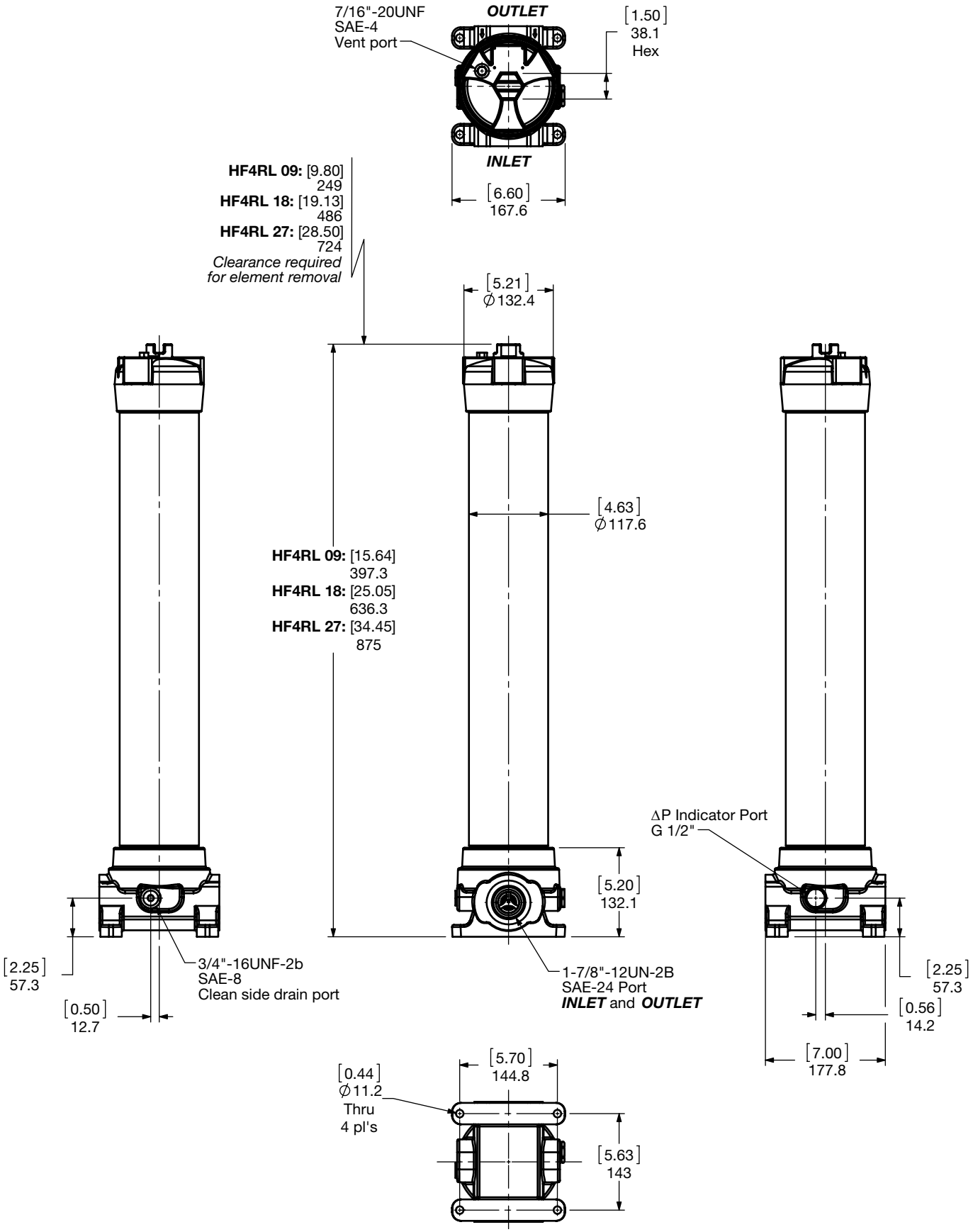
Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
HF4RL



Size	09	18	27
Weight (lbs.)	10.7	33	45.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

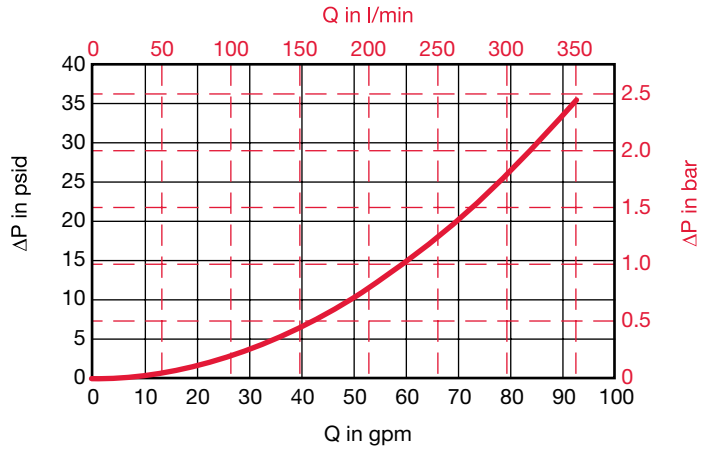
Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

HF4RL Housing



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Autospec HF4 Depth	5.03.XXDXXBN Low Collapse			
Size	3 µm	5 µm	10 µm	20 µm
5.03.09DXXBN	0.168	0.141	0.079	0.044
5.03.18DXXBN	0.080	0.067	0.038	0.021
5.03.27DXXBN	0.052	0.043	0.024	0.014

Autospec HF4 Depth	5.03.XXDXXBH High Collapse			
Size	3 µm	5 µm	10 µm	20 µm
5.03.09DXXBH	0.207	0.146	0.089	0.047
5.03.18DXXBH	0.097	0.068	0.041	0.022
5.03.27DXXBH	0.063	0.044	0.027	0.014

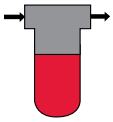
Autospec HF4 Wire Mesh	5.03.XXDXXW
Size	25, 50, 100, 200 µm
5.03.09DXXW	0.007
5.03.18DXXW	0.004
5.03.27DXXW	0.002

All Element K Factors in psi / gpm.

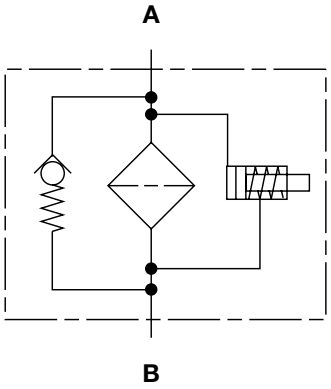
LPF Series

Inline Filters

725 psi • up to 74 gpm



Hydraulic Symbol



Features

- LPF filters are manufactured with cast aluminum head and aluminum cold formed bowls.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- LPF filters are a desirable substitute for spin-on filters when dynamic fluid conditions call for the superior durability and leak-proof quality of a well-constructed cartridge filter.
- Quick-response, bypass valves, located in the filter head, protect against high differential pressures caused by cold start-ups, flow surges and pressure spikes. Filters can also be supplied without bypasses.
- The simple inline design minimizes pressure drop and provides the significant benefit of compactness. The use of lightweight materials, makes these filters ideal for mobile equipment applications.

Applications

Agricultural

Automotive

Construction

Industrial

Steel / Heavy Industry

Technical Specifications

Mounting Method	35 - 55: 3 mounting holes 160 - 280: 2 mounting holes	
Port Connection		
35 - 55	SAE-8, 1/2" BSPP	
160 - 280	SAE-20, 1 1/4" BSPP	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Cast Aluminum	
Bowl	Aluminum Extrusion	
Flow Capacity		
35	9 gpm (35 lpm)	
55	15 gpm (55 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	35 - 55	580 psi (40 bar)
	160 - 280	725 psi (50 bar)* *Note: 580 psi (40 bar) when using BF indicator
Fatigue Pressure	35 - 55	580 psi (40 bar) (10^7 cycles)
	160 - 280	725 psi (50 bar) (10^6 cycles)
Burst Pressure	35 - 55	Contact HYDAC
	160 - 280	> 3625 psi (200 bar)
Element Collapse Pressure Rating		
BH4HC, V		3045 psid (210 bar)
ON, W/HC		290 psid (20 bar)
Fluid Temp. Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications operating below -22°F (-30°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected		
ΔP Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 36.25 psid (2.5 bar) *(BF indicator)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*		
ΔP = 87 psid (6 bar) +10% *(standard sizes 160 - 660)*		
ΔP = 100 psid (7 bar) +10% *(standard sizes 35 / 55)*		

PN#02081318 / 07.19 / FIL1907-2109

Model Code

LPF ON 280 G E 3 B 1 . 2 / 12 B6

Filter Type
LPF Inline filter

Element Media
ON = Optimicron® *(Low Collapse)* BH/HC = Betamicron® *(High Collapse)*
W/HC = Wire Mesh

Size
35, 55, 160, 240, 280

Operating Pressure
G = 725 psi *(sizes 160, 240, 280)*
E = 580 psi *(size 35 & 55)*

Type of Connection
B = 1/2" threaded, SAE, BSPP (LPF 35,55) E = 1 1/4" threaded SAE, BSPP (LPF 160-280)

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON 3, 5, 10, 20 = BH/HC 25, 50, 100, 200 = W/HC

Type of ΔP Clogging Indicator
A, B, BM, BF, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1

Modification Number *(latest version always supplied)*

Port Configuration
0 = BSPP Ports (160 - 280 = G 1 1/4") 12 = SAE Parallel Straight Thread Ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Without Bypass *(BH4HC elements recommended)* B6 = 87 psid bypass *(standard) (sizes 160 - 280 only)*
B3 = 43 psid bypass *(optional)* B7 = 102 psid bypass *(standard) (sizes 35 - 55 only)*

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
T100 = Thermal Lockout on indicator at 100°F *(contact HYDAC for B or BM type indicators)*
W = Modification of "W/HC" and "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
BFL = BF Clogging indicator on left looking into inlet.
BFR = BF Clogging indicator on right looking into inlet.
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

0280 D 003 ON / V

Size
0035, 0055, 0160, 0240, 0280

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BH4HC
25, 50, 100, 200 = W/HC

Element Media
ON, BH4HC, W/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation
SO263 = Same as above
W = Same as above

Clogging Indicator Model Codes

VM 5 B . X /

Indicator Prefix
VM = G 1/2 3000 psi *(sizes 35-280)*
VL = 580 psi *(sizes 160-280) (BF only)*

Trip Pressure
2 = 29 psid (2 bar)
2.5 = 36.25 psid (2.5 bar) *(BF only)*
5 = 72 psid (5 bar)

Type of Indicator
A = no indicator, plugged port
B = Visual pop-up *(auto reset)*
BM = Visual pop-up *(manual reset)*
BF = Visual analog *(sizes 160-280 only)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

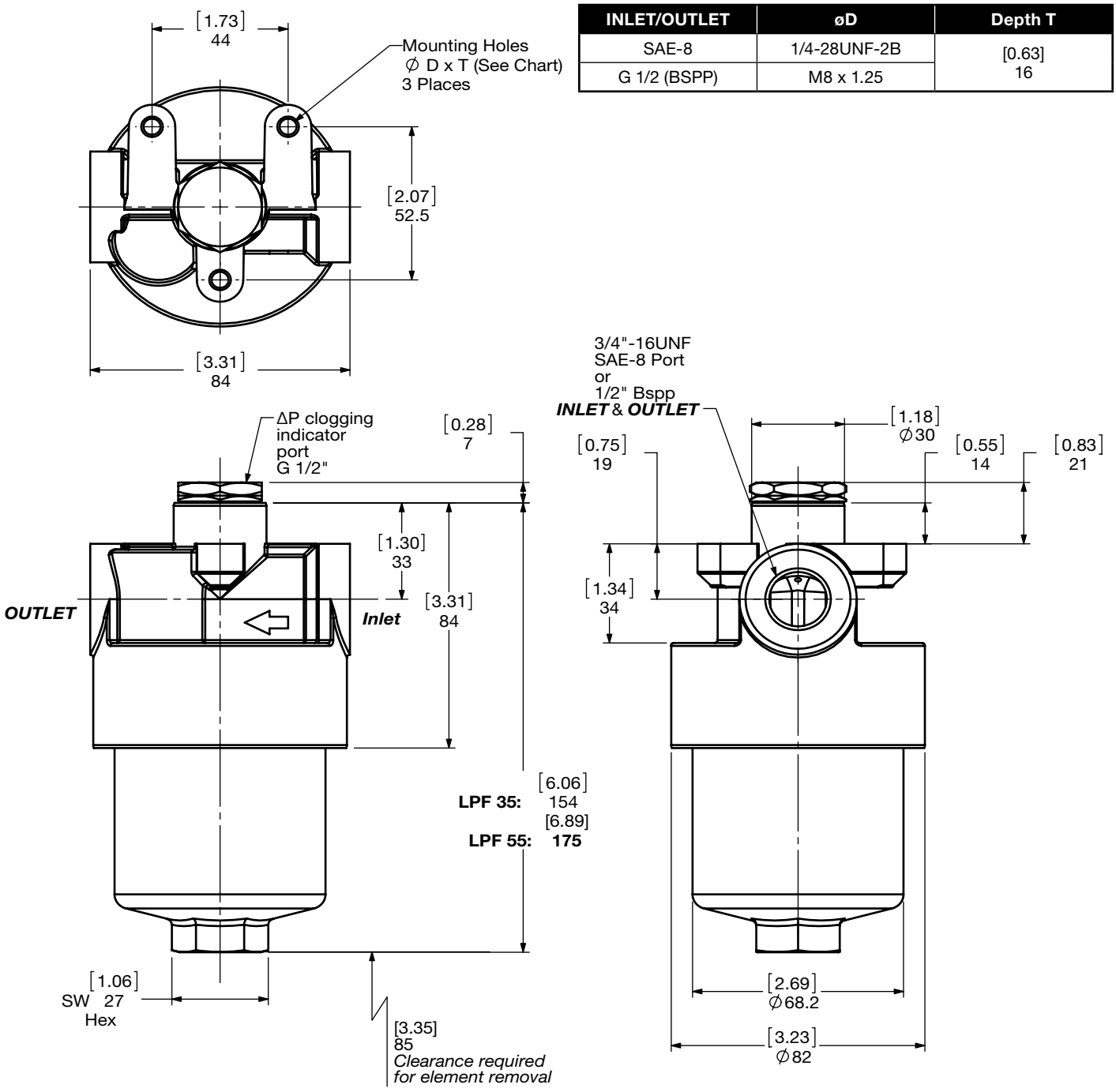
Underwriters Recognition *(VM, VD types C, D, J, and J4 only*
cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
LPF 35 / 55

INLET/OUTLET	øD	Depth T
SAE-8	1/4-28UNF-2B	[0.63] 16
G 1/2 (BSPP)	M8 x 1.25	

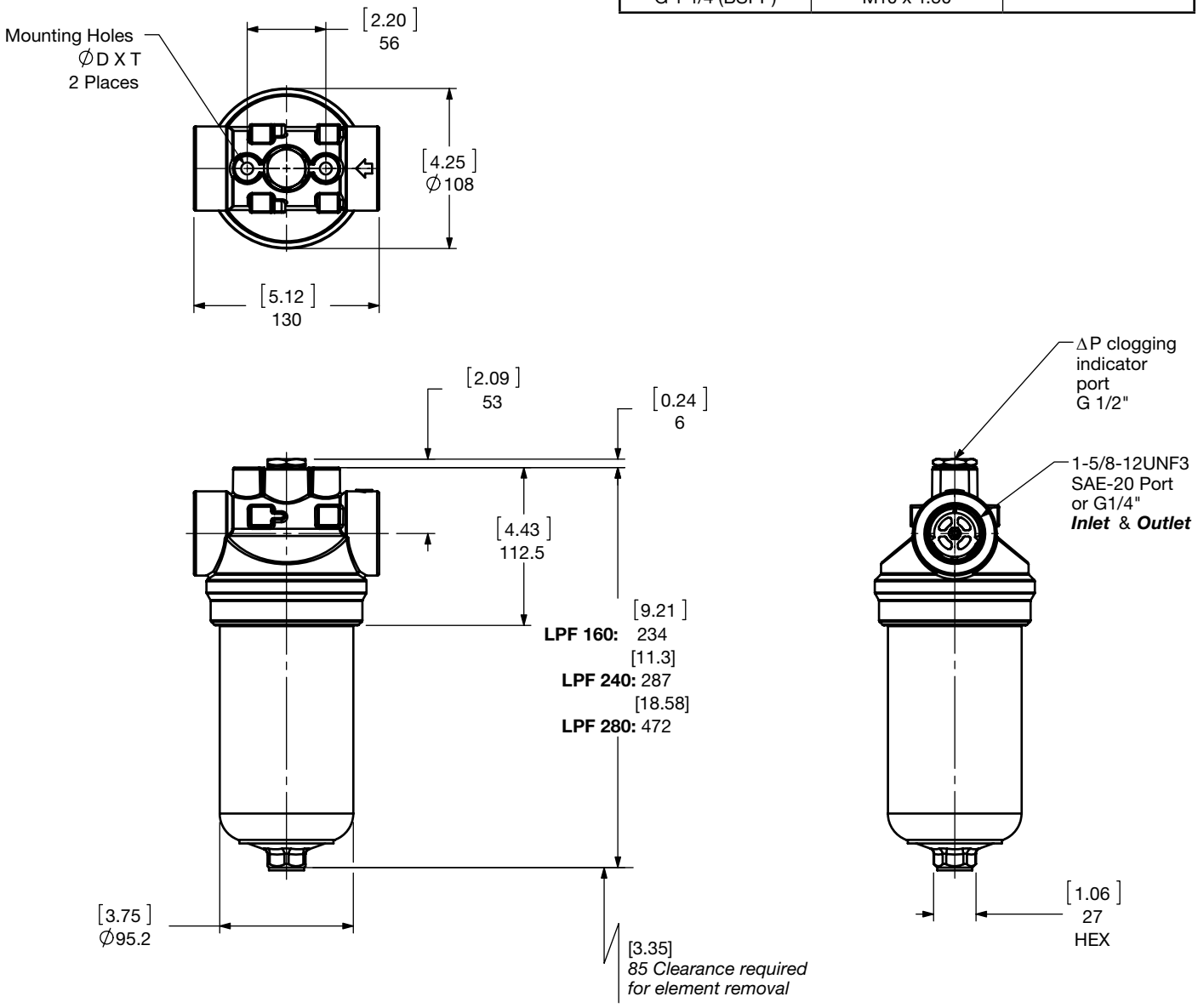


Size	35	55
Weight (lbs.)	2.3	2.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
LPF 160 / 240 / 280

INLET/OUTLET	øD	Depth T
SAE-20	3/8-24 UNF-2B	[0.551] 14
G 1-1/4 (BSPP)	M10 x 1.50	



Size	160	240	280
Weight (lbs.)	4.5	5.1	7.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

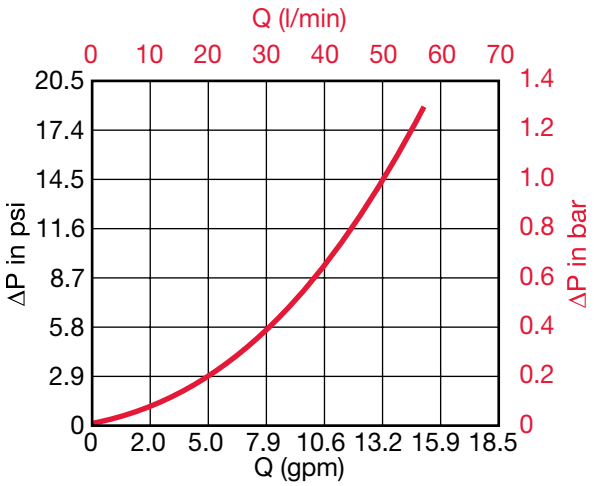
Housing Curve:

Pressure loss through housing is as follows:

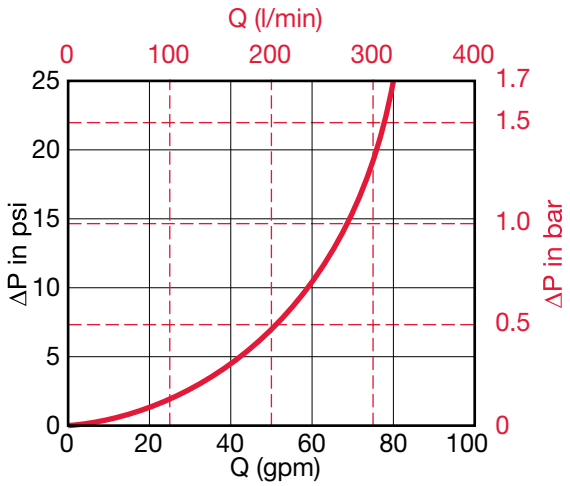
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

LPF 35 / 55 Housing



LPF 160 / 240 / 280 Housing



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

"ON" Pressure Elements	...D...ON (Optimicron Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0035 D XXX ON	2.755	1.169	0.938	0.752	0.549	0.408
0055 D XXX ON	1.427	0.675	0.543	0.434	0.284	0.211
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064

"D" Pressure Elements	...D...BH4HC (Betamicron High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0035 D XXX BH4HC	2.623	1.542	0.922	0.576
0055 D XXX BH4HC	1.328	0.779	0.466	0.291
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088

Wire Mesh	...D...W/HC Elements (Low Collapse)
Size	...D...W/HC Elements 25, 50, 100, 200 µm
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005

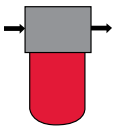
All Element K Factors in psi / gpm.

Notes

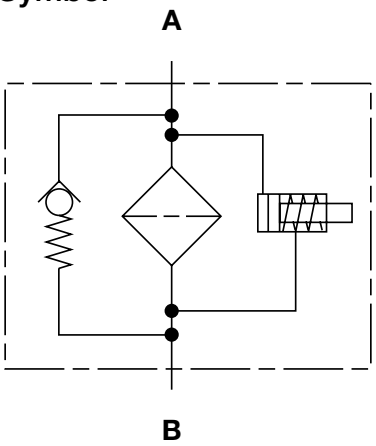
LF Series

Inline Filters

1500 psi • up to 180 gpm



Hydraulic Symbol



Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- Inlet & outlet port options include NPT, BSPP and SAE straight thread O-ring boss to allow easy installation with maximum flexibility.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials (nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl mounted below the filter head requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- A poppet-type bypass valve (optional) is separate from the main flow path, in the filter head, to provide positive sealing during normal operation and fast opening during cold starts and flow surges.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications

Agricultural

Automotive

Construction

Industrial

Railways

Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes	
Port Connection		
30	SAE-8, 1/2" NPT, 1/2" BSPP	
60/110	SAE-12, 3/4" NPT, 3/4" BSPP	
160/240/280	SAE-20, 1 1/4" NPT, 1 1/4" BSPP	
330/660	SAE-24, 1 1/2" NPT, 1 1/2" BSPP	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Cast Aluminum	
Bowl	Aluminum Extrusion (sizes 30 - 660) Steel (size 280)	
Flow Capacity		
30	8 gpm (30 lpm)	
60	16 gpm (60 lpm)	
110	29 gpm (110 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
330	84 gpm (330 lpm)	
660	174 gpm (660 lpm)	
Housing Pressure Rating		
Max. Operating Pressure	1500 psi (100 bar)	
Fatigue Pressure	1500 psi (100 bar)	
Burst Pressure	size 30 5510 psi (380bar) sizes 60 - 660 > 6090 psi (420 bar)	
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
ON, W/HC	290 psid (20 bar)	
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications operating below -22°F (-30°C)		
Fluid Compatibility	Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected	
ΔP Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*		
ΔP = 87 psid (6 bar) +10% *(standard)*		

Model Code

LF ON 30 I B 3 B 1 . 0 / 12

Filter Type
LF = Inline filter

Element Media
ON = Optimicron® *(low collapse)*
W/HC = Wire Mesh
BH/HC = Betamicron® *(High Collapse)*
V = Metal Fiber

Size
30, 60, 110, 160, 240, 280, 330, 660

Operating Pressure
I = 1500 psi (100 bar)

Type of Connection
B = 1/2" Threaded *(size 30 only)*
C = 3/4" Threaded *(sizes 60 & 110 only)*
E = 1 1/4" Threaded *(sizes 160 - 280 only)*
F = 1 1/2" Threaded *(sizes 330 - 660 only)*

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BH/HC
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1 = Sizes 30 to 660

Modification Number *(latest version always supplied)*

Port Configuration
0 = BSPP
3 = NPT Ports *(with adapters)*
12 = SAE Straight Thread O-Ring Boss Ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Non-Bypass – Critical applications *(high collapse element required)*
B3 = 43 psid (3 bar) *(optional)*
B6 = 87 psid (6 bar) *(standard setting for pressure filters)*

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SO184 = G-1/2 Drain in Bowl Option For Sizes 60 - 280 *(comes standard for sizes 330, 660, & 1320)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
W = Modification of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

0030 D 003 ON / V

Size
0030, 0060, 0110, 0160,
0240, 0280, 0330, 0660

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BH4HC
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

Element Media
ON, BH4HC, W/HC, V

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Same as above
W = Same as above
SFREE = Element specially designed to minimize electrostatic charge generation

Clogging Indicator Model Code

VM 2 B . X /

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2 = 29 psid (2 bar) *(optional)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seal
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V
L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

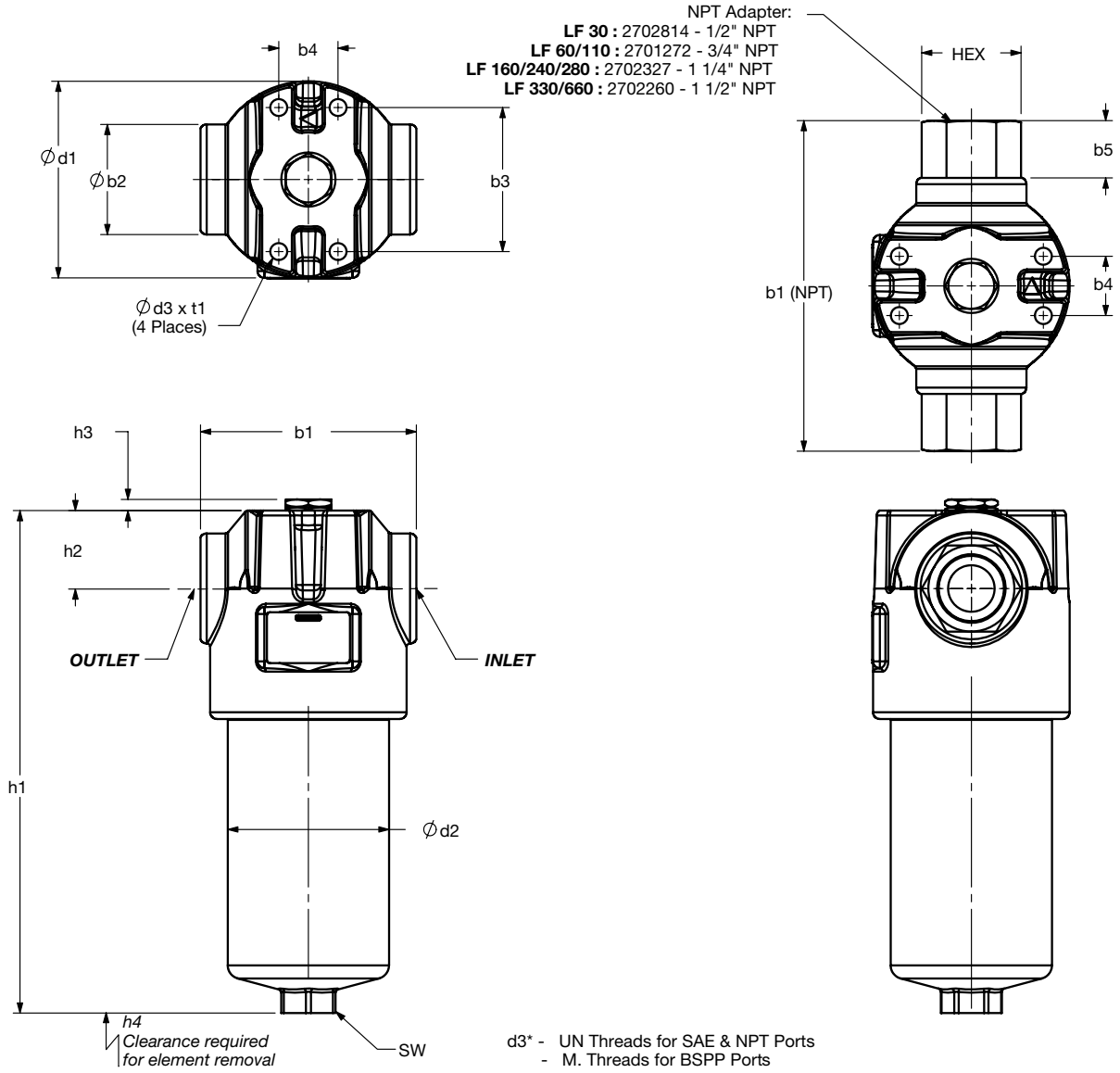
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

MEDIUM PRESSURE FILTERS

Dimensions
LF 30 - 660



Size	b1	b1 (NPT)	b2	b3	b4	b5	d1	d2	d3*	h1	h2	h3	h4	SW	t1	HEX
30	(2.72) 69	(4.84) 123	(1.42) 36	(1.77) 45	(1.18) 30	(1.062) 27	(2.64) 67	(2.05) 52	10-32UNF-2B M5 X 0.8	(6.16) 156	(1.22) 31	(0.28) 7	(2.95) 75	(0.94) 24	(0.24) 6	(1.125) 28.6
60	(3.54) 90	(5.80) 147.2	(1.89) 48	(2.20) 56	(1.26) 32	(1.126) 28.6	(3.31) 84	(2.68) 68	1/4-28UNF-2B M6 X 1.0	(6.95) 176.5	(1.54) 39	(0.24) 6	(2.95) 75	(1.06) 27	(0.35) 9	(1.38) 34.93
110	(3.54) 90	(5.80) 147.2	(1.89) 48	(2.20) 56	(1.26) 32	(1.126) 28.6	(3.31) 84	(2.68) 68	1/4-28UNF-2B M6 X 1.0	(9.68) 246	(1.54) 39	(0.24) 6	(2.95) 75	(1.06) 27	(0.35) 9	(1.38) 34.93
160	(4.92) 125	(7.67) 194.9	(2.56) 65	(3.35) 85	(1.38) 35	(1.376) 34.95	(4.57) 116	(3.74) 95	3/8-24UNF-2B M10 X 1.5	(9.29) 236	(1.81) 46	(0.24) 6	(3.74) 95	(1.26) 32	(0.55) 14	(2.00) 50.8
240	(4.92) 125	(7.67) 194.9	(2.56) 65	(3.35) 85	(1.38) 35	(1.376) 34.95	(4.57) 116	(3.74) 95	3/8-24UNF-2B M10 X 1.5	(11.67) 296.5	(1.81) 46	(0.24) 6	(3.74) 95	(1.26) 32	(0.55) 14	(2.00) 50.8
280	(4.92) 125	(7.67) 194.9	(2.56) 65	(3.35) 85	(1.38) 35	(1.376) 34.95	(4.57) 116	(3.74) 95	3/8-24UNF-2B M10 X 1.5	(18.98) 482	(1.81) 46	(0.24) 6	(3.74) 95	(1.26) 32	(0.55) 14	(2.00) 50.8
330	(6.26) 159	(9.07) 230.4	(3.35) 85	(4.53) 115	(2.36) 60	(1.406) 35.71	(6.3) 160	(5.12) 130	1/2-20UNF-2B M12 X 1.75	(11.90) 302.5	(1.97) 50	(0.24) 6	(4.13) 105	(1.42) 36	(0.67) 17	(2.25) 57.15
660	(6.26) 159	(9.07) 230.4	(3.35) 85	(4.53) 115	(2.36) 60	(1.406) 35.71	(6.3) 160	(5.12) 130	1/2-20UNF-2B M12 X 1.75	(18.40) 467.5	(1.97) 50	(0.24) 6	(4.13) 105	(1.42) 36	(0.67) 17	(2.25) 57.15

Size	30	50	110	160	240	330	660
Weight (lbs.)	1.8	3.4	4	8.2	9.5	17.7	24.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

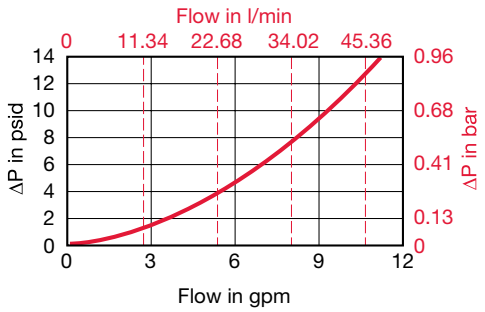
Housing Curve:

Pressure loss through housing is as follows:

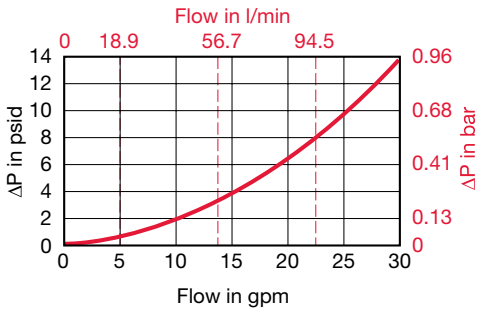
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

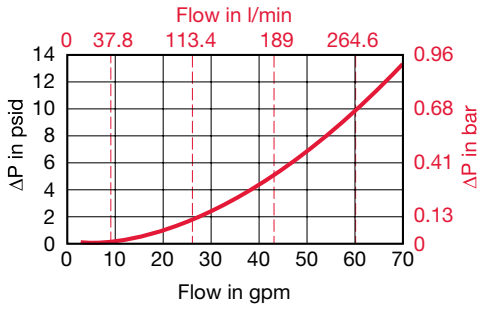
LF 30 Housing



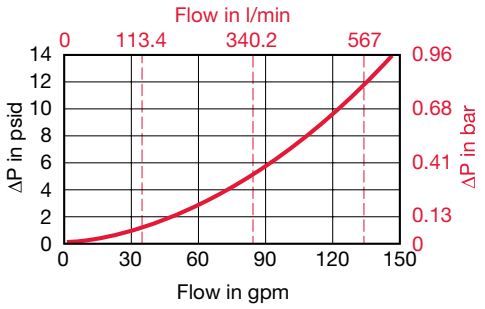
LF 60 / 110 Housing



LF 160 / 240 / 280 Housing



LF 330 / 660 Housing



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

"ON" Pressure Elements:	...D...ON (Optimicron Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0030 D XXX ON	4.27	3.507	2.376	1.251	0.768	0.62
0060 D XXX ON	2.936	1.427	1.004	0.664	0.537	0.347
0110 D XXX ON	1.416	0.735	0.527	0.333	0.254	0.164
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031

"D" Pressure Elements	...D...BH4HC (Betamicron High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX BH4HC	5.005	2.782	1.992	1.043
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049

Wire Mesh	...D...W/HC Elements (Low Collapse)
Size	25, 50, 100, 200 µm
0030 D XXX W/HC	0.166
0060 D XXX W/HC	0.042
0110 D XXX W/HC	0.023
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004

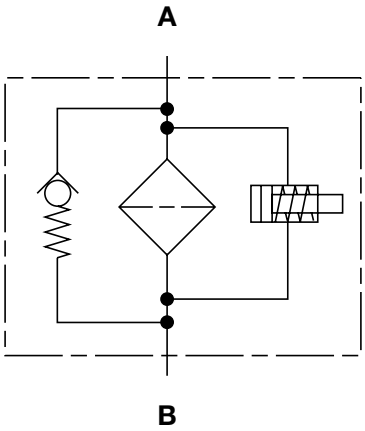
All Element K Factors in psi / gpm.

LPFH Series

Inline Filters

500 psi • up to 112 gpm

Hydraulic Symbol



Features

- LPFH filters are manufactured with cast aluminum head and aluminum cold formed bowls.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- LPFH filters are a desirable substitute for spin-on filters when dynamic fluid conditions call for the superior durability and leak-proof quality of a well-constructed cartridge filter.
- Quick-response, bypass valves, located in the filter head, protect against high differential pressures caused by cold start-ups, flow surges and pressure spikes. Filters can also be supplied without bypasses.
- The simple inline design minimizes pressure drop and provides the significant benefit of compactness. The use of lightweight materials, makes these filters ideal for mobile equipment applications.
- Integrated retrofit protection.

Applications


Agricultural


Automotive


Construction


Industrial


Steel / Heavy Industry

Technical Specifications

Mounting Method	325 - 425: 5 mounting hole options	
Port Connection		
325 - 425	SAE-24, 1 1/2" BSPP	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Cast Aluminum	
Bowl	Aluminum Extrusion	
Flow Capacity		
325	87 gpm (325 lpm)	
425	112 gpm (425 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	325 - 425	500 psi (34 bar)
Fatigue Pressure	325 - 425	500 psi (34 bar) (10^6 cycles)
Burst Pressure	325 - 425	> 2700 psi (186 bar)
Element Collapse Pressure Rating		
ON, W/HC		290 psid (20 bar)
Fluid Temp. Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications operating below -22°F (-30°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycwol, oil/water emulsion, and high water based fluids when the appropriate seals are selected		
ΔP Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 36.25 psid (2.5 bar) *(BF indicator)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*		
ΔP = 72 psid (5 bar) +10% *(optional)*		
ΔP = 87 psid (6 bar) +10% *(optional)*		

Model Code

LPFH ON 325 E F 3 B 1 . 0 / 12 B6

Filter Type
LPFH Inline filter

Element Media
ON = Optimicron® *(Low Collapse)* BH/HC = Betamicron (High Collapse)
W/HC = Wire Mesh

Size
325, 425

Operating Pressure
E = 500 psi (35 bar)

Type of Connection
F = 1 1/2" threaded SAE, BSPP

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON 25, 74, 149 = W/HC

Type of ΔP Clogging Indicator
A, B, BM, BF, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1

Modification Number *(latest version always supplied)*

Port Configuration
0 = BSPP Ports (G 1 1/2") 12 = SAE Parallel Straight Thread Ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Without Bypass *See note below *(standard)* B6 = 87 psid bypass *(optional)* B3 = 43 psid bypass *(optional)*

Supplementary Details

L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SO263 = Modification of ON & W/HC *(Betamicron® Low Collapse)* Elements For Phosphate Ester Fluids
SO155H = Modification of BH4HC *(Betamicron® High Collapse)* Element For Phosphate Ester Fluids
T100 = Thermal Lockout on indicator at 100˚F *(contact HYDAC for B or BM type indicators)*
W = Modification of "W/HC" and "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
BFL = BF Clogging indicator on left looking into inlet.
BFR = BF Clogging indicator on right looking into inlet.
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's recognition

*Note: Use 5 bar indicator when filter has no bypass. Replace element when indicator trips.

Replacement Element Model Code

0325 D 003 ON / V

Size
0325, 0425

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
25, 74, 149 = W/HC
3, 5, 10, 20 = BH4HC

Element Media
ON, BH4HC, W/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation
SO263 = Same as above
S0155H = Same as above
W = Same as above

Clogging Indicator Model Codes

VM 5 B . X /

Indicator Prefix
VM = G 1/2 3000 psi
VL = 580 psi *(BF only)*

Trip Pressure
2 = 29 psid (2 bar)
2.5 = 36.25 psid (2.5 bar) *(BF only)*
5 = 72 psid (5 bar)

Type of Indicator
A = no indicator, plugged port
B = Visual pop-up *(auto reset)*
BM = Visual pop-up *(manual reset)*
BF = Visual analog
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

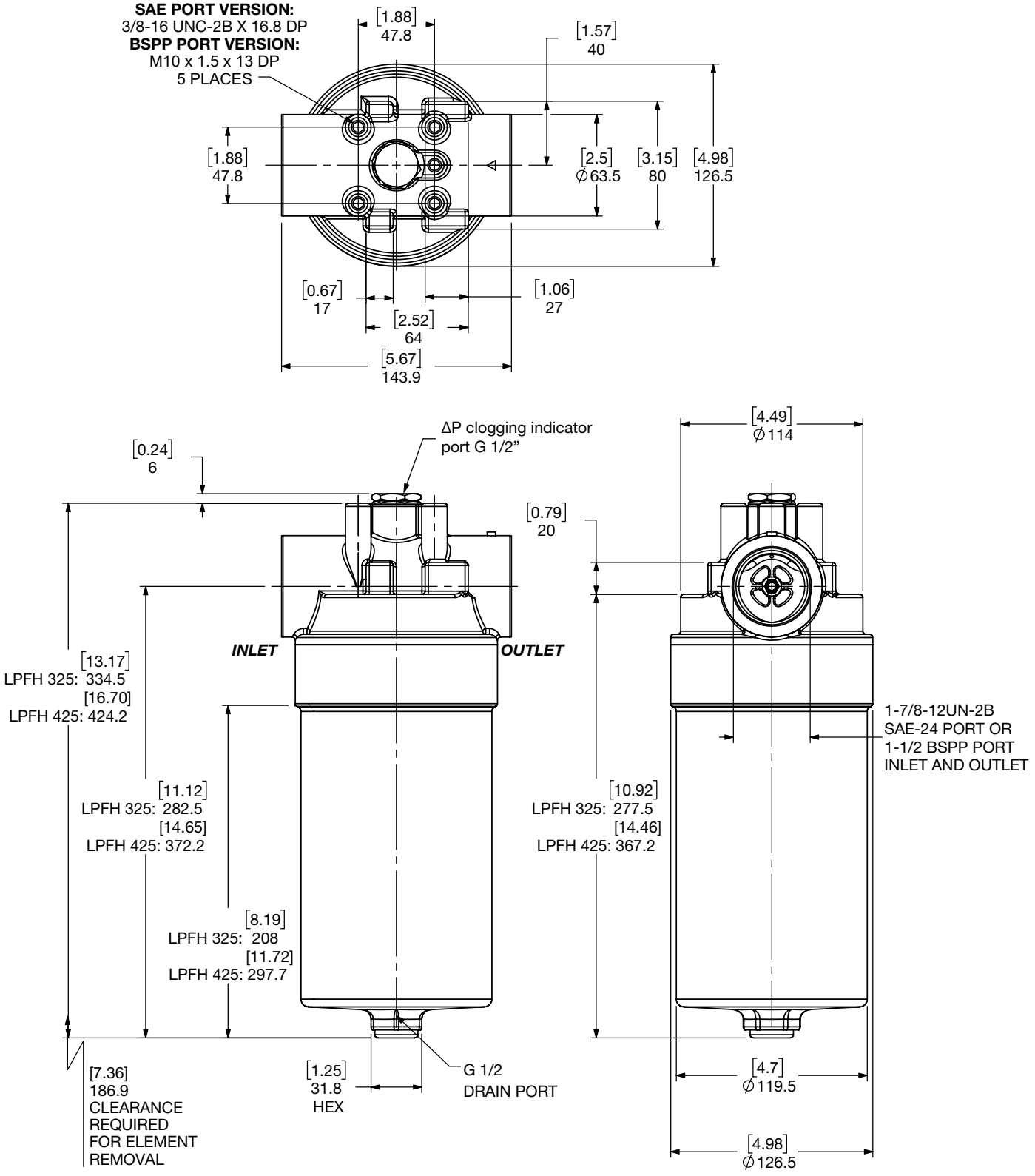
Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Recognition *(VM, VD types C, D, J, and J4 only*
cRUus = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
LPFH 325 / 425



Dimensions are [inches] Millimeters

Size	325	425
Weight (lbs.)	8.0	10.0

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

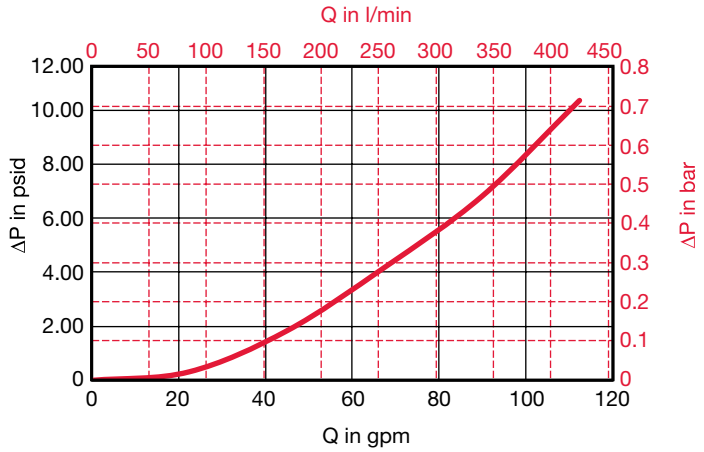
Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

LPFH 325 / 425 Housing



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0325 D XXX ON	0.444	0.204	0.150	0.081	0.070	0.056
0425 D XXX ON	0.289	0.143	0.104	0.06	0.046	0.038

Wire Mesh	...D...W/HC
Size	...D...W/HC Elements 25, 50, 74, 100, 149, 200 µm
0325 D XXX W/HC	0.011
0425 D XXX W/HC	0.007

Betamicron	...D...BH/HC					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0325 D XXX BH/HC	Consult factory upon request					
0425 D XXX BH/HC						

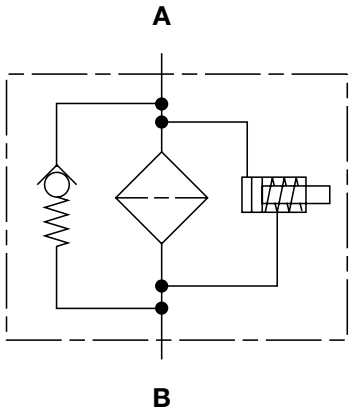
All Element K Factors in psi / gpm.

MFX Series

Inline Filters

725 psi • up to 35 gpm

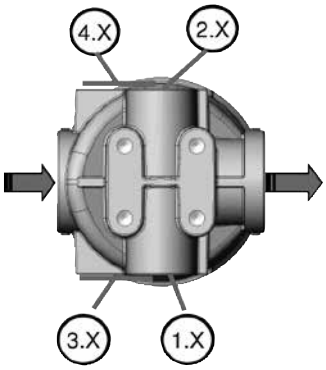
Hydraulic Symbol



Features

- Eco-friendly, cost-effective alternative to spin-on filters
- Integrated retrofit protection
- Longer service life of the filter bowl because of fatigue resistant up to 725 psi
- High level of operational safety - Bowl seal and bypass valve are integrated in the filter element and therefore replaced at every element change
- “Missing Element Protection” - cannot operate without element installed.
- Many choices of clogging indicators available
- Various port connection types (SAE-12, G ¾, SAE-16, G 1, M33x2)

Clogging Indicator Assignment



Technical Specifications

Mounting Method	4 Mounting holes (3/8-16UNC) or (M10-13) Ref. Drawing
Port Connection	SAE-12, G 3/4 SAE-16, G 1, M33x2
Flow Direction	Inlet: Side Outlet: Side (opposite each other)
Construction Materials	
Head	Die Cast Aluminum
Bowl	Extruded Aluminum
Flow Capacity	
100	26 gpm (100 lpm)
200	35 gpm (130 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	725 psi (50 bar)
Fatigue Pressure	725 psi (50 bar) @ 1 million cycles
Burst Pressure	2600 psi (183 bar)
Element Collapse Pressure Rating	
BN4HC	290 psid (20 bar)
ECON2, MM	145 psid (10 bar)
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C) Consult HYDAC for applications below -22˚F (-30˚C)
Fluid Compatibility	Compatible with all hydrocarbon based, synthetic, and high water based fluids compatible with Nitrile Rubber (NBR) seals
ΔP Indicator Trip Pressure	ΔP = 36.25 psid (2.5 bar) -10% (standard). ΔP = 14.5 psid (1 bar) -10% (optional)
Bypass Valve Cracking Pressure	ΔP = 50.75 psid (3.5 bar) +10% *(standard)* ΔP = 25 psid (1.7 bar) +10% *(optional)*

Applications

Agricultural

Automotive

Construction

Commercial Municipal

Railways

PN#02081318 / 07.19 / FIL1907-2109

Model Code

MFX BN/HC 100 G I 10 BF 4 . 0 / B3.5

Filter Type
MFX = In-Line Medium Pressure Filter

Filter Media
BN/HC, ECON2, MM

Size
100, 200

Operating Pressure
G = 725 psi (50 bar)

Type of Connection
C = G 3/4"
I = 3/4" (SAE 12 straight thread)
D = G 1"
K = 1" (SAE 16 straight thread)
L = M33x2

Filtration Rating *(microns)*
3, 5, 10, 20 = BN4HC 3, 5, 10, 20 = ECON2 10, 15 = MM

Type of Clogging Indicator
A, W, BM, C, D, M, BF *(Others available upon request, see Clogging Indicators section.)*

Indicator Location
1-4 = 3 + 4 BF Indicator only
1 + 2 not with BF indicator

Type Modification Number *(latest version always supplied)*

Supplementary Details
B1.7 = Cracking pressure (bypass valve) 25 psi (1.7) bar
B3.5 = Standard, cracking pressure bypass valve 50 psi (3.5 bar)
KB = Non-bypass option
L... = Lamp for relevant voltage (24V, 48V, 110V, 220V)
LED = 2 LEDs up to a voltage of 24 Volt
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

0100 MX 010 BN4HC / - B3.5

Size
0100, 0200

Type
MX

Filtration Rating *(micron)*
3, 5, 10, 20 = BN4HC
3, 5, 10, 20 = ECON2
10, 15 = MM

Filter Material
BN4HC, ECON2, MM

Supplementary Details
Seals:
(omit) = Nitrile rubber (NBR) *(standard)*
B1.7 = Cracking pressure (bypass valve) 25 psi (1.7 bar)
B3.5 = Standard, cracking pressure (bypass valve) 50 psi (3.5 bar)
KB = Non-bypass option

Clogging Indicator Model Code

VL 2.5 BF . X /

Indicator Prefix
VM = G 1/2 3000 psi
VL = BF only

Trip Pressure
2.5 = 36 psid (2.5 bar)
1 = 14.5 psid (1 bar)

Type of Indicator
A = No indicator, plugged port
W = No indicator, without port
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
M = Electric switch, single pole
D = Electric switch and LED light - SPDT
BF = Visual analog

Modification Number

Supplementary Details
Seals
(omit) = Nitrile rubber (NBR) *(standard)*

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

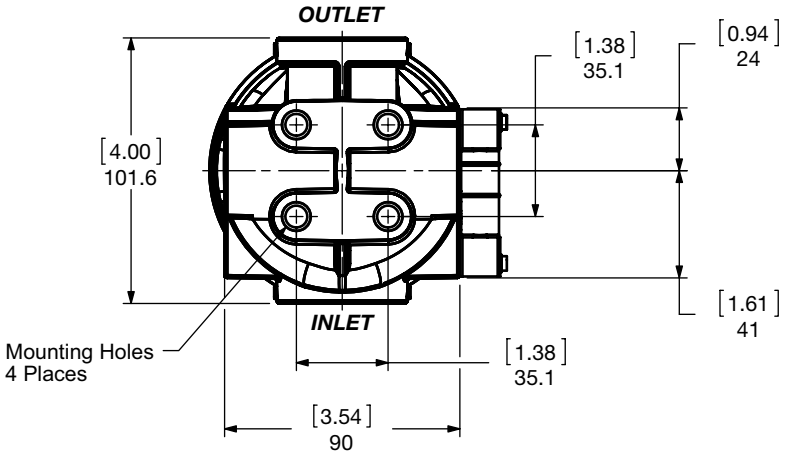
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUuS = Electrical Indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

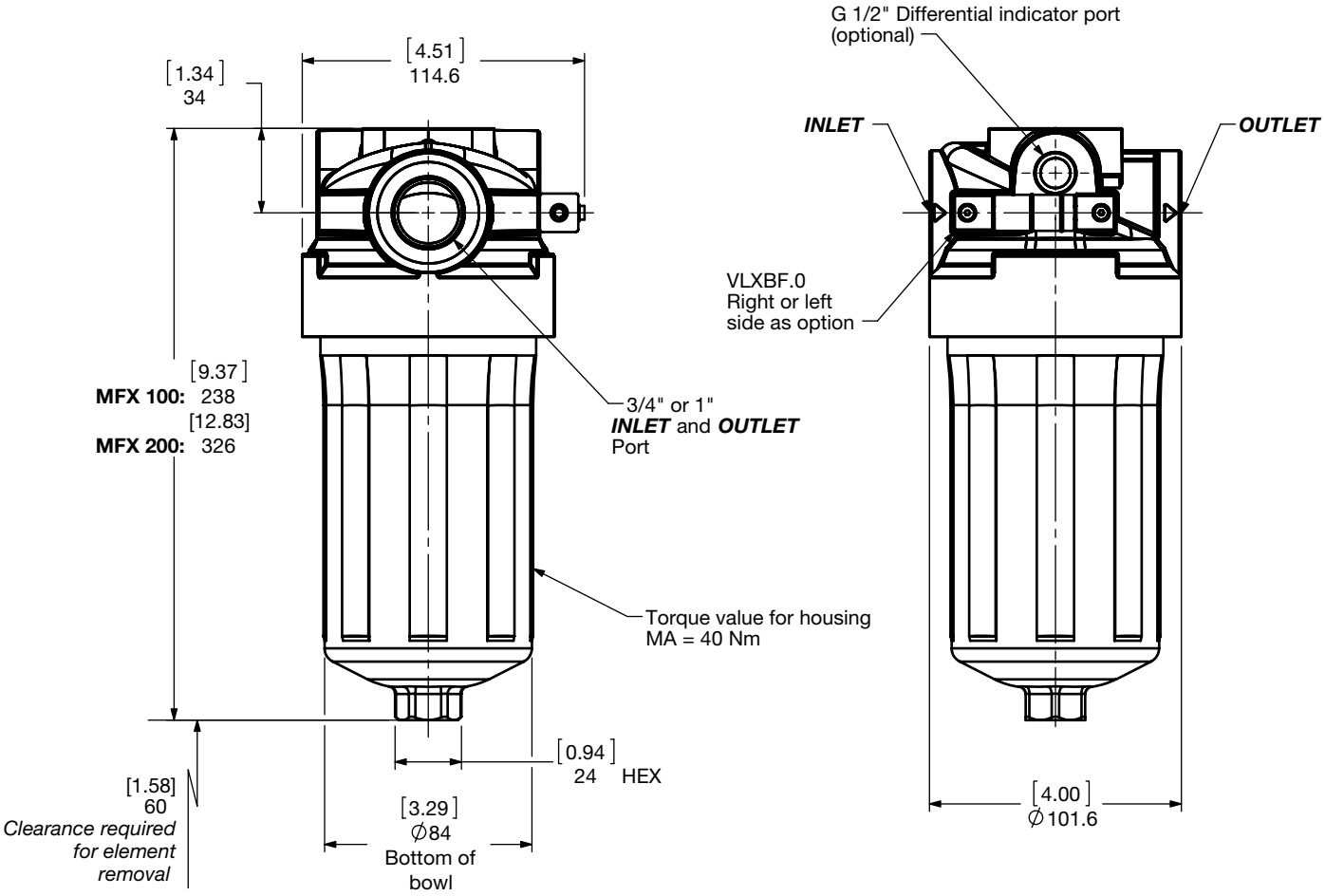
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

MEDIUM PRESSURE FILTERS

Dimensions
MFX 100 / 200



MFX 100/200...	Mounting x
...G C...	M10-13 [0.5] Deep
...G D...	M10-13 [0.5] Deep
...G I...	3/- 16UNC. 13 [0.5] Deep
...G K...	3/8-16UNC. 13 [0.5] Deep
...G L...	M10-13 [0.5] Deep



Size	100	200
Weight (lbs.)	3.3	3.9

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

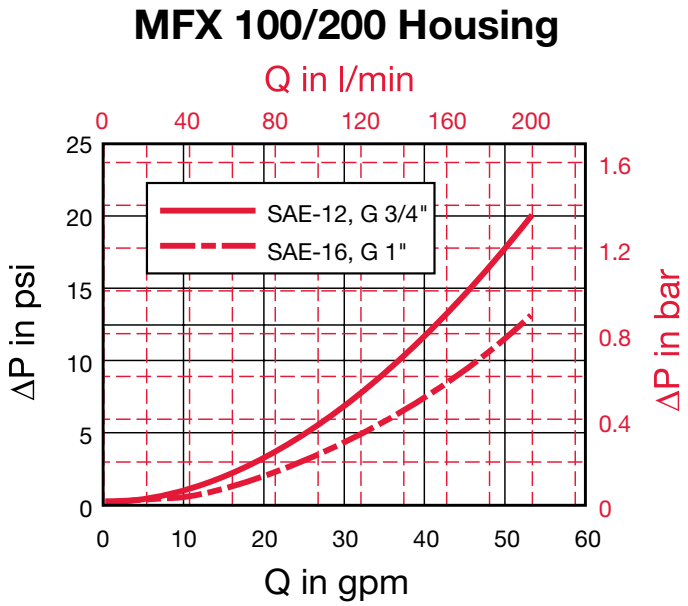
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\textit{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron	...MX...BN4HC (Betamicron® Low Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0100 MX XXX BN4HC	0.659	0.494	0.252	0.187
0200 MX XXX BN4HC	0.384	0.291	0.148	0.110

ECOmicron	...MX...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0100 MX XXX ECON2	0.713	0.549	0.357	0.263
0200 MX XXX ECON2	0.439	0.324	0.209	0.154

Mobilemicron	...MX...MM		
Size	8 µm	10 µm	15 µm
0100 MX XXX MM	0.148	0.148	0.121
0200 MX XXX MM	0.088	0.088	0.071

All Element K Factors in psi / gpm.

Notes

F

High Pressure Filters

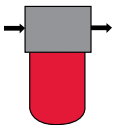
3000-6000 psi

Robust carbon steel/ductile iron construction filters, provide reliability in demanding industrial applications. Inline, manifold-mount, reverse-flow, bi-directional-flow configurations provide flexibility to accommodate any application. Duplex filters allow for uninterrupted operation during element change-out.

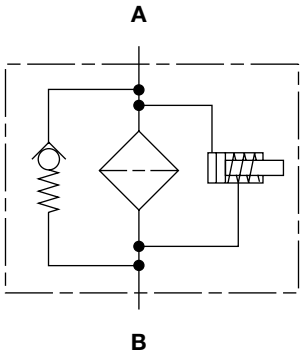
DF Series

Inline Filters

6090 psi • up to 200 gpm



Hydraulic Symbol



Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Choice of NPT, BSPP, SAE straight thread O-ring boss, and SAE 4-bolt flange porting (sizes 60 - 1320) to allow easy installation with maximum flexibility.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials (nitrile rubber, fluorocarbon elastomer, and ethylene propylene rubber) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl or lid (on 2-pc. bowls) mounted below the filter head requires minimal clearance to remove the element for replacement and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC Differential Pressure Indicators have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- A poppet-type bypass valve located in the filter head provides positive sealing during normal operation and fast opening during cold starts and flow surges. *(Optional non-bypass available)*
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.
- Fatigue pressure ratings equal maximum allowable working pressure rating.

Note: QPD is available in sizes 160-1320 only.

Applications

Technical Specifications

Mounting Method	4 mounting holes	
Port Connection		
30	SAE-8, 1/2” NPT, 1/2” BSPP	
60/110	SAE-12, 3/4” NPT, 3/4” BSPP 3/4” SAE, Code 62	
160/240/280	SAE-20, 1 1/4” NPT, 1 1/4” BSPP 1 1/4” SAE, Code 62	
330/660/1320	SAE-24, 1 1/2” NPT, 1 1/2” BSPP 2” SAE Flange Code 62	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Ductile iron	
Bowl *(30-660)*	Steel	
Housing/Bowl *(660-1320 - 2.0)*	Steel	
Cap/Lid *(660-1320 type)*	Steel	
Flow Capacity		
30	8 gpm (30 lpm)	
60	16 gpm (60 lpm)	
110	29 gpm (110 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
330	87 gpm (330 lpm)	
660	174 gpm (660 lpm)	
1320	200 gpm (757 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	6090 psi (420 bar)	
Fatigue Pressure	6090 psi (420 bar) @ 1 million cycles	
Burst Pressure	30	15950 psi (1100 bar)
	60/110	17400 psi (1200 bar)
	160/240/280	17110 psi (1180 bar)
	330/660/1320	15080 psi (1040 bar
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
ON, W/HC	290 psid (20 bar)	
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
ΔP = 116 psid (8 bar) -10% *(optional non bypass)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*		
ΔP = 87 psid (6 bar) +10% *(standard)*		
Non Bypass Available		

Model Code

DF ON 30 T B 5 D 1 . X / 12 - V B6 QPD L24

Filter Type
DF = Inline filter

Element Media
ON = Optimicron® BH/HC = Betamicron® *(High Collapse)*
W/HC = Wire Mesh V = Metal Fiber

Size
30, 60, 110, 160, 240, 280, 330, 660, 1320

Pressure Range
T = 420 bar

Size and Nominal Connection
B = 1/2" Threaded *(size 30 only)* I = 3/4" SAE Code 62 Flange *(sizes 60-140 only)*
C = 3/4" Threaded *(sizes 60-140 only)* J = 1 1/4" SAE Code 62 Flange *(sizes 160-280 only)*
E = 1 1/4" Threaded *(sizes 160-280 only)* L = 2" SAE Code 62 Flange *(sizes 330-1320 only)*
F = 1 1/2" Threaded *(sizes 330-1320 only)*

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON 3, 5, 10, 20 = BH/HC 25, 50, 100, 200 = W/HC 3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1 = One piece bowl *(sizes 30-660 only)* 2 = Two piece bowl *(sizes 660-1320 only)*
3 = Upside down mount *(two-piece bowl) - (sizes 330-1320)*

Modification Number *(latest version always supplied)*

Port Configuration
0 = BSPP 12 = SAE straight thread O-ring boss ports
3 = NPT ports – NPT ported filters will be SAE with adaptors in each port 16 = SAE flange ports *(sizes 60-1320 only)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Non-bypass B3 = Bypass *(3 bar)* B6 = Bypass *(6 bar)*

Version
(omit) = No quality protection
QPD = Quality Protection Design

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SO184 = G-1/2 Drain in Bowl Option For Sizes 60 - 280 *(comes standard for sizes 330, 660, & 1320)*
SO210H = Alternate Bowl *(sizes 160, 240, & 280)* - 16 mm longer
W = "VD…" indicator modified with a brass piston for use with High water based emulsions/solutions (HFA) & (HFC) or when using "V" elements
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
cRUus = Electrical Indicators with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0030 D 005 ON / V QPD

Size
0030, 0060, 0110, 0160, 0240, 0280, 0330, 0660, 1320

Filtration Rating *(micron)*
3, 5, 10, 20 = BH4HC
1, 3, 5, 10, 15, 20 = ON
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

Element Media
BH4HC, ON, W/HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EP = Ethylene propylene rubber (EPR)

Version
(omit) = No quality protection
QPD = Quality Protection Design

Supplementary Details
SO263 = *(same as above)*
W = Modication of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC) usually polyglycol
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 D . X / V L24

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 15 psid (1 bar) & 116 psid (8 bar) available upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch – SPDT
D = Electric switch and LED light – SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EP = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

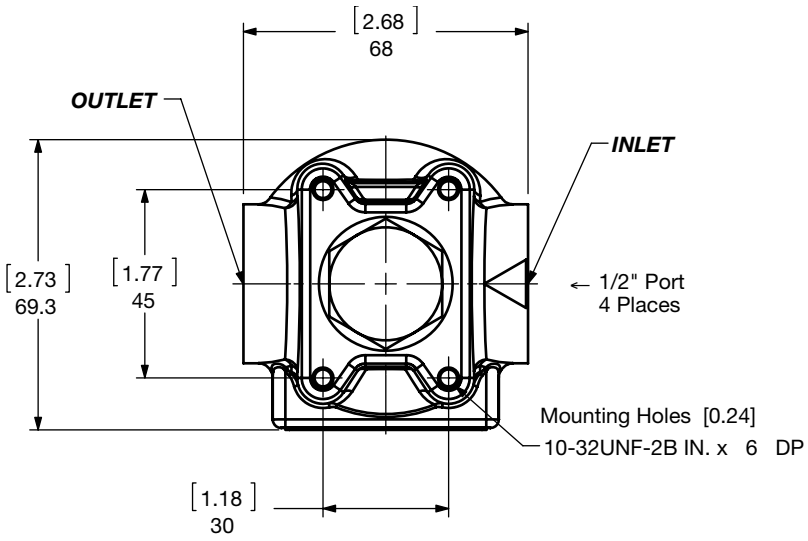
Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

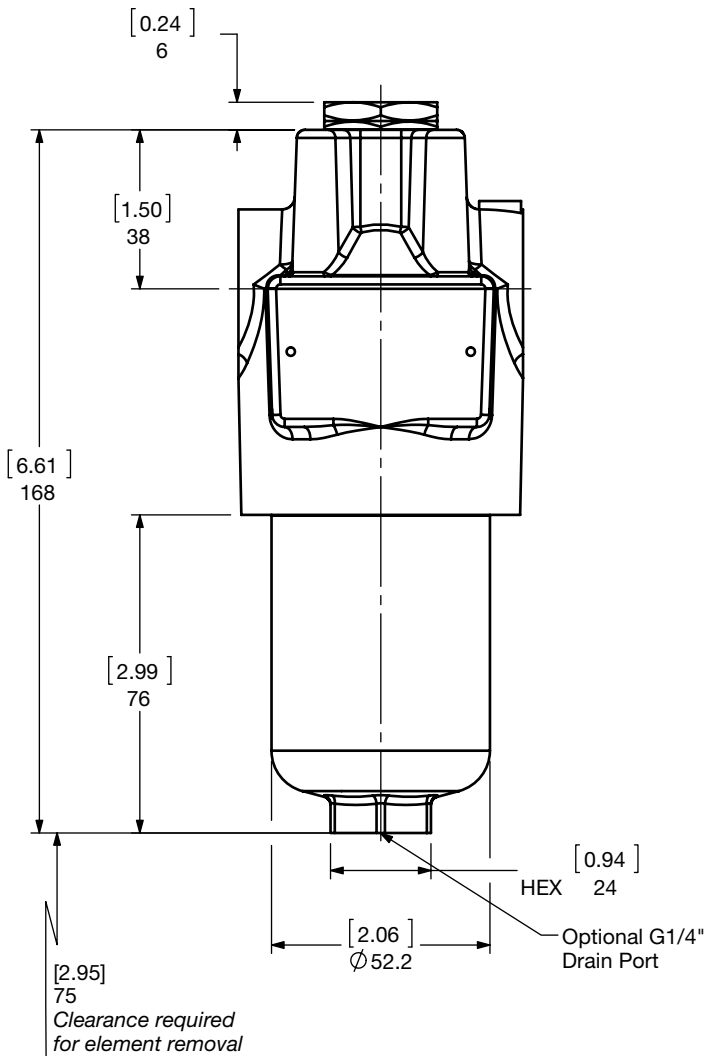
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicators with underwriter's recognition
W = "VD…" indicator modified with a brass piston for use with High water based emulsions/solutions (HFA) & (HFC)

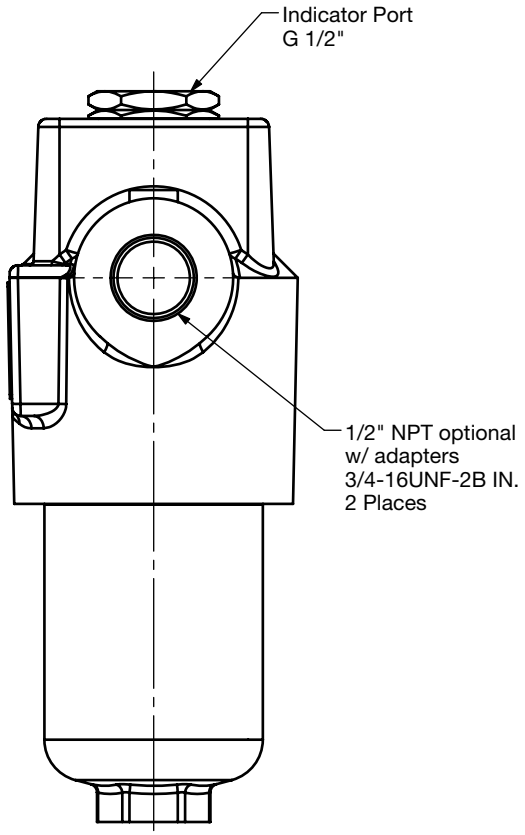
(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
DF 30



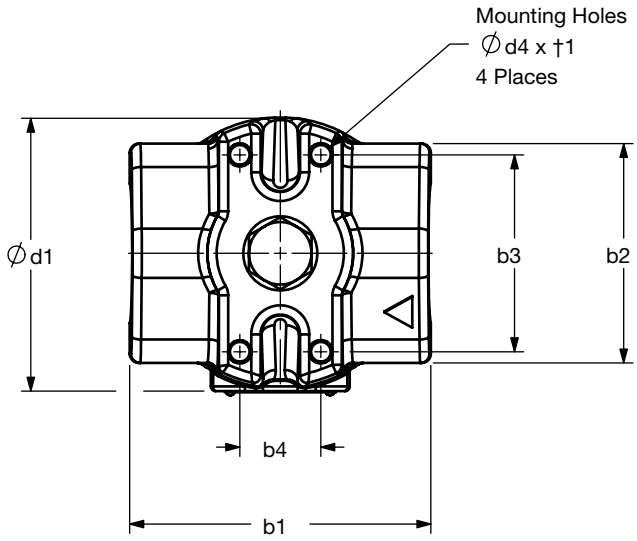


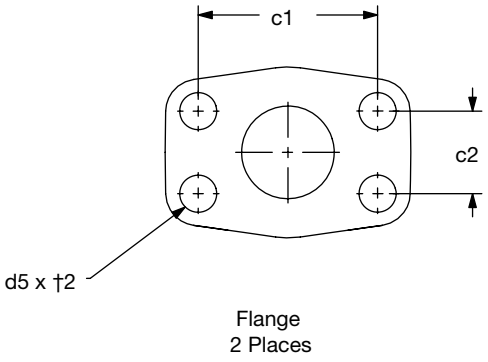


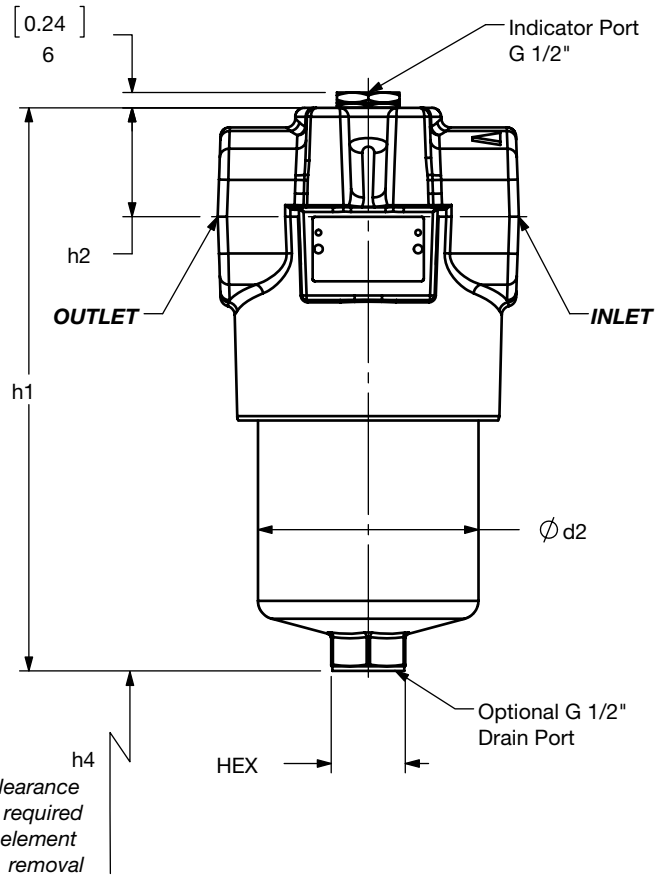
Size	30
Weight (lbs.)	5.1

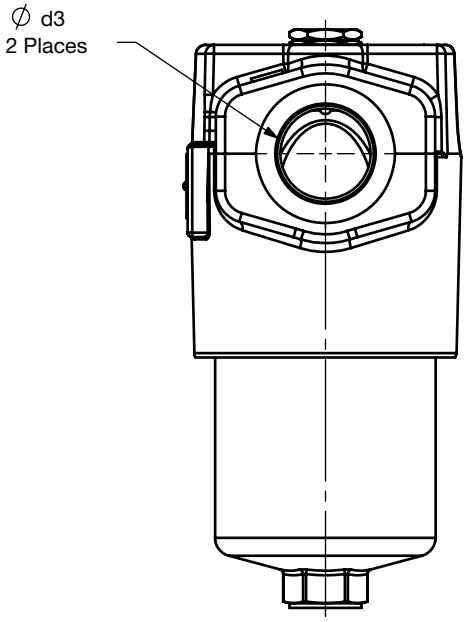
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DF 60-330









Size	60	110	160	240	280	330
Weight (lbs.)	10	12	22.8	26.1	36	54.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DF 60-330 (cont'd)

Size	b1	b2	b3	b4	c1	c2	d1	d2	d3 NOM	d4*	d5	h1	h2	h4	HEX	†1	†2
60...C... 1.X	(3.54) 90	(2.8) 71	(2.2) 56	(1.26) 32	-	-	(3.39) 86	(2.68) 68	3/4"	1/4-28UNF- 2B M6x1.0	-	(7.22) 183.5	(1.57) 40	(3.35) 85	(1.06) 27	(0.35) 9	-
60...I... 1.X	(3.50) 89	(2.8) 71	(2.2) 56	(1.26) 32	(2.00) 50.8	(0.94) 23.8	(3.39) 86	(2.68) 68			3/8-16UNC- 2B M10 X 1.5	(7.22) 183.5	(1.57) 40	(3.35) 85	(1.06) 27	(0.35) 9	(0.59) 15
110...C... 1.X	(3.54) 90	(2.8) 71	(2.2) 56	(1.26) 32	-	-	(3.39) 86	(2.68) 68	3/4"	1/4-28UNF- 2B M6x1.0	-	(9.88) 251	(1.57) 40	(3.35) 85	(1.06) 27	(0.35) 9	-
110...I... 1.X	(3.50) 89	(2.8) 71	(2.2) 56	(1.26) 32	(2.00) 50.8	(0.94) 23.8	(3.39) 86	(2.68) 68			3/8-16UNC- 2B M10 X 1.5	(9.88) 251	(1.57) 40	(3.35) 85	(1.06) 27	(0.35) 9	(0.59) 15
160...E... 1.X	(4.92) 125	(3.74) 95	(3.35) 85	(1.38) 35	-	-	(4.69) 119	(3.74) 95	1-1/4"	3/8-24UNF- 2B M10x1.5	-	(9.57) 243	(1.85) 47	(4.13) 105	(1.26) 32	(0.55) 14	-
160...J... 1.X	(4.92) 125	(3.74) 95	(3.35) 85	(1.38) 35	(2.63) 66.7	(1.25) 31.8	(4.69) 119	(3.74) 95			1/2-13UNC- 2B M14 X 2	(9.57) 243	(1.85) 47	(4.13) 105	(1.26) 32	(0.55) 14	(0.75) 19
240...E... 1.X	(4.92) 125	(3.74) 95	(3.35) 85	(1.38) 35	-	-	(4.69) 119	(3.74) 95	1-1/4"	3/8-24UNF- 2B M10x1.5	-	(11.91) 302.5	(1.85) 47	(4.13) 105	(1.26) 32	(0.55) 14	-
240...J... 1.X	(4.92) 125	(3.74) 95	(3.35) 85	(1.38) 35	(2.63) 66.7	(1.25) 31.8	(4.69) 119	(3.74) 95			1/2-13UNC- 2B M14 X 2	(11.91) 302.5	(1.85) 47	(4.13) 105	(1.26) 32	(0.55) 14	(0.75) 19
280...E... 1.X	(4.92) 125	(3.74) 95	(3.35) 85	(1.38) 35	-	-	(4.69) 119	(3.74) 95	1-1/4"	3/8-24UNF- 2B M10x1.5	-	(19.06) 484	(1.85) 47	(4.13) 105	(1.26) 32	(0.55) 14	-
280...J... 1.X	(4.92) 125	(3.74) 95	(3.35) 85	(1.38) 35	(2.63) 66.7	(1.25) 31.8	(4.69) 119	(3.74) 95			1/2-13UNC- 2B M14 X 2	(19.06) 484	(1.85) 47	(4.13) 105	(1.26) 32	(0.55) 14	(0.75) 19
330...F... 1.X	(6.30) 160	(5.24) 133	(4.53) 115	(2.36) 60	-	-	(6.42) 163	(5.12) 130	2"	1/2-20UNF- 2B M12x1.75	-	(12.16) 309	(2.05) 52	(4.53) 115	(1.42) 36	(0.67) 17	-
330...L... 1.X	(6.30) 160	(5.24) 133	(4.53) 115	(2.36) 60	(3.81) 96.8	(1.75) 44.5	(6.42) 163	(5.12) 130			3/4-10UNC- 2B M2O X 2.5	(12.16) 309	(2.05) 52	(4.53) 115	(1.42) 36	(0.67) 17	(0.98) 25
330...F... 2.X	(6.30) 160	(5.24) 133	(4.53) 115	(2.36) 60	-	-	(6.42) 163	(5.12) 130	2"	1/2-20UNF- 2B M12x1.75	-	(12.16) 309	(2.05) 52	(7.09) 180	(1.42) 36	(0.67) 17	-
330...L... 2.X	(6.30) 160	(5.24) 133	(4.53) 115	(2.36) 60	(3.81) 96.8	(1.75) 44.5	(6.42) 163	(5.12) 130			3/4-10UNC- 2B M2O X 2.5	(12.16) 309	(2.05) 52	(7.09) 180	(1.42) 36	(0.67) 17	(0.98) 25

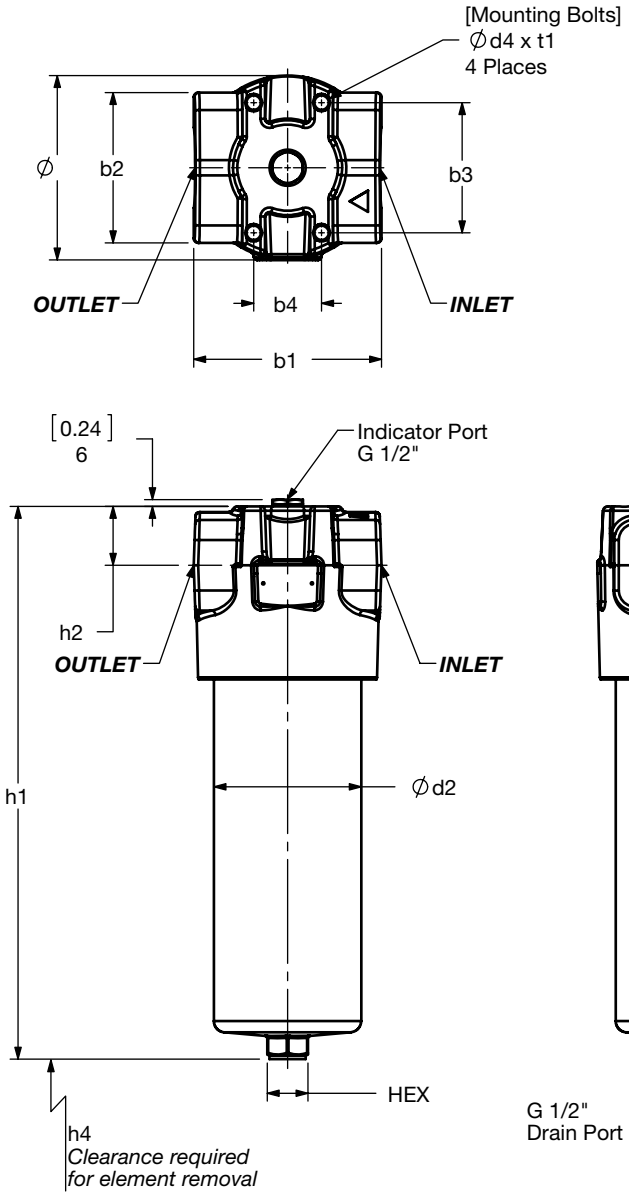
*__d4__ - UN Threads for SAE (/12) & Flanged (/16) ports
- M Threads for BSPP ports & Flanged metric ports

Notes

PN#02081318 / 07.19 / FIL1907-2109

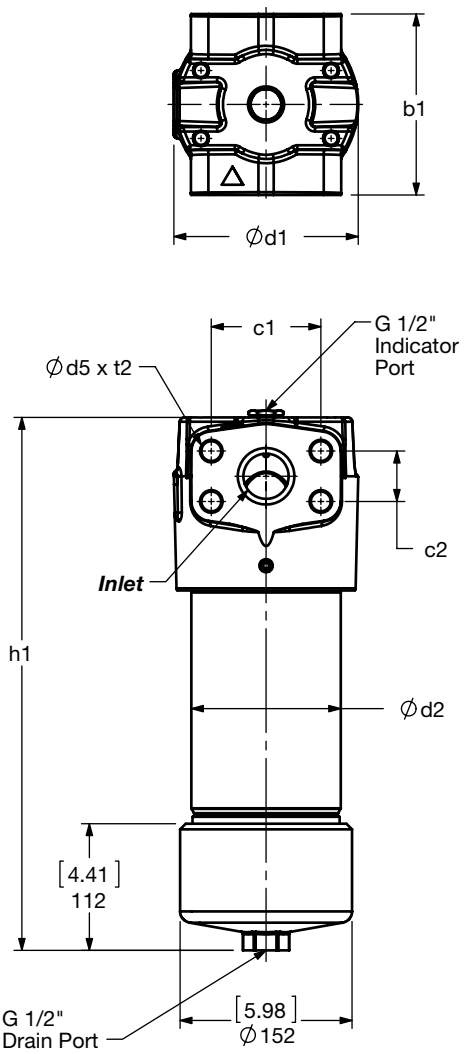
Dimensions
DF 660-1320

660 1.0 Version



660-1320 2.0 Version

Note - See 1.X Version for mounting

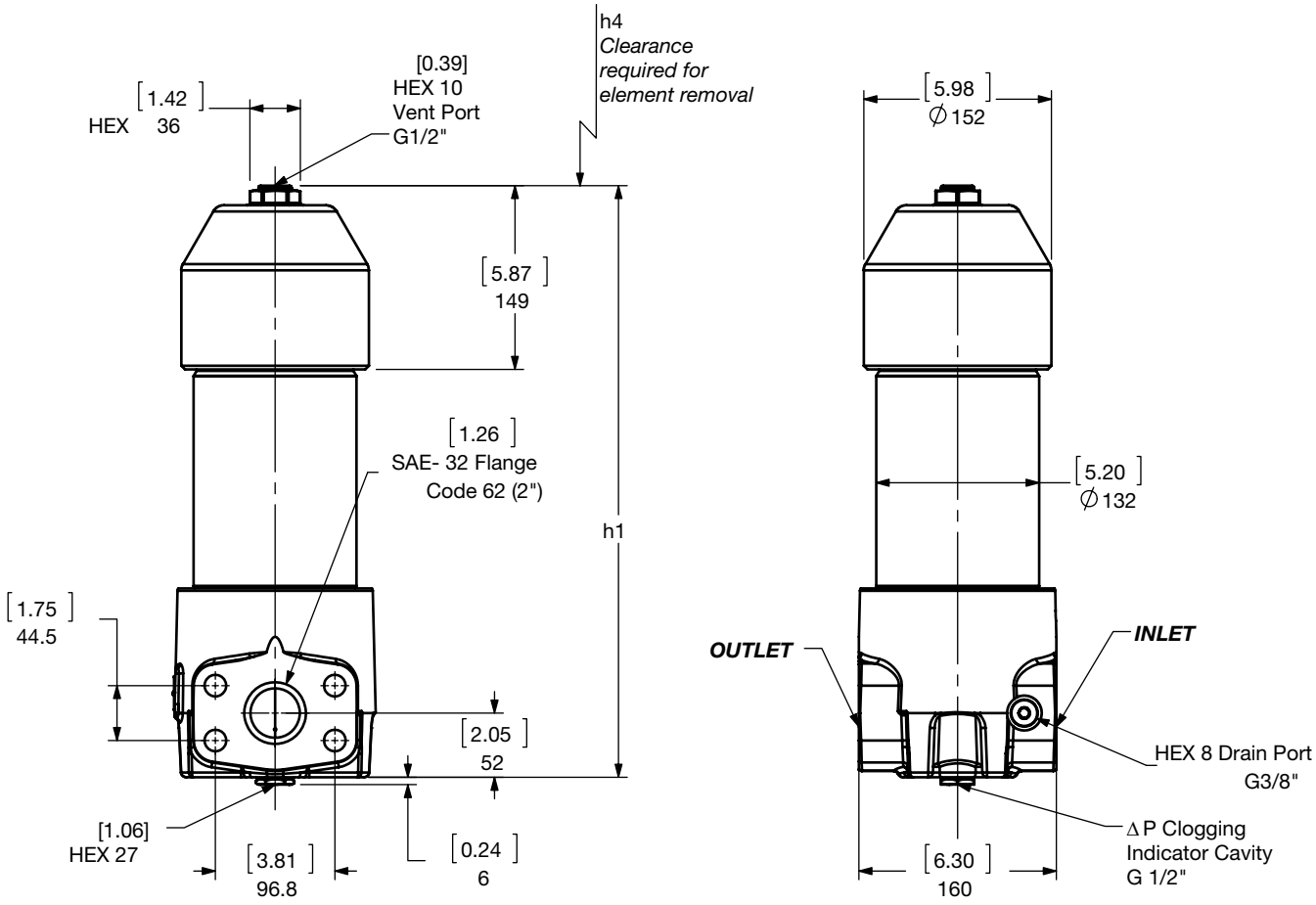


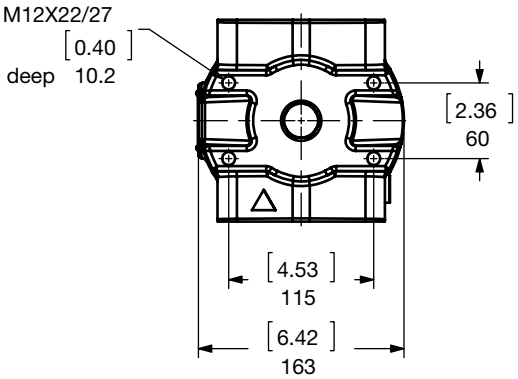
Size	b1	b2	b3	b4	c1	c2	d1	d2	d3 NOM	d4*	d5	h1	h2	h4	HEX	†1	†2
660...F... 1.X	(6.3) 160	(5.24) 133	(4.53) 115	(2.36) 60	-	-	(6.42) 163	(5.12) 130	1-1/2"	1/2-20UNF- 2B M12x1.75	-	(18.93) 481	(2.05) 52	(4.53) 115	(1.42) 36	(0.67) 17	-
660...L... 1.X	(6.3) 160	(5.24) 133	(4.53) 115	(2.36) 60	(3.81) 96.8	(1.75) 44.5	(6.42) 163	(5.12) 130	2"		3/4-10UNC- 2B M20x2.5	(18.93) 481	(2.05) 52	(4.53) 115	(1.42) 36	(0.67) 17	(0.98) 25
660...F... 2.X	(6.3) 160	(5.24) 133	(4.53) 115	(2.36) 60	-	-	(6.42) 163	(5.12) 130	1-1/2"	1/2-20UNF- 2B M12x1.75	-	(18.54) 471	(2.05) 52	(13.78) 350	(1.42) 36	(0.67) 17	-
660...L... 2.X	(6.3) 160	(5.24) 133	(4.53) 115	(2.36) 60	(3.81) 96.8	(1.75) 44.5	(6.42) 163	(5.12) 130	2"		3/4-10UNC- 2B M20x2.5	(18.54) 471	(2.05) 52	(13.78) 350	(1.42) 36	(0.67) 17	(0.98) 25
1320...F... 2.X	(6.3) 160	(5.24) 133	(4.53) 115	(2.36) 60	-	-	(6.42) 163	(5.12) 130	1-1/2"	1/2-20UNF- 2B M12x1.75	-	(29.25) 743	(2.05) 52	(26.38) 670	(1.42) 36	(0.67) 17	-
1320...L... 2.X	(6.3) 160	(5.24) 133	(4.53) 115	(2.36) 60	(3.81) 96.8	(1.75) 44.5	(6.42) 163	(5.12) 130	2"		3/4-10UNC- 2B M20x2.5	(29.25) 743	(2.05) 52	(26.38) 670	(1.42) 36	(0.67) 17	(0.98) 25

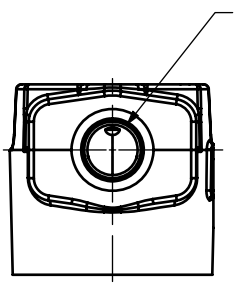
Size	660 1.0	660 2.0	1320 2.0
Weight (lbs.)	70	75.9	112.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DF 330/660/1320 3.0 Version







Threaded Port

Size	h1	h4
330...F..3.X	[10.35] 263	[3.15] 80
330...L..3.X		
660...F..3.x	[16.85] 428	[9.84] 250
660...L..3.x		
1320...F..3.x	[29.49] 749	[22.44] 570
1320...L..3.x		

Size	330	660	1320
Weight (lbs.)	61.5	74.8	112.0

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

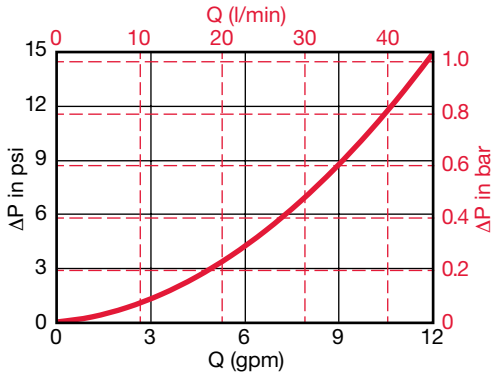
Housing Curve:

Pressure loss through housing is as follows:

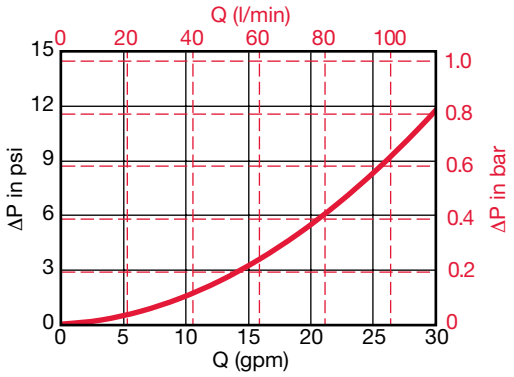
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

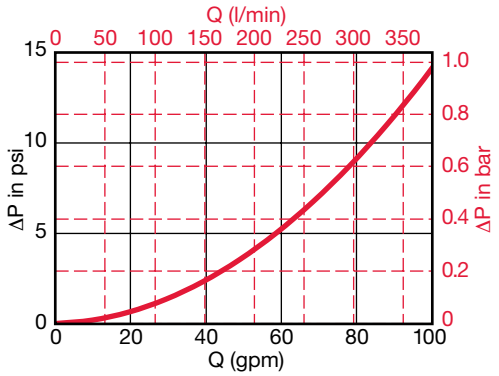
DF 30 Housing



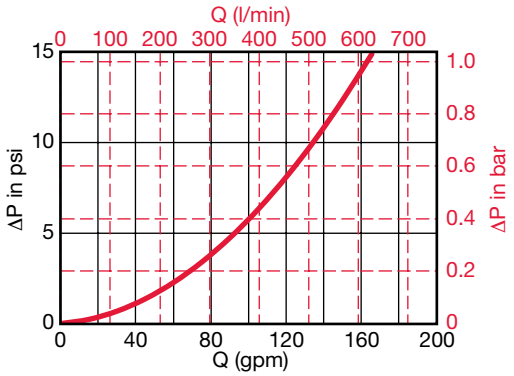
DF 60/110 Housing



DF 160/240/280 Housing



DF 330/660/1320 Housing



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron®	...D...BH4HC Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX BH4HC	5.005	2.782	1.992	1.043
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049
1320 D XXX BH4HC	0.088	0.055	0.033	0.022

Optimicron	...D...ON Elements					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0030 D XXX ON	4.27	3.507	2.376	1.251	0.768	0.62
0060 D XXX ON	2.936	1.427	1.004	0.664	0.537	0.347
0110 D XXX ON	1.416	0.735	0.527	0.333	0.254	0.164
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031
1320 D XXX ON	0.102	0.053	0.042	0.025	0.019	0.015

Wire Mesh	...D...W/HC Elements
Size	25, 50, 100, 200 µm
0030 D XXX W/HC	0.166
0060 D XXX W/HC	0.042
0110 D XXX W/HC	0.023
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004
1320 D XXX W/HC	0.002

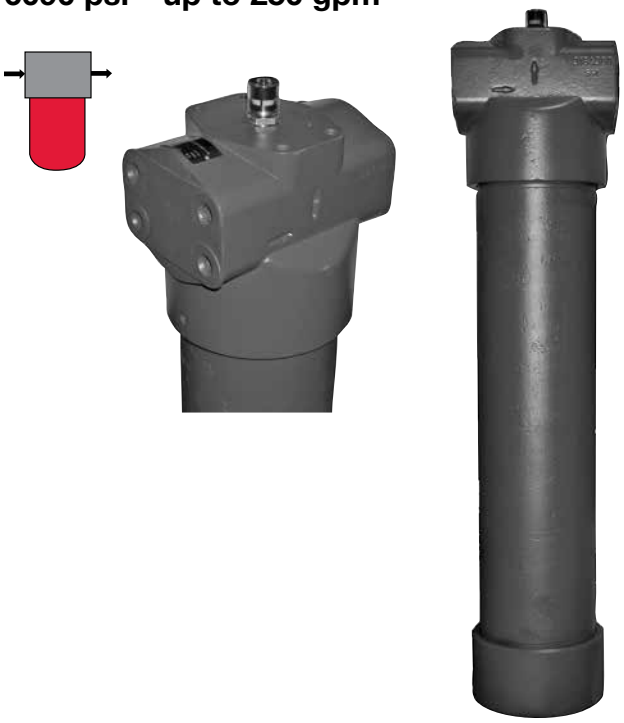
Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX V	1.011	0.740	0.411	0.200
0060 D XXX V	0.877	0.511	0.296	0.183
0110 D XXX V	0.452	0.304	0.182	0.118
0160 D XXX V	0.251	0.177	0.123	0.079
0240 D XXX V	0.169	0.137	0.093	0.062
0280 D XXX V	0.126	0.093	0.064	0.041
0330 D XXX V	0.121	0.097	0.065	0.043
0660 D XXX V	0.063	0.050	0.034	0.021
1320 D XXX V	0.032	0.026	0.018	0.012

All Element K Factors in psi / gpm.

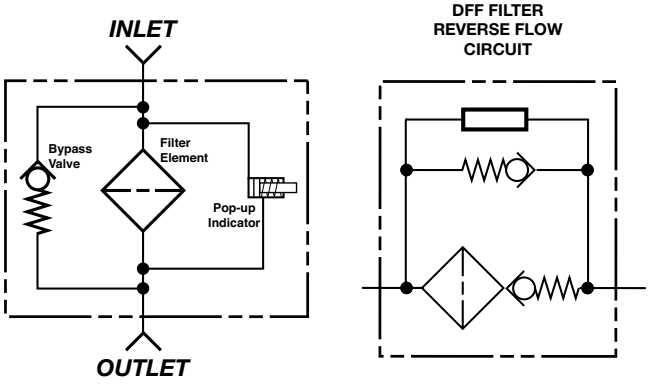
DF/DFF 1500 Series

Inline Filters

6090 psi • up to 250 gpm



Hydraulic Symbol



Features

- Available in T ported or L ported configurations
- Handles high flows to 250 GPM (pricing competitive)
- Available in bidirectional flow and single flow configurations
- Two part bowl for ease of operation and element change-out
- Filter head made of ductile iron
- Filter housing (bowl) and lid made of steel
- Can mount head on top with bottom access (2.x) or head on bottom with top access (3.x)
- Single flow version (DF) can be supplied with bypass (located in head assembly).
- Bidirectional flow version (DFF) can only be supplied with no-bypass.

Technical Specifications

Mounting Method	4 Mounting holes in the filter head - M-12 Threads
Port Connection	SAE-32 four bolt code 62 Flange (DN 51) with metric bolt threads (M20 x 30mm deep) 2" SAE 32 straight thread O-Ring Boss / 2" BSPP thread
Flow Direction	Side inlet and outlet - Indicator on top Side inlet and top outlet - Indicator on side
Construction Materials	Head: Ductile Iron (GGG40) Filter housing (bowl) & lid: Steel
Flow Capacity	250 gpm (950 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	6090 psi (420 bar)
Fatigue Pressure	6090 psi (420 bar) @ 300,000 cycles
Burst Pressure	Contact HYDAC
Element Collapse Pressure Rating	
ON, W/HC	290 psid (20 bar)
BH4HC, V	3045 psid (210 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10% ΔP = 72 psid (5 bar) -10% ΔP = 116 psid (8 bar) -10% *(non-bypass)*	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10% ΔP = 87 psid (6 bar) +10% Non Bypass Available	

Applications

PN#02081318 / 07.19 / FIL1907-2109

Model Code

DF BH/HC 1500 T G 10 B 2 . X / 12 V

Filter Type
DF = Inline filter DFF = Inline filter - Reverse flow

Element Media
ON = Optimicron®
W/HC = Wire Mesh
BH/HC = Betamicron® *(High Collapse) (required on DFF)*
V = Metal Fiber

Size and Nominal Connection
1500 = 2" BSPP / SAE 32 Straight Thread / 2" SAE DN 51 Flange

Pressure
T = 6090 psi / 420 bar

Type of Head
(omit) = T Port
L = L Port

Type of Connection
G = 2" Threaded
L = 2" Flanged SAE DN 51 Code 62

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = BH/HC
3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
2 = Standard Mounting - Bottom Accessible *(two-piece bowl)*
3 = Upside Down Mounting w/o Drain Port in Head *(two-piece bowl) - (cust. to supply low point drain external to filter)*

Modification Number *(latest version always supplied)*

Port Configuration
(omit) = 2" SAE DN 51 Flange Ports *(metric bolt threads M20)* 0 = 2" BSPP 12 = 2" SAE Straight Thread O-Ring Boss Ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Without Bypass *(BH4HC or "V" High Collapse elements recommended))*
B3 = 43 psid Bypass *(optional)*
B6 = 87 psid Bypass *(standard)*
No bypass on DFF 1500

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
W = "VD…" indicator modified with a brass piston for use with High water based emulsions/solutions (HFA) & (HFC) or when using "V" elements
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
cRUus = Electrical Indicators with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

1500 D 010 BH4HC / V

Size
1500

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = BH4HC
3, 5, 10, 20 = V

Element Media
ON, BH4HC, W/HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
W = Modification of "V" elements for use with oil/water emulsions (HFA) and water polymer (usually polyglycol) solutions (HFC)
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 B . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 15 psid (1 bar) & 116 psid (8 bar) available upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch – SPDT
D = Electric switch and led light – SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EP = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

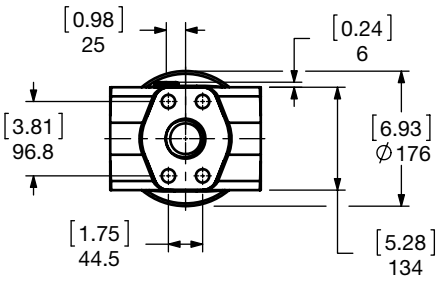
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicators with underwriter's recognition

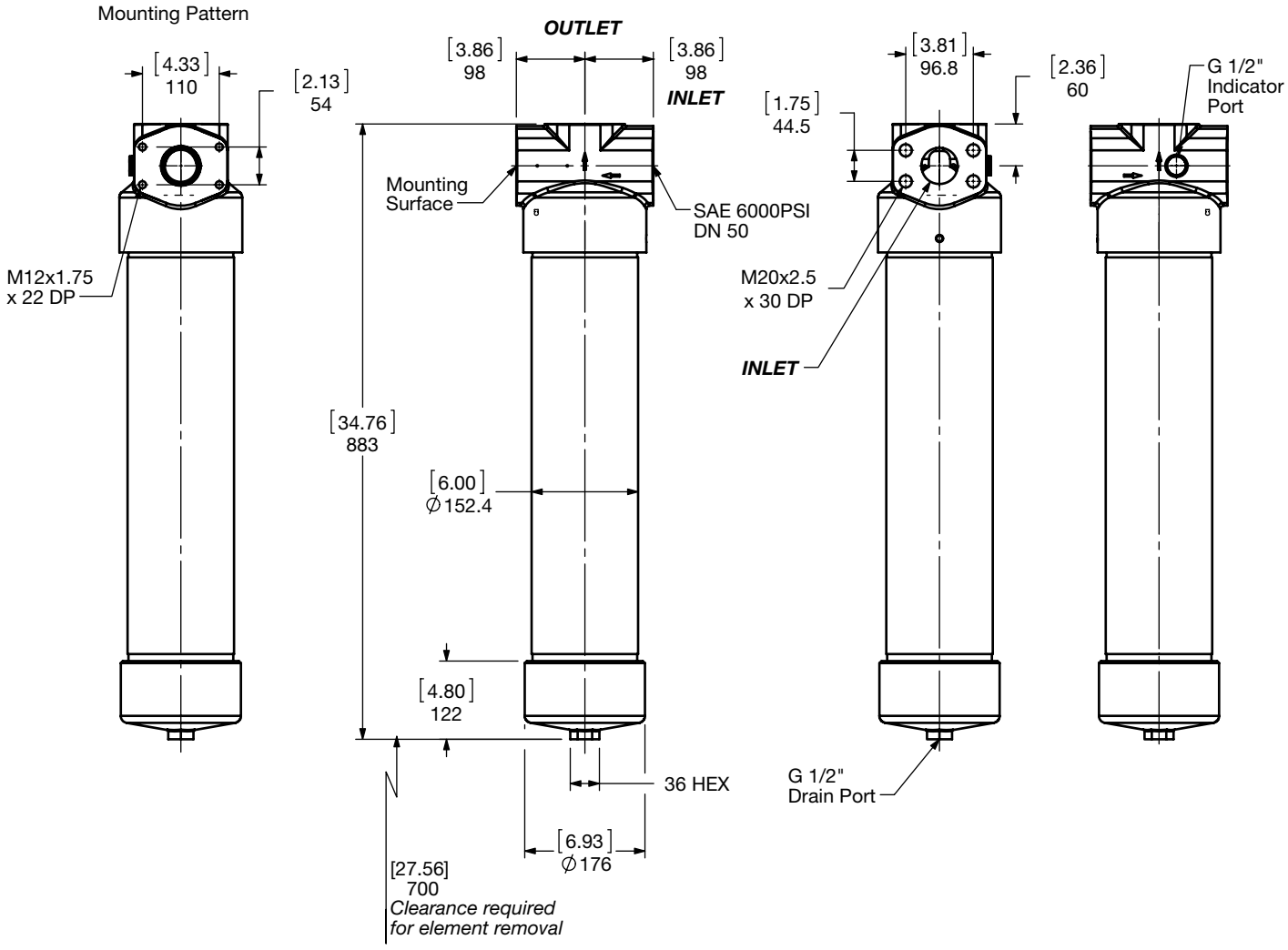
W = "VD…" indicator modified with a brass piston for use with High water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
DF/DFF 1500 2.0 L Configuration

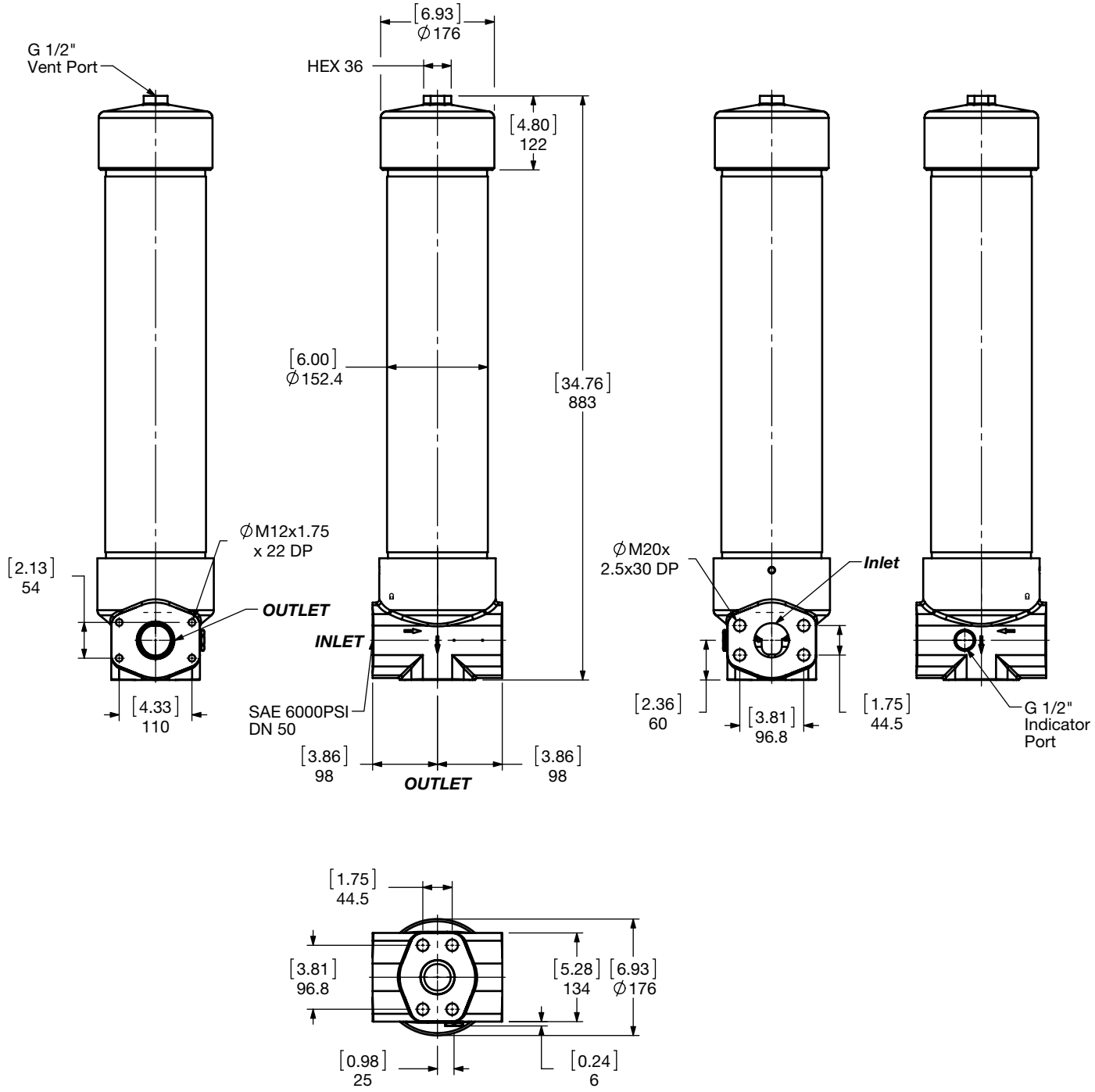




Size	DF/DFF 1500 2.0 “L”
Weight (lbs.)	152.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

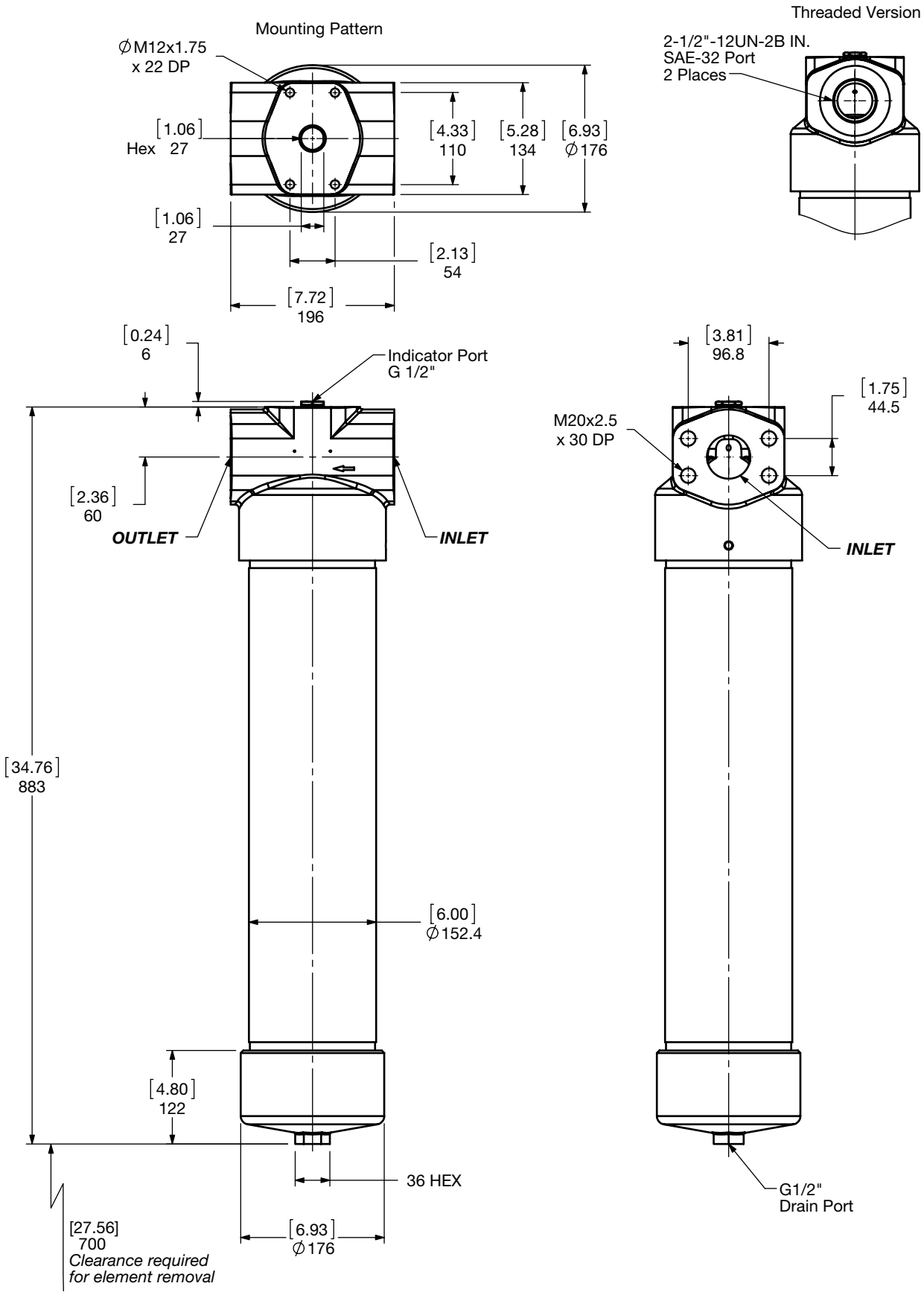
Dimensions
DF/DFF 1500 3.0 L Configuration



Size	DF/DFF 1500 3.0 “L”
Weight (lbs.)	152.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

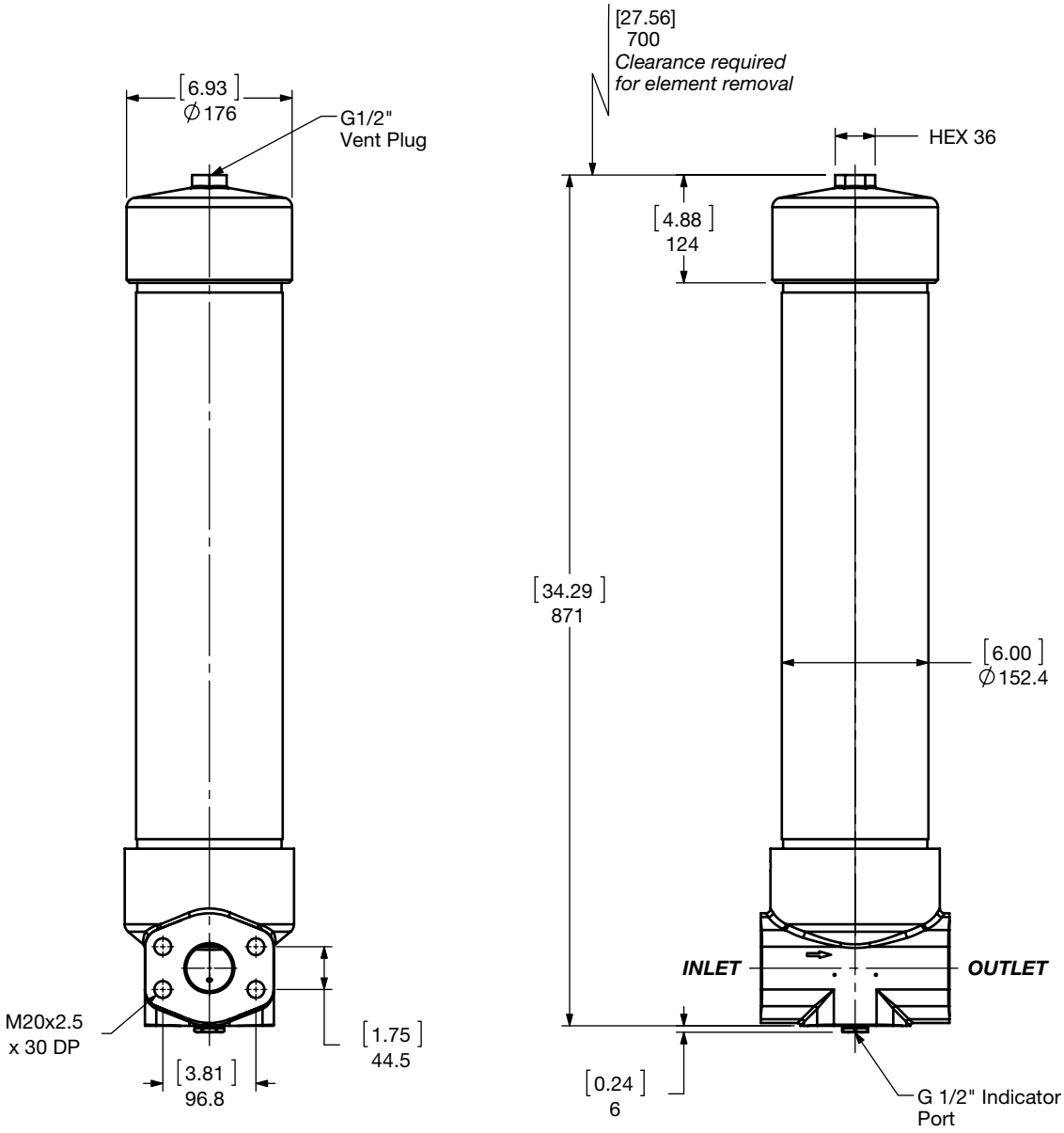
Dimensions
DF/DFF 1500 2.0 T Configuration

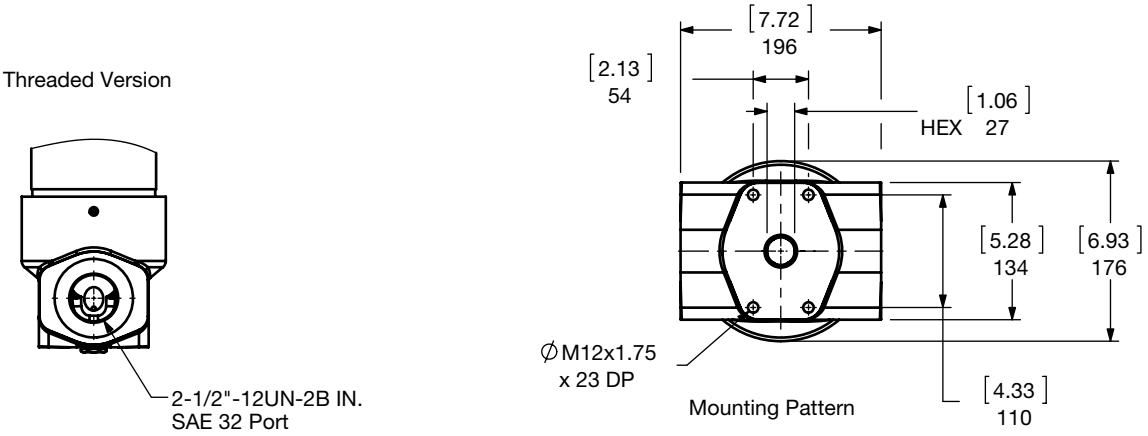


Size	DF/DFF 1500 2.0 "T"
Weight (lbs.)	152.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DF/DFF 1500 3.0 T Configuration





Size	DF/DFF 1500 3.0 "T"
Weight (lbs.)	152.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

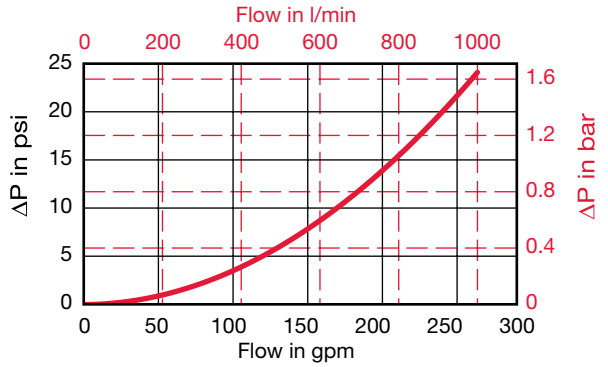
Housing Curve:

Pressure loss through housing is as follows:

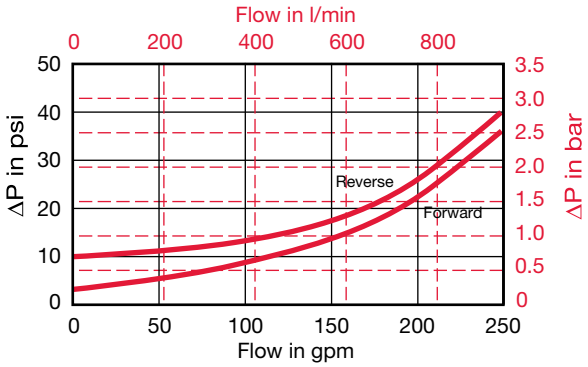
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

DF 1500



DFF 1500



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON (Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1500 D XXX ON	0.09	0.053	0.038	0.026	0.02	0.015

Betamicron	...D...BH4HC (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
1500 D XXX BH4HC	0.077	0.044	0.033	0.027

Wire Mesh	...D...W/HC Elements
Size	...D...W/HC Elements 25, 50, 100, 200 µm
1500 D XXX W/HC	0.001

Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
1500 D XXX V	0.016	0.011	0.011	0.005

All Element K Factors in psi / gpm.

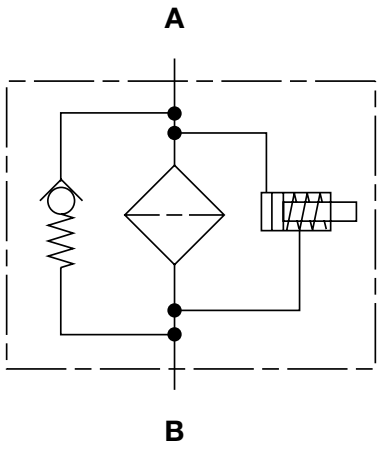
Notes

HF2P Series

Inline Filters

4000 psi • up to 25 gpm

Hydraulic Symbol



Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Inlet/Outlet port options include SAE straight thread O-ring boss, BSPP and subplate mounting to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. A choice of O-ring materials (nitrile, fluorocarbon elastomer, ethylene propylene rubber) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl mounted below the filter head requires minimal clearance to remove the element for replacement and contaminated fluid cannot be washed downstream when element is serviced.
- Clogging indicators are actuated by differential pressure and have no external dynamic seal. High reliability is achieved and magnetic indicator actuation eliminates a potential leak point.
- A poppet type bypass valve is typically mounted in the filter head out of the flow path between the inlet and outlet port to provide positive sealing during normal operation and fast response during cold starts and flow surges.
- Fatigue pressure rating equals maximum allowable working pressure rating.

Technical Specifications

Mounting Method	2 mounting holes	
Port Connection	SAE-12, 3/4” BSPP, Manifold Mount – (0.689”)	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Ductile iron	
Bowl	Steel	
Flow Capacity		
4”	16 gpm (60 lpm)	
8”	25 gpm (95 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	4000 psi (276 bar)	
Fatigue Pressure	4000 psi (276 bar) @ 1 million cycles	
Burst Pressure	14,680 psi (1012 bar)	
Element Collapse Pressure Rating		
BH4HC	3045 psid (210 bar)	
BN	290 psid (20 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
ΔP = 116 psid (8 bar) -10% *(optional on bypass)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*		
ΔP = 87 psid (6 bar) +10% *(standard)*		
Non Bypass Available		

Applications


Agricultural


Automotive


Construction


Industrial


Railways

PN#02081318 / 07.19 / FIL1907-2109

Model Code

HF2P BN 08 O I 3 C 1 . 2 / 12 V - B6 - T100

Filter Type
HF2P = Inline pressure filter

Element Media
BN = Betamicron® *(Low Collapse)* BH = Betamicron® *(High Collapse)*

Element Length
04 = 4 inches 08 = 8 inches

Pressure Range
O = 276 bar

Size and Nominal Connection
I = 3/4" Threaded In-Line P = Manifold Mount

Filtration Rating *(microns)*
3, 6, 12, 25 = BN 3, 6, 10, 17 = BH

Type of Clogging Indicator
A, B, BM, C, D, J, J4 *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(the latest version is always supplied)*

Port Configuration
(omit) = Manifold Filter
12 = SAE 12" straight thread O-ring boss
0 = BSPP straight thread G 3/4" *(contact factory for minimum quantity & availability)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Non-bypass - Critical applications *(high collapse element required)*
B3 = 43 psid (3 bar) - Optional
B6 = 87 psid (6 bar) *(standard)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Thermal lockout on indicator at 100°F *(C, D, J, and J4 indicators only)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

1 . 07 . 08 D 03 BN / V

Length *(nominal inches)*
04, 08

Filtration Rating *(micron)*
3, 6, 12, 25 = BN
3, 6, 10, 17 = BH

Element Media
BN, BH

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 C . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 116 psid (8 bar) available upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
(Top mount only)
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
J = Electric switch
(Brad Harrison 5-pin mini connector)
J4 = Electric switch - M12
(Brad Harrison 4-pin micro connector)

Modification Number

Supplementary Details

Seals
(omit) = Nitrile RUBBER (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

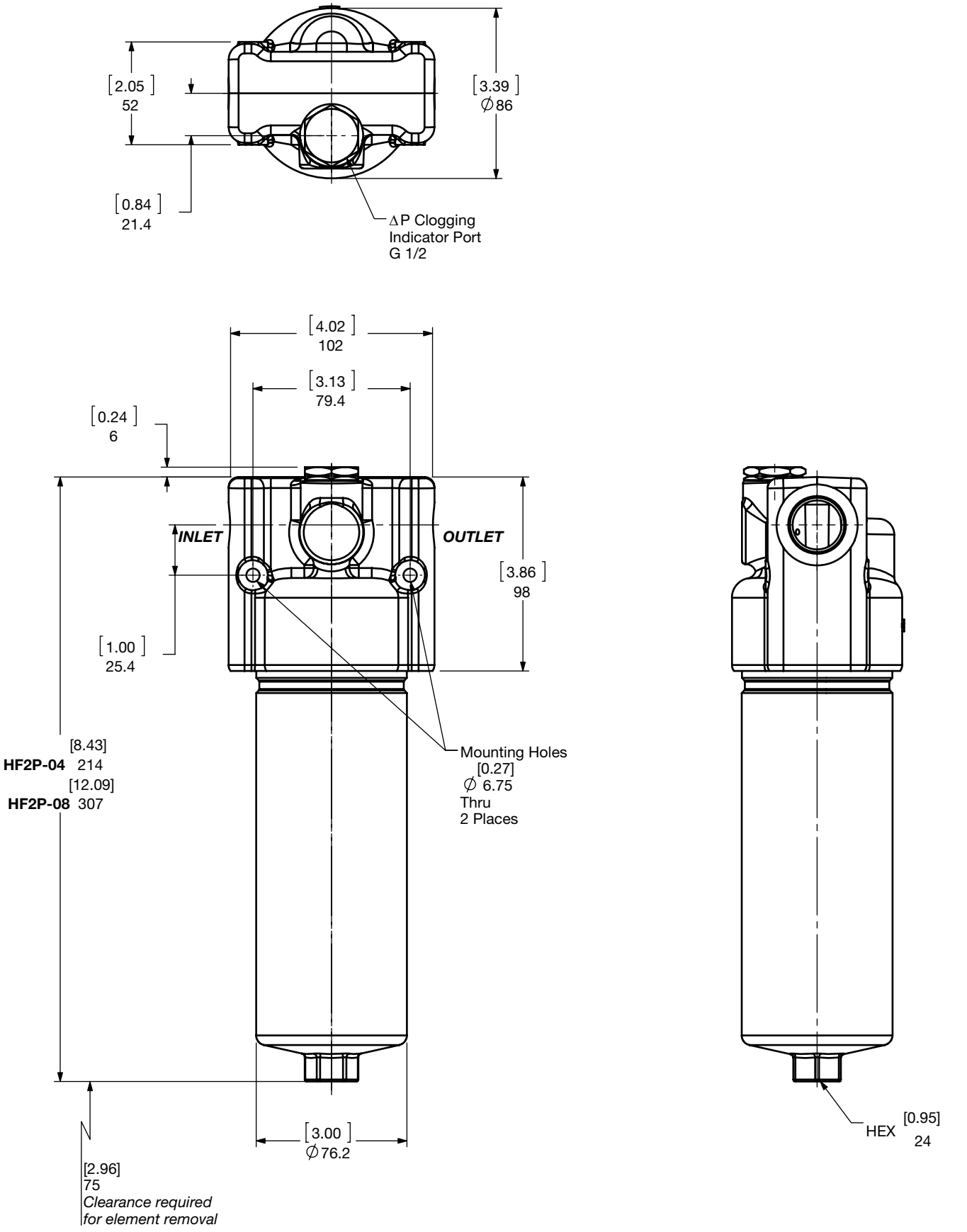
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

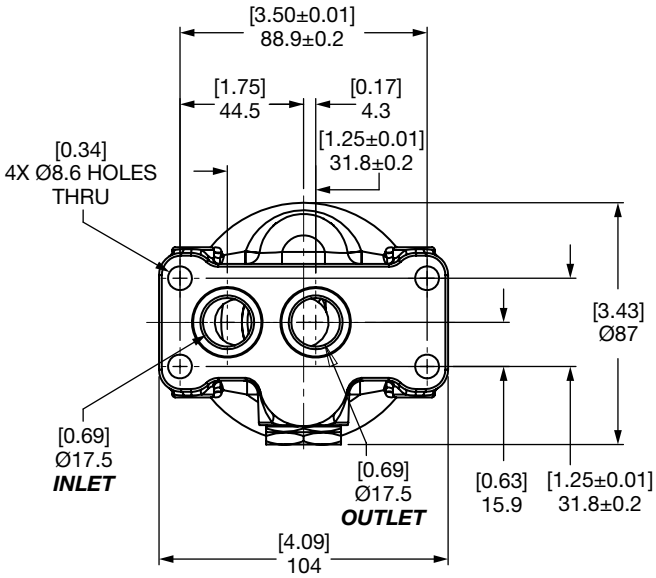
Dimensions
HF2P Inline Mounting

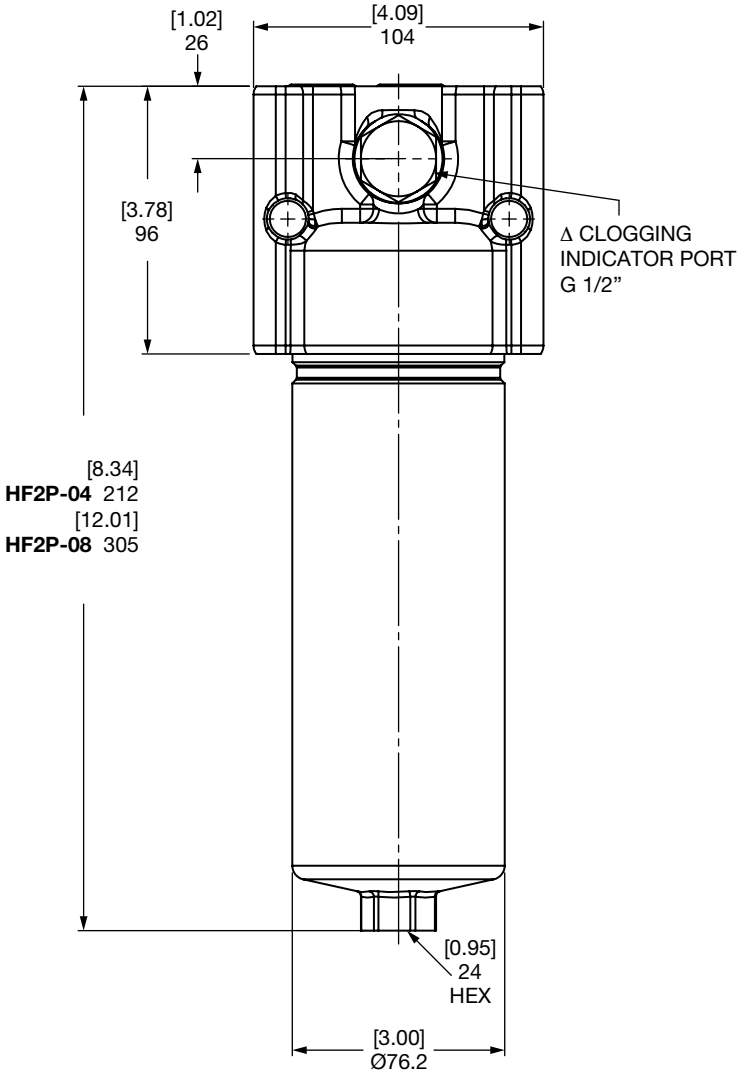


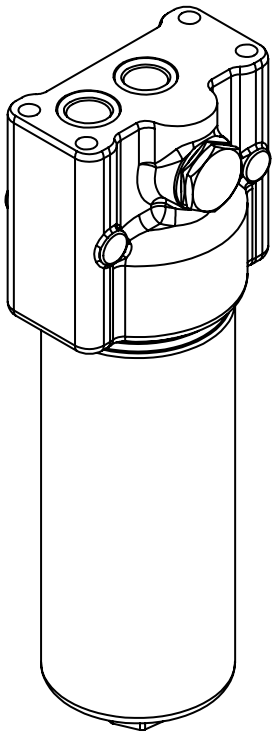
Size	04	08
Weight (lbs.)	10.7	14.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
HF2P Subplate Mounting







Size	04	08
Weight (lbs.)	10.7	14.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

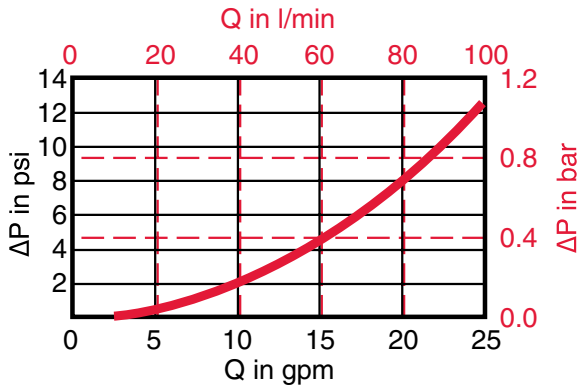
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Autospec HF2 Depth	**1.07.08DXXBN** (Low Collapse)			
Size	**3 µm**	**6 µm**	**12 µm**	**25µm**
1.07.04DXXBN	2.046	1.735	0.925	0.531
1.07.08DXXBN	0.975	0.815	0.457	0.257

Autospec HF2 Depth	**1.07.08DXXBH** (High Collapse)			
Size	**3 µm**	**6 µm**	**10 µm**	**17 µm**
1.07.04DXXBH	2.400	1.690	1.027	0.538
1.07.08DXXBH	1.165	0.820	0.499	0.262

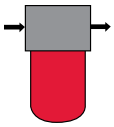
All Element K Factors in psi / gpm.

Notes

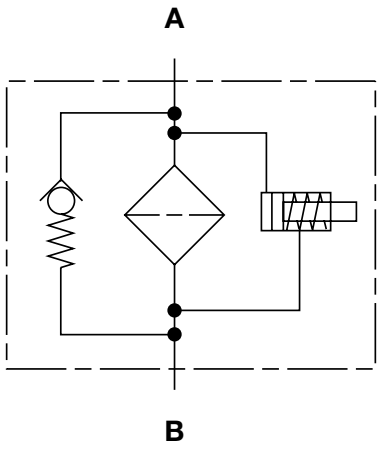
HF3P Series

Inline Filters

6090 psi • up to 120 gpm



Hydraulic Symbol



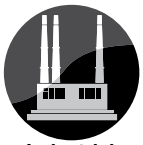
Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Inlet/Outlet port options include SAE straight thread O-ring boss, BSPP and flange mounting to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials (nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl or lid (on 2 piece bowls), mounted below the filter head requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- Clogging indicators are actuated by differential pressure and have no external dynamic seal. High reliability is achieved and magnetic indicator actuation eliminates a potential leak point.
- A poppet type bypass valve, located in filter head, mounted between the inlet and outlet port to provides positive sealing during normal operation and fast response during cold starts and flow surges, while additionally providing low operating ΔP.
- Fatigue pressure rating equals maximum allowable working pressure rating.

Applications

Automotive

Construction



Industrial

Railways

Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes	
Port Connection	SAE-16, SAE-24, 1” BSPP, 1 1/2” BSPP, 1 1/2” SAE Flange Code 61, 2” SAE Flange Code 62	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Ductile iron	
Bowl	Steel	
Housing (size 16)	Steel	
Cap (size 16)	Ductile iron	
Flow Capacity		
4”	28 gpm (106 lpm)	
8”	55 gpm (208 lpm)	
13”	91 gpm (344 lpm)	
16”	120 gpm (454 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	6090 psi (420 bar)	
Fatigue Pressure	6090 psi (420 bar) @ 1 million cycles	
Burst Pressure	15,080 psi (1040 bar)	
Element Collapse Pressure Rating		
BH	3045 psid (210 bar)	
BN	290 psid (20 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C) Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility	Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	ΔP = 29 psid (2 bar) -10% *(optional)* ΔP = 72 psid (5 bar) -10% *(standard)* ΔP = 116 psid (8 bar) -10% *(optional)*	
Bypass Valve Cracking Pressure	ΔP = 43 psid (3 bar) +10% *(optional)* ΔP = 87 psid (6 bar) +10% *(standard* Non Bypass Available	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

HF3P BN 08 T F 3 B 1 . X / 12 V B6

Filter Type
HF3P = In-Line pressure filter

Element Media
BN = Betamicron® *(Low Collapse)* BH = Betamicron® *(High Collapse)*

Element Length
04 = 4 inches *(non-standard)* 13 = 13 inches
08 = 8 inches 16 = 16 inches *(non-standard)*

Pressure Range
T = 420 bar

Size and Nominal Connection
D = 1" Threaded F = 1-1/2" Threaded
K = 1-1/2" Flanged SAE Code 61 L = 2" Flanged SAE Code 62

Filtration Ratings *(microns)*
3, 6, 12, 25 = BN 3, 6, 10, 17 = BH

Type of ΔP Clogging Indicator
A, B, BM, C, D, J, J4

Type Number
1 = One piece bowl *(lengths 4-13)* 2 = Two piece bowl *(lengths 13 & 16)*

Modification Number *(the latest version is always supplied)*

Port Configuration
0 = BSPP Threaded Ports G 1 1/2" or G 1"
12 = SAE straight thread O-ring boss SAE 24" or SAE 16"
16 = SAE flange ports - SAE 2", code 62 (6000 psi) or 1 1/2" code 61

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = without bypass *(BH elements recommended)*
B3 = 3 bar/43 psid
B6 = 6 bar/87 psid *(standard)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Thermal lockout on indicator at 100°F *(C, D, J, and J4 indicators only)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

1 . 11 . 08 D 03 BN / V

Length *(nominal inches)*
04, 08, 13, 16

Filtration Rating *(micron)*
3, 6, 12, 25 = BN
3, 6, 10, 17 = BH

Element Media
BN, BH

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 C . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 116 psid (8 bar) upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
J = Electric switch
(Brad Harrison 5-pin mini connector)
J4 = Electric switch - M12
(Brad Harrison 4-pin micro connector)

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

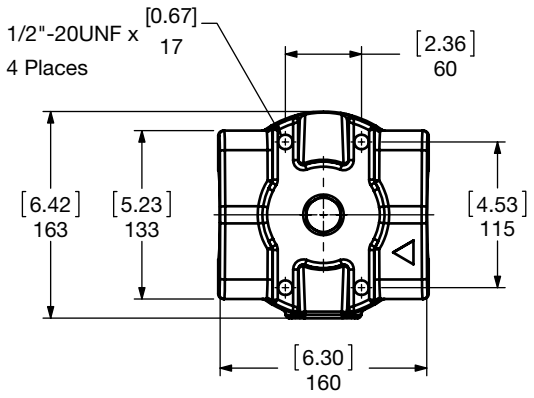
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

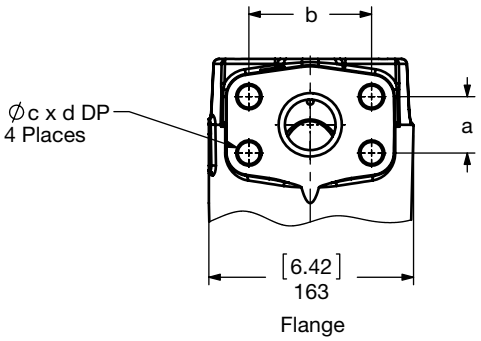
(For additional details and options, see Clogging Indicators section.)

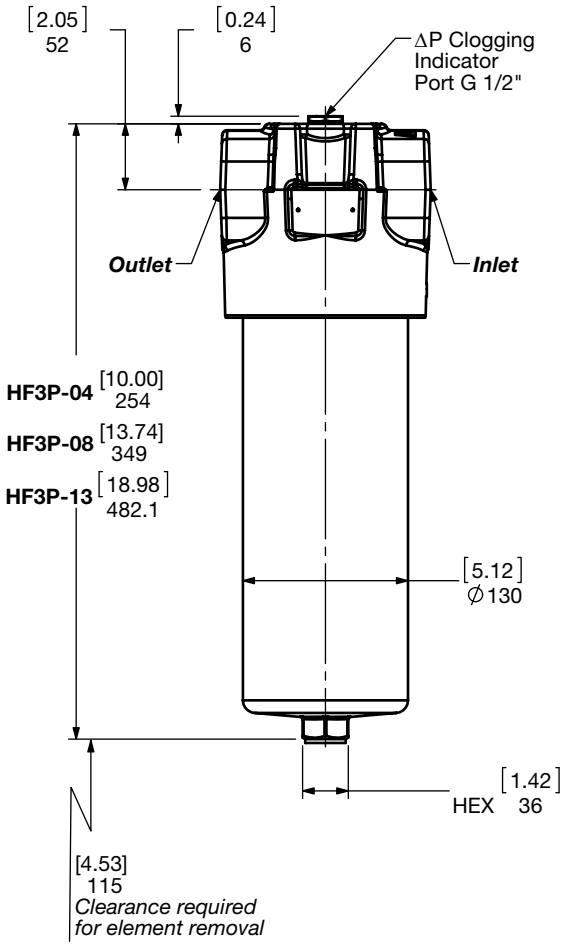
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

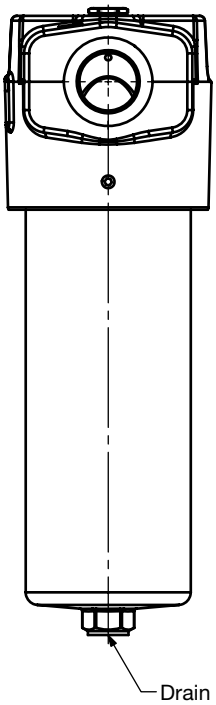
Dimensions
HF3P-04/08/13/16

	a	b	c	d
1-1/2” Code 61	(1.406) 35.71	(2.750) 69.85	1/2-13UNC-2B	(0.87) 22
2” Code 62	(1.750) 44.45	(3.812) 96.80	3/4-10UNC-2B	(0.98) 25

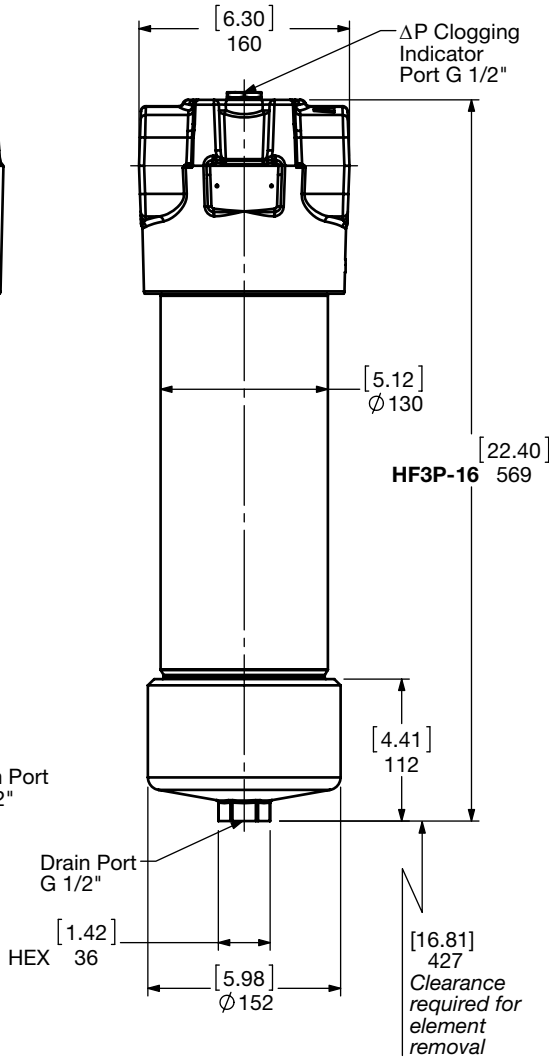








HF3P-16



Size	04	08	13	16
Weight (lbs.)	49.2	56.1	72.5	107.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

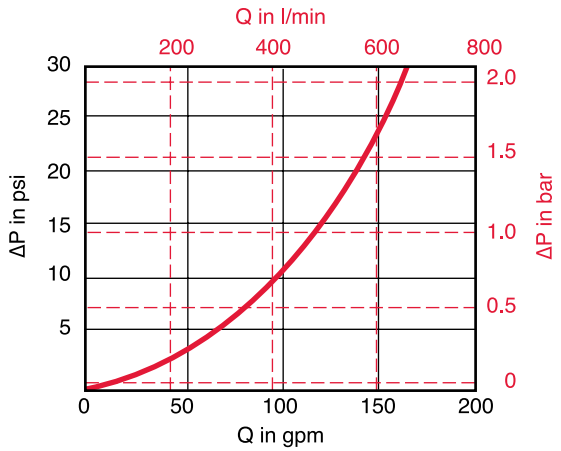
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Autospec HF3 Depth	1.11.08DXXBN (Low Collapse)			
Size	3 µm	6 µm	12 µm	25 µm
1.11.04DXXBN	0.590	0.500	0.266	0.153
1.11.08DXXBN	0.289	0.241	0.135	0.076
1.11.13DXXBN	0.175	0.146	0.082	0.046
1.11.16DXXBN	0.132	0.110	0.062	0.035

Autospec HF3 Depth	1.11.08DXXBH (High Collapse)			
Size	3 µm	6 µm	10 µm	17 µm
1.11.04DXXBH	0.937	0.660	0.401	0.210
1.11.08DXXBH	0.460	0.321	0.195	0.102
1.11.13DXXBH	0.274	0.193	0.117	0.615
1.11.16DXXBH	0.206	0.145	0.089	0.046

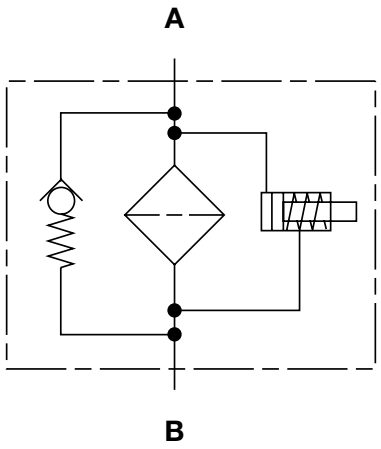
All Element K Factors in psi / gpm.

HF4P Series

Inline Filters

5000 psi • up to 120 gpm

Hydraulic Symbol



Features

- Meets HF4 automotive standard
- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Inlet/Outlet port options include SAE straight thread O-ring boss, SAE flange code 62 and code 61 (optional) BSPP and subplate mounting to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. A choice of O-ring materials (nitrile rubber or fluorocarbon elastomer) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- The element filter housing is permanently mounted above the filter head for easy top access and minimal clearance to remove elements for replacement.
- Clogging indicators are actuated by differential pressure and have no external dynamic seal. High reliability is achieved and magnetic indicator actuation eliminates a potential leak point.
- A poppet type bypass valve located in filter head base is mounted between the inlet and outlet port to provide positive sealing during normal operation and fast response during cold starts and flow surges.
- Fatigue pressure rating equals maximum allowable working pressure rating.

Applications

Technical Specifications

Mounting Method	4 mounting holes
Port Connection	SAE-24, 1 1/2" BSPP, 1 1/2" SAE Flange Code 61, 1 1/2" SAE Flange Code 62, Manifold Mount
Flow Direction	Inlet: Side Outlet: Side *(opposite each other)*
Construction Materials	
Head, Cap	Ductile iron
Housing	Steel
Flow Capacity	
9"	50 gpm (189 lpm)
18"	100 gpm (378 lpm)
27"	120 gpm (454 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	5000 psi (345 bar)
Fatigue Pressure	5000 psi (345 bar) @ 1 million cycles
Burst Pressure	15,000 psi (1040 bar)
Element Collapse Pressure Rating	
BH	3045 psid (210 bar)
BN	145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C) Consult HYDAC for applications operating below 14°F (-10°C)
Fluid Compatibility	Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.
Indicator Trip Pressure	ΔP = 29 psid (2 bar) -10% *(optional)* ΔP = 72 psid (5 bar) -10% *(standard)* ΔP = 116 psid (8 bar) -10% *(optional on non-bypass filters)*
Bypass Valve Cracking Pressure	ΔP = 43 psid (3 bar) +10% *(optional)* ΔP = 87 psid (6 bar) +10% *(standard)* Non Bypass Available

Model Code

HF4P BN 09 G 3 D 1 . 1 / 12 V B6 L115

Filter Type
HF4P = Inline pressure filter

Element Media
BH = Betamicron® *(High Collapse)* BN = Betamicron® *(Low Collapse)* W = Wire Mesh

Element Length
09 = 9 inches 18 = 18 inches 27 = 27 inches

Type of Connection
P = Manifold Mount G = Threaded In-Line F = Flanged

Filtration Rating *(microns)*
3, 5, 10, 20 = BH, BN 25, 50, 100, 200 = W

Type of Clogging Indicator
A, BM, C, D, J, J4 *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(the latest version is always supplied)*

Port Configuration
(omit) = Manifold mount *(use when "P" connection type is selected)*
0 = 1 1/2" BSPP Straight Threads
12 = SAE-24 straight thread O-ring boss
16 = 1 1/2" SAE 4 bolt flange code 61 or 62

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM)

Bypass Valve
(omit) = Non-bypass – Critical applications *(high collapse element required)*
B3 = 43 psid (3 bar)
B6 = 87 psid (6 bar) Standard setting for pressure filters

Supplementary Details
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Thermal lockout on indicator at 100°F *(C, D, J, and J4 indicators only)*
Code 61 = 4 Bolt Code 61 *(changes MAWP from 5000 PSI to 3000 PSI)*
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

5 . 03 . 09 D 03 BN / V

Length *(nominal inches)*
09, 18, 27

Filtration Rating *(micron)*
3, 5, 10, 20 = BN, BH
25, 50, 100, 200 = W

Element Media
BN, BH, W

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Clogging Indicator Model Code

VD 5 D . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 15 psid (1 bar) & 116 psid (8 bar) available upon request

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT
J = Electric switch *(Brad Harrison 5-pin mini connector)*
J4 = Electric switch - M12 *(Brad Harrison 4-pin micro connector)*

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L48 = 48V L110 = 110V L220 = 220V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

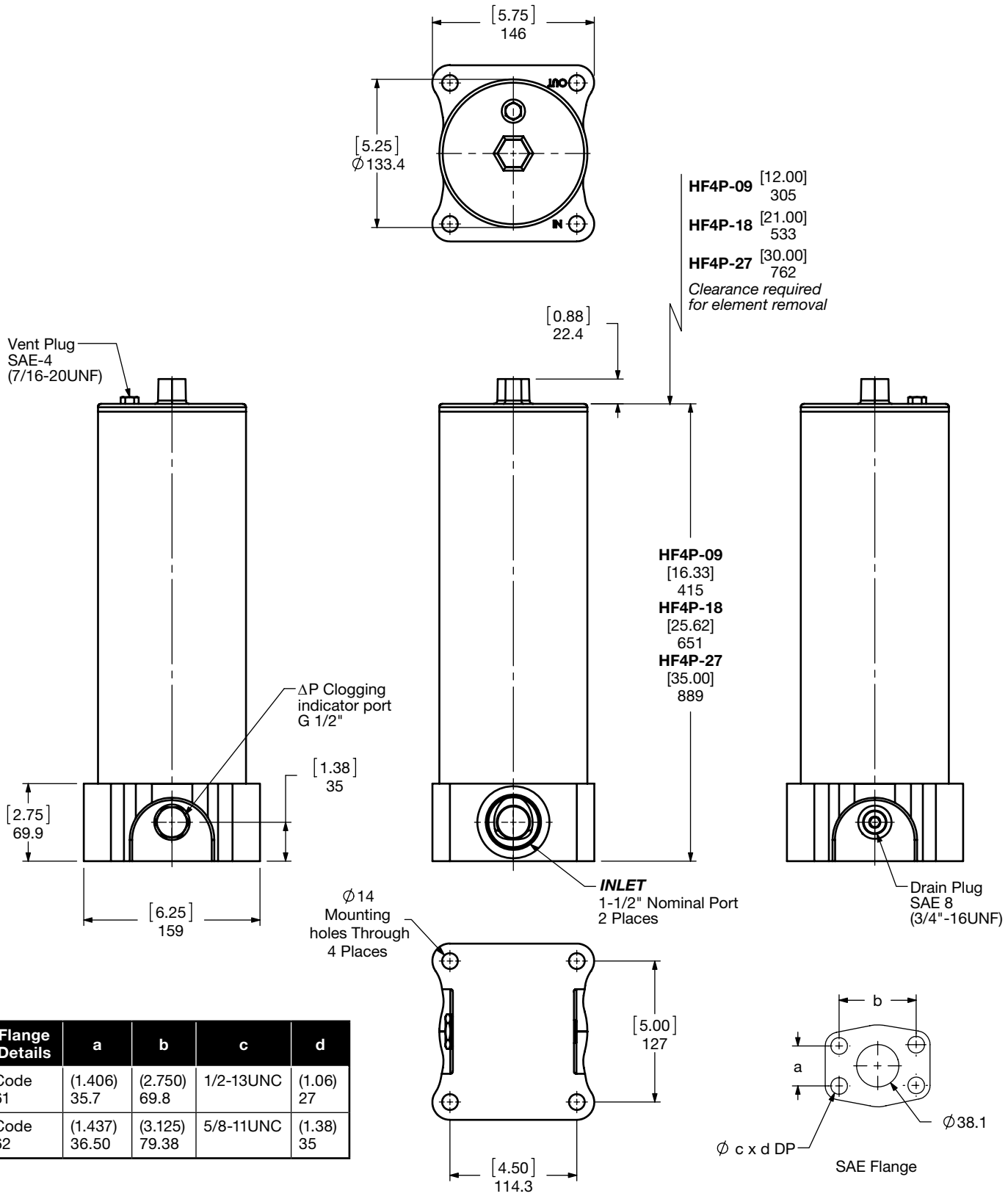
Underwriters Approval *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicators with underwriter's recognition

W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
HF4P Inline



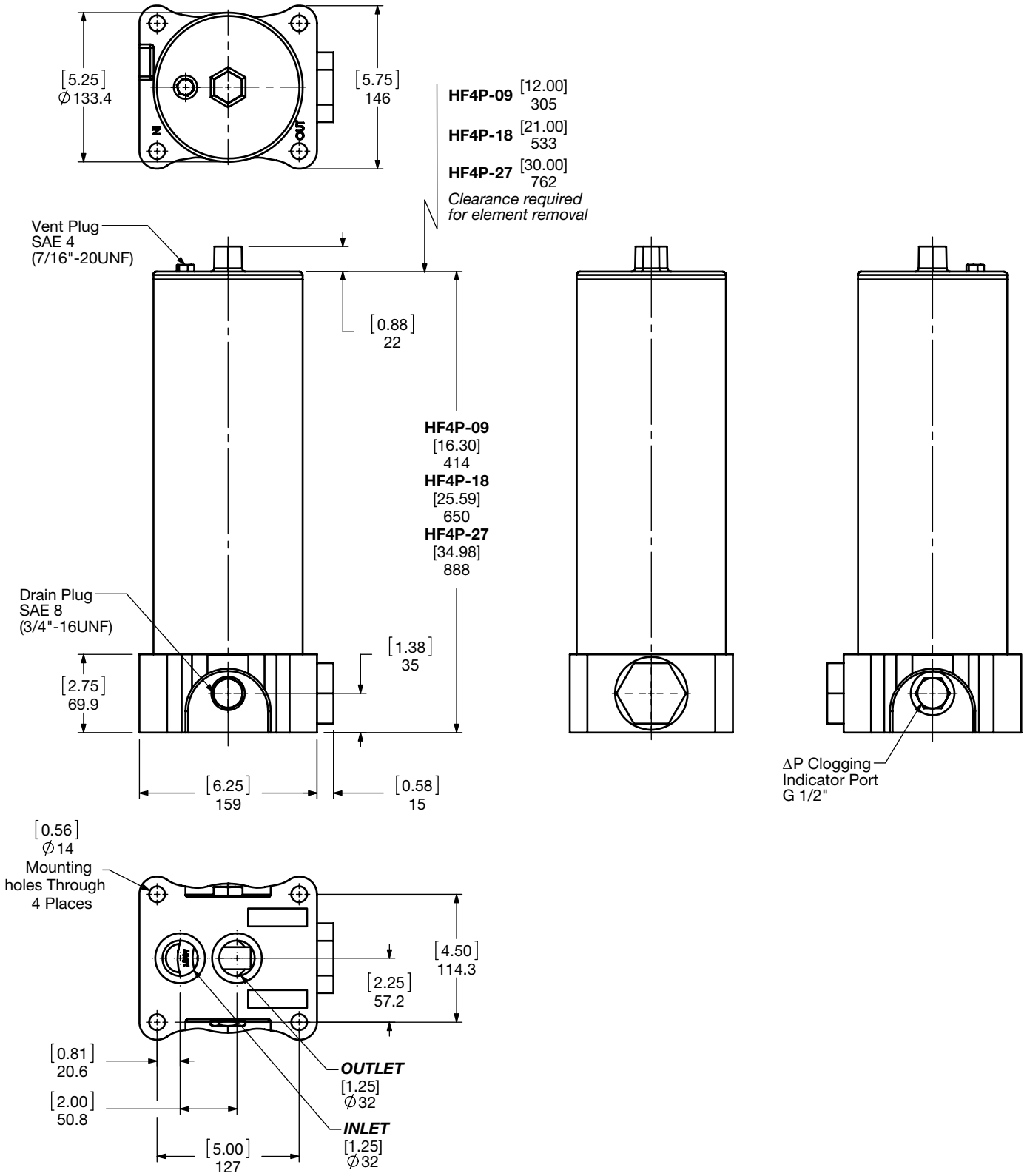
Flange Details	a	b	c	d
Code 61	(1.406) 35.7	(2.750) 69.8	1/2-13UNC	(1.06) 27
Code 62	(1.437) 36.50	(3.125) 79.38	5/8-11UNC	(1.38) 35

Size	09	18	27
Weight (lbs.)	69.9	98.4	132.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

PN#02081318 / 07.19 / FIL1907-2109

Dimensions
HF4P Manifold



Size	09	18	27
Weight (lbs.)	71.7	100.2	134.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

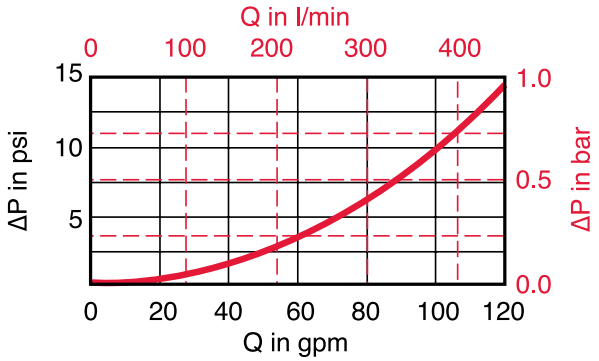
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Autospec HF4 Depth	5.03.XXDXXBN (Low Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
5.03.09DXXBN	0.168	0.141	0.079	0.044
5.03.18DXXBN	0.080	0.067	0.038	0.021
5.03.27DXXBN	0.052	0.043	0.024	0.014

Autospec HF4 Depth	5.03.XXDXXBH (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
5.03.09DXXBH	0.207	0.146	0.089	0.047
5.03.18DXXBH	0.097	0.068	0.041	0.022
5.03.27DXXBH	0.063	0.044	0.027	0.014

Autospec HF4 Wire Mesh	5.03.XXDXXW
Size	25, 50, 100, 200 µm
5.03.09DXXW	0.007
5.03.18DXXW	0.004
5.03.27DXXW	0.002

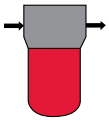
All Element K Factors in psi / gpm.

Notes

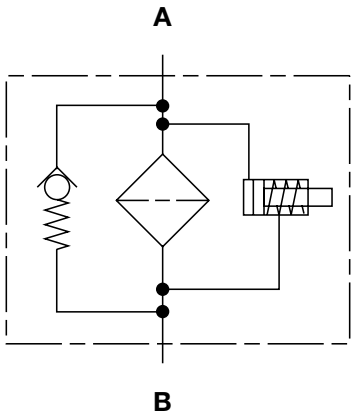
MFM Series

Inline Filters

4060 PSI • up to 25 GPM



Hydraulic Symbol



Features

- Because of their efficient design and construction, MFM filters are considered a cost effective solution for new equipment, or as a replacement for filters already specified on existing equipment.
- The MFM filter is available in 4 sizes comprised of four different bowl and element lengths. The models 35, 55, 75, and 95, provide maximum flow rates of 10, 18, 20, and 25 GPM respectively.
- A quick-response bypass valve located in filter head protects against high differential pressures caused by cold startups, flow surges and pressure spikes.
- The high bypass pressure setting (100 psid) minimizes the possibility of contamination due to premature bypassing.
- Filter materials are compatible with all mineral, lubricating oils, and commonly used fire retardant fluids per ISO 2943.
- Fatigue pressure rating equals maximum allowable working pressure rating.

Applications

Agricultural

Automotive

Construction

Gearboxes

Industrial

Commercial Municipal

Technical Specifications

Mounting Method	4 mounting holes - filter head	
Port Connection	SAE-12, 3/4" BSPP	
Flow Direction	Inlet: Side *(opposite each other)*	Outlet: Side
Construction Materials		
Head	Ductile iron	
Bowl	Steel	
Flow Capacity		
35	10 gpm (35 lpm)	
55	18 gpm (68 lpm)	
75	20 gpm (76 lpm)	
95	25 gpm (95 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	4060 psi (280 bar)	
Fatigue Pressure	4060 psi (280 bar) @ 1 million cycles 4641 psi (320 bar) @ 100,000 cycles	
Burst Pressure	13,920 psi (960 bar)	
Element Collapse Pressure Rating		
ON	290 psid (20 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C) Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 72 psid (5 bar) -10%		
Bypass Valve Cracking Pressure		
ΔP = 50.75 psid (3.5 bar) +10% *(optional)* ΔP = 100 psid (7 bar) +10% *(standard)*		

Model Code

MFM ON 35 O I 10 C 4 . 0 / V B7

Filter Type
MFM = In-Line High Pressure Filter

Element Media
ON = Optimicron® *(Low Collapse)*

Size
35 = 10 gpm
55 = 18 gpm
75 = 20 gpm
95 = 25 gpm

Operating Pressure
O = 4000 psi (280 bar)

Type of Connection
I = 3/4" Threaded SAE 12 (1-1/16-12UN-2B))
H = 3/4" Threaded G 3/4 (BSPP)
(Other connections available on request)

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON

Type of Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
4 = Indicator port on top of head - 4 mounting holes *(standard)*
3 = Indicator port on side of head - 3 mounting holes

Type Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM)

Bypass Valve
B3.5 = 50.75 psid (3.5 bar) - Optional
B7 = 101.5 psid (7 bar) - Standard

Supplementary Details
W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
LED = 2 LEDs up to a voltage of 24 Volt
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

0035 D 010 ON / V

Size
0035, 0055, 0075, 0095

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON

Element Media
ON = Optimicron®

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 C . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*

Type of Indicator
A = no indicator, plugged port
B = Pop-up indicator *(auto reset)* - top mount only
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

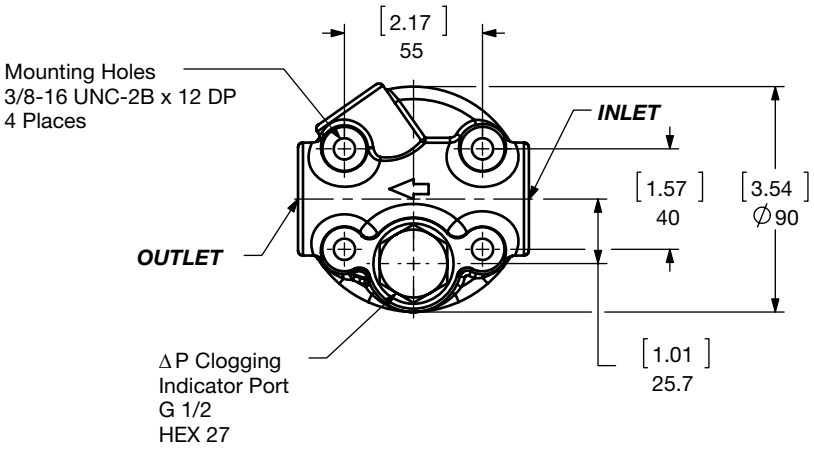
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

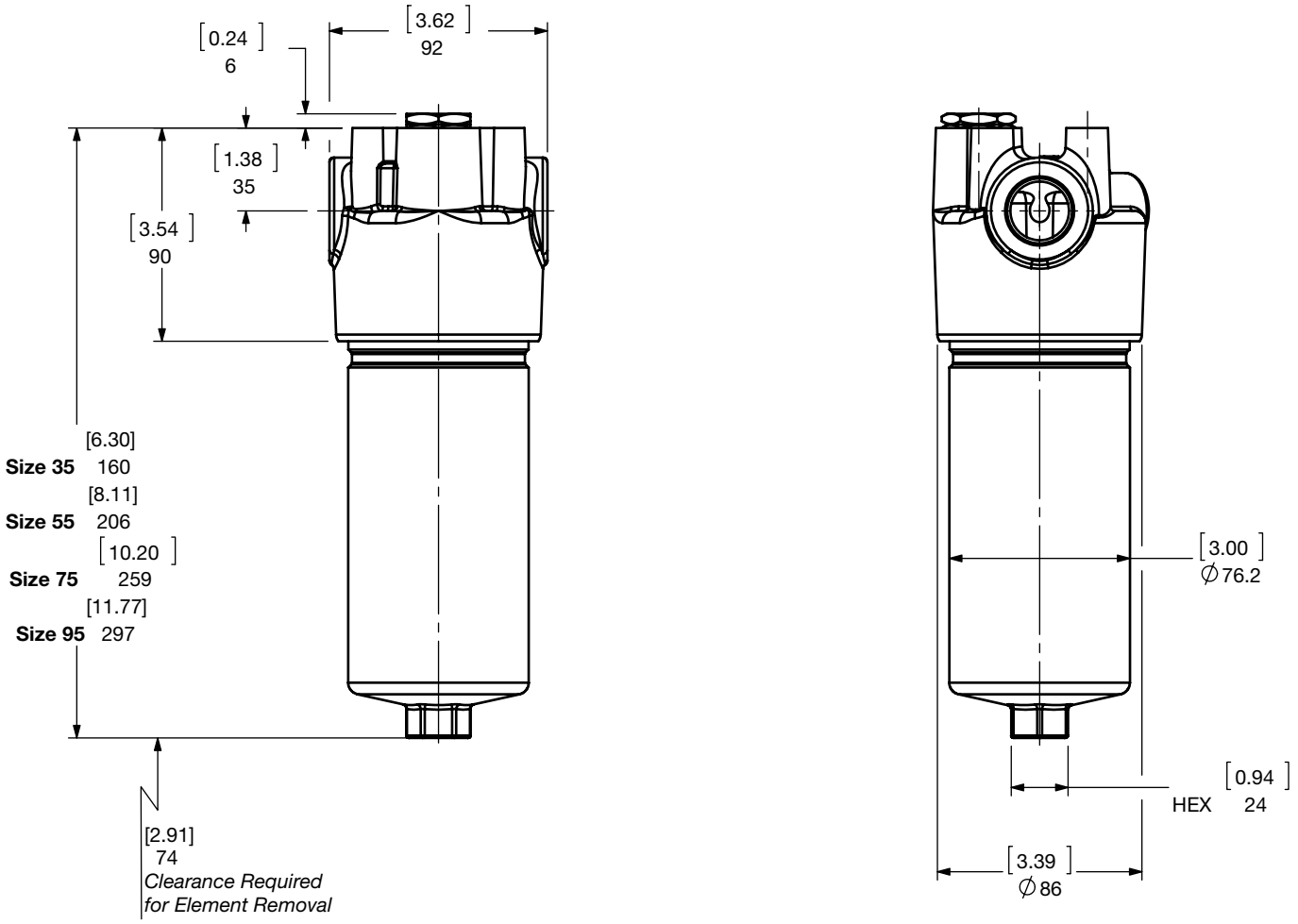
W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
MFM 4.X Version (Standard)

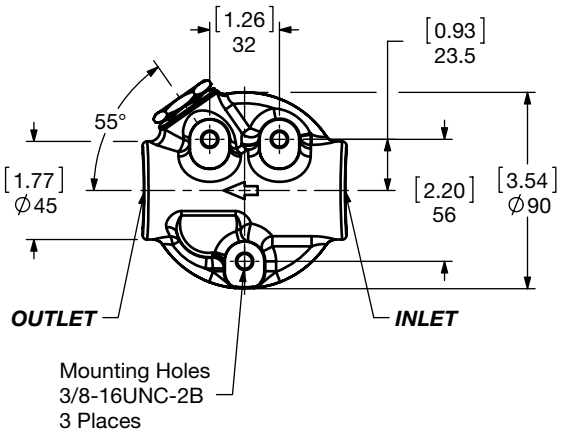


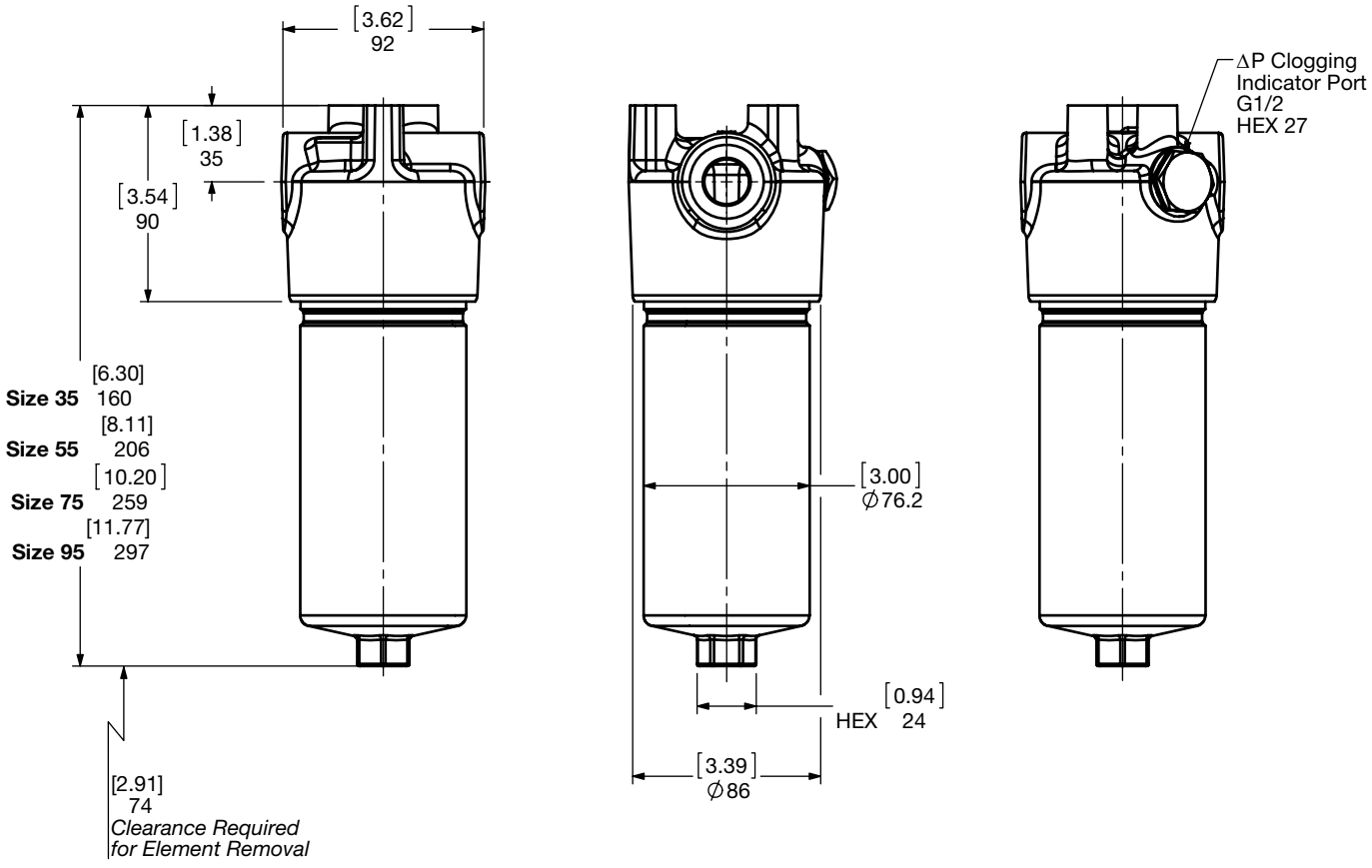


Size	35	55	75	95
Weight (lbs.)	8.2	9.3	10.4	11.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
MFM 3.X Version





Size	35	55	75	95
Weight (lbs.)	8.2	9.3	10.4	11.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

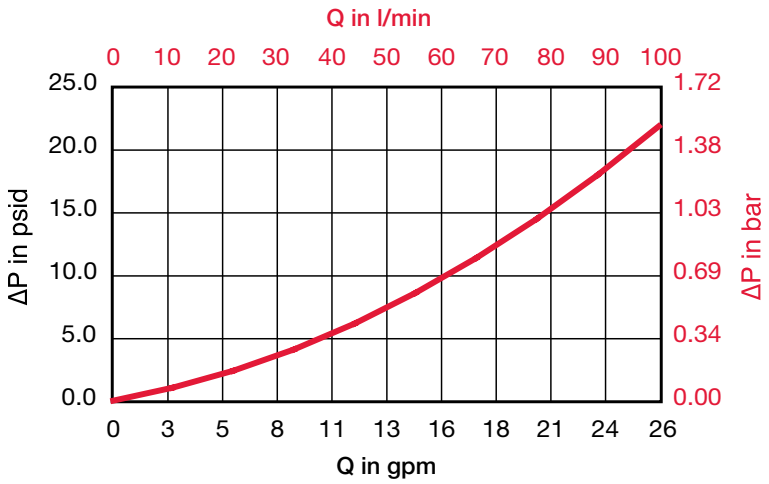
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	…D…ON (Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0035 D XXX ON	2.755	1.169	0.938	0.752	0.549	0.408
0055 D XXX ON	1.427	0.675	0.543	0.434	0.284	0.211
0075 D XXX ON	0.916	0.461	0.37	0.296	0.183	0.136
0095 D XXX ON	0.724	0.37	0.296	0.238	0.144	0.105

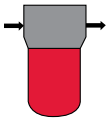
All Element K Factors in psi / gpm.

Notes

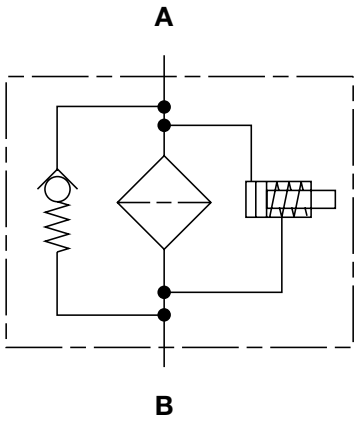
HFM Series

Inline Filters

5800 psi • up to 37 gpm



Hydraulic Symbol



Features

- The HFM filter is available in two sizes comprised of two different bowl and element lengths. The models 75 and 95 provide maximum flow rates of 29 and 37 GPM respectively.
- A quick-response by-pass valve located in the filter head, protects against high differential pressures caused by cold start-ups, flow surges and pressure spikes.
- The high bypass pressure setting (100 psid) minimizes the possibility of contamination due to premature bypassing.
- Filter materials are compatible with all mineral, lubricating oils, and commonly used fire retardant fluids per ISO 2943.
- Fatigue pressure rating equals maximum allowable working pressure rating.
- Wide variety of indicators available with standard setting of 72 psid (5 bar).

Applications

Agricultural

Automotive

Construction

Gearboxes

Industrial

Commercial Municipal

Power Generation

Technical Specifications

Mounting Method	3 or 4 mounting holes - filter head	
Port Connection	SAE 16, 1" BSPP	
Flow Direction	Inlet: Side *(opposite each other)*	Outlet: Side
Construction Materials		
Head	Ductile iron	
Bowl	Steel	
Flow Capacity		
75	29 gpm (110 lpm)	
95	37 gpm (140 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	5800 psi (400 bar)	
Fatigue Pressure	Contact HYDAC office	
Burst Pressure	13,920 psi (960 bar)	
Element Collapse Pressure Rating		
ON	290 psid (20 bar)	
Fluid Temperature Range Consult HYDAC for applications below 14˚F (-10˚C)	14°F to 212°F (-10°C to 100°C)	
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 72 psid (5 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 101.5 psid (7 bar) +10% *(standard)*		

Model Code

HFM ON 95 S K 10 A 1 . 0 / V B7 _

Filter Type
HFM = In-Line High Pressure Filter

Element Media
ON = Optimicron® *(Low Collapse)*

Size
75 = 29 gpm
95 = 37 gpm

Operating Pressure
S = 5800 psi (400 bar)

Type of Connection
J = 1" threaded (1" BSPP)
K = 1" threaded (1 5/16" threaded-12UN)=SAE 16

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON

Type of Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1

Type Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Bypass Valve
B3.5 = 50.75 psid (3.5 bar) *(optional)*
B7 = 101.5 psid (7 bar) *(standard)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
LED = 2 LEDs up to a voltage of 24 Volt
T100 = Thermal lockout on indicator at 100°F *(C and D indicators only)*
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

0095 D 010 ON / V _

Size
0075, 0095

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = BN4HC

Element Media
ON = Optimicron®

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 B . X / V _ _ _

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 15 psid (1 bar) & 116 psid (8 bar) available upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

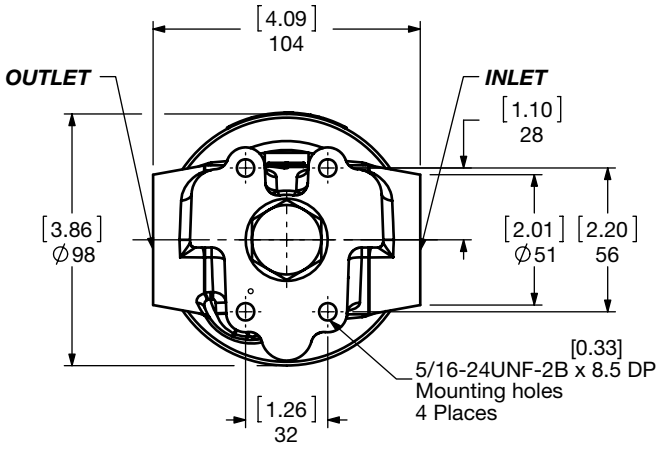
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

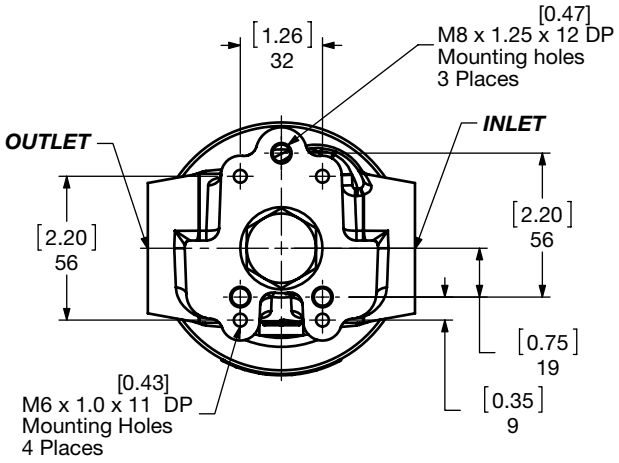
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

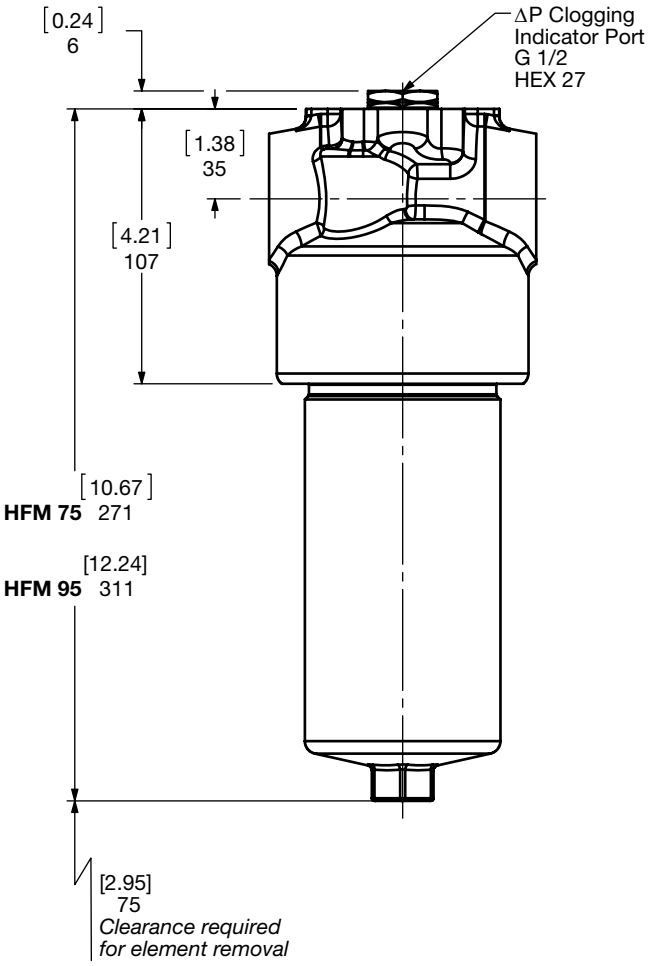
Dimensions
HFM 75/95

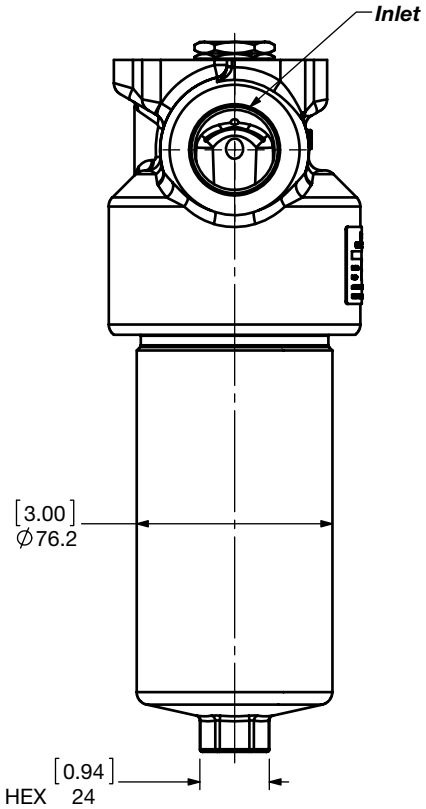
SAE mounting Pattern



BSPP Mounting Pattern







Size	75	95
Weight (lbs.)	12.4	13.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

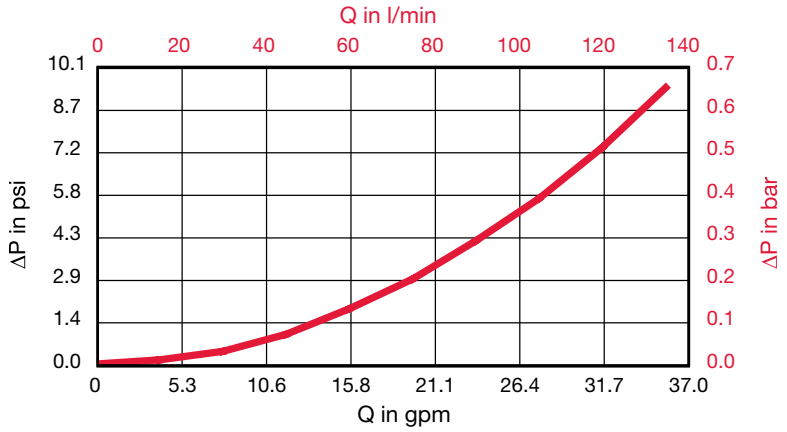
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	…D…ON (Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0075 D XXX ON	0.916	0.461	0.37	0.296	0.183	0.136
0095 D XXX ON	0.724	0.37	0.296	0.238	0.144	0.105

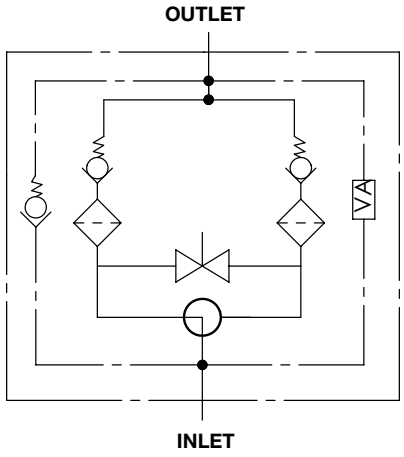
All Element K Factors in psi / gpm.

FMND Series

Inline Duplex Filters

3000 psi • up to 100 gpm

Hydraulic Symbol



Features

- The FMND filter consists of a ductile iron filter head with built-in changeover valve and three different lengths of screw-in filter bowls.
- The FMND filter can be supplied with or without bypass valve, (located in head assembly) but includes vent and drain screws, and also a connection for a differential pressure clogging indicator.
- Pressure equalization requirement is achieved by raising the changeover lever prior to switching it to the relevant filter side.
- Fatigue pressure rating = maximum allowable working pressure rating.
- Germanischer Lloyd (GL) approved
- This filter can be modified to meet the requirements of DIN 24550* as follows:
  - Filter size 0160 with G 1-1/4" port selection
  - Filter size 0250 with G 1-1/2" port selection
  - Filter size 0400 with SAE-DN 38 1-1/2" Flange

*Note - QPD design does not meet DIN 24550.

Applications

Technical Specifications

Mounting Method	4 Mounting holes
Port Connections	Inlet / Outlet 1-1/4" Threaded – SAE 20, 1-1/4" BSPP 1-1/2" Threaded – SAE 24, 1-1/2" BSPP 1-1/2" Flange-SAE-DN 38 Code 61
Flow Direction	Inlet: Side Outlet: Opposite Side
Construction Materials	
Head	Ductile iron
Bowl	Steel
Flow Capacity	
160	42 gpm (160 lpm)
250	66 gpm (250 lpm)
400	100 gpm (400 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	3000 psi (207 bar)
Fatigue Pressure	3000 psi (210 bar) @ 1 million cycles
Burst Pressure	10,650 psi (735 bar)
Element Collapse Pressure Rating	
BH4HC	3045 psid (210 bar)
BN4HC, W/HC	290 psid (20 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 36.25 psid (2.5 bar) -10% *(optional)* ΔP = 50.75 psid (3.5 bar) +10% *(optional)* ΔP = 72 psid (5 bar) -10% *(standard)* ΔP = 116 psid (8 bar) -10% *(optional)* [Used with non-bypass]	
Bypass Valve Cracking Pressure	
ΔP = 102 psid (7 bar) +10%	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

FMND BN/HC 250 L D F 10 C 1 . X / 12 - V - QPD B7

Filter Type
FMND = Inline Duplex Filter

Element Media
BH/HC = Betamicron® *(High Collapse)* BN/HC = Betamicron® *(Low Collapse)*
W/HC = Wire Mesh

Size
160, 250, 400

Operating Pressure
L = 3000 psi (210 bar)

Type of Changeover
D = segment valve

Type and Size of Port
E = 1-1/4" Threaded – SAE 20, 1-1/4" BSPP
F = 1-1/2" Threaded – SAE 24, 1-1/2" BSPP
K = 1-1/2" Flange-SAE-DN 38 Code 61

Filtration Rating *(micron)*
3, 6, 10, 25 = BH/HC 3, 6, 10, 25 = BN/HC 25, 50, 100, 200 = W/HC

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code
1

Modification Number *(the latest version is always supplied)*

Port Configuration
(omit) = SAE DN Flange
0 = BSPP Threaded
12 = SAE Straight Threaded

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Version
(omit) = meets DIN 24550
QPD = Quality Protection Design

Bypass Valve
(omit) = no bypass *(optional)*
B3.5 = 50.75 psid (3.5 bar) *(optional)*
B7 = 101.5 psid (7 bar) *(standard)*

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
RL = Flow Path reversed - Right inlet/Left outlet
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0250 DN 010 BN4HC / V QPD

Size
0160, 0250, 0400

Type
DN

Filtration Rating *(micron)*
3, 6, 10, 25 = BH/HC
3, 6, 10, 25 = BN4HC
25, 50, 100, 200 = W/HC

Element Media
BH/HC, BN4HC, W/HC

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Version
(omit) = meets DIN 24550
QPD = Quality Protection Design

Supplementary Details
SFREE = *(same as above)*
SO263 = *(same as above)*

Clogging Indicator Model Code

VM 8 C . X / V

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
2 = 29 psid (2 bar) *(optional)*
5 = 72 psid (5 bar) *(standard)*
8 = 116 psid (8 bar) *(optional)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM types C, D, J, and J4 only)*
T100 = Lockout below 100°F

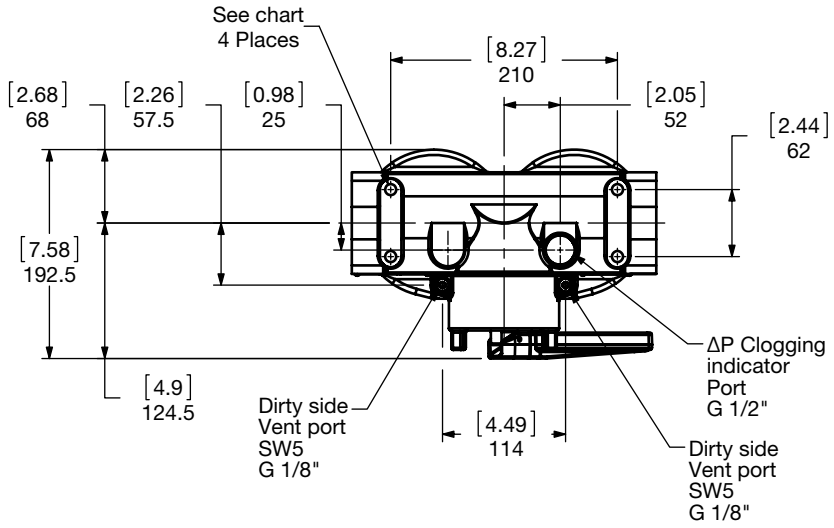
Underwriters Recognition *(VM types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

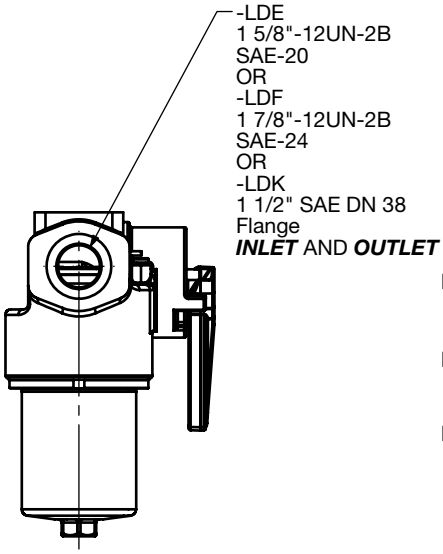
(For additional details and options, see Clogging Indicators Section.)

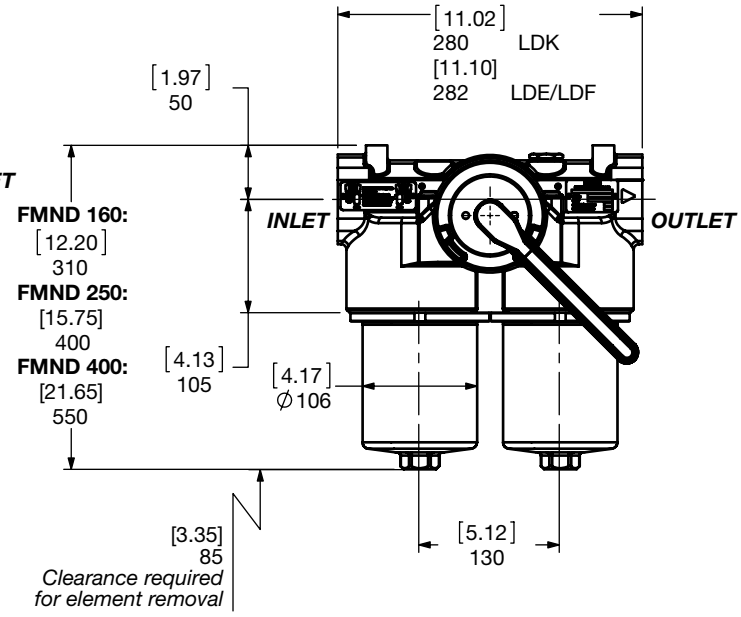
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

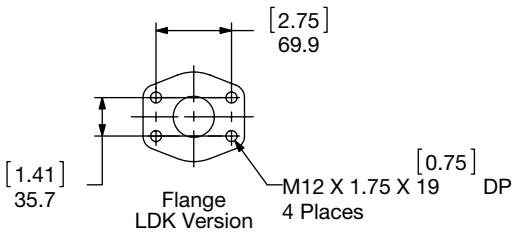
Dimensions
FMND 160/250/400

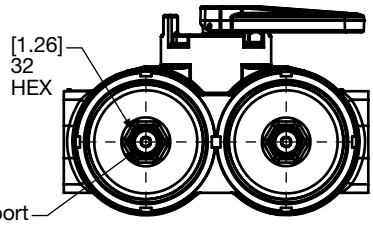
Model	Mounting Hole
FMND160-400LDE	M12X1.75 x 19mm Deep
FMND160-400LDE/12	3/8-24UNF x 14mm Deep
FMND160-400LDF	M12X1.75 x 19mm Deep
FMND160-400LDF/12	3/8-24UNF x 14mm Deep
FMND160-400LDK	M12X1.75 x 19mm Deep

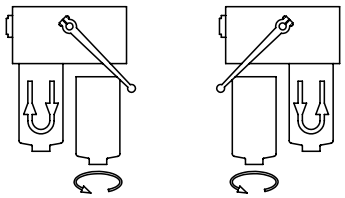












Before changing the element, relieve pressure in the filter housing.

Size	160	250	400
Weight (lbs.)	52.7	59.8	71.0

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

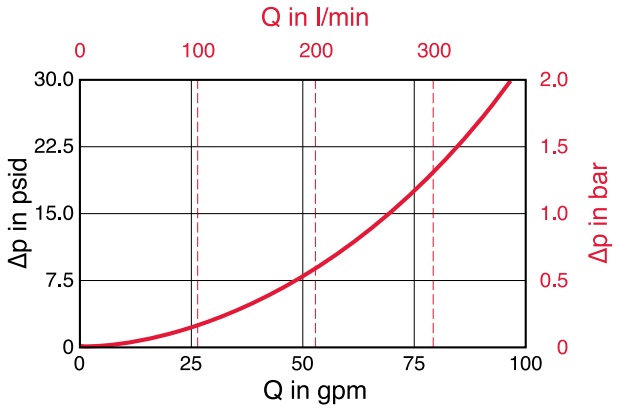
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

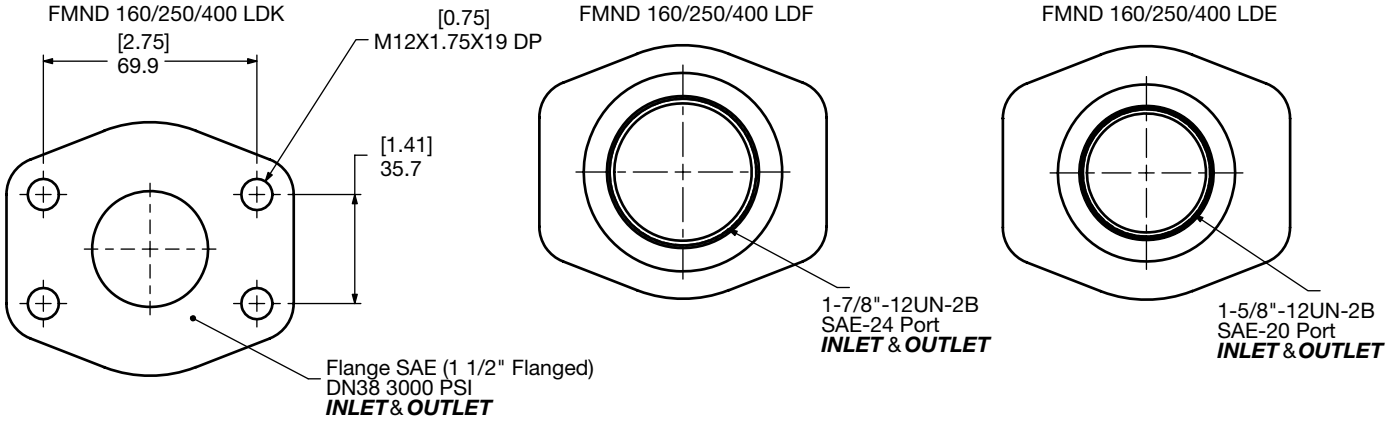
Betamicron	**...DN...BN/HC Elements** (Low Collapse)			
Size	**3µm**	**6 µm**	**10 µm**	**25 µm**
0160 DN XXX BN4HC	0.434	0.280	0.187	0.143
0250 DN XXX BN4HC	0.280	0.176	0.115	0.099
0400 DN XXX BN4HC	0.176	0.110	0.071	0.055

Wire Mesh	**...DN...W/HC Elements**			
Size	**25 µm**	**50 µm**	**100 µm**	**200 µm**
0160 DN XXX W/HC	0.009	0.009	0.009	0.009
0250 DN XXX W/HC	0.006	0.006	0.006	0.006
0400 DN XXX W/HC	0.004	0.004	0.004	0.004

Betamicron	**...DN...BH/HC Elements** (High Collapse)			
Size	**3 µm**	**6 µm**	**10 µm**	**25 µm**
0160 DN XXX BH4HC	0.439	0.280	0.209	0.137
0250 DN XXX BH4HC	0.296	0.187	0.154	0.104
0400 DN XXX BH4HC	0.187	0.115	0.093	0.060

All Element K Factors in psi / gpm.

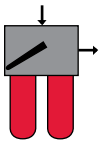
FMND 160/250/400 LDK



DFDK Series

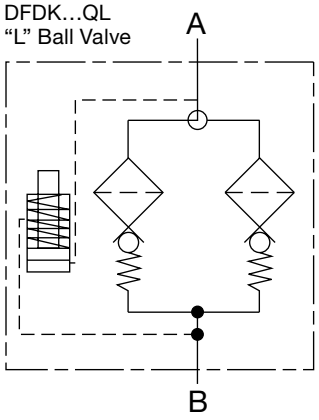
Inline Duplex Filters

4568 psi • up to 90 gpm

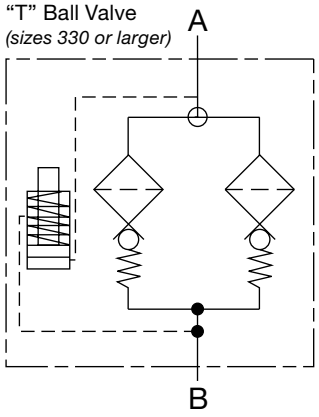


Hydraulic Symbol

DFDK…QL
"L" Ball Valve



DFDK…QT
"T" Ball Valve
(sizes 330 or larger)



Features

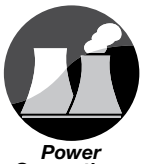
- The DFDK Filters have a filter head of ductile iron and a screw-in bowl of cold-formed steel.
- The filter housings are designed to withstand pressure surges as well as high static pressure loads.
- The screw-in bowl or lid, allows the filter element to be easily removed for replacement or cleaning.
- A visual *(pop-up)*, electrical, electrical/visual (lamp), or other electronic differential types of clogging indicators are available to suit each application.
- DFDK filters are available only with high collapse pressure elements since no bypass is provided.
- DFDK sizes 330 and above can be ordered with a T Ball Valve which can operate in mid position with both elements fully open and online in parallel.

Note: QPD is available in sizes 160-1320 only.

Applications

Automotive

Industrial



Power Generation

Pulp & Paper

Railways

Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes	
Port Connection		
60/110	SAE-12	
160/240/280	SAE-24	
330/660/1320	2" SAE-DN 51 Code 62 Flange	
Flow Direction	60 - 280	330 - 1320
Inlet	Top	Top
Outlet	Side	Back
Construction Materials		
Head	Ductile iron	
Bowl	Steel	
Housing (1320)	Steel	
Lid/Cap (1320)	Ductile iron	
Flow Capacity		
60/110	13 gpm (50 lpm)	
160/240/280	35 gpm (132 lpm)	
330/660/1320	90 gpm (340 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	4568 psi (315 bar)	
Fatigue Pressure	Contact HYDAC Office	
Burst Pressure	> 18,270 psi (1260 bar)	
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 116 psid (8 bar) -10% (standard) Non-bypass Only		

Model Code

DFDK BH/HC 60 Q L C 3 A 1 . 2 - _ _ QPD

Filter Type
DFDK = Duplex Pressure Filter with Ball Valve Selector

Element Media
BH/HC = Betamicron® *(High Collapse)* V = Metal Fiber

Size
60, 110, 160, 240, 280, 330, 660, 1320 *(larger sizes available - contact HYDAC)*

Pressure Range
K = 2320 psi (160 bar) *(sizes 1320 with type code 3 only - larger sizes upon request)*
Q = 4568 psi (315 bar) *(sizes 30 - 1320 with type code 1 or 2 only)*

Valve
L = ball change-over valve in "L" configuration *(standard)*
T = ball change-over valve in "T" configuration
(full simultaneous flow through both sides - sizes 330 and larger)

Connection
B = 1/2" SAE 8 *(size 30 only)*
C = 3/4" SAE 12 *(sizes 60/110 only)*
F = 1 1/2" SAE 24 *(sizes 160 - 280 only)*
L = 2" SAE DN 51 Code 62 *(sizes 330 - 1320 only)*
M = 2 1/2" SAE DN 64 Code 62 *(sizes 1320 only) - 3.0 only*

Filtration Rating *(micron)*
3, 5, 10, 20 = BH/HC 3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Code
1 = One Piece Bowl *(sizes 60 - 660 only)*
2 = Two Piece Bowl *(size 660 to 1320 only)*
3 = Upside down mounting - Element top access *(size 1320 only - larger sizes upon request)*

Modification Number *(latest version always supplied)*

Port Configuration
(omit) = 2" SAE DN 50 Flange Ports *(sizes 330-1320 only)*
12 = SAE Straight thread O-ring Boss Ports *(sizes 60-280 only)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene Propylene (EPR)

Version
(omit) = No quality protection
QPD = Quality Protection Design

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
T100 = Thermal lockout on indicator at 100°F *(C, D, J, and J4 indicators only)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0060 D 003 BH4HC / V QPD

Size
0060, 0110, 0160, 0240,
0280, 0330, 0660, 1320

Filtration Rating *(micron)*
3, 5, 10, 20 = BH4HC
3, 5, 10, 20 = V

Element Media
BH4HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Version
(omit) = No quality protection
QPD = Quality Protection Design

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*
W = Modification of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)

Clogging Indicator Model Code

VD 8 B . X / _ _ _ _

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
8 = 116 psid (8 bar)

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

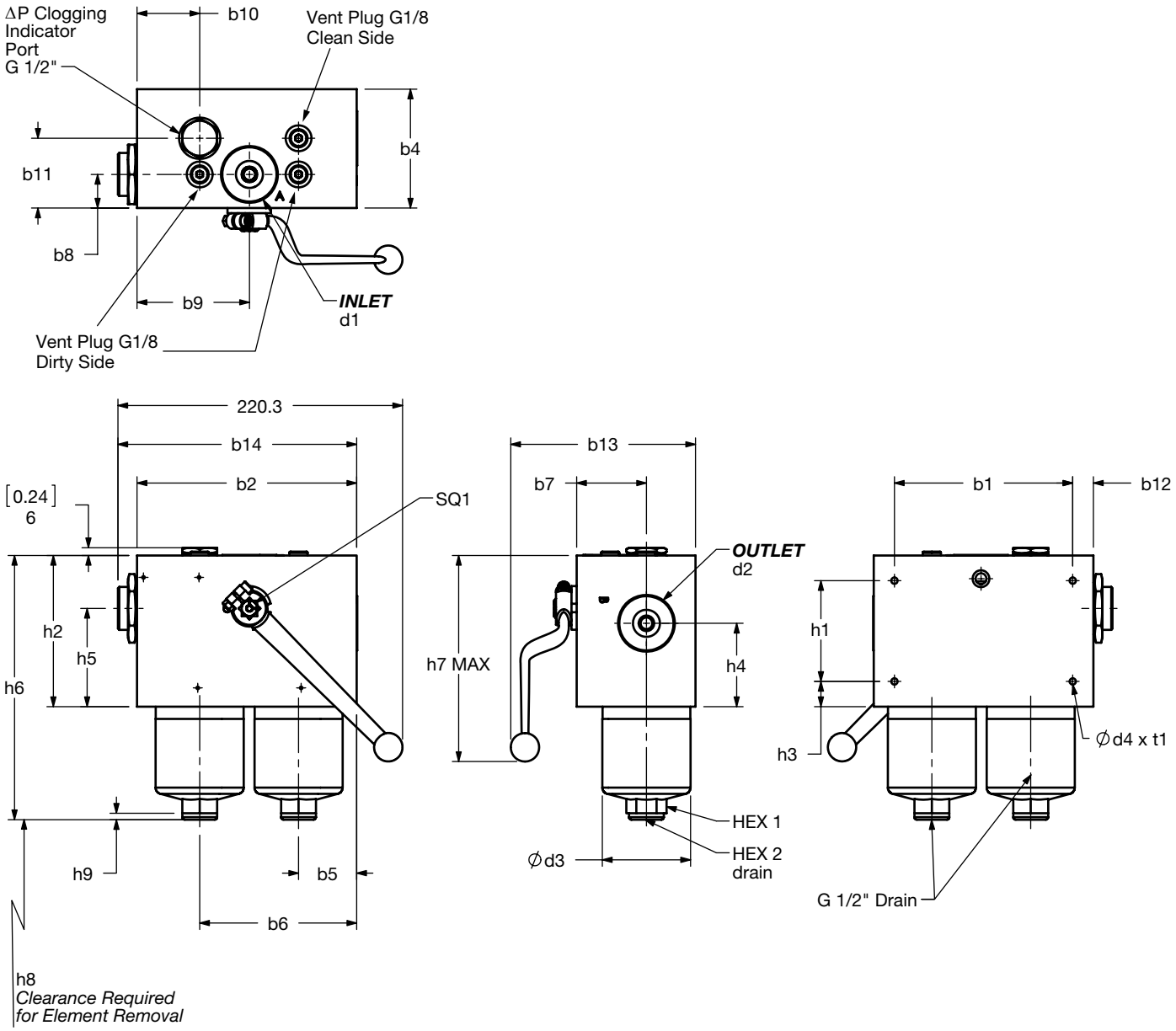
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
DFDK 60 / 110 / 160 / 240 / 280



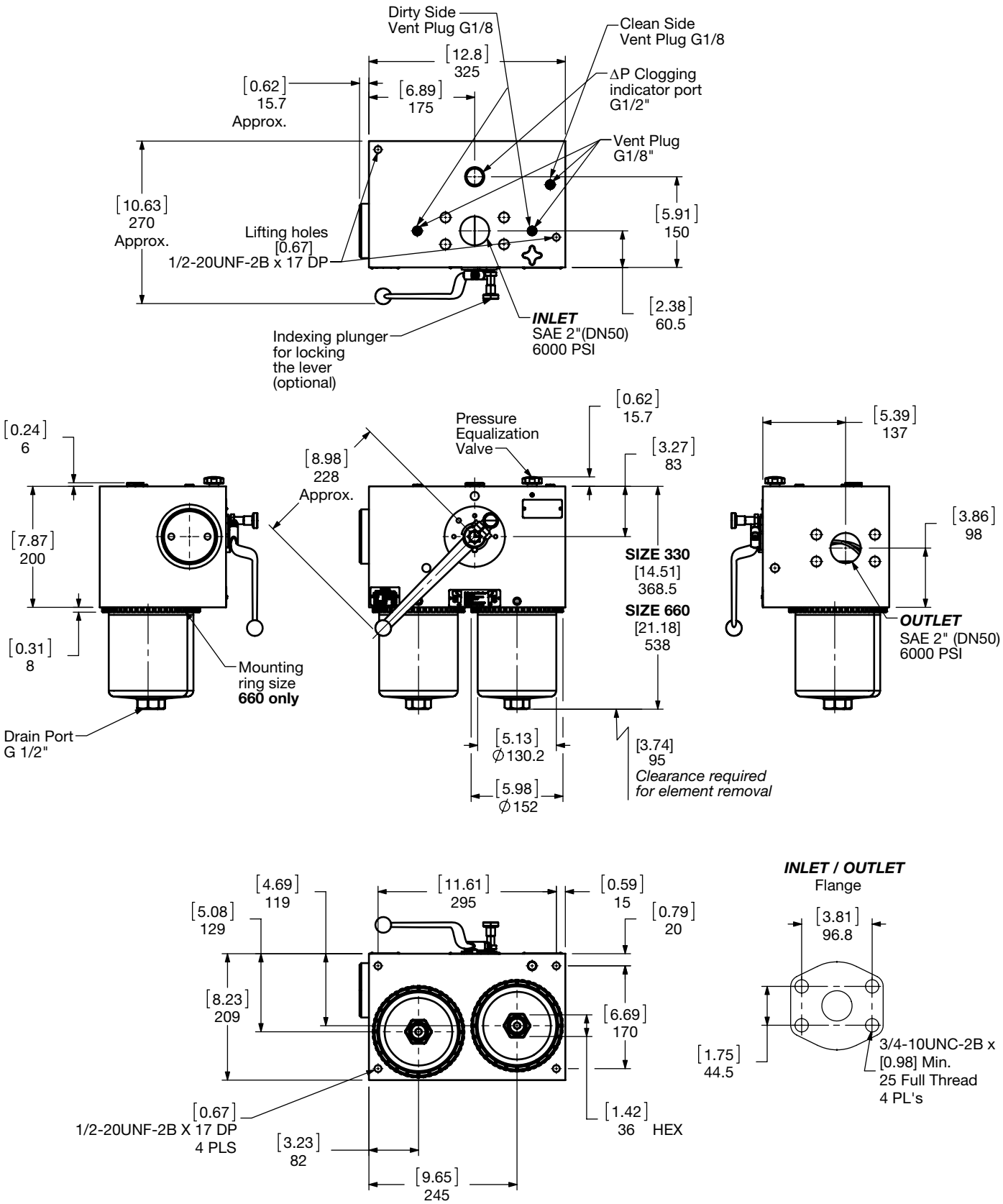
Size	60	110	160	240	280
Weight (lbs.)	33.1	37.5	72.8	79.4	99.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

DFDK	60	110	160	240	280
b1	[5.43] 138	[5.43] 138	[7.48] 190	[7.48] 190	[7.48] 190
b2	[6.69] 170	[6.69] 170	[8.27] 210	[8.27] 210	[8.27] 210
b4	[3.62] 92	[3.62] 92	[5.04] 128	[5.04] 128	[5.04] 128
b5	[1.77] 45	[1.77] 45	[2.07] 52.5	[2.07] 52.5	[2.07] 52.5
b6	[4.78] 121.5	[4.78] 121.5	[6.20] 157.5	[6.20] 157.5	[6.20] 157.5
b7	[2.13] 54	[2.13] 54	[2.97] 75.5	[2.97] 75.5	[2.97] 75.5
b8	[1.02] 26	[1.02] 26	[1.40] 35.5	[1.40] 35.5	[1.40] 35.5
b9	[3.43] 87	[3.43] 87	[4.13] 105	[4.13] 105	[4.13] 105
b10	[1.91] 48.5	[1.91] 48.5	[2.07] 52.5	[2.07] 52.5	[2.07] 52.5
b11	[2.13] 54	[2.13] 54	[2.97] 75.5	[2.97] 75.5	[2.97] 75.5
b12	[0.63] 16	[0.63] 16	[0.39] 10	[0.39] 10	[0.39] 10
b13 (≈)	[5.91] 150	[5.91] 150	[7.60] 193	[7.60] 193	[7.60] 193
b14 (≈)	[7.13] 181	[7.13] 181	[8.70] 221	[8.70] 221	[8.70] 221
d1*	1-1/16-12UN-2B SAE-12		1-7/8-12UN-2B SAE-24		
d2*					
d3	[2.69] 68.2	[2.69] 68.2	[3.75] 95.2	[3.75] 95.2	[3.75] 95.2
d4	1/4-28UNF-2B		3/8-24UNF-2B		
h1	[3.07] 78	[3.07] 78	[3.78] 96	[3.78] 96	[3.78] 96
h2	[4.61] 117	[4.61] 117	[6.38] 162	[6.38] 162	[6.38] 162
h3	[0.77] 19.5	[0.77] 19.5	[1.30] 33	[1.30] 33	[1.30] 33
h4	[2.54] 64.5	[2.54] 64.5	[4.17] 106	[4.17] 106	[4.17] 106
h5	[2.99] 76	[2.99] 76	[3.94] 100	[3.94] 100	[3.94] 100
h6	[8.07] 205	[10.89] 276.5	[11.20] 284.5	[13.60] 345.5	[20.69] 525.5
h7 (≈)	[8.07] 205	[8.07] 205	[9.65] 245	[9.65] 245	[9.65] 245
h8	[2.95] 75	[2.95] 75	[3.35] 85	[3.35] 85	[3.35] 85
h9	[0.20] 5	[0.20] 5	[0.20] 5	[0.20] 5	[0.20] 5
t1	[0.28] 7	[0.28] 7	[0.43] 11	[0.43] 11	[0.43] 11
HEX1	[1.06] 27	[1.06] 27	[1.26] 32	[1.26] 32	[1.26] 32
HEX2	[0.39] 10	[0.39] 10	[0.39] 10	[0.39] 10	[0.39] 10
SQ1	[0.47] 12	[0.47] 12	[0.55] 14	[0.55] 14	[0.55] 14

Dimensions shown are [inches] millimeters for general information and overall envelope size only.

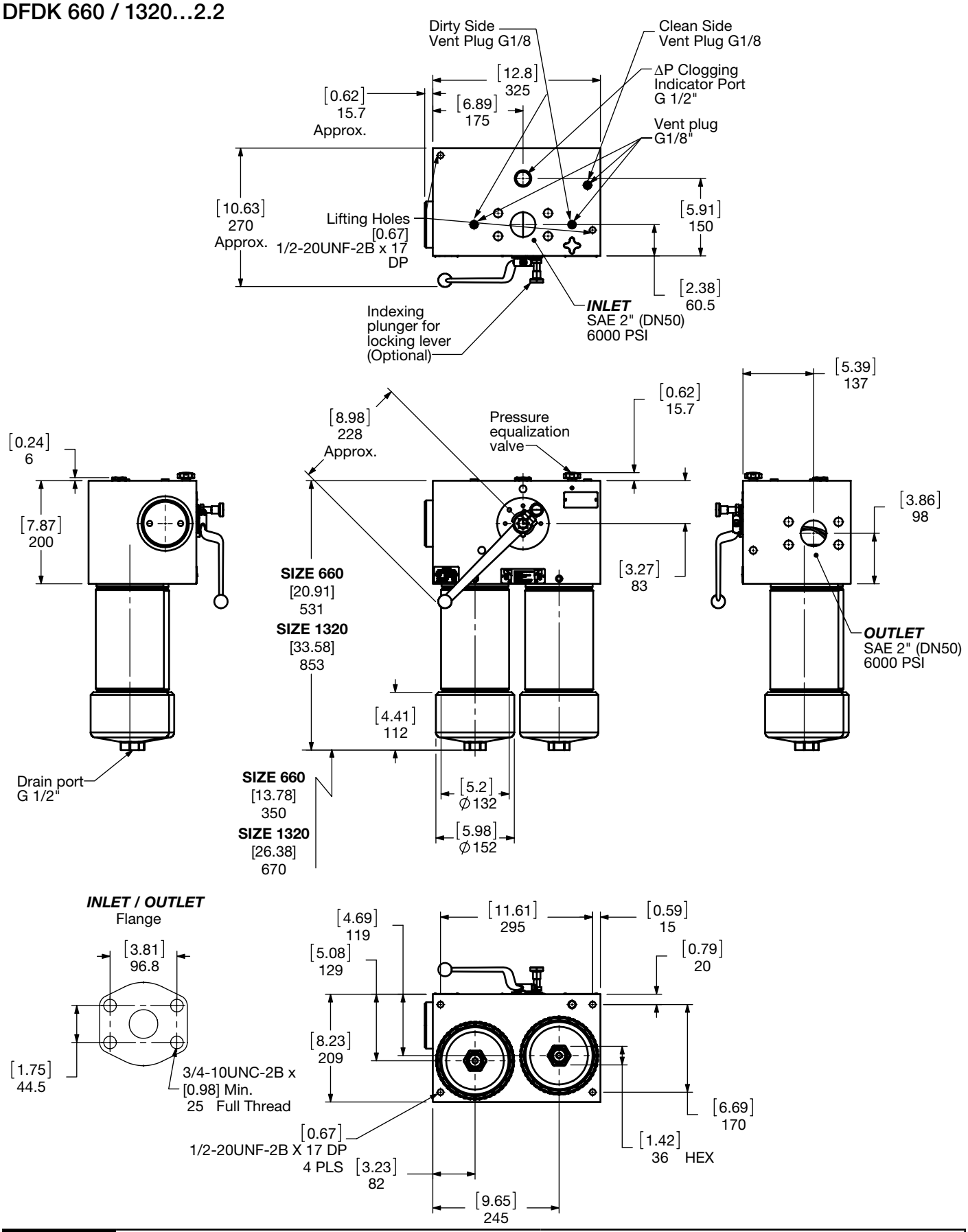
Dimensions
DFDK 330 / 660…1.2



Size	330	660
Weight (lbs.)	213.9	249

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFDK 660 / 1320…2.2



Size	660	1320
Weight (lbs.)	262.5	335.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

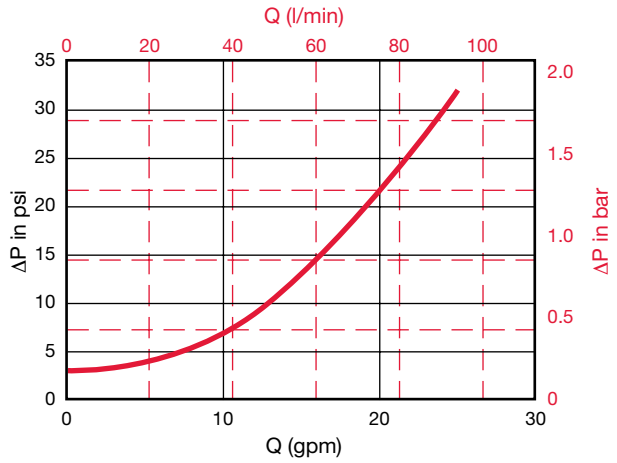
Housing Curve:

Pressure loss through housing is as follows:

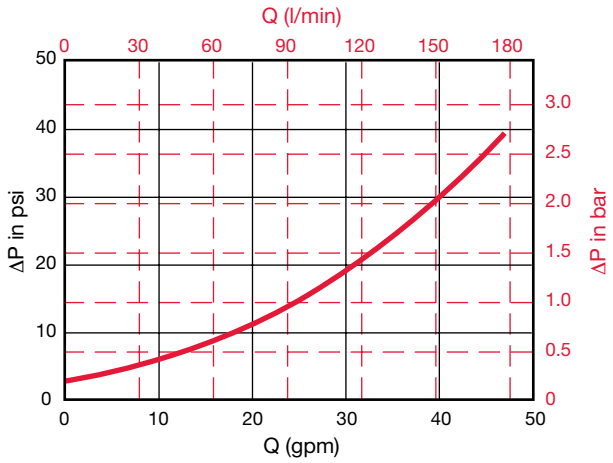
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

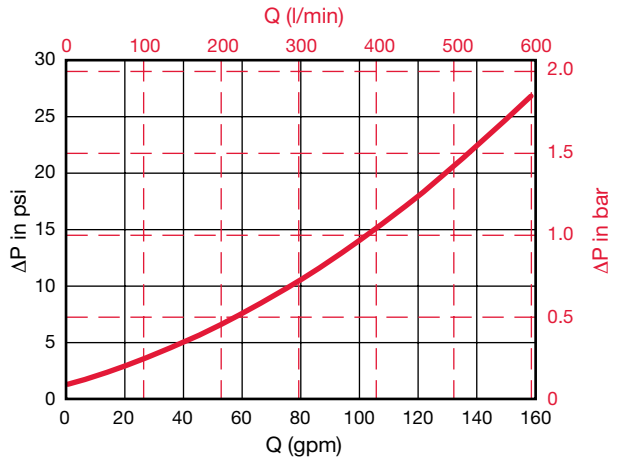
DFDK 60 / 110 Housing



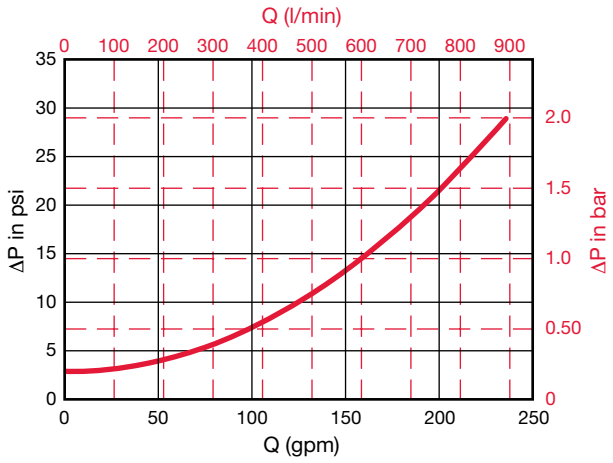
DFDK 160 / 240 / 280 Housing



DFDK 330 / 660 / 1320 QLL Housing "L" Ball Valve



DFDK 330 / 660 / 1320 QTL Housing "T" Ball Valve



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron	...D...BH4HC Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049
1320 D XXX BH4HC	0.088	0.055	0.033	0.022

Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0060 D XXX V	0.877	0.511	0.296	0.183
0110 D XXX V	0.452	0.304	0.182	0.118
0160 D XXX V	0.251	0.177	0.123	0.079
0240 D XXX V	0.169	0.137	0.093	0.062
0280 D XXX V	0.126	0.093	0.064	0.041
0330 D XXX V	0.121	0.097	0.065	0.043
0660 D XXX V	0.063	0.050	0.034	0.021
1320 D XXX V	0.032	0.026	0.018	0.012

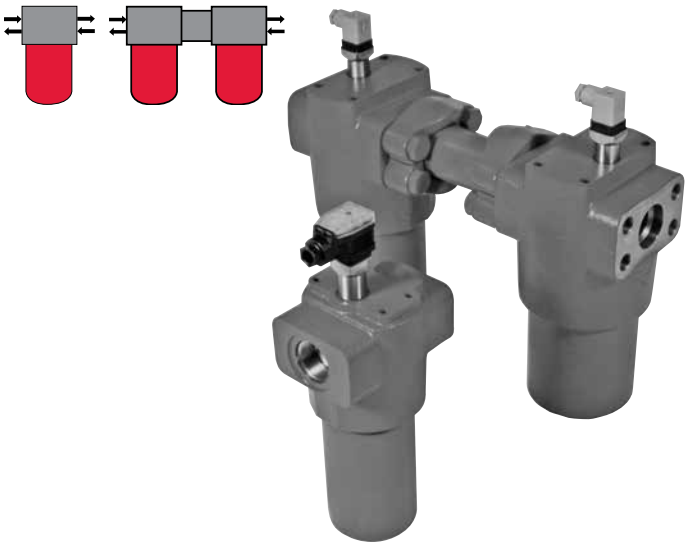
All Element K Factors in psi / gpm.

Notes

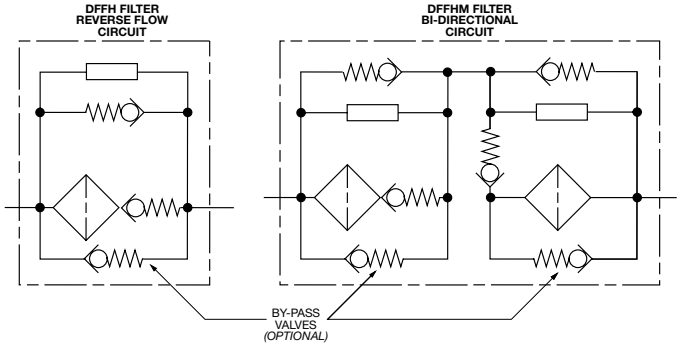
DFFH & DFFHM Series

Reverse Flow Bypass & Bi-Directional Filters

6090 psi • up to 100 gpm



Hydraulic Symbol



Features

- DFFH Reverse bypass Flow models filter fluid in the forward direction and bypass the filter element when the flow direction is reversed.
- DFFHM Bi-Directional model provides fluid filtering in both directions. There are separate filter elements for each direction.
- Inlet/outlet port options include SAE 4-bolt flange code 62, or SAE ports (DFFHM flange only) to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. A choice of O-ring materials (nitrile rubber, Fluorocarbon elastomer, and ethylene propylene rubber) provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl or lid, mounted below the filter head requires minimal clearance to remove the element for replacement; contaminated fluid cannot be washed downstream when element is serviced.
- Clogging indicators have no external dynamic seal. This results in high reliability due to magnetic actuation which eliminates a leak point.
- A poppet-type bypass valve, located in filter head, (optional) provides positive sealing during normal operation and fast opening during cold starts and flow surges.

Applications


Agricultural


Automotive


Construction


Industrial


Railways

Technical Specifications

Mounting Method	DFFH: 4 mounting holes DFFHM: 8 mounting holes	
Port Connection		
DFFH 160/240/280	SAE-20, 1 1/4" SAE Flange Code 62	
DFFH 330/660/1320	SAE-24, 2" SAE Flange Code 62	
DFFHM 160/240/280	1 1/4" SAE Flange Code 62	
DFFHM 330/660/1320	2" SAE Flange Code 62	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Ductile iron	
Single piece bowl "1.X"		
Bowl	Steel	
Two piece bowl "2.X"		
Housing	Steel	
Lid/Cap	Steel	
Flow Capacity		
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
330	87 gpm (330 lpm)	
660/1320	100 gpm (378.5 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	6090 psi (420 bar)	
Fatigue Pressure	6000 psi (420 bar)	
Burst Pressure	Contact HYDAC Office	
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
ON, W/HC	290 psid (20 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C) Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility	Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)* ΔP = 72 psid (5 bar) -10% *(standard)* ΔP = 116 psid (8 bar) *(non-bypass appplication)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)* ΔP = 87 psid (6 bar) +10% *(standard)*		

Model Code

DFFH BH/HC 160 T E 3 B 1 . 0 / 12

Filter Type
DFFH = Reverse Flow bypass Filter DFFHM = Bi-Directional Filter

Element Media
ON = Optimicron® *(Low Collapse)* BH/HC = Betamicron® *(High Collapse)*
W/HC = Wire Mesh V = Metal Fiber

Size
160, 240, 280, 330, 660, 1320

Pressure Range
T = 420 bar

Type of Connection
E = 1-1/4 Threaded *(DFFH sizes 160-280 only)*
F = 1-1/2 Threaded *(DFFH sizes 330-1320 only)*
J = 1-1/4 Flanged SAE Code 62 *(DFFH & DFFHM sizes 160-280 only)*
L = 2 Flanged SAE Code 62 *(DFFH & DFFHM sizes 330-1320 only)*

Filtration Rating *(micron)*
3, 5, 10, 20 = BH/HC, BN/HC 3, 5, 10, 20 = V 1, 3, 5, 10, 15, 20 = ON 25, 50, 100, 200 = W/HC

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1
2 = 2 Piece Bowl *(size 660/1320 only)*

Modification Number *(latest version is always supplied)*

Port Configuration
12 = SAE Straight Thread O-Ring Boss Ports *(available on DFFH only)* 16 = SAE Flange Ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene Propylene rubber (EPR)

Bypass Valve
(omit) = Non-bypass - Critical applications *(high collapse element required)*
B3 = 43 psid (3 bar) - Optional
B6 = 87 psid (6 bar) - Standard setting for pressure filters

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluid
SO184 = G-1/2" Drain in Bowl Option For Sizes 160 - 280 *(standard for sizes 330 & 660)*
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0160 D 003 BH4HC /

Size
0160, 0240, 0280,
0330, 0660, 1320

Filtration Rating *(micron)*
3, 5, 10, 20 = BH4HC 1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = V 25, 50, 100, 200 = W/HC

Element Media
BH4HC, ON, V, W/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 B . X /

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 116 psid (8 bar) available upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

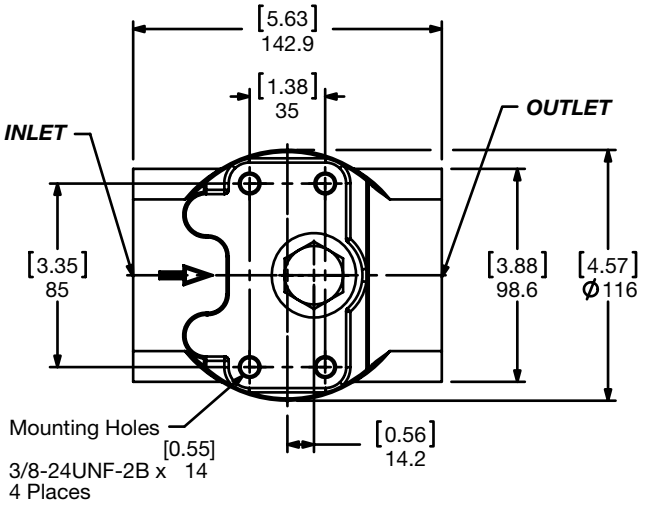
Underwriters Recognition *(VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

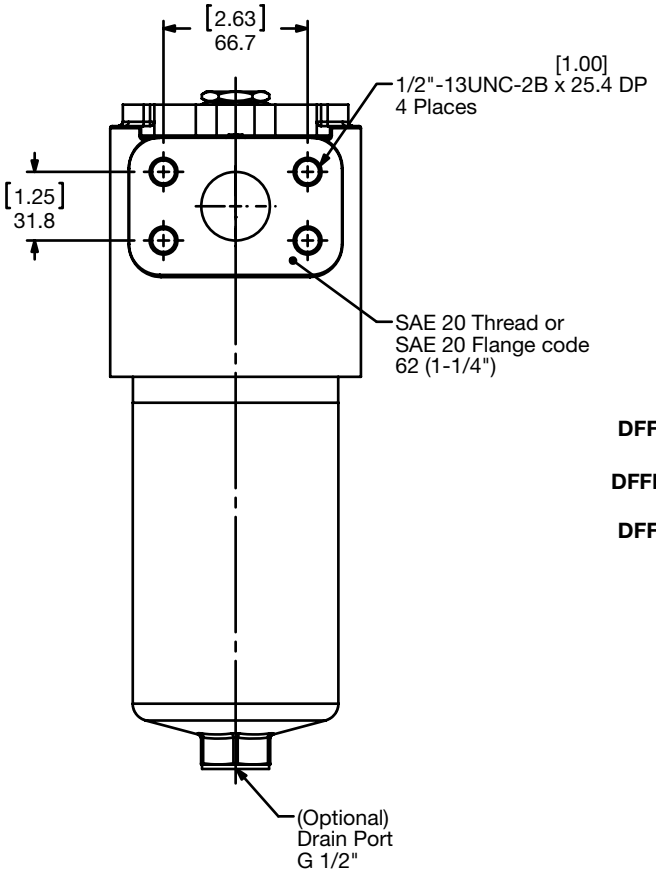
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

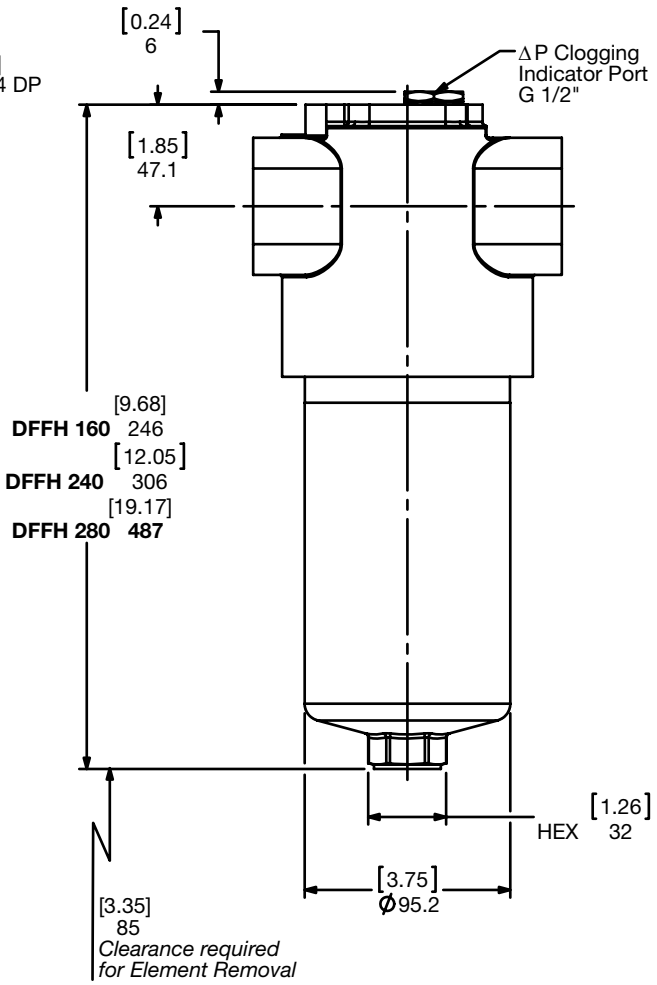
(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
DFFH 160 / 240 / 280



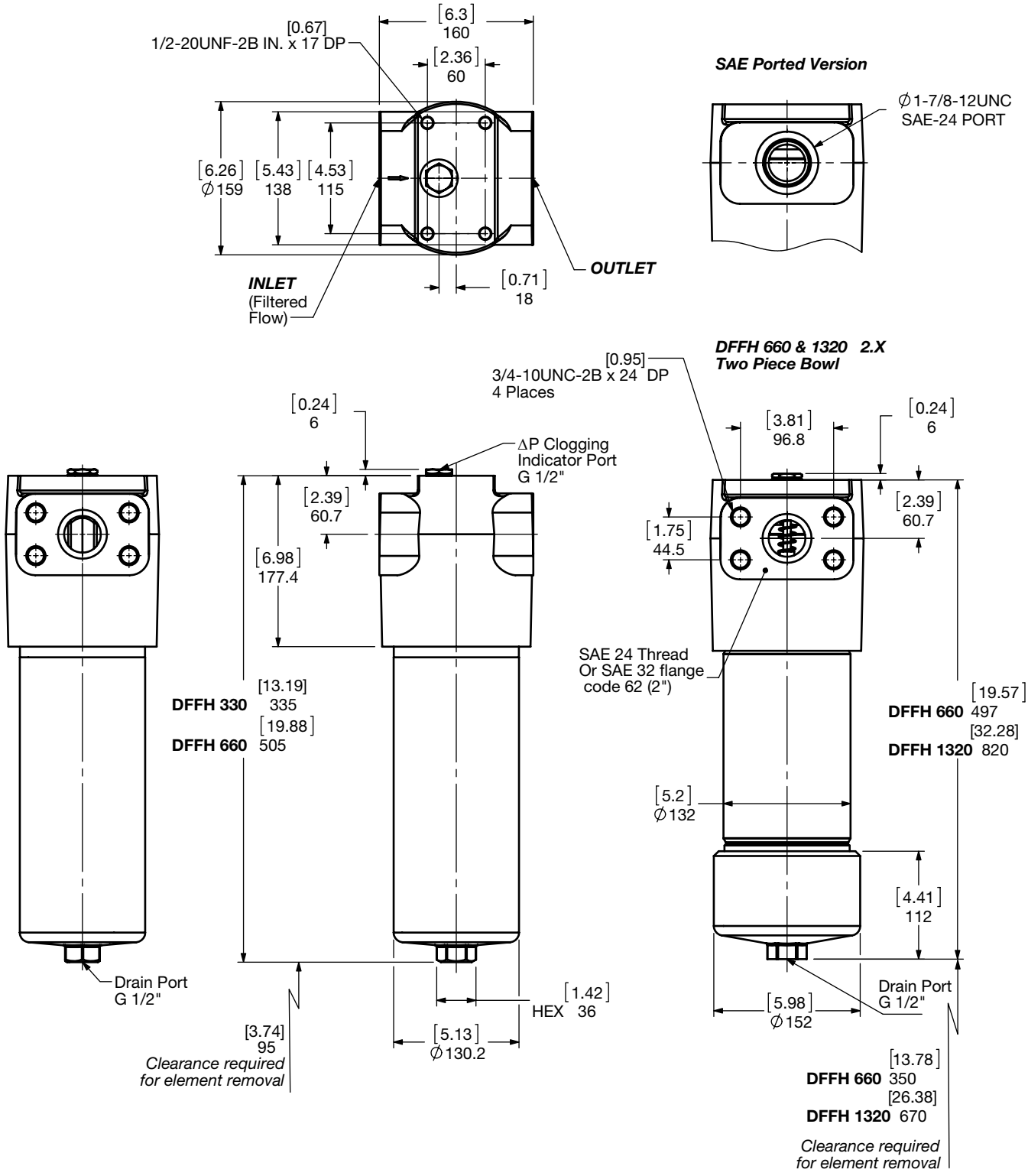




Size - DFFH	160	240	280
Weight (lbs.)	25.6	29.2	39.6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

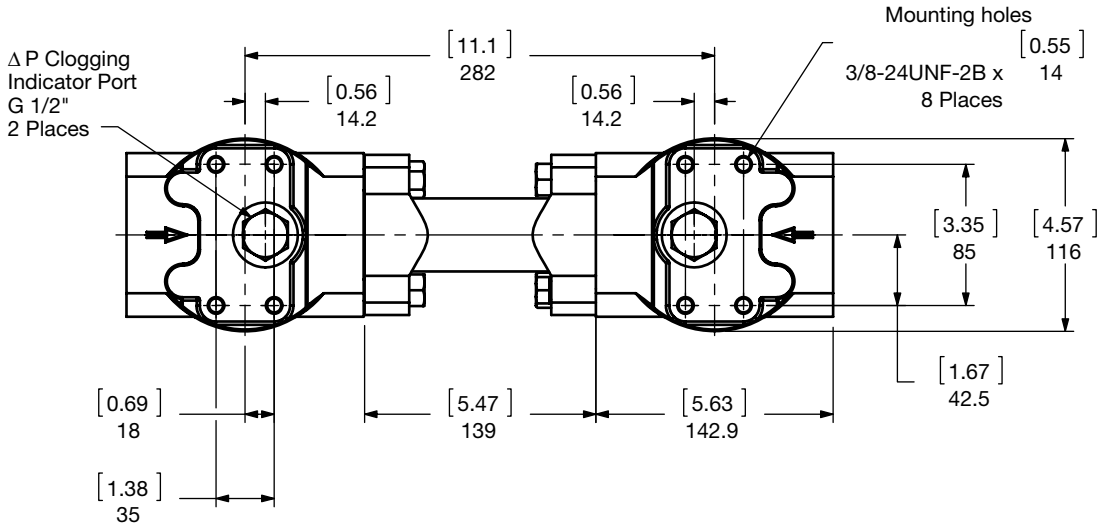
Dimensions
DFFH 330 / 660 / 1320

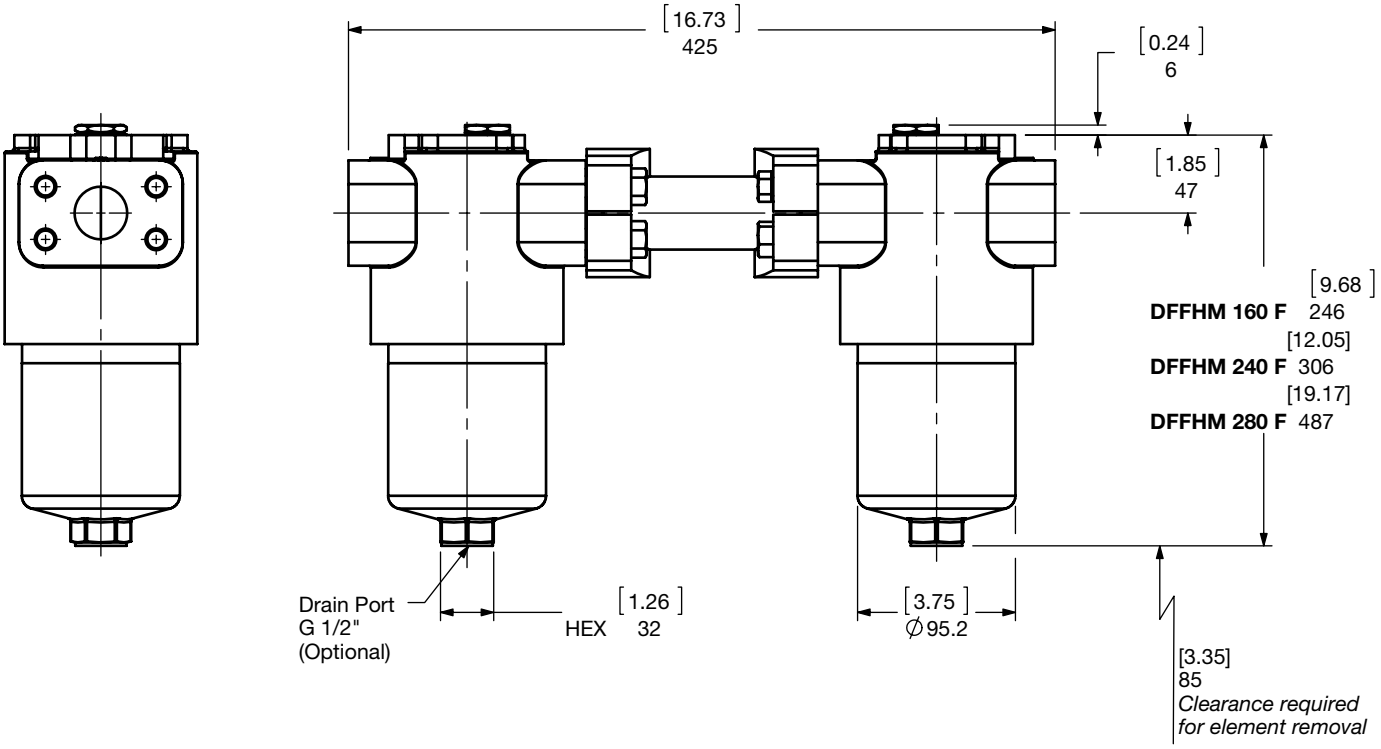


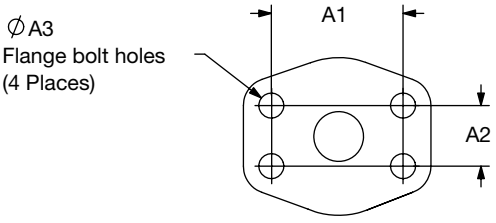
Size - DFFH	330	660	1320
Weight (lbs.)	61.3	78.7	127

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFFHM 160 / 240 / 280





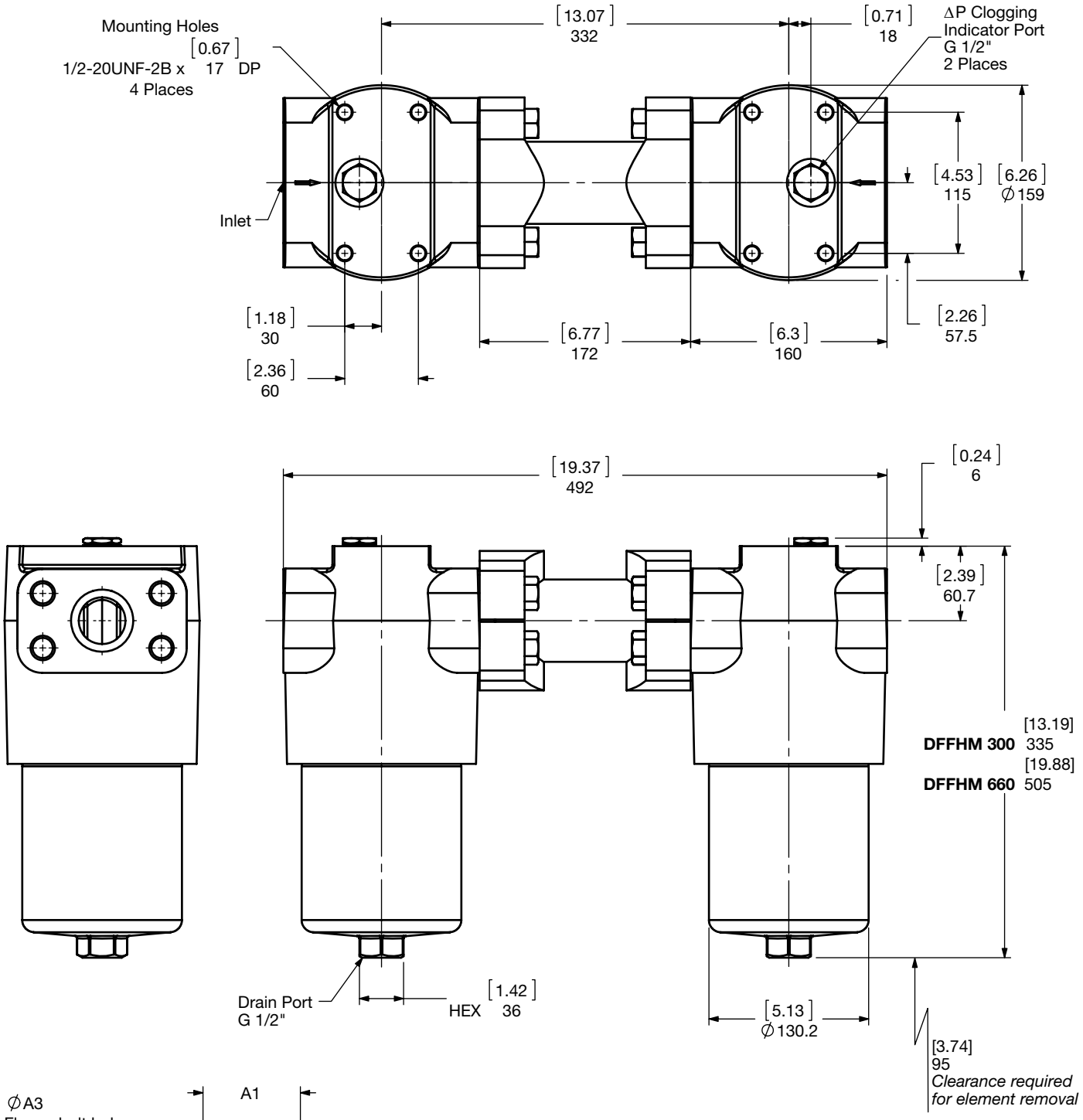


Size	A1	A2	A3
DFFHM 160/240/280	66.7±0.3	31.8±0.3	1/2-13UNC-2B x [1.00] 25.4 DP

Size - DFFHM	160	240	280
Weight (lbs.)	59.1	66.3	77

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFFHM 330 / 660

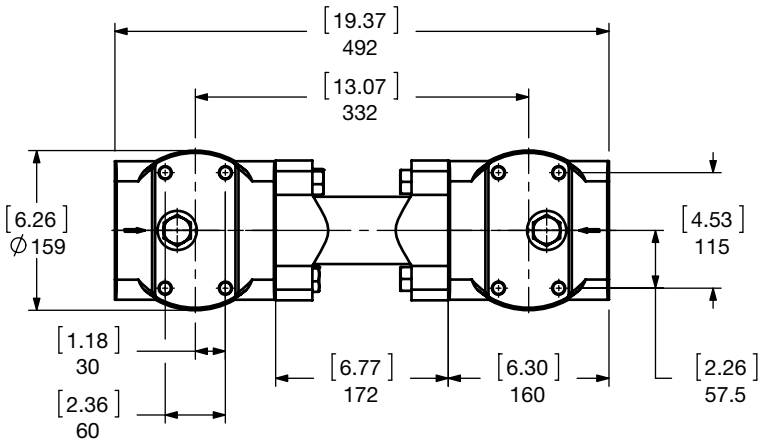


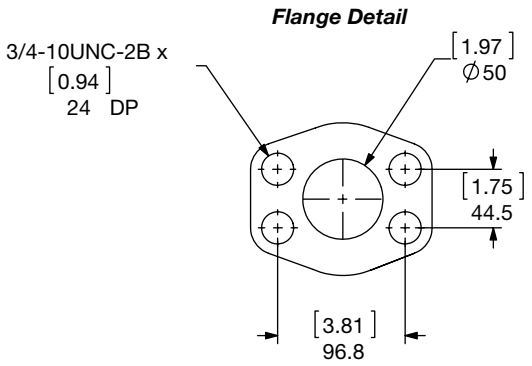
Size	A1	A2	A3
DFFHM 160/240/280	66.7±0.3	31.8±0.3	1/2-13UNC-2B x [1.00] 25.4 DP

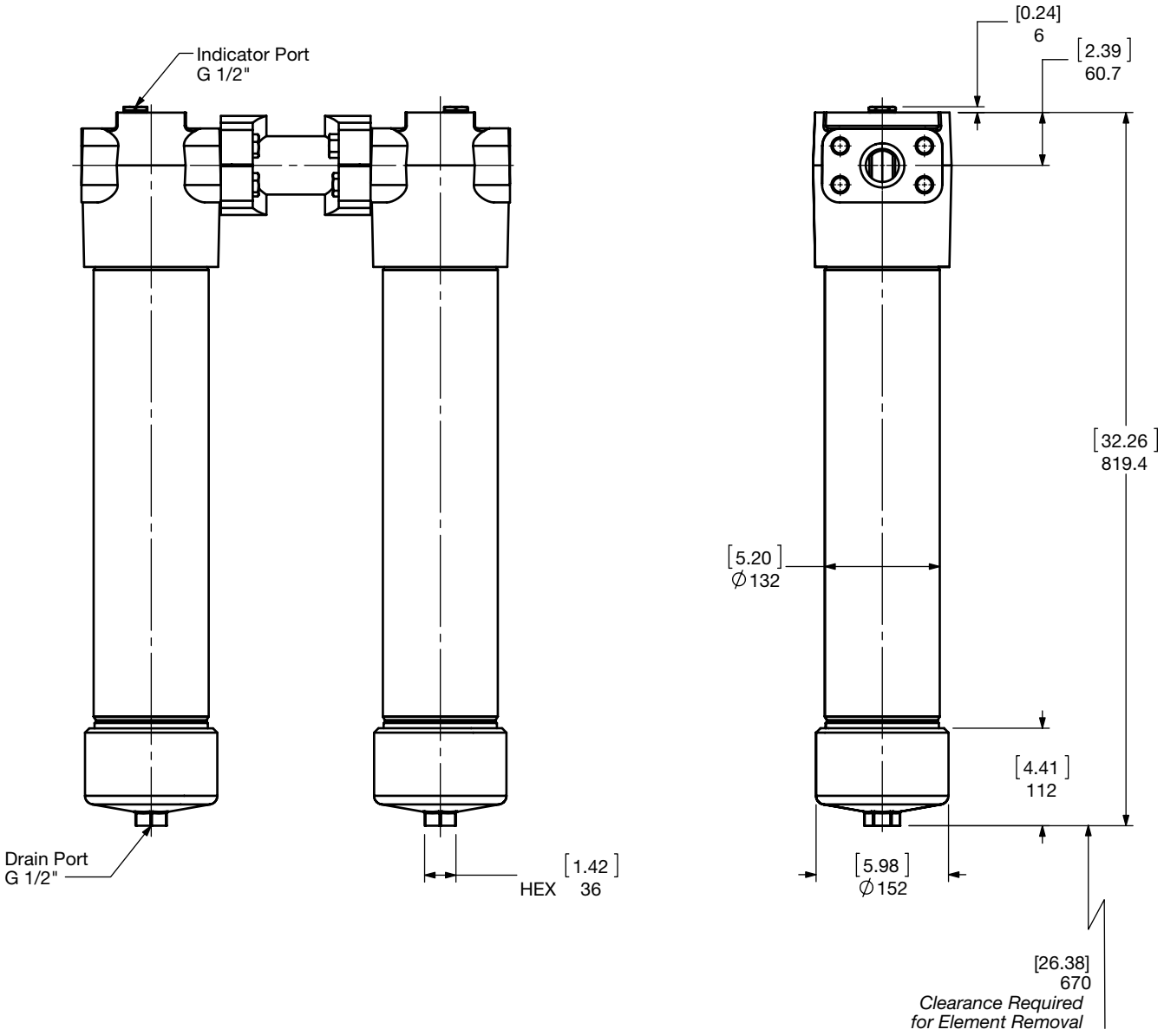
Size - DFFHM	330	660
Weight (lbs.)	139.4	175.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFFHM 1320







Size - DFFHM	1320
Weight (lbs.)	271.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

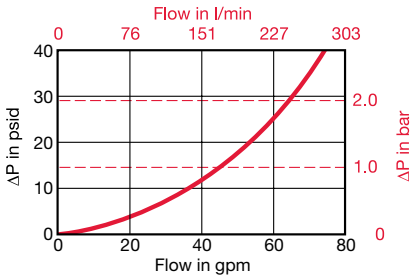
Housing Curve:

Pressure loss through housing is as follows:

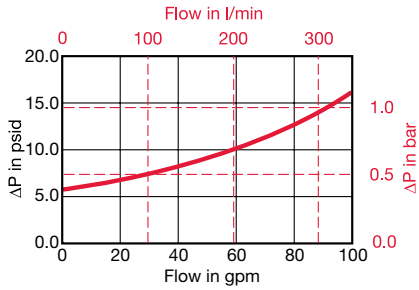
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

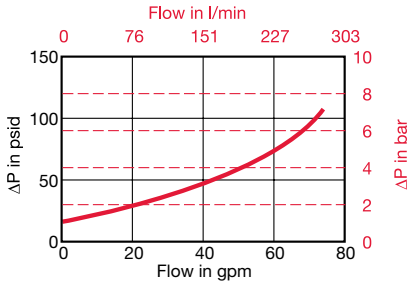
DFFH 160/240/280 Forward Flow



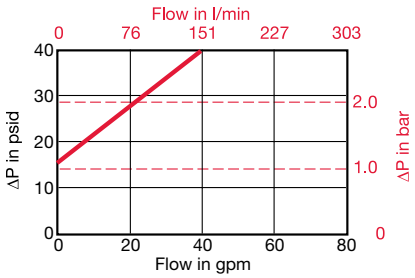
DFFH 330/660/1320 Forward Flow



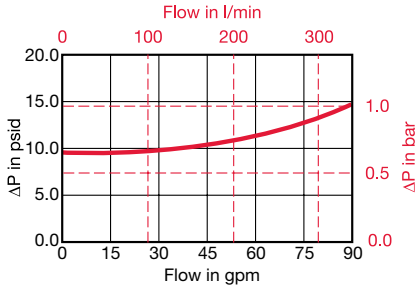
DFFHM 160/240/280 Forward & Reverse Flow



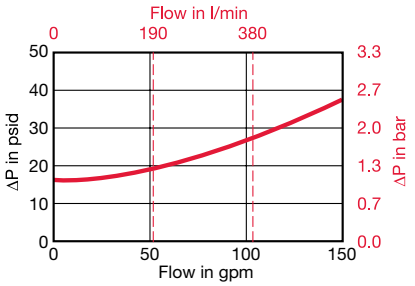
DFFH 160/240/280 Reverse Flow



DFFH 330/660/1320 Reverse Flow



DFFHM 330/660/1320 Forward & Reverse Flow



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON Elements					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031
1320 D XXX ON	0.102	0.053	0.042	0.025	0.019	0.015

Betamicron	...D...BH4HC (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049
1320 D XXX BH4HC	0.088	0.055	0.033	0.022

Wire Mesh	...D...W/HC Elements
Size	25, 50, 100, 200 µm
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004
1320 D XXX W/HC	0.002

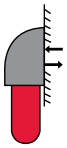
Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0160 D XXX V	0.251	0.177	0.123	0.079
0240 D XXX V	0.169	0.137	0.093	0.062
0280 D XXX V	0.126	0.093	0.064	0.041
0330 D XXX V	0.121	0.097	0.065	0.043
0660 D XXX V	0.063	0.050	0.034	0.021
1320 D XXX V	0.032	0.026	0.018	0.012

All Element K Factors in psi / gpm.

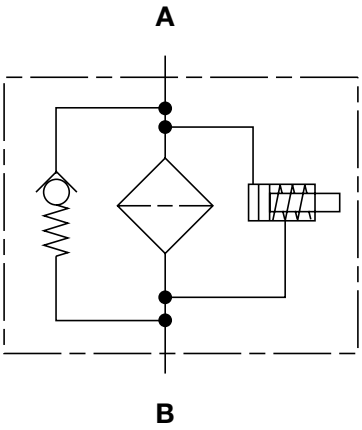
DF...QE Series

Manifold Mount Filters

4568 psi • up to 110 gpm



Hydraulic Symbol



Features

- The DF...QE Filters have a filter head of ductile iron and a screw-in bowl of cold-formed steel for high fatigue strength.
- The filter housings are designed to withstand pressure surges as well as high static pressure loads.
- The screw-in bowl or lid/cap allows the filter element to be easily removed for replacement or cleaning.
- Visual (pop-up), electrical, electrical/visual (lamp), or electronic differential type clogging indicators can be installed.
- DF...QE filters are available with or without a bypass valve located in filter head, so either high or low collapse pressure elements may be used.
- Fatigue pressure rating equals maximum allowable working pressure rating.

Applications

Industrial

Railways

Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes *(manifold mount)*	
Port Connection	Diameters	
30	0.551" (14mm)	
60/110	0.787" (20mm)	
160/240/280	1.260" (32mm)	
330/660/1320	1.181" (30mm)	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head	Ductile iron	
Single piece bowl "1.X"		
Bowl	Steel	
Two piece bowl "2.X"		
Housing	Steel	
Lid/Cap	Steel	
Flow Capacity		
30	8 gpm (30 lpm)	
60	16 gpm (60 lpm)	
110	29 gpm (110 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
330	87 gpm (330 lpm)	
660	100 gpm (378.5 lpm)	
1320	110 gpm (416.4 lpm)	
Housing Pressure Rating	QE	MHE
Max. Allowable Working Pressure	4568 psi (315 bar)	3625 psi (250 bar)
Fatigue Pressure	4568 psi (315 bar) @ 1 mil. cycles	3625 psi (250 bar) @ 100 mil. cycles
Burst Pressure	Contact HYDAC	
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
ON, W/HC	290 psid (20 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*		
ΔP = 87 psid (6 bar) +10% *(standard)*		

Model Code

DF BH/HC 30 Q E 3 B 1 . X /

Filter Type
DF

Element Media
ON = Optimicron® *(Low Collapse)*
BH/HC = Betamicron® *(High Collapse)*
V = Metal Fiber
W/HC = Wire Mesh

Size
30, 60, 110, 160, 240, 280, 330, 660, 1320

Operating Pressure
Q = 4500 psi (300 bar)
MH = 3625 psi (250 bar) *(high dynamic @ 100 million cycles)*

Type of Connection
E = Manifold Block Mounting - Side of Filter Head - 4 mounting holes

Filtration Rating *(microns)*
3, 5, 10, 20 = BH/HC
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = V
25, 50, 100, 200 = W/HC

Type of ΔP Clogging Indicator
A, B, BM, C, D *(Others available upon request, see Clogging Indicators section.)*

Type Number
1 = Filters with one piece bowls *(sizes 30-660)*
2 = Filters with two piece bowls *(sizes 660-1320)*

Modification Number *(the latest version is always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Without Bypass *(BH4HC or V elements recommended)*
B3 = 43 psid Bypass *(optional)*
B6 = 87 psid Bypass *(standard)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SO184 = G-1/2 Drain in Bowl Option For Sizes 30 - 280 *(standard for sizes 330 - 1320)*
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter's recognition

Replacement Element Model Code

0030 D 003 BH4HC /

Size
0030, 0060, 0110, 0160, 0240, 0280, 0330, 0660, 1320

Filtration Rating *(micron)*
3, 5, 10, 20 = BH4HC
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = V
25, 50, 100, 200 = W/HC

Element Media
BH4HC, ON, V, W/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 B . X /

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 116 psid (8 bar) upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V
L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

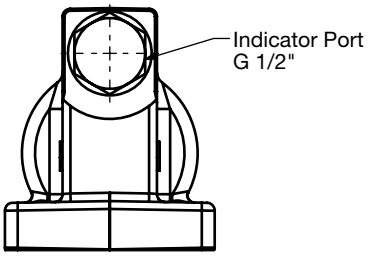
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

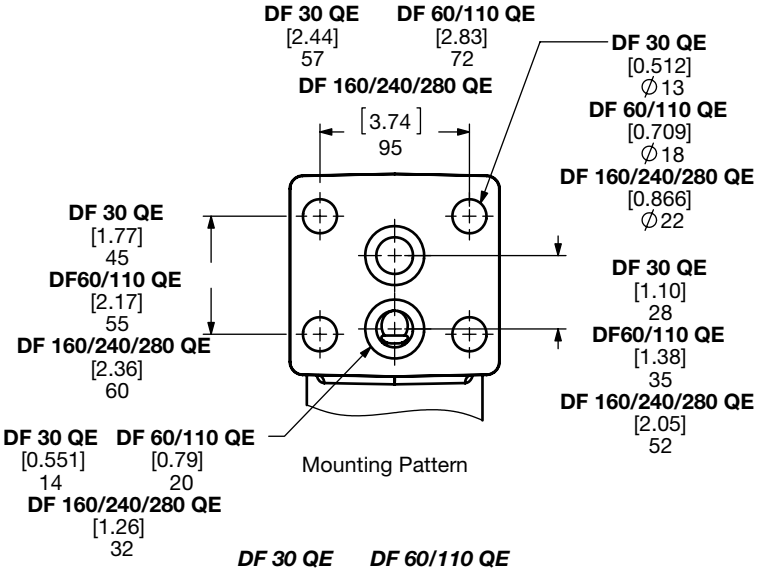
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

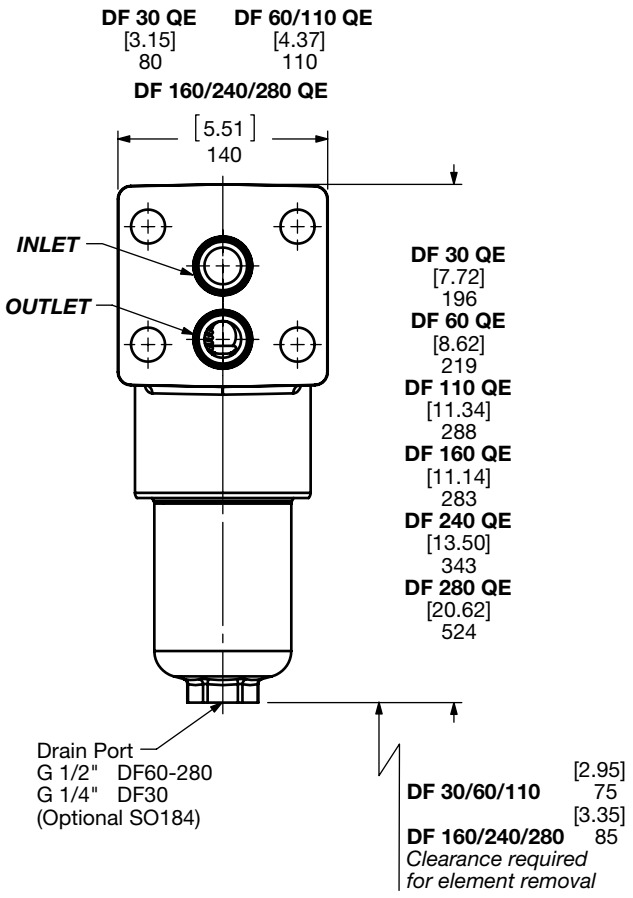
(For additional details and options, see Clogging Indicators section.)

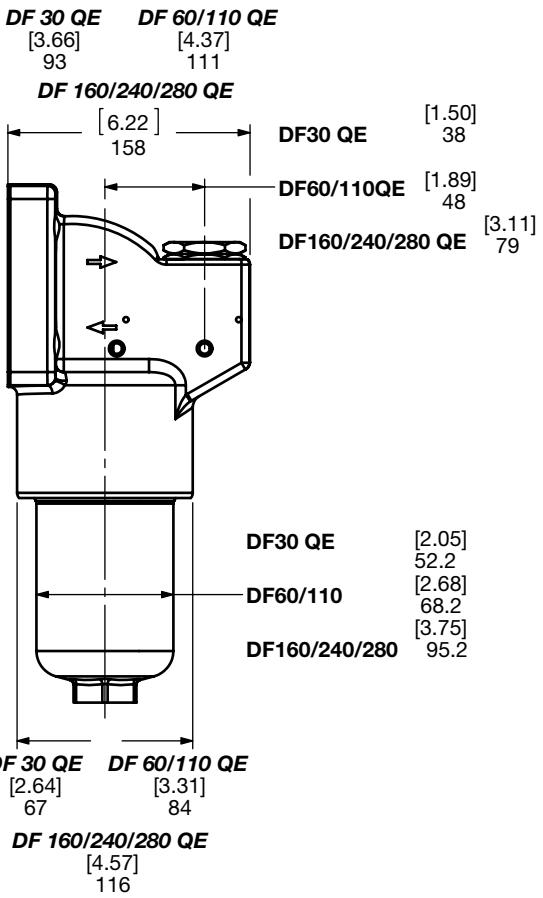
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

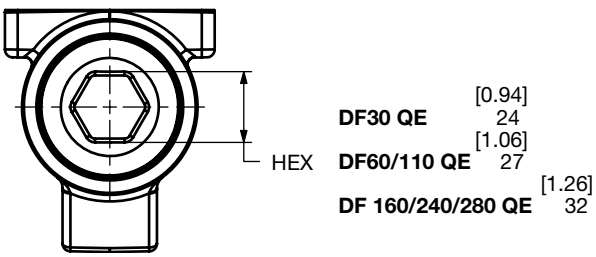
Dimensions
DF 30 – 280 QE 1.X







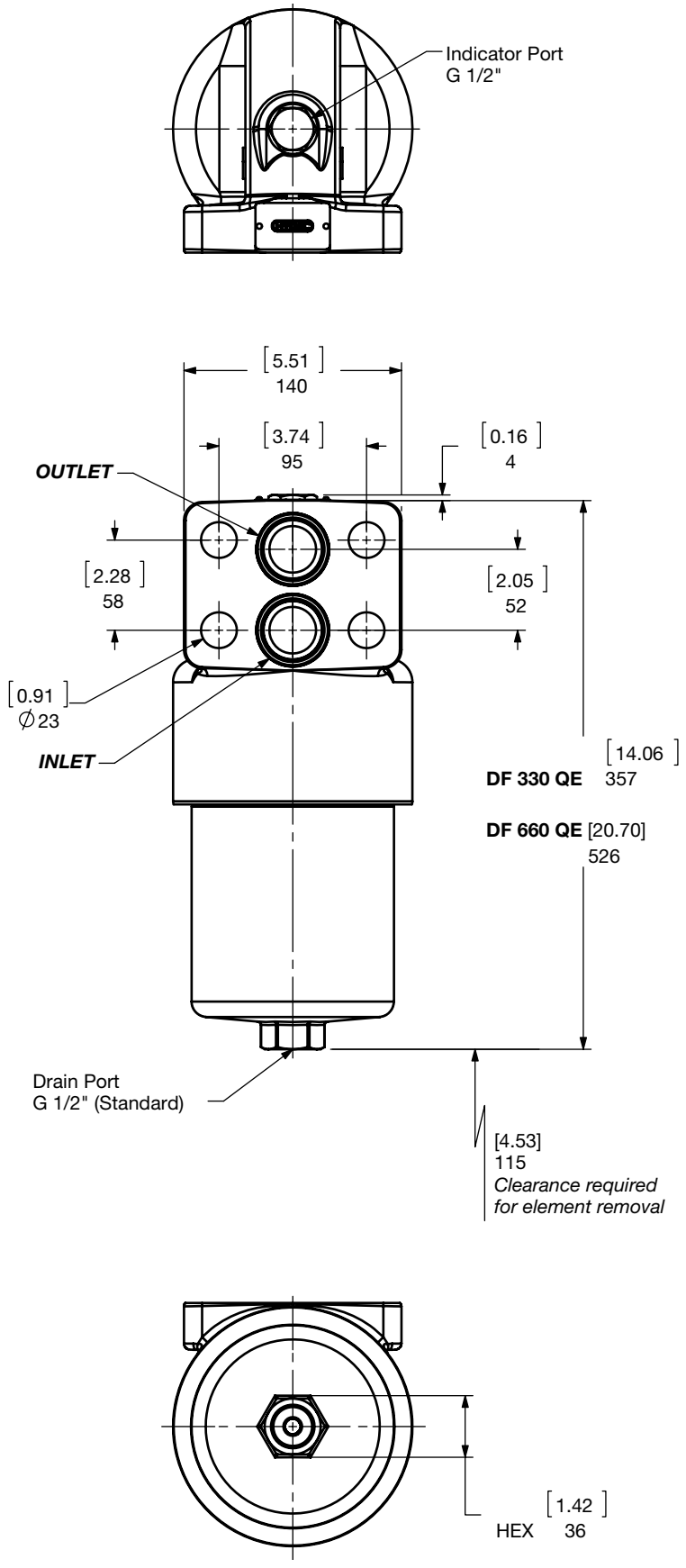




Size	30	60	110	160	240	280
Weight (lbs.)	6.4	11.5	13.5	21.2	25.6	35.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

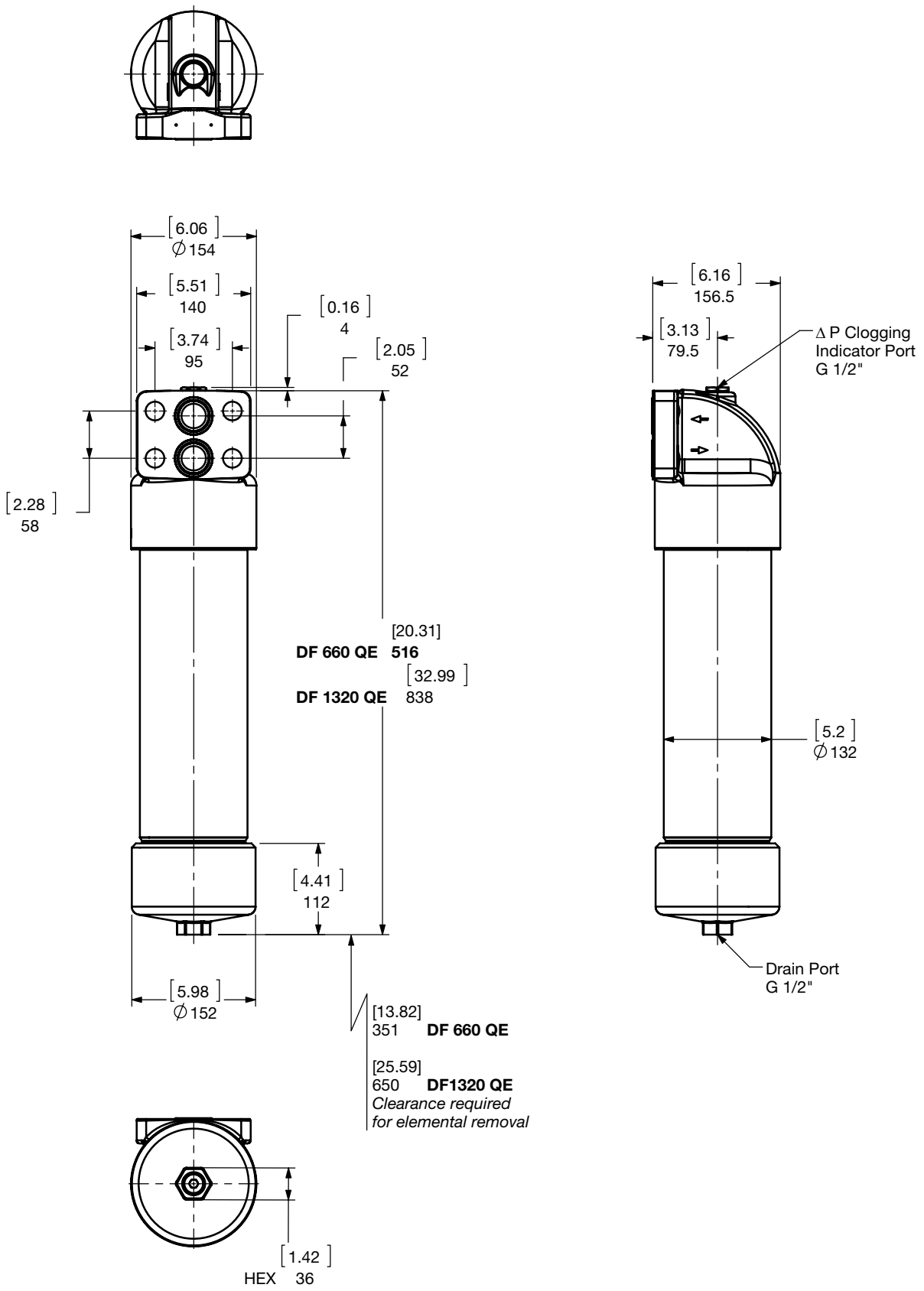
Dimensions
DF 330 – 660 QE 1.X



Size	330	660
Weight (lbs.)	50.5	75.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DF 660 – 1320 QE 2.X



Size	660	1320
Weight (lbs.)	50.5	75.2

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

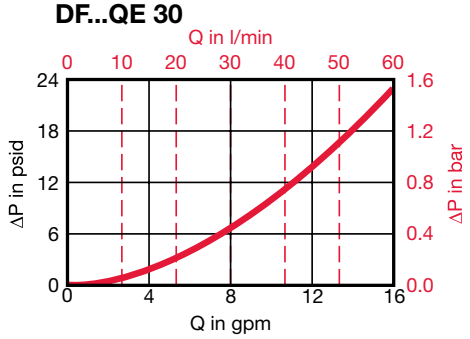
Housing Curve:

Pressure loss through housing is as follows:

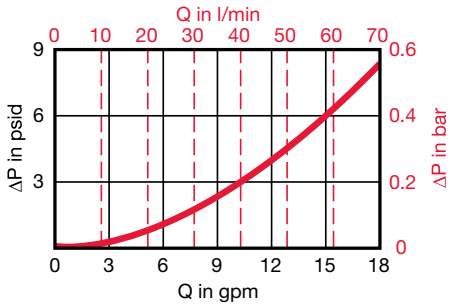
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

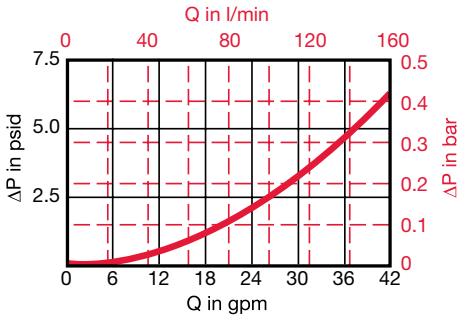
DF...QE 30



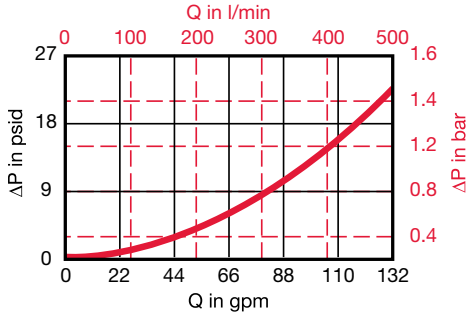
DF...QE 60/110



DF...QE 160/240/280



DF...QE 330/660/1320



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON Elements					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0030 D XXX ON	4.27	3.507	2.376	1.251	0.768	0.62
0060 D XXX ON	2.936	1.427	1.004	0.664	0.537	0.347
0110 D XXX ON	1.416	0.735	0.527	0.333	0.254	0.164
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031
1320 D XXX ON	0.102	0.053	0.042	0.025	0.019	0.015

Betamicron	...D...BH4HC Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX BH4HC	5.005	2.782	1.992	1.043
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049
1320 D XXX BH4HC	0.088	0.055	0.033	0.022

Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX V	1.011	0.740	0.411	0.200
0060 D XXX V	0.877	0.511	0.296	0.183
0110 D XXX V	0.452	0.304	0.182	0.118
0160 D XXX V	0.251	0.177	0.123	0.079
0240 D XXX V	0.169	0.137	0.093	0.062
0280 D XXX V	0.126	0.093	0.064	0.041
0330 D XXX V	0.121	0.097	0.065	0.043
0660 D XXX V	0.063	0.050	0.034	0.021
1320 D XXX V	0.032	0.026	0.018	0.012

Wire Mesh	...D...W/HC Elements (Low Collapse)
Size	25, 50, 100, 200 µm
0030 D XXX W/HC	0.166
0060 D XXX W/HC	0.042
0110 D XXX W/HC	0.023
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004
1320 D XXX W/HC	0.002

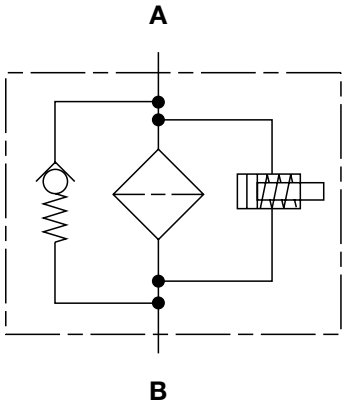
All Element K Factors in psi / gpm.

DFP Series

Manifold Mount Filters

4568 psi • up to 125 gpm

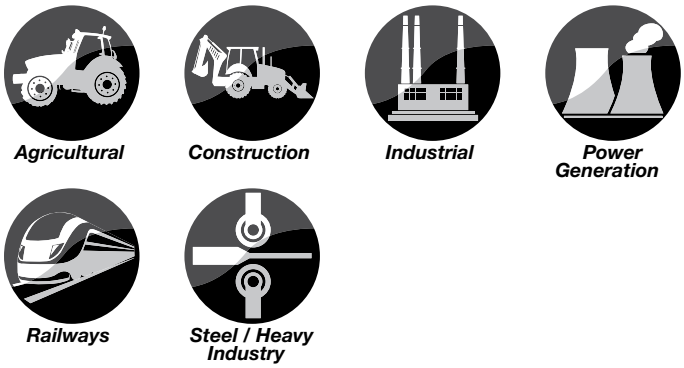
Hydraulic Symbol



Features

- The filter housings are designed to withstand pressure surges as well as high static pressure loads.
- The screw-in bowl or lid/cap allows the filter element to be easily removed for replacement or cleaning.
- A visual (pop-up), electrical, electrical/visual (lamp), or electronic differential type clogging indicator can be installed.
- DFP filters are available with or without a bypass valve (located in filter head) so either high or low collapse pressure elements may be used.
- Multiple indicator port locations (DFP330/660/1320 only) also allow two different types of indicators to be installed into the filter. Indicators of the same type, but with different trip pressures can also be installed. (both ports machined and plugged)
- Fatigue pressure rating equals maximum allowable working pressure rating.

Applications



Technical Specifications

Mounting Method	*(manifold mount)*	
60 - 280	4 mounting holes	
330 - 1320	6 mounting holes	
Port Connection	Diameter	
60/110	0.689” (17.5mm)	
160/240/280	0.843” (21.4mm)	
330/660/1320	1.181” (30mm)	
Flow Direction	Inlet: Top	Outlet: Top
Construction Materials		
Head	Ductile iron	
Bowl	Steel	
Housing (660-1320)	Steel	
Cap/Lid (660-1320)	Low Carbon Steel	
Flow Capacity		
60	16 gpm (60 lpm)	
110	29 gpm (110 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
330	87 gpm (330 lpm)	
660	174 gpm (660 lpm)	
1320	180 gpm (680 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	4568 psi (315 bar)	
Fatigue Pressure	4568 psi (315 bar) @ 1 milllion cycles	
Burst Pressure	60/110	15,805 psi (1090 bar)
	160/240/280	>18,000 psi (1240 bar)
	330/660/1320	15,660 psi (1080 bar)
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
ON, W/HC	290 psid (17 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14ºF (-10ºC)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*)		
ΔP = 87 psid (6 bar) +10% *(standard)*		

PN#02081318 / 07.19 / FIL1907-2109

Model Code

DFP BH/HC 60 Q B 3 B 1 . X / V

Filter Type
DFP = Manifold mount filter

Element Media
ON = Optimicron® *(Low Collapse)*
W/HC = Wire Mesh
BH/HC = Betamicron® *(High Collapse)*
V = Metal Fiber

Size and Nominal Port Dimension
60 = 3/4”
110 = 3/4”
160 = 1”
240 = 1”
280 = 1”
330 = 1 1/4”
660 = 1 1/4”
1320 = 1 1/4”

Operating Pressure
Q = 4500 psi (315 bar)

Port Size
B = 0.69 *(sizes 60 - 110)*
C = 0.84 *(sizes 160 - 280)*
D = 1.18 *(sizes 330 - 1320)*

Filtration Rating *(microns)*
3, 5, 10, 20 = BH/HC
3, 5, 10, 20 = V
25, 50, 100, 200 = W/HC
1, 3, 5, 10, 15, 20 = ON

Type of ΔP Clogging Indicator
A, B, BM, C, D *(others available upon request, see Clogging Indicators section.)*

Type Number
1 = Single piece bowl *(sizes 60 - 660)*
2 = Two piece bowl *(size 330, 660 & 1320 only)*

Modification Number *(the latest version is always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Without Bypass *(BH4HC or V elements recommended)*
B3 = 43 psid Bypass *(optional)*
B6 = 87 psid Bypass *(standard)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SO184 = G-1/2 Drain in Bowl Option For Sizes 60 - 280 *(standard for sizes 330, 660, & 1320)*
W = “VD…” indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with underwriter’s recognition

Replacement Element Model Code

0060 D 003 BH4HC / V

Size
0060, 0110, 0160, 0240, 0280, 0330, 0660, 1320

Filtration Rating *(micron)*
3, 5, 10, 20 = BH4HC
3, 5, 10, 20 = V
25, 50, 100, 200 = W/HC
1, 3, 5, 10, 15, 20 = ON

Element Media
BH4HC, ON, V, W/HC

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 5 B . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
Optional 116 psid (8 bar) available upon request

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and LED light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only*
L24 = 24V
L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

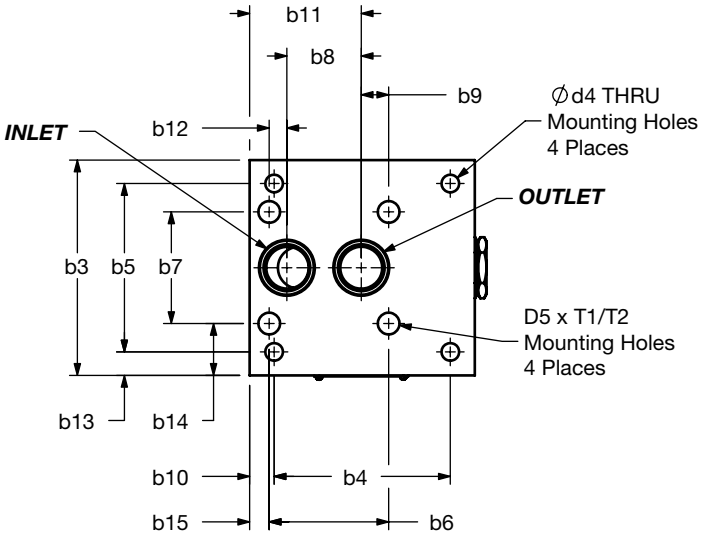
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter’s recognition

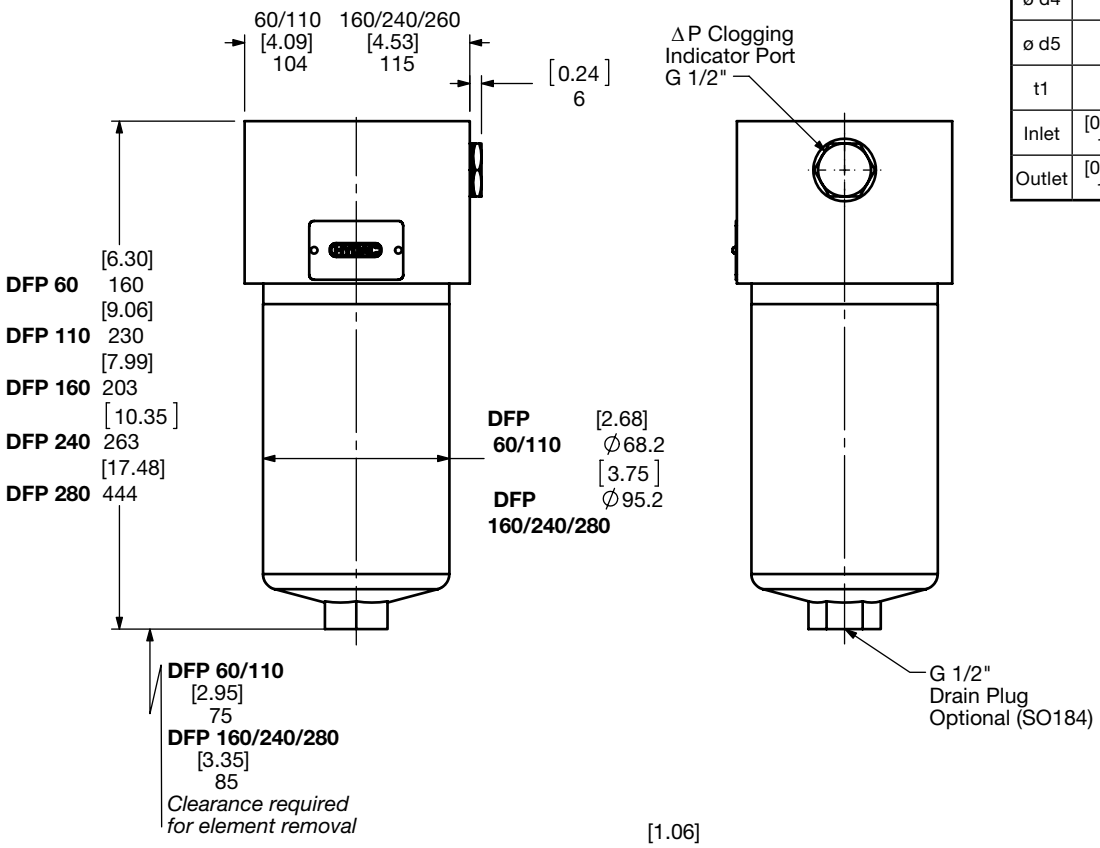
W = “VD…” indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

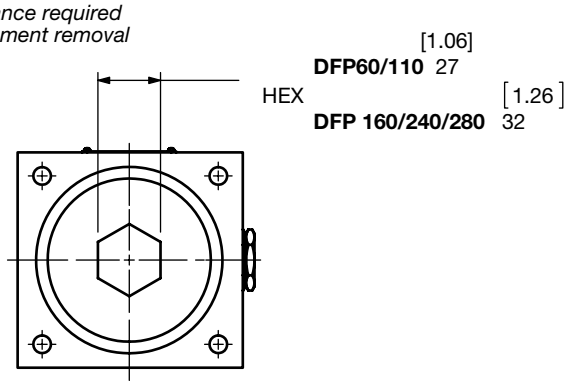
(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
DFP 60 – 280…1.X





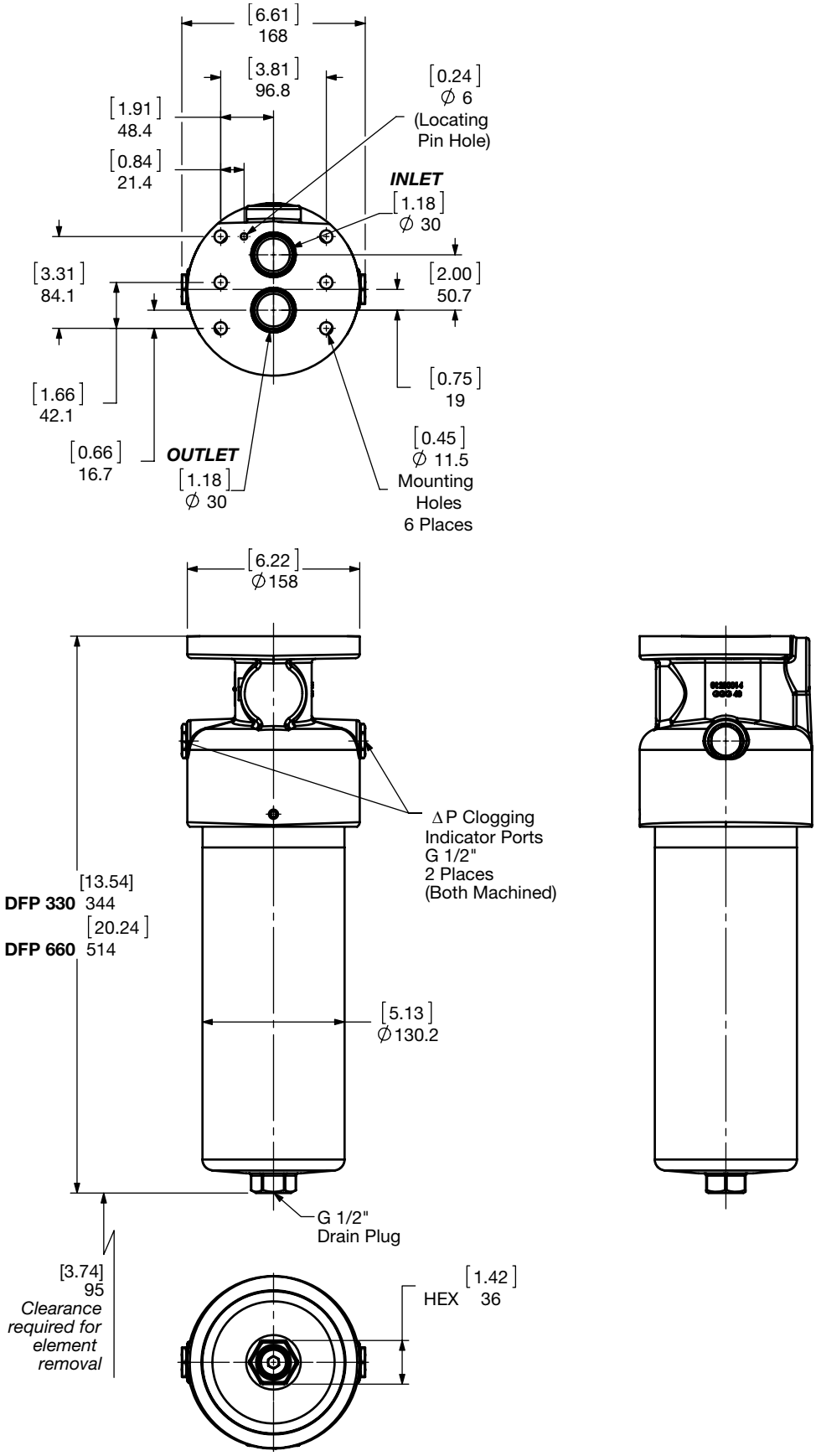


	60 / 110	160 / 240 / 280
B3	[3.15] 80	[4.33] 110
B4	[3.50] 89	[3.54] 90
B5	[1.25] 31.8	[3.39] 86
B6	–	[2.40] 61
B7	–	[2.24] 57
B8	[1.24] 31.6	[1.50] 38
B9	–	[0.55] 14
B10	[0.30] 7.5	[0.49] 12.5
B11	[2.20] 55.9	[2.26] 57.5
B12	–	[0.35] 9
B13	[0.95] 24.1	[0.47] 12
B14	–	[1.04] 26.5
B15	–	[0.41] 10.5
ø d4	[0.33] 8.5	[0.35] 9
ø d5	-	7/16-14UNC-2B
t1	-	[0.51] 13
Inlet	[0.639] 17.5	0.843" 21.4
Outlet	[0.689] 17.5	[0.843] 21.4

Size	60	110	160	240	280
Weight (lbs.)	11.3	13.3	20.1	23	32.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

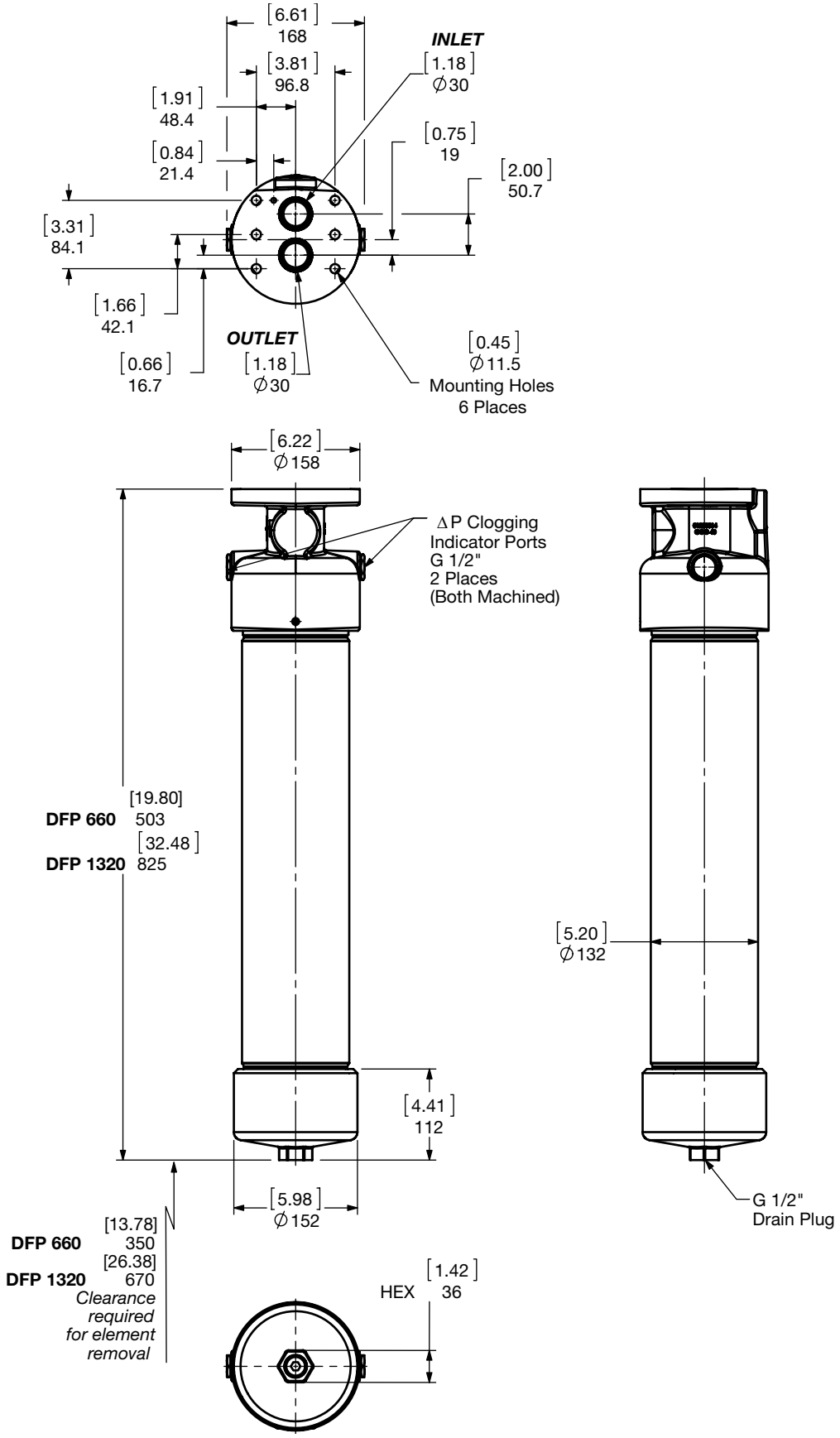
Dimensions
DFP 330/660…1.X



Size	330	660
Weight (lbs.)	46.3	64

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFP 660 & 1320…2.X



Size	660	1320
Weight (lbs.)	64	103.9

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

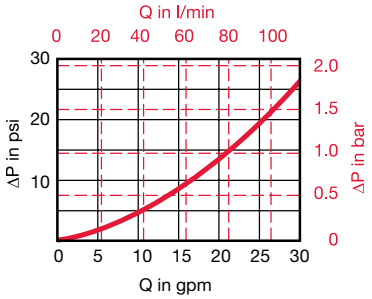
Housing Curve:

Pressure loss through housing is as follows:

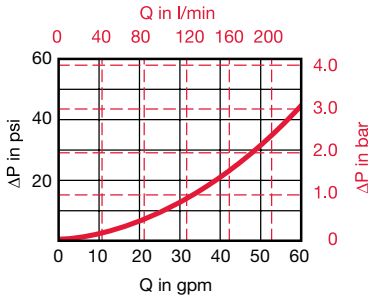
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

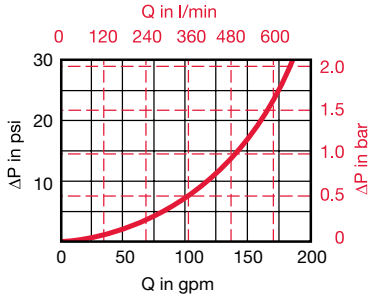
DFP 60/110 Housing



DFP 160/240/280 Housing



DFP 330/660/1320 Housing



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON Elements					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0060 D XXX ON	2.936	1.427	1.004	0.664	0.537	0.347
0110 D XXX ON	1.416	0.735	0.527	0.333	0.254	0.164
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031
1320 D XXX ON	0.102	0.053	0.042	0.025	0.019	0.015

Betamicron	...D...BH4HC Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049
1320 D XXX BH4HC	0.088	0.055	0.033	0.022

Wire Mesh	...D...W/HC Elements (Low Collapse)
Size	25, 50, 100, 200 µm
0060 D XXX W/HC	0.042
0110 D XXX W/HC	0.023
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004
1320 D XXX W/HC	0.002

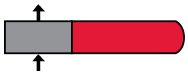
Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0060 D XXX V	0.877	0.511	0.296	0.183
0110 D XXX V	0.452	0.304	0.182	0.118
0160 D XXX V	0.251	0.177	0.123	0.079
0240 D XXX V	0.169	0.137	0.093	0.062
0280 D XXX V	0.126	0.093	0.064	0.041
0330 D XXX V	0.121	0.097	0.065	0.043
0660 D XXX V	0.063	0.050	0.034	0.021
1320 D XXX V	0.032	0.026	0.018	0.012

All Element K Factors in psi / gpm.

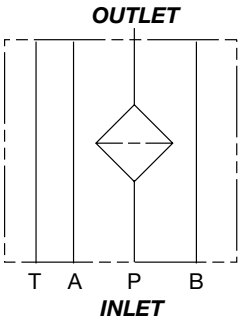
DFZ Series

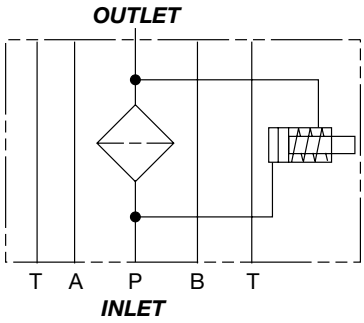
Modular Stacking Filters

4568 psi • up to 10 gpm



Hydraulic Symbol





Features

- A visual (pop-up), electrical, electrical/visual (lamp) differential type clogging indicator can be installed.
- The DFZ filter can be ordered with the bowl on the left or the right side for easy element changeout.
- The DFZ filter is available in two mounting patterns to fit different hydraulic manifolds:
  ANSI/B93.7M-D03 / Cetop R35
  (was B93.7-D01) DF 30 Z
  ANSI/B93.7M-D05 / Cetop R35
  (was V93.7-D02)* DF 60 Z or DF 110 Z
  **includes fifth port for optional tank connection*
- Filter does not contain a bypass valve. Only available with non bypass, high collapse elements required.

Applications


Agricultural


Automotive


Construction


Industrial


Power Generation


Railways


Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes *(manifold mount)*	
Port Connection		
30 ø.25”	ANSI DO3/A6 DIN 24340 / Cetop R35	
60/110 ø.44”	ANSI DO5/A10 DIN 24340 / Cetop R35	
Flow Direction	Inlet: Side	Outlet: Side
Construction Materials		
Head, Bowl	Steel	
Flow Capacity		
30	6 gpm (23 lpm)	
60/110	10 gpm (38 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	4568 psi (315 bar)	
Fatigue Pressure	30	4568 psi (315 bar) @ 250,000 cycles
	60/110	4568 psi (315 bar) @ 1 million cycles
Burst Pressure	> 18,270 psi (1260 bar)	
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C) Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 116 psid (8 bar) -10% (standard)		

PN#02081318 / 07.19 / FIL1907-2109

Model Code

DFZ BH/HC 60 Q C 10 B 1 . 0 / _ - 1 -

Filter Type
DFZ = Pressure Filter

Element Media
BH/HC = Betamicron® *(High Collapse)* V = Metal Fiber

Size & Connection
30 = D03 manifold pattern
60 = D05 manifold pattern
110 = D05 manifold pattern

Operating Pressure
Q = 4500 psi (315 bar) *(all sizes)*

Type / Port Size
B = 4 ports / A 6 DIN 24340/Cetop R 35 H *(DFZ 30 only)* .25" dia.
C = 5 ports / A 10 DIN 24340/Cetop R 35 H *(DFZ 60 & 110 only)* .44" dia.

Filtration Rating *(micron)*
3, 5, 10, 20 = BH/HC 3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
A, B, BM, C, D *(For additional details and options, see Clogging Indicators section.)*

Type Number
1

Modification Number *(latest version is always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM) EPR = Ethylene propylene rubber (EPR)

Bowl Location
(omit) = Right Side *(standard)*
1 = Left Side

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
SFREE = Element specially designed to minimize electrostatic charge generation
cRUus = Electrical Indicator with Underwriter's Recognition

Replacement Element Model Code

0060 D 010 BH4HC / _

Size
0030, 0060, 0110

Filtration Rating *(micron)*
3, 5, 10, 20 = BH4HC
3, 5, 10, 20 = V

Element Media
BH4HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*

Clogging Indicator Model Code

VD 8 B . X / _ _ _ _

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
8 = 116 psid (8 bar)

Type of Indicator
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and led light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L48 = 48V L110 = 110V L220 = 220V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with Underwriter's Recognition

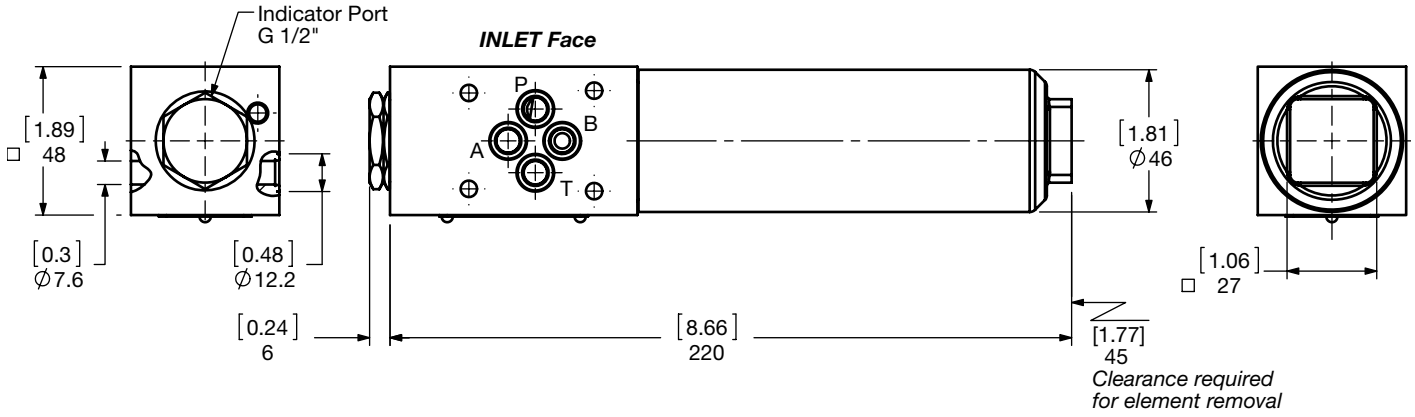
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

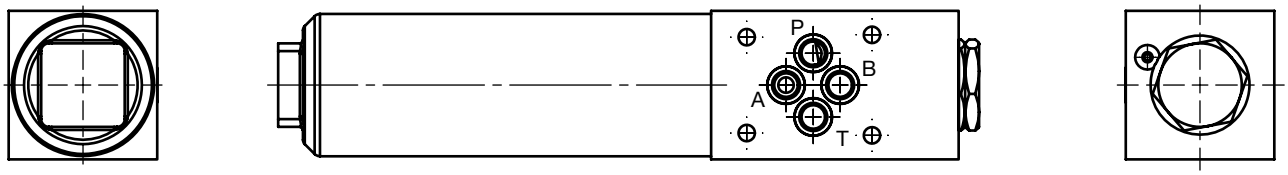
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
DF 30 Z

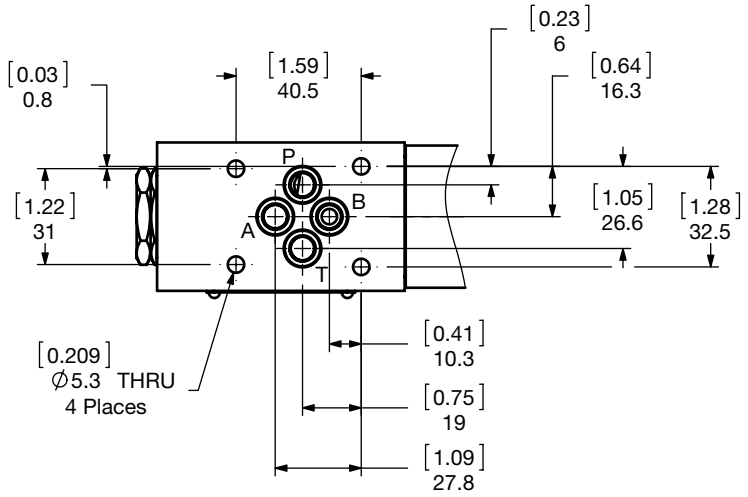
(Right Hand Version) - *(optional)*



(Left Hand Version) - *(optional)*



D03 Pattern

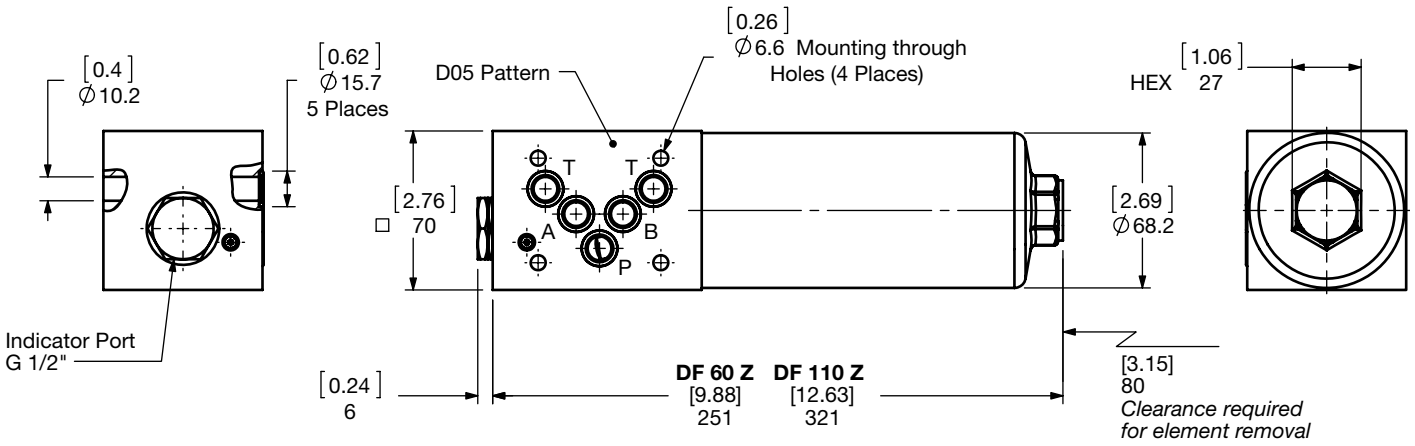


Size	30
Weight (lbs.)	5.3

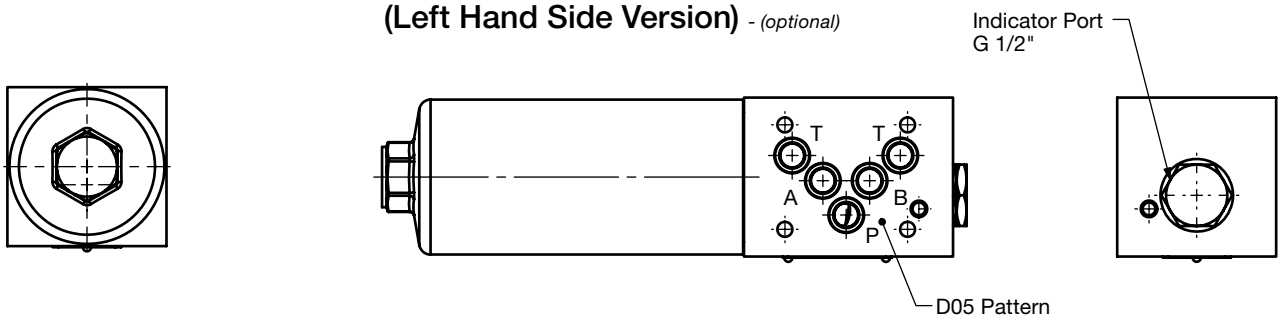
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DF 60 / 110 Z

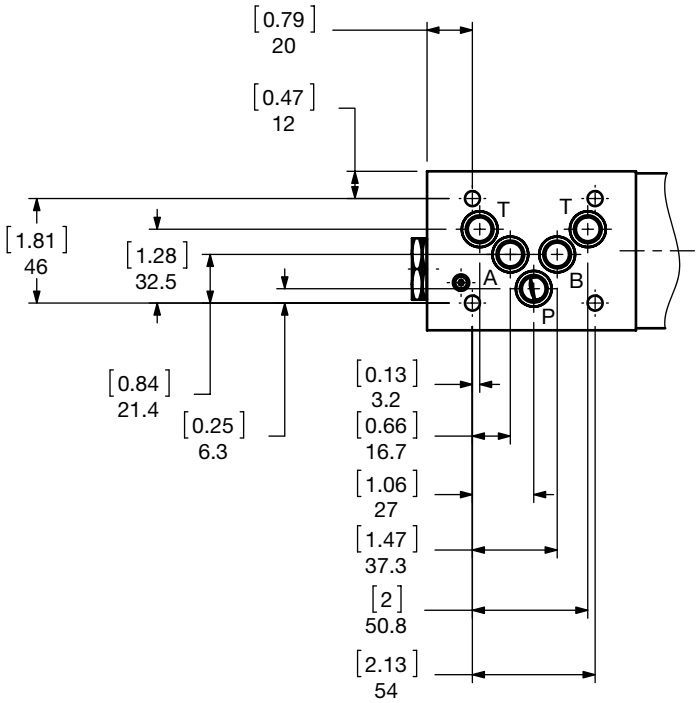
(Right Hand Side Version) - *(standard)*



(Left Hand Side Version) - *(optional)*



D05 Pattern



Size	60	110
Weight (lbs.)	13.1	15

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

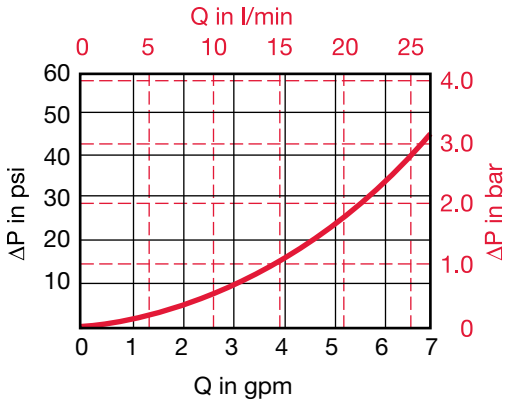
Housing Curve:

Pressure loss through housing is as follows:

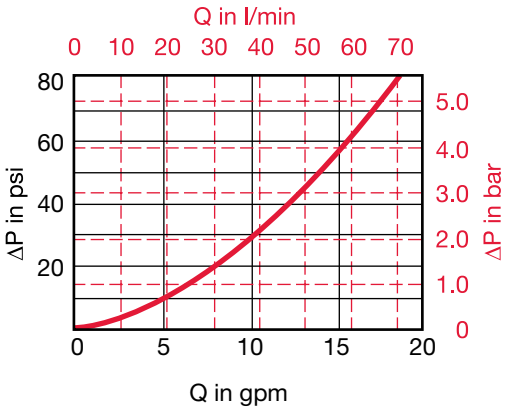
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

DFZ 30 Housing



DFZ 60 / 110 Housing



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron	**...D...BH4HC Elements** (High Collapse)			
Size	**3 µm**	**5 µm**	**10 µm**	**20 µm**
0030 D XXX BH4HC	5.005	2.782	1.992	1.043
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307

Metal Fiber	**...D...V Elements** (High Collapse)			
Size	**3 µm**	**5 µm**	**10 µm**	**20 µm**
0030 D XXX V	1.011	0.740	0.411	0.200
0060 D XXX V	0.877	0.511	0.296	0.183
0110 D XXX V	0.452	0.304	0.182	0.118

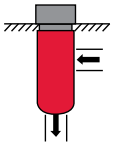
All Element K Factors in psi / gpm.

Notes

CF Series

Manifold Cartridge Filters

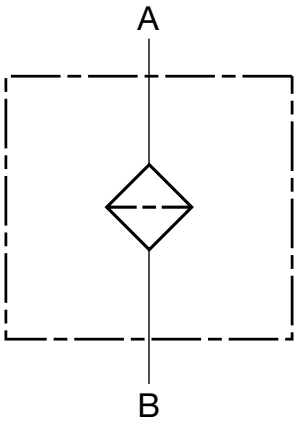
3000 psi • up to 25 gpm



CFxx20

CFxx45

Hydraulic Symbol



Features

- Made of aluminum for light weight and low cost.
- Made to dispose of when fully clogged.
- Low price - market competitive.

Technical Specifications

Port Connections	CF20 CF45	SAE-16 Modified Cavity SAE-20 Cavity (VC20-S3)
Direction of Flow		Outside to Inside flow
Materials of Construction		Aluminum
Flow Capacity		
CF20		5 GPM (15 micron - fiberglass media) 2.5 GPM recommended design flow max. - for high efficiency media
CF45		12 GPM (25, 149 micron - wire screen media) 12 GPM (15 micron - fiberglass media) 6 GPM recommended design flow max. - for high efficiency media 25 GPM (25, 149 micron - wire screen media)
Housing Pressure Rating		
Max. Allowable Working Pressure:		3000 psi (207 bar)
Proof Pressure:		4500 psi (310 bar)
Element Performance Rating		
MM, W		290 psid (20 bar)
Fluid Temperature Range		-22°F to 250°F (-30°C to 121°C) Consult HYDAC for applications operating below -22°F (-30°C)
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		

Applications

Agricultural

Construction

Industrial

Commercial Municipal

Railways

Model Code

CF W 20 G 25 W 1 . 0 / 12

Filter Type
CF = Manifold Cartridge Filter

Element Media
MM = Mobilemicron® W = Wire Mesh

Size
20, 45

Type of Connection
G = Threaded

Filtration Rating *(micron)*
25, 149 = W 15 = MM

Type of Indicator
W = No Indicator Available

Type Number
1 = Standard Configuration

Modification Number *(latest version always supplied)*

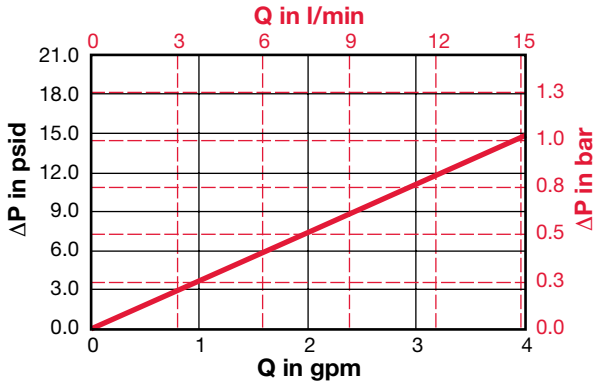
Port Configuration
12 = SAE-16 Modified Cavity *(CF 20)*
12 = SAE-20 Cavity (VC20-S3) *(CF 45)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

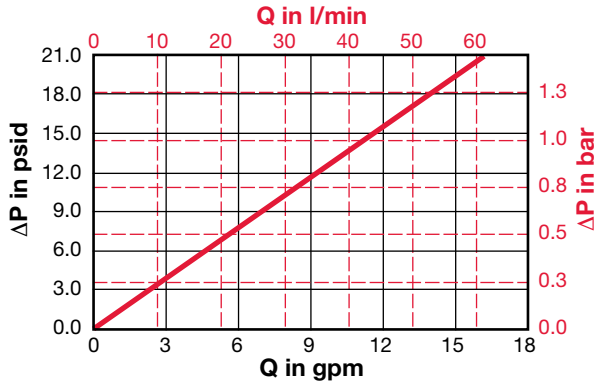
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Pressure Drop Curves

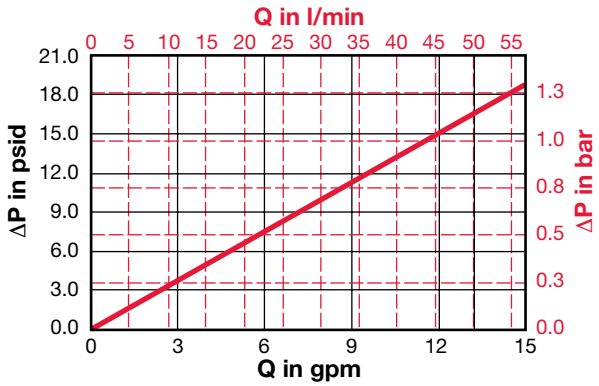
CFMM20G15W1.0/12



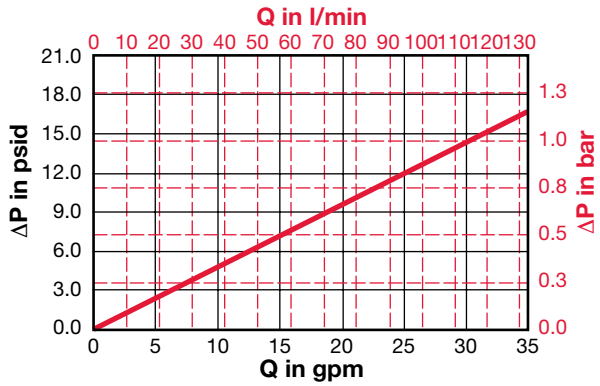
CFW20G25/149W1.0/12



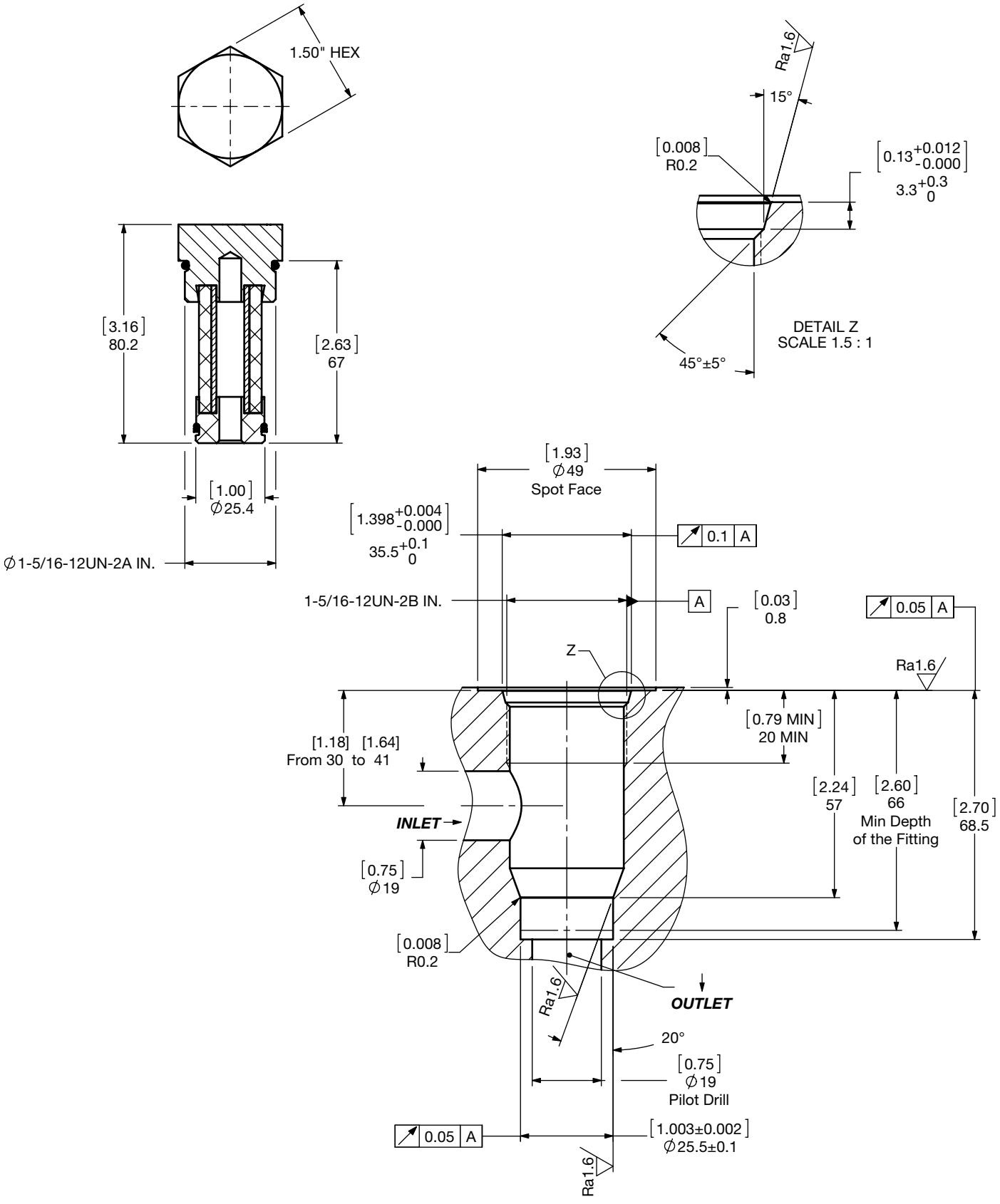
CFMM45G15W1.0/12



CFW45G25/149W1.0/12



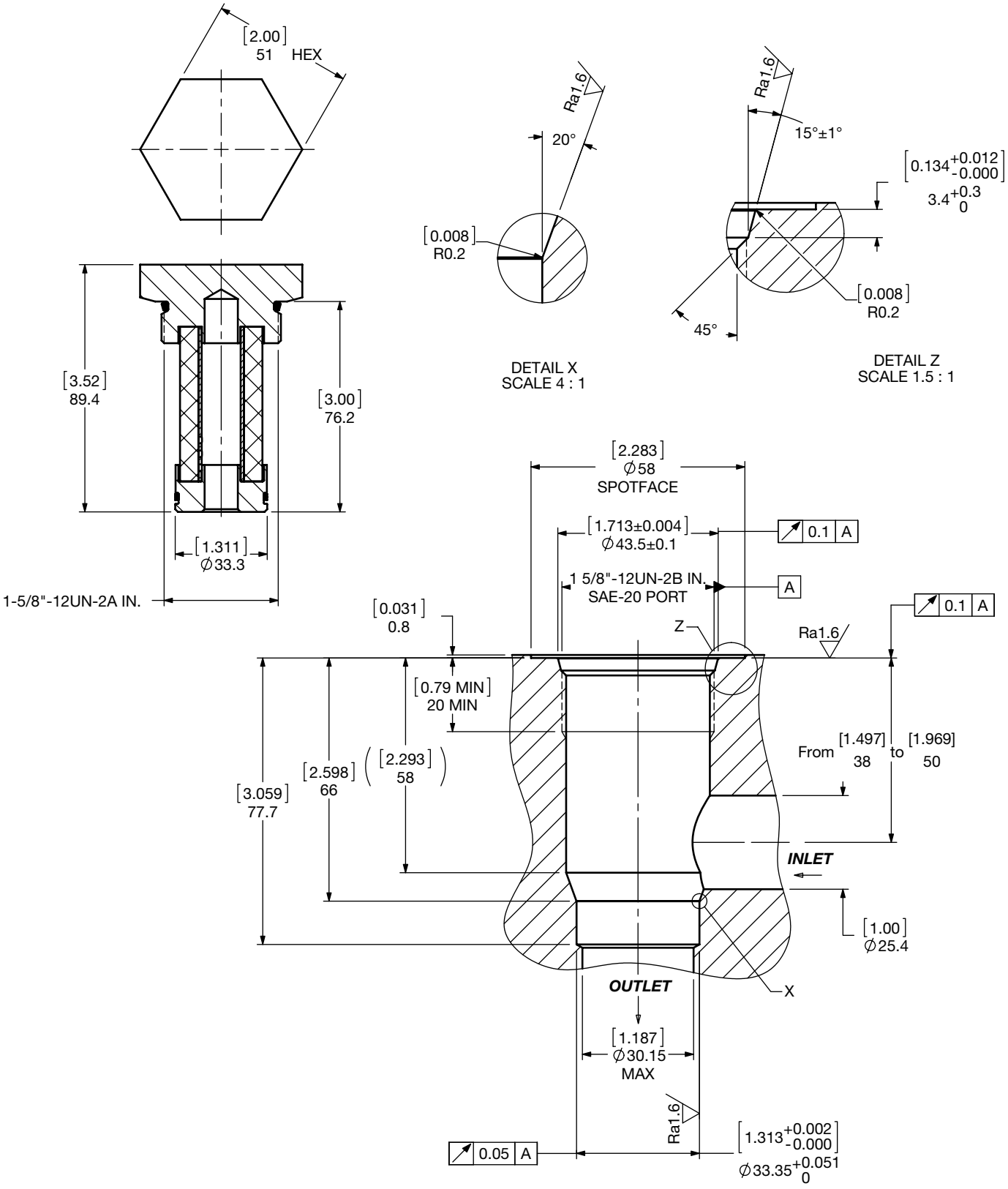
Dimensions
CFxx20



Size	20
Weight (lbs.)	0.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
CFxx45



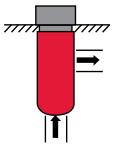
Size	45
Weight (lbs.)	0.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

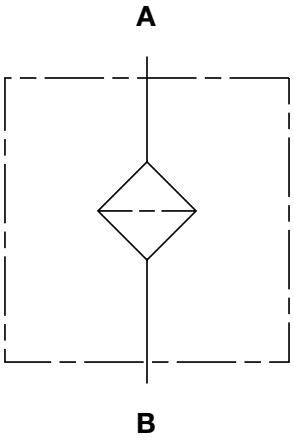
CP-C16 Series

Circuit Protector Manifold Cartridge Filters

3000 psi • up to 12 gpm



Hydraulic Symbol



Features

- Simple cost effective method of component protection with minimal space requirements, eliminating design restraints.
- Fits into a standard manifold Cavity No. C16-2 Port.
- CP Circuit Protector Filters provide backup protection when upstream pressure filters go into bypass or if element damage occurs.
- Two (2) different element options: 10 micron, and 141 micron allow filter to be tailored to individual application needs.
- Suitable for petroleum based fluids.
- Flow Path - inside to outside.

Technical Specifications

Mounting Method	C16-2 Cavity (SAE-16 Threaded Port)	
Flow Direction	Inlet: Bottom	Outlet: Side
Construction Materials	Steel	
Flow Capacity	12 gpm (45 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	3000 psi (210 bar)	
Fatigue Pressure	Contact HYDAC Office	
Burst Pressure	Contact HYDAC Office	
Element Collapse Pressure Rating		
W/HC	250 psid (17 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C) Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility		
Compatible with all petroleum oils rated for use with Nitrile rubber (NBR) seals.		

Applications

Agricultural

Automotive

Construction

Model Code

CP-C16 W 40 G 10 W 1 . 0 / 12

Filter Type
CP-C16 = Circuit Protector
(Common Cavity No. C16-2)

Element Media
W = Wire Mesh

Size
40

Inline Port
G = 1” Male Thread 1 5/16-12UN-2A (SAE-16)

Filtration Rating *(micron)*
10 = 10 micron
141 = 141 micron

Bypass Indicator
W = No indicator Port

Type Number
1 = Standard Configuration

Modification Number

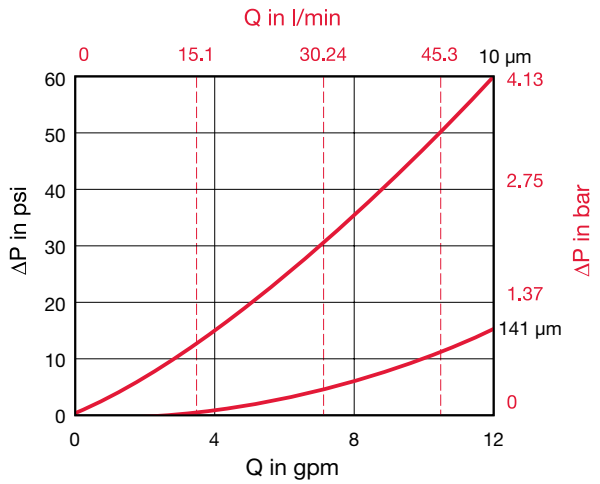
Port Configuration
12

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

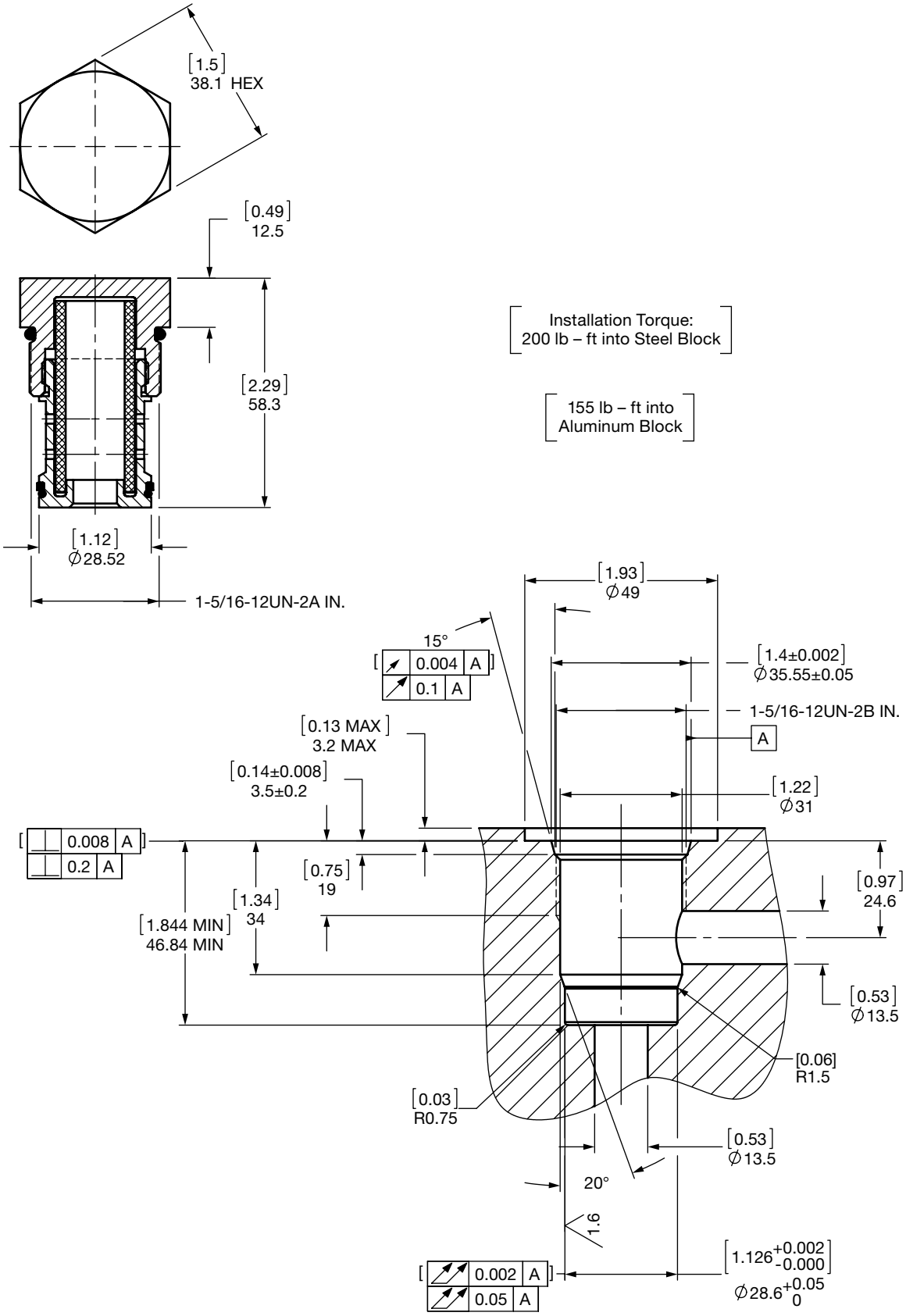
Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Pressure Drop Curves

Based on testing conducted with 150 SUS fluid at 105˚F.



Dimensions
CP-C16



Size	40
Weight (lbs.)	0.75

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

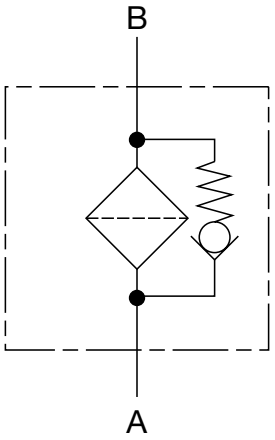
Notes

CP-SAE Series

Circuit Protector Manifold Cartridge Filters

6090 psi • up to 30 gpm

Hydraulic Symbol



Features

- Simple cost effective way to provide component protection with minimal space required eliminating design restraints.
- Fits into a standard manifold SAE O-ring Port.
- CP Circuit Protector Filters provide backup protection when upstream pressure filters go into bypass or if element damage occurs.
- CP-SAE provides operations protection through supply of a bypass to assure flow to critical components if filter becomes clogged.
- Increased range of product use through three (3) different sizes available, 15 at 4 gpm, 40 at 12 gpm, and size 120 at 30 gpm.
- Suitable for petroleum based fluids.
- Flow Path - inside to outside.

Applications

Agricultural *Automotive* *Construction*

Technical Specifications

Mounting Method		
CP-SAE-15	SAE-10 Port (5/8”)	
CP-SAE-40	SAE-16 Port (1”)	
CP-SAE-120	SAE-24 Port (1 1/2”)	
Flow Direction	Inlet: Bottom	Outlet: Side
Construction Materials		
CP-SAE-15	Carbon steel	
CP-SAE-40	Carbon steel	
CP-SAE-120	Carbon steel	
Flow Capacity		
CP-SAE-15	4 gpm (15 lpm)	
CP-SAE-40	12 gpm (45 lpm)	
CP-SAE-120	30 gpm (113 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	6090 psi (420 bar)	
Fatigue Pressure	Contact HYDAC Office	
Burst Pressure	Contact HYDAC Office	
Element Collapse Pressure Rating		
W	100 psid (6.9 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all petroleum oils rated for use with Nitrile rubber (NBR) seals.		
Bypass Valve Cracking Pressure		
ΔP = 50 psid (3.4 bar) +10% (standard)		

Replacement Elements

Part Number	Description	Flow Rate
02069397	0015 D 010 W	0015 - 4 gpm
02069398	0040 D 010 W	0040 - 12 gpm
02069399	0120 D 010 W	0120 - 30 gpm

Model Code

CP-SAE W 15 G 10 W 1 . 0 / 12 B3.5

Filter Type
CP-SAE = Circuit Protector
(SAE O-ring Port)

Element Media
W = Wire Mesh

Size
15 = 4 gpm 40 = 12 gpm 120 = 30 gpm

Inline Port
G = Male Threaded
15 = 5/8" SAE 10 Port-Threaded
40 = 1" SAE 16 Port-Threaded
120 = 1 1/2" SAE 24 Port-Threaded

Filtration Rating *(micron)*
10 = 10 micron 75 = 75 micron 149 = 149 micron

Bypass Indicator
W = No indicator Port

Type Number
1 = Standard Configuration

Modification Number

Port Configuration
12

Bypass Valve
B3.5 = 50 psi

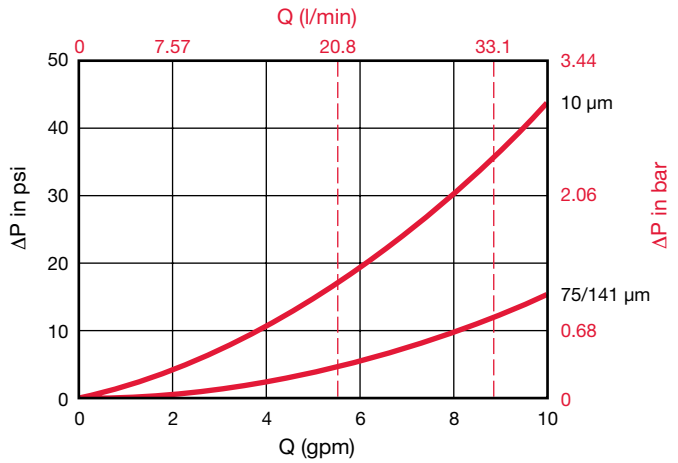
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

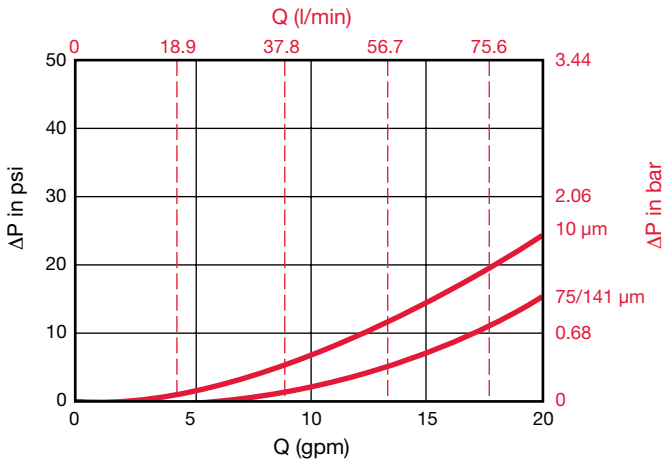
Pressure Drop Curves

Based on testing conducted with 150 SUS fluid at 105°F.

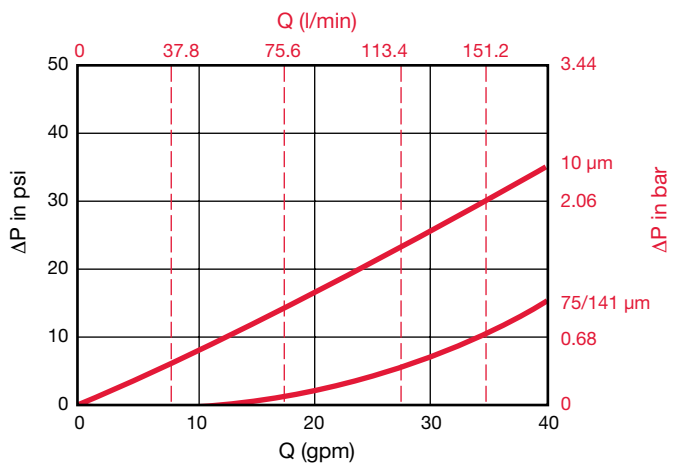
CP-SAE 15



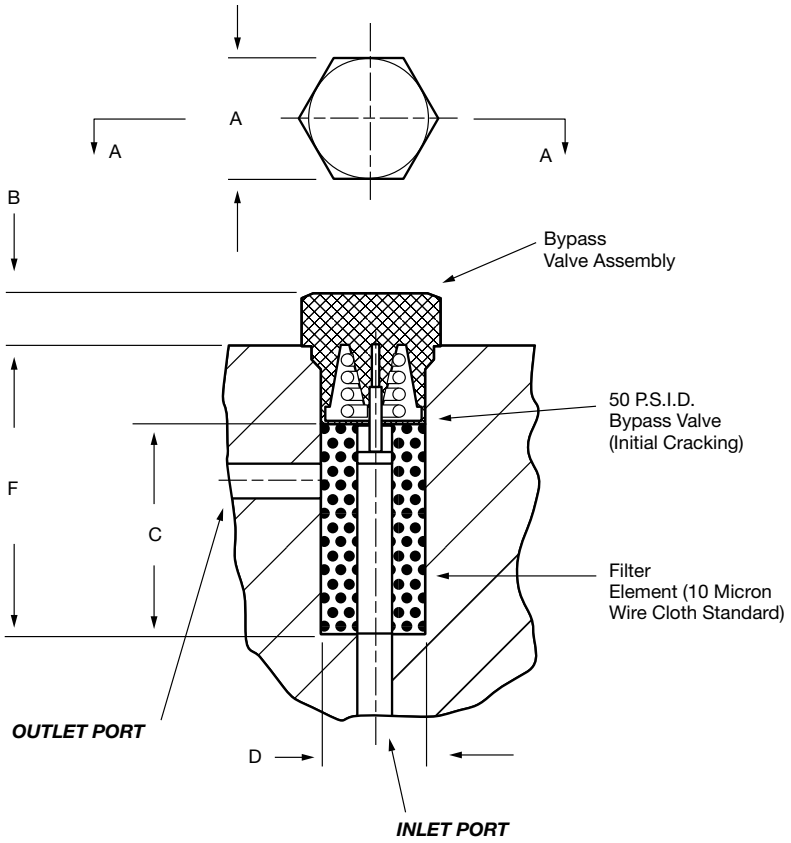
CP-SAE 40

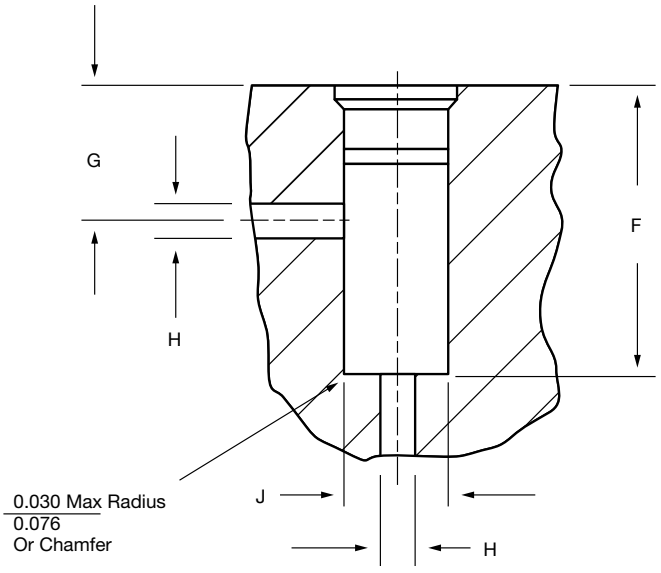


CP-SAE 120



Dimensions
CP-SAE





Manifold Filter

Model	A	B	C	D	E SAE O-Ring Port	F	G	H	J	Torque Alu.	Torque Steel
CP-SAE 15	1.00/25.4	0.41/10.4	1.75/44.5	0.74/18.8	-10 (7/8-14)	2.41/61.2	1.12/28.4 min 1.87/47.5 max	0.266/6.8	0.781/19.8 min 0.814/20.7 max	65 ft-lb	85 ft-lb
CP-SAE 40	1.5/38.1	0.5/12.7	2.50/63.5	1.00/25.4	-16 (1 5/16-12)	3.34/84.8	1.49/37.8 min 2.53/64.3 max	0.531/13.5	1.140/29.0 min 1.1875/30.1 max	150 ft-lb	200 ft-lb
CP-SAE 120	2.13/54.1	0.65/16.5	4.00/101.6	1.50/38.1	-24 (1 7/8-12)	5.01/127.3	1.92/48.8 min 3.81/96.8 max	0.875/22.2	1.750/44.5 min 1.803/45.8 max	230 ft-lb	305 ft-lb

Size	15, 40, 120
Weight (lbs.)	1.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

G

SET Series – Manifold Cartridge Filters

Manifold cartridge filters are installed into a threaded cavity that is machined in the customer's manifold. More than one SET may be installed in the manifold, if required for capacity. Cavity drawings are provided for easy implementation and installation. A SET filter can be provided with an element or without an element *(existing installations)*. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(indicator cavity drawings available upon request)*.

NF Set Series

Manifold Cartridge Filters

360 psi • up to 450 gpm

Manifold cavity is only for representation and not HYDAC's scope of supply

Features

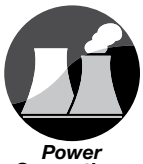
- Non-welded housing design reduces stress concentrations and
- prevents fatigue failure.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials *(nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber)* provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in lid requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators *(optional)* have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications

Agricultural

Gearboxes

Industrial



Power Generation

Pulp & Paper

Shipbuilding

Steel / Heavy Industry

Installation

The NF Set Manifold Cartridge Filter is installed into a threaded cavity that is machined in the manifold *(manifold not included - see cavity drawing)*. A bushing is provided for proper element installation, as well as a bowl with o-ring seal and back-up ring. An element can be provided as a option. The bushing holds the element in place during filtration operation, and facilitates easy removal for element change out.

More than one SET may be installed in the manifold if required for capacity. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(cavity drawings for that upon request)*. For additional information, contact HYDAC.

Technical Specifications

Mounting Method	See drawings
Flow Direction	
Element	Out-to-in
Construction Materials	
Housing, Lid	Aluminum
Flow Capacity	
1350	343 gpm (1300 lpm)
2250	396 gpm (1500 lpm)
2650	450 gpm (1700 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure*	360 psi (25 bar)
Fatigue Pressure	360 psi (25 bar)
Burst Pressure	1754 psi (121 bar)
Element Collapse Pressure Rating *(optional)*	
ON, W/HC	290 psid (20 bar)
ECON2, BN4AM, P/HC, AM	145 psid (10 bar)
V	435 psid (30 bar)
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)
Consult HYDAC for applications below -22˚F (-30˚C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure *(optional)*	
ΔP = 29 psid (2 bar) -10%	1.0 - Static
ΔP = 72 psid (5 bar) -10%	2.0 - Differential
Bypass Valve Cracking Pressure *(included when element present)*	
ΔP = 14.5 psid (1 bar) +10%	
ΔP = 43 psid (3 bar) +10% *(standard)*	
ΔP = 87 psid (6 bar) +10%	

*Note: All NF...1.0 Filters MAWP reduce to 7 bar (101.5 psi) when using the following "VMF" and "VR" indicators: B, BM, E, ES, GC, LE, LZ.

Model Code

NF ON 1350 SET 3 W 1 . 0 / ___ ___ ___

Filter Type
NF = Manifold cartridge filter

Element Media

(omit)	=	Without element	ON	=	Optimicron®
BN/AM	=	Betamicron®/Aquamicron®	ECON2	=	ECOmicron®
AM	=	Aquamicron®	W/HC	=	Wire Mesh
P/HC	=	Polyester	V	=	Metal Fiber

Size
1350, 2250, 2650

Type of Mounting
SET = Manifold cartridge

Filtration Rating *(micron)*
XX = Without element
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
3, 10 = BN4AM
40 = AM
10, 20 = P/HC
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
W = Without indicator *(Indicators can be installed in manifold, cavity drawing upon request).*
(For additional details and options, see Clogging Indicators section.)

Type Number
1 = Sizes 1350, 2250, 2650

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve *(included when element present)*
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = no bypass *(flushing system)*
not available with ECON2

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
W = Modification of “V” elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation
QPG5 = Quality protected

Replacement Element Model Code

1300 R 003 ON / V ___ ___

Size
1300 - for housings: 1350
2200 - for housings: 2250
2600 - for housings: 2650

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
3, 10 = BN4AM
40 = AM
10, 20 = P/HC
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

Element Media
ON, ECON2, BN4AM, AM, P/HC, W/HC, V

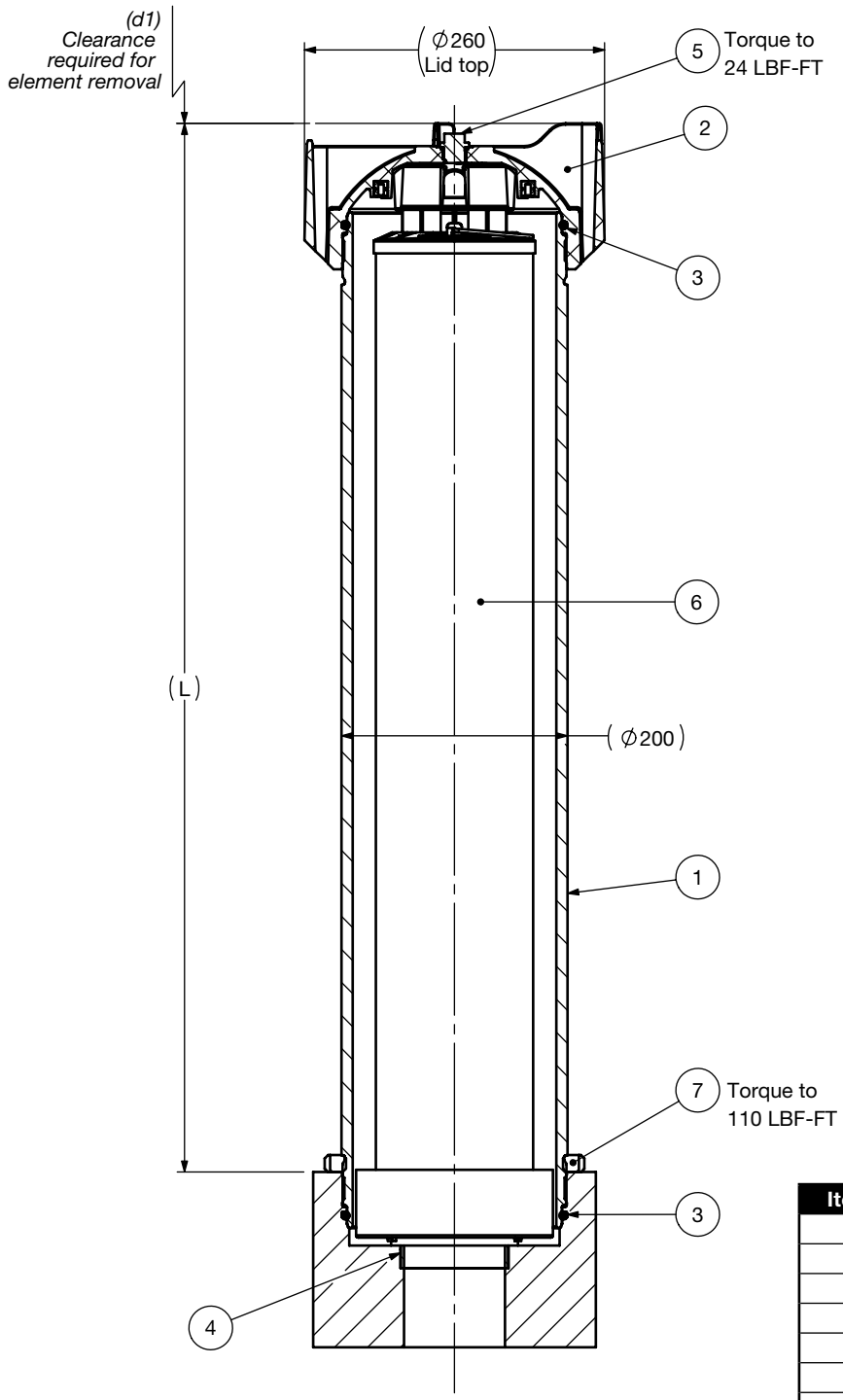
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

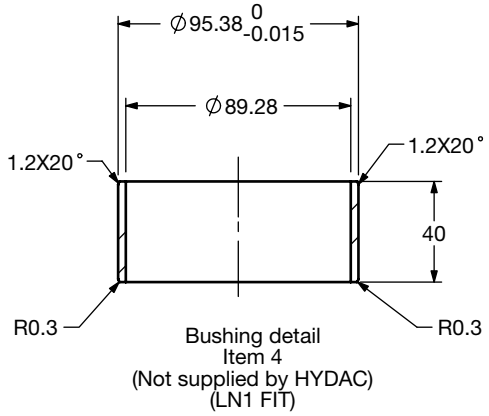
Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)
KB = no bypass

Supplementary Details
SO263 = *(same as above)*
W = *(same as above)*
SFREE = *(same as above)*
QPG5 = Quality protected

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
NF Set 1350 / 2250 / 2650





Size	L	D1
NF 1350 SET	490	470
NF 2250 SET	587	571
NF 2650 SET	931	915

Item No	SET Components
1	Housing tube
2	Lid
3	O-ring seal
4	Bushing
5	Vent/drain plug
6	Element *(optional)*
7	Lock nut

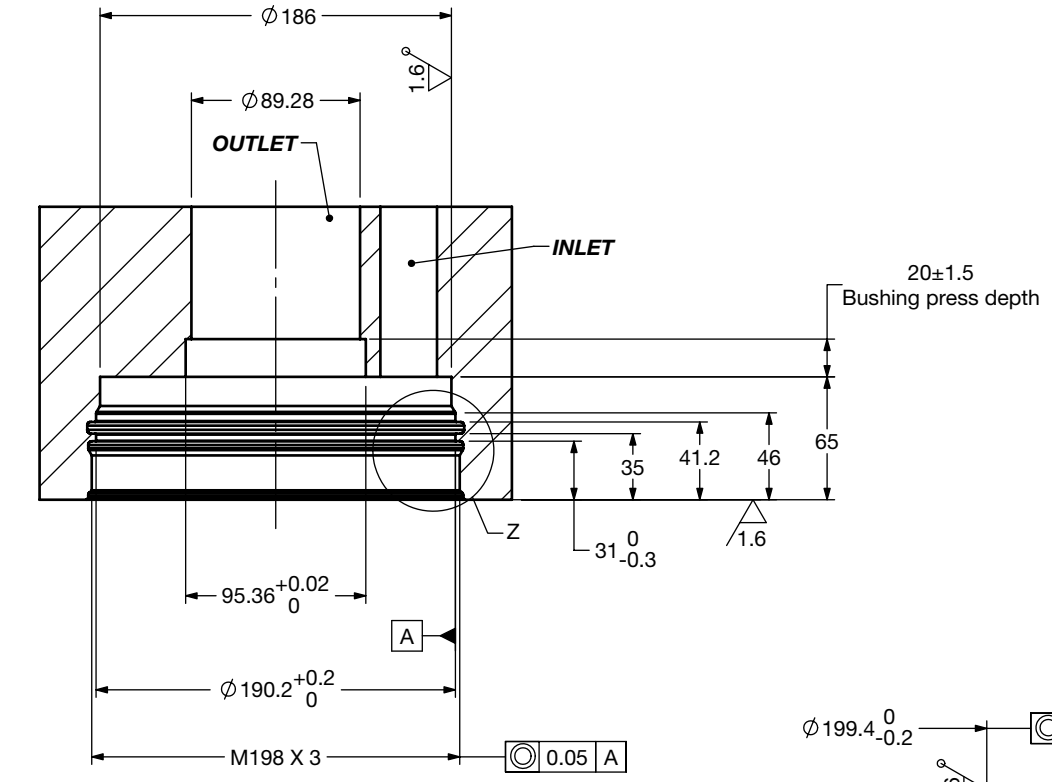
Unspecified Tolerances

From	0.5	6	30	120	400
To	6	30	120	400	1000
	±0.1	±0.2	±0.3	±0.5	±0.8

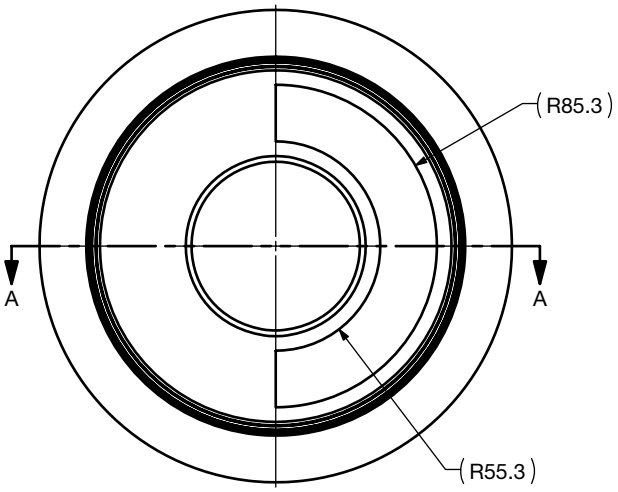
Size	1350	2250	2650
Weight (lbs.)	33.1	47	51.4

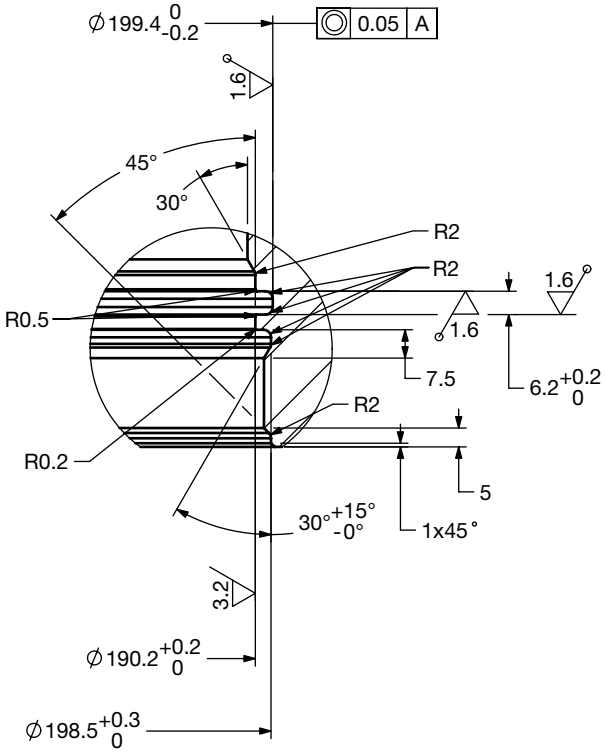
Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
NF Set 1350 / 2250 / 2650



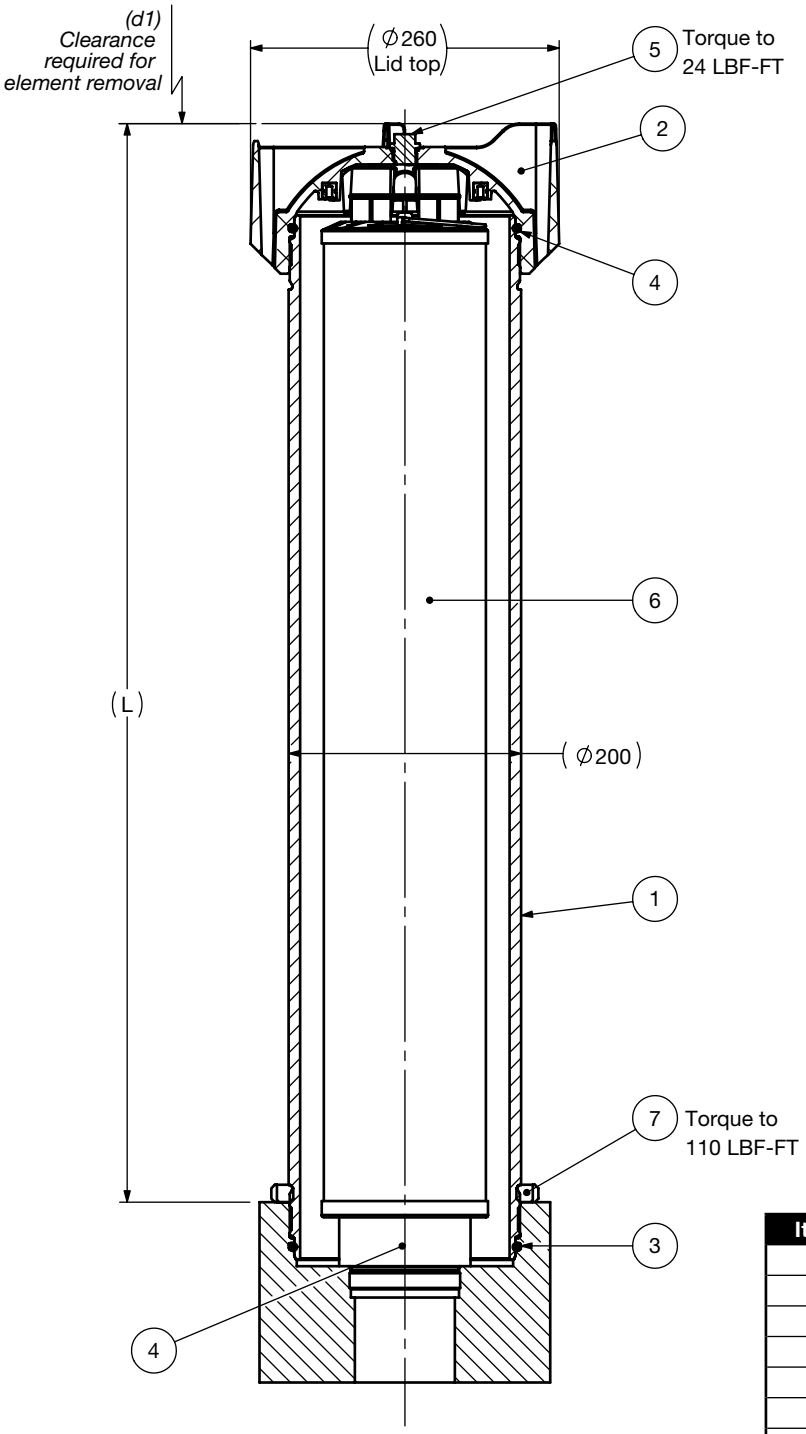
Section A-A

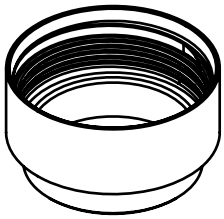




Detail Z

Dimensions
NF Set QPG5 1350 / 2250 / 2650





Bushing detail
Item 4
(Supplied by HYDAC)

Item No	SET Components
1	Housing tube
2	Lid
3	O-ring seal
4	Bushing
5	Vent/drain plug
6	Element *(optional)*
7	Lock nut

Size	L	D1
NF 1350 SET	490	470
NF 2250 SET	587	571
NF 2650 SET	931	915

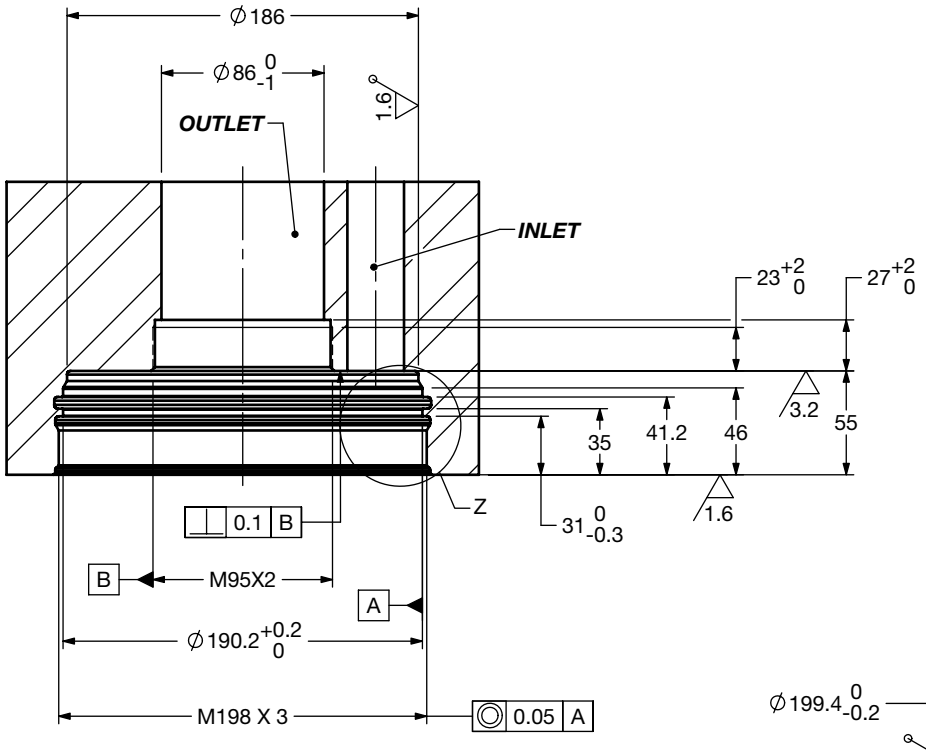
Unspecified Tolerances

From	0.5	6	30	120	400
To	6	30	120	400	1000
	±0.1	±0.2	±0.3	±0.5	±0.8

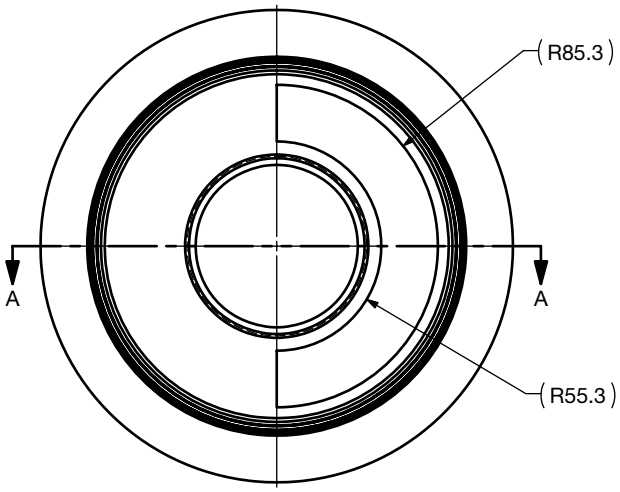
Size	1350	2250	2650
Weight (lbs.)	33.7	47.6	52

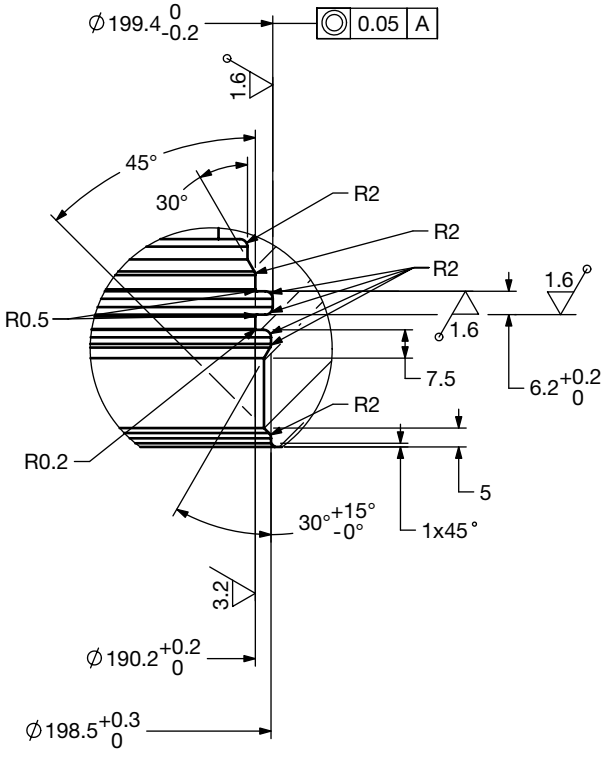
Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
NF Set QPG5 1350 / 2250 / 2650



Section A-A





Detail Z

SET SERIES FILTERS – LOW PRESSURE

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
2200 R XXX ON	0.058	0.027	0.022	0.012	0.011	0.008
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
1300 R XXX ECON2	0.044	0.033	0.022	0.016
2200 R XXX ECON2	0.029	0.021	0.013	0.008
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
1300 R XXX BN4AM	0.088	0.033
2200 R XXX BN4AM	0.062	0.021
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
1300 R 040 AM	0.026
2200 R 040 AM	0.016
2600 R 040 AM	0.013

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
1300 R XXX W/HC	0.002
2200 R XXX W/HC	0.001
2600 R XXX W/HC	0.001

Polyester	...R...P/HC	
Size	10 µm	20 µm
1300 R XXX P/HC	0.004	0.002
2200 R XXX P/HC	0.004	0.004
2600 R XXX P/HC	0.002	0.001

All Element K Factors in psi / gpm.

Notes

LPF Set Series

Manifold Cartridge Filters

725 psi • up to 74 gpm

Manifold cavity is only for representation and not HYDAC's scope of supply

Features

- Non-welded housing design reduces stress concentrations and
- prevents fatigue failure.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials *(nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber)* provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators *(optional)* have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications

Agricultural

Automotive

Construction

Industrial

Steel / Heavy Industry

Installation

The LPF Set Manifold Cartridge Filter is installed into a threaded cavity that is machined in the manifold *(manifold not included - see cavity drawing)*. A bushing is provided for proper element installation, as well as a bowl with o-ring seal and back-up ring. An element can be provided as a option. The bushing holds the element in place during filtration operation, and facilitates easy removal for element change out.

More than one SET may be installed in the manifold if required for capacity. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(cavity drawings for that upon request)*. For additional information, contact HYDAC.

Technical Specifications

Mounting Method	Threaded bowl	
Flow Direction		
Element	Out-to-in	
Construction Materials		
Bowl	Aluminum Extrusion	
Flow Capacity		
35	9 gpm (35 lpm)	
55	15 gpm (55 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	35 - 55	580 psi (40 bar)
	160 - 280	725 psi (50 bar)*
	*Note: 580 psi (40 bar) when using BF indicator	
Fatigue Pressure	35 - 55	580 psi (40 bar) (10^7 cycles)
	160 - 280	725 psi (50 bar) (10^6 cycles)
	35 - 55	Contact HYDAC
Burst Pressure	160 - 280	> 3625 psi (200 bar)
Element Collapse Pressure Rating *(optional)*		
BH4HC, V		3045 psid (210 bar)
ON, W/HC		290 psid (20 bar)
Fluid Temp. Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications operating below -22°F (-30°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected		
ΔP Indicator Trip Pressure *(optional)*		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 36.25 psid (2.5 bar) *(BF indicator)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		

Model Code

LPF ON 280 SET 3 W 1 . 0 / _ _

Filter Type
LPF = Manifold cartridge filter

Element Media
(omit) = Without element
ON = Optimicron® *(low collapse)*
BH/HC = Betamicron® *(High Collapse)*
W/HC = Wire Mesh

Size
35, 55, 160, 240, 280

Type of Mounting
SET = Manifold cartridge

Filtration Rating *(microns)*
XX = Without element
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BH/HC
25, 50, 100, 200 = W/HC

Type of ΔP Clogging Indicator
W = Without indicator *(Indicators can be installed in manifold, cavity drawing upon request).*
(For additional details and options, see Clogging Indicators section.)

Type Number
1 = Sizes 35 to 280

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SFREE = Element specially designed to minimize electrostatic charge generation
QPG1 = Quality Protection (sizes 160-280)
QPGI1V2 = Quality Protection (sizes 35, 55)

Replacement Element Model Code

0280 D 003 ON / V _

Size
0035, 0055, 0160, 0240, 0280

Filtration Rating *(micron)*
ON = 1, 3, 5, 10, 15, 20
BH/HC = 3, 5, 10, 20
W/HC = 25, 50, 100, 200

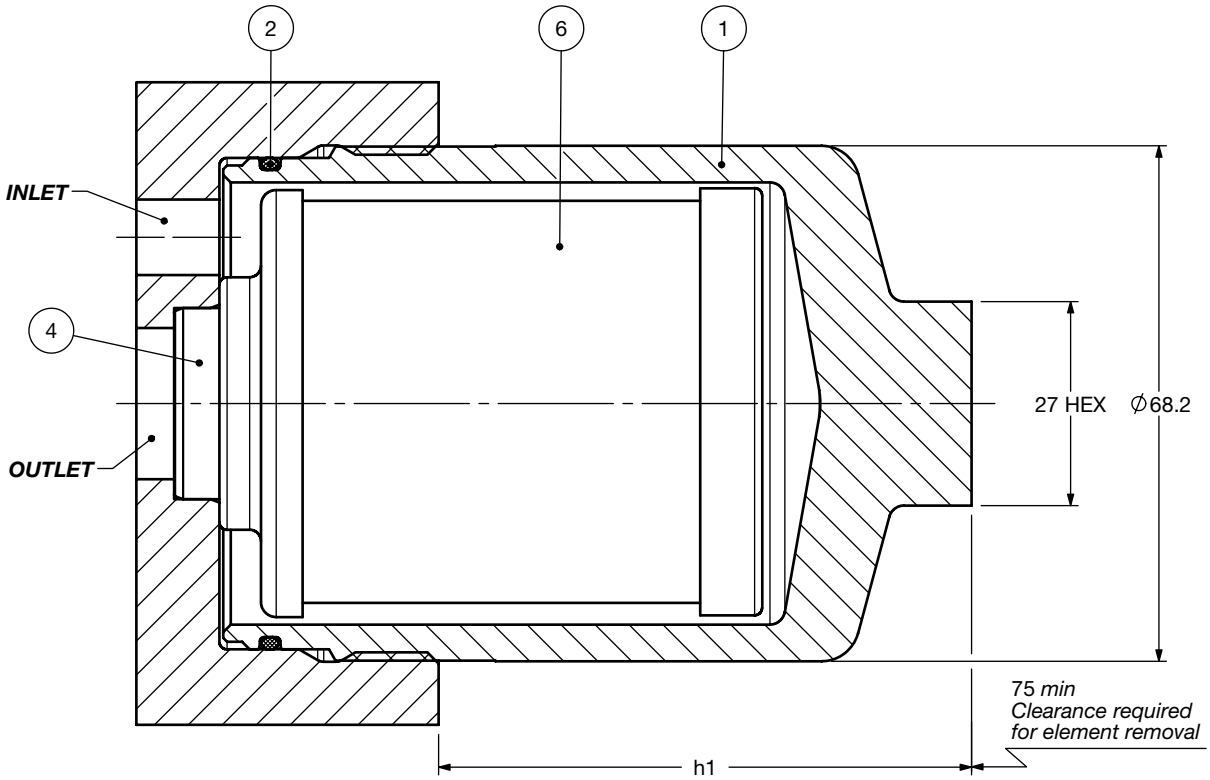
Element Media
ON, BH4HC, W/HC

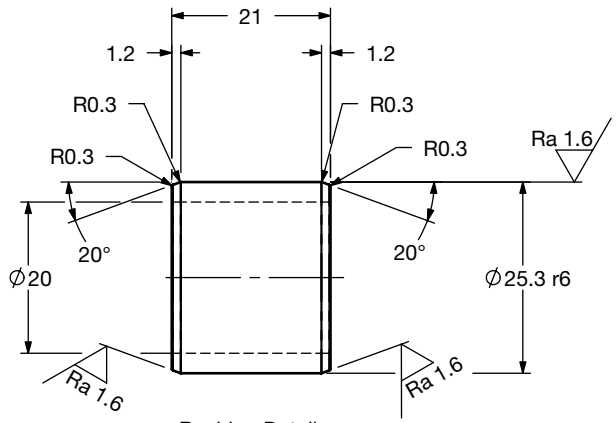
Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Same as above
SFREE = Element specially designed to minimize electrostatic charge generation
QPG1 = Quality Protection (sizes 160-280)
QPGI1V2 = Quality Protection (sizes 35, 55)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
LPF Set 35 / 55





Bushing Detail
Item 4

Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*

Size	h1
LPF 35 SET	70.5
LPF 55 SET	116.5

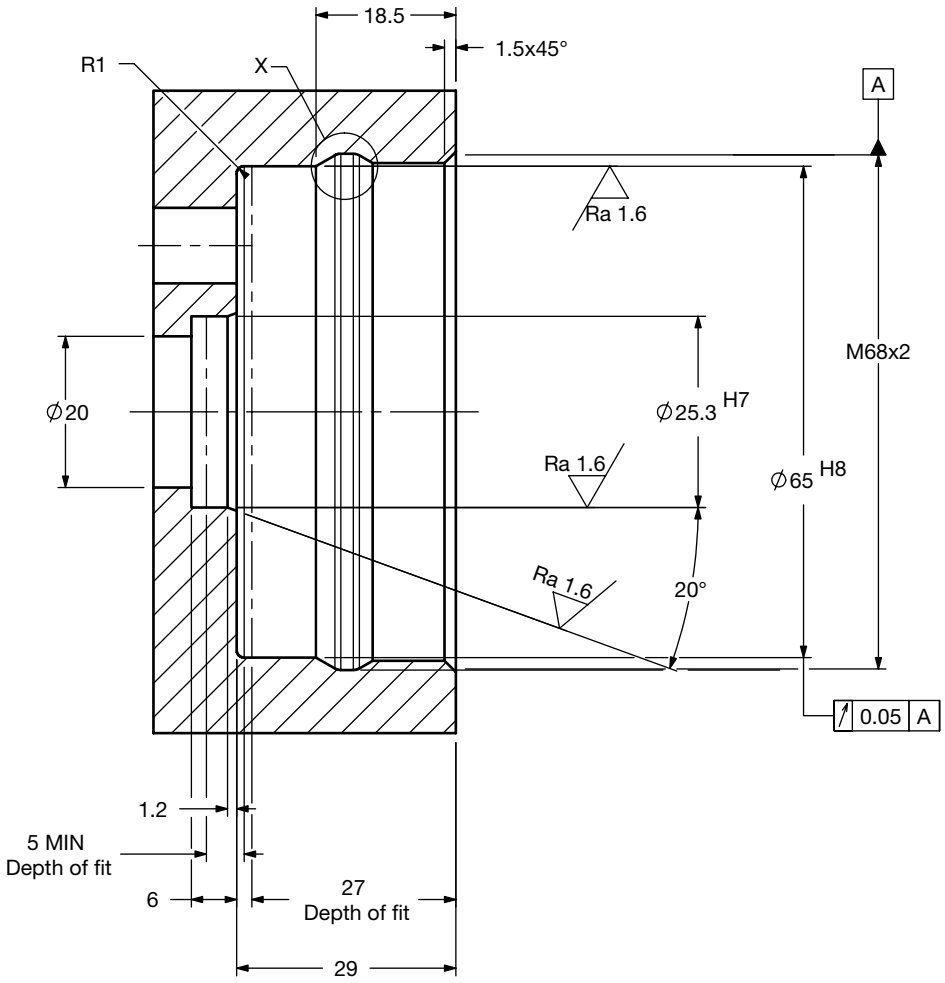
Unspecified Tolerances

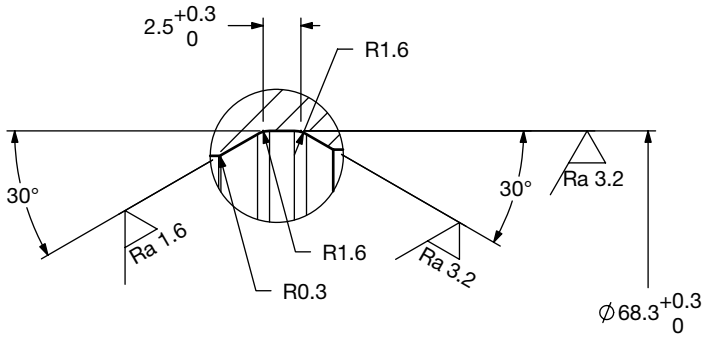
From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	±0.1	±0.2	±0.3	±0.5

Size	35	55
Weight (lbs.)	1	1.6

Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

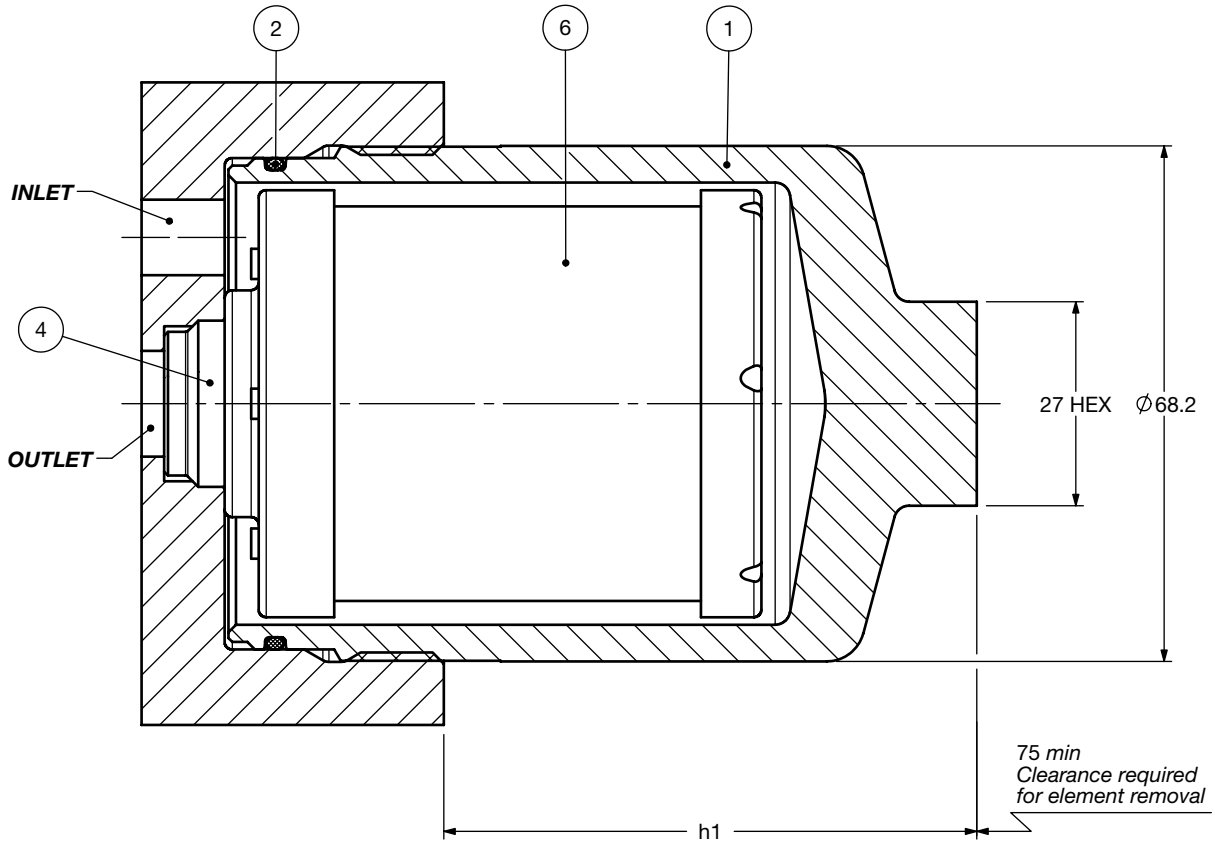
Customer Manifold Machining
LPF Set 35 / 55

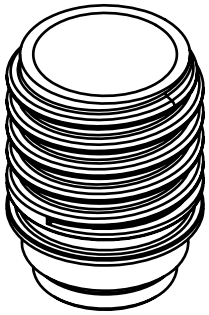




Detail X

Dimensions
LPF Set QPGI1V2 35 / 55





Bushing Detail
Item 4
Secure with Loctite 4204
Torque to 10-2Nm

Item No	SET Components
1	Bowl
2	Bowl back-up ring
4	Bushing
6	Element *(optional)*

Size	h1
LPF 35 SET	70.5
LPF 55 SET	116.5

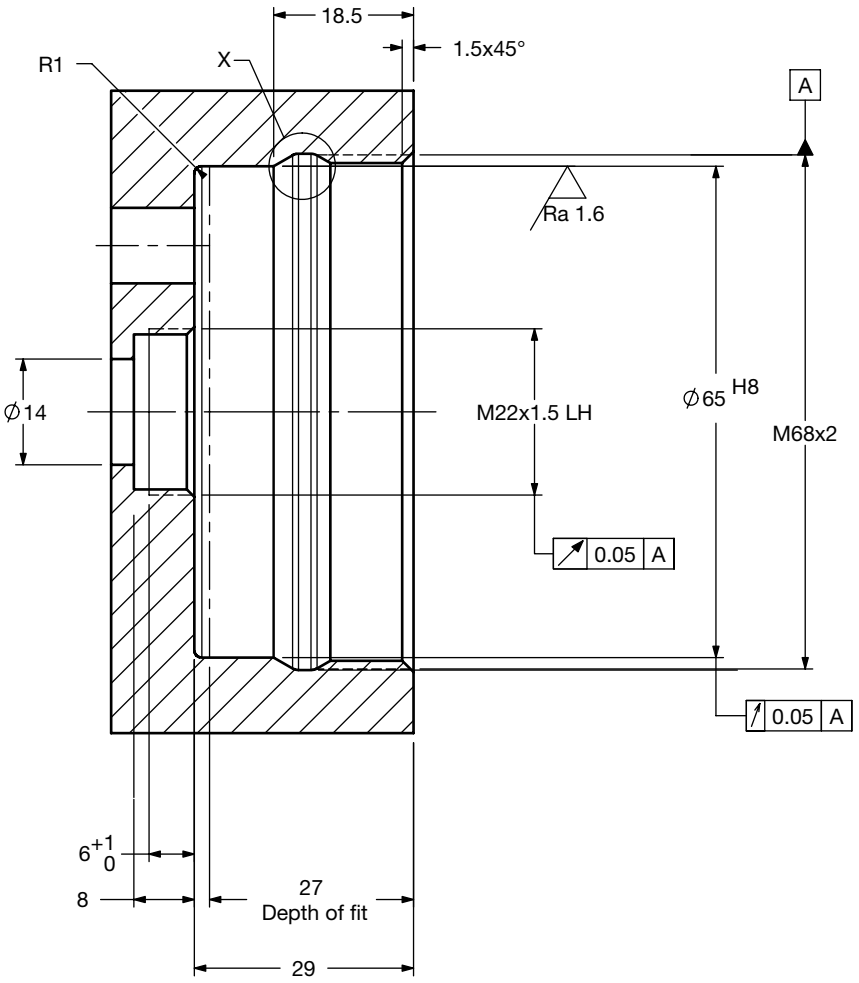
Unspecified Tolerances

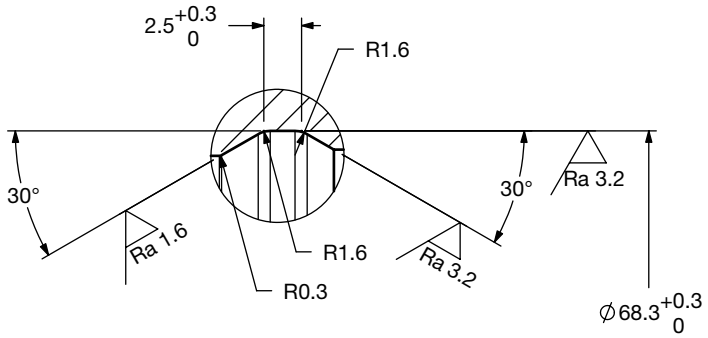
From	0.5	3	6	30
To	3	6	30	120
	±0.1	±0.1	±0.2	±0.3

Size	35	55
Weight (lbs.)	1	1.6

Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

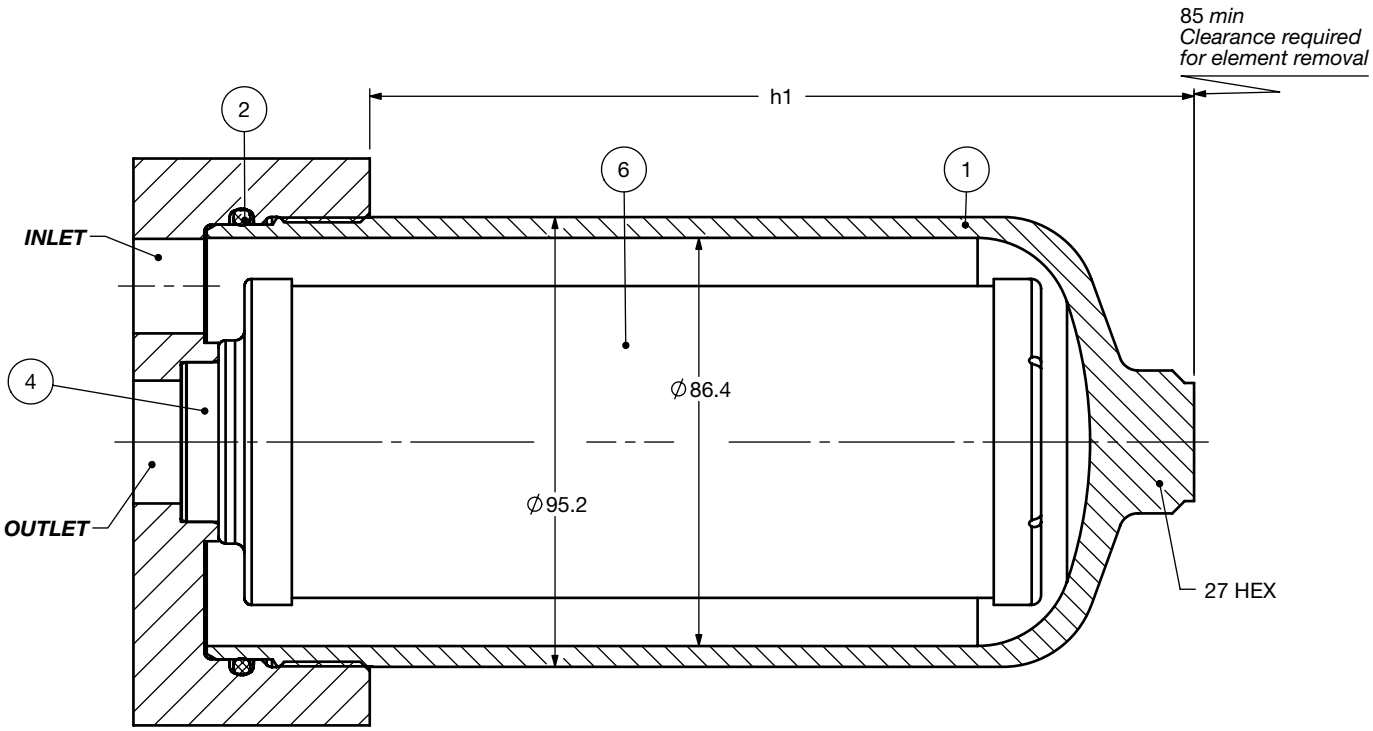
Customer Manifold Machining
LPF Set QPGI1V2 35 / 55

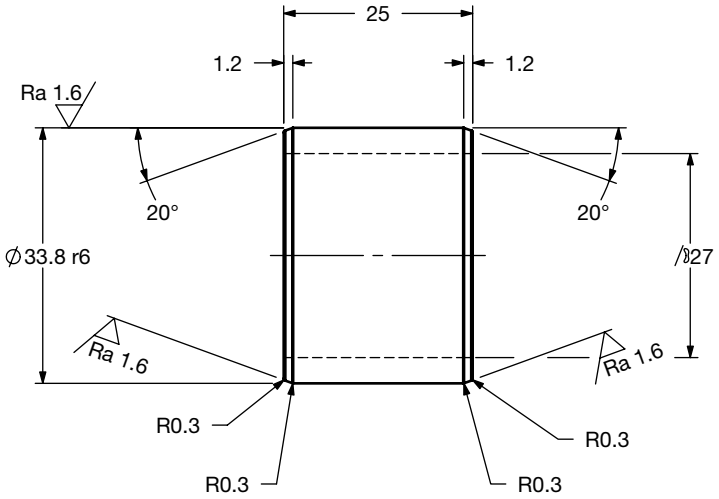




Detail X

Dimensions
LPF Set 160 / 240 / 260 / 280





Bushing Detail
Item 4

Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*

Size	h1
LPF 160 SET	121.5
LPF 240 SET	174.5
LPF 260 SET	244.5
LPF 280 SET	359.5

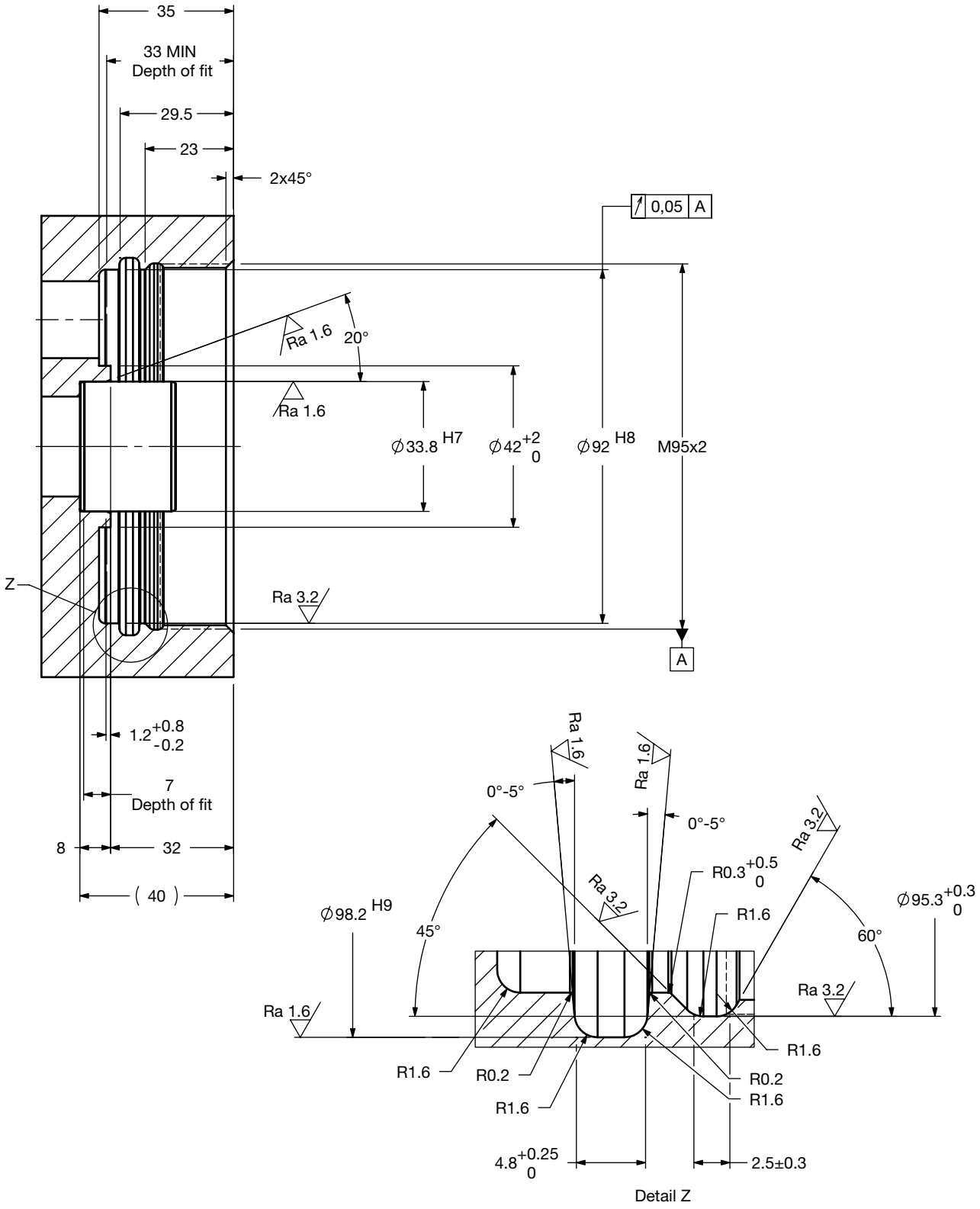
Unspecified Tolerances

From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	±0.1	±0.2	±0.3	±0.5

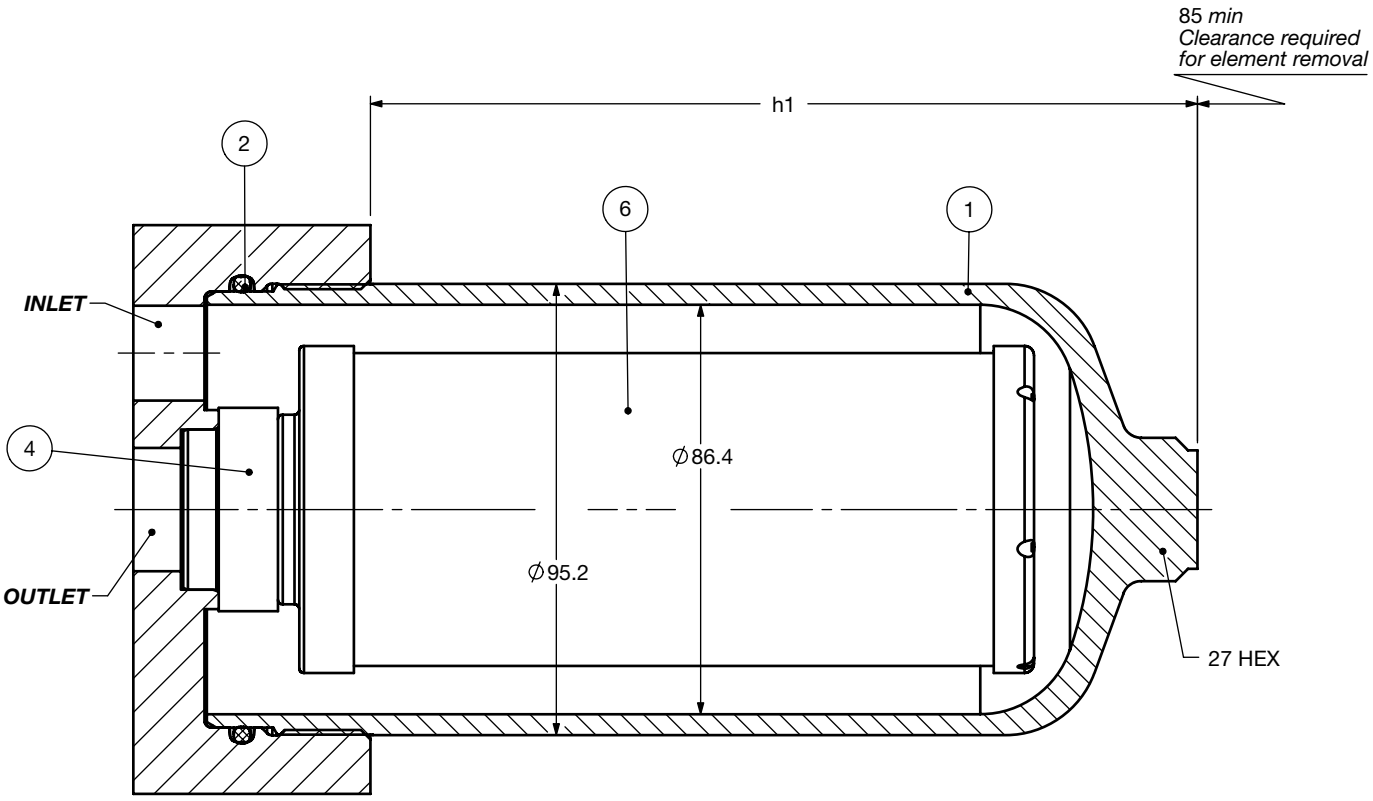
Size	160	240	260	280
Weight (lbs.)	1.9	2.5	3.2	4.7

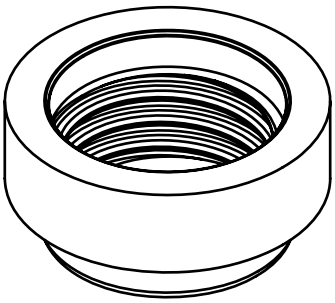
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
LPF Set 160 / 240 / 260 / 280



Dimensions
LPF Set QPG1 160 / 240 / 260 / 280





Bushing Detail
Item 4
(Supplied by HYDAC)

Item No	SET Components
1	Bowl
2	Bowl back-up ring
4	Bushing
6	Element *(optional)*

Size	h1
LPF 160 SET	121.5
LPF 240 SET	174.5
LPF 260 SET	244.5
LPF 280 SET	359.5

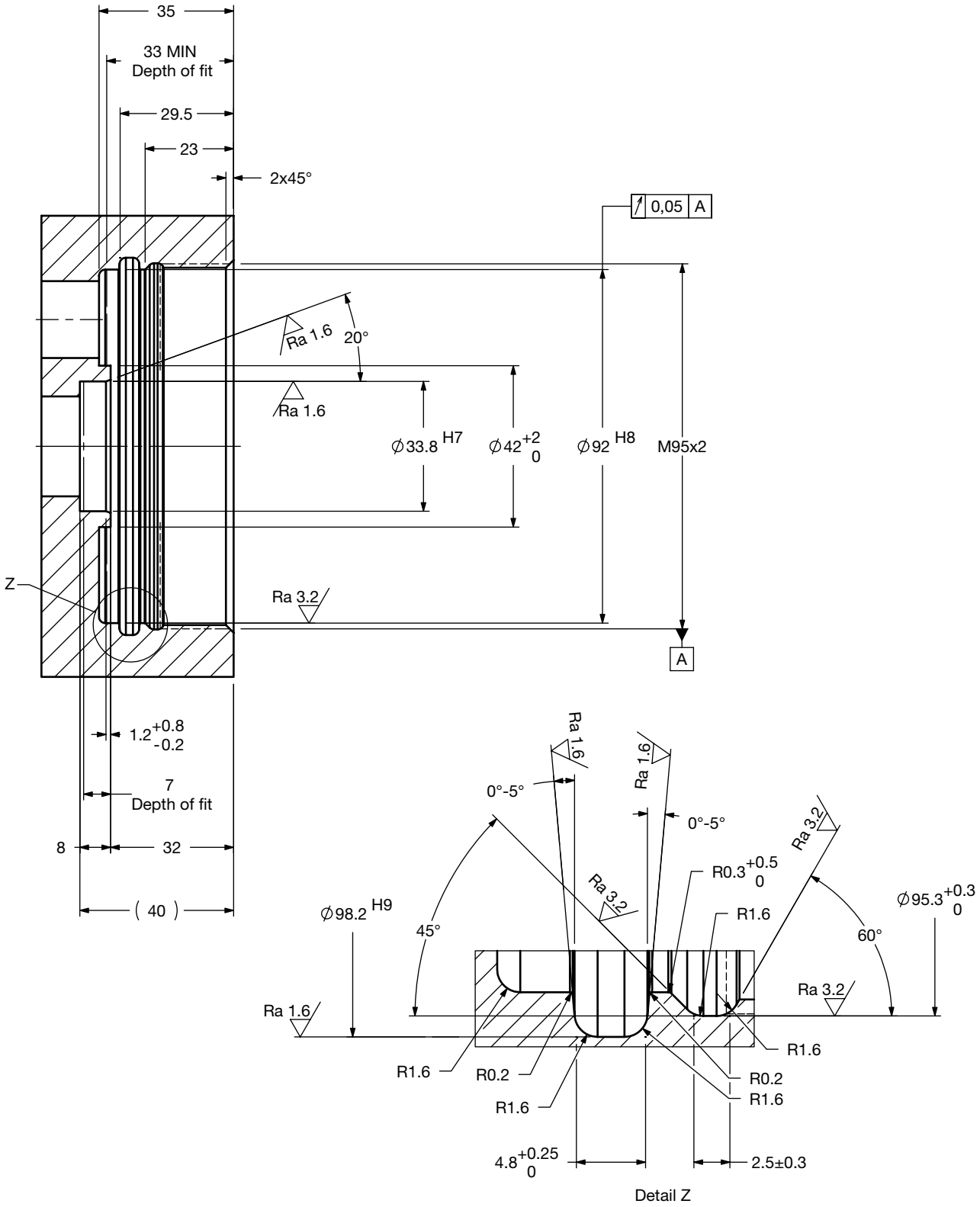
Unspecified Tolerances

From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	±0.1	±0.2	±0.3	±0.5

Size	160	240	260	280
Weight (lbs.)	2	2.6	3.3	4.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
LPF Set QPG1 160 / 240 / 260 / 280



SET SERIES FILTERS – MEDIUM PRESSURE

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

"ON" Pressure Elements	...D...ON (Optimicron Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0035 D XXX ON	2.755	1.169	0.938	0.752	0.549	0.408
0055 D XXX ON	1.427	0.675	0.543	0.434	0.284	0.211
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064

"D" Pressure Elements	...D...BH4HC (Betamicron High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0035 D XXX BH4HC	2.623	1.542	0.922	0.576
0055 D XXX BH4HC	1.328	0.779	0.466	0.291
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088

Wire Mesh	...D...W/HC Elements (Low Collapse)
Size	...D...W/HC Elements 25, 50, 100, 200 µm
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005

All Element K Factors in psi / gpm.

Notes

LF Set Series

Manifold Cartridge Filters

1500 psi • up to 180 gpm

Manifold cavity is only for representation and not HYDAC's scope of supply

Features

- Non-welded housing design reduces stress concentrations and
- prevents fatigue failure.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials *(nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber)* provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators *(optional)* have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications

Agricultural

Automotive

Construction

Industrial

Railways

Steel / Heavy Industry

Installation

The LF Set Manifold Cartridge Filter is installed into a threaded cavity that is machined in the manifold *(manifold not included - see cavity drawing)*. A bushing is provided for proper element installation, as well as a bowl with o-ring seal and back-up ring. An element can be provided as a option. The bushing holds the element in place during filtration operation, and facilitates easy removal for element change out.

More than one SET may be installed in the manifold if required for capacity. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(cavity drawings for that upon request)*. For additional information, contact HYDAC.

Technical Specifications

Mounting Method	Threaded bowl
Flow Direction	
Element	Out-to-in
Construction Materials	
Bowl	Aluminum Extrusion *(sizes 30 - 660)* Steel *(size 280)*
Flow Capacity	
30	8 gpm (30 lpm)
60	16 gpm (60 lpm)
110	29 gpm (110 lpm)
160	42 gpm (160 lpm)
240	63 gpm (240 lpm)
280	74 gpm (280 lpm)
330	84 gpm (330 lpm)
660	174 gpm (660 lpm)
Housing Pressure Rating	
Max. Operating Pressure	1500 psi (100 bar)
Fatigue Pressure	1500 psi (100 bar)
Burst Pressure	size 30 5510 psi (380bar) sizes 60 - 660 > 6090 psi (420 bar)
Element Collapse Pressure Rating *(optional)*	
BH4HC, V	3045 psid (210 bar)
ON, W/HC	290 psid (20 bar)
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)
Consult HYDAC for applications operating below -22°F (-30°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected	
ΔP Indicator Trip Pressure *(optional)*	
ΔP = 29 psid (2 bar) -10%	
ΔP = 72 psid (5 bar) -10%	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

LF ON 30 SET 3 W 1 . 0 / __ __

Filter Type
LF = Manifold cartridge filter

Element Media
(omit) = Without element
ON = Optimicron® *(low collapse)*
BH/HC = Betamicron® *(High Collapse)*
W/HC = Wire Mesh
V = Metal Fiber

Size
30, 60, 110, 160, 240, 280, 330, 660

Type of Mounting
SET = Manifold cartridge

Filtration Rating *(microns)*
XX = Without element
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BH/HC
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
W = Without indicator *(Indicators can be installed in manifold, cavity drawing upon request).*
(For additional details and options, see Clogging Indicators section.)

Type Number
1 = Sizes 30 to 660

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SO184 = G-1/2 Drain in Bowl Option For Sizes 60 - 280 *(comes standard for sizes 330, 660)*
W = Modification of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation
QPD = Quality Protection

Replacement Element Model Code

0030 D 003 ON / V __

Size
0030, 0060, 0110, 0160,
0240, 0280, 0330, 0660

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BH/HC
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

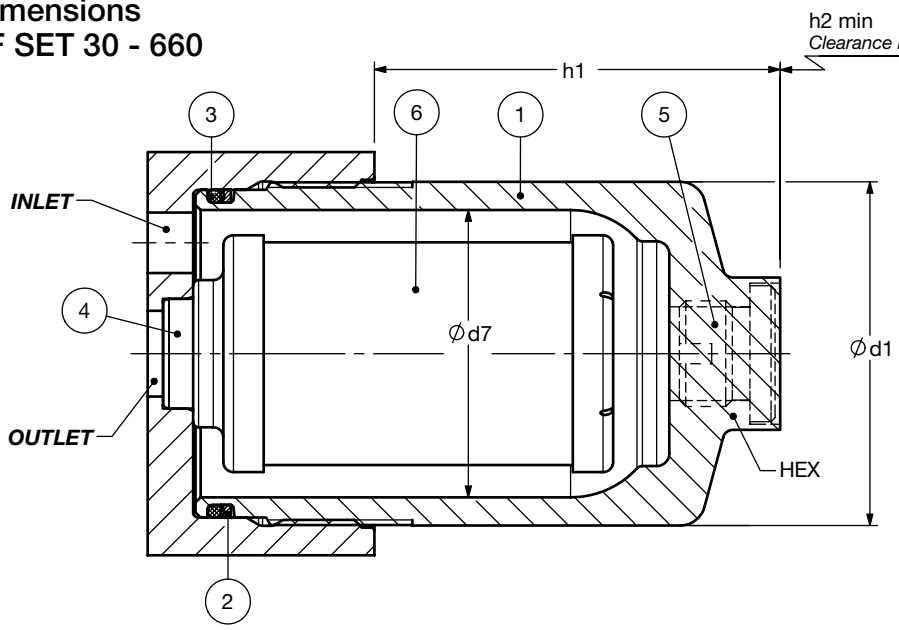
Element Media
ON, BH4HC, W/HC, V

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

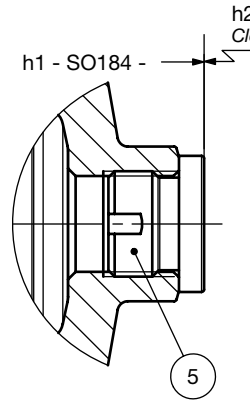
Supplementary Details
SO263 = Same as above
W = Same as above
SFREE = Element specially designed to minimize electrostatic charge generation
QPD = Quality Protection

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

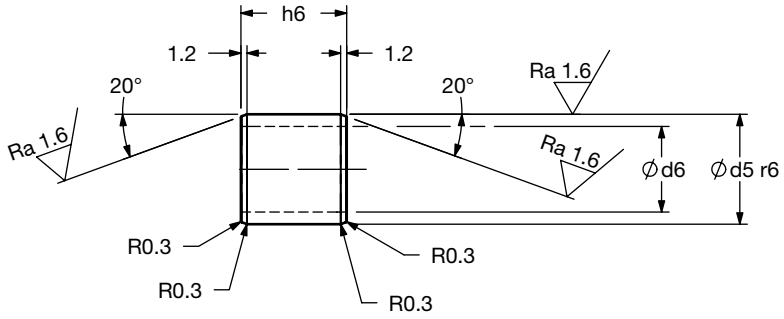
Dimensions
LF SET 30 - 660



Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*



Version with -SO184



Bushing Detail
Item 4

Size	d1	d2	d3	d4	d5	d6	d7	d8	d9	h1	h1 -SO184	h2	h3	h4	h5	h6	h7	h8	h9	HEX
30	52	52	M55x1.5	11.9	11.9	8	44	56	55.2	77.5	80.5	75	33	31	23	18	6	4	5	24
60	68	65	M68x2	21.8	21.8	17	57	69	68.3	82.5	86.5	75	36	34	25.5	21	6	4	5	27
110	68	65	M68x2	21.8	21.8	17	57	69	68.3	150	154	75	36	34	25.5	21	6	4	5	27
160	95	88	M95x2	33.8	33.8	26	78	96	95.3	113.5	117.5	95	47	45	35	25	8	5	7	32
240	95	88	M95x2	33.8	33.8	26	78	96	95.3	173.5	177.5	95	47	45	35	25	8	5	7	32
280	95	88	M95x2	33.8	33.8	26	78	96	95.3	358.7	362.7	95	47	45	35	25	8	5	7	32
330	130	125	M130x2	47.8	47.8	36	110	131	130.3	165.5	-	105	55	52	41.6	26	10	6	9	36
660	130	125	M130x2	47.8	47.8	36	110	131	130.3	336.5	-	105	55	52	41.6	26	10	6	9	36

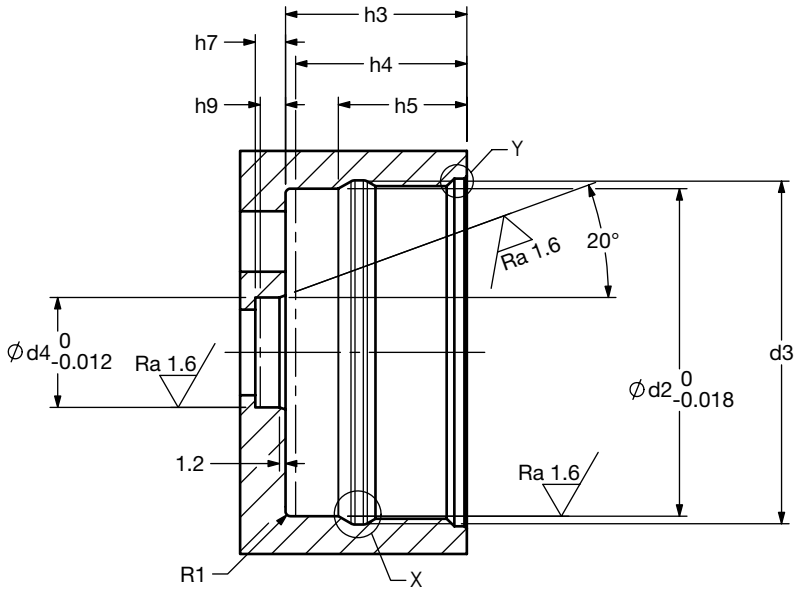
Unspecified Tolerances

From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	**±0.1**	**±0.2**	**±0.3**	**±0.5**

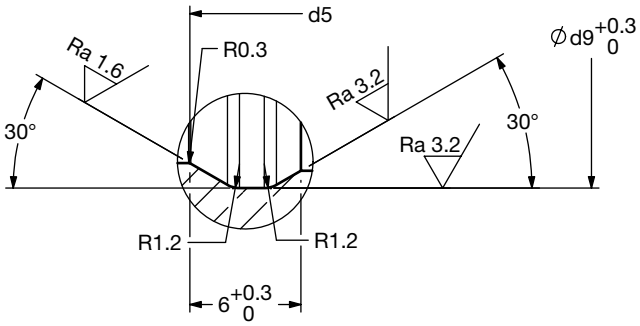
Size	30	60	110	160	240	280	330	660
Weight (lbs.)	0.7	1.2	1.8	3.2	4	21.4	7.5	13.2

Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

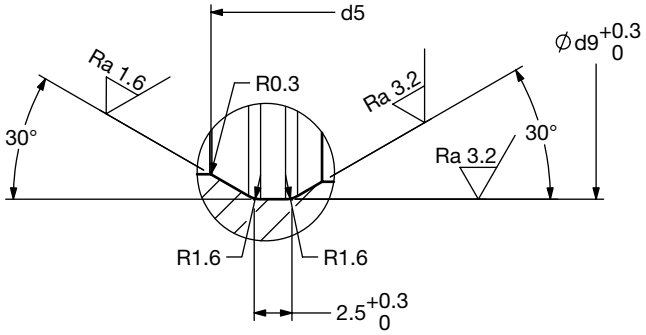
Customer Manifold Machining
LF SET 30 - 660



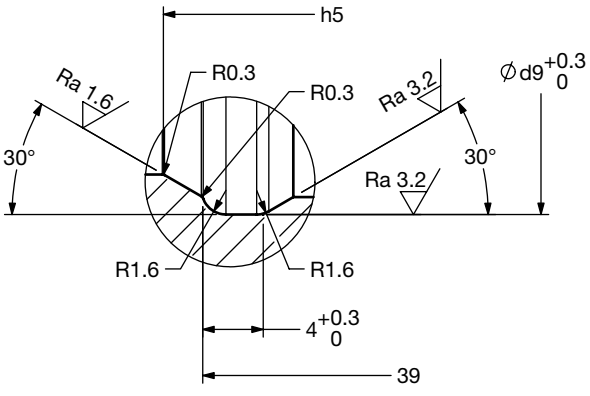
MANIFOLD MACHINING



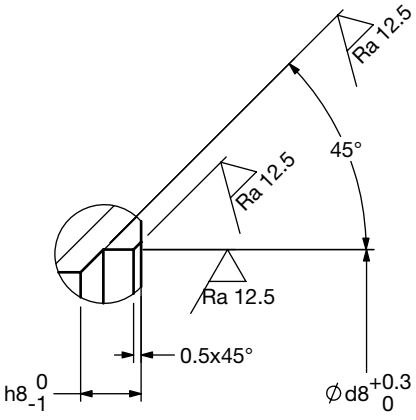
DETAIL X (SIZE 30)



DETAIL X (SIZE 60-240)

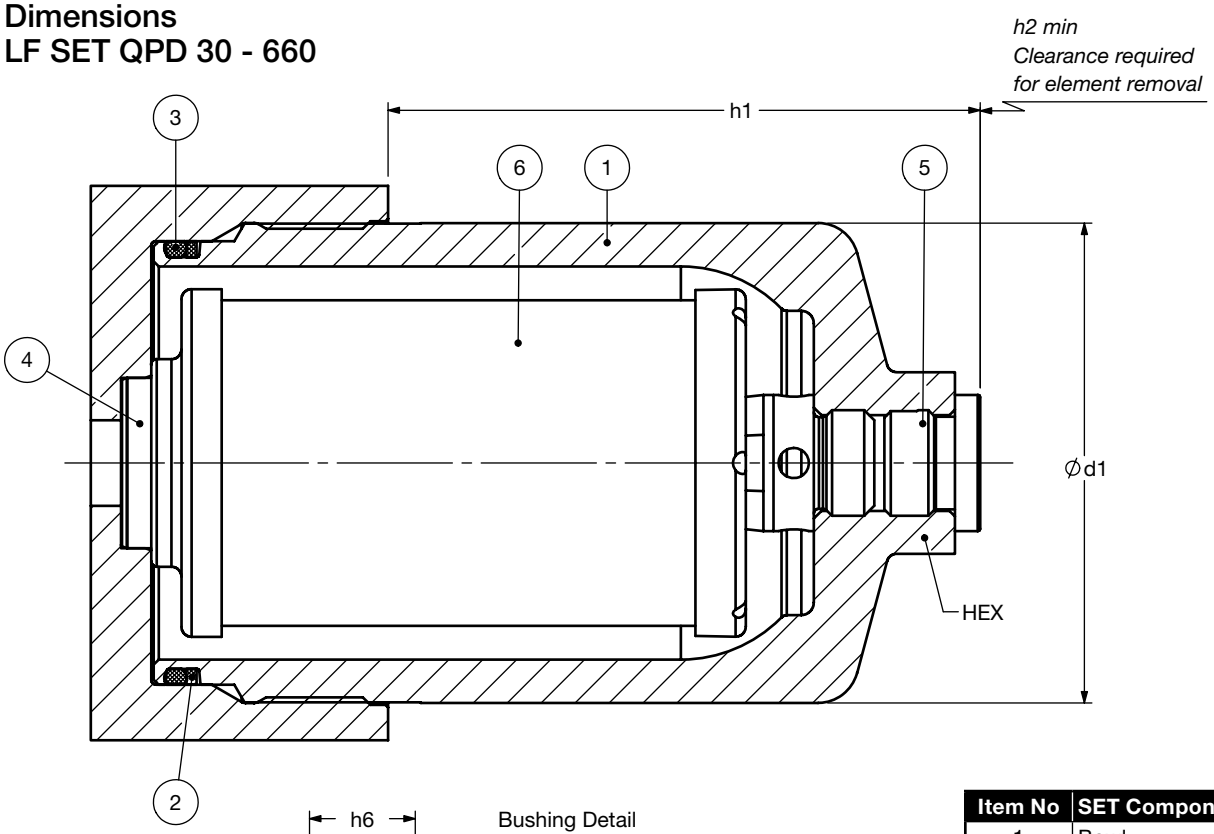


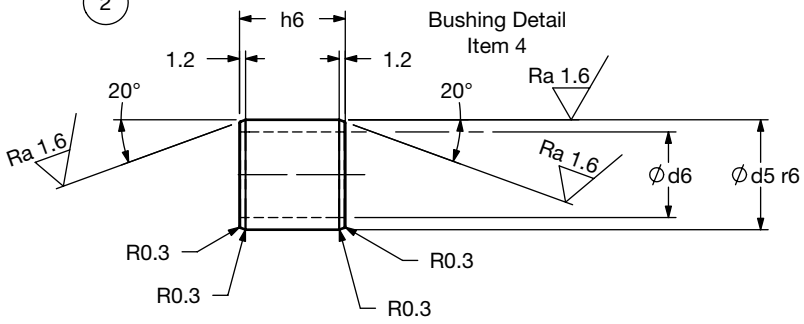
DETAIL X (SIZE 330 / 660)



DETAIL Y

Dimensions
LF SET QPD 30 - 660





Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*

Size	d1	d2	d3	d4	d5	d6	d7	d8	d9	h1	h2	h3	h4	h5	h6	h7	h8	h9	HEX
30	52	52	M55x1.5	11.9	11.9	8	44	56	55.2	80.5	75	33	31	23	18	6	4	5	24
60	68	65	M68x2	21.8	21.8	17	57	69	68.3	86.5	75	36	34	25.5	21	6	4	5	27
110	68	65	M68x2	21.8	21.8	17	57	69	68.3	154	75	36	34	25.5	21	6	4	5	27
160	95	88	M95x2	33.8	33.8	26	78	96	95.3	117.5	95	47	45	35	25	8	5	7	32
240	95	88	M95x2	33.8	33.8	26	78	96	95.3	177.5	95	47	45	35	25	8	5	7	32
280	95	88	M95x2	33.8	33.8	26	78	96	95.3	362.7	95	47	45	35	25	8	5	7	32
330	130	125	M130x2	47.8	47.8	36	110	131	130.3	165.5	105	55	52	41.6	26	10	6	9	36
660	130	125	M130x2	47.8	47.8	36	110	131	130.3	336.5	105	55	52	41.6	26	10	6	9	36

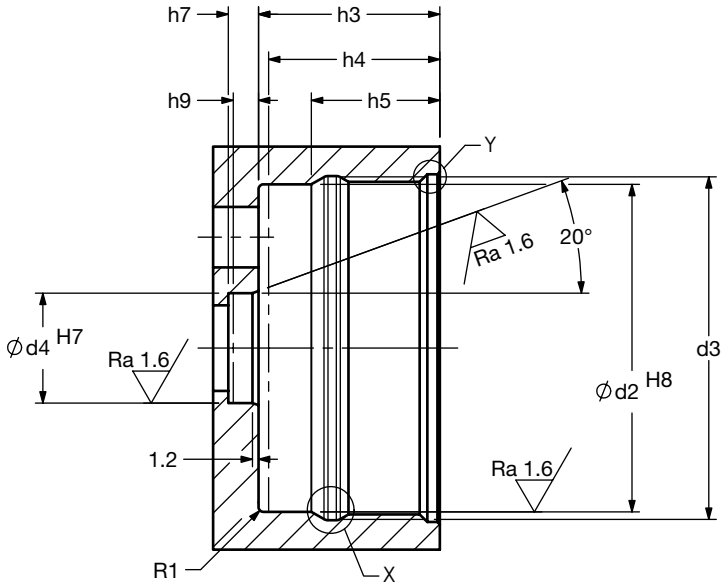
Unspecified Tolerances

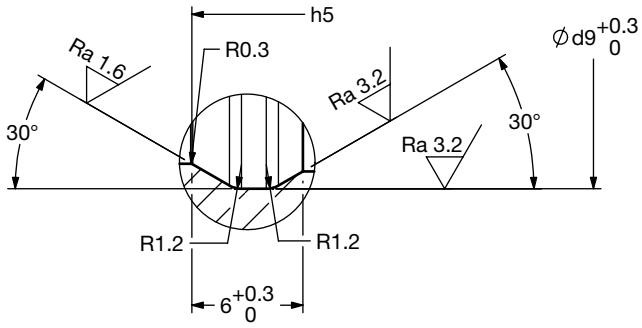
From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	**±0.1**	**±0.2**	**±0.3**	**±0.5**

Size	30	60	110	160	240	280	330	660
Weight (lbs.)	1.9	2.4	3	3.2	4	21.4	8.8	14.5

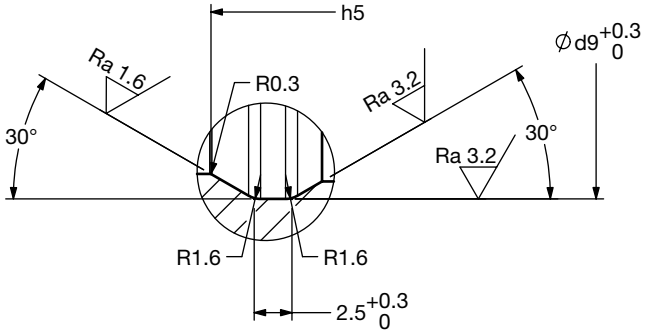
Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
LF SET QPD 30 - 660

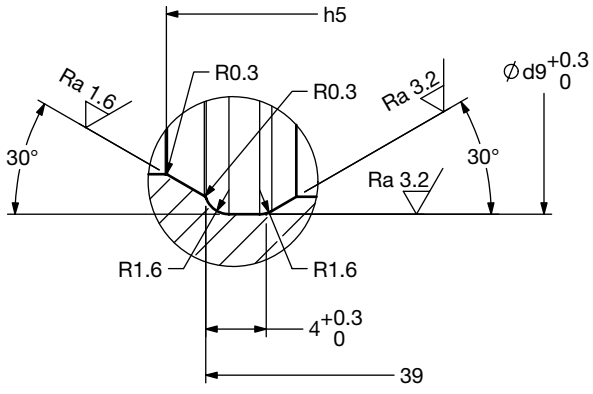




Detail X (SIZE 30)



Detail X (SIZE 60-240)



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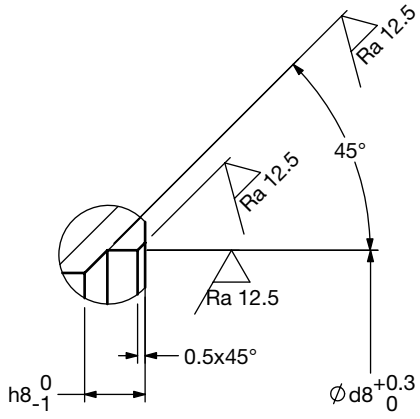


Detail Y

SET SERIES FILTERS – MEDIUM PRESSURE

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

"ON" Pressure Elements:	...D...ON (Optimicron Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0030 D XXX ON	4.27	3.507	2.376	1.251	0.768	0.62
0060 D XXX ON	2.936	1.427	1.004	0.664	0.537	0.347
0110 D XXX ON	1.416	0.735	0.527	0.333	0.254	0.164
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031

"D" Pressure Elements	...D...BH4HC (Betamicron High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX BH4HC	5.005	2.782	1.992	1.043
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049

Wire Mesh	...D...W/HC Elements (Low Collapse)
Size	25, 50, 100, 200 µm
0030 D XXX W/HC	0.166
0060 D XXX W/HC	0.042
0110 D XXX W/HC	0.023
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004

All Element K Factors in psi / gpm.

Notes

LPFH Set Series

Manifold Cartridge Filters

500 psi • up to 112 gpm

Manifold cavity is only for representation and not HYDAC's scope of supply

Features

- Integrated retrofit protection
- Non-welded housing design reduces stress concentrations and
- prevents fatigue failure.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials *(nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber)* provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators *(optional)* have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications

Agricultural

Automotive

Construction

Industrial

Steel / Heavy Industry

Installation

The LPFH Set Manifold Cartridge Filter is installed into a threaded cavity that is machined in the manifold *(manifold not included - see cavity drawing)*. A bushing is provided for proper element installation, as well as a bowl with o-ring seal and back-up ring. An element can be provided as a option. The bushing holds the element in place during filtration operation, and facilitates easy removal for element change out.

More than one SET may be installed in the manifold if required for capacity. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(cavity drawings for that upon request)*. For additional information, contact HYDAC.

Technical Specifications

Mounting Method	Threaded bowl	
Flow Direction		
Element	Out-to-in	
Construction Materials		
Bowl	Aluminum Extrusion	
Flow Capacity		
325	87 gpm (325 lpm)	
425	112 gpm (425 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	325 - 425	500 psi (34 bar)
Fatigue Pressure	325 - 425	500 psi (34 bar) (10^6 cycles)
Burst Pressure	325 - 425	> 2700 psi (186 bar)
Element Collapse Pressure Rating *(optional)*		
ON, W/HC		290 psid (20 bar)
Fluid Temp. Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications operating below -22°F (-30°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycwol, oil/water emulsion, and high water based fluids when the appropriate seals are selected		
ΔP Indicator Trip Pressure *(optional)* ΔP = 29 psid (2 bar) -10% *(optional)* ΔP = 36.25 psid (2.5 bar) *(BF indicator)* ΔP = 72 psid (5 bar) -10% *(standard)*		

PN#02081318 / 07.19 / FIL1907-2109

Model Code

LPFH ON 325 SET 3 W 1 . 0 / __ __

Filter Type
LPFH = Manifold cartridge filter

Element Media
(omit) = Without element
ON = Optimicron® *(Low Collapse)*
BH/HC = Betamicron (High Collapse)
W/HC = Wire Mesh

Size
325, 425

Type of Mounting
SET = Manifold cartridge

Filtration Rating *(microns)*
XX = Without element
1, 3, 5, 10, 15, 20 = ON
25, 74, 149 = W/HC

Type of ΔP Clogging Indicator
W = Without indicator *(Indicators can be installed in manifold, cavity drawing upon request).*
(For additional details and options, see Clogging Indicators section)

Type Number
1

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Modification of ON & W/HC *(Betamicron® Low Collapse)* Elements For Phosphate Ester Fluids
W = Modification of "W/HC" and "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation
QPG = Quality Protection (sizes 325, 425)

Replacement Element Model Code

0325 D 003 ON / V __

Size
0325, 0425

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
25, 74, 149 = W/HC
3, 5, 10, 20 = BH4HC

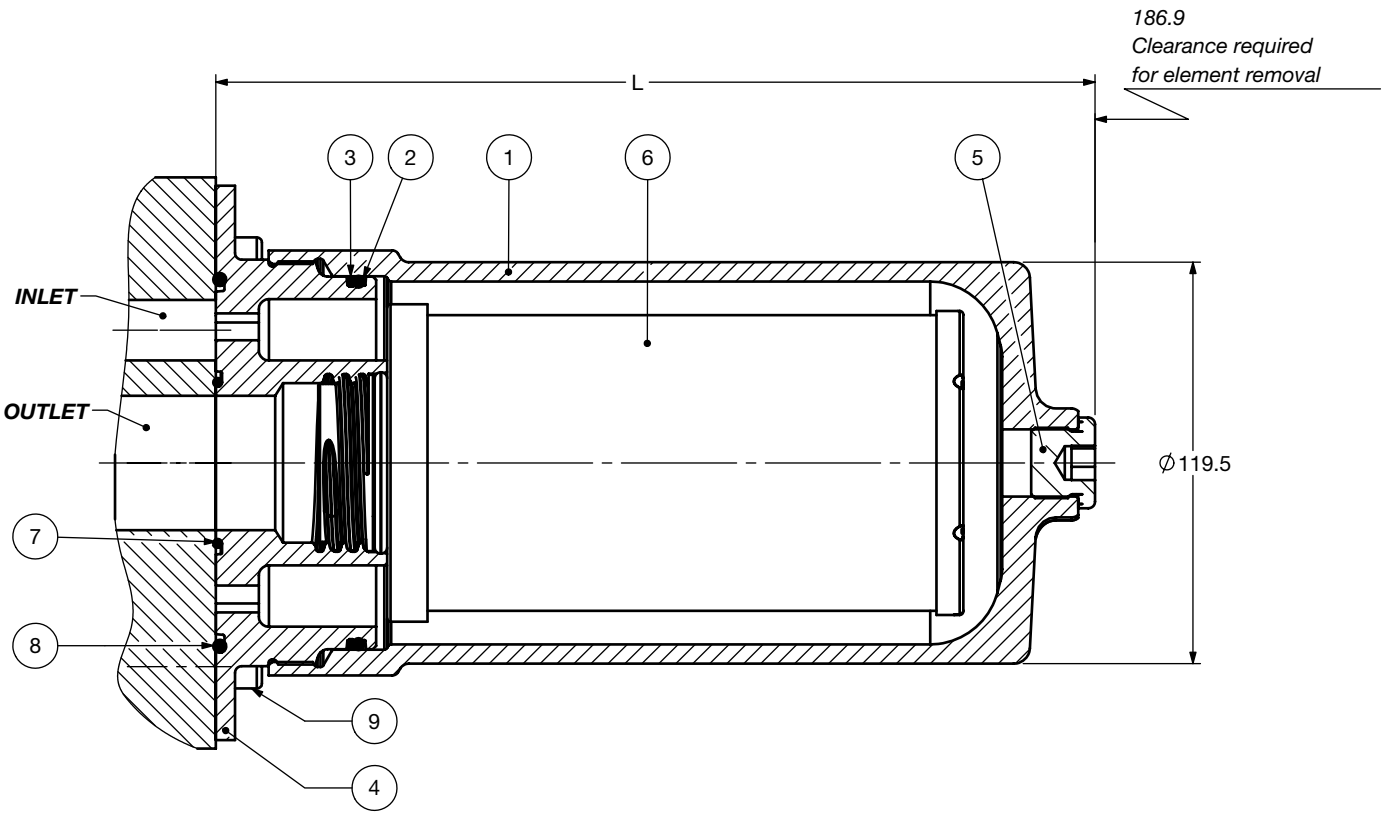
Element Media
ON, BH4HC, W/HC

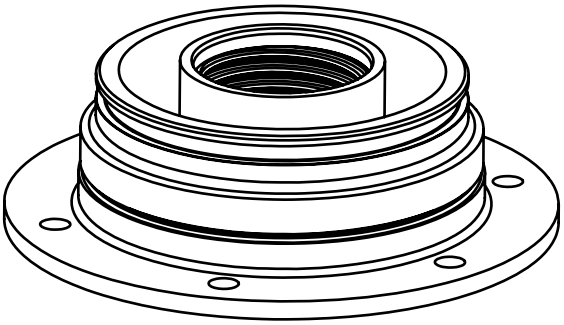
Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Same as above
W = Same as above
SFREE = Element specially designed to minimize electrostatic charge generation
QPG = Quality Protection (sizes 325, 425)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
LPFH Set 325 / 425





ITEM 4
PROVIDED

Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug
6	Element *(optional)*
7	Inner seal
8	Outer seal
9	Set screw *(not supplied by HYDAC)*

Size	L
325	262
425	352

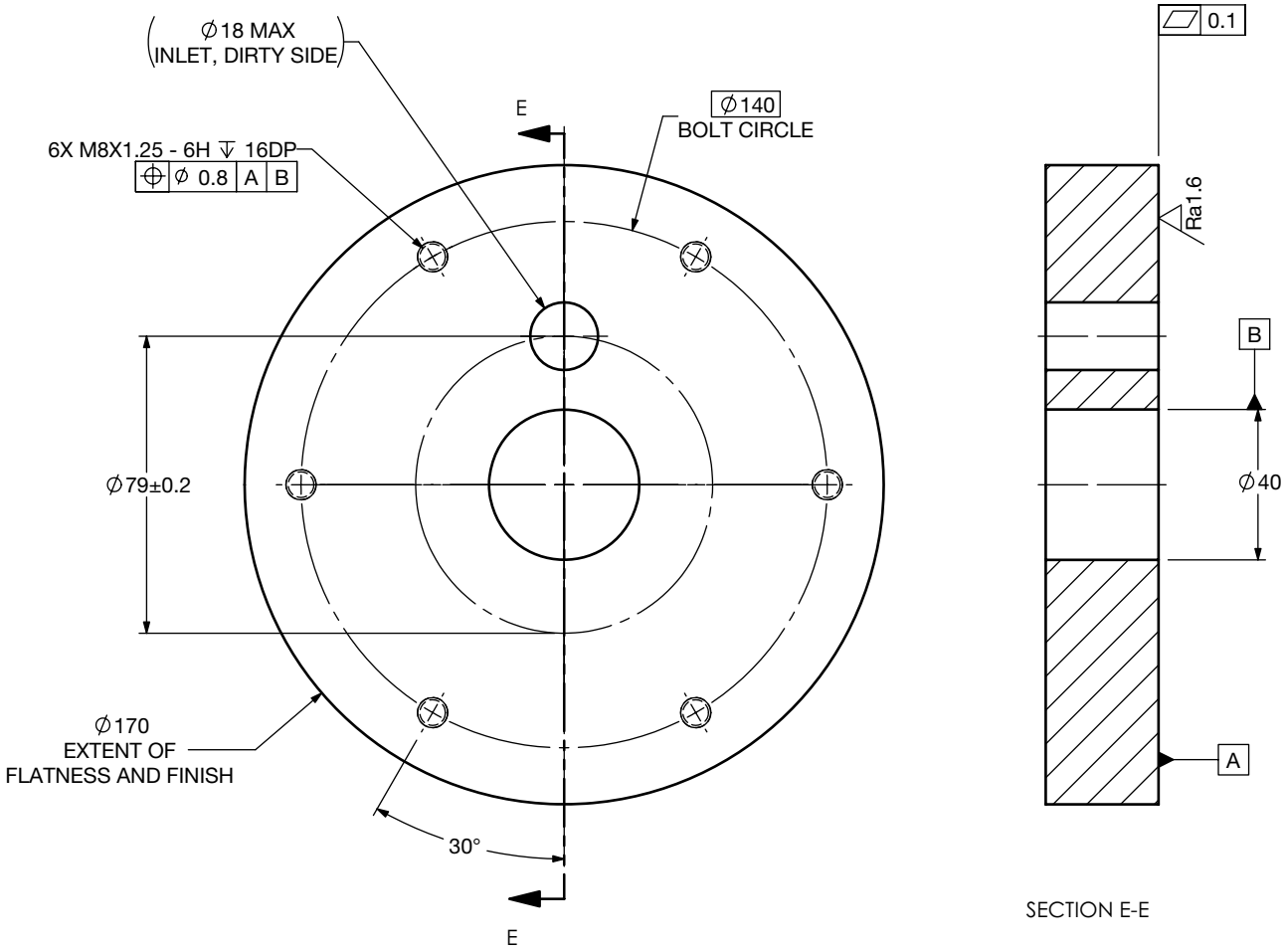
Unspecified Tolerances

From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	±0.1	±0.2	±0.3	±0.5

Size	325	425
Weight (lbs.)	6.5	7.9

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
LPFH Set 325 / 425



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141\ \text{SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0325 D XXX ON	0.444	0.204	0.150	0.081	0.070	0.056
0425 D XXX ON	0.289	0.143	0.104	0.06	0.046	0.038

Wire Mesh	...D...W/HC
Size	...D...W/HC Elements 25, 50, 74, 100, 149, 200 µm
0325 D XXX W/HC	0.011
0425 D XXX W/HC	0.007

Betamicron	...D...BH/HC					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0325 D XXX BH/HC	Consult factory upon request					
0425 D XXX BH/HC						

All Element K Factors in psi / gpm.

MFX Set Series

Manifold Cartridge Filters

725 psi • up to 35 gpm

Manifold cavity is only for representation and not HYDAC's scope of supply

Features

- Integrated retrofit (quality) protection
- High level of operational safety - Bowl seal and bypass valve are integrated in the filter element and therefore replaced at every element change
- "Missing Element Protection" - cannot operate without element installed.
- Non-welded housing design reduces stress concentrations and
- prevents fatigue failure.
- Aluminum alloy is water tolerant - anodization is not required for water based fluids (HWBF).
- Screw-in bowl requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators *(optional)* have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications

Agricultural

Automotive

Construction

Commercial Municipal

Railways

Installation

The MFX Set Manifold Cartridge Filter is installed into a threaded cavity that is machined in the manifold *(manifold not included - see cavity drawing)*. A bushing is provided for proper element installation. The bushing holds the element in place during filtration operation, and facilitates easy removal for element change out.

More than one SET may be installed in the manifold if required for capacity. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(cavity drawings for that upon request)*. For additional information, contact HYDAC.

Technical Specifications

Mounting Method	Threaded
Flow Direction	
Element	Out-to-in
Construction Materials	
Bowl	Extruded Aluminum
Flow Capacity	
100	26 gpm (100 lpm)
200	35 gpm (130 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	725 psi (50 bar)
Fatigue Pressure	725 psi (50 bar) @ 1 million cycles
Burst Pressure	2600 psi (183 bar)
Element Collapse Pressure Rating	
BN4HC	290 psid (20 bar)
ECON2, MM	145 psid (10 bar)
Fluid Temperature Range	-22°F to 212°F (-30°C to 100°C)
Consult HYDAC for applications below -22˚F (-30˚C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, and high water based fluids compatible with Nitrile Rubber (NBR) seals	
ΔP **Indicator Trip Pressure** *(optional)*	
ΔP = 36.25 psid (2.5 bar) -10% (standard). ΔP = 14.5 psid (1 bar) -10% (optional)	
Bypass Valve Cracking Pressure	
B1.7 = Cracking pressure (bypass valve) 25 psi (1.7) bar B3.5 = Standard, cracking pressure bypass valve 50 psi (3.5 bar) KB = Non-bypass option	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

MFX BN/HC 100 SET 10 W 1 . 0 / __ __

Filter Type
MFX = Manifold cartridge filter

Element Media
BH/HC = Betamicron® *(High Collapse)*
ECON2 = ECOmicron®
MM = Mobilemicron®

Size
100, 200

Type of Mounting
SET = Manifold cartridge

Filtration Rating *(microns)*
BN4HC = 3, 5, 10, 20
ECON2 = 3, 5, 10, 20
MM = 10, 15

Type of ΔP Clogging Indicator
W = Without indicator *(Indicators can be installed in manifold, cavity drawing upon request).*
(For additional details and options, see Clogging Indicators section)

Type Number
1 = Sizes 100, 200

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation
B1.7 = Cracking pressure (bypass valve) 25 psi (1.7) bar
B3.5 = Standard, cracking pressure bypass valve 50 psi (3.5 bar)
KB = Non-bypass option

Replacement Element Model Code

0100 MX 010 BN4HC / - B3.5

Size
0100, 0200

Type
MX

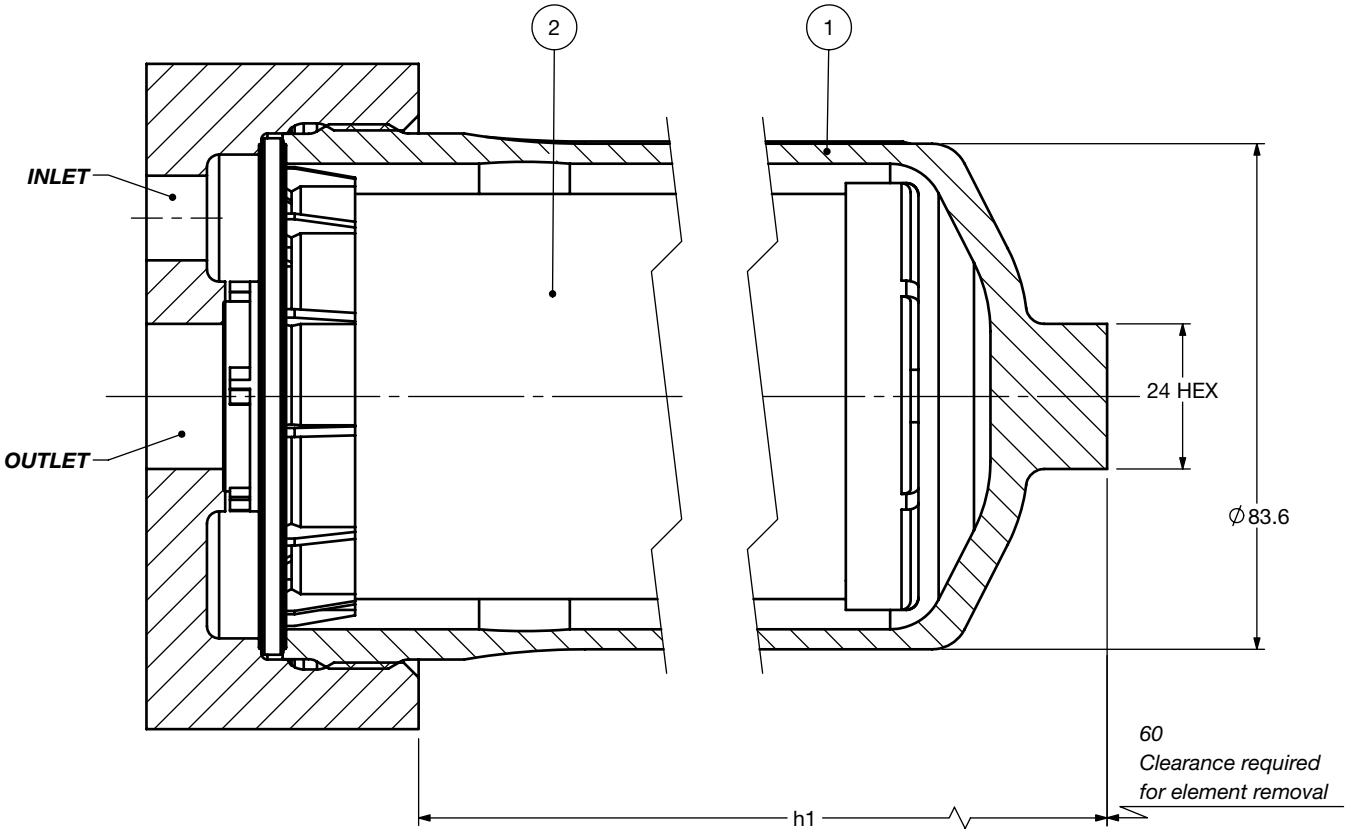
Filtration Rating *(micron)*
3, 5, 10, 20 = BN4HC
3, 5, 10, 20 = ECON2
10, 15 = MM

Filter Material
BN4HC, ECON2, MM

Supplementary Details
Seals:
(omit) = Nitrile rubber (NBR) *(standard)*
B1.7 = Cracking pressure (bypass valve) 25 psi (1.7 bar)
B3.5 = Standard, cracking pressure (bypass valve) 50 psi (3.5 bar)
KB = Non-bypass option

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
MFX Set 100 / 200



Item No	SET Components
1	Bowl
2	Element *(integral bowl seal and bushing)*

Size	h1
MFX 100 SET	154.5
MFX 200 SET	242.5

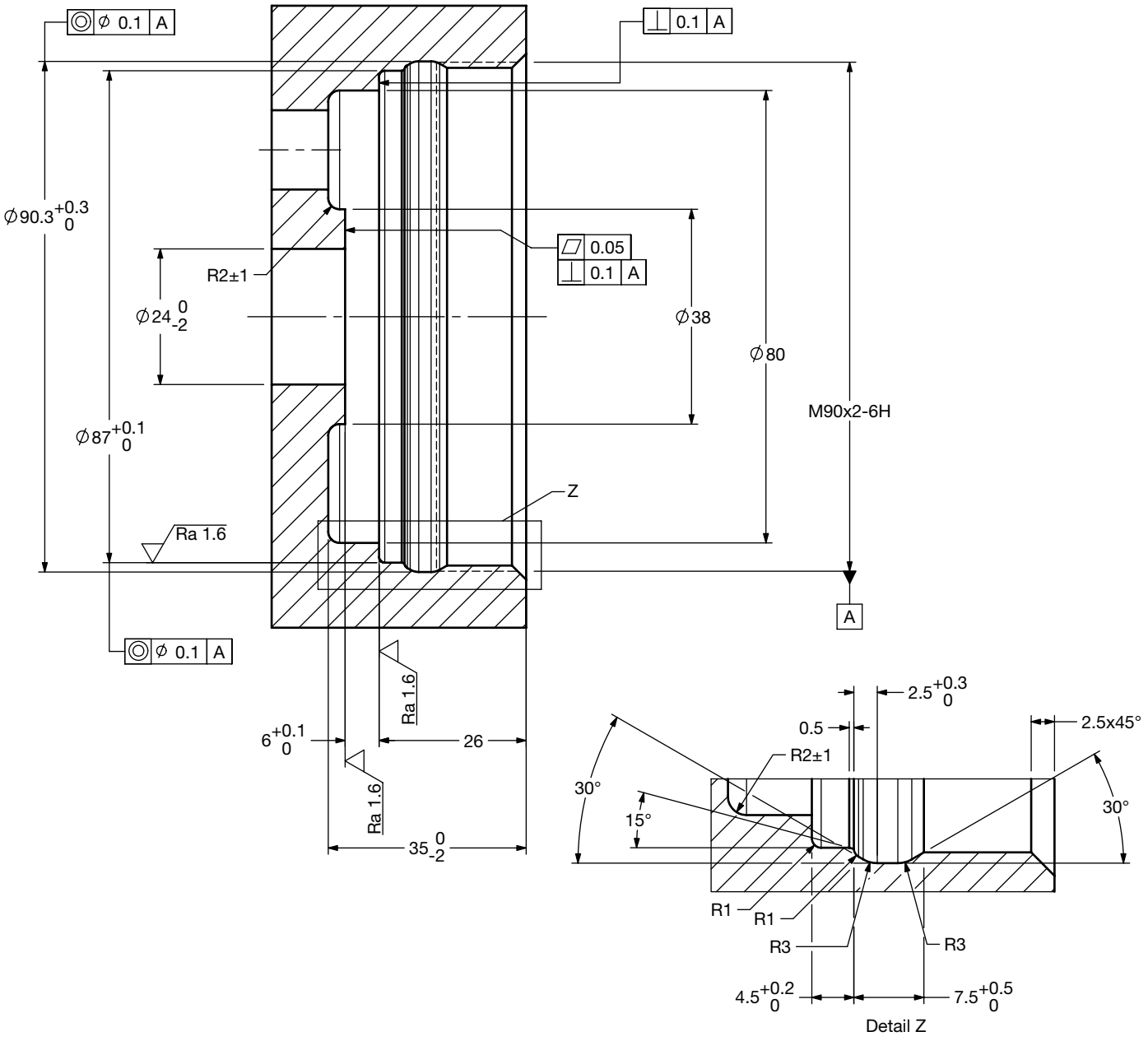
Unspecified Tolerances

From	0.5	6	30	120
To	6	30	120	400
	±0.1	**±0.2**	**±0.3**	**±0.5**

Size	100	200
Weight (lbs.)	2	2.9

Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
MFX Set 100 / 200



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron	...MX...BN4HC (Betamicron® Low Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0100 MX XXX BN4HC	0.659	0.494	0.252	0.187
0200 MX XXX BN4HC	0.384	0.291	0.148	0.110

ECOmicron	...MX...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0100 MX XXX ECON2	0.713	0.549	0.357	0.263
0200 MX XXX ECON2	0.439	0.324	0.209	0.154

Mobilemicron	...MX...MM		
Size	8 µm	10 µm	15 µm
0100 MX XXX MM	0.148	0.148	0.121
0200 MX XXX MM	0.088	0.088	0.071

All Element K Factors in psi / gpm.

DF SET Series

Manifold Cartridge Filters

6090 psi • up to 200 gpm

Manifold cavity is only for representation and not HYDAC's scope of supply

Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials *(nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber)* provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators *(optional)* have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications

Installation

The DF Set Manifold Cartridge Filter is installed into a threaded cavity that is machined in the manifold *(manifold not included - see cavity drawing)*. A bushing is provided for proper element installation, as well as a bowl with o-ring seal and back-up ring. An element can be provided as a option. The bushing holds the element in place during filtration operation, and facilitates easy removal for element change out.

More than one SET may be installed in the manifold if required for capacity. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(cavity drawings for that upon request)*. For additional information, contact HYDAC.

Technical Specifications

Mounting Method	Threaded bowl	
Flow Direction		
Element	Out-to-in	
Construction Materials		
Bowl *(30-660)*	Steel	
Housing/Bowl *(660-1320 - 2.0)*	Steel	
Flow Capacity		
30	8 gpm (30 lpm)	
60	16 gpm (60 lpm)	
110	29 gpm (110 lpm)	
160	42 gpm (160 lpm)	
240	63 gpm (240 lpm)	
280	74 gpm (280 lpm)	
330	87 gpm (330 lpm)	
660	174 gpm (660 lpm)	
1320	200 gpm (757 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	6090 psi (420 bar)	
Fatigue Pressure	6090 psi (420 bar) @ 1 million cycles	
Burst Pressure	30	15950 psi (1100 bar)
	60/110	17400 psi (1200 bar)
	160/240/280	17110 psi (1180 bar)
	330/660/1320	15080 psi (1040 bar)
Element Collapse Pressure Rating *(optional)*		
BH4HC, V	3045 psid (210 bar)	
ON, W/HC	290 psid (20 bar)	
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure *(optional)*		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
ΔP = 116 psid (8 bar) -10% *(optional non bypass)*		

Model Code

DF ON 30 SET 5 W 1 . 0 / _ _

Filter Type
DF = Manifold cartridge filter

Element Media
(omit) = Without element
ON = Optimicron® *(low collapse)*
BH/HC = Betamicron® *(High Collapse)*
W/HC = Wire Mesh
V = Metal Fiber

Size
30, 60, 110, 160, 240, 280, 330, 660, 1320

Type of Mounting
SET = Manifold cartridge

Filtration Rating *(microns)*
XX = Without element
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = BH/HC
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
W = Without indicator *(Indicators can be installed in manifold, cavity drawing upon request).*
(For additional details and options, see Clogging Indicators section.)

Type Number
1 = Sizes 30 to 1320

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SO184 = G-1/2 Drain in Bowl Option For Sizes 60 - 280 *(comes standard for sizes 330, 660 & 1320)*
W = Modification of "V" elements for use with oil water emulsions (HFA) and water polymer solutions (HFC)
SFREE = Element specially designed to minimize electrostatic charge generation
QPD = Quality Protection

Replacement Element Model Code

0030 D 003 ON / V _

Size
0030, 0060, 0110, 0160,
0240, 0280, 0330, 0660, 1320

Filtration Rating *(micron)*
ON = 1, 3, 5, 10, 15, 20
BH/HC = 3, 5, 10, 20
W/HC = 25, 50, 100, 200
V = 3, 5, 10, 20

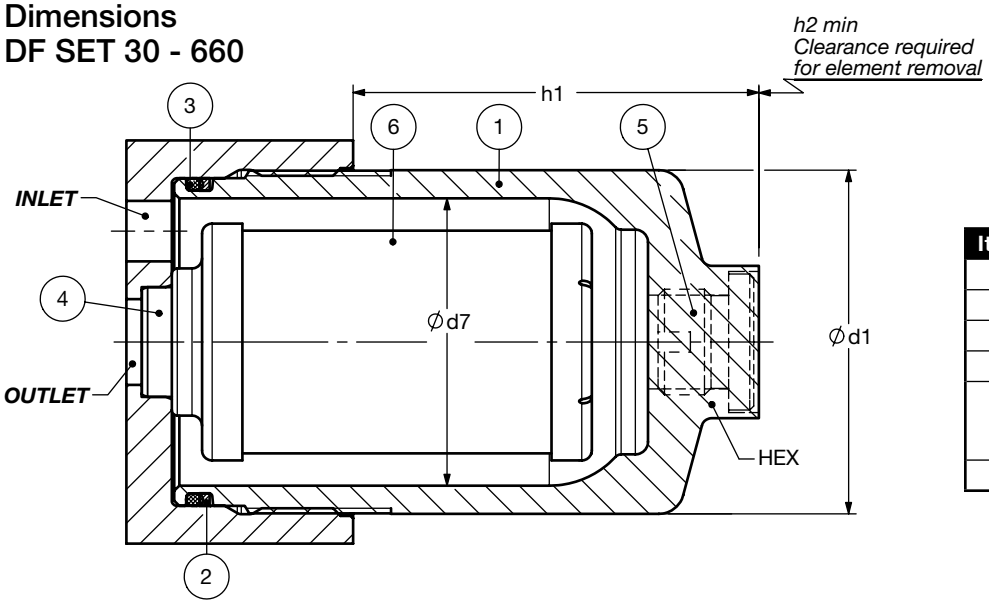
Element Media
ON, BH4HC, W/HC, V

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

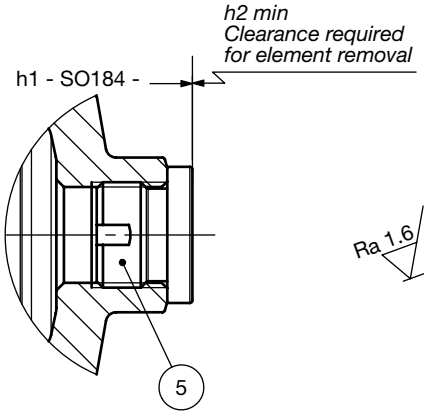
Supplementary Details
SO263 = Same as above
W = Same as above
SFREE = Element specially designed to minimize electrostatic charge generation
QPD = Quality Protection

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

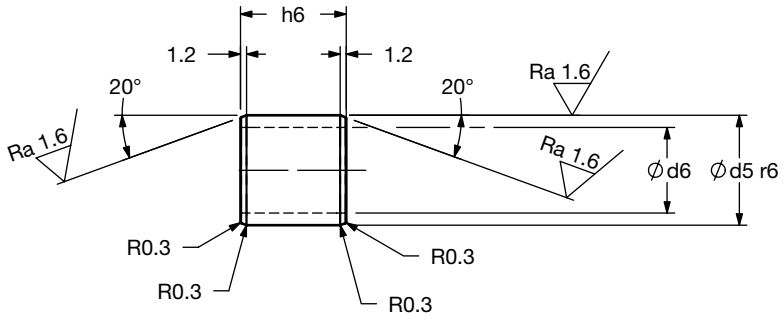
Dimensions
DF SET 30 - 660



Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*



Version with -SO184



Bushing Detail
Item 4

Size	d1	d2	d3	d4	d5	d6	d7	d8	d9	h1	h1 -SO184	h2	h3	h4	h5	h6	h7	h8	h9	h10	HEX
030	52	52	M55x1.5	11.9	11.9	8	42	56	55.2	76	81	75	36	34	26	18	6	4	5	1.8	24
060	68	65	M68x2	21.8	21.8	17	52	69	68.3	72.5	77.5	85	45	43	34.5	21	6	6.5	5	2.5	27
110	68	65	M68x2	21.8	21.8	17	52	69	68.3	140	145	85	45	43	34.5	21	6	6.5	5	2.5	27
140	68	65	M68x2	21.8	21.8	17	52	69	68.3	183.5	188.5	85	45	43	34.5	21	6	6.5	5	2.5	27
160	95	88	M95x2	33.8	33.8	26	75	96	95.3	106	110	105	56	54	44	25	8	6.5	7	2.5	32
240	95	88	M95x2	33.8	33.8	26	75	96	95.3	166	169.5	105	56	54	44	25	8	6.5	7	2.5	32
280	95	88	M95x2	33.8	33.8	26	75	96	95.3	348	352	105	56	54	44	25	8	6.5	7	2.5	32
330	130	125	M130x2	47.8	47.8	36	102	131	130.3	156	-	115	66	64	52.6	26	10	5	9	4	36
500	130	125	M130x2	47.8	47.8	36	102	131	130.3	249	-	115	66	64	52.6	26	10	5	9	4	36
660	130	125	M130x2	47.8	47.8	36	102	131	130.3	326.5	-	115	66	64	52.6	26	10	5	9	4	36

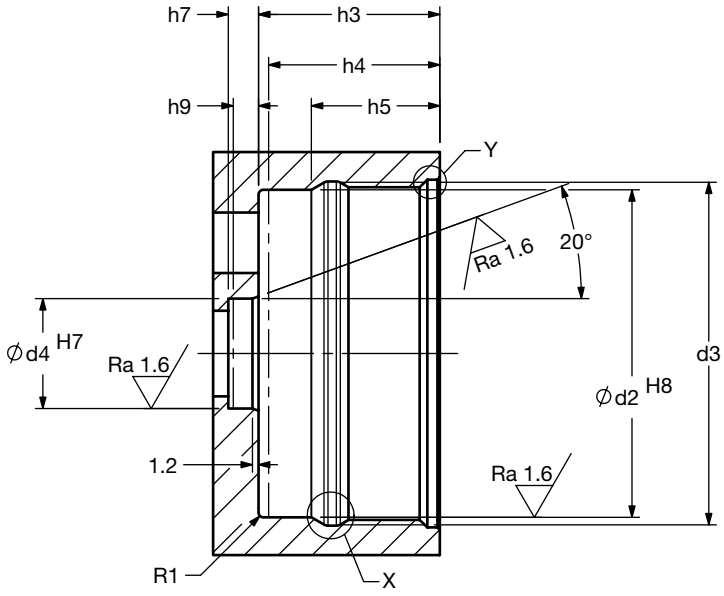
Unspecified Tolerances

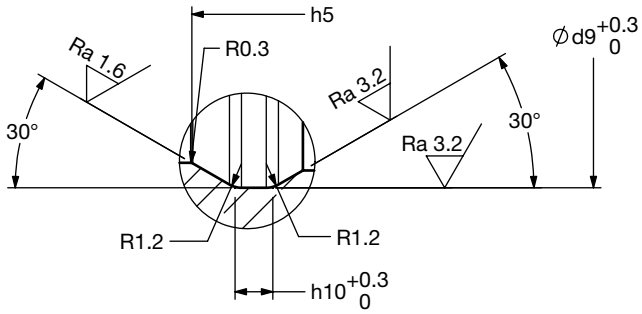
From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	**±0.1**	**±0.2**	**±0.3**	**±0.5**

Size	30	60	110	140	160	240	280	330	500	660
Weight (lbs.)	1.9	3.6	6	7.2	8.6	11.6	21.4	22.9	32.1	39.2

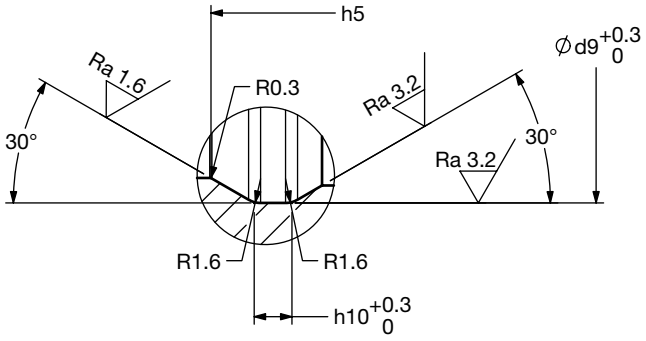
Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
DF SET 30 - 660

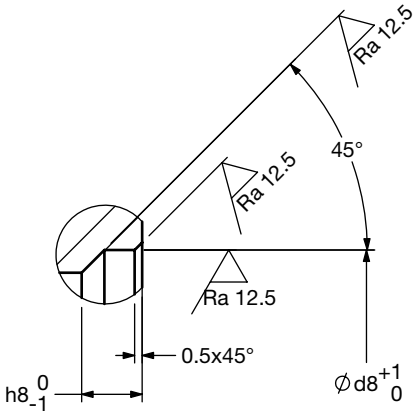




DETAIL X (SIZE 30)

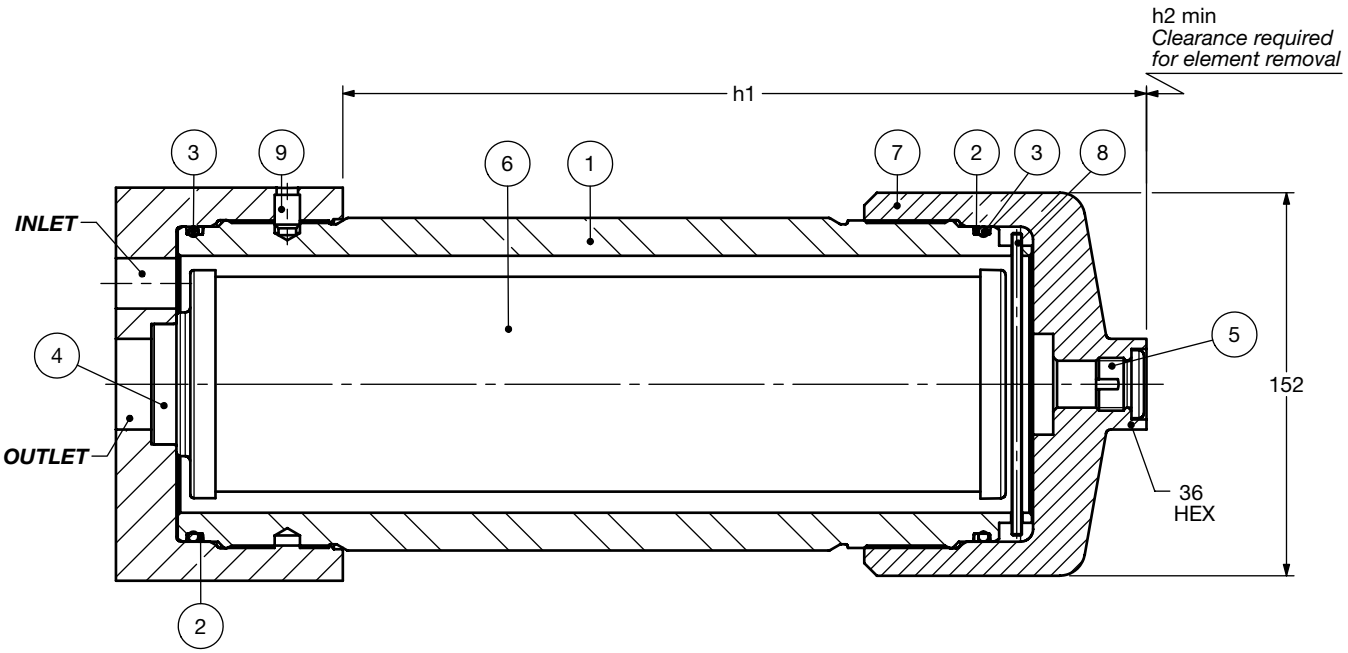


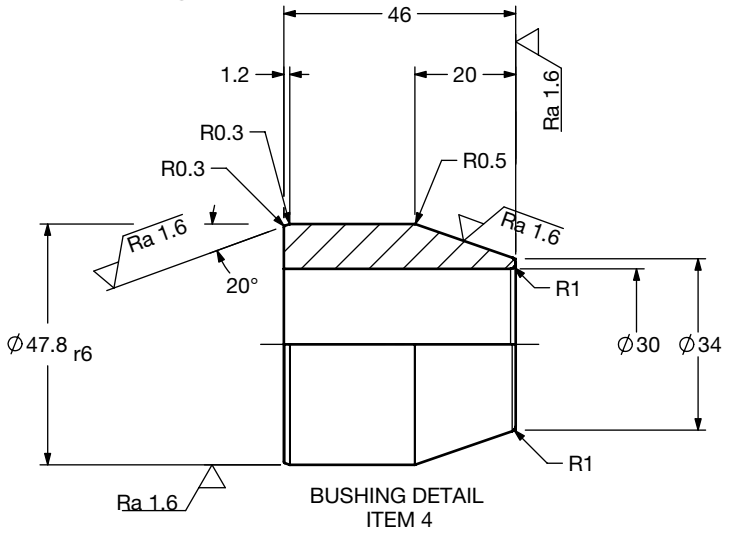
DETAIL X (SIZE 60-660)



DETAIL Y

Dimensions
DF SET 660 - 1320 2.X





Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*
7	Bowl cap
8	Cap seal
9	Set screw

Size	h1	h2
660 2.X	319	350
990 2.X	477	500
1320 2.X	643	670

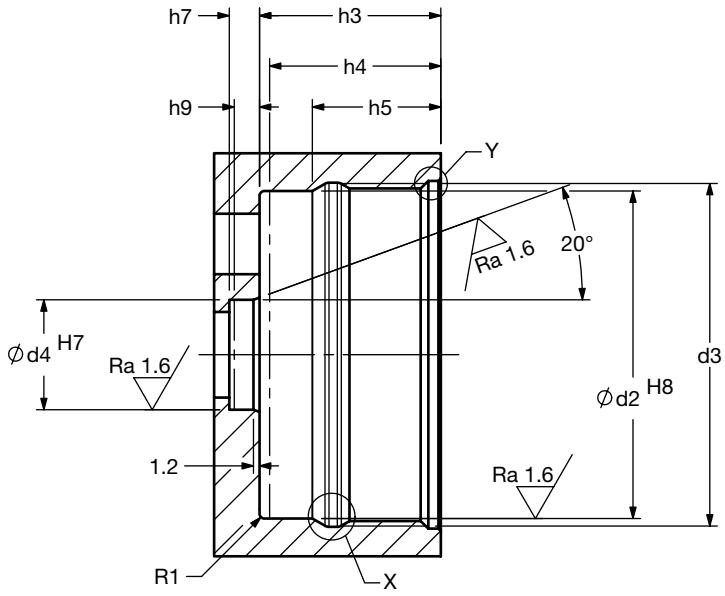
Unspecified Tolerances

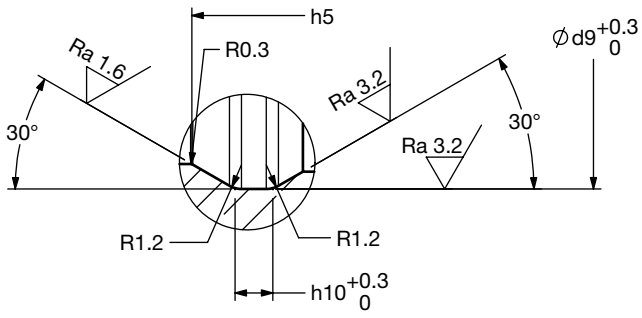
From	0.5	3	6	30	120	400
To	3	6	30	120	400	1000
	±0.1	**±0.1**	**±0.2**	**±0.3**	**±0.5**	**±0.8**

Size	660 2.X	990 2.X	1320 2.X
Weight (lbs.)	48.4	64.1	82.1

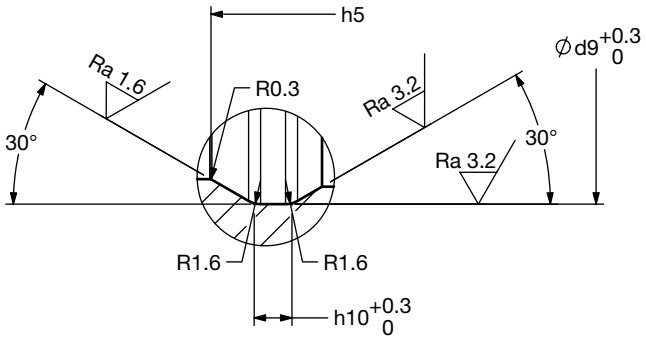
Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
DF SET 660 - 1320 2.X

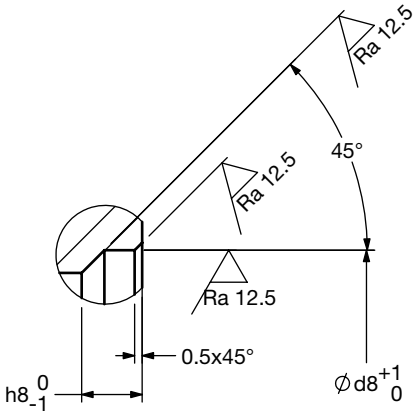




DETAIL X (SIZE 30)

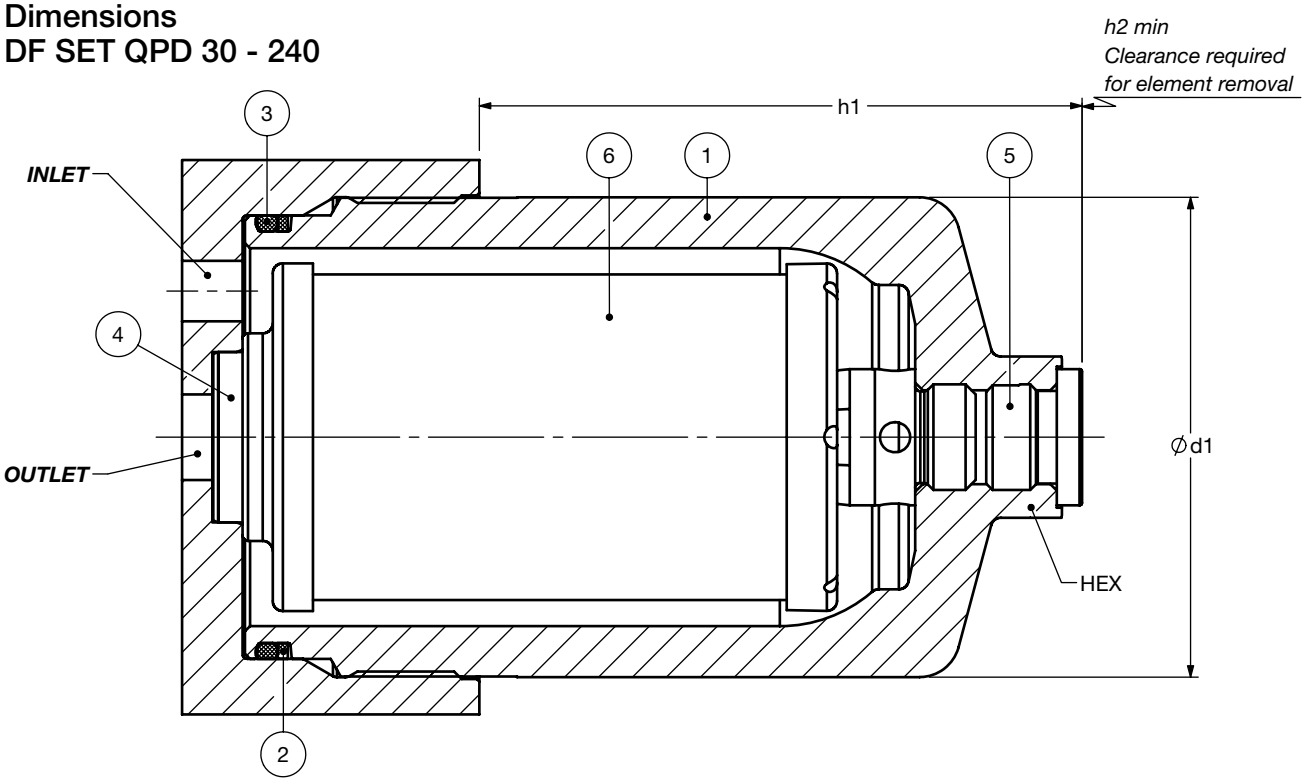


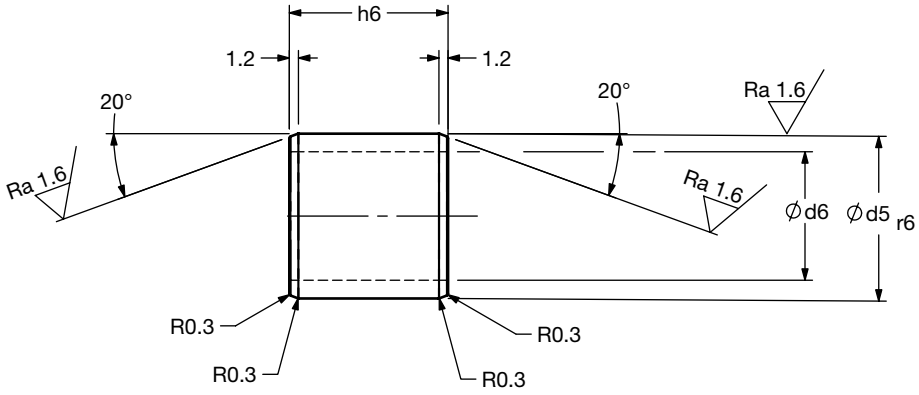
DETAIL X (SIZE 60-660)



DETAIL Y

Dimensions
DF SET QPD 30 - 240





BUSHING DETAIL
ITEM 4

Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*

Size	d1	d2	d3	d4	d5	d6	d7	d8	d9	h1	h2	h3	h4	h5	h6	h7	h8	h9	h10	HEX
030	95	88	M95x2	33.8	33.8	26	75	96	95.3	110	105	56	54	44	25	8	6.5	7	2.5	32
060	95	88	M95x2	33.8	33.8	26	75	96	95.3	169.5	105	56	54	44	25	8	6.5	7	2.5	32
110	95	88	M95x2	33.8	33.8	26	75	96	95.3	352	105	56	54	44	25	8	6.5	7	2.5	32
140	130	125	M130x2	47.8	47.8	36	102	131	130.3	156	115	66	64	52.6	26	10	5	9	4	36
160	130	125	M130x2	47.8	47.8	36	102	131	130.3	249	115	66	64	52.6	26	10	5	9	4	36
240	130	125	M130x2	47.8	47.8	36	102	131	130.3	326.5	115	66	64	52.6	26	10	5	9	4	36

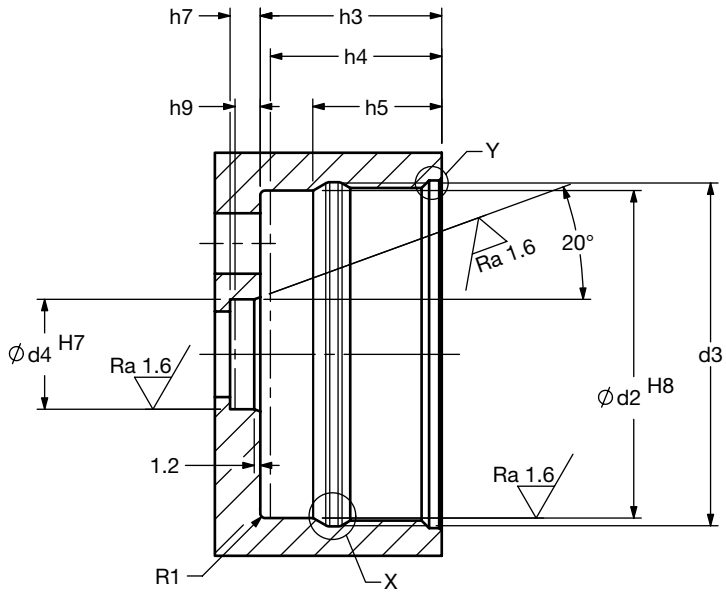
Unspecified Tolerances

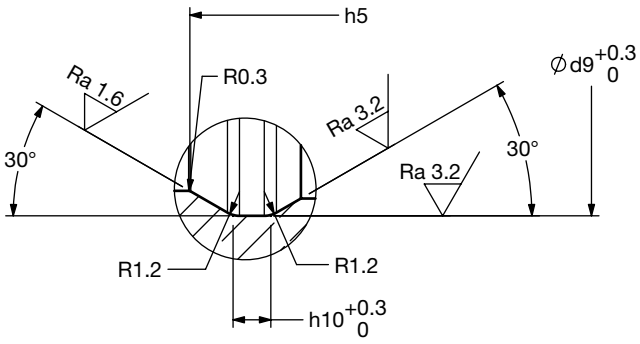
From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	**±0.1**	**±0.2**	**±0.3**	**±0.5**

Size	30	60	110	160	240	280
Weight (lbs.)	9.3	12.8	22	24.4	33.3	41.1

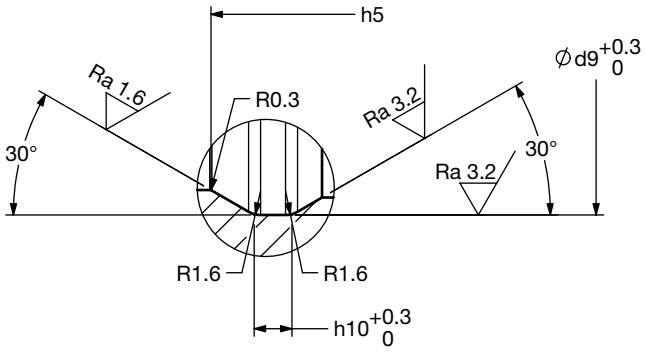
Dimensions shown are millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
DF SET QPD 30 - 240

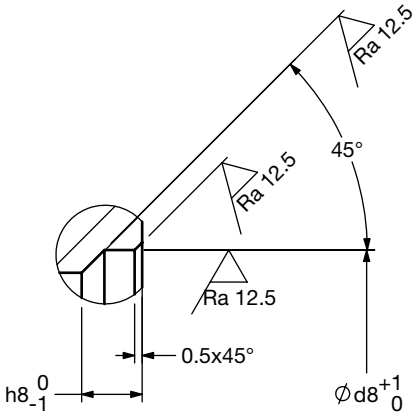




DETAIL X (SIZE 30)



DETAIL X (SIZE 60-660)



DETAIL Y

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron®	...D...BH4HC Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX BH4HC	5.005	2.782	1.992	1.043
0060 D XXX BH4HC	3.216	1.789	0.993	0.670
0110 D XXX BH4HC	1.394	0.818	0.489	0.307
0160 D XXX BH4HC	0.922	0.571	0.324	0.241
0240 D XXX BH4HC	0.582	0.373	0.214	0.159
0280 D XXX BH4HC	0.313	0.187	0.099	0.088
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049
1320 D XXX BH4HC	0.088	0.055	0.033	0.022

Optimicron	...D...ON Elements					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0030 D XXX ON	4.27	3.507	2.376	1.251	0.768	0.62
0060 D XXX ON	2.936	1.427	1.004	0.664	0.537	0.347
0110 D XXX ON	1.416	0.735	0.527	0.333	0.254	0.164
0160 D XXX ON	1.015	0.604	0.423	0.225	0.204	0.175
0240 D XXX ON	0.631	0.379	0.293	0.175	0.134	0.115
0280 D XXX ON	0.304	0.185	0.15	0.082	0.075	0.064
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031
1320 D XXX ON	0.102	0.053	0.042	0.025	0.019	0.015

Wire Mesh	...D...W/HC Elements
Size	25, 50, 100, 200 µm
0030 D XXX W/HC	0.166
0060 D XXX W/HC	0.042
0110 D XXX W/HC	0.023
0160 D XXX W/HC	0.016
0240 D XXX W/HC	0.010
0280 D XXX W/HC	0.005
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004
1320 D XXX W/HC	0.002

Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0030 D XXX V	1.011	0.740	0.411	0.200
0060 D XXX V	0.877	0.511	0.296	0.183
0110 D XXX V	0.452	0.304	0.182	0.118
0160 D XXX V	0.251	0.177	0.123	0.079
0240 D XXX V	0.169	0.137	0.093	0.062
0280 D XXX V	0.126	0.093	0.064	0.041
0330 D XXX V	0.121	0.097	0.065	0.043
0660 D XXX V	0.063	0.050	0.034	0.021
1320 D XXX V	0.032	0.026	0.018	0.012

All Element K Factors in psi / gpm.

PN#02081318 / 07.19 / FIL1907-2109

Notes

MFM SET Series

Manifold Cartridge Filters

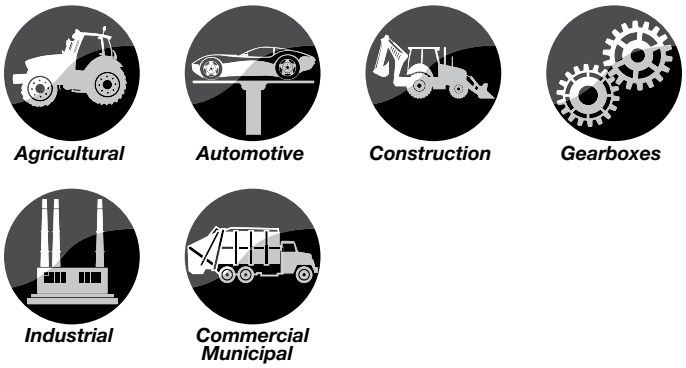
4060 PSI • up to 25 GPM

Manifold cavity is only for representation and not HYDAC's scope of supply

Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials *(nitrile rubber, fluorocarbon elastomer, ethylene propylene rubber)* provides compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl requires minimal clearance to remove the element for replacement, and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC differential Pressure Indicators *(optional)* have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- For special finishes and coatings – consult HYDAC for minimum quantities, availability and pricing.

Applications



Installation

The MFM Set Manifold Cartridge Filter is installed into a threaded cavity that is machined in the manifold *(manifold not included - see cavity drawing)*. A bushing is provided for proper element installation, as well as a bowl with o-ring seal and back-up ring. An element can be provided as a option. The bushing holds the element in place during filtration operation, and facilitates easy removal for element change out.

More than one SET may be installed in the manifold if required for capacity. A differential pressure clogging indicator, to warn of high upstream pressure *(element clogged)*, can be attached to the manifold as well *(cavity drawings for that upon request)*. For additional information, contact HYDAC.

Technical Specifications

Mounting Method	Threaded bowl
Flow Direction	
Element	Out-to-in
Construction Materials	
Bowl	Steel
Flow Capacity	
35	10 gpm (35 lpm)
55	18 gpm (68 lpm)
75	20 gpm (76 lpm)
95	25 gpm (95 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	4060 psi (280 bar)
Fatigue Pressure	4060 psi (280 bar) @ 1 million cycles 4641 psi (320 bar) @ 100,000 cycles
Burst Pressure	13,920 psi (960 bar)
Element Collapse Pressure Rating *(optional)*	
ON	290 psid (20 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C) Consult HYDAC for applications operating below 14°F (-10°C)
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure *(optional)*	
ΔP = 72 psid (5 bar) -10% ΔP = 100 psid (7 bar) +10% *(standard)*	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

MFM ON 35 SET 3 W 1 . 0 / __ __

Filter Type
MFM = Manifold cartridge filter

Element Media
(omit) = Without element
ON = Optimicron® *(Low Collapse)*

Size
35 = 10 gpm
55 = 18 gpm
75 = 20 gpm
95 = 25 gpm

Type of Mounting
SET = Manifold cartridge

Filtration Rating *(microns)*
XX = Without element
1, 3, 5, 10, 15, 20 = ON

Type of ΔP Clogging Indicator
W = Without indicator *(Indicators can be installed in manifold, cavity drawing upon request).*
(For additional details and options, see Clogging Indicators section.)

Type Number
1 = Sizes 35 to 95

Type Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SFREE = Element specially designed to minimize electrostatic charge generation
QPGI1V2 = Quality Protection

Replacement Element Model Code

0035 D 010 ON / V __

Size
0035, 0055, 0075, 0095

Filtration Rating *(micron)*
ON = 1, 3, 5, 10, 15, 20

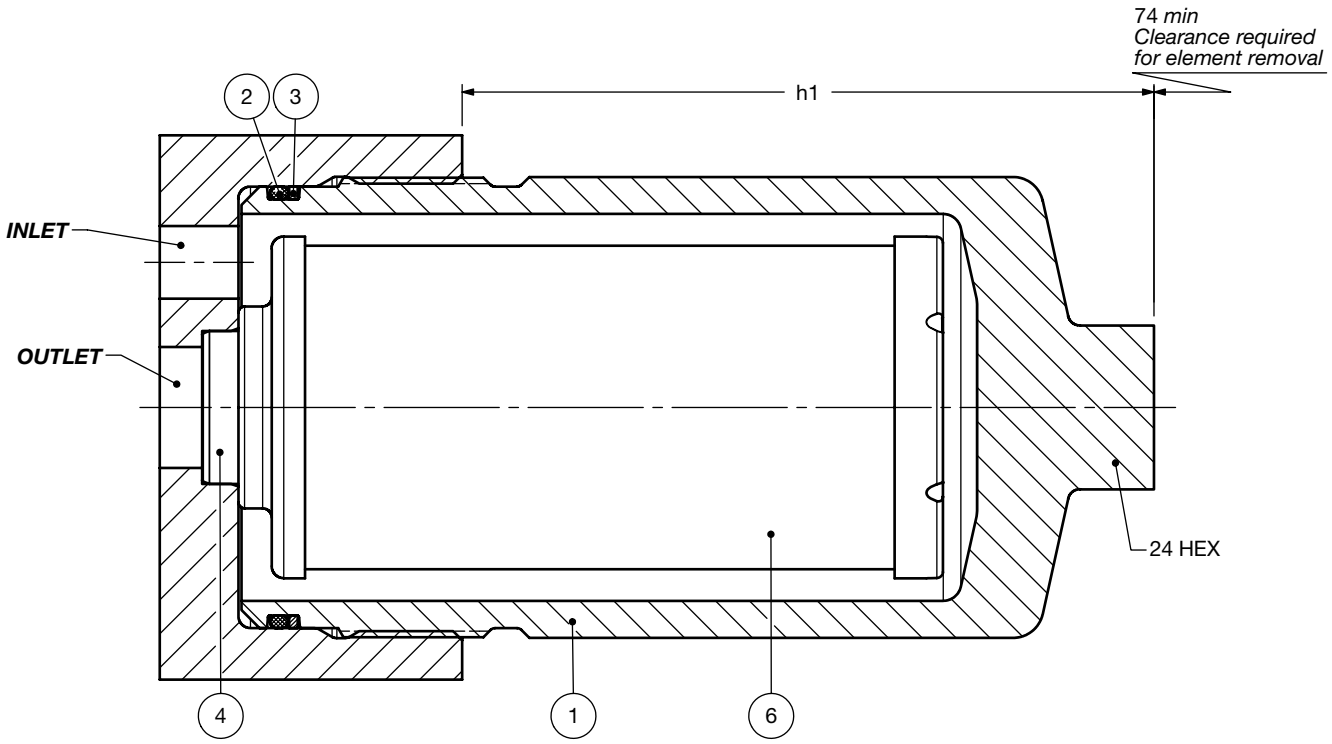
Element Media
ON = Optimicron®

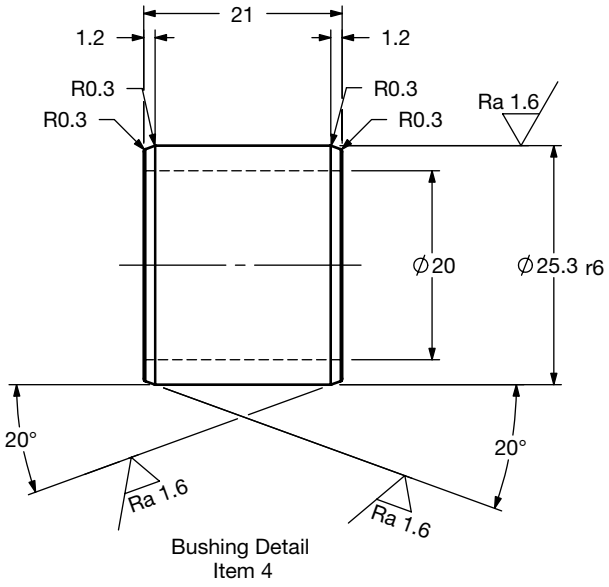
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SFREE = *(same as above)*
QPGI1V2 = Quality Protection

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
MFM SET 35 - 95





Bushing Detail
Item 4

Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*

Size	h1
MFM 35 SET	~ 70
MFM 55 SET	~ 116
MFM 75 SET	~ 169
MFM 95 SET	~ 209

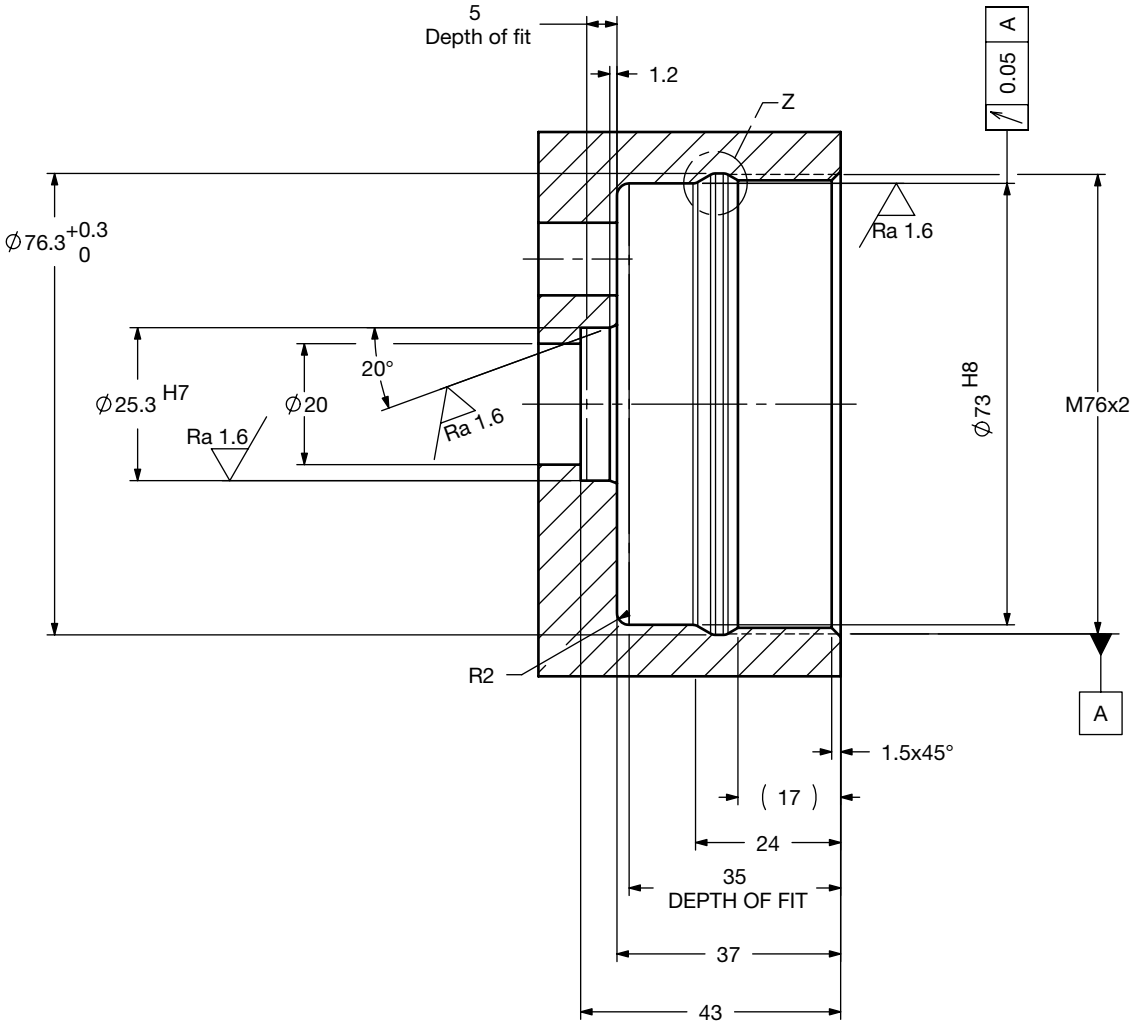
Unspecified Tolerances

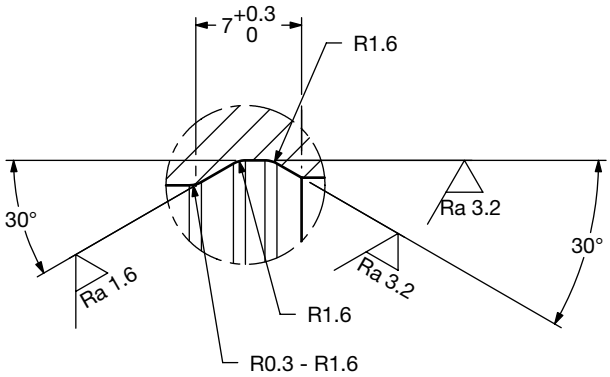
From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	±0.1	±0.2	±0.3	±0.5

Size	35	55	75	95
Weight (lbs.)	3	4.5	5.7	6.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

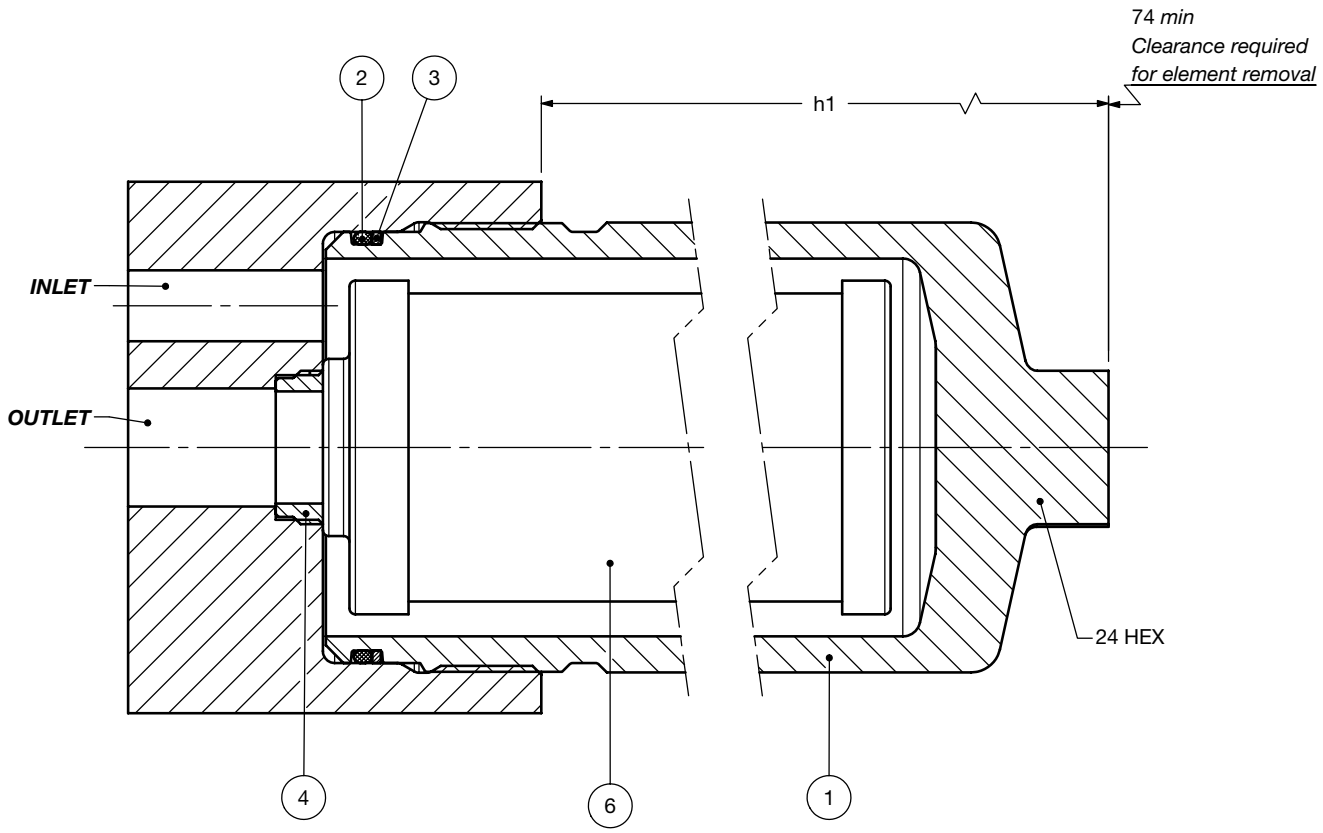
Customer Manifold Machining
MFM SET 35 - 95

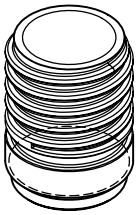




DETAIL Z

Dimensions
MFM SET QPGI1V2 35 - 95





Bushing
Item 4
(Supplied by HYDAC)

Item No	SET Components
1	Bowl
2	Bowl back-up ring
3	Bowl o-ring
4	Bushing
5	Drain plug *(Std – sizes 330/660,* *Opt – sizes 60-280 - use code SO184)*
6	Element *(optional)*

Size	h1
MFM 35 QP SET	~ 70
MFM 55 QP SET	~ 116
MFM 75 QP SET	~ 169
MFM 95 QP SET	~ 209

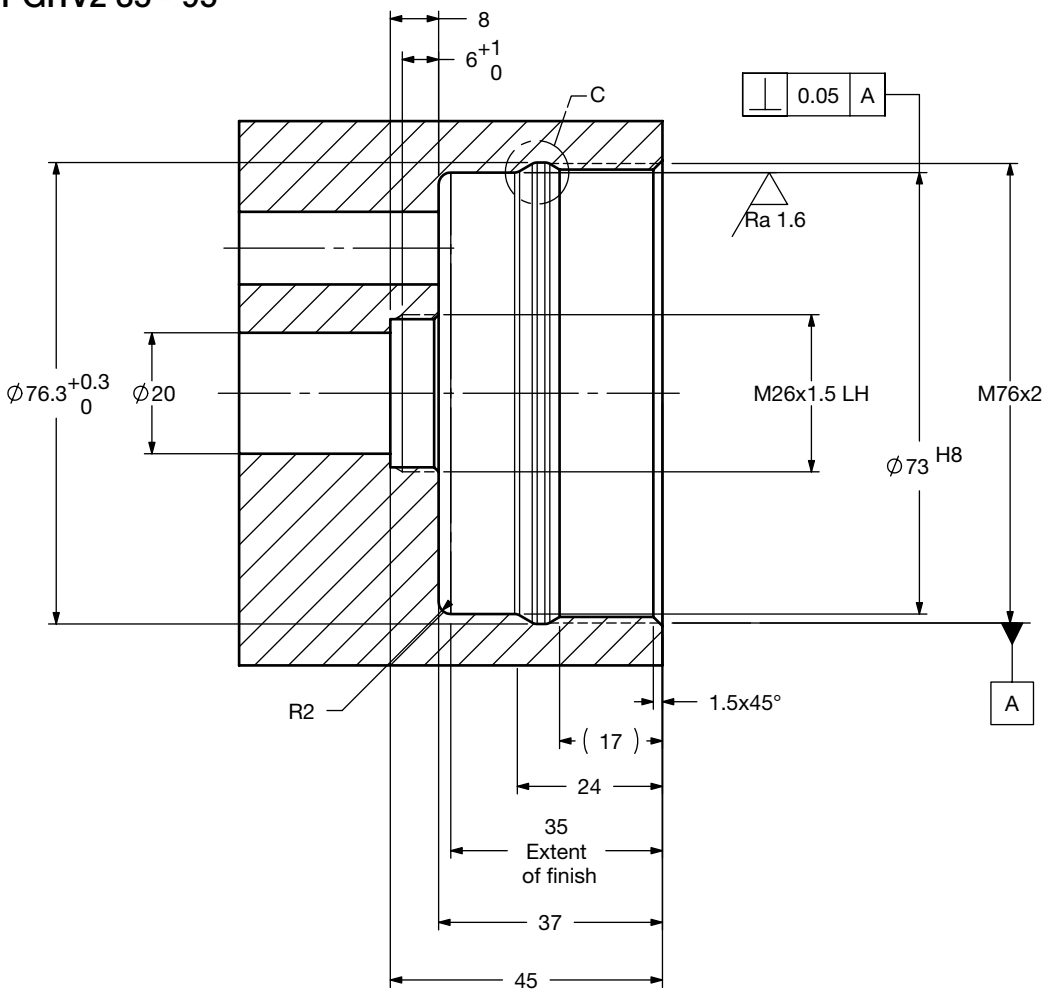
Unspecified Tolerances

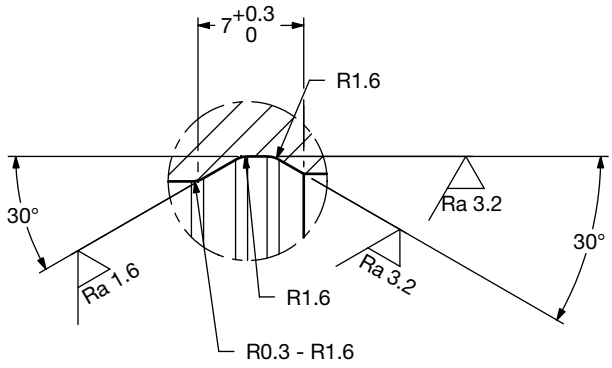
From	0.5	3	6	30	120
To	3	6	30	120	400
	±0.1	±0.1	±0.2	±0.3	±0.5

Size	35	55	75	95
Weight (lbs.)	3.2	4.7	5.9	6.9

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Customer Manifold Machining
MFM SET QPGI1V2 35 - 95





Detail C

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141\ \text{SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON (Pressure Elements)					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0035 D XXX ON	2.755	1.169	0.938	0.752	0.549	0.408
0055 D XXX ON	1.427	0.675	0.543	0.434	0.284	0.211
0075 D XXX ON	0.916	0.461	0.37	0.296	0.183	0.136
0095 D XXX ON	0.724	0.37	0.296	0.238	0.144	0.105

All Element K Factors in psi / gpm.

Notes

H Special Order Filters

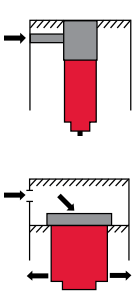
The Special order filters in this section are application-specific engineered filters, ideal for custom solutions or large scale projects. Because they are engineered solutions, they are not stock items and minimum quantities and longer lead times can be expected. Please plan well in advance if specifying any of the filters in this section.

Note - Minimum order quantities and/or extended lead times will apply (consult HYDAC Product Management)

RFM...S & RFM...Set Series

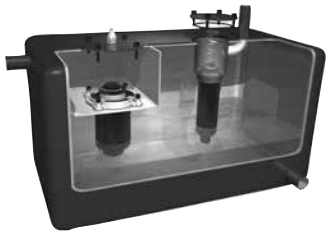
Inside Tank Return Line Filters

145 psi • up to 132 gpm



RFM...S

RFM...Set



Typical Installation of Both Models
Tank Cutaway

Features

- Unique design allows filter to be installed completely inside of the reservoir tank. This saves space, protects the filter, reduces leak points and reduces overall installation cost.
- Lightweight unit requiring no filter head reduces pressure drop while decreasing cost.
- Excellent option for low overhead clearance applications.
- Allows pre-filtration of new make-up oil assuring cleanliness of system.
- Contamination Basket prevents filtered contamination from re-entering the tank during element changeout on 330 & 500 size models.
- Simplifies element changeout procedure in the field.
- RFM Set configuration (tank plenum) allows for multiple returns to enter plenum without manifolding.

Note: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

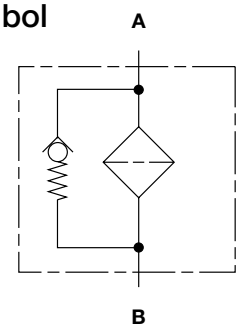
Applications

Agricultural

Automotive

Construction

Hydraulic Symbol



Installation

RFM...SET: Inside Tank Filters are installed into a separate chamber *(see tank cutaway)* built into the reservoir tank via the filter ring and four bolts. More than one filter may be installed in the chamber if required for capacity. This procedure will require a hole to be cut into the top of the reservoir tank and an access cover fastened to the tank for each filter installed. The inlet piping for return should be connected through the tank wall into the separate chamber. A clip installed on the filter ring holds the element in place during filtration operations, and facilitates easy removal for element change out. A static pressure clogging indicator, to warn of high upstream pressure *(element clogged),* can be attached to the access cover. For additional information, contact HYDAC.

RFM...S: Inside Tank Filters are installed to the top of the tank by welding the inner chamber to the tank cover *(see tank cutaway).* This procedure will require a hole to be cut into the top of the reservoir tank and an access cover fastened to the tank. A smaller hole must be cut somewhere in the tank for the return line piping to pass through. The hole located in the side of the inner chamber must be directed towards the return line piping. The inlet piping for return should then be welded through the tank wall and to the inner chamber. The spring located between the element and the access cover provides force to hold element in place during filter operation. A static pressure indicator to warn of high upstream pressure, and if element is clogged can be attached to the access cover. Multiple filters can be installed in the tank. For additional installation information, contact HYDAC.

Technical Specifications

Mounting Method	See Installation at left	
Port Connection	Outlet	
75/165	1.26” Smooth Port	
330/500	2” NPT	
Flow Direction	Inlet: Side	Outlet: Bottom
Construction Materials		
Chamber	Steel (75/165/185)	
Bowl	Plastic	
Ring	Aluminum (330/500)	
Flow Capacity		
75 RFM-S	20 gpm (75 lpm)	
165 RFM-S	43 gpm (165 lpm)	
330 RFM-Set	87 gpm (330 lpm)	
500 RFM-Set	132 gpm (500 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure:	145 psi (10 bar)	
Fatigue Pressure	145 psi (10 bar)	
Burst Pressure	> 580 psi (40 bar)	
Element Collapse Pressure Rating		
ON, W/HC, MM,	290 psid (20 bar)	
BN4AM, ECON2, AM, P/HC,	145 psid (10 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14˚F (-10˚C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10%		
ΔP = 87 psid (6 bar) +10%		

Model Code

RFM ON 75 S 3 W 1.0 / V

Series
RFM = In-Tank Return Line Filter

Element Media
ON = Optimicron®
ECON2 = ECOmicron®
W/HC = Wire Mesh
MM = Mobilemicron® *(Low Collapse)*
BN/AM = Betamicron®/Aquamicron®
AM = Aquamicron®
P/HC = Polyester

Size
75
165 — *Not available in the SET Style*
330
500 — *Not available in the S Style*

Type of Mounting Connection
S = Inside Tank with shroud for welding and spring for element hold-down *(sizes 75 & 165 only)*
SET = Inside Tank with Ring for bolt mounting and clip for element hold-down *(sizes 330 & 500 only)*

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 10 = BN/AM
3, 5, 10, 20 = ECON2
40 = AM
25, 50, 100, 200 = W/HC
10, 20 = P/HC
10, 15 = MM

Clogging Indicator
W = Without Indicator *(Indicators are installed on access cover on top of tank)*
(For additional details and options, see Clogging Indicators section.)

Modification Number *(latest version always supplied)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)* — not available with ECON2
KB = no bypass *(flushing system)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0330 R 003 ON / V

Size
0075, 0165, 0330, 0500

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
25, 50, 100, 200 = W/HC
10, 15 = MM
3, 10 = BN4AM
40 = AM
10, 20 = P/HC

Element Media
ON, BN4AM, ECON2, AM, W/HC, P/HC, MM

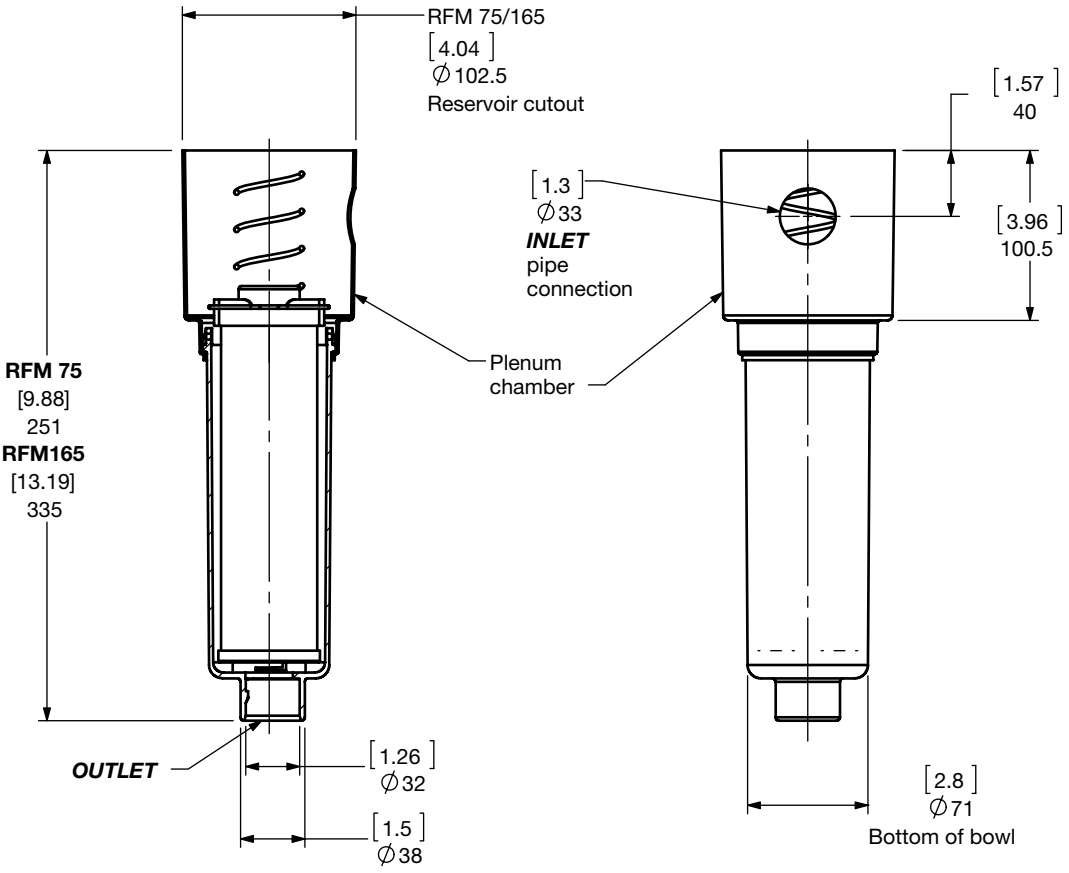
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lube or coolant)*
B6 = 87 psid (6 bar) *(return line extended life)* — not available with ECON2
KB = no bypass *(flushing system*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SFREE = Element specially designed to minimize electrostatic charge generation

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

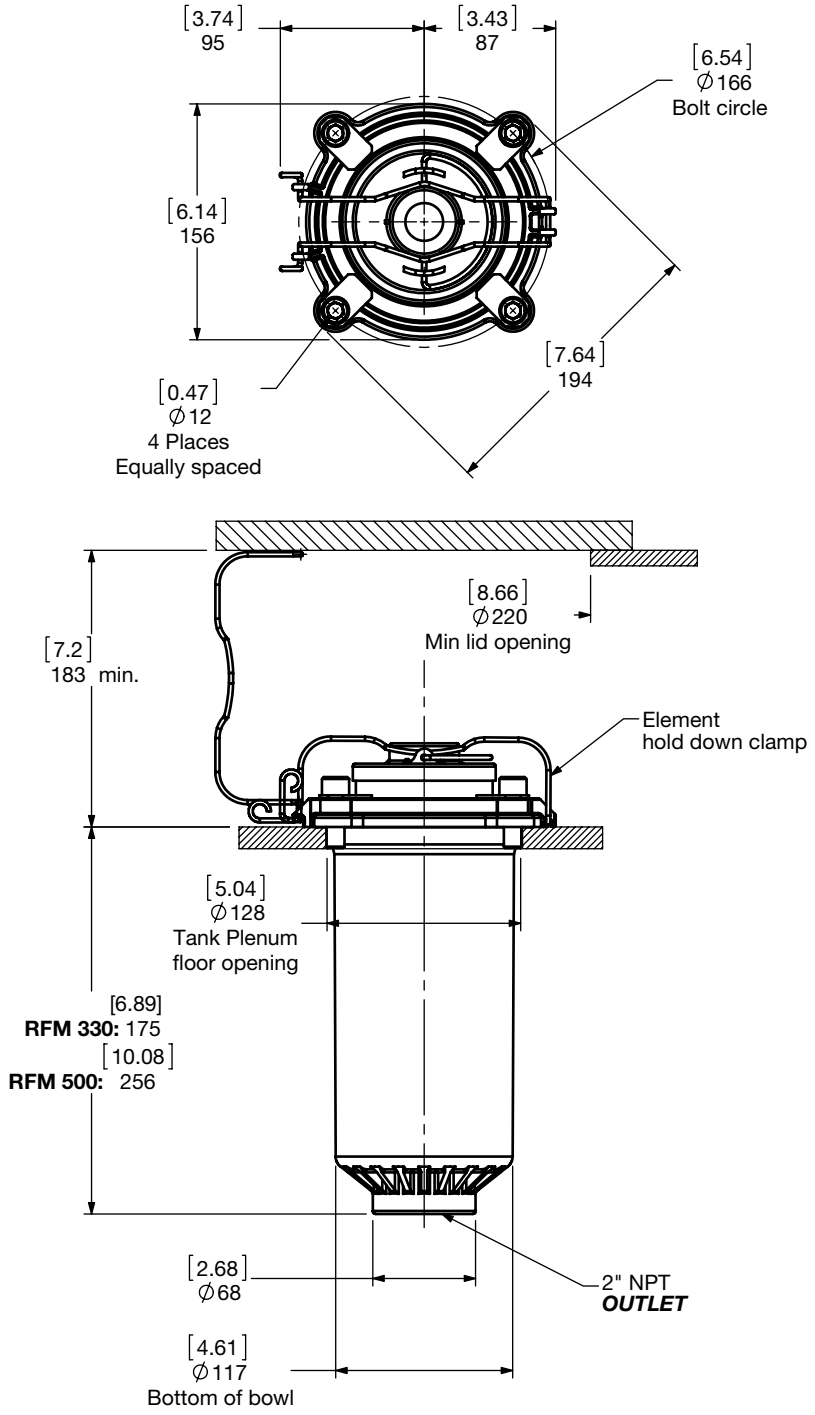
Dimensions
RFM…S



Size	75	165
Weight (lbs.)	2.1	2.7

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFM…Set



Size	330	500
Weight (lbs.)	5.2	6

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

SPECIAL ORDER FILTERS - LOW PRESSURE

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP = Ø (no housing) + Element ΔP = Element ΔP

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

Element K Factors

$$\Delta P \text{ Assembly} = \Delta P \text{ Element} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0075 R XXX ON	1.405	1.065	0.735	0.401	0.263	0.241
0165 R XXX ON	0.774	0.518	0.404	0.221	0.123	0.133
0330 R XXX ON	0.444	0.204	0.15	0.081	0.07	0.056
0500 R XXX ON	0.289	0.143	0.104	0.06	0.046	0.038

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0165 R XXX ECON2	0.615	0.428	0.247	0.132
0330 R XXX ECON2	0.230	0.148	0.093	0.066
0500 R XXX ECON2	0.165	0.104	0.071	0.044

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0330 R XXX BN4AM	0.477	0.165
0500 R XXX BN4AM	0.313	0.11

Aquamicron	...R...AM
Size	40 µm
0330 R 040 AM	0.115
0500 R 040 AM	0.076

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
0075 R XXX W/HC	0.020
0165 R XXX W/HC	0.011
0330 R XXX W/HC	0.011
0500 R XXX W/HC	0.007

Polyester	...R...P/HC	
Size	10 µm	20 µm
0075 R XXX P/HC	0.071	0.036
0165 R XXX P/HC	0.033	0.016
0330 R XXX P/HC	0.016	0.008
0500 R XXX P/HC	0.011	0.005

Mobilemicron	...R...MM		
Size	8 µm	10 µm	15 µm
0075 R XXX MM	0.265	0.265	0.166
0165 R XXX MM	0.146	0.146	0.091
0330 R XXX MM	0.078	0.078	0.049
0500 R XXX MM	0.052	0.052	0.032

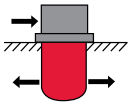
All Element K Factors in psi / gpm.

Notes

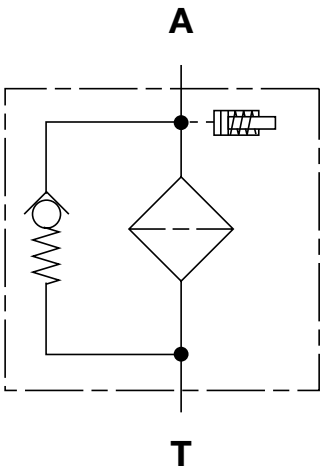
RFMP Series

In-Tank Return Line Filters

100 psi • up to 26 gpm



Hydraulic Symbol



Features

- The compact and lightweight design make RFMP filters especially suitable for mobile applications.
- RFMP filters integrate the head and bowl into a single one piece polyamide housing. This makes for a more leak-tight housing.
- The housing is designed so that a down tube can be attached to the outlet spout.

Note: This filter is configured with an .....R.... type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Applications

Agricultural

Construction

Technical Specifications

Mounting Method		
165	4 mounting holes - filter housing	
Port Connections	Inlet / Outlet	
165	1” Hose Barb/1.26” smooth port	
Direction of Flow	Side inlet and bottom outlet.	
Mat. of Construc.	Housing	Lid
165	Polyamide	Plastic
Flow Capacity		
165	26 gpm (100 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	101.5 psi (7 bar)	
Element Collapse Pressure Rating		
ON	290 psid (20 bar)	
ECON2, P/HC, MM	145 psid (10 bar)	
Fluid Temperature Range	-22˚F to 176˚F (-30˚C to 80˚C)	
Consult HYDAC for applications below -22˚F (-30˚C)		
Fluid Compatibility		
Compatible with all petroleum oils and synthetic fluids rated for use with nitrile rubber (NBR) seals.		
Indicator Trip Pressure		
P = 29 psi (2 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(standard)*		

*Note: All RFMP Filters MAWP reduce to 7 bar (101.5 psi) when using the following “VMF” and “VR” indicators: B, BM, E, ES, GC, LE, LZ.

Model Code

RFMP ON 165 V HB 10 BM 1 . X / - 4L

Filter Type
RFMP = In-Tank Return Line Filter

Element Media
ON = Optimicron® *(Low Collapse)*
ECON2 = ECOmicron® *(Low Collapse)*
P/HC = Polyester *(Low Collapse)*
MM = Mobilemicron® *(Low Collapse)*

Size
165

Working Pressure
V = 101.5 psid (7 bar)

Inlet Connection
HB = Hose Barb

Filtration Rating *(microns)*
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = ECON2
10, 20 = P/HC
10, 15 = MM

Type of Static Clogging Indicator
A, BM

Type Number
1 = clogging indicator positions *(see chart)*

Modification Number *(latest version always supplied)*

Mounting Method
4L = 4 hole tank flange

Supplementary Details
DTxx = Down tube *(xx length in inches - up to 12 inches)*
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0165 R 010 ON /

Size
0165

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
10, 20 = P/HC
3, 5, 10, 20 = ECON2
10, 15 = MM

Element Media
ON, ECON2, P/HC, MM

Seals
(omit) = Nitrile rubber (NBR) *(standard)*

Bypass Valve
(omit) = 43 psid (3 bar) *(standard)*

Supplementary Details
SFREE = *(same as above)*

Clogging Indicator Model Code

VMF 2 BM . X /

Indicator Prefix
VMF = Mobile Filters

Trip Pressure
2 = 29 psid (2 bar)

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*

Modification Number

Seals
(omit) = Nitrile rubber (NBR) *(standard)*

(For additional details and options, see Clogging Indicators section.)

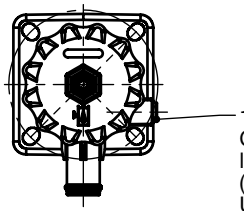
Note: Requires Adapter (P/N 02702449)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

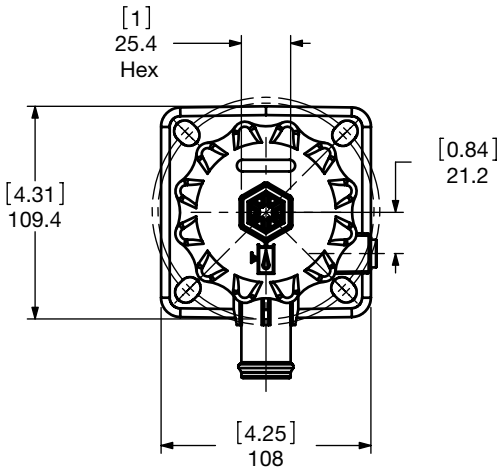
SPECIAL ORDER FILTERS - LOW PRESSURE

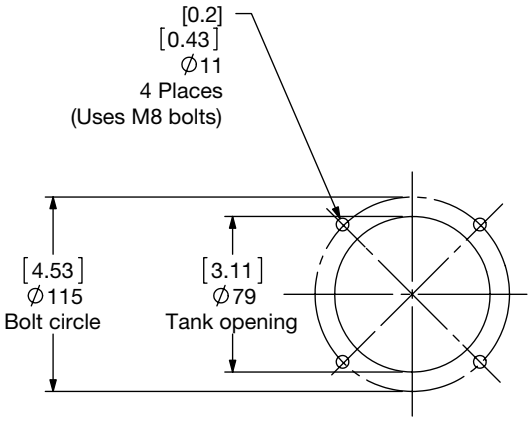
Dimensions

RFMP 165

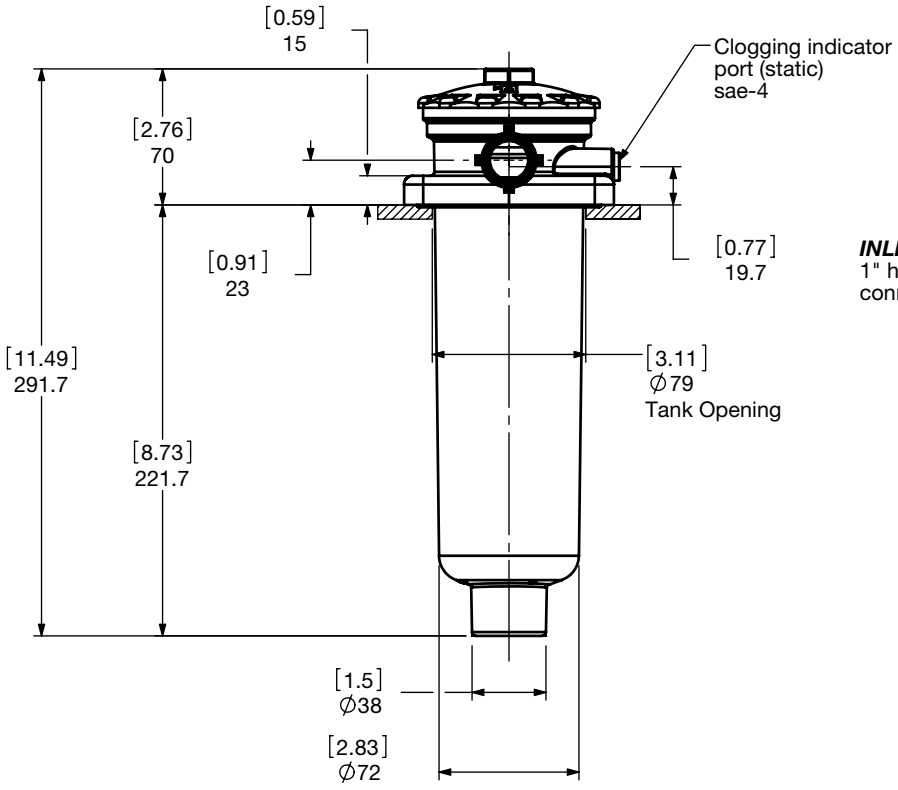


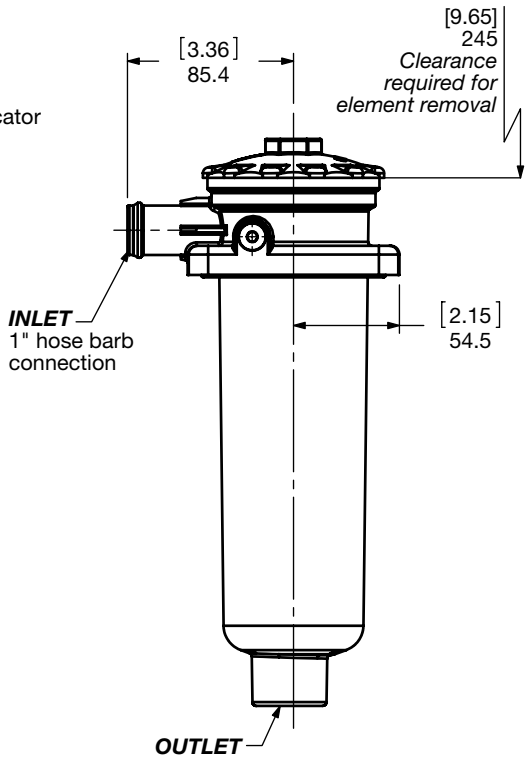
1.X
Clogging indicator
location
(right front)
Uses indicator model (VMF...)
with adapter (P/N: 02702449)





Mounting pattern





Size	165
Weight (lbs.)	2.5

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

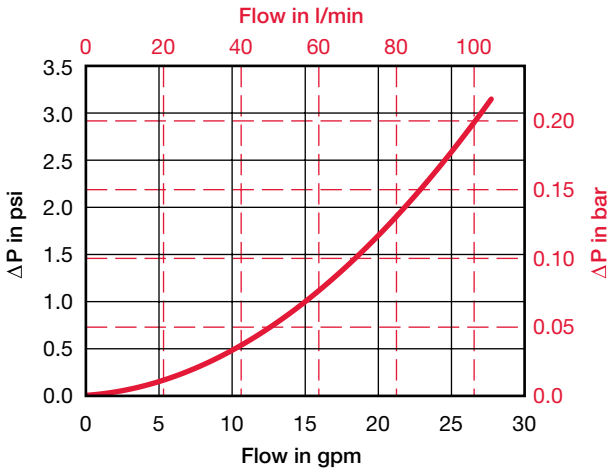
Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

RFMP 165 Housing



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0165 R XXX ON	0.774	0.518	0.404	0.221	0.123	0.133

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0165 R XXX ECON2	0.615	0.428	0.247	0.132

Mobilemicron	...R...MM		
Size	8 µm	10 µm	15 µm
0165 R XXX MM	0.146	0.146	0.091

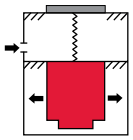
Polyester	...R...P/HC	
Size	10 µm	20 µm
0165 R XXX P/HC	0.033	0.016

All Element K Factors in psi / gpm.

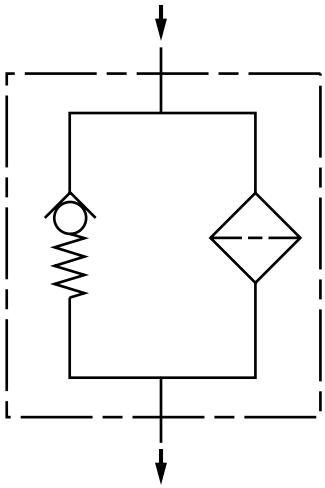
RKT Series

Return Line Filter

145 psi • up to 317 gpm



Hydraulic Symbol



Features

Filter Housing - Design

This filter system provides an economic solution for full-flow return line filtration for large flow rates. The filter is mounted in the intermediate chamber that is formed in the top part of the tank. This integrates the filter into the tank so any design is possible for the return port connections and several filters can be used without splitting up the return lines. The optimal flow conditions in the chamber guarantee effective magnetic pre-filtration and filter service life. The filter housings are designed in accordance with international regulations. They consist of a housing tube, filter lid and an element location nozzle.

The filter element can be removed from the top.

Standard equipment

- magnetic core integrated into clamp (only for RKT 0170 – 0500)
- magnetic core integrated into cover (only for RKT 0600 – 1200)
- with diffuser
- with element location nozzle
- with bypass valve

Filter Elements

HYDAC filter elements are validated and their quality is constantly monitored according to the following standards:

ISO 2941, ISO 2942, ISO 2943, ISO 3724,ISO 3968, ISO 11170, ISO 16889

Filter elements are available with the following pressure stability values:

Glass fiber (ULP):	87 psi (6 bar)
Glass fiber with pre-filter (UMC):	87 psi (6 bar)
Wire mesh (WPI):	87 psi (6 bar)

Other filtration ratings on request.

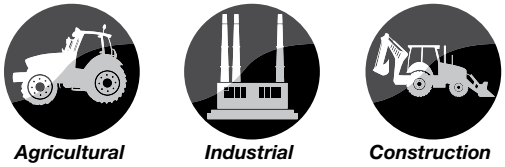
Special Models and Accessories

- without magnetic core
- without shroud (only RKT 0170 – 0500)
- with shroud
- outlet grill in openings in protective tube
- seals made of FKM

Technical Specifications

Mounting Method	4 Mounting holes - filter housing	
Direction of Flow	Inlet: Tank Chamber	Outlet: Shroud windows
Materials of Construction		
	Housing	**Lid**
0170, 0230, 0300, 0400,	Steel	Aluminum
0310, 0410, 0500,	Steel	Aluminum
0600, 0800, 1200	Steel	Aluminum
Flow Capacity		
0170	45 gpm (170 l/min)	
0230	66 gpm (250 l/min)	
0300	79 gpm (300 l/min)	
0310	92 gpm (350 l/min)	
0400	105 gpm (400 l/min)	
0410	118 gpm (450 l/min)	
0500	145 gpm (550 l/min)	
0600	158 gpm (600 l/min)	
0800	211 gpm (800 l/min)	
1200	317 gpm (1200 l/min)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	145 psi (10 bar)	
Fluid Temp. Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications below -22˚F (-30˚C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Bypass Valve Cracking Pressure		
ΔP = 36 psi (2.5 bar) *standard* ΔP = 11 psi (0.8 bar) *optional*		

Applications



Agricultural *Industrial* *Construction*

PN#02081318 / 07.19 / FIL1907-2109

Model Code

RKT 0500 UMC 010 V M B L B N VX X 1 /-XXX

Filter type
RKT

Size
0170, 0230, 0300, 0400, 0310, 0410, 0500, 0600, 0800, 1200

Element Media
ULP = glass fiber
UMC = glass fiber with pre-filter
WPI = wire mesh

Filtration rating in µm
ULP = 010, 025
UMC = 010, 020
WPI = 100

Bypass valve
C = with bypass valve 0.8 bar (11 psi)
V = standard: with bypass valve 2.5 bar (36 psi)
X = without bypass valve

Magnetic core
M = with magnetic core
X = without magnetic core

Operating pressure
B = 145 psi (10 bar)

Outlet shroud version
X = without shroud (only RKT 0170, 0230, 0300, 0400, 0310, 0410, 0500)
B = with shroud, floor open
L = standard: with diffuser (perforated)
R = with diffuser (openings with outlet grill)

Cover
A = with cover
B = cover with filling port
D = cover with handle
X = without cover

Seals
N = NBR (nitrile rubber)
V = FKM

Clogging indicator
VX = without clogging indicator; plugged port

Trip pressure
X = none (no clogging indicator is installed)

Modification number
X = the latest version is always supplied

Supplementary details

Replacement Element

UMC - 0010 - 117-X509-S - N - RT / __

Element Media
ULP, UMC, WPI

Filtration Rating *(micron)*
10, 25 = ULP
10, 20 = UMC
100 = WPI

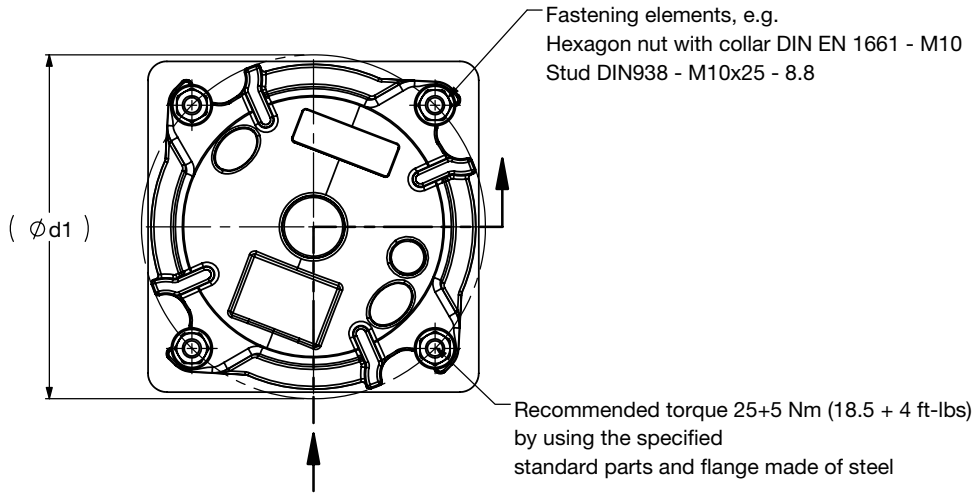
Size
117-X509-S = RKT0170 element code
117-X512-S = RKT0230 element code
117-X516-S = RKT0300 element code
120-XZ11-Q = RKT0310 element code
117-X520-S = RKT0400 element code
120-XZ14-Q = RKT0410 element code
120-XZ18-Q = RKT0500 element code
152-X218-S = RKT0600 element code
152-X225-S = RKT0800 element code
152-X231-S = RKT1200 element code

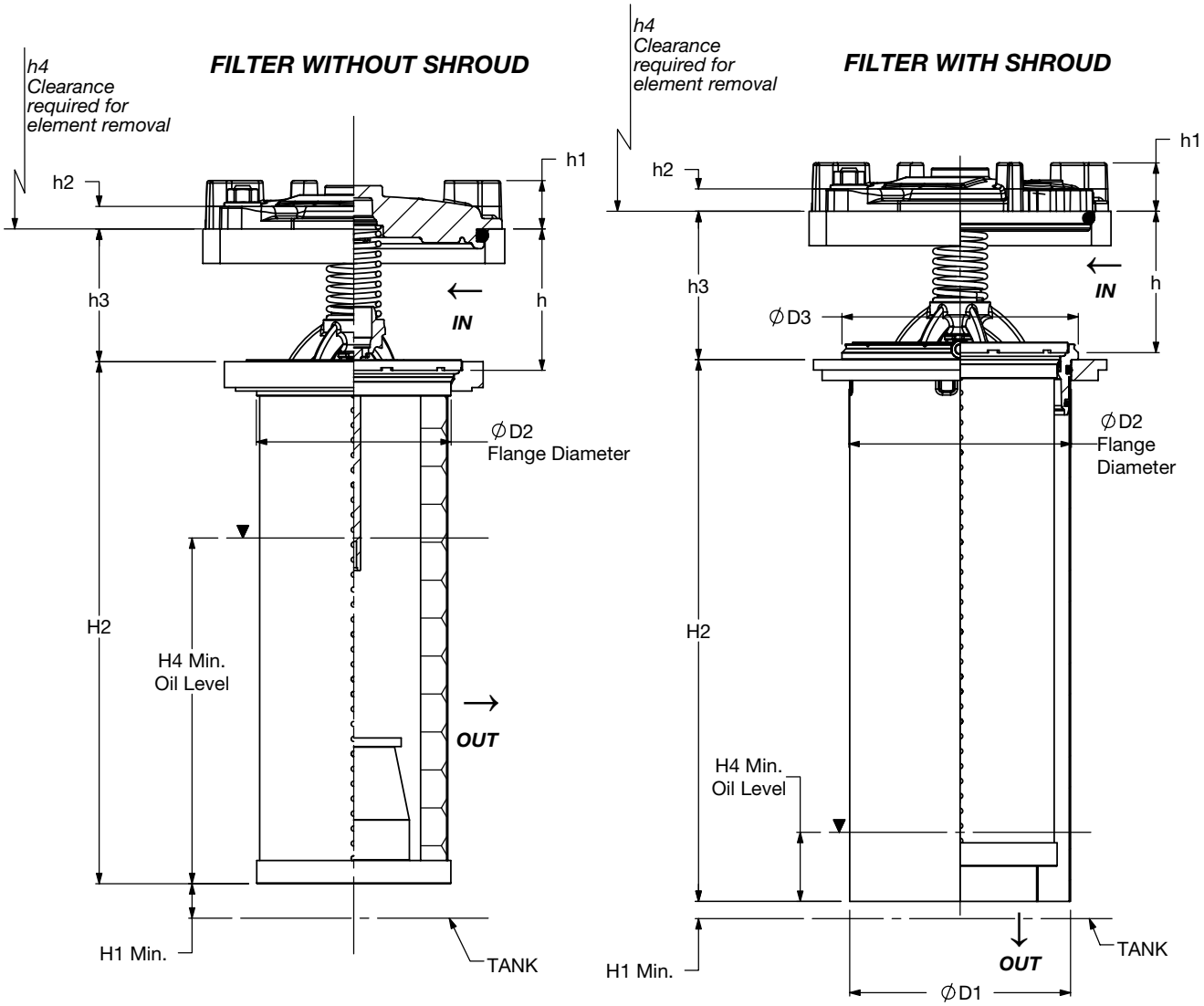
Seals
N = Nitrile rubber (NBR)
V = Fluorocarob elastomer (FKM)

Packaging

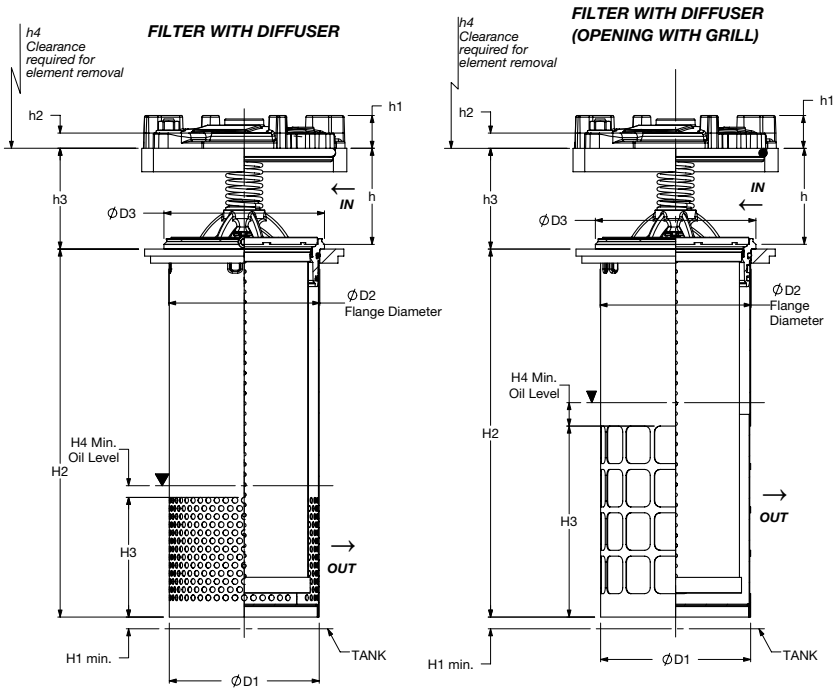
Supplementary details

Dimensions
RKT 0170, 0230, 0300, 0400





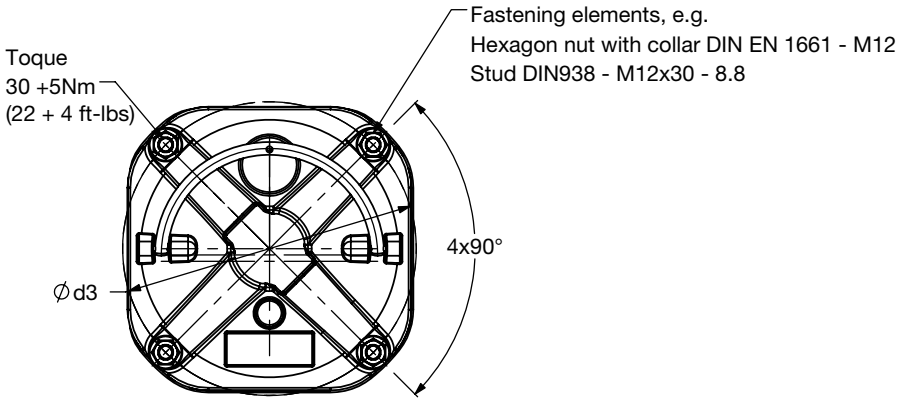
Dimensions
RKT 0170, 0230, 0300, 0400



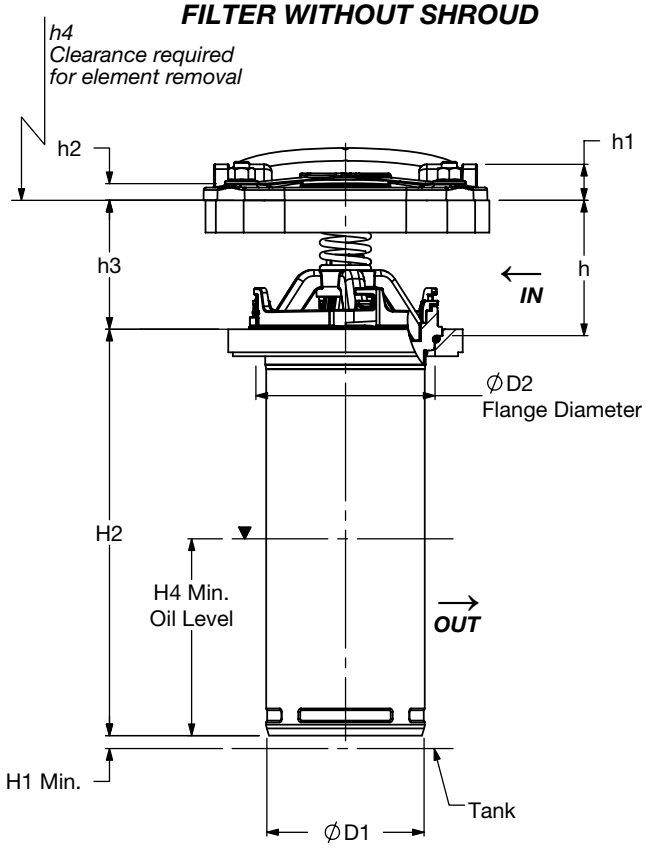
Type	Design	H1	H2	H3	H4	h	h1	h2	h3	h4	ØD1	ØD2	ØD3	Ød1	Wt (lbs)
RKT 0170	Without shroud	[0.39] 10	[9.13] 232	-	[6.1] 155	[3.23] 82	[1.1] 28	[0.51] 13	[3.03] 77	[10.39] 264	-	[4.45] 113	-	[7.17] 182	4.4
	With shroud		[9.57] 243	-	[1.57] 40				[3.39] 86		[5.04] 128	[5.08] 129	[5.39] 137		5.5
	With diffuser	[0.2] 5		[4.02] 102	[0.39] 10										5.7
	Diffuser with opening			[4.96] 126											7.7
RKT 0230	Without shroud	[0.39] 10	[11.93] 303	-	[7.99] 203				[3.03] 77	[13.19] 335	-	[4.45] 113	-		6.0
	With shroud		[12.36] 314	-	[1.57] 40				[3.39] 86		[5.04] 128	[5.08] 129	[5.39] 137		5.1
	With diffuser	[0.2] 5		[4.02] 102	[0.39] 10										6.4
	Diffuser with opening			[6.42] 163											6.6
RKT 0300	Without shroud	[0.39] 10	[15.71] 399	-	[10.51] 267				[3.03] 77	[16.97] 431	-	[4.45] 113	-		6.8
	With shroud		[16.14] 410	-	[1.57] 40				[3.39] 86		[5.04] 128	[5.08] 129	[5.39] 137		5.7
	With diffuser	[0.2] 5		[4.02] 102	[0.39] 10										8.6
	Diffuser with opening			[7.87] 200											8.8
RKT 0400	Without shroud	[0.39] 10	[20.16] 512	-	[13.23] 336				[3.03] 77	[21.26] 540	-	[4.45] 113	-		7.5
	With shroud		[20.63] 524	-	[1.57] 40				[3.39] 86		[5.04] 128	[5.08] 129	[5.39] 137		9.0
	With diffuser	[0.2] 5		[4.02] 102	[0.39] 10										9.5
	Diffuser with opening			[9.33] 237											9.7

* Non-machined port
** Machined port

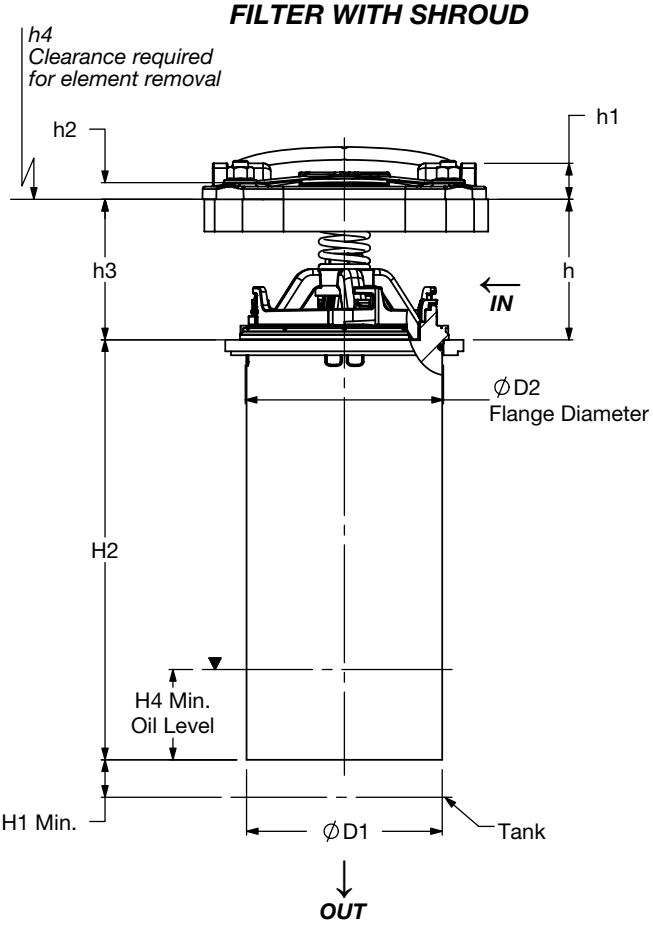
Dimensions
RKT 0310, 0410, 0500



FILTER WITHOUT SHROUD



FILTER WITH SHROUD



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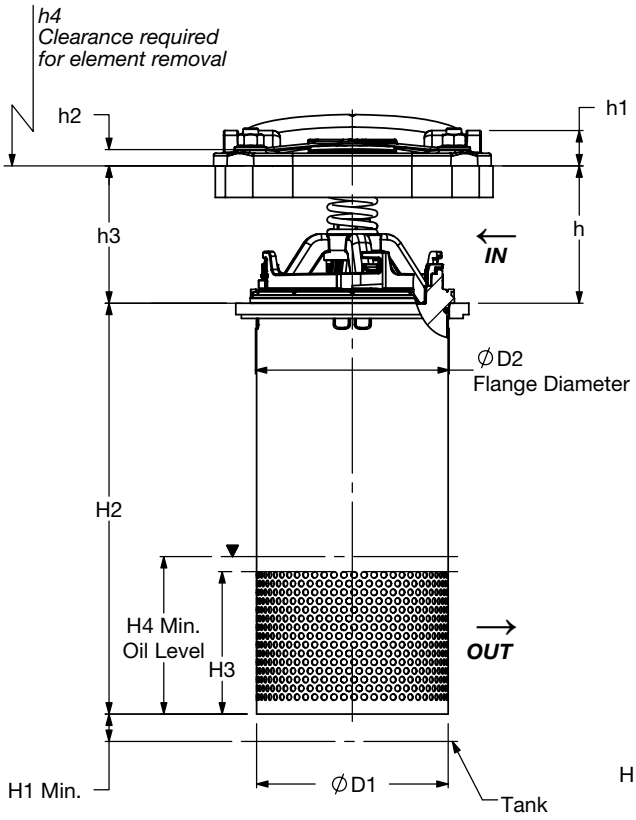
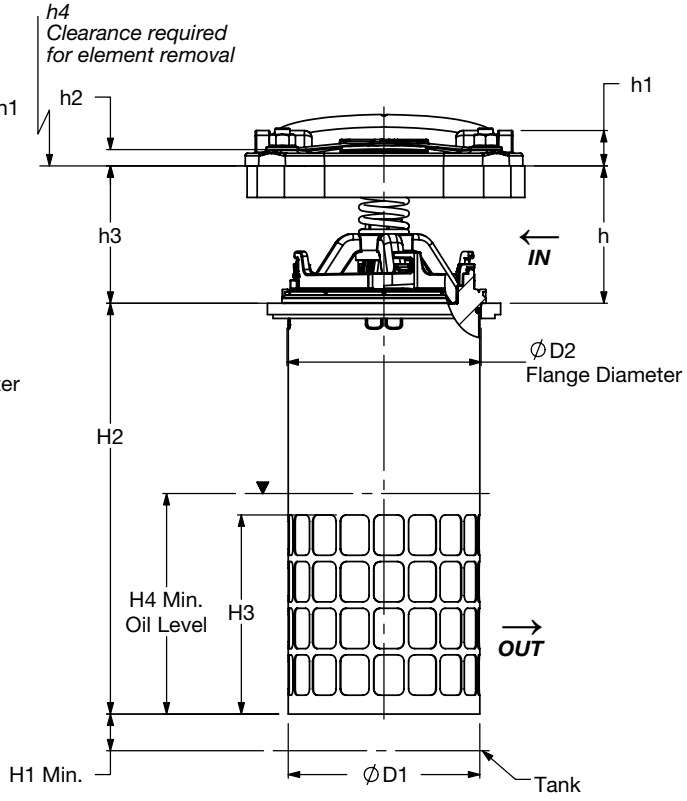
Dimensions
RKT 0310, 0410, 0500

FILTER WITH DIFFUSER

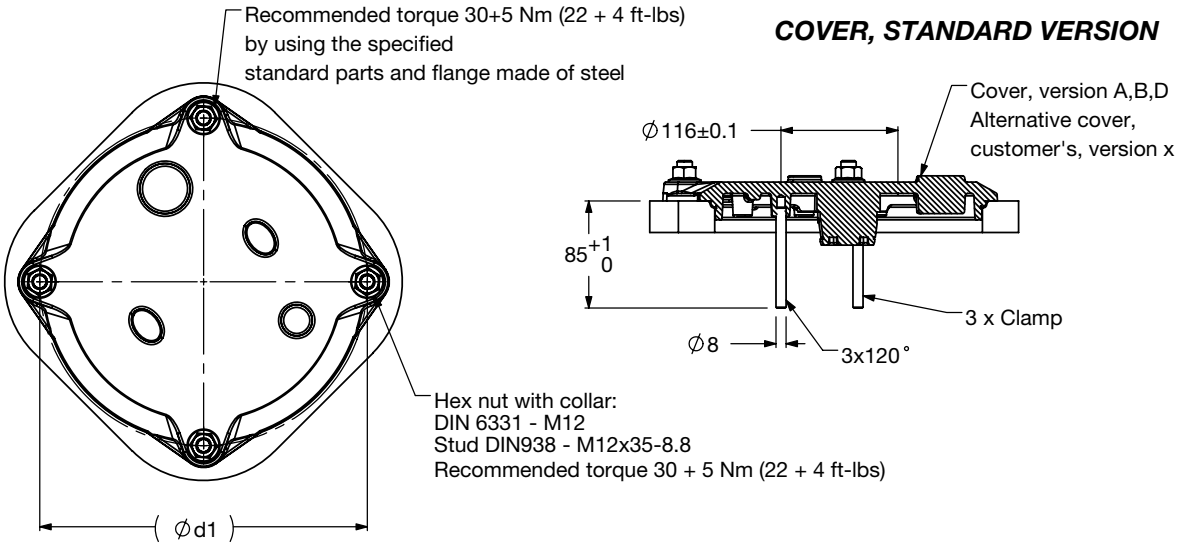


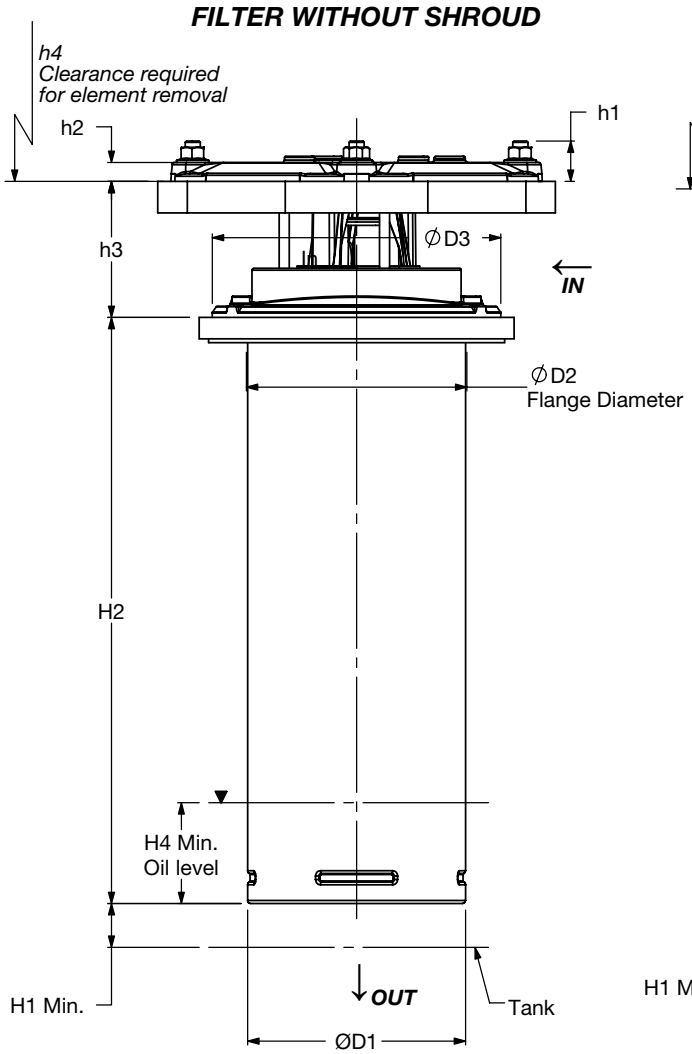
FILTER WITH DIFFUSER (Opening with grill)

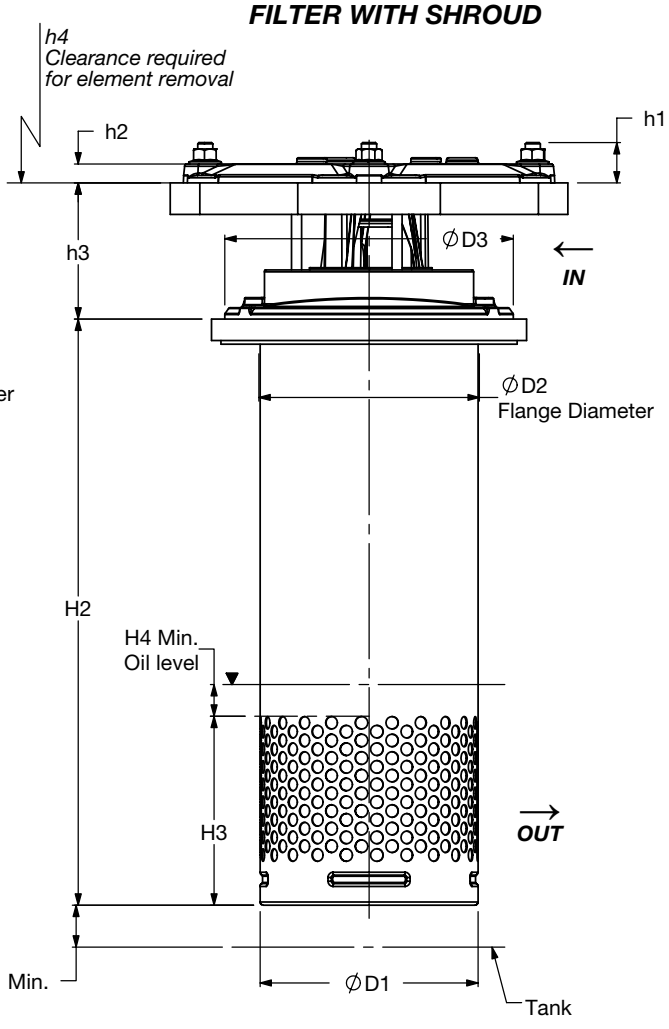


Type	Design	H1	H2	H3	H4	h	h1	h2	h3	h4	ØD1	ØD2	Ød3	Wt (lbs)
RKT 0310	Without shroud	[0.39] 10	[12.42] 315.5	-	[7.87] 200	[4.13] 105	[1.1] 28	[0.51] 13	[3.94] 100	[16.54] 420	[4.84] 123	[5.47] 139	[8.98] 228	3.7
	With shroud		[12.83] 326	-	[2.36] 60				[4.29] 109		[5.98] 152	[6.06] 154		5.3
	With diffuser	[0.2] 5		[4.53] 115	[0.39] 10									5.5
	Diffuser with opening			[6.22] 158										5.7
RKT 0410	Without shroud	[0.39] 10	[16.36] 415.5	-	[10.63] 270				[3.94] 100	[20.47] 520	[4.84] 123	[5.47] 139		4.4
	With shroud		[16.77] 426	-	[2.36] 60				[4.29] 109		[5.98] 152	[6.06] 154		6.4
	With diffuser	[0.2] 5		[4.53] 115	[0.39] 10									6.6
	Diffuser with opening			[7.68] 195										6.8
RKT 0500	Without shroud	[0.39] 10	[19.9] 505.5	-	[12.99] 330				[3.94] 100	[24.02] 610	[4.84] 123	[5.47] 139		5.5
	With shroud		[20.31] 516	-	[2.36] 60				[4.29] 109		[5.98] 152	[6.06] 154		7.7
	With diffuser	[0.2] 5		[5.12] 130	[0.39] 10									7.9
	Diffuser with opening			[10.63] 270										8.2

Dimensions
RKT 0600, 0800, 1200







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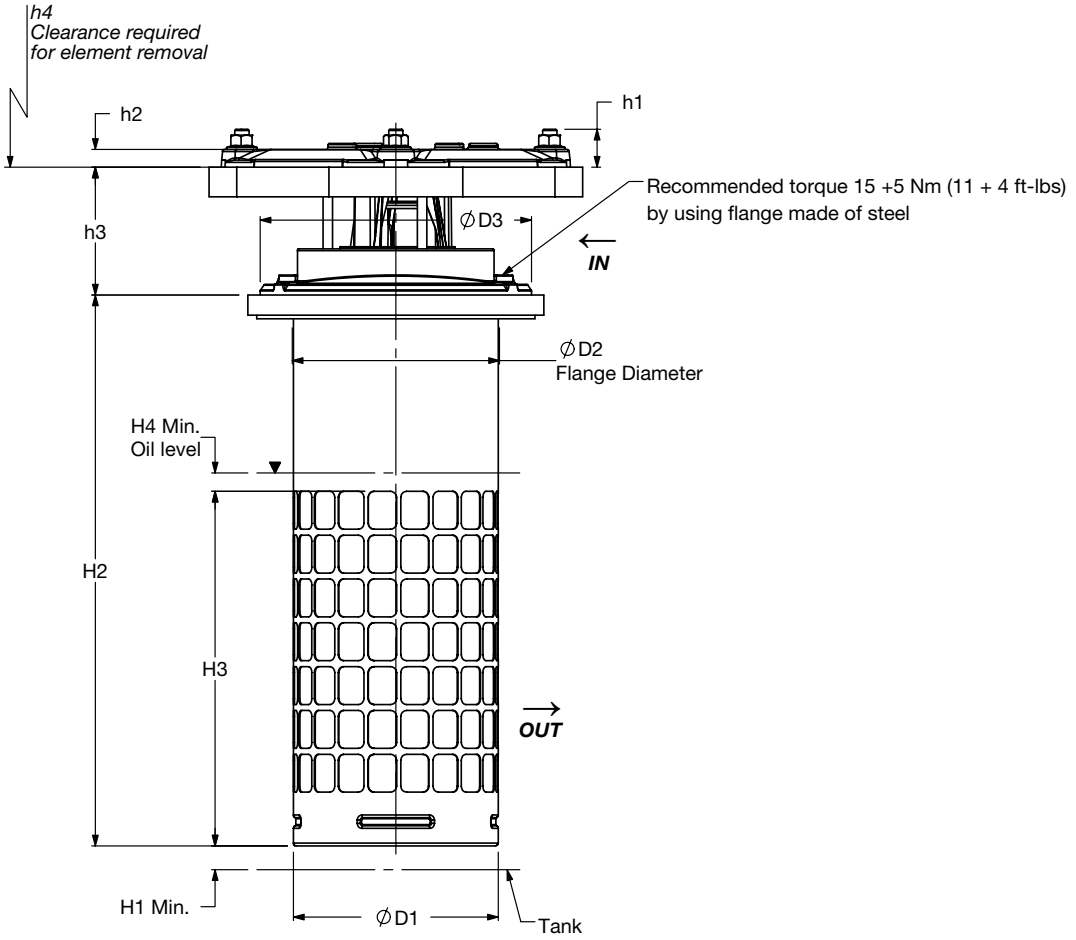
Dimensions
RKT 0600, 0800, 1200

FILTER WITH DIFFUSER (OPENING WITH GRILL)



Type	Shroud Version	H1	H2	H3	H4	h1	h2	h3	h4	ØD1	ØD2	ØD3	Ød1	Wt (lbs)
RKT 0600	With shroud	[0.98] 25	[18.31] 465	-	[2.95] 75	[1.38] 35	[0.59] 15	[4.25] 108	[21.65] 550	[6.81] 173	[6.89] 175	[9.02] 229	[10.24] 260	33.1
	With diffuser	[0.39] 10		[5.90] 150	[0.39] 10									
	Diffuser with opening			[11.81] 300										
RKT 0800	With shroud	[0.98] 25	[25.91] 658	-	[2.95] 75				[29.53] 750					38.6
	With diffuser	[0.39] 10		[5.90] 150	[0.39] 10									
	Diffuser with opening			[16.18] 411										
RKT 1200	With shroud	[0.98] 25	[31.97] 812	-	[2.95] 75				[37.4] 950					44.1
	With diffuser	[0.39] 10		[5.90] 150	[0.39] 10									
	Diffuser with opening			[22.01] 559										

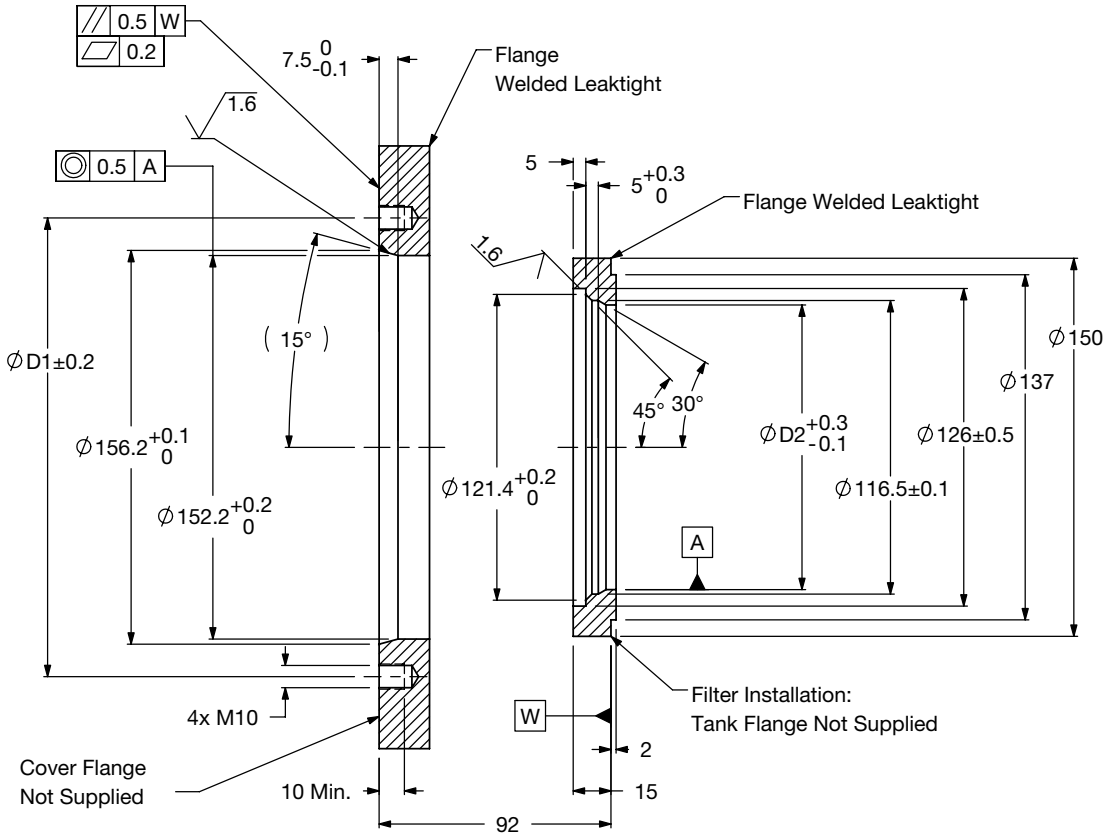
Specifications For The Tank Flange

1. In the filter mounting interface, the tank flange should have a maximum flatness of 0.3 mm and maximum roughness of Ra 3.2 µm.
2. In addition, the mounting interface should be free from damage and scratches.
3. The mounting holes of the flange must be blind, or stud bolts . Loctite must be used to mount the filter. As an alternative, the tank flange can be continuously welded from the inside.
4. Both the tank sheet metal and the filter mounting flange must be sufficiently robust so that neither deform when the seal is compressed during tightening.

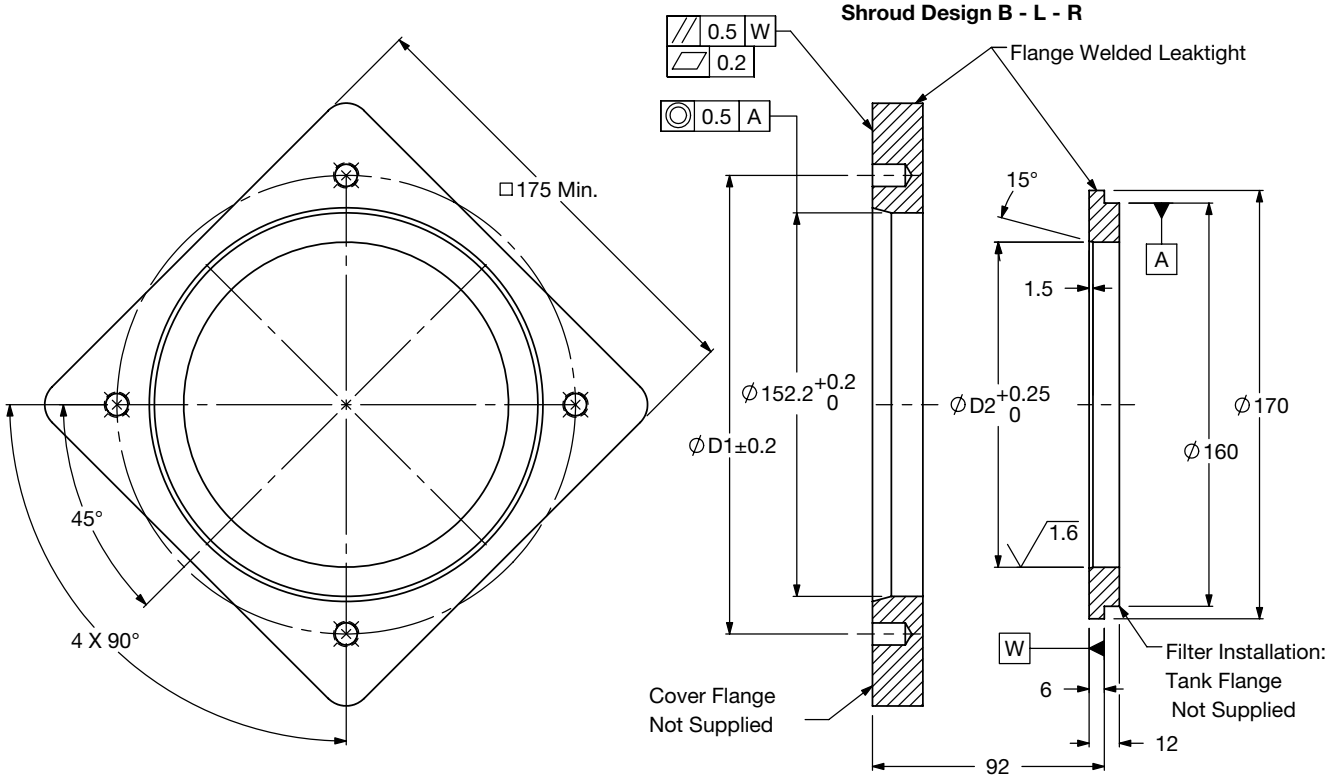
Dimensions

RKT 0170, 0230, 0300, 0400

Shroud Design X



Shroud Design B - L - R



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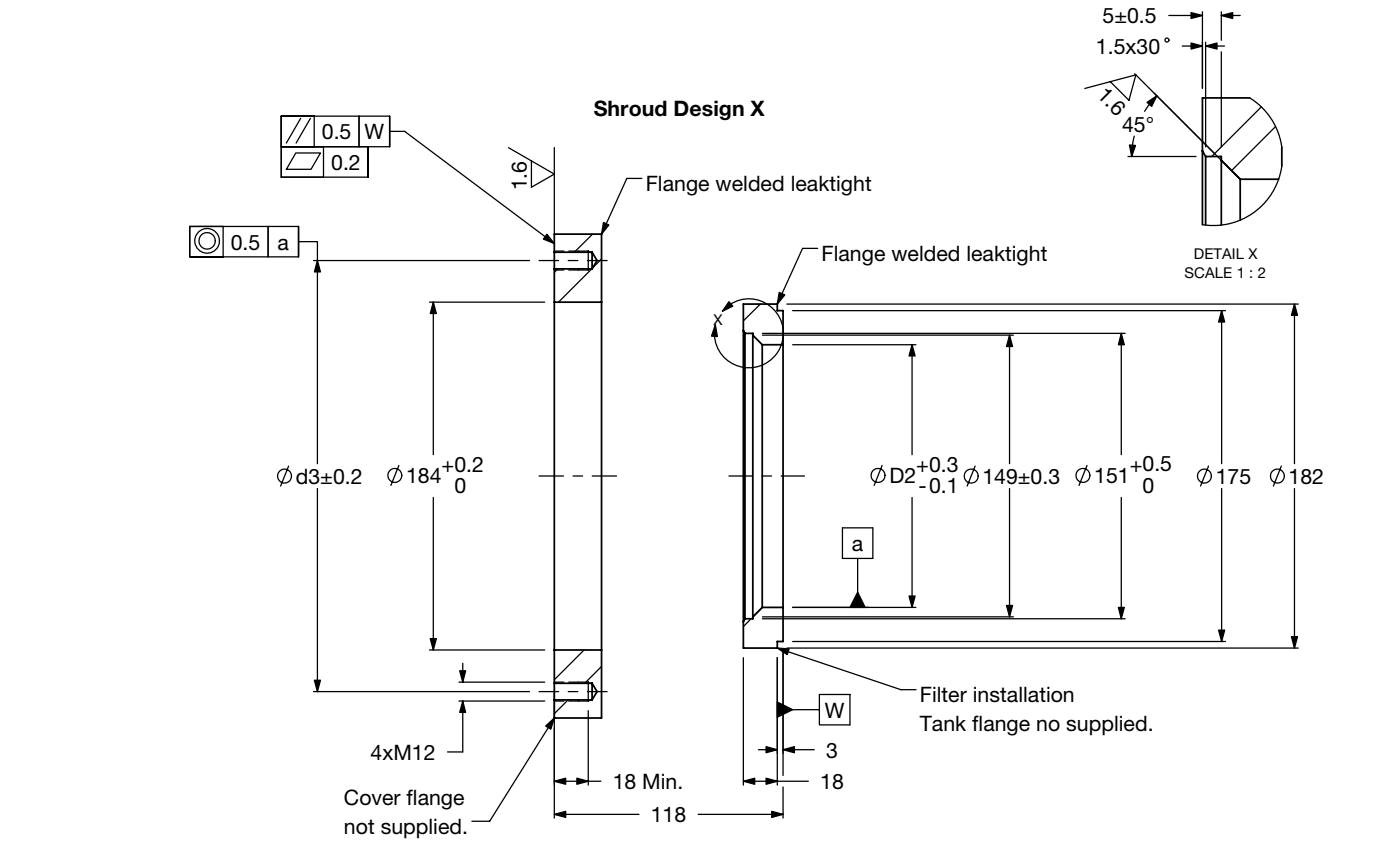
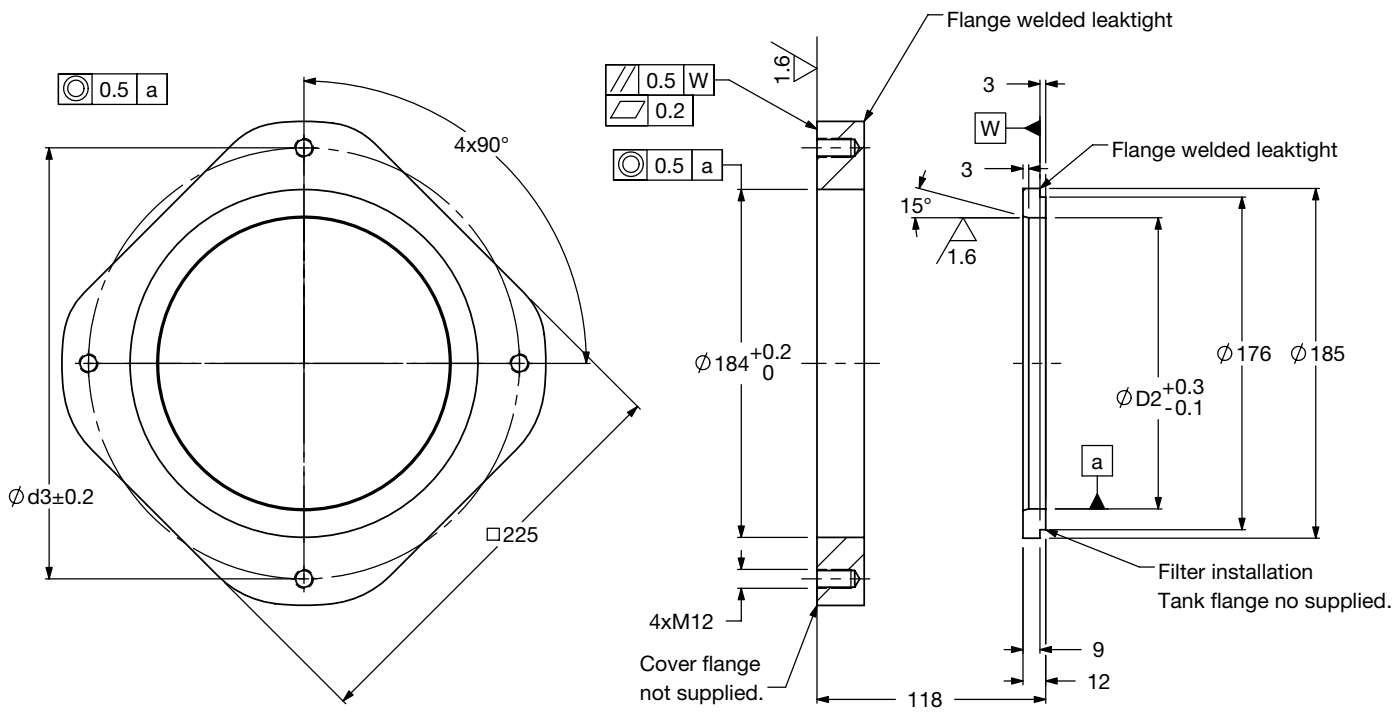
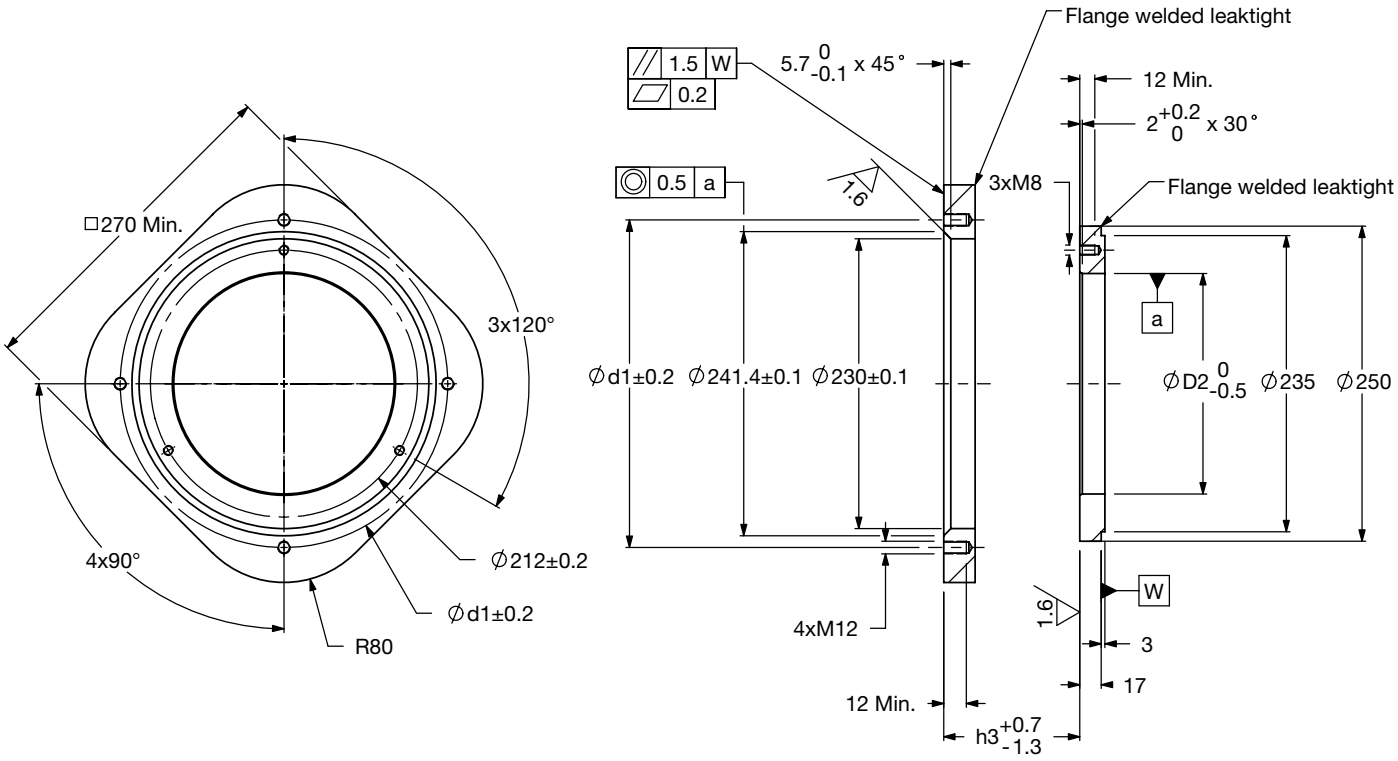
Dimensions
RKT 0310, 0410, 0500





Dimensions
RKT 0600, 0800, 1200



Tank flange not supplied

Sizing Information

Assembly Curve:

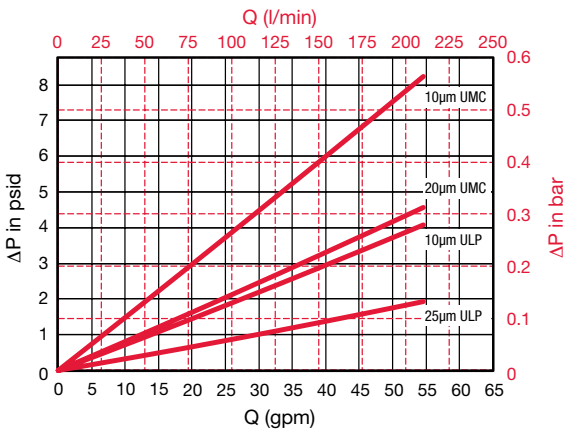
Pressure loss through housing is as follows:

Adjustments must be made for viscosity & specific gravity of the fluid to be used!

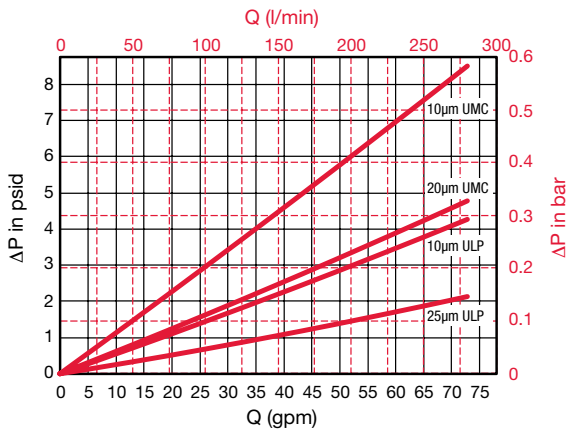
$$\text{Assembly } \Delta P = \text{Assembly Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Note: All curves represent 30 cSt viscosity.

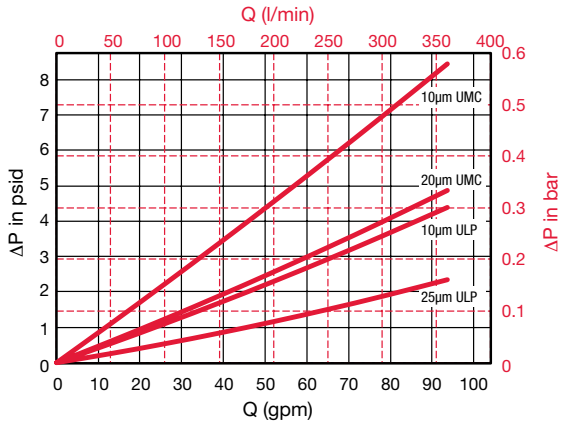
RKT 170 Assembly



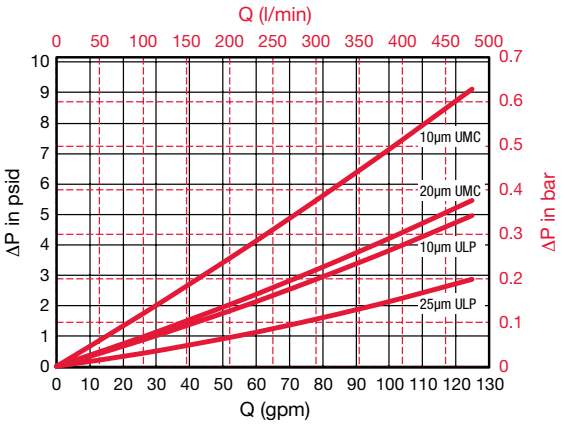
RKT 230 Assembly



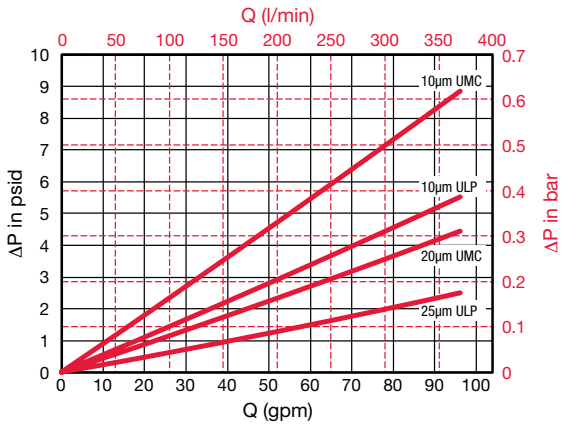
RKT 300 Assembly



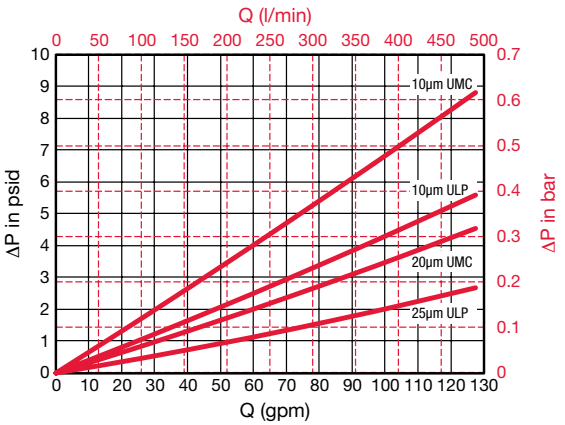
RKT 400 Assembly



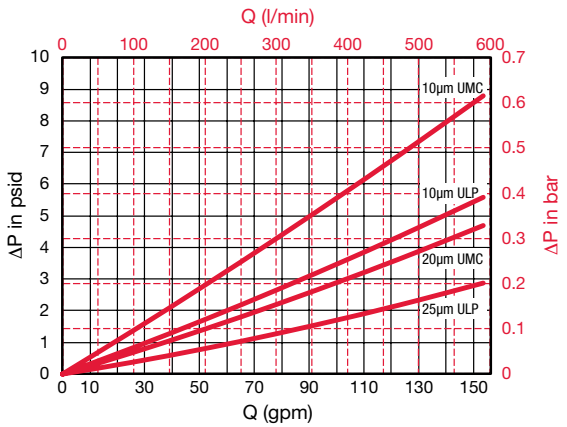
RKT 310 Assembly



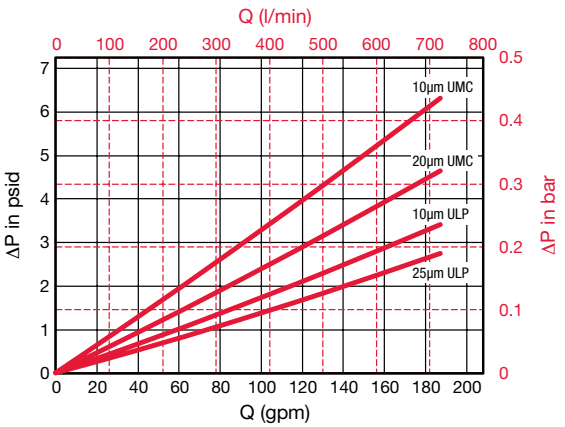
RKT 410 Assembly



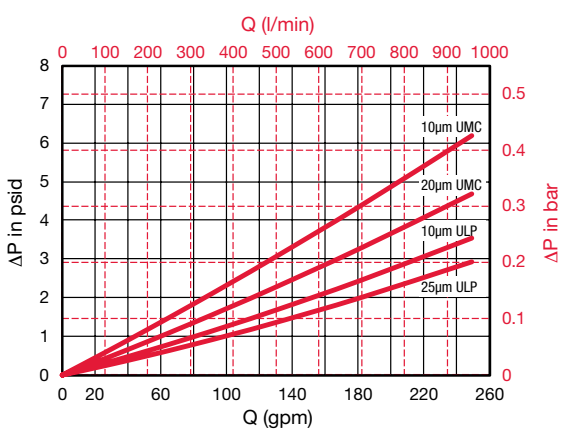
RKT 500 Assembly



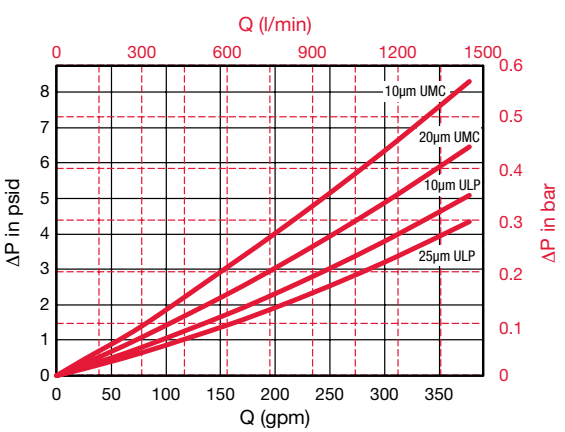
RKT 600 Assembly



RKT 800 Assembly



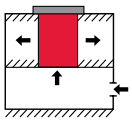
RKT 1200 Assembly



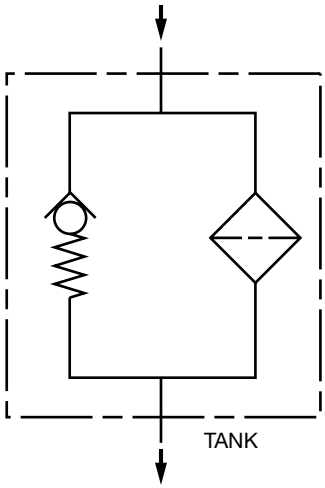
RKB Series

Return Line Filter

145 psi • up to 317 gpm



Hydraulic Symbol



Features

Filter Housing - Design

This filter system provides an economic solution for full-flow return line filtration for medium to large flow rates. The filter is mounted in the intermediate chamber that is formed in the bottom part of the tank. The oil flows into the filter from below and, after filtration, into the tank via the shroud. This integrates the filter into the tank so any design is possible for the return port connections and several filters can be used without splitting up the return lines. The optimal flow conditions in the chamber guarantee optimum air separation, effective magnetic pre-filtration and long filter service life.

The filter housings are designed in accordance with international regulations. They consist of a housing tube, filter head and a filter lid. The filter element can be removed from the top.

Standard equipment

- with bypass valve
- with diffuser
- with element location nozzle

Filter Elements

HYDAC filter elements are validated and their quality is constantly monitored according to the following standards:

ISO 2941, ISO 2942, ISO 2943, ISO 3724, ISO 3968, ISO 11170, ISO 16889

Filter elements are available with the following pressure stability values:

Glass fiber (ULP):	87 psi (6 bar)
Glass fiber with pre-filter (UMC):	87 psi (6 bar)
Wire mesh (WPI):	87 psi (6 bar)

Other filtration ratings on request.

Special Models and Accessories

- without element location nozzle
- outlet grill in openings in shroud
- seals made of FKM

Technical Specifications

Mounting Method	4 Mounting holes - filter housing	
Direction of Flow	Inlet: Bottom	Outlet: Shroud Windows
Materials of Construction		
	Housing	**Lid**
0600	Steel	Aluminum
0800	Steel	Aluminum
1200	Steel	Aluminum
Flow Capacity		
0600	158 gpm (600 l/min)	
0800	211 gpm (800 l/min)	
1200	317 gpm (1200 l/min)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	145 psi (10 bar) MAWP	
Element Collapse Pressure Rating		
ULP, UMC, WPI	87 psid (6 bar)	
Fluid Temp. Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications below -22˚F (-30˚C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Bypass Valve Cracking Pressure		
ΔP = 36 psi (2.5 bar) *standard* ΔP = 11 psi (0.8 bar) *optional*		

Applications

Agricultural

Industrial

Construction

Model Code

RKB 0600 UMC 010 V X B L X E N VX X 1 /-XXX

Filter Type
RKB = Return Line Filter

Size
0600, 0800, 1200

Element Media
ULP = Glass fiber
UMC = Glass fiber with pre-filter
WPI = Wire mesh

Filtration Rating *(microns)*
ULP: = 010, 025
UMC: = 010, 020
WPI: = 100

Bypass Valve
C = with bypass valve 0.8 bar (11 psi)
V = with bypass valve 2.5 bar, standard (36 psi)
X = without bypass valve

Magnetic Core
X = without magnetic core

Operating Pressure
B = 145 psi (10 bar)

Outlet Shroud Version
L = standard: with diffuser, perforated
R = with diffuser *(openings with outlet grill)*

Anti-Drain Valve in Element
V = with anti-drain valve
X = without anti-drain valve

Flange
X = without flange
B = version E with welding flange
C = version I with welding flange
E = with die-cast aluminium flange
I = with die-cast aluminium flange and poka yoke

Seals
N = NBR (nitrile rubber)
V = FKM

Clogging Indicator
VX = without clogging indicator; plugged port

Trip Pressure
X = none (if no clogging indicator is installed)

Modification Number
X = the latest version is always supplied

Supplementary Details

Replacement Element

UMC - 0010 - 117-X509-S - N - RT / __

Element Media
ULP, UMC, WPI

Filtration Rating *(micron)*
10, 25 = ULP
10, 20 = UMC
100 = WPI

Size

Filter with Flange B or E
152-XD18-S = RKB0600 element code
152-XD25-S = RKB0800 element code
152-XD31-S = RKB1200 element code

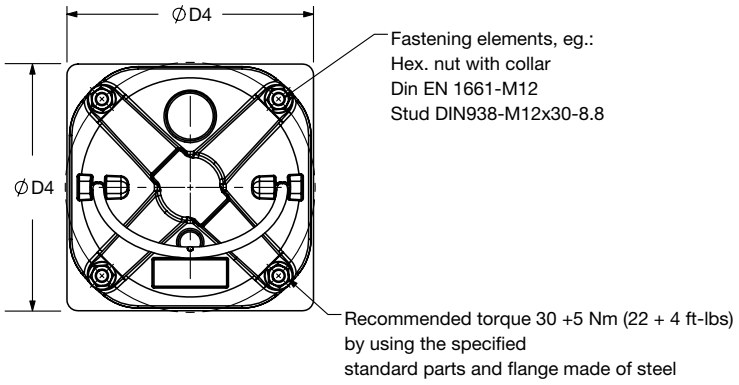
Filter with Flange C or I
152-XD18-Q = RKB0600 element code
152-XD25-Q = RKB0800 element code
152-XD31-Q = RKB1200 element code

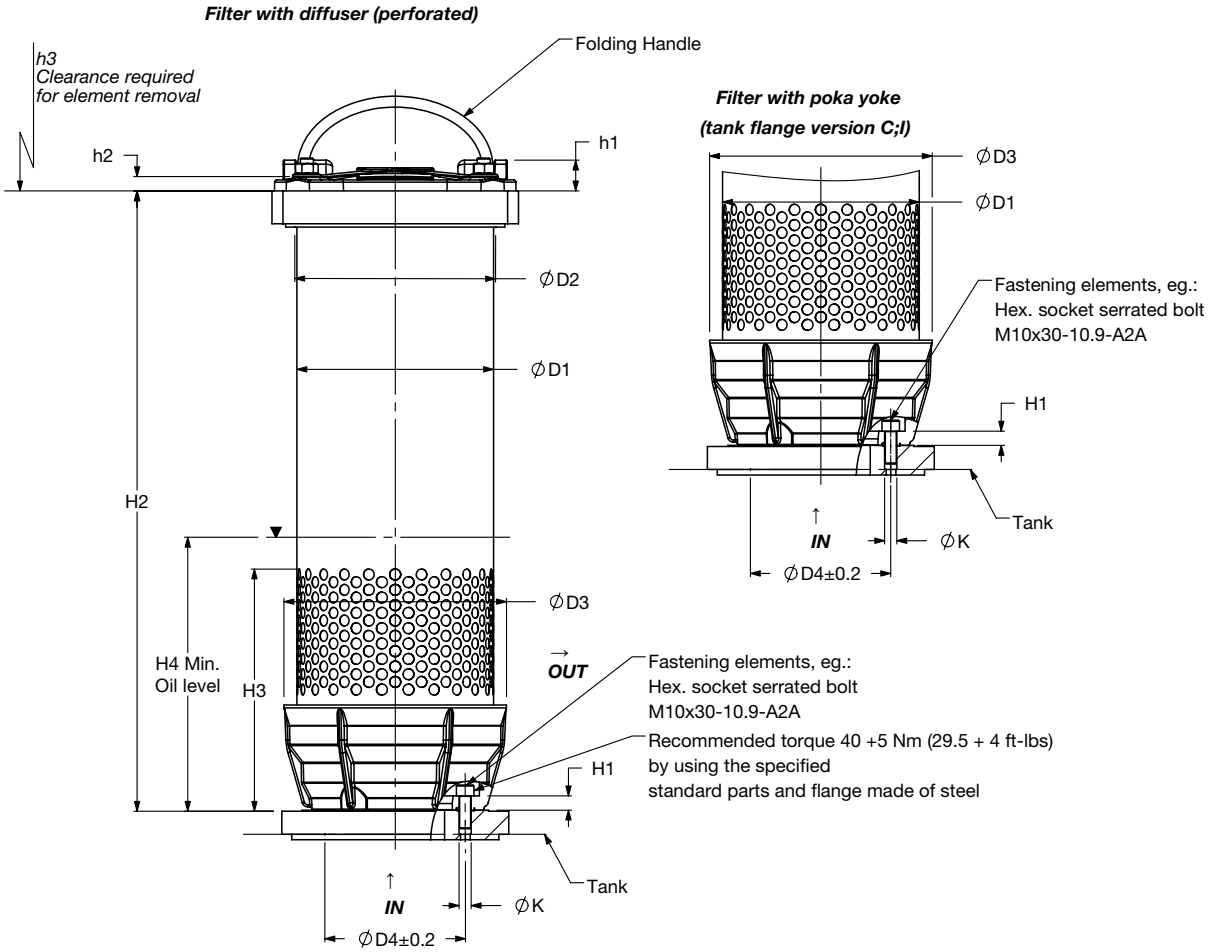
Seals
N = Nitrile rubber (NBR)
V = Fluorocarob elastomer (FKM)

Packaging

Supplementary details

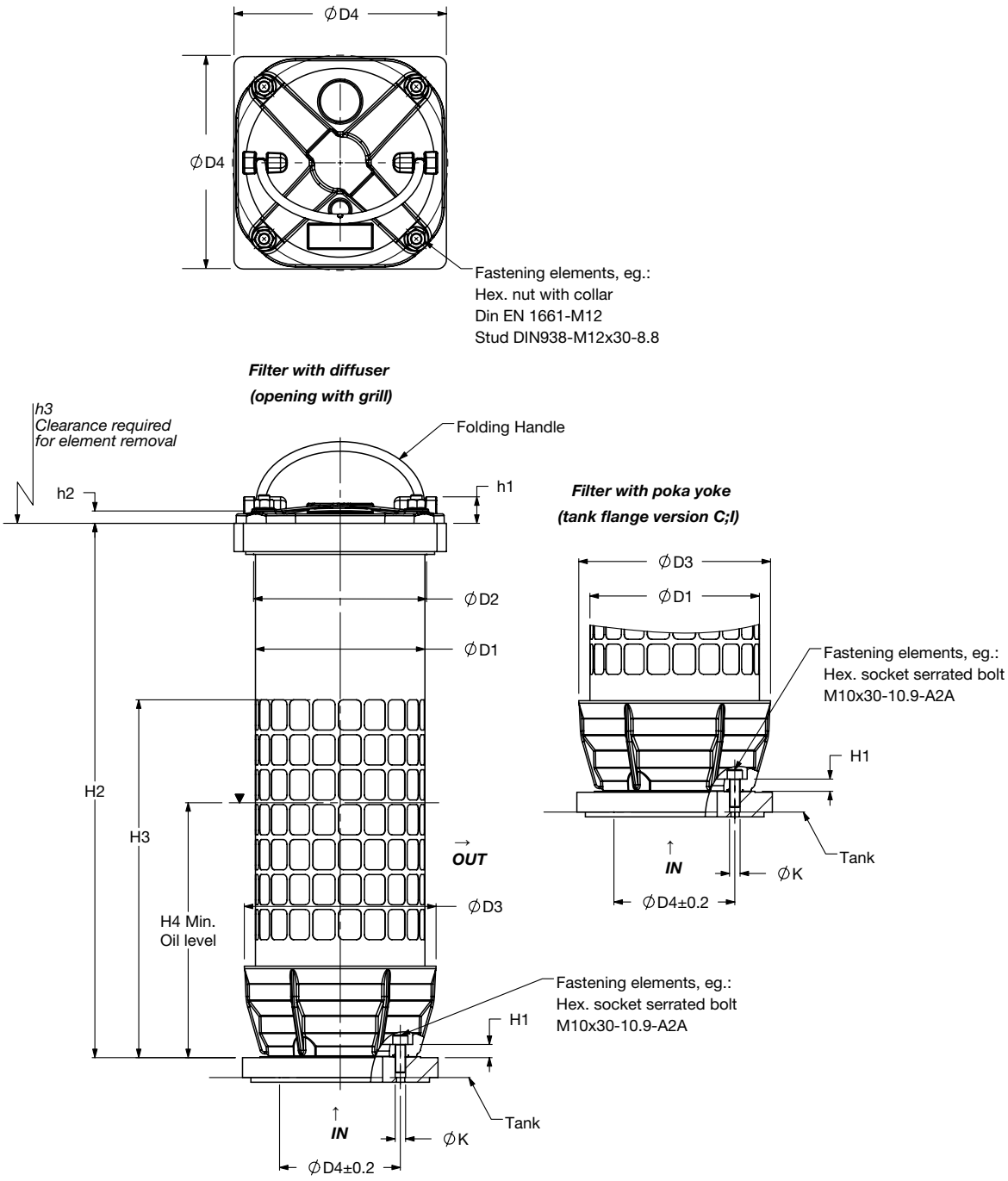
Dimensions
RKB 0600-1200 with diffuser (perforated)





Type	Shroud Version	Tank Flange	H1	H2	H3	H4	h1	h2	h3	ØD1	ØD2	ØD3	ØD4	ØK	Ød1	Weight (lbs)
RKB 0600	L	B; E	[0.55] 14	[22.24] 565	[8.66] 220	[9.13] 232	[1.18] 30	[0.51] 13	[19.09] 485	[7.07] 179.5	[7.13] 181	[7.99] 203	[5.04] 128	[0.41] 10.5	[8.98] 228	19
		C; I										[7.28] 185				18.7
RKB 0800	L	B; E		[29.84] 758					[26.69] 678			[7.99] 203				24.9
		C; I										[7.28] 185				24.7
RKB 1200	L	B; E		[35.91] 912					[32.76] 832			[7.99] 203				30
		C; I										[7.28] 185				29.8

Dimensions
RKB 0600-1200 with diffuser (opening with grille)



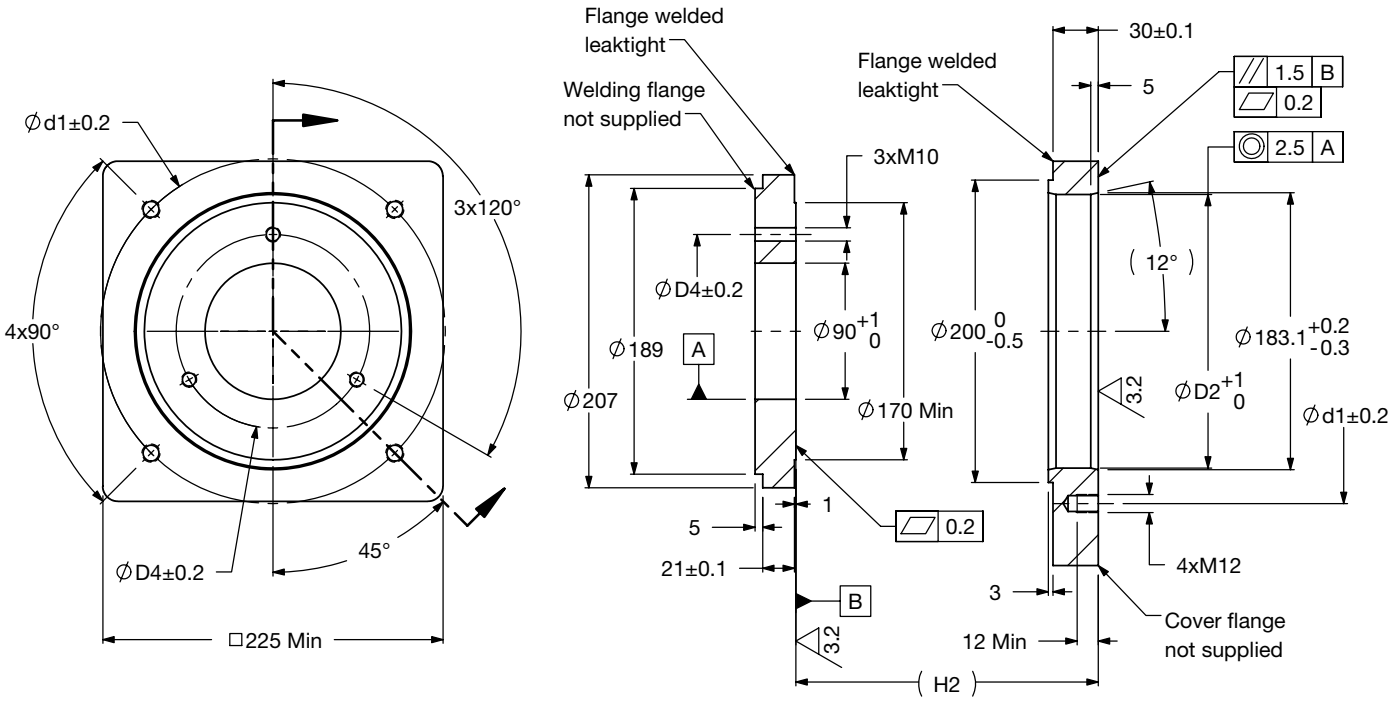
Type	Shroud Version	Tank Flange	H1	H2	H3	H4	h1	h2	h3	ØD1	ØD2	ØD3	ØD4	ØK	Ød1	Weight (lbs)
RKB 0600	R	B; E	[0.55] 14	[22.24] 565	[14.88] 378	[9.13] 232	[1.18] 30	[0.51] 13	[19.09] 485	[7.07] 179.5	[7.13] 181	[7.99] 203	[5.04] 128	[0.41] 10.5	[8.98] 228	19.4
		C; I										[7.28] 185				19.2
RKB 0800	R	B; E		[29.84] 758	[17.8] 452	[10.59] 269			[26.69] 678			[7.99] 203				25.6
		C; I										[7.28] 185				25.4
RKB 1200	R	B; E		[35.91] 912	[23.62] 600	[13.5] 343			[32.76] 832			[7.99] 203				30.9
		C; I										[7.28] 185				30.6

Dimensions
RKB 0600 – 1200

Specifications For The Tank Flange

1. In the filter mounting interface, the tank flange should have a maximum flatness of 0.2 mm and maximum roughness of Ra 3.2 µm.
2. In addition, the mounting interface should be free from damage and scratches.
3. The mounting holes of the tank flange must be blind, or stud bolts. Loctite must be used to mount the filter.
   As an alternative, the tank flange can be continuously welded from the inside.
4. Both the tank sheet metal and the filter mounting flange must be sufficiently robust so that neither deform when the seal is compressed during tightening.

Dimensions
RKB 0600-1200



Sizing Information

Assembly Curve:

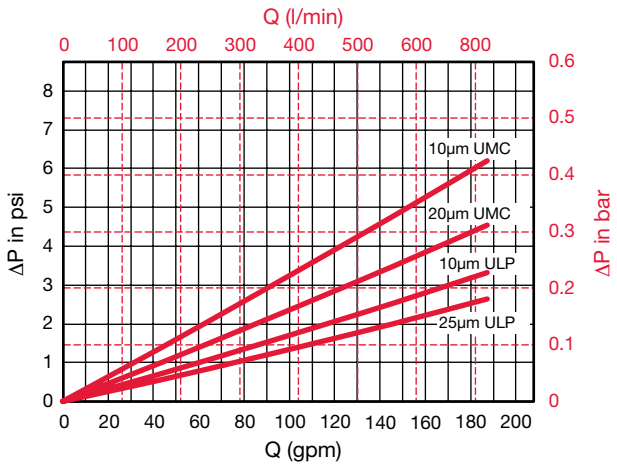
Pressure loss through housing is as follows:

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

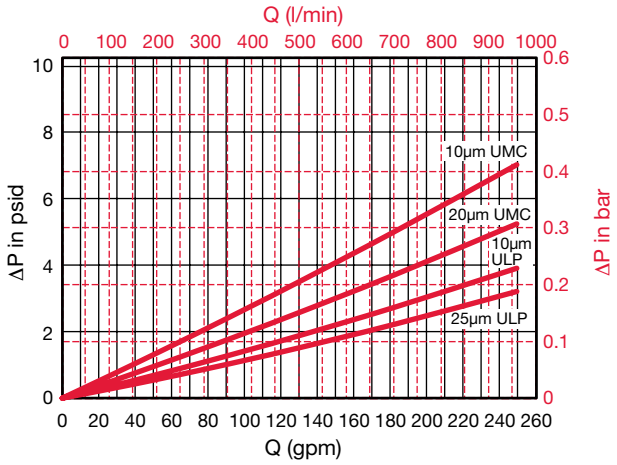
$$\text{Assembly } \Delta P = \text{Assembly Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Note: All curves represent 30 cSt viscosity.

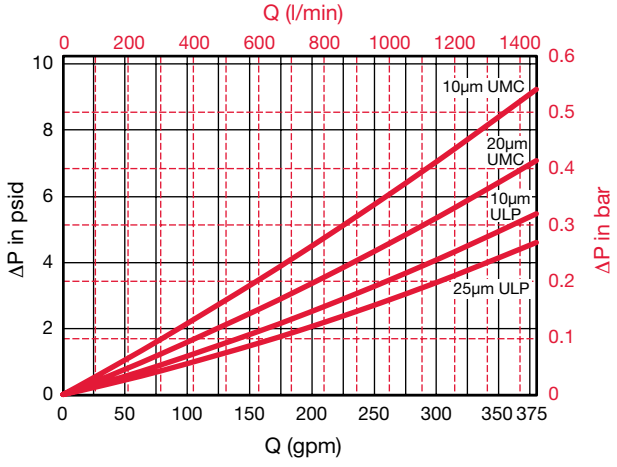
RKB 600 Assembly



RKB 800 Assembly



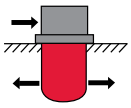
RKB 1200 Assembly



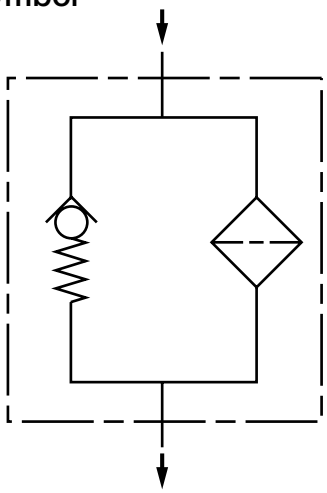
RFT Series

Return Line Filter

145 psi • up to 634 gpm



Hydraulic Symbol



Features

This filter system provides an economic solution for full-flow return line filtration. The filter head is mounted on the tank. The protective tube can be supplied in various optional versions. Firstly as a closed tube with the outlet opening facing downwards or with a closed base and rows of opening holes at the height of the tank's oil level.
In the second version, separating air from the oil is made easier.
The optional magnetic core is connected to the filter element via a bayonet fitting, guaranteeing effective magnetic pre-filtration.

The filter housings are designed in accordance with international regulations. They consist of a filter cover, filter head, shroud cover, and element location nozzle.

The element is top-removable.

Standard equipment

- Magnetic core integrated into clamp (only for RFT 0170 – 0500)
- Magnetic core integrated into cover (only for RFT 0600 – 2400)
- with protective tube
- with bypass valve

Filter Elements

HYDAC filter elements are validated and their quality is constantly monitored according to the following standards:

ISO 2941, ISO 2942, ISO 2943, ISO 3724,ISO 3968, ISO 11170, ISO 16889

Filter elements are available with the following pressure stability values:

Glass fiber (ULP):	87 psi (6 bar)
Glass fiber with pre-filter (UMC):	87 psi (6 bar)
Wire mesh (WPI):	87 psi (6 bar)

Other filtration ratings on request.

Special Models and Accessories

- without magnetic core
- without shroud *(only RFT 0170 – 500)*
- with shroud
- Outlet grill in openings in shroud
- Seals made of FKM
- Hydraulic oils H to HLPD DIN 51524
- Lubrication oils DIN 51517, API, ACEA, DIN 51515, ISO 6743
- Compressor oils DIN 51506
- Biodegradable operating fluids VDMA 24568 HETG, HEES, HEPG

Important Information

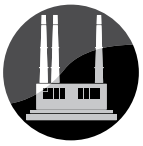
- Filter housings must be grounded
- When using electrical clogging indicators, the electrical power supply to the system must be switched off before removing the clogging indicator connector

Technical Specifications

Mounting Method	4 Mounting holes - filter housing	
Direction of Flow	Inlet: Side	Outlet: Shroud windows
Materials of Construction		
	Housing	**Lid**
0170-0400	Steel	Aluminum
0310-1200	Steel	Aluminum
1800-2400	Steel	Aluminum
Flow Capacity		
0170	45 gpm (170 l/min)	
0230	66 gpm (250 l/min)	
0300	79 gpm (300 l/min)	
0310	92 gpm (350 l/min)	
0400	105 gpm (400 l/min)	
0410	118 gpm (450 l/min)	
0500	145 gpm (550 l/min)	
0600	158 gpm (600 l/min)	
0800	211 gpm (800 l/min)	
1200	317 gpm (1200 l/min)	
1800	475 gpm (1800 l/min)	
2000	528 gpm 2000 l/min)	
2400	634 gpm (2400 l/min)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	145 psi (10 bar) MAWP	
Element Collapse Pressure Rating		
ULP, UMC, WPI	87 psid (6 bar)	
Fluid Temp. Range	-22°F to 248°F (-30°C to 120°C)	
Consult HYDAC for applications below -22°F (-30°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
P = 29 psi (2.0 bar) *standard* P = 11 psi (0.8 bar) *optional - consult factory*		
Bypass Valve Cracking Pressure		
ΔP = 36 psi (2.5 bar) *standard)* ΔP = 11 psi (0.8 bar) *optional*		

Applications

Agricultural



Industrial

Construction

Model Code

RFT | 0600 | UMC | 010 | V | M | B | H | L | N | J0 | VX | X | 1 | /-XXX

Filter Type
RFT = Return Line Filter

Size
0170, 0230, 0300, 0400, 0310, 0410, 0500,
0600, 0800, 1200, 1800, 2000, 2400

Element Media
ULP = glass fiber
UMC = glass fiber with pre-filter
WPI = wire mesh

Filtration Rating
ULP = 010, 025
UMC = 010, 020
WPI = 100

Bypass Valve
C = with bypass valve 0.8 bar (11 psi)
V = standard: with bypass valve 2.5 bar (36 psi)
X = without bypass valve

Magnetic Core
M = with magnetic core
X = without magnetic core

Operating Pressure
B = 145 psi (10 bar)

Type and Size of Port

F *(sizes 0170 - 0400)* =	E1: G 1½", SAE-24
G *(sizes 0310 - 0500)* =	E1: SAE DN 50 (2") E2: G 1¼", SAE-20
H *(sizes 0600 - 1200)* =	E1: SAE DN 80 (3") E4: SAE DN 50 (2") E5: G 1½", SAE-24
I *(sizes 0600 - 1200)* =	E1: SAE DN 65 (2½") E4: SAE DN 40 (1½") E5: G 1½", SAE-24
J *(sizes 0310 - 0500)* =	E1: SAE DN 40 (1½") E2: G 1", SAE-16
K *(sizes 0170 - 0400)* =	E1: G 1½", SAE-24 E2: SAE DN 40 (1½")
N *(sizes 1800 - 2400)* =	E1: SAE DN 80 (3")
P *(sizes 1800 - 2400)* =	E1: SAE DN 100 (4")
others on request	

Outlet Shroud Version
X = without shroud *(only RFT 0170, 0230, 0300, 0400, 0310, 0410, 0500)*
B = with shroud, base open
L = standard: with diffuser *(perforated)*
R = with diffuser *(openings with outlet grille)*

Seals
N = NBR (nitrile rubber)
V = FKM

Position of Clogging Indicator
JA = both parts machined G1/8; plugged ports
J1 = as per the drawing
J2 = as per the drawing
J0 = without clogging indicator

Clogging Indicator
VA = visual/electrical
VE = electrical
VO = visual
VX = no clogging indicator, sealed up with plugs

Trip Pressure
C = 0.8 bar *(Optional - Consult factory)*
D = 2.0 bar
X = none *(if no clogging indicator is installed)*

Modification Number
X = the latest version is always supplied

Supplementary Details

SPECIAL ORDER FILTERS - LOW PRESSURE

Replacement Element Model Code

UMC 0010 117-X509-S - N - RT / B1.5 __

Element Media
ULP, UMC, WPI

Filtration Rating *(micron)*
10, 25 = ULP
10, 20 = UMC
100 = WPI

Size
117-X509-S = RFT0170 element code
117-X512-S = RFT0230 element code
117-X516-S = RFT0300 element code
120-XZ11-Q = RFT0310 element code
117-X520-S = RFT0400 element code
120-XZ14-Q = RFT0410 element code
120-XZ18-Q = RFT0500 element code
152-X218-S = RFT0600 element code
152-X225-S = RFT0800 element code
152-X231-S = RFT1200 element code
202-X235-S = RFT1800 element code
202-X245-S = RFT2000 element code
202-X246-S = RFT2400 element code

Seals
N = Nitrile rubber (NBR)
V = Fluorocarob elastomer (FKM)

Packaging

Bypass Valve
(omit) = 2.5 bar bypass
B0.8 = 0.8 bar bypass
B1.5 = 1.8 bar bypass
KB = No bypass

Supplemental Details

Clogging Indicator Model Code

VMF 2 B . X / __ V

Indicator Prefix
VMF = Mobile Filters *(all sizes)*

Trip Pressure
0.8 = 11 psid (0.8 bar) - Noted by “C” in filter model code
2 = 29 psid (2 bar) - Noted by “D” in filter model code

Type of Indicator
Note by “VO” in filter model code - use B
Noted by “VE” in filter model code - use C
Noted by “VA” in filter model code - use D

Modification Number

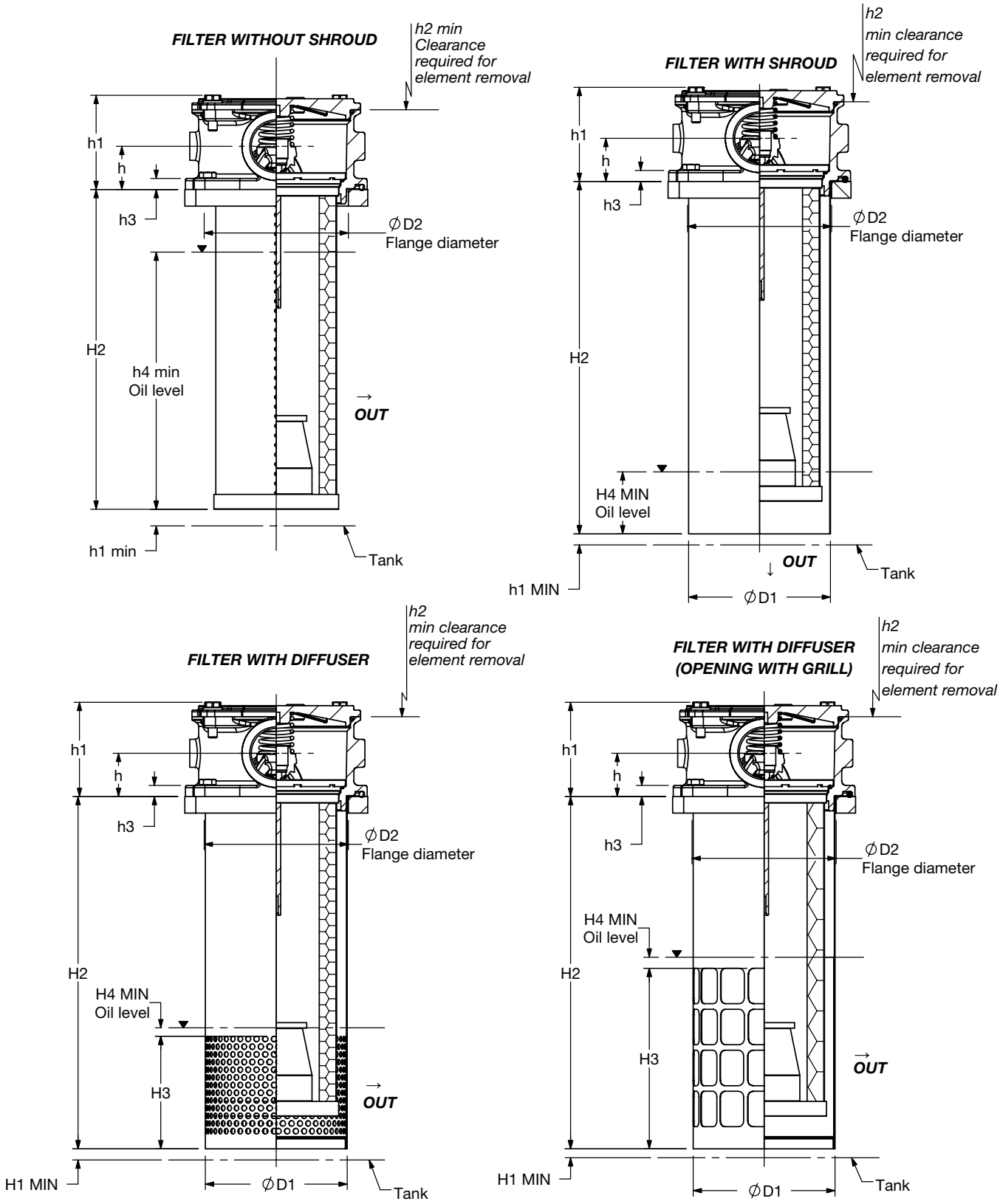
Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) (standard)
V = Fluorocarbon elastomer (FKM)

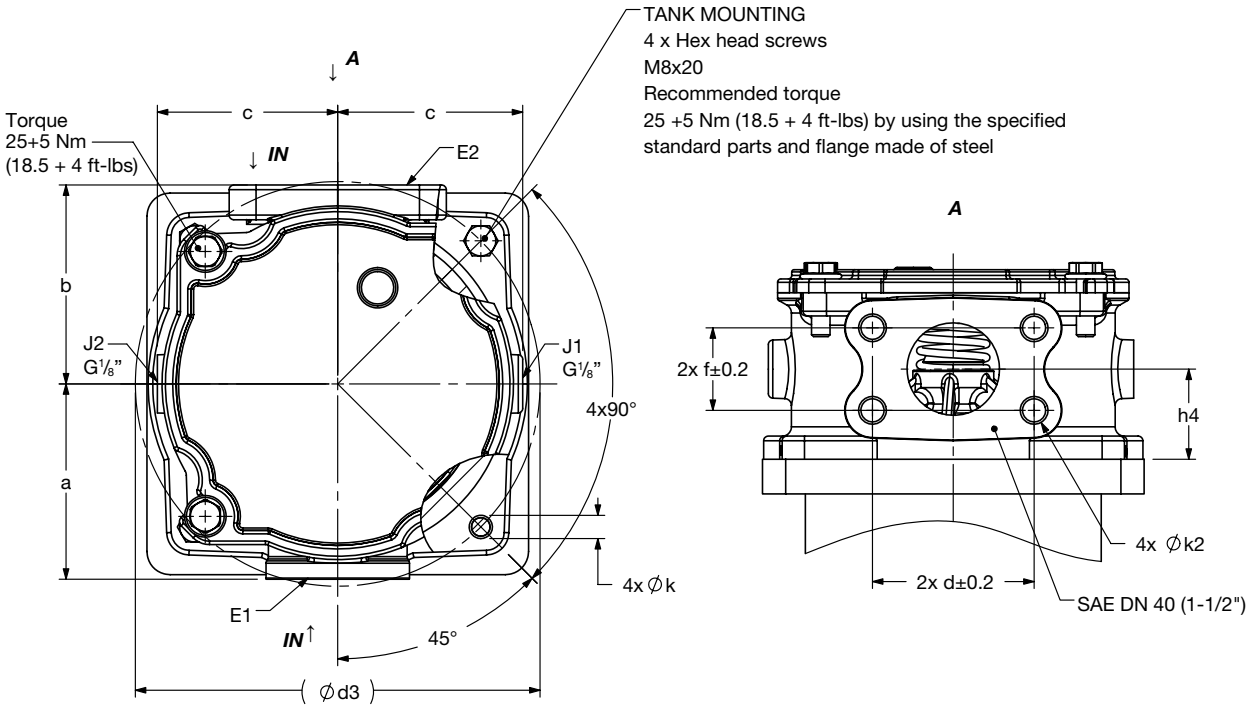
(For additional details and options, see Clogging Indicators section.)

PN#02081318 / 07.19 / FIL1907-2109

Dimensions
RFT 0170, 0230, 0300, 0400



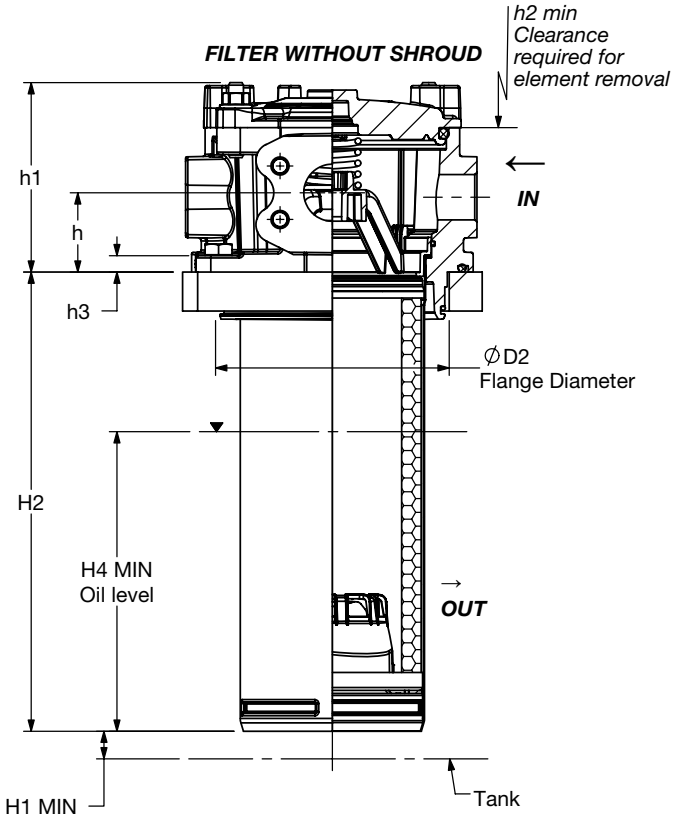
SPECIAL ORDER FILTERS - LOW PRESSURE

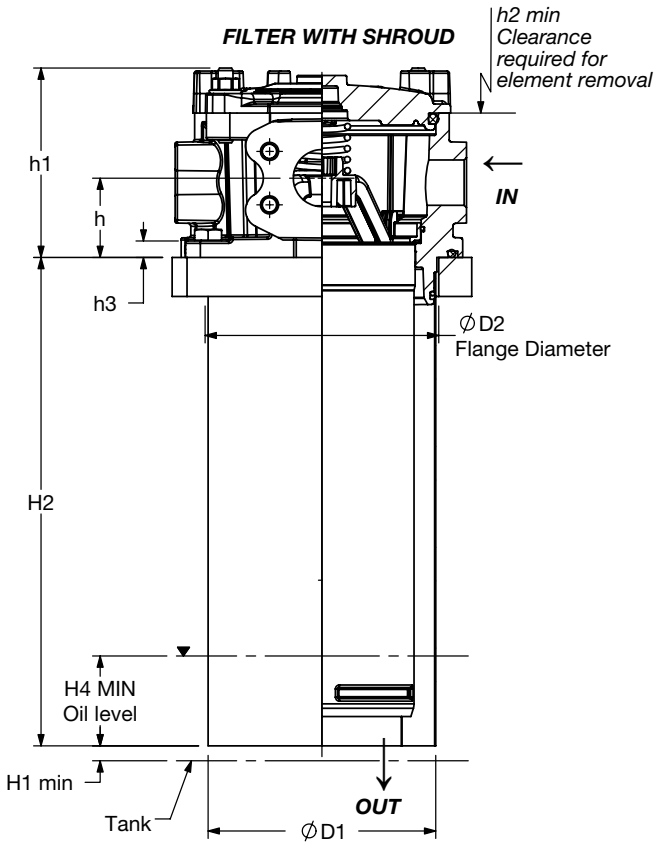


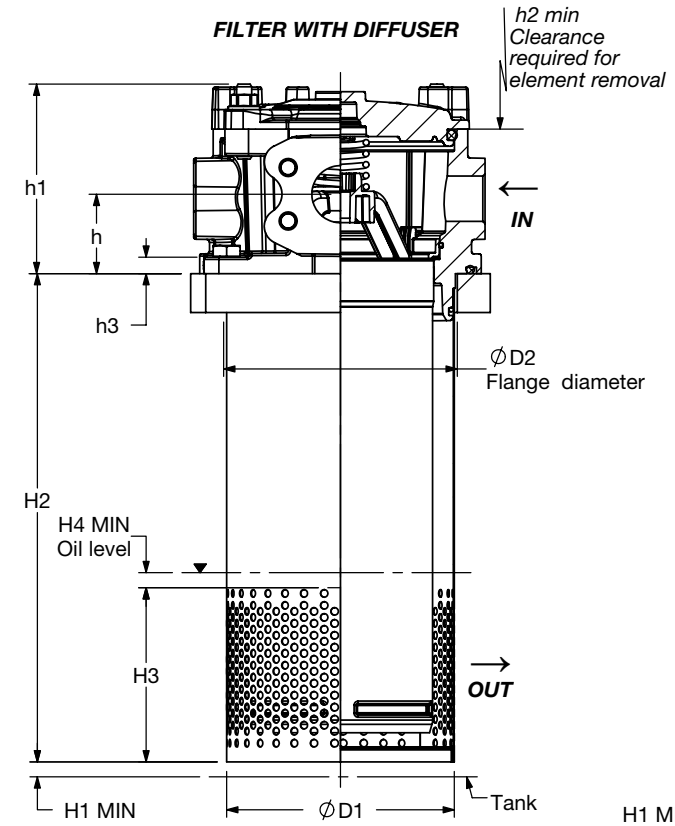
Type	Shroud Version	H1	H2	H3	H4	h	h1	h2	h3	h4	ØD1	ØD2	Ød3	a	b	c	d	f	Øk	Øk2	Wt (lbs)
RFT 0170	Without shroud	[0.39] 10	[8.58] 218	-	[6.1] 155	[1.54] 39	[3.35] 85	[10.24] 260	[0.39] 10	-	-	[5.31] 135	[6.89] 175	[3.33] 84.5	[3.39] 86.0* [3.33] 84.5**	[3.15] 80* [3.07] 78**	[2.75] 69.9	[1.48] 37.5	[0.39] 10	M12	5.7
	With shroud		[9.72] 247	-	[1.97] 50						[5.04] 128										7.1
	With diffuser	[0.2] 5		[4.02] 102	[0.39] 10																7.5
	Diffuser with opening			[4.96] 126																	7.7
RFT 0230	Without shroud	[0.39] 10	[11.38] 289	-	[7.99] 203			[12.99] 330			-										6.4
	With shroud		[12.52] 318	-	[1.97] 50						[5.04] 128										7.7
	With diffuser	[0.2] 5		[4.02] 102	[0.39] 10																8.2
	Diffuser with opening			[6.42] 163																	8.4
RFT 0300	Without shroud	[0.39] 10	[15.16] 385	-	[10.51] 267			[16.93] 430		[1.54] 39	-										6.8
	With shroud		[16.3] 414	-	[1.97] 50						[5.04] 128										8.2
	With diffuser	[0.2] 5		[4.02] 102	[0.39] 10																8.6
	Diffuser with opening			[7.87] 200																	8.8
RFT 0400	Without shroud	[0.39] 10	[19.65] 499	-	[13.23] 336			[21.26] 540			-										75
	With shroud		[20.79] 528	-	[1.97] 50						[5.04] 128										9.0
	With diffuser	[0.2] 5		[4.02] 102	[0.39} 10																9.5
	Diffuser with opening			[9.33] 237																	9.7

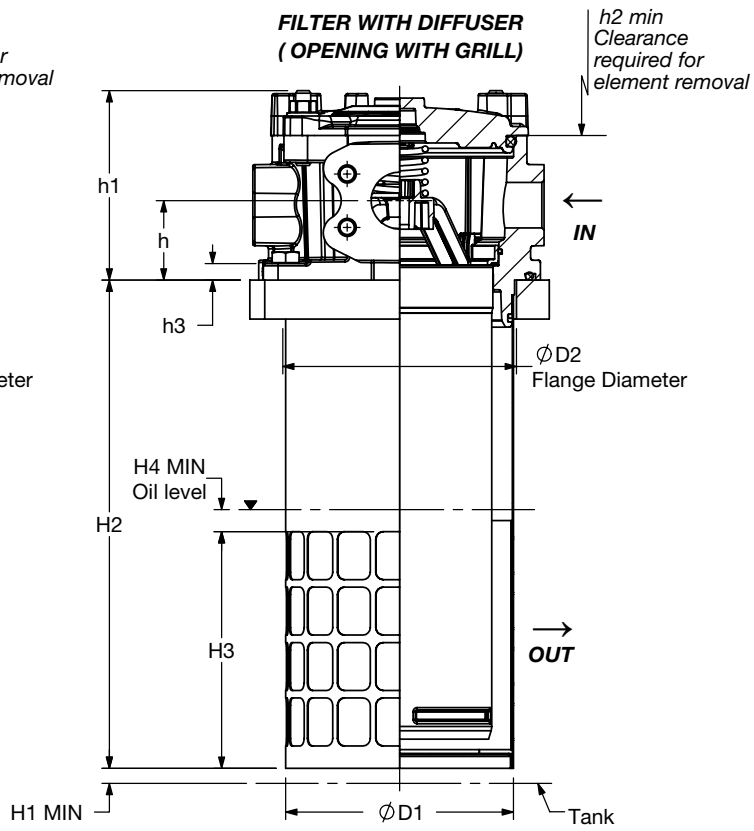
* Non-machined port
** Machined port

Dimensions
RFT 0310, 0410, 0500

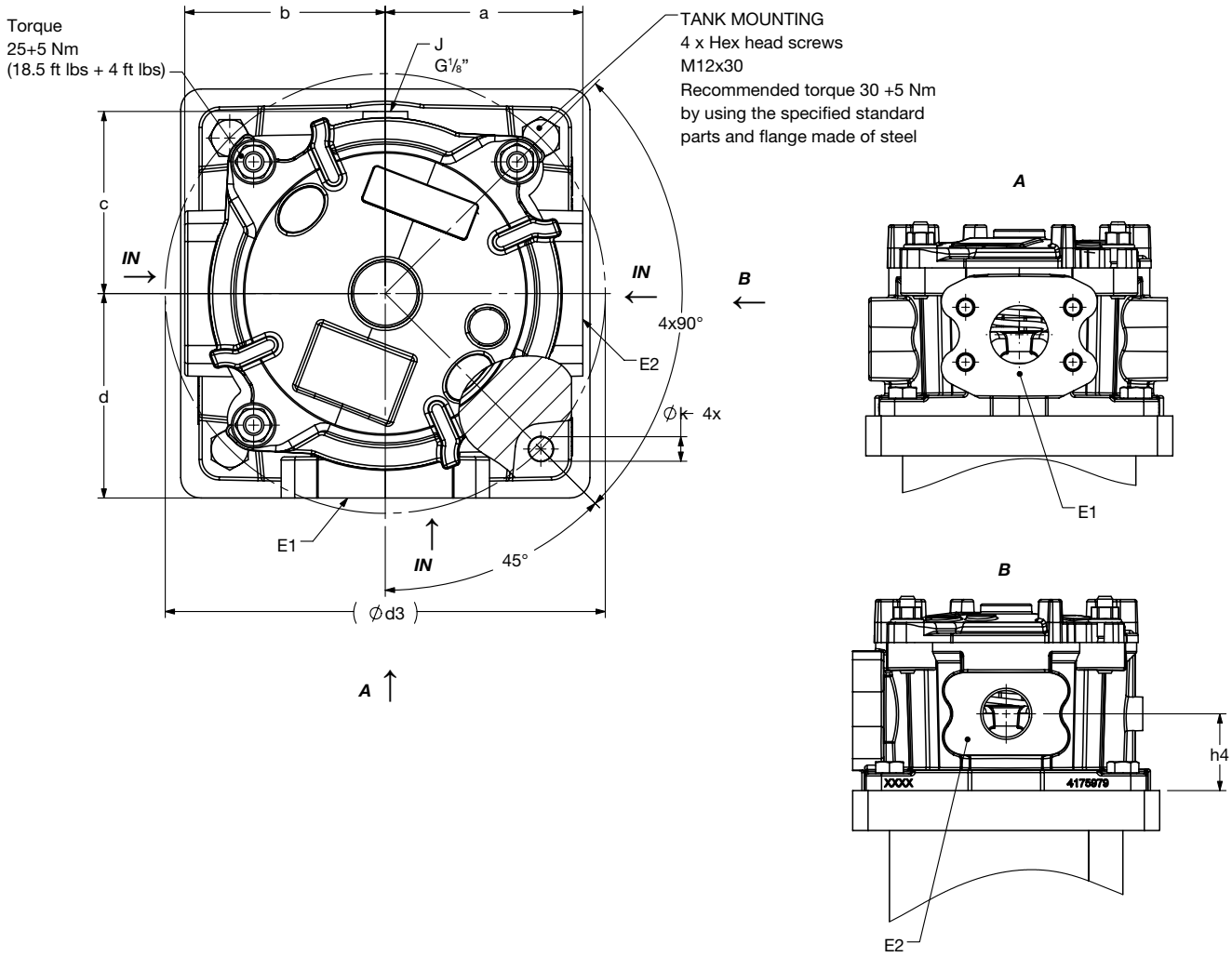








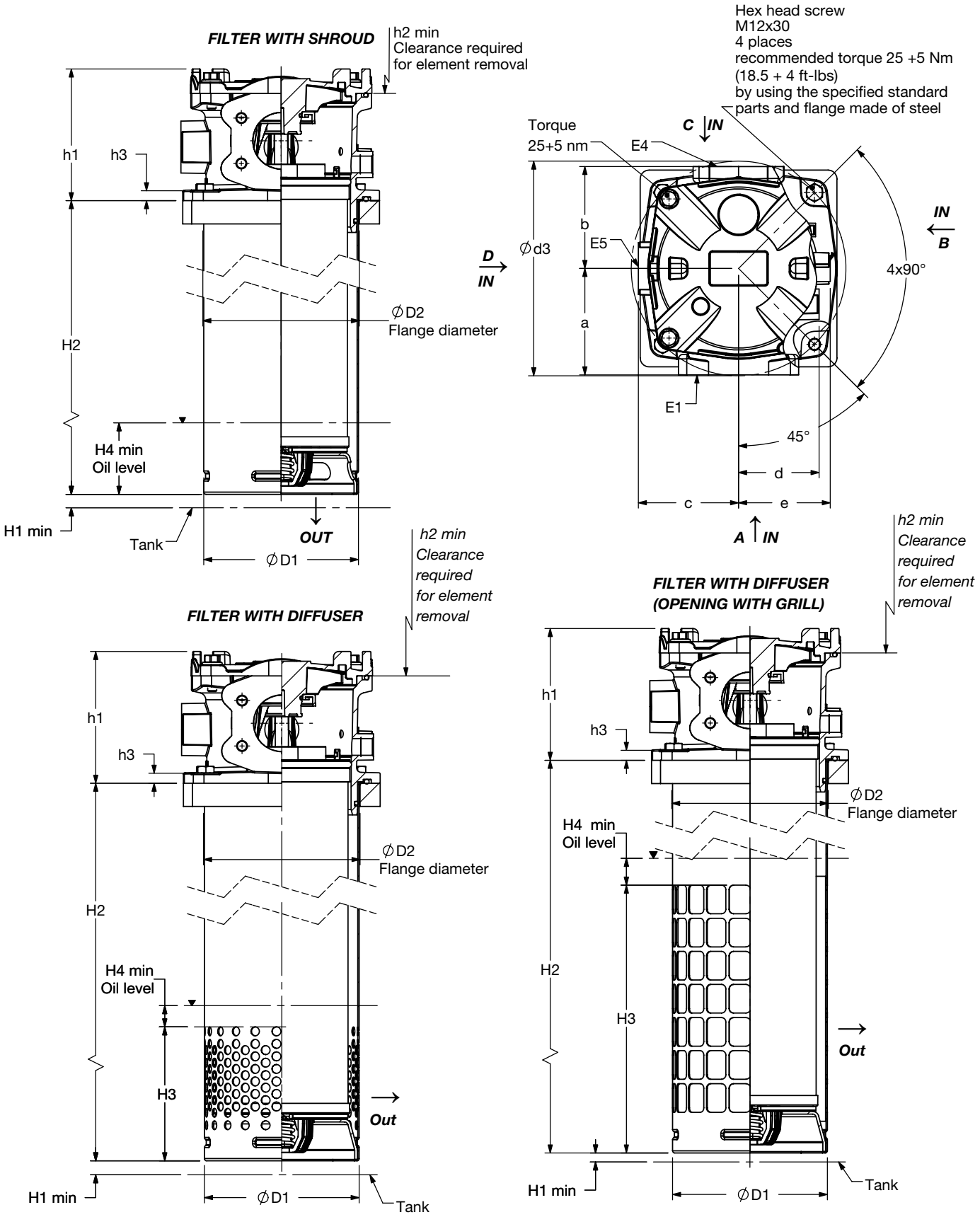
SPECIAL ORDER FILTERS - LOW PRESSURE



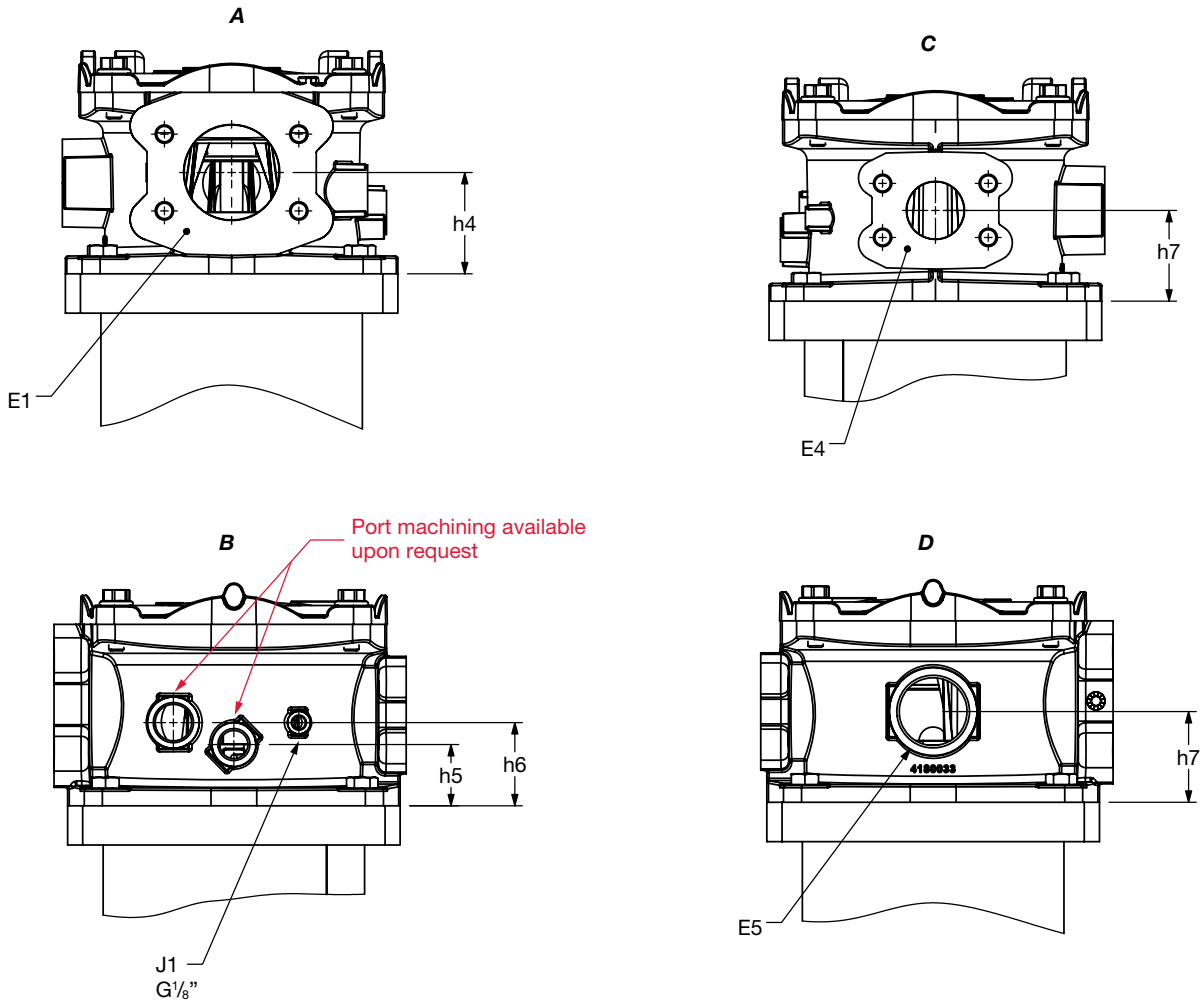
Type	Design	H1	H2	H3	H4	h	h1	h2	h3	h4	ØD1	ØD2	Ød3	a	b	c	d	Øk	Wt (lbs)
RFT 0310	Without shroud	[0.39] 10	[12.03] 305.5	-	[7.87] 200	[2.09] 53	[4.98] 126.5	[16.54] 420	[0.43] 11	[1.97] 50	-	[6.14] 156	[8.46] 215	[3.85] 98.0* [3.80] 96.5**	[3.85] 98.0* [3.80] 96.5**	[3.58] 91* [3.50] 89**	[3.94] 100	[0.49] 12.5	9.3
	With shroud		[12.83] 326	-	[2.36] 60						[5.98] 152								10.8
	With diffuser	[0.2] 5		[4.53] 115	[0.39] 10														11.0
	Diffuser with opening			[6.22] 158															11.2
RFT 0410	Without shroud	[0.39] 10	[15.96] 405.5	-	[10.63] 270			[20.47] 520			-								9.9
	With shroud		[16.77] 426	-	[2.36] 60						[5.98] 152								11.9
	With diffuser	[0.2] 5		[4.53] 115	[0.39] 10														12.1
	Diffuser with opening			[7.68] 195															12.3
RFT 0500	Without shroud	[0.39] 10	[19.51] 495.5	-	[12.99] 330			[24.02] 610			-								11.0
	With shroud		[20.31] 516	-	[2.36] 60						[5.98] 152								13.2
	With diffuser	[0.2] 5		[4.53] 115	[0.39] 10														13.4
	Diffuser with opening			[10.63] 270															13.7

* Non-machined port
** Machined port

Dimensions
RFT 0600, 0800, 1200



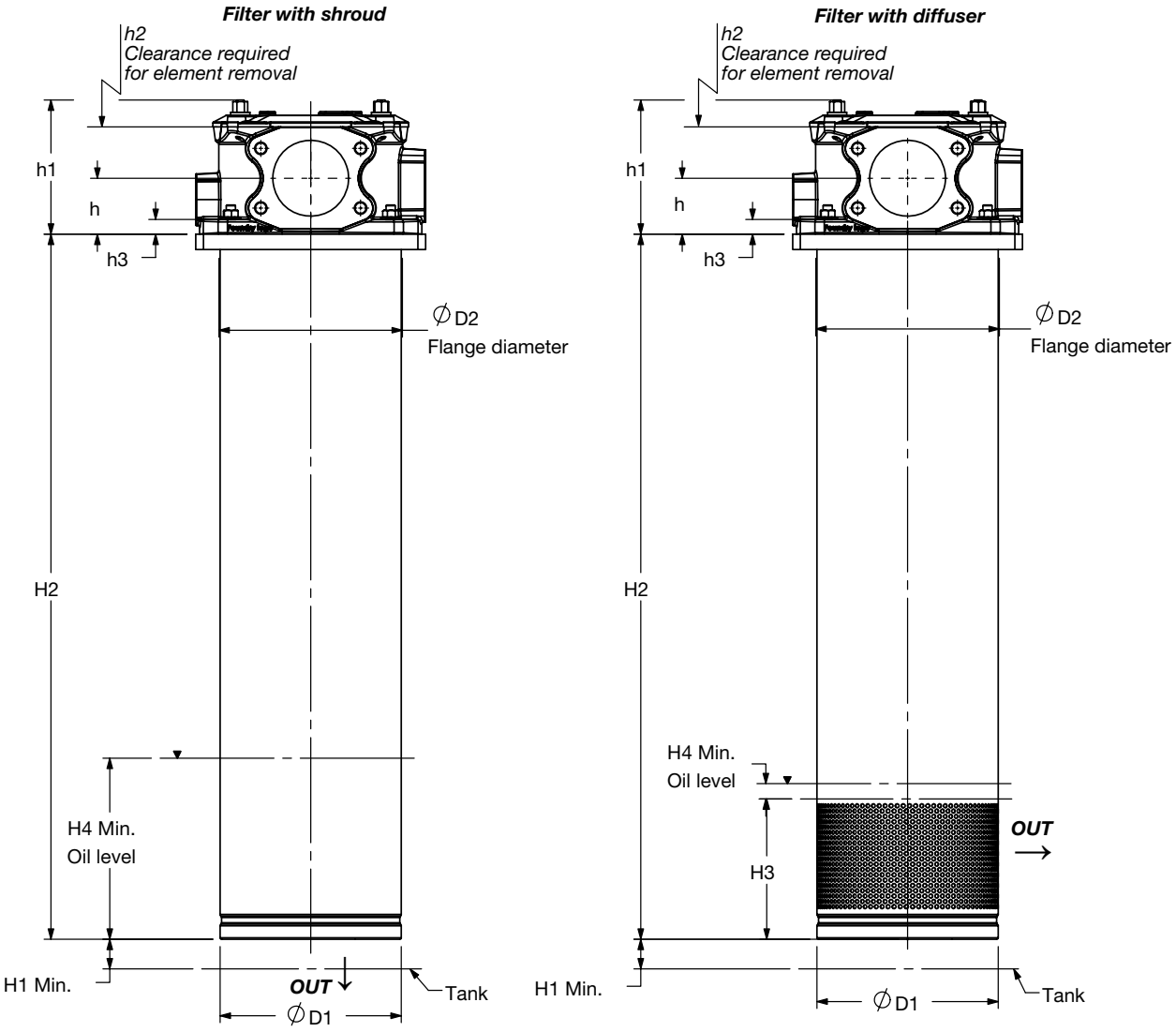
SPECIAL ORDER FILTERS - LOW PRESSURE



Type	Design	H1	H2	H3	H4	h	h1	h2	h3	h4	ØD1	ØD2	Ød3	a	f	f2	g	g2	Øk	Øk2	Wt (lbs)
RFT 0600	With shroud	[0.39] 10	[18.94] 481	-	[3.15] 80	[1.63] 41.5	[4.41] 112	[19.69] 500	[0.51] 13	[2.01] 51	[6.81] 173	[6.89] 175	[8.66] 220	[4.21] 107* [4.17] 106**	[2.75] 69.9	[3.06] 77.8	[1.41] 35.7	[1.69] 42.9	[0.49] 12.5	M12 18 deep	26.5
	With diffuser	[0.2] 5		[5.51] 140	[0.39] 10																26.9
	Diffuser with opening			[11.42] 290																	27.1
RFT 0800	With shroud	[0.39] 10	[26.54] 674	-	[3.15] 80			[27.56] 700													28.2
	With diffuser	[0.2] 5		[5.51] 140	[0.39] 10																28.7
	Diffuser with opening			[15.75] 400																	28.9
RFT 1200	With shroud	[0.39] 10	[32.6] 828	-	[3.15] 80			[35.43] 900													34.6
	With diffuser	[0.2] 5		[5.51] 140	[0.39] 10																35.1
	Diffuser with opening			[21.65] 550																	35.3

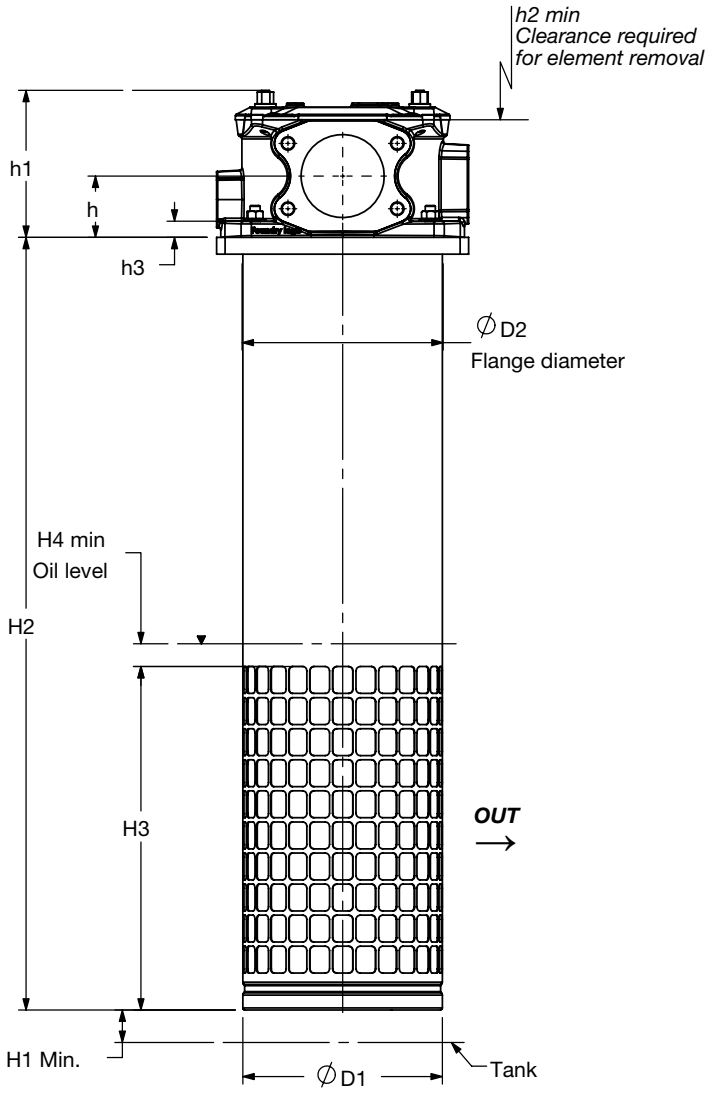
* Non-machined port
** Machined port

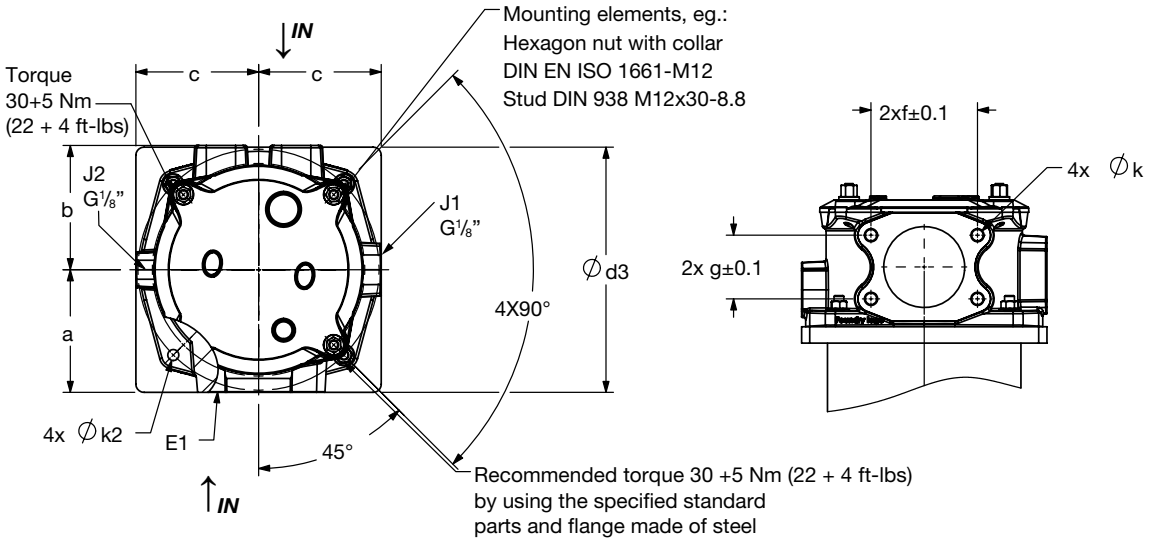
Dimensions
RFT 1800, 2000, 2400



RFT 1800, 2000, 2400

Filter with diffuser (opening with grill)





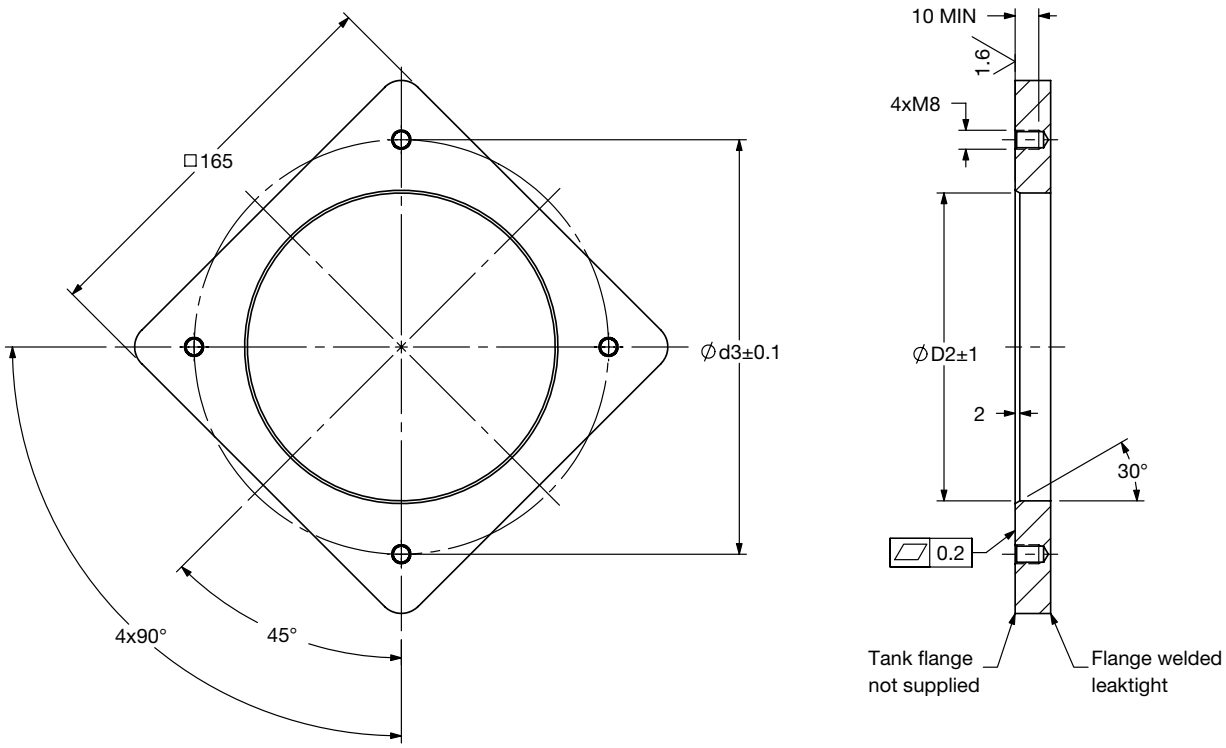
Type	Design	H1	H2	H3	H4	h	h1	h2	h3	ØD1	ØD2	Ød3	a	b	c	f	g	Øk	Øk2	Wt (lbs)
RFT 1800	With shroud	[1.38] 35	[36.22] 920	-	[5.12] 130	[2.87] 73	[6.89] 175	[35.43] 900	[0.75] 19	[9.35] 237.5	[9.43] 239.5	[11.61] 295	[5.98] 152* [5.91] 150**	[5.98] 152* [5.91] 150**	[5.98] 152* [5.91] 150**	SAE 4" [5.13] 130.2 SAE 3" [4.19] 106.4	SAE 4" [3.06] 77.8 SAE 3" [2.44] 61.9	M 16x32 deep	[0.53] 13.5	64.6
	With diffuser	[0.59] 15		[7.09] 180	[0.39] 10															66.8
	Diffuser with opening			[16.14] 410																67.2
RFT 2000	With shroud	[1.38] 35	[47.24] 1200	-	[5.12] 130			[45.28] 1150												76.5
	With diffuser	[0.59] 15		[8.07] 205	[0.39] 10															78.7
	Diffuser with opening			[21.65] 550																79.1
RFT 2400	With shroud	[1.38] 35	[47.24] 1200	-	[5.12] 130			[46.46] 1180												78.9
	With diffuser	[0.59] 15		[8.07] 205	[0.39] 10															81.1
	Diffuser with opening			[21.65] 550																81.6

* Non-machined port
** Machined port

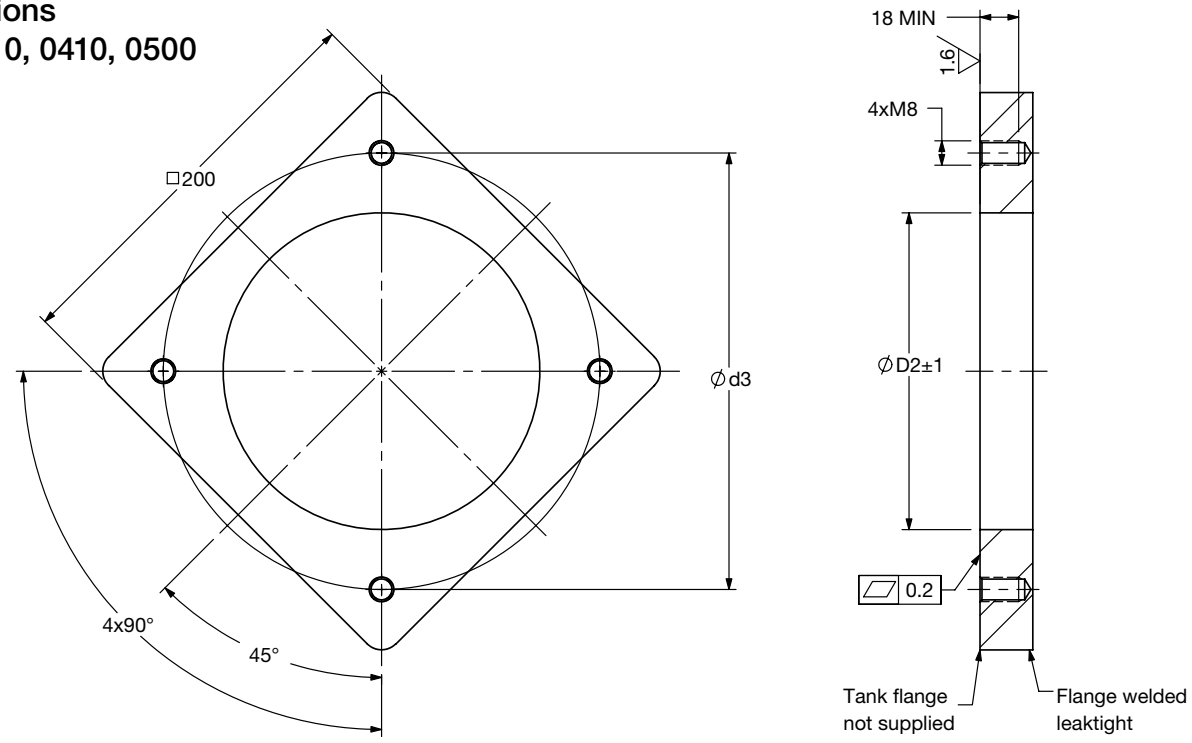
Specifications For The Tank Flange

1. In the filter mounting interface, the tank flange should have a maximum flatness of 0.3 mm and maximum roughness of Ra 3.2 µm.
2. In addition, the mounting interface should be free from damage and scratches.
3. The mounting holes of the flange must be blind, or stud bolts. Loctite must be used to mount the filter. As an alternative, the tank flange can be continuously welded from the inside.
4. Both the tank sheet metal and the filter mounting flange must be sufficiently robust so that neither deform when the seal is compressed during tightening.

Dimensions
RFT 0170, 0230, 0300, 0400



Dimensions
RFT 0310, 0410, 0500



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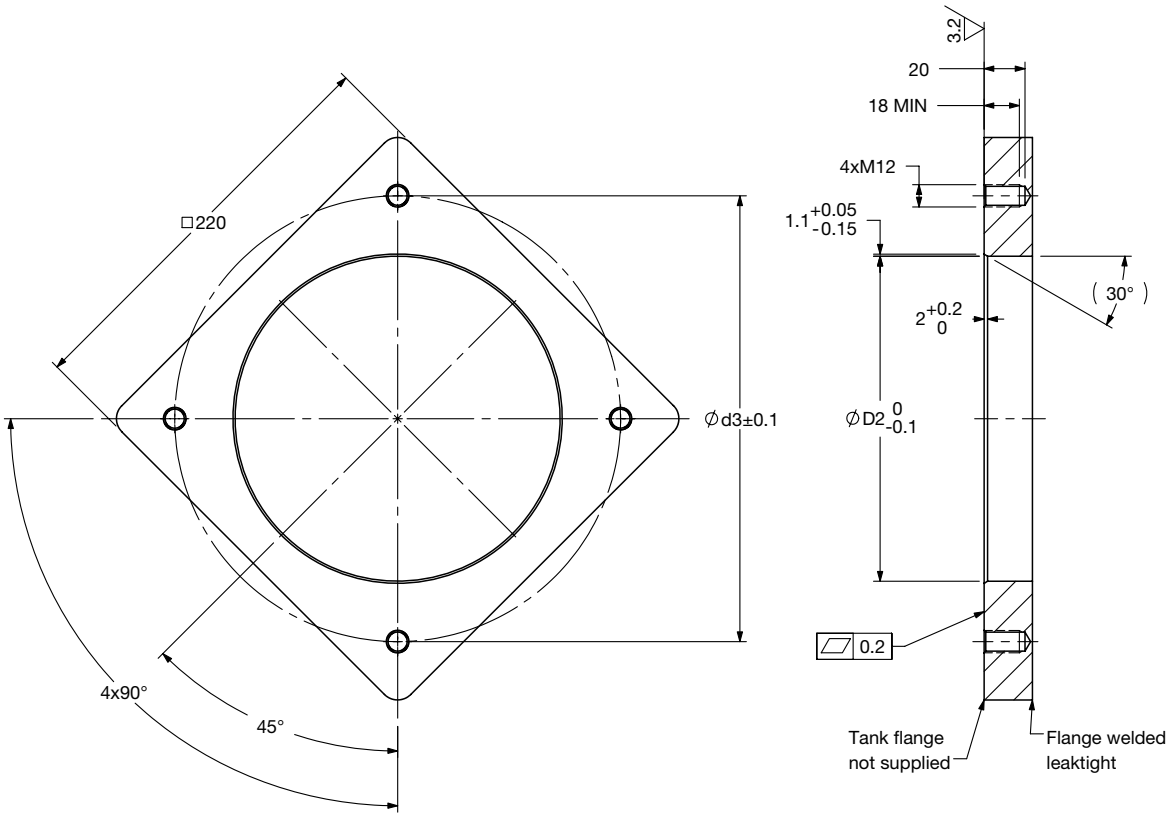
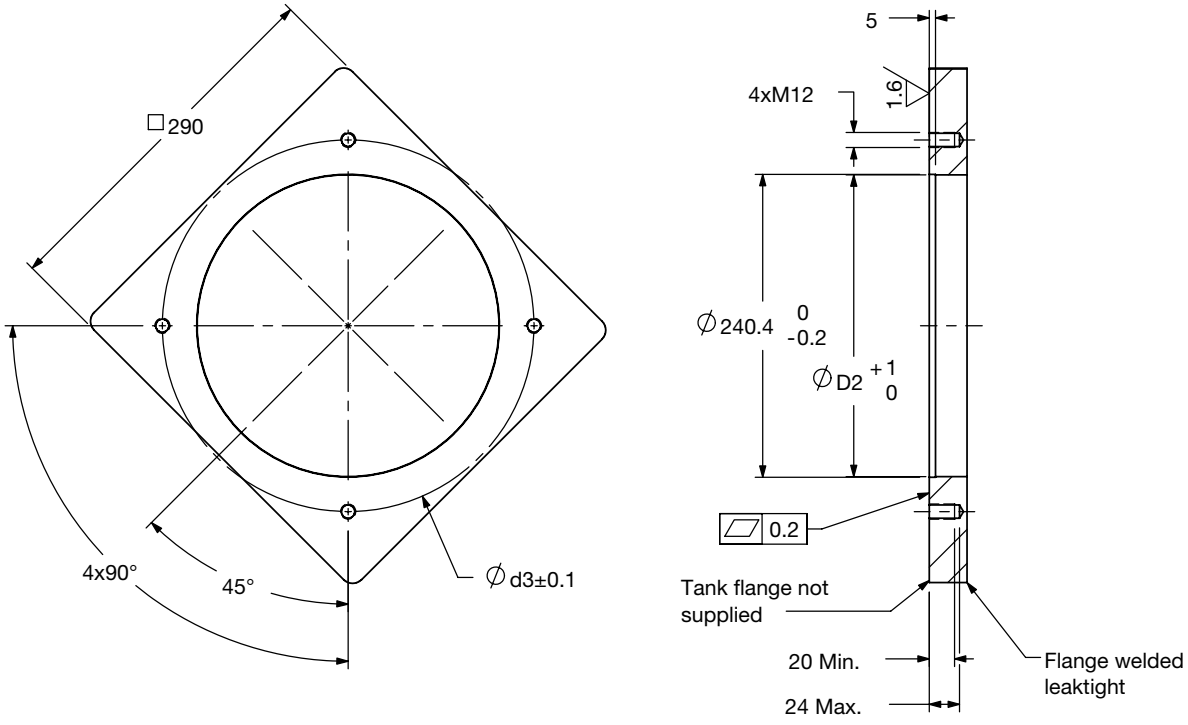
Dimensions
RFT 0600, 0800, 1200



Dimensions
RFT 1800, 2000, 2400



Sizing Information

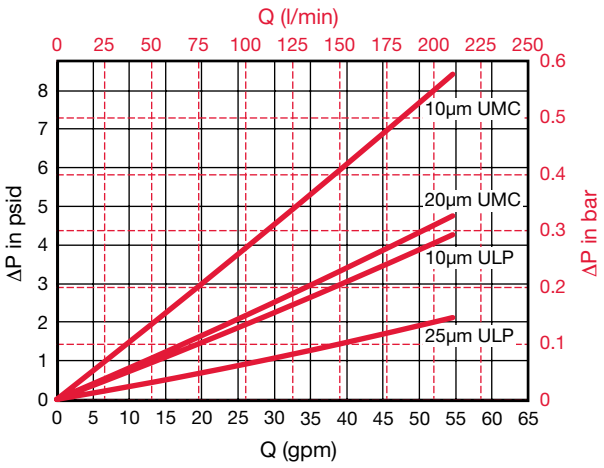
Assembly Curve:

Pressure loss through Assembly is as follows. These curves are based on a viscosity of 30 cst.

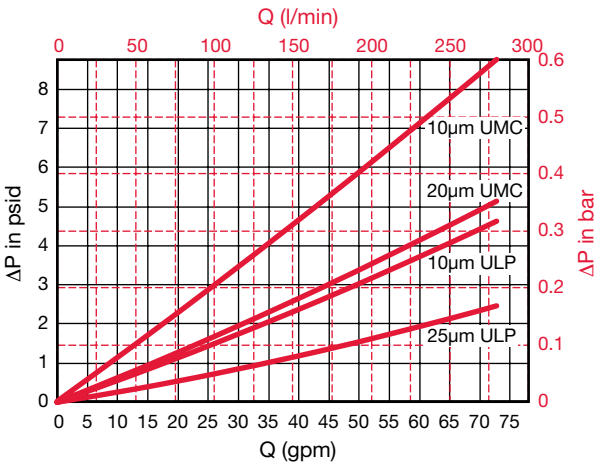
Adjustments must be made for viscosity & specific gravity of the fluid to be used!

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

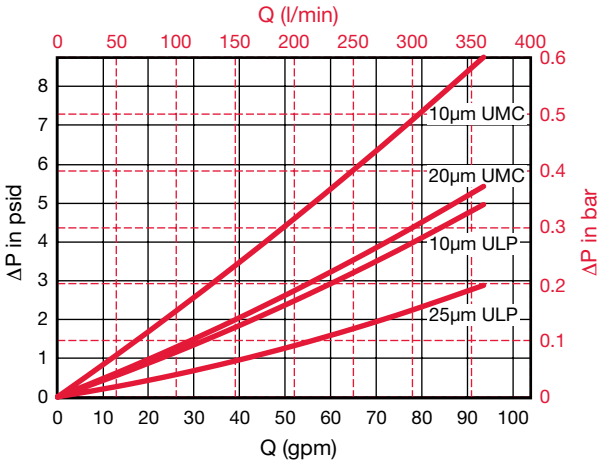
RFT 170 Assembly



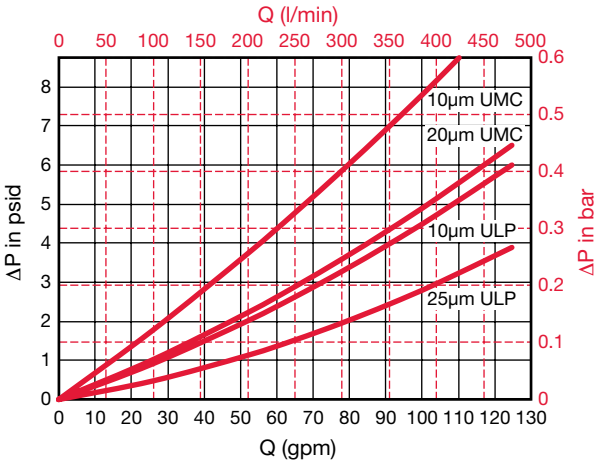
RFT 230 Assembly



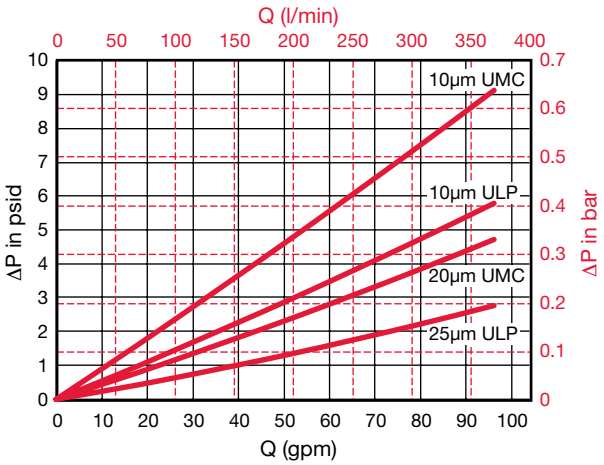
RFT 300 Assembly



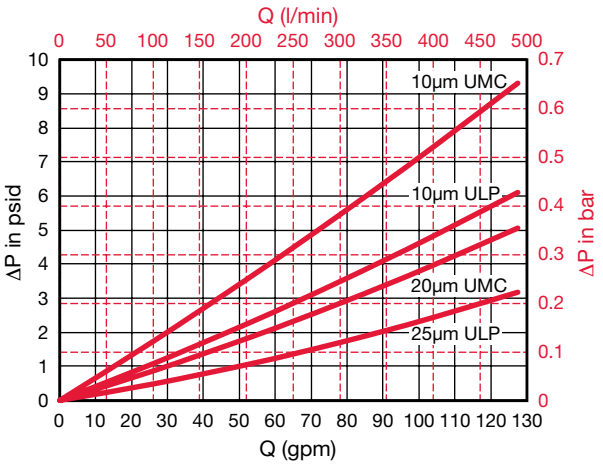
RFT 400 Assembly



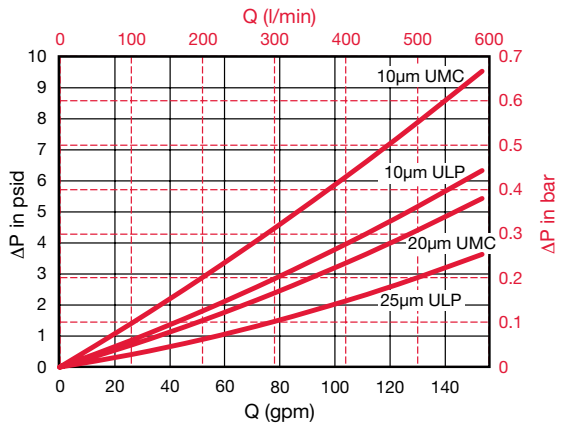
RFT 310 Assembly



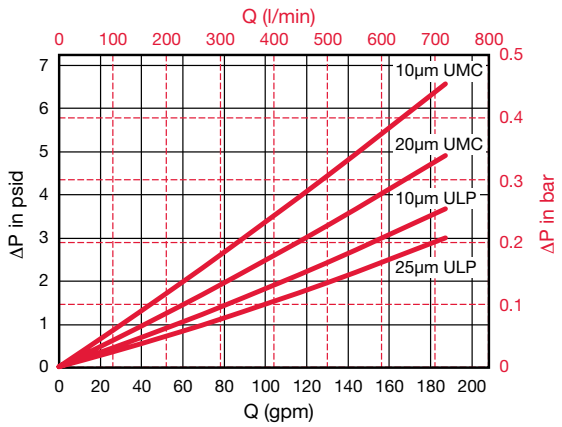
RFT 410 Assembly



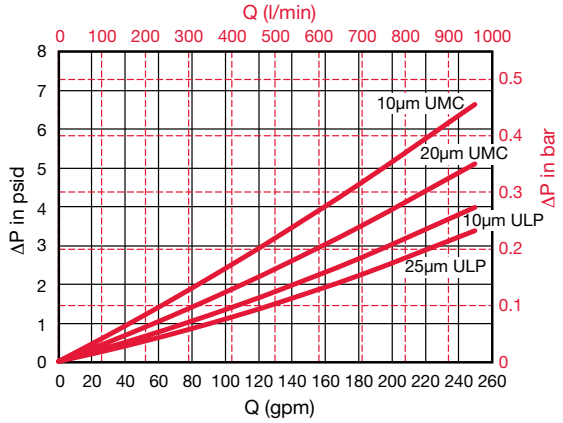
RFT 500 Assembly



RFT 600 Assembly

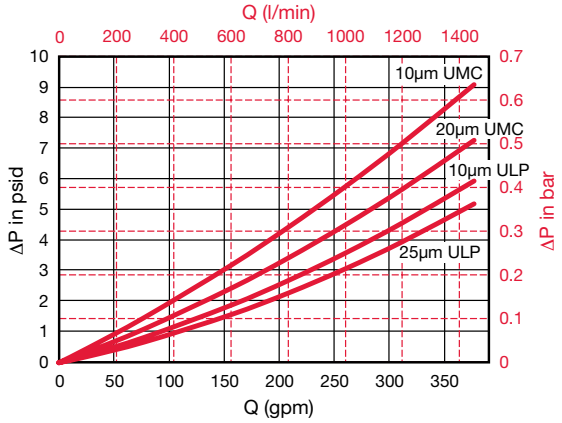


RFT 800 Assembly

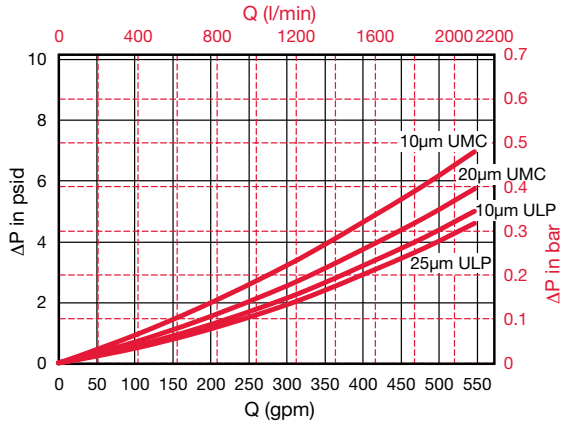


10µm ULP

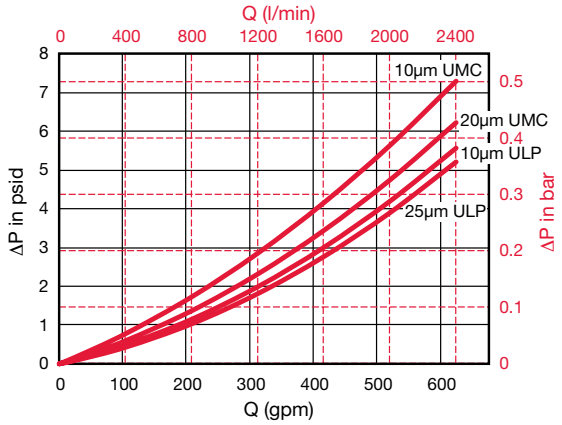
RFT 1200 Assembly



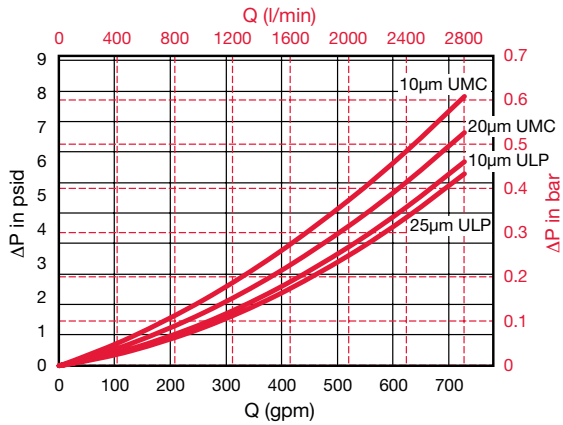
RFT 1800 Assembly



RFT 2000 Assembly



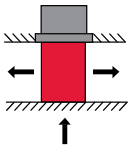
RFT 2400 Assembly

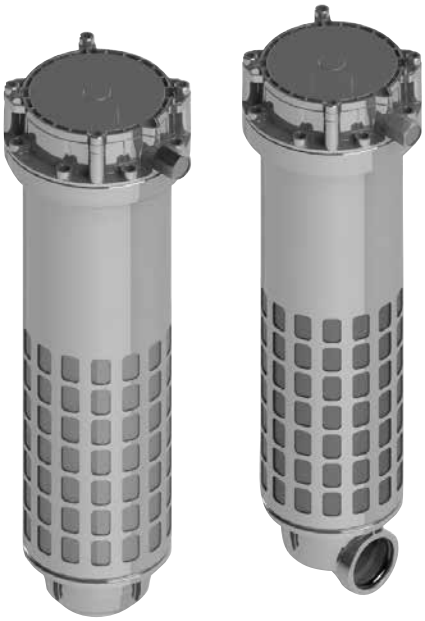


RFB Series

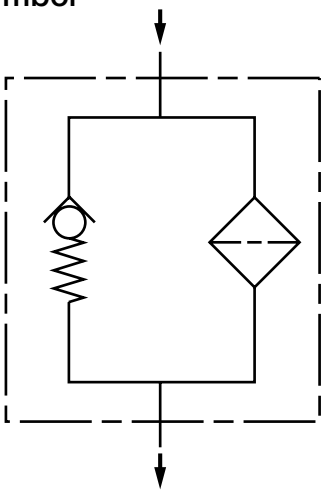
Return Line Filter

145 psi • up to 158 gpm





Hydraulic Symbol



Features

Filter Housing - Design

The RFB filters are suitable for medium to large flow rates. The filter is mounted in the tank and flow passes through it through a pipe connection from below or from the side. The optimal flow conditions created by flow from beneath guarantee optimum air separation, high pulsation stability and long filter service life.

The filter housings are designed in accordance with international regulations. They consist of a housing tube, filter head and a filter lid. The element is top-removable.

Standard equipment

- mounting holes on the filter head
- with bypass valve
- inlet as easy-fit model
- outlet via diffuser *(openings with outlet grill)*
- multi-patented filter
  (including integrated housing seal and two-part bypass)
- bored, without clogging indicator
- with anti-drain valve

Filter Elements

HYDAC filter elements are validated and their quality is constantly monitored according to the following standards:
ISO 2941, ISO 2942, ISO 2943, ISO 3724, ISO 3968, ISO 11170, ISO 16889

Filter elements are available with the following pressure stability values:

Glass fiber (ULP):	87 psi (6 bar)
Glass fiber with pre-filter (UMC):	87 psi (6 bar)

Special Models and Accessories

- integrated retrofit protection
- clogging indicator optional to measure differential pressure with element
- seals made of FKM
- without anti-drain valve

Technical Specifications

Mounting Method	4 Mounting holes - filter housing	
Direction of Flow	Inlet: Bottom	Outlet: Shroud windows
Materials of Construction		
	Housing	**Lid**
0170	Steel	Aluminum
0300	Steel	Aluminum
0400	Steel	Aluminum
0600	Steel	Aluminum
Flow Capacity		
0170	45 gpm (170 l/min)	
0300	79 gpm (300 l/min)	
0400	105 gpm (400 l/min)	
0600	158 gpm (600 l/min)	
Housing Pressure Rating		
Max. Allowable Working Pressure*	145 psi (10 bar)	
Element Collapse Pressure Rating		
ULP, UMC	87 psid (6 bar)	
Fluid Temp. Range	-22°F to 212°F (-30°C to 100°C)	
Consult HYDAC for applications below -22°F (-30°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
P = 29 psi (2.0 bar) *standard* P = 11 psi (0.8 bar) *optional*		
Bypass Valve Cracking Pressure		
ΔP = 36 psi (2.5 bar) *standard)* ΔP = 11 psi (0.8 bar) *optional*		

Applications

Agricultural

Industrial

Construction

Model Code

RFB 0400 UMC 010 V X B V R 0 V N J1 VX X 1 /-XXX

Filter Type
RFB = Return Line filter

Size
0170, 0300, 0400, 0600

Element Media
ULP = Glass fiber
UMC = Glass fiber with pre-filter

Filtration Rating *(micron)*
ULP = 010, 025
UMC = 010, 020

Bypass Valve
C = with bypass valve 0.8 bar (11 psi)
V = standard: with bypass valve 2.5 bar (36 psi)

Magnetic Core
X = without magnetic core

Operating Pressure
B = 145 psi (10 bar)

Inlet Connection Position
V = centrally from below
H = from side

Outlet Shroud Version
R = standard: with diffuser *(openings with outlet grill)*

Location of Inlet Pipe Relative to Clogging Indicator Port
0 = 0° to clogging indicator *(others on request)*

Anti-Drain Valve
X = without valve
V = with valve

Seal
N = NBR *(nitrile rubber)*
V = FKM

Clogging Indicator Position
J1 = bored, for orientation see drawing.

Clogging Indicator
VA = visual/electrical
VE = electrical
VO = visual
VX = no clogging indicator, plugged port

Trip Pressure
C = 0.8 bar (11 psi)
D = 2.0 bar (29 psi)
X = none *(if no clogging indicator is installed)*

Modification Number
X = the latest version is always supplied

Supplementary Details

SPECIAL ORDER FILTERS - LOW PRESSURE

Replacement Element

UMC - 0010 - 117-X509-S - N - RT / __

Element Media
ULP, UMC

Filtration Rating (micron)
10, 25 = ULP
10, 20 = UMC

Size
101-X512-S = RFB0170 element code
101-X518-S = RFB0300 element code
121-X517-S = RFB0400 element code
121-X523-S = RFB0600 element code

Seals
N = Nitrile rubber (NBR)
V = Fluorocarob elastomer (FKM)

Packaging

Supplementary details

Clogging Indicator Model Code

VM 2 B . X / __ V

Indicator Prefix
VM = G 1/2 3000 psi

Trip Pressure
0.8 = 11 psid (0.8 bar) - Noted by “C” in filter model code
2 = 29 psid (2 bar) - Noted by “D” in filter model code

Type of Indicator
Note by “VO” in filter model code - use B
Noted by “VE” in filter model code - use C
Noted by “VA” in filter model code - use D

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

(For additional details and options, see Clogging Indicators section.)

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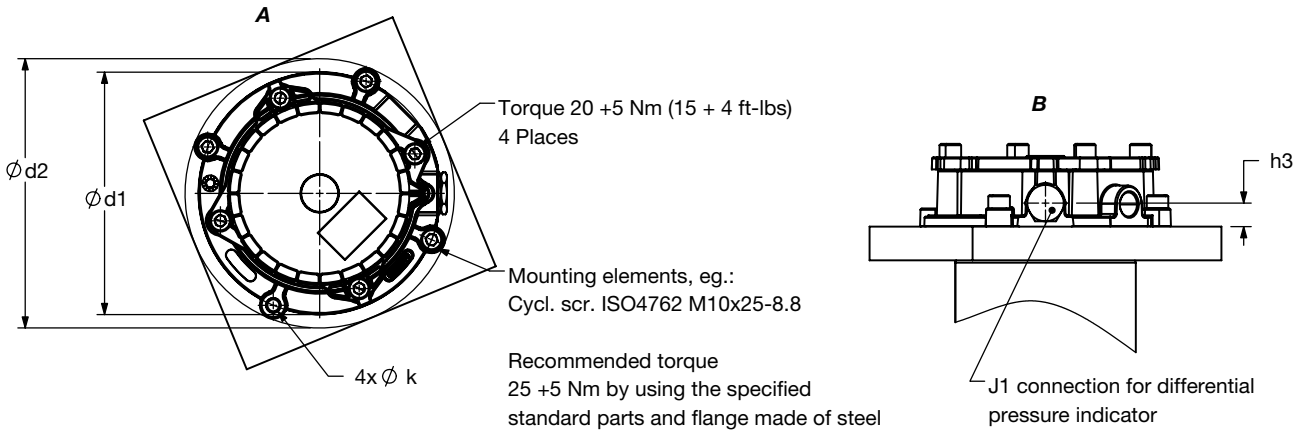
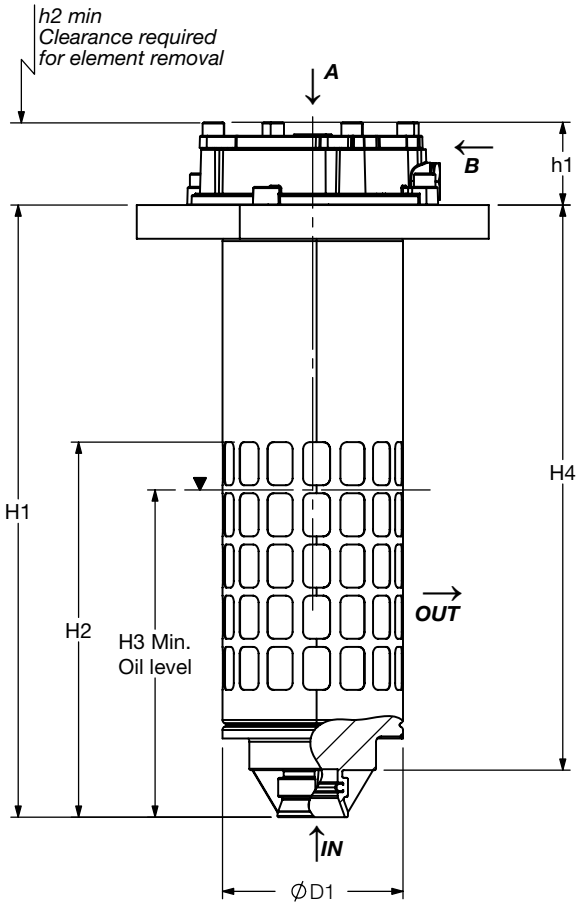
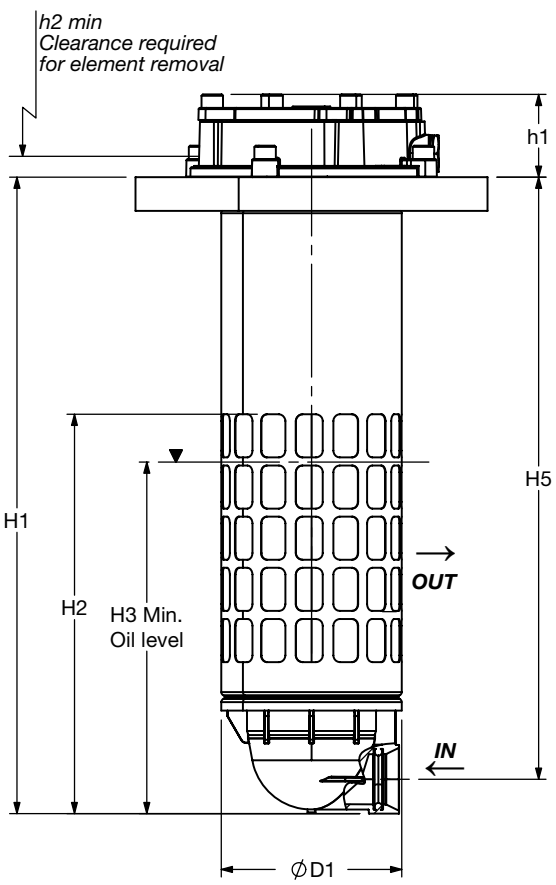
Dimensions
RFB 0170-0300



Housing closure V

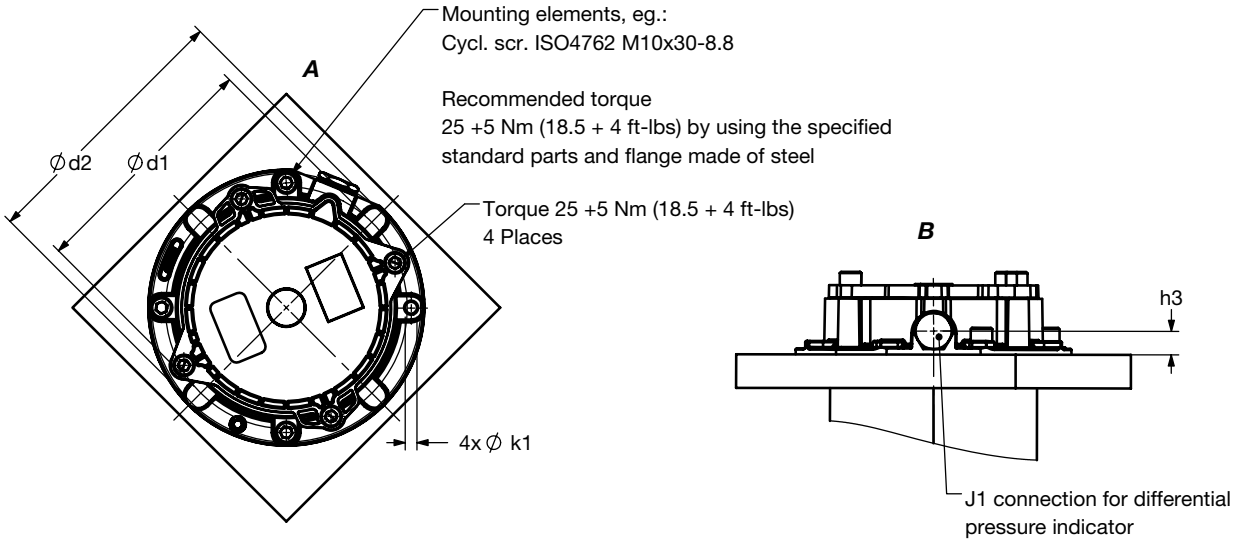


Housing closure H

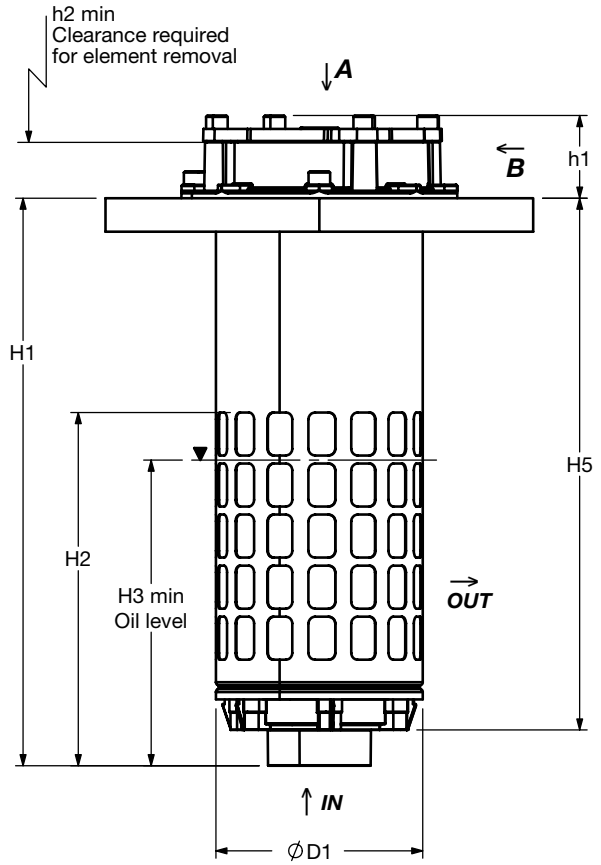


Type	Design	Connection position	H1	H2	H3	H4	H5	h1	h2	h3	ØD1	Ød1	Ød2	Øk	Weight (lbs)
RFB 0170	Diffuser with opening	H	[12.7] 322.5	[8.68] 220.5	[7.32] 186	-	[11.69] 297	[2.42] 61.5	[11.81] 300	[0.69] 17.5	[5.28] 134	[7.09] 180	[7.87] 200	[0.41] 10.5	7.3
	Diffuser with opening	V	[11.99] 304.5	[7.97] 202.5	[6.61] 168	[10.61] 269.5	-								7.1
RFB 0300	Diffuser with opening	H	[18.6] 472.5	[11.67] 296.5	[10.31] 262	-	[17.6] 447		[17.72] 450						8.6
	Diffuser with opening	V	[17.89] 454.5	[10.96] 278.5	[9.61] 244	[16.52] 419.5	-								8.8

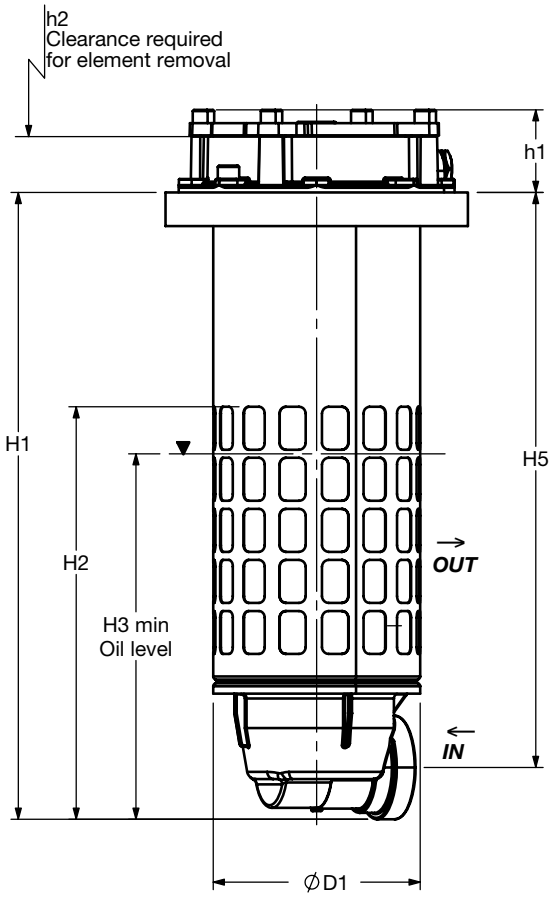
Dimensions
RFB 0400-0600



Housing closure V



Housing closure H

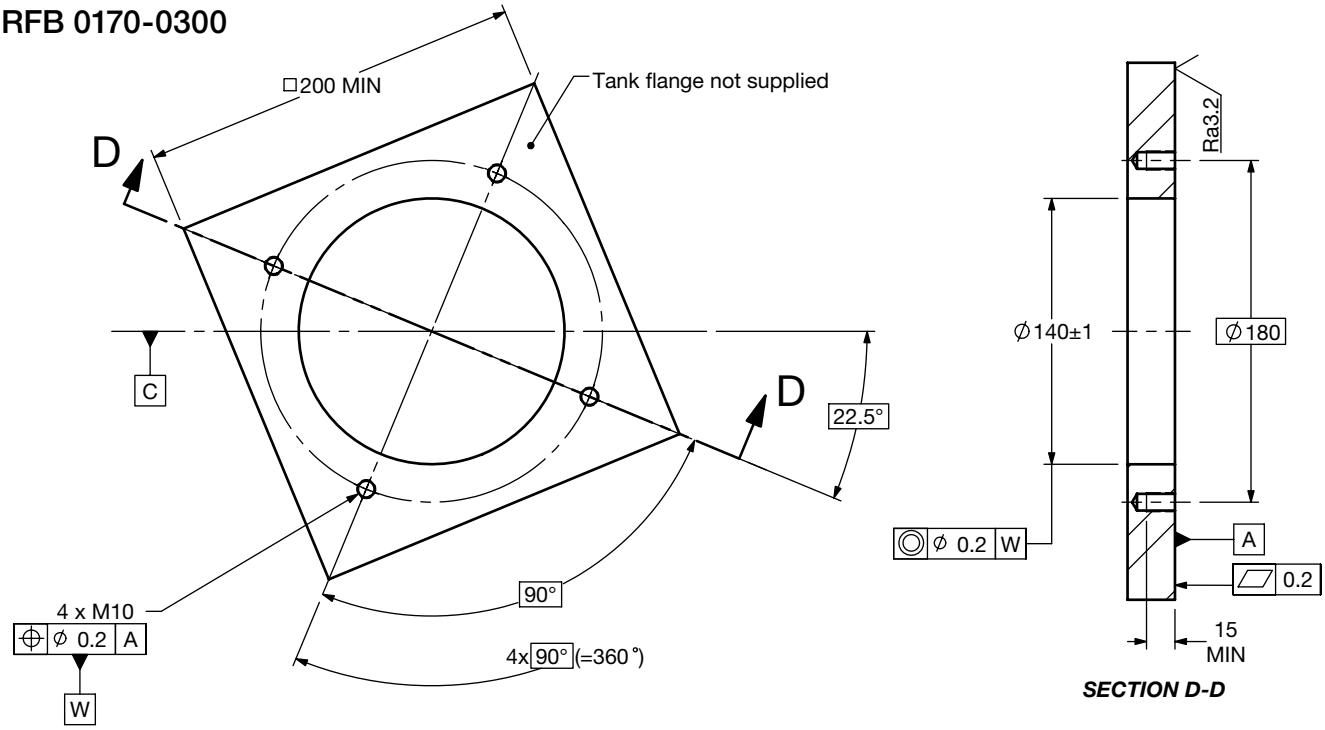


Type	Design	Connection position	H1	H2	H3	H4	H5	h1	h2	h3	ØD1	Ød1	Ød2	Øk1	Weight (lbs)
RFB 0400	Diffuser with opening	H	[18.37] 466.5	[12.09] 307	[9.21] 234	–	[16.85] 428	[2.42] 61.5	[16.93] 430	[0.69] 17.5	[6.06] 154	[7.31] 185.7	[8.07] 205	[0.41] 10.5	9.9
	Diffuser with opening	V	[16.63] 422.4	[10.34] 262.6	[7.17] 182	[15.5] 393.8	-								9.5
RFB 0600	Diffuser with opening	H	[24.16] 613.7	[15.09] 383.2	[12.2] 310	–	[22.65] 575.2		[22.83] 580						12.1
	Diffuser with opening	V	[22.11] 561.6	[13.04] 331.1	[10.16] 258	[21.3] 541	-								11.7

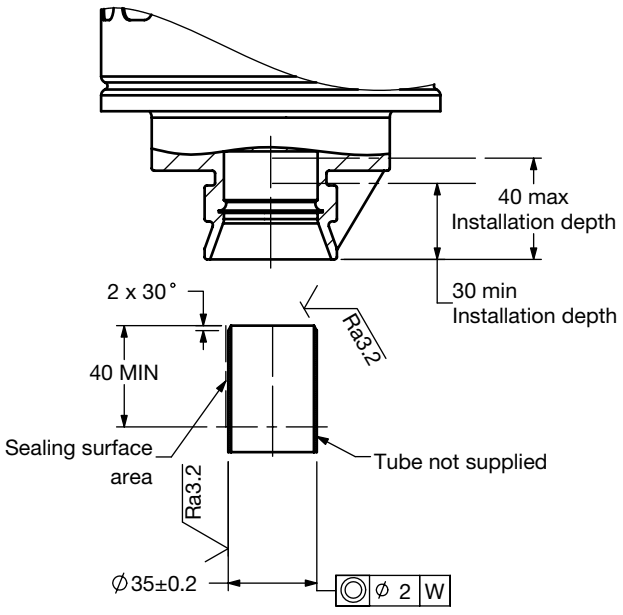
Specifications For The Tank Flange

1. In the filter mounting interface, the tank flange should have a maximum flatness of 0.3 mm and maximum roughness of Ra 3.2 µm.
2. In addition, the mounting interface should be free from damage and scratches.
3. The mounting holes of the flange must be blind, or stud bolts. Loctite must be used to mount the filter. As an alternative, the tank flange can be continuously welded from the inside.
4. Both the tank sheet metal and the filter mounting flange must be sufficiently robust so that neither deform when the seal is compressed during tightening.

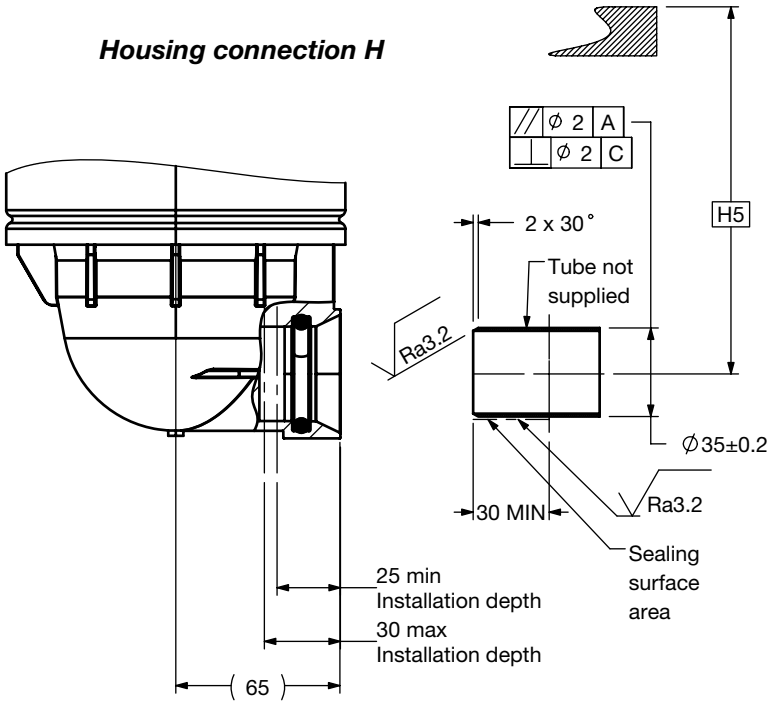
Dimensions
RFB 0170-0300



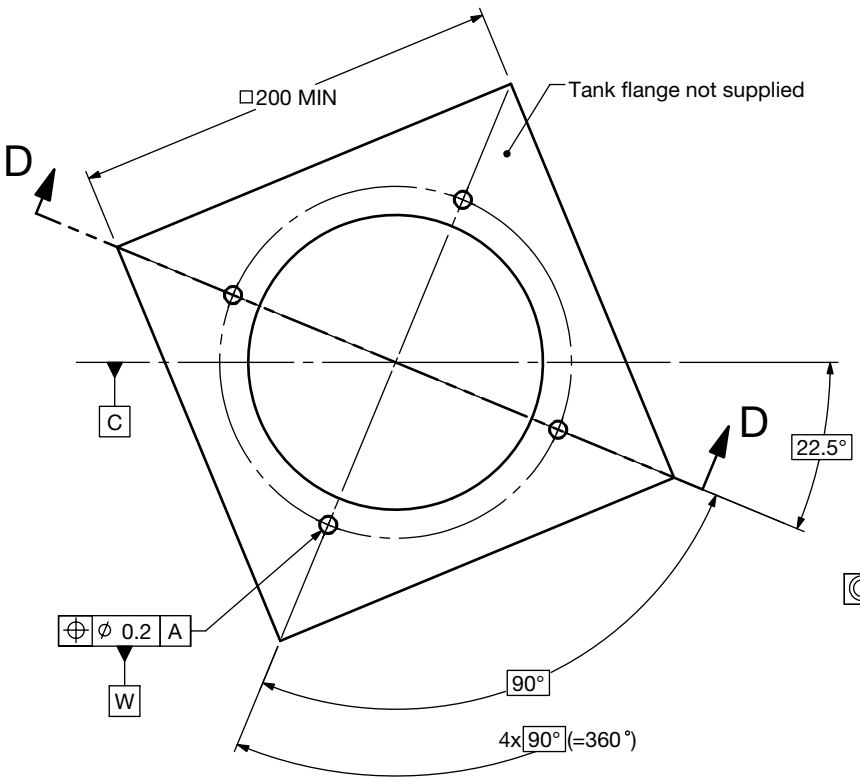
Housing Connection V

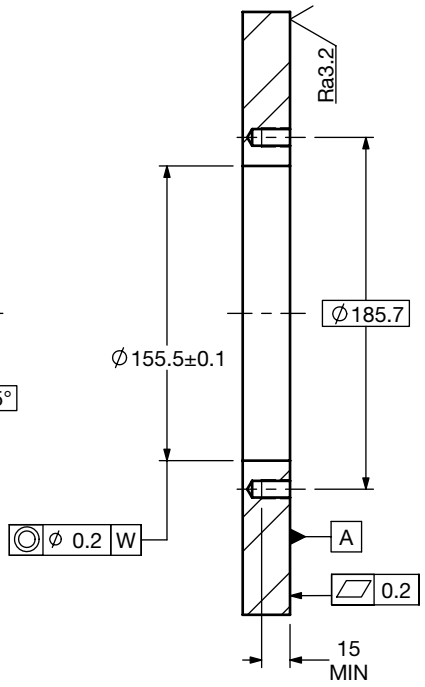


Housing connection H



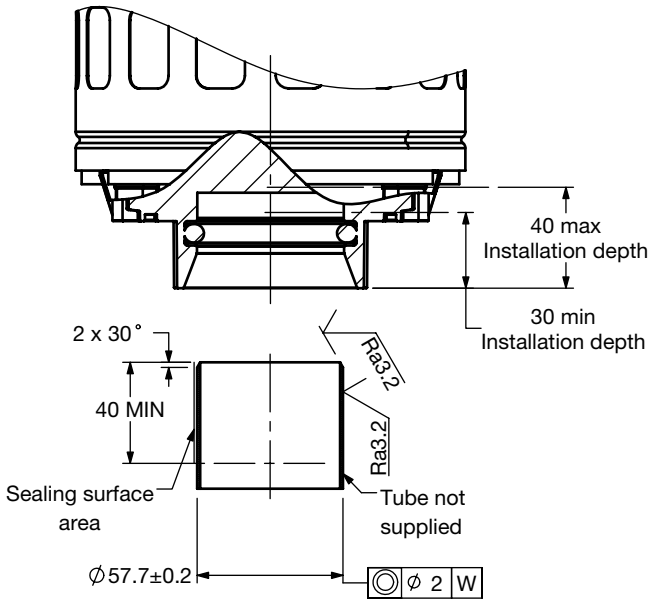
Dimensions
RFB 0400-0600



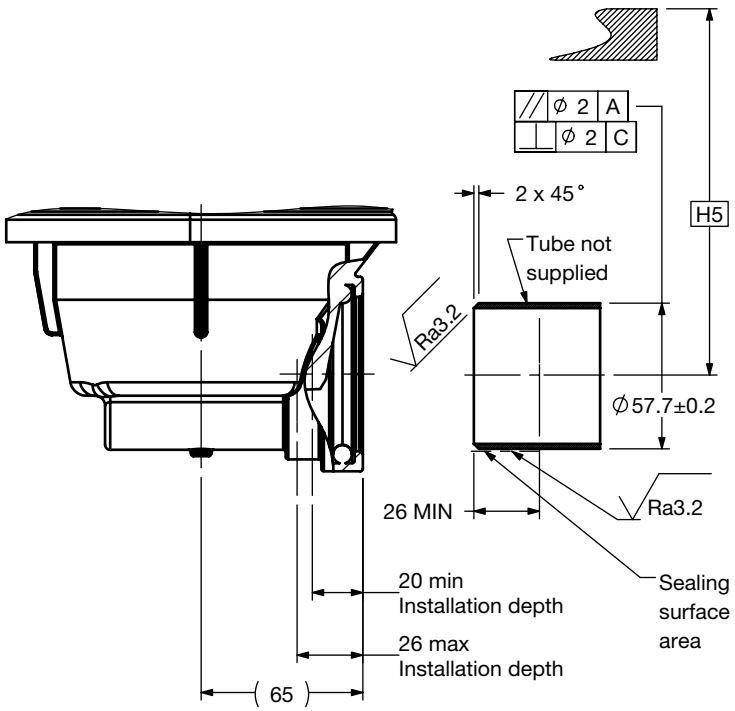


SECTION D-D

Housing Connection V



Housing Connection H



PN#02081318 / 07.19 / FIL1907-2109

Sizing Information

Assembly Curve:

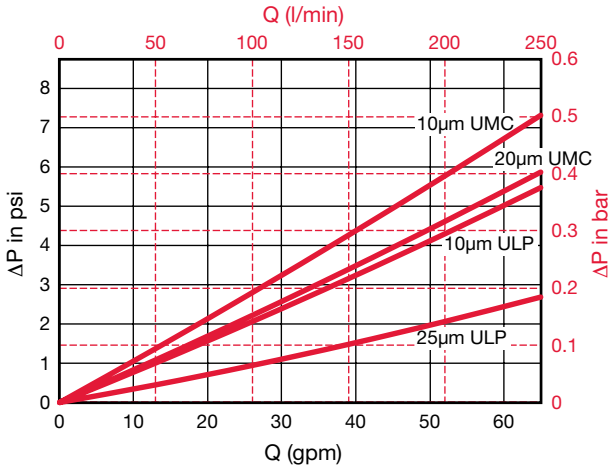
Pressure loss through housing is as follows:

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

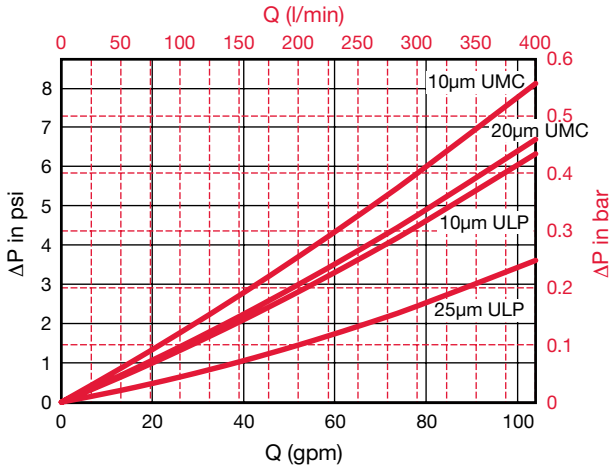
$$\text{Assembly } \Delta P = \text{Assembly Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Note: All curves represent 30 cSt viscosity.

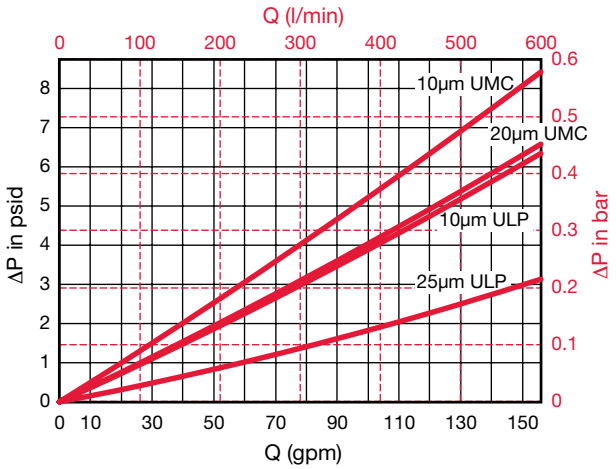
RFB 170 Assembly



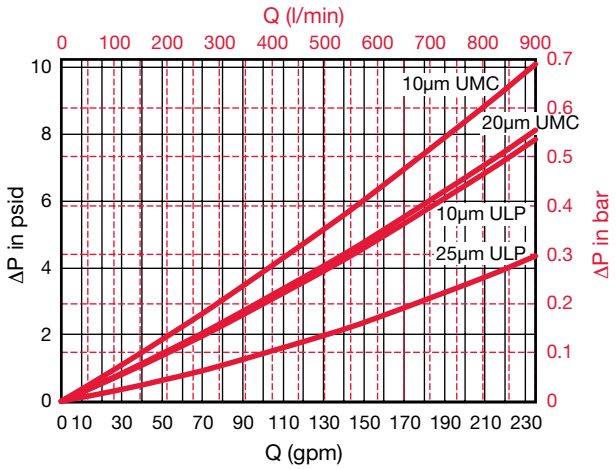
RFB 300 Assembly



RFB 400 Assembly



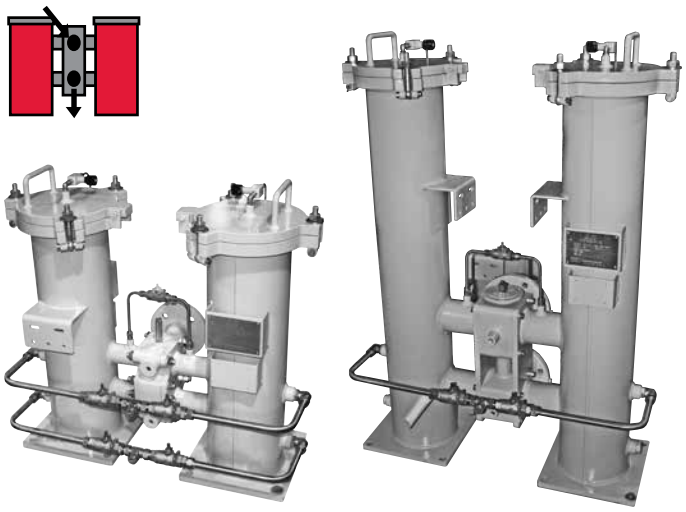
RFB 600 Assembly



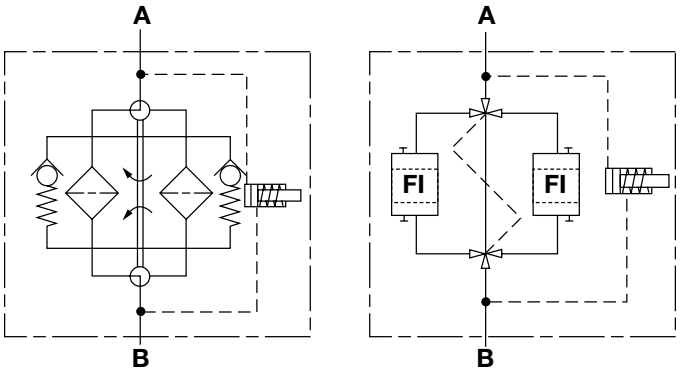
RFLDH Welded Series

Inline Duplex Filters

150 psi • up to 700 gpm



Hydraulic Symbol



Features

- Models are available in carbon and stainless steel versions. Lids are swing bolt mounted.
- ANSI flange connections
- Inlet and outlet connections are located on the same side of the transfer valve.
- Transfer valve and pressure equalization line allow easy changeover between filter housings without costly system shutdown.
- Clogging indicators have no external dynamic seal. High reliability is achieved and magnetic actuation eliminates a leak point.
- Stainless drain piping with ball valves available.
- Air bleed line available
- ASME stamp available
- Australian AS1210 approval available
- Canadian registration approval available

Notes: This filter is configured with an …..R…. type (return/low pressure) element, so if the filter requires a bypass, the bypass is located in the closed end cap of the cartridge element.

Most states and local jurisdictions in the United States require pressure vessels to be ASME stamped. It is the responsibility of the end customer to research and fully understand the ASME code requirements of the jurisdiction this filter will ultimately be installed in, and to fully communicate these requirements to HYDAC.

Applications

Technical Specifications

Mounting Method	Floor mounted legs *(Filters must not be used as pipe support)*
Port Connection	
1300/1303	2” ANSI 150# Flange
2500/2503	3” ANSI 150# Flange
1320/1323, 2520/2523	4” ANSI 150# Flange
2520/2523, 4020/4023	6” ANSI 150# Flange
Flow Direction	Inlet: Front Top Outlet: Front Bottom
Construction Materials	
1300, 1320, 2500, 2520, 4020	Carbon Steel
1303, 1323, 2503, 2523, 4023	Stainless Steel
Flow Capacity	
1300/1303	170 gpm (644lpm)
1320/1323	304 gpm (1150 lpm)
2500/2503	270 gpm (1050 lpm)
2520/2523	525 gpm (2000 lpm)
4020/4023	700 gpm (2650 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	150 psi (10 bar) standard
Proof Pressure (ASME)	195 psi (13.4 bar)
Element Collapse Pressure Rating	
ON, W/HC	290 psid (20 bar)
ECON2, BN4AM, AM, P/HC	145 psid (10 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications below 14˚F (-10˚C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 29 psid (2 bar) -10%	
ΔP = 72 psid (5 bar) -10%	
Bypass Valve Cracking Pressure	
ΔP = 43 psid (3 bar) +10%	
ΔP = 87 psid (6 bar) +10%	

Model Code

RFLDH ON 1300 B A 3 10 C 1 . X / ZU 150 V _ DH

Filter Type

Element Media

ON	=	Optimicron®	BN/AM	=	Betamicron®/Aquamicron®
ECON2	=	ECOmicron®	AM	=	Aquamicron®
W/HC	=	Wire Mesh	P/HC	=	Polyester

Size

1300 / 1303 / 1320 / 1323 / 2500 / 2503 / 2520 / 2523 / 4020 / 4023

Operating Pressure

B = 150 psi (10 bar)

Type of Change Over Valve

A = Ball Valve *(other ratings available, consult factory)*

Type of Connection

3 = 2" ANSI Flange *(sizes 1300/1303)*
4 = 3" ANSI Flange *(sizes 2500/2503)*
5 = 4" ANSI Flange *(sizes 1320/1323 & 2520/2523)*
7 = 6" ANSI Flange *(sizes 2520/2523 & 4020/4023)*

Filtration Rating *(microns)*

1, 3, 5, 10, 15, 20 = ON	3, 10 = BN/AM	3, 5, 10, 20 = ECON2
40 = AM	25, 50, 100, 200 = W/HC	10, 20 = P/HC

Type of ΔP Clogging Indicator

A, B, BM, C, D

Type Code

1

Modification Number *(latest version always supplied)*

Country of Installation

ZU = ASME Coded with "ASME" Stamp

Flange

150 = 150 lbs ANSI Flange

Seals

(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Bypass Valve

(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar) *(lubrication or coolant applications)*
B6 = 87 psid (6 bar) *(return line extended life)*
KB = No Bypass *(flushing system)*

not available with ECON2

Supplementary Details

(omit) = Cover Lifting Device *(Handle only)*
DH = Cover Lifting Device *(Davit lifting mechanism for sizes 4020/4023)*
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
cRUus = Electrical indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation
VKD = Drain piping
EM = Air bleed valves
W = Indicator with brass piston (for water based fluids)

Replacement Element Model Code

1300 R 010 ON / V B6 _

Size

0850, 1300, 1700, 2600

Filtration Rating *(micron)*

1, 3, 5, 10, 15, 20 = ON	3, 10 = BN4AM
3, 5, 10, 20 = ECON2	40 = AM
25, 50, 100, 200 = W/HC	10, 20 = P/HC

Element Media

ON, BN4AM, ECON2, AM, W/HC, P/HC

Seals

(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Bypass Valve

(omit) = 43 psid (3 bar) *(standard)*
B1 = 14.5 psid (1 bar)
B6 = 87 psid (6 bar)
KB = No Bypass

Supplementary Details

W = *(same as above)*
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VM 2 C . X / _ _ _ _

Indicator Prefix

VM = G 1/2 3000 psi

Trip Pressure

2 = 29 psid (2 bar) *(standard)*
5 = 72 psid (5 bar) *(optional)*

Type of Indicator

A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = electric switch - SPDT
D = electric switch & LED light – SPDT

Modification Number

Supplementary Details

Seals

(omit) = Nitrile (NBR)
V = Fluorocarbon elastomer (FKM) *(standard)*

Light Voltage *(D type indicators only)*

L24 = 24V L110 = 110V

Thermal Lockout *(VM, VD types C, D, J, and J4 only)*

T100 = Lockout below 100°F

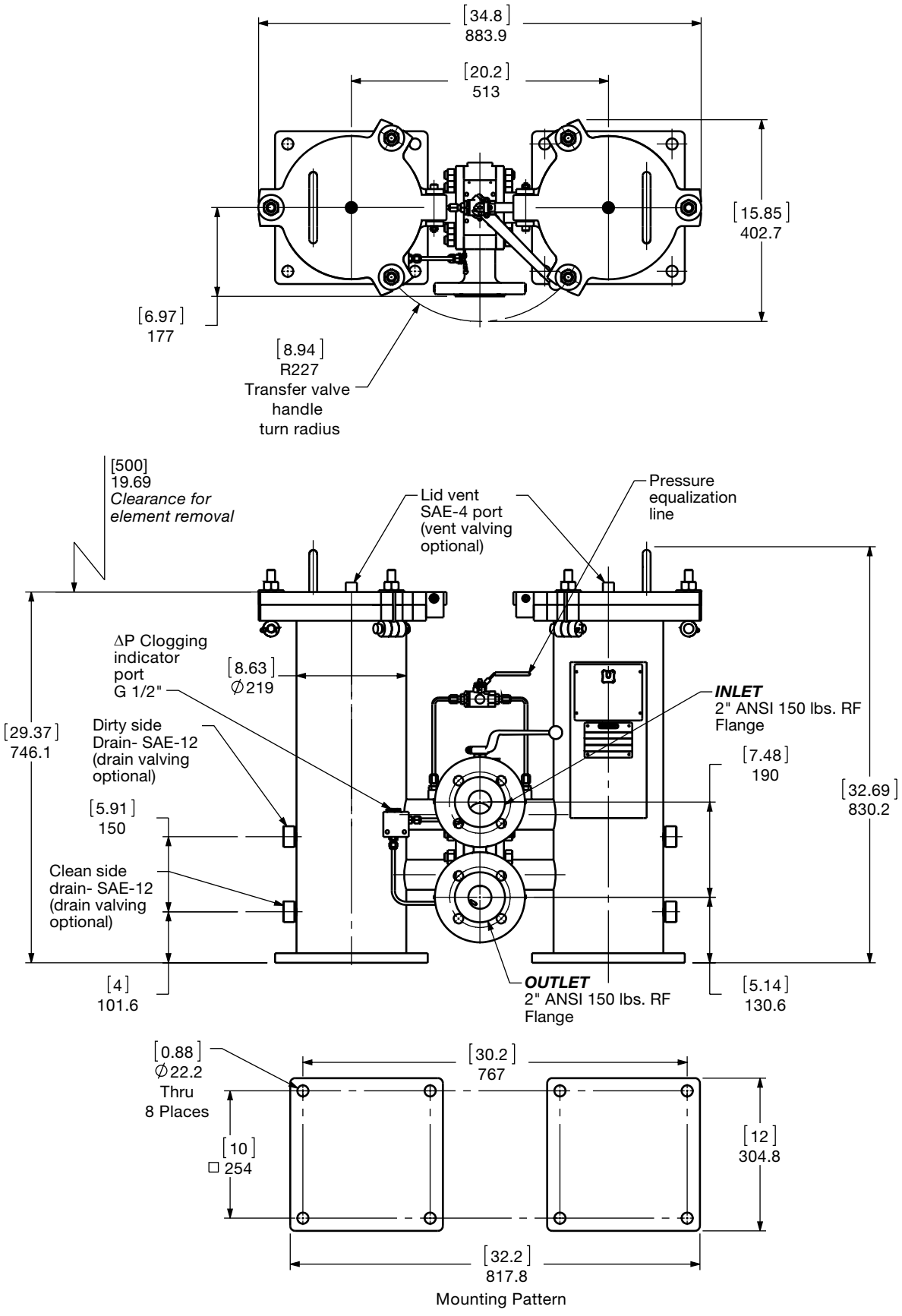
Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*

cRUus = Electrical indicator with underwriter's recognition

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
RFLDH 1300 / 1303

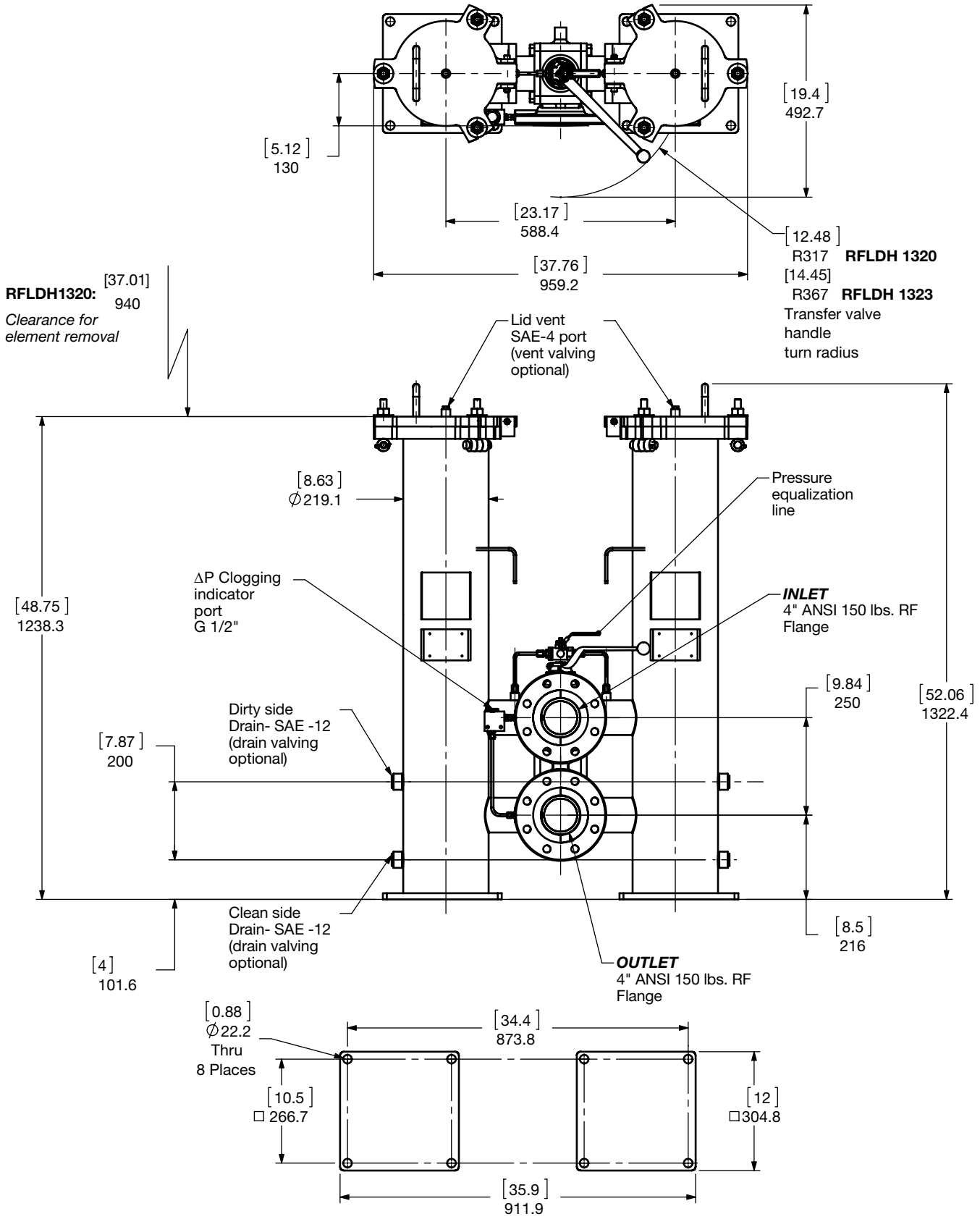


Mounting Pattern

Size	1300	1303
Weight (lbs.)	475	475

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFLDH 1320 / 1323

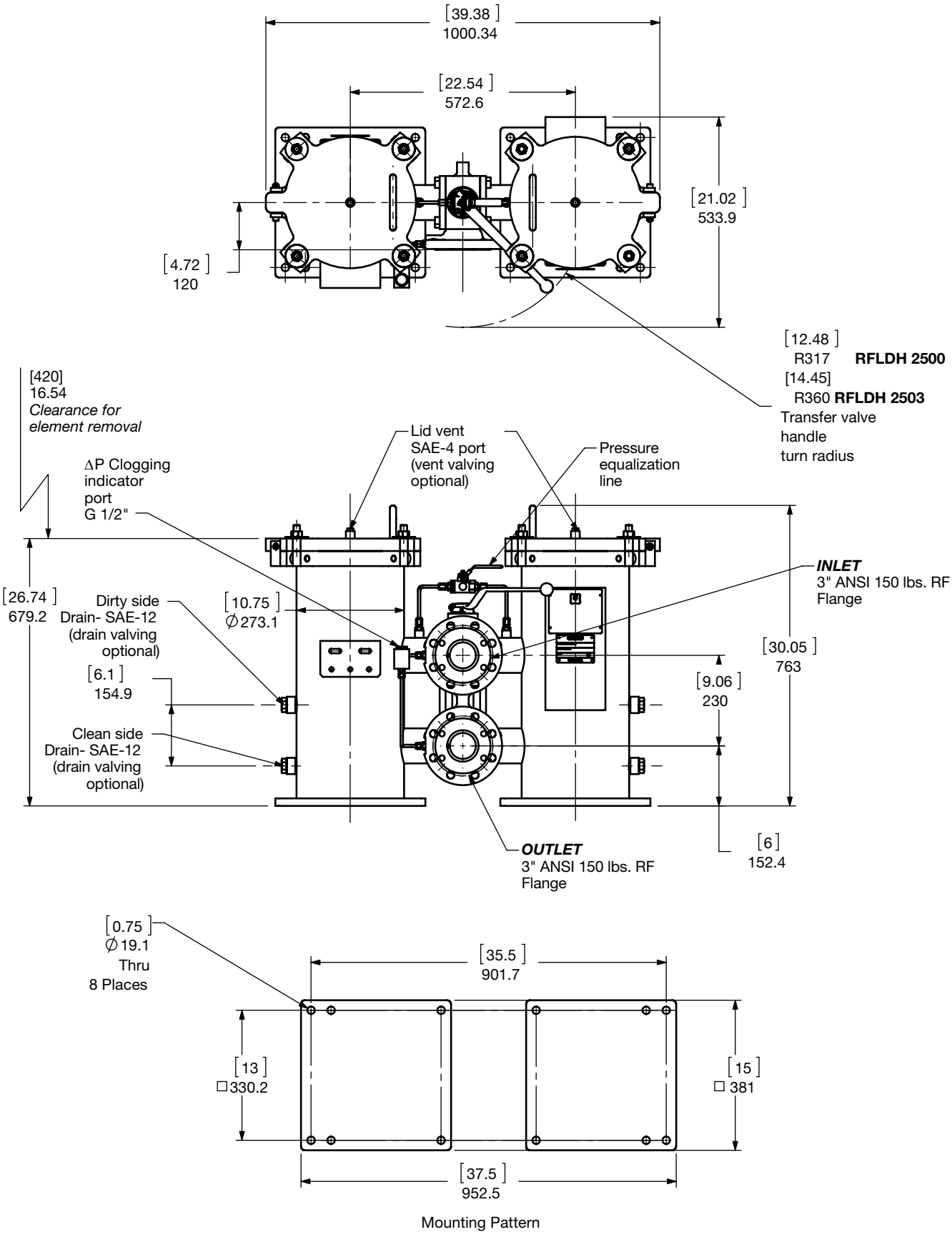


Mounting Pattern

Size	1320	1323
Weight (lbs.)	575	575

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFLDH 2500 / 2503

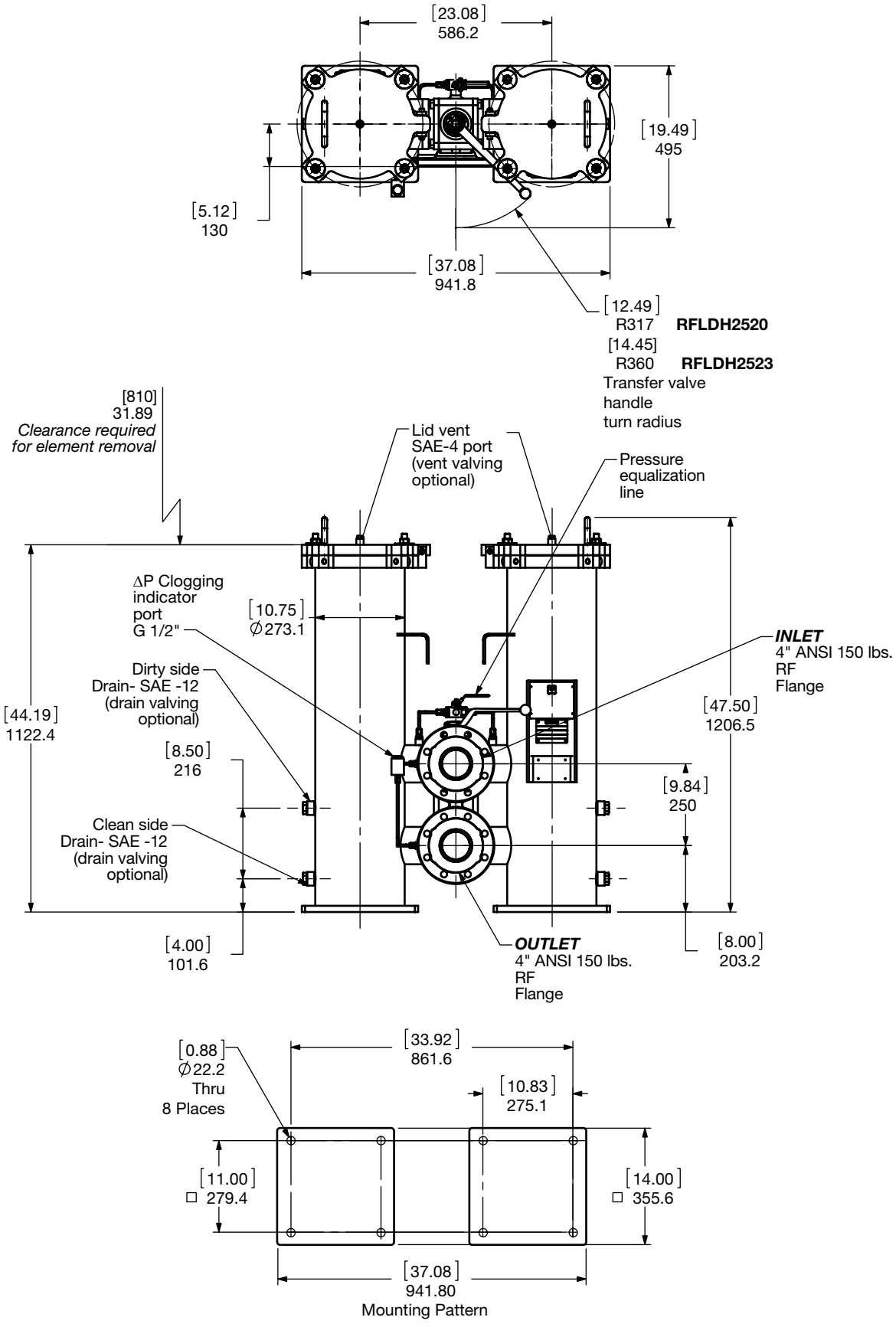


Mounting Pattern

Size	2500	2503
Weight (lbs.)	270	270

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

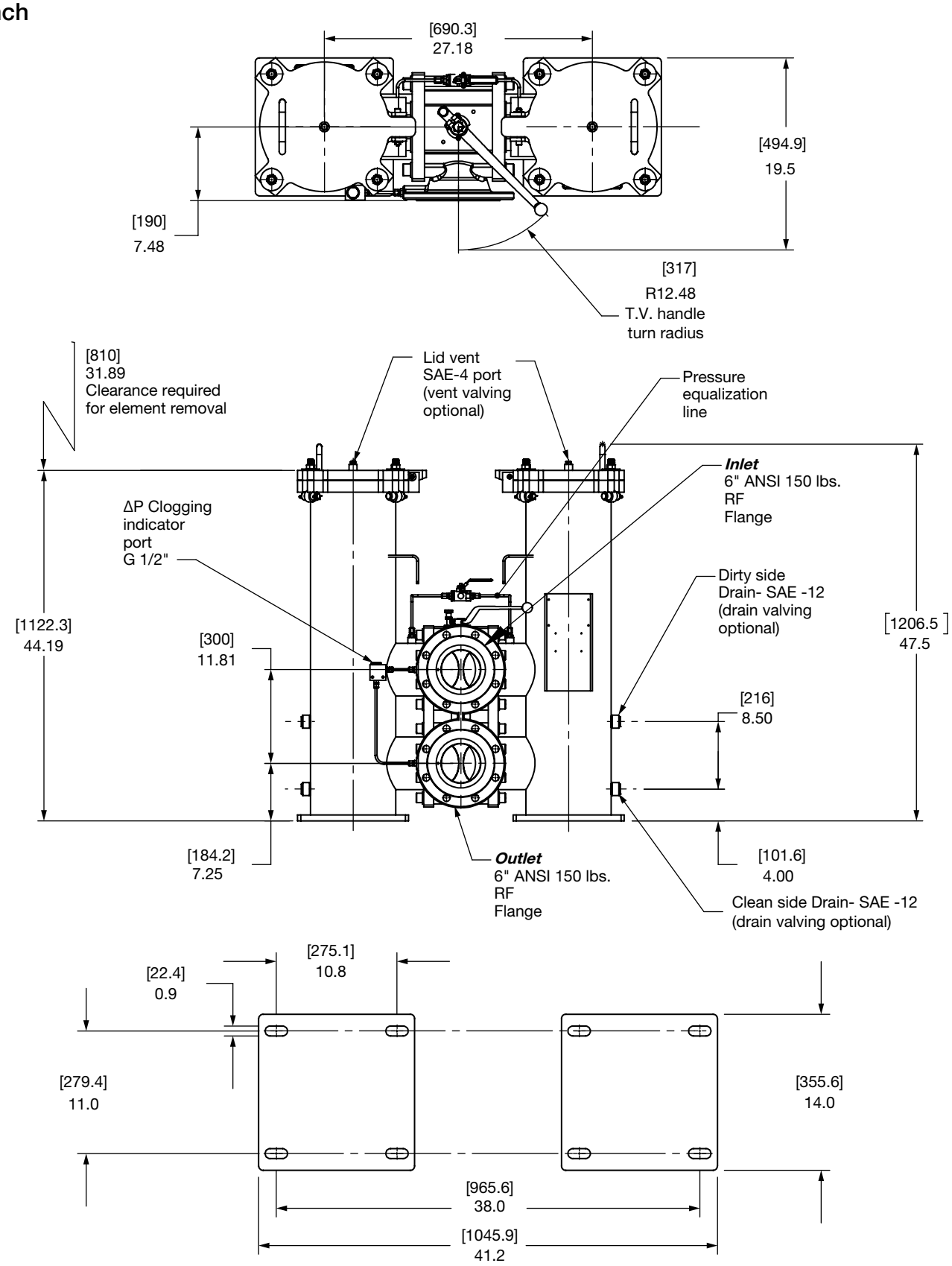
Dimensions
RFLDH 2520 / 2523
4 inch



Size	2520	2523
Weight (lbs.)	700	700

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFLDH 2520 / 2523
6 inch

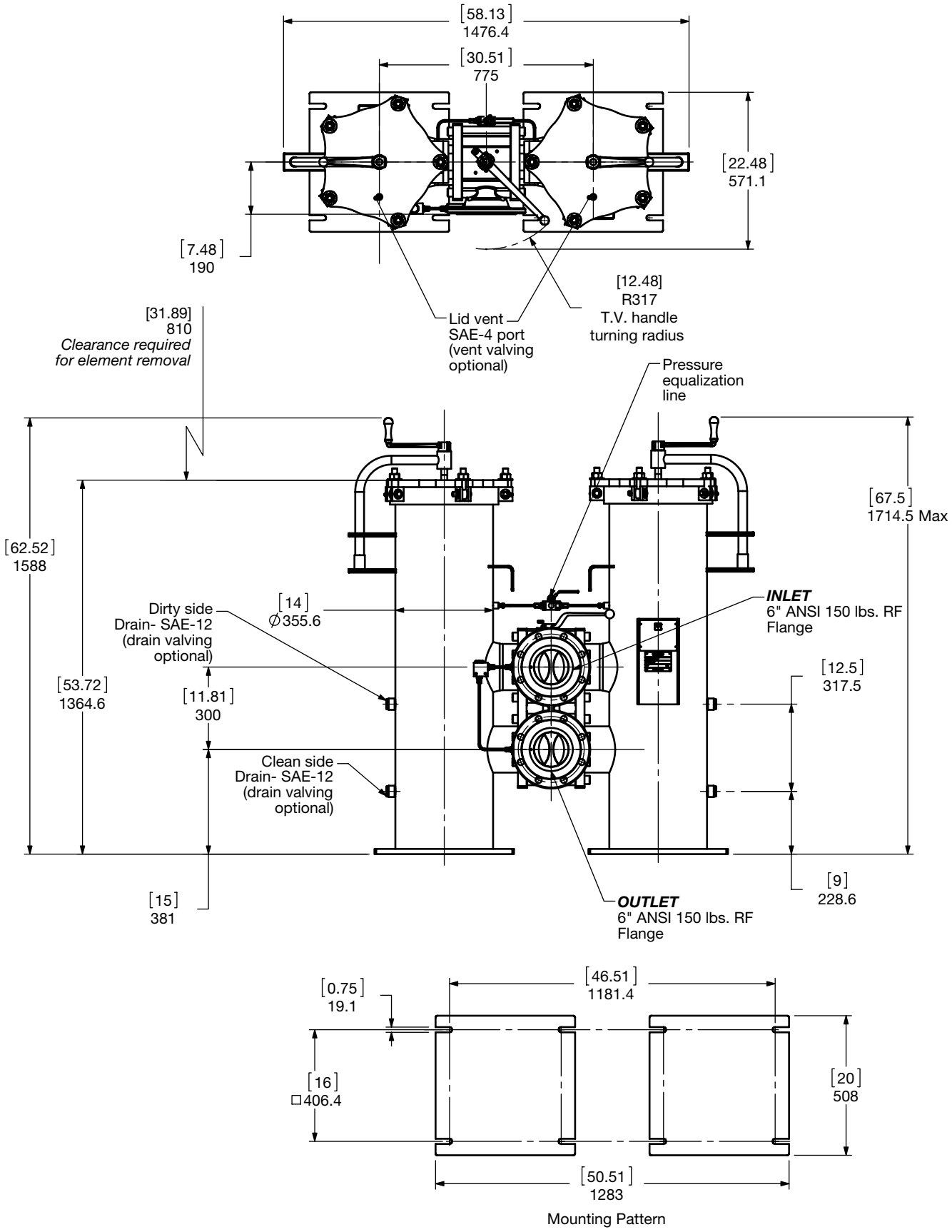


Mounting Pattern

Size	2520	2523
Weight (lbs.)	915	915

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
RFLDH 4020



Mounting Pattern

Size	4020
Weight (lbs.)	1500

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

SPECIAL ORDER FILTERS - LOW PRESSURE

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

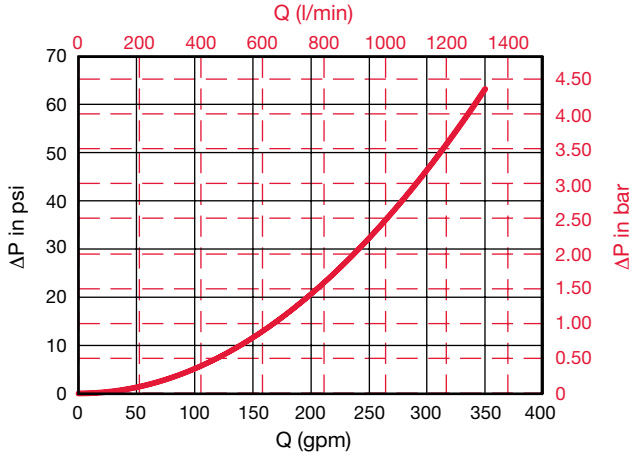
Housing Curve:

Pressure loss through housing is as follows:

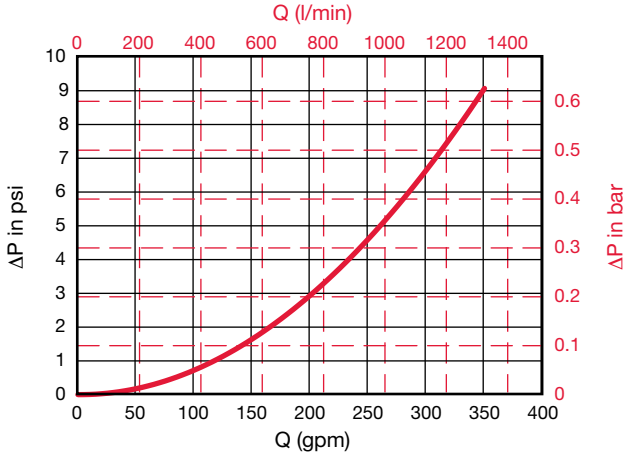
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

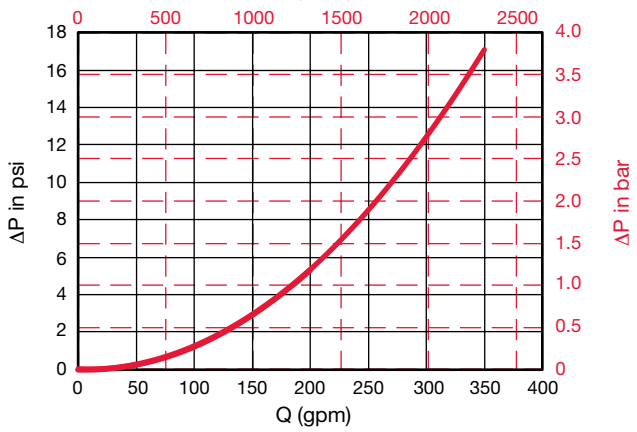
RFLDH 1300 Housing with ANSI 2" 150 lb. Flange



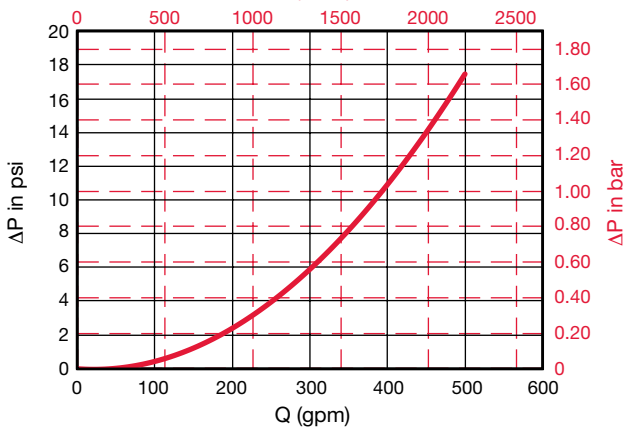
RFLDH 1320 Housing with ANSI 4" 150 lb. Flange



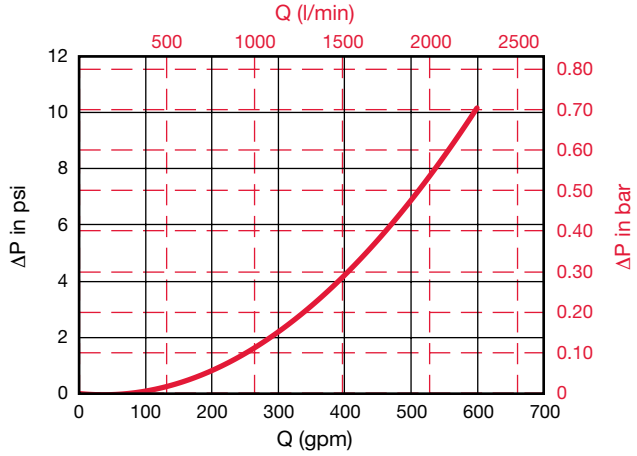
RFLDH 2500 Housing with ANSI 3" 150 lb. Flange



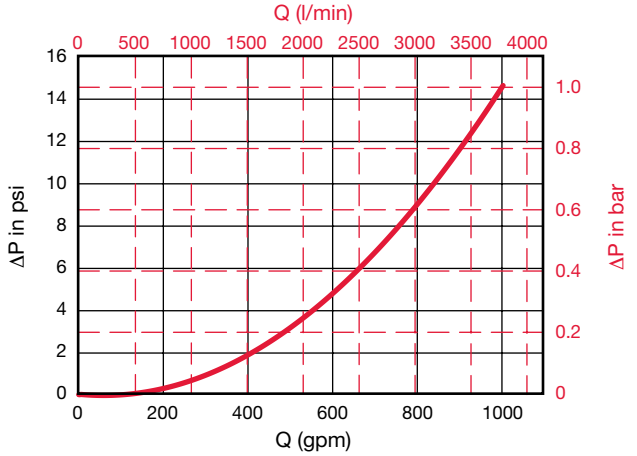
RFLDH 2520 Housing with ANSI 4" 150 lb. Flange



RFLDH 2520 Housing with ANSI 6" 150 lb. Flange



RFLDH 4020 Housing with ANSI 6" 150 lb. Flange



Required Element Per Housing

Housing Size	Element Size	Elements per Side
1300 / 1303	1300	1
1320 / 1323	2600	1
2500 / 2503	0850	3
2520 / 2523	1700	3
4020 / 4023	1700	5

Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...R...ON					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0850 R XXX ON	0.152	0.072	0.055	0.032	0.024	0.02
1300 R XXX ON	0.094	0.04	0.032	0.019	0.018	0.012
1700 R XXX ON	0.074	0.035	0.029	0.015	0.014	0.01
2600 R XXX ON	0.046	0.02	0.016	0.01	0.009	0.006

ECOmicron	...R...ECON2			
Size	3 µm	5 µm	10 µm	20 µm
0850 R XXX ECON2	0.082	0.055	0.038	0.022
1300 R XXX ECON2	0.044	0.033	0.022	0.016
1700 R XXX ECON2	0.038	0.027	0.016	0.011
2600 R XXX ECON2	0.022	0.016	0.011	0.005

Betamicron/Aquamicron	...R...BN4AM	
Size	3 µm	10 µm
0850 R XXX BN4AM	0.154	0.049
1300 R XXX BN4AM	0.088	0.033
1700 R XXX BN4AM	0.071	0.027
2600 R XXX BN4AM	0.055	0.016

Aquamicron	...R...AM
Size	40 µm
0850 R 040 AM	0.040
1300 R 040 AM	0.026
1700 R 040 AM	0.020
2600 R 040 AM	0.013

Wire Mesh	...R...W/HC
Size	25, 50, 100, 200 µm
0850 R XXX W/HC	0.003
1300 R XXX W/HC	0.002
1700 R XXX W/HC	0.001
2600 R XXX W/HC	0.001

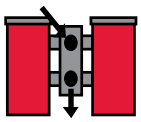
Polyester	...R...P/HC	
Size	10 µm	20 µm
0850 R XXX P/HC	0.007	0.003
1300 R XXX P/HC	0.004	0.002
1700 R XXX P/HC	0.003	0.002
2600 R XXX P/HC	0.002	0.001

All Element K Factors in psi / gpm.

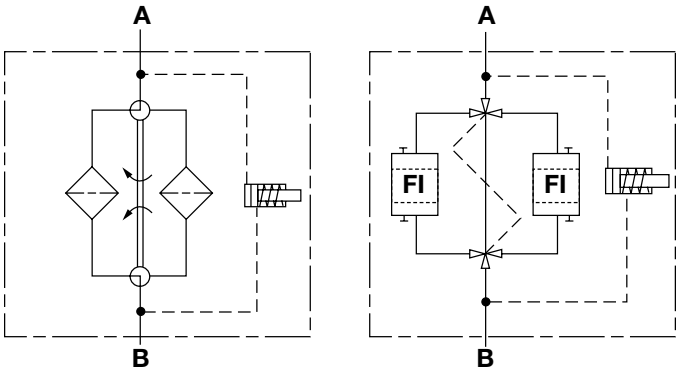
AFLD API 614 Series

Inline Duplex Filters

232 psi • up to 630 gpm



Hydraulic Symbol



Features

- Filter series designed to meet the requirements of API 614 for lube oil and other applications.
- Models are available in carbon and stainless steel versions.
- Transfer valve internal components of stainless steel.
- ANSI flange connections standard
- Inlet and outlet connections are located on the same side of the transfer valve.
- Transfer valve and pressure equalization line allow easy changeover between filter housings without costly system shutdown.
- Air bleed line and drain line available.
- ASME coded with ASME-stamp
- CRN available
- AS1210 available
- GOST available
- 3.1 material certificate standard
- API 614 requires compliant filters to be non-bypass

Notes: Most states and local jurisdictions in the United States require pressure vessels to be ASME stamped. It is the responsibility of the end customer to research and fully understand the ASME code requirements of the jurisdiction this filter will ultimately be installed in, and to fully communicate these requirements to HYDAC.

Applications

Off Shore

Power Generation

Industrial

Technical Specifications

Mounting Method	Floor mounted legs *(Filters must not be used as pipe support)*	
Port Connection		
122/123	1”	ANSI 150# Flanges*
232/233	1.5”	ANSI 150# Flanges*
332/333	2”	ANSI 150# Flanges*
502/503	2”	ANSI 150# Flanges*
542/543	2”	ANSI 150# Flanges*
882/883	3”	ANSI 150# Flanges*
1402/1403	4”	ANSI 150# Flanges*
2702/2703	6”	ANSI 150# Flanges
Flow Direction	Inlet: Front Top	Outlet: Front Bottom
Construction Materials *(Transfer valve balls and spindle, stainless steel)*		
122, 232, 332, 502, 542, 882, 1402, 2702 - Carbon Steel 123, 233, 333, 503, 543, 883, 1403, 2703 - Stainless Steel		
Flow Capacity @ 32 CSt		
122/123	20 gpm	76 lpm
232/233	45 gpm	171 lpm
332/333	58 gpm	220 lpm
502/503	66 gpm	250 lpm
542/543	79 gpm	300 lpm
882/883	211 gpm	800 lpm
1402/1403	330 gpm	1250 lpm
2702/2703	449 gpm	1700 lpm
Housing Pressure Rating		
Max. Allowable Working Pressure	232 psi (16 bar) standard	
Fatigue Pressure	Contact HYDAC	
Burst Pressure	Contact HYDAC*	
**(other pressures available upon request)*		
Element Collapse Pressure Rating		
ON/PO	145 psid (10 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications below 14˚F (-10˚C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure *(optional)*		
ΔP = 29 psid (2 bar) -10% *(non-bypass per API 614)*		

Model Code

AFLD ON/PO 1402 C A 5 10 W 1 . X / Z U 150 V _ DH

Filter Type

Element Media
ON/PO = Optimicron® Power with Stat-Free®

Size
122/123, 232/233, 332/333, 502/503, 542/543, 882/883, 1402/1403, 2702/2703

Operating Pressure
C = 232 psi (16 bar)

Type of Change Over Valve
A = Ball Valve

Type of Connection
1 = 1" ANSI 150# Flange *(sizes 122/123)**
2 = 1.5" ANSI 150# Flange *(sizes 232/233)**
3 = 2" ANSI 150# Flange *(sizes 332/333, 502/503, 542/543)**
4 = 3" ANSI 150# Flange *(sizes 882/883)**
5 = 4" ANSI 150# Flange *(sizes 1402/1403)**
7 = 6" ANSI 150# Flange *(sizes 2702/2703)*
**(300# and 600# available upon request)*

Filtration Rating *(microns)*
10 = ON/PO

Type of ΔP Clogging Indicator

			Indicator Model
A	=	No indicator	
B	=	Pop-up indicator *(auto-reset)*	VM...B
C	=	electric switch	VM...C
D	=	electric switch and light	VM...D/L *(lamp voltage selected from supplementary section)*
W	=	no indicator block supplied - D/P ports on vessel plugged *(standard)*	

(For additional details and options, see Clogging Indicators section.)

Type Code
1

Modification Number *(latest version always supplied)*

Country of Installation
(omit) = *(non coded)*
ZU = ASME Coded with "ASME" Stamp *(with 3.1 material and pressure test certification)*
Z = 3.1 material and pressure test certification *(standard - documentation only)*

Flange
150 = 150 lbs ANSI Flange
300 = 300 lbs ANSI Flange

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM)

Bypass Valve
(omit) = No Bypass *(API standard)*

Supplementary Details
DH = Cover Lifting Device *(Davit lifting mechanism for sizes 2702 / 2703 only)*
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
VKD = Drain piping
EM = Air bleed valves

Replacement Element Model Code

0880 A 010 ON/PO / V

Size
0120, 0230, 0330, 0500, 0540,
0880, 2600, 2700

Filtration Rating *(micron)*
10= ON/PO

Element Media
ON/PO

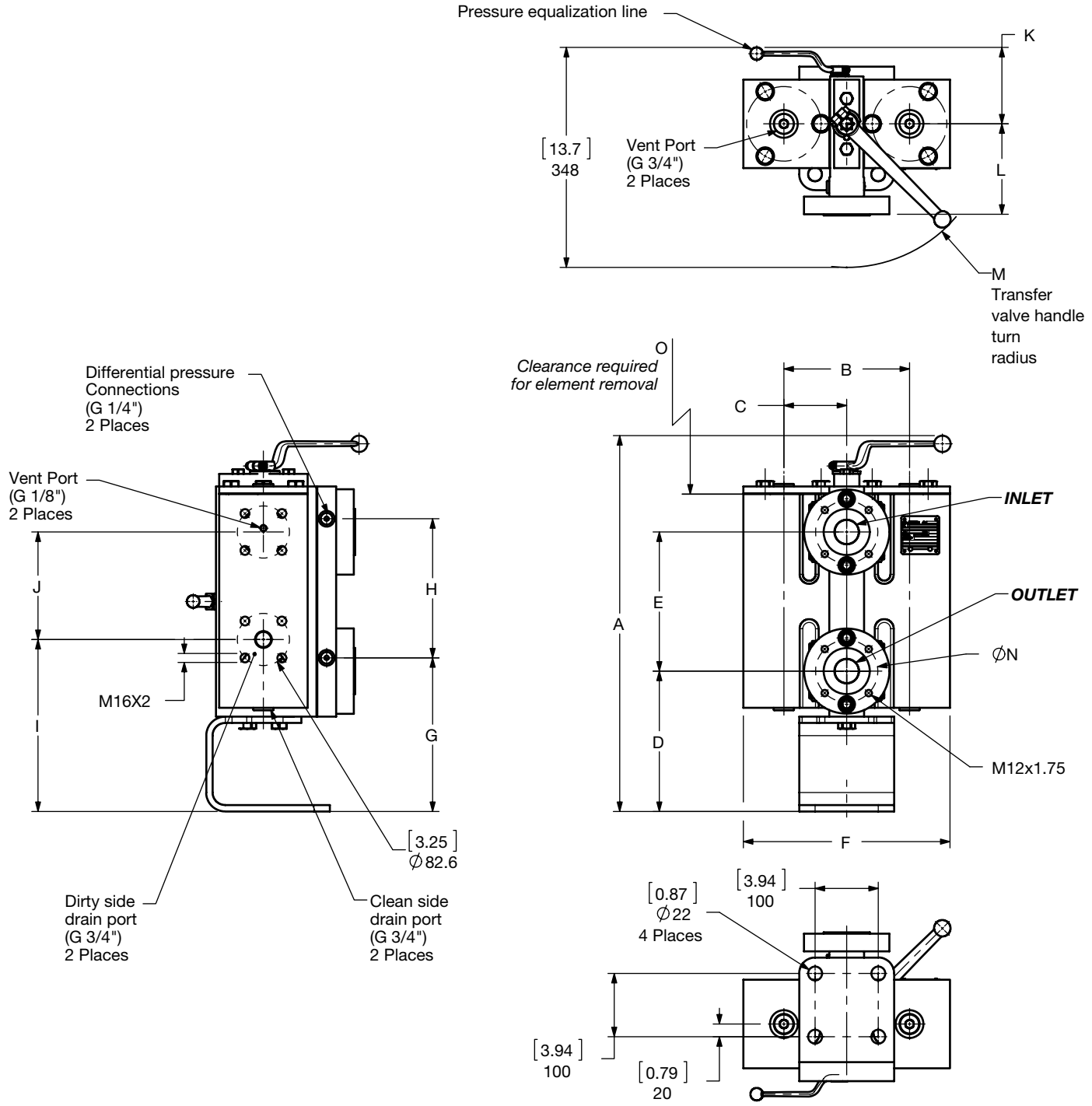
Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Note: Elements supplied with no bypass valve per API 614.

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

SPECIAL ORDER FILTERS - LOW PRESSURE

Dimensions
AFLD 122 / 123 / 232 / 233

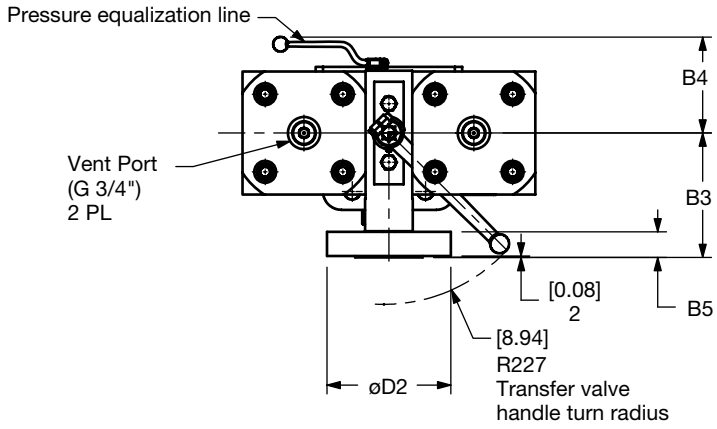


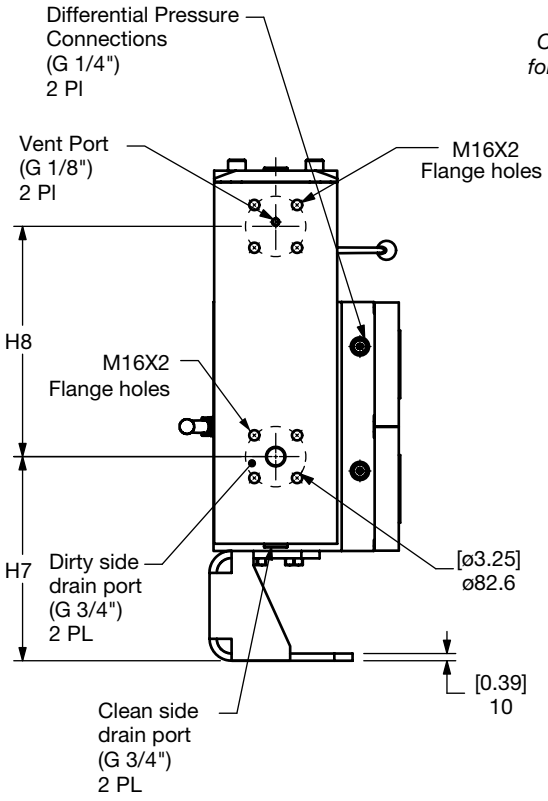
Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Connection
AFLD 122/123	[20.24] 514	[4.99] 126. 8	[2.49] 63.4	[7.87] 200	[6.10] 155	[9.09] 230.8	[8.50] 216	[6.10] 155	[9.02] 229	[6.04] 153. 5	[3.78] 96	[4.25] 108	[7.20] 183	[3.13] 79.4	[7.68] 195	ANSI 150 lb RF 1"
AFLD 232/233	[23.5] 597	[7.04] 178. 8	[3.91] 89.4	[8.74] 222	[8.66] 220	[12.87] 326.8	[9.57] 243	[8.66] 220	[10.71] 22	[6.69] 170	[4.79] 121. 7	[5.71] 145	[8.94] 227	[3.87] 98.4	[8.07] 205	ANSI 150 lb RF 1.5"

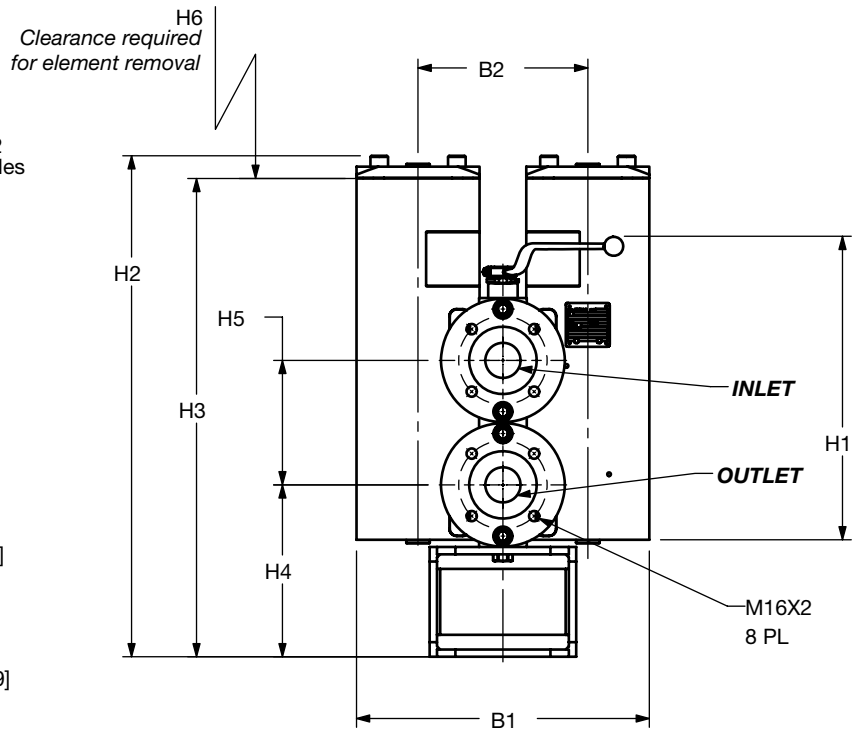
Size	122 / 123	232 / 233
Weight (lbs.)	122.4	269.8

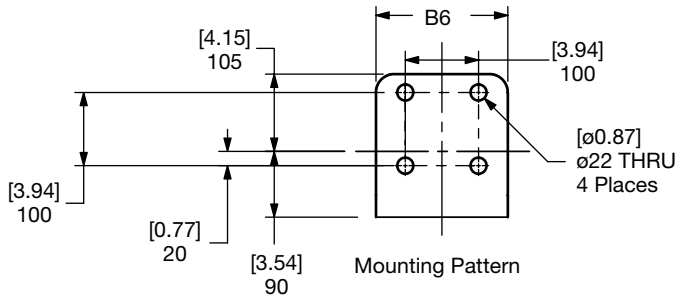
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
AFLD 332 / 333 / 502 / 503 / 542 / 543









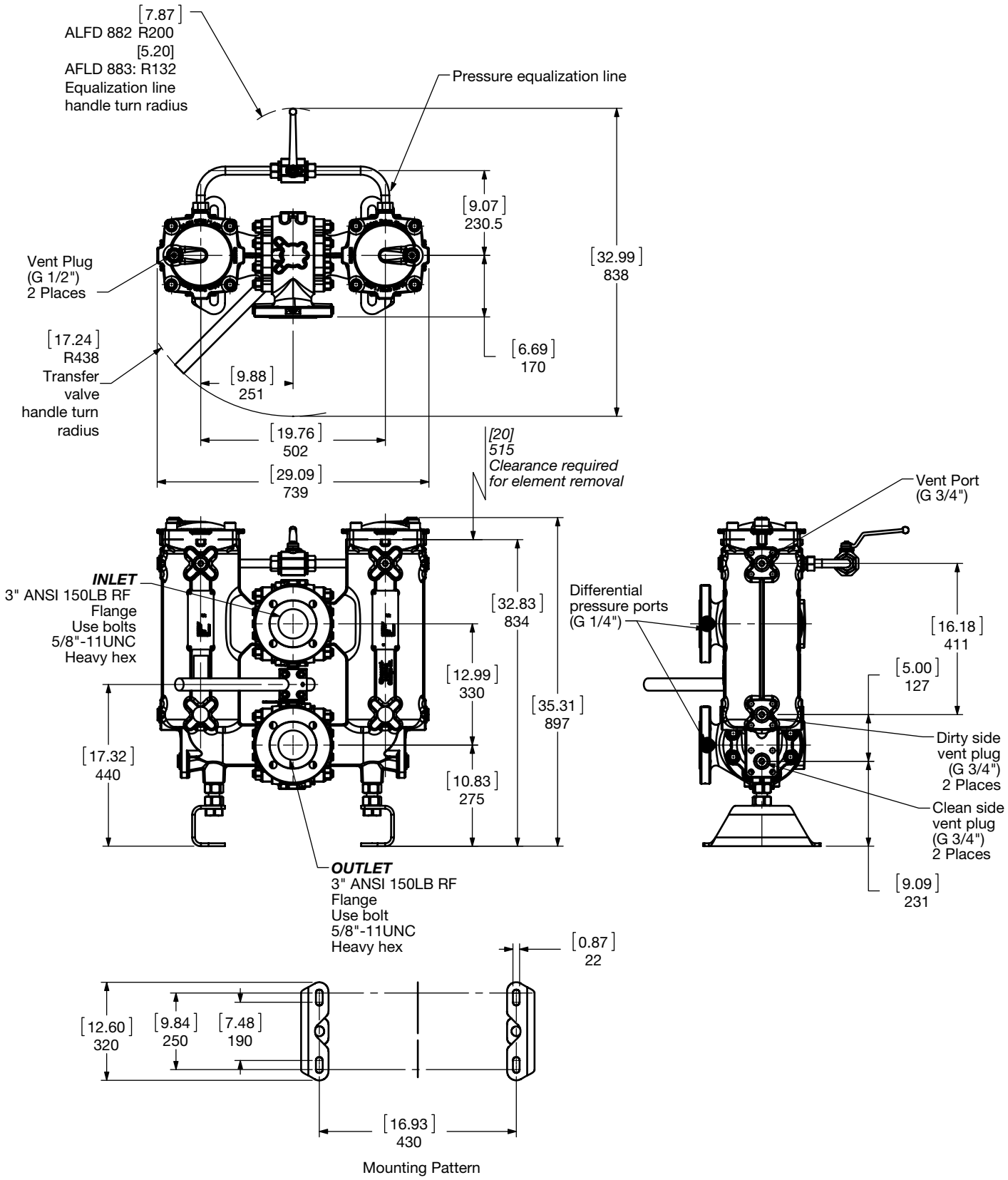
Size	Flange Size	B1	B2	B3	B4	B5	B6	D2	H1	H2	H3	H4	H5	H6	H7	H8
AFLD 332/333	2" 150 lb	[15.75] 400	[9.13] 232	[6.69] 170	[5.16] 131	[1.38] 35	[5.91] 150	[6.65] 169	[22.56] 573	[20.59] 523	[19.65] 499	[9.25] 235	[6.69] 170	[8.07] 205	[11.38] 289	[5.91] 150
AFLD 502/503		[15.75] 400	[9.13] 232	[6.69] 170	[5.16] 131	[1.38] 35	[5.91] 150	[6.65] 169	[25.71] 653	[23.78] 604	[22.83] 580	[9.25] 235	[6.69] 170	[11.81] 300	[11.38] 289	[9.09] 231
AFLD 542/543		[15.75] 400	[9.13] 232	[6.69] 170	[5.16] 131	[1.38] 35	[5.91] 150	[6.65] 169	[22.56] 573	[26.69] 678	[25.71] 653	[9.25] 235	[6.69] 170	[14.57] 370	[12.4] 315	[12.4] 315

Size	332 / 333	502 / 503	542 / 543
Weight (lbs.)	440.9	496	551.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

SPECIAL ORDER FILTERS - LOW PRESSURE

Dimensions
AFLD 882 / 883

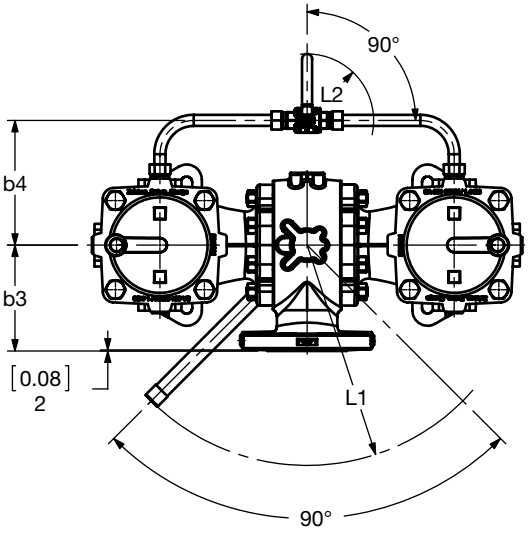


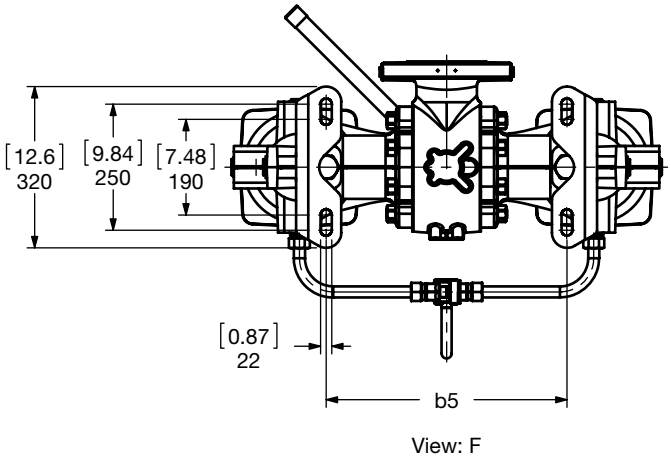
Mounting Pattern

Size	882	883
Weight (lbs.)	441	441

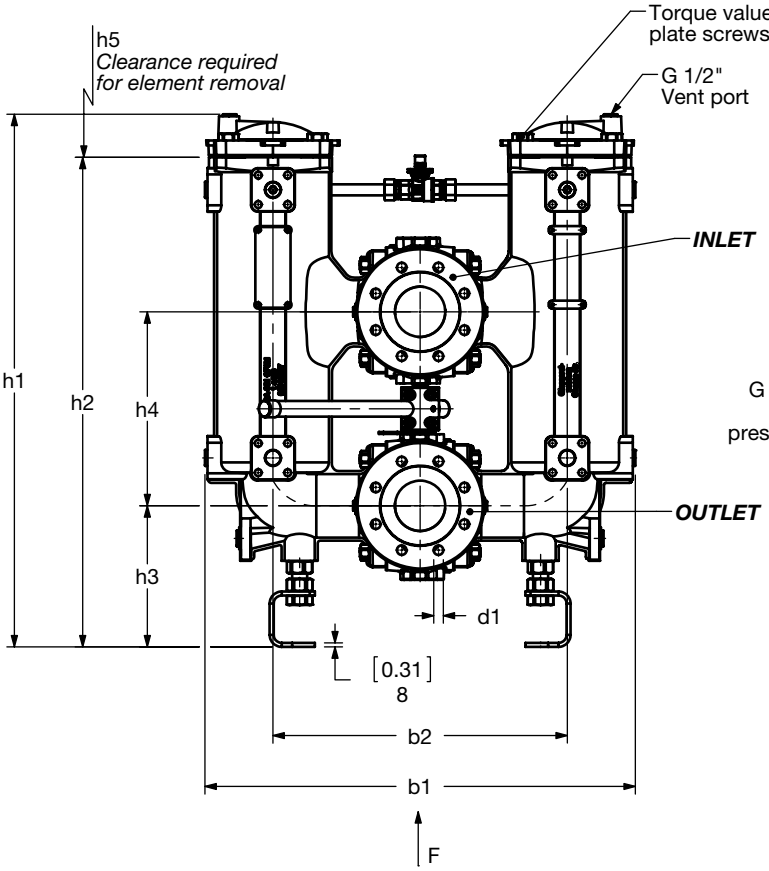
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

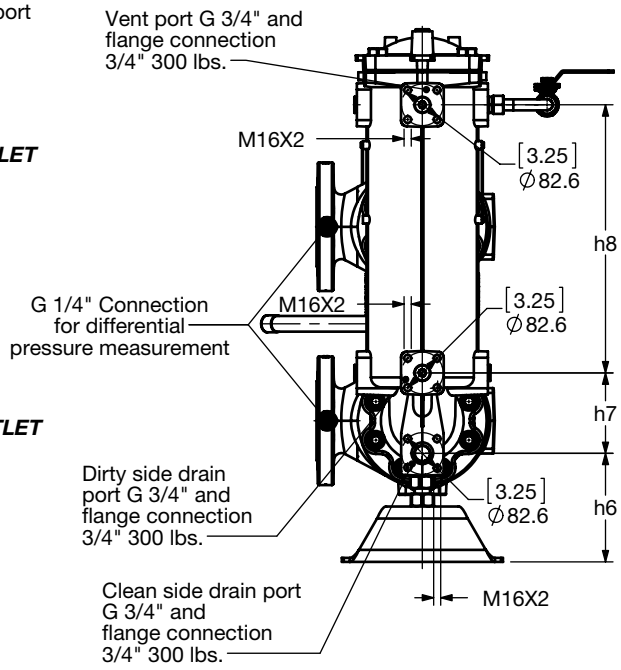
Dimensions
AFLD 1402 / 1403





View: F





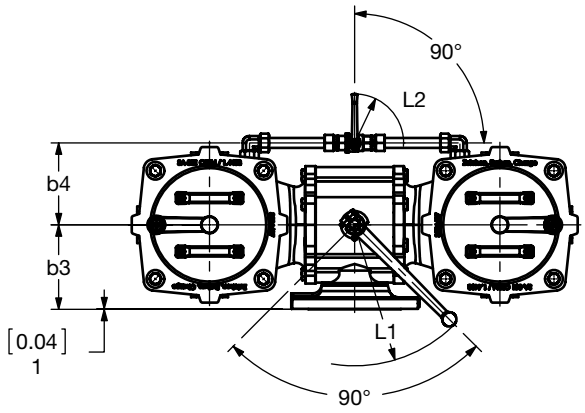
Size	Flange Size	b1	b2	b3	b4	b5	d1	h1	h2	h3	h4	h5	h6	h7	h8	L1	L2	M1 [N/m]	Vol. of Pressure Vessel, [liters]
AFLD 1402	4" 150 lbs	[33.6] 854	[23] 584	[8.3] 210	[6.1] 155	[18.8] 478	8 x ø19	[41.6] 1057	[38.3] 972	[11] 280	[15.2] 385	[25.6] 650	[8.5] 216	[6.3] 160	[20.9] 532	[17.2] 438	[7.9] 200	170	2 x 24
AFLD 1403	4" 300 lbs				[10.5] 266		8 x ø23										[5.2] 132	110	

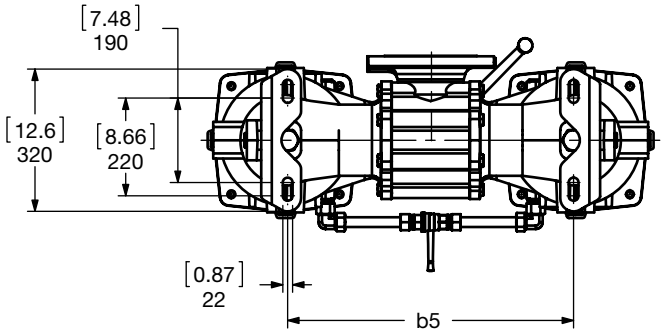
Size	1402	1403
Weight (lbs.)	639	639

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

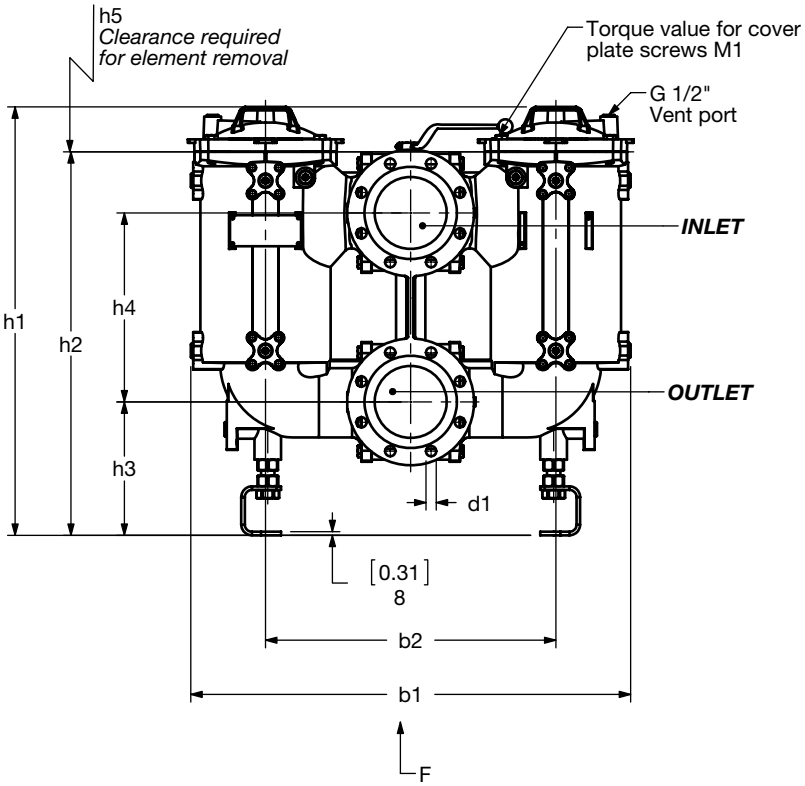
SPECIAL ORDER FILTERS - LOW PRESSURE

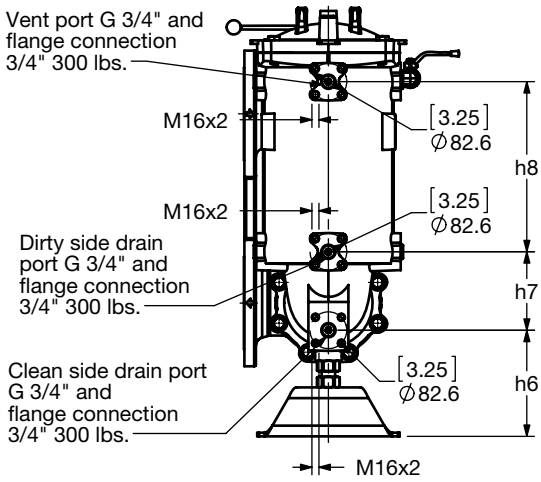
Dimensions
AFLD 2702 / 2703





View: F





Size	Flange Size	b1	b2	b3	b4	b5	d1	h1	h2	h3	h4	h5	h6	h7	h8	L1	L2	M1 [N/m]	Vol. of Pressure Vessel, liters
AFLD 2702	6" 150 lbs	[38.6] 980	[25.7] 653	[7.5] 190	[7.2] 184	[25.4] 645	8 x ø23	[38] 964	[34] 863	[11.8] 300	[16.7] 425	[19.7] 500	[9.4] 239	[7] 177	[15.1] 383	[12.5] 317	[7.9] 200	110	2 x 37
AFLD 2703					[9.8] 249												[5.2] 132		

Size	2702	2703
Weight (lbs.)	794	794

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

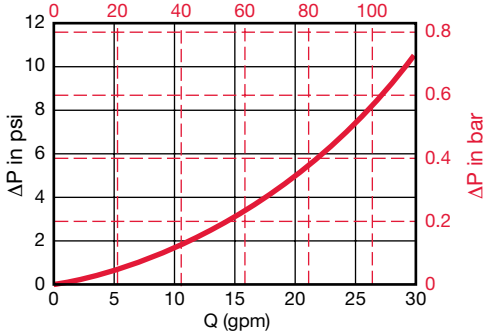
Housing Curve:

Pressure loss through housing is as follows:

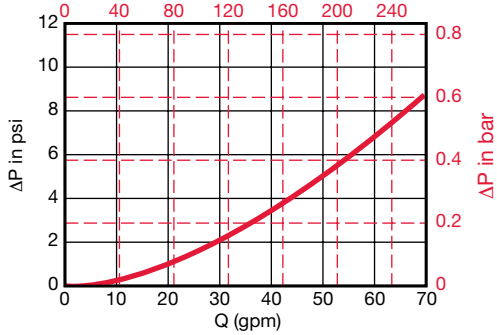
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

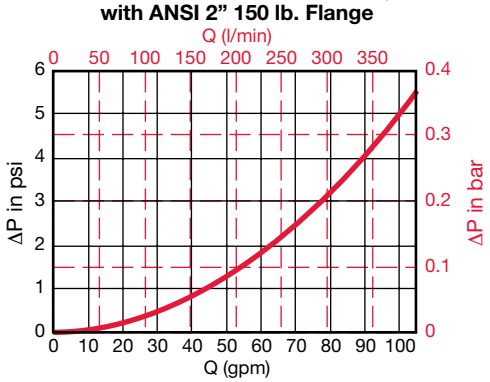
AFLD 122/123 Housing with ANSI 1" 150 lb. Flange



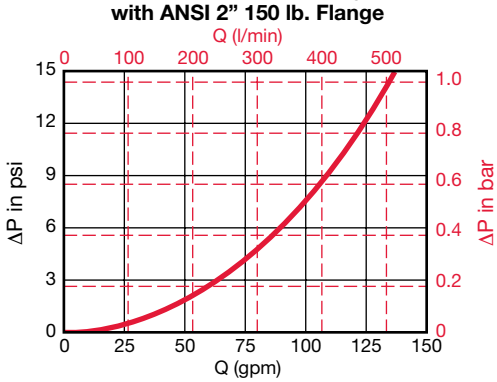
AFLD 232/233 Housing with ANSI 1.5" 150 lb. Flange



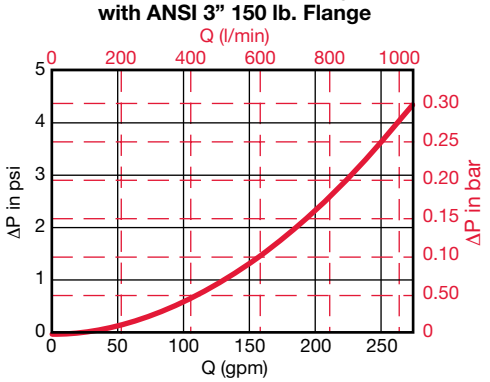
AFLD 332-502/333-503 Housing with ANSI 2" 150 lb. Flange



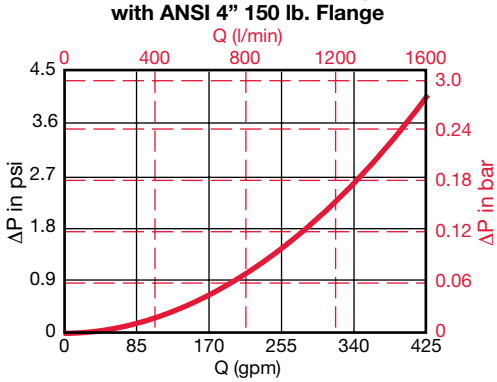
AFLD 542/543 Housing with ANSI 2" 150 lb. Flange



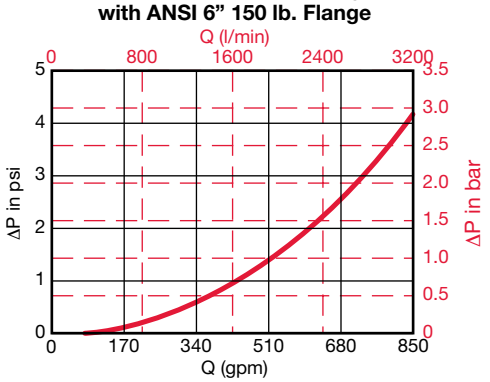
AFLD 882/883 Housing with ANSI 3" 150 lb. Flange



AFLD 1402/1403 Housing with ANSI 4" 150 lb. Flange



AFLD 2702/2703 Housing with ANSI 6" 150 lb. Flange



Required Element Per Housing

Housing Size	Element Size	Elements per Side
122 / 123	0120	1
232 / 233	0230	1
332 / 333	0330	1
502 / 503	0500	1
542 / 543	0540	1
882 / 883	0880	1
1402 / 1403	2600	1
2702 / 2703	2700	1

Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron Power	"ON/PO" API Compliant
Size	10 µm
0120 A XXX ON/PO	0.075
0230 A XXX ON/PO	0.037
0330 A XXX ON/PO	0.037
0500 A XXX ON/PO	0.025
0540 A XXX ON/PO	0.018
0880 A XXX ON/PO	0.008
2600 A XXX ON/PO	0.004
2700 A XXX ON/PO	0.004

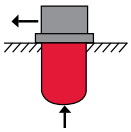
All Element K Factors in psi / gpm.

Notes

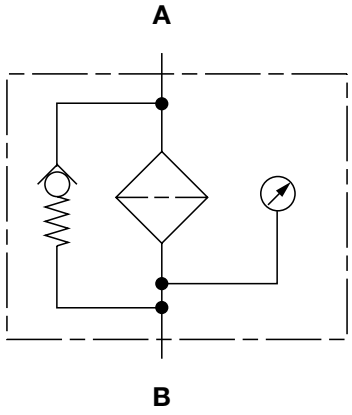
SF Series

In-tank Suction Filters

360 psi • up to 30 gpm



Hydraulic Symbol



Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Inlet/Outlet port options include NPT port or SAE 4-bolt flange to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials (nitrile rubber, fluorocarbon elastomer, or ethylene propylene rubber) provides compatibility with oil/water emulsions, high water base fluids, and synthetic fluids.
- Bolt-on lid requires minimal clearance for removal.
- A mechanically actuated, electrical, electrical / visual (lamp), or vacuum gauge bypass indicator can be installed.
- Bypass valve, located in element end cap, with low cracking pressure prevents pump cavitation.

Technical Specifications

Mounting Method	4 mounting holes - filter head	
Port Connection	Inlet	Outlet
110	3/4" SAE-12 3/4" BSPP 3/4" SAE-12	3/4" SAE-12 3/4" BSPP 3/4" NPT
240	1 1/4" SAE-20 1 1/4" BSPP 1 1/4" SAE-20	1 1/4" SAE-20 1 1-4" BSPPP 1 1/4" NPT
330	2" NPT 2" BSPP 2" NPT 2" NPT	2" SAE-32 2" BSPP 2" SAE CODE 61 1 1/4" SAE-20
Flow Direction	Inlet: Bottom	Outlet: Side
Construc. Materials	Housing	Lid
SF 110-330	Aluminum	Aluminum
Flow Capacity		
110 240 330	5 gpm (20 lpm) 15 gpm (57 lpm) 30 gpm (114 lpm)	
Housing Pressure Rating		
Max. allowable working pressure	360 psi (25 bar)	
Fatigue Pressure	360 psi (25 bar) @ 700,000 cycles	
Burst Pressure	110 240 330	1080 psi (75 bar) 1230 psi (85 bar) 1440 psi (100 bar)
Element Collapse Pressure Rating		
W/HC	290 psid (20 bar)	
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected		
Indicator Trip Pressure		
ΔP = 3 psi (0.2 bar) -10% *(standard)*		
Bypass Valve Cracking Pressure		
ΔP = 3 psi (0.2 bar) +10% *(standard - sizes 60, 950, 1300)* ΔP = 4.4 psi (0.3 bar) +10% *(standard - sizes 110,160,240,330)*		

Applications

Agricultural

Industrial

Construction

Gearboxes

Automotive

Steel / Heavy Industry

Model Code

SF W 330 W G 25 UE 1 . X / 3

Filter Type
SF = In-Tank Inlet Suction Filter

Element Media
W = Wire Mesh

Size
110, 240, 330

Operating Pressure
W = suction operation

Type of Outlet Connection
C = 3/4" Threaded SAE 12 *(sizes 110)*
E = 1-1/4" Threaded SAE 20 *(sizes 240*
G = 2" Threaded SAE 32 *(size 330)*
NPT available w/Adapter

Filtration Rating *(micron)*
75, 125 = W

Type of Clogging Indicator *(static)*
A, UE, UF

Type Number

Modification Number *(latest version always supplied)*

Outlet Port Configuration
3 = NPT *(size 110, 240, 330) (sizes 110, 240 with adapters)*
12 = SAE Straight Thread Inlet/Outlet Connection *(sizes 110, 240, 330)*
16 = SAE Code 61 Flange *(sizes 330)*

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 3 psid (0.2 bar) *(standard sizes 60)*
(omit) = 4.4 psid (0.3 bar) *(standard sizes 110, 160, 240, 330)*
KB = No Bypass

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

0330 RS 25 W / V

Size
0110, 0240, 0330

Filtration Rating *(micron)*
75, 125 = W

Element Media
W

Seals
(omit) = standard
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = 3 psid (0.2 bar) sizes 60
(omit) = 4.4 psid (0.3 bar) sizes 110, 160, 240, 330
KB = No Bypass

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VR 2 UE . X /

Indicator Prefix
VR = Return Filters

Trip Pressure
0.2 = 3 psid (0.2 bar)

Type of Indicator
A = No indicator, plugged port
UE = Vacuum gauge
UF = Vacuum switch

Modification Number

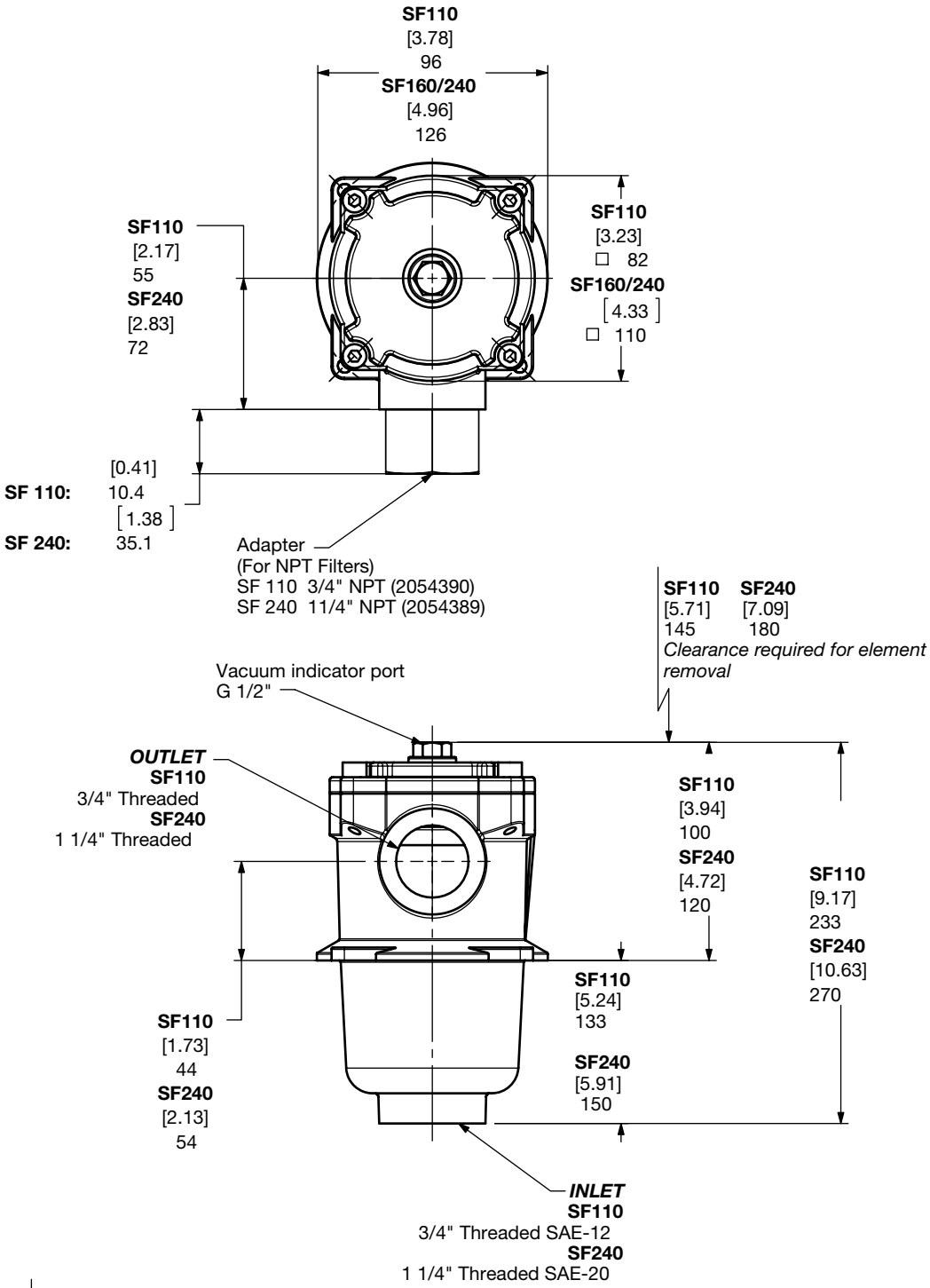
Supplementary Details
Seals
(omit) = Nitrile rubber (NBR) (standard)
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

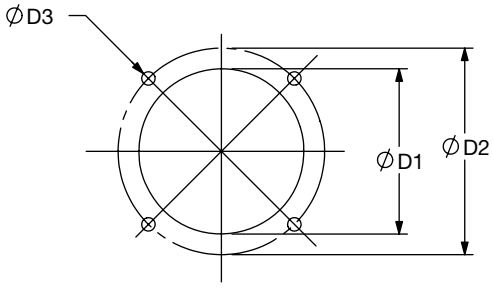
(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

SPECIAL ORDER FILTERS - LOW PRESSURE

Dimensions
SF 110 / 240





Mounting pattern

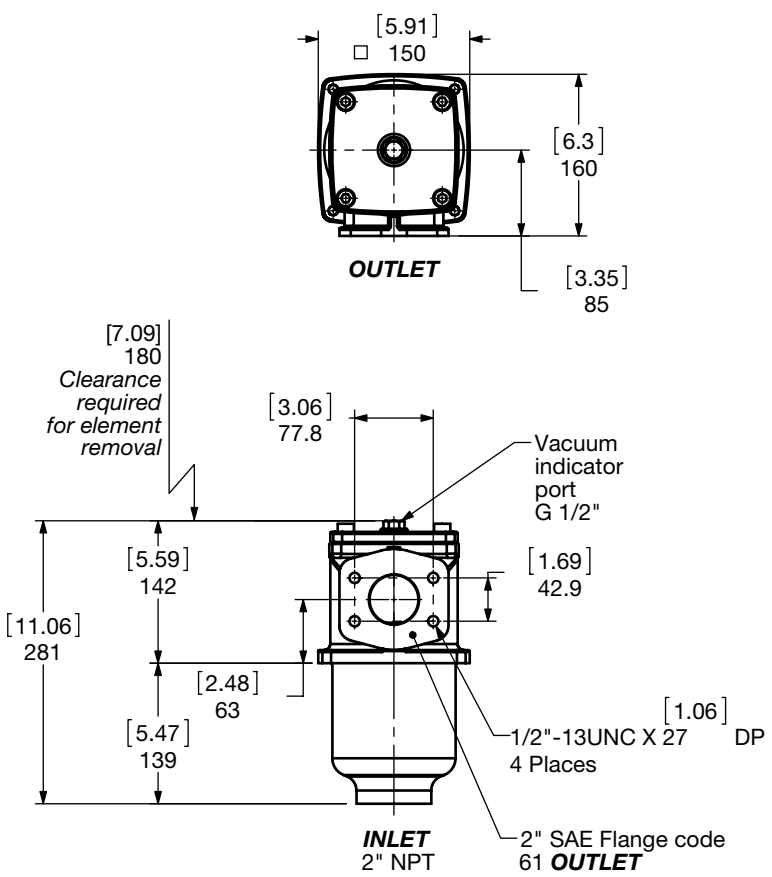
Size	øD1	øD2	øD3	USES BOLTS
110	[3.15"] 80mm	[3.94"] 100mm	[0.26"] 6.5mm	M5
240	[4.17"] 106mm	[5.32"] 135mm	[0.30"] 7.5mm	M6

Size	SF 110	SF 240
Weight (lbs.)	2.5	5.0

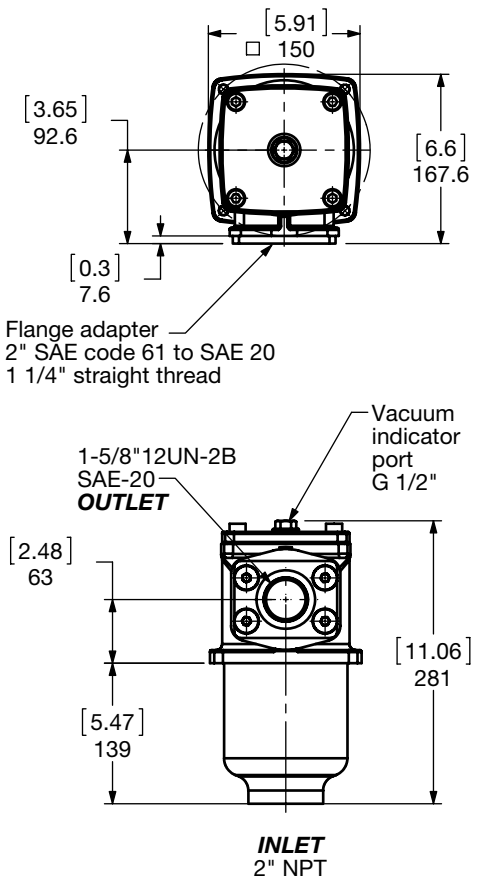
Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

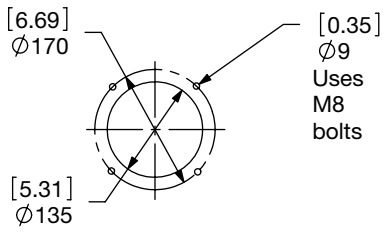
Dimensions
SF 330

SF 330 / 16



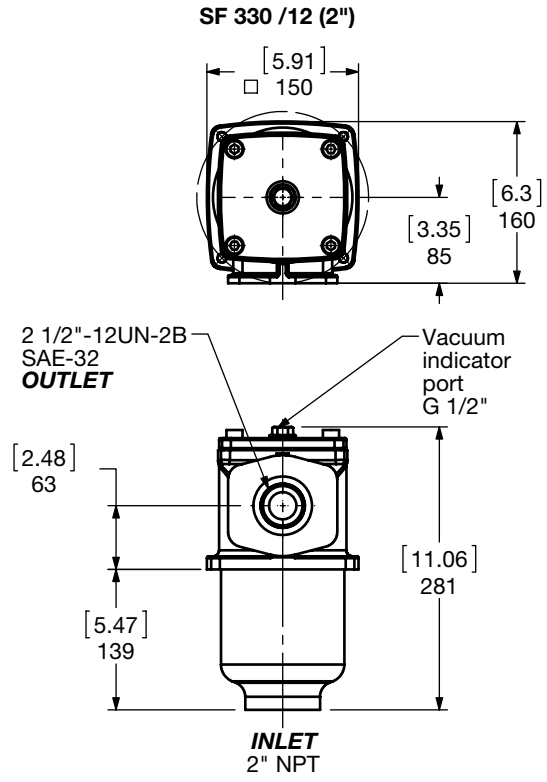
SF 330 /12 (1 1/4")





Mounting pattern

SF 330 /12 (2")



Size	SF 330
Weight (lbs.)	9.1

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

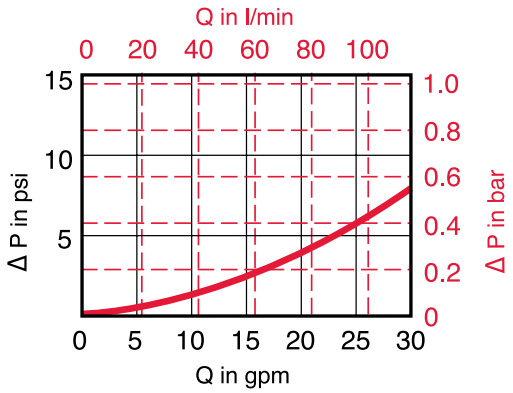
Housing Curve:

Pressure loss through housing is as follows:

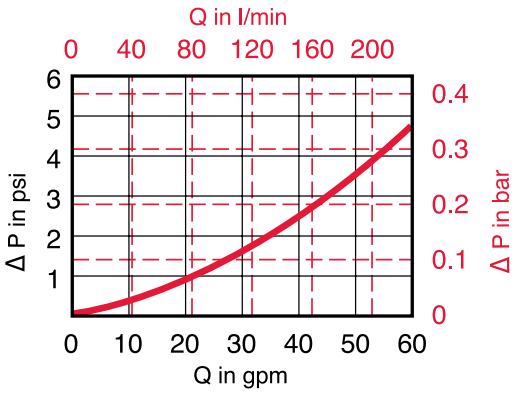
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

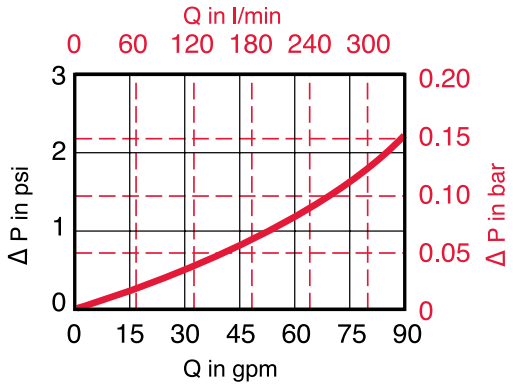
SF 110 HOUSING



SF 240 HOUSING



SF 330 HOUSING



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

WIRESCREEN	...RS...W/HC	
SIZE	74 µm	125 µm
0110 RS XXX W/HC	0.029	0.014
0240 RS XXX W/HC	0.014	0.007
0330 RS XXX W/HC	0.010	0.005

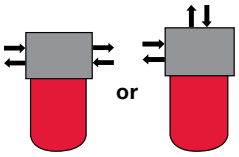
All Element K Factors in psi / gpm.

Notes

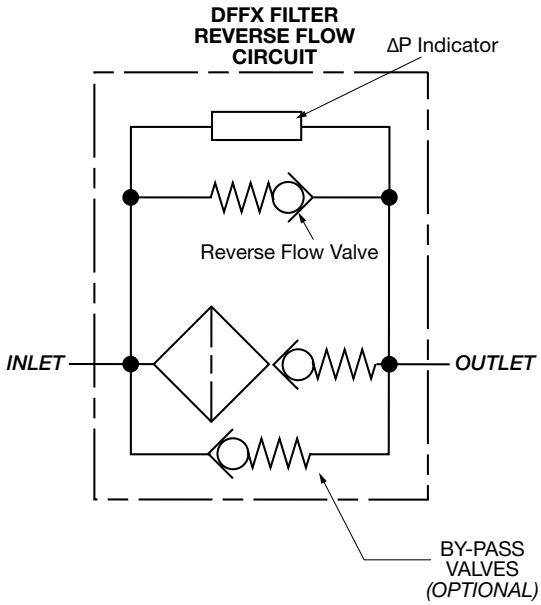
DFFX Series

Reverse Flow Differential Pressure Optimized Filters

6090 psi • up to 160 gpm



Hydraulic Symbol



Features

- DFFX Reverse Flow models filter fluid in the forward direction and bypass the filter element when the flow direction is reversed.
- O-ring seals are used to provide positive, reliable sealing. Choice of O-ring materials provide compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl/lid mounted below the filter head requires minimal clearance to remove the element for replacement; contaminated fluid cannot be washed downstream when element is serviced.
- Clogging indicators have no external dynamic seal. This results in high reliability due to magnetic actuation which eliminates a leak point.
- A poppet-type bypass valve (optional) located in the filter head provides positive sealing during normal operation and fast opening during cold starts and flow surges.

Applications


Agricultural


Automotive


Construction


Industrial


Railways

Technical Specifications

Mounting Method	4 mounting holes	
Port Connection		
DFFX 330/660/1320	2” SAE Flange Code 62	
Flow Direction	Inlet: Side	Outlet: Side or Top
Construction Materials		
Head	Ductile iron	
Single piece bowl “1.X”		
Bowl	Steel	
Two piece bowl “2.X”		
Housing	Steel	
Lid/Cap	Steel	
Flow Capacity		
330	80 gpm (303 lpm)	
660/1320	100 gpm (379 lpm)/160 gpm (606 lpm)	
Housing Pressure Rating		
Max. Allowable Working Pressure	6090 psi (420 bar)	
Fatigue Pressure	Contact HYDAC Office	
Burst Pressure	Contact HYDAC Office	
Element Collapse Pressure Rating		
BH4HC, V	3045 psid (210 bar)	
ON, W/HC	290 psid (20 bar)	
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)	
Consult HYDAC for applications operating below 14°F (-10°C)		
Fluid Compatibility		
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.		
Indicator Trip Pressure		
ΔP = 29 psid (2 bar) -10% *(optional)*		
ΔP = 72 psid (5 bar) -10% *(standard)*		
ΔP = 116 psid (8 bar) -10% *(optional)*		
Bypass Valve Cracking Pressure		
ΔP = 43 psid (3 bar) +10% *(optional)*		
ΔP = 87 psid (6 bar) +10% *(standard)*		
Non Bypass Available		

Model Code

DFFX ON 1320 T L L 3 BM 2 . X / 16 V

Filter Type
DFFX = Reverse Flow Bypass Filter

Element Media
ON = Optimicron®
W/HC = Wire Mesh
BH/HC = Betamicron® *(High Collapse)*
V = Metal Fiber

Size and Nominal Connection
330 = 2" Flange SAE Code 62
660 = 2" Flange SAE Code 62
1320 = 2" Flange SAE Code 62

Pressure Range
T = 6000 psi (414 bar)

Head Design
(omit) = T head
L = L Head

Size and Nominal Configuration
L = 2" SAE Code 62 Flange)

Filtration Rating *(microns)*
3, 5, 10, 20 = BH/HC
25, 50, 100, 200 = W/HC
1, 3, 5, 10, 15, 20 = ON
3, 5, 10, 20 = V

Type of ΔP Clogging Indicator
A, BM, C, D *(others available upon request)*

Type Number
1 = One piece bowl *(sizes 330-660 only*
2 = 2 Piece Bowl *(size 660 - 1320)*
3 = Upside-down Mounting *(size 660 - 1320)*

Modification Number *(latest version always supplied)*

Port Configuration
16 = SAE flange ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Bypass Valve
(omit) = Non-bypass – Critical applications *(high collapse element required)*
B3 = 43 psid (3 bar) *(Optional)*
B6 = 87 psid (6 bar) *(Standard setting for pressure filters)*

Supplementary Details
SO263 = Modification of elements for Skydrol or HYJET phosphate ester fluids
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC) or when using "V" elements
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
cRUus = Electrical Indicators with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

1320 D 003 BH4HC / V

Size
0330, 0660, 1320

Filtration Rating *(micron)*
1, 3, 5, 10, 15, 20 = ON
25, 50, 100, 200 = W/HC
3, 5, 10, 20 = BH4HC
3, 5, 10, 20 = V

Element Media
BH4HC, ON, W/HC, V

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EP = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 8 BM . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
2 = 29 psid (2 bar) *(option)*
5 = 72 psid (5 bar) *(standard)*
8 = 116 psid (8 bar)

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch – SPDT
D = Electric switch and LED light – SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EP = Ethylene propylene rubber (EPR)

Light Voltage *(D type indicators only)*
L24 = 24V L48 = 48V L110 = 110V L220 = 220V

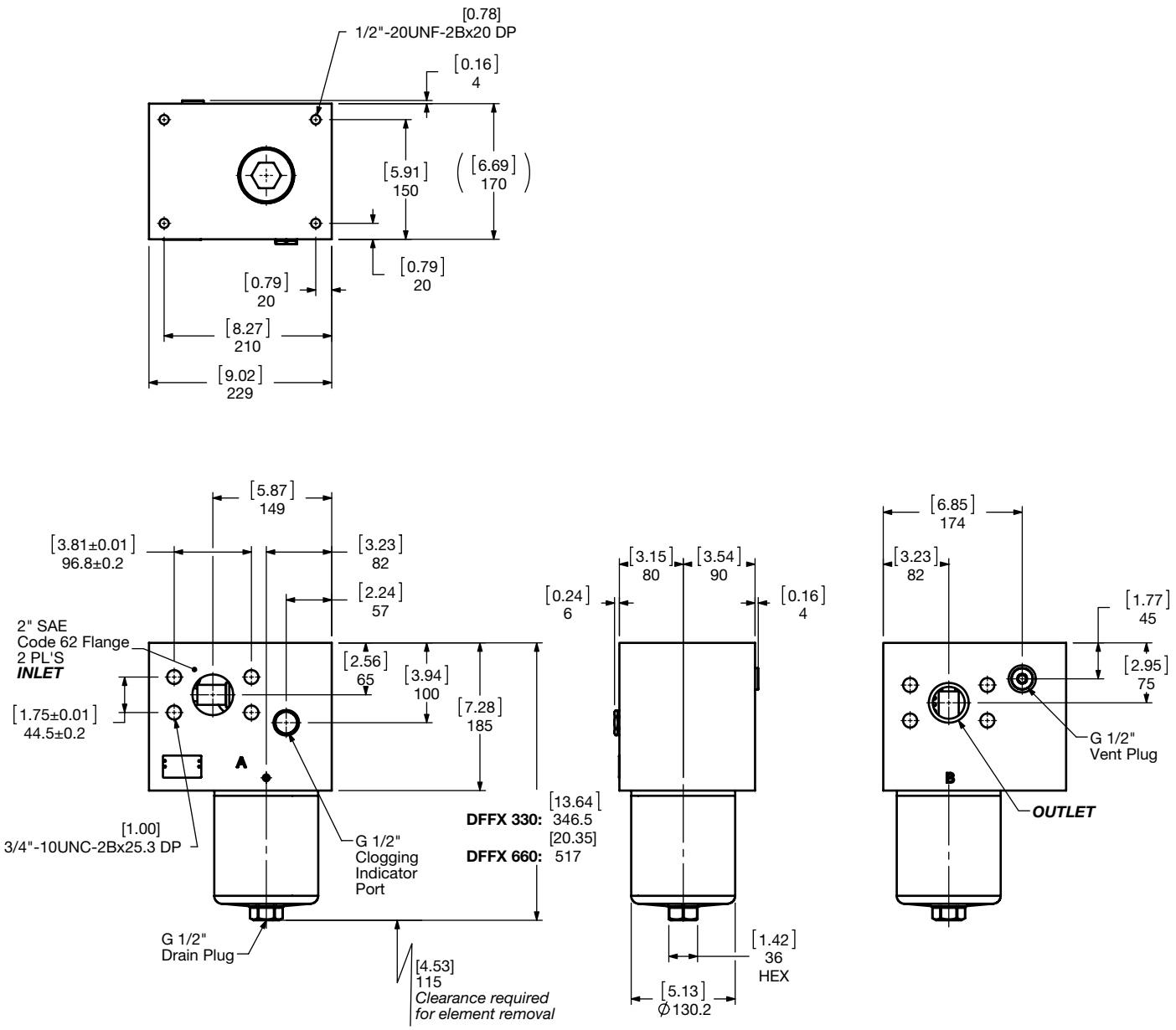
Thermal Lockout *(VM, VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

Underwriters Recognition *(VM, VD types C, D, J, and J4 only)*
cRUus = Electrical Indicators with underwriter's recognition
W = "VD…" indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

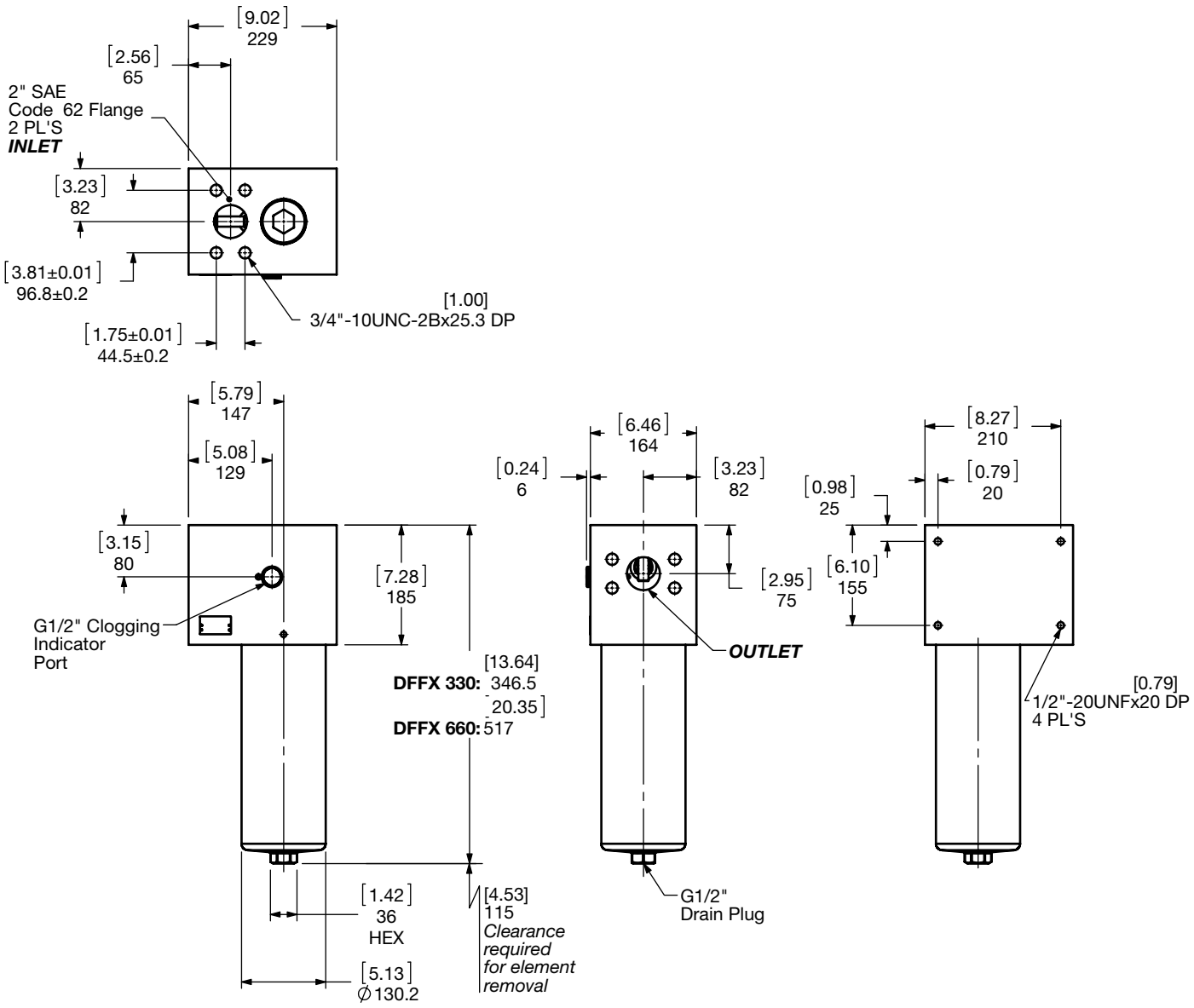
Dimensions
DFFX 330 / 660 TL 1.X Version



Size	330 TL1.0v	660 TL1.0v
Weight (lbs.)	109.2	124.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFFX 330 / 660 TLL 1.X Version

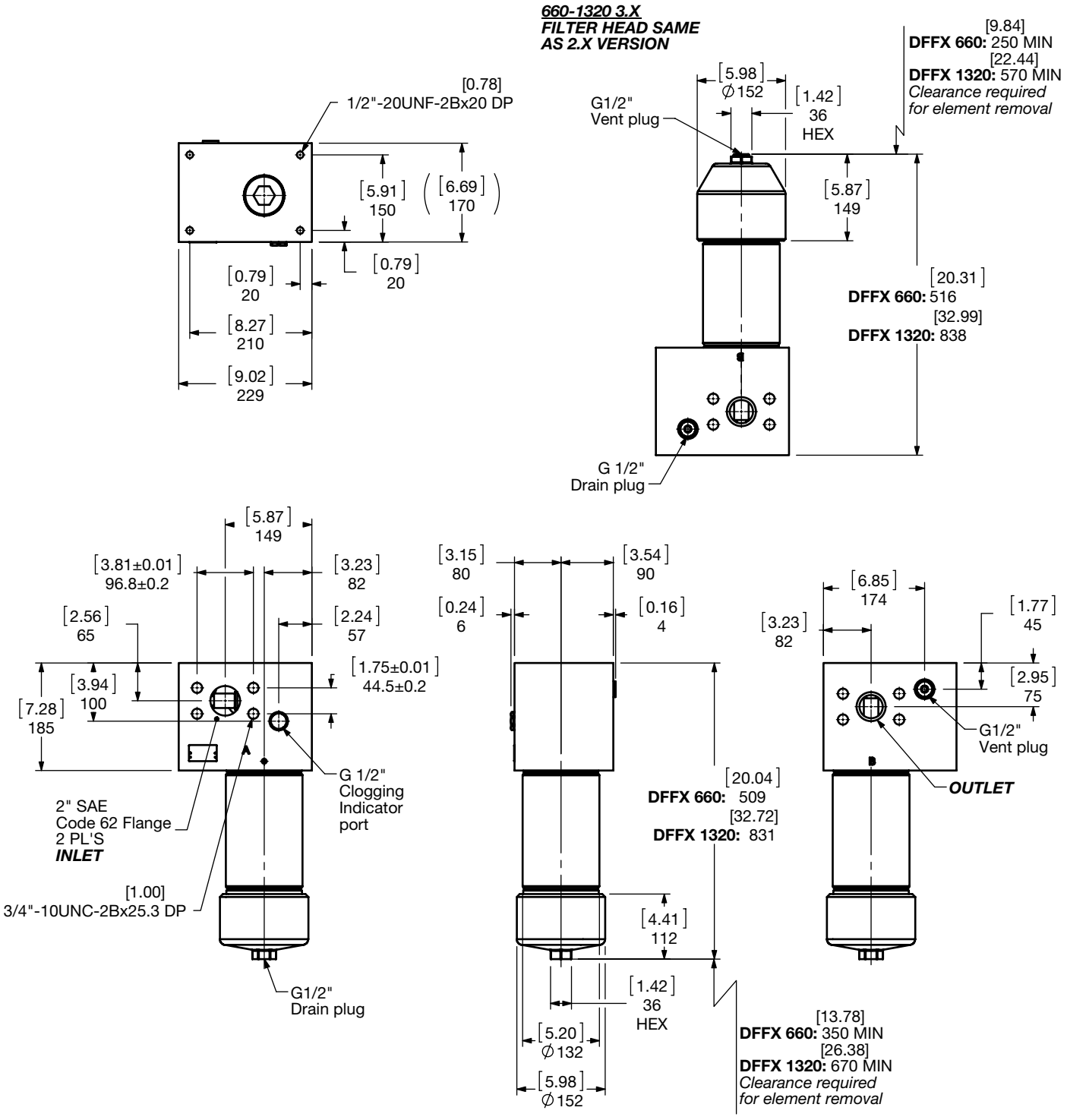


Size	330 TLL1.0v	660 TLL1.0v
Weight (lbs.)	109.2	124.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFFX 660 / 1320 TL 2.X & 3.X Version

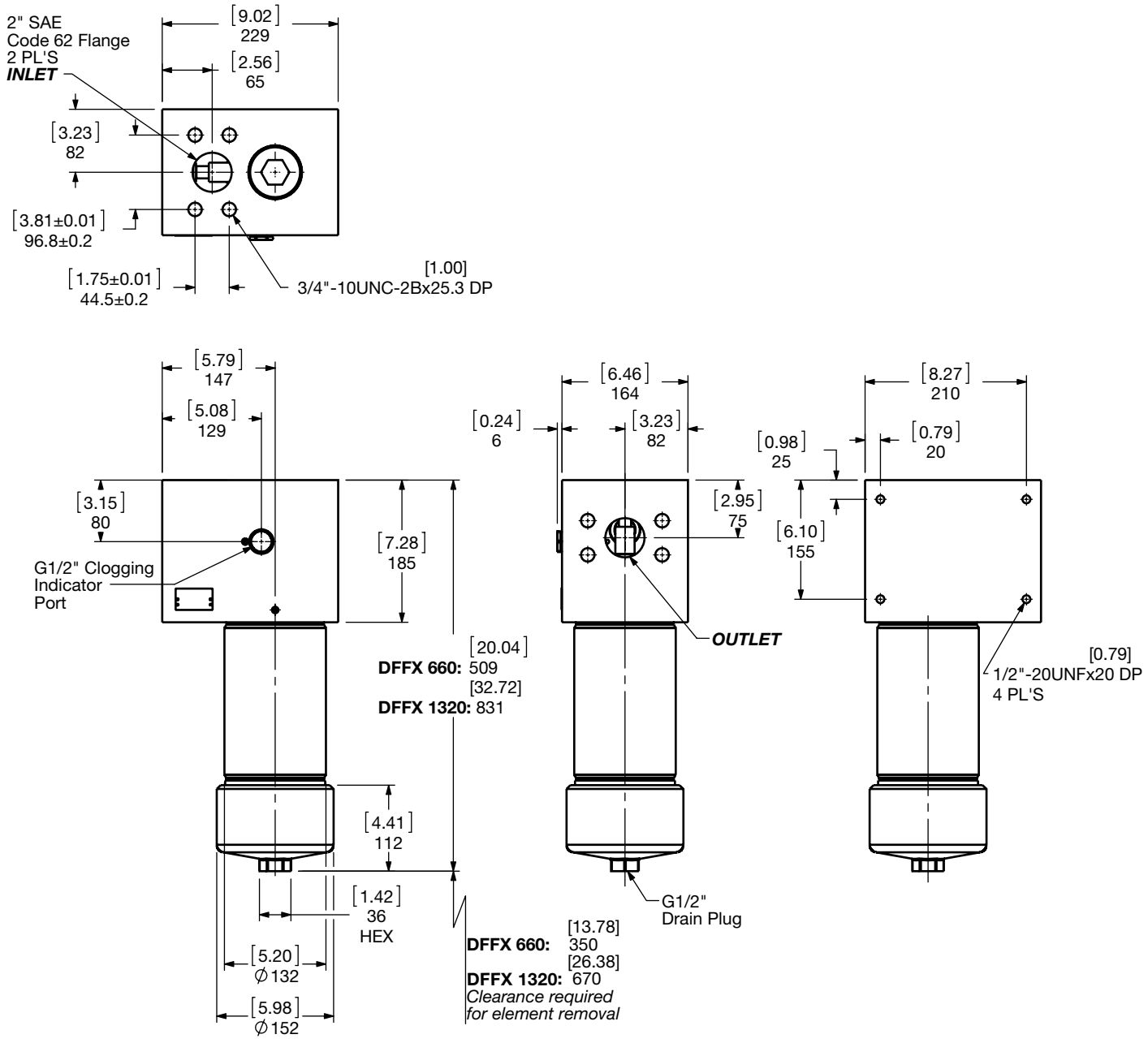
660 / 1320 2.X Version



Size	660 TL2.0_3.0v	1320 TL2.0_3.0v
Weight (lbs.)	124.8	167.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
DFFX 660 / 1320 TLL 2.X Version



Size	660 TLL2.0v	1320 TLL2.0v
Weight (lbs.)	124.8	167.8

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

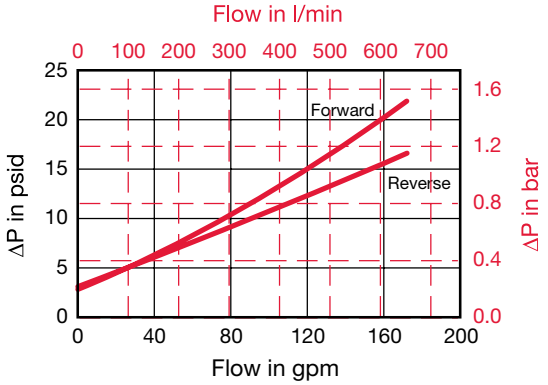
Housing Curve:

Pressure loss through housing is as follows:

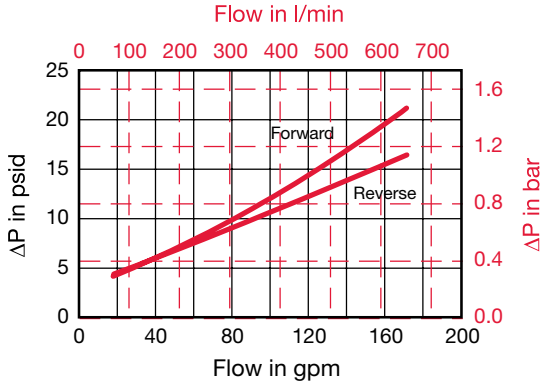
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

DFFX 330 / 660 / 1320 TL Housing



DFFX 330 / 660 / 1320 TLL Housing



Element K Factors

$$\Delta P \text{ Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Betamicron	...D...BH4HC Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0330 D XXX BH4HC	0.423	0.247	0.154	0.110
0660 D XXX BH4HC	0.181	0.104	0.055	0.049
1320 D XXX BH4HC	0.088	0.055	0.033	0.022

Optimicron	...D...ON Elements					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0330 D XXX ON	0.452	0.23	0.185	0.135	0.085	0.067
0660 D XXX ON	0.207	0.106	0.086	0.051	0.039	0.031
1320 D XXX ON	0.102	0.053	0.042	0.025	0.019	0.015

Wire Mesh	...D...W/HC Elements
Size	25, 50, 100, 200 µm
0330 D XXX W/HC	0.008
0660 D XXX W/HC	0.004
1320 D XXX W/HC	0.002

Metal Fiber	...D...V Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0330 D XXX V	0.121	0.097	0.065	0.043
0660 D XXX V	0.063	0.050	0.034	0.021
1320 D XXX V	0.032	0.026	0.018	0.012

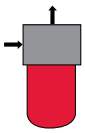
All Element K Factors in psi / gpm.

Notes

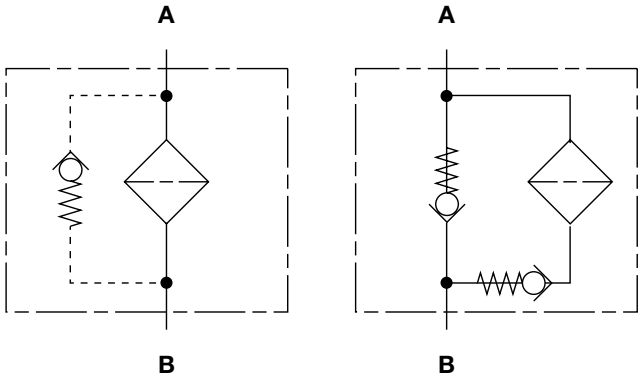
HDF/HDFF Series

Inline Filters & Inline Filters With Reversible Flow

4060 psi • up to 100 gpm



Hydraulic Symbol



Features

- Non-welded housing design reduces stress concentrations and prevents fatigue failure.
- Choice of SAE straight thread O-ring boss, and straight thread BSPP (sizes 300 - 900) to allow easy installation without costly adapters.
- O-ring seals are used to provide positive, reliable sealing. We offer a choice of O-ring materials (Nitrile rubber or Fluorocarbon elastomer), to provide compatibility with petroleum oils, synthetic fluids, water-glycols, oil/water emulsions, and high water based fluids.
- Screw-in bowl mounted below the filter head requires minimal clearance to remove the element for replacement and contaminated fluid cannot be washed downstream when element is serviced.
- HYDAC Differential Pressure Indicators have no external dynamic seal. This results in a high system reliability due to magnetic actuation, thus eliminating a potential leak point.
- A poppet-type bypass valve (optional) provides positive sealing during normal operation and fast opening during cold starts and flow surges.
- The HDF is available with a bypass valve. The HDFF is offered in non bypass only.
- Fatigue pressure ratings equal maximum allowable working pressure rating.
- Inlet/outlet ports in “L” configuration
- No element valve-only available with HDF in “L” configuration.

Applications

Technical Specifications

Mounting Method	4 mounting holes
Port Connection	
300, 450, 650, 900:	1” SAE-16 parallel straight thread or 1” BSPP or 1 1/4” SAE-20 parallel straight thread or 1 1/4” BSPP or 1 1/2” SAE-24 parallel straight thread or 1 1/2” BSPP
Flow Direction	Inlet: Side Outlet: Top
Construction Materials	
Head	Ductile iron
Bowl	Steel
Flow Capacity	
300	30 gpm (114 lpm)
450	60 gpm (227 lpm)
650	90 gpm (340 lpm)
900	100 gpm (378.5 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	4060 psi (280 bar)
Fatigue Pressure	4060 psi (280 bar) @ 1 million cycles 6090 psi (420 bar) @ 250,000 cycles
Burst Pressure	*(Consult HYDAC)*
Element Collapse Pressure Rating	
BH4HC	3045 psid (210 bar)
ON	290 psid (20 bar)
Fluid Temp. Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility	Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.
Indicator Trip Pressure	ΔP = 29 psid (2 bar) -10% *(optional)* ΔP = 72 psid (5 bar) -10% *(standard)* ΔP = 116 psid (8 bar) -10% *(optional non bypass)*
Bypass Valve Cracking Pressure	ΔP = 43 psid (3 bar) +10% *(optional-HDF only)* ΔP = 87 psid (6 bar) +10% *(standard)* Non Bypass Available for HDF *(HDFF available only with no bypass)*

PN#02081318 / 07.19 / FIL1907-2109

Model Code

HDF BH/HC 450 O L E 10 D 1 . X / 12 V

Filter Type
HDF or HDFF *(HDFF on request)*

Element Media
ON = Optimicron® BH/HC = Betamicron® *(High Collapse)*

Size
300, 450, 650, 900

Pressure Range
O = 4060 psi (280 bar); 6090 psi (420 bar) at 250,000 cycles

Type of Connection
L = Flow path in L-configuration *(standard version)*

Size and Nominal Connection
D = 1" Threaded
E = 1 1/4" Threaded
F = 1 1/2" Threaded

Filtration Rating *(microns)*
3, 5, 10, 20 = BH/HC 1, 3, 5, 10, 15, 20 = ON

Type of ΔP Clogging Indicator
A, BM, C, D, Y

Type Modification Number
1

Modification Number *(latest version always supplied)*

Port Configuration
0 = BSPP straight thread
12 = SAE parallel straight thread o-ring boss ports

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM)

Bypass Valve
(omit) = Non-bypass - critical applications (high collapse element required)
B3 = 43 psid *(3 bar) - optional*
B6 = 87 psid *(6 bar - standard setting for pressure filters)*

Supplementary Details
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
LED = 2 light-emitting diodes up to 24 Volt *(only for clogging indicator type "D")*
NEV = No Element valve (only for HDF filters in L-configuration)
SO184 = pressure release drain screw (G-1/2")
SFREE = Element specially designed to minimize electrostatic charge generation
W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC) or when using "V" elements

Replacement Element Model Code

0450 D 010 BH4HC / V

Size
0300, 0450, 0650, 0900

Type
D

Filtration Rating *(micron)*
3, 5, 10, 20 = BH4HC
1, 3, 5, 10, 15, 20 = ON

Element Media
BH4HC, ON

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
W = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 8 D . X / V

Indicator Prefix
VD = differential pressure indicator up to 420 bar operating pressure

Pressure setting
5 = standard 5 bar *(for HDF filters)*
8 = standard 8 bar *(for HDFF filters)*
Others available upon request

Type of Indicator
A = No indicator, plugged port
BM = Pop-up indicator *(manual reset)*
C = Electric switch – SPDT
D = Electric switch and LED light – SPDT
Y = Plastic blanking plug in indicator port

Modification Number *(latest version always supplied)*

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

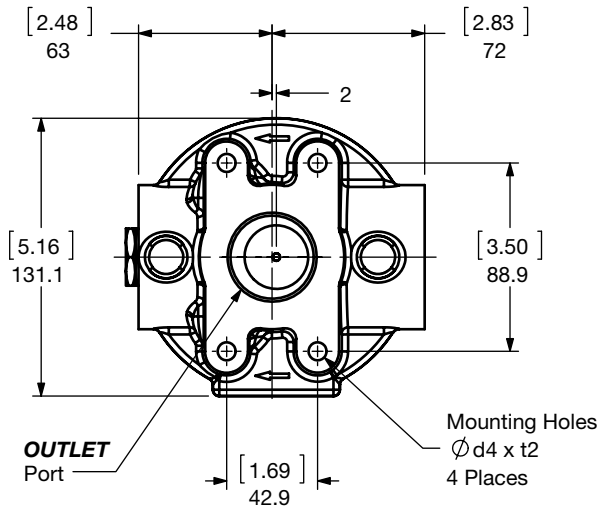
W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

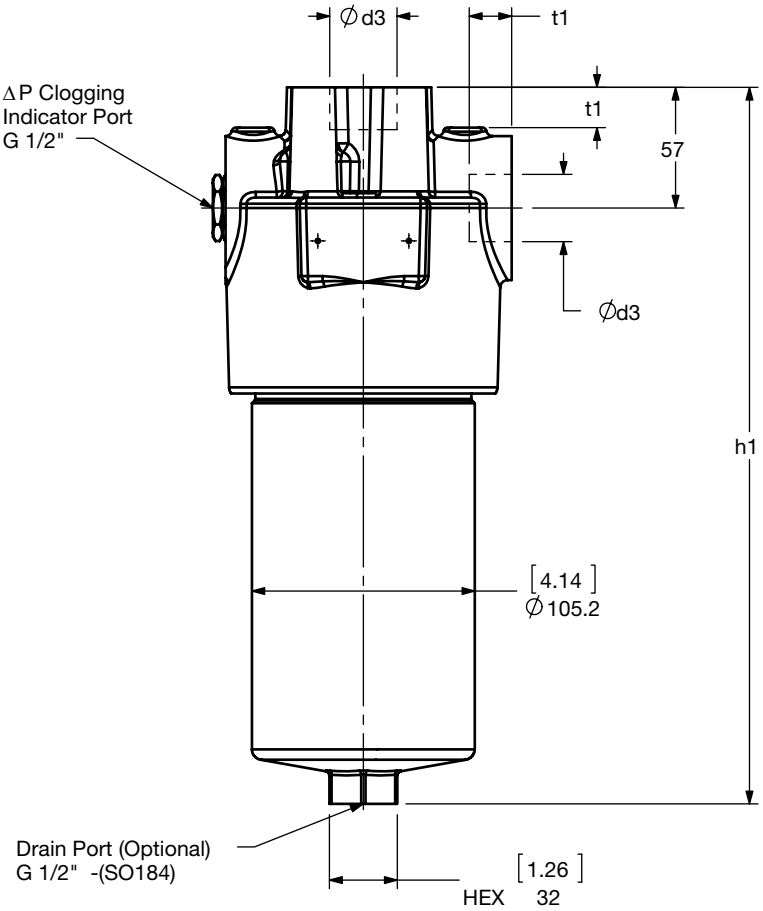
SPECIAL ORDER FILTERS - HIGH PRESSURE

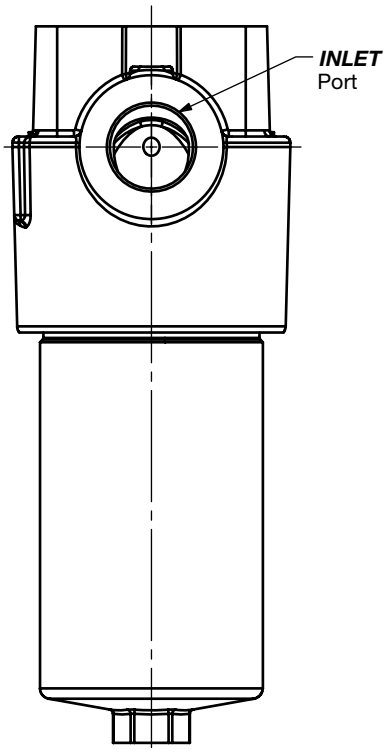
Dimensions
HDF/HDFF 300-900



HDF/HDFF	h1
300	[9.680] 246
450	[13.35] 339
650	[18.11] 460
900	[22.28] 566

ød3	†1	ød4	†2
G1	[0.71] 18	M10 X 1.5	[0.71] 18
G1-1/4	[0.79] 20		
G1-1/2	[0.87] 22		
SAE-16	[0.75] 19	3/8-24UNF-2B	[0.55] 14
SAE-20	[0.75] 19		
SAE-24	[0.75] 19		





Size	300	450	650	900
Weight (lbs.)	24.7	28.9	35.8	47.4

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

PN#02081318 / 07.19 / FIL1907-2109

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

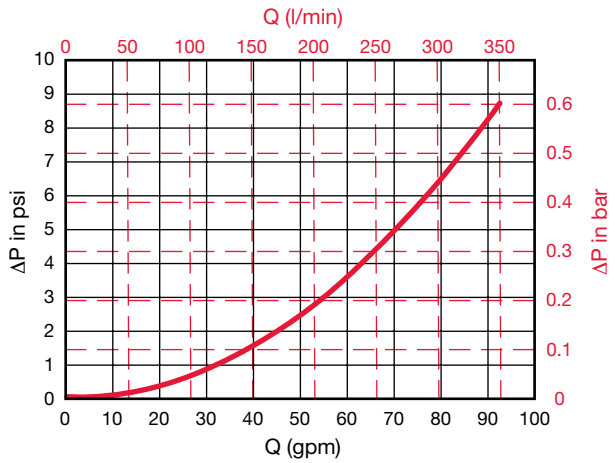
Housing Curve:

Pressure loss through housing is as follows:

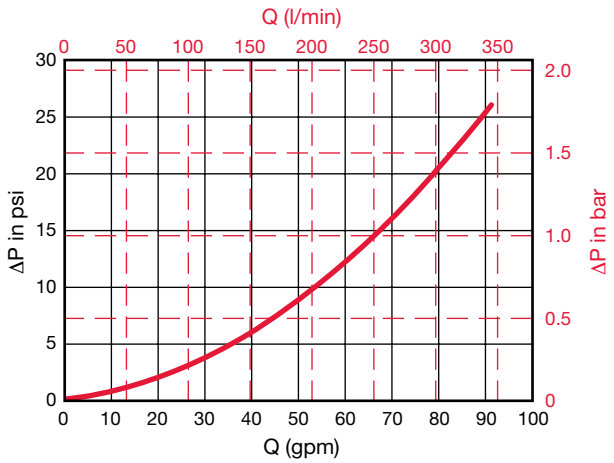
$$\text{Housing } \Delta P = \text{Housing Curve } \Delta P \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

HDF Housing



HDFF Housing



Element K Factors

$$\Delta P \text{ Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141 \text{ SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Optimicron	...D...ON Elements					
Size	1 µm	3 µm	5 µm	10 µm	15 µm	20 µm
0300 D XXX ON	0.801	0.488	0.391	0.268	0.154	0.143
0450 D XXX ON	0.401	0.244	0.193	0.131	0.077	0.069
0650 D XXX ON	0.245	0.148	0.121	0.081	0.047	0.044
0900 D XXX ON	0.185	0.115	0.092	0.06	0.036	0.035

Betamicron	...D...BH4HC Elements (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
0300 D XXX BH4HC	0.878	0.488	0.390	0.181
0450 D XXX BH4HC	0.428	0.236	0.187	0.088
0650 D XXX BH4HC	0.258	0.143	0.115	0.055
0900 D XXX BH4HC	0.192	0.110	0.088	0.038

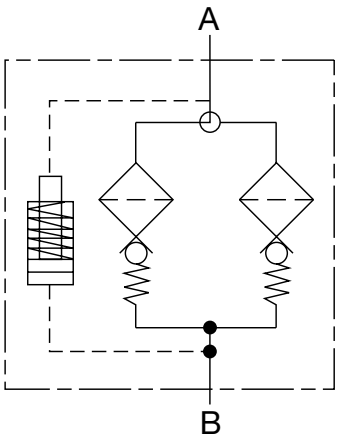
All Element K Factors in psi / gpm.

HFDK4P Series

Inline Duplex Filters

4568 psi • up to 90 gpm

Hydraulic Symbol

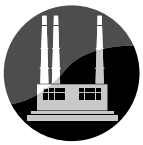


Features

- The HFDK4P pressure duplex filter meets HF4 automotive specification element requirements.
- The HFDK4P filters have a filter head and lid of ductile iron and a cold formed steel housing to meet high fatigue pressure requirements.
- The filter housings are designed to withstand pressure surges as well as high static pressure loads.
- The screw-in lids allow top access for the filter element to be easily removed for replacement.
- Visual (pop-up), electrical, electrical/visual (lamp), or electronic differential type clogging indicators are available.
- HFDK4P filters are available only with high collapse pressure elements with no bypass provided.

Applications


Automotive


Industrial


Power Generation


Pulp & Paper


Shipbuilding


Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes
Port Connection	2” SAE Flange Code 62
Flow Direction	Inlet: Bottom Outlet: Left Side
Construction Materials	
Head, Lid	Ductile iron
Housing	Steel
Flow Capacity	
9”	50 gpm (189 lpm)
18”	75 gpm (284 lpm)
27”	90 gpm (340 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	4568 psi (315 bar)
Fatigue Pressure	4500 psi (315 bar)
Burst Pressure	Contact HYDAC Office
Element Collapse Pressure Rating	
BH	3045 psid (210 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 116 psid (8 bar) -10% *(standard)*	
ΔP = 72 psid (5 bar) -10% *(optional)*	

Model Code

HFDK4P BH 27 Q L L 5 C 2 . 2 / 16 A5 V

Filter Type
HFDK4P = Inline duplex pressure filter

Element Media
BH = Betamicron® *(High Collapse)*

Element Length
09 = 9 inches
18 = 18 inches
27 = 27 inches

Pressure Range
Q = 4568 psi (315 bar)

Valve
L = ball change over valve in "L" configuration *(standard)*

Type of Connection
L = 2" SAE 4 Bolt Flange (code 62)

Filtration Rating *(micron)*
3, 5, 10, 20 = BH

Type of Clogging Indicator
A, B/BM, C, D

Type Code
2

Modification Number *(the latest version is always supplied)*

Port Configuration
16 = 2" SAE 4 bolt flange (code 62)

Indicator Trip Pressure
(omit) = 116 psid (8 Bar) *(standard)*
A5 = 72 psid (5 Bar)

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM)

Supplementary Details
W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

5 . 03 . 27 D 05 BH /-V

Length *(nominal inches)*
09, 18, 27

Filtration Rating *(micron)*
3, 5, 10, 20 = BH

Element Media
BH

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)

Supplementary Details
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 8 C . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
5 = 72 psid (5 bar) *(optional)*
8 = 116 psid (8 bar) *(standard)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and led light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

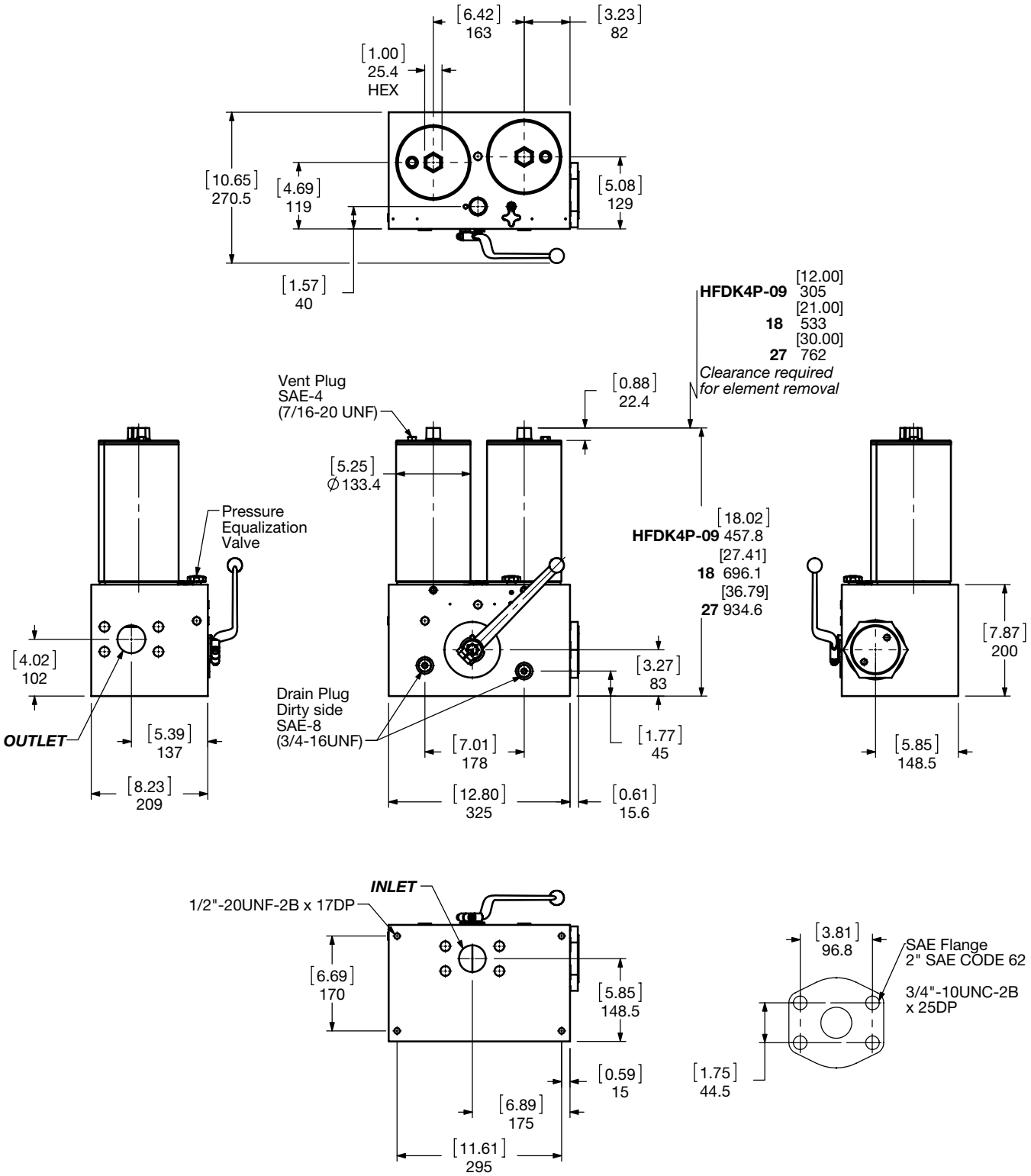
Underwriters Recognition *(VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

Dimensions
HFDK4P 09, 18, 27...2.2



Size	09	18	27
Weight (lbs.)	233.7	270.5	306.4

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

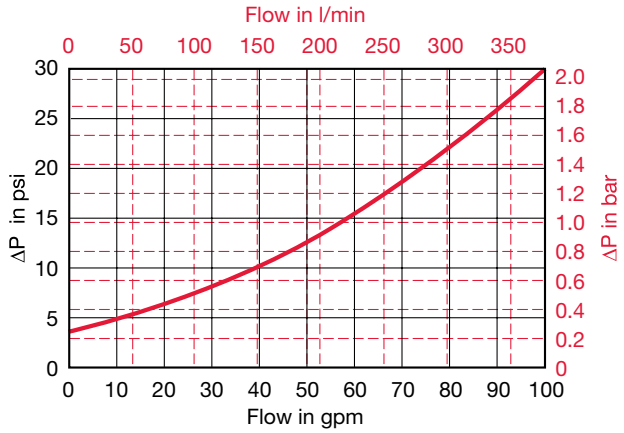
Assembly ΔP = Housing ΔP + Element ΔP

Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*



Element K Factors

$$\text{P Elements} = \text{Elements (K) Flow Factor (From Tables Below)} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141\ \text{SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

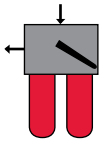
Autospec HF4 Depth	5.03.XXDXXBH (High Collapse)			
Size	3 µm	5 µm	10 µm	20 µm
5.03.09DXXBH	0.207	0.146	0.089	0.047
5.03.18DXXBH	0.097	0.068	0.041	0.022
5.03.27DXXBH	0.063	0.044	0.027	0.014

All Element K Factors in psi / gpm.

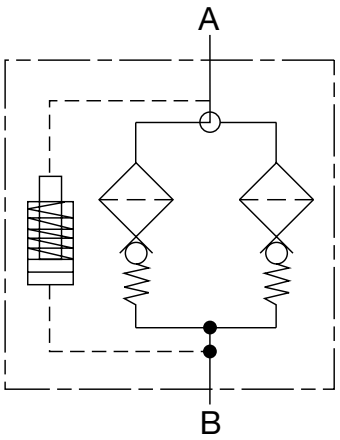
HFDK3P Series

Inline Duplex Filters

4568 psi • up to 90 gpm



Hydraulic Symbol



Features

- The HFDK3P pressure duplex filter meets HF3 automotive specification element requirements.
- The HFDK3P filters have a filter head and lid of ductile iron and a cold formed steel housing to meet high fatigue pressure requirements.
- The filter housings are designed to withstand pressure surges as well as high static pressure loads.
- Visual (pop-up), electrical, electrical/visual (lamp), or electronic differential type clogging indicators are available.
- The HFDK3P housing is non-bypass only. Therefore, a clogging indicator must be used with a low collapse element).

Applications


Automotive


Industrial


Power Generation


Pulp & Paper


Shipbuilding


Steel / Heavy Industry

Technical Specifications

Mounting Method	4 mounting holes
Port Connection	2” SAE Flange Code 62
Flow Direction	Inlet: Bottom Outlet: Left Side
Construction Materials	
Head, Lid	Ductile iron
Housing	Steel
Flow Capacity	
8”	50 gpm (189 lpm)
13”	75 gpm (284 lpm)
16”	90 gpm (340 lpm)
Housing Pressure Rating	
Max. Allowable Working Pressure	4568 psi (315 bar)
Fatigue Pressure	4500 psi (315 bar)
Burst Pressure	Contact HYDAC Office
Element Collapse Pressure Rating	
BN4	290 psid (20 bar)
BH4	3045 psid (210 bar)
Fluid Temperature Range	14°F to 212°F (-10°C to 100°C)
Consult HYDAC for applications operating below 14°F (-10°C)	
Fluid Compatibility	
Compatible with all hydrocarbon based, synthetic, water glycol, oil/water emulsion, and high water based fluids when the appropriate seals are selected.	
Indicator Trip Pressure	
ΔP = 116 psid (8 bar) -10% *(standard)*	
ΔP = 72 psid (5 bar) -10% *(optional)*	

PN#02081318 / 07.19 / FIL1907-2109

Model Code

HFDK3P BH 13 Q L L 5 C 3 . 0 / 16 A5 V

Filter Type
HFDK3P = Inline duplex pressure filter

Element Media
BH = Betamicron® *(High Collapse)*
BN = Betamicron® *(Low Collapse)*
Note: The HFDK3P housing is non-bypass only. Therefore, a clogging indicator must be used with a low collapse element).

Element Length
08 = 8 inches
13 = 13 inches
16 = 16 inches

Pressure Range
Q = 4568 psi (315 bar)

Valve
L = ball change over valve in "L" configuration *(standard)*

Type of Connection
L = 2" SAE 4 Bolt Flange (code 62)

Filtration Rating *(micron)*
3, 5, 10, 20 = BH
3, 6, 12, 25 = BN

Type of Clogging Indicator
A, B/BM, C, D

Type Code
2 = Two Piece Bowl
3 = Upside down mounting - Element top access

Modification Number *(the latest version is always supplied)*

Port Configuration
16 = 2" SAE 4 bolt flange (code 62)

Indicator Trip Pressure
(omit) = 116 psid (8 Bar) *(standard)*
A5 = 72 psid (5 Bar)

Seals
(omit) = Nitrile rubber (NBR) *(standard)* V = Fluorocarbon elastomer (FKM)

Supplementary Details
SO155H = Modification of BH elements for phosphate ester fluids
W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)
L24, L48, L110, L220 = Lamp for D-type clogging indicator *(LXX, XX = voltage)*
T100 = Indicator Thermal Lockout, 100°F *(C and D indicators only)*
cRUus = Electrical Indicator with underwriter's recognition
SFREE = Element specially designed to minimize electrostatic charge generation

Replacement Element Model Code

1 . 11 . 08 D 03 BN / V

Length *(nominal inches)*
04, 08, 13, 16

Filtration Rating *(micron)*
3, 6, 12, 25 = BN
3, 6, 10, 17 = BH

Element Media
BN, BH

Seals
(omit) = Nitrile rubber (NBR) *(standard)*
V = Fluorocarbon elastomer (FKM)
EPR = Ethylene propylene rubber (EPR)

Supplementary Details
SO263 = *(same as above)*
SFREE = *(same as above)*

Clogging Indicator Model Code

VD 8 C . X / V

Indicator Prefix
VD = G 1/2 6000 psi

Trip Pressure
5 = 72 psid (5 bar) *(optional)*
8 = 116 psid (8 bar) *(standard)*

Type of Indicator
A = No indicator, plugged port
B = Pop-up indicator *(auto reset)*
BM = Pop-up indicator *(manual reset)*
C = Electric switch - SPDT
D = Electric switch and led light - SPDT

Modification Number

Supplementary Details

Seals
(omit) = Nitrile rubber (NBR)
V = Fluorocarbon elastomer (FKM)

Light Voltage *(D type indicators only)*
L24 = 24V L110 = 110V

Thermal Lockout *(VD types C, D, J, and J4 only)*
T100 = Lockout below 100°F

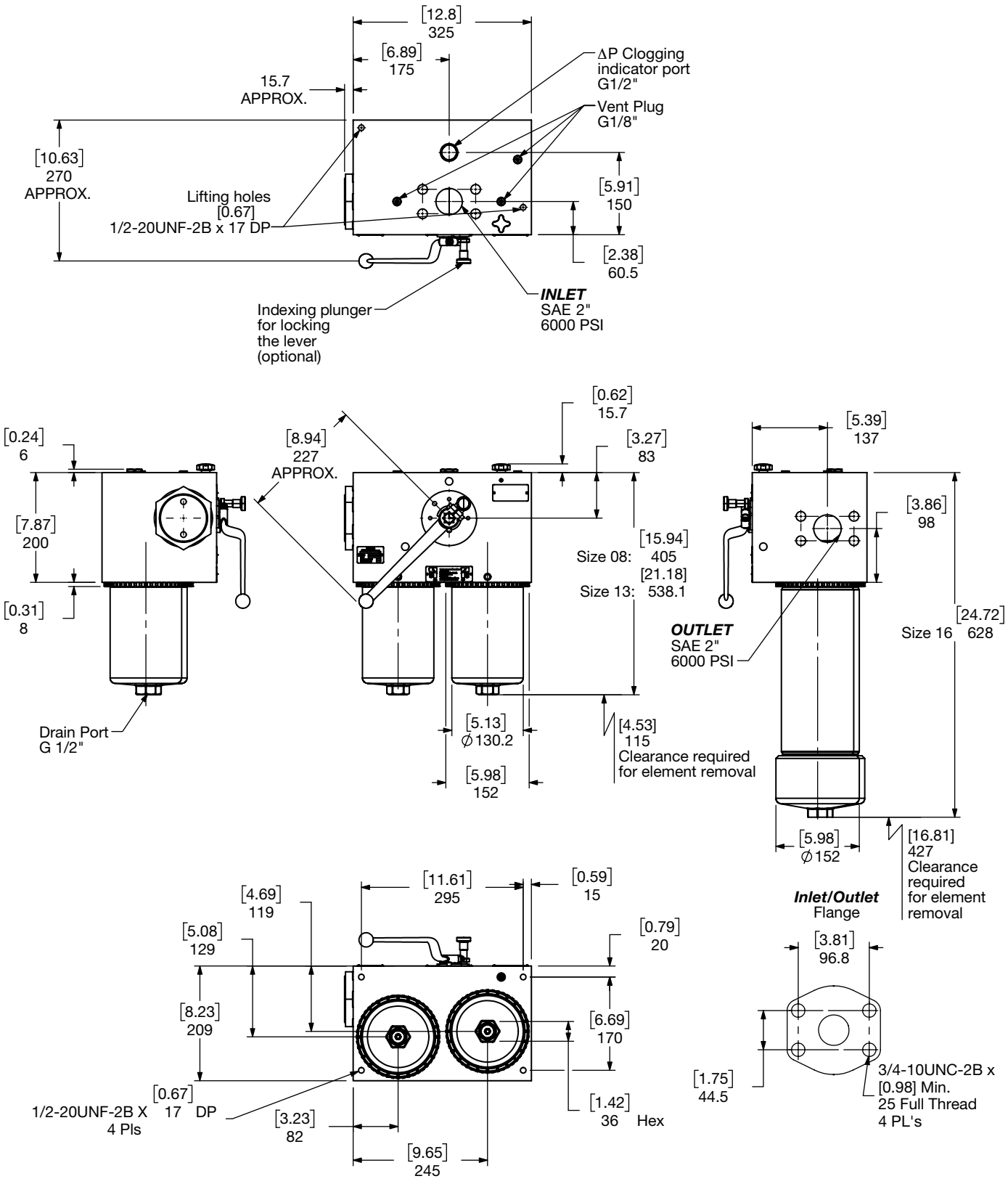
Underwriters Recognition *(VD types C, D, J, and J4 only)*
cRUus = Electrical Indicator with underwriter's recognition

W = "VD..." indicator modified with a brass piston for use with high water based emulsions/solutions (HFA) & (HFC)

(For additional details and options, see Clogging Indicators section.)

Model Codes Containing RED are non-stock items — Minimum quantities may apply – Contact HYDAC for information and availability

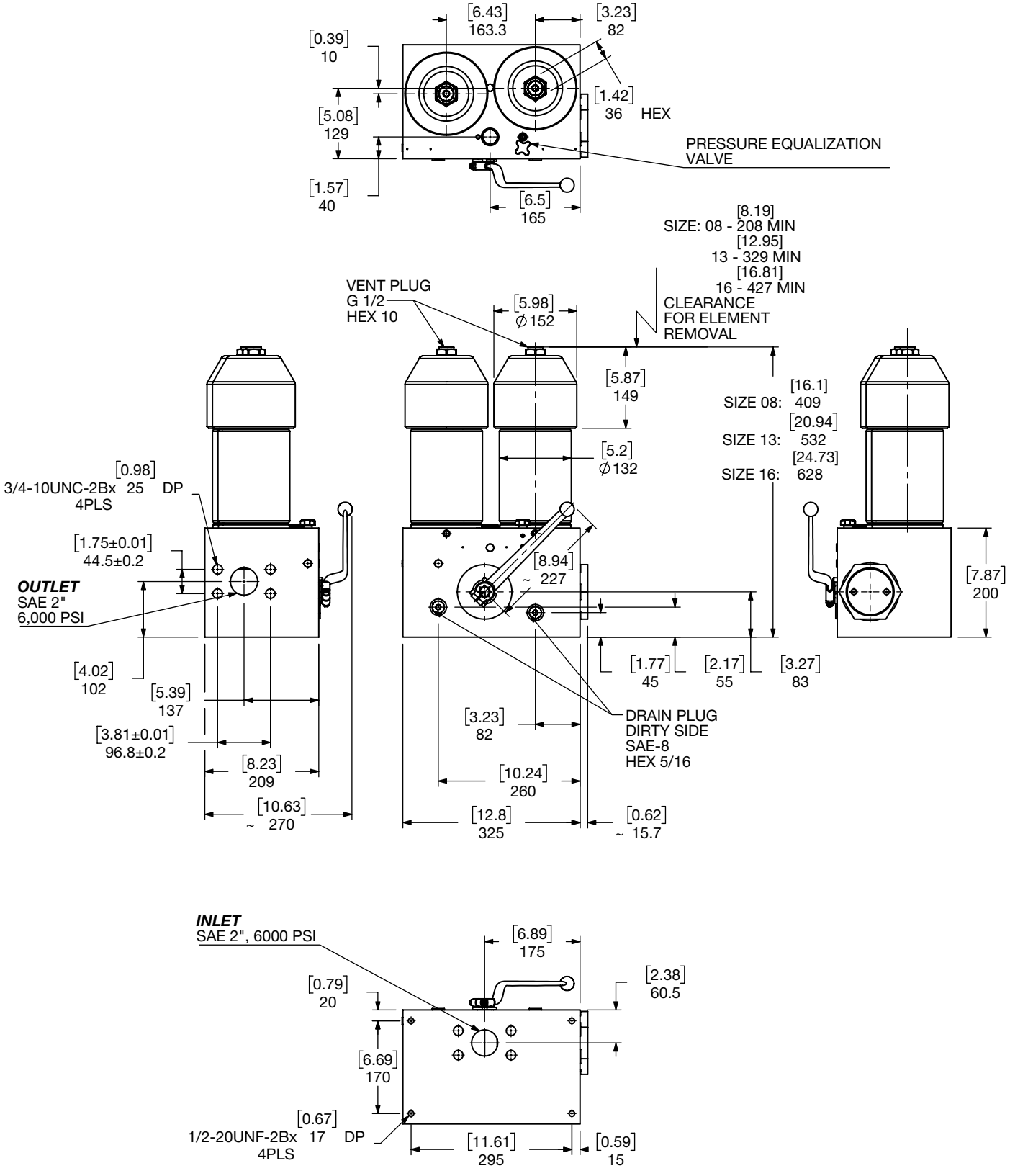
Dimensions
HFDK3P 2.0



Size	08	13	16
Weight (lbs.)	225.3	250.6	284.3

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Dimensions
HFDK3P 3.0



Size	08	13	16
Weight (lbs.)	239.4	266.2	297.9

Dimensions shown are [inches] millimeters for general information and overall envelope size only. Weights listed include element.
For complete dimensions please contact HYDAC to request a certified print.

Sizing Information

Total pressure loss through the filter is as follows:

Assembly ΔP = Housing ΔP + Element ΔP

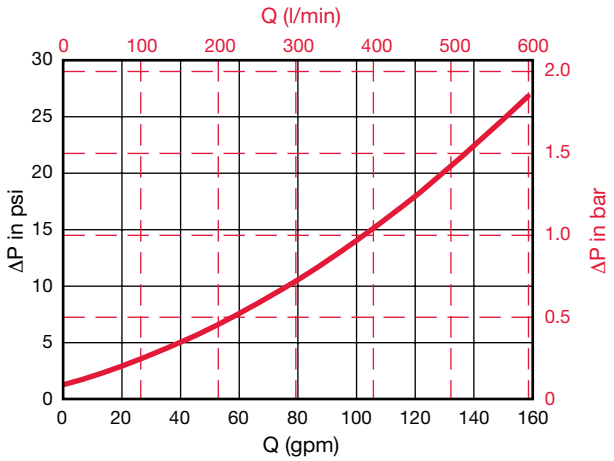
Housing Curve:

Pressure loss through housing is as follows:

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

Adjustments must be made for viscosity & specific gravity of the fluid to be used! *(see "Sizing HYDAC Filter Assemblies" in Section B - Overview)*

HFDK3P Housing



Element K Factors

$$\text{P Elements} = \underset{\text{(From Tables Below)}}{\text{Elements (K) Flow Factor}} \times \text{Flow Rate (gpm)} \times \frac{\text{Actual Viscosity (SUS)}}{141\ \text{SUS}} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Autospec HF3 Depth	**1.11.08DXXBN** (Low Collapse)			
Size	**3 µm**	**6 µm**	**12 µm**	**25 µm**
1.11.04DXXBN	0.590	0.500	0.266	0.153
1.11.08DXXBN	0.289	0.241	0.135	0.076
1.11.13DXXBN	0.175	0.146	0.082	0.046
1.11.16DXXBN	0.132	0.110	0.062	0.035

Autospec HF3 Depth	**1.11.08DXXBH** (High Collapse)			
Size	**3 µm**	**6 µm**	**10 µm**	**17 µm**
1.11.04DXXBH	0.937	0.660	0.401	0.210
1.11.08DXXBH	0.460	0.321	0.195	0.102
1.11.13DXXBH	0.274	0.193	0.117	0.615
1.11.16DXXBH	0.206	0.145	0.089	0.046

All Element K Factors in psi / gpm.

Clogging Indicators

Early warning pressure devices protect the hydraulic circuit from contamination, alerting the operator that the filter element is near capacity and must be changed. The clogging indicator is typically set to trip at 1-bar (14 psid) below the filter bypass setting, to allow the operator sufficient time for element change-out. Available in visual, combo electrical/visual, as well as an extensive list of other options and certifications. A comprehensive offering of clogging indicators ensures that any application can be accommodated.

Clogging Indicators Sections

FILTER CLOGGING INDICATORS

Purpose of Indicators

Clogging indicators are warning devices that signal visually and/or electrically that the filter element is filled with contaminants and should be changed or cleaned. These devices activate *(trip)* when the flow of fluid causes a pressure drop across the filter element that exceeds the indicator setting. In filters that incorporate bypass valves, contaminated fluid will bypass the element if the operator does not respond to the indicator warning signal within a reasonable time. In non-bypass filters, if the indicator warning is not heeded, the pressure across the filter will build up to the point where system performance is degraded, the element fails, or the system relief valve is actuated.

The indicator is set to trip well before the element becomes fully clogged *(14 psid / 1 bar lower than bypass)*, thereby giving the operator sufficient time to take corrective action. The indicator warning may be a visual signal at the filter site *(pop-up button, light, etc.)*; or, some form of signal at a remote location *(trouble light, sound alarm, etc.)*. In some critical applications, where contamination is intolerable, the signal from the indicator may be used to shut down the system so that personnel must immediately service the unit.

Some users install filters without indicators, preferring instead to change and/or clean elements according to a fixed time schedule — or based on number of hours of operation. There is some risk in utilizing this approach. It may be difficult to establish a reliable schedule for installing new elements because the rate of dirt ingression is not known, and, in fact, may vary from time-to-time and from machine-to-machine. Use of a clogging indicator has two main benefits: first, it eliminates the need to guess when the element will clog; second, it avoids the unnecessary cost of replacing elements too soon.

Indicator Settings

In a majority of applications, a HYDAC indicator is set to trip at 15 psid (1 bar) below the bypass valve cracking pressure; or, for a non-bypass filter, at 15 psid below the element design changeout pressure. Typically, a HYDAC pressure filter bypass valve begins to crack at 87 psid (6 bar), so the indicator is set to trip at 72 psid (5 bar). A HYDAC return filter ordinarily begins to bypass at 43 psid (3 bar), so the indicator is set to trip at 29 psid (2 bar). Consequently, the operator has a period of time in which to change or clean the element before the bypass valve opens and passes contaminated fluid to sensitive components downstream of the filter.

Typically, the time from indication to bypass is 5-15% of the life of the element. For instance, if the normal service life of the element is 100 days, there is a grace period of 5-15 days before the filter begins bypassing. Nevertheless, it is advisable to change the element as soon as the indicator trips.

Non-standard indicator settings are often employed for various reasons. For instance, in lubrication systems, filters may not be allowed to have a high pressure drop, therefore, the indicator may be set to trip at less than 15 psid. When the filter is installed on the suction side of a pump, it is a common practice to limit the ΔP across the filter to 3 psid, and to set the indicator at a correspondingly low amount.

Certain HYDAC non-bypass filters, such as the DFDK duplex series and DFZ series of sandwich filters, utilize indicators that are set at 116 psid (8 bar) in order to maximize the dirt retention and service life of the elements.

In most cases, HYDAC pressure and return line filters bypass at higher pressures than other commonly used filters, meaning that indicator settings also are higher than usual. This has the advantage of extending element service life.

Types of Indicators

Filter assemblies may be ordered with or without indicators. When ordered with an indicator, the assembly model code includes a letter symbol for the indicator, such as B, C, or D. When ordered separately, an indicator has its own complete model code, as described subsequently in this brochure.

A type B or BM visual indicator is suitable when only a local warning is required. When it is necessary to signal a remote warning device, control panel, or PLC, one of the electric switches should be specified. Various kinds of switches are available to provide a range of electrical configurations, contact ratings, and connections.

The D indicator incorporates a switch and built-in light for both local and remote warning signals.

Special Indicators

Mobile indicators

These indicators have been developed for special applications and are fitted with AMP, Deutsch and Junior Power Timer plugs.

ATEX indicators

These indicators are used in potentially explosive locations and are subject to the ATEX Equipment Directive 94/9/EC and the ATEX Operator Directive 1999/92/EC.

UL and CSA indicators

Indicators which are exported to the USA and Canada often require classification according to current UL and CSA standards. The UL and CSA symbols are found on many products, particularly in the field of electrical engineering.

Key Features

Automatic vs. Manual Reset

All indicators with electric switches reset automatically to their original position when the pressure across the filter drops below trip pressure. This is true, also, for the type B visual indicator. However, on the type BM visual indicator with manual reset, the signal arm extends once the trip pressure is exceeded and remains that way until physically reset. The advantage is that the indicator signals that the element is dirty even after the system is shut down, thus, simplifying maintenance.

Thermal Lockout

When mobile and other equipment is started in the cold, the hydraulic or lube fluid is likely to be highly viscous until it approaches normal operating temperature. The high pressure drop created by a highly viscous fluid can trip the indicator and falsely signify that the element is clogged. An optional thermal lockout device, available on many HYDAC electric indicators, prevents the indicator from tripping until the fluid reaches a certain specified temperature. The device consists of a switch in series in the indicator circuit, which is caused to make or break by a bi-metal strip that alters in shape according to temperature.

The thermal lockout feature may be chosen so that the indicator is deactivated at a fluid temperature less than 100˚ F ±5˚ *(called T100)*.

Because electric indicators automatically reset once the fluid heats up, thermal lockout is necessary only when a false signal of filter condition during cold start-up poses a problem.

Single Pole, Double Throw Switches (SPDT)

HYDAC's differential pressure and most static pressure electrical indicators contain single-pole, double-throw switches. This provides the choice of normally open or normally closed contacts when the pressure differential is below trip-point.

Whether the contacts are normally open *(N/O)* or normally closed *(N/C)* is determined by the way in which the indicator is wired on site. This applies to types C, D, J, J4, LE, and LZ.

Magnetic Coupling

Most of HYDAC's indicators employ magnetic coupling, which separates the fluid from the actuating device. The benefit is that there is no need for a dynamic seal, therefore, far less chance of fluid leakage under high system pressure.

Interchangeability

HYDAC indicators are designed for use only with HYDAC filters, and should not be applied to other makes of filters.

Certain differential pressure indicators can be used in non-filter applications when mounted on special blocks. Detailed information regarding blocks of various kinds is presented subsequently in this brochure.

Operation

In the drawings on the following page, examples of two types of differential pressure indicators and a static pressure indicator are provided.

Application Guidelines

Differential pressure indicators react to the pressure drop across the filter that is caused by the flow of fluid through the filter housing and element. These devices measure the difference in pressure upstream and downstream of the filter element, regardless of the system pressure. They are utilized in most pressure and inline return filters.

Static pressure indicators measure only the build-up of pressure upstream of the filter element *(downstream pressure is ambient - tank vented to atmosphere)*. Consequently, if any components are located downstream of the filter, the indicator will measure the pressure drop caused by the filter and that component, thus, causing a false reading of ΔP across the filter. As a result, static indicators are recommended only on filters that discharge directly to vented tanks and have minimal back pressure.

A filter that incorporates a differential pressure indicator should be used whenever there is a significant resistance to flow in the line after the filter, even when system pressure is relatively low. For example, the filter in the feed line of a lube system requires a differential pressure indicator, although the system pressure may be low.

Differential Pressure Indicator Operation

As the differential pressure across the filter increases, the piston / magnet assembly is driven down against a spring until the attractive force between the magnet and indicator pin *(Type 1)* or a switch actuator lever *(Type 2)* is reduced sufficiently to allow the indicator to trip. In a visual indicator *(Type 1)*, tripping results in the indicator pin rising and giving visual indication that the filter must be serviced. In an electric indicator *(Type 2)*, tripping causes a switch to make or break, permitting a remote indication to warn of the need for servicing. When the ΔP drops below the trip pressure for any reason, *(installation of a clean element, heating of the oil, etc.)*, the piston/ magnet assembly returns to its original position.

With a visual indicator, the pop-up indicator pin may then respond in one of two ways: (1) With Manual Reset *(type BM)* the pin remains extended, even after the system is shut down, and must be physically pushed down to reset (2) With Automatic Reset *(type B)* the indicator pin retracts to its original position along with the piston. With all electric indicators, the circuit is automatically restored to its original normally closed or normally open position once the ΔP drops below the trip setting.

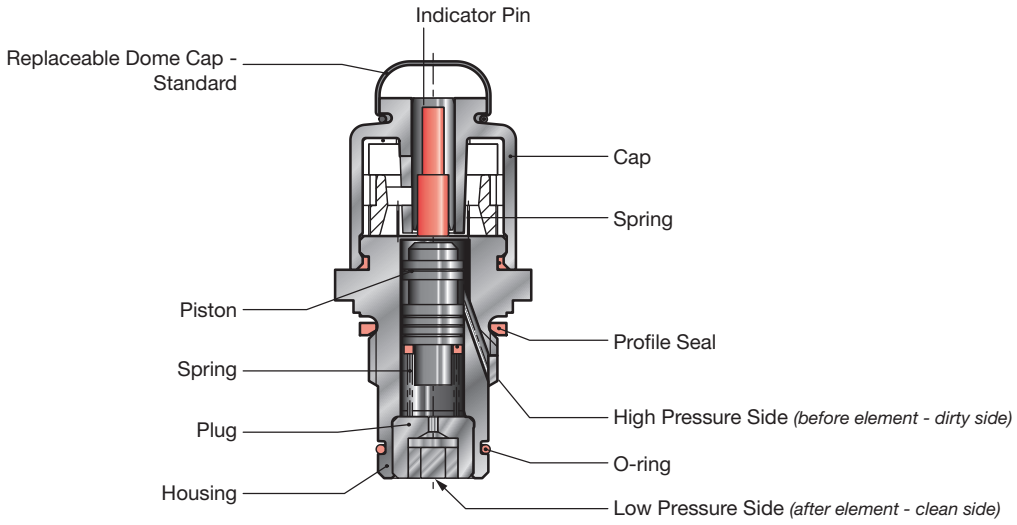
Static Pressure Indicator Operation

Increasing pressure upstream of the filter acts upon a diaphragm in the indicator *(Type 3)* and causes the indicator pin to overcome an opposing spring force until it trips at a pre-set pressure. The indicator pin automatically resets once pressure is reduced below the trip pressure. Electric static pressure indicators, which also operate mechanically, are available as well. These too, reset automatically.

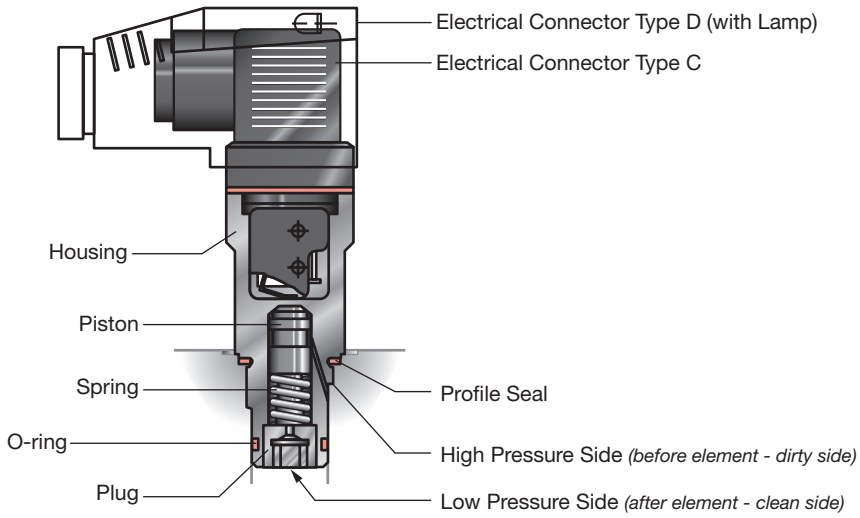
Note: Certain indicators have a red/ yellow/ green display in addition to, or instead of, the pop-up indicator pin.

General Indicator Type Drawings:

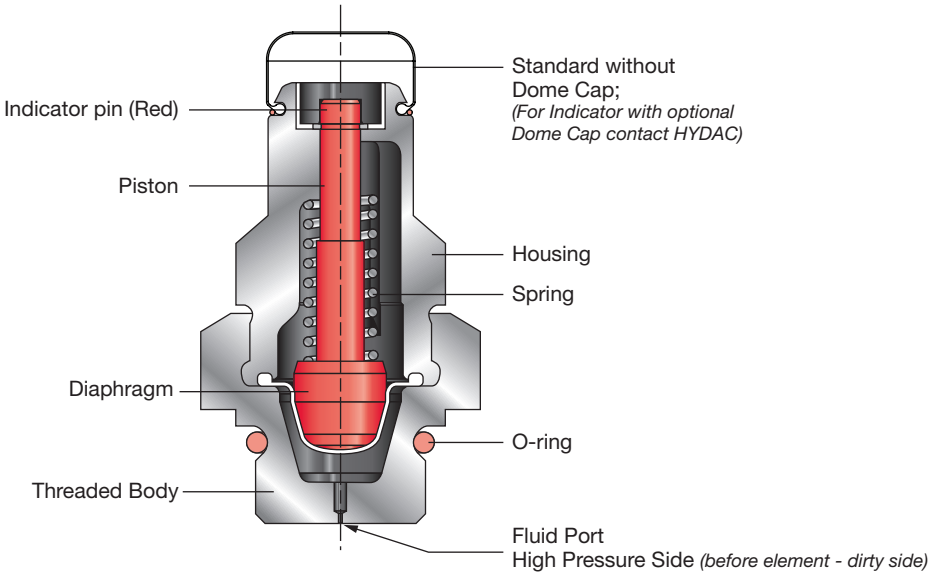
TYPE 1 Differential Pressure
Visual Indicator (B/BM)



TYPE 2 Differential Pressure
Electric Indicator (C or D)



TYPE 3 Static Pressure
Visual Indicator (B/BM)

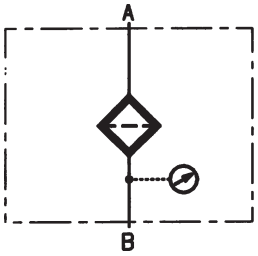


Notes

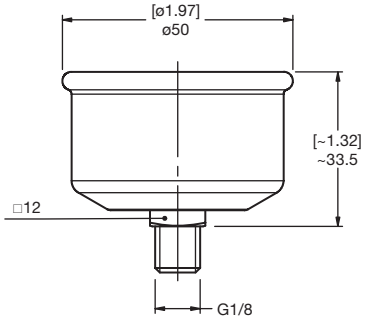
FILTER CLOGGING INDICATORS

Specifications of Vacuum Indicators

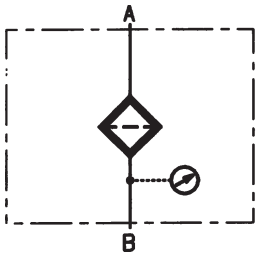
VMF x UE.x



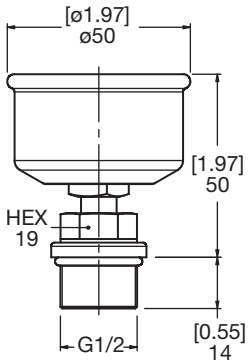
Type of indication	Visual-analog, scale indication
Weight	0.12 lbs (54 g)
Trip Pressure / Range	-14.5 psi to 0 psi (-1 bar to 0 bar)
Permitt. operating pressure	-10.2 psi to 0 psi (-0.7 to 0 bar) continuous
Permitt. temperature range	-4°F to 140°F (-20°C to 60°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VMF 1 UE.0**



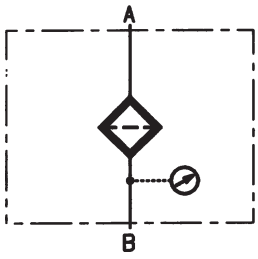
VR x UE.x



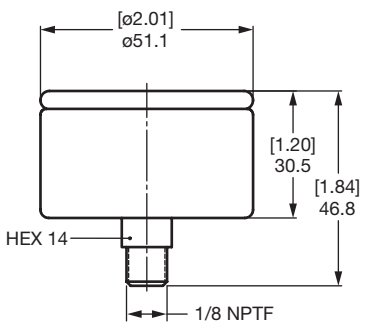
Type of indication	Visual-analog, scale indication
Weight	0.28 lbs (125 g)
Trip Pressure / Range	-14.5 psi to 0 psi (-1 bar to 0 bar)
Permitt. operating pressure	-10.2 psi to 0 psi (-0.7 to 0 bar) continuous
Permitt. temperature range	-4°F to 140°F (-20°C to 60°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VR 1 UE.0**



VMF 0.2 UE.x /3

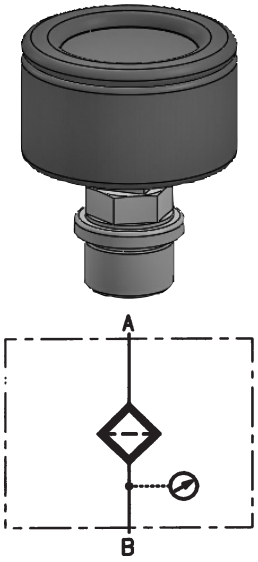


Type of indication	Visual-analog, scale indication
Weight	0.18 lbs (80 g)
Trip Pressure / Range	use w/3 psi (0.2 bar) bypass valve
Permitt. operating pressure	-30 inHg to 0 inHg
Permitt. temperature range	-40°F to 200°F (-40°C to 93°C)
Thread	1/8" NPTF
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VMF0.2UE.0/3**

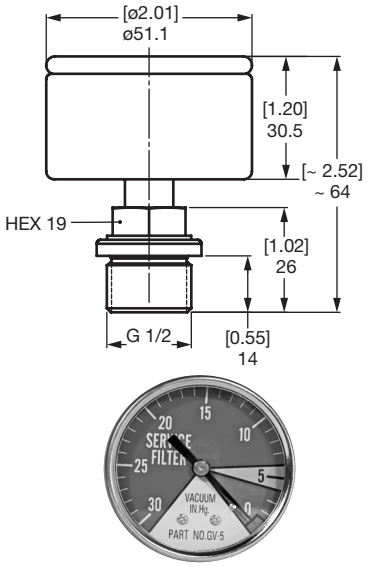


Specifications of Vacuum Indicators

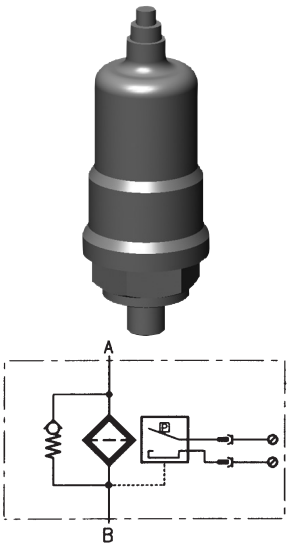
VR 0.2 UE.x



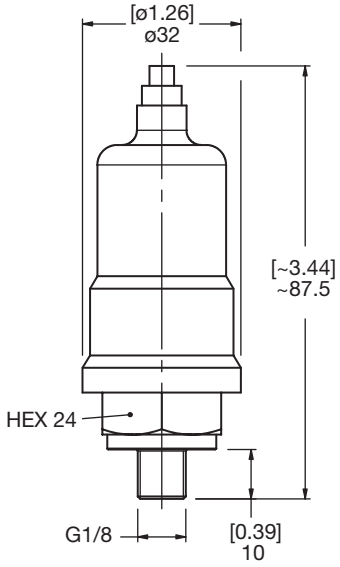
Type of indication	Visual-analog, scale indication
Weight	0.28 lbs (125 g)
Trip Pressure / Range	use w/3 psi (0.2 bar) bypass valve
Permitt. operating pressure	-30 inHg to 0 inHg
Permitt. temperature range	-22°F to 200°F (-30°C to 93°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VR 0.2 UE.0**



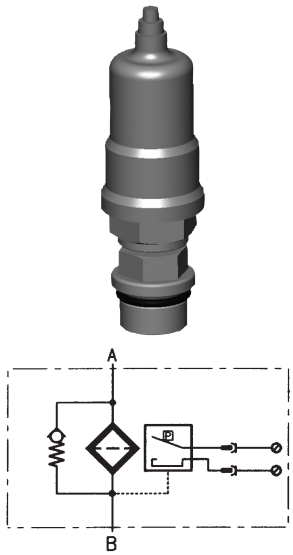
VMF x UF.x



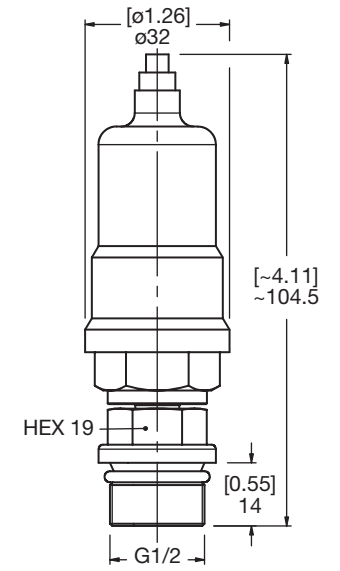
Type of indication	Electrical switch
Weight	0.37 lbs (170 g)
Trip Pressure / Range	-2.9 psi ±1.5 psi (-0.2 bar ±0.1 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22˚F to 212˚F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/O contact
Max. switching voltage	48 V
Electrical connection	threaded connection
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	ohmic 2.5 A at 24 V = ohmic 2.5 A at 42 V ~
Protection class to DIN 40050	IP 65, terminals IP 00
Order example	**VMF 0.2 UF.0**



VR x UF.x



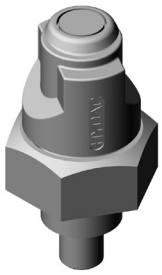
Type of indication	Electrical switch
Weight	0.37 lbs (170 g)
Trip Pressure / Range	-2.9 psi ±1.5 psi (-0.2 bar ±0.1 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22˚F to 212˚F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O contact
Max. switching voltage	48 V
Electrical connection	threaded connection
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	ohmic 2.5 A at 24 V = ohmic 2.5 A at 42 V ~
Protection class to DIN 40050	IP 65, terminals IP 00
Order example	**VR 0.2 UF.0**

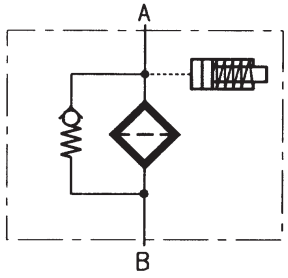


FILTER CLOGGING INDICATORS

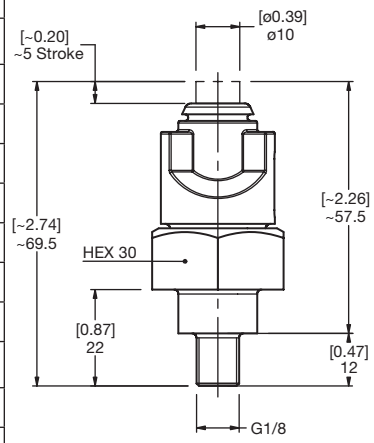
Specifications of Static Indicators

VMF x B.x

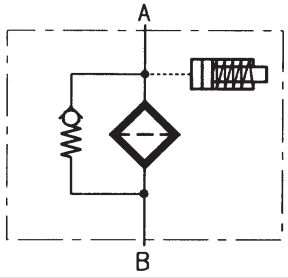




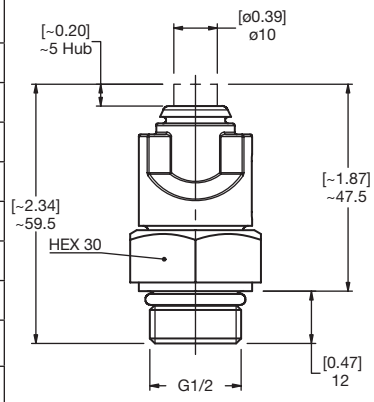
Type of indication	Visual, red pin
Weight	0.19 lbs (84 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VMF 2 B.1**



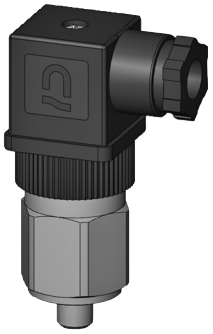
VR x B.x

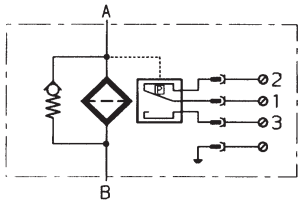


Type of indication	visual, red pin
Weight	0.10 lbs (44 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VR 2 B.1**

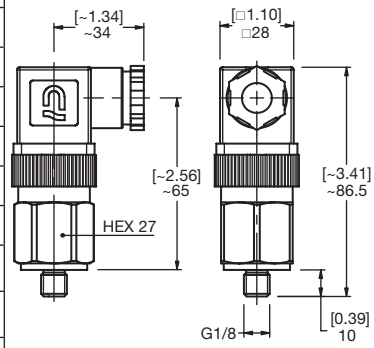


VMF x C.x





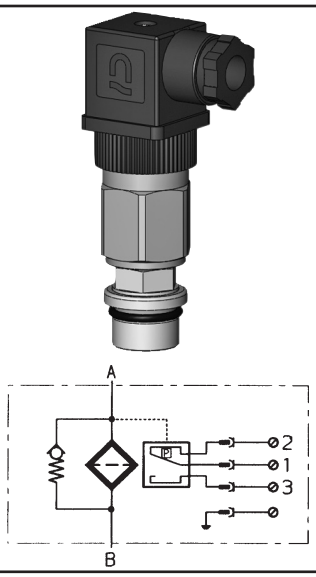
Type of indication	Electrical switch
Weight	0.60 lbs (270 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 24 V = Ohmic 0.03 to 6 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 C.1**



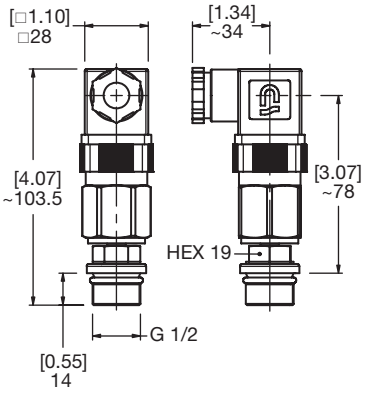
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

Specifications of Static Indicators

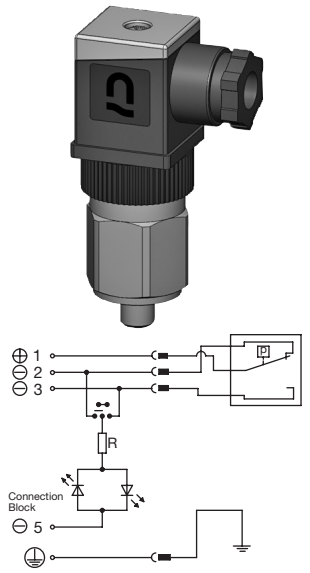
VR x C.x



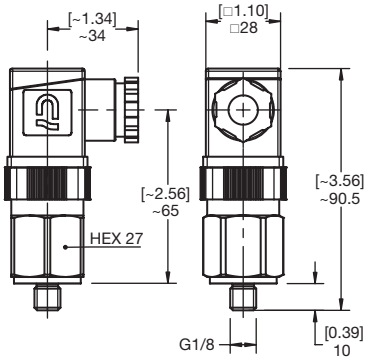
Type of indication	Electrical switch
Weight	0.75 lbs (340 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 24 V Ohmic 0.03 to 6 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 C.1**



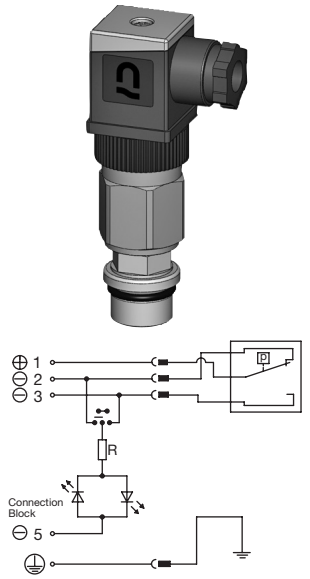
VMF x D.x /-L...



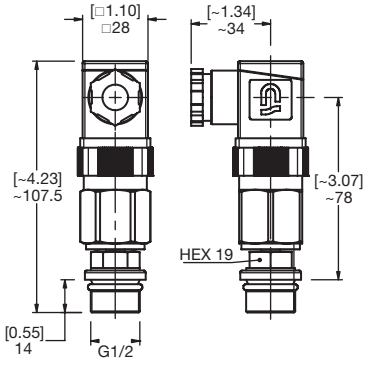
Type of indication	Visual indicator & electrical switch
Weight	0.66 lbs (300 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	24, 48, 115, 230 V *(depending on the type of light insert)*
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 230 V = Ohmic 0.03 to 6 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 D.1 /-L24**



VR x D.x /-L...



Type of indication	Visual indicator & electrical switch
Weight	0.79 lbs (360 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	24, 48, 115, 230 V *(depending on the type of light insert)*
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 24 V = Ohmic 0.03 to 6 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 D.1 /-L110**

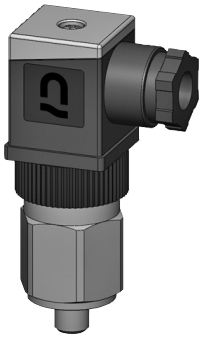


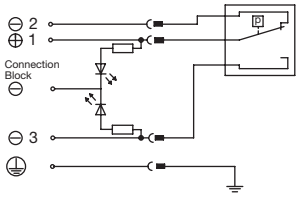
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

FILTER CLOGGING INDICATORS

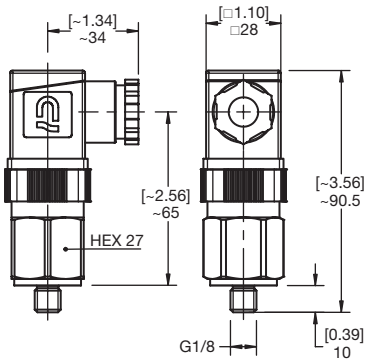
Specifications of Static Indicators

VMF x D.x /-LED

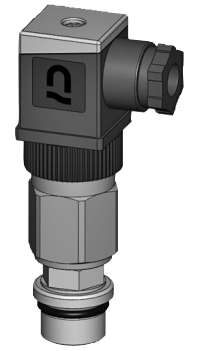


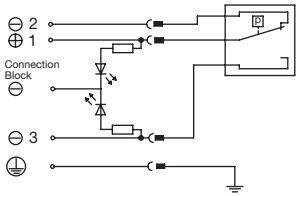


Type of indication	Visual indicator & electrical switch
Weight	0.66 lbs (300 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/O contact
Max. switching voltage	24 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 D.1 /-LED**

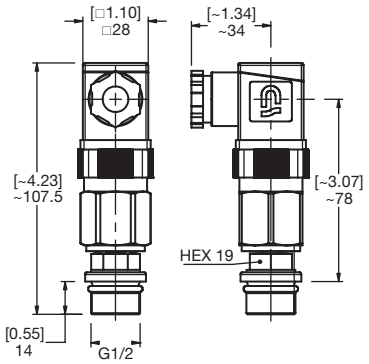


VR x D.x /-LED

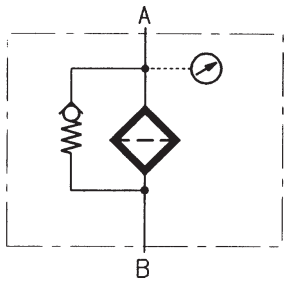




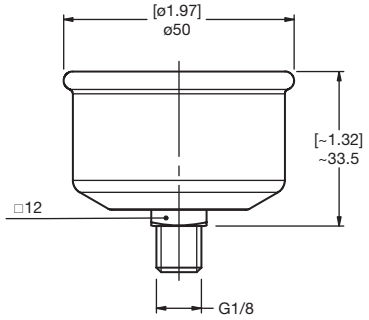
Type of indication	Visual indicator & electrical switch
Weight	0.79 lbs (360 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O contact
Max. switching voltage	24 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 D.1 /-LED**



VMF x E.x



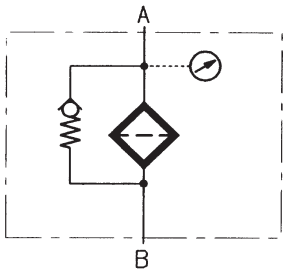
Type of indication	Visual-analog, scale indication
Weight	0.12 lbs (54 g)
Trip Pressure / Range*	0 psi to 145 psi (0 bar to 10 bar)
Permitt. operating pressure	102 psi (7 bar) continuous
Permitt. temperature range	-4°F to 140°F (-20°C to 60°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VMF 2 E.0**



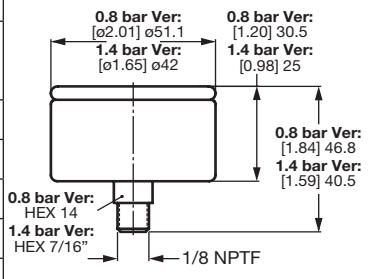
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

Specifications of Static Indicators

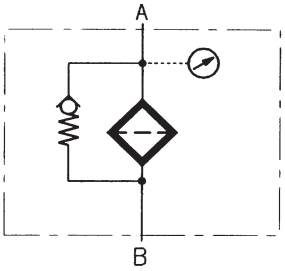
VMF x E.x /-3



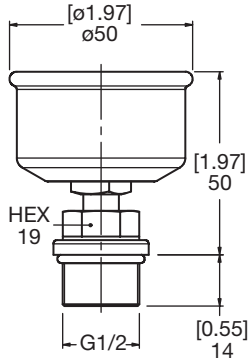
Type of indication	Visual-analog, scale indication
Weight	0.22 lbs (98 g)
Trip Pressure / Range	**Green Range:** 0-12 / 0-20 psi **Yellow Range:** 12-15 / 20-25 psi **Red Range:** 15-60 / 25-60 psi
Permitt. operating pressure	60 psi (4 bar)
Permitt. temperature range	-40°F to 200°F (-40°C to 93°C)
Thread	1/8" NPTF
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VMF 0.8 E.1 /-3; VMF 1.4 E.1 /-3**



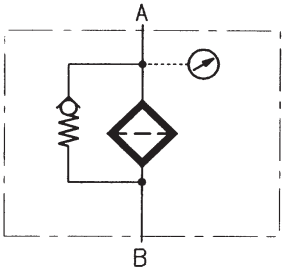
VR x E.x



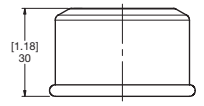
Type of indication	Visual-analog, scale indication
Weight	0.28 lbs (125 g)
Trip Pressure / Range	0 psi to 145 psi (0 bar to 10 bar)
Permitt. operating pressure	102 psi (7 bar) continuous
Permitt. temperature range	-4°F to 140°F (-20°C to 60°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VR 2 E.0**

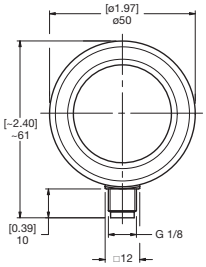


VMF x ES.x



Type of indication	Visual-analog, scale indication
Weight	0.12 lbs (54 g)
Trip Pressure / Range	0 psi to 145 psi (0 bar to 10 bar)
Permitt. operating pressure	102 psi (7 bar) continuous
Permitt. temperature range	-4°F to 140°F (-20°C to 60°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VMF 2 ES.0**

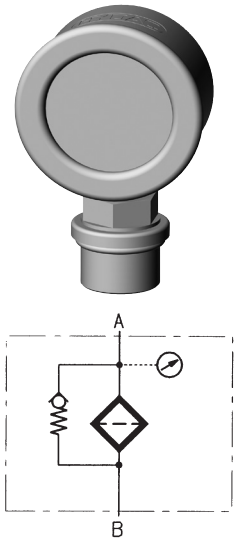




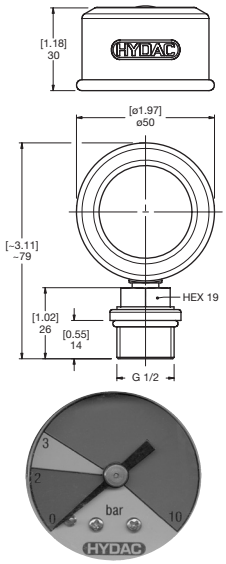
FILTER CLOGGING INDICATORS

Specifications of Static Indicators

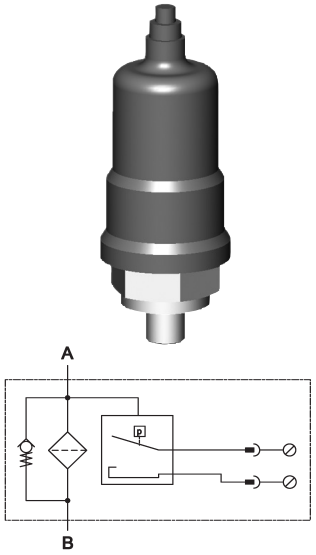
VR x ES.x



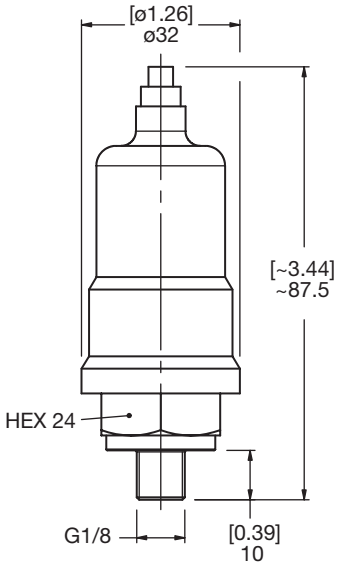
Type of indication	Visual-analog, scale indication
Weight	0.28 lbs (125 g)
Trip Pressure / Range	0 psi to 145 psi (0 bar to 10 bar)
Permitt. operating pressure	102 psi (7 bar) continuous
Permitt. temperature range	-4°F to 140°F (-20°C to 60°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	–
Max. switching voltage	–
Electrical connection	–
Max. switching voltage at resistive load	–
Switching capacity	–
Protection class to DIN 40050	–
Order example	**VR 2 ES.0**



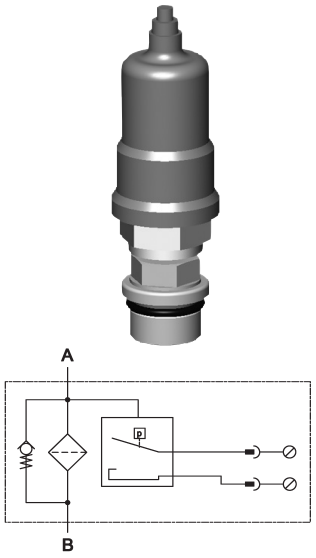
VMF x F.x



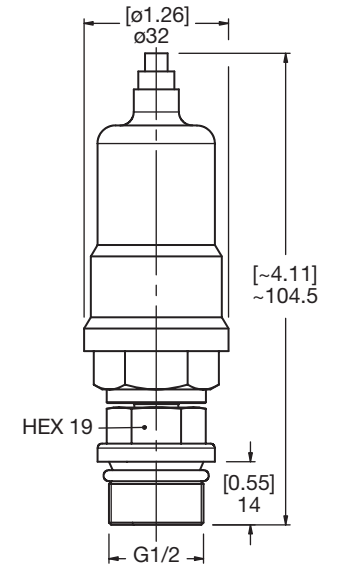
Type of indication	Electrical switch
Weight	0.15 lbs (70 g)
Trip Pressure / Range	29 psi ±4.4 psi (2 bar ±0.3 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/O contact *(N/C as an option)*
Max. switching voltage	42 V
Electrical connection	threaded connection
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	Ohmic 2.5 A at 24 V = Ohmic 2.5 A at 42 V ~
Protection class to DIN 40050	IP 65, terminals IP 00
Order example	**VMF 2 F.0**



VR x F.x

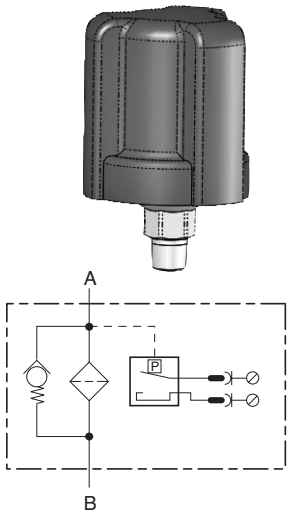


Type of indication	Electrical switch
Weight	0.29 lbs (130 g)
Trip Pressure / Range	29 psi ±4.4 psi (2 bar ±0.3 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O contact *(N/C as an option)*
Max. switching voltage	42 V
Electrical connection	threaded connection
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	Ohmic 2.5 A at 24 V = Ohmic 2.5 A at 42 V ~
Protection class to DIN 40050	IP 65, terminals IP 00
Order example	**VR 2 F.0**

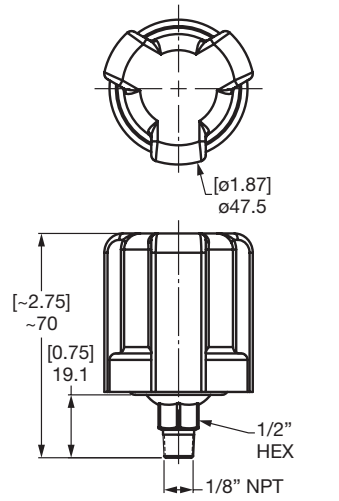


Specifications of Static Indicators

VMF x G.x /-3

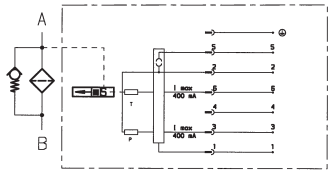


Type of indication	Electrical switch
Weight	0.18 lbs (82 g)
Trip Pressure / Range*	20 psi ±3 psi (1.4 bar ±0.2 Bar)
Permitt. operating pressure	250 psi (17 bar)
Permitt. temperature range	-40˚F to 250˚F (-40˚C to 121˚C)
Thread	1/8” NPT
Max. torque	Refer to end of section H
Switching type	N/O - SPDT
Max. switching voltage	240 VDC and 240 VAC
Electrical connection	2x #8-32 screw terminals
Max. switching voltage at resistive load	24 VDC
Switching capacity	Ohmic 4 A at 24 V = Ohmic 1 A at 120 V ~
Protection class to DIN 40050	Terminals IP 00
Order example	**VMF 1.4 G.0 /3**

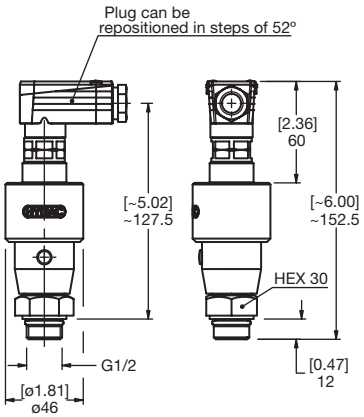


VR x GC.x

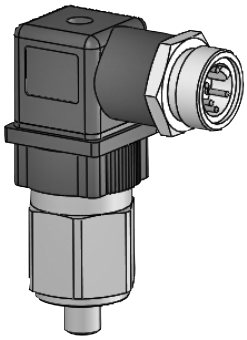
Discontinued (consult HYDAC for suitable replacements)

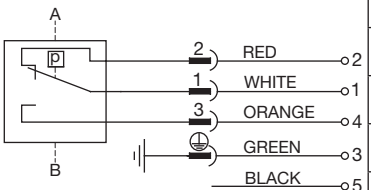


Type of indication	Electronic / Analog (4-20 mA or 1-10 V) 1 electrical switching contact at 75% and at 100% of pressure setting Analog signal up to 20% of pressure setting constant 4mA or 1 V
Weight	0.75 lbs (340 g)
Trip Pressure / Range*	29 psi -10% (2 bar -10%)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22˚F to 176˚F (-30˚C to 80˚C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O, electronic, PNP positive switching *(factory setting)*
Max. switching voltage	Operating voltage 20-30 V DC
Electrical connection	7 pole plug to DIN 43651, PG 11
Max. switching voltage at resistive load	12 W
Switching capacity	Ohmic 0.4 A at 30 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 GC.0 /-LED-SQ-123**

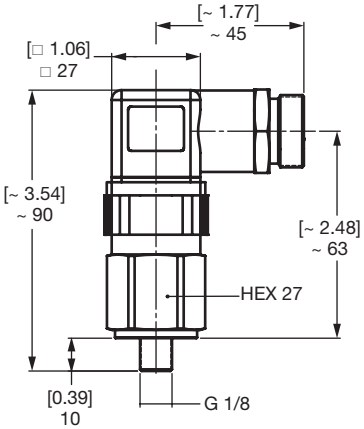


VMF x J.x





Type of indication	Electrical switch
Weight	0.66 lbs (300 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-13˚F to 185˚F (-25˚C to 85˚C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	7/8” Mini connector (5 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 24 V = Ohmic 0.03 to 6 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 J.1**

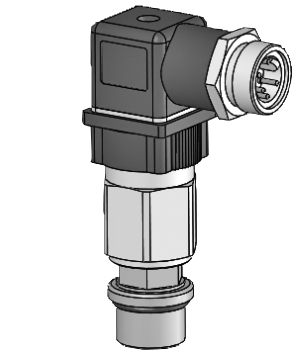


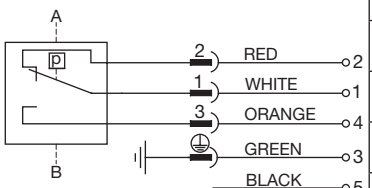
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

FILTER CLOGGING INDICATORS

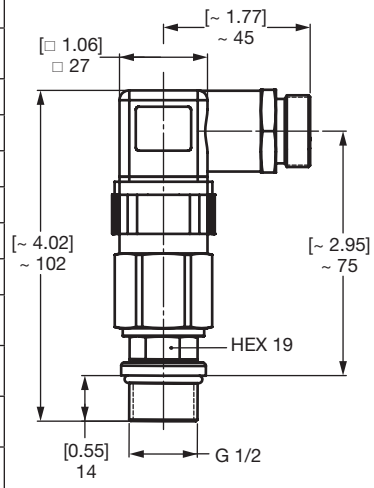
Specifications of Static Indicators

VR x J.x

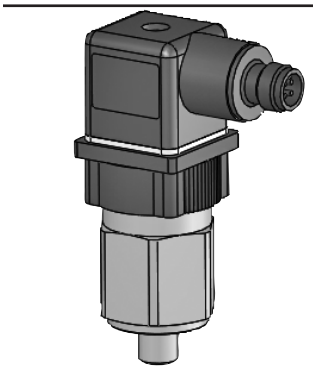


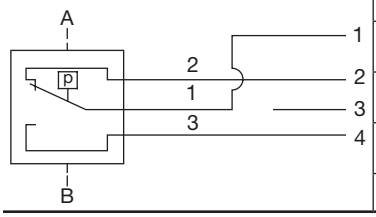


Type of indication	Electrical switch
Weight	0.82 lbs (370 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-13˚F to 185˚F (-25°C to 85°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	7/8" Mini connector (5 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 6 A at 24 V Ohmic 0.03 to 6 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 J.1**

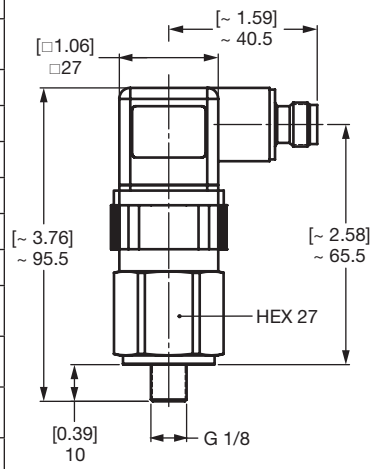


VMF x J4.x

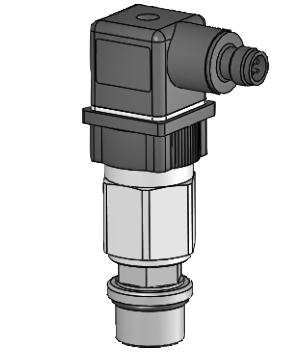


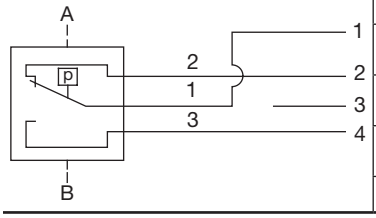


Type of indication	Electrical switch
Weight	0.60 lbs (270 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-13˚F to 185˚F (-25˚C to 85˚C)
Thread	G1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230V
Electrical connection	12mm (Micro) connector (4 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	250W= 300VA~
Switching capacity	Ohmic 6A at 24V= Ohmic 0.03 to 6A at max. 230V~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 J4.1**

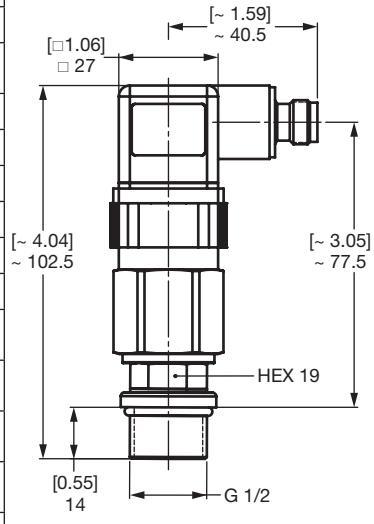


VR x J4.x





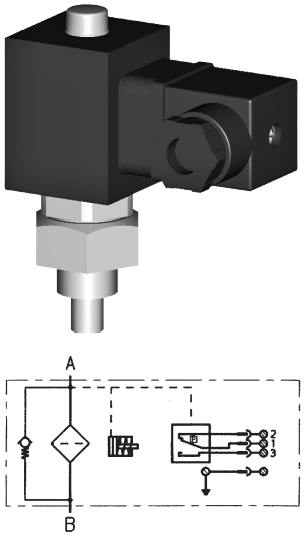
Type of indication	Electrical switch
Weight	0.75 lbs (340 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar) 73 psi -7.3 psi (5 bar -0.5 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-13˚F to 185˚F (-25˚C to 85˚C)
Thread	G1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230V
Electrical connection	12mm (Micro) connector (4 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	250W= 300VA~
Switching capacity	Ohmic 6A at 24V= Ohmic 0.03 to 6A at max. 230V~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 J4.1**



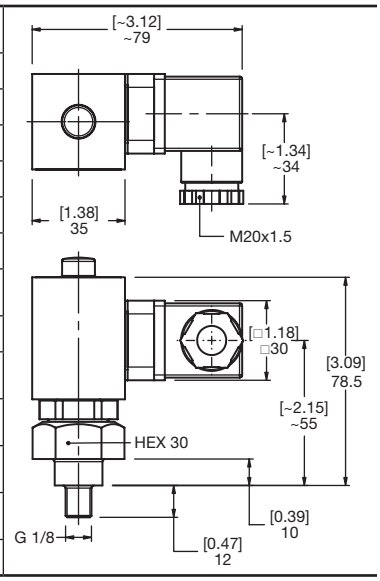
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

Specifications of Static Indicators

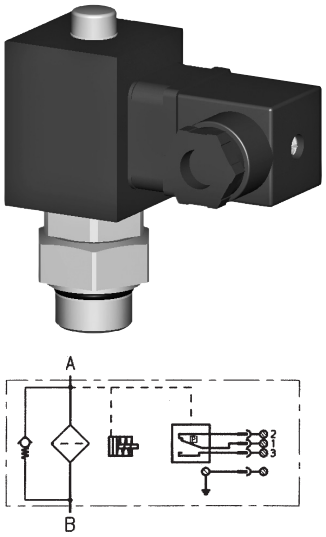
VMF x LE.x



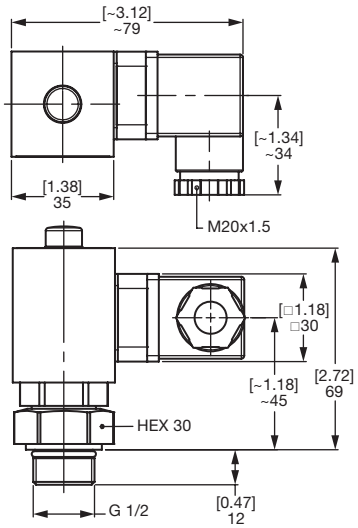
Type of indication	Visual (red pin) & electrical switch (100% activation)
Weight	0.26 lbs (120 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	115 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 LE.1**



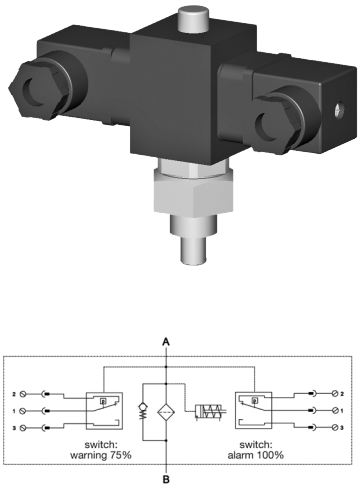
VR x LE.x



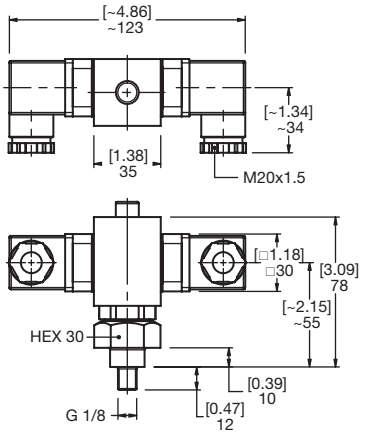
Type of indication	Visual (red pin) & electrical switch (100% activation)
Weight	0.32 lbs (143 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	115 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 LE.1**



VMF x LZ.x



Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.51 lbs (230 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	115 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 LZ.1**

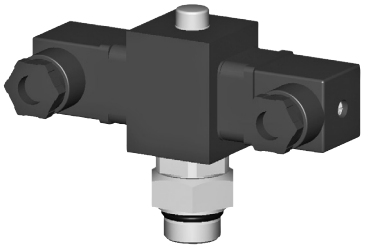


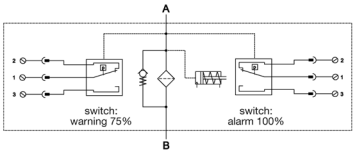
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

FILTER CLOGGING INDICATORS

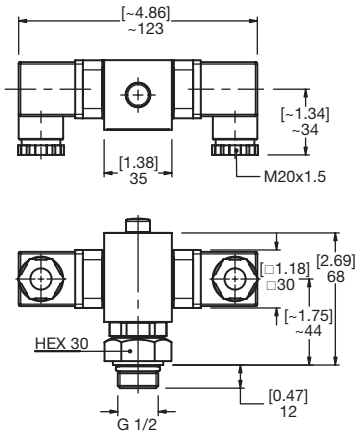
Specifications of Static Indicators

VR x LZ.x

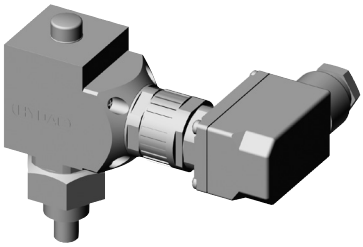


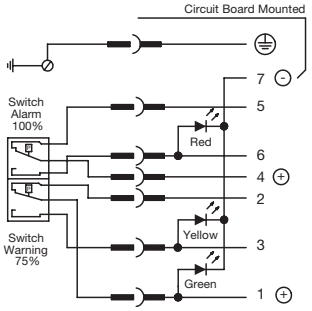


Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.42 lbs (190 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	115 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 LZ.1**

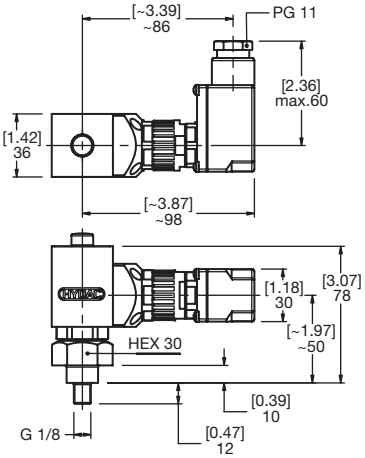


VMF x LZ.x /-DB

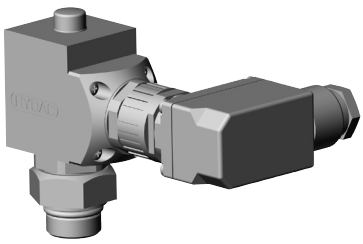


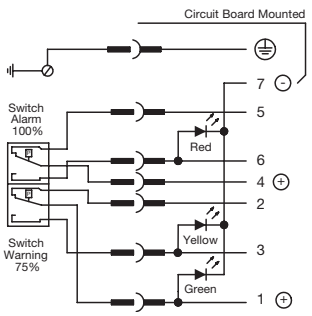


Type of indication	Visual (red pin) & electrical switch (75% & 100% activation). 3 LEDs (grn=power, yel=75%, red=100%)
Weight	0.37 lbs (170 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection PG 11 Female connector to DIN 43651
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 LZ.1 /-DB**

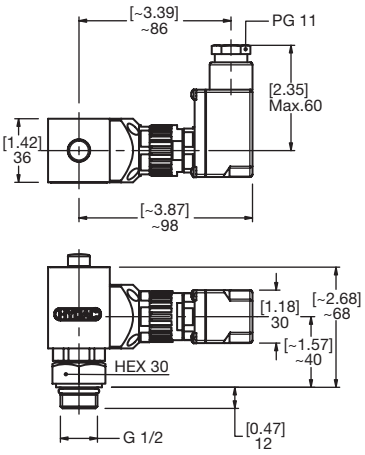


VR x LZ.x /-DB





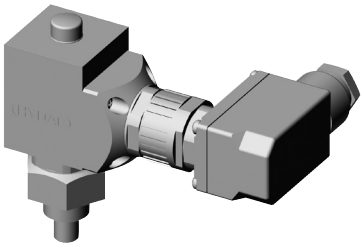
Type of indication	Visual (red pin) & electrical switch (75% & 100% activation). 3 LEDs (grn=power, yel=75%, red=100%)
Weight	0.42 lbs (190 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection PG 11 Female connector to DIN 43651
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 LZ.1 /-DB**

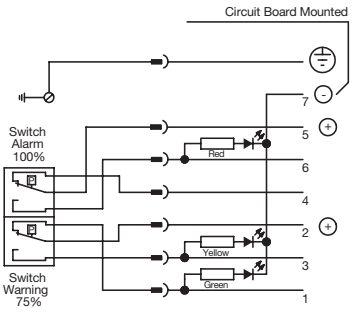


*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

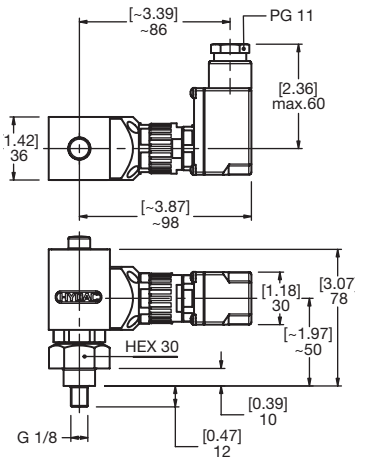
Specifications of Static Indicators

VMF x LZ.x /-CN

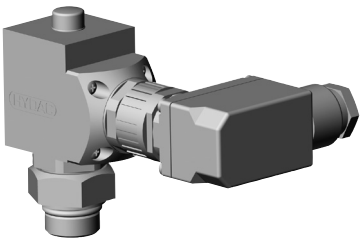


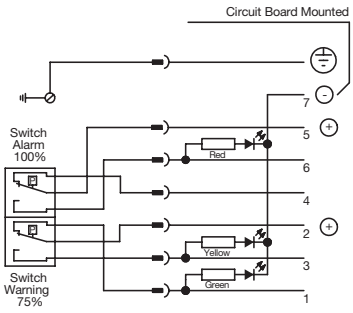


Type of indication	Visual (red pin) & electrical switch (75% & 100% activation). 3 LEDs (grn=pwr, yel=75%, red=100%)
Weight	0.37 lbs (170 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection PG 11 Female connector to DIN 43651
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 LZ.1 /-CN**

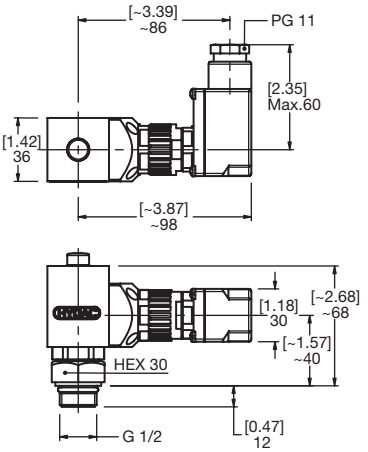


VR x LZ.x /-CN

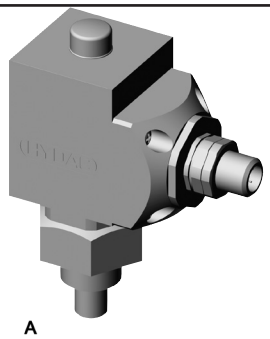


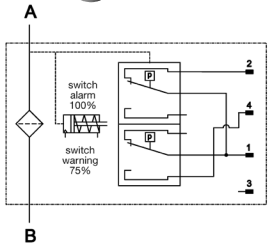


Type of indication	Visual (red pin) & electrical switch (75% & 100% activation). 3 LEDs (grn=pwr, yel=75%, red=100%)
Weight	0.42 lbs (190 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection PG 11 Female connector to DIN 43651
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 LZ.1 /-CN**

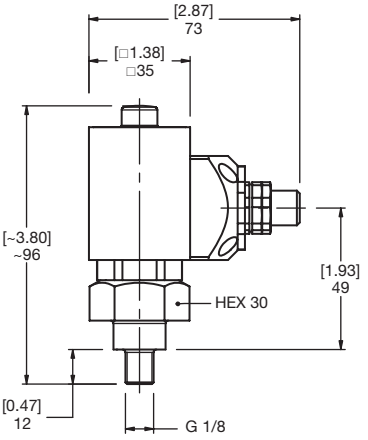


VMF x LZ.x /-BO





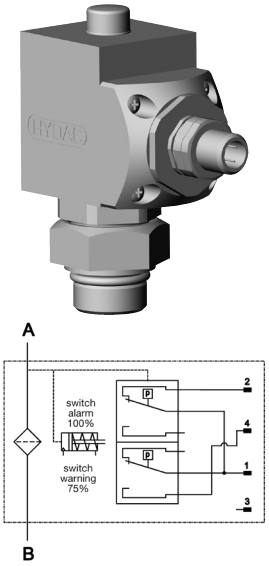
Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.26 lbs (120 g)
Trip Pressure / Range*	29 psi (or 36 psi) -10% 2 bar (or 2.5 bar) -10%
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/O (75%) N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VMF 2 LZ.1 /-BO**



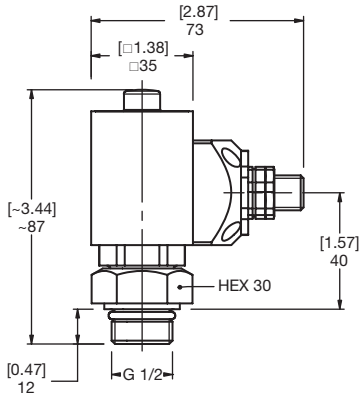
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

Specifications of Static Indicators

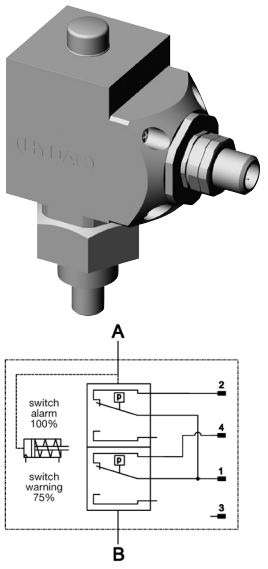
VR x LZ.x /-BO



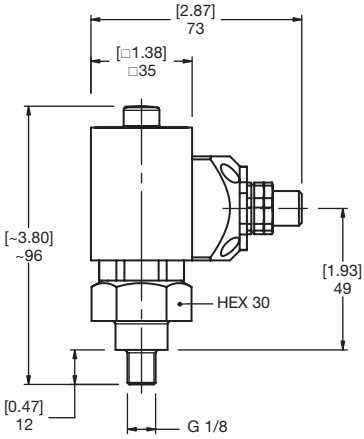
Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.32 lbs (145 g)
Trip Pressure / Range	29 psi (or 36 psi) -10% 2 bar (or 2.5 bar) -10%
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O (75%) N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VR 2 LZ.1 /-BO**



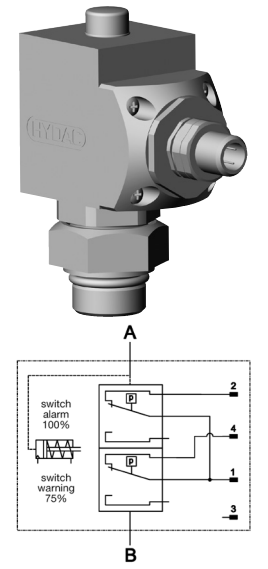
VMF x LZ.x /-AV



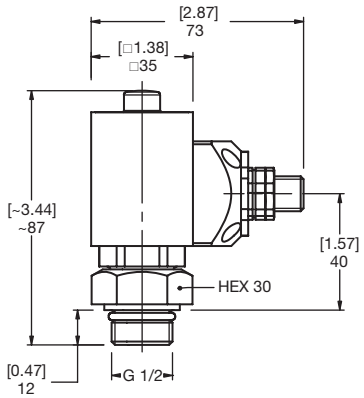
Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.26 lbs (120 g)
Trip Pressure / Range	29 psi (or 36 psi) -10% 2 bar (or 2.5 bar) -10%
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C (75% and 100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VMF 2 LZ.1 /-AV**



VR x LZ.x /-AV

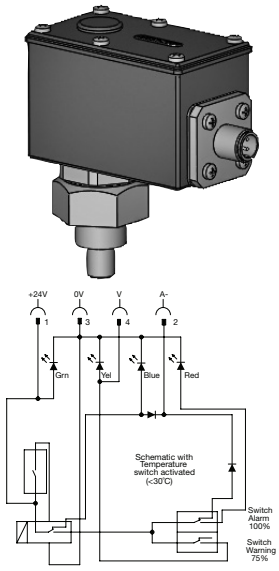


Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.32 lbs (145 g)
Trip Pressure / Range	29 psi (or 36 psi) -10% 2 bar (or 2.5 bar) -10%
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C (75% and 100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VR 2 LZ.1 /-AV**

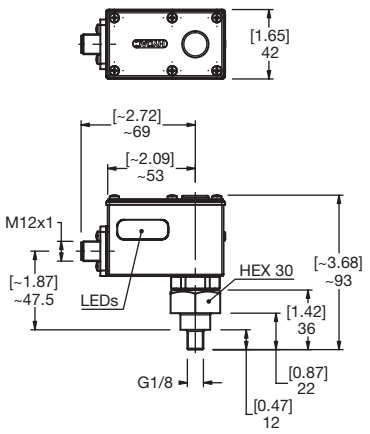


Specifications of Static Indicators

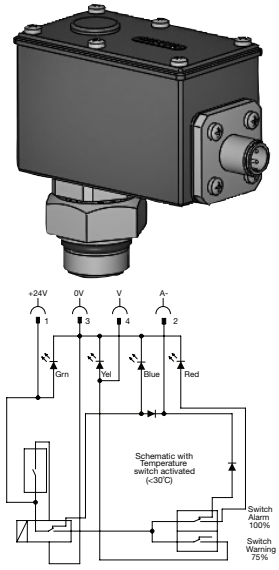
VMF x LZ.x /-D4C



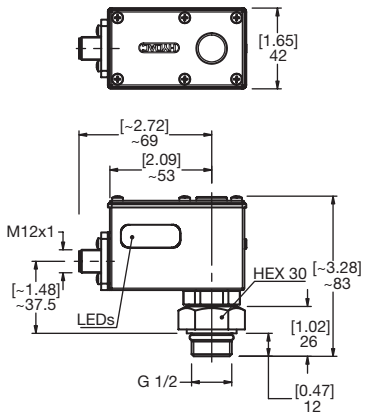
Type of indication	Electrical switch (75% & 100% activation) w/30°C thermal lockout. 4 LEDs (grn=pwr, blue= below 86°F, yel=75%, red=100%)
Weight	0.54 lbs (245 g)
Trip Pressure / Range	36 psi -10% (2.5 bar -10%)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/O (75%), N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VMF 2 LZ.1 /-D4C**



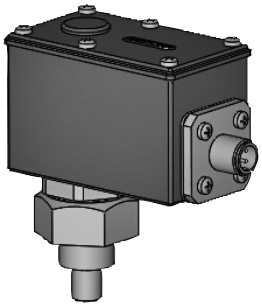
VR x LZ.x /-D4C

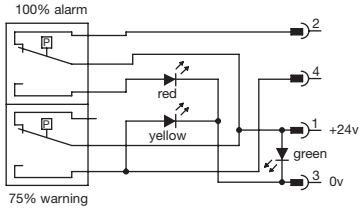


Type of indication	Electrical switch (75% & 100% activation) w/30°C thermal lockout. 4 LEDs (grn=pwr, blue= below 86°F, yel=75%, red=100%)
Weight	0.45 lbs (205 g)
Trip Pressure / Range	36 psi -10% (2.5 bar -10%)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O (75%), N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VR 2 LZ.1 /-D4C**

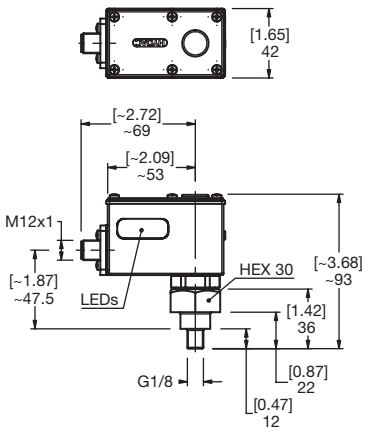


VMF x LZ.x /-BO-LED





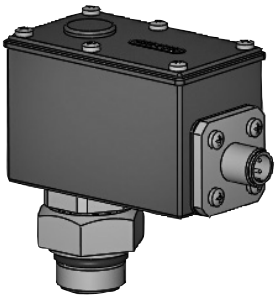
Type of indication	Electrical switch (75% & 100% activation). 3 LEDs (grn=pwr, yel=75%, red=100%)
Weight	0.54 lbs (245 g)
Trip Pressure / Range	36 psi -10% (2.5 bar -10%)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/O (75%), N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VMF 2 LZ.1 /-BO-LED**

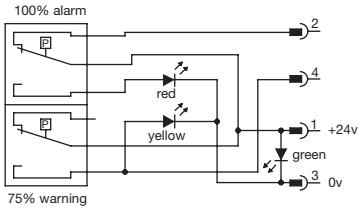


FILTER CLOGGING INDICATORS

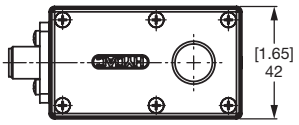
Specifications of Static Indicators

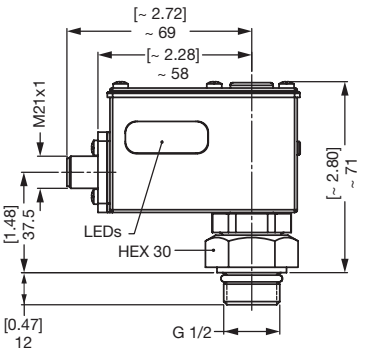
VR x LZ.x /-BO-LED





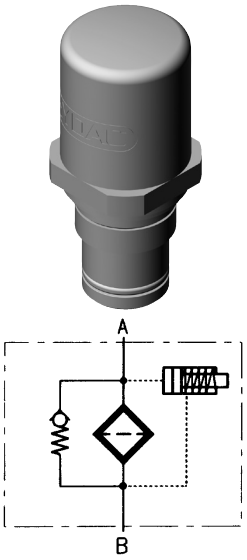
Type of indication	Electrical switch (75% & 100% activation). 3 LEDs (grn=pwr, yel=75%, red=100%)
Weight	0.45 lbs (205 g)
Trip Pressure / Range	36 psi -10% (2.5 bar -10%)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O (75%), N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x 1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VR 2 LZ.1 /-BO-LED**



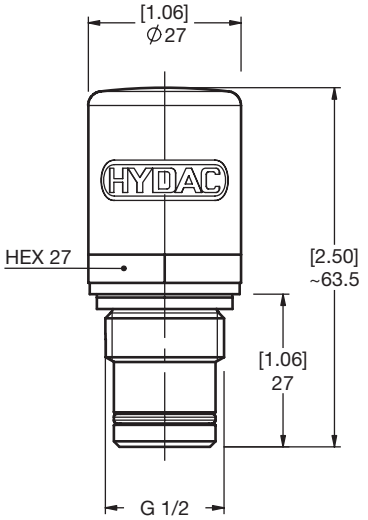


Specifications of Differential Pressure Indicators

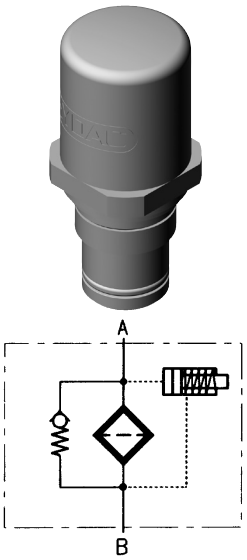
VM x B.x



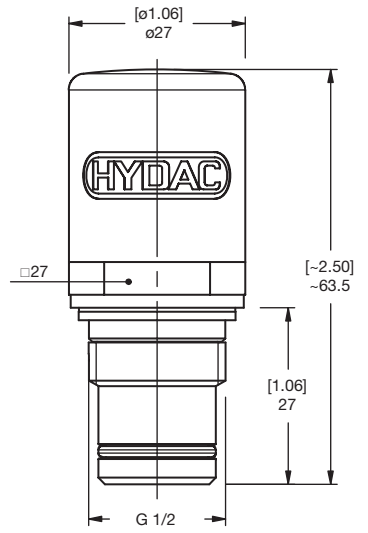
Type of indication	Visual, red/green band automatic reset
Weight	0.12 lbs (55 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VM 5 B.1**



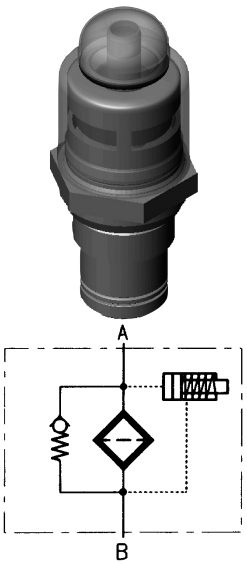
VD x B.x



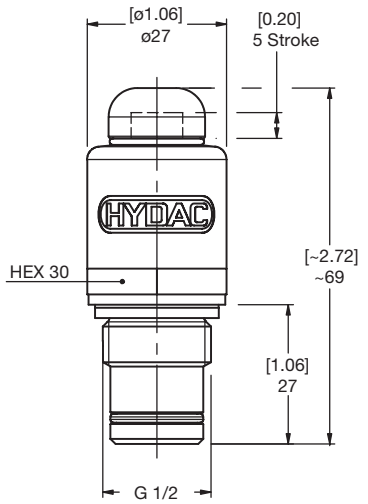
Type of indication	Visual, red/green band automatic reset
Weight	0.24 lbs (110 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi 420 bar
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VD 5 B.1**



VM x BM.x



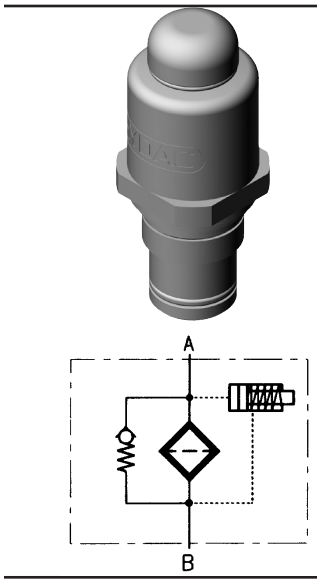
Type of indication	Visual, red/green band manual reset
Weight	0.12 lbs (55 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VM 5 BM.1**



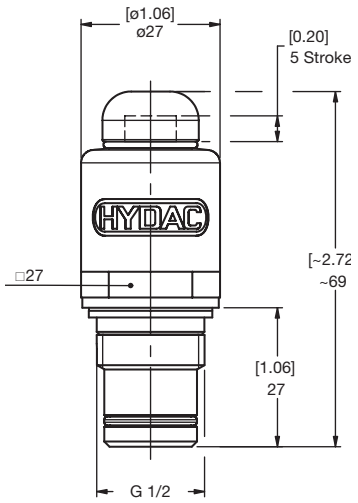
FILTER CLOGGING INDICATORS

Specifications of Differential Pressure Indicators

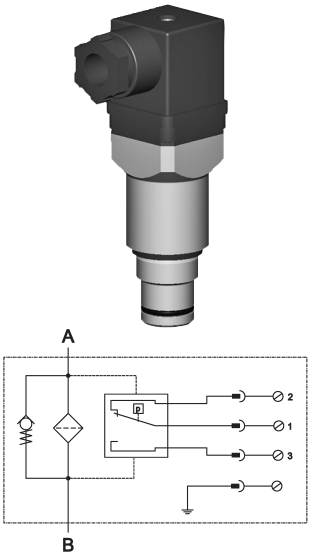
VD x BM.x



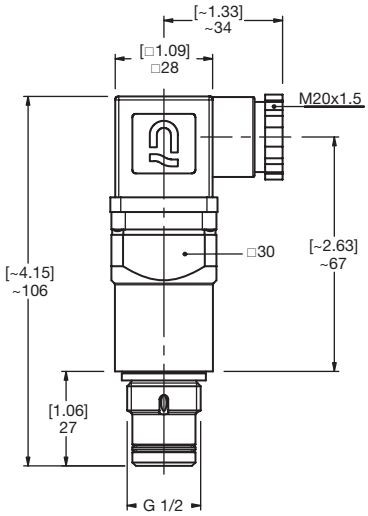
Type of indication	Visual, red/green band manual reset
Weight	0.24 lbs (110 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VD 5 BM.1**



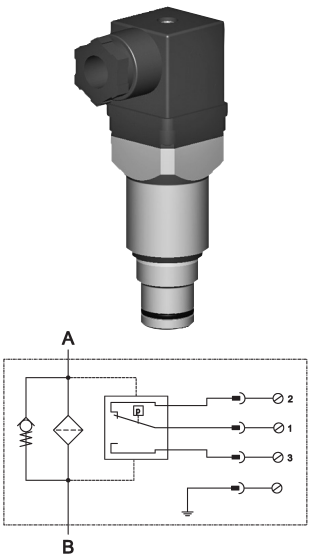
VM x C.x



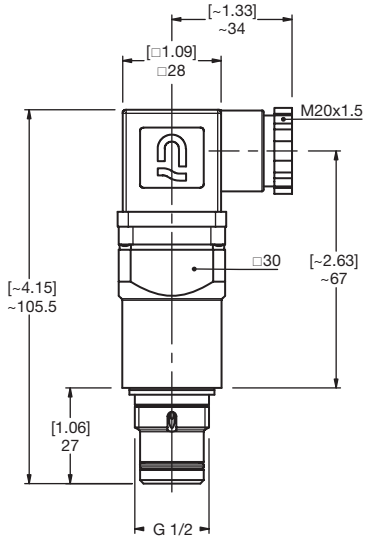
Type of indication	Electrical switch
Weight	0.26 lbs (120 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity*	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 C.0**



VD x C.x



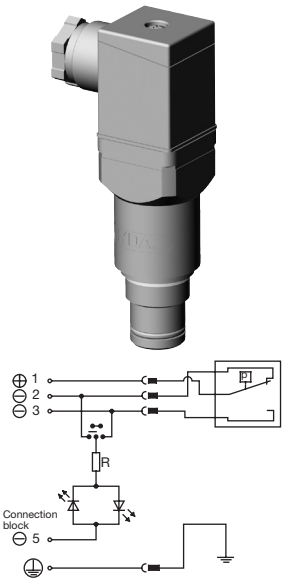
Type of indication	Electrical switch
Weight	0.49 lbs (220 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity*	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 C.0**



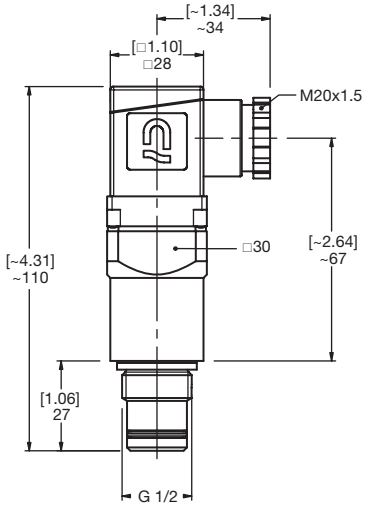
*Required amperage > 20 mA; for lower amperages, order "-SO135" indicators (see Supplementary Details in the Model Code).

Specifications of Differential Pressure Indicators

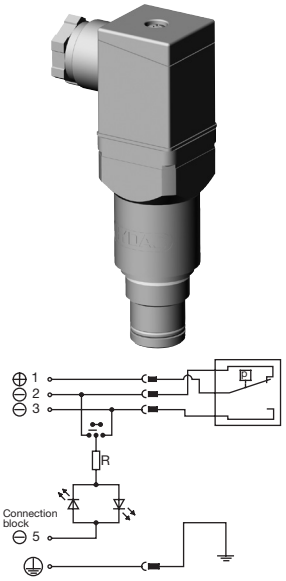
VM x D.x/-L...



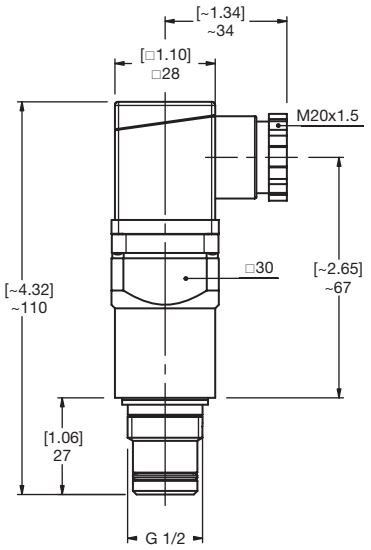
Type of indication	Visual indicator & electrical switch
Weight	0.33 lbs (150 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	24, 48, 115, 230 V *(depending on the type of light insert)*
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity*	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 D.0 /-L24**



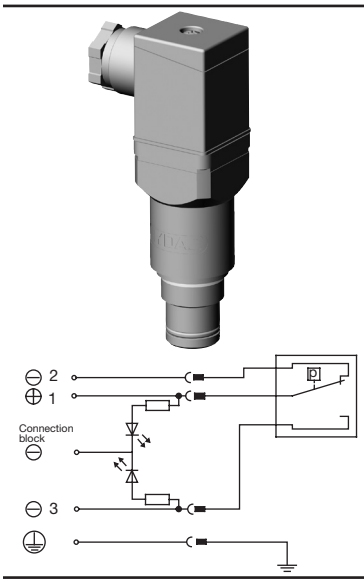
VD x D.x/-L...



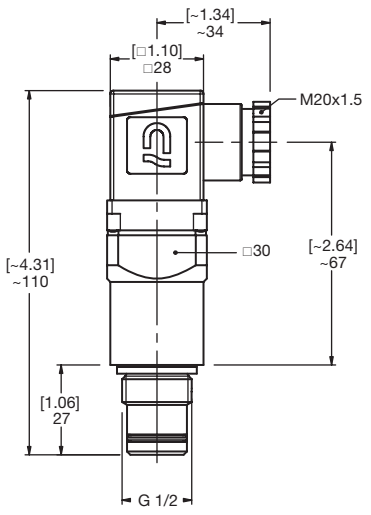
Type of indication	Visual indicator & electrical switch
Weight	0.55 lbs (250 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	24, 48, 115, 230 V *(depending on the type of light insert)*
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity*	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 D.0 /-L24**



VM x D.x/-LED



Type of indication	Visual indicator & electrical switch
Weight	0.33 lbs (150 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity*	Ohmic 3 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 D.0 /-LED**

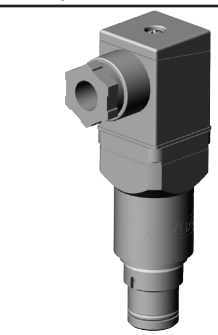


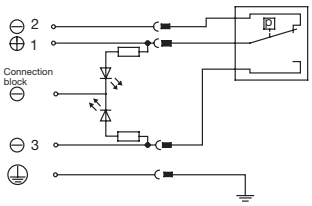
*Required amperage > 20 mA; for lower amperages, order "-SO135" indicators (see Supplementary Details in the Model Code).

FILTER CLOGGING INDICATORS

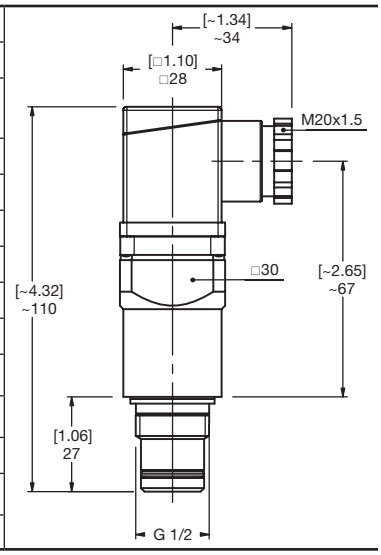
Specifications of Differential Pressure Indicators

VD x D.x/-LED

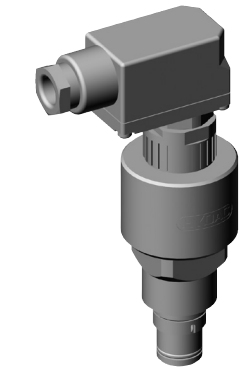


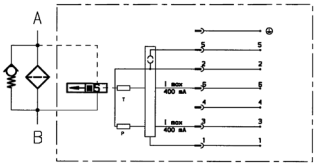


Type of indication	Visual indicator & electrical switch
Weight	0.55 lbs (250 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity*	Ohmic 3 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 D.0 /-LED**

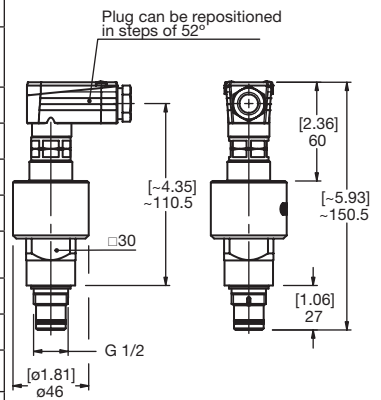


VD x GC.x **Discontinued (consult HYDAC for suitable replacements)**

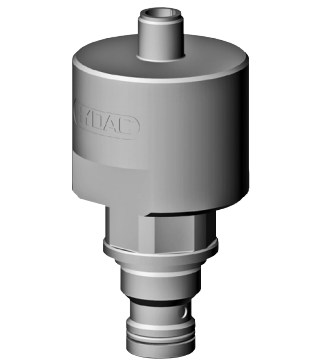


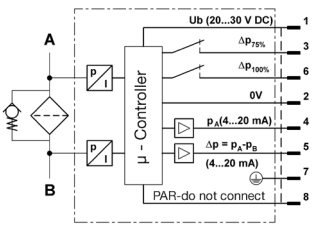


Type of indication	Electronic / Analog (4-20 mA or 1-10 V) 1 switch contact at 75% and at 100% trip pressure
Weight	0.88 lbs (400 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi -10% (8 bar -10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 176°F (-30°C to 80°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O, electronic PNP positive switching *(factory setting)*
Max. switching voltage	Operating voltage 20-30 V DC
Electrical connection	7 pole plug to DIN 43650, PG 11
Max. switching voltage at resistive load	12 W
Switching capacity	Ohmic 0.4 A at 30 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 GC.0 /-LED-SQ-123**

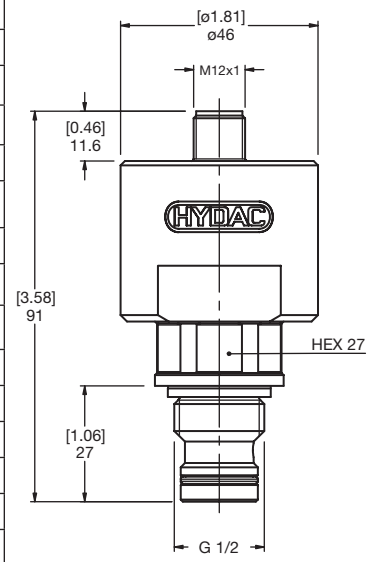


VL x GW.x





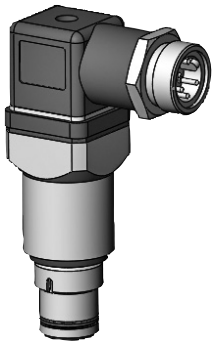
Type of indication	Electronic / Analog, (4-20 mA) 1 switch contact at 75% and at 100% trip pressure		
Weight	0.35 lbs (157 g)		
Pressure setting (100%)	29 psi ±5% (2 bar ±5%)	44 psi ±5% (3 bar ±5%)	73 psi ±5% (5 bar ±5%)
Indication range Δp	0 - 73 psi (0 - 5 bar)	0 - 73 psi (0 - 5 bar)	0 - 116 psi (0 - 8 bar)
Indication range *(p before filter)*	363 psi (25 bar)		
Switching type *(output Δp)*	El. switch, PNP positive switching N/C or N/O contacts *(factory set.)*		
Output load	400 mA		
Max. switching operating voltage	20 - 30V DC		
Analog outputs *(p before filter & Δp)*	4 - 20 mA (max. load resistance 600Ω)		
Electrical connection	M12x1/8 pole		
Protection class to DIN 40050	IP 65		
Permitt. operating pressure	25 bar		
Permitt. temperature range	-40°F to 185°F (-40°C to 85°C)		
Thread	G 1/2		
Max. torque	Refer to end of section H		
Order example	**VL 5 GW.0 /-V-123**		

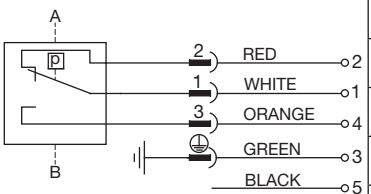


*Required amperage > 20 mA; for lower amperages, order "-SO135" indicators (see Supplementary Details in the Model Code).

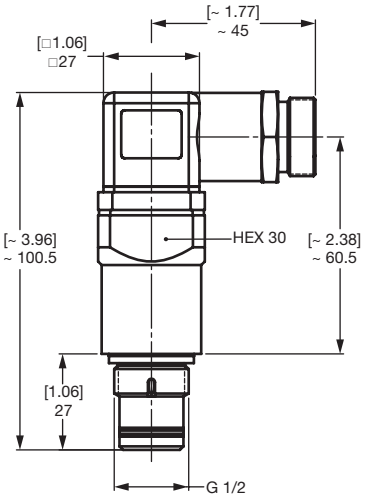
Specifications of Differential Pressure Indicators

VM x J.x

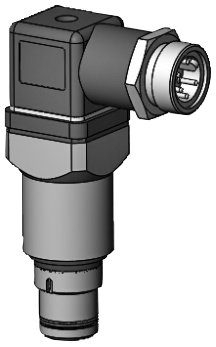


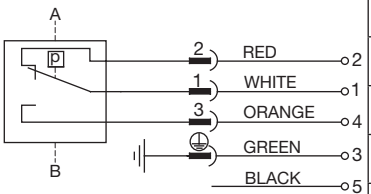


Type of indication	Electrical switch
Weight	0.33 lbs (150 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-13˚F to 185˚F (-25˚C to 85˚C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230V
Electrical connection	7/8" (Mini) connector (5 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	60W= 100VA~
Switching capacity	Ohmic 3A at 24V= Ohmic 0.03 to 5A at max. 230V~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 J.1**

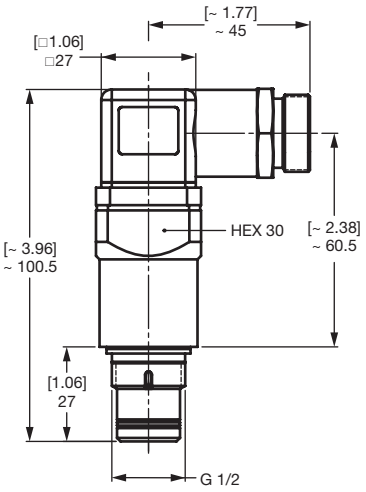


VD x J.x

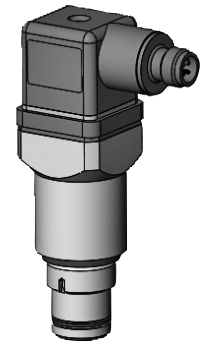


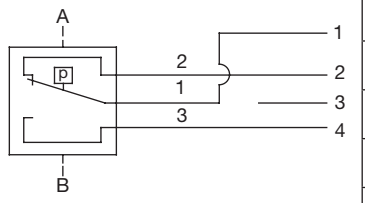


Type of indication	Electrical switch
Weight	0.55 lbs (250 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-13˚F to 185˚F (-25˚C to 85˚C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230V
Electrical connection	7/8" (Mini) connector (5 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	60W= 100VA~
Switching capacity	Ohmic 3A at 24V= Ohmic 0.03 to 5A at max. 230V~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 J.1**

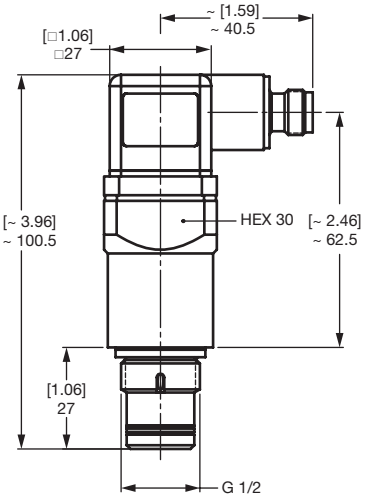


VM x J4.x



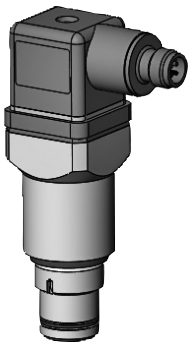


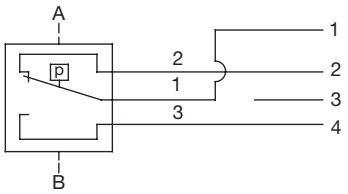
Type of indication	Electrical switch
Weight	0.26 lbs (120 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-13˚F to 185˚F (-25˚C to 85˚C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230V
Electrical connection	12mm (Micro) connector (4 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	60W= 100VA~
Switching capacity	Ohmic 3A at 24V= Ohmic 0.03 to 5A at max. 230V~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 J4.1**



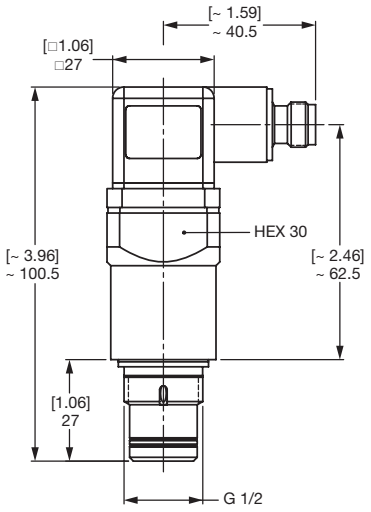
Specifications of Differential Pressure Indicators

VD x J4.x

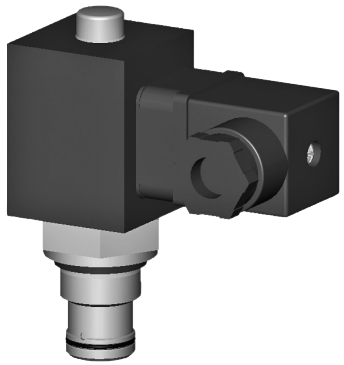


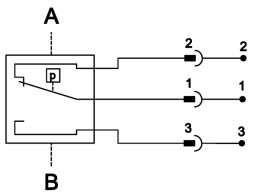


Type of indication	Electrical switch
Weight	0.49 lbs (220 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-13°F to 185°F (-25°C to 85°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230V
Electrical connection	12mm (Micro) connector (4 PIN); Female connector to DIN 43650
Max. switching voltage at resistive load	60W= 100VA~
Switching capacity	Ohmic 3A at 24V= Ohmic 0.03 to 5A at max. 230V~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 J4.1**

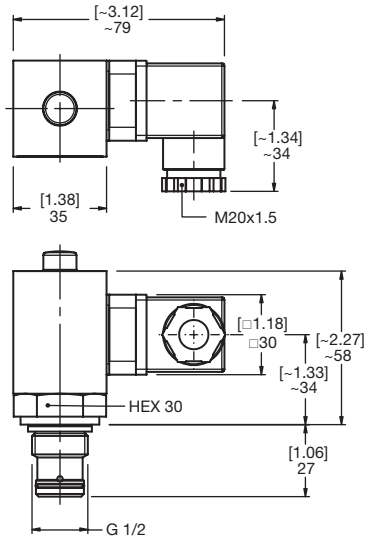


VD x LE.x

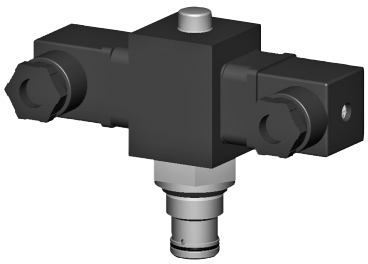


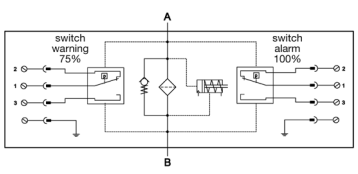


Type of indication	Visual (red pin) & electrical switch (100% activation)
Weight	0.44 lbs (198 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	115 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 LE.1**

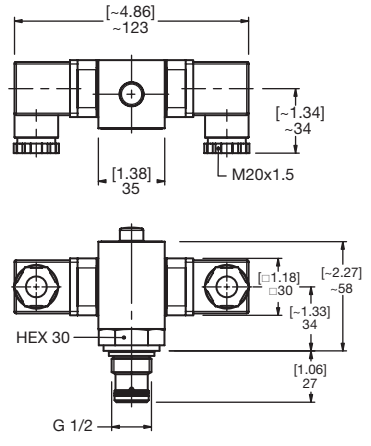


VD x LZ.x



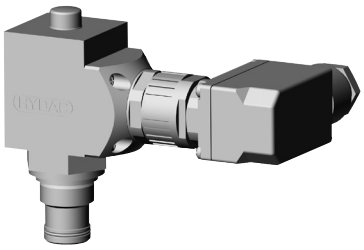


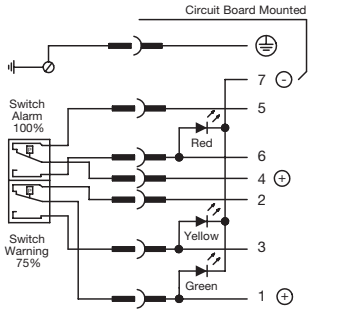
Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.53 lbs (240 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	115 V
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 LZ.1**



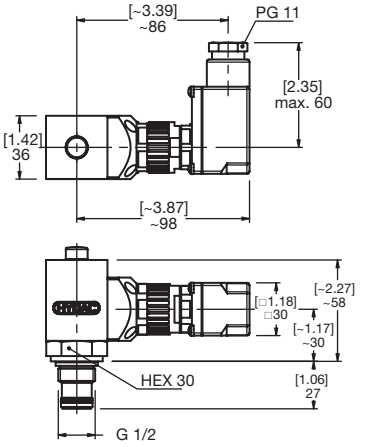
Specifications of Differential Pressure Indicators

VD x LZ.x /-DB

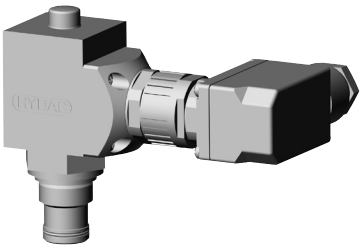


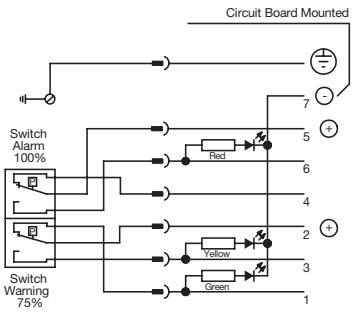


Type of indication	Visual (red pin) & electrical switch (75% & 100% activation). 3 LEDs (grn=pwr, yel=75%, red=100%)
Weight	0.54 lbs (245 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection PG 11 Female connector to DIN 43651
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 LZ.1 /-DB**

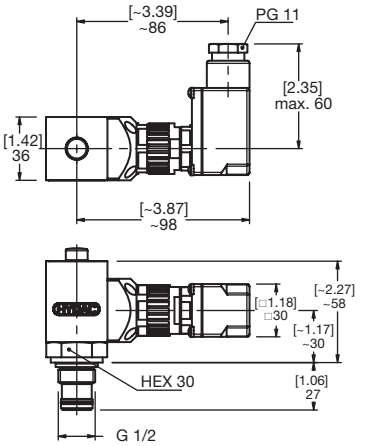


VD x LZ.x /-CN

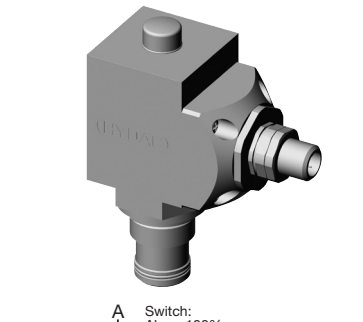




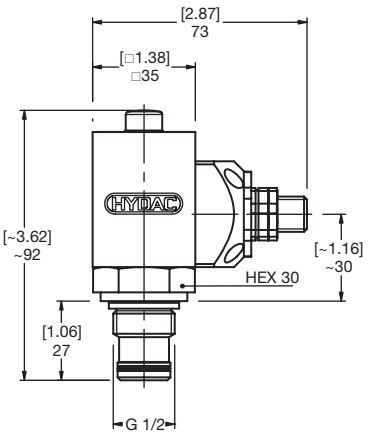
Type of indication	Visual (red pin) & electrical switch (75% & 100% activation). 3 LEDs (grn=pwr, yel=75%, red=100%)
Weight	0.54 lbs (245 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O contacts, Reed contacts *(change-over contacts)*
Max. switching voltage	24 V
Electrical connection	Male connection PG 11 Female connector to DIN 43651
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 LZ.1 /-CN**



VD x LZ.x /-BO

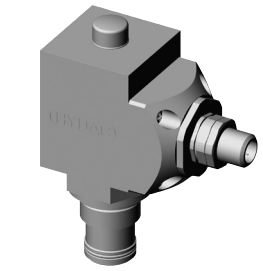


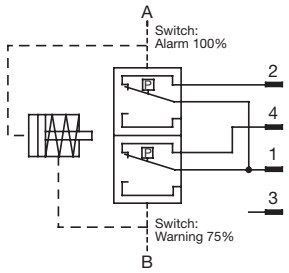
Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.43 lbs (197 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O (75%), N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VD 5 LZ.1 /-BO**



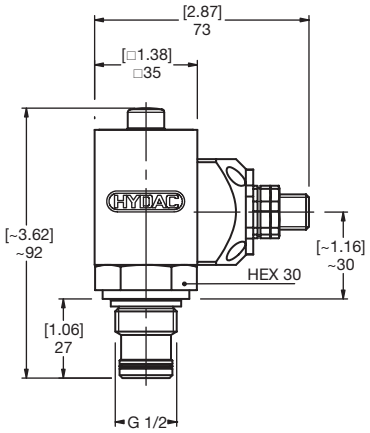
Specifications of Differential Pressure Indicators

VD x LZ.x /-AV

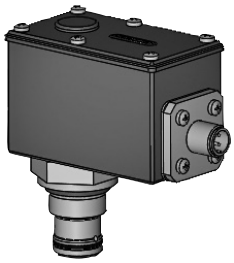


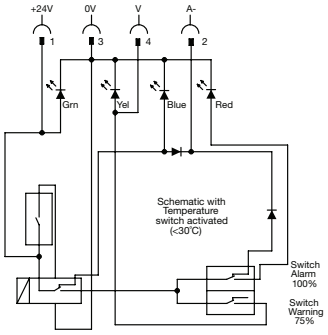


Type of indication	Visual (red pin) & electrical switch (75% & 100% activation)
Weight	0.43 lbs (197 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C (75% and 100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VD 5 LZ.1 /-AV**

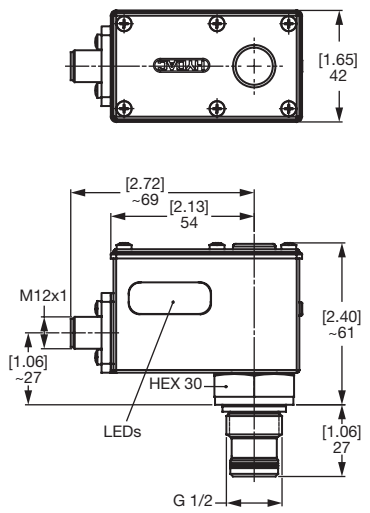


VD x LZ.x /-D4C

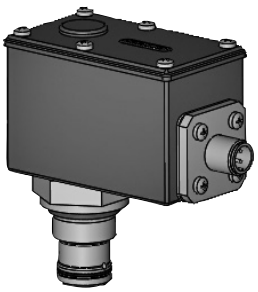


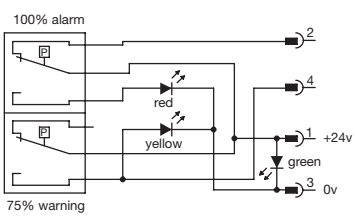


Type of indication	Electrical switch (75% & 100% activation) w/30°C thermal lockout. 4 LEDs (grn=pwr, blue= below 86°F, yel=75%, red=100%)
Weight	0.56 lbs (256 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O (75%), N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VD 5 LZ.1 /-D4C**

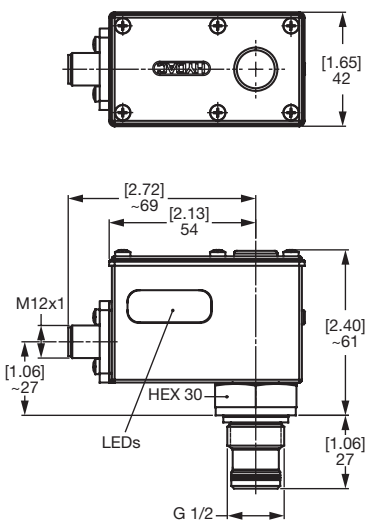


VD x LZ.x /-BO-LED



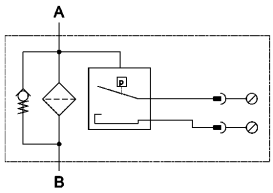


Type of indication	Electrical switch (75% & 100% activation). 3 LEDs (grn=pwr, yel=75%, red=100%)
Weight	0.55 lbs (250 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi (8 bar) - Consult HYDAC
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	14°F to 212°F (-10°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O (75%), N/C (100%)
Max. switching voltage	24 V
Electrical connection	Male connection M12 x1
Max. switching voltage at resistive load	15 W = max. 15 VA ~
Switching capacity	Ohmic 1 A at 15 V = Ohmic 1 A at 15 V ~
Protection class to DIN 40050	IP 65
Order example	**VD 5 LZ.1 /-BO-LED**

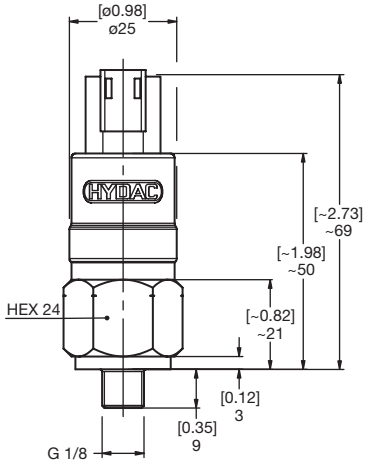


Specifications of Return Line Mobile Indicators

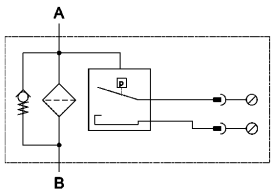
VMF x FD.x



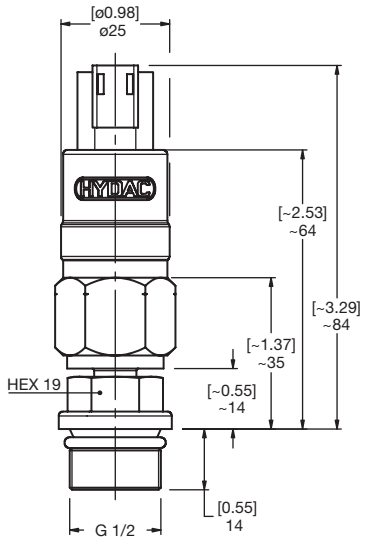
Type of indication	Electrical switch
Weight	0.15 lbs (70 g)
Trip Pressure / Range	29 psi ±4.4 psi (2 bar ±0.3 bar)
Permitt. operating pressure	160 psi (11 bar) continuous
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/O or N/C
Max. switching voltage	42 V
Electrical connection	Deutsch DT 04-2P
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	Ohmic 2.5 A at 24 V = Ohmic 1 A at 220 V ~
Protection class to DIN 40050	IP 67 *(only if the connector is wired and fitted correctly)*
Order example	**VMF 2 FD.0 /-2M0**



VR x FD.x

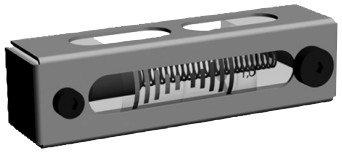


Type of indication	Electrical switch
Weight	0.20 lbs (90 g)
Trip Pressure / Range	29 psi ±4.4 psi (2 bar ±0.3 bar)
Permitt. operating pressure	160 psi (11 bar) continuous
Permitt. temperature range	-22°F to 212°F (-30 C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O or N/C
Max. switching voltage	42 V
Electrical connection	Deutsch DT 04-2P
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	Ohmic 2.5 A at 24 V = Ohmic 1 A at 220 V ~
Protection class to DIN 40050	IP 67 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 FD.0 /-2M0**

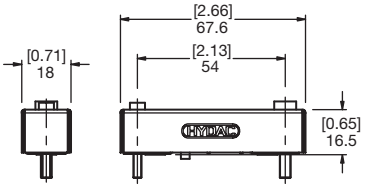


Specifications of Differential Pressure Mobile Indicators

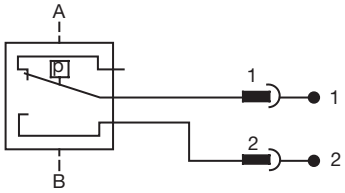
VL x BF.x



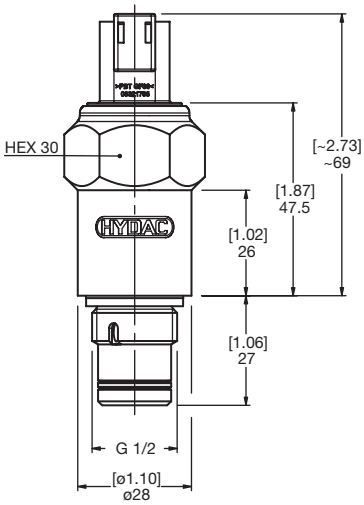
Type of indication	Visual
Weight	0.06 lbs (25 g)
Trip Pressure / Range	14.5 psi -10% (1 bar –10%) 36 psi -10% (2.5 bar –10%)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	14°F to 176°F (-10°C to 80°C)
Thread	M3; M4
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VL 2.5 BF.0**



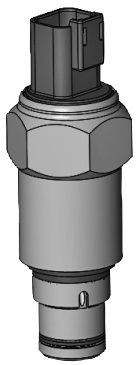
VM x CD.x

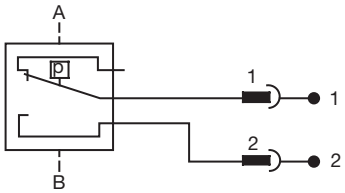


Type of indication	Electrical switch
Weight	0.22 lbs (100 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O or N/C
Max. switching voltage	48 V
Electrical connection	-
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~
Protection class to DIN 40050	IP 67 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 CD.0 /-2M0**

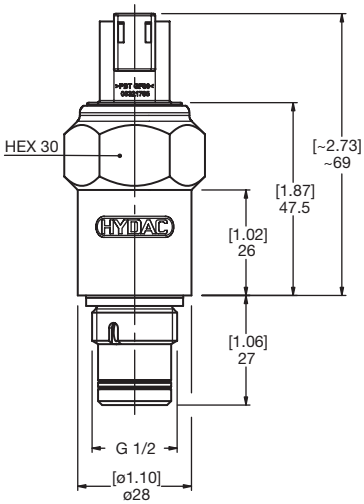


VD x CD.x



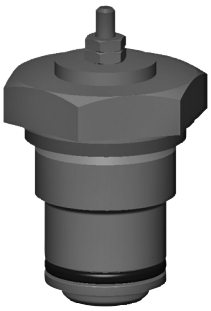


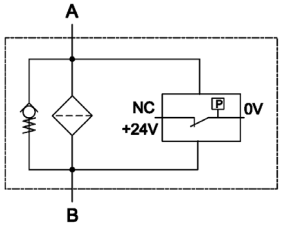
Type of indication	Electrical switch
Weight	0.43 lbs (195 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O or N/C
Max. switching voltage	48 V
Electrical connection	-
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	Ohmic 3 A at 24 V = Ohmic 0.03 to 5 A at max. 230 V ~
Protection class to DIN 40050	IP 67 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 CD.0 /-2M0**



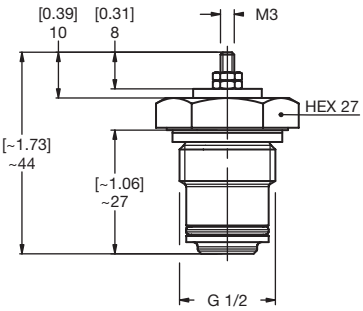
Specifications of Differential Pressure Mobile Indicators

VM x M.x

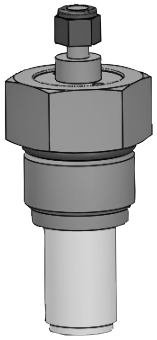


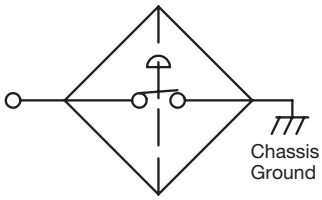


Type of indication	Single pole *(ground switching)*
Weight	0.07 lbs (31 g)
Trip Pressure / Range	29 psi ±15% (2 bar ±15%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O or N/C
Max. switching voltage	24V
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	Terminals IP00
Order example	**VM 2 M.0**

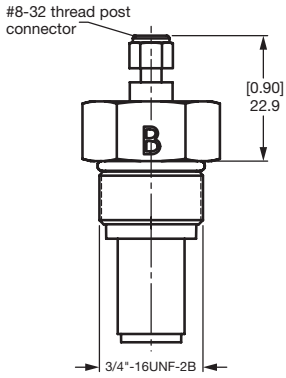


B...CMF*

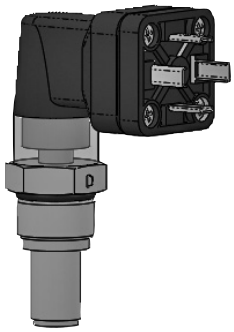


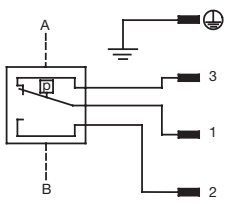


Type of indication	Single pole *(ground switching)*
Weight	0.05 lbs (24 g)
Trip Pressure / Range	44 psi +6 psi (3 bar +0.4 bar)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	22°F to 200°F (-30°C to 93°C)
Thread	SAE-8 differential port
Max. torque	Refer to end of section H
Switching type	N/O
Max. switching voltage	–
Electrical connection	#8 - 32 threaded post
Max. switching voltage at resistive load	–
Switching capacity	ohmic 200MA at 36VDC
Protection class to DIN 40050	Terminals IP00
Order example	**B3420CMF.0**

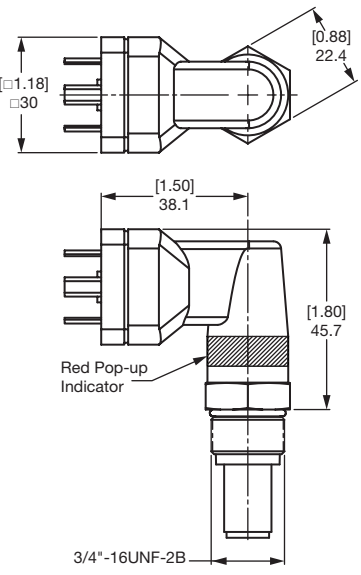


B...LEMF* **Discontinued (consult HYDAC for suitable replacements)**





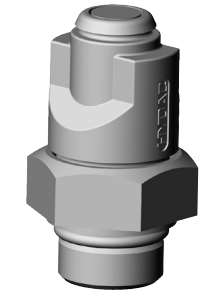
Type of indication	Visual indicator & electric switch
Weight	0.18 lbs (80 g)
Trip Pressure / Range	44 psi +6 psi (3 bar +0.4 bar)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	22°F to 200°F (-30°C to 93°C)
Thread	SAE-8 differential port
Max. torque	Refer to end of section H
Switching type	N/O or N/C *(change-over contacts)*
Max. switching voltage	–
Electrical connection	Female connector to DIN 43650
Max. switching voltage at resistive load	–
Switching capacity	ohmic 5A at 125/250VAC, 5A at 24VDC
Protection class to DIN 40050	IP60
Order example	**B3420LEMF.0**

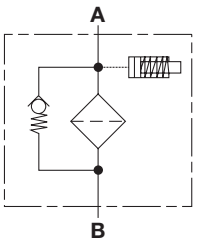


*This clogging indicator is for use with the MF/MFD/MFDS Series only.

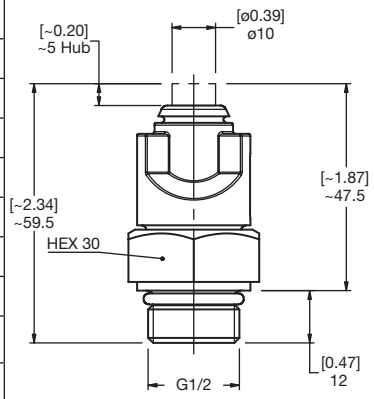
Specifications of Return Line Indicators in accordance with ATEX Directive

VR x B.x (ATEX) Can be used on aluminium filters up to Zone 1

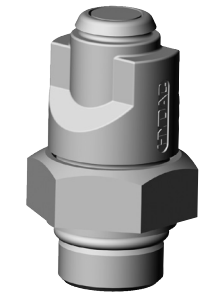


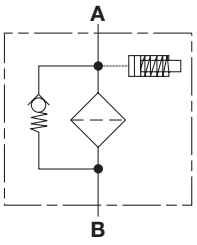


Type of indication	Visual, red pin
Weight	0.10 lbs (44 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VR 2 B.0 /-2GC**

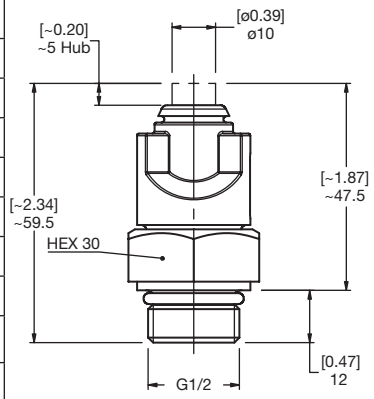


VR x B.x (ATEX) Can be used on steel/cast iron filters up to Zone 1

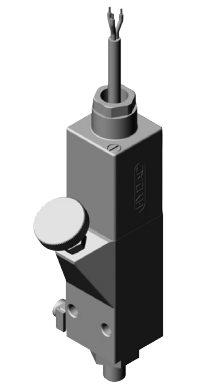


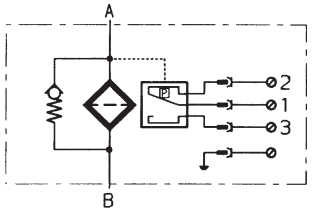


Type of indication	Visual, red pin
Weight	0.10 lbs (44 g)
Trip Pressure / Range*	29 psi -2.9 psi (2 bar -0.2 bar)
Permitt. operating pressure	102 psi (7 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VR 2 B.0 /-2GC-SO174**

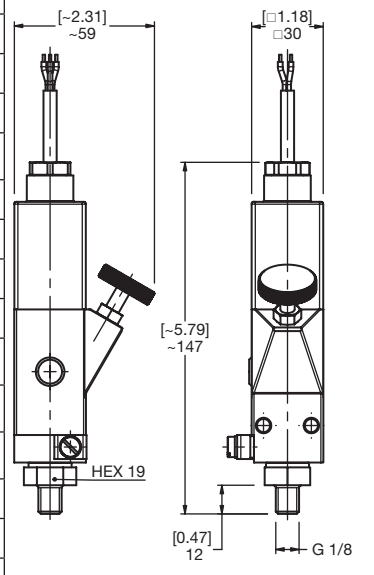


VMF x C.x /-Ex2G





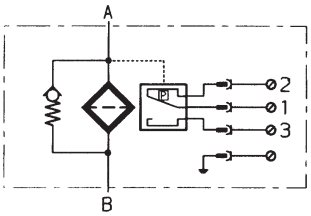
Type of indication	Electrical switch
Weight	0.91 lbs (415 g)
Trip Pressure / Range*	29 psi ±7.3 psi (2 bar ±0.5 bar)
Permitt. operating pressure	2901 psi (200 bar)
Permitt. temperature range	-4°F to 158°F (-20°C to 70°C) *(T6)* -4°F to 176°F (-20°C to 80°C) *(T5)*
Thread	G 1/8
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	250 V
Electrical connection	Cable connection PG 9 Cable length 2 m
Max. switching voltage at resistive load	62.5 W = 250 VA ~
Switching capacity	Ohmic 0.25 A at 250 V = Ohmic 1 A at 250 V ~
Protection class to DIN 40050	IP 65
ATEX designation	Ⓔx II 2G EEx d IIC T6 / T5
Order example	**VMF 2 C.0 /-Ex2G**



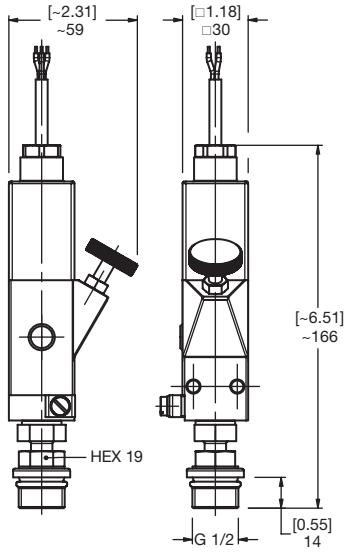
*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

Specifications of Return Line Indicators in accordance with ATEX Directive

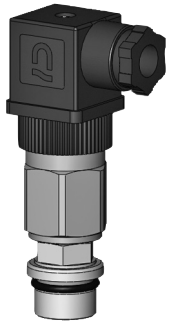
VR x C.x /-Ex2G

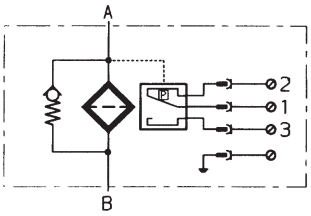


Type of indication	Electrical switch
Weight	1.04 lbs (470 g)
Trip Pressure / Range	29 psi ±7.3 psi (2 bar ±0.5 bar)
Permitt. operating pressure	2900 psi (200 bar)
Permitt. temperature range	-4˚F to 158˚F (-20°C to 70°C) *(T6)* -4˚F to 176˚F (-20°C to 80°C) *(T5)*
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	250 V
Electrical connection	Cable connection PG 9 Cable length 2 m
Max. switching voltage at resistive load	62.5 W = 250 VA ~
Switching capacity	Ohmic 0.25 A at 250 V = Ohmic 1 A at 250 V ~
Protection class to DIN 40050	IP 65
ATEX designation	Ⓔx II 2G EEx d IIC T6 / T5
Order example	**VR 2 C.0 /-Ex2G**

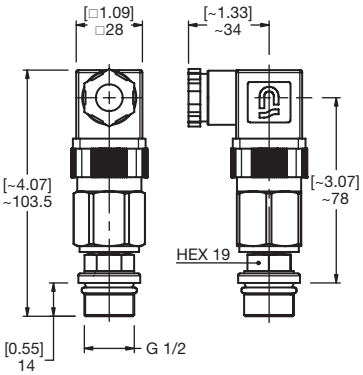


VR x C.x (ATEX) Can be used on filters up to Zone 1*





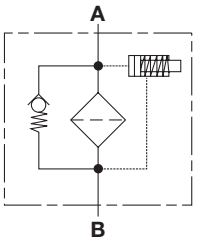
Type of indication	Electrical switch
Weight	0.75 lbs (340 g)
Trip Pressure / Range	29 psi ±4.4 psi (2 bar ±0.3 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	-22˚F to 212˚F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	*
Electrical connection	Male connection M20 Female connector to DIN 43650
Max. switching voltage at resistive load	*
Switching capacity	*
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 C.1 /-2GBC**



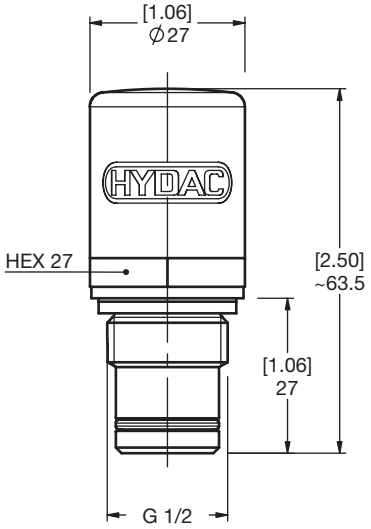
*The clogging indicator is simple electrical operating equipment according to DIN EN 60079-14 and may only be used in intrinsically safe circuits *(supplied with manufacturer's declaration and operating instructions).*

Specifications of Differential Pressure Indicators in accordance with ATEX Directive

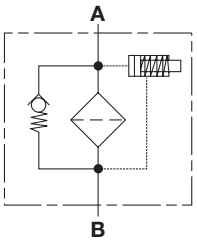
VM x B.x (ATEX) Can be used on aluminium filters up to Zone 1



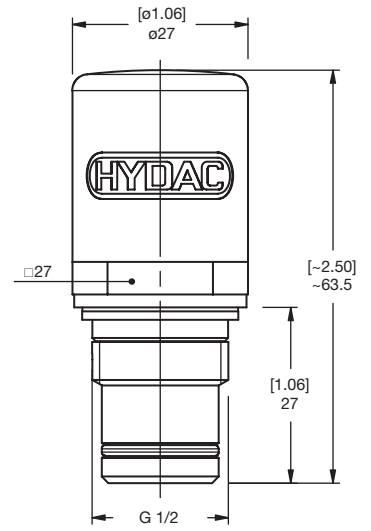
Type of indication	Visual, red/green band Automatic reset
Weight	0.24 lbs (110 g)
Trip Pressure / Range	73 psi - 10% (5 bar -10%) 116 psi ± 10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VM 5 B.1 /-2GC**



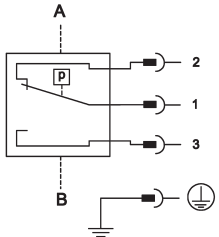
VD x B.x (ATEX) Can be used on filters up to Zone 1



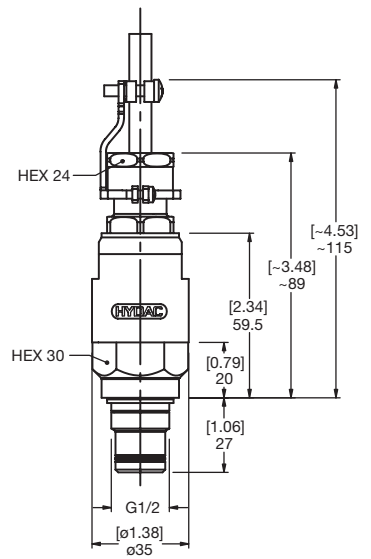
Type of indication	Visual, red/green band Automatic reset
Weight	0.24 lbs (110 g)
Trip Pressure / Range	73 psi - 10% (5 bar -10%) 116 psi ± 10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	-
Max. switching voltage	-
Electrical connection	-
Max. switching voltage at resistive load	-
Switching capacity	-
Protection class to DIN 40050	-
Order example	**VD 5 B.1 /-2GC**



VD x C.x /-2GEXDIIC

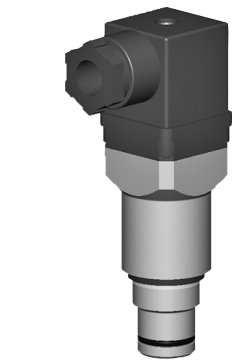


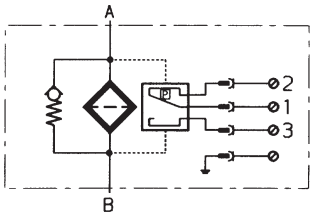
Type of indication	Electrical switch
Weight	1.32 lbs (600 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-4°F to 140°F (-20°C to 60°C) setting *(media temp. max. 75° C)*
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	Change-over
Max. switching voltage	250 V
Electrical connection	Cable connection
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	ohmic 3 A at 24 V = ohmic 0.03 A to 5 A at 250 V ~
Protection class to DIN 40050	IP 66
ATEX designation	Ex II 2G Ex d IIC T6
Order example	**VD 2 C.1 /-2GEXDIIC**



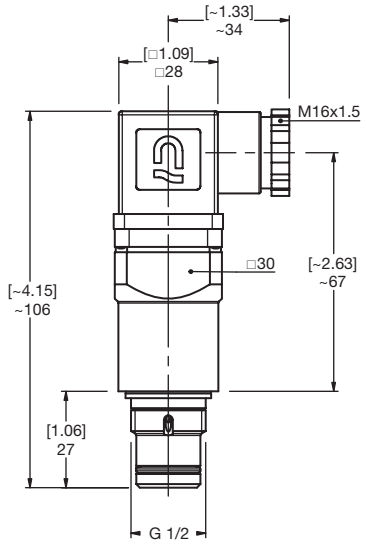
Specifications of Differential Pressure Indicators in accordance with ATEX Directive

VM x C.x (ATEX) Can be used on aluminium filters up to Zone 1

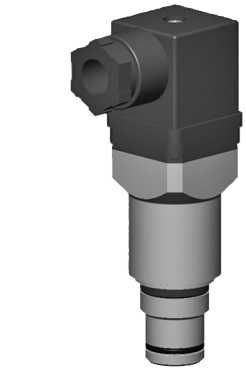


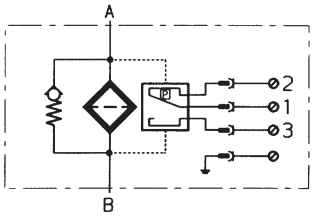


Type of indication	Electrical switch
Weight	0.26 lbs (120 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	*
Electrical connection	Male connection M16 Female connector to DIN 43650
Max. switching voltage at resistive load	*
Switching capacity	*
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 C.0 /-2GBC-SO135**

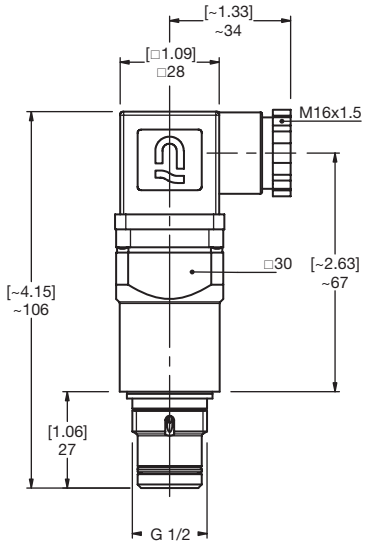


VD x C.x (ATEX) Can be used on filters up to Zone 1*





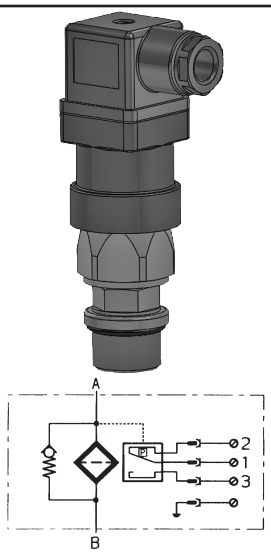
Type of indication	Electrical switch
Weight	0.49 lbs (220 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 212°F (-30°C to 100°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	*
Electrical connection	Male connection M16 Female connector to DIN 43650
Max. switching voltage at resistive load	*
Switching capacity	*
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 C.0 /-2GBC-SO135**



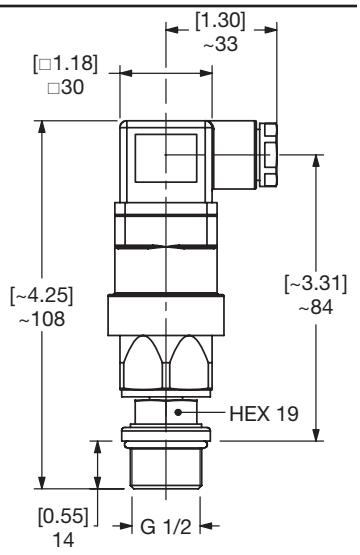
*The clogging indicator is simple electrical operating equipment according to DIN EN 60079-14 and may only be used in intrinsically safe circuits *(supplied with manufacturer's declaration and operating instructions).*

Specifications of Return Line Indicators with UL or CSA approval

VR x C.x (CSA)

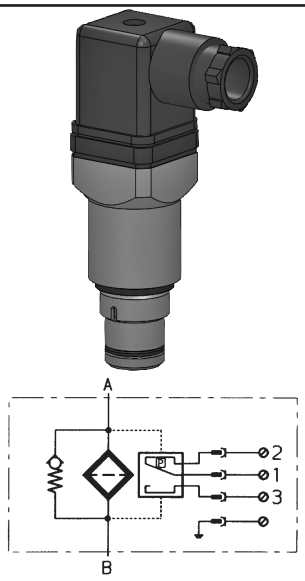


Type of indication	Electrical switch
Weight	0.75 lbs (340 g)
Trip Pressure / Range*	29 psi -4.4 psi (2 bar -0.3 bar)
Permitt. operating pressure	580 psi (40 bar)
Permitt. temperature range	23°F to 248°F (-5°C to 120°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	Male connection PG 9 Female connector to DIN 43650
Max. switching voltage at resistive load	250 W = 300 VA ~
Switching capacity	Ohmic 4 A at 24 V Ohmic 0.3 to 4 A at max. 230 V ~
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VR 2 C.0 /-CSA**

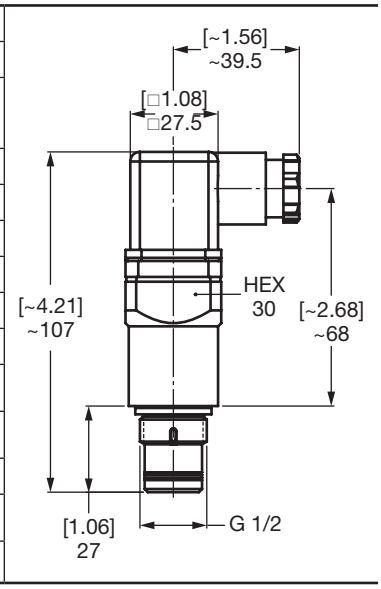


Specifications of Differential Pressure Indicators with UL or CSA approval

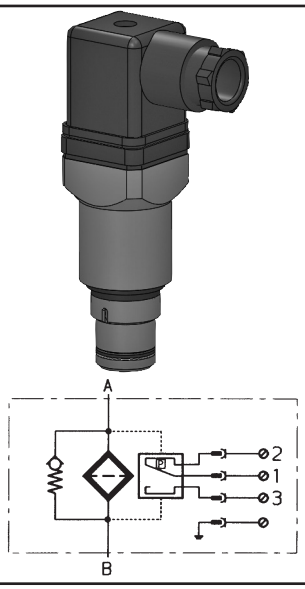
VM x C.x (UL, Standard 508)



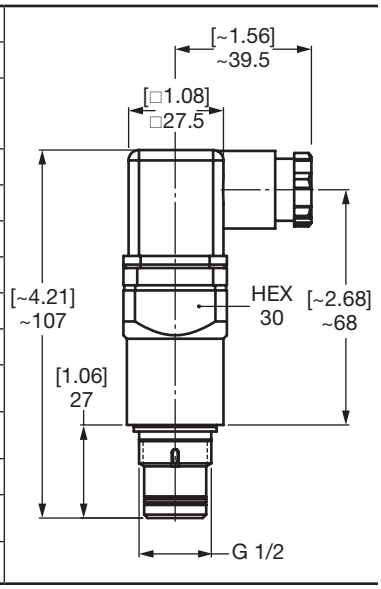
Type of indication	Electrical switch
Weight	0.26 lbs (120 g)
Trip Pressure / Range*	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. temperature range	-22°F to 176°F (-30°C to 80°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	Male connection PG 11 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	ohmic 3 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 C.0 /-CRUUS**



VD x C.x (UL, Standard 508)



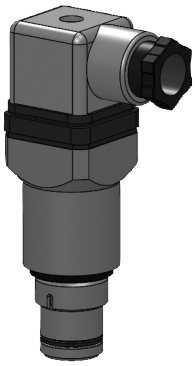
Type of indication	Electrical switch
Weight	0.55 lbs (250 g)
Trip Pressure / Range*	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-22°F to 176°F (-30°C to 80°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/C or N/O *(change-over contacts)*
Max. switching voltage	230 V
Electrical connection	Male connection PG 11 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	ohmic 3 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 C.0 /-CRUUS**

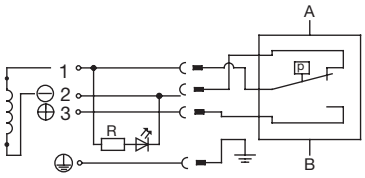


*When presented as a pressure followed by a negative (ex 29 psi -4.4 psi), the 4.4 is the lower tolerance. This is not to be interpreted as a range (ex 4.4 - 29 psi). The range in this instance would be 24.6 - 29 psi. Indicators are not field adjustable.

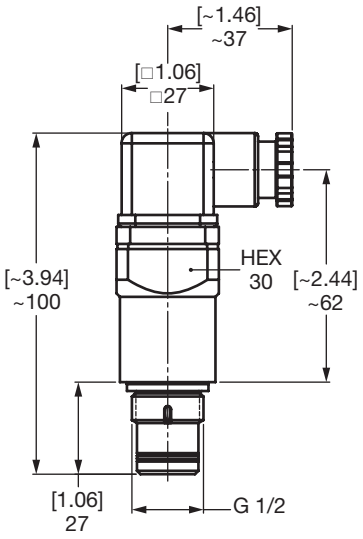
Specifications of Differential Pressure Indicators with UL or CSA approval

VM x D.x /-L... (UL, Standard 508)

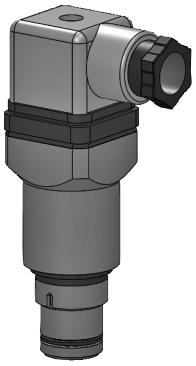


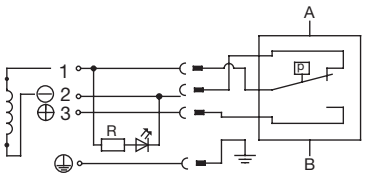


Type of indication	Electrical switch
Weight	0.26 lbs (120 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	3000 psi (210 bar)
Permitt. fluid temperature	-13˚F to 176˚F (-25°C to 80°C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O
Max. switching voltage	24, 110 V *(depending on the type of light insert)*
Electrical connection	Male connection PG 11 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	ohmic 3 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VM 5 D.0 /-L24-CRUUS**

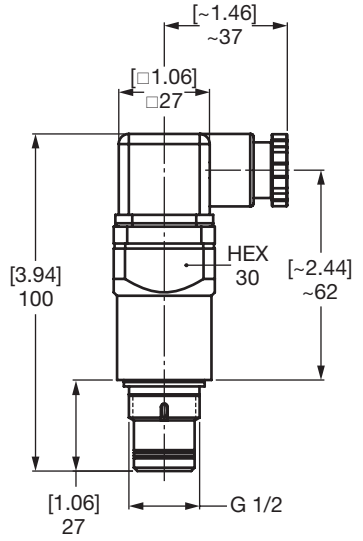


VD x D.x /-L... (UL, Standard 508)





Type of indication	Electrical switch
Weight	0.49 lbs (220 g)
Trip Pressure / Range	29 psi -10% (2 bar -10%) 73 psi -10% (5 bar -10%) 116 psi ±10% (8 bar ±10%)
Permitt. operating pressure	6000 psi (420 bar)
Permitt. temperature range	-13˚ F to 176˚ F (-25° C to 80° C)
Thread	G 1/2
Max. torque	Refer to end of section H
Switching type	N/O
Max. switching voltage	24, 110 V *(depending on the type of light insert)*
Electrical connection	Male connection PG 11 Female connector to DIN 43650
Max. switching voltage at resistive load	60 W = 100 VA ~
Switching capacity	ohmic 3 A at 24 V =
Protection class to DIN 40050	IP 65 *(only if the connector is wired and fitted correctly)*
Order example	**VD 5 D.0 /-L24-CRUUS**



FILTER CLOGGING INDICATORS

Model Code: Standard Clogging Indicators

VR 2 D . X /-V-L24

Category

VMF	=	Return line *(static)* indicator; connection G 1/8
VR	=	Return line *(static)* indicator; connection G 1/2
VM	=	Differential pressure indicator; up to 3000 psi (210 bar) operating pressure
VD	=	Differential pressure indicator; up to 6000 psi (420 bar) operating pressure
VL	=	Differential pressure indicator; up to 360 psi (25 bar) operating pressure

G 1/2

Pressure setting

1 = 15 psi (1 bar) *(optional, for use in lube applications) - (not available with all types- Consult HYDAC)*
2 = 29 psid (2 bar) *(standard, for use on return line filters)*
5 = 72 psid (5 bar) *(standard, for use on pressure filters, except DFDK & DFZ)*
8 = 116 psid (8 bar) *(standard, on DFDK & DFZ filters) - (not available with all types- Consult HYDAC)*

Type

A	=	no indicator, port is drilled and plugged
B	=	Visual pop-up with automatic reset
BF	=	Visual, mobile applications
BM	=	Visual pop-up with manual reset
C	=	Electrical switch
CD	=	Electrical switch with Deutsch plug *(DT 04-2P)*
D	=	Electric switch and Visual *(light - 24 VDC, 110 VAC)*
E	=	Pressure gauge, horizontal *(static only)*
ES	=	Pressure gauge, vertical
F	=	Pressure switch, mobile applications
FD	=	Pressure switch with Deutsch plug *(DT 04-2P)*, mobile applications
GC	=	Electronic analog *(4-20 mA or 1-10 V)* / pressure switch 75% and 100% trips *(VD & VR only)* **Discontinued (consult HYDAC for suitable replacements)**
GW	=	Electronic analog *(4-20 mA or 1-10 V)* / pressure switch 75% and 100% trips & bypass monitoring *(VL only)*
J	=	Electric switch - Brad Harrison 5-pin mini connector
J4	=	Electric switch - Brad Harrison 4-pin micro connector
LE	=	Electric pressure switch / visual pop-up button with 100% switching contact
LEM	=	Electric pressure switch / visual pop-up button with 100% switching contact and M12x1 plug, mobile applications
LZ	=	Electric pressure switch / visual pop-up button with 75% and 100% switching contact
M	=	Electrical, ground switching
UE	=	Vacuum pressure gauge, horizontal
UF	=	Vacuum switch
W	=	no indicator, port is not drilled

Modification Number

X	=	The latest version is always supplied

Supplementary Details

T100	=	Lockout below 100˚F (VM, VD – types C, D, J and J4 only)
30C	=	Cold start suppression of switching outputs up to 30°C ±5°C *(only for C, D, LZ indicators; DC voltage supply only – max. 24 Volt; C and D indicators only for VD and VM; on D and LZ indicators, contacts must be wired N/O only)*
L...	=	Light with corresponding voltage *(24, 48, 110, 230 Volt)*
LED	=	2 LEDs up to 24 Volt
OE	=	N/C function
SO135	=	Indicator suitable for PLC controls *(Gold-Crosspoint contacts)*
W	=	Suitable for oil/water emulsions (HFA, HFC)
V	=	Fluorocarbon elastomer (FKM), suitable for phosphate esters (HFD-R) and biodegradable oils *(must be specified for type "GW")* Nitrile (NBR) is standard. Ethylene propylene (EPDM, code EPR) available upon request.
2M0	=	Two contacts *(male)*, 2-pin Deutsch connector, no connector cable
2M20	=	Two contacts *(male)*, 2-pin Deutsch connector, 200 mm connector cable

only for type "D"

Supplementary Details for "GC" type Discontinued (consult HYDAC for suitable replacements)

SP	=	Analog signal: output 1-10 V
SQ	=	Analog signal: output 4-20 mA *(current source)*
113	=	N/O function - pressure peak suppression up to 10 sec. Cold start suppression of switching outputs *(PNP technique, positive switching)* up to 25°C
123	=	N/C function - pressure peak suppression up to 10 sec. Cold start suppression of switching outputs *(PNP technique positive switching)* up to 25°C
30C	=	Cold start suppression of switching outputs up to 30°C *(other temperatures on request)*
LED	=	3 LED's *(green, yellow, red)* in terminal box
PF	=	Floating switching outputs (due to relay in the plug)

if SP or SQ are not specified "current sink" model supplied

Must be specified! Others on request

Supplementary Details to "GW" type

113	=	N/O function - pressure peak suppression up to 10 sec. Cold start suppression of switching outputs *(PNP technique positive switching)* up to 25°C
123	=	N/C function - pressure peak suppression up to 10 sec. Cold start suppression of switching outputs *(PNP technique positive switching)* up to 25°C

Must be specified! Others on request

PN#02081318 / 07.19 / FIL1907-2109

Supplementary Details for “LZ” type

AV	=	Plug and connector to AUDI, VW specification
BO	=	Plug and connector to BMW, Opel, Ford specification
BO-LED	=	Same as BO, but with progressive LED strip
CN	=	Electrical connection, 1 connector DIN 43651 with 3 LEDs *(to CNOMO specification NF E 48-700)*
DB	=	Electrical connection, 1 connector to DIN 43651 with 3 LEDs *(to Daimler-Benz and BMW specification)*
D4C	=	Plug and connector to Daimler-Chrysler specification with cold start suppression 30 °C

Supplementary Details to “ATEX” type

2GC	=	For visual indicator type “B” with ATEX certificate
2GBC	=	For electrical indicator type “C” with ATEX certificate *(the switch used in the indicator is a passive component according to EN 50020 and can therefore be used in intrinsically safe circuits as simple apparatus in accordance with EN 60079-14)*
2GEXDIIC	=	For electrical indicator suitable for use in Zone 1 *(Category 2)*, gas atmosphere, Category d *(Flameproof Enclosure)*, Explosive subdivision IIC to ATEX directive
EX2G	=	Ex-protection type for the return line indicator type “C”

Supplementary Details for “UL” and “CSA” approval

cRUus	=	For electrical differential indicator type “C” and “D” with UL Underwriter’s Recognition
CSA	=	For electrical return line indicator type “C” with CSA approval

Notes: 1. Old style indicators for filters HF2P / HF3P / HF4P - pre 2008 (Example **Model Code: B2210BHF**), contact HYDAC for further information.

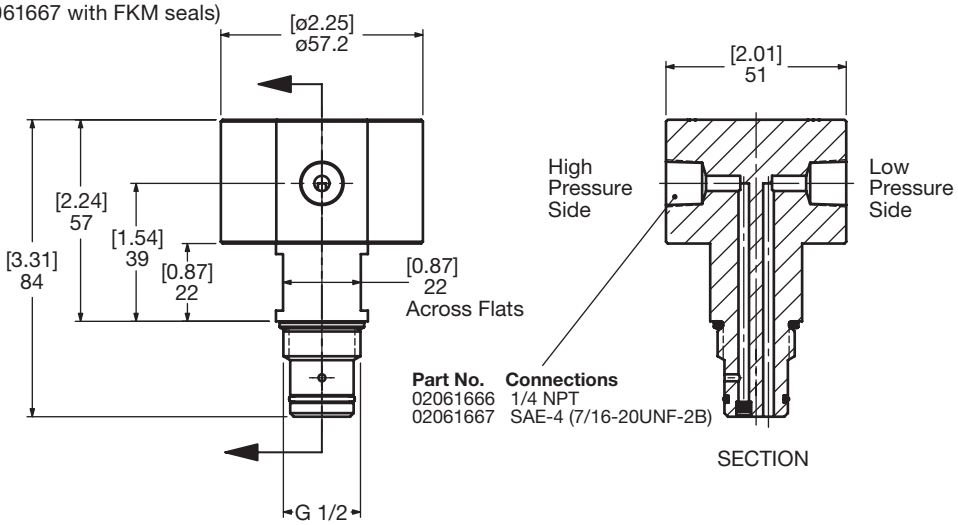
2. VMF indicators of type B, LE, LZ, and C I-EX2G, must include “V” at the end of the Model Code if Fluorocarbon elastomer (FKM) seals are required. All other VMF indicators come with Fluorocarbon elastomer (FKM) seals as a standard *(no Supplementary Detail required)*.

Dual Indicator / Gauge Blocks

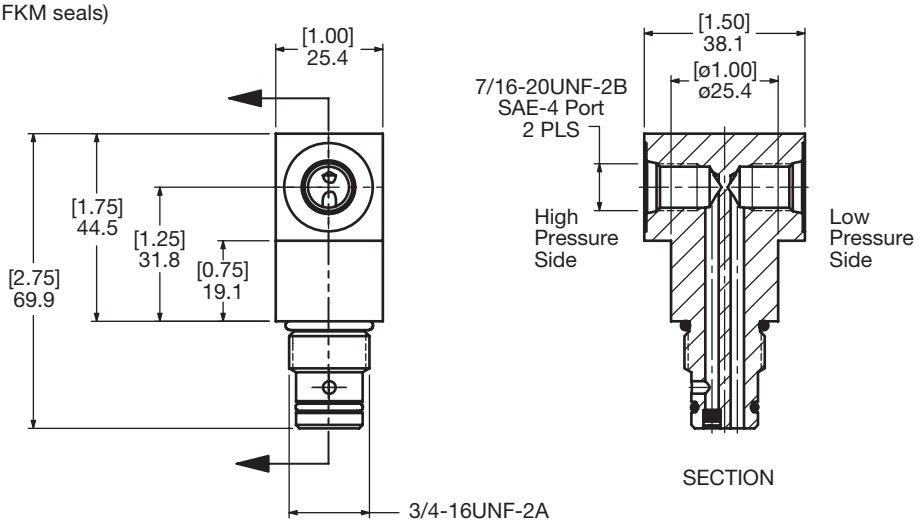
Dual Gauge Block - G 1/2 Differential Indicator Port to SAE-4 or 1/4 NPT Ports
(Part No. 02061666 & 02061667 with FKM seals)

Remote-mount Applications:

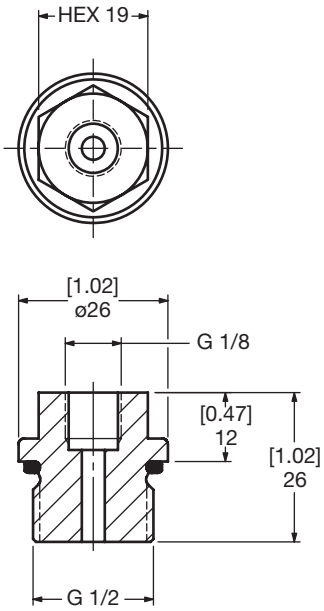
- Use Part No. 02061666 / 02061667 / 319004 in filter head
- Use Part No. 02080588 / 318740 in remote location
- Keep pipe run below 10 ft.



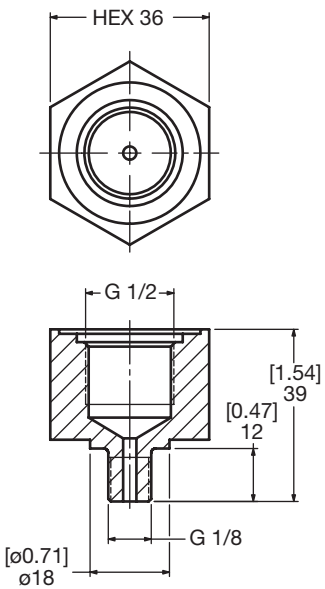
Dual Gauge Block - 3/4-16UNF-2A Differential Indicator Port to SAE-4 Ports
(Part No. 02059931 with FKM seals)



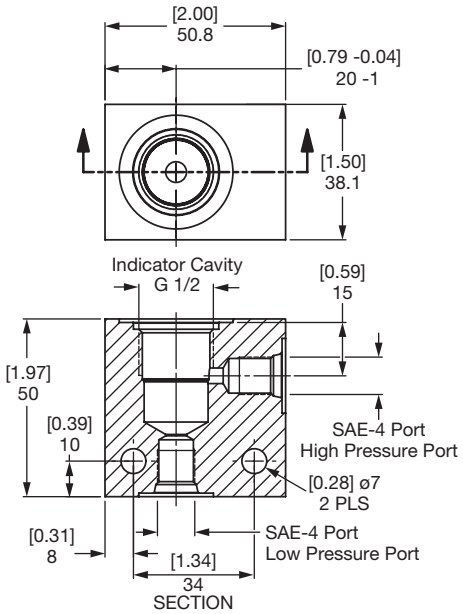
Adapter - Static - G 1/2" to G 1/8"
(Part No. 319004 w/NBR seal)



Adapter - Static - G 1/8" to G 1/2"
(Part No. 318740)

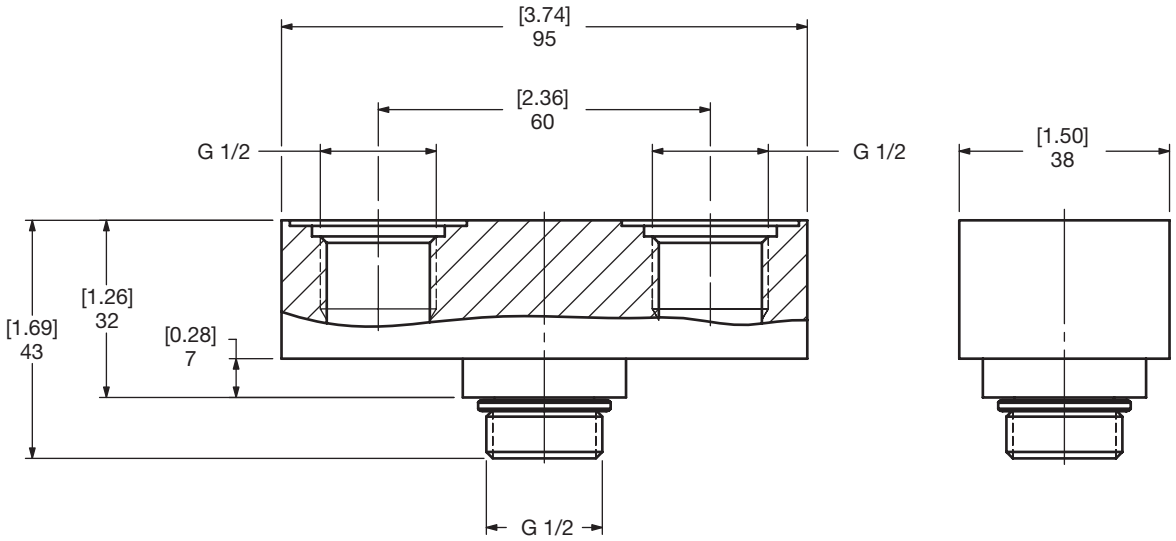


Pipe Connection Block - SAE-4 Ports to G1/2 Differential Indicator Port
(Part No. 02080588)

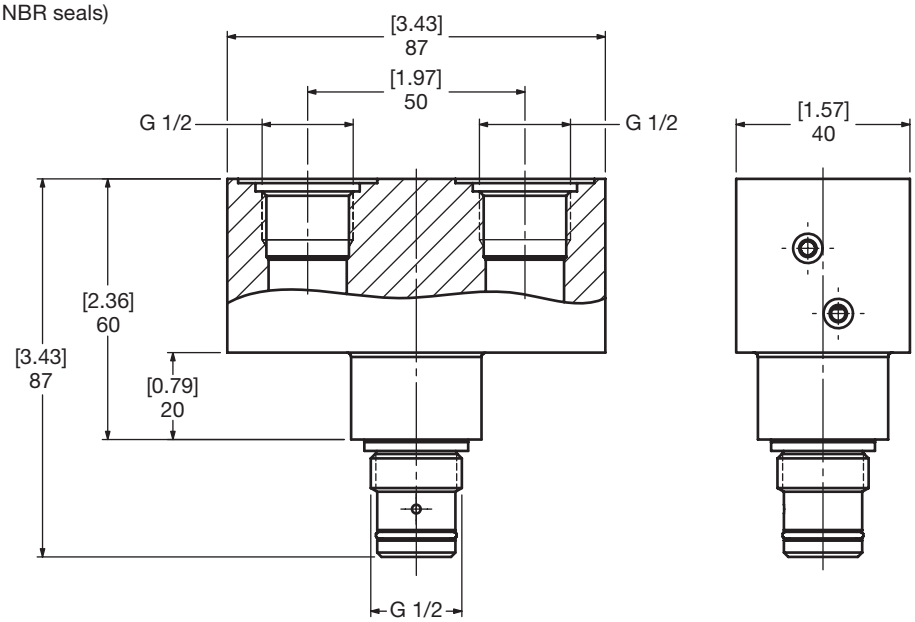


Note: Can be used as a test block

Dual Indicator Block- Static - G 1/2 port to 2 x G 1/2 ports
(Part No. 00318741 with NBR seal)



Dual Indicator Block- Differential - G 1/2 Indicator Port to 2 x G 1/2 Indicator Ports
(Part No. 00318732 with NBR seals)



INDICATOR INSTALLATION INFORMATION FOR FILTERS

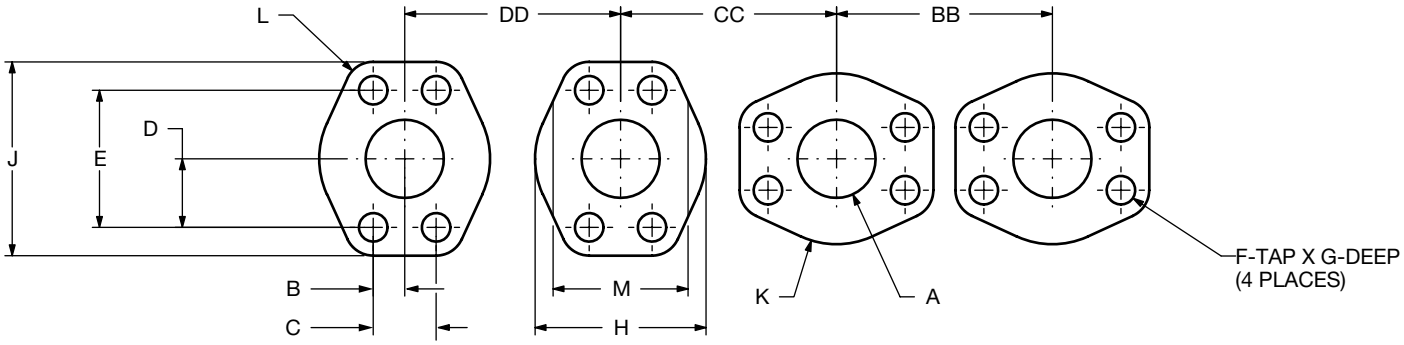
	Indicator Series	Indicator Type	Tightening Torque (lbf-ft)				Sealing
			Material of the Indicator Ported Part				
			Steel	Ductile Iron	Aluminum	Plastic (Nylon)	
STATIC INDICATORS	VMF	A (G 1/8" VSTI PLUG)	11	11	7.5	NOT APPLICABLE	No elastomeric seals included with indicator. When sealing indicator to static indicator port, apply Loctite 542 or equivalent thread locker and sealant to indicator port threads and tighten to recommended torque. Allow a minimum of 24 hours for full curing of thread locker and sealant.
		B/BM					
		C/CM					
		D					
		E/ES					
		F/FA/FD/FF/FJ/FM/FS					
		K					
		LE/LEC/LEM/LZ					
		M					
		R/RS					
		UBM	1.5	1.5	1.5	1.5	
		UC/UCM	11	11	7.5	NOT APPLICABLE	
		UE/UED					
		UF/UFJ					
	VR	A	37	37	24	7.5	Elastomeric seal included.
		B/BM	11	11	11		
		C/CM	37	37	24		
		D					
		E/ES					
		F/FA/FD/FF/FJ/FM/FS					
		GC*	11	11	11		
		LE/LEC/LEM/LZ					
		K	37	37	24		
		R/RS					
		UC/UCM					
		UE/UED					
		UF/UFJ					
	VRD	C/CM	37	37	24	7.5	Elastomeric seal included.
		D					
		E/ES					
		K					
		F/FA/FD/FF/FJ/FM/FS					
		R/RS					
		UC/UCM					
		UE/UED					
		UF/UFJ					
DIFFERENTIAL INDICATORS	VD	A	37	37	24	7.5	Elastomeric seal included.
		B/BM	74	74	NOT APPLICABLE	NOT APPLICABLE	
		C/CA/CC/CD/CJ/CM/CS/CW					
		D					
		B/BM (W Option)			24		
		C/CA/CC/CD/CJ/CM/CS/CW (W Option)					
		D (W Option)					
		GC*				7.5	
		LE/LEC/LEM/LZ	37	37			
		MB/MBM					
		MC/MCD/MCJ					
	VL	BF	0.5	0.5	0.5	NOT APPLICABLE	Elastomeric seal included.
		GW	24	24	24	7.5	
	VM	B/BM	24	24	24	7.5	Elastomeric seal included.
		C/CA/CC/CD/CJ/CM/CS/CW					
		D					
		GM					
		M					
		MB/MBM					
		MC/MCD/MCJ					
	B...MF	B	N/A	N/A	24	N/A	Elastomeric seal included.
		LE*					
		C					

***Discontinued (consult HYDAC for suitable replacements)**

J Appendix – Flange Details

SAE Code 61 & 62

Flange Details



SAE 4 Bolt Flange Port Dimension: Code 61

SIZE CODE	MAX PRESS	A DIA. MAX	B ±0.01	C ±0.01	D ±0.01	E ±0.01	F UNC-2B	G MIN.	H ±0.01	J ±0.03	K RAD	L RAD	M MIN.	BB Min.	CC MIN.	DD MIN.
8	5000	0.5 12.7	9 0.34	17.48 0.688	19 0.75	38.10 1.5	5/16-18	24 0.94	46 1.81	54 2.12	23 0.91	8 0.31	33 1.31	56 2.22	52 2.06	49 1.91
12	5000	0.75 19.05	11 0.437	22.23 0.875	24 0.94	47.63 1.875	3/8-16	22 0.88	52 2.06	65 2.56	26 1.03	9 0.34	41 1.62	68 2.66	61 2.41	55 2.16
16	5000	1.00 25.4	13 0.52	26.19 1.031	26 1.03	52.37 2.062	3/8-16	22 0.88	59 2.31	70 2.75	29 1.16	9 0.34	48 1.88	72 2.84	67 2.62	61 2.41
20	4000	1.25 31.75	15 0.59	30.18 1.188	29 1.16	58.72 2.312	7/16-14	28 1.12	73 2.88	79 3.12	37 1.44	10 0.41	54 2.12	82 3.22	78 3.09	75 2.97
24	3000	1.5 38.1	18 0.70	35.71 1.406	35 1.38	69.85 2.75	1/2-13	27 1.06	83 3.25	94 3.69	41 1.62	12 0.47	64 2.50	96 3.78	90 3.56	85 3.34
32	3000	2.00 50.8	21 0.84	42.88 1.688	39 1.53	77.77 3.062	1/2-13	27 1.06	97 3.81	102 4.00	49 1.91	12 0.47	76 3.00	104 4.09	102 4.00	99 3.91
40	2500	2.5 63.5	25 1.00	50.8 2.00	44 1.75	88.90 3.50	1/2-13	30 1.19	109 4.28	114 4.500	54 2.14	13 0.50	89 3.50	117 4.59	114 4.50	111 4.38
48	2000	3.00 76.2	31 1.22	61.93 2.438	53 2.09	106.38 4.188	5/8-11	30 1.19	131 5.16	135 5.31	66 2.58	14 0.56	106 4.19	137 5.41	136 5.34	133 5.25
56	500	3.5 88.9	35 1.38	69.85 2.75	60 2.38	120.65 4.75	5/8-11	33 1.31	140 5.50	152 6.00	70 2.75	16 0.62	119 4.69	155 6.09	148 5.84	142 5.59
64	500	4.00 101.6	39 1.53	77.77 3.062	65 2.56	130.18 5.125	5/8-11	30 1.19	152 6.00	162 6.38	76 3.00	16 0.62	132 5.19	164 6.47	160 6.28	155 6.09
80	500	5.00 127	46 1.81	92.08 3.625	76.2 3.00	152.40 6.00	5/8-11	33 1.31	181 7.12	184 7.25	90 3.56	16 0.62	157 6.19	186 7.34	185 7.28	183 7.22

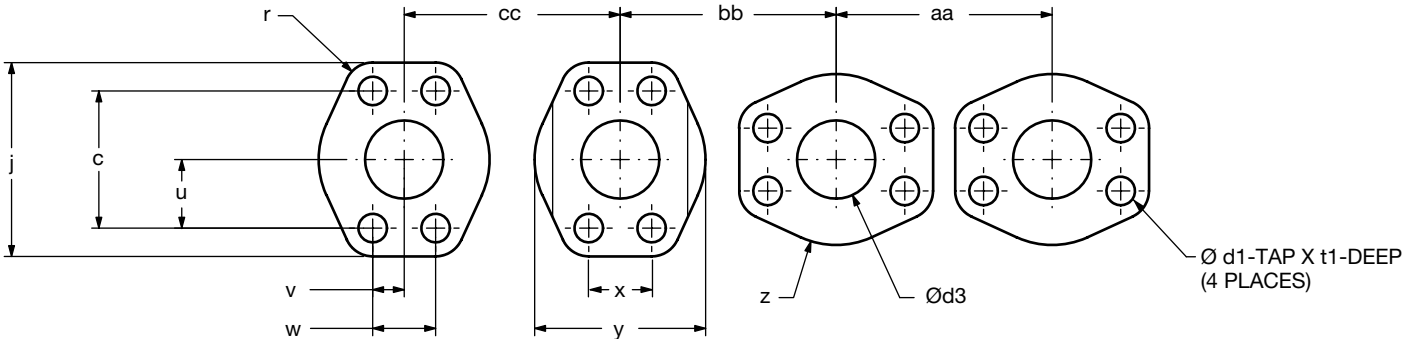
SAE 4 Bolt Flange Port Dimension: Code 62

SIZE CODE	MAX PRESS	A DIA. MAX	B ±0.01	C ±0.01	D ±0.01	E ±0.01	F UNC-2B	G MIN.	H ±0.01	J ±0.03	K RAD	L RAD	M MIN.	BB Min.	CC MIN.	DD MIN.
8	6000	0.5 12.7	9 0.359	18.24 0.718	20 0.80	40.49 1.594	5/16-18	21 0.81	48 1.88	56 2.22	24 0.94	8 0.31	38 1.50	59 2.34	56 2.22	53 2.09
12	6000	0.75 19.05	12 0.469	23.80 0.937	25 1.00	50.8 2.00	3/8-16	24 0.94	60 2.38	71 2.81	30 1.19	10 0.41	48 1.88	75 2.94	70 2.75	66 2.59
16	6000	1.00 25.4	14 0.55	27.76 1.093	28 1.12	57.15 2.250	7/16-14	27 1.06	70 2.75	81 3.19	35 1.38	12 0.47	54 2.12	84 3.31	80 3.16	75 2.97
20	6000	1.25 31.75	16 0.62	31.75 1.250	33 1.31	66.68 2.625	1/2-13	25 1.00	78 3.06	95 3.75	39 1.53	14 0.56	60 2.38	99 3.88	90 3.56	83 3.25
24	6000	1.5 38.1	18 0.72	36.50 1.437	40 1.56	79.38 3.125	5/8-11	35 1.38	95 3.75	113 4.44	48 1.88	17 0.66	70 2.75	116 4.56	108 4.25	101 3.97
32	6000	2.00 50.8	22 0.88	44.45 1.750	49 1.91	96.82 3.812	3/4-10	38 1.50	114 4.50	133 5.25	57 2.25	18 0.72	86 3.38	137 5.38	128 5.03	120 4.72
40*	6000	2.5 63.5	29.36 1.156	58.72 2.312	62 2.437	123.83 4.875	7/8-9	46 1.81	149.09 5.87	174.49 6.87	75 2.94	25 1.00	111 4.38	178 7.00	166 6.54	155 6.09
48*	6000	3.00 76.2	35.71 1.406	71.43 2.812	76 3.00	152.4 6	1 1/8-7	59 2.31	177.8 7	215.9 8.5	89 3.50	32 1.25	137 5.38	219 8.62	201 7.92	183 7.22

*Not SAE-Standard

SAE - DN

Flange Details



ISO 6162 Bolt Flange Port Dimension: 25-350 Bar Series

Size DN	Max Press. Bar (psi)	Ød3	v	w	u	c	Ød1	t1	y	j	z	r	x	aa	bb	cc
13	350 (5000)	(0.50) 12.7	(0.34) 8.75	(0.69) 17.5	(0.75) 19.05	(1.50) 38.1	M8 x 1.25	(0.49) 12.5	(1.81) 46	(2.13) 54	(0.91) 23	(0.31) 8	(1.30) 33	(2.20) 56	(2.05) 52	(1.93) 49
19	350 (5000)	(0.75) 19.1	(0.44) 11.15	(0.88) 22.3	(0.94) 23.8	(1.87) 47.6	M10 x 1.50	(0.65) 16.5	(2.05) 52	(2.56) 65	(1.02) 26	(0.35) 9	(1.61) 41	(2.68) 68	(2.40) 61	(2.17) 55
25	350 (5000)	(0.96) 25.4	(0.52) 13.1	(1.03) 26.2	(1.03) 26.2	(2.06) 52.4	M10 x 1.50	(0.57) 14.5	(2.32) 59	(2.76) 70	(1.14) 29	(0.35) 9	(1.89) 48	(2.83) 72	(2.64) 67	(2.40) 61
32	250 (4000)	(1.25) 31.8	(0.59) 15.1	(1.19) 30.2	(1.16) 29.35	(2.31) 58.7	M10 x 1.5	(0.65) 16.5	(2.87) 73	(3.11) 79	(1.46) 37	(0.39) 10	(2.13) 54	(3.23) 82	(3.07) 78	(2.95) 75
38	200 (3000)	(1.50) 38.1	(0.70) 17.85	(1.41) 35.7	(1.38) 34.95	(2.75) 69.9	M12 x 1.75	(0.77) 19.5	(3.27) 83	(3.7) 94	(1.61) 41	(0.47) 12	(2.52) 64	(3.78) 96	(3.54) 90	(3.35) 85
51	200 (3000)	(2.00) 50.8	(0.84) 21.45	(1.69) 42.9	(1.53) 38.9	(3.06) 77.8	M12 x 1.75	(0.77) 19.5	(3.82) 97	(4.02) 102	(1.93) 49	(0.47) 12	(2.99) 76	(4.09) 104	(4.02) 102	(3.90) 99
64	160 (2500)	(2.50) 63.5	(1.00) 25.4	(2.00) 50.8	(1.75) 44.45	(3.5) 88.9	M12 x 1.75	(0.85) 21.5	(4.29) 109	(4.49) 114	(2.13) 54	(0.51) 13	(3.5) 89	(4.61) 117	(4.49) 114	(4.37) 111
76	100 (2000)	(3.00) 76.2	(1.22) 30.95	(2.44) 61.9	(2.09) 53.2	(4.19) 106.4	M16 x 2.00	(1.12) 28.5	(5.16) 131	(5.31) 135	(2.60) 66	(0.55) 14	(4.17) 106	(5.39) 137	(5.35) 136	(5.24) 133
89	25 (500)	(3.50) 88.9	(1.38) 34.95	(2.75) 69.9	(2.38) 60.35	(4.75) 120.7	M16 x 2.00	(1.12) 28.5	(5.51) 140	(5.98) 152	(2.76) 70	(0.63) 16	(4.69) 119	(6.10) 155	(5.83) 148	(5.59) 142
102	25 (500)	(4.00) 101.6	(1.53) 38.9	(3.06) 77.8	(2.56) 65.1	(5.13) 130.2	M16 x 2.00	(1) 25.5	(5.98) 152	(6.38) 162	(2.36) 76	(0.63) 16	(5.20) 132	(6.46) 164	(6.30) 160	(6.10) 155
127	25 (500)	(5.00) 127	(1.81) 46.05	(3.63) 92.1	(3.00) 76.2	(6.00) 152.4	M16 x 2.00	(1.08) 27.5	(7.13) 181	(7.24) 184	(3.54) 90	(0.63) 16	(5.94) 151	(7.32) 186	(7.28) 185	(7.20) 183

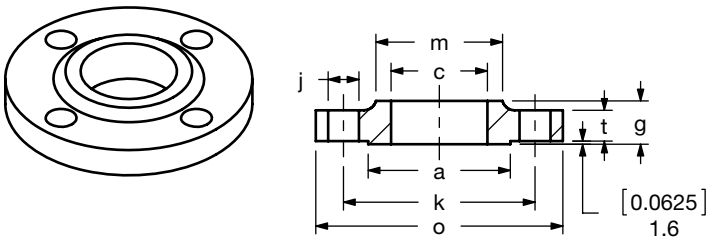
ISO 6162 Bolt Flange Port Dimension: 400 Bar Series

Size DN	Max Press. Bar (psi)	Ød3	v	w	u	c	Ød1	t1	y	j	z	r	x	aa	bb	cc
13	400 (6000)	(0.50) 12.7	(0.36) 9.1	(0.72) 18.2	(0.80) 20.25	(1.59) 40.5	M8 X 1.25	(0.57) 14.5	(1.89) 48	(2.20) 56	(0.94) 24	(0.31) 8	(1.50) 38	(2.32) 59	(2.20) 56	(2.09) 53
19	400 (6000)	(0.75) 19.1	(0.47) 11.9	(0.94) 23.8	(1.00) 25.4	(2.00) 50.8	M10 X 1.50	(0.65) 16.5	(2.36) 60	(2.80) 71	(1.18) 30	(0.39) 10	(1.89) 48	(2.95) 75	(2.76) 70	(2.6) 66
25	400 (6000)	(1.00) 25.4	(0.55) 13.9	(1.09) 27.8	(1.13) 28.6	(2.25) 57.2	M12 X 1.75	(0.85) 21.5	(2.76) 70	(3.19) 81	(1.38) 35	(0.47) 12	(2.13) 54	(3.31) 84	(3.15) 80	(2.95) 75
32	400 (6000)	(1.25) 31.8	(0.63) 15.9	(1.25) 31.8	(1.31) 33.3	(2.62) 66.6	M12 X 1.75	(0.73) 18.5	(3.07) 78	(3.74) 95	(1.54) 39	(0.55) 14	(2.36) 60	(3.9) 99	(3.54) 90	(3.27) 83
38	400 (6000)	(1.50) 38.1	(0.72) 18.25	(1.44) 36.5	(1.56) 39.65	(3.12) 79.3	M16 X 2.00	(0.81) 20.55	(3.74) 95	(4.45) 113	(1.89) 48	(0.67) 17	(2.76) 70	(4.57) 116	(4.25) 108	(3.98) 101
51	400 (6000)	(2.00) 50.8	(0.88) 22.25	(1.75) 44.5	(1.91) 48.4	(3.81) 96.8	M20 X 2.50	(1.32) 33.5	(4.49) 114	(5.24) 133	(2.24) 57	(0.71) 18	(3.39) 86	(5.39) 137	(5.04) 128	(4.72) 120

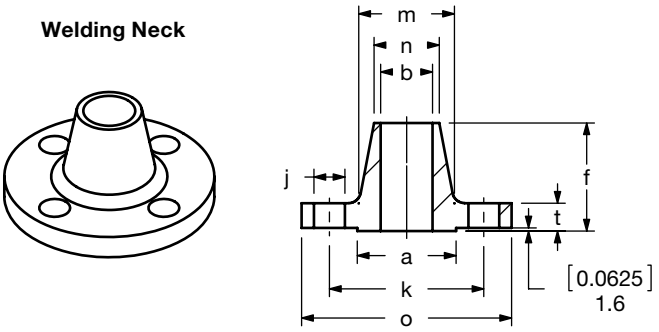
ANSI

Flange Details

Slip On



Welding Neck

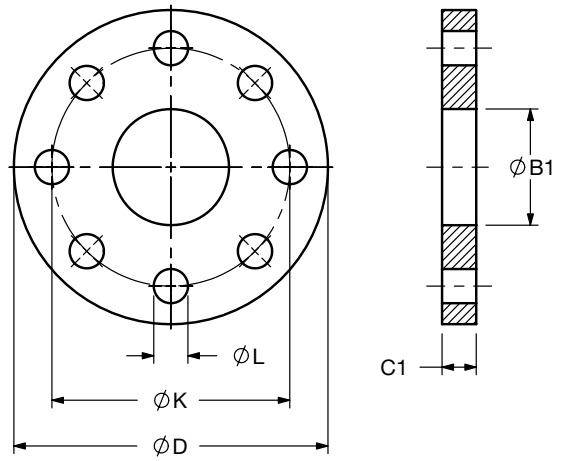


150 lb. ANSI Flange Port Dimensions

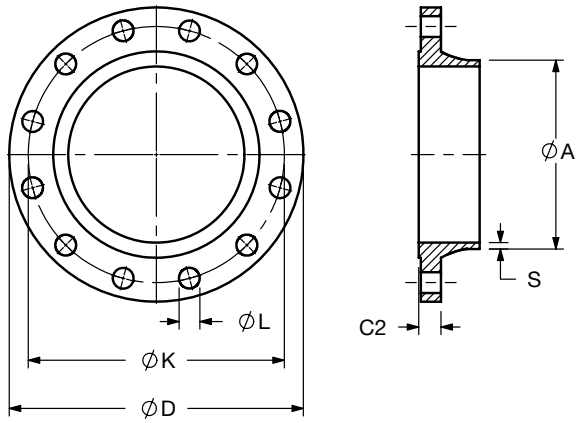
Pipe size	o	t	a	b	c	# of holes	j	k
0.5	(3.50) 88.9	(0.44) 11.1	(1.38) 34.9	(0.62) 15.7	(0.88) 22.35	4	(0.63) 15.88	(2.38) 60.3
0.75	(3.88) 98.4	(0.50) 12.7	(1.69) 42.9	(0.82) 20.8	(1.09) 27.69	4	(0.63) 15.88	(2.75) 69.85
1	(4.25) 107.9	(0.56) 14.29	(2.00) 50.8	(1.05) 26.67	(1.36) 34.5	4	(0.63) 15.88	(3.13) 79.4
1.25	(4.63) 117.5	(0.63) 15.9	(2.50) 63.5	(1.38) 35.05	(1.70) 43.2	4	(0.63) 15.88	(3.50) 88.9
1.5	(5.00) 127	(0.69) 17.5	(2.88) 73	(1.61) 40.9	(1.95) 49.5	4	(0.63) 15.88	(3.88) 98.4
2	(6.00) 152.4	(0.75) 19	(3.63) 92.1	(2.07) 52.6	(2.44) 61.98	4	(0.75) 19	(4.75) 120.6
2.5	(7.00) 177.8	(0.88) 22.2	(4.13) 104.8	(2.47) 62.7	(2.94) 74.7	4	(0.75) 19	(5.50) 139.7
3	(7.50) 190.5	(0.94) 23.8	(5.00) 127	(3.07) 78	(3.57) 90.7	4	(0.75) 19	(6.00) 152.4
3.5	(8.50) 215.9	(0.94) 23.8	(5.50) 139.7	(3.55) 90.17	(4.07) 103.4	8	(0.75) 19	(7.00) 177.8
4	(9.00) 228.6	(0.94) 23.8	(6.19) 157.2	(4.03) 102.4	(4.57) 116.1	8	(0.75) 19	(7.50) 190.5
5	(10.00) 254	(0.94) 23.8	(7.31) 185.7	(5.05) 128.3	(5.66) 143.8	8	(0.88) 22.2	(8.50) 215.9
6	(11.00) 279.4	(1.00) 25.4	(8.50) 215.9	(6.07) 154.2	(6.72) 170.7	8	(0.88) 22.2	(9.50) 241.3
8	(13.50) 342.9	(1.13) 28.6	(10.63) 269.9	(7.98) 202.7	(8.72) 221.5	8	(0.88) 22.2	(11.75) 298.5
10	(16.00) 406.4	(1.19) 30.2	(12.75) 323.8	(10.02) 254.5	(10.88) 276.4	12	(1.00) 25.4	(14.25) 362
12	(19.00) 482.6	(1.25) 31.8	(15.00) 381	(12.00) 304.8	(12.88) 327.2	12	(1.00) 25.4	(17.00) 431.8

DN Flange DIM PN 16

Slip On



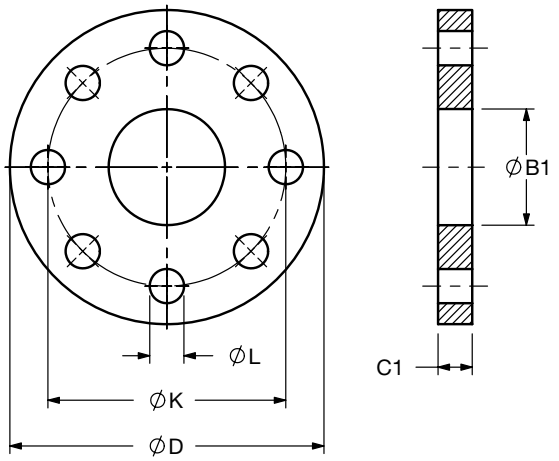
Weld Neck



DN	D	K	L	# OF BOLTS	BOLT SIZE	A	B1	C1	C2	S
10	(3.54) 90	(2.36) 60	(0.55) 14	4	M12	(0.68) 17.2	(0.71) 18	(0.55) 14	(0.63) 16	(0.07) 1.8
15	(3.74) 95	(2.56) 65	(0.55) 14	4	M12	(0.84) 21.3	(0.87) 22	(0.55) 14	(0.63) 16	(0.08) 2
20	(4.13) 105	(2.95) 75	(0.55) 14	4	M12	(1.06) 26.9	(1.08) 27.5	(0.63) 16	(0.71) 18	(0.09) 2.3
25	(4.53) 115	(3.35) 85	(0.55) 14	4	M12	(1.33) 33.7	(1.36) 34.5	(0.63) 16	(0.71) 18	(0.10) 2.6
32	(5.51) 140	(3.94) 100	(0.71) 18	4	M16	(1.67) 42.4	(1.71) 43.5	(0.71) 18	(0.71) 18	(0.10) 2.6
40	(5.91) 150	(4.33) 110	(0.71) 18	4	M16	(1.90) 48.3	(1.95) 49.5	(0.71) 18	(0.71) 18	(0.10) 2.6
50	(6.5) 165	(4.92) 125	(0.71) 18	4	M16	(2.37) 60.3	(2.42) 61.5	(0.79) 20	(0.71) 18	(0.11) 2.9
65	(7.28) 185	(5.71) 145	(0.71) 18	8	M16	(3.00) 76.1	(3.05) 77.5	(0.79) 20	(0.71) 18	(0.11) 2.9
80	(7.87) 200	(6.30) 160	(0.71) 18	8	M16	(3.50) 88.9	(3.56) 90.5	(0.79) 20	(0.79) 20	(0.13) 3.2
100	(8.66) 220	(7.09) 180	(0.71) 18	8	M16	(4.50) 114.3	(4.57) 116	(0.87) 22	(0.79) 20	(0.14) 3.6
125	(9.84) 250	(8.27) 210	(0.71) 18	8	M16	(5.50) 139.7	(5.57) 141.5	(0.87) 22	(0.87) 22	(0.16) 4
150	(11.22) 285	(9.45) 240	(0.87) 22	8	M20	(6.63) 168.3	(6.71) 170.5	(0.94) 24	(0.87) 22	(0.18) 4.5
200	(13.39) 340	(11.61) 295	(0.87) 22	12	M20	(8.63) 219.1	(8.72) 221.5	(1.02) 26	(0.94) 24	(0.25) 6.3
250	(15.94) 405	(13.98) 355	(1.02) 26	12	M24	(10.75) 273	(10.89) 276.5	(1.14) 29	(1.02) 26	(0.25) 6.3
300	(18.11) 460	(16.14) 410	(1.02) 26	12	M24	(12.75) 323.9	(12.89) 327.5	(1.26) 32	(1.10) 28	(0.28) 7.1

DN Flange DIM PN 25

Slip On



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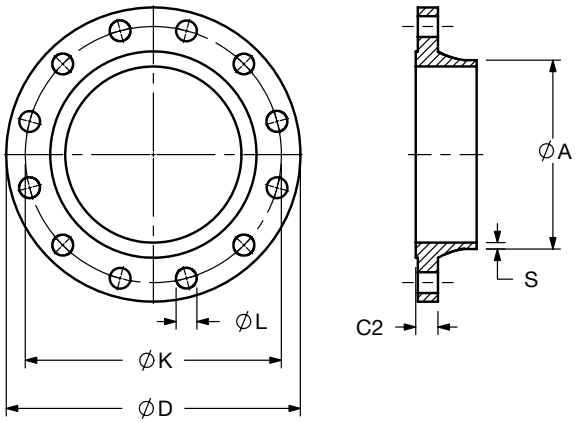
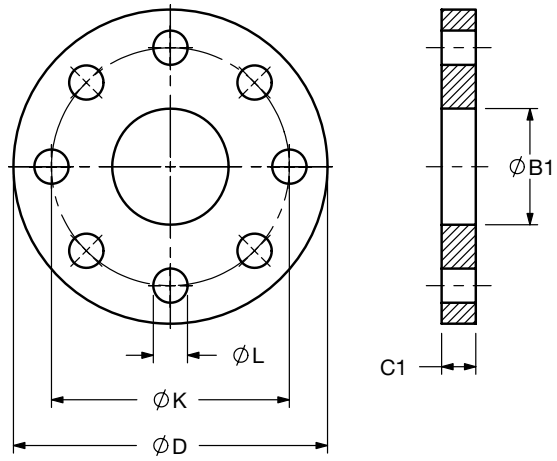


DN	D	K	L	# OF BOLTS	BOLT SIZE	A	B1	C1	C2	S
10	(3.54) 90	(2.36) 60	(0.55) 14	4	M12	(0.68) 17.2	(0.71) 18	(0.55) 14	(0.63) 16	(0.07) 1.8
15	(3.74) 95	(2.56) 65	(0.55) 14	4	M12	(0.84) 21.3	(0.87) 22	(0.55) 14	(0.63) 16	(0.08) 2
20	(4.13) 10ww5	(2.95) 75	(0.55) 14	4	M12	(1.06) 26.9	(1.08) 27.5	(0.63) 16	(0.71) 18	(0.09) 2.3
25	(4.53) 115	(3.35) 85	(0.55) 14	4	M12	(1.33) 33.7	(1.36) 34.5	(0.63) 16	(0.71) 18	(0.10) 2.6
32	(5.51) 140	(3.94) 100	(0.71) 18	4	M16	(1.67) 42.4	(1.71) 43.5	(0.71) 18	(0.71) 18	(0.10) 2.6
40	(5.91) 150	(4.33) 110	(0.71) 18	4	M16	(1.90) 48.3	(1.95) 49.5	(0.71) 18	(0.71) 18	(0.10) 2.6
50	(6.50) 165	(4.92) 125	(0.71) 18	4	M16	(2.37) 60.3	(2.42) 61.5	(0.79) 20	(0.79) 20	(0.11) 2.9
65	(7.28) 185	(5.71) 145	(0.71) 18	8	M16	(3.00) 76.1	(3.05) 77.5	(0.87) 22	(0.87) 22	(0.11) 2.9
80	(7.87) 200	(6.3) 160	(0.71) 18	8	M16	(3.50) 88.9	(3.56) 90.5	(0.94) 24	(0.94) 24	(0.13) 3.2
100	(9.25) 235	(7.48) 190	(0.87) 22	8	M20	(4.50) 114.3	(4.57) 116	(1.02) 26	(0.94) 24	(0.14) 3.6
125	(10.63) 270	(8.66) 220	(1.02) 26	8	M24	(5.50) 139.7	(5.57) 141.5	(1.10) 28	(1.02) 26	(0.16) 4
150	(11.81) 300	(9.84) 250	(1.02) 26	8	M24	(6.63) 168.3	(6.71) 170.5	(1.18) 30	(1.10) 28	(0.18) 4.5
200	(14.17) 360	(12.2) 310	(1.02) 26	12	M24	(8.63) 219.1	(8.72) 221.5	(1.26) 32	(1.18) 30	(0.25) 6.3
250	(16.73) 425	(14.57) 370	(1.18) 30	12	M27	(10.75) 273	(10.89) 276.5	(1.38) 35	(1.26) 32	(0.28) 7.1
300	(19.09) 485	(16.93) 430	(1.18) 30	16	M27	(12.75) 323.9	(12.89) 327.5	(1.50) 38	(1.34) 34	(0.31) 8

DN Flange DIM PN 40

Slip On



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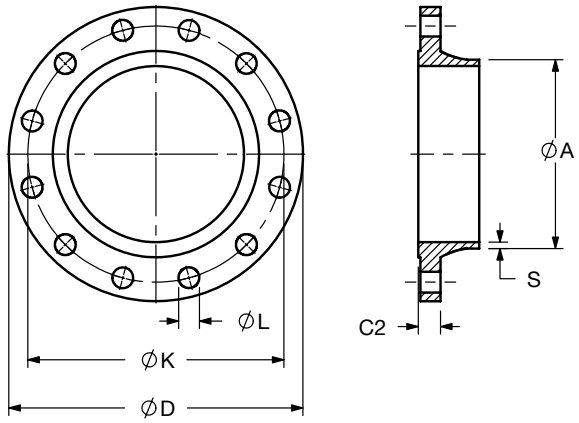

DN	D	K	L	# OF BOLTS	BOLT SIZE	A	B1	C1	C2	S
10	(3.54) 90	(2.36) 60	(0.55) 14	4	M12	(0.68) 17.2	(0.71) 18	(0.55) 14	(0.63) 16	(0.07) 1.8
15	(3.74) 95	(2.56) 65	(0.55) 14	4	M12	(0.84) 21.3	(0.87) 22	(0.55) 14	(0.63) 16	(0.08) 2
20	(4.13) 105	(2.95) 75	(0.55) 14	4	M12	(1.06) 26.9	(1.08) 27.5	(0.63) 16	(0.71) 18	(0.09) 2.3
25	(4.53) 115	(3.35) 85	(0.55) 14	4	M12	(1.33) 33.7	(1.36) 34.5	(0.63) 16	(0.71) 18	(0.10) 2.6
32	(5.51) 140	(3.94) 100	(0.71) 18	4	M16	(1.67) 42.4	(1.71) 43.5	(0.71) 18	(0.71) 18	(0.10) 2.6
40	(5.91) 150	(4.33) 110	(0.71) 18	4	M16	(1.90) 48.3	(1.95) 49.5	(0.71) 18	(0.71) 18	(0.10) 2.6
50	(6.50) 165	(4.92) 125	(0.71) 18	4	M16	(2.37) 60.3	(2.42) 61.5	(0.79) 20	(0.79) 20	(0.11) 2.9
65	(7.28) 185	(5.71) 145	(0.71) 18	8	M16	(3.00) 76.1	(3.05) 77.5	(0.87) 22	(0.87) 22	(0.11) 2.9
80	(7.87) 200	(6.3) 160	(0.71) 18	8	M16	(3.50) 88.9	(3.56) 90.5	(0.94) 24	(0.94) 24	(0.13) 3.2
100	(9.25) 235	(7.48) 190	(0.87) 22	8	M20	(4.50) 114.3	(4.57) 116	(1.02) 26	(0.94) 24	(0.14) 3.6
125	(10.63) 270	(8.66) 220	(1.02) 26	8	M24	(5.50) 139.7	(5.57) 141.6	(1.10) 28	(1.02) 26	(0.16) 4
150	(11.81) 300	(9.84) 250	(1.02) 26	8	M24	(6.63) 168.3	(6.71) 170.5	(1.18) 30	(1.10) 28	(0.18) 4.5
200	(14.76) 375	(12.60) 320	(1.18) 30	12	M27	(8.63) 219.1	(8.72) 221.5	(1.42) 36	(1.34) 34	(0.25) 6.3
250	(17.72) 450	(15.16) 385	(1.30) 33	12	M30	(10.75) 273	(10.89) 276.5	(1.65) 42	(1.50) 38	(0.28) 7.1
300	(20.28) 515	(17.72) 450	(1.30) 33	16	M30	(12.75) 323.9	(12.89) 327.5	(2.05) 52	(1.65) 42	(0.31) 8

APPENDIX – FLANGE DETAILS

Notes

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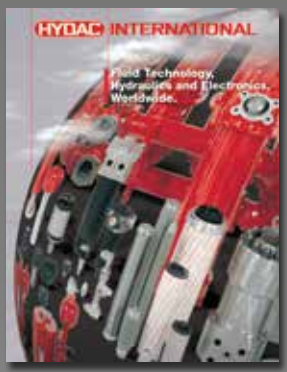
Overview Brochure
PN02088157



Filters Catalog
PN02081318

Accumulators Catalog
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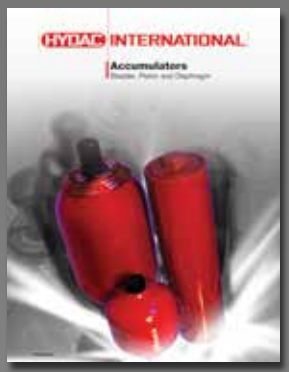
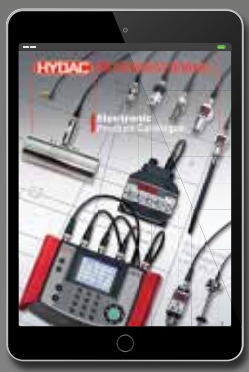
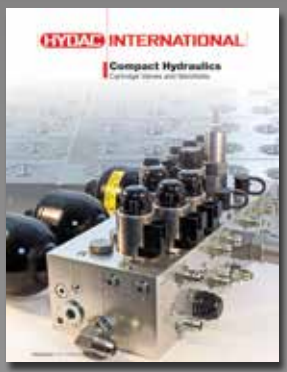


Electronics Catalog*
(online only)

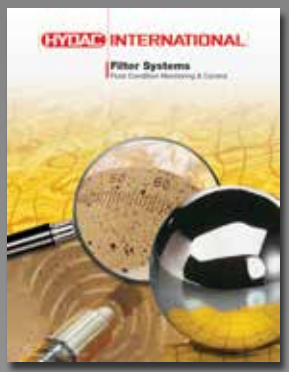


Compact Hydraulics
Catalog - PN02087369



Standard Coolers
Catalog - PN02085359

Filter Systems Catalog
PN02075860



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Mobile Valves Brochure
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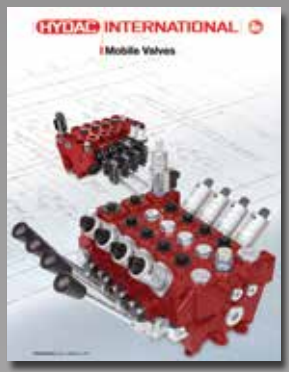
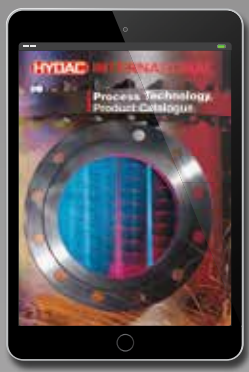


Hydraulic Cylinders
Brochure (Release: TBD)

Process Technology*
Catalog (online only)



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