

# LF(M)

## High Viscosity Filter Assemblies

Low pressure filter assemblies optimized for high flow hydraulic, high viscosity lube and heavily contaminated fuel applications.

**Max Operating Pressure: 150 psi (10 bar)**

**Available options up to 1000 psi (68.9 bar)**

Donaldson  
HY-PRO™

[hyprofiltration.com/](http://hyprofiltration.com/)



## Filtration starts with the filter.

The oversized coreless filter element in every LF delivers lower ISO Codes over a long element lifespan to ensure low disposal impact, simultaneously reducing your environmental footprint and your bottom line. To top it off, select elements come standard with an integral zero-leak bypass so with every filter change you get a new bypass along with peace of mind.



## Built for industrial use.

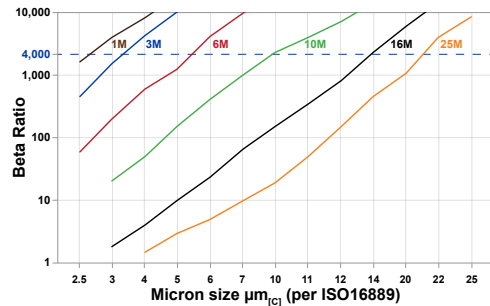
Constructed from heavy duty carbon steel (standard) or the optional 304 or 316 stainless steel, the LF filter housings are designed to excel in even the toughest industrial conditions. Multi-round units go even further to provide increased capacity whether you're operating with incredibly high viscosity oils, extreme flow rates or need extended service intervals.



## Element configuration & media options.

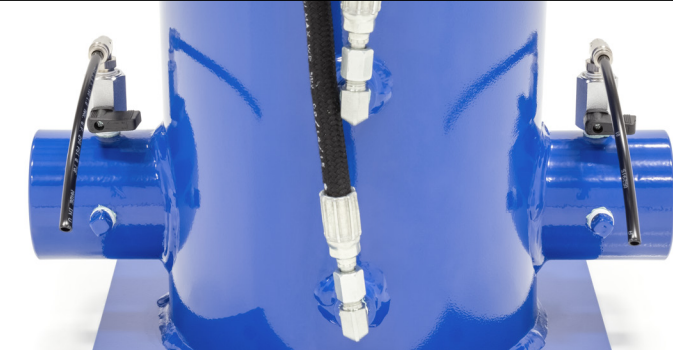
With media options down to  $\beta_{3[C]} > 4000$ , insoluble varnish removal and water absorbing options, you get the perfect element for your application, every time. Element configurations include Donaldson Hy-Pro HP106 and HP107 coreless style elements with integral, zero-leak bypass valves. For those plants using 8314 style industry standard elements, the HP8314 offers an improved bypass valve design.

Glass Media Filtration Efficiency (Beta Ratio) vs Micron Size



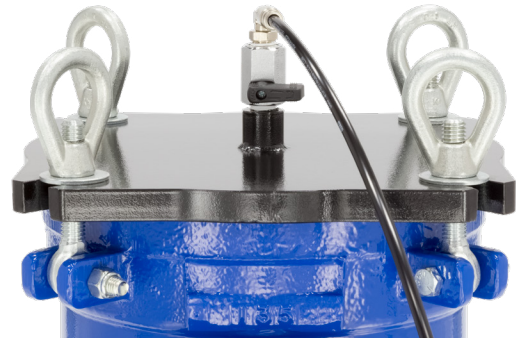
## Setting the new standard.

Sampling and condition monitoring are no longer optional, they're a necessity. That's why every LF comes standard with sample ports and green to red true  $\Delta P$  gages that indicate exact element condition at all times. With access to accurate system cleanliness conditions, you'll know exactly how well your filtration is performing.



## Minimize the mess.

Top loading filter housings minimize the mess from element services and changes. And with the easy open swing bolt lid design, you'll be back to filtering your fluids without having to search for all those lost parts.



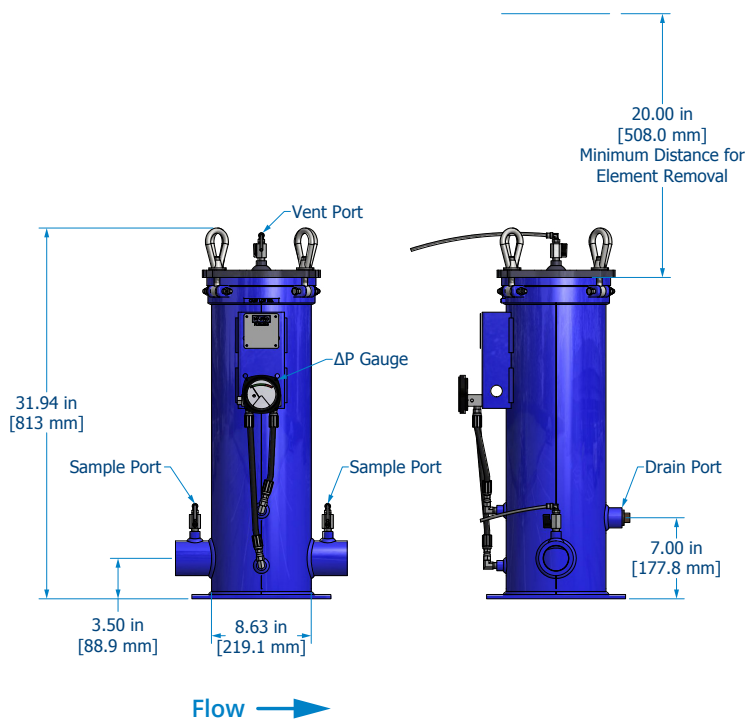
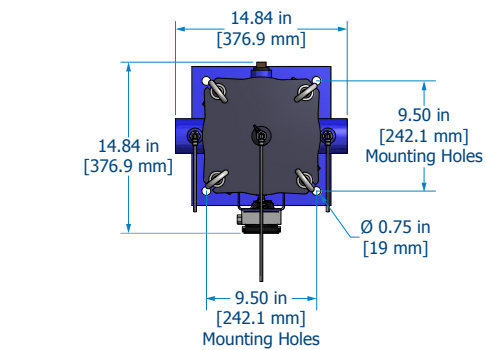
## Seamlessly integrated into your systems.

Multiple connection options and port customization provide the flexibility to integrate LF directly into existing re-circulating or auxiliary side loop and dispensing lines to improve fluid cleanliness and optimize existing assets. Get filtration exactly where you need it without extra expense of installing new plumbing and electrical.

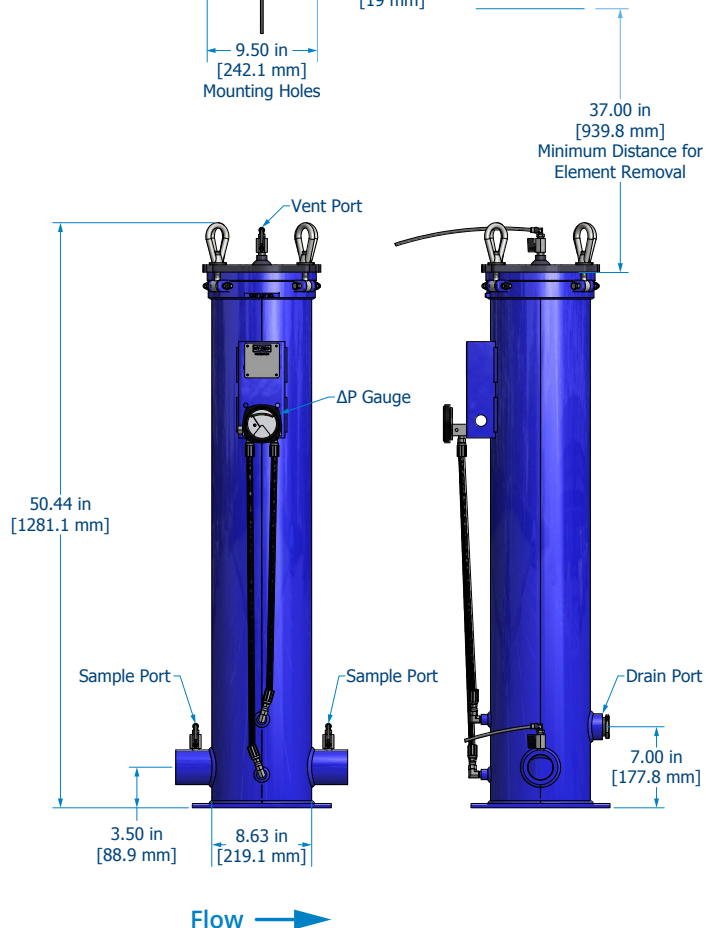
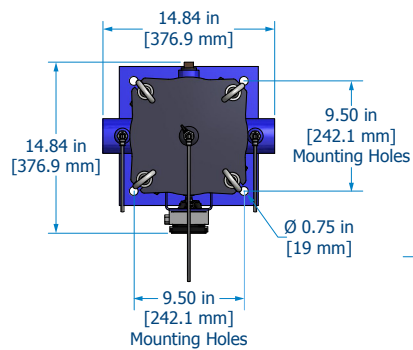


# LF Installation Drawings

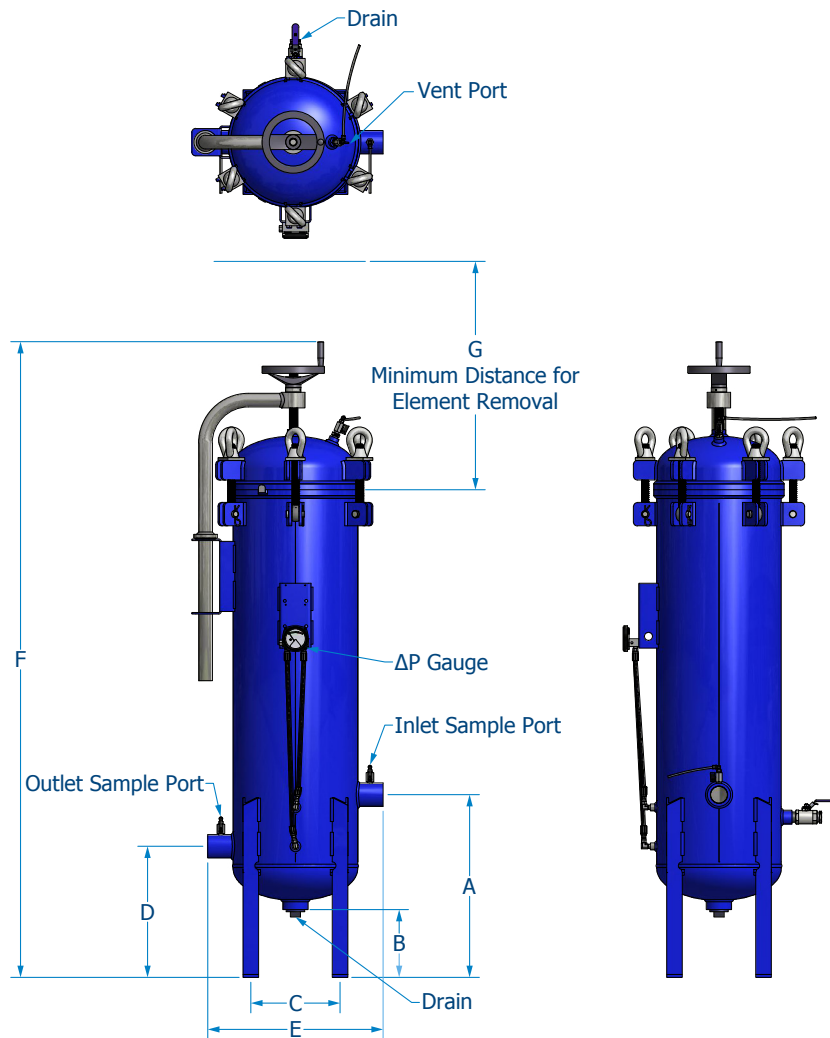
## LF (L18) Installation Drawing



## LF (L36) Installation Drawing



# LFM Installation Drawings



Series	Number of Elements	Port Size	Vessel Diameter	A	B	C	D	E	F	G	Weight
LFM	3	2	16.0 in 40.6 cm	27.1 in 68.8 cm	13.0 in 33.0 cm	14.1 in 35.8 cm	16.8 in 42.7 cm	26.0 in 66.0 cm	78.5 in 199.4 cm	37.0 in 94.0 cm	465.0 lb 210.9 kg
		3	16.0 in 40.6 cm	27.1 in 68.8 cm	13.0 in 33.0 cm	14.1 in 35.8 cm	16.8 in 42.7 cm	26.0 in 66.0 cm	78.5 in 199.4 cm	37.0 in 94.0 cm	465.0 lb 210.9 kg
		4	16.0 in 40.6 cm	27.1 in 68.8 cm	13.0 in 33.0 cm	14.1 in 35.8 cm	16.8 in 42.7 cm	26.0 in 66.0 cm	78.5 in 199.4 cm	37.0 in 94.0 cm	65.0 lb 29.5 kg
	4	2	18.0 in 45.7 cm	29.8 in 75.7 cm	13.0 in 33.0 cm	16.1 in 40.9 cm	17.5 in 44.5 cm	26.0 in 66.0 cm	83.0 in 210.8 cm	37.0 in 94.0 cm	550.0 lb 249.5 kg
		3	18.0 in 45.7 cm	29.8 in 75.7 cm	13.0 in 33.0 cm	16.1 in 40.9 cm	17.5 in 44.5 cm	26.0 in 66.0 cm	83.0 in 210.8 cm	37.0 in 94.0 cm	550.0 lb 249.5 kg
		4	18.0 in 45.7 cm	29.8 in 75.7 cm	13.0 in 33.0 cm	16.1 in 40.9 cm	17.5 in 44.5 cm	26.0 in 66.0 cm	83.0 in 210.8 cm	37.0 in 94.0 cm	550.0 lb 249.5 kg
	9	3	24.0 in 61.0 cm	32.3 in 82.0 cm	13.0 in 33.0 cm	23.5 in 59.7 cm	23.7 in 60.2 cm	37.3 in 94.7 cm	89.0 in 226.1 cm	37.0 in 94.0 cm	645.0 lb 292.6 kg
		4	24.0 in 61.0 cm	32.3 in 82.0 cm	13.0 in 33.0 cm	23.5 in 59.7 cm	23.7 in 60.2 cm	37.3 in 94.7 cm	89.0 in 226.1 cm	37.0 in 94.0 cm	645.0 lb 292.6 kg
		6	24.0 in 61.0 cm	32.3 in 82.0 cm	13.0 in 33.0 cm	23.5 in 59.7 cm	23.7 in 60.2 cm	37.3 in 94.7 cm	89.0 in 226.1 cm	37.0 in 94.0 cm	645.0 lb 292.6 kg

Dimensions are approximations taken from base model and will vary according to options chosen and customer sizing requirements.



# Filter Sizing Guidelines

## Filter Assembly Sizing Guidelines

Effective filter sizing requires consideration of flow rate, viscosity (operating and cold start), fluid type and degree of filtration. When properly sized, bypass during cold start can be avoided/minimized and optimum element efficiency and life achieved. The filter assembly differential pressure values provided for sizing differ for each media code, and assume 32 cSt (150 SUS) viscosity and 0.86 fluid specific gravity. Use the following steps to calculate clean element assembly pressure drop.

## Sizing recommendations to optimize performance and permit future flexibility

- To avoid or minimize bypass during cold start the actual assembly clean  $\Delta P$  calculation should be repeated for start-up conditions if cold starts are frequent.
- Actual assembly clean  $\Delta P$  should not exceed 10% of bypass  $\Delta P$  gauge/indicator set point at normal operating viscosity.
- If suitable assembly size is approaching the upper limit of the recommended flow rate at the desired degree of filtration consider increasing the assembly to the next larger size if a finer degree of filtration might be preferred in the future. This practice allows the future flexibility to enhance fluid cleanliness without compromising clean  $\Delta P$  or filter element life.
- Once a suitable filter assembly size is determined consider increasing the assembly to the next larger size to optimize filter element life and avoid bypass during cold start.
- When using water glycol or other specified synthetics, we recommend increasing the filter assembly by 1~2 sizes.

## Step 1: Calculate $\Delta P$ coefficient for actual viscosity

### Using Saybolt Universal Seconds (SUS)

$$\Delta P \text{ Coefficient} = \frac{\text{Actual Operating Viscosity}_1 \text{ (SUS)}}{150} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

### Using Centistokes (cSt)

$$\Delta P \text{ Coefficient} = \frac{\text{Actual Operating Viscosity}_1 \text{ (cSt)}}{32} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

## Step 2: Calculate actual clean filter assembly $\Delta P$ at both operating and cold start viscosity

$$\text{Actual Assembly Clean } \Delta P = \text{Flow Rate} \times \Delta P \text{ Coefficient (from Step 1)} \times \text{Assembly } \Delta P \text{ Factor (from sizing table)}$$

$\Delta P$ Factors <sup>1</sup>	Model	Length	Units	Media								
				VTM	05M	1M	3M	6M	10M	16M	25M	**W
LF	16/18		psid/gpm	0.0628	0.0473	0.0463	0.0391	0.0303	0.0271	0.0266	0.0256	0.0046
			bard/lpm	0.0011	0.0009	0.0008	0.0007	0.0006	0.0005	0.0005	0.0005	0.0001
	36/39		psid/gpm	0.0440	0.0331	0.0324	0.0273	0.0212	0.0190	0.0186	0.0179	0.0032
			bard/lpm	0.0008	0.0006	0.0006	0.0005	0.0004	0.0003	0.0003	0.0003	0.0001
LFM3	36/39		psid/gpm	0.0122	0.0092	0.0081	0.0055	0.0051	0.0045	0.0041	0.0035	0.0029
			bard/lpm	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
LFM4	36/39		psid/gpm	0.0091	0.0069	0.0067	0.0048	0.0044	0.004	0.0037	0.0032	0.0025
			bard/lpm	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00005
	Model	Length	Units	Media								
				1A	3A	6A	10A	16A	25A			
LF	16/18		psid/gpm	0.0514	0.0434	0.0336	0.0302	0.0295	0.0284			
			bard/lpm	0.0009	0.0008	0.0006	0.0005	0.0005	0.0005			
	36/39		psid/gpm	0.0360	0.0304	0.0235	0.0211	0.0207	0.0199			
			bard/lpm	0.0007	0.0006	0.0004	0.0004	0.0004	0.0004			
LFM3	36/39		psid/gpm	0.0073	0.0049	0.0046	0.0040	0.0037	0.0031			
			bard/lpm	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001			
LFM4	36/39		psid/gpm	0.0060	0.0043	0.0040	0.0036	0.0033	0.0029			
			bard/lpm	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001			

Max flow rates and  $\Delta P$  factors assume  $\mu$  = 150 SUS, 32 cSt. See filter assembly sizing guideline for viscosity conversion formula on page 22 for viscosity change.

# LF (M) Specifications

Dimensions	See Installation Drawings for model specific dimensions.			
Operating Temperature	<b>Fluid Temperature</b> 30°F to 225°F (0°C to 105°C)		<b>Ambient Temperature</b> -4°F to 140°F (-20C to 60C)	
Operating Pressure	150 psi (10 bar) standard, see Special Options for additional pressure ratings.			
Element Collapse Rating	<b>HP105</b> 150 psi (10.3 bar)	<b>HP106</b> 150 psi (10.3 bar)	<b>HP107</b> 150 psi (10.3 bar)	<b>HP8314 (All Codes)</b> 150 psi (10.3 bar)
Integral Bypass Setting	<b>HP106 – integral element bypass</b> 25 psid (1.7 bard)	<b>HP107 – Integral element bypass</b> 50 psid (3.4 bard)	<b>HP8314 (Code 82) – Integral housing bypass</b> 25 psid (1.7 bard)	<b>HP8314 (Code 83) – Integral housing bypass</b> 50 psid (3.4 bard)
Materials of Construction	<b>Housing</b> Carbon steel with industrial coating Optional 304/316 stainless steel			
Media Description	<b>M</b> G8 Dualglass, our latest generation of DFE rated, high performance glass media for all hydraulic & lubrication fluids. $\beta_{x_{[C]}} \geq 4000$	<b>A</b> G8 Dualglass high performance media combined with water removal scrim. $\beta_{x_{[C]}} \geq 4000$	<b>W</b> Stainless steel wire mesh media $\beta_{x_{[C]}} \geq 2$ ( $\beta_x \geq 2$ )	<b>VTM</b> $\beta_{0.9_{[C]}} \geq 4000$ particulate, insoluble oxidation by-product and water removal media
Replacement Elements	<b>To determine replacement elements, use corresponding codes from your assembly part number:</b>			
	<b>Element Type Code</b> 5 6 7	<b>Filter Element Part Number</b> HP105L[Length Code] – [Media Selection Code][Seal Code] HP106L[Length Code] – [Media Selection Code][Seal Code] HP107L[Length Code] – [Media Selection Code][Seal Code]		<b>Example</b> HP105L36–6AB HP106L18–10MV HP107L36–VTM710V
	8X 82 85	HP8314L[Length Code] – [Media Selection Code][Seal Code] HP8314L[Length Code] – [Media Selection Code][Seal Code] HP8314L[Length Code] – [Media Selection Code][Seal Code]		HP8314L39–25WV HP8314L16–12MB HP8314L39–16ME–WS
Fluid Compatibility	Petroleum and mineral based fluids, #2 diesel fuels (standard). For specified synthetics contact factory for compatibility with fluorocarbon seal option. For phosphate ester (P9) or skydrol fluid (S9) compatibility select fluid compatibility from special options.			

# LF(M) Part Number Builder

LF

					-		-	
Series	Connection	Element Type	Element Length	ΔP Indicator	Special Options	Media	Seal	

Series	Number of Elements	Max Flow Rate
<b>omit</b>	1 element	200 gpm (757 lpm) <sup>1</sup>
<b>M3</b>	3 elements	600 gpm (2271 lpm) <sup>1</sup>
<b>M4</b>	4 elements	800 gpm (3028 lpm) <sup>1</sup>
<b>M9</b>	9 elements	1800 gpm (6814 lpm) <sup>1</sup>
<b>M14</b>	14 elements	2800 gpm (10,600 lpm) <sup>1</sup>
<b>M22</b>	22 elements	4400 gpm (16,656 lpm) <sup>1</sup>
<b>M38</b>	38 elements	7600 gpm (28,769 lpm) <sup>1</sup>

Connection		
<b>A2</b>	2" ANSI flange – 150# standard	<b>D4</b> 4" DIN flange
<b>A3</b>	3" ANSI flange – 150# standard	<b>D6</b> 6" DIN flange
<b>A4</b>	4" ANSI flange – 150# standard	<b>F2<sup>1</sup></b> 2" Code 61 flange
<b>A6</b>	6" ANSI flange – 150# standard	<b>F3<sup>1</sup></b> 3" Code 61 flange
<b>D2</b>	DN50 DIN flange – PN16 standard	<b>G2</b> 2" G thread (BSPP)
<b>D3</b>	DN80 DIN flange – PN16 standard	<b>N2</b> 2" NPT
		<b>S2<sup>2</sup></b> 2" SAE threaded O-ring boss

Element Type		
<b>1</b>	HP101 – no bypass	<b>8X</b> HP8314 – no bypass
<b>5</b>	HP105 – no bypass	<b>82</b> HP8314 – 25 psid (1.7 bard) integral housing bypass
<b>6</b>	HP106 – 25 psid (1.7 bard) integral element bypass	<b>85</b> HP8314 – 50 psid (3.4 bard) integral housing bypass
<b>7</b>	HP107 – 50 psid (3.4 bard) integral element bypass	

Element Length		
<b>18<sup>3</sup></b>	L18 single length filter housing and coreless element	<b>16<sup>3</sup></b> L16 single length filter housing and coreless element
<b>36<sup>3</sup></b>	L36 single length filter housing and coreless element	<b>39<sup>3</sup></b> L39 single length filter housing and coreless element

ΔP Indicator		
<b>D</b>	22 psid visual gauge + electric switch	<b>H</b> 65 psid visual gauge + electric switch (elements 5 or 8X only)
<b>E</b>	22 psid visual gauge	<b>J</b> 65 psid visual gauge (elements 5 or 8X only)
<b>F</b>	45 psid visual gauge + electric switch	<b>P</b> 2 pressure gages (industrial liquid filled)
<b>G</b>	45 psid visual gauge	<b>X</b> None (ports plugged)

Special Options		
<b>omit</b>	150 psi (10.3 bar) max operating pressure, carbon steel	<b>S3<sup>5</sup></b> 450 psi (31.0 bar) max oper. pressure, 304 stainless steel
<b>F</b>	Filter element ΔP gauge with tattle tale follower needle	<b>S9<sup>6</sup></b> Skydrol fluid compatibility modification
<b>G</b>	Spill retention pan with fork guides (industrial coated steel)	<b>U1</b> U Code (ASME U code certified)
<b>P9<sup>4</sup></b>	Phosphate ester fluid compatibility modification	<b>W</b> Automatic air bleed valve
<b>S1<sup>5</sup></b>	150 psi (10.3 bar) max oper. pressure, 304 stainless steel	<b>X</b> 250 psi (17.2 bar) max oper. pressure, carbon steel
<b>S2<sup>5</sup></b>	250 psi (17.2 bar) max oper. pressure, 304 stainless steel	<b>Y</b> 450 psi (31.0 bar) max oper. pressure, carbon steel

Media Selection	G8 Dualglass	G8 Dualglass + water removal	Stainless wire mesh
<b>05M</b>	β <sub>0.9</sub> <sub>[C]</sub> ≥ 4000	<b>1A</b> β <sub>3</sub> <sub>[C]</sub> ≥ 4000	<b>25W</b> 25μ nominal
<b>1M</b>	β <sub>3</sub> <sub>[C]</sub> ≥ 4000	<b>3A</b> β <sub>5</sub> <sub>[C]</sub> ≥ 4000	<b>40W</b> 40μ nominal
<b>3M</b>	β <sub>5</sub> <sub>[C]</sub> ≥ 4000	<b>6A</b> β <sub>7</sub> <sub>[C]</sub> ≥ 4000	<b>74W</b> 74μ nominal
<b>6L</b>	β <sub>7</sub> <sub>[C]</sub> ≥ 4000	<b>10A<sup>7</sup></b> β <sub>12</sub> <sub>[C]</sub> ≥ 4000	<b>149W</b> 149μ nominal
<b>10M<sup>7</sup></b>	β <sub>12</sub> <sub>[C]</sub> ≥ 4000	<b>16A</b> β <sub>16</sub> <sub>[C]</sub> ≥ 4000	
<b>16M</b>	β <sub>17</sub> <sub>[C]</sub> ≥ 4000	<b>25A</b> β <sub>22</sub> <sub>[C]</sub> ≥ 4000	
<b>25M</b>	β <sub>22</sub> <sub>[C]</sub> ≥ 4000		

## VTM

**VTM710<sup>8</sup>** β<sub>0.9</sub><sub>[C]</sub> ≥ 4000 particulate, insoluble oxidation by-product and water removal media

Seals	
<b>B</b>	Nitrile (Buna)
<b>V</b>	Fluorocarbon
<b>E-WS</b>	EPR seals + stainless steel support mesh

<sup>1</sup>Maximum recommended flow rate based on velocity through port and internal flow path. Consult sizing guidelines or consult factory for sizing based on flow rate, viscosity, temperature, filter media selection.

<sup>2</sup>Code 61 flange and SAE connection options include all other ports with SAE connections. When selected, no NPT connections are present in the assembly.

<sup>3</sup>Compatibility will be based on Element Type selection. For elements HP105, HP106, and HP107, use Length Code 18 or 36. Length Codes 16 and 39 only compatible with HP8314 element.

<sup>4</sup>When selected, must be paired with Seal option "V." Contact factory for more information or assistance in fluid compatibility.

<sup>5</sup>Lid closure hardware is plated carbon steel.

<sup>6</sup>When selected, must be paired with Seal option "E-WS." Contact factory for more information or assistance in fluid compatibility.

<sup>7</sup>For elements HP8314, use 12M or 12A for respective media code in place of 10M or 10A.

<sup>8</sup>Only available on HP107 series elements. Max recommended flow rate 16 gpm (60 lpm) for HP107L36-VTM710\* elements and 8 gpm (30 lpm) for HP107L18-VTM710\* elements.

For all up to date option details and compatibilites, please reference our Contamination Solutions Price List or contact customer service.



# Filtration starts with the filter.

**Lower ISO Codes: Lower Total Cost of Ownership** Donaldson Hy-Pro filter elements deliver lower operating ISO Codes so you know your fluids are always clean, meaning lower total cost of ownership and reducing element consumption, downtime, repairs, and efficiency losses.

**DFE Rated Filter Elements** DFE is Donaldson Hy-Pro's proprietary testing process which extends ISO 16889 Multi Pass testing to include real world, dynamic conditions and ensures that our filter elements excel in your most demanding hydraulic and lube applications.

**Upgrade Your Filtration** Keeping fluids clean results in big reliability gains and upgrading to Donaldson Hy-Pro filter elements is the first step to clean oil and improved efficiency.

**Advanced Media Options** DFE glass media maintaining efficiency to  $\beta_{3\mu} > 4000$ , Dualglass + water removal media to remove free and emulsified water, stainless wire mesh for coarse filtration applications, and Dynafuzz stainless fiber media for EHC and aerospace applications.

**Delivery in days, not weeks** From a massive inventory of ready-to-ship filter elements to flexible manufacturing processes, Donaldson Hy-Pro is equipped for incredibly fast response time to ensure you get your filter elements and protect your uptime.

**More than just filtration** Purchasing Donaldson Hy-Pro filter elements means you not only get the best filters, you also get the unrivaled support, training, knowledge and expertise of the Donaldson Hy-Pro team working shoulder-to-shoulder with you to eliminate fluid contamination.



**Want to find out more? Get in touch.**

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