



# FCL

## High Viscosity Filter Cart

A self contained solution for high viscosity bulk oil handling, fluid transfer and reservoir or gearbox conditioning.

Ideal for higher viscosity lube oil and highly contaminated fuel and hydraulic oil.

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Donaldson.  
HY-PRO™

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

## Built-in versatility.

From cold weather to cold starts, the FCL is engineered to easily handle almost any job you can throw at it. Rugged construction including the heavy duty, oversized filter housing and cast iron gear pump with internal relief all come together so that you can be sure the FCL will tackle your application with ease.



## Filtration starts with the filter.

The oversized coreless filter element in every FCL 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.



## Unmatched on the move.

Non-shredding wheels, optional off-road, heavy duty tires, and easy to maneuver cart design with ergonomic handle mean you get powerful filtration exactly when and where you need it.



## Setting the new standard.

Sampling is no longer an option, it's a necessity. That's why every FCL comes standard with upstream and downstream sample ports located in the proper positions for best practice oil sampling. You'll get consistently accurate readings and a first hand view at just how well your FCL is working.



## With options to make your job easier.

Use the FCL to pump out your gearbox or to ease cold starts and get your system up to temperature faster with the optional complete filter bypass line. Add on the PM-1 Particle Monitor to see real time ISO Codes of your fluid and you'll be amazed to watch how effective your FCL will be.



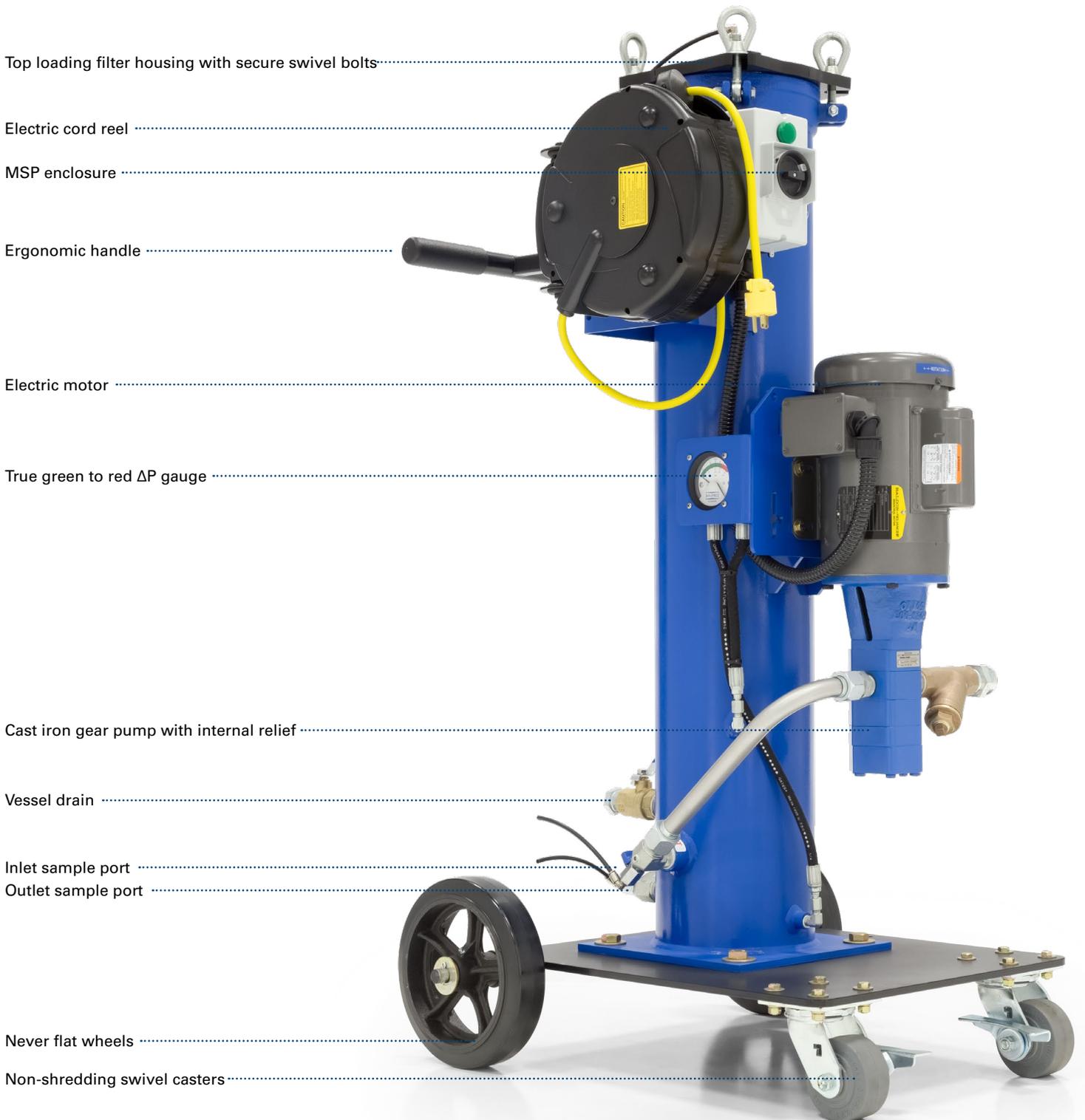
## Completely customizable.

Tailor your FCL specifically to your application with options including pneumatic or explosion proof models, CE and CUL marks, and stainless steel construction for safety and compatibility with your existing systems. And if you're nice, we'll even let you trick it out with a custom paint job.



# FCL Quick Guide

FCL10 model shown (L36 element length)



# Filter Sizing Guidelines

## Filter Sizing Guidelines and Viscosity Conversion

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.

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)

$$\Delta P \text{ Coefficient} = \frac{\text{Actual Operating Viscosity}^1 \text{ (cSt)}}{32} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

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

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

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.

# Filter Sizing Guidelines

$\Delta P$ Factors <sup>1</sup>	Length	Units	Media	05M	1M	3M	6M	10M	16M	25M	**W
			VTM								
	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

Length	Units	Media	3A	6A	10A	16A	25A
		1A					
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

<sup>1</sup>Max flow rates and  $\Delta P$  factors assume  $\beta = 150$  SUS, 32 cSt. See filter assembly sizing guideline for viscosity conversion formula.

# FCL Specifications

<b>Dimensions<sup>1</sup></b>	<b>Height</b> 57" (144 cm)	<b>Width</b> 30" (77 cm)	<b>Depth</b> 30" (77 cm)	<b>Approximate Weight</b> 351 lbs (159 kg)
<b>Connections</b>	<b>Inlet</b> FCL05-FCL5: 1" male JIC (37° flare) FCL10: 1.25" male JIC (37° flare) FCL20-FCL30: 1.5" male JIC (37° flare)	<b>Outlet</b> FCL05-FCL10: 1" male JIC (37° flare) FCL20-FCL30: 1.25" male JIC (37° flare)	<b>Hoses</b> FCL05-FCL5: 1" x 10 ft (2.4 m) FCL10: 1.25" x 10 ft (2.4 m) suction 1" x 10 ft (2.4 m) discharge FCL20-FCL30: 1.5" x 10 ft (2.4 m) suction 1.25" x 10 ft (2.4 m) discharge	
<b>Operating Temperature</b>	<b>Fluid Temperature</b> 30°F to 225°F (0°C to 105°C)	<b>Ambient Temperature</b> -4°F to 104°F (-20C to 40C)		
<b>Materials of Construction</b>	<b>Housing</b> Carbon steel with industrial coating	<b>Hoses</b> Reinforced synthetic	<b>Wands</b> Stainless steel	
<b>Electric Motor</b>	TEFC, 56-215 frame 0.5 – 7.5HP, 900 – 1750 RPM, see Appendix for amp ratings.			
<b>Motor Starter</b>	MSP (motor starter/protector) in an IP55, enclosure with short circuit and overload protection.			
<b>Electric Connection</b>	Voltages 230 V ac and under, single phase: 35' (11 m) retractable cord reel included. NEMA 5-15 plug installed on Power Option 12. Voltages over 230 V ac: 35' (11 m) loose cord included.			
<b>Pump</b>	Cast iron, positive displacement gear pump with internal relief. Maximum pressure on pump inlet 15 psi (1 bar). Consult factory for higher pressures.			
<b>Pump Bypass</b>	Full bypass at 150 psi (10 bar) <sup>2</sup>			
<b>Pneumatic Option Air Consumption</b>	~40 cfm @ 80 psi <sup>3</sup> 35' (11 m) retractable air hose included when pneumatic option selected. Replaces 35' (11m) electric cord reel.			
<b>Media Description</b>	<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
<b>Replacement Elements</b>	<b>To determine replacement elements, use corresponding codes from your equipment part number:</b>			
	<b>Element Type Code</b>	<b>Filter Element Part Number</b>	<b>Example</b>	
	5	HP105L[Length Code] – [Media Selection Code][Seal Code]	HP105L36–6AB	
	6	HP106L[Length Code] – [Media Selection Code][Seal Code]	HP106L18–10MV	
	7	HP107L[Length Code] – [Media Selection Code][Seal Code]	HP107L36–VTM710V	
	8X	HP8314L[Length Code] – [Media Selection Code][Seal Code]	HP8314L39–25WV	
	82	HP8314L[Length Code] – [Media Selection Code][Seal Code]	HP8314L16–12MB	
	85	HP8314L[Length Code] – [Media Selection Code][Seal Code]	HP8314L39–16ME–WS	
<b>Viscosity</b>	2-5000 cSt <sup>4</sup>			
<b>Fluid Compatibility</b>	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.			
<b>Hazardous Environment Options</b>	Select pneumatic powered unit (Power Option 00) or explosion proof NEC Article 501, Class 1, Division 1, Group D. Call for IEC, Atex or other requirements. If Explosion Proof option (X--) selected, no electrical cord or cord reel will be included.			

<sup>1</sup>Dimensions & weights are approximations taken from base model and will vary according to options chosen.

<sup>2</sup>10 GPM pump is rated for intermittent duty only at pressures above 100 psi. Continual operation with dual clogged filters resulting in operating pressures over 100 psi will reduce pump life and/or cause premature pump failure.

<sup>3</sup>Air consumption values are estimated maximums and will vary with regulator setting.

<sup>4</sup>When sized and installed appropriately. Contact factory for applications above 800 cSt for sizing requirements.

# FCL Part Number Builder

**FCL**       -  -

Flow Rate    Element Type    Element Length    Indicator    Power Options    Hose Connection    Special Options    Media    Seal

<b>Flow Rate*</b>	<b>05</b>	0.5 gpm (1.7 lpm)	900 RPM (50Hz) / 1200 RPM (60Hz)	<b>10<sup>1</sup></b>	10 gpm (37.9 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)
	<b>1</b>	1 gpm (3.7 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)	<b>20</b>	20 gpm (75.7 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)
	<b>2</b>	2 gpm (7.5 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)	<b>30</b>	30 gpm (114 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)
	<b>5</b>	5 gpm (18.9 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)			

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

<b>Element Length</b>	<b>16<sup>2</sup></b>	L16 single length filter housing and coreless element	<b>18<sup>2</sup></b>	L18 single length filter housing and coreless element
	<b>36<sup>2</sup></b>	L36 single length filter housing and coreless element	<b>39<sup>2</sup></b>	L39 single length filter housing and coreless element

<b>ΔP Indicator</b>	<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>Power Options</b> Contact factory for options not listed	<b>60 Hz</b>		<b>50 Hz</b>		<b>Pneumatic</b>
	<b>12</b>	120 V ac, 1P	<b>11</b>	110 V ac, 1P	<b>00</b> Pneumatically driven air motor & PD pump. FRL & flow meter included.
	<b>22</b>	208-230 V ac, 1P	<b>21</b>	220 V ac, 1P	
	<b>23</b>	208-230 V ac, 3P	<b>40</b>	380-440 V ac, 3P	
	<b>46</b>	460-480 V ac, 3P	<b>52</b>	525 V ac, 3P	
	<b>57</b>	575 V ac, 3P			

**Explosion proof - Class 1, Division 1, Group D per NEC 501 – Ready for outdoor use**

**X** Add X prefix to power option listed above. Not available with (00) Pneumatic Option.

<b>Hose Connection</b>	<b>G</b>	Female BSPP swivel hose ends, no wands
	<b>S</b>	Female JIC swivel hose ends, no wands
	<b>W</b>	Female JIC swivel hose ends, with wands

<b>Special Options</b>	<b>B</b>	Complete filter bypass line	<b>M</b>	Total system flow meter (120 cSt max)
	<b>C</b>	CE marked for machinery safety directive 2006/42/EC	<b>O<sup>4</sup></b>	On-board PM-1 particle monitor & clean oil indicator light
	<b>D<sup>3</sup></b>	High filter ΔP auto shutdown	<b>P9<sup>5</sup></b>	Phosphate ester fluid compatibility modification
	<b>E</b>	100 mesh cast iron basket strainer	<b>R</b>	Spill retention pan with 4.5" caster wheels (industrial coated steel)
	<b>F</b>	Filter element ΔP gauge with tattle tale follower needle	<b>S<sup>6</sup></b>	All wetted components 303 or higher stainless steel
	<b>G</b>	Spill retention pan with fork guides (industrial coated steel)	<b>S9<sup>7</sup></b>	Skydrol fluid compatibility modification
	<b>H1</b>	10' (3 m) return line hose extension	<b>T<sup>8</sup></b>	Foam filled off-road tires for rugged environment
	<b>H2</b>	20' (6 m) return line hose extension	<b>U</b>	CUL and/or CSA marked starter enclosure for Canada
	<b>J</b>	Add pressure gauge between pump & filter assembly	<b>W</b>	Automatic air bleed valve
	<b>K</b>	HP75L8-149W Spin-On suction strainer	<b>Y</b>	VFD variable speed motor frequency control
	<b>L</b>	High filter element ΔP indicator light	<b>Z</b>	On site start-up training

<b>Media Selection</b>	<b>G8 Dualglass</b>		<b>G8 Dualglass + water removal</b>		<b>Stainless wire mesh</b>	
	<b>05M</b>	β <sub>0.9</sub> (c) ≥ 4000	<b>3A</b>	β <sub>4</sub> (c) ≥ 4000	<b>25W</b>	25μ nominal
	<b>1M</b>	β <sub>3</sub> (c) ≥ 4000	<b>6A</b>	β <sub>6</sub> (c) ≥ 4000	<b>40W</b>	40μ nominal
	<b>3M</b>	β <sub>4</sub> (c) ≥ 4000	<b>10A<sup>9</sup></b>	β <sub>11</sub> (c) ≥ 4000	<b>74W</b>	74μ nominal
	<b>6L</b>	β <sub>6</sub> (c) ≥ 4000	<b>25A</b>	β <sub>22</sub> (c) ≥ 4000	<b>149W</b>	149μ nominal
	<b>10M<sup>9</sup></b>	β <sub>11</sub> (c) ≥ 4000				
	<b>16M</b>	β <sub>16</sub> (c) ≥ 4000				
	<b>25M</b>	β <sub>22</sub> (c) ≥ 4000				

**VTM**

**VTM710<sup>10</sup>** β<sub>0.9</sub>(c) ≥ 4000 particulate, insoluble oxidation by-product and water removal media

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

\*Nominal flow rates at 60 Hz motor speeds.

<sup>1</sup>Has a max viscosity 200cSt limitation with 1P electrical option, and not available with "O" special option.

<sup>2</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.

<sup>3</sup>"D & L" Option requires DP Indicator option with electric switch selected (options D,F,H).

<sup>4</sup>"O" Option not available with "X\_" or "Y" options. "O" Option includes "J" option, do not add to part number. "O" Option not available with 30 GPM flow rate.

<sup>5</sup>When selected, must be paired with Seal option "V." Contact factory for more information or assistance in fluid compatibility.

<sup>6</sup>With exception to cast iron gear pump.

<sup>7</sup>When selected, must be paired with Seal option "E-WS." Contact factory for more information or assistance in fluid compatibility.

<sup>8</sup>When selected, front casters of unit will be replaced with stationary feet. "T" Option not available with "G & R" options.

<sup>9</sup>For elements HP8314, use 12M or 12A for respective media code in place of 10M or 10A.

<sup>10</sup>Only available on HP107 series elements. Flow rate should not exceed 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 compatibilities, 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  $\beta_{3[\text{e}]}$  > 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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