



FCL

High Viscosity Filter Cart

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

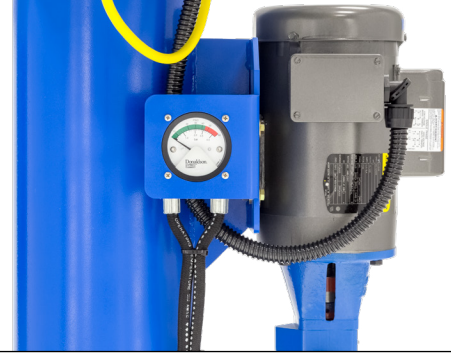
Ideal for higher viscosity lube oil and highly contaminated fuel and hydraulic oil.

Donaldson.
HY-PRO™

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.



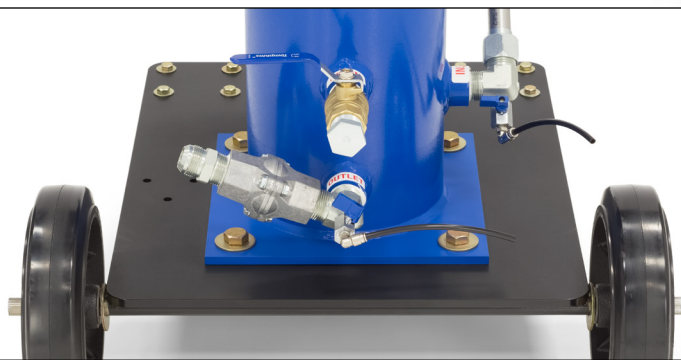
Unmatched on the move.

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.



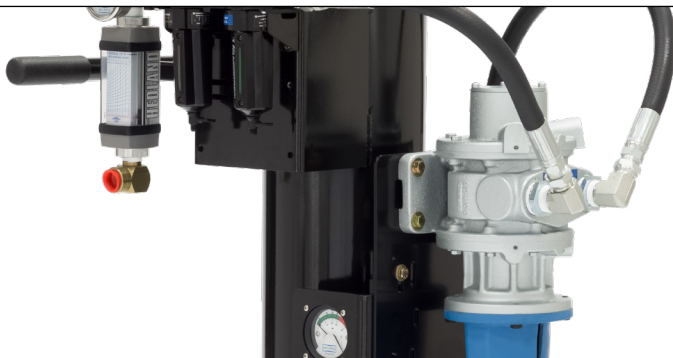
With options to make your job easier.

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)

Top loading filter housing with secure swivel bolts

Electric cord reel

MSP enclosure

Ergonomic handle

Electric motor

True green to red ΔP gauge

Cast iron gear pump with internal relief

Vessel drain

Inlet sample port

Outlet sample port

Never flat wheels

Non-shredding swivel casters



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 ΔP 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 ΔP 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 ΔP calculation should be repeated for start-up conditions if cold starts are frequent.
- Actual assembly clean ΔP should not exceed 10% of bypass ΔP 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 ΔP 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

ΔP Factors ¹	Length	Units	Media								
			VTM	05M	1M	3M	6M	10M	16M	25M	**W
	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					
		1A	3A	6A	10A	16A	25A
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

¹Max flow rates and ΔP factors assume $\beta = 150$ SUS, 32 cSt. See filter assembly sizing guideline for viscosity conversion formula.

FCL Specifications

Dimensions¹	Height 57" (144 cm)	Width 30" (77 cm)	Depth 30" (77 cm)	Weight 351 lbs (159 kg)
Connections	Inlet FCL05-FCL5: 1" male JIC (37° flare) FCL10: 1.25" male JIC (37° flare) FCL20-FCL30: 1.5" male JIC (37° flare)	Outlet FCL05-FCL10: 1" male JIC (37° flare) FCL20-FCL30: 1.25" male JIC (37° flare)	Hoses 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- 1.5" x 10 ft (2.4 m) suction FCL30: 1.25" x 10 ft (2.4 m) discharge	
Operating Temperature	Fluid Temperature 30°F to 225°F (0°C to 105°C)	Ambient Temperature -4°F to 104°F (-20C to 40C)		
Materials of Construction	Housing Carbon steel with industrial coating	Hoses Reinforced synthetic	Wands Stainless steel	
Electric Motor	TEFC, 56-215 frame 0.5-3 hp, 1450-1750 RPM, see Appendix for amp ratings.			
Motor Starter	MSP (motor starter/protector) in an IP65, aluminum enclosure with short circuit and overload protection.			
Electric Connection	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.			
Pump	Cast iron, positive displacement gear pump with internal relief. Maximum pressure on pump inlet 15 psi (1 bar). Consult factory for higher pressures.			
Pump Bypass	Full bypass at 150 psi (10 bar) ²			
Pneumatic Option Air Consumption	~40 cfm @ 80 psi ³ 35' (11 m) retractable air hose included when pneumatic option selected. Replaces 35' (11m) electric cord reel.			
Media Description	M G8 Dualglass, our latest generation of DFE rated, high performance glass media for all hydraulic & lubrication fluids. $\beta_{x_{(c)}} \geq 4000$	A G8 Dualglass high performance media combined with water removal scrim. $\beta_{x_{(c)}} \geq 4000$	W Stainless steel wire mesh media $\beta_{x_{(c)}} \geq 2$ ($\beta_x \geq 2$)	VTM $\beta_{0.9_{(c)}} \geq 4000$ particulate, insoluble oxidation by-product and water removal media
Replacement Elements	To determine replacement elements, use corresponding codes from your equipment part number:			
	Element Type Code	Filter Element Part Number	Example	
	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	
Viscosity	2-5000 cSt ⁴			
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.			
Hazardous Environment Options	Select pneumatic powered unit (Power Option 00) or explosion proof NEC Article 501, Class 1, Division 1, Group C+D. Call for IEC, Atex or other requirements. If Explosion Proof option (X--) selected, no electrical cord or cord reel will be included.			

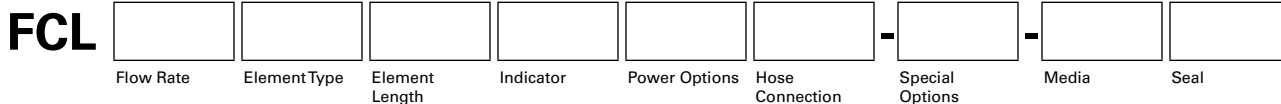
¹Dimensions are approximations taken from base model and will vary according to options chosen.

²10 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.

³Air consumption values are estimated maximums and will vary with regulator setting.

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

FCL Part Number Builder



Flow Rate¹	05	0.5 gpm (1.7 lpm)	10	10 gpm (37.9 lpm)
	1	1 gpm (3.7 lpm)	20	20 gpm (75.7 lpm)
	2	2 gpm (7.5 lpm)	30	30 gpm (114 lpm)
	5	5 gpm (18.9 lpm)		

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

Element Length	16²	L16 single length filter housing and coreless element	18²	L18 single length filter housing and coreless element
	36²	L36 single length filter housing and coreless element	39²	L39 single length filter housing and coreless element

ΔP Indicator	D	22 psid visual gauge + electric switch	H	65 psid visual gauge + electric switch (elements 5 or 8X only)
	E	22 psid visual gauge	J	65 psid visual gauge (elements 5 or 8X only)
	F	45 psid visual gauge + electric switch	P	2 pressure gages (industrial liquid filled)
	G	45 psid visual gauge		

Power Options Contact factory for options not listed	60 Hz, 1750 RPM	50 Hz, 1450 RPM	Pneumatic
	12 120 V ac, 1P	11 110 V ac, 1P	00 Pneumatically driven air motor & PD pump. FRL & flow meter included.
	22 208-230 V ac, 1P	21 220 V ac, 1P	
	23 208-230 V ac, 3P	40 380-440 V ac, 3P	
	46 460-480 V ac, 3P	52 525 V ac, 3P	

Explosion proof - Class 1, Division 1, Group C+D per NEC 501 – Ready for outdoor use
X Add X prefix to power option listed above. Not available with (00) Pneumatic Option.

Hose Connection	G	Female BSPP swivel hose ends, no wands
	S	Female JIC swivel hose ends, no wands
	W	Female JIC swivel hose ends, with wands

Special Options	B	Complete filter bypass line	M	Total system flow meter (120 cSt max)
	C	CE marked for machinery safety directive 2006/42/EC	O	On-board PM-1 particle monitor & clean oil indicator light
	D	High filter ΔP auto shutdown	P9³	Phosphate ester fluid compatibility modification
	E	100 mesh cast iron basket strainer	R	Spill retention pan with 4.5" caster wheels (industrial coated steel)
	F	Filter element ΔP gauge with tattle tale follower needle	S⁴	All wetted components 304 or higher stainless steel
	G	Spill retention pan with fork guides (industrial coated steel)	S9⁵	Skydrol fluid compatibility modification
	H1	10' (3 m) return line hose extension	T⁶	Foam filled off-road tires for rugged environment
	H2	20' (6 m) return line hose extension	U	CUL and/or CSA marked starter enclosure for Canada
	J	Add pressure gauge between pump & filter assembly	W	Automatic air bleed valve
	K	HP75L8-149W Spin-On suction strainer	Y	VFD variable speed motor frequency control
	L	High filter element ΔP indicator light	Z	On site start-up training

Media Selection	G8 Dualglass	G8 Dualglass + water removal	Stainless wire mesh
	05M β _{0.9} (_{cl}) ≥ 4000	3A β ₄ (_{cl}) ≥ 4000	25W 25μ nominal
	1M β ₃ (_{cl}) ≥ 4000	6A β ₆ (_{cl}) ≥ 4000	40W 40μ nominal
	3M β ₄ (_{cl}) ≥ 4000	10A⁷ β ₁₁ (_{cl}) ≥ 4000	74W 74μ nominal
	6L β ₆ (_{cl}) ≥ 4000	25A β ₂₂ (_{cl}) ≥ 4000	149W 149μ nominal
	10M⁷ β ₁₁ (_{cl}) ≥ 4000		
	16M β ₁₆ (_{cl}) ≥ 4000		

VTM
VTM710⁸ β_{0.9}(_{cl}) ≥ 4000 particulate, insoluble oxidation by-product and water removal media

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

¹Nominal flow rates at 60 Hz motor speeds.
²Compatibility 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.
³When selected, must be paired with Seal option "V." Contact factory for more information or assistance in fluid compatibility.
⁴With exception to cast iron gear pump.
⁵When selected, must be paired with Seal option "E-WS." Contact factory for more information or assistance in fluid compatibility.
⁶When selected, front casters of unit will be replaced with stationary feet.
⁷For elements HP8314, use 12M or 12A for respective media code in place of 10M or 10A.
⁸Only 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.

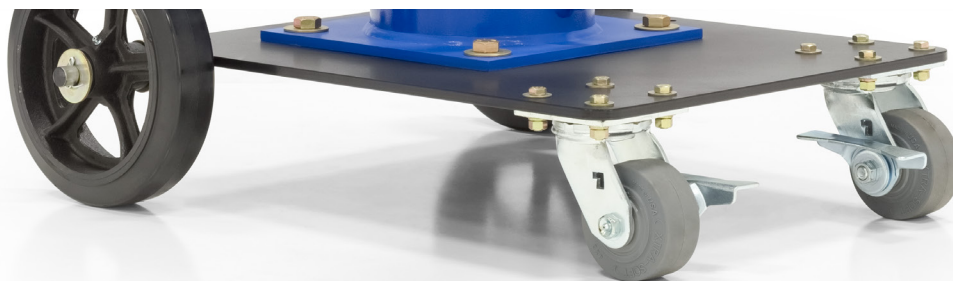
DFE Rated Filter Elements DFE is Donaldson Hy-Pro's proprietary testing process which extends ISO 16889 Multi Pass testing to include real world, dynamic conditions and ensures that our filter elements excel in your most demanding hydraulic and lube applications.

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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