



FPL

Dedicated Off-line Filter Panel

A dedicated contamination solution for bulk oil handling, fluid transfer and reservoir or gearbox conditioning.

Enhance cleanliness by adding the FPL to an existing hydraulic system and extend the life of in-line filters.

Ready when you are.

From the pump to the seals, every FPL arrives fully assembled and ready for installation so you can get straight to cleaning your fluids and improving the efficiency of your equipment.



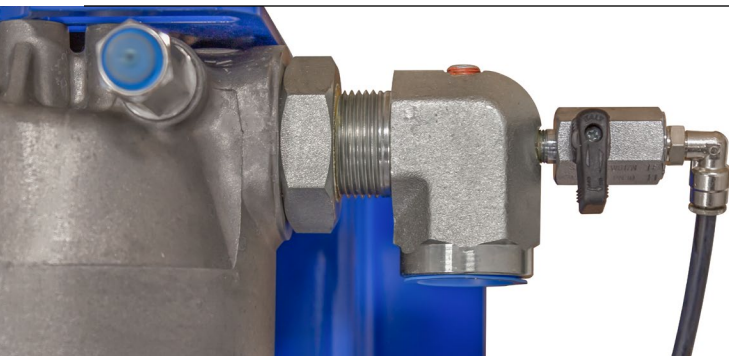
The first stage of success.

Staged filtration allows a range of media selections for particulate and water removal to deliver ISO Codes right on target. Choose between dual MF110 cartridge or up to four Spin-On elements to tackle the most viscous fluids and achieve unimaginably low ISO Codes in a single pass.



Media matters.

DFE rated filter elements stay true to efficiency ratings and ensure the highest level of particulate capture and retention capabilities. And with media options down to $\beta_{3[C]} \geq 4000$, you can be sure contamination stays exactly where you want it: out of your system.



Setting the new standard.

Sample ports in the right locations arm you with access to consistently accurate system conditions which is why every FPL comes standard with upstream and downstream sample ports in their proper positions.

Engineered for industrial use.

Precision engineered and built from heavy gauge steel, the FPL is designed to be a powerhouse addition to your equipment. To top it off, the cast iron gear pump with internal relief gives you the durability you want with the safety you need.

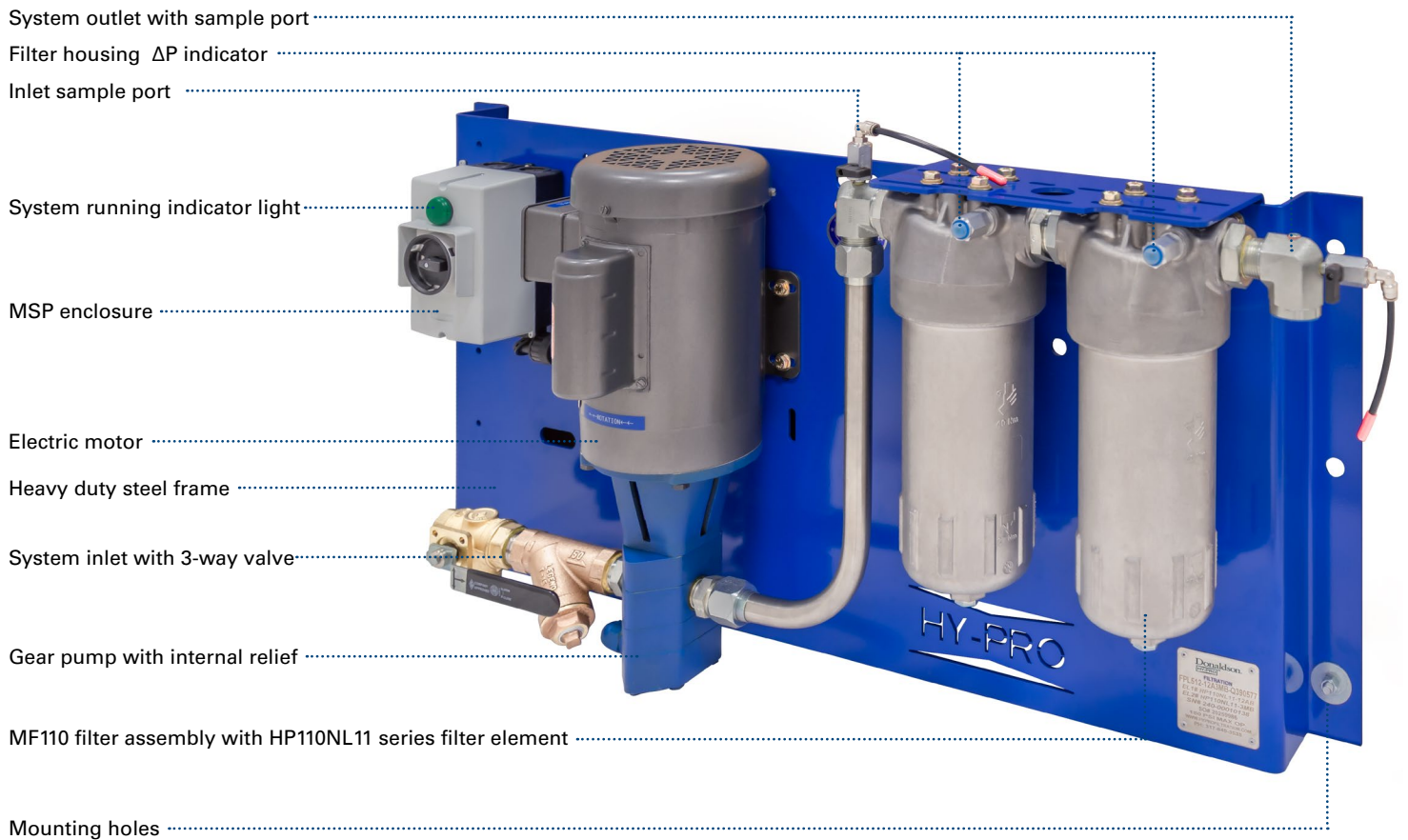


From concept to creation.

Whether for plastic injection molding hydraulics with varnish issues or a wind turbine gearbox with small size restrictions, the FPL can be custom designed and built to meet the exact needs to solve your contamination problems.



FPL Reference Guide



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.

FPL Filter Sizing Guidelines

MF90-MF110 Options ΔP Factors ¹	Series	Length	Units	Media						
				1M	3M	6M	10M	16M	25M	**W
	MF90	L9	psid/gpm	0.270	0.228	0.177	0.159	0.155	0.149	0.027
			bard/lpm	0.005	0.004	0.003	0.003	0.003	0.003	0.000
	MF110	L8	psid/gpm	0.250	0.211	0.164	0.147	0.144	0.138	0.025
			bard/lpm	0.005	0.004	0.003	0.003	0.003	0.003	0.000
		L11	psid/gpm	0.176	0.149	0.115	0.103	0.101	0.097	0.018
			bard/lpm	0.003	0.003	0.002	0.002	0.002	0.002	0.000

S75D Options ΔP Factors ¹	Series	Length	Units	Media						
				1M	3M	6M	12M	16M	25M	**W
	S75D	L8	psid/gpm	0.092	0.077	0.060	0.054	0.053	0.051	0.009
			bard/lpm	0.002	0.001	0.001	0.001	0.001	0.001	0.000
	Series	Length	Units	Media						
				3A	6A	12A	25A	3C	10C	25C
	S75D	L8	psid/gpm	0.086	0.067	0.060	0.056	0.124	0.081	0.078
			bard/lpm	0.002	0.001	0.001	0.001	0.002	0.001	0.001

DFN39 Option ΔP Factors ¹	Series	Length	Units	Media						
				1M	3M	6M	12M	16M	25M	**W
	DFN39N	L15	psid/gpm	0.463	0.391	0.301	0.266	0.218	0.210	0.117
			bard/lpm	0.008	0.007	0.005	0.005	0.004	0.004	0.002

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

FPL Specifications

Dimensions ¹	Height 32" (81 cm)	Length 50.5" (128 cm)	Depth 25" (63.5 cm)			
Connections	Inlet with 3-way valve 1" FNPT		Outlet 1" FNPT			
Operating Temperature	Fluid Temperature 30°F to 225°F (0°C to 105°C)		Ambient Temperature -4°F to 104°F (-20C to 40C)			
ΔP Indicator Trigger	Standard MF110 Assemblies 18 psi (1.2 bar)	Special Options D1 22 psi (1.5 bar)				
Filter Assembly Bypass	Standard MF110 Assemblies 25 psid (1.7 bard)	Special Options D1 25 psid (1.7 bard)				
Materials of Construction	Frame Carbon steel with industrial coating					
Electric Motor	TEFC, 56-185 frame 0.5 - 7.5 hp, 900 - 1750 RPM					
Motor Starter	MSP (motor starter/protector) in an IP55, aluminum enclosure with short circuit and overload protection.					
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					
Media Description	M G8 Dualglass, our latest generation of DFE rated, high performance glass media for all hydraulic & lubrication fluids. βx _[C] ≥ 4000 (βx ≥ 200)	A G8 Dualglass high performance media combined with water removal scrim. βx _[C] ≥ 4000 (βx ≥ 200)	W Stainless steel wire mesh media βx _[C] ≥ 2 (βx ≥ 2)			
Replacement Elements	To determine replacement elements, use corresponding codes from your equipment part number: <table><tr><td>Model Standard FPL (2x MF110 11" bowls) Special Option D1</td><td>Filter Element Part Number HP110NL11 – [Media Selection Code] [Seal Code] HP75L8 – [Media Selection Code] [Seal Code]</td><td>Example HP110NL11-12MV HP75L8-25MB</td></tr></table>			Model Standard FPL (2x MF110 11" bowls) Special Option D1	Filter Element Part Number HP110NL11 – [Media Selection Code] [Seal Code] HP75L8 – [Media Selection Code] [Seal Code]	Example HP110NL11-12MV HP75L8-25MB
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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 will be included.					

¹Dimensions & weights 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.

FPL Part Number Builder

FPL - -

Flow Rate Power Options Special Options Media 1 Media 2 Seal

Flow Rate¹	05	0.5 gpm (1.7 lpm)	900 RPM (50Hz) / 1200 RPM (60Hz)
	1	1 gpm (3.7 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)
	2	2 gpm (7.5 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)
	5	5 gpm (18.9 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)
	10²	10 gpm (37.9 lpm)	1450 RPM (50Hz) / 1750 RPM (60Hz)

Power Options Contact factory for options not listed	60 Hz		50 Hz		Pneumatic 00 Pneumatically driven air motor & PD pump. FRL & flow meter included.
	12	120 V ac, 1P	11	110 V ac, 1P	
	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	
	57	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

Special Options	B	Complete filter bypass line	O⁴	On-board PM-1 particle monitor & clean oil indicator light
	C	CE marked for machinery safety directive 2006/42/EC	P9⁵	Phosphate ester fluid compatibility modification
	D1³	2 x S75DL8 filter assemblies in series	S9⁶	Skydrol fluid compatibility modification
	D3	True differential pressure gauge, visual green to red	U	CUL and/or CSA marked starter enclosure for Canada
	E	100 mesh cast iron basket strainer	Y	VFD variable speed motor frequency control
	J	Add pressure gauge between pump & filter assembly	Z	On site start-up training
	K	HP75L8-149W Spin-On suction strainer	S2	51" (130 cm) Mounting Stand - Ships Fully Assembled
	M	Total system flow meter (120 cSt max)		

Media Selection	G8 Dualglass		G8 Dualglass + water removal		Stainless wire mesh	
	1M	$\beta_{3[C]} \geq 4000$	3A	$\beta_{4[C]} \geq 4000$	25W	25μ nominal
	3M	$\beta_{4[C]} \geq 4000$	6A	$\beta_{6[C]} \geq 4000$	40W	40μ nominal
	6M	$\beta_{6[C]} \geq 4000$	10A	$\beta_{11[C]} \geq 4000$	74W	74μ nominal
	10M	$\beta_{11[C]} \geq 4000$	25A	$\beta_{22[C]} \geq 4000$	149W	149μ nominal
	16M	$\beta_{16[C]} \geq 4000$				
	25M	$\beta_{22[C]} \geq 4000$				

Seals	B	Nitrile (Buna)
	V	Fluorocarbon
	E-WS⁷ EPR seals + stainless steel support mesh	

¹Nominal flow rates at 60 Hz motor speeds.

²Has a max viscosity 200cSt limitation with 1P electrical option, and not available with "O" special option.

³Replaces standard MF110 housings.

⁴"O" option not available with "X__" or "Y" options.

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

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

⁷Only available in 3M media for HP75L8 series 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 $\beta_{3_{\text{te}}}$ > 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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