FPL

Dedicated Off-line Filter Panel

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

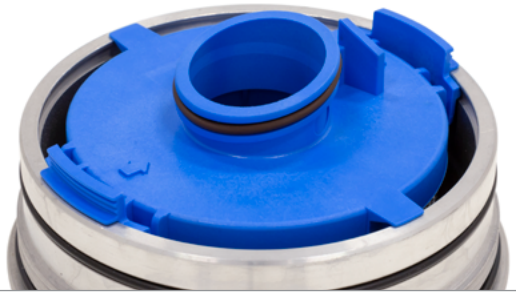
Enhance cleanliness by adding the FPL to an existing hydraulic system and extend the life of in-line filters.

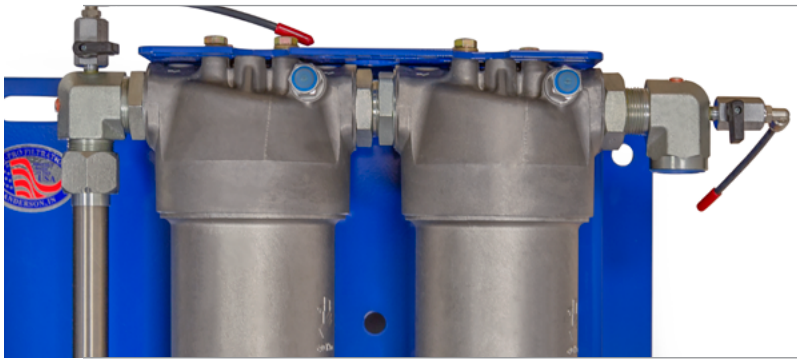
HY-PRO

hyprofiltration.com/FPL

Easy servicing.

When a new element is installed in the bowl, special slots in the MF90 and MF110 bowls allow tabs in the elements' locking grab handles to freely rotate as the bowl is threaded onto the matching head. In this way, the element automatically finds the proper orientation to engage its unique, proprietary seal with the matching seal surface in the head.



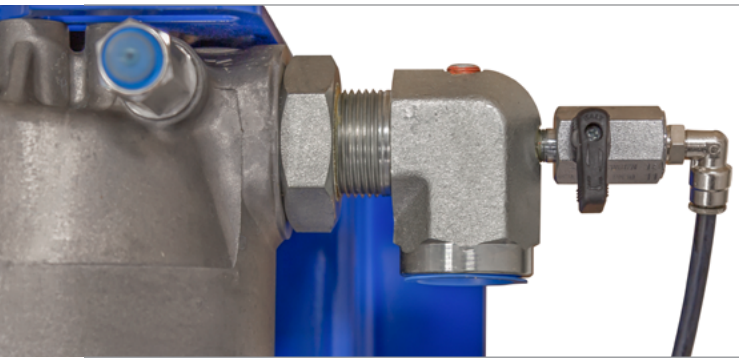


The first stage of success.

Staged filtration allows a range of media selections for particulate and water removal to deliver ISO Codes right on target. Choose between dual MF3 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

System outlet with sample port
Filter housing ΔP indicator
Inlet sample port
System running indicator light
MSP enclosure
Electric motor
Heavy duty steel frame
System inlet with 3-way valve
Gear pump with internal relief
MF110 filter assembly with HP110NL11 series filter element
Mounting holes

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)

$$\text{ΔP Coefficient} = \frac{\text{Actual Operating Viscosity}^{1}\text{ (SUS)}}{150} \times \frac{\text{Actual Specific Gravity}}{0.86}$$

Using Centistokes (cSt)

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

Calculate actual clean filter assembly ΔP at both operating and cold start viscosity

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

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

MF110 Options ΔP Factors[1]

Series	Length	Units	Media 1M	3M	6M	10M	16M	25M	**W
MF110	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	10M	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

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

FPL Specifications

Dimensions[1]	**Height** 22" (58 cm)	**Length** 42" (107 cm)	**Depth** 12" (31 cm)	**Weight** 138 lbs (63 kg)
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** 22 psi (1.5 bar)	**Special Options D1 + S1 (S75/D)** 22 psi (1.5 bar)	**Special Option D2 (DFN)** 32 psid (2.2 bard)	**Special Option P1** 73 psid (5 bard)
Filter Assembly Bypass	**Standard MF110 Assemblies** 25 psid (1.7 bard)	**Special Options D1 + S1 (S75/D)** 25 psid (1.7 bard)	**Special Option D2 (DFN)** 50 psid (3.4 bard)	**Special Option P1** 102 psid (7 bard)
Materials of Construction	**Frame** Carbon steel with industrial coating			
Electric Motor	TEFC, 56-145 frame 0.5-1 hp, 1450-1750 RPM			
Motor Starter	MSP (motor starter/protector) in an IP65, 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. $\beta x_{[C]} \geq 4000$	**A** G8 Dualglass high performance media combined with water removal scrim. $\beta x_{[C]} \geq 4000$	**W** Stainless steel wire mesh media $\beta x_{[C]} \geq 2$	
Replacement Elements	To determine replacement elements, use corresponding codes from your equipment part number:			
	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	
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.			

[1]Dimensions are approximations taken from base model and will vary according to options chosen.
[2]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.
[3]Air consumption values are estimated maximums and will vary with regulator setting.
[4]When 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 Rate[1]

05	0.5 gpm (1.7 lpm)
1	1 gpm (3.7 lpm)
2	2 gpm (7.5 lpm)
5	5 gpm (18.9 lpm)
10	10 gpm (37.9 lpm)

Power Options

Contact factory for options not listed

60 Hz, 1750 RPM

12	120 V ac, 1P
22	208-230 V ac, 1P
23	208-230 V ac, 3P
46	460-480 V ac, 3P
57	575 V ac, 3P

50 Hz, 1450 RPM

11	110 V ac, 1P
21	220 V ac, 1P
40	380-440 V ac, 3P
52	525 V ac, 3P

Pneumatic

00	Pneumatically driven air motor & PD pump. FRL & flow meter included.

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

Special Options

B	Complete filter bypass line
C	CE marked for machinery safety directive 2006/42/EC
D1[2]	2 x S75DL8 filter assemblies in series
D3	True differential pressure gauge, visual green to red
E	100 mesh cast iron basket strainer
J	Add pressure gauge between pump & filter assembly
K	HP75L8-149W Spin-On suction strainer
M	Total system flow meter (120 cSt max)
O	On-board PM-1 particle monitor & clean oil indicator light
P9[4]	Phosphate ester fluid compatibility modification
S9[5]	Skydrol fluid compatibility modification
U	CUL and/or CSA marked starter enclosure for Canada
Y	VFD variable speed motor frequency control
Z	On site start-up training
L2	Liquid cooled heat exchanger

Media Selection

G8 Dualglass

1M	$\beta 3_{[C]} \geq 4000$
3M	$\beta 4_{[C]} \geq 4000$
6M	$\beta 6_{[C]} \geq 4000$
10M[6]	$\beta 11_{[C]} \geq 4000$
16M	$\beta 16_{[C]} \geq 4000$
25M	$\beta 22_{[C]} \geq 4000$

G8 Dualglass + water removal

3A	$\beta 4_{[C]} \geq 4000$
6A	$\beta 6_{[C]} \geq 4000$
10A[6]	$\beta 11_{[C]} \geq 4000$
25A	$\beta 22_{[C]} \geq 4000$

Stainless wire mesh

25W	25µ nominal
40W	40µ nominal
74W	74µ nominal
149W	149µ nominal

Seals

B	Nitrile (Buna)
V	Fluorocarbon
E-WS[7]	EPR seals + stainless steel support mesh

[1]Nominal flow rates at 60 Hz motor speeds.
[2]Replaces standard MF3 housings.
[3]When selected, omit Media 2 option from part number builder.
[4]When selected, must be paired with Seal option "V." Contact factory for more information or assistance in fluid compatibility.
[5]When selected, must be paired with Seal option "E-WS." Contact factory for more information or assistance in fluid compatibility.
[6]When D1 is selected, must use 12M and 12A in place of 10M and 10A respectively.
[7]Only available in 3M media for HP75L8 series elements.

Filtration starts with the filter.

Lower ISO Codes: Lower Total Cost of Ownership 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.

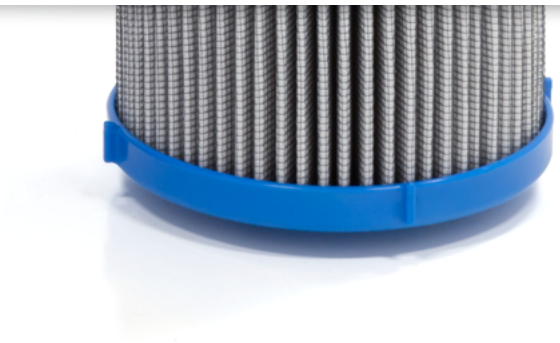
DFE Rated Filter Elements DFE is Hy-Pro's proprietary testing process which extends ISO 16889 Multi Pass testing to include real world, dynamic conditions and ensures that our filter elements excel in your most demanding hydraulic and lube applications.

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

Advanced Media Options DFE glass media maintaining efficiency to $\beta 3_{[c]} > 4000$, 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, 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 Hy-Pro filter elements means you not only get the best filters, you also get the unrivaled support, training, knowledge and expertise of the 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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