PF4 High Pressure Base Mounted Filter

Hy-Pro G8 Dualglass DFE rated high performance filter elements.

APPLICATIONS

Ideal for protecting sensitive components in hydraulic circuits, and should be located upstream of specific components or directly after the pressure pump.

- Protect a component that is very sensitive to particulate contamination (ie servo valve) and requires clean pressurized fluid for reliable operation.
- To help meet mill/plant target cleanliness codes and required ISO 4406:1999 cleanliness standards set by hydraulic component manufacturers (warranty).
- To protect a component that is very expensive where minimizing the risk of failure and replacement cost justifies the cost of filtration.
- To protect a component or system that can affect overall mill productivity and cause downtime.

PF4 FEATURES

DFE rated elements	G8 Dualglass and PE glass elements are DFE rated to assure performance even when exposed to the toughest hydraulic systems (See DFE literature for details)
Base mount Top loading	Element is removed by removing housing cover, minimizing mess, no heavy bowl to lift, ease of service
Low housing pressure drop	Unique internal flow paths provide low resistance to flow. (Low pressure drop)
Coreless elements	PF4 housings (with bypass valve option) can be ordered with Hy-Pro coreless filter element for easy disposal (crush or incinerate). Retro-fit kits available to convert conventional housings to coreless.
HF4 compatible	Port to port dimension, mounting pattern, and element design meet HF4 automotive specification. (Automotive standard)
High flow capacity	Triple length option allows for flow rates up to 150 gpm for select media

PRODUCT SPECIFICATIONS

Pressure ratings	5000 psi (354 bar) max operating 13500 psi (931 bar) burst
Flow rate	150 gpm (560 lpm) max with F port
Element collapse	code K: 150 psid (10 bar) code K3: 3000 psid (212 bar) code KC: 150 psid (10 bar) * *coreless element series
Temperature rating	Buna -45°F(-43°C) to 250°F(121°C) Viton -15°F(-26°C) to 275°F(135°C)
Housing material	Head and Cover: Ductile iron Bowl: Seamless steel tubing
Fluid compatibility (ISO 2948)	Compatible with all petroleum, based oils, HWBF, water glycol, oil/water emulsion, and specified synthetic fluids with Flurocarbon or EPR seals (call factory)
Flow fatigue rating	3500 psi (238 bar)
Differential pressure indicator trigger	Visual, electrical, combination, Thermal lock-out (see options)
Bypass valve crack	50 psid (3.5 bar) standard.
Weight (no element)	~9" length bowl 60 lbs (27 kg) ~18" length bowl 83 lbs (38 kg) ~27" length bowl 110 lbs (50 kg)

PF4 SPARE PARTS & ELEMENT SERVICE INSTRUCTIONS

1. Stop and /or isolate filter from system pressure.
2. Relieve pressure in filter line.
3. Drain filter housing to avoid cross contamination.
4. Remove the cover.
5. Remove the element from the housing.
6. Inspect filter housing o-ring seal for damage.
7. If damaged replace seal kit.
8. Inspect new element for damage.
9. Lubricate new element seals and install element.
10. Replace cover ,tighten to 5-10 ft.lbs. Torque.

1	**Element (see Element number guide)**	**p/n**
2	**Seal Kit**	
	Nitrile NBR	PF4SKB
	Fluorocarbon	PF4SKV
3	**Replacement Bowl Kits**	
	~9" length code 9	PF4B9
	~18" length code 18	PF4B18
	~27" length code 27	PF4B27

FILTER ASSEMBLY SIZING & OPERATING PRESSURE GUIDELINES

Effective filter sizing requires consideration of flow rate, viscosity (operating and cold start), fluid type, 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 150 SSU (32Cts) viscosity and 0.86 fluid specific gravity. Use the following steps to identify the correct high pressure filter assembly.

1. Calculate Δp coefficient at both operating and cold start viscosity:

$$\Delta p \text{ Coefficient} = \frac{\text{Actual Operating Viscosity (SSU)}}{150} \times \frac{\text{Actual S.G.}}{0.86}$$

2. Calculate actual clean filter assembly Δp at both operating and cold start viscosity:

Actual assembly clean Δp = Flow rate x Δp Coefficient x (Empty filter housing Δp factor + Element Δp factor)

3. 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.
- Ideal actual assembly clean Δp should not exceed 15 psid 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.
- High viscosity fluid (ie gear lube ISO 220) will typically display very high viscosity as the temperature drops below 100°F. For such applications avoiding bypass during start-up might not be possible.

FILTER ASSEMBLY SIZING & OPERATING PRESSURE GUIDELINES

PF4K**, PF4K1**, PF4KC** Empty Housing & Filter Element Δ Pressure Factor

Media code	Element Length	*Max recommended flow rate gpm (lpm)	*Empty Housing ΔP by port factor psid / gpm (bar / lpm)	*Filter Element Δp factor psid / gpm	*Filter Element Δp factor bar / lpm
1M	9	41 (152)	M1 = 0.12 (0.0021) C1, F1, N1, S1 = 0.10 (0.0018)	0.252	0.0046
3M		57 (215)		0.141	0.0026
6M		66 (250)		0.105	0.0019
12M		72 (270)		0.088	0.0016
16M		78 (292)		0.072	0.0013
25M		93 (349)		0.041	0.0008
**W		104 (393)		0.023	0.0004
1M	18	55 (207)	M1 = 0.12 (0.0021) C1, F1, N1, S1 = 0.10 (0.0018)	0.151	0.0028
3M		73 (275)		0.084	0.0015
6M		82 (310)		0.061	0.0012
12M		89 (334)		0.048	0.0009
16M		92 (345)		0.043	0.0008
25M		104 (390)		0.024	0.0005
**W		130 (487)		0.013	0.0003
1M	27	66 (249)	M1 = 0.12 (0.0021) C1, F1, N1, S1 = 0.10 (0.0018)	0.106	0.0020
3M		82 (310)		0.061	0.0012
6M		91 (342)		0.044	0.0008
12M		97 (365)		0.034	0.0006
16M		103 (385)		0.026	0.0005
25M		109 (410)		0.017	0.0004
**W		150 (562)		0.010	0.0002

*Max flow rate and Δp factor assumes υ = 150 sus, 32 Centistokes. See Δp viscosity conversion formula for viscosity

PF4K3** Empty Housing & Filter Element Δ Pressure Factor (Non-bypass housing)

Media code	Element Length	Max recommended flow rate* gpm (lpm)	*Empty Housing ΔP by port factor psid / gpm (bar / lpm)	*Filter Element Δp factor psid / gpm	*Filter Element Δp factor bar / lpm
1M	9	27 (102)	M1 = 0.12 (0.0021) C1, F1, N1, S1 = 0.10 (0.0018)	0.428	0.0078
3M		42 (156)		0.239	0.0044
6M		50 (188)		0.178	0.0032
12M		55 (209)		0.149	0.0027
25M		78 (294)		0.071	0.0013
**W		104 (393)		0.023	0.0004
1M	18	40 (149)	M1 = 0.12 (0.0021) C1, F1, N1, S1 = 0.10 (0.0018)	0.256	0.0047
3M		57 (215)		0.142	0.0026
6M		67 (252)		0.104	0.0019
12M		74 (278)		0.082	0.0015
25M		93 (349)		0.041	0.0007
**W		130 (487)		0.013	0.0002
1M	27	50 (187)	M1 = 0.12 (0.0021) C1, F1, N1, S1 = 0.10 (0.0018)	0.181	0.0033
3M		67 (252)		0.103	0.0019
6M		77 (289)		0.074	0.0013
12M		84 (316)		0.058	0.0011
25M		100 (377)		0.029	0.0005
**W		150 (562)		0.010	0.0002

*Max flow rate and Δp factor assumes υ = 150 sus, 32 Centistokes. See Δp viscosity conversion formula for viscosity

HIGH PERFORMANCE FILTER ELEMENTS — THE HEART OF A FILTER

Dynamic Filter Efficiency (DFE) Testing

Revolutionary test methods assure that DFE rated elements perform true to rating even under demanding variable flow and vibration conditions. Today's industrial and mobile hydraulic circuits require elements that deliver specified cleanliness under ALL circumstances. Wire mesh supports the media to ensure against cyclical flow fatigue, temperature, and chemical resistance failures possible in filter elements with synthetic support mesh. Contact your distributor or Hy-Pro for more information and published articles on DFE testing.

Media Options

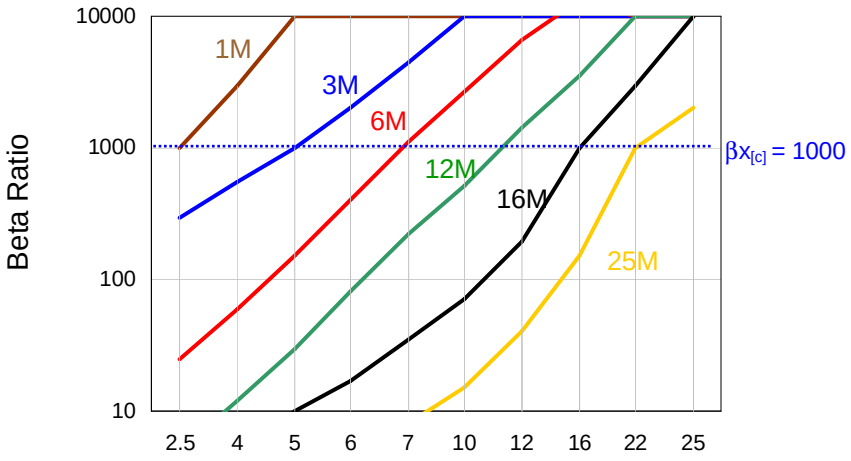
Through extensive testing we have developed media choices to handle any application. Options include G8 Dualglass, Dynafuzz (stainless fiber), and Wire mesh (stainless).

Fluid Compatibility

Petroleum based fluids, water glycol, polyol ester, phosphate ester, high water based fluids and many other synthetics. Contact us for seal material selection assistance.

FILTER MEDIA SPECIFICATIONS

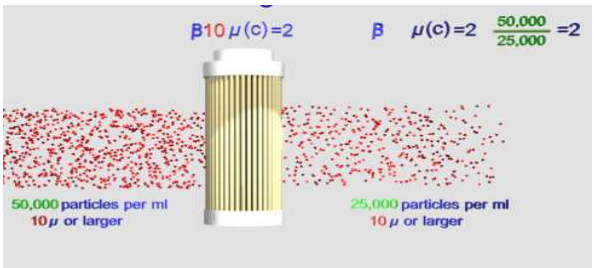
Glass Media Code Filtration Efficiency (Beta Ratio) vs Micron



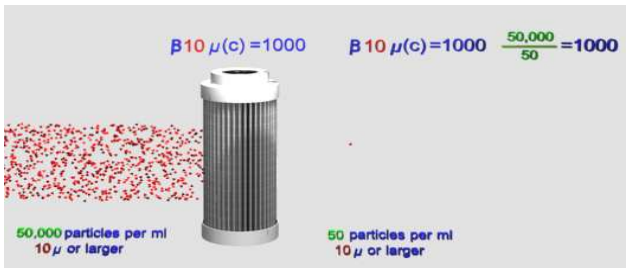
Micron size $\mu m_{[c]}$ (per ISO16889)

media code	media description
A	G8 Dualglass high performance media combined with water removal scrim. $\beta x_{[c]} = 1000$ ($\beta x = 200$)
M	G8 Dualglass our latest generation of DFE rated, high performance glass media for all hydraulic & lubrication fluids. $\beta x_{[c]} = 1000$ ($\beta x = 200$)
W	Stainless steel wire mesh media $\beta x_{[c]} = 2$ ($\beta x = 2$) nominally rated

Typical cellulose media performance



Hy-Pro G8 Dualglass media performance



PF4 FILTER ASSEMBLY PART NUMBER GUIDE

PF4 [table 1] [table 2] - [table 3] [table 4] [table 5] [table 6] [table 7]

BOLD denotes quick ship options for porting, bypass and indicator

PF4 FILTER ELEMENT PART NUMBER GUIDE

HP [table 1] L [table 2] - [table 3] [table 5]

table 1 code	element collapse & seal configuration
K	150 psid (10 bar), HF4 element configuration
K3	3000 psid (212 bar), HF4 element configuration
KC	150 psid (10 bar), coreless, o-ring seals

table 2 code	element length
9	~9"
18	~18"
27	~27"

table 6 code	bypass valve Setting
X	Non-Bypass (K3 element collapse only, table 1)
5*	**50 psid (3.5 bar)**

*Contact factory for higher cracking pressure

table 3 code	filtration rating
1M	$\beta 2.5_{[c]}$ = 1000 (β1 = 200)
3M	$\beta 5_{[c]}$ = 1000 (β3 = 200)
6M	$\beta 7_{[c]}$ = 1000 (β6 = 200)
6A	$\beta 7_{[c]}$ = 1000 + water removal
12M	$\beta 12_{[c]}$ = 1000 (β12 = 200)
12A	$\beta 12_{[c]}$ = 1000 + water removal
16M	$\beta 17_{[c]}$ = 1000 (β17 = 200)
16A	$\beta 17_{[c]}$ = 1000 + water removal
25M	$\beta 22_{[c]}$ = 1000 (β25 = 200)
25A	$\beta 22_{[c]}$ = 1000 + water removal
25W	25u nominal wire mesh
40M 40W	$\beta 35_{[c]}$ = 1000 (β40 = 200) or 40u nominal wire mesh
74W	74u nominal wire mesh
149W	149u nominal wire mesh
250W	250u nominal wire mesh

table 4 code	porting option
C1	1 1/2" SAE 4-bolt Flange (code 61)
F1	**1 1/2" SAE 4-bolt Flange (code 62)**
G5	G 1 1/2" BSPP Thread
M1	Manifold mount (see installation detail)
N1	NPTF 1 1/2"
S1	**SAE-24 (1 7/8"-12 UN straight thread)**

table 5 code	seal Material
B	**Buna (Nitrile)**
E-WS	EPR + stainless steel support mesh (Skydrol fluid)
V	Viton (Fluorocarbon)

table 7 code	Δp Indicator Type & set-point ΔPSI (ΔBAR)
XD*	**Electrical/visual 35 (2,2)**
HE*	Electrical/visual 100 (7)
XJ	Indicator port plugged
XL	**Visual only 35 (2,5)**
XO	Visual only 100 (7)
HR*	**Electrical switch only 35 (2,5)**

Electrical indicator voltage: 115VAC / 28VDC. Standard electrical connection is Hirschmann 4 pin DIN 43650 denoted by H in table 8. If indicator codes begins with X then only 3 wire leads are supplied. 5 pin 41512 Harrison connections are available upon request.

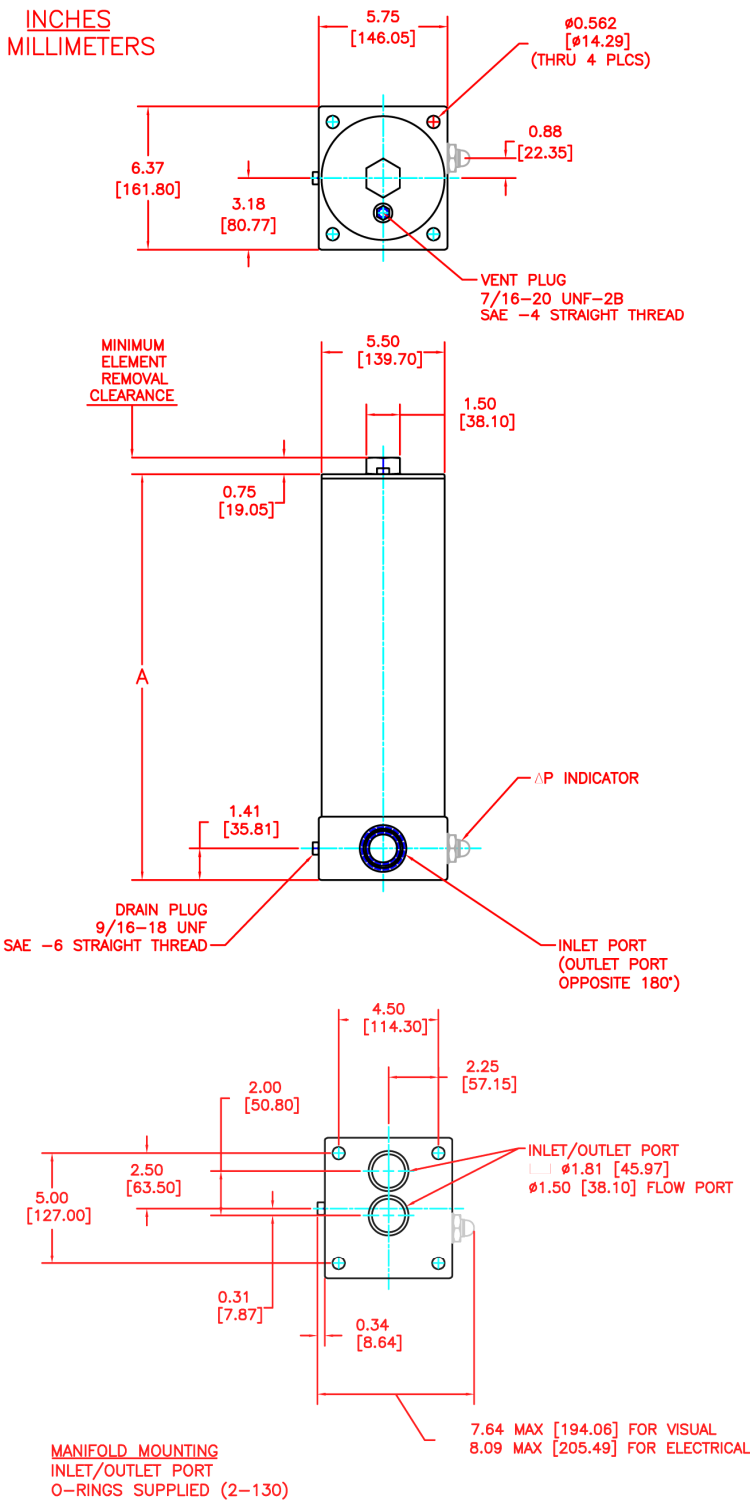
ΔP indicator set-point must be lower than bypass valve setting to ensure indication. Recommended indicator/bypass setting combinations below. Pop up visual indicators reset automatically once the pressure has subsided so filter ΔP condition must be inspected while the system is running.

Recommended bypass valve setting / ΔP indicator combinations

Bypass valve setting (code)	**X**	**5**
Recommended Indicator selection	HE, XO	XD, XL, HR

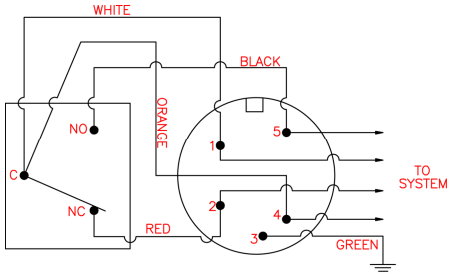
ΔP indicators with thermal lockout and surge protection are available upon request.

INSTALLATION DRAWINGS & INDICATOR WIRING DIAGRAMS

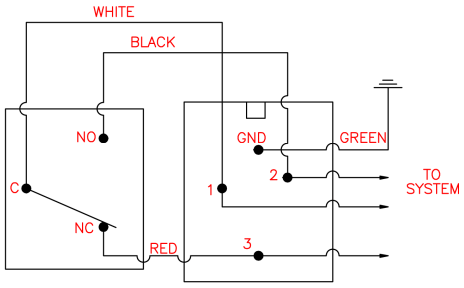


Dimension	L9	L18	L27
A (overall length)	15.31 (389)	24.7 (628)	34.0 (864)
Element removal	9.0 (229)	18.0 (457)	27.0 (686)

Electrical indicator wiring diagrams (Aluminum housing + thermal lockout)

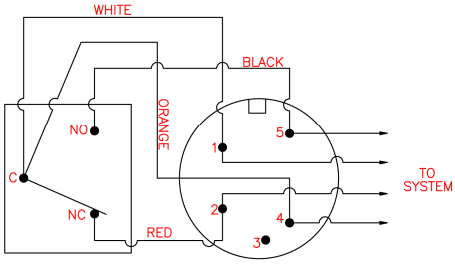


Brad Harrison 5-pin receptacle 41512

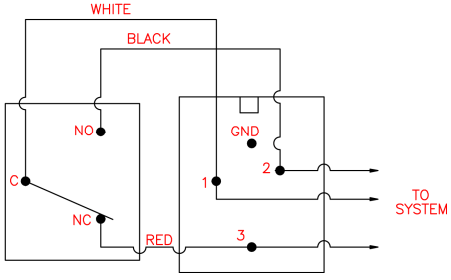


Hirschman 4-pin DIN 43650

Electrical indicator wiring diagrams (Plastic housing NO thermal lockout)



Brad Harrison 5-pin receptacle 41512



Hirschman 4-pin DIN 43650