

FSLD

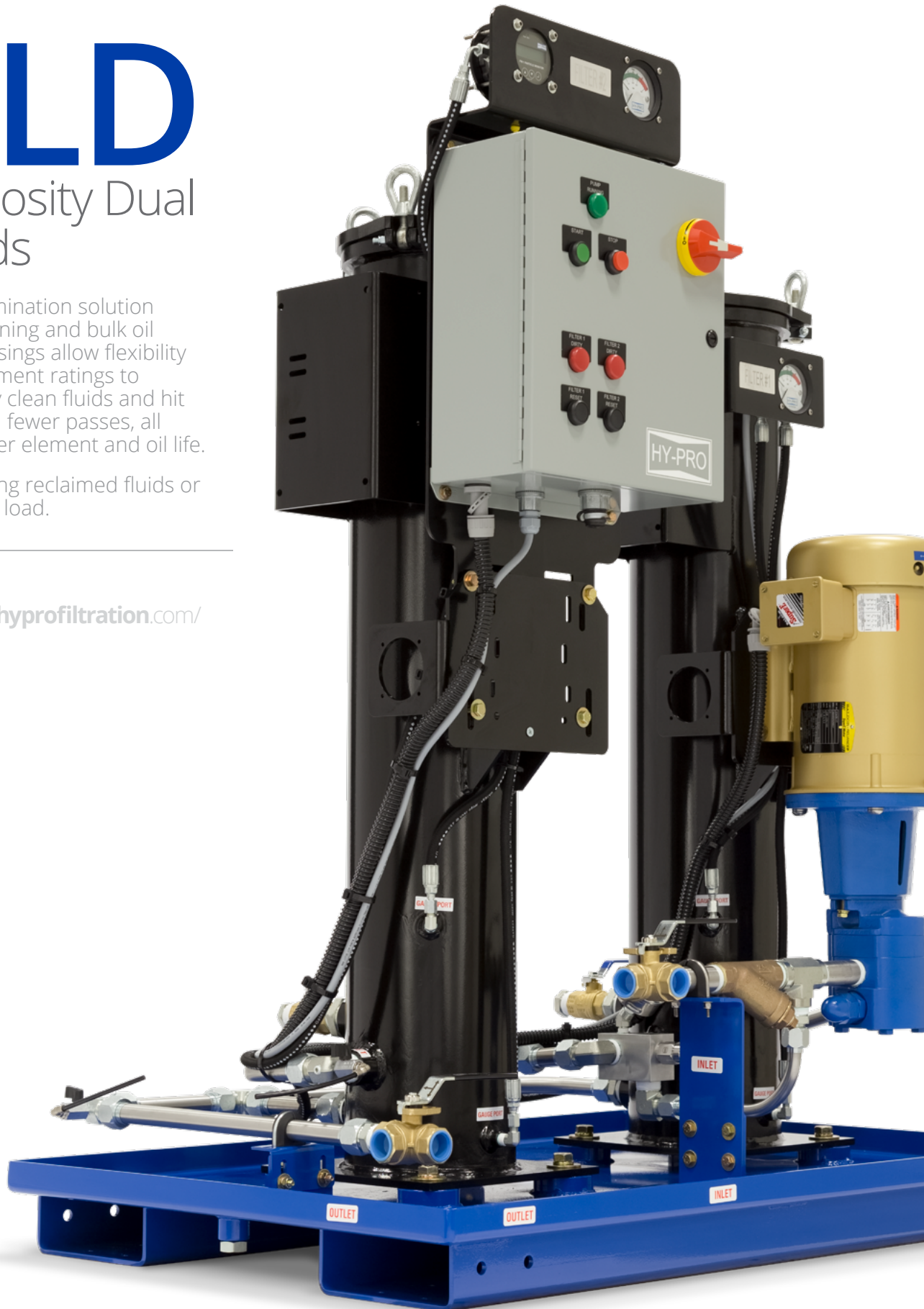
High Viscosity Dual Filter Skids

A dedicated contamination solution for off-line conditioning and bulk oil handling. Dual housings allow flexibility in using staged element ratings to achieve remarkably clean fluids and hit target ISO Codes in fewer passes, all while extending filter element and oil life.

Ideal for conditioning reclaimed fluids or fluids with high dirt load.



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Dynamic duo.

Combine a number of media options in the dual FSL filter housings to maximize single pass efficiency and achieve lower ISO Codes even faster than you thought possible.



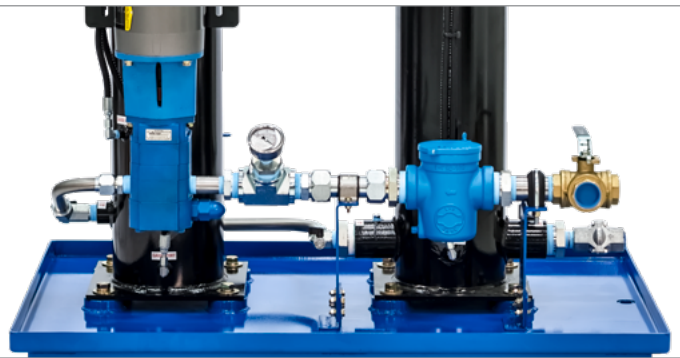
Filtration starts with the filter(s).

The FSLD's dual oversized coreless filter elements deliver 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, giving you time back from unnecessary gearbox rebuilds and letting you focus on what really matters.



Engineered for Industrial use.

Rugged construction and attention to the smallest of details come together remarkably so that nothing holds you or your equipment back. The standard spill retention pan and cast iron pump with internal relief mean you get the power and durability you want with the safety you have to have. To top it off, the standard 3-way inlet valve allows you to add new oil through the filter to stop contamination before it can ever enter your system.



Make your filtration count.

With the optional filter bypass line, cold starts and element change outs become easier than ever. Add to that the PM-1 Particle Monitor for real time cleanliness data and watch your ISO Codes drop like you'd never believe.



Setting the new standard.

Every FSLD comes standard with sample ports in the proper locations to arm you with access to consistently accurate system conditions. And with true differential pressure gages, you'll always know exactly how well your filtration is performing.



Completely customizable.

Every FSLD can be tailored specifically to your application whether you're dealing with high viscosities, cold weather, or temperature sensitive components so you get the perfect solution to your contamination problems.



FSLD Reference Guide

FSLD10 model with PM-1 option shown

Filter #2 true green to red ΔP gauge

Integrated PM-1 Particle Monitor

Top loading filter housing with secure swivel bolts

Air bleed valve

Machine E-stop

Machining running indicator light

Control panel

Filter #1 true green to red ΔP gauge

Dirty filter indicator lights

Electric motor

Pressure gauge

Flow control needle valve

Pressure gauge

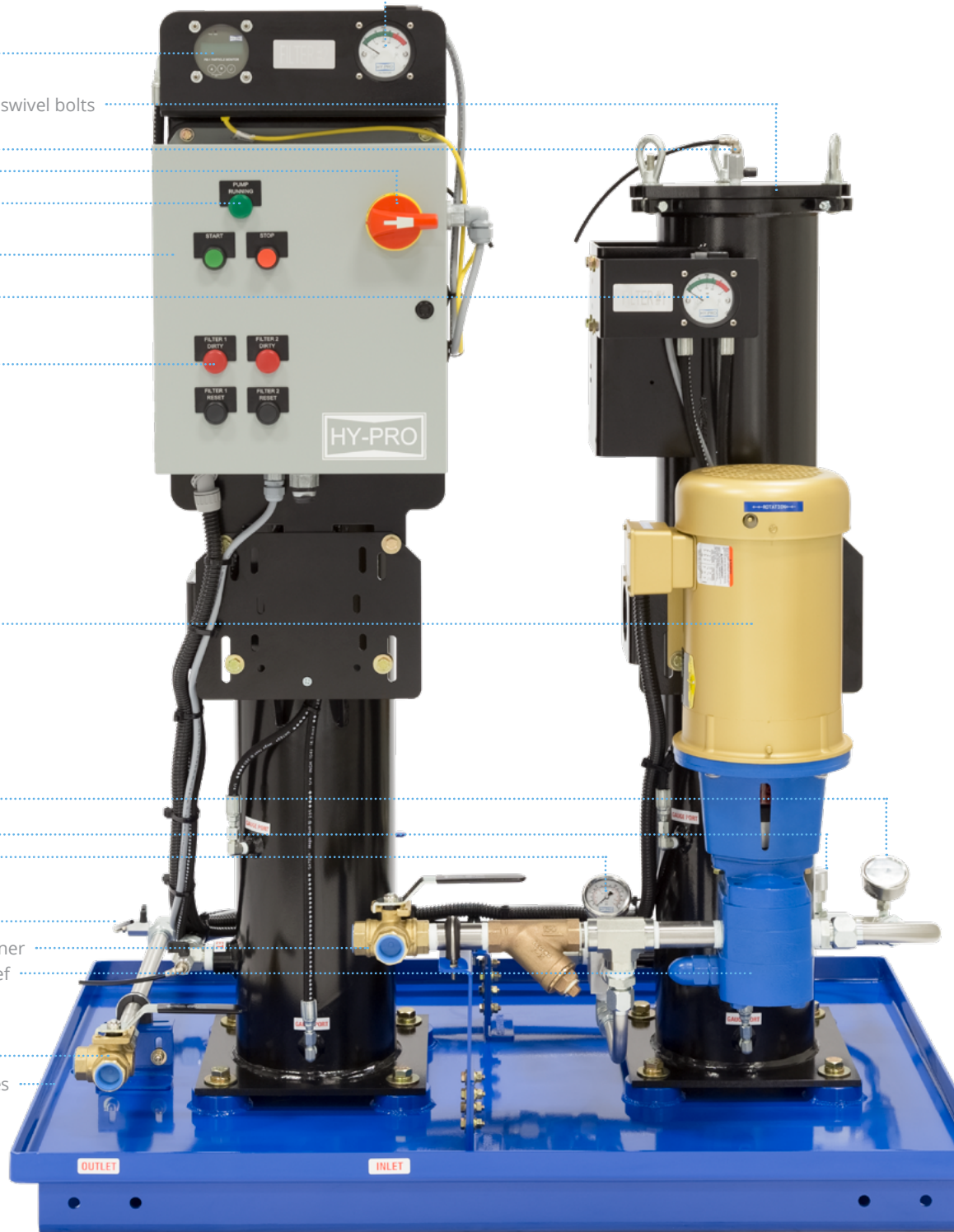
Outlet sample port

System inlet with 3-way valve + Y-strainer

Cast iron gear pump with internal relief

System outlet with 3-way valve

Powder coated steel tray with fork guides



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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.

FSLD Filter Sizing Guidelines

Filter Sizing¹

Filter assembly clean element ΔP after actual viscosity correction should not exceed 10% of filter assembly bypass setting. See previous page for filter assembly sizing guidelines & examples. For applications with extreme cold start condition contact Hy-Pro for sizing recommendations.

ΔP Factors¹

Length	Units	Media VTM	05M	1M	3M	6M	10M	16M	25M	**W
16/18	psid/gpm	0.063	0.047	0.046	0.039	0.030	0.027	0.027	0.026	0.005
	bard/lpm	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000
36/39	psid/gpm	0.044	0.033	0.032	0.027	0.021	0.019	0.019	0.018	0.003
	bard/lpm	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000

Length	Units	Media 1A	3A	6A	10A	16A	25A
16/18	psid/gpm	0.051	0.043	0.034	0.030	0.030	0.028
	bard/lpm	0.001	0.001	0.001	0.001	0.001	0.001
36/39	psid/gpm	0.036	0.030	0.024	0.021	0.021	0.020
	bard/lpm	0.001	0.001	0.000	0.000	0.000	0.000

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



FSLD Specifications

Dimensions ¹	Height 55" (139 cm)	Length 48" (121 cm)	Width 32" (81 cm)	Weight 484 lbs (219 kg)
Connections	Inlet with 3-Way Valve FSLD05-FSLD10: 1" FNPT FSLD20-FSLD30: 1.5" FNPT		Outlet FSLD05-FSLD10: 1" FNPT FSLD20-FSLD30: 1.25" 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)	
Materials of Construction	Housings Carbon steel with industrial coating	Tray Carbon steel with industrial coating		
Electric Motor	TEFC, 56-215 frame 1-5 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. $\beta_{x_{[C]}} \geq 1000$ ($\beta_x \geq 200$)	A G8 Dualglass high performance media combined with water removal scrim. $\beta_{x_{[C]}} \geq 1000$ ($\beta_x \geq 200$)	W Stainless steel wire mesh media $\beta_{x_{[C]}} \geq 2$ ($\beta_x \geq 2$)	VTM $\beta_{0.9_{[C]}} \geq 1000$ 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 5 6 7	Filter Element Part Number HP105L[Length Code] – [Media Selection Code][Seal Code] HP106L[Length Code] – [Media Selection Code][Seal Code] HP107L[Length Code] – [Media Selection Code][Seal Code]	Example HP105L36-6AB HP106L18-10MV HP107L36-VTM710V	
	8X 82 85	HP8314L[Length Code] – [Media Selection Code][Seal Code] HP8314L[Length Code] – [Media Selection Code][Seal Code] HP8314L[Length Code] – [Media Selection Code][Seal Code]	HP8314L39-25WV HP8314L16-12MB 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.



FSLD Part Number Builder

FSLD - -

Flow Rate Flow Type Element Type Element Length Indicator 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) 20 20 gpm (75.7 lpm) 30 30 gpm (114 lpm)
Flow Type	D ² Duplex P ² Parallel S Series	
Element Type	5 HP105 – no bypass 6 HP106 – 25 psid (1.7 bard) integral element bypass 7 HP107 – 50 psid (3.4 bard) integral element bypass	8X HP8314 – no bypass 82 HP8314 – 25 psid (1.7 bard) integral housing bypass 85 HP8314 – 50 psid (3.4 bard) integral housing bypass
Element Length	18 ³ L18 single length filter housing and coreless element 36 ³ L36 single length filter housing and coreless element	16 ³ L16 single length filter housing and coreless element 39 ³ L39 single length filter housing and coreless element
ΔP Indicator	D 22 psid visual gages + electric switches E 22 psid visual gages F 45 psid visual gages + electric switches G 45 psid visual gages	H 65 psid visual gages + electric switches J 65 psid visual gages (elements 5 or 8X only) P 2 pressure gages (industrial liquid filled) X None (ports plugged)
Power Options Contact factory for options not listed	60 Hz, 1750 RPM 12 ⁴ 120 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 ⁴ 110 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		
Special Options	X Add X prefix to power option listed above. Not available with (00) Pneumatic Option. A Air cooled heat exchanger (consult factory) B Complete filter bypass line C CE marked for machinery safety directive 2006/42/EC D ⁵ High filter ΔP auto shutdown E 100 mesh cast iron basket strainer F Filter element ΔP gauge with tattle tale follower needle J Add pressure gauge between pump & filter assembly K HP75L8-149W Spin-On suction strainer L ⁵ High filter element ΔP indicator light M Total system flow meter (120 cSt max) N PM-1 ready (plumbing only)	O On-board PM-1 particle monitor & clean oil indicator light P ⁶ Phosphate ester fluid compatibility modification R Spill retention pan with wheels (industrial coated steel) S ⁷ All wetted components 304 or higher stainless steel S ⁸ Skydrol fluid compatibility modification U CUL and/or CSA marked starter enclosure for Canada V Lifting eye kit W Automatic air bleed valve Y VFD variable speed motor frequency control Z On site start-up training
Media Selection	G8 Dualglass 05M β _{0.9} _(C) ≥ 1000, β ₁ ≥ 200 1M β _{2.5} _(C) ≥ 1000, β ₁ ≥ 200 3M β ₅ _(C) ≥ 1000, β ₃ ≥ 200 6M β ₇ _(C) ≥ 1000, β ₆ ≥ 200 10M ⁹ β ₁₂ _(C) ≥ 1000, β ₁₂ ≥ 200 16M β ₁₇ _(C) ≥ 1000, β ₁₇ ≥ 200 25M β ₂₂ _(C) ≥ 1000, β ₂₅ ≥ 200	G8 Dualglass + water removal 3A β ₅ _(C) ≥ 1000, β ₃ ≥ 200 6A β ₇ _(C) ≥ 1000, β ₆ ≥ 200 10A ⁹ β ₁₂ _(C) ≥ 1000, β ₁₂ ≥ 200 25A β ₂₂ _(C) ≥ 1000, β ₂₅ ≥ 200 Stainless wire mesh 25W 25μ nominal 40W 40μ nominal 74W 74μ nominal 149W 149μ nominal
	VTM VTM710 ¹⁰ β _{0.9} _(C) ≥ 1000 particulate, insoluble oxidation by-product and water removal media	Bag filter BAG ¹¹ #2 size bag housing 25μ nominal
Seals	B Nitrile (Buna) V Fluorocarbon E-WS EPR seals + stainless steel support mesh	

¹Nominal flow rates at 60 Hz motor speeds.

²When selected, omit Media 2 option from part number builder. Element chosen will be supplied for both filter housings.

³Compatibility will be based on Element Type selection. For elements HP105, HP106, and HP107, use Length code 36. Length code 39 only compatible with HP8314.

⁴High amp draw on 10 GPM models. Estimated FLA 18. See Appendix for details.

⁵Requires ΔP Indicator option with electric switch selected (options D, F, H).

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

⁷With exception to cast iron gear pump.

⁸When selected, must be paired with Seal option "E-WS." Contact factory for more information or assistance in fluid compatibility.

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

¹⁰Only 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.

¹¹Available in series 1 housing only. Replaces Element Type in series 1 housing.



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 $\beta_{10} > 4000$, 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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