

# MF

## Medium Pressure Filter Assemblies

Hy-Pro's MF90 and MF110 medium pressure filters are designed to protect sensitive components in hydraulic and transmission circuits. Install the series upstream of specific components or directly after the pressure pump in mid-flow systems to minimize risk of failure and costly system downtime.

Ideal for use as a charge pump discharge filter or a pilot filter, and to protect components that are sensitive to particulate contamination and require clean pressurized fluid for reliable operation.

**Max Operating Pressure: 580 psi (40 bar)**



[hyprofiltration.com/](http://hyprofiltration.com/)



## Elements that go beyond industry standard.

DFE rated advanced media technologies provide the highest level of particulate capture and retention capabilities so your equipment operates unimpeded by contamination. With media options down to  $\beta_{3[\text{c}]} \geq 4000$ , + water absorption, you get the perfect element for your application, every time.

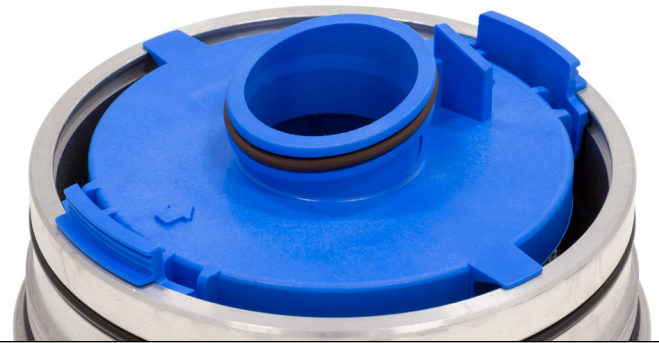


## Industrial duty.

Standard mounting, a variety of port options and indicator options, and several length options with standard drain ports make the MF90 and MF110 series the ideal choice for heavy duty hydraulic filtration.

## 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.



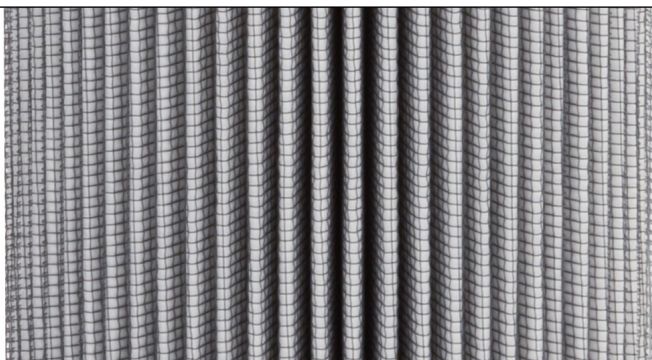
## Unique applications.

With the unique element design, the MF90 and MF110 are ideal for applications with limited space for bowl clearance during servicing. Only 2.56" (65mm) of clearance is required as the proprietary locking grab handles retain the element inside the filter bowl during removal, automatically withdrawing the element from its seal as the bowl is rotated off during servicing. Simply pinch the locking grab handles to remove the used element from the bowl.



## Minimize the mess.

The MF90 and MF110 series come standard with bowl drains to minimize mess during servicing. Even better, this MF series retains the element cartridge using a slot in the bowl and locking grab handles on the elements. No need to reach in and pry off the used element, let the bowl removal do the work for you.

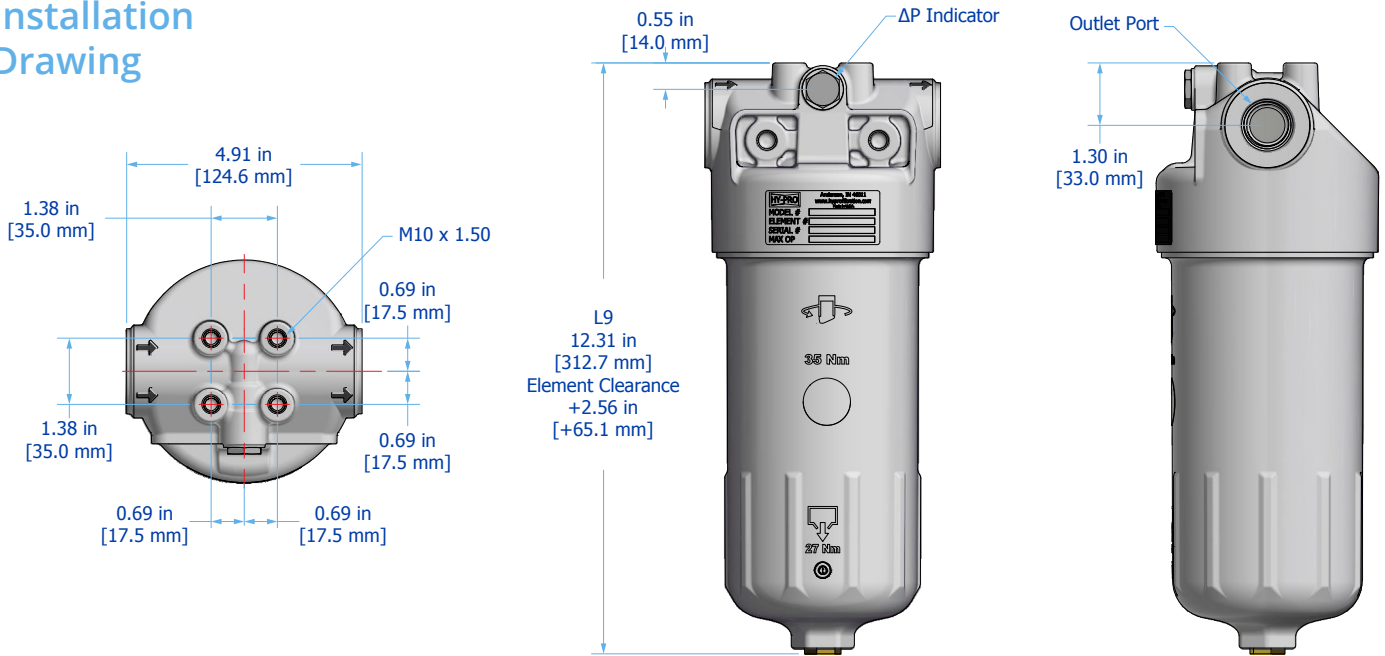


## The ideal choice for hydraulics.

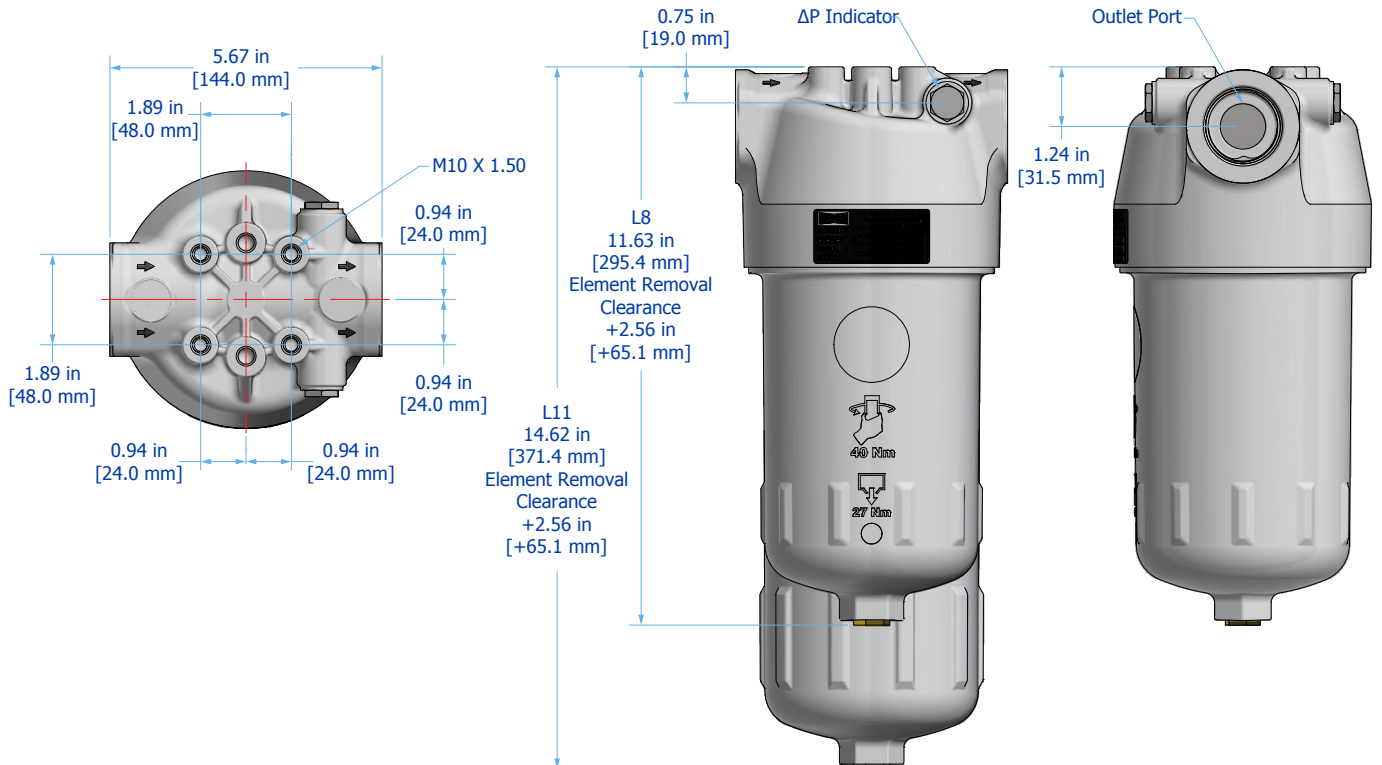
Use the MF90 or MF110 as the main pressure filter(s) in medium pressure hydraulic systems or upstream of sensitive components as a pilot filter to protect your valves and actuators. Engineered to provide lower operating ISO Codes than what is required for compliance with hydraulics component manufacturers' warranties, they are well-suited for hydrostatic charge pump filtration and power shift transmission applications.

# MF Installation Drawings

## MF90 Installation Drawing



## MF110 Installation Drawing



# MF Sizing Guidelines

## Filter Assembly Sizing Guidelines

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.

## Sizing recommendations to optimize performance and permit future flexibility

- To avoid or minimize bypass during cold start the actual assembly clean  $\Delta P$  calculation should be repeated for start-up conditions if cold starts are frequent.
- Actual assembly clean  $\Delta P$  should not exceed 10% of bypass  $\Delta P$  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  $\Delta P$  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.

Step 1: Calculate  $\Delta P$  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)

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

Step 2: Calculate actual clean filter assembly  $\Delta P$  at both operating and cold start viscosity

$$\text{Actual Assembly Clean } \Delta P = \text{Flow Rate} \times \Delta P \text{ Coefficient (from Step 1)} \times \text{Assembly } \Delta P \text{ Factor (from sizing table)}$$

## Filter Sizing<sup>1</sup>

Filter assembly clean element  $\Delta P$  after actual viscosity correction should not exceed 10% of filter assembly bypass setting. See above for filter assembly sizing guidelines. For applications with extreme cold start condition contact Hy-Pro for sizing recommendations.

## $\Delta P$ Factors<sup>1</sup>

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

<sup>1</sup>Max flow rates and  $\Delta P$  factors assume  $\mu = 150$  SUS, 32 cSt. See filter assembly sizing guideline for viscosity conversion formula.



# MF Specifications

**Dimensions** See Installation Drawings on page 209 for model specific dimensions.

**Weight**

<b>MF90</b> L9: 5.2 lbs (2.36 kg)	<b>MF110</b> L8: 6.2 lbs (2.82 kg) L11: 7.0 lbs (3.18 kg)
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**Operating Temperature** -20°F to 250°F  
(-29°C to 121°C)

**Operating Pressure**

<b>MF90</b> 580 psi (40 bar) max	<b>MF110</b> 435 psi (30 bar) max
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**Burst Pressure**

<b>MF90</b> 2000 psi (138 bar) max	<b>MF110</b> 1300 psi (90 bar) max
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**ΔP Indicator Trigger** 18 psid (1.2 bard) for 25 psid bypass and non bypass

**Element Collapse Rating** 150 psid (10.7 bard)

**Materials of Construction**

<b>Head</b> Cast aluminum	<b>Bowl</b> Cast aluminum
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**Media Description**

<b>M</b> G8 Dualglass, our latest generation of DFE rated, high performance glass media for all hydraulic & lubrication fluids. $\beta_{x_{[c]}} \geq 4000$	<b>A</b> G8 Dualglass high performance media combined with water removal scrim. $\beta_{x_{[c]}} \geq 4000$	<b>W</b> Stainless steel wire mesh media $\beta_{x_{[c]}} \geq 2$
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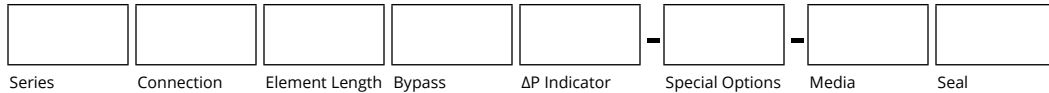
**Replacement Elements** [To determine replacement elements, use corresponding codes from your assembly part number:](#)

<b>Series</b> MF90 MF110	<b>Filter Element Part Number</b> HP90NL[Length Code] - [Media Selection Code] [Seal Code] HP110NL[Length Code] - [Media Selection Code] [Seal Code]	<b>Example</b> HP90NL9-10AB HP110NL11-3MB
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**Fluid Compatibility** Petroleum and mineral based fluids (standard). For polyol ester, phosphate ester, and other specified synthetic fluids use fluorocarbon seal option or contact factory.

# MF Part Number Builder

MF



**Series**

**90** Nominal flow rate up to 40 gpm (151 lpm)  
**110** Nominal flow rate up to 75 gpm (284 lpm)

**Connection**

<b>MF90</b>	<b>MF110</b>
<b>G16</b> 1" G thread (BSPP)	<b>G20</b> 1.25" G thread (BSPP)
<b>S12</b> 3/4" SAE	<b>S20</b> 1.25" SAE
<b>S16</b> 1" SAE	

**Element Length**

<b>MF90</b>	<b>MF110</b>
<b>9</b> 9" (23 cm) nominal length filter element	<b>8</b> 8" (20 cm) nominal length filter element
	<b>11</b> 11" (28 cm) nominal length filter element

**Bypass**

**2** 25 psid (1.7 bard) bypass  
**3** 50 psid (3.4 bard) bypass  
**X** No bypass

**ΔP Indicator**

<b>Indicator Options</b>	<b>Electrical Specifications</b>	<b>Connector</b>
<b>A</b> DC 2 wire N.C.	100 mA DC @ 30 VDC	Metri-pack 150 Series, AWG 18
<b>B</b> DC 2 wire N.O.	200 mA DC @ 30 VDC	Packard Weatherpack, AWG 18
<b>C</b> Single post DC N.O.	200 mA DC @ 30 VDC	10-32UNF threaded post
<b>E</b> AC/DC 3-wire	-	AWG 18
<b>F</b> DC 3 wire N.C.	100 mA DC @ 30 VDC	AWG 18
<b>V</b> Visual Pop-Up	-	-
<b>X</b> No indicator (port plugged)		

**Special Options**

**M2** Mounting Bracket

**Media Selection**

<b>G8 Dualglass</b>	<b>G8 Dualglass + water removal</b>	<b>Stainless wire mesh</b>
<b>1M</b> $\beta_{3[\text{c}]} \geq 4000$	<b>3A</b> $\beta_{4[\text{c}]} \geq 4000$	<b>25W</b> 25 $\mu$ nominal
<b>3M</b> $\beta_{4[\text{c}]} \geq 4000$	<b>6A</b> $\beta_{6[\text{c}]} \geq 4000$	<b>40W</b> 40 $\mu$ nominal
<b>6M</b> $\beta_{6[\text{c}]} \geq 4000$	<b>10A</b> $\beta_{11[\text{c}]} \geq 4000$	<b>74W</b> 74 $\mu$ nominal
<b>10M</b> $\beta_{11[\text{c}]} \geq 4000$	<b>25A</b> $\beta_{22[\text{c}]} \geq 4000$	<b>149W</b> 149 $\mu$ nominal
<b>16M</b> $\beta_{16[\text{c}]} \geq 4000$		
<b>25M</b> $\beta_{22[\text{c}]} \geq 4000$		

**Seals**

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

Maximum recommended flow rate based on velocity through port and internal flow path. Consult sizing guidelines or consult factory for sizing based on flow rate, viscosity, temperature, filter media selection.  
\*Only available with ΔP Indicator option "X" selected.

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** 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.

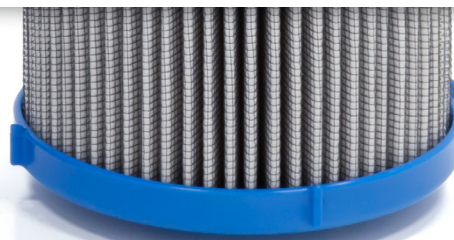
**DFE Rated Filter Elements** DFE is Hy-Pro's proprietary testing process which extends ISO 16889 Multi Pass testing to include real world, dynamic conditions and ensures that our filter elements excel in your most demanding hydraulic and lube applications.

**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  $\beta_{3[\mu]} > 4000$ , 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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