DFH
High Pressure Duplex Filter Assembly

The DFH series is designed to remove particulate and water from a variety of fluids including hydrogen seal oil, turbine lube oil, bearing lube oil, and FD-ID-PA fan lube. Applicable for wind turbine, boiler feed pump, mechanical/electro hydraulic control, and fuel handling systems.

Ideal for systems where filters must be serviced while continuous operation is not interrupted such as hydraulic, gearbox, and servo systems.

Max Operating Pressure: 3600 psi (248 bar)

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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 $\beta_{2.5} = 1000$, + water absorption, you get the perfect element for your application, every time.

Two positions, one result.
DFH housings provide unmatched in-line filtration with incredible ease of use. With a squeeze of the trigger and turn of the wrist, you’ll introduce a new element to your fluid while simultaneously valving the used element out of service to easily change and replace, all while your system continues operating at full capacity.

All duplexes are not created equal.
Air in any lube system can quickly cause failure and force you to take your system down for maintenance. DFH assemblies utilize internal equalization and external vent ports to automatically push oil into and purge air out from the unused housing without any added effort.

DFH19 Installation Drawing
DFH39 Installation Drawing
Filter Assembly Sizing

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.

Calculate ΔP coefficient for actual viscosity

Using Saybolt Universal Seconds (SUS)

\[
\Delta P \text{ Coefficient} = \frac{\text{Actual Operating Viscosity} \times \text{Actual Specific Gravity}}{150 \times 0.86}
\]

Using Centistokes (cSt)

\[
\Delta P \text{ Coefficient} = \frac{\text{Actual Operating Viscosity} \times \text{Actual Specific Gravity}}{32 \times 0.86}
\]

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

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

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.
DFH Specifications

Dimensions
See Installation Drawing on page 221 for model specific dimensions.

Operating Temperature
- Fluid Temperature
  30°F to 225°F (0°C to 105°C)
- Ambient Temperature
  -4°F to 140°F (-20°C to 60°C)

Operating Pressure
- DFH19
  3600 psi (248.2 bar) max
- DFH39
  3000 psi (206.8 bar) max

ΔP Indicator Trigger
73 psid (5 bard)

Element Collapse Rating
450 psid (31.0 bard)

Materials of Construction
- Head: Cast steel
- Bowl: Cast steel
- Housing Bypass Valve: Steel

Media Description
- M: G8 Dualglass, our latest generation of DFE rated, high performance glass media for all hydraulic & lubrication fluids. \( \beta_x = 1000 \) \( (\beta_x = 200) \)
- A: G8 Dualglass high performance media combined with water removal scrim. \( \beta_x = 1000 \) \( (\beta_x = 200) \)
- W: Stainless steel wire mesh media \( \beta_x = 2 \) \( (\beta_x = 2) \)

Replacement Elements
To determine replacement elements, use corresponding codes from your assembly part number:

<table>
<thead>
<tr>
<th>Series Code</th>
<th>Filter Element Part Number</th>
<th>Example</th>
</tr>
</thead>
</table>

Fluid Compatibility
Biodegradable and mineral based fluids. For high water based of specified synthetics, consult factory.

Filter Sizing
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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Length</th>
<th>Units</th>
<th>Media</th>
<th>**W</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1M</td>
<td>3M</td>
</tr>
<tr>
<td>DFH19</td>
<td>L4</td>
<td>psid/gpm</td>
<td>3.402</td>
<td>2.871</td>
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<tr>
<td></td>
<td>L6</td>
<td>psid/gpm</td>
<td>2.099</td>
<td>1.771</td>
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<tr>
<td></td>
<td>L10</td>
<td>psid/gpm</td>
<td>1.494</td>
<td>1.261</td>
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<tr>
<td></td>
<td></td>
<td>bard/lpm</td>
<td>0.0620</td>
<td>0.0523</td>
</tr>
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<td></td>
<td></td>
<td>bard/lpm</td>
<td>0.0382</td>
<td>0.0323</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bard/lpm</td>
<td>0.0272</td>
<td>0.0230</td>
</tr>
<tr>
<td>DFH39</td>
<td>L6</td>
<td>psid/gpm</td>
<td>0.654</td>
<td>0.552</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bard/lpm</td>
<td>0.0119</td>
<td>0.0101</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bard/lpm</td>
<td>0.0095</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>bard/lpm</td>
<td>0.0084</td>
<td>0.0071</td>
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</tbody>
</table>

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

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# DFH Part Number Builder

<table>
<thead>
<tr>
<th>DFH</th>
<th>Series</th>
<th>Connection</th>
<th>Collapse</th>
<th>Length</th>
<th>Bypass</th>
<th>ΔP Indicator</th>
<th>Media</th>
<th>Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19</td>
<td>DFH19</td>
<td>H</td>
<td>4</td>
<td>7</td>
<td>D</td>
<td>G8 Dualglass + water removal</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>39</td>
<td>DFH39</td>
<td>N</td>
<td>6</td>
<td>X</td>
<td>V</td>
<td>Stainless wire mesh</td>
<td>V</td>
</tr>
</tbody>
</table>

1. **Series**
   - 19: 25 gpm (95 lpm) max flow rate
   - 39: 70 gpm (265 lpm) max flow rate

2. **Connection**
   - DFH19: F16 1" Code 61 flange
   - G16 1" G thread (BSPP)
   - DFH39: F24 1½" Code 61 flange
   - G24 1½" G thread (BSPP)

3. **Collapse**
   - H: 3000 psid (206.8 bard)
   - N: 450 psid (31.0 bard)

4. **Element Length**
   - DFH19: 4" (10 cm) nominal length filter element and housing
   - 6" (15 cm) nominal length filter element and housing
   - 10" (25 cm) nominal length filter element and housing
   - DFH39: 6" (15 cm) nominal length filter element and housing
   - 10" (25 cm) nominal length filter element and housing
   - 15" (38 cm) nominal length filter element and housing

5. **Bypass**
   - 7: 102 psid (7 bard) bypass
   - X: No bypass

6. **ΔP Indicator**
   - D: Visual with electric switch (DIN connection)
   - V: Visual/Mechanical
   - X: No indicator (port plugged)

7. **Media Selection**
   - G8 Dualglass
     - 1M: \(\beta_{2.5}^{(c)} = 1000, \beta_1 = 200\)
     - 3M: \(\beta_{5}^{(c)} = 1000, \beta_3 = 200\)
     - 6M: \(\beta_{7}^{(c)} = 1000, \beta_6 = 200\)
     - 10M: \(\beta_{12}^{(c)} = 1000, \beta_{12} = 200\)
     - 16M: \(\beta_{17}^{(c)} = 1000, \beta_{17} = 200\)
     - 25M: \(\beta_{22}^{(c)} = 1000, \beta_{25} = 200\)
     - G8 Dualglass + water removal
     - 3A: \(\beta_{5}^{(c)} = 1000, \beta_3 = 200\)
     - 6A: \(\beta_{7}^{(c)} = 1000, \beta_6 = 200\)
     - 10A: \(\beta_{12}^{(c)} = 1000, \beta_{12} = 200\)
     - 25A: \(\beta_{22}^{(c)} = 1000, \beta_{25} = 200\)
   - Stainless wire mesh
     - 25W: 25μ nominal
     - 40W: 40μ nominal
     - 74W: 74μ nominal
     - 149W: 149μ nominal

8. **Seals**
   - B: Nitrile (Buna)
   - V: Fluorocarbon

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

*Metric threads for flange connection bolts. See Appendix for exact connection sizes and specifications.*