Technical Information

Hydrostatics

External Remote Charge Pressure Filter

powersolutions.danfoss.com
### Technical Information

**External Remote Charge Pressure Filter**

## Revision History

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<table>
<thead>
<tr>
<th>Date</th>
<th>Changed</th>
<th>Rev</th>
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<tbody>
<tr>
<td>Mar 2014</td>
<td>Converted to Danfoss layout - DITA CMS</td>
<td>BA</td>
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<tr>
<td>Nov 2010</td>
<td></td>
<td>AB</td>
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Technical Information

External Remote Charge Pressure Filter

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Introduction

For more than 40 years, Danfoss has been developing state-of-the-art components and systems for mobile machinery used in off-highway operations around the world. We have become a preferred supplier by offering the best of what really matters: The hardware inside your vehicle application.

Features

• Common filter head
• 3 different filter sizes
• Compatible with
  — H1 P
  — S 90
  — S 42
  — S 40
• Integrated functionality
  — Bypass valve
  — Electric contamination indicator
• Servicebility
  — No extra space for element replacement needed, (side way removal possible)
System Design Parameters

Filtration

Remote charge pressure filtration

The remote pressure filter head is designed with a filter bypass valve and noncontacting bypass sensor. The pressure differential acting on the filter element also acts on a spring biased bypass spool. This spool is designed with a magnetic area. When a certain spool position is reached, the magnet closes a switch in the bypass sensor which allows R2 to be in parallel with R1. This occurs without any mechanical contact between the spool and the bypass sensor.

The position of the bypass spool is indicated by the change in the measured sensor resistance. The change in resistance occurs when R2 is switched in and out of the circuit. When the filter is not being bypassed, the nominal measured resistance is 510 ohms. When the switch is closed, the nominal measured resistance is 122 ohms.

The bypass spool is designed so the bypass sensor switch will be closed before oil bypasses the filter element. This gives the machine operator an indication that the filter is very close to bypassing and a filter replacement is required.

For cold start conditions, it is typical that the filter may bypass for a short amount of time while the oil is warming up. At normal operating oil temperatures, a system that does not yet need a filter replacement will operate in the non-bypass mode. The addition of an oil temperature sensor and additional control logic, is recommended to properly determine if a filter replacement is required.

Technical data, pressures

<table>
<thead>
<tr>
<th>Filter bypass sensor switch closure</th>
<th>( \Delta p \ 3.7 - 5.1 \text{ bar} ) [54 - 74 psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass valve</td>
<td>( \Delta p \ 5.6 \pm 0.9 \text{ bar} ) [80 \pm 13 psi]</td>
</tr>
<tr>
<td>T000 159E</td>
<td></td>
</tr>
</tbody>
</table>

Technical data, electric

<table>
<thead>
<tr>
<th>Max. voltage</th>
<th>48 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. power</td>
<td>0.6 W</td>
</tr>
<tr>
<td>Switch open</td>
<td>510 ( \Omega )</td>
</tr>
<tr>
<td>Switch closed</td>
<td>122 ( \Omega )</td>
</tr>
<tr>
<td>Resistor tolerance</td>
<td>1 %</td>
</tr>
<tr>
<td>Temperature range</td>
<td>(-20 \ ^\circ \text{C} \div +100 \ ^\circ \text{C} ) [-4 \ ^\circ \text{F} \div +212 \ ^\circ \text{F}]</td>
</tr>
<tr>
<td>IP Rating (IEC 60 529) + DIN 40 050, part 9 with mating connector</td>
<td>IP 69K</td>
</tr>
<tr>
<td>T000 160E</td>
<td></td>
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</table>

Integral filter head with filter bypass sensors
### System Design Parameters

#### Schematic

![Schematic Diagram](image)

- **M6**
- **Pinout**
- **Description**
  - Pin 1: Voltage
  - Pin 2: Ground

#### Alternative pinout

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>Voltage</td>
</tr>
</tbody>
</table>

#### Pin location

For device electrical schematic, see Schematic, page 5.

#### H1 Filter bypass sensor mating connector parts list

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Ordering number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mating connector</td>
<td>1</td>
<td>Deutsch DTM06-2S</td>
</tr>
<tr>
<td>Secondary wedge lock</td>
<td>1</td>
<td>Deutsch WM-2S</td>
</tr>
<tr>
<td>Socket terminal</td>
<td>2</td>
<td>Deutsch 0462-201-20141</td>
</tr>
<tr>
<td>Danfoss mating connector kit</td>
<td>1</td>
<td>11031205</td>
</tr>
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</table>

#### Operating pressure

<table>
<thead>
<tr>
<th>Unit</th>
<th>Value [psi]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum working pressure</td>
<td>45 [653]</td>
</tr>
<tr>
<td>Maximum pressure (cold start)</td>
<td>55 [798]</td>
</tr>
</tbody>
</table>
System Design Parameters

Differential pressure and $\beta$-ratio

<table>
<thead>
<tr>
<th>Nominal flow at 30 mm$^2$/s and $\Delta p$ 0.5 bar [7.3 psi] (clean filter element only)</th>
<th>Min $\beta$ ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>60 l/min</td>
</tr>
<tr>
<td>Medium</td>
<td>80 l/min</td>
</tr>
<tr>
<td>Long</td>
<td>105 l/min</td>
</tr>
</tbody>
</table>

Bypass valve and bypass sensor

A common spool is used to activate both the bypass sensor and bypass function leading to the assurance that the bypass sensor will be closed before the bypass is engaged. The bypass sensor occurs at a filter pressure drop of 4.4 +/- 0.7 bar. The minimum pressure drop between bypass sensor and open bypass is 1.0 bar.

<table>
<thead>
<tr>
<th>Bypass sensor engages at T301 041E</th>
<th>Differential pressure [bar]</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4 +/- 0.7</td>
<td></td>
</tr>
</tbody>
</table>

Bypass valve function

The bypass valve opens at 1.2 bar +/- 0.2 bar above bypass sensor engagement pressure.
System Design Parameters

Filter Bypass Valve Characteristic (completely blocked Filter element)

Below diagramm shows the differential pressure between filter “in” and “out” with a filter element completely blocked, so that all flow runs across the filter bypass valve.
System Design Parameters

Remote filter 11001484, short, 60 l/min, and 11001485, medium 80 l/min

Remote filter 110048860, long, 105 l/min
System Design Parameters

Bypass sensor clearance

The bypass sensor is activated by the magnetic bypass valve. For proper function it is required to have no steel parts around the sensor within in below radius. No steel parts are allowed within a radius of 150 mm [5.91 in]. Moving steel devices or parts are not allowed within a radius of 250 mm [9.84 in].
System Design Parameters

Dimensions

<table>
<thead>
<tr>
<th>Filter assembly</th>
<th>In and out port size</th>
<th>L max. mm [inch]</th>
<th>Replacement element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>7/8 - 14</td>
<td>205 [8.07]</td>
<td>11004917</td>
</tr>
<tr>
<td>Medium</td>
<td>7/8 - 14</td>
<td>233 [9.17]</td>
<td>11004918</td>
</tr>
<tr>
<td>Long</td>
<td>1 1/16 - 12</td>
<td>292 [11.49]</td>
<td>11004919</td>
</tr>
</tbody>
</table>
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