Assignment of connections and functions

A: air bleeding G1/2
B: air bleeding G1/2
C: mini-measuring connection G1/4 dirt side
D: mini-measuring connection G1/4 clean side
E: drain G1/2 dirt side

1) Connection for the potential equalization, only for application in the explosive area.

Weight LF 251: approx. 14 kg
Weight LF 401: approx. 21 kg
Weight LF 631: approx. 29 kg

Dimensions: mm

Designs and performance values are subject to change.

EDV 08/19
Description:
In-line filters of the type LF 251-631 are suitable for a working pressure up to 32 bar. Pressure peaks are absorbed with a sufficient margin of safety. It can be used as suction filter, pressure filter and return-line filter.

The filter element consists of star-shaped, pleated filter material, which is supported on the inside by a perforated core tube and is bonded to the end caps with a high-quality adhesive. The flow direction is from outside to inside.

For cleaning the stainless steel mesh element (see special leaflets 21070-4 and 39448-4) or changing the filter element, remove the cover and take out the element. The mesh elements are not guaranteed to maintain 100% performance after cleaning.

For filtration finer than 40 μm, use the disposable elements made of microglass. Filter elements as fine as 5 μm(c) are available; finer filter elements are available upon request.

Eaton filter elements are known for a high intrinsic stability and an excellent filtration capability, a high dirt-retaining capacity and a long service life.

Eaton filter can be used for petroleum-based fluids, HW emulsions, water glycols, most synthetic fluids and lubrication fluids. Consult factory for specific fluid applications.

Ship classifications available upon request.

Type index:

Complete filter: (ordering example)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF</td>
<td>401</td>
<td>10VG</td>
<td>30</td>
<td>E</td>
<td>P</td>
<td>-</td>
<td>FS</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>AE</td>
</tr>
</tbody>
</table>

1. series:
   - LF = in-line filter
2. nominal size: 251, 401, 631
3. filter-material:
   - 130G, 80G, 40G, 25G stainless steel wire mesh
   - 25VG, 16VG, 10VG, 6VG, 3VG microglass
   - 25API, 10API microglass according to API
4. filter element collapse rating:
   - 30 μm
5. filter element design:
   - E = single end open
   - S = with bypass valve Δp 2.0 bar
   - S1 = with bypass valve Δp 3.5 bar
6. sealing material:
   - P = Nitrile (NBR)
   - V = Viton (FPM)
7. filter element specification:
   - VA = standard
   - IS06 = stainless steel
   - IS06 = for HFC application, see sheet-no. 31601

8. process connection:
   - FS = SAE-flange connection 3000 PSI

9. process connection size:
   - 7 = 1 ½” (LF 251)
   - 8 = 2” (LF 401)
   - 9 = 2 ½” (LF 631)

10. filter housing specification:
    - FS = standard

11. pressure vessel specification:
    - IS20 = ASME VIII Div.1 with ASME equivalent material, see sheet-no. 65517 (max. operating pressure 16 bar)

12. internal valve:
    - = without

13. clogging indicator or clogging sensor:
    - = without
    - AOR = visual, see sheet-no.1606
    - AOC = visual, see sheet-no.1606
    - AE = visual-electric, see sheet-no.1609
    - OP = visual, see sheet-no.1628
    - OE = visual-electric, see sheet-no.1628
    - VS5 = electronic, see sheet-no.1641

To add an indicator/sensor to your filter, use the corresponding indicator data sheet to find the indicator details and add them to the filter assembly model code.

Filter element: (ordering example)

<table>
<thead>
<tr>
<th>01NL</th>
<th>400</th>
<th>10VG</th>
<th>30</th>
<th>E</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

1. series:
   - 01NL = standard filter element according to DIN 24550, T3
2. nominal size: 250, 400, 630
3. see type index complete filter

Accessories:
- gauge port and bleeder connection, see sheet-no. 1650
- drain- and bleeder connection, see sheet-no. 1651
- SAE-counter flanges, see sheet-no. 1652
Technical data:
- operating temperature: -10 °C to +100 °C
- operating medium: mineral oil, other media on request
- max. operating pressure: 32 bar
- test pressure: 64 bar
- max. operating pressure with IS20: 16 bar
- test pressure with IS20: 32 bar
- process connection: SAE-flange connection 3000 PSI
- housing material: EN-GJS-400-18-LT
- sealing material: Nitrile (NBR) or Viton (FPM), other materials on request
- installation position: vertical
- measuring connections: G ¼
- drain- and bleeder connections: G ½
- volume tank LF 251: 2,4 l
  LF 401: 3,6 l
  LF 631: 5,3 l

Classified under the Pressure Equipment Directive 2014/68/EU for mineral oil (fluid group 2), Article 4, Para. 3.
Classified under ATEX Directive 2014/34/EU according to specific application (see questionnaire sheet-no. 34279-4).

Pressure drop flow curves:

Filter calculation/sizing
The pressure drop of the assembly at a given flow rate Q is the sum of the housing ∆p and the element ∆p and is calculated as follows:

\[ \Delta p_{\text{assembly}} = \Delta p_{\text{housing}} + \Delta p_{\text{element}} \]

\[ \Delta p_{\text{housing}} = Q \left( \frac{1}{\text{min}} \right) \times \frac{\text{MSK}}{10} \left( \frac{\text{mbar}}{\text{l/min}} \right) \times \nu \left( \frac{\text{mm}^2}{\text{s}} \right) \times \frac{\rho}{0,876} \left( \frac{\text{kg}}{\text{dm}^3} \right) \]

For ease of calculation our Filter Selection tool is available online at www.eatonpowersource.com/calculators/filtration/

Material gradient coefficients (MSK) for filter elements
The material gradient coefficients in mbar/(l/min) apply to mineral oil (HLP) with a density of 0,876 kg/dm³ and a kinematic viscosity of 30 mm²/s (139 SUS). The pressure drop changes proportionally to the change in kinematic viscosity and density.

<table>
<thead>
<tr>
<th>LF</th>
<th>3VG</th>
<th>6VG</th>
<th>10VG</th>
<th>16VG</th>
<th>25VG</th>
<th>25G</th>
<th>40G</th>
<th>80G</th>
<th>130G</th>
<th>10API</th>
<th>25API</th>
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</thead>
<tbody>
<tr>
<td>251</td>
<td>0,931</td>
<td>0,646</td>
<td>0,414</td>
<td>0,360</td>
<td>0,246</td>
<td>0,0277</td>
<td>0,0258</td>
<td>0,0177</td>
<td>0,0131</td>
<td>0,212</td>
<td>0,097</td>
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<tr>
<td>401</td>
<td>0,571</td>
<td>0,397</td>
<td>0,254</td>
<td>0,221</td>
<td>0,151</td>
<td>0,0169</td>
<td>0,0158</td>
<td>0,0108</td>
<td>0,0080</td>
<td>0,130</td>
<td>0,059</td>
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<tr>
<td>631</td>
<td>0,436</td>
<td>0,303</td>
<td>0,194</td>
<td>0,169</td>
<td>0,115</td>
<td>0,0142</td>
<td>0,0132</td>
<td>0,0091</td>
<td>0,0067</td>
<td>0,099</td>
<td>0,045</td>
</tr>
</tbody>
</table>

\[ \Delta p = f(Q) \] – characteristics according to ISO 3968
The pressure drop characteristics apply to mineral oil (HLP) with a density of 0,876 kg/dm³. The pressure drop changes proportionally to the density.
Symbols:

without indicator

with bypass valve

AE 30 and AE 40

with electric indicator

AE 50 and AE 62

with visual-electric indicator

AE 70 and AE 80

with visual indicator

AOR/AOC/OP

OE

with electronic sensor

VS5

Spare parts:

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>Qty.</th>
<th>Dimension and Article No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Filter Element</td>
<td>1</td>
<td>LF 251 01NL.250...</td>
</tr>
<tr>
<td>2</td>
<td>O-ring</td>
<td>1</td>
<td>304389 (NBR) 304391 (FPM)</td>
</tr>
<tr>
<td>3</td>
<td>O-ring</td>
<td>1</td>
<td>303963 (NBR) 307762 (FPM)</td>
</tr>
<tr>
<td>4</td>
<td>O-ring (LF 401/631)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Screw Plug</td>
<td>3</td>
<td>G ½ 304678</td>
</tr>
<tr>
<td>6</td>
<td>Screw Plug</td>
<td>2</td>
<td>G ¼ 305003</td>
</tr>
<tr>
<td>7</td>
<td>Clogging Indicator, Visual</td>
<td>-</td>
<td>AOR or AOC see sheet no. 1606</td>
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<tr>
<td>8</td>
<td>Clogging Indicator, Visual</td>
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<td>see sheet no. 1628</td>
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<tr>
<td>9</td>
<td>Clogging Indicator, Visual-Electric</td>
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<td>OE see sheet no. 1628</td>
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<tr>
<td>10</td>
<td>Clogging Indicator, Electric</td>
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<td>AE see sheet no. 1609</td>
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<td>11</td>
<td>Clogging Indicator, Electric</td>
<td>1</td>
<td>VS 5 see sheet no. 1641</td>
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<tr>
<td>12</td>
<td>Screw Plug</td>
<td>2</td>
<td>G ¼ 305003</td>
</tr>
</tbody>
</table>

Item 12 execution only without clogging indicator or clogging sensor

Test methods:

Filter elements are tested according to the following ISO standards:

ISO 2941 Verification of collapse/burst resistance
ISO 2942 Verification of fabrication integrity
ISO 2943 Verification of material compatibility with fluids
ISO 3723 Method for end load test
ISO 3724 Verification of flow fatigue characteristics
ISO 3968 Evaluation of pressure drop versus flow characteristics
ISO 16889 Multi-pass method for evaluating filtration performance