Return Filters

**E 212 · E 222**
Tank top mounting · Connection up to G1¼ / -20 SAE · Nominal flow rate up to 220 l/min / 58.1 gpm

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**Description**

**Application**
In the return line circuits of hydraulic systems.

**Performance features**

*Protection against wear:*
By means of filter elements that even in full-flow filtration meet the highest demands regarding cleanliness classes.

*Protection against malfunction:*
By means of full-flow filtration in the system return, the pumps above all are protected from dirt particles remaining in the system after assembly, repairs, or which are generated by wear or enter the system from outside.

**Special features**

› **By-pass valve:**
The location close to the inlet port prevents dirt particles retained by the filter element from entering into the clean oil side.

› **Removable bowl:**
In case of maintenance the filter bowl is removed together with the filter element - therefore dirt particles are not flushed back into the tank.

› **Filling filter / By-pass protection strainer:**
The filling filter is integrated in the filter element and prevents coarse particles from entering during filling or re-filling due to maintenance or repair reasons. Filling can be carried out at the filter. Therefore the cover must be removed. In operation, the filling filter functions as a by-pass protection strainer and prevents dirt from entering into the tank when the by-pass valve is open.

› **Port for ventilating filter:**
The ventilating filter thread connection M42 x 2 allows assembly of a ventilating filter, which assumes ventilation of the tank. The ventilating filter has to be ordered separately.

**Filter elements**

Flow direction from outside to center.
The star-shaped pleating of the filter material results in:

› large filter surfaces

› low pressure drop

› high dirt-holding capacities

› long service life

**Filter maintenance**
By using a clogging indicator the correct moment for maintenance is stated and guarantees the optimum utilization of the filter life.
Materials
- Screw-on cap: Polyester, GF-reinforced
- Filter head: Aluminum alloy
- Filter bowl: Polyamide, CF-reinforced, electrically conducting
- Seals: NBR (FPM on request)
- Filter media: EXAPOR®MAX 2 - inorganic multi-layer microfiber web
- Filling filter: Polyamide, reinforced; Polyester web

Accessories
- Electrical and / or optical clogging indicators are available on request. Dimensions and technical data see catalog sheet 60.20.
- Ventilating filters with connection thread M42 x 2 have to be ordered separately. Dimensions and technical data see catalogue sheet 50.20 and 50.30.
- Extension pipes or diffusors on the bowl outlet are available on request.
- Extension pipe
  A correct extension pipe length ensures oil outlet below minimum oil level and prevents foaming.

Characteristics

Nominal flow rate
Return filter:
Up to 220 l/min / 58.1 gpm (see Selection Chart, column 2).
The nominal flow rates indicated by ARGO-HYTOS are based on the following features:
- closed by-pass valve at ν ≤ 200 mm²/s / 927 SUS
- element service life > 1000 operating hours at an average fluid contamination of 0.07 g per l/min / 0.27 g per gpm flow volume
- flow velocity in the connection lines ≤ 4.5 m/s / 14.8 ft/s

Filling filter:
Up to 20 l/min / 5.3 gpm (see Selection Chart, column 3).

Connection
Threaded ports according to
- ISO 228 or DIN 13
- SAE standard J514
Sizes see Selection Chart, column 9, (other port threads on request).

Filter fineness
5 μm(c) ... 30 μm(c)
β-values according to ISO 16889
(see Selection Chart, column 5 and diagram Dx).

Dirt-holding capacity
Values in g test dust ISO MTD according to ISO 16889
(see Selection Chart, column 6).

Hydraulic fluids
Mineral oil and biodegradable fluids
(HEES and HETG, see info-sheet 00.20).
With high filling conditions we recommend an electrical conductivity ≥ 500 pS/m at 20 °C / 68 °F.

Temperature range
-30 °C ... +100 °C (temporary -40 °C ... +120 °C)
-22 °F ... +212 °F (temporary -40 °F ... +248 °F)

Viscosity at nominal flow rate
- at operating temperature: ν < 60 mm²/s / 280 SUS
- as starting viscosity: νₘᵡᵢₐₓ = 1200 mm²/s / 5560 SUS
- at initial operation:
  The recommended starting viscosity can be read from the diagram D (pressure drop as a function of the kinematic viscosity) as follows: Find the 70% Δp of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the Δp curve at a point. Read this point on the horizontal axis for the viscosity.

Operating pressure
Max. 10 bar / 145 psi

Mounting position
Preferably vertical, outlet downwards.
Diagrams

$\Delta p$-curves for complete filters in Selection Chart, column 4

**Types w/o filling filter**

D1 Pressure drop as a function of the flow volume at $v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS}$ ($0 = \text{casing empty}$)

![Diagram D1](image)

D2 Pressure drop as a function of the flow volume at $v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS}$ ($0 = \text{casing empty}$)

![Diagram D2](image)

**Types with filling filter**

D3 Pressure drop as a function of the flow volume at $v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS}$ ($0 = \text{casing empty}$)

![Diagram D3](image)
D4 Pressure drop as a function of the flow volume at \( v = 35 \text{ mm}^2/\text{s} / 162 \text{ SUS} (0 = \text{casing empty})

Pressure drop as a function of the kinematic viscosity at nominal flow

Filter fineness curves in Selection Chart, column 5

Dx Filtration ratio \( \beta \) as a function of particle size \( x \) obtained by the Multi-Pass-Test according to ISO 16889

The abbreviations represent the following \( \beta \)-values resp. finenesses:

For EXAPOR®MAX 2- and Paper elements:
- \( 5\text{EX}2 = \beta_{5\text{(c)}} = 200 \text{EXAPOR®MAX 2} \)
- \( 7\text{EX}2 = \beta_{7\text{(c)}} = 200 \text{EXAPOR®MAX 2} \)
- \( 10\text{EX}2 = \beta_{10\text{(c)}} = 200 \text{EXAPOR®MAX 2} \)
- \( 16\text{EX}2 = \beta_{16\text{(c)}} = 200 \text{EXAPOR®MAX 2} \)
- \( 30\text{P} = \beta_{30\text{(c)}} = 200 \text{Paper} \)

Based on the structure of the filter media of the 30P paper elements, deviations from the printed curves are quite probable.

For screen elements:
- \( 40\text{S} = \text{screen material with mesh size } 40 \mu\text{m} \)
- \( 60\text{S} = \text{screen material with mesh size } 60 \mu\text{m} \)
- \( 100\text{S} = \text{screen material with mesh size } 100 \mu\text{m} \)

Tolerances for mesh size according to DIN 4189.

For special applications, finenesses differing from these curves are also available by using special composed filter media.
### Selection Chart

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<th>Part No.</th>
<th>Nominal flow rate l/min</th>
<th>Return filter Fineness µm</th>
<th>Pressure drop bar</th>
<th>Protection filter Fineness µm</th>
<th>Dirt-holding capacity cm²</th>
<th>Connection</th>
<th>Crack pressure of by-pa.st valve bar</th>
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</table>

1 Preferred type, no minimum order quantity required
2 At 200 mm²/s (ISO VG46 at ca. 15°C / 59 °F)
3 Paper media supported with metal gauze
4 Open connection for ventilating filter. Please assemble ventilating filter before operating.

All filters are delivered with a plugged clogging indicator connection M12 x 1.5. As clogging indicators either manometers or electrical pressure switches can be used. Optional extension pipes adapt the filter length to various tank depths.

For ordering of accessories please use the below mentioned codes.

**Order example:** The filter E 222-151 has to be supplied with an extension pipe for a mounting depth of 500 mm.

**Order description:**

E 222-151 / EV 500

**Part No. (Basic unit)**

**Extension pipe (4 various lengths are available on request)**

E 212: EV 300, EV 366, EV 400, EV 466
E 222: EV 434, EV 500, EV 534, EV 600

For the appropriate ventilating filters with M42 x 2 thread connection see catalogue sheet 50.20 and 50.30, for the appropriate clogging indicators see catalogue sheet 60.20.

**Remarks:**

- The switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 10).
- Clogging indicators are optional and always delivered detached from the filter.
- The filters listed in this chart are standard filters. Other designs available on request.
# Selection Chart

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<th>Part No.</th>
<th>Nominal flow rate</th>
<th>Return filter</th>
<th>Nominal flow rate</th>
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<th>Microfine see Diagram DX</th>
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<th>Dirt-holding capacity</th>
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<th>By-pass protection strainer</th>
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<td>16EX2 76</td>
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<td>13</td>
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<td>36</td>
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<tr>
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<td>D4/4</td>
<td>30P 35</td>
<td>D/4</td>
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<td>13</td>
<td>20-3/16</td>
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<td>4</td>
<td>K7.0833-11 5</td>
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</table>

1 Preferred type, no minimum order quantity required
2 At 927 SUS (ISO VG46 at approx. 15 °C / 59 °F)
3 Corresponds to 1½-12 UN-2B
4 Corresponds to 1½-12 UN-2B, plugged with locking screw
5 Paper media supported with metal gauze
6 Open connection for ventilating filter, please assemble ventilating filter before operating

All filters are delivered with a plugged clogging indicator connection M12 x 1.5 mm. As clogging indicators either manometers or electrical pressure switches can be used. Optional extension pipes adapt the filter length to various tank depths. For ordering of accessories please use the below mentioned codes.

Order example: The filter E 222-761 has to be supplied with an extension pipe for a mounting depth of 500 mm (resp. 19.69 inch).

Order description: E 222-761 / EV 500

Part No. (Basic unit) E 222-761

Extension pipe (4 various lengths are available on request)

E 212: EV 300 (11.81 inch), EV 366 (14.41 inch), EV 400 (15.74 inch), EV 466 (18.35 inch)
E 222: EV 434 (17.09 inch), EV 500 (19.69 inch), EV 534 (21.02 inch), EV 600 (23.62 inch)

For the appropriate ventilating filters with M42 x 2 thread connection see catalog sheet 50.20 and 50.30, for the appropriate clogging indicators see catalog sheet 60.20.

Remarks:
- The switching pressure of the electrical pressure switch has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 10).
- Clogging indicators are optional and always delivered detached from the filter.
- The filters listed in this chart are standard filters. Other designs available on request.
### Dimensions

**Version without connection for ventilating filter**

**Version with connection for ventilating filter**

**Measurements in mm**

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
<th>A1</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
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<tbody>
<tr>
<td>E 212</td>
<td>G1½</td>
<td>G1</td>
<td>126</td>
<td>118/121</td>
<td>95</td>
<td>110</td>
<td>11.5</td>
<td>32</td>
<td>105</td>
<td>325</td>
<td>213</td>
<td>165</td>
<td>141</td>
<td>76</td>
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<tr>
<td>E 222</td>
<td>G1½</td>
<td>G1</td>
<td>126</td>
<td>118/121</td>
<td>95</td>
<td>110</td>
<td>11.5</td>
<td>32</td>
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<td>455</td>
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<table>
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<th>V</th>
<th>W</th>
<th>X</th>
<th>Y</th>
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<tbody>
<tr>
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<td>35</td>
<td>23</td>
<td>113</td>
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<td>74</td>
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<tr>
<td>E 222</td>
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<td>113</td>
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<td>67</td>
<td>74</td>
<td>44</td>
<td>83</td>
<td>13</td>
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</table>

**Measurements in inch**

<table>
<thead>
<tr>
<th>Type</th>
<th>A</th>
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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
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</thead>
<tbody>
<tr>
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<td>-20¹</td>
<td>-16²</td>
<td>4.96</td>
<td>4.65/4.76</td>
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<td>1.26</td>
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<td>E 222</td>
<td>-20¹</td>
<td>-16²</td>
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<td>4.65/4.76</td>
<td>3.74</td>
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<td>0.45</td>
<td>1.26</td>
<td>4.13</td>
<td>17.91</td>
<td>13.66</td>
<td>6.50</td>
<td>5.55</td>
<td>2.99</td>
<td>0.43</td>
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<table>
<thead>
<tr>
<th>Type</th>
<th>Q</th>
<th>R</th>
<th>S</th>
<th>U</th>
<th>V</th>
<th>W</th>
<th>X</th>
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<th>Z</th>
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<tbody>
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<td>0.91</td>
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<td>1.12</td>
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<td>2.91</td>
<td>1.73</td>
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<tr>
<td>E 222</td>
<td>1.38</td>
<td>0.91</td>
<td>4.45</td>
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<td>2.67</td>
<td>2.91</td>
<td>1.73</td>
<td>3.27</td>
<td>0.51</td>
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¹ Corresponds to $\frac{1}{8}$-12 UN-2B  ² Corresponds to $\frac{1}{16}$-12 UN-2B
<table>
<thead>
<tr>
<th>Pos.</th>
<th>Designation</th>
<th>Part No.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Screw-on cap with valve (2.5 bar / 36 psi) and Pos. 2</td>
<td>E 221.1200</td>
</tr>
<tr>
<td>1</td>
<td>Screw-on cap with valve (1.5 bar / 21 psi) and Pos. 2</td>
<td>E 221.1210</td>
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<tr>
<td>2</td>
<td>O-ring 100 x 4 mm 3.94 x 0.16 inch</td>
<td>N007.1004</td>
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<tr>
<td>3</td>
<td>Replacement filter element see Chart / col. 12</td>
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</tr>
<tr>
<td>4</td>
<td>Filter bowl E 212*</td>
<td>E 212.0901</td>
</tr>
<tr>
<td>4</td>
<td>Filter bowl E 222*</td>
<td>E 222.0901</td>
</tr>
<tr>
<td>5</td>
<td>O-ring 90 x 4 mm 3.54 x 0.16 inch</td>
<td>N007.0904</td>
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<tr>
<td>6</td>
<td>O-ring 126 x 4 mm 4.96 x 0.16 inch</td>
<td>N007.1264</td>
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<tr>
<td>7</td>
<td>Connection for ventilating filter (incl. O-ring 31 x 4 mm / 1.22 x 0.16 inch)</td>
<td>E 222.1900</td>
</tr>
</tbody>
</table>

*Specify mounting depth (EV) in mm

The functions of the complete filters as well as the outstanding features of the filter elements assured by ARGO-HYTOS can only be guaranteed if original ARGO-HYTOS spare parts are used.

Quality Assurance

Quality management according to DIN EN ISO 9001
To ensure constant quality in production and operation, ARGO-HYTOS filter elements undergo strict controls and tests according to the following ISO standards:

ISO 2941 Verification of collapse / burst pressure rating
ISO 2942 Verification of fabrication integrity (Bubble Point Test)
ISO 2943 Verification of material compatibility with fluids
ISO 3968 Evaluation of pressure drop versus flow characteristics
ISO 16889 Multi-Pass-Test (evaluation of filter fineness and dirt-holding capacity)
ISO 23181 Determination of resistance to flow fatigue using high viscosity fluid

Various quality controls during the production process guarantee the leakfree function and solidity of our filters.

Illustrations may sometimes differ from the original. ARGO-HYTOS is not responsible for any unintentional mistake in this specification sheet.