D 162 · D 232 · D 332

In-line mounting · Operating pressure up to 63 bar / 914 psi · Nominal flow rate up to 350 l/min / 92.5 gpm

Description

Application
In the pressure circuits of hydraulic and lubrication 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:
Through installation near to the control valves or other expensive components. The specific determined flow rate guarantees a closed by-pass valve even at \( v \leq 200 \text{ mm}^2/\text{s} / 927 \text{ SUS} \) (cold start condition).

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
Filter head: Aluminum alloy
Filter bowl: Aluminum alloy
Seals: NBR (FPM on request)
Filter media: EXAPOR®MAX 2 - inorganic multi-layer microfiber web
Paper - cellulose web, impregnated with resin

Clogging indicators
Electrical and / or optical clogging indicators can be integrated in the filter head if desired. For dimensions and technical data see catalog sheet 60.40.
Suitable retrofittable indicators - optionally with one or two switching points or temperature compensation - can be found in catalog sheet 60.30.
Characteristics

Operating pressure
0 ... 40 bar / 580 psi, min. 3 x 10⁶ pressure cycles
Nominal pressure according to DIN 24550
0 ... 63 bar / 914 psi, min. 10⁴ pressure cycles
Quasi-static operating pressure

Permissible pressures for other numbers of cycles

<table>
<thead>
<tr>
<th>Operating pressure [bar]</th>
<th>Number of cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 (1088)</td>
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</tr>
<tr>
<td>50 (725)</td>
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</tr>
<tr>
<td>25 (363)</td>
<td></td>
</tr>
<tr>
<td>0</td>
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Nominal flow rate
Up to 350 l/min / 92.5 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 \( \nu \leq 200 \text{ mm}^2/\text{s} / 927 \text{ SUS} \)
› 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:
  up to 100 bar \( \leq 6 \text{ m/s} / 1450 \text{ psi} \leq 19.7 \text{ ft/s} \)

Filter fineness
5 \( \mu \text{m}(c) \) ... 30 \( \mu \text{m}(c) \)
\( \beta \)-values according to ISO 16889
(see Selection Chart, column 4 and diagram Dx).

Dirt-holding capacity
Values in g test dust ISO MTD according to ISO 16889
(see Selection Chart, column 5).

Hydraulic fluids
Mineral oil and biodegradable fluids
(HEEs and HETG, see info-sheet 00.20).

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: \( \nu < 60 \text{ mm}^2/\text{s} / 280 \text{ SUS} \)
› as starting viscosity: \( \nu_{\text{max}} = 1200 \text{ mm}^2/\text{s} / 5560 \text{ SUS} \)
› 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% \( \Delta p \) of the cracking pressure of the by-pass valve on the vertical axis. Draw a horizontal line so that it intersects the \( \Delta p \) curve at a point. Read this point on the horizontal axis for the viscosity.

Mounting position
Preferably vertical, filter head on top.

Connection
Threaded ports according to
› ISO 228 or DIN 13
› SAE standard J514.
Sizes see Selection Chart, column 6
(other port threads on request).
Δp-curves for complete filters in Selection Chart, column 3

**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)

**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)
Filter fineness curves in Selection Chart, column 4

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®MAX2 and Paper elements:
- $5\text{EX2} = \beta_{5(6)} = 200$ EXAPOR®MAX 2
- $7\text{EX2} = \beta_{7(6)} = 200$ EXAPOR®MAX 2
- $10\text{EX2} = \beta_{10(6)} = 200$ EXAPOR®MAX 2
- $16\text{EX2} = \beta_{16(6)} = 200$ EXAPOR®MAX 2
- $30\text{P} = \beta_{30(6)} = 200$ Paper

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

For special applications, finenesses differing from these curves are also available by using special composed filter material.
<table>
<thead>
<tr>
<th>Part No.</th>
<th>Nominal flow rate</th>
<th>Pressure drop</th>
<th>Dirt-holding capacity</th>
<th>Cracking pressure of by-pass</th>
<th>Symbol</th>
<th>Replacement filter element</th>
<th>Part No.</th>
<th>Weight</th>
<th>Clogging indicator</th>
<th>Remarks</th>
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<td></td>
<td>V3.0833-06</td>
<td>4.0</td>
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</table>

1 Preferred type, no minimum order quantity required  
2 Paper media supported with metal gauze

Optical or electrical clogging indicators are available to monitor the clogging condition of the element. When ordering filters with integrated monitoring, the abbreviation of the clogging indicator has to be added to the order code of the desired filter variant.

For the appropriate clogging indicator see catalog sheet 60.40.

Order example: The filter D 162-253 is to be supplied with an optical indicator with automatic reset.
Order code:    D 162-253 OD1
Part No. (basic unit)  
Clogging indicator  

From catalog sheet 60.30, you can see clogging indicators that can be retrofitted.

Remarks:
- The switching pressure of the clogging indicator has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 7).
- The filters listed in this chart are standard filters. Other designs available on request.
- For versions with electrical clogging indicator, the device socket is not included in the scope of delivery.
- For the electrical clogging indicator of type DIN EN 175301-803 (ED8 and ED9) a device socket with two LEDs is available, which additionally enables visual indication of the filter contamination (order no. DG 041.1200).
Optical or electrical clogging indicators are available to monitor the clogging condition of the element. When ordering filters with integrated monitoring, the abbreviation of the clogging indicator has to be added to the order code of the desired filter variant.

For the appropriate clogging indicator see catalog sheet 60.40.

**Order example:** The filter D 162-753 is to be supplied with an optical indicator with automatic reset.

Order code: D 162-753 OD1

From catalog sheet 60.30, you can see clogging indicators that can be retrofitted.

**Remarks:**
- The switching pressure of the clogging indicator has always to be lower than the cracking pressure of the by-pass valve (see Selection Chart, column 7).
- The filters listed in this chart are standard filters. Other designs available on request.
- For versions with electrical clogging indicator, the device socket is not included in the scope of delivery.
- For the electrical clogging indicator of type DIN EN 175301-803 (ED8 and ED9), a device socket with two LEDs is available, which additionally enables visual indication of the filter contamination (order no. DG 041.1200).
### Dimensions

Clogging indicator optional: Pressure holes plugged with screws M4

Version with integrated optical clogging indicator (OD2)

Version with integrated electrical clogging indicator (ED8) and device socket*

Minimum distance from ferromagnetic parts: 7 mm / 0.3 inch

* not included in scope of delivery

### Measurements in mm

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<tr>
<th>Type</th>
<th>A/B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<th>N</th>
<th>O</th>
<th>P</th>
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<td>228</td>
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<td>140</td>
<td>95</td>
<td>80</td>
<td>AF 32</td>
<td>80</td>
<td>M12 / 18</td>
<td>116</td>
<td>AF 60</td>
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### Measurements in inch

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<td>M12 / 0.71</td>
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### Spare Parts

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<tr>
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<td>D 332.0102</td>
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<td>2</td>
<td>O-ring 88.57 x 2.62 mm</td>
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<td>3</td>
<td>Replacement filter element (with seal)</td>
<td>see Chart / col. 9</td>
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<tr>
<td>4</td>
<td>Hexagonal head screw M4 x 8 DIN 933-8.8</td>
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<td>5</td>
<td>Bonded seal 4.1 x 7.2 x 1 mm 0.16 x 0.28 x 0.04 inch</td>
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<td>6</td>
<td>Clogging indicator (with seal)</td>
<td>s. catalog sheet 60.40</td>
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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

Before release into the series production the filter casing is tested for fatigue strength in our pressure pulse test rig. 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.