Duplex Filter
Pi 2100
Nominal pressure 32/63 bar (460/900 psi), nominal size up to 400 according to DIN 24550

1. Features

High performance filters for modern hydraulic systems

- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Threaded connections
- Change over valve on upstream side
- Ergonomic switch-over handle with safety lock and pressure compensation
- User-optimized one-hand-operation
- Equipped with highly efficient glass fibre PS filter elements
- Beta rated elements according to ISO 16889 multipass test
- Elements with high differential pressure stability and dirt holding capacity
- Other connections on request
- Worldwide distribution
2. Flow rate/pressure drop curve complete filter

\[ y = \text{differential pressure } \Delta p \text{ [bar]} \]

\[ x = \text{flow rate } V \text{ [l/min]} \]

Calculation of individual filter under www.industrialfiltration-catalogue.mahle.com
3. Separation grade characteristics

\[ y = \text{beta-value} \]
\[ x = \text{particle size [µm]} \]

determined by multipass tests (ISO 16889)
calibration according to ISO 11171 (NIST)

4. Filter performance data

tested according to ISO 16889 (multipass test)

<table>
<thead>
<tr>
<th>PS elements with max. ( \Delta p ) 20 bar</th>
<th>PS vst elements with max. ( \Delta p ) 210 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS 3 ( \beta^{5(C)} \geq 200 )</td>
<td>PS vst 3 ( \beta^{5(C)} \geq 200 )</td>
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<tr>
<td>PS 6 ( \beta^{7(C)} \geq 200 )</td>
<td>PS vst 6 ( \beta^{7(C)} \geq 200 )</td>
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<td>PS 10 ( \beta^{10(C)} \geq 200 )</td>
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<td>PS 16 ( \beta^{15(C)} \geq 200 )</td>
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<td>PS 25 ( \beta^{20(C)} \geq 200 )</td>
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values guaranteed up to 10 bar differential pressure
values guaranteed up to 20 bar differential pressure

5. Quality assurance

MAHLE filters and filter elements are produced according to the following international standards:

<table>
<thead>
<tr>
<th>Norm</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN ISO 2941</td>
<td>Hydraulic fluid power filter elements; verification of collapse/burst resistance</td>
</tr>
<tr>
<td>DIN ISO 2942</td>
<td>Hydraulic fluid power filter elements; verification of fabrication integrity</td>
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<tr>
<td>DIN ISO 2943</td>
<td>Hydraulic fluid power filter elements; verification of material compatibility with fluids</td>
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<td>DIN ISO 3723</td>
<td>Hydraulic fluid power filter elements; metod for end load test</td>
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<td>ISO 3968</td>
<td>Hydraulic fluid power filters; evaluation of pressure drop versus flow characteristics</td>
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<tr>
<td>ISO 10771.1</td>
<td>Fatigue pressure testing of metal containing envelopes in hydraulic fluid applications</td>
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<tr>
<td>ISO 16889</td>
<td>Hydraulic fluid power filters-multipass method for evaluation filtration performance of a filter element</td>
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6. Symbols
### 7. Order numbers

Example for ordering filter:

<table>
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<tr>
<th>Housing design</th>
<th>2. 2x Filter elements</th>
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<tr>
<td>V = 100 l/min and electrical maintenance indicator</td>
<td>PS vst 3 NBR</td>
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<tr>
<td>Type: Pi 21010-069</td>
<td>Type: Pi 71010 DN PS vst 3</td>
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<tr>
<td>Order number: 78204158</td>
<td>Order number: 78227480</td>
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#### 7.1 Housing design

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When filter with non bypass configuration is selected, the collapse pressure of the element must not be exceeded.
### 7.2 Filter elements*

<table>
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<tr>
<th>Nominal size NG [l/min]</th>
<th>Order number</th>
<th>Type</th>
<th>Filter material</th>
<th>max. Δ p [bar]</th>
<th>Filter surface [cm²]</th>
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|                         | 77960867     | Pi 22006 DN PS 6 | PS 6           | 835            |                     |
|                         | 77925589     | Pi 23006 DN PS 10 | PS 10         | 20             | 835                 |
|                         | 78260978     | Pi 24006 DN PS 16 | PS 16         | 835            |                     |
|                         | 78260986     | Pi 25006 DN PS 25 | PS 25         | 835            |                     |
|                         | 78216137     | Pi 71006 DN PS vst 3 | PS vst 3 | 780            |                     |
|                         | 77960149     | Pi 72006 DN PS vst 6 | PS vst 6 | 210            | 780                 |
|                         | 77925662     | Pi 73006 DN PS vst 10 | PS vst 10 | 780            |                     |
|                         | 78216145     | Pi 74006 DN PS vst 16 | PS vst 16 | 780            |                     |
|                         | 78216152     | Pi 75006 DN PS vst 25 | PS vst 25 | 780            |                     |

| 100                     | 78227472     | Pi 21010 DN PS 3 | PS 3           | 1375           |                     |
|                         | 77960875     | Pi 22010 DN PS 6 | PS 6           | 1375           |                     |
|                         | 77925597     | Pi 23010 DN PS 10 | PS 10         | 20             | 1375               |
|                         | 78261000     | Pi 24010 DN PS 16 | PS 16         | 1375           |                     |
|                         | 78261018     | Pi 25010 DN PS 25 | PS 25         | 1375           |                     |
|                         | 78227480     | Pi 71010 DN PS vst 3 | PS vst 3 | 1275           |                     |
|                         | 77960131     | Pi 72010 DN PS vst 6 | PS vst 6 | 210            | 1275               |
|                         | 77925670     | Pi 73010 DN PS vst 10 | PS vst 10 | 1275           |                     |
|                         | 78261281     | Pi 74010 DN PS vst 16 | PS vst 16 | 1275           |                     |
|                         | 78216160     | Pi 75010 DN PS vst 25 | PS vst 25 | 1275           |                     |

| 160                     | 78261034     | Pi 21016 DN PS 3 | PS 3           | 2530           |                     |
|                         | 77960826     | Pi 22016 DN PS 6 | PS 6           | 2530           |                     |
|                         | 77925605     | Pi 23016 DN PS 10 | PS 10         | 20             | 2530               |
|                         | 78261042     | Pi 24016 DN PS 16 | PS 16         | 2530           |                     |
|                         | 78261059     | Pi 25016 DN PS 25 | PS 25         | 2530           |                     |
|                         | 77940638     | Pi 71016 DN PS vst 3 | PS vst 3 | 1885           |                     |
|                         | 77960123     | Pi 72016 DN PS vst 6 | PS vst 6 | 210            | 1885               |
|                         | 77925688     | Pi 73016 DN PS vst 10 | PS vst 10 | 1885           |                     |
|                         | 78269797     | Pi 74016 DN PS vst 16 | PS vst 16 | 1885           |                     |
|                         | 78216178     | Pi 75016 DN PS vst 25 | PS vst 25 | 1885           |                     |

*a wider range of elements is available on request*
### 7.2 Filter elements*

<table>
<thead>
<tr>
<th>Nominal size NG [l/min]</th>
<th>Order number</th>
<th>Type</th>
<th>Filter material</th>
<th>max. Δ p [bar]</th>
<th>Filter surface [cm²]</th>
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</table>

*a wider range of elements is available on request

### 8. Technical specifications

**Design:**
- line mounting filter

**Nominal pressure:**
- Pi 21004-21010: $10^7$ load changes, 63 bar (900 psi)
- Pi 21016-21040: $10^7$ load changes, 25 bar (360 psi), $2 \times 10^6$ load changes, 32 bar (460 psi)

**Test pressure:**
- Pi 21004-21010: 95 bar (1370 psi)
- Pi 21016-21040: 48 bar (690 psi)

**Temperature range:**
- $-10 \, ^\circ C$ to $+120 \, ^\circ C$
- Survival temperature: $-40 \, ^\circ C$
- (other temperature ranges on request)

**Bypass setting:**
- $\Delta p 3.5 \text{ bar} \pm 10 \%$

**Filter head material:**
- GAL

**Filter housing material:**
- AL/St.

**Sealing material:**
- NBR/AL

**Maintenance indicator setting:**
- $\Delta p 2.2 \text{ bar} \pm 10 \%$

**Electrical data of maintenance indicator:**
- Max. voltage: 250 V AC/200 V DC
- Max. current: 1 A
- Type of protection: IP 65 in inserted and secured status
- Contact load: 70 W
- Contact: normally open/closed
- Cable connection: M20x1.5

The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance indicator details and designs are available in the maintenance indicator data sheet.

We draw attention to the fact that all values indicated are average values which do not always occur in specific cases of application. Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer you advice.

We recommend to contact us concerning applications of our filters in areas governed by the EU Directive 94/9 EC (ATEX 95). The standard version can be used for liquids based on mineral oil (corresponding to the fluids in Group 2 of Directive 97/23 EC Article 9). If you consider to use other fluids please contact us for additional support.

Subject to technical alteration without prior notice.
### 9. Dimensions

All dimensions except "J" in mm.

<table>
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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<th>H</th>
<th>øl</th>
<th>J*</th>
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* SAE flange connections (3000 psi), NPT and SAE connections on request

Inlet Inlet
Outlet Outlet
*H Minimum clearance required for element change
*1 Lever locking and arresting
*2 Venting screws
*3 Optional wall mounting for NG 160 up to 400
10. Installation, operating and maintenance instructions

10.1 Filter installation
When installing filter make sure that sufficient space is available to remove filter element and filter housing.
Preferably the filter should be installed with the filter housing pointing downwards.
The maintenance indicator must be visible.

10.2 Connecting the electrical maintenance indicator
The electrical indicator is connected via a 2-pole appliance plug according to DIN EN 175301-803 with poles marked 1 and 2. The electrical section can be inverted to change from normally open to normally closed position or vice versa. The state on delivery is a normally closed contact.

10.3 When should the filter element be replaced?
1. Filters equipped with visual and electrical maintenance indicator:
   During cold starts, the indicator may give a warning signal. Press the red button of the visual indicator once again only after operating temperature has been reached. If the red button immediately pops up again and/or the electrical signal has not switched off after reaching operating temperature the filter element must be replaced after the end of the shift.
2. Please always ensure that you have original MAHLE spare elements in stock: Disposable elements cannot be cleaned.

10.4 Element replacement
Note: Elements may only be replaced by people who are familiar with the function of the filter. When replacing elements, appropriate safety clothing (protective goggles, gloves, safety shoes) must be worn.
Note: The maintenance indicator monitors the filter side in operation, which is identified by the position of the switching lever catch. The change-over transfer valve must be switched prior filter servicing. Now the signal of the maintenance indicators cancelled and the red button can be repressed again:
1. Operate and hold pressure equalizing lever located behind switching lever. Pull catch knob and swivel switching lever. Engage the catch on the clear filter side. Place through or drip pan underneath to collect leaving oil.
2. Loosen vent screw of the filter side not in use by 2-3 turns; max. until contact is made with the safety stop.
3. Unscrew filter housing by rotating same counter-clockwise and clean with a suitable medium.
   Warning: The shift lever may not, from now until the screwing back in of the filter housing (7.), be activated under any circumstances!
5. Check O-ring on the filter house for damage. Replace, if necessary.
6. Make sure that the order number on the spare element corresponds to the order number of the filter name-plate.
7. Lightly lubricate the threads of the filter housing and screw into the filter head. Maximum tightening torque for NG 40 to 100 = 60 Nm, for NG 160 to 400 = 100 Nm.
8. To refill the filter chamber, operate only the pressure equalizing lever (leave the switching lever arrested in its catch) long enough for the medium to emerge bubble-free from the vent bore.
9. Tighten vent screw. Check filter for leaks by operating the pressure equalizing lever once again.
### 11. Spare parts list

![Diagram of Duplex Filter Pi 2100 up to NG 400]

<table>
<thead>
<tr>
<th>Position</th>
<th>Type</th>
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