

Low Pressure Filter/Suction Filter

Pi 220

Nominal pressure 10 bar (140 psi), up to nominal size 160

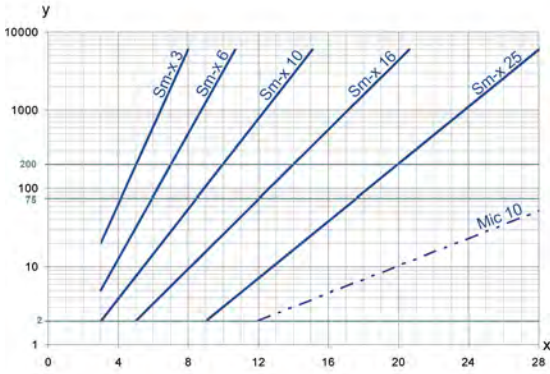
1. Features

High performance filters for modern hydraulic systems

- Provided for pipe installation
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electronic/electrical maintenance indicator
- Threaded connections
- Quality filters, easy to service
- Equipped with highly efficient Mic or Sm-x filter elements
- Beta rated elements according to ISO 16889
- Elements with high differential pressure stability and dirt holding capacity
- Worldwide distribution



3. Separation grade characteristics



y = beta-value
x = 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)

Sm-x-elements with
max. Δp 5 bar

Sm-x 10 $\beta_{10(C)} \geq 200$

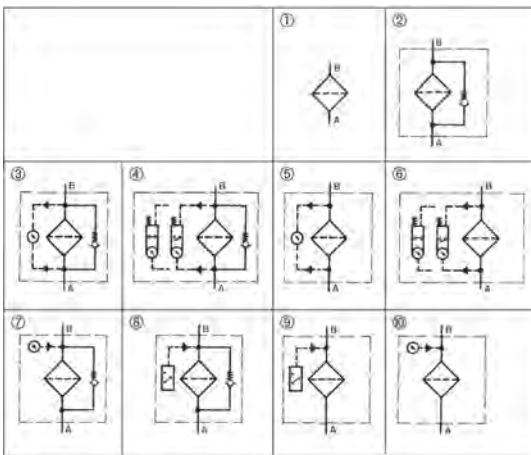
values guaranteed up to
5 bar differential pressure

5. Quality assurance

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

| Norm | Designation |
|--------------|--|
| DIN ISO 2941 | Hydraulic fluid power filter elements; verification of collapse/burst resistance |
| DIN ISO 2942 | Hydraulic fluid power filter elements; verification of fabrication integrity |
| DIN ISO 2943 | Hydraulic fluid power filter elements; verification of material compatibility |
| DIN ISO 3723 | Hydraulic fluid power filter elements; method for end load test |
| DIN ISO 3724 | Hydraulic fluid power filter elements; verification of flow fatigue characteristics |
| ISO 3968 | Hydraulic fluid power-filters-evaluation of pressure drop versus flow characteristics |
| ISO 10771.1 | Fatigue pressure testing of metal containing envelopes in hydraulic fluid applications |
| ISO 16889 | Hydraulic fluid power filters-multipass method for evaluation filtration performance of a filter element |

6. Symbols



7. Order numbers

Example for ordering filters:

| 1. Housing design | 2. Spin-on cartridge |
|---|---|
| V=25 l/min, bypass, electrical maintenance indicator Type: Pi 2202-058 Order number: 77665649 | Mic 10 Type: OC 58 Order number: 77785983 |

7.1 Housing design/order number for pressure-side installation

| Nominal size NG [l/min] | Order number | Type | ① | ② | ③ | ④ | ⑤ | ⑥ |
|----------------------------|-----------------|------------|------------|----------------------|--|--|-----------------------------|---------------------------------|
| | | | no options | with bypass valve | with bypass valve and visual indicator | with bypass valve and electrical indicator | with visual indicator | with electrical indicator |
| 25 | 77665656 | Pi 2202-60 | | | | | | |
| | 77665623 | Pi 2202-56 | | | | | | |
| | 77665631 | Pi 2202-57 | | | | | | |
| | 77665649 | Pi 2202-58 | | | | | | |
| | 77665664 | Pi 2202-68 | | | | | | |
| | 77665672 | Pi 2202-69 | | | | | | |
| 40 | 77665714 | Pi 2203-60 | | | | | | |
| | 77665680 | Pi 2203-56 | | | | | | |
| | 77665698 | Pi 2203-57 | | | | | | |
| | 77665706 | Pi 2203-58 | | | | | | |
| | 77665748 | Pi 2203-68 | | | | | | |
| | 77665755 | Pi 2203-69 | | | | | | |
| 63 | 77665813 | Pi 2205-60 | | | | | | |
| | 77665789 | Pi 2205-56 | | | | | | |
| | 77665797 | Pi 2205-57 | | | | | | |
| | 77665805 | Pi 2205-58 | | | | | | |
| | 77665847 | Pi 2205-68 | | | | | | |
| | 77665854 | Pi 2205-69 | | | | | | |
| 100 | 77666001 | Pi 2210-60 | | | | | | |
| | 77665979 | Pi 2210-56 | | | | | | |
| | 77665987 | Pi 2210-57 | | | | | | |
| | 77665995 | Pi 2210-58 | | | | | | |
| | 77666050 | Pi 2210-68 | | | | | | |
| | 77666068 | Pi 2210-69 | | | | | | |
| 160 | 77666126 | Pi 2214-60 | | | | | | |
| | 77666092 | Pi 2214-56 | | | | | | |
| | 77666100 | Pi 2214-57 | | | | | | |
| | 77666118 | Pi 2214-58 | | | | | | |
| | 77666183 | Pi 2214-68 | | | | | | |
| | 77666191 | Pi 2214-69 | | | | | | |

When filter with non bypass configuration is selected, the collapse pressure of the spin-on cartridge must not be exceeded.

7.2 Spin-on cartridges

| Nominal size NG [l/min] Press./Suct. side | Order number | Type | Filter material | max. Δp [bar] | Filter surface [cm ²] |
|--|--------------|--------|-----------------|-----------------------|-----------------------------------|
| 25/10 | 77785983 | OC 58 | Mic 10 | 5 | 1775 |
| | 77500184 | OC 168 | Sm-x 10 | | 1309 |
| 40/16 | 77501273 | HC 6 | Mic 10 | 5 | 3000 |
| | 77501232 | HC 46 | Sm-x 10 | | 2075 |
| 63/25 | 72013241 | HC 2 | Mic 10 | 5 | 5440 |
| | 77501372 | HC 42 | Sm-x 10 | | 3360 |
| 100/40 | 77643331 | HC 18 | Mic 10 | 5 | 7000 |
| | 77643398 | HC 28 | Sm-x 10 | | 3400 |
| 160/63 | 77504194 | HC 34 | Mic 10 | 5 | 14025 |
| | 77643844 | HC 35 | Sm-x 10 | | 7638 |

7.3 Housing design/order numbers for suction-side installation

| Nominal size NG [l/min] | Order number | Type | ① no options | ② with bypass 0.25 bar | ③ with bypass 0.25 bar and vacuum gauge | ④ with bypass 0.25 bar and vacuum switch | ⑤ with vacuum switch | ⑥ with vacuum gauge |
|-------------------------|--------------|-------------|--------------|------------------------|---|--|----------------------|---------------------|
| 10 | 77665656 | Pi 2202-060 | | | | | | |
| | 77736614 | Pi 2202-067 | | | | | | |
| | 77736622 | Pi 2202-062 | | | | | | |
| | 77736630 | Pi 2202-061 | | | | | | |
| | 77736606 | Pi 2202-065 | | | | | | |
| | 77736598 | Pi 2202-066 | | | | | | |
| 16 | 77665714 | Pi 2203-060 | | | | | | |
| | 77665730 | Pi 2203-067 | | | | | | |
| | 77736689 | Pi 2203-062 | | | | | | |
| | 77736697 | Pi 2203-061 | | | | | | |
| | 77736671 | Pi 2203-065 | | | | | | |
| | 77665722 | Pi 2203-066 | | | | | | |
| 25 | 77665813 | Pi 2205-060 | | | | | | |
| | 77736747 | Pi 2205-067 | | | | | | |
| | 77665821 | Pi 2205-062 | | | | | | |
| | 77736754 | Pi 2205-061 | | | | | | |
| | 77665839 | Pi 2205-065 | | | | | | |
| | 77736739 | Pi 2205-066 | | | | | | |
| 40 | 77666001 | Pi 2210-060 | | | | | | |
| | 77735947 | Pi 2210-067 | | | | | | |
| | 77666027 | Pi 2210-062 | | | | | | |
| | 77666019 | Pi 2210-061 | | | | | | |
| | 77666035 | Pi 2210-065 | | | | | | |
| | 77666043 | Pi 2210-066 | | | | | | |
| 63 | 77666126 | Pi 2214-060 | | | | | | |
| | 77666175 | Pi 2214-067 | | | | | | |
| | 77666142 | Pi 2214-062 | | | | | | |
| | 77666134 | Pi 2214-061 | | | | | | |
| | 77666159 | Pi 2214-065 | | | | | | |
| | 77666167 | Pi 2214-066 | | | | | | |

When filter with non bypass configuration is selected, the collapse pressure of the spin-on cartridge must not be exceeded.

8. Technical specifications

| | |
|--------------------|--|
| Design: | line mounting filter |
| Nominal pressure: | 10 bar (140 psi)* |
| Test pressure: | 13 bar (180 psi) |
| Temperature range: | -10 °C to +120 °C (other temperature ranges on request) |

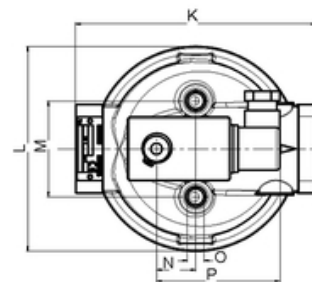
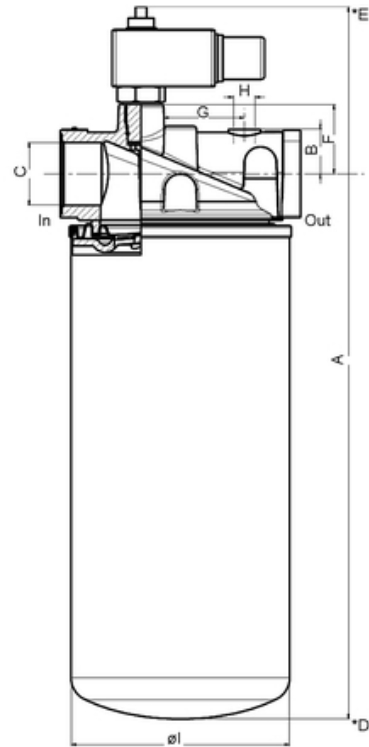
| | |
|---|--------------------------------------|
| Bypass setting: | |
| Pressure side: | Δp 3.5 bar \pm 10% |
| Suction side: | Δp 0.25 bar \pm 10% |
| Filter head material: | GDAL |
| Filter housing material: | St |
| Sealing material: | NBR/AL |
| Maintenance indicator setting: | Δp 2.2 bar \pm 0.3 bar |
| Indicating range vacuum meter: | -1 bar to +1.5 bar |
| Pressure setting vacuum switch: | 200 mbar |
| Type of protection (suction side): | IP 54 |
| Electrical data of maintenance indicator: | |
| Max. voltage: | 250 V AC/200 V DC |
| Max. current: | 1 A |
| Contact load: | 70 W |
| Type of protection: | IP 65 in inserted and secured status |
| Contact: | normally open/closed |
| Cable sleeve: | 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.

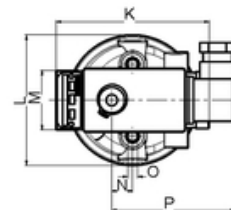
We draw attention to the fact that all values indicated are average values which do not always occur in specific cases of application. Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer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

We recommend you 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.

* For the contamination of the housing designs as per 7.1 with medium-pressure spin-on cartridges refer to leaflet "spin-on cartridges" for dimensions and specifications. Operating pressure on request.



Pi 2210 - Pi 2214



Pi 2202 - Pi 2205

In = Inlet

Out = Outlet

*D = Height required for spin-on cartridge removal

*E = Height required for maintenance indicator removal

Subject to technical alteration without prior notice.

9. Dimensions

All dimensions except "C" and "H" in mm.

| Type | A | B | C | D | E | F | G* | H* | I | K | L | M | N | O | P | Weight [kg] |
|---------|-----|----|------------------|----|----|------|------|------|-----|-----|-----|----|------|--------|----|-------------|
| Pi 2202 | 241 | 19 | G $\frac{1}{2}$ | 30 | 45 | 37.5 | 23.5 | G1/8 | 76 | 95 | 80 | 45 | 13.0 | M8x10 | 78 | 0.90 |
| Pi 2203 | 261 | 19 | G $\frac{1}{2}$ | 30 | 45 | 37.5 | 23.5 | G1/8 | 93 | 95 | 80 | 45 | 13.0 | M8x10 | 78 | 1.00 |
| Pi 2205 | 328 | 19 | G $\frac{3}{4}$ | 30 | 45 | 37.5 | 23.5 | G1/8 | 93 | 95 | 80 | 45 | 13.0 | M8x10 | 78 | 1.25 |
| Pi 2210 | 302 | 30 | G1 $\frac{1}{4}$ | 40 | 45 | 43.5 | 40.0 | G1/8 | 136 | 150 | 128 | 60 | 24.5 | M12x15 | 78 | 2.30 |
| Pi 2214 | 442 | 30 | G1 $\frac{1}{4}$ | 40 | 45 | 43.5 | 40.0 | G1/8 | 136 | 150 | 128 | 60 | 24.5 | M12x15 | 78 | 2.70 |

*with suction-side installation only.

10. Installation, operating and maintenance instructions

10.1 Filter installation

When installing the filter make sure that sufficient space is available to remove spin-on cartridge. Filter should be installed with the spin-on cartridge 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 position to normally closed position or vice versa.

10.3 When should the filter element be replaced?

- 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.
- Filters without maintenance indicator:

The filter element should be replaced after the trial run or flushing of the system. Afterwards follow instructions of the manufacturer.
- Please always ensure that you have original MAHLE spare elements in stock: disposable elements (Sm-x) cannot be cleaned.

10.4 Spin-on cartridge exchange

- Stop system and relieve filter from pressure.
- Unscrew the spin-on cartridge with the aid of a belt spanner by turning same to the left
- Make sure that the order number on the spin-on cartridge corresponds to the order number of the plate.
- The seal of the screw-on cartridge should be lightly oiled.
- Screw cartridge on in accordance with the printed-on instructions.



11. Spare parts list

| Order numbers for spare parts | | |
|-------------------------------|------------------------------------|--------------|
| Position | Type | Order number |
| ① | Maintenance indicator | |
| | Visual PiS 3098 | 77669971 |
| | Electrical PiS 3097 | 77669948 |
| | Electrical upper part only | 77536550 |
| ② | Seal kit for maintenance indicator | |
| | NBR | 77760309 |
| ③ | Vacuum gauge | 76345763 |
| ④ | Vacuum switch PiS 3070 | 77669724 |