

Low Pressure Filter

Pi 2300

Operating pressure 25/140 bar, Nominal size up to 2000
Filter elements according DIN 24550

1. Features

Efficient filters for hydraulic systems

- Modular design principle
- Compact design
- Minimal pressure drop
- Optical/electrical/electronic contamination control
- SAE 4 bolt flange connection
- Inlet sideways at the sight or at the bottom outlet sideways

Quality filters, easy to service

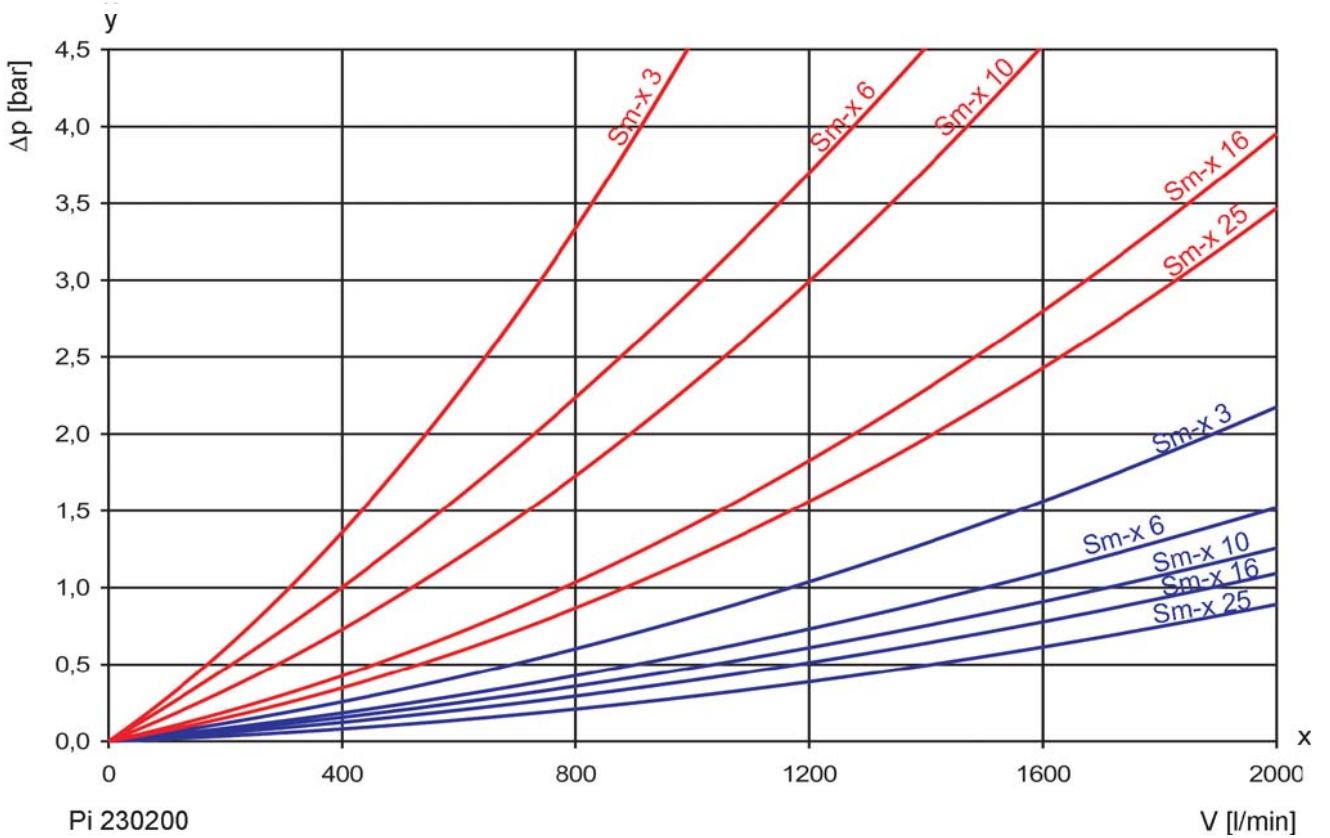
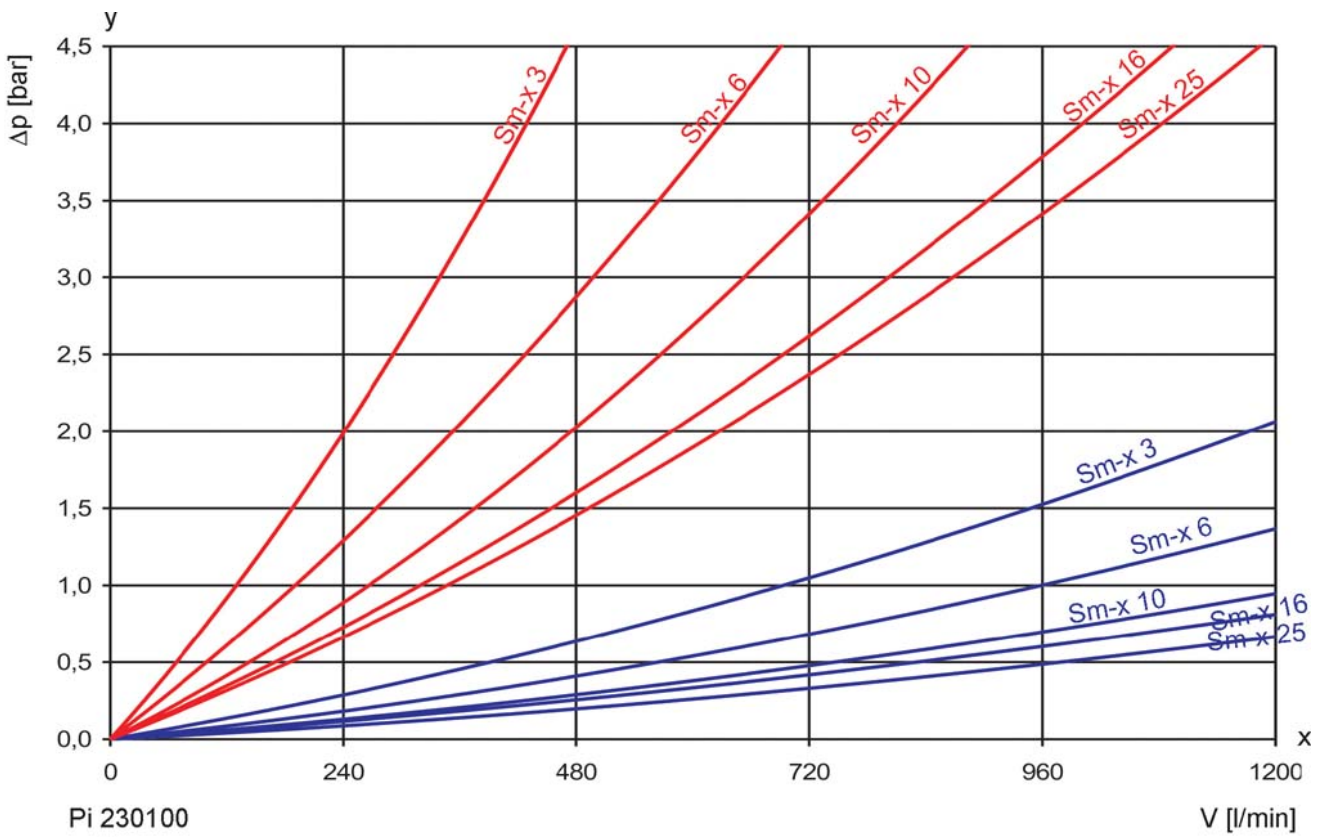
- Equipped with highly efficient Sm-x filter elements
- β -valued elements per ISO 16889
- High dirt holding capacity and differential pressure stability providing optimal element service life.
- Maintainable with toggle-lock for easy element change

Worldwide distribution



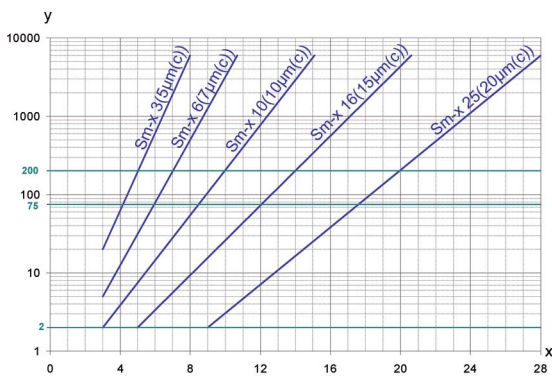
2. Flow rate/pressure drop curve complete filter

■ 190 mm²/s (25° E)
■ 33 mm²/s (4,5° E)



y = differential pressure Δp [bar]
 x = flow rate V [l/min]

3. Separation characteristics



y = beta-ratio

x = Particle size [μm]

determined by multipass test (ISO 16889)

calibration according to ISO 11171 (NIST)

4. Filter performance data

measured according to ISO 16889 (multipass test)

Sm-x elements with Δp 10 bar

Sm-x 3 $\beta_{5(C)} \geq 200$

Sm-x 6 $\beta_{7(C)} \geq 200$

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

Sm-x 16 $\beta_{15(C)} \geq 200$

Sm-x 25 $\beta_{20(C)} \geq 200$

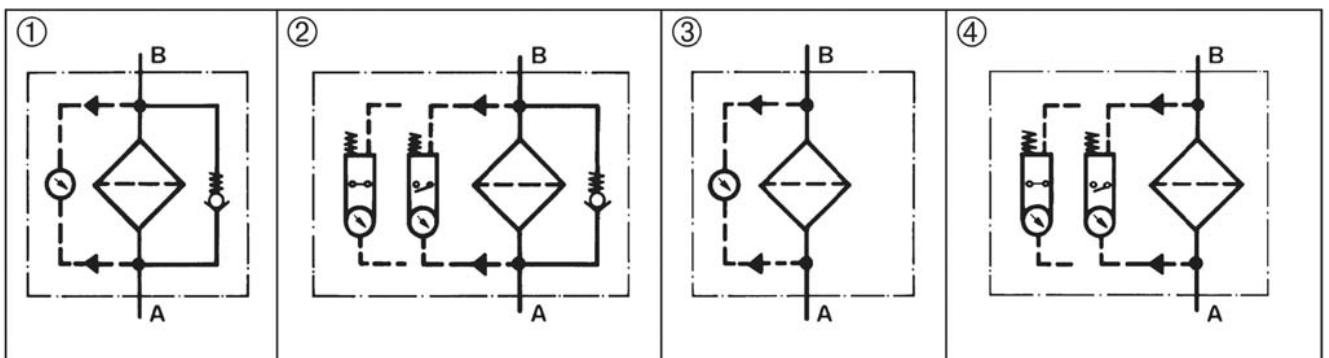
up to 10 bar differential pressure

5. Quality assurance

MAHLE filter and filter elements are manufactured respectively, tested in accordance with 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 with fluids
DIN ISO 2923	Hydraulic fluid power filter elements; method for end load test
DIN ISO 2924	Hydraulic fluid power filter elements; verifications 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. Filter elements
Nominal size 1000, with bypass, electrical contamination indicator, inlet at the bottom Type: Pi 230100/11-058 Order number: 76321129	Sm-x 10 Type: 23100 RN Sm-x 10 Order number: 77924228 Attention: At a nominal size of 2000, 2 filter elements per housing are required

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	Inlet	①	②	③	④
				with bypass valve and optical indicator	with bypass valve and electrical indicator	with optical indicator	with electrical indicator
1000	76321087	Pi 230100/11-057	at the bottom				
	76321129	Pi 230100/11-058					
	76321160	Pi 230100/11-068					
	76321202	Pi 230100/11-069					
1000	76321095	Pi 230100/21-057	at the sight				
	76321137	Pi 230100/21-058					
	76321178	Pi 230100/21-068					
	76321210	Pi 230100/21-069					
2000	76321103	Pi 230200/11-057	at the bottom				
	76321145	Pi 230200/11-058					
	76321186	Pi 230200/11-068					
	76321228	Pi 230200/11-069					
2000	76321111	Pi 230200/21-057	at the sight				
	76321152	Pi 230200/21-058					
	76321194	Pi 230200/21-068					
	76321236	Pi 230200/21-069					

When using filter with non bypass configuration is selected the collapse pressure of the element may not be exceeded.

7.2 Filter elements*

Nominal size NG [l/min]	Order number	Type	Filter material	Collapse pressure [bar]	Filter surface [cm ²]
1000	77924210	Pi 21100 RN Sm-x 3	Sm-x 3	10	18760
	77964109	Pi 22100 RN Sm-x 6	Sm-x 6		18760
	77924228	Pi 23100 RN Sm-x 10	Sm-x 10		18760
	77963689	Pi 24100 RN Sm-x 16	Sm-x 16		18760
	77960271	Pi 25100 RN Sm-x 25	Sm-x 25		18760
2000	77924210	Pi 21100 RN Sm-x 3	Sm-x 3	10	2 x 18760
	77964109	Pi 22100 RN Sm-x 6	Sm-x 6		2 x 18760
	77924228	Pi 23100 RN Sm-x 10	Sm-x 10		2 x 18760
	77963689	Pi 24100 RN Sm-x 16	Sm-x 16		2 x 18760
	77960271	Pi 25100 RN Sm-x 25	Sm-x 25		2 x 18760

* further elements available upon request respectively acc. leaflet "Filter elements and retrofit kits Pi 230/Pi 2300".

8. Specifications

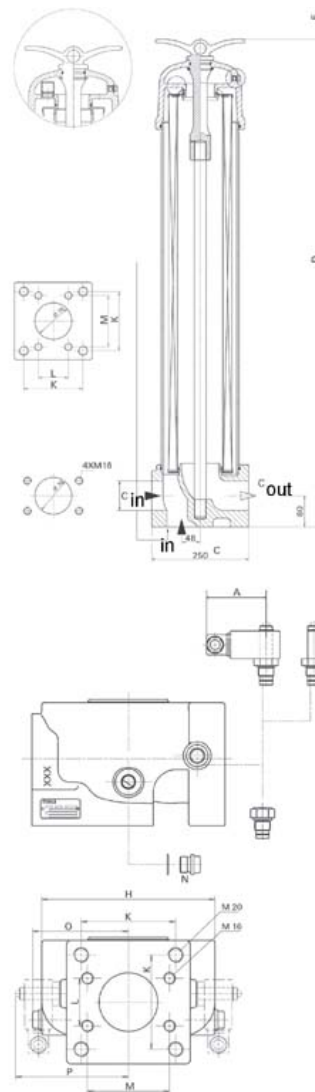
Operating pressure (10000000 LW):	25 bar
Test pressure (statical):	40 bar
Temperature range:	-10 °C to +120 °C (other temperature ranges on request)
Bypass opening pressure:	Δp 3.5 bar \pm 10 %
Filter head material:	GAL
Filter bowl material:	AL
Sealing material:	NBR
Activating pressure of optical/electrical differential pressure indicator:	Δp 2.2 bar \pm 0.3 bar
Electrical data of differential pressure indicator:	
Maximum voltage:	250 V AC/200 V DC
Maximum current on contact:	1 A
Inrush current:	70 W
Type of protection:	IP 65 when inserted and secured

Contact: bistable
Cable connection: M 20 x 1.5
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.
The use of quenching circuits must be checked in the case of inductivity in the DC current circuit. The contamination indicator data sheet contains further information and additional contamination indicator versions.

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.

When using our filters in areas which are to be classified according to EU Directive 94/9 EC (ATEX 95), we recommend prior discussion with us. 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). Please consult with us if using other media.

Subject to technical alteration without prior notice.



in = intake
out = outlet

9. Dimensions

All dimensions except "C" and "N" in mm

Type	A	B	C	D	E	F	G	H
Pi230100	78	80	SAE 3", 3000 psi	710	770	230	200	224
Pi230200	78	80	SAE 3", 3000 psi	1260	770	230	200	224

Type	I	K	L	M	N	O	P	Weight [kg]
Pi230100	250	122.3	61.9	106.6	G ½	124	146	29
Pi230200	250	122.3	61.9	106.6	G ½	124	146	38

10. Installation, operating and maintenance instructions

10.1 Filter installation

When installing filter make sure that sufficient space is available to remove filter element.

10.2 Connecting the electrical contamination indicator

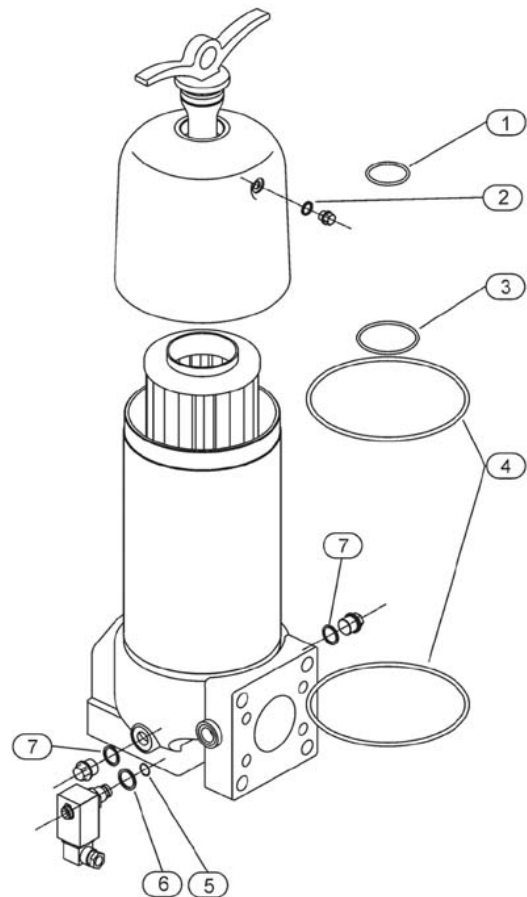
The electrical indicator is connected via a 2-pole appliance plug according to DIN EN 175301-803 with poles marked 1 and 2. The electrical section can be inverted to change from normally open to normally closed position or vice versa.

10.3 When must the filter be replaced?

- Filters equipped with optical and electrical contamination indicator:
During cold starts, the indicator may give a warning signal. Depress the red button of the optical indicator once again only after operating temperature has been reached. If the red button immediately pops out 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 contamination indicator: The filter element should be replaced after trial run or flushing of the system. Afterwards follow instructions of the manufacturer.
- Please always ensure that you have Original MAHLE replacement elements in stock: disposable elements (SM-x, Sm-N 2) cannot be cleaned.

10.4 Element replacement

- Stop system and relieve filter from pressure.
- Loosen toggle, remove cover, and open drain valve. Housing completely vented.
- Remove filter element from the filter bowl. With filter type Pi 230200 remove the spacer sleeve from the elements clean and reuse.
- Check seals for damages. Replace, if necessary.
- Make sure that the part number on the spare element corresponds with the part number on the filter label. With the filter type Pi 230200 always change both elements. Remove the plastic bag and push element over spigot in the filter head. With filter type Pi 230200 put the sleeve on the element. On this, telescope the second element and locate it.
- Close drain valve. Put the thumb screw together with the cover on the centre rod and tighten strong. Filter must be bled!



11. Spare parts list

Order numbers for spare parts		
Position	Type	Order number
①	Seal kit	
②	NBR	76321244
③	FPM	76321251
④	EPDM	76321269
	Differential pressure indicator	
	Optical PiS 3098/2.2	77669971
	Optical/electrical PiS 3097/2.2	77669948
⑤	Seal kit for differential pressure indicator PiS 3098/2.2 + PiS 3097/2.2	
⑥	NBR	77760300
	FPM	77760317
	EPDM	77760325
not illustrated	Adapter for elements at Pi 230200	76937791

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