

High Pressure Filter

Pi 420

Operating pressure 400 bar, Nominal size up to 450

1. Features

Efficient filters for modern hydraulic systems

- Modular design principle
- Compact design
- Minimal pressure drop
- Optical/electrical/electronic contamination control
- Threaded or SAE flange connection

Quality filters, easy to service

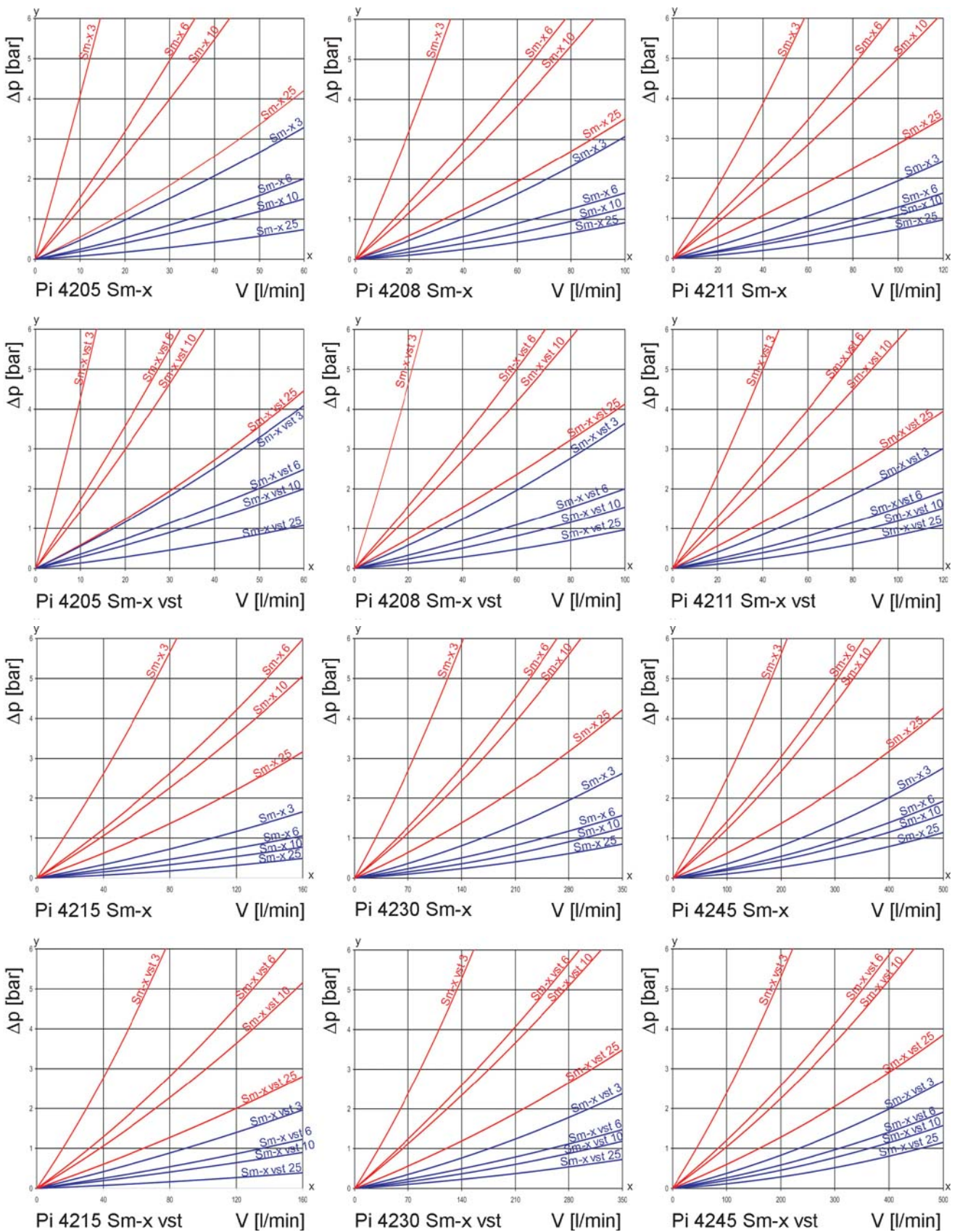
- Equipped with highly efficient Sm-x filter elements
- β -valued elements per ISO 16889
- High dirt holding capacity and differential pressure stability providing optimal element service life

Worldwide distribution



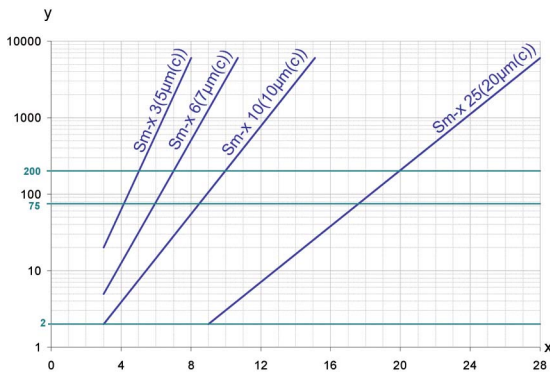
2. Flow rate/pressure drop curve complete filter

■ 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
Δ p 20 bar

Sm-x 3 β_{5(C)} ≥200
Sm-x 6 β_{7(C)} ≥200
Sm-x 10 β_{10(C)} ≥200
Sm-x 25 β_{20(C)} ≥200

up to 10 bar differential
pressure

Sm-x vst elements with
Δ p 210 bar

Sm-x vst 3 β_{5(C)} ≥200
Sm-x vst 6 β_{7(C)} ≥200
Sm-x vst 10 β_{10(C)} ≥200
Sm-x vst 25 β_{20(C)} ≥200

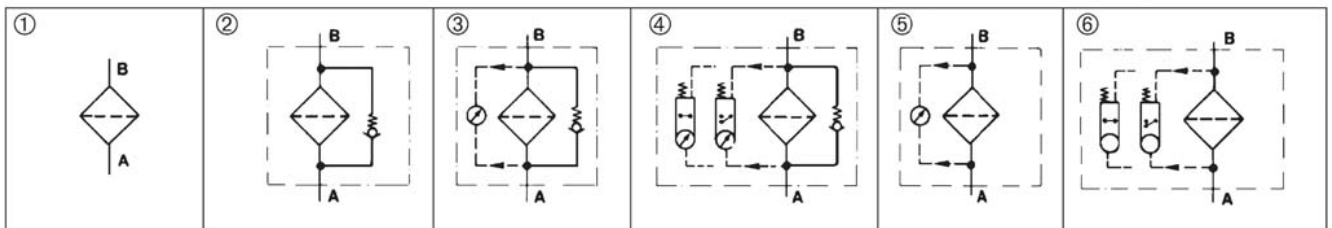
up to 20 bar differential
pressure

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 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. Filter elements
Housing design V = 80 l/min, electrical indicator Type: Pi 4208-15 Order number: 77666472	Sm-x vst 3 Type: Pi 2208 Sm-x vst 3 Order number: 77680200

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	Order number	Type	①	②	③	④	⑤	⑥
					with indicator cavity	with bypass valve and indicator cavity	with bypass valve and optical indicator	with bypass valve and electrical indicator	with optical indicator	with electrical indicator
50	77666357	Pi 4205-10	77967714	Pi 4205-10 FL						
	77666365	Pi 4205-11	77967722	Pi 4205-11 FL						
	77666373	Pi 4205-12	77967730	Pi 4205-12 FL						
	77666381	Pi 4205-13	77967748	Pi 4205-13 FL						
	77666399	Pi 4205-14	77967755	Pi 4205-14 FL						
	77666415	Pi 4205-15	77967763	Pi 4205-15 FL						
80	77666423	Pi 4208-10	77967771	Pi 4208-10 FL						
	77666431	Pi 4208-11	77967789	Pi 4208-11 FL						
	77666449	Pi 4208-12	77967797	Pi 4208-12 FL						
	77666456	Pi 4208-13	77967805	Pi 4208-13 FL						
	77666464	Pi 4208-14	77967813	Pi 4208-14 FL						
	77666472	Pi 4208-15	77967821	Pi 4208-15 FL						
110	77666480	Pi 4211-10	77967839	Pi 4211-10 FL						
	77666498	Pi 4211-11	77967847	Pi 4211-11 FL						
	77666506	Pi 4211-12	77967854	Pi 4211-12 FL						
	77666514	Pi 4211-13	77967862	Pi 4211-13 FL						
	77666522	Pi 4211-14	77967870	Pi 4211-14 FL						
	77666530	Pi 4211-15	77967888	Pi 4211-15 FL						
150	77666548	Pi 4215-10	77968596	Pi 4215-10 FL						
	77666555	Pi 4215-11	77968604	Pi 4215-11 FL						
	77666563	Pi 4215-12	77968612	Pi 4215-12 FL						
	77666571	Pi 4215-13	77968620	Pi 4215-13 FL						
	77666589	Pi 4215-14	77968638	Pi 4215-14 FL						
	77666597	Pi 4215-15	77968646	Pi 4215-15 FL						
300	77666613	Pi 4230-10	77968653	Pi 4230-10 FL						
	77666621	Pi 4230-11	77968661	Pi 4230-11 FL						
	77666639	Pi 4230-12	77968679	Pi 4230-12 FL						
	77666647	Pi 4230-13	77968687	Pi 4230-13 FL						
	77666654	Pi 4230-14	77968695	Pi 4230-14 FL						
	77666662	Pi 4230-15	77964505	Pi 4230-15 FL						
450	77666688	Pi 4245-10	77968703	Pi 4245-10 FL						
	77666696	Pi 4245-11	77968711	Pi 4245-11 FL						
	77666704	Pi 4245-12	77968729	Pi 4245-12 FL						
	77666712	Pi 4245-13	77968737	Pi 4245-13 FL						
	77666720	Pi 4245-14	77968745	Pi 4245-14 FL						
	77666746	Pi 4245-15	77968752	Pi 4245-15 FL						

When 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]
50	77680135	Pi 2105 Sm-x 3	Sm-x 3	20	590
	77943509	Pi 5105 Sm-x 6	Sm-x 6		590
	77680325	Pi 3105 Sm-x 10	Sm-x 10		590
	77680440	Pi 4105 Sm-x 25	Sm-x 25		590
	77680192	Pi 2205 Sm-x vst 3	Sm-x vst 3	210	425
	77943533	Pi 5205 Sm-x vst 6	Sm-x vst 6		425
	77680382	Pi 3205 Sm-x vst 10	Sm-x vst 10		425
	77680507	Pi 4205 Sm-x vst 25	Sm-x vst 25		425
80	77680143	Pi 2108 Sm-x 3	Sm-x 3	20	1150
	77943517	Pi 5108 Sm-x 6	Sm-x 6		1150
	77680341	Pi 3108 Sm-x 10	Sm-x 10		1150
	77680457	Pi 4108 Sm-x 25	Sm-x 25		1150
	77680200	Pi 2208 Sm-x vst 3	Sm-x vst 3	210	850
	77943541	Pi 5208 Sm-x vst 6	Sm-x vst 6		850
	77681190	Pi 3208 Sm-x vst 10	Sm-x vst 10		850
	77680515	Pi 4208 Sm-x vst 25	Sm-x vst 25		850
110	77680150	Pi 2111 Sm-x 3	Sm-x 3	20	1700
	77943525	Pi 5111 Sm-x 6	Sm-x 6		1700
	77680333	Pi 3111 Sm-x 10	Sm-x 10		1700
	77680465	Pi 4111 Sm-x 25	Sm-x 25		1700
	77680218	Pi 2211 Sm-x vst 3	Sm-x vst 3	210	1275
	77943558	Pi 5211 Sm-x vst 6	Sm-x vst 6		1275
	77680390	Pi 3211 Sm-x vst 10	Sm-x vst 10		1275
	77680523	Pi 4211 Sm-x vst 25	Sm-x vst 25		1275
150	77680168	Pi 2115 Sm-x 3	Sm-x 3	20	2425
	77955099	Pi 5115 Sm-x 6	Sm-x 6		2425
	77680358	Pi 3115 Sm-x 10	Sm-x 10		2425
	77680473	Pi 4115 Sm-x 25	Sm-x 25		2425
	77680226	Pi 2215 Sm-x vst 3	Sm-x vst 3	210	2010
	77955123	Pi 5215 Sm-x vst 6	Sm-x vst 6		2010
	77680408	Pi 3215 Sm-x vst 10	Sm-x vst 10		2010
	77680531	Pi 4215 Sm-x vst 25	Sm-x vst 25		2010
300	77680176	Pi 2130 Sm-x 3	Sm-x 3	20	4620
	77955107	Pi 5130 Sm-x 6	Sm-x 6		4620
	77680366	Pi 3130 Sm-x 10	Sm-x 10		4620
	77680481	Pi 4130 Sm-x 25	Sm-x 25		4620
	77680234	Pi 2230 Sm-x vst 3	Sm-x vst 3	210	3800
	77955131	Pi 5230 Sm-x vst 6	Sm-x vst 6		3800
	77680416	Pi 3230 Sm-x vst 10	Sm-x vst 10		3800
	77680549	Pi 4230 Sm-x vst 25	Sm-x vst 25		3800
450	77680184	Pi 2145 Sm-x 3	Sm-x 3	20	6865
	77955115	Pi 5145 Sm-x 6	Sm-x 6		6865
	77680374	Pi 3145 Sm-x 10	Sm-x 10		6865
	77680499	Pi 4145 Sm-x 25	Sm-x 25		6865
	77680242	Pi 2245 Sm-x vst 3	Sm-x vst 3	210	5600
	77955149	Pi 5245 Sm-x vst 6	Sm-x vst 6		5600
	77680424	Pi 3245 Sm-x vst 10	Sm-x vst 10		5600
	77680556	Pi 4245 Sm-x vst 25	Sm-x vst 25		5600

* further elements available upon request.

8. Specifications

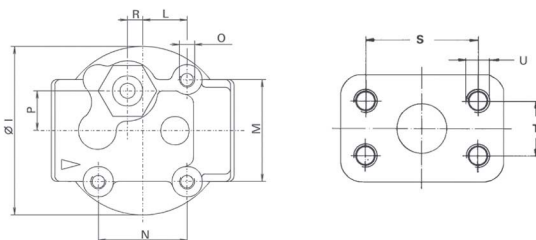
Design:	line mounting filter
Operating pressure:	400 bar
Test pressure:	520 bar
Temperature range:	-10 °C to +120 °C (other temperature ranges on request)
Bypass opening pressure:	Δp 7 bar \pm 10 %
Filter head material:	GGG
Filter bowl material:	St
Sealing material:	NBR/PTFE
Activating pressure of optical/ electrical differential pressure in- dicator:	Δp 5 bar \pm 10 %
Electrical data of contamination 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 EG (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 EG article 9). Please consult with us if using other media.

Subject to technical alteration without prior notice.

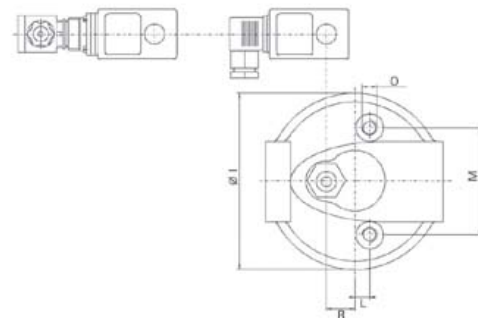
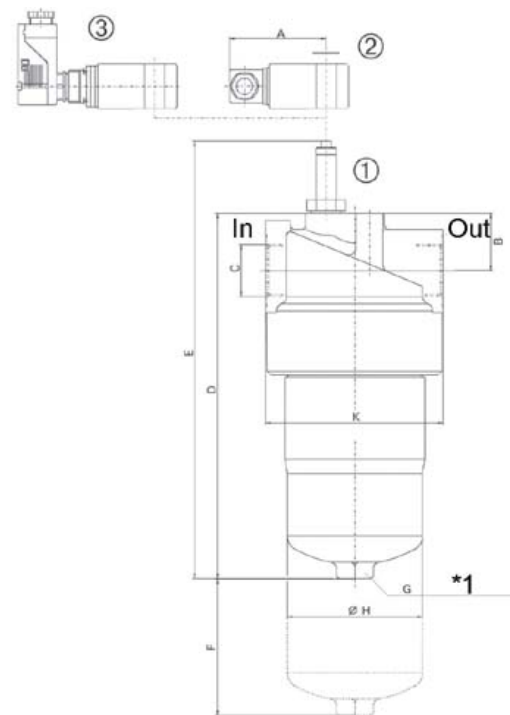


NG 50 - 110

*1

*1

DN 25 according to SAE 1" 6000psi
 DN 38 according to SAE 1½" 6000psi
 Flange, screw, o-ring not included in delivery



NG 150 - 450

In = intake

Out = outlet

Pos 1

Optical contamination indicator

Pos 2

Electrical upper section connector according
 DIN EN 175301-803,

Executions: 3092, 3105, 3115

Pos 3

Electrical upper section connector according
 DIN EN 175201-804,

Executions: 3102, 3122, 3110

*1

NG 300, 450 with drain screw G ¼ DIN 910

9. Dimensions

All dimensions except "C" in mm.

Type	A	B	C	D	E	F	G SW	H	I	K
Pi 4205	78	31	G ½	189	247	80	27	66	90	92
Pi 4205 FL		28	DN 25	204	262				85	95
Pi 4208	78	31	G 1	267	325	80	27	66	90	92
Pi 4208 FL		28	DN 25	282	340				85	95
Pi 4211	78	31	G 1	343	401	80	27	66	90	92
Pi 4211 FL		28	DN 25	358	416				85	95
Pi 4215	78	46	G 1¼	284	342	110	30	109	142	143.5
Pi 4215 FL		40	DN 38							
Pi 4230	78	46	G 1¼	409	467	110	30	109	142	143.5
Pi 4230 FL		40	DN 38							
Pi 4245	78	46	G 1½	525	583	110	30	109	142	143.5
Pi 4245 FL		40	DN 38							

Type	L	M	N	O	P	R	S	T	U	Weight [kg]
Pi 4205	23.5	54	47	M 8 x 14	21	8	57.1	27.8	M 12 x 20	4.1
Pi 4205 FL	10		-			12				4.6
Pi 4208	23.5	54	47	M 8 x 14	21	8	57.1	27.8	M 12 x 20	4.9
Pi 4208 FL	10		-			12				5.3
Pi 4211	23.5	54	47	M 8 x 14	21	8	57.1	27.8	M 12 x 20	5.8
Pi 4211 FL	10		-			12				6.2
Pi 4215	12	86	-	M 12 x 15	-	23	79.4	36.5	M 16 x 20	12.3
Pi 4215 FL										13.3
Pi 4230	12	86	-	M 12 x 15	-	23	79.4	36.5	M 16 x 20	14.8
Pi 4230 FL										15.9
Pi 4245	12	86	-	M 12 x 15	-	23	79.4	36.5	M 16 x 20	17.1
Pi 4245 FL										18.6

10. Installation, operating and maintenance instructions

10.1 Filter installation

When installing the filter make sure that sufficient space is available to remove filter element and filter bowl. Preferable the filter should be installed with the filter bowl pointing downwards. The contamination indicator must be visible.

10.2 Connecting the electrical contamination indicator

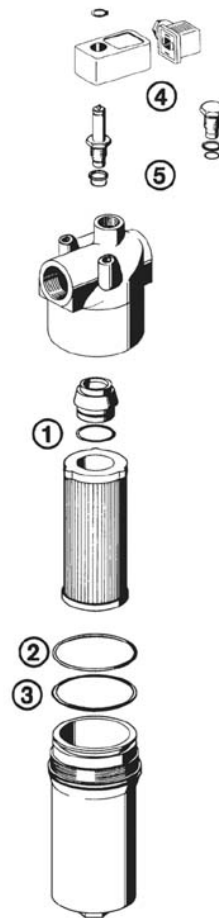
The electrical indicator is connected via a 2-pole appliance plug according to DIN EN 175301-803 with poles marked 1 and 2. The electrical section can be inverted to change from normally open position to normally closed position or vice versa.

10.3 When must the filter element 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 visual 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 the 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) cannot be cleaned.

10.4 Element replacement

- Stop system and relieve filter from pressure.
- Unscrew the filter bowl by turning counter-clockwise. Clean the bowl using a suitable cleaning solvent.
- Remove the filter element with a side-to-side motion.
- Check o-ring and spigot for damage. Replace, if necessary.
- Make sure that the order number on the spare element corresponds with the order number of the plate. Remove the plastic bag and push element over the spigot in the filter head.
- Complete installation by screwing on the bowl, turning clockwise until it comes to a full stop. Back off the bowl 1/8 to 1/2 turn.



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11. Spare parts list

Order numbers for spare parts		
Position	Type	Order number
① - ③	Seal kit	
	Pi 4205 - Pi 4211	
	NBR	77544851
	FPM	77544869
	EPDM	77544877
	Pi 4215 - Pi 4245	
	NBR	77544885
	FPM	77544893
	EPDM	77544901
④	Contamination indicator	
	Optical PiS 3093/5	77669914
	Electrical PiS 3092/5	77669864
	Electrical upper section only	77536550
⑤	Seal kit for contamination indicator	
	NBR	77760275
	FPM	77760283
	EPDM	77760291