

MAHLE

Industrial Filtration

Duplex Filter

Pi 2100

Operating pressure 25/63 bar, Nominal size up to 400
according DIN 24550

1. Features

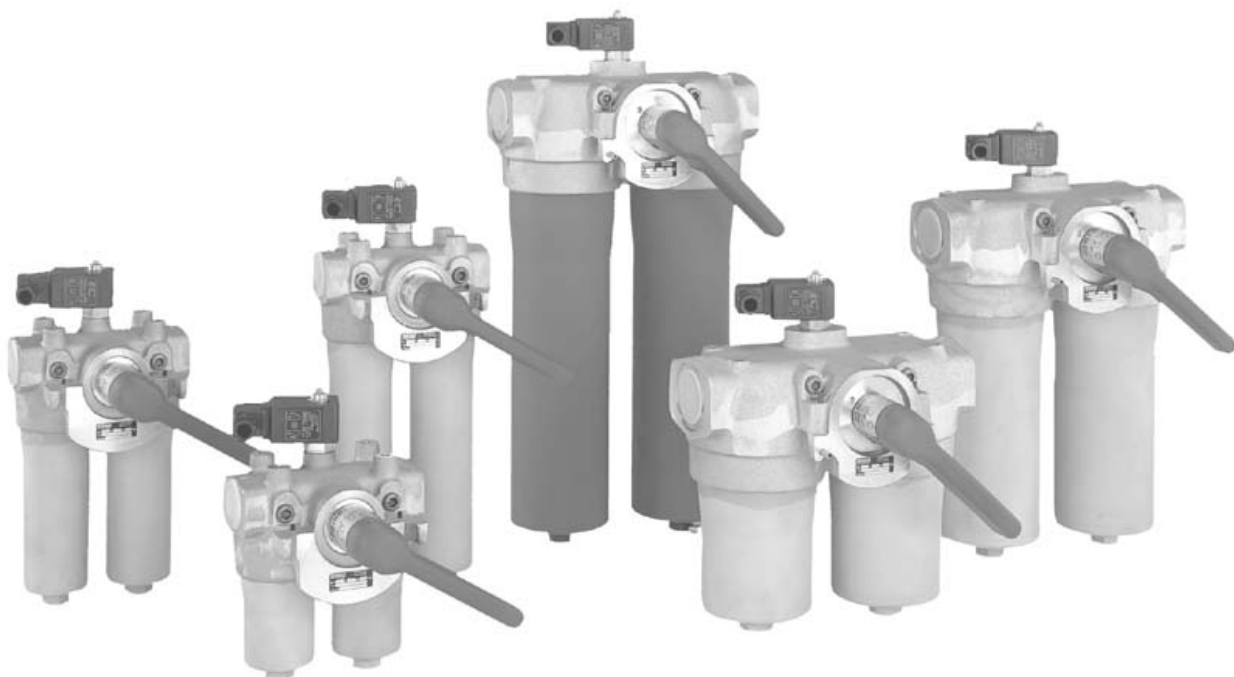
Efficient filters for modern hydraulic systems

- Modular design principle
- Compact design
- Minimal pressure drop
- Optical/electrical/electronic contamination control
- Threaded or SAE 4 bolt flange ports
- Switching valve on upstream side
- Ergonomic switch-over handle with safety lock and pressure compensation

Quality filters, easy to service

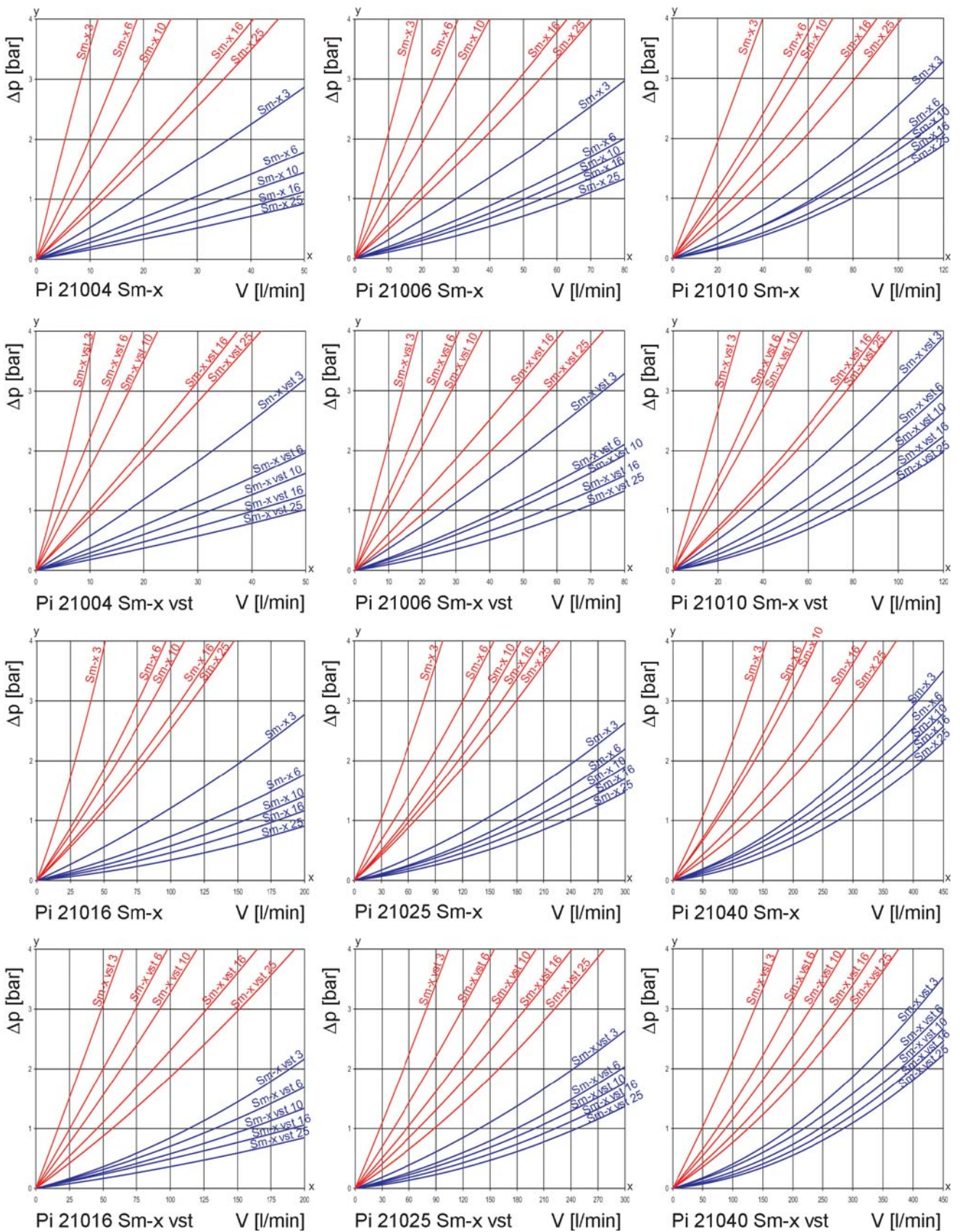
- Equipped with highly efficient SM-x filter elements
- β -valued elements per ISO 16889
- High dirt holding capacity and differential pressure stability providing optimal element service life

Worldwide distribution



2. Flow rate/ pressure drop curve complete filter

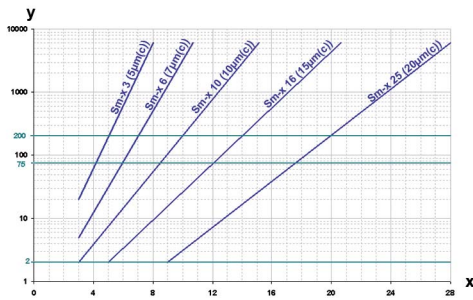
■ 190 mm²/s (25° E)
■ 33 mm²/s (4,5° E)



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
 Δp 20 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

Sm-x vst elements with
 Δp 210 bar

Sm-x vst	3	$\beta_{5(C)} \geq 200$
Sm-x vst	6	$\beta_{7(C)} \geq 200$
Sm-x vst	10	$\beta_{10(C)} \geq 200$
Sm-x vst	16	$\beta_{15(C)} \geq 200$
Sm-x vst	25	$\beta_{20(C)} \geq 200$

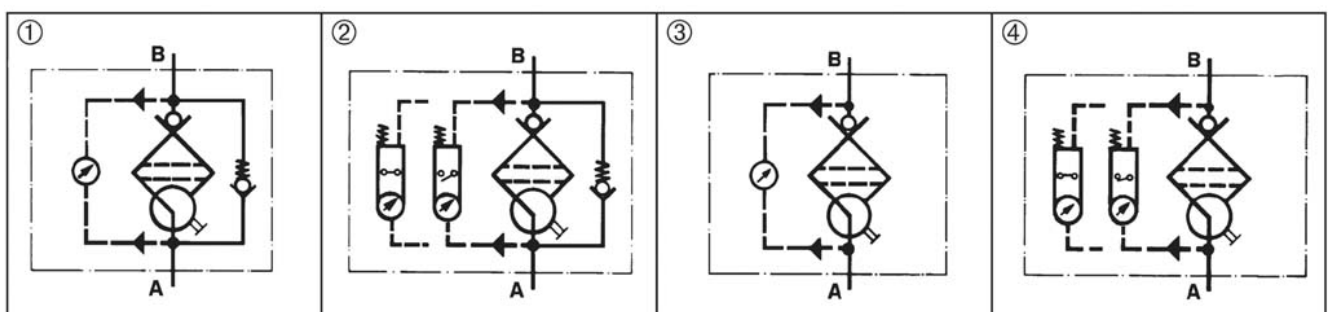
up to 20 bar differential
pressure

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 2923	Hydraulic fluid power filter elements; method for end load test
DIN ISO 2924	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 filter:

1. Housing design	2. 2 x Filter elements
V = 100 l/min and electrical contamination indicator Type: Pi 21010-069 Order number: 78204158	Sm-x vst 3 Type: Pi 71010 DN Sm-x vst 3 Order number: 78227480

7.1 Housing design						
Nominal size NG [l/min]	Order number	Type	① with bypass valve and optical indicator	② with bypass valve and electrical indicator	③ with optical indicator	④ with electrical indicator
40	79328261	Pi 21004-057				
	79304263	Pi 21004-058				
	79328279	Pi 21004-068				
	79328287	Pi 21004-069				
63	79715905	Pi 21006-057				
	78304271	Pi 21006-058				
	79715913	Pi 21006-068				
	79715921	Pi 21006-069				
100	78204125	Pi 21010-057				
	78204133	Pi 21010-058				
	78204141	Pi 21010-068				
	78204158	Pi 21010-069				
160	79715939	Pi 21016-057				
	79715947	Pi 21016-058				
	79715954	Pi 21016-068				
	79715962	Pi 21016-069				
250	79328295	Pi 21025-057				
	79328303	Pi 21025-058				
	79328311	Pi 21025-068				
	79328329	Pi 21025-069				
400	79715970	Pi 21040-057				
	79715988	Pi 21040-058				
	79715996	Pi 21040-068				
	79716002	Pi 21040-069				

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

The housings Pi 21004, Pi 21006 and Pi 21010 are approved for 63 bar operating pressure/test pressure 82 bar.

7.2 Filter elements*					
Nominal size NG [l/min]	Order number	Type	Filter material	Collapse pressure [bar]	Filter surface [cm ²]
40	78260929	Pi 21004 DN Sm-x 3	Sm-x 3	20	475
	77690859	Pi 22004 DN Sm-x 6	Sm-x 6		475
	77925571	Pi 23004 DN Sm-x 10	Sm-x 10		475
	78260937	Pi 24004 DN Sm-x 16	Sm-x 16		475
	78260945	Pi 25004 DN Sm-x 25	Sm-x 25		475
	78216079	Pi 71004 DN Sm-x vst 3	Sm-x vst 3	210	445
	77960156	Pi 72004 DN Sm-x vst 6	Sm-x vst 6		445
	77925654	Pi 73004 DN Sm-x vst 10	Sm-x vst 10		445
	78216087	Pi 74004 DN Sm-x vst 16	Sm-x vst 16		445
	78216095	Pi 75004 DN Sm-x vst 25	Sm-x vst 25		445

7.2 Filter elements*					
Nominal size NG [l/min]	Order number	Type	Filter material	Collapse pressure [bar]	Filter surface [cm ²]
63	78260960	Pi 21006 DN Sm-x 3	Sm-x 3	20	835
	77960867	Pi 22006 DN Sm-x 6	Sm-x 6		835
	77925589	Pi 23006 DN Sm-x 10	Sm-x 10		835
	78260978	Pi 24006 DN Sm-x 16	Sm-x 16		835
	78260986	Pi 25006 DN Sm-x 25	Sm-x 25		835
	78216137	Pi 71006 DN Sm-x vst 3	Sm-x vst 3	210	780
	77960149	Pi 72006 DN Sm-x vst 6	Sm-x vst 6		780
	77925662	Pi 73006 DN Sm-x vst 10	Sm-x vst 10		780
	78216145	Pi 74006 DN Sm-x vst 16	Sm-x vst 16		780
	78216152	Pi 75006 DN Sm-x vst 25	Sm-x vst 25		780
100	78227472	Pi 21010 DN Sm-x 3	Sm-x 3	20	1375
	77960875	Pi 22010 DN Sm-x 6	Sm-x 6		1375
	77925597	Pi 23010 DN Sm-x 10	Sm-x 10		1375
	78261000	Pi 24010 DN Sm-x 16	Sm-x 16		1375
	78261018	Pi 25010 DN Sm-x 25	Sm-x 25		1375
	78227480	Pi 71010 DN Sm-x vst 3	Sm-x vst 3	210	1275
	77960131	Pi 72010 DN Sm-x vst 6	Sm-x vst 6		1275
	77925670	Pi 73010 DN Sm-x vst 10	Sm-x vst 10		1275
	78261281	Pi 74010 DN Sm-x vst 16	Sm-x vst 16		1275
	78216160	Pi 75010 DN Sm-x vst 25	Sm-x vst 25		1275
160	78261034	Pi 21016 DN Sm-x 3	Sm-x 3	20	2530
	77960826	Pi 22016 DN Sm-x 6	Sm-x 6		2530
	77925605	Pi 23016 DN Sm-x 10	Sm-x 10		2530
	78261042	Pi 24016 DN Sm-x 16	Sm-x 16		2530
	78261059	Pi 25016 DN Sm-x 25	Sm-x 25		2530
	77940638	Pi 71016 DN Sm-x vst 3	Sm-x vst 3	210	1885
	77960123	Pi 72016 DN Sm-x vst 6	Sm-x vst 6		1885
	77925688	Pi 73016 DN Sm-x vst 10	Sm-x vst 10		1885
	78269797	Pi 74016 DN Sm-x vst 16	Sm-x vst 16		1885
	78216178	Pi 75016 DN Sm-x vst 25	Sm-x vst 25		1885
250	78227514	Pi 21025 DN Sm-x 3	Sm-x 3	20	4020
	77960834	Pi 22025 DN Sm-x 6	Sm-x 6		4020
	77925613	Pi 23025 DN Sm-x 10	Sm-x 10		4020
	78261075	Pi 24025 DN Sm-x 16	Sm-x 16		4020
	78261083	Pi 25025 DN Sm-x 25	Sm-x 25		4020
	77940646	Pi 71025 DN Sm-x vst 3	Sm-x vst 3	210	3090
	77960115	Pi 72025 DN Sm-x vst 6	Sm-x vst 6		3090
	77925696	Pi 73025 DN Sm-x vst 10	Sm-x vst 10		3090
	78269813	Pi 74025 DN Sm-x vst 16	Sm-x vst 16		3090
	78216186	Pi 75025 DN Sm-x vst 25	Sm-x vst 25		3090
400	78227522	Pi 21040 DN Sm-x 3	Sm-x 3	20	6770
	77960842	Pi 22040 DN Sm-x 6	Sm-x 6		6770
	77925621	Pi 23040 DN Sm-x 10	Sm-x 10		6770
	78261109	Pi 24040 DN Sm-x 16	Sm-x 16		6770
	78261117	Pi 25040 DN Sm-x 25	Sm-x 25		6770
	77940653	Pi 71040 DN Sm-x vst 3	Sm-x vst 3	210	5240
	77960107	Pi 72040 DN Sm-x vst 6	Sm-x vst 6		5240
	77930829	Pi 73040 DN Sm-x vst 10	Sm-x vst 10		5240
	78269821	Pi 74040 DN Sm-x vst 16	Sm-x vst 16		5240
	78260903	Pi 75040 DN Sm-x vst 25	Sm-x vst 25		5240

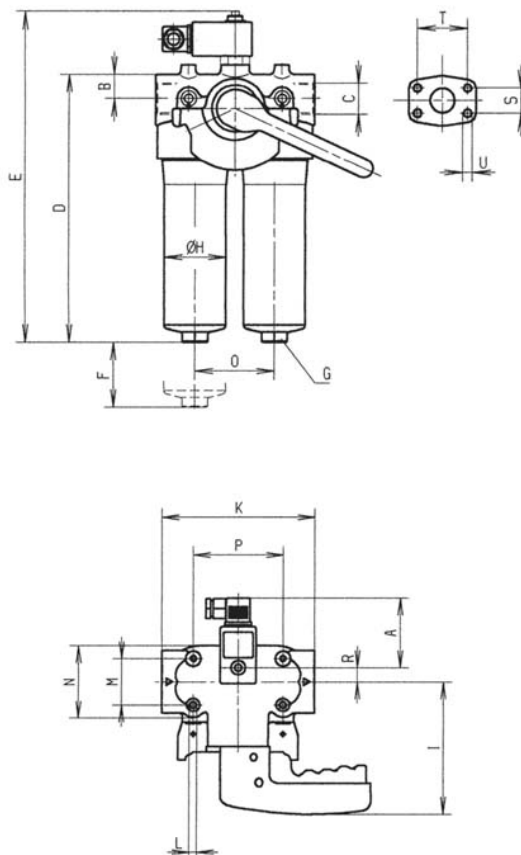
*further elements available upon request.

8. Specifications

Design:	line mounting filter
Operating pressure:	25/63 bar*
Test pressure:	33/82 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/St.
Sealing material:	NBR/AL
Activating pressure of optical/ electrical differential pressure indicator:	Δp 2.2 bar \pm 10 %
Electrical data of contamination in- dicator:	
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 Goup 2 of Directive 97/23 EC Article 9). Please consult with us if using other media.

Subject to technical alteration without prior notice.

* The housings Pi 21004, Pi 21006 and Pi 21010 are approved for 63 bar operating pressure/test pressure 82 bar.

9. Dimensions

All dimensions except "C" in mm.

Type	A	B	C	D	E	F	G SW	H	I	K	L	M	N	O	P	R	S	T	U	Weight [kg]
Pi 21004	78	38	G 1*	205	263	80	27	66	139	168	M 8 x 16	52	81	85	100	16	26.2	52.4	M 10 x 20	2.6
Pi 21006	78	38	G 1*	265	323	80	27	66	139	168	M 8 x 16	52	81	85	100	16	26.2	52.4	M 10 x 20	2.9
Pi 21010	78	38	G 1*	358	416	80	27	66	139	168	M 8 x 16	52	81	85	100	16	26.2	52.4	M 10 x 20	3.3
Pi 21016	78	40	G 1½*	291	439	110	32	109	165	280	M 10 x 20	62	140	140	210	19	35.7	69.9	M 12 x 20	7.1
Pi 21025	78	40	G 1½*	386	444	110	32	109	165	280	M 10 x 20	62	140	140	210	19	35.7	69.9	M 12 x 20	8.0
Pi 21040	78	40	G 1½*	530	588	110	24	109	165	280	M 10 x 20	62	140	140	210	19	35.7	69.9	M 12 x 20	16.3

* SAE-flange connections (3000 PSI) on request.

10. Installation, operating and maintenance instructions

10.1 Filter installation

Install filter in accordance with the identified flow direction. The filter head is provided with threaded holes for mounting the filter. Ascertain that the required underclearance is provided so that the filter element and the filter bowl can be removed. Preferably 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 to normally closed position or vice versa.

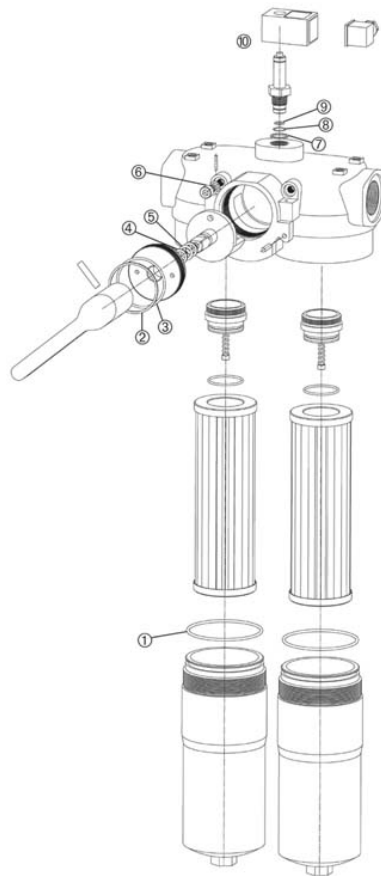
10.3 When must the filter element be replaced?

- Filters equipped with optical and electrical contamination indicator: During cold starts, the indicator may give a warning signal. Depress the red button of the 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.
- Please always ensure that you have Original MAHLE - replacement elements in stock: disposable elements (Sm-x) cannot be cleaned.

10.4 Element replacement

Note: The contamination 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 contamination indicator is cancelled and the red button can be repressed again:

- 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.
- Loosen vent screw of the filter side not in use by 2-3 turns; max. until contact is made with the safety stop.
- Unscrew filter bowl by rotating same counterclockwise and clean with a suitable medium.
- Remove filter element with a side-to-side motion.
- Check o-ring on the filter bowl for damage. Replace, if necessary.
- Make sure that the part number on the spare element corresponds with the part number on the filter label. Open the plastic bag and push element over the spigot in the filter head. Now remove plastic bag.
- 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.
- 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.
- Tighten vent screw. Check filter for leaks by operating the pressure equalizing lever once again.



11. Spare parts list

Order number for spare parts		
Position	Type	Order number
① to ⑥	Seal kit for housing	
	Pi 21004 - Pi 21010	
	NBR	79774258
	FPM	79774266
	EPDM	7977474
	Pi 21016 - Pi 21040	
	NBR	79774282
	FPM	79774290
	EPDM	79774308
⑦ to ⑨	Seal kit for contamination indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325
⑩	Contamination indicator	
	Optical PiS 3098/2.2	77669971
	Electrical PiS 3097/2.2	77669948
	Electrical upper section only	77536550

Please return filter for sealing replacement of switch-over unit!

MAHLE

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