MAHLE Industry

Duplex Filter
Pi 2100

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

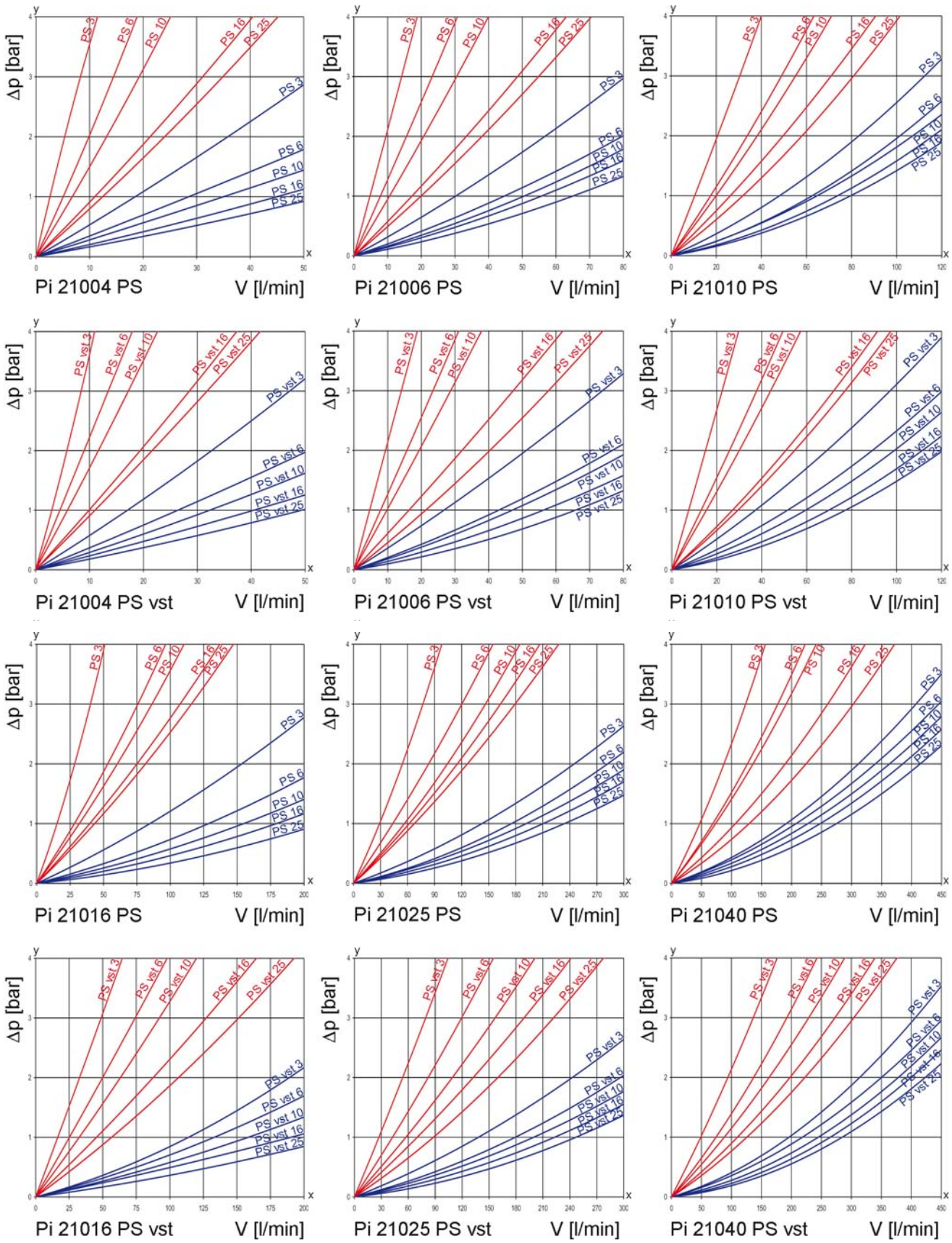
1. Features

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 saftey 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

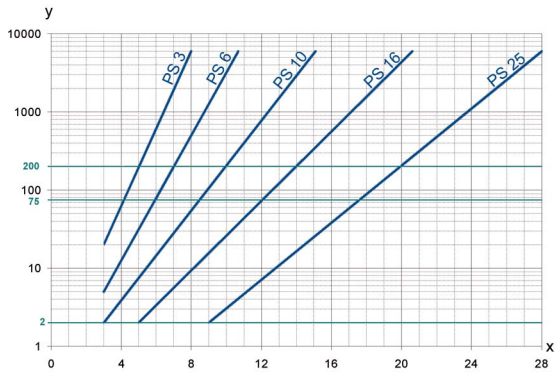
190 mm²/s
33 mm²/s



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

Calculation of individual filter under www.industrialfiltration-catalogue.mahle.com

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)

PS elements with
max. Δ p 20 bar

PS	3	$\beta_{5(C)}$	≥200
PS	6	$\beta_{7(C)}$	≥200
PS	10	$\beta_{10(C)}$	≥200
PS	16	$\beta_{15(C)}$	≥200
PS	25	$\beta_{20(C)}$	≥200

values guaranteed up to
10 bar differential pressure

PS vst elements with
max. Δ p 210 bar

PS vst	3	$\beta_{5(C)}$	≥200
PS vst	6	$\beta_{7(C)}$	≥200
PS vst	10	$\beta_{10(C)}$	≥200
PS vst	16	$\beta_{15(C)}$	≥200
PS vst	25	$\beta_{20(C)}$	≥200

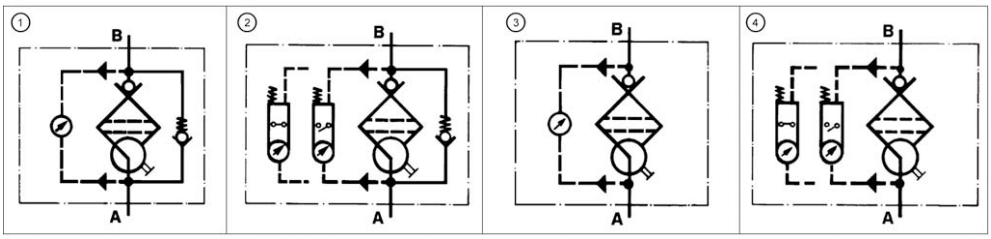
values guaranteed up to
20 bar differential pressure

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 with fluids
DIN ISO 3723	Hydraulic fluid power filter elements; metod 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 filter:

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

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① with bypass valve and visual indicator	② with bypass valve and electrical indicator	③ with visual indicator	④ with electrical indicator
40	79328261	Pi 21004-057	■			
	78304263	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 must not be exceeded.

7.2 Filter elements*					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
40	78260929	Pi 21004 DN PS 3	PS 3	**20**	475
	77960859	Pi 22004 DN PS 6	PS 6		475
	77925571	Pi 23004 DN PS 10	PS 10		475
	78260937	Pi 24004 DN PS 16	PS 16		475
	78260945	Pi 25004 DN PS 25	PS 25		475
	78216079	Pi 71004 DN PS vst 3	PS vst 3	**210**	445
	77960156	Pi 72004 DN PS vst 6	PS vst 6		445
	77925654	Pi 73004 DN PS vst 10	PS vst 10		445
	78216087	Pi 74004 DN PS vst 16	PS vst 16		445
	78216095	Pi 75004 DN PS vst 25	PS vst 25		445
63	78260960	Pi 21006 DN PS 3	PS 3	**20**	835
	77960867	Pi 22006 DN PS 6	PS 6		835
	77925589	Pi 23006 DN PS 10	PS 10		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	**210**	780
	77960149	Pi 72006 DN PS vst 6	PS vst 6		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	**20**	1375
	77960875	Pi 22010 DN PS 6	PS 6		1375
	77925597	Pi 23010 DN PS 10	PS 10		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	**210**	1275
	77960131	Pi 72010 DN PS vst 6	PS vst 6		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	**20**	2530
	77960826	Pi 22016 DN PS 6	PS 6		2530
	77925605	Pi 23016 DN PS 10	PS 10		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	**210**	1885
	77960123	Pi 72016 DN PS vst 6	PS vst 6		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 elemens is available on request

7.2 Filter elements*					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
250	78227514	Pi 21025 DN PS 3	PS 3	**20**	4020
	77960834	Pi 22025 DN PS 6	PS 6		4020
	77925613	Pi 23025 DN PS 10	PS 10		4020
	78261075	Pi 24025 DN PS 16	PS 16		4020
	78261083	Pi 25025 DN PS 25	PS 25		4020
	77940646	Pi 71025 DN PS vst 3	PS vst 3	**210**	3090
	77960115	Pi 72025 DN PS vst 6	PS vst 6		3090
	77925696	Pi 73025 DN PS vst 10	PS vst 10		3090
	78269813	Pi 74025 DN PS vst 16	PS vst 16		3090
	78216186	Pi 75025 DN PS vst 25	PS vst 25		3090
400	78227522	Pi 21 040 DN PS 3	PS 3	**20**	6770
	77960842	Pi 22 040 DN PS 6	PS 6		6770
	77925621	Pi 23 040 DN PS 10	PS 10		6770
	78261109	Pi 24 040 DN PS 16	PS 16		6770
	78261117	Pi 25 040 DN PS 25	PS 25		6770
	77940653	Pi 71 040 DN PS vst 3	PS vst 3	**210**	5240
	77960107	Pi 72 040 DN PS vst 6	PS vst 6		5240
	77930829	Pi 73 040 DN PS vst 10	PS vst 10		5240
	78269821	Pi 74 040 DN PS vst 16	PS vst 16		5240
	78260903	Pi 75 040 DN PS vst 25	PS vst 25		5240

*a wider range of elemens 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) 2x 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 °C to +120 °C survival temperature - 40 °C (other temperature ranges on request)
Bypass setting:	Δp 3.5 bar ± 10 %
Filter head material:	GAL
Filter housing material:	AL/St.
Sealing material:	NBR/AL
Maintenance indicator setting:	Δp 2.2 bar ± 10 %
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 connection:	M20x1.5

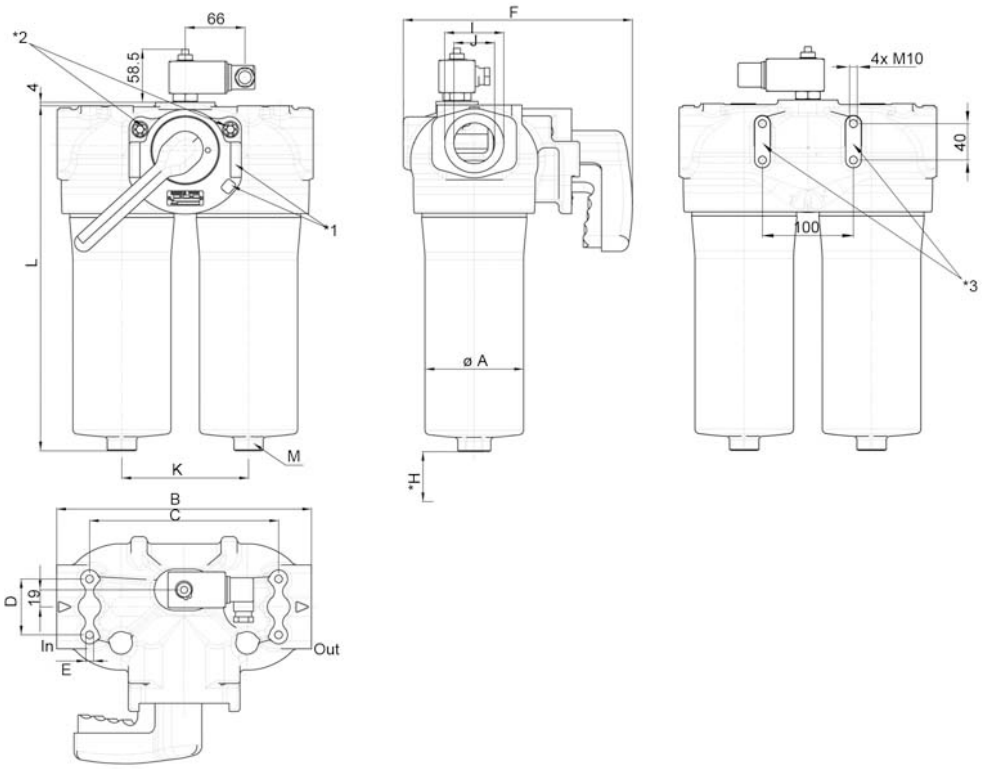
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance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



In Inlet
Out 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

All dimensions except "J" in mm.

Type	øA	B	C	D	E	F	G	H	øI	J*	K	L	M SW	Wt. [kg]
Pi 21004	66	172	100	52	M8x16	189	130	80	47	G1	85	203	27	2.6
Pi 21006	66	172	100	52	M8x16	189	130	80	47	G1	85	261	27	2.9
Pi 21010	66	172	100	52	M8x16	189	130	80	47	G1	85	351	27	3.3
Pi 21016	109	283	210	62	M10x20	252	194	110	65	G1½	140	288	32	8.6
Pi 21025	109	283	210	62	M10x20	252	194	110	65	G1½	140	389	32	9.5
Pi 21040	109	283	210	62	M10x20	252	194	110	65	G1½	140	531	32	19.0

* SAE flange connections (3000 psi), NPT and SAE connections on request

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?

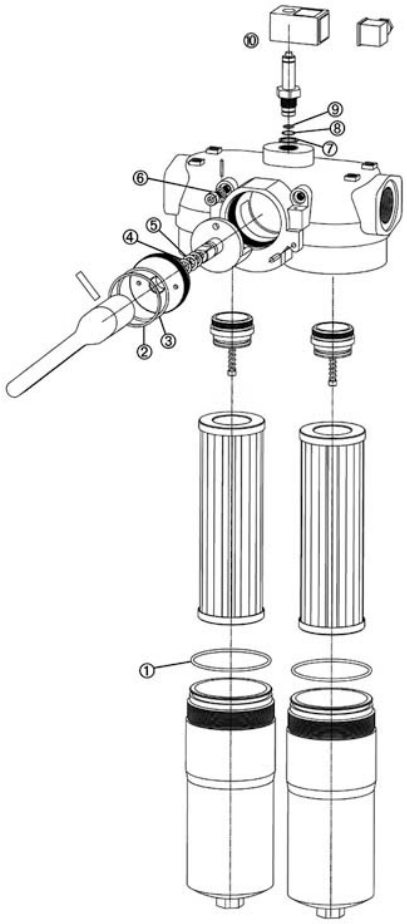
1 . Filters equipped with visual and electrical maintenance indicator:
During cold starts, the indicator may give a warning signal. Press the red button of the visual indicator once again only after operating temperature has been reached. If the red button immediately pops up again and/or the electrical 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!
4 . Remove filter element with a side-to-side motion.
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 oder 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



Order number for spare parts		
Position	**Type**	**Order number**
① bis ⑥	Seal kit for housing	
	Pi 21004 - Pi 21010	
	NBR	79774258
	FPM	79774266
	EPDM	79774274
	Pi 21016 - Pi 21040	
	NBR	79774282
	FPM	79774290
	EPDM	79774308
⑦ bis ⑨	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325
⑩	Maintenance indicator	
	Visual PiS 3098/2.2	77669971
	Electrical PiS 3097/2.2	77669948
	Electrical upper section only	77536550

MAHLE Industriefiltration GmbH
Schleifbachweg 45
D-74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industrialfiltration@mahle.com
www.mahle-industrialfiltration.com
79336280.09/2012

MAHLE Industry

Duplex Filter
Pi 210

Nominal pressure 32/63 bar (460/900 psi), nominal size up to 600

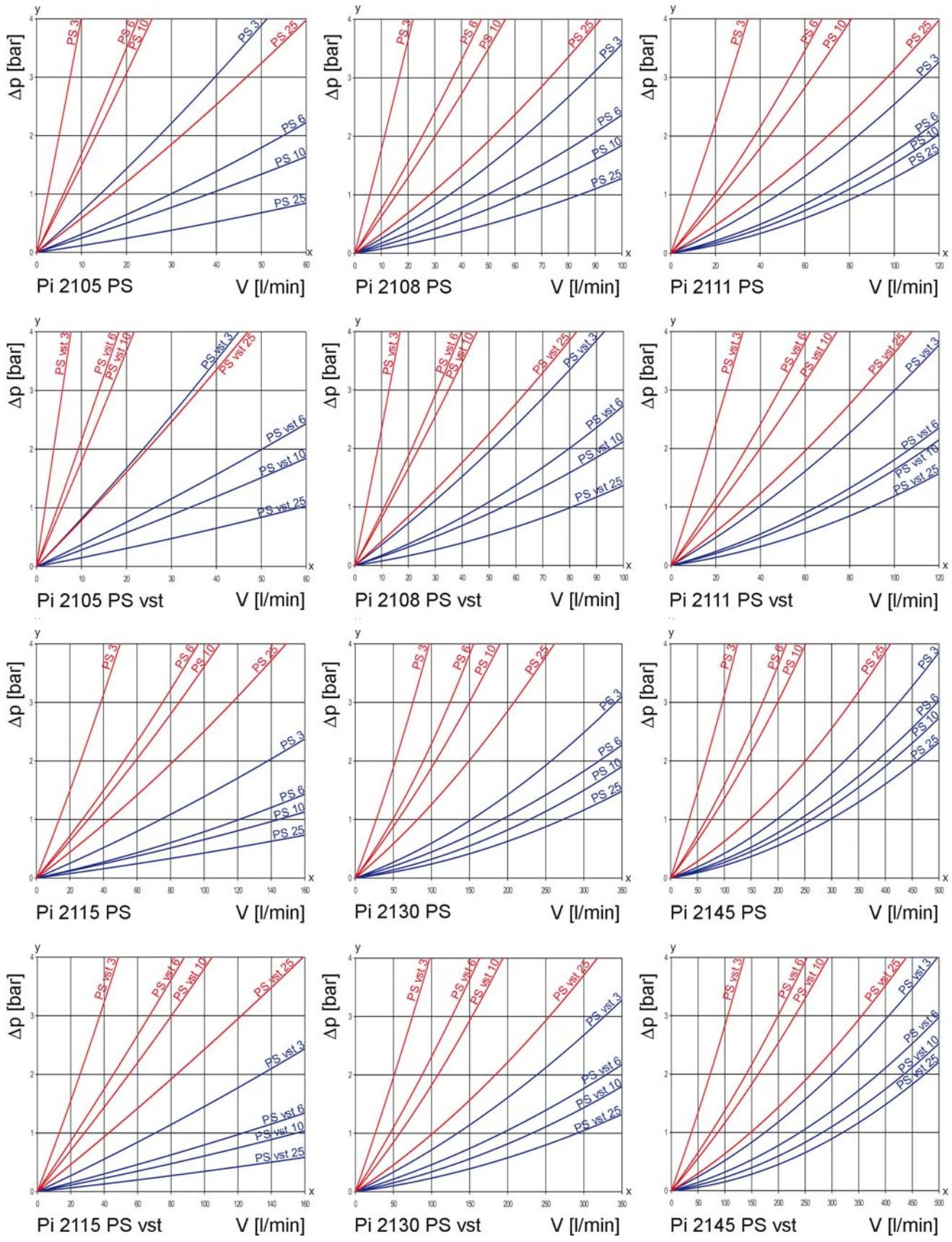
1. Features

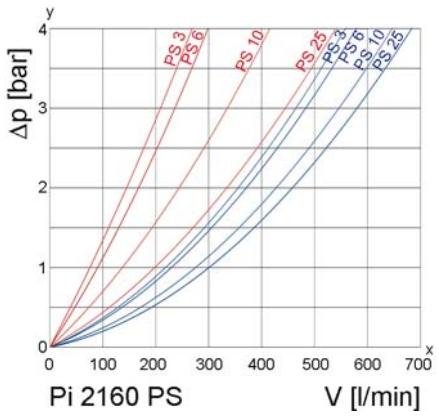
High performance filters for modern hydraulic systems

- 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

190 mm²/s
33 mm²/s

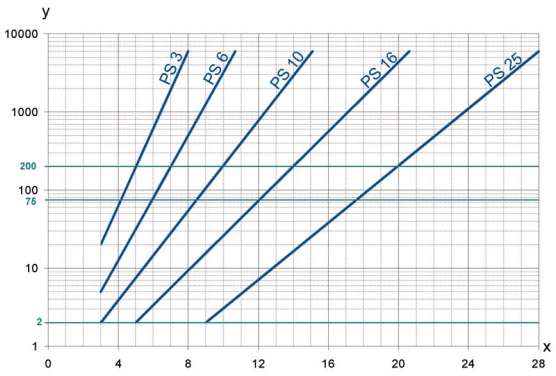




y = differential pressure Δ p [bar]
x = flow rate V [l/min]

Calculation of individual filter under **www.industrialfiltration-catalogue.mahle.com**

3. Separation grade characteristics



y = beta-value
x = particle size [µm]

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

4. Filter performance data

tested according to ISO 16889 (multipass test)

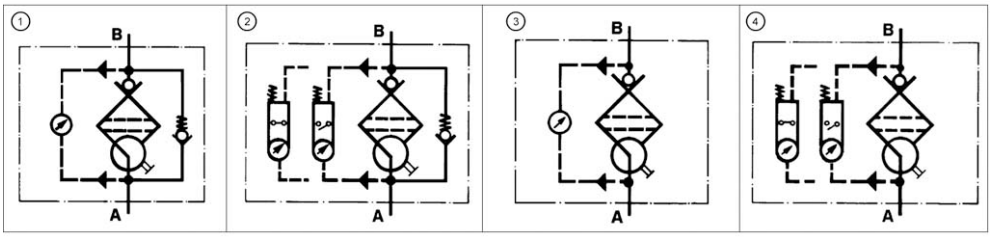
PS elements with max. Δ p 20 bar					PS vst elements with max. Δ p 210 bar				
PS	3	$\beta_{5(C)}$	≥	200	PS vst	3	$\beta_{5(C)}$	≥	200
PS	6	$\beta_{7(C)}$	≥	200	PS vst	6	$\beta_{7(C)}$	≥	200
PS	10	$\beta_{10(C)}$	≥	200	PS vst	10	$\beta_{10(C)}$	≥	200
PS	25	$\beta_{20(C)}$	≥	200	PS vst	25	$\beta_{20(C)}$	≥	200
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:

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 element
V = 80 l/min and visual/electrical indicator Type: Pi 2108-069 Order number: 77810286	PS vst 3 Type: Pi 2208 PS vst 3 Order number: 77680200

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① with bypass valve and visual indicator	② with bypass valve and electrical indicator	③ with visual indicator	④ with electrical indicator
50	77810211	Pi 2105-057	■			
	77810229	Pi 2105-058		■		
	77810237	Pi 2105-068			■	
	77810245	Pi 2105-069				■
80	77810252	Pi 2108-057	■			
	77810260	Pi 2108-058		■		
	77810278	Pi 2108-068			■	
	77810286	Pi 2108-069				■
110	78204083	Pi 2111-057	■			
	78204091	Pi 2111-058		■		
	78204109	Pi 2111-068			■	
	78204117	Pi 2111-069				■
150	77774573	Pi 2115-057	■			
	77774565	Pi 2115-058		■		
	77774557	Pi 2115-068			■	
	77774540	Pi 2115-069				■
300	77774532	Pi 2130-057	■			
	77774524	Pi 2130-058		■		
	77774516	Pi 2130-068			■	
	77774508	Pi 2130-069				■
450	77774490	Pi 2145-057	■			
	77774482	Pi 2145-058		■		
	77774474	Pi 2145-068			■	
	77774466	Pi 2145-069				■
600	70574769	Pi 2160-057	■			
	70574768	Pi 2160-058		■		
	70574767	Pi 2160-068			■	
	70574766	Pi 2160-069				■

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

7.2 Filter elements*					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δp [bar]**	**Filter surface [cm²]**
50	77680135	Pi 2105 PS 3	PS 3	**20**	590
	77943509	Pi 5105 PS 6	PS 6		590
	77680325	Pi 3105 PS 10	PS 10		590
	77680440	Pi 4105 PS 25	PS 25		590
	77680192	Pi 2205 PS vst 3	PS vst 3	**210**	425
	77943533	Pi 5205 PS vst 6	PS vst 6		425
	77680382	Pi 3205 PS vst 10	PS vst 10		425
	77680507	Pi 4205 PS vst 25	PS vst 25		425
80	77680143	Pi 2108 PS 3	PS 3	**20**	1150
	77943517	Pi 5108 PS 6	PS 6		1150
	77680341	Pi 3108 PS 10	PS 10		1150
	77680457	Pi 4108 PS 25	PS 25		1150
	77680200	Pi 2208 PS vst 3	PS vst 3	**210**	850
	77943541	Pi 5208 PS vst 6	PS vst 6		850
	77681190	Pi 3208 PS vst 10	PS vst 10		850
	77680515	Pi 4208 PS vst 25	PS vst 25		850
110	77680150	Pi 2111 PS 3	PS 3	**20**	1700
	77943525	Pi 5111 PS 6	PS 6		1700
	77680333	Pi 3111 PS 10	PS 10		1700
	77680465	Pi 4111 PS 25	PS 25		1700
	77680218	Pi 2211 PS vst 3	PS vst 3	**210**	1275
	77943558	Pi 5211 PS vst 6	PS vst 6		1275
	77680390	Pi 3211 PS vst 10	PS vst 10		1275
	77680523	Pi 4211 PS vst 25	PS vst 25		1275
150	77680168	Pi 2115 PS 3	PS 3	**20**	2425
	77955099	Pi 5115 PS 6	PS 6		2425
	77680358	Pi 3115 PS 10	PS 10		2425
	77680473	Pi 4115 PS 25	PS 25		2425
	77680226	Pi 2215 PS vst 3	PS vst 3	**210**	2010
	77955123	Pi 5215 PS vst 6	PS vst 6		2010
	77680408	Pi 3215 PS vst 10	PS vst 10		2010
	77680531	Pi 4215 PS vst 25	PS vst 25		2010
300	77680176	Pi 2130 PS 3	PS 3	**20**	4620
	77955107	Pi 5130 PS 6	PS 6		4620
	77680366	Pi 3130 PS 10	PS 10		4620
	77680481	Pi 4130 PS 25	PS 25		4620
	77680234	Pi 2230 PS vst 3	PS vst 3	**210**	3800
	77955131	Pi 5230 PS vst 6	PS vst 6		3800
	77680416	Pi 3230 PS vst 10	PS vst 10		3800
	77680549	Pi 4230 PS vst 25	PS vst 25		3800
450	77680184	Pi 2145 PS 3	PS 3	**20**	6865
	77955115	Pi 5145 PS 6	PS 6		6865
	77680374	Pi 3145 PS 10	PS 10		6865
	77680499	Pi 4145 PS 25	PS 25		6865
	77680242	Pi 2245 PS vst 3	PS vst 3	**210**	5600
	77955149	Pi 5245 PS vst 6	PS vst 6		5600
	77680424	Pi 3245 PS vst 10	PS vst 10		5600
	77680556	Pi 4245 PS vst 25	PS vst 25		5600

*a wider range of element types is availble on request

7.2 Filter elements*					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δp [bar]**	**Filter surface [cm²]**
600	70346506	Pi 2160 PS 3	PS 3	**20**	9398
	76114318	Pi 5160 PS 6	PS 6		9398
	79393380	Pi 3160 PS 10	PS 10		9398
	79748047	Pi 4160 PS 25	PS 25		9398

*a wider range of element types is availble on request

8. Technical specifications

Design:	line mounting filter
Nominal pressure:	
Pi 2105 - Pi 2111	10^7 load changes 63 bar (900 psi)
Pi 2115 - Pi 2160	10^7 load changes 25 bar (360 psi) 2x 10^6 load changes 32 bar (460 psi)
Test pressure:	
Pi 2105 - Pi 2111	95 bar (1370 psi)
Pi 2115 - Pi 2160	48 bar (690 psi)
Temperature range:	-10 °C to +120 °C survival temperature -40 C (other temperature ranges on request)
Bypass setting:	Δ p 3.5 bar ± 10
Filter head material:	GAL
Filter housing material:	AL/St
Sealing material:	NBR/AL
Maintenance indicator setting:	Δ p 2.2 bar ± 10 %
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 connection:	M20x1.5

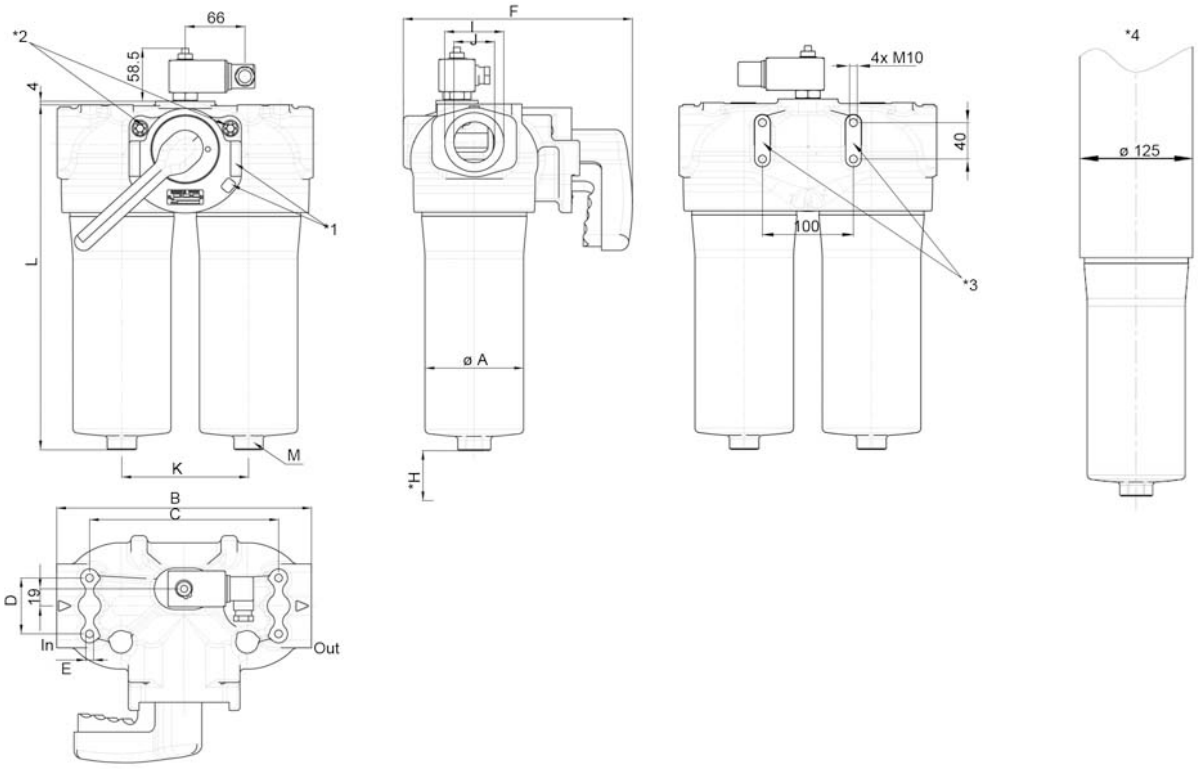
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance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



In Inlet
Out Outlet
*H Minimum clearance required for element change

*1 Lever locking and arresting
*2 Venting screws
*3 Optional fixing for NG 150 to 600
*4 Housing version NG 600

All dimensions except "J" in mm

Type	øA	B	C	D	E	F	G	H	øI	J*	K	L	M SW	Wt. [kg]
Pi 2105	66	172	100	52	M8x16	189	130	80	47	G1	85	203	27	2.60
Pi 2108	66	172	100	52	M8x16	189	130	80	47	G1	85	261	27	2.90
Pi 2111	66	172	100	52	M8x16	189	130	80	47	G1	85	351	27	3.30
Pi 2115	109	283	210	62	M10x20	252	194	110	65	G1½	140	264	32	8.50
Pi 2130	109	283	210	62	M10x20	252	194	110	65	G1½	140	385	32	9.50
Pi 2145	109	283	210	62	M10x20	252	194	110	65	G1½	140	497	32	17.25
Pi 2160	109	283	210	62	M10x20	252	194	110	65	G1½	140	636	32	15.50

* SAE flange connections (3000 psi), NPT and SAE connections on request

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 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 position 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?

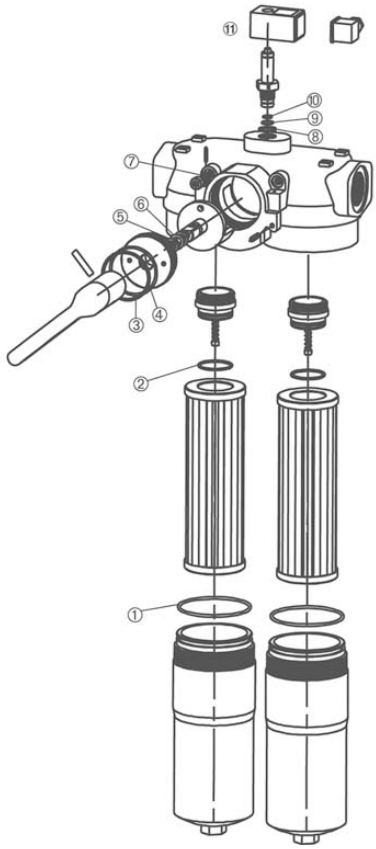
1 . Filters equipped with visual and electrical maintenance indicator:
   During cold starts, the indicator may give a warning signal. Press the red button of the visual indicator once again only after operating temperature has been reached. If the red button immediately pops up again and/or the electrical 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!
4 . Remove filter element with a side-to-side motion.
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 oder 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 50 to 110 = 60 Nm, for NG 150 to 600 = 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



Order number for spare parts		
Position	**Type**	**Order number**
① - ⑦	Seal kit for housing	
	Pi 2105 - Pi 2111	
	NBR	79761271
	FPM	79761289
	EPDM	79761297
	Pi 2115 - Pi 2160	
	NBR	79761230
	FPM	79761248
	EPDM	79761255
⑧ - ⑩	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325
⑪	Maintenance indicator	
	Visual PiS 3098/2.2	77669971
	Electrical PiS 3097/2.2	77669948
	Electrical upper section only	77536550

MAHLE Industry

MAHLE Industriefiltration GmbH
Schleifbachweg 45
D-74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industrialfiltration@mahle.com
www.mahle-industrialfiltration.com
78356552.01/2013

MAHLE Industry

Duplex Filter
Pi 2110

Nominal pressure 40 bar (570 psi), nominal size 630 and 1000
according DIN 24550

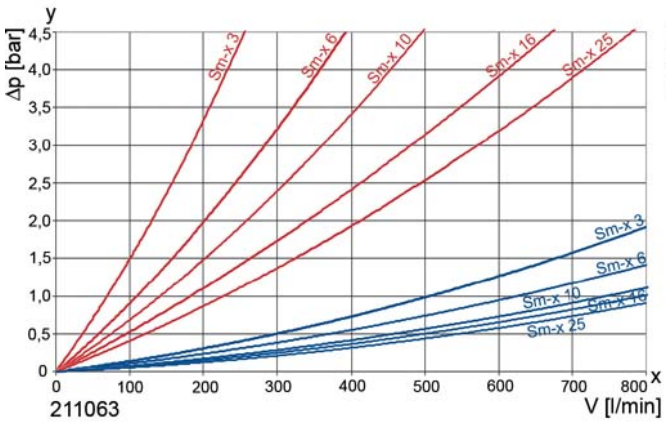
1. Features

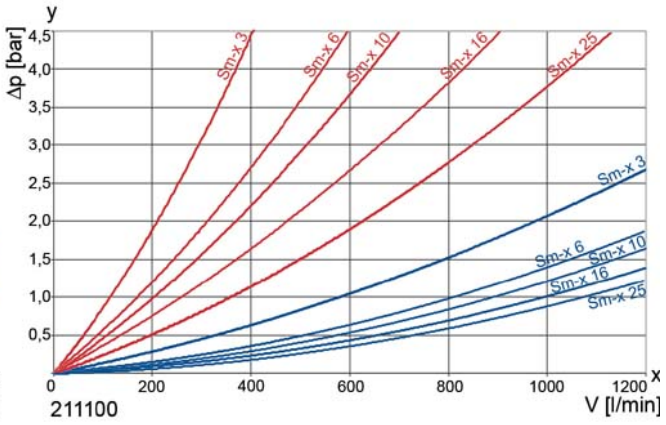
High performance filters for modern hydraulic systems

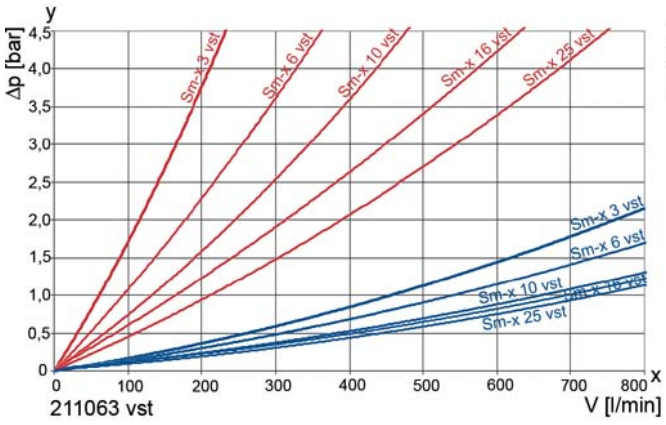
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Flanged connections
- Quality filters, easy to service
- Equipped with highly efficient glass fibre Sm-x filter elements
- Beta rated elements according to ISO 16889 multipass test
- Elements with high differential pressure stability and dirt holding capacity
- Worldwide distribution

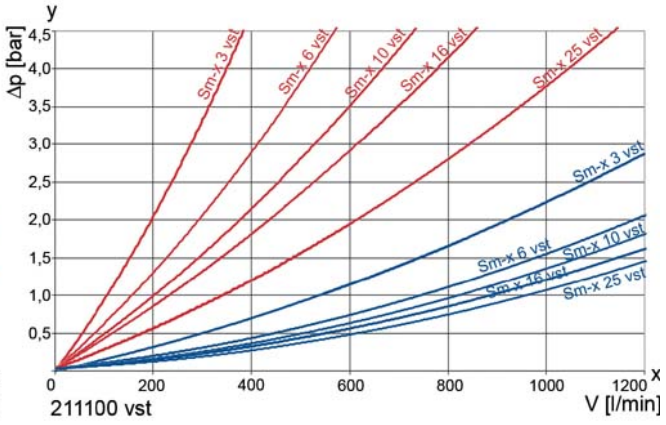
2. Flow rate/pressure drop curve complete filter

190 mm²/s
33 mm²/s





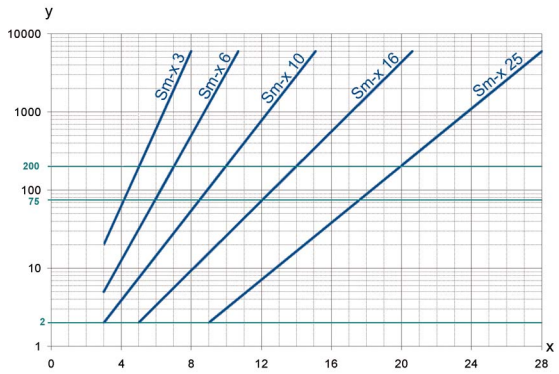




y = differential pressure Δp [bar]

x = flow rate V [l/min]

3. Separation grade characteristics



y = beta-value
x = partcle 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. Δ p 20 bar

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

values guaranteed up to
10 bar differential pressure

Sm-x vst elements with
max. Δ p 210 bar

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

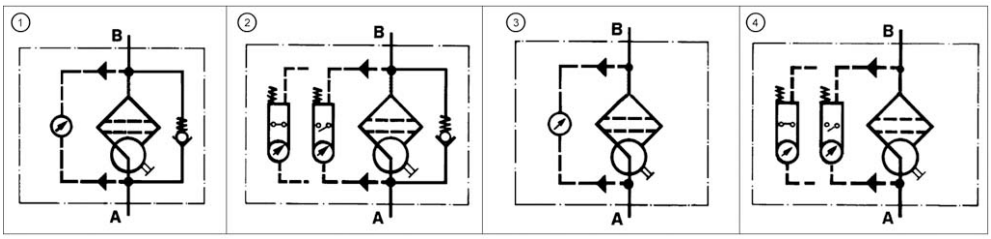
values guaranteed up to
20 bar differential pressure

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 with fluids
DIN ISO 3723	Hydraulic fluid power filter elements, methods for end load test
DIN ISO 3724	Hydraulic fluid power filter elements, verification of flow fatigue charactersitics
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. 2 x Filter element
V = 630 l/min and visual/electrical maintenance indicator Type: Pi 211063-069 Order number: 70316223	Sm-x vst 25 Type: Pi 75063 DN Sm-x vst 25 Order number: 77961568

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① with bypass valve and visual indicator	② with bypass valve and electrical indicator	③ with visual indicator	④ with electrical indicator
630	70316221	Pi 211063-057	■			
	70316207	Pi 211063-058		■		
	70316222	Pi 211063-068			■	
	70316223	Pi 211063-069				■
1000	70316224	Pi 211100-057	■			
	70316226	Pi 211100-058		■		
	70316227	Pi 211100-068			■	
	70316228	Pi 211100-069				■

When filter with non bypass configuration is selected the collapse pressure must not be exceeded!

7.2 Filter elements*

Nominal size NG [l/min]	Order number	Type	Filter material	max. Δp [bar]	Filter surface [cm²]
630	77961519	Pi 21063 DN Sm-x 3	Sm-x 3	20	9300
	77943699	Pi 22063 DN Sm-x 6	Sm-x 6		9300
	77925639	Pi 23063 DN Sm-x 10	Sm-x 10		9300
	77961527	Pi 24063 DN Sm-x 16	Sm-x 16		9300
	77961535	Pi 25063 DN Sm-x 25	Sm-x 25		9300
	77961543	Pi 71063 DN Sm-x vst 3	Sm-x vst 3	210	7230
	77960099	Pi 72063 DN Sm-x vst 6	Sm-x vst 6		7230
	77925712	Pi 73063 DN Sm-x vst 10	Sm-x vst 10		7230
	77961550	Pi 74063 DN Sm-x vst 16	Sm-x vst 16		7230
	77961568	Pi 75063 DN Sm-x vst 25	Sm-x vst 25		7230
1000	77961618	Pi 21100 DN Sm-x 3	Sm-x 3	20	14500
	77943723	Pi 22100 DN Sm-x 6	Sm-x 6		14500
	77925647	Pi 23100 DN Sm-x 10	Sm-x 10		14500
	77961626	Pi 24100 DN Sm-x 16	Sm-x 16		14500
	77961634	Pi 25100 DN Sm-x 25	Sm-x 25		14500
	77961642	Pi 71100 DN Sm-x vst 3	Sm-x vst 3	210	11450
	77960081	Pi 72100 DN Sm-x vst 6	Sm-x vst 6		11450
	77925720	Pi 73100 DN Sm-x vst 10	Sm-x vst 10		11450
	77961659	Pi 74100 DN Sm-x vst 16	Sm-x vst 16		11450
	77961667	Pi 75100 DN Sm-x vst 25	Sm-x vst 25		11450

* A wider range of element types is available on request.

8. Technical specifications

Design:	line mounting filter
Nominal pressure:	40 bar (570 psi)
Test pressure:	60 bar (850 psi)
Temperature range:	-10 °C to +120 °C
	(other temperature ranges on request)
	Minimum viscosity of the fluid: 10 mm²/s
	(if viscosity of the fluid < 10 mm²/s on request)
Bypass setting:	Δ p 3.5 bar ± 10 %
Filter head material:	GGG
Filter housing material:	St
Filter cover material:	GGG
Sealing material:	NBR
Maintenance indicator setting:	Δ p 2.2 bar ± 0.3 bar
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 sleave:	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.

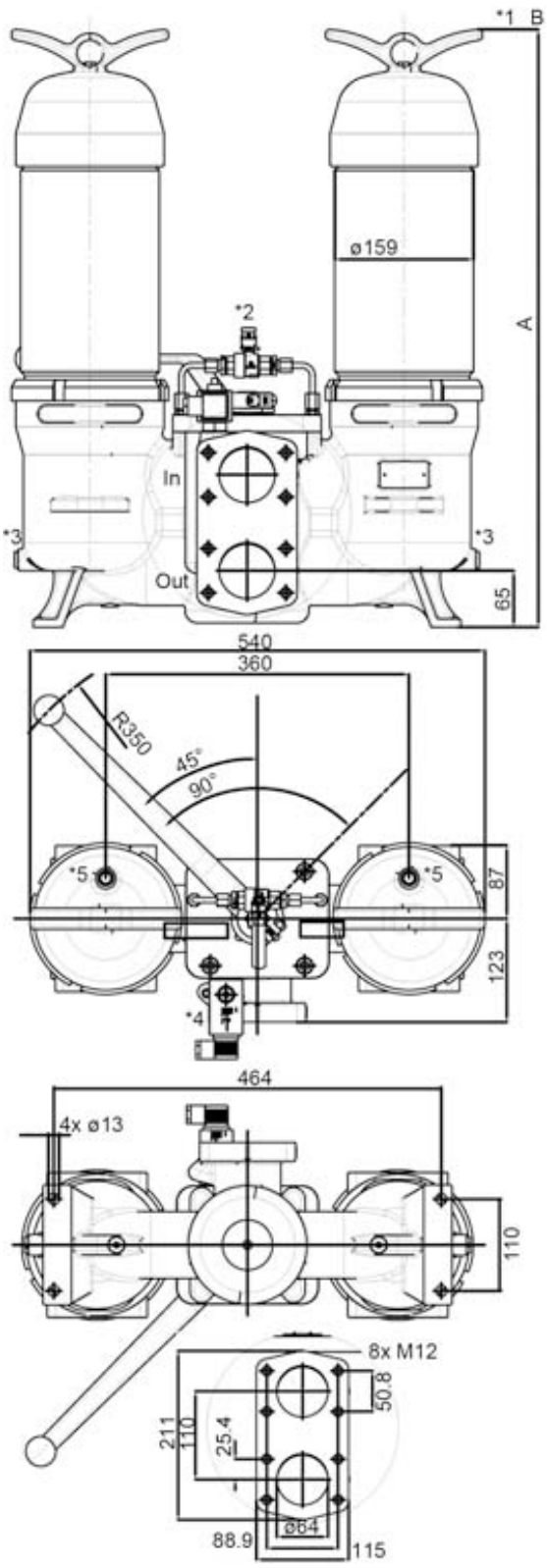
We draw attention to the fact that all values indicated are average values which do not always occur in specific cases of application. Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer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

Subject to technical alteration without prior notice.

In = Inlet
Out = Outlet

*1 Clearance B
*2 Pressure equalization valve
*3 Drain screw G¼
*4 Maintenance indicator
*5 Vent screw



9. Dimensions

All dimensions in mm.

Type	Connection	A	B	Weight [kg]
Pi 211063	DN 64	690	300	80
Pi 211100	DN 64	920	530	100

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 housing.
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.

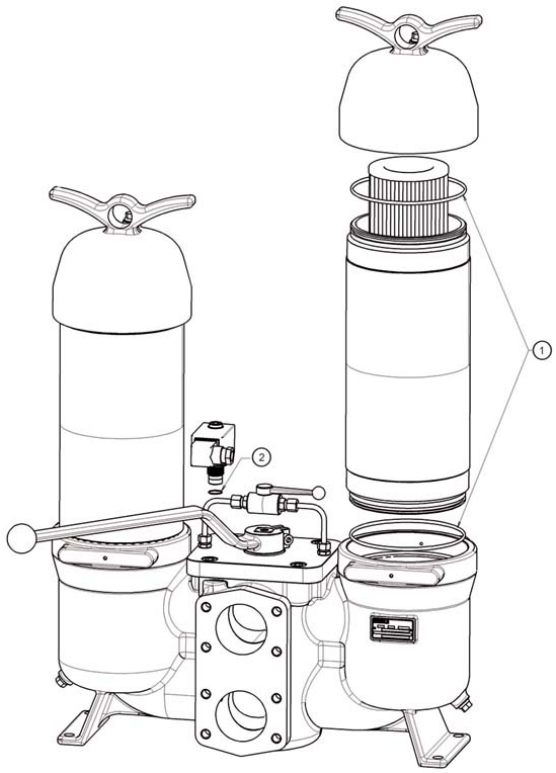
10.3 When should the filter element be replaced?

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 . 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.
3 . Please always ensure that you have original MAHLE spare elements in stock: disposable elements (Sm-x) cannot be cleaned.

10.4 Element replacement

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. Place through or drip pan underneath to collect leaving oil. Close pressure equalization valve.
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 . Remove drain plug in housing bottom and drain oil.
4 . Unscrew filter cover counter-clockwise.
5 . Lift out filter element.
6 . Check seal on filter cover. We recommend replacement in any case.
7 . Make sure that the order number on the spare element corresponds to the order number of the filter name-plate. To ensure no contamination occurs during the exchange of the element first open the plastic bag and push the element over the spigot in the filter head. Now remove plastic bag.
8 . Push the element carefully over the spigot and tight cover until full stop. Back off the cover 1/8 turn.
9 . Tighten drain plug housing bottom.
10 . To refill the filter chamber, operate only the pressure equalizing lever, until fluid emerges bubble-free from the drain cavity.
11 . Tight vent screw. Check for leckage by actuating the equalizing lever again.



11. Spare parts list

Order numbers for spare parts		
Position	**Type**	**Order number**
①	Seal kit for housing	
	NBR	70318468
	FPM	70318469
	EPDM	70318471
	Maintenance indicator	
	Visual PiS 3098/2,2	77669971
	Visual/electrical PiS 3097/2,2	77669948
	Electrical upper section only	77536550
②	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325

MAHLE Industriefiltration GmbH, Schleifbachweg 45, D-74613 Öhringen, Phone +49 7941 67-0,
Fax +49 7941 67-23429, industrialfiltration@mahle.com, www.mahle-industrialfiltration.com
70352585.10/2012

MAHLE Industry

Duplex Filter
Pi 232

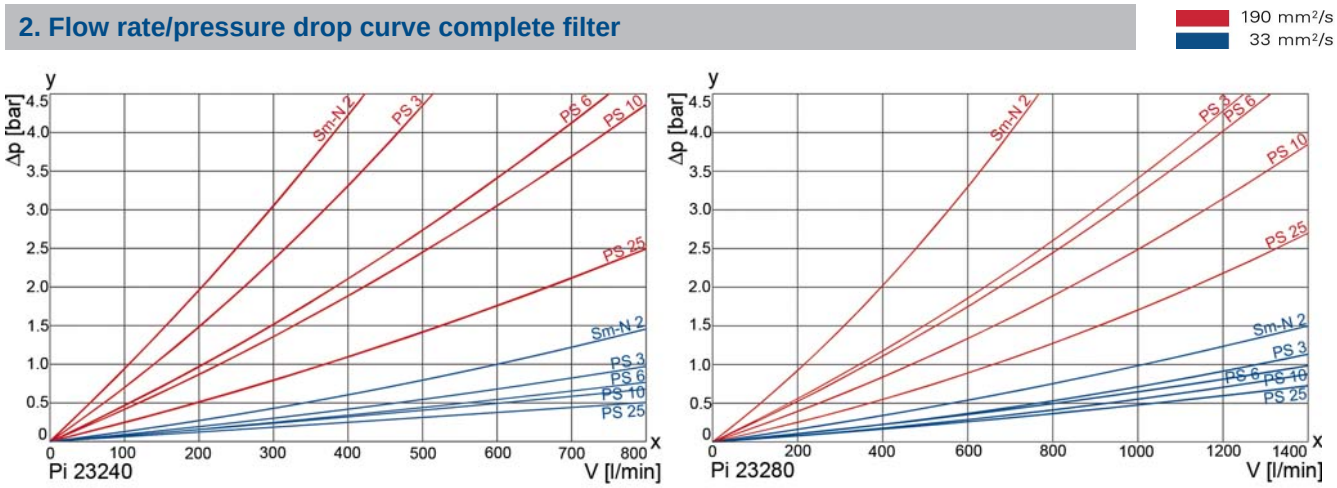
Nominal pressure 25 bar (360 psi), nominal size 800 and 1400
according DIN 24550

1. Features

Duplex filter for gear boxes, lubrication and hydraulic systems

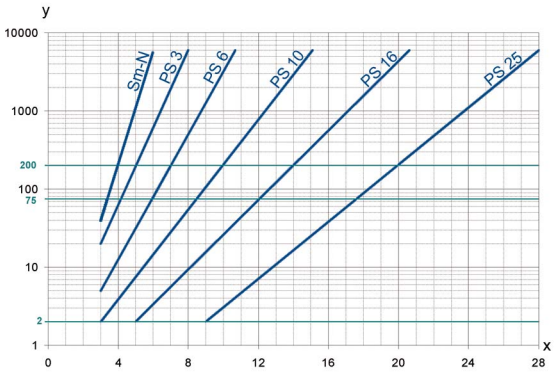
- Modular system
- Compact design
- Weight optimized design
- Minimal pressure drop through optimal flow design
- Flange connections, DIN DN 80, SAE 3“
- Visual/electrical maintenance indicator
- Drain on dirt and clean side
- Beta rated elements according to ISO 16889 multipass test
- Defined cleanliness classes according to ISO 4406/1999
- Elements with high differential pressure stability and dirt holding capacity
- Quality filters, easy to service
- Worldwide sales and service

2. Flow rate/pressure drop curve complete filter



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

3. Separation grade characteristics



y = beta-value
x = partcle 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)

PS elements with
max. Δ p 20 bar

PS	3	$\beta_{5(C)}$	≥	200
PS	6	$\beta_{7(C)}$	≥	200
PS	10	$\beta_{10(C)}$	≥	200
PS	25	$\beta_{20(C)}$	≥	200

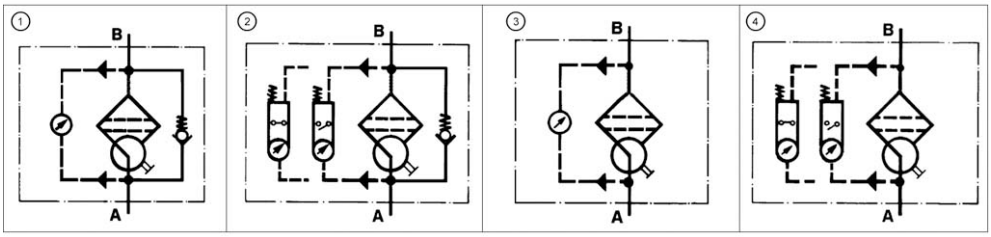
values guaranteed up to
10 bar differential pressure

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 with fluids
DIN ISO 3723	Hydraulic fluid power filter elements, methods for end load test
DIN ISO 3724	Hydraulic fluid power filter elements, verification of flow fatigue charactersitics
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. 2x Filter element
V = 800 l/min and visual/electrical maintenance indicator Type: Pi 23240-069 Order number: 70554948	PS 25 Type: 852014 PS 25 Order number: 76321663

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① with bypass valve and visual indicator	② with bypass valve and electrical indicator	③ with visual indicator	④ with electrical indicator
800	70554951	Pi 23240-057	■			
	70554950	Pi 23240-058		■		
	70554949	Pi 23240-068			■	
	70554948	Pi 23240-069				■
1400	70554947	Pi 23280-057	■			
	70554942	Pi 23280-058		■		
	70554945	Pi 23280-068			■	
	70554946	Pi 23280-069				■

When filter with non bypass configuration is selected the collapse pressure must not be exceeded!

7.2 Filter elements for standard housing design*

Nominal size NG [l/min]	Order number	Type	Filter material	max. Δ p [bar]	Filter surface [cm²]
800	76136220	852014 Sm-N 2	Sm-N 2	20	18533
	76321830	852014 PS 3	PS 3		24830
	76321822	852014 PS 6	PS 6		24830
	76321814	852014 PS 10	PS 10		24830
	76321806	852014 PS 25	PS 25		24830
1400	76136212	852015 Sm-N 2	Sm-N 2	20	42275
	76321897	852015 PS 3	PS 3		57200
	76321889	852015 PS 6	PS 6		57200
	76321871	852015 PS 10	PS 10		57200
	76321863	852015 PS 25	PS 25		57200

*other element types are available on request

8. Technical specifications

Design:	line mounting filter
Nominal pressure:	10^7 load changes 25 bar (360 psi)
Test pressure:	33 bar (470 psi)
Temperature range:	-10 °C to +120 °C
	survival temperature -40 °C (other temperature ranges on request)
	minimum viscosity of the fluid: 10 mm²/s
Bypass setting:	Δ p 3.5 bar ± 10
Filter head material:	GAL
Filter housing material:	AL
Filter cover material:	GAL
Sealing material:	NBR
Maintenance indicator setting	Δ p 2.2 bar ± 10 %
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 sleave:	M20x1.5

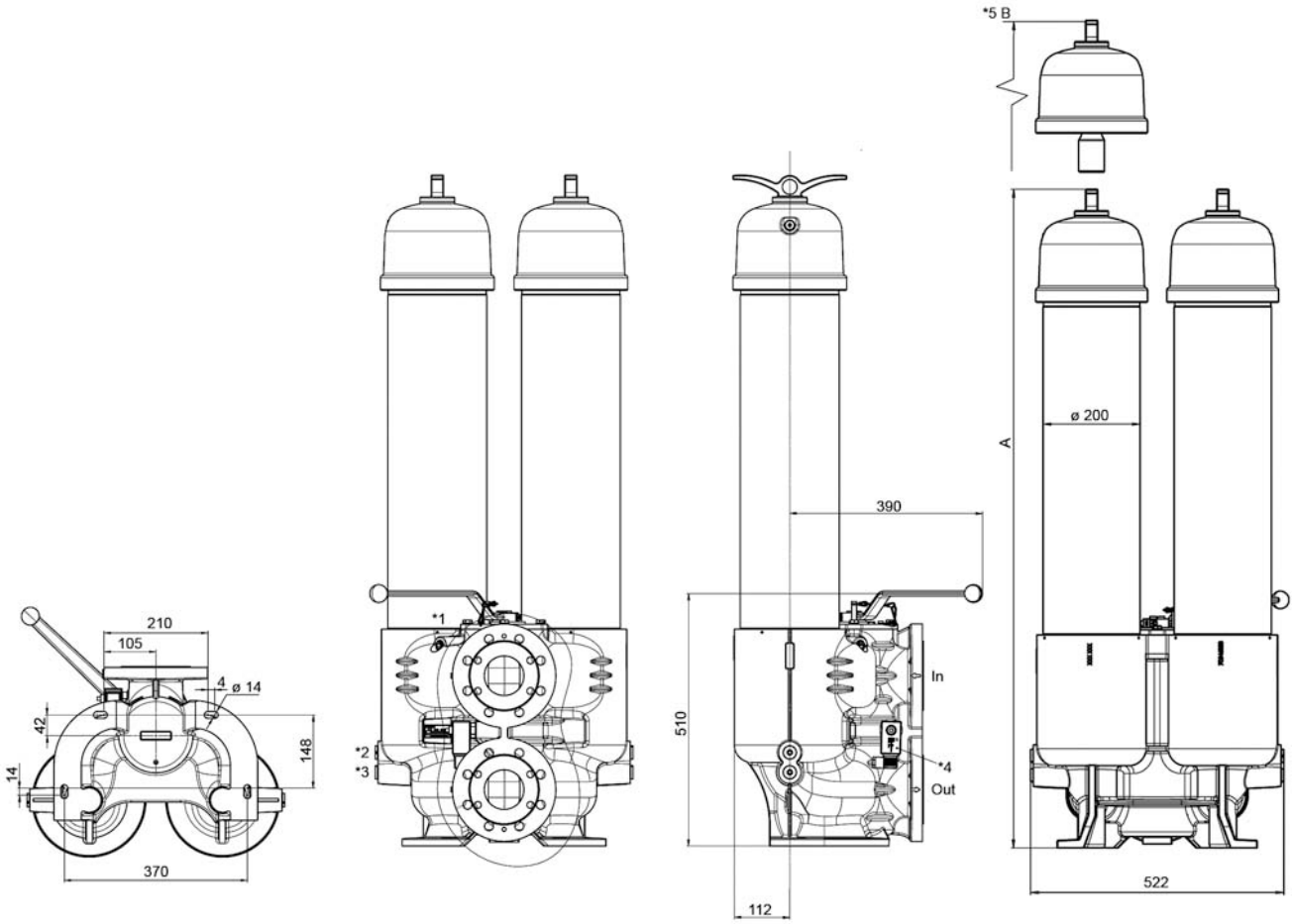
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance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

Subject to technical alteration without prior notice.

9. Dimensions



In	Inlet
Out	Outlet
*1	Pressure equalization screw
*2	Drain clean side G½
*3	Drain dirt side G½
*4	Maintenance indicator
*5	Clearance B

All dimensions in mm.

Type	Connection	A	B	Weight [kg]
Pi 23240	DN 80	805	500	80
Pi 23280	DN 80	1355	1000	90

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 housing.
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 . 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.
3 . Please always ensure that you have original MAHLE spare elements in stock: disposable elements (PS, Sm-N) cannot be cleaned.

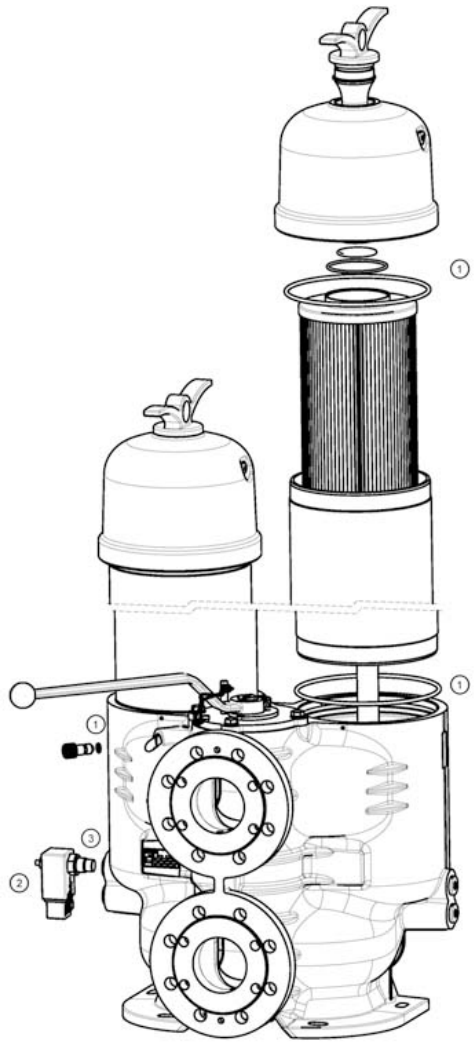
10.4 Element replacement

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 pressure equalizing screw. Swivel switching lever. Place through or drip pan underneath to collect leaving oil. Close pressure equalization screw.
2 . Loosen vent screw of the filter side not in use by 2-3 turns.
3 . Remove drain plug in housing bottom and drain oil.
4 . Unscrew filter cover counter-clockwise.
   Warning: The shift lever may not, from now until the screwing back in of the filter housing (7.), be activated under any circumstances!
5 . Lift out filter element.
6 . Check seal on filter cover. We recommend replacement in any case.
7 . Make sure that the order number on the spare element corresponds to the order number of the filter name-plate. Remove the element packaging and put the element with the o-Ring side down into the housing.
8 . Push the element carefully over the spigot and tight cover with the hand-tight.
9 . Tighten drain plug housing bottom.
10 . To refill the filter chamber, operate only the pressure equalizing screw. Tighten the screw when fluid emerges bubble-free from the drain.
11 . Tight vent screw. Check for leckage by actuating the equalizing screw again.

11. Spare parts list



Order numbers for spare parts		
Position	**Type**	**Order number**
①	Seal kit for housing	
	NBR	70566903
	FPM	70566904
	EPDM	70566905
②	Maintenance indicator	
	Visual PiS 3098/2,2	77669971
	Visual/electrical PiS 3097/2,2	77669948
	Electrical upper section only	77536550
②	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325

MAHLE Industriefiltration GmbH
Schleifbachweg 45
D-74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industrialfiltration@mahle.com
www.mahle-industrialfiltration.com
70582030.10/2012

MAHLE

Industry

Duplex Filter
Pi 241

Nominal pressure 40 bar (570 psi), nominal size 50 up to 80

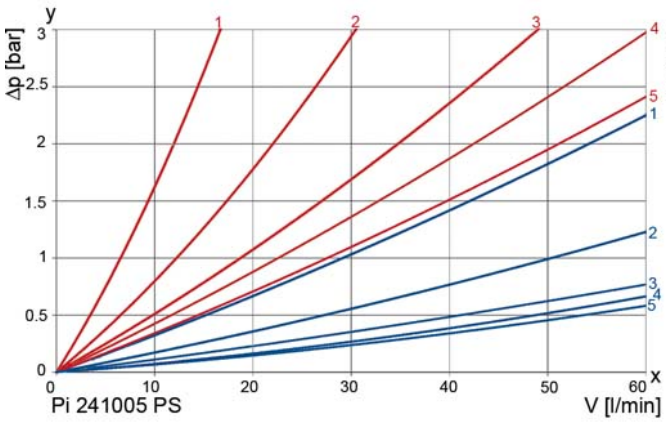
1. Features

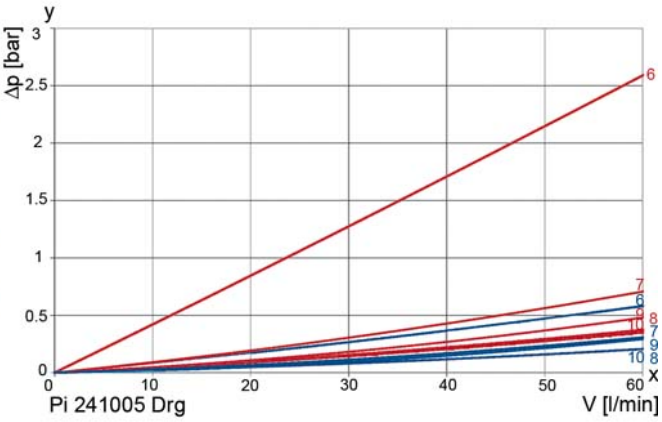
High performance filters for modern hydraulic, lubrication and fuel systems

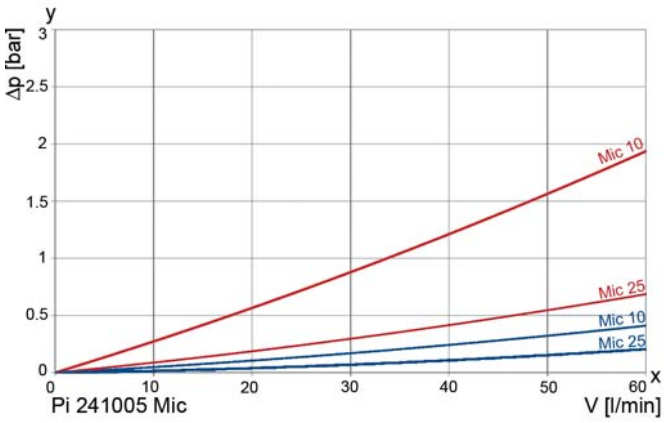
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Ball switching unit
- Visual/electrical/electronic maintenance indicator
- Flanged and threaded connections
- Variable operating and mounting possibilities
- Extensive range of accessories
- Quality filters, easy to service
- 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
- Worldwide distribution

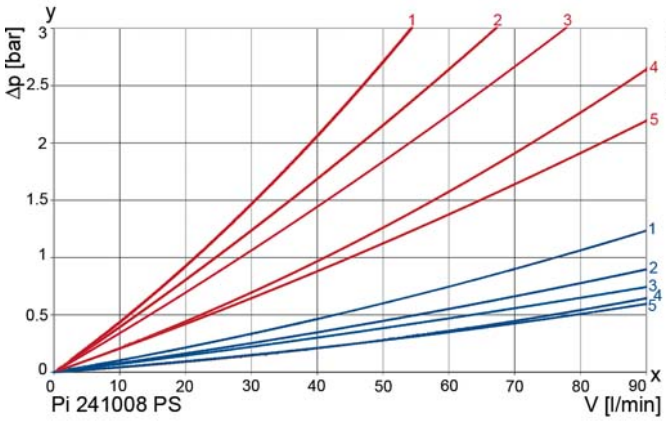
2. Flow rate/pressure drop curve complete filter

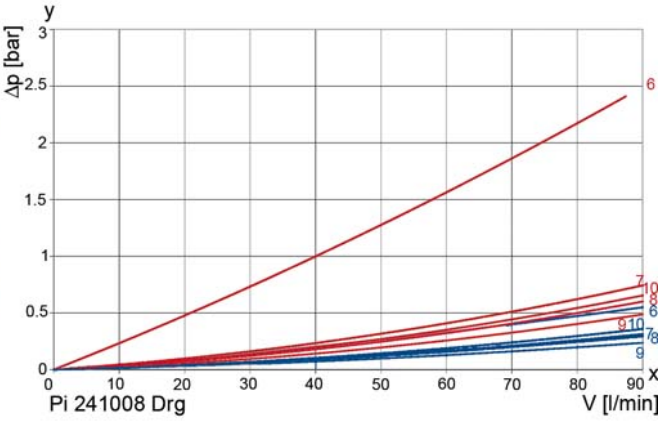
190 mm²/s
33 mm²/s

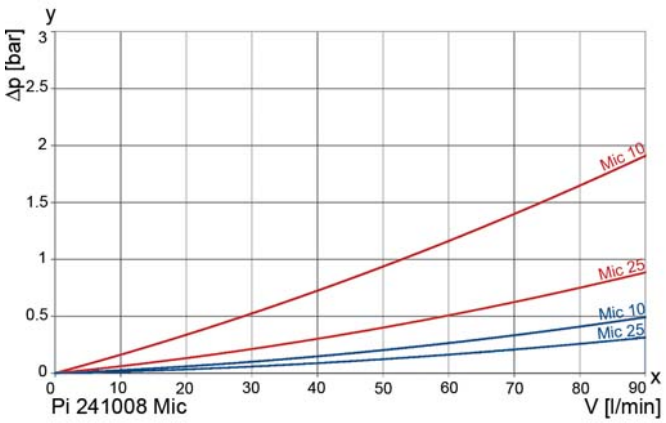








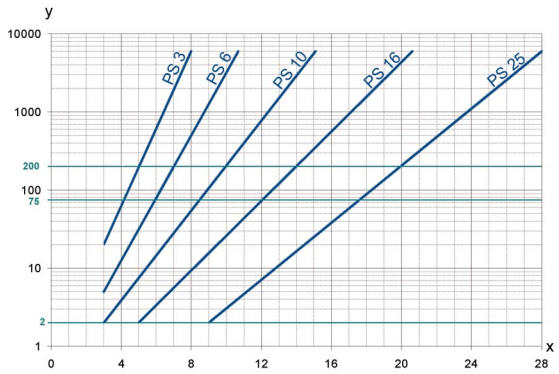




y = differential pressure Δ p [bar]
x = flow rate V [l/min]

1 = PS 3	3 = PS 10	5 = PS 25	7 = Drg 25	9 = Drg 60
2 = PS 6	4 = PS 16	6 = Drg 10	8 = Drg 40	10 = Drg 100

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)

PS elements with max. Δ p 20 bar

PS	3	$\beta_{5(C)}$	≥200
PS	6	$\beta_{7(C)}$	≥200
PS	10	$\beta_{10(C)}$	≥200
PS	16	$\beta_{16(C)}$	≥200
PS	25	$\beta_{20(C)}$	≥200

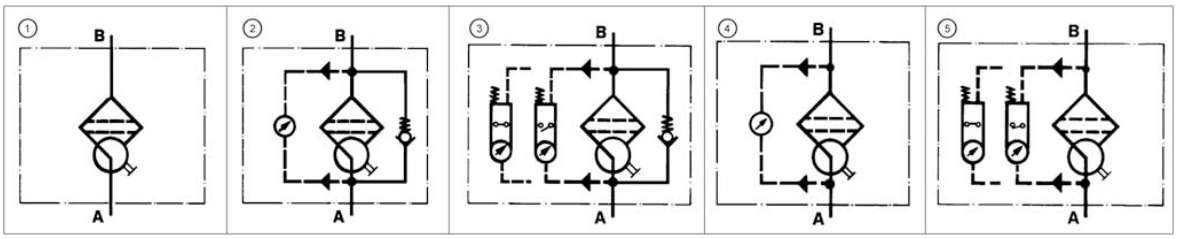
values guaranteed up to
10 bar differential pressure

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 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. Type number key and order numbers

7.1 Type number key housings

Type							
241	Duplex filter						
	Nominal size [l/min]						
	005	NG 50					
	008	NG 80					
		Connection					
		1	SAE flange				
		4	Thread connection				
			Clearance opening				
			C	1" DN 25			
				Seal material			
				N	NBR		
				F	FPM		
				E	EPDM		
					Housing code*		
					-046	with screw plug	
					-057	with bypass and visual indicator	
					-058	with bypass and electrical indicator	
					-068	with visual indicator	
					-069	with electrical indicator	
						Special equipment	
						M	Magnet
Pi 241	**008/**	**1**	**C/**	**N**	**-069/**	**M**	Example for ordering

*Other types on request

Example for ordering filters:

1. Filter housing	2. Filter element
V = 80 l/min, connection 1" SAE, seal NBR und visual/electrical maintenance indicator Type: Pi 241008/1C/N-069 Order number: 70535442	PS 10 Type: Pi 23008 AN PS 10 Order number: 70518877

7.2 Order numbers housings

Nominal size NG [l/min]	Order number	Type	① with blank plug for indicator	② with bypass valve and visual indicator	③ with bypass valve and electrical indicator	④ with visual indicator	⑤ with electrical indicator
50	70525737	Pi 241005/1C/N-046	■				
	70535419	Pi 241005/1C/N-057		■			
	70535420	Pi 241005/1C/N-058			■		
	70535421	Pi 241005/1C/N-068				■	
	70535422	Pi 241005/1C/N-069					■
80	70535438	Pi 241008/1C/N-046	■				
	70535439	Pi 241008/1C/N-057		■			
	70535440	Pi 241008/1C/N-058			■		
	70535441	Pi 241008/1C/N-068				■	
	70535442	Pi 241008/1C/N-069					■

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

7.3 Filter elements (a wider range of element types is availble on request)					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δp [bar]**	**Filter surface [cm²]**
50	70526314	Pi 21005 AN PS 3	PS 3	**20**	820
	70526312	Pi 22005 AN PS 6	PS 6		820
	70526310	Pi 23005 AN PS 10	PS 10		820
	70526308	Pi 24005 AN PS 16	PS 16		820
	70526302	Pi 25005 AN PS 25	PS 25		820
	70526259	Pi 11005 AN Mic 10	Mic 10		855
	70526261	Pi 12005 AN Mic 25	Mic 25		855
	70526219	Pi 31005 AN Drg 10	Drg 10		495
	70526234	Pi 32005 AN Drg 25	Drg 25		495
	70526237	Pi 33005 AN Drg 40	Drg 40		495
	70526241	Pi 34005 AN Drg 60	Drg 60		495
	70526243	Pi 35005 AN Drg 100	Drg 100		495
80	70518885	Pi 21008 AN PS 3	PS 3	**20**	1445
	70518881	Pi 22008 AN PS 6	PS 6		1445
	70518877	Pi 23008 AN PS 10	PS 10		1445
	70518873	Pi 24008 AN PS 16	PS 16		1445
	70518863	Pi 25008 AN PS 25	PS 25		1445
	70526267	Pi 11008 AN Mic 10	Mic 10		1539
	70526269	Pi 12008 AN Mic 25	Mic 25		1539
	70518989	Pi 31008 AN Drg 10	Drg 10		915
	70518983	Pi 32008 AN Drg 25	Drg 25		915
	70518981	Pi 33008 AN Drg 40	Drg 40		915
	70518978	Pi 34008 AN Drg 60	Drg 60		915
	70518975	Pi 35008 AN Drg 100	Drg 100		915

8. Technical specifications

Design:	Duplex filter
Nominal pressure:	40 bar (570 psi)
Test pressure:	60 bar (860 psi)
Temperature range:	-10 °C to +120 °C
	(other temperature ranges on request)
Bypass setting:	Δ p 3.5 bar ± 10 %
Filter housing material:	EN-GJS-400
Switch parts material:	Stainless steel
Sealing material:	NBR/AL
Maintenance indicator setting:	Δ p 2.2 bar ± 10 %
Electrical data of maintenance indicator:	
Maximum voltage:	250 V AC/200 V DC
Maximum current:	1 A
Contact load:	70 W
Type of protection:	IP 65 in inserted and secured status
Contact:	normally open/closed
Cable sleave:	M20x1.5

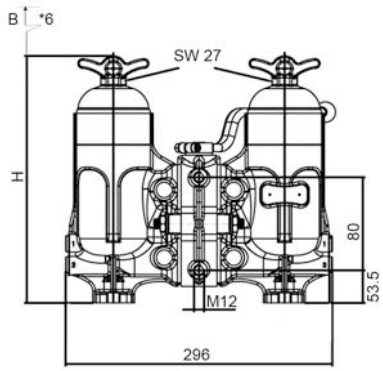
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance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

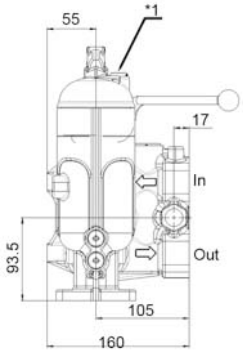
We draw attention to the fact that all values indicated are average values which do not always occur in specific cases of application. Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer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

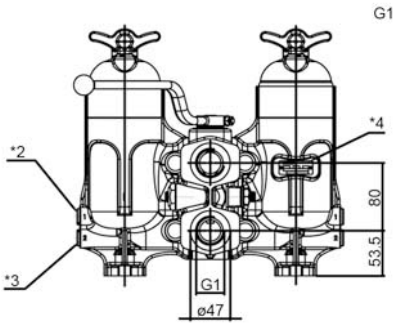
We recommend you to contact us concerning applications of our filters in areas governed by the EU Directive 94/9 EC (ATEX 95). The standard version can be used for liquids based on mineral oil (corresponding to the fluids in Group 2 of Directive 97/23 EC Article 9). If you consider to use other fluids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

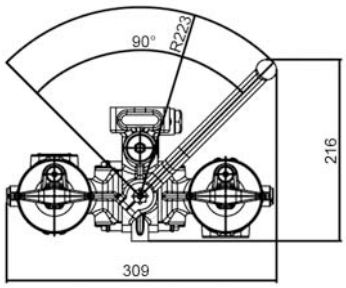
Subject to technical alteration without prior notice.

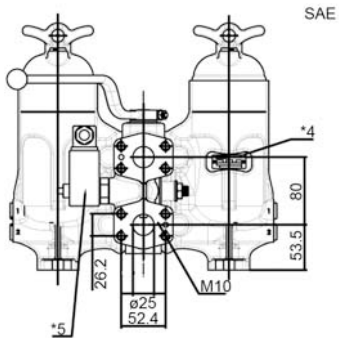
9. Dimensions











All dimensions in mm.

Type	Connections*	H	B	Weight in [kg]
241005	SAE DN 25/G1"	248	110	16
241008	SAE DN 25/G1"	286	160	18

* Other connections on request

In	Inlet
Out	Outlet
*1	Venting G¼
*2	Drain outlet dirt side G¼
*3	Drain outlet clean side G¼
*4	Type plate
*5	Maintenance indicator optional
*6	Clearance B

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 housing. 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. 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.
2 . 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.
3 . Please always ensure that you have original MAHLE spare elements in stock: Disposable elements (PS/Mic) cannot be cleaned.

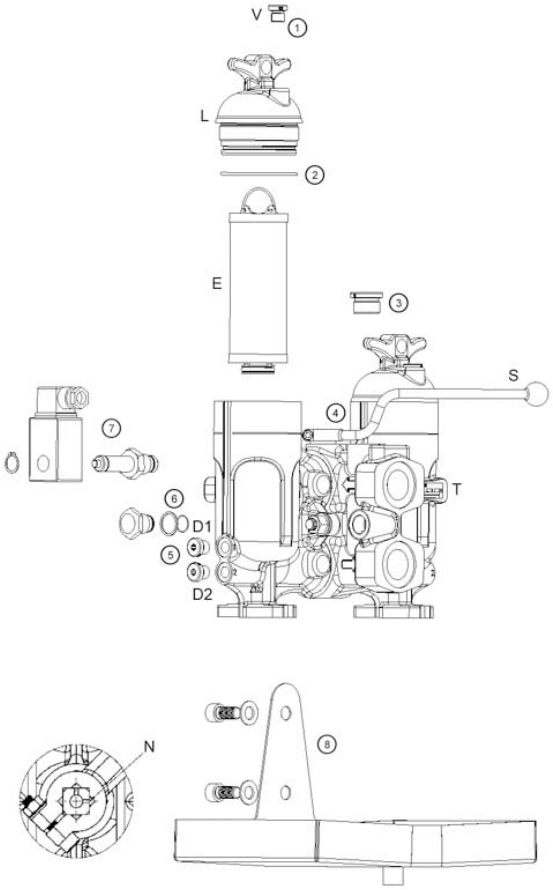
10.4 Element replacement

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. This is indicated by notches (N) on the switching shaft. Before carrying out filter maintenance, switch off the housing to be serviced.

1 . Move switching lever (S) completely to the stop.
2 . Loosen vent plug (V) on the filter side now shut down by 2-3 turns.
3 . Remove drain plug "1" (D1) and allow the medium to drain.
4 . Remove drain plug "2" (D2) and allow the medium to drain.
5 . Unscrew filter cover (L) by turning in anti-clockwise direction. **Warning: The shift lever may not, from now until the screwing back in of the filter housing, be activated under any circumstances!**
6 . Lift out filter element (E) from above.
7 . Check seal (2) on filter cover.We recommend replacement in any case.
8 . Make sure that the order number on the spare element corresponds to the order number of the filter name plate (T). Remove the element packaging and insert the element into the housing with the closed side facing upwards.
9 . Push the element carefully into the holding fixture and tighten cover against stop.
10 . Screw in drain plugs "1" and "2" and tighten (30-35 Nm).
11 . When filling the filter chamber, move the switching lever to the middle position until the medium flows out of the vent bore bubble-free. Tighten vent plug (30-35 Nm).
12 . Check the serviced filter chamber for leaks.
13 . Move the switching lever back to stop position and put the serviced filter chamber out of operation again.

11. Spare parts list



Order number for spare parts		
Position	**Type**	**Order number**
① - ⑤	Seal kit for housing	
	Pi 241 005 - Pi 241 008	
	NBR	70535673
	FPM	70535674
	EPDM	70535675
⑥	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325
⑦	Maintenance indicator	
	Visual PiS 3098/2.2	77669971
	Electrical PiS 3097/2.2	77669948
	Electrical upper section only	77536550
⑧	Oil drip pan	
	Pi 241 005 - Pi 241 008	70535711
	SAE welding counter-flange 3000 psi incl. O-Ring and mounting screws	
	SAE 1" NBR	70535783
	Drain plugs with permanent magnet	
	G¼"	70535672

MAHLE Industriefiltration GmbH
Schleifbachweg 45
74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industrialfiltration@mahle.com
www.mahle-industrialfiltration.com
70543420.03/2012

MAHLE Industry

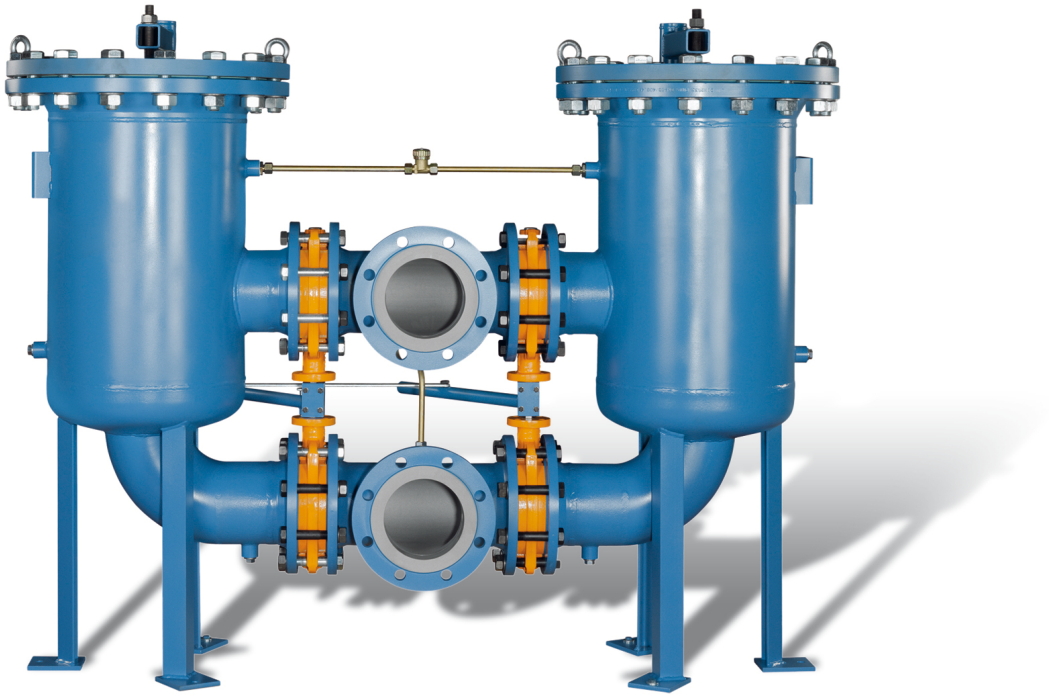
Duplex Filter
Pi 281

Nominal pressure 10/16 bar (140/230 psi), nominal size 1250 up to 8000

1. Features

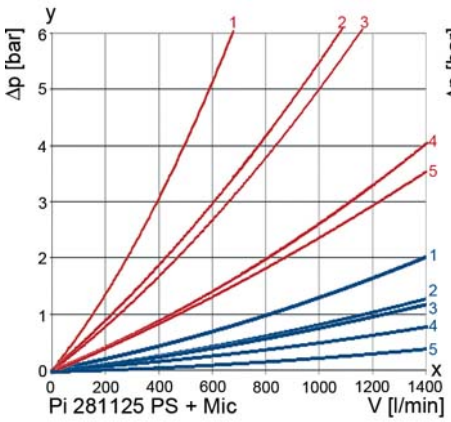
High performance filters for modern hydraulic systems

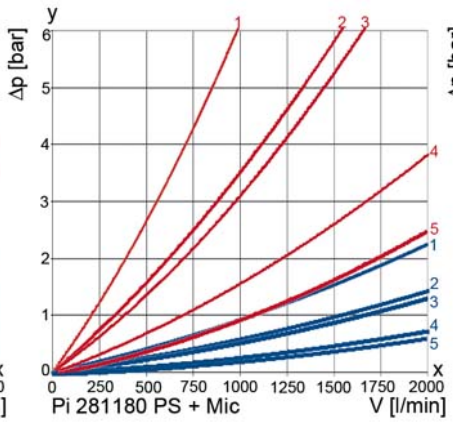
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Flanged connections
- Quality filters, easy to service
- Equipped with highly efficient glass fibre PS filter elements
- Beta rated elements according to ISO 16889 multipass test
- Elements with high differential pressure stability and dirt holding capacity
- Worldwide distribution

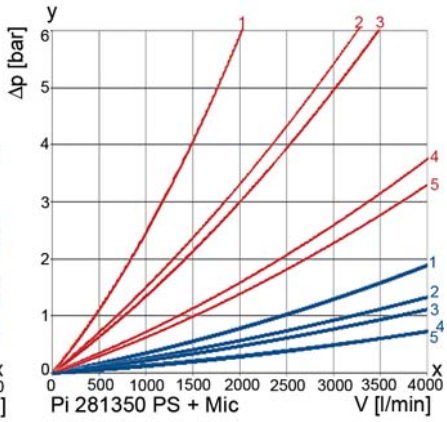


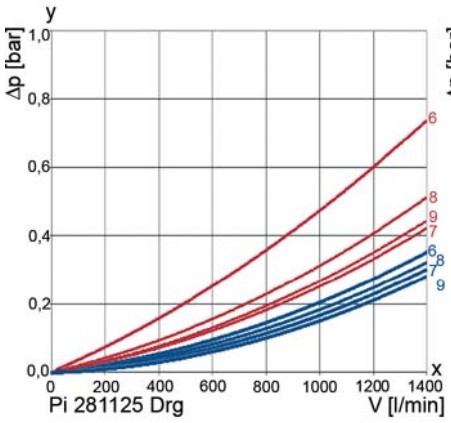
2. Flow rate/pressure drop curve complete filter

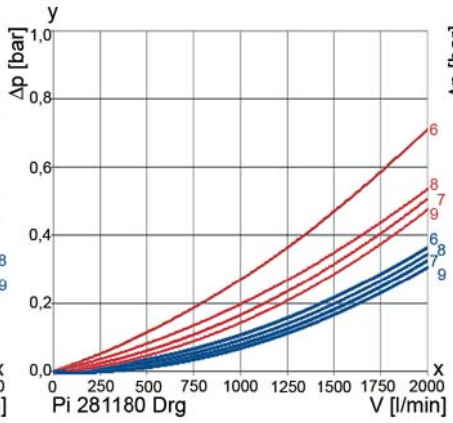
190 mm²/s
33 mm²/s

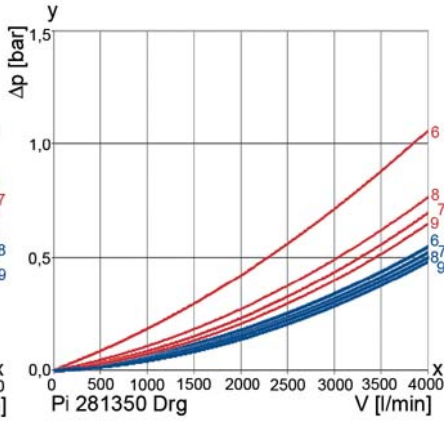


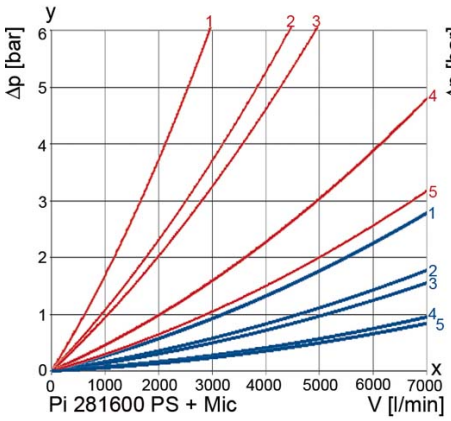


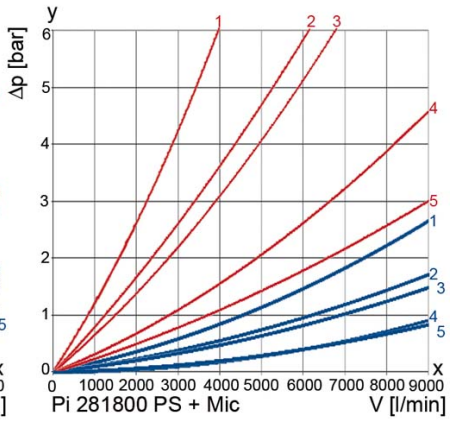


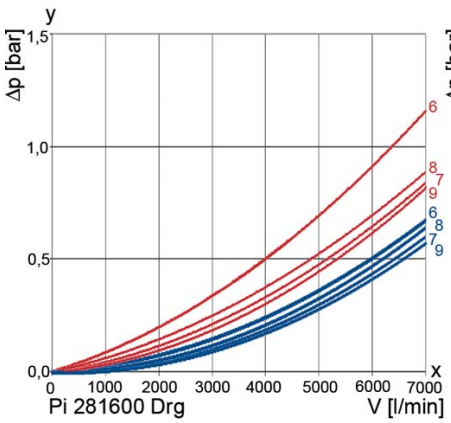


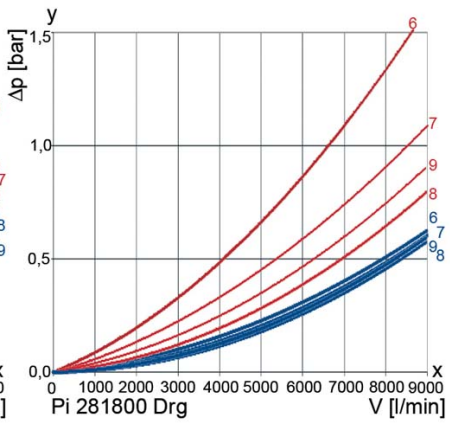










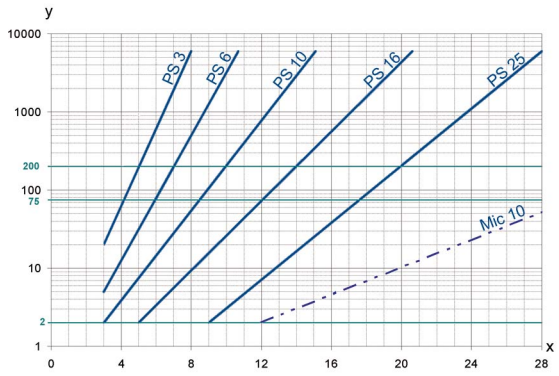


y = differential pressure Δp [bar]

x = flow rate V [l/min]

1 = PS 3	3 = PS 10	5 = Mic 10	7 = Drg 40	9 = Drg 100
2 = PS 6	4 = PS 25	6 = Drg 25	8 = Drg 60	

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)

PS elements with
max. Δ p 10 bar

PS	3	$\beta_{5(C)} \geq 200$
PS	6	$\beta_{7(C)} \geq 200$
PS	10	$\beta_{10(C)} \geq 200$
PS	25	$\beta_{20(C)} \geq 200$

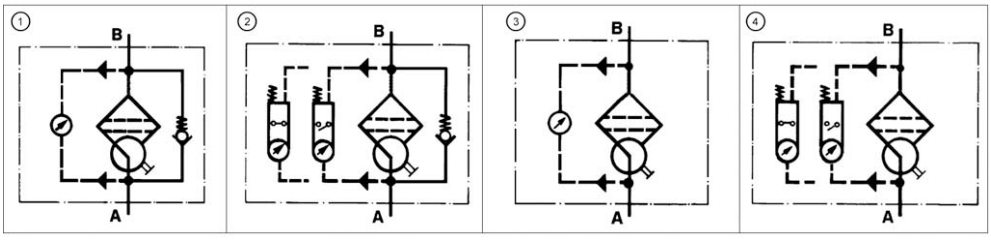
values guaranteed at
5 bar differential pressure

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 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-multi-passmethod for evaluation filtration performance of a filter element

6. Symbols



7. Type code and order numbers

Pi 281125/21-058/852 888 PS 10

Pi 281	125	/2	1	-058	/825 888 PS 10
1	2	3	4	5	6

1 Filter type

2 Size/Connections
Connection flange
(In, Out): DIN EN 1092-1
- 125 = 1250 l/min - DN 100
- 180 = 1800 l/min - DN 125
- 350 = 3500 l/min - DN 150
- 600 = 6000 l/min - DN 200
- 800 = 8000 l/min - DN 250

3 Nominal pressure
- 1 = 10 bar
- 2 = 16 bar

4 Number of elements
- 1 per filter side from NG 1250 up to NG 1800,
- 3 per filter side from NG 3500 up to NG 6000,
- 4 per filter side at NG 8000

5 Housing design
- 058 = with bypass valve and electrical maintenance indicator
- 069 = electrical maintenance indicator

6 Filter element
- Filter element type and filter rating

Filters DN 100 and DN 125 optional, DN 150 up to DN 250 standard with cover lifting device.

7.1 Housing design

Nominal size NG [l/min]	Type	Number of elements per filter side and element type	Pressure [bar]	② with bypass valve and electrical indicator	④ with electrical indicator
1250	281125/11-058	1x 852 888	10	■	
	281125/11-069				■
	281125/21-058		16	■	
	281125/21-069				■
1800	281180/11-058	1x 852 884	10	■	
	281180/11-069				■
	281180/21-058		16	■	
	281180/21-069				■
3500	281350/13-058	3x 852 888	10	■	
	281350/13-069				■
	281350/23-058		16	■	
	281350/23-069				■
6000	281600/13-058	3x 852 884	10	■	
	281600/13-069				■
	281600/23-058		16	■	
	281600/23-069				■
8000	281800/14-058	4x 852 884	10	■	
	281800/14-069				■
	281800/24-058		16	■	
	281800/24-069				■

7.2 Filter elements (a wider range of element types is available on request)				
Order number	**Type**	**Filter material**	**max. Δp [bar]**	**Filter surface [cm²]**
78263295	852 888 PS 3	PS 3		21850
78354029	852 888 PS 6	PS 6		21850
78226813	852 888 PS 10	PS 10		21850
78226821	852 888 PS 25	PS 25		21850
78207664	852 888 Mic 10	Mic 10	**10**	21850
78228017	852 888 Drg 25	Drg 25		16500
78228025	852 888 Drg 40	Drg 40		16500
78303026	852 888 Drg 60	Drg 60		16500
78228470	852 888 Drg 100	Drg 100		16500
78227431	852 884 PS 3	PS 3		28500
79337916	852 884 PS 6	PS 6		28500
78226797	852 884 PS 10	PS 10		28500
78226805	852 884 PS 25	PS 25		28500
70366315	852 884 Mic 10	Mic 10	**10**	28500
79337460	852 884 Drg 25	Drg 25		23450
78261653	852 884 Drg 40	Drg 40		23450
79700402	852 884 Drg 60	Drg 60		23450
79327750	852 884 Drg 100	Drg 100		23450

8. Technical specifications

Design:	line mounting filter, mounting via through holes at supporting stands
Fitting position:	upright
Butterfly valve switch over device	
Temperature range:	- 10 °C to + 100 °C (other temperature ranges on request)
Filter housing material:	steel welded construction
Material of seals:	NBR (other materials on request)
Bypass opening pressure:	Δ p 3.5 bar +/- 10 %
Activating pressure of optical/electrical contamination indicator:	Δ p 2.2 bar +/-10 %
Electrical data of contamination indicator:	
Maximum voltage:	230 V AC/200 V DC
Maximum current on contact:	1 A
Maximum contact load:	70 W
Type of protection:	IP 65 when inserted and secured
Contact:	bistable
Cable connection:	M20x1.5

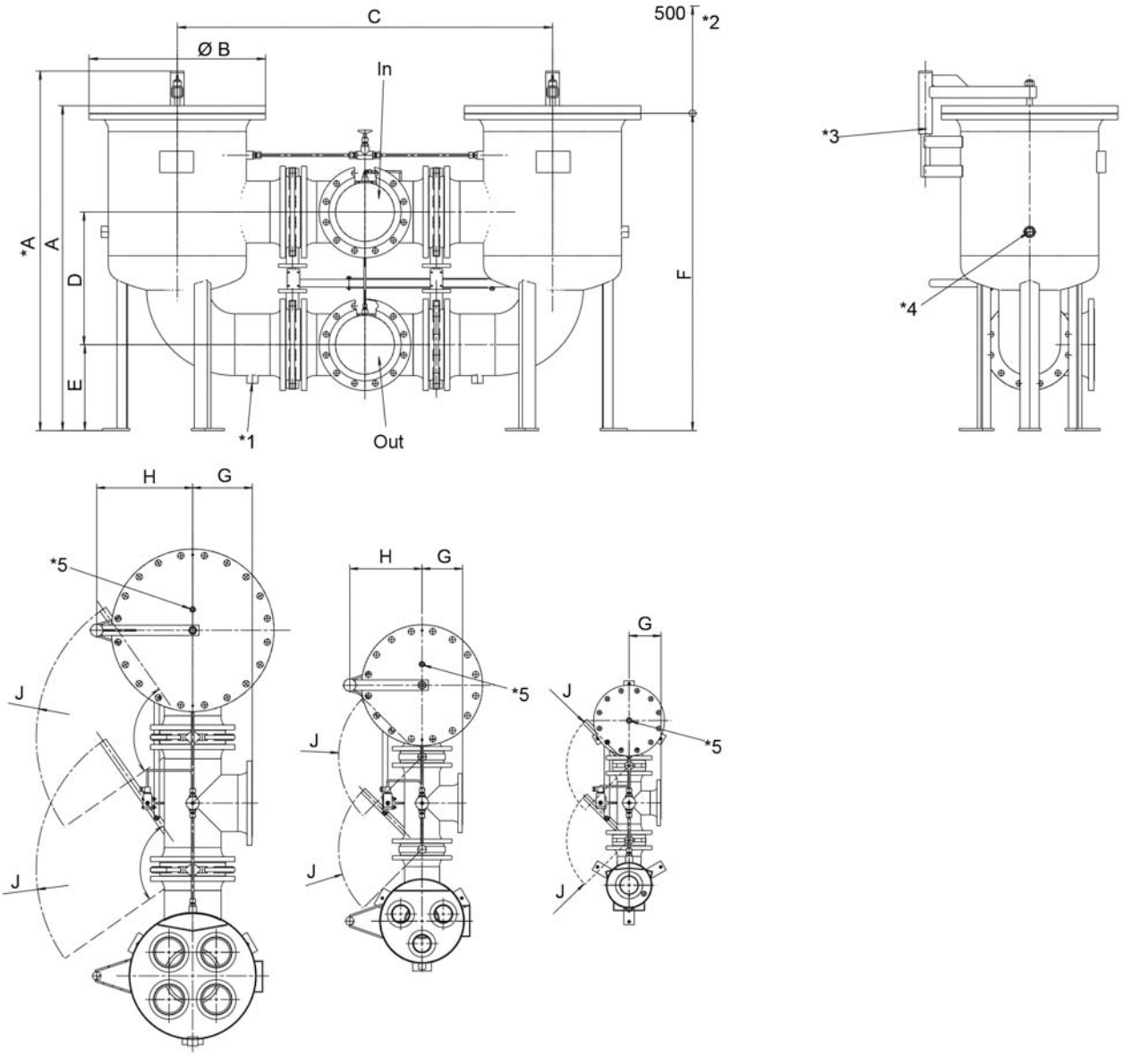
Please contact us in case of using other media.

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 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.

Subject to technical alteration without prior notice.

9. Dimensions



A for Pi 281125 up to 281180
*A for Pi 281350 up to 281800

*1 drain connection G½
*2 minimum clearance

*3 cover lifting device
*4 drain connection G½

*5 vent screw G½

In = Inlet
Out = Outlet

All dimensions in mm.

Nominal size NG [l/min]	Connection DN	Nominal pressure PN [bar]	A ± 10	B	C ± 10	D ± 1	E ± 1	F	G	H	J
1250	100	10 + 16	984	340	790	365	250	960	153	-	378
1800	125		1091	405	922	391	250	975	175	250	378
3500	150	16	1346	580	1132	435	332	1200	194	340	396
6000	200		1466	715	1332	483	350	1300	236	400	421
8000	250		1610	840	1654	587	380	1403	279	490	726
3500	150	10	1346	565	1132	435	332	1200	194	340	396
6000	200		1450	670	1332	483	350	1300	236	380	421
8000	250		1590	780	1654	587	380	1403	279	460	726

MAHLE Industriefiltration GmbH, Schleifbachweg 45, 74613 Öhringen, Phone +49 7941 67-0,
Fax +49 7941 67-23429, industrialfiltration@mahle.com, www.mahle-industrialfiltration.com, 70366830.10/2012

MAHLE Industry

Duplex Filter
Pi 3700

Nominal pressure 200/250 bar (2850/3560 psi), nominal size up to 400
according DIN 24550

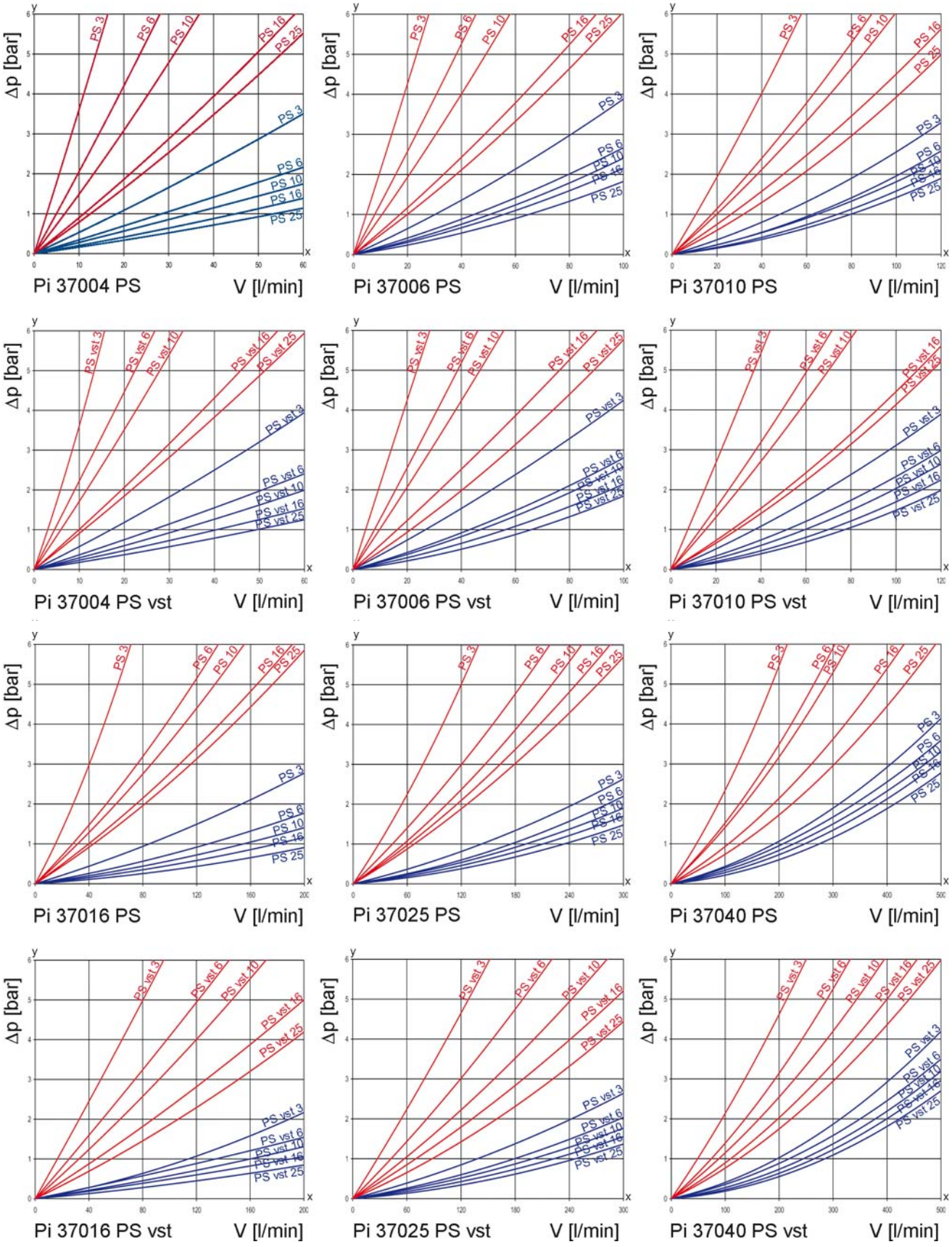
1. Features

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
- NPT- and SAE-connections on request
- Worldwide distribution

2.. Flow rate/pressure drop curve complete filter

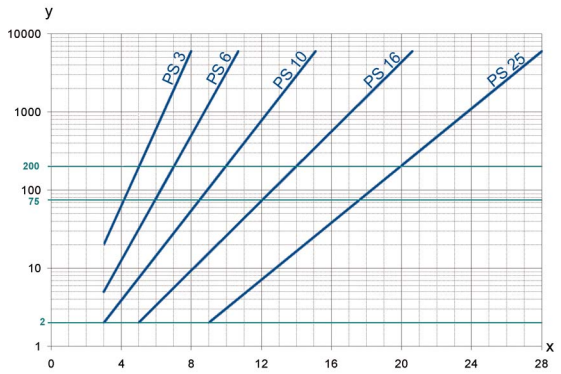
190 mm²/s
33 mm²/s



y = differential pressure Δp [bar]

x = flow rate V [l/min]

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)

PS elements with
max. Δ p 20 bar

PS	3	$\beta_{5(C)}$	≥200
PS	6	$\beta_{7(C)}$	≥200
PS	10	$\beta_{10(C)}$	≥200
PS	16	$\beta_{15(C)}$	≥200
PS	25	$\beta_{20(C)}$	≥200

values guaranteed up to
10 bar differential pressure

PS vst elements with
max. Δ p 210 bar

PS vst	3	$\beta_{5(C)}$	≥200
PS vst	6	$\beta_{7(C)}$	≥200
PS vst	10	$\beta_{10(C)}$	≥200
PS vst	16	$\beta_{15(C)}$	≥200
PS vst	25	$\beta_{20(C)}$	≥200

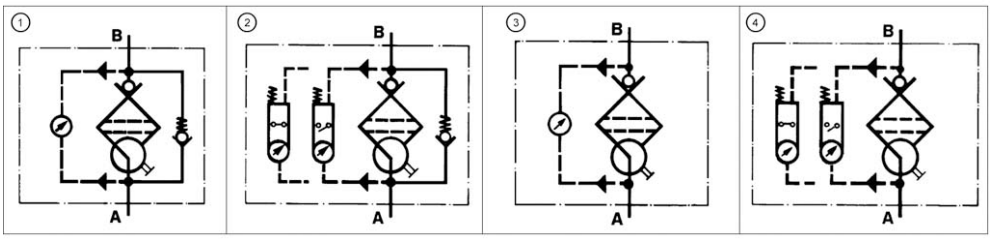
values guaranteed up to
20 bar differential pressure

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 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. Filter housing	2. 2x Filter element
V = 100 l/min and electrical maintenance indicator Type: Pi 37010-015 Order number: 78208423	PS vst 3 Type: Pi 71010 DN PS vst 3 Order number: 78227480

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① with bypass valve and visual indicator	② with bypass valve and electrical indicator	③ with visual indicator	④ with electrical indicator
40	78208290	Pi 37004-012	■			
	78259889	Pi 37004-013		■		
	78208316	Pi 37004-014			■	
	78208324	Pi 37004-015				■
63	78208340	Pi 37006-012	■			
	78259897	Pi 37006-013		■		
	78208365	Pi 37006-014			■	
	78208373	Pi 37006-015				■
100	78208399	Pi 37010-012	■			
	78259905	Pi 37010-013		■		
	78208415	Pi 37010-014			■	
	78208423	Pi 37010-015				■
160	78208449	Pi 37016-012	■			
	78259913	Pi 37016-013		■		
	78208464	Pi 37016-014			■	
	78208472	Pi 37016-015				■
250	78208498	Pi 37025-012	■			
	78259921	Pi 37025-013		■		
	78208514	Pi 37025-014			■	
	78259863	Pi 37025-015				■
400	78208530	Pi 37040-012 FL	■			
	78259939	Pi 37040-013 FL		■		
	78208555	Pi 37040-014 FL			■	
	78208563	Pi 37040-015 FL				■

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

7.2 Filter elements*					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
40	78260929	Pi 21004 DN PS 3 NBR	PS 3	**20**	475
	77960859	Pi 22004 DN PS 6 NBR	PS 6		475
	77925571	Pi 23004 DN PS 10 NBR	PS 10		475
	78260937	Pi 24004 DN PS 16 NBR	PS 16		475
	78260945	Pi 25004 DN PS 25 NBR	PS 25		475
	78216079	Pi 71004 DN PS vst 3 NBR	PS vst 3	**210**	445
	77960156	Pi 72004 DN PS vst 6 NBR	PS vst 6		445
	77925654	Pi 73004 DN PS vst 10 NBR	PS vst 10		445
	78216087	Pi 74004 DN PS vst 16 NBR	PS vst 16		445
	78216095	Pi 75004 DN PS vst 25 NBR	PS vst 25		445
63	78260960	Pi 21006 DN PS 3 NBR	PS 3	**20**	835
	77960867	Pi 22006 DN PS 6 NBR	PS 6		835
	77925589	Pi 23006 DN PS 10 NBR	PS 10		835
	78260978	Pi 24006 DN PS 16 NBR	PS 16		835
	78260986	Pi 25006 DN PS 25 NBR	PS 25		835
	78216137	Pi 71006 DN PS vst 3 NBR	PS vst 3	**210**	780
	77960149	Pi 72006 DN PS vst 6 NBR	PS vst 6		780
	77925662	Pi 73006 DN PS vst 10 NBR	PS vst 10		780
	78216145	Pi 74006 DN PS vst 16 NBR	PS vst 16		780
	78216152	Pi 75006 DN PS vst 25 NBR	PS vst 25		780
100	78227472	Pi 21010 DN PS 3 NBR	PS 3	**20**	1375
	77960875	Pi 22010 DN PS 6 NBR	PS 6		1375
	77925597	Pi 23010 DN PS 10 NBR	PS 10		1375
	78261000	Pi 24010 DN PS 16 NBR	PS 16		1375
	78261018	Pi 25010 DN PS 25 NBR	PS 25		1375
	78227480	Pi 71010 DN PS vst 3 NBR	PS vst 3	**210**	1275
	77960131	Pi 72010 DN PS vst 6 NBR	PS vst 6		1275
	77925670	Pi 73010 DN PS vst 10 NBR	PS vst 10		1275
	78261281	Pi 74010 DN PS vst 16 NBR	PS vst 16		1275
	78216160	Pi 75010 DN PS vst 25 NBR	PS vst 25		1275

*a wider range of element types is available on request

7.2 Filter elements*					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
160	78261034	Pi 21016 DN PS 3 NBR	PS 3	**20**	2530
	77960826	Pi 22016 DN PS 6 NBR	PS 6		2530
	77925605	Pi 23016 DN PS 10 NBR	PS 10		2530
	78261042	Pi 24016 DN PS 16 NBR	PS 16		2530
	78261059	Pi 25016 DN PS 25 NBR	PS 25		2530
	77940638	Pi 71016 DN PS vst 3 NBR	PS vst 3	**210**	1885
	77960123	Pi 72016 DN PS vst 6 NBR	PS vst 6		1885
	77925688	Pi 73016 DN PS vst 10 NBR	PS vst 10		1885
	78269797	Pi 74016 DN PS vst 16 NBR	PS vst 16		1885
	78216178	Pi 75016 DN PS vst 25 NBR	PS vst 25		1885
250	78227514	Pi 21025 DN PS 3 NBR	PS 3	**20**	4020
	77960834	Pi 22025 DN PS 6 NBR	PS 6		4020
	77925613	Pi 23025 DN PS 10 NBR	PS 10		4020
	78261075	Pi 24025 DN PS 16 NBR	PS 16		4020
	78261083	Pi 25025 DN PS 25 NBR	PS 25		4020
	77940646	Pi 71025 DN PS vst 3 NBR	PS vst 3	**210**	3090
	77960115	Pi 72025 DN PS vst 6 NBR	PS vst 6		3090
	77925696	Pi 73025 DN PS vst 10 NBR	PS vst 10		3090
	78269813	Pi 74025 DN PS vst 16 NBR	PS vst 16		3090
	78216186	Pi 75025 DN PS vst 25 NBR	PS vst 25		3090
400	78227522	Pi 21 040 DN PS 3 NBR	PS 3	**20**	6770
	77960842	Pi 22 040 DN PS 6 NBR	PS 6		6770
	77925621	Pi 23 040 DN PS 10 NBR	PS 10		6770
	78261109	Pi 24 040 DN PS 16 NBR	PS 16		6770
	78261117	Pi 25 040 DN PS 25 NBR	PS 25		6770
	77940653	Pi 71 040 DN PS vst 3 NBR	PS vst 3	**210**	5240
	77960107	Pi 72 040 DN PS vst 6 NBR	PS vst 6		5240
	77930829	Pi 73 040 DN PS vst 10 NBR	PS vst 10		5240
	78269821	Pi 74 040 DN PS vst 16 NBR	PS vst 16		5240
	78260903	Pi 75 040 DN PS vst 25 NBR	PS vst 25		5240

* a wider range of element types is available on request

8. Technical specifications

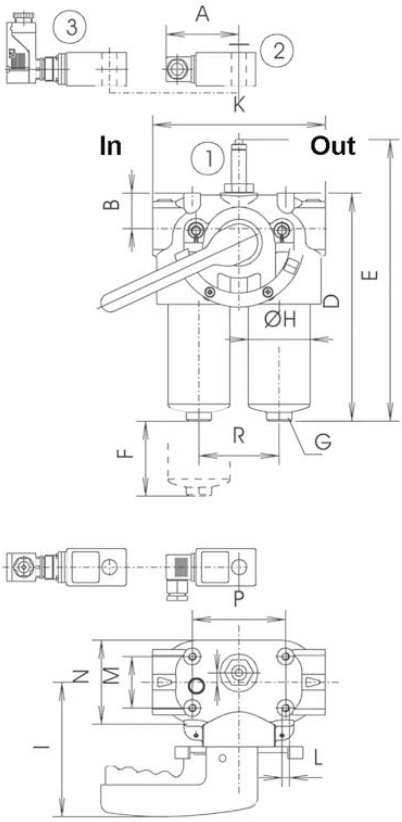
Design:	line mounting filter
Nominal: Pi 37016-37040	200 bar (2850 psi)
Pi 37004-37010	250 bar (3560 psi)
Test pressure: Pi 37016-37040	260 bar (3700 psi)
Pi 37004-37010	325 bar (4620 psi)
Temperature range:	-10 °C to +120 °C
	(other temperature ranges on request)
Bypass setting:	Δ p 7 bar ± 10 %
Filter head material:	GGG
Filter housing material:	St
Sealing material:	NBR/PTFE
Maintenance indicator setting:	Δ p 5 bar ± 10 %
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 sleave:	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 indícator 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.

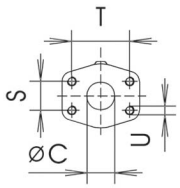
We recommend to contact us concerning applications of our filters in areas governed by the EU Directive 94/9 EC (ATEX 95). The standard version can be used for liquids based on mineral oil (corresponding to the fluids in Group 2 of Directive 97/23 EC Article 9). If you consider to use other fluids please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

Subject to technical alteration without prior notice.



In = inlet
Out = outlet

Pos. 1	Visual maintenance indicator
Pos. 2	Electrical upper section Connector acc. DIN EN 175301-803 Version: PiS 3092, 3105, 3115
Pos. 3	Electrical upper section Connector acc. DIN EN 175301-804 Version: PiS 3102, 3122, 3110
Pos. 4	NG 250, 400 with drain plug G ¼ DIN 910



DN 38 ≥ SAE 11/2" 6000 psi flange,
Bolts and O-rings not included in delivery

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 37004	78	38	G1	228	285	80	27	66	144	182	M8x15	55	90	10	100	86	-	-	-	10.5
Pi 37006	78	38	G1	288	345	80	27	66	144	182	M8x15	55	90	10	100	86	-	-	-	12.0
Pi 37010	78	38	G1	370	427	80	27	66	144	182	M8x15	55	90	10	100	86	-	-	-	14.0
Pi 37016	78	50	G1½	311	363	110	30	110	160	280	M12x18	62	140	28	210	136	-	-	-	30.0
Pi 37025	78	50	G1½	412	463	110	30	110	160	280	M12x18	62	140	28	210	136	-	-	-	35.0
Pi 37040	78	50	DN 38	562	614	110	20	110	160	280	M12x18	62	140	28	210	136	35,7	69,85	M12x20	41.0

* SAE-connections on request

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 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.

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 (PS) cannot be cleaned.

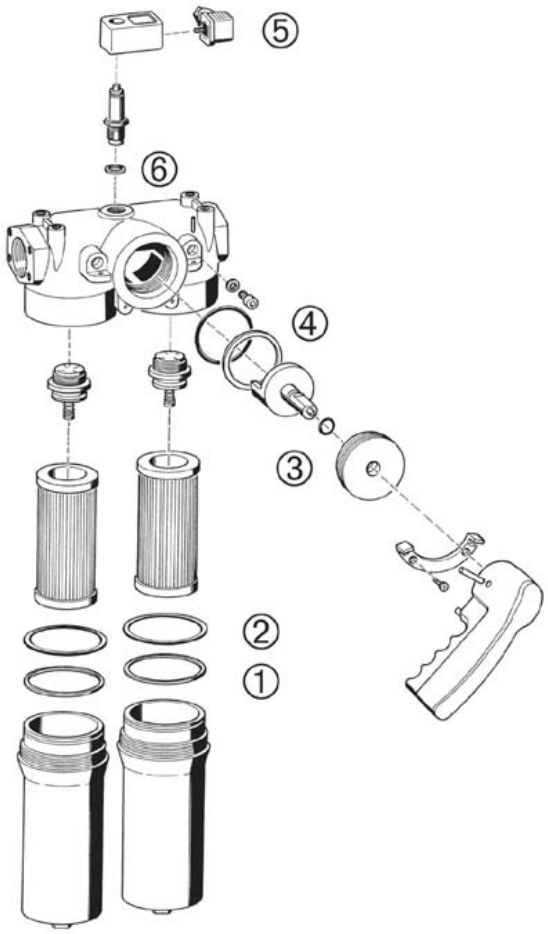
10.4 Element replacement

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 turning counter-clockwise. Clean the housing using a suitable cleaning solvent.
   Warning: The shift lever may not, from now until the screwing back in of the filter housing (7.), be activated under any circumstances!
4 . Remove filter element by pulling down carefully.
5 . Check o-ring on the filter housing 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.
   To ensure no contamination occurs during the exchange of the element first open the plastic bag and push the element over the spigot in the filter head. Now remove plastic bag.
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



Order numbers for spare parts		
Position	**Type**	**Order numbers**
① bis ④	Seal kit	
	Pi 37004 - Pi 37010	
	NBR	79322009
	FPM	79322017
	EPDM	79322025
	Pi 37016 - Pi 37040	
	NBR	79375213
	FPM	79375221
	EPDM	79375239
⑤	Maintenance indicator	
	Visual PiS 3093/5	77669914
	Electrical PiS 3092/5	77669864
	Electrical upper section only	77536550
⑥	Seal kit for maintenance indicator	
	NBR	77760275
	FPM	77760283
	EPDM	77760291

MAHLE Industriefiltration GmbH
Schleifbachweg 45
74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industrialfiltration@mahle.com
www.mahle-industrialfiltration.com
78368631.07/2012

MAHLE Industry

Duplex Filter
Pi 370

Nominal pressure 200/250 bar (2850/3560 psi), nominal size up to 450

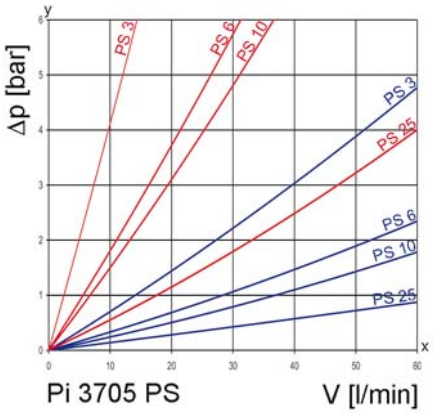
1. Features

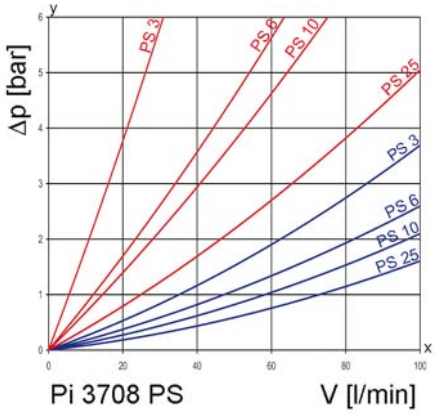
High performance filters for modern hydraulic systems

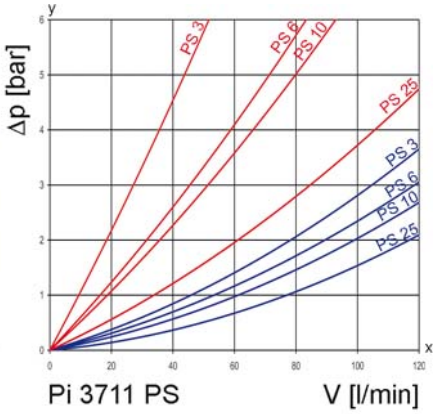
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Threaded connections
- Change over valve on upstream side
- Ergonomic switch-over handle with saftey lock and pressure compensation
- User-optimized one-hand-operation
- 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
- NPT- and SAE-connections on request
- Worldwide distribution

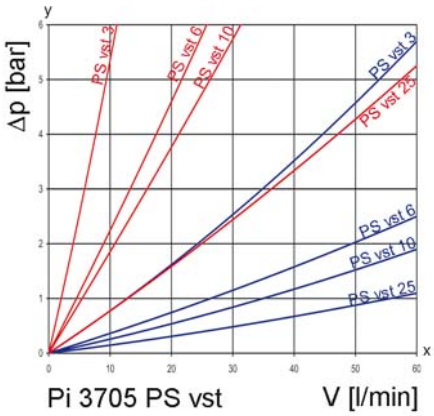
2. Flow rate/pressure drop curve complete filter

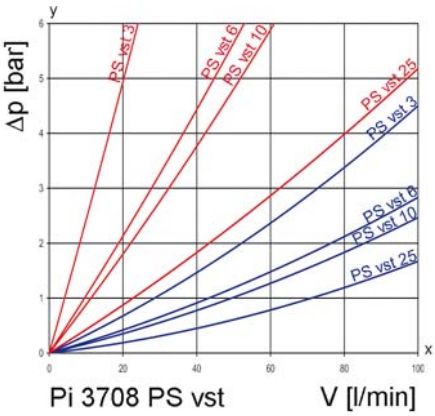
190 mm²/s
33 mm²/s

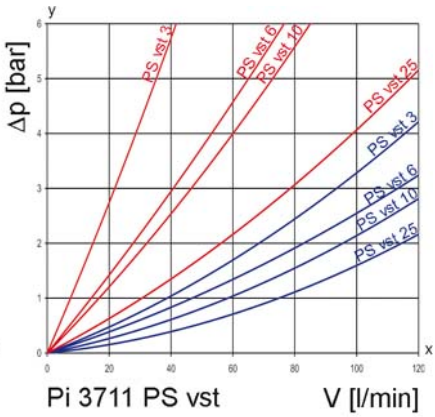


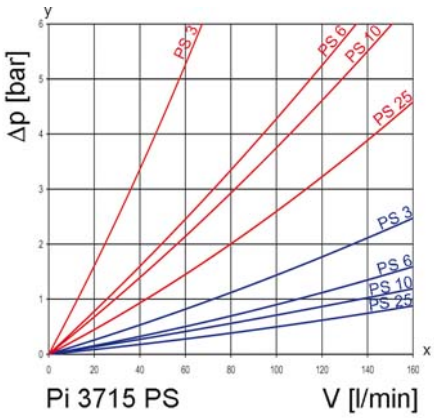


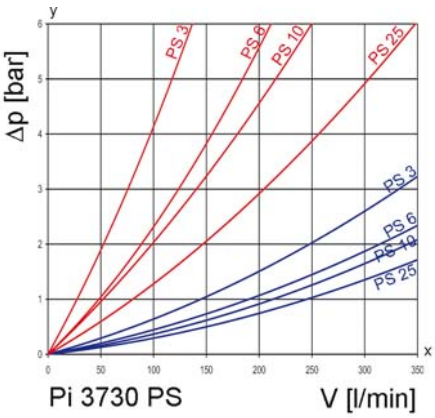


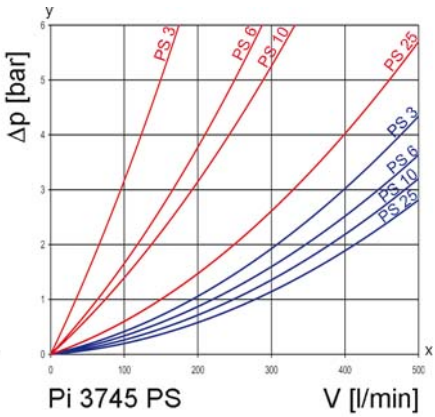


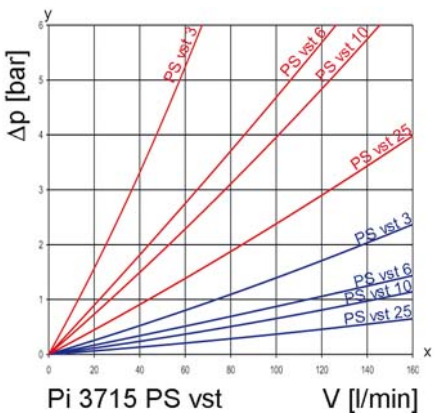


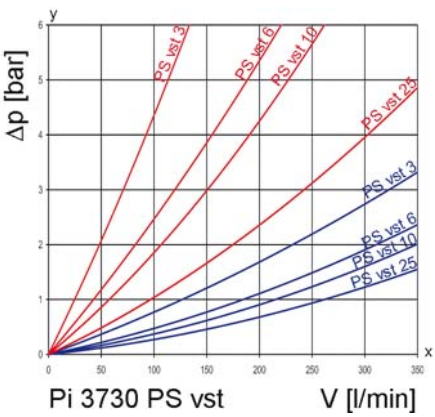


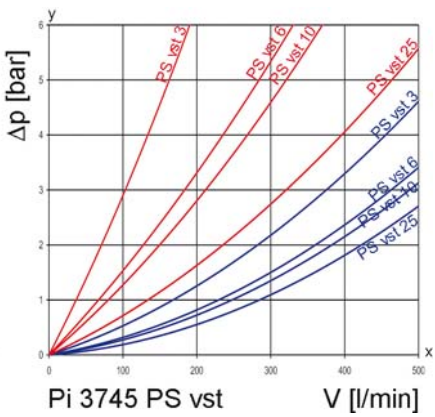








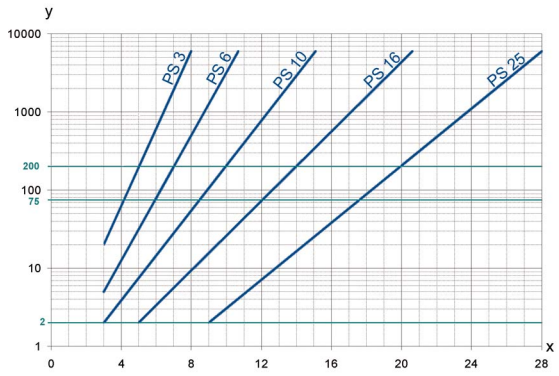




y = differential pressure Δp [bar]

x = flow rate V [l/min]

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)

PS elements with
max. Δ p 20 bar

PS	3	$\beta_{5(C)}$	≥200
PS	6	$\beta_{7(C)}$	≥200
PS	10	$\beta_{10(C)}$	≥200
PS	25	$\beta_{20(C)}$	≥200

values guaranteed up to
10 bar differential pressure

PS vst elements with
max. Δ p 210 bar

PS vst	3	$\beta_{5(C)}$	≥200
PS vst	6	$\beta_{7(C)}$	≥200
PS vst	10	$\beta_{10(C)}$	≥200
PS vst	25	$\beta_{20(C)}$	≥200

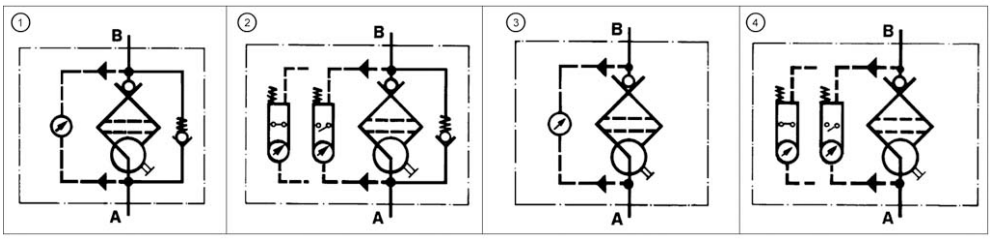
values guaranteed up to
20 bar differential pressure

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 pressure
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 filter; 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. Filter housing	2. 2x Filter elements
V = 80 l/min and electrical maintenance indicator Type: Pi 3708-015 Order number: 77810369	PS vst 3 Type: Pi 2208 PS vst 3 Order number: 77680200

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① with bypass valve and visual indicator	② with bypass valve and electrical indicator	③ with visual indicator	④ with electrical indicator
50	77810294	Pi 3705-012	■			
	77810302	Pi 3705-013		■		
	77810310	Pi 3705-014			■	
	77810328	Pi 3705-015				■
80	77810336	Pi 3708-012	■			
	77810344	Pi 3708-013		■		
	77810351	Pi 3708-014			■	
	77810369	Pi 3708-015				■
110	77810377	Pi 3711-012	■			
	77810385	Pi 3711-013		■		
	77810393	Pi 3711-014			■	
	77810401	Pi 3711-015				■
150	77810419	Pi 3715-012	■			
	77810427	Pi 3715-013		■		
	77810435	Pi 3715-014			■	
	77810443	Pi 3715-015				■
300	77810450	Pi 3730-012	■			
	77810468	Pi 3730-013		■		
	77810476	Pi 3730-014			■	
	77810484	Pi 3730-015				■
450	77810492	Pi 3745-012	■			
	77814403	Pi 3745-013		■		
	77814411	Pi 3745-014			■	
	77814429	Pi 3745-015				■

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

7.2 Filter elements (a wider range of element types is availble on request)					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δp [bar]**	**Filter surface [cm²]**
50	77680135	Pi 2105 PS 3	PS 3	**20**	590
	77943509	Pi 5105 PS 6	PS 6		590
	77680325	Pi 3105 PS 10	PS 10		590
	77680440	Pi 4105 PS 25	PS 25		590
	77680192	Pi 2205 PS vst 3	PS vst 3	**210**	425
	77943533	Pi 5205 PS vst 6	PS vst 6		425
	77680382	Pi 3205 PS vst 10	PS vst 10		425
	77680507	Pi 4205 PS vst 25	PS vst 25		425
80	77680143	Pi 2108 PS 3	PS 3	**20**	1150
	77943517	Pi 5108 PS 6	PS 6		1150
	77680341	Pi 3108 PS 10	PS 10		1150
	77680457	Pi 4108 PS 25	PS 25		1150
	77680200	Pi 2208 PS vst 3	PS vst 3	**210**	850
	77943541	Pi 5208 PS vst 6	PS vst 6		850
	77681190	Pi 3208 PS vst 10	PS vst 10		850
	77680515	Pi 4208 PS vst 25	PS vst 25		850
110	77680150	Pi 2111 PS 3	PS 3	**20**	1700
	77943525	Pi 5111 PS 6	PS 6		1700
	77680333	Pi 3111 PS 10	PS 10		1700
	77680465	Pi 4111 PS 25	PS 25		1700
	77680218	Pi 2211 PS vst 3	PS vst 3	**210**	1275
	77943558	Pi 5211 PS vst 6	PS vst 6		1275
	77680390	Pi 3211 PS vst 10	PS vst 10		1275
	77680523	Pi 4211 PS vst 25	PS vst 25		1275
150	77680168	Pi 2115 PS 3	PS 3	**20**	2425
	77955099	Pi 5115 PS 6	PS 6		2425
	77680358	Pi 3115 PS 10	PS 10		2425
	77680473	Pi 4115 PS 25	PS 25		2425
	77680226	Pi 2215 PS vst 3	PS vst 3	**210**	2010
	77955123	Pi 5215 PS vst 6	PS vst 6		2010
	77680408	Pi 3215 PS vst 10	PS vst 10		2010
	77680531	Pi 4215 PS vst 25	PS vst 25		2010
300	77680176	Pi 2130 PS 3	PS 3	**20**	4620
	77955107	Pi 5130 PS 6	PS 6		4620
	77680366	Pi 3130 PS 10	PS 10		4620
	77680481	Pi 4130 PS 25	PS 25		4620
	77680234	Pi 2230 PS vst 3	PS vst 3	**210**	3800
	77955131	Pi 5230 PS vst 6	PS vst 6		3800
	77680416	Pi 3230 PS vst 10	PS vst 10		3800
	77680549	Pi 4230 PS vst 25	PS vst 25		3800
450	77680184	Pi 2145 PS 3	PS 3	**20**	6865
	77955115	Pi 5145 PS 6	PS 6		6865
	77680374	Pi 3145 PS 10	PS 10		6865
	77680499	Pi 4145 PS 25	PS 25		6865
	77680242	Pi 2245 PS vst 3	PS vst 3	**210**	5600
	77955149	Pi 5245 PS vst 6	PS vst 6		5600
	77680424	Pi 3245 PS vst 10	PS vst 10		5600
	77680556	Pi 4245 PS vst 25	PS vst 25		5600

8. Technical specifications

Design:	line mounting filter
Operating pressure:	200 bar*
Test pressure:	260 bar
Temperature range:	-10 °C to +120 °C (other temperature ranges on request)
Bypass opening pressure:	Δ p 7 bar ± 10 %
Filter head material:	GGG
Filter bowl material:	St
Sealing material:	NBR/PTFE
Activating pressure of optical/ electrical differential pressure indicator:	Δ p 5 bar ± 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:	M20x1.5

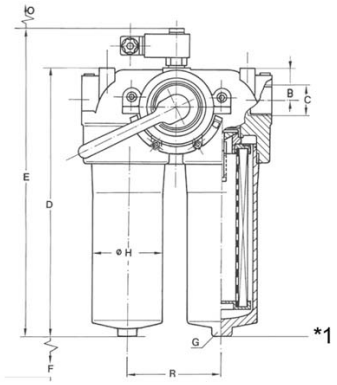
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. The use of quenching circuits must be checked in the case of inductivity in the DC current circuit. The contamination indicator data sheet contains further information and additional contamination indicator versions.

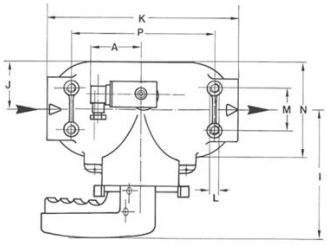
We draw attention to the fact that all values indicated are average values which do not always occur in specific cases of application. Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer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

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.

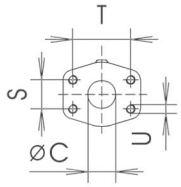
Subject to technical alteration without prior notice.

* Types Pi 3705-.. bis Pi 3711-.. have an operating pressure of 250 bar (test pressure 325 bar).





*1 Pi 3730-Pi 3745 with drain screw G¼ DIN 910



9. Dimensions

All dimensions except "C" in mm.

Type	A	B	C*	D	E	F	Weight [kg]
Pi 3705	78	38	G1	219	271	80	11.0
Pi 3708	78	38	G1	294	346	80	12.0
Pi 3711	78	38	G1	370	422	80	15.0
Pi 3715	78	50	G1½	302	354	110	31.5
Pi 3730	78	50	G1½	427	479	110	37.0
Pi 3745	78	50	G1½	543	595	110	41.5

* SAE flange connection on request.

Type	G SW	H	I	J	K	L	M	N	O	P	R	S	T	U	Weight [kg]
Pi 3705	27	65	144	45	182	M8x15	55	90	45	100	86	-	-	-	11.0
Pi 3708	27	65	144	45	182	M8x15	55	90	45	100	86	-	-	-	12.0
Pi 3711	27	65	144	45	182	M8x15	55	90	45	100	86	-	-	-	15.0
Pi 3715	30	110	175	70	280	M12x18	62	140	45	210	136	-	-	-	31.5
Pi 3730	30	110	175	70	280	M12x18	62	140	45	210	136	-	-	-	37.0
Pi 3745	30	110	175	70	280	M12x18	62	140	45	210	136	35.7	69.85	M12x20	41.5

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.

10.3 When should the filter element be replaced?

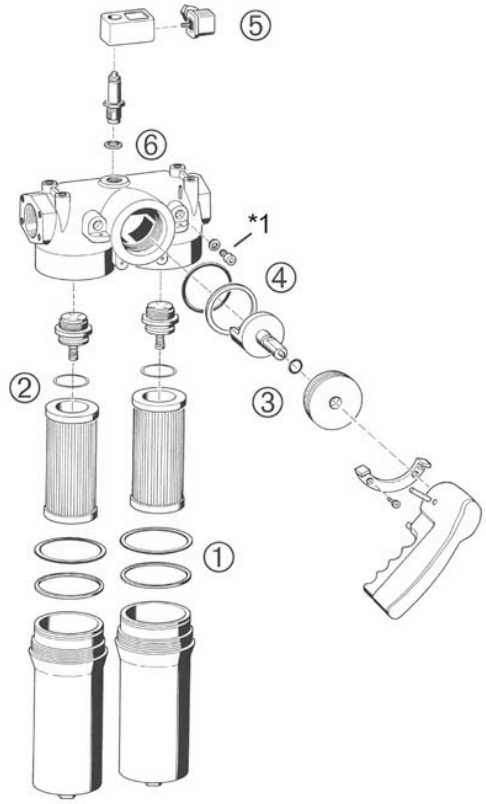
1 . Filters equipped with visual and electrical maintenance indicator:
   During cold starts, the indicator may give a warning signal. Press the red button of the visual indicator once again only after operating temperature has been reached. If the red button immediately pops up again and/or the electrical 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 (PS) 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!
4 . Remove filter element with a side-to-side motion.
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 oder 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 50 to 110 = 60 Nm, for NG 150 to 450 = 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



Order numbers for spare parts		
Position	**Type**	**Order numbers**
① bis ④	Seal kit	
	Pi 3705 - Pi 3711	
	NBR	78305062
	FPM	78305054
	EPDM	78305047
	Pi 3715 - Pi 3745	
	NBR	79375056
	FPM	79375064
	EPDM	79375072
⑤	Maintenance indicator	
	Visual PiS 3093/5	77669914
	Electrical PiS 3092/5	77669864
	Electrical upper section only	77536550
⑥	Seal kit for maintenance indicator	
	NBR	77760275
	FPM	77760283
	EPDM	77760291

*1 vent screw

MAHLE Industriefiltration GmbH
Schleifbachweg 45
74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industrialfiltration@mahle.com
www.mahle-industrialfiltration.com
78356909.07/2012

MAHLE Industry

Duplex Filter
Pi 4700

Nominal pressure up to 315/350 bar (4570/4980 psi), nominal size 40 up to 400
according to DIN 24550

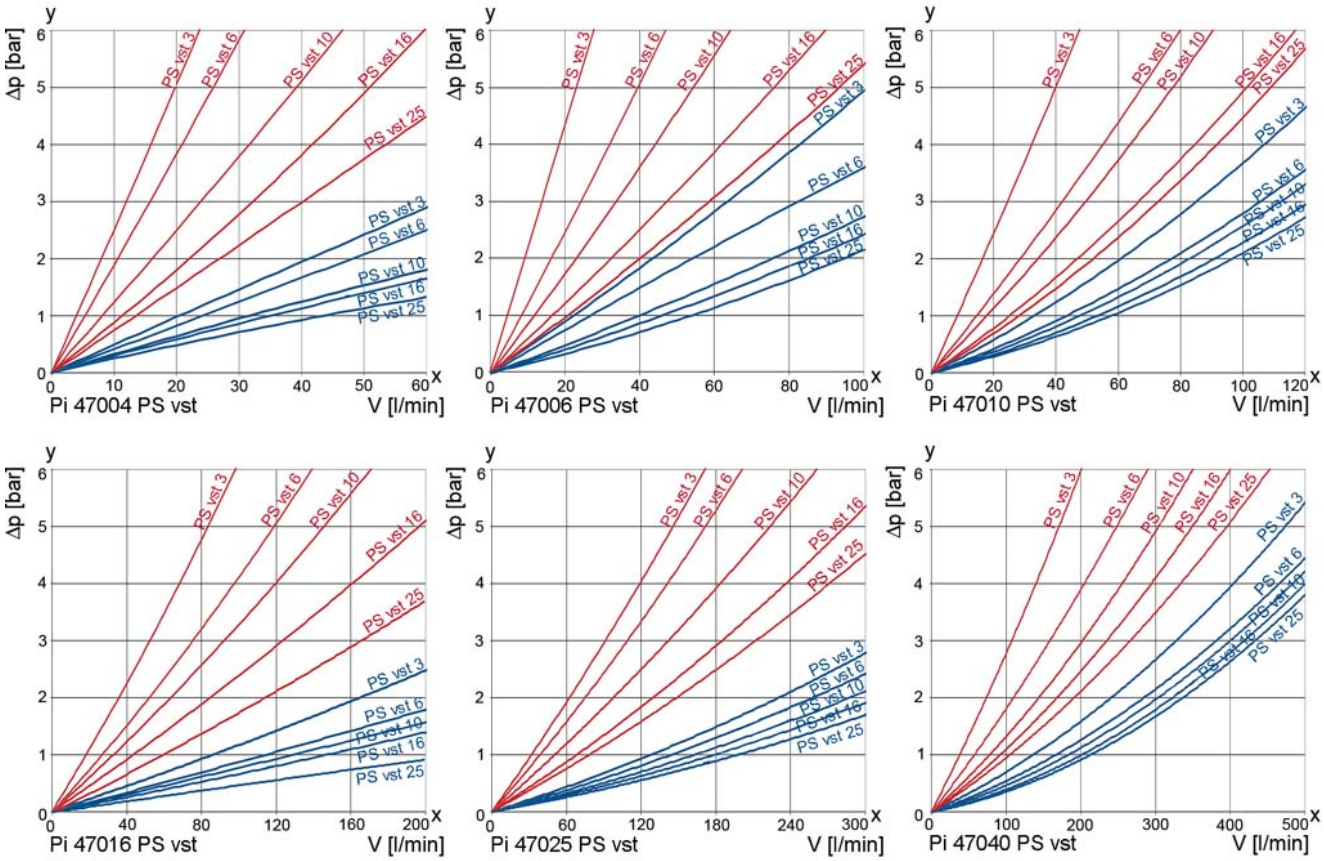
1. Features

High performance filters for modern hydraulic systems

- Provided for pipe installation
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Threaded connections
- Ergonomic switch-over handle with saftey lock user-optimized one-hand-operation
- Quality filters, easy to service
- 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
- NPT- and SAE-connections on request
- Worldwide distribution

2. Flow rate/pressure drop curve complete filter

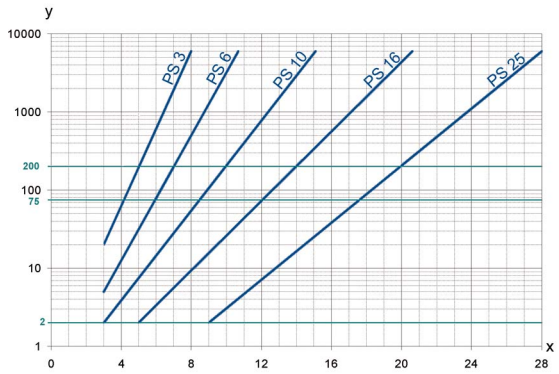
190 mm²/s
33 mm²/s



y = differential pressure Δp [bar]

x = flow rate V [l/min]

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)

PS vst elements with
max. Δ p 210 bar

PS vst	3	$\beta_{5(C)}$	≥ 200
PS vst	6	$\beta_{7(C)}$	≥ 200
PS vst	10	$\beta_{10(C)}$	≥ 200
PS vst	16	$\beta_{15(C)}$	≥ 200
PS vst	25	$\beta_{20(C)}$	≥ 200

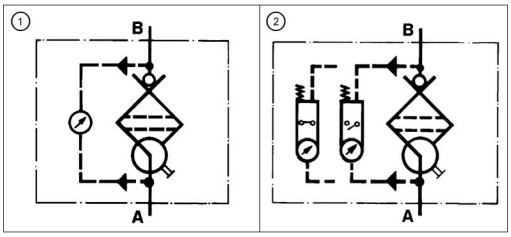
values guaranteed up to
20 bar differential pressure

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 with fluids
DIN ISO 3723	Fluidtechnik-Hydraulik Filterelemente, 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. 2x Filter element
V = 100 l/min and viusal/electrical maintenance indication Type: Pi 47010-015 Order number: 70304308	PS vst 10 Type: Pi 73010 DN PS vst 10 Order number: 77925670

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	with indicator cavity	① with visual indication	② with electrical indication
40	70304318	Pi 47004-010	■		
	70304300	Pi 47004-014		■	
	70304306	Pi 47004-015			■
63	70304319	Pi 47006-010	■		
	70304301	Pi 47006-014		■	
	70304307	Pi 47006-015			■
100	70304320	Pi 47010-010	■		
	70304302	Pi 47010-014		■	
	70304308	Pi 47010-015			■
160	70304338	Pi 47016-010	■		
	70304340	Pi 47016-014		■	
	70304341	Pi 47016-015			■
250	70304332	Pi 47025-010	■		
	70304335	Pi 47025-014		■	
	70304331	Pi 47025-015			■
400	70304333	Pi 47040-010	■		
	70304336	Pi 47040-014		■	
	70304337	Pi 47040-015			■

When filter with non bypass configuration is selected the max. Δ p pressure of the element must not be exceeded.

7.2 Filter elements*

Nominal size NG [l/min]	Order number	Type	Filter material	max. Δ p [bar]	Filter surface [cm²]
40	78216079	Pi 71004 DN PS vst 3	PS vst 3	210	445
	77960156	Pi 72004 DN PS vst 6	PS vst 6		
	77925654	Pi 73004 DN PS vst 10	PS vst 10		
	78216087	Pi 74004 DN PS vst 16	PS vst 16		
	78216095	Pi 75004 DN PS vst 25	PS vst 25		
63	78216137	Pi 71006 DN PS vst 3	PS vst 3		780
	77960149	Pi 72006 DN PS vst 6	PS vst 6		
	77925662	Pi 73006 DN PS vst 10	PS vst 10		
	78216145	Pi 74006 DN PS vst 16	PS vst 16		
	78216152	Pi 75006 DN PS vst 25	PS vst 25		
100	78227480	Pi 71010 DN PS vst 3	PS vst 3		1275
	77960131	Pi 72010 DN PS vst 6	PS vst 6		
	77925670	Pi 73010 DN PS vst 10	PS vst 10		
	78261281	Pi 74010 DN PS vst 16	PS vst 16		
	78216160	Pi 75010 DN PS vst 25	PS vst 25		

*a wider range of element types is available on request

7.2 Filter elements*					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
160	77940638	Pi 71016 DN PS vst 3	PS vst 3	**210**	1885
	77960123	Pi 72016 DN PS vst 6	PS vst 6		
	77925688	Pi 73016 DN PS vst 10	PS vst 10		
	78269797	Pi 74016 DN PS vst 16	PS vst 16		
	78216178	Pi 75016 DN PS vst 25	PS vst 25		
250	77940646	Pi 71025 DN PS vst 3	PS vst 3	**210**	3090
	77960115	Pi 72025 DN PS vst 6	PS vst 6		
	77925696	Pi 73025 DN PS vst 10	PS vst 10		
	78269813	Pi 74025 DN PS vst 16	PS vst 16		
	78216186	Pi 75025 DN PS vst 25	PS vst 25		
400	77940653	Pi 71040 DN PS vst 3	PS vst 3	**210**	5240
	77960107	Pi 72040 DN PS vst 6	PS vst 6		
	77930829	Pi 73040 DN PS vst 10	PS vst 10		
	78269821	Pi 74040 DN PS vst 16	PS vst 16		
	78260903	Pi 75040 DN PS vst 25	PS vst 25		

* a wider range of element types ia available on request

8. Technical specifications

Design: line mounting filter
Nominal pressure: Pi 47016-47040 315 bar (4480 psi)
Pi 47004-Pi 47010 350 bar (4980 psi)
Test pressure: Pi 47016-47040 410 bar (5830 psi)
Pi 47004-Pi 47010 455 bar (6470 psi)
Temperature range: -10 °C to +120 °C
(other temperature ranges on request)
Filter head material: St
Filter housing material: St
Sealing material: NBR/PTFE
Maintenance indicator setting: Δ p 5 bar ± 10 %

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 sleave: M20x1.5

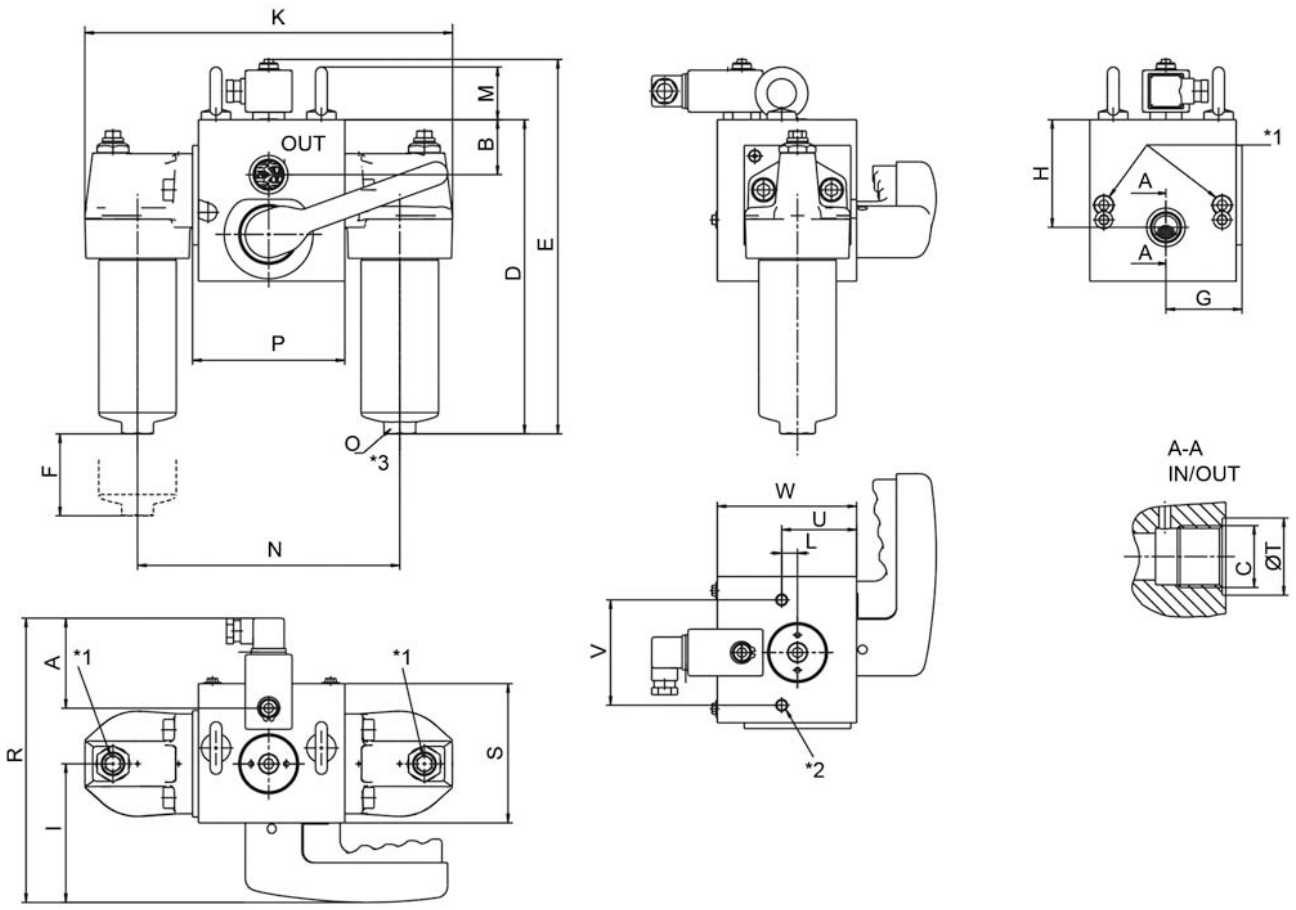
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance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

Subject to technical alteration without prior notice.

9. Dimensions



*1 Vent screw

*2 Mounting cavity
M10x20 for Pi 47004 up to Pi 47010
M16x20 for Pi 47016 up to Pi 47040

*3 Drain screw Pi 47016 up to Pi 47040

All dimensions except "C" in mm.

Type	A	B	C	D	E	F	G	H	I	K	L
Pi 47004	78	47	G¾	269	320	110	65	92	119	314	14
Pi 47006	78	47	G¾	347	398	110	65	92	119	314	14
Pi 47010	78	47	G¾	423	474	110	65	92	119	314	14
Pi 47016	78	53	G1½	334	396	110	75	125	135	450	23
Pi 47025	78	53	G1½	424	486	110	75	125	135	450	23
Pi 47040	78	53	G1½	574	636	110	75	125	135	450	23

Type	M	N	O	P	R	S	T	U	V	W	Weight [kg]
Pi 47004	45	224	SW27	130	243	119	33	64	90	119	22
Pi 47006	45	224	SW27	130	243	119	33	64	90	119	23
Pi 47010	45	224	SW27	130	243	119	33	64	90	119	25
Pi 47016	62	300	SW30	150	271	150	65	90	100	150	56
Pi 47025	62	300	SW30	150	271	150	65	90	100	150	61
Pi 47040	62	300	SW30	150	271	150	65	90	100	150	66

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 filters. Ascertain that the required clearance is provided so that the filter element and the filter housing can be removed. 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.

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 lement must be replaced after the end of the shift.

2 . 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.

3 . Please always ensure that you have original MAHLE spare elements in stock: Disposable elements (PS) 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 contamination indicatoris 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 to 3 turns.

3 . Unscrew filter housing by turning counter-clockwise. Clean the housing using a suitable cleaning solvent.
Warning: The shift lever may not, from now until the screwing back in of the filter housing (7.), be activated under any circumstances!

4 . Remove filter element by pulling down carefully.

5 . Check O-ring on the filter housing for damage. Replace, if necessary.

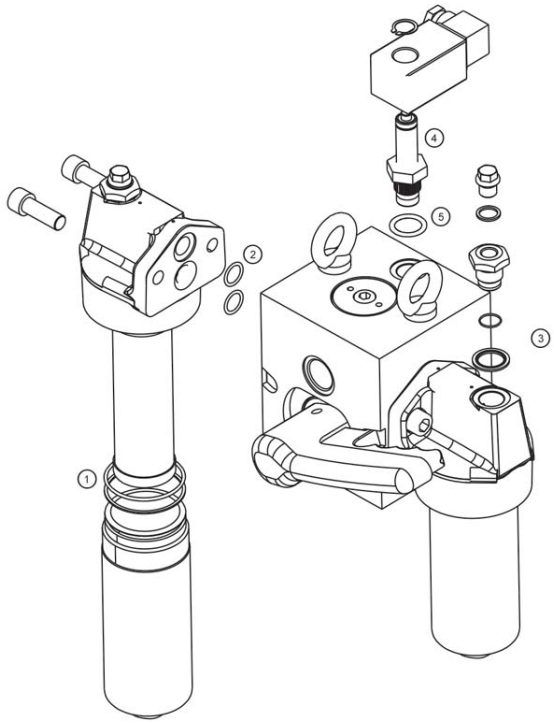
6 . Make sure that the order number on the spare element corresponds to the order number of the filter name-plate. Open the plastic bag and push element over the spigot in the filter head. Now remove plastic bag.

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



Order number for spare parts		
Position	**Type**	**Order number**
① - ③	Seal kit for housing	
	Pi 47004-47010	
	NBR	70304944
	FPM	70304945
	EPDM	70304946
	Pi 47016-47040	
	NBR	70304922
	FPM	70304924
	EPDM	70304925
④	Maintenance indicator	
	Visual PiS 3093/5	77669914
	Electrical PiS 3092/5	77669864
	Electrical upper part only	77536550
⑤	Seal kit for maintenance indicator	
	NBR	77760275
	FPM	77760283
	EPDM	77760291

MAHLE Industriefiltration GmbH
Schleifbachweg 45
74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industrialfiltration@mahle.com
www.mahle-industrialfiltration.com
70349845.07/2012