

### Tank top return-line filter

Pi 5000

Nominal size 160 up to 1000  
according to DIN 24550

#### 1. Features

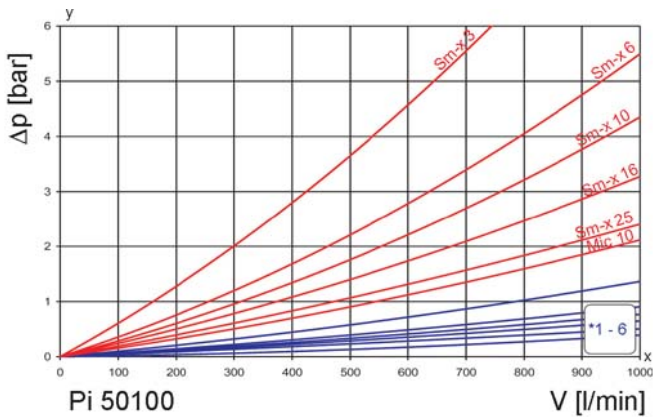
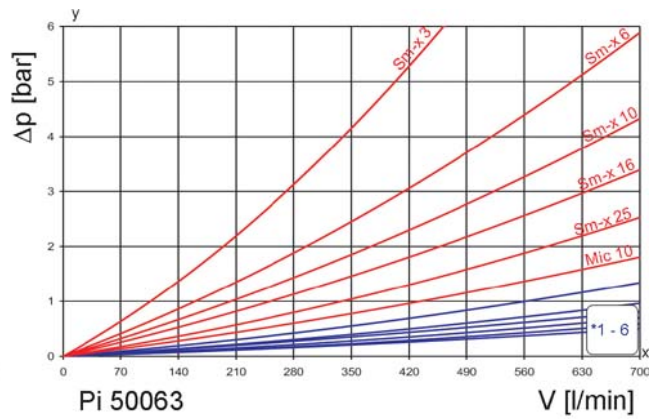
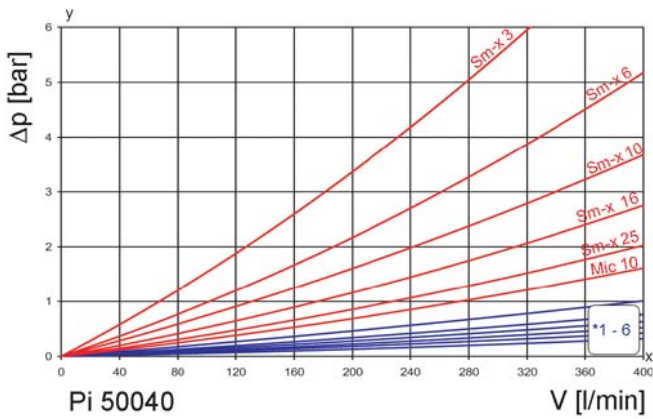
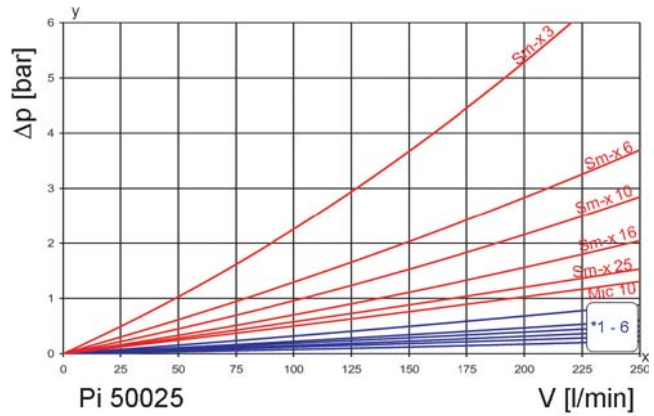
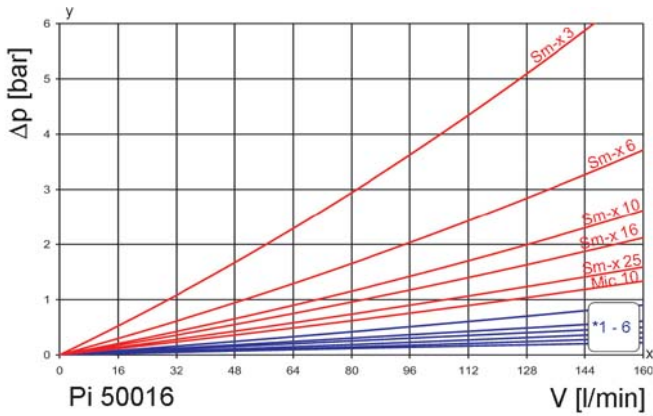
##### High performance filters for modern hydraulic systems

- Provided for tank top installation
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Threaded or 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
- NPT- and SAE-connections on request
- Worldwide distribution



## 2. Flow rate/pressure drop curve complete filter

■ 190 mm<sup>2</sup>/s  
■ 33 mm<sup>2</sup>/s



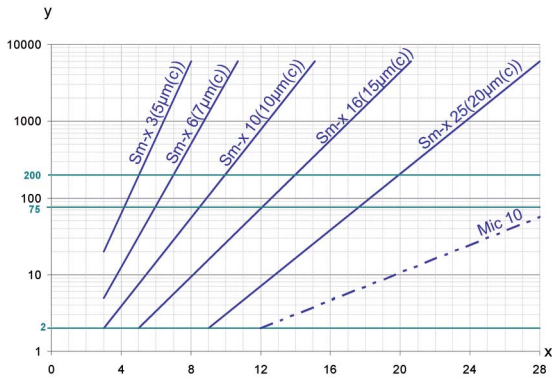
y = differential pressure  $\Delta p$  [bar]

x = flow rate V [l/min]

\*1 - 6

1. Sm-x 3
2. Sm-x 6
3. Sm-x 10
4. Sm-x 16
5. Sm-x 25
6. Mic 10

### 3. Separation grade characteristics



y = beta-value

x = particle size [µm]

determined by multipass tests (ISO 16889)

calibration according to ISO 1171 (NIST)

### 4. Filter performance data

tested according to ISO 16889 (multipass test)

Sm-x elements with  
max.  $\Delta p$  10 bar

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

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

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

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

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

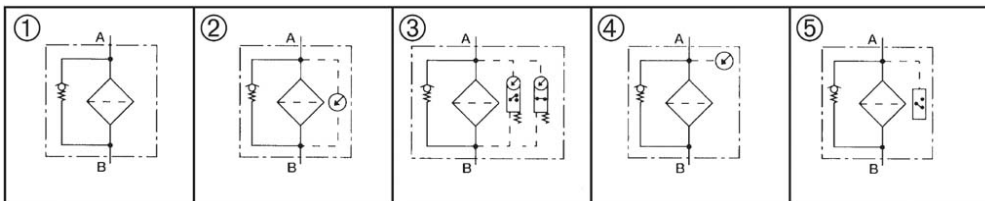
values guaranteed up to  
10 bar differential pressure

### 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 material compatibility with fluids
DIN ISO 2923	Fluidtechnik-Hydraulik Filterelemente; method for end load test
DIN ISO 2924	Hydraulic fluid power filter elements; verification of flow fatigue characteristics
ISO 3968	Hydraulic fluid power filters; evaluation of pressure drop versus flow characteristics
ISO 10771.1	Fatigue pressure testing of metal containing envelopes in hydraulic fluid applications
ISO 16889	Hydraulic fluid power filters; multipass method for evaluation filtration performance of a filter element

### 6. Symbols



## 7. Order numbers

Example for ordering filters:

<b>1. Housing design</b>	<b>2. Filter element</b>
Bypass valve 3.5 bar, Connection execution 2 = DN 38 Type: Pi 50016-056/NG 160	Sm-x 25 NBR Type: Pi 2516 RN

### 7.1 Housing design\* Pi 50016- Pi 50025 - Pi 50040 - Pi 50063 - Pi 50100-

Nominal size NG [l/min]	Housing code	①	①	②	③	④	⑤	⑤	with filling connection (BA)
		with bypass valve 3.5 bar	with indicator cavity	with visual maintenance indicator 2.2 bar	with electrical maintenance indicator 2.2 bar	with pressure gauge (DM)	with pressure switch normally open (DSS)	with pressure switch normally closed (DSO)	
160 250 400 630 1000	- 047								
	- 056								
	- 057								
	- 058								
	- 059								
	- 050								
	- 052								
	- 092								
	- 093								
	- 094								
	- 095								
	- 096								
	- 097								

\* a wider range of executions is available on request

### 7.2 Connection executions

Nominal size NG [l/min]	Type	Standard connection according DIN 24550 part 1							
		/1	/2	/3	/4	/5	/6		
160	Pi 50016-...	G1¼	G1½	DN 38					
250	Pi 50025-...	G1½		DN 38	G1¼				
400	Pi 50040-...	DN 51	G1½			G2	DN 64		
630	Pi 50063-...	DN 64	G1½			G2			DN 51
1000	Pi 50100-...	DN 76							

DN 38 = SAE 1½ "

DN 51 = SAE 2"

DN 64 = SAE 2½"

DN 76 = SAE 3"

3000 psi

### 7.3 Filter elements\*

Nominal size NG [l/min]	Order number	Type	Filter material	max. $\Delta p$ [bar]	Filter surface [cm <sup>2</sup> ]
160	77925035	Pi 13016 RN Mic 10 NBR	Mic 10	10	3750
	77924137	Pi 21016 RN Sm-x 3 NBR	Sm-x 3		3750
	77964067	Pi 22016 RN Sm-x6 NBR	Sm-x 6		3750
	77924145	Pi 23016 RN Sm-x10 NBR	Sm-x 10		3750
	77963648	Pi 24016 RN Sm-x16 NBR	Sm-x 16		3750
	77960230	Pi 25016 RN Sm-x25 NBR	Sm-x 25		3750
250	77925043	Pi 13025 RN Mic 10 NBR	Mic 10	10	6050
	77924152	Pi 21025 RN Sm-x 3 NBR	Sm-x 3		6050
	77964075	Pi 22025 RN Sm-x6 NBR	Sm-x 6		6050
	77924160	Pi 23025 RN Sm-x10 NBR	Sm-x 10		6050
	77963655	Pi 24025 RN Sm-x16 NBR	Sm-x 16		6050
	77960248	Pi 25025 RN Sm-x25 NBR	Sm-x 25		6050
400	77925050	Pi 13040 RN Mic 10 NBR	Mic 10	10	9450
	77924178	Pi 21040 RN Sm-x 3 NBR	Sm-x 3		8250
	77964083	Pi 22040 RN Sm-x6 NBR	Sm-x 6		8250
	77924186	Pi 23040 RN Sm-x10 NBR	Sm-x 10		8250
	77963663	Pi 24040 RN Sm-x16 NBR	Sm-x 16		8250
	77960255	Pi 25040 RN Sm-x25 NBR	Sm-x 25		8250
630	77925068	Pi 13063 RN Mic 10 NBR	Mic 10	10	15500
	77924194	Pi 21063 RN Sm-x 3 NBR	Sm-x 3		13515
	77964091	Pi 22063 RN Sm-x6 NBR	Sm-x 6		13515
	77924202	Pi 23063 RN Sm-x10 NBR	Sm-x 10		13515
	77963671	Pi 24063 RN Sm-x16 NBR	Sm-x 16		13515
	77960263	Pi 25063 RN Sm-x25 NBR	Sm-x 25		13515
1000	77925076	Pi 13100 RN Mic 10 NBR	Mic 10	10	18335
	77924210	Pi 21100 RN Sm-x 3 NBR	Sm-x 3		18335
	77964109	Pi 22100 RN Sm-x6 NBR	Sm-x 6		18335
	77924228	Pi 23100 RN Sm-x10 NBR	Sm-x 10		18335
	77963689	Pi 24100 RN Sm-x16 NBR	Sm-x 16		18335
	77960271	Pi 25100 RN Sm-x25 NBR	Sm-x 25		18335

\*a wider range of element types is available on request

## 8. Technical specifications

Design:	tank top installation
Nominal pressure:	10 bar (140 psi)
Test pressure:	13 bar (180 psi)
Temperature range:	- 10 °C to +80 °C (other temperature ranges on request)
Bypass setting:	$\Delta p$ 3.5 bar $\pm$ 10 %
Filter head material:	GD Al
Filter housing material:	St.
Filter cover material:	GD Al/G Al
Maintenance indicator setting:	$\Delta p$ 2.2 bar $\pm$ 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 sleeve:	M20x1.5

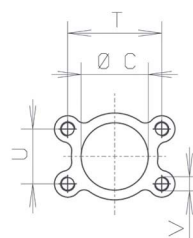
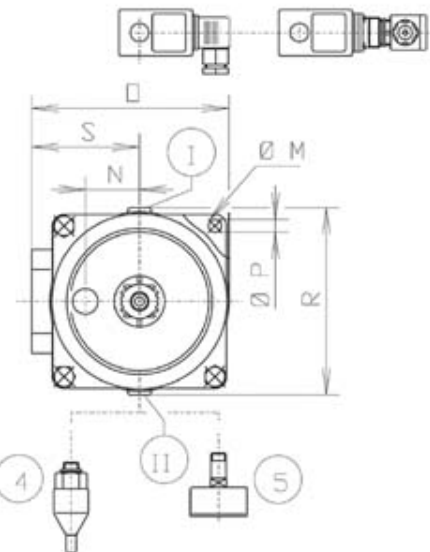
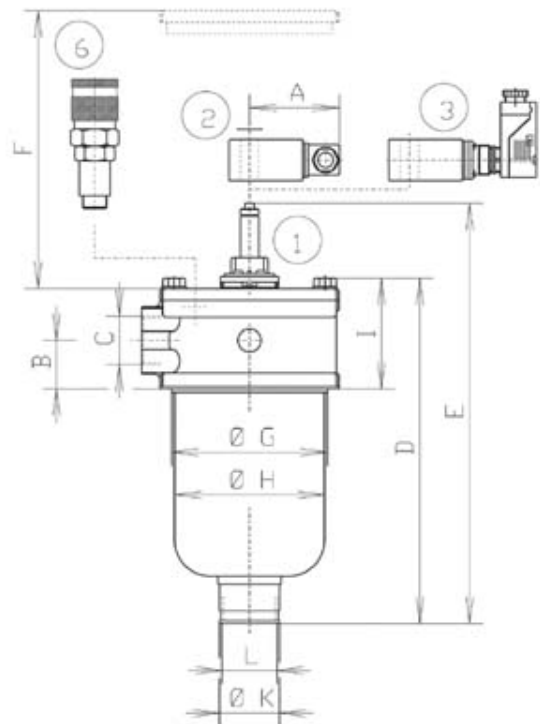
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance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

We draw attention to the fact that all values indicated are average values 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.

- 1 = Standard maintenance indicator visual  
PiS 3084
- 1 + 2 = Standard maintenance indicator electrical  
PiS 3085
- 3 = Further executions see data sheet maintenance indicator
- 4 = Pressure switch
- 4 + 5 = Can be mounted at I or II alternatively
- 5 = Pressure gauge
- 6 = Coupling for filling



## 9. Dimensions

All Dimensions except "L" in mm.

Type	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	S	T	U	V	Weight [kg]
Pi 50016 - ...	78	42	see 7.2	298	361	180	135,0	130	96	52	G1½	185	47	171	11	162	93,5	70	35,7	M12	3,2
Pi 50025 - ...	78	42		391	454	270	135,0	130	96	52	G1½	185	47	171	11	162	93,5	70	35,7	M12	3,4
Pi 50040 - ...	78	57		427	489	270	175,5	163	120	70	G2	220	56	216	11	218	110	77,8	42,9	M12	6,4
Pi 50063 - ...	78	57		577	639	420	175,5	163	120	70	G2	220	56	216	11	218	110	89	50,8	M12	6,9
Pi 50100 - ...	78	72		579	669	420	200,0	190	151	-	G3	250	70	257	11	256	135	106	62,0	M16	11,1

## 10. Installation, operating and maintenance instructions

### 10.1 Filter installation

When installing the filter make sure that:

- that sufficient space is available to remove filter element and filter housing,
- the mounting hole in the tank top is not excessively large, to ensure proper sealing,
- the filter is free of tension after installation

Preferably the filter should be installed with the filter housing pointing downwards. In this position the maintenance indicator is accessible and visible.

### 10.2 Connecting the electrical maintenance indicator

The electrical maintenance indicator is connected via a 2-pole appliance plug according to DIN EN 17 5301-803 with poles marked 1 and 2. The electrical section can be inverted to change from normally open position to normally closed position or vice versa.

### 10.3 When must the filter element be replaced?

- Filters equipped with visual and/or electrical maintenance indicator:  
During cold starts, the indicator may give a warning signal. Press the button of the visual indicator once again only after operating temperature has been reached. If the red button immediately pops up again and/or the electrical signal has not switched off after reaching operating temperature, the filter element must be replaced after the end of the shift.
- Filters without maintenance indicator:  
The filter element should be replaced after trial run or flushing of the system. Afterward follow instructions of the manufacturer.
- Please always ensure that you have original MAHLE spare elements in stock: Disposable elements (Sm-x and Mic) cannot be cleaned.

### 10.4 Element replacement

- Stop system and relieve filter from pressure.
- Unscrew cover, turning counter-clockwise.
- Remove filter housing and filter element by pulling upwards.
- Remove filter element with a side-to-side motion.
- Clean the housing using a suitable cleaning solvent.
- Check O-ring on filter cover and filter housing for damage. Replace, if necessary.
- Make sure that the order number on the spare element corresponds to the order number of the filter name-plate.
- Remove filter element from the plastic bag and reassemble filter in reverse order (items 1 to 6).

Subject to technical alteration without prior notice.

## 11. Spare parts list

Order numbers for spare parts		
Position	Type	Order number
	Seal kit for housing	
	<b>NG 160/250</b>	
	NBR	78227902
	FPM	78227910
	EPDM	78227928
	<b>NG 400/630</b>	
①	NBR	78227936
to	FPM	78227944
②	EPDM	78227951
	<b>NG 1000</b>	
	NBR	78227969
	FPM	78227977
	EPDM	78227985
	Maintenance indicator	
	Visual PiS 3084/2.2	77737802
	Electrical PiS 3085/2.2	77738032
③	Electrical upper section only	77536550
	Pressure gauge	70521417
	Pressure switch	
	Normally open	77845845
	Normally closed	77870595
	Seal kit for maintenance indicator	
④	NBR	78383382
	FPM	78383390
	EPDM	78383408
⑤	Quick-release coupling	77965130



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