

# MAHLE

*Driven by performance*

## Low Pressure Filter

Pi 200

Nominal pressure 32/63 bar (460/910 psi), nominal size up to 600

### 1. Features

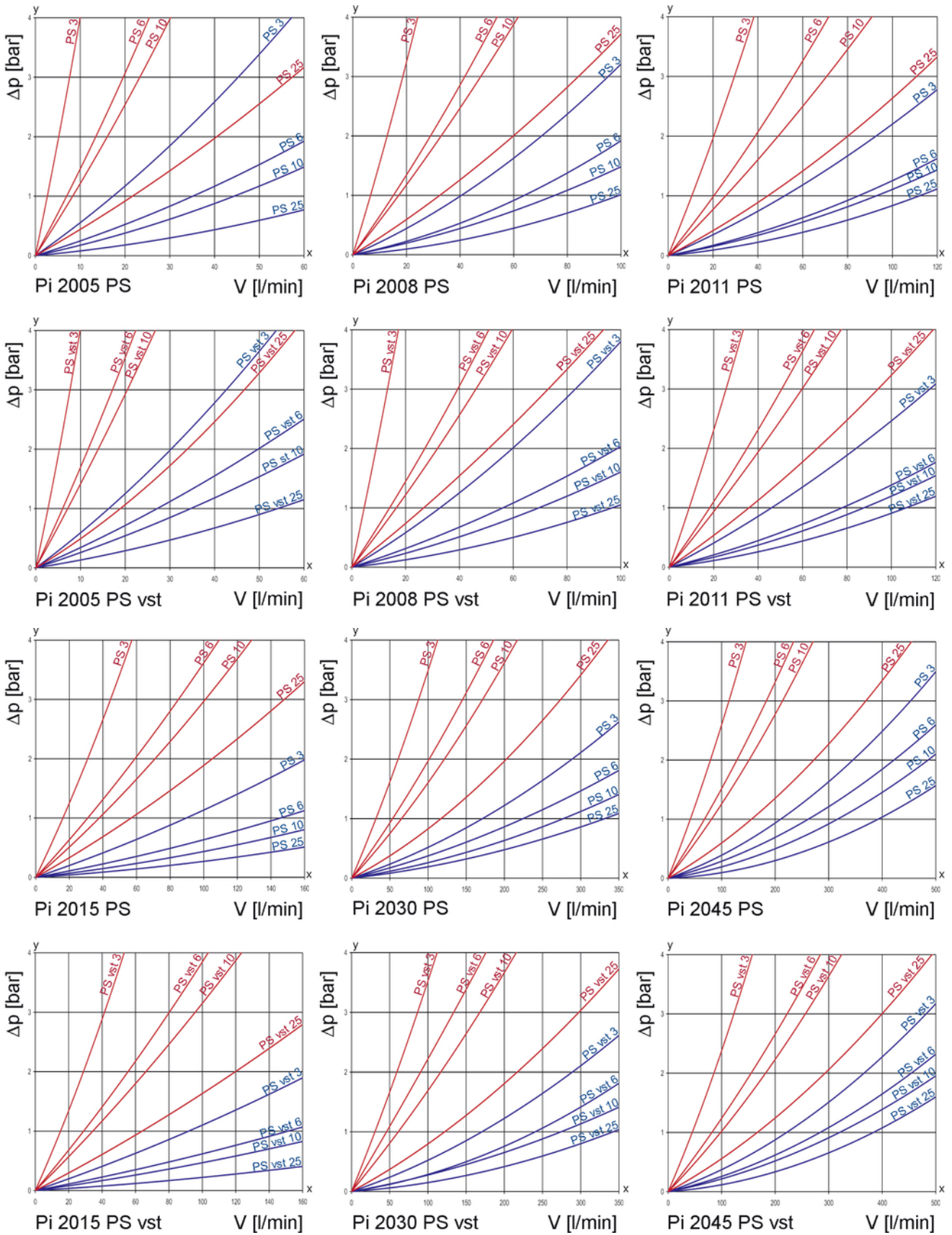
#### High performance filters for modern hydraulic systems

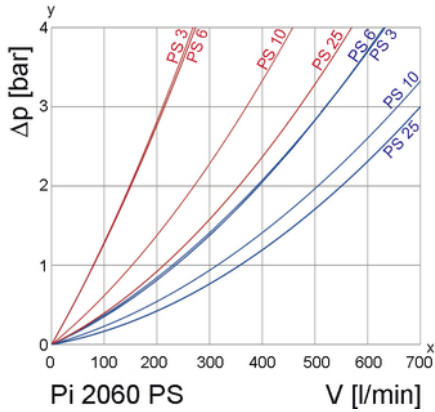
- Provided for pipe installation
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Threaded connections
- Quality filters, easy to service
- Equipped with highly efficient glass fibre PS filter elements
- Beta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



## 2. Flow rate/pressure drop curve (filter housing incl. element)

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

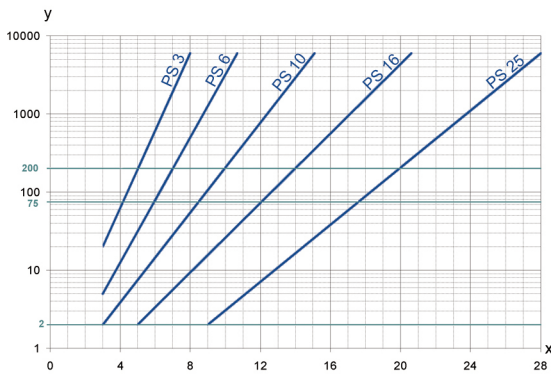




y = differential pressure  $\Delta p$  [bar]  
 x = flow rate V [l/min]

Calculation of individual filter under [www.industrialfiltration-catalogue.mahle.com](http://www.industrialfiltration-catalogue.mahle.com)

### 3. Separation grade characteristics



y = beta-value  
 x = particle size [ $\mu\text{m}$ ]

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.  $\Delta p$  20 bar

PS 3  $\beta_{5(C)} \geq 200$

PS 6  $\beta_{7(C)} \geq 200$

PS 10  $\beta_{10(C)} \geq 200$

PS 25  $\beta_{20(C)} \geq 200$

PS vst elements with

max.  $\Delta p$  210 bar

PS vst 3  $\beta_{5(C)} \geq 200$

PS vst 6  $\beta_{7(C)} \geq 200$

PS vst 10  $\beta_{10(C)} \geq 200$

PS vst 25  $\beta_{20(C)} \geq 200$

values guaranteed up to  
 10 bar differential pressure

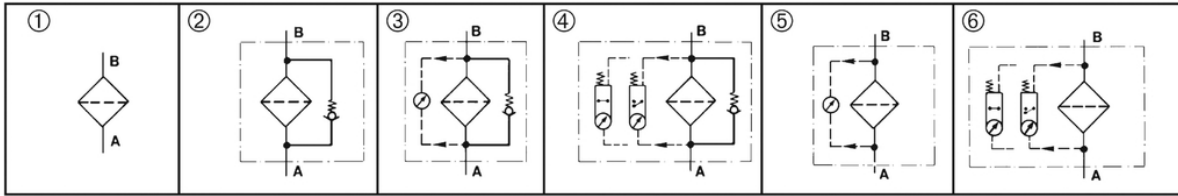
values guaranteed up to  
 20 bar differential pressure

### 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. Filter housing	2. Filter element
V = 80 l/min and visual/electrical maintenance indicator	PS vst 3
Type: Pi 2008-069	Type: Pi 2208 PS vst 3
Order number: 77665284	Order number: 77680200

### 7.1 Housing design

Nominal size NG [l/min]	Order number	Type	①	②	③	④	⑤	⑥
			no options	with bypass valve	with bypass valve and visual indicator	with bypass valve and electrical indicator	with visual indicator	with electrical indicator
50	77665144	Pi 2005-060	■					
	77665110	Pi 2005-056		■				
	77665128	Pi 2005-057			■			
	77665136	Pi 2005-058				■		
	77665169	Pi 2005-068					■	
	77665177	Pi 2005-069						■
80	77665235	Pi 2008-060	■					
	77665201	Pi 2008-056		■				
	77665219	Pi 2008-057			■			
	77665227	Pi 2008-058				■		
	77665276	Pi 2008-068					■	
	77665284	Pi 2008-069						■
110	78205114	Pi 2011-060	■					
	78205122	Pi 2011-056		■				
	78205130	Pi 2011-057			■			
	78205148	Pi 2011-058				■		
	78205155	Pi 2011-068					■	
	78205163	Pi 2011-069						■
150	77840580	Pi 2015-060	■					
	76165203	Pi 2015-056		■				
	76165211	Pi 2015-057			■			
	79320748	Pi 2015-058				■		
	76165229	Pi 2015-068					■	
	78396616	Pi 2015-069						■
300	77665474	Pi 2030-060	■					
	77665441	Pi 2030-056		■				
	77665458	Pi 2030-057			■			
	77665466	Pi 2030-058				■		
	77665516	Pi 2030-068					■	
	77665532	Pi 2030-069						■

## 7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① no options	② with bypass valve	③ with bypass valve and visual indicator	④ with bypass valve and electrical indicator	⑤ with visual indicator	⑥ with electrical indicator
450	77664881	Pi 2045-060						
	77664873	Pi 2045-056						
	77664865	Pi 2045-057						
	77664857	Pi 2045-058						
	77664923	Pi 2045-068						
	77664931	Pi 2045-069						
600	70576046	Pi 2060-060						
	70576045	Pi 2060-056						
	70534876	Pi 2060-057						
	79714171	Pi 2060-058						
	78205254	Pi 2060-068						
	70576047	Pi 2060-069						

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 available on request)

Nominal size NG [l/min]	Order number	Type	Filter material	max. $\Delta p$ [bar]	Filter surface [cm <sup>2</sup> ]	
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	
	50	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
	77943517	Pi 5108 PS 6	PS 6	1150		
	77680341	Pi 3108 PS 10	PS 10	1150		
	77680457	Pi 4108 PS 25	PS 25	1150		
	80	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	
	110	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	

## 7.2 Filter elements (a wider range of element types is available on request)

Nominal size NG [l/min]	Order number	Type	Filter material	max. $\Delta p$ [bar]	Filter surface [cm <sup>2</sup> ]
150	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
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

## 8. Technical specifications

Design:	in-line filter
Nominal pressure:	
Pi 2005 - 2011	10 <sup>7</sup> load changes 63 bar (900 psi)
Pi 2015 - 2060	10 <sup>7</sup> load changes 25 bar (360 psi)
	2x 10 <sup>6</sup> load changes 32 bar (460 psi)
Test pressure:	
Pi 2005 - 2011	95 bar (1370 psi)
Pi 2015 - 2060	48 bar (690 psi)
Temperature range:	-30 °C to +120 °C
	survival temperature -40 °C (other temperature ranges on request)
Bypass setting:	$\Delta p$ 3.5 bar $\pm$ 10 %
Filter head material:	GDAL
Filter housing material:	AL/St
Sealing material:	NBR/AL
Maintenance indicator setting:	$\Delta p$ 2.2 bar $\pm$ 10 %
Electrical data of maintenance indicator:	
Max. voltage:	250 V AC/200 V DC
Max. current:	1 A
Max. power:	70 W
Type of protection:	IP 65 in inserted and secured status
Contact:	normally open/closed
Cable sleeve:	M20x1.5

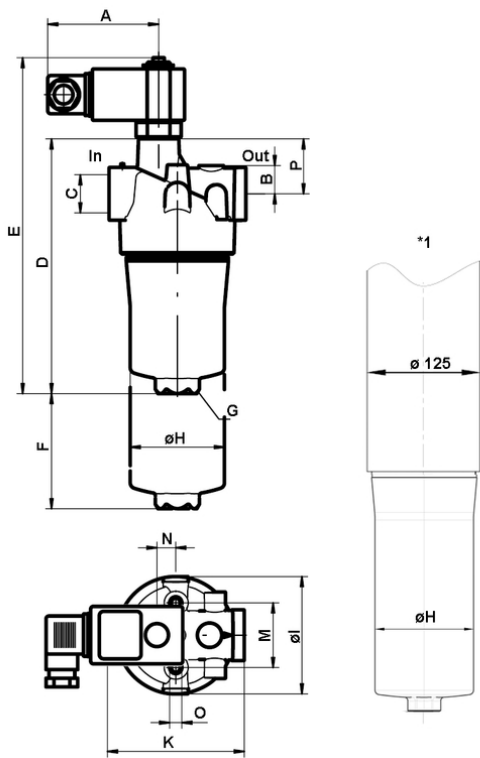
The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance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

## 9. Dimensions



In Inlet

Out Outlet

\*1 Housing design for NG 600

All dimensions except "C" in mm.

Type	A	B	C*	D	E	F	G SW	H	I	K	M	N	O	P	Weight [kg]
Pi 2005	78	19	G½	177	235	80	27	66	80	95	45	13.0	M8x10	37,5	0.9
Pi 2008	78	19	G¾	253	311	80	27	66	80	95	45	13.0	M8x10	37,5	1.0
Pi 2011	78	19	G¾	335	393	80	27	66	80	95	45	13.0	M8x10	37,5	1.2
Pi 2015	78	30	G1¼	244	302	110	32	109	128	150	60	24.5	M12x15	43,5	2.1
Pi 2030	78	30	G1¼	360	418	110	32	109	128	150	60	24.5	M12x15	43,5	2.4
Pi 2045	78	30	G1¼	475	533	110	24	109	128	150	60	24.5	M12x15	43,5	6.5
Pi 2060	78	30	G1¼	615	643	110	32	109	128	150	60	24.5	M12x15	43,5	5.5

\* 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

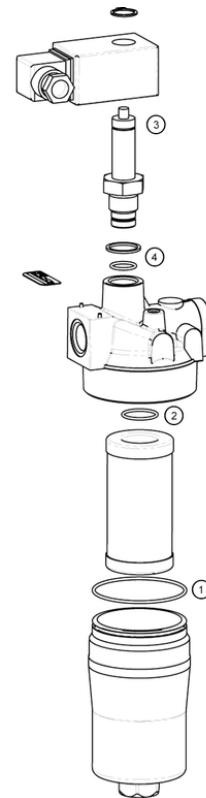
### 10.3 When should the filter element be replaced?

- 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.
- 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.
- Please always ensure that you have original MAHLE spare elements in stock: Disposable elements cannot be cleaned.

### 10.4 Element replacement

- Stop system and relieve filter from pressure.
- Unscrew the filter housing by turning counter-clockwise. Clean the housing using a suitable cleaning solvent.
- Remove element by pulling down carefully.
- Check O-ring on the 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.  
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.
- Lightly lubricate the threads of the filter housing a little bit and screw into the filter head. Maximum tightening torque for NG 50 to 110 = 60 Nm, for NG 150 to 600 = 100 Nm.

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78356446.01/2016



## 11. Spare parts list

Order numbers of spare parts		
Position	Type	Order number
① - ②	Seal kit for filter	
	<b>Pi 2005 - Pi 2011</b>	
	NBR	77550213
	FPM	77845795
	EPDM	77845803
	<b>Pi 2015 - Pi 2060</b>	
	NBR	77550221
	FPM	77845811
	EPDM	77845829
③	Maintenance indicator	
	Visual PiS 3098/2,2	77669971
	Electrical PiS 3097/2,2	77669948
	Electrical upper section only	77536550
④	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325