

Medium Pressure Filter

Pi 360

Operating pressure 160/210/315 bar, Nominal size up to 300

1. Features

Efficient filters for modern hydraulic systems

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

Quality filters, easy to service

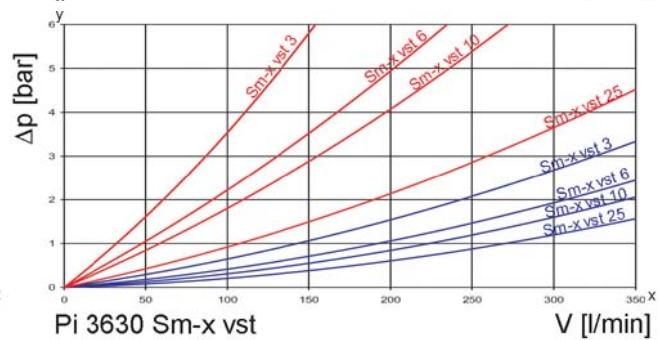
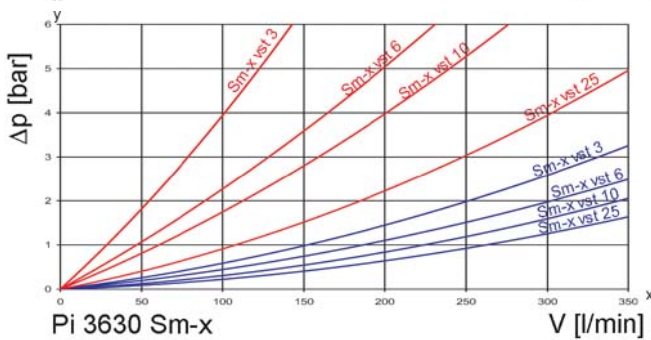
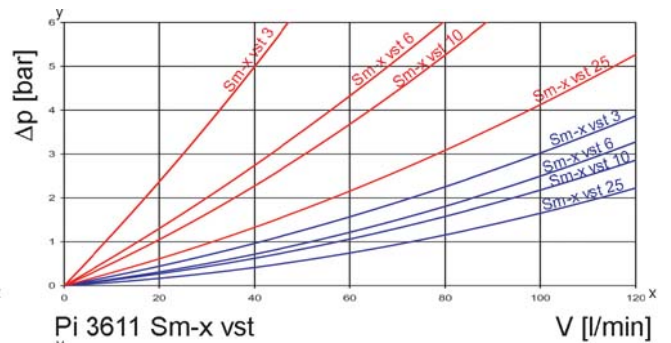
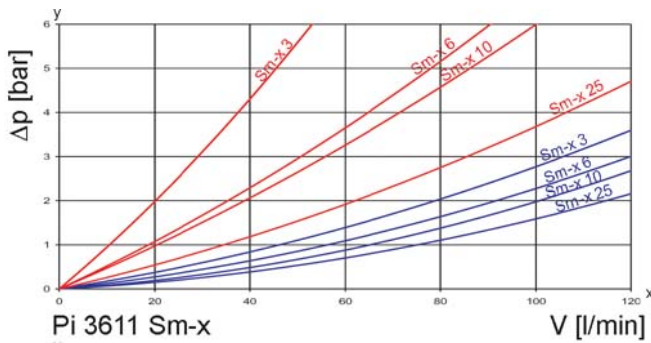
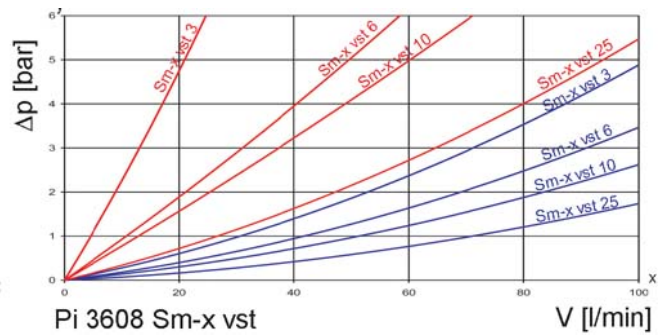
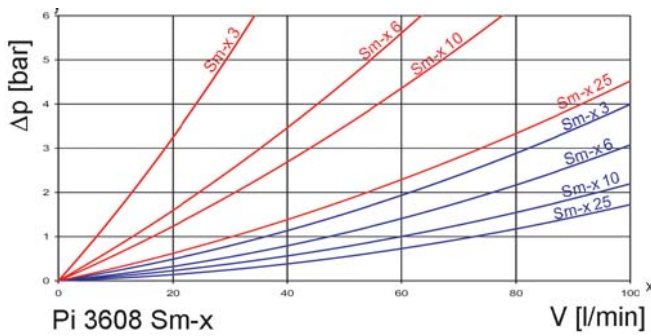
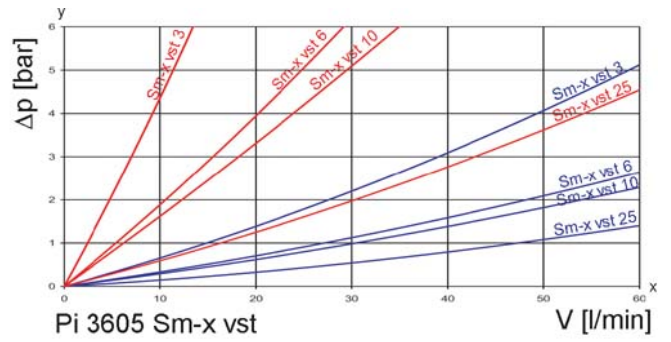
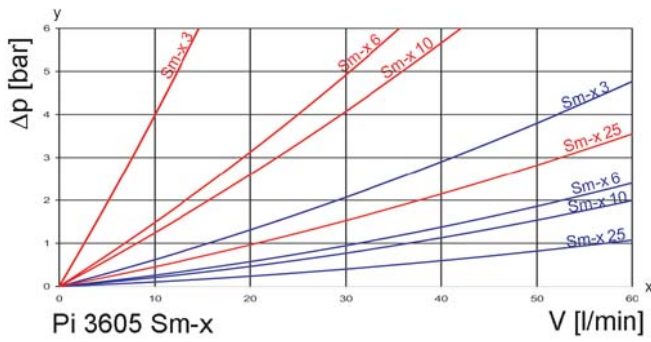
- Equipped with highly efficient Sm-x filter elements
- β -valued elements per ISO 16889
- High dirt holding capacity and differential pressure stability providing optimal element service life

Worldwide distribution



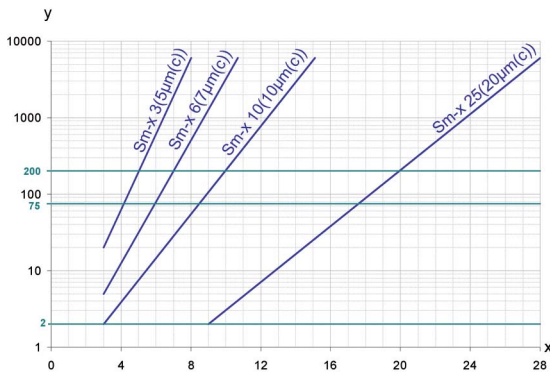
2. Flow rate/pressure drop curve complete filter

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



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

3. Separation characteristics



y = beta-ratio

x = particle size [μm]

determined by multipass test (ISO 16889)

calibration according to ISO 1171 (NIST)

4. Filter performance data

measured according to ISO 16889 (multipass test)

Sm-x elements with
 Δp 20 bar

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

up to 10 bar differential
pressure

Sm-x vst elements with
 Δp 210 bar

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

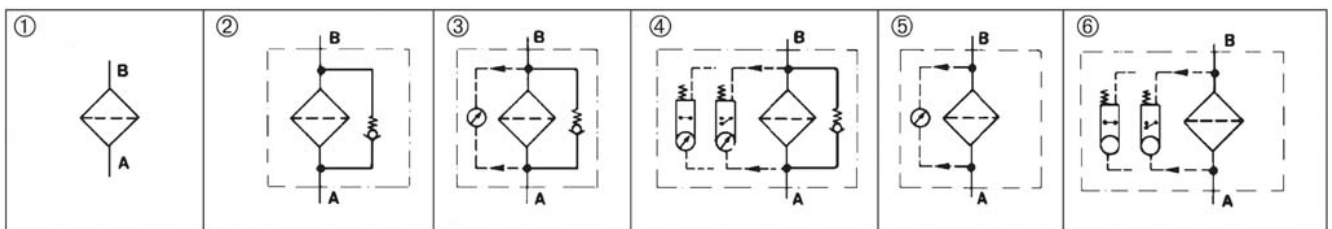
up to 20 bar differential
pressure

5. Quality assurance

MAHLE filter and filter elements are manufactured respectively, tested in accordance with the following international standards:

Norm	Designation
DIN ISO 2941	Hydraulic fluid power filter elements; verification of collapse/burst resistance
DIN ISO 2942	Hydraulic fluid power filter elements; verification of fabrication integrity
DIN ISO 2943	Hydraulic fluid power filter elements; verification of material compatibility with fluids
DIN ISO 3723	Hydraulic fluid power filter elements; method for end load test
DIN ISO 3724	Hydraulic fluid power filter elements; verification of flow fatigue characteristics
ISO 3968	Hydraulic fluid power filters; evaluation of pressure drop versus flow characteristics
ISO 10771.1	Fatigue pressure testing of metal containing envelopes in hydraulic fluid applications
ISO 16889	Hydraulic fluid power filters; multipass method for evaluation filtration performance of a filter element

6. Symbols



7. Order numbers

Example for ordering filters:

1. Housing design	2. Filter elements
V = 80 l/min and electrical contamination indicator Type: Pi 3608-15 Order number: 77666282	Sm-x vst 3 Type: Pi 2208 Sm-x vst 3 Order number: 77680200

7.1 Housing design								
Nominal size NG [l/min]	Order number	Type	① no options	② with bypass valve and indicator cavity	③ with bypass valve and optical indicator	④ with bypass valve and optical indicator	⑤ with optical indicator	⑥ with electrical indicator
50	77655996	Pi 3605-060						
	77666217	Pi 3605-011						
	77666225	Pi 3605-012						
	77656044	Pi 3605-013						
	77666233	Pi 3605-014						
	77666241	Pi 3605-015						
80	77656002	Pi 3608-060						
	77666258	Pi 3608-011						
	77666266	Pi 3608-012						
	77656036	Pi 3608-013						
	77666274	Pi 3608-014						
	77666282	Pi 3608-015						
110	77656010	Pi 3611-060						
	77666290	Pi 3611-011						
	77666308	Pi 3611-012						
	77656028	Pi 3611-013						
	77731821	Pi 3611-014						
	77666316	Pi 3611-015						
150	77647845	Pi 3615-060						
	77731854	Pi 3615-011						
	77666324	Pi 3615-012						
	77655988	Pi 3615-013						
	77731862	Pi 3615-014						
	77731847	Pi 3615-015						
300	77655970	Pi 3630-060						
	77731896	Pi 3630-011						
	77666332	Pi 3630-012						
	77647837	Pi 3630-013						
	77731904	Pi 3630-014						
	77731888	Pi 3630-015						

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

7.2 Filter elements*

Nominal size NG [l/min]	Order number	Type	Filter material	Collapse pressure [bar]	Filter surface [cm ²]
50	77680135	Pi 2105 Sm-x 3	Sm-x 3	20	590
	77943509	Pi 5105 Sm-x 6	Sm-x 6		590
	77680325	Pi 3105 Sm-x 10	Sm-x 10		590
	77680440	Pi 4105 Sm-x 25	Sm-x 25		590
	77680192	Pi 2205 Sm-x vst 3	Sm-x vst 3	210	425
	77943533	Pi 5205 Sm-x vst 6	Sm-x vst 6		425
	77680382	Pi 3205 Sm-x vst 10	Sm-x vst 10		425
	77680507	Pi 4205 Sm-x vst 25	Sm-x vst 25		425
80	77680143	Pi 2108 Sm-x 3	Sm-x 3	20	1150
	77943517	Pi 5108 Sm-x 6	Sm-x 6		1150
	77680341	Pi 3108 Sm-x 10	Sm-x 10		1150
	77680457	Pi 4108 Sm-x 25	Sm-x 25		1150
	77680200	Pi 2208 Sm-x vst 3	Sm-x vst 3	210	850
	77943541	Pi 5208 Sm-x vst 6	Sm-x vst 6		850
	77681190	Pi 3208 Sm-x vst 10	Sm-x vst 10		850
	77680515	Pi 4208 Sm-x vst 25	Sm-x vst 25		850
110	77680150	Pi 2111 Sm-x 3	Sm-x 3	20	1700
	77943525	Pi 5111 Sm-x 6	Sm-x 6		1700
	77680333	Pi 3111 Sm-x 10	Sm-x 10		1700
	77680465	Pi 4111 Sm-x 25	Sm-x 25		1700
	77680218	Pi 2211 Sm-x vst 3	Sm-x vst 3	210	1275
	77943558	Pi 5211 Sm-x vst 6	Sm-x vst 6		1275
	77680390	Pi 3211 Sm-x vst 10	Sm-x vst 10		1275
	77680523	Pi 4211 Sm-x vst 25	Sm-x vst 25		1275
150	77680168	Pi 2115 Sm-x 3	Sm-x 3	20	2425
	77955099	Pi 5115 Sm-x 6	Sm-x 6		2425
	77680358	Pi 3115 Sm-x 10	Sm-x 10		2425
	77680473	Pi 4115 Sm-x 25	Sm-x 25		2425
	77680226	Pi 2215 Sm-x vst 3	Sm-x vst 3	210	2010
	77955123	Pi 5215 Sm-x vst 6	Sm-x vst 6		2010
	77680408	Pi 3215 Sm-x vst 10	Sm-x vst 10		2010
	77680531	Pi 4215 Sm-x vst 25	Sm-x vst 25		2010
300	77680176	Pi 2130 Sm-x 3	Sm-x 3	20	4620
	77955107	Pi 5130 Sm-x 6	Sm-x 6		4620
	77680366	Pi 3130 Sm-x 10	Sm-x 10		4620
	77680481	Pi 4130 Sm-x 25	Sm-x 25		4620
	77680234	Pi 2230 Sm-x vst 3	Sm-x vst 3	210	3800
	77955131	Pi 5230 Sm-x vst 6	Sm-x vst 6		3800
	77680416	Pi 3230 Sm-x vst 10	Sm-x vst 10		3800
	77680549	Pi 4230 Sm-x vst 25	Sm-x vst 25		3800

* further elements available upon request

8. Specifications

Design: line mounting filter
 Operating pressure: 160/210/315 bar*
 Test pressure: 210/275/410 bar
 Temperature range: -10 °C to +120 °C
 (other temperature ranges on request)

Bypass opening pressure: Δp 7 bar \pm 10 %
 Filter head material: GGG
 Filter bowl material: St
 Sealing material: NBR/PTFE
 Activating pressure of optical/electrical differential pressure indicator: Δp 5 bar \pm 10 %

Electrical data of contamination indicator:

Maximum voltage: 250 V AC/200 V DC
 Maximum current on contact: 1 A
 Inrush current: 70 W
 Type of protection: IP 65 when inserted and secured

Contact: bistable

Cable connection: M 20 x 1.5

The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact.

The use of quenching circuits must be checked in the case of inductivity in the DC current circuit. The contamination indicator data sheet contains further information and additional contamination indicator versions.

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

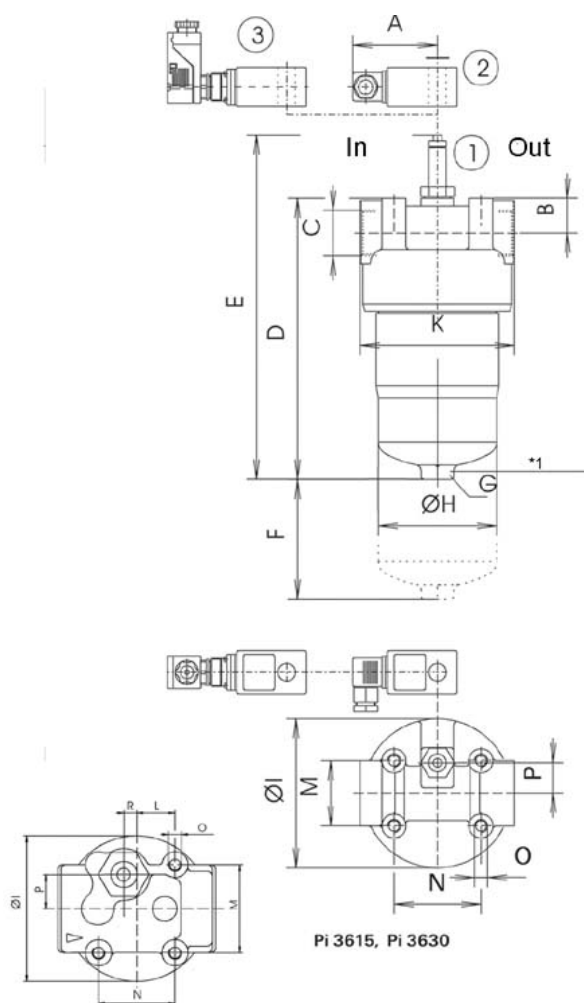
When using our filters in areas which are to be classified according to EU Directive 94/9 EC (ATEX 95), we recommend prior discussion with us. The standard version can be used for liquids based on mineral oil (corresponding to the fluids in Group 2 of Directive 97/23 EC Article 9). Please consult with us if using other media.

Subject to technical alteration without prior notice.

* Types Pi 3605, Pi 3608 and Pi 3611 have an operating pressure of 315 bar/test pressure of 410 bar.

Types Pi 3615-3645 without bypass have an operating pressure of 210 bar

Types Pi 3615-3645 with bypass have an operating pressure of 160 bar



Pi 3605 - Pi 3611

In = inlet

Out = outlet

Pos 1 - Optical contamination indicator
 Pos 2 - Electrical upper section connector according to DIN EN 175301-803

Executions: Pis 3092, 3105, 3115

Pos 3 - Electrical upper section connector according to DIN EN 175201-804

Executions: Pis 3102, 3122, 3110, 3132

*1

NG 300 with drain screw

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	Weight [kg]
Pi 3605	78	31	G ½	189	247	80	27	66	90	92	23.5	54	47	M 8x16	21	8	4.1
Pi 3608	78	31	G ¾	267	325	80	27	66	90	92	23.5	54	47	M 8x16	21	8	5.0
Pi 3611	78	31	G ¾	343	401	80	27	66	90	92	23.5	54	47	M 8x16	21	8	5.9
Pi 3615	78	32	G 1 ¼	259	315	110	30	109	137	142	-	60	80	M 12x16	28	-	9.8
Pi 3630	78	32	G 1 ¼	384	440	110	30	109	137	142	-	60	80	M 12x16	28	-	12.5

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 bowl. Preferable the filter should be installed with the filter bowl pointing downwards.

The contamination indicator must be visible.

10.2 Connecting the electrical contamination indicator

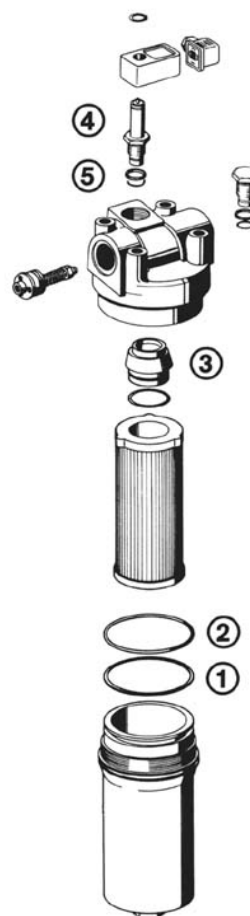
The electrical indicator is connected via a 2-pole appliance plug according to DIN EN 175301-803 with poles marked 1 and 2. The electrical section can be inverted to change from normally open to normally closed position or vice versa.

10.3 When must the filter be replaced?

- Filters equipped with optical and electrical contamination indicator:
During cold starts, the indicator may give a warning signal. Depress the red button of the optical indicator once again only after operating temperature has been reached. If the red button immediately pops out again and/or the electrical signal has not switched off after reaching operating temperature. The filter element must be replaced after the end of the shift.
- Filters without contamination indicator: The filter element should be replaced after trial run or flushing of the system. Afterwards follow instructions of the manufacturer.
- Please always ensure that you have Original MAHLE replacement elements in stock: disposable elements SM-x cannot be cleaned.

10.4 Element replacement

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



11. Spare parts list

Order numbers for spare parts		
Position	Type	Order number
① - ③	Seal kit	
	Pi 3605 - Pi 3611	
	NBR	77637150
	FPM	77637168
	EPDM	77637176
	Pi 3615 - Pi 3630	
	NBR	77637184
	FPM	77637192
	EPDM	77637200
④	Contamination indicator	
	Optical PiS 3093/5	77669914
	Optical/electrical PiS 3092/5	77669864
	Electrical upper section only	77536550
⑤	Seal kit for contamination indicator	
	NBR	77760275
	FPM	77760283
	EPDM	77760291

MAHLE

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