MAHLE

Industrial Filtration

Duplex Filter
Pi 2110

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

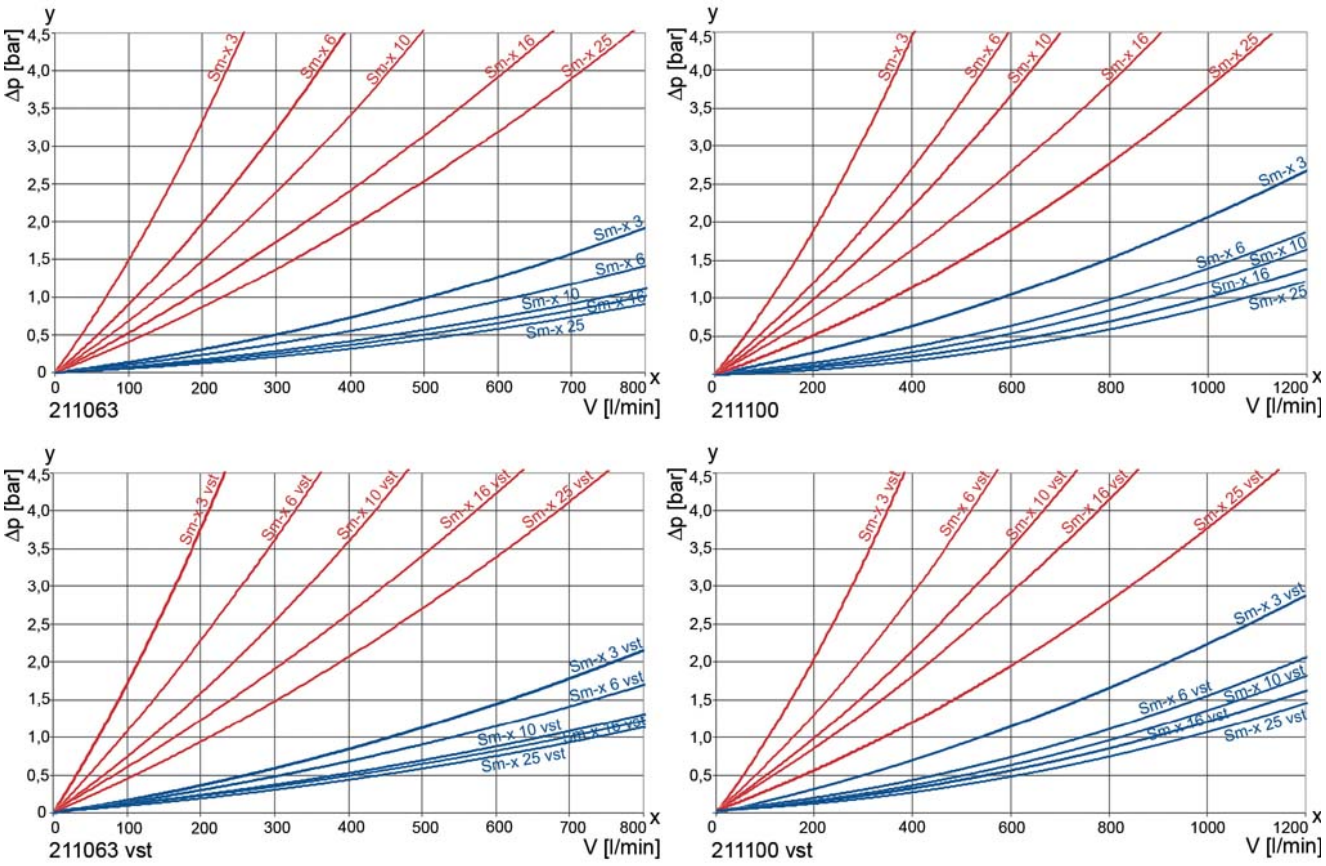
1. Features

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

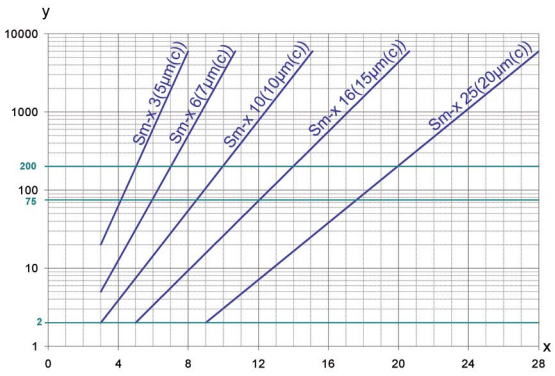
2. Flow rate/pressure drop curve complete filter

190 mm²/s (25° E)
33 mm²/s (4,5° E)



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

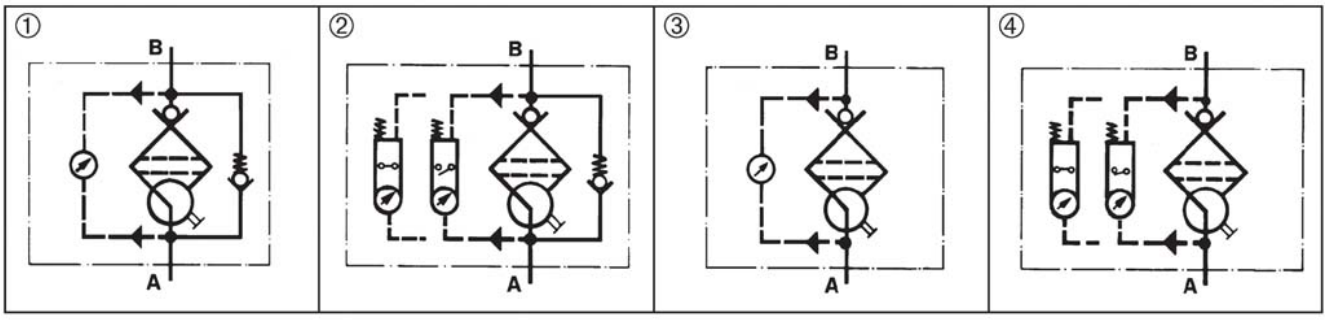
values guaranteed up to
20 bar differential pressure

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 2923	Hydraulic fluid power filter elements, methods for end load test
DIN ISO 2924	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!

Filter elements*

Nominal size NG [l/min]	Order number	Type	Filter material	max. Δ p [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:	52 bar (740 psi)
Temperature range:	-10 °C to +120 °C
	(other temperature ranges 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.

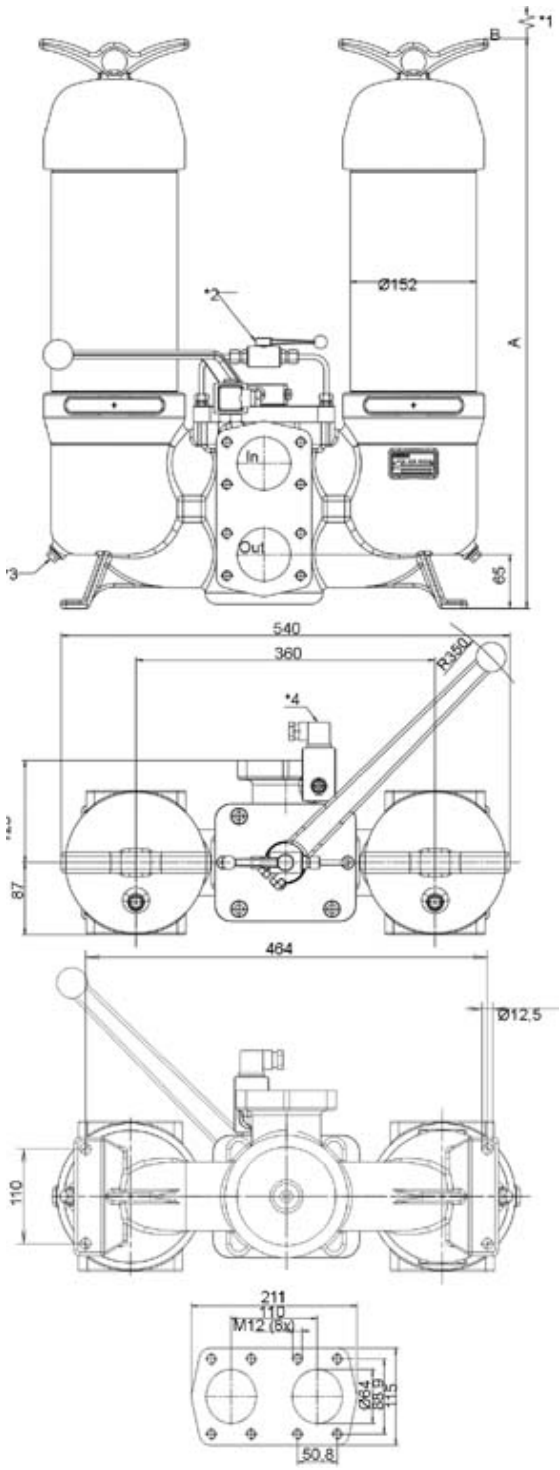
We draw attention to the fact that all values indicated are average values which do not always occur in specific cases of application. Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer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

In = Inlet
Out = Outlet

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



9. Dimensions

All dimensions in mm.

Type	Connection	A	B	Weight [kg]
Pi 211063	DN 64	687	300	80
Pi 211100	DN 64	917	530	96

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.

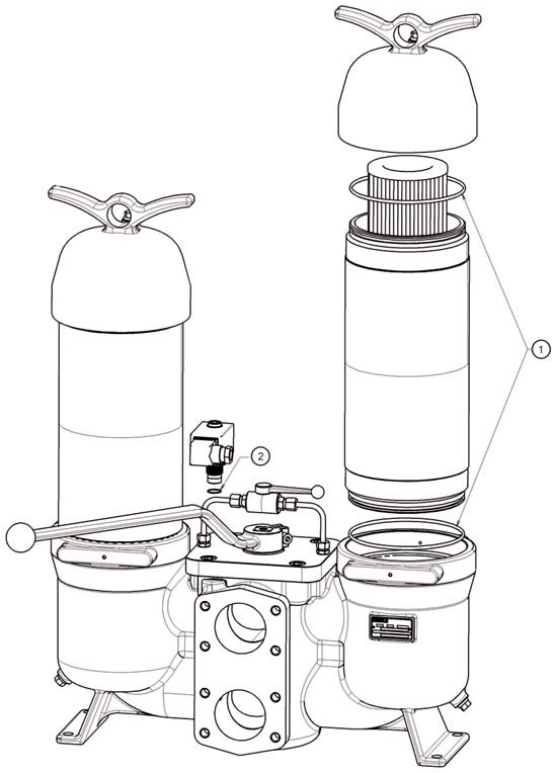
10.3 When should the filter element be replaced?

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.
9 . Tighten drain plug housing bottom. Back off the drain plug 1/8 turn.
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 number for spare parts		
Position	**Type**	**Order number**
①	Seal kit for housing	
	Pi 211063 - Pi 211100	
	NBR	70318468
	FPM	70318469
	EPDM	70318471
②	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325

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