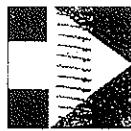




0296-06.08.13



MAHLE
Industriefilter

Duplex Filter Pi 210

Operating pressure 25 (63) bar, Nominal size up to 450

1. Features

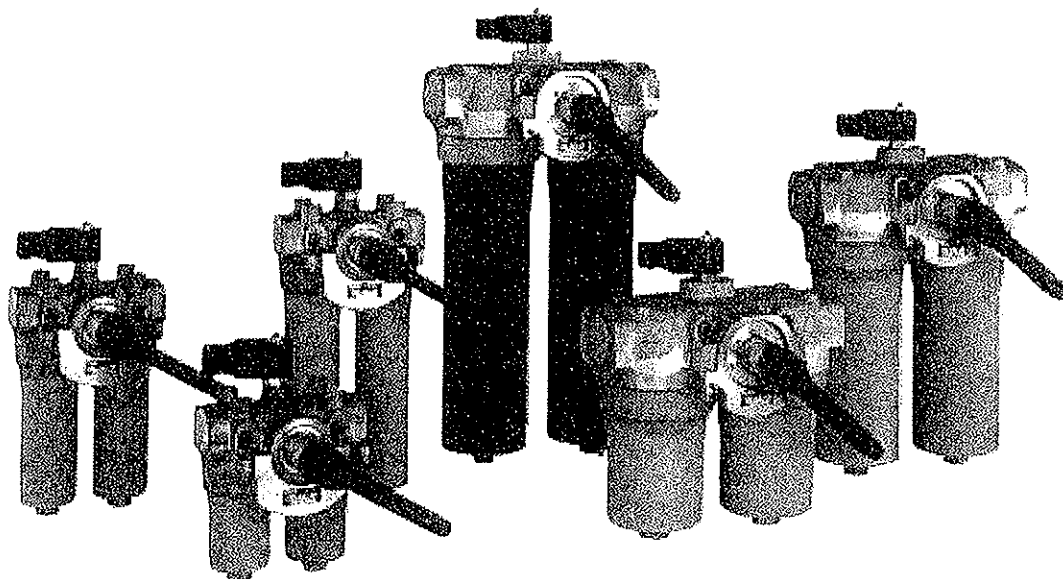
Efficient filters for modern hydraulic systems

- Modular design
- Minimal pressure loss
- Compact design
- Visual / electrical / electronic differential pressure indication
- Threaded or SAE 4 bolt flange ports
- Switching valve on upstream side
- Ergonomic switch-over handle with safety lock and pressure compensation
- User-optimized one-hand-operation

Quality filters, easy to service

- Highly efficient Sm-x filter elements
- β -rated elements per ISO 4572
- Large dirt holding capacity and high differential pressure stability providing optimal element service life

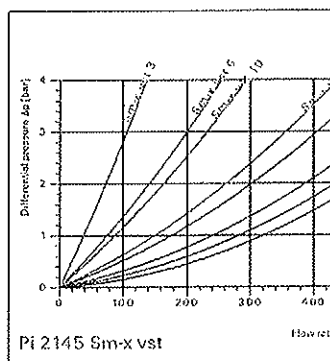
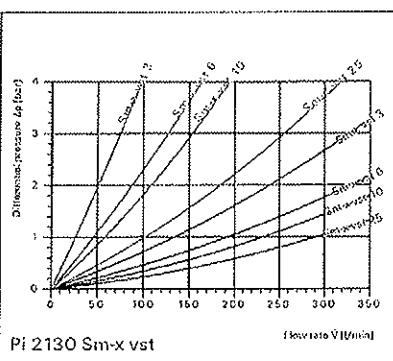
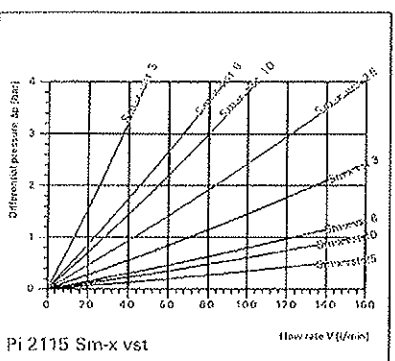
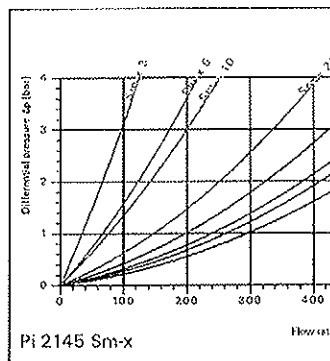
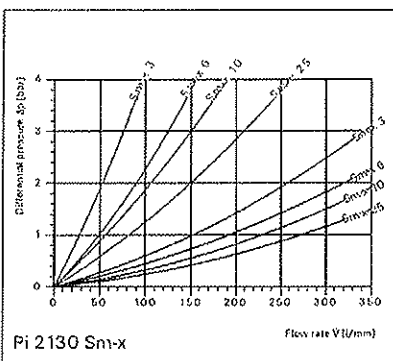
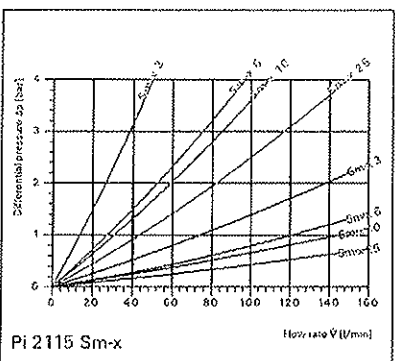
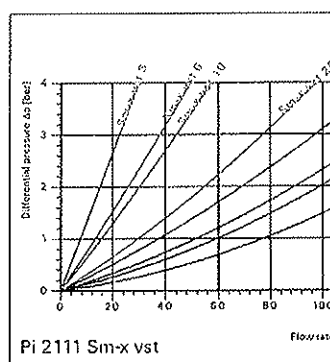
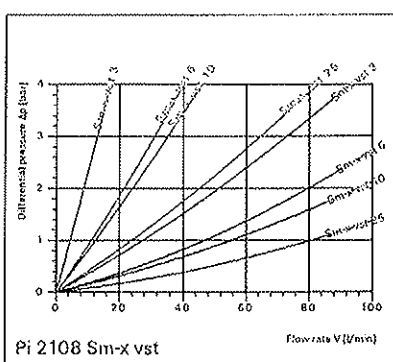
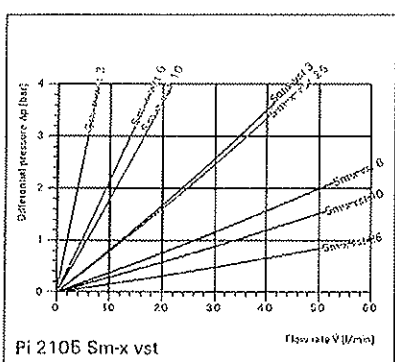
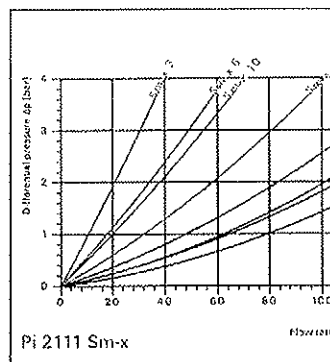
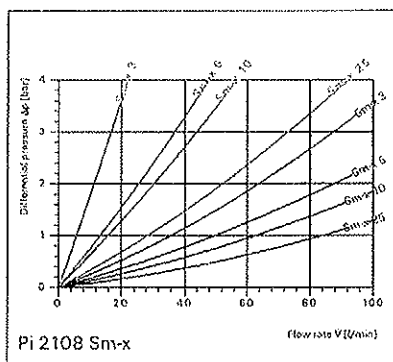
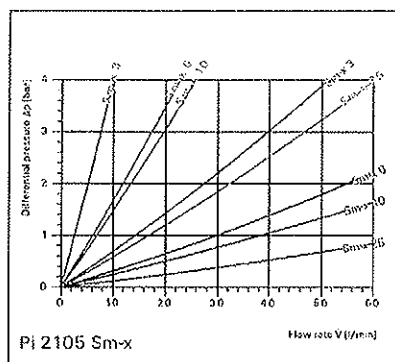
World-wide sales



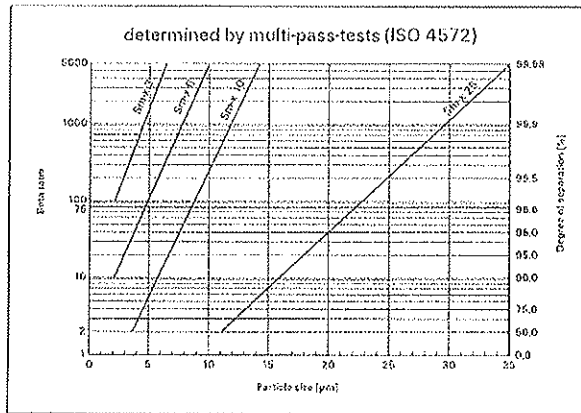
MAHLE INDUSTRIEFILTER AG, D-71364 Vaihingen, Germany. Tel.: +49 (0) 7141 137-0, Fax: +49 (0) 7141 137-400

2. Flow rate / pressure drop curve compl. filter

190 mm²/s
33 mm²/s



3. Separation characteristics



4. Filter performance data

tested according to ISO 4572 (multi-pass-test)

Sm-x-elements
with Δp 20 bar

Sm-x 3 $\beta_3 \geq 75$
Sm-x 6 $\beta_6 \geq 75$
Sm-x 10 $\beta_{10} \geq 75$
Sm-x 25 $\beta_{25} \geq 75$

at 7 bar differential pressure

Sm-x-vst-elements
with Δp 210 bar

Sm-x vst 3 $\beta_3 \geq 75$
Sm-x vst 6 $\beta_6 \geq 75$
Sm-x vst 10 $\beta_{10} \geq 75$
Sm-x vst 25 $\beta_{25} \geq 75$

at 16 bar differential pressure

Example for ordering filters:

Housing design with $V = 80$ l/min, electrical indicator
type no. Pi 2108-069

order-no. 781.028.6

+ Filter element Sm-x vst 3
type no. Pi 2208

order-no. 768.020.0

7. Order numbers

7.1 Housing design

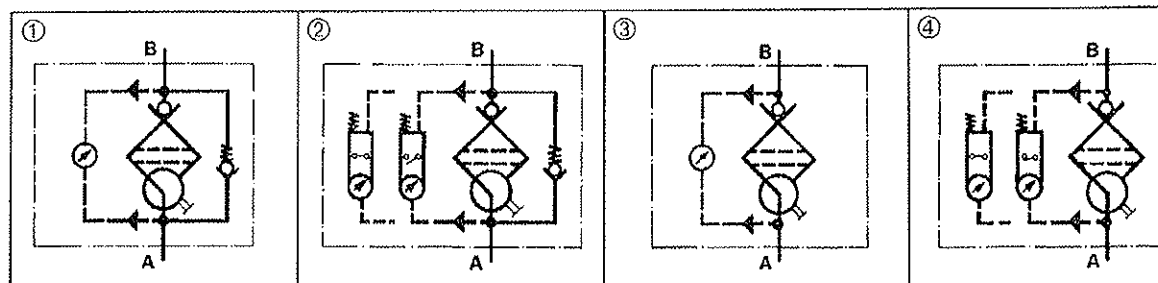
Order number	Type number	Nominal size NG [l/min]	① with bypass valve and visual indicator	② with bypass valve and visual/electrical indicator	③ with visual indicator	④ with visual/electrical indicator
781.021.1	Pi 2105-057	50				
781.022.9	Pi 2105-058					
781.023.7	Pi 2105-068					
781.024.5	Pi 2105-069					
781.025.2	Pi 2108-057	80				
781.026.0	Pi 2108-058					
781.027.8	Pi 2108-068					
781.028.6	Pi 2108-069					
820.408.3	Pi 2111-057	110				
820.409.1	Pi 2111-058					
820.410.9	Pi 2111-068					
820.411.7	Pi 2111-069					
777.457.3	Pi 2115-057	150				
777.456.5	Pi 2115-058					
777.455.7	Pi 2115-068					
777.454.0	Pi 2115-069					
777.453.2	Pi 2130-057	300				
777.452.4	Pi 2130-058					
777.451.6	Pi 2130-068					
777.450.8	Pi 2130-069					
777.449.0	Pi 2145-057	450				
777.448.2	Pi 2145-058					
777.447.4	Pi 2145-068					
777.446.6	Pi 2145-069					

5. Test regulations

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

No.	Designation
ISO 2941	Hydraulic-filter elements: Verification of burst resistance
ISO 2942	Hydraulic-filter elements: Determination of fabrication integrity
ISO 2943	Hydraulic-filter elements: Verification of material compatibility with hydraulic fluids
ISO 3723	Hydraulic-filter elements: Method for testing end-cap load
ISO 3724	Hydraulic-filter elements: Verification of flow fatigue characteristics
ISO 39682	Hydraulic-filters: Evaluation of pressure drop versus flow
ISO 4572	Hydraulic-filter elements: Testing of filter performance (multi-pass-test)

6. Symbols



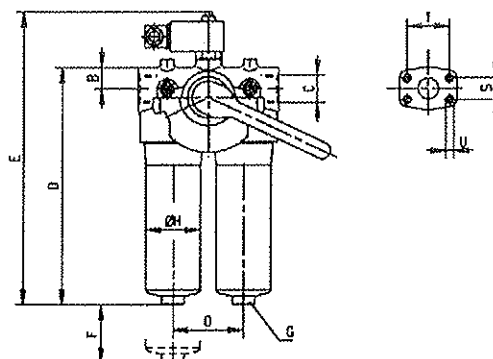
7.2 Filter elements* () = filter surface area [] = type number

Sm-x 3 Δp 20 bar	Sm-x 6 Δp 20 bar	Sm-x 10 Δp 20 bar	Sm-x 25 Δp 20 bar	Sm-x vst 3 Δp 210 bar	Sm-x vst 6 Δp 210 bar	Sm-x vst 10 Δp 210 bar	Sm-x vst 2 Δp 210 bar
(590 cm²)	(590 cm²)	(590 cm²)	(590 cm²)	(470 cm²)	(470 cm²)	(470 cm²)	(470 cm²)
768.013.5	794.350.9	768.032.5	768.044.0				
768.013.5	794.350.9	768.032.5	768.044.0	[Pi 2205]	[Pi 5205]	[Pi 3205]	[Pi 4205]
[Pi 2105]	[Pi 5105]	[Pi 3105]	[Pi 4105]	768.019.2	794.353.3	768.038.2	768.050.1
				768.019.2	794.353.3	768.038.2	768.050.1
(1150 cm²)	(1150 cm²)	(1150 cm²)	(1150 cm²)	(900 cm²)	(900 cm²)	(900 cm²)	(900 cm²)
768.014.3	794.351.7	768.034.1	768.045.7				
768.014.3	794.351.7	768.034.1	768.045.7	[Pi 2208]	[Pi 5208]	[Pi 3208]	[Pi 4208]
[Pi 2108]	[Pi 5108]	[Pi 3108]	[Pi 4108]	768.020.0	794.354.1	768.119.0	768.051.1
				768.020.0	794.354.1	768.119.0	768.051.1
(1700 cm²)	(1700 cm²)	(1700 cm²)	(1700 cm²)	(1315 cm²)	(1315 cm²)	(1315 cm²)	(1315 cm²)
768.015.0	794.352.5	768.033.3	768.046.5				
768.015.0	794.352.5	768.033.3	768.046.5	[Pi 2211]	[Pi 5211]	[Pi 3211]	[Pi 4211]
[Pi 2111]	[Pi 5111]	[Pi 3111]	[Pi 4111]	768.021.8	794.355.8	768.039.0	768.052.1
				768.021.8	794.355.8	768.039.0	768.052.1
(2350 cm²)	(2350 cm²)	(2350 cm²)	(2350 cm²)	(2010 cm²)	(2010 cm²)	(2010 cm²)	(2010 cm²)
768.016.8	795.509.9	768.035.8	768.047.3				
768.016.8	795.509.9	768.035.8	768.047.3	[Pi 2215]	[Pi 5215]	[Pi 3215]	[Pi 4215]
[Pi 2115]	[Pi 5115]	[Pi 3115]	[Pi 4115]	768.022.6	795.512.3	768.040.8	768.053.1
				768.022.6	795.512.3	768.040.8	768.053.1
(4420 cm²)	(4420 cm²)	(4420 cm²)	(4420 cm²)	(3800 cm²)	(3800 cm²)	(3800 cm²)	(3800 cm²)
768.017.6	795.510.7	768.036.6	768.048.1				
768.017.6	795.510.7	768.036.6	768.048.1	[Pi 2230]	[Pi 5230]	[Pi 3230]	[Pi 4230]
[Pi 2130]	[Pi 5130]	[Pi 3130]	[Pi 4130]	768.023.4	795.513.1	768.041.6	768.054.1
				768.023.4	795.513.1	768.041.6	768.054.1
(6540 cm²)	(6540 cm²)	(6540 cm²)	(6540 cm²)	(5600 cm²)	(5600 cm²)	(5600 cm²)	(5600 cm²)
768.018.4	795.511.5	768.037.4	768.049.9				
768.018.4	795.511.5	768.037.4	768.049.9	[Pi 2245]	[Pi 5245]	[Pi 3245]	[Pi 4245]
[Pi 2145]	[Pi 5145]	[Pi 3145]	[Pi 4145]	768.024.2	795.514.9	768.042.4	768.055.1
				768.024.2	795.514.9	768.042.4	768.055.1

*further elements upon request

8. Specifications

Design:	line mounting filter
Nominal pressure:	25 bar*
Test pressure:	33 bar
Temperature range:	-10 °C to +120 °C (other temperature ranges on request)
Bypass opening pressure:	Δp 3,5 bar $\pm$ 10 %
Filter head material:	GAL
Filter bowl material:	AL / St
Material of seals:	NBR / AL
Activating pressure of visual/electrical differential pressure indicator:	Δp 2,2 bar $\pm$ 0,3 bar
Electrical data of contamination indicator:	
Maximum voltage:	230 V ~ / ~
Maximum current on contact:	2,5 A
Maximum contact load:	60 VA / 40 W
Inrush current:	70 VA
Type of protection:	IP 65 when inserted and secured
Contact:	bistable
Cable connection:	PG 11 $\varnothing$ 6-10



The electrical indicator function can be changed from the Normally Open position to the Normally Closed position or visa versa by inverting the electrical section.

With the inrush current of 70 VA the indicator can trigger small contactors or contactor relays.

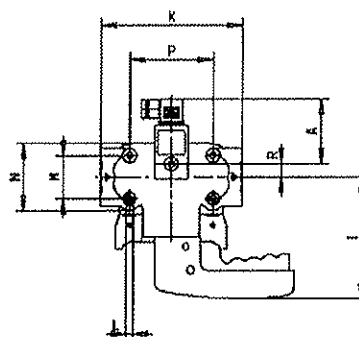
Inductivity in the direct current may require the use of a signal eraser.

For further information and executions please see our leaflet: "Contamination indicators".

Filters compatible with standard mineral oils.

Please contact us in case of using other media.

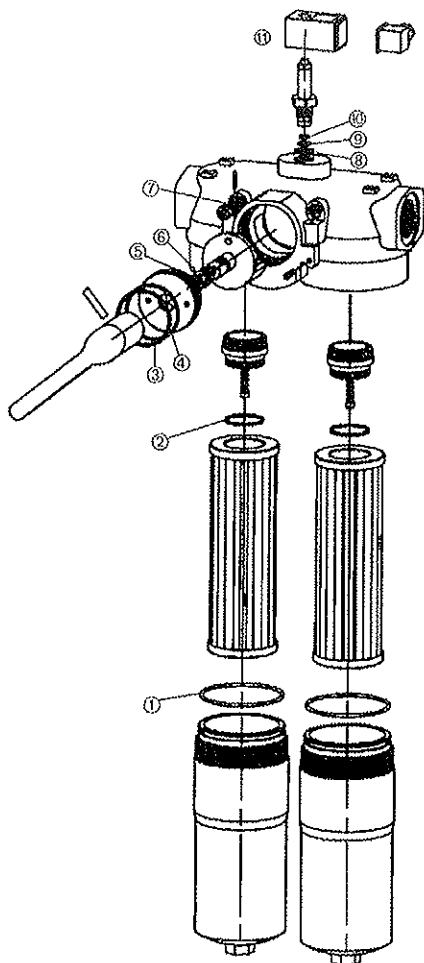
*The housings Pi 2105, Pi 2108 and Pi 2111 are approved for 63 bar operating pressure (test pressure 82 bar).



9. Dimensions

All dimensions (except °C) in mm

Dimension Type	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R	Weight [kg]
Pi 2105	78	38	G 1"	200	258	80	SW 27	66	139	168	M 8 x 16	52	81	85	100	16	2,6
Pi 2108	78	38	G 1"	276	334	80	SW 27	66	139	168	M 8 x 16	52	81	85	100	16	2,9
Pi 2111	78	38	G 1"	358	416	80	SW 27	66	139	168	M 8 x 16	52	81	85	100	16	3,3
Pi 2115	78	40	G 1½"	269	327	110	SW 32	109	165	280	M 10 x 20	62	140	140	210	19	7,1
Pi 2130	78	40	G 1½"	388	444	110	SW 32	109	165	280	M 10 x 20	62	140	140	210	19	8,0
Pi 2145	78	40	G 1½"	501	559	110	SW 24	109	165	280	M 10 x 20	62	140	140	210	19	16,0



11. Spare parts list

Pos.	Type number/housing	
	Pi 2105-Pi 2111	Pi 2115-Pi 2145
①	Seal kit	Seal kit
to	NBR 976.127.1	NBR 976.123.0
	FPM 976.128.9	FPM 976.124.8
②	EPDM 976.129.7	EPDM 976.125.5
③	Seal kit for contamination indicator	
to	NBR 776.030.9	
	FPM 776.031.7	
④	EPDM 776.032.5	
⑤	Contamination indicator	
	visual	electrical
	766.997.1	766.994.8
	Pis 3098 / 2,2	Pis 3097 / 2,2
		electrical upper part only
		753.655.0

Please return filter for sealing replacement of switch-over unit!

10. Installation, Operating and Servicing Instructions

10.1 Filter installation

Install filter in accordance with the identified flow direction. The filter head is provided with threaded holes for mounting. Ascertain that the required removal height is provided so filter element and the filter bowl can be removed.

Preferably the filter should be installed with the filter bowl pointing down.

The contamination indicator must be well visible.

10.2 Connecting the electrical contamination indicator

The electrical indicator is connected via a 2-pole appliance according to DIN 43650 with poles marked 1 and 2.

The electrical section can be inverted to change from Normally Open position to Normally Closed position or visa versa.

10.3 When must the filter element be replaced?

- During cold starts, the indicator may give a warning signal. Depress the red button of the visual indicator once again after operating temperature has been reached. If the red button immediately pops out again and/or the electrical indicator has not switched off after reaching operating temperature, the filter element must be replaced after the end of the shift.
- Please always ensure that you have original MAHLE replacement elements in stock: disposable elements (Sm-x) can be cleaned.

10.4 Element replacement

Note: The contamination indicator monitors the filter side operation, which is identified by the position of the switching lever catch. The flow transfer valve must be switched prior to filter servicing. Now the signal of the contamination indicator is cancelled and the red button can be depressed again.

- Operate and hold pressure equalizing lever located in the switching lever. Swivel switching lever. Engage the catch. Place trough or drip pan underneath to collect leaking oil.
- Loosen vent screw of the filter side not in use by 2-3 turns maximum back out against safety stop.
- Unscrew filter bowl by rotating same counterclockwise clean with a suitable medium.
- Remove filter element with a side-to-side motion.
- Check O-ring on the filter bowl and the 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 plastic bag and push element over the spigot in the filter. Now remove plastic bag.
- Complete installation by screwing on the bowl, turning clockwise until it comes to a full stop. Back off the bowl 1/4 turn.
- To refill the filter chamber, operate only the pressure equalizing lever long enough for the medium to emerge bubble-free from the vent bore.
- Tighten vent screw. Check filter for leaks by operating the pressure equalizing lever once again.

Subject to technical alteration.



KNECHT Filterwerke GmbH

Werk Öhringen · Schleifbachweg 45 · 74613 Öhringen · Postfach 13 09 · 74603 Öhringen
Telefon (0 79 41) 67-0 · Telex (0 79 41) 67-429



A ThermoSys Company

Thermal Transfer Products
5215 21st Street
Racine, WI 53406-5024
U.S.A.

Phone: (262) 554-8330

Fax: (262) 554-8536

E-mail: Thermal_Transfer_Sales@thermasys.com

Company: Advanced Fluid Systems

Contact: San Rockwell

Phone: (570) 265 3317

Sized By: SR

Location: LUKoil

Reference: DRESSER

Fax:

Date: 11/9/2012

HEAT EXCHANGER SELECTION

	SHELL SIDE	TUBE SIDE
Fluid Circulated	ISO-32 Oil	Water
Flow Rate (GPM)	9	6
Inlet Temperature (°F)	130.3	82.4
Outlet Temperature (°F)	120	88.9
Fluid Velocity (Ft/sec)	1.2	1.9
Pressure Drop (PSI)	0.31	0.34
Viscosity (Centipoise)	21	0.8
Specified Fouling Factor (Hr – ft ² – F/Btu)	0	
Heat Load (HP)	7.7	
Heat Load (Btu/hr)	19610.8	
Model Number	CS-614-3-4-T-SS-SB-S	
Approx. Length (IN)	17.12	
Tube OD (IN)	0.25	
Number of Passes	2	
Surface Area (Sq Ft)	4.61	

PRICE:

LEAD TIME:

Prices are firm for acceptance within 30 days of quotation date. Terms are net 30 days from date of shipment, subject to approved credit. Prices do not include any applicable taxes. Stock items subject to prior sale.

TTP XSelector 5



0296-06.08.13

Duplex Filter Pi 370

Operating pressure 200 (250) bar, Nominal size up to 450

1. Features

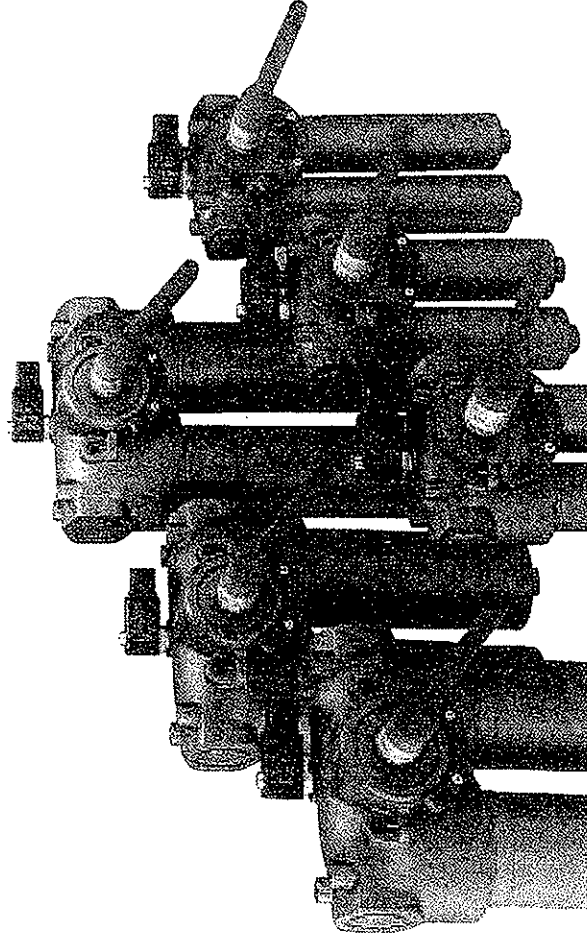
Efficient filters for modern hydraulic systems

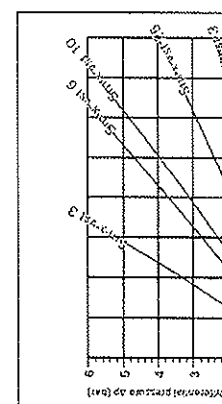
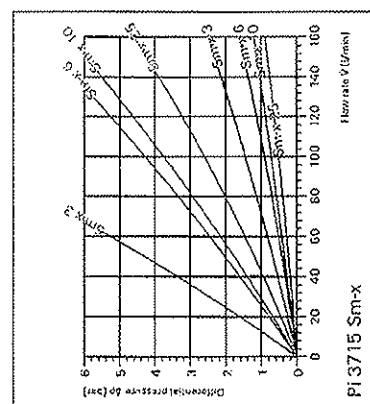
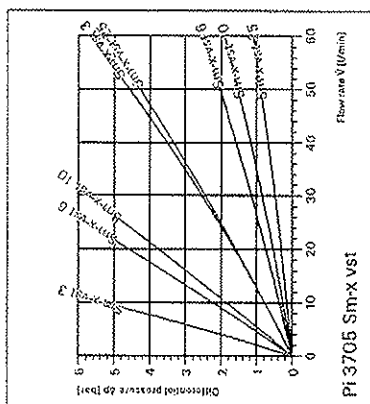
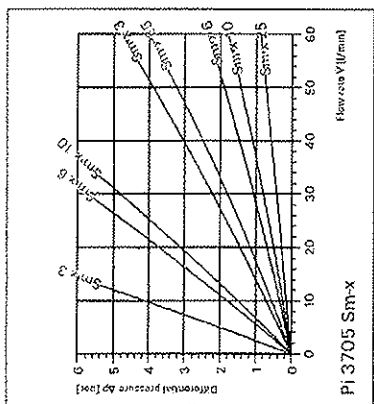
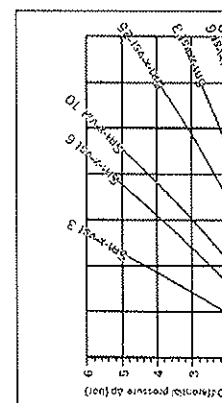
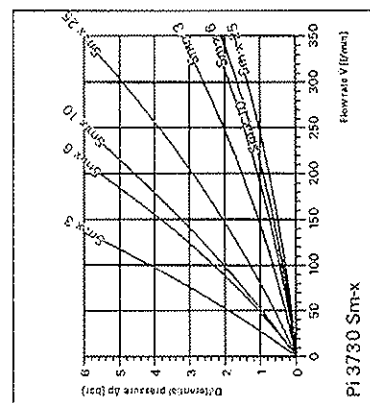
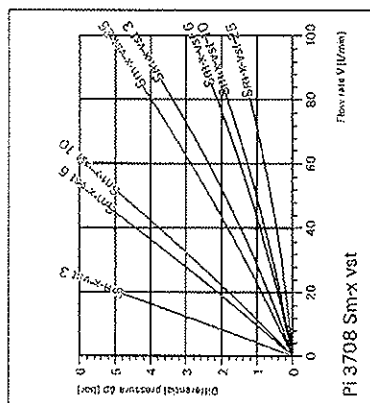
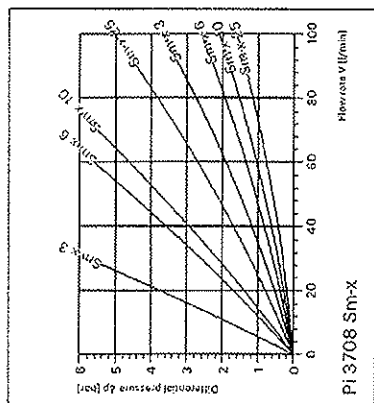
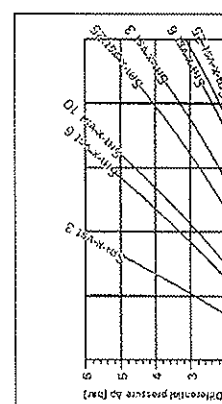
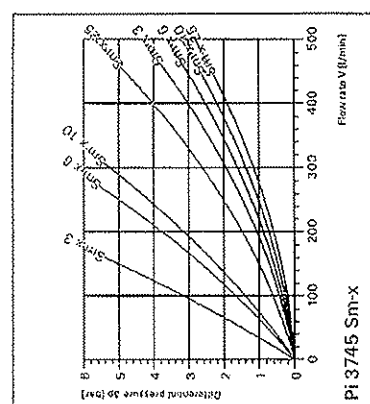
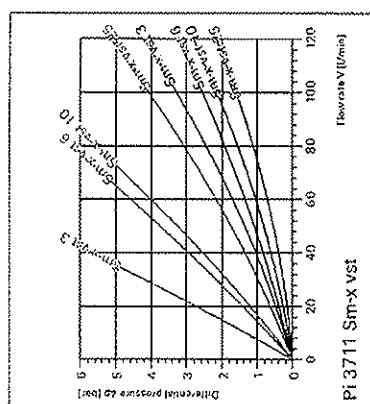
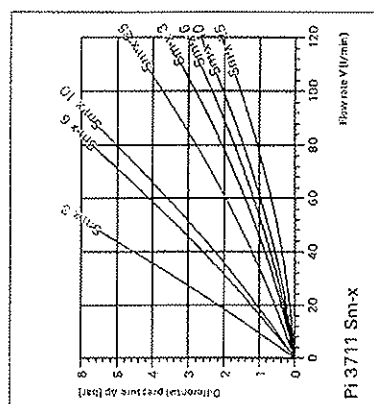
- Modular design
- Minimal pressure loss
- Compact design
- Visual / electrical / electronic differential pressure indication
- Threaded or SAE 4 bolt flange ports
- Switching valve on upstream side
- Ergonomic switch-over handle with safety lock and pressure compensation
- User-optimized one-hand-operation

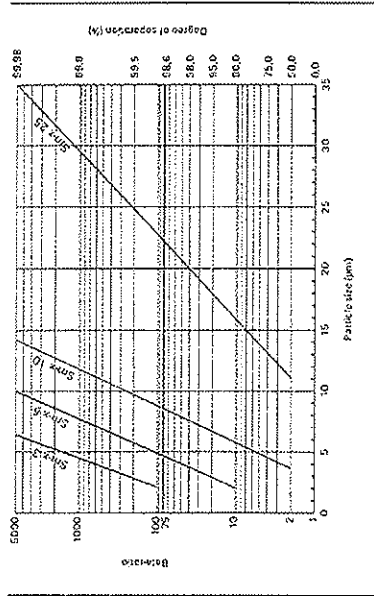
Quality filters, easy to service

- Highly efficient Sm-x filter elements
- B-rated elements per ISO 4572
- Large dirt holding capacity and high differential pressure stability providing optimal element service life

World-wide sales







with Δp 20 bar

Sm-x 3 $\beta_5 \geq 75$

Sm-x vst 6 $\beta_6 \geq 75$

Sm-x vst 10 $\beta_{10} \geq 75$

Sm-x vst 25 $\beta_{25} \geq 75$

at 16 bar differential pressure

with Δp 20 bar

Sm-x 3 $\beta_5 \geq 75$

Sm-x 6 $\beta_6 \geq 75$

Sm-x 10 $\beta_{10} \geq 75$

Sm-x 25 $\beta_{25} \geq 75$

at 7 bar differential pressure

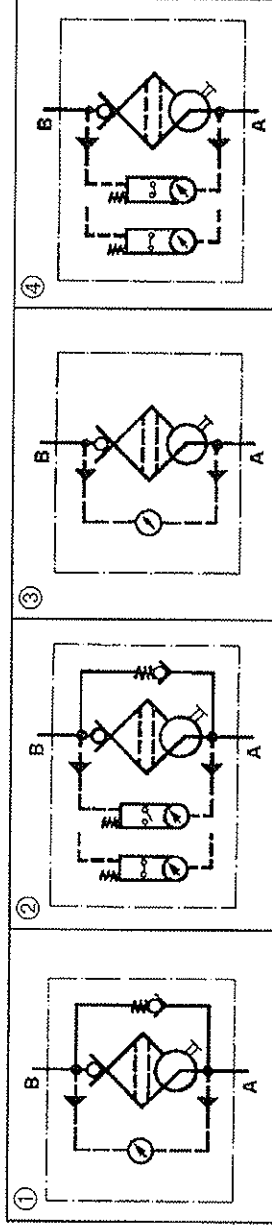
Example for ordering filters:	1. Housing design with $V = 80$ l/min, electrical indicator type-no. PI 3708-015	Order-no. 781.036.9
	+ 2. filter element Sm-x vst 3 type-no. PI 2208	Order-no. 768.020.0

7. Order numbers for pressure side installation

7.1 Housing Design						
Order number	Type number	Nominal size (NG)	① with bypass valve and visual indicator	② with bypass valve and electrical indicator	③ with visual indicator	④ with electrical indicator
781.029.4	PI 3705-012	50				
781.030.2	PI 3705-013					
781.031.0	PI 3705-014					
781.032.8	PI 3705-015					
781.033.6	PI 3708-012	80				
781.034.4	PI 3708-013					
781.035.1	PI 3708-014					
781.036.9	PI 3708-015					
781.037.7	PI 3711-012	110				
781.038.5	PI 3711-013					
781.039.3	PI 3711-014					
781.040.1	PI 3711-015					
781.041.9	PI 3715-012	150				
781.042.7	PI 3715-013					
781.043.5	PI 3715-014					
781.044.3	PI 3715-015					
781.045.0	PI 3730-012	300				
781.046.8	PI 3730-013					
781.047.6	PI 3730-014					

ISO 2941	Hydraulic-filter elements: Verification of burst resistance
ISO 2942	Hydraulic-filter elements: Determination of fabrication integrity
ISO 2943	Hydraulic-filter elements: Verification of material compatibility with hydraulic fluids
ISO 3723	Hydraulic-filter elements: Method for testing end-cap load
ISO 3724	Hydraulic-filter elements: Verification of flow fatigue characteristics
ISO 3968.2	Hydraulic-filters: Evaluation of pressure drop versus flow
ISO 4572	Hydraulic-filter elements: Testing of filter performance (multi-pass-test)

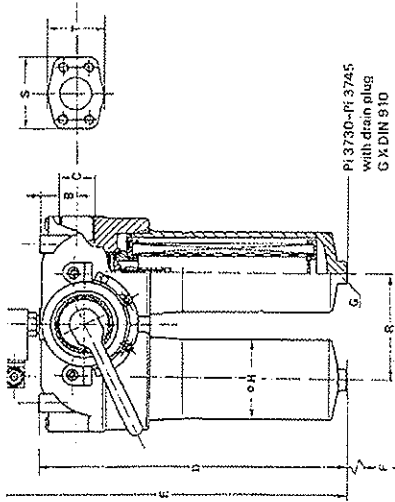
6. Symbols



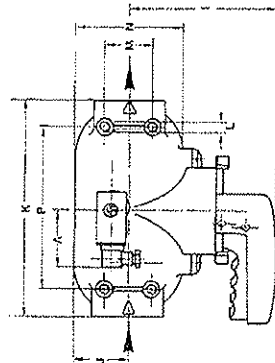
7.2 Filter elements*

() = filter surface area { } = type number

Sm-x 3 Δp 20 bar	Sm-x 6 Δp 20 bar	Sm-x 10 Δp 20 bar	Sm-x 25 Δp 20 bar	Sm-x vst 3 Δp 210 bar	Sm-x vst 6 Δp 210 bar	Sm-x vst 10 Δp 210 bar	Sm-x vst 25 Δp 210 bar
(590 cm ²)	(590 cm ²)	(590 cm ²)	(590 cm ²)	(470 cm ²)	(470 cm ²)	(470 cm ²)	(470 cm ²)
768.013.5	794.350.9	768.032.5	768.044.0				
768.013.5	794.350.9	768.032.5	768.044.0	[Pi 2205]	[Pi 5205]	[Pi 3205]	[Pi 4205]
[Pi 2105]	[Pi 5105]	[Pi 3105]	[Pi 4105]	768.019.2	794.353.3	768.038.2	768.050.7
				768.019.2	794.353.3	768.038.2	768.050.7
(1150 cm ²)	(1150 cm ²)	(1150 cm ²)	(1150 cm ²)	(900 cm ²)	(900 cm ²)	(900 cm ²)	(900 cm ²)
768.014.3	794.351.7	768.034.1	768.045.7				
768.014.3	794.351.7	768.034.1	768.045.7	[Pi 2208]	[Pi 5208]	[Pi 3208]	[Pi 4208]
[Pi 2108]	[Pi 5108]	[Pi 3108]	[Pi 4108]	768.020.0	794.354.1	768.119.0	768.051.5
				768.020.0	794.354.1	768.119.0	768.051.5
(1700 cm ²)	(1700 cm ²)	(1700 cm ²)	(1700 cm ²)	(1315 cm ²)	(1315 cm ²)	(1315 cm ²)	(1315 cm ²)
768.015.0	794.352.5	768.033.3	768.046.5				
768.015.0	794.352.5	768.033.3	768.046.5	[Pi 2211]	[Pi 5211]	[Pi 3211]	[Pi 4211]
[Pi 2111]	[Pi 5111]	[Pi 3111]	[Pi 4111]	768.021.8	794.355.8	768.039.0	768.052.3
				768.021.8	794.355.8	768.039.0	768.052.3
(2350 cm ²)	(2350 cm ²)	(2350 cm ²)	(2350 cm ²)	(2010 cm ²)	(2010 cm ²)	(2010 cm ²)	(2010 cm ²)
768.016.8	795.509.9	768.035.8	768.047.3				
768.016.8	795.509.9	768.035.8	768.047.3	[Pi 2215]	[Pi 5215]	[Pi 3215]	[Pi 4215]
[Pi 2115]	[Pi 5115]	[Pi 3115]	[Pi 4115]	768.022.6	795.512.3	768.040.8	768.053.1
				768.022.6	795.512.3	768.040.8	768.053.1
(4420 cm ²)	(4420 cm ²)	(4420 cm ²)	(4420 cm ²)	(3800 cm ²)	(3800 cm ²)	(3800 cm ²)	(3800 cm ²)
768.017.6	795.510.7	768.036.6	768.048.1				
768.017.6	795.510.7	768.036.6	768.048.1	[Pi 2230]	[Pi 5230]	[Pi 3230]	[Pi 4230]
[Pi 2130]	[Pi 5130]	[Pi 3130]	[Pi 4130]	768.023.4	795.513.1	768.041.6	768.054.9



PI 3730-PI 3745
with drain plug
G X DIN 910



Test pressure: 260 bar*

Temperature range:
(other temperature ranges on request)
-10° C to +120° C

Bypass opening pressure:
Δp 7 bar ±10 %

Filter head material:
GGG

Filter bowl material:
SI

Material of seals:
NBR / PTFE / CU

Activating pressure of visual / electrical
differential pressure indicator:
Δp 5 bar ±10 %

Electrical data of contamination indicator:
Maximum voltage:
230 V ~ / ~

Maximum current on contact:
2.5 A

Maximum contact load:
60 VA / 40 W

Inrush current:
70 VA

Type of protection:
IP 65 when inserted and secured

Contact:
bistable

Cable connection:
PG 11 Ø 6-10

The electrical indicator function can be changed from the Normally Open position to the Normally Closed position or visa versa by inverting the electrical section.

With the inrush current of 70 VA the indicator can trigger small contactors or contactor relays.

Inductivity in the direct current may require the use of a signal eraser.

For further information and executions please see our leaflet: "Contamination indicators".

Filters compatible with standard mineral oils.

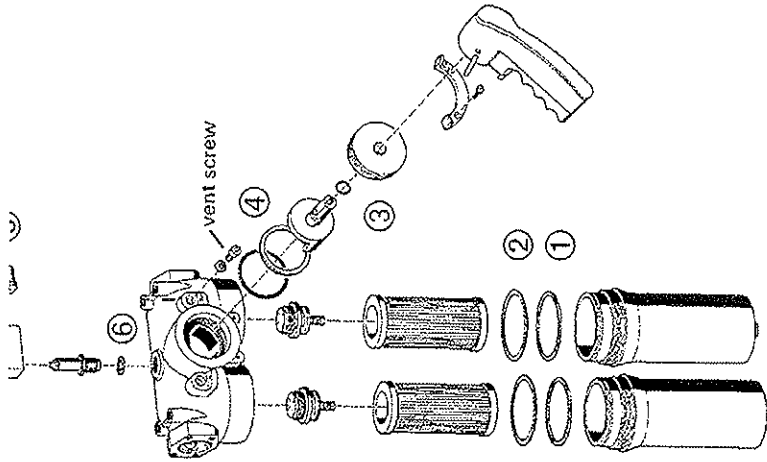
Please contact us in case of using other media.

* The housings PI 3705, PI 3708 and PI 3711 are approved for 250 bar operating pressure (test pressure 325 bar).

9. Dimensions

All dimensions (except °C) in mm.

Dimen- sion Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	Weight [kg]
PI 3705	78	38	G 1"	219	271	80	27	65	144	45	182	M 8 x 15	55	90	45	100	86	70	58	11,0
PI 3708	78	38	G 1"	294	346	80	27	65	144	45	182	M 8 x 15	55	90	45	100	86	70	58	13,0
PI 3711	78	38	G 1"	370	422	80	27	65	144	45	182	M 8 x 15	55	90	45	100	86	70	58	15,0
PI 3715	78	50	G 1 1/2"	302	354	110	30	110	175	70	280	M 12 x 18	62	140	45	210	136	94	82	31,5



11. Spare parts list

Pos.	Type-Number / Housing	
	Pi 3705-Pi 3711	Pi 3715-Pi 3745
①	Seal kit	Seal kit
-	NBR 830.506.2	NBR 937.505.6
④	FPM 830.505.4	FPM 937.506.4
	EPDM 830.504.7	EPDM 937.507.2
⑤	Contamination indicator	electrical upper section only
	visual	
	766.991.4	766.988.4
	Pis 3093/5 bar	Pis 3092/5 bar
⑥	Seal kit for contamination indicator	
	NBR 776.027.5	
	FPM 776.028.3	
	EPDM 776.029.1	

Install filter in accordance with the identified flow direction. The filter head is provided with threaded holes for mounting the filter. Ascertain that the required underclearance is provided so that the filter element and the filter bowl can be removed. Preferably the filter should be installed with the filter bowl pointing downwards.
The contamination indicator must be well visible.

10.2 Connecting the electrical contamination indicator

The electrical indicator is connected via a 2-pole appliance plug according to DIN 43650 with poles marked 1 and 2. The electrical section can be inverted to change from Normally Open position to Normally Closed position or visa versa.

10.3 When must the filter element be replaced?

- During cold starts, the indicator may give a warning signal. Depress the red button of the visual 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.
- Please always ensure that you have original MAHLE-replacement elements in stock: disposable elements (Sm-x) cannot be cleaned.

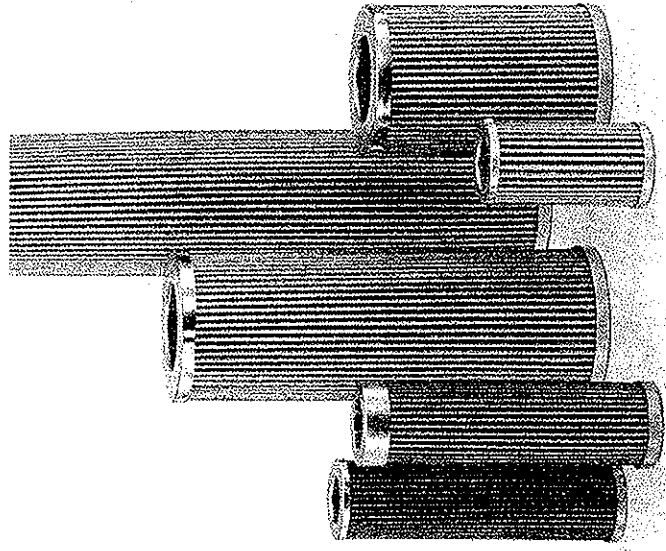
10.4 Element replacement

Note: The contamination indicator monitors the filter side in operation, which is identified by the position of the switching lever catch. The change-over valve must be switched prior to filter servicing. Now the signal of the contamination indicator is cancelled and the red button can be depressed again.

- Operate and hold pressure equalizing lever located behind the switching lever. Pull catch knob and swivel switching lever. Engage the catch on the clear filter side. Place trough or drip pan underneath to collect leaking oil.
- Loosen vent screw of the filter side not in use by 2-3 turns; max. until contact is made with the safety stop.
- Unscrew filter bowl by rotating same counterclockwise and clean with a suitable medium.
- Remove filter element with a side-to-side motion.
- Check O-ring and back-up ring on the filter bowl for damage. Replace, if necessary.
- Make sure that the part number on the spare element corresponds with the part number of 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 bowl, turning clockwise until it comes to a full stop.
Back off the bowl 1/4 to 1/2 turn.
- 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.
- Tighten vent screw. Check filter for leaks by operating the pressure equalizing lever once again.

Subject to technical alteration.

HY-PRO Filter Element Supplies for
PTI PG-030-#U and Mahle PI-##11
Pressure Filters



Hy-Pro G8 Dualglass High Performance Filter Elements

Performance

Temperature: Buna: -45°F ~ 225°F, -43°C ~ 107°C
EPR: -65°F ~ 300°F, -53°C ~ 148°C
Viton: -20°F ~ 250°F, -29°C ~ 121°C

Standard Element Collapse: ΔP 3000 psi, ΔP 204 bar

Media

G8 media pleat pack features our latest generation of graded density glass media that delivers required cleanliness while optimizing dirt capacity.

Dynamic Filter Efficiency

DfE rated elements perform true to rating even under demanding variable flow and vibration conditions. Today's industrial and mobile hydraulic circuits require elements that deliver specified cleanliness under all circumstances. Wire mesh supports the media to ensure against cyclical flow fatigue, temperature, and chemical resistance failures possible in filters with synthetic support mesh.

Water Removal

Media code "A" specifies G8 Dualglass media co-pleated with water removal scrim to produce a filter that can remove water while maintaining $\beta_{x_{10}} > 1000$ efficiency down to $1\mu / 2.5\mu_{\text{eq}}$.

Fluid Compatibility

Petroleum based fluids, water glycols, polyol esters, phosphate esters, HWBF. Contact Hy-Pro for seal selection assistance.

Tested to ISO Quality Standards

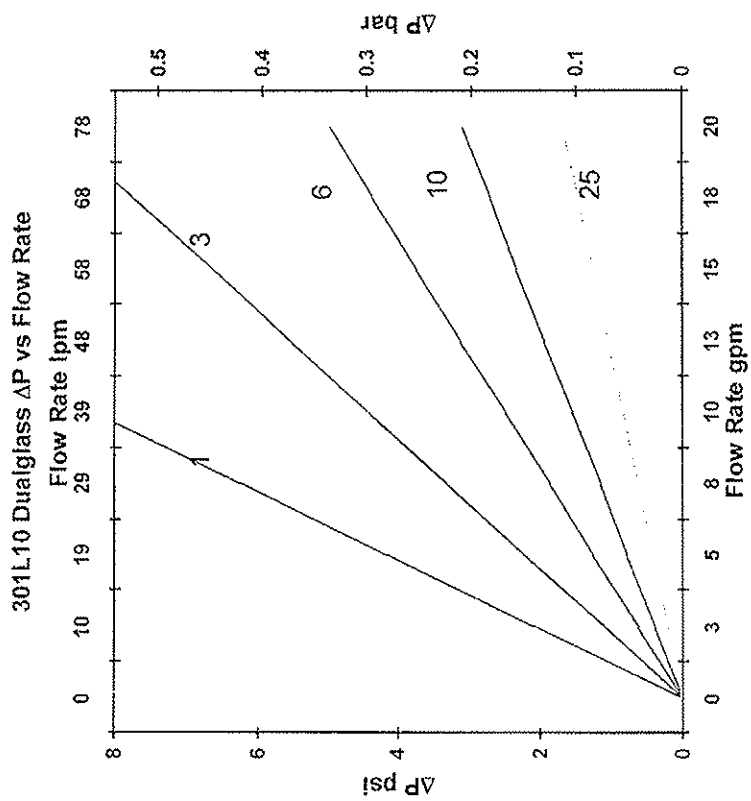
ISO 2941 Collapse and burst resistance
ISO 2942 Fabrication and Integrity test
ISO 2943 Material compatibility with fluids
ISO 3724 Flow fatigue characteristics
ISO 3968 Pressure drop vs. flow rate
ISO 16889 Multi-pass performance testing

Interchanges by Series Only:
(See Interchange Guide for Exact Cross
Reference and Complete Part Numbers)

<u>PTI</u>	<u>HY-PRO</u>
PG-030-#U	HP301L10-##

<u>MAHLE</u>	<u>HY-PRO</u>
PI1111	HP301L10-##
PI2211	HP301L10-##
PI3211	HP301L10-##

Water removal and Dynafuzz media also available.
Call or consult the Hy-Pro on line interchange guide at
www.filterelement.com.

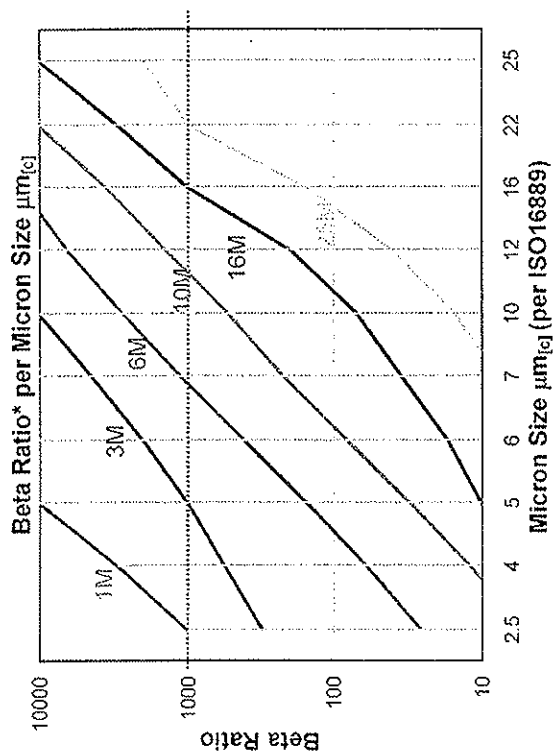


Adjusted Pressure Drop : Pressure drop curves based on viscosity 150 SUS / 32 cSt, and specific gravity = 0.86.
 Element ΔP varies with viscosity and specific gravity. To adjust ΔP factor for different viscosities use the following formula:

Kinematic Viscosity in SUS: $\Delta P \text{ Element} = \Delta P \text{ Curve} \times \text{Actual Viscosity SUS} / 150 \times \text{Actual SG} / 0.86$

Kinematic Viscosity in cSt: $\Delta P \text{ Element} = \Delta P \text{ Curve} \times \text{Actual Viscosity cSt} / 32 \times \text{Actual SG} / 0.86$

Centistoke to SUS conversion: 1 cSt = 4.63 SUS



FILTER ELEMENT PART NUMBER GUIDE

Table 1

HP301L10 -

Table 2	Media Selection
1M	$\beta_{2.5\mu} = 1000$ ($\beta_1 = 200$)
3M	$\beta_{5\mu} = 1000$ ($\beta_3 = 200$)
3SF*	$\beta_{5\mu} = 1000$ ($\beta_3 = 200$) Dynafuzz
6M	$\beta_{7\mu} = 1000$ ($\beta_6 = 200$)
6SF*	$\beta_{7\mu} = 1000$ ($\beta_6 = 200$) Dynafuzz
10M	$\beta_{12\mu} = 1000$ ($\beta_{12} = 200$)
10SF*	$\beta_{12\mu} = 1000$ ($\beta_{12} = 200$) Dynafuzz
149W	$\beta_{2.5\mu} = 1000$ ($\beta_{2.5} = 200$)
25A	$\beta_{22\mu} = 1000$ ($\beta_{25} = 200$) + Water Removal
25W*	25µ Nominal Wire Mesh
25SF*	$\beta_{22\mu} = 1000$ ($\beta_{25} = 200$) Dynafuzz
40W*	40µ Nominal Wire Mesh
50W*	50µ Nominal Wire Mesh
74W*	74µ Nominal Wire Mesh
149W*	149µ Nominal Wire Mesh