Filter element
2-stage filter elements for lubricating oil filtration

Resistant to differential pressure up to 30 bar, nominal size 110 to 220 l/min

1. Brief description

2-Stufen-Filterelement für Schmiersysteme
The Filtration Group 2-stage filter element with the unique Premium Select element structure, with integrated reliable bypass valves and the sturdy safety insert is used as for gear oil filtration in wind turbine plants. These filter elements are used in the oil filter modules Pi 8300 and the low-pressure filters Pi 260.

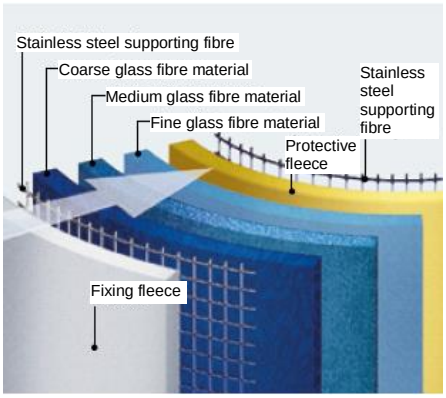
- Filter elements with two filtration stages for the filtration of lubricating in wind turbine gearboxes
- Unique, multilayer Filtration Group Premium Select (PS) folding star-shape filter design made of chemically and thermally resistant materials.
- Filter performance that fits like a glove: A force-fit fixing fleece material presses the folding star-shape tight to the supporting body and fixes the folds in place in such a way as to prevent block formation. At the same time, the fixing fleece takes over a pre-filter function.
- Progressive structure: The degree of fineness of the glass fibre material decreases from the inside to the outside, combining the advantages of a depth filter with those of a large effective filtering surface. The result: greater dirt pick-up capacity even at lower pressure loss in conjunction with a defined discharging rate (multipass test in compliance with ISO 16889).
- Supporting fibre on both sides made of high-quality stainless steel ensures the high rigidity of the folding star-shape.
- Chemical resistance is guaranteed by the use of high-grade stainless steel wire mesh.
- Supporting body and end plates are made of materials free of chromium VI.
- Suitable for universal use for hydraulic and lubricating fluids, fuels, aqueous media and synthetic fluids.
- Low initial differential pressure
- Version for Filtration Group filter housing, as alternative elements in the dimensions of other manufacturers and in customer-specific designs.
- High differential pressure stability and dirt pick-up capacity of the elements
- Global sales

2. Quality assurance

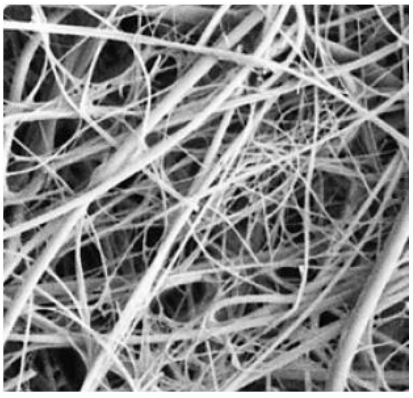
Filtration Group filters and filter elements are manufactured and/or tested in compliance with the following international standards:

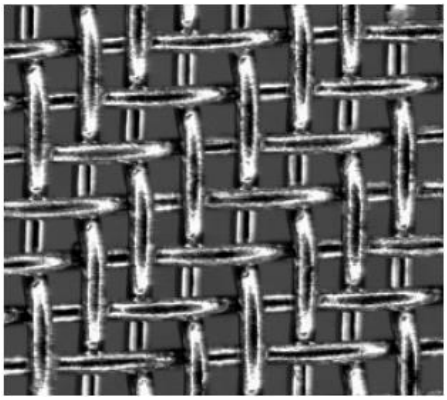
Standard	Title
DIN ISO 2941	Hydraulic fluid power; filter elements; verification of collapse/burst resistance
DIN ISO 2942	Hydraulic fluid power; filter elements; verification of fabrication integrity
DIN ISO 2943	Hydraulic fluid power; filter elements; verification of material compatibility with fluids
DIN ISO 3723	Hydraulic fluid power; filter elements; method for end load test
DIN ISO 3724	Hydraulic fluid power; filter elements; determination of resistance to flow fatigue
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

3. Filter media

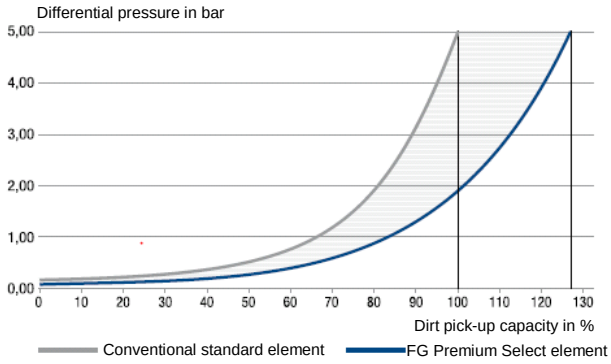


Structure of a PS folding star-shape


Micro-fibre glass


Wire mesh

3.1 Filter media PS



Permanently more capacity plus longer service life: innovative Premium Select element with 30% increase in dirt pick.-up capacity, lower differential pressure and optimised differential pressure curve – for reduced energy consumption.

There is a complete range of filter elements available for use in wind power applications. Our Filtration Group Premium Select elements reduce solid soiling to the prescribed soiling class and maintain the properties of the lubricating fluid over a long period.

Our Filtration Group Premium Select elements are tested to all the usual hydraulic standards. Because we want results we can objectively prove to customers. For this reason, we only monitor our products against globally recognised standards such as ISO 16889. Here, our filters achieve outstanding values for dirt pick-up capacity, beta-value stability and retaining rate.

The filter element is the central component in which the filtration process takes place.

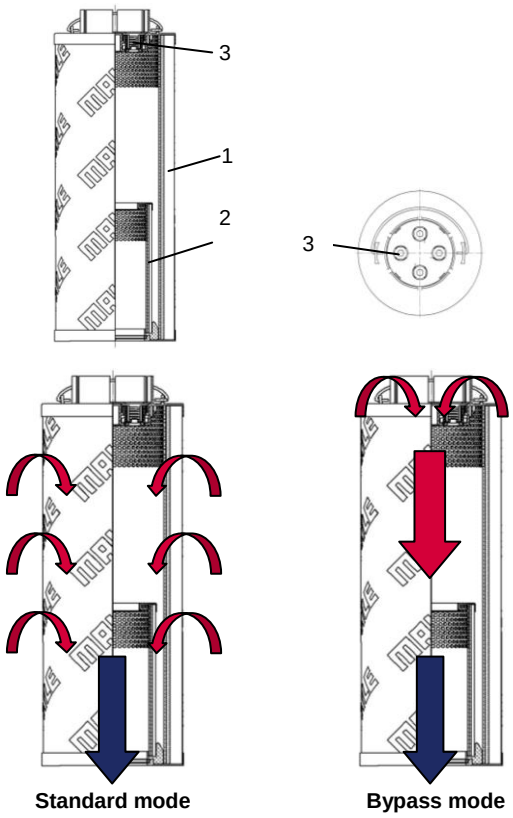
The 2-stage filter elements used for lubricating oil filtration in wind turbines are a combination of depth filter (1st filter stage – glass fibre) and surface filter (2nd filter stage – wire mesh).

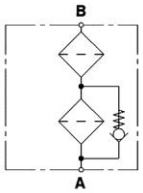
The direction of flow through the 2-stage filter element is from the outside to the inside. The first filter stage (1), the multilayer star-pleated depth filter, is responsible for the prescribed purity class being achieved. Inside the first filter stage, the protection filter (2) is installed in such a way that only filtered oil is allowed to flow into the gearbox.

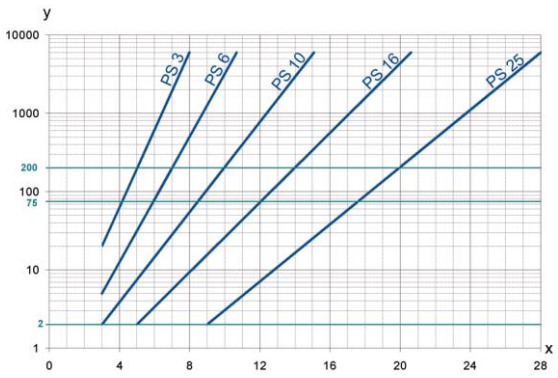
There are 2 operating modes, normal mode and bypass mode

Normal mode:
The bypass valves (3) in the upper end plate are closed so that the unfiltered oil flows through the 1st filter stage (1), the depth filter.
Then the pre-filtered oil flows the 2nd filter stage (2), the surface filter.

Bypass mode:
With a lubrication system cold start, the viscosity of the lubricating oil (ISO VG 320) can be so high that the pressure built up at the filter element is high enough to open the bypass valves (3). This means that part of the unfiltered oil flows past the first filter stage (1) and gets into the inside of the 2-stage filter element unfiltered and flows through the second filter stage (2). This guarantees that the wind turbine gearbox is always supplied with filtered oil.







y = beta value
x = particle size [µm]

determined from multipass measurements (ISO 16889)
Calibration in accordance with ISO 11171 (NIST)

measured in accordance with ISO 16889 (multipass test)

PS elements with max. Δp 10 bar

PS	3 $ß_{5(C)}$	≥ 200
PS	6 $ß_{7(C)}$	≥ 200
PS	10 $ß_{10(C)}$	≥ 200
PS	25 $ß_{20(C)}$	≥ 200

up to 10 bar differential pressure

In a hydraulic or lubricating system, the filters have the task of keeping the soiling level of the fluid to the required level by filtering out particulate matter and keeping this level constant over a long operating period. In industrial hydraulics, it is usual to use codes for the numbers of particles in accordance with ISO 4406 to mark solid impurities. The purity classes which can be achieved with PS filter elements are listed below. These values reflect our long years of experience in designing hydraulic filters and are to be viewed as reference values.

Purity classes	
Filter material	**Purity classes in accordance with ISO 4406 (1999), > 4 µm(c)/ > 6 µm (c)/ >14 µm (c)**
PS 3	14/12/09
PS 6	16/13/10
PS 10	17/15/11
PS 16	20/17/12
PS 25	23/19/13

3.2 Filter material Drg

The filter element of the 2nd filter stage is made of stainless steel wire mesh and has very low flow resistance properties. The fineness levels usual in the gear oil filtration of wind power plants are 40 µm (mesh weave: twill) and 50 µm (weave: single lacing).
In the case of wire mesh elements the filter fineness is the diameter of the largest spherical particle that can just about pass through the mesh. Wire mesh elements are used in hydraulic and lubricating oil filtration as suction filters or coarse filters, with high-viscosity media as well as in safety filters in cooling lubricant filtration. Wire mesh elements have a sharp cut point as surface filters and a lower dirt pick-up capacity than depth filters.

4. Designation, ordering example and order numbers

4.1 Ordering example				
Type	Series			
852 099	**Filter material 1st stage**			
	PS 10	Premium Select, Feinheit 10 µm		
		Filter material 2nd stage		
		DRG 50	Wire mesh, fineness 50 µm	
			Bypass valve	
			V5.0	Opening pressure 5 bar
852 099	**PS 10/**	**DRG 50/**	**V5.0**	Ordering example

4.2 Order numbers 2-stage elements for housing/oil filter modules from Filtration Group				
Oil filter module	**Designation**	**Order number**	**Filter area [cm³]**	**Dirt pick-up capacity* [g]**
Pi 83011 **Pi 83011/1**	852 099 PS 6/DRG 50/V3.0	70535932	22100	450
	852 099 PS 6/DRG 50/V5.0	70534327		
	852 099 PS 10/DRG 50/V3.0	70536627		
	852 099 PS 10/DRG 50/V5.0	70514957		
Pi 83022 **Pi 83115/1**	852 100 PS 6/DRG 50/V5.0	70535918	52000	1200
	852 100 PS 10/DRG 50/V5.0	70517355		

4.3 Order numbers 2-stage elements for housing/oil filter modules from competitors				
Oil filter module	**Designation**	**Order number**	**Filter area [cm³]**	**Dirt pick-up capacity* [g]**
Pi 83011 **Pi 83011/1**	852 105 PS 10/DRG 50/V3.0	70582987	18500	380
	852 105 PS 10/DRG 50/V5.0	70583161		
Pi 83022 **Pi 83115/1**	852 270 PS 10/DRG 50/V5.0	72341076	31760	730

* according to ISO 16889

5. Technical data

Folding star-shape	Pleated (star-pleated)
Direction of flow	from the outside to the inside
End plates and supporting tubes	Free of chromium VI
Resistance to collapse	30 bar
Operating temperature range	-10 °C to +120 °C
Seals	NBR (other materials on request)
Adhesive	Epoxy resin

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01/2017

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Filter elements for liquid filters
Degree of filtration 2 µm up to 500 µm

Nominal size 5 up to 1800
Differential pressure resistant up to 210 bar (3045 psi)

1. Features

High performance elements for nearly all fluids

- PS: new Filtration Group Premium Select high performance disposal filter elements with innovativ design for hydraulic oils and lubricants, fuels, aqueous media and synthetic media
- Sm-N: disposal deep filtration elements with highest degree of filtration and dirt holding capacity
- Sm-x: standard disposal glass fibre filter elements for various applications
- Mic: inexpensive disposable filter elements
- Drg: cleanable surface filter element, made of wire mesh
- KS-Mic: high efficient disposable depth filter elements for cooling emulsions
- WS-Mic WS-PS and WS-Sm-x: Filter elements with additional water absorption ability
- Designed for Filtration Group filter housings, as alternative elements in the dimensions of other manufacturers and according to a customized specification
- Complete product range according DIN 24550
- Beta rated elements according to ISO 16889 multipass test
- Elements with high differential pressure stability and dirt holding capacity
- Worldwide distribution

2. Preface

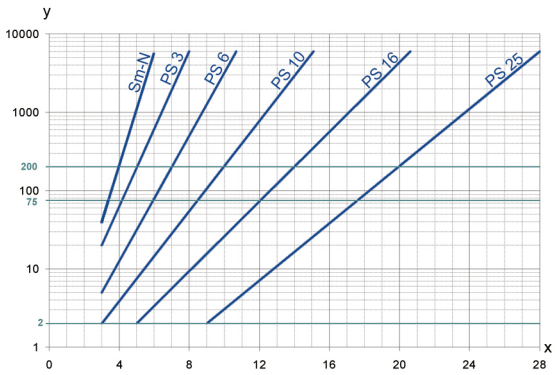
Filter elements are the virtual part of a filter through which the filtration process is realised. For the different liquids and applications Filtration Group developed different filter materials. Therefore a variety of elements are available which would fit into the same housing, but would suit different applications.

3.1 Filter material PS and Sm-N

Depth filters consisting of several layers of glass fibre (progressive design) to filter hydraulic oils and lubricants, flame resistant liquids, fuels and synthetic liquids.

- PS is available in ratings of 5 µm (c), 7 µm (c), 10 µm (c), 15 µm (c) and 20 µm (c) according to ISO 16889 (3µm, 6 µm, 10 µm, 16 µm and 25 µm according to ISO 4572) with a very high dirt holding capacity and simultaneous very low flow resistance.
- Sm-N 2 is available in ratings of 4 µm (c) according to ISO 16889 (2 µm according to ISO 4572) with an extremely high dirt holding capacity for very demanding requirements in regards to the filtration quality, for off-line filtration and for single-pass applications.

Separation grade characteristics



y = beta-value
x = particle size [µm]

determined by multipass tests (ISO 16889)
calibration according to ISO 11171 (NIST)

Filter performance data

tested according to ISO 16889 (multipass test)

PS/Sm-N elements with max. Δp 10 bar

Sm-N	2	$\beta_{4(C)}$	≥	200
PS	3	$\beta_{5(C)}$	≥	200
PS	6	$\beta_{7(C)}$	≥	200
PS	10	$\beta_{10(C)}$	≥	200
PS	16	$\beta_{15(C)}$	≥	200
PS	25	$\beta_{20(C)}$	≥	200

values guaranteed up to 10 bar differential pressure.

In a hydraulic or lubrication system a filter has the task to reduce the contamination to the accepted cleanliness level and to keep it for as long as possible. For the identification of solid particles in industrial hydraulics it is common practice to count particles according to ISO 4406. Subsequently the achievable cleanliness classes of the Sm-x and Sm-N. These values mirror our longtime experience in designing hydraulic filters and could be considered as guide values.

Cleanliness classes	
Filter material	Cleanliness classes according to ISO 4406 (1999), > 4 µm(c)/ > 6 µm (c)/ >14 µm (c)
Sm-N 2	13/11/08
PS 3	14/12/09
PS 6	16/13/10
PS 10	17/15/11
PS 16	20/17/12
PS 25	23/19/13

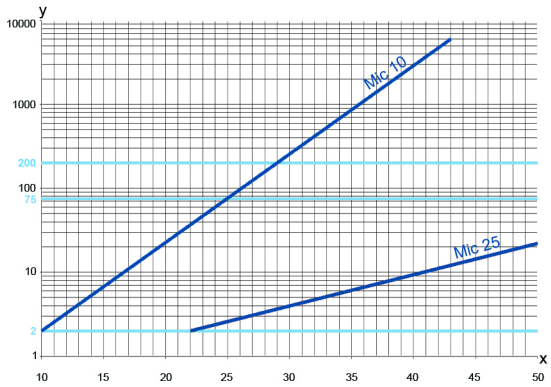
3.2 Filter material Sm-x

Deep filters with glasfibre filter material for all purposes. Filter performance, retention rates and the achievable cleaniness classes are fully corresponding to the new PS filter material.

3.3 Filter material Mic

Depth filters made of cellulose or glass fibre layers with a high dirt holding capacity and a low flow resistance. Degree of filtration 10 µm and 25 µm according to FGC norm. Use in hydraulic oil and lubricants filtration as suction filter as well as low cost filtration in plants with minor demands in regards to the filtrat quality.

Separation grade characteristics



y = beta-value
x = particle size [µm]

Filter performance data

tested according to ISO 16889 (multipass test)

Mic	10	β_{10}	≥	2
Mic	25	β_{25}	≥	2

determined by multipass tests (ISO 16889)
calibration according to ISO 11171 (NIST)

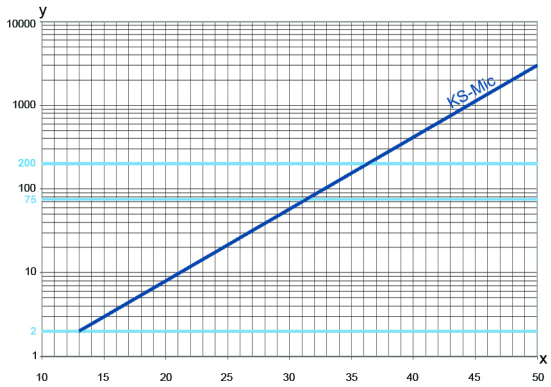
3.4 Filter material Drg

Surface filters made of stainless steel wire mesh with a very low flow resistance designed in the following weaves: plait, twill and linen. Degree of filtration 10 µm, 25 µm, 40 µm, 60 µm, 100 µm, 200 µm, 300 µm and 500 µm. For a wire mesh filter element the degree of filtration is determined by the largest diameter of a globular particle which would be able to pass the fabric. Wire mesh filter elements are used in hydraulic oil and lubricants filtration as suction or coarse filters, for high viscose fluids as well as safety filters for coolant filtration. Wire mesh elements possess a defined removal size as surface filter and a low dirt holding capacity as depth filter.

3.5 Filter material KS-Mic

Depth filter consisting of several, coordinated, binder-free polyester materials with a very high dirt holding capacity and low flow resistance. Degree of filtration: 25 µm according to FGC norm. Use as disposable filter in coolant filtration.

Separation grade characteristics



y = beta-value
x = particle size [µm]

Filter performance data

tested according to ISO 16889 (multipass test)

KS-Mic	25	β_{25}	≥	5

determined by multipass tests (ISO 16889)
calibration according to ISO 11171 (NIST)

3.6 Filter materials WS-Mic, WS-Sm-x and WS-Sm-N

Filtration Group WS-elements for water removal are available as water absorber elements WS-Mic 25 with a low filter efficiency for particles or in combination with the highly efficient Sm-N 2 and Sm-x 10 configuration. A super absorper will change its chemical structure while absorbing water and indicates the amount of absorbed free water by an increase of flow resistance. The free water will be absorbed until the saturation limit is reached. WS-elements are applicable for all common lubrication and hydraulic fluids. The filter property complies with the corresponding Mic-, Sm-x- and Sm-N 2 element. The flow resistance of a water-free liquid would be insignificantly higher.

4. Quality assurance

Filtration Group 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 te
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

5. Technical specifications

Pleated filter elements
Flow direction from outside to inside
Corrosion protected, chrome VI free, end caps and support tube
Berst pressure resistance up to 210 bar
Filter material and filter area see table
Temperature range of application: -10 °C to +120 °C
Possible applications see description „Filter material“ chapter 3.1
Standard sealings for DIN elements: NBR, other sealing materials available on request
Elements with stainless steel parts available on request

6.1 Type number key and order numbers filter elements for in-line filters

6.1.1 Type number key filter elements for in-line filters

Type			
Pi	in-line filter		
	Filter material and degree of filtration		
	01	Sm-N 2	
	10	Mic 25	
	11	Mic 10	
	21	PS 3	
	22	PS vst 3	
	31	PS 10	
	32	PS vst 10	
	41	PS 25	
	42	PS vst 25	
	51	PS 6	
	52	PS vst 6	
	81	Drg 10	
	82	Drg 25	
	83	Drg 40	
	84	Drg 60	
	85	Drg 100	
	86	Drg 200	
	87	Drg 300	
	88	Drg 500	
	89	Drg special version	
	91	Drg vst 10	
	92	Drg vst 25	
	93	Drg vst 40	
	94	Drg vst 60	
	95	Drg vst 100	
	96	Drg vst 200	
	97	Drg vst 300	
	98	Drg vst 500	
	99	metal edge	
		Nominal size	
		05	NG 50
		08	NG 80
		11	NG 110
		15	NG 150
		30	NG 300
		45	NG 450
Pi	**10**	**05**	**Selection example**

6.1.2 Filter elements* for in-line filters					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
50	77576630	Pi 1105 Mic 10	Mic 10	**20**	640
	77718620	Pi 1005 Mic 25	Mic 25		640
	77680135	Pi 2105 PS 3	PS 3		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
	77680192	Pi 2205 PS vst 3	PS vst 3	**210**	470
	77943533	Pi 5205 PS vst 6	PS vst 6		470
	77680382	Pi 3205 PS vst 10	PS vst 10		470
	77680507	Pi 4205 PS vst 25	PS vst 25		470
	77680895	Pi 8105 Drg 10	Drg 10	**20**	590
	77680911	Pi 8205 Drg 25	Drg 25		590
	77680960	Pi 8305 Drg 40	Drg 40		590
	77576648	Pi 8405 Drg 60	Drg 60		365
	77681067	Pi 8505 Drg 100	Drg 100		590
	77718687	Pi 8605 Drg 200	Drg 200		365
	77718703	Pi 8705 Drg 300	Drg 300		365
	77718695	Pi 8805 Drg 500	Drg 500		590
	77689102	Pi 9105 Drg vst 10	Drg vst 10	**210**	470
	77689128	Pi 9205 Drg vst 25	Drg vst 25		470
	77689169	Pi 9305 Drg vst 40	Drg vst 40		470
	77689219	Pi 9405 Drg vst 60	Drg vst 60		470
	77689276	Pi 9505 Drg vst 100	Drg vst 100		470
	77740921	Pi 9605 Drg vst 200	Drg vst 200		470
	77740939	Pi 9705 Drg vst 300	Drg vst 300		470
	77740947	Pi 9805 Drg vst 500	Drg vst 500		470
	on request	on request	KS-Mic25	**20**	-
	on request	on request	Sm-N 2		-
80	77680085	Pi 1108 Mic 10	Mic 10	**20**	1250
	77657174	Pi 1008 Mic 25	Mic 25		1250
	77680143	Pi 2108 PS 3	PS 3		1150
	77943517	Pi 5108 PS 6	PS 6		1150
	77680341	Pi 3108 PS 10	PS 10		1150
	77680457	Pi 4108 PS 25	PS 25		1150
	77680200	Pi 2208 PS vst 3	PS vst 3	**210**	900
	77943541	Pi 5208 PS vst 6	PS vst 6		900
	77681190	Pi 3208 PS vst 10	PS vst 10		900
	77680515	Pi 4208 PS vst 25	PS vst 25		900
	77718737	Pi 8108 Drg 10	Drg 10	**20**	1150
	77680929	Pi 8208 Drg 25	Drg 25		1150
	77680978	Pi 8308 Drg 40	Drg 40		1150
	77681018	Pi 8408 Drg 60	Drg 60		725

* A wider range of element types is available on request.

6.1.2 Filter elements* for in-line filters					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
80	77681075	Pi 8508 Drg 100	Drg 100	**20**	744
	77718711	Pi 8608 Drg 200	Drg 200		725
	77668528	Pi 8708 Drg 300	Drg 300		725
	77718729	Pi 8808 Drg 500	Drg 500		1150
	77689110	Pi 9108 Drg vst 10	Drg vst 10	**210**	950
	77740954	Pi 9208 Drg vst 25	Drg vst 25		950
	77740970	Pi 9308 Drg vst 40	Drg vst 40		950
	77689227	Pi 9408 Drg vst 60	Drg vst 60		950
	77740962	Pi 9508 Drg vst 100	Drg vst 100		950
	77740988	Pi 9608 Drg vst 200	Drg vst 200		950
	77740996	Pi 9708 Drg vst 300	Drg vst 300		950
	77741002	Pi 9808 Drg vst 500	Drg vst 500		950
	on request	on request	KS-Mic 25	**20**	-
	on request	on request	SM-N 2		-
110	77680093	Pi 1111 Mic 10	Mic 10	**20**	1840
	77657182	Pi 1011 Mic 25	Mic 25		1840
	77680150	Pi 2111 PS 3	PS 3		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
	77680218	Pi 2211 PSvst 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
	77680903	Pi 8111 Drg 10	Drg 10	**20**	1700
	77680937	Pi 8211 Drg 25	Drg 25		1700
	77680986	Pi 8311 Drg 40	Drg 40		1700
	77681026	Pi 8411 Drg 60	Drg 60		1080
	77718778	Pi 8511 Drg 100	Drg 100		1700
	77718760	Pi 8611 Drg 200	Drg 200		1080
	77718752	Pi 8711 Drg 300	Drg 300		1080
	77718745	Pi 8811 Drg 500	Drg 500		1700
	77741010	Pi 9111 Drg vst 10	Drg vst 10	**210**	1410
	77689136	Pi 9211 Drg vst 25	Drg vst 25		1410
	77689177	Pi 9311 Drg vst 40	Drg vst 40		1410
	77689235	Pi 9411 Drg vst 60	Drg vst 60		1410
	77689284	Pi 9511 Drg vst 100	Drg vst 100		1410
	77668544	Pi 9611 Drg vst 200	Drg vst 200		1410
	77668551	Pi 9711 Drg vst 300	Drg vst 300		1410
	77741028	Pi 9811 Drg vst 500	Drg vst 500		1410
	76182067	Pi 1011 KS-Mic 25	KS-Mic 25	**20**	1240
	on request	on request	Sm-N 2		-

* A wider range of element types is available on request.

6.1.2 Filter elements* for in-line filters					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
150	77680101	Pi 1115 Mic 10	Mic 10	**20**	2565
	77657190	Pi 1015 Mic 25	Mic 25		2565
	77680168	Pi 2115 PS 3	PS 3		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
	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
	77711120	Pi 8115 Drg 10	Drg 10	**20**	2250
	77680945	Pi 8215 Drg 25	Drg 25		2250
	77680994	Pi 8315 Drg 40	Drg 40		2250
	77681034	Pi 8415 Drg 60	Drg 60		1575
	77681083	Pi 8515 Drg 100	Drg 100		2250
	77711138	Pi 8615 Drg 200	Drg 200		1575
	77711146	Pi 8715 Drg 300	Drg 300		1575
	77711153	Pi 8815 Drg 500	Drg 500		2250
	77741036	Pi 9115 Drg vst 10	Drg vst 10	**210**	1800
	77689144	Pi 9215 Drg vst 25	Drg vst 25		1800
	77689185	Pi 9315 Drg vst 40	Drg vst 40		1800
	77689243	Pi 9415 Drg vst 60	Drg vst 60		1800
	77689292	Pi 9515 Drg vst 100	Drg vst 100		1800
	77741044	Pi 9615 Drg vst 200	Drg vst 200		1800
	77741051	Pi 9715 Drg vst 300	Drg vst 300		1800
	77741069	Pi 9815 Drg vst 500	Drg vst 500		1800
	on request	on request	KS-Mic 25	**20**	-
	76373112	Pi 0115 SM-N 2	Sm-N 2		2150
300	77680119	Pi 1130 Mic 10	Mic 10	**20**	4885
	77657208	Pi 1030 Mic 25	Mic 25		4885
	77680176	Pi 2130 PS 3	PS 3		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
	77718810	Pi 8130 Drg 10	Drg 10	**20**	4280
	77680952	Pi 8230 Drg 25	Drg 25		4280
	77718802	Pi 8330 Drg 40	Drg 40		4280
	77681042	Pi 8430 Drg 60	Drg 60		2975

* A wider range of element types is available on request.

6.1.2 Filter elements* for in-line filters					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
300	77689078	Pi 8530 Drg 100	Drg 100	**20**	4280
	77668510	Pi 8630 Drg 200	Drg 200		2975
	77718786	Pi 8730 Drg 300	Drg 300		2975
	77718794	Pi 8830 Drg 500	Drg 500		4280
	77741077	Pi 9130 Drg vst 10	Drg vst 10	**210**	3400
	77689151	Pi 9230 Drg vst 25	Drg vst 25		3400
	77689193	Pi 9330 Drg vst 40	Drg vst 40		3400
	77689250	Pi 9430 Drg vst 60	Drg vst 60		3400
	77689300	Pi 9530 Drg vst 100	Drg vst 100		3400
	77741085	Pi 9630 Drg vst 200	Drg vst 200		3400
	77741093	Pi 9730 Drg vst 300	Drg vst 300		3400
	77741101	Pi 9830 Drg vst 500	Drg vst 500		3400
	78268625	Pi 1030 KS-Mic 25	KS-Mic 25	**20**	4190
	77879877	Pi 0130 Sm-N 2	Sm-N 2		4215
450	77680127	Pi 1145 Mic 10	Mic 10	**20**	7265
	77711161	Pi 1045 Mic 25	Mic 25		7265
	77680184	Pi 2145 PS 3	PS 3		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
	77711179	Pi 8145 Drg 10	Drg 10	**20**	6370
	77711187	Pi 8245 Drg 25	Drg 25		6370
	77681000	Pi 8345 Drg 40	Drg 40		6370
	77681059	Pi 8445 Drg 60	Drg 60		4410
	77689094	Pi 8545 Drg 100	Drg 100		6370
	77725534	Pi 8645 Drg 200	Drg 200		4410
	77725559	Pi 8745 Drg 300	Drg 300		4410
	77725542	Pi 8845 Drg 500	Drg 500		6370
	77741119	Pi 9145 Drg vst 10	Drg vst 10	**210**	5020
	77741127	Pi 9245 Drg vst 25	Drg vst 25		5020
	77689201	Pi 9345 Drg vst 40	Drg vst 40		5020
	77689268	Pi 9445 Drg vst 60	Drg vst 60		5020
	77689318	Pi 9545 Drg vst 100	Drg vst 100		5020
	77741135	Pi 9645 Drg vst 200	Drg vst 200		5020
	77741143	Pi 9745 Drg vst 300	Drg vst 300		5020
	77741150	Pi 9845 Drg vst 500	Drg vst 500		5020
	79359746	Pi 1045 KS-Mic 25	KS-Mic 25	**20**	6230
	79337130	Pi 0145 Sm-N 2	Sm-N 2		6260

* A wider range of element types is available on request.

6.2 Type number key and order numbers filter elements for DIN filters

6.2.1 Type number key filter elements acc. DIN 24550 part 3 and part 4

Typ						
Pi	in-line filter					
	Filter material					
	1	Mic				
	2	PS				
	3	Drg				
	7	PS vst				
	8	Drg vst				
		Degree of filtration				
		1	3 µm			
		2	6 µm			
		3	10 µm			
		4	16 µm			
		5	25 µm			
		6	40 µm			
		7	60 µm			
		8	100 µm			
		9	250 µm			
		S	optional			
			Nominal size			
			004	NG 40		
			006	NG 60		
			010	NG 100		
			016	NG 160		
			025	NG 250		
			040	NG 400		
			063	NG 630		
			100	NG 1000		
				Version		
				D	pressure filter	
				R	return line filter	
					Seal material	
					N	NBR
					E	EPDM
					F	FPM
					P	PTFE or PTFE coated
					C	CR
Pi	**2**	**5**	**006**	**D**	**N**	**Selection example**

Optional degree of filtration: the degree of filtration (µ**m)** will be added to the corresponding type designation, e.g. Pi 3S 004 DN **500**

6.2.2 Filter elements for in-line filters acc. DIN 24550 part 3					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
40	77929698	Pi 13004 DN Mic 10	Mic 10	**20**	475
	78260911	Pi 15004 DN Mic 25	Mic 25		475
	78260929	Pi 21004 DN PS 3	PS 3		475
	77960859	Pi 22004 DN PS 6	PS 6		475
	77925571	Pi 23004 DN PS 10	PS 10		475
	78260937	Pi 24004 DN PS 16	PS 16		475
	78260945	Pi 25004 DN PS 25	PS 25		475
	78216079	Pi 71004 DN PS vst 3	PS vst 3	**210**	445
	77960156	Pi 72004 DN PS vst 6	PS vst 6		445
	77925654	Pi 73004 DN PS vst 10	PS vst 10		445
	78216087	Pi 74004 DN PS vst 16	PS vst 16		445
	78216095	Pi 75004 DN PS vst 25	PS vst 25		445
	70317774	Pi 33004 DN Drg 10	Drg 10	**20**	475
	79769308	Pi 35004 DN Drg 25	Drg 25		475
	79704461	Pi 36004 DN Drg 40	Drg 40		475
	76116909	Pi 37004 DN Drg 60	Drg 60		475
	79703802	Pi 38004 DN Drg 100	Drg 100		475
	70314654	Pi 39004 DN Drg 250	Drg 250		475
	76371090	Pi 83004 DN Drg vst 10	Drg vst 10	**210**	445
	79737461	Pi 85004 DN Drg vst 25	Drg vst 25		445
	78266587	Pi 86004 DN Drg vst 40	Drg vst 40		445
	79713942	Pi 87004 DN Drg vst 60	Drg vst 60		445
	on request	Pi 88004 DN Drg vst 100	Drg vst 100		-
63	77929706	Pi 13006 DN Mic 10	Mic 10	**20**	835
	78260952	Pi 15006 DN Mic 25	Mic 25		835
	78260960	Pi 21006 DN PS 3	PS 3		835
	77960867	Pi 22006 DN PS 6	PS 6		835
	77925589	Pi 23006 DN PS 10	PS 10		835
	78260978	Pi 24006 DN PS 16	PS 16		835
	78260986	Pi 25006 DN PS 25	PS 25		835
	78216137	Pi 71006 DN PS vst 3	PS vst 3	**210**	780
	77960149	Pi 72006 DN PS vst 6	PS vst 6		780
	77925662	Pi 73006 DN PS vst 10	PS vst 10		780
	78216145	Pi 74006 DN PS vst 16	PS vst 16		780
	78216152	Pi 75006 DN PS vst 25	PS vst 25		780
	76362586	Pi 33006 DN Drg 10	Drg 10	**20**	835
	70307615	Pi 35006 DN Drg 25	Drg 25		835
	on request	Pi 36006 DN Drg 40	Drg 40		-
	on request	Pi 37006 DN Drg 60	Drg 60		-
	76132369	Pi 38006 DN Drg 100	Drg 100		835
	on request	Pi 83006 DN Drg vst 10	Drg vst 10	**210**	-
	on request	Pi 85006 DN Drg vst 25	Drg vst 25		-
	on request	Pi 86006 DN Drg vst 40	Drg vst 40		780
	70318732	Pi 87006 DN Drg vst 60	Drg vst 60		525
	on request	Pi 88006 DN Drg vst 100	Drg vst 100		780
	76940050	Pi 89006 DN Drg vst 200	Drg vst 250		525

6.2.2 Filter elements for in-line filters acc. DIN 24550 part 3					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
100	77929714	Pi 13010 DN Mic 10	Mic 10	**20**	1375
	78260994	Pi 15010 DN Mic 25	Mic 25		1375
	78227472	Pi 21010 DN PS 3	PS 3		1375
	77960875	Pi 22010 DN PS 6	PS 6		1375
	77925597	Pi 23010 DN PS 10	PS 10		1375
	78261000	Pi 24010 DN PS 16	PS 16		1375
	78261018	Pi 25010 DN PS 25	PS 25		1375
	78227480	Pi 71010 DN PS vst 3	PS vst 3	**210**	1275
	77960131	Pi 72010 DN PS vst 6	PS vst 6		1275
	77925670	Pi 73010 DN PS vst 10	PS vst 10		1275
	78261281	Pi 74010 DN PS vst 16	PS vst 16		1275
	78216160	Pi 75010 DN PS vst 25	PS vst 25		1275
	70305610	Pi 33010 DN Drg 10	Drg 10	**20**	1375
	79735762	Pi 35010 DN Drg 25	Drg 25		1375
	76329098	Pi 36010 DN Drg 40	Drg 40		1375
	76344501	Pi 37010 DN Drg 60	Drg 60		1375
	79394677	Pi 38010 DN Drg 100	Drg 100		1375
	76330898	Pi 39010 DN Drg 250	Drg 250		1375
	on request	Pi 83010 DN Drg vst 10	Drg vst 10	**210**	1275
	79755877	Pi 85010 DN Drg vst 25	Drg vst 25		1275
	79359886	Pi 86010 DN Drg vst 40	Drg vst 40		1275
	79714239	Pi 87010 DN Drg vst 60	Drg vst 60		1275
	on request	Pi 88010 DN Drg vst 100	Drg vst 100		1275
160	77929722	Pi 13016 DN Mic 10	Mic 10	**20**	2530
	78261026	Pi 15016 DN Mic 25	Mic 25		2530
	78261034	Pi 21016 DN PS 3	PS 3		2530
	77960826	Pi 22016 DN PS 6	PS 6		2530
	77925605	Pi 23016 DN PS 10	PS 10		2530
	78261042	Pi 24016 DN PS 16	PS 16		2530
	78261059	Pi 25016 DN PS 25	PS 25		2530
	77940638	Pi 71016 DN PS vst 3	PS vst 3	**210**	1885
	77960123	Pi 72016 DN PS vst 6	PS vst 6		1885
	77925688	Pi 73016 DN PS vst 10	PS vst 10		1885
	78269797	Pi 74016 DN PS vst 16	PS vst 16		1885
	78216178	Pi 75016 DN PS vst 25	PS vst 25		1885
	on request	Pi 33016 DN Drg 10	Drg 10	**20**	2225
	79701954	Pi 35016 DN Drg 25	Drg 25		2225
	79363474	Pi 36016 DN Drg 40	Drg 40		2225
	76111991	Pi 37016 DN Drg 60	Drg 60		2225
	76371900	Pi 38016 DN Drg 100	Drg 100		2225
	on request	Pi 83016 DN Drg vst 10	Drg vst 10	**210**	-
	76940621	Pi 85016 DN Drg vst 25	Drg vst 25		1660
	on request	Pi 86016 DN Drg vst 40	Drg vst 40		-
	on request	Pi 87016 DN Drg vst 60	Drg vst 60		-
	76371967	Pi 88016 DN Drg vst 100	Drg vst 100		1660

6.2.2 Filter elements for in-line filters acc. DIN 24550 part 3					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
250	77929730	Pi 13025 DN Mic 10	Mic 10	**20**	4020
	78261067	Pi 15025 DN Mic 25	Mic 25		4020
	78227514	Pi 21025 DN PS 3	PS 3		4020
	77960834	Pi 22025 DN PS 6	PS 6		4020
	77925613	Pi 23025 DN PS 10	PS 10		4020
	78261075	Pi 24025 DN PS 16	PS 16		4020
	78261083	Pi 25025 DN PS 25	PS 25		4020
	77940646	Pi 71025 DN PS vst 3	PS vst 3	**210**	3090
	77960115	Pi 72025 DN PS vst 6	PS vst 6		3090
	77925696	Pi 73025 DN PS vst 10	PS vst 10		3090
	78269813	Pi 74025 DN PS vst 16	PS vst 16		3090
	78216186	Pi 75025 DN PS vst 25	PS vst 25		3090
	on request	Pi 33025 DN Drg 10	Drg 10	**20**	-
	76347199	Pi 35025 DN Drg 25	Drg 25		3530
	79736430	Pi 36025 DN Drg 40	Drg 40		3530
	79766882	Pi 37025 DN Drg 60	Drg 60		3530
	76370514	Pi 38025 DN Drg 100	Drg 100		3530
	on request	Pi 83025 DN Drg vst 10	Drg vst 10	**210**	-
	on request	Pi 85025 DN Drg vst 25	Drg vst 25		-
	on request	Pi 86025 DN Drg vst 40	Drg vst 40		-
	70303520	Pi 87025 DN Drg vst 60	Drg vst 60		3090
	76106504	Pi 88025 DN Drg vst 100	Drg vst 100		3090
400	77929748	Pi 13040 DN Mic 10	Mic 10	**20**	6770
	78261091	Pi 15040 DN Mic 25	Mic 25		6770
	78227522	Pi 21040 DN PS 3	PS 3		6770
	77960842	Pi 22040 DN PS 6	PS 6		6770
	77925621	Pi 23040 DN PS 10	PS 10		6770
	78261109	Pi 24040 DN PS 16	PS 16		6770
	78261117	Pi 25040 DN PS 25	PS 25		6770
	77940653	Pi 71040 DN PS vst 3	PS vst 3	**210**	5240
	77960107	Pi 72040 DN PS vst 6	PS vst 6		5240
	77930829	Pi 73040 DN PS vst 10	PS vst 10		5240
	78269821	Pi 74040 DN PS vst 16	PS vst 16		5240
	78260903	Pi 75040 DN PS vst 25	PS vst 25		5240
	on request	Pi 33040 DN Drg 10	Drg 10	**20**	-
	76180749	Pi 35040 DN Drg 25	Drg 25		5900
	76344949	Pi 36040 DN Drg 40	Drg 40		5900
	76114367	Pi 37040 DN Drg 60	Drg 60		3950
	76131809	Pi 38040 DN Drg 60	Drg 100		5900
	on request	Pi 83040 DN Drg vst 10	Drg vst 10	**210**	4900
	on request	Pi 85040 DN Drg vst 25	Drg vst 25		4900
	76370803	Pi 86040 DN Drg vst 40	Drg vst 40		4900
	78381196	Pi 87040 DN Drg vst 60	Drg vst 60		3300
	76180673	Pi 88040 DN Drg vst 100	Drg vst 100		4900

6.2.2 Filter elements for in-line filters acc. DIN 24550 part 3					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
630	77929755	Pi 13063 DN Mic 10	Mic 10	**20**	9300
	77961501	Pi 15063 DN Mic 25	Mic 25		9300
	77961519	Pi 21063 DN PS 3	PS 3		9300
	77943699	Pi 22063 DN PS 6	PS 6		9300
	77925639	Pi 23063 DN PS 10	PS 10		9300
	77961527	Pi 24063 DN PS 16	PS 16		9300
	77961535	Pi 25063 DN PS 25	PS 25		9300
	77961543	Pi 71063 DN PS vst 3	PS vst 3	**210**	7230
	77960099	Pi 72063 DN PS vst 6	PS vst 6		7230
	77925712	Pi 73063 DN PS vst 10	PS vst 10		7230
	77961550	Pi 74063 DN PS vst 16	PS vst 16		7230
	77961568	Pi 75063 DN PS vst 25	PS vst 25		7230
	79308107	Pi 33063 DN Drg 10	Drg 10	**20**	8685
	77943707	Pi 35063 DN Drg 25	Drg 25		8685
	77999154	Pi 36063 DN Drg 40	Drg 40		8685
	77943715	Pi 37063 DN Drg 60	Drg 60		8685
	77963408	Pi 38063 DN Drg 100	Drg 100		8685
	79309915	Pi 39063 DN Drg 250	Drg 250		8685
1000	77929763	Pi 13100 DN Mic 10	Mic 10	**20**	14950
	77961600	Pi 15100 DN Mic 25	Mic 25		14950
	77961618	Pi 21100 DN PS 3	PS 3		14950
	77943723	Pi 22100 DN PS 6	PS 6		14950
	77925647	Pi 23100 DN PS 10	PS 10		14950
	77961626	Pi 24100 DN PS 16	PS 16		14950
	77961634	Pi 25100 DN PS 25	PS 25		14950
	77961642	Pi 71100 DN PS vst 3	PS vst 3	**210**	11700
	77960081	Pi 72100 DN PS vst 6	PS vst 6		11700
	77925720	Pi 73100 DN PS vst 10	PS vst 10		11700
	77961659	Pi 74100 DN PS vst 16	PS vst 16		11700
	77961667	Pi 75100 DN PS vst 25	PS vst 25		11700
	on request	Pi 33100 DN Drg 10	Drg 10	**20**	14000
	77943731	Pi 35100 DN Drg 25	Drg 25		14000
	78229569	Pi 36100 DN Drg 40	Drg 40		14000
	77943749	Pi 37100 DN Drg 60	Drg 60		14000
	77977465	Pi 38100 DN Drg 100	Drg 100		14000
	78264095	Pi 39100 DN Drg 250	Drg 250		14000

6.2.3 Filter elements for tank top return line filters acc. DIN 24550 part 4					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
40	77925001	Pi 13004 RN Mic 10	Mic 10	**10**	900
	77962210	Pi 15004 RN Mic 25	Mic 25		900
	77923998	Pi 21004 RN PS 3	PS 3		820
	77964034	Pi 22004 RN PS 6	PS 6		820
	77924004	Pi 23004 RN PS 10	PS 10		820
	77962244	Pi 24004 RN PS 16	PS 16		820
	77960206	Pi 25004 RN PS 25	PS 25		820
	on request	Pi 33004 RN Drg 10	Drg 10		-
	77962277	Pi 35004 RN Drg 25	Drg 25		520
	77999394	Pi 36004 RN Drg 40	Drg 40		520
	77962301	Pi 37004 RN Drg 60	Drg 60		520
	on request	Pi 38004 RN Drg 100	Drg 100		-
63	77925019	Pi 13006 RN Mic 10	Mic 10	**10**	1585
	77962228	Pi 15006 RN Mic 25	Mic 25		1585
	77924012	Pi 21006 RN PS 3	PS 3		1445
	77964042	Pi 22006 RN PS 6	PS 6		1445
	77924020	Pi 23006 RN PS 10	PS 10		1445
	77962251	Pi 24006 RN PS 16	PS 16		1445
	77960214	Pi 25006 RN PS 25	PS 25		1445
	76345326	Pi 33006 RN Drg 10	Drg 10		-
	77962285	Pi 35006 RN Drg 25	Drg 25		915
	77999402	Pi 36006 RN Drg 40	Drg 40		915
	77962319	Pi 37006 RN Drg 60	Drg 60		915
	78266520	Pi 38006 RN Drg 100	Drg 100		915
100	77925027	Pi 13010 RN Mic 10	Mic 10	**10**	2610
	77962236	Pi 15010 RN Mic 25	Mic 25		2610
	77924038	Pi 21010 RN PS 3	PS 3		2380
	77940844	Pi 22010 RN PS 6	PS 6		2380
	77924046	Pi 23010 RN PS 10	PS 10		2380
	77962269	Pi 24010 RN PS 16	PS 16		2380
	77960222	Pi 25010 RN PS 25	PS 25		2380
	on request	Pi 33010 RN Drg 10	Drg 10		-
	77962293	Pi 35010 RN Drg 25	Drg 25		1510
	77999410	Pi 36010 RN Drg 40	Drg 40		1510
	77962327	Pi 37010 RN Drg 60	Drg 60		1510
	78298226	Pi 38010 RN Drg 100	Drg 100		1510
160	77925035	Pi 13016 RN Mic 10	Mic 10	**10**	3750
	77963598	Pi 15016 RN Mic 25	Mic 25		3750
	77924137	Pi 21016 RN PS 3	PS 3		3750
	77964067	Pi 22016 RN PS 6	PS 6		3750
	77924145	Pi 23016 RN PS 10	PS 10		3750
	77963648	Pi 24016 RN PS 16	PS 16		3750
	77960230	Pi 25016 RN PS 25	PS 25		3750
	on request	Pi 33016 RN Drg 10	Drg 10		-
	77963697	Pi 35016 RN Drg 25	Drg 25		2020
	77999428	Pi 36016 RN Drg 40	Drg 40		2020
	77963747	Pi 37016 RN Drg 60	Drg 60		2020
	on request	Pi 38016 RN Drg 100	Drg 100		-

6.2.3 Filter elements for tank top return line filters acc. DIN 24550 part 4					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
250	77925043	Pi 13025 RN Mic10	Mic 10	**10**	6050
	77963606	Pi 15025 RN Mic 25	Mic 25		6050
	77924152	Pi 21025 RN PS 3	PS 3		6050
	77964075	Pi 22025 RN PS 6	PS 6		6050
	77924160	Pi 23025 RN PS 10	PS 10		6050
	77963655	Pi 24025 RN PS 16	PS 16		6050
	77960248	Pi 25025 RN PS 25	PS 25		6050
	on request	Pi 33025 RN Drg 10	Drg 10		-
	77963705	Pi 35025 RN Drg 25	Drg 25		3250
	77999436	Pi 36025 RN Drg 40	Drg 40		3250
	77963754	Pi 37025 RN Drg 60	Drg 60		3250
	79335746	Pi 38025 RN Drg 100	Drg 100		3250
400	77925050	Pi 13040 RN Mic 10	Mic 10	**10**	9450
	77963614	Pi 15040 RN Mic 25	Mic 25		9450
	77924178	Pi 21040 RN PS 3	PS 3		8250
	77964083	Pi 22040 RN PS 6	PS 6		8250
	77924186	Pi 23040 RN PS 10	PS 10		8250
	77963663	Pi 24040 RN PS 16	PS16		8250
	77960255	Pi 25040 RN PS 25	PS 25		8250
	on request	Pi 33040 RN Drg 10	Drg 10		-
	77963713	Pi 35040 RN Drg 25	Drg 25		6370
	77999444	Pi 36040 RN Drg 40	Drg 40		6370
	77963762	Pi 37040 RN Drg 60	Drg 60		6370
	78267833	Pi 38040 RN Drg 100	Drg 100		6370
	79335894	Pi 39040 RN Drg 250	Drg 250		6370
630	77925068	Pi 13063 RN Mic 10	Mic 10	**10**	15550
	77963622	Pi 15063 RN Mic 25	Mic 25		15550
	77924194	Pi 21063 RN PS 3	PS 3		13515
	77964091	Pi 22063 RN PS 6	PS 6		13515
	77924202	Pi 23063 RN PS 10	PS 10		13515
	77963671	Pi 24063 RN PS 16	PS 16		13515
	77960263	Pi 25063 RN PS 25	PS 25		13515
	on request	Pi 33063 RN Drg 10	Drg 10		-
	77963721	Pi 35063 RN Drg 25	Drg 25		10320
	77999451	Pi 36063 RN Drg 40	Drg 40		10320
	77963770	Pi 37063 RN Drg 60	Drg 60		10320
	78264459	Pi 38063 RN Drg 100	Drg 100		10320
	79309253	Pi 39063 RN Drg 250	Drg 250		10320

6.2.3 Filter elements for tank top return line filters acc. DIN 24550 part 4					
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**
1000	77925076	Pi 13100 RN Mic 10	Mic 10	**10**	18335
	77963630	Pi 15100 RN Mic 25	Mic 25		18335
	77924210	Pi 21100 RN PS 3	PS 3		18335
	77964109	Pi 22100 RN PS 6	PS 6		18335
	77924228	Pi 23100 RN PS 10	PS 10		18335
	77963689	Pi 24100 RN PS 16	PS 16		18335
	77960271	Pi 25100 RN PS 25	PS 25		18335
	on request	Pi 33100 RN Drg 10	Drg 10		-
	77963739	Pi 35100 RN Drg 25	Drg 25		14210
	77999469	Pi 363100 RN Drg 40	Drg 40		14210
	77963788	Pi 37100 RN Drg 60	Drg 60		9590
	78299174	Pi 38100 RN Drg 250	Drg 100		14210

6.3 Filter elements 852 xxx series

6.3.1 Filter elements 852 xxx series						
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**	**Used in housing**
5	77684566	**852 149**	Mic 10	**20**	190	**Pi 4301**
	77684582		Mic 25		190	
	on request		Sm-N 2		-	
	77684632		Sm-x 3		165	
	on request		Sm-x 6		-	
	77684640		Sm-x 10		165	
	77684665		Sm-x 25		165	
5	77684681	**852 149**	Sm-x vst 3	**160**	150	**Pi 4301**
	on request		Sm-x vst 6		-	
	77684699		Sm-x vst 10		150	
	77684715		Sm-x vst 25		150	
5	77684343	**852 149**	Drg 10	**20**	165	**Pi 4301**
	77684368		Drg 25		165	
	77684384		Drg 40		165	
	77684400		Drg 60		165	
	77684525		Drg 100		165	
	77856990		Drg 200		165	
	on request		Drg 250		-	
	77857014		Drg 500		165	
5	77684434	**852 149**	Drg vst 10	**160**	150	**Pi 4301**
	77684459		Drg vst 25		150	
	77684475		Drg vst 40		150	
	77684483		Drg vst 60		150	
	77684509		Drg vst 100		150	

6.3.1 Filter elements 852 xxx series						
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**	**Used in housing**
20	77685340	**852 243**	Mic 10	**20**	360	**Pi 41002**
	77685373		Mic 25		360	
	on request		Sm-N 2		-	
	77685407		PS 3		305	
	78216038		PS 6		305	
	77740327		PS 10		305	
	78216053		PS 16		305	
	77685415		PS 25		305	
20	77685423	**852 243**	PS vst 3	**160**	275	**Pi 41002**
	78216046		PS vst 6		275	
	77685431		PS vst 10		275	
	78216061		PS vst 16		275	
	77685449		PS vst 25		275	
20	77740301	**852 243**	Drg 10	**20**	305	**Pi 41002**
	77685316		Drg 25		305	
	on request		Drg 40		-	
	77685324		Drg 60		305	
	77740319		Drg 100		305	
	77872625		Drg 200		305	
	on request		Drg 300		-	
	on request		Drg 500		-	
20	77740822	**852 243**	Drg vst 10	**160**	275	**Pi 41002**
	77740830		Drg vst 25		275	
	on request		Drg vst 40		-	
	77685332		Drg vst 60		275	
	77740848		Drg vst 100		275	
35	78309387	**852 939**	Mic 10	**5**	870	**Pi 53003**
	78206781		Mic 25		870	
35	77699705	**852 588**	Mic 10	**10**	920	**Pi 53003**
	78206328		Mic 25		920	
	79312117		Sm-x 3		650	
	79355595		Sm-x 6		650	
	79312125		Sm-x 10		650	
	on request		Sm-x 16		-	
	79312133		Sm-x 25		650	
	79353509		Drg 25		590	
	77696065		Drg 100		590	
50	78309205	**852 940**	Mic 10	**5**	1100	**Pi 53005**
	79312299		Mic 25		1100	
50	79312158	**852 945**	Sm-x 3	**10**	810	**Pi 53005**
	on request		Sm-x 6		-	
	79312166		Sm-x 10		810	
	on request		Sm-x 16		-	
	79312174		Sm-x 25		810	
	79362690		Drg 25		750	

6.3.1 Filter elements 852 xxx series						
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**	**Used in housing**
	77675903		Mic 10		27000	
	77675911		Mic 25		27000	
	79735952		KS-Mic 25		18150	
	79309303		Sm-N 2		13150	
	77956220		PS 3		15500	
	on request		PS 6		-	
	77725583		PS 10		15500	
	on request		PS 16		-	
50	on request	**852 275**	PS 25	**5**	-	**Pi 1975**
	on request		Drg 10		-	
	77678048		Drg 25		14000	
	77910011		Drg 40		14000	
	on request		Drg 60		-	
	77678097		Drg 100		14000	
	on request		Drg 200		-	
	79747114		Drg 250		14000	
	on request		Drg 500		-	
	77729338		Mic 10		5700	
	77729429		Mic 25		5700	
	77729551		Sm-x 10		3750	
	77729577		Sm-x 25		3750	
	77998388		Drg 10		2300	
80	on request	**852 753**	Drg 25	*****	-	**Pi 1607**
	77729460		Drg 40		2300	
	77862345		Drg 60		2300	
	77729486		Drg 100		2300	
	on request		Drg 250		-	
	on request		Drg 500		-	
	77729387		Mic 10		15850	
	77729445		Mic 25		15850	
	77730179		Sm-x 10		10400	
	77730195		Sm-x 25		10400	
	on request		Drg 10		-	
100	on request	**852 754**	Drg 25	*****	-	**Pi 1615**
	77729510		Drg 40		6250	
	77862352		Drg 60		6250	
	77729528		Drg 100		6250	
	on request		Drg 250		-	
	on request		Drg 500		-	

* Suction filters: flow direction from inside to outside

6.3.1 Filter elements 852 xxx series						
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**	**Used in housing**
160	77874514	**852 821**	Mic 10	*****	16750	**Pi 1620**
	77874522		Mic 25		16750	
	77999089		Sm-x 10		11000	
	77874530		Sm-x 25		11000	
	on request		Drg 10		-	
	on request		Drg 25		-	
	on request		Drg 40		-	
	77874548		Drg 60		6650	
	77874555		Drg 100		6650	
	78376238		Drg 250		6650	
	on request		Drg 500		-	
400	77774441	**852 760**	Mic 10	**5**	23800	**Pi 1535**
	77806581		Mic 25		23800	
	79364407		KS-Mic 25		19000	
	77955859		Sm-N 2		16000	
400	77774433	**852 760**	PS 3	**10**	14500	**Pi 1535**
	78299042		PS 6		14500	
	77774425		PS 10		14500	
	77806565		PS 25		14500	
	on request		Drg 10		-	
	77936594		Drg 25		11680	
	on request		Drg 40		-	
	78367682		Drg 60		11680	
	77914773		Drg 100		11680	
	on request		Drg 250		-	
	79336785		Drg 500		11680	
630	77774409	**852 761**	Mic 10	**5**	47600	**Pi 1560**
	77806599		Mic 25		47600	
	79364134		KS-Mic 25		38000	
	78375867		Sm-N 2		38000	
630	77774391	**852 761**	PS 3	**10**	29000	**Pi 1560**
	78225898		PS 6		29000	
	77774383		PS 10		29000	
	77806573		PS 25		29000	
	on request		Drg 10		-	
	78269938		Drg 25		23360	
	79376542		Drg 40		23360	
	78264574		Drg 60		23360	
	77896913		Drg 100		23360	
	78379653		Drg 250		23360	
	77974629		Drg 500		23360	

* Suction filters: flow direction from inside to outside

6.3.1 Filter elements 852 xxx series						
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**	**Used in housing**
800	76113369	**852 014**	Mic 10	**20**	26440	**Pi 23040**
	76113385		Mic 25		26440	
	76113401		KS-Mic 25		22690	
	76136220		Sm-N 2		18533	
	76321830		PS 3		24830	
	76321822		PS 6		24830	
	76321814		PS 10		24830	
	76321806		PS 25		24830	
	on request		Drg 10		-	
	70367987		Drg 25		21860	
	on request		Drg 40		-	
	on request		Drg 60		-	
	on request		Drg 100		-	
	70367986		Drg 250		14350	
	on request		Drg 500		-	
1250	78207664	**852 888**	Mic 10	**10**	21850	**Pi 1907** **Pi 281**
	78226839		Mic 25		21850	
	76111371		KS-Mic 25		20100	
	76114979		Sm-N 2		14000	
	78263295		PS 3		21850	
	78354029		PS 6		21850	
	78226813		PS 10		21850	
	78226821		PS 25		21850	
	on request		Drg 10		-	
	78228017		Drg 25		16500	
	78228025		Drg 40		16500	
	78303026		Drg 60		16500	
	78228470		Drg 100		16500	
	78382772		Drg 250		16500	
	79337148		Drg 500		16500	
1400	76113427	**852 015**	Mic 10	**20**	60900	**Pi 23080**
	76113443		Mic 25		60900	
	76345995		KS-Mic 25		52250	
	76136212		Sm-N 2		42275	
	76321897		PS 3		57200	
	76321889		PS 6		57200	
	76321871		PS 10		57200	
	76321863		PS 25		57200	
	on request		Drg 10		-	
	70341663		Drg 25		51450	
	76940290		Drg 40		51450	
	70360020		Drg 60		34242	
	76919666		Drg 100		51450	
	on request		Drg 200		-	
	on request		Drg 250		-	
	on request		Drg 500		-	

6.3.1 Filter elements 852 xxx series						
Nominal size NG [l/min]	**Order number**	**Type**	**Filter material**	**max. Δ p [bar]**	**Filter surface [cm²]**	**Used in housing**
1800	70366315	**852 884**	Mic 10	**10**	-	**Pi 1907 Pi 281**
	78267171		Mic 25		28500	
	on request		KS-Mic 25		-	
	79715434		Sm-N 2		23450	
	78227431		PS 3		28500	
	79337916		PS 6		28500	
	78226797		PS 10		28500	
	78375925		PS 16		28500	
	78226805		PS 25		28500	
	on request		Drg 10		-	
	79337460		Drg 25		23450	
	78261653		Drg 40		23450	
	79700402		Drg 60		23450	
	79327750		Drg 100		23450	
	78367393		Drg 250		23450	
	78376204		Drg 500		23450	

7. 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 Filtration Group spare
elements in stock. Disposable elements (Mic, KS-Mic, PS and Sm-x) cannot be cleaned .

8. Possibilities of cleaning wire gauge elements

1. Ultrasonic cleaning

Immerse contaminated filter element into the ultrasonic bath for approx. 90 – 120 minutes, then flush with clean solvent. Then carefully blow out filter element from the clean side in outward direction using compressed air. As solvent, cleaning gasoline etc. may be used.

2. Manual cleaning

Only for degree of filtration ≥ 40 µm.

1 . Remove coarse external dirt with a brush or similar tool in a separate cleaning container filled with solvent such as cleaning gasoline.

2 . Put filter element into a clean liquid solvent (approx. 20 minutes).

3 . Flush filter element with liquid solvent from inside to outside.

4 . Blow out filter element from the clean side in outward direction using compressed air.

With either method ascertain that no dirt can deposit on the inside (clean side) of the filterelement. Further it needs to be considered that the element will not damaged because of proper handling. An entire cleaning (100 %) cannot be achieved (especially at a grade of filtration≤ 25 µm. The service life of the element will decrease continiously per cleaning!

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Filter elements for hydraulic and lubricating fluids
e-protect

electrostatically conductive

1. Features

High-performance filter elements for low conductive hydraulic and lubricating oils

The FGC e-protect filter element made by Filtration Group, has been designed for use with low conductive hydraulic and lubricating oils (e.g. turbine lubricating oil in power plant technology) . The filter element is distinguished by reliable conductivity, which has been registered for patent approval, as well as an element design that is optimised to suit electrostatic properties. The special element design prevents damage in the filter layers caused by electrostatic discharge.

The long-term advantages of using FGC e-protect filter elements:

- No disruptive discharge or damage in the filter material caused by electrostatic discharge
- Reliable filtration during the entire service life of the element
- Guaranteed equipment availability
- Prevention of follow-up costs
- Increase of oil service life
- Prevention of varnish build-up on the element caused by electrostatic effects
- No additional maintenance requirements needed because of direct compatibility with conventional filter elements
- Reliable filtration in electrostatically critical applications
- High dirt-holding capacity, defined filtration rate and efficient differential pressure properties
- Worldwide distribution

2. Description

Charge separation in fluid systems is a well-known phenomenon in high-performance filters (filter fineness < 10 µm).
Charge separation occurs during perfusion of the filter's fine pores due to the viscous friction between the oil molecules and the surface of the fibre. Electron transfer takes place as a result of the close contact between the friction partners.
The intensity and direction of the electron transfer depends on the material properties of the friction partners (triboelectric series). Depending on the electric properties of the filter material and of the oil, there is a subsequent charge equalisation or charge accumulation (after charge separation).
With the fluids that have dominated the market so far, the charge separation is equalised again depending on the so-called relaxation time so that there are no noticeable effects in the fluid components including the filter elements or in the fluids (TRBS 2153).

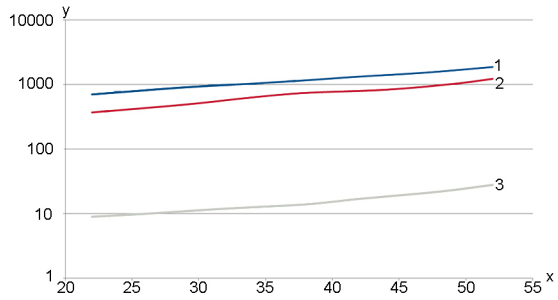
A significant increase of electrostatic charge within the fluid systems can have many causes:

- Low retention time due to increasingly compact systems with low oil volumes
- Increasing filtration requirements, even in lubrication applications
- Increased application of environmentally-friendly zinc and ash-free oils

3. Practical consequences

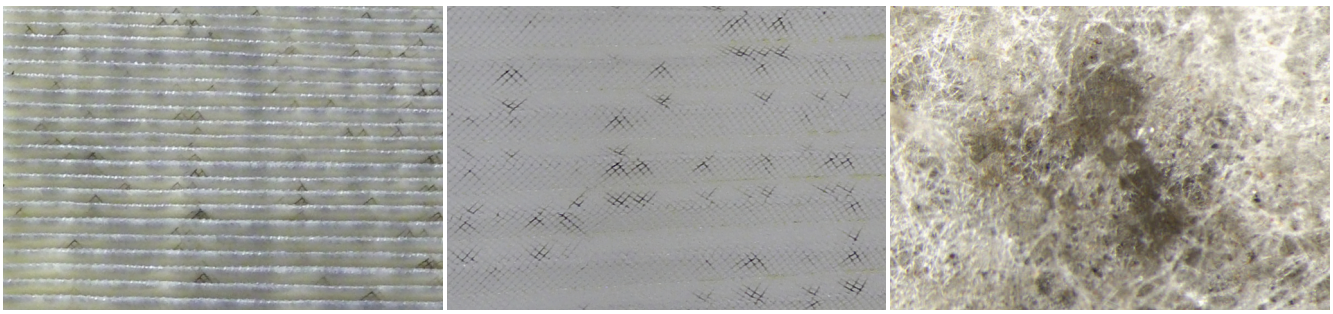
If these requirements are satisfied, electrostatic charges can occur in the filter element and in the fluid, which are equalised through local discharge with a higher energy. Indicators of intense discharge processes range from audible crackling to detectable damage in the filter layers and components. Effects on oil ageing and the appearance of "varnish" plus the malfunction of electronic components cannot be excluded. However, these depend on additional limiting conditions in the respective system. Filters that prevent electrostatic discharge must be used when high viscosity lubricating oils are utilised with fine filters as well as in the field of power plant technology.

To prevent electrostatic charges, the conductivity of the fluid should be at least 500 pS/m.
With the new zinc and ash-free hydraulic oils however, there are fluids on the market that are far below the minimum conductivity mentioned above, which can lead to increased electrostatic charges.



x = Oil temperature °C
y = Conductivity pS/m

1 = High-alloy hydraulic oil, contains Zn
2 = Synthetic ester (HEES)
3 = Low-alloy hydraulic oil, Zn-free



Filter materials with discharge traces when using zinc and ash-free oil.

4. Prevention of damaging discharge

We generally recommend the application of FGC e-protect filter elements or hydraulic and lubricating oils with conductivity < 500 pS/m (e.g. zinc and ash-free oils) or when electrostatic effects occur in the system (e.g. discharge sounds).

Designation examples:	
Pi 3105 PS 10	Standard design
Pi 3105 PS 10 EP	e-protect design

The FGC e-protect design is available as an additional feature with PS, SM-x and MB elements. The e-protect design is marked with the addition "EP" in the element description.

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72360363.03/2017