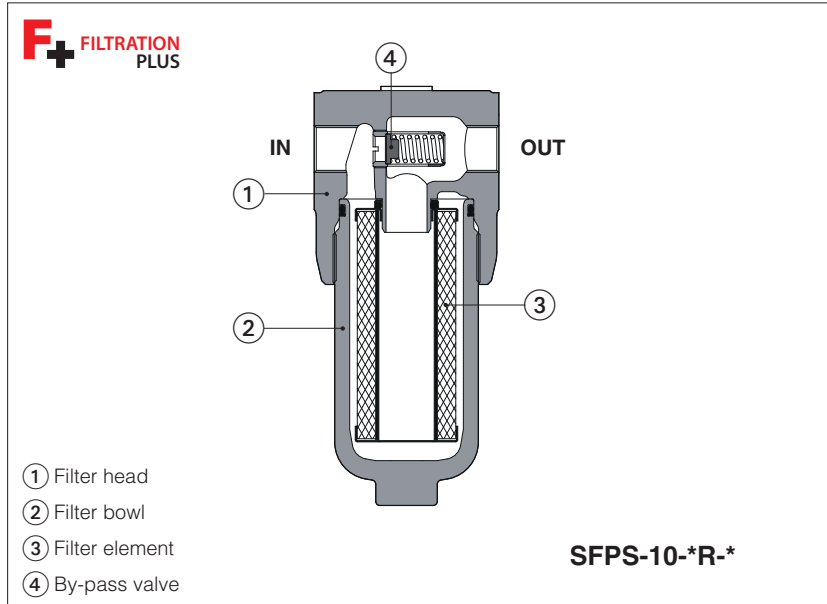


In line filters, high pressure type SFPS

Threaded ports



SFPS

In line filters are designed for installation on the pressure line downstream the pump, to ensure a high cleanliness of the fluid circulating into the hydraulic system. They protect sensible components from contamination present in the working fluid and they are particularly recommended for systems with proportional valves.

- three head sizes
- port sizes: G1/2" to G1 1/2"
SAE-16, SAE-20, SAE-24
- **Filtration Plus** microfiber elements ensure high efficiency, low pressure drop, high DHC and long lasting performance. Collapse pressure 21 bar for filters equipped with by-pass valve or 210 bar for filters without by-pass
- filtration rating 5 - 7 - 12 - 22 μm(c) (βx(c) >1000, ISO 16889).
- versions without or with by-pass valve with cracking pressure 6 bar.
- without or with differential clogging indicator

Max flow **450 l/min**
Max working pressure **420 bar**

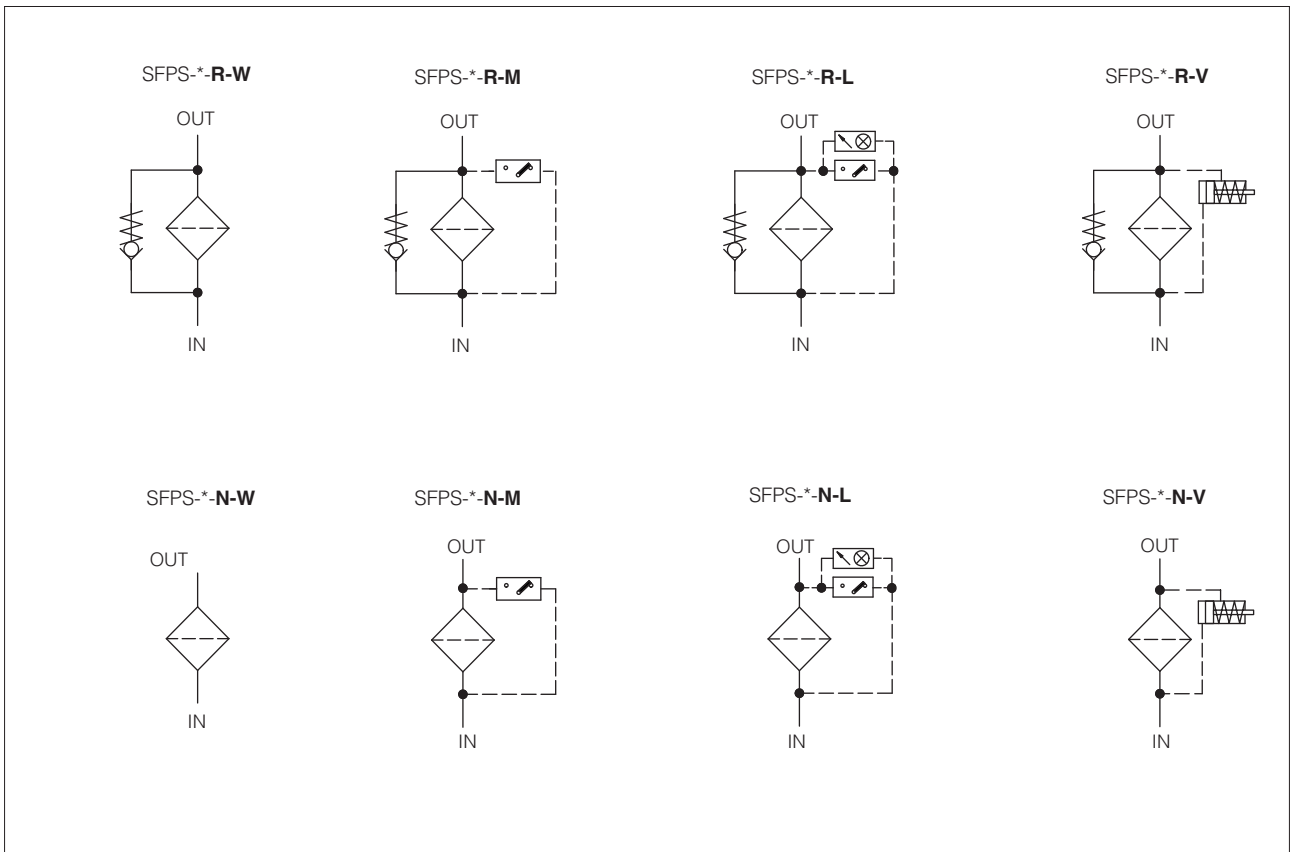
1 MODEL CODE OF COMPLETE FILTERS

SFPS	-	10	-	A	-	F10	-	01	-	R	-	W	*	/	*																				
In line filter, high pressure													Seals material: - = NBR PE = FKM																						
Filter size (ports size): 10 = G1/2" ÷ G1" or SAE-16 20 = G1" ÷ G1 1/4" or SAE-20 30 = G1 1/4" ÷ G1 1/2" or SAE-24													Series number																						
<table border="1"> <thead> <tr> <th>Filter length:</th> <th>SFPS-10</th> <th>SFPS-20</th> <th>SFPS-30</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>= 115</td> <td>191</td> <td>256</td> </tr> <tr> <td>B</td> <td>= 137</td> <td>205</td> <td>361</td> </tr> <tr> <td>C</td> <td>= -</td> <td>226</td> <td>406</td> </tr> <tr> <td>D</td> <td>= -</td> <td>-</td> <td>450</td> </tr> </tbody> </table>													Filter length:	SFPS-10	SFPS-20	SFPS-30	A	= 115	191	256	B	= 137	205	361	C	= -	226	406	D	= -	-	450			
Filter length:	SFPS-10	SFPS-20	SFPS-30																																
A	= 115	191	256																																
B	= 137	205	361																																
C	= -	226	406																																
D	= -	-	450																																
Filter element: SN = only body, without filter element F+ microfiber filter element βx(c) >1000 - ISO 16889: F03 = 5 μm (c) F10 = 12 μm (c) F06 = 7 μm (c) F20 = 22 μm (c) Filter element F01 = 4 μm (c) available on request																																			
<table border="1"> <thead> <tr> <th>Ports size:</th> <th>SFPS-10</th> <th>SFPS-20</th> <th>SFPS-30</th> </tr> </thead> <tbody> <tr> <td>BSPP</td> <td>00 = G 1/2"</td> <td>02 = G 1"</td> <td>03 = G 1 1/4"</td> </tr> <tr> <td>threaded:</td> <td>01 = G 3/4" 02 = G 1"</td> <td>03 = G 1 1/4"</td> <td>04 = G 1 1/2"</td> </tr> <tr> <td>SAE J1926-1 threaded:</td> <td>42 = SAE-16</td> <td>43 = SAE-20</td> <td>44 = SAE-24 (1 1/2")</td> </tr> </tbody> </table>													Ports size:	SFPS-10	SFPS-20	SFPS-30	BSPP	00 = G 1/2"	02 = G 1"	03 = G 1 1/4"	threaded:	01 = G 3/4" 02 = G 1"	03 = G 1 1/4"	04 = G 1 1/2"	SAE J1926-1 threaded:	42 = SAE-16	43 = SAE-20	44 = SAE-24 (1 1/2")							
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BSPP	00 = G 1/2"	02 = G 1"	03 = G 1 1/4"																																
threaded:	01 = G 3/4" 02 = G 1"	03 = G 1 1/4"	04 = G 1 1/2"																																
SAE J1926-1 threaded:	42 = SAE-16	43 = SAE-20	44 = SAE-24 (1 1/2")																																
Differential clogging indicator see sect. 14 (2): W = without, indicator port with plastic plug (3) P = without, indicator port with steel plug L = electrical indicator with LED M = electrical indicator without LED V = visual indicator see also note (4)																																			
By-pass valve see sect. 9: R = by-pass valve with cracking pressure 6 bar (filter element SPSH-*R with collapse pressure 21 bar) N = without by-pass (filter element SPSH-*-N with collapse pressure 210 bar)																																			

Note: filters for use in potentially explosive atmosphere are available on request, contact Atos Technical Office

- (1) Max flow rates are measured with: Δp 1 bar, filter element F20, largest port size, option -R, oil viscosity 32 mm²/s - see also section 6
In case of different conditions see section 10 for filter sizing
- (2) The clogging indicator is supplied disassembled from the filter. The indicator port on filter head is plugged with plastic plug
- (3) The plastic plug (option W) is factory assembled to prevent impurities from entering the filter through the clogging indicator port.
A clogging indicator must be fitted on the filter before commissioning. Do not install the filter with the plastic cap on the hydraulic system
- (4) Differential clogging indicator CID-E*-M/UL with cURus certification is available on request, see section 4

2 HYDRAULIC SYMBOLS (representation according to ISO 1219-1)



3 MODEL CODE OF FILTER ELEMENTS - only for spare (1)

<p>SPSH</p> <p>Spare filter element for in line filter type SFPS</p>	-	<p>10</p>	-	<p>A</p>	-	<p>F10</p>	-	<p>R</p>	/	<p>*</p>															
<p>Filter element size:</p> <p>10 = for SFPS-10 20 = for SFPS-20 30 = for SFPS-30</p>								<p>R = filter element with collapse pressure 21 bar, for filter SFPS-*-R with by-pass valve</p> <p>N = filter element with collapse pressure 210 bar, for filter SFPS-*-N without by-pass valve</p>		<p>Seals material: - = NBR PE = FKM</p>															
<p>Filter element length:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">for SFPS-10</td> <td style="width: 33%;">for SFPS-20</td> <td style="width: 33%;">for SFPS-30</td> </tr> <tr> <td>A</td> <td>A</td> <td>A</td> </tr> <tr> <td>B</td> <td>B</td> <td>B</td> </tr> <tr> <td></td> <td>C</td> <td>C</td> </tr> <tr> <td></td> <td></td> <td>D</td> </tr> </table>	for SFPS-10	for SFPS-20	for SFPS-30	A	A	A	B	B	B		C	C			D								<p>Microfibre filter element, $\beta_{x(c)} > 1000$ - ISO 16889:</p> <p>F03 = 5 μm (c) F06 = 7 μm (c) F10 = 12 μm (c) F20 = 22 μm (c) Filter element F01 = 4 μm (c) available on request</p>		
for SFPS-10	for SFPS-20	for SFPS-30																							
A	A	A																							
B	B	B																							
	C	C																							
		D																							

(1) Select the filter element according to the model code reported on the filter nameplate, see section 17

4 MODEL CODE OF DIFFERENTIAL CLOGGING INDICATORS - only for spare - see section 13 and 14

CID	-	E	05	-	M	*	/	*
Spare differential clogging indicator for in line filter						Series number		Seals material: - = NBR PE = FKM
Type of indicator: E = electrical V = visual								
Differential switching pressure: 05 = 5 bar for filters with by-pass valve 08 = 8 bar for filters without by-pass valve								
					Optional LED - only for CID-E L = with LED M = without LED M/UL = without LED, certified according to North American Standard cURus (available on request)			

5 GENERAL CHARACTERISTICS

Assembly position / location	Vertical position with the bowl downward
Ambient temperature range	Standard = -20°C ÷ +70°C / PE option = -20°C ÷ +70°C
Storage temperature range	Standard = -20°C ÷ +80°C / PE option = -20°C ÷ +80°C
Materials	Filter head: Cast iron Filter bowl: Carbon steel
Surface protection	Zinc coating with black passivation
Corrosion resistance	Salt spray test (EN ISO 9227) > 600 h
Fatigue strength	min. 1 x 10 ⁶ cycles at 420 bar
Compliance	Tested to NFPA T3.10.5.1, ISO 10771, ISO 3968 RoHS Directive 2011/65/EU as last update by 2015/863/EU REACH Regulation (EC) n°1907/2006

6 HYDRAULICS CHARACTERISTICS - based on mineral oil ISO VG 46 at 50 °C (viscosity 32mm²/s)

Filter size	SFPS-10						SFPS-20						SFPS-30								
	00		01		02, 42		02		03, 43		03		04, 44								
Ports size code	G1/2"		G3/4		G1", SAE-16		G1"		G1"1/4, SAE-20		G1"1/4		G1"1/2, SAE-24								
Filter length	A	B	A	B	A	B	A	B	C	A	B	C	A	B	C	D	A	B	C	D	
Max flow (l/min) at Δp= 1 bar Filter with by-pass - R (see note)	F03	36	56	40	62	43	73	73	84	105	80	93	118	88	164	213	259	91	172	226	277
	F06	48	69	53	79	61	98	100	112	135	112	127	154	127	225	277	330	132	239	297	356
	F10	63	79	72	92	86	120	135	148	170	154	170	195	183	275	321	380	193	295	347	414
	F20	78	87	90	101	115	137	166	178	196	191	205	226	240	333	373	412	256	361	406	450
Max flow (l/min) at Δp= 1 bar Filter without by-pass - N (see note)	F03	31	43	34	48	36	53	60	70	88	65	76	98	71	120	191	215	74	125	202	228
	F06	47	55	52	61	58	71	83	94	116	91	105	131	93	187	228	290	97	197	242	311
	F10	54	75	60	87	70	111	117	130	153	133	149	176	158	245	298	343	166	260	321	372
	F20	72	85	82	99	103	131	154	166	187	177	192	215	210	315	367	380	223	340	400	414
Max operating pressure [bar]	420																				
Burst pressure [bar]	> 1260																				

Note: Max flow rates are measured with Δp= 1 bar and viscosity 32mm²/s. In case of different conditions see section 10 for filter sizing

7 FILTER ELEMENTS 

Material		Inorganic microfibre
Filtration rating as per ISO16889	F03	$\beta_{4,5\mu\text{m}}(c) \geq 1000$
	F06	$\beta_{7\mu\text{m}}(c) \geq 1000$
	F10	$\beta_{12\mu\text{m}}(c) \geq 1000$
	F20	$\beta_{22\mu\text{m}}(c) \geq 1000$
Filter element collapse pressure	R = for filter with by-pass valve	21 bar
	N = for filter without by-pass valve	210 bar

8 SEALS AND HYDRAULIC FLUIDS - for other fluids not included in below table, consult our technical office

Seals, recommended fluid temperature	NBR seals (standard) = $-30^{\circ}\text{C} \div +100^{\circ}\text{C}$, with HFC hydraulic fluids = $+10^{\circ}\text{C} \div +50^{\circ}\text{C}$ FKM seals (/PE option) = $-25^{\circ}\text{C} \div +120^{\circ}\text{C}$		
Recommended viscosity	15 ÷ 100 mm ² /s - max allowed range 2.8 ÷ 500 mm ² /s		
Hydraulic fluid	Suitable seals type	Classification	Ref. Standard
Mineral oils	NBR, FKM	HL, HLP, HLPD, HVL, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDD, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

9 BY-PASS VALVE

Filter with by-pass valve - version -R

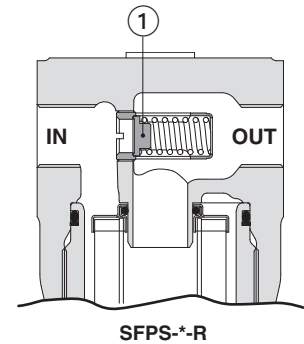
The filter with by-pass valve ① is used in combination with filter elements SPSH-*-R with collapse pressure 21 bar.

The by-pass valve allows the oil flow to by-pass the filter element in particular conditions:

- it protects the filter element from pressure peaks that could be generated, especially at the cold system start-up. In these cases the valve opens only for the instant necessary to discharge the pressure peak, limiting the quantity of oil that bypasses the filter.

- it allows the free passage of the oil flow in case of completely clogged filter element ($\Delta p > 6$ bar).

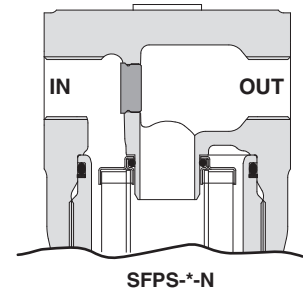
This situation should be carefully avoided, by means of a scheduled maintenance, otherwise the contaminated oil will pass to the clean side of the filter and then it will circulate in the hydraulic system. The filter element must be replaced before the clogging condition, at this purpose the use of a differential clogging indicator CID-V (visual, option V) or CID-E (electrical, options L or M) is highly recommended.



Filter without by-pass valve - version -N

The filter version without by-pass is recommended when the hydraulic system must be absolutely protected by contamination, then avoiding the risk that the contaminant passes through the by-pass valve.

The filter without by pass must be used in combination with filter elements SPSH-N with high collapse pressure 210 bar



10 FILTERS SIZING

For the filter sizing it is necessary to consider the Total Δp at the maximum flow at which the filter must work.

The Total Δp is given by the sum of filter head Δp plus the filter element Δp :

$$\text{Total } \Delta p = \text{filter head } \Delta p + \text{filter element } \Delta p$$

In the best conditions the total Δp should not exceed 1,0 bar

See below sections to calculate the Δp of filter head and Δp of the filter element

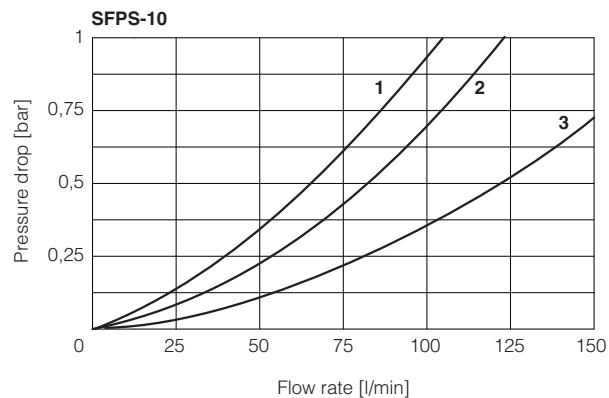
10.1 Q/ Δp DIAGRAMS OF FILTER HEAD

The pressure drop of filter head mainly depends on the ports size and fluid density

In the following diagrams are reported the Δp characteristics of filter head based on mineral oil with density 0,86 kg/dm³ and viscosity 30 mm²/s

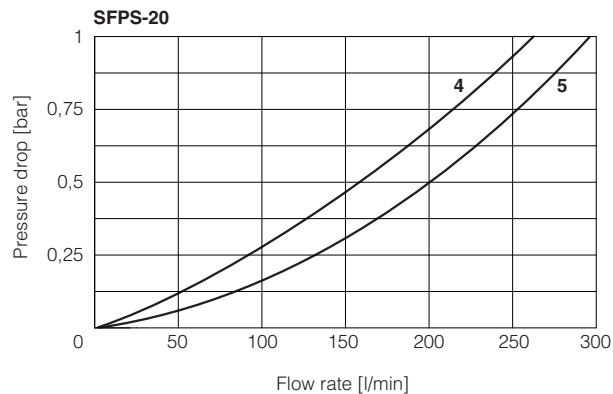
SFPS-10

- 1 = SFPS-10*** 00 (G 1/2")
- 2 = SFPS-10*** 01 (G 3/4")
- 3 = SFPS-10*** 02 (G 1")
SFPS-10*** 42 (SAE-16)



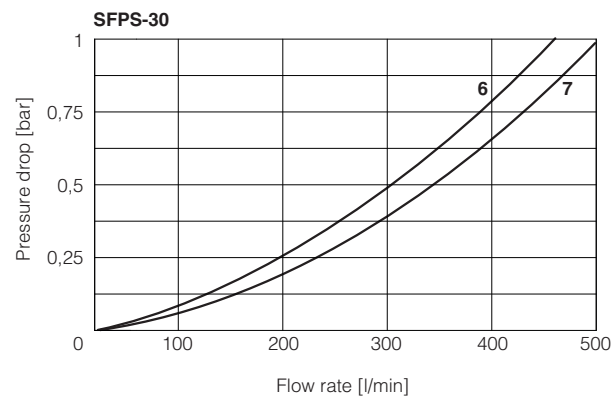
SFPS-20

- 4 = SFPS-20*** 02 (G 1")
- 5 = SFPS-20*** 03 (G 1 1/4")
SFPS-20*** 43 (SAE-20)



SFPS-30

- 6 = SFPS-30*** 03 (G 1 1/4")
- 7 = SFPS-30*** 04 (G 1 1/2")
SFPS-30*** 44 (SAE-24)



10.2 FILTER ELEMENT Δp

The pressure drop through the filter depends to:

- size of filter element
- filtration rating
- fluid viscosity

The Δp of filter element is given by the formula:

$$\Delta p \text{ of filter element} = Q \times \frac{Gc}{1000} \times \frac{\text{Viscosity}}{32}$$

Q = working flow (l/min)

Gc = Gradient coefficient (mbar/(l/min)).

The Gc values are reported in the following table

Viscosity = effective fluid viscosity in the working conditions (mm²/s)

Gradient coefficient Gc of SPSH filter elements

Filter element size		10		20			30			
Filter element length		A	B	A	B	C	A	B	C	D
Filter element type	Filtration rating	Gc Gradient coefficient								
R for filter with bypass valve	F03	21.30	10.84	11.07	9.23	6.74	10.26	4.82	3.27	2.30
	F06	13.97	6.79	7.27	6.06	4.43	6.73	2.98	1.99	1.26
	F10	8.39	4.42	4.45	3.71	2.71	4.12	2.02	1.36	0.70
	F20	4.78	2.93	2.87	2.39	1.75	2.66	1.21	0.77	0.40
N for filter without bypass valve	F03	26.03	16.72	14.19	11.83	8.64	13.00	7.15	3.87	3.21
	F06	14.77	11.25	9.50	7.92	5.79	9.63	4.00	2.93	1.80
	F10	11.57	5.25	5.66	4.72	3.45	5.05	2.57	1.67	1.10
	F20	6.13	3.34	3.41	2.84	2.07	3.33	1.44	0.83	0.70

Example:

Calculation of Total Δp for filter type SFPS-10-B-F10-02-R at Q = 80 l/min and viscosity 46 mm²/s (filter element SPSH-10-B-F10-R)

Dp of filter head = 0,24 bar

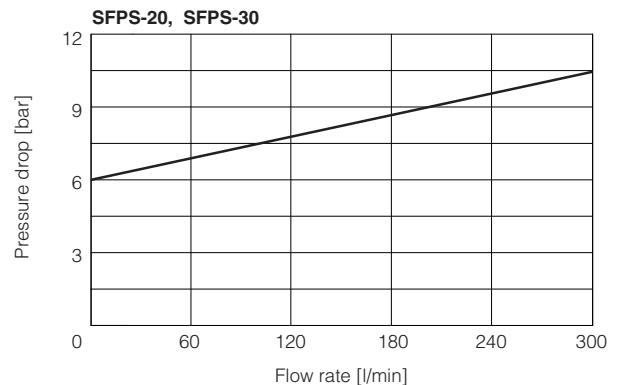
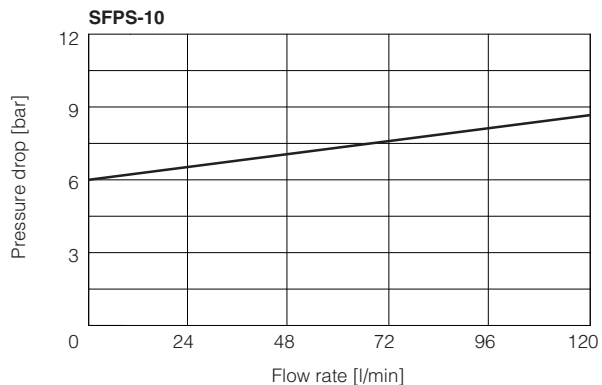
Gr = 4,42 mbar/(l/min)

$$\text{Filter element } \Delta p = 80 \times \frac{4,42}{1000} \times \frac{46}{32} = 0,51 \text{ bar}$$

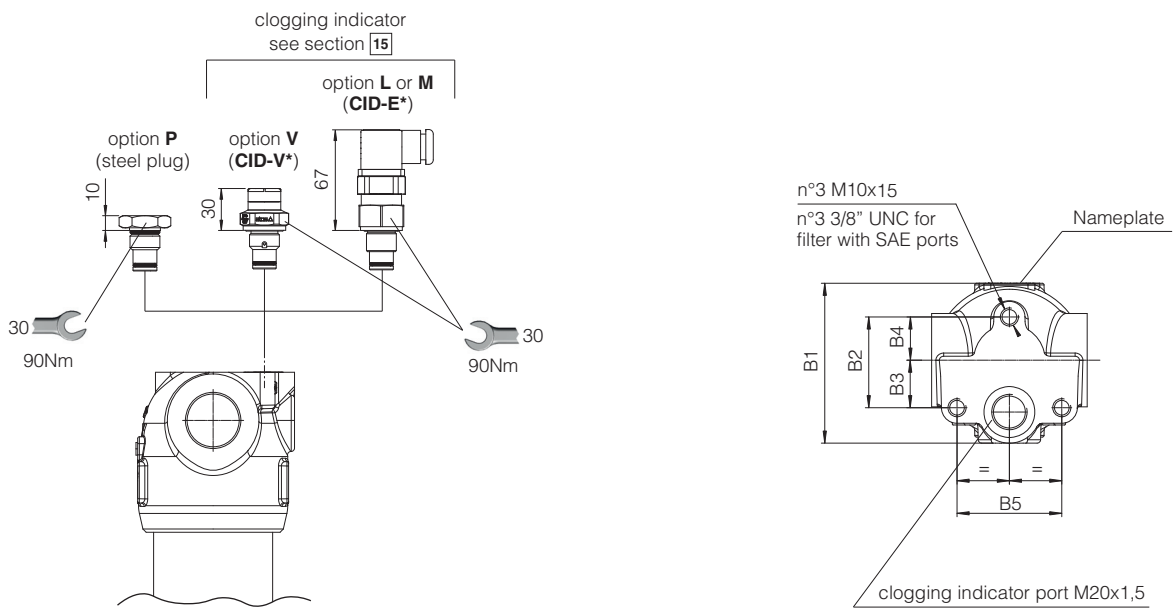
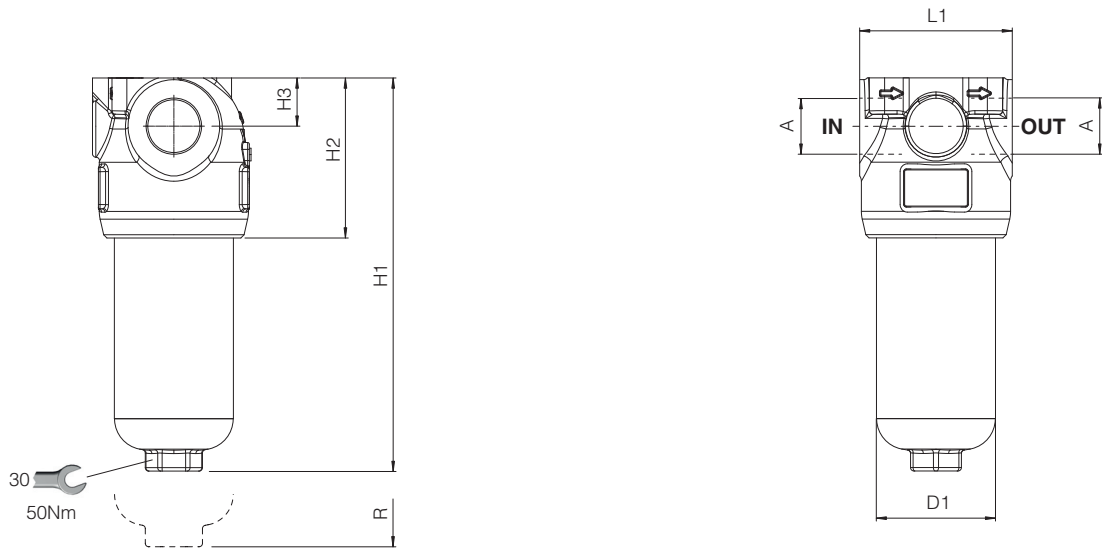
Total Δp = 0,24 + 0,51 = **0,75 bar**

11 BY-PASS VALVE - based on mineral oil ISO VG46 at 50°C (viscosity = 32 mm²/s)

Q/ Δp diagrams of flow through the by-pass valve



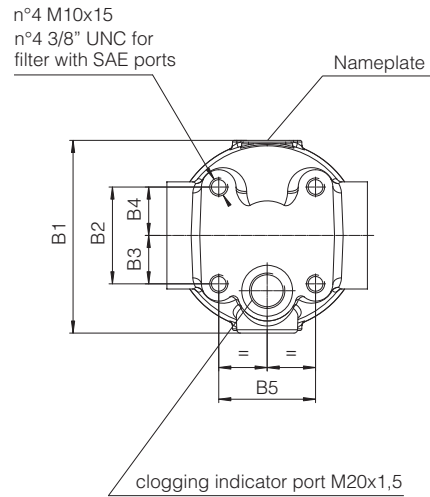
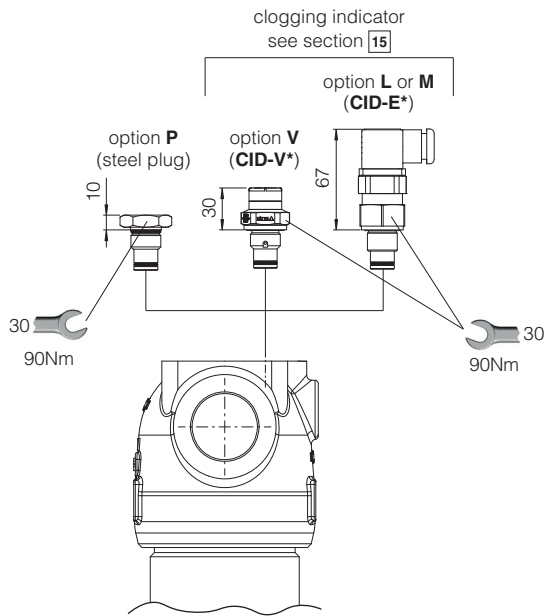
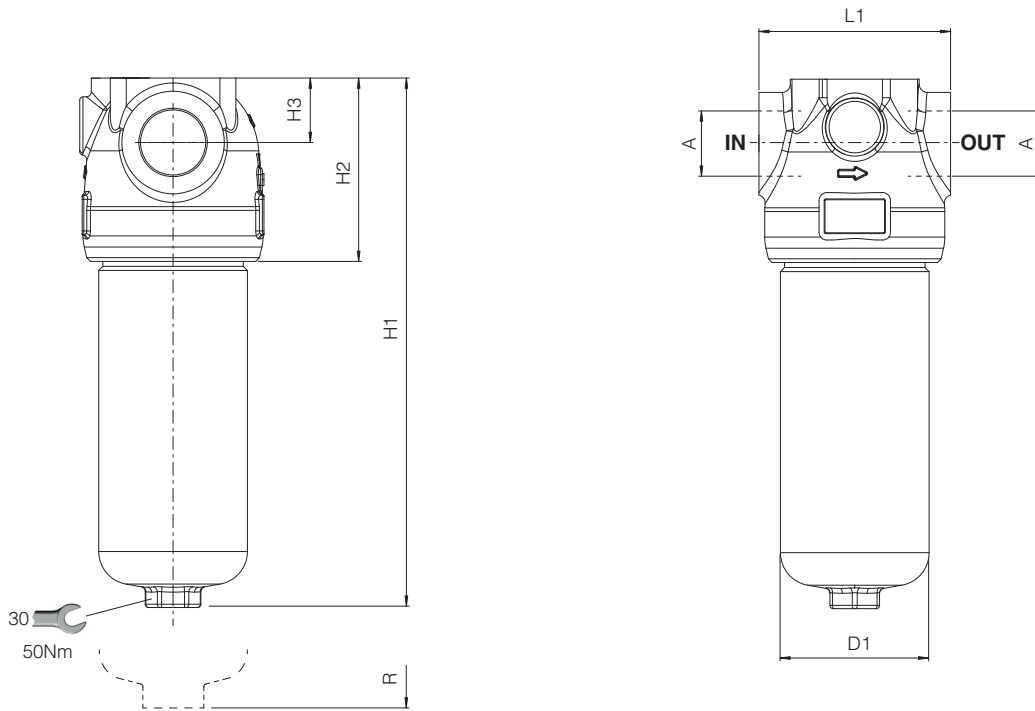
SFPS -10



Code	A	B1	B2	B3	B4	B5	D1	H1	H2	H3	L1	R (element removal)	Mass (Kg)
SFPS-10-A	1/2" BSPP	93.5	52.5	27.5	25	60.6	70	203	93	28	90	110	4
SFPS-10-B	3/4" BSPP 1" BSPP SAE-16 (1)							296					5

(1) SAE-16 thread size 1" 5/16-12-UN-2B

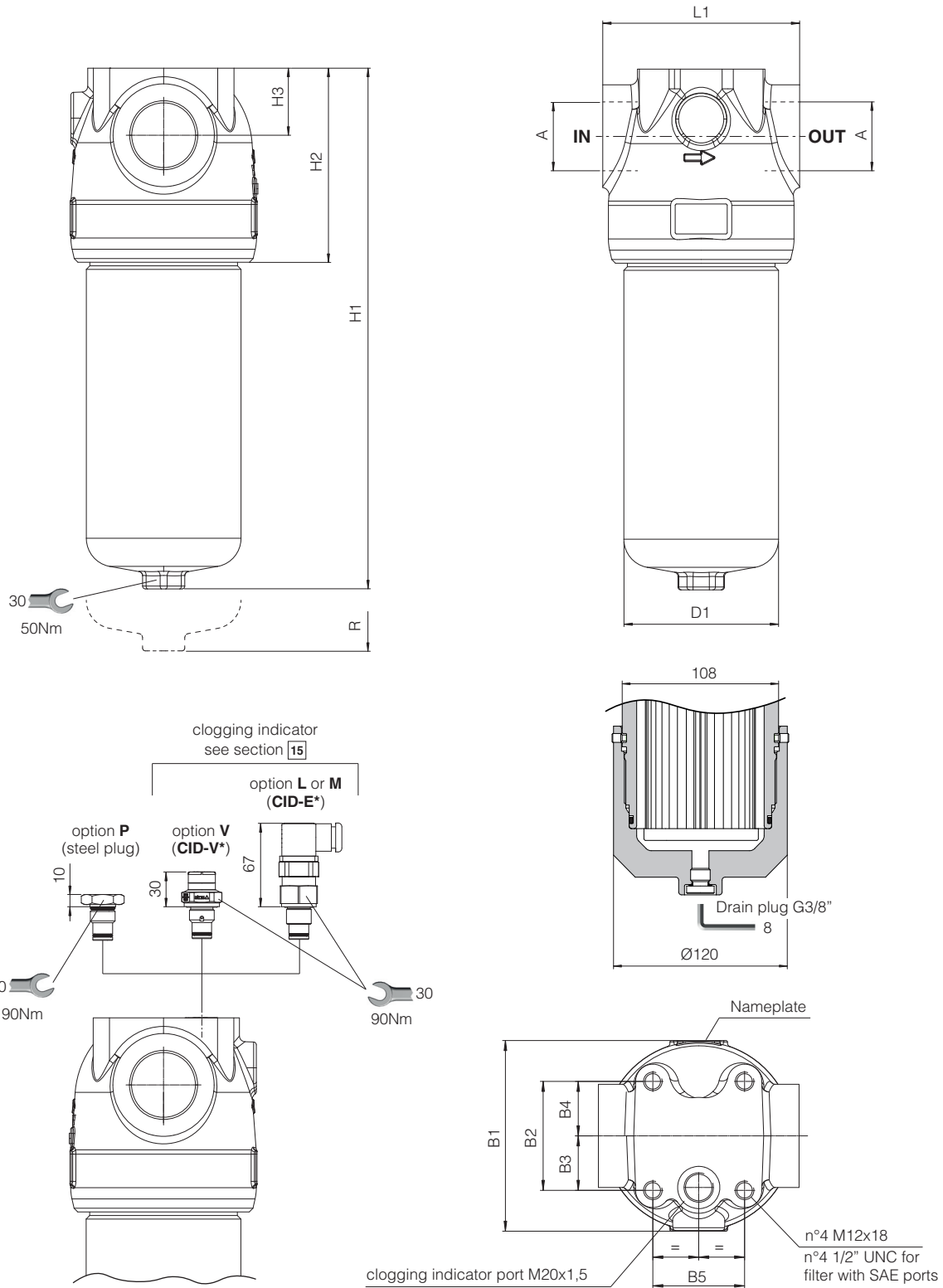
SFPS -20



Code	A	B1	B2	B3	B4	B5	D1	H1	H2	H3	L1	R (element removal)	Mass (Kg)	
SFPS-20-A	1" BSPP 1 1/4" BSPP SAE-20 (1)	111.5	56	28	28	56	90	261	111	39	116	120	7.4	
SFPS-20-B								320						8.5
SFPS-20-C								390						

(1) SAE-20 thread size 1" 5/8-12-UN-2B

SFPS -30



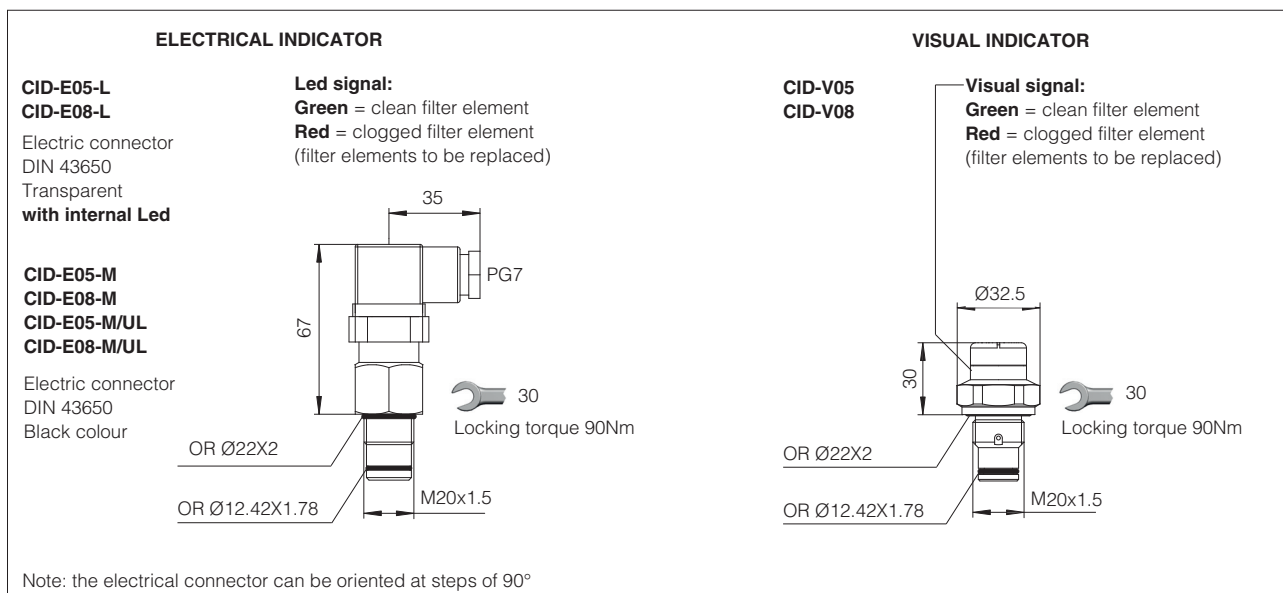
Code	A	B1	B2	B3	B4	B5	D1	H1	H2	H3	L1	R (element removal)	Mass (Kg)
SFPS-30-A	1 1/4" BSPP 1 1/2 BSPP SAE-24 (1)	133.5	76	38	38	64	110	240.5	136	47	140	130	10.5
SFPS-30-B								333.5					13
SFPS-30-C								453.5					16.4
SFPS-30-D								552.5					19

(1) SAE-24 thread size 1" 7/8-12-UN-2B

13 CHARACTERISTICS OF DIFFERENTIAL CLOGGING INDICATORS

Model code	CID-E* ELECTRICAL		CID-V* VISUAL
Differential switching pressure	CID-E05, CID-V05	5 bar ± 10%	5 bar ± 15%
	CID-E08, CID-V08	8 bar ± 10%	8 bar ± 10%
Max pressure	450 bar		420 bar
Max differential pressure	200 bar		
Ambient temperature	-25°C ÷ +100°C		-25°C ÷ +80°C
Hydraulic connection	M20x1,5		
Duty factor	100%		
Mechanical life	1 x 10 ⁶ operations		
Mass (Kg)	0,16		0,11
Electric connection	Electric plug connection as per DIN 43650 with cable gland type PG7		-
Power supply	CID-E05-L, CID-E08-L	24 V _{DC} ± 10%	
	CID-E05-M, CID-E08-M	14 V _{DC} ÷ 30 V _{DC}	125 V _{AC} ÷ 250 V _{AC}
Max current - resistive (inductive)	5 A (4 A) ÷ 4 A (3 A)	5 A (3 A) ÷ 3 A (2 A)	
Protection degree to DIN EN 60529	IP65 with mating connector		-
Switching scheme	CID*-L	CID*-M	GREEN
	clean filter element		
Switching scheme	CID*-L	CID*-M	RED
	clogged filter element		

14 DIMENSIONS OF DIFFERENTIAL CLOGGING INDICATORS



15 INSTALLATION AND COMMISSIONING

The max operating pressure of the system must not exceed the max working pressure of the filter (420 bar).

During the filter installation, pay attention to respect the flow direction, shown by the arrow on the filter head.

The filter should be preferably mounted with the bowl downward.

The filter should be properly secured using the threaded fixing holes on the filter head.

Make sure that there is enough space for the replacement of the filter element, see dimension "R" at section 12.

Never run the system without the filter element.



For filters ordered with clogging indicator:

- remove the plastic plug from the indicator port on the filter head
- install the clogging indicator and lock it at the specified torque

During the cold start up (fluid temperature lower than 30°C), a false clogging indicator signal can be given due to the high fluid viscosity.



16 MAINTENANCE

The filter element must be replaced as soon as the clogging indicator switches to highlight the filter clogged condition.

For filters without clogging indicator, the filter element must be replaced according to the system manufacturer's recommendations.

Select the new filter element according to the model code reported on the filter nameplate, see section 17.

For the replacement of the filter element, proceed as follow:

- releases the system pressure; the filter has no pressure bleeding device
- pay attention to the fluid and filter surface temperature. Always use suitable gloves and protection glasses
- unscrew the bowl (2) from the filter head (1) by turning counterclockwise (view from bottom side)
- remove the dirty filter element (3) pulling it carefully
- lubricate the seal of new filter element and insert it over the spigot in the filter head
- clean the bowl internally, check the o-ring (6) and replace it if damaged
- lubricate the o-ring, the threads and screw by hand the bowl to the filter head by turning clockwise (view from bottom side). Tighten at the recommended torque.

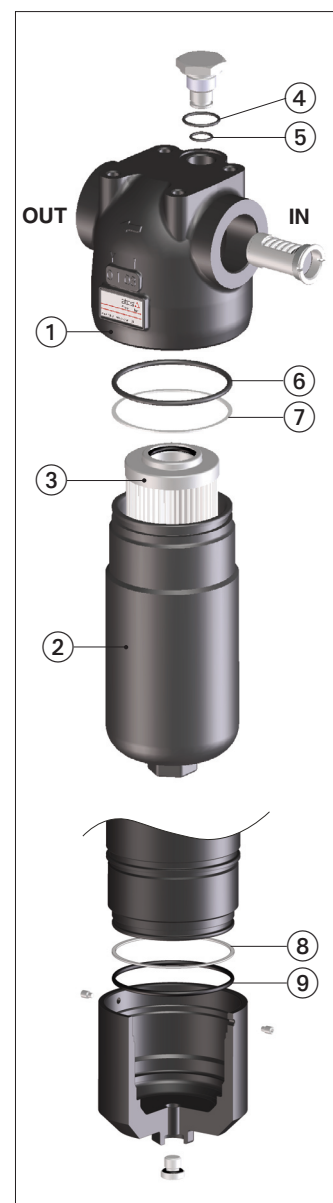


WARNING: The dirty filter elements cannot be cleaned and re-used. They are classified as "dangerous waste material", then they must be disposed of by authorized Companies, according to the local laws.

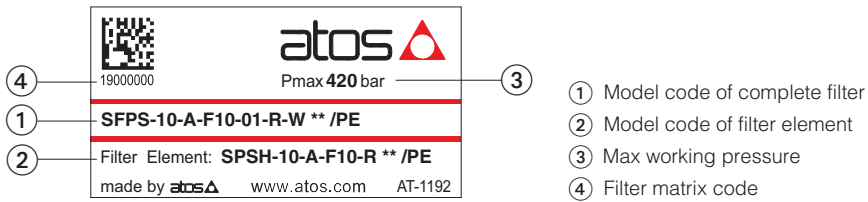
16.1 SEALS KIT

Filter type	Seal kit code (NBR)	Seal kit code (FKM)	Seal kit composition
SFPS-10	GUARN SFPS-10	GUARN SFPS-10 /PE	④+⑤+⑥+⑦
SFPS-20	GUARN SFPS-20	GUARN SFPS-20 /PE	④+⑤+⑥+⑦
SFPS-30	GUARN SFPS-30	GUARN SFPS-30 /PE	④+⑤+⑥+⑦+⑧+⑨ (1)

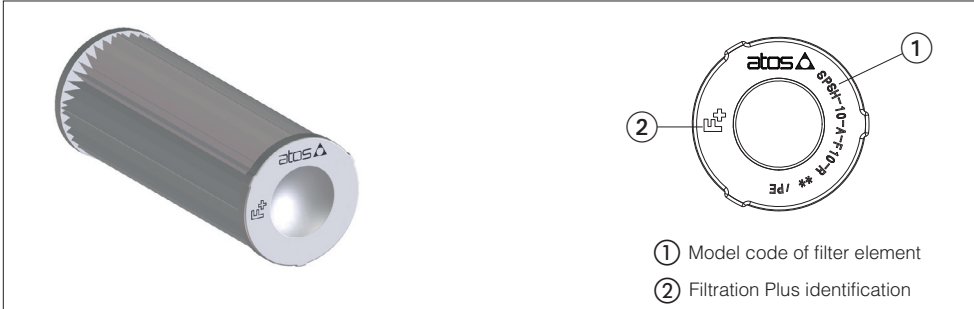
(1) Seals (8) and (9) are supplied in seal kit but used only for SFPS-30-D



17 FILTER IDENTIFICATION NAMEPLATE



17.1 IDENTIFICATION OF FILTER ELEMENT



18 RELATED DOCUMENTATION

LF010	Fluid contamination
LF020	Filtration guidelines