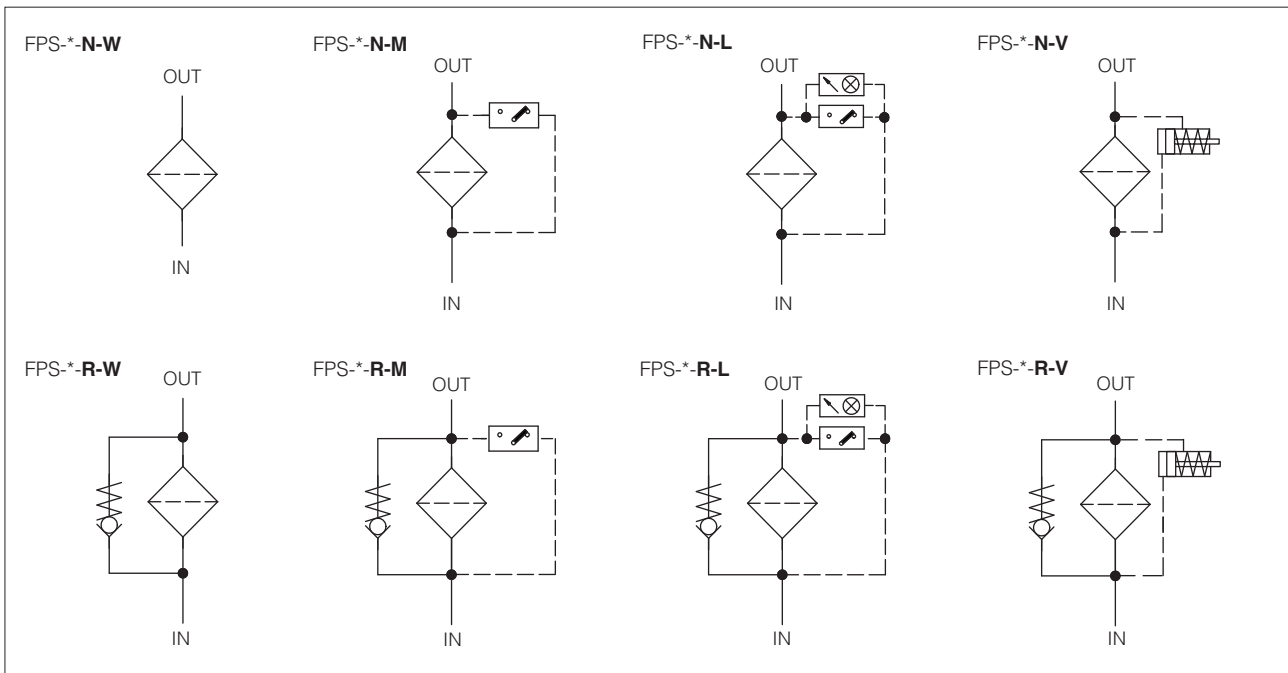




**2 HYDRAULIC SYMBOLS** (representation according to ISO 1219-1)



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

<p><b>PSH</b></p> <p>Spare filter element for in line filter type FPS</p>	-	<p><b>10</b></p> <p>Filter element size: 10 = for FPS-10 30 = for FPS-30</p>	-	<p><b>A</b></p> <p>Filter element length: for FPS-10    for FPS-30 <b>A</b>            <b>A</b> <b>B</b>            <b>B</b>                  <b>C</b>                  <b>D</b></p>	-	<p><b>F10</b></p> <p>Microfibre filtration rating, <math>\beta_{x(c)} &gt; 1000</math> - ISO 16889: <b>F03</b> = 4,5 <math>\mu\text{m}</math> (c) <b>F06</b> = 7 <math>\mu\text{m}</math> (c) <b>F10</b> = 12 <math>\mu\text{m}</math> (c)</p>	-	<p><b>R</b></p> <p>R = filter element with collapse pressure 21 bar, for filter FPS-*R with by-pass valve N = filter element with collapse pressure 210 bar, for filter FPS-*N without by-pass valve</p>	/	<p><b>*</b></p> <p>Series number</p>	/	<p><b>*</b></p> <p>Seals material: - = NBR <b>PE</b> = FKM (2)</p>
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- (1) Select the filter element according to the model code reported on the filter nameplate, see section 14.1  
 (2) Filters element with FKM seals are available on request

**4 MODEL CODE OF DIFFERENTIAL CLOGGING INDICATORS** - only for spare

<p><b>CID</b></p> <p>Spare differential clogging indicator for in line filter</p>	-	<p><b>E</b></p> <p>Type of indicator: <b>E</b> = electrical <b>V</b> = visual</p>	-	<p><b>05</b></p> <p>Differential switching pressure: <b>05</b> = 5 bar for filters with by-pass valve <b>08</b> = 8 bar for filters without by-pass valve</p>	-	<p><b>M</b></p> <p>Optional LED - only for CID-E <b>L</b> = with LED <b>M</b> = without LED</p>	/	<p><b>*</b></p> <p>Series number</p>	/	<p><b>*</b></p> <p>Seals material: - = NBR <b>PE</b> = FKM</p>
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## 5 GENERAL CHARACTERISTICS

Assembly position / location	Vertical position with the bowl downward	
Ambient temperature range	<b>Standard</b> = -20°C ÷ +70°C <b>/PE option</b> = -20°C ÷ +70°C	
Storage temperature range	<b>Standard</b> = -20°C ÷ +80°C <b>/PE option</b> = -20°C ÷ +80°C	
Materials	Filter head	Cast iron
	Filter bowl	Steel
Surface protection	Phosphatized	
Fatigue strength	min. 1 x 10 <sup>6</sup> cycles at 320 bar, for FPS-10 and FPS-30 with ports size 1 1/4" min. 1 x 10 <sup>6</sup> cycles at 280 bar, only for FPS-30 with ports size 1 1/2"	

## 6 HYDRAULICS CHARACTERISTICS

Filter size	10			30		
	01	02	42	03	04	44
Port size code						
Port dimension	BSP threaded	G3/4"	G1"	G1 1/4"	G1 1/2"	
	SAE J1926-1 threaded			SAE-16		SAE-24
Max operating pressure (bar)	320			280		
Max flow (1) (l/min)	<b>R</b> = filter with by-pass	60 ÷ 80	75 ÷ 105	60 ÷ 80	165 ÷ 305	170 ÷ 330
	<b>N</b> = filter without by-pass	55 ÷ 75	65 ÷ 90	55 ÷ 75	145 ÷ 245	150 ÷ 260
Direction of filtration	See the arrow on the filter head					
<b>(1) Max flow rates are performed in following conditions:</b>						
<ul style="list-style-type: none"> <li>- clean filter element</li> <li>- filtration rating F10 (12 µm (c))</li> <li>- Δp 1 bar</li> <li>- min ÷ max filter length</li> <li>- mineral oil with viscosity 32 mm<sup>2</sup>/s</li> </ul>						
In case of different conditions the max flow rates have to be recalculated - see section 10						

## 7 FILTER ELEMENTS

Material	Inorganic microfibre	
Filtration rating as per ISO16889	<b>F03</b>	β <sub>4,5µm (c)</sub> ≥ 1000
	<b>F06</b>	β <sub>7,5µm (c)</sub> ≥ 1000
	<b>F10</b>	β <sub>12µm (c)</sub> ≥ 1000
Filter element collapse pressure	<b>R</b> = for filter with by-pass valve	21 bar
	<b>N</b> = 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) = -25°C ÷ +100°C, with HFC hydraulic fluids = +10°C ÷ +50°C FKM seals (/PE option) = -25°C ÷ +100°C		
Recommended viscosity	15 ÷ 100 mm <sup>2</sup> /s - max allowed range 2.8 ÷ 500 mm <sup>2</sup> /s		
<b>Hydraulic fluid</b>	<b>Suitable seals type</b>	<b>Classification</b>	<b>Ref. Standard</b>
Mineral oils	NBR, FKM	HL, HLP, HLPD, HVL, HVLDP	DIN 51524
Flame resistant without water	FKM	HFDU, HFDR	ISO 12922
Flame resistant with water	NBR	HFC	

## 9 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 <sup>6</sup> 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 <sub>DC</sub> ± 10%
	CID-E05-M, CID-E08-M		14 V <sub>DC</sub> ÷ 30 V <sub>DC</sub>
Max current - resistive (inductive)	5 A (4 A) ÷ 4 A (3 A)	125 V <sub>AC</sub> ÷ 250 V <sub>AC</sub>	5 A (3 A) ÷ 3 A (2 A)
Protection degree to DIN EN 60529	IP65 with mating connector		
Electric scheme shown with switch position in case of clean filter element	<b>CID*-L</b>	<b>CID*-M</b>	

## 10 FILTERS SIZING

For the filter sizing it is necessary to consider the Total  $\Delta p$  at the maximum flow at which the filter must work.

The Total  $\Delta p$  is given by the sum of filter head  $\Delta p$  plus the filter element  $\Delta p$ :

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

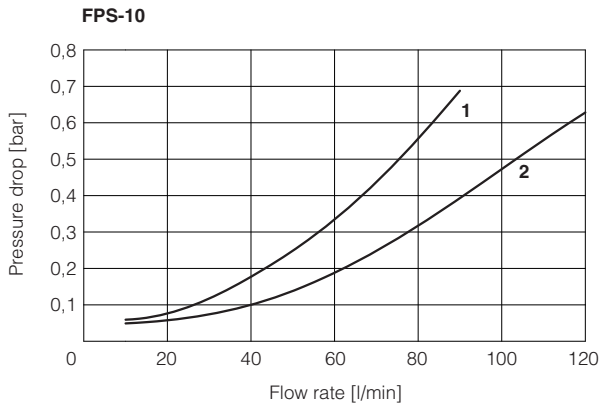
In the best conditions the total  $\Delta p$  should not exceed 1,0 bar

See below sections to calculate the  $\Delta p$  of filter head and  $\Delta p$  of the filter element

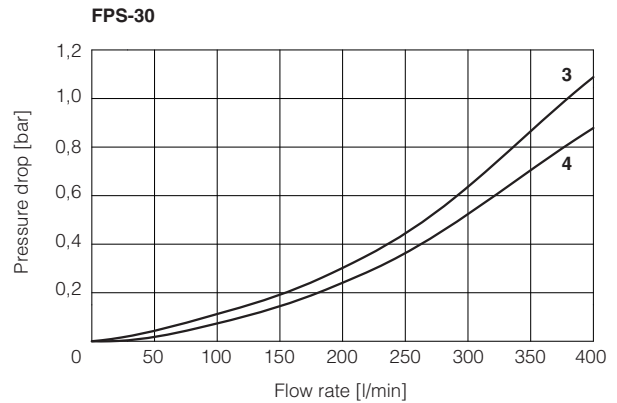
### 10.1 Q/ $\Delta p$ DIAGRAMS OF FILTER HEAD

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

In the following diagrams are reported the  $\Delta p$  characteristics of filter head based on mineral oil with density 0,86 kg/dm<sup>3</sup> and viscosity 30 mm<sup>2</sup>/s



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



3 = FPS-30\*\*\* 03 (G 1 1/4")    4 = FPS-30\*\*\* 04 (G 1 1/2")  
FPS-30\*\*\* 44 (SAE-24)

### 10.2 FILTER ELEMENT $\Delta p$

The pressure drop through the filter depends to:

- size of filter element
- filtration rating
- fluid viscosity

The  $\Delta p$  of filter element is given by the formula:

$$\Delta p \text{ of filter element} = Q \times \frac{Gc}{1000} \times \frac{\text{Viscosity}}{30}$$

**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 (mm<sup>2</sup>/s)

#### Gradient coefficient Gc of PSH filter elements

Filter element size		10		30			
Filter element lenght		A	B	A	B	C	D
Filter element type	Filtration rating	Gc Gradient coefficient					
R for filter with bypass valve	F03	27.75	15.25	14	7.13	4.7	3.62
	F06	15.12	7.58	8.03	3.37	2.2	1.89
	F10	9.37	4.91	4.43	2.33	1.5	1.12
N for filter without bypass valve	F03	32.2	17.32	16.48	8.13	5.5	4.71
	F06	22.38	9.41	11.88	4.18	3.28	2.91
	F10	11.2	6.27	5.27	3.45	2.36	2.15

#### Example:

Calculation of Total  $\Delta p$  for filter type FPS-10-B-F10-02-R at Q = 80 l/min and viscosity 46 mm<sup>2</sup>/s (filter element PSH-10-B-F10-R)

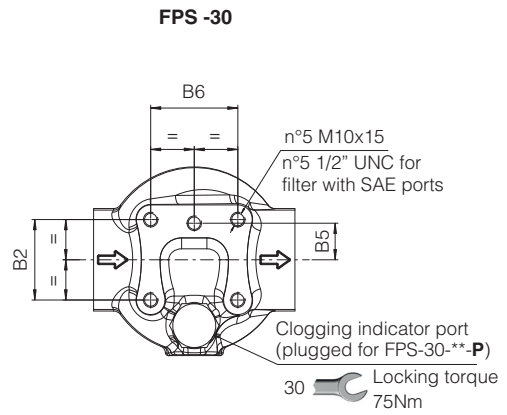
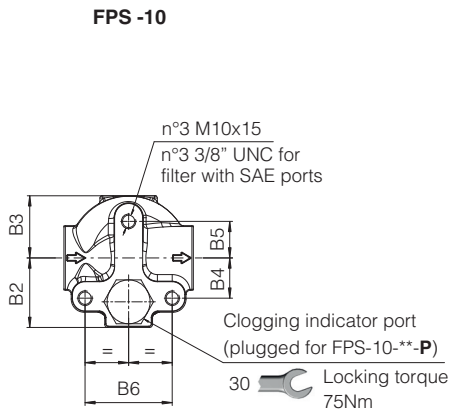
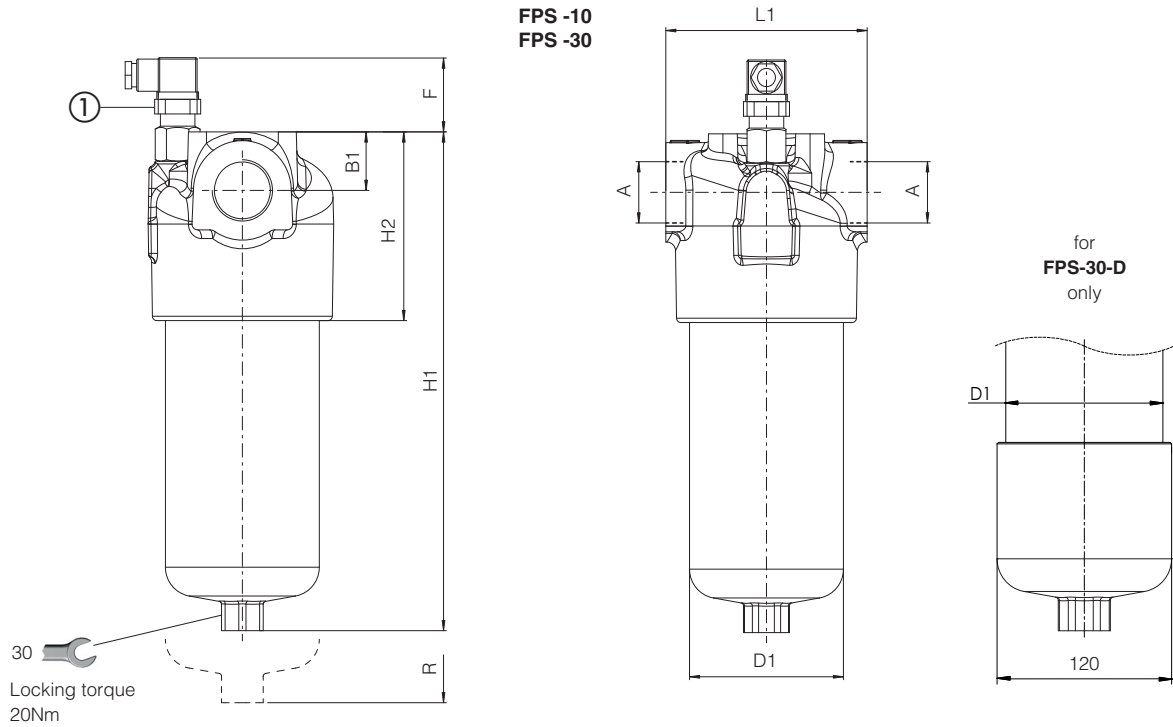
$\Delta p$  of filter head + filter bowl = 0,31 bar

**Gc** = 4,91 mbar/(l/min)

$$\text{Filter element } \Delta p = 80 \times \frac{4,91}{1000} \times \frac{46}{30} = 0,60 \text{ bar}$$

**Total  $\Delta p$  = 0,31 + 0,60 = 0,91 bar**

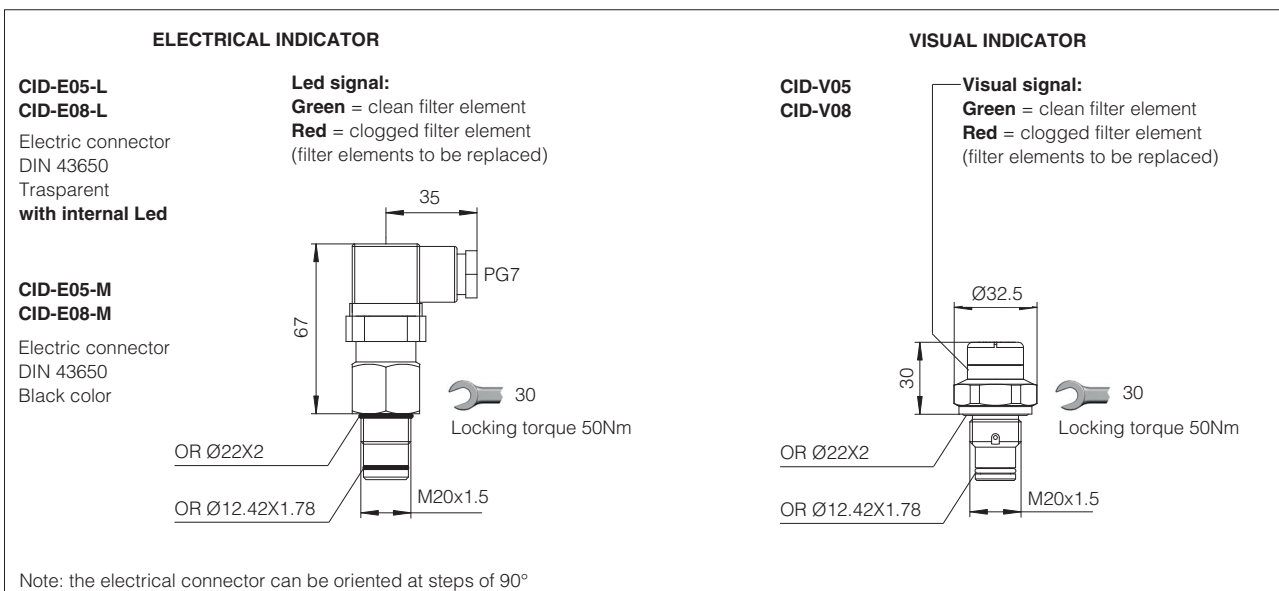
11 INSTALLATION DIMENSIONS OF FPS FILTERS [mm]



① Optional differential clogging indicator. The drawing shows the electrical indicator type CIA-E\*

Code	A	B1	B2	B3	B4	B5	B6	D1	F	H1	H2	L1	R (element removal)	Mass (Kg)
FPS-10-A	3/4" BSPP 1" BSPP SAE-16	22,5	47,5	43,5	27,5			70	70	200	92	90	110	3,5
FPS-10-B										293				4,5
FPS-30-A	1 1/4" BSPP 1 1/2 BSPP SAE-24	40	55	-	-	25	60,6		50	248	129	140	130	9,0
FPS-30-B										341				9,5
FPS-30-C						461	14,4							
FPS-30-D						554	18,8							

## 12 DIMENSIONS OF DIFFERENTIAL CLOGGING INDICATORS



## 13 INSTALLATION AND COMMISSIONING

The max operating pressure of the system must not exceed the max working pressure of the filter.  
 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 head 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.  
 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.



## 14 MAINTENANCE

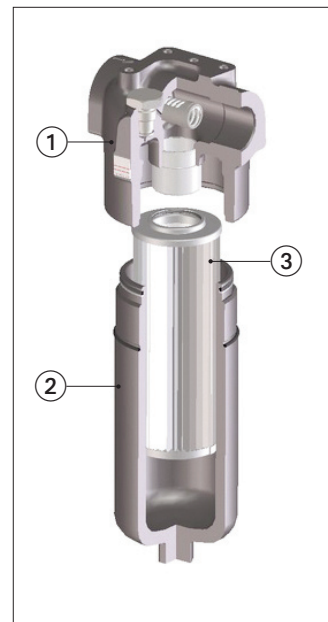
The filter element must be replaced as soon as the clogging indicator switches to highlight the filter clogged condition  
 For filters without clogging indicator, the filter element must be replaced according to the system manufacturer's recommendations.  
 Select the new filter element according to the model code reported on the filter nameplate, see section 14.1

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, lubricate 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.



### 14.1 FILTER IDENTIFICATION NAMEPLATE



- ① Model code of complete filter
- ② Model code of filter element
- ③ Max working pressure
- ④ Filter matrix code