HARLEX

Inline filter with filter element according standard

Type 16 FE 2500 ... 7500

- Sizes according to **according to standard:** 2500 ... 7500
- Nominal pressure of 16 bar *[232 MPa]*
- Connection up to DN 300
- Operating temperature of –10 °C ... +100 °C *[14 °F ... 212 °F]*

Features

Inline filters are used in hydraulic systems for separating solid materials from fluids and lubricating oils. They are intended for installation in piping.

They distinguish themselves by the following:

- Filter for inline installation, return flow or bypass with several filter elements in one filter housing
- Special highly efficient filter materials
- Filtration of very fine particles and high dirt holding capacity across a broad pressure differential range
- High collapse rating of the filter elements
- Optionally equipped with mechanical/optical maintenance indicator with memory function
- Optional equipment with various electronic switching elements, modular design
- Optional bypass valves integrated in the filter elements

HARLEX
HRL MACHINERY

Ordering code
Filter

01	02	03		04		05	06	07		08	09	10	11		11		11
16 FE			–	**A00**	–	**0**			–	**D0**		**0**		–		–	

Series

01	Inline filter, 16 bar *[232 psi]*	**16 FE**

Size

02	FE... (Filter element according to **standard**)	**2500** **3000** **4000** **6000** **7000** **7500**

Filter rating in µm

03	**Absolute** **(ISO 16889; $\beta_x(c) \geq 200$)**	Glass fiber material, not cleanable	**H3XL** **H6XL** **H10XL** **H20XL**
	Nominal	Stainless steel wire mesh, cleanable	**G10** **G25** **G40** **G60** **G100**
		Filter paper, not cleanable	**P10** **P25**

Pressure differential

04	Max. admissible pressure differential of the filter element of 30 bar *[435 psi]*	**A00**

Solenoid

05	**Without a** solenoid	**0**

Bypass valve

06	Filter element **without** bypass valve	**0**
	Filter element **with** bypass valve, cracking pressure of 3 bar *[44 psi]*	**6**

Maintenance indicator

07	Maintenance indicator, mech./optical, switching pressure of 0.8 bar *[11.6 psi]*	**V0,8**
	Maintenance indicator, mech./optical, switching pressure of 1.5 bar *[21.8 psi]*	**V1,5**
	Maintenance indicator, mech./optical, switching pressure of 2.2 bar *[32 psi]*	**V2.2**

Port

08	**Frame size** / **Port**	**2500**	**3000 ... 4000**	**6000**	**7000**	**7500**	
	DN 125	●					**D0**
	DN 150		●				
	DN 200			●			
	DN 250				●		
	DN 300					●	
		● Standard port					

Seal

09	NBR seal	**M**
	FKM seal	**V**

Material

10	Standard	**0**

Ordering code
Filter

01	02	03		04		05	06	07		08	09	10	11		11		11
16 FE			**–**	**A00**	**–**	**0**			**–**	**D0**		**0**		**–**		**–**	

Supplementary information

11	**Without** supplementary information	**0**
	Bleed valve	**E**
	Cover removal device (as of NG4000)	**LD**
	Manufacturer's inspection certificate M according to DIN 55350 T18 Z1	**Z1**

Order example:

16 FE 2500 H10XL-A00-06V2,2-D0M00

Further models on request.

Preferred types

NBR seal, with bypass, flow specifications for 30 mm²/s *[143 SUS]*

Inline filter 16 FE, filter rating of 3 µm

Type	**Flow in l/min** *[gpm]* **at Δ*p* = 0.5 bar** *[7.25 psi]* [1)]
16 FE 2500 H3XL-A00-06V2,2-D0M00	1390 *[367.20]*
16 FE 3000 H3XL-A00-06V2,2-D0M00	1480 *[390.97]*
16 FE 4000 H3XL-A00-06V2,2-D0M00	2100 *[554.76]*
16 FE 6000 H3XL-A00-06V2,2-D0M00	3250 *[858.56]*
16 FE 7000 H3XL-A00-06V2,2-D0M00	5050 *[1334.07]*
16 FE 7500 H3XL-A00-06V2,2-D0M00	5550 *[1452.95]*

Inline filter 16 FE, filter rating of 10 µm

Type	**Flow in l/min** *[gpm]* **at Δ*p* = 0.5 bar** *[7.25 psi]* [1)]
16 FE 2500 H10XL-A00-06V2,2-D0M00	2400 *[634.01]*
16 FE 3000 H10XL-A00-06V2,2-D0M00	2950 *[779.31]*
16 FE 4000 H10XL-A00-06V2,2-D0M00	3540 *[935.17]*
16 FE 6000 H10XL-A00-06V2,2-D0M00	5750 *[1518.99]*
16 FE 7000 H10XL-A00-06V2,2-D0M00	8100 *[2139.79]*
16 FE 7500 H10XL-A00-06V2,2-D0M00	11800 *[3117.23]*

[1)] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering codes
Accessories
(dimensions in mm *[inch]*)

Electronic switching element for maintenance indicators

01		02		03
WE	–		–	

Maintenance indicator

01	Electronic switching element	**WE**

Type of signal

02	1 switching point	**1SP**
	2 switching points, 3 LED	**2SP**
	2 switching points, 3 LED and signal suppression up to 30 °C *[86 °F]*	**2SPSU**

Connector

03	Round plug-in connection M12x1, 4-pole	**M12x1**
	Rectangular plug-in connection, 2-pole, design A according to EN-175301-803	**EN175301-803**

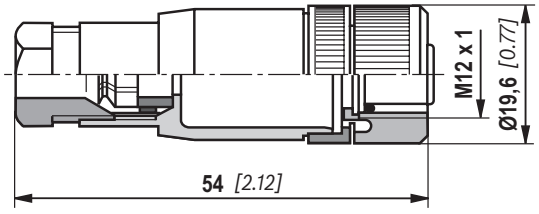
Material numbers of the electronic switching elements

Type	Signal	Switching points	Connector	LED
WE-1SP-M12x1	Changeover	1	M12x1	without
WE-2SP-M12x1	Normally open contact (at 75%) / normally closed contact (at 100%)	2		3 pieces
WE-2SPSU-M12x1				
WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	without

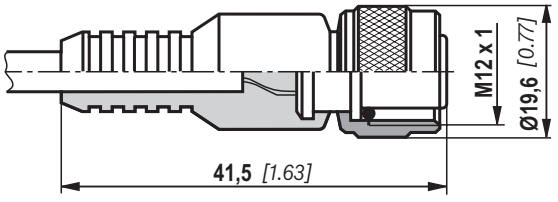
Mating connectors (max. permissible voltage of 50 V)

for electronic switching element with round plug-in connection M12x1

Mating connector suitable for K24 4-pole, M12x1
with screw connector, cable gland Pg9.



Mating connector suitable for K24-3m 4-pole, M12x1
with potted-in PVC cable, 3 m long.
Line cross-section: 4 x 0.34 mm²
Core marking: **1** brown **2** white
3 blue **4** black



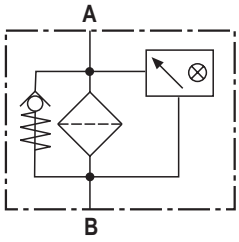
For more round plug-in connections and technical data, refer to data sheet.

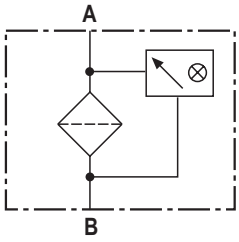
Order example:
Inline filter with mechanical/optical maintenance indicator for p_{nom} = 16 bar *[232 psi]* with bypass valve, size 3000, with 10 µm filter element and electronic switching element M12x1 with one switching point.

Filter with mech./opt. maintenance indicator:	16 FE 3000 H10XL-A00-06V2,2-D0M00
Electr. switching element:	WE-1SP-M12x1
Mating connector:	Mating connector suitable for K24 4-pole, M12x1 with screw connector, Cable gland Pg9.

Symbols

Inline filter
with bypass and
mechanical indicator

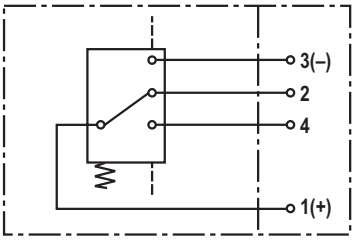




Inline filter
without bypass and with
mechanical indicator

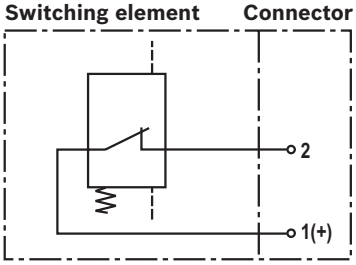
Electronic switching element
for maintenance indicator

Switching element **Connector**



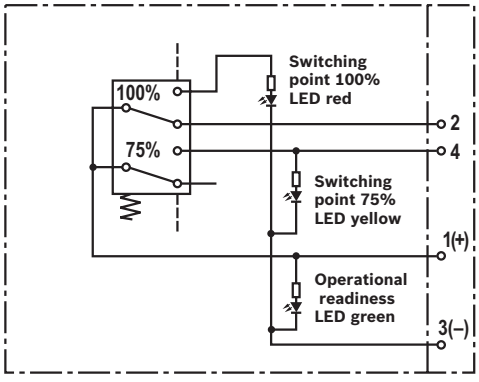
WE-1SP-M12x1

Switching element **Connector**



WE-1SP-EN175301-803

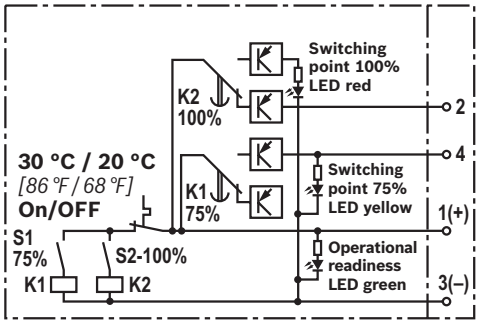
Switching element **Connector**



WE-2SP-M12x1

Circuit diagram drawn in plugged condition
(operating state)

Switching element **Connector**



WE-2SPSU-M12x1

Circuit diagram drawn in plugged condition
at temperature > 30 °C *[86 °F]*
(operating condition)

Function, section

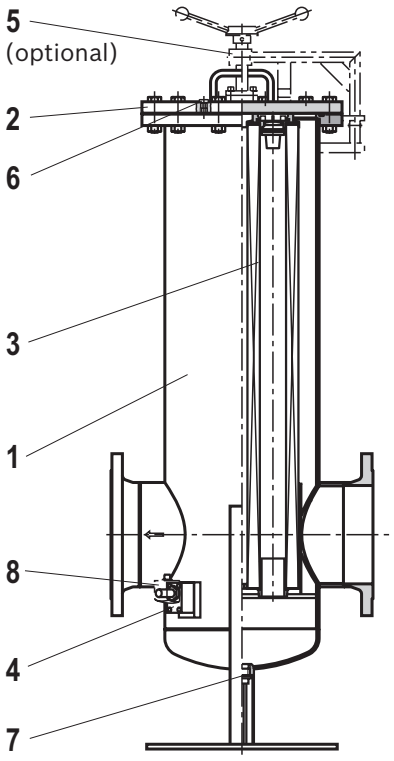
The 16 FE inline filter is suitable for inline installation.

Essentially, it consists of filter housing (1), a filter cover (2), several filter elements (3) and mechanical/optical maintenance indicator (4) and an optional cover removal tool (5). The fluid reaches the filter element (3), where it is cleaned, via the inlet. The dirt particles filtered out collect in the filter elements (3). The filter elements are filled indirectly.
The filtered fluid enters the hydraulic circuit via the outlet. The filter housing and all connection elements are designed so that pressure peaks – as they may occur, for example, in the event of abrupt opening of large control valves due to the accelerated fluid quantity – can be securely absorbed. A bleed screw (6) and drain screw (7) is included in standard equipment for all sizes.
Instead of a bleed screw, an optional bleed valve – option code E – (6) is possible.

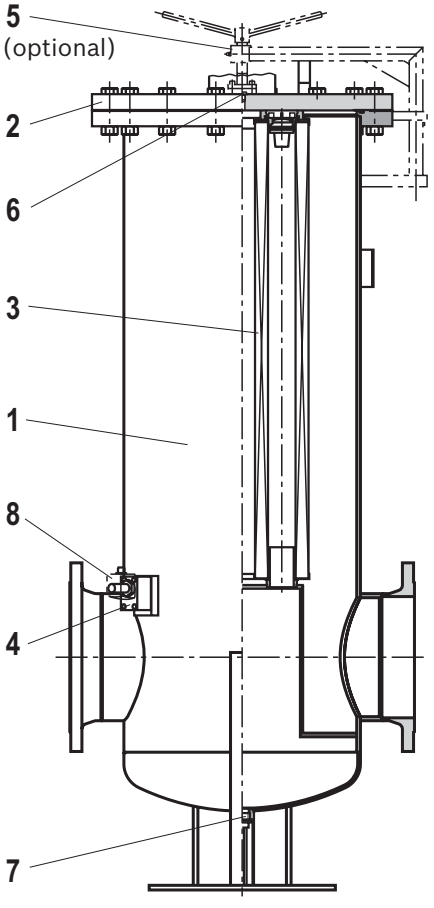
An electronic switching element can be added to the mechanical/optical maintenance indicator in order to integrate the maintenance indicator. The electronic switching element (8) must be attached to the mechanical/optical maintenance indicator (4) and held by means of a locking ring. The electronic switching elements are connected by means of a mating connector or cable connection.
The electronic switching element must be ordered separately.

⚠ WARNING!

- If the maintenance indicator is not observed while the element is exchanged, the optional bypass valves will open as the pressure differential increases. This means that part of the volume flow enters unfiltered into the clean side of the filter. Effective filtration is therefore no longer guaranteed.



16 FE 2500 ... 6500



16 FE 7000 ... 7500

Technical data

(For applications outside these values, please consult us!)

General					
Installation position			Vertical		
Ambient temperature range		°C *[°F]*	–10 ... +65 *[14 ... +149]* (short-time to –30 *[–22]*)		
Storage conditions	▶ NBR seal	°C *[°F]*	–40 ... +65 *[-40 ... +149]*; max. relative air humidity of 65%		
	▶ FKM seal	°C *[°F]*	–20 ... +65 *[-4 ... +149]*; max. relative air humidity of 65%		
Mass filter		Size	**2500**	**3000**	**4000**
		kg *[lbs]*	104 *[229]*	108 *[238]*	140 *[308]*
		Size	**6000**	**7000**	**7500**
		kg *[lbs]*	168 *[370]*	333 *[734]*	355 *[782]*
Cover weight		Size	**2500**	**3000**	**4000**
		kg *[lbs]*	21 *[46]*	21 *[46]*	26 *[57]*
		Size	**6000**	**7000**	**7500**
		kg *[lbs]*	29.5 *[65]*	91 *[200]*	91 *[200]*
Volume		Size	**2500**	**3000**	**4000**
		l *[US gal]*	51 *[13]*	53 *[14]*	94 *[24]*
		Size	**6000**	**7000**	**7500**
		l *[US gal]*	149 *[39]*	335 *[88]*	344 *[90]*
Material	▶ Filter housing\filter cover		Steel		
	▶ Connection flange		Steel according to DIN 2633		
	▶ Bypass valve		Steel/plastic		
	▶ Seals		NBR or FKM		
	▶ Visual maintenance indicator		Aluminum		
	▶ Electronic switching element		Plastic PA6		

Hydraulic			
Maximum operating pressure	Bar *[psi]*	16 *[7.25]*	
Hydraulic fluid temperature range	°C *[°F]*	–10 ... +100 *[+14 ... +212]*	
Minimum conductivity of the medium	pS/m	300	
Fatigue strength according to ISO 10771	Load cycles	> 10^6 at max. operating pressure	
Type of pressure measurement of the maintenance indicator		Pressure differential	
Assignment: Response pressure of the maintenance indicator/cracking pressure of the bypass valve		Response pressure of the maintenance indicator	Cracking pressure of the bypass valve
	Bar *[psi]*	0.8 ± 0.15 *[11.6 ± 2.2]*	3.0 ± 0.3 *[43.51 ± 4.4]*
		1.5 ± 0.2 *[21.8 ± 2.9]*	
		2.2 ± 0.3 *[31.9 ± 4.4]*	
Filtration direction		From the outside to the inside	

Technical data
(For applications outside these values, please consult us!)

Electrical (electronic switching element)					
Electrical connection			Round plug-in connection M12x1, 4-pole		Standard connection EN 175301-803
	Version	WE-1SP-M12x1	WE-2SP-M12x1	WE-2SPSU-M12x1	WE-1SP-EN175301-803
Contact load, direct voltage	$A_{max.}$	1			
Voltage range	$V_{max.}$	150 (AC/DC)	10 ... 30 (DC)		250 (AC) / 200 (DC)
Max. switching power at resistive load	W	20			70
Switching type	▶ 75% signal	–	Normally open contact		–
	▶ 100% signal	Changeover	Normally closed contact		Normally closed contact
	▶ 2SPSU			Signal switching through at 30 °C *[86 °F]*, return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...			Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)		
Protection class according to EN 60529		IP 67			IP 65
Ambient temperature range	°C *[°F]*	-25 ... +85 *[-13 ... +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.					
Weight	kg *[lbs]*	0.1 *[0.22]*			

Filter element				
Glass fiber material H.XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 of up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	▶ A00	Bar *[psi]*	30 *[435]*	

For detailed information on filter elements, please refer to data sheet.

Compatibility with permitted hydraulic fluids

Hydraulic fluid		**Classification**	**Suitable sealing materials**	**Standards**
Mineral oil		HLP	NBR	DIN 51524
Bio-degradable	▶ Insoluble in water	HETG	NBR	VDMA 24568
		HEES	FKM	
	▶ Soluble in water	HEPG	FKM	VDMA 24568
Flame resistant	▶ Water free	HFDU, HFDR	FKM	VDMA 24317
	▶ Containing water	HFAS	NBR	DIN 24320
		HFAE	NBR	
		HFC	NBR	VDMA 24317

Important important information on hydraulic fluids:

- For more information and data on the use of other hydraulic fluids, please refer to data sheet or contact us!
- **Flame resistant - containing water:** due to possible chemical reactions with materials or surface coatings of machine and system components, the service life with these hydraulic fluids may be less than expected.

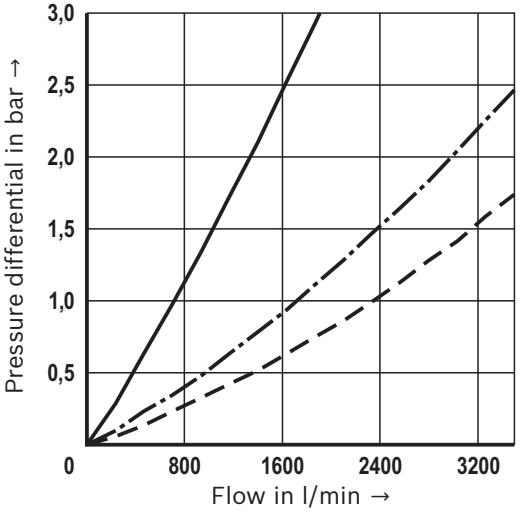
  Filter materials made of filter paper (cellulose) must not be used, filter elements with glass fiber filter material or wire mesh must be used instead.
- **Bio-degradable:** If filter materials made of filter paper are used, the filter life may be shorter than expected due to material incompatibility and swelling.

Characteristic curves: H3XL
(measured with mineral oil HLP46 according to DIN 51524)

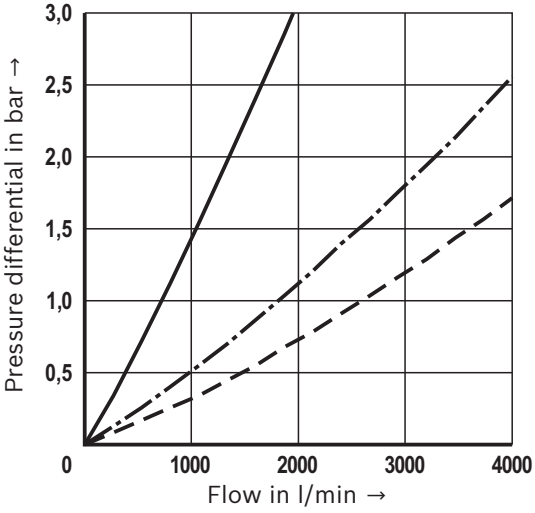
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended starting Δ*p* for design = 0.5 bar *[7.25 psi]*

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[143 SUS]*

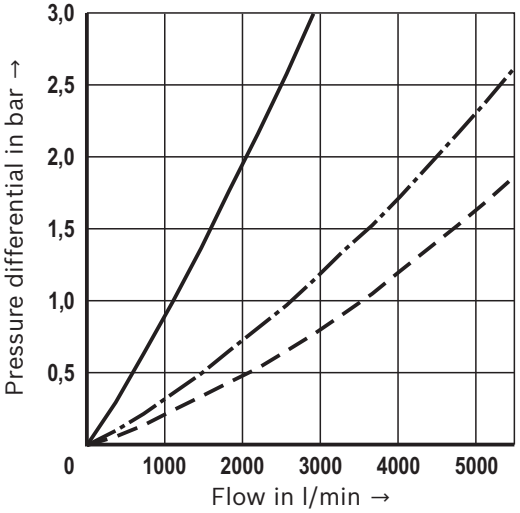
16 FE 2500 H3XL



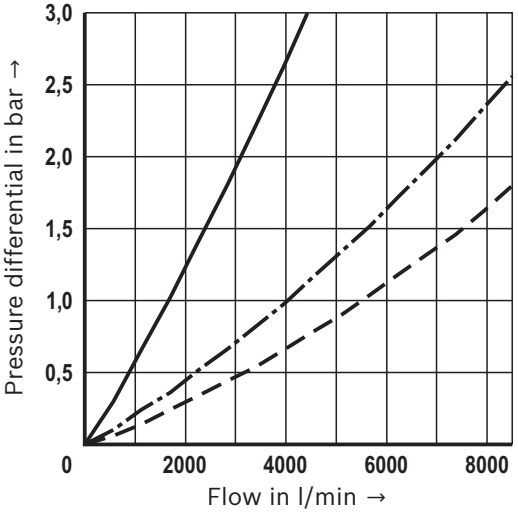
16 FE 3000 H3XL



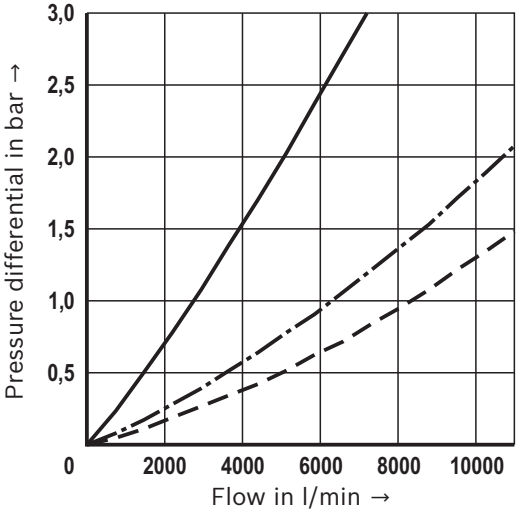
16 FE 4000 H3XL



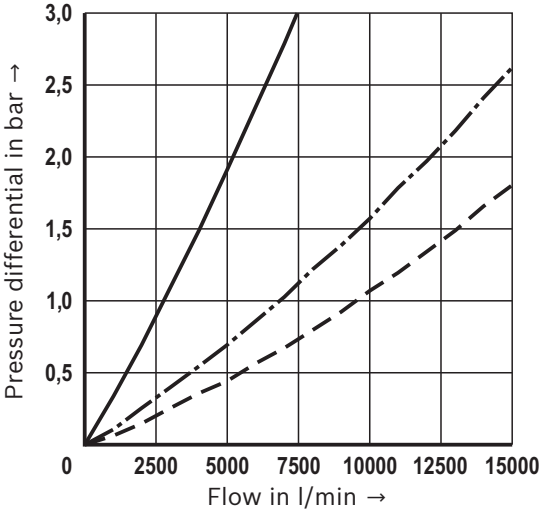
16 FE 6000 H3XL



16 FE 7000 H3XL



16 FE 7500 H3XL

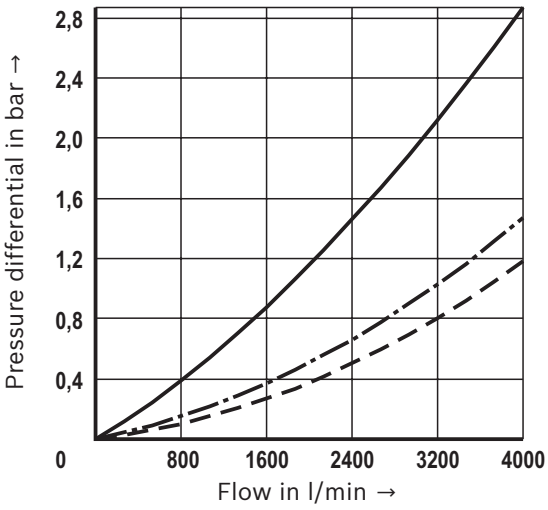


Characteristic curves: H10XL
(measured with HLP46 mineral oil according to DIN 51524)

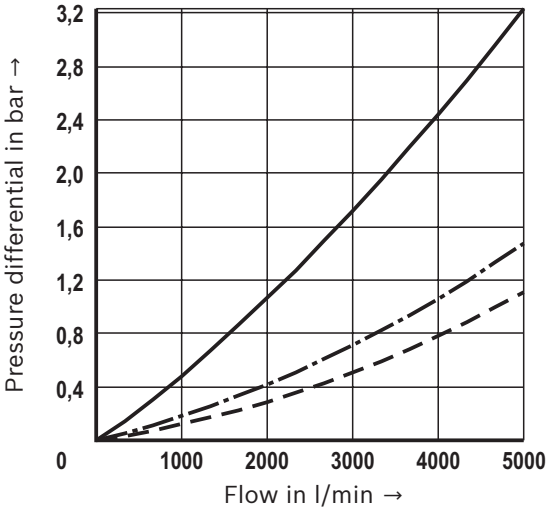
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended starting Δ*p* for design = 0.5 bar *[7.25 psi]*

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[143 SUS]*

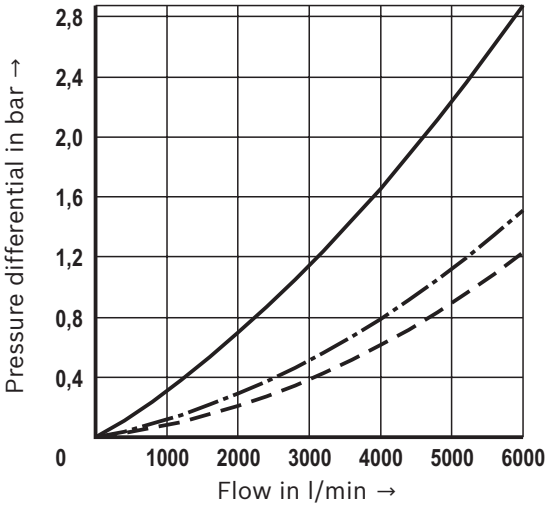
16 FE 2500 H10XL



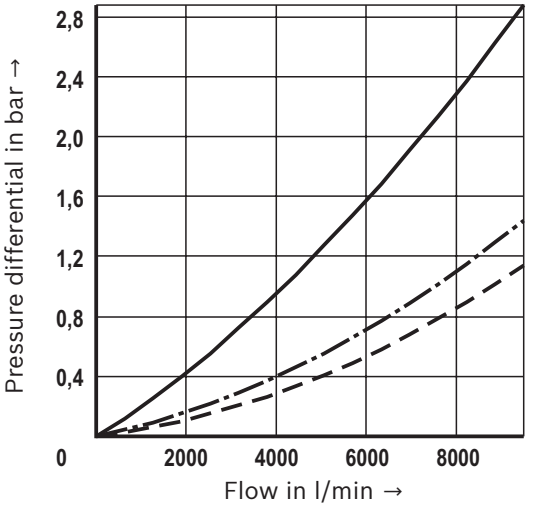
16 FE 3000 H10XL



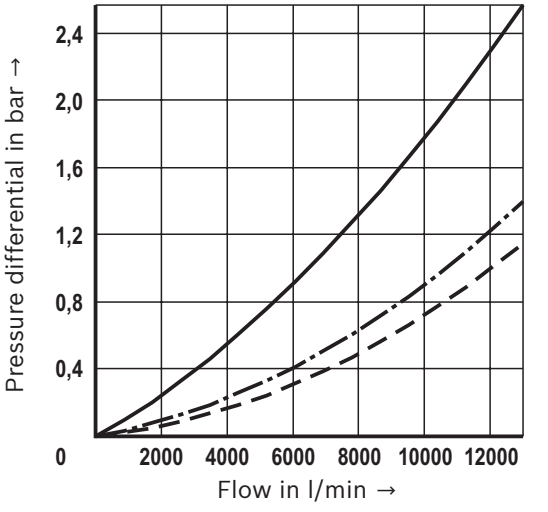
16 FE 4000 H10XL



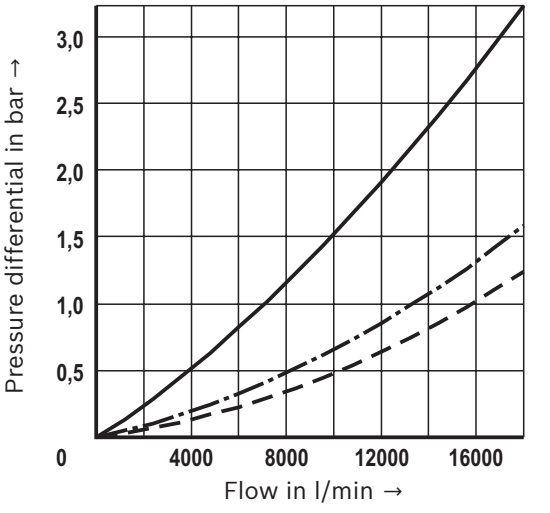
16 FE 6000 H10XL



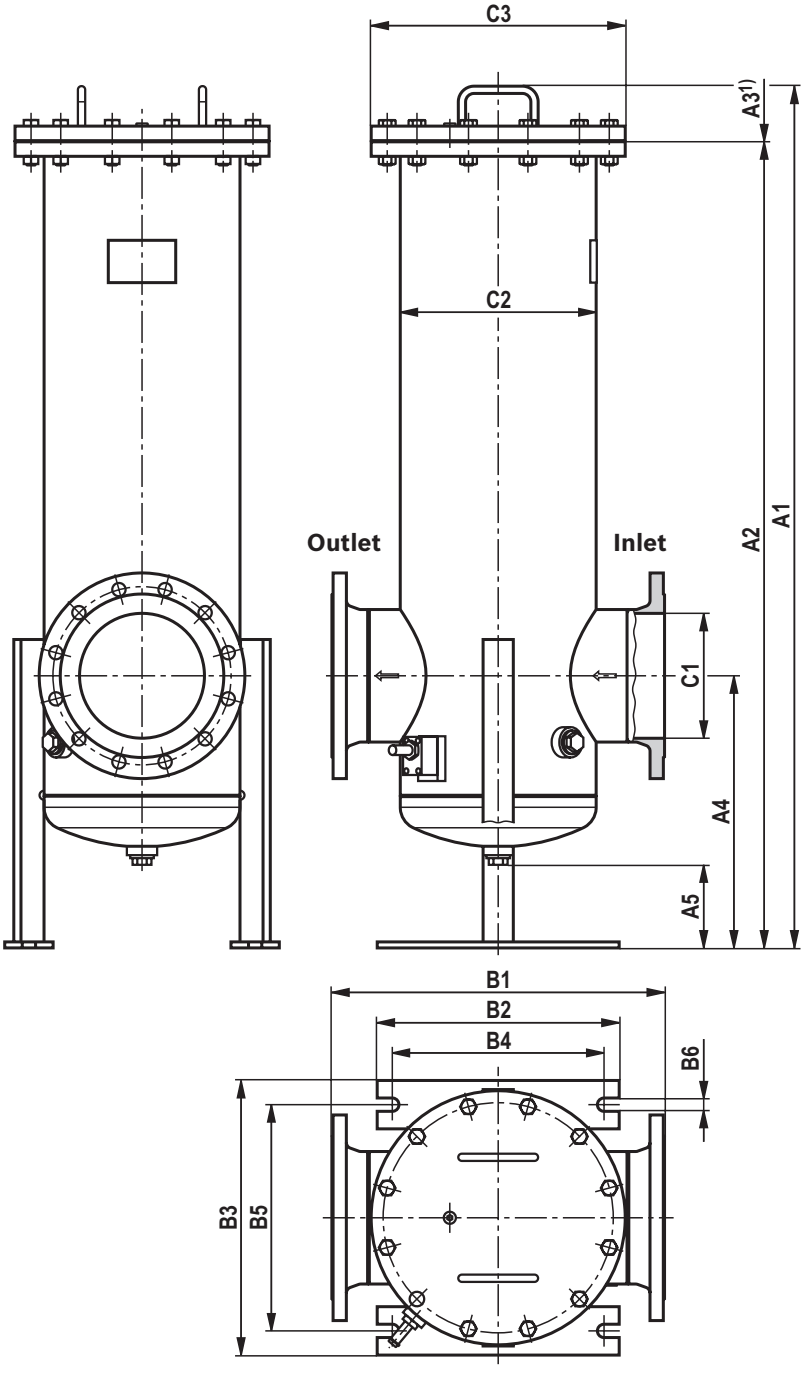
16 FE 7000 H10XL



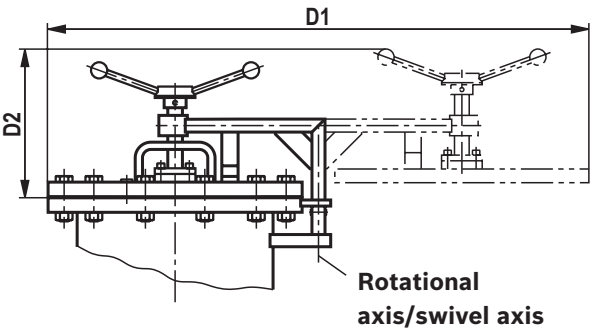
16 FE 7500 H10XL



Dimensions: NG2500 ... NG6500
(dimensions in mm *[inch]*)



Variant with cover removal tool



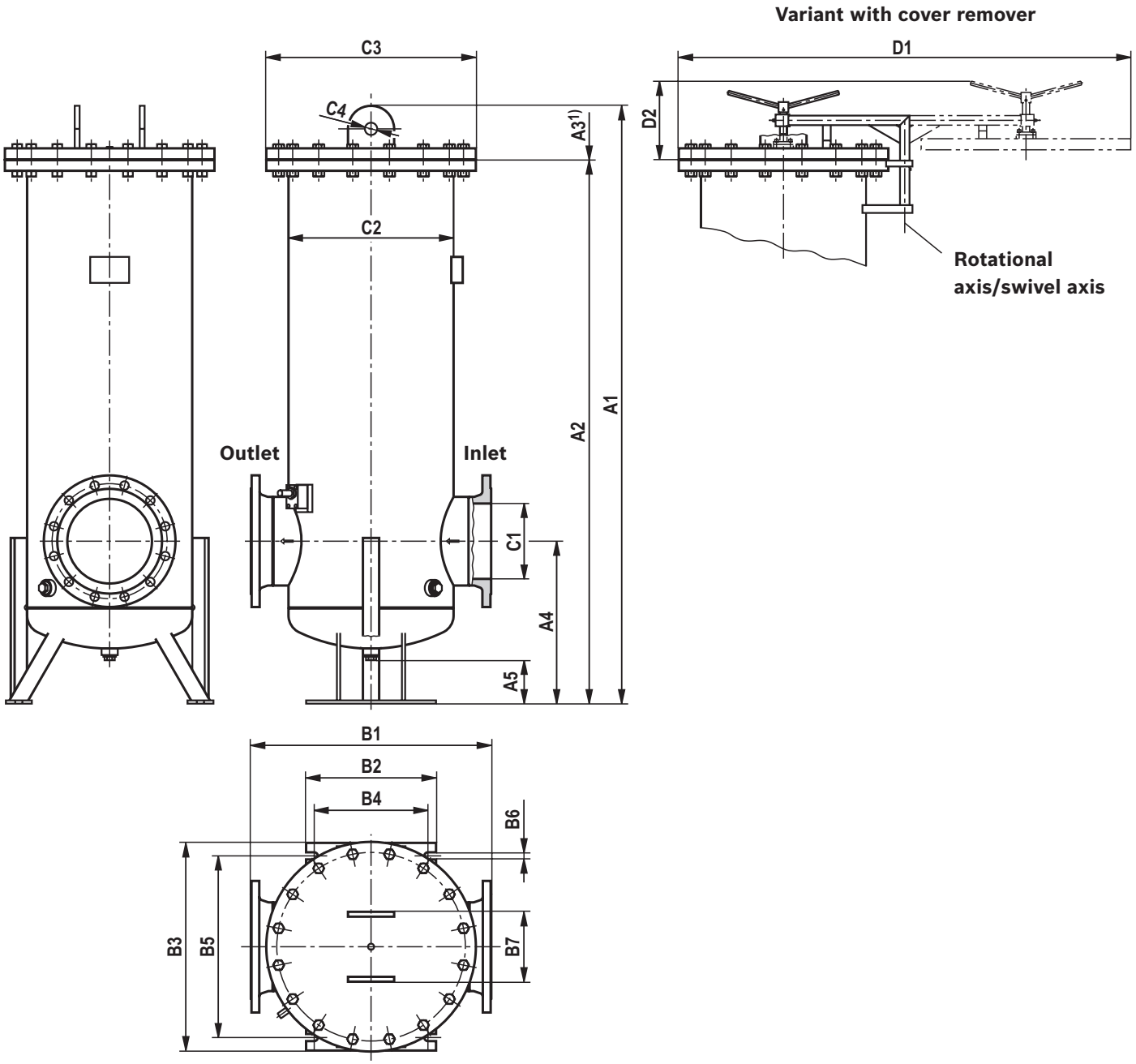
16 FE...	D1	D2
2500	Approx. 330 *[12.99]*	Approx. 800 *[31.50]*
3000		
4000		Approx. 900 *[35.43]*
4500		
6000		Approx. 1100 *[43.31]*
6500		

16 FE...	C1 Ø	C1 DN	ØC2	ØC3
2500	131.7 *[5.19]*	DN125	273 *[10.75]*	375 *[14.76]*
3000	159.3 *[6.27]*	DN150		
4000			323.9 *[12.75]*	420 *[16.54]*
4500	206.5 *[8.13]*	DN200		
6000			355.6 *[14.00]*	445 *[17.52]*
6500	260.4 *[10.25]*	DN250		

1) Servicing height for filter element exchange

16 FE...	A1	A2	A3 1)	A4	A5	B1	B2	B3	B4	B5	B6
2500	1385 *[54.53]*	1295 *[50.98]*	860 *[33.86]*	500 *[19.69]*	257 *[10.12]*	500 *[19.69]*	400 *[15.75]*	403 *[15.87]*	350 *[13.78]*	323 *[12.72]*	22 *[0.87]*
3000											
4000	1465 *[57.68]*	1375 *[54.13]*	990 *[38.98]*	450 *[17.72]*	198 *[7.80]*	550 *[21.65]*		454 *[17.87*		374 *[14.72]*	
4500	1425 *[56.10]*	1335 *[52.56]*			155 *[6.10]*						
6000	1730 *[68.11]*	1640 *[64.57]*		500 *[19.69]*	212 *[8.35]*	600 *[23.62]*		486 *[19.13]*		406 *[15.98]*	
6500	1760 *[69.29]*	1670 *[65.75]*			210 *[8.27]*						

Dimensions: NG7000 ... NG7500
(dimensions in mm *[inch]*)



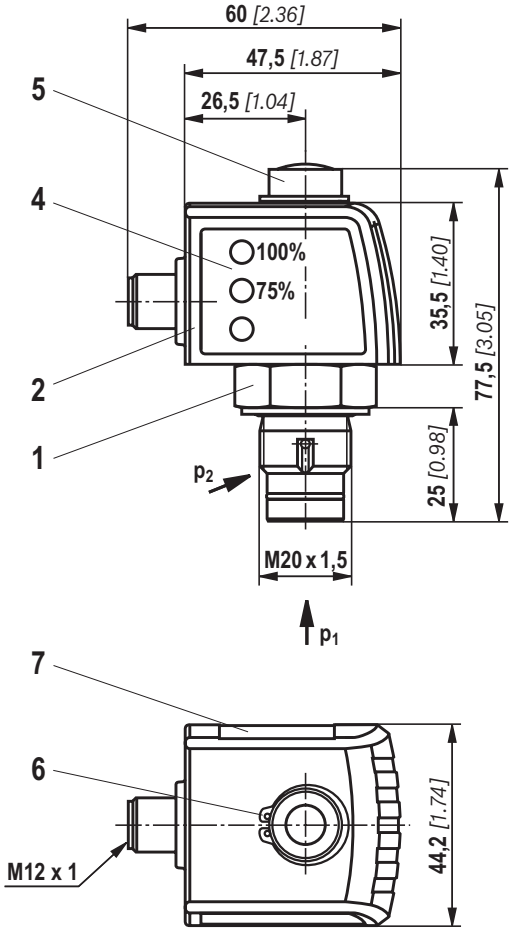
1) Servicing height for filter element exchange

16 FE...	A1	A2	A3 1)	A4	A5	B1	B2	B3	B4	B5	B6	B7
7000	1840 *[72.44]*	1675 *[65.94]*	990 *[38.98]*	500 *[19.69]*	134 *[5.28]*	740 *[29.13]*	400 *[15.75]*	639 *[25.16]*	350 *[13.78]*	559 *[22.01]*	22 *[0.87]*	215 *[8.46]*
7500	1870 *[73.62]*	1705 *[67.13]*			114 *[4.49]*	750 *[29.53]*						

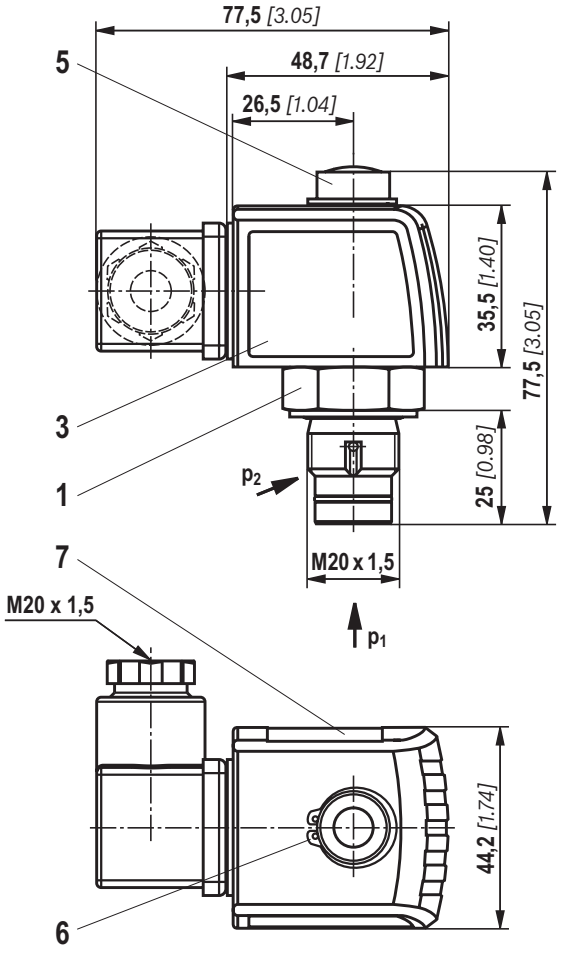
16 FE...	C1 Ø	C1 DN	ØC2	ØC3	ØC4	D1	D2
7000	260.4 *[10.25]*	DN250	508 *[20.00]*	645 *[25.39]*	38 *[1.50]*	Approx. 350 *[13.78]*	Approx. 1400 *[55.12]*
7500	309.7 *[12.19]*	DN300					

Maintenance indicator
(dimensions in mm *[inch]*)

Pressure differential indicator with mounted switching element M12x1



Pressure differential indicator with mounted switching element EN-175301-803



1 Mechanical/optical maintenance indicator;
max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°);
round plug-in connection M12x1, 4-pole

3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°);
rectangular plug-in connection EN175301-803

4 Housing with three LEDs: 24 V =
Green: stand-by
Yellow: switching point 75%
Red: switching point 100%

5 Visual indicator with memory function

6 Locking ring DIN 471-16x1,

7 Name plate

☞ **Notices:**
Representation contains mechanical/optical maintenance indicator (1) and electronic switching element (2) (3).

Ordering code
Spare parts

Filter element

01	02	03		04	05	06		
2nd			**–**	**A00**	**–**		**–**	

Filter element

01	Design	**2nd**

Size

02	FE... (Filter elements according to **standard**)	**Filter size**	**Number of filter elements per filter**	
		2500, 3000	3	**0058**
		4000	4	**0059**
		6000	6	**0059**
		7000, 7500	10	**0059**

Filter rating in µm

03	**Absolute** **(ISO 16889; $\beta_x(c) \geq 200$)**	Glass fiber material, not cleanable	**H3XL** **H6XL** **H10XL** **H20XL**
	Nominal	Stainless steel wire mesh, cleanable	**G10** **G25** **G40** **G60** **G100**
		Filter paper, not cleanable	**P10** **P25**

Pressure differential

04	Max. admissible pressure differential of the filter element of 30 bar *[435 psi]*	**A00**

Bypass valve

05	Filter element **without** bypass valve	**0**
	Filter element **with** bypass valve of 3.0 bar *[43.51 psi]*	**6**

Seal

06	NBR seal	**M**
	FKM seal	**V**

Order example:
2.0058 H10XL-A00-6-M

For detailed information on filter elements, please refer to data sheet.

Preferred types
Filter elements

Type
2.0058 H...XL-A00-6-M
2.0059 H...XL-A00-6-M

Ordering code
Spare parts

Mechanical/optical maintenance indicator

01	02		03		04		05		06
W	**O**	**–**	**D01**	**–**		**–**		**–**	**160**

01	**Maintenance indicator**	**W**

02	**Mechanical/optical indicator**	**O**

Version

03	Pressure differential, modular design	**D01**

Switching pressure

04	0.8 bar *[11.6 psi]*	**0.8**
	1.5 bar *[22 psi]*	**1.5**
	2.2 bar *[32 psi]*	**2.2**

Seal

05	NBR seal	**M**
	FKM seal	**V**

Max. nominal pressure

06	Switching pressure of 0.8 bar *[11.6 psi]*, 160 bar *[2321 psi]*	**160**
	Switching pressure of 1.5 bar *[21.8 psi]*, 160 bar *[2321 psi]*	**160**
	Switching pressure of 2.2 bar *[31.9 psi]*, 160 bar *[2321 psi]*	**160**

Description
WO-D01-0.8-M-160
WO-D01-0.8-V-160
WO-D01-1.5-M-160
WO-D01-1.5-V-160
WO-D01-2.2-M-160
WO-D01-2.2-V-160

Ordering code
Spare parts

Seal kit

01	02	03		04
D	**16FE**		**–**	

01	**Seal kit**	**D**

02	**Series 16FE**	**16FE**

Size

03	2500-3000	**2500-3000**
	4000	**4000**
	6000	**6000**
	7000-7500	**7000-7500**

Seal

04	NBR seal	**M**
	FKM seal	**V**

Description
D16FE2500-3000-M
D16FE2500-3000-V
D16FE4000-M
D16FE4000-V
D16FE6000-M
D16FE6000-V
D16FE7000-7500-M
D16FE7000-7500-V

Assembly, commissioning, maintenance

Assembly

- The max. operating pressure of the system must not exceed the max. admissible operating pressure of the filter (see name plate).
- During assembly of the filter (see also chapter “Tightening torque”), the flow direction (direction arrows) and the required servicing height of the filter elements (see chapter “Dimensions”) are to be considered.
- The maintenance indicator must be arranged so it is easily visible in operation.
- For stability reasons, the cover must not be pivoted before the assembly on filters with a cover remover.
- Remove the plastic plugs from the filter inlet and outlet.
- The filter must be installed vertically.
- Fasten the filter feet to the floor or frame. Ensure that the system is assembled without tension stress.
- The optional electronic maintenance indicator is connected via the electronic switching element with one or two switching points, which is attached to the mechanical/optical maintenance indicator and held by means of the locking ring.

Commissioning

- Commission the system and bleed the filter until fluid begins to escape from the bleeding point.

Maintenance

- If, at operating temperature, the red indicator pin reaches out of the mechanical/optical maintenance indicator and/or the switching process is triggered in the electronic switching element, the filter element is contaminated and needs to be replaced or cleaned. For more details, see data sheet.
- The material number of the corresponding replacement filter elements is indicated on the name plate of the complete filter. It must correspond to the material number on the filter elements.
- Decommission the system.
- Open the bleed screw or bleed valve and relieve the pressure
- After undoing and removing the cover screws, the filter cover is removed by hand and placed on a clean surface. Alternatively, the cover can be removed from the filter by turning the hand wheel of the optional cover remover counter-clockwise before being swiveled to the side.
- The fluid on the dirt side can be drained via the lateral drain screw. If necessary, additional fluid can be drained via the lower drain screw (clean side).
- Remove the filter elements from the spigot by rotating them slightly.
- Clean the filter components, if necessary.
- Check the cover seal, mounting screws and nuts for damage and replace them, if necessary.
  For suitable seal kits, refer to chapter “Spare parts”.
- Filter elements made of wire mesh can be cleaned. For detailed cleaning instructions, refer to data sheet.
- Install the new or cleaned filter elements on the respective spigots again by slightly rotating them.
- The filter is to be assembled in reverse order.
- The torque specifications (Tightening torques chapter) are to be observed.
- Commission the system and bleed the filter until fluid begins to escape from the bleeding point.

⚠ WARNING!

- Assemble and disassemble only with depressurized system!
- Filter is under pressure!
- Open the cover screws only if it is depressurized!
- Do not exchange the maintenance indicator while the filter is under pressure!
- If the flow direction is not considered during assembly, the filter element will be destroyed. Particles will enter the system and damage the downstream components.

☞ **Notices:**

- All maintenance of the filter should be performed by trained specialists.
- Proper function and safety are only guaranteed if original filter elements and spare parts are used.
- Warranty becomes void if the delivered item is modified by the ordering party or third parties or improperly mounted, installed, serviced, repaired, used or exposed to environmental condition that do not comply with the installation conditions.

Tightening torques
(dimensions in mm *[inch]*)

Cover mounting

Series 16 FE...		**2500 ... 3000**	**4000**	**6000**	**7000 ... 7500**
Screw		M16		M20	
Tightening torque at μ_{tot} = 0.14	Nm *[lbf-ft]*	215 ± 20 *[159 ± 15]*		430 ± 40 *[317 ± 30]*	
Quantity		8	12	16	16
Recommended property class of screw		8.8			

Bleed screw

Series 16 FE...		**2500 ... 3000**	**4000**	**6000**	**7000 ... 7500**
Screw		G1/4			
Tightening torque at μ_{tot} = 0.14	Nm *[lbf-ft]*	30 ± 3 *[22 ± 2]*			
Quantity		1			
Recommended property class of screw		1.4571			

Drain screw

Series 16 FE...		**2500 ... 3000**	**4000**	**6000**	**7000 ... 7500**
Screw		G1			
Tightening torque at μ_{tot} = 0.14	Nm *[lbf-ft]*	225 *[166]* ± 10 %			
Quantity		2			
Recommended property class of screw		5.8			

Maintenance indicator

Series 16 FE...		**2500 ... 3000**	**4000**	**6000**	**7000 ... 7500**
Tightening torque of mechanical/optical maintenance indicator	Nm *[lbf-ft]*	Max. 50 *[37]*			
Tightening torque of cubic connector screw switching element EN-175301-803		M3 / 0.5 *[0.4]*			

Directives and standardization

Classification according to the Pressure Equipment Directive

The inline filters for hydraulic applications according are pressure-holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, based on the exception in article 1, section 3.6 of the PED, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19).
The fluids from the chapter “Compatibility with approved hydraulic fluids” were considered for the classification. They do not receive a CE mark.

Use in explosive areas according to directive 94/9/EC (ATEX)

The inline filters according are not devices or components in the sense of directive 94/9/EC and are not provided with a CE mark. It has been proven by the ignition risk analysis that these inline filters do not have own ignition sources according to DIN EN 13463-1:2009.

According to DIN EN 60079-11:2012, electronic maintenance indicators with a switching point:
WE-1SP-M12x1
WE-1SP-EN175301-803
are simple electronic operating equipment that do not have their own voltage source. This simple electronic operating equipment may be used – according to DIN EN 60079-14:2012 – in intrinsically safe electric circuits (Ex ib) without marking and certification in systems. The inline filters and the electronic maintenance indicators described here can be used in the following explosive areas:

	Zone suitability	
Gas	1	2
Dust	21	22

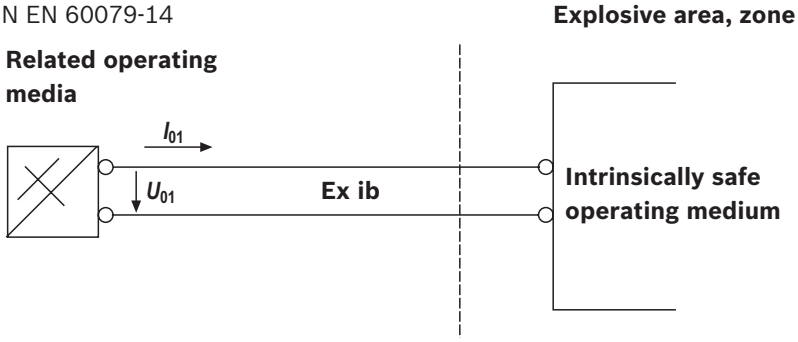
Directives and standardization

Complete filter with mech./opt. maintenance indicator				
Use/assignment			**Gas 2G**	**Dust 2D**
Assignment			Ex II 2G c IIC TX	Ex II 2D c IIC TX
Conductivity of the medium	pS/m	min	300	
Dust accumulation		max	–	0.5 mm

Electronic switching element in intrinsically safe electric circuit				
Use/assignment			**Gas 2G**	**Dust 2D**
Assignment			Ex II 2G Ex ib IIC T4 Gb	Ex II 2D Ex ib IIIC T100 °C Db
Perm. intrinsically safe electric circuits			Ex ib IIC, Ex ic IIC	Ex ib IIIC
Technical data			**Values only for intrinsically safe electric circuit**	
Switching voltage	Ui	max	150 V AC/DC	
Switching current	Ii	max	1.0 A	
Switching power	Pi	max	1.3 W T4 T_{max} 40 °C	750 mW T_{max} 40 °C
		max	1.0 W T4 T_{max} 80 °C	550 mW T_{max} 100 °C
Surface temperature [1]		max	–	100 °C
Inner capacity	Ci		Neglectable	
Inner inductivity	Li		Neglectable	
Dust accumulation		max	–	0.5 mm

[1] The temperature depends on the temperature of the medium in the filter and must not exceed the value specified here.

Possible circuit according to DIN EN 60079-14



⚠ WARNING!

- Explosion hazard due to high temperature!
  The temperature depends on the temperature of the medium in the hydraulic circuit and must not exceed the value specified here. Measures are to be taken so that the max. admissible ignition temperature is not exceeded in the explosive area.
- When using the inline filters according to 51403 in explosive areas, sufficient potential equalization has to be ensured. The filter is preferably to be grounded via the mounting screws.
  It has to be noted in this connection that coatings and oxide protective layers are not electrically conductive.
- During filter element exchanges, the packaging material is to be removed from the replacement element outside the explosive area

☞ **Notices:**

- Maintenance only by specialists, instruction by the machine end-user according to DIRECTIVE 1999/92/EC appendix II, section 1.1
- Functional and safety warranty is only applicable when using original spare parts