

# Inline filter with filter element according to Hengst standard

## Type 16 FE 2500 ... 7500

**RE 51403**

Edition: 2021-04

Replaces: -



- ▶ Sizes according to **according to Hengst standard:**  
2500 ... 7500
- ▶ Nominal pressure of 16 bar [232 psi]
- ▶ 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

## Contents

Features	1
Ordering code filter	2, 3
Preferred types	3
Ordering codes accessories	4
Filter design	5
Symbols	6
Function, section	7
Technical data	8, 9
Compatibility with permitted hydraulic fluids	9
Dimensions	10, 11
Maintenance indicator	12
Ordering code for spare parts	13 ... 15
Assembly, commissioning, maintenance	16
Tightening torques	17
Directives and standardization	17 ... 19

## Ordering code

### Filter

01	02	03	04	05	06	07	08	09	10	11	11	11
<b>16 FE</b>			<b>- A00</b>	<b>- 0</b>			<b>- D0</b>	<b>0</b>		<b>-</b>	<b>-</b>	

**Series**

01	Inline filter, 16 bar [232 psi]	<b>16 FE</b>
----	---------------------------------	--------------

**Size**

02	FE... (Filter element according to <b>Hengst standard</b> )	<b>2500</b> 3000 4000 6000 7000 7500
----	----------------------------------------------------------------	-----------------------------------------------------

**Filter rating in µm**

03	<b>Absolute</b> (ISO 16889; $\beta_x(c) \geq 200$ )	Glass fiber material, not cleanable	<b>PWR3</b> PWR6 PWR10 PWR20
	<b>Nominal</b>	Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100
		Filter paper, not cleanable	P10 P25

**Pressure differential**

04	Max. permissible pressure differential of the filter element of 30 bar [435 psi]	<b>A00</b>
----	----------------------------------------------------------------------------------	------------

**Solenoid**

05	<b>Without</b> a solenoid	<b>0</b>
----	---------------------------	----------

**Bypass valve**

06	Filter element <b>without</b> bypass valve	<b>0</b>
	Filter element <b>with</b> bypass valve, cracking pressure of 3 bar [44 psi]	<b>6</b>

**Maintenance indicator**

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

**Port**

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

**Seal**

09	NBR seal	<b>M</b>
	FKM seal	<b>V</b>

**Material**

10	Standard	<b>0</b>
----	----------	----------

## 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 PWR10-A00-06V2,2-D0M00

Material number: R928001249

Further models on request.

## Preferred types

NBR seal, with bypass, flow specifications for 30 mm<sup>2</sup>/s [143 SUS]

#### Inline filter 16 FE, filter rating of 3 µm

Type	Flow in l/min [gpm] at Δp = 0.5 bar [7.25 psi] <sup>1)</sup>	Material no. Filter	Material no. Replacement filter element
16 FE 2500 PWR3-A00-06V2,2-D0M00	1390 [367.20]	R928001243	3x R928007113
16 FE 3000 PWR3-A00-06V2,2-D0M00	1480 [390.97]	R928001244	3x R928007113
16 FE 4000 PWR3-A00-06V2,2-D0M00	2100 [554.76]	R928001245	4x R928007131
16 FE 6000 PWR3-A00-06V2,2-D0M00	3250 [858.56]	R928001246	6x R928007131
16 FE 7000 PWR3-A00-06V2,2-D0M00	5050 [1334.07]	R928001247	10x R928007131
16 FE 7500 PWR3-A00-06V2,2-D0M00	5550 [1452.95]	R928001248	10x R928007131

#### Inline filter 16 FE, filter rating of 10 µm

Type	Flow in l/min [gpm] at Δp = 0.5 bar [7.25 psi] <sup>1)</sup>	Material no. Filter	Material no. Replacement filter element
16 FE 2500 PWR10-A00-06V2,2-D0M00	2400 [634.01]	R928001249	3x R928007115
16 FE 3000 PWR10-A00-06V2,2-D0M00	2950 [779.31]	R928001250	3x R928007115
16 FE 4000 PWR10-A00-06V2,2-D0M00	3540 [935.17]	R928001251	4x R928007133
16 FE 6000 PWR10-A00-06V2,2-D0M00	5750 [1518.99]	R928001252	6x R928007133
16 FE 7000 PWR10-A00-06V2,2-D0M00	8100 [2139.79]	R928001253	10x R928007133
16 FE 7500 PWR10-A00-06V2,2-D0M00	11800 [3117.23]	R928001254	10x R928007133

<sup>1)</sup> 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**

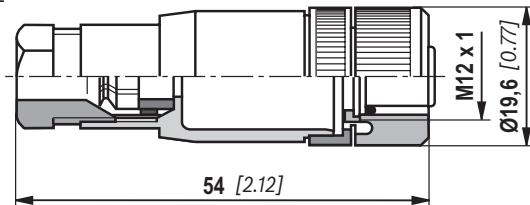
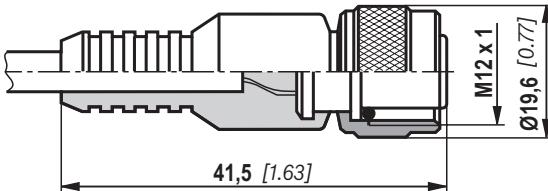
03	Round plug-in connection M12x1, 4-pole	M12x1
	Rectangular plug-in connection, 2-pole, design A according to EN-175301-803	EN175301-803

**Material numbers of the electronic switching elements**

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1		without
R928028410	WE-2SP-M12x1	Normally open contact (at 75%) / normally closed contact (at 100%)	2	M12x1	3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	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.**Material no. R900031155**Mating connector suitable for K24-3m 4-pole, M12x1  
with potted-in PVC cable, 3 m long.Line cross-section: 4 x 0.34 mm<sup>2</sup>Core marking: 1 brown 2 white  
3 blue 4 black**Material no. R900064381**

For more round plug-in connections and technical data, refer to data sheet 08006.

**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 PWR10-A00-06V2,2-D0M00 **Material no. R928001250****Electr. switching element:** WE-1SP-M12x1 **Material no. R928028409****Mating connector:** Mating connector suitable for K24 4-pole, M12x1 with screw connector, Cable gland Pg9. **Material no. R900031155**

## Filter design

Easy selection of the filter size is made possible by the FilterSelect online tool. The filter can be designed using the operating pressure, flow and fluid system parameters. The required filter rating is based on the application, the sensitivity to contamination of the components and the environmental conditions.

The program leads you through the menu on a step-by-step basis.

A documentation of the filter selection can finally be created in the form of a PDF file. This file contains the entered parameters, the designed filter with material number including spare parts, and the pressure loss curves.

Link FilterSelect:

<http://www.filterselect.de>

Other languages can be selected using the page navigation.

### standard search

application:

Product category:

type:

pressure range:

filter material:  

fineness:

volume flow rate:   

viscosity:  kin viscosity 1:  [mm<sup>2</sup>/s] 

\* = working point

collapse pressure resistance according to ISO 2941:

Start search 

search via type of medium 

full-text search medium

please select 

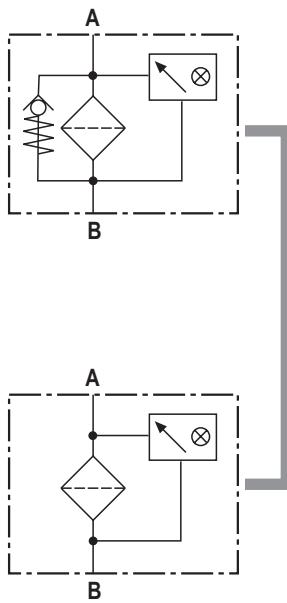
please select 

temp 1:  [°C]  [°F] kin viscosity 1:  [mm<sup>2</sup>/s] 

dyn. Viscosity 1:  [cP] density 1:  [kg/dm<sup>3</sup>] kin viscosity 1:  [mm<sup>2</sup>/s] 

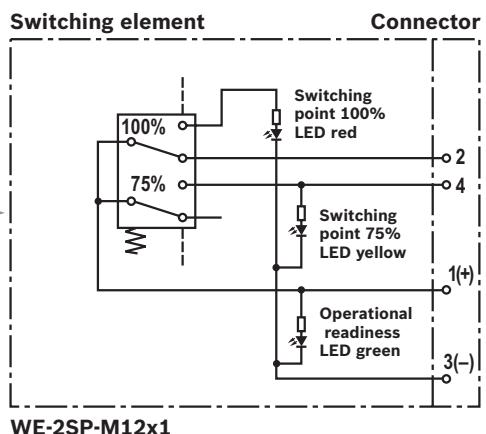
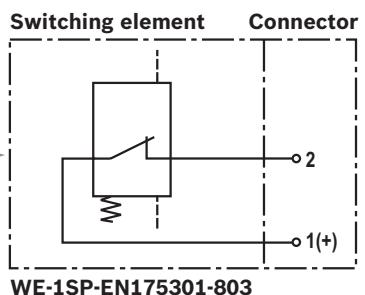
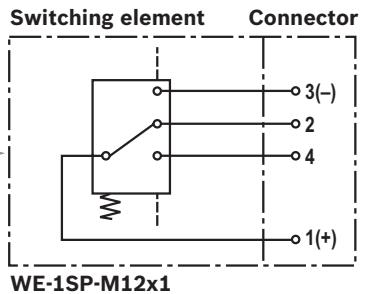
## Symbols

**Inline filter**  
with bypass and  
mechanical indicator

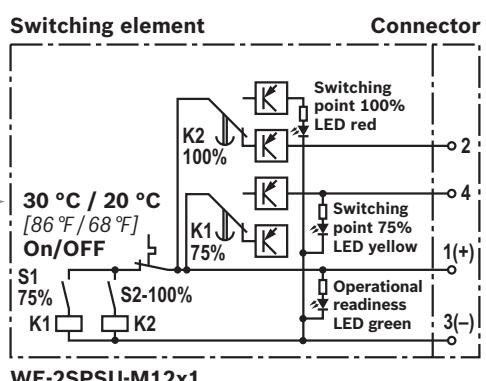


**Inline filter**  
without bypass and with  
mechanical indicator

Electronic switching element  
for maintenance indicator



Circuit diagram drawn in plugged condition  
(operating state)



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.

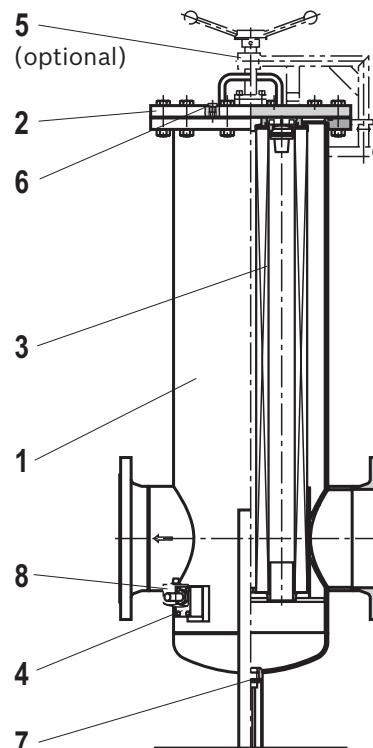
The filtered fluid enters the hydraulic circuit via the outlet. The filter housing and all connection elements are designed so that pressure peaks – as they may occur, for example, in the event of abrupt opening of large control valves due to the accelerated fluid quantity – can be securely absorbed. 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.

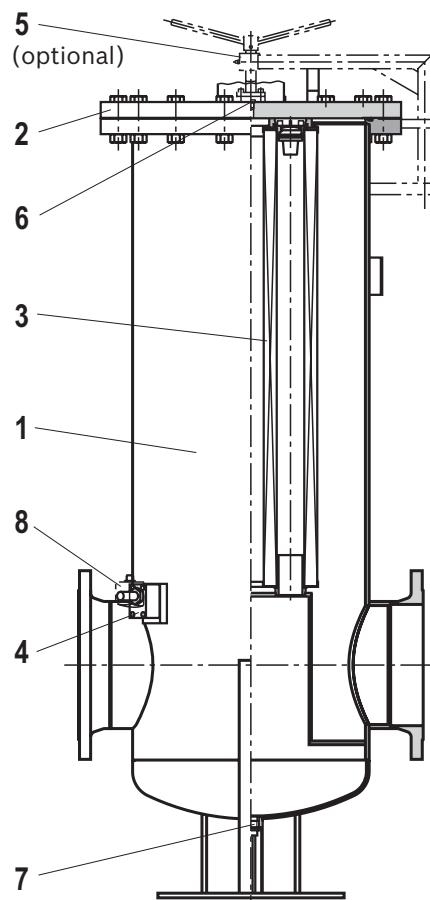
An electronic switching element can be added to the mechanical/optical maintenance indicator in order to integrate the maintenance indicator. The electronic switching element (8) must be attached to the mechanical/optical maintenance indicator (4) and held by means of a locking ring. The electronic switching 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 warning is not adhered to, and the filter element is not changed on indication, the by-pass valve will open with the increase in differential pressure and part of the flow will be diverted passed the filter element, to the clean side without being filtered. Thus, effective filtration is no longer guaranteed.



16 FE 2500 ... 6500



16 FE 7000 ... 7500

**Technical data**

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

<b>General</b>			
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	<b>2500</b>	<b>3000</b>
	kg [lbs]	104 [229]	108 [238]
	Size	<b>6000</b>	<b>7000</b>
	kg [lbs]	168 [370]	333 [734]
	Size	<b>2500</b>	<b>3000</b>
Cover weight	kg [lbs]	21 [46]	21 [46]
	Size	<b>6000</b>	<b>7000</b>
	kg [lbs]	29.5 [65]	91 [200]
Volume	Size	<b>2500</b>	<b>3000</b>
	l [US gal]	51 [13]	53 [14]
	Size	<b>6000</b>	<b>7000</b>
	l [US gal]	149 [39]	335 [88]
	<b>4000</b>	<b>4000</b>	<b>4000</b>
	<b>7500</b>	<b>7500</b>	<b>7500</b>
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	

<b>Hydraulic</b>			
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 <sup>6</sup> at rated 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 Bar [psi] 0.8 ± 0.15 [11.6 ± 2.2]		
	1.5 ± 0.2 [21.8 ± 2.9]		
	2.2 ± 0.3 [31.9 ± 4.4]		
Filtration direction	From the outside to the inside		
Cracking pressure of the bypass valve	3.0 ± 0.3 [43.51 ± 4.4]		

## Technical data

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

Electrical (electronic switching element)				
Electrical connection	Version	Round plug-in connection M12x1, 4-pole		
		WE-1SP-M12x1	WE-2SP-M12x1	WE-2SPSU-M12x1
Contact load, direct voltage	A <sub>max.</sub>	1		WE-1SP-EN175301-803
Voltage range	V <sub>max.</sub>	150 (AC/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 PWR..		Single-use element on the basis of inorganic fiber	
		Filtration ratio according to ISO 16889 of up to $\Delta p = 5$ bar [72.5 psi]	Achievable oil cleanliness according to ISO 4406 [SAE-AS 4059]
	PWR20	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
	PWR10	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
	PWR6	$\beta_6(c) \geq 200$	15/12/10 – 19/14/11
	PWR3	$\beta_5(c) \geq 200$	13/10/8 – 17/13/10
Permissible pressure differential	► A00	Bar [psi]	30 [435]

For detailed information on Hengst filter elements, please refer to data sheet 51420.

## Compatibility with permitted hydraulic fluids

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

### Important important information on hydraulic fluids:

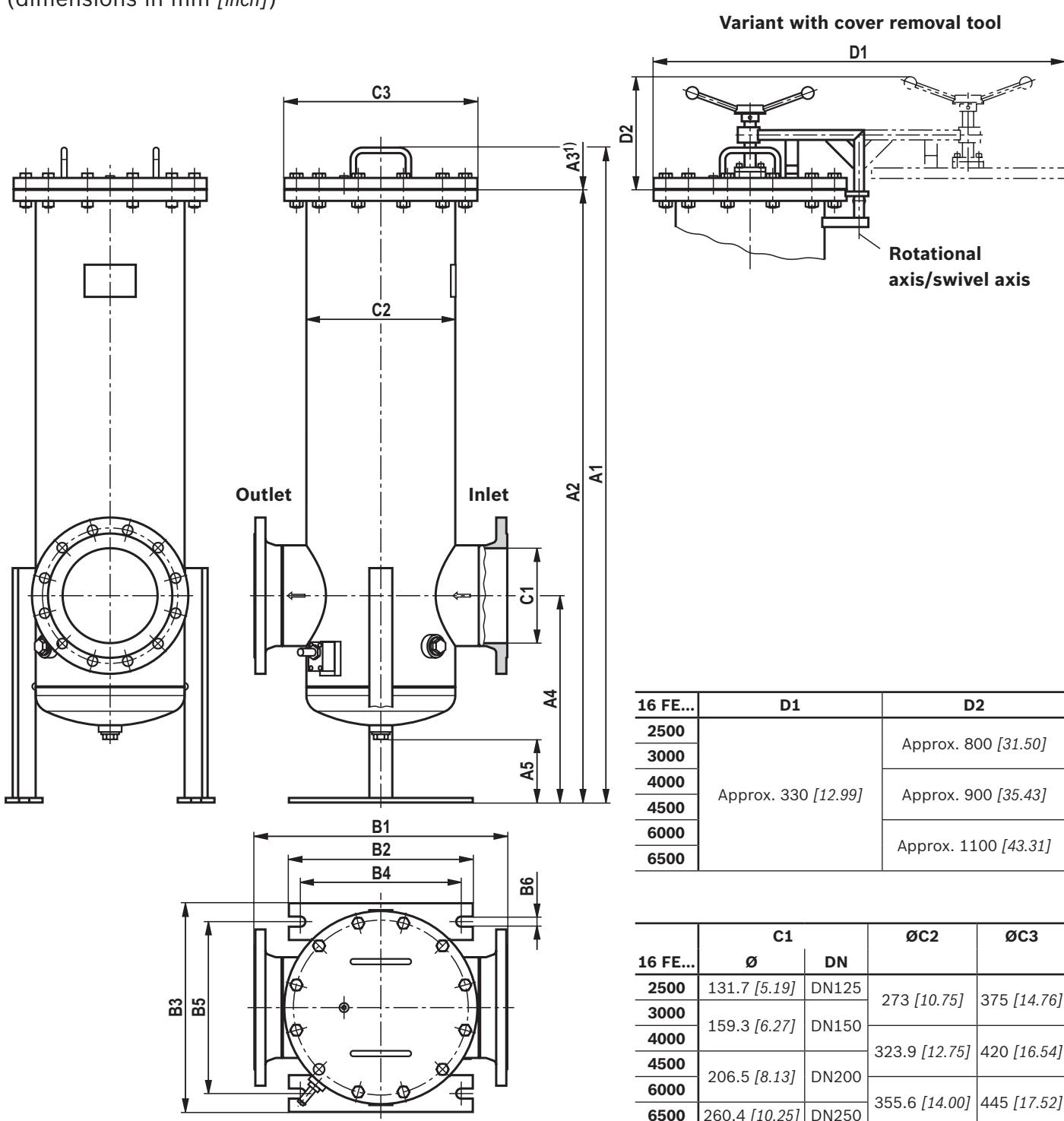
- For more information and data on the use of other hydraulic fluids, please refer to data sheet 90220 or contact us!
- **Flame resistant - containing water:** due to possible chemical reactions with materials or surface coatings of machine and system components, the service life with these hydraulic 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.

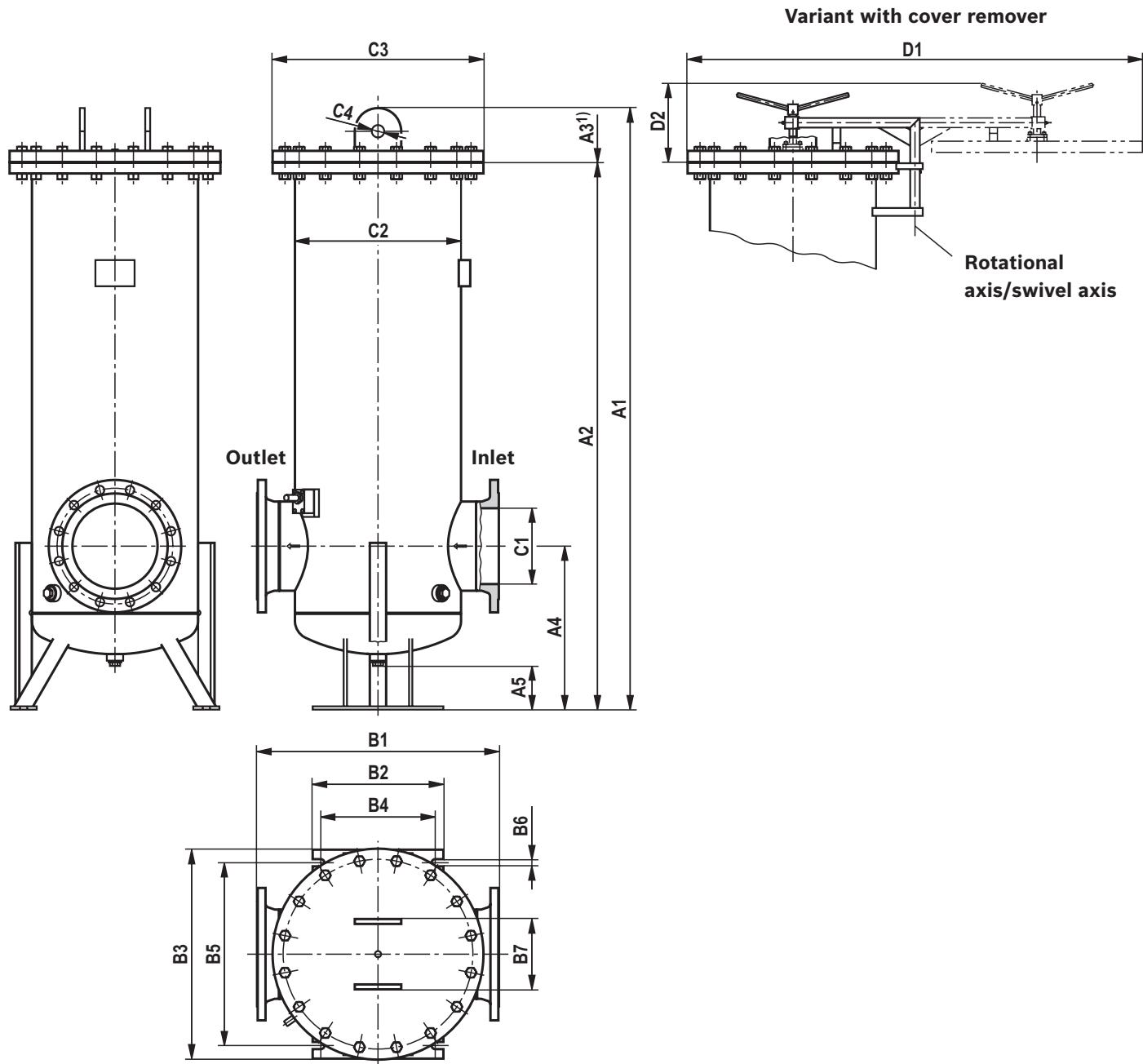
**Dimensions: NG2500 ... NG6500**

(dimensions in mm [inch])

<sup>1)</sup> Servicing height for filter element exchange

16 FE...	A1	A2	A3 <sup>1)</sup>	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]		403 [15.87]		323 [12.72]	
3000											
4000	1465 [57.68]	1375 [54.13]			450 [17.72]	198 [7.80]	400 [15.75]	454 [17.87]	350 [13.78]	374 [14.72]	22 [0.87]
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])



<sup>1)</sup> Servicing height for filter element exchange

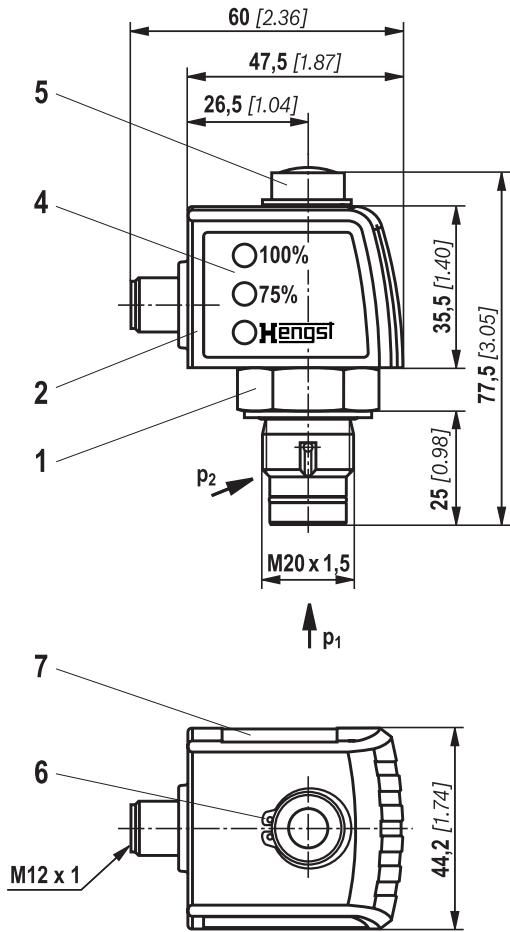
16 FE...	A1	A2	A3 <sup>1)</sup>	A4	A5	B1	B2	B3	B4	B5	B6	B7
7000	1840 [72.44]	1675 [65.94]	990 [38.98]	500 [19.69]	134 [5.28]	740 [29.13]	400 [15.75]	639 [25.16]	350 [13.78]	559 [22.01]	22 [0.87]	215 [8.46]
	1870 [73.62]	1705 [67.13]			114 [4.49]	750 [29.53]						

16 FE...	C1		ØC2	ØC3	ØC4	D1	D2
	Ø	DN					
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					

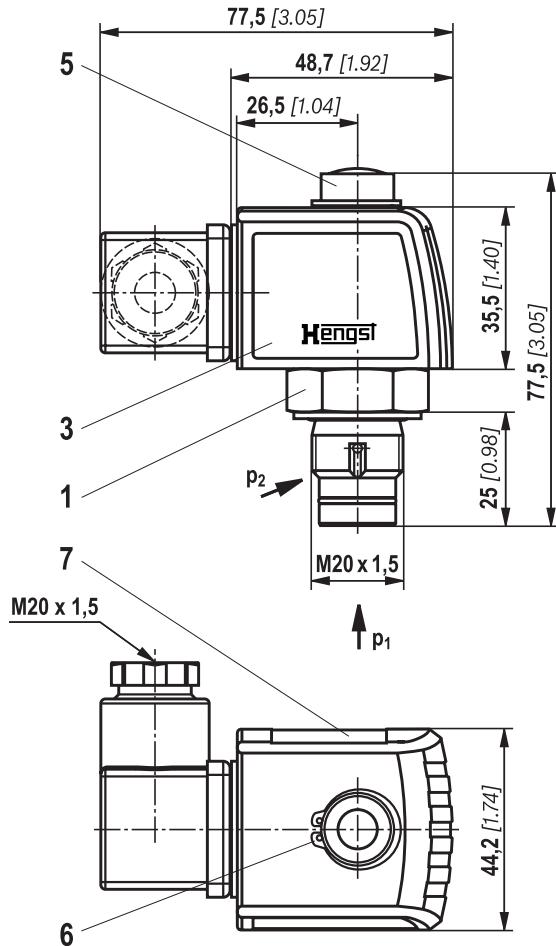
## Maintenance indicator

(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  $M_A \max = 50 \text{ Nm} [36.88 \text{ lb}\cdot\text{ft}]$
- 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, **material no. R900003923**
- 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
<b>2nd</b>			<b>A00</b>	-	

#### Filter element

01	Design	<b>2nd</b>
----	--------	------------

#### Size

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

#### Filter rating in $\mu\text{m}$

03	<b>Absolute</b> (ISO 16889; $\beta_x(c) \geq 200$ )	Glass fiber material, not cleanable	<b>PWR3</b> <b>PWR6</b> <b>PWR10</b> <b>PWR20</b>
	<b>Nominal</b>	Stainless steel wire mesh, cleanable	<b>G10</b> <b>G25</b> <b>G40</b> <b>G60</b> <b>G100</b>
		Filter paper, not cleanable	<b>P10</b> <b>P25</b>

#### Pressure differential

04	Max. permissible pressure differential of the filter element of 30 bar [435 psi]	<b>A00</b>
----	----------------------------------------------------------------------------------	------------

#### Bypass valve

05	Filter element <b>without</b> bypass valve	<b>0</b>
	Filter element <b>with</b> bypass valve of 3.0 bar [43.51 psi]	<b>6</b>

#### Seal

06	NBR seal	<b>M</b>
	FKM seal	<b>V</b>

#### Order example:

**2.0058 PWR10-A00-6-M**

**Material number: R928007115**

**For detailed information on Hengst filter elements, please refer to data sheet 51420.**

#### Preferred types

##### Filter elements

Type	Material no. Filter element, Filter rating in $\mu\text{m}$		
	<b>PWR3</b>	<b>PWR6</b>	<b>PWR10</b>
2.0058 PWR..-A00-6-M	<b>R928007113</b>	<b>R928007114</b>	<b>R928007115</b>
2.0059 PWR..-A00-6-M	<b>R928007131</b>	<b>R928007132</b>	<b>R928007133</b>

## Ordering code

### Spare parts

#### Mechanical/optical maintenance indicator

01	02	03	04	05	06
<b>W</b>	<b>O</b>	<b>-</b>	<b>D01</b>	<b>-</b>	<b>-</b>

01	<b>Maintenance indicator</b>	<b>W</b>
----	------------------------------	----------

02	<b>Mechanical/optical indicator</b>	<b>O</b>
----	-------------------------------------	----------

#### Version

03	Pressure differential, modular design	<b>D01</b>
----	---------------------------------------	------------

#### Switching pressure

04	0.8 bar [11.6 psi]	<b>0.8</b>
	1.5 bar [22 psi]	<b>1.5</b>
	2.2 bar [32 psi]	<b>2.2</b>

#### Seal

05	NBR seal	<b>M</b>
	FKM seal	<b>V</b>

#### Max. nominal pressure

06	Switching pressure of 0.8 bar [11.6 psi], 160 bar [2321 psi]	<b>160</b>
	Switching pressure of 1.5 bar [21.8 psi], 160 bar [2321 psi]	<b>160</b>
	Switching pressure of 2.2 bar [31.9 psi], 160 bar [2321 psi]	<b>160</b>

Material no.	Description
<b>R928038779</b>	WO-D01-0.8-M-160
<b>R928038778</b>	WO-D01-0.8-V-160
<b>R928038781</b>	WO-D01-1.5-M-160
<b>R928038780</b>	WO-D01-1.5-V-160
<b>R901025312</b>	WO-D01-2.2-M-160
<b>R901066233</b>	WO-D01-2.2-V-160

## Ordering code

### Spare parts

#### Seal kit

01	02	03	04
<b>D</b>	<b>16FE</b>		

01	<b>Seal kit</b>	<b>D</b>
02	<b>Series 16FE</b>	<b>16FE</b>

#### Size

03	2500-3000	<b>2500-3000</b>
	4000	<b>4000</b>
	6000	<b>6000</b>
	7000-7500	<b>7000-7500</b>

#### Seal

04	NBR seal	<b>M</b>
	FKM seal	<b>V</b>

Material no.	Description
<b>R928044517</b>	D16FE2500-3000-M
<b>R928038587</b>	D16FE2500-3000-V
<b>R928054095</b>	D16FE4000-M
<b>R928054096</b>	D16FE4000-V
<b>R928054097</b>	D16FE6000-M
<b>R928054098</b>	D16FE6000-V
<b>R928054099</b>	D16FE7000-7500-M
<b>R928054100</b>	D16FE7000-7500-V

## Assembly, commissioning, maintenance

### Assembly

- ▶ The max. operating pressure of the system must not exceed the max. permissible 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 51450.

- ▶ 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 51420.
- ▶ 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!

<ul style="list-style-type: none"> <li>▶ Assemble and disassemble only with depressurized system!</li> <li>▶ Filter is under pressure!</li> <li>▶ Open the cover screws only if it is depressurized!</li> <li>▶ Do not exchange the maintenance indicator while the filter is under pressure!</li> </ul>	<ul style="list-style-type: none"> <li>▶ 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.</li> </ul>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

### ☞ Notices:

<ul style="list-style-type: none"> <li>▶ All maintenance of the filter should be performed by trained specialists.</li> <li>▶ Proper function and safety are only guaranteed if original Hengst filter elements and spare parts are used.</li> </ul>	<ul style="list-style-type: none"> <li>▶ 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.</li> </ul>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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

Series 16 FE...	2500 ... 3000	4000	6000	7000 ... 7500
Screw	M16		M20	
Tightening torque at $\mu_{\text{tot}} = 0.14$	Nm [ <i>lbf-ft</i> ]	215 $\pm$ 20 [159 $\pm$ 15]		430 $\pm$ 40 [317 $\pm$ 30]
Quantity		8	12	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 $\mu_{\text{tot}} = 0.14$	Nm [ <i>lbf-ft</i> ]	30 $\pm$ 3 [22 $\pm$ 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 $\mu_{\text{tot}} = 0.14$	Nm [ <i>lbf-ft</i> ]	225 [166] $\pm$ 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 [ <i>lbf-ft</i> ]	Max. 50 [37]		
Tightening torque of cubic connector screw switching element EN-175301-803			M3 / 0.5 [0.4]	

**Directives and standardization****Product validation**

Hengst filters, the filter elements built into them and filter accessories are tested and quality-monitored according to different ISO test standards:

Pressure pulse test	ISO 10771:2015-08
Filtration performance test (multipass test)	ISO 16889:2008-06
$\Delta p$ (pressure loss) characteristic curves	ISO 3968:2001-12
Compatibility with hydraulic fluid	ISO 2943:1998-11
Collapse pressure test	ISO 2941:2009-04

The development, manufacture and assembly of Hengst industrial filters and Hengst filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2015.

## Directives and standardization

### Classification according to the Pressure Equipment

#### Directive

The inline filters for hydraulic applications according to 51403 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 to 51403 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 **R928028409**

WE-1SP-EN175301-803 **R928036318**

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

#### 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

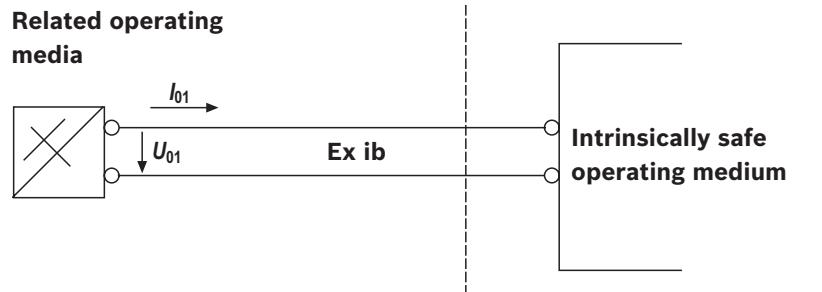
#### Electronic switching element in intrinsically safe electric circuit

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 T <sub>max</sub> 40 °C	750 mW T <sub>max</sub> 40 °C
	max 1.0 W T <sub>max</sub> 80 °C	550 mW T <sub>max</sub> 100 °C
Surface temperature <sup>1)</sup>	max –	100 °C
Inner capacity Ci	Neglectable	
Inner inductivity Li	Neglectable	
Dust accumulation	max –	0.5 mm

<sup>1)</sup> The temperature depends on the temperature of the medium in the filter and must not exceed the value specified here.

## Directives and standardization

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. permissible 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 Hengst spare parts