

Duplex filter with filter element according to Hengst standard

Type 16FDK 2500 up to 4000

RD 51493

Edition: 04.21



- ▶ Nominal size according to **Hengst Standard**: 2500 to 4000
- ▶ Nominal pressure 16 bar [232 psi]
- ▶ Connection DN 100
- ▶ Operating temperature $-10\text{ °C} \dots +100\text{ °C}$ [14 °F to 212 °F]

Features

Duplex filters are used in hydraulic systems for separating solid materials from fluids and lubricating oils, and are intended for installation in pipelines. The filter elements can be changed without any operational interruption.

They have the following characteristics:

- ▶ Filters for inline installation, switchable
- ▶ Special highly efficient filter materials
- ▶ High collapse resistance of the filter elements
- ▶ As standard fitted with mechanical-optical maintenance indicator with memory function
- ▶ Optional features with various electrical switching elements possible, modular design
- ▶ Optional integrated by-pass valve in the filter element
- ▶ Test ports fitted as a standard on the change-over valve housing
- ▶ Gas-tight ball valve change-over mechanism
- ▶ Pressure equalization line as a standard feature

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Type codes

Filter

01	02	03	04	05	06	07	08	09	09	09						
16FDK		-	1X	/		A00	-		-		-		-		-	

Series

01	Duplex filter 16 bar [232 psi]	16FDK
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Size

02	FDK... (Filter elements according to Hengst standard)	2500	4000
03	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X	

Filter rating in µm

04	Absolute (ISO 16889)	Glass fiber material, not cleanable	PWR3 PWR6 PWR10 PWR20
	Absolute (ISO 16889)	Water-absorbing, not cleanable	AS10
	Nominal	Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100

Differential pressure

05	max. admissible pressure differential of the filter element 30 bar [435 psi], with bypass valve	A00
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Maintenance indicator

06	Maintenance indicator, mech./visual, switching pressure 0.8 bar [11.6 psi] - bypass cracking pressure 3.0 bar [43.7 psi]	V0,8
	Maintenance indicator, mech./visual, switching pressure 1.5 bar [21.8 psi] - bypass cracking pressure 3.0 bar [43.7 psi]	V1,5
	Maintenance indicator, mech./visual, switching pressure 2.2 bar [32 psi] - bypass cracking pressure 3.0 bar [43.7 psi]	V2,2

Seal

07	NBR seal	M
	FKM seal	V

Connection

08	Frame size	2500 ... 4000	<input type="checkbox"/> Standard port
	Connection		
	DN100 PN40	D12	

Supplementary information (multiple specifications possible)

09	Bleeding by measuring coupling instead of bleed screw	E
	Cover lift-off device (for NG 4000)	LD
	Without bypass valve	NB
	Manufacturer's inspection certificate M according to DIN 55350 T18	Z1

Order example:

16FDK2500-1X/PWR10A00-V2,2-M-D12

Further versions are available upon request.

Preferred types**16FDK2500-4000 flow specifications for 30 mm²/s [143 SUS]****Filter rating 3 µm**

Type	Flow in l/min [US gpm] with $\Delta p = 0.5$ bar [7.5 psi]	Flow in l/min [US gpm] in $\Delta p = 0.3$ bar [4.5 psi]	Material no. filter	Material no. replacement element 3 x for NG2500 per side 4 x for NG4000 per side
16FDK2500-1X/PWR3A00-V2,2-M-D12	1075 [284]	765 [202]	R928058274	R928007113
16FDK4000-1X/PWR3A00-V2,2-M-D12	1210 [320]	900 [238]	R928058275	R928007131

16FDK2500-4000 flow specifications for 30 mm²/s [143 SUS]**Filter rating 6 µm**

Type	Flow in l/min [US gpm] with $\Delta p = 0.5$ bar [7.5 psi]	Flow in l/min [US gpm] in $\Delta p = 0.3$ bar [4.5 psi]	Material no. filter	Material no. replacement element 3 x for NG2500 per side 4 x for NG4000 per side
16FDK2500-1X/PWR6A00-V2,2-M-D12	1150 [304]	850 [225]	R928058276	R928007114
16FDK4000-1X/PWR6A00-V2,2-M-D12	1310 [346]	1000 [264]	R928058277	R928007132

16FDK2500-4000 flow specifications for 30 mm²/s [143 SUS]**Filter rating 10 µm**

Type	Flow in l/min [US gpm] with $\Delta p = 0.5$ bar [7.5 psi]	Flow in l/min [US gpm] in $\Delta p = 0.3$ bar [4.5 psi]	Material no. filter	Material no. replacement element 3 x for NG2500 per side 4 x for NG4000 per side
16FDK2500-1X/PWR10A00-V2,2-M-D12	1235 [326]	900 [238]	R928058278	R928007115
16FDK4000-1X/PWR10A00-V2,2-M-D12	1340 [354]	1010 [267]	R928058279	R928007133

16FDK2500-4000 flow specifications for 30 mm²/s [143 SUS]**Filter rating 20 µm**

Type	Flow in l/min [US gpm] with $\Delta p = 0.5$ bar [7.5 psi]	Flow in l/min [US gpm] in $\Delta p = 0.3$ bar [4.5 psi]	Material no. filter	Material no. replacement element 3 x for NG2500 per side 4 x for NG4000 per side
16FDK2500-1X/PWR20A00-V2,2-M-D12	1430 [378]	1100 [291]	R928058280	R928007116
16FDK4000-1X/PWR20A00-V2,2-M-D12	1480 [391]	1150 [304]	R928058281	R928007134

16FDK2500-4000 flow specifications for 30 mm²/s [143 SUS]**Filter rating 25 µm**

Type	Flow in l/min [US gpm] with $\Delta p = 0.5$ bar [7.5 psi]	Flow in l/min [US gpm] in $\Delta p = 0.3$ bar [4.5 psi]	Material no. filter	Material no. replacement element 3 x for NG2500 per side 4 x for NG4000 per side
16FDK2500-1X/G25A00-V2,2-M-D12	1550 [409]	1220 [322]	R928058282	R928007112
16FDK4000-1X/G25A00-V2,2-M-D12	1555 [411]	1225 [324]	R928058284	R928007130

Filter design

A simple selection of the filter size is possible with the online tool, FilterSelect. The filter can be selected with the system parameters operating pressure, volume flow and fluid. The required filter fineness is based on the application, the components sensitivity to contamination and the environmental conditions.

The FilterSelect sizing program leads you through the menu step-by-step.

A document of the chosen filter and its associated selection parameters can be created in the form of a PDF file. This document contains the specified parameters, the selected filter material number with the relevant spare parts, and the differential pressure curves.

Link FilterSelect:

<http://www.filtersselect.de/>

Other languages can be selected using the page navigation.

standard search

application: hydraulics for industrial use and applications with lubricating oil ▼
Product category: please select ▼
type: please select ▼
pressure range: please select ▼
filter material: please select ▼ ?
fineness: please select ▼
volume flow rate: [l/min] ▼
viscosity:
 * = working point

kin viscosity 1: [mm²/s] +
 search via type of medium full-text search medium
please select ▼
please select ▼
 temp 1: [°C] [°F] kin viscosity 1: [mm²/s] +
 dyn. Viscosity 1: [cP] density 1: [kg/dm³] kin viscosity 1: [mm²/s] +

collapse pressure resistance according to ISO 2941: 30 bar ▼
Start search 🔍

Ordering code**Accessories** (dimensions in mm [*inch*])**Electronic switching element for maintenance indicators**

01	02	03
WE	-	-

Maintenance indicator

01	electronic switching element	WE
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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 connector, 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	M12x1	none	
R928028410	WE-2SP-M12x1	Normally open (at 75%) / normally closed contact (at 100%)	2		EN 175301-803	3 pieces
R928028411	WE-2SPSU-M12x1					
R928036318	WE-1SP-EN175301-803	Normally closed contact	1			none

Electrical connectors (max. admissible voltage: 50 V)

for electronic switching element with round plug-in connection M12x1

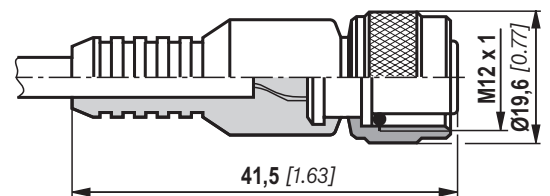
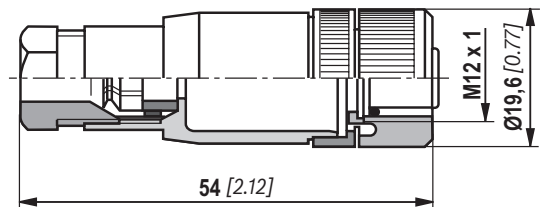
Connector suitable for K24 4-pole, M12x1 with screw connection, cable gland Pg9.

Material no. R900031155

Connector suitable for K24-3m 4-pole, M12x1 with potted-in PVC cable, 3 m long.

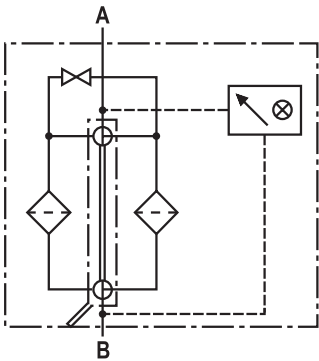
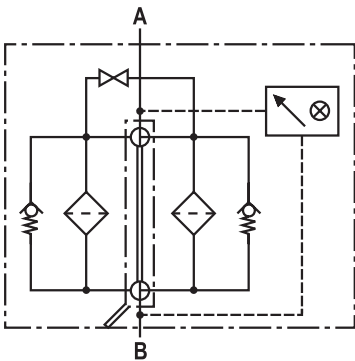
Line cross-section: 4 x 0.34 mm²Core marking: 1 brown 2 white
3 blue 4 black**Material no. R900064381**

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

**Order example:**Duplex filter with mechanical/optical maintenance indicator for $p_{nom.} = 16 \text{ bar}$ [232 psi] with bypass valve, size 2500, with filter element 10 µm and electronic switching element M12x1 with 1 switching point.**Filter:** 16FDK2500-1X/PWR10A00-V2,2-M-D12**Material no.:** R928058278**Maintenance indicator:** WE-1SP-M12x1**Material no.:** R928028409**Electrical connector:** Connector suitable for K24 4-pole, M12x1**Material no.:** R900031155

Symbols

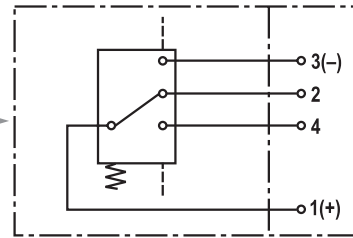
Duplex filter with by-pass valve and mechanical indicator as well as pressure equalization line



Duplex filter without by-pass valve and with mechanical indicator as well as pressure equalization line

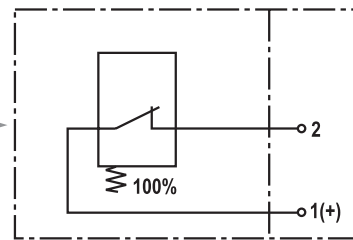
electronic switching element
for maintenance indicator

Switching element Connector



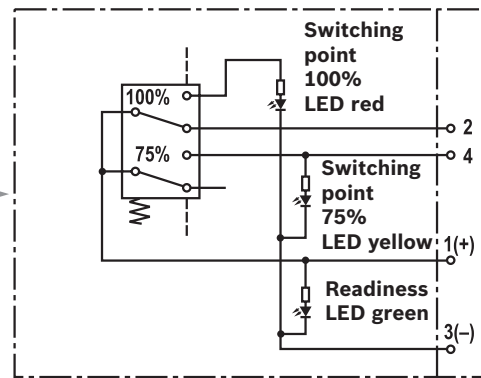
WE-1SP-M12x1

Switching element Connector



WE-1SP-EN175301-803

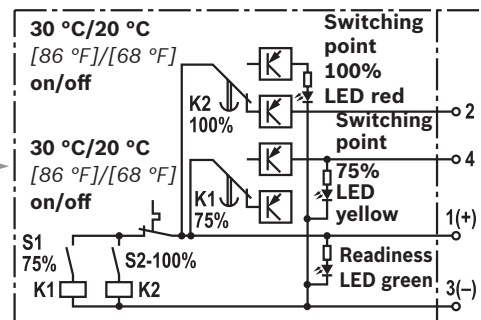
Switching element Connector



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 state)

Function, section

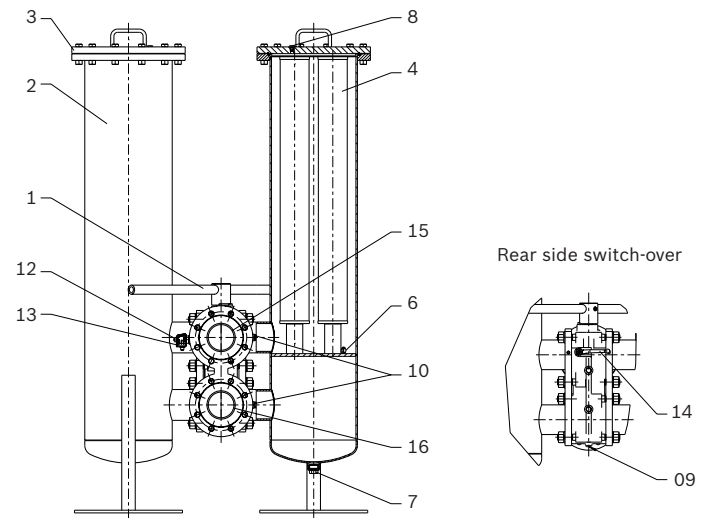
The 16FDK duplex filter is suitable for inline installation. It basically consists of two filter housings (2) with a switch-over ball-valve assembly (1), a flange-mounted filter cover (3), filter elements with optionally installed by-pass valve (4) as well as a mechanical optical maintenance indicator (12). Via the inlet, the hydraulic fluid reaches the filter element (4) where it is filtered. The dirt particles are retained in the filter element. Via the outlet, the filtered fluid enters the hydraulic circuit.

Switching between the two filter housings, without interrupting flow, is achieved by activating the ball-valve change over lever. The pressure equalization line (14) is used for filling and bleeding of the filter housing, in the event of a filter element change-out as well as for reduction of the switching force required to changing over the change over-valve.

The filter housing and all connection parts are designed in such a way that pressure peaks - such as those found in sudden opening of large control valves, where an acceleration of liquid masses can occur - can be safely accommodated. A drain plug (9) is included as standard. The vent screw (8) - is used to vent the corresponding filter. The test ports (10) on the side of the connecting flanges are included as a standard and closed off with screw plugs.

As a standard the filter is equipped with a mechanical optical maintenance indicator (12). The electronic switching element (13), which must be ordered separately, is fitted over the mechanical optical maintenance indicator and held in place with a locking ring.

The electronic switching elements with 1 or 2 switching points are connected using an electrical connector according to IEC-60947-5-2 or with a cable connection according to EN 17301-803.



- 6** Draining, dirt side
- 7** Draining, clean side
- 15** Inlet
- 16** Outlet

WARNING!

If the maintenance indicator for element replacement is not heeded, the by-pass valve will open with the rise in the differential pressure. This will result in partial unfiltered fluid reaching the clean side of the filter. Consequently, efficient filtration is no longer guaranteed.

Technical data

(For use of the device outside the stated values, please ask us!)

general				
Ambient temperature range	°C [°F]	-10 ... +65 [14 ... 149]; (-30 [-22] at reduced operating pressure of 10 bar [145psi] max)		
Storage conditions	- Seal NBR	°C [°F]	-40 ... +65 [-40 ... 149]; max. relative air humidity 65%	
	- Seal FKM	°C [°F]	0 ... +65 [32 ... 149]; max. relative air humidity 65%	
Installation position		vertical		
		2500	4000	
Weight complete filter ¹⁾	kg [lbs]	275 [606]	340 [750]	
Weight filter cover	kg [lbs]	21 [46]	26 [57]	
Volume	l [US gal]	2 x 74 [19.55]	2 x 110 [29]	
Material	- Filter cover	Steel		
	- Filter housing	Steel		
	- Bypass valve	Steel / POM		
	- Seals	NBR / FKM		
	- Optical maintenance indicator	V0,8, V1,5, V2,2	Aluminium	
	- Electronic switching element	Plastic PA6		

hydraulic			
Maximum operating pressure	bar [psi]	16 [232]	
Hydraulic fluid temperature range	°C [°F]	-10 ... +100 [+14 ... +212]	
Fatigue strength according to ISO 10771	Load cycles	> 10 ⁶ with 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	bar [psi]	Response pressure of the maintenance indicator	Cracking pressure of the bypass valve
		0.8 ± 0.15 [11.6 ± 2.2]	3.0 ± 0.30 [43.5 ± 4.3]
		1.5 ± 0.2 [21.8 ± 2.9]	3.0 ± 0.30 [43.5 ± 4.3]
		2.2 ± 0.3 [31.9 ± 4.4]	3.0 ± 0.30 [43.5 ± 4.3]

¹⁾ The information given for the sizes refers to the standard version.

Technical data

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

electric (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 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 with resistive load	W	20		70
Switching type	- 75% signal	-	Normally open contact	-
	- 100% signal	Changeover	Normally closed contact	Normally closed contact
	- 2SPSU		Signal interconnection 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 in order to protect the switching contacts.				
Weight	electronic switching element	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 up to $\Delta p = 5$ bar [72.5 psi]		Achievable oil cleanliness according to ISO 4406 [SAE-AS 4059]
Particle separation	PWR20	$\beta_{20(c)} \geq 200$	$\beta_{21(c)} \geq 1000$	19/16/12 ... 22/17/14
	PWR10	$\beta_{10(c)} \geq 200$	$\beta_{11(c)} \geq 1000$	17/14/10 ... 21/16/13
	PWR6	$\beta_{6(c)} \geq 200$	$\beta_{8(c)} \geq 1000$	15/12/10 ... 19/14/11
	PWR3	$\beta_{5(c)} \geq 200$	$\beta_{6(c)} \geq 1000$	13/10/8 ... 17/13/10
admissible pressure differential	- A00	bar [psi]	30 [435]	

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	
	- soluble in water	HEPG	VDMA 24568
Flame-resistant	- water-free	HFDU, HFDR	VDMA 24317
	- containing water	HFAS	DIN 24320
		HFAE	
		HFC	
		NBR	VDMA 24317

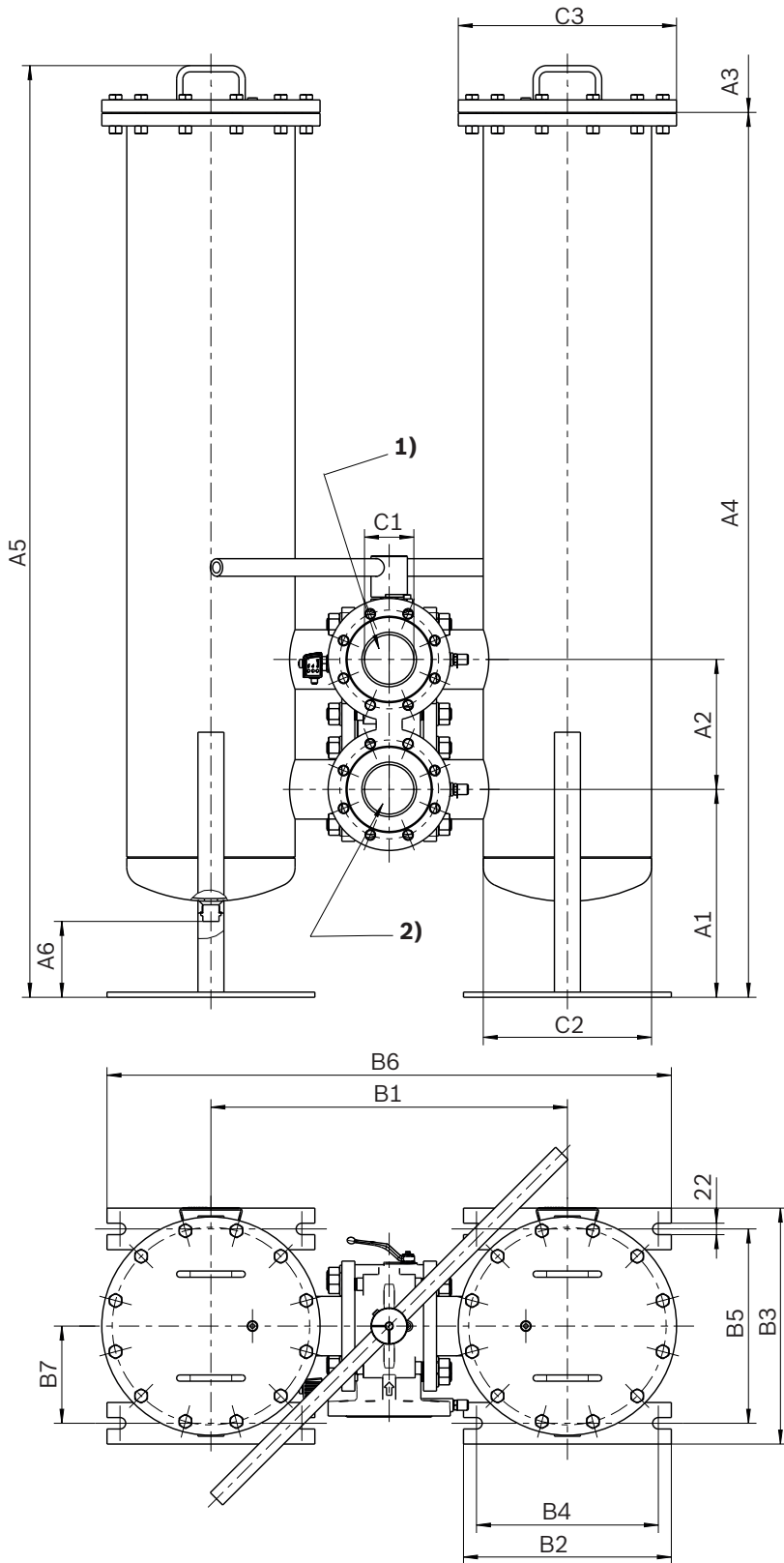
Important information on hydraulic fluids!

- For further 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 lower than expected. Filter materials made of filter paper P (cellulose) must not be used, filter elements with glass fiber material (Pure Power PWR... or wire mesh G) 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 expansion.

Unit dimensions: NG2500 ... NG4000
 (dimensions in mm [inch])



- 1) Inlet DN100PN40 DIN EN 1092-1:2008-09
- 2) Outlet DN100PN40 DIN EN 1092-1:2008-09

Unit dimensions: NG2500 ... NG4000
(dimensions in mm [*inch*])

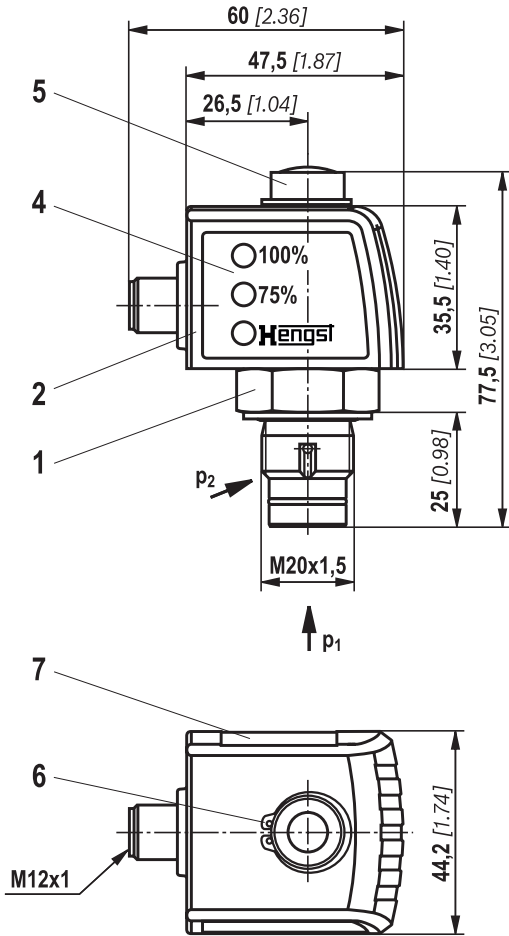
Size	A1	A2	A3	A4	A5	A6
2500	400 [15.7]	250 [9.84]	860 [33.9]	1550 [59.1]	1640 [64.6]	146 [5.75]
4000			900 [35.4]	1703 [67]	1793 [70.6]	

Size	B1	B2	B3	B4	B5	B6	B7
2500	632 [24.9]	400 [15.7]	403 [15.9]	350 [13.8]	323 [12.7]	1032 [40.6]	161.5 [6.35]
4000	686 [27]		454 [17.9]		374 [14.7]	1086 [42.8]	187 [7.36]

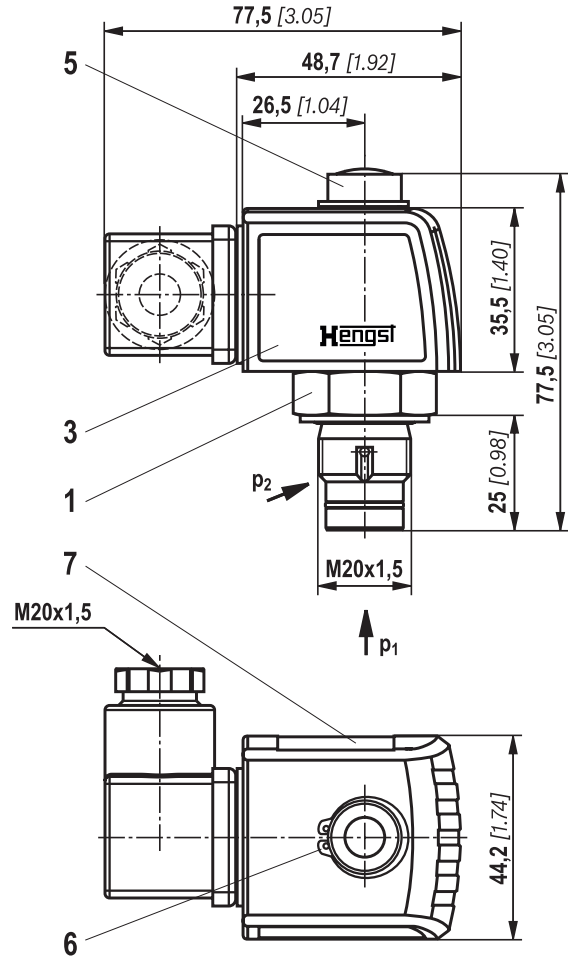
Size	C1	C2	C3
2500	100 [3.94]	273 [10.7]	375 [14.8]
4000		323.9 [12.8]	420 [16.5]

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 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 Optical indicator with memory function
- 6 Locking ring DIN 471-16x1,
material no. R900003923
- 7 Name plate

Notes:
The drawing shows the mechanical/optical maintenance indicator (1) and the electronic switching element (2) (3).

Ordering code Spare parts

Filter element

01	02	03	04	05	06
2.			- A00 -		

Filter element

01	Design	2.
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Size

02	FLDK... (Filter element according to Hengst Standard)	Filter size	Number of filter elements per filter housing	
		2500	3	0058
		4000	4	0059

Filter rating in µm

03	Absolute (ISO 16889)	Glass fiber material, not cleanable	PWR3 PWR6 PWR10 PWR20
		Water-absorbing, not cleanable	AS10
	Nominal	Stainless steel wire mesh, cleanable	G10 G25 G40 G60 G100

Pressure differential

04	Maximum admissible pressure differential of the filter element 30 bar [435 psi]	A00
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Bypass valve

05	Filter element without bypass valve	0
	Filter element with bypass valve, cracking pressure [43.51 psi]	6

Seal

06	NBR seal	M
	FKM seal	V

Order example:

2.0058 PWR10-A00-6-M

Material number: R928007115

For further information on Hengst filter elements, please refer to data sheet 51517.

Preferred types

Filter elements

Type	Material no. filter material, filter rating in µm					
	PWR3	PWR6	PWR10	PWR20	G25	AS10
2.0058...-A00-6-M	R928007113	R928007114	R928007115	R928007116	R928007112	R928007117
2.0059...-A00-6-M	R928007131	R928007132	R928007133	R928007134	R928007130	R928007135

Ordering code

Spare parts

Mechanical/optical maintenance indicator

01	02	03	04	05	06
W	O	-	D01	-	-

01	Maintenance indicator	W
02	mechanical/optical indicator	O
03	Design pressure differential M20x1.5	D01

Switching pressure

04	0.8 bar [11.6 psi]	0.8
	1.5 bar [21.8 psi]	1.5
	2.2 bar [31.9 psi]	2.2

Seal

05	NBR seal	M
	FKM seal	V

max. nominal pressure

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

Mechanical/optical maintenance indicator	Material no.
WO-D01-0,8-M-160	R928038779
WO-D01-1,5-M-160	R928038781
WO-D01-2,2-M-160	R901025312
WO-D01-0,8-V-160	R928038778
WO-D01-1,5-V-160	R928038780
WO-D01-2,2-V-160	R901066233

Ordering code Spare parts

Seal kit

01	02	03	04	05
D	16FDK		- 1X / -	

01	Seal kit	D
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Series

02	Series	16FLDK
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Size

03	2500	2500
	4000	4000

04	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X
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Seal

05	NBR seal	M
	FKM seal	V

Seal kit	Material number
D16FDK2500-1X/-M	R928058420
D16FDK2500-1X/-V	R928058421
D16FDK4000-1X/-M	R928058422
D16FDK4000-1X/-V	R928058423

Notice:

Seals for the switch-over valve are not included in the filter seal kit. If the maintenance of the switch-over valve is required, please contact the Hengst Service Department.

Ordering code Accessories

Screw coupling incl. hose for ventilation	Material number
DN2-400/MCS20-MOS-G1/4/630ST3N00Z-P (NBR)	R901360230
DN2-400/MCS20-MOS-G1/4/630ST3F00Z-P (FKM)	R901360231

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 the assembly of the filter (also see the section „Tightening torques“), the flow direction (direction arrows) and the required servicing height of the filter element (see the section „Dimensions“) must be considered.
- ▶ Perfect functionality is only guaranteed if the filter is installed in the vertical position. The maintenance indicator should be easily visible.
- ▶ Remove the plastic plugs in the filter inlet and outlet.
- ▶ Ensure that the filter is installed with the power supply fully deactivated.
- ▶ The optional electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held in place by means of the locking ring.

Notice:

Before completion of assembly, the stability is compromised. Ensure that the filter is properly secured.

Commissioning

- ▶ Open the pressure equalization line.
- ▶ Commission the system.
- ▶ The filter is to be bled via bleed screws on both filter covers. After the operating fluid escapes, the bleed screws are to be closed again.
- ▶ Switch the filter into the operating position; to do so, switch the switching lever to one of the two end positions. (See information on the name plate).
- ▶ The switch-over lever is on the filter side which is in operation.
- ▶ The pressure compensation remains open.

Maintenance

- ▶ If at operating temperature, the red indicator pin extends out of the mechanical optical maintenance indicator and/or if the electronic switching element opens / closes the circuit, the filter element is contaminated and needs to be replaced or cleaned accordingly. See also data sheet **51450**.
- ▶ The material number of the corresponding replacement filter element is indicated on the name plate of the complete filter assembly. It should comply with the material number on the filter element.
- ▶ The switch-over lever lies in front of the filter side that is in operation. (See information on the name plate).
- ▶ Switch the filter over.
- ▶ Close the pressure equalization valve.
- ▶ To safely remove pressure, open the bleed screw on the filter cover of the decommissioned filter side.
- ▶ The oil on the dirt side can be drained through the drain screw.
- ▶ Unscrew the filter cover of the filter side which is not in operation.
- ▶ Remove the filter element from the spigot by rotating it slightly.
- ▶ Clean the filter components if necessary.
- ▶ Check the seals for damage and replace them, if necessary. For suitable seal kits, refer to the section „Spare parts“.
- ▶ Filter elements made of wire mesh can be cleaned.
- ▶ For detailed cleaning instructions, see data sheet 51517.
- ▶ Install the new or cleaned filter element on the spigot again by slightly rotating it.
- ▶ The filter is to be assembled in reverse order.
- ▶ The torque specifications („Assembly“ chapter) are to be observed.
- ▶ To fill the maintained filter side, open the pressure equalization line.
- ▶ The filter is bled through the corresponding bleed screw of the filter that is being serviced.
- ▶ As soon as fluid flows through the bleed screw it should be closed off.
- ▶ Ensure correct position of the switch-over lever end position.
- ▶ The pressure compensation remains open.

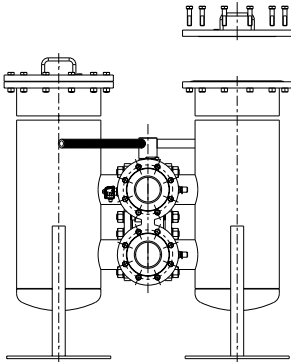
Notice:

The ball valve switch-over assembly may only be disassembled by Hengst service personnel. If the ball valve has not been switched over for an extended period of time, the required change-over torque will increase.

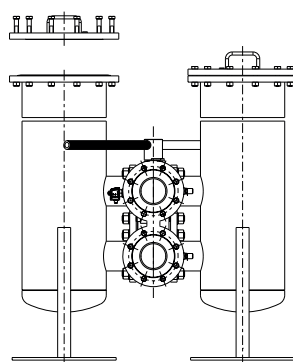
Assembly, commissioning, maintenance

Correct position of the switching lever during filter element change-out

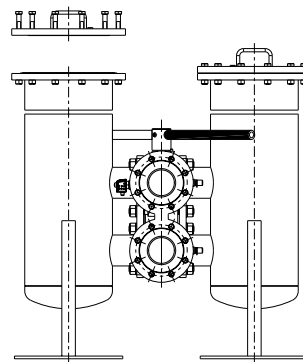
Lever left = correct



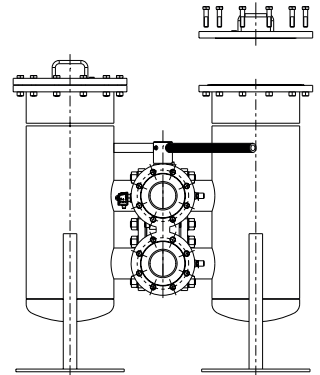
Lever left = incorrect



Lever right = correct

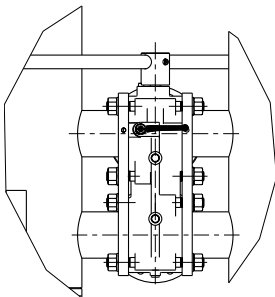


Lever right = incorrect

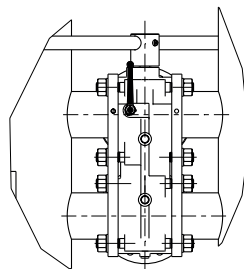


Correct position of the switching lever during pressure compensation

Open



Closed



WARNINGS!

- ▶ Assembly and disassembly work may only take place when the system is depressurized! To exchange the filter element, refer to „Maintenance“.
- ▶ The tank is under pressure!
- ▶ Work on the filter may only be carried out by trained specialists.
- ▶ Only remove the filter cover when it is depressurized!
- ▶ Do not exchange the optical/mechanical maintenance indicator while the filter is under pressure!
- ▶ Do not operate the switching lever or the pressure equalization valve when exchanging the filter element.

- ▶ When disassembling the filter, it must be ensured that the system is depressurized.
- ▶ Functioning and safety are only guaranteed if original Hengst filter elements and spare parts are used.
- ▶ Warranty becomes void if the delivered item is changed by the ordering party or third parties or improperly mounted, installed, maintained, repaired, used or exposed to environmental condition that do not comply with the installation conditions.

Tightening torques

(dimensions in mm [inch])

Cover screw

Series 16 FDK...		2500	4000
Screw		M16	
Tightening torque with $\mu_{\text{total}} = 0.14$	Nm [lb-ft]	215 \pm 20 % [159 \pm 15]	
Quantity		8	12
Recommended strength class of screw		8.8	

Bleed screw

Series 16 FDK...		2500	4000
Screw		G1/4	
Tightening torque with $\mu_{\text{total}} = 0.14$	Nm [lb-ft]	30 \pm 3 [22 \pm 2]	
Quantity		1	
Recommended strength class of screw		1.4571	

Drain screw

Series 16 FDK...		2500	4000
Screw		G1	
Tightening torque with $\mu_{\text{total}} = 0.14$	Nm [lb-ft]	225 [166] \pm 10 %	
Quantity		2	
Recommended strength class of screw		5.8	

Maintenance indicator

Series 16 FDK...		2500	4000
Tightening torque maintenance indicator	Nm [lb-ft]	max. 50 [37]	
Tightening torque 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
Δp (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.

Classification according to the Pressure Equipment

Directive

The duplex filters are pressure holding equipment according to article 2, section 5 of the Pressure Equipment Directive 2014/68/EU (PED).

However, due to the safety requirements fulfilled in article 4, section 3, hydraulic filters are exempt from the PED if they are not classified higher than category I.

For the classification, fluids from the chapter „Compatibility with permitted hydraulic fluids“ have been taken into consideration.

The intended use is only admissible with fluids of group 2 and within the specified limitations of use (see chapter „Technical data“). Therefore, these filters are not provided with the CE mark.

Use in potentially explosive areas according to Directive 2014/34/EU

These duplex filters are not equipment or components in terms of Directive 2014/34/EU and are not provided with the CE mark. It has been demonstrated in the ignition risk analysis that these inline filters do not have their own ignition sources according to DIN EN 80079-36.

The electronic maintenance indicators with one switching point:

WE-1SP-M12x1 **R928028409**

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

are, according to DIN EN 60079-11:2012, simple, electronic operating equipment without their own voltage source.

Note:

According to DIN EN 60079-14:2014, in intrinsically safe electric circuits (Exib), this simple, electronic operating equipment may be used in systems without marking and certification.

The duplex filters and electronic maintenance indicators described here can be used for the following potentially explosive areas.

	Zone suitability	
Gas	1	2
Dust	21	22

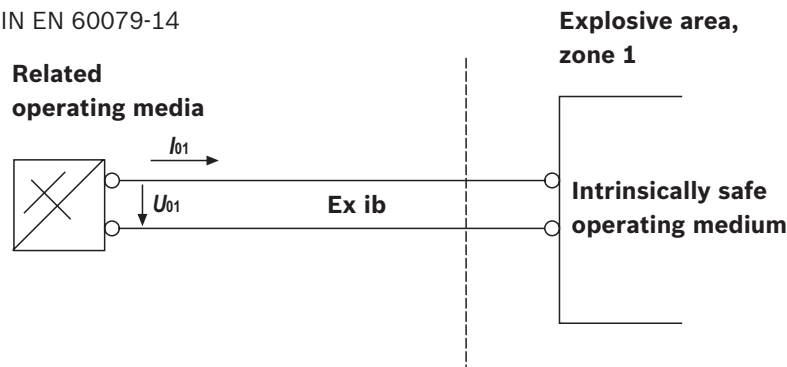
Directives and standardization

Complete filter with mechanical / optical maintenance indicator			
Use /assignment		Gas 2G	Dust 2D
Assignment		Ex h II c T6...T1 Gb	Ex h II C T70°C...T450°C Db
Conductivity of the medium	pS/m	min	300
Dust accumulation		max	–
			0.5 mm

Electronic switching element in the intrinsically safe electric circuit			
Use /assignment		Gas 2G	Dust 2D
Assignment		Ex II 2G Ex ib IIB T4 Gb	Ex II 2D Ex ib IIIC T100°C Db
adm. 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
		max	1.0 W T4 T _{max} 80 °C
Surface temperature ²⁾		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 to ensure that the maximum admissible ignition temperature is not exceeded in the potentially explosive atmosphere.

- ▶ When using the duplex filters according to 51493 in potentially explosive areas, sufficient equipotential bonding must be ensured. The filter should ideally be earthed via the mounting screws. Here, please note that paintings and oxidic protective layers are not electrically conductive.
- ▶ During filter element change-outs, the packaging material is to be removed from the replacement element outside the potentially explosive area.

👉 Notes:

- ▶ Maintenance to be conducted only by specialists, as per the instruction by the machine end-user according to DIRECTIVE 1999/92/EC appendix II, section 1.1
- ▶ Functional and safety warranty only applicable when using genuine Hengst spare parts.

Applications

Intended use

The filters consist of a filter housing, filter element and maintenance indicator, which serve as components in the sense of the EC Machinery Directive 2006/42/EC in hydraulic machinery for the separation of dirt particles.

The filters are used under the following boundary conditions and limits:

- ▶ Only in systems with fluids of group 2, according to Pressure Equipment Directive 2014/68/EU.
- ▶ Only according to the application and environmental conditions in the section „Technical data“.
- ▶ Only in compliance with the specified performance limits in the section “Technical data”; extended operational durability/load cycles on request.
- ▶ Only with hydraulic fluids and the intended seals according to the section „Compatibility with hydraulic fluids“.
- ▶ Use in potentially explosive areas according to the section „Directives and standardization“.
- ▶ The notes regarding the operating modes according to the section „Assembly, commissioning, maintenance“ must be observed.
- ▶ Compliance with application and environmental conditions according to the technical data.
- ▶ Compliance with the specified performance limits.
- ▶ Use in the original condition, without damage.
- ▶ Maintenance work, such as the replacement of seals, filter elements and optical indicators with original Hengst spare parts, is admissible. Repair by the customer, particularly at pressurized components, is inadmissible.
- ▶ The filters are intended exclusively for professional use and not for private use.

Improper use

Any use deviating from the intended use is improper and not therefore admissible.

Improper use of the filters includes:

- ▶ Incorrect storage
- ▶ Incorrect transport
- ▶ Lack of cleanliness during storage and assembly
- ▶ Incorrect installation
- ▶ Use of inappropriate/non-admissible hydraulic fluids
- ▶ Exceedance of the specified maximum pressures and load cycles
- ▶ Operation outside the approved temperature range
- ▶ Installation and operation in an inadmissible device group or category
- ▶ Operation outside the specified limits for the operating voltage, see the section „Technical data“

Hengst AG does not assume any liability for damage caused by improper use. The user assumes responsibility for all risks surrounding improper use.

Environment and recycling

- ▶ The used filter element has to be disposed of according to the country-specific legal regulations for environmental protection.
- ▶ At the end of the service life of the filter, the filter components can be recycled according to the country-specific statutory environmental protection regulations.

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