

Maintenance indicators for Hengst Filter

Type WE and WO

RD 51450

Edition: 2021-04

Replaced: -



- ▶ Pressure differential indicators WO for filters in pressure lines
- ▶ Backpressure indicators WO for return line filters
- ▶ Electronic switching element WE
- ▶ Nominal pressure 10, 160 and 450 bar [145, 2321 and 6527 psi]
- ▶ Operating temperature WO
-30 °C to +100 °C [-22 °F to 212 °F]
- ▶ Operating temperature WE
-30 °C to +85 °C [-22 °F to 185 °F]

Features

Maintenance indicators serve the monitoring of filters by indicating the exceedance of a pressure differential and/or a back pressure in the filter.

They distinguish themselves by the following:

- ▶ Modular structure
- ▶ Mechanical/visual indicators WO with one switching point and memory function
- ▶ Electronic switching element (WE) with one or two switching points
- ▶ Possibility to suppress the signal during cold start
- ▶ Optional improved resistance through differential pressure indicators in stainless steel

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Ordering code

Mechanical optical maintenance indicator

01	02	03	04	05	06
WO	-	-	-	-	-

Maintenance indicator

01	mechanical/optical	WO
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Design

02	Back pressure, connection M30x1,5	S01
	Pressure differential, connection M20x1,5	D01

Switching pressure

03	bar [psi]	S01	S01 (PA)	D01 (160 bar) [2321 psi]	D01 (450 bar) [6527 psi]	D01 (450 bar / VA) [6527 psi / VA]	
	0.8 [11.6]	●		●			0,8
	1.5 [21.8]	●		●			1,5
	2.2 [31.9]	●	●	●	●	●	2,2
	5.0 [72.5]				●	●	5,0
	8.0 [116]				●		8,0

Seal

04	EPDM seal	E ¹⁾
	NBR seal	M
	FKM seal	V

Maximum operating pressure

05	S01	10 bar [145 psi]	10
	D01	160 bar [2321 psi]	160
		450 bar [6527 psi]	450

Supplementary information

06	Without supplementary information	Without
	Back pressure indicator made of plastic (only with S01-2.2)	-PA
	Pressure differential indicator made of stainless steel (only for D01-2.2 and D01-5.0 and max. operating pressure 450 bar [6527 psi])	-VA ²⁾

¹⁾ Only in combination with D01 - 450 bar/5 bar and D01 VA

²⁾ Only in combination with FKM or EPDM seal

Order example: WO-D01-2,2-M-450

Material no.: R928038783

Other versions available on request

Ordering code

Mechanical optical maintenance indicator

Material numbers of the mechanical-optical maintenance indicators – Pressure differential

Material no.	Type	Switching pressure in bar [psi]	Tolerance in bar [psi]	Material	Maximum operating pressure in bar [psi]
R901025313	WO-D01-5,0-M-450	5.0 [72.5]	±0.5 [7.3]	brass	up to 450 [6527]
R901066235	WO-D01-5,0-V-450				
R928038785	WO-D01-8,0-M-450	8.0 [116]	±0.8 [11.6]		
R928038784	WO-D01-8,0-V-450				
R928038783	WO-D01-2,2-M-450	2.2 [31.9]	±0.3 [4.4]		
R928038782	WO-D01-2,2-V-450				
R901025312	WO-D01-2,2-M-160	2.2 [31.9]	±0.3 [4.4]	Aluminium	up to 160 [2321]
R901066233	WO-D01-2,2-V-160				
R928038781	WO-D01-1,5-M-160	1.5 [21.8]	±0.2 [2.9]		
R928038780	WO-D01-1,5-V-160				
R928038779	WO-D01-0,8-M-160	0.8 [11.6]	±0.15 [2.2]		
R928038778	WO-D01-0,8-V-160				
R928055341	WO-D01-2,2-V-450-VA	2.2 [31.9]	±0.3 [4.4]	Stainless steel	up to 450 [6527]
R928054976	WO-D01-5,0-V-450-VA	5.0 [72.5]	±0.5 [7.3]		

Material numbers of the mechanical-optical maintenance indicators – Back pressure

Material no.	Type	Switching pressure in bar [psi]	Tolerance in bar [psi]	Material	Maximum operating pressure in bar [psi]
R901025310	WO-S01-2,2-M-10	2.2 [31.9]	±0.3 [4.4]	Aluminium	up to 10 [145]
R901066232	WO-S01-2,2-V-10				
R928038776	WO-S01-1,5-M-10	1.5 [21.8]	±0.2 [2.9]		
R928038774	WO-S01-1,5-V-10				
R928038773	WO-S01-0,8-M-10	0.8 [11.6]	±0.15 [2.2]		
R928038772	WO-S01-0,8-V-10				
R928038771	WO-S01-2,2-M-10-PA	2.2 [31.9]	± 0.44 [6.4]	PA6.6	up to 10 [145]
R928038769	WO-S01-2,2-V-10-PA		± 0.3 [4.4]		

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

Mating connectors (max. admissible voltage: 50 V)

for electronic switching element with round plug-in connection M12x1

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

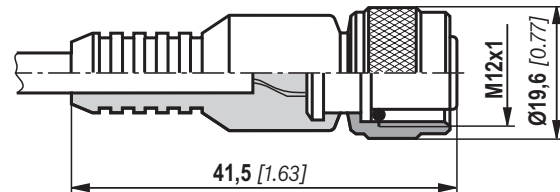
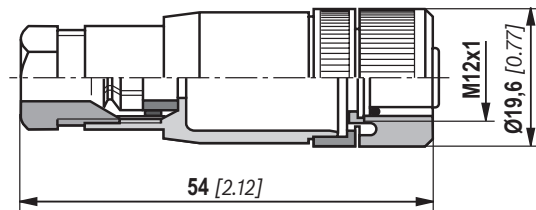
Material no. R900031155

Mating connector suitable for K24-3m 4-pole, M12x1

with potted-in PVC cable, 3 m long.

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

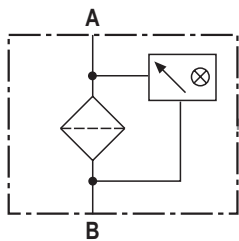
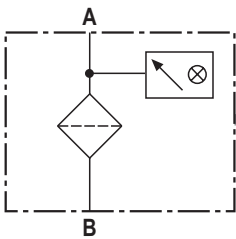
For further round plug-in connections and technical data, refer to data sheet 08006.



Symbols

A line filter as an example

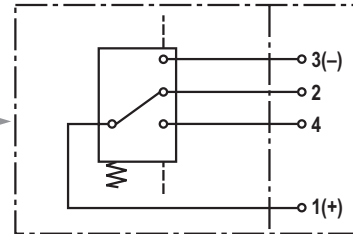
**mechanical/optical
back pressure indicator**
with a return flow filter
without bypass



**mechanical/optical
pressure differential indicator**
with a line filter without bypass

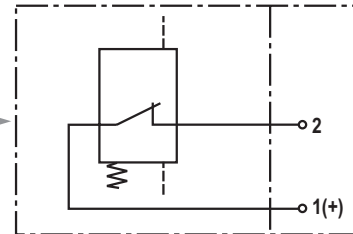
Electronic switching element
for maintenance indicator

Switching element Connector



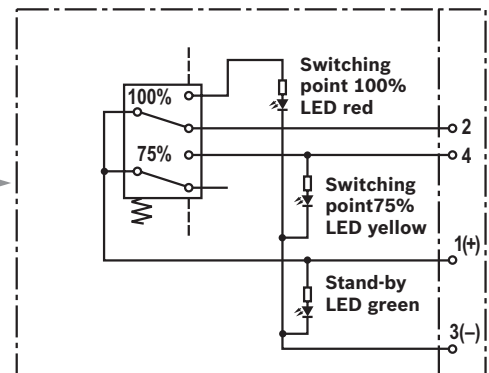
WE-1SP-M12x1

Switching element Connector



WE-1SP-EN175301-803

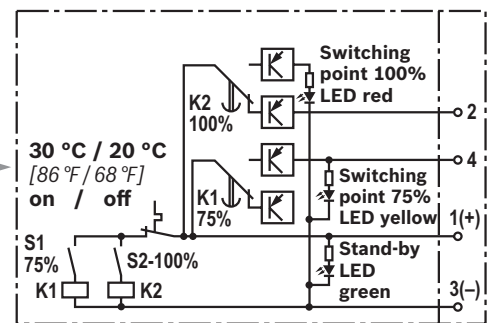
Switching element Connector



WE-2SP-M12x1

Circuit diagram drawn in plugged condition (operating condition)

Switching element Connector



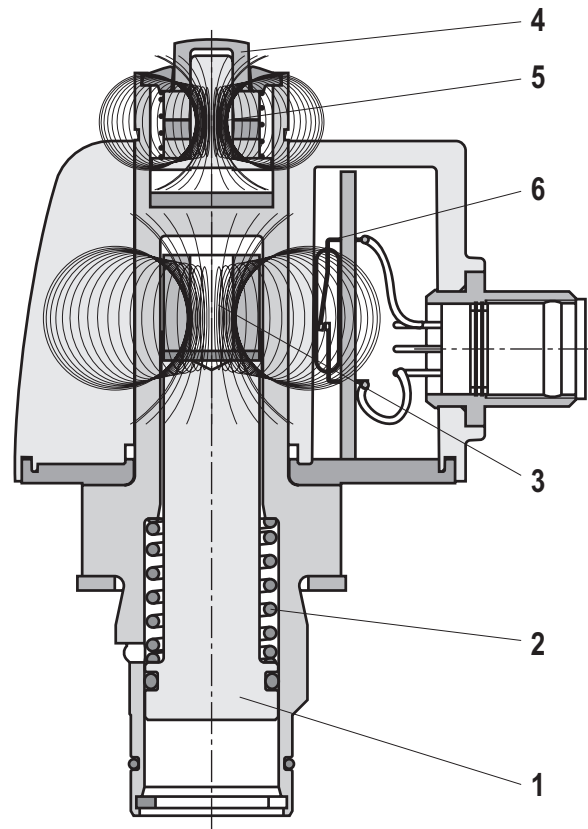
WE-2SPSU-M12x1

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

Function, section

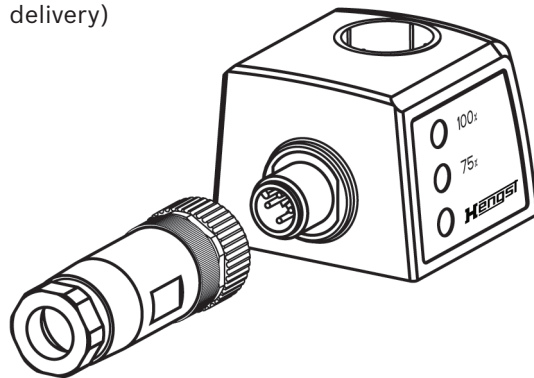
By default, the Hengst filters are supplied with a mechanical/visual maintenance indicator (WO). The electronic switching element (WE) is available as accessory and compatible with all mechanical/visual maintenance indicators. The electronic switching element is attached to the visual maintenance indicator and fixed by means of a locking ring. The electronic maintenance indicator is not dependent on the nominal pressure of the filter.

The increasing back pressure and/or pressure differential pushes a piston (1) against a spring (2) upwards. The solenoid (3) mounted on the piston is moved together with the piston. The visual pin (4) may take two valid positions. If the position of the piston (1) with solenoid (3) is below the nominal pressure of the maintenance indicator, the visual pin remains in retracted "rest position". Upon first exceedance of the nominal pressure, the position of the visual pin (5) is changed rapidly into the second possible "On condition" by repulsion of the solenoid of the pin (5) to the solenoid of the piston (3). The pin will permanently remain in this extended position, even visible after machine switch-off (or pressure drop, cold start) (memory function). It has to be acknowledged.



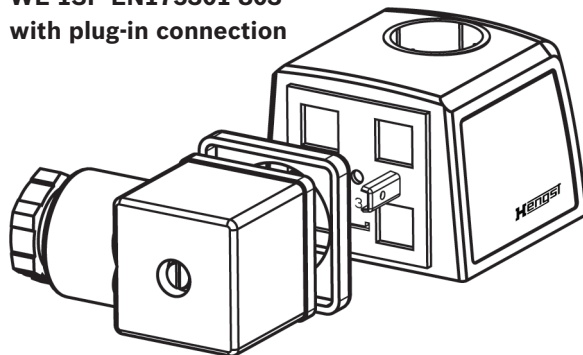
WE-2SP-M12x1

with mating connector (not included in the scope of delivery)



WE-1SP-EN175301-803

with plug-in connection



Technical data

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

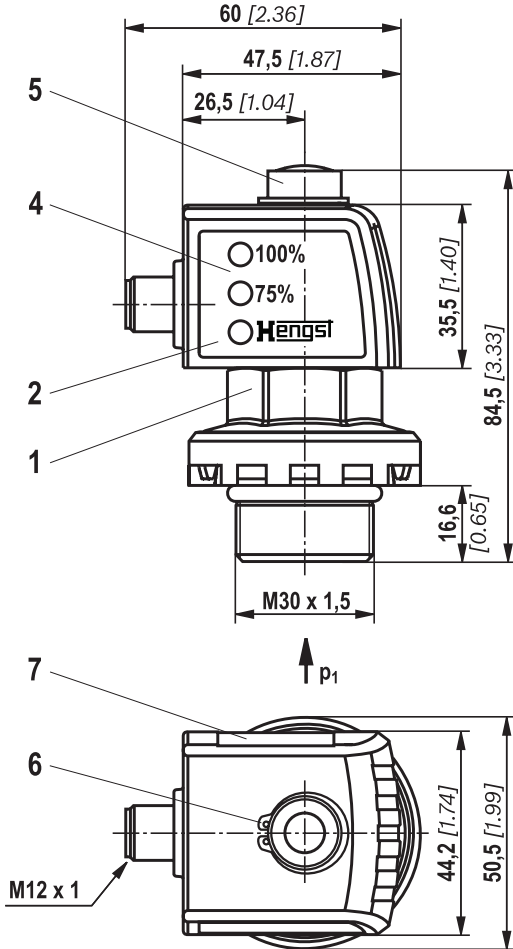
Mechanical optical maintenance indicator				
Version	D01 (450 bar) [6527 psi]	D01 (160 bar) [2321 psi]	S01	S01 (PA)
Material	Stainless steel or brass	Aluminium	Aluminium	PA6.6

Seal material		NBR	FKM	EPDM
Temperature range	°C [°F]	-30...+100 [-22...212]	-20 ...+120 [-4...248]	-30 ...+120 [-22...248]

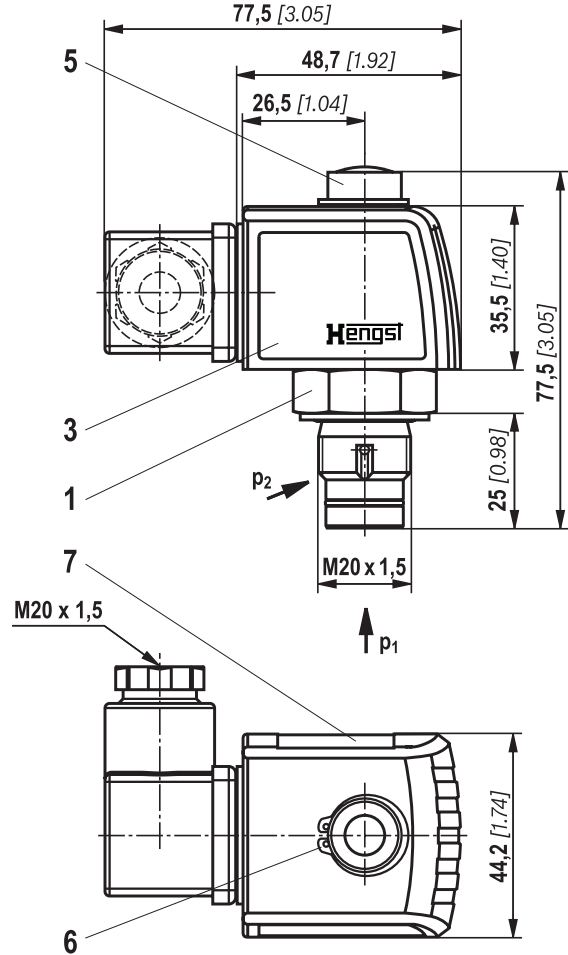
electric (electronic switching element)					
Electrical connection	Version	Round plug-in connection M12x1, 4-pole			Standard connection EN 175301-803
		WE-1SP- M12x1	WE-2SP- M12x1	WE-2SPSU- M12x1	WE-1SP- EN175301-803
Contact load, direct voltage	A _{max.}	1			
Voltage range	V _{max.}	150 (AC/DC)	10 ... 30 (DC)		250 (AC)/200 (DC)
max. switching power 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]		

Dimensions: Maintenance indicator
(dimension in mm [inch])

Back pressure indicator with mounted switching element



Pressure differential indicator with mounted switching element



- 1 Mechanical optical maintenance indicator;
max. tightening torque $M_{A \max} = 50 \text{ Nm [36.88 lb-ft]}$
tightening torque for back pressure indicator in
PA6.6 $M_{A \max} = 35 \text{ Nm [25.82 lb-ft]}$
- 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:
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

Installation, operating and maintenance instructions

Connection of the electronic switching elements

By default, the filter is equipped with mechanical/visual maintenance indicator WO. The electronic switching element is attached to the mechanical/visual maintenance indicator and fixed by means of a locking ring.

What must generally be observed with Hengst filters:

- ▶ Components must always be assembled without tension stress.
- ▶ The filter housing must always be grounded.

When has the filter element to be replaced or cleaned?

- ▶ The filter element is to be exchanged after initial commissioning of the system.
- ▶ Upon start-up in cold condition, the red pushbutton of the visual maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electric signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively.
- ▶ The filter element should be replaced or cleaned after max. 6 months.

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
Compatibility with hydraulic fluid	ISO 2943:1998-11

Hengst products are developed, manufactured and assembled as part of a certified quality management system in accordance with ISO 9001:2015. The relevant standards and directives can be found in the CE Declaration of Conformity.

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

These maintenance indicator according to 51450 are not equipment or components in terms of Directive 94/9/EG and are not provided with the CE mark. It has been proven with the ignition risk analysis that these inline filters do not have own ignition sources acc. to DIN EN 13463-1:2009.

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 own voltage source.

According to DIN EN 60079-14:2012, in intrinsically safe electric circuits (Ex ib), this simple, electronic operating equipment may be used in systems without marking and certification.

The electronic maintenance indicators described here can be used for the following potentially explosive areas:

	Zone suitability	
Gas	1	2
Dust	21	22

Note:

Maintenance indicators with EC type examination certificate upon request.

Mechanical / optical 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

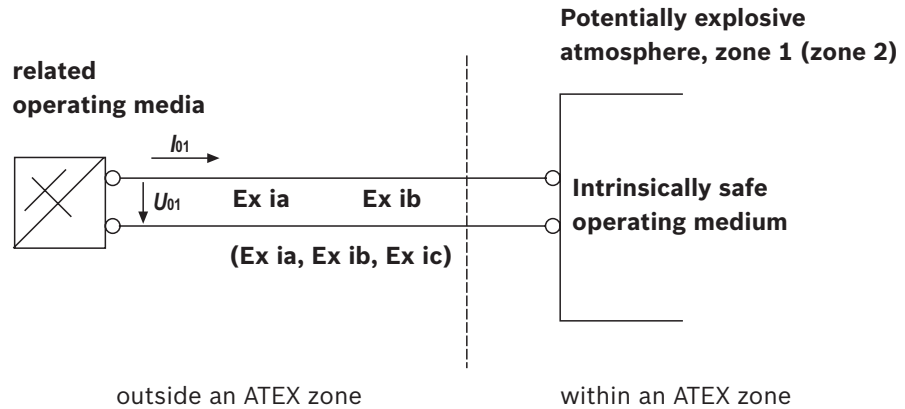
Electronic switching element in the intrinsically safe electric circuit

Use /assignment			Gas 2G	Dust 2D
Assignment			Ex II 2G Ex ib IIB T4 Gb	Ex II 2D Ex ib IIC T100°C Db
adm. intrinsically safe electric circuits			Ex ia IIB/IIC, Ex ib IIB/IIC, Ex ic IIB/IIC	Ex ia IIIC, Ex ib IIIC
Technical data			Werte nur für eigensicheren Stromkreis	
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.

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 to ensure that the maximum admissible ignition temperature is not exceeded in the potentially explosive atmosphere.
- ▶ When using the maintenance indicators according to 51450 in potentially explosive areas, sufficient equipotential bonding must be ensured. The filter should ideally be earthed via the mounting screws. In this respect, please note that paintwork and oxidic protective layers are not electrically conductive.

👉 Notices:

- ▶ Functional and safety warranty is only valid when using genuine Hengst spare parts.
- ▶ Maintenance by specialist staff only. Instruction by the machine end-user according to DIRECTIVE 1999/92/EC appendix II, section 1.1

Environment and recycling

- ▶ 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.

Notes

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