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Overfill Prevention Sensor (e-OPS)

81 D-Ex... and 83 UV-...

(en)



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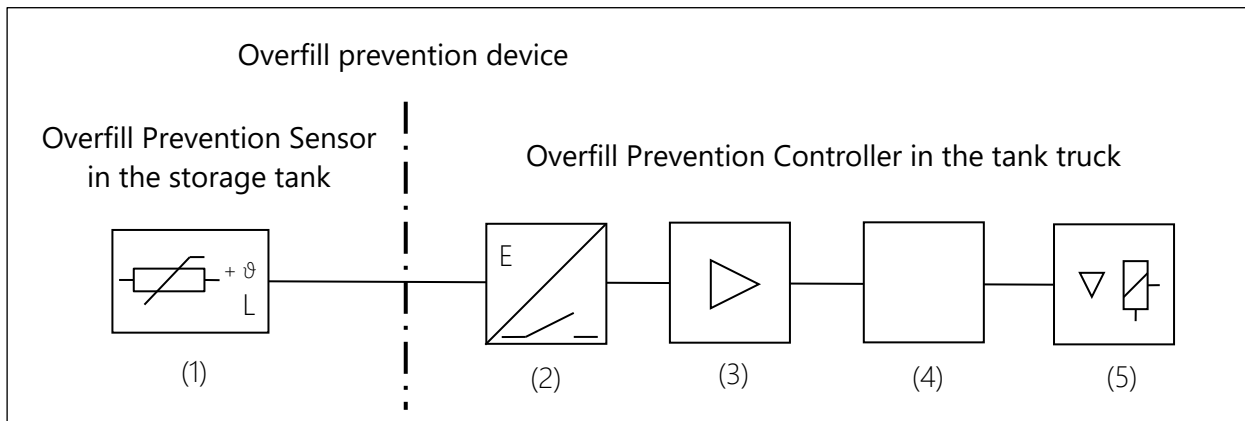
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1 Overview

Under the German Water Resources Act, vessels with water-polluting liquids must be equipped with overflow prevention devices. In other countries, the corresponding national rules and regulations must be observed. In the case of storage tanks which are filled by tank vehicles, the overflow prevention device consists of an Overflow Prevention Sensor (e-OPS) in the storage tank and an Overflow Prevention Controller installed in the tank vehicle.

The Overflow Prevention Sensors 81 D-Ex and 83 UV-... approved to standard EN 13616, and the Overflow Prevention Controller approved to prEN 16657 in the tank truck (tanker) provide this overflow prevention device - see the Figure below:



- 1 Overflow Prevention Sensor 81 D-Ex... or 83 UV-...
- 2 Measuring transducer
- 3 Signal amplifier
- 4 Controller (Tank truck Management Computer TMC)
- 5 Actuator

Function

At the lower end of the probe tube the Overflow Prevention Sensor contains a sensor (PTC thermistor). The measuring transducer transmits changes in resistance to the signal amplifier in form of binary signals. According to the resistance value (liquid level in the tank), the actuator in the tank truck is either opened so that the fuel can be filled or closed so that the fuel supply is interrupted.

Connection between the Overflow Prevention Controller and the Overflow Prevention Sensor

The connection between the Overflow Prevention Controller on the tank truck and the Overflow Prevention Sensor on the tank is made via a connecting cable with a socket coupler which is inserted into the connection fitting (see Figure below). Depending on the tank filling method, two different connection fittings are used for the connection to the Overflow Prevention Sensor:

- 1) Overflow Prevention Sensor with *pipe fitting* for the direct filling of individual tanks.
The socket coupler is inserted directly into the *pipe fitting* on the Overflow Prevention Sensor.
- 2) Overflow Prevention Sensor with *junction box* and *wall fitting* for remote filling.
The socket coupler is inserted into the *wall fitting* which is connected to the Overflow Prevention Sensor in the tank by an extension cable.

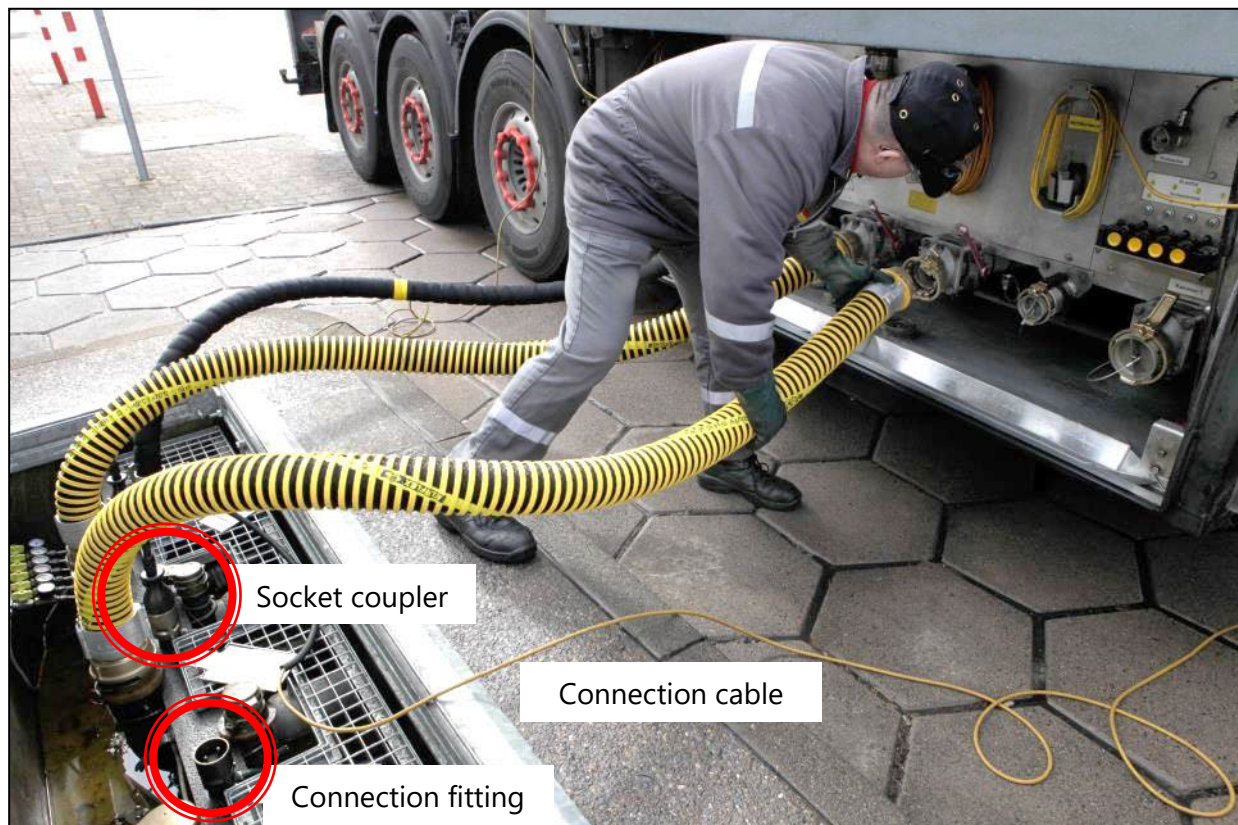


Figure 1: Filling a tank from the tank truck

Security system

The Overfill Prevention Sensor can be used to install a security system which, as required by prEN 16657, consists of the digital *product identification device (PID)* and the *product recognition device (PRD)*. The magnetic *Cross Over Prevention (COP)* and the analogue *Filling Hose Safety (FHS)* are also used as an alternative. PID and PRD systems are third party products.

The magnetic *Cross Over Prevention (COP)* is used to prevent product mixes. In order to achieve this, the Overfill Prevention Sensors are equipped with a coded connection fitting. The particular code allocated to each product is read out by the Overfill Prevention Controller in the tank truck. The liquid can only be released if the dispensing product coincides with the product in the tank.

The analogue *Filling Hose Safety (FHS)* is used to monitor the hose. The connections of the filling hose and the vapour recovery are monitored via the connection cable of the Overfill Prevention Controller. The liquid can only be released when the hoses are securely connected.

Types

The following types of Overfill Prevention Sensors are available:

- 83 UV (for fuel oil, diesel, petrol, brass probe tube, pipe or wall fitting)
- 83 UV-A (as 83 UV, stainless steel probe tube)
- 83 UV-C (as 83 UV-A, without junction box, with 5 m long cable)
- 81 D-Ex (as 83 UV-A, also for aviation fuels, solvents, etc. See list of substances)
- 81 D-Ex U (as 81 D-Ex, with voltage surge protection)

2 Safety Instructions

The safety instructions in this manual are marked as follows:



If these safety instructions are not observed, it may result in the risk of accident or damage to the device/system.



Useful information which ensures continued and correct operation of the system and makes your work easier.

Overfill Prevention Sensors (e-OPS) are designed to monitor the filling procedures in static tanks. Use the Overfill Prevention Sensors exclusively for this purpose. The manufacturer accepts no liability for any form of damage resulting from improper use.

The Overfill Prevention Sensors have been developed, manufactured and tested in accordance with the latest good engineering practices and generally accepted safety standards. Nevertheless, hazards may arise from their use. For this reason, the following Safety Instructions must be observed:

- The proper function of the Overfill Prevention Sensors is only guaranteed in combination with an approved Overfill Prevention Controller in the tank truck.
- Do not change or modify the Overfill Prevention Sensors or the overall system, or add any equipment without the prior consent of the manufacturer.
- Only use original parts. These comply with the technical requirements specified by the manufacturer.
- The installation, operation and maintenance of the Overfill Prevention Sensors must only be carried out by expert personnel. Specialised knowledge must be acquired by regular training.
- The Overfill Prevention Sensors must be checked and approved before commissioning and also at regular intervals (see Section 5.5, Approval and Testing Obligations)
- Operators, installers and service technicians must observe all applicable safety regulations. This also applies to any local safety and accident prevention regulations which are not stated in this manual.

3 Structure and Design

3.1 Description

The Overfill Prevention Sensors consist of a probe which extends into the tank and the height of which can be adjusted, a screw-in unit which carries the probe and a connection fitting.

The probe is sealed in the screw-in unit and can be moved and fixed within the adjustment range. The screw-in unit is secured in place with a stuffing box fitting and additionally with a locking screw. It is suitable for the pressure range from 0.67 – 2 bar (absolute). The sensor (steel-enclosed PTC resistor) is located at the lower end of the probe. The PTC resistor in the steel capsule is liquid-tight and gas-tight enclosed.

The connection fitting is a pipe fitting (direct filling) or a junction box with connection to the wall fitting (remote filling). A 2-core connection cable (2 x 1 mm²) is installed from the junction box to the wall fitting.

The Overfill Prevention Sensors are manufactured in probe lengths from 100 to 6,000 mm in 100 mm steps. The probe length is permanently engraved on the upper end of the probe tube above the groove marking. The probe length represents the distance between the groove marking on the upper end of the probe and the groove marking on the protective sleeve at the height of the sensor.

3.2 Function

The PTC resistor is heated up after connecting the Overfill Prevention Sensor with the signal amplifier of the Overfill Prevention Controller on the tank truck. After achieving a certain temperature, the change in resistance caused by this process prompts a signal in the signal amplifier "Overfill prevention device ready for operation".

The delivery of the liquid can now take place. As soon as the liquid reaches the sensor of the Overfill Prevention Sensor, the heated PTC resistor is cooled down, thereby causing the resistance to change; this prompts a signal "close actuator" in the signal amplifier. The actuator is automatically closed and the delivery therefore is stopped.

The reaction time for the closing process from the time the liquid is recognised to the end of the product flow must not exceed 5.5 seconds: from the recognition of the liquid by the sensor up to the output signal of the Overfill Prevention Controller max. 2.5 seconds, from the output signal of the controller to the end of the product flow max. 3 seconds. [prEN16657, Section 5.4.2]

3.3 List of Substances

The Overfill Prevention Sensors (e-OPS) are suitable for use in tanks with the following liquids:

Overfill Prevention Sensor	83 UV	83 UV-A	83 UV-C		81 D-Ex	81 D-Ex U
List of Substances	- Fuel oil EL to DIN 51603 - Heating oil with FAME (fatty acid methyl ester) - Diesel fuel to DIN 51601/61606 - Diesel fuel with FAME (fatty acid methyl ester) - Petrol to DIN 51600/51607 - Petrol with up to 60% ethanol - Biodiesel - Vegetable oils				such as e-OPS 83 ... plus: - Petrol with up to 85 % ethanol - Aviation gasoline - Aviation kerosenes - Industrial spirits - Solvents	



See the appendix for the detailed list of substances for the 81 D-EX Overfill Prevention Sensor.



The storage tanks must be approved for the liquids to be stored in them.

3.4 Structure

Overfill Prevention Sensor	83 UV	83 UV-A	83 UV-C	81 D-Ex	81 D-Ex U
Probe tube	Brass	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Probe tube length [mm]	100 - 6000	100 - 6000	100 - 6000	100 - 6000	100 - 6000
Probe tube Ø [mm]	24 x 2	16 x 1.5	16 x 1.5	24 x 1	24 x 1
Screw-in unit	Brass	Brass	Brass	Brass/ stainless steel	Brass/ stainless steel
Screw-in unit thread [inch]	G1	G1	G ³ / ₄	G1	G1

4 Overfill Prevention Sensor ...

4.1.1 ... 83 UV with Pipe Fitting

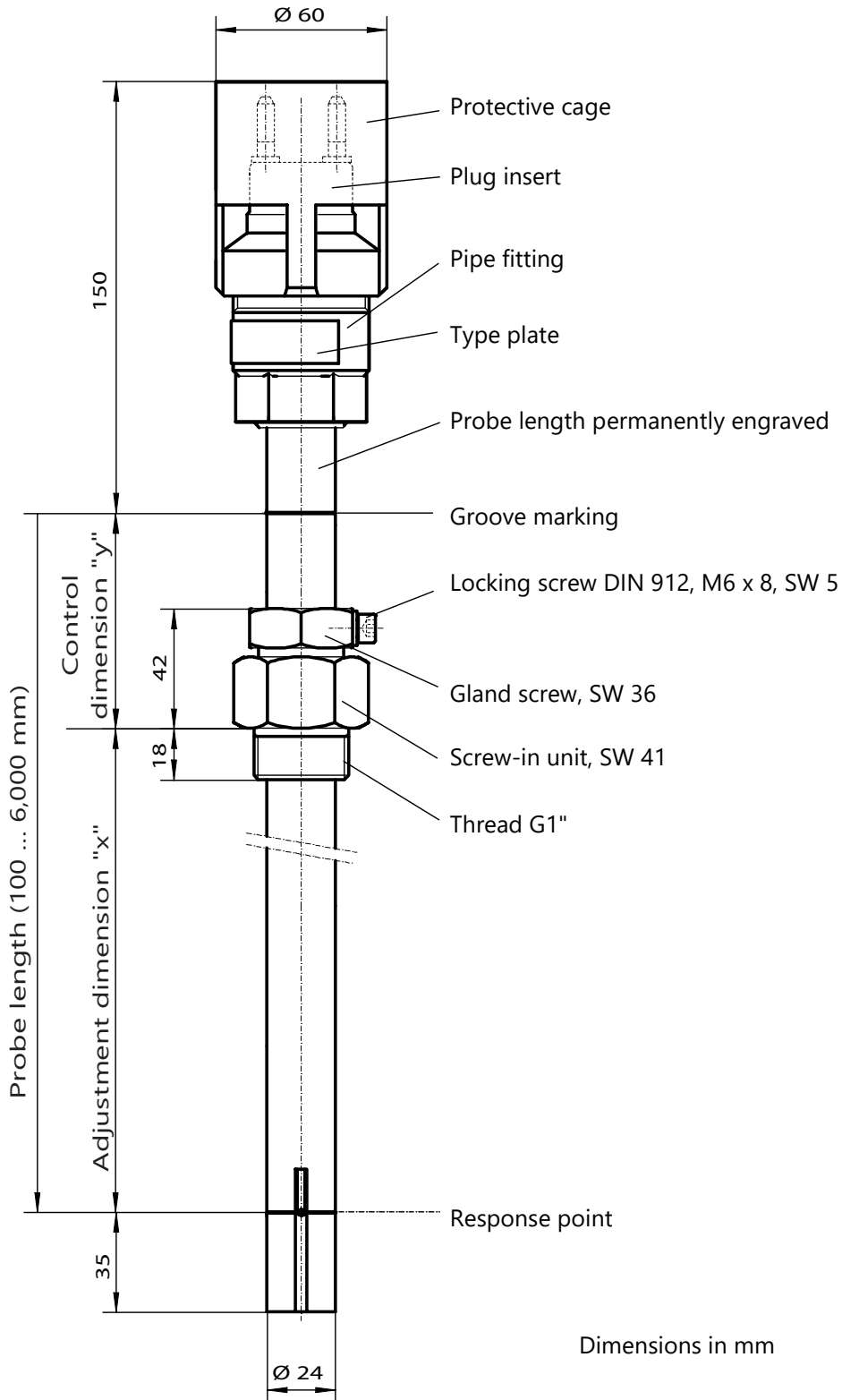


Figure 2: Overfill Prevention Sensor 83 UV with pipe fitting

4.1.2 ... 83 UV with Wall Fitting

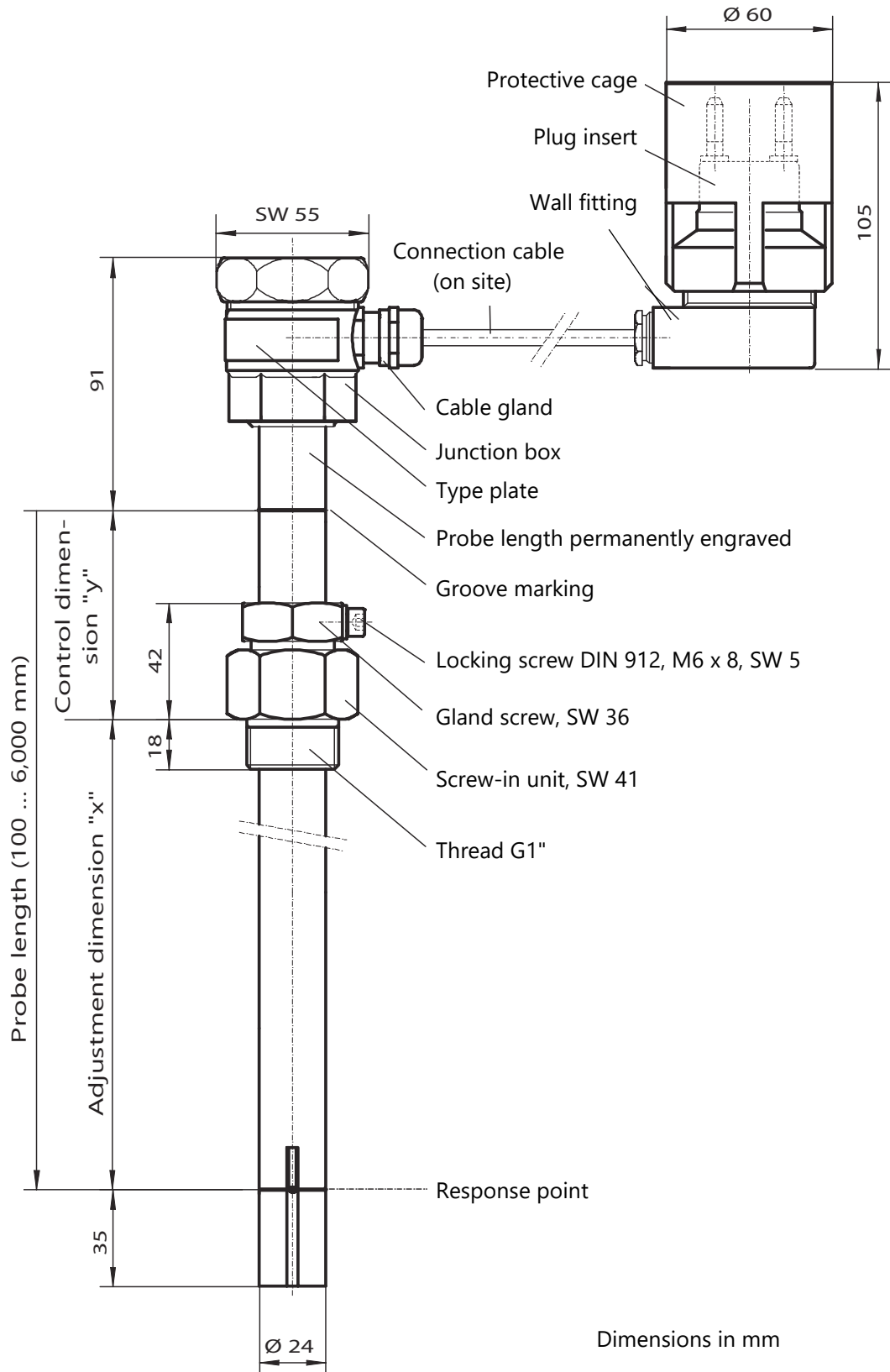
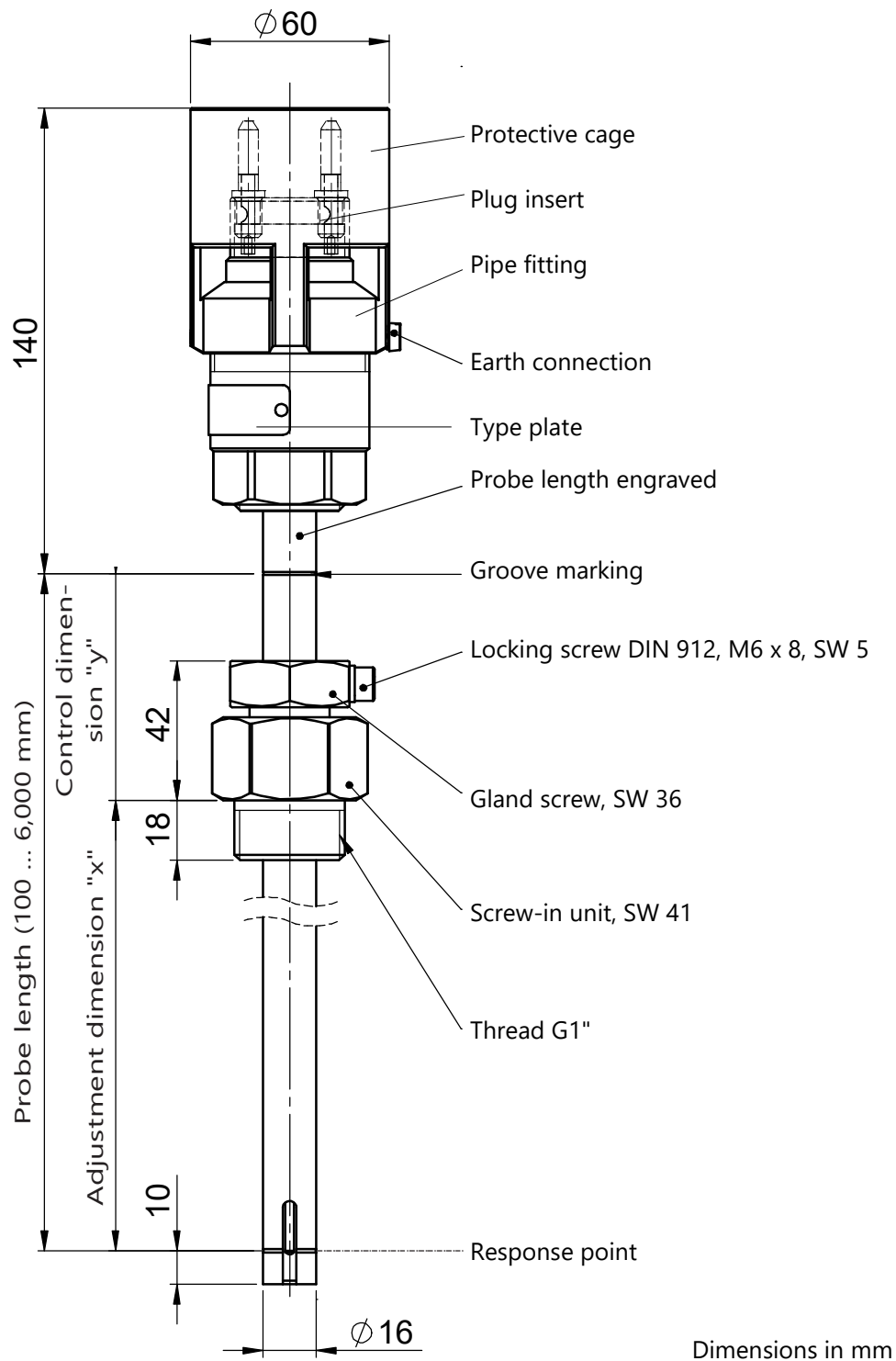


Figure 3: Overfill Prevention Sensor 83 UV with wall fitting

4.1.3 ... 83 UV-A with Pipe Fitting



Dimensions in mm

Figure 4: Overfill Prevention Sensor 83 UV-A

4.1.4 ... 83 UV-A with Wall Fitting

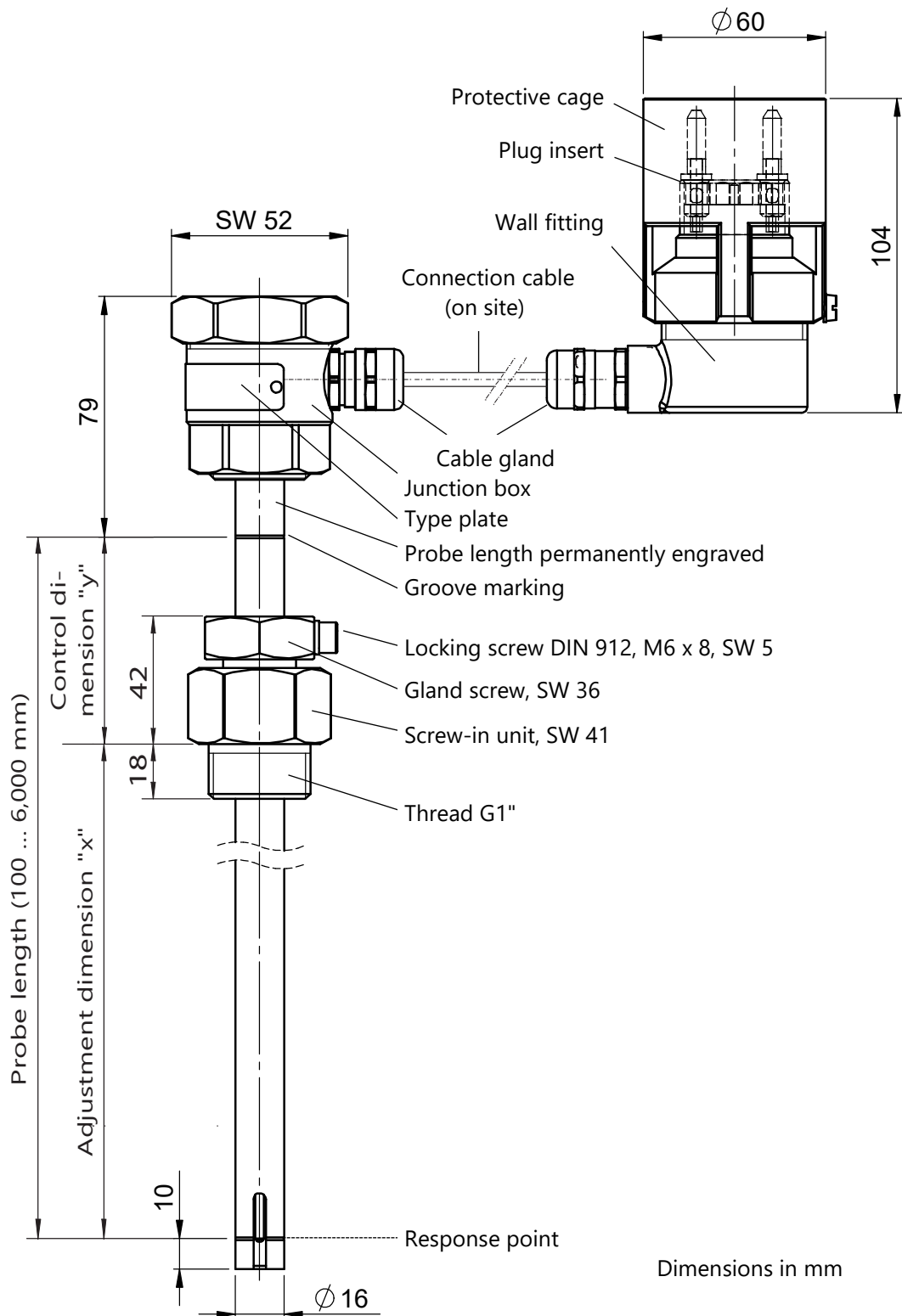


Figure 5: Overfill Prevention Sensor 83 UV-A

4.1.5 ... 83 UV-C

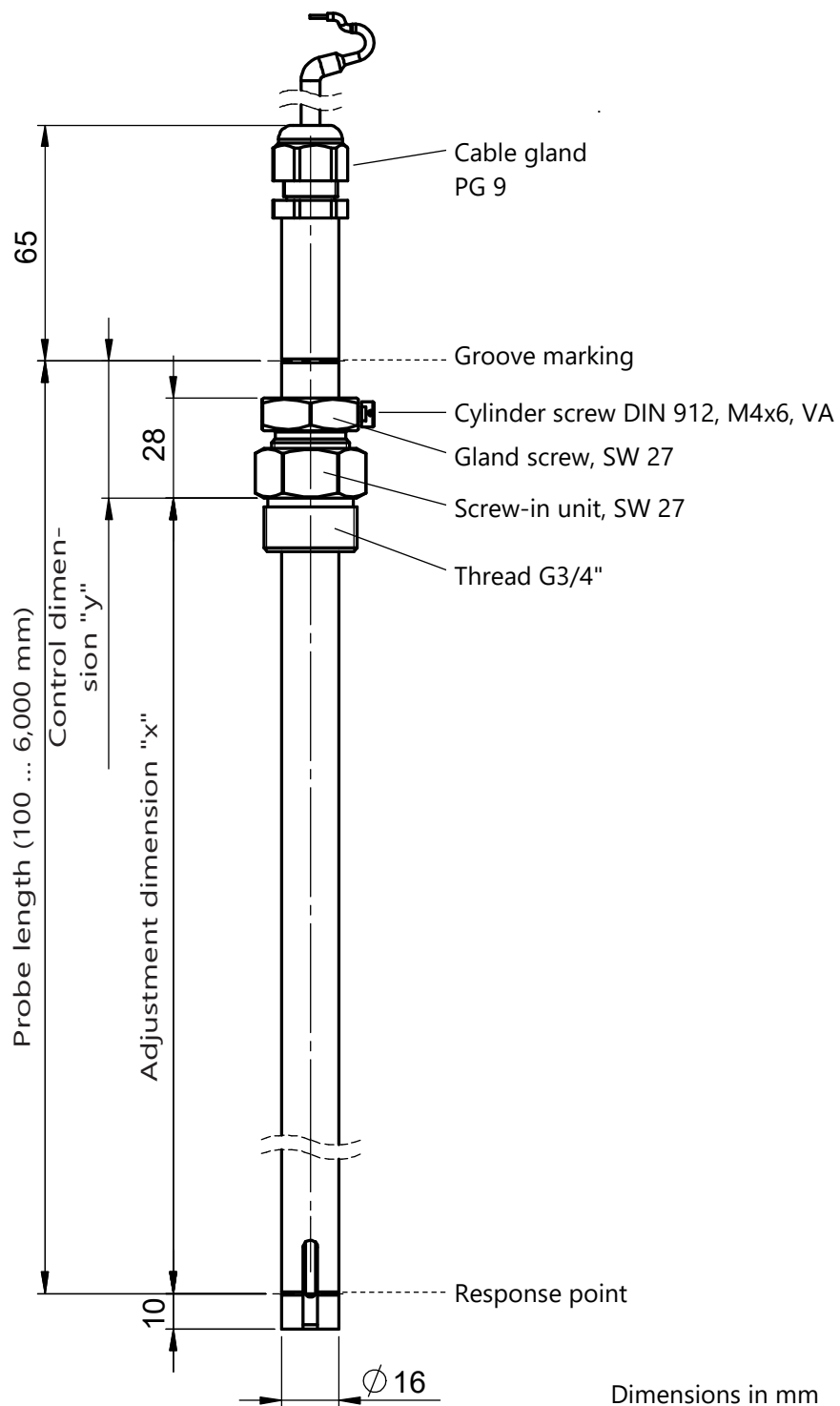
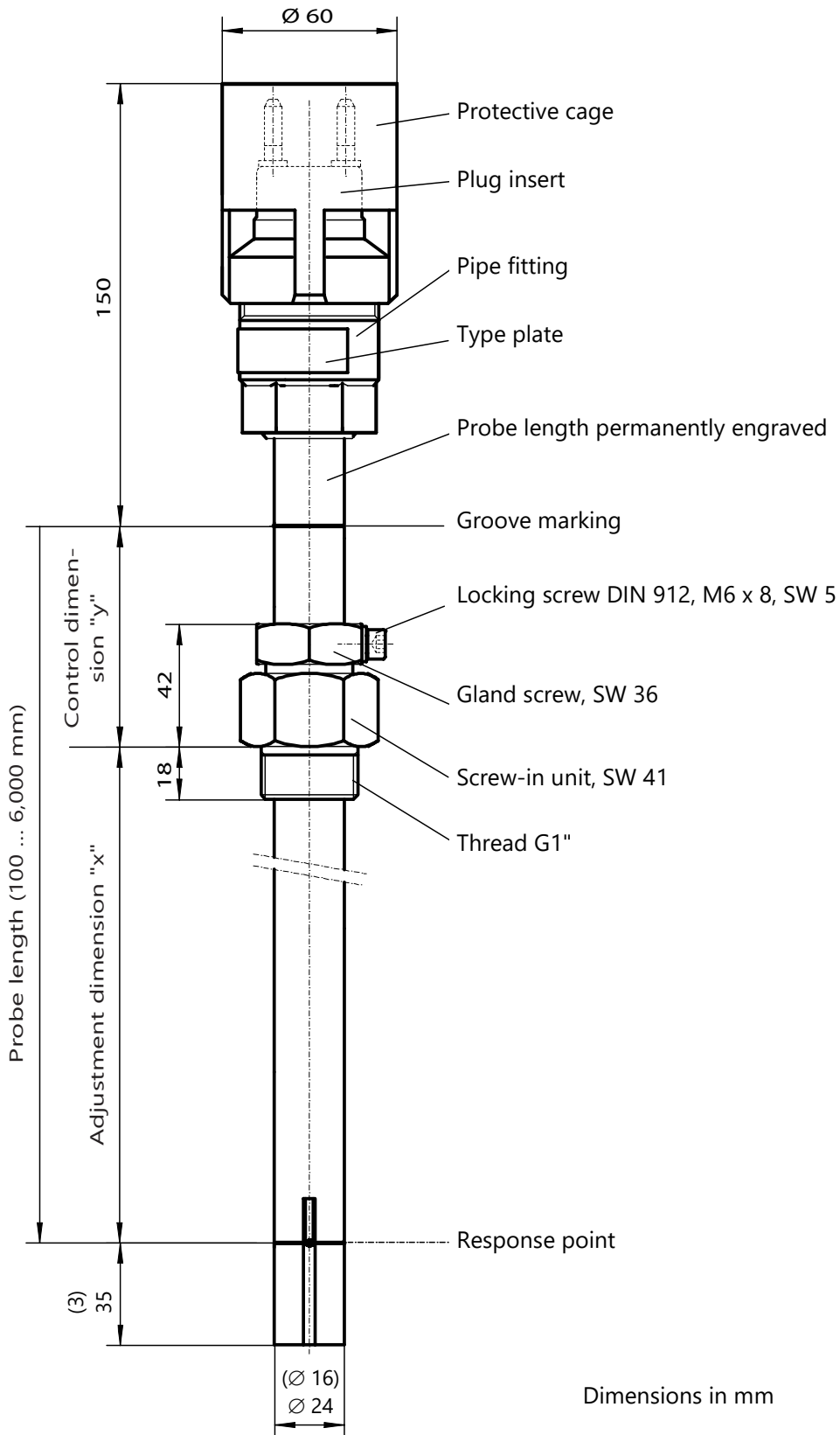


Figure 6: Overfill Prevention Sensor 83 UV-C

4.1.6 ... 81 D-Ex with Pipe Fitting



Dimensions in mm

Figure 7: Overfill Prevention Sensor 81 D-Ex with pipe fitting

4.1.7 ... 81 D-Ex with Wall Fitting

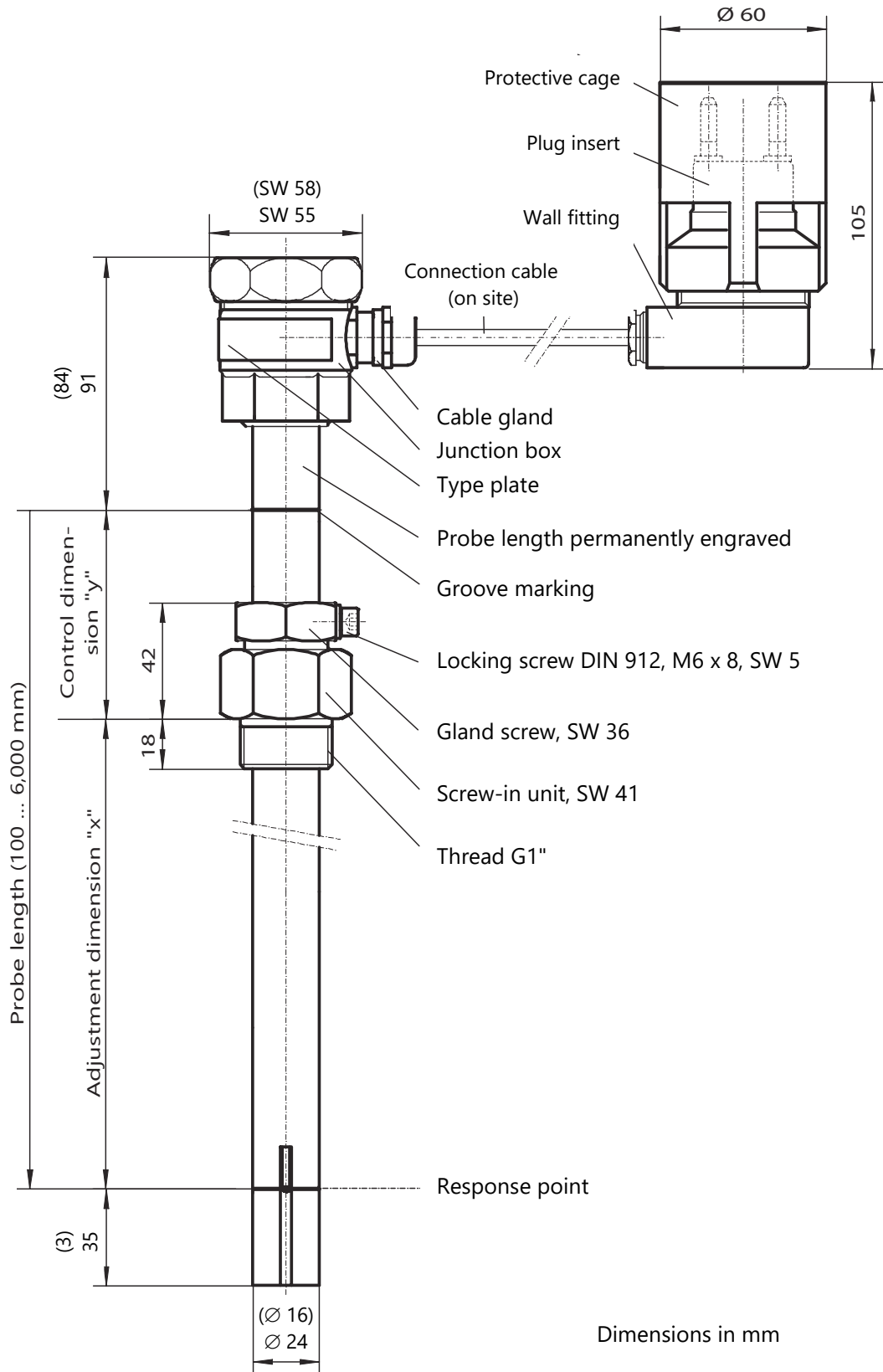


Figure 8: Overfill Prevention Sensor 81 D-Ex with wall fitting

4.2 Connection Fitting

The connection fitting is the interface between the Overfill Prevention Sensor and tank truck. Depending on the method used to fill the tank, different connection fittings are used for the connection to the Overfill Prevention Sensor: *pipe fitting* and *wall fitting*. The connection fitting can also be equipped with a security system (COP/FHS, see following chapters).

4.2.1 Pipe Fitting

If the supply connection and the Overfill Prevention Sensor are located in the manhole, the connection fitting for the Overfill Prevention Sensor is to be a pipe fitting.

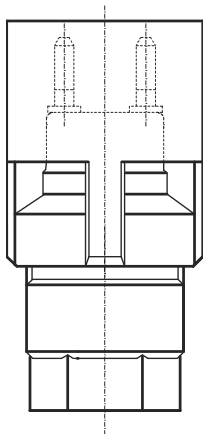
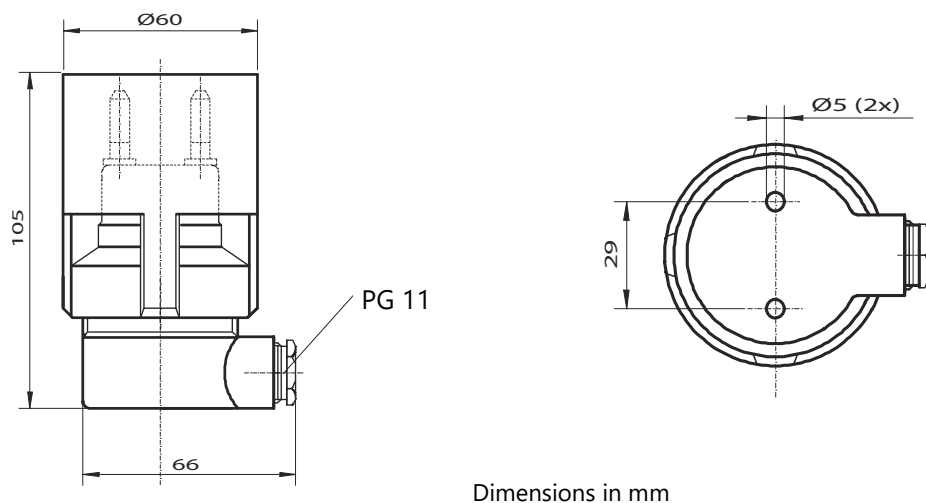


Figure 9: Pipe fitting type 907 with plug insert type 901

4.2.2 Wall Fitting

If the supply connection is at a distance from the tank (e.g. in a remote filling pit), the Overfill Prevention Sensor with junction box and wall fitting is used. The connection between junction box and wall fitting must be installed with a cable/wire of $2 \times 1 \text{ mm}^2$ with a maximum length of 150 m. In the case of $2 \times 1.5 \text{ mm}^2$ cables, the maximum length is 250 m.



Dimensions in mm

Figure 10: Wall fitting type 907 with plug insert type 901

4.2.3 Cross Over Prevention (COP)

The Overfill Prevention Sensors may be equipped with a coded connection fitting. A specific code is allocated to each product; this is read out by the Overfill Prevention Controller in the tank truck via the socket coupler FP 903/FHS/K, and only approves the liquid delivery when the product to be delivered coincides with the stored product. The coding is carried out via the type FP 901 plug insert.

4.2.4 Filling Hose Safety (FHS)

The connection fitting can be used to monitor the hose. A signal is transmitted via connection cable from the Overfill Prevention Controller of the tank truck to the Overfill Prevention Sensor and then via the hoses back to the Overfill Prevention Controller. Only when the filler hose (for petrol also the vapour recovery hose) is safely connected the delivery can take place. Contact is made via the type FP 901 FHS plug insert.

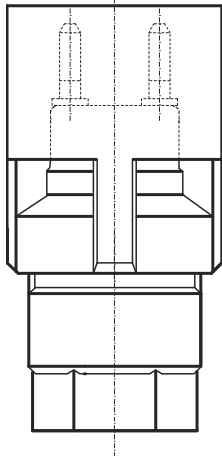
4.2.5 Product Identification Device (PID)

If a connection cable with a type FP 903 FHS socket coupler is used and the connection fitting has a type FP 901 FHS plug insert, the digital product identification PID (third party product) can also be used.

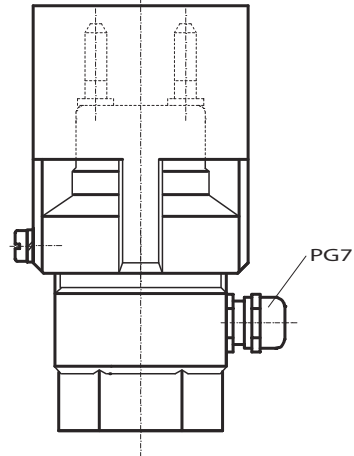
4.2.6 Coding (Example)

Code 1 = Super E10	Code 4 = Super Plus
Code 2 = Diesel fuel	Code 5 = not currently used
Code 3 = Super E5	Code 6 = not currently used
Code N = Neutral, FHS without COP	

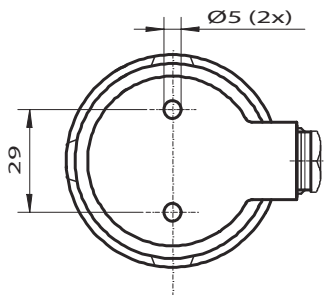
Cross Over Prevention (COP)
Pipe fitting type 907 with
plug insert type FP 901/1-6



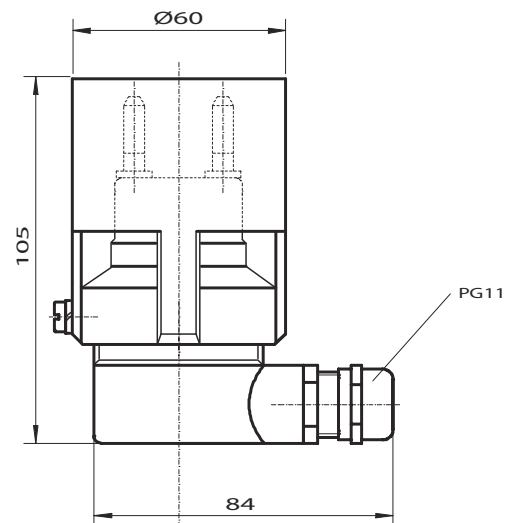
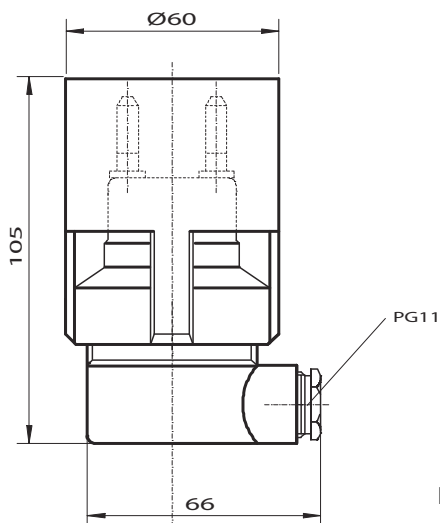
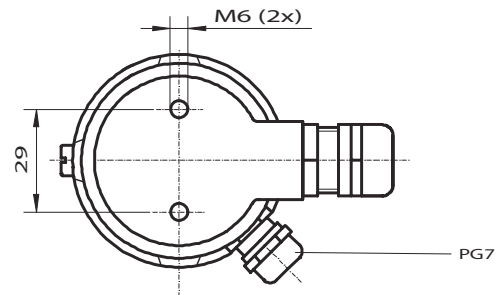
Filling Hose Safety (FHS):
Pipe fitting type FP 907/FHS with
plug insert type FP 901/1-6 FHS



Cross Over Prevention (COP)
Wall fitting type FPW 907 with
plug insert type FP 901/1-6



Filling Hose Safety (FHS):
Wall fitting type FPW 907/FHS with
plug insert type FP 901 H/1-6 FHS



Dimensions in mm

Figure 11: Pug insert with COP/FHS locking system

5 Installation

5.1 Mounting



When working on tanks for storage of flammable liquids, all local safety and accident prevention regulations must be observed as a matter of principle.



When filling static tanks with water-polluting liquids, the tanks may only be filled up to their permitted level (see the German Water Resources Act resp. corresponding national rules and regulations).



Installation in protective tubes or dipstick pipes is not permitted.

- (1) The Overfill Prevention Sensor must always be installed in a vertical position in the tank. Installation is via a screw-in unit. Provide the thread of the screw-in unit with a suitable sealant and screw into the tank coupling. Release the locking screw and the stuffing box (see Figure below). To obtain the correct position, the Overfill Prevention Sensor can be moved upwards and fixed in position.

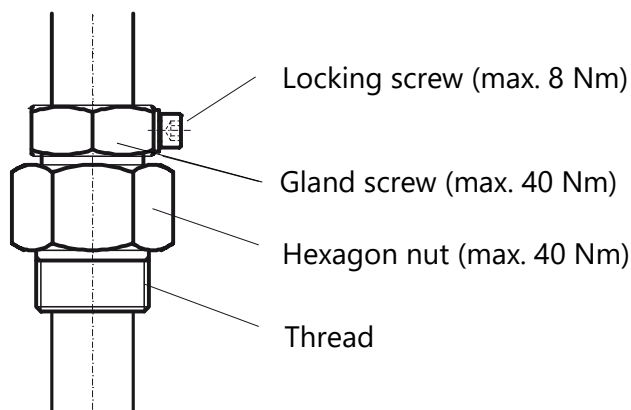


Figure 12: Screw-in unit

- (2) Determine the adjustment dimension "x" for the Overfill Prevention Sensor (see Section 5.4). The adjustment dimension "x" is the distance between the hexagon nut seat of the screw-in unit and the groove marking on the sensor's protective sleeve at the lower end of the probe.
- (3) Set the height of the Overfill Prevention Sensor to the control dimension "y" (see Section 5.2). The control dimension "y" is the distance between the hexagon nut seat of the screw-in unit and the upper groove marking on the probe tube.
- (4) Then re-tighten the stuffing box and locking screw.

5.2 Installation Height

In the case of tanks to the DIN standard, the response height "h" and the adjustment dimension "x" needed for this can be taken from the tables in the Section "Adjustment Dimension". The diameter, nominal capacity (particularly for multi-chamber tanks) and the height of the manway nozzle height including the tank lid are important in calculating the adjustment dimension "x".

The installation height is adjusted using the control dimension "y" (see Figure below):
Control dimension "y" = probe length - adjustment dimension "x"

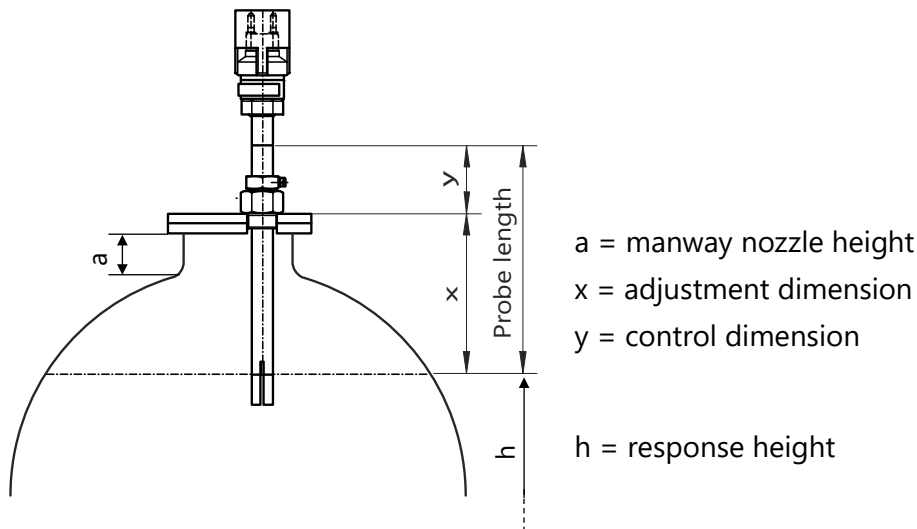


Figure 13: Control dimension "y"



If the Overfill Prevention Sensor is mounted in tanks that are not detailed in the tables, it must be ensured that the maximum filling ratio (volumes) of 95% for above-ground and 97% for underground tanks (minimum 300 mm earth covering) is not exceeded.



The adjustment dimension "x" takes into consideration a manway nozzle height of 100 mm for tanks according to DIN 6608, 6616, 6618, and EN 12285, and 60 mm for tanks according to DIN 6619, 6623 and 6624, as well as an overall thickness of 20 mm of the tank lid including sealing (see Tables of adjustment dimensions). In the case of different heights, the adjustment dimension "x" must be amended correspondingly.



The response height "h" and the adjustment dimensions "x" detailed in the tables take into consideration shutdown volumes (due to switching delays in the control circuit of the controller) for permanently installed fill pipes up to 20 m in length. For tanks with permanently installed fill pipes over 20 m in length, the adjustment dimensions "x" must be increased by an amount that corresponds to the additional volumes in the pipe.



If an additional leak protection lining is fitted to the inside of the tank, the adjustment dimension "x" must be increased accordingly.

5.3 Mounting Distance for Installation in the Manhole

When installing Overfill Prevention Sensors in manholes, the distance between the top edge of the connection fitting and the lower edge of the manhole cover should not be less than 20 mm and not more than 300 mm.

5.4 Adjustment Dimension X ...

5.4.1 ... for Cylindrical Horizontal Tanks (DIN 6608/ -16/ -17/ -24 and EN 12285)

(See Tables 1, 2, 3 or 7)



For tanks, the diameters of which are not detailed in the tables, the adjustment dimension must be selected for the next largest tank diameter.

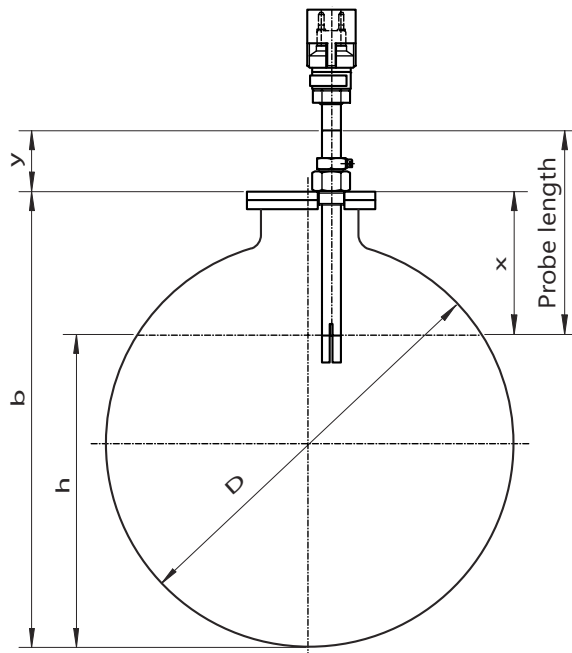


Figure 14: Tanks in accordance with DIN 6608, 6616, 6617, 6624 and EN 12285

b = distance between the tank bottom and the tank lid (hexagon nut seat)

h = max. filling height / response height (see tables 1–3, 7)

D = tank diameter

x = Overfill Prevention Sensor adjustment dimension (see tables 1–3, 7)

y = control dimension to check the position of the Overfill Prevention Sensor

$y = \text{probe length} - x$

5.4.2 ... for Standing Tanks According to DIN 6619/-23

DIN 6619 see Tables 4 or 5

DIN 6623 see Table 6



For tanks, the diameters of which are not detailed in the tables, the adjustment dimension must be selected for the next largest tank diameter.

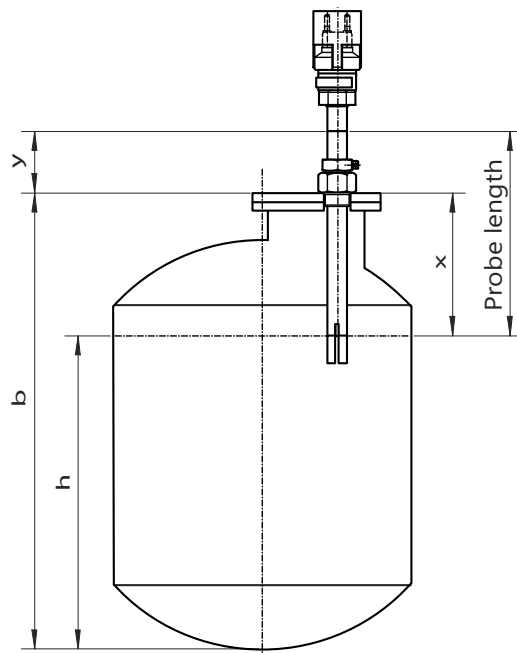


Figure 15: Tanks in accordance with DIN 6619 and 6623

b = distance between the tank bottom and the tank lid (hexagon nut seat)

h = max. filling height / response height (see tables 4–6)

D = tank diameter

x = Overfill Prevention Sensor adjustment dimension (see tables 4–6)

y = control dimension to check the position of the Overfill Prevention Sensor

$y = \text{probe length} - x$

5.4.3 ... for Standing Tanks According to DIN 6618

DIN 6618 see Tables 7 or 8

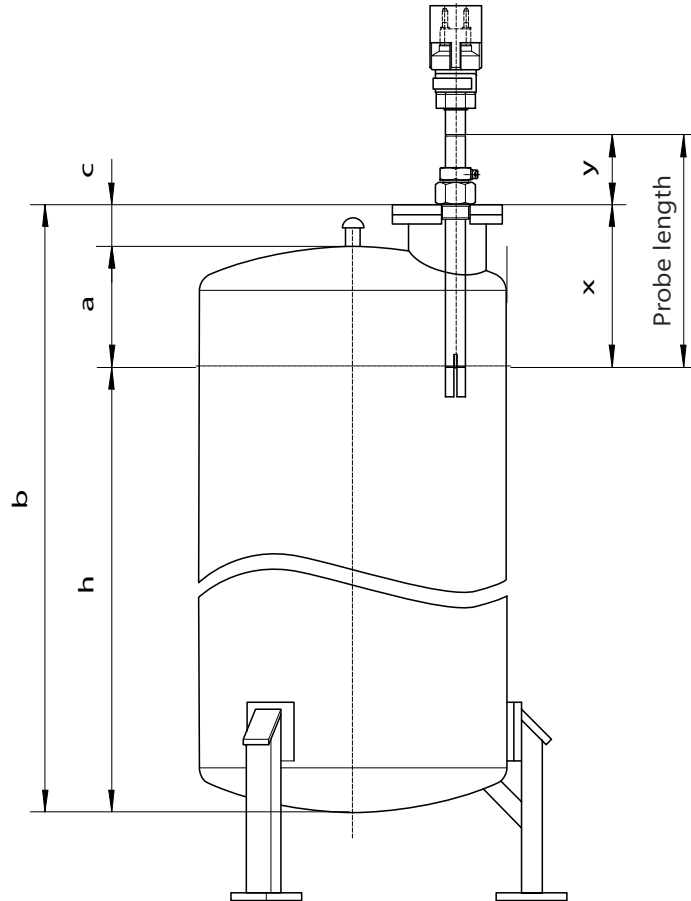


Abbildung 16: Tanks nach DIN 6618

a = response height

b = distance between the tank bottom and the tank lid (hexagon nut seat)

c = auxiliary distance dimension (upper edge of tank shell up to hexagon nut seat)

h = max. filling height / response height (see tables 7-8)

x = Overfill Prevention Sensor adjustment dimension (see tables 7-8)

y = control dimension

- (1) Use value „a“ from table 8
- (2) Measuring the auxiliary distance c (upper edge of tank shell up to hexagon nut seat)
Calculate the adjustment dimension "x": $x = a + c$
- (3) If the determination of the adjustment dimension "x" is not possible by this procedure, following method can also be used: Measure value „b“ by dipping (middle of the tank) and use value „h“ from the table 7. Calculate the adjustment dimension "x":
 $x = b - h$

5.4.4 ... for all other Cylindrical Standing Tanks

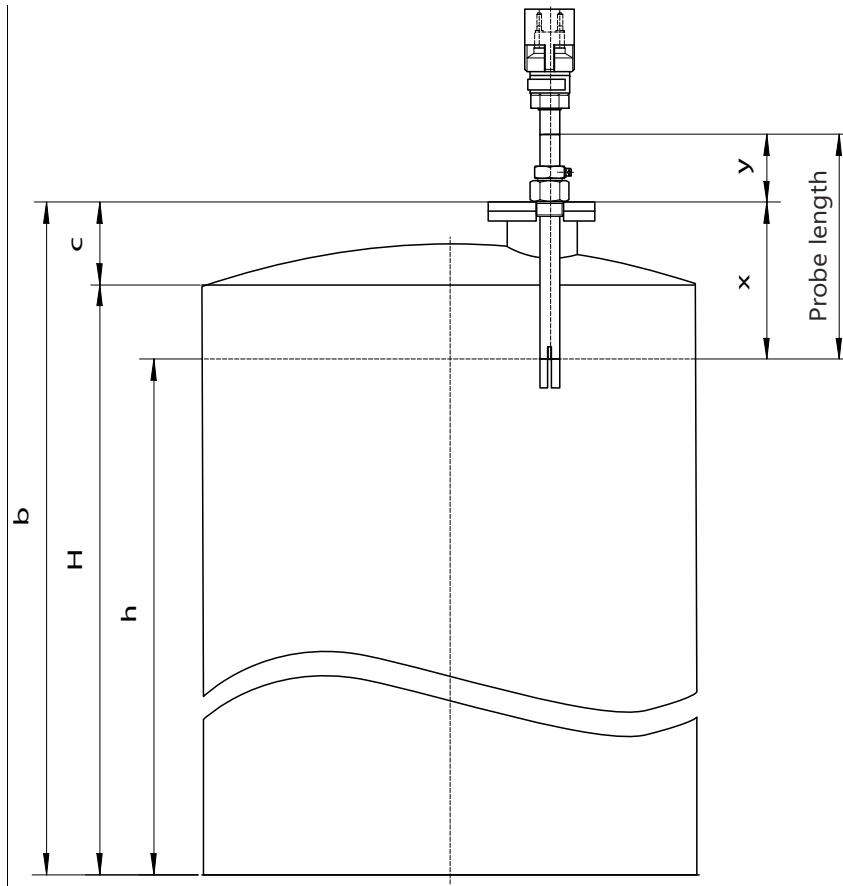


Figure 17: Tanks in accordance with DIN 4119

b = distance between the tank bottom and the tank lid (hexagon nut seat)

c = auxiliary distance dimension (upper edge of tank shell up to hexagon nut seat)

h = max. filling height / response height

H = shell height

x = Overfill Prevention Sensor adjustment dimension

y = control dimension

- (1) Measuring the "H" shell height. The "H" dimension represents the distance between the bottom plate and the upper edge of the tank shell.
- (2) Calculating the filling height "h", which corresponds to the permitted filling ratio.

$$h = H \cdot 0.95$$
- (3) Measuring the vertical auxiliary distance dimension "c".
- (4) Calculate the adjustment dimension "x" according to the figure above:

$$b = H + c; \quad x = b - h$$

5.4.5 Adjustment Dimensions X Tables



The adjustment dimension "x" takes into consideration a manway nozzle height of 100 mm for tanks according to DIN 6608, 6616, 6618, and EN 12285, and 60 mm for tanks according to DIN 6619, 6623 and 6624, as well as an overall thickness of 20 mm of the tank lid including sealing. In the case of different heights, the adjustment dimension "x" must be amended correspondingly.

Table 1: Adjustment dimension X for cylindrical horizontal tanks according to DIN 6608
for underground storage with more than 300 mm earth covering

Tank diameter D [mm]	Nominal volume tank or compartment [m ³]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]
1,000	1	795	320
1,250	3	1,095	270
	1	990	375
1,600	16	1,465	250
	13	1,460	255
	10	1,455	260
	7	1,440	275
	5	1,430	285
	3	1,395	320
	2	1,355	360
2,000	30	1,840	275
	25	1,835	280
	20	1,830	285
	16	1,825	290
	13	1,820	295
	10	1,815	300
	7	1,795	320
	5	1,775	340
2,500	60	2,305	310
	50	2,305	310
	40	2,300	315
	30	2,295	320
	25	2,290	325
	20	2,285	330
	10	2,255	360
2,900	100	2,675	335
	80	2,670	340
	60	2,670	340
	50	2,665	345
	40	2,665	345
	20	2,645	365

Table 2: Adjustment dimension X for cylindrical horizontal tanks according to DIN 6608, 6616, and 6617

for underground storage with less than 300 mm earth covering,
as well as above ground and partially-aboveground tanks

Tank diameter D [mm]	Nominal volume tank or compartment [m ³]	Maximum filling height "h"	Adjustment dimen- sion "x" [mm]
1,000	1	775	340
1,250	3	1,065	300
	1	965	400
1,600	16	1,420	295
	13	1,415	300
	10	1,410	305
	7	1,400	315
	5	1,385	330
	3	1,355	360
	2	1,320	395
2,000	30	1,785	330
	25	1,780	335
	20	1,775	340
	16	1,770	345
	13	1,765	350
	10	1,760	355
	7	1,745	370
	5	1,725	390
2,500	60	2,235	380
	50	2,230	385
	40	2,230	385
	30	2,225	390
	25	2,220	395
	20	2,215	400
	10	2,185	430
2,900	100	2,595	415
	80	2,590	420
	60	2,590	420
	50	2,585	425
	40	2,585	425
	20	2,560	450

Table 3: Adjustment dimension X for cylindrical horizontal tanks according to DIN 6624
For above ground storage

Tank diameter D [mm]	Nominal volume of tank or compartment [m ³]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]
1,000	3.0	855	220
	2.0	835	240
	1.5	815	260
	1.0	780	295
1,250	5.0	1,085	240
	3.5	1,075	250
	3.0	1,065	260
	2.0	1,040	285

Table 4: Adjustment dimension X for standing tanks according to DIN 6619 :1981-10/ 1982-09/ 1989-09

Tank diameter D [mm]	Nominal volume of tank or compartment [m ³]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]
2,000	7.0	2,145	385
	5.0	1,500	385
2,500	11.5	2,240	460
2,900	15.0	2,230	505

Table 5: Adjustment dimension X for standing tanks according to DIN 6619 :1968-07

Tank diameter D [mm]	Nominal volume of tank or compartment [m ³]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]
1,250	1.7	1,325	230
1,600	5.0	2,430	275
	3.8	1,850	240
	2.8	1,375	215
2,000	6.0	1,910	240

Table 6: Adjustment dimension X for standing tanks according to DIN 6623

Tank diameter D [mm]	Nominal volume of tank or compartment [m ³]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]
1,000	0.7	910	245
1,250	0.6	665	230
	0.4	420	215
	1.0	780	205

Table 7: Adjustment dimension X for cylindrical standing tanks according to DIN 6618 :1968-07

Tank diameter D [mm]	Nominal volume of tank [m ³]	Maximum filling height "h" [mm]	Response height a [mm]
1.600	16	7.800	765
	13	6.350	605
	10	4.895	450
	7	3.460	275
2.000	25	7.856	678
	20	6.313	641
2.500	40	8.066	727
	30	6.100	558
2.900	60	9.026	550
	50	7.565	826

Table 8: Adjustment dimension X for cylindrical standing tanks according to DIN 6618 :1981-10, Part 1–4

Tank diameter D [mm]	Nominal volume of tank [m ³]	Adjustment dimension "x" [mm]
1.600	16	7.800
	13	6.350
	10	4.895
	7	3.460
2.000	25	7.856
	20	6.313
2.500	40	8.066
	30	6.100
2.900	60	9.026
	50	7.565

Table 9: Adjustment dimension X for cylindrical horizontal tanks according to EN 12285
for underground storage with less than 300 mm earth covering, as well as aboveground and partly-aboveground tanks with maximum filling level of 95%, 97% and 98%.

Tank diameter D [mm]	Nominal volume tank tank compartment [m ³]	95 %		97 %		98 %	
		Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]
900	1	660	355	675	340	685	330
1,000	1	730	385	750	365	760	355
1,250	1	910	455	930	435	940	425
	1.5	970	395	995	370	1,010	355
	2	1,005	360	1,030	335	1,045	320
	3	1,040	325	1,070	295	1,080	285
1,600	2	1,280	435	1,315	400	1,330	385
	2.5	1,310	405	1,340	375	1,360	355
	3	1,325	390	1,360	355	1,380	335
	4	1,350	365	1,390	325	1,405	310
	5	1,370	345	1,410	305	1,425	290
	7	1,385	330	1,425	290	1,445	270
	10	1,400	315	1,440	275	1,465	250
	13	1,405	310	1,450	265	1,475	240
	16	1,410	305	1,455	260	1,480	235
1,900	4	1,595	420	1,640	375	1,665	350
	5	1,620	395	1,665	350	1,690	325
	7	1,640	375	1,690	325	1,715	300
	10	1,660	355	1,710	305	1,735	280
	13	1,670	345	1,720	295	1,745	270
	15	1,675	340	1,725	290	1,750	265
	20	1,680	335	1,730	285	1,760	255
	25	1,685	330	1,735	280	1,765	250
	30	1,690	325	1,740	275	1,770	245

Tank diameter D [mm]	Nominal volume tank or compartment [m ³]	95 %		97 %		98 %	
		Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]	Maximum filling height "h" [mm]	Adjustment dimension "x" [mm]
2,000	4	1,675	440	1,720	395	1,745	370
	5	1,700	415	1,750	365	1,775	340
	7	1,725	390	1,775	340	1,805	310
	10	1,745	370	1,795	320	1,825	290
	13	1,755	360	1,805	310	1,840	275
	15	1,760	355	1,815	300	1,845	270
	16	1,760	355	1,820	295	1,845	270
	20	1,765	350	1,825	290	1,850	265
	25	1,770	345	1,830	285	1,855	260
	30	1,775	340	1,835	280	1,860	255
2,500	5	2,100	515	2,160	455	2,195	420
	10	2,170	445	2,240	375	2,275	340
	15	2,195	420	2,260	355	2,300	315
	20	2,205	410	2,275	340	2,315	300
	25	2,215	400	2,285	330	2,325	290
	30	2,220	395	2,290	325	2,330	285
	40	2,225	390	2,295	320	2,335	280
	50	2,230	385	2,300	315	2,340	275
	60	2,230	385	2,300	315	2,340	275
2,900	10	2,500	510	2,580	430	2,625	390
	20	2,550	460	2,635	375	2,680	330
	30	2,565	445	2,650	360	2,695	315
	40	2,575	435	2,660	350	2,705	305
	50	2,580	430	2,665	345	2,710	300
	60	2,585	425	2,665	345	2,710	300
	80	2,585	425	2,670	340	2,715	295
	100	2,590	420	2,670	340	2,720	290
3,000	10	2,580	530	2,660	450	2,710	400
	20	2,635	475	2,720	390	2,770	340
	30	2,655	455	2,740	370	2,790	320
	40	2,665	445	2,750	360	2,795	315
	50	2,670	440	2,755	355	2,800	310
	60	2,670	440	2,755	355	2,805	305
	80	2,675	435	2,760	350	2,810	300
	100	2,680	430	2,765	345	2,815	295

5.5 Approval and Testing Obligations

A mounting diagram must be delivered to the operator, in which the tank diameter, capacity, nozzle height, manhole cover thickness and the dimensions "x" and "y" as well as the Overfill Prevention Sensor type with approval code can be seen.



Testing obligations in accordance with §§ 15 and 16 of the German Industrial Safety Regulations (BetrSichV) and § 1 of the German Regulations on Equipment Handling Substances Hazardous to Water (WasgefStAnIV). In other countries, the corresponding national rules and regulations must be observed. Storage facilities for static tanks, filler points, petrol stations, airport refuelling equipment, and their components, e.g. Overfill Prevention Sensors, must be tested by an approved inspection agency prior to commissioning, re-commissioning (after modifications subject to testing) as well as repeatedly at specific testing intervals. The system parts, e.g. Overfill Prevention Sensors, must be tested at regular intervals by the operator or an authorised person as required by the manufacturer's operating instructions, e.g. by using the FAFNIR Overfill Prevention Sensor tester ME 6.

6 Maintenance

6.1 Servicing



Limit switch devices are safety devices and, as such, must be tested for functionality at least every 10 years. This functional test also includes a test of the shutdown function and the response time (≤ 1.5 s) by immersion in liquid. The test must be performed using a suitable testing device like the FAFNIR testing device type ME 6. The test must be documented.

6.2 Return Shipment

Before returning any FAFNIR devices, the Return Material Authorization (RMA) is required. Please contact your Account Manager or the Technical Support for more information on returning goods.

Telephone	+49/40/39 82 07-0
Open (CET)	Mon. to Thu. 07:00 a.m. to 05:00 p.m., Fri. 07:00 a.m. to 04:00 p.m.



The return of FAFNIR devices is possible only with authorization (RMA) by the FAFNIR Support.

7 Technical Data

Ambient temperature	-25 °C ... +60 °C
Media temperature	-25 °C ... +50 °C



In addition, the technical data specified in the EU-type examination certificate and the operating instructions must be observed (see appendix).

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10 Appendix

10.1 List of Substances for the Overfill Prevention Sensors

List of Substances I for Overfill Prevention Sensors 83 UV-...	
List of Substances	- Fuel oil EL to DIN 51603 - Heating oil with FAME (fatty acid methyl ester) - Diesel fuel to DIN 51601/61606 - Diesel fuel with FAME (fatty acid methyl ester) - Petrol to DIN 51600/51607 - Petrol with up to 60% ethanol - Biodiesel - Vegetable oils

Table 10: List of Substances I - Fuels and Oils

List of Substances II Supplements List of Substances I for Overfill Prevention Sensors 81 D-Ex and 81 D-Ex U						
Aviation fuels	in accordance with specification			Abbreviations		
	Bundesrepublik Deutschland [Federal Republic of Germany] (Nato-Code)	United Kingdom	USA	Bundesrepublik Deutschland [Federal Republic of Germany] (Nato-Code)	United Kingdom	USA
Aviation Gasoline 80 [82 UL]			MIL G-5572 F		AVGAS 80 [82 UL]	AVGAS Grade 80 [82 UL]
Aviation Gasoline 100		DERD 2485 Edition 8			AVGAS 100	AVGAS Grade 100
Aviation Gasoline 100 LL		DERD 2475 Edition 8	MIL G-5572 F	F 18	AVGAS 100 LL	AVGAS Grade 100 LL
Aviation Gasoline 115/145	VTL-9130-004/2c	DERD 2485 Edition 8	MIL G-5572 F	F 22	AVGAS 115	AVGAS Grade 115

Table 11: List of Substances II - Aviation gasolines

List of Substances III						
Supplements List of Substances I for Overfill Prevention Sensors 81 D-Ex and 81 D-Ex U						
Aviation fuels	in accordance with specification			Abbreviations		
Aviation turbine fuel, kerosene, type Jet A [Jet A-1]	VTL-9130-006/4	DERD 2494 Edition 8		F 34 ¹⁾ F 35	AVTUR	JP 1
Aviation turbine fuel, wide cut, type Jet B	VTL-9130-006/4	DERD 2454 Edition 8	MIL-T-5624 L	F 40 ²⁾ F 45	AVTAG	JP 4
Aviation turbine fuel, high flash, type	VTL-9130-007/4 respective VTL-9130-010/2	DERD 2452 Edition 8	MIL-J-5624 L	F 44	AVCAT	JP 5
Jet fuel			MIL-J-25656 B (USAF)			JP 6
Turbine fuel, low volatility			MIL-T-38219 (USAF)			JP 7
Aviation turbine fuel, kerosene, type Jet A-1		DERD 2453	MIL-T-83133 D	F 34	AVTUR/FSII	JP 8

¹⁾ F34 = F35 with ice formation inhibitor

²⁾ F40 = F45 with ice formation inhibitor

Table 12: List of Substances III - Aviation kerosenes

List of Substances IV	
Supplements List of Substances I for Overfill Prevention Sensors 81 D-Ex and 81 D-Ex U	
<i>Special benzines</i>	
Petrol with up to 85% ethanol	
Petrol-ether	to DIN 51 630
Boiling point benzines	to DIN 51 631
Test benzines	to DIN 51 632
Safety lamp benzines	to DIN 51 634
FAM regular gasolines to DIN 51 635	
Lighting, burning and solvent petroleum	to DIN 51 636
<i>Aliphatic hydrocarbons</i>	
Pentane	
Hexane [n-hexane] octane	
Nonane	
Decane [n-decane, iso-decane]	
<i>Aromatic hydrocarbons</i>	
Benzene, toluol xylol	
Solvent naphta (light) to DIN 51 63	
<i>Alcohols</i>	
Propanol	
Butanol	
Ethanol	

Table 13: List of Substances IV - Special benzines, solvents, alcohols



**EU-Konformitätserklärung
EU Declaration of Conformity
Déclaration UE de Conformité
Dichiarazione di Conformità UE**



FAFNIR GmbH, Deutschland / Germany / Allemagne / Germania

erklärt als Hersteller in alleiniger Verantwortung, dass die Produkte
declares as manufacturer under sole responsibility that the products
déclare sous sa seule responsabilité en qualité de fabricant que les produits
dichiara sotto la sola responsabilità del produttore, che i prodotti sono

**Grenzwertgeber bzw. Standaufnehmer bzw. Aufstausensor /
Overfill Prevention Sensor resp. Level Detector resp. High Level Sensor /
Capteurs de valeur limite resp. Détecteur de niveau resp. Capteur de niveau haut /
Sensore di troppo pieno o rivelatore di livello o sensore di alto livello
81 D-Ex ... & 83 UV-... / 76 ... & LS 300 ... / SEPARIX-T ...**

den Vorschriften der europäischen Richtlinien
comply with the regulations of the European directives
sont conformes aux réglementations des directives européennes suivantes
rispetta i regolamenti delle direttive europee

2011/65/EU	Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten	RoHS
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment	RoHS
2011/65/UE	Limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques	RoHS
2011/65/UE	Restrizione dell'uso di determinate sostanze pericolose nelle apparecchiature elettriche ed elettroniche	RoHS
2014/34/EU	Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen	ATEX
2014/34/EU	Equipment and protective systems intended for use in potentially explosive atmospheres	ATEX
2014/34/UE	Appareils et systèmes de protection destinés à être utilisés en atmosphères explosibles	ATEX
2014/34/UE	Apparecchi e sistemi di protezione destinati a essere utilizzati in atmosfera potenzialmente esplosiva	ATEX

durch die Anwendung folgender harmonisierter Normen entsprechen
by applying the harmonised standards
par l'application des normes
applicando le norme armonizzate

**RoHS / RoHS / RoHS / RoHS
ATEX / ATEX / ATEX / ATEX**

**EN IEC 63000:2018
EN IEC 60079-0:2018
EN 60079-11:2012
EN 60079-26:2015**

Die Produkte sind bestimmt als Elektro- und Elektronikgeräte der RoHS-
The products are determined as electrical and electronic equipment of RoHS
Les produits sont déterminés comme des équipements électriques et électroniques de RoHS
I prodotti sono determinati come apparecchiature elettriche ed elettroniche della RoHS

Kategorie / Category / Catégorie / Categoria

**Überwachungs- und Kontrollinstrumenten in der Industrie /
Industrial Monitoring and Control Instruments /
Instruments de contrôle et de surveillance industriels /
Strumenti di monitoraggio e controllo industriali**

Die notifizierte Stelle TÜV NORD CERT GmbH, 0044 hat eine EU-Baumusterprüfung durchgeführt und folgende Bescheinigung ausgestellt
The notified body TÜV NORD CERT GmbH, 0044 performed a EU-type examination and issued the certificate
L'organisme notifié TÜV NORD CERT GmbH, 0044 a effectué examen UE de type et a établi l'attestation
L'organismo notificato TÜV NORD CERT GmbH, 0044 ha effettuato esame UE del tipo e rilasciato il certificato

81 D-Ex ... & 83 UV-... / LS 300 ... / SEPARIX-T ...

TÜV 00 ATEX 1656 X

Hamburg, 15.11.2021

Ort, Datum / Place, Date / Lieu, Date / Luogo, data

Geschäftsführer / Managing Director / Gérant / Direttore Generale: René Albrecht

Translation

(1) **EU-Type Examination Certificate**

TÜV NORD

- (2) Equipment and protective systems intended for use in potentially explosive atmospheres, **Directive 2014/34/EU**



- (3) **Certificate Number** TÜV 00 ATEX 1656 X **issue:** 00
- (4) for the product: Overfill Prevention Sensor type 81 D-Ex ... and type 83 UV-...
Level Detector type LS 300 ...
High-Level Sensor type SEPARIX-T ...
- (5) of the manufacturer: **FAFNIR GmbH**
- (6) Address: Schnackenburgallee 149 c, 22525 Hamburg, Germany
- Order number: 8000488168
- Date of issue: 2018-09-11
- (7) The design of this product and any acceptable variation thereto are specified in the schedule to this EU-Type Examination Certificate and the documents therein referred to.
- (8) The TÜV NORD CERT GmbH, Notified Body No. 0044, in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and the Council of 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential ATEX Assessment Report No. 18 203 228654.
- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60079-0:2012 + A11:2013 **EN 60079-11:2012** **EN 60079-26:2015**
except in respect of those requirements listed at item 18 of the schedule.
- (10) If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Specific Conditions for Use specified in the schedule to this certificate.
- (11) This EU-Type Examination Certificate relates only to the design, and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (12) The marking of the product shall include the following:



See item 15 of the schedule

TÜV NORD CERT GmbH, Langemarckstraße 20, 45141 Essen, notified by the central office of the countries for safety engineering (ZLS), Ident. Nr. 0044, legal successor of the TÜV NORD CERT GmbH & Co. KG Ident. Nr. 0032

The head of the notified body

Roder

Hanover office, Am TÜV 1, 30519 Hannover, Tel. +49 511 998-61455, Fax +49 511 998-61590

This certificate may only be reproduced without any change, schedule included.
Excerpts or changes shall be allowed by the TÜV NORD CERT GmbH

(13) SCHEDULE

(14) EU-Type Examination Certificate No. TÜV 00 ATEX 1656 X issue 00

(15) Description of product

The sensors are intrinsically safe equipment that can be used in a potentially explosive area and are used to detect a limit level. The overfill prevention sensors (OPS) serve as part of an overfill prevention. The level detector is used as part of an overfill protection, dry run protection or filling control. The high-level sensor is used to detect backwater within a light liquid separator.

In the future, the sensors may also be manufactured in accordance with the test documents listed in the ATEX test report. The changes affect the addition of new types. Furthermore, the equipment was assessed according to the latest standards.

The marking is as follows:

Type 81 D-Ex resp. 83 UV-... resp. LS 300 ... resp. SEPARIX-T ...

 II 1 G Ex ia IIC T4 Ga resp.
 II 1/2 G Ex ia IIC T4 Ga/Gb

Type 81 D-Ex U resp. LS 300 ... U...

 II 1/2 G Ex ia IIC T4 Ga/Gb

Type LS 300 ... C

 II 1 G Ex ia IIB T4 Ga resp.
 II 1/2 G Ex ia IIB T4 Ga/Gb

Type designation:

Type 81 D-Ex ...:

81 D-Ex

OPS made of stainless steel

81 D-Ex U

OPS additionally with overvoltage protection

Type 83 UV-...:

83 UV-A

Stainless steel OPS with junction box and wall fitting

83 UV-C

Stainless steel OPS with permanently connected cable and wall fitting

83 UV-SCR

Brass OPS with permanently connected cable, reed contact / float and wall fitting

83 UV-SR

Brass OPS with reed contact / float

83 UV-SV

Brass OPS with variably adjustable junction box

83 UV-SVR

Brass OPS with variably adjustable junction box and reed contact / float

Type LS 300 ... (only Ex relevant designations):

LS 300

Level detector without process connection, test connection and overvoltage protection as well as normal medium temperature range

LS 300 E...

Level detector with screw-in unit

LS 300 F...

Level detector with flange

LS 300 ...P...

Level detector with test connection and without check valve

LS 300 ...PR...

Level detector with test connection and with check valve

LS 300 ...U...

Level detector with overvoltage protection

LS 300 ...H...

Level detector for high medium temperature range

LS 300 ...HH...

Level detector for the highest medium temperature range

Schedule to EU-Type Examination Certificate No. TÜV 00 ATEX 1656 X issue 00

LS 300 ... L...	Level detector for low medium temperature range
LS 300 ... C	Level detector with plastic coating
LS 300 ... Duo	Double level detector
LS 300 ... Steck	Level detector with plug connection
LS 300 ... Tantal	Level detector with at least sensor element made of tantalum
LS 300 ... Trio	Triple level detector
Type SEPARIX-T ...:	
SEPARIX-T H	High-level sensor with sensor tube made of stainless steel for aggressive media
SEPARIX-T L Plus	High-level sensor with sensor tube made of stainless steel for non-aggressive media

Technical data:

Signal- and power circuit	in type of protection "Intrinsic Safety" Ex ia IIC/IIB only for the connection to a certified intrinsically safe circuit
	Maximum values: $U_i = 30 \text{ V}$
	$I_i = 200 \text{ mA}$
	$P_i = 1 \text{ W}$
	L_i negligibly small
	C_i negligibly small

The types LS 300 ... C with plastic coating are only for gas group IIB allowed.

Permissible ambient temperature range:

The ambient temperature range is $-40 \text{ }^{\circ}\text{C}$ to $+110 \text{ }^{\circ}\text{C}$. When using a sensor with overvoltage protection, the maximum temperature is $+90 \text{ }^{\circ}\text{C}$.

When used in areas requiring category 1 or 1/2, the following applies:

The process pressure for the media must be between 0.8 bar and 1.1 bar where explosive vapour-air mixtures are present. If no explosive mixtures are present, the equipment may also be operated outside this area according to the manufacturer's specification.

All further data are valid unchanged.

(16) Drawings and documents are listed in the ATEX Assessment Report No. 18 203 228654

(17) Specific Conditions for Use

1. Overfill prevention sensors and level detectors with overvoltage protection do not comply with the dielectric strength requirements according to EN 60079-11, clause 6.3.13. When performing an insulation test on the intrinsically safe circuit, the device must be disconnected.
2. When using the integrated overvoltage protection, integration into the equipotential bonding is required.

(18) Essential Health and Safety Requirements

no additional ones

- End of Certificate -



Instructions in accordance with Directive 2014/34/EU

TÜV 00 ATEX 1656 X

Overfill Prevention Sensor Type 81 D-Ex ... and 83 UV-...

Level detector LS 300 ...

High-level sensor type SEPARIX-T ...

Edition: 09.2018

I Range of application

The sensors are intrinsically safe operating equipment for use in explosion hazardous area and serve for detecting the limit level. The Overfill Prevention Sensors serve as part of a filling safety device. The level detector is used as part of an overfill prevention system, dry run protection or filling control. The high-level sensor is used to detect a fluid back pressure within a light liquid separator.

II Standards

The sensors are designed in accordance with the following European standards

EN 60079-0: 2012 + A11:2013	Equipment - General Requirements
EN 60079-11: 2012	Equipment protection by intrinsic safety "i"
EN 60079-26: 2015	Equipment with Equipment Protection Level (EPL) Ga

III Instructions for safe ...

III.a ... use

The sensors are designed as intrinsically safe equipment and are suitable for use in potentially explosive areas. The level detectors LS 300 ... C (coated with plastic) are suitable for the gas groups IIA and IIB. All other level detectors are suitable for all gas groups (IIA, IIB and IIC).

The approval applies to device versions 81 D-Ex ..., 83 UV-..., LS 300 ... and SEPARIX-T ...

III.b ... assembling and dismantling

Assembling and dismantling must solely be carried out with the power disconnected!

For sensors with connection housing the cover of the connection housing may be removed for the electrical installation. After installation, the connection housing must be locked again.

III.c ... installation

The wiring must be carried out only with the power disconnected. Special rules and regulations, including EN 60079-14 and local installation regulations, must be observed.

The sensors can be installed completely inside Zone 0. If the integrated overvoltage protection is used, e. g. LS 300 U, the terminal compartment with overvoltage protection must be installed outside Zone 0.

General information (see also EN 60079-14:2014, section 16.3 or EN 60079-25:2010, section 12):

The overvoltage protection device must be installed outside, but as close to the border of Zone 0 as technically possible, preferably at a distance of up to 1 m.

If a screw-in unit is used, it must be provided with a suitable sealing material and screwed into the tank coupling. If the sensor tube is permanently connected with a flange, the installation length cannot be changed. The flange shall be provided with a suitable seal and fixed with flange bolts or nuts.

By the process connection, there may be an opening in the boundary wall to the area requiring EPL "Ga". Then, there is the risk of flammable gases release and flame entrance.

If the sensor is supplied without process connection, the installer is responsible for compliance with the EX requirements.



General information (see also EN 60079-26, section 4.3):

Attention must be paid, if the sensor is installed in the separating wall between Zone 0 and Zone 1. Then a protection class of at least IP66 or IP67 must be achieved after installation.

When wiring the sensor to the measuring transducer (preferably blue coloured cable), the approved inductance and capacitance of the measuring transducer must not be exceeded.

The sensors have a two-pole screw or plug connection or cable tail. Attention does not need to be paid to polarity.

The integration of the sensors without overvoltage protection into the equipotential bonding is not required. For integration of the sensors with overvoltage protection into the equipotential bonding, a PA terminal is provided.

III.d ... adjustment

No Ex-relevant adjustments are required for operation of the sensors.

III.e ... putting into service

Before putting into service, all devices must be checked of right installation and connection. The electrical supply, as well as connected devices, must be checked.

III.f ... maintenance (servicing and emergency repair)

The sensors are generally maintenance-free. In case of a defect, the sensors must be sent back to the manufacturer or one of its representations.

The sensors, in particular the probe tip, may be cleaned. Grease-dissolving cleansing agents can be used to remove any firmly clinging grease or oil residues. Sharp-edged objects are unsuitable for the purpose of cleaning since they could damage the sensor.

When performing an insulation test of the intrinsically safe circuit with 500 V under well-controlled conditions, according to EN 60079-25, section 12 it is necessary to disconnect sensors with overvoltage protection since there is no compliance with the requirements for dielectric strength according to EN 60079-11, section 6.3.13. For all other sensors, there is compliance between the intrinsically safe circuit and the chassis or, if present, other intrinsically safe circuits with 500 V_{AC}.

IV Equipment marking

- | | | | |
|---|----------------------------|--|---|
| 1 | Manufacturer: | FAFNIR GmbH, 22525 Hamburg | |
| 2 | Type designation: | 81 D-Ex ... or 83 UV-... or LS 300 ... or SEPARIX-T ... | |
| 3 | Certificate number: | TÜV 00 ATEX 1656 X | |
| 4 | Ex marking: | 81 D-Ex / 83 UV-... / LS 300 ... / SEPARIX-T ... | |
| | |  | II 1 G Ex ia IIC T4 Ga
II 1/2 G Ex ia IIC T4 Ga/Gb |
| | 81 D-Ex U / LS 300 ...U... | | |
| | |  | II 1/2 G Ex ia IIC T4 Ga/Gb |
| | LS 300 ... C | | |
| | |  | II 1 G Ex ia IIB T4 Ga
II 1/2 G Ex ia IIB T4 Ga/Gb |
| 5 | CE marking: |  0044 | |
| 6 | Technical Data: | $U_i \leq 30 \text{ V}$
$I_i \leq 200 \text{ mA}$
$P_i \leq 1 \text{ W}$ | |



V Technical data

The following electrical input values apply to the sensors:

$$\begin{aligned}U_i &\leq 30 \text{ V} \\I_i &\leq 200 \text{ mA} \\P_i &\leq 1 \text{ W}\end{aligned}$$

The effective internal capacitance and inductance that are externally effective, are negligibly small. If the sensors are supplied with integrated cable, then the electrical characteristics are:

$$\begin{aligned}C_c &= 200 \text{ pF/m} \\L_c &= 1 \text{ }\mu\text{H/m} \\L_c/R_c &= 30 \text{ }\mu\text{H}/\Omega\end{aligned}$$

The sensors may be used in the following ambient temperature range:

$$T_a = -40 \text{ }^\circ\text{C} \dots +110 \text{ }^\circ\text{C}$$

When using a sensor with overvoltage protection, the maximum temperature is +90 °C for the sensor head.

General information (see also EN 60079-0, section 1):

Zone 0 exists only under atmospheric conditions:

Temperature range: -20 °C ... +60 °C

Pressure range: 0.8 bar to 1.1 bar

Oxidants: Air (oxygen content approx. 21 %)

The sensors achieve a housing protection of:

Degree of protection: IP68

The following technical data apply to sensors with overvoltage protection:

The nominal DC spark-over voltage amounts to:

$$U = 350 \text{ V} \pm 20 \%$$

The nominal impulse discharge current amounts to:

$$I = 20 \text{ kA (10} \times \text{ Wave 8/20 }\mu\text{s)}$$

The nominal alternating discharge current amounts to:

$$I = 20 \text{ A (10} \times \text{ @ 50 Hz, 1 s)}$$

The insulation resistance of an overvoltage arrester amounts to:

$$R > 10 \text{ G}\Omega$$

VI Specific conditions for use

1. Overfill Prevention Sensor and Level detectors with overvoltage protection do not comply with the dielectric strength requirements according to EN 60079-11, section 6.3.13. When performing an insulation test of the intrinsically safe circuit it is therefore necessary to disconnect the device.
2. When using the integrated overvoltage protection, integration into the equipotential bonding is required.

Leistungserklärung gemäß Verordnung (EU) Nr. 305/2011
Declaration of Performance according to regulation (EU) No 305/2011
Déclaration des Performances conformément à règlement (UE) N° 305/2011

Nr. / No. / N° L-GWG-03

1. Eindeutiger Kenncode des Produkttyps: **Grenzwertgeber**
 Unique identification code of the product-type: **Overfill Prevention Sensors**
 Code d'identification unique du produit type: **Capteurs de valeur limite**

81 D-Ex ...

2. Typen-, Chargen-, oder Seriennummer oder ein anderes Kennzeichen zur Identifikation des Bauprodukts gemäß Artikel 11 Absatz 4:
 Type, batch or serial number or any other element allowing identification of the construction product as required pursuant to Article 11(4):
 Numéro de type, de lot ou de série ou tout autre élément permettant l'identification du produit de construction, conformément à l'article 11, paragraphe 4:

Gerätenummer / Serial Number / Numéro d'appareil

3. Vom Hersteller vorgesehener Verwendungszweck oder vorgesehene Verwendungszwecke des Bauprodukts gemäß der anwendbaren harmonisierten technischen Spezifikation:
 Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:
 Usage ou usages prévus du produit de construction, conformément à la spécification technique harmonisée applicable, comme prévu par le fabricant:

Grenzwertgeber für Überfüllsicherungen für die Verwendung in/mit unter- oder oberirdischen, drucklosen, metallischen oder nichtmetallischen ortsfesten Tanks für flüssige Brenn- und Kraftstoffe /
Overfill prevention sensors for overfill prevention devices used in/with underground or above ground, non-pressurised, metallic or non-metallic, static tanks designed for liquid fuels /
Capteurs de valeur limite pour les dispositifs anti-débordement de prévention utilisés dans / avec réservoirs sans pression enterrés ou de surfaces, métalliques ou non-métalliques, statiques conçus pour les combustibles liquide

4. Name, eingetragener Handelsname oder eingetragene Marke und Kontaktschrift des Herstellers gemäß Artikel 11 Absatz 5:
 Name, registered trade name or registered trade mark and contact address of the manufacturer as required pursuant to Article 11(5):
 Nom, raison sociale ou marque déposée et adresse de contact du fabricant, conformément à l'article 11, paragraphe 5:

FAFNIR GmbH, Schnackenburgallee 149 c, 22525 Hamburg, Deutschland / Germany / Allemagne

6. System oder Systeme zur Bewertung und Überprüfung der Leistungsbeständigkeit des Bauprodukts gemäß Anhang V:
 System or systems of assessment and verification of constancy of performance of the construction product as set out in Annex V:
 Le ou les systèmes d'évaluation et de vérification de la constance des performances du produit de construction, conformément à l'annexe V:

System 3 / System 3 / Système 3

7. Im Falle der Leistungserklärung, die ein Bauprodukt betrifft, das von einer harmonisierten Norm erfasst wird:
 In case of the declaration of performance concerning a construction product covered by a harmonised standard:
 Dans le cas de la déclaration des performances concernant un produit de construction couvert par une norme harmonisée:

TÜV NORD Systems GmbH & Co. KG (0045)

hat **eine Typprüfung** nach dem System 3 vorgenommen und folgendes ausgestellt **Prüfbericht Nr.**
 performed a **type testing** under system 3 and issued **Test report No.**
 a réalisé un **d'essais de type** selon le système 3 a délivré **Rapport du test N°**

8237 BG 00211

9. Erklärte Leistung / Declared performance / Performances déclarées

Wesentliche Merkmale / Essential characteristics / Caractéristiques essentielles	Leistung / Performance / Performances	Harmonisierte technische Spezifikation / Harmonised technical specification / Spécifications techniques harmonisées
Signal oberhalb Füllhöhe L ₁ / To provide the signal above level L ₁ / Signal au-dessus de niveau de remplissage L ₁	Bestanden/ Pass / Passé	EN 13616:2004 Überfüllsicherungen ohne Schließeinrichtung / Overfill prevention devices without closure device / Dispositifs limiteurs de remplissage sans dispositifs de fermeture
Signal unterhalb Füllhöhe L ₁ / To provide the signal below level L ₁ / Signal au-dessous du niveau de remplissage L ₁	Bestanden/ Pass / Passé	
Beständigkeit gegenüber / Durability against / Résistance au	Bestanden/ Pass / Passé	
- Temperatur / Temperature / Température	Bestanden/ Pass / Passé	
- chemische Beanspruchung / chemical attack / contrainte chimique	Bestanden/ Pass / Passé	
- Betriebszyklen / operational cycles / cycle de service	Bestanden/ Pass / Passé	

10. Die Leistung des Produkts gemäß den Nummern 1 und 2 entspricht der erklärten Leistung nach Nummer 9. Verantwortlich für die Erstellung dieser Leistungserklärung ist allein der Hersteller gemäß Nummer 4. Unterzeichnet für den Hersteller und im Namen des Herstellers von:
 The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 9. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4. Signed for and on behalf of the manufacturer by:
 Les performances du produit identifié aux points 1 et 2 sont conformes aux performances déclarées indiquées au point 9. La présente déclaration des performances est établie sous la seule responsabilité du fabricant identifié au point 4. Signé pour le fabricant et en son nom par:

René Albrecht, Geschäftsführer / Managing Director / Gérant



Hamburg, 22.11.2017
 Ort, Datum / Place, Date / Lieu, Date

Unterschrift / Signature / Signature

Leistungserklärung gemäß Verordnung (EU) Nr. 305/2011
Declaration of Performance according to regulation (EU) No 305/2011
Déclaration des Performances conformément à règlement (UE) N° 305/2011

Nr. / No. / N° **L-GWG-04**

1. Eindeutiger Kenncode des Produkttyps: **Grenzwertgeber**
 Unique identification code of the product-type: **Overfill Prevention Sensors**
 Code d'identification unique du produit type: **Capteurs de valeur limite**

83 UV ... / 84 UVT

2. Typen-, Chargen-, oder Seriennummer oder ein anderes Kennzeichen zur Identifikation des Bauprodukts gemäß Artikel 11 Absatz 4:
 Type, batch or serial number or any other element allowing identification of the construction product as required pursuant to Article 11(4):
 Numéro de type, de lot ou de série ou tout autre élément permettant l'identification du produit de construction, conformément à l'article 11, paragraphe 4:

Gerätenummer / Serial Number / Numéro d'appareil

3. Vom Hersteller vorgesehener Verwendungszweck oder vorgesehene Verwendungszwecke des Bauprodukts gemäß der anwendbaren harmonisierten technischen Spezifikation:
 Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:
 Usage ou usages prévus du produit de construction, conformément à la spécification technique harmonisée applicable, comme prévu par le fabricant:

Grenzwertgeber für Überfüllsicherungen für die Verwendung in/mit unter- oder oberirdischen, drucklosen, metallischen oder nichtmetallischen ortsfesten Tanks für flüssige Brenn- und Kraftstoffe /
Overfill prevention sensors for overfill prevention devices used in/with underground or above ground, non-pressurised, metallic or non-metallic, static tanks designed for liquid fuels /
Capteurs de valeur limite pour les dispositifs anti-débordement de prévention utilisés dans / avec réservoirs sans pression enterrés ou de surfaces, métalliques ou non-métalliques, statiques conçus pour les combustibles liquide

4. Name, eingetragener Handelsname oder eingetragene Marke und Kontaktschrift des Herstellers gemäß Artikel 11 Absatz 5:
 Name, registered trade name or registered trade mark and contact address of the manufacturer as required pursuant to Article 11(5):
 Nom, raison sociale ou marque déposée et adresse de contact du fabricant, conformément à l'article 11, paragraphe 5:

FAFNIR GmbH, Schnackenburgallee 149 c, 22525 Hamburg, Deutschland / Germany / Allemagne

6. System oder Systeme zur Bewertung und Überprüfung der Leistungsbeständigkeit des Bauprodukts gemäß Anhang V:
 System or systems of assessment and verification of constancy of performance of the construction product as set out in Annex V:
 Le ou les systèmes d'évaluation et de vérification de la constance des performances du produit de construction, conformément à l'annexe V:

System 3 / System 3 / Système 3

7. Im Falle der Leistungserklärung, die ein Bauprodukt betrifft, das von einer harmonisierten Norm erfasst wird:
 In case of the declaration of performance concerning a construction product covered by a harmonised standard:
 Dans le cas de la déclaration des performances concernant un produit de construction couvert par une norme harmonisée:

TÜV NORD Systems GmbH & Co. KG (0045)

hat **eine Typprüfung** nach dem System **3** vorgenommen und folgendes ausgestellt **Prüfbericht Nr.**
 performed a **type testing** under system **3** and issued **Test report No.**
 a réalisé un **d'essais de type** selon le système **3** a délivré **Rapport du test N°**

8237 BG 00111

9. Erklärte Leistung / Declared performance / Performances déclarées

Wesentliche Merkmale / Essential characteristics / Caractéristiques essentielles	Leistung / Performance / Performances	Harmonisierte technische Spezifikation / Harmonised technical specification / Spécifications techniques harmonisées
Signal oberhalb Füllhöhe L ₁ / To provide the signal above level L ₁ / Signal au-dessus de niveau de remplissage L ₁	Bestanden/ Pass / Passé	EN 13616:2004 Überfüllsicherungen ohne Schließeinrichtung / Overfill prevention devices without closure device / Dispositifs limiteurs de remplissage sans dispositifs de fermeture
Signal unterhalb Füllhöhe L ₁ / To provide the signal below level L ₁ / Signal au-dessous du niveau de remplissage L ₁	Bestanden/ Pass / Passé	
Beständigkeit gegenüber / Durability against / Résistance au	Bestanden/ Pass / Passé	
- Temperatur / Temperature / Température - chemische Beanspruchung / chemical attack / contrainte chimique - Betriebszyklen / operational cycles / cycle de service	Bestanden/ Pass / Passé Bestanden/ Pass / Passé Bestanden/ Pass / Passé	

10. Die Leistung des Produkts gemäß den Nummern 1 und 2 entspricht der erklärten Leistung nach Nummer 9. Verantwortlich für die Erstellung dieser Leistungserklärung ist allein der Hersteller gemäß Nummer 4. Unterzeichnet für den Hersteller und im Namen des Herstellers von:
 The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 9. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4. Signed for and on behalf of the manufacturer by:
 Les performances du produit identifié aux points 1 et 2 sont conformes aux performances déclarées indiquées au point 9. La présente déclaration des performances est établie sous la seule responsabilité du fabricant identifié au point 4. Signé pour le fabricant et en son nom par:

René Albrecht, Geschäftsführer / Managing Director / Gérant



Hamburg, 22.11.2017
 Ort, Datum / Place, Date / Lieu, Date

Unterschrift / Signature / Signature

Große Bahnstraße 31•22525 Hamburg

Tel.: 040 8557-0
 Fax: 040 8557-2295

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 www.tuev-nord.de

Prüfbericht Nr.: 8237 BG 00211
Auftrags-Nr.: 8107 355 813

**für einen Grenzwertgeber Bauart Typ B mit Stromschnittstelle nach
 DIN EN 13616:2004-09/DIN EN 13616:2004-09 Berichtigung 1:2006-04**

Prüflabor TÜV NORD

Datum: 24.01.2011

Hersteller: FAFNIR GmbH
Bahrenfelder Straße 19, 22765 Hamburg

Grenzwertgeber Typ FAFNIR 81 D-EX nach technischer Dokumentation des Herstellers 03/2004, Ausgabe:1			
Einsatzbereich: Einbau in Behältern nach DIN 6608, DIN 6616, DIN 6617, DIN 6618, DIN 6619, DIN 6623, DIN 6624, DIN 4119, DIN EN 12285-1 und TGL 5315 oder andere zugelassene Tanks aus Stahl oder aus gleichwertigen Werkstoffen.			
Lagermedien: Heizöl EL, Dieselmotortreibstoff, Flugmotortreibstoffe, Ottomotortreibstoffe, Flugturbinentreibstoffe, Ottomotortreibstoffgemische mit Ethanol sowie weitere Spezialbenzine und flüssige Kohlenwasserstoffe nach Stoffliste Punkt 6 der o.g. technischer Dokumentation,			
Anzahl Prüfmuster:1			
Prüfungen nach EN 13616	Erfüllt		Bemerkungen
	ja	nein	
4.1 Funktionskriterien			
Prüfung nach Abschnitt 4.1.5 (Abs. 4.1.1 bis 4.1.4 u. 4.1.6 nicht zutreffend)			
Keine Freigabe zum Beginn des Befüllvorganges	X		betrifft Steuereinheit
Unterbrechung bei Ausfall der Hilfsenergie	X		betrifft Steuereinheit
4.2 Aufbau			
4.2.1 Eignung der Werkstoffe im Temperaturbereich -25 °C bis + 60°C	X		
Materialliste der Medienberührten Teile für Grenzwertgeber Typ FAFNIR 81 D-EX Einschraubkörper Messing, CuZn39 Pb2 O-Ring NBR, 70 shore Sondenrohr Edelstahl, 1.4301 - 1.4571 Aufnahmestück Edelstahl, 1.4301 - 1.4571 Fühlerhülse Edelstahl, 1.4301 - 1.4571 Kaltleiter Typ KF 860 Schutzhülse Edelstahl, 1.4301 - 1.4571	X		über Materialliste
Chemische Eignungsprüfung nach Abschnitt 5.5.2	X		
Typprüfung nach Prüfzyklus mit Flüssigkeiten : 1. Standard EN 13616 2. Biodiesel 3. E 85 4. Heizöl EL Diesel	X		
4.2.2 Leitfähigkeit als Teil der elektrostatischen Ableitfähigkeit (Messung mit 100 V Prüfspannung Einschraubkörper/Hülse)	X		0,0 MΩ Hülse-Einschraubmutter

Prüfungen nach EN 13616	Erfüllt		Bemerkungen
	ja	nein	
Prüfungen nach Anhang A Typprüfungen (Funktionsprüfungen und Umweltprüfungen)			
A 1.2 Sensorprüfung mit DK nach EN 590 nach chemischer Eignungsprüfung!			
Messung vor Zyklen $I > I_1$ für mind. 0,5 s Messwert I : 63,8 mA	X		Wert I_1 mit $41 \text{ mA} < I_1 < 49,5 \text{ mA}$ Wert I_2 mit $38 \text{ mA} < I_2 < 44 \text{ mA}$ Wert I_3 mit $2,0 \text{ mA} < I_3 < 10 \text{ mA}$
Signal bei Sensor trocken nach $\geq 180 \text{ s}$ mit $I < I_2$ Messwert I nach $t = 29,2 \text{ s}$ erreicht	X		
Signal bei Sensor nass nach $< 1 \text{ s}$ mit Wert $I > I_2$ Signal nach 92 ms	X		
Funktionsprüfung nach 5.000 Zyklen ($T = 20 \pm 5 \text{ }^\circ\text{C}$)	X		
Funktionsprüfung nach 10 Zyklen ($T = 5 \pm 1 \text{ }^\circ\text{C}$)	X		
Funktionsprüfung nach 10 Zyklen ($T = 30 \pm 2 \text{ }^\circ\text{C}$)	X		
Messung nach Zyklen $I > I_1$ für mind. 0,5 s Messwert: 66,3 mA	X		
Signal bei Sensor trocken nach $\geq 180 \text{ s}$ mit $I < I_2$ Messwert I nach $t = 23,8 \text{ s}$ erreicht	X		
Signal bei Sensor nass nach $< 1 \text{ s}$ mit Wert $I > I_2$ Messwert: 133 ms	X		
6.4 Betriebskennwerte			
6.4.1 Allgemeines			
Zustandsänderung des Sensors vom trockenen zum nassen Zustand bei $5 \text{ }^\circ\text{C} \leq 1 \text{ s}$ $t = 127 \text{ ms}$	X		
Zustandsänderung des Sensors vom trockenen zum nassen Zustand bei $30 \text{ }^\circ\text{C} (50 \text{ }^\circ\text{C}) \leq 1 \text{ s}$ $t = 133 \text{ ms}$	X		
6.4.2 Schnittstelle			
6.4.2.1 Mechanischer Aufbau der Stromschnittstelle			
Maße und Form stimmen mit Bild 1 oder Bild 2 überein	X		Bild 2

Prüfergebnis

Die Erstprüfung des Grenzwertgebers vom Typ FAFNIR 81 D-EX mit Stromschnittstelle nach DIN EN 13616:2004-09 in der Bauart Typ B ergab keinen Anlass zu Beanstandungen. Die Anforderungen nach DIN EN 13616:2004-09 an den Grenzwertgeber werden in den obengenannten Positionen eingehalten.

Hamburg, den 24.01.2011



V. Schlieue
Prüflabor für Bauprodukte
TÜV NORD Systems GmbH & Co. KG



Der Leiter



J. Straube
Prüflabor für Bauprodukte
TÜV NORD Systems GmbH & Co. KG

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Prüfbericht Nr.: 8237 BG 00111
 Auftrags-Nr.: 8107 355 813

**für einen Grenzwertgeber Bauart Typ B mit Stromschnittstelle nach
 DIN EN 13616:2004-09/DIN EN 13616:2004-09 Berichtigung 1:2006-04**

Prüflabor TÜV NORD

Datum: 24.01.2011

Hersteller: FAFNIR GmbH
Bahrenfelder Straße 19, 22765 Hamburg

Grenzwertgeber Typ FAFNIR 83 UV, 83 UV-A und 83UV-Cbzw.84 UVT nach technischer Dokumentation 01/2004			
Sondenlänge: 83 UV von 200 bis 5000 mm 84 UVT 600 mm und 900 mm			
Einsatzbereich GWG: Einbau in Behältern nach DIN 6608, DIN 6616, DIN 6617, DIN 6619, DIN 6623, DIN 6624, DIN 6625, DIN EN 12285-1 sowie TGL 5315 oder andere zugelassene Tanks aus Stahl oder aus gleichwertigen Werkstoffen, die ohne Flammendurchschlagsicherungen betrieben werden dürfen.			
Zulässige Lagermedien: Heizöl EL, Heizöle-Fettsäure-Methylester, Dieselmotortreibstoff, Dieselmotortreibstoff-Fettsäuremethylester, Ottomotortreibstoffe und Ottomotortreibstoffe mit einem Ethanolgehalt bis 60 % sowie Dieselmotortreibstoff/Heizöle mit FAME und Pflanzenöle.			
Anzahl Prüfmuster: 4			
Prüfungen nach EN 13616	Erfüllt		Bemerkungen
	ja	nein	
4.1 Funktionskriterien			
Prüfung nach Abschnitt 4.1.5 (Abs. 4.1.1 bis 4.1.4 u. 4.1.6 nicht zutreffend)			
Keine Freigabe zum Beginn des Befüllvorganges			betrifft Steuereinheit
Unterbrechung bei Ausfall der Hilfsenergie			betrifft Steuereinheit
4.2 Aufbau			
4.2.1 Eignung der Werkstoffe im Temperaturbereich -25 °C bis + 60°C	X		
Materialliste der medienberührenden Teile für Grenzwertgeber Typ FAFNIR 83 UV-A; 83 UV-C oder Typ FAFNIR 83 UV, 84 UVT 1 Einschraubkörper Messing, CuZn39 Pb2 1 Dichtung Vulkulan oder O-Ring NBR, 70 shore 1 Sondenrohr Edelstahl, 1.4301 - 1.4571 oder Messing, 2.0371 1 Aufnahmestück klein Kunststoff, POM GF (25 %) 1 O-Ring Viton, 70 shore 1 Fühlerhülse Edelstahl, 1.4301 - 1.4571 1 Kaltleiter Typ KF 860 1 Seeger-Zackenring Federstahl verzinkt, 1.1248	X		Materialliste
Chemische Eignungsprüfung nach Abschnitt 5.5.2	X		
Typprüfung nach Prüfzyklus mit Flüssigkeiten : 1. Standard EN 13616 2. Biodiesel 3. E 85 4. ÖL Nr.3 IRM 903 5. Heizöl EL/Diesel	X		
4.2.2 Leitfähigkeit als Teil der elektrostatischen Ableitfähigkeit (Messung mit 100 V Prüfspannung Einschraubkörper/Hülse)	X		0,0 MΩ Hülse-Einschraubmutter

Anforderungen nach EN 13616	Erfüllt		Bemerkungen
	ja	nein	
Prüfungen nach Anhang A Typprüfungen (Funktionsprüfungen und Umweltprüfungen)			
A 1.2 Sensorprüfung mit DK nach EN 590 nach chemischer Eignungsprüfung!			
Messung vor Zyklen $I > I_1$ für mind. 0,5 s Messwerte I : $> 60 \text{ mA}$	X		Wert I_1 mit $41 \text{ mA} < I_1 < 49,5 \text{ mA}$ Wert I_2 mit $38 \text{ mA} < I_2 < 44 \text{ mA}$ Wert I_3 mit $2,0 \text{ mA} < I_3 < 10 \text{ mA}$
Signal bei Sensor trocken nach $\geq 180 \text{ s}$ mit $I < I_2$ Messwert I in $t = 17 \text{ bis } 20 \text{ s}$ erreicht	X		
Signal bei Sensor nass nach $< 1 \text{ s}$ mit Wert $I > I_2$ Signal nach 130 ms bis 210 ms	X		
Funktionsprüfung nach 5.000 Zyklen ($T = 20 \pm 5 \text{ °C}$)	X		
Funktionsprüfung nach 10 Zyklen ($T = 5 \pm 1 \text{ °C}$)	X		
Funktionsprüfung nach 10 Zyklen ($T = 30 \pm 2 \text{ °C}$)	X		
Messung nach Zyklen $I > I_1$ für mind. 0,5 s	X		
Signal bei Sensor trocken nach $\geq 180 \text{ s}$ mit $I < I_2$	X		
Signal bei Sensor nass nach $< 1 \text{ s}$ mit Wert $I > I_2$	X		
6.4 Betriebskennwerte			
6.4.1 Allgemeines			
Zustandsänderung des Sensors vom trockenen zum nassen Zustand bei $5 \text{ °C} \leq 1 \text{ s}$ $t = 130 \text{ ms bis } 210 \text{ ms}$	X		Anfangsstrom ($I > I_1$) $65,5 \text{ mA bis } 72,91 \text{ mA}$
Zustandsänderung des Sensors vom trockenen zum nassen Zustand bei $30 \text{ °C} \leq 1 \text{ s}$ $t = 130 \text{ ms bis } 210 \text{ ms}$	X		Anfangsstrom ($I > I_1$) $67,01 \text{ mA bis } 73,2 \text{ mA}$
6.4.2 Schnittstelle			
6.4.2.1 Mechanischer Aufbau der Stromschnittstelle			
Maße und Form stimmen mit Bild 1 oder Bild 2 überein	X		Bild 2: unwesentliche Abweichungen

Prüfergebnis

Die Erstprüfung des Grenzwertgebers vom Typ FAFNIR 83 UV-A; 83 UV-C bzw. Typ FAFNIR 83 UV, 84 UVT mit Stromschnittstelle nach DIN EN 13616:2004-09 in der Bauart Typ B ergab keinen Anlass zu Beanstandungen. Die Anforderungen nach DIN EN 13616:2004-09 an den Grenzwertgeber werden in den obengenannten Positionen eingehalten.

Hamburg, den 24.01.2011

Schliewe

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