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Единый адрес: frn@nt-rt.ru **Веб-сайт:** www.fafnir.nt-rt.ru

Техническое описание оптической системы предотвращения перелива LOF FAFNIR

LOF

The Fibre-Optical Overfill Protection

The overfill protection is a safety device to prevent the overfilling of tanks and process containers. When working with water polluting liquids it is an essential element for the environmental protection. An overfill protection consists of a level sensor inside the tank and a transducer with an alarm and output terminal.

Application

FAFNIR's overfill protection is used in all storage tanks with liquids which are subject to the WHG. In some countries storage tanks with a volume of more than 1.000 litres must by law be equipped with an overfill protection.

Tanks with a smaller volume are not subject to this law. However, operators who have already experienced the misfortune of an overfilling will appreciate FAFNIR's overfill protection because it relieves them of the task of permanently checking the filling levels of tanks.

Advantages of FAFNIR's Technology

- Independent of pressure, temperature, density and conductivity
- Space-saving, robust and corrosion-free design
- Easy adjustability for different tank sizes
- Two-wire connection to the transducer, independent of polarity
- Sensor without moving components
- Totally maintenance-free
- Continuously self-monitoring sensor
- In accordance with the German design and test regulations for overfill prevention systems (certified as per WHG)
- Certification for zone 0



Level Sensor Type LOF
Transducer Type LOF 500

- Proper physical check during running process possible

Our Terminology

Water law: WHG
Indicator with sheath and tank connection: level sensor
Ex-zone: zone 0 / zone 1

Function

The electrical connection between the level sensor, series LOF, inside the tank and the transducer, series LOF 500 or NB 220 resp., is made by a two-wire cable.

The detector on the threshold point of the level sensor is a reflecting body with a conical tip. The reflecting body is connected to two optical fibres. Infrared light is coupled into one optical fibre. Via the other optical fibre the light which was lead back via the reflecting body is converted into an electrical signal again. In order to exclude external light influences it works with pulsed infrared light.

If the reflecting body comes into contact with the liquid medium, the refractive index on the reflecting body changes. Thus the difference of the refractive index (between air or gas and liquid) is used as a signal for evaluation.

Installation Possibilities

The threshold length that must be maintained for each tank can be easily adjusted by shifting the probe tube inside the screw-in unit. Probe tubes and flanges are supplied according to customer measurements.

The transducer is designed to be mounted on the wall or in a control unit. For the LOF 500 a 19" design is also available.

Design

The level sensor consists of:

- Sensor
- Probe tube
- Process connection optional
 - Screw-in unit
 - Flange
- Test connection (on request)

The transducer consists of:

- Signal conditioning electronics
- Floating relay contacts
- Panel lights (operation, failure S-version only, sensor)
- Housing with supply terminals
- Europe card

Process Connection

- The level sensor LOF is supplied with a screw-in unit or flange. The screw-in body is available with the dimensions G³/₈ for a 10 mm probe tube and G1 for a 24 mm probe tube.

Varying sizes with test connections are available as well as diverse special materials.

Installation Advice

The transducer must not be operated in an ex-zone. It must be installed in closed rooms or in a housing of protection class IP 54.

Technical Data

Level Sensor LOF:

Operating Data:

- Temperature: -180 °C to +300 °C
- Pressure : up to 110 bar
- Immersion switching delay: < 0.5 sec.
- Housing protection type: IP 67

Materials of parts in contact with media:

- Stainless steel 1.4571
- Aluminium oxide 99.9 % (reflecting body)
- Perfluorine elastomer FFKM (e.g. Kalrez)
- Special materials for parts in contact with media:
 - Flange (plated on stainless steel 1.4571), screw-in unit, probe tube Tantal; Hastelloy C4 / C22; B2 / B3
 - Platings on stainless steel 1.4571: E-CTFE (Halar)

Dimensions:

- Tube diameter: 10 x 1.5; 24 x 2
- Probe lengths: 100 mm to 3.000 mm, observe standards
- Further data: see illustration

Transducer LOF 500:

Operating Data:

- Auxiliary power: 24 V, 230 V; 50 Hz or 24 V DC
- Power consumption: 4 VA; 5 W
- Ambient temperature: -25 °C to +50 °C
- Housing protection type: IP 40, rack IP 20

Inputs:

- Level sensor input: two-wire independent of polarity
- max. cable length: 750 m for 1.5 mm²

Dimensions in mm:

- LOF 500: H 150 x B 75 x T 110

Transducer NB 220:

Operating Data:

- Auxiliary power: 24 V, 110 V, 230 V; 50 Hz or 24 V DC
- Power consumption: 4 VA or 6 W
- Ambient temperature: -25 °C to +50 °C
- Housing protection type: IP 40

Outputs:

- Change-over contact (floating) load AC: ≤ 250 V; ≤ 4 A; cosφ ≥ 0.7; max 500 VA
- Load DC: ≤ 250 V; ≤ 0.25 A; max. 50 W

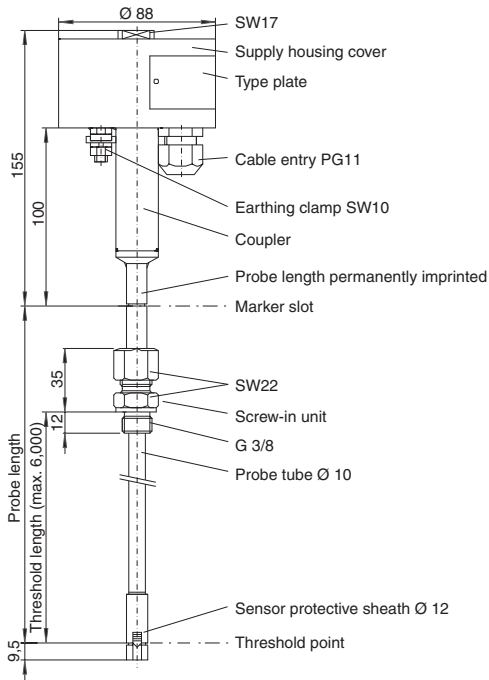
Inputs:

- Level sensor input: two-wire independent of polarity,
- max. cable length: 750 m for 1.5 mm²

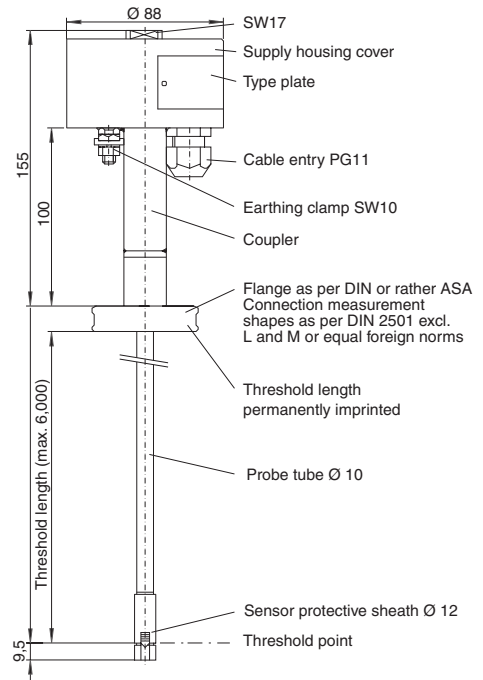
Dimensions in mm:

- NB 220 H: H 110 x B 50 x T 110

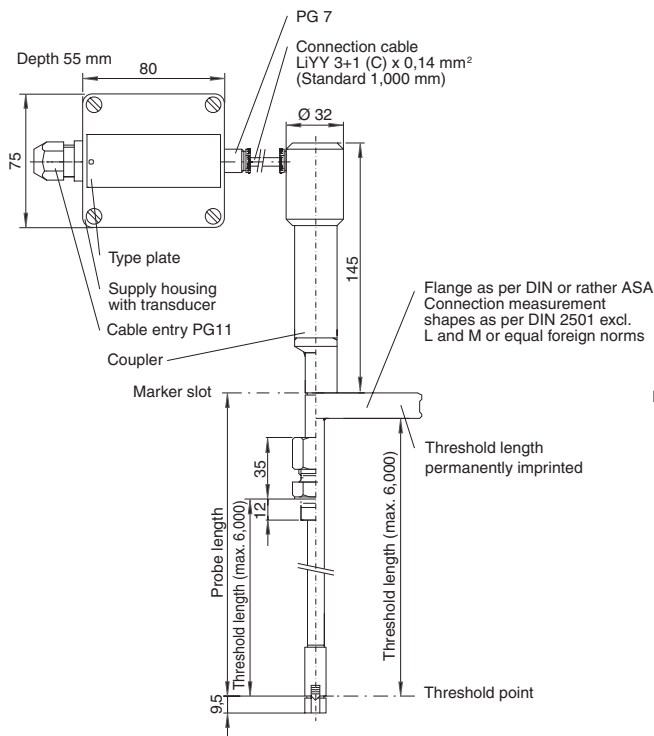
LOF 1.11 E



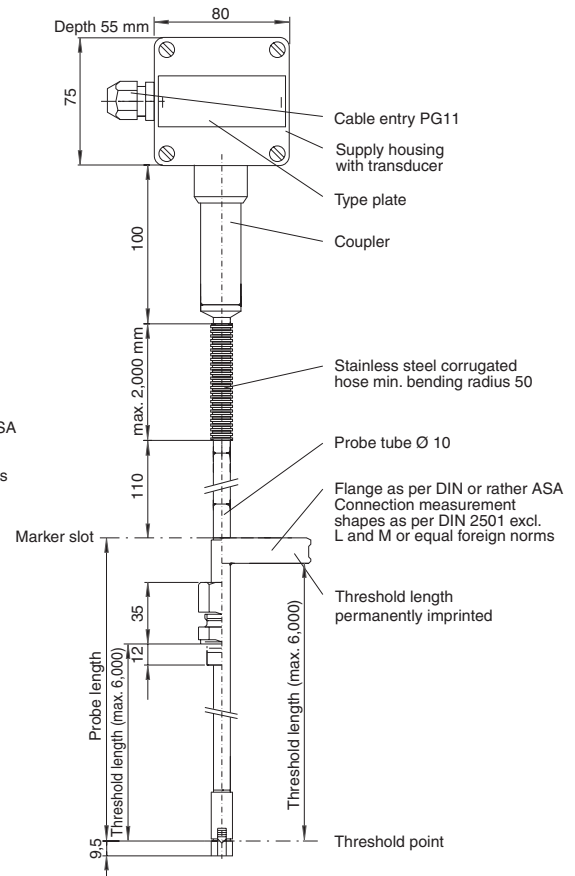
LOF 1.11 F



LOF 1.12 E / F



LOF 1.13 E / F

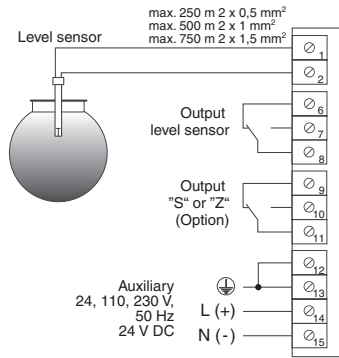


Dimensions in mm

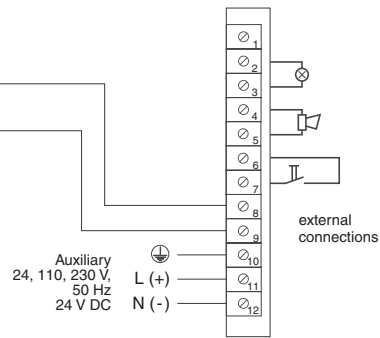
Electrical Connection

for operation in explosive atmospheres

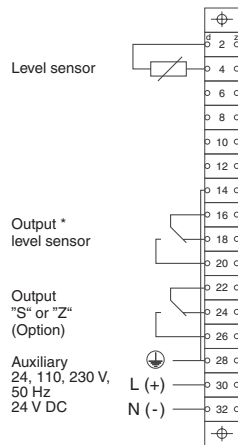
LOF 500



QE 200

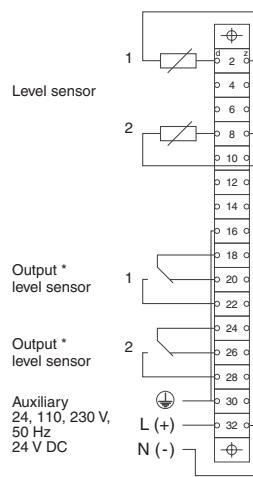


LOF 500 19"



* Acknowledgement or control unit

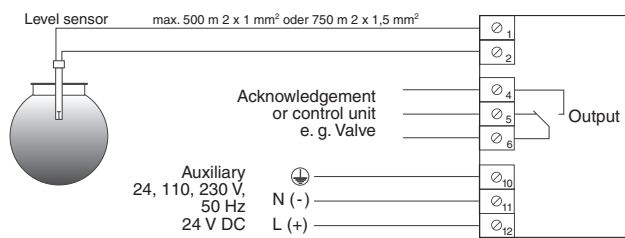
LOF 500 19" DUO



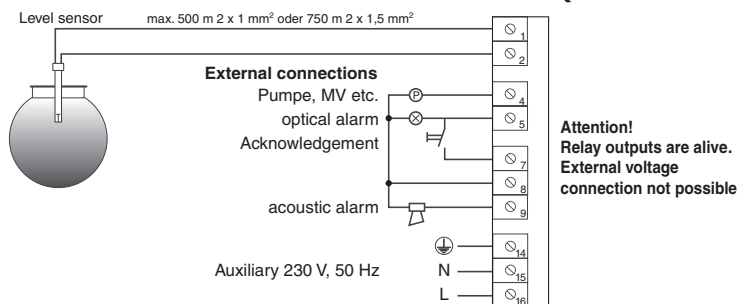
* Acknowledgement or control unit

for operation in non-explosive atmospheres

NB 220 H



NB 220 QS



Accessories

- Acknowledgement unit type QE 200
- Collective acknowledgement unit type SAM 10 for max. 10 fault indicators
- Collective acknowledgement unit type SAM 25 for max. 25 fault indicators
- Acoustic signal type HPW 110
- Acoustic signal with integrated warning lamp type HR
- Warning lamp type W
- All-round lamp type R4
- Counter plug type S28 for LOF 1.11 with plug-in connection
- Female connector as per DIN 41612 design F
- Control unit for overflow prevention devices

Purchase Order Codes

Please state the following order number in your purchase order.

Level Detector Type LOF

Materials for parts in contact with product		Stainless steel 1.4571	0
[Prism = Aluminium oxide 99,9 %, Seal = Perfluorine elastomer FFKM (e.g. Kalrez)]		Hastelloy C4 / C22	2
		Hastelloy B2 / B3	3
		with flange FS only coating on stainless steel 1.4571: E-CTFE (Halar)	4
		other materials	9
Probe lengths	for flanged version state the threshold length for screw-in units code two digits: Length in mm / 100 (e. g. 1,500 mm = 15)		0 0
Pressure range (overpressure)		0 - 3 bar	0
		0 - 6 bar	1
		0 - 10 bar	2
		0 - 16 bar	3
		0 - 25 bar	4
		0 - 60 bar	5
		0 - 80 bar	6
		0 - 95 bar	7
		0 - 110 bar	8
Temperature range	Standard [pressure up to 3 bar]	-25 °C to +50 °C	0
	[depressurised]	-25 °C to +300 °C	1
	[pressure up to 80 bar]	-25 °C to +180 °C	2
	[pressure up to 95 bar]	-25 °C to +120 °C	3
	[pressure up to 110 bar]	-25 °C to +20 °C	4
Electrical plug connection DD 28		without	0
		C: with	1
Pneumatic test connection (for probe tube 24 x 2 only, or flange)		without	0
		P: with	1
Ex-Versions	no		0
	yes		1
Versions	LOF 1.11		1
	LOF 1.12		2
	LOF 1.13		3
Process connection / Probe tube			
	E: Screw-in unit G ³ / ₈ / 10 x 1.5		5
	ES: Screw-in unit G1 / 24 x 2		6
	F: Flange / 10 x 1.5		8
	FS: Flange / 24 x 2		9

Order number	5121										
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For flanged versions the following written data are required:

Threshold length	e. g. 151 mm	
Nominal width DN	e. g. DN 40	
Pressure level PN	e. g. PN 16	
Standard DIN / ANSI	e. g. DIN 2527	
Shape	e. g. B	

Purchase Order Codes

Please state the following order number in your purchase order.

Transducer Type NB 220

Auxiliary power		230 V AC	1			
		24 V AC	3			
		24 V DC	4			
Output / Alarm / Test button	H: 1 floating change-over contact / none / none	1	0	0		
	QS: 3 external outputs / acoustic signal, warning lamps, acknowledgement button	3	1	1		
Order number		3312				

Transducer Type LOF 500

Auxiliary power		230 V AC	1			
		24 V AC	3			
		24 V DC	4			
Cased versions	Output: 1 x Change over contacts (Alarm signal)	1	1	0	0	
	S: Outputs: 2 x Change over contacts (1 x Alarm signal, 1 x Fault signal)	2	1	0	0	
	Z: Outputs: 2 x Change over contacts (Alarm signal)	3	1	0	0	
Version on 19"-Board	19": Output: 1 x Change over contacts (Alarm signal)	1	2	0	0	
	19"S: Outputs: 2 x Change over contacts (1 x Alarm signal, 1 x Fault signal)	2	2	0	0	
	19"Z: Outputs: 2 x Change over contacts (Alarm signal)	3	2	0	0	
	19"Duo: 2 x LOF 500 on a 19"-Karte, Output: 2 x [1 Change over contacts (Alarm signal)]	1	2	1	0	
Order number		3331				

For further information contact us on telephone +49/40/39 82 07-0

Current information under: www.fafnir.com

Please note:

We also supply level sensors with several threshold points in different heights.

This gives you the opportunity to realize overflow prevention and tank control with only one process connection.

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