

# **Overfill Prevention Systems** LS 300 / LS 500



# The Overfill Prevention System for Zone 0 **Type LS 300** with **LS 500**, also with AK5 The Complete Solution

The overfill prevention is a safety device to prevent the overfilling of tanks and process containers. When working with water polluting liquids, the overfill prevention is a essential element for the environmental protection. The level sensor consists of a level detector inside the tank and a transducer with alarm and output terminal. Overfill protection system for zone 0 Type LS 300 (up) with LS 500 (down)

### Application

FAFNIR's level sensor is used in all storage tanks filled with liquids that are subject of the WHG. Storage tanks with a volume of more than 1,000 litres must by law be equipped with a level sensor.

Tanks with a smaller volume are not subject to this law. However, operators who already experienced an overfilling will appreciate FAFNIR's level sensors, because they relieve them from the task of permanently checking the filling levels of tanks.

#### Advantages of FAFNIR's Technology

- Tested and tried under the most difficult conditions
- More than 25 years of FAFNIR-experience in using this technology
- Space-saving, robust and corrosion-resistant design
- Easy adjustability for different tank sizes
- Alignment on site not necessary
- Two-wire connection to the transducer, independent of polarity
- Sensor without moving parts

- Totally maintenance-free
- Continuous self-monitoring of the sensor
- In accordance with the German design and test regulations for overfill prevention systems (registered according to the WHG)
- Certified for zone 0
- Continuous self-monitoring of the system according to AK 5 (fail safe)
- Proper physical check during running process possible



#### **Our Terminology**

Water law: WHG (German Water Law) Sealed sensor: indicator Indicator with sheath and tank connection: level sensor Required protection class: AK Fail safe design: AK5 Explosion zone: Zone 0 / Zone 1 Self- monitoring sensor: Scanner function

# **Function**

The electrical connection between the level sensor, series LS 300, inside the tank, and the transducer, series LS 500, is made by a two-wire cable.

The indicator on the threshold point of the level detector is a sealed PTC-resistor. The PTC-resistor is a variable resistance whose value increases in relation to the rising temperature. As liquids are better thermal conductors than air or gas, the PTC-resistor heats up better in air or gas. When dipped into liquid, the PTC-resistor is cooled down, and the changing resistance-value is interpreted by the transducer.

The correct function of the PTC-resistor is continuously monitored by a scanner function. The transducer controls floating relay contacts for connection to optical and acoustic alarms to controls or power actuators.

If the threshold point of a level detector is immersed into liquid or if the overfill prevention fails, the termination of the filling process is required by an alarm, and/or an actuator is closed or a pump is switched off. By this filling process is stopped automatically. The periodical check of the level sensor as required by the WHG is performed by triggering or by dismounting the level detector and dipping it into the stored liquid. A pneumatic testing device (optional) facilitates the entire test during the running process without dismounting the level sensor.

Due to the fail-safe operation proven by AK5, the periodical check of the overfill prevention system is not necessary. The required test of the peripheral components can be initiated via push-button.

# **Installation Advice**

The threshold length that must be maintained for each tank can be easily adjusted by shifting the probe tube inside the screw-in unit. The threshold length for flanged probe tubes can be customised.

The transducer is designed for mounting on the wall or in a control unit as well as for integration in 19" systems.

#### Design

- The level sensor consists of:
- Indicator
- Probe tube
- Process connection, optional
  - Screw-in unit
  - Flange
- Connection housing with overvoltage protection
- Optional with plug connection
- Test connection (P-version only)

#### The transducer consists of:

- Analysing processor for PTC-resistor with scanner function
- Relay contacts (floating)
- Indicator lamps (operation, malfunction S-version only, scanner, indicator)
- Housing with terminals (not for LS 500 19")

#### **Process Connection**

The level detector LS 300 is supplied with screw-in unit or flange. The screw-in unit is available with the dimensions G3/8 and a probe tube of 10 mm, and G1 and a probe tube of 24 mm.

The test connection can be supplied with a plug for a portable pneumatic testing device, or with a fixed connection for a pressure cable.

# **Installation Advice**

When installing the level sensor it must be assured that the indicator is not in the area of a gas flow. If this cannot be avoided, the indicator must be equipped with a protective sleeve against increased gas flow.

The transducer may not be operated in an explosive atmosphere. It must be installed in closed rooms or in a housing, protection class IP 54.





# Technical Data Level Sensor LS 300:

#### **Operating data:**

- Temperature range of products: -25 °C to +80 °C; -40 °C to +50 °C
- Ambient temperature: -25 °C to +80 °C or -40°C to + 50 °C
- Pressure: 0 25 bar
  Immersion switching delay:
  2 seconds
- Connection housing LS 300: Brass chromium-plated, LS 300 ES / FS stainless steel
- Intergrated overvoltage protection LS 300...U
- Protection type of housing: IP 67
- Plug-in connection: DD28

# Materials of parts in contact with product:

- Stainless steel 316 Ti
- Special materials for parts in contact with product:
  Flange (plated on stainless steel 316 Ti), screwin unit, probe tube, test nozzle:
  Hastelloy C22 (2.4602);
  B3 (2.4600) Coating on stainless steel 316 Ti: E-CTFE (Halar) Indicator: Tantalum; Hastelloy C22 (2.4602); B3 (2.4600)

#### Dimensions:

- Pipe diameter: 10 x 1.5; 24 x 2
- Probe lengths: 100 mm to 3,000 mm, observe the standards
- For more data refer to the illustration

# Transducer LS 500:

#### **Operating data:**

- Auxiliary power: 24 V, 110 V, 230 V; 50 Hz or 24 V DC
- Power consumption: 4 VA; 5 W
- Auxiliary power LS 500 19" AK5: 24 V, 50 Hz or 24 V DC
- Power consumption: 6 VA; 7 WAmbient temperature:
- -25 °C to +50 °C
- Protection type of housing: IP 40, rack IP 20

### **Electrical Connection**



#### Outputs, LS 500:

max. 50 W

- Change-over contacts (floating)
- Load AC:  $\leq 250 \text{ V}; \leq 4 \text{ A};$  $\cos \phi \geq 0.7; \text{ max. } 500 \text{ VA}$
- Load DC: ≤ 250 V; ≤ 0.25 A;

# Outputs, LS 500 19" AK5:

- Normally open contacts (floating)
- Load AC: ≤ 60 V; ≤ 4 A;
- $\cos \phi \ge 0.7$ ; max. 500 VA
- Load DC: ≤ 60 V; ≤ 0.25A; max. 50 W

#### Inputs:

- Level detector input: twin-wire, independent of polarity
- max. cable length:
  750 m bei 1.5 mm<sup>2</sup>

#### **Dimensions:**

- LS 500: H 150 x W 75 x D 110
- LS 500 19": European board 160 x 100; 7TE

#### Accessories

- Portable testing device type FS 82 T / type FS 92 T
- Acknowledge unit, type QE 200
- Collective acknowledge unit, type SAM 10 for max. 10 fault indicators
- Collective acknowledge unit, type SAM 25 for max. 25 fault indicators
- acoustic signal, type HPW 110
- Acoustic signal with integrated alarm lamp type HR
- Alarm lamp type W
- Alarm lamp type R4
- Counter-plug type S28 for LS 300 with plug-in connection
- Rack 19"
- Plastic housing 19"
- Female connector according to DIN 41612 model F
- Control unit for overfill prevention systems











date of issue 01/04 Subject to technical change

Purchase Order Codes

Please state the following order number in your purchase order.

# Level Detector Type LS 300

Material indicatorStainless steel 316 Ti Hastelloy C22 (2.4602) Hastelloy B3 (2.4600) ES / FS only Tantalum other materials										
Materials for parts in contact with product (without indicator)    Stainless steel 316 Ti    0      Hastelloy C22 (2.4602)    2      Hastelloy B3 (2.4600)    3      with flange F only, FS coating on stainless steel 316 Ti: E-CTFE (Halar)    4      other materials    9										
Probe lengths    for flanged version state the threshold length    0    0      For screw-in units code two digits: Length in mm / 100 (e. g. 1,500 mm = 15)    15)										
Protection sleeve for strong gas flow  excl.  0    incl.  1										
Pressure range (overpressure)      0 - 3 bar      0        0 - 6 bar      1        0 - 10 bar      2        0 - 16 bar      3        0 - 25 bar      4										
Temperature range      -25 °C to +50 °C      0        H: -25 °C to +80 °C      1        K: depressurised -40 °C to +50 °C      2										
Electrical plug connection DD 28  excl.  0    C: incl.  1										
Pneumatic test connection (for probe tube 24 x 2 only)    excl.    0      excl.    0    P: incl.    1      PR: for fixed connection with non-return valve    2    2										
Process connection / Probe tube										
EU: Screw-in unit G3/8 / 10 x 1.5    5      ESU: Screw-in unit G1 / 24 x 2    6      FU: Flange / 10 x 1.5    8      FSU: Flange / 24 x 2    9										
Order number 3321 State										
For flanged versions (Type LS 300 F) 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 LS 500

Auxiliary power				(not for 1 (not for 1	9'' AK5) 19" AK5)	230 V AC 110 V AC 24 V AC 24 V DC	1 2 3 4
Housing S: Outputs on 19" board 19"S: Outputs 19"Duo: 2 x LS 500 on one 19"AK5 (fail safe): Outputs: 2	Output: 1 x change-over contact (ala :: 2 x change-over contacts (1 x alarm signal, 1 x fa <b>Z:</b> Outputs: 2 x change-over contacts (ala <b>19":</b> Output: 1 x change-over contact (ala :: 2 x change-over contacts (1 x alarm signal, 1 x fa <b>19"Z:</b> Outputs: 2 x change-over contacts (ala 19" board, output: 2 x [1 change-over contact (alar 2 x normally open contacts (1 x alarm signal, 1 x fa	rm signal) ault signal) arm signal) ault signal) ault signal) ault signal) ault signal)] ault signal)	1 2 3 1 2 3 1 4	1 1 2 2 2 2 2 2	0 0 0 0 0 1 0	0 0 0 0 0 0 0 2	
	Order number	3322					

For further information do not hesitate to contact us. Call us under: Telephone +49/40/39 82 07 - 0 We are available in your office if requested. Latest product information under: www.fafnir.com

Please note:

We also deliver level sensors with several threshold points in different heights,

which enable you to realise overfill protection and tank control with only one process connection.







# **THE COOL ONE** Calorimetric Level Sensor



# The Level Sensor THE COOL ONE, a Filling Level Limit Switch for Liquids – Independent of Media

The level sensor THE COOL ONE monitors limits of liquids in tanks, containers, channels, and pipes. THE COOL ONE replaces float switches and vibrating limit switches and it is also most suitable for those locations where such devices cannot be used for lack of space.

THE COOL ONE is particularly suitable for products whose viscosity increases with the rising temperature, i.e. oily liquids and greases. However, it is also applied in agressive media.

#### **Application**

THE COOL ONE is used in machine and plant construction, in the printing industry, automation technology, in the chemical and pharmaceutical industries, food and beverage industry, in vehicle construction, in ships and in many other areas for the purpose of overfill protection, level supervision, minimax detection, dry running protection and tank control.

#### Advantages of FAFNIR's Technology

- Level sensor according to the calorimetric measuring principle
- Measuring principle tested and tried under most difficult conditions
- More than 25 years of FAFNIR-experience in using this technology
- Compact design with completely integrated electronics
- 2 x PNP open collector outputs
- Direct connection to a PLC

- Supply and signal outputs via M12 connector
- Space-saving, robust and corrosion-free design
- Resistant to agressive media
- Specific adjustment for the liquid being measured not necessary
- Customised sensor lengths
- Adjustable installation lengths
- Sensor without moving parts
- Integrated test function



#### **Function**

The threshold point of the level sensor includes a sealed PTC-resistor. The PTCresistor is a variable resistance whose resistance value increases in relation to the rising temperature. As liquids are better thermal conductors than air or gas, the PTC-resistor heats up better in air or gas. When immersed into liquid, the PTC-resistor is cooled down. The changing resistance value is interpreted by the integrated electronics.

The evaluation electronics control two PNP open collector outputs for triggering one PLC or one small relay.

The level sensor can be optional equipped with an integrated test function. Thus the functioning is tested.

# **Installation Possibilities**

Type 1 and Type 2:

The level sensor with screw-in unit is especially suited for installation above the liquid level. The threshold length to be maintained for each container can be easily adjusted by shifting the probe tube inside the clampable screw-in unit.

#### Туре 3:.

The level sensor with a fixed screw-in piece is provided for a lateral installation or an installation below the filling level.

### Design

The level sensor consists of:

- Sealed PTC-resistor
- Height-adjustable jacket tube
- Clampable or fixed screw-in unit
- Evaluation electronics
- Integrated connector plug

#### **Process Connection**

- Level sensor type 1 and type 2 with clampable screw-in unit: G3/4
- Level sensor type 3 with fixed screw-in piece: G3/8

# **Installation Advice**

When installing the level sensor please ensure that the threshold point is not in the area of a strong gas flow.





# **Technical Data**

#### **Operating data:**

- Auxiliary power: 24 V DC +/-10%
- Power consumption: < 2 W
- Temperature range of products:
  -25 °C to +50 °C
- Ambient temperature: -25 °C to +80 °C
- Pressure: 0 2 bar
- Media compatibility: see substances type 1, 2 or 3
- Immersion switch delay:< 2 seconds</li>
- Protection type of housing: IP 67

#### Outputs:

2 x PNP open collector max. 80 mA

#### Materials of parts in contact with product: Type 1

- Brass: 2.0332
- Stainless steel according to DIN 17440: 1.4301 to 1.4571
- Spring steel according to DIN 17222: 1.248, galvanised
- Solder: L-Sn 40 Pb
- Viton: FPM
- linear Polyester: Ultradur

#### Type 2

- Stainless steel according to DIN 17440: 1.4301 to 1.4571
- Viton: FPM

#### Туре 3

Stainless steel according to DIN 17440: 1.4301 to 1.4571

#### Dimensions:

- Tube diameter: 16 x 1,5
- Probe lengths (type 1 and type 2): 200 mm to 3,000 mm, standard up to 1,000 mm
- Threshold length (type 3): firm
- For additional data see illustration



# **Electrical Connection**

The electrical connection is made via an M12 plug-in connection. The connector coupling can be supplied with LEDs for visualising the switching states.

### Accessories

- Connecting cable with coupler plug
  - Bar magnet for
  - actuating the test function



Purchase Order Codes

Please state the following order number in your purchase order.

Level Sensor THE COOL ONE									
Test function						excl. incl.	0 1		
Length of sensor	Code two digits: Length in mm / 100 (e. g. 1,500 mm = <b>15</b> ) Note: Lengths up to 1,000 mm can be delivered immediately Type 3: length cannot be chosen (Code = 0 0)								
Туре	Standard material pairing / clampable screw-in unit G3/41Stainless steel / clampable screw-in unit G3/42Stainless steel / fixed screw-in piece G3/83								
	Order number	5111				0			
Connecting Cable with	M12 Coupler Plug								
Cable length						5 m:	2		
Cable path				ang	straight Jular 90°	0 1			
Visualising		with LED	(angular 9	excl. 0° only)	0 1				
	Order number		5190	1			2		
Bar Magnet for actuating the Test Funktion									
	Order number					5190	2		

For further information do not hesitate to contact us. Call us under: Telephone +49/40/39 82 07-0 We are available in your office if requested. Latest product information under: www.fafnir.com

