Operators instructions
CleverLevel switch, LFFS

CleverLevel switch, type LFFS is an universal level switch, which can be used for all applications in liquids and solids with a DK-value above 1,5

Safety instructions

This instrument is constructed and tested according to the current EU-directives and packed in technically safe condition. In order to maintain this condition and to ensure safe operation, the user must follow the instructions and warnings given in this instruction.

During the installation local standards have to be observed. Ignoring the warnings may lead to severe personal injury or substantial damage to property.

The product must be operated by trained staff. Correct and safe operation of this equipment is dependent on proper transport, storage, installation and operation.

All electrical wiring must conform to local standards and the connection must be made according to the connecting diagrams.

Before switching on the power supply take care that other equipment is not affected. Ensure that the supply voltage and the conditions in the environment comply with the specification of the device.

Before switching off the supply voltage check the possible effects on other equipment and the processing system.

To obtain the specified protection degree, the LFFS must be mounted with a compliant cable.

Description

The Level Switch LFFS designed to detect levels in tanks, media separation and provide empty-pipe detection or dry-run protection for pumps.

A high frequency sweep signal is radiated from the sensor tip into the tank. The media will act as a virtual capacitor, which together with a coil in the sensor head, will form a circuit creating the switch point signal. This virtual capacity will depend of the di-electric value (DK-value) of the media.

By means of the FlexProgrammer 9701 the output can be configured to either NPN, PNP or digital output signal. A damping of the output signal can be activated in case of a fluctuating media level, e.g. during tank filling.

The measurement is precise and unaffected by the mounting position in the tank. In the Flex-software a compensation for foam, bubbles and condensate as well as viscous media can be set.

The Flex-software also features an adjustment facility making the user able to adjust the sensor to a specific media.

The Level Switch LFFS measures liquids such as water and beer as well as viscous, sticky fluids, such as honey, yoghurt, tooth-paste and ketchup. Even dry medias can be measured, e.g. sugar or flour.

The Level Switch LFFS is resistant against CIP and SIP agents.

Hygienic installation is also possible with the comprehensive range of accessories, see the overview at page 6.

WARNING

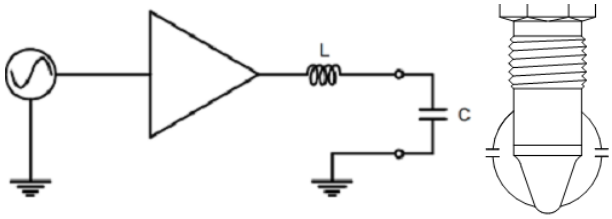
When the top cover is removed, do not look directly at the blue LED with unshielded eyes or damage to retina may occur !

This product contains no replaceable parts. In case of malfunction the product must be shipped to Baumer for repair.

Baumer
Passion for Sensors

Operators instructions
CleverLevel switch, LFFS

Measuring principle



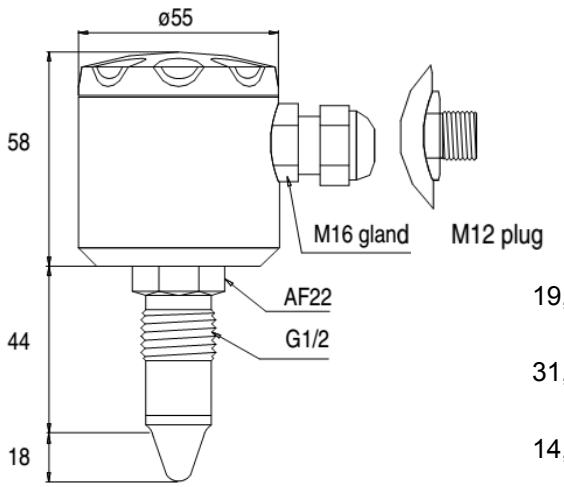
The capacity (C) of the media is directly proportional to the dielectric value of the media.

A frequency between 100 and 180MHz is swept into the media.

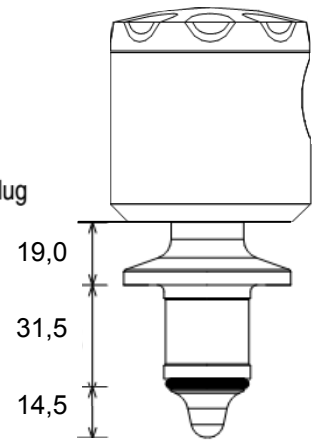
When the coil (L) and the capacitor (C) reach a resonance frequency, it will be detected by the electrical circuit.

Dimensions

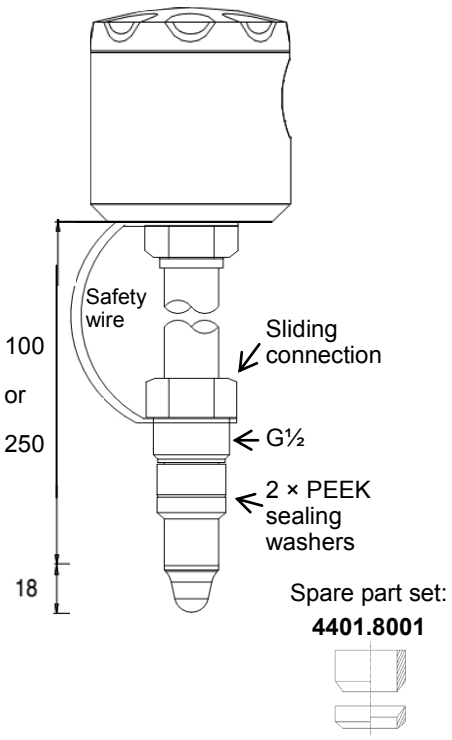
G½ hygienic



3A DN38 hygienic



G½ hygienic sliding connection



Mounting

Please refer to “Accessories” data sheet. The welding part has an engraved mark or a leak hole. When the product has been mounted and correctly tightened the gland or M12 plug will align with this mark.

Make sure that the gland/plug is pointing downwards to prevent fluids from penetrating into the instrument.

Use only the authorised special designed accessories. The product warranty is void when installed with other adapters.

Do not use PTFE, fibre or other gaskets. The PEEK tip against the stainless steel welding part will perform a hygienic tightening provided that the guidelines have been followed.

Due to the measuring principle it is essential that the sensor tip can “see” an ample amount of the metal shaft or welding part.

Mounting instructions for sliding connection:

1) Clean the sliding shaft.
2) Mount the smallest ring against the media as indicated.
3) Tighten the G1/2 Hygienic sliding nipple at 25...30 Nm.
4) Replace the Washer ring kit when one or both parts are permanently deformed or stick to the shaft of the sliding connection.

WARNING

The Level Switch LFFS with sliding connection can be mounted in installations with a static pressure up to 16 bar.

To prevent personal injuries or property damage it is essential that the safety wire is mounted correctly and is undamaged.

Operators instructions
CleverLevel switch, LFFS

Mounting

Installation of 3A approved and EHEDG certified products:

1) Use only a 3A approved counter part.

2) The inspection hole should be visible and drained.

3) Mount the instrument in a self drained position.

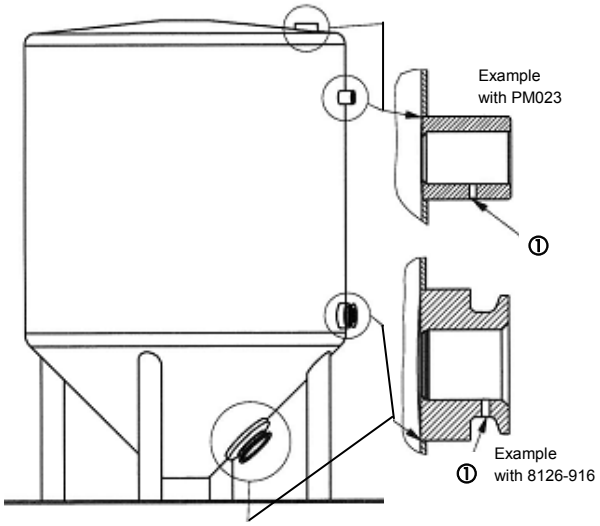
4) Level the inner surface of the pipe with the counter part.

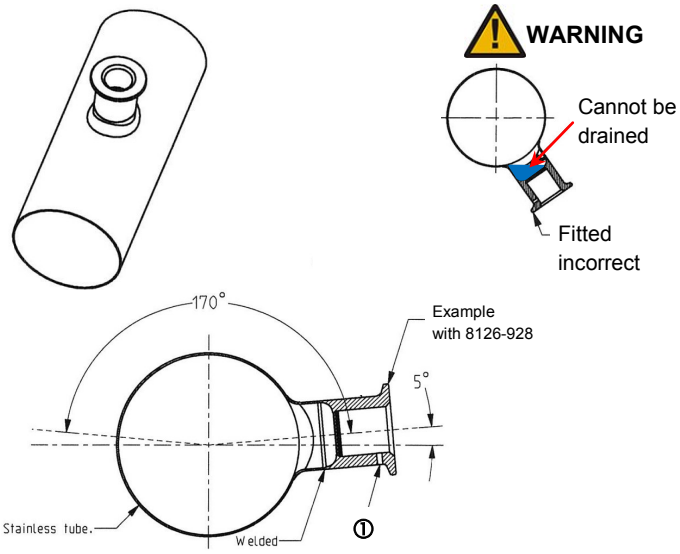
5) Welding's should be grinded to Ra= 0.8

Tighten the union with a torque of:

Std. version 20...25 Nm.

Sliding connection 25...30 Nm.





After installation and configuration

- Check the leak tightness of the sleeve.
- Check the tightness of glands or M12 plugs.
- Check the tightness of the cover

① Leakage indication hole
must be places downwards

Operators instructions
CleverLevel switch, LFFS

Mounting connections



ISO2852
DN38: **CAM023.505**
DN51: **CAM023.640**


SMS 1145
DN51: **SAM020.051.1**


Welding
for tank
PM023


Variline, type N
VAM023


DIN 11851
DN25: **MAM020.025**
DN40: **MAM020.040**
DN50: **MAM020.050**


Welding
for tank
PM021


Adapter
G½ → G1
RAM020.1


Welding
to pipe end
DN25...50: **PM022.1**
DN65...100: **PM022.2**


Adapter
1" level switch
LAM020.3


Welding Ø35
for tank/tube
PM025


Adapter, industrial
G½ → G1
RAM020.2




Welding
for tank
8126916



Welding
for pipe end
8126928


On a welding adapter there is an arrow or a 3A logo.
This must be placed upwards when welding the adapter into a tank (horizontal position).
This assures that the electrical connection will be pointing downwards (opposite of the arrow; 3A logo)

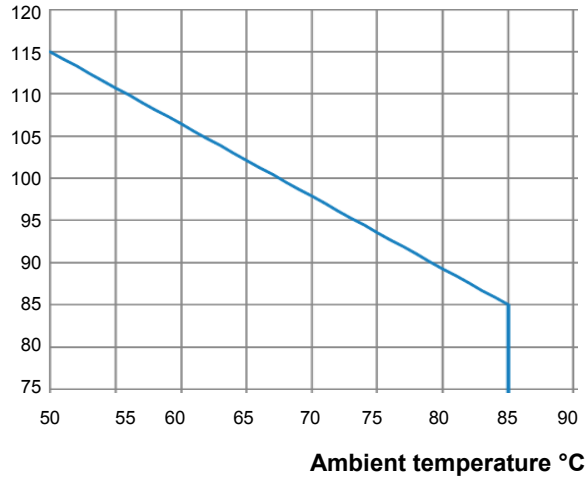
Refer to data sheet "Accessories Universal" for further information

NOTE:
The LFFS must be mounted in a Baumer mounting connection. If not, Baumer do not guarantee correct function or tightness.

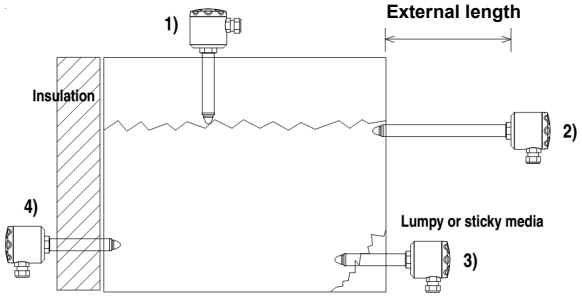
Media temperature and external length for sliding connection

LFFS-xx1.x / LFFS-xx2.x

Media temperature °C



For CIP/SIP	Media temperature, max.	140°C
	Ambient temperature, max.	60°C
	Duration, max.	1 hour

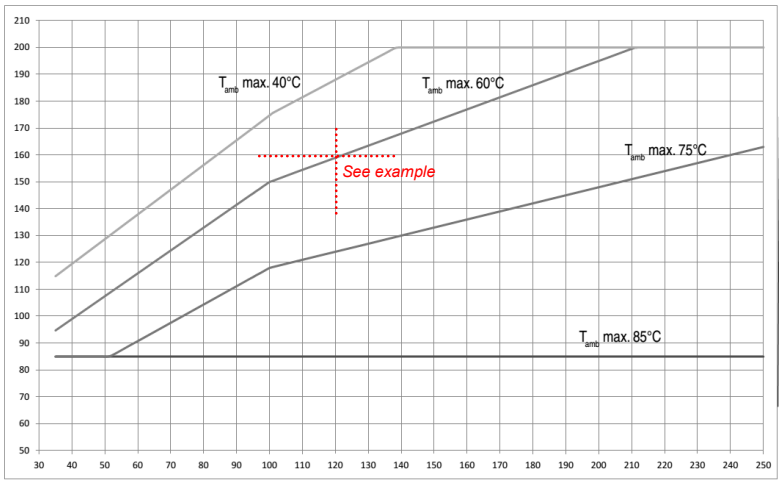


The drawing shows how the sliding connection can be used for at least 4 applications:

1) Mounted at the top of a tank to adjust to a maximum level.
2) Serving as a cooling neck in high media temperature applications.
3) Adjusted to place the sensor tip deeper inside the tank.
4) To reach in through insulation material.

LFFS-xx3.x and LFFS-xx4.x

Media temperature °C



It is essential that the max. ambience temperature for the electronics is never exceeded (85°C). For ATEX approved products please refer ATEX data.

Example, how to read External length curve:

Example: Media temperature / Ambient temperature / External length
160°C *60°C* *120 mm*

- A 250 mm sliding connection is mounted in a tank with a total insert length of 130 mm. Hence the external length of the sliding connection will be 250 – 130 = 120 mm.
- The media temperature will be max. 160 °C.
- Read the x-axis at 120 mm an the y-axis at 160°C and find that the ambient temperature must be kept below 60°C.

In case the radiated heat from the tank will cause a higher ambient temperature at the housing efficient insulation of the tank must be established.

When re-ordering a CleverLevel switch

If a new CleverLevel switch is installed in an existing application, it is normally a “plug-n’-play” operation.

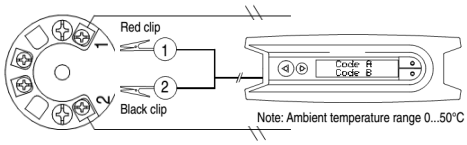
If the settings of the level switch was changed from standard factory settings, it is necessary to re-adjust the new switch to same as the “old” switch. It is possible to save the settings of the “old” switch on the PC and download those again to the new level switch.

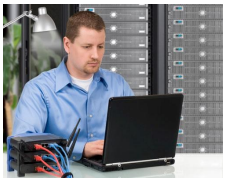
The factory setting of the sensitivity of the media may vary up to ±5%. This means that if an very exact set point is required, a new teach-in or adjustment by the FlexProgram must be performed.

Operators instructions
CleverLevel switch, LFFS

Teach-In using the FlexProgram and FlexProgrammer 9701

Sophisticated settings for Teach-In as well as output type, diagnostics, data logging, tag no. and damping can be configured using the FlexProgrammer 9701. Integrated HELP-menus will give full instruction.





Using the FlexProgrammer 9701 alone and Teach-In

FlexProgrammer 9701 stand alone menu

Press
- ◀ Turn on FlexProgrammer if in sleep mode
  Empty configuration
- ▶ Search for product
  LFFS/LBFS configuration
- ▲ Product LFFS / LBFS
- ▲ TAG number xxxxxxxxxxxxxxx
- ▲ Range min. x.x%
- ▲ Range max. xx.x%
- ▲ Damping x,x sec
- ▲ Output config. Xxxxxxx
- ▲ Trigger level xx,x%
- ▲ Range hyst. x,xx%
- ▲ Trigger hyst. x.xx%

Press ▲ or ▼ to browse the menus
- ◀ to access current menu point
- ▶ to return to previous menu
- ◀ and ▶ simultaneously to reset FlexProgrammer and go in sleep mode

Teach-In

Press
▲ and ▼ simultaneously
Select Menu “Teach-In”
- ◀ Search for product
  = Product LFS/LBFS
- ◀ At empty tank setting 0%
- ◀ At full tank setting 100%

Manually Teach-In

Make sure that power is on before Teach-In.
For best Teach-In it is important the product is fixed in the final application.
During Teach-In mode the light intensity of the LED will decrease, please protect your eyes.

Step	To do	LED	Result
1	Connect terminal ”Teach-In” to - VDC (T1 or T2) for 3,5 second	Flash 1 time per second	Ready for Teach-in
2	With no media present connect ”Teach-In” to - VDC shortly	Light on for 2 second and then flash	Register ”empty” state. Pls. See note
3	With media present connect ”Teach-In” to - VDC shortly	Light on for 2 seconds	Register ”full” state, stores the value and returns to Normal operation with new setting

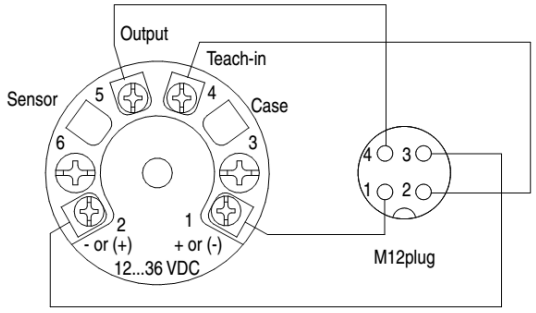
NOTE:
If the media is sticky, foamy, powdery or in other ways leaving parts of the media at the sensor tip this situation has to be established also during the Teach-In process. Otherwise a faulty calibration can be the result.

If Teach-In for some reason do not succeed, the CleverLevel Switch LFFS will enter “Error State” and automatically reload factory settings . The factory settings can always be reloaded by connecting the terminal “Teach-In” to -VDC for more than 6.5 seconds. A reloaded factory settings will be confirmed by pulsing light intensity 3 times.

Error state description	LED	Result
Error state	Blinking, 3 × short and 1 × long	Can normally be fixed by powering off and on and remake the Teach-In. Alternatively remake the Teach-In configuration by use of the FlexProgram and the FlexProgrammer 9701

Operators instructions
CleverLevel switch, LFFS

Electrical connection



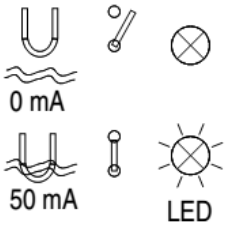
M12 plug: 1 Brown
2 White*
3 Blue
4 Black

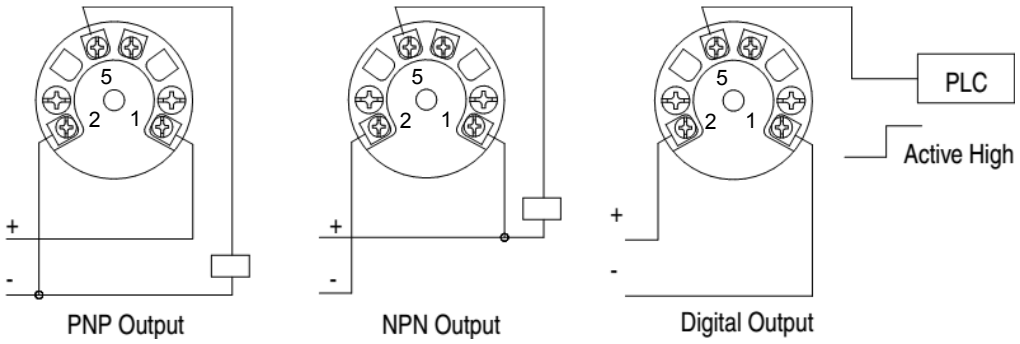
* To avoid unintended Teach-In, be aware not to connect the Teach-In pin or expose it to any electrical noise during normal operation.

Electrical specifications:

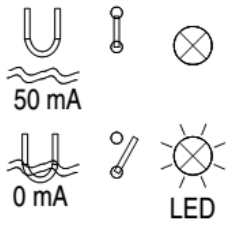
Power supply	12,5...36 VDC, 35 mA max.
Output	PNP, NPN or Digital Max. 50 mA, short-circuit and high temperature protected
Active “Low”	NPN and Digital output (-VDC +2,5V) ±0,5V, R_{load} 1 kΩ
Active “High”	PNP and Digital output (+VDC -2,5V) ±0,5V, R_{load} 1 kΩ

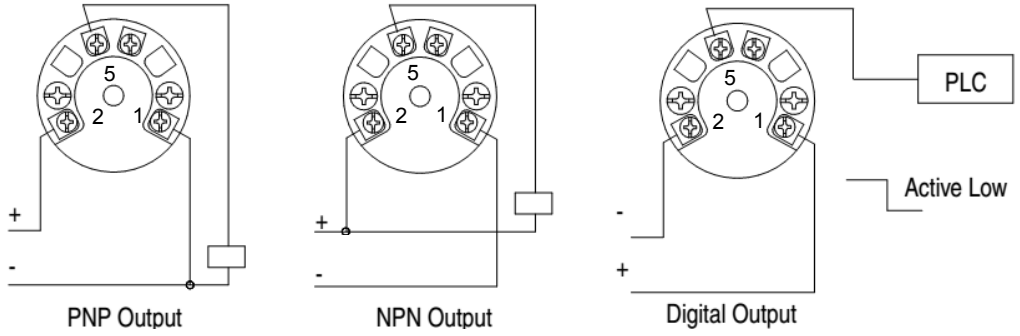
Normally open - NO





Normally closed - NC





Operators instructions
CleverLevel switch, LFFS

ATEX

Conditions for Ex certification

Connection type	Ambient temperature	Media temperature (max. allowed)	Note
G½ hygienic	-40 … +85 °C	+85 °C	
3A DN38	-40 … +60 °C	+95 °C	*1)*
	-40 … +40 °C	+115 °C	*1)*
100 mm	-40 … +85 °C	+85 °C	
Sliding connection	-40 … +60 °C	+155 °C	*1)*
	-40 … +40 °C	+175 °C	*1)*
250 mm	-40 … +85 °C	+85 °C	
Sliding connection	-40 … +60 °C	+195 °C	*1)*
	-40 … +40 °C	+200 °C	*1)*

1) Provided that the sensor tip at the instrument is the only part in contact with the media

ATEX Gas ia

Ex ia IIC T5, ATEX II 1G - Installation

A Level Switch LFFS-1xx.x is Ex ia IIC T5, ATEX II 1G approved for application in hazardous areas in accordance with the current EU directives. The product must be installed in accordance with prevailing guidelines for zone 0 with a barrier

Ex-data

Supply range	24...30 VDC	
Temperature class	T1...T5	Pls. see above table
Internal inductivity	L_i	<10 µH
Internal capacity	C_i	<33 nF
Barrier data	U	<30 VDC
	I	<0.1 A
	P	<0.75 W

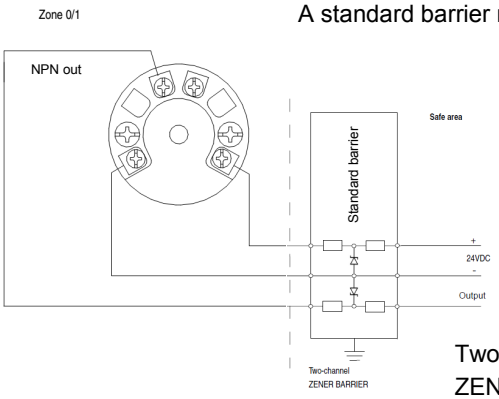
Note:

There is an electrical connection between intrinsic safe circuit and housing due to the measurement principle

LFFS-1xx.x
with **NPN output**

Note:

For NPN output only!
A standard barrier may be used

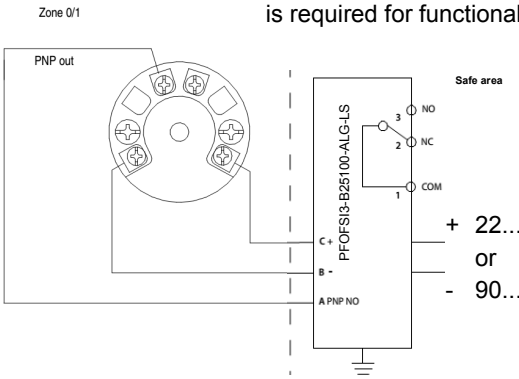


Two-channel
ZENER barrier

LFFS-1xx.x
with **PNP output**

Note:

For PNP output the barrier module **PFOFSI3-B25100-ALG-LS** is required for functional purposes.

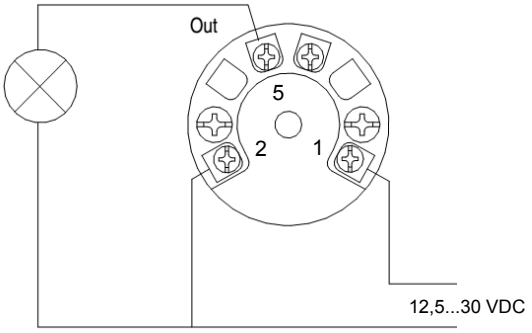


\+ 22...120 VDC
or
\- 90...253 VAC

Operators instructions
CleverLevel switch, LFFS

ATEX Dust tD

A Level Switch LFFS-2xx.x is Ex tD A20 IP67 T100°C, ATEX II 1D approved for application in hazardous areas in accordance with the current EU-directives. The product must be installed in accordance with prevailing guidelines for zone 20 without a barrier.

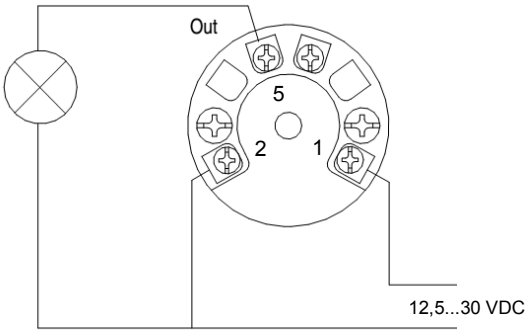


Ex-data

Supply range	VDC	12,5...30
Load	I	<0.1 A
Temperature class	T1...T5	Pls. see table top page 8

ATEX Gas nA

A Level Switch LFFS-3xx.x is Ex nA II T5, ATEX II 3G approved for application in hazardous areas in accordance with the current EU directives. The product must be installed in accordance with prevailing guidelines for zone 2 without a barrier.



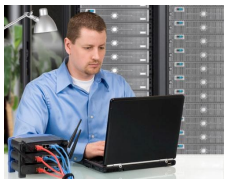
Ex-data

Supply range	VDC	12,5...30
Load	I	<0.1 A
Temperature class	T1...T5	Pls. see table top page 8

Ex-Configuring

The FlexProgrammer 9701 configuring unit must not be connected to the CleverLevel Switch LFFS within the hazardous area.

Outside hazardous area



Configuring procedure:

a) Disconnect mains from the 4...20 mA loop circuit.
b) Disconnect the Level Switch from the circuitry within the hazardous area.
c) Uninstall and bring the Level Switch to the safe area.
d) Connect the FlexProgrammer 9701 and perform the configuring session.
e) Re-install the Level Switch in the hazardous area.
f) Connect the power supply to the circuit.

WHG leakage approval

Deutsches Institut für Bautechnik
DIBt

Allgemeine bauaufsichtliche Zulassung

Zulassungsstelle für Bauprodukte und Bauarten
Bautechnisches Prüfamt
Eine vom Bund und den Ländern gemeinsam getragene Anstalt des öffentlichen Rechts
Mitglied der EOTA, der UEAtc und der WFTAO

Datum: 15.05.2013
Geschäftszeichen: II 23-1.65.40-20/13

Zulassungsnummer:
Z-65.40-521

Geltungsdauer
vom: **15. Mai 2013**
bis: **15. Mai 2018**

Antragsteller:
Baumer A/S
Runetoften 19
8210 Århus
DÄNEMARK

Zulassungsgegenstand:
Leckagesonde Typ "LBFS" und Typ "LFFS" mit eingebautem Messumformer als Teil von Leckageerkennungssystemen

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.
Diese allgemeine bauaufsichtliche Zulassung umfasst sechs Seiten und eine Anlage mit zwei Seiten.

Deutsches Institut für Bautechnik
16

DIBt | Kolonnenstraße 30 B | D-10829 Berlin | Tel.: +49 30 78730-0 | Fax: +49 30 78730-320 | E-Mail: dibt@dibt.de | www.dibt.de

WHG overfill protection approval

Deutsches Institut für Bautechnik DIBt

Allgemeine bauaufsichtliche Zulassung

Zulassungsstelle für Bauprodukte und Bauarten
Bautechnisches Prüfamt
Eine vom Bund und den Ländern gemeinsam getragene Anstalt des öffentlichen Rechts
Mitglied der EOTA, der UEAtc und der WFTAO

Datum: 15.05.2013

Geschäftszeichen: II 23-1.65.13-19/13

Zulassungsnummer:
Z-65.13-520

Geltungsdauer
vom: **15. Mai 2013**
bis: **15. Mai 2018**

Antragsteller:
Baumer A/S
Runetoften 19
8210 Århus
DÄNEMARK

Zulassungsgegenstand:
Standaufnehmer Typ "LBFS" und Typ "LFFS" mit eingebautem Messumformer als Teil von Überfüllsicherungen

Der oben genannte Zulassungsgegenstand wird hiermit allgemein bauaufsichtlich zugelassen.
Diese allgemeine bauaufsichtliche Zulassung umfasst sechs Seiten und eine Anlage mit zwei Seiten.

Deutsches Institut für Bautechnik 16

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Leckagesonde LBFS und LFFS

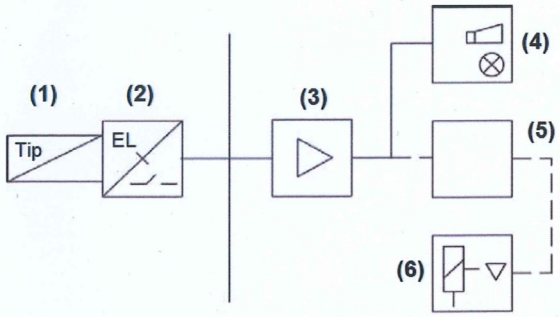
1. Aufbau der Leckageerkennung

Die Leackageerkennung besteht aus einer Leckagesonde (1) der den Frequenzhub beim Eintauchen in eine Flüssigkeit erfasst, mit integrierter Elektronik (2) die die Frequenzänderung ermittelt und daraus ein binäres Signal erzeugt.

Dieses binäre Signal kann direkt oder über einen Signalverstärker (3), der Meldeeinrichtung (4) oder der Steuerungseinrichtung (5) mit ihrem Stellglied (6) zugeführt werden.

Die nicht geprüften Anlageteile der Leckageerkennung, wie der Signalverstärker (3), die Meldeeinrichtung (4) oder die Steuerungseinrichtung (5) mit dem Stellglied (6) müssen den Anforderungen der Abschnitte 3 und 4 der Zulassungsgrundsätze (ZG-ÜS) für Überfüllsicherungen entsprechen.

1.1 Schema der Leckageerkennung



(1) Leckagesonde
(2) Messumformer (integrierte Elektronik)
(3) Signalverstärker
(4) Meldeeinrichtung mit Hupe und Lampe
(5) Steuerungseinrichtung
(6) Stellglied

Standgrenzschalter LBFS und LFFS

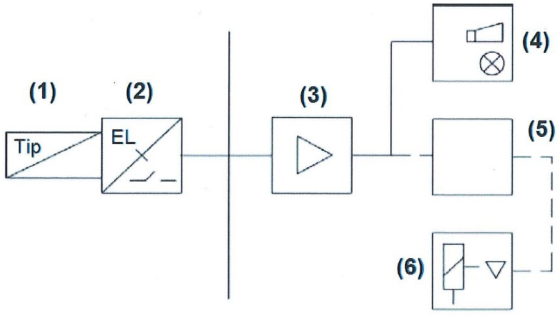
1. Aufbau der Überfüllsicherung

Der Standgrenzschalter besteht aus einem Standaufnehmer (Füllstandgrenzschalter) (1) der den Frequenzhub beim Eintauchen in eine Flüssigkeit erfasst, mit integrierter Elektronik (2) die die Frequenzänderung ermittelt und daraus ein binäres Signal erzeugt.

Dieses binäre Signal kann direkt oder über einen Signalverstärker (3), der Meldeeinrichtung (4) oder der Steuerungseinrichtung (5) mit ihrem Stellglied (6) zugeführt werden.

Die nicht geprüften Anlageteile der Überfüllsicherung, wie der Signalverstärker (3), die Meldeeinrichtung (4) oder die Steuerungseinrichtung (5) mit dem Stellglied (6) müssen den Anforderungen der Abschnitte 3 und 4 der Zulassungsgrundsätze (ZG-ÜS) für Überfüllsicherungen entsprechen.

1.1 Schema der Überfüllsicherung



Standaufnehmer (Füllstandgrenzschalter
Messumformer (integrierte Elektronik)
Signalverstärker
Meldeeinrichtung mit Hupe und Lampe
Steuerungseinrichtung
Stellglied

WHG leakage and overfill protection approval

Baumer
Passion for Sensors

WHG

Operators instructions
CleverLevel switch, LFFS