

# Level Switch LFFS

**Wetted parts in acid-proof, stainless steel and PEEK**

**Compact, food compatible, hygienic design**

**Hygienic connections conform to 3-A standards, FDA demands and EHEDG guidelines**

**Precise switching point without calibration**

**Process temperature -40...200°C**

**Measures media with DK-values >1.5**

**Not influenced by foam**

**LED switch indicator**

**Maintenance free**

**Suitable for media separation measurement**

**Configurable by FlexProgrammer 9701**

**ATEX approval for gas and dust**



## 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 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, toothpaste and ketchup. Even dry medias can be measured, eg. 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.



**Baumer**

## Technical Data

### Sensor

<b>Radiated signal</b>	100...180 MHz
<b>Process connection</b>	Hygienic: G1/2, 3A/DN38 or sliding connection
<b>Adapters</b>	Refer to page 6
<b>Insulating material</b>	PEEK Natura

### Mechanical data

<b>Housing</b>	Stainless Steel, W1.4301/AISI 304
<b>Process connection</b>	Stainless Steel, W1.4404/AISI 316 L
<b>Amb. temperature</b>	-40...85°C
<b>Process temperature</b>	
Sliding connection	-40...200°C (See curve 1)
Std. & 3A/DN38	-40...115°C (See curve 1)
< 1 hour, $T_{amb} < 60^{\circ}\text{C}$	-40...140°C
<b>Protection class</b>	IP67 (IEC 529)
<b>Media pressure</b>	Sliding connection: Max. 16 bar Std. & 3A/DN38: Max. 40 bar
<b>Vibrations</b>	IEC 60068-2-6, GL test2
<b>Installation</b>	Any position
<b>Conformity</b>	3-A standards (Std. & 3A/DN38)

### Electrical connection

<b>Cable gland M16</b>	Plast or Nickel-plated brass
<b>Plug M12</b>	Nickel-plated brass

### Other electrical data

<b>Power supply</b>	12,5...36 VDC, 35 mA max.
<b>Damping</b>	0...10 sec.
<b>Power-up time</b>	<2 sec.
<b>Hysteresis</b>	± 1 mm
<b>Repeatability</b>	± 1 mm
<b>Reaction time</b>	0.1 sec. max.

### Disposal of product and packing

According to national laws or by returning to Baumer

### EMC data

<b>Immunity</b>	EN 61326
<b>Emission</b>	EN 61326

### Ex data (ia)

<b>Internal inductivity</b>	$L_i \leq 10 \mu\text{H}$
<b>Internal capacity</b>	$C_i \leq 33 \text{ nF}$
<b>Barrier data</b>	$U \leq 30 \text{ VDC}$ ; $I \leq 0.1 \text{ A}$ ; $P \leq 0.75 \text{ W}$

### Approval Ex ia IIC T5, ATEX II 1G (See table 1)

<b>Supply range</b>	24...30 VDC
<b>Temperature class</b>	T1...T5: $-40 < T_{amb} < 85^{\circ}\text{C}$

### Approval Ex tD A20 IP67 T100°C, ATEX II 1D (See table 1)

<b>Supply range</b>	12,5...30 VDC
<b>Temperature class</b>	T100°C: $-40 < T_{amb} < 85^{\circ}\text{C}$

### Approval Ex nA II T5, ATEX II 3G (See table 1)

<b>Supply range</b>	12,5...30 VDC
<b>Temperature class</b>	T1...T5: $-40 < T_{amb} < 85^{\circ}\text{C}$

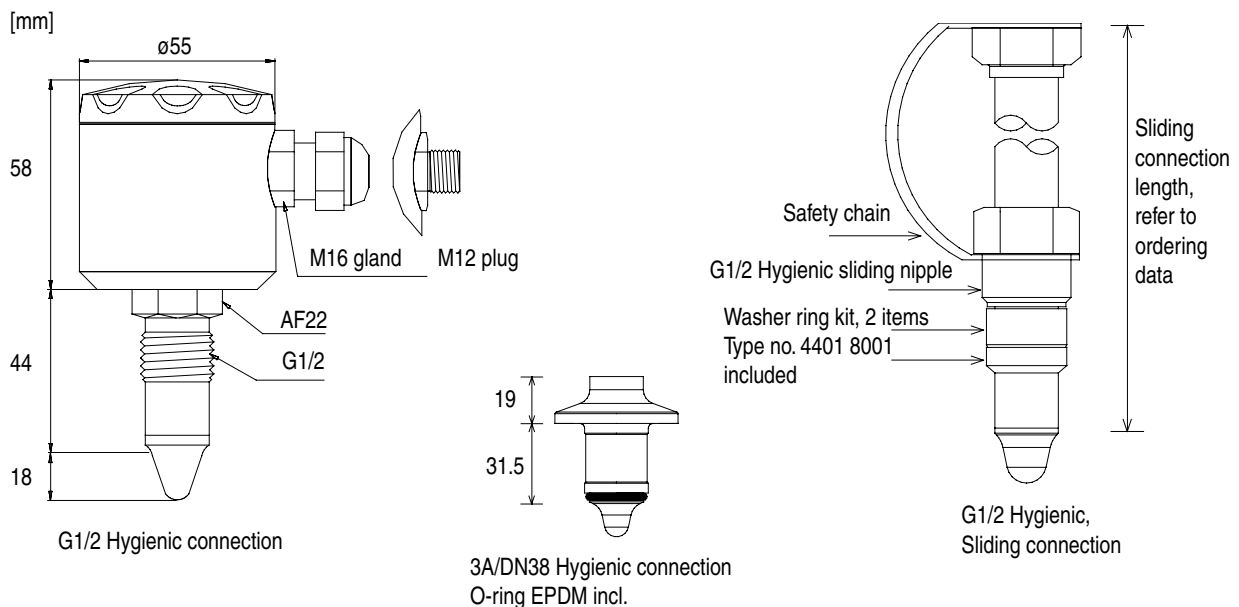
### Output

<b>Output (active)</b>	Max. 50 mA, short-circuit and high-temperature protected
<b>Output type</b>	PNP, NPN or Digital output (Push-pull)
<b>Output polarity</b>	See drawing
<b>Active "Low"</b>	NPN and Digital output (-VDC +2.5V) ± 0.5V ; Rload 1 kOhm
<b>Active "High"</b>	PNP and Digital output (VDC -2.5V) ± 0.5V ; Rload 1 kOhm
<b>Three State Output</b>	± 100µA Max.

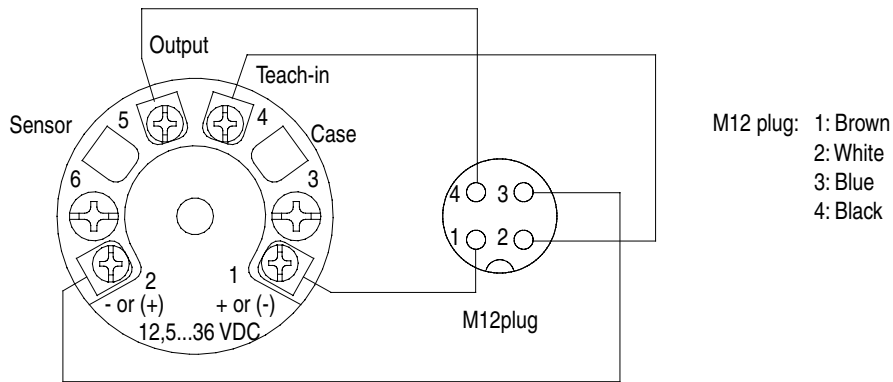
### Factory Settings

<b>Output</b>	PNP
<b>Measure</b>	DK value > 2
<b>Damping</b>	0.1 sec.

## Dimensional Drawings

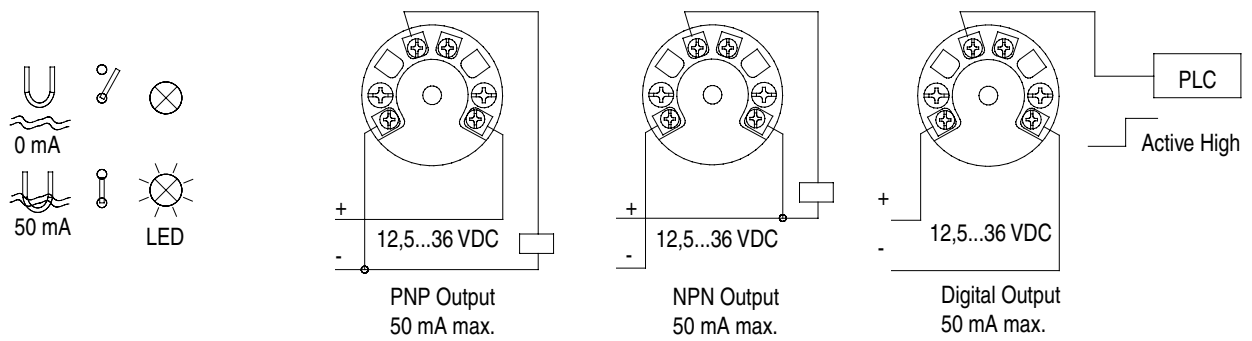


## Electrical Connection

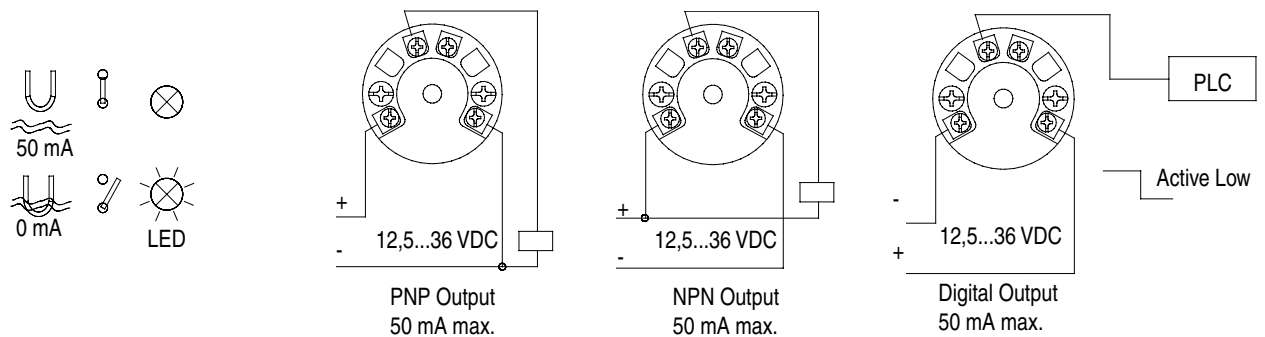


## Electrical Installation

### Normally Open



### Normally Closed



## Ordering Details - Level Switch LFFS

	LFFS xxx (c)	
<b>Safety</b>	<b>5' digit</b>	
Standard		0
Ex ia IIC T5, ATEX II 1G (Gas) *		1
Ex tD A20 IP67 T100°C, ATEX II 1D (Dust)		2
Ex nA II T5, ATEX II 3G		3
<b>Electrical Connection</b>	<b>6' digit</b>	
Plug, M12		1
Cable gland, M16 brass		2
Cable gland, M16 Polyamid		3
<b>Process Connection</b>	<b>7' digit</b>	
G1/2, PEEK tip, 3-A conform, Note{1}		1
3A/DN38 Hygienic connection, 3-A conform, Note {1}		2
G1/2, PEEK tip, sliding connection, 100 mm adjustable, incl. washer ring kit 4401 8001		3
G1/2, PEEK tip, sliding connection, 250 mm adjustable, incl. washer ring kit 4401 8001		4
<b>Configuration</b>	<b>8' digit</b>	
Configuration according to customer specifications		c

The washer ring kit for sliding connection, type no. 4401 8001  
Can be ordered separately.  
Baumer recommended to replace this kit if deformed.

\* Recommended isolating module: PROFSI3-B25100-ALG-LS

## 3-A Conformity

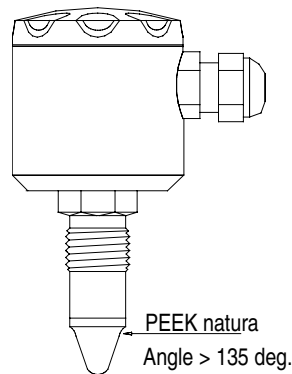
Note {1}: The 3-A mark is valid only when the product is mounted in a 3-A marked counter part and installed according to the installation manual. Use also a 3-A marked O-ring or gasket if relevant. The 3-A marked products conforms to the 3-A Sanitary Standard criteria. Materials and surfaces fulfill the FDA demands and follow the EHEDG guidelines regarding design, materials and finishing.

EPDM O-rings supplied with 3-A marked products are conform to Sanitary Standard Class II (8% milk fat max.)

EPDM gaskets supplied with 3-A marked products are conform to Sanitary Standard Class I (8% milk fat max.)

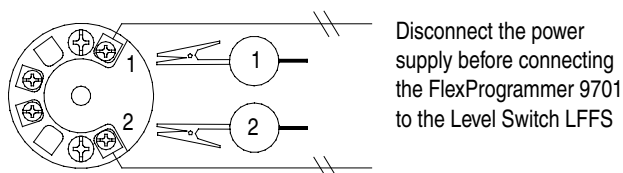
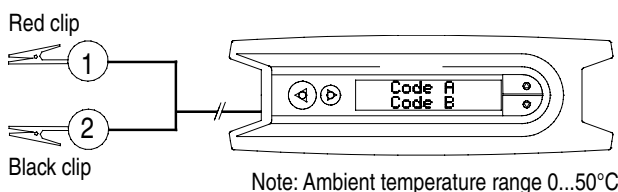
Refer to the 3-A marked counter parts in the data sheet "Accessories Universal".

### Level Switch LFFS, example



## Configuration

### FlexProgrammer 9701



## Accessories

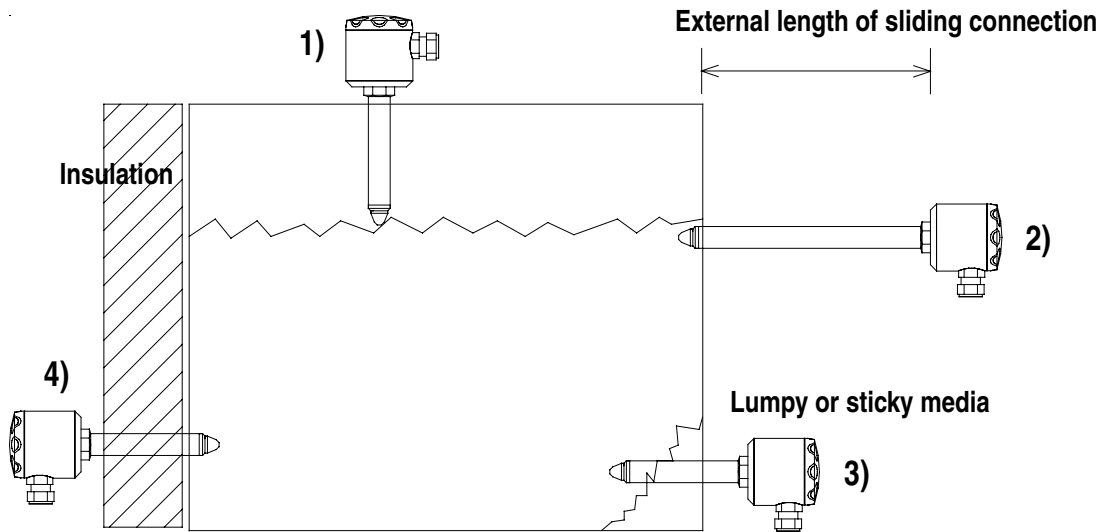


The FlexProgrammer 9701 is a dedicated tool to configure all Baumer configurable Flex-products.

### Type No. 9701-0001 comprises:

- FlexProgrammer
- Cable with 2 alligator clips
- Cable from FlexProgrammer to M12 plug for TE2
- Cable from FlexProgrammer to M12 Plug for LFFS, LBFS, CPX
- USB cable
- CD with the FlexProgram software

## The Sliding Connection (Figure 1)



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.

It is essential that the max. ambience temperature for the electronics is never exceeded. For ATEX approved products please refer to table 1.

The working conditions for the sliding connection in different media temperatures and specified ambient temperatures can be found in curve 1.

Example, how to read Curve 1:

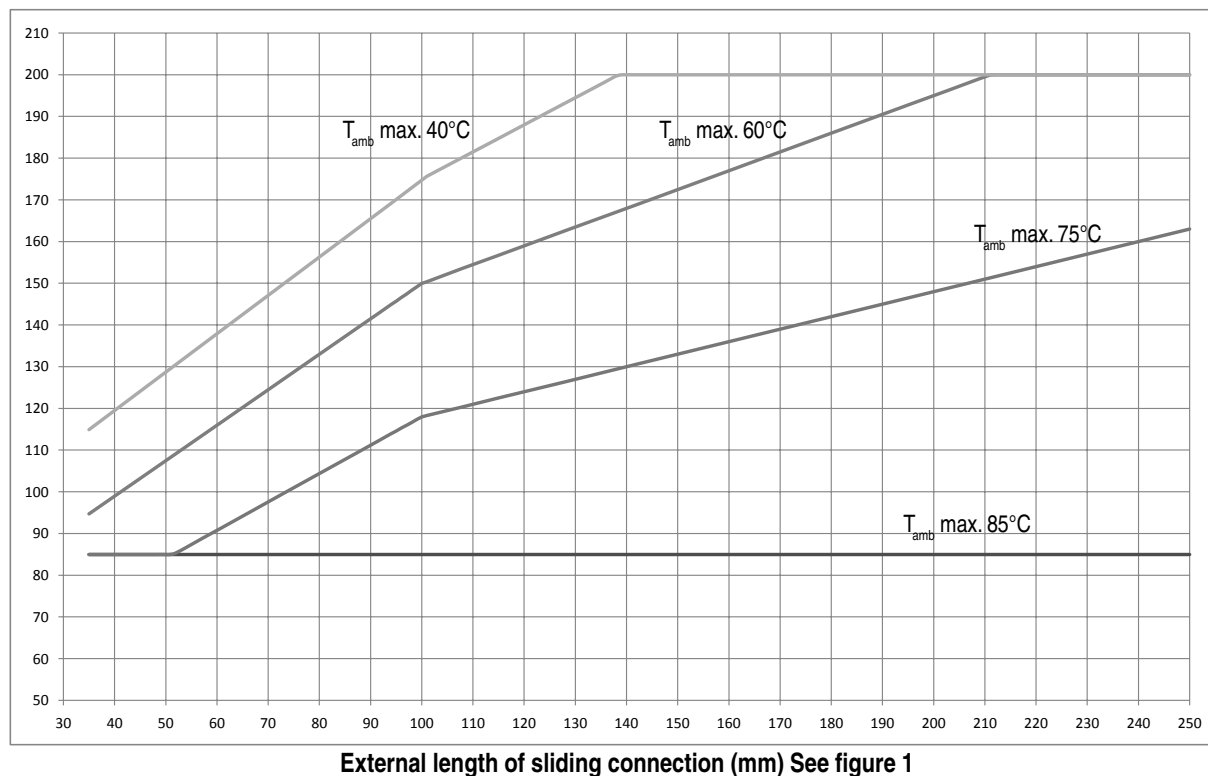
A 250 mm sliding connection is mounted in a tank with a total insert length of 150 mm. Hence the external length of the sliding connection will be  $250 - 150 = 100$  mm.

The media temperature will be max.  $160^{\circ}\text{C}$ .

Read the x-axis at 100 mm on the y-axis at  $160^{\circ}\text{C}$  and find that the ambient temperature must be kept below  $50^{\circ}\text{C}$ . 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.

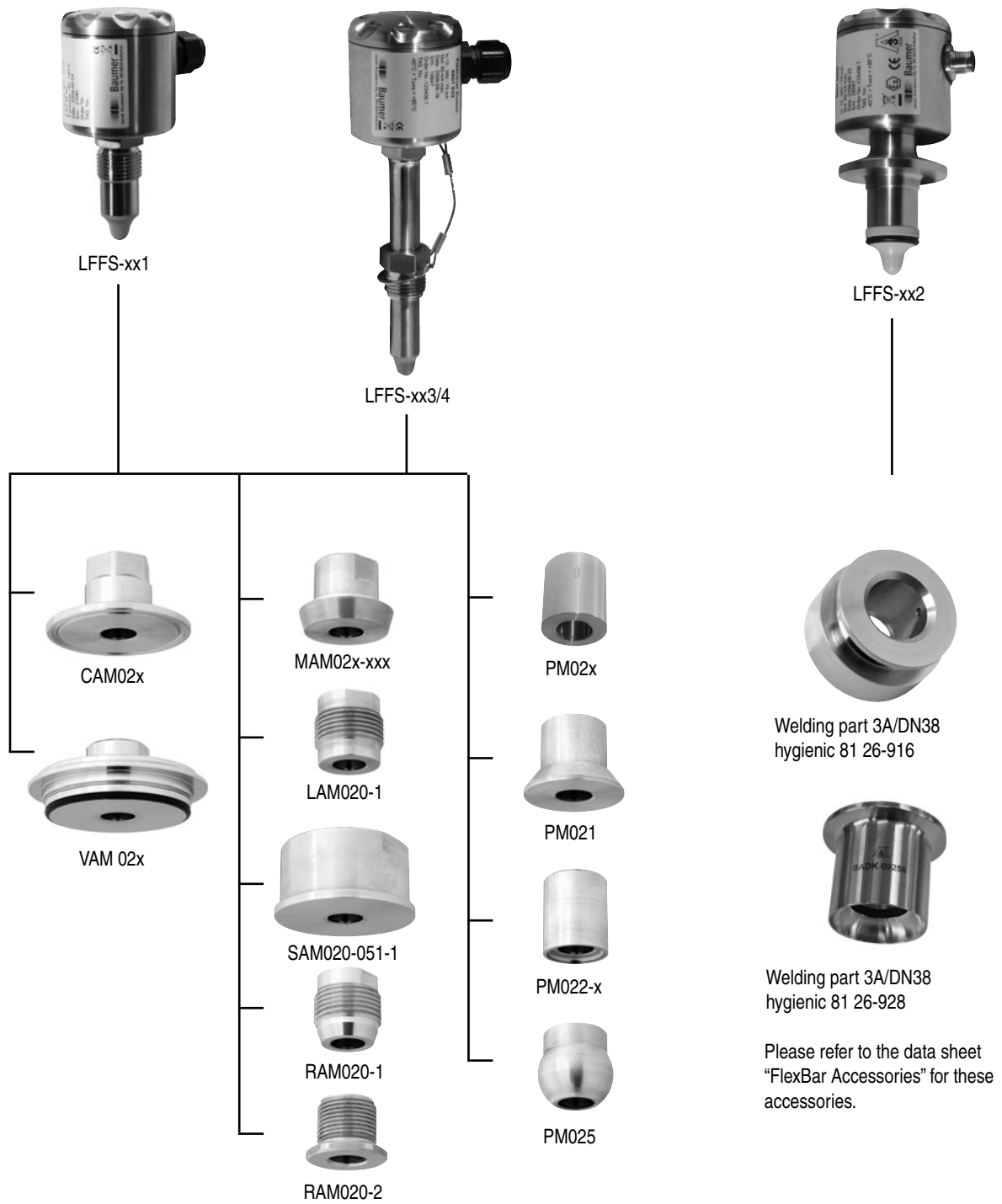
## Media Temperature versus External Length of Sliding Connection (Curve 1)

Media Temperature  
 $^{\circ}\text{C}$



NB: Std. + 3A/DN38 = 35 mm external length

# Accessories - Overview



Please refer to the data sheet  
"Accessories Universal" for these  
accessories.

Please refer to the data sheet  
"FlexBar Accessories" for these  
accessories.

## Ex ia G - Installation

A Level Switch LFFS-1xx 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 tD - Installation

A Level Switch LFFS-2xx 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 nA - Installation

A Level Switch LFFS-3xx 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.

## Conditions for Ex-Certification (Table 1)

Connection Type	Tamb °C	Media Temp. max. °C	Note
Std. & 3A/DN38	-40...85	85	
	-40...60	95	{2}
	-40...40	115	{2}
Sliding 100 mm	-40...85	85	
	-40...60	150	{2}
	-40...40	175	{2}
Sliding 250 mm	-40...85	85	
	-40...60	195	{2}
	-40...40	200	{2} {3}

Note {2}: Provided that the sensor tip at the instrument is the only part in contact with the media.

Note {3}: Max. allowed media temperature.

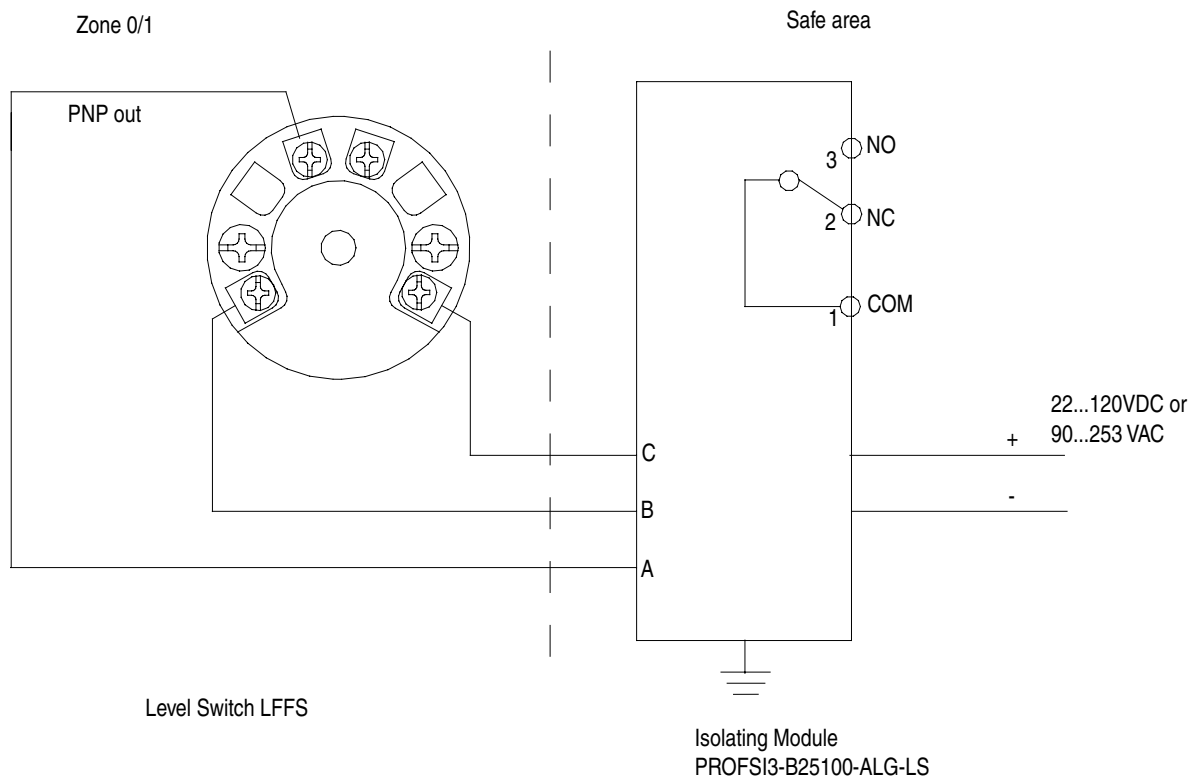
## Ex ia IIC T5, ATEX II 1G - Installation

A Level Switch LFFS-1xx 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.

A certified Ex ia or isolation barrier with the maximum values  $U_{\max} = 30 \text{ VDC}$ ;  $I_{\max} = 0.1 \text{ A}$ ;  $P_{\max} = 0.75 \text{ W}$  must be used.

### Ex-data

<b>Supply range</b>	24...30 VDC
<b>Temperature class</b>	T1...T5: See table 1
<b>Internal inductivity</b>	$L_i \leq 10 \mu\text{H}$
<b>Internal capacity</b>	$C_i \leq 33 \text{ nF}$
<b>Barrier data</b>	$U \leq 30 \text{ VDC}$ ; $I \leq 0.1 \text{ A}$ ; $P \leq 0.75 \text{ W}$



NB: Only valid for PNP output

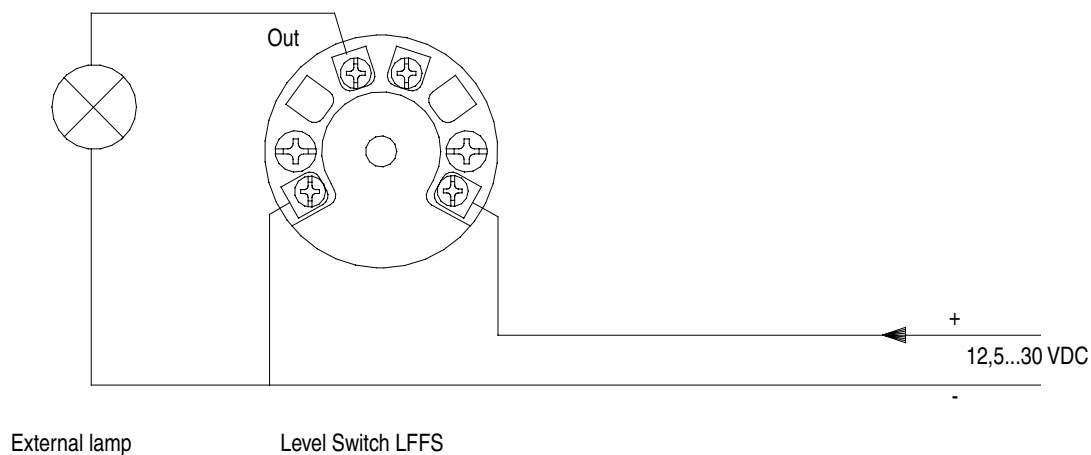


## Ex tD A20 IP67 T100, ATEX II 1D - Installation

A Level Switch LFFS-2xx 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** 12,5...30 VDC, max 100 mA  
**Temperature class** T100: See table 1

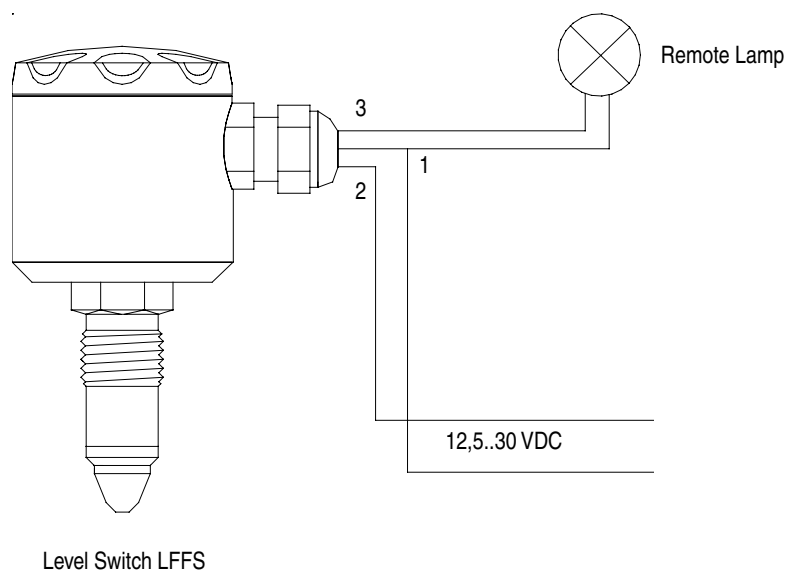


## Ex nA II T5, ATEX II 3G - Installation

A Level Switch LFFS-3xx 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** 12,5...30 VDC, Max. 0.1A  
**Temperature class** T1...T5: See table 1







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