Level Switch LBFS

Special Features
- Wetted parts in stainless steel and PEEK
- Compact design
- Precise switching point with no requirement for calibration
- Process temperature -40 ... 115 °C
- Measures media with DK-values >1.5 (DK = Dielectrical Constant)
- LED switch indicator
- Maintenance free
- Suitable for media separation
- Configurable by FlexProgrammer 9701
- ATEX approval for gas and dust
- WHG (pending)

Technical Data

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Radiated signal</th>
<th>100...180 MHZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process connection</td>
<td>Refer to dimensional drawings</td>
<td></td>
</tr>
<tr>
<td>Insulating material</td>
<td>PEEK</td>
<td></td>
</tr>
</tbody>
</table>

**Mechanical data**
- Housing Stainless Steel
- Amb. temperature -40...85 °C
- Process temperature -40...115 °C
- Protection class IP67 (IEC 529)
- Media pressure Max. 100 bar
- Vibrations IEC 60068-2-6, GL test2
- Installation Any position

**Electrical connection**
- Cable 5 meter, 4 wire
- Plug M12 Plastic or Stainless steel 304

**Other electrical data**
- Power supply 12...30 VDC, 35 mA max.
- Damping 0...10 sec.
- Power-up time <2 sec.
- Hysteresis ± 1 mm
- Repeatability ± 1 mm
- Reaction time 0.1 sec. (100 mS)

Disposal of product and packing
- According to national laws or by returning to Baumer

**EMC data and packing**
- Immunity EN 61326
- Emission EN 61326

**EMC data and packing**
- Internal inductivity L ≤ 10 µH
- Internal capacity C ≤ 43 nF
- Barrier data U ≤ 30 VDC ; I < 0.1 A ; P < 0.75 W

Approval Ex ia IIC T5, ATEX II 1G
- Supply range 24...30 VDC
- Temperature class T1...T4: -40 < Tamb < 85 °C
- T1...T5: -40 < Tamb < 74 °C

Approval Ex ta IIIC T100 Da, ATEX II 1D
- Supply range 12...30 VDC
- Temperature class T100 °C: -40 < Tamb < 85 °C

Approval Ex nA II T5, ATEX II 3G
- Supply range 12,5...30 VDC
- Temperature class T1...T5: -40 < Tamb < 85 °C

Output
- Output (active) Max. 20 mA, short-circuit and high-temperature protected
- Output type PNP or NPN
- Output polarity NO and NC
- Active “High” PNP (VDC -1.5V) ± 0.5V ; Rload 10 kOhm
- Active “Low” NPN (-VDC +1.5V) ± 0.5V ; Rload 10 kOhm
- Off leak current ± 100µA Max.

Factory Settings
- Damping 0.1 sec.

Approvals/conformities
- Approvals/conformities DNV Marine Approval
- EN 50155 Railway
- 3A, EHEDG, FDA, WHG (pending)
Description

The Level Switch LBFS is designed to detect levels in tanks, for 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 capacitance will depend of the dielectric value DK (Dielectrical Constant) of the media.

Two output signals are available, Normally Open (NO) and Normally Closed (NC). By means of the FlexProgrammer 9701, a damping of the output signal can be activated in case of a fluctuating media level, e.g. during tank filling. Additionally the output signals NO and NC can be reversed.

Dimensional Drawings

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 sticky 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 LBFS measures liquids such as water and oil. Even dry media can be measured, e.g. coal dust or plastic granulate.

Level Switch LBFS can be delivered with PNP output as well as NPN output.

The process connection can easily be sealed by use of PTFE tape or by use of special welding adapter for the hygienic edition.

Technical Data

- **Disp. of product and packing**: Refer to dimensional drawings
- **Electrical Connection**: See dimensional drawings
- **Material**: Stainless Steel
- **Process temperature**: -40...85°C
- **Amb. temperature**: T1...T5: -40 < Tamb < 74°C
- **Media pressure**: Max. 100 bar
- **Media**: Fluids such as water and oil, dry media such as coal dust or plastic granulate
- **Water resistant**: IP67 (IEC 529)
- **Power supply**: 12...30 VDC, 35 mA max.
- **Power-up time**: 0...10 sec.
- **Reaction time**: 0.2 sec. typ.
- **Hysteresis**: ± 1 mm
- **Supply range**: 12...30 VDC
- **Internal capacity**: Ci < 43 nF
- **Output type**: NO and NC
- **Output polarity**: Active “Low”
- **Approval**: Ex ta IIIC T100 Da, ATEX II 1D
- **Ex data**: Ex ia IIC T5, ATEX II 1G
- **Hazardous area**: II 1D, Zona 1
- **Barrier data**: See dimensional drawings
- **Insulating material**: PEEK
- **Internal inductivity**: 100...180 MHZ
- **Emission**: EN 61326
- **Immunity**: EN/120820
- **Other electrical data**: U < 30 VDC ; I < 0.1 A ; P  < 0.75 W
- **Cable**: R = 17.0040 ± 0.05
- **Cable Function**: NPN: (VDC -1.5V) ± 0.5V ; Rload 10 kOhm
- **Cable Function**: PNP: (-VDC +1.5V) ± 0.5V ; Rload 10 kOhm
- **Supply type**: 1...4
- **Oscillator**: 2...8
- **Cable**: 3...5
- **M12 plug**: 4...6
- **Cable**: 1...3
- **Function**: 4...6
- **M12 plug**: 1...3
- **Cable**: 2...3
- **Function**: 1...3
- **Cable**: 2...3
- **Function**: 1...3

Design and specifications subject to change without notice

Data sheet E21.01

For more details, please visit www.baumer.com/process
Level Switch LBFS

### Electrical Connection

<table>
<thead>
<tr>
<th>M12 plug</th>
<th>Cable</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Brown</td>
<td>+ VDC</td>
</tr>
<tr>
<td>2</td>
<td>White</td>
<td>Normally Closed</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>- VDC</td>
</tr>
<tr>
<td>4</td>
<td>Black</td>
<td>Normally Open</td>
</tr>
</tbody>
</table>

### Electrical Installation

**Normally Closed**

- **PNP Output**
  - 20 mA max.
  - LED: 0 mA, 20 mA
  - 12...30 VDC

- **NPN Output**
  - 20 mA max.
  - LED: 0 mA, 20 mA
  - 12...30 VDC
Level Switch LBFS

Configuration

FlexProgrammer 9701

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

Type No. 9701-0001 comprises:
- FlexProgrammer
- Cables
- CD with the FlexProgram software

Disconnect the power supply before connecting the FlexProgrammer 9701 to the Level Switch LBFS.

Note: Ambient temperature range 0...50°C

Accessories

FlexProgrammer 9701

Accessories examples

- LB020: G1/2 welding sleeve AISI 304 (for non hygienic installation)
- CAM023: ISO 2852 clamp
- VAM023: Varivent
- PM023: G½ hygienic welding sleeve in AISI 316

Application

- LBFS xx5x x
Media Temperature versus Ambient Temperature

Media Temperature
°C

Ambient Temperature
Ex ia IIC T5, ATEX II 1G - Installation

A Level Switch LBFS 1xxx 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. A certified Ex ia isolation barrier with the maximum values $U_{\text{max}} = 30 \text{ VDC}$; $I_{\text{max}} = 0.1 \text{ A}$; $P_{\text{max}} = 0.75 \text{ W}$ must be used. Use the isolating module PROFSI 3-B25100-ALG-LS (for PNP output only) or a ZENER Barrier (for NPN output only) as shown below (see installation manual for special instructions).

### Ex-data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply range</td>
<td>24...30 VDC</td>
</tr>
</tbody>
</table>
| Temperature class  | T1...T4: -40 < $T_{\text{amb}}$ < 85 °C  
                     | T1...T5: -40 < $T_{\text{amb}}$ < 74 °C |
| Internal inductivity| $L < 10 \mu\text{H}$ |
| Internal capacity  | $C < 43 \text{nF}$  |
| Barrier data       | $U < 30 \text{ VDC}$ ; $I < 0.1 \text{ A}$ ; $P < 0.75 \text{ W}$ |

**NB:** For PNP output the PROFSI3-B25100-ALG-LS barrier must be used.

**Isolating Module**

PROFSI3-B25100-ALG-LS
**Ex ta IIIC T100 Da, ATEX II 1D - Installation**

A Level Switch LBFS 2xxx x Ex ta IIIC T100 Da, 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.

<table>
<thead>
<tr>
<th>Ex-data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply range</td>
</tr>
<tr>
<td>Temperature class</td>
</tr>
</tbody>
</table>

**Level Switch LBFS**

NB: The cable must be fixed to an external strain relief not more than 5 cm from the Level Switch. Only IP 67 compliant cable must be used for installation.
See below.

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

A Level Switch LBFS3 xxx 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.

<table>
<thead>
<tr>
<th>Ex-data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply range</td>
</tr>
<tr>
<td>Temperature class</td>
</tr>
</tbody>
</table>

**Level Switch LBFS**

Ex ia and Ex ta - Installation for both gas and dust

Only IP 67 compliant cable must be used for installation
The cable must be fixed to an external strain relief not more than 5 cm from the Level Switch
A zener barrier / isolating module must be used for protection
## Ordering details

<table>
<thead>
<tr>
<th>Model</th>
<th>Level Switch LBFS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td>5' digit</td>
</tr>
<tr>
<td>Standard</td>
<td>0</td>
</tr>
<tr>
<td>Ex ia IIIC T5, ATEX II 1G (Gas)</td>
<td>1</td>
</tr>
<tr>
<td>Ex ta IIIC T100 Da, ATEX II 1D (Dust)</td>
<td>2</td>
</tr>
<tr>
<td>Ex naII T5, ATEX II 3G</td>
<td>3</td>
</tr>
<tr>
<td>Ex ia IIIC T5 / Ex ta IIIC T100 Da (combined gas/dust)</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical Connection</th>
<th>6' digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug, M12 plastic with LED</td>
<td>1</td>
</tr>
<tr>
<td>Cable 5 meter</td>
<td>2</td>
</tr>
<tr>
<td>Plug, M12, stainless steel, without LED</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Connection</th>
<th>7' digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1/2&quot;</td>
<td>1</td>
</tr>
<tr>
<td>G3/4&quot;</td>
<td>2</td>
</tr>
<tr>
<td>G1&quot;</td>
<td>3</td>
</tr>
<tr>
<td>G1/2&quot; hygienic (for Accessories Universal) 3A / EHEDG</td>
<td>4</td>
</tr>
<tr>
<td>G1/2&quot; for reverse assembly</td>
<td>5</td>
</tr>
<tr>
<td>3/4&quot; NPT</td>
<td>6</td>
</tr>
<tr>
<td>M18x1(5)</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Process Connection material</th>
<th>8' digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless Steel 1.4301 - AISI 304</td>
<td>1</td>
</tr>
<tr>
<td>Stainless Steel 1.4404 - AISI 316L</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Configuration</th>
<th>9' digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP output</td>
<td>1</td>
</tr>
<tr>
<td>NPN output</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Configuration</th>
<th>10' digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>No configuration</td>
<td>0</td>
</tr>
<tr>
<td>Configuring according to customer specification</td>
<td>C</td>
</tr>
</tbody>
</table>

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(1) Max. 85 °C media temperature  
(2) Not valid with "cable connection"  
(3) Max ambient temperature 70 °C  
(4) Max 130 °C for <1 hour, Tamb 40°C  
(5) Only available in AISI 304  
(6) Only available in AISI 316L  
(7) For PNP output the barrier module PFOFSI3-B25100-ALG-LS is required for functional purposes. For NPN output a standard barrier may be used.