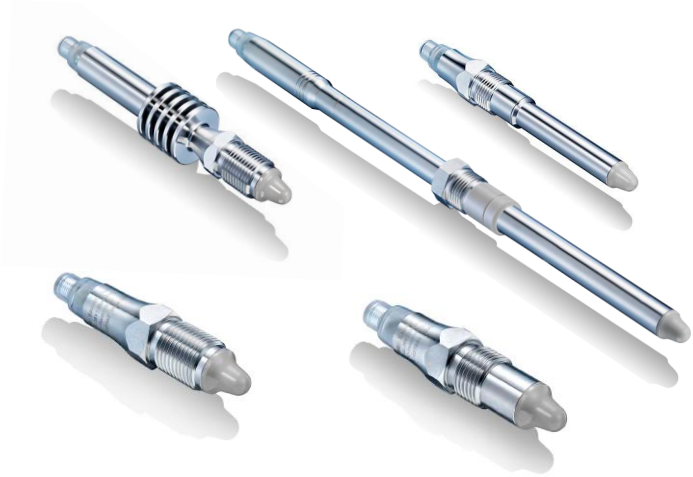
Baumer
Passion for Sensors

Level measurement

# *CleverLevel*® LBFS

## Point level detection



## Product highlights

- Save detection of liquids, bulk-solids and powders
- Short immersion length
- Excellent cleanability
- Ability for differentiation between foam and liquid
- Not sensitive to adherent or sticky media
- Status signaling by bright, blue LED
- Compact stainless steel housing, sealed up to IP69K
- Measures media with DC-values >1.5 (Dielectric Constant)

## User benefits

- One sensor for all applications
- Less disturbance of process
- Safe process with less downtime
- Visual observation of process
- Long life time even in wash-down areas

EN 50155

## Technical data

### Housing

| | |
|---|---|
| Style | ▪ Compact design |
| Dimension | ▪ Refer to dimensional drawings (page 4 f.) |
| Material | ▪ Stainless steel |

### Electrical connection

| | |
|---|---|
| Connector variants | ▪ M12, 4 pin, polycarbonate<br>▪ M12, 4 pin, stainless steel |
| Cable outlet | ▪ 5 m, 4-wire, PVC |

### Ambient conditions

| | |
|---|---|
| Operating temperature range | ▪ -40 ... 85 °C |
| Storage temperature range | ▪ -40 ... 85 °C |
| Humidity (IEC 68-2-38) | ▪ < 98 % RH, condensing |
| Protection class (IEC 60529) | ▪ IP67<br>▪ IP69K (with appropriate cable) |
| Vibration | ▪ IEC 60068-2-6<br>▪ GL Test 2 |

### Process connection

| | |
|---|---|
| Connection variants | ▪ Refer to dimensional drawings (page 4 f.) |
| Mounting position | ▪ Any (top, bottom, side) |
| Wetted parts material | ▪ PEEK Natura<br>▪ AISI 316L (1.4404)<br>▪ AISI 304 (1.4301) (optional) |
| Surface roughness wetted parts | ▪ Ra < 0.8 µm |

### Process conditions

| | |
|---|---|
| Process temperature | ▪ Refer to table (page 2 f.) |
| Process pressure | ▪ Refer to table (page 2 f.) |

### Power supply

| | |
|---|---|
| Voltage supply range | ▪ 12 ... 30 V DC |
| Current consumption (no load) | ▪ 25 mA typ., 50 mA max. |
| Reverse polarity protection | ▪ Yes |
| Power-up time | ▪ < 2 s |

### Output signalization

| | |
|---|---|
| Switching polarity | ▪ PNP<br>▪ NPN |
| Current rating | ▪ 20 mA max. |
| Short circuit protection | ▪ Yes |
| Voltage drop | ▪ PNP: (+Vs -1.5 V) ± 0.5 V, Rload = 10 kΩ<br>▪ NPN: (+1.5 V) ± 0.5 V, Rload = 10 kΩ |
| Off leak current | ▪ ± 100 µA max. |
| Switching logic | ▪ Normally open (NO)<br>▪ Normally closed (NC) |

### Sensor performance

| | |
|---|---|
| Repeatability | ▪ ± 1 mm |
| Hysteresis | ▪ ± 1 mm |
| Response time | ▪ 0.1 s typ. (0.15 ± 0.05 s) |
| Damping | ▪ 0.0 ... 10.0 s (adjustable) |

### Factory settings

| | |
|---|---|
| Switching range (dielectric constant DC) | ▪ < 75 % (DC > 2) |
| Damping | ▪ 0.1 s |

### Compliance and approvals

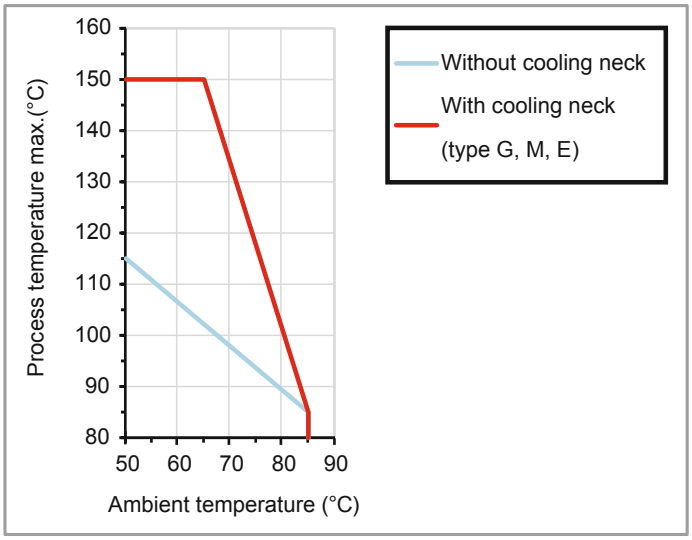
| | |
|---|---|
| EMC Immunity | ▪ EN 61326 |
| EMC Emission | ▪ EN 61326 (installed on a metal tank) |
| Explosion protection | ▪ ATEX II 1 G Ex ia IIC T4/T5<br>▪ ATEX II 1 D Ex ta IIIC T100 °C Da<br>▪ ATEX II 3 G Ex nA II T4/T5 |
| Safety | ▪ cULus Listed, Class 2, E365692 |
| Hygiene | ▪ Refer to table (page 3) |
| Railway | ▪ EN 50155 |
| Marine | ▪ Refer to table (page 3) |

**Note:** Information on product characteristics may relate to defined product options

## Process conditions

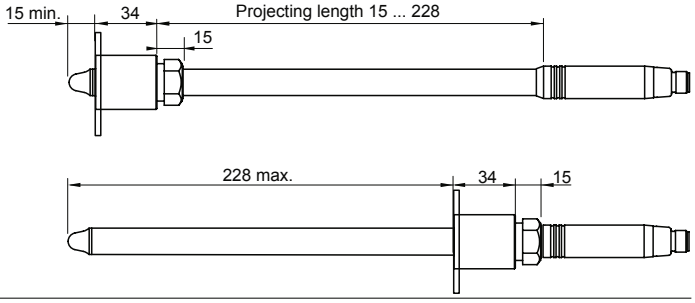
| Type | Process connection | | Process temperature continuous Tamb < 50 °C | Process pressure | Process temperature max. temporary t < 1 h Tamb < 50 °C | Process pressure @ Process temperature max. temporary |
|---|---|---|---|---|---|---|
| | | BCID | °C | bar | °C | bar |
| LBFS-xx1xx.x | G 1/2 A ISO 228-1 | G07 | -40 … 115 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xxGxx.x | G 1/2 A ISO 228-1 with cooling neck, not applicable for mounting with ZPW1-7x1 | G07 | -40 … 150 | -1 … 100 | N/A | N/A |
| LBFS-xxAxx.x | G 1/2 A DIN 3852-E, NBR gasket | G51 | -40 … 115 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xxBxx.x | G 1/2 A DIN 3852-E, FKM (Viton®) gasket | G51 | -40 … 115 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xx4xx.x | G 1/2 A hygienic | A03 | -40 … 115 | -1 … 10 | 135 | -1 … 5 |
| LBFS-xxKxx.x | G 1/2 A hygienic, length 82 mm | A03 | -40 … 115 | -1 … 100 | 135 | -1 … 5 |
| LBFS-xxLxx.x | G 1/2 A hygienic, sliding connection, length 250 mm | A03 | -40 … 200 | -1 … 5 | N/A | N/A |
| LBFS-xx5xx.x | G 1/2 A ISO 228-1 for reverse assembly (in-shell thread) | T10 | -40 … 85 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xx2xx.x | G 3/4 A ISO 228-1 | G10 | -40 … 115 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xx3xx.x | G 1 A ISO 228-1 | G11 | -40 … 115 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xxNxx.x | 1/2-14 NPT | N02 | -40 … 115 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xxMxx.x | 1/2-14 NPT with cooling neck | N02 | -40 … 150 | -1 … 100 | N/A | N/A |
| LBFS-xx6xx.x | 3/4-14 NPT | N03 | -40 … 115 | -1 … 100 | 135 | -1 … 100 |
| LBFS-xx7xx.x | M18x1 | M11 | -40 … 115 | N/A | N/A | N/A |
| LBFS-xxExx.x | G 1/2 A DIN 3852-E, FKM (Viton®) gasket with cooling neck | G51 | -40 … 150 | -1 … 100 | N/A | N/A |

### Process connection type 1, 2, 3, 4, 6, 7, A, B, G, K, M, N, E




### Process connection type L (sliding connection)

| Process temperature (°C) | Projecting length min. (mm) | | | | | | |
|---|---|---|---|---|---|---|---|
| 200 | 25 | 35 | 50 | 65 | 90 | 145 |
| 190 | 20 | 35 | 45 | 65 | 90 | 140 |
| 180 | 20 | 30 | 45 | 60 | 85 | 140 |
| 170 | 20 | 25 | 40 | 55 | 85 | 135 |
| 160 | | 25 | 35 | 55 | 80 | 130 |
| 150 | | 20 | 25 | 50 | 75 | 130 |
| 140 | | 20 | 30 | 45 | 75 | 125 |
| 130 | | | 25 | 45 | 70 | 120 |
| 120 | | | 20 | 40 | 65 | 115 |
| 110 | | | 20 | 25 | 60 | 110 |
| 100 | No limitation | | | 30 | 55 | 105 |
| 90 | | | | 25 | 50 | 100 |
| 80 | | | | 20 | 45 | 95 |
| 70 | | | | | 35 | 85 |
| 60 | | | | | 35 | 65 |
| | 35 | 40 | 45 | 50 | 55 | 60 | 65 |
| | Ambient temperature (°C) | | | | | | |



## Compliance and approvals

| Type | Process connection | BCID | EN 1935/2004 EN 10/2011 EN 2023/2006 | FDA | 3-A | EHEDG EL-Class I | DNV | GL | Lloyd's Register | CCS | WHG (overfill, leakage) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LBFS-xx1xx.x | G 1/2 A ISO 228-1 | G07 | | | | | ■ | ■ | ■ | ■ | ■ |
| LBFS-xxGxx.x | G 1/2 A ISO 228-1 with cooling neck | G07 | | | | | | | | | |
| LBFS-xxAxx.x | G 1/2 A DIN 3852-E, NBR gasket | G51 | | | | | ■ | ■ | | | |
| LBFS-xxBxx.x | G 1/2 A DIN 3852-E, FKM (Viton®) gasket | G51 | | | | | ■ | ■ | | | |
| LBFS-xx4xx.x | G 1/2 A hygienic | A03 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| LBFS-xxKxx.x | G 1/2 A hygienic, length 82 mm | A03 | ■ | ■ | | | | | | | |
| LBFS-xxLxx.x | G 1/2 A hygienic, sliding connection, length 250 mm | A03 | ■ | ■ | | | | | | | |
| LBFS-xx5xx.x | G 1/2 A ISO 228-1 for reverse assembly (in-shell thread) | T10 | | | | | ■ | ■ | ■ | ■ | ■ |
| LBFS-xx2xx.x | G 3/4 A ISO 228-1 | G10 | | | | | ■ | ■ | ■ | ■ | ■ |
| LBFS-xx3xx.x | G 1 A ISO 228-1 | G11 | | | | | ■ | ■ | ■ | ■ | ■ |
| LBFS-xxNxx.x | 1/2-14 NPT | N02 | | | | | | | | | |
| LBFS-xxMxx.x | 1/2-14 NPT with cooling neck | N02 | | | | | | | | | |
| LBFS-xx6xx.x | 3/4-14 NPT | N03 | | | | | ■ | ■ | | ■ | ■ |
| LBFS-xx7xx.x | M18x1 | M11 | | | | | ■ | ■ | ■ | ■ | ■ |
| LBFS-xxExx.x | G 1/2 A DIN 3852-E, FKM (Viton®) gasket with cooling neck | G51 | | | | | | | | | |

**Note:** Information on product characteristics may relate to defined product options

The requirements of the respective 3-A Sanitary Standard will be only fulfilled in combination with appropriate mounting accessories. Those are marked with the 3-A logo.

The EHEDG certification is only valid in combination with appropriate mounting accessories. Those are marked with the "EHEDG Certified" logo

### ATEX II 1 G Ex ia IIC T4/T5

| | |
|---|---|
| Maximun values (for barrier selection) (1) | ▪ Ui: 30 V DC<br>▪ Ii: 100 mA<br>▪ Pi: 0.75 W |
| Internal capacitance | ▪ Ci: 43 nF |
| Internal inductance | ▪ Li: 10 µH |
| Temperature class | ▪ T1…T4: -40 < Tamb < 85 °C<br>▪ T1…T5: -40 < Tamb < 74 °C |

### ATEX II 1 D Ex ta IIIC T100 °C Da

| | |
|---|---|
| Voltage supply range | ▪ 30 V DC max. |
| Temperature class | ▪ T100 °C: -40 < Tamb < 85 °C |
| Protection class of cable accessory | ▪ IP67 |

### ATEX II 3 G Ex nA II T4/T5

| | |
|---|---|
| Voltage supply range | ▪ 30 V DC max. |
| Temperature class | ▪ T1…T4: -40 < Tamb < 85 °C<br>▪ T1…T5: -40 < Tamb < 74 °C |

(1) Recommended barrier: PROFSI3-B25100-ALG-LS (please refer to accessories, page 10)



EN/2018-03-01

# *CleverLevel*® LBFS

Point level detection

## Field of application

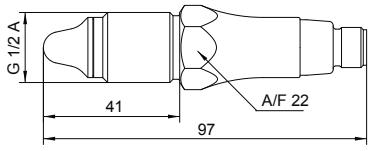
*CleverLevel*® LBFS is designed for level detection in tanks and dry-run protection of pumps by empty pipe monitoring. It detects liquid, pasty or oily media, but also solid-bulk materials like flour or plastic granulate. The LBFS is capable of media differentiation by distinguishing the specific properties, such as oil, wate , foam and liquid.
Reliable performance is assured in any mounting position (from top, bottom or side). Depending on the desired process connection, different mounting options are available. Corresponding mounting aids and adaptors for conventional process connections are available as an accessory.

Two parallel switching outputs are available as Normally Open (NO) and Normally Closed (NC) which is defined by PN or NPN polarity when placing the order.
*CleverLevel*® LBFS in its default configuration covers a major part of potential applications. Where customer-specific configuration is require because of difficult media (e. g. foamy or adhering), the interface pr - gramming tool FlexProgrammer 9701 allows for easy parameterization of the optimum switching points by convenient teach-in functionality.
The measured data can be visualized on a PC for further parameter adjustment, for example time constant of a damping function and inverted switching output logic.

## Measuring principle

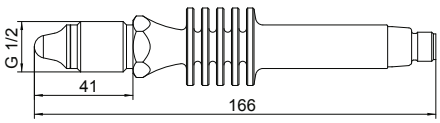
An electrode inside the sensor tip builds a capacitor together with the surroundings. The medium with its dielectric constant (DC value) is defining the capacitance value. A resonance circuit is created in combination with a coil in the sensor head. Switching signal tripping is according to the measured resonance frequency and the programmed trigger thresholds.

## Dimensional drawings



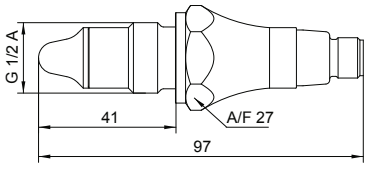

**LBFS-xx1xx.x**

G 1/2 A
ISO 228-1



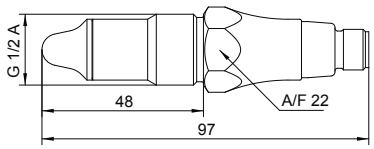

**LBFS-xxGxx.x**

G 1/2 A
ISO 228-1
with cooling neck



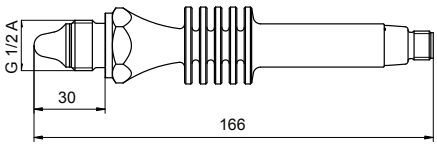

**LBFS-xxAxx.x**
**LBFS-xxBxx.x**

G 1/2 A DIN 3852-E,
NBR / FKM (Viton®) gasket




**LBFS-xx4xx.x**

G 1/2 A hygienic



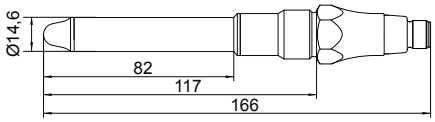

**LBFS-xxExx.x**

G 1/2 A DIN 3852-E,
FKM (Viton®) gasket,
with cooling neck



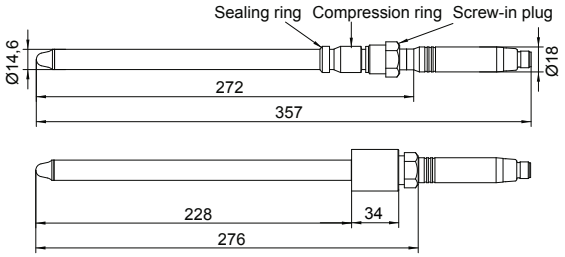
EN/2018-03-01

## Dimensional drawings



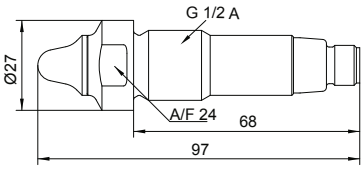

**LBFS-xxKxx.x**

G 1/2 A hygienic, length 82 mm



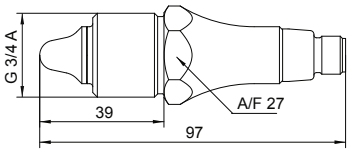

**LBFS-xxLxx.x**

G 1/2 A hygienic,
sliding connection, length 250 mm



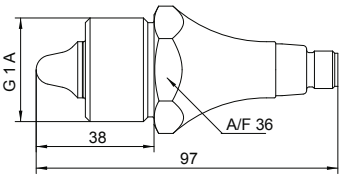

**LBFS-xx5xx.x**

G 1/2 A
ISO 228-1
for reverse assembly
(in-shell thread)



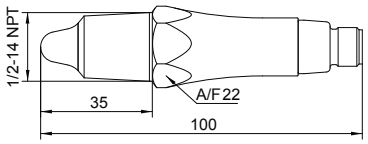

**LBFS-xx2xx.x**

G 3/4 A
ISO 228-1



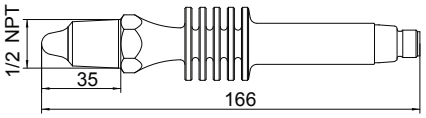

**LBFS-xx3xx.x**

G 1 A
ISO 228-1



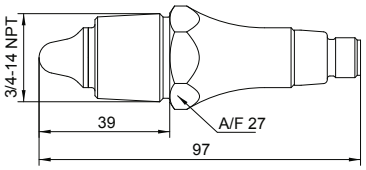

**LBFS-xxNxx.x**

1/2-14 NPT




**LBFS-xxMxx.x**

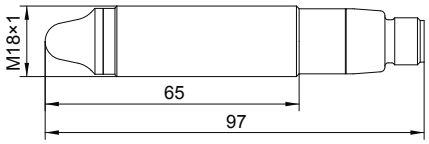
1/2-14 NPT
with cooling neck




**LBFS-xx6xx.x**

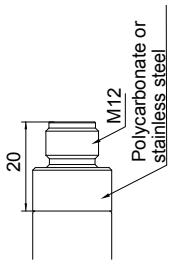
3/4-14 NPT

## Dimensional drawings



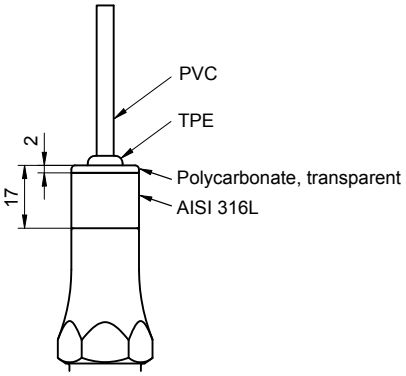

**LBFS-xx7xx.x**

M18x1




**LBFS-x1xxx.x**
**LBFS-x3xxx.x**

Connector M12

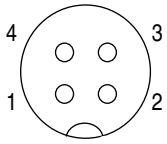



**LBFS-x2xxx.x**

Cable outlet

## Electrical connection

### Terminal assignment



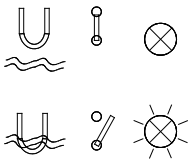

| Connector M12 | Cable outlet | Function |
|---|---|---|
| 1 | Brown | + Vs |
| 2 | White | Normally closed (NC) |
| 3 | Blue | 0 V |
| 4 | Black | Normally open (NO) |

### Switching characteristic

Switching logic

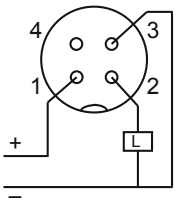
Switching polarity

**Normally closed (NC)**

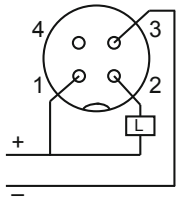


**LED**

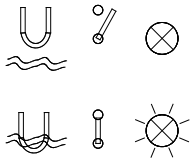
**PNP**




**NPN**

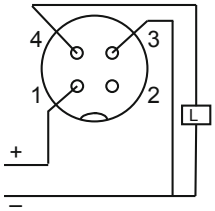



**Normally open (NO)**

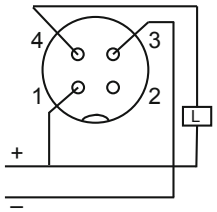


**LED**

**PNP**




**NPN**



## Ordering code

| | | LBFS | - | x | x | x | x | x | . | x |
|---|---|---|---|---|---|---|---|---|---|---|
| **Type** | | | | | | | | | | |
| Level switch | | LBFS | | | | | | | | |
| **Compliance and approvals** | | | | | | | | | | |
| Standard | | | | 0 | | | | | | |
| ATEX II 1 G Ex ia IIC T4/T5 (2) | | | | 1 | | | | | | |
| ATEX II 1 D Ex ta IIIC T100 °C Da | | | | 2 | | | | | | |
| ATEX II 3 G Ex nA II T4/T5 | | | | 3 | | | | | | |
| ATEX II 1 G Ex ia IIC T4/T5 and ATEX II 1 D Ex ta IIIC T100 °C Da (2) | | | | 4 | | | | | | |
| cULus Listed, Class 2, E365692 | | | | A | | | | | | |
| EAC (TR CU 020/2011) | | | | B | | | | | | |
| **Electrical connection** | | | | | | | | | | |
| Connector M12, 4 pin, polycarbonate (with LED) | | | | | 1 | | | | | |
| Cable outlet 5 m, 4-wire, PVC (3) | | | | | 2 | | | | | |
| Connector M12, 4 pin, stainless steel (without LED) | | | | | 3 | | | | | |
| **Process connection** | **(BCID)** | | | | | | | | | |
| G 1/2 A ISO 228-1 | (G07) | | | | | 1 | | | | |
| G 1/2 A ISO 228-1 with cooling neck | (G07) | | | | | G | | | | |
| G 1/2 A DIN 3852 form E, NBR gasket | (G51) | | | | | A | | | | |
| G 1/2 A DIN 3852 form E, FKM (Viton®) gasket | (G51) | | | | | B | | | | |
| G 1/2 A DIN 3852 form E, FKM (Viton®) gasket, with cooling neck | (G51) | | | | | E | | | | |
| G 1/2 A hygienic | (A03) | | | | | 4 | | | | |
| G 1/2 A hygienic, length 82 mm | (A03) | | | | | K | | | | |
| G 1/2 A hygienic, sliding connection, length 250 mm | (A03) | | | | | L | | | | |
| G 1/2 A ISO 228-1 for reverse assembly (in-shell thread) (4) | (T10) | | | | | 5 | | | | |
| G 3/4 A ISO 228-1 | (G10) | | | | | 2 | | | | |
| G 1 A ISO 228-1 | (G11) | | | | | 3 | | | | |
| 1/2-14 NPT | (N02) | | | | | N | | | | |
| 1/2-14 NPT with cooling neck | (N02) | | | | | M | | | | |
| 3/4-14 NPT | (N03) | | | | | 6 | | | | |
| M18x1 | (M11) | | | | | 7 | | | | |
| **Wetted parts material** | | | | | | | | | | |
| AISI 304 (1.4301) (available for „Process connection“ 1, 2, 3, 5, 6, 7) | | | | | | | 1 | | | |
| AISI 316L (1.4404) | | | | | | | 2 | | | |
| **Switching polarity** | | | | | | | | | | |
| PNP | | | | | | | | 1 | | |
| NPN | | | | | | | | 2 | | |
| **Configuration** | | | | | | | | | | |
| Factory setting | | | | | | | | | | 0 |
| Customer-specific | | | | | | | | | | C |

(2) The isolating barrier PROFSI3-B25100-ALG-LS is recommended with PNP switching polarity for Ex ia IIC (please refer to accessories, page 10)

(3) Ambient temperature: -25 ... 70°C (if the cable is unmoved)
-5 ... 70°C (if the cable is moved)
Bending radius min.: r ≥ 10 mm

(4) Including gasket ZPX3-14B0 (glass/aramide fiber with NBR)



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## Accessories

### Industrial weld-in sleeves for LBFS-xx1xx.x, (BCID: G07)

| | Description | Ordering code |
|---|---|---|
|  | Thick wall tank - AISI 304 (1.4301) | ZPW1-711 |
|  | Thick wall tank - AISI 316L (1.4404) | ZPW1-721 |

### Hygienic adapters for LBFS-xx4xx.x, LBFS-xxKxx.x, LBFS-xxLxx.x (BCID: A03)

| | Description | Ordering code |
|---|---|---|
|  | Clamp,<br>DIN 32676 DN 25, DN 40<br>ISO 2852 DN 25, DN 38<br><br>DIN 32676 DN 50<br>ISO 2852 DN 51 | <br><br>ZPH3-3213<br><br><br>ZPH3-3216 |
|  | DIN 11851<br>DN 25<br>DN 40<br>DN 50 | <br>ZPH3-3221<br>ZPH3-3224<br>ZPH3-3225 |
|  | SMS 1145<br>DN 51 | <br>ZPH1-3236 |
|  | Varivent® Type N<br>Varivent® Type F | ZPH3-324E<br>ZPH3-344F |
| | DIN 11864-1-A<br>DN 40<br>DN 50 | <br>ZPH3-3254<br>ZPH3-3255 |



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## Accessories

### Hygienic weld-in sleeves for LBFS-xx4xx.x, LBFS-xxKxx.x, LBFS-xxLxx.x (BCID: A03)

| | Description | Ordering code |
|---|---|---|
|  | Tanks, with leak detection port | ZPW3-321 |
|  | Thin wall tanks | ZPW3-322 |
|  | Tanks, pipes | ZPW2-324 |
|  | Pipe with collar<br>DN 25 ... DN 50<br>DN 65 ... DN 150 | <br>ZPW2-326<br>ZPW2-327 |

### Threaded adapters for LBFS-xx4xx.x, LBFS-xxKxx.x, LBFS-xxLxx.x (BCID: A03)

| | Description | Ordering code |
|---|---|---|
|  | Vibronic level switch replacement<br>EH FTL G 3/4 A<br>VS G 3/4 A<br>EH FTL G 1 A<br>VS G 1 A | <br>ZPH1-32BA<br>ZPH1-32BC<br>ZPH1-32CB<br>ZPH1-32CD |
|  | Industrial<br>G 1 A<br>G 1 1/2 A<br>G 2 A | <br>ZPI1-32B<br>ZPI1-32D<br>ZPI1-32E |



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## Accessories

### Spare parts

| | Description | Ordering code |
|---|---|---|
|  | G 1/2 A gland nut for LBFS-xxL2x.x with sliding connection (BCID: A03) | ZPX1-008 |
|  | Compression ring kit for LBFS-xxL2x.x with sliding connection (BCID: A03) | ZPX1-006 |
|  | Gasket for LBFS-xx5xx.x for reverse assembly (BCID: T10) | ZPX3-14B0 |

### Interfaces

| | Description | Ordering code |
|---|---|---|
|  | FlexProgrammer 9701<br>Programming kit for sensor parameterization. The set contains a FlexProgrammer, all cables needed, carrying strap and the FlexProgrammer software on a CD. | 9701-0001 |
|  | ATEX isolating barrier for LBFS-xxxx1.x, LBFS-xxxx4.x with PNP switching polarity for Ex ia IIC | PROFSI3-B25100-ALG-LS |

For more detailed information please refer to the applicable product data sheet.



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