



EN 50155

## 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

## 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 ■ 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 ■ IP69K (with appropriate cable)
Vibration	■ IEC 60068-2-6 ■ 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 ■ AISI 316L (1.4404) ■ 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	■ 25 mA typ.. 50 mA max.

Reverse polarity protection	■ Yes
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Power-up time	■ < 2 s
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### Output signalization

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

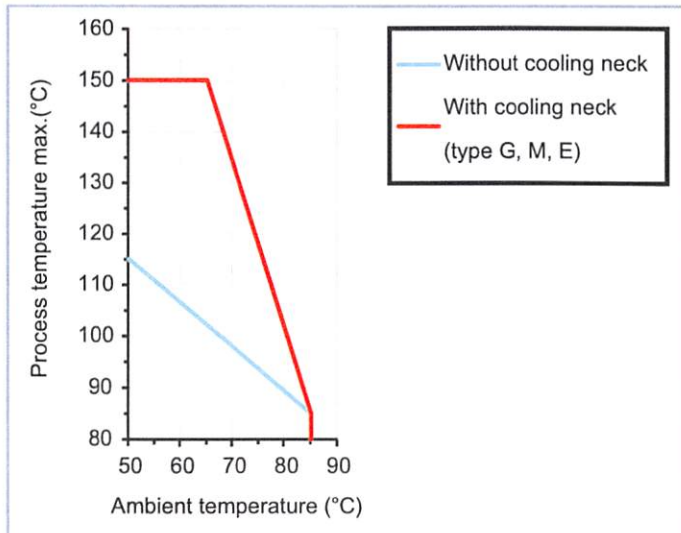
### Compliance and approvals

EMC Immunity	■ EN 61326 (installed in a metal tank)
EMC Emission	■ EN 61326 (installed in a metal tank)
Explosion protection	■ ATEX II 1 G Ex ia IIC T4/T5 ■ ATEX II 1 D Ex ta IIIC T100 °C Da ■ 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)

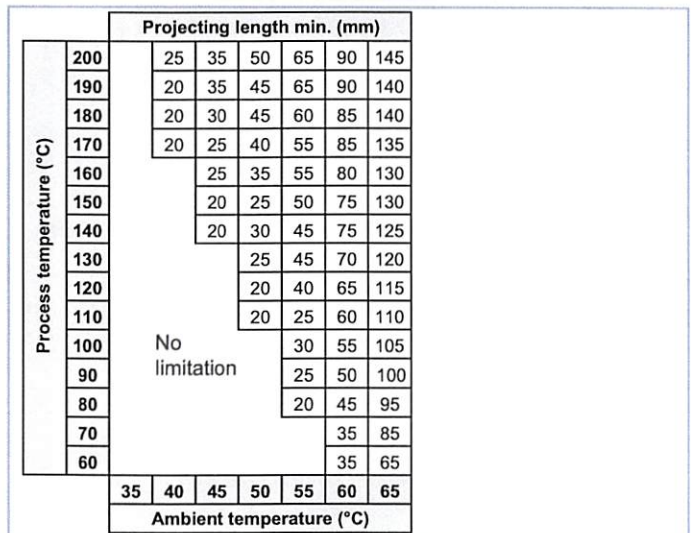
**Process conditions**

Type	Process connection	BCID	Process temperature	Process pressure	Process temperature max.	Process pressure
			continuous Tamb < 50 °C	bar	temporary t < 1 h Tamb < 50 °C	@ Process temperature max. temporary
			°C		°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 ... 100
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)



**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)	<ul style="list-style-type: none"> <li>■ Ui: 30 V DC</li> <li>■ li: 100 mA</li> <li>■ Pi: 0.75 W</li> </ul>
Internal capacitance	■ Ci: 43 nF
Internal inductance	■ Li: 10 µH
Temperature class	<ul style="list-style-type: none"> <li>■ T1...T4: -40 &lt; Tamb &lt; 85 °C</li> <li>■ T1...T5: -40 &lt; Tamb &lt; 74 °C</li> </ul>

**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	<ul style="list-style-type: none"> <li>■ T1...T4: -40 &lt; Tamb &lt; 85 °C</li> <li>■ T1...T5: -40 &lt; Tamb &lt; 74 °C</li> </ul>

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

## 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, water, 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.

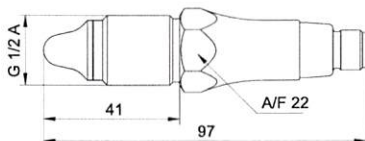
Two parallel switching outputs are available as Normally Open (NO) and Normally Closed (NC) which is defined by PN or NPN polarity when placing the order.

*CleverLevel*® LBFS in its default configuration covers a major part of potential applications. Where customer-specific configuration is required because of difficult media (e. g. foamy or adhering), the interface programming 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

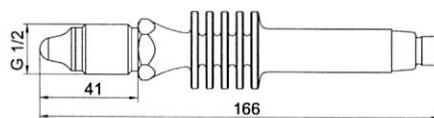
An electrode inside the sensor tip builds a capacitor together with the surroundings. The medium with its dielectric constant (DC value) is defining the capacitance value. A resonance circuit is created in combination with a coil in the sensor head. Switching signal tripping is according to the measured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

## Dimensional drawings



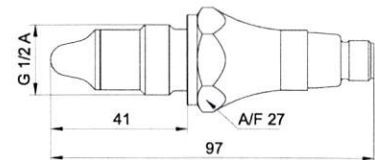
**LBFS-xx1xx.x**

G 1/2 A  
ISO 228-1



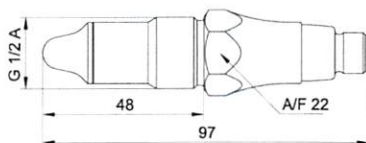
**LBFS-xxGxx.x**

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



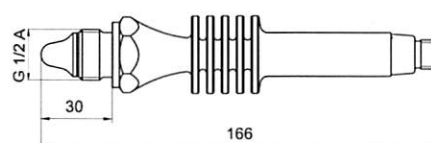
**LBFS-xxAxx.x**  
**LBFS-xxBxx.x**

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



**LBFS-xx4xx.x**

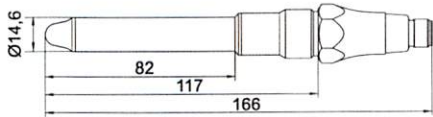
G 1/2 A hygienic



**LBFS-xxExx.x**

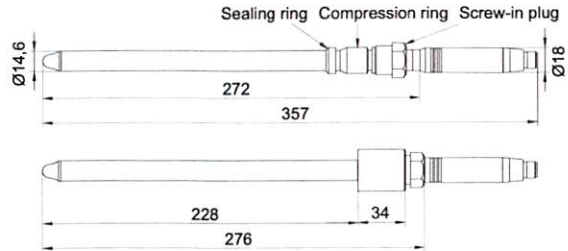
G 1/2 A DIN 3852-E,  
FKM (Viton®) gasket,  
with cooling neck

**Dimensional drawings**



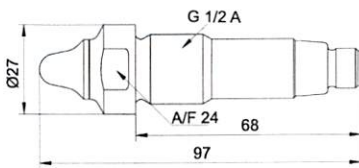
**LBFS-xxKxx.x**

G 1/2 A hygienic, length 82 mm



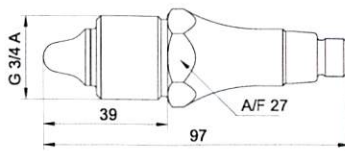
**LBFS-xxLxx.x**

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



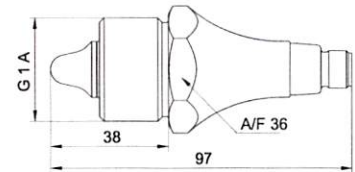
**LBFS-xx5xx.x**

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



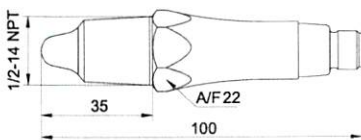
**LBFS-xx2xx.x**

G 3/4 A  
ISO 228-1



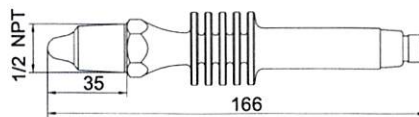
**LBFS-xx3xx.x**

G 1 A  
ISO 228-1



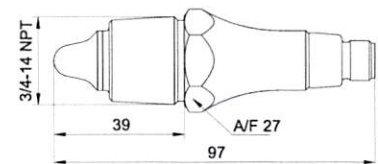
**LBFS-xxNxx.x**

1/2-14 NPT



**LBFS-xxMxx.x**

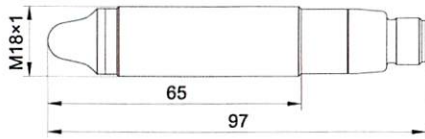
1/2-14 NPT  
with cooling neck



**LBFS-xx6xx.x**

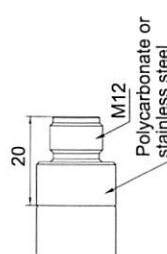
3/4-14 NPT

## Dimensional drawings



LBFS-xx7xx.x

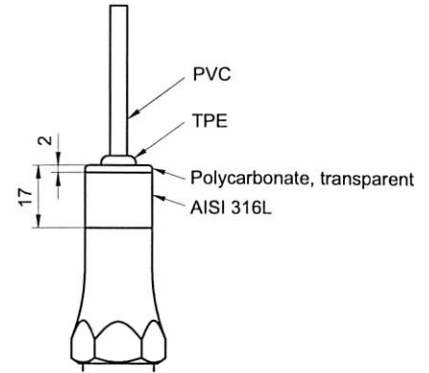
M18x1



LBFS-x1xxx.x

LBFS-x3xxx.x

Connector M12

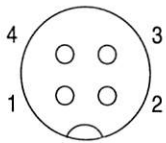


LBFS-x2xxx.x

Cable outlet

## Electrical connection

### Terminal assignment



#### Connector M12

- 1
- 2
- 3
- 4

#### Cable outlet

- Brown
- White
- Blue
- Black

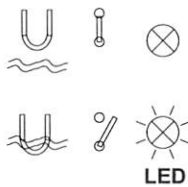
#### Function

- + Vs
- Normally closed (NC)
- 0 V
- Normally open (NO)

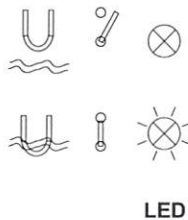
### Switching characteristic

#### Switching logic

#### Normally closed (NC)

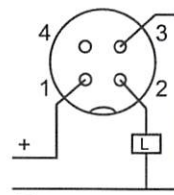


#### Normally open (NO)

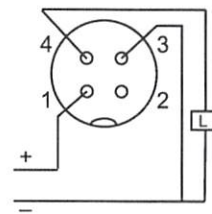


#### Switching polarity

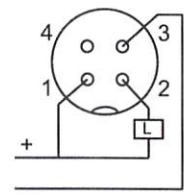
#### PNP



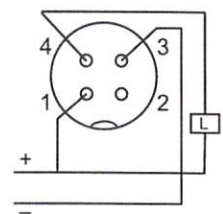
#### PNP



#### NPN



#### NPN



**Ordering code**
**Type**

Level switch

**Compliance and approvals**

Standard

ATEX II 1 G Ex ia IIC T4/T5 (2)

ATEX II 1 D Ex ta IIIC T100 °C Da

ATEX II 3 G Ex nA II T4/T5

ATEX II 1 G Ex ia IIC T4/T5 and ATEX II 1 D Ex ta IIIC T100 °C Da (2)

cULus Listed, Class 2, E365692

EAC (TR CU 020/2011)

**Electrical connection**

Connector M12, 4 pin, polycarbonate (with LED)

Cable outlet 5 m, 4-wire, PVC (3)

Connector M12, 4 pin, stainless steel (without LED)

**Process connection**

G 1/2 A ISO 228-1

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

G 1/2 A DIN 3852 form E, NBR gasket

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

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

G 1/2 A hygienic

G 1/2 A hygienic, length 82 mm

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

G 1/2 A ISO 228-1 for reverse assembly (in-shell thread) (4)

G 3/4 A ISO 228-1

G 1 A ISO 228-1

1/2-14 NPT

1/2-14 NPT with cooling neck

3/4-14 NPT

M18x1

**(BCID)**

(G07)

(G07)

(G51)

(G51)

(G51)

(A03)

(A03)

(A03)

(T10)

(G10)

(G11)

(N02)

(N02)

(N03)

(M11)

**Wetted parts material**

AISI 304 (1.4301) (available for „Process connection“ 1, 2, 3, 5, 6, 7)

AISI 316L (1.4404)

**Switching polarity**

PNP

NPN

**Configuration**

Factory setting

Customer-specific

LBFS	-	x	x	x	x	x	x	.	x
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LBFS

0

1

2

3

4

A

B

1

2

3

1

G

A

B

E

4

K

L

5

2

3

N

M

6

7

1

2

1

2

0

C

(2) The isolating barrier PROFIS3-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.:  $r \geq 10$  mm

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

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


Description	Ordering code
Clamp, DIN 32676 DN 25, DN 40 ISO 2852 DN 25, DN 38	ZPH3-3213



DIN 32676 DN 50 ISO 2852 DN 51	ZPH3-3216
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DIN 11851 DN 25	ZPH3-3221
DN 40	ZPH3-3224
DN 50	ZPH3-3225



SMS 1145 DN 51	ZPH1-3236
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Varivent® Type N	ZPH3-324E
Varivent® Type F	ZPH3-344F



DIN 11864-1-A DN 40	ZPH3-3254
DN 50	ZPH3-3255



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


Description

Tanks, with leak detection port

Ordering code

ZPW3-321



Thin wall tanks

ZPW3-322



Tanks, pipes

ZPW2-324


 Pipe with collar  
 DN 25 ... DN 50  
 DN 65 ... DN 150

ZPW2-326

ZPW2-327

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


Description

 Vibronic level switch replacement  
 EH FTL G 3/4 A  
 VS G 3/4 A  
 EH FTL G 1 A  
 VS G 1 A

Ordering code

ZPH1-32BA

ZPH1-32BC

ZPH1-32CB

ZPH1-32CD


 Industrial  
 G 1 A  
 G 1 1/2 A  
 G 2 A

ZPI1-32B

ZPI1-32D

ZPI1-32E

**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
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Gasket for LBFS-xx5xx.x for reverse assembly (BCID: T10)	ZPX3-14B0
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**Interfaces**


Description	Ordering code
FlexProgrammer 9701 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
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For more detailed information please refer to the applicable product data sheet.



## The FlexProgrammer 9701 kit

The FlexProgrammer 9701 is the dedicated configuring tool for a wide range of Baumer products.

The kit consists of

- FlexProgrammer 9701
- CD with the FlexProgram PC software
- USB cable
- Cable with 2 alligator clips
- Cable from FlexProgrammer to M12 plug for TE2
- Cable from FlexProgrammer to M12 Plug for various instruments such as LBFS and PBMN

## Installation of FlexProgram PC software

### WARNING!



**Do not connect the FlexProgrammer 9701 to your PC before the installation of the FlexProgram software.**



- 1) Quit all programs and insert the CD.
  - a) The CD will start an automatic installation.
  - b) If your autorun function has been disabled the installation should be done manually.  
Select the "FlexProgram\_Package" folder at the CD and run the .exe-file.
- 2) During installation you will be prompted for
  - a) User rights for the software
  - b) Folder name for the FlexProgram installation.
- 3) After the installation the FlexProgram will start automatically.

## Charging of battery of the FlexProgrammer 9701

- 1) Connect the FlexProgrammer 9701 to your PC to ensure that the battery will be recharged.
- 2) The battery will be discharged if the FlexProgrammer 9701 is not connected to a PC for some time.
- 3) It takes up to 16 hours to fully charge the FlexProgrammer 9701.
- 4) When receiving the FlexProgrammer 9701 it may be necessary to charge it before use.

## FlexProgrammer 9701 menu



Press  and  simultaneously to enter the FlexProgrammer 9701 menu containing e.g. Teach-In and Autozero functionalities.

Press  or  to browse the menu

Press  to access current menu point

Press  to return to previous menu

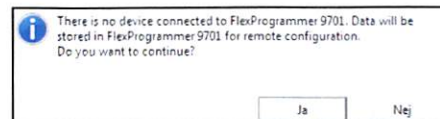
## Reset


Press  and  simultaneously for 5 seconds to reset the FlexProgrammer 9701.

## Store configuration to FlexProgrammer 9701

It is possible to store configuration data from a wide range of Baumer products included in the FlexProgram PC software (except AF14/AF15) to the FlexProgrammer 9701 for remote configuration.

- 1) Connect the FlexProgrammer 9701 to the USB port, open the FlexProgram PC software and select the product.  
*Note: Do not connect the product.*
- 2) Press the icon "store to device" and click "yes" to the following screen:



- 3) Once finished a screen shows "Configuration is successful finished".
- 4) Go to the field and connect the FlexProgrammer 9701 to the instrument and press .
- 5) The FlexProgrammer 9701 display will show "Download 'instrument type'".
- 6) Once done the display shows "Download Success".

# FlexProgram & Firmware

## Installation of Flexprogram software

English

### Downloading FlexProgram and Firmware



Downloading of the FlexProgram PC software and various instrument firmware can be done from the Baumer home page.

*FlexProgram:*

*www.baumer.com > Services > Downloads > Software - FlexProgram Package - B...*

*FlexProgrammer 9701:*

*www.baumer.com > Services > Downloads > Software - FlexProgrammer Firmware...*

*Baumer instrument:*

*www.baumer.com > Services > Downloads > Software - "relevant instrument" Firmware, e.g. CombiPress PFMx Firmware ver...*

Click on the desired download in the "Language" box.

Download and save the file on your PC in a selected directory e.g. on your desktop.

If it is a ZIP-file, please unzip the downloaded file to a selected directory, e.g. on your desktop.

### Installation and update of the FlexProgram software

Open the file with the downloaded, unzipped file, click on the "FlexProgram software package B...exe" and follow the instructions and the FlexProgram will automatically be installed on your PC.

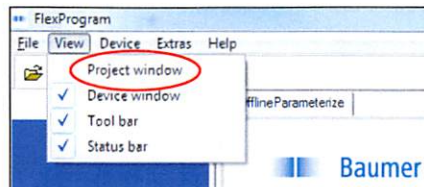
The Basic FlexProgram Package includes drivers for the FlexProgrammer 9701 and all the instruments, that are programmable with this software. A new version will automatically overwrite older versions and you are able to work with the new version as soon as it is installed.

### Update the FlexProgrammer 9701 and instrument Firmware

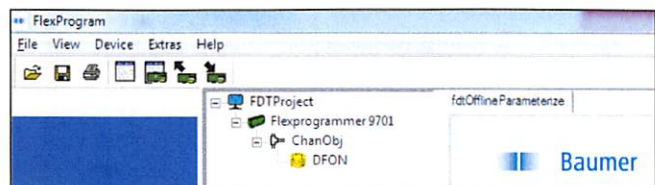
Connect the instrument to the FlexProgrammer 9701 and the FlexProgrammer 9701 to your PC.

Choose the relevant instrument from the list to the left.

Press "View" and click on "Project window"



A project tree appears



Go to page 3 for FlexProgrammer 9701 firmware update

Go to page 4 for instrument firmware update

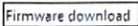
English

### Updating the FlexProgrammer 9701 firmware



Right click on 


and this selection box will appear

Click on 



and this window will appear



Press 

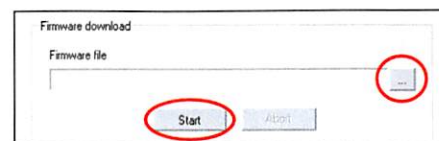
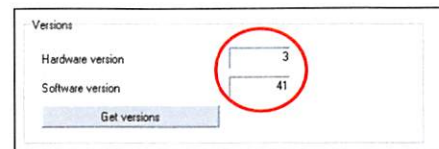
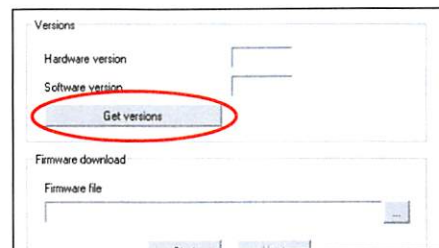
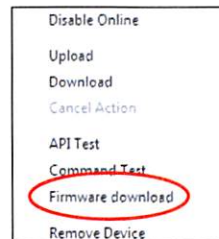
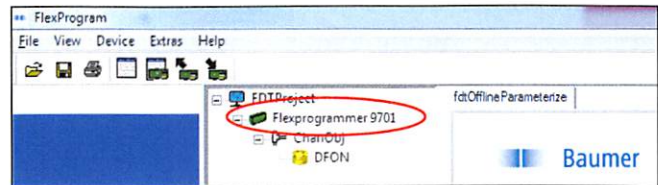
and the hardware and software version number will be shown. If your software version has a lower version number than the newest version of the FlexProgrammer 9701 firmware, please update the FlexProgrammer 9701.

*Note: In case the software is corrupt and shows an error message please close and reopen the FlexProgram.*  
Skip the step  and go directly to Firmware download.

#### Firmware download

Press  and find and select the unzipped file (.txt file) in your directory and then press . Update will now take place. It may take several minutes before the update is completed.

After finishing the update of the FlexProgrammer 9701 please press   simultaneously for 5 seconds on the FlexProgrammer 9701 to complete the installation.



English

### Updating of instrument firmware



Right click on the connected instrument e.g. DFON

and this selection box will appear

Click on Firmware download

and this window will appear

Press

and the version number will be displayed.  
If your software version has a lower version number than the newest version of the instrument firmware, please update the instrument.

*Note: In case the software is corrupt and shows an error message please close and reopen the FlexProgram.*

*Skip the step and go directly to Firmware download.*

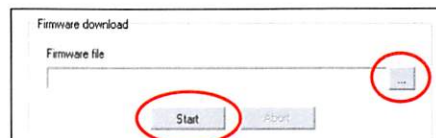
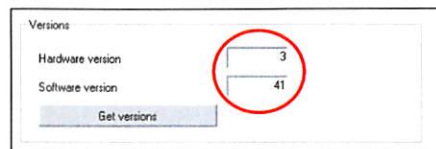
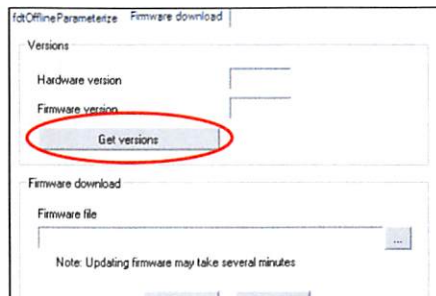
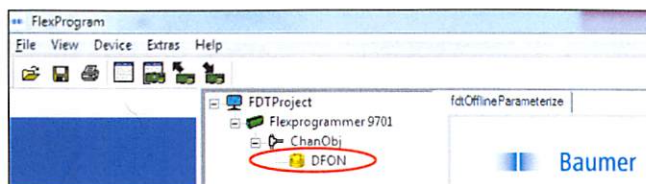
#### Firmware download

Press and find and select the unzipped file (.txt file) in your directory and then press

Update will now take place.

It may take several minutes before the update is completed.

When the update of the instrument firmware has been finished successfully the text to the right will be displayed.



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