

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 2 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 (no load) ■ 25 mA typ., 50 mA max.

- Reverse polarity protection ■ Yes

- Power-up time ■ < 2 s

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

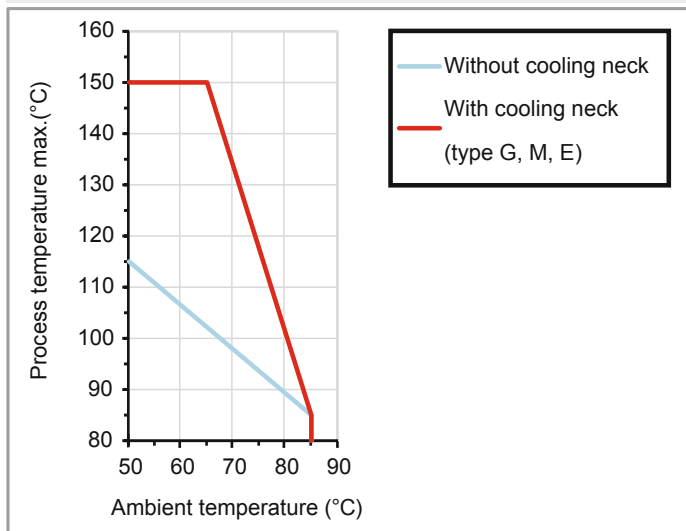
Compliance and approvals

- 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)
- Pharmaceutical ■ USP Class VI (PEEK material)

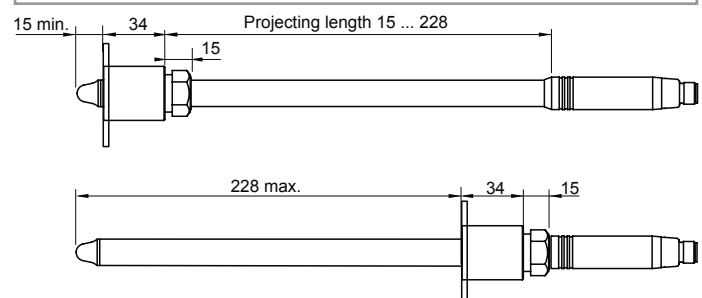
Note: Information on product characteristics may relate to defined product options

Process conditions

Type	Process connection	BCID	Process temperature	Process pressure	Process temperature max.	Process pressure
			continuous T _{amb} < 50 °C	bar	temporary t < 1 h T _{amb} < 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)

Process temperature (°C)	Projecting length min. (mm)						
	25	35	50	65	90	145	
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				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

Maximum values (for barrier selection) (1)	<ul style="list-style-type: none"> ■ Ui: 30 V DC ■ Ii: 100 mA ■ Pi: 0.75 W
Internal capacitance	■ Ci: 43 nF (2)
Internal inductance	■ Li: 10 µH (3)
Temperature class	<ul style="list-style-type: none"> ■ T1...T4: -40 < Tamb < 85 °C ■ T1...T5: -40 < Tamb < 74 °C Cable version: <ul style="list-style-type: none"> ■ T1...T5: -25 < Tamb < 70 °C

ATEX II 1 D Ex ta IIIC T100 °C Da

Supply range	<ul style="list-style-type: none"> ■ Un: 30 V DC max. ■ In: 100 mA max.
Temperature class	<ul style="list-style-type: none"> ■ T100 °C: -40 < Tamb < 85 °C Cable version: <ul style="list-style-type: none"> ■ T100 °C: -25 < Tamb < 70 °C
Protection class of cable accessory	■ IP67

ATEX II 3 G Ex nA II T4/T5

Supply range	<ul style="list-style-type: none"> ■ Un: 30 V DC max. ■ In: 100 mA max.
Temperature class	<ul style="list-style-type: none"> ■ T1...T4: -40 < Tamb < 85 °C ■ T1...T5: -40 < Tamb < 74 °C Cable version: <ul style="list-style-type: none"> ■ T1...T5: -25 < Tamb < 70 °C

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

(2) For cable version LBFS-x2xxx.x add 0.17 nF/meter to Ci for cable lengths above 5 meter

(3) For cable version LBFS-x2xxx.x add 0.27 µH/meter to Li for cable lengths above 5 meter

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.

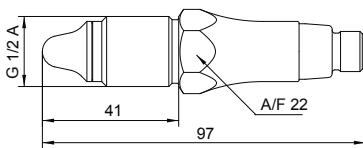
Two parallel switching outputs are available as Normally Open (NO) and Normally Closed (NC) which is defined by PN or NPN polarity when placing the order.

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

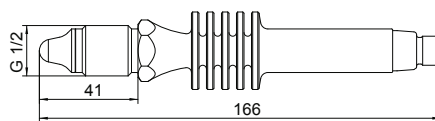
An electrode inside the sensor tip builds a capacitor together with the surroundings. The medium with its dielectric constant (DC value) is defining the capacitance value. A resonance circuit is created in combination with a coil in the sensor head. Switching signal tripping is according to the measured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

Dimensional drawings



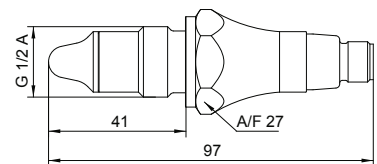
LBFS-xx1xx.x

G 1/2 A
ISO 228-1



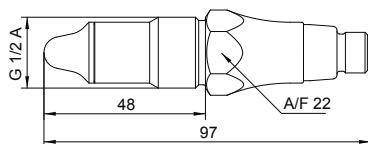
LBFS-xxGxx.x

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



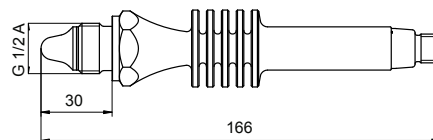
LBFS-xxAxx.x
LBFS-xxBxx.x

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



LBFS-xx4xx.x

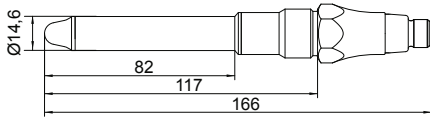
G 1/2 A hygienic



LBFS-xxExx.x

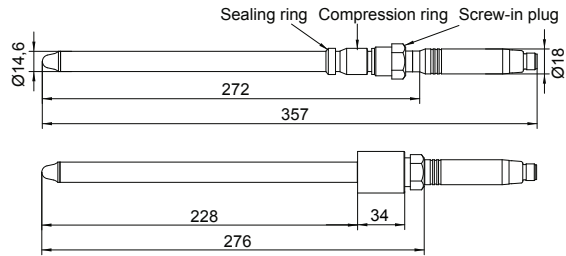
G 1/2 A DIN 3852-E,
FKM (Viton®) gasket,
with cooling neck

Dimensional drawings



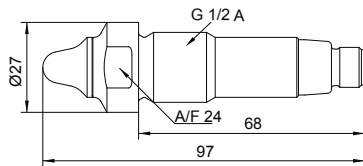
LBFS-xxKxx.x

G 1/2 A hygienic, length 82 mm



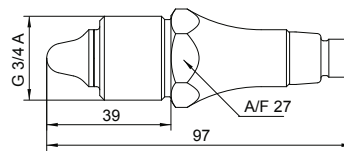
LBFS-xxLxx.x

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



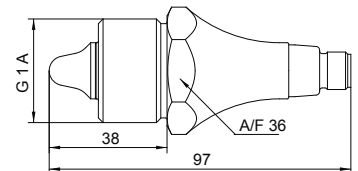
LBFS-xx5xx.x

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



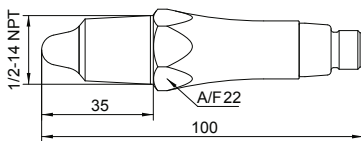
LBFS-xx2xx.x

G 3/4 A
ISO 228-1



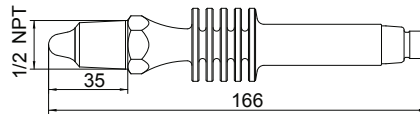
LBFS-xx3xx.x

G 1 A
ISO 228-1



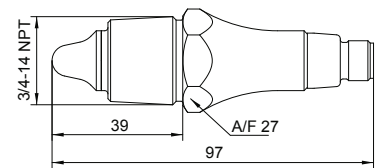
LBFS-xxNxx.x

1/2-14 NPT



LBFS-xxMxx.x

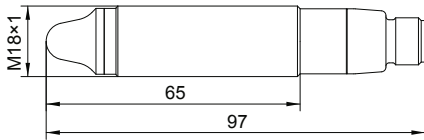
1/2-14 NPT
with cooling neck



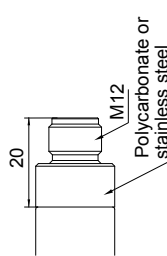
LBFS-xx6xx.x

3/4-14 NPT

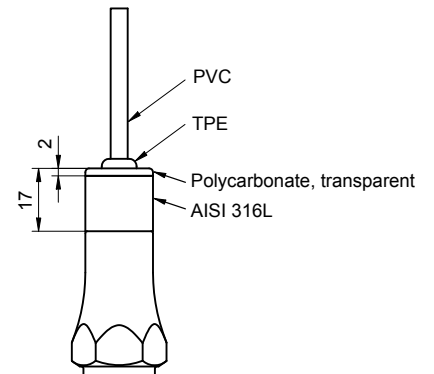
Dimensional drawings



LBFS-xx7xx.x
M18x1



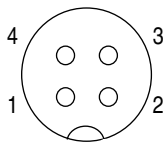
LBFS-x1xxx.x
LBFS-x3xxx.x
Connector M12



LBFS-x2xxx.x
Cable outlet

Electrical connection

Terminal assignment



Connector M12
1
2
3
4

Cable outlet
Brown
White
Blue
Black

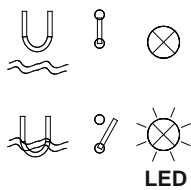
Function
+ Vs
Normally closed (NC)
0 V
Normally open (NO)

Switching characteristic

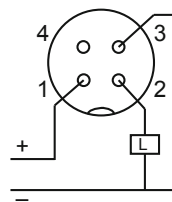
Switching logic

Switching polarity

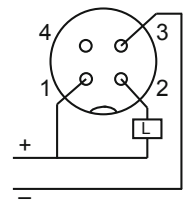
Normally closed (NC)



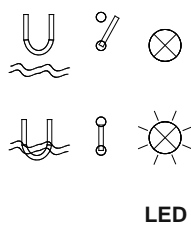
PNP



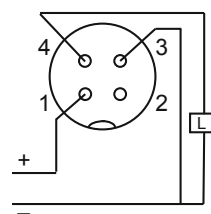
NPN



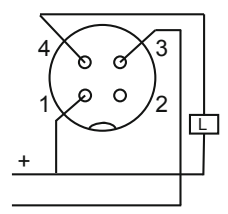
Normally open (NO)



PNP



NPN



Ordering code



	LBFS	-	x	x	x	x	x	x	.	x
Type	LBFS									
Level switch										
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 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



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
	DIN 11851 DN 25 DN 40 DN 50	ZPH3-3221 ZPH3-3224 ZPH3-3225
	SMS 1145 DN 51	ZPH1-3236
	Varivent® Type N Varivent® Type F	ZPH3-324E ZPH3-344F
	DIN 11864-1-A DN 40 DN 50	ZPH3-3254 ZPH3-3255
	Baumer Hygienic Connection BHC 3A DN 38	ZPH1-32D3

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 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	Ordering code
	Vibronic level switch replacement EH FTL G 3/4 A VS G 3/4 A EH FTL G 1 A VS G 1 A	ZPH1-32BA ZPH1-32BC ZPH1-32CB ZPH1-32CD
	Industrial G 1 A G 1 1/2 A G 2 A	ZP11-32B ZP11-32D ZP11-32E

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

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

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