CleverLevel® LBFI

Point level detection

Product highlights

- Safe detection of liquids, bulk solids and powders
- Short immersion length
- Capable of differentiation between foam and liquid
- Insensitive to adherent or sticky media
- Status indication by bright, multicolor LED
- Compact stainless steel housing, protection up to IP69K
- Teach-in on site or remote by control wire
- Two switching outputs with dedicated switching windows
- IO-Link configuration and interface

User benefits

- One sensor for all applications
- Safe process with less downtime
- Visual observation of process
- High acceptance of process connections
- Easy to operate

Technical data

Housing

Style	■ Compact design
Overall size	■ Refer to section „Dimensional drawings"
Material	■ Stainless steel

Electrical connection

Connector variants	■ M12-A, 4-pin, polycarbonate ■ M12-A, 4-pin, stainless steel

Ambient conditions

Operating temperature range	■ -40 ... 85 °C
Storage temperature range	■ -40 ... 85 °C
Humidity	■ < 98 % RH, condensing
Degree of protection (EN 60529)	■ IP67 ■ IP69K (with appropriate cable)
Vibration (sinusoidal) (EN 60068-2-6)	■ 1.6 mm p-p (2 … 25 Hz), 4 g (25 … 100 Hz), 1 octave / min.

Process connection

Connection variants	■ Refer to section „Dimensional drawings"
Mounting position	■ Any (top, bottom, side)
Wetted parts material	■ PEEK Natura ■ AISI 316L (1.4404)
Surface roughness wetted parts	■ Ra < 0.8 μm

Process conditions

Process temperature	■ Refer to section „Process conditions"
Process pressure	■ Refer to section „Process conditions"

Power supply

Voltage supply range	■ 8 ... 36 V DC
Current consumption (no load)	■ < 35 mA typ., 50 mA max.

Power supply

Reverse polarity protection	■ Yes
Power-up time	■ < 3 s

Output signal

Output type	■ PNP ■ NPN ■ Digital (push-pull)
Current rating	■ 100 mA max.
Short circuit protection	■ Yes
Voltage drop	■ PNP: (+Vs -0.5 V) ± 0.2 V, Rload ≥ 10 kΩ ■ NPN: (+0.4 V) ± 0.2 V, Rload ≥ 10 kΩ
Off leak current	■ < 100 μA max.
Switching logic	■ Normally open (NO) ■ Normally closed (NC) ■ Active high ■ Active low
Interface	■ IO-Link 1.1

Performance characteristics

Repeatability	■ ± 1 mm
Hysteresis	■ ± 1 mm
Response time	■ 0.04 s typ.
Media characteristics	■ DC > 1.5
Damping	■ 0.0 ... 10.0 s (adjustable)

Factory settings

Switching range (dielectric constant DC)	■ < 75 % (DC > 2)
Range hysteresis	■ 2.4 %
Switching logic	■ SW1: Normally open (NO) ■ SW2: Normally closed (NC)
qTeach	■ activated
Damping	■ 0.1 s

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

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Technical data

ATEX II 1G Ex ia IIC T4 Ga, ATEX II 1D Ex ta IIIC T100 °C Da

Maximum values (for barrier selection)	■ Ui: 30 V DC max. ■ Ii: 100 mA ■ Pi: 750 mW
Internal capacitance	■ Ci: 63 nF
Internal inductance	■ Li: 617 µH
Temperature class	■ T1 … T4: -40 < Tamb < 85 °C ■ T100 °C: -40 < Tamb < 85 °C
Degree of protection for cable	■ IP67

ATEX II 3G Ex nA IIC T4 Gc

Voltage supply range	■ Un: 30 V DC max.
Current rating	■ In: 100 mA
Temperature class	■ T1 … T4: -40 < Tamb < 85 °C
Degree of protection for cable	■ IP67

Compliance and approvals

|	
EMC Immunity	■ EN 61326
EMC Emission	■ EN 61326 (installed in a metal tank)
Safety	■ cULus listed, E365692
Hygiene	■ FDA (21 CFR 177.2416)

Process conditions

Process connection	BCID	Ordering key	Process temperature continuous Tamb < 50 °C	Process pressure	Process temperature max. temporary t < 1 h Tamb < 50 °C	Process pressure @ Process temperature max. temporary
			°C	bar	°C	bar
G 1/2 A ISO 228-1	G07	G070	-40 … 115	-1 … 100	135	-1 … 100
G 1/2 A hygienic	A03	A030	-20 … 115	-1 … 10	135	-1 … 5
1/2-14 NPT	N02	N020	-40 … 115	-1 … 100	135	-1 … 100

Dimensional drawings

Process connection
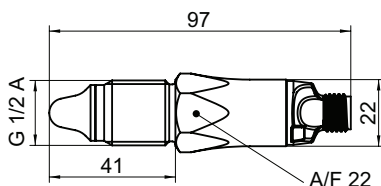
G 1/2 A ISO 228-1

G07-G070
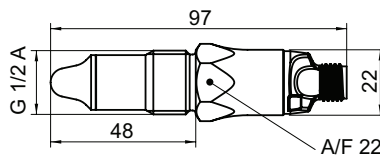
G 1/2 A hygienic

A03-A030
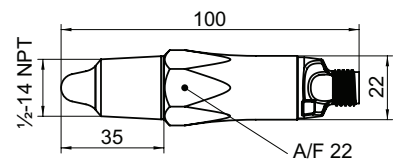
1/2-14 NPT

N02-N020

Note:

Information on product characteristics may relate to defined product options.

Information in format AXX-X... relates to „Baumer Connection Identifier" (BCID) and dedicated ordering code.

CleverLevel® LBFI

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Field of application

CleverLevel® LBFI 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 *CleverLevel*® LBFI 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 switching outputs are available with dedicated switching windows.

The switching function is programmable as PNP, NPN or digital (push-pull) polarity, as well as the switching logic like Normally Open (NO), Normally Closed (NC) or inverted.
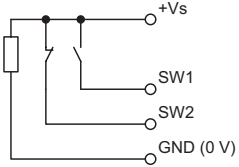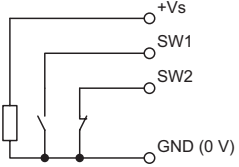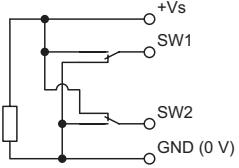*CleverLevel*® LBFI in its default configuration covers a major part of potential applications. Where customer-specific configuration is required because of demanding media (e. g. foamy or adhering), qTeach, remote teach or the FlexProgrammer 9701 allows for easy optimation of the switching windows. 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.
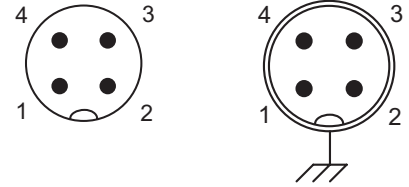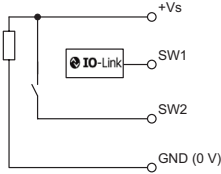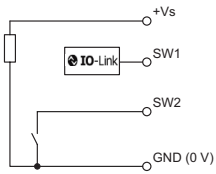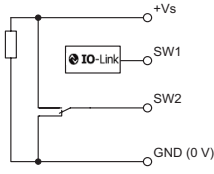
Measuring principle

An electrode integrated into the sensor tip forms a capacitor with the environment. The medium determines the capacity value depending on its dielectric c onstant (DC values). A resonant circuit occurs together with a coil in the sensor electronics.
Depending on the resonance frequency measured and the programmable switching window, the switch signal is activated.
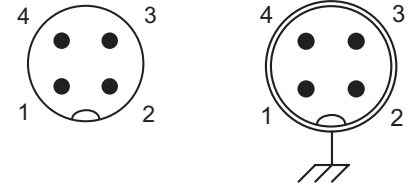
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Electrical connection

Pin assignment

Output type	Equivalent circuit	Function	M12-A, 4-Pin, polycarbonat X04-010	M12-A, 4-Pin, stainless steel X04-020
PNP		+Vs	1	1
		SW1	4	4
		SW2	2	2
		GND (0 V)	3	3
		Frame ground	N/A	Plug thread
NPN		+Vs	1	1
		SW1	4	4
		SW2	2	2
		GND (0 V)	3	3
		Frame ground	N/A	Plug thread
Digital (push-pull)		+Vs	1	1
		SW1	4	4
		SW2	2	2
		GND (0 V)	3	3
		Frame ground	N/A	Plug thread

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Electrical connection

Pin assignment

Output type	Equivalent circuit	Function	M12-A, 4-Pin, polycarbonat X04-010	M12-A, 4-Pin, stainless steel X04-020
Programmable output IO-Link PNP		+Vs	1	1
		SW1 (IO-Link)	4	4
		SW2	2	2
		GND (0 V)	3	3
		Frame ground	N/A	Plug thread
Programmable output IO-Link NPN		+Vs	1	1
		SW1 (IO-Link)	4	4
		SW2	2	2
		GND (0 V)	3	3
		Frame ground	N/A	Plug thread
Programmable output IO-Link Digital (push-pull)		+Vs	1	1
		SW1 (IO-Link)	4	4
		SW2	2	2
		GND (0 V)	3	3
		Frame ground	N/A	Plug thread

Ordering information

			LBFI	-	x	1	.	xxx	.	xxxx	2	0	.	x	.	x	00	0	.	x

Type		
Level switches		LBFI

Version		
Standard without IO-Link		1
Programmable output, IO-Link		2

Housing		
Standard		1

Electrical connection	**(BCID)**	
Connector M12-A, 4-pin, polycarbonate (with LED)	X04	010
Connector M12-A, 4-pin, stainless steel (without LED)	X04	020

Process connection	**(BCID)**	
G 1/2 A ISO 228-1	G07	G070
G 1/2 A hygienic	A03	A030
1/2-14 NPT	N02	N020

Wetted parts material	
AISI 316L (1.4404)	2

Gasket	
Without	0

Output type	
PNP	1
NPN	2
Digital (push-pull)	3

Explosion protection	
Without	0
ATEX II 3G Ex nA IIC T4 Gc	3
ATEX II 1G Ex ia IIC T4 Ga and ATEX II 1D Ex ta IIIC T100 °C Da	4

Industrial approvals	
Standard	00

Special approvals	
Standard	0

Configuration	
Factory settings	0
Customer-specific	1

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Accessories

	Industrial weld-in sleeves for „Process connection" G070 (G 1/2 A ISO 228-1, BCID: G07)	
	Description	Ordering information
	Universal use Ø 30 x 26, AISI 304 (1.4301) Ø 30 x 26, AISI 316L (1.4404)	ZPW1-711 ZPW1-721

	Hygienic weld-in sleeves for „Process connection" A030 (G 1/2 A hygienic, BCID: A03)	
	Description	Ordering information
	Universal use, with leak detection port Ø 30 x 34, AISI 316L (1.4404)	ZPW2-321
	Thin-walled tanks Ø 45 x 34, AISI 316L (1.4404)	ZPW2-322
	Inclined mounting Ø 35 x 34, AISI 316L (1.4404)	ZPW2-324
	Pipes with collar DN 25 … 50, Ø 29 x 36.5 AISI 316L (1.4404) DN 65 … 150, Ø 30 x 36.5 AISI 316L (1.4404)	ZPW2-326 ZPW2-327

	Thread adapters for „Process connection" A030 (G 1/2 A hygienic, BCID: A03)	
	Description	Ordering information
	Industry standard G 1 A ISO 228-1, AISI 316L (1.4404) G 1 1/2 A ISO 228-1, AISI 316L (1.4404) G 2 A ISO 228-1, AISI 316L (1.4404)	ZPI1-32B ZPI1-32D ZPI1-32E
	Vibration fork replacement G 3/4 A EH FTL (GW2), AISI 316L (1.4404) G 1 A EH FTL (GQ2), AISI 316L (1.4404) G 3/4 A VS, AISI 316L (1.4404) G 1 A VS, AISI 316L (1.4404)	ZPH1-32BA ZPH1-32BC ZPH1-32CB ZPH1-32CD
	Hygienic interfacing G 1 A hygienic, AISI 316L (1.4404)	ZPH1-32C0

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Accessories

	Connectors with stainless steel knurl for demanding applications, protection up to IP69K (M12-A, 4-pin, BCID: X04)	
	Description	Ordering information
	Female connector straight with attached cable	
	2 m, TPE	ESG 34AY0200
	5 m, TPE	ESG 34AY0500
	10 m, TPE	ESG 34AY1000
	25 m, TPE	ESG 34AY2500
	Female connector angular with attached cable	
	2 m, TPE	ESW 33AY0200
	5 m, TPE	ESW 33AY0500
	10 m, TPE	ESW 33AY1000
	25 m, TPE	ESW 33AY2500
	Industrial connectors, protection up to IP67 (M12-A, 4-pin, BCID: X04)	
	Description	Ordering information
	Female connector straight with attached cable	
	2 m, PUR	ESG 34AH0200
	5 m, PUR	ESG 34AH0500
	10 m, PUR	ESG 34AH1000
	Female connector angular with attached cable	
	2 m, PUR	ESW 33AH0200
	5 m, PUR	ESW 33AH0500
	10 m, PUR	ESW 33AH1000
	15 m, PUR	ESW 33AH1500
	20 m, PUR	ESW 33AH2000
	Female connector straight with attached cable, shielded	
	2 m, PUR	ESG 34AH0200G
	5 m, PUR	ESG 34AH0500G
	10 m, PUR	ESG 34AH1000G
	Female connector angular with attached cable, shielded	
	2 m, PUR	ESW 33AH0200G
	5 m, PUR	ESW 33AH0500G
	10 m, PUR	ESW 33AH1000G
	Female connector straight with screw terminals	
	PG7, PBT	ES 18A PG7
	Female connector angular with screw terminals	
	PG7, PBT	ES 14A PG7

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Accessories		
	Interfaces	
	Description	Ordering information
	FlexProgrammer 9701	
	Kit for sensor parameterization, including programming interface with USB, connecting cables, carrying strap, CD-ROM with PC software and DTM drivers	9701-0001