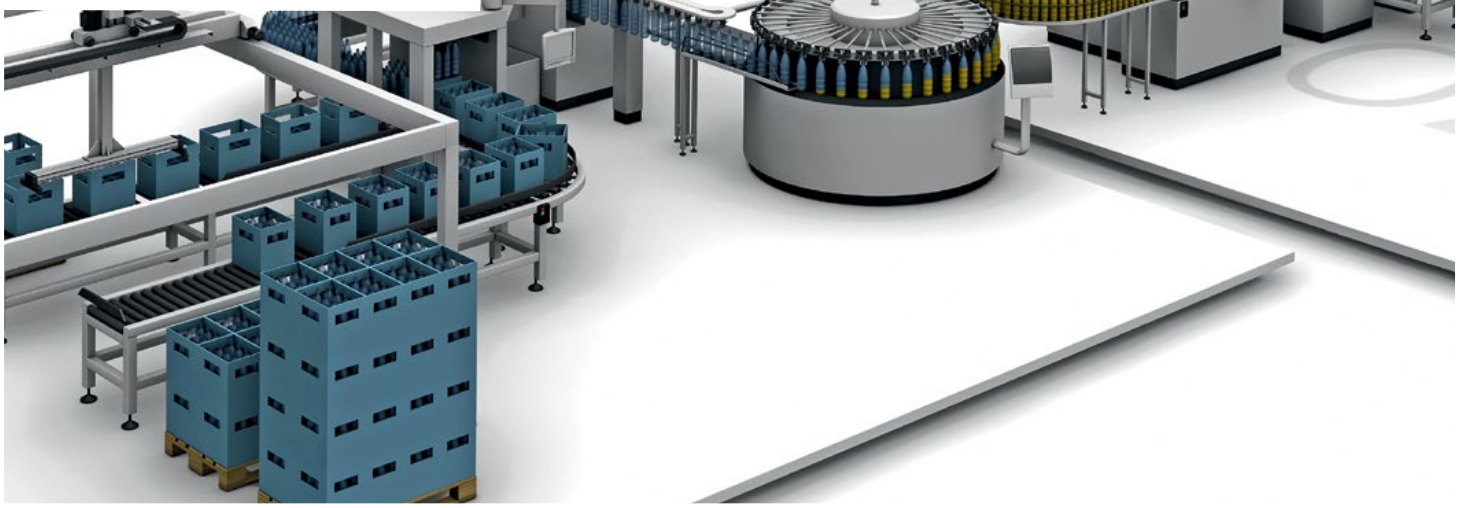
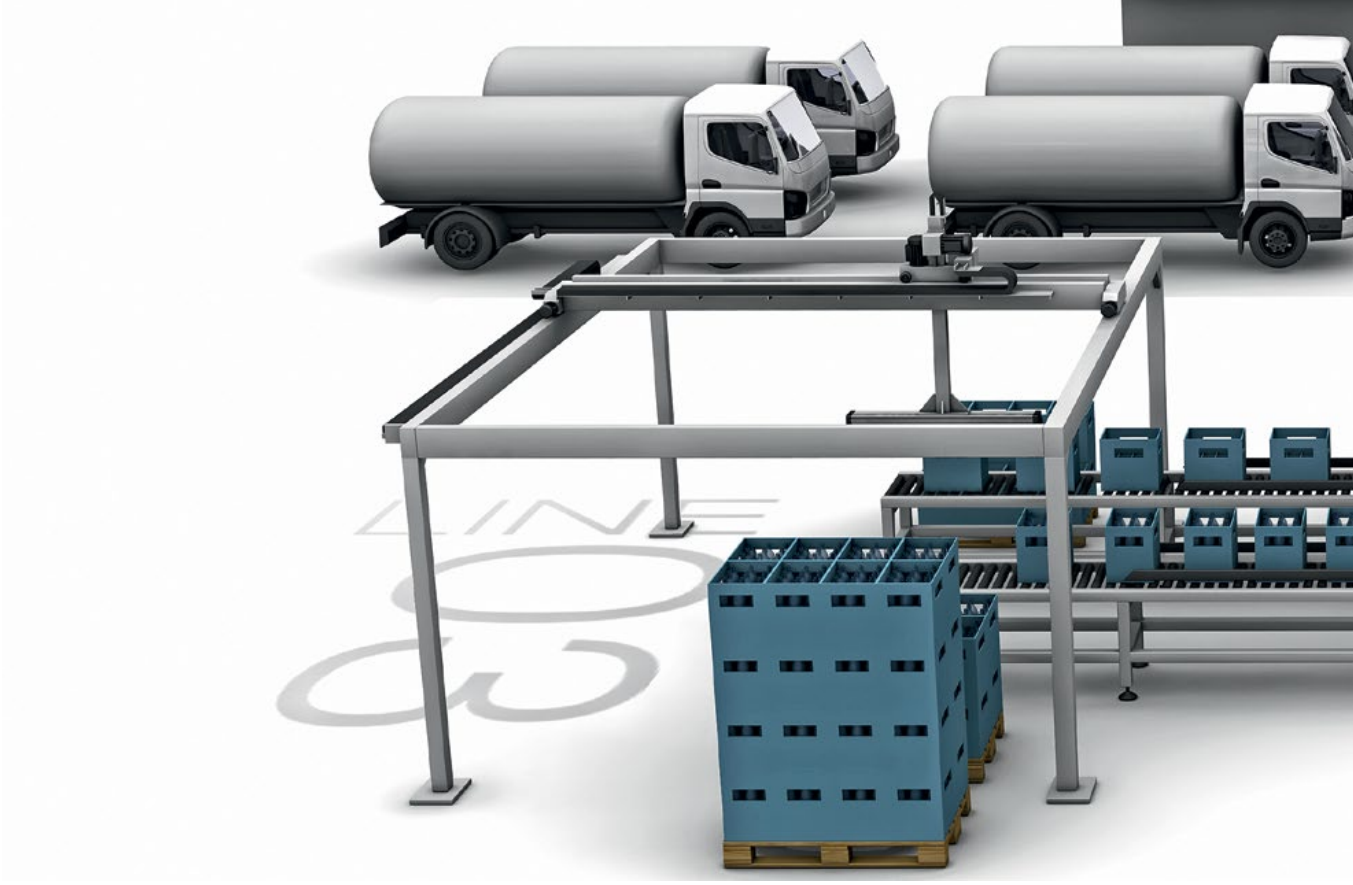
BALLUFF

Washdown Select Series

Sensors, connectivity & traceability solutions for food & beverage





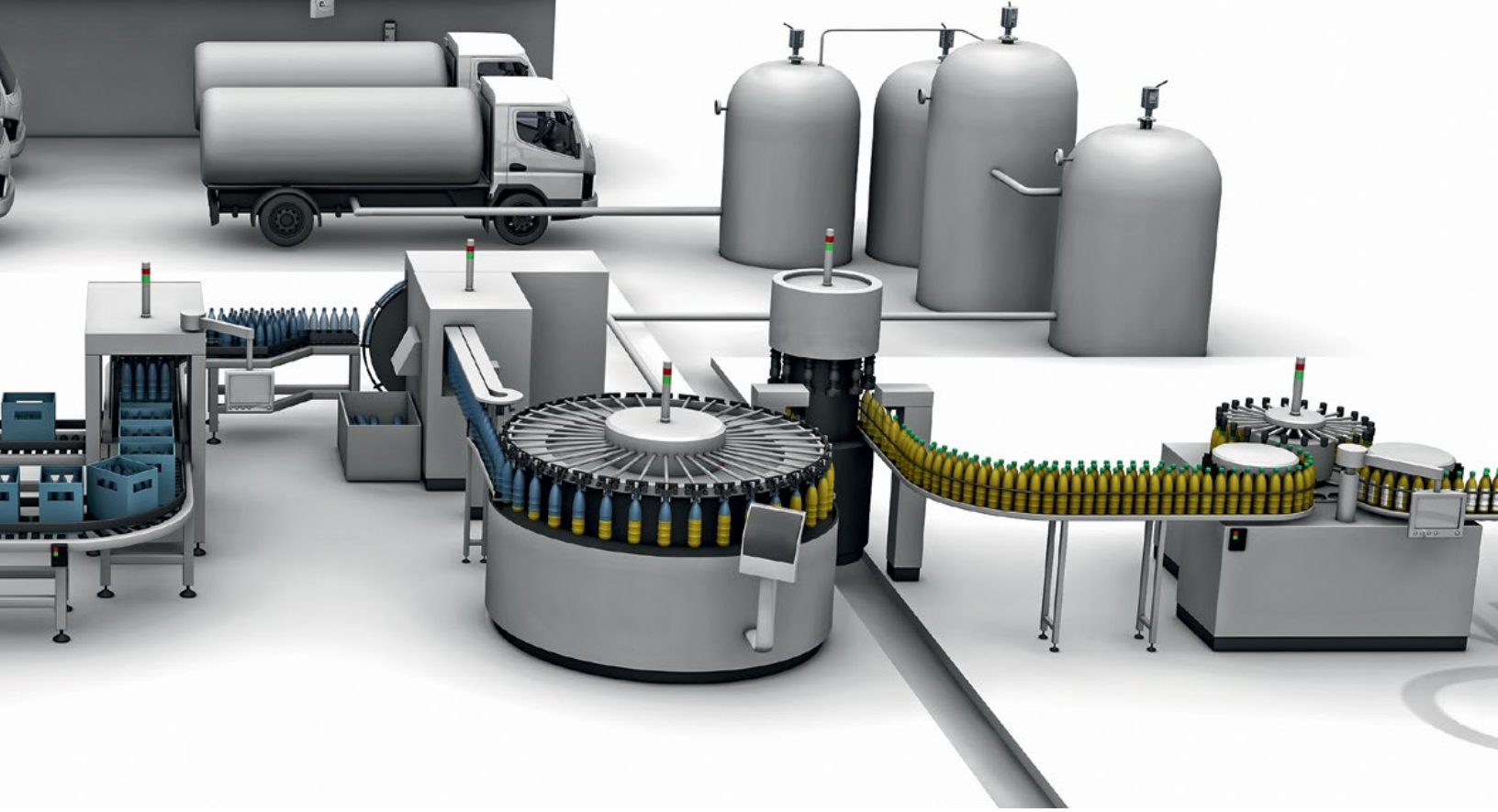
Washdown Select Series

Stainless & IP69K rated products for the Food & Beverage Industry

When working in automated food and beverage manufacturing segments like dairy, meat, filling and bottling, components that can survive in sanitary, hygienic and aseptic environments become necessary. Specifications for equipment look to reduce and remove areas for harboring bacteria. Poor survivability for automation components during washdown can become a major cause of downtime and lost production during changeovers and cleaning processes.

Balluff is utilized to improve manufacturing automation in four distinct applications inside a food and beverage facility: process automation, factory automation, flexible manufacturing and traceability.

- Sensing technologies like photoelectric, inductive, capacitive, and linear position
- Industrial RFID technologies and connectivity technologies
- Individual products with testing and ratings: FDA, 3A, EHEDG, ECOLAB
- RFID technologies can be used to support FSAM hazard analysis and risk-based preventive controls implementations



Process Automation
Detecting level and flow of media in a tank or pipe can be done with multiple technologies. Typically hard to detect media like ketchup, peanut butter, and powders are easy for advanced SmartLevel sensors.

Factory Automation
The washdown environment can cause havoc for general automation components like sensors. Having the right housing materials and higher ingress protection can help sensors survive harsh washdown processes.

Flexible Manufacturing
Variable lot sizes, multiple package formats, infinite recipes. There is an increasing demand to individualize and customize delivery of food & beverage products. Automation components like sensors and industrial RFID help enable the implementation of these go-to market strategies.

Traceability
Traceability inside the plant is a key component of modern manufacturing. Industrial RFID systems are used to track information like: access to equipment, how often the equipment is cleaned, where product is located, where product came from, which change tooling is installed, and what recipe is being run.

Contents

Photoelectric Sensors	4
Magnetic Cylinder Sensors	29
Inductive Sensors	30
Capacitive SmartLevel Sensors	40
Linear Position Sensors	44
Industrial Networking & IO-Link	54
Industrial RFID Systems	56
Mechanical Mounting Systems	62
Cables & Connectors	66

⚠ WARNING

- Read, understand, and follow warnings and manual. Failure to do so could result in serious injury or death.
- NEVER USE AS A SENSING DEVICE FOR PERSONNEL PROTECTION
- Does NOT include self-checking redundancy circuitry required for use in personnel safety applications
- Does NOT meet OSHA and ANSI standards for point-of-operation devices

Balluff, Inc. · www.balluff.com · 1-800-543-8390

Ø 18 Stainless Steel Smooth Body

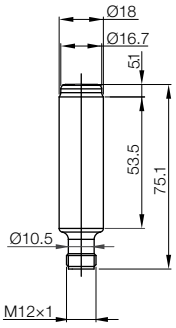
Rugged with maximum performance
The BOS 18E photoelectric sensors are made of corrosion-resistant stainless steel. This makes them especially rugged and resistant to many cleaning agents and other chemicals. A special housing nose and optics construction provides optimum sealing and rigidity.

The optical element is available in plastic.
The new BOS 18E series can thus be used for applications wherever other sensors reach their limits. Preferred areas of application are the foods and pharmaceutical industries.

Benefits
- Housing made of 1.4404 stainless steel (316L equivalent)
- Outstanding sealing quality: IP69K, IP68
- Available threaded or with smooth sleeve
- Hygiene-compliant – washdown design
- Available in all function principles

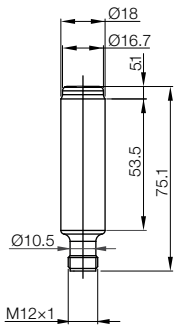
Type		**Diffuse sensor**
Detection range		**1…250 mm**
PNP, NO/NC		**BOS0241**
Emitter		
Supply voltage U_S		10...30 V DC
Output current		100 mA
No-load supply current I_0 max.		≤ 24 mA
Switching type		Light/dark switching
Polarity reversal protected/short-circuit protected		Yes/yes
Emitter, light type		LED, red light
Wavelength		640 nm
Switching frequency f		400 Hz
Degree of protection per IEC 60529		IP68/IP69K
Ambient temperature T_a		–25…+70 °C
Permissible ambient light		10000 Lux
Material	Housing	1.4404 stainless steel
	Optical surface	PMMA
Connection		M12 connector, 4-pin

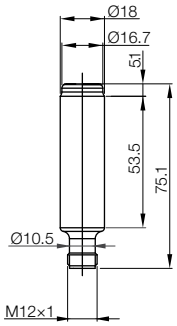
Other variants on our website or on request

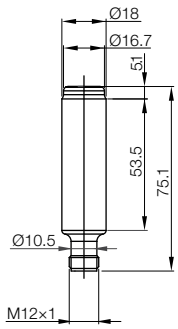


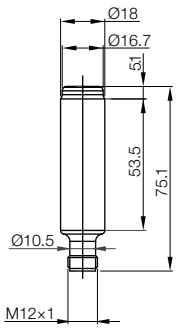
Photoelectric Standard Sensors
BOS G18E stainless steel

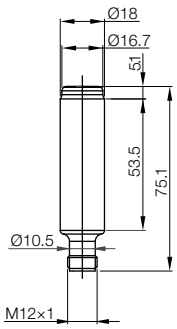
Diffuse sensor	**Diffuse sensor**	**Retroreflective sensor with polarization**	**Through-beam sensor**	**Through-beam sensor**
1…500 mm	**1…700 mm**	**0…5 m**	**0…20 m**	**0…20 m**
BOS0240	**BOS0244**	**BOS0245**		**BOS0243**
			BOS0242	
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA	100 mA
≤ 24 mA	≤ 24 mA	≤ 24 mA	≤ 24 mA	≤ 24 mA
Light/dark switching	Light/dark switching	Light/dark switching		Light/dark switching
Yes/yes	Yes/yes	Yes/yes	Yes/yes	Yes/yes
LED, red light	LED, infrared	LED, red light	LED, red light	LED, red light
640 nm	850 nm	640 nm	640 nm	640 nm
400 Hz	400 Hz	400 Hz		400 Hz
IP68/IP69K	IP68/IP69K	IP68/IP69K	IP68/IP69K	IP68/IP69K
–25…+70 °C	–25…+70 °C	–25…+70 °C	–25…+70 °C	–25…+70 °C
10000 Lux	10000 Lux	10000 Lux		10000 Lux
1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel
PMMA	PMMA	PMMA	PMMA	PMMA
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin







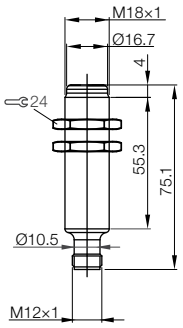


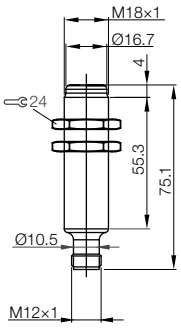


M18 Stainless Steel Thread

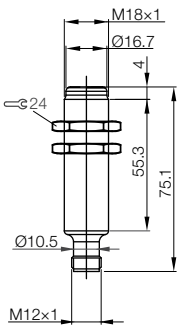
Type		**Diffuse sensor**	**Diffuse sensor**
Detection range		**1...250 mm**	**1…500 mm**
PNP, NO/NC		**BOS023T**	**BOS023R**
Emitter			
Supply voltage U_S		10...30 V DC	10...30 V DC
Output current		100 mA	100 mA
No-load supply current I_0 max.		≤ 24 mA	≤ 24 mA
Switching type		Light/dark switching	Light/dark switching
Polarity reversal protected/short-circuit protected		Yes/yes	Yes/yes
Emitter, light type		LED, red light	LED, red light
Wavelength		640 nm	640 nm
Switching frequency f		400 Hz	400 Hz
Degree of protection per IEC 60529		IP68/IP69K	IP68/IP69K
Ambient temperature T_a		–25…+70 °C	–25…+70 °C
Permissible ambient light		10000 Lux	10000 Lux
Material	Housing	1.4404 stainless steel	1.4404 stainless steel
	Optical surface	PMMA	PMMA
Connection		M12 connector, 4-pin	M12 connector, 4-pin

Other variants on our website or on request

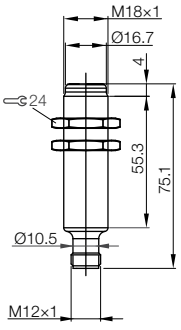




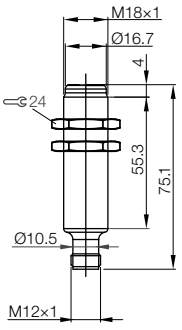
Diffuse sensor
1…700 mm
BOS023Z
10...30 V DC
100 mA
≤ 24 mA
Light/dark switching
Yes/yes
Infrared
850 nm
400 Hz
IP68/IP69K
–25…+70 °C
10000 Lux
1.4404 stainless steel
PMMA
M12 connector, 4-pin



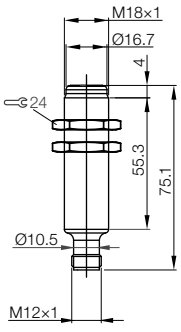
Retroreflective sensor with polarization
0…5 m
BOS023Y
10...30 V DC
100 mA
≤ 24 mA
Light/dark switching
Yes/yes
LED, red light
640 nm
400 Hz
IP68/IP69K
–25…+70 °C
10000 Lux
1.4404 stainless steel
PMMA
M12 connector, 4-pin



Through-beam sensor
0…20 m
BOS023U
10...30 V DC
100 mA
≤ 24 mA
Yes/yes
LED, red light
640 nm
IP68/IP69K
–25…+70 °C
1.4404 stainless steel
PMMA
M12 connector, 4-pin



Through-beam sensor
0…20 m
BOS023W
10...30 V DC
100 mA
≤ 24 mA
Light/dark switching
Yes/yes
LED, red light
640 nm
400 Hz
IP68/IP69K
–25…+70 °C
10000 Lux
1.4404 stainless steel
PMMA
M12 connector, 4-pin



For harsh environments

The new BOS R01E series sensors are ideal for harsh environments. With a full stainless steel housing they resist aggressive media such as all common cleaning agents. This makes these sensors ideal for many applications and industries – especially the food & beverage industry.

Their compact size means the BOS R01E series sensors also fit in tight spaces. Their installation is quick and easy.

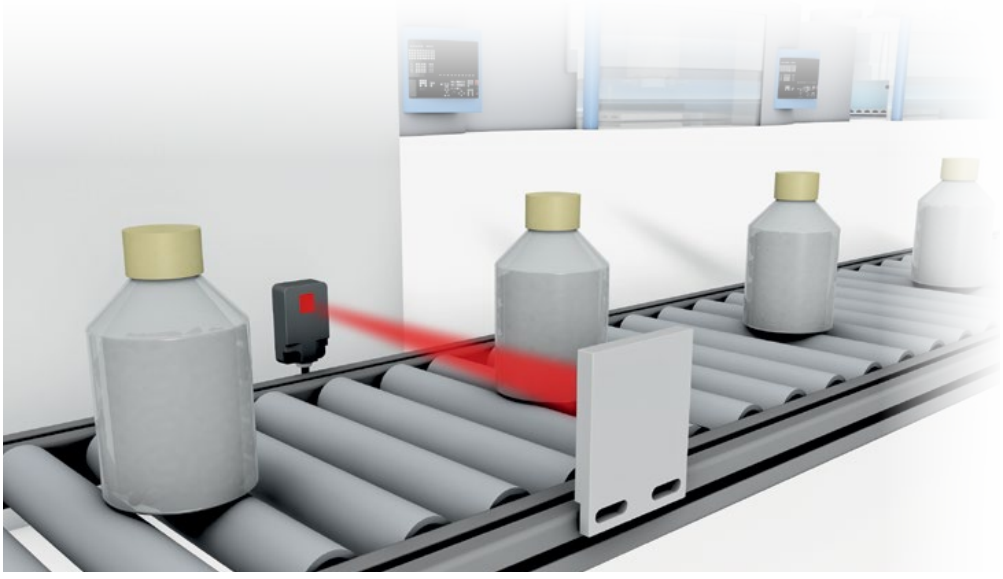
Benefits

- Full stainless steel – ideal in harsh environments
- Bright, homogeneous light spot – quick and easy alignment
- Strong red light – precision for long ranges
- Complete family – all optical sensor types available

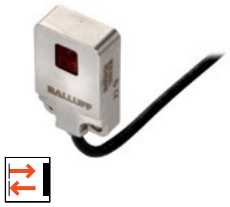
Type		
Detection range		
PNP, NO		
PNP, NC		
Emitter		
Supply voltage U_S		
Output current max.		
No-load supply current I_0 max.		
Polarity reversal protected/short-circuit protected		
Settings		
Emitter, light type		
Switching frequency f		
Degree of protection per IEC 60529/DIN 40050		
Ambient temperature T_a		
Material	Housing	
	Optical surface	
Connection		

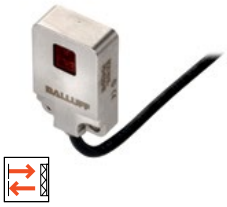
Reference object: white, 90 % reflection, 200 × 200 mm
Reference reflector: BOS R-9

Other variants on our website or on request

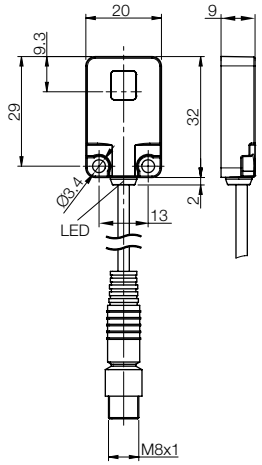


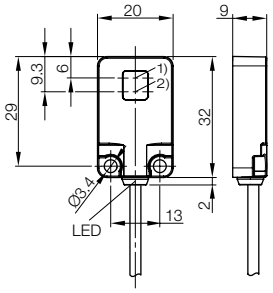
The stainless steel housing enables presence verification in the foods industry.

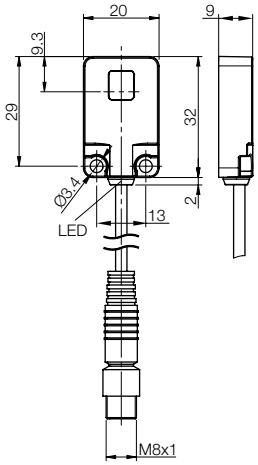


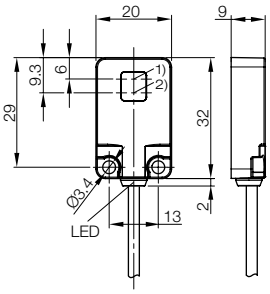


Diffuse sensor	**Diffuse sensor**	**Retroreflective sensor with polarization**	**Retroreflective sensor with polarization**
1...100 mm	**1...100 mm**	**25...1000 mm**	**25...1000 mm**
BOS021J	**BOS021K**	**BOS021L**	**BOS021M**
BOS021Y	**BOS021Z**	**BOS0222**	**BOS0223**
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA
10 mA	10 mA	10 mA	10 mA
Yes/yes	Yes/yes	Yes/yes	Yes/yes
fixed	fixed	fixed	fixed
LED, red light	LED, red light	LED, red light	LED, red light
500 Hz	500 Hz	500 Hz	500 Hz
IP67/IP69K	IP67/IP69K	IP67/IP69K	IP67/IP69K
–5…+55 °C	–5…+55 °C	–5…+55 °C	–5…+55 °C
1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel
PA	PA	PA	PA
0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable, 3 × 0.14 mm²	0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable, 3 × 0.14 mm²

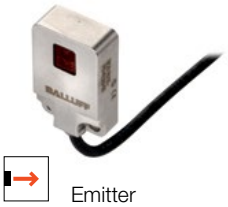








Emitter

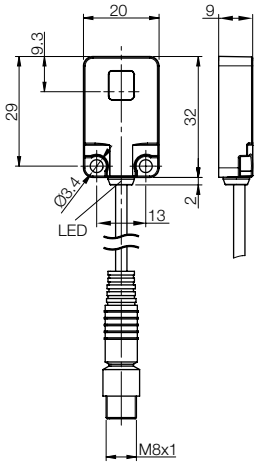


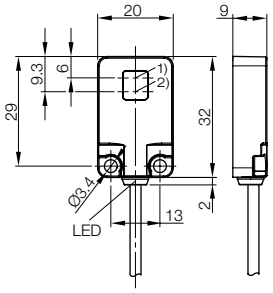
Emitter

Type		**Through-beam sensor**	**Through-beam sensor**
Detection range		**0...2200 mm**	**0...2200 mm**
PNP, NO			
PNP, NC			
Emitter		**BOS021R**	**BOS021T**
Supply voltage U_S		10...30 V DC	10...30 V DC
Output current max.			
No-load supply current I_0 max.		10 mA	10 mA
Polarity reversal protected/short-circuit protected		Yes/yes	Yes/yes
Settings		fixed	fixed
Emitter, light type		LED, red light	LED, red light
Switching frequency f			
Degree of protection per IEC 60529/DIN 40050		IP67/IP69K	IP67/IP69K
Ambient temperature T_a		–5…+55 °C	–5…+55 °C
Material	Housing	1.4404 stainless steel	1.4404 stainless steel
	Optical surface	PA	PA
Connection		0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable, 3 × 0.14 mm²

Reference object: white, 90 % reflection, 200 × 200 mm
Reference reflector: BOS R-9

Other variants on our website or on request

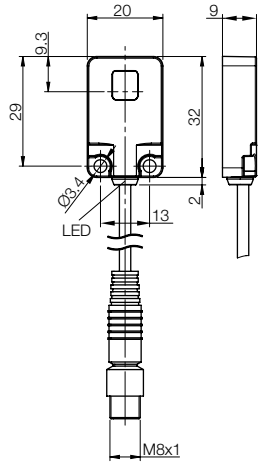


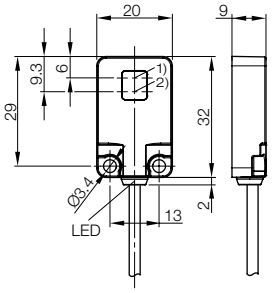


Receiver

Receiver

Through-beam sensor	**Through-beam sensor**
0...2200 mm	**0...2200 mm**
BOS021N	**BOS021P**
BOS0226	**BOS0227**
10...30 V DC	10...30 V DC
100 mA	100 mA
10 mA	10 mA
Yes/yes	Yes/yes
fixed	fixed
500 Hz	500 Hz
IP67/IP69K	IP67/IP69K
–5…+55 °C	–5…+55 °C
1.4404 stainless steel	1.4404 stainless steel
PA	PA
0.2 m PUR cable with M8 connector, 3-pin	2 m PUR cable, 3 × 0.14 mm²

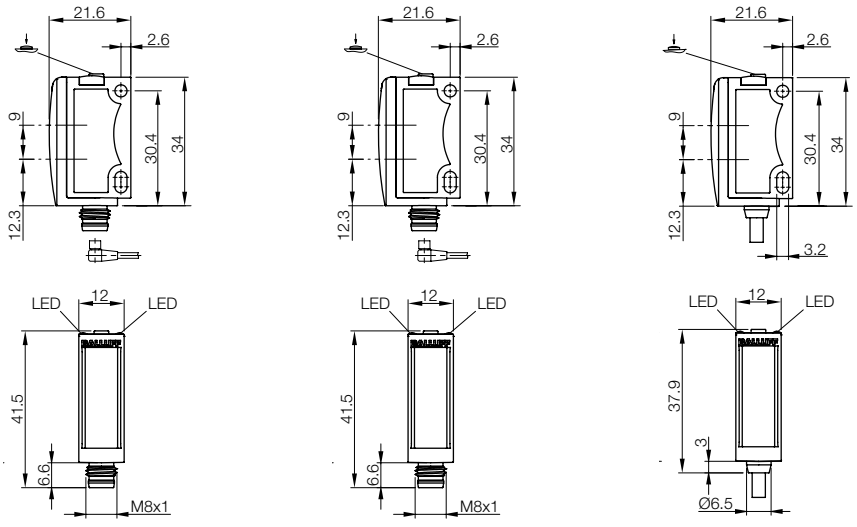




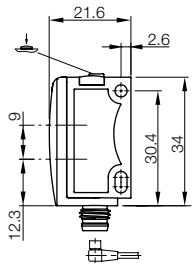
Type		**Diffuse sensor with background suppression**	**Diffuse sensor with background suppression**	**Diffuse sensor with background suppression**
Detection range		**1...200 mm**	**1...200 mm**	**1...200 mm**
PNP, NO/NC		**BOS01KY**	**BOS01KW**	**BOS01L0**
Supply voltage U_S		10...30 V DC	10...30 V DC	10...30 V DC
Output current		100 mA	100 mA	100 mA
No-load supply current I_0 max.		≤ 30 mA	≤ 30 mA	≤ 30 mA
Switching type		Light/dark	Light/dark	Light/dark
Polarity reversal protected/ short-circuit protected		Yes/yes	Yes/yes	Yes/yes
Settings		Teach-in	Teach-in	Teach-in
Emitter, light type		LED, red light	LED, red light	LED, red light
Light spot diameter		Approx. 5 × 5 mm at 50 mm	Approx. 5 × 5 mm at 50 mm	Approx. 5 × 5 mm at 50 mm
Power-on indicator		Green LED	Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED	Yellow LED
Response time		0.5 ms	0.5 ms	0.5 ms
Switching frequency f		1 kHz	1 kHz	1 kHz
Degree of protection per IEC 60529/DIN 40050		IP67/IP69K	IP67/IP69K	IP67/IP69K
Ambient temperature T_a		–20...+60 °C	–20...+60 °C	–20...+60 °C
Permissible ambient light		5000 Lux	5000 Lux	5000 Lux
Material	Housing	ABS	ABS	ABS
	Optical surface	PMMA	PMMA	PMMA
Connection		M8 connector, 4-pin	M8 connector, 4-pin	2 m PVC cable, 4 × 0.14 mm²

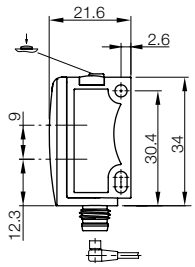
Reference object:
white, 90 % reflection,
200 × 200 mm.

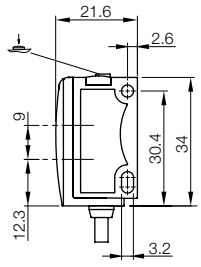
Other variants on our website or on request

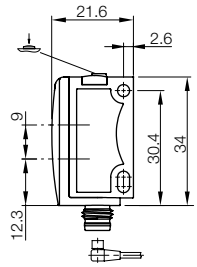


Diffuse sensor with background suppression	**Diffuse sensor with background suppression**	**Diffuse sensor with background suppression**	**Diffuse sensor (energetic)**
3...400 mm	**3...400 mm**	**3...400 mm**	**0...800 mm**
BOS01L3	**BOS01L2**	**BOS01L5**	**BOS01LK**
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA
≤ 30 mA	≤ 30 mA	≤ 30 mA	≤ 30 mA
Light/dark	Light/dark	Light/dark	Light/dark
Yes/yes	Yes/yes	Yes/yes	Yes/yes
Teach-in	Teach-in	Teach-in	Teach-in
LED, red light	LED, red light	LED, red light	LED, red light
Approx. 8 × 8 mm at 60 mm	Approx. 8 × 8 mm at 60 mm	Approx. 8 × 8 mm at 60 mm	20 × 20 mm at 180 mm
Green LED	Green LED	Green LED	Green LED
Yellow LED	Yellow LED	Yellow LED	Yellow LED
0.5 ms	0.5 ms	0.5 ms	0.5 ms
1 kHz	1 kHz	1 kHz	1 kHz
IP67/IP69K	IP67/IP69K	IP67/IP69K	IP67/IP69K
–20...+60 °C	–20...+60 °C	–20...+60 °C	–20...+60 °C
5000 Lux	5000 Lux	5000 Lux	5000 Lux
ABS	ABS	ABS	ABS
PMMA	PMMA	PMMA	PMMA
M8 connector, 4-pin	M8 connector, 4-pin	2 m PVC cable, 4 × 0.14 mm²	M8 connector, 3-pin







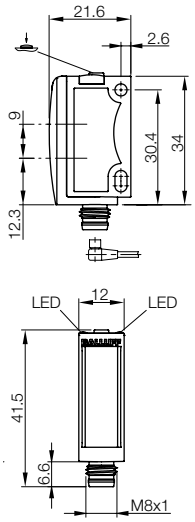


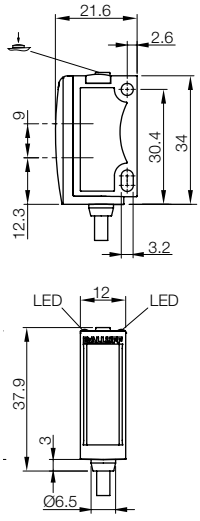
For transparency detection

Type		**Diffuse sensor (energetic)**	**Diffuse sensor (energetic)**	**Retroreflective sensor**
Detection range		**0...800 mm**	**0...800 mm**	**0...2 m**
PNP, NO/NC		**BOS01LL**	**BOS01LN**	**BOS01L7**
Supply voltage U_S		10...30 V DC	10...30 V DC	10...30 V DC
Output current		100 mA	100 mA	100 mA
No-load supply current I_0 max.		≤ 30 mA	≤ 30 mA	≤ 30 mA
Switching type		Light/dark	Light/dark	Light/dark
Polarity reversal protected/ short-circuit protected		Yes/yes	Yes/yes	Yes/yes
Settings		Teach-in	Teach-in	Teach-in
Emitter, light type		LED, red light	LED, red light	LED, red light, autocollimation
Light spot diameter		20 × 20 mm at 180 mm	20 × 20 mm at 180 mm	Approx. 50 × 50 mm at 2 m
Power-on indicator		Green LED	Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED	Yellow LED
Response time		0.5 ms	0.5 ms	0.5 ms
Switching frequency f		1 kHz	1 kHz	1 kHz
Degree of protection per IEC 60529/DIN 40050		IP67/IP69K	IP67/IP69K	IP67/IP69K
Ambient temperature T_a		–20...+60 °C	–20...+60 °C	–20...+60 °C
Permissible ambient light		5000 Lux	5000 Lux	5000 Lux
Material	Housing	ABS	ABS	ABS
	Optical surface	PMMA	PMMA	PMMA
Connection		M8 connector, 4-pin	2 m PVC cable, 4 × 0.14 mm²	M8 connector, 3-pin

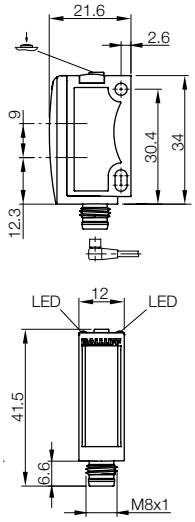
Reference object:
white, 90 % reflection,
200 × 200 mm.

Other variants on our website or on request





Reference reflector:
BOS R-22

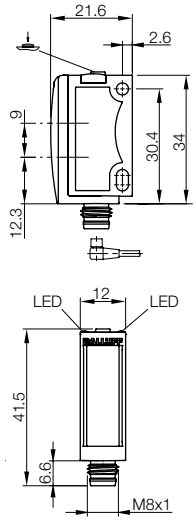


For transparency detection

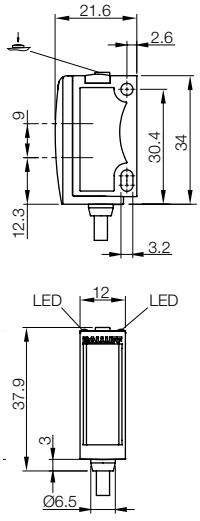
For transparency detection

Retroreflective sensor	**Retroreflective sensor**	**Retroreflective sensor**	**Retroreflective sensor**
0...2 m	**0...2 m**	**0...6 m**	**0...6 m**
BOS01L8	**BOS01LA**	**BOS01MH**	**BOS01MJ**
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA
≤ 30 mA	≤ 30 mA	≤ 30 mA	≤ 30 mA
Light/dark	Light/dark	Light/dark	Light/dark
Yes/yes	Yes/yes	Yes/yes	Yes/yes
Teach-in	Teach-in	Teach-in	Teach-in
LED, red light, autocollimation	LED, red light	LED, red light	LED, red light
Approx. 5 × 5 mm at 50 mm	Approx. 50 × 50 mm at 2 m	600 × 600 mm at 7 m	500 × 500 mm at 6 m
Green LED	Green LED	Green LED	Green LED
Yellow LED	Yellow LED	Yellow LED	Yellow LED
0.5 ms	0.5 ms	0.5 ms	0.5 ms
1 kHz	1 kHz	1 kHz	1 kHz
IP67/IP69K	IP67/IP69K	IP67/IP69K	IP67/IP69K
–20...+60 °C	–20...+60 °C	–20...+60 °C	–20...+60 °C
5000 Lux	5000 Lux	5000 Lux	5000 Lux
ABS	ABS	ABS	ABS
PMMA	PMMA	PMMA	PMMA
M8 connector, 4-pin	2 m PVC cable, 4 × 0.14 mm²	M8 connector, 3-pin	M8 connector, 4-pin

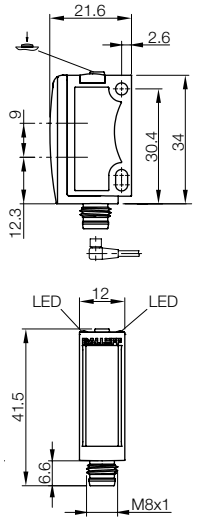
Reference reflector:
BOS R-22



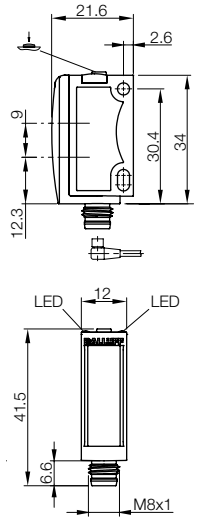
Reference reflector:
BOS R-22



Reference reflector:
BOS R-1



Reference reflector:
BOS R-1

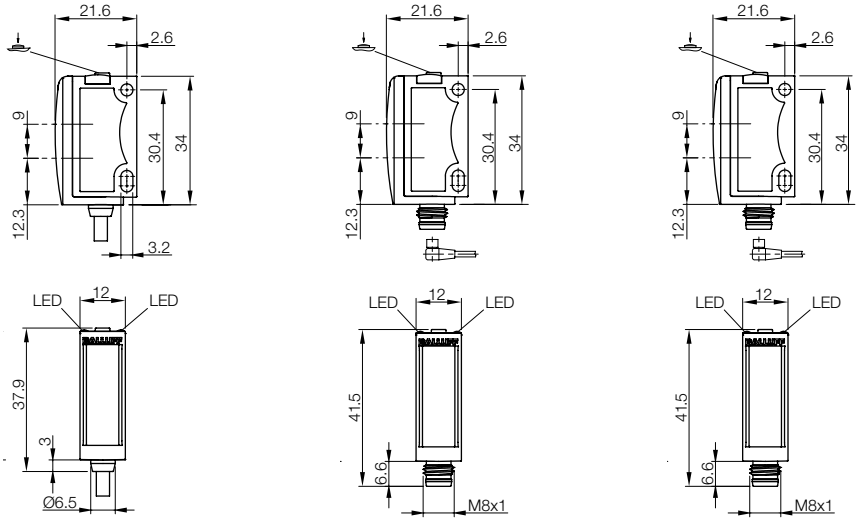


Type		Retroreflective sensor	Through-beam sensor	Through-beam sensor
Detection range		**0...6 m**	**0...13 m**	**0...13 m**
PNP, NO/NC		**BOS01ML**		
PNP	Receiver		**BOS01M8**	**BOS01M9**
	Emitter		**BOS01MF**	**BOS01LR**
Supply voltage U_S		10...30 V DC	10...30 V DC	10...30 V DC
Output current		100 mA	100 mA	100 mA
No-load supply current I_0 max.		≤ 30 mA	≤ 30 mA	≤ 30 mA
Switching type		Light/dark	Light/dark	Light/dark
Polarity reversal protected/ short-circuit protected		Yes/yes	Yes/yes	Yes/yes
Settings		Teach-in	Teach-in	Teach-in
Emitter, light type		LED, red light	LED, red light	LED, red light
Laser class				
Light spot diameter		600 × 600 mm at 7 m	1.2 × 1.2 mm at 15 m	1 × 1 mm at 13 m
Power-on indicator		Green LED	Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED	Yellow LED
Response time		0.5 ms	0.5 ms	0.5 ms
Switching frequency f		1 kHz	1 kHz	1 kHz
Degree of protection per IEC 60529/DIN 40050		IP67/IP69K	IP67/IP69K	IP67/IP69K
Ambient temperature T_a		–20...+60 °C	–20...+60 °C	–20...+60 °C
Permissible ambient light		5000 Lux	5000 Lux	5000 Lux
Material	Housing	ABS	ABS	ABS
	Optical surface	PMMA	PMMA	PMMA
Connection		2 m PVC cable, 4 × 0.14 mm²	M8 connector, 3-pin	M8 connector, 4-pin

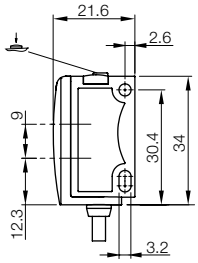
Reference object: white, 90 % reflection, 200 × 200 mm.

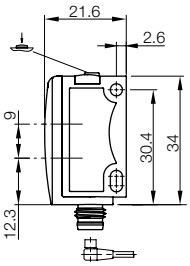
Reference reflector: BOS R-1

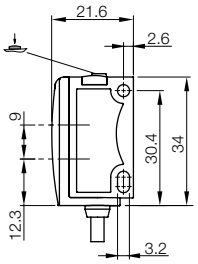
Other variants on our website or on request

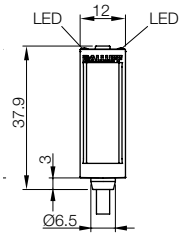


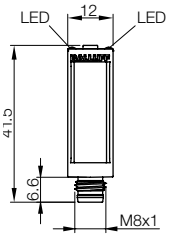
Through-beam sensor	Diffuse sensor with background suppression	Diffuse sensor with background suppression
0...13 m	**4...120 mm**	**4...120 mm**
	BOS01LE	**BOS01LH**
BOS01MC		
BOS01LT		
10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA
≤ 30 mA	≤ 30 mA	≤ 30 mA
Light/dark	Light/dark	Light/dark
Yes/yes	Yes/yes	Yes/yes
Teach-in	Teach-in	Teach-in
LED, red light	Laser, red light	Laser, red light
	1	1
1.2 × 1.2 mm at 15 m	1.2 × 1.2 mm at 120 mm	1.2 × 1.2 mm at 120 mm
Green LED	Green LED	Green LED
Yellow LED	Yellow LED	Yellow LED
0.5 ms	0.5 ms	0.5 ms
1 kHz	1 kHz	1 kHz
IP67/IP69K	IP67/IP69K	IP67/IP69K
–20...+60 °C	–20...+60 °C	–20...+60 °C
5000 Lux	5000 Lux	5000 Lux
ABS	ABS	ABS
PMMA	PMMA	PMMA
2 m PVC cable, 4 × 0.14 mm²	M8 connector, 4-pin	2 m PVC cable, 4 × 0.14 mm²

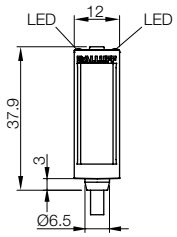












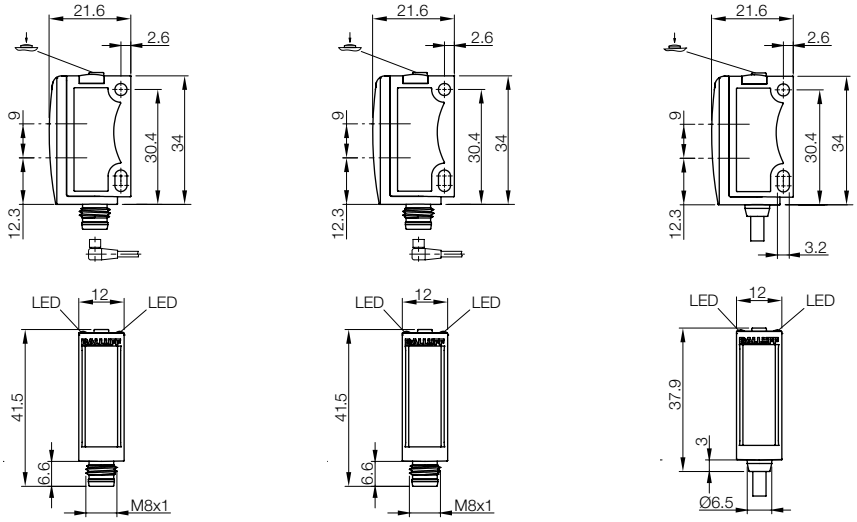
Laserklasse 1

Type		Retroreflective sensor	Retroreflective sensor	Retroreflective sensor
Detection range		**0...4 m**	**0...4 m**	**0...4 m**
PNP, NO/NC		**BOS01MN**	**BOS01M4**	**BOS01M6**
PNP	Receiver			
	Emitter			
Supply voltage U_S		10...30 V DC	10...30 V DC	10...30 V DC
Output current		100 mA	100 mA	100 mA
No-load supply current I_0 max.		≤ 30 mA	≤ 30 mA	≤ 30 mA
Switching type		Light/dark	Light/dark	Light/dark
Polarity reversal protected/ short-circuit protected		Yes/yes	Yes/yes	Yes/yes
Settings		Teach-in	Teach-in	Teach-in
Emitter, light type		Laser, red light, autocollimation	Laser, red light, autocollimation	Laser, red light, autocollimation
Laser class		1	1	1
Light spot diameter		Ø 2 mm at 2.5 m	2 × 4 mm at 2 m	Ø 1 mm at focal point
Power-on indicator		Green LED	Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED	Yellow LED
Response time		0.5 ms	0.5 ms	0.5 ms
Switching frequency f		1 kHz	1 kHz	1 kHz
Degree of protection per IEC 60529/DIN 40050		IP67/IP69K	IP67/IP69K	IP67/IP69K
Ambient temperature T_a		–20...+60 °C	–20...+60 °C	–20...+60 °C
Permissible ambient light		5000 Lux	5000 Lux	5000 Lux
Material	Housing	ABS	ABS	ABS
	Optical surface	PMMA	PMMA	PMMA
Connection		M8 connector, 3-pin	M8 connector, 4-pin	2 m PVC cable, 4 × 0.14 mm²

Reference object: white, 90 % reflection, 200 × 200 mm.

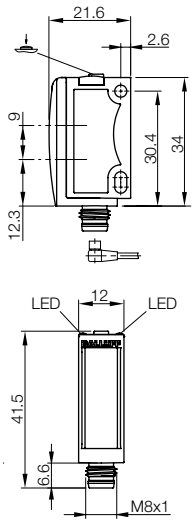
Reference reflector: BOS R-22

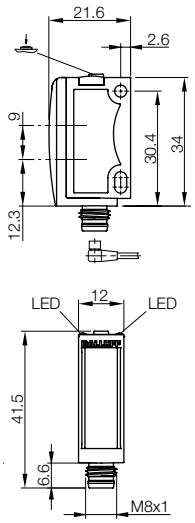
Other variants on our website or on request

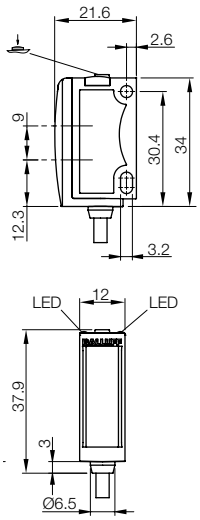


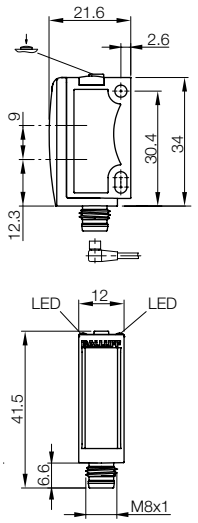
Photoelectric Standard Sensors
BOS 6K and BKT 6K
Laser and contrast

Through-beam sensor	Through-beam sensor	Through-beam sensor	Contrast sensor
0...18 m	**0...18 m**	**0...18 m**	**1...250 mm**
			BKT0010
BOS01LU	**BOS01LW**	**BOS01LZ**	
BOS01M1	**BOS01M2**	**BOS01M3**	
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA
≤ 30 mA	≤ 30 mA	≤ 30 mA	≤ 25 mA
Light/dark	Light/dark	Light/dark	Light/dark switching (selectable)
Yes/yes	Yes/yes	Yes/yes	Yes/yes
Teach-in	Teach-in	Teach-in	Teach-in
Laser, red light	Laser, red light	LED, red light	Laser, red light
1	1	1	1
14 × 14 mm at 20 m	13 × 13 mm at 18 m	14 × 14 mm at 20 m	0.7 × 0.7 mm at 250 mm
Green LED	Green LED	Green LED	Green LED
Yellow LED	Yellow LED	Yellow LED	Yellow LED
0.5 ms	0.5 ms	0.5 ms	0.5 ms
1 kHz	1 kHz	1 kHz	1 kHz
IP67/IP69K	IP67/IP69K	IP67/IP69K	IP67/IP69K
–20...+60 °C	–20...+60 °C	–20...+60 °C	–20...+60 °C
5000 Lux	5000 Lux	5000 Lux	5000 Lux
ABS	ABS	ABS	Impact-resistant ABS
PMMA	PMMA	PMMA	PMMA
M8 connector, 3-pin	M8 connector, 4-pin	2 m PVC cable, 4 × 0.14 mm²	M8 connector, 4-pin









BOS 23K

IO-Link

Designed for industry

The product characteristics of our BOS 23K photoelectric sensors have proven themselves many times over. They feature long range, high switching accuracy and a sensor design tailored to industry. With IO-Link, these sensors can be configured even easier. The sensor process data includes switching signals and the actual remission values. After a sensor is replaced, all the settings can be easily sent from the master to the new sensor. This saves time and increases equipment availability.

Benefits

- Simple parameterizing via IO-Link
- Decentralized data storage in the master
- Unambiguous sensor identification
- Simplified installation

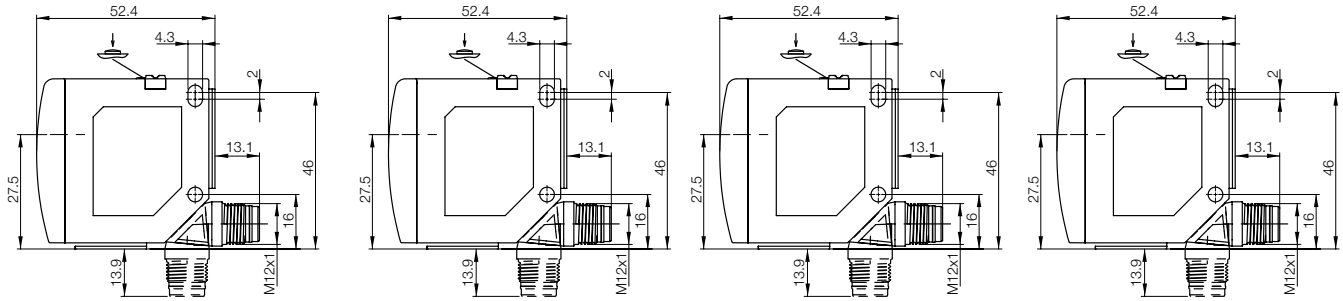
Type		
Detection range		
PNP, NO/NC selectable		
PNP, receiver		
PNP, emitter		
Supply voltage U_S		
Output current		
No-load supply current I_0 max.		
Polarity reversal protected/short-circuit protected		
Settings		
Emitter, light type		
Wavelength		
Power-on indicator		
Output function indicator		
Stability indicator		
Switching frequency f		
Degree of protection per IEC 60529/DIN 40050		
Ambient temperature T_a		
Material	Housing	
	Optical surface	
Connection		

Reference object: white, 90 % reflection, 200 × 200 mm
Recommended reflector: BAM00UK

Other variants on our website or on request

IO-Link options available on our website

Diffuse sensor with background suppression	Diffuse sensor (energetic)	Retroreflective sensor	Through-beam sensor
3...1200 mm	**5...2000 mm**	**0.3...12 m**	**0...20 m**
BOS017A	**BOS0171**	**BOS016T**	
			BOS016J
			BOS01UT
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA	100 mA
≤ 30 mA	≤ 30 mA	≤ 30 mA	≤ 30 mA
Yes/yes	Yes/yes	Yes/yes	Yes/yes
Potentiometer/IO-Link	Teach-in button/IO-Link	Teach-in button/IO-Link	Teach-in button/IO-Link
LED, red light	LED, red light	LED, red light	LED, red light
640 nm	640 nm	640 nm	640 nm
Green LED	Green LED	Green LED	Green LED
Yellow LED	Yellow LED	Yellow LED	Yellow LED
Flashing yellow LED	Flashing yellow LED	Flashing yellow LED	Flashing yellow LED
600 Hz	600 Hz	600 Hz	500 Hz
IP67/IP69K	IP67/IP69K	IP67/IP69K	IP67/IP69K
–20...+60 °C	–20...+60 °C	–20...+60 °C	–20...+60 °C
PC-ABS	PC-ABS	PC-ABS	PC-ABS
PMMA	PMMA	PMMA	PMMA
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin

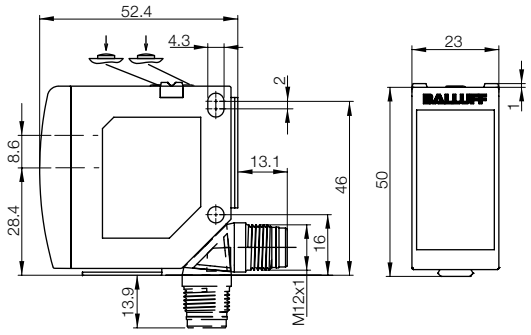


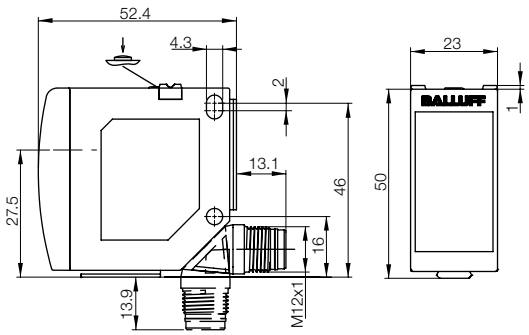
Simple, reliable detection of transparent objects

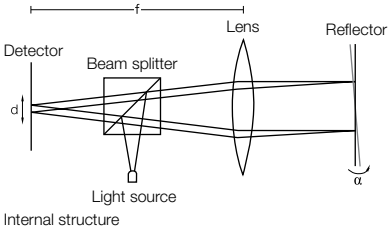
Type		
Detection range		
2 × PNP, complementary		
Supply voltage U_S		
Output current		
No-load supply current I_0 max.		
Switching type		
Polarity reversal protected/short-circuit protected		
Settings		
Emitter, light type		
Wavelength		
Laser class		
Power-on indicator		
Output function indicator		
Stability indicator		
Response time		
Switching frequency f		
Degree of protection per IEC 60529/DIN 40050		
Ambient temperature T_a		
Permissible ambient light		
Material	Housing	
	Optical surface	
Connection		

Reference reflector: BOS R-22

Diffuse sensor with background suppression	**Retroreflective sensor**
0...5 m	**0.1...20 m**
BOS01UW	**BOS01NC**
18...30 V DC	10...30 V DC
100 mA	100 mA
≤ 30 mA	≤ 30 mA
Light/dark	Light/dark
Yes/yes	Yes/yes
Teach-in button/control input	Teach-in button/control input
Laser, red light	Laser, red light, autocollimation
655 nm	655 nm
1	1
Green LED	Green LED
Yellow LED	Yellow LED
	Flashing yellow LED
1 ms	0.2 ms
500 Hz	2.5 kHz
IP67/IP69K	IP67/IP69K
–40...+60 °C	–20...+60 °C
EN 60947-5-2	EN 60947-5-2
PC-ABS	PC-ABS
PMMA	PMMA
M12 connector, 4-pin	M12 connector, 4-pin

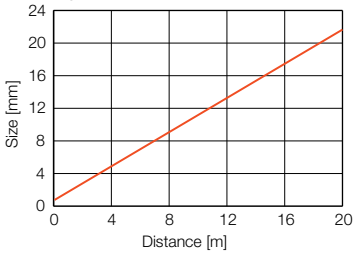






Internal structure

Light spot size



Precise and reliable measurement
Factory automation requires reliable and precise measurements of objects in many various applications. Robots often use distance sensors as a check to ensure they are in position when gripping a part for welding or other processes. Paper, roofing, or other continuous processes use distance sensors for loop control so that process can continue running at the proper tension or provide run time during core changes.

Balluff's newest distance sensor utilizes time of flight technology that allows for detecting objects at longer distances with various surface characteristics. The BOD 23 sensor incorporates flexible outputs and pushbutton setup for easy integration and configuration. In addition, the IP69K rating tolerates wash-down applications in the food and beverage industry.

Type	
Detection range	
Switching output	
Resolution	
Ambient Temperature	
Protection	

Visit www.balluff.com for technical information.

Features
- Time-of-Flight technology
- Analog output with two teach points
- Laser
- 5m range
- Pushbutton teach

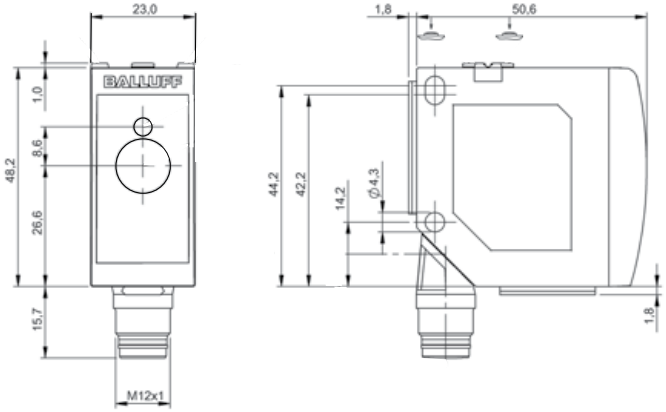
Benefits
- Class 1 laser, no danger to operators
- Reliable position detection independent of material or surface characteristics
- Flexible integration with configurable outputs and easy configuration with pushbuttons
- Precise and dependable measurement with high repeatability and good resolution

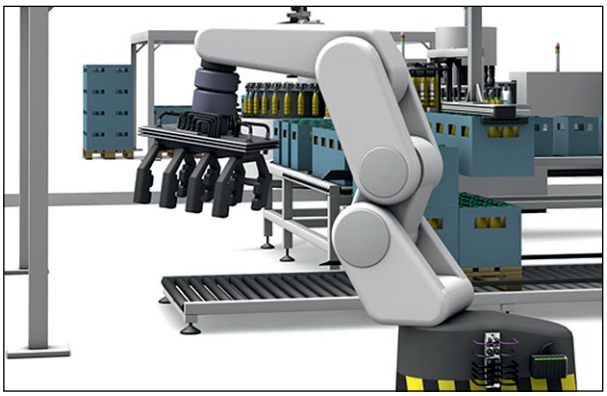
Advantages
- < 5mm resolution
- Class 1 Laser
- Scalable voltage/ current analog output
- PNP/NPN, NO/NC discrete output with window function
- IP69K / ECOLAB certified

Photoelectric Distance Sensors
BOD 23K Laser

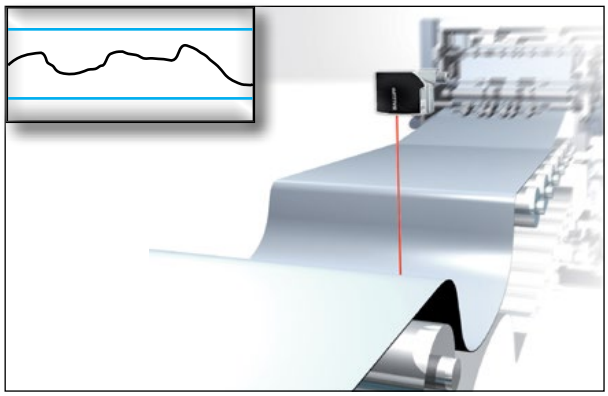
IO-Link

Distance sensor	Distance sensor	Distance sensor
0...5 m	**0...5 m**	**0...5 m**
BOD001N	**BOD001P**	**BOD0020**
Yes	Yes	Yes
< 5mm	< 5mm	< 5mm
-40...+60°C	-40...+60°C	-40...+60°C
IP67/IP69K	IP67/IP69K	IP67/IP69K





Applications
Robot positioning, Stack height measurement, Loop control, Contour verification, Product height confirmation, Positioning, Error proofing



Industries
Automotive, Packaging, Manufacturing, Food & Beverage, Pharmaceutical, Plastics & Rubber, Wood & Timber

Stainless Steel Through-beam Fork Sensors

Tough performers

The new BGL series fork sensors are ideal for challenging environments. Aggressive media such as cleaning agents or coolant/lubricants typically have no effect on them. Their stainless steel housing provides full protection. That makes these sensors ideal for many applications in various sectors – especially the foods industry and for metalworking processes.

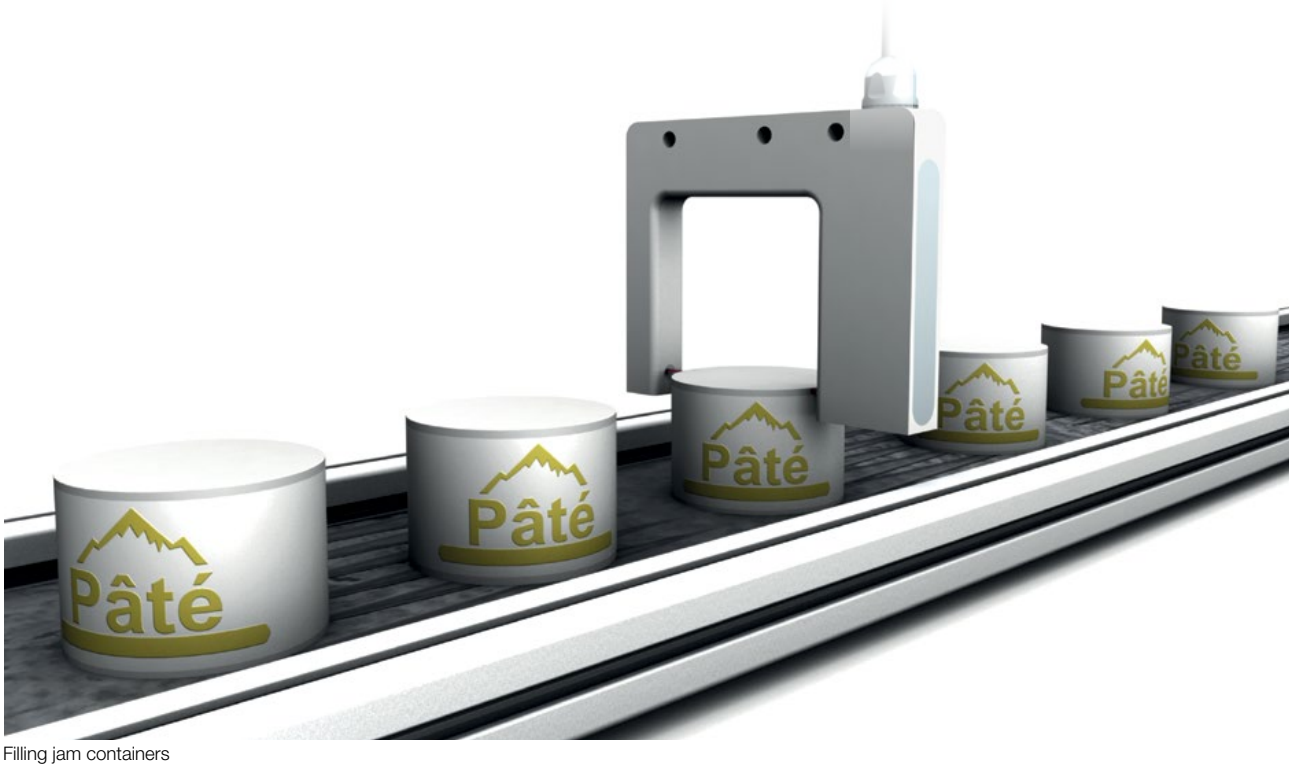
Benefits

- Fully enclosed stainless steel housing with high protection rating
- With visible red light or strong infrared light
- Compact housing – easy to install
- Washdown design for ease of cleaning

CE ECOLAB

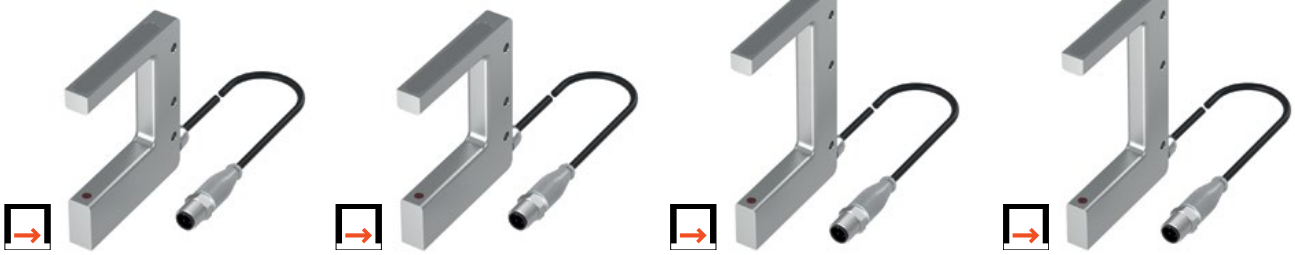
Type	
Fork opening	
Fork depth	
2 × PNP, NO/NC	
Supply voltage U_S	
Output current	
No-load supply current I_0 max.	
Switching type	
Polarity reversal protected/short-circuit protected	
Emitter, light type	
Wavelength	
Power-on indicator	
Switching state indicator	
Switching frequency f	
Degree of protection per IEC 60529	
Ambient temperature T_a	
Permissible ambient light	
Material	Housing
	Optical surface
Connection	

Other variants on our website or on request

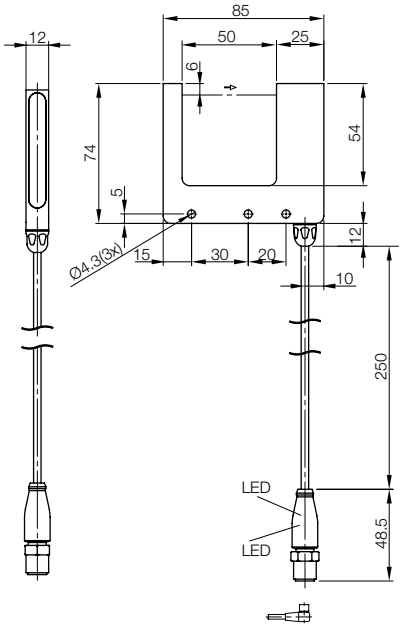


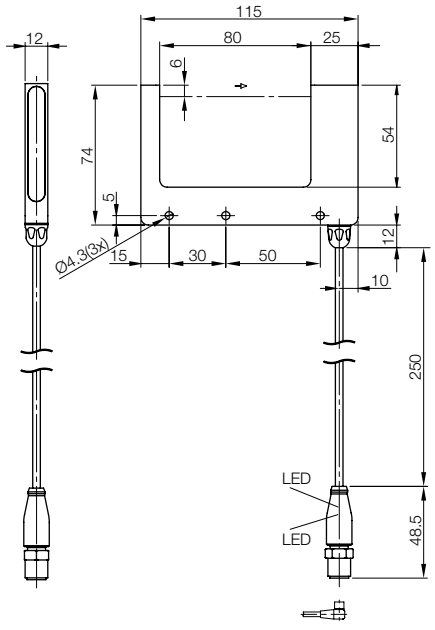
Filling jam containers

Stainless steel through-beam fork sensors BGL



Stainless steel fork sensor	Stainless steel fork sensor	Stainless steel fork sensor	Stainless steel fork sensor
50 mm	**50 mm**	**80 mm**	**80 mm**
54 mm	**54 mm**	**54 mm**	**54 mm**
BGL004L	**BGL004M**	**BGL004N**	**BGL004P**
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
200 mA	200 mA	200 mA	200 mA
35 mA	35 mA	35 mA	35 mA
Light/dark switching	Light/dark switching	Light/dark switching	Light/dark switching
Yes/yes	Yes/yes	Yes/yes	Yes/yes
LED, red light	LED, infrared	LED, red light	LED, infrared
660 nm	850 nm	660 nm	850 nm
Green LED in connector	Green LED in connector	Green LED in connector	Green LED in connector
Yellow LED in connector	Yellow LED in connector	Yellow LED in connector	Yellow LED in connector
3 kHz	2 kHz	3 kHz	2 kHz
IP67/IP69K	IP67/IP69K	IP67/IP69K	IP67/IP69K
–10...+60 °C	–10...+60 °C	–10...+60 °C	–10...+60 °C
5000 Lux	5000 Lux	5000 Lux	5000 Lux
1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel	1.4404 stainless steel
PMMA	PMMA	PMMA	PMMA
0.25 m PUR cable with M12 connector, 4-pin	0.25 m PUR cable with M12 connector, 4-pin	0.25 m PUR cable with M12 connector, 4-pin	0.25 m PUR cable with M12 connector, 4-pin



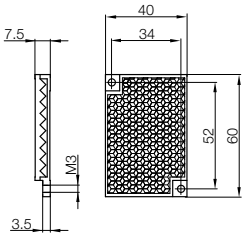


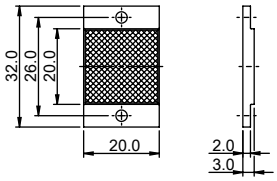
Special Accessories for Photoelectric Sensors
Reflectors for washdown applications

ECOLAB

Laser

Size	**Reflector 60×40 mm**	**Reflector 20×32 mm**
Fasteners	Two M3 screws	Two M3 screws
	BAM01HE	**BAM023T**
Material	Solidchem	Solidchem
Cube size	4 mm	1.1 mm
Special features	Chemical-resistant	Chemical-resistant
Temperature range	–20...+140°C	–20...+140°C

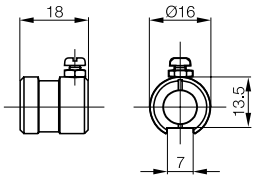




Magnetic Cylinder Sensors with Special Properties
For the food industry BMF 10E

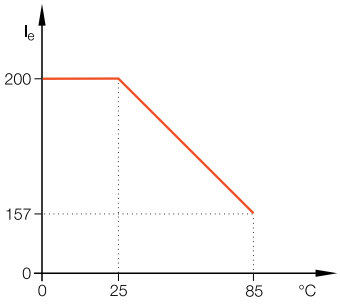
BMF 10E – developed for the higher demands of the food industry. Extremely robust due to its one-piece, stainless steel housing.

Mounting bracket:
BMF 10E-HW-19 made of stainless steel 1.4571
Ordering code: BAM00KR
(please order separately)



Please order tube cuff separately.

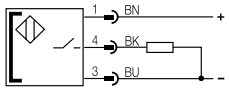
Temperature load curve



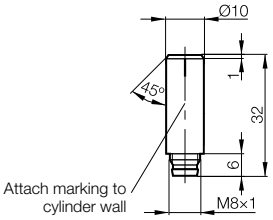
Wiring diagrams

NO

PNP connector



Series	**BMF 10E**
Properties	The stainless steel sensor specially for the food industry
PNP, NO	**BMF001Z**
Supply voltage U_B	10...30 V DC
Voltage drop U_d	≤ 3.1 V
Rated insulation voltage U_i	75 V DC
Rated operating current I_e	200 mA
No-load supply current I_0 max.	12 mA
Polarity reversal protected/transposition protected/short-circuit protected	Yes/Yes/Yes
Rated switching field strength I H_n I	1.2 kA/m (15 Gauss)
Assured switching field strength I H_a I	2 kA/m (25 Gauss)
Hysteresis of I H_n I	45%
Temperature drift of switch-on point of I H_n I	0.3%
On/off delay	≤ 0.05 ms/≤ 0.05 ms
Ambient temperature T_a	–40...+85 °C
Degree of protection as per IEC 60529	IP 69K
Approval	CE
Housing material	Stainless steel 1.4571
Suggested mating cable	BCC S323-0000-10-004-PX0334-050



Inductive Sensors with Special Properties
Harsh environment sensors

In the food industry, and medical and pharmaceutical technology, and special requirements are placed on sensors: FDA conformity and testing according to the Ecolab standard.

These sensors fulfill the highest requirements:

- Extended temperature range
- Safe to clean according to Ecolab
- FDA conformity
- Resistant to high-pressure cleaners
- Stainless steel 1.4571 (316Ti equivalent) and 1.4404 (316L equivalent)

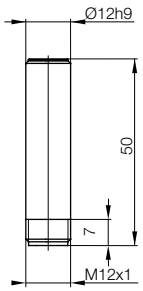
Steam jet tested

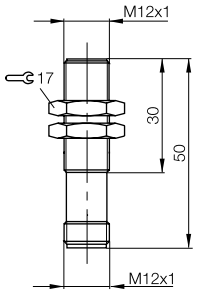
IP 69K | IP 68 as per BWN | Stainless steel | H_2O_2 resistant | FDA | ECOLAB

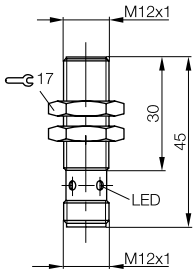
Harsh environment sensors
Ø 12 mm, M12×1

Housing size		**Ø 12 mm**	**M12×1**	**M12×1**
Installation type (observe instructions in the Basic Information chapter)		Flush	Flush	Flush
Rated switching distance s_n		**2 mm**	**2 mm**	**4 mm**
Assured switching distance s_a		0...1.6 mm	0...1.6 mm	0...3.2 mm
Sensing distance		1X	1X	1X
PNP, NO		**BES0430**	**BES0444**	**BES0433**
PNP, NC				**BES0432**
Supply voltage U_B		10...30 V DC	10...30 V DC	10...30 V DC
Voltage drop U_d at I_e max.		3.5 V	3.5 V	2 V
Rated insulation voltage U_i (protection class)		75 V DC	75 V DC	250 V AC (I)
Rated operating current I_e		130 mA*	130 mA*	200 mA
Polarity reversal protected/transposition protected/short-circuit protected		Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
Ambient temperature T_a		–40...+105 °C	–40...+105 °C	–25...+85 °C
Switching frequency f max.		800 Hz	800 Hz	2000 Hz
Degree of protection as per IEC 60529		IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 20
Approvals		CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant
Material	Housing	Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4404
	Sensing surface	PEEK	PEEK	LCP
Connection		M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin
Suggested mating cable		BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020

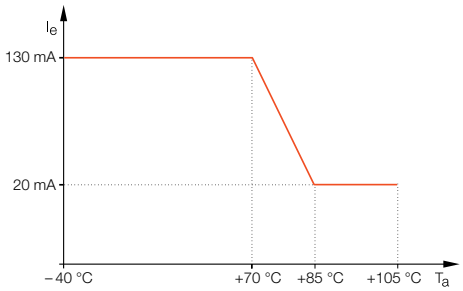
Additional cable lengths and PUR cable jacket material available on request.







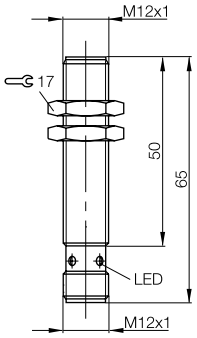
***Current decrease curve**

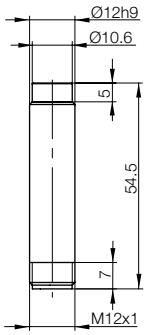


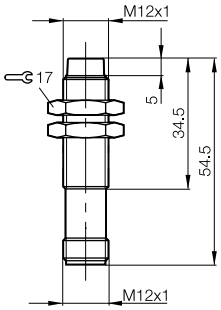
Harsh environment sensors
Ø 12 mm, M12×1

Housing size		**M12×1**	**Ø 12 mm**	**M12×1**
Installation type (observe instructions in the Basic Information chapter)		Flush	Non-flush	Non-flush
Rated switching distance s_n		**4 mm**	**4 mm**	**4 mm**
Assured switching distance s_a		0...3.2 mm	0...3.2 mm	0...3.2 mm
Sensing distance		1X	1X	1X
PNP, NO		**BES0435**	**BES0431**	**BES0443**
PNP, NC		**BES0434**		
NPN, NO		**BES0436**		
Supply voltage U_B		10...30 V DC	10...30 V DC	10...30 V DC
Voltage drop U_d at I_e max.		2.5 V	3.5 V	3.5 V
Rated insulation voltage U_i (protection class)		250 V AC (▯)	75 V DC	75 V DC
Rated operating current I_e		200 mA	130 mA*	130 mA*
Polarity reversal protected/transposition protected/short-circuit protected		Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
Ambient temperature T_a		–25...+85 °C	–40...+105 °C	–40...+105 °C
Switching frequency f max.		1000 Hz	400 Hz	400 Hz
Degree of protection as per IEC 60529		IP 69K and IP 68 as per BWN Pr. 20	IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27
Approvals		CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant
Material	Housing	Stainless steel 1.4404	Stainless steel 1.4571	Stainless steel 1.4571
	Sensing surface	LCP	PEEK	PEEK
Connection		M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin
Suggested mating cable		BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020

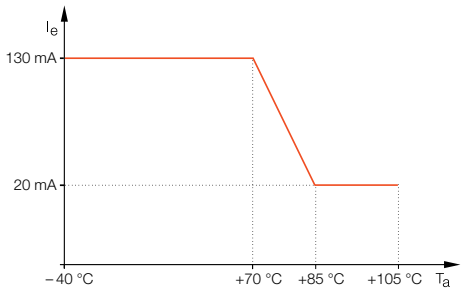
Additional cable lengths and PUR cable jacket material available on request.







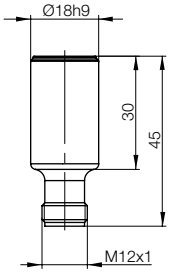
***Current decrease curve**

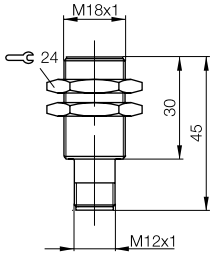


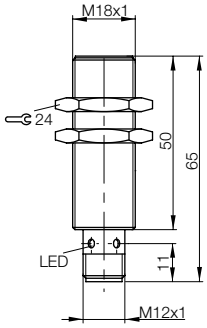
IP 69K | IP 68 as per BWN | Stainless steel | H_2O_2 resistant | FDA | ECOLAB

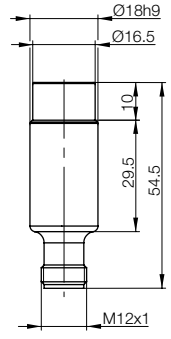
Harsh environment sensors
Ø 18 mm, M18×1

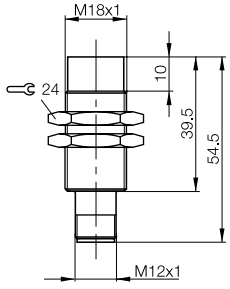
Ø 18 mm	**M18×1**	**M18×1**	**Ø 18 mm**	**M18 mm**
Flush	Flush	Flush	Non-flush	Non-flush
5 mm	**5 mm**	**8 mm**	**8 mm**	**8 mm**
0...4 mm	0...4 mm	0...6.4 mm	0...6.4 mm	0...6.4 mm
1X	1X	1X	1X	1X
BES0439	**BES0441**	**BES0437**	**BES043A**	**BES0442**
		BES0438		
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
3.5 V	3.5 V	2.5 V	3.5 V	3.5 V
75 V DC	75 V DC	250 V AC (∫)	75 V DC	75 V DC
130 mA*	130 mA*	200 mA	130 mA*	130 mA*
Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
–40...+105 °C	–40...+105 °C	–40...+85 °C	–40...+105 °C	–40...+105 °C
500 Hz	500 Hz	700 Hz	200 Hz	200 Hz
IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 20	IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27
CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant
Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4404	Stainless steel 1.4571	Stainless steel 1.4571
PEEK	PEEK	PEEK	PEEK	PEEK
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin
BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020











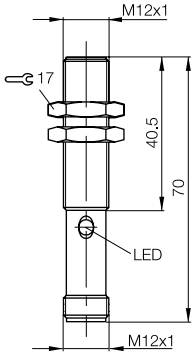
Inductive Sensors with Special Properties

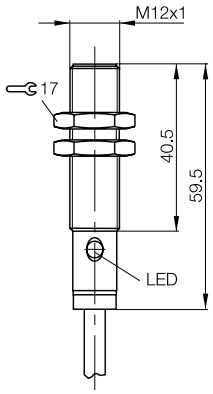
Harsh environment sensors
M12x1 standard

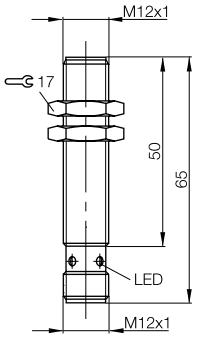
Increased temperature range

Housing size		**M12×1**	**M12×1**	**M12×1**
Installation type (observe instructions in the Basic Information chapter)		Flush	Flush	Flush
Rated switching distance s_n		**2 mm**	**2 mm**	**4 mm**
Assured switching distance s_a		0...1.6 mm	0...1.6 mm	0...3.2 mm
Sensing distance		1X	1X	2X
PNP, NO		**BES02EL**	**BES02EH**	**BES02FU**
PNP, NC				**BES02FT**
NPN, NO				**BES02FR**
Supply voltage U_B		10…30 V DC	10…30 V DC	10…30 V DC
Voltage drop U_d at I_e max.		1.5 V	1.5 V	1.5 V
Rated insulation voltage U_i (protection class)		250 V AC (I)	250 V AC (I)	250 V AC (I)
Rated operating current I_e		200 mA	200 mA	200 mA
Polarity reversal protected/transposition protected/short-circuit protected		Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
Ambient temperature T_a		–25…+70 °C	–25…+70 °C	–25…+85 °C
Switching frequency f max.		≤ 3 kHz	≤ 3 kHz	≤ 1 kHz
Function indicator		Yellow LED	Yellow LED	Yellow LED
Degree of protection as per IEC 60529		IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20
Approvals		CE, cULus	CE, cULus	CE, cULus
Material	Housing	Stainless steel	Stainless steel	Stainless steel
	Sensing surface	PA 12	PA 12	LCP
Connection		M12 connector, 4 pin	3 m PUR cable, 22 AWG	M12 connector, 4-pin
Suggested mating cable		BCC M415-0000-1A-003-EX44T2-020		BCC M415-0000-1A-003-EX44T2-020

Additional cable lengths and PUR cable jacket material available on request.





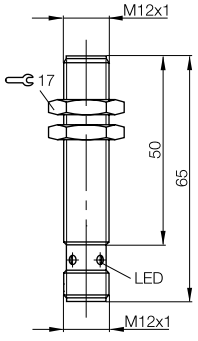


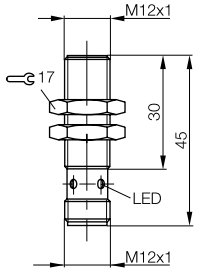
Built tough – stainless steel housing stops aggressive media in its tracks.
Inductive sensors are also used more and more in aggressive environments: in machine tools, in the chemical industry, in packaging machines and the food industry. Balluff harsh environment sensors are ideal for applications where aggressive cleaning agents, in connection with high-pressure cleaning devices are used.

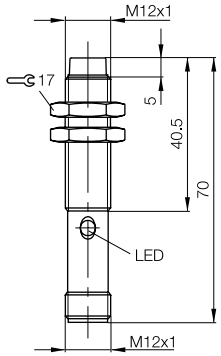
Increased temperature range

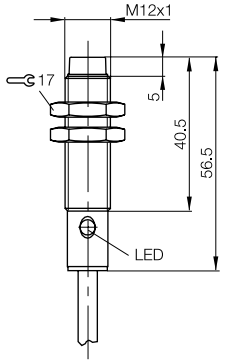
Increased temperature range

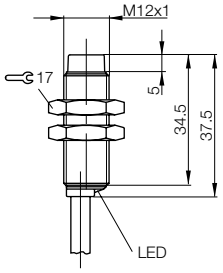
M12×1	**M12×1**	**M12×1**	**M12×1**	**M12×1**
Flush	Flush	Non-flush	Non-flush	Non-flush
4 mm	**4 mm**	**4 mm**	**4 mm**	**4 mm**
0...3.2 mm	0...3.2 mm	0...3.2 mm	0...3.2 mm	0...3.2 mm
2X	2X	1X	1X	1X
BES038C	**BES014W**	**BES02FC**	**BES02F3**	**BES02F7**
	BES014U			
10…30 V DC	10…30 V DC	10…30 V DC	10…30 V DC	10…30 V DC
2.5 V	2 V	1.5 V	1.5 V	2 V
250 V AC (⏍)	250 V AC (⏍)	250 V AC (⏍)	250 V AC (⏍)	250 V AC (⏍)
200 mA	200 mA	200 mA	200 mA	200 mA
Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
–40…+85 °C	–25…+85 °C	–25…+70 °C	–25…+70 °C	–25…+70 °C
≤ 2 kHz	≤ 2 kHz	≤ 1.5 kHz	≤ 1.5 kHz	≤ 2 kHz
Yellow LED	Yellow LED	Yellow LED	Yellow LED	Yellow LED
IP 67	IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20
CE, cULus	CE, cULus	CE, cULus	CE, cULus	CE, cULus
Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
LCP	LCP	PA 12	PA 12	PBT
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	3 m PVC cable, 22 AWG	3 m PVC cable, 22 AWG
BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020		











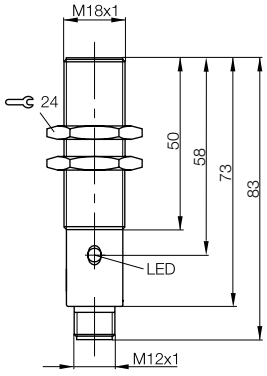
Harsh environment sensors
M18x1

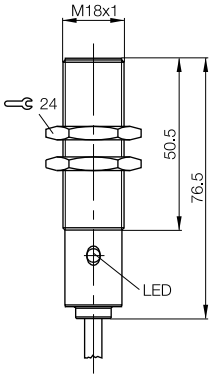
Increased temperature range

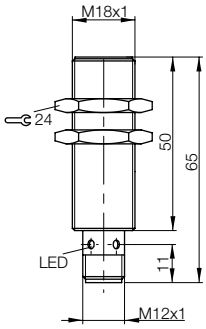
Increased temperature range

Housing size		**M18×1**	**M18×1**	**M18×1**
Installation type (observe instructions in the Basic Information chapter)		Flush	Flush	Flush
Rated switching distance s_n		**5 mm**	**5 mm**	**8 mm**
Assured switching distance s_a		0...4.1 mm	0...4.1 mm	0...6.5 mm
Sensing distance		1X	1X	2X
PNP, NO		**BES02EU**	**BES02EN**	**BES02H0**
PNP, NC				**BES02FZ**
Supply voltage U_B		10…30 V DC	10…30 V DC	10…30 V DC
Voltage drop U_d at I_e max.		1.5 V	1.5 V	2.5 V
Rated insulation voltage U_i (protection class)		250 V AC (I)	250 V AC (I)	250 V AC (I)
Rated operating current I_e		200 mA	200 mA	200 mA
Polarity reversal protected/transposition protected/short-circuit protected		Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
Ambient temperature T_a		–40…+85 °C	–25…+70 °C	–40…+85 °C
Switching frequency f max.		900 Hz	900 Hz	≤ 700 Hz
Function indicator		Yellow LED	Yellow LED	Yellow LED
Degree of protection as per IEC 60529		IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20
Approvals		CE, cULus	CE, cULus	CE, cULus
Material	Housing	Stainless steel	Stainless steel	Stainless steel
	Sensing surface	PA 12	PA 12	PBT
Connection		M12 connector, 4-pin	3 m PUR cable, 22 AWG	M12 connector, 4-pin
Suggested mating cable		BCC M415-0000-1A-003-EX44T2-020		BCC M415-0000-1A-003-EX44T2-020

Additional cable lengths and PUR cable jacket material available on request.

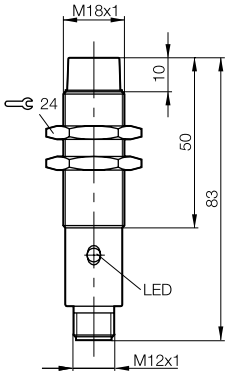


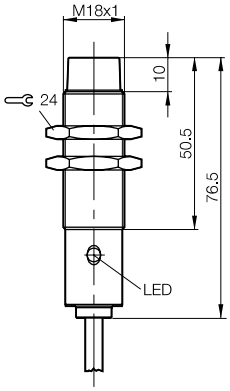


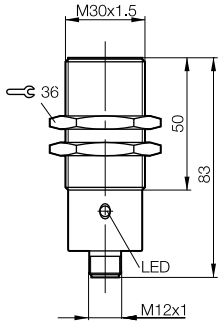


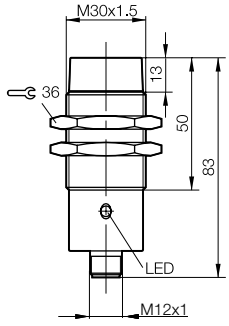
Increased temperature range

M18×1	**M18×1**	**M30×1.5**	**M30×1.5**
Non-flush	Non-flush	Flush	Non-flush
8 mm	**8 mm**	**10 mm**	**15 mm**
0...6.5 mm	0...6.5 mm	0...8.1 mm	0...12.2 mm
1X	1X	1X	1X
BES02FL	**BES02FH**	**BES02F1**	**BES02FN**
10…30 V DC	10…30 V DC	10…30 V DC	10…30 V DC
1.5 V	1.5 V	2.5 V	2.5 V
250 V AC ([)	250 V AC ([)	250 V AC ([)	250 V AC ([)
200 mA	200 mA	200 mA	200 mA
Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
–40…+85 °C	–25…+70 °C	–25…+70 °C	–25…+70 °C
≤ 600 Hz	≤ 600 Hz	≤ 300 Hz	≤ 100 Hz
Yellow LED	Yellow LED	Yellow LED	Yellow LED
IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20	IP 68 per BWN Pr. 20
CE, cULus	CE, cULus	CE, cULus	CE, cULus
Stainless steel	Stainless steel	Stainless steel	Stainless steel
PA 12	PA 12	PA 12	PA 12
M12 connector, 4-pin	3 m PUR cable, 22 AWG	M12 connector, 4-pin	M12 connector, 4-pin
BCC M415-0000-1A-003-EX44T2-020		BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020









Withstand the harshest cleaning processes

In the food and beverage industry, the chemical industry, and even conveying operations, inductive sensors are routinely cleaned with more and more aggressive methods. Whether acids, bases, steam, foaming cleaners or high-pressure cleaners – stainless steel sensors fulfill stringent requirements.

Features

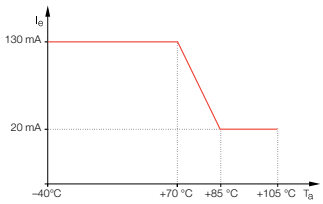
- No function indicator directly on the sensor: The drill hole for the LED is a potential source of danger during cleaning processes and a possible means of entry for bacteria. The function display is completely wrapped in the transparent plastic of the connector.
- Housing made of stainless steel (material 1.4571): This material is common in the food and beverage- industry. The cable plug has to be adapted to different cleaning and- disinfection agents.
- Gold-coated contacts: The difficult installation relationships require gold-coated contacts, so that plug corrosion is prevented.
- Lasered or etched part number: Cleaning- and disinfection processes dissolve type plates. Lasered or etched part numbers are there to stay.
- Additional O-ring-seals for extreme requirements: temperature shocks, triggered by cleaning and disinfection, cause strong, different residual stress on steel housings and potting.

Housing size	
Installation type (observe instructions in the Basic Information chapter)	
Rated switching distance s_n	
Assured switching distance s_a	
Sensing distance	
PNP, NO	
Supply voltage U_R	
Voltage drop U_d at I_e max.	
Rated insulation voltage U_i (protection class)	
Rated operating current I_e	
Polarity reversal protected/transposition protected/short-circuit protected	
Ambient temperature T_a	
Ambient temperature T_a at load current ≤ 20 mA	
Ambient temperature range T_a short-time 30 min	
Switching frequency f max.	
Degree of protection as per IEC 60529	
Approvals	
Material	Housing
	Sensing surface
Connection	
Suggested mating cable	

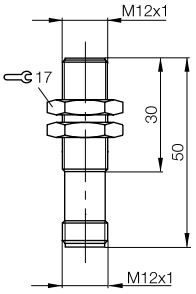
Additional cable lengths and PUR cable jacket material available on request.

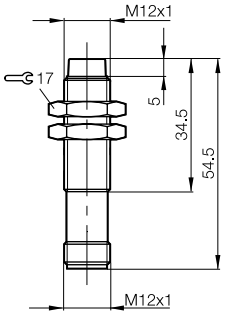
Steam jet tested

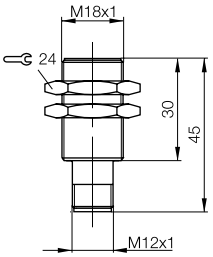
Current reduction as a function of ambient temperature range

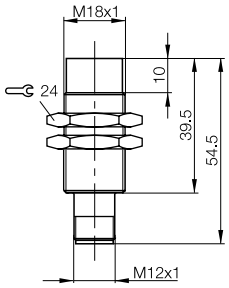


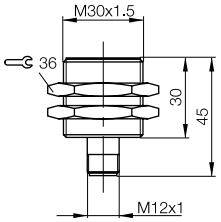
M12×1	**M12×1**	**M18×1**	**M18×1**	**M30×1.5**
Flush	Non-flush	Flush	Non-flush	Flush
2 mm	**4 mm**	**5 mm**	**8 mm**	**10 mm**
0...1.6 mm	0...3.2 mm	0...4.1 mm	0...6.5 mm	0...8.1 mm
1X	1X	1X	1X	1X
BES02EK	**BES02FA**	**BES02ET**	**BES02FK**	**BES02F0**
10…30 V DC	10…30 V DC	10…30 V DC	10…30 V DC	10…30 V DC
3.5 V	3.5 V	3.5 V	3.5 V	3.5 V
75 V DC	75 V DC	75 V DC	75 V DC	75 V DC
130 mA	130 mA	130 mA	130 mA	130 mA
Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes	Yes/Yes/Yes
–40…+70 °C	–40…+70 °C	–40…+70 °C	–40…+70 °C	–40…+70 °C
–40…+85 °C	–40…+85 °C	–40…+85 °C	–40…+85 °C	–40…+85 °C
+105 °C	+105 °C	+105 °C	+105 °C	+105 °C
≤ 800 Hz	≤ 400 Hz	≤ 500 Hz	≤ 200 Hz	≤ 200 Hz
IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27	IP 69K and IP 68 as per BWN Pr. 27
CE, cULus	CE, cULus	CE, cULus	CE, cULus	CE, cULus
Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4571
PEEK	PEEK	PA 12	PA 12	PA 12
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin
BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020	BCC M415-0000-1A-003-EX44T2-020











Capacitive Sensors for Level Detection
SmartLevel, immersion sensors, DC 3-wire, M12 × 1, G½"

Flexible use: in plastic or metal

BCS capacitive immersion sensors detect levels of plastic granulates or highly conductive media with absolute reliability. Their excellent foam and build-up compensation makes them highly flexible. They can be installed in plastic or metal tanks.

Benefits

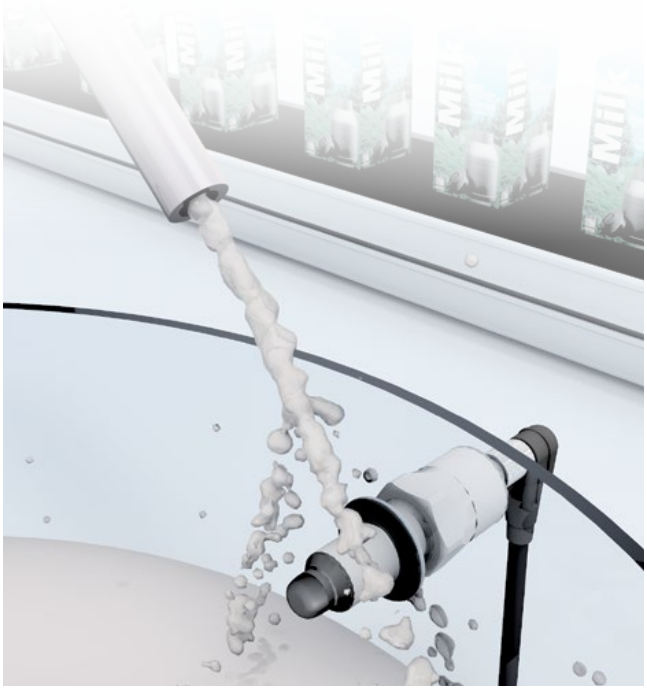
- High-quality 1.4404 (316L) stainless and PEEK housings
- Wire connection for remote teach-in
- EHEDG conformal with special approved adapters
- Media temperature up to 105 °C
- Autoclave compatible (1 h)
- IO-Link versions available
- Pressure rated to 10 bar and IP69K at the M12 connector

Applications

- Detect plastic granulates up to 105 °C
- Sense adhering foods such as yogurt, milk, beverages etc.
- Detect highly conductive acids and bases up to a value of 100 mS/cm

Size		
Installation type		
Rated switching distance s_n		
PNP, NO		
PNP, NC		
NPN, NO		
NPN, NC		
IO-Link, PNP/NPN and NO/NC can be coded		
Supply voltage U_S		
Voltage drop U_d at I_e		
Rated insulation voltage U_i		
Output current max.		
No-load supply current I_0 max.		
Polarity reversal protected/transposition protected/short-circuit protected		
Ambient temperature T_a/media temperature		
Switching frequency f		
Output function indicator		
Degree of protection per IEC 60529		
Special properties		
Material	Housing	
	Sensing surface	
	O-ring	
Connection		

EHEDG conformal only when used with a corresponding accessory

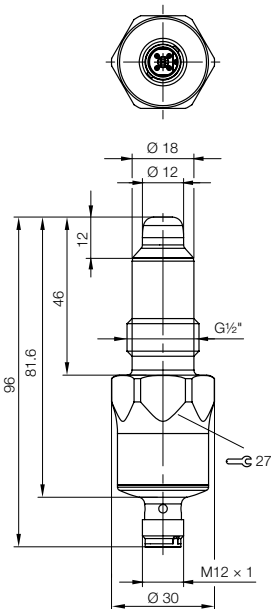


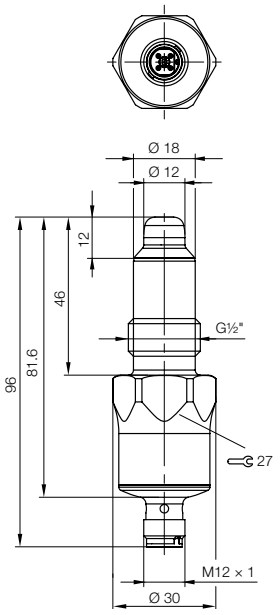
The BCS capacitive immersion sensor reliably detects the level of a milk tank.

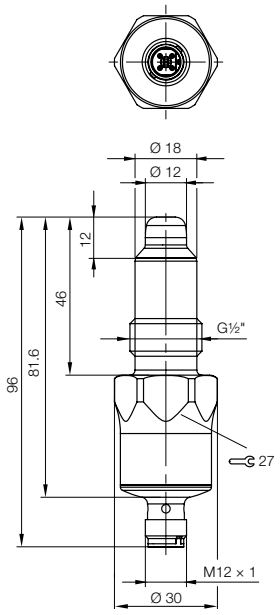
Capacitive Sensors for Level Detection

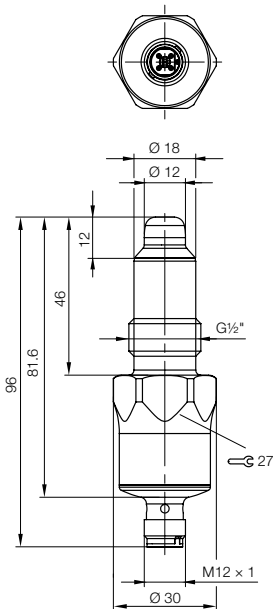
SmartLevel, immersion sensors, DC 3-wire, M12 × 1, G½"

G½"	**G½"**	**G½"**	**G½"**
Not flush	Not flush	Not flush	Not flush
Level teachable	**Level teachable**	**Level teachable**	**Level teachable**
BCS011F		**BCS011M**	
BCS011H		**BCS011N**	
BCS011J		**BCS011P**	
BCS011K		**BCS011R**	
	BCS011E		**BCS011L**
12...30 V DC	18...30 V DC	12...30 V DC	18...30 V DC
≤ 2 V	≤ 2 V	≤ 2 V	≤ 2 V
75 V DC	75 V DC	75 V DC	75 V DC
50 mA	50 mA	50 mA	50 mA
15 mA	15 mA	15 mA	15 mA
Yes/yes/yes	Yes/yes/yes	Yes/yes/yes	Yes/yes/yes
–40...+85 °C/105 °C	–40...+85 °C/105 °C	–10...+85 °C/105 °C	–10...+85 °C/105 °C
5 Hz	5 Hz	5 Hz	5 Hz
Yellow LED	Yellow LED	Yellow LED	Yellow LED
IP68 10 bar/IP69K	IP68 10 bar/IP69K	IP68 10 bar/IP69K	IP68 10 bar/IP69K
Autoclave compatible	Autoclave compatible	Autoclave compatible	Autoclave compatible
1.4404 (316L) stainless steel	1.4404 (316L) stainless steel	1.4404 (316L) stainless steel	1.4404 (316L) stainless steel
PEEK	PEEK	PEEK	PEEK
EPDM	EPDM	FKM, oil-resistant	FKM, oil-resistant
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin





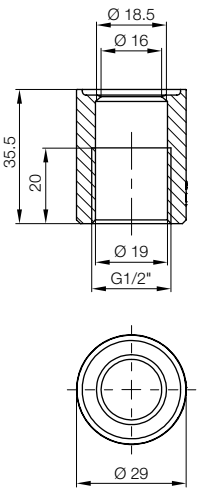


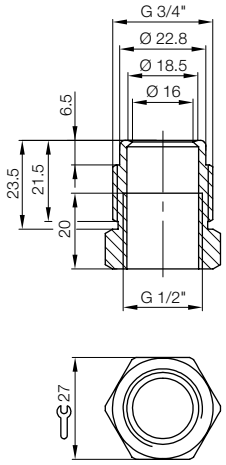


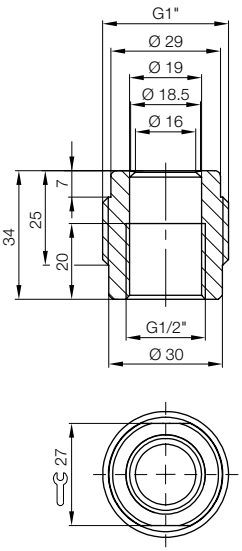
Accessories for Capacitive Sensors
Adapters for immersion sensors

Description		Adapter	Adapter	Adapter
Version		G½" ➔ Ø 29 mm	G½" ➔ G¾"	G½" ➔ G1"
Use		for hygienic processes with BCS capacitive immersion sensor	for hygienic processes with BCS capacitive immersion sensor	for hygienic processes with BCS capacitive immersion sensor
Can be welded		**BAM0294**		
Thread-in			**BAM0292**	**BAM0293**
Dairy coupling per DIN 11851				
Tri-Clamp				
Weight		105 g	70 g	120 g
Approvals		EHEDG conformal	EHEDG conformal	EHEDG conformal
Material	Housing	1.4404 (316L) stainless steel	1.4404 (316L) stainless steel	1.4404 (316L) stainless steel
Connection	Sensor	G½"	G½"	G½"
	Process	Ø 18.5 mm	G¾"	G1"

EHEDG conformal only when used with a corresponding sensor





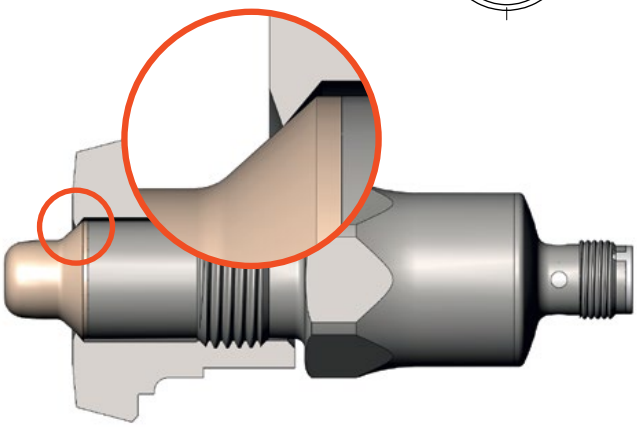


Optimal installation

The capacitive immersion sensors are to be installed in combination with the EHEDG conformal adapters shown here. They are approved for level detection in the European foods industry.

Benefits

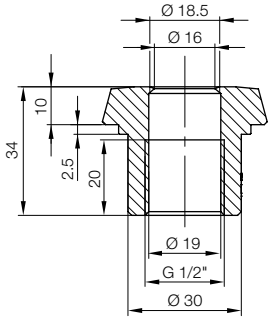
- Housing stainless steel 1.4404 (316L)
- EHEDG approved when used with Balluff BCS immersion sensor
- Other special versions upon request

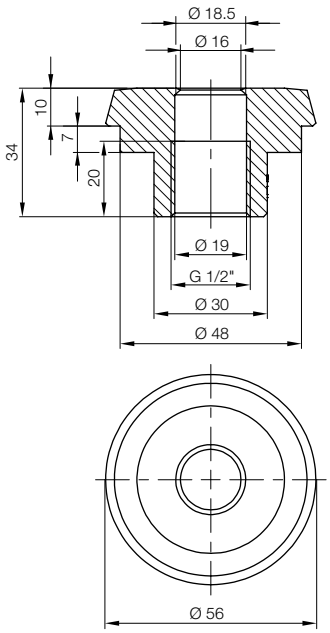


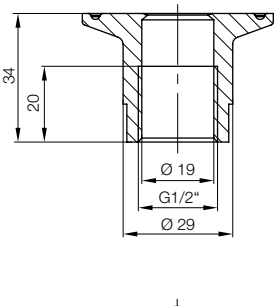
Stainless steel adapter for hygienic installation of the Balluff BCS immersion sensor.

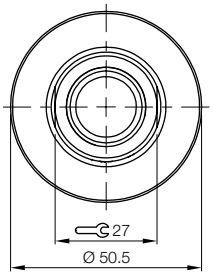
Adapters for immersion sensors

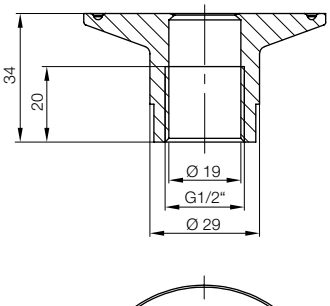
Adapter	**Adapter**	**Adapter**	**Adapter**
G½" ➔ DN25	G½" ➔ DN40	G½" ➔ Tri-Clamp Ø 50.5 mm	G½" ➔ Tri-Clamp Ø 64 mm
for hygienic processes with BCS capacitive immersion sensor	for hygienic processes with BCS capacitive immersion sensor	for hygienic processes with BCS capacitive immersion sensor	for hygienic processes with BCS capacitive immersion sensor
BAM0295	**BAM0296**		
		BAM02NT	**BAM02NU**
170 g	230 g	142 g	205 g
EHEDG conformal	EHEDG conformal	EHEDG conformal	EHEDG conformal
1.4404 (316L) stainless steel	1.4404 (316L) stainless steel	1.4404 (316L) stainless steel	1.4404 (316L) stainless steel
G½"	G½"	G½"	G½"
DN25	DN40	Tri-Clamp Ø 50.5 mm	Tri-Clamp Ø 64 mm

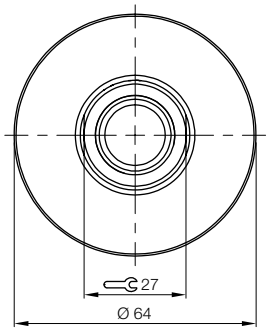












100% stainless steel

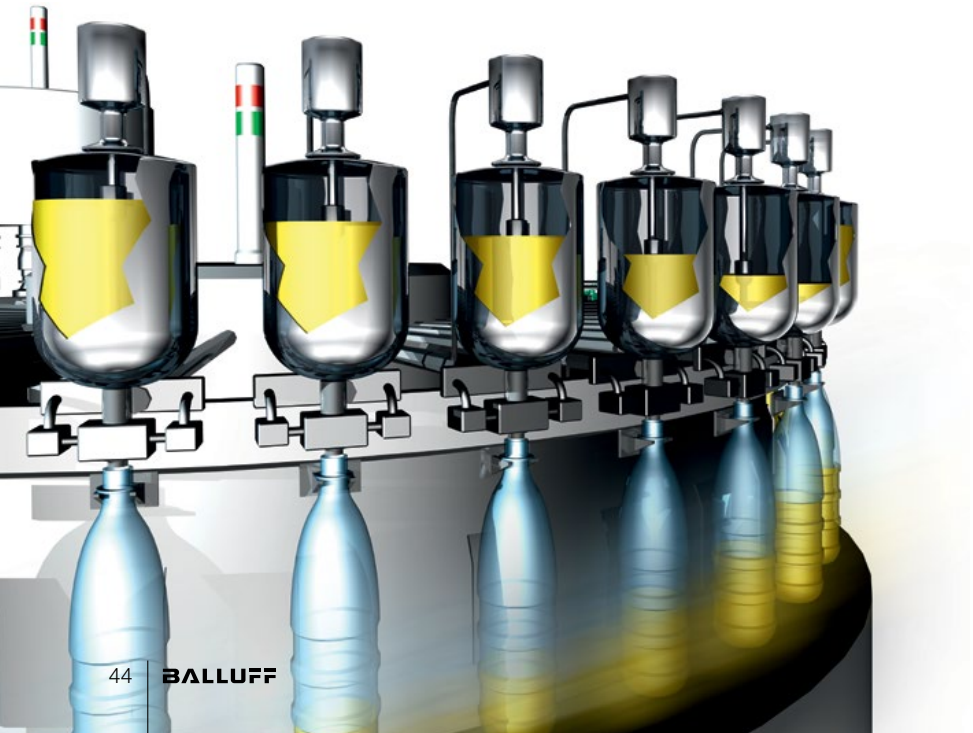
Maximum precision for food hygiene – internationally certified
The filling level sensor BTL-SF ensures continuously precise measurement in applications that have extreme hygiene requirements. Made from corrosion-free stainless steel with excellent surface quality and rounded edges, the sensor meets the highest international hygiene standards and fulfills all of the food industry's strict requirements.

Other benefits:
- Neutral for all liquids
- Unaffected by foam, thus delivering reliable filling level values
- Adjustment-free installation
- Easy to clean in installed state (CIP – clean in place)
- For process temperatures up to 130 °C (SIP – sterilization in place
- Standardized interfaces ensure flexible installation
- Internationally certified quality ensures global marketing and sales of your system
- Rising and falling signal available

In the USA, 3-A Sanitary Standards Inc. formulates and monitors hygiene guidelines for devices used in the manufacture and packaging of milk and foodstuffs. Our products with this designation are 3-A authorized.

The FDA (Food and Drug Administration) oversees the U.S. food and drug industries and certifies devices, materials as well as systems in these industries. A product designation of this kind makes your system eligible for FDA approval.

The ECOLAB marking stands for resistance to aggressive cleaning agents. Devices with ECOLAB markings fulfill their standards.



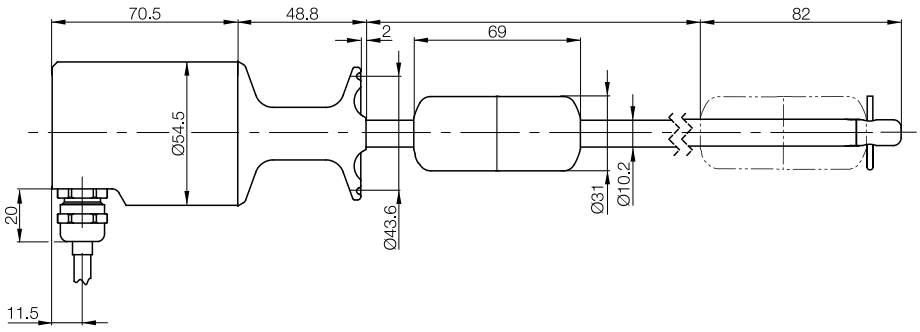
Filling Level Sensor SF
General data

IP69K

Series	**Rod SF BTL5**
Polarity reversal protected	yes
Overvoltage protection	36 V
Dielectric strength	500 V DC (GND to housing)
Degree of protection as per IEC 60529	IP 67/IP 69K (flange and tube)
Housing material	Stainless steel 1.4404
Flange and tube material	1.4404
Connection	Cable connection
Fastener	1.5" Tri Clamp as per SSI 3A standard 74-03
Pressure rating	300 bar (depending on float)
EMC testing	
Radio interference emission	EN 55016-2-3 (industrial and residential area)
Static electricity (ESD)	EN 61000-4-2/EN 61000-4-2 Severity level 3
Electromagnetic fields (RFI)	EN 61000-4-3/EN 61000-4-3 Severity level 3
Electrical fast transient bursts	EN 61000-4-4/EN 61000-4-4 Severity level 3
Conducted interference induced by high-frequency fields	EN 61000-4-6/EN 61000-4-6 Severity level 3
Surge voltage	IEC 61000-4-5/EN 61000-4-5 Severity level 2
Magnetic fields	IEC 61000-4-8/EN 61000-4-8 Severity level 4
Standard nominal stroke (mm)	50...2500 in 1 mm increments

Scope of delivery
- Transducer
- Quick start instructions

Please order separately:
Tri Clamp
Float
Seal
Weld flange



Filling Level Sensor SF
Analog interface

The industry-standard filling level sensor works with tried-and-tested Micropulse technology, absolute and contact-free magnetostrictive measurement, which has been associated with top reliability for years. In addition, it has analog interfaces and, due to this common standard signal, can be used in process automation.

Analog signal

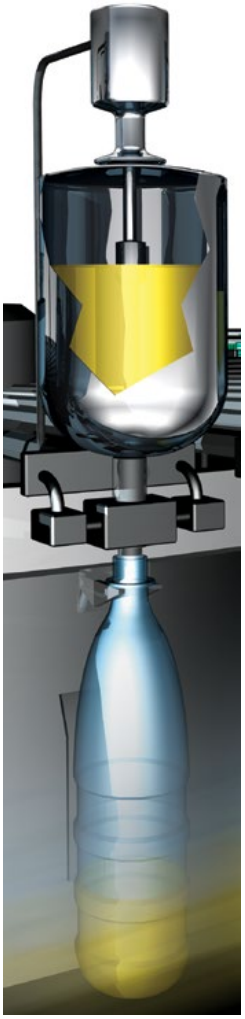
A signal that can assume any value between a minimum and maximum continuously (almost) without increments is called an analog signal. The output signal for the filling level sensor BTL-SF is analog and directly proportional to the position of the float on the sensor tube.

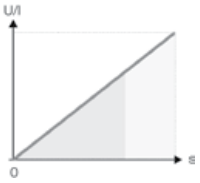
Features

- Economically priced system solution
- Cable break monitoring using 4...20 mA signal
- Current signal, interference-free signal transfer
- High resolution and repeatability
- Rising and falling signal available

Variants

- Current (4...20 mA or 0...20 mA)
- Voltage (0...10 V or 10...0 V)





Series	
Output signal	
Transducer interface	
Customer device interface	
Part number	
Output voltage	
Output current	
Load current	
Max. residual ripple	
Load resistance	
System resolution	
Hysteresis	
Repeat accuracy	
Sampling rate	
Max. linearity deviation	
Temperature coefficient	
Supply voltage	
Current consumption	
Polarity reversal protected	
Overvoltage protection	
Dielectric strength	
Operating temperature	
Process temperature (130 °C over one hour)	

Scope of delivery

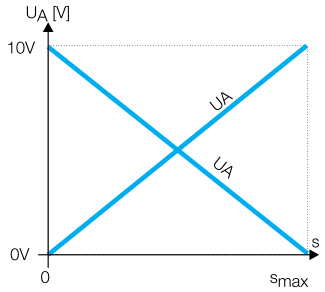
- Transducer
- Quick start instructions

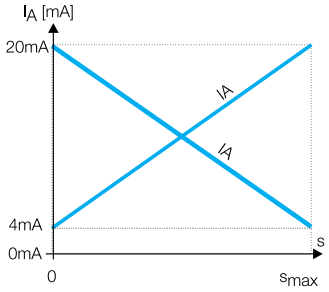
Please order separately:
Tri Clamp
Float
Seal
Weld nipple

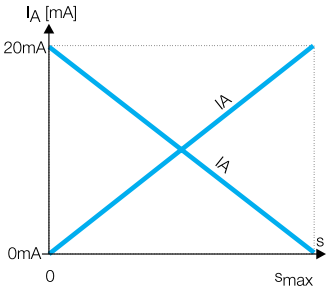
PTFE cable – LIF5Y-FC-5Y (7x0.25 mm²):

- Temperature-resistant up to 200 °C
- Good resistance to chemicals and oil

Rod SF BTL5	**Rod SF BTL5**	**Rod SF BTL5**
Analog	Analog	Analog
A	**E**	**C**
Analog	Analog	Analog
BTL5-**A**11-M_ _ _ _-SF-_ _ _	BTL5-**E**1_-M_ _ _ _-SF-_ _ _	BTL5-**C**1_-M_ _ _ _-SF-_ _ _
0...10 V and 10...0 V		
	4...20 mA or 20...4 mA	0...20 mA or 20...0 mA
Max. 5 mA		
≤ 5 mV		
	≤ 500 ohms (500 ohms)	≤ 500 ohms (500 ohms)
≤ 0.1 mV	≤ 0.2 µA	≤ 0.2 µA
≤ 4 µm	≤ 4 µm	≤ 4 µm
System resolution/min. 2 µm	System resolution/min. 2 µm	System resolution/min. 2 µm
$f_{STANDARD}$ = 500 Hz	$f_{STANDARD}$ = 500 Hz	$f_{STANDARD}$ = 500 Hz
±100 µm to 500 mm of nominal stroke ±0.02% of 500 to max. nominal stroke	±100 µm to 500 mm of nominal stroke ±0.02% of 500 to max. nominal stroke	±100 µm to 500 mm of nominal stroke ±0.02% of 500 to max. nominal stroke
≤ 40 ppm/K for nominal stroke 500 mm, float at center of measuring range	≤ 40 ppm/K for nominal stroke 500 mm, float at center of measuring range	≤ 40 ppm/K for nominal stroke 500 mm, float at center of measuring range
20...28 V DC	20...28 V DC	20...28 V DC
≤ 150 mA	≤ 150 mA	≤ 150 mA
yes	yes	yes
36 V	36 V	36 V
500 V DC (ground to housing)	500 V DC (ground to housing)	500 V DC (ground to housing)
–10...+85 °C	–10...+85 °C	–10...+85 °C
–20...+100 °C	–20...+100 °C	–20...+100 °C







Ordering example:
BTL5-_1_-M_ _ _ _-SF-_ _ _

Output signal

A Analog 0...10 V
C Analog 0...20 mA
E Analog 4...20 mA

Characteristic curves

1 Rising and falling for A
0 Rising (for C and E)
7 Falling (for C and E)

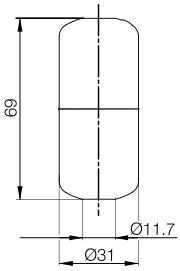
Standard nominal stroke [mm]

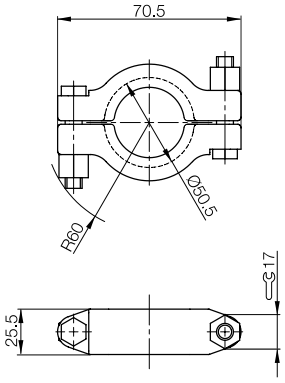
50...2500 mm in 1 mm increments

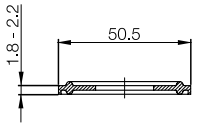
Radial connection

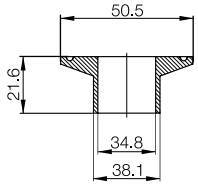
K-radial design
F02 2 m PTFE cable
F05 5 m PTFE cable
F10 10 m PTFE cable
F15 15 m PTFE cable
F20 20 m PTFE cable

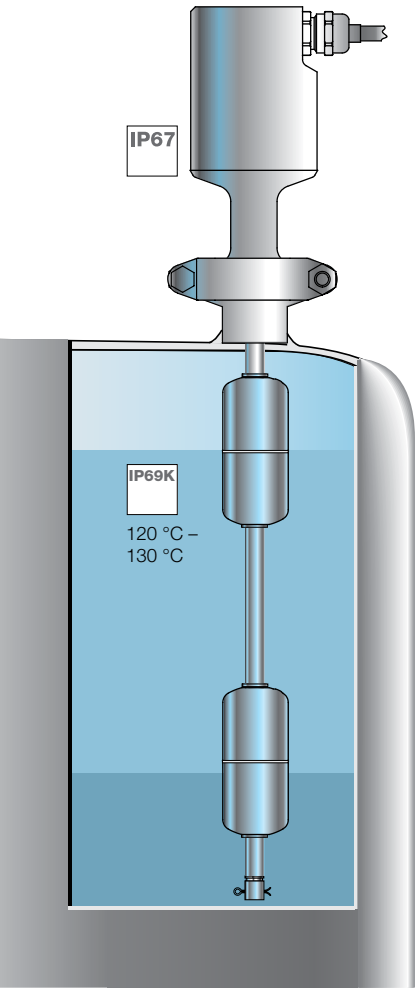
Description	**Float**	**Tri Clamp (DIN 32676)**	**O-ring**	**Weld flange**
for Series	Rod SF BTL	Rod SF BTL	Rod SF BTL	Rod SF BTL
	BAM01A2	**BAM01A5**	**BAM01A4**	**BAM01A3**
Material	Stainless steel 1.4404	USA ASTM 316 (1.4401)	Platinum catalyzed silicone	Part no. W. 1.4435 BN2 (Fe ≤ 0.5%) as per EB 10088
Weight	Approx. 30 g			
Operating temperature/	–40...+130 °C			
Storage temperature				
Immersion depth in water	approx. 31 mm			
Pressure rating (static)	4 bar (58 psi)			







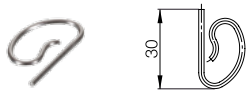




Process temperature:
maximum permissible temperature of the rod under the flange (with media contact).
Certain production processes require sterilization at 120...130°C for 0.5...1 hour, for instance.

Included in scope of delivery for float

- Float
- Instructions
- Cotter pin (spring pin 2×30)



Caution!
Approvals only issued through use of these components.
Please read the instructions in the user's guide before designing, installing, and commissioning!

Filling Level Sensor SF
Application

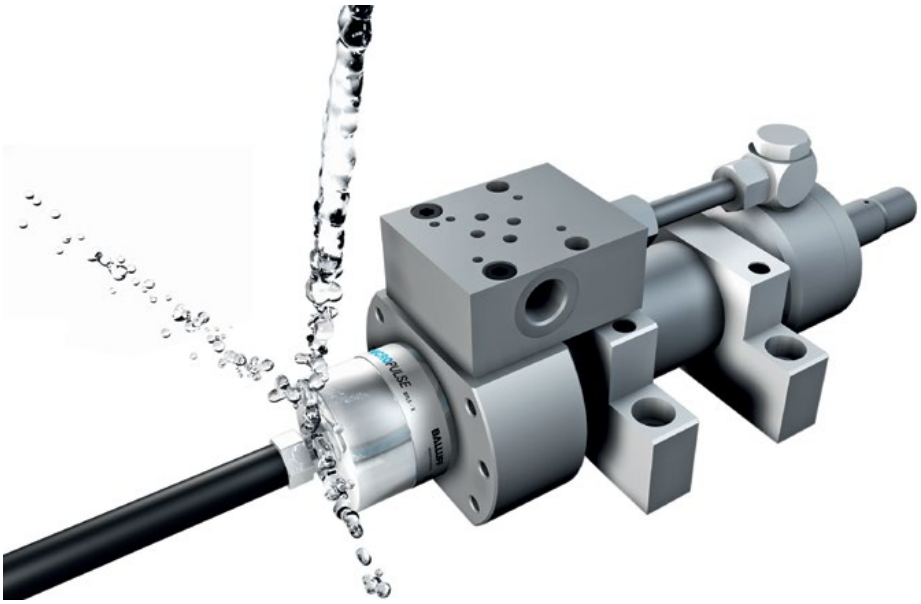
- Continuously precise measurement delivers excellent filling results
- 100% stainless steel ensures top hygiene standards and long service life
- International certificates ensure maximum quality

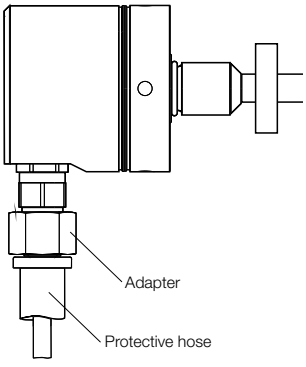
Maximum precision for food hygiene – internationally certified
The filling level sensor BTL-SF ensures continuously precise measurement in applications that have extreme hygiene requirements. Made from corrosion-free stainless steel with excellent surface quality and rounded edges, the sensor meets the highest international hygiene standards and fulfills all of the food industry's strict requirements. Take advantage of the best quality directly from the manufacturer.

Other benefits:
- Neutral for all liquids
- Unaffected by foam, thus delivering reliable filling level values
- Adjustment-free installation
- Easy to clean in installed state (CIP – clean in place)
- For process temperatures up to 130 °C (SIP – sterilization in place)
- Standardized interfaces ensure flexible installation
- Internationally certified quality ensures global marketing and sales of your system
- Rising and falling signal available

Micropulse ProCompact with cable protection system

Extreme ambient conditions, in which high reliability and accuracy are required, are typical application areas for Micropulse ProCompact transducers. The non-contact working principle of the systems ensures a complete absence of wear and nearly endless service life. The high-precision output signal is available as an absolute signal for the controller in a wide range of different interfaces.





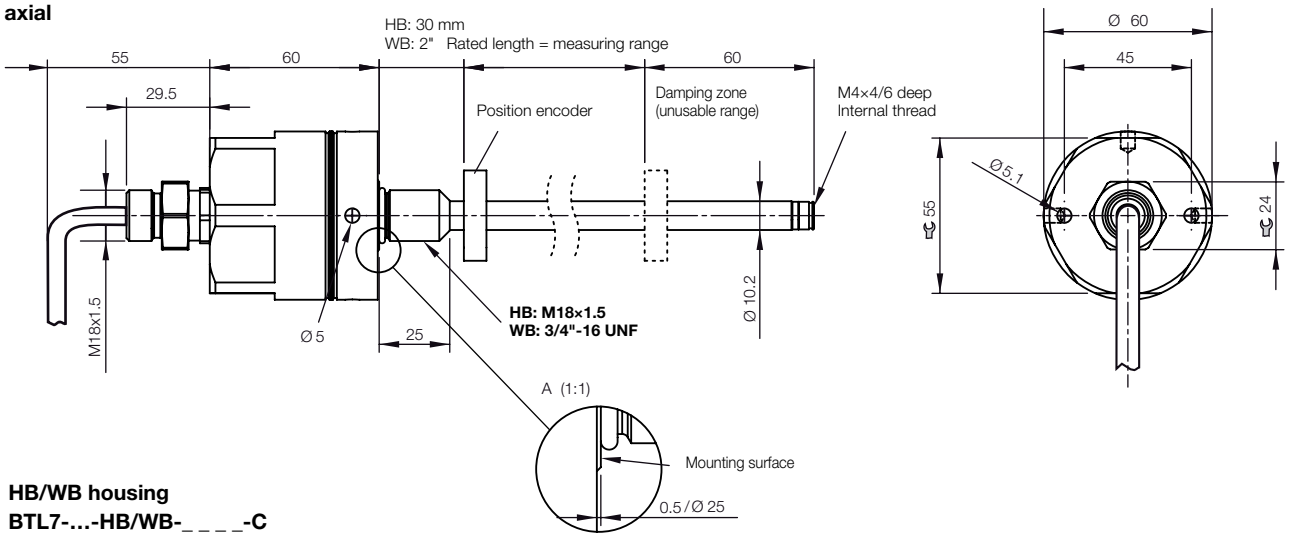
Accessories for the cable protection system

Series	**Adapter**
	BAM01JY
Part number	BAM AD-XA-007-M18×1.5/D12-4
Housing material	Stainless steel V2A (conditionally seawater-resistant)
Series	**Protective hose**
Part number	BAM PT-XA-001-095-0-_ _ _
Tube length	02, 05, 10, 15, 20, 30, 50 and 100 m
Degree of protection	IP 68 (40 bar) IP 69K (in installed and screwed-on state)
Housing material	PUR
Outer diameter	16 mm
Inside diameter	9.5 mm
Temperature range	–40...+95 °C
Bending radius min. (static)	51 mm

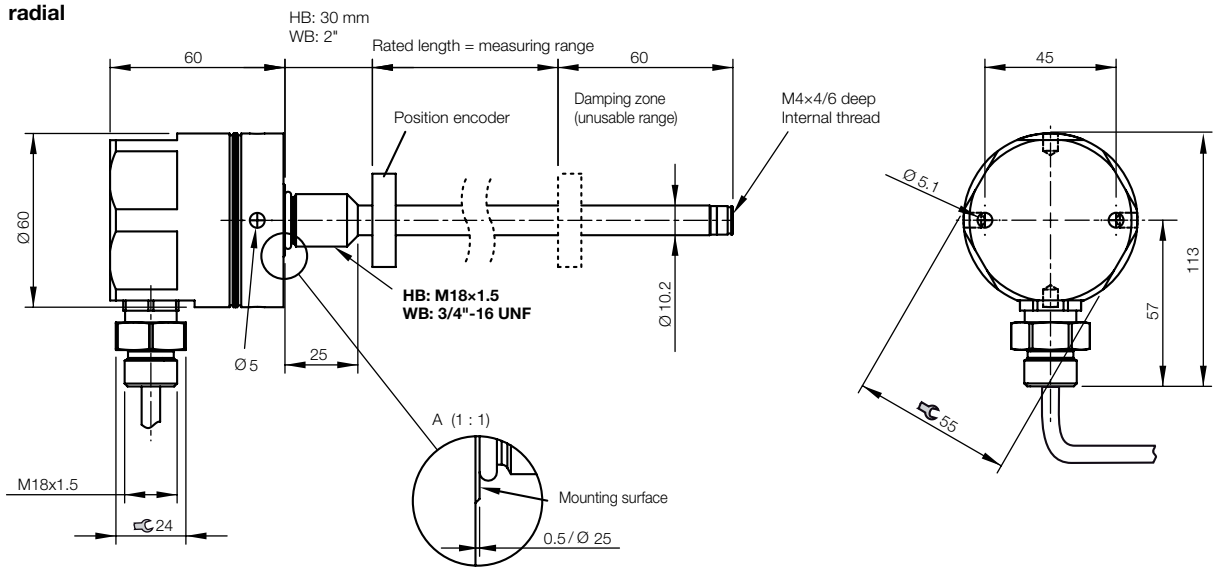
General data

Series	**Rod ProCompact HB/WB BTL7**
Shock load	100 g/6 ms per EN 60068-2-27 and 100 g/2 ms per EN 60068-2-29
Vibration	12 g, 10...2000 Hz per EN 60068-2-6
Polarity reversal protected	yes
Overvoltage protection	TransZorb protection diodes
Dielectric strength	500 V AC (GND to housing)
Degree of protection as per IEC 60529	IP 68 (5 bar with cable); IP 69K, 40 bar (with cable protection system)
Housing material	Stainless steel 1.4404
Flange and tube material	Stainless steel tube 1.4571, flange 1.4404
Housing attachment	Flange with thread
Connection	Cable connection
EMC testing	
Radio interference emission	EN 55016-2-3 (industrial and residential area)
Static electricity (ESD)	EN 61000-4-2 Severity level 3
Electromagnetic fields (RFI)	EN 61000-4-3 Severity level 3
Rapid, transient electrical pulses (burst)	EN 61000-4-4 Severity level 3
Conducted interference induced by high-frequency fields	EN 61000-4-6 Severity level 3
Standard nominal strokes [mm]	0025...7620 mm in 1 mm increments

HB/WB housing
BTL7-...-HB/WB-_ _ _ _-C
axial



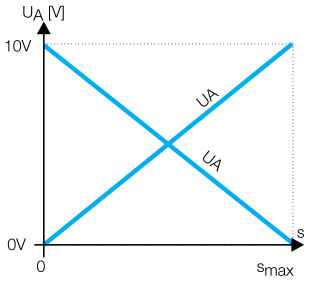
HB/WB housing
BTL7-...-HB/WB-_ _ _ _-C
radial

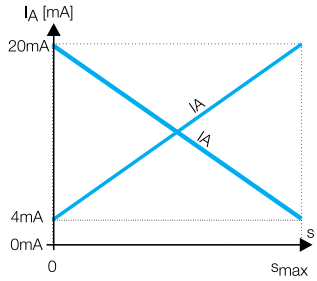


Series		**BTL7 Compact rod**	**BTL7 Compact rod**
Output signal		analog	analog
Transducer interface		**A**	**E**
Customer device interface		analog	analog
Part number		BTL7-**A510**-M_ _ _ _-HB/WB-_ _ _ _	BTL7-**E5**-M_ _ _ _-HB/WB-_ _ _ _
Output voltage		0...10 V and 10...0 V	
Output current			4...20 mA or 20...4 mA
Load current		Max. 5 mA	
Max. residual ripple		≤ 5 mV	
Load resistance			≤ 500 ohms
System resolution		≤ 0.1 mV	≤ 0.2 µA
Hysteresis		≤ 4 µm	≤ 4 µm
Repeat accuracy (typical)		10 µm	10 µm
Measurement rate		$f_{STANDARD}$ = 1 kHz	$f_{STANDARD}$ = 1 kHz
Max. linearity deviation		±50 µm up to 500 mm nominal stroke ±0.02% 500...max. nominal stroke	±50 µm up to 500 mm nominal stroke ±0.02% 500...max. nominal stroke
Temperature coefficient	Voltage output	[150 µV/°C + (5 ppm/°C × P ×U/L)] × ΔT	
	Current output		[0.6 µA/°C + (10 ppm/°C × P ×I/L)] × ΔT
Supply voltage		10...30 V DC	10...30 V DC
Current consumption		≤ 120 mA	≤ 120 mA
Polarity reversal protected		yes	yes
Overvoltage protection		TransZorb protection diodes	TransZorb protection diodes
Dielectric strength		500 V DC (ground to housing)	500 V DC (ground to housing)
Operating temperature		–40...+85 °C	–40...+85 °C
Storage temperature		–40...+100 °C	–40...+100 °C

See website for accessories and additional variations.

Please enter code for output signal, nominal stroke, design and connection in the part number.



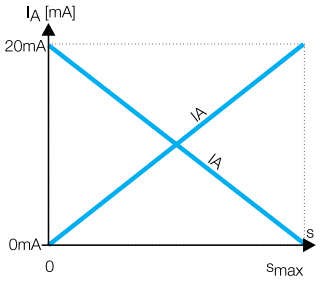


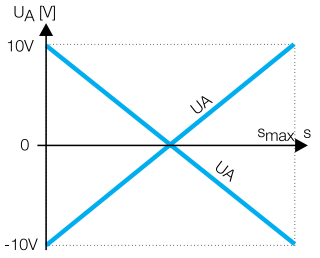
Scope of delivery

- Transducer
- Quick start instructions

Please order separately:
Magnet/float
Mounting nut

BTL7 Compact rod	**BTL7 Compact rod**
analog	analog
C	**G**
analog	analog
BTL7-**C5**-M_ _ _ _-HB/WB-_ _ _ _	BTL7-**G510**-M_ _ _ _-HB/WB-_ _ _ _
	–10...10 V and 10...–10 V
0...20 mA or 20...0 mA	
	Max. 5 mA
	≤ 5 mV
≤ 500 ohms	
≤ 0.2 µA	≤ 0.1 mV
≤ 4 µm	≤ 4 µm
10 µm	10 µm
$f_{STANDARD}$ = 1 kHz	$f_{STANDARD}$ = 1 kHz
±50 µm up to 500 mm nominal stroke ±0.02% 500...max. nominal stroke	±50 µm up to 500 mm nominal stroke ±0.02% 500...max. nominal stroke
	[150 µV/°C + (5 ppm/°C × P ×U/L)] × ΔT
[0.6 µA/°C + (10 ppm/°C × P ×I/L)] × ΔT	
10...30 V DC	10...30 V DC
≤ 120 mA	≤ 120 mA
yes	yes
TransZorb protection diodes	TransZorb protection diodes
500 V DC (ground to housing)	500 V DC (ground to housing)
–40...+85 °C	–40...+85 °C
–40...+100 °C	–40...+100 °C





Ordering example:

BTL7-E500_-M_ _ _ _-_ _-_ _ _ _-C

Characteristic

1 rising and falling (output types A and G)

0 Rising

7 Falling (output types C and E)

Nominal length in mm (4-digit)
e.g., M0025...M7620

Design

WB ProCompact rod
3/4"-16 UNF thread-in design
50.8 mm (2") null point

H8 ProCompact rod
M18 x 1.5 thread-in design
30 mm null point

Connection

Radial output
F05 5 m PTFE jacketed cable

Axial output
KA05 5 m PTFE jacketed cable

EtherNet/IP

Dimensions	70.0 x 228.0 x 44.1 mm	70.0 x 228.0 x 44.1 mm	70.0 x 228.0 x 44.1 mm
Housing material	Stainless Steel (1.4571)	Stainless Steel (1.4571)	Stainless Steel (1.4571)
	16 PNP Input Only	16 Configurable I/O	8 IO-Link Master, 16 Configurable I/O
	BNI009L	**BNI009K**	**BNI0096**
Installation Type	2-hole screw mounting	2-hole screw mounting	2-hole screw mounting
Supply voltage	18 V … 30.2 V	18 V … 30.2 V	18 V … 30.2 V
Current	9.0 A	9.0 A	9.0 A
Max. output current per channel	2.0A	2.0A	2.0A
Max. input load per channel	1.6A	1.6A	1.6A
Operating temperature	-5°C … 70°C	-5°C … 70°C	-5°C … 70°C
Protection per IEC 60529	IP69K	IP69K	IP69K
Number of Ports	8	8	8
Aux Power Configuration	7/8" 4pole	7/8" 4pole	7/8" 4pole
Transmission Protocol	EtherNet/IP	EtherNet/IP	EtherNet/IP

PROFINET

Dimensions	70.0 x 228.0 x 44.1 mm	70.0 x 228.0 x 44.1 mm
Housing material	Stainless Steel (1.4571)	Stainless Steel (1.4571)
	16 Configurable I/O	8 IO-Link Master, 16 Configurable I/O
	BNI009N	**BNI009M**
Installation Type	2-hole screw mounting	2-hole screw mounting
Supply voltage	18 V … 30.2 V	18 V … 30.2 V
Current	9.0 A	9.0 A
Max. output current per channel	2.0A	2.0A
Max. input load per channel	1.6A	1.6A
Operating temperature	-5°C … 70°C	-5°C … 70°C
Protection per IEC 60529	IP69K	IP69K
Number of Ports	8	8
Aux Power Configuration	7/8" 5pole	7/8" 5pole
Transmission Protocol	PROFINET	PROFINET

Dimensions	70.0 x 181.6 x 37.9 mm	70.0 x 181.6 x 37.9 mm	70.0 x 181.6 x 38.4 mm
Housing material	Stainless Steel V4A (1.4571)	Stainless Steel V4A (1.4571)	Stainless Steel V4A (1.4571)
	16 PNP Input	16 Configurable	16 Configurable
	BNI00AP	**BNI00AR**	**BNI00AT**
IO-Link Connection	M12, A-coded	M12, A-coded	M12 A-Coded
Sesnor Connection	M12, A-coded	M12, A-coded	M12 A-Coded
Installation Type	2-hole screw mounting	2-hole screw mounting	2-hole screw mounting
Supply voltage	18 V … 30.2 V	18 V … 30.2 V	18 V … 30.2 V
Max Current	4.0 A	4.0 A	9.0 A
Max Output per channel	350mA	350mA	2.0A
Operating temperature	-5°C … 70°C	-5°C … 70°C	-5°C … 70°C
Protection per IEC 60529	IP67	IP67	IP67
Number of Ports	8	8	8
Aux Power Configuration	Pin 2	Pin 2	7/8" 5pole
Transmission Protocol	IO-Link V1.1	IO-Link V1.1	IO-Link V1.1
Additional Feature	Balluff Expansion Port	Balluff Expansion Port	Balluff Expansion Port

Dimensions		**Ø31.0 mm x 5.1mm**
Housing material		Fiberglass reinforced ABS
Weight		4.50 g
Data size 40 bit	Black	**BIS0128**
	Blue	**BIS0129**
	Green	**BIS012A**
	Red	**BIS012C**
Operating Temperature		-40…85 °C
Storage Temperature		-40 °C … +95 °C
Protection per IEC 60529		IP67

Reasons for Machine Access Control

Operators:

- Verify the operator is trained to run the equipment
- Verify who was running the machine during a problem
- Verify a cleaning or washdown process happened on the appropriate cycle

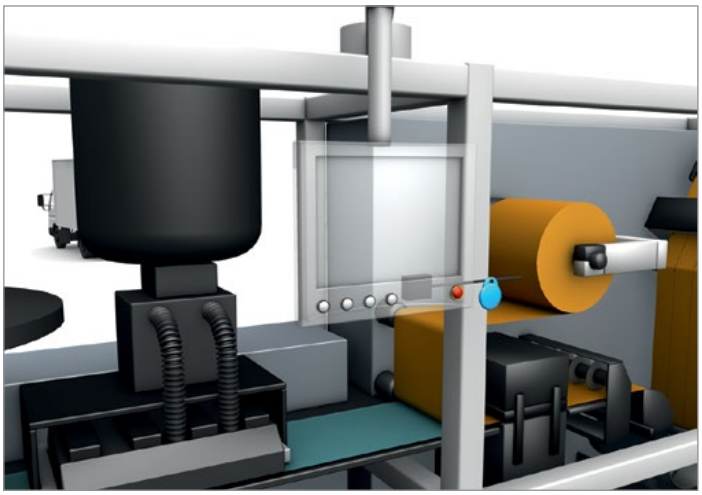
Maintenance/Engineers:

- Provide access to troubleshooting screens and update
- Provide access to locked screens or pushbuttons
- Track regular maintenance cycles and preventative visits

Supervisors:

- Review a quality or poka-yoke issue
- Review a machine setup or run problem
- Must override or clear a certain machine status

Dimensions	**40.0 x 50.0 x 20.0 mm**
Housing material	Interface PBT & ABS
	Serial RS232
	BIS0121
Installation Type	Through up to 3mm Stainless Steel
Supply voltage	19.2…26.4 V DC
Current	200 mA
Operating temperature	0 °C … +70 °C
Storage temperature	-20 °C … +85 °C
Protection per IEC 60529	IP67
Connection type	M12 8 pole
Connection cable	0.32 m PU



Access Control in Food & Beverage and Washdown

- Utilize existing stainless steel control boxes
- 125 kHz RFID antenna can read through 3mm of stainless steel
- Colored key fob tags can be utilized for indicating various roles

Dimensions	**M30×1,5**
Housing material	316L, Sensing face PA12
IO-Link 10 byte	**BIS0157**
Mounting	▬
Supply voltage	24 V DC +10 %/–20 % including ripple
Current	≤ 150 mA
Operating temperature	0...+70 °C
Storage temperature	–20...+85 °C
Protection per IEC 60529	IP 69K
Connection type	Round 4-pin IO-Link
Accessories included	Configuration software
Connection cable	See Connectivity section for cable options

For installation see technical section.

*8k byte tag for use with 32 byte IO-Link head only.

Mounting (see technical section for details):

▬ flush in steel

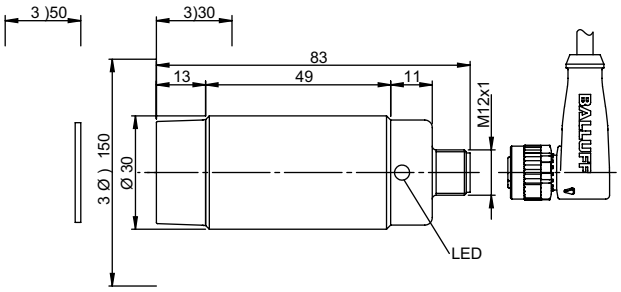
▬ non-flush in steel

▬ non-metal

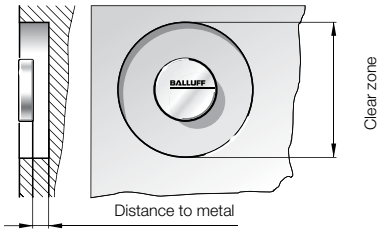
Antenna type:

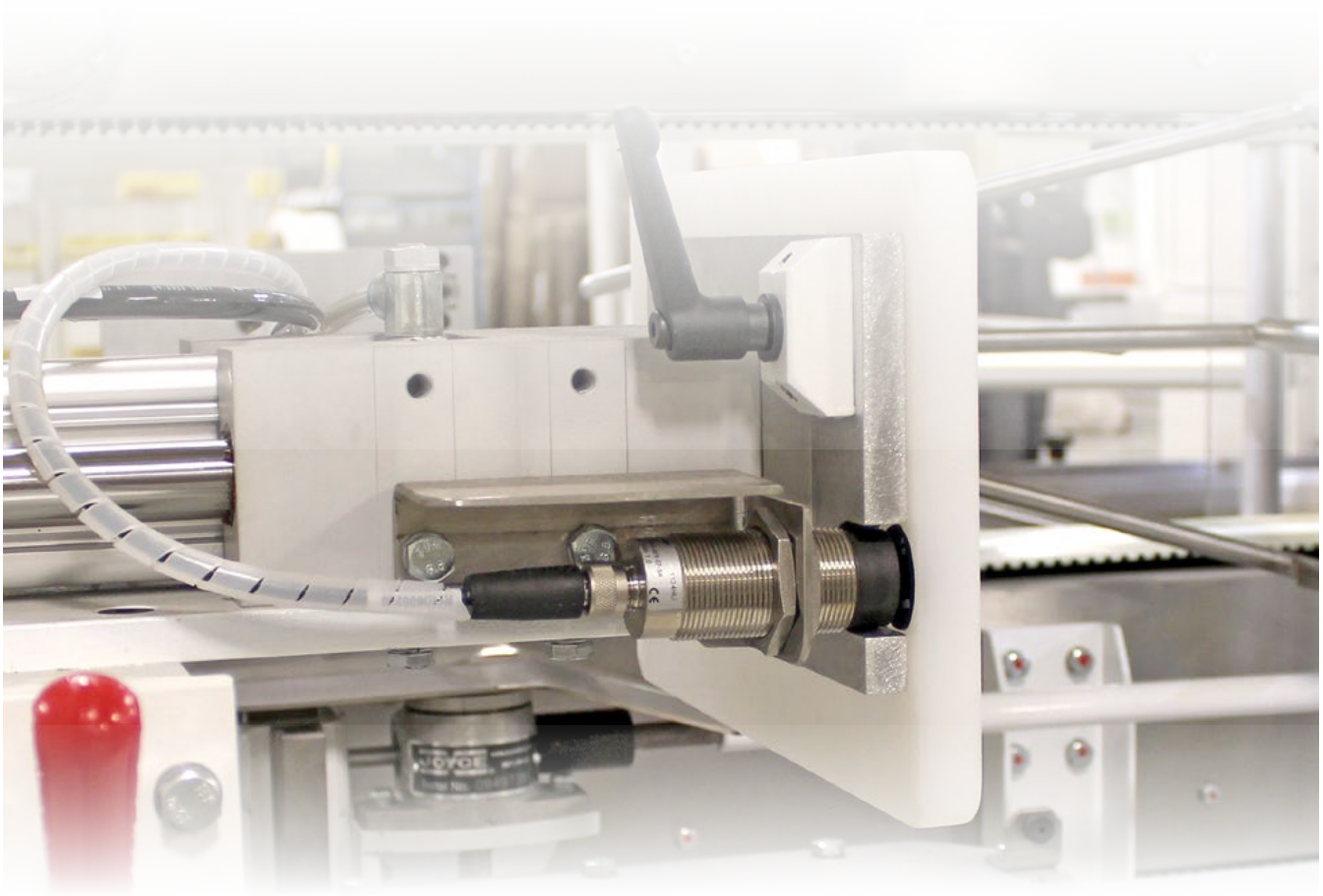
rod

round



Installation note for data carriers





High Temperature Type

Dimensions	**Ø 25x5**	**Ø 25x5**	**Ø 50x5**
Housing material	PPS	PPS	PPS
Weight	4 g	4 g	17 g
BIS M Programmable			
112 bytes	**BIS00YE**		
736 bytes		**BIS00YA**	**BIS00Y7**
992 bytes			
Operating temperature	-40...+93 °C	-40...+93 °C	-40...+93 °C
Storage temperature	-40...+220 °C	-40...+220 °C	-40...+220 °C
Storage temperature extended			
Protection per IEC 60529	IP 67	IP 67	IP 67

For installation see technical section of the Industrial Identification catalog.

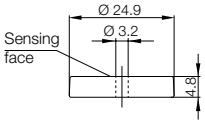
Supported standard
* ISO 15693
**ISO 14443

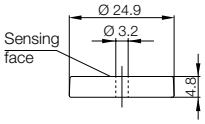
Mounting (see technical section for details):

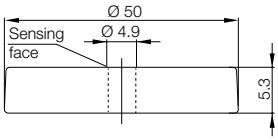
- flush in steel
- non-flush on steel
- non-metal

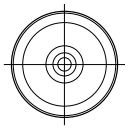
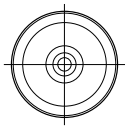
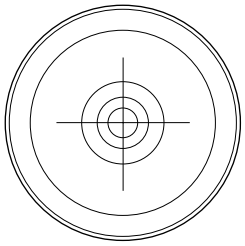
Antenna type:

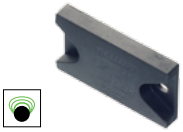
- rod
- round





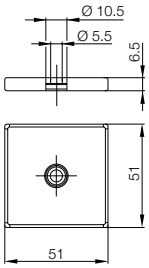


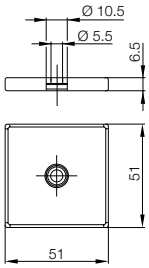




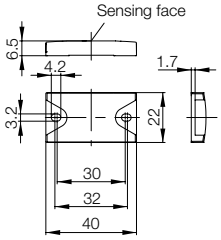


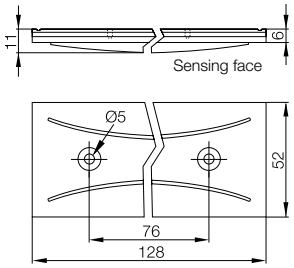
51.5x51.5x6.5 mm	**51.5x51.5x6.5 mm**	**40x22x6.5 mm**	**128x52x11 mm**
PPS	PPS	PPS-GF40	PPS
25 g	25 g	6,00 g	68 g

BIS00Y4		**BIS00LC**	**BIS00Y1**
	BIS00Y2		
-40...+93 °C	-40...+93 °C	-25...+70 °C	-40...+93 °C
-40...+220 °C	-40...+220 °C	-25...+85 °C	-40...+220 °C
		200° C (1000 h tested)	
IP 67	IP 67	IP 68/x9K	IP 67



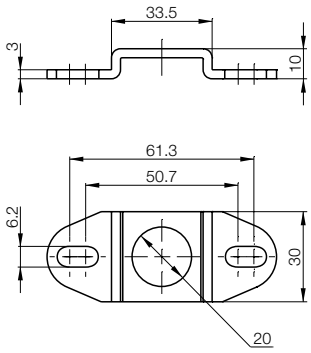


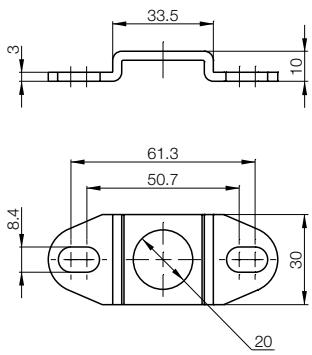




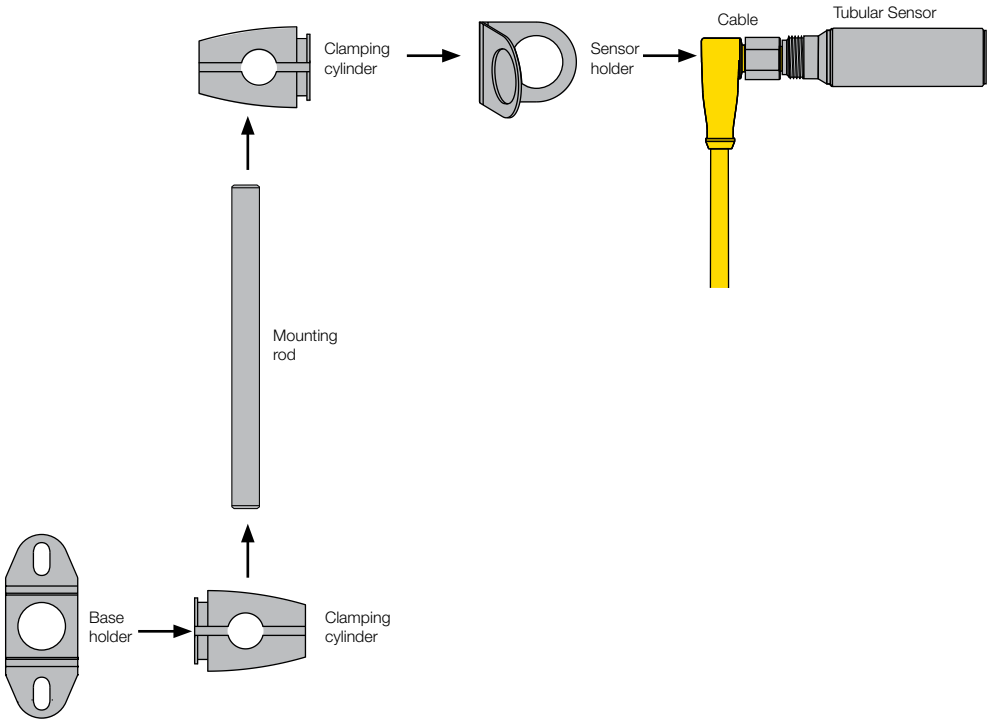
Base holder

Description	**Base holder**	**Base holder**
Version	For clamping cylinders	For clamping cylinders
Use	For mounting on base plates or profiles with M6	For mounting on base plates or profiles with M8
	BAM01CH	**BAM0044**
Material	Stainless steel	Stainless steel

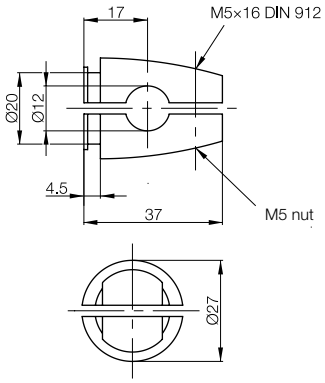




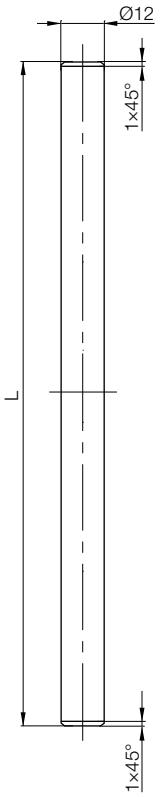
Sensor Mounting System



Clamping cylinder	
For 1 mounting rod	
Ø 12 mm	
For holding all sensor and reflector mounts	
BAM003Y	
Stainless steel	

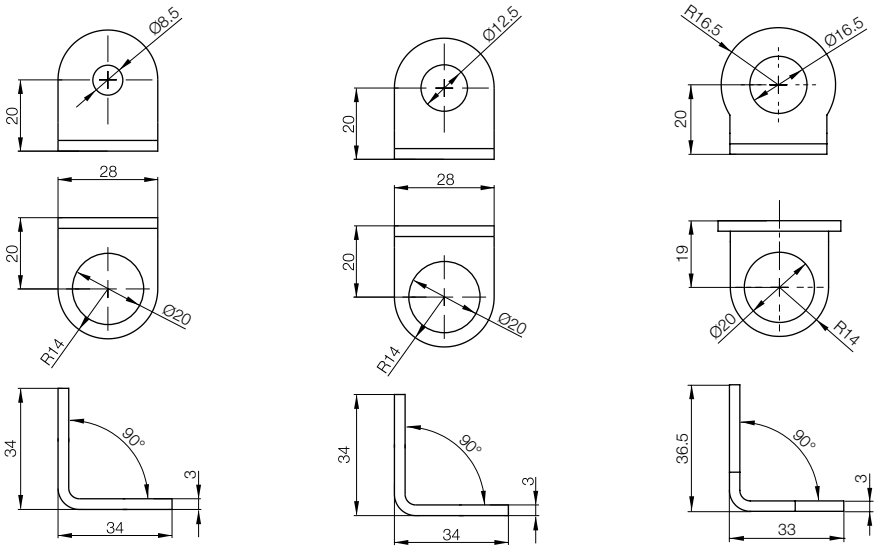


Description	**Mounting rod Ø 12 mm**
Version	Smooth, can be cut to required size
Length 150 mm	**BAM0045**
Length 300 mm	**BAM0046**
Material	Stainless steel



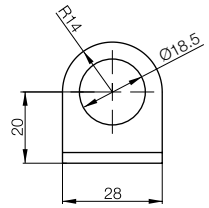
Sensor holder

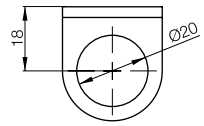
Description	**M8 sensor holder**	**M12 sensor holder**	**M16 sensor holder**
Version	For clamping cylinders	For clamping cylinders	For clamping cylinders
Use	For sensors and clamps M8	For sensors and clamps M12	For sensors and clamps M16
	BAM0036	**BAM0037**	**BAM003K**
Material	Stainless steel	Stainless steel	Stainless steel

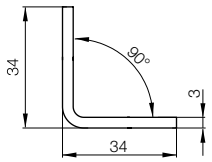


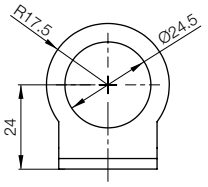
Sensor holder

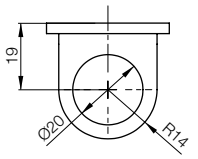
M18 sensor holder	M24 sensor holder	M30 sensor holder
For clamping cylinders	For clamping cylinders	For clamping cylinders
For sensors and clamps M18	For sensors and clamps M24	For M30 sensors and clamps
BAM0032	**BAM003L**	**BAM0033**
Stainless steel	Stainless steel	Stainless steel

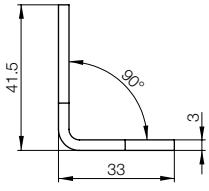


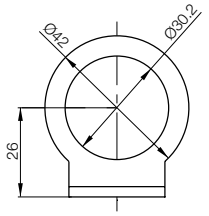


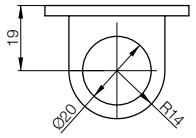


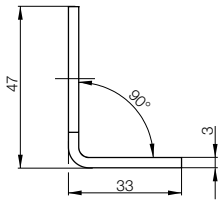












M8 and M12 Specialty Cables

Single ended
IP69K, ECOLAB, stainless
Stainless nut, IP69K

ECOLAB

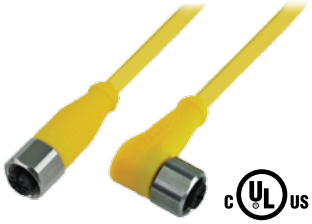
Single-Ended		
Type		IP69K Rated, 1.4404 Stainless, PP overmolded PVC cable
Configuration		Stainless nuts, PP overmolded
Voltage Rating		250 V
Amperage		4A

M8 Versions	Length	
3-wire, M8 Female, Straight	2 meters	
	5 meters	
	10 meters	
3-wire, M8 Female, Right Angle	2 meters	
	5 meters	
	10 meters	
3-wire, M8 Female, Right Angle, N/O PNP-LED	2 meters	
	5 meters	
	10 meters	
4-wire, M8 Female, Straight	2 meters	
	5 meters	
	10 meters	
4-wire, M8 Female, Right Angle	2 meters	
	5 meters	
	10 meters	

M12 Versions	Length	
3-wire, M12 Female, Straight	2 meters	**BCC0HE0**
	5 meters	**BCC0HE1**
	10 meters	**BCC0HE2**
3-wire, M12 Female, Right Angle, N/O PNP-LED	2 meters	
	5 meters	
	10 meters	
4-wire, M12 Female, Straight	2 meters	**BCC0HE4**
	5 meters	**BCC0HE5**
	10 meters	**BCC0HE6**
4-wire, M12 Female, Straight, N/O PNP-LED	2 meters	
	5 meters	
	10 meters	
4-wire, M12 Female, Right Angle	2 meters	
	5 meters	
	10 meters	
4-wire, M12 Female, Right Angle, N/O PNP-LED	2 meters	
	5 meters	
	10 meters	

M8 and M12 Specialty Cables

Single ended
IP69K, ECOLAB, stainless
Stainless nut, IP69K



IP69K Rated, 1.4404 Stainless, ECOLAB	IP69K Rated, 1.4404 Stainless, ECOLAB
Stainless Nut, Black Overmold	Stainless Nut, Yellow Overmold & PVC Cable
60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12)	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12 non-LED), 36 V (M12 LED)
4 A	4 A
	BCC0AH1
	BCC0AH3
	BCC0AH4
	BCC0AH5
	BCC0AH6
	BCC0AH7
BCC08CZ	
BCC08E0	
BCC0A2H	
	BCC0AKP
	BCC0AH8
	BCC0AH9
	BCC0AHA
	BCC0AHC
	BCC0AHE
BCC08CM	**BCC0AT0**
BCC08CP	**BCC0ARR**
BCC08CR	**BCC0ART**
	BCC0AH2
BCC0EZ9	**BCC0AHF**
BCC0EZA	**BCC0AHH**
	BCC0APF
	BCC0APT
	BCC0APJ
	BCC0AHJ
BCC0EZC	**BCC0AHK**
BCC0EZE	**BCC0AHL**
	BCC0APH
BCC08CU	**BCC0APK**
BCC0A2K	**BCC0APL**

M12 Cables
Double-ended

Double-Ended			
Type		IP69K Rated, 1.4404 Stainless, PP overmolded PVC cable	1.4404 Stainless, IP69K Rated
Configuration		Stainless nuts, PP overmolded	Stainless Nut, Yellow Overmold & PVC Cable
Voltage Rating		250 V	250 V (M12 non-LED), 36 V (M12 LED)
Amperage		4A	4 A
M12 Versions	**Length**		
3-wire, M12 Female – M12 Male	0.6 meters	**BCC0HE7**	
	2 meters	**BCC0HE8**	
	5 meters	**BCC0HE9**	
	10 meters	**BCC0HEA**	
4-wire, M12 Female – M12 Male	0.3 meters		**BCC0CK9**
	0.6 meters	**BCC0HEC**	**BCC0CH9**
	1 meter		**BCC0CHA**
	1.5 meters		**BCC0CHC**
	2 meters	**BCC0HEE**	**BCC0CHE**
	3 meters		**BCC0CH8**
	5 meters	**BCC0HEF**	**BCC0CK5**
	10 meters	**BCC0HEH**	**BCC0H3H**
4-wire, M12 Female – M12 Male, N/O PNP-LED	0.3 meters		**BCC0CK6**
	0.6 meters		**BCC0CK7**
	1 meter		**BCC0CK8**
	1.5 meters		**BCC0CHL**
	2 meters		**BCC0CHK**
	3 meters		**BCC0CHJ**
	5 meters		**BCC0CHH**

M12 Cables
Double-ended

1.4404 Stainless, IP69K Rated	1.4404 Stainless, IP69K Rated	1.4404 Stainless, IP69K Rated
Stainless Nut, Yellow Overmold & PVC Cable	Stainless Nut, Yellow Overmold & PVC Cable	Stainless Nut, Yellow Overmold & PVC Cable
250 V (M12 non-LED), 36 V (M12 LED)	250 V (M12 non-LED), 36 V (M12 LED)	250 V (M12 non-LED), 36 V (M12 LED)
4 A	4 A	4 A
BCC0CHW	**BCC0CHF**	**BCC0CJF**
BCC0CHU	**BCC0CHT**	**BCC0CJE**
BCC0CJ5	**BCC0CHR**	**BCC0CJC**
BCC0CJ4	**BCC0CHP**	**BCC0CJW**
BCC0CJ3	**BCC0CHM**	**BCC0CJU**
BCC0CJ2	**BCC0CHN**	**BCC0CJT**
BCC0CJ1	**BCC0CJK**	**BCC0CL5**
		BCC0HUL
BCC0CJA	**BCC0CJL**	**BCC0CJR**
BCC0CJ9	**BCC0CJM**	**BCC0CK3**
BCC0CJ8	**BCC0CJN**	**BCC0CK2**
BCC0CJ7	**BCC0CJP**	**BCC0CK1**
BCC0CJ6	**BCC0CJ0**	**BCC0CK0**
BCC0CJJ	**BCC0CHZ**	**BCC0CJZ**
BCC0CJH	**BCC0CHY**	**BCC0CJY**

M12 A-coded Receptacles

Type				M12 Female	M12 Male
Configuration				Straight	Straight
Wire Gauge				22 AWG	22 AWG
Connector Thread Type				Internal	External
No. Conductors	Mounting	Housing	Length		
4-wire	1/4"-18 NPT	Stainless Steel	0.6 meters	**BCC0CUE**	**BCC0CUK**
			2 meters	**BCC0CUF**	**BCC0CUL**
	1/2"-14 NPT	Stainless Steel	0.6 meters	**BCC0CUH**	**BCC0CUM**
			2 meters	**BCC0CUJ**	**BCC0CUN**

Standard Cable Information

Jacket			Wires	Conductors	Diameter	
PVC		Yellow	3	22 AWG	4.7 ± 0.15 mm	**BCC0AE7**
PVC		Yellow	4	22 AWG	5.0 ± 0.15 mm	**BCC0AE8**
PVC		Grey	3	0.34 mm²	4.5 ± 0.15 mm	**BCC0C14**
PVC		Grey	4	0.34 mm²	4.8 ± 0.15 mm	**BCC0C15**

Receptacles
M12 field attachables

M12 Female Field Attachables

Type		M12 Female	M12 Female
Configuration		Straight	Right Angle
Nut material		Stainless Steel	Stainless Steel
Connection		Screw Terminals	Screw Terminals
Conductor Range		0.14...0.75 mm² (26...18 AWG)	0.14...0.75 mm² (26...18 AWG)
No. of Conductors	Allowable Cable Ø		
5-wire	4...6 mm	**BCC097P**	**BCC097T**
	6...8 mm	**BCC097R**	**BCC097U**

*Consult factory for availability.

M12 Male Field Attachables

Type		M12 Male	M12 Male
Configuration		Straight	Right Angle
Nut material		Stainless Steel	Stainless Steel
Connection		Screw Terminals	Screw Terminals
Conductor Maximum		0.14...0.75 mm² (26...18 AWG)	0.14...0.75 mm² (26...18 AWG)
5-wire	4...6 mm	**BCC097K**	**BCC097M**
	6...8 mm	**BCC097L**	**BCC097N**

*Consult factory for availability.

BALLUFF

USA
Balluff Inc.
8125 Holton Drive
Florence, KY 41042
Phone: (859) 727-2200
Toll-free: 1-800-543-8390
Fax: (859) 727-4823
E-Mail: balluff@balluff.com

Canada
Balluff Canada, Inc.
2840 Argentia Road, Unit #1
Mississauga, Ontario L5N 8G4
Phone: (905) 816-1494
Toll-free: 1-800-927-9654
Fax: (905) 816-1411
E-Mail: balluff.canada@balluff.ca

Mexico
Balluff de México SA de CV
Anillo Vial II Fray Junípero Serra No. 4416
Colonia La Vista Residencial.
Querétaro, Qro. CP76146
Phone: (++52 442) 212-4882
Fax: (++52 442) 214-0536
E-Mail: balluff.mexico@balluff.com

www.balluff.com

Doc. no. 929719/Mat. no. 253567 EN
K16; Product specifications, availability, and pricing are subject to change without notice. Replaces E16.