BALLUFF

sensors worldwide

Global Products

General-purpose sensors and accessories for industrial automation

Balluff Global
Support and service

Balluff North America

Florence, Kentucky USA
Balluff's Florence, Kentucky United States headquarters is located just south of Cincinnati, Ohio. Our customers are in industries such as automotive, machine tool, robotics, injection molding, packaging, material handling, and more.

In addition to sales, marketing, and logistic functions, this facility manufactures Micropulse® magnetostrictive linear position sensors and warehouses over 60,000 products.

The Balluff Global Network

Balluff spans the globe with representation in 49 countries.

Argentina	China	Greece	Japan	Poland	Spain
Australia	Columbia	Hong Kong	Korea	Portugal	Sweden
Austria	Croatia	Hungary	Malaysia	Romania	Switzerland
Belarus	Czech Republic	India	Mexico	Russia	Thailand
Belgium	Denmark	Indonesia	Netherlands	Singapore	Taiwan
Brazil	Finland	Iran	Norway	Slovakia	Turkey
Bulgaria	France	Israel	Pakistan	Slovenia	USA
Canada	Great Britain	Italy	Phillipines	South Africa	Venezuela

Service

■ **24 hour on-call service.**

■ **Complete in-house technical support.**

■ **Comprehensive product selection, cross reference, and application assistance.**

■ **Fast, friendly experienced service – guaranteed!**

■ **Same day shipping – in by 2:00 p.m. EST, out the same day!**

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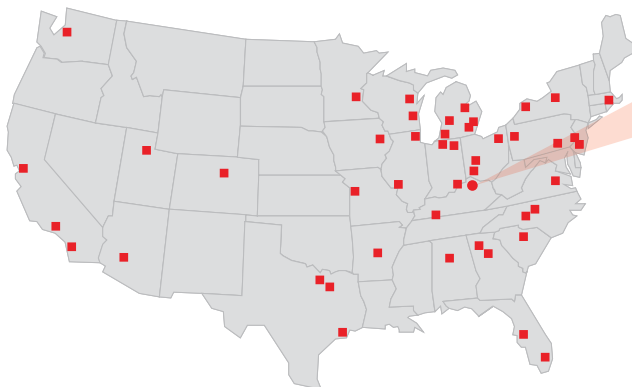Visit us online.

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BALLUFF
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Florence, KY

Our premier distributor network can quickly assist with applications and order fulfillment.

For a distributor in your area, visit www.balluff.us

⚠ 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

Performance and Value in Inductive Proximity Sensors

Balluff's economical line of inductive proximity sensors offers a broad range of top-quality, performance proven products. The family includes a wide array of tubular M8, M12, M18, and M30 sensors available in 3-wire DC and 2-wire DC models. Built to the same high standards as all Balluff inductive proximity sensors, these sensors are 100% tested to guarantee conformance to critical published specifications. This attention to quality and performance ensures all models provide years of worry-free, reliable operation which increases production run time and decreases maintenance costs.

Advances in integrated circuit technology and high volume production techniques enable Balluff to offer superior quality products at value pricing. These sensors also carry international approvals to meet the demands of a global customer base. All sensors are CE marked, cULus listed, and are backed by Balluff's standard lifetime warranty.

Product Family Improvements

- 3-wire DC PNP and NPN models provide more choice for control variations
- Metal porthole LED connector versions with robust connectors for rugged applications
- Extended range "shorty" 2-Wire DC normally-closed outputs for small spaces

Features

- Convenience – most models stocked for same day delivery
- Variety – 2 wire DC, 3 wire DC, flush/non-flush models, connectorized or cable out, M8 to M30 sizes
- Reliability – protected from short circuits, voltage surges, polarity reversal and current overload
- Quality – 100% tested, lifetime warranty

| Standard Specifications	
Rated supply voltage	24 V DC
Supply voltage range	10...30 V DC, 12...30 V DC, or 10...36 V DC
Max. load current	100 mA, 130 mA, or 200 mA
Short circuit protection	Yes
Current overload protection	Yes
Voltage surge protection	Yes
Polarity reversal protection	Yes
Degree of protection	IP67 or IP68
Temperature range	-25° C...+70° C
Approvals	CE and cULus

Cable lengths may vary per model.
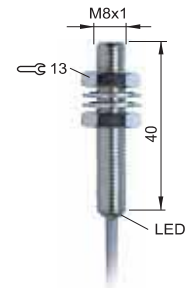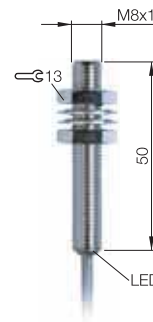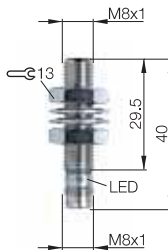
Consult factory for all available models.
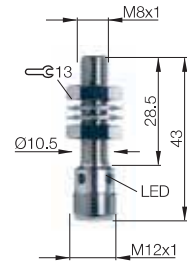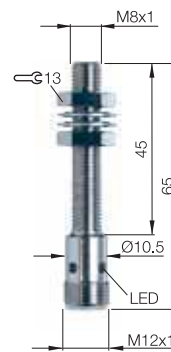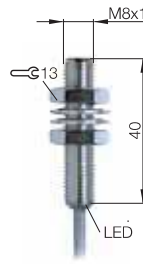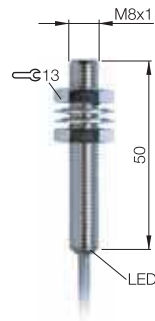
Housing size	M8×1		M8×1	M8×1	M8x1
Mounting	Flush		Flush	Flush	Flush
Rated operating distance Sn	1.5 mm		1.5 mm	1.5 mm	1.5 mm
Assured operating distance Sa	0...1.2 mm		0...1.2 mm	0...1.2 mm	0...1.2 mm
Cable length and material	3m PVC	3m PUR	3m PUR		
PNP Normally open	**BES0038**	**BES0035**	**BES00CU**	**BES0027**	**BES00CH**
PNP Normally closed	**BES0031**	**BES002Y**	**BES00CR**	**BES0026**	**BES00CA**
NPN Normally open	**BES002H**	**BES002A**	**BES00CN**	**BES0024**	**BES00C6**
NPN Normally closed	**BES03PJ**		**BES00CL**	**BES0023**	**BES00C2**

Housing size	M8×1		M8×1	M8×1		M8x1	
Mounting	Flush		Flush	Flush		Flush	
Rated operating distance Sn	1.5 mm		1.5 mm	2 mm		2 mm	
Assured operating distance Sa	0...1.2 mm		0...1.2 mm	0...1.6 mm		0...1.6 mm	
Cable length and material				3m PVC	3m PUR	2m PUR	
PNP Normally open	**BES003C**		**BES00CJ**	**BES003L**	**BES003H**	**BES00CW**	
PNP Normally closed	**BES03P6**		**BES00CC**	**BES03TH**		**BES00CT**	
NPN Normally open	**BES002K**		**BES00C7**	**BES002R**	**BES002M**	**BES00CP**	
NPN Normally closed	**BES03PK**		**BES00C3**	**BES03TF**		**BES00CM**	

Sensing Distance   Sensing Distance

Refer to Balluff website for latest technical information.

	⊠ Sensing Distance	⊠ Sensing Distance	⊠ Sensing Distance	⊠ Sensing Distance	⊠ Sensing Distance
Housing size	M8×1	M8×1	M8×1	M8x1	M8x1
Mounting	Flush	Flush	Flush	Flush	Flush
Rated operating distance Sn	2 mm	2 mm	2 mm	2 mm	2 mm
Assured operating distance Sa	0...1.6 mm	0...1.6 mm	0...1.6 mm	0...1.6 mm	0...1.6 mm
Cable length and material					.2m PUR
PNP Normally open	BES0028	BES00FC	BES003P	BES00CK	BES003E
PNP Normally closed	BES03T5	BES00CE	BES0033	BES00CF	
NPN Normally open	BES0025	BES00C8	BES002U	BES00C9	
NPN Normally closed	BES03T6	BES00C4	BES03TJ	BES00C5	

	M12×1		M12×1	M12×1	M12x1
Housing size	M12×1		M12×1	M12×1	M12x1
Mounting	Flush		Flush	Flush	Flush
Rated operating distance Sn	2 mm		2 mm	2 mm	2 mm
Assured operating distance Sa	0...1.6 mm		0...1.6 mm	0...1.6 mm	0...1.6 mm
Cable length and material	2m PVC	3m PUR	2m PUR		
PNP Normally open	BES005U	BES005R	BES00E4	BES0060	BES00EE
PNP Normally closed	BES00FP	BES005A	BES00E2	BES005F	BES00EA
NPN Normally open	BES00FL	BES0050	BES00E0	BES0054	BES00E8
NPN Normally closed	BES03PR		BES00CY	BES004Y	BES00E6
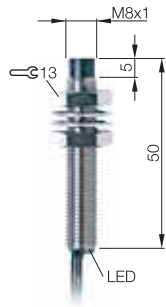
⟲X Sensing Distance		⟲X Sensing Distance		⟲X Sensing Distance	⟲X Sensing Distance	⟲X Sensing Distance
M8×1		M8×1		M8×1	M8x1	M8x1
Non-flush		Non-flush		Non-flush	Non-flush	Non-flush
4 mm		4 mm		4 mm	4 mm	4 mm
0...3.2 mm		0...3.2 mm		0...3.2 mm	0...3.2 mm	0...3.2 mm
2m PVC	2m PUR	2m PVC	2m PUR			
BES0017	BES0016	BES000Z	BES000Y	BES001H	BES000M	BES001J
BES0015	BES0014	BES000W	BES000U	BES001E	BES000L	BES001F
BES0013	BES0012	BES000T	BES000R	BES001A	BES000K	BES001C
BES0011	BES0010	BES000P	BES000N	BES0018	BES000J	BES0019

⟲X Sensing Distance			⟲X Sensing Distance	⟲X Sensing Distance	⟲X Sensing Distance	⟲X Sensing Distance	
M12×1			M12×1	M12×1	M12x1	M12x1	
Flush			Flush	Flush	Flush	Non-flush	
4 mm			4 mm	4 mm	4 mm	8 mm	
0...3.2 mm			0...3.2 mm	0...3.2 mm	0...3.2 mm	0...6.5 mm	
2m PVC	3m PVC	3m PUR	2m PUR			2m PVC	2m PUR
	BES0001	BES0062	BES00E5	BES0068	BES00EF	BES004M	BES004L
	BES005M	BES005J	BES00E3	BES005N	BES00EC	BES004J	BES004H
	BES0057		BES00E1	BES0059	BES00E9	BES004E	
BES03PT		BES0055	BES00CZ	BES004Z	BES00E7	BES0049	BES0048
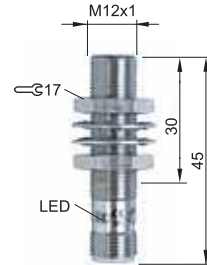
Refer to Balluff website for latest technical information.
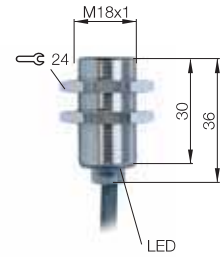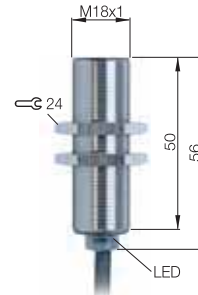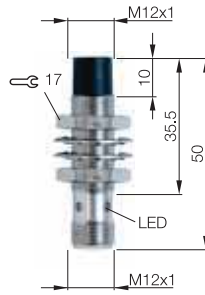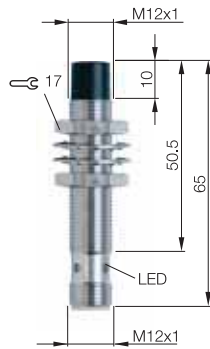
	Sensing Distance	Sensing Distance			
Housing size	M12×1	M12×1	M18×1		M18x1
Mounting	Non-flush	Non-flush	Flush		Flush
Rated operating distance Sn	8 mm	8 mm	5 mm		5 mm
Assured operating distance Sa	0...6.5 mm	0...6.5 mm	0...4.1 mm		0...4.1 mm
Cable length and material			3m PVC	3m PUR	2m PUR
PNP Normally open	BES004N	BES01PY	BES0083	BES0080	BES00EN
PNP Normally closed	BES004K	BES01PU	BES007T	BES007P	BES00EL
NPN Normally open	BES004F	BES01PT	BES007C	BES0078	BES00EJ
NPN Normally closed	BES004A	BES01PR	BES03RR		BES03T8
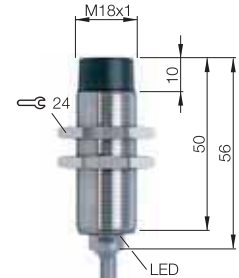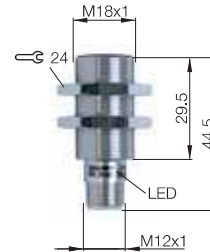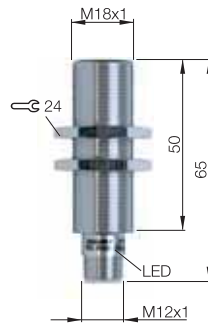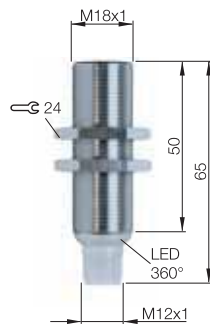
	Sensing Distance	Sensing Distance	Sensing Distance	Sensing Distance	
Housing size	M18×1	M18×1	M18×1	M18x1	
Mounting	Flush	Flush	Flush	Non-flush	
Rated operating distance Sn	8 mm	8 mm	8 mm	16 mm	
Assured operating distance Sa	0...6.5 mm	0...6.5 mm	0...6.5 mm	0...12.8 mm	
Cable length and material				2m PVC	2m PUR
PNP Normally open	BES008M	BES008L	BES00EZ	BES006Z	BES006Y
PNP Normally closed	BES007Y	BES03RP	BES00EW	BES006U	BES006T
NPN Normally open	BES007M	BES007L	BES00ET	BES006P	BES006N
NPN Normally closed	BES03T9	BES0077	BES03RN	BES006L	BES006K
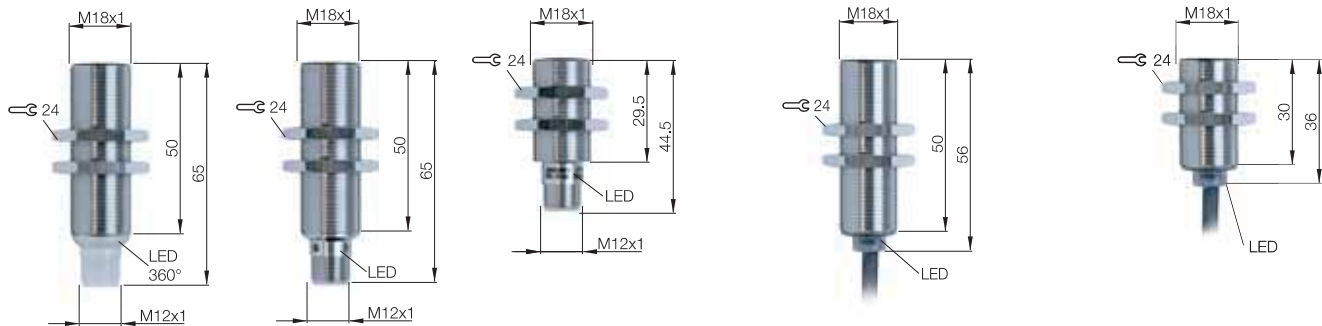
M18×1	M18×1	M18×1	**⟳x** Sensing Distance M18x1				**⟳x** Sensing Distance M18x1
Flush	Flush	Flush	Flush				Flush
5 mm	5 mm	5 mm	8 mm				8 mm
0...4.1 mm	0...4.1 mm	0...4.1 mm	0...6.5 mm				0...6.5 mm
			2m PVC	3m PVC	3m PUR	5m PUR	2m PUR
BES0087	BES0086	BES00EY		BES008F	BES0089		BES00EP
BES007W		BES00EU	BES03PY			BES03PM	BES00EM
BES007F		BES00ER		BES007J	BES007H		BES00EK
BES0076		BES03T7	BES03T4				
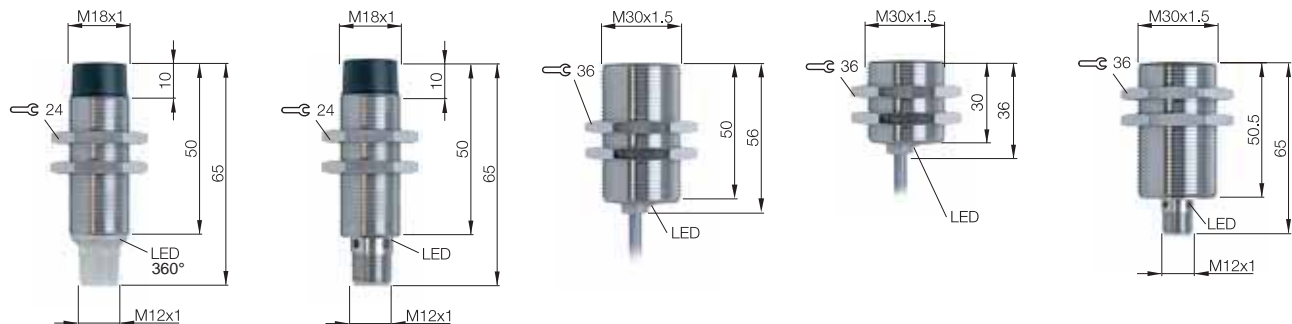
⟳x Sensing Distance M18×1	**⟳x** Sensing Distance M18×1	M30x1.5		M30x1.5	M30x1.5
Non-flush	Non-flush	Flush		Flush	Flush
16 mm	16 mm	10 mm		10 mm	10 mm
0...12.8 mm	0...12.8 mm	0...8.1 mm		0...8.1 mm	0...8.1 mm
		2m PVC	3m PUR	2m PUR	
BES0070	BES03RM	BES00A0	BES009Y	BES00F3	BES00A3
BES006W	BES03RL	BES009M	BES009L	BES03TC	
BES006R		BES009C	BES0099	BES00F0	
BES006M		BES0096	BES0095	BES03TE	

Refer to Balluff website for latest technical information.
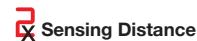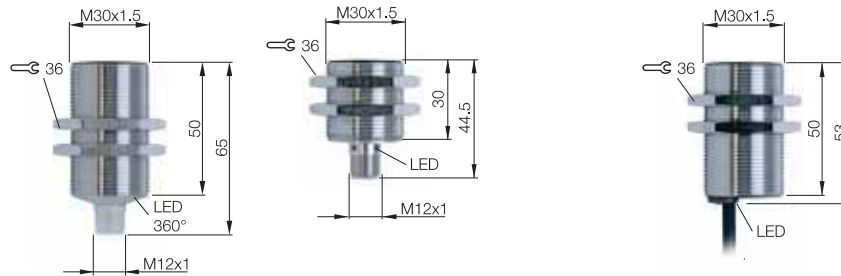
Sensing Distance

Housing size	M30×1.5	M30×1.5	M30×1.5			
Mounting	Flush	Flush	Flush			
Rated operating distance Sn	10 mm	10 mm	15 mm			
Assured operating distance Sa	0...8.1 mm	0...8.1 mm	0...12.2 mm			
Cable length and material			2m PVC	2m PUR	3m PUR	
PNP Normally open	BES00A4	BES00F8	BES00AA		BES00A6	
PNP Normally closed	BES009P	BES00F6	BES009T	BES009R		
NPN Normally open	BES009H	BES00F5	BES03RH			
NPN Normally closed	BES0097	BES03TA	BES03RJ			

Sensing Distance   **Sensing Distance**   **Sensing Distance**   **Sensing Distance**
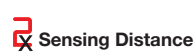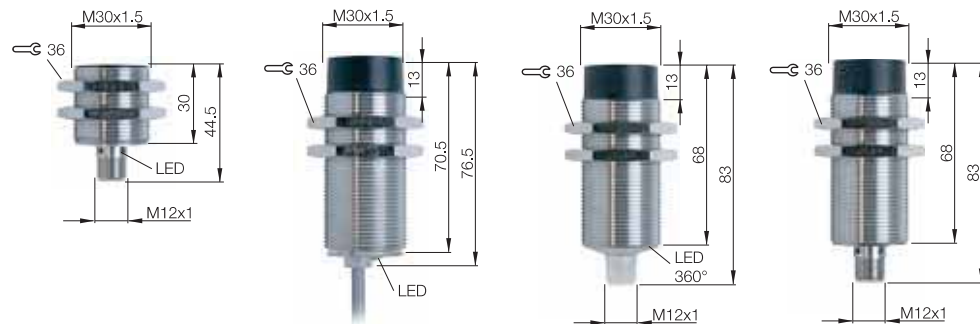
Housing size	M30×1.5	M30×1.5		M30×1.5	M30×1.5
Mounting	Flush	Non-flush		Non-flush	Non-flush
Rated operating distance Sn	15 mm	30 mm		30 mm	30 mm
Assured operating distance Sa	0...12.0 mm	0...24.3 mm		0...24.3 mm	0...24.3 mm
Cable length and material		2m PVC	2m PUR		
PNP Normally open	BES00F9	BES00AY	BES00AW	BES00AZ	BES03RE
PNP Normally closed	BES00F7	BES00AT	BES00AR	BES00AU	BES03RC
NPN Normally open		BES00AN	BES00AM	BES00AP	
NPN Normally closed		BES00AK	BES00AJ	BES00AL	

M30x1.5 · 36 · 30 · 36 · LED

M30x1.5 · 36 · 50 · 65 · LED · M12x1

M30x1.5 · 36 · 50 · 65 · M12x1

Wiring diagrams for 4-wire cordsets
(See page 31 for cordsets.)

PNP N/O: 1 BN, 4 BK, 3 BU +/−
PNP N/C: 1 BN, 2 WH, 3 BU +/−
NPN N/O: 1 BN, 4 BK, 3 BU +/−
NPN N/C: 1 BN, 2 WH, 3 BU +/−

Subject to change without notice. See Balluff website for latest technical specifications.

Sensing Distance

M30×1.5	M30x1.5	M30x1.5
Flush	Flush	Flush
15 mm	15 mm	15 mm
0...12.0 mm	0...12.2 mm	0...12.2 mm
2m PUR		
BES00F4	**BES00AF**	**BES00AH**
BES00F2	**BES03RK**	**BES009U**
BES00F1		**BES009J**
BES03RF		**BES0098**

Correction factor
...gives the reduction in sensing distances for target materials which are not made of Fe 360 unless otherwise noted.

Material	Factor
steel	1.0
copper	0.25...0.45
brass	0.35...0.50
aluminum	0.30...0.45
stainless steel	0.60...1.00
nickel	0.65...0.75
cast iron	0.93...1.05

Refer to Balluff website for latest technical information.

	Sensing Distance		Sensing Distance	Sensing Distance	
Housing size	M8×1		M8×1	M8x1	
Mounting	Flush		Flush	Flush	
Rated operating distance Sn	2 mm		2 mm	2 mm	
Assured operating distance Sa	0...1.6 mm		0...1.6 mm	0...1.6 mm	
Cable length and material	2m PVC	2m PUR	.3m PUR		
Polarized	Normally open	**BES001L**	**BES03HC**	**BES001Z**	**BES0022**
Polarized	Normally closed	**BES024R**	**BES03H9**	**BES03H8**	**BES024N**
Non-polarized	Normally open	**BES001T**	**BES03HJ**		**BES001Y**
Non-polarized	Normally closed	**BES024T**	**BES03HE**		**BES024P**
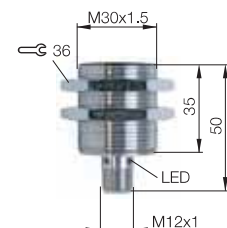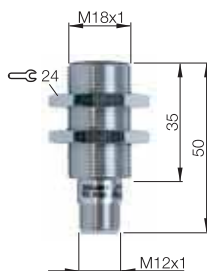
	Sensing Distance	Sensing Distance	Sensing Distance	
Housing size	M18×1	M18x1	M30x1.5	
Mounting	Flush	Flush	Flush	
Rated operating distance Sn	7 mm	7 mm	15 mm	
Assured operating distance Sa	0...5.7 mm	0...5.6 mm	0...12 mm	
Cable length and material				
Polarized	Normally open	**BES0328**	**BES0069**	**BES008W**
Polarized	Normally closed	**BES02NL**	**BES02NM**	**BES027J**
Non-polarized	Normally open	**BES02NR**	**BES02NP**	**BES0094**
Non-polarized	Normally closed	**BES02NN**	**BES006A**	**BES027H**
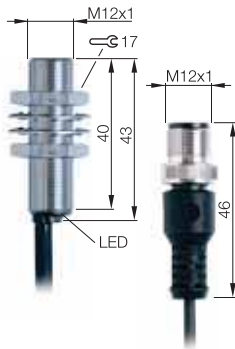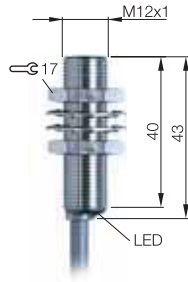
⊋X Sensing Distance

M12×1	
Flush	
3 mm	
0...2.4 mm	
2m PVC	3m PVC
BES0045	
BES024L	
	BES004U
BES024M	

⊋X Sensing Distance

M12×1
Flush
3 mm
0...2.4 mm
.3m PUR
BES0042
BES03HK

⊋X Sensing Distance

M12×1
Flush
3 mm
0...2.4 mm
BES003Z
BES024J
BES0041
BES024K

⊋X Sensing Distance

M18x1	
Flush	
7 mm	
0...5.7 mm	
2m PVC	2m PUR
BES00FA	**BES039A**
BES02NT	
BES0073	
BES02NU	

⊋X Sensing Distance

M18x1
Flush
7 mm
0...5.7 mm
.3m PUR
BES006C
BES039L
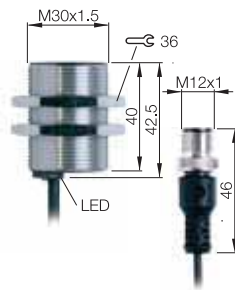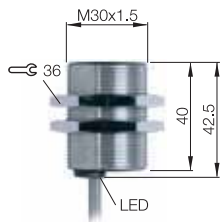
⊋X Sensing Distance

M30×1.5	
Flush	
15 mm	
0...12.2 mm	
2m PVC	2m PUR
BES008R	**BES03FW**
BES0279	**BES03FY**
BES0091	**BES03FZ**
BES027A	**BES03H0**

⊋X Sensing Distance

M30×1.5
Flush
15 mm
0...12.2 mm
.3m PUR
BES008Y
BES03H4

Wiring diagrams for 4-wire cordsets
(See page 31 for cordsets.)
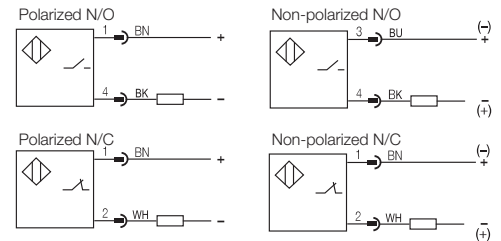
Subject to change without notice. See Balluff website for latest technical specifications.

Correction factor
...gives the reduction in sensing distances for target materials which are not made of Fe 360 unless otherwise noted.

Material	Factor
steel	1.0
copper	0.25...0.45
brass	0.35...0.50
aluminum	0.30...0.45
stainless steel	0.60...1.00
nickel	0.65...0.75
cast iron	0.93...1.05

Refer to Balluff website for latest technical information.

Capacitive proximity sensors — object and level detection sensors that are competitively priced with above-average features

Balluff's economical line of capacitive sensors offers a broad range of products to reliably solve object and level detection applications. The family includes a wide array of tubular M12, M18 and M30 sensors available with either M12 connectors or pre-wired cables. Built to Balluff's high standards, all of the sensors offer reverse polarity and short circuit protection with enhanced EMC protection. Balluff's attention to quality, superior sensor design, and performance means better reliability, less down time, and higher productivity.

Features

- **Stainless steel or plastic (PBT) housings**
- **PNP and NPN versions with normally open or normally closed outputs**
- **Large Green power on LED**
- **Large Yellow output function LED**
- **High EMC noise immunity**

Standard Specifications	
Rated supply voltage	24 V DC
Supply voltage range	10...30 V DC,
Max. load current	100 mA,
Short circuit protection	Yes
Polarity reversal protection	Yes
Switching frequency	100 Hz
Power indicator	Green LED
Output function indicator	Yellow LED
Degree of protection	IP67
Temperature range	-25° C...+70° C
Approvals	CE and CULus
Cable length and material	2m PUR

Object Detection

- **Flush switching characteristics**
- **Extended switching distances**
- **Recognition of plastic parts**

Flush-mount capacitive sensors employ a concentrated electrical field to detect objects up to 15mm away, regardless of color, texture or material.

Level Detection

- **Improved adhesion compensation through non-flush switching characteristic**
- **User adjustable sensitivity**

Non-flush mount versions of the sensor line are ideal for level detection of bulk material or liquids either directly or through a plastic or glass container wall. Non-flush sensors make use of a spherical electrical field that compensates for material adhesion with sensing distances up to 25mm.

Object Detection

Housing size	M12×1	M12×1	M12×1	M12x1
Mounting	Flush	Flush	Flush	Flush
Rated switching distance Sn	1…4 mm	1…4 mm	1…4 mm	1…4 mm
Housing/Sensing face material	Stainless Steel/PBT	Stainless Steel/PBT	PBT/PBT	PBT/PBT
PNP Normally open	**BCS00P0**	**BCS00R4**	**BCS00PJ**	**BCS00PU**
PNP Normally closed	**BCS00P1**	**BCS00P8**	**BCS00PK**	**BCS00PW**
NPN Normally open	**BCS00P2**	**BCS00P9**	**BCS00PL**	**BCS00PY**
NPN Normally closed	**BCS00P3**	**BCS00PA**	**BCS00PM**	**BCS00PZ**

Level Detection

| Housing size	M12×1	M12×1	M12×1	M12x1
Mounting	Non-flush	Non-flush	Non-flush	Non-flush
Rated switching distance Sn	1…8 mm	1…8 mm	1…8 mm	1…8 mm
Housing/Sensing face material	Stainless Steel/PBT	Stainless Steel/PBT	PBT/PBT	PBT/PBT
PNP Normally open	**BCS00P4**	**BCS00PC**	**BCS00PN**	**BCS00R0**
PNP Normally closed	**BCS00P5**	**BCS00PE**	**BCS00PP**	**BCS00R1**
NPN Normally open	**BCS00P6**	**BCS00PF**	**BCS00PR**	**BCS00R2**
NPN Normally closed	**BCS00P7**	**BCS00PH**	**BCS00PT**	**BCS00R3**

Wiring diagrams (See page 31 for cordsets.)
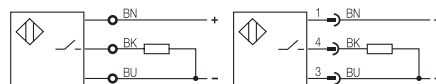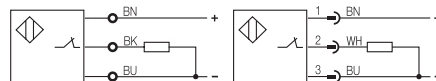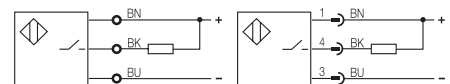
PNP (+) sourcing
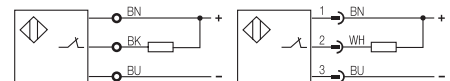
Normally open

Normally closed

NPN (-) sinking

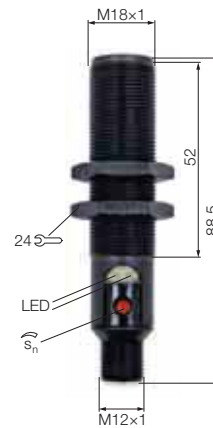Normally open

Normally closed

Subject to change without notice. See Balluff website for latest technical specifications.

Refer to Balluff website for latest technical information.

Balluff Global – Capacitive

M18

Object Detection

Housing size	M18×1	M18×1	M18×1	M18x1
Mounting	Flush	Flush	Flush	Flush
Rated switching distance Sn	2…8 mm	2…8 mm	2…8 mm	2…8 mm
Housing/Sensing face material	Stainless Steel/PBT	Stainless Steel/PBT	PBT/PBT	PBT/PBT
PNP Normally open	BCS00MF	BCS00LK	BCS00M8	BCS00NZ
PNP Normally closed	BCS00M4	BCS00LR	BCS00MH	BCS00M1
NPN Normally open	BCS00M5	BCS00LN	BCS00MJ	BCS00M2
NPN Normally closed	BCS00M6	BCS00LP	BCS00MK	BCS00M3

Level Detection

Housing size	M18×1	M18×1	M18×1	M18x1
Mounting	Non-flush	Non-flush	Non-flush	Non-flush
Rated switching distance Sn	2…15 mm	2…15 mm	2…15 mm	2…15 mm
Housing/Sensing face material	Stainless Steel/PBT	Stainless Steel/PBT	PBT/PBT	PBT/PBT
PNP Normally open	BCS00ME	BCS00M7	BCS00LM	BCS00LL
PNP Normally closed	BCS00ML	BCS00M9	BCS00LT	BCS00LY
NPN Normally open	BCS00MM	BCS00MA	BCS00LU	BCS00LZ
NPN Normally closed	BCS00MN	BCS00MC	BCS00LW	BCS00M0

Object Detection

M30×1.5 · M30×1.5 · M30×1.5 · M30×1.5

Housing size	M30x1.5	M30x1.5	M30x1.5	M30x1.5
Mounting	Flush	Flush	Flush	Flush
Rated switching distance Sn	2...15 mm	2...15 mm	2...15 mm	2...15 mm
Housing/Sensing face material	Stainless Steel/PBT	Stainless Steel/PBT	PBT/PBT	PBT/PBT
PNP Normally open	**BCS00MR**	**BCS00N2**	**BCS00NA**	**BCS00NM**
PNP Normally closed	**BCS00MT**	**BCS00N3**	**BCS00NC**	**BCS00NN**
NPN Normally open	**BCS00MU**	**BCS00N4**	**BCS00NE**	**BCS00NP**
NPN Normally closed	**BCS00MW**	**BCS00N5**	**BCS00NF**	**BCS00NR**

Level Detection

| Housing size	M30x1.5	M30x1.5	M30x1.5	M30x1.5
Mounting	Non-flush	Non-flush	Non-flush	Non-flush
Rated switching distance Sn	1...25 mm	1...25 mm	1...25 mm	1...25 mm
Housing/Sensing face material	Stainless Steel/PBT	Stainless Steel/PBT	PBT/PBT	PBT/PBT
PNP Normally open	**BCS00MY**	**BCS00N6**	**BCS00NH**	**BCS00NT**
PNP Normally closed	**BCS00MZ**	**BCS00N7**	**BCS00NJ**	**BCS00NU**
NPN Normally open	**BCS00N0**	**BCS00N8**	**BCS00NK**	**BCS00NW**
NPN Normally closed	**BCS00N1**	**BCS00N9**	**BCS00NL**	**BCS00NY**

Wiring diagrams (See page 31 for cordsets.)
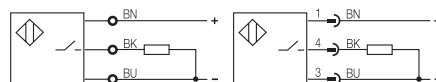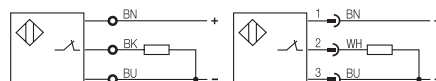
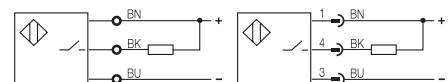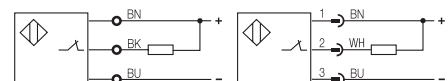**PNP (+) sourcing**

Normally open

Normally closed

NPN (-) sinking

Normally open

Normally closed

Subject to change without notice. See Balluff website for latest technical specifications.

Refer to Balluff website for latest technical information.

The best choice for everyday sensing needs

Simple to use, easy to install, economically priced – these characteristics describe this line of photoelectric sensors from Balluff. Featuring complete families of background suppression, diffuse, retroreflective, and thru-beam technologies, and several body styles to choose from, there is a solution waiting for your application. For standard specifications, refer to page 34.
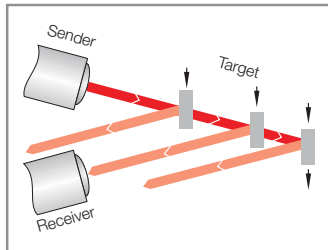

Background Suppression – *page 19*
An advanced sensing technology, Background Suppression sensors are able to sense targets and ignore objects behind them. This is made possible through either a mechanical or electronic adjustment on the receiving element that looks for the light reflected off of the target. These single-piece sensors feature an adjustable or fixed sensing range that lets you sense your target at a specific point within the sensor's range.
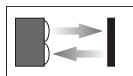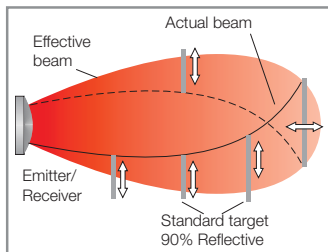

Diffuse – *page 20*
This standard sensing mode relies on the target to reflect light back to the receiver to turn on its output. Featuring a single piece design, these sensors are less expensive than Background Suppression sensors since they do not have the advanced technology necessary to ignore objects behind the desired target. Diffuse sensors also have an adjustment potentiometer or teach pushbutton that allows you to set the desired sensing range of the target.
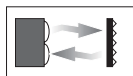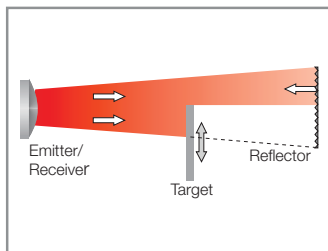
Retroreflective – *page 24*
In Retroreflective sensing, a self-contained sensor with both an emitter and receiver emits light towards a reflector mounted within its rated sensing range. The output of the sensor is actuated when a target is passed into the effective beam of the sensor and it blocks the return of light to the receiver. The primary advantage of Retroreflective sensors over Diffuse or Background Suppression sensors is longer sensing range.
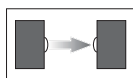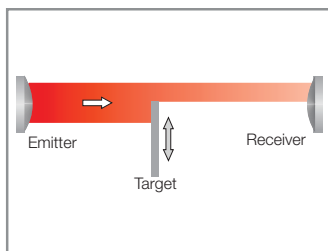

Thru-beam – *page 26*
The most reliable form of photoelectric sensing, Thru-beam sensors include a separate emitter and receiver that are aligned such that the maximum amount of light from the emitter hits the receiver. The output of the receiver is actuated when a target passes between the sensors and blocks the light to the receiver. Thru-beam sensors also feature the longest sensing range of these modes since all of the light from the emitter is directed at the receiver.

Body style	
Type	
Sensing range	
Light source	
Cable length and material	
PNP NC/NO : Light-on/Dark-on	⑥
NPN NC/NO : Light-on/Dark-on	⑦
PNP NO/NC : Dark-on/Light-on	⑥
NPN NO/NC : Dark-on/Light-on	⑦
PNP NC/NO : Light-on/Dark-on	⑩

① = number indicates wiring diagram on page 34

Body style	
Type	
Sensing range	
Light source	
Cable length and material	
PNP NO/NC : Light-on/Dark-on	⑥
NPN NO/NC : Light-on/Dark-on	⑦
PNP NO Light-on	①
NPN NO Light-on	③
PNP NC Dark-on	②
NPN NC Dark-on	④

① = number indicates wiring diagram on page 34
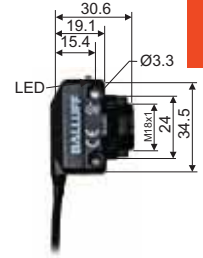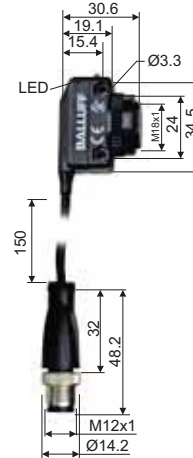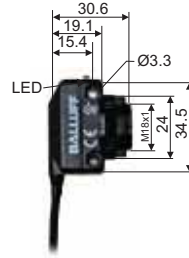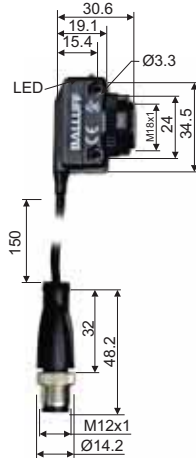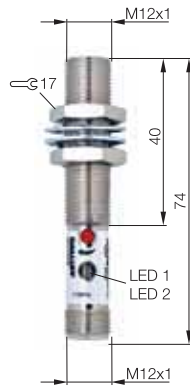
12 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded
Straight optics	90° optics	90° optics	90° optics	90° optics
60 mm	50 mm	50 mm	100 mm	100 mm
Visible red LED	Visible red	Visible red	Visible red	Visible red
	.15m PVC	2m PVC	.15m PVC	2m PVC
	BOS014R*	BOS014P*		
	BOS014U*	BOS014T*		
			BOS019A*	BOS019E*
			BOS019C*	BOS019F*
BOS007T				

* Sensors cannot be adjusted, install sensors so that background cannot be detected.
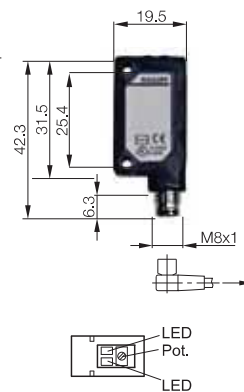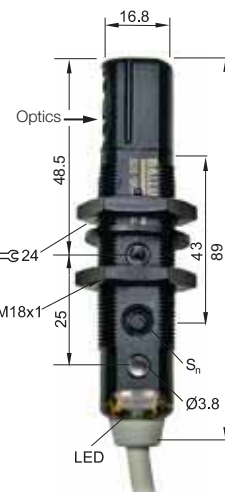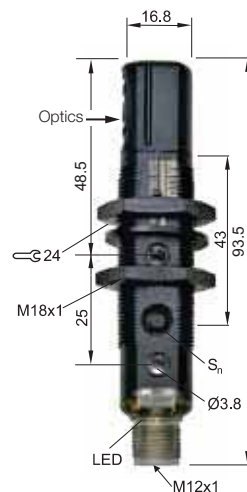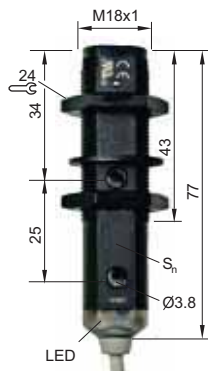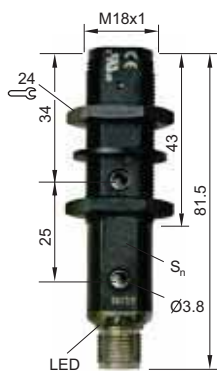
Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Small block	Small block
Straight optics	Straight optics	90° optics	90° optics	90° optics	90° optics
100 mm	100 mm	100 mm	100 mm	200 mm	200 mm
Visible red	Visible red	Visible red	Visible red	Visible red	Visible red
	2m PVC		2m PVC		2m PVC
BOS00JM	BOS00JL	BOS00LH	BOS00LF		
BOS00HR	BOS00HP	BOS00KY			
				BOS012A	BOS0129
				BOS011F	BOS011E
				BOS011Z	BOS011Y
				BOS0112	BOS0111

Refer to Balluff website for latest technical information.
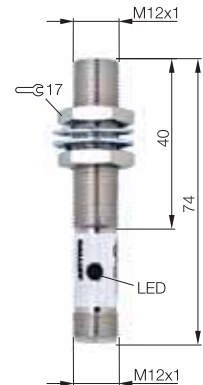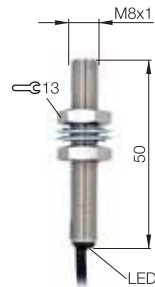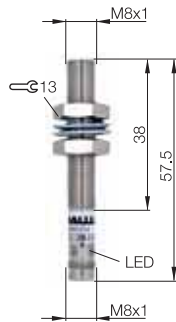
Body style	8 mm threaded		8 mm threaded	12 mm threaded	
Type	Straight optics		Straight optics	Straight optics	
Sensing range	55 mm		55 mm	23 mm Fixed Focus	
Light source	Visible red		Visible red	Visible red	
Cable length and material			2m PUR		
PNP NO Light-on	①	BOS0006	BOS0005	BOS007R	
NPN NO Light-on	③	BOS0002	BOS014N		
PNP NC Dark-on	②	BOS0004	BOS0003		
PNP NC Dark-on	⑧				
NPN NC Dark-on	④		BOS014M		
NPN NC Dark-on	⑫	BOS0001			

① = number indicates wiring diagram on page 34
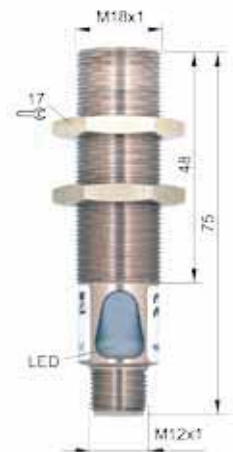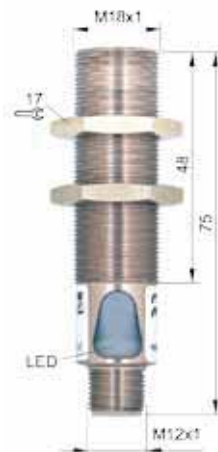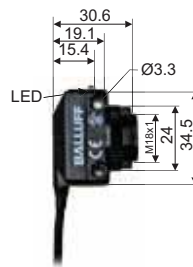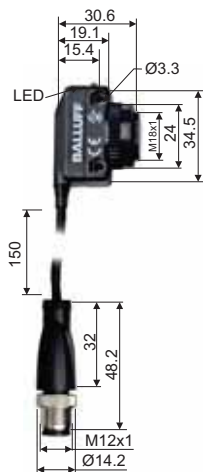
Body style		Combination 18 mm threaded	Combination 18 mm threaded	18 mm threaded	18 mm threaded	
Type		90° optics	90° optics	Straight optics	Straight optics	
Sensing range		450 mm	450 mm	400 mm	600 mm	
Light source		Infrared	Infrared	Visible red	Infrared	
Cable length and material		.15m PVC	2m PVC			
PNP NO Light-on	①			BOS01FA	BOS01HL	
PNP NC Dark-on	②			BOS01FC		
PNP NC/NO : Light-on/Dark-on	⑥	BOS012P	BOS012R			
NPN NC/NO : Light-on/Dark-on	⑦	BOS012F	BOS012H			

① = number indicates wiring diagram on page 34

	12 mm threaded Straight optics 100 mm Visible red	12 mm threaded Straight optics 100 mm Visible red 3m PVC	12 mm threaded Straight optics 200 mm Visible red	12 mm threaded Straight optics 200 mm Visible red 3m PVC	12 mm threaded Straight optics 400 mm Infrared	12 mm threaded Straight optics 400 mm Infrared 3m PVC
	BOS0012	BOS0010	BOS0043	BOS0013	BOS0045	BOS000Y
	BOS000H		BOS000K	BOS000J	BOS000E	BOS000C
	BOS000P		BOS000T		BOS0044	
				BOS000R		BOS000L
	BOS0042		BOS000A		BOS0007	

	Combination 18 mm threaded Straight optics 350 mm Class 1 red laser	Combination 18 mm threaded Straight optics 350 mm Class 1 red laser 2m PVC	Combination 18 mm threaded Straight optics 400 mm Infrared	Combination 18 mm threaded Straight optics 400 mm Infrared 2m PVC
	BOS00JP	BOS00JN	BOS00JZ	BOS00JY
	BOS00HU	BOS00HT	BOS00J3	BOS00J1

Refer to Balluff website for latest technical information.
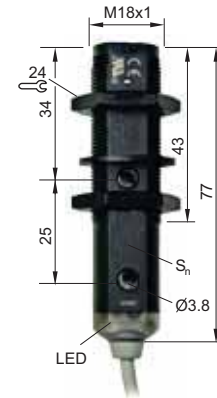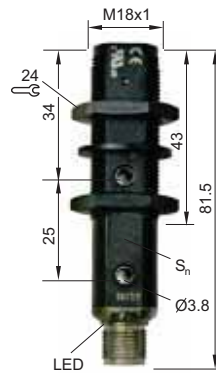
Body style	Combination 18 mm threaded	Combination 18 mm threaded	
Type	Straight optics	Straight optics	
Sensing range	700 mm	700 mm	
Light source	Infrared	Infrared	
Cable length and material		2m PVC	
PNP NO/NC : Light-on/Dark-on ⑥	**BOS00K1**	**BOS00K0**	
NPN NO/NC : Light-on/Dark-on ⑦	**BOS00J5**	**BOS00J4**	

① = number indicates wiring diagram on page 34
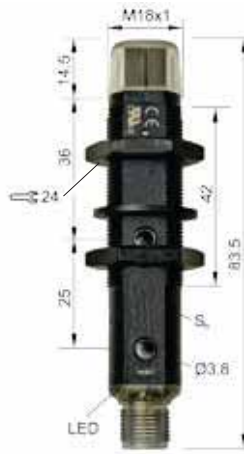
Body style	Combination 18 mm threaded	Combination 18 mm threaded	
Type	90° optics	90° optics	
Sensing range	80 mm	80 mm	
Light source	Infrared	Infrared	
Cable length and material		2m PVC	
PNP NO Light-on ①			
NPN NO Light-on ③			
PNP NC Dark-on ②			
PNP NC Dark-on ⑧			
NPN NC Dark-on ④			
PNP NO/NC : Light-on/Dark-on ⑥	**BOS00M1**	**BOS00M0**	
NPN NO/NC : Light-on/Dark-on ⑦	**BOS00LE**		

① = number indicates wiring diagram on page 34
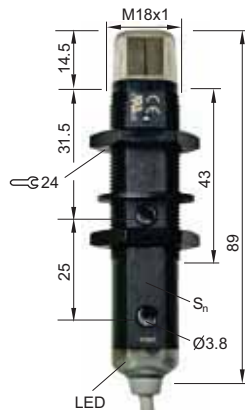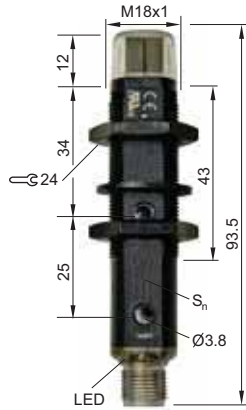
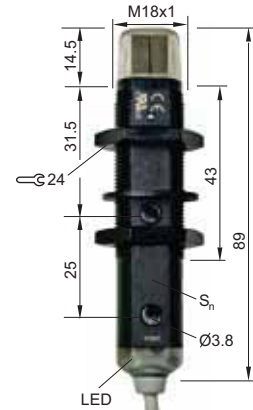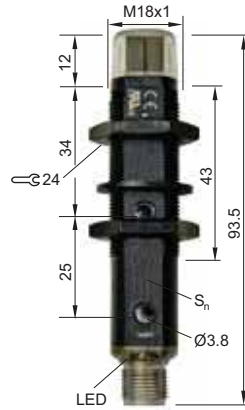|			
Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded
90° optics	90° optics	90° optics	90° optics
400 mm	400 mm	250 mm	250 mm
Infrared	Infrared	Class 1 red laser	Class 1 red laser
	2m PVC		2m PVC
BOS00LT	**BOS00LR**	**BOS00LK**	**BOS00LJ**
BOS00L6	**BOS00L5**	**BOS00L0**	**BOS00KZ**
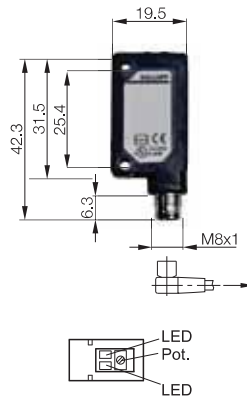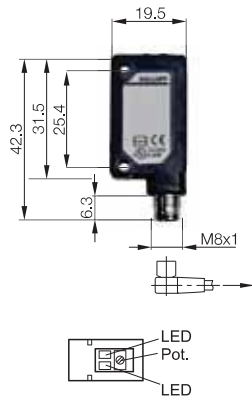
Small block	Small block	Small block	Small block
90° optics	90° optics	90° optics	90° optics
200 mm	200 mm	900 mm	900 mm
Visible red	Visible red	Infrared	Infrared
	2m PVC		2m PVC
BOS0128	**BOS0127**	**BOS0124**	**BOS0123**
BOS011C	**BOS011A**	**BOS0117**	**BOS0116**
BOS011W			
	BOS011U		**BOS011K**
BOS0110	**BOS010Z**		**BOS010P**

Refer to Balluff website for latest technical information.

| Body style	8 mm threaded	8 mm threaded	12 mm threaded	12 mm threaded	18 mm theaded	
Type	Straight optics	Straight optics	Straight optics	Straight optics	Straight optics	
Sensing range	550 mm (polarized)	550 mm (polarized)	1.5 m (polarized)	1.5 m (polarized)	4 m (polarized)	
Light source	Visible red	Visible red	Visible red	Visible red	Visible red	
Cable length and material		2m PUR		3m PVC		
PNP NO/NC : Dark-on/Light-on ⑥						
NPN NO/NC : Dark-on/Light-on ⑦						
PNP NO Dark-on ①	BOS00RC	BOS00RA	BOS00RE	BOS00RK	BOS01F8	
NPN NO Dark-on ③	BOS00R7	BOS014Z	BOS00RF			
PNP NC Dark-on ②	BOS00R9		BOS00RJ		BOS01F9	
PNP NC Dark-on ⑧		BOS00R8		BOS00RH		
NPN NC Light-on ④	BOS00R6	BOS014Y				

① = number indicates wiring diagram on page 34
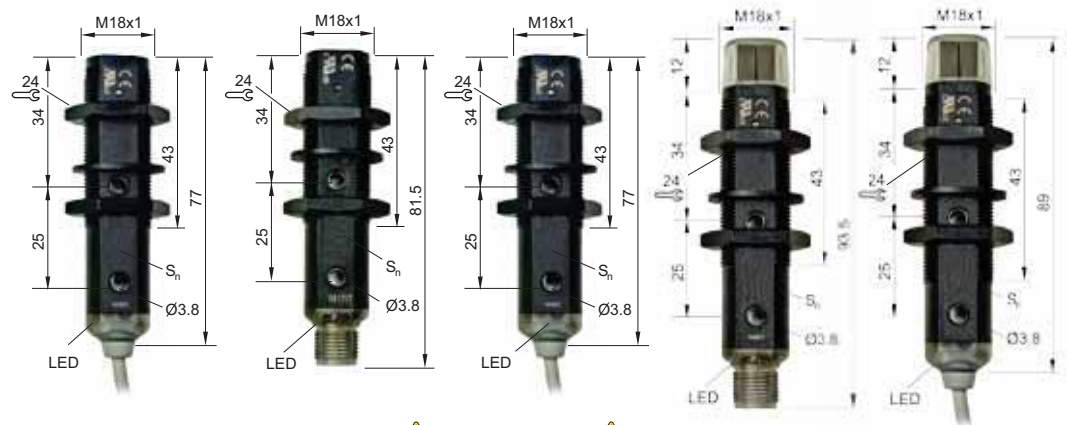
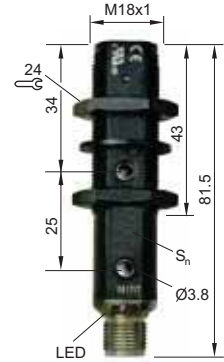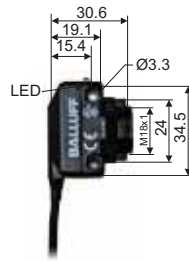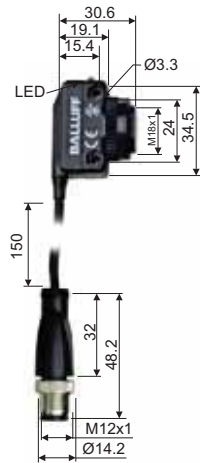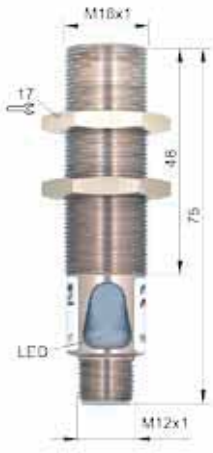| Body style	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	
Type	Straight optics	Straight optics	Straight optics	90° optics	90° optics	
Sensing range	4.5 m (polarized)	16 m (polarized)	16 m (polarized)	3 m (polarized)	3 m (polarized)	
Light source	Visible red	Class 1 red laser	Class 1 red laser	Visible red	Visible red	
Cable length and material	2m PVC		2m PVC		2m PVC	
PNP NO Dark-on ①						
NPN NO Dark-on ③						
PNP NC Light-on ②						
PNP NC Light-on ⑧						
NPN NC Light-on ④						
PNP NO/NC : Dark-on/Light-on ⑥	BOS00K2	BOS00JT	BOS00JR	BOS00LW	BOS00LU	
NPN NO/NC : Dark-on/Light-on ⑦	BOS00J6	BOS00HY	BOS00HW	BOS00L8	BOS00L7	

① = number indicates wiring diagram on page 34
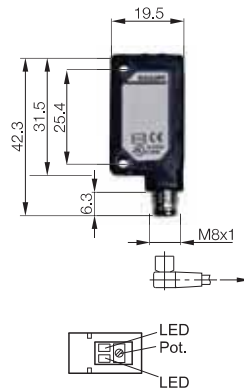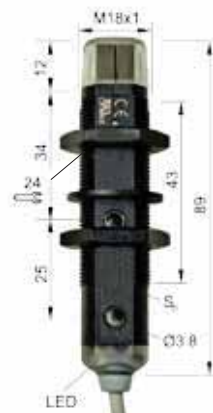
18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded
Straight optics	90° optics	90° optics	90° optics	Straight optics
6 m	3.5 m (polarized)	3.5 m (polarized)	6.5 m (polarized)	4.5 m (polarized)
Infrared	Visible red	Visible red	Visible red	Visible red
	.15m PVC	2m PVC	2m PVC	
	BOS012W	**BOS012Y**	**BOS012Z**	**BOS00K3**
	BOS012L	**BOS012M**	**BOS012N**	**BOS00J7**
BOS01HK				

Combination 18 mm threaded	Combination 18 mm threaded	Small block	Small block
90° optics	90° optics	90° optics	90° optics
9 m (polarized)	9 m (polarized)	4 m (polarized)	4 m (polarized)
Class 1 red laser	Class 1 red laser	Visible red	Visible red
	2m PVC		2m PVC
		BOS012E	**BOS012C**
		BOS011J	**BOS011H**
		BOS0122	
			BOS0120
		BOS0115	**BOS0113**
BOS00LM	**BOS00LL**		
BOS00L2	**BOS00L1**		

Polarized Retroreflective Sensors

In the illustration, light emitted by the sensor is filtered to take the vertical component out of the waveform. The light is then reflected off of a corner-cube reflector, which changes its orientation by 90 degrees. An additional filter is placed on the receiver lens to stop any light with the wrong orientation from getting through to the receiver, including ambient light or light reflecting from a shiny surface (like a mirror). This method of filtering allows Polarized Retroreflective sensors to see all kinds of targets.

Refer to Balluff website for latest technical information.

Thru-beam Sensor

Body style		8 mm threaded	8 mm threaded	12 mm threaded	12 mm threaded	18 mm threaded	
Type		Straight optics	Straight optics	Straight optics	Straight optics	Straight optics	
Sensing range		1.1 m	1.1 m	5 m	5 m	20 m	
Light source		Visible red	Visible red	Visible red	Visible red	Visible red	
Cable length and material			2m PUR		3m PVC		
Receiver PNP NO Dark-on	①	BOS00W9	BOS018F			BOS01FE	
Receiver NPN NO Dark-on	③	BOS0154	BOS018C				
Receiver PNP NC Light-on	②	BOS0153				BOS01FF	
Receiver PNP NC Light-on	⑧		BOS018E				
Receiver NPN NC Light-on	④	BOS0152	BOS018A				
Receiver PNP NO/NC : Dark-on/Light on	⑥			BOS00UE	BOS00UC		
Receiver NPN NO/NC : Dark-on/Light on	⑦			BOS00UA			
Emitter	⑤	BOS0151	BOS018H	BOS00W2	BOS00UW	BOS01FH	
Emitter	⑨						

① = number indicates wiring diagram on page 34
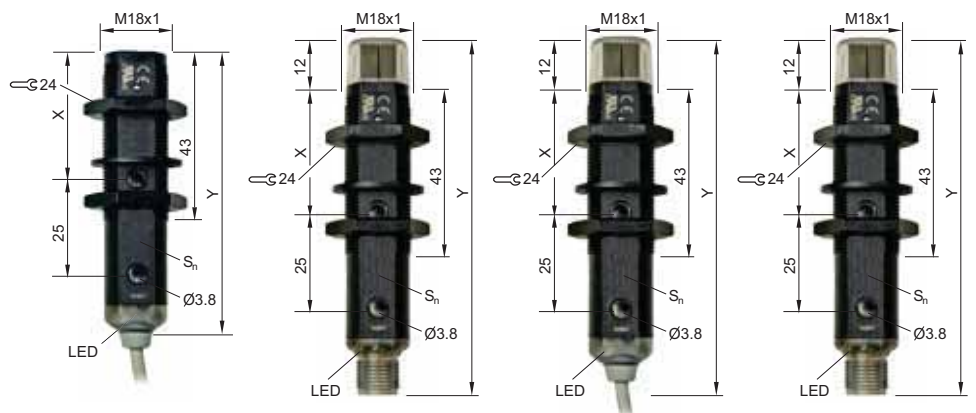
Receiver: X = 34, Y = 77
Emitter: X = 24, Y = 67

Receiver: X = 34, Y = 93.5
Emitter: X = 24, Y = 83.5

Receiver: X = 34, Y = 89
Emitter: X = 24, Y = 79

Receiver: X = 34, Y = 93.5
Emitter: X = 24, Y = 83.5

Body style		Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	
Type		Straight optics	90° optics	90° optics	90° optics	
Sensing range		60 m	15 m	15 m	50 m	
Light source		Class 1 red laser	Infrared	Infrared	Class 1 red laser	
Cable length and material		2m PVC		2m PVC		
Receiver PNP NO/NC : Dark-on/Light-on	⑥	BOS00CF	BOS00CW	BOS00CU	BOS00CT	
Receiver NPN NO/NC : Dark-on/Light-on	⑦	BOS00C9	BOS00CP	BOS00CN	BOS00CM	
Emitter	⑨	BOS00EL	BOS00EW	BOS00EU	BOS00ET	

① = number indicates wiring diagram on page 34

Receiver: X = 34, Y = 81.5
Emitter: X = 24, Y = 71.5

Receiver: X = 34, Y = 77
Emitter: X = 24, Y = 67

Receiver: X = 34, Y = 81.5
Emitter: X = 24, Y = 71.5

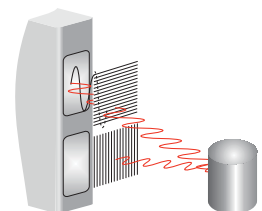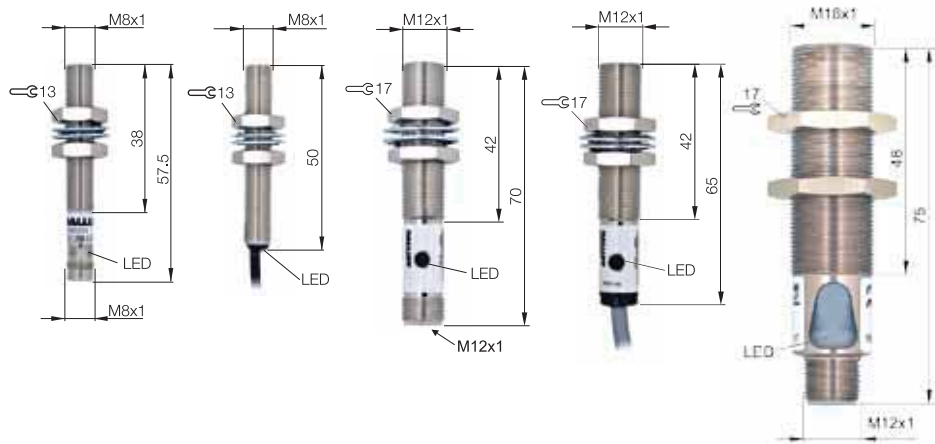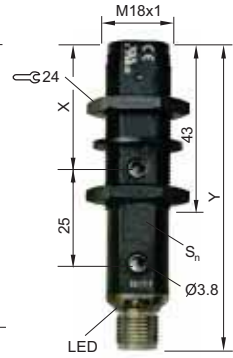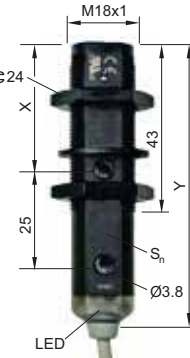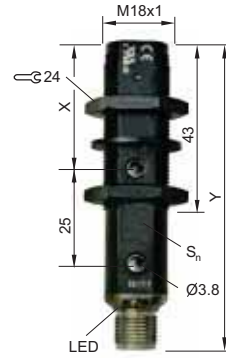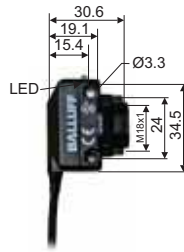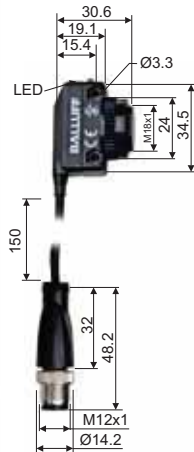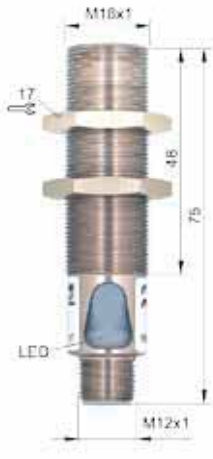| 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded	Combination 18 mm threaded
Straight optics	90° optics	90° optics	Straight optics	Straight optics	Straight optics
25 m	50 m	20 m	20 m	20 m	60 m
Infrared	Infrared	Infrared	Infrared	Infrared	Class 1 red laser
	.15m PVC	2m PVC		2m PVC	
BOS01HP					
	BOS012T	BOS012U	BOS00CK	BOS00CJ	BOS00CH
	BOS012J	BOS012K	BOS00CE	BOS00CC	BOS00CA
BOS01HM	BOS0130	BOS0131			
			BOS00EP	BOS00EN	BOS00EM
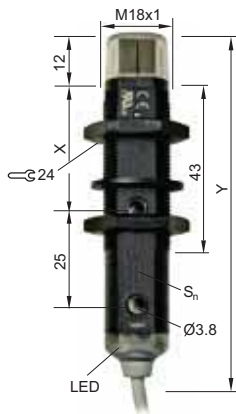
Receiver: X = 34, Y = 89
Emitter: X = 24, Y = 79

	Combination 18 mm threaded
	90° optics
	50 m
	Class 1 red laser
	2m PVC
	BOS00CL
	BOS00ER

Body style		Small block	Small block
Type		90° optics	90° optics
Sensing range		10 m	10 m
Light source		Infrared	Infrared
Cable length and material			2m PVC
PNP	NO Dark-on (E-R set) ① ⑤	BOS0126*	BOS0125*
NPN	NO Dark-on (E-R set) ③ ⑤	BOS0119*	BOS0118*
PNP	NC Light-on (E-R set) ② ⑤	BOS011T*	
PNP	NC Light-on (E-R set) ⑧ ⑤		BOS011N*
NPN	NC Light-on (E-R set) ④ ⑤	BOS010Y*	
NPN	NC Light-on (E-R set) ⑧ ⑤		BOS010U*

*Emitter-Receiver set   Refer to Balluff website for latest technical information.

Sensors for pneumatic cylinders

Balluff's magnetic field cylinder sensors are based on non-contact, solid-state sensor technology that is compatible with both reed and Hall Effect magnetic pole orientations, making them the ideal replacement for standard magnetic switches. Electrically rugged, they feature short circuit protection, overload protection, and reverse polarity protection…all backed by Balluff's exclusive Lifetime Warranty. Improved sensor performance and better reliability results in less downtime and increased productivity. With Balluff's magnetic field sensors, you install and forget them.

Balluff's compact BMF sensors are designed to fit either C-slot or T-slot extrusions and require no additional brackets for mounting. These sensors fit flush into the slot, offering better sensor protection…nothing sticking out and nothing in the way. Flush mounting sensors make installation in space critical applications easier and less time consuming. In addition, cable clips are included for cleaner cable routing and better strain relief.

BMF Standard Specifications	
Rated supply voltage	24 V DC
Supply voltage range	10...30 V DC,
Max. load current	100 mA,
Short circuit protection	Yes
Polarity reversal protection	Yes
Function indicator	Yes
Output function indicator	Yellow LED
Degree of protection	IP67
Temperature range	-25° C...+85° C
Approvals	CE and cULus
Cable material	PUR
Rated switching field	15 gauss
Assured switching field	25 gauss

BMF 204 and BMF 214 C-slot – Single Sensor
These magnetic field sensors are C-slot styles that are bracketless and provide rock-solid holding

Position detection with compact sensors for C-slots

BMF 204 – Designed for 3.8 mm slot
BMF 214 – Designed for 4 mm slot
- Slides into the C-slot from the end
- Superior holding strength
- Miniature design for short stroke cylinders and grippers
- Precise, accurate positioning

Festo C-slot 10

SMC C-slot

Series	BMF 204				BMF 214			
Cable length	.3 m	.3 m	.5 m	2 m	.3 m	.5 m	2 m	5 m
Connection type	M8 connector	M12 connector	M8 connector	PU cable	M8 connector	M8 connector	PU cable	PU cable
PNP No contact	BMF0002	BMF00A6	BMF0003	BMF0001	BMF00A2	BMF00A3	BMF00A1	BMF00E3

3.8 mm (BMF 204)   4 mm (BMF 214)

min 2.95   min 2.95

3.8   2.17   4   2.3
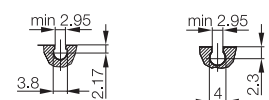
BMF 235 T-slot – Single Sensor

Position detection with compact sensors for T-slots

BMF 235 – The new standard for every T-slot
- Large, ultra-bright LED for easy diagnostics
- Installs from above into the T-slot – drop-in installation
- Installs with standard screwdriver or 1.5 mm Allen wrench
- Short, compact design with greater holding strength

Series	BMF 235				
Cable length	.3 m	.5 m	.3 m	.5 m	2 m
Dimensions (HxWxL)	5.5x5x23.5 mm	5.5x5x23.5 mm			5.5x5x23.5 mm
Connection type	M8 connector	M8 connector	M12 connector	M12 connector	PU cable
PNP NO	BMF00C4	BMF00CF	BMF00C5	BMF00CL	BMF00AR
PNP NC	BMF00C6				BMF00AT
NPN NO	BMF00C2				BMF00AU
NPN NC	BMF00C3				BMF00AW

V TWIN

V-Twin M8

V-Twin M12

Balluff's V-Twin® magnetic field sensors provide two sensors with a single connector in either an M8 or M12 configuration.

Substantial savings when using two sensors on one cylinder

- One, four-conductor cable verses two, three-conductor cables
- Less installation hardware
- Fewer wiring terminations
- Less installation time
- Lower initial costs compared to two separate sensors
- Double the number of sensors into a multiple interface block or sensor hub
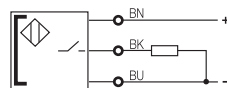
V-Twin

Series	204 C-slot		214 C-slot		235 T-slot	
Cable length	.3 m	.3 m	.3 m	.3 m	.3 m	.3 m
Connector	M8	M12	M8	M12	M8	M12
PNP NO	BMF0006	BMF0005	BMF00A5	BMF00A4	BMF00CA	BMF00C9

Wiring diagrams

NO
PNP/cable

NC
NPN/cable
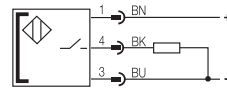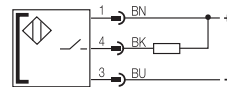
V-Twin Wiring
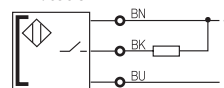
PNP/connector

PNP/connector

NPN/connector
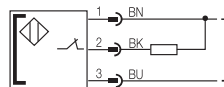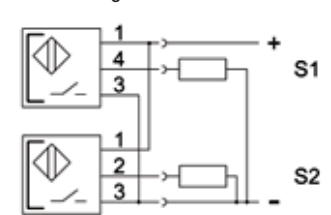
NPN/connector

Subject to change without notice. See Balluff website for latest technical specifications.

Know your cylinder? Find your sensor.

Balluff's exclusive, easy-to-use online Pneumatic Cylinder Sensor Resource Center is designed to help you select the best solution for specific cylinder models.

The web-based interface will generate up to three sensor recommendations for each application. The Resource Center is designed to help you make a preliminary selection of products so you can download sensor datasheets and mounting bracket installation instructions.

The Resource Center will reduce your design time, aid you in component standardization, and ultimately provide you with a reference guide that will help reduce downtime when a replacement sensor is needed.

Visit:
www.balluff.us/bmfcenter

Refer to Balluff website for latest technical information.

DC – Power Supplies

For industrial automation power supply applications, the quality you expect from Balluff at a competitive price.

- 24 VDC output
- 0.75A to 40A output
- Single and three phase input
- DIN rail mount
- CE, UL, CUL, and TUV approvals
- Short circuit protected

Output Voltage	Output Current	Input Voltage	Housing	Class II Rating	Parallel Mode	Ready Output	Part Number	Order Code
Single-phase Input Power								
24 VDC	0.75 A	100…240 VAC	Plastic	Yes			BAE PS-XA-1W-24-007-001	**BAE0001**
24 VDC	1.25 A	100…240 VAC	Plastic	Yes		Yes	BAE PS-XA-1W-24-012-002	**BAE0004**
24 VDC	2.5 A	100…240 VAC	Plastic	Yes		Yes	BAE PS-XA-1W-24-025-002	**BAE0005**
24 VDC	3.8 A	115/230 VAC	Metal	Yes	Yes	Yes	BAE PS-XA-1W-24-038-003	**BAE003J**
24 VDC	5.0 A	115/230 VAC	Metal		Yes	Yes	BAE PS-XA-1W-24-050-003	**BAE0006**
24 VDC	10.0 A	115/230 VAC	Metal		Yes	Yes	BAE PS-XA-1W-24-100-004	**BAE0002**
24 VDC	20.0 A	115/230 VAC	Metal		Yes	Yes	BAE PS-XA-1W-24-200-005	**BAE0003**
Three-phase Input Power								
24 VDC	5.0 A	3x 340…575 VAC	Metal			Yes	BAE PS-XA-3Y-24-050-009	**BAE0007**
24 VDC	10.0 A	3x 340…575 VAC	Metal		Yes	Yes	BAE PS-XA-3Y-24-100-006	**BAE0008**
24 VDC	20.0 A	3x 340…575 VAC	Metal		Yes	Yes	BAE PS-XA-3Y-24-200-007	**BAE0009**
24 VDC	40.0 A	3x 340…575 VAC	Metal				BAE PS-XA-3Y-24-400-010	**BAE003R**

M8 Single-Ended

Type	M8 Female	M8 Female
Configuration	Straight	Right Angle
Voltage Rating	60 VAC/VDC (3wire), 30 VAC/VDC (4wire)	60 VAC/VDC (3wire) 30 VAC/VDC (4wire)
Amperage	4 A	4 A

3-wire	2m	BCC0CC0	BCC0CAY
	5m	BCC0AUM	BCC0AUP
	10m	BCC0AUN	BCC0AUR
4-wire	2m	BCC0CAZ	BCC0CAW
	5m	BCC0AUT	BCC0AUW
	10m	BCC0AUU	BCC0AUY

See our full line in the **Industrial Networking and Connectivity** catalog.

M12 Single-Ended

Type	M12 Female	M12 Female
Configuration	Straight	Right Angle
Voltage Rating	250 VAC/VDC	250 VAC/VDC
Amperage	4 A	4 A

4-wire	2m	BCC0CAU	BCC0CAT
	5m	BCC0AUZ	BCC0AW1
	10m	BCC0AW0	BCC0AW2

M8 and M12 Cable Specifications

Jacket Material	PVC	
Overmold material	Black TPU	
Cable jacket color	Yellow	
Conductor gauge	22AWG	
Temperature rating (moving)	-5…105°C	
Temperature rating (fixed	-40…105°C	
Bending cycles	> 2 Million	
Number of conductors	3	4
Cable diameter	4.7 ± 0.15mm	5.0 ± 0.15mm

Technical data

M8 connectors – female straight and right-angle
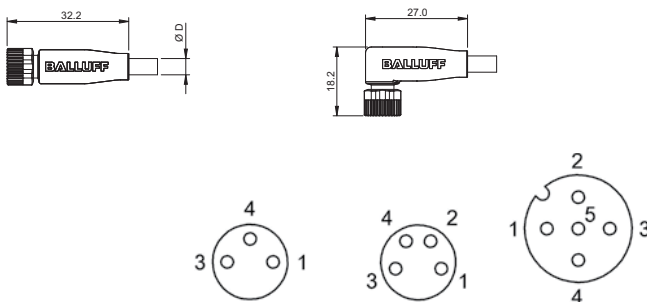
Size	M8	M8	M12
Gender	Female	Female	Female
Poles	3-wire	4-wire	4-wire
Wire Code	DC	DC	DC
1	BR	BR	BR
2		WH	WH
3	BU	BU	BU
4	BK	BK	BK

M12 connectors – female straight and right-angle
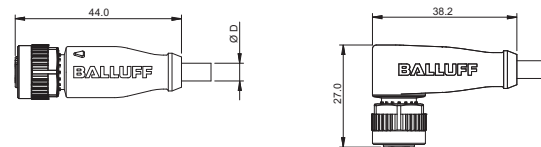
3-Wire

Non-LED	Normally Open
Wiring code	001

4-Wire

Non-LED	Normally Open/ Normally Closed
Wiring code	003

Refer to Balluff website for latest technical information.

Inductive, capacitive, and photoelectric accessories

Clamping cuff

	A	B	C	ØD	E	F	G	H	I	J
BAM00A2	17	27	16	7.9	12	8	4.5	4.5	8	1
BAM00C4	22	32	20	11.9	12	8	4.5	4.5	10	1
BAM00F2	26	36	26	17.9	12	8	4.5	4.5	13	1
BAM00HN	42	55	38	30	18	10	5.5	5.5	19	1.5

Material: PA6
Note: All units are in mm
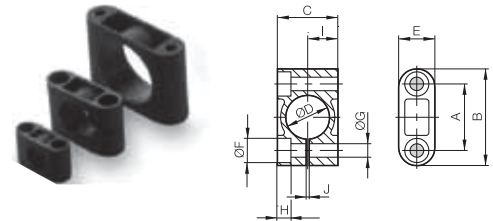
Slotted angle bracket (screws and washers included)

	A	B	C	D	E	F	G	H	I
BAM009U	25	30	30	8.1	12	7	4	6	14
BAM00C0	25	30	30	12.1	9	8.5	4	6	14
BAM00EY	30	40	40	18.1	11	12	5	10	18
BAM00HH	40	60	40	30.1	18	19	5	10	30

Material: Aluminum
Note: All units are in mm
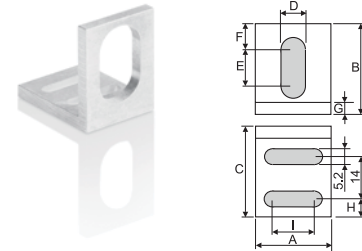
Photoelectric accessories

Type	Reflector Ø 84 mm	Reflector 51×62 mm	Small L bracket	Protective bracket
Mounting	One M5 screw	Two M4 screws	Two M3 screws	Two M3 screws
Ordering code	**BAM00RH**	**BAM00WL**	**BAM00U5**	**BAM00U6**
Material	PMMA	PMMA	Stainless steel	Stainless steel
Suitable product	All	All	BOS 5K	BOS 5K
Temperature range	0...+65 °C	0...+50 °C		
Reflectivity rating	85%	100 %		

Type	Small L bracket	Mounting adapter	Small L bracket
Mounting	Two M3 screws	Two M3 screws	Two M3 screws
Material	Stainless steel	Durethan	Aluminum
Suitable product	BOS 11K	BOS 18KF/KW	BOS 18KF/KW
Ordering code	**BAM00PT**	**BAM00RW**	**BAM00RY**
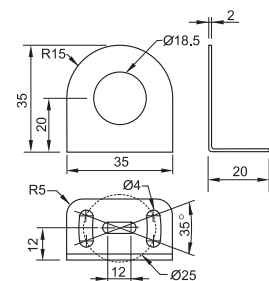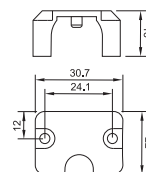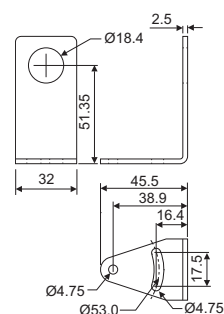
Capacitive accessories

Mounting Brackets

Fits		M12	M18	M30
Dimensions (mm)	A	10.5	11.7	19.1
	B	29.5	38.1	67.8
	C	38.1	45.0	69.9
	D	12.1	18.1	30.1
Tube diameter (mm)		9.4-20.6	9.4-20.6	25.4-44.5
Ordering code		**BAM015E**	**BAM015F**	**BAM015H**

Material: Plastic and Stainless Steel
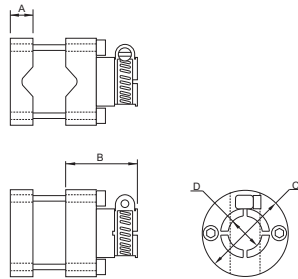
Accessories Deliver Faster Changeover Time

A common application, tank level control, is now simple with Balluff BCSA sight glass mounts. On and off levels can be easily adjusted on the external tube by moving the sensors up or down as desired. The ability to make these process changes quickly saves you money and satisfies the need for high-accuracy feedback.

Cover Nut

Fits	M18×1	M30×1.5
Ordering code	**BAM00F1**	**BAM00H2**

Note: All units are in mm
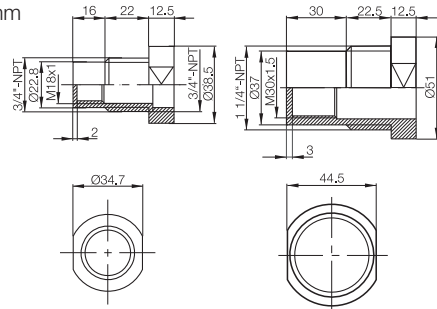
Protective Teflon™ switchwells

are perfect for attaching capacitive sensors to containers for level detection.

Please note. The nominal switching distance of capacitive switches is reduced by 2 mm when the cover nut is installed.

BMF accessories

Tie rod and round body cylinders – T-slot sensors with "stay put brackets" offer solutions for tie rod and round body cylinders.

BMF 235 – round body

T-slot bracket with tube cuff

Part number	Cylinder diameter (mm)
SET010H	7-11
SET010J	11-19
SET010K	18-29
SET010L	28-39
SET010M	38-49
SET010N	48-59
SET010P	58-69
SET010T	68-79
SET010R	78-89

Tie rod brackets for BMF 235

Part number	Cylinder profile
BAM01M9	Profile cylinder and tie bar up to 5...11 mm
BAM01MA	Profile cylinder and tie bar up to 9...15 mm
BAM01MC	Profile cylinder and tie bar 14...20 mm

Refer to Balluff website for latest technical information.

Specifications and Wiring Diagrams

Photoelectric Standard Specifications
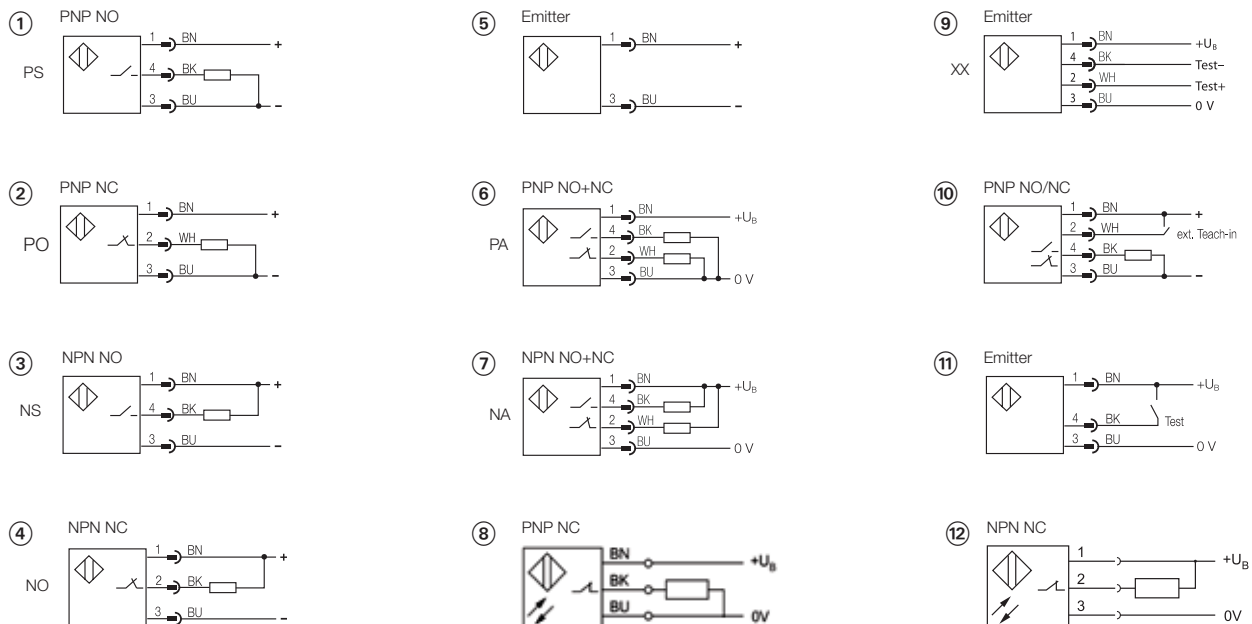
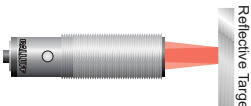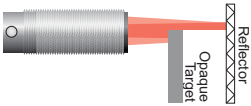|	BOS 5K	BOS 08M	BOS 11K	BOS 12M	BOS 18KF/KW	BOS 18M
Form Factor	Small block	8 mm threaded	Combination 18 mm threaded	12 mm threaded	Combination 18 mm threaded	18 mm threaded
Optics orientation	90°	Straight	90°	Straight	Straight (18KF), 90° (18KW)	Straight
Supply voltage	10…30 Vdc	10…30 Vdc	10…30 Vdc	10…30 Vdc	10…30 Vdc	10…30 Vdc
Max. load current	100 mA	100 mA	100 mA	100 mA* 200 mA	100 mA	100 mA
Short circuit protection	Yes	Yes	Yes	Yes	Yes	Yes
Current overload protection	Yes	Yes	Yes	Yes	Yes	Yes
Polarity reversal protection	Yes	Yes	Yes	Yes	Yes	Yes
Degree of protection	IP67	IP67	IP67	IP67	IP67	IP67
Temperature range	-25 to +55° C	-10 to +60° C	-20 to +55° C	-20 to +60° C* -10 to +60° C	-25 to +55° C	-5 to +55° C
Approvals	CE	CE, cULus	CE, cULus	CE, cULus	CE, cULus	CE, cULus
Connection	M8 4-pin or 2 m cable	M8 3-pin or cable	M12 4-pin pigtail or 2 m cable	M12 4-pin or cable	M12 4-pin or 2 m cable	M12

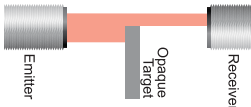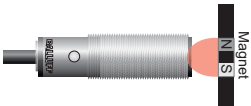Consult Balluff website for latest technical specifications.
*Background suppression fixed focus.

Wiring Diagrams

Subject to change without notice. See Balluff website for latest technical specifications.

Sensor Technology Guide

	Description	Sensing Range (typ.)	Advantages	Disadvantages	Applications
Inductive	Detects various metal targets using magnetic field	0 - 30 mm	Popular, very rugged, best in harsh environments, economical, simple use	Short range, detects only metal targets	General purpose, welding, metal cutting, RPM pickup
Photoelectric: Diffuse	Detects any target capable of reflecting light	0 - 900 mm	Popular, good for small targets, handles many applications	Short range, affected by dirt, color dependent	General purpose, color mark, label detection
Photoelectric: Retroreflective	Detects any target capable of blocking light	0 - 16 m	Best for conveyors or transparent targets, medium sensing range	Requires a reflector, affected by dirt build-up	Conveyors, large openings, bottle detection
Photoelectric: Thru-Beam	Detects target capable of blocking light	0 - 60 m	Best for long range or to look through a translucent object, tolerant of dirt	Requires both an emitter and a receiver	Height verification, loop control, fill level
Capacitive: Object Detection	Detects target based on change in density	0 - 25 mm	Best for detecting dense materials; adjustable, simple	Short range, affected by humidity changes	Detects objects regardless of color, texture, or material
Capacitive: Level Detection	Detects target based on change in density	0 - 25 mm	Best for detecting bulk material or liquids directly or through plastic or glass container wall	Can be affected by material buildup	Detects objects regardless of color, texture, or material
Magnetic	Detects a magnet	Magnet dependent	Best for pneumatic cylinders, detects through most objects (except steel)	Short range, requires magnet	Cylinder position detection

Product Update

BALLUFF
sensors worldwide

Global Fork and Angle Sensors
**Self-contained through-beam sensors**

Balluff's newest additions to the Global products are self-contained through-beam sensors that are designed to solve applications that many other sensors cannot. Offering reliable performance in an innovative package, these sensors are the first ones to use in error-proofing, process monitoring, and general automation tasks in a number of environments.

Fork light sensors
C / U slot or fork sensors are universal self-contained through-beam sensors available in slot widths from 5 mm up to 220 mm. The self-contained design means the emitter and receiver are always in alignment.

Angle sensors
Angle self-contained through-beam photoelectric sensors are the best for large or varying size objects, two axis movements, and confined space applications. Leg lengths vary from 40 mm x 40 mm to 110 x 110 mm.
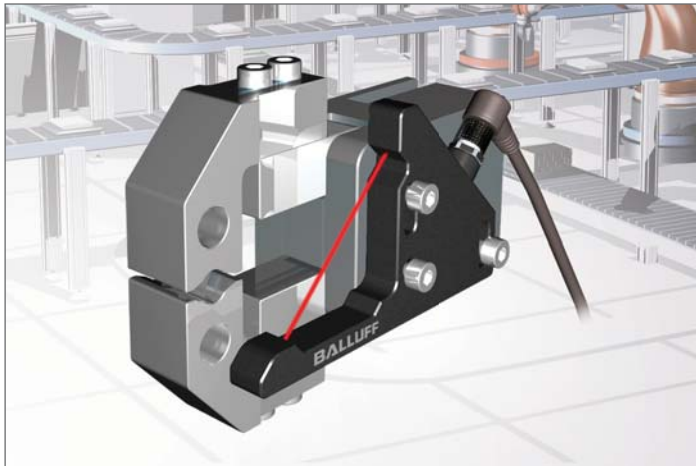
Features / Benefits
- Rugged metal one-piece housing - always in alignment
- Easy installation
- Visible red light - easy setup
- Glass optics
- High resolution
- Stackable
- Light / Dark operation selectable
- Adjustable sensitivity
- High switching frequency
- M8 connector with 360° LED
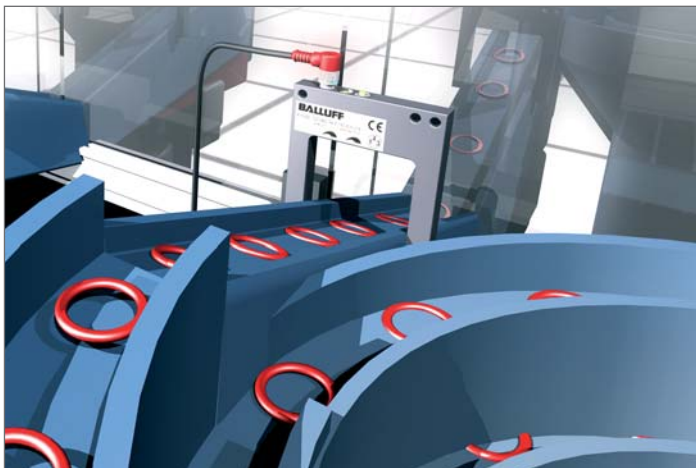
Applications
- Part sensing on conveyor and feed belts
- Parts counting
- Tool break monitoring
- Part dimension verification
- Position verification
- Level monitoring
- Error proofing
- Part accumulation
- Part detection in grippers
- Handling and assembly

See reverse side for descriptions and ordering information

Product Update

BALLUFF
sensors worldwide

Fork Sensors

Ordering code	Part number	Features
BGL001W	BGL 5A-001-S49	5mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL001Y	BGL 5A-002-S49	5mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL0001	BGL 10A-001-S49	10mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL0002	BGL 10A-002-S49	10mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL000R	BGL 20A-001-S49	20mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL000T	BGL 20A-002-S49	20mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL0016	BGL 30A-001-S49	30mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL0018	BGL 30A-002-S49	30mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL001J	BGL 50A-001-S49	50mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL001L	BGL 50A-002-S49	50mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL0023	BGL 80A-001-S49	80mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL0024	BGL 80A-002-S49	80mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL0007	BGL 120A-001-S49	120mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL0008	BGL 120A-002-S49	120mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL000J	BGL 180A-001-S49	180mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL000K	BGL 180A-002-S49	180mm, NPN, Red Light, 0.3mm resolution, M8 connector
BGL0010	BGL 220A-001-S49	220mm, PNP, Red Light, 0.3mm resolution, M8 connector
BGL0011	BGL 220A-002-S49	220mm, NPN, Red Light, 0.3mm resolution, M8 connector

Angle Sensors

Ordering code	Part number	Features
BWL000F	BWL 4040D-R011-S49	40x40mm, PNP, Red Light, 0.4mm resolution, M8 connector
BWL000H	BWL 4040D-R012-S49	40x40mm, NPN, Red Light, 0.4mm resolution, M8 connector
BWL000R	BWL 5454D-R011-S49	54x54mm, PNP, Red Light, 0.4mm resolution, M8 connector
BWL000T	BWL 5454D-R012-S49	54x54mm, NPN, Red Light, 0.4mm resolution, M8 connector
BWL0012	BWL 6868D-R011-S49	68x68mm, PNP, Red Light, 0.5mm resolution, M8 connector
BWL0013	BWL 6868D-R012-S49	68x68mm, NPN, Red Light, 0.5mm resolution, M8 connector
BWL0019	BWL 9090D-R011-S49	90x90mm, PNP, Red Light, 0.6mm resolution, M8 connector
BWL001A	BWL 9090D-R012-S49	90x90mm, NPN, Red Light, 0.6mm resolution, M8 connector
BWL0005	BWL 110110D-R011-S49	110x110mm, PNP, Red Light, 0.6mm resolution, M8 connector
BWL0006	BWL 110110D-R012-S49	110x110mm, NPN, Red Light, 0.6mm resolution, M8 connector

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Sensing, Networking, and Identification for Industrial Automation

BALLUFF

sensors worldwide

CONTROL

CONNECTIVITY AND IDENTIFICATION

SENSORS AND SOLUTIONS

IO-Link   CC-Link   DeviceNet   EtherNet/IP

Object Detection

Inductive sensors, cylinder sensors, magnetic field sensors capacitive sensors, ultrasonic sensors, photoelectric sensors, fiber optic devices, fiber optics, angle sensors, through-beam fork sensors, optical window sensors, light grids, contrast sensors, luminescence sensors, color sensors, mechanical and inductive single and multiple position switches

Linear Position and Measurement

Micropulse® transducers, magnetic linear encoder system, inductive displacement system, inductive distance sensors, magnetoinductive distance sensors, capacitive distance sensors, photoelectric distance sensors, ultrasonic sensors

Fluid Detection

Pressure sensors, capacitive sensors for level detection

Industrial Identification

Industrial RFID systems, vision sensors

Networking and Connectivity

Connectors and connection cables, valve connectors, passive splitter boxes, active splitter boxes, IO-Link, bus systems (Profibus, Profinet, CC-Link, DeviceNet, EtherNet), inductive couplers, power supplies, electrical devices

Accessories

Brackets and mountings, assembly system BMS

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