

Accessories

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Counters and displays are available for all series to integrate the sensor systems perfectly in your application. The range of sensor guides gives you the option of integrating robust, high-precision measurement systems in applications where machines are not able to provide adequate guidance.

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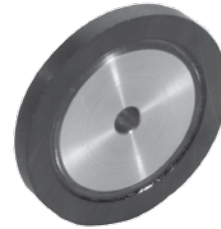
Magnet rings

Special solutions for a range of applications

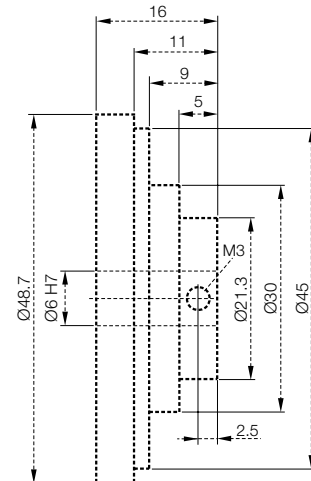
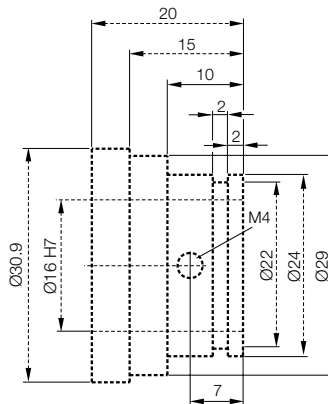
Magnetic rings are suitable for all types of application where the monitoring of rotary movements is required. Due to the high resolution, synchronous run monitoring is just as easy to implement as precision angle positioning.

Balluff offers a range of standard rotary tapes that are suitable for most types of application. Due to the wide variety of different machine applications, special dimensions and magnetic configurations are available on request.

Even linear tapes have been used successfully in rotary applications. For example, the magnetic tape can be attached to the shaft of a solar panel unit to monitor whether the panel is aligned perfectly with the sun. Balluff also offers prefabricated magnetic tapes with holes for convenient, simplified installation.



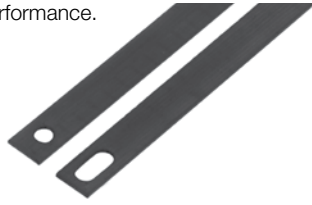
Series	Sensor range B/C/E	Sensor range B/C/E
Ordering code	BML002T	BML002R
Part number	BML-M22-I40-A0-M031/016-R0	BML-M21-I40-A0-M048/006-R0
With hub		
Material	Hard ferrite/aluminum	Hard ferrite/aluminum



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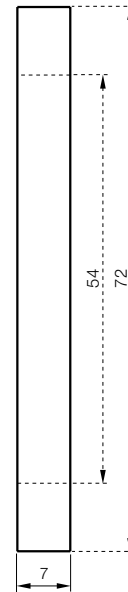
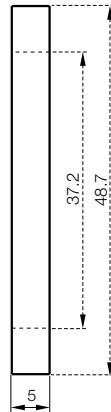
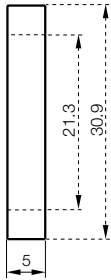
Magnet rings

Special solutions for even greater performance.
Do not hesitate to contact us.



Magnet rings
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Sensor range B/C/E	Sensor range B/C/E	Sensor range B/C/E
BML002L	BML002M	BML002N
BML-M20-I40-A0- M031/021-R0	BML-M20-I40-A0- M048/037-R0	BML-M20-I40-A0- M072/054-R0
Hard ferrite	Hard ferrite	Hard ferrite

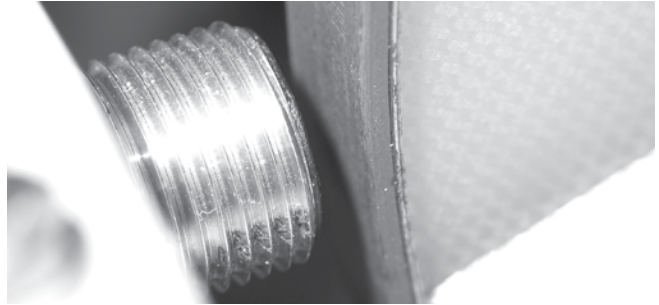


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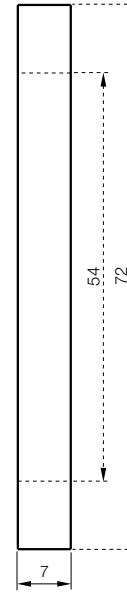
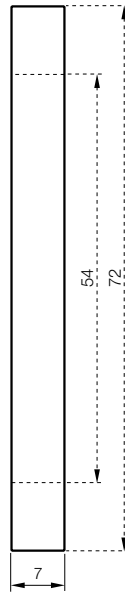
Magnet rings

Speed monitoring in rotary applications: so much easier.

Designed for the B/C/E range of sensors, the magnetic rings and tapes shown here allow you to measure speed, even in combination with switching magnetic field sensors from the BMF series. The sensor BMF 12M-PS-C-2-S4 with standard M12 thread is suitable for a wide range of applications and can be installed as close as 2 mm from the magnet. A pulse signal that represents the rotary speed is issued at the switching output. The sensor can detect frequencies up to 7 kHz and measure speeds of up to 20000 rpm, depending on the selected tape.



Series	Sensor range B/C/E	Sensor range A/F	
Ordering code	BML002P	BML002K	
Part number	BML-M20-I40-A0- M072/054-R1	BML-M20-I30-A0- M072/054-R0	
With reference mark			
Material	Hard ferrite	Hard ferrite	



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Magnet rings



Sensor range A/F
BML01EW
 BML-M30-I30-A0-M122/090-R0

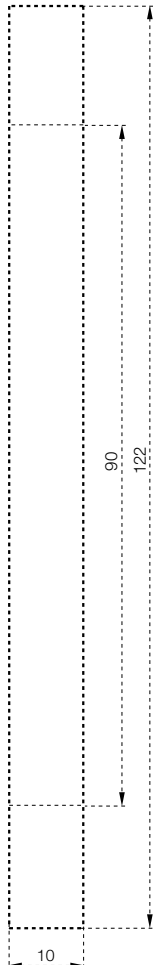
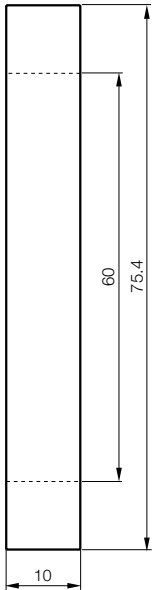
Sensor range A/F
BML01KM
 BML-M31-I30-A0-M075/060-R0

Elastomer on steel ring with fit H7

Elastomer on steel ring with fit H7



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Counter displays



Ordering example:

BDD 610-R3Q3-0-_-N-00

Options

- 51 2 digital inputs
- 53 2 digital outputs

BDD 611-R_Q4-0-_-N-00

Operating voltage

Options

- 3 24 V DC
- 4 115/230 V
- 52 Sensor supply 5 or 24 V DC with operating voltage 24 V DC
- 54 Sensor supply 5 or 12 V DC with operating voltage 115/230 V



BDD 6_2-R3Q4-0-_-N-00

Number of axes

Options

- 2 2 axes
- 3 3 axes
- 52 Sensor supply 5 or 24 V DC with operating voltage 24 V DC

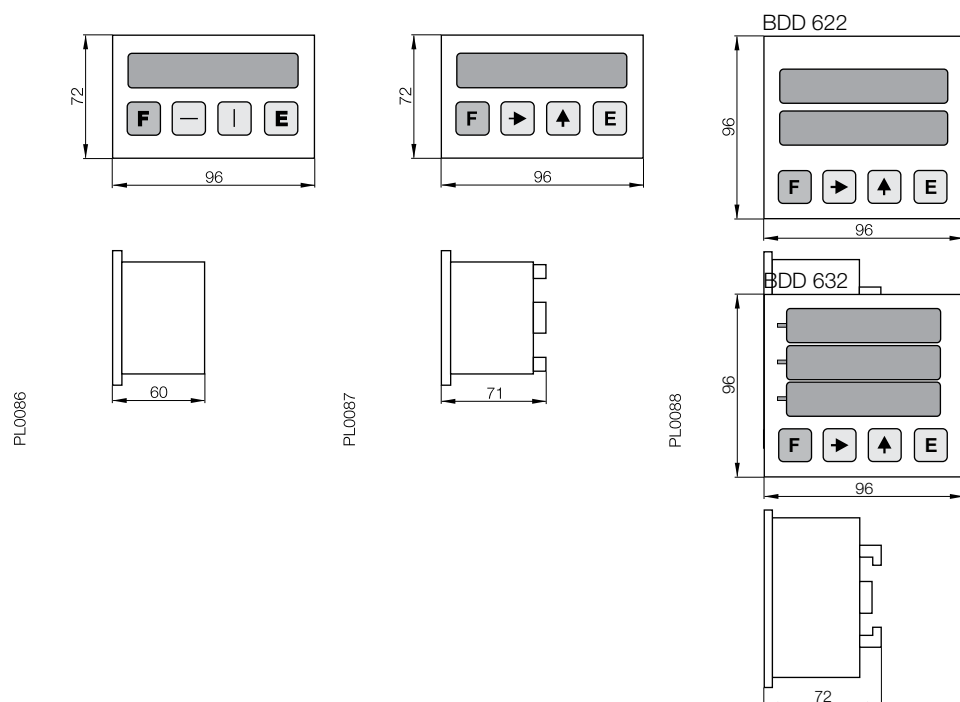
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Counter displays

Series	BDD 610	BDD 611	BDD 622/BDD 632
Interface	Single-axis counter for BML-S1B..., BML-S1C... and BML-S1E...	Single-axis counter for all BML-Sxx...	Multiple-axis counter for all BML-Sxx...
Part number	BDD 610-R3Q3-0-_-_-N-00	BDD 611-R_Q4-0-_-_-N-00	BDD 6_2-R_Q4-0-_-_-N-00
Functions	<ul style="list-style-type: none"> – Set value – Power down memory – Factor calculation – Reverse count direction – Up to 3 decimal places – Assignable key functions – Reset and set logic – In- and outputs logic – Security code 	<ul style="list-style-type: none"> – Set value – Power down memory – Factor calculation – Edge evaluation – Reverse count direction – Up to 3 decimal places – Assignable key functions – Reset and set logic – Absolute and incremental – Offset logic – Saw blade correction – In- and outputs logic – Security code – Reference pulse 	<ul style="list-style-type: none"> – Set value – Power down memory – Factor calculation – Edge evaluation – Reverse count direction – Up to 3 decimal places – Assignable key functions – Reset and set logic – Absolute and incremental – Offset logic – Saw blade correction – In- and outputs logic – Security code – Reference pulse
Features	<ul style="list-style-type: none"> – 1×6 decade LED display – Digit height 14 mm – Incremental measuring system with tracks A, B – max. 25 kHz – Operating voltage 24 V DC – 2 digital inputs – 2 digital outputs 	<ul style="list-style-type: none"> – 1×6 decade LED display – Digit height 14 mm – Incremental measuring system with A, \bar{A}, B, \bar{B}, Z, \bar{Z} or A, B, Z – max. input frequency: Signal A or B: 1 MHz – Min. edge separation for 4-way processing: 250 ns – 4 digital inputs – 2 digital outputs (BDD 611-R3Q4-0-52-N-00) 	<ul style="list-style-type: none"> – 2×6/3×6 decade LED display – Digit height 14 mm – Incremental measuring system with A, \bar{A}, B, \bar{B}, Z, \bar{Z} – Min. edge separation for 4-way processing: 250 ns – Operating voltage 24 V DC – 4 digital inputs – 2 digital outputs (BDD 622-R3Q4-0-52-N-00)
Version	for BML-S1B0..., BML-S1E0... and BML-S1C0-..., min. edge separation Code M, N, P, R	for BML with operating voltage 5 V/10...30 V, output voltage RS422/HTL, min. edge separation Code E, F, G, H, K, L, M, N, P, R	for BML with operating voltage 5 V/10...30 V, output voltage RS422/HTL, min. edge separation Code E, F, G, H, K, L, M, N, P, R



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Sensor guide



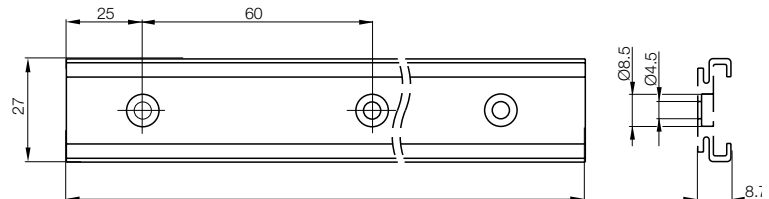
The sensor guide always consists of an aluminum rail that retains the magnetic tape and a carriage with runners that guides the sensor head accurately. A standard control arm is used for the mechanical connection.

The benefits:

Perfect adaptation to your individual application:

- Individual lengths available
- Direct screws or mounting elements for simple attachment
- Rails can be mounted side by side and elements disassembled
- Connection of drag chains possible
- Flat design, minimal space requirements
- Low costs
- Lubrication of runners unnecessary, no maintenance costs as a result
- Minimum stock holding times because concept is universal, even compatible with different sensor heads
- Mounting aid for easy installation of the magnetic tape

Sensor guide	Guide rail for slide carriage	
Ordering code		
Part number	BML-R01-M_ _ _	
Features	<ul style="list-style-type: none"> - Anodized aluminum - Mounting holes available - Alternative mounting using lateral groove and brackets - Side by side installation using mounting brackets - Maintenance-free dry operation - Free of lubricants - Suitable for all linear tapes 	
Version	for retaining slide carriages BML-C01 or BML-C02	



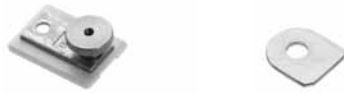
Ordering example: aluminum rail

BML-R01-M_ _ _

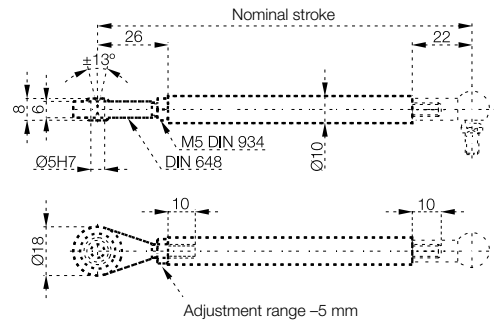
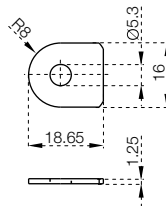
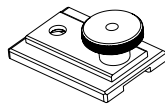
Length in cm, max. 300

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Sensor guide



Accessories	Mounting guide	Brackets	Control arm
Ordering code	BAM01L9	BAM01JL	
Part number	BML-Z0010	BML-Z0008	BTL2-GS10-____-A
Version	for mounting the magnetic tape with maximum precision	for side mounting of the rail as well as on transition points	for connecting the slide carriage to the machine



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Slide carriage
for sensors BML-S2B, BML-S2E, BML-S1C

BML01FR
BML-C01

- Aluminum
- Fully assembled with runners and connection for control arm
- Connection for drag chains available
- Maintenance-free dry operation
- Free of lubricants

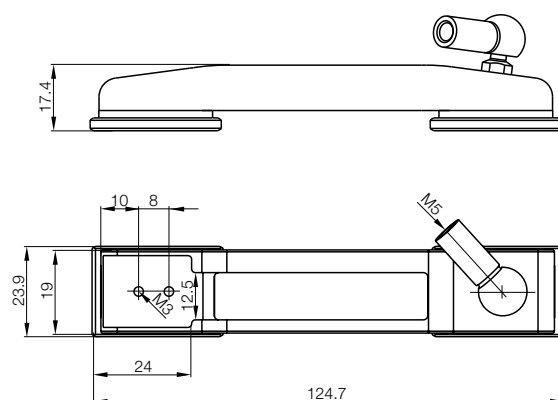
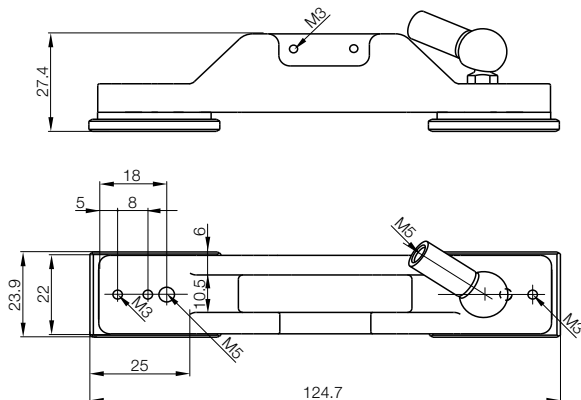
for retaining sensors BML-S2B, BML-S1C or BML-S2E

Slide carriage
for sensors BML-S1F

BML01FJ
BML-C02

- Aluminum
- Fully assembled with runners and connection for control arm
- Connection for drag chains available
- Maintenance-free dry operation
- Free of lubricants

for retaining sensor BML-S1F



The BML system allows precision adaptation to the relevant application. Balluff offers a technical selection guide that provides valuable assistance.

Selecting a suitable controller

Each sensor with a digital output signal has a characteristic minimum edge separation gap that the higher level controller must reliably detect. We therefore recommend selecting a controller with a counting frequency that is higher than the theoretically calculated counting frequency.

Please use the following formula to select a suitable controller:

$$\text{Counting frequency of controller} > \frac{1}{\text{min. edge separation}}$$

Example: If the sensor has a minimum edge separation gap of 1µs, then a controller capable of detecting a frequency of at least 1 MHz must be selected based on the above formula.

Maximum traverse speed, resolution and edge separation

The following tables show the relationship between the selected resolution of the sensor head, the minimum edge separation and the potential traverse speed:

Sensors from the S1A/S1F series: system accuracy up to 10 µm

min. edge separation		Vmax in accordance with edge separation and resolution			
		Mechanical resolution			
		D 1 µm	E 2 µm	F 5 µm	G 10 µm
D	0.12 µs	5 m/s	10 m/s	20 m/s	20 m/s
E	0.29 µs	2 m/s	4 m/s	10 m/s	10 m/s
F	0.48 µs	1 m/s	2 m/s	5.41 m/s	5.41 m/s
G	1 µs	0.65 m/s	1.3 m/s	2.95 m/s	2.95 m/s
H	2 µs	0.3 m/s	0.6 m/s	1.54 m/s	1.54 m/s
K	4 µs	0.15 m/s	0.3 m/s	0.79 m/s	0.79 m/s
L	8 µs	0.075 m/s	0.15 m/s	0.34 m/s	0.34 m/s
N	16 µs	0.039 m/s	0.079 m/s	0.19 m/s	0.19 m/s
P	24 µs	0.026 m/s	0.052 m/s	0.13 m/s	0.13 m/s

Table 1: Selection guide for maximum traverse speed of S1A/S1F series.

Sensors from the S2B/S2E series: system accuracy up to 50 µm

min. edge separation		Vmax in accordance with edge separation and resolution			
		Mechanical resolution			
		F 5 µm	G 10 µm	H 25 µm	K 50 µm
D	0.12 µs	20 m/s	20 m/s	20 m/s	20 m/s
E	0.29 µs	10 m/s	20 m/s	20 m/s	20 m/s
F	0.48 µs	5 m/s	10 m/s	20 m/s	20 m/s
G	1 µs	3.25 m/s	6.5 m/s	14.75 m/s	14.75 m/s
H	2 µs	1.5 m/s	3 m/s	7.7 m/s	7.7 m/s
K	4 µs	0.75 m/s	1.5 m/s	3.95 m/s	3.95 m/s
L	8 µs	0.375 m/s	0.75 m/s	1.7 m/s	1.7 m/s
N	16 µs	0.195 m/s	0.395 m/s	0.95 m/s	0.95 m/s
P	24 µs	0.13 m/s	0.26 m/s	0.65 m/s	0.65 m/s

Table 2: Selection guide for maximum traverse speed of S2B/S2E series.

Sensors from the S2B/S2E series: system accuracy up to 100 µm

min. edge separation		Vmax in accordance with edge separation and resolution				
		Mechanical resolution				
		L 100 µm	M 200 µm	N 500 µm	P 1000 µm	R 2000 µm
M	10 µs	8 m/s	10 m/s	10 m/s	10 m/s	10 m/s
R	0.29 µs	0.9 m/s	1.8 m/s	4.2 m/s	8.8 m/s	10 m/s

Table 3: Selection guide for maximum traverse speed of S1C series.

Rotary applications

The BML system allows precision adaptation of rotary tapes to the relevant application.

Balluff offers a technical selection guide for rotary systems that provides valuable assistance.

Determining the pulses per rotation

The number of required pulses per rotation varies depending on the application, which determines the resolution of the sensor head and the diameter of the magnetic ring.

Sensors from S1A/S1F series

Sensor head resolution	Pulses/revolution with 4-way evaluation		
	∅ External magnetic ring		
	72 mm	75 mm	122 mm
D = 1 µm	228000	238000	384000
E = 2 µm	114000	119000	192000
F = 5 µm	45600	47600	76800
G = 10 µm	22800	23800	38400

Table 4: Selection guide for magnetic rings from the S1A/S1F series

Sensors from S2B/S2E series

Sensor head resolution	Pulses/revolution with 4-way evaluation		
	∅ External magnetic ring		
	31 mm	49 mm	72 mm
F = 5 µm	20000	32000	46000
G = 10 µm	10000	16000	23000
H = 25 µm	4000	6400	9200
K = 50 µm	2000	3200	4600

Table 5: Selection guide for magnetic rings from the S2B/S2E series

Sensors from S1C series

Sensor head resolution	Pulses/revolution with 4-way evaluation		
	∅ External magnetic ring		
	31 mm	49 mm	72 mm
L = 100 µm	1000	1600	2300
M = 200 µm	500	800	1150
N = 500 µm	200	320	460
P = 1000 µm	100	160	230
R = 2000 µm	50	80	115

Table 6: Selection guide for magnetic rings from the S1C series

Maximum speed

The BML system enables the detection of rotary movements. The speed and the diameter of the magnetic ring determine the speed of the ring on the sensor head.

The maximum traverse speed that the sensor can detect influences the selection of the resolution and edge separation of the sensor head. A maximum speed is then calculated using the following formula:

$$\text{Max. speed (rpm)} = \frac{60 \times \text{max. traverse speed (m/s)}}{\pi \times \text{magnetic ring diameter (m)}}$$

Refer to tables 1 to 3 for information on the maximum traverse speed. When selecting a maximum speed for the application, we recommend using a value 10 % lower than this value.

Example:

You are using a BML-S2B sensor with a resolution of 5 µm (F) and a minimum edge separation of 1 µm (G). For this sensor, a maximum traverse speed of 3.25 m/s is calculated using Table 2. If the magnetic ring diameter is 48 mm = 0.048 m, a speed of 1293 rpm can be achieved using the formula. With consideration for the reduced value, the speed should not exceed 1164 rpm.

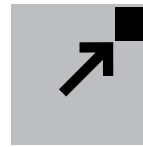


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Alphanumeric Directory

BML

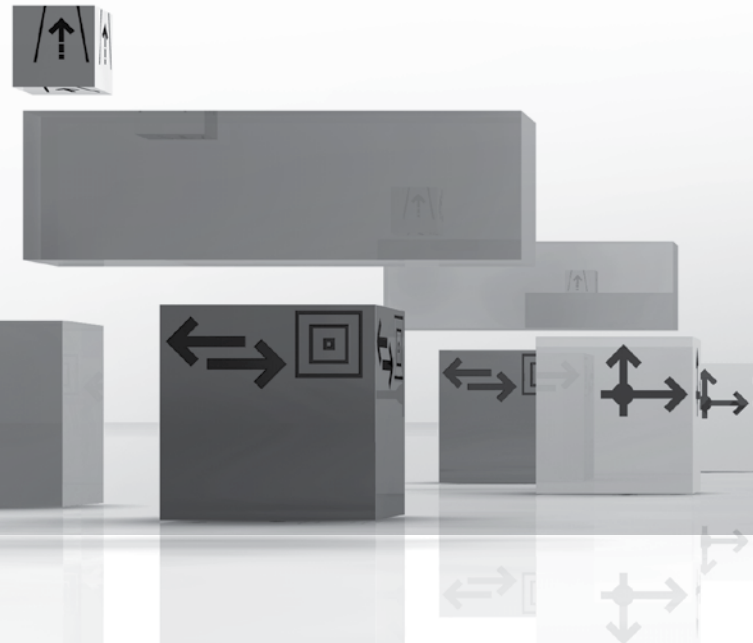
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Object Detection

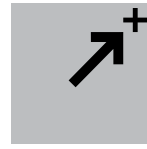
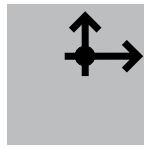
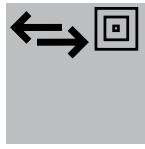
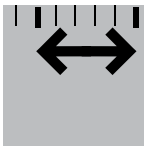
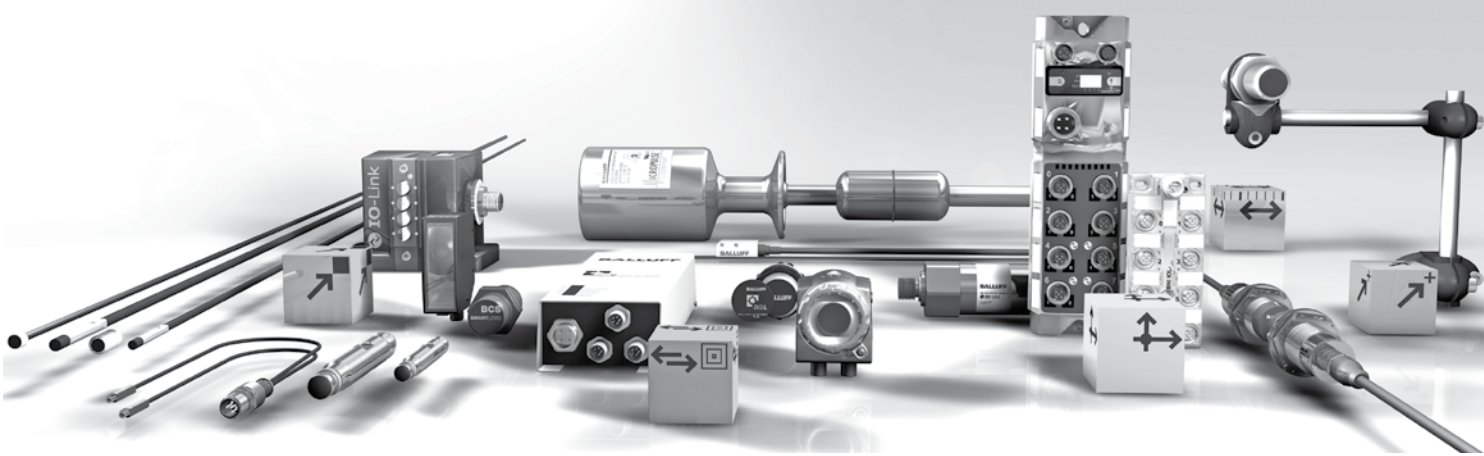
- BES Inductive sensors
- BMF Sensors for pneumatic cylinders
- BMF Magnetic field sensors
- BCS Capacitive sensors
- BUS Ultrasonic sensors
- BSP Pressure sensors
- BOS Photoelectric sensors
- BFB Fiber optic devices
- BGL Through-beam fork sensors
- BOWA Dynamic optical windows
- BLG Light grids
- BKT Contrast sensors
- BLT Luminescence sensors
- BFS Color sensors
- BNS Mechanical single and multiple position switches
- BNS Inductive single and multiple position switches

Take advantage of the broad performance spectrum from Balluff. And profit from maximum precision, even in difficult areas. Balluff stands for comprehensive systems from a single source, continuous innovation, the most modern technology, highest quality and greatest reliability and prides itself on distinctive customer orientation, custom-tailored solutions, fast worldwide service and outstanding application assistance. In short: for reliable, expert partnership.



Intelligent Sensor Solutions

The whole product range for your needs



Linear Position Sensing

- BTL Micropulse transducers
- BML Magnetic linear encoder system
- BDG Incremental encoders
- BRG Absolute encoders
- BIW Inductive linear position sensors
- BAW Inductive distance sensors
- BIL Magneto-inductive position sensors
- BOD Photoelectric distance sensors
- BUS Ultrasonic sensors

Industrial Identification

- BIS Industrial RFID systems
- BVS Vision sensors

Industrial Networking and Connectivity

- BCC Connectors and connection cables
- BPI Passive splitter boxes
- BNI Active splitter boxes
- IO-Link
- BIC Inductive couplers
- Bus systems
- Wireless
- Electrical devices

Mechanical Accessories

- Holders and fastening systems
- BMS Mounting system

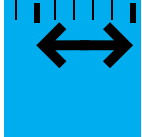
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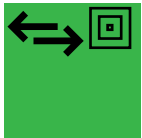
sensors worldwide



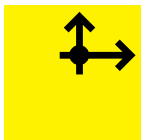
Object Detection



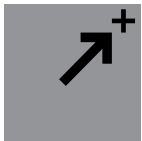
Linear Position and Measurement



Industrial Identification



Networking and Connectivity



Accessories



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