Contrast sensors are high-resolution diffuse sensors that distinguish objects based on their gray values.
Color, brightness and reflectivity have a strong effect on the measurement result.
The measuring distance should be kept constant when gray values differ only slightly. The resolution of the sensor decreases with increasing sensing distance.
Multiple series with various light types and functions are available for the multitude of uses for sensors.

Applications

- Sensing markings on packaging material
- Synchronizing cutting or separating processes
- Checking for adhesive, ink and color
- Position checking of printing templates
- Sensing objects based on contrast

Photoelectric Sensors with Special Properties

Contrast sensors BKT

Product overview

Type		Sensing distance	Light type			Output			Switching type		Switching frequency	U_S	Connection				Page
■ Ordering code □ Part number			White light	Red, green and blue light	Laser light	PNP transistor	NPN transistor	Analog output	Light switching	Dark switching		10...30 V DC	M8 plug, 4-pin	M12 plug, 4-pin	M12 plug, 5-pin	Cable	
Contrast sensors																	
BKT000A	BKT 6K-001-P-S75	40...150 mm			■	■			■	■	1 kHz	■	■				297
BKT0008	BKT 6K-001-N-S75	40...150 mm			■		■		■	■	1 kHz	■	■				297
BKT0009	BKT 6K-001-P-02	40...150 mm			■	■			■	■	1 kHz	■				■	297
BKT0007	BKT 6K-001-N-02	40...150 mm			■		■		■	■	1 kHz	■				■	297
BKT000H	BKT 18KF-001-P-S4	10 mm	■			■			■	■	5 kHz	■		■			299
BKT000F	BKT 18KF-001-P-02	10 mm	■			■			■	■	5 kHz	■				■	299
BKT000Y	BKT 21M-002-P-S4	19 mm	■			■			■	■	5 kHz	■		■			301
BKT000W	BKT 21M-002-N-S4	19 mm	■				■		■	■	5 kHz	■		■			301
BKT0001	BKT 67M-001-U-S92	9 mm*		■		■	■	■	■	■	15 kHz	■			■		303
BKT0002	BKT 67M-002-U-S92	9 mm*		■		■	■	■	■	■	15 kHz	■			■		303
BKT0003	BKT 67M-003-U-S92	9 mm*		■		■	■	■	■	■	25 kHz	■			■		303
BKT0004	BKT 67M-004-U-S92	9 mm*		■		■	■	■	■	■	25 kHz	■			■		303
BKT0005	BKT 67M-005-U-S92	9 mm*		■		■	■		■	■	30 kHz	■			■		303
BKT0006	BKT 67M-006-U-S92	9 mm*		■		■	■		■	■	30 kHz	■			■		303

*Longer sensing distances using interchangeable optics

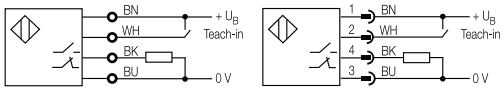
Laser Contrast Sensor

The laser contrast sensor **BKT 6K** is designed to reliably detect small areas of contrast variances. Even the narrowest lines can be detected reliably in the optimum working range of 70...100 mm. Larger areas are capable of being detected outside this range.

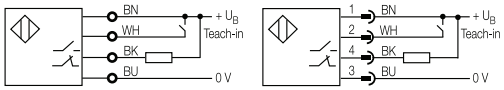
Programming the sensor is easy using its teach-in button or a control line.

Wiring diagrams

BKT 6K-001-P



BKT 6K-001-N



Recommended accessories
(please order separately)

Description	Ordering code
Mounting bracket	**BAM00UH**

You can find special accessories for diffuse sensors, such as **reflectors, apertures, lenses, filters and deflection heads,** in this catalog starting on page 376.

More mechanical accessories: You can find a large selection of mounting components of all types, such as clamping holders, mounting brackets and the Balluff mounting system BMS, in our **Accessories Line** catalog.

Suitable connectors
(please order separately)

Size	Design	Cable material	Color	Length	Ordering code
M8, 4-pin	Straight	PUR	Black	2 m	**BCC02N2**
M8, 4-pin	Straight	PVC	Gray	2 m	**BCC02PL**
M8, 4-pin	Angled	PUR	Black	2 m	**BCC02NC**
M8, 4-pin	Angled	PVC	Gray	2 m	**BCC02PZ**

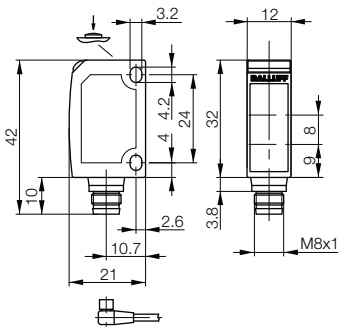
Connectors without LED are suitable for PNP and NPN sensors.

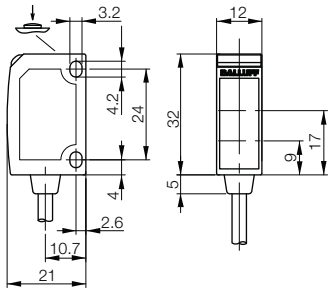
More electrical accessories: You can find a large selection of plug connectors and connector cables in a wide variety of cable materials, colors and lengths in our **Industrial Networking and Connectivity catalog.**

Laser contrast sensor BKT 6K

Series			**BKT 6K**	**BKT 6K**
Working distance			**40...150 mm***	**40...150 mm***
PNP	NC/NO	**Ordering code**	**BKT000A**	**BKT0009**
		Part number	BKT 6K-001-P-S75	BKT 6K-001-P-02
NPN	NC/NO	**Ordering code**	**BKT0008**	**BKT0007**
		Part number	BKT 6K-001-N-S75	BKT 6K-001-N-02
Supply voltage U_S			10...30 V DC	10...30 V DC
No-load supply current I_0 max.			≤ 25 mA	≤ 25 mA
Output current			100 mA	100 mA
Switching type			Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected			Yes/Yes	Yes/Yes
Settings			Teach-in	Teach-in
Emitter, light type			Laser, red light	Laser, red light
Wavelength			650 Nm	650 Nm
Laser class			2	2
Light spot diameter			0.7 mm at the focus (85 mm ± 15 mm)	0.7 mm at the focus (85 mm ± 15 mm)
Output function indicator			Yellow LED	Yellow LED
Stability indicator			Green LED	Green LED
Response time			0.5 ms	0.5 ms
Switching frequency			1 kHz	1 kHz
Degree of protection as per IEC 60529			IP 67	IP 67
Ambient temperature T_a			–20...+60 °C	–20...+60 °C
Permissible ambient light			EN 60947-5-2	EN 60947-5-2
Material		Housing	Impact-resistant ABS	Impact-resistant ABS
		Optical surface	PMMA	PMMA
Connection			M8 connector, 4-pin	2 m PVC cable, 4×0.14 mm²

*Optimum working range for small markings: 70...100 mm.

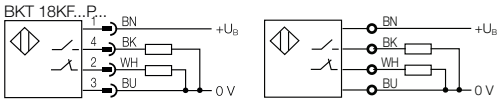




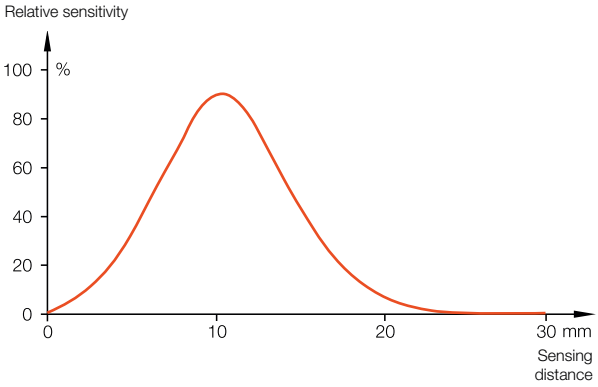
White Light Contrast Sensor

The contrast sensor **BKT 18KF** operates with white light and draws attention with its ability to be configured simply at just the press of a button. It detects colored markings as well as gray levels on various surfaces. In the standard setting the sensor operates using dark switching.
Precise configuration is available for slight contrast differences. The switching type can also be selected in this setting.

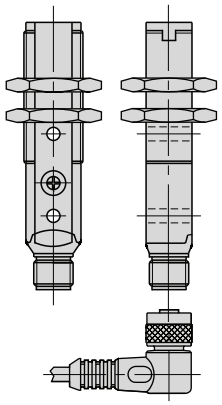
Wiring diagrams



Function diagram



Connector orientation



Recommended accessories
(please order separately)

Description	Ordering code
① Mounting bracket	**BAM00RY**
② Mounting clamp	**BAM00T3**

You can find special accessories for diffuse sensors, such as **reflectors, apertures, lenses, filters and deflection heads,** in this catalog starting on page 376.

More mechanical accessories: You can find a large selection of mounting components of all types, such as clamping holders, mounting brackets and the Balluff mounting system BMS, in our **Accessories Line** catalog.

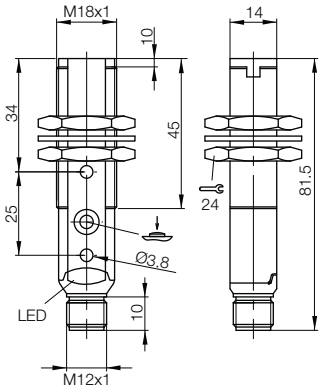
Suitable connectors
(please order separately)

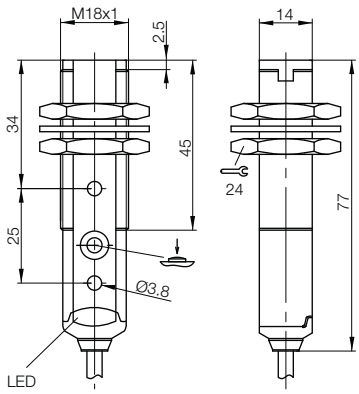
Size	Design	Cable material	Color	Length	Ordering code
M12, 4-pin	Straight	PUR	Black	2 m	**BCC032F**
M12, 4-pin	Straight	PVC	Gray	2 m	**BCC0367**
M12, 4-pin	Angled	PUR	Black	2 m	**BCC032Y**
M12, 4-pin	Angled	PVC	Gray	2 m	**BCC036N**

Connectors without LED are suitable for PNP and NPN sensors.

More electrical accessories: You can find a large selection of plug connectors and connector cables in a wide variety of cable materials, colors and lengths in our **Industrial Networking and Connectivity catalog.**

Series			**BKT**	**BKT**
Working distance			**10 mm±2 mm**	**10 mm±2 mm**
PNP	NC/NO	**Ordering code**	**BKT000H**	**BKT000F**
		Part number	BKT 18KF-001-P-S4	BKT 18KF-001-P-02
Supply voltage U_S			10...30 V DC	10...30 V DC
No-load supply current I_0 max.			≤ 25 mA	≤ 25 mA
Output current			100 mA	100 mA
Switching type			Light and dark switching	Light and dark switching
Polarity reversal/short-circuit protected			Yes/Yes	Yes/Yes
Settings			Teach-in	Teach-in
Emitter, light type			LED, white light	LED, white light
Wavelength			400...700 nm	400...700 nm
Light spot diameter			ca. 4.5 mm 10 mm	ca. 4.5 mm 10 mm
Output function indicator			Yellow LED	Yellow LED
Power/error indicator			Green/red LED	Green/red LED
Response time			100 µs	100 µs
Switching frequency			5 kHz	5 kHz
Degree of protection as per IEC 60529			IP 67	IP 67
Ambient temperature T_a			–25...+55 °C	–25...+55 °C
Permissible ambient light			EN 60947-5-2	EN 60947-5-2
Material		Housing	PBT	PBT
		Optical surface	PMMA	PMMA
Connection			M12 connector, 4-pin	2 m PVC cable, 4×0.14 mm²

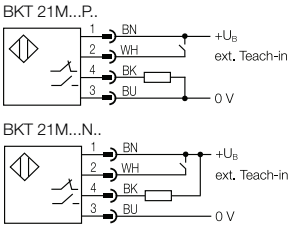




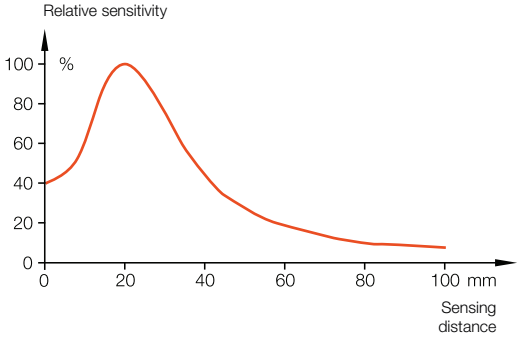
White Light Contrast Sensor

The **BKT 21M** contrast sensor uses white light and can be programmed at the push of a button. It detects colored markings as well as gray levels on various surfaces. In its standard setting the sensor is dark switching (markings with less light intensity are detected as the background).
Precise configuration is available for slight contrast differences. The switching type can also be selected in this setting.

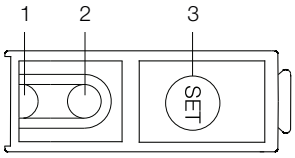
Wiring diagrams



Function diagram



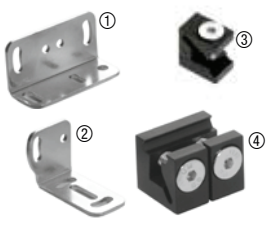
Indicators and operating elements



1 Output function indicator (yellow)
2 Power-/error indicator (green/red)
3 SET- button

Recommended accessories
(please order separately)

Description	Ordering code
① Mounting bracket	**BAM00T9**
② Mounting bracket	**BAM00TA**
③ Clamping holders	**BAM00TF**
④ Clamping holders	**BAM00TH**



You can find special accessories for diffuse sensors, such as **reflectors, apertures, lenses, filters and deflection heads,** in this catalog starting on page 376.

More mechanical accessories: You can find a large selection of mounting components of all types, such as clamping holders, mounting brackets and the Balluff mounting system BMS, in our **Accessories Line** catalog.

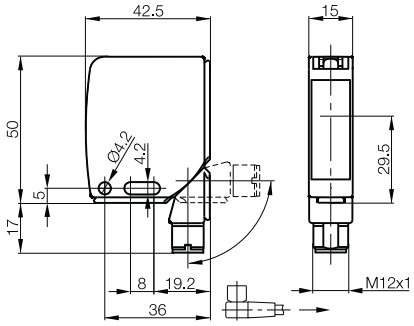
Suitable connectors
(please order separately)

Size	Design	Cable material	Color	Length	Ordering code
M12, 4-pin	Straight	PUR	Black	2 m	**BCC032F**
M12, 4-pin	Straight	PVC	Gray	2 m	**BCC0367**
M12, 4-pin	Angled	PUR	Black	2 m	**BCC032Y**
M12, 4-pin	Angled	PVC	Gray	2 m	**BCC036N**

Connectors without LED are suitable for PNP and NPN sensors.

More electrical accessories: You can find a large selection of plug connectors and connector cables in a wide variety of cable materials, colors and lengths in our **Industrial Networking and Connectivity catalog.**

Series			**BKT**
Working distance			**19 mm±2 mm**
PNP	NC/NO	**Ordering code**	**BKT000Y**
		Part number	BKT 21M-002-P-S4
NPN	NC/NO	**Ordering code**	**BKT000W**
		Part number	BKT 21M-002-N-S4
Supply voltage U_S			10...30 V DC
No-load supply current I_0 max.			≤ 30 mA
Output current			100 mA
Switching type			Light/dark switching (adjustable in precise mode)
Polarity reversal/short-circuit protected			Yes/Yes
Settings			Teach-in
Emitter, light type			LED, white light
Wavelength			400...700 nm
Light spot diameter			ca. 3.5 mm 19 mm
Output function indicator			Yellow LED
Power/error indicator			Green/red LED
Response time			0.1 ms
Switching frequency			5 kHz
Time function			20 ms off-delay
Degree of protection as per IEC 60529			IP 67
Ambient temperature T_a			–25...+55 °C
Permissible ambient light			EN 60947-5-2
Material		Housing	GD-Zn/Al
		Optical surface	Glass
Connection			M12 connector, 4-pin



R-G-B Contrast Sensor

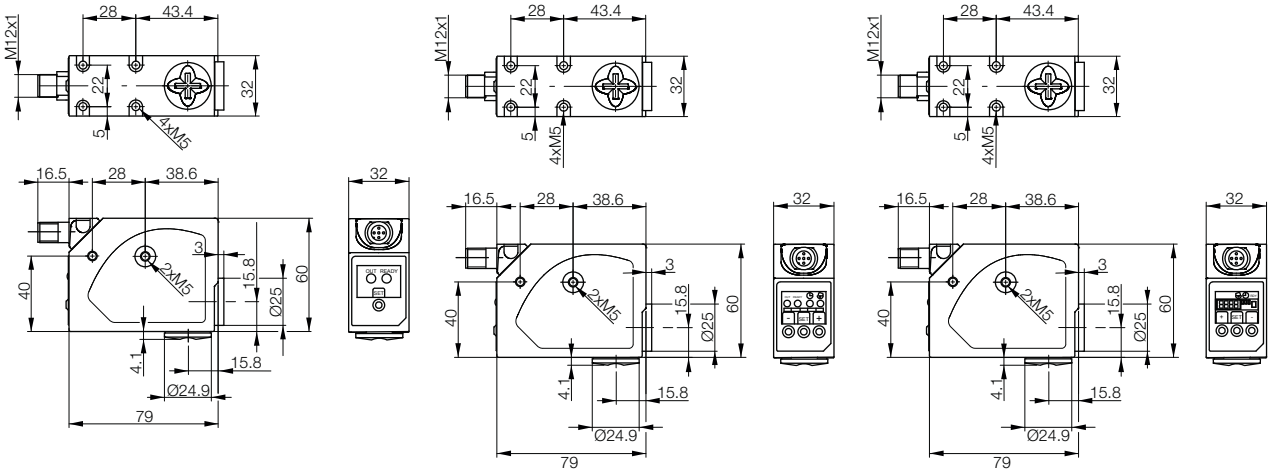
Specially designed for print mark detection

- Three models for any application complexity
- Red, green or blue light emission for unique color identification
- Rugged aluminum housing
- Greatest freedom in equipment design with optional front or bottom light exit

Series		
Working distance		
PNP and NPN transistor (selectable)	**Ordering code**	
Vertical light spot	Part number	
PNP and NPN transistor (selectable)	**Ordering code**	
Horizontal light spot	Part number	
Supply voltage U_S		
No-load supply current I_0 max.		
Output current		
Switching type		
Analog output		
Polarity reversal/short-circuit protected		
Settings		
Additional function		
Emitter, light type		
Wavelength		
Light spot diameter		
Output function indicator		
Power/error indicator		
Time function display		
Response time		
Switching frequency		
Time function		
Degree of protection as per IEC 60529		
Ambient temperature T_a		
Permissible ambient light		
Material	Housing	
	Optical surface	
Connection		

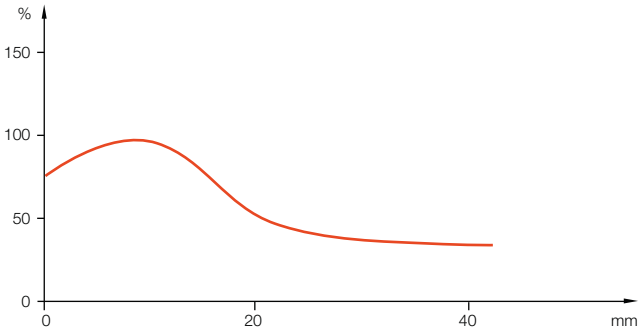
*Longer sensing distance using interchangeable optics

BKT	**BKT**	**BKT**
9 mm* ± 3 mm	**9 mm* ± 3 mm**	**9 mm* ± 3 mm**
BKT0001	**BKT0003**	**BKT0005**
BKT 67M-001-U-S92	BKT 67M-003-U-S92	BKT 67M-005-U-S92
BKT0002	**BKT0004**	**BKT0006**
BKT 67M-002-U-S92	BKT 67M-004-U-S92	BKT 67M-006-U-S92
10...30 V DC	10...30 V DC	10...30 V DC
≤ 50 mA	≤ 85 mA	≤ 35 mA
100 mA	100 mA	100 mA
Light/Dark (automatic)	Light/Dark (automatic)	Light/Dark (automatic)
1...3 V	1...3 V	
Yes/Yes	Yes/Yes	Yes/Yes
Teach-in button	3 teach-in buttons	3 teach-in buttons
	Segment display	4-digit display
Red, green and blue light	Red, green and blue light	Red, green and blue light
630 nm/520 nm/465 nm	630 nm/520 nm/465 nm	630 nm/520 nm/465 nm
1.5×5 mm	1.5×5 mm	1.5×5 mm
Yellow LED	Yellow LED	Yellow LED
Green LED	Green LED	Green LED
	Orange LED	
33 µs	25 µs	17 µs
15 kHz	20 kHz	30 kHz
	20 ms (can be activated)	
IP 67	IP 67	IP 67
–10...+55 °C	–10...+55 °C	–10...+55 °C
EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Al	Al	Al
PMMA	PMMA	PMMA
M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin

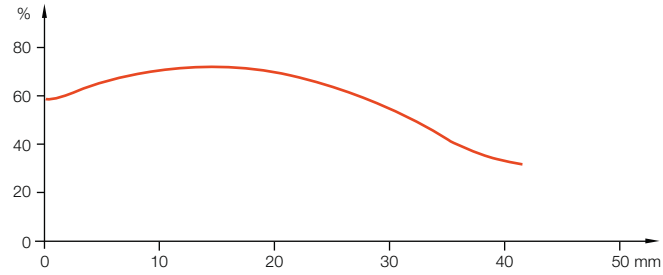


Contrast sensors BKT 67M
Function diagrams

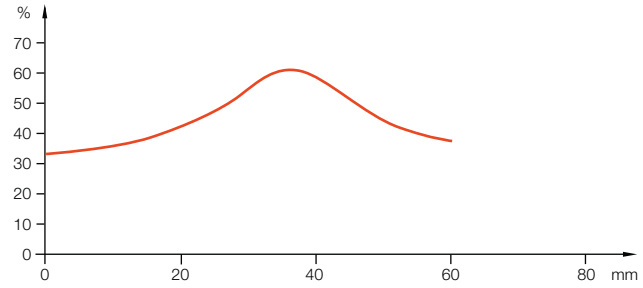
BKT 67M with BKT M-PK-2 (standard lens)
BKT M-PK-4



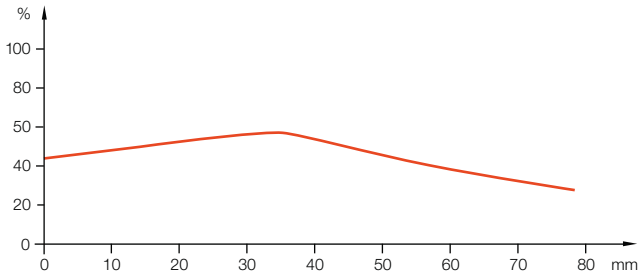
BKT 67M with BKT M-PK-1



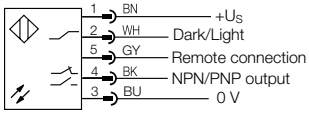
BKT 67M with BKT M-PK-3



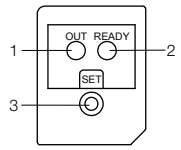
BKT 67M with BKT M-PK-5



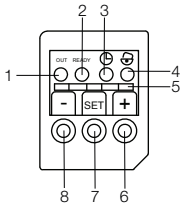
Wiring diagram



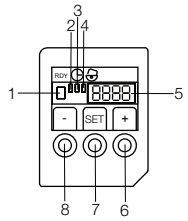
Indicators and operating elements



1. Output function indicator
2. Power indicator
3. SET key



1. Output function indicator
2. Power indicator
3. Time delay indicator
4. Button status indicator
5. Switching threshold level indicator
6. + key
7. SET key
8. - key



1. Output function indicator
2. Power indicator
3. Time delay indicator
4. Button status indicator
5. Scattered quantity of light indicator
6. + key
7. SET key
8. - key

Photoelectric Sensors
Photoelectric Sensors
Photoelectric Sensors with Special Properties
Analog Fork Sensors BGL_C
Optical Window Sensors BOW
Light Grids BLG
Color Sensors BFS
Contrast Sensors BKT
Luminescence Sensors BLT
Optical Fiber Base Units BFB/ BOS
Plastic Fiber Optics BFO
Glass Fiber Optics BFO
Photoelectric Distance Sensors for Analog Distance Measurement
Accessories for Photoelectric Sensors

Recommended accessories
(please order separately)

Description	Focal length/ focus	Ordering code
① Lens	18 mm	**BAM0120**
② Lens	9 mm	**BAM0121**
③ Lens	28 mm	**BAM0122**
④ Lens	50 mm	**BAM00P3**
⑤ Intermediate ring		**BAM00P2**

You can find special accessories for diffuse sensors, such as **reflectors, apertures, lenses, filters and deflection heads,** in this catalog starting on page 376.

More mechanical accessories: You can find a large selection of mounting components of all types, such as clamping holders, mounting brackets and the Balluff mounting system BMS, in our **Accessories Line** catalog.

Suitable connectors
(please order separately)

Size	Design	Cable material	Color	Length	Ordering code
M12, 5-pin	Straight	PUR	Black	5 m	**BCC098C**
M12, 5-pin	Angled	PUR	Black	5 m	**BCC08FC**

Connectors without LED are suitable for PNP and NPN sensors.

More electrical accessories: You can find a large selection of plug connectors and connector cables in a wide variety of cable materials, colors and lengths in our **Industrial Networking and Connectivity catalog.**