

# Photoelectric Special Sensors

## Contrast sensors BKT

### Product overview



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

Contrast sensor

Luminescence sensor

Color sensors

Fork sensors


Angle sensors

Dynamic optical windows

Light grids

Photoelectric distance sensors for analog distance measurement

Special accessories for photoelectric sensors

Type		Sensing distance	Light type			Output			Switching type		Switching frequency	U <sub>s</sub>	Connection				Features		Page
			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	for adapting fiber optics		
 <b>Contrast sensors</b>																			
<b>BKT000A</b>	BKT 6K-001-P-S75	40...150 mm			■	■			■	■	1 kHz	■	■					283	
<b>BKT0008</b>	BKT 6K-001-N-S75	40...150 mm			■		■		■	■	1 kHz	■	■					283	
<b>BKT0009</b>	BKT 6K-001-P-02	40...150 mm			■	■			■	■	1 kHz	■				■		283	
<b>BKT0007</b>	BKT 6K-001-N-02	40...150 mm			■		■		■	■	1 kHz	■				■		283	
<b>BKT000H</b>	BKT 18KF-001-P-S4	10 mm	■			■			■	■	5 kHz	■		■				285	
<b>BKT000F</b>	BKT 18KF-001-P-02	10 mm	■			■			■	■	5 kHz	■				■		285	
<b>BKT000Y</b>	BKT 21M-002-P-S4	19 mm	■			■			■	■	5 kHz	■		■				287	
<b>BKT000W</b>	BKT 21M-002-N-S4	19 mm	■				■		■	■	5 kHz	■		■				287	
<b>BKT0001</b>	BKT 67M-001-U-S92	9 mm*		■		■	■	■	■	■	15 kHz	■			■			289	
<b>BKT0002</b>	BKT 67M-002-U-S92	9 mm*		■		■	■	■	■	■	15 kHz	■			■			289	
<b>BKT0003</b>	BKT 67M-003-U-S92	9 mm*		■		■	■	■	■	■	25 kHz	■			■			289	
<b>BKT0004</b>	BKT 67M-004-U-S92	9 mm*		■		■	■	■	■	■	25 kHz	■			■			289	
<b>BKT0005</b>	BKT 67M-005-U-S92	9 mm*		■		■	■		■	■	30 kHz	■			■			289	
<b>BKT0006</b>	BKT 67M-006-U-S92	9 mm*		■		■	■		■	■	30 kHz	■			■			289	
<b>BKT000N</b>	BKT M-15C-U-S4	6...12 mm*	■			■	■	■	■	■	20 kHz	■						291	
<b>BKT000R</b>	BKT M-45-U-S4	0...3 mm	■			■	■	■	■	■	20 kHz	■				■		291	

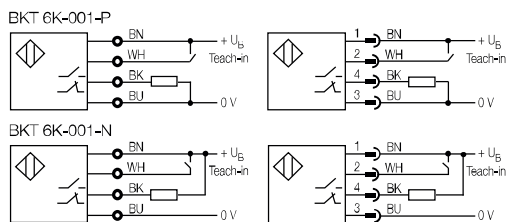
\*Longer sensing distances using interchangeable optics



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 a teach-in button or control line.

### Wiring diagrams



### Recommended accessories

(please order separately)

Description	Ordering code
Mounting bracket	<b>BAM00UH</b>



You can find special accessories for diffuse sensors, such as **reflectors, apertures, lenses, filters and deflection heads**, in this catalog starting on page 379.

**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 **Accessory Product Line** catalog.



### Suitable connector

(please order separately)



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

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.





# Photoelectric Special Sensors

## Laser contrast sensor BKT 6K



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

Contrast sensor

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

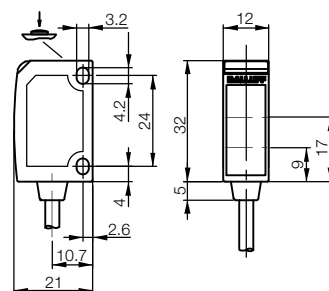
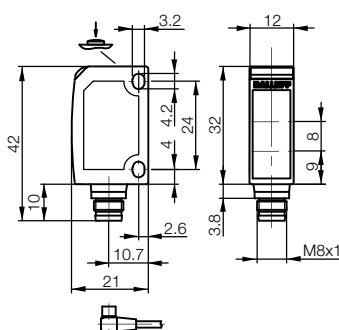
Light grids

Photoelectric distance sensors for analog distance measurement

Special accessories for photoelectric sensors

Series	<b>BKT 6K</b>		<b>BKT 6K</b>
Working distance	<b>40...150 mm*</b>		<b>40...150 mm*</b>
PNP NC/NO	<b>Ordering code</b>	<b>BKT000A</b>	<b>BKT0009</b>
	Part number	BKT 6K-001-P-S75	BKT 6K-001-P-02
NPN NC/NO	<b>Ordering code</b>	<b>BKT0008</b>	<b>BKT0007</b>
	Part number	BKT 6K-001-N-S75	BKT 6K-001-N-02
Supply voltage $U_B$	10...30 V DC		10...30 V DC
No-load supply current $I_0$ max.	$\leq 25$ mA		$\leq 25$ 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 $\pm$ 15 mm)		0.7 mm at the focus (85 mm $\pm$ 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, 4x0.14 mm <sup>2</sup>

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





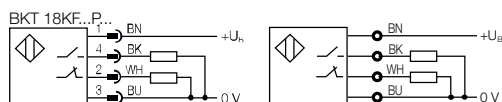
## Photoelectric Special Sensors

### Contrast sensor BKT 18KF

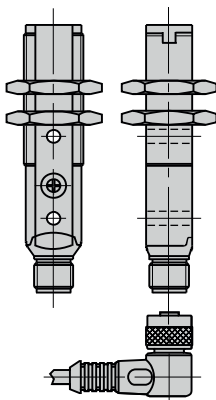
The contrast sensor **BKT 18KF** operates with white light and draws attention with its ability to be configured simply at just the press of a button. It detects colored markings as well as gray levels on various surfaces. In the standard setting the sensor operates using dark switching.

Precise configuration is available for slight contrast differences. The switching type can also be selected in this setting.

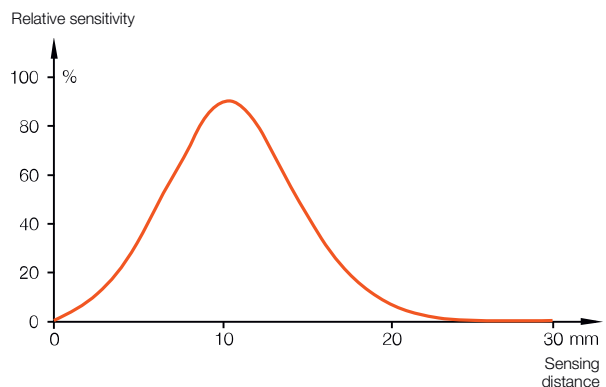
#### Wiring diagrams



#### Connector orientation



#### Function diagram



#### Recommended accessories (please order separately)

Description	Ordering code
① Mounting bracket	<b>BAM00RY</b>
② Mounting clamp	<b>BAM00T3</b>



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**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 **Accessory Product Line** catalog.

#### Suitable connector (please order separately)

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

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.





# Photoelectric Special Sensors

## Contrast sensor BKT 18KF



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

**Contrast sensor**

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

Light grids

Photoelectric distance sensors

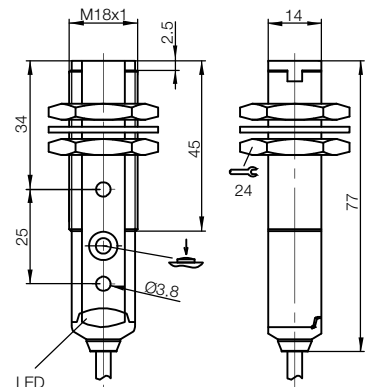
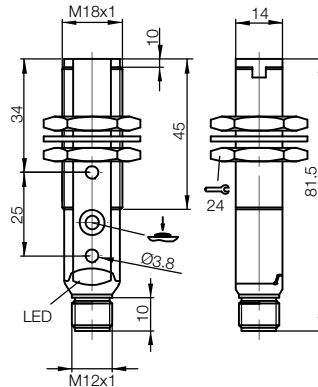
sensors for analog

distance measurement

Special accessories for

photoelectric sensors

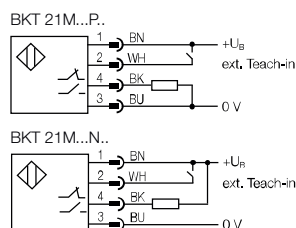
Series	<b>BKT</b>	<b>BKT</b>
Working distance	<b>10 mm±2 mm</b>	<b>10 mm±2 mm</b>
PNP NC/NO	<b>BKT000H</b>	<b>BKT000F</b>
Ordering code		
Part number	BKT 18KF-001-P-S4	BKT 18KF-001-P-02
Supply voltage $U_B$	10...30 V DC	10...30 V DC
No-load supply current $I_0$ max.	≤ 25 mA	≤ 25 mA
Output current	100 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 mm <sup>2</sup>



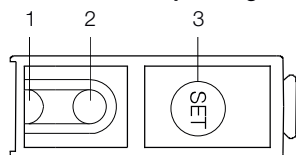


The **BKT 21M** contrast sensor uses white light and can be programmed at the push of a button. It detects colored markings as well as gray levels on various surfaces. In its standard setting the sensor is dark switching (markings with less light intensity are detected as the background). Precise configuration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

### Wiring diagrams

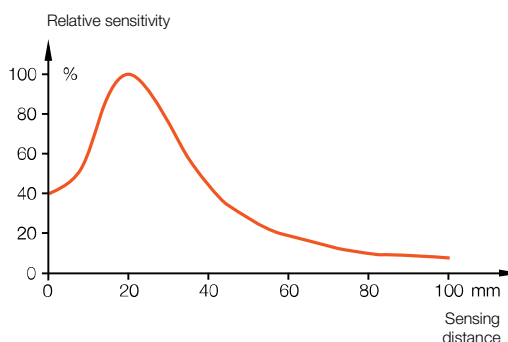


### Indicators and operating elements



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

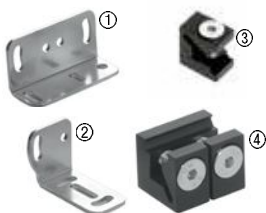
### Function diagram



### Recommended accessories

(please order separately)

Description	Ordering code
① Mounting bracket	<b>BAM00T9</b>
② Mounting bracket	<b>BAM00TA</b>
③ Clamp holder	<b>BAM00TF</b>
④ Clamp holder	<b>BAM00TH</b>



You can find special accessories for diffuse sensors, such as **reflectors, apertures, lenses, filters and deflection heads**, in this catalog starting on page 379.

**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 **Accessory Product Line** catalog.

### Suitable connector

(please order separately)



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

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.



# Photoelectric Special Sensors

## Contrast sensors BKT 21M



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

**Contrast sensor**

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

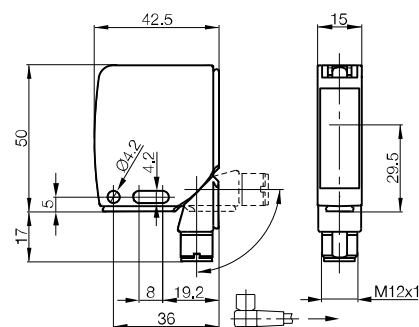
Light grids

Photoelectric distance sensors

for analog distance measurement

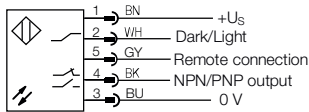
Special accessories for photoelectric sensors

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 <sub>B</sub>			10...30 V DC
No-load supply current I <sub>0</sub> 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 <sub>a</sub>			−25...+55 °C
Permissible ambient light			EN 60947-5-2
Material	Housing		GD-Zn/Al
	Optical surface		Glass
Connection			M12 connector, 4-pin

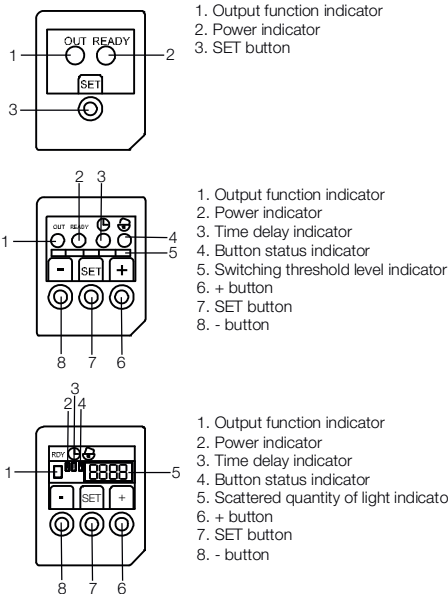




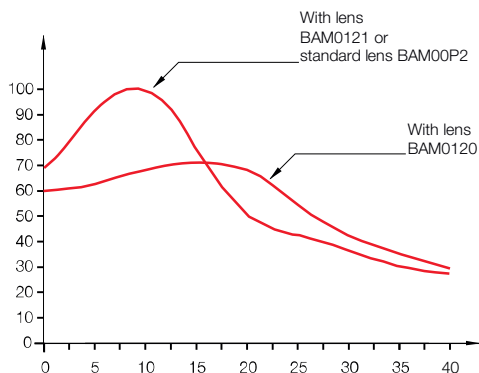
### Wiring diagram



### Indicators and operating elements



### Relative responsiveness based on object distance



### Recommended accessories (please order separately)

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



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**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 **Accessory Product Line** catalog.

Series	
Working distance	
PNP and NPN transistor (selectable)	<b>Ordering code</b>
Vertical light spot	Part number
PNP and NPN transistor (selectable)	<b>Ordering code</b>
Horizontal light spot	Part number
Supply voltage $U_B$	
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

### Suitable connector (please order separately)



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

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.



# Photoelectric Special Sensors

## Contrast sensors BKT 67M



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

Contrast sensor

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

Light grids

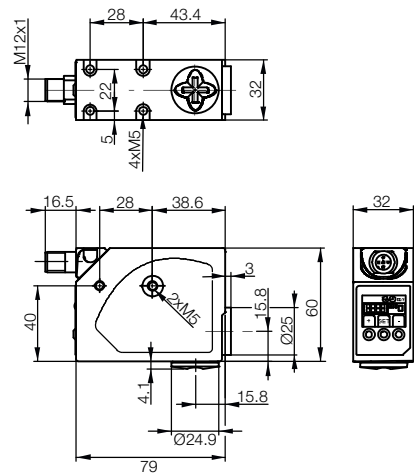
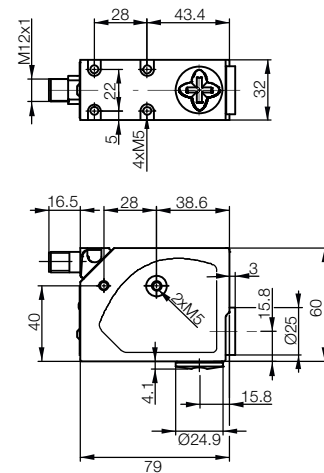
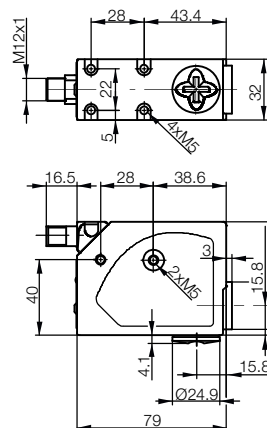
Photoelectric distance sensors

sensors for analog distance measurement

Special accessories for photoelectric sensors



BKT	BKT	BKT
9 mm* ± 3 mm	9 mm* ± 3 mm	9 mm* ± 3 mm
<b>BKT0001</b>	<b>BKT0003</b>	<b>BKT0005</b>
BKT 67M-001-U-S92	BKT 67M-003-U-S92	BKT 67M-005-U-S92
<b>BKT0002</b>	<b>BKT0004</b>	<b>BKT0006</b>
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
1.5x5 mm	1.5x5 mm	1.5x5 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





# Photoelectric Special Sensors

## Contrast sensor BKT M

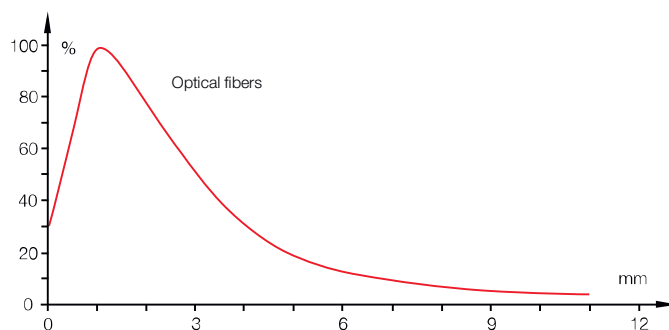
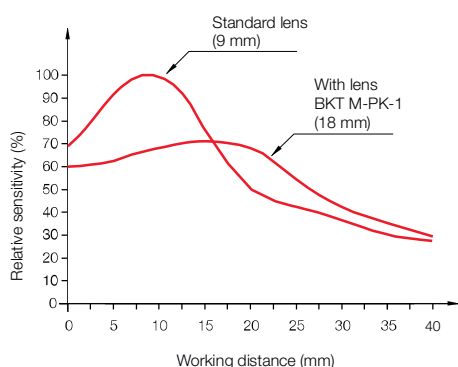
# White Light Contrast Sensor

The **BKT M...** series of contrast sensors are also available with white light. Models with either a round light spot or an optical fiber connection are available.

### Features

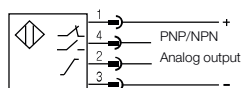
- Round light spot
- White light
- Automatic setting of light/dark switching
- Time delay and key lock
- Interchangeable optics (straight and 90°)
- Analog output

### Function diagrams



### Wiring diagram

BKT M...



### Recommended access

(please order separately)

Description	Ordering code
① Optical fibers	<b>BFO0008</b>
② Lens	<b>BAM0120</b>



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### Suitable connector

(please order separately)



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

Connectors without LED are suitable for PNP and NPN sensors.

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# Photoelectric Special Sensors

## Contrast sensor BKT M



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Fiber optics

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Luminescence sensor

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Fork sensors

Angle sensors

Dynamic optical windows

Light grids

Photoelectric distance sensors

sensors for analog distance measurement

Special accessories for photoelectric sensors

Series	<b>BKT</b>		<b>BKT</b>
Working distance	<b>9 mm± 3 mm</b>		
Working distance with lens PK-1	<b>18 mm± 4 mm</b>		
Working distance with optical fibers (diffuse)			<b>0...3 mm</b>
PNP/NPN NC/NO Round spot	<b>Ordering code</b>	<b>BKT000N</b>	
	Part number	BKT M-15C-U-S4	
PNP/NPN NC/NO for optical fibers	<b>Ordering code</b>		<b>BKT000R</b>
	Part number		BKT M-45-U-S4
Supply voltage $U_B$	10...30 V DC		10...30 V DC
No-load supply current $I_0$ max.	≤ 80 mA		≤ 80 mA
Output current	200 mA		200 mA
Switching type	Light/dark switching (selectable)		Light/dark switching (selectable)
Analog output	0...5.5 V DC*		0...5.5 V DC*
Polarity reversal/short-circuit protected	Yes/Yes		Yes/Yes
Settings	Teach-in		Teach-in
Additional function	Disable buttons		Disable buttons
Emitter, light type	LED, white light		LED, white light
Wavelength	400...700 nm		400...700 nm
Ready indicator	Green LED		Green LED
Output function indicator	Red LED		Red LED
Response time	25µs		25µs
Switching frequency	20 kHz		20 kHz
Time function	20 ms off-delay selectable		20 ms off-delay selectable
Degree of protection as per IEC 60529	IP 67		IP 67
Ambient temperature $T_a$	-10...+55 °C		-10...+55 °C
Permissible ambient light	EN 60947-5-2		EN 60947-5-2
Material Housing	GD-Zn		GD-Zn
Optical surface	Glass		Glass
Connection	M12 connector, 4-pin		M12 connector, 4-pin

2.5 V DC with 90% reflective Kodak gray card

