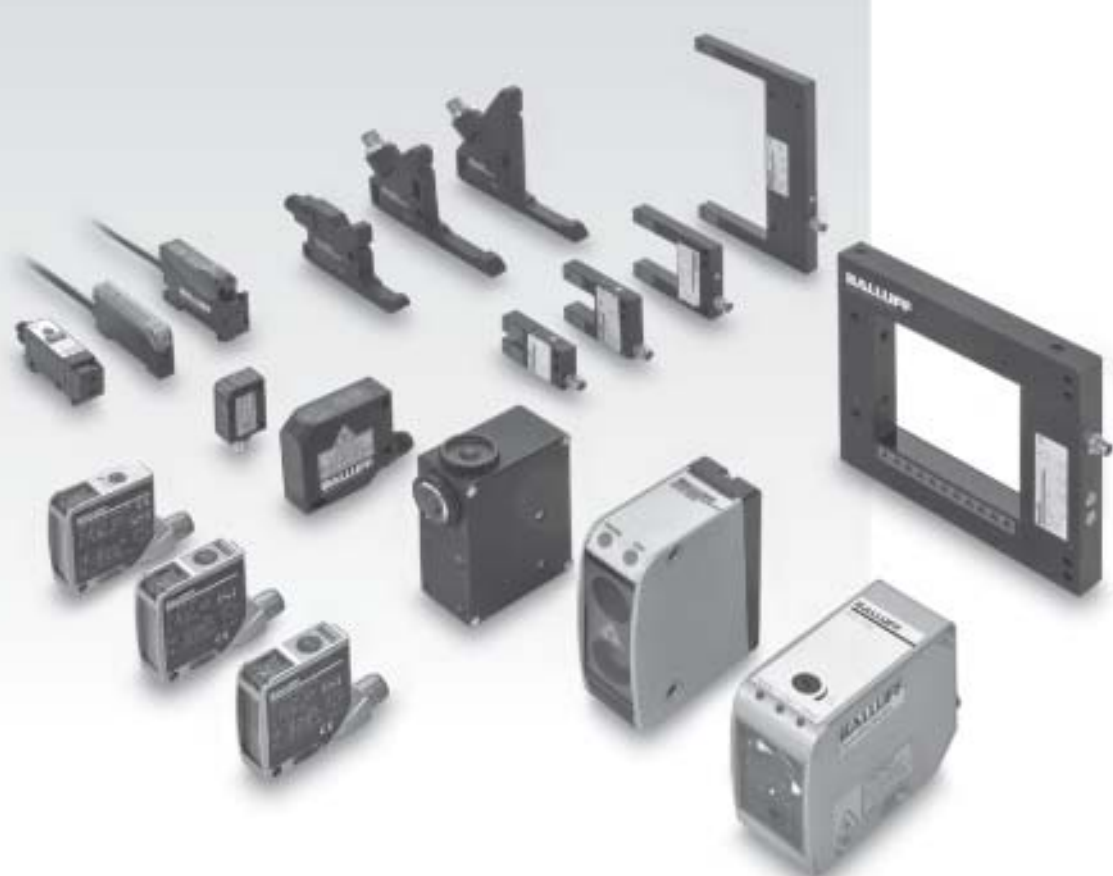
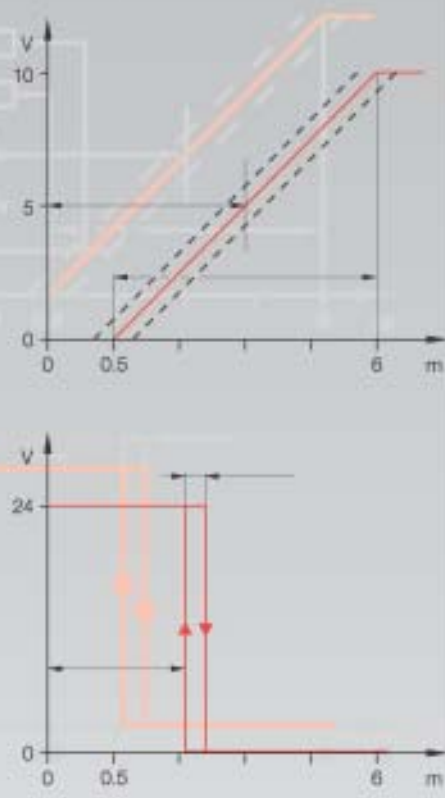


Photoelectric Sensors for Special Applications

- 2.2.2 BOS**
Fiber optic base units
- 2.2.12 BFO**
Plastic fiber optics
- 2.2.20 BFO 18**
Glass fiber optics
- 2.2.26 BOD**
Distance sensors
- 2.2.44 BKT**
Contrast sensors
- 2.2.52 BLT**
Luminescence sensors
- 2.2.58 BFS**
Color sensors
- 2.2.62 BGL**
Slot sensors
- 2.2.72 BWL**
Angle sensors
- 2.2.76 BOWA**
Dynamic optical windows



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 measuring result.


When gray values differ only slightly the measuring distance should be kept equal. The resolution of the sensor decreases with increasing range.

A variety of models with various light types and functions are available.

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



Type	Range	Light type			Output			Output function		Switching frequency	U _B	Connection			Page
		White light	Red and green light	Laser light	PNP-Transistor	NPN-Transistor	Analog output	Light-on	Dark-on			10...30 V DC	M8 connector, 4-pin	M12 connector, 4-pin	
 Contrast sensor															
BKT 6K-001-P-S75	40...150 mm			■	■			■	■	1 kHz	■	■			2.2.47
BKT 6K-001-N-S75	40...150 mm			■		■		■	■	1 kHz	■	■			2.2.47
BKT 6K-001-P-02	40...150 mm			■	■			■	■	1 kHz	■			■	2.2.47
BKT 6K-001-N-02	40...150 mm			■		■		■	■	1 kHz	■			■	2.2.47
BKT 21M-002-P-S4	19 mm	■			■			■	■	5 kHz	■		■		2.2.49
BKT 21M-002-N-S4	19 mm	■				■		■	■	5 kHz	■		■		2.2.49
BKT M-15-U-S4	9 mm (18 mm)		■		■	■	■	■	■	10 kHz	■		■		2.2.51
BKT M-15L-U-S4	9 mm (18 mm)		■		■	■	■	■	■	10 kHz	■		■		2.2.51
BKT M-11-U-03	9 mm (18 mm)		■		■	■	■	■	■	10 kHz	■			■	2.2.51
BKT M-11L-U-03	9 mm (18 mm)		■		■	■	■	■	■	10 kHz	■			■	2.2.51

2.2

2.3

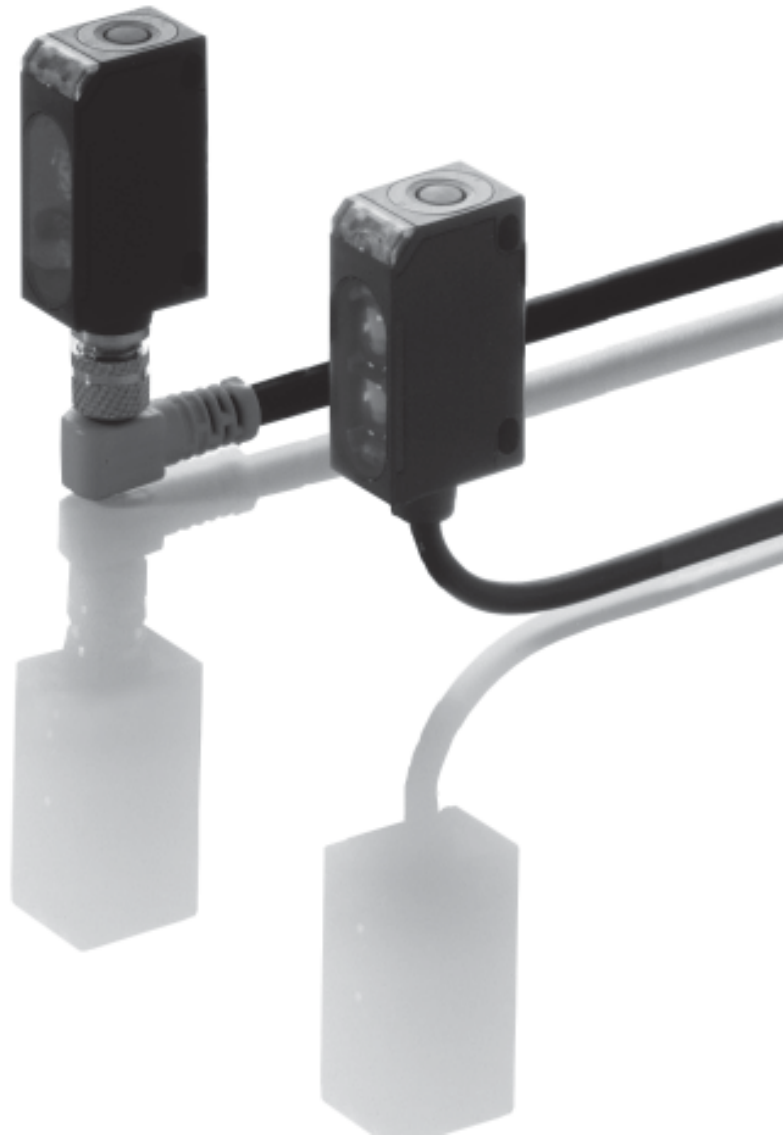
Photoelectric sensors
accessories
page 2.3.2 ...

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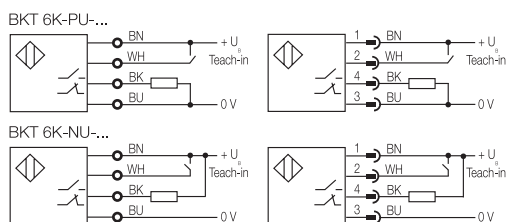
Connectors
page 6.2 ...

The **BKT 6K** laser contrast sensor is designed for reliable detection of small-area contrast differences. Even the narrowest lines can be definitively sensed over 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



Mounting bracket
BOS 6-HW-1



Connector
BKS-S 74/BKS-S 75

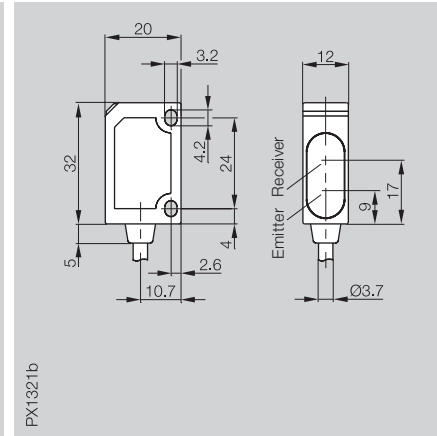
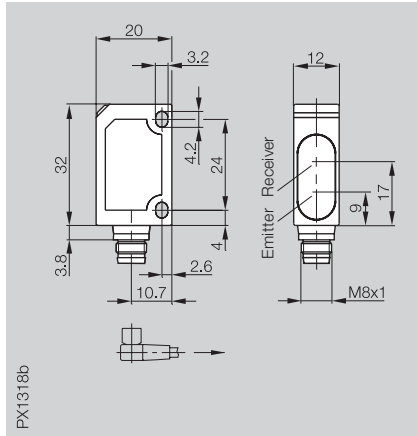
Laser Contrast Sensor



**Photoelectric
Sensors**

**BKT 6K
Laser Contrast Sensor**

Series	BKT 6K	BKT 6K
Working distance	40...150 mm*	40...150 mm*



Contrast sensor

PNP	BKT 6K-001-P-S75	BKT 6K-001-P-02
NPN	BKT 6K-001-N-S75	BKT 6K-001-N-02
Electrical data		
Supply voltage U_B	10...30 V DC	10...30 V DC
Ripple	10 %	10 %
No-load supply current I_0 max.	≤ 25 mA	≤ 25 mA
Switching output	PNP- or NPN-Transistor	PNP- or NPN-Transistor
Switching type	Light-/dark-on (selectable)	Light-/dark-on (selectable)
Output current	100 mA	100 mA
Voltage drop U_d at I_0	≤ 2.4 V	≤ 2.4 V
Settings	teach-in	teach-in
Optical data		
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 focus (85 mm ±15 mm)	0.7 mm at focus (85 mm ±15 mm)
Time data		
Response time	0.5 ms	0.5 ms
Switching frequency f	1 kHz	1 kHz
Indicators		
Output function indicator	LED yellow	LED yellow
Stability indicator	LED green	LED green
Mechanical data		
Connection	M8 connector, 4-pin	2 m cable, PVC
No. of wires × cross-section		4×0.14 mm ²
Housing material	impact-resistant ABS	impact-resistant ABS
Optical surface	PMMA	PMMA
Weight	40 g	120 g
Ambient data		
Degree of protection per IEC 60529	IP 67	IP 67
Polarity reversal protected	yes	yes
Short circuit protected	yes	yes
Ambient light rejection	EN 60947-5-2	EN 60947-5-2
Ambient temperature range T_a	-20...+60 °C	-20...+60 °C

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



Contrast sensor values referenced to Kodak gray card 90% reflective, 100×100 mm.

2.2

2.3

Photoelectric sensors accessories page 2.3.2 ...

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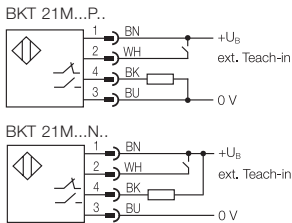
Connectors page 6.2 ...

The **BKT 21M** contrast sensor uses white light and is programmed with the push of a button. It discriminates colored markings as well as gray levels on various surfaces. In its standard setting the sensor is dark-switching (markings with less

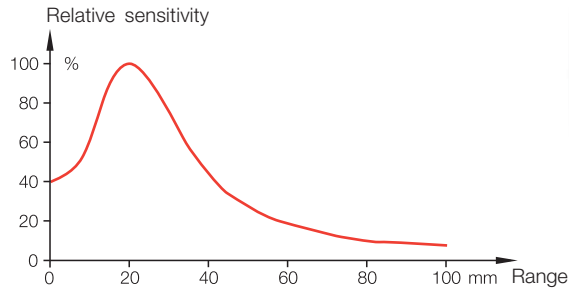
light intensity are detected as the background). A fine setting is available for slight contrast differences. The output function can also be selected in this setting.



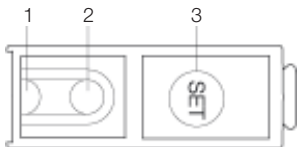
Wiring diagrams



Function diagram



Indicators and operating elements



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

Recommended accessories

please order separately



Mounting clamp
BOS 21-KH-1



Mounting clamp
BOS 21-KH-2



Mounting bracket
BOS 21-HW-1



Mounting bracket
BOS 21-HW-2



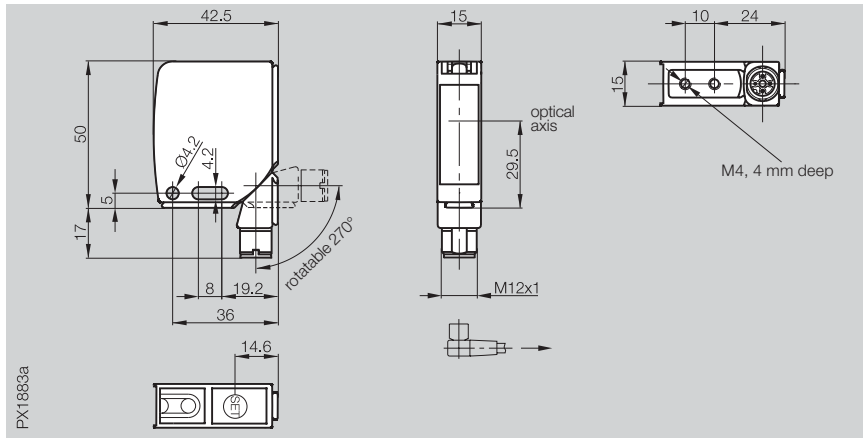
Connector
BKS-_ 19/BKS-_ 20

Contrast Sensor

Photoelectric Sensors

BKT 21M
Contrast Sensor

Series	BKT
Working distance	19 mm ±2 mm



Contrast sensor

PNP	BKT 21M-002-P-S 4
NPN	BKT 21M-002-N-S 4
Electrical data	
Supply voltage U_B	10...30 V DC
Ripple	≤ 2 V DC
No-load supply current I_0 max.	≤ 30 mA
Switching output	PNP- or NPN-Transistor
Output current	100 mA
Switching type	Light-/dark-on (settable in fine mode)
Voltage drop U_d at I_0	≤ 2 V
Settings	teach-in
Additional functions	Button disable
Optical data	
Emitter, light type	LED, white light
Wavelength	400...700 nm
Light spot diameter	3.5 mm in 19 mm
Time data	
Response time	0.1 ms
Switching frequency f	5 kHz
Time functions	20 ms off-delay
Indicators	
Output function indicator	LED yellow
Operating/error indicator	LED green/red
Mechanical data	
Dimensions	42.5×50×15 mm
Connection	M12 connector, 4-pin
Housing material	GD-Zn/Al
Optical surface	Glass
Weight	80 g
Ambient data	
Degree of protection per IEC 60529	IP 67
Polarity reversal protected	yes
Short circuit protected	yes
Ambient light rejection	EN 60947-5-2
Ambient temperature range T_a	-25...+55 °C

→ Connector orientation

2.2

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Photoelectric sensors accessories page 2.3.2 ...

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Connectors page 6.2 ...

In this device the micro-processor takes over the entire setup process. The latter monitors and synchronizes the emitter, receiver and output circuits, for optimum switching frequency, repeatability and insensitivity to interference and ambient light. The user needs only to press two buttons for setting the sensor for the marking and the background. Remote control of the key functions and remote selection of 4 previously stored contrast ratios is available in the cable version depending on lead selection. It is also possible to enable a turn-off delay or to disable the buttons.

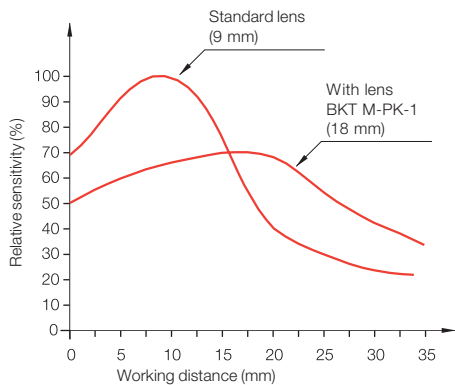
The sensor output is selectable between NPN and PNP. All models have an analog output whose signal is proportional to the light intensity reflected from the target. The sensor lens can be placed in two positions, for setting the exit surface straight or rotated 90° from the sensor axis. For even greater installation.

Features

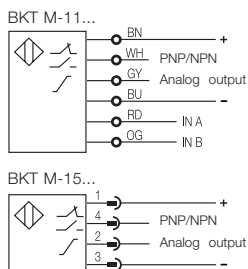
- Selectable vertical or horizontal light spot
- Automatic selection of red or green emitter light
- Automatic setting of light-on/dark-on function
- Remote key functions and 4 storable programs (cable version)
- Time delay and key lock selectable
- Interchangeable optics (straight and 90°)
- Analog output



Function diagram



Wiring diagrams



Recommended accessories
please order separately



Lens
BKT M-PK-1



Lens
BKT M-PK-3



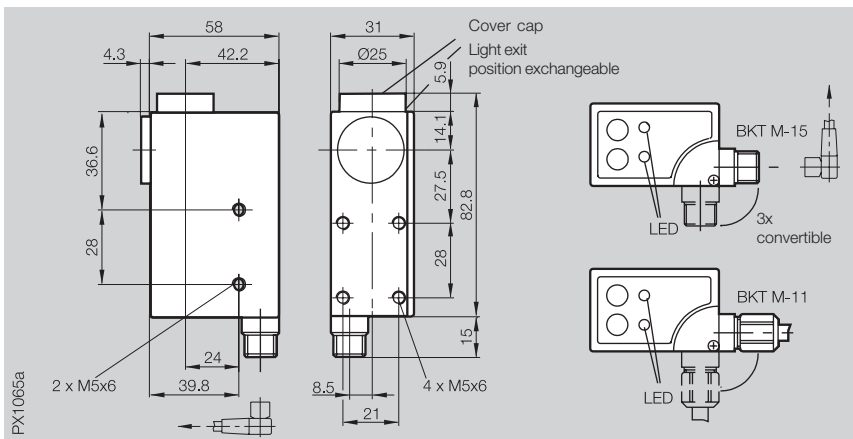
Connector
BKS-S 19-3/BKS-S 20-3

Contrast Sensor

Photoelectric Sensors

BKT M-15, BKT M-11
Contrast Sensor

Series	BKT	BKT
Working distance	9 mm ±2 mm	9 mm ±2 mm
Working distance with lens PK-1	18 mm ±4 mm	18 mm ±4 mm



Contrast sensor

		BKT M-15-U-S 4	BKT M-11-U-03
PNP/NPN	vertical spot	BKT M-15-U-S 4	BKT M-11-U-03
PNP/NPN	horizontal spot	BKT M-15L-U-S 4	BKT M-11L-U-03
Electrical data			
Supply voltage U_B		10...30 V DC	10...30 V DC
Ripple		2 V DC	2 V DC
No-load supply current I_0 max.		≤ 80 mA	≤ 80 mA
Switching output		PNP- and NPN-Transistor (selectable)	PNP- and NPN-Transistor (selectable)
Output current		200 mA	200 mA
Switching type		Light-/dark-on (selectable)	Light-/dark-on (selectable)
Voltage drop U_d at I_0		≤ 2 V	≤ 2 V
Analog output		0...5.5 V DC*	0...5.5 V DC*
Settings		teach-in	teach-in
Additional functions		Button disable	Button disable
Optical data			
Emitter, light type		LED red/green	LED red/green
Wavelength		630 nm/526 nm	630 nm/526 nm
Light spot diameter		1.5x5 mm**	1.5x5 mm**
Time data			
Response time		50 μs	50 μs
Switching frequency f		10 kHz	10 kHz
Time function		20 ms off-delay selectable	20 ms off-delay selectable
Indicators			
Ready indicator		LED green	LED green
Output function indicator		LED red	LED red
Mechanical data			
Connection		M12 connector, 4-pin	3 m cable, PVC
No. of wires × cross-section			6×0.34 mm ² with shield
Housing material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Weight		310 g	600 g
Ambient data			
Degree of protection per IEC 60529		IP 67	IP 67
Polarity reversal protected		yes	yes
Short circuit protected		yes	yes
Ambient light rejection		EN 60947-5-2	EN 60947-5-2
Ambient temperature range T_a		-10...+55 °C	-10...+55 °C

*2.5 V DC with Kodak gray card 90% reflective

**2×7 mm with BKT M-PK1



2.2

2.3

Photoelectric sensors accessories page 2.3.2 ...

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Connectors page 6.2 ...


Photoelectric sensors usually detect the target or the desired target features themselves. When this isn't possible, markings are applied to the object and these are detected by the sensor. But what do you do when you can't apply visible markings to the object? Very simple: apply invisible markings!

How does that work? You use so-called fluorescent materials (contained in special chinks, inks, paints, etc.), which are only visible in ultraviolet (UV) light. The fluorescent materials change the invisible UV light (short-wavelength, here 380 nm) into visible light (between blue 450 nm and dark red 780 nm). This effect is called photo-synthesis. The visible light can then be detected as usual by the receiver portion of the sensor.

Applications

- Logistics (marking, selecting)
- Assembly (guiding, monitoring, sorting)
- Packaging machines (to monitor cutting, folding)
- Ceramics (e.g., parts positioning)
- Wood industry (e.g., controlling the glue bead)
- Pharmaceuticals (control tasks in the manufacturing process)
- Textiles (e.g., cut guiding)
- Foods industry



Type	Range	Light type		Output			Output		Switching frequency	U _B	Connection	Page
		UV light		PNP-Transistor	NPN-Transistor	Analog output	Light-on	Dark-on				
 Luminescence sensor												
BLT 21M-001-P-S4	0...40 mm	■		■			■	■	2 kHz	■	■	2.2.55
BLT 21M-001-N-S4	0...40 mm	■			■		■	■	2 kHz	■	■	2.2.55
BLT M-15-U-S4	9...18 mm	■		■	■	■	■	■	2 kHz	■	■	2.2.57

2.2

2.3

Photoelectric sensors
accessories
page 2.3.2 ...

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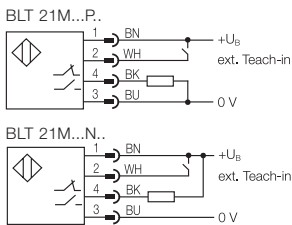
Connectors
page 6.2 ...

BLT 21M luminescence sensors detect all kinds of luminescent markings on any background. The sensor is calibrated with the simple push of a button. In the standard setting the sensor is light-switching (marking with greater luminescence are recognized as the background).

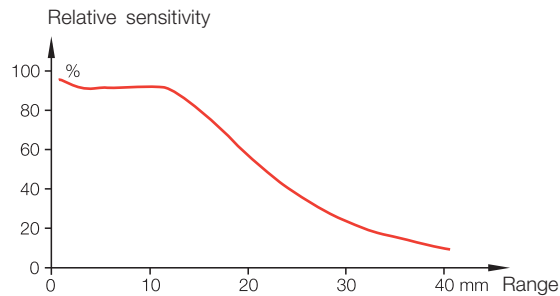
A fine setting is available for weakly luminescent markings. In this setting the output function can also be selected.



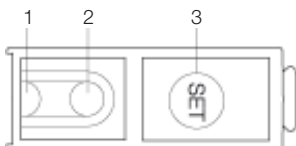
Wiring diagrams



Function diagram



Indicators and operating elements



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

Recommended accessories

please order separately



Mounting clamp
BOS 21-KH-1



Mounting clamp
BOS 21-KH-2



Mounting bracket
BOS 21-HW-1

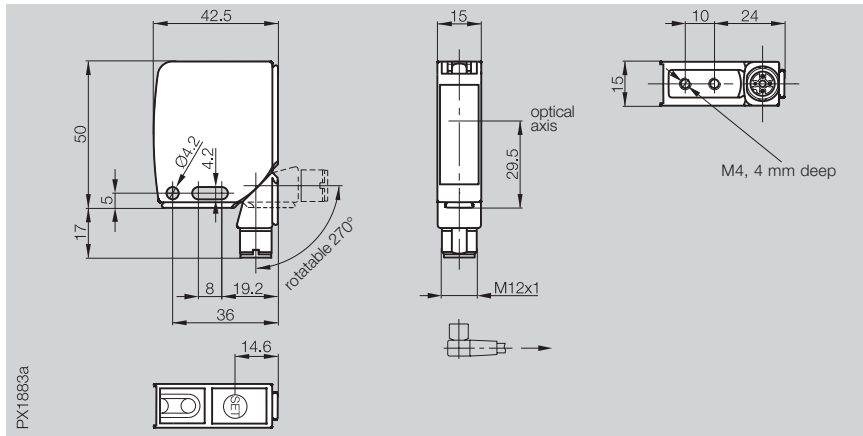


Mounting bracket
BOS 21-HW-2



Connector
BKS- 19/BKS- 20

Series	BLT
Working range	0...40 mm



Luminescence sensor

PNP	BLT 21M-001-P-S4
NPN	BLT 21M-001-N-S4

Electrical data

Supply voltage U_B	10...30 V DC
Ripple	≤ 2 V DC
No-load supply current I_0 max.	≤ 30 mA
Switching output	PNP- or NPN-Transistor
Output current	100 mA
Switching type	Light-/dark-on (settable in fine mode)
Voltage drop U_d at I_0	≤ 2 V
Settings	teach-in
Additional functions	Button disable

Optical data

Emitter, light type	LED, UV
Wavelength	370 nm
Light spot diameter	ca. 1.5 mm at 10 mm

Time data

Response time	250 μ s
Switching frequency f	2 kHz
Time functions	20 ms off-delay

Indicators

Output function indicator	LED yellow
Operating/error indicator	LED green/red

Mechanical data

Dimensions	42.5x50x15 mm
Connection	M12 connector, 4-pin
Housing material	GD-Zn/Al
Optical surface	Glass
Weight	80 g

Ambient data

Degree of protection per IEC 60529	IP 67
Polarity reversal protected	yes
Short circuit protected	yes
Ambient light rejection nach	EN 60947-5-2
Ambient temperature range T_a	-10...+55 °C



2.2

2.3

Photoelectric sensors accessories page 2.3.2 ...

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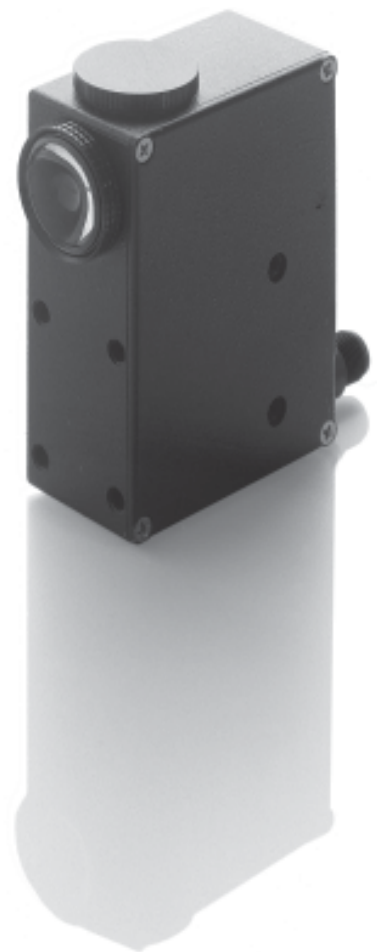
Connectors page 6.2 ...

The Balluff luminescence sensor is equipped with a modern UV source so that no external UV lamp is needed. A microcontroller handles the evaluation using a teach-in procedure. By simply pressing a button the BLT learns the difference between the fluorescent marking and the background. If the difference is too slight and can not be reliably discriminated, this is indicated by an error message (flashing LED). The range is typically from 9 to 18 mm, but can be increased by using other lenses.

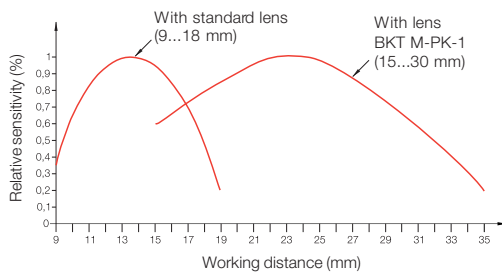
Configuring two internal DIP switches allows you to set a turn-off delay of 20 ms or disable the buttons. The PNP/NPN output is also selectable. An analog signal proportional to the light reflected by the marking rounds out the functionality of the BLT.

Features

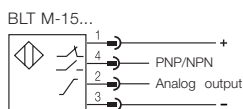
- UV source: LED, 100,000 hour life
- Push-button setting
- Automatic setting of light-on/dark-on
- Time delay selectable
- Analog output 0...7 V DC standard
- M12 connector rotatable (3 positions)
- Button disable



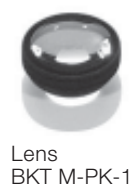
Function diagram



Wiring diagram



Recommended accessories
please order separately

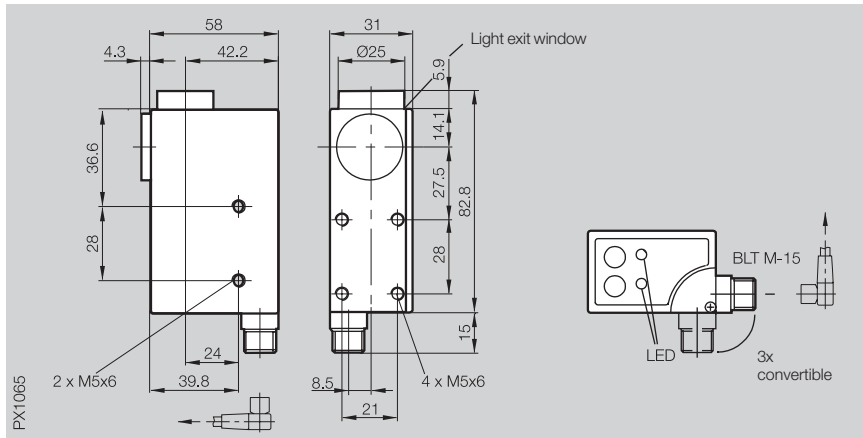


Lens
BKT M-PK-1



Connector
BKS-S 19-3/BKS-S 20-3

Series	BLT
Working range	9...18 mm
Working range with lens PK-1	15...30 mm



Luminescence sensor

PNP/NPN	BLT M-15-U-S 4
Electrical data	
Supply voltage U_B	10...30 V DC
Ripple	2 V DC
No-load supply current I_0 max.	≤ 80 mA
Switching output	PNP- and NPN-Transistor (selectable)
Switching type	Light-/dark-on (selectable)
Output current	200 mA
Voltage drop U_d at I_e	≤ 2 V
Analog output	0...7 V DC
Settings	teach-in
Additional functions	Button disable
Optical data	
Emitter, light type	LED, UV
Wavelength	380 nm
Light spot diameter	5 mm
Time data	
Response time	250 μ s
Switching frequency f	2 kHz
Time functions	20 ms off-delay selectable
Indicators	
Ready indicator	LED green
Output function indicator	LED red
Mechanical data	
Connection	M12 connector, 4-pin
Housing material	GD-Zn
Optical surface	Glass
Weight	310 g
Ambient data	
Degree of protection per IEC 60529	IP 67
Polarity reversal protected	yes
Short circuit protected	yes
Ambient light rejection	EN 60947-5-2
Ambient temperature range T_a	-10...+55 °C



Please note! Lenses not interchangeable for BLT M-15.

2.2

2.3

Photoelectric sensors accessories page 2.3.2 ...

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Connectors page 6.2 ...