

**BOS 21M** – the complete series in one compact, robust metal housing with comprehensive functionality. State-of-the-art sensor technology and innovative manufacturing technologies leave nothing to be desired for versatile applications in robotics and automation, packaging technology, installing, and handling technology, etc. Teach-in switches and potentiometers assure fast startup as well as simple and economical operation of the sensors. A wide range of accessories such as mounting brackets, stands, dovetail clamps, etc., enable adjustable mounting of the sensors in any position.



# Photoelectric Sensors

## BOS 21M

### Product overview



Photoelectric Sensors

Photoelectric Sensors

Cylinder Designs

Block Designs

Fork Sensors

BGL

Angle Sensors

BWL

Photoelectric Sensors with Special Properties

Photoelectric Distance Sensors for Analog Distance Measurement

Accessories for Photoelectric Sensors

Type	Sensing distance/Range	Light type			Output	Switching type		Switching frequency	U <sub>S</sub>	Connection	Special features					Page
		Red light	Infrared	Laser		PNP transistor	Light switching				Dark switching	Teach-in	Polarizing filter	Autocollimation	Glass detection	
Diffuse sensor with background suppression																
<b>BOS0034</b> BOS 21M-PUS-LH12-S4	50...100 mm			■	■	■	■	1 kHz	■	■		■				190
<b>BOS0035</b> BOS 21M-PUS-RH12-S4	70...200 mm	■			■	■	■	1 kHz	■	■		■				184
<b>BOS0036</b> BOS 21M-PUS-RV13-S4	70...200 mm	■			■	■	■	1 kHz	■	■		■				185
Diffuse sensor																
<b>BOS0033</b> BOS 21M-PA-RD10-S4	0.01...1 m	■			■	■	■	500 Hz	■	■						185
<b>BOS0031</b> BOS 21M-PA-ID10-S4	0.05...2 m		■		■	■	■	500 Hz	■	■						185
<b>BOS0032</b> BOS 21M-PA-LD10-S4	0...600 mm			■	■	■	■	2 kHz	■	■						191
Retroreflective sensor																
<b>BOS00TR</b> BOS 21M-PA-PR10-S4	0.1...8 m	■			■	■	■	1 kHz	■	■		■				186
<b>BOS00TT</b> BOS 21M-PA-PR10-S4S	0.1...8 m	■			■	■	■	1 kHz	■	■		■		■		186
<b>BOS00TL</b> BOS 21M-PA-LR10-S4	0.1...20 m			■	■	■	■	2 kHz	■	■		■				191
<b>BOS00TM</b> BOS 21M-PA-LR10-S4S	0.1...20 m			■	■	■	■	2 kHz	■	■		■		■		191
Retroreflective sensor with autocollimation																
<b>BOS00TN</b> BOS 21M-PA-PK10-S4	0...4 m	■			■	■	■	1 kHz	■	■		■	■			187
<b>BOS00TP</b> BOS 21M-PA-PK10-S4S	0...4 m	■			■	■	■	1 kHz	■	■		■	■	■		187
Retroreflective sensor for Detecting Glass																
<b>BOS00TY</b> BOS 21M-PA-PT14-S4	0...2 m	■			■	■	■	1 kHz	■	■		■	■	■		187
<b>BOS00TU</b> BOS 21M-PA-PT10-S4	0...2 m	■			■	■	■	1 kHz	■	■		■	■	■		187
<b>BOS00TW</b> BOS 21M-PA-PT10-S4S	0...2 m	■			■	■	■	1 kHz	■	■		■	■	■		187
Through-beam sensor Receiver																
<b>BOS00WT</b> BOS 21M-PA-IE10-S4	0...20 m		■		■	■	■	500 Hz	■	■						188
<b>BOS00WU</b> BOS 21M-PA-IE10-S4S	0...20 m		■		■	■	■	500 Hz	■	■					■	188
<b>BOS00WW</b> BOS 21M-PA-LE10-S4	0...60 m			■	■	■	■	1.5 kHz	■	■						191
<b>BOS00WY</b> BOS 21M-PA-LE10-S4S	0...60 m			■	■	■	■	1.5 kHz	■	■					■	191
Through-beam sensor Emitter																
<b>BOS00WZ</b> BOS 21M-XT-IS11-S4	0...20 m		■						■	■						189
<b>BOS00Y0</b> BOS 21M-XT-LS11-S4	0...60 m			■					■	■						191

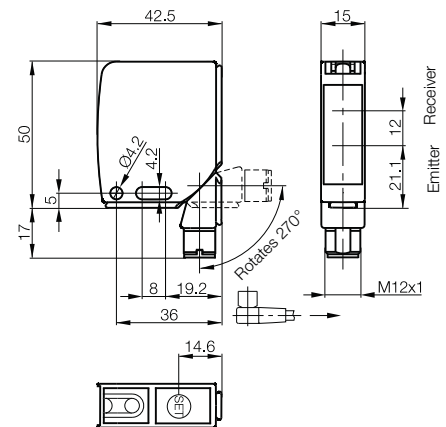
NPN on request



Type			<b>Diffuse sensor with background suppression</b>
Detection range			<b>70...200 mm</b>
PNP NC/NO	<b>Ordering code</b>		<b>BOS0035</b>
	Part number		BOS 21M-PUS-RH12-S4
PNP NC/NO	<b>Ordering code</b>		
	Part number		
Supply voltage $U_s$			10...30 V DC
Output current			100 mA
No-load supply current $I_0$ max.			$\leq 50$ mA
Switching type			Light/dark switching (selectable)
Polarity reversal/short-circuit protected			Yes/Yes
Settings			Teach-in
Emitter, light type			LED, red light
Wavelength			670 Nm
Output function indicator			Yellow LED
Stability indicator			Green/red LED
Response time			0.5 ms
Switching frequency $f$			1 kHz
Degree of protection as per IEC 60529			IP 67
Ambient temperature $T_a$			-10...+50 °C
Permissible ambient light			10 klx
Material	Housing		GD-Zn/Al
	Optical surface		PMMA
Connection			M12 connector, 4-pin

Reference object: white, 90% reflection, 200x200 mm

Wiring diagrams on page 195.



# Photoelectric Sensors

## BOS 21M



Photoelectric Sensors

Photoelectric Sensors

Cylinder Designs

Block Designs

Fork Sensors

BGL

Angle Sensors

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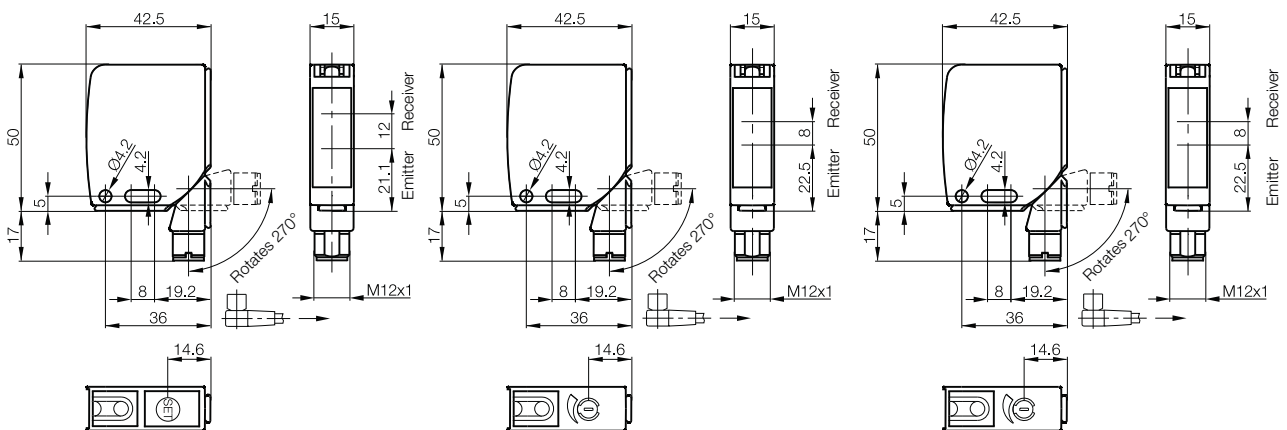
Photoelectric Sensors with Special Properties

Photoelectric Distance Sensors for Analog Distance Measurement

Accessories for Photoelectric Sensors



Diffuse sensor with foreground and background suppression 70...200 mm	Diffuse sensor 0.01...1 m	Diffuse sensor 0.05...2 m
<b>BOS0036</b>	<b>BOS0033</b>	<b>BOS0031</b>
BOS 21M-PUS-RV13-S4	BOS 21M-PA-RD10-S4	BOS 21M-PA-ID10-S4
10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA
≤ 50 mA	≤ 35 mA	≤ 35 mA
Light/dark switching (selectable)	Light/dark (complementary)	Light/dark (complementary)
Yes/Yes	Yes/Yes	Yes/Yes
Teach-in	Potentiometer, 270°	Potentiometer, 270°
LED, red light	LED, red light	LED, infrared
670 Nm	650 Nm	880 Nm
Yellow LED	Yellow LED	Yellow LED
Green LED	Green LED	Green LED
0.5 ms	1 ms	1 ms
1 kHz	500 Hz	500 Hz
IP 67	IP 67	IP 67
-10...+50 °C	-25...+55 °C	-25...+55 °C
10 klx	10 klx	10 klx
GD-Zn/Al	GD-Zn/Al	GD-Zn/Al
PMMA	PMMA	PMMA
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin

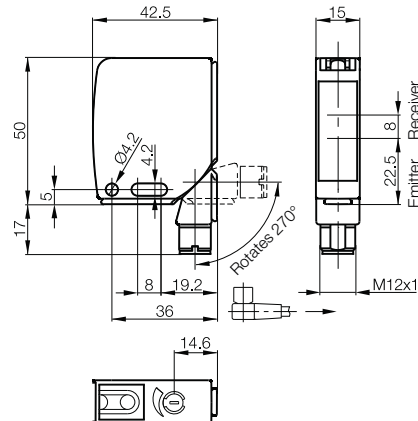




Type				<b>Retroreflective sensor</b>
Detection range				<b>0.1...8 m</b>
PNP NC/ NO	Polarizing filter	<b>Ordering code</b>	<b>BOS00TR</b>	
		Part number	BOS 21M-PA-PR10-S4	
PNP NC/ NO	Polarizing filter Output special assignment	<b>Ordering code</b>	<b>BOS00TT</b>	
		Part number	BOS 21M-PA-PR10-S4S	
PNP NC/ NO	Polarizing filter, autocollimation	<b>Ordering code</b>		
		Part number		
PNP NC/ NO	Polarizing filter, autocollimation Output special assignment	<b>Ordering code</b>		
		Part number		
PNP NC/ NO	Polarizing filter, glass detection, autocollimation	<b>Ordering code</b>		
		Part number		
PNP NC/ NO	Polarizing filter, glass detection, autocol- limation, Output special assignment	<b>Ordering code</b>		
		Part number		
Supply voltage $U_S$				10...30 V DC
Output current				100 mA
No-load supply current $I_0$ max.				$\leq 35$ mA
Switching type				Light/dark (complementary)
Polarity reversal/short-circuit protected				Yes/Yes
Settings				Potentiometer, 270°
Emitter, light type				LED, red light
Wavelength				650 Nm
Output function indicator				Yellow LED
Stability indicator				Green LED
Response time				0.5 ms
Switching frequency $f$				1 kHz
Degree of protection as per IEC 60529				IP 67
Ambient temperature $T_a$				-25...+55 °C
Permissible ambient light				10 klx
Material	Housing			GD-Zn/Al
	Optical surface			PMMA
Connection				M12 connector, 4-pin

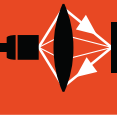
Reference reflector: BOS R-1

For wiring diagrams see page 195.



# Photoelectric Sensors

## BOS 21M



Photoelectric Sensors

Photoelectric Sensors

Cylinder Designs

Block Designs

Fork Sensors

BGL

Angle Sensors

BWL

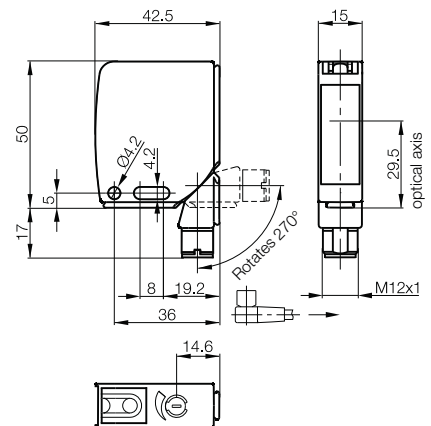
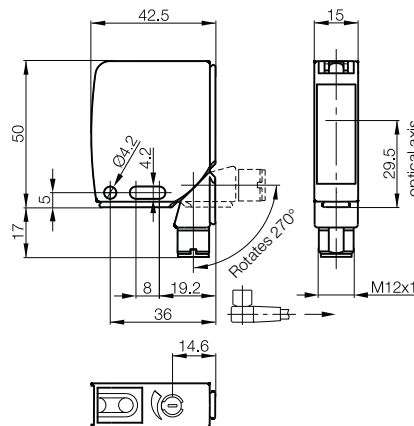
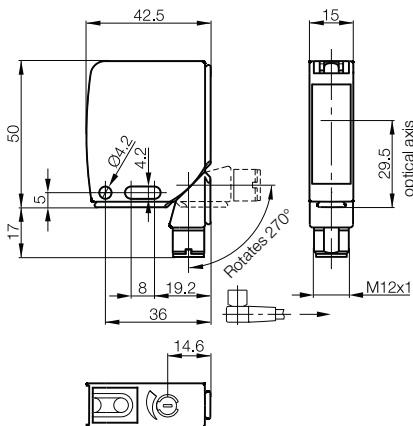
Photoelectric Sensors with Special Properties

Photoelectric Distance Sensors for Analog Distance Measurement

Accessories for Photoelectric Sensors



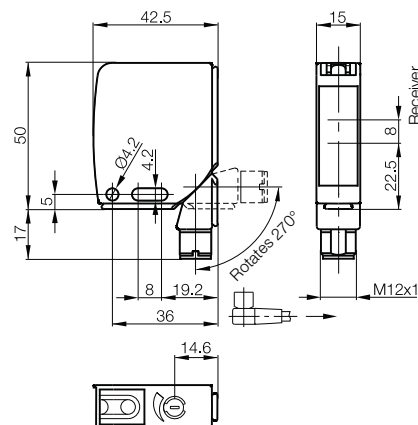
Retroreflective sensor with autocollimation 0...4 m	Retroreflective sensor for Detecting Glass 0...2 m	Retroreflective sensor for Detecting Glass 0...2 m
<b>BOS00TN</b> BOS 21M-PA-PK10-S4		
<b>BOS00TP</b> BOS 21M-PA-PK10-S4S		
	<b>BOS00TU</b> BOS 21M-PA-PT10-S4	<b>BOS00TY</b> BOS 21M-PA-PT14-S4
	<b>BOS00TW</b> BOS 21M-PA-PT10-S4S	
10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA
≤ 35 mA	≤ 35 mA	≤ 35 mA
Light/dark (complementary)	Light/dark (complementary)	Light/dark (complementary)
Yes/Yes	Yes/Yes	Yes/Yes
Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
LED, red light	LED, red light	LED, red light
650 Nm	650 Nm	650 Nm
Yellow LED	Yellow LED	Yellow LED
Green LED		
0.5 ms	0.5 ms	0.5 ms
1 kHz	1 kHz	1 kHz
IP 67	IP 67	IP 67
-25...+55 °C	-25...+55 °C	-25...+55 °C
10 klx	10 klx	10 klx
GD-Zn/Al	GD-Zn/Al	GD-Zn/Al
Glass	Glass	PMMA
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin





Type				<b>Through-beam sensor</b>
Detection range				<b>0...20 m</b>
PNP	NC/ NO	Receiver	<b>Ordering code</b>	<b>BOS00WT</b>
			Part number	BOS 21M-PA-IE10-S4
PNP	NC/ NO	Receiver	<b>Ordering code</b>	<b>BOS00WU</b>
		Output special assignment	Part number	BOS 21M-PA-IE10-S4S
		Emitter	<b>Ordering code</b>	
			Part number	
Supply voltage $U_s$				10...30 V DC
Output current				100 mA
No-load supply current $I_0$ max.				$\leq 35$ mA
Switching type				Light/dark (complementary)
Polarity reversal/short-circuit protected				Yes/Yes
Settings				Potentiometer, 270°
Help functions				
Emitter, light type				LED, infrared
Wavelength				880 Nm
Power-on indicator				
Output function indicator				Yellow LED (receiver)
Stability indicator				Green LED (receiver)
Response time				1 ms
Switching frequency $f$				500 Hz
Degree of protection as per IEC 60529				IP 67
Ambient temperature $T_a$				-25...+55 °C
Permissible ambient light				10 klx
Material		Housing		GD-Zn/Al
		Optical surface		PMMA
Connection				M12 connector, 4-pin

For wiring diagrams see page 195.



# Photoelectric Sensors

## BOS 21M



Photoelectric Sensors

Photoelectric Sensors

Cylinder Designs

**Block Designs**

Fork Sensors

BGL

Angle Sensors

BWL

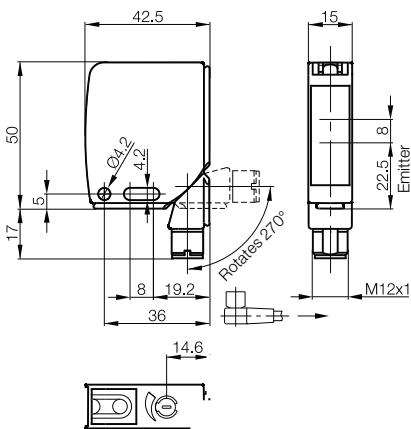
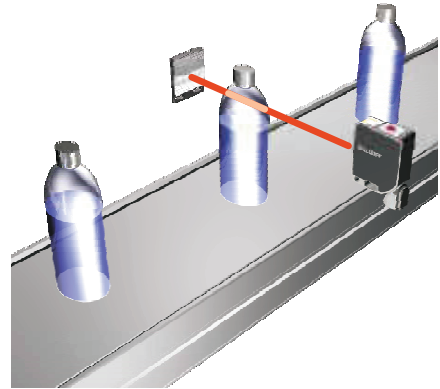
Photoelectric Sensors with Special Properties

Photoelectric Distance Sensors for Analog Distance Measurement

Accessories for Photoelectric Sensors



<b>Through-beam sensor</b>
<b>0...20 m</b>
<b>BOS00WZ</b>
BOS 21M-XT-IS11-S4
10...30 V DC
≤ 35 mA
Yes/Yes
Test input
Green LED
IP 67
-25...+55 °C
10 klx
GD-Zn/Al
PMMA
M12 connector, 4-pin



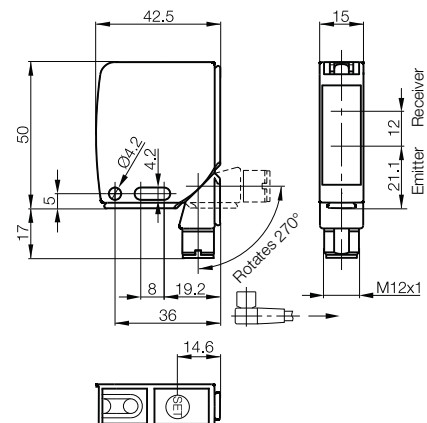




Type				<b>Diffuse sensor with background suppression</b>
Detection range				<b>50...100 mm</b>
PNP	NC/NO		<b>Ordering code</b>	<b>BOS0034</b>
			Part number	BOS 21M-PUS-LH12-S4
PNP	NC/NO	Polarizing filter	<b>Ordering code</b>	
			Part number	
PNP	NC/NO	Polarizing filter	<b>Ordering code</b>	
		Output special assignment	Part number	
PNP	NC/NO	Receiver	<b>Ordering code</b>	
			Part number	
PNP	NC/NO	Receiver	<b>Ordering code</b>	
		Output special assignment	Part number	
		Emitter	<b>Ordering code</b>	
			Part number	
Supply voltage $U_s$				10...30 V DC
Output current				100 mA
No-load supply current $I_0$ max.				60 mA
Switching type				Light/dark switching (selectable)
Polarity reversal/short-circuit protected				Yes/Yes
Settings				Teach-in
Help functions				
Emitter, light type				Laser, red light
Wavelength				650 Nm
Laser class				1
Power-on indicator				
Output function indicator				Yellow LED
Stability indicator				Green/red LED
Response time				0.5 ms
Switching frequency $f$				1 kHz
Degree of protection as per IEC 60529				IP 67
Ambient temperature $T_a$				-10...+50 °C
Permissible ambient light				5 klx
Material	Housing			GD-Zn/Al
	Optical surface			PMMA
Connection				M12 connector, 4-pin

Reference object: white, 90% reflection, 200×200 mm  
 Reference reflector: BOS R-1

For wiring diagrams see page 195.





# Photoelectric Sensors

## BOS 21M Laser



Photoelectric Sensors

Photoelectric Sensors

Cylinder Designs

Block Designs

Fork Sensors

BGL

Angle Sensors

BWL

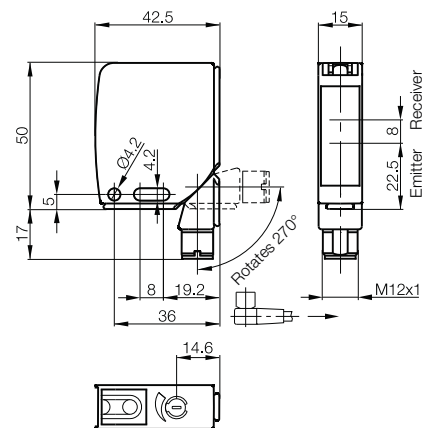
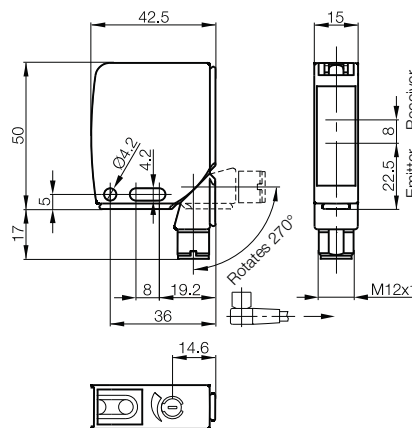
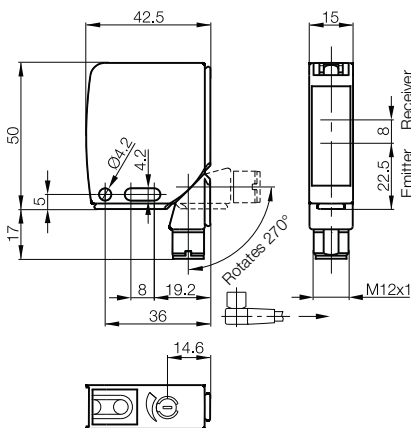
Photoelectric Sensors with Special Properties

Photoelectric Distance Sensors for Analog Distance Measurement

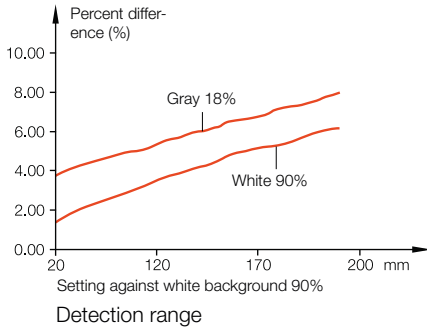
Accessories for Photoelectric Sensors



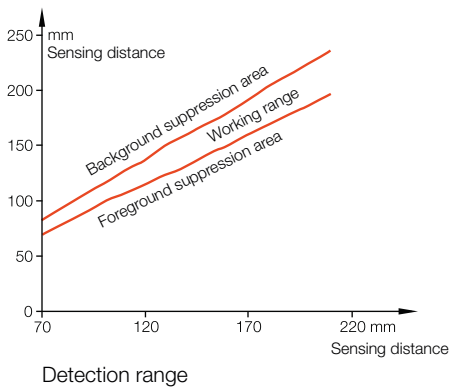
Diffuse sensor 0...600 mm <b>BOS0032</b> BOS 21M-PA-LD10-S4	Retroreflective sensor 0.1...20 m <b>BOS00TL</b> BOS 21M-PA-LR10-S4 <b>BOS00TM</b> BOS 21M-PA-LR10-S4S	Through-beam sensor 0...60 m <b>BOS00WW</b> BOS 21M-PA-LE10-S4 <b>BOS00WY</b> BOS 21M-PA-LE10-S4S <b>BOS00Y0</b> BOS 21M-XT-LS11-S4
10...30 V DC	10...30 V DC	10...30 V DC
100 mA	100 mA	100 mA
35 mA	35 mA	≤ 35 mA
Light/dark (complementary)	Light/dark (complementary)	Light/dark (complementary)
Yes/Yes	Yes/Yes	Yes/Yes
Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
Laser, red light 650 Nm 1 Green LED Yellow LED	Laser, red light 650 Nm 1 Green LED Yellow LED	Laser, red light 650 Nm 1 Green LED Yellow LED
0.25 ms	0.25 ms	1 ms
2 kHz	2 kHz	500 Hz
IP 67	IP 67	IP 67
-10...+50 °C	-10...+50 °C	-25...+55 °C
5 klx	5 klx	10 klx
GD-Zn/Al	GD-Zn/Al	GD-Zn/Al
PMMA	PMMA	PMMA
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin



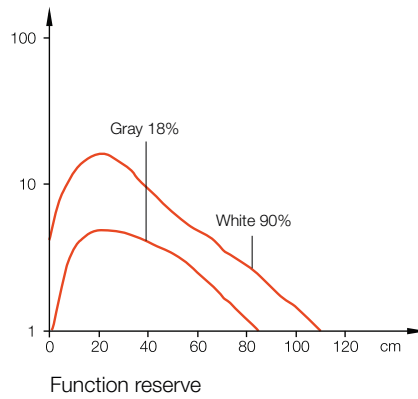
**Diffuse sensor with background suppression**  
**BOS 21M-PUS-RH12**



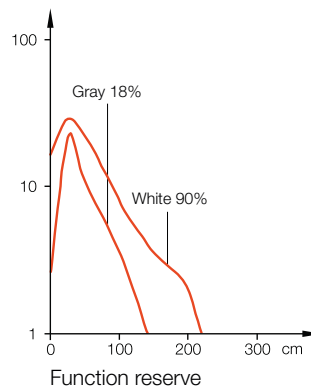
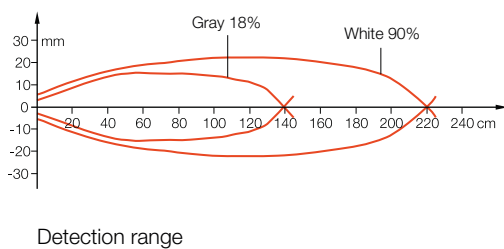
**Diffuse sensor with fore- and background suppression**  
**BOS 21M-PUS-RV13**



**Diffuse sensor**  
**BOS 21M-PA-RD10**



**Diffuse sensor, long range**  
**BOS 21M-PA-ID10**



# Photoelectric Sensors

## BOS 21M

### Function diagrams



Photoelectric Sensors

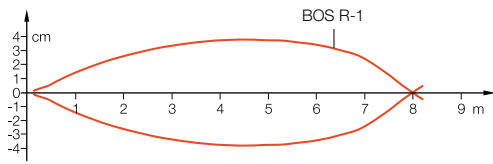
Photoelectric Sensors  
Cylinder Designs  
**Block Designs**  
Fork Sensors  
BGL  
Angle Sensors  
BWL

Photoelectric Sensors with Special Properties

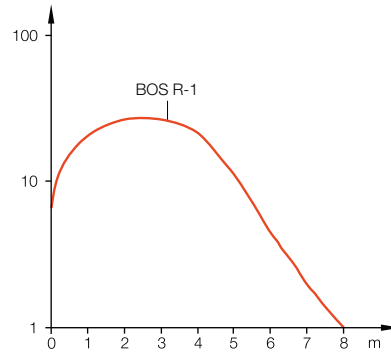
Photoelectric Distance Sensors for Analog Distance Measurement

Accessories for Photoelectric Sensors

#### Retroreflective sensor with polarization BOS 21M-PA-PR10

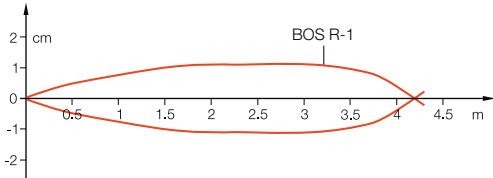


Detection range

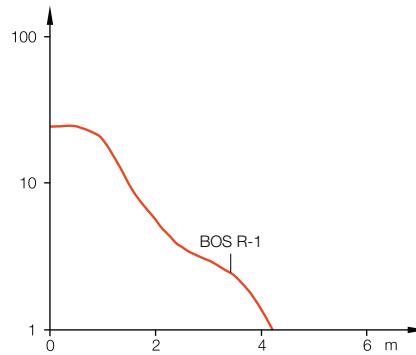


Function reserve

#### Retroreflective sensor with autocollimation BOS 21M-PA-PK10

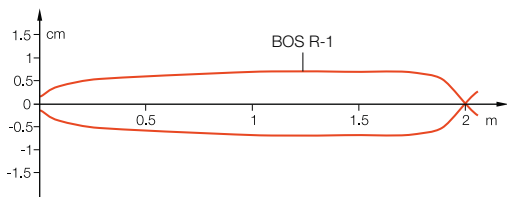


Detection range

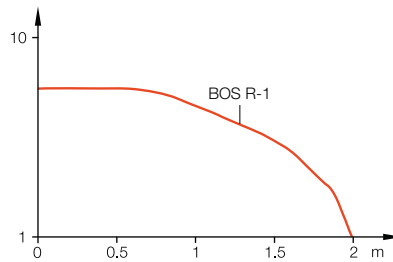


Function reserve

#### Retroreflective sensor with glass detection BOS 21M-PA-PT\_S4

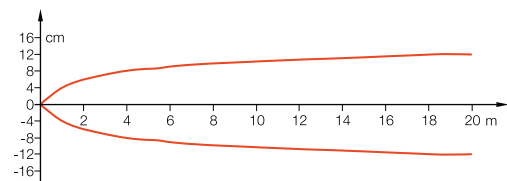


Detection range

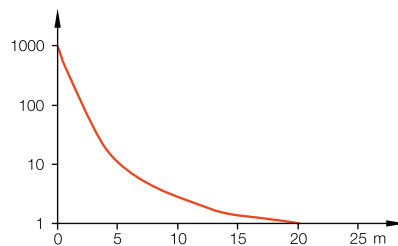


Resolution

#### Through-beam sensor BOS 21M-PA-IE10

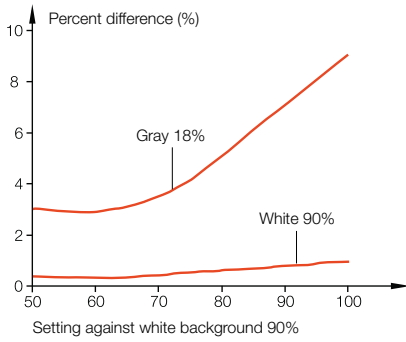


Detection range



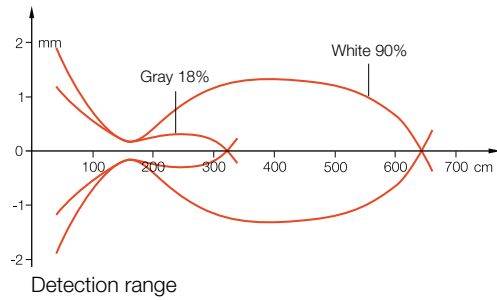
Function reserve

**Laser diffuse sensor with background suppression**  
**BOS 21M-PUS-LH12-**

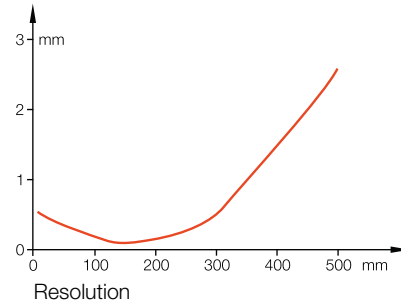


Tolerance with standard setting

**Laser diffuse sensor**  
**BOS 21M-PA-LD10-**

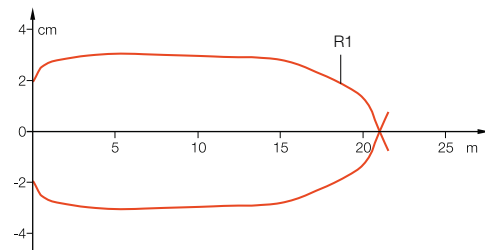


Detection range

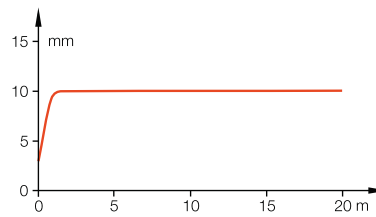


Resolution

**Laser retroreflective sensor with polarization**  
**BOS 21M-PA-LR10-**

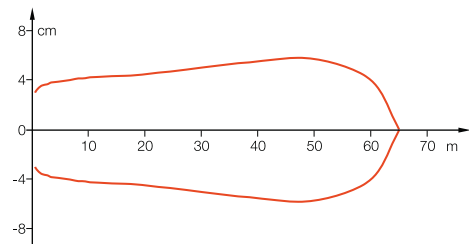


Detection range

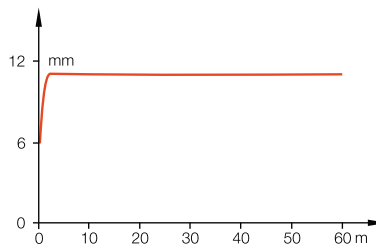


Resolution

**Laser through-beam sensor**  
**BOS 21M-PA-LE10-**



Detection range

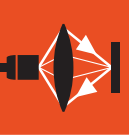


Resolution

# Photoelectric Sensors

## BOS 21M

### Connection, accessories



Photoelectric Sensors

Photoelectric Sensors

Cylinder Designs

Block Designs

Fork Sensors

BGL

Angle Sensors

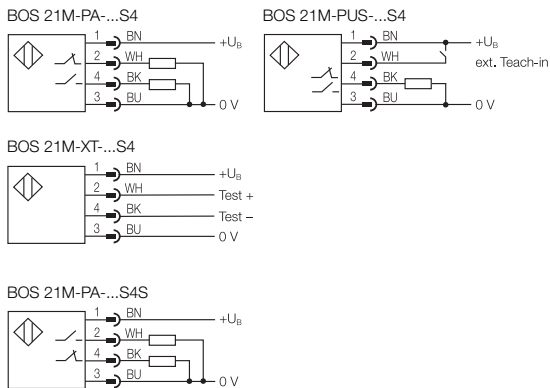
BWL

Photoelectric Sensors with Special Properties

Photoelectric Distance Sensors for Analog Distance Measurement

Accessories for Photoelectric Sensors

#### Wiring diagrams



#### Recommended accessories (please order separately)

Description	Ordering code
① Reflector	<b>BAM00UK</b>
② Reflector	<b>BAM00WL</b>
③ Clamping holders	<b>BAM00TF</b>
④ Clamping holders	<b>BAM00TH</b>
⑤ Adapter plate	<b>BAM00T7</b>
⑥ Mounting bracket	<b>BAM00T9</b>
⑦ Mounting bracket	<b>BAM00TA</b>



#### Suitable connectors (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.

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.

**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.