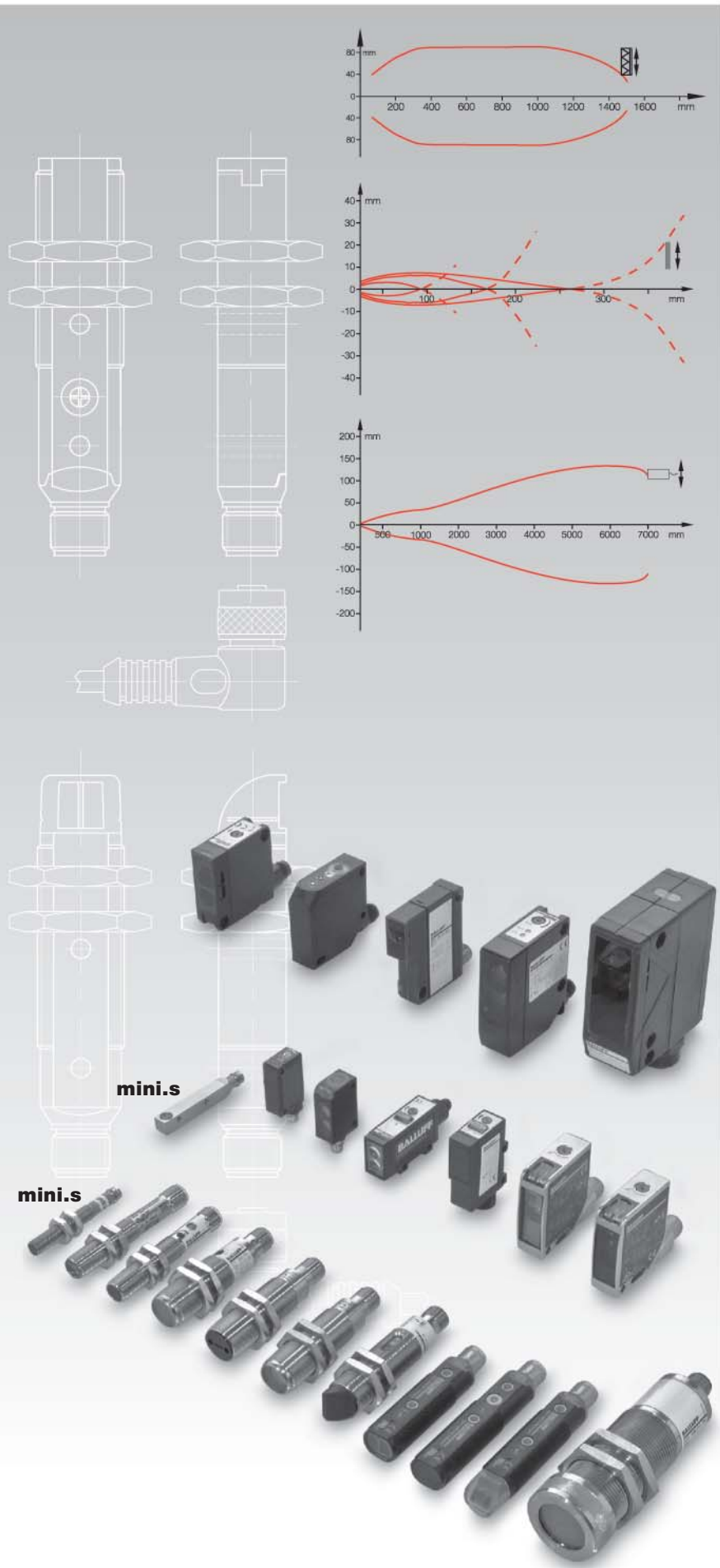


# Photoelectric Sensors – Standard







- 2.1.2 **Round style**  
**BOS 08M**  
M8 Metal
- 2.1.6 **BOS 12M**  
M12 Metal
- 2.1.16 **BOS 18M**  
M18 Metal  
with potentiometer  
tough  
with teach-in  
Laser  
with AC voltage  
with angled head
- 2.1.46 **BOS 18E**  
M18 stainless steel
- 2.1.52 **BOS 18KF**  
M18 plastic  
Laser
- 2.1.70 **BOS 18KW**  
M18 plastic  
with angled head  
Laser
- 2.1.84 **BOS 18K(R)**  
M18 plastic
- 2.1.92 **BOS 30M**  
M30 metal
  
- Cube style**
- 2.1.96 **BOS Q08M**  
mini.s
- 2.1.100 **BOS 2K**  
mini.s
- 2.1.110 **BOS 5K**  
mini.s  
with potentiometer
- 2.1.118 **BOS 6K**  
mini.s  
with teach-in  
Laser
- 2.1.130 **BOS 15K**
- 2.1.136 **BOS 21M**  
Laser
- 2.1.148 **BOS 26K**  
Laser
- 2.1.156 **BOS 36K**
- 2.1.162 **BOS 65K**

**BOS 21M** – a complete family in a compact, tough metal housing. Comprehensive functionality, use of the most modern sensor technologies and innovative manufacturing technology leave nothing to be desired for versatile application in robotics and automation, packaging, assembly and handling.

Teach-in switches and potentiometers assure fast startup as well as simple and economical operation of the sensor.

A wide range of accessories such as mounting brackets, stands, dovetail clamps etc. enable variable attachment of the products in any position.



Type	Sensing distance/ range	Light type			Output		Output function	Switching frequency	U <sub>B</sub>	Connec- tion	Special features				Page	
		Red light	Infrared	Laser light	PNP-Transistor	NPN-Transistor					Light-on	Dark-on	10...30 V DC	M12 connector, 4-pin		Teach-in
 <b>Diffuse with HGA</b>																
BOS 21M-PUS-LH12-S4	50...100 mm			■	■		■	■	1 kHz	■	■		■			<b>2.1.142</b>
BOS 21M-NUS-LH12-S4	50...100 mm			■		■	■	■	1 kHz	■	■		■			<b>2.1.142</b>
BOS 21M-PUS-RH12-S4	70...200 mm	■			■		■	■	1 kHz	■	■		■			<b>2.1.138</b>
BOS 21M-NUS-RH12-S4	70...200 mm	■				■	■	■	1 kHz	■	■		■			<b>2.1.138</b>
BOS 21M-PUS-RV13-S4	70...200 mm	■			■		■	■	1 kHz	■	■		■			<b>2.1.139</b>
BOS 21M-NUS-RV13-S4	70...200 mm	■				■	■	■	1 kHz	■	■		■			<b>2.1.139</b>
 <b>Diffuse</b>																
BOS 21M-PA-RD10-S4	0.01...1 m	■			■		■	■	500 Hz	■	■					<b>2.1.139</b>
BOS 21M-NA-RD10-S4	0.01...1 m	■				■	■	■	500 Hz	■	■					<b>2.1.139</b>
BOS 21M-PA-ID10-S4	0.05...2 m		■		■		■	■	500 Hz	■	■					<b>2.1.139</b>
BOS 21M-NA-ID10-S4	0.05...2 m		■			■	■	■	500 Hz	■	■					<b>2.1.139</b>
BOS 21M-PA-LD10-S4	0...600 mm			■	■		■	■	2 kHz	■	■					<b>2.1.143</b>
BOS 21M-NA-LD10-S4	0...600 mm			■		■	■	■	2 kHz	■	■					<b>2.1.143</b>
 <b>Retroreflective</b>																
BOS 21M-PA-PR10-S4	0.1...8 m	■			■		■	■	1 kHz	■	■		■			<b>2.1.140</b>
BOS 21M-NA-PR10-S4	0.1...8 m	■				■	■	■	1 kHz	■	■		■			<b>2.1.140</b>
BOS 21M-PA-LR10-S4	0.1...20 m			■	■		■	■	2 kHz	■	■		■			<b>2.1.143</b>
BOS 21M-NA-LR10-S4	0.1...20 m			■		■	■	■	2 kHz	■	■		■			<b>2.1.143</b>
BOS 21M-PA-PK10-S4	0...4 m	■			■		■	■	1 kHz	■	■		■	■		<b>2.1.141</b>
BOS 21M-NA-PK10-S4	0...4 m	■				■	■	■	1 kHz	■	■		■	■		<b>2.1.141</b>
BOS 21M-PA-PT10-S4	0...2 m	■			■		■	■	1 kHz	■	■		■	■	■	<b>2.1.141</b>
BOS 21M-NA-PT10-S4	0...2 m	■				■	■	■	1 kHz	■	■		■	■	■	<b>2.1.141</b>
 <b>Through-beam</b>																
BOS 21M-PA-IE10-S4	0...20 m	■			■		■	■	500 Hz	■	■					<b>2.1.141</b>
BOS 21M-NA-IE10-S4	0...20 m	■				■	■	■	500 Hz	■	■					<b>2.1.141</b>
BOS 21M-PA-LE10-S4	0...60 m			■	■		■	■	1.5 kHz	■	■					<b>2.1.143</b>
BOS 21M-NA-LE10-S4	0...60 m			■		■	■	■	1.5 kHz	■	■					<b>2.1.143</b>
BOS 21M-XT-IS11-S4	0...20 m	■								■	■					<b>2.1.141</b>
BOS 21M-XT-LS11-S4	0...60 m		■							■	■					<b>2.1.143</b>

2.1

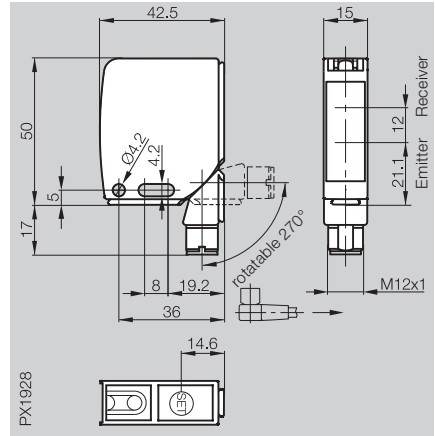
2.3

Photoelectric sensors accessories page 2.3.2 ...

5

Connectors ... page 5.2 ...

Diffuse with background suppression	Sensing distance	<b>70...200 mm</b>
Diffuse with foreground suppression	Sensing distance	
Diffuse	Sensing distance	



**Diffuse**

PNP	70...200 mm	HGA
NPN	70...200 mm	HGA
PNP	70...200 mm	VGA + HGA
NPN	70...200 mm	VGA + HGA
PNP	0.01...1 m	
NPN	0.01...1 m	
PNP	0.05...2 m	
NPN	0.05...2 m	

BOS 21M-PUS-RH12-S4
BOS 21M-NUS-RH12-S4

**Electrical data**

Supply voltage $U_B$	10...30 V DC
Ripple	≤ 2 V DC
No-load supply current $I_0$ max.	≤ 50 mA
Switching output	PNP- or NPN-Transistor
Output current	100 mA
Switching type	Light-/dark-on (selectable)
Voltage drop $U_d$ at $I_o$	2 V
Settings	Teach-in


**Optical data**

Recommended sensing distance	70...200 mm
Emitter, light type	LED, red light
Wavelength	670 nm


**Indicators**

Output function indicator	LED yellow
Stability indicator	LED green/red


**Time data**

Response time	0.5 ms
Switching frequency $f$	1 kHz


**Mechanical data**

Dimensions	42.5×50×15 mm
Connection	M12 connector, 4-pin
Housing material	GD-Zn/Al
Optical surface	PMMA
Weight	76 g


**Ambient data**

Degree of protection per IEC 60529	IP 67
Polarity reversal protected	yes
Short circuit protected	yes
Ambient temperature range $T_a$	-10...+50 °C
Ambient light rejection	10 kLux


Diffuse values referenced to Kodak gray card 90% Reflexion.

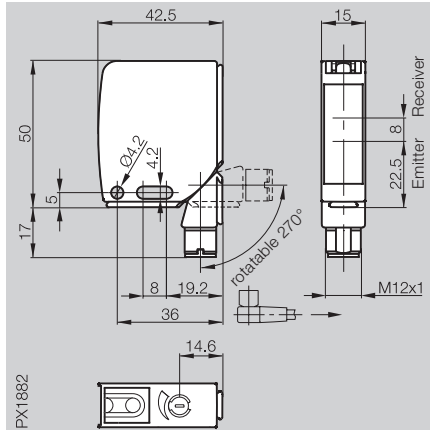
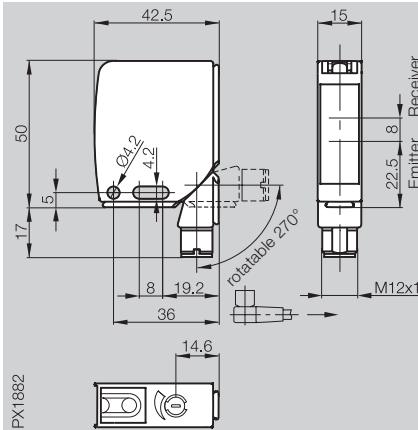
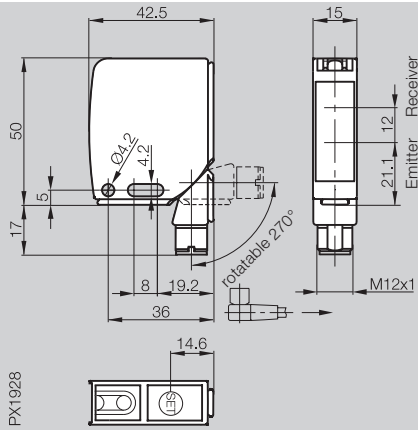
Wiring diagrams, characteristics and accessories see page 2.1.144 to 2.1.147.



**70...200 mm**

**0.01...1 m**

**0.05...2 m**



BOS 21M-PUS-RV13-S4  
BOS 21M-NUS-RV13-S4

BOS 21M-PA-RD10-S4  
BOS 21M-NA-RD10-S4

BOS 21M-PA-ID10-S4  
BOS 21M-NA-ID10-S4

10...30 V DC  
≤ 2 V DC  
≤ 50 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (selectable)  
2 V  
Teach-in

10...30 V DC  
≤ 2 V DC  
≤ 35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°

10...30 V DC  
≤ 2 V DC  
≤ 35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°

70...200 mm  
LED, red light  
670 nm

0.01...1 m  
LED, red light  
650 nm

0.05...2 m  
LED, infrared  
880 nm

LED yellow  
LED green

LED yellow  
LED green

LED yellow  
LED green

0.5 ms  
1 kHz

1 ms  
500 Hz

1 ms  
500 Hz

42.5x50x15 mm  
M12 connector, 4-pin  
GD-Zn/Al  
PMMA  
76 g

42.5x50x15 mm  
M12 connector, 4-pin  
GD-Zn/Al  
PMMA  
76 g

42.5x50x15 mm  
M12 connector, 4-pin  
GD-Zn/Al  
PMMA  
76 g

IP 67  
yes  
yes  
-10...+50 °C  
10 kLux

IP 67  
yes  
yes  
-25...+55 °C  
10 kLux

IP 67  
yes  
yes  
-25...+55 °C  
10 kLux

**2.1**

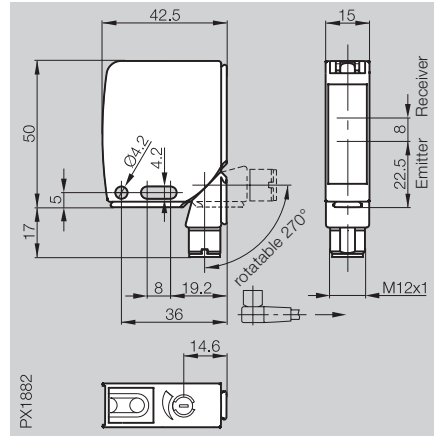
**2.3**

Photoelectric sensors  
accessories  
page 2.3.2 ...

**5**

Connectors ...  
page 5.2 ...

Retroreflective with polarizing filter	Range	<b>0.1...8 m</b>
Retroreflective Autocollimation	Range	
Retroreflective for glass sensing	Range	
Through-beam	Range	



**Retroreflective**

	PNP	0.1...8 m	Polarizing filter	BOS 21M-PA-PR10-S4
	NPN	0.1...8 m	Polarizing filter	BOS 21M-NA-PR10-S4
	PNP	4 m	Polarizing filter, autocollimation	
	NPN	4 m	Polarizing filter, autocollimation	
	PNP	2 m	Polarizing filter, autocollimation, glass sensing	
	NPN	2 m	Polarizing filter, autocollimation, glass sensing	

**Through-beam**

	PNP	20 m	Receiver	
	NPN	20 m	Receiver	
		20 m	Emitter	

**Electrical data**

Supply voltage $U_B$	10...30 V DC
Ripple	$\leq 2$ V DC
No-load supply current $I_0$ max.	$\leq 35$ mA
Switching output	PNP- or NPN-Transistor
Output current	100 mA
Switching type	Light-/dark-on (push-pull)
Voltage drop $U_d$ at $I_0$	2 V
Settings	Potentiometer 270°

**Optical data**

Recommended range	0.1...8 m
Emitter, light type	LED, red light
Wavelength	650 nm

**Indicators**

Power-on indicator	
Output function indicator	LED yellow
Stability indicator	LED green

**Time data**

Response time	0.5 ms
Switching frequency $f$	1 kHz

**Mechanical data**

Dimensions	42.5x50x15 mm
Connection	M12 connector, 4-pin
Housing material	GD-Zn/Al
Optical surface	PMMA
Weight	76 g

**Ambient data**

Degree of protection per IEC 60529	IP 67
Polarity reversal protected	yes
Short circuit protected	yes
Ambient temperature range $T_a$	-25...+55 °C
Ambient light rejection	10 kLux

Retroreflective values referenced to R1 reflector.

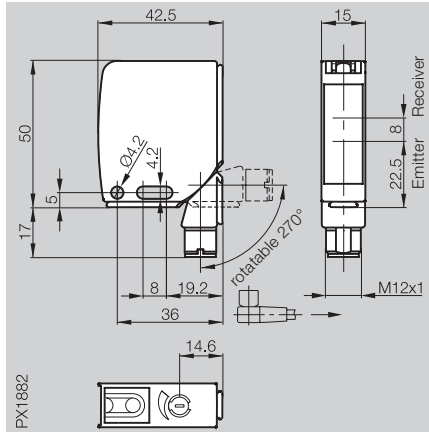
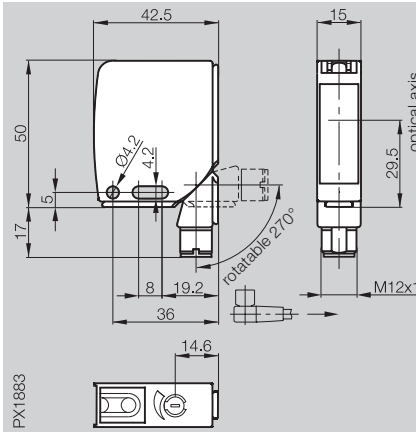
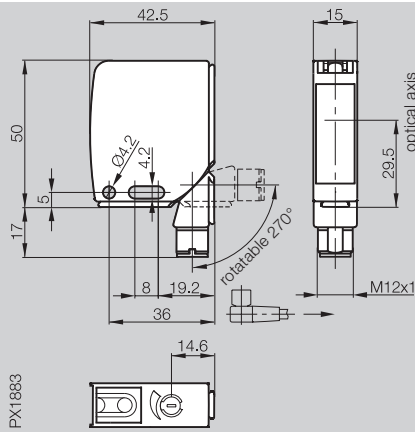
Wiring diagrams, characteristics and accessories see page 2.1.144 to 2.1.147.



**0...4 m**

**0...2 m**

**0...20 m**



BOS 21M-PA-PK10-S4  
BOS 21M-NA-PK10-S4

BOS 21M-PA-PT10-S4  
BOS 21M-NA-PT10-S4

BOS 21M-PA-IE10-S4  
BOS 21M-NA-IE10-S4  
BOS 21M-XT-IS11-S4

10...30 V DC  
≤ 2 V DC  
≤ 35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°

10...30 V DC  
≤ 2 V DC  
≤ 35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°

10...30 V DC  
≤ 2 V DC  
≤ 35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°  
Test input (emitter)

0...4 m  
LED, red light  
650 nm

0...2 m  
LED, red light  
650 nm

0...20 m  
LED, infrared  
880 nm

LED yellow  
LED green

LED yellow

LED green (emitter)  
LED yellow (receiver)  
LED green (receiver)

0.5 ms  
1 kHz

0.5 ms  
1 kHz

1 ms  
500 Hz

42.5x50x15 mm  
M12 connector, 4-pin  
GD-Zn/Al

42.5x50x15 mm  
M12 connector, 4-pin  
GD-Zn/Al

42.5x50x15 mm  
M12 connector, 4-pin  
GD-Zn/Al

Glass  
78 g

Glass\*  
78 g

PMMA  
75 g

IP 67  
yes  
yes

IP 67  
yes  
yes

IP 67  
yes  
yes

-25...+55 °C  
10 kLux

-25...+55 °C  
10 kLux

-25...+55 °C  
10 kLux

\*also available with PMMA

**2.1**

**2.3**

Photoelectric sensors accessories page 2.3.2 ...

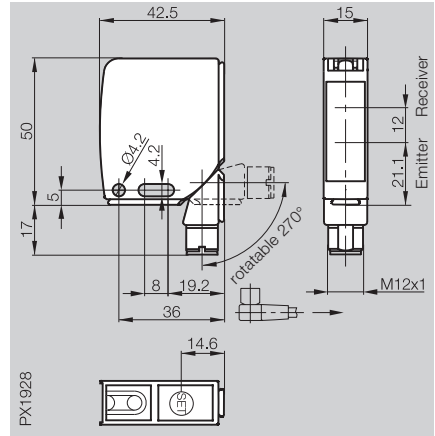
**5**

Connectors ... page 5.2 ...

# Photoelectric Sensors

BOS 21M  
Sensing distance 100 mm

Diffuse with background suppression	Sensing distance	<b>50...100 mm</b>
Diffuse	Sensing distance	
Retroreflective with polarizing filter	Range	
Through-beam	Range	



Diffuse			
	PNP	50...100 mm HGA	BOS 21M-PUS-LH12-S4
	NPN	50...100 mm HGA	BOS 21M-NUS-LH12-S4
	PNP	600 mm	
	NPN	600 mm	
Retroreflective			
	PNP	0.1...20 m Polarizing filter	
	NPN	0.1...20 m Polarizing filter	
Through-beam			
	PNP	60 m Receiver	
	NPN	60 m Receiver	
		60 m Emitter	
Electrical data			
Supply voltage $U_B$		10...30 V DC	
Ripple		$\leq 2$ V DC	
No-load supply current $I_0$ max.		60 mA	
Switching output		PNP- or NPN-Transistor	
Output current		100 mA	
Switching type		Light-/dark-on (selectable)	
Voltage drop $U_d$ at $I_0$		2 V	
Settings		Teach-in	
Help functions			
Optical data			
Recommended sensing distance/range		50...100 mm	
Emitter, light type		Laser, red light	
Wavelength		650 nm	
Laser class		1	
Indicators			
Power-on indicator			
Output function indicator		LED yellow	
Stability indicator		LED green/red	
Time data			
Response time		0.5 ms	
Switching frequency $f$		1 kHz	
Mechanical data			
Dimensions		42.5x50x15 mm	
Connection		M12 connector, 4-pin	
Housing material		GD-Zn/Al	
Optical surface		PMMA	
Weight		77 g	
Ambient data			
Degree of protection per IEC 60529		IP 67	
Polarity reversal protected		yes	
Short circuit protected		yes	
Ambient temperature range $T_a$		-10...+50 °C	
Ambient light rejection		5 kLux	

Diffuse values referenced to Kodak gray card 90% Reflexion.  
Retroreflective values referenced to R1 reflector.





Laser



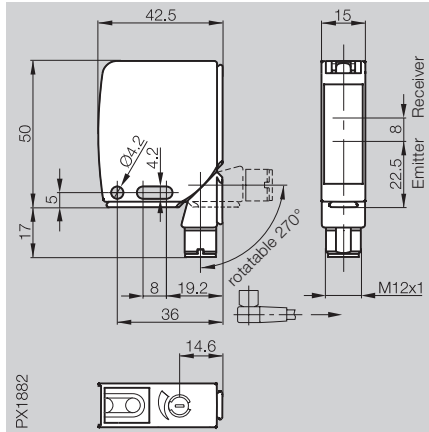
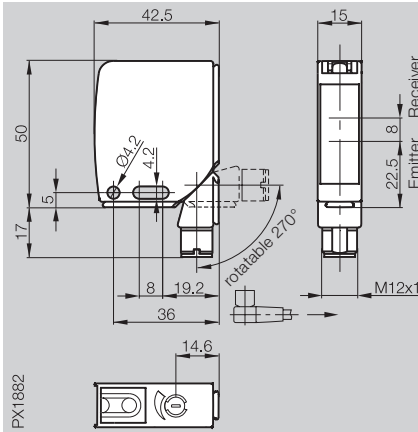
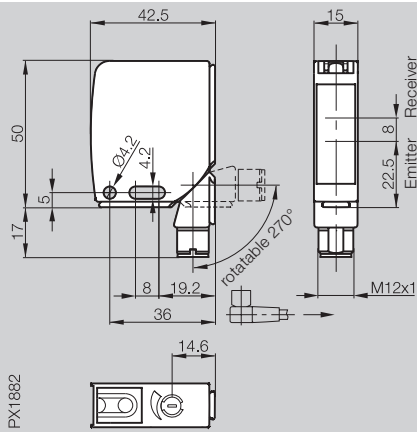
Photoelectric  
Sensors

BOS 21M  
Sensing distance 600 mm  
Range 20 m, 60 m

0...600 mm

0.1...20 m

0...60 m



BOS 21M-PA-LD10-S4  
BOS 21M-NA-LD10-S4

BOS 21M-PA-LR10-S4  
BOS 21M-NA-LR10-S4

BOS 21M-PA-LE10-S4  
BOS 21M-NA-LE10-S4  
BOS 21M-XT-LS11-S4

10...30 V DC  
≤ 2 V DC  
35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°

10...30 V DC  
≤ 2 V DC  
35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°

10...30 V DC  
≤ 2 V DC  
35 mA  
PNP- or NPN-Transistor  
100 mA  
Light-/dark-on (push-pull)  
2 V  
Potentiometer 270°  
Test input (emitter)

0...600 mm  
Laser, red light  
650 nm  
1

0.1...20 m  
Laser, red light  
650 nm  
1

0...60 m  
Laser, red light  
650 nm  
1

LED green  
LED yellow

LED green  
LED yellow

LED green  
LED yellow

0.25 ms  
2 kHz

0.25 ms  
2 kHz

0.33 ms  
1.5 kHz

42.5×50×15 mm  
M12 connector, 4-pin  
GD-Zn/Al  
PMMA  
77 g

42.5×50×15 mm  
M12 connector, 4-pin  
GD-Zn/Al  
PMMA  
77 g

42.5×50×15 mm  
M12 connector, 4-pin  
GD-Zn/Al  
PMMA  
76 g

IP 67  
yes  
yes  
-10...+50 °C  
5 kLux

IP 67  
yes  
yes  
-10...+50 °C  
5 kLux

IP 67  
yes  
yes  
-10...+50 °C  
5 kLux

2.1

2.3

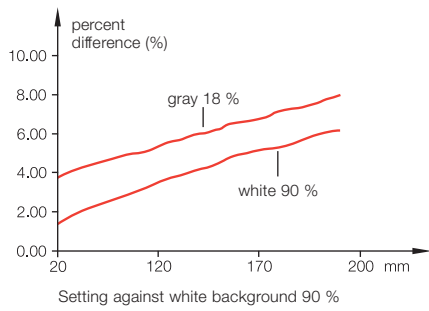
Photoelectric  
sensors  
accessories  
page 2.3.2 ...

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Connectors ...  
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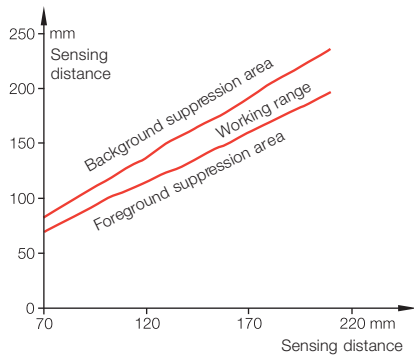
Wiring diagrams, characteristics and accessories see page 2.1.144 to 2.1.147.

**Diffuse with background suppression**  
**BOS 21M- \_US-RH12-S4**



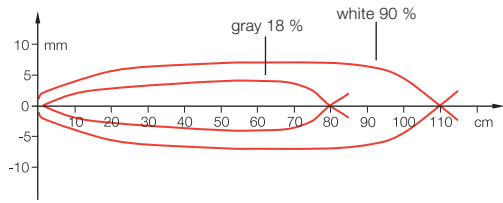
Detection range

**Diffuse with fore- and background suppression**  
**BOS 21M- \_US-RV13-S4**

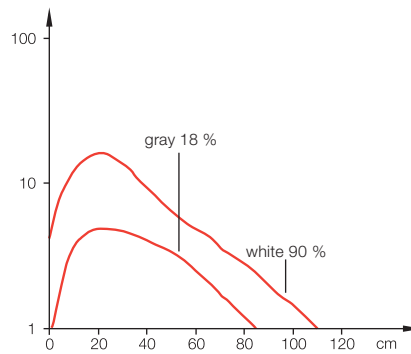


Detection range

**Diffuse**  
**BOS 21M- \_A-RD10-S4**

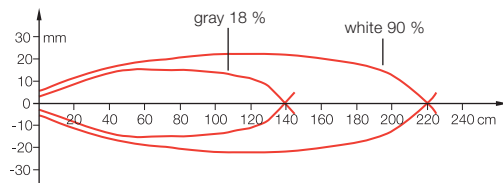


Detection range

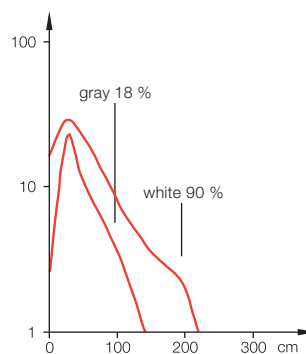


Function reserve

**Diffuse long range**  
**BOS 21M- \_A-ID10-S4**

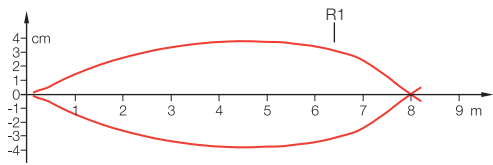


Detection range

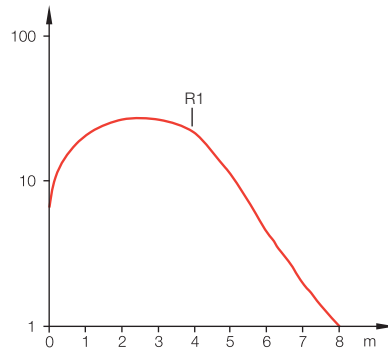


Function reserve

**Retroreflective polarized  
BOS 21M- A-PR10-S4**

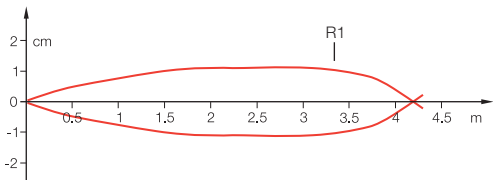


Detection range

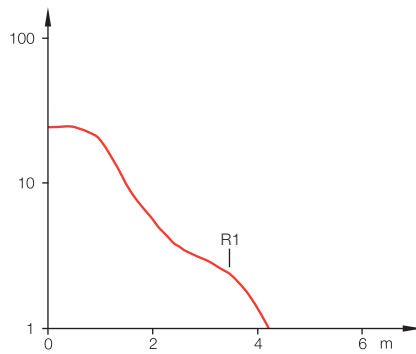


Function reserve

**Retroreflective autocollimation  
BOS 21M- A-PK10-S4**

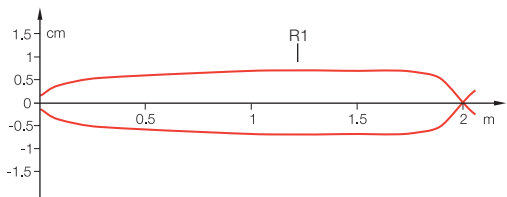


Detection range

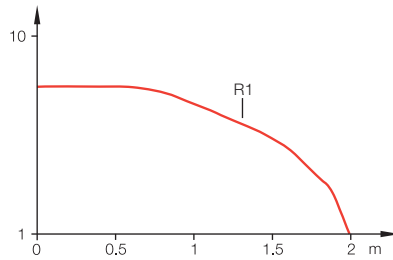


Function reserve

**Retroreflective glass sensing  
BOS 21M- A-PT10-S4**

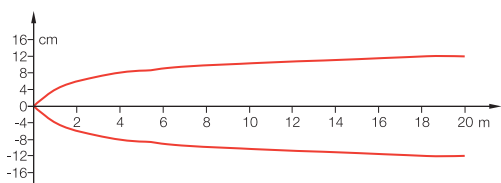


Detection range

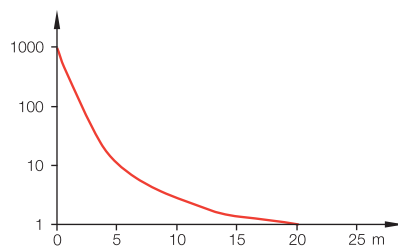


Resolution

**Through-beam  
BOS 21M- A-IE10-S4**



Detection range



Function reserve

**2.1**

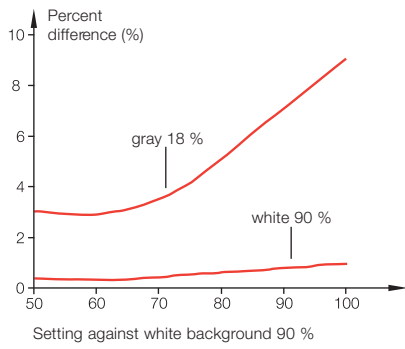
**2.3**

Photoelectric sensors  
accessories  
page 2.3.2 ...

**5**

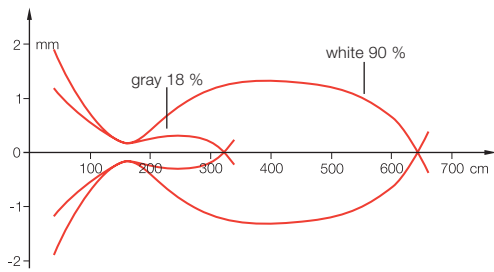
Connectors ...  
page 5.2 ...

**Laser diffuse with background suppression**  
**BOS 21M-\_US-LH12-S4**

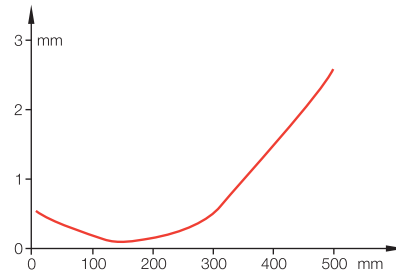


Tolerance with standard setting

**Laser diffuse**  
**BOS 21M-\_A-LD10-S4**

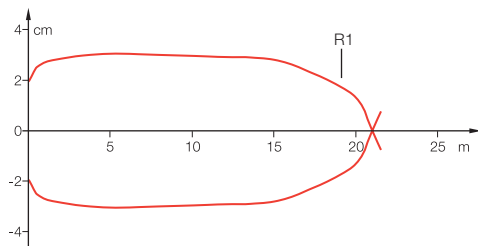


Detection range

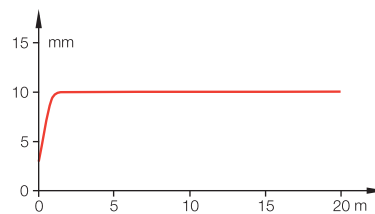


Resolution

**Laser retroreflective polarized**  
**BOS 21M-\_A-LR10-S4**

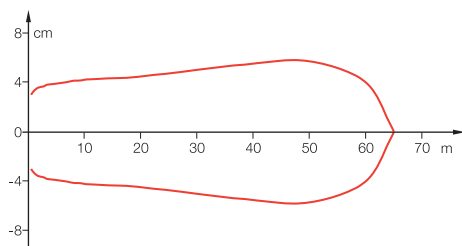


Detection range

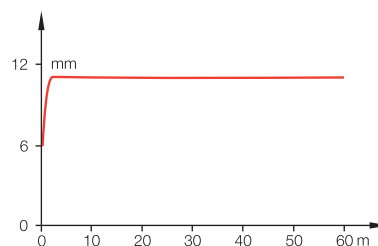


Resolution

**Laser through-beam**  
**BOS 21M-\_A-LE10-S4**

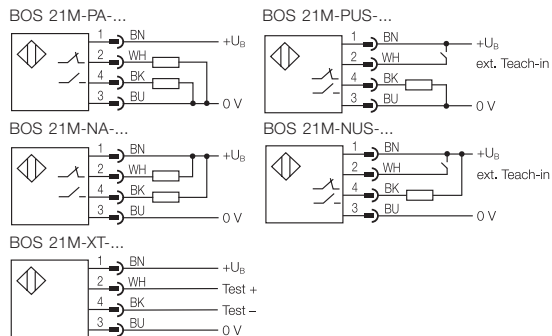


Detection range



Resolution

**Wiring diagrams**



**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



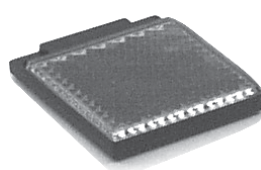
Adapter plate  
BOS 21-AD-1



Holding system  
BOS 21-HS-1



Reflector  
BOS R-1



Reflector  
BOS R-9



Connector  
BKS-\_19/BKS-\_20

**2.1**

**2.3**

Photoelectric  
sensors  
accessories  
page 2.3.2 ...

**5**

Connectors ...  
page 5.2 ...