



Only true specialists are capable of achieving top results. So Balluff has expanded its product range with optosensors designed for an equally wide range of applications. We will be glad to assist you in selecting the right optosensors for your applications.

**Tubular Sensors in Metal Housing**

- 2.1.2 BOS 12M
- 2.1.7 BOS 18 overview
- 2.1.9 BOS 18M with potentiometer
- 2.1.14 BOS 18M with teach-in
- 2.1.17 BOS 18M high-precision laser thru-beams
- 2.1.21 BOS 18M rugged sensors for machine tools
- 2.1.24 BOS 18E in stainless, sensors for the foods industry

**Tubular Sensors in Plastic Housing**

- 2.1.27 BOS 18K with potentiometer
- 2.1.30 BOS 18K with laser

**Tubular High Performance Sensors**

- 2.1.34 BOS 30M
- Small Sensors**
- 2.1.37 BOS 6K, BOS 15K overview
- 2.1.38 BOS 6K with teach-in
- 2.1.42 BOS 15K with potentiometer

**Block Style Sensors**

- 2.1.46 BOS 25K, BOS 26K, BOS 35K overview
- 2.1.47 BOS 25K with potentiometer
- 2.1.51 BOS 26K precision
- 2.1.54 BOS 26K laser
- 2.1.57 BOS 35K rugged sensors

**High Performance Sensors**

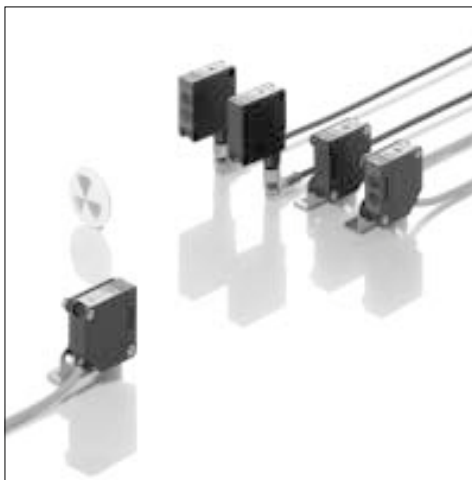
- 2.1.60 BOS 36K, BOS 65K overview
- 2.1.61 BOS 36K compact sensors
- 2.1.65 BOS 65K versatile sensors

Block style sensors have the best optical performance. Likewise, complex signal processing (background suppression, relays, lasers) and ease of use (numerical indicator, rotatable connector) are best realized in block style sensors.

Series **BOS 25K** and **BOS 26K** are mechanically compatible. With BOS 25K the emphasis was placed on as many standard applications as possible (e. g. DC or AC/DC power options with relay output).

The **BOS 26K** sensors add additional features such as laser and red light as well as increased range and sensing distances. Mechanically the BOS 26K series offers advantages as well: rotatable connector, 4-turn pot with numerical indicator.

The **BOS 35K** series is tailor made for harsh ambient conditions (such as filling bottles and cans, the food industry, machine tool building). The sensor is fully potted, making it absolutely sealed, shock and vibration proof.



**BOS 25K**



**BOS 26K**



**BOS 35K**

Special functions like adjustable background suppression or relay output naturally require more space. That you can still have a handy, compact sensor is shown by the **BOS 25K**.

- Diffuse
- Diffuse with background suppression
- Retroreflective with polarizing filter
- Thru-beam

The complete series is available for DC (10...30 V) and AC/DC (15...275 V), with relay output. The DC version uses an M12 connector (cable versions upon request), the AC/DC version is only available with cable.

### Features

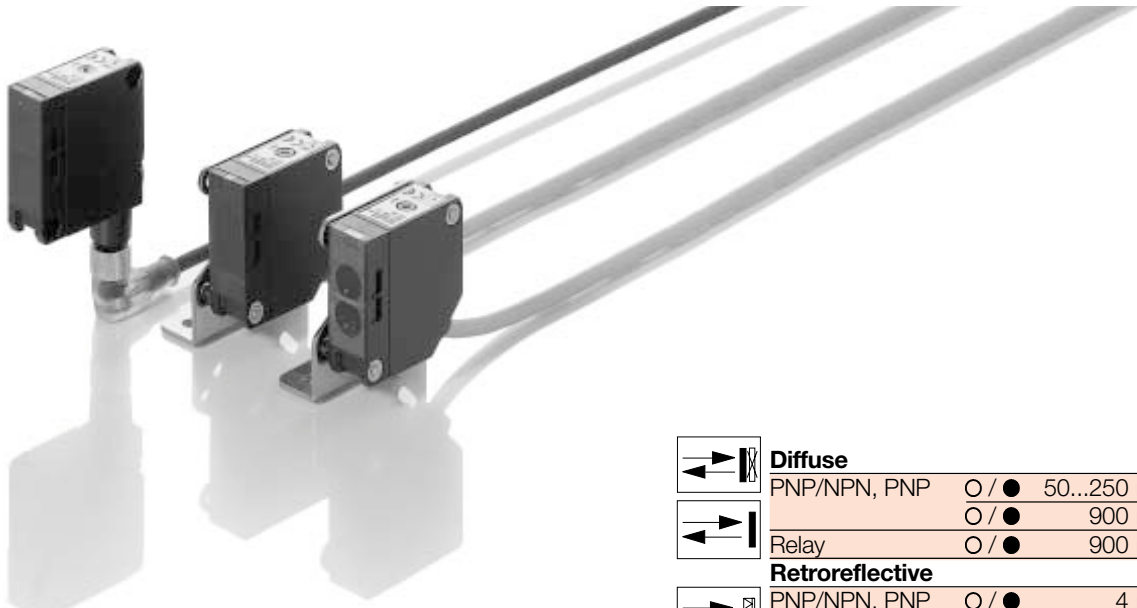
- For DC supply 10...30 V DC with PNP output
- Universal model 15...264 V AC/DC with relay output
- Light-on/dark-on selectable
- Reception LED for the safe zone (green LED)
- Function display for the output (red LED)

- Thru-beam, retroreflective with polarizing filter and diffuse in the same housing
- Retroreflective with adjustable background suppression
- Impact resistant plastic housing
- Thru-beam version with test input and alarm output
- LED display visible from the front and top
- High immunity to ambient light and noise spikes

### Applications

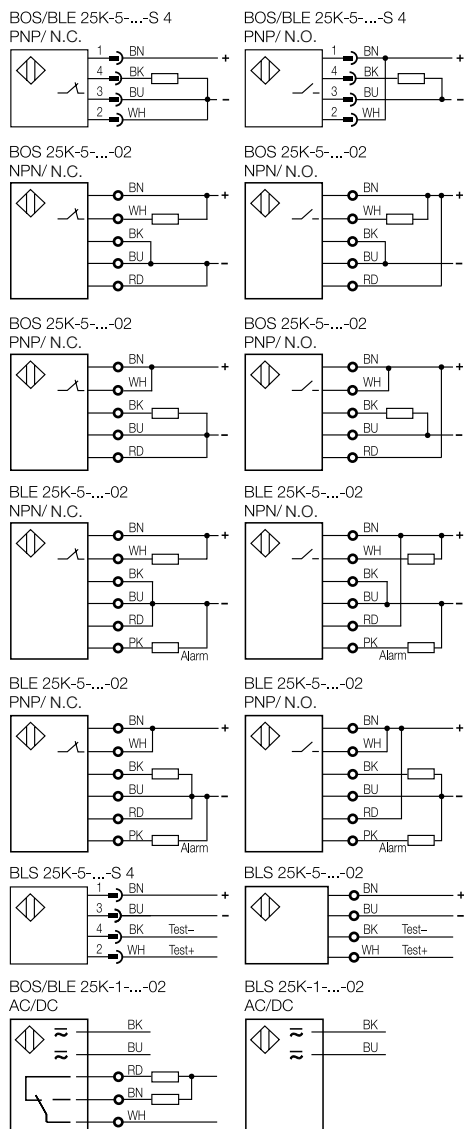
- Conveying
- Packaging
- Elevators
- Machine tools
- Gate controls
- Robots
- Small parts recognition
- Parts counting
- Assembly and handling automation





Series	
Diffuse	sensing range
Retroreflective	sensing range
Thru-beam	sensing range

Wiring diagrams



	<b>Diffuse</b>			
	PNP/NPN, PNP	O / ●	50...250 mm	HGA
	<b>Retroreflective</b>		900 mm	
		Relay	O / ●	900 mm
	<b>Thru-beam</b>	PNP/NPN, PNP	O / ●	4 m red light, polariz. filter
		Relay	O / ●	4 m red light, polariz. filter
	<b>Relay</b>	PNP/NPN, PNP	O / ●	5 m receiver
				5 m emitter
		Relay	O / ●	5 m receiver
				5 m emitter

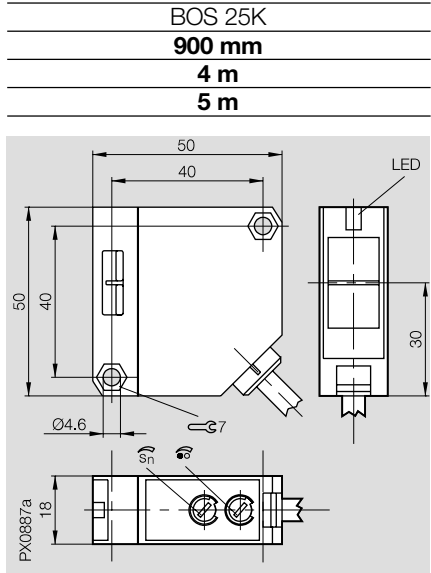
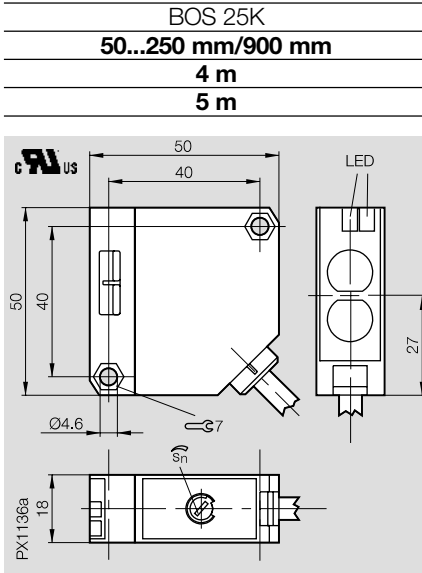
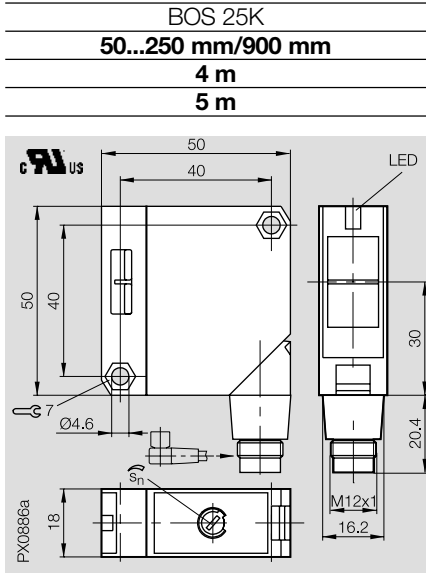
Supply voltage $U_B$
Voltage drop $U_d$ at $I_e$
Rated isolation voltage $U_i$
Rated operational current $I_e$
No-load supply current $I_0$ max.
Protected against polarity reversal
Short circuit protected
Permissible capacitance
On/off delay (Standard)
Frequency of operating cycles $f$ (Standard)
Utilization category
Output
Output function
Permissible ambient light
Sensitivity/range adjustment
Function indicator (receiver sees light)
Contamination indication
Ambient temperature range $T_a$
Degree of protection per IEC 60529
Insulation class
Housing material
Material of sensing face
Connection
No. of wires x conductor cross section
Recommended connector
Weight
O/● = Light-on/dark-on

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

For characteristics and accessories see page 2.1.50.

Sensors supplied standard with 2 m cable. Other lengths on request.





BOS 25K-5-M25-P-S 4
BOS 25K-5-C90-P-S 4
BOS 25K-5-B3-P-S 4
BLE 25K-5-F5-P-S 4
BLS 25K-5-G5-S 4

BOS 25K-5-M25-02
BOS 25K-5-C90-02
BOS 25K-5-B3-02
BLE 25K-5-F5-02
BLS 25K-5-G5-02

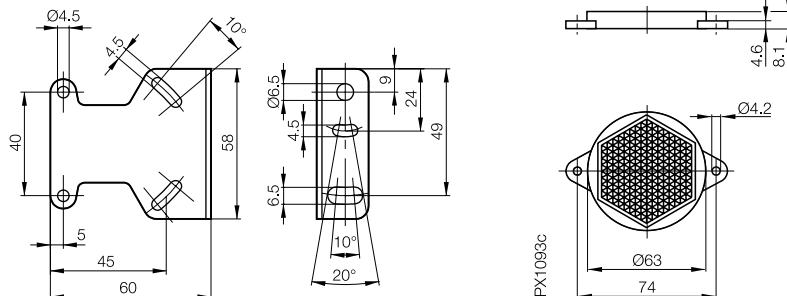
BOS 25K-1-C90-02
BOS 25K-1-B3-02
BLE 25K-1-F5-02
BLS 25K-1-G5-02

10...30 V DC
≤ 1.5 V
75 V DC
≤ 100 mA
≤ 30 mA
yes
yes
1 µF
≤ 1 ms
500 Hz
DC 13
PNP
O / ● selectable
3000 lux
pot. 0...270°, BOS 25K-5-M25-... w/spindle dr.
LED red
LED green (only BOS 25K-5-M25-...)
-15...55 °C
IP 65
ABS
PMMA
connector
BKS-B 19/BKS-B 20
80 g

10...30 V DC
≤ 1.5 V
75 V DC
≤ 100 mA
≤ 30 mA
yes
yes
1 µF
≤ 1 ms
500 Hz
DC 13
PNP/NPN
O / ● selectable
3000 lux
pot. 0...270°, BOS 25K-5-M25-... w/spindle dr.
LED red
LED green (only BOS 25K-5-M25-...)
-15...55 °C
IP 65
ABS
PMMA
2 m cable, PVC
4 × 0.34 mm <sup>2</sup>
160 g (with 2 m cable)

15...264 V AC/DC
250 V AC
≤ 40 mA
yes
no
≤ 30 ms
2 Hz
AC 140
relay 3 A, 250 V AC, 1 changeover
O / ● selectable
3000 lux
potentiometer 0...270°
LED red
no
-15...55 °C
IP 65
□
ABS
PMMA
2 m cable, PVC
5 × 0.25 mm <sup>2</sup>
160 g (with 2 m cable)

**Mounting bracket and reflector BOS R-10**  
(supplied)



2.1

2.3

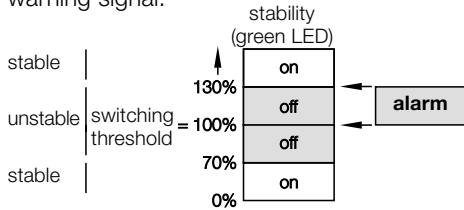
Accessories  
Optosensors  
page 2.3.2 ...

6

Connectors ...  
page 6.2 ...

### Alarm output for receiver (cable versions only)

The receiver is equipped with an alarm output. Any malfunctions caused by contamination or mechanical maladjustment are reported on this output (PNP open collector 30 mA) as a warning signal.



The alarm output is activated if the receiver signal stays in the alarm range for at least 3 seconds.

### Test input for emitter

The test input for the emitter interrupts the light pulses from the emitter and allows the function of emitter and receiver to be checked (when using Test+, Test- must be at 0 V, when using Test-, Test+ must be at 10...30 V).

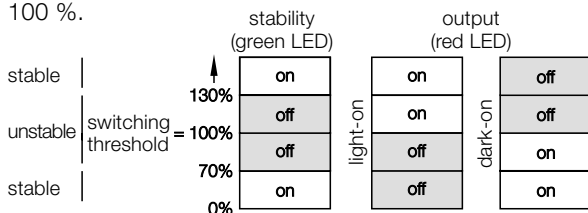
The receiver output must switch each time when a voltage of 10...30 V DC (Test+) or 0 V (Test-) is present on the test input. Contamination or maladjustment on the optical

axis causes the emitter signal to reach the receiver only weakly, if at all. Therefore the output will not switch even though the test input is activated. The test function provides a remote check of the thru-beam type and serves as a preventative measure.

### Green stability display only for BOS 25K-5-M25-...

The green stability display illuminates in the "safe" range, where the input energy is at least 30 % over or under the "threshold energy".

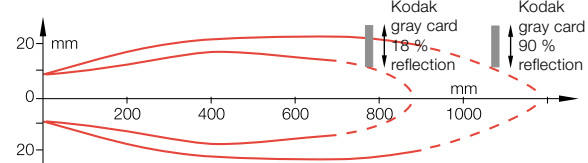
The "threshold energy" at which a signal change is effected, is defined as 100 %.



The "safe" range is therefore reached when

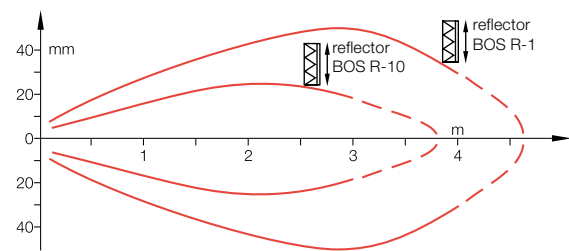
- the input signal is at 130 % or more of the threshold energy
- the input signal is at 70 % or less than the threshold energy.

### Diffuse BOS 25K-...-C90-...



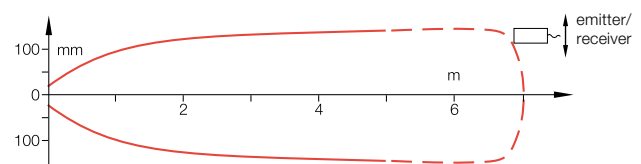
Sensing distance measured with lateral approach using Kodak gray card.

### Retroreflective with polarizing filter BOS 25K-...-B3-...



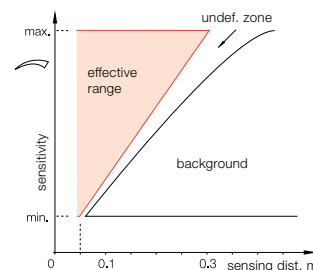
Sensing distance measured with lateral approach using reflector.

### Thru-beam BLE/BLS 25K-...



For the thru-beam sensor the maximum possible offset between emitter and receiver is measured.

### Diffuse BOS 25K with background suppression



The "undefined zone" in the diffuse BOS 25K-5-M25-... is the zone between the effective range and the background. The sensing distance can be set between 50 mm and 250 mm using a spindle screw on the upper side of the unit. Remember that the "undefined zone" also changes proportionally to the sensing distance.

### Recommended accessories

please order separately



Reflector BOS R-1



Connector BKS-B 19/BKS-B 20

The **BOS 26K** series with its 50 × 50 × 17 mm rectangular housings represents the logical development of an already successful design: a uniform housing for all sensor types used. This makes the BOS 26K series compatible with series BOS 25K and complements it with new kinds of sensors with special specifications and features:

- Laser sensors
- New, high-performance red light and infrared sensors
- Additional optical and mechanical functions

### Features

Features common to all sensors in the BOS 26K series include:

- Rotatable M12 connector
- Precise setting mechanism with two revolutions (720°)
- Clear character display for sensitivity setting
- Switching state and contamination display visible any direction
- Optimal design to resist contamination of the optics
- Complementary PNP or NPN output
- Approvals



### Applications

The BOS 26K series is ideally suited wherever greater demands are made in terms of precision, handling, high sensing distance or range, as well as small-parts detection.

- Precise small part detection
- Positioning tasks
- Detail checking
- Conveyor inspection (HGA)
- Conveyor technology
- Automation
- Handling equipment, robotics
- Machine building
- Specialty machines



2.1

2.3

Accessories  
Optosensors  
page 2.3.2 ...

6

Connectors ...  
page 6.2 ...

**Red light- and infrared light sensors**

**BOS 26K...-1HC** diffuse sensor with background suppression. Sensing distance 30...300 mm. Main advantages include the visible red light spot and the extended sensing range with the finest optical specifications.

The **BOS 26K...-1IE** offers extended sensing range from 150...600 mm. Uses IR light.

Retroreflective with autocollimation **BOS 26K...-1QE**. Uses a single-eye optical design, i. e., emitter and receiver beam coincide geometrically. Range is 5.5 m. The thru-beam works with polarized red light and offers increased precision, range and switching frequency compared with traditional systems.



Series	
Diffuse	sensing range
Retroreflective	sensing range

Diffuse			
	PNP O/●	30...300 mm	HGA, red light
	NPN O/●	30...300 mm	HGA, red light
	PNP O/●	150...600 mm	HGA, infrared light
	NPN O/●	150...600 mm	HGA, infrared light
Retroreflective			
	PNP O/●	0...5.5 m	red light, polariz. filter, autocollimation
	NPN O/●	0...5.5 m	red light, polariz. filter, autocollimation

Supply voltage $U_B$
Voltage drop $U_d$ at $I_e$
Rated isolation voltage $U_i$
Rated operational current $I_e$
No-load supply current $I_0$ max.
Protected against polarity reversal
Short circuit protected
Permissible capacitance
On/off delay (Standard)
Frequency of operating cycles $f$ (Standard)
Utilization category
Output
Output function
Permissible ambient light
Sensitivity/range adjustment
Function indicator (receiver sees light)
Status/contamination indication
Ambient temperature range $T_a$
Degree of protection per IEC 60529
Insulation class
Housing material
Material of sensing face
Connection

Recommended connector
Weight
Emitter type
Light spot diameter
Hysteresis (18 %/18 %)
Gray value shift (90 %/18 %)
O/● = Light-on/dark-on

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

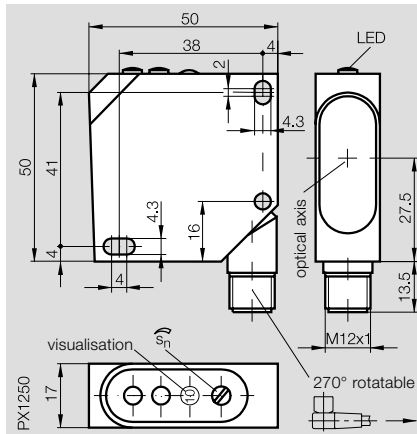
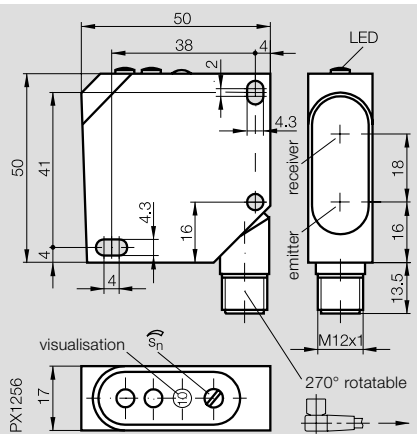
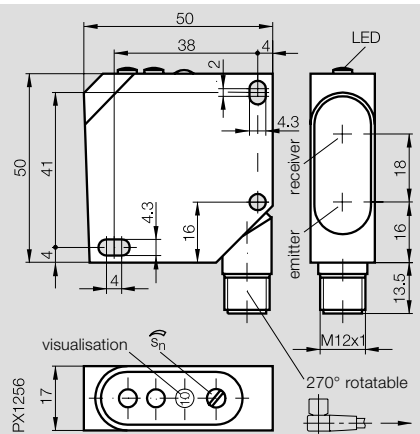
For characteristics and accessories see page 2.1.56.



BOS 26K  
30...300 mm

BOS 26K  
150...600 mm

BOS 26K  
0...5.5 m



BOS 26K-PA-1HC-S 4-C  
BOS 26K-NA-1HC-S 4-C

BOS 26K-PA-1IE-S 4-C  
BOS 26K-NA-1IE-S 4-C

BOS 26K-PA-1QE-S 4-C  
BOS 26K-NA-1QE-S 4-C

10...30 V DC  
≤ 2.4 V  
250 V AC  
200 mA  
≤ 35 mA

10...30 V DC  
≤ 2.4 V  
250 V AC  
200 mA  
≤ 70 mA

10...30 V DC  
≤ 2.4 V  
250 V AC  
200 mA  
≤ 30 mA

yes

yes

yes

yes

yes

yes

0.33 µF

0.33 µF

0.33 µF

0.5 ms

0.625 ms

0.5 ms

1000 Hz

800 Hz

1000 Hz

DC 13

DC 13

DC 13

PNP/NPN

PNP/NPN

PNP/NPN

O/●

O/●

O/●

5000 lux

5000 lux

5000 lux

2-turn spindle drive with display

2-turn spindle drive with display

2-turn potentiometer with display

LED yellow

LED yellow

LED yellow

LED green/red

LED green/red

LED green/red

-20...+60 °C

-20...+60 °C

-20...+60 °C

IP 67

IP 67

IP 67

ABS impact resistant

ABS impact resistant

ABS impact resistant

PMMA

PMMA

PMMA

connector

connector

connector

BKS-B 19/BKS-B 20

BKS-B 19/BKS-B 20

BKS-B 19/BKS-B 20

40 g

40 g

40 g

red 660 nm

infrared 880 nm

red 660 nm

8 × 8 mm at  $s_n = 200$  mm

20 × 20 mm at  $s_n = 400$  mm

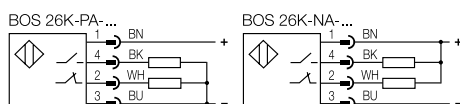
≤ 5 %

≤ 5 %

≤ 8 %

≤ 12 %

## Wiring diagrams



2.1

2.3

Accessories  
Optosensors  
page 2.3.2 ...

6

Connectors ...  
page 6.2 ...

**Laser sensors**

Features common to the laser sensors are: brilliant red light, extreme precision, extended sensing distance and range, and very high switching frequency. laser protection class II (no special safety measures required).

**The BOS 26K-..-1LHB**

proximity sensor with background suppression and focused red spot can detect very small objects virtually color-independent at between 30 and 150 mm. Extraneous objects, even in the near background, are ignored by the sensor. The fixed focusing provides a spot size of 0.1 mm at a distance of 80 mm.

**The BOS 26K-..-1LQK**

retroreflective model uses autocollimation, i. e., emitter and receiver beam coincide geometrically (single eye optics). Advantage: precise switching points for objects entering laterally over the entire beam area. Range is 2.5 m or 12 m! The polarizing filter is integrated. Advantage: the point where the beam meets the target or reflector is visible, making setup easier!

**Laser safety regulation**

(see page 2.0.18)

The emitter corresponds to laser safety class II per DIN EN 60825-1/94. Therefore, no additional safety measures are required.



The device must be mounted so that the laser warning label is easily visible.

Series	
Diffuse	sensing range
Retroreflective	sensing range



Diffuse			
	O/●	30...150 mm	HGA, red light
	O/●	30...150 mm	HGA, red light
Retroreflective			
	O/●	0...2,5 m	red light, polariz. filter, autocollimation
	O/●	0...12 m	red light, polariz. filter, autocollimation
	O/●	0...12 m	red light, polariz. filter, autocollimation

Supply voltage $U_B$
Voltage drop $U_d$ at $I_e$
Rated isolation voltage $U_i$
Rated operational current $I_e$
No-load supply current $I_0$ max.
Protected against polarity reversal
Short circuit protected
Permissible capacitance
On/off delay (Standard)
Frequency of operating cycles $f$ (Standard)
Utilization category
Output
Output function
Permissible ambient light
Sensitivity/range adjustment
Function indicator (receiver sees light)
Status/contamination indication
Ambient temperature range $T_a$
Degree of protection per IEC 60529
Insulation class
Laser protection class
Housing material
Material of sensing face
Connection
Recommended connector
Weight
Emitter type
Light spot diameter
Hysteresis (18 %/18 %)
Gray value shift (90 %/18 %)
O/● = Light-on/Dark-on

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

For characteristics and accessories see page 2.1.56.

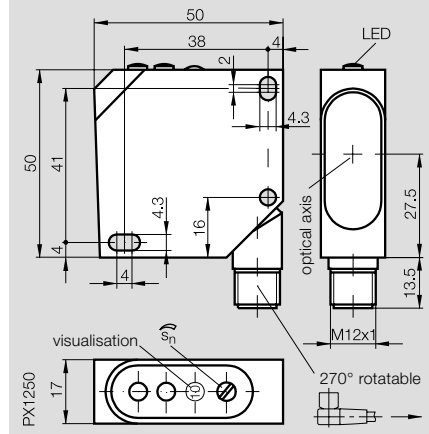
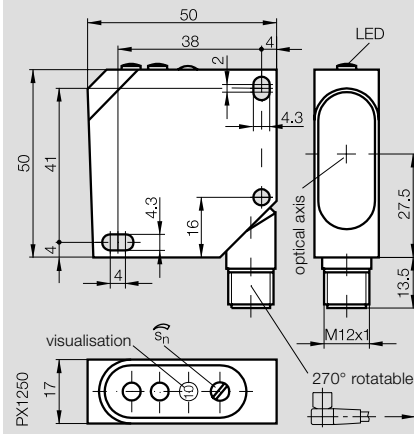
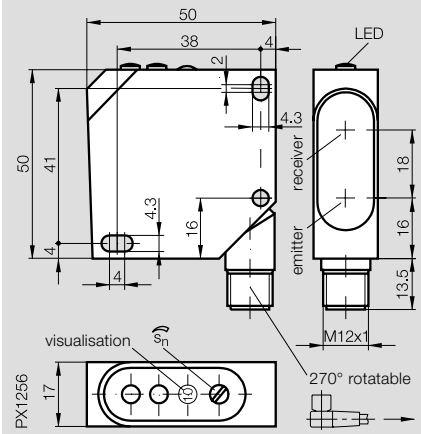




BOS 26K  
30...150 mm

BOS 26K  
0...12 m

BOS 26K  
0...2.5 m  
for precision small part detection



BOS 26K-PA-1LHB-S 4-C  
BOS 26K-NA-1LHB-S 4-C

BOS 26K-PA-1LQK-S 4-C  
BOS 26K-NA-1LQK-S 4-C

BOS 26K-PA-1LQB-S 4-C

10...30 V DC

≤ 2,5 V

250 V AC

200 mA

≤ 50 mA

yes

yes

0.33 µF

0.2 ms

2500 Hz

DC 13

PNP/NPN

O/●

5000 lux

2-turn spindle drive with display

LED yellow

LED green/red

-15...+45 °C

IP 67

II

ABS impact resistant

PMMA

connector

BKS-B 19/BKS-B 20

40 g

laser light red 660 nm

see table

≤ 5 %

≤ 8 %

10...30 V DC

≤ 2,5 V

250 V AC

200 mA

≤ 40 mA

yes

yes

0.33 µF

0.2 ms

2500 Hz

DC 13

PNP/NPN

O/●

5000 lux

2-turn potentiometer with display

LED yellow

LED green/red

-15...+45 °C

IP 67

II

ABS impact resistant

PMMA

connector

BKS-B 19/BKS-B 20

40 g

laser light red 670 nm

15 mm in 8 m

10...30 V DC

≤ 2,5 V

250 V AC

200 mA

≤ 40 mA

yes

yes

0.33 µF

0.2 ms

2500 Hz

DC 13

PNP/NPN

O/●

5000 lux

2-turn potentiometer with display

LED yellow

LED green/red

-15...+45 °C

IP 67

II

ABS impact resistant

PMMA

connector

BKS-B 19/BKS-B 20

40 g

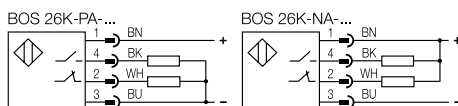
laser light red 670 nm

1 mm in 500 mm

### Light spot diameter [mm]

Distance	30	60	80	100	150
Spot-Ø	1.8	0.7	0.1	1.1	2.5

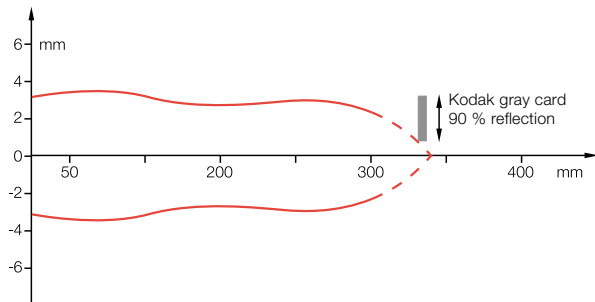
### Wiring diagrams



for use only with special laser reflectors  
BOS R-13 and BOS R-14

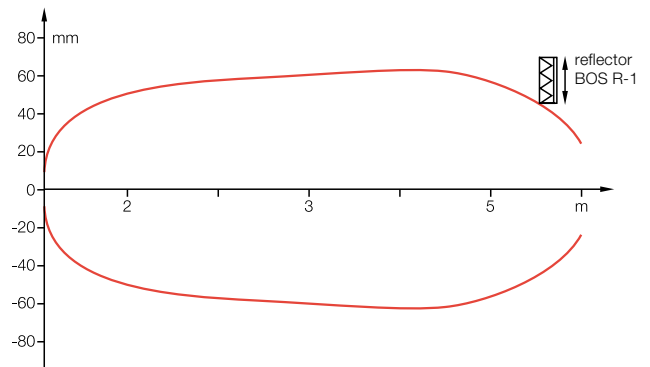


**Diffuse BOS 26K-...-1HC-...**



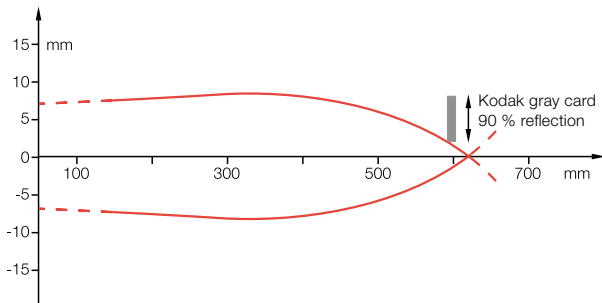
Sensing distance measured with lateral approach using Kodak gray card.

**Retroreflective BOS 26K-...-1QE-...**



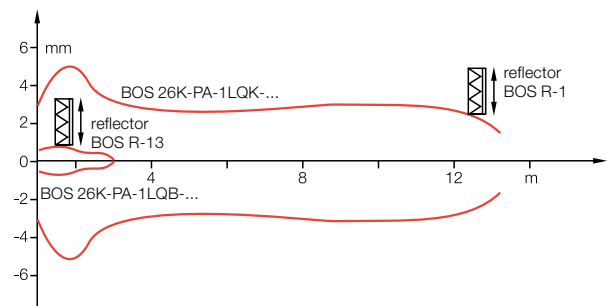
Sensing distance measured with lateral approach using reflector.

**Diffuse BOS 26K-...-1IE-...**



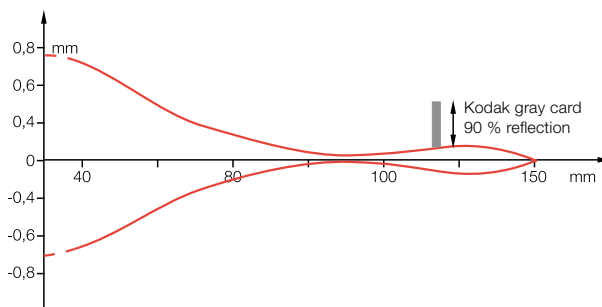
Sensing distance measured with lateral approach using Kodak gray card.

**Retroreflective BOS 26K-...-1LQK/1LQB-...**



Sensing distance measured with lateral approach using reflector.

**Diffuse BOS 26K-...-1LHB-...**







Sensing distance measured with lateral approach using Kodak gray card.

**Contamination indicator**

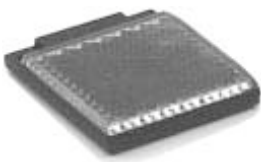
The BOS 26K has 2 display LED's: one yellow for function indicating and a green/red for status and contamination indication. Should the received light drop below a certain level, this will be indicated by a red LED. This permits contamination or maladjustment to be detected early.

**Display and operating elements**

-  Function display "light at receiver" yellow LED
-  Status/contamination indicator, dual-LED green/red
-  Visualizing switching distance
-  Sensitivity or range adjustment pot or spindle

**Recommended accessories**

please order separately



Reflector  
BOS R-9



Reflector  
BOS R-1



Mounting bracket  
BOS 26-HW-1



Connector  
BKS-B 19/BKS-B 20