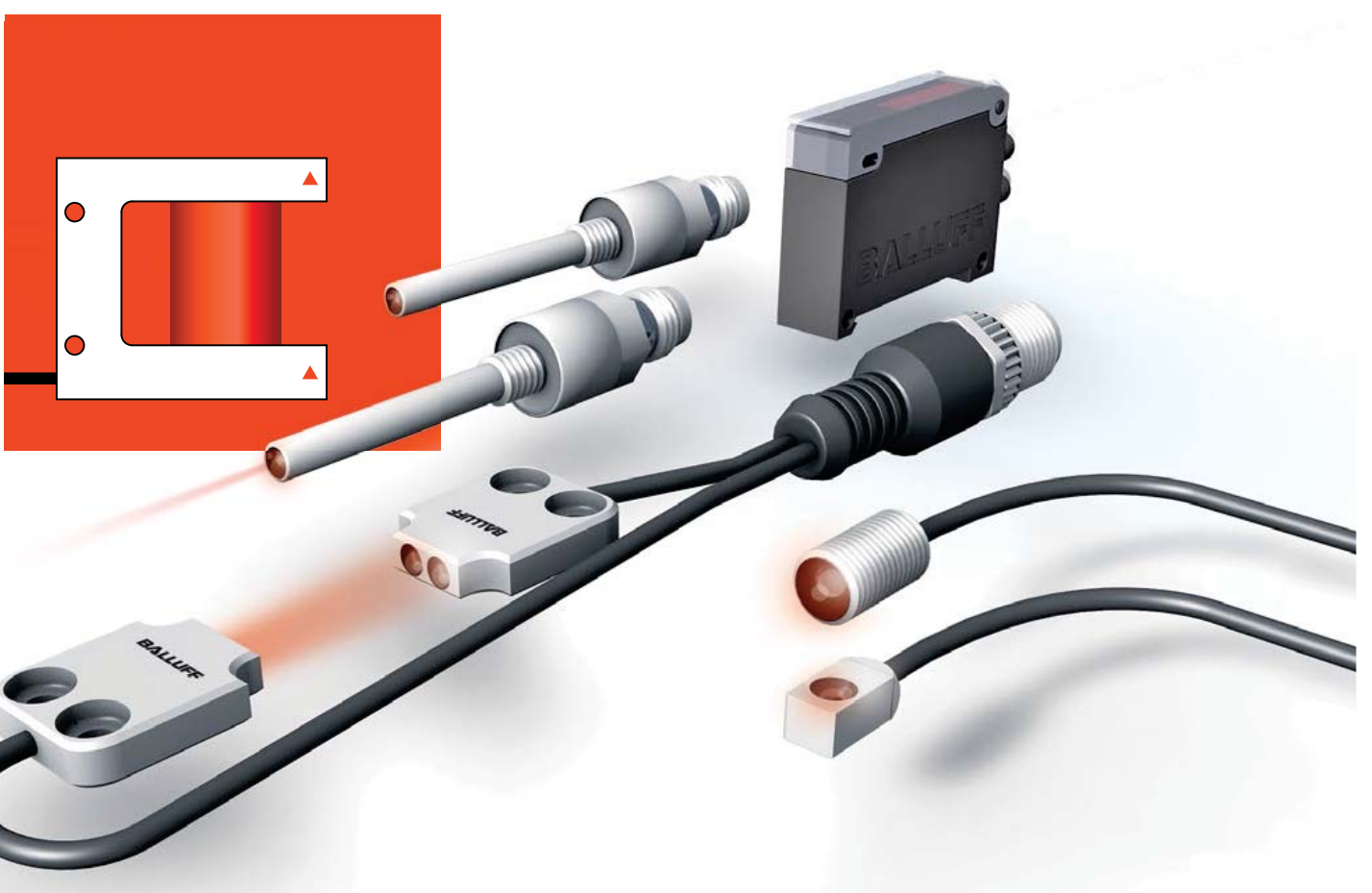
BALLUFF

sensors worldwide

Object Detection

Photoelectric Sensors with Outstanding Precision



Balluff North America

Florence, Kentucky USA
Balluff's Florence, Kentucky United States headquarters is located just south of Cincinnati, Ohio. Our customers are in industries such as automotive, machine tool, robotics, injection molding, packaging, material handling, and more.

In addition to sales, marketing, and logistic functions, this facility manufactures Micropulse® magnetostrictive linear position sensors and warehouses over 60,000 products.

The Balluff Global Network

Balluff spans the globe with representation in 49 countries.

Argentina
Australia
Austria
Belarus
Belgium
Brazil
Bulgaria
Canada
China
Columbia
Croatia
Czech Republic
Denmark
Finland
France
Great Britain
Greece
Hong Kong
Hungary
India
Indonesia
Iran
Israel
Italy
Japan
Korea
Malaysia
Mexico
Netherlands
Norway
Pakistan
Phillipines
Poland
Portugal
Romania
Russia
Singapore
Slovakia
Slovenia
South Africa
Spain
Sweden
Switzerland
Thailand
Taiwan
Turkey
USA
Venezuela

Photoelectric Sensors with Outstanding Precision

Modular components for maximum possible flexibility

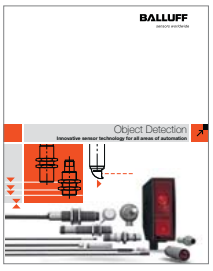
Flexible modular system thanks to manufacturer expertise
Our photoelectric sensors feature unmatched performance and precision. No wonder, as we are proven photoelectric specialists. We have the entire technological bandwidth of development and production of photoelectric sensors. We have expertise in each individual sensor component, allowing you to benefit from our advanced knowledge of sensor applications. Take advantage of our modular design principle, which provides the ideal solution for your requirements. For example, with modular size systems for optical window and through-beam fork sensors. Individually selected light wavelengths. Or compact sensors with high-performance miniature optics.

Optimized for the smallest installation space
From the beginning, fitting a large amount of optical performance into the smallest possible space was our most important goal for sensor production. However, the photoelectric components available on the market were not precise or powerful enough to meet our requirements.

Therefore, we developed our own manufacturing technology, had it patented and put the requirements in place for micro-optical components with unmatched technical characteristics: LED, photodiode, phototransistor and laser diode units.

Their micro-optics feature long range and excellent resolution values. Integrated metal housings provide the needed durability. Highly flexible electrical cables transmit the sensor signals to separate amplifiers with convenient indicators and operating elements that are installed where installation space is not critical.

This results in a wide variety of minimally sized standard products with a wide variety of unique selling points. Consequently we are able to implement even customer-specific solutions with greater speed, cost-effectiveness and reliability.



For additional photoelectric sensors, refer to our complete catalog:
Object Detection.
Sophisticated sensor technology for all areas of automation

WARNING
- Read, understand, and follow warnings and manual. Failure to do so could result in serious injury or death.
- NEVER USE AS A SENSING DEVICE FOR PERSONNEL PROTECTION
- Does NOT include self-checking redundancy circuitry required for use in personnel safety applications
- Does NOT meet OSHA and ANSI standards for point-of-operation devices

Balluff, Inc. · www.balluff.com · 1-800-543-8390

Photoelectric Sensors

MICROmote® sensors
BOH – Balluff Optical Head

MICROmote® sensors are miniaturized photoelectric sensors with separate electronic processor unit. Their highly flexible, purely electric sensor cable makes them a genuine technical alternative to conventional fiber optics—with many added advantages for users.

The photoelectric sensor heads have exceptionally small dimensions, excellent technical characteristic values and outstanding flexibility for customer-specific solutions. This makes them ideal for combining optimally with a wide variety of electronic functions, while maintaining convenient operation and maximum visibility.

MICROmote® sensors are particularly well suited to installation in moving machine parts and robot grippers.

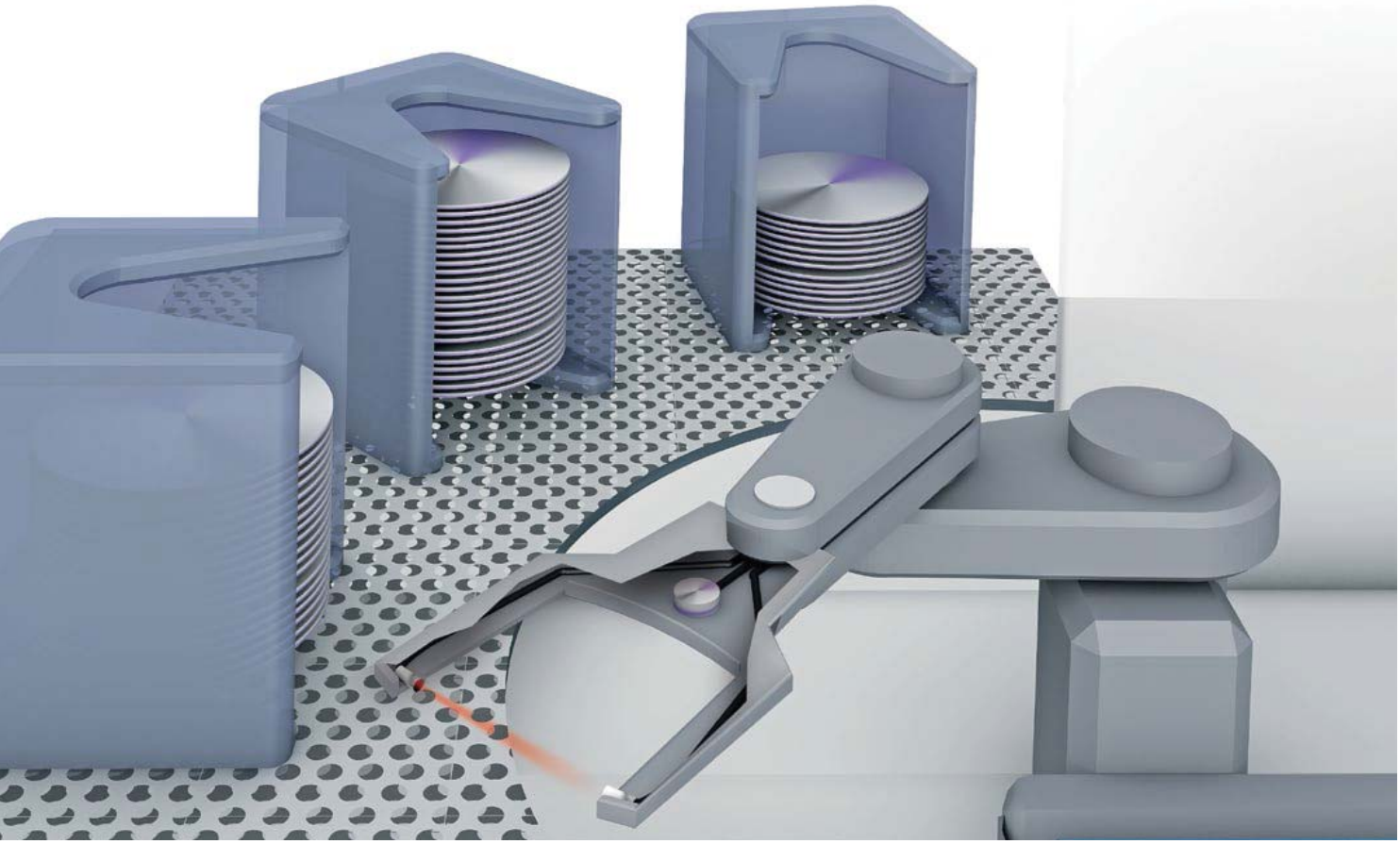
micro SPOT®

microSPOT® is a manufacturing technology developed to implement exceptional optical precision in extremely small housings. Therefore, the strength of the microSPOT® photoelectric sensors is reliable detection of tiny objects in extremely tight spaces—without interference from reflections from the surrounding area.

Through our patented method of production, the optics of each sensor are matched to the respective application during production—without complicated simulations or non-recurring costs for tools. In spite of its tiny dimensions, this helps in achieving excellent optical precision in LEDs, photodiodes and phototransistors. With technical characteristic values, which are far superior to conventional photoelectric components.

The minimum size opens a width spectrum of outstanding miniature photoelectric sensors with a wide variety of unique selling points.

Contents



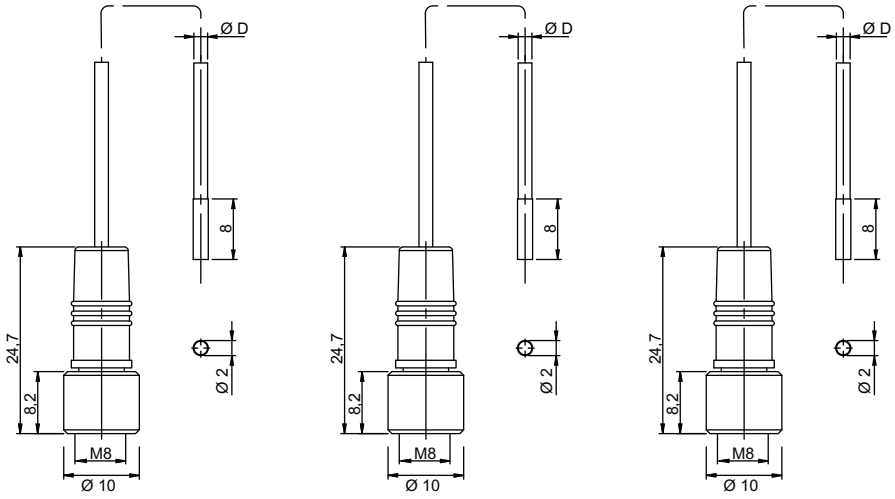
Diffuse sensors BOH for separate amplifiers BAE
Cylinder designs



Type	Diffuse sensor	Diffuse sensor	Diffuse sensor	
Housing size	**Ø 2×8 mm**	**Ø 2×8 mm**	**Ø 2×8 mm**	
Sensing distance	**12 mm**	**12 mm**	**20 mm**	
Order code	**BOH0003**	**BOH0002**	**BOH0035**	
Part number	BOH DR-G02-001-01-S49F	BOH DI-G02-001-01-S49F	BOH DI-G02-006-01-S49F	
Light type	Red light	Infrared	Infrared	
Wavelength	660 Nm	880 Nm	880 Nm	
Light spot diameter				
Degree of protection as per IEC 60529	IP 65	IP 65	IP 65	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	–10...+55 °C	
Housing material	Stainless steel	Stainless steel	Stainless steel	
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	

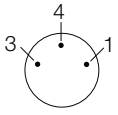
Reference object: white, 90% reflection, 100×100 mm

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02
Function diagrams on page 62.



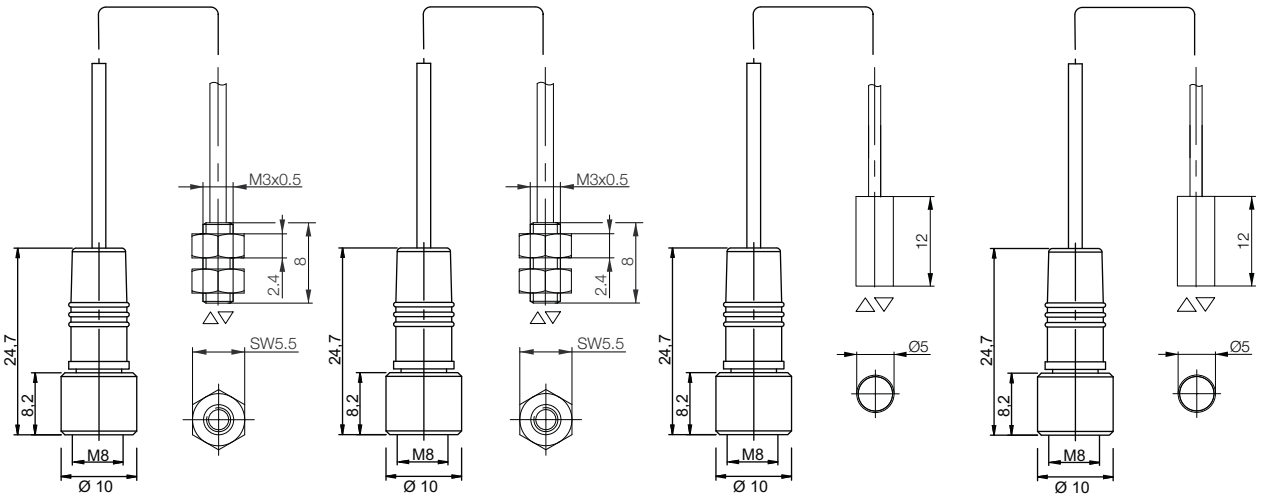
Connection configuration
M8 connector, 3-pin

3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Diffuse sensors BOH for separate amplifiers BAE
Cylinder designs

	Diffuse sensor	Diffuse sensor	Diffuse sensor	Diffuse sensor
	M3×0.5×8 mm	**M3×0.5×8 mm**	**Ø 5×12 mm**	**Ø 5×12 mm**
	12 mm	**12 mm**	**60 mm**	**60 mm**
	BOH0009	**BOH0004**	**BOH0006**	**BOH0005**
	BOH DR-M03-001-01-S49F	BOH DI-M03-001-01-S49F	BOH DK-G05-002-01-S49F	BOH DR-G05-002-01-S49F
	Red light	Infrared	Red light microSPOT	Red light
	660 Nm	880 Nm	645 Nm	660 Nm
			5 mm (at 50 mm)	14 mm (at 50 mm)
	IP 65	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Stainless steel	Stainless steel	Stainless steel	Stainless steel
	PUR cable with	PUR cable with	PUR cable with	PUR cable with
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin



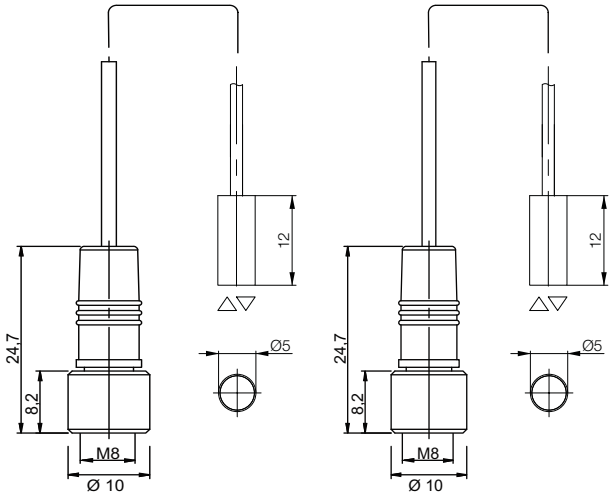
Diffuse sensors BOH for separate amplifiers BAE
Cylinder designs

Type	**Diffuse sensor**	**Diffuse sensor**		
Housing size	**5x12 mm**	**5x12 mm**		
Sensing distance	**60 mm**	**100 mm**		
Rated switching distance S_n				
Order code	**BOH003C**	**BOH003F**		
Part number	BOH DI-G05-002-01-S49F	BOH DI-G05-007-01-S49F		
Light type	Infrared	Infrared		
Wavelength	880 Nm	880 Nm		
Light spot diameter				
Degree of protection as per IEC 60529	IP65	IP65		
Ambient temperature T_a	-10...+55 °C	-10...+55 °C		
Housing material	Stainless steel	Stainless steel		
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin		

Reference object: white, 90% reflection, 100×100 mm

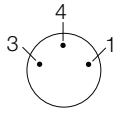
Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

Function diagrams beginning on page 62.



Connection configuration
M8 connector, 3-pin

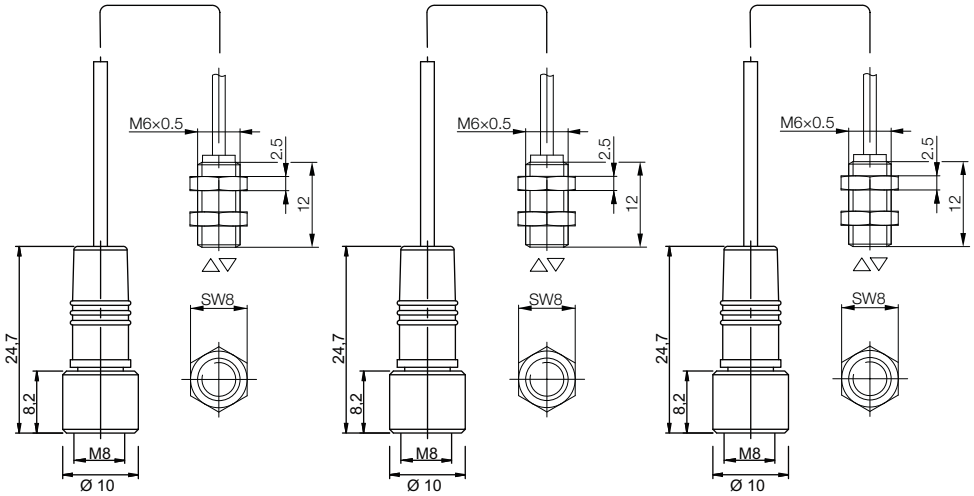
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



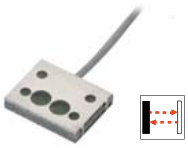
Diffuse sensors BOH for separate amplifiers BAE
Cylinder designs

microSPOT®

	Diffuse sensor M6×0.5×12 mm 60 mm	Diffuse sensor M6×0.5×12 mm 60 mm	Diffuse sensor M6×0.5×12 mm 60 mm	
	BOH0008	**BOH0007**	**BOH003M**	
	BOH DK-M06-002-01-S49F	BOH DR-M06-002-01-S49F	BOH DI-M06-002-01-S49F	
	Red light microSPOT	Red light	Infrared	
	645 Nm	660 Nm	880 Nm	
	5 mm (at 50 mm)	14 mm (at 50 mm)		
	IP 65	IP 65	IP 65	
	–10...+55 °C	–10...+55 °C	–10...+55 °C	
	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	
	PUR cable with	PUR cable with	PUR cable with	
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin	



Diffuse sensors BOH for separate amplifiers BAE
Block designs

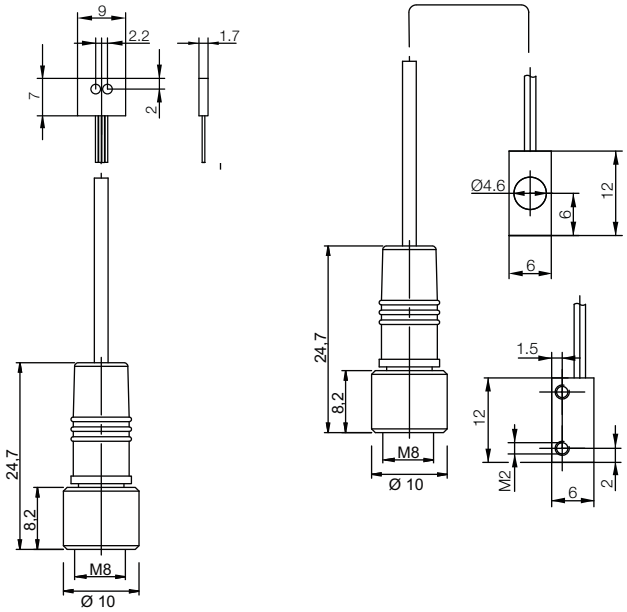


Type	Diffuse sensor	Diffuse sensor		
Housing size	**9x7x1.7 mm**	**6×6×12 mm**		
Sensing distance	**10 mm**	**60 mm**		
Rated switching distance S_n				
Order code	**BOH00A0**	**BOH000M**		
Part number	BOH DI-R006-009-TF-01-S49F	BOH DK-Q06-001-01-S49F		
Light type	Infrared	Red light microSPOT		
Wavelength	880 Nm	645 Nm		
Light spot diameter		4 mm (at 50 mm)		
Degree of protection as per IEC 60529	IP65	IP 65		
Ambient temperature T_a	–10...+55 °C	–10...+55 °C		
Housing material	Stainless steel	Nickel-plated brass		
Connection	PFA encapsulated cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin		

Reference object: white, 90% reflection, 100×100 mm

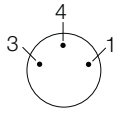
Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

Function diagrams beginning on page 62.



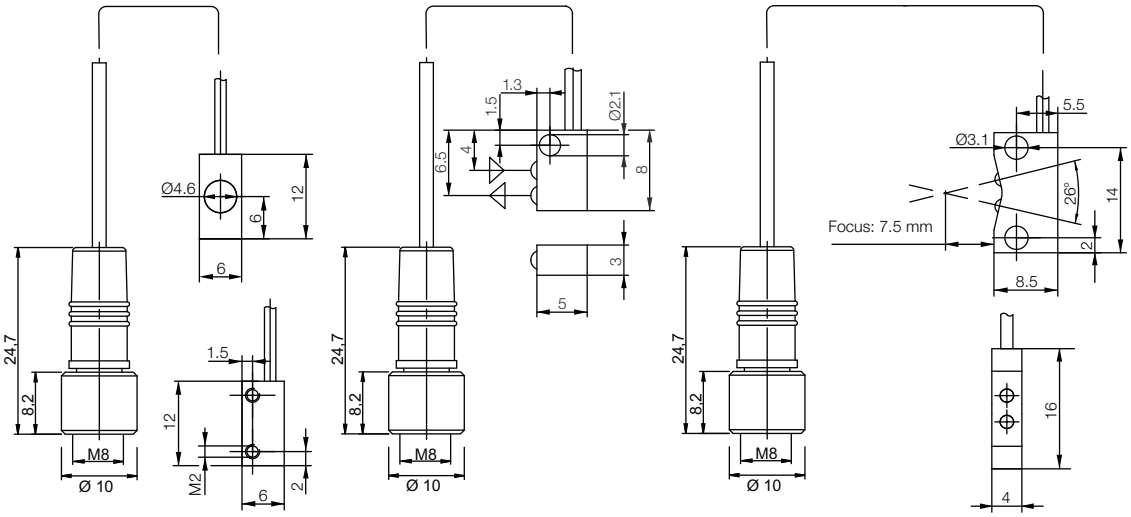
Connection configuration
M8 connector, 3-pin

3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Diffuse sensors BOH for separate amplifiers BAE
Block designs

	Diffuse sensor	Diffuse sensor	Fixed-focus diffuse sensor	
	6×6×12 mm	**3×8×5 mm**	**16×4×8.5 mm**	
	60 mm	**70 mm**		
			3 ... 15 mm	
	BOH000L	**BOH002K**	**BOH002L**	
	BOH DR-Q06-001-01-S49F	BOH DK-R002-006-01-S49F	BOH FK-Z001-001-01-S49F	
	Red light	Red light microSPOT	Red light microSPOT	
	660 Nm	645 Nm	645 Nm	
	11 mm (at 50 mm)	5 mm (at 50 mm)		
	IP 65	IP 65	IP 65	
	–10...+55 °C	–10...+55 °C	–10...+55 °C	
	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass	
	PUR cable with	PUR cable with	PUR cable with	
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin	



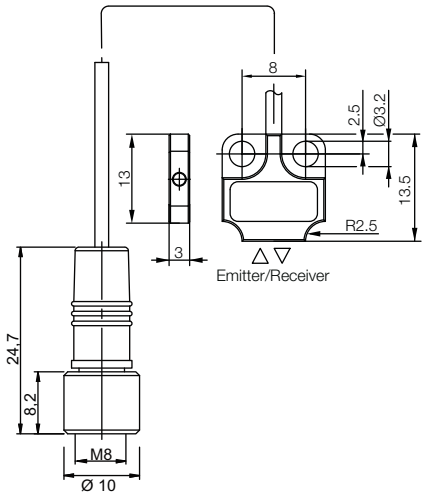
Diffuse sensors BOH for separate amplifiers BAE
Block designs

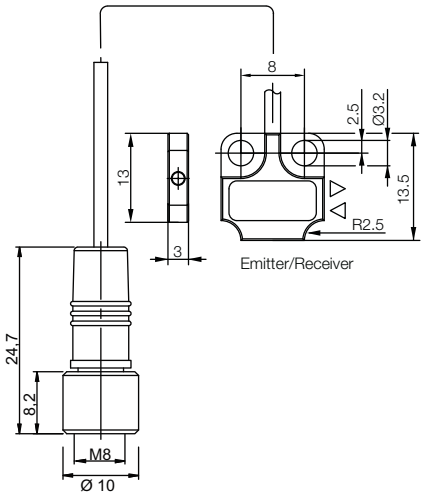
Type	**Diffuse sensor**	**Diffuse sensor**
Housing size	**13.5×13×3 mm**	**13.5×13×3 mm**
Sensing distance	**60 mm**	**60 mm**
Order code	**BOH0027**	**BOH0028**
Part number	BOH DK-R018-001-01-S49F	BOH DK-R018-002-01-S49F
Light type	Red light microSPOT	Red light microSPOT
Wavelength	645 Nm	645 Nm
Light spot diameter	5 mm (at 50 mm)	5 mm (at 50 mm)
Degree of protection as per IEC 60529	IP 67	IP 67
Ambient temperature T_a	–10...+55 °C	–10...+55 °C
Housing material	Naturally anodized aluminum	Naturally anodized aluminum
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin

Reference object: white, 90% reflection, 100×100 mm

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

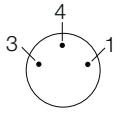
Function diagrams beginning on page 62.





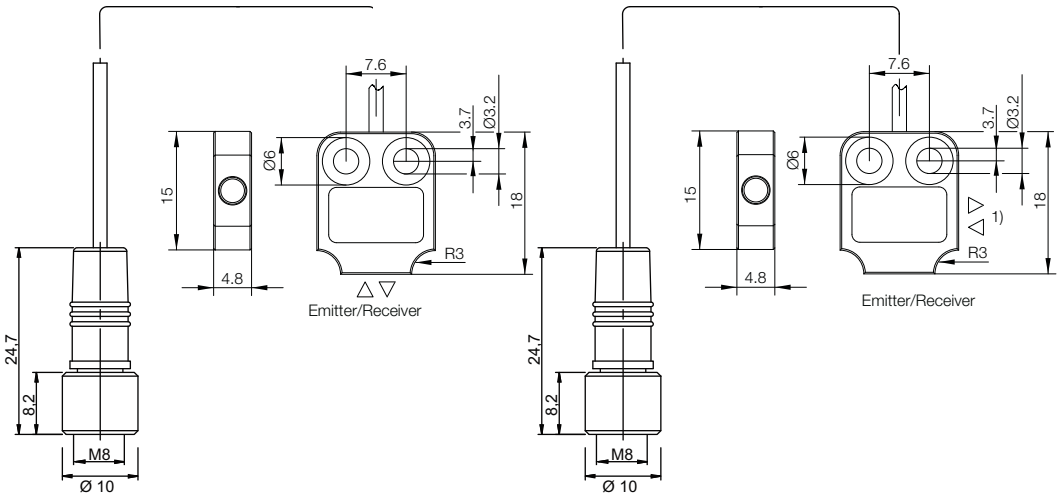
Connection configuration
M8 connector, 3-pin

3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Diffuse sensors BOH for separate amplifiers BAE
Block designs

	Diffuse sensor	**Diffuse sensor**	
	18×15×4.8 mm	**18×15×4.8 mm**	
	100 mm	**100 mm**	
	BOH0029	**BOH002A**	
	BOH DK-R027-003-01-S49F	BOH DK-R027-004-01-S49F	
	Red light microSPOT	Red light microSPOT	
	645 Nm	645 Nm	
	8 mm (at 100 mm)	8 mm (at 100 mm)	
	IP 67	IP 67	
	–10...+55 °C	–10...+55 °C	
	Naturally anodized aluminum	Naturally anodized aluminum	
	PUR cable with	PUR cable with	
	M8 connector, 3-pin	M8 connector, 3-pin	



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

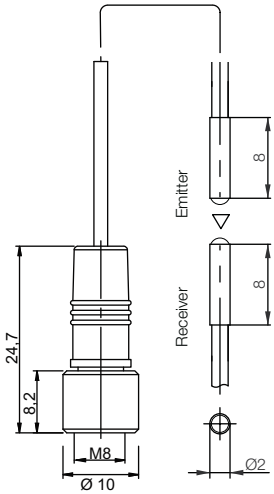
Type	**Through-beam sensor**	**Through-beam sensor**	
Housing size	**Ø 2×8 mm**	**Ø 2×8 mm**	
Range	**300 mm**	**800 mm**	
Order code	**BOH005J**	**BOH005N**	
Part number	BOH TI-G02-001-01-S49F	BOH TI-G02-008-01-S49F	
Light type	Infrared	Infrared	
Wavelength	880 Nm	880 Nm	
Light spot diameter			
Resolution (smallest detectable part)	0.1 mm	0.2 mm	
Degree of protection as per IEC 60529	IP 65	IP 65	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Housing material	Stainless steel	Stainless steel	
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	

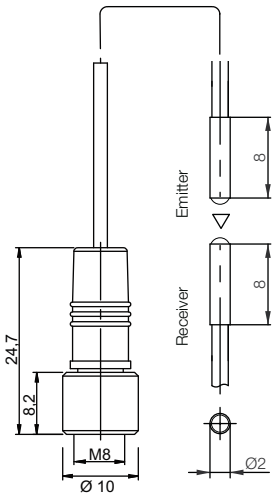
Reference object: white, 90% reflection, 100×100 mm

Included in the scope of delivery: Emitter and receiver

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

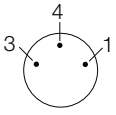
Function diagrams on page 62.





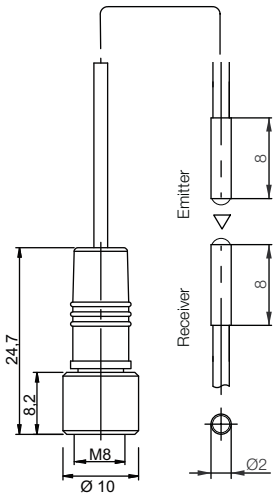
Connection configuration
M8 connector, 3-pin

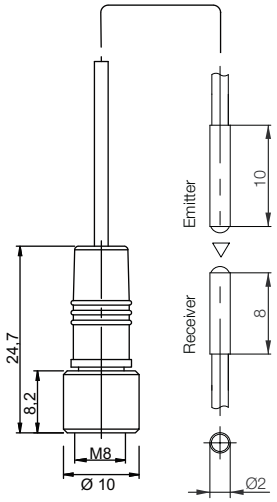
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)

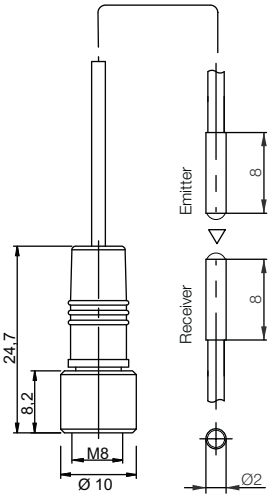


Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

	Through-beam sensor Ø 2×8 mm	Through-beam sensor Emitter Ø 2x10 mm Receiver Ø 2x8 mm	Through-beam sensor Ø 2×8 mm
	300 mm	**200 mm**	**500 mm**
	BOH000A	**BOH001K**	**BOH000C**
	BOH TR-G02-001-01-S49F	BOH TZ-G02-001-01-S49F-SA2	BOH TK-G02-001-01-S49F
	Red light	Red light	Red light microSPOT
	660 Nm	660 Nm	645 Nm
		0.4 mm (at 10 mm)	10 mm (at 100 mm)
	0.2 mm	0.1 mm	0.2 mm
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Stainless steel	Stainless steel	Stainless steel
	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin







Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

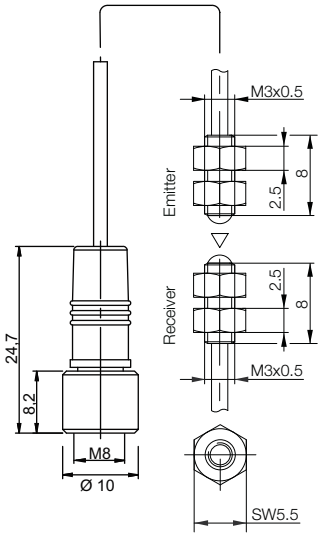
Type	**Through-beam sensor**	**Through-beam sensor**	
Housing size	**M3×0.5×8 mm**	**M3×0.5×8 mm**	
Range	**300 mm**	**800 mm**	
Order code	**BOH0061**	**BOH0064**	
Part number	BOH TK-G02-001-01-S49F	BOH TI-M03-012-01-S49F	
Light type	Infrared	Infrared	
Wavelength	880 Nm	880 Nm	
Light spot diameter			
Resolution (smallest detectable part)	0.1 mm	0.2 mm	
Degree of protection as per IEC 60529	IP 65	IP 65	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Housing material	Stainless steel	Stainless steel	
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	

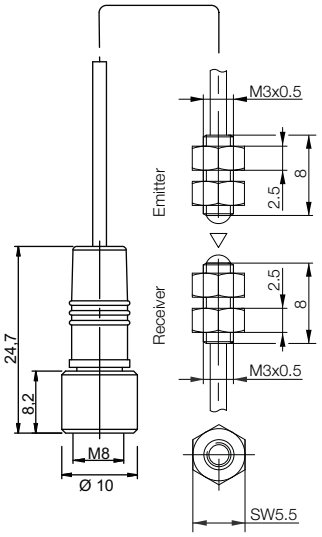
Reference object: white, 90% reflection, 100×100 mm

Included in the scope of delivery: Emitter and receiver

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

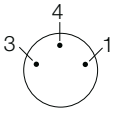
Function diagrams on page 62.





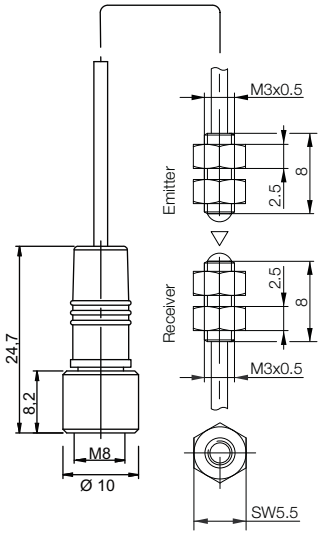
Connection configuration
M8 connector, 3-pin

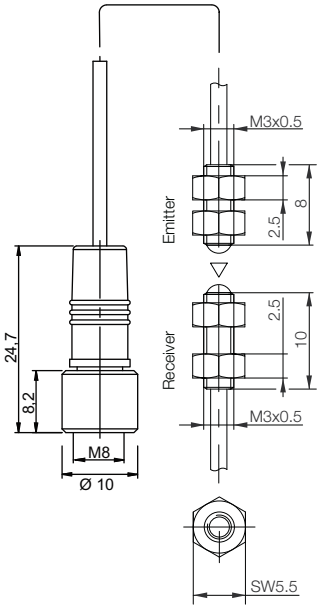
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)

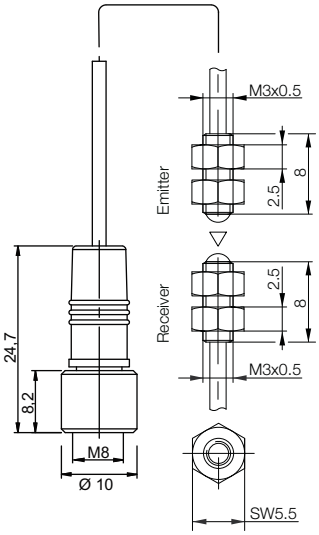


Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

	Through-beam sensor M3×0.5×8 mm	Through-beam sensor M3×0.5×10 mm M3×0.5×8 mm	Through-beam sensor M3×0.5×8 mm
	300 mm	200 mm	500 mm
	BOH000T	BOH001L	BOH000U
	BOH TR-M03-001-01-S49F	BOH TZ-M03-001-01-S49F-SA2	BOH TK-M03-001-01-S49F
	Red light	Red light	Red light microSPOT
	660 Nm	660 Nm	645 Nm
		0.4 mm (at 10 mm)	10 mm (at 100 mm)
	0.2 mm	0.1 mm	0.2 mm
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Stainless steel	Stainless steel	Stainless steel
	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin







Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

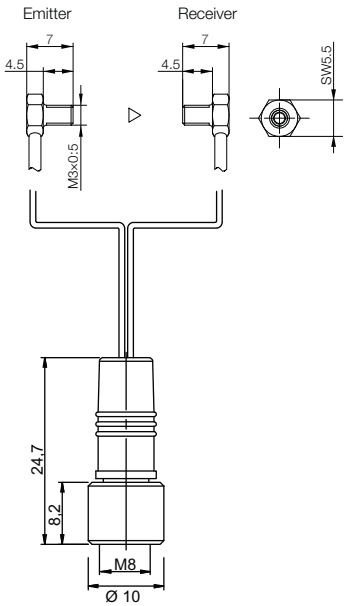
Model	Through-beam sensor	Through-beam sensor	
Housing size	**M3×0.5×7 mm**	**Ø 3×5 mm**	
Range	**500 mm**	**500 mm**	
Order code	**BOH000E**	**BOH000Z**	
Part number	BOH TK-M03-005-01-S49F	BOH TK-G03-004-01-S49F	
Light type	Red light microSPOT	Red light microSPOT	
Wavelength	645 Nm	645 Nm	
Light spot diameter	10 mm (at 100 mm)	10 mm (at 100 mm)	
Resolution (smallest detectable part)	0.2 mm	0.2 mm	
Degree of protection as per IEC 60529	IP 65	IP 65	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Housing material	Stainless steel	Stainless steel	
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	

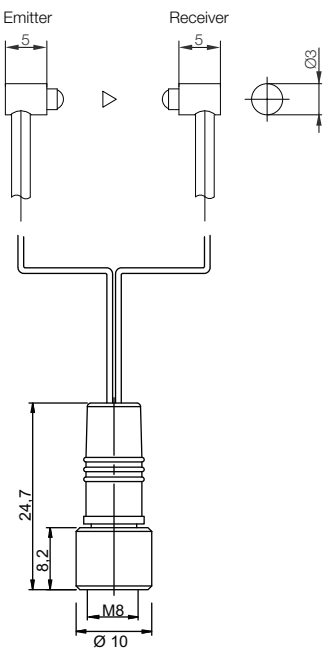
Reference object: white, 90% reflection, 100×100 mm

Included in the scope of delivery: Emitter and receiver

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

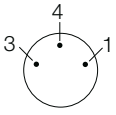
Function diagrams beginning on page 62.



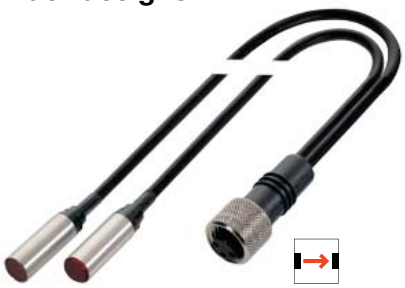


Connection configuration
M8 connector, 3-pin

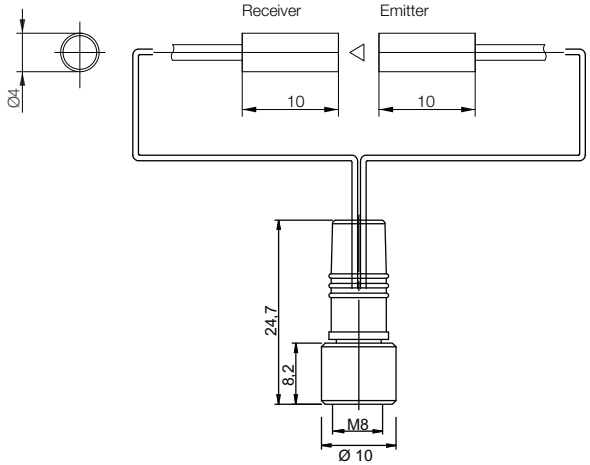
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs



	Through-beam sensor Ø 4×10 mm	Through-beam sensor Ø 4×10 mm	Through-beam sensor Ø 4×10 mm
	1000 mm	**2000 mm**	**1000 mm**
	BOH005P	**BOH005T**	**BOH000W**
	BOH TI-G04-003-01-S49F	BOH TI-G04-010-01-S49F	BOH TR-G04-003-01-S49F
	Infrared	Infrared	Red light
	880 Nm	880 Nm	660 Nm
	0.1 mm	0.4 mm	0.3 mm
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Stainless steel	Stainless steel	Stainless steel
	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

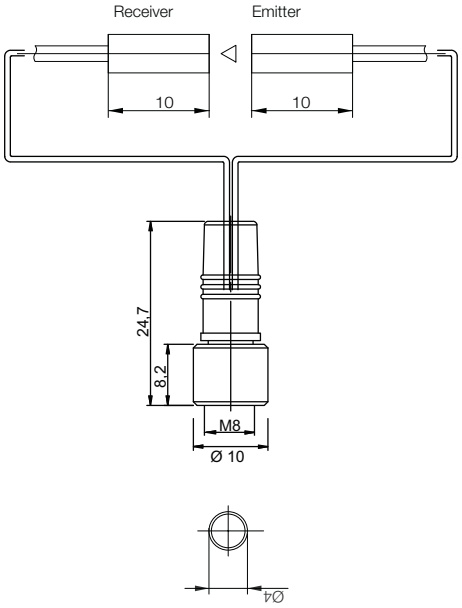
Model	Through-beam sensor	Through-beam sensor	
Housing size	**Ø 4×10 mm**	**Ø 5×12 mm**	
Range	**2000 mm**	**4000 mm**	
Order code	**BOH0014**	**BOH0010**	
Part number	BOH TK-G04-003-01-S49F	BOH TR-G05-005-02-S49F	
Light type	Red light microSPOT	Red light	
Wavelength	645 Nm	660 Nm	
Light spot diameter	8 mm (at 100 mm)		
Resolution (smallest detectable part)	0.4 mm	0.4 mm	
Degree of protection as per IEC 60529	IP 65	IP 65	
Ambient temperature T_a	–10°C... +55°C	–10...+55 °C	
Housing material	Stainless steel	Stainless steel	
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	

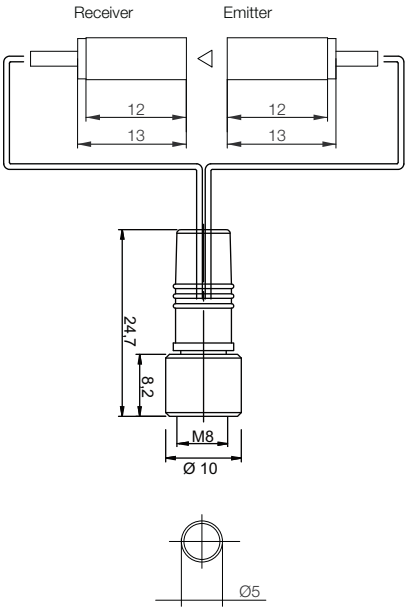
Reference object: white,
90% reflection, 100×100 mm

Included in the scope of delivery:
Emitter and receiver

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

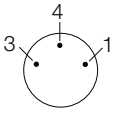
Function diagrams
beginning on page 62.



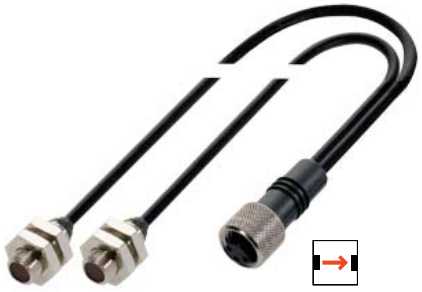


Connection configuration
M8 connector, 3-pin

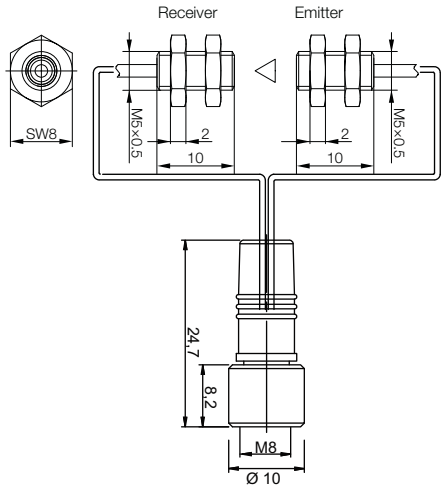
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs



	Through-beam sensor M5×0.5×10 mm	Through-beam sensor M5×0.5×10 mm	Through-beam sensor M5×0.5×10 mm
	1000 mm	**2000 mm**	**1000 mm**
	BOH0065	**BOH006A**	**BOH000Y**
	BOH TK-M05-003-01-S49F	BOH TK-M05-013-01-S49F	BOH TR-M05-003-01-S49F
	Infrared	Infrared	Red light
	880 Nm	880 Nm	660 Nm
	0.1 mm	0.4 mm	0.3 mm
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Stainless steel	Stainless steel	Nickel-plated brass
	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

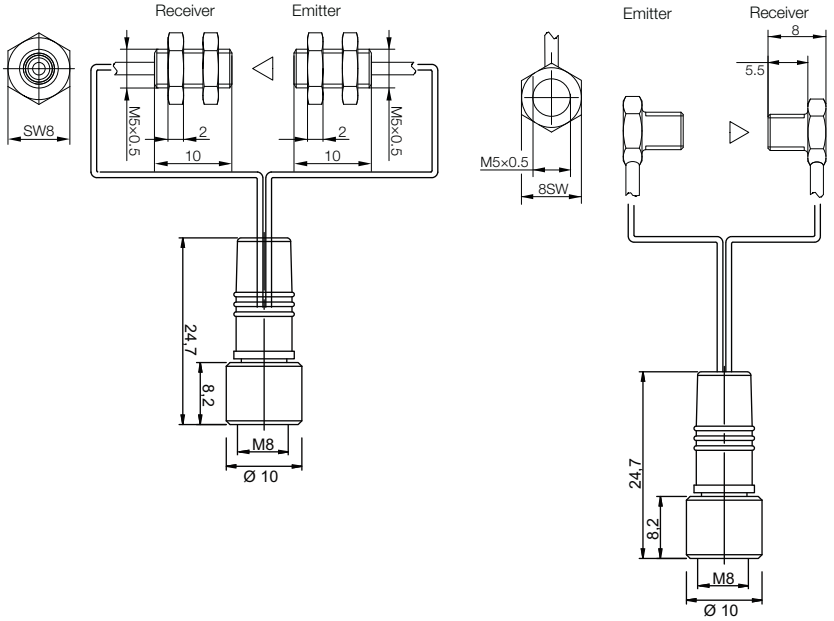
Model	Through-beam sensor	Through-beam sensor
Housing size	**M5×0.5×10 mm**	**M5×0.5×8 mm**
Range	**2000 mm**	**2000 mm**
Order code	**BOH0013**	**BOH000F**
Part number	BOH TK-M05-003-01-S49F	BOH TK-M05-006-01-S49F
Light type	Red light microSPOT	Red light microSPOT
Wavelength	645 Nm	645 Nm
Light spot diameter	8 mm (at 100 mm)	8 mm (at 100 mm)
Resolution (smallest detectable part)	0.4 mm	0.4 mm
Degree of protection as per IEC 60529	IP 65	IP 65
Ambient temperature T_a	–10...+55 °C	–10...+55 °C
Housing material	Nickel-plated brass	Stainless steel
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin

Reference object: white,
90% reflection, 100×100 mm

Included in the scope of delivery:
Emitter and receiver

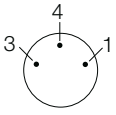
Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

Function diagrams
beginning on page 62.



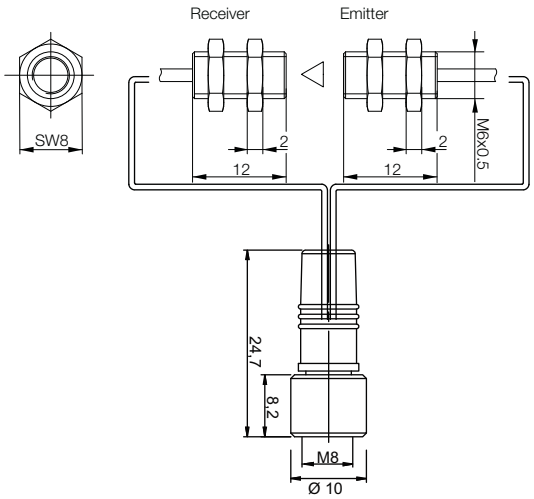
Connection configuration
M8 connector, 3-pin

3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

	Through-beam sensor		
	M6×0.5×12 mm		
	4000 mm		
	BOH006H		
	BOH TI-M06-002-01-S49F		
	Infrared		
	880 Nm		
	0.4 mm		
	IP 65		
	–10...+55 °C		
	Stainless steel		
	PUR cable with M8 connector, 3-pin		



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

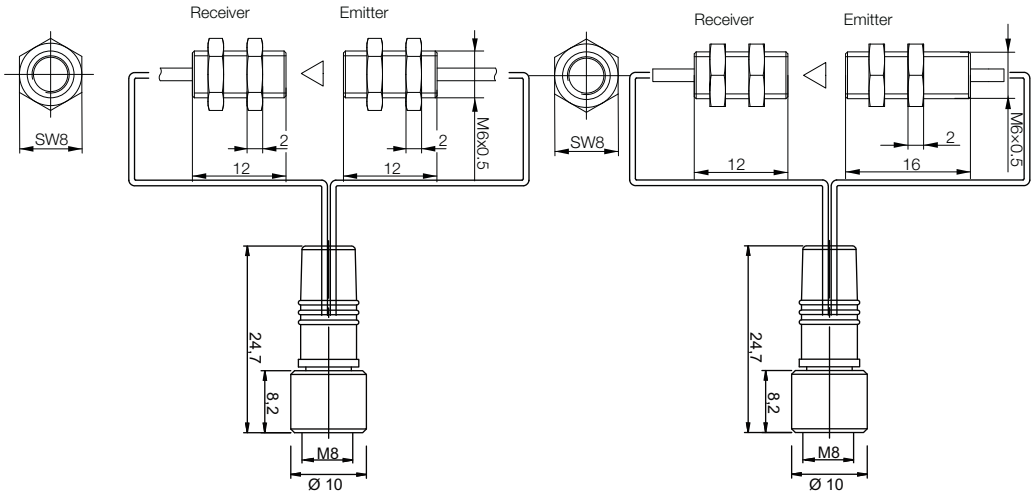
Model	Through-beam sensor	Through-beam sensor
Housing size	**M6×0.5×12 mm**	**M6×0.5×16 mm**
Range	**4000 mm**	**4000 mm**
Order code	**BOH000K**	**BOH000H**
Part number	BOH TR-M06-002-02-S49F	BOH TL-M06-007-02-S49F
Light type	Red light	Laser red light, class 1
Wavelength	660 Nm	650 Nm
Light spot diameter		4.5 mm (at 2000 mm)
Resolution (smallest detectable part)	0.4 mm	< 0.05 mm
Degree of protection as per IEC 60529	IP 65	IP 65
Ambient temperature T_a	–10...+55 °C	–10...+55 °C
Housing material	Nickel-plated brass	Stainless steel
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin

Reference object: white, 90% reflection, 100×100 mm

Included in the scope of delivery: Emitter and receiver

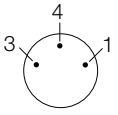
Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

Function diagrams beginning on page 62.



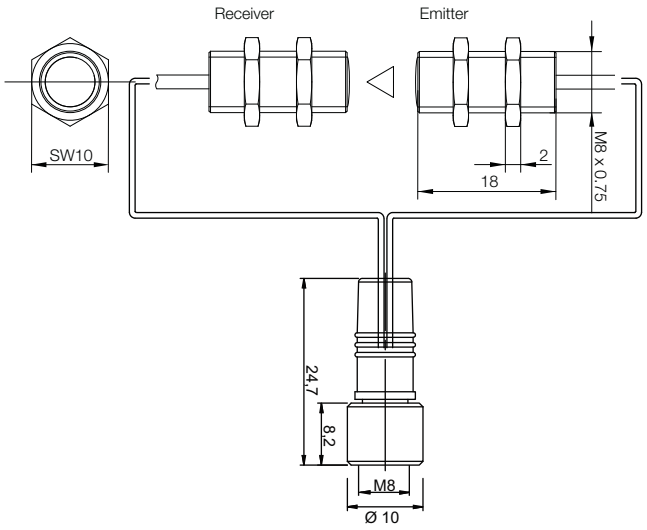
Connection configuration
M8 connector, 3-pin

3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Through-beam sensors BOH for separate amplifiers BAE
Cylinder designs

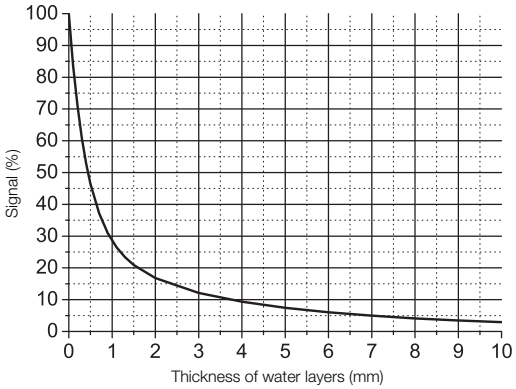
	Through-beam sensor		
	M8×0.75×18 mm		
	4000 mm		
	BOH0012		
	BOH TK-M08-004-02-S49F		
	Red light microSPOT		
	645 Nm		
	18 mm (at 1000 mm)		
	0.2 mm		
	IP 65		
	–10...+55 °C		
	Nickel-plated brass		
	PUR cable with M8 connector, 3-pin		



Through-beam sensors BOH for water detection for separate amplifiers BAE

Detection of water

MICROmote® photoelectric sensors for water detection use a specific wavelength at which water absorbs more light. This significantly simplifies the detection of liquids with high water content using optical sensors.
The combination of an extra-compact design and powerful micro-optics allows for reliable use in tubes and capillary tubes where other physical effects are stretched to their natural limits.



Type	
Housing size	
Range	
Order code	
Part number	
Light type	
Wavelength	
Degree of protection as per IEC 60529	
Ambient temperature T_a	
Housing material	
Connection	

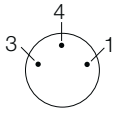
Included in the scope of delivery:
Emitter and receiver

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

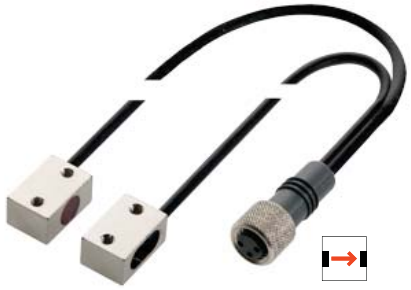
Function diagrams
on pages 62.

Connection configuration
M8 connector, 3-pin

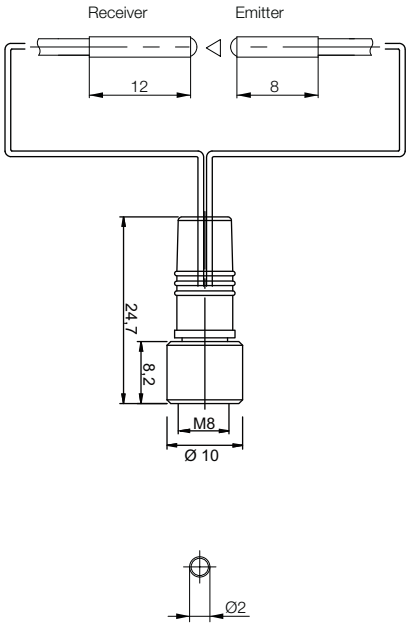
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)

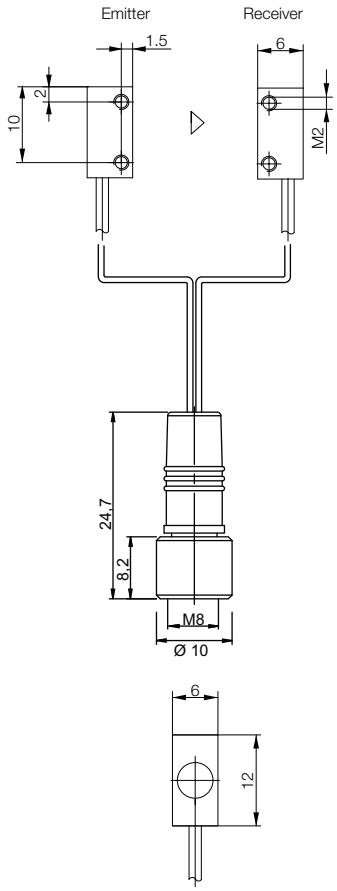


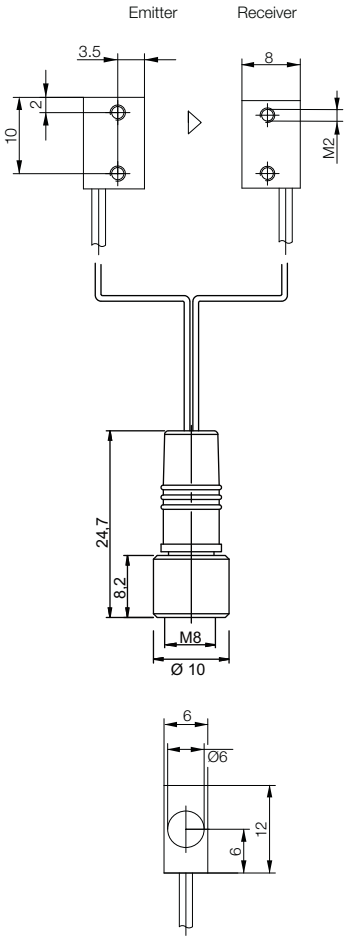
Through-beam sensors BOH for water detection for separate amplifiers BAE



	Through-beam sensor **Detection of water** **Emitter Ø 2×8 mm** **Receiver Ø 2×12 mm**	**Through-beam sensor** **Detection of water** **6×6×12 mm**	**Through-beam sensor** **Detection of water** **6×8×12 mm**
	250 mm	**500 mm**	**900 mm**
	BOH000J	**BOH000R**	**BOH007A**
	BOH TJ-G02-001-01-S49F	BOH TJ-Q06-001-01-S49F	BOH TJ-R010-008-01-S49F
	Infrared	Infrared	Infrared
	1480 Nm	**1480 Nm**	**1480 Nm**
	IP 67	IP 67	IP 67
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Stainless steel	Nickel-plated brass	Nickel-plated brass
	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin







Through-beam sensors BOH for separate amplifiers BAE
Block designs

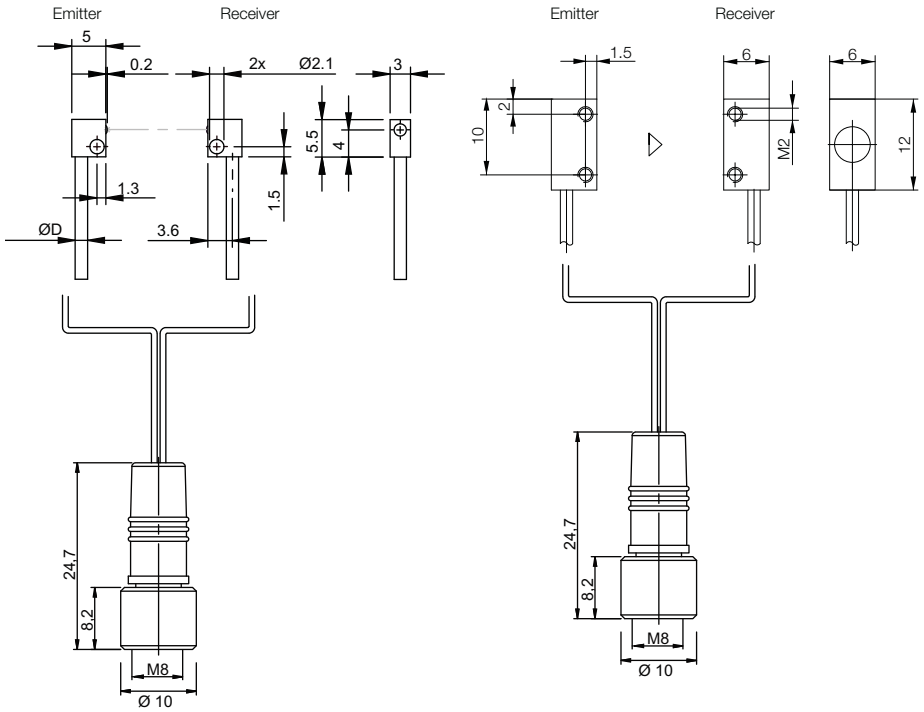
Model	Through-beam sensor	Through-beam sensor	
Housing size	**3×6×5.5 mm**	**6×6×12 mm**	
Range	**500 mm**		
Order code	**BOH001Z**	**BOH006P**	
Part number	BOH TK-R003-007-01-S49F	BOH TI-Q06-001-01-S49F	
Light type	Red light microSPOT	Infrared	
Wavelength	645 Nm	880 Nm	
Light spot diameter	10 mm (at 100 mm)		
Resolution (smallest detectable part)	0.2 mm	0.1 mm	
Degree of protection as per IEC 60529	IP 65	IP 65	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Housing material	Nickel-plated brass	Nickel-plated brass	
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	

Reference object: white, 90% reflection, 100×100 mm

Included in the scope of delivery: Emitter and receiver

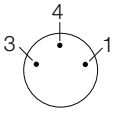
Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

Function diagrams beginning on page 62.



Connection configuration
M8 connector, 3-pin

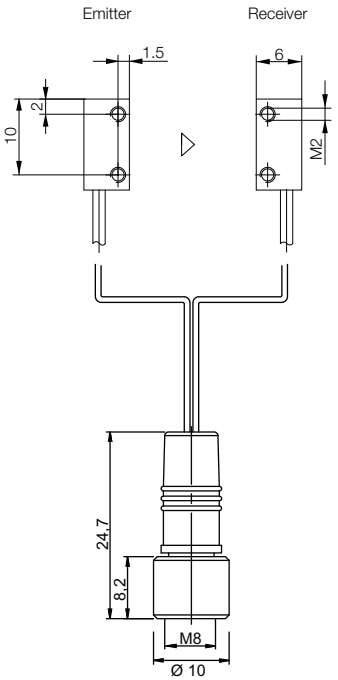
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)

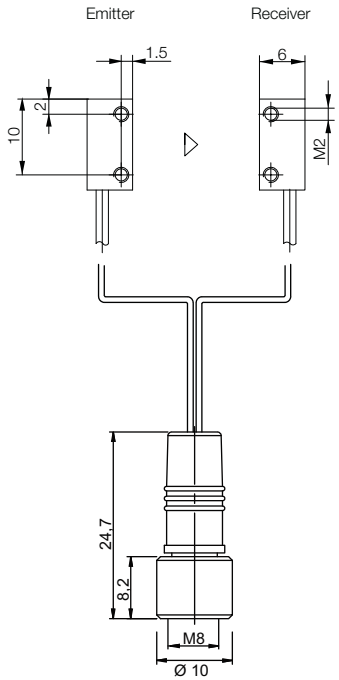


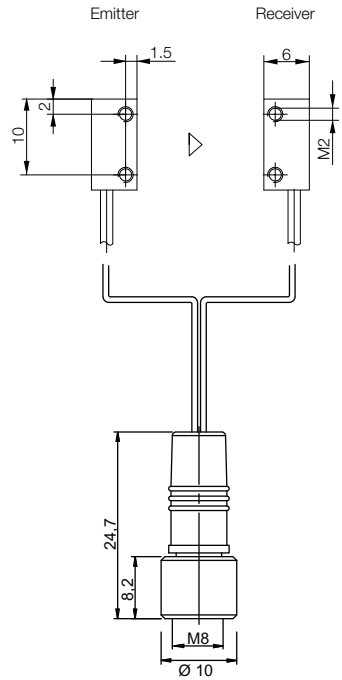
Through-beam sensors BOH for separate amplifiers BAE

Block designs

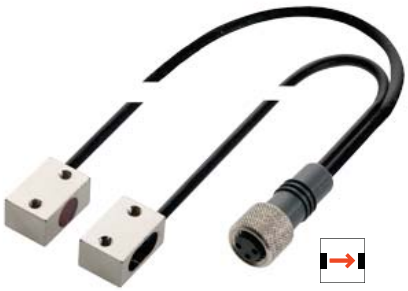
	Through-beam sensor 6×6×12 mm 2000 mm BOH006W	Through-beam sensor 6×6×12 mm 1000 mm BOH000N	Through-beam sensor 6×6×12 mm 2000 mm BOH000P
	BOH TI-Q06-002-01-S49F	BOH TR-Q06-001-01-S49F	BOH TK-Q06-001-01-S49F
	Infrared	Red light	Red light microSPOT
	880 Nm	660 Nm	645 Nm
			8 mm (at 100 mm)
	0.4 mm	0.3 mm	0.4 mm
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10°C... +55°C
	Nickel-plated brass	Nickel-plated brass	Nickel-plated brass
	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin







Through-beam sensors BOH for separate amplifiers BAE
Block designs



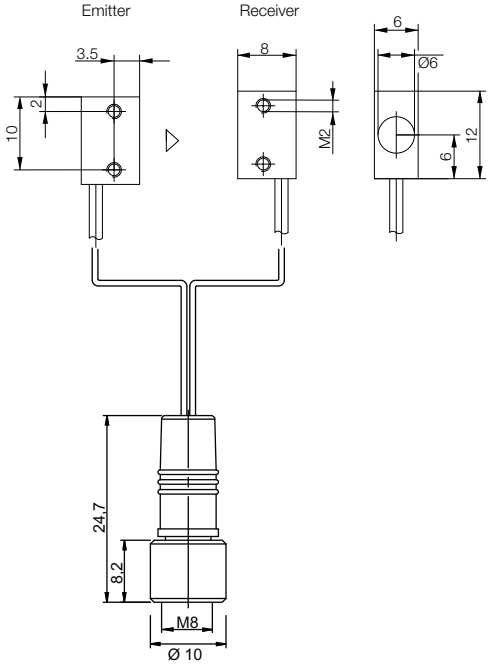
Model	**Through-beam sensor**		
Housing size	**6×8×12 mm**		
Range			
Order code	**BOH006Z**		
Part number	BOH TI-R90-008-01-S49F		
Light type	Infrared		
Wavelength	880 mm		
Light spot diameter			
Resolution (smallest detectable part)	0.4 mm		
Degree of protection as per IEC 60529	IP 65		
Ambient temperature T_a	–10...+55 °C		
Housing material	Nickel-plated brass		
Connection	PUR cable with M8 connector, 3-pin		

Reference object: white, 90% reflection, 100×100 mm

Included in the scope of delivery: Emitter and receiver

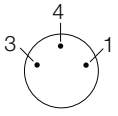
Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

Function diagrams beginning on page 62.



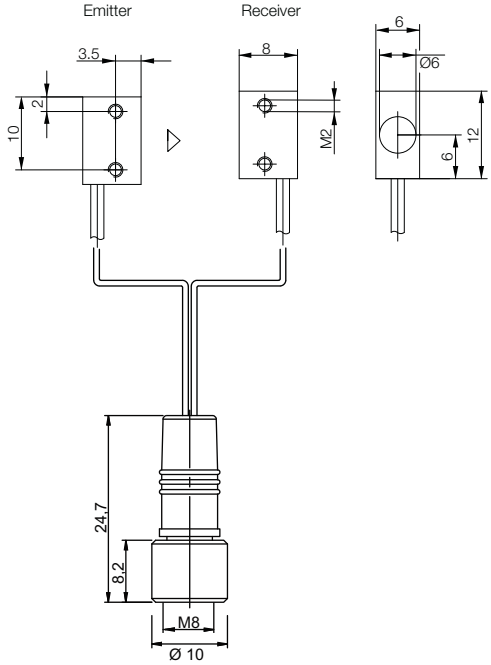
Connection configuration
M8 connector, 3-pin

3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Through-beam sensors BOH for separate amplifiers BAE
Block designs

	Through-beam sensor		
	6×8×12 mm		
	4000 mm		
	BOH0020		
	BOH TR-R010-008-02-S49F		
	Red light		
	660 Nm		
	0.4 mm		
	IP 65		
	–10...+55 °C		
	Nickel-plated brass		
	PUR cable with M8 connector, 3-pin		



Through-beam sensors BOH for separate amplifiers BAE
Block designs

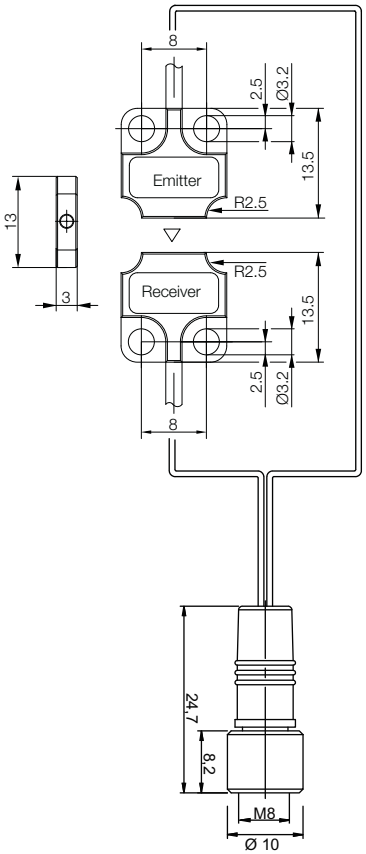
Type	**Through-beam sensor**	**Through-beam sensor**
Housing size	**13.5×13×3 mm**	**13.5×13×3 mm**
Range	**500 mm**	**500 mm**
Order code	**BOH002C**	**BOH002E**
Part number	BOH TK-R018-001-01-S49F	BOH TK-R018-002-01-S49F
Light type	Red light microSPOT	Red light microSPOT
Wavelength	645 Nm	645 Nm
Light spot diameter	10 mm (at 100 mm)	10 mm (at 100 mm)
Resolution (smallest detectable part)	0.2 mm	0.2 mm
Degree of protection as per IEC 60529	IP 67	IP 67
Ambient temperature T_a	–10...+55 °C	–10...+55 °C
Housing material	Naturally anodized aluminum	Naturally anodized aluminum
Connection	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin

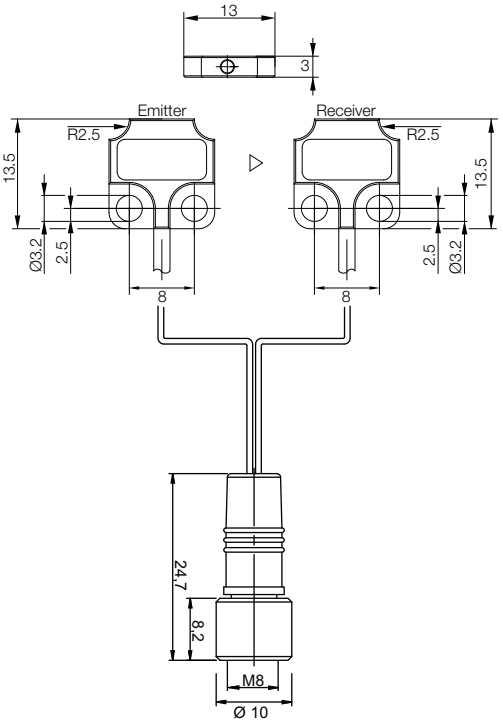
Reference object: white, 90% reflection, 100×100 mm

Included in the scope of delivery: Emitter and receiver

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

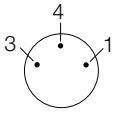
Function diagrams beginning on page 62.





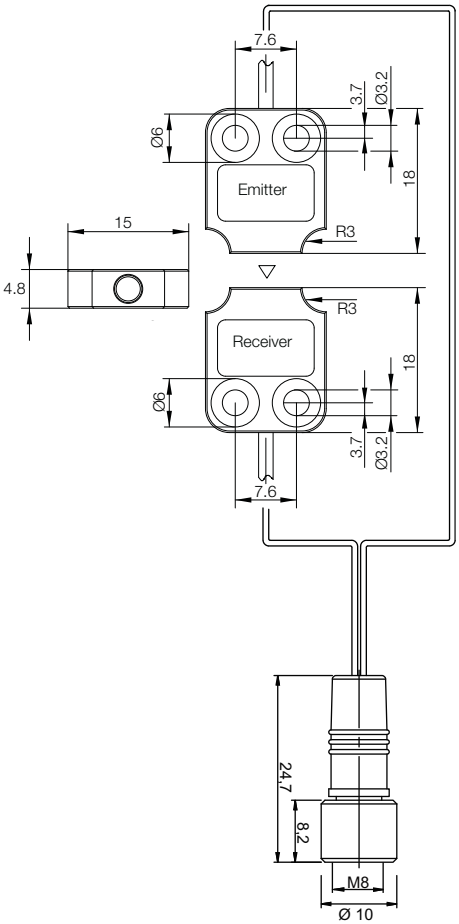
Connection configuration
M8 connector, 3-pin

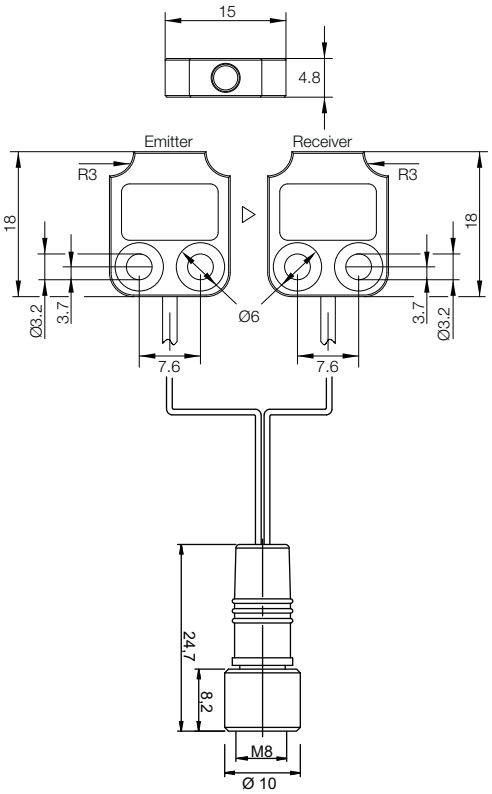
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



Through-beam sensors BOH for separate amplifiers BAE
Block designs

	Through-beam sensor 18×15×4.8 mm 2000 mm BOH002F	Through-beam sensor 18×15×4.8 mm 2000 mm BOH002H
	BOH TK-R027-003-01-S49F	BOH TK-R027-004-01-S49F
	Red light microSPOT	Red light microSPOT
	645 nm	645 Nm
	8 mm (at 100 mm)	8 mm (at 100 mm)
	0.4 mm	0.4 mm
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	Naturally anodized aluminum	Naturally anodized aluminum
	PUR cable with M8 connector, 3-pin	PUR cable with M8 connector, 3-pin





The vacuum-compatible
MICROmote® photoelectric sensors are the only classic photoelectric sensors that are suitable for direct use in a high or ultra-high vacuum.

Versions for direct use in the chamber wall with an integrated sealing function and versions meant for complete installation in the chamber are available. These versions have electric signals that are guided to outside electronics via a conventional vacuum feed through. The outgassing properties of these sensors are optimized by selecting appropriate materials. The minimum size saves valuable chamber space.

Here you will find a representative selection of possible versions. The modular design enables extraordinarily fast implementation of customer-specific solutions.


Emitter Receiver

Type	**Through-beam sensor**
Housing size	**M6×55.5 mm**
Fork opening	
Range	**300 mm**
Sensing distance	
Order code	**BOH009U**
Part number	BOH TR-M06V-009-S49/S75-SA3
Light type	Red light
Wavelength	650 Nm
Resolution (smallest discernible part)	0.2 mm
Degree of protection as per IEC 60529	IP 65
Ambient temperature T_a	–10...+55 °C
Housing material	Stainless steel
Connection	M8 connector, 4-pin, **emitter** M8 connector, 3-pin, **receiver**

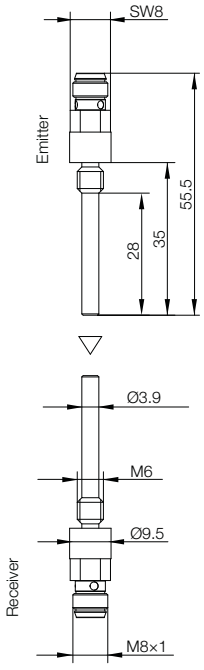
Reference object: white, 90% reflection, 100×100 mm

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02

Function diagrams beginning on page 62.

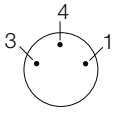
***Required cable: BCC0FTN**
BCC M313-M314-M313-U2063-020

Included in the scope of delivery: Emitter and receiver



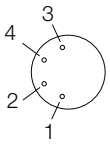
M8 connector, 3-pin, **receiver**

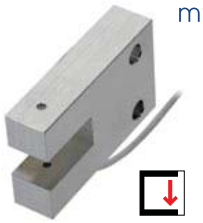
1	(green)	FT –
3		Not assigned
4	(black)	FT +

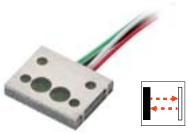


Connection configuration
M8 connector, 4-pin, **emitter**

1		Not assigned
2		Not assigned
3	(Red)	LED +
4	(white)	LED

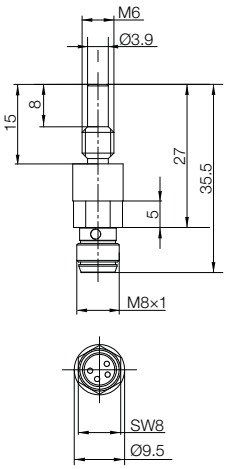


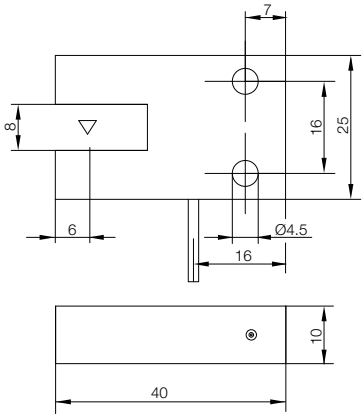


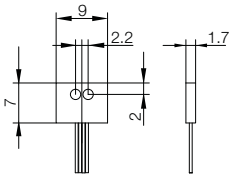


	Diffuse sensor	**Fork sensor**	**Diffuse sensor**
	M6×35.5 mm	**40×25×10 mm**	**9×7×1.7 mm**
		8 mm	
	12 mm		**10 mm**
	BOH009R	**BOH001J**	**BOH0021**
	BOH DI-M06V-008-S75-SA3	BOH TK-F08V-004-TF-01	BOH DI-R006V-009-TL-01
	Infrared	Red light microSPOT	Infrared
	880 Nm	645 Nm	880 Nm
		Ø 1.5 mm	
	IP 67	IP 67	IP 67
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Stainless steel	Aluminum	Stainless steel
	M8 connector, 4-pin	1 m cable PFA encapsulated, 4×AWG36	1 m cable PFA coated wires, 4×AWG36

***Required cable: BCC0FTJ**
BCC M314-M313-50-712-PS0402-020

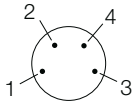






Connection configuration
M8 connector, 4-pin

1 + Receiver (green)
2 – Receiver (black)
3 – Emitter (white)
4 + Emitter (red)



Connection configuration

Emitter:	Red:	LED +
	White:	LED
Receiver:	green:	FT +
	Black:	FT –

Connection configuration

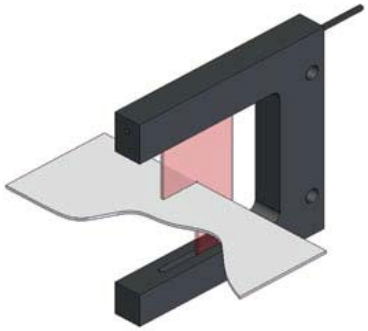
Emitter:	Red:	LED +
	White:	LED
Receiver:	Green:	FT +
	Black:	FT –

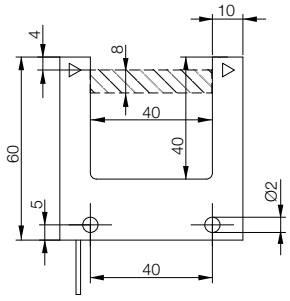
Light band fork sensors BOH for separate amplifiers BAE

Type		**Light band fork sensor**	
Light band width		**8 mm**	
Fork opening		**40 mm**	
Order code		**BOH001M**	
Part number		BOH AR-F40-001-01-S49F	
Light type		LED, red light	
Wavelength		645 Nm	
Edge resolution		0.05 mm	
Resolution (smallest discernible part)		0.5 mm	
Reproducibility		< 0.03 mm	
Linearity		Range 0...8 mm: 8% Range 1...7 mm: 2% Range 2...6 mm: 1%	
Degree of protection as per IEC 60529		IP 65	
Ambient temperature T_a		–10...+55 °C	
Housing material		Anodized aluminum	
Connection		1 m PUR cable with M8 connector, 3-pin	

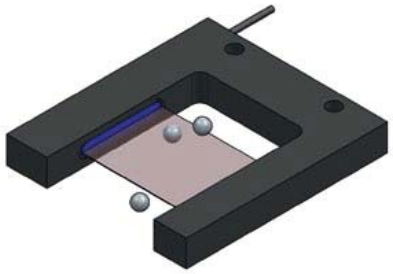
Function diagrams
beginning on page 62.

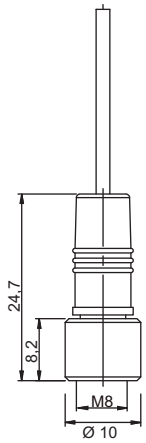
Recommended amplifier for edge control:
BAE00NH, BAE SA-OH-038-UA-DV02
or **BAE00N4,** BAE SA-OH-038-IC-DV02





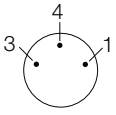
Recommended amplifier for counting window:
BAE00NJ, BAE SA-OH-040-PP-DV02





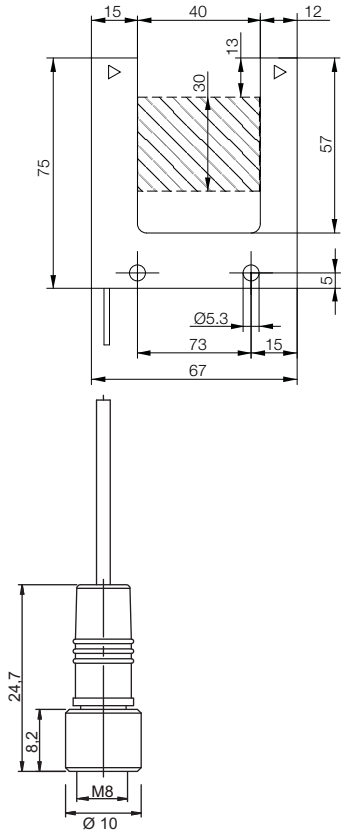
Connection configuration
M8 connector, 3-pin

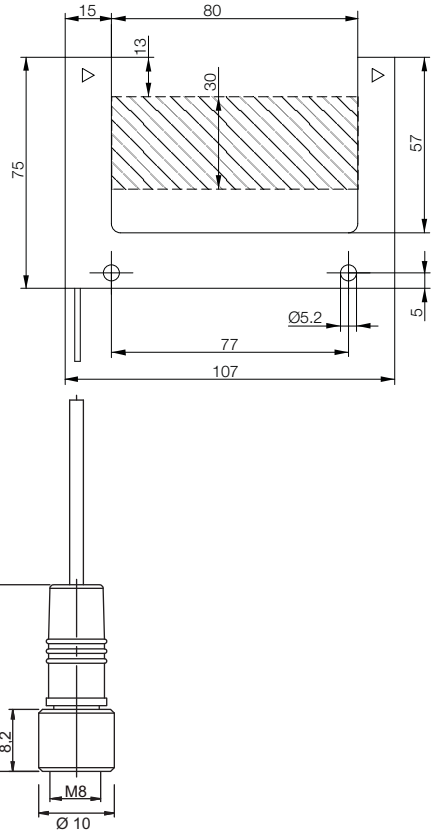
3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)



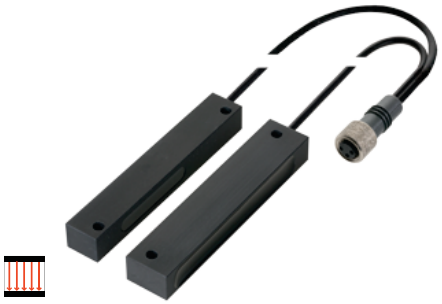
Light band fork sensors BOH for separate amplifiers BAE

Light band fork sensor	Light band fork sensor
30 mm	**30 mm**
40 mm	**80 mm**
BOH001N	**BOH001P**
BOH AR-F40-002-01-S49F	BOH AR-F80-003-01-S49F
LED, red light	LED, red light
645 Nm	645 Nm
0.1 mm	0.15 mm
0.5 mm	0.5 mm
0.05 mm	0.05 mm
Range 0...30 mm: 10%	Range 0...30 mm: 10%
Range 3...27 mm: 5%	Range 3...27 mm: 5%
Range 6...24 mm: 3.2%	Range 6...24 mm: 3.4%
IP 65	IP 65
–10...+55 °C	–10...+55 °C
Anodized aluminum	Anodized aluminum
1 m PUR cable with M8 connector, 3-pin	1 m PUR cable with M8 connector, 3-pin





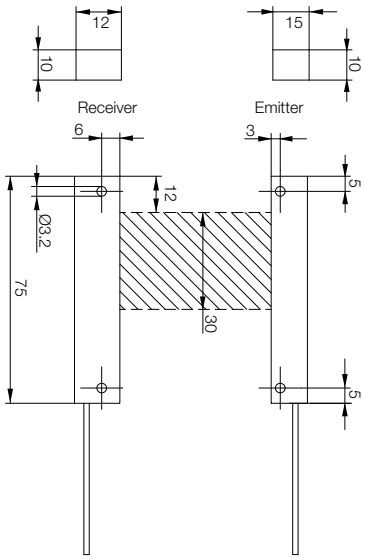
Light band sensors BOH for separate amplifiers BAE



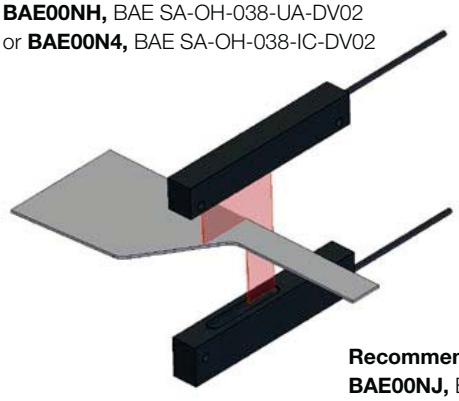
Type	**Light band sensor**
Light band width	**30 mm**
Working distance	**40...200 mm**
Order code	**BOH0024**
Part number	BOH AR-R113-010-01-S49F
Light type	LED, red light
Wavelength	645 Nm
Edge resolution	0.1 mm
Resolution (smallest discernible part)	0.5 mm
Reproducibility	0.05 mm
Degree of protection as per IEC 60529	IP 65
Ambient temperature T_a	–10...+55 °C
Housing material	Anodized aluminum
Connection	1 m PUR cable with M8 connector, 3-pin

Included in the scope of delivery:
Emitter and receiver

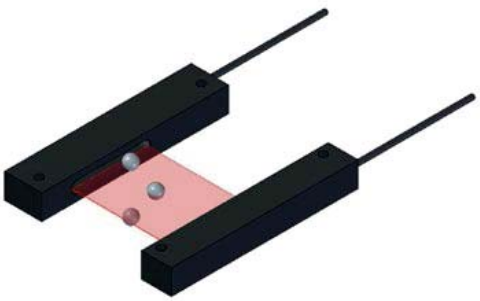
Function diagrams
beginning on page 62.

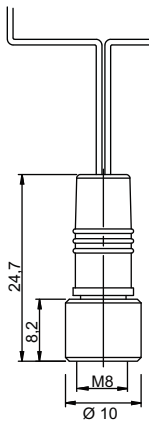


Recommended amplifier for edge control:
BAE00NH, BAE SA-OH-038-UA-DV02
or **BAE00N4,** BAE SA-OH-038-IC-DV02

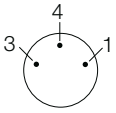


Recommended amplifier for counting window:
BAE00NJ, BAE SA-OH-040-PP-DV02





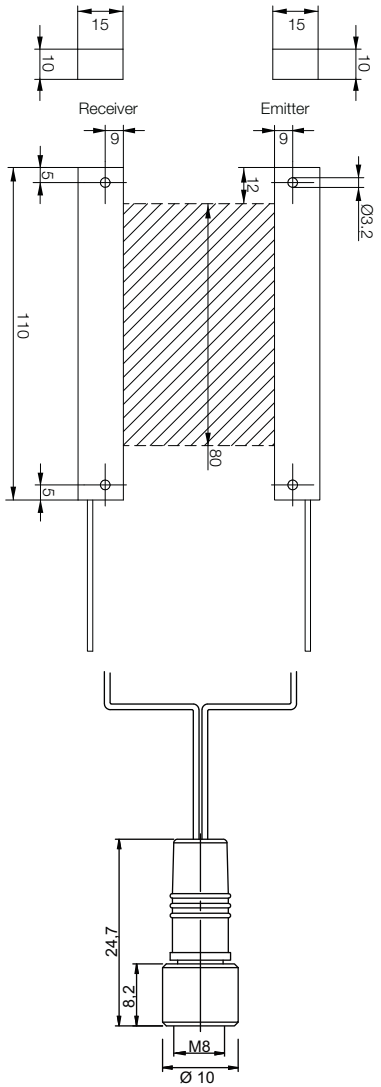
Connection configuration
M8 connector, 3-pin



3 + Receiver (green)
4 GND/Shield (white, black)
1 + Emitter (red)

Light band sensors BOH for separate amplifiers BAE

Light band sensor	
80 mm	
50...500 mm	
BOH002M	
BOH AI-R165-011-01-S49F	
LED, infrared	
950 Nm	
0.15 mm	
1.5 mm	
0.05 mm	
IP 65	
–10...+55 °C	
Anodized aluminum	
1 m PUR cable with M8 connector, 3-pin	

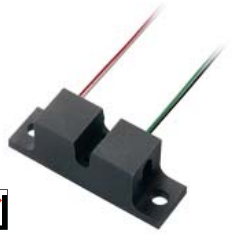


Precision tube sensors BOH for separate amplifiers BAE
Detection of liquids/bubbles

Detection of liquids/bubbles
Precision tube sensors for detecting liquids/bubbles use the differing light refraction in the air or liquid column within the tube. Therefore they are very reliable even for clear liquids.

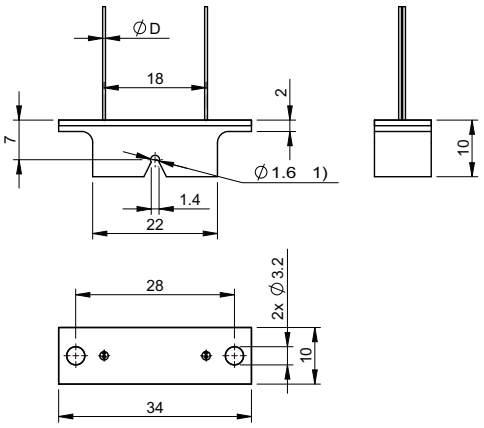
Built-in micro-optics detect the air-to-liquid transitions with high accuracy. The high reproducibility of the signal jump makes the tube sensors excellent for precisely determining volume.

The optical properties and thickness of the tube can affect the magnitude of the resulting signal swings.

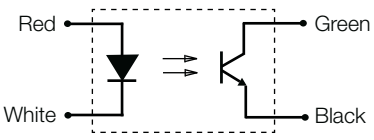


Type	**Precision tube sensor**	
Tube diameter	**1.6 mm (1/16")**	
Use	**Detection of liquids/bubbles**	
Order code	**BOH001T**	
Part number	BOH TR-T16-001-TL-00,1	
Light type	Red light	
Wavelength	665 Nm	
Functional principle	Light refraction	
Degree of protection as per IEC 60529	IP 54	
Ambient temperature T_a	–10...+60 °C	
Housing material	Black anodized aluminum	
Connection	**100 mm stranded wire PFTE encapsulated, 4×AWG32**	

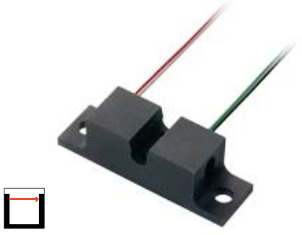
Function diagrams beginning on page 62.

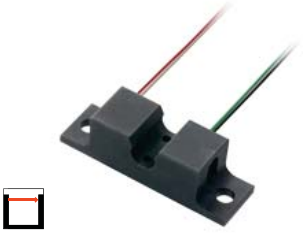


Connection configuration for all Stranded wire variants

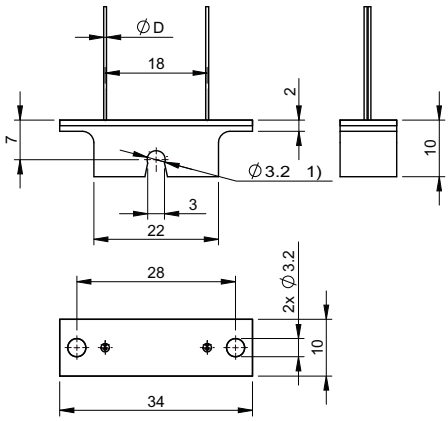


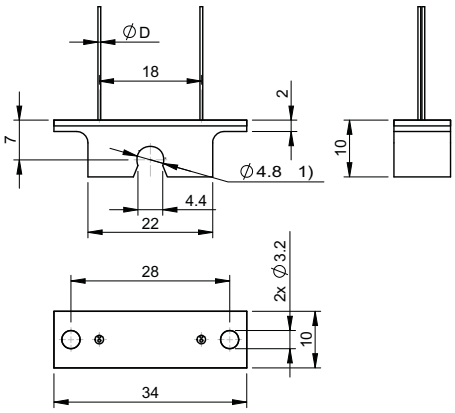
Precision tube sensors BOH for separate amplifiers BAE
Detection of liquids/bubbles

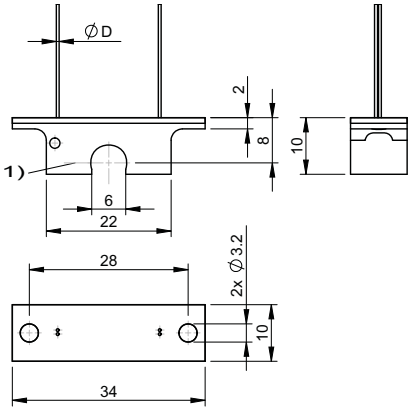




	Precision tube sensor	**Precision tube sensor**	**Precision tube sensor**
	3.2 mm (1/8")	**4.8 mm (3/16")**	**6.4 mm (1/4")**
	Detection of liquids/bubbles	**Detection of liquids/bubbles**	**Detection of liquids/bubbles**
	BOH001C	**BOH001E**	**BOH001F**
	BOH TR-T32-001-TL-00,1	BOH TR-T48-001-TL-00,1	BOH TR-T64-001-TL-00,1
	Red light	Red light	Red light
	665 Nm	665 Nm	665 Nm
	Light refraction	Light refraction	Light refraction
	IP 54	IP 54	IP 54
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	Black anodized aluminum	Black anodized aluminum	Black anodized aluminum
	100 mm stranded wire PFTE encapsulated, 4×AWG32	**100 mm stranded wire PFTE encapsulated, 4×AWG32**	**100 mm stranded wire PFTE encapsulated, 4×AWG32**





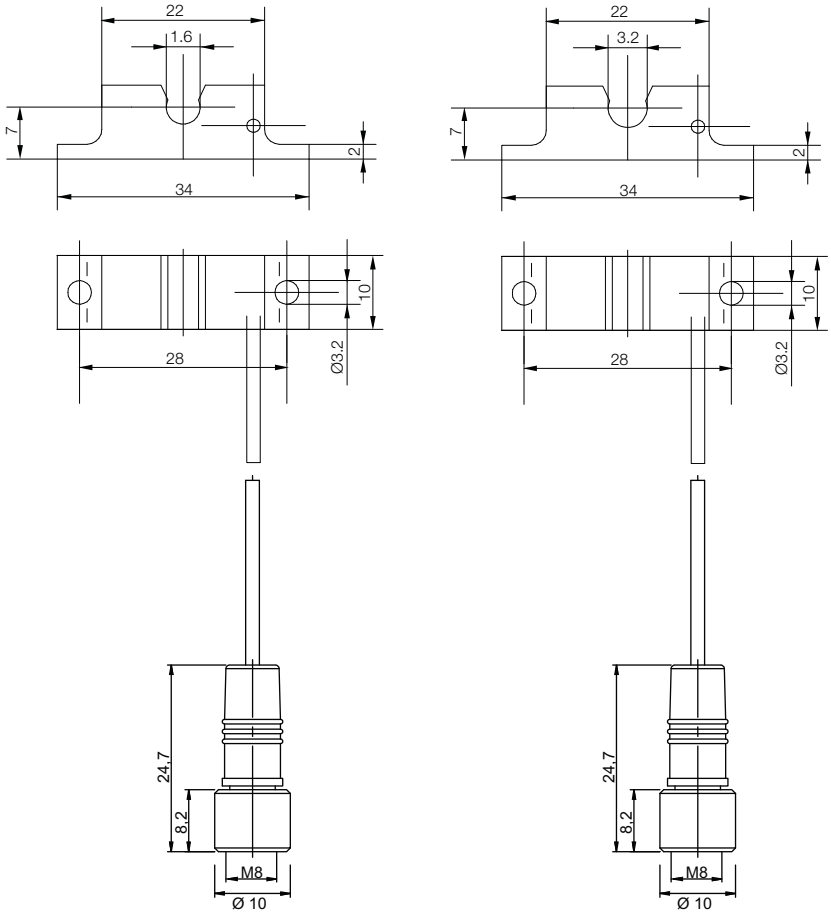


Precision tube sensors BOH for separate amplifiers BAE
Detection of liquids/bubbles

Type	**Precision tube sensor**	**Precision tube sensor**	
Tube diameter	**1.6 mm (1/16")**	**3.2 mm (1/8")**	
Use	**Detection of liquids/bubbles**	**Detection of liquids/bubbles**	
Order code	**BOH001R**	**BOH001Y**	
Part number	BOH TR-T16-001-01-S49F	BOH TR-T32-001-01-S49F	
Light type	Red light	Red light	
Wavelength	665 Nm	665 Nm	
Functional principle	Light refraction	Light refraction	
Degree of protection as per IEC 60529	IP 54	IP 54	
Ambient temperature T_a	–10...+60 °C	–10...+60 °C	
Housing material	Black anodized aluminum	Black anodized aluminum	
Connection	**PUR cable with M8 connector, 3-pin**	**PUR cable with M8 connector, 3-pin**	

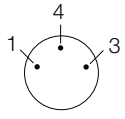
Function diagrams
beginning on page 62.

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02



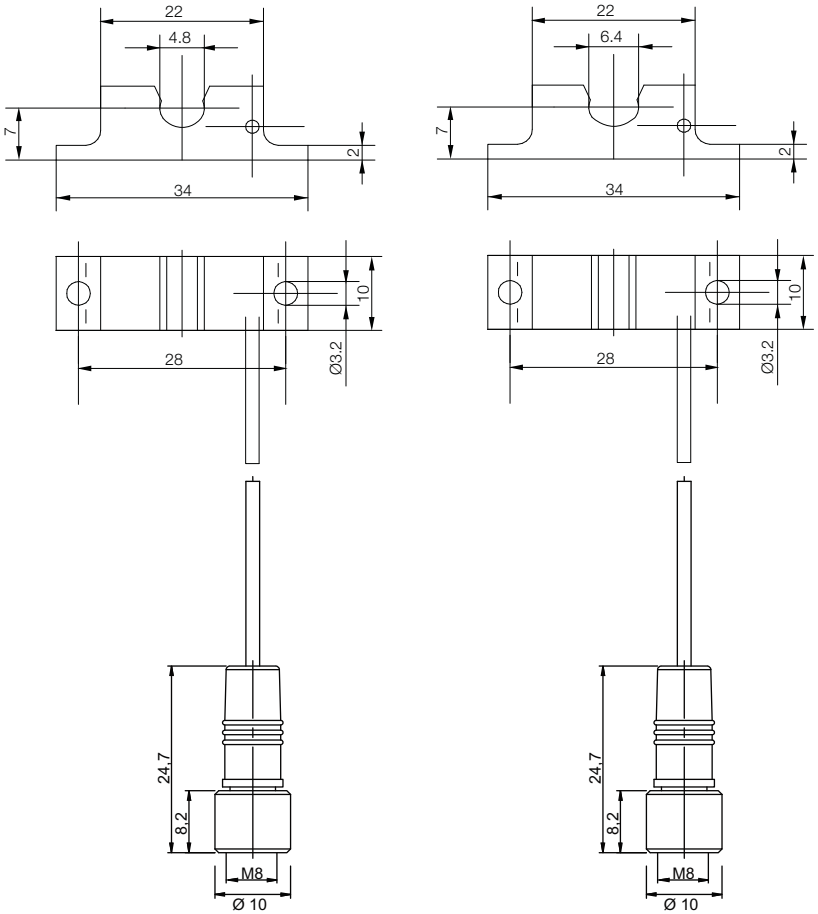
Connection configuration
M8 connector, 3-pin

1	(red)	LED +
4	(white/black)	LED – /FT –
3	(green)	FT +



Precision tube sensors BOH for separate amplifiers BAE
Detection of liquids/bubbles

	Precision tube sensor	**Precision tube sensor**	
	4.8 mm (3/16")	**6.4 mm (1/4")**	
	Detection of liquids/bubbles	**Detection of liquids/bubbles**	
	BOH0019	**BOH001A**	
	BOH TR-T48-001-01-S49F	BOH TR-T64-001-01-S49F	
	Red light	Red light	
	665 Nm	665 Nm	
	Light refraction	Light refraction	
	IP 54	IP 54	
	–10...+60 °C	–10...+60 °C	
	Black anodized aluminum	Black anodized aluminum	
	PUR cable with	**PUR cable with**	
	M8 connector, 3-pin	**M8 connector, 3-pin**	



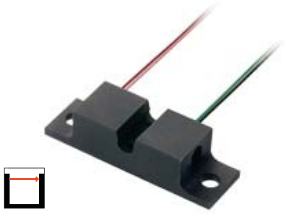
Precision tube sensors BOH for separate amplifiers BAE
Detection of water/bubbles and aqueous liquids

Detection of water and aqueous liquids

Precision tube sensors for detecting water and aqueous liquids use the light attenuation in the liquid column within the tube. They use a special wavelength so that the water absorbs the light. This makes them perfect for applications involving water and aqueous liquids.

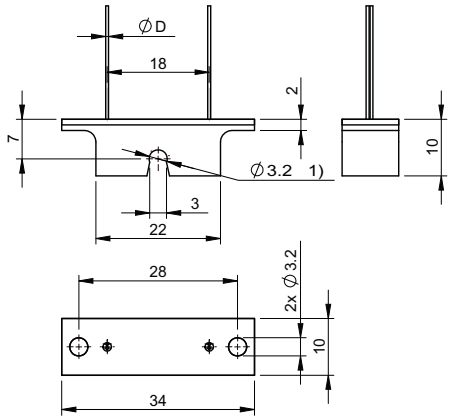
Built-in micro-optics detect the air-to-liquid transitions with high accuracy. The high reproducibility of the signal jump makes the tube sensors excellent for precisely determining volume.

Together with the microprocessor-controlled MICROmote® amplifiers with either switching or analog output, they form a complete measurement system with diverse application possibilities in laboratory, analysis and medical technology.

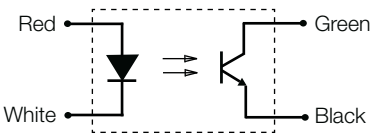


Type	**Precision tube sensor**
Tube diameter	**3.2 mm (1/8")**
Use	**Detection of water/bubbles and aqueous liquids**
Order code	**BOH001W**
Part number	BOH TJ-T32-001-TL-00,1
Light type	Infrared
Wavelength	1480 Nm
Functional principle	Absorption
Degree of protection as per IEC 60529	IP 54
Ambient temperature T_a	–10...+60 °C
Housing material	Black anodized aluminum
Connection	**100 mm stranded wire PFTE encapsulated, 4×AWG32**

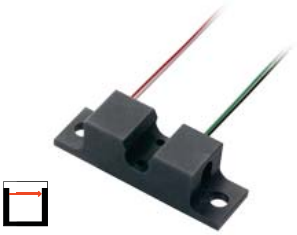
Function diagrams beginning on page 62.



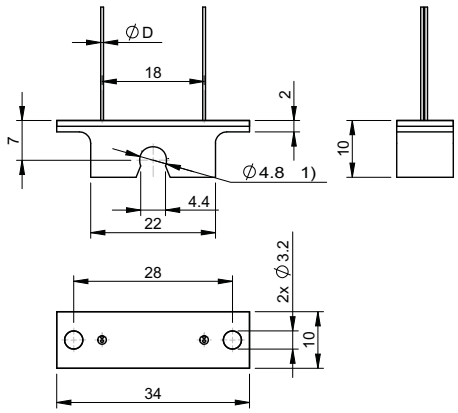
Connection configuration for all Stranded wire variants

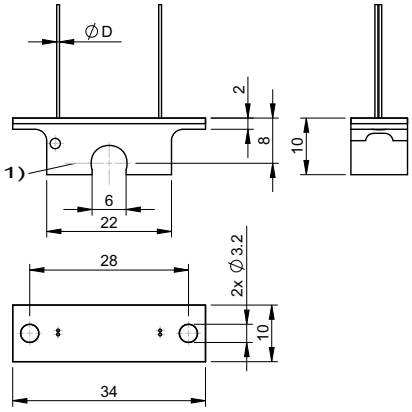


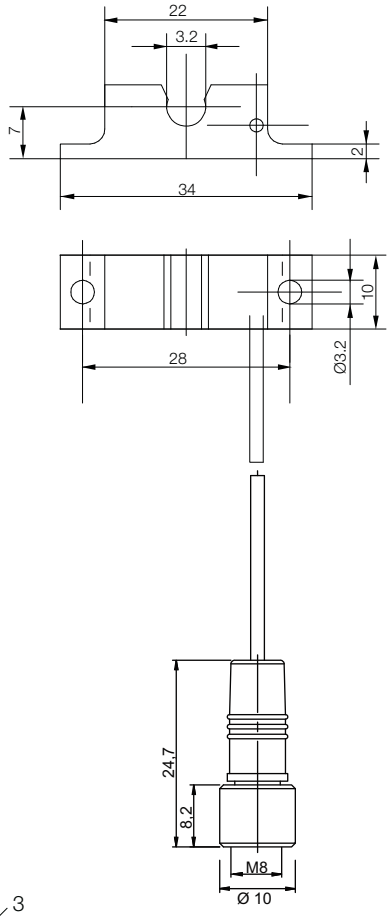
Precision tube sensors BOH for separate amplifiers BAE
Detection of water/bubbles and aqueous liquids



	Precision tube sensor 4.8 mm (3/16") Detection of water/bubbles and aqueous liquids	Precision tube sensor 6.4 mm (1/4") Detection of water/bubbles and aqueous liquids	Precision tube sensor 3.2 mm (1/8") Detection of water/bubbles and aqueous liquids
	BOH0017	**BOH0018**	**BOH001U**
	BOH TJ-T48-001-TL-00,1	BOH TJ-T64-001-TL-00,1	BOH TJ-T32-001-01-S49F
	Infrared	Infrared	Infrared
	1480 Nm	1480 Nm	1480 Nm
	Absorption	Absorption	Absorption
	IP 54	IP 54	IP 54
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	Black anodized aluminum	Black anodized aluminum	Black anodized aluminum
	100 mm stranded wire PFTE encapsulated, 4×AWG32	**100 mm stranded wire PFTE encapsulated, 4×AWG32**	**PUR cable with M8 connector, 3-pin**

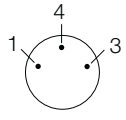






Connection configuration
M8 connector, 3-pin

1	(red)	LED +
4	(white/black)	LED – /FT –
3	(green)	FT +

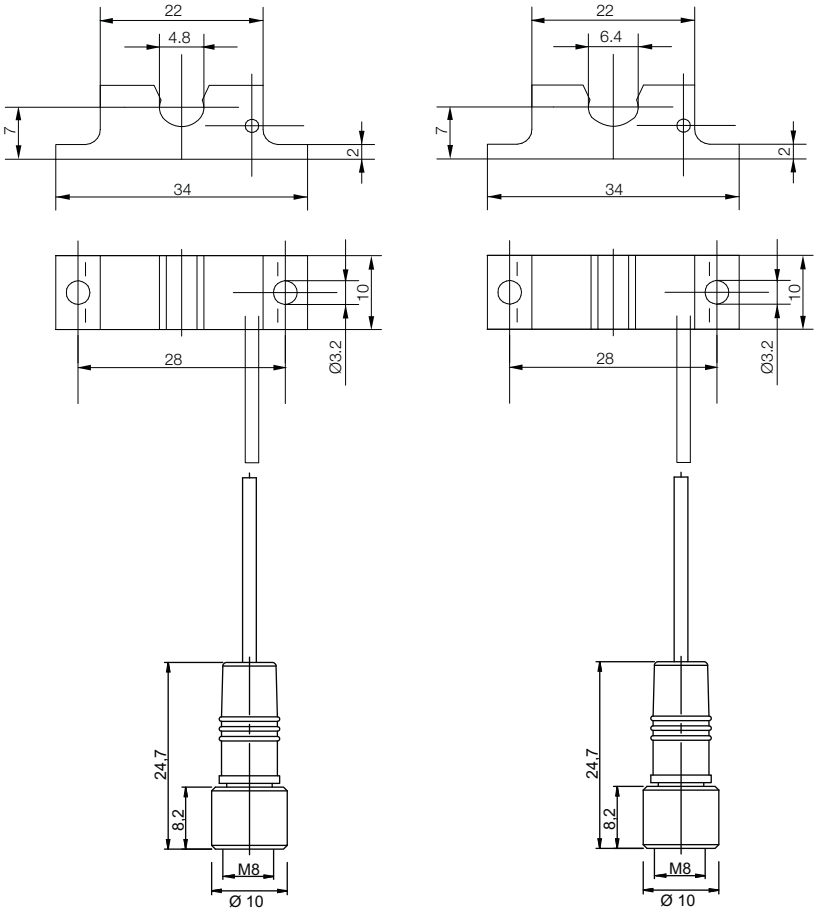


Precision tube sensors BOH for separate amplifiers BAE
Detection of water and aqueous liquids

Type	**Precision tube sensor**	**Precision tube sensor**
Tube diameter	**4.8 mm (3/16")**	**6.4 mm (1/4")**
Use	**Detection of water/bubbles and aqueous liquids**	**Detection of water/bubbles and aqueous liquids**
Order code	**BOH0015**	**BOH0016**
Part number	BOH TJ-T48-001-01-S49F	BOH TJ-T64-001-01-S49F
Light type	Infrared	Infrared
Wavelength	1480 Nm	1480 Nm
Functional principle	Absorption	Absorption
Degree of protection as per IEC 60529	IP 54	IP 54
Ambient temperature T_a	–10...+60 °C	–10...+60 °C
Housing material	Black anodized aluminum	Black anodized aluminum
Connection	**PUR cable with M8 connector, 3-pin**	**PUR cable with M8 connector, 3-pin**

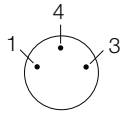
Function diagrams beginning on page 62.

Recommended amplifier:
BAE00NE
BAE-SA-OH-035-PP-DV02



Connection configuration
M8 connector, 3-pin

1	(red)	LED +
4	(white/black)	LED – /FT –
3	(green)	FT +



Precision tube sensors BOH for separate amplifiers BAE
Detection of microbubbles

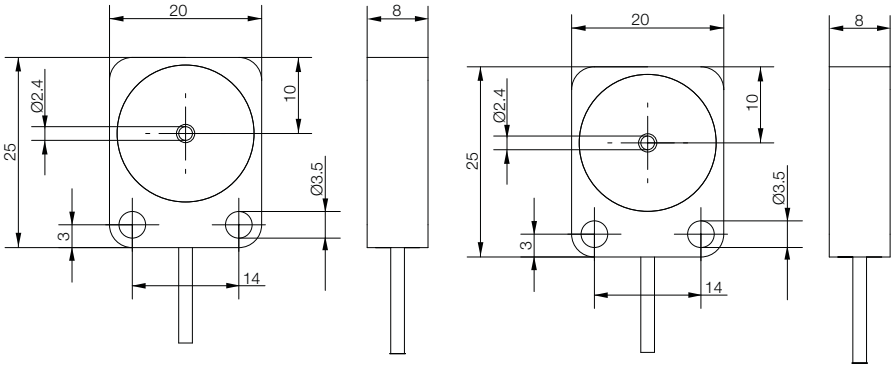
Detection of microbubbles
This series of precision tube sensors is designed to free-floating microbubbles in transparent liquids. Microbubbles refer to little gas bubbles with dimensions smaller than the inside diameter of the tube.

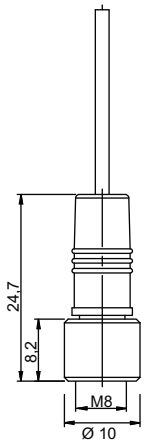
Uniform lighting is achieved in the liquid column by using a concentrated arrangement of multiple light beams with very uniform intensity distribution. Gas bubbles that move through this field induce a signal jump in the built-in photoelectric receiver elements.

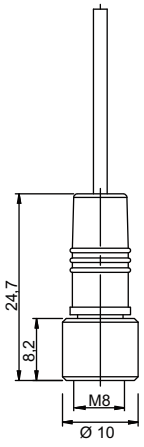
Together with the microprocessor-controlled MICROmote® amplifiers with either switching or analog output, these tube sensors form a complete detection system with diverse application possibilities for laboratory, analysis and medical technology.

The optical properties and thickness of the tube can affect the magnitude of the resulting signal swings.

Type	Precision tube sensor	Precision tube sensor
Tube diameter	**1.6 mm (1/16")**	**2.4 mm (1/11")**
Use	**Detection of microbubbles**	**Detection of microbubbles**
Order code	**BOH001H**	**BOH009J**
Part number	BOH ZR-T16-002-S49F-SA1	BOH ZR-T24-002-01-S49F-SA1
Light type	Red light	Red light
Wavelength	665 Nm	665 Nm
Functional principle	Light refraction	Light refraction
Degree of protection as per IEC 60529	IP 54	IP 54
Ambient temperature T_a	–10...+60 °C	–10...+60 °C
Housing material	PEEK black	PEEK black
Connection	**PUR cable with M8 connector, 3-pin**	**PUR cable with M8 connector, 3-pin**

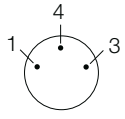






Connection configuration
M8 connector, 3-pin

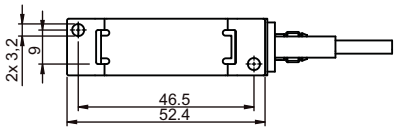
1	(red)	LED +
4	(white/black)	LED – /FT –
3	(green)	FT +

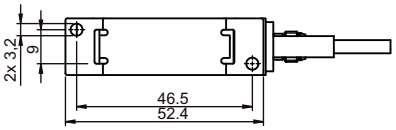


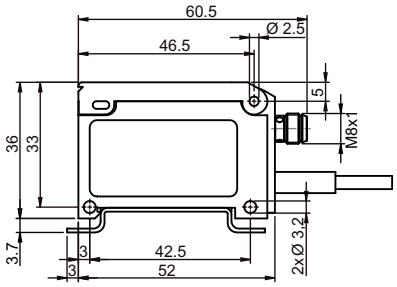
Sensor amplifiers BAE with display
Premium

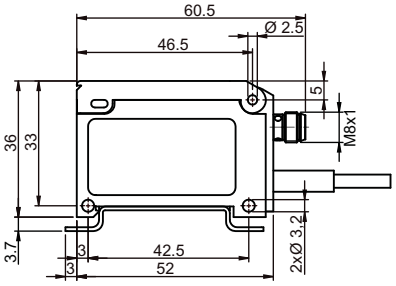
Type	Premium switching amplifier	Premium switching amplifier
Order code	**BAE00NE**	**BAE00PR**
Part number	BAE SA-OH-035-PP-DV02	BAE SA-OH-035-NP-DV02
Supply voltage U_S	10 to 30 V DC	10 to 30 V DC
Output current	200 mA	200 mA
Max. response time	1 ms	1 ms
Polarity reversal protected/ Short-circuit protected	Yes/Yes	Yes/Yes
Power indicator	Green LED	Green LED
Function indicator	Yellow LED / 3-digit display	Yellow LED / 3-digit display
Function principle	Clocked	Clocked
Pulse stretching (Off delay)	0...250 ms selectable	0...250 ms selectable
Output	**PNP**	**NPN**
Limit frequency	500 Hz	500 Hz
Intrinsic current consumption	45 mA	45 mA
Degree of protection as per IEC 60529	IP 54	IP 54
Ambient temperature T_a	–10...+55 °C	–10...+55 °C
Housing Material	ABS	ABS
Supply connection	**2 m PVC cable, 5x26 AWG**	**2 m PVC cable, 5x26 AWG**

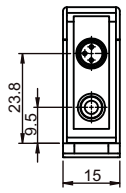
Function diagrams beginning on page 62.

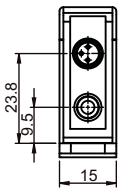






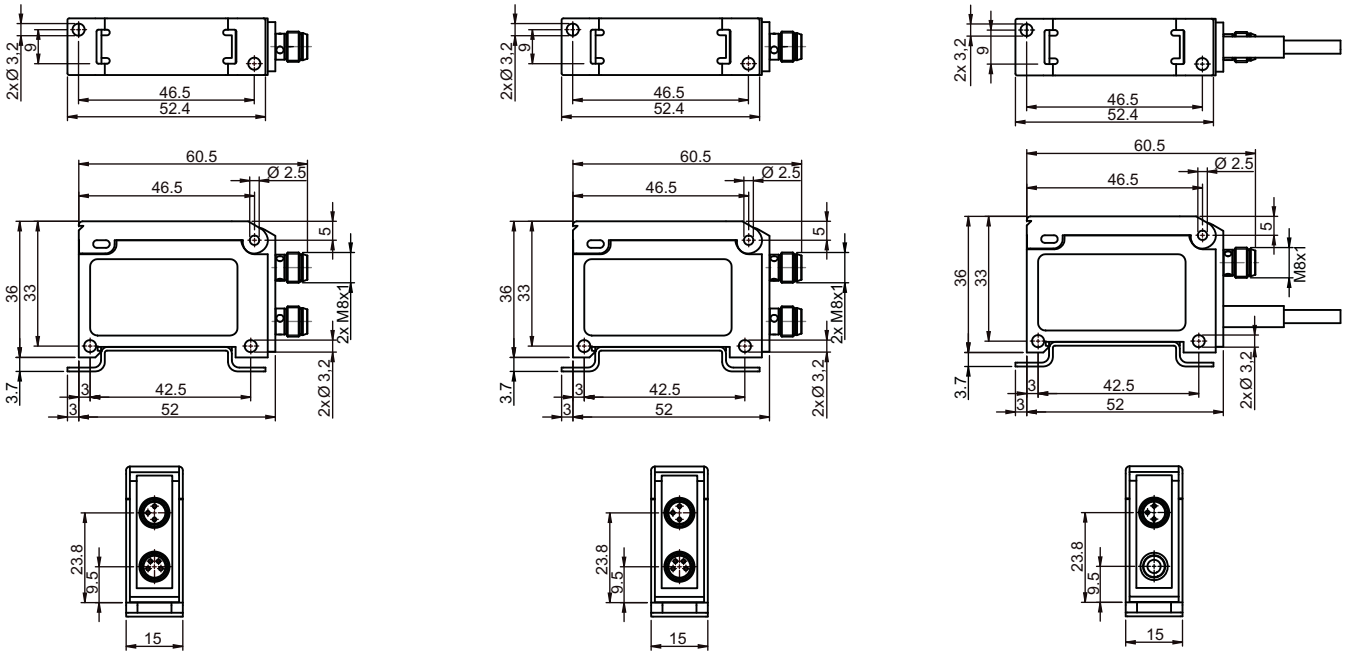






Sensor amplifiers BAE with display
Premium

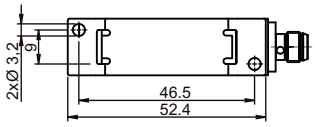
	Premium switching amplifier	Premium switching amplifier	Premium switching amplifier
	BAE00NF	**BAE00PT**	**BAE00NL**
	BAE SA-OH-035-PP-S75G	BAE SA-OH-035-NP-S75G	BAE SA-OH-039-PP-DV02
	10 to 30 V DC	10 to 30 V DC	10 to 30 V DC
	200 mA	200 mA	200 mA
	1 ms	1 ms	1 ms
	Yes/Yes	Yes/Yes	Yes/Yes
	Green LED	Green LED	Green LED
	Yellow LED / 3-digit display	Yellow LED / 3-digit display	Yellow LED / 3-digit display
	Clocked	Clocked	**Clocked, self-synchronized**
	0...250 ms selectable	0...250 ms selectable	0...250 ms selectable
	PNP	**NPN**	**PNP**
	500 Hz	500 Hz	500 Hz
	45 mA	45 mA	45 mA
	IP 54	IP 54	IP 54
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	ABS	ABS	ABS
	M8 connector, 4-pin	**M8 connector, 4-pin**	**2 m PVC cable, 5x26 AWG**

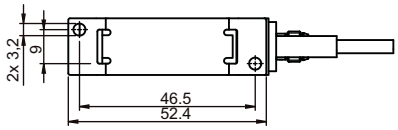


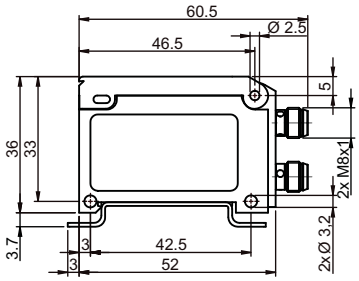
Sensor amplifiers BAE with display
Premium

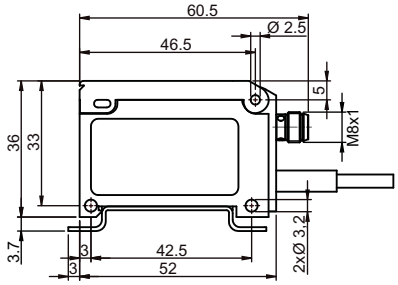
Type	**Premium switching amplifier**	**Premium switching amplifier**
Order code	**BAE00NK**	**BAE00R2**
Part number	BAE SA-OH-039-PP-S75G	BAE SA-OH-036-PP-DV02
Supply voltage U_S	10 to 30 V DC	10 to 30 V DC
Output current	200 mA	200 mA
Max. response time	1 ms	170 µs
Polarity reversal protected/ Short-circuit protected	Yes/Yes	Yes/Yes
Power indicator	Green LED	Green LED
Function indicator	Yellow LED / 3-digit display	Yellow LED / 3-digit display
Function principle	**Clocked, self-synchronized**	Clocked
Pulse stretching (Off delay)	0...250 ms selectable	0...250 ms selectable
Output	**PNP**	**PNP**
Limit frequency	500 Hz	3 kHz
Intrinsic current consumption	45 mA	45 mA
Degree of protection as per IEC 60529	IP 54	IP 54
Ambient temperature T_a	–10...+55 °C	–10...+55 °C
Housing Material	ABS	ABS
Supply connection	**M8 connector, 4-pin**	**2m PVC cable, 5x26 AWG**

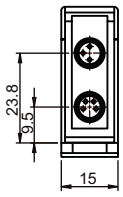
Function diagrams beginning on page 62.

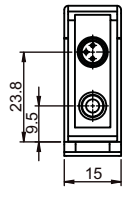






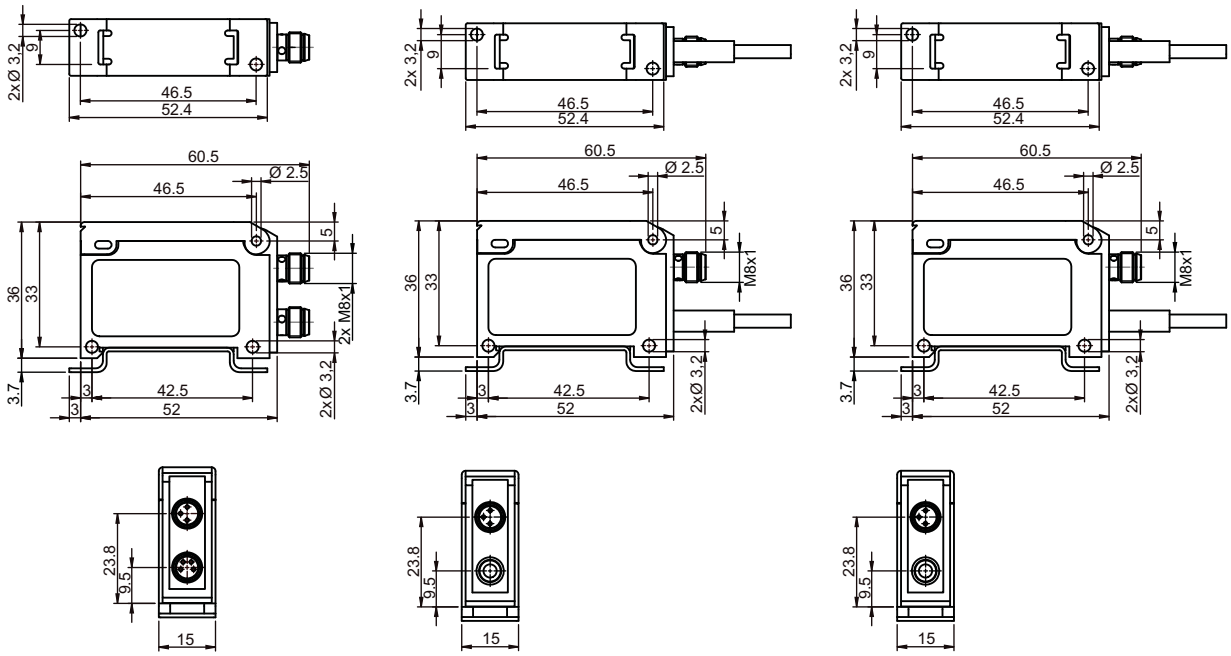






Sensor amplifiers BAE with display
Premium

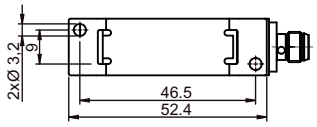
	Premium switching amplifier	Premium switching amplifier	Premium switching amplifier
	BAE00R3	**BAE00R5**	**BAE00R4**
	BAE SA-OH-036-PP-S75G	BAE SA-OH-037-PP-DV02	BAE SA-OH-037-NP-DV02
	10 to 30 V DC	10 to 30 V DC	10 to 30 V DC
	200 mA	200 mA	200 mA
	170 µs	50 µs	50 µs
	Yes/Yes	Yes/Yes	Yes/Yes
	Green LED	Green LED	Green LED
	Yellow LED / 3-digit display	Yellow LED / 3-digit display	Yellow LED / 3-digit display
	Clocked		
	0...250 ms selectable	0...250 ms selectable	0...250 ms selectable
	PNP	**PNP**	**NPN**
	3 kHz	10 kHz	10 kHz
	45 mA	50 mA	50 mA
	IP 54	IP 54	IP 54
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	ABS	ABS	ABS
	M8 connector, 4-pin	**2m PVC cable, 5x26 AWG**	**2m PVC cable, 5x26 AWG**

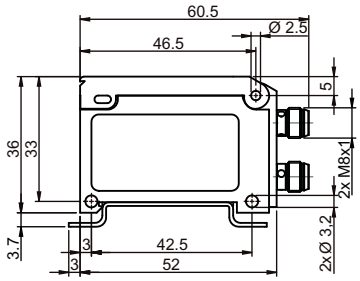


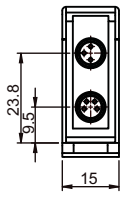
Sensor amplifiers BAE with display
Premium

Type	**Premium switching amplifier**	
Order code	**BAE00R6**	
Part number	BAE SA-OH-037-PP-S75G	
Supply voltage U_S	10 to 30 VDC	
Output current	200 mA	
Max. response time	50 µs	
Polarity reversal protected/ Short-circuit protected	Yes/Yes	
Power indicator	Green LED	
Function indicator	Yellow LED / 3-digit display	
Function principle		
Pulse stretching (Off delay)	0...250 ms	
Output	**PNP**	
Limit frequency	10 kHz	
Intrinsic current consumption	50 mA	
Degree of protection as per IEC 60529	IP 54	
Ambient temperature T_a	–10...+55 °C	
Housing Material	ABS	
Supply connection	**M8 connector, 4-pin**	

Function diagrams
beginning on page 62.

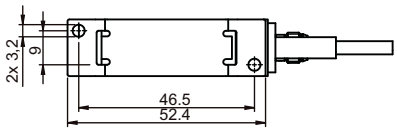


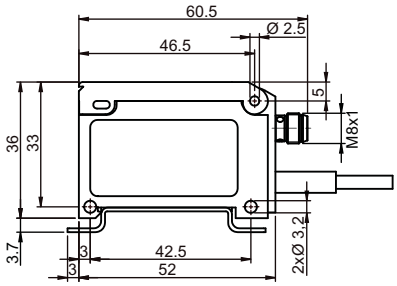


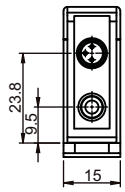


Sensor amplifiers BAE with display
Premium

	Premium analog amplifier	
	BAE00NH	
	BAE SA-OH-038-UA-DV02	
	15...30 VDC	
	200 mA	
	0.5 ms	
	Yes/Yes	
	Green LED	
	Yellow LED / 3-digit display	
	Clocked	
	0...10 V (analog)	
	1 kHz	
	45 mA	
	IP 54	
	–10...+55 °C	
	ABS	
	2 m PVC cable, 5x26 AWG	



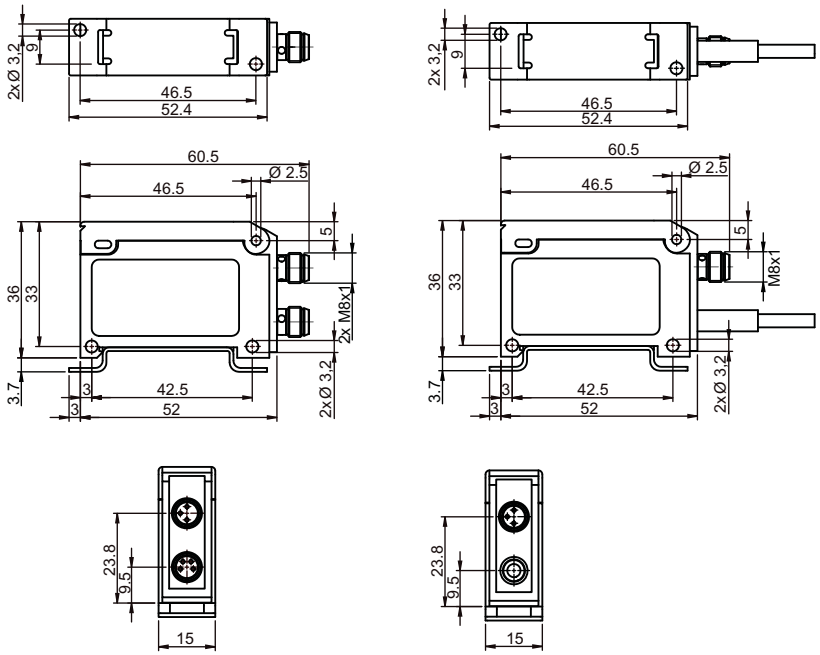




Sensor amplifiers BAE with display
Premium

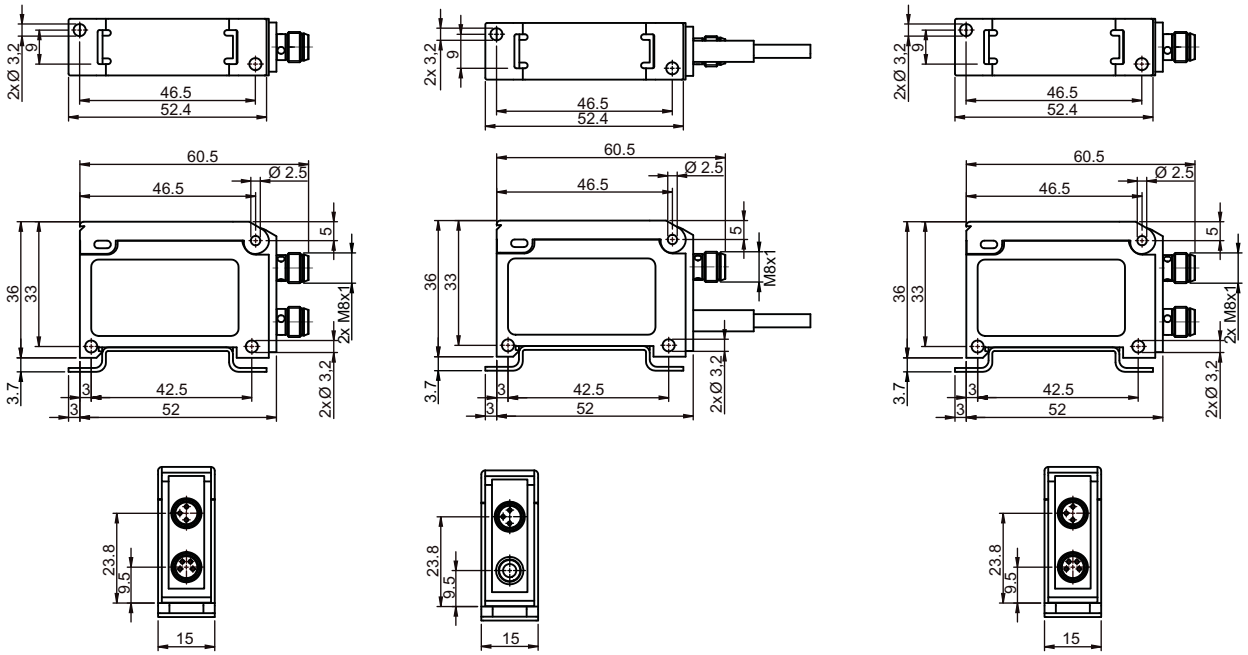
Type	Premium analog amplifier	Premium analog amplifier	
Order code	**BAE00N6**	**BAE00N4**	
Part number	BAE SA-OH-038-UA-S75G	BAE SA-OH-038-IC-DV02	
Supply voltage U_S	15...30 VDC	15...30 VDC	
Output current	200 mA	200 mA	
Max. response time	0.5 ms	0.5 ms	
Polarity reversal protected/ Short-circuit protected	Yes/Yes	Yes/Yes	
Power indicator	Green LED	Green LED	
Function indicator	Yellow LED / 3-digit display	Yellow LED / 3-digit display	
Function principle	Clocked	Clocked	
Pulse stretching (Off delay)			
Output	**0...10 V (analog)**	**4...20 mA (analog)**	
Limit frequency	1 kHz	1 kHz	
Intrinsic current consumption	45 mA	45 mA	
Degree of protection as per IEC 60529	IP 54	IP 54	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Housing material	ABS	ABS	
Supply connection	**M8 connector, 4-pin**	**2 m PVC cable, 5x26 AWG**	

Function diagrams
beginning on page 62.



Sensor amplifiers BAE with display
Premium

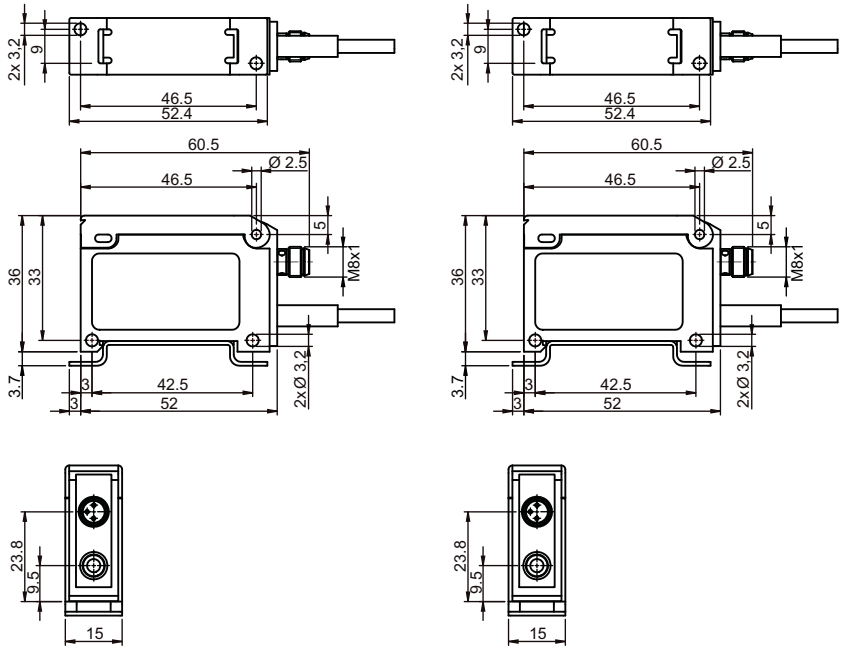
	Premium analog amplifier	Premium dynamic amplifier	Premium dynamic amplifier
	BAE00N5	**BAE00NJ**	**BAE00N7**
	BAE SA-OH-038-IC-S75G	BAE SA-OH-040-PP-DV02	BAE SA-OH-040-PP-S75G
	15...30 VDC	10 to 30 V DC	10 to 30 V DC
	200 mA	200 mA	200 mA
	0.5 ms	1 ms	1 ms
	Yes/Yes	Yes/Yes	Yes/Yes
	Green LED	Green LED	Green LED
	Yellow LED / 3-digit display	Yellow LED / 3-digit display	Yellow LED / 3-digit display
	Clocked	**Clocked, dynamic**	**Clocked, dynamic**
		0...250 ms	0...250 ms
	4...20 mA (analog)	**PNP**	**PNP**
	1 kHz	2 kHz (scan rate)	3 kHz
	45 mA	45 mA	45 mA
	IP 54	IP 54	IP 54
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	ABS	ABS	ABS
	M8 connector, 4-pin	**2 m PVC cable, 5x26 AWG**	**M8 connector, 4-pin**



Sensor amplifiers BAE
Advanced

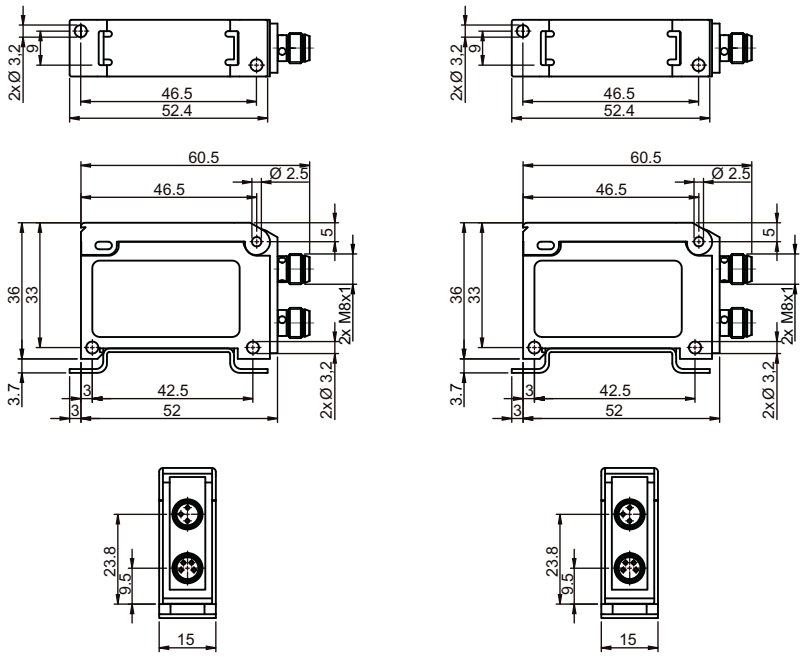
Type	Advanced switching amplifier	Advanced switching amplifier
Order code	**BAE00N8**	**BAE00PC**
Part number	BAE SA-OH-032-PP-DV02	BAE SA-OH-032-NP-DV02
Supply voltage U_S	10 to 30 V DC	10 to 30 V DC
Output current	100 mA	100 mA
Max. response time	1.1 ms	1.1 ms
Polarity reversal protected/ Short-circuit protected	Yes/Yes	Yes/Yes
Power indicator	Green LED	Green LED
Function indicator	Yellow LED	Yellow LED
Function principle	Clocked	Clocked
Pulse stretching (Off delay)	0/50 ms (selectable)	0/50 ms (selectable)
Output	**PNP**	**NPN**
Limit frequency	500 Hz	500 Hz
Intrinsic current consumption	40 mA	40 mA
Degree of protection as per IEC 60529	IP 54	IP 54
Ambient temperature T_a	–10...+55 °C	–10...+55 °C
Housing material	ABS	ABS
Supply connection	**2 m PVC cable, 3x26 AWG**	**2 m PVC cable, 3x26 AWG**

Function diagrams
beginning on page 62.



Sensor amplifiers BAE Advanced

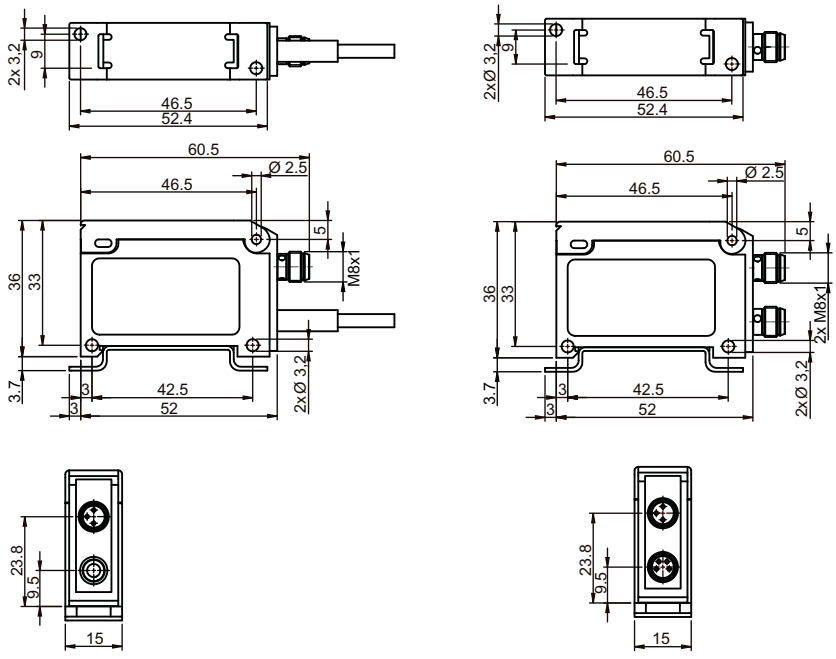
	Advanced switching amplifier	Advanced switching amplifier	
	BAE00N9	**BAE00PE**	
	BAE SA-OH-032-PP-S75G	BAE SA-OH-032-NP-S75G	
	10 to 30 V DC	10 to 30 V DC	
	100 mA	100 mA	
	1.1 ms	1.1 ms	
	Yes/Yes	Yes/Yes	
	Green LED	Green LED	
	Yellow LED	Yellow LED	
	Clocked	Clocked	
	0/50 ms (selectable)	0/50 ms (selectable)	
	PNP	**NPN**	
	500 Hz	500 Hz	
	40 mA	40 mA	
	IP 54	IP 54	
	–10...+55 °C	–10...+55 °C	
	ABS	ABS	
	M8 connector, 4-pin	**M8 connector, 4-pin**	



Sensor amplifiers BAE
Basic

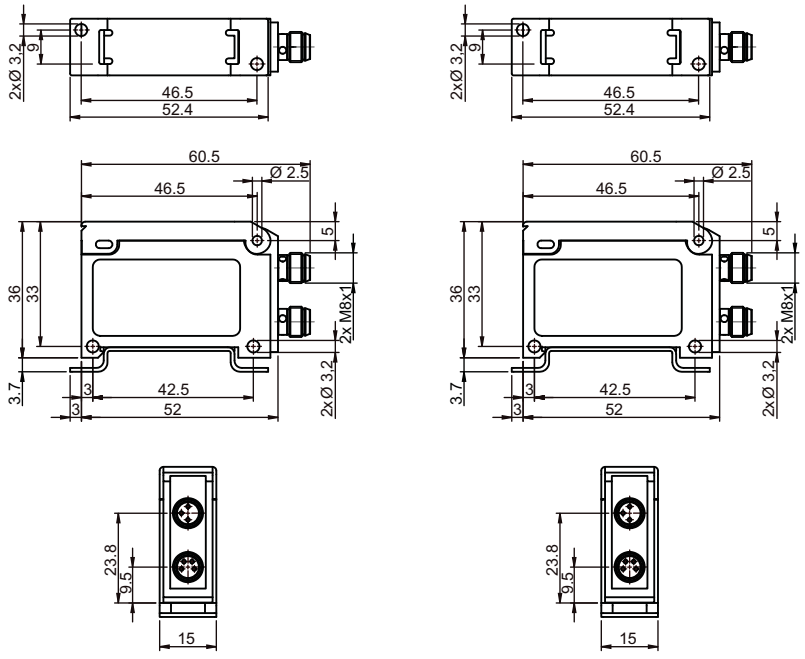
Type	Basic switching amplifier	Basic switching amplifier	
Order code	**BAE00NA**	**BAE00NC**	
Part number	BAE SA-OH-029-YP-DV02	BAE SA-OH-029-YP-S75G	
Supply voltage U_S	15...30 VDC	15...30 VDC	
Output current	100 mA	100 mA	
Max. response time	1.1 ms	1.1 ms	
Polarity reversal protected/ Short-circuit protected	Yes/Yes	Yes/Yes	
Power indicator	Green LED	Green LED	
Function indicator	Yellow LED	Yellow LED	
Function principle	Clocked	Clocked	
Pulse stretching (Off delay)	0/50 ms (selectable)	0/50 ms (selectable)	
Output	**PNP/NPN**	**PNP/NPN**	
Limit frequency	500 Hz	500 Hz	
Intrinsic current consumption	40 mA	40 mA	
Degree of protection as per IEC 60529	IP 54	IP 54	
Ambient temperature T_a	–10...+55 °C	–10...+55 °C	
Housing material	ABS	ABS	
Supply connection	**2 m PVC cable, 4x26 AWG**	**M8 connector, 4-pin**	

Function diagrams beginning on page 62.



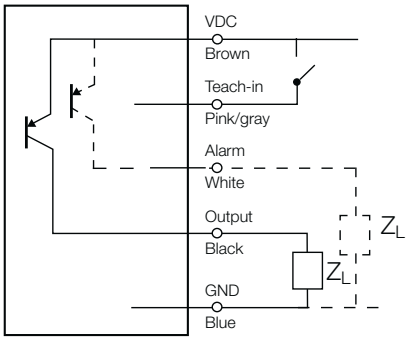
Sensor amplifiers BAE
Basic

	Basic switching amplifier	**Basic switching amplifier**	
	BAE00P7	**BAE00PA**	
	BAE SA-OH-030-YP-S75G	BAE SA-OH-031-YP-S75G	
	15...30 VDC	15...30 VDC	
	100 mA	100 mA	
	200 µs	70 µs	
	Yes/Yes	Yes/Yes	
	Green LED	Green LED	
	Yellow LED	Yellow LED	
	Clocked	Clocked	
	0/50 ms (selectable)	0/50 ms (selectable)	
	PNP/NPN	**PNP/NPN**	
	3 kHz	5 kHz	
	40 mA	45 mA	
	IP 54	IP 54	
	–10...+55 °C	–10...+55 °C	
	ABS	ABS	
	M8 connector, 4-pin	**M8 connector, 4-pin**	



Switching amplifiers BAE for sensor heads BOH
Wiring diagrams

Switching amplifier and premium dynamic amplifier

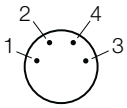


2 m PVC cable, 5×0.14 mm²

Brown	+ VDC
White	Alarm output
Blue	– GND
Black	Signal output
Pink	Teach input

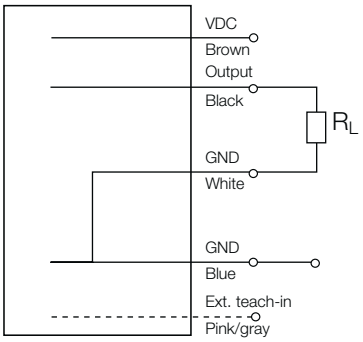
M8 connector, 4-pin

1 (brown)	+ VDC
2 (white)	Alarm output
3 (blue)	– GND
4 (black)	Signal output



NPN on request.

Premium analog amplifier with current output

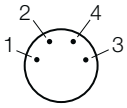


2 m PVC cable, 5×0.14 mm²

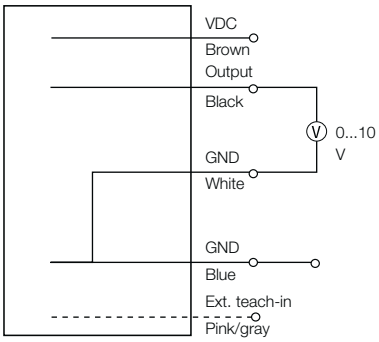
Brown	+ VDC
White	Analog GND
Blue	– GND
Black	Analog +
Pink	External teach

M8 connector, 4-pin

1 (brown)	+ VDC
2 (white)	Analog GND
3 (blue)	– GND
4 (black)	Analog +



Premium analog amplifier with voltage output

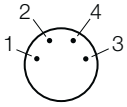


2 m PVC cable, 5×0.14 mm²

Brown	+ VDC
White	Analog GND
Blue	– GND
Black	Analog +
Pink	External teach

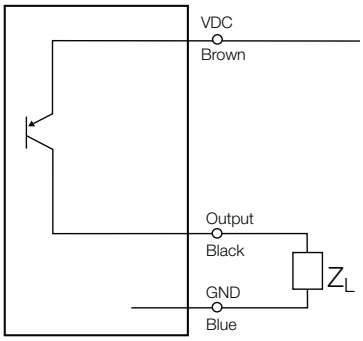
M8 connector, 4-pin

1 (brown)	+ VDC
2 (white)	Analog GND
3 (blue)	– GND
4 (black)	Analog +



Switching amplifiers BAE for sensor heads BOH
Wiring diagrams

Advanced switching amplifier



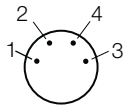
NPN on request.

2 m PVC cable, 3×0.14 mm²

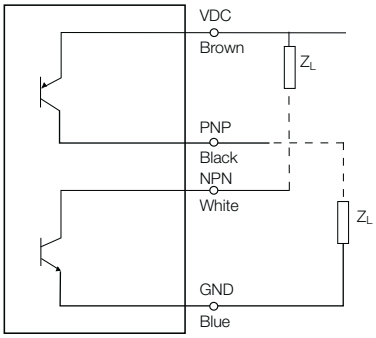
Brown	+ VDC
Blue	– GND
Black	Signal output

M8 connector, 4-pin

1 (brown)	+ VDC
2 (white)	Not assigned
3 (blue)	– GND
4 (black)	Signal output



Basic switching amplifier

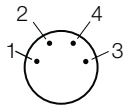


2 m PVC cable, 4×0.14 mm²

Brown	+ VDC
White	NPN signal output
Blue	– GND
Black	PNP signal output

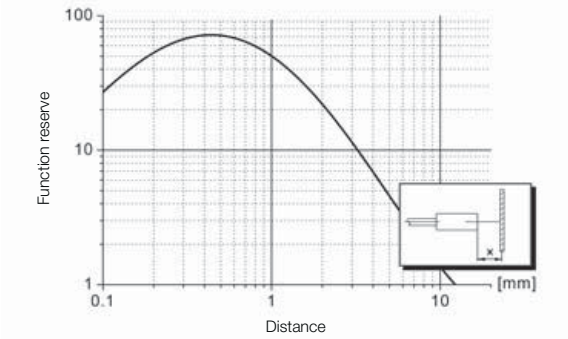
M8 connector, 4-pin

1 (brown)	+ VDC
2 (white)	NPN signal output
3 (blue)	– GND
4 (black)	PNP signal output



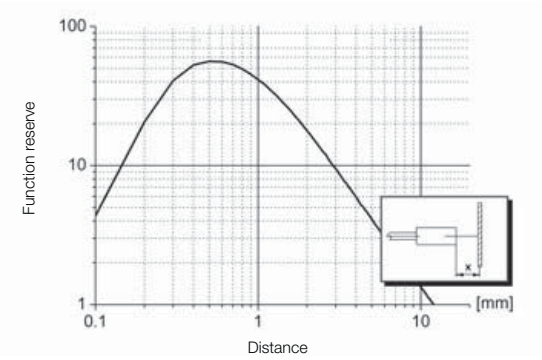
Diffuse sensors BOH for separate amplifiers BAE
Function diagrams

BOH0002, BOH DI-G02-001-01-S49F
BOH0004, BOH DI-M03-001-01-S49F
BOH009R, BOH DI-M06V-008-S75-SA3

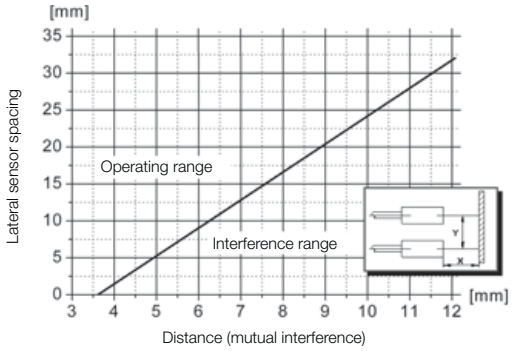


Function reserve depending on distance

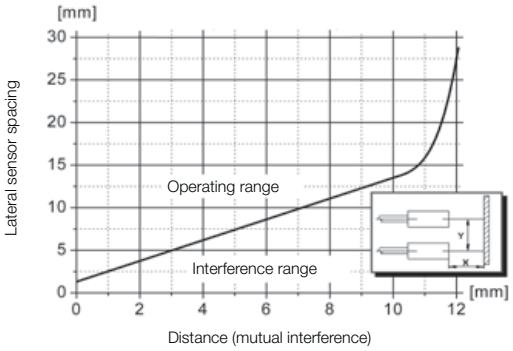
BOH0003, BOH DR-G02-001-01-S49F
BOH0009, BOH DR-M03-001-01-S49F



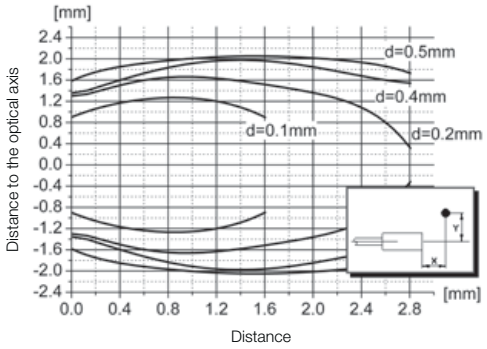
Function reserve depending on distance



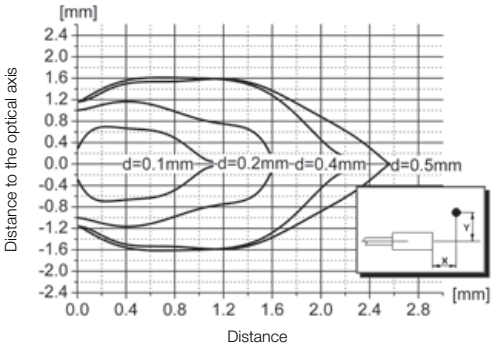
Minimum distance between two sensors for avoiding mutual interference



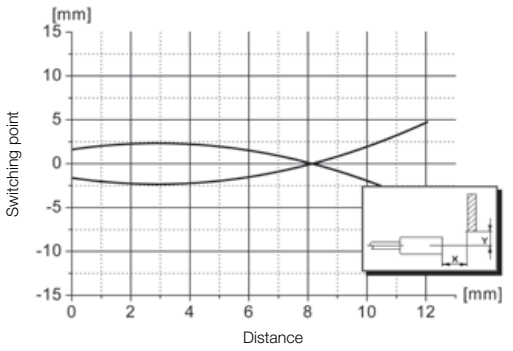
Minimum distance between two sensors for avoiding mutual interference



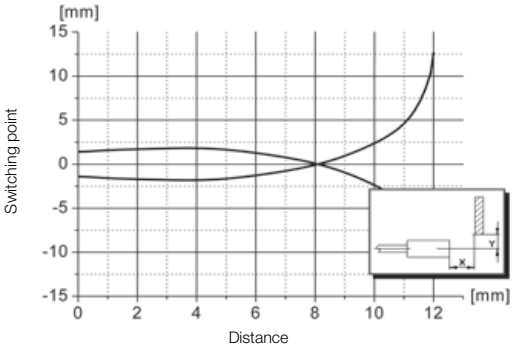
Resolution depending on distance



Resolution depending on distance



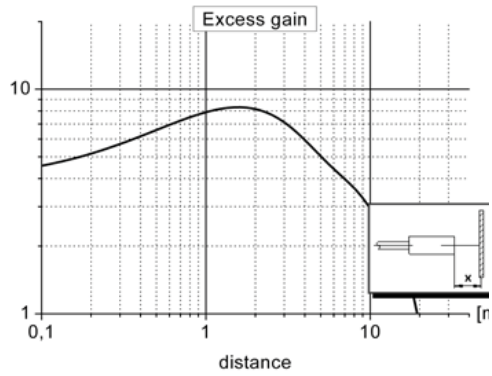
Detection range depending on distance

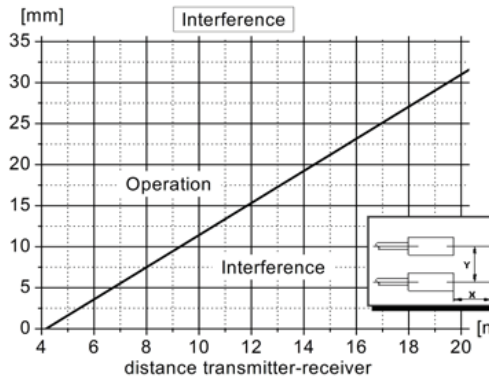


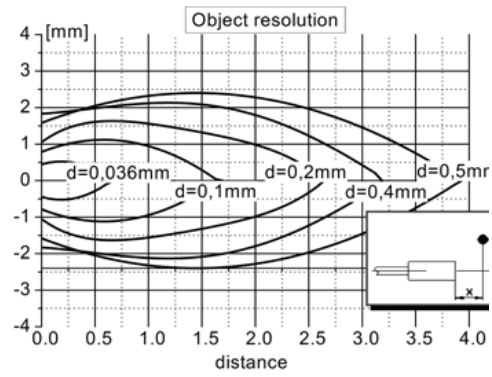
Detection range depending on distance

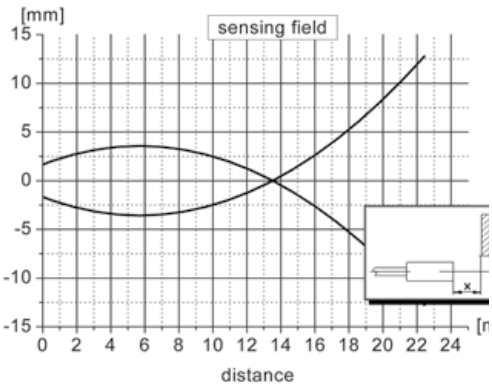
Diffuse sensors BOH for separate amplifiers BAE
Function diagrams

BOH0035, BOH DI-G02-006-01-S49F

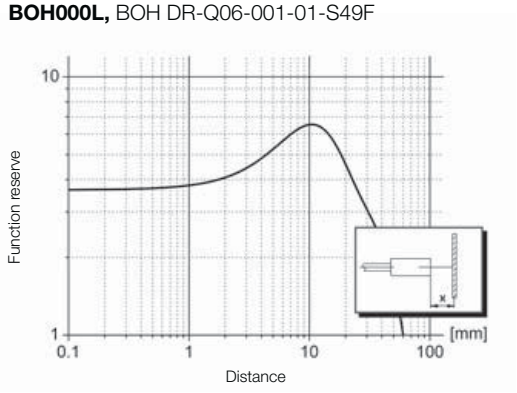




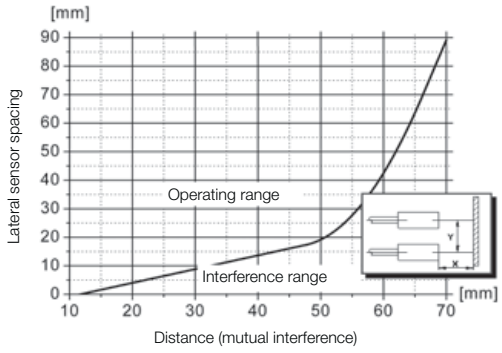




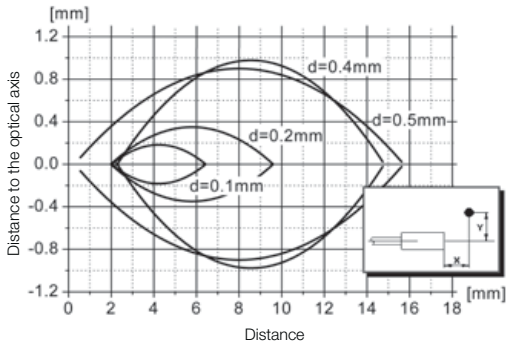
BOH0005, BOH DR-G05-002-01-S49F
BOH0007, BOH DR-M06-002-01-S49F
BOH000L, BOH DR-Q06-001-01-S49F



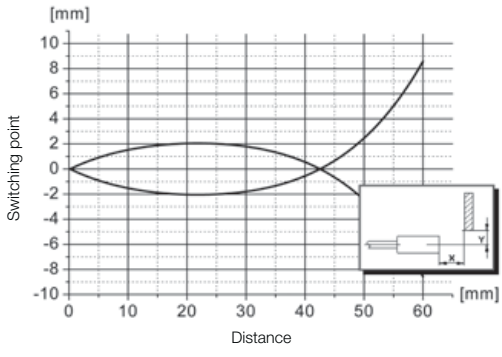
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



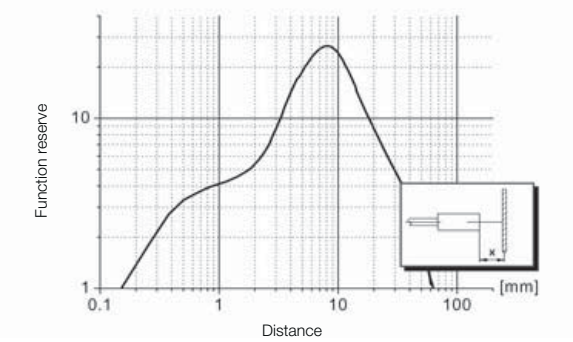
Resolution depending on distance



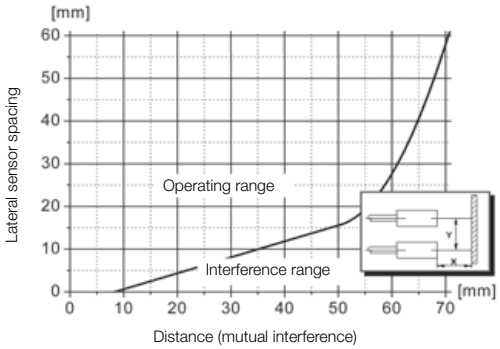
Detection range depending on distance

Diffuse sensors BOH for separate amplifiers BAE
Function diagrams

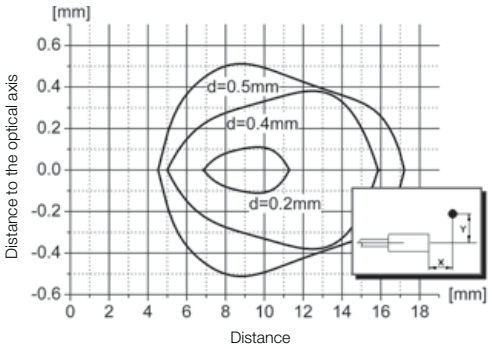
BOH0006, BOH DK-G05-002-01-S49F
BOH0008, BOH DK-M06-002-01-S49F
BOH000M, BOH DK-Q06-001-01-S49F



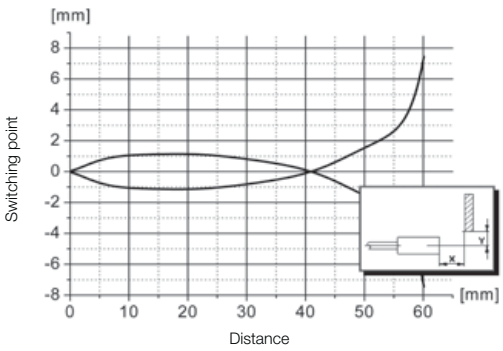
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

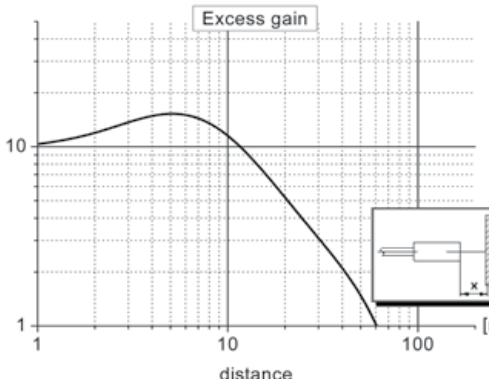


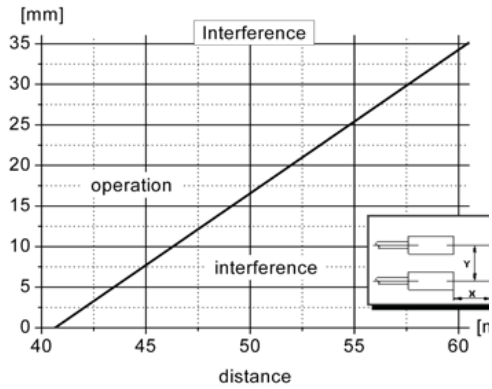
Resolution depending on distance

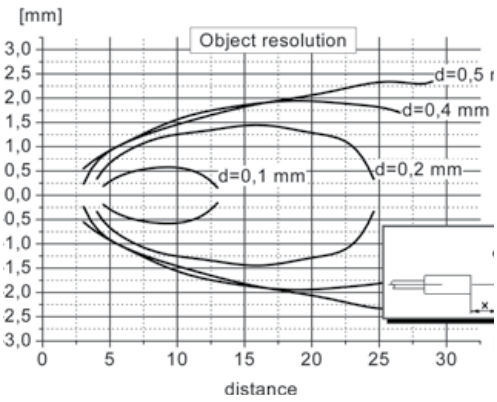


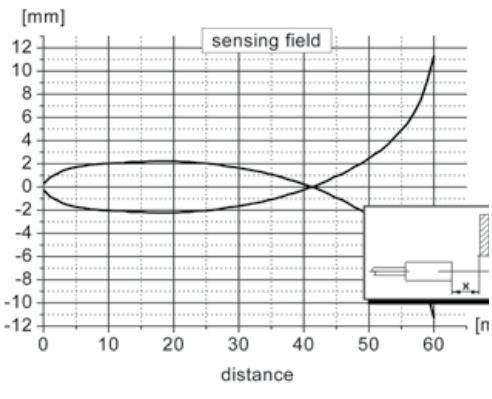
Detection range depending on distance

BOH003C, BOH DI-G05-002-01-S49F
BOH003M, BOH DI-G06-002-01-S49F



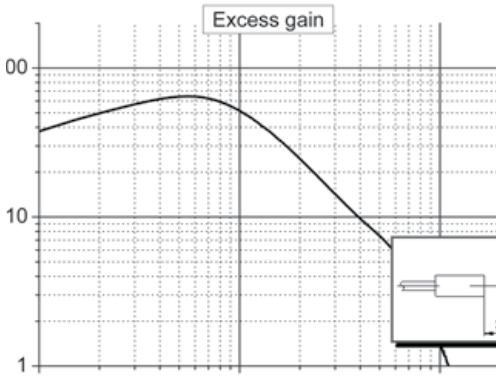


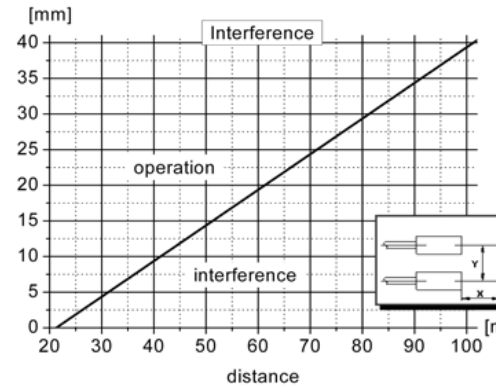


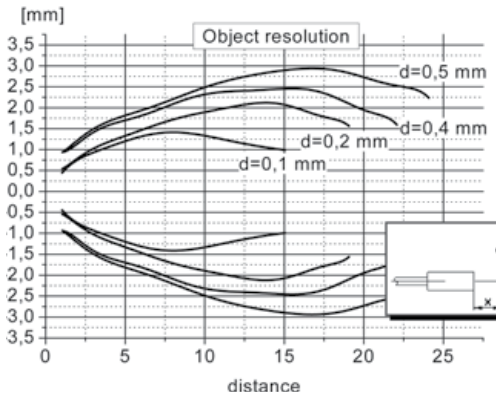


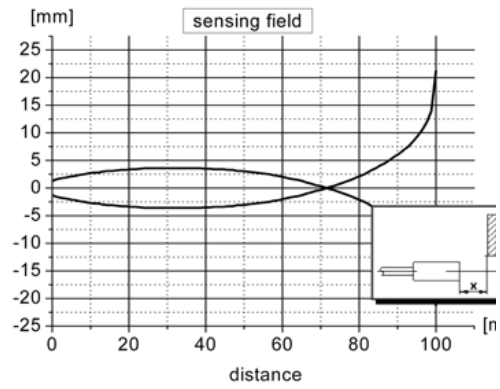
Diffuse sensors BOH for separate amplifiers BAE
Function diagrams

BOH003F, BOH DI-G05-007-01-S49F

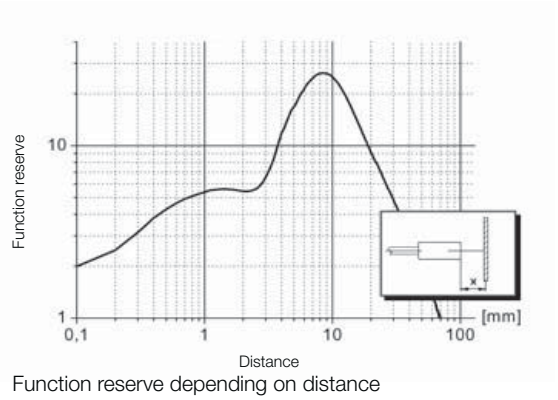




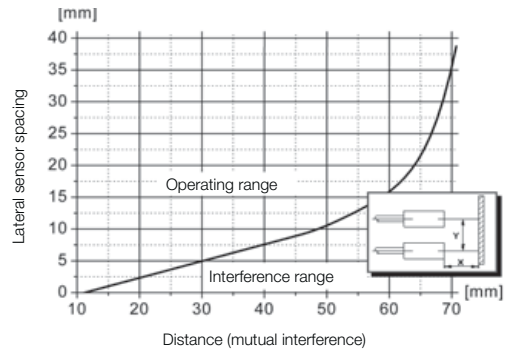




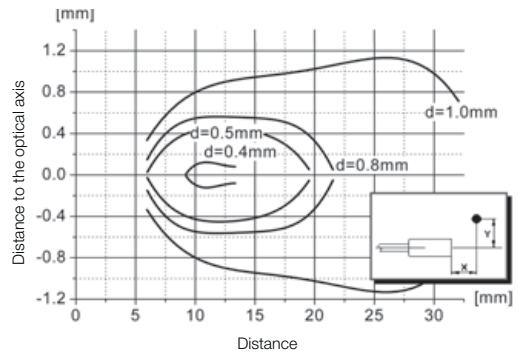
BOH002K, BOH DK-R002-006-01-S49F



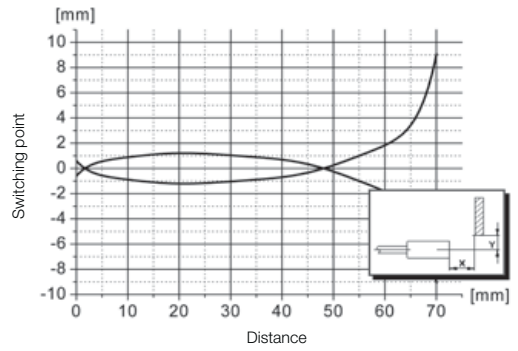
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



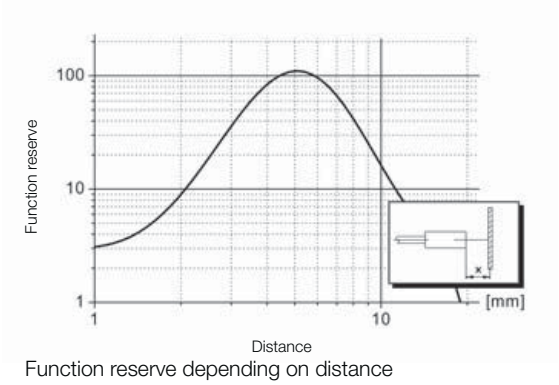
Resolution depending on distance



Detection range depending on distance

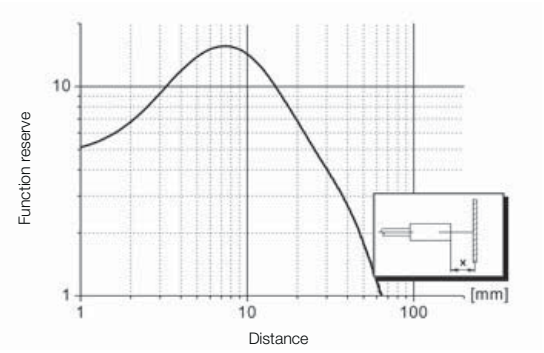
Diffuse sensors BOH for separate amplifiers BAE
Function diagrams

BOH002L, BOH FK-Z001-001-01-S49F

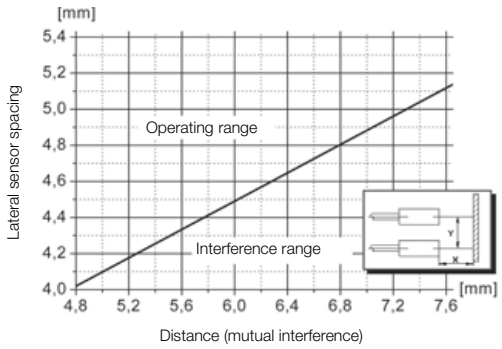


Function reserve depending on distance

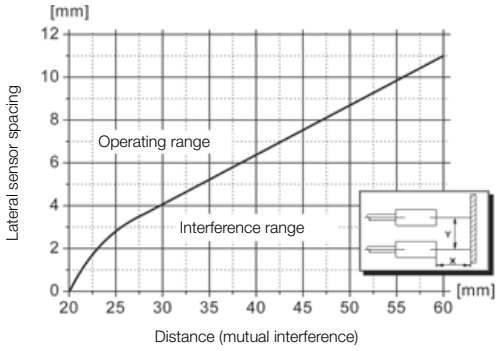
BOH0027, BOH DK-R018-001-01-S49F
BOH0028, BOH DK-R018-002-01-S49F



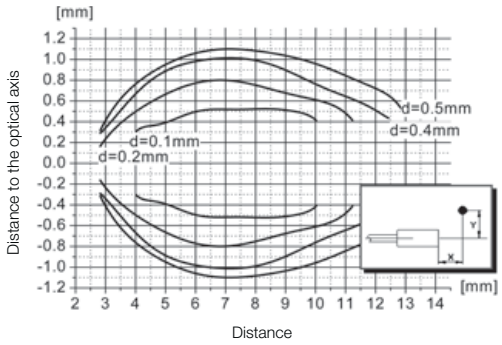
Function reserve depending on distance



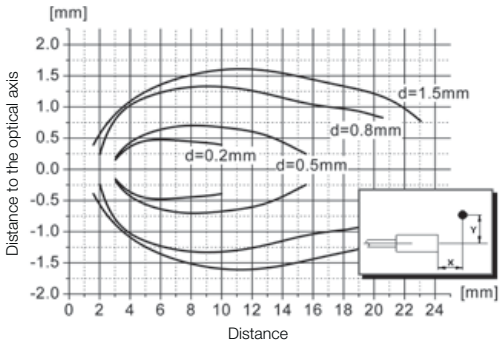
Minimum distance between two sensors for avoiding mutual interference



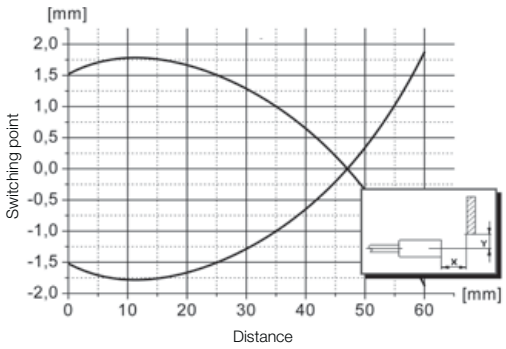
Minimum distance between two sensors for avoiding mutual interference



Resolution depending on distance



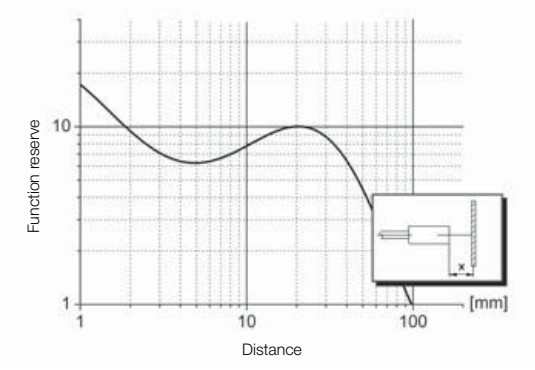
Resolution depending on distance



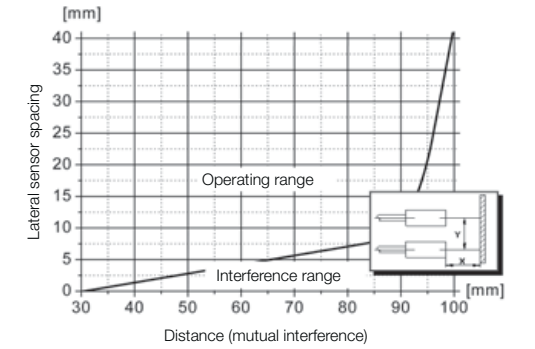
Detection range depending on distance

Diffuse sensors BOH for separate amplifiers BAE
Function diagrams

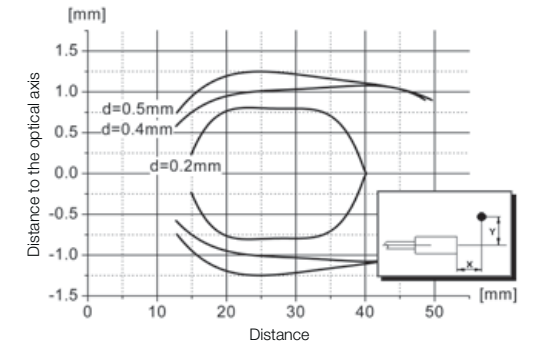
BOH0029, BOH DK-R027-003-01-S49F
BOH002A, BOH DK-R027-004-01-S49F



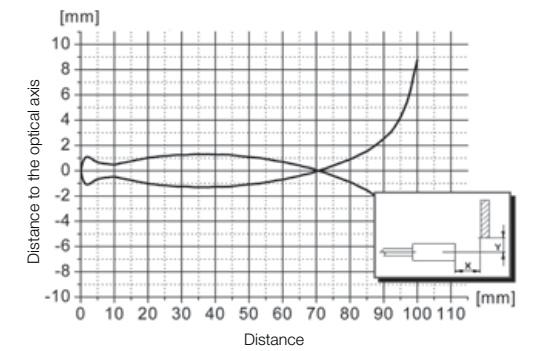
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

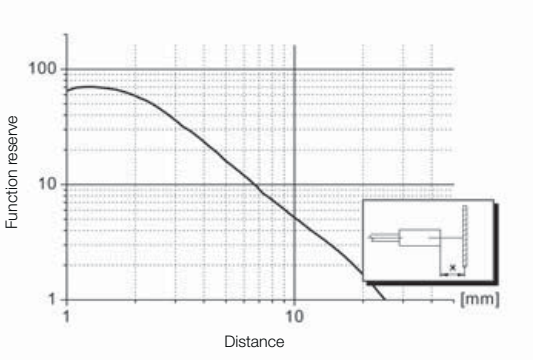


Resolution depending on distance

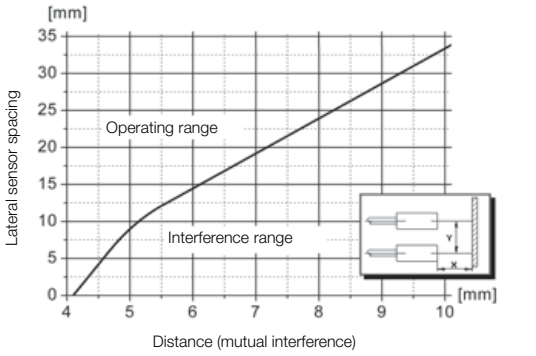


Detection range depending on distance

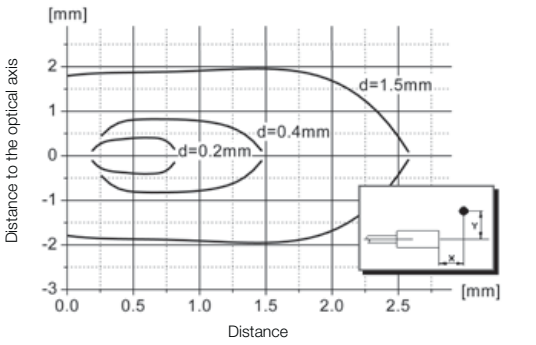
BOH0021, BOH DI-R006V-009-TL-01
BOH00A0. BOH DI-R006-009-TF-01-S49F



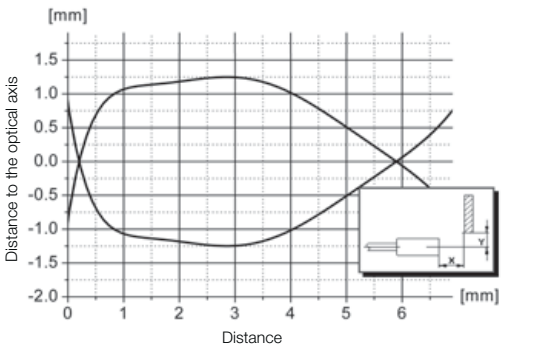
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



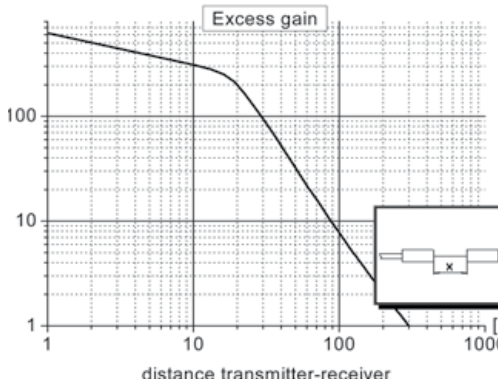
Resolution depending on distance

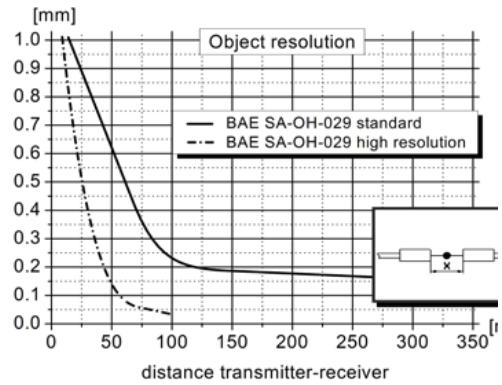


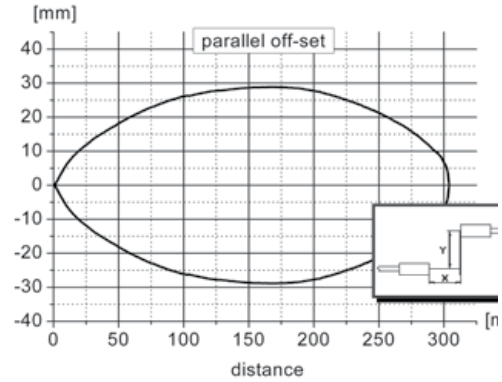
Detection range depending on distance

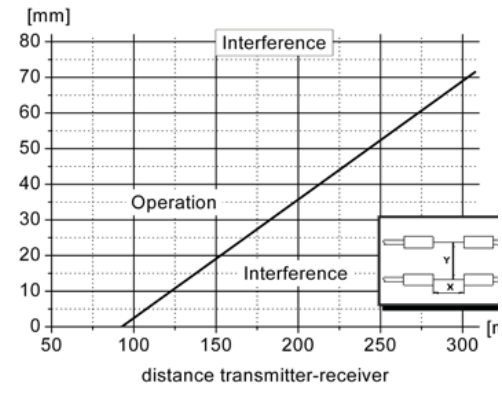
Diffuse sensors BOH for separate amplifiers BAE
Function diagrams

BOH005J, BOH TI-G02-001-01-S49F
BOH0061, BOH TI-M03-001-01-S49F

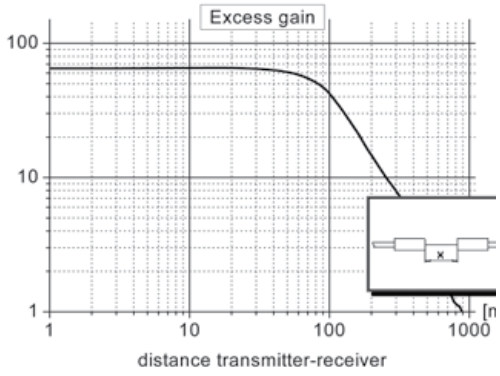


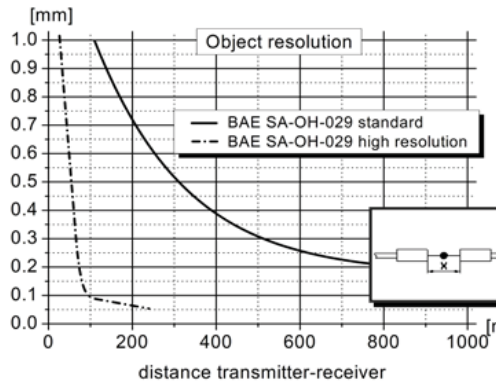


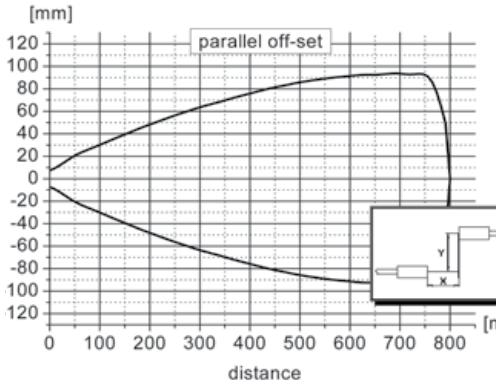


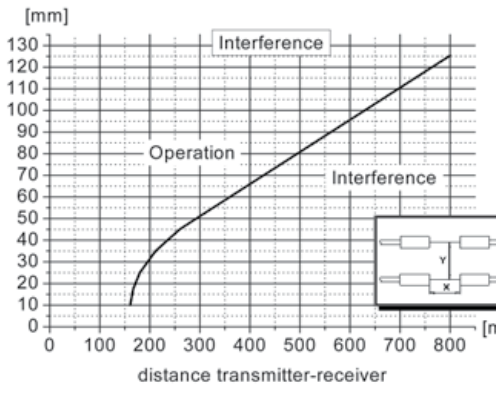


BOH005N, BOH TI-G02-008-01-S49F
BOH0064, BOH TI-MO3-012-01-S49F



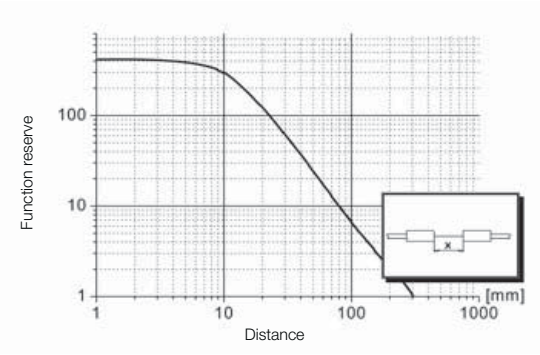




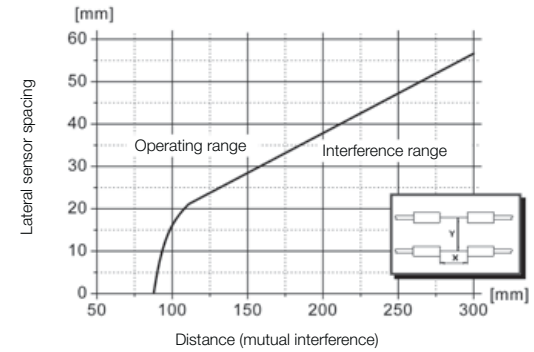


Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

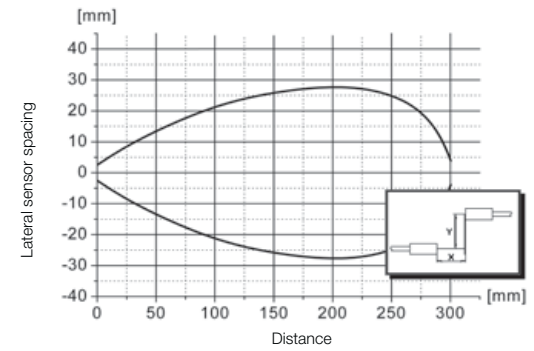
BOH000A, BOH TR-G02-001-01-S49F
BOH009U, BOH TR-M06V-009-S49-S75



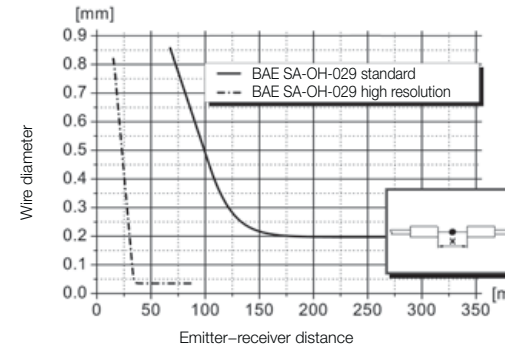
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

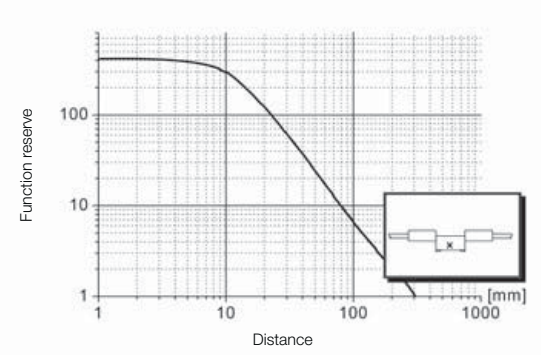


Lateral offset depending on distance

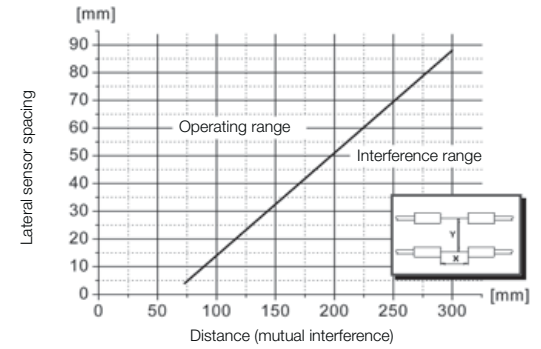


Resolution depending on distance

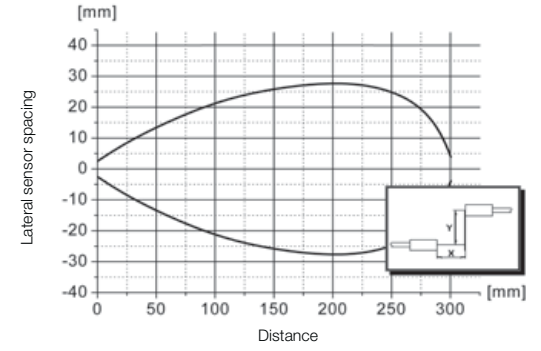
BOH000T, BOH TR-M03-001-01-S49F



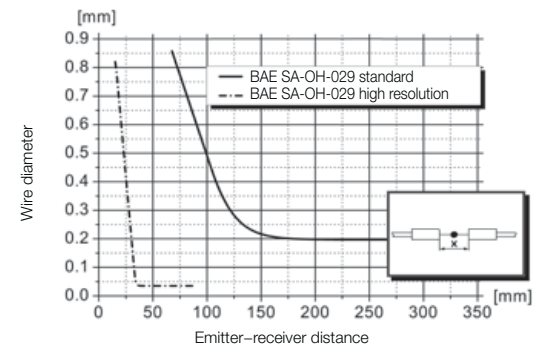
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



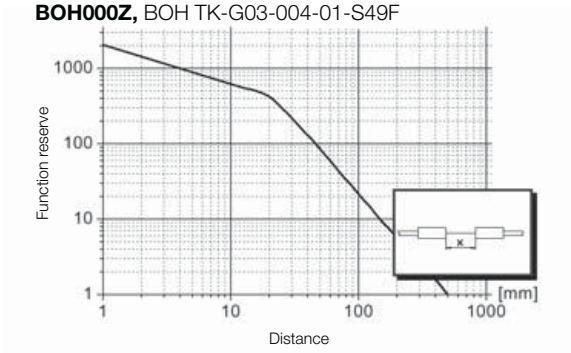
Lateral offset depending on distance



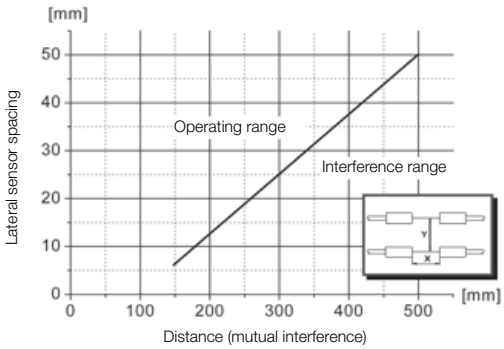
Resolution depending on distance

Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

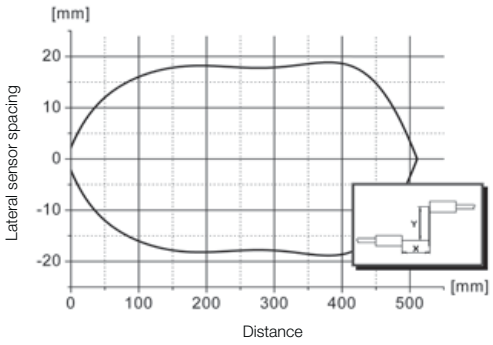
BOH000U, BOH TK-M03-001-01-S49F
BOH000E, BOH TK-M03-005-01-S49F
BOH000C, BOH TK-G02-001-01-S49F
BOH000Z, BOH TK-G03-004-01-S49F



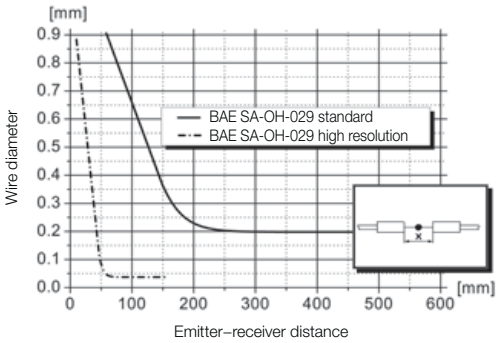
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

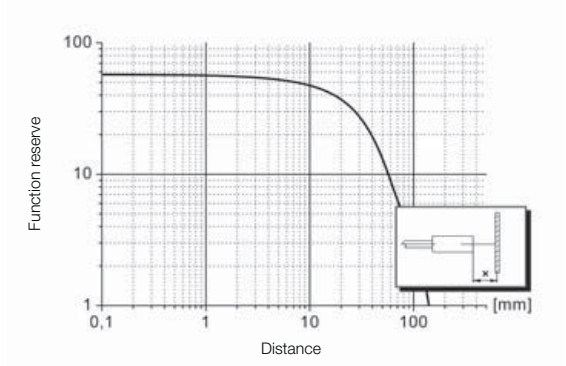


Lateral offset depending on distance

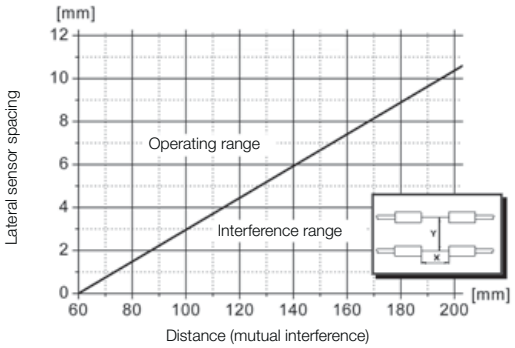


Resolution depending on distance

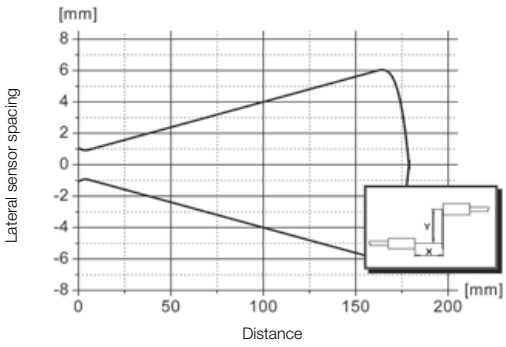
BOH001L, BOH TZ-M03-001-01-S49F-SA2
BOH001K, BOH TZ-G02-001-01-S49F-SA2



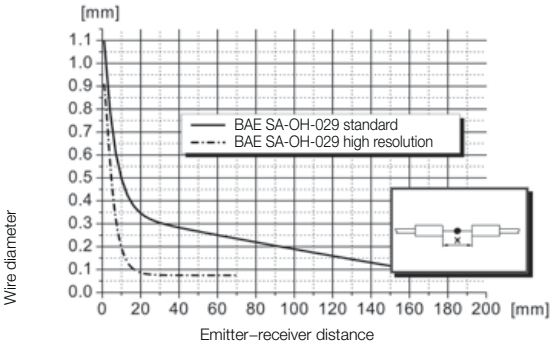
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

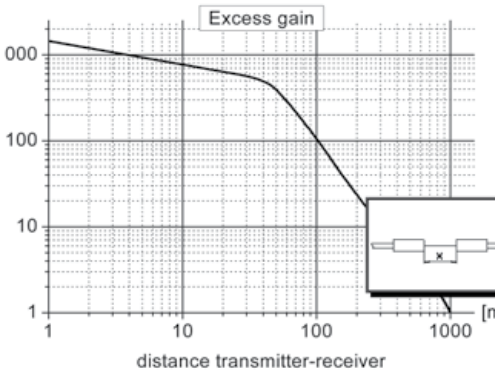


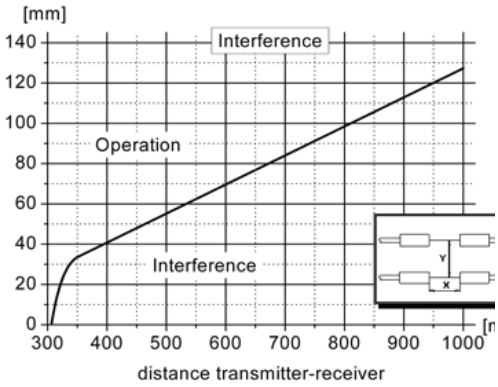
Lateral offset depending on distance

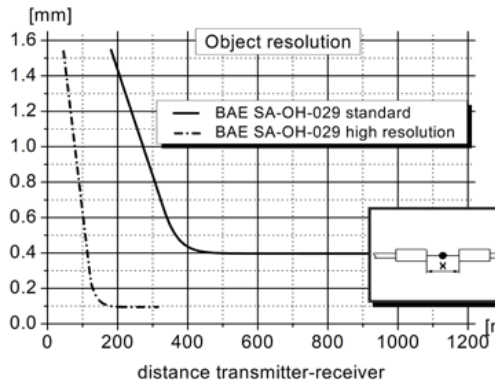


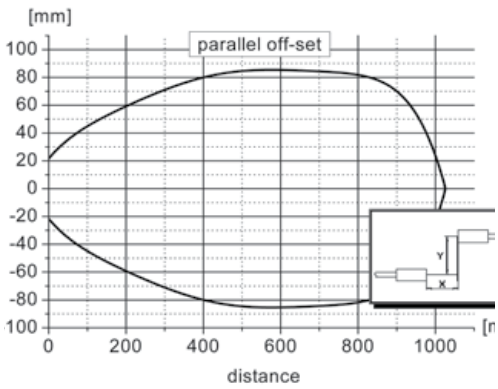
Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

BOH005P, BOH TI-G04-003-01-S49F
BOH0065, BOH TI-M05-003-01-S49F
BOH006P, BOH TI-Q06-001-01-S49F



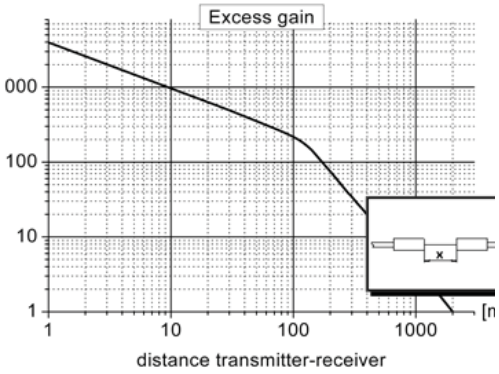


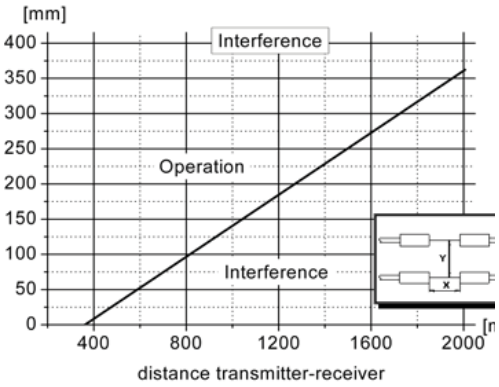


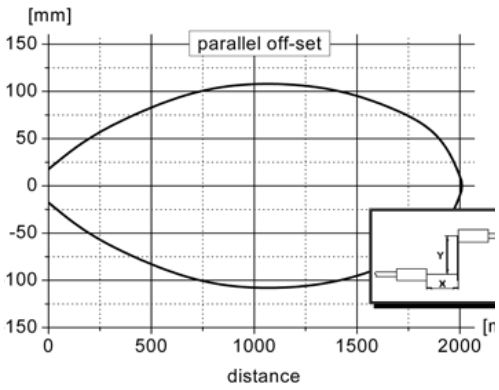


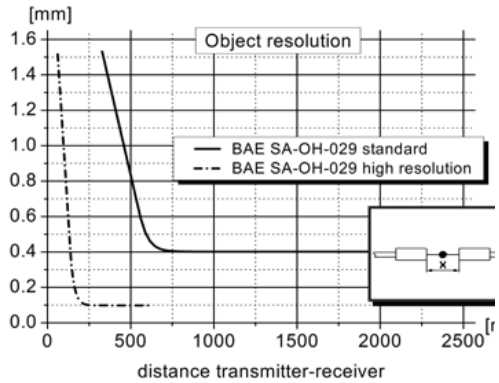
Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

BOH005T, BOH TI-G04-010-01-S49F
BOH006A, BOH TI-M05-013-01-S49F
BOH006W, BOH TI-Q06-002-01-S49F

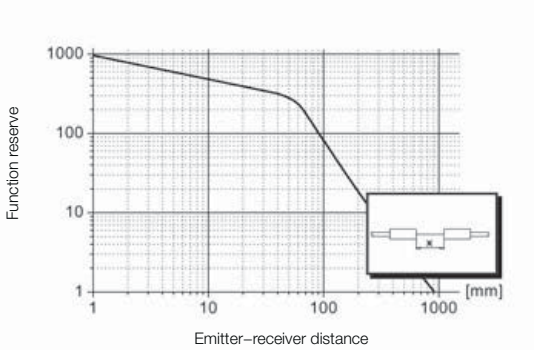




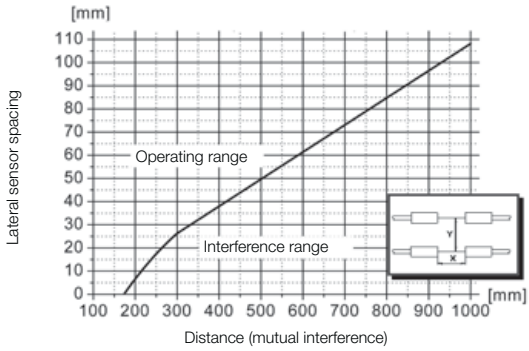




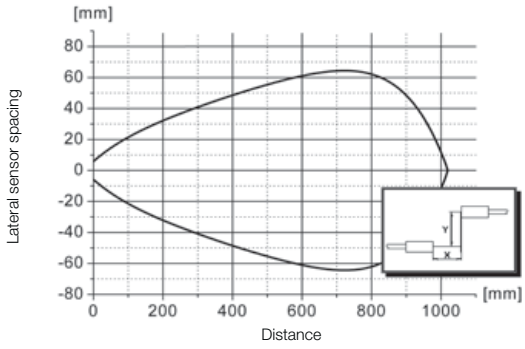
BOH000W, BOH TR-G04-003-01-S49F



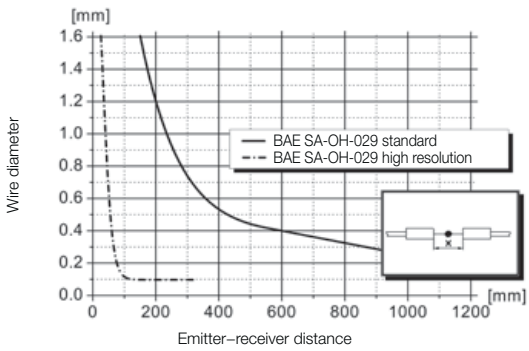
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



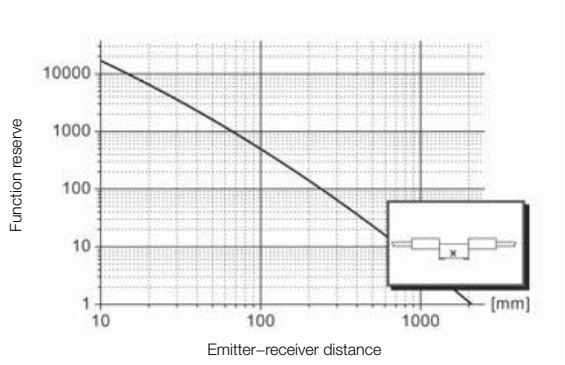
Lateral offset depending on distance



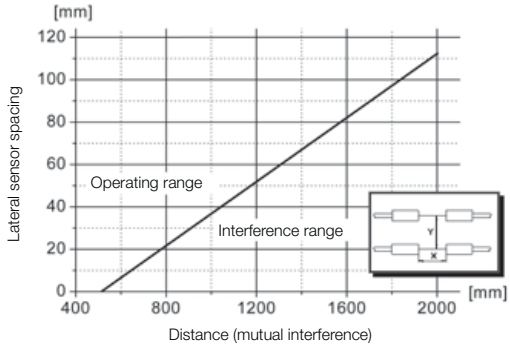
Resolution depending on distance

Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

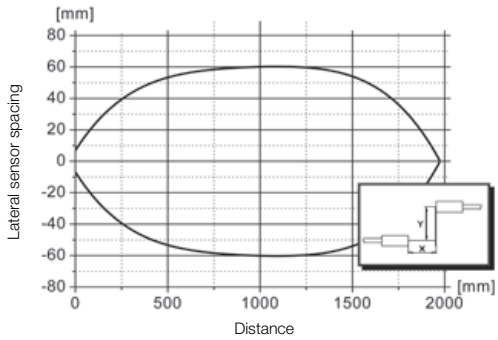
BOH0014, BOH TK-G04-003-01-S49F
BOH000P, BOH TK-Q06-001-01-S49F



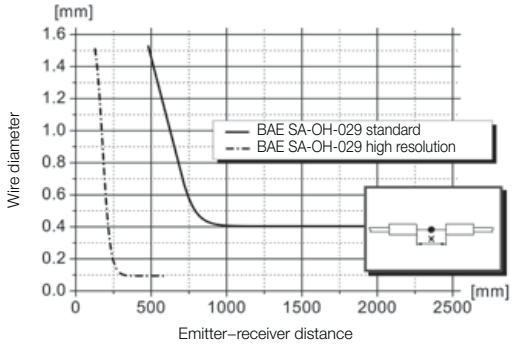
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

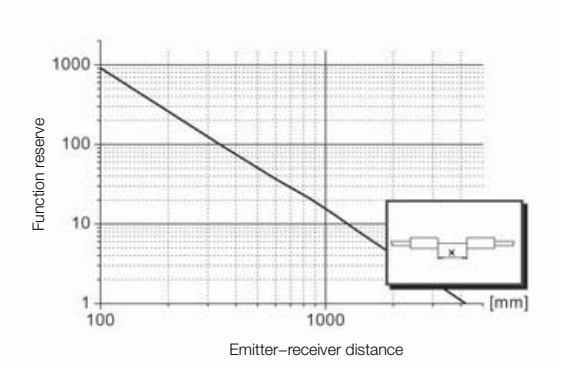


Lateral offset depending on distance

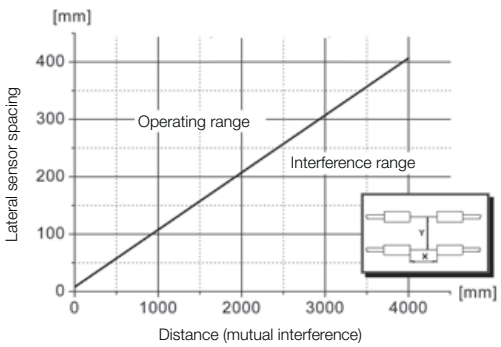


Resolution depending on distance

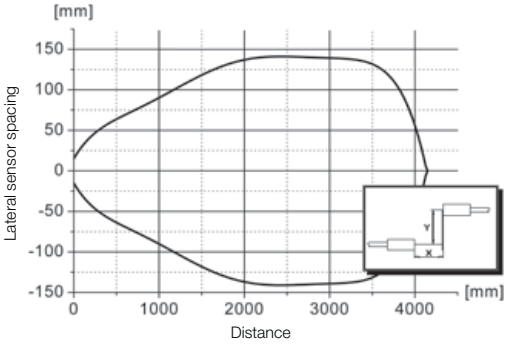
BOH0010, BOH TR-G05-005-02-S49F



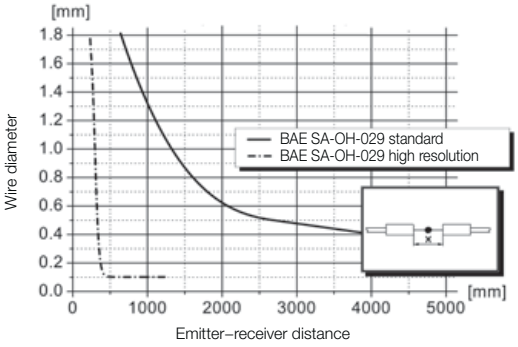
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



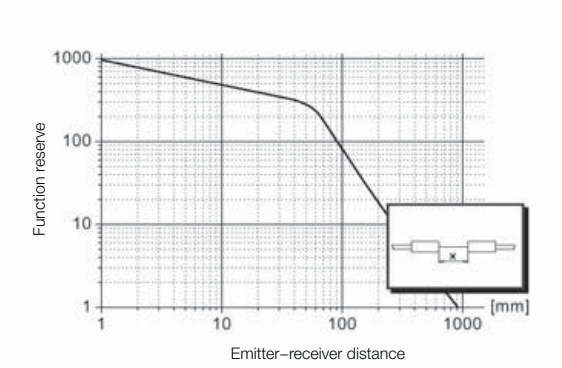
Lateral offset depending on distance



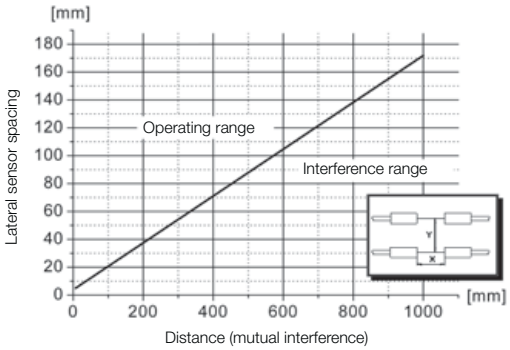
Resolution depending on distance

Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

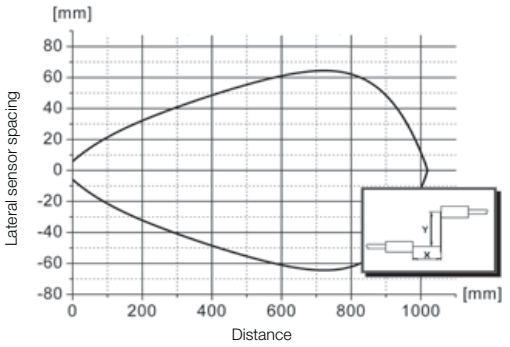
BOH000Y, BOH TR-M05-003-01-S49F
BOH000N, BOH TR-Q06-001-01-S49F



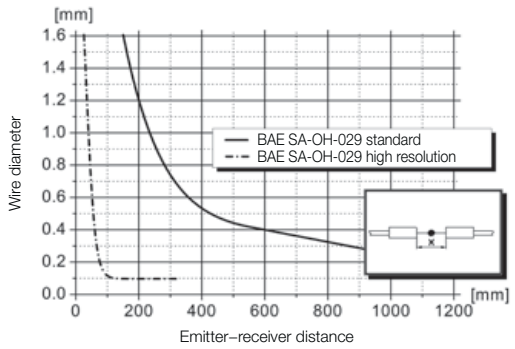
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

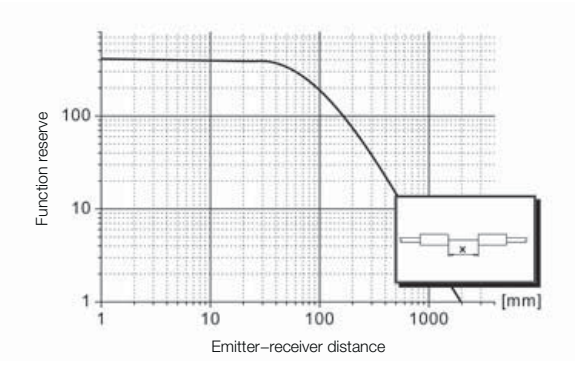


Lateral offset depending on distance

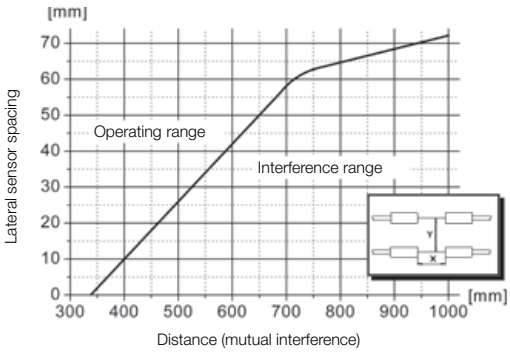


Resolution depending on distance

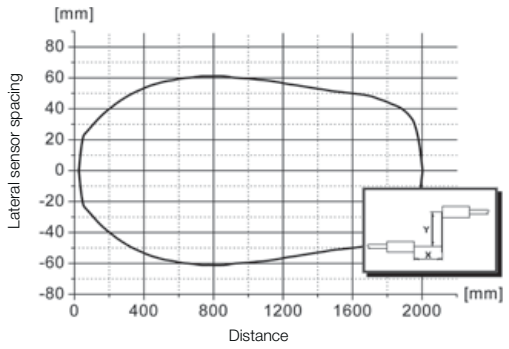
BOH0013, BOH TK-M05-003-01-S49F
BOH000F, BOH TK-M05-006-01-S49F



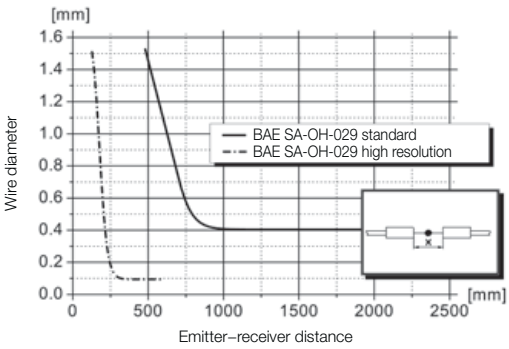
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



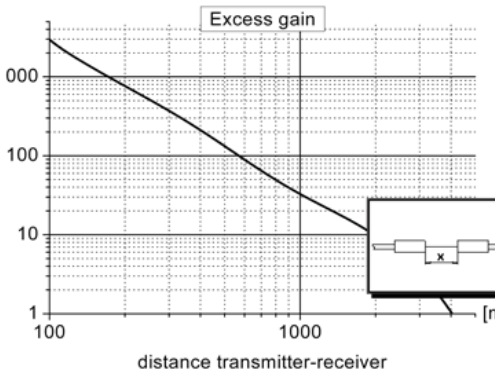
Lateral offset depending on distance

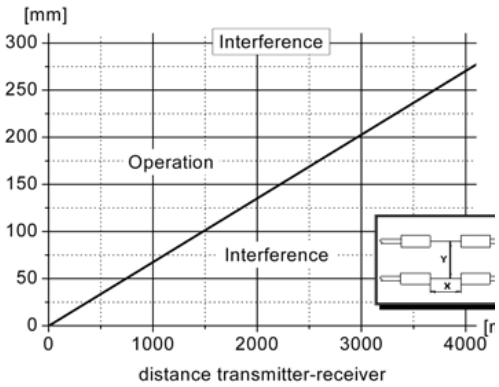


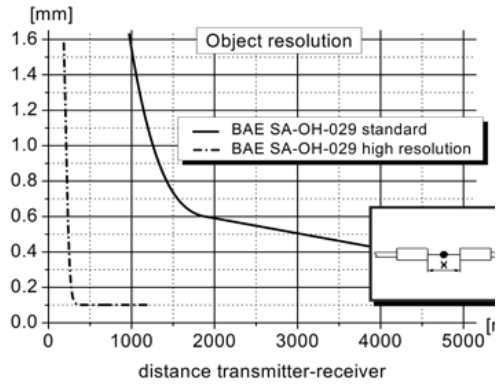
Resolution depending on distance

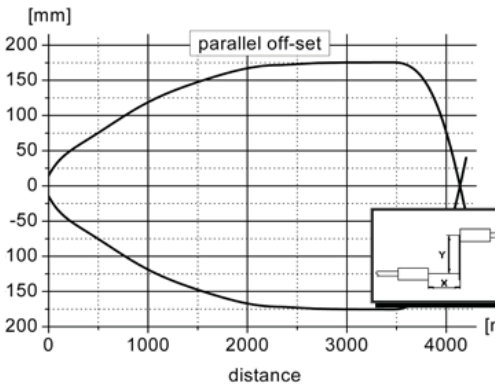
Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

BOH006H, BOH TI-M06-002-01-S49F

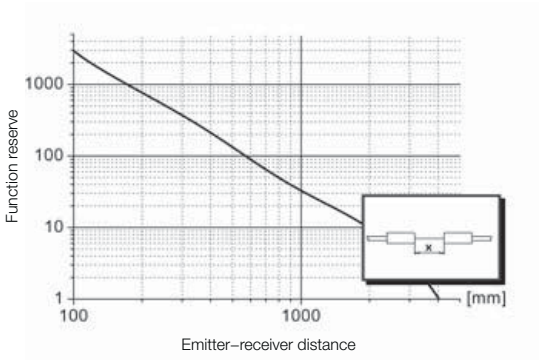




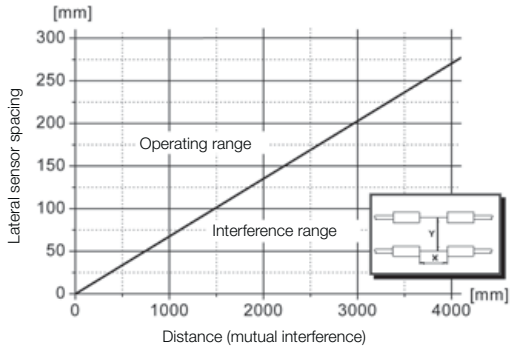




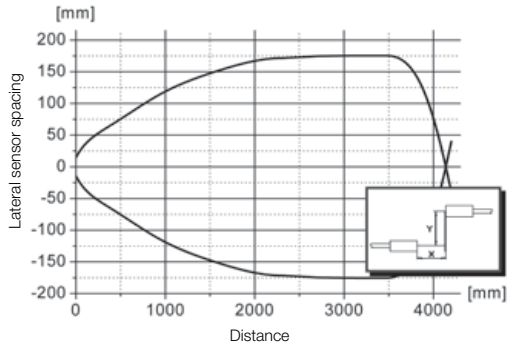
BOH000K, BOH TR-M06-002-02-S49F
BOH0020, BOH TR-R010-008-01-S49F



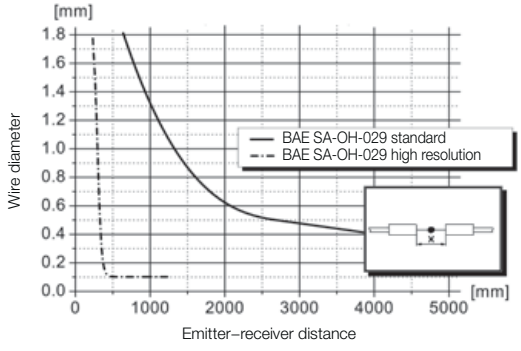
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference



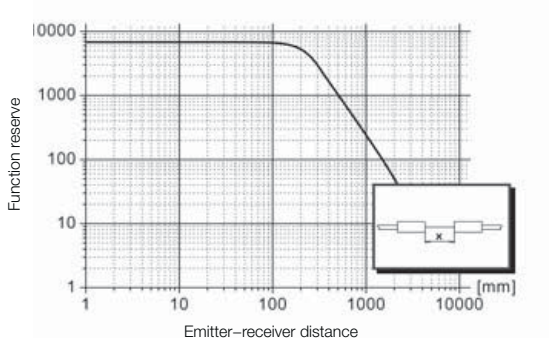
Lateral offset depending on distance



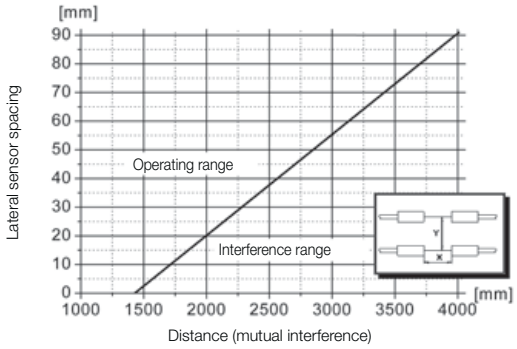
Resolution depending on distance

Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

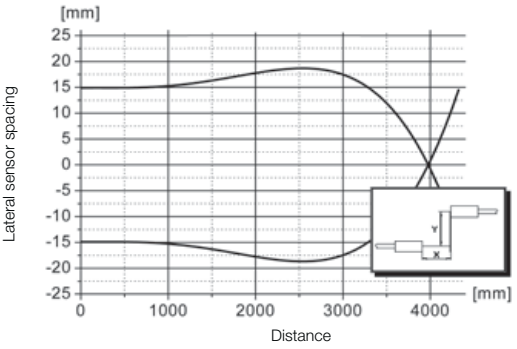
BOH0012, BOH TK-M08-004-02-S49F



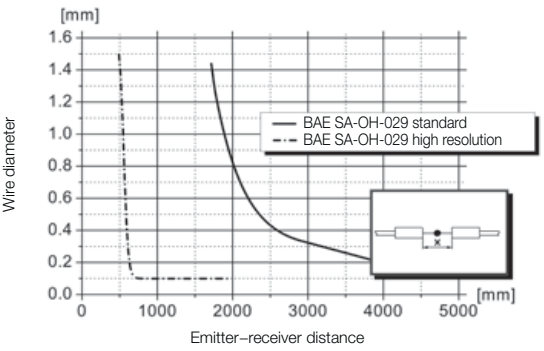
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

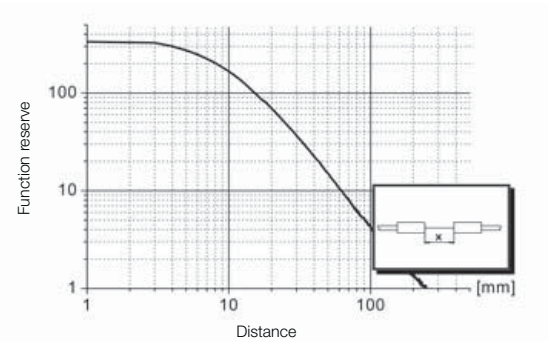


Lateral offset depending on distance

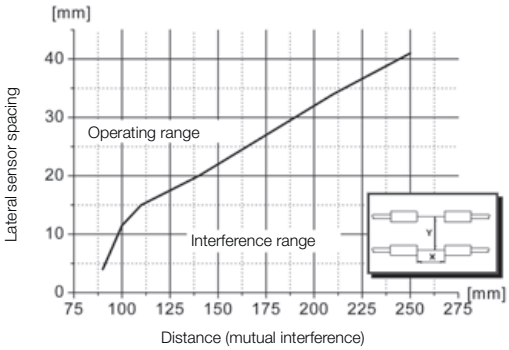


Resolution depending on distance

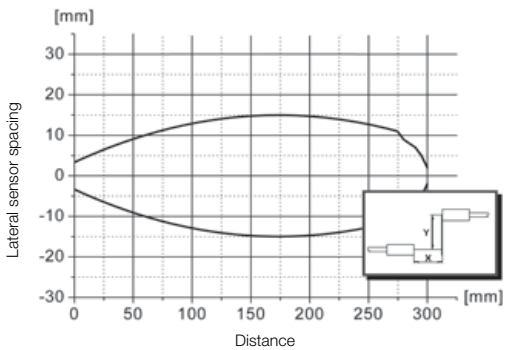
BOH000J, BOH TJ-G02-001-01-S49F



Function reserve depending on distance



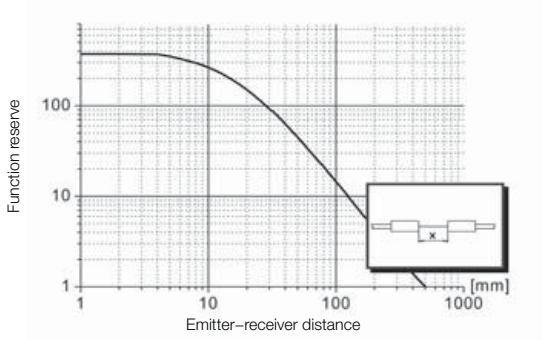
Minimum distance between two sensors for avoiding mutual interference



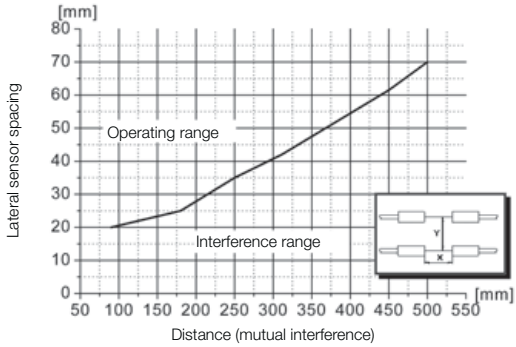
Lateral offset depending on distance

Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

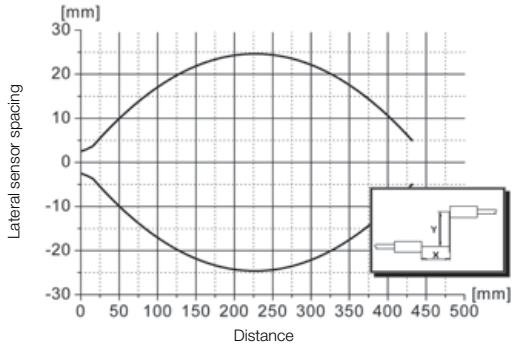
BOH000R, BOH TJ-Q06-001-01-S49F



Function reserve depending on distance

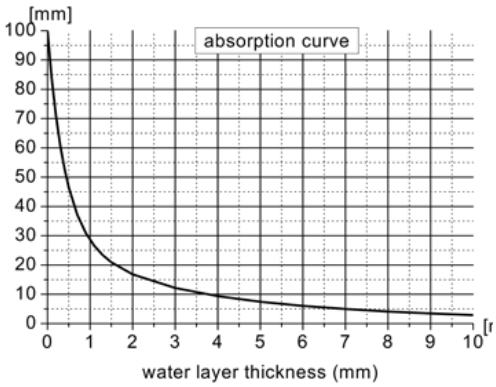


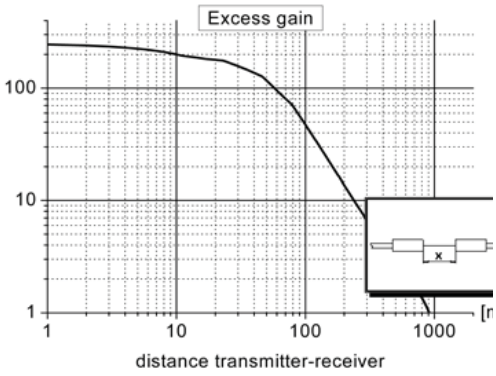
Minimum distance between two sensors for avoiding mutual interference

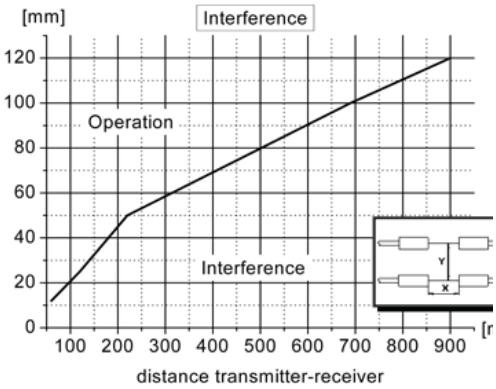


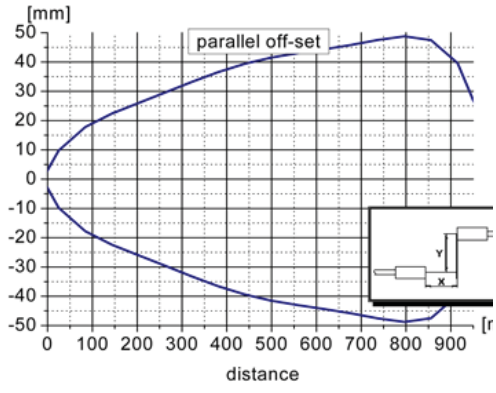
Lateral offset depending on distance

BOH007A, BOH TJ-R010-008-01-S49F



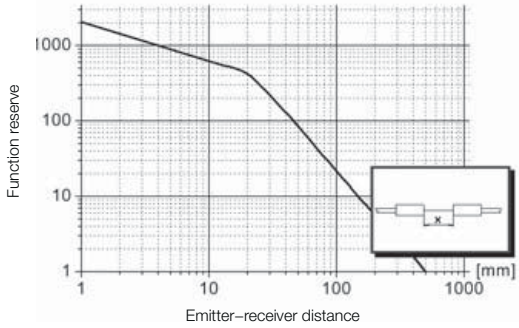




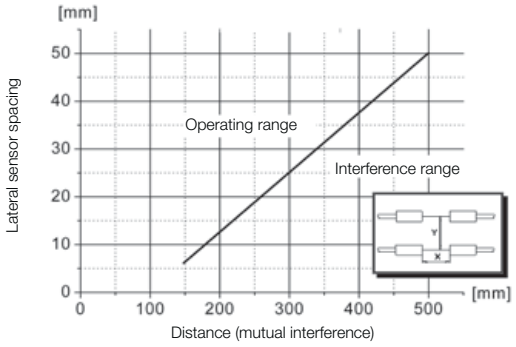


Through-beam sensors BOH for separate amplifiers BAE
Function diagrams

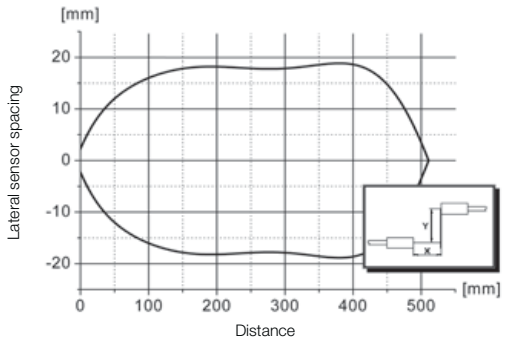
BOH001Z, BOH TK-R003-007-01-S49F
BOH002C, BOH TK-R018-001-01-S49F
BOH002E, BOH TK-R018-002-01-S49F



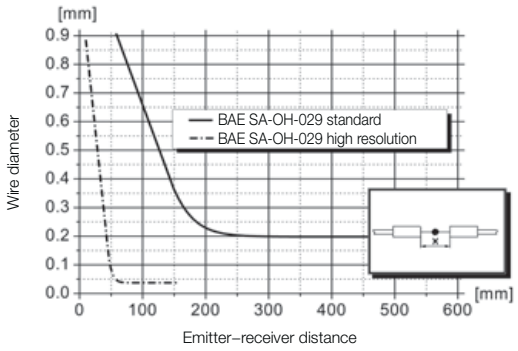
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

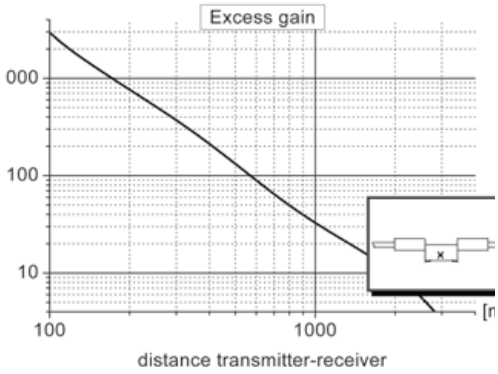


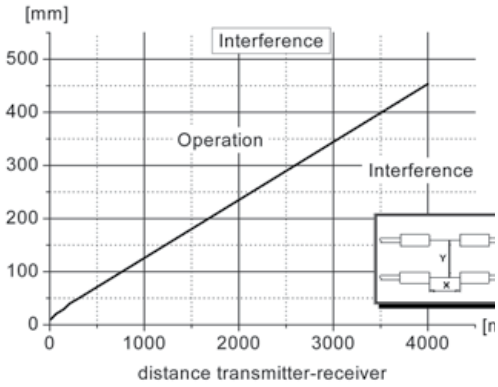
Lateral offset depending on distance

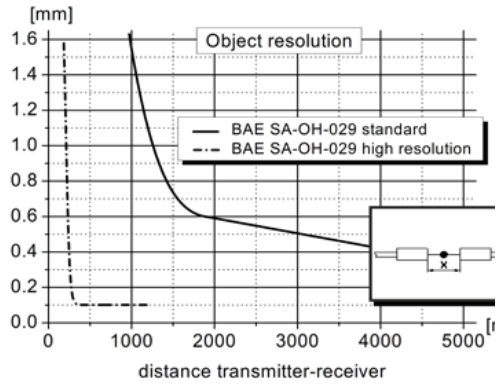


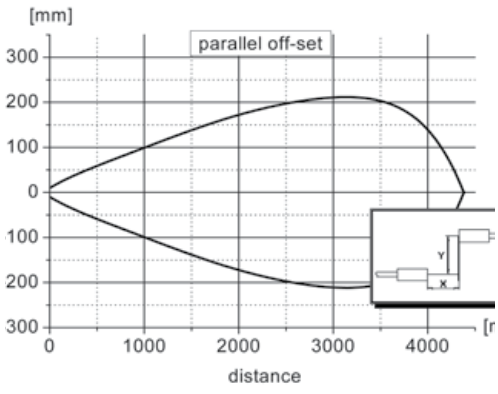
Resolution depending on distance

BOH006Z, BOH TI-R010-008-01-S49F

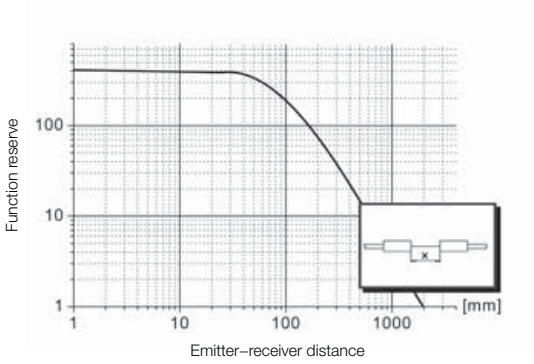




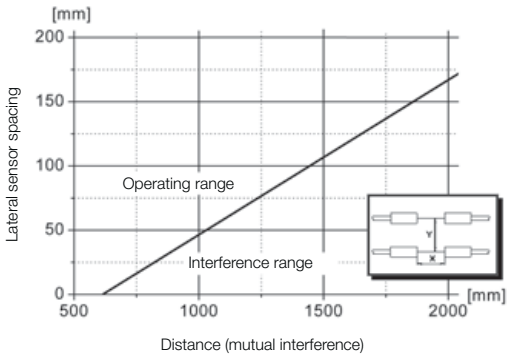




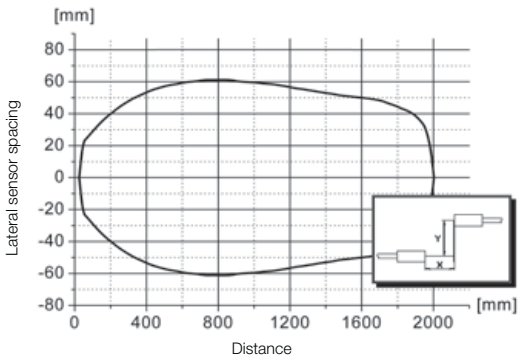
BOH002F, BOH TK-R027-003-01-S49F
BOH002H, BOH TK-R027-004-01-S49F



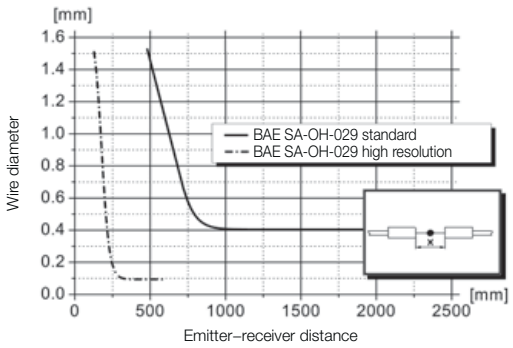
Function reserve depending on distance



Minimum distance between two sensors for avoiding mutual interference

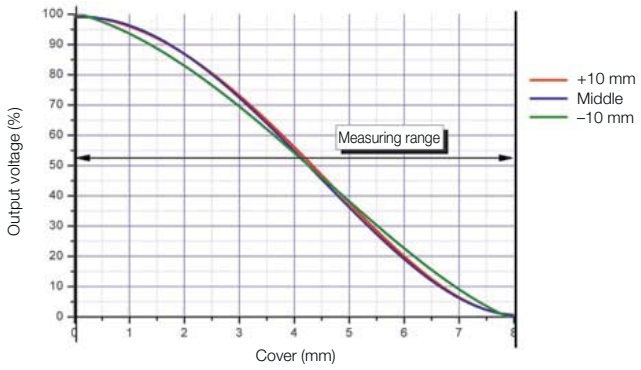


Lateral offset depending on distance



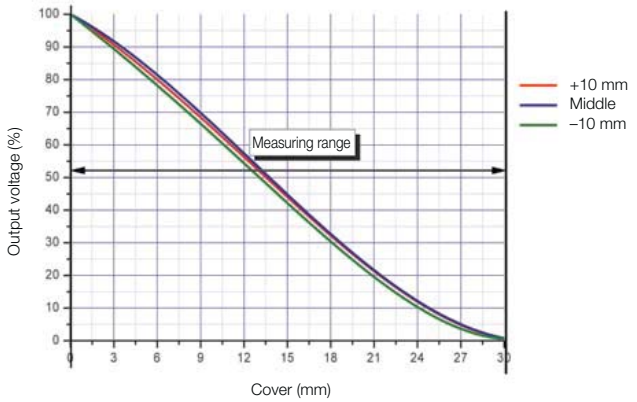
Resolution depending on distance

BOH001M, BOH AR-F40-001-01-S49F



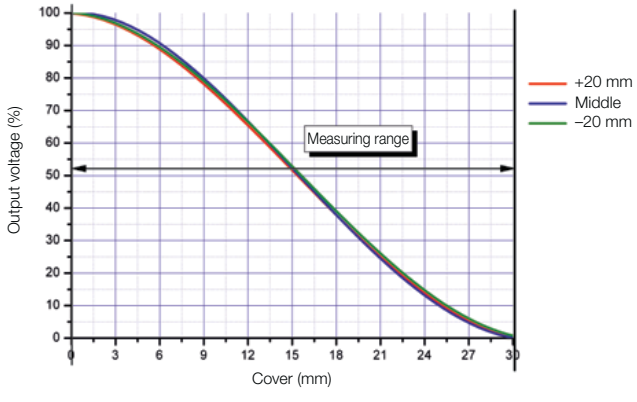
Output voltage dependent on the cover

BOH001N, BOH AR-F40-002-01-S49F



Output voltage dependent on the cover

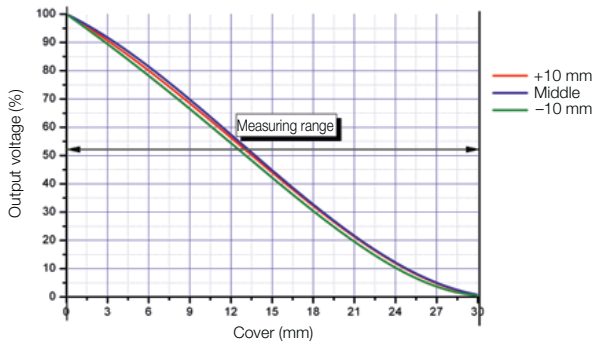
BOH001P, BOH AR-F80-003-01-S49F



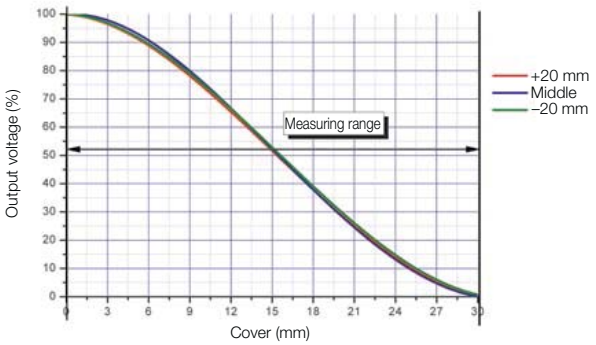
Output voltage dependent on the cover

Through-beam sensors and light band fork sensors BOH for separate amplifiers BAE, function diagrams

BOH0024, BOH AR-R113-010-01-S49F

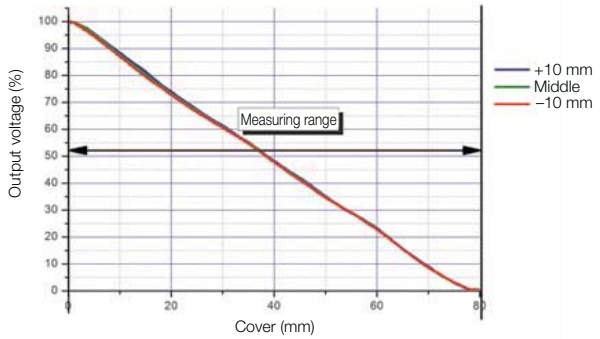


Emitter–receiver distance: 40 mm
Output voltage dependent on the cover

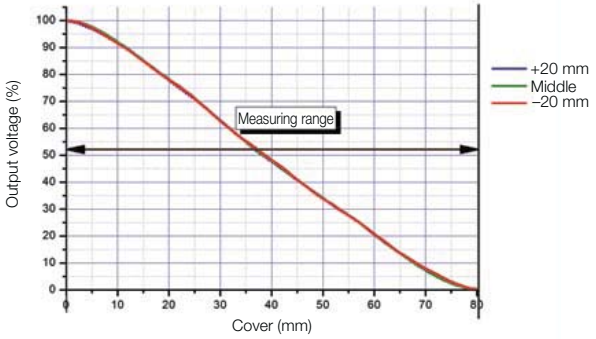


Emitter–receiver distance: 80 mm
Output voltage dependent on the cover

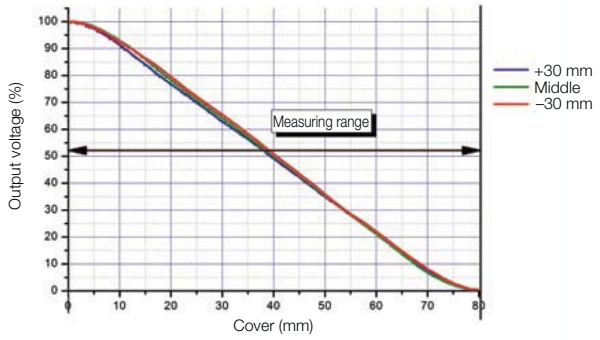
BOH002M, BOH AI-R165-011-01-S49F



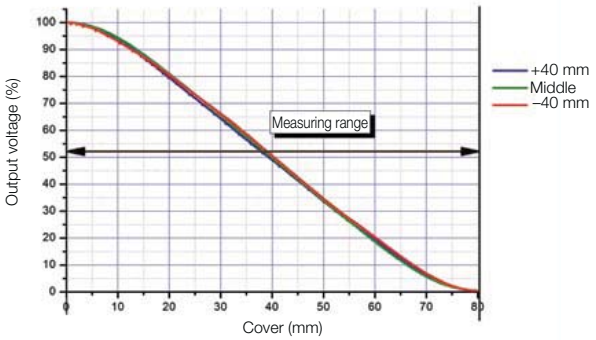
Emitter–receiver distance: 50 mm
Output voltage dependent on the cover



Emitter–receiver distance: 80 mm
Output voltage dependent on the cover



Emitter–receiver distance: 120 mm
Output voltage dependent on the cover



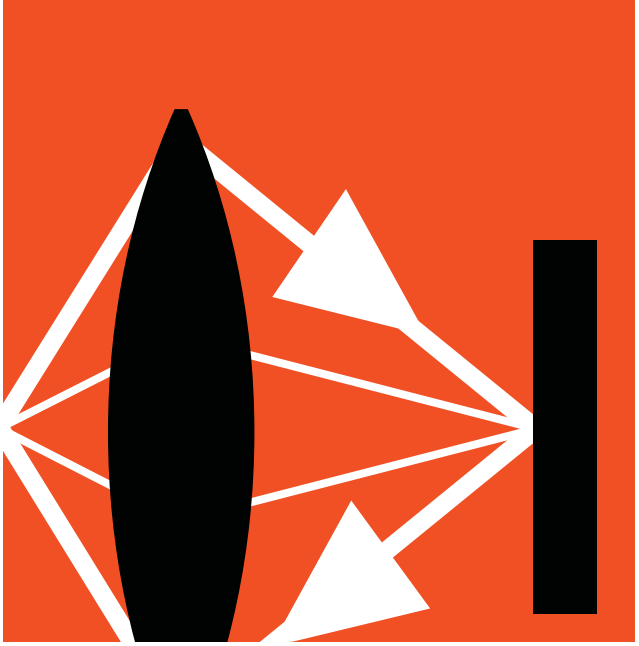
Emitter–receiver distance: 180 mm
Output voltage dependent on the cover

The depicted signal characteristics result if the sensor is used with an analog amplifier. More information can be found in the amplifier data sheets.

In combination with an analog amplifier, the sensor returns a linear output signal analogous to the cover of the measuring range (for example, with voltage or current output).

This makes the sensor ideally suited for high-resolution web edge control systems.

In combination with a dynamic amplifier, the sensor detects quick processes (such as numbers and identification of objects) within the entire measuring range.



Photoelectric Sensors

High-resolution Laser Light Band BLA

If various objects have to be identified in production, when packaging or in quality control, the new high-resolution light-band BLA is ideal. Because it identifies, compares or sorts objects based on minimum size or height differences.

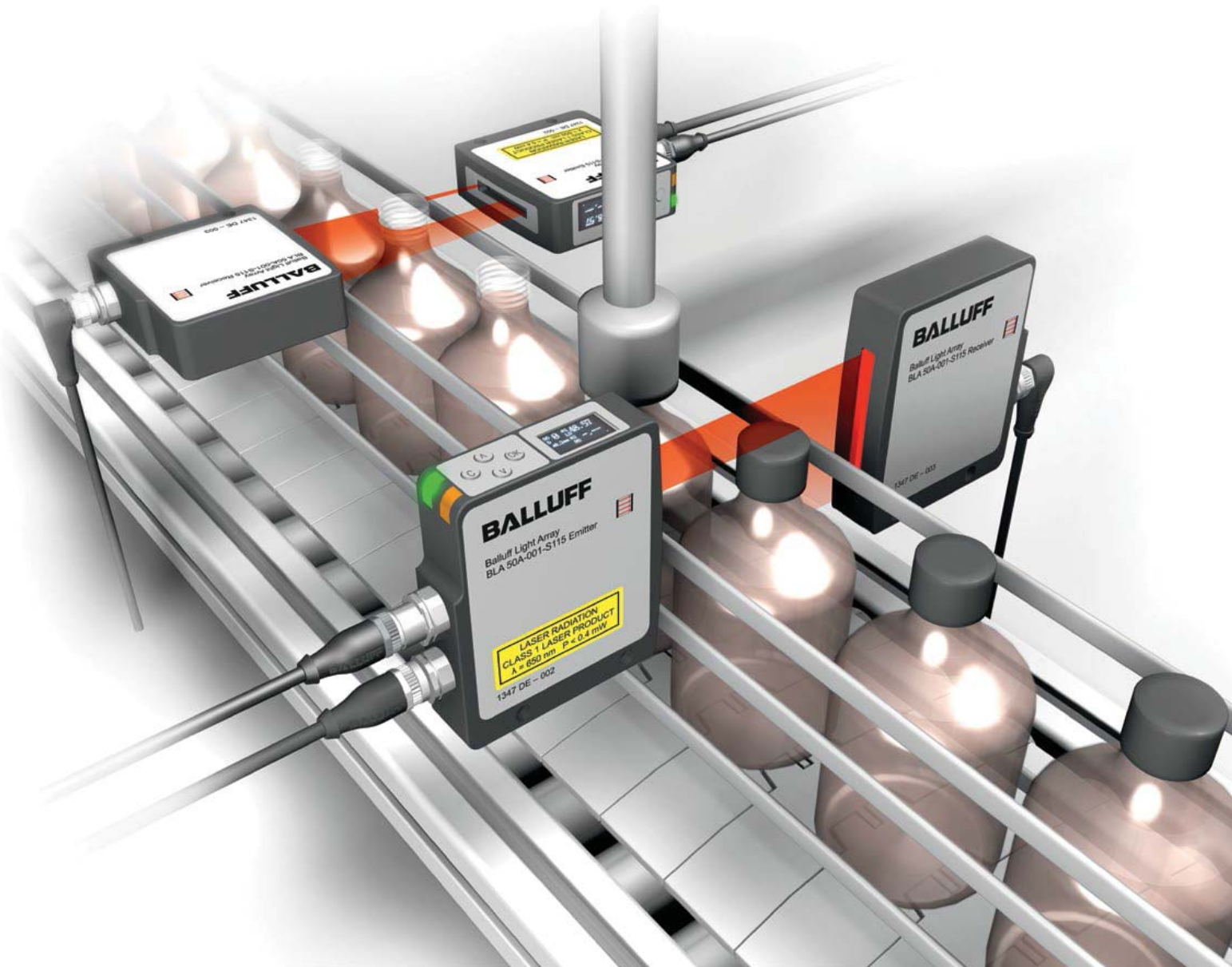
The intuitively operated device can be put into operation easily. It consists of a high-performance red-light laser and a receiver and operates entirely on its own. It does not need any other accessories such as a controller, a computer, or special software.

The range extends up to 2 m. The continuous, highly visible light band has an excellent resolution of 0.01 mm.

Application
The multi-functional device provides numerous measuring modes such as object diameter, object position, gap width, gap position, edge position, etc. In addition, the user can use keys to teach-in up to six different objects and blank out disruptive objects in the measuring field (blanking). Parallel use of the different measuring modes is also possible: e.g. checking the diameter of the object at the same time as determining the position of the object.

The BLA is very versatile, even in particularly harsh conditions, thanks to its robust metal housing

- High-precision position monitoring and detection
- Quick and easy sorting of parts according to size and/or diameter
- Quality assurance and monitoring, e.g. of heights of objects, gap sizes, etc.
- Precise detection of web edges, even with semitransparent materials

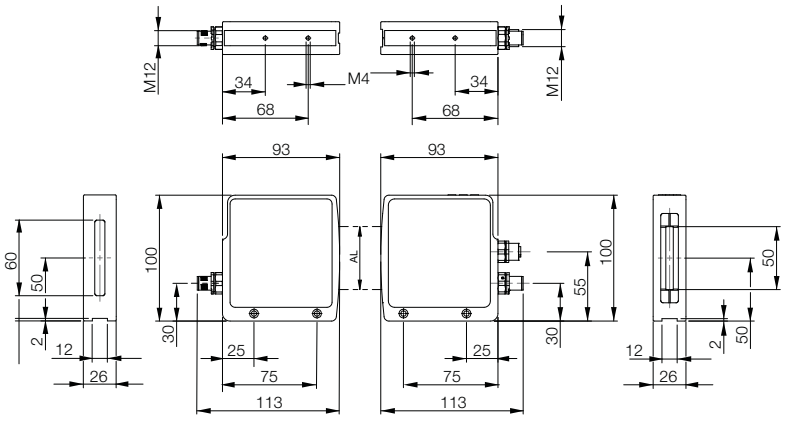


Laser Light Band Sensor

High-resolution light band BLA

Type	**Light band BLA**
Light band width	**50 mm**
Order code	**BLA0001**
Part number	BLA 50A-001-S115
Usable light band width	48.6 mm
Max. emitter-receiver distance	2000 mm
Best resolution	0.01 mm
Smallest object	0.3 mm
Supply voltage U_S	15...30 VDC
No-load supply current I_0 max.	< 100 mA
Output current	Max. 100 mA per switching output
Analog outputs	2× current (4...20 mA) or voltage (0...10 V) can be disconnected
Digital outputs	3× PNP
Output function	Difference of up to 6 objects (binary coded)
Output current	Max. 100 mA per switching output
Polarity reversal/short-circuit protected	Yes/Yes
Settings	Via a multifunction display and 4 teach buttons
Emitter, light type	Laser 650 nm
Laser class	1
Power indicator	Green
Object display	Yellow
Scanning period	Typically 5 ms (2 ms…100 ms, automatically configured)
Degree of protection	IP 65
Ambient temperature T_a	+5…+55 °C
Housing Material	Anodized aluminum
Optical surface	Glass

*Required cables included



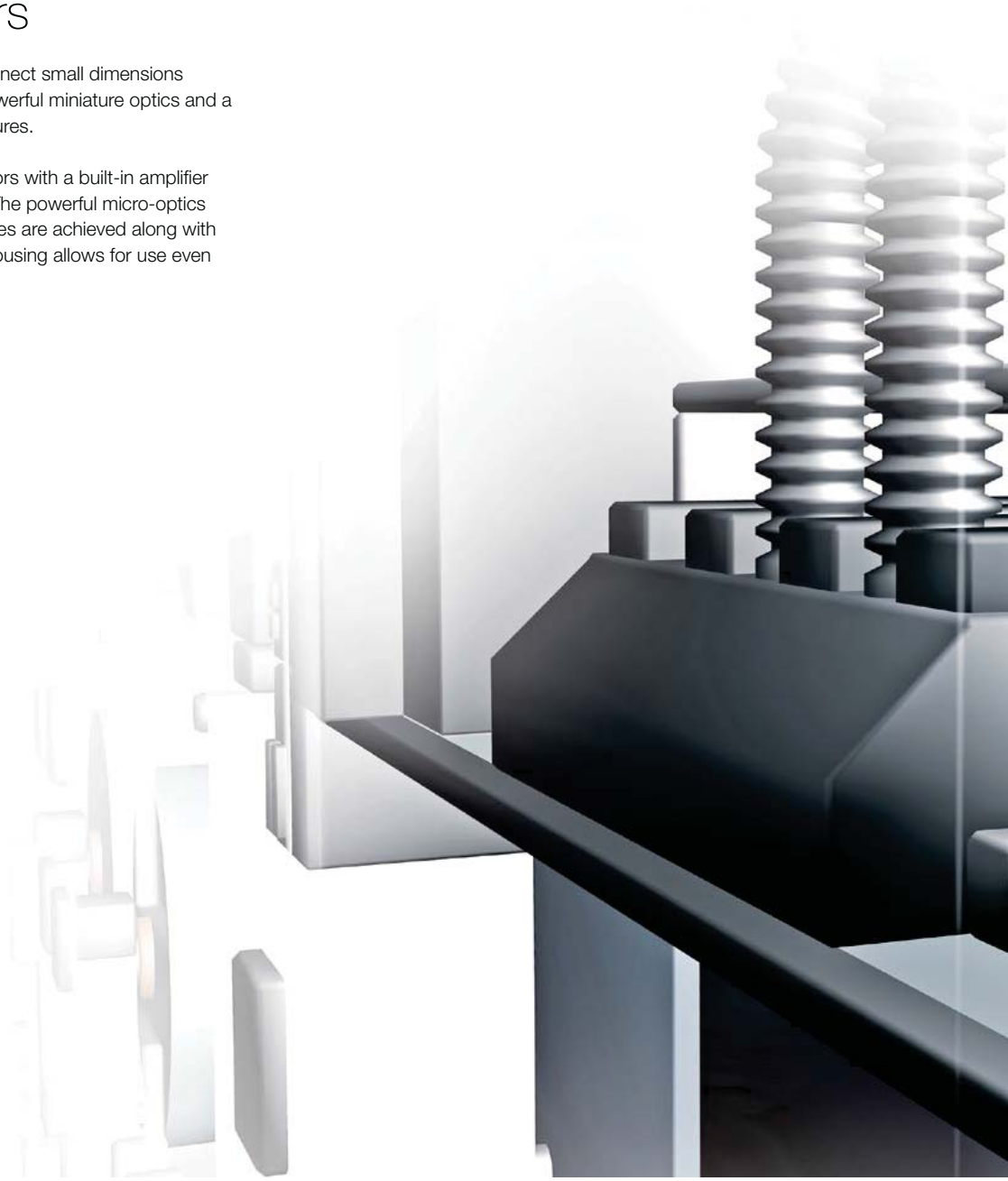
Laser Light Band Sensor
High-resolution light band BLA

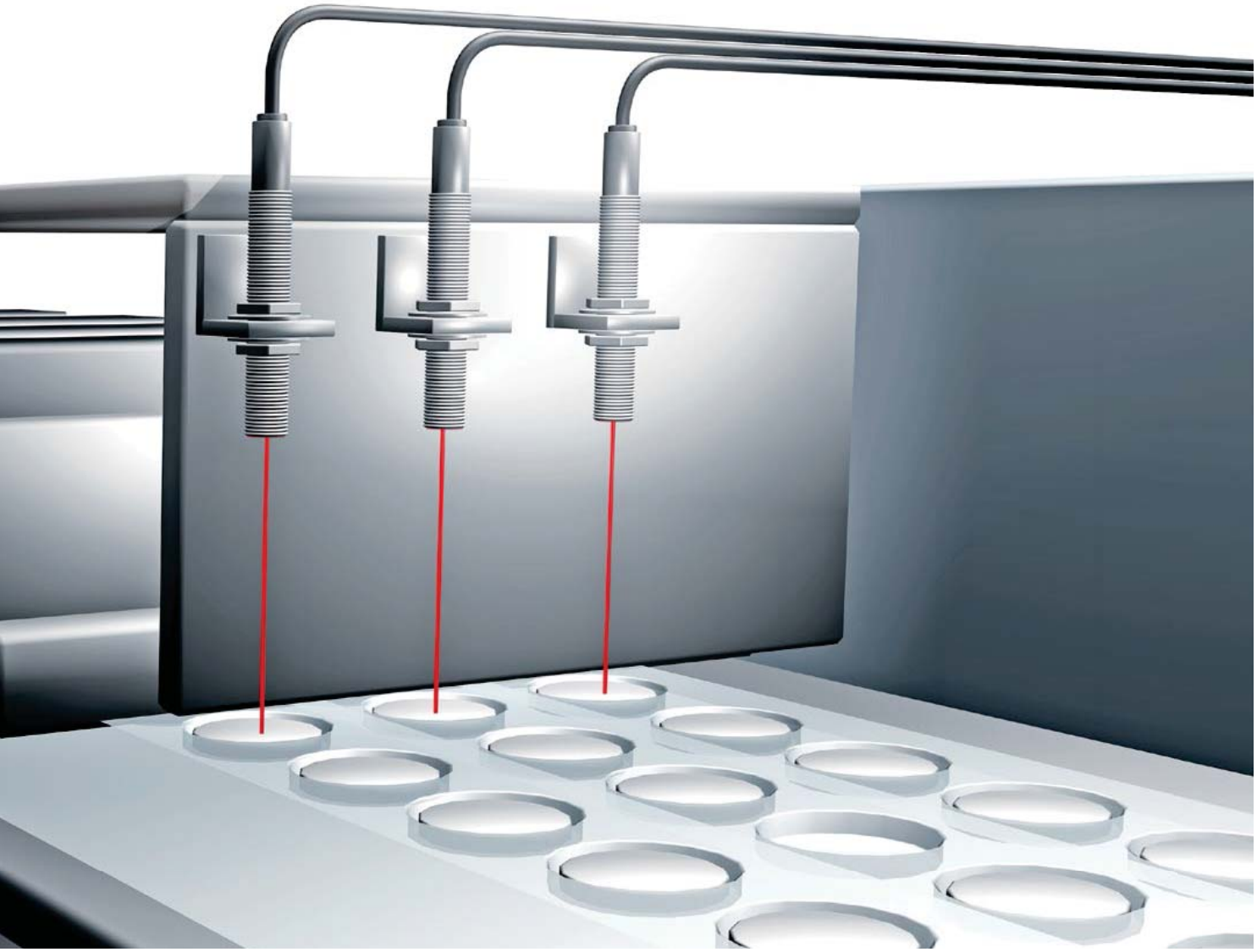
Photoelectric Sensors

Compact sensors

The compact photoelectric sensors connect small dimensions with compact switching electronics. Powerful miniature optics and a metal housing are its characteristic features.

Compact stands for photoelectric sensors with a built-in amplifier and an exceptionally compact design. The powerful micro-optics ensure a perfect light beam. Large ranges are achieved along with excellent object resolution. The metal housing allows for use even under harsh conditions.





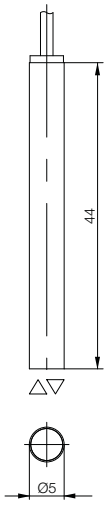
Diffuse sensors

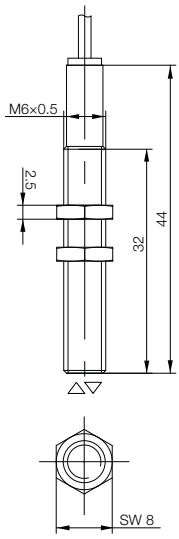
Type	**Diffuse sensor**	**Diffuse sensor**	
Dimension	**Ø 5×44 mm**	**M6×0.5×44 mm**	
Detection range	**50 mm**	**50 mm**	
Order code	**BOS01UZ**	**BOS01W0**	
Part number	BOS G05E-PS-RD10-PU-02	BOS M06M-PS-RD10-PU-02	
Supply voltage	10 to 30 V DC	10 to 30 V DC	
Output current	PNP 100 mA	PNP 100 mA	
Intrinsic current consumption	30 mA	30 mA	
Polarity reversal protected/ Short-circuit protected	Yes/Yes	Yes/Yes	
Light type	Red light	Red light	
Wavelength	660 Nm	660 Nm	
Light spot diameter	14 mm (at 50 mm)	14 mm (at 50 mm)	
Function indicator	Red LED	Red LED	
Ambient temperature T_a	–10°C... +55 °C	–10°C... +55 °C	
Function principle	Clocked	Clocked	
Limit frequency	500 Hz	500 Hz	
Degree of protection as per IEC 60529	IP 65	IP 65	
Housing material	Stainless steel	Nickel-plated brass	
Fastening	Adhesive or clamp fastening	Screw fastening	
Connection	2 m PUR cable, 3×27 AWG	2 m PUR cable, 3×27 AWG	

Reference object: white, 90% reflection, 100×100 mm

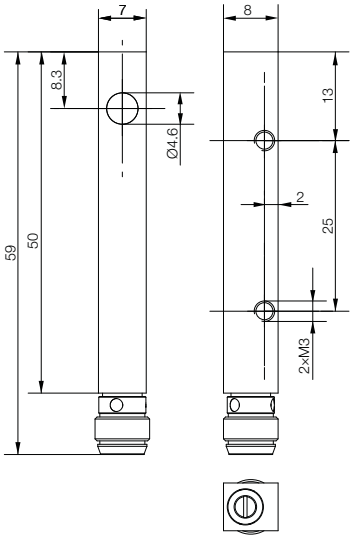
Function diagrams beginning on page 90.

Connectors without LED are suitable for PNP and NPN sensors.



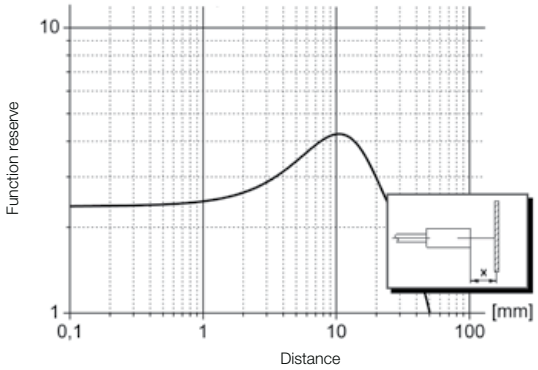


	Diffuse sensor	
	7×8×59 mm	
	50 mm	
	BOS01W1	
	BOS R040M-PS-RD10-S49	
	10 to 30 V DC	
	PNP 100 mA	
	30 mA	
	Yes/Yes	
	Red light	
	660 Nm	
	14 mm (at 50 mm)	
	Red LED	
	–10°C... +55 °C	
	Clocked	
	500 Hz	
	IP 65	
	Nickel-plated brass	
	Screw fastening	
	M8 connector, 3-pin	

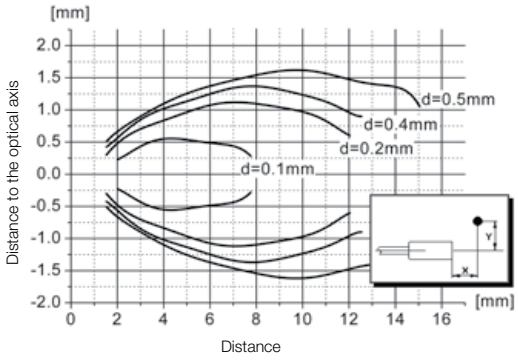


Function diagrams

BOS01UZ, BOS G05E-PS-RD10-PU-02
BOS01W0, BOS M06M-PS-RD10-PU-02
BOS01W1, BOS R040M-PS-RD10-S49



Function reserve depending on distance

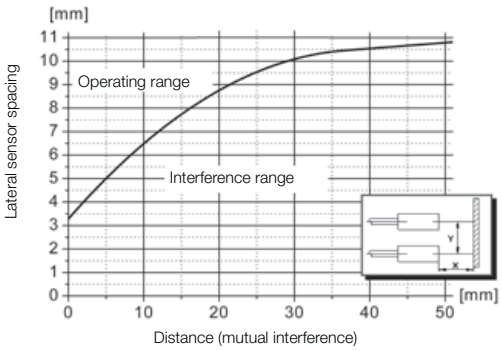


Resolution depending on distance

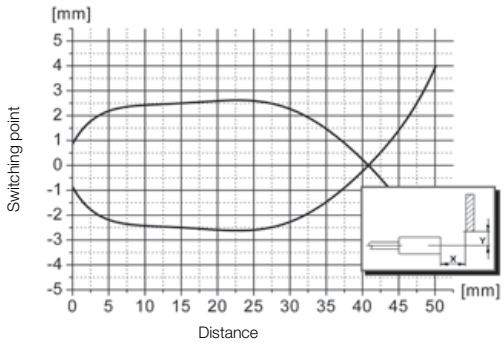
Suitable connector
(please order separately)

Size	Design	Cable material	Color	Length	Ordering code
M8, 3-pin	Straight	PVC	Yellow	2 m	**BCC050Y**
M8, 3-pin	Straight	TPE	Yellow	2 m	**BCC050L**
M8, 3-pin	Angled	PVC	Yellow	2 m	**BCC055N**
M8, 3-pin	Angled	TPE	Yellow	2 m	**BCC0555**

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.**

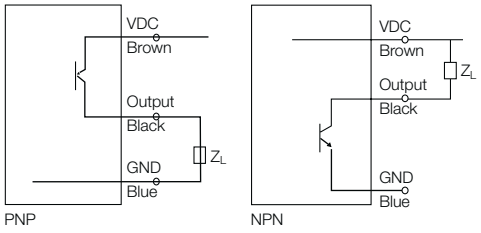


Minimum distance between two sensors for avoiding mutual interference



Detection range depending on distance

Wiring diagrams



Brown	+ VDC
Blue	– GND
Black	Signal output

Photoelectric Sensors

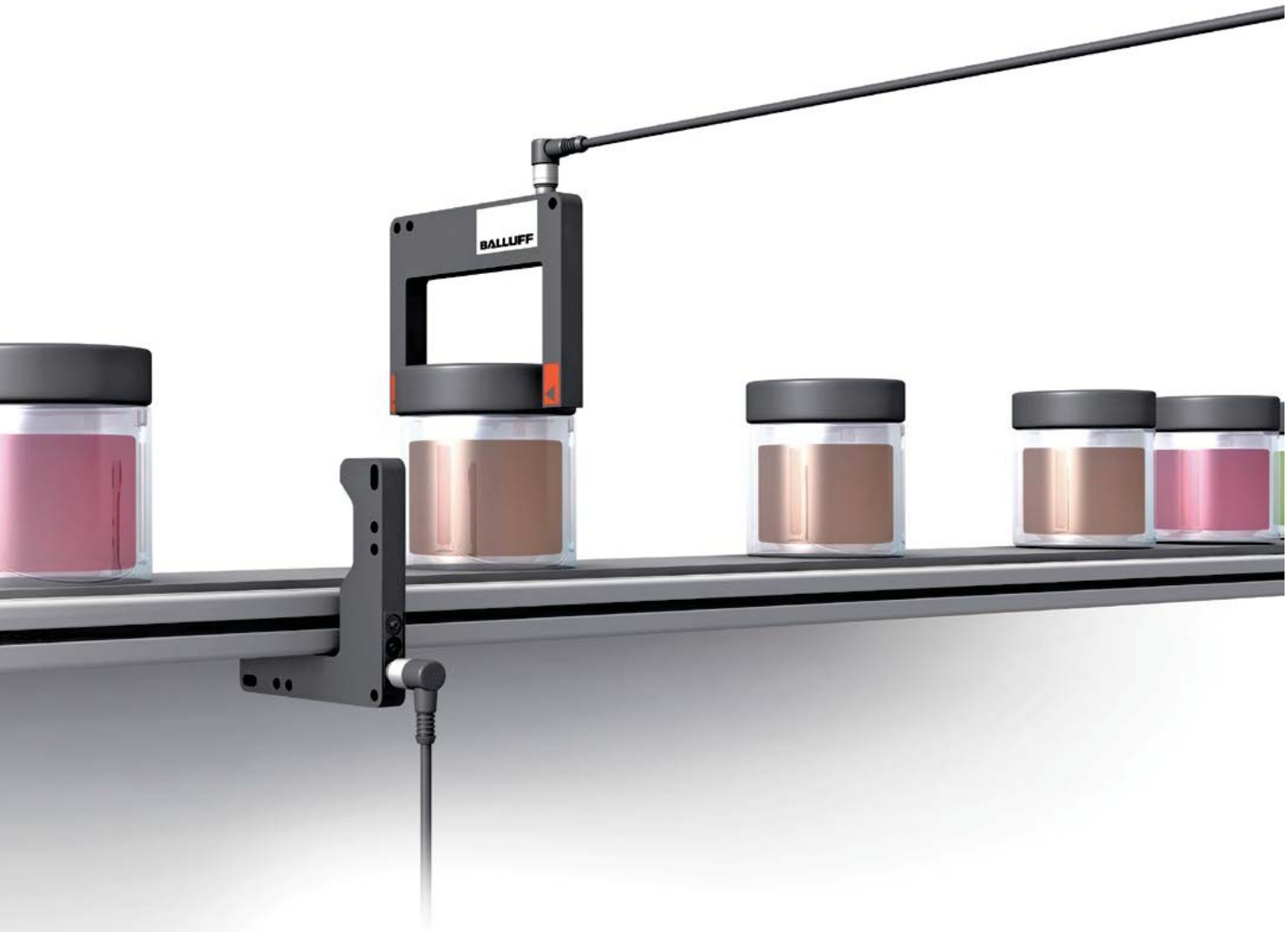
Optical window, fork and angle sensors

Fork sensors include all types of transmitted light sensors that have their electronics and optics mounted and precisely adjusted in a U-shaped metal housing. These range from the universal single-beam photoelectric sensor with red light, infrared or laser, all the way to photoelectric label sensors. The extraordinary thing is that, in addition to precision designs, you get modular size increments ideally matched to your applications. Even special dimensions and materials are possible.

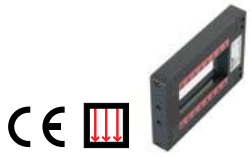
As a further development of the fork sensor, the angle sensor has almost identical technical data. Its special design makes it extremely valuable for diverse and demanding applications. This is because the beam geometry enables objects to be approached and detected from almost any direction. Angle sensors are perfect with regard to accuracy and detection of small parts and details.

Optical window sensors are densely packed through-beam sensors in a metal housing. They are ideal for highly accurate scanning and counting of fast, randomly falling or flying objects. In addition, they can provide dynamic or static analysis.
Designs: Our optical window sensors are available in fixed sizes or can be variably assembled from a modular construction set.

Optical Window, Fork and Angle Sensors
Contents

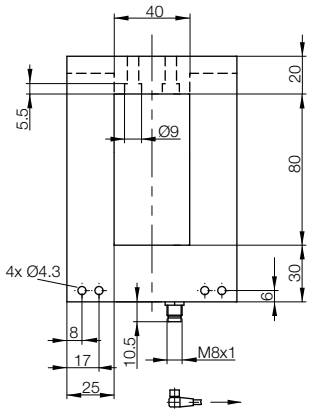


Dynamic optical window sensors BOW

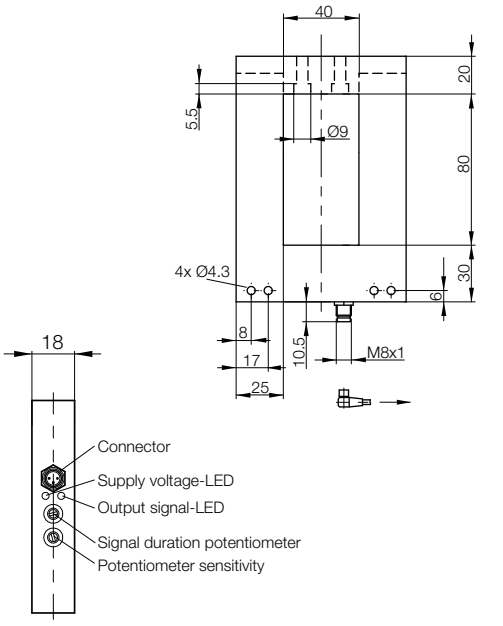


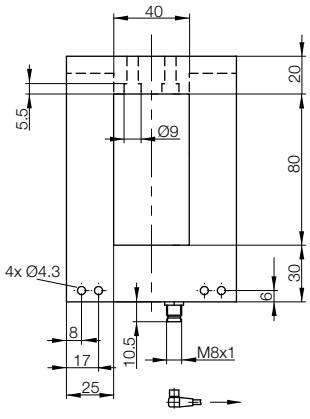
Type		**BOW**
Active area		**40×80 mm**
PNP NO/NC	**Order code**	**BOW001A**
	Part number	BOW A-0408-PS-C-S49
NPN NO/NC	**Order code**	
	Part number	
PNP/NPN NO/NC	**Order code**	
	Part number	
Supply voltage U_S		10...30 V DC
No-load supply current I_0 max.		≤ 40 mA
Output current		200 mA
Switching type		Dark switching
Polarity reversal/short-circuit protected		Yes/Yes
Settings		2× Potentiometer, 270°
Emitter, light type		LED, infrared
Wavelength		880 Nm
Resolution (smallest discernible part)		1.0 mm
Power-on indicator		Green LED
Output function indicator		Red LED
Turn-on delay		0.4 ms
Signal duration for pulse stretching		5...300 ms adjustable
Switching frequency		3...100 Hz
Function principle		Dynamic
Degree of protection as per IEC 60529		IP 67
Ambient temperature T_a		–10...+55 °C
Ambient light limit according to		EN 60947-5-2
Housing Material		Anodized aluminum
Optical surface		PMMA
Connection		M8 connector, 3-pin

Connection and operating elements on page 118.



	BOW **40×80 mm**	**BOW** **40×80 mm**
	BOW0019	
	BOW A-0408-NS-C-S49	
		BOW0038
		BOW A-0408-DS-C-S75
	10...30 V DC	10...30 V DC
	≤ 40 mA	≤ 40 mA
	200 mA	200 mA
	Dark switching	Dark switching
	Yes/Yes	Yes/Yes
	2× Potentiometer, 270°	2× Potentiometer, 270°
	LED, infrared	LED, infrared
	880 Nm	880 Nm
	1.0 mm	1.0 mm
	Green LED	Green LED
	Red LED	Red LED
	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
	M8 connector, 3-pin	M8 connector, 4-pin



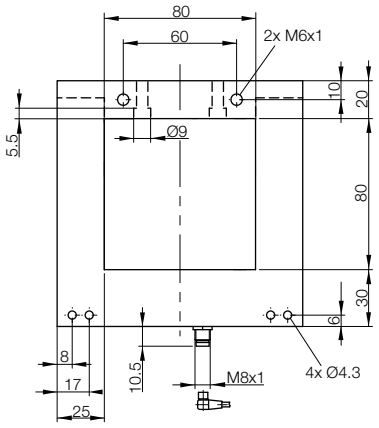


Note when using for ambient light:
The receiver is located on the connector side.

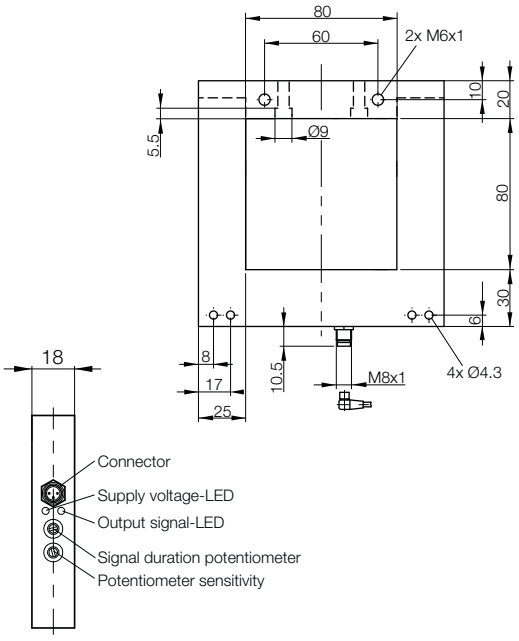
Dynamic optical window sensors BOW

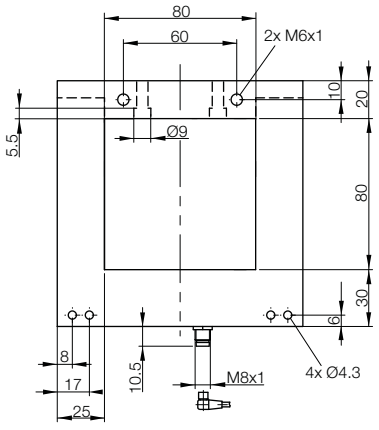
Type		**BOW**
Active area		**80×80 mm**
PNP NO/NC	**Order code**	**BOW001J**
	Part number	BOW A-0808-PS-C-S49
NPN NO/NC	**Order code**	
	Part number	
PNP/NPN NO/NC	**Order code**	
	Part number	
Supply voltage U_S		10...30 V DC
No-load supply current I_0 max.		≤ 45 mA
Output current		200 mA
Switching type		Dark switching
Polarity reversal/short-circuit protected		Yes/Yes
Settings		2× Potentiometer, 270°
Emitter, light type		LED, infrared
Wavelength		880 Nm
Resolution (smallest discernible part)		1.0 mm
Power-on indicator		Green LED
Output function indicator		Red LED
Turn-on delay		0.4 ms
Signal duration for pulse stretching		5...300 ms adjustable
Switching frequency		3...100 Hz
Function principle		Dynamic
Degree of protection as per IEC 60529		IP 67
Ambient temperature T_a		–10...+55 °C
Ambient light limit according to		EN 60947-5-2
Housing Material		Anodized aluminum
Optical surface		PMMA
Connection		M8 connector, 3-pin

Connection and operating elements on page 118.



	BOW 80×80 mm	BOW 80×80 mm
	BOW001H	
	BOW A-0808-NS-C-S49	
		BOW003A
		BOW A-0808-DS-C-S75
	10...30 V DC	10...30 V DC
	≤ 45 mA	≤ 45 mA
	200 mA	200 mA
	Dark switching	Dark switching
	Yes/Yes	Yes/Yes
	2× Potentiometer, 270°	2× Potentiometer, 270°
	LED, infrared	LED, infrared
	880 Nm	880 Nm
	1.0 mm	1.0 mm
	Green LED	Green LED
	Red LED	Red LED
	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
	M8 connector, 3-pin	M8 connector, 4-pin



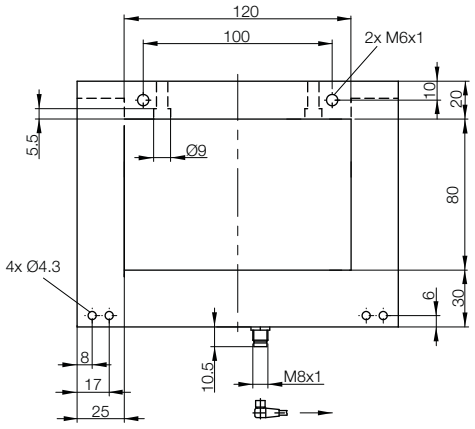


Note when using for ambient light:
The receiver is located on the connector side.

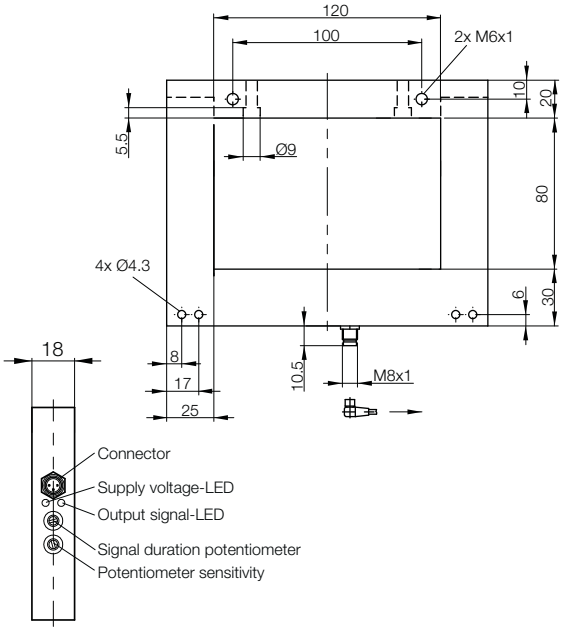
Dynamic optical window sensors BOW

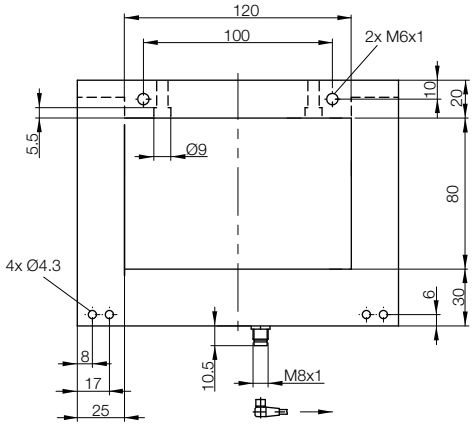
Type		**BOW**
Active area		**120×80 mm**
PNP NO/NC	**Order code**	**BOW0012**
	Part number	BOW A-1208-PS-C-S49
NPN NO/NC	**Order code**	
	Part number	
PNP/NPN NO/NC	**Order code**	
	Part number	
Supply voltage U_S		10...30 V DC
No-load supply current I_0 max.		≤ 60 mA
Output current		200 mA
Switching type		Dark switching
Polarity reversal/short-circuit protected		Yes/Yes
Settings		2× Potentiometer, 270°
Emitter, light type		LED, infrared
Wavelength		880 Nm
Resolution (smallest discernible part)		1.2 mm
Power-on indicator		Green LED
Output function indicator		Red LED
Turn-on delay		0.4 ms
Signal duration for pulse stretching		5...300 ms adjustable
Switching frequency		3...100 Hz
Function principle		Dynamic
Degree of protection as per IEC 60529		IP 67
Ambient temperature T_a		–10...+55 °C
Ambient light limit according to		EN 60947-5-2
Housing Material		Anodized aluminum
Optical surface		PMMA
Connection		M8 connector, 3-pin

Connection and operating elements on page 118.



	BOW **120×80 mm**	**BOW** **120×80 mm**
	BOW001W BOW A-1208-NS-C-S49	
		BOW003E BOW A-1208-NS-C-S49
	10...30 V DC	10...30 V DC
	≤ 60 mA	≤ 60 mA
	200 mA	200 mA
	Dark switching	Dark switching
	Yes/Yes	Yes/Yes
	2× Potentiometer, 270°	2× Potentiometer, 270°
	LED, infrared	LED, infrared
	880 Nm	880 Nm
	1.2 mm	1.2 mm
	Green LED	Green LED
	Red LED	Red LED
	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
	M8 connector, 3-pin	M8 connector, 4-pin



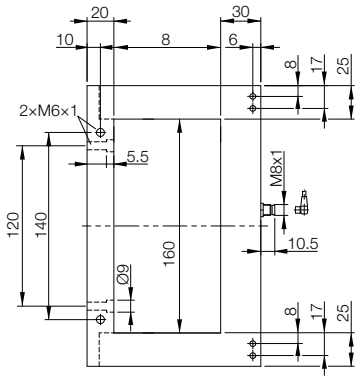


Note when using for ambient light:
The receiver is located on the connector side.

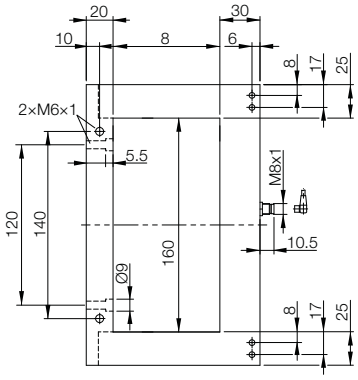
Dynamic optical window sensors BOW

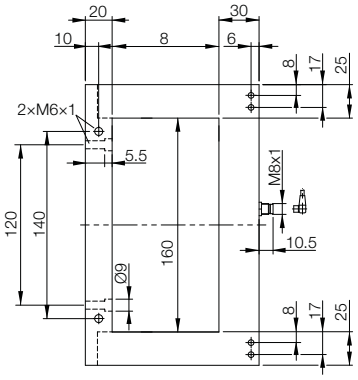
Type		**BOW**
Active area		**160×80 mm**
PNP NO/NC	**Order code**	**BOW002C**
	Part number	BOW A-1608-PS-C-S49
NPN NO/NC	**Order code**	
	Part number	
PNP/NPN NO/NC	**Order code**	
	Part number	
Supply voltage U_S		10...30 V DC
No-load supply current I_0 max.		≤ 75 mA
Output current		200 mA
Switching type		Dark switching
Polarity reversal/short-circuit protected		Yes/Yes
Settings		2× Potentiometer, 270°
Emitter, light type		LED, infrared
Wavelength		880 Nm
Resolution (smallest discernible part)		1.5 mm
Power-on indicator		Green LED
Output function indicator		Red LED
Turn-on delay		0.4 ms
Signal duration for pulse stretching		5...300 ms adjustable
Switching frequency		3...100 Hz
Function principle		Dynamic
Degree of protection as per IEC 60529		IP 67
Ambient temperature T_a		–10...+55 °C
Ambient light limit according to		EN 60947-5-2
Housing Material		Anodized aluminum
Optical surface		PMMA
Connection		M8 connector, 3-pin

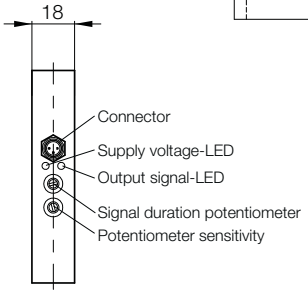
Connection and operating elements on page 118.



	BOW **160×80 mm**	**BOW** **160×80 mm**
	BOW0026	
	BOW A-1608-NS-C-S49	
		BOW003H
		BOW A-1608-DS-C-S75
	10...30 V DC	10...30 V DC
	≤ 75 mA	≤ 75 mA
	200 mA	200 mA
	Dark switching	Dark switching
	Yes/Yes	Yes/Yes
	2× Potentiometer, 270°	2× Potentiometer, 270°
	LED, infrared	LED, infrared
	880 Nm	880 Nm
	1.5 mm	1.5 mm
	Green LED	Green LED
	Red LED	Red LED
	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
	M8 connector, 3-pin	M8 connector, 4-pin





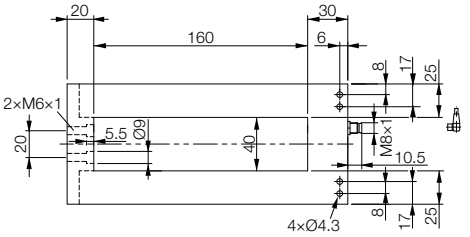


Note when using for ambient light:
The receiver is located on the connector side.

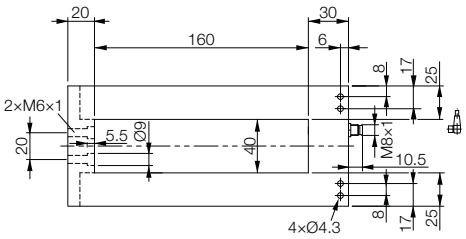
Dynamic optical window sensors BOW

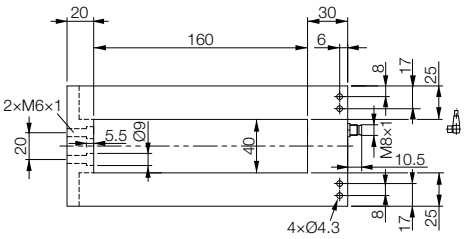
Type		**BOW**
Active area		**40×160 mm**
PNP NO/NC	**Order code**	**BOW002E**
	Part number	BOW A-0416-PS-C-S49
NPN NO/NC	**Order code**	
	Part number	
PNP/NPN NO/NC	**Order code**	
	Part number	
Supply voltage U_S		10...30 V DC
No-load supply current I_0 max.		≤ 65 mA
Output current		200 mA
Switching type		Dark switching
Polarity reversal/short-circuit protected		Yes/Yes
Settings		2× Potentiometer, 270°
Emitter, light type		LED, infrared
Wavelength		880 Nm
Resolution (smallest discernible part)		1.5 mm
Power-on indicator		Green LED
Output function indicator		Red LED
Turn-on delay		0.4 ms
Signal duration for pulse stretching		5...300 ms adjustable
Switching frequency		3...100 Hz
Function principle		Dynamic
Degree of protection as per IEC 60529		IP 67
Ambient temperature T_a		–10...+55 °C
Ambient light limit according to		EN 60947-5-2
Housing Material		Anodized aluminum
Optical surface		PMMA
Connection		M8 connector, 3-pin

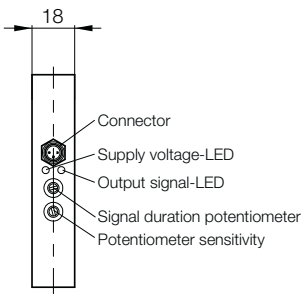
Connection and operating elements on page 118.



	BOW 40×160 mm	BOW 40×160 mm
	BOW0027	
	BOW A-0416-NS-C-S49	
		BOW0039
		BOW A-0416-DS-C-S75
	10...30 V DC	10...30 V DC
	≤ 65 mA	≤ 65 mA
	200 mA	200 mA
	Dark switching	Dark switching
	Yes/Yes	Yes/Yes
	2× Potentiometer, 270°	2× Potentiometer, 270°
	LED, infrared	LED, infrared
	880 Nm	880 Nm
	1.0 mm	1.0 mm
	Green LED	Green LED
	Red LED	Red LED
	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
	M8 connector, 3-pin	M8 connector, 4-pin





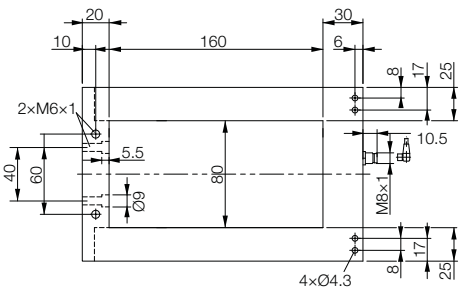


Note when using for ambient light:
The receiver is located on the connector side.

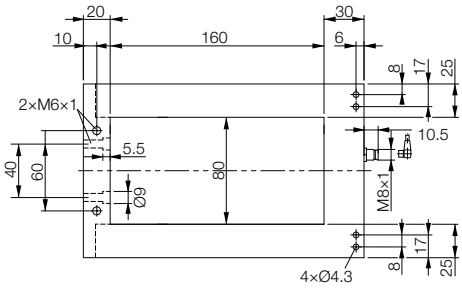
Dynamic optical window sensors BOW

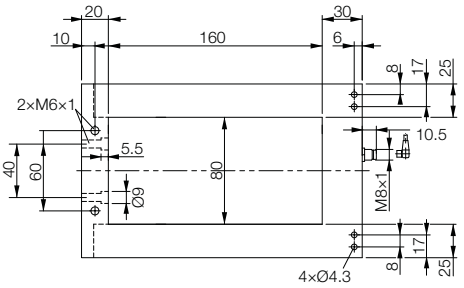
Type		**BOW**	
Active area		**80×160 mm**	
PNP NO/NC	**Order code**	**BOW002F**	
	Part number	BOW A-0816-PS-C-S49	
NPN NO/NC	**Order code**		
	Part number		
PNP/NPN NO/NC	**Order code**		
	Part number		
Supply voltage U_S		10...30 V DC	
No-load supply current I_0 max.		≤ 75 mA	
Output current		200 mA	
Switching type		Dark switching	
Polarity reversal/short-circuit protected		Yes/Yes	
Settings		2× Potentiometer, 270°	
Emitter, light type		LED, infrared	
Wavelength		880 Nm	
Resolution (smallest discernible part)		1.5 mm	
Power-on indicator		Green LED	
Output function indicator		Red LED	
Turn-on delay		0.4 ms	
Signal duration for pulse stretching		5...300 ms adjustable	
Switching frequency		3...100 Hz	
Function principle		Dynamic	
Degree of protection as per IEC 60529		IP 67	
Ambient temperature T_a		–10...+55 °C	
Ambient light limit according to		EN 60947-5-2	
Housing Material		Anodized aluminum	
Optical surface		PMMA	
Connection		M8 connector, 3-pin	

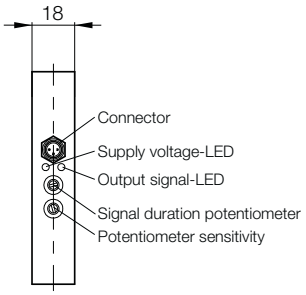
Connection and operating elements on page 118.



	BOW 80×160 mm	BOW 80×160 mm
	BOW0028	
	BOW A-0816-NS-C-S49	
		BOW003C
		BOW A-0816-DS-C-S75
	10...30 V DC	10...30 V DC
	≤ 75 mA	≤ 75 mA
	200 mA	200 mA
	Dark switching	Dark switching
	Yes/Yes	Yes/Yes
	2× Potentiometer, 270°	2× Potentiometer, 270°
	LED, infrared	LED, infrared
	880 Nm	880 Nm
	1.0 mm	1.0 mm
	Green LED	Green LED
	Red LED	Red LED
	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
	M8 connector, 3-pin	M8 connector, 4-pin





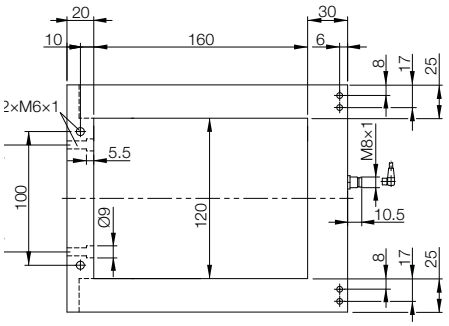


Note when using for ambient light:
The receiver is located on the connector side.

Dynamic optical window sensors BOW

Type		**BOW**
Active area		**120×160 mm**
PNP NO/NC	**Order code**	**BOW002H**
	Part number	BOW A-1216-PS-C-S49
NPN NO/NC	**Order code**	
	Part number	
PNP/NPN NO/NC	**Order code**	
	Part number	
Supply voltage U_S		10...30 V DC
No-load supply current I_0 max.		≤ 90 mA
Output current		200 mA
Switching type		Dark switching
Polarity reversal/short-circuit protected		Yes/Yes
Settings		2× Potentiometer, 270°
Emitter, light type		LED, infrared
Wavelength		880 Nm
Resolution (smallest discernible part)		1.2 mm
Power-on indicator		Green LED
Output function indicator		Red LED
Turn-on delay		0.4 ms
Signal duration for pulse stretching		5...300 ms adjustable
Switching frequency		3...100 Hz
Function principle		Dynamic
Degree of protection as per IEC 60529		IP 67
Ambient temperature T_a		–10...+55 °C
Ambient light limit according to		EN 60947-5-2
Housing Material		Anodized aluminum
Optical surface		PMMA
Connection		M8 connector, 3-pin

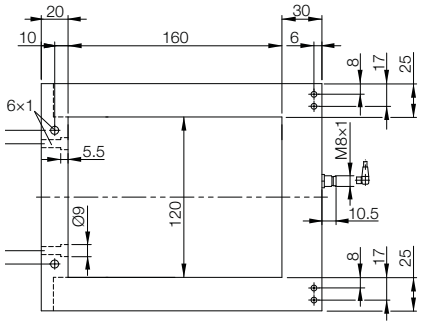
Connection and operating elements on page 118.

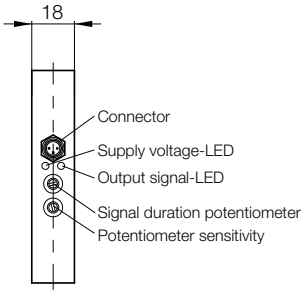


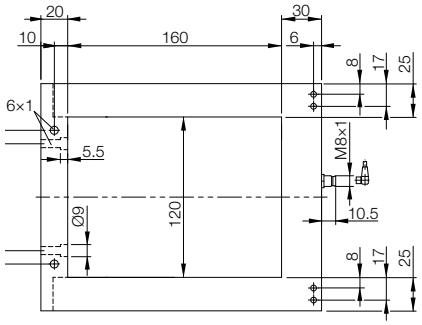
Optical Window, Fork and Angle Sensors

Dynamic optical window sensors BOW

	BOW 120×160 mm	BOW 120×160 mm
	BOW0029	
	BOW A-1216-NS-C-S49	
		BOW003F
		BOW A-1216-DS-C-S75
	10...30 V DC	10...30 V DC
	≤ 90 mA	≤ 90 mA
	200 mA	200 mA
	Dark switching	Dark switching
	Yes/Yes	Yes/Yes
	2× Potentiometer, 270°	2× Potentiometer, 270°
	LED, infrared	LED, infrared
	880 Nm	880 Nm
	1.2 mm	1.2 mm
	Green LED	Green LED
	Red LED	Red LED
	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
	IP 67	IP 67
	–10...+55 °C	–10...+55 °C
	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
	M8 connector, 3-pin	M8 connector, 4-pin





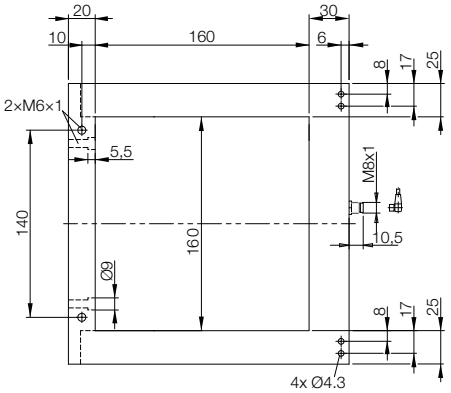


Note when using for ambient light:
The receiver is located on the connector side.

Dynamic optical window sensors BOW

Type		**BOW**
Active area		**160×160 mm**
PNP NO/NC	**Order code**	**BOW002J**
	Part number	BOW A-1616-PS-C-S49
NPN NO/NC	**Order code**	
	Part number	
PNP/NPN NO/NC	**Order code**	
	Part number	
Supply voltage U_S		10...30 V DC
No-load supply current I_0 max.		≤ 100 mA
Output current		200 mA
Switching type		Dark switching
Polarity reversal/short-circuit protected		Yes/Yes
Settings		2× Potentiometer, 270°
Emitter, light type		LED, infrared
Wavelength		880 Nm
Resolution (smallest discernible part)		1.5 mm
Power-on indicator		Green LED
Output function indicator		Red LED
Turn-on delay		0.4 ms
Signal duration for pulse stretching		5...300 ms adjustable
Switching frequency		3...100 Hz
Function principle		Dynamic
Degree of protection as per IEC 60529		IP 67
Ambient temperature T_a		–10...+55 °C
Ambient light limit according to		EN 60947-5-2
Housing Material		Anodized aluminum
Optical surface		PMMA
Connection		M8 connector, 3-pin

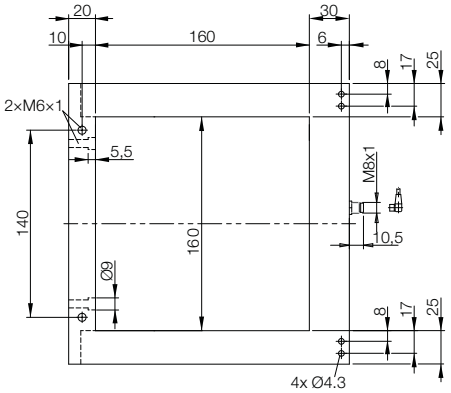
Connection and operating elements on page 118.

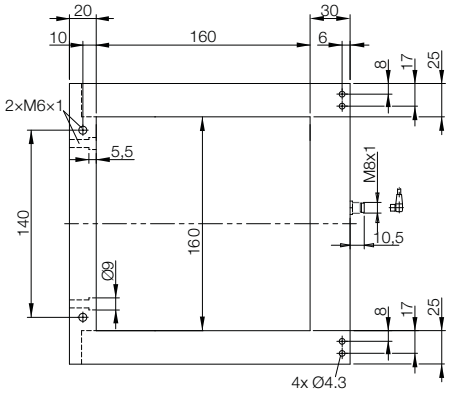


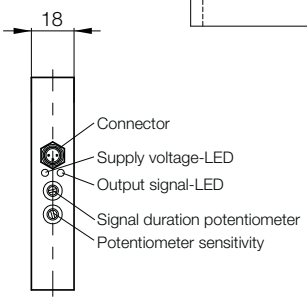
Optical Window, Fork and Angle Sensors

Dynamic optical window sensors BOW

	BOW 160×160 mm	BOW 160×160 mm
	BOW002A	
	BOW A-1616-NS-C-S49	
		BOW003J
		BOW A-1616-DS-C-S75
Operating voltage	10...30 V DC	10...30 V DC
Current consumption	≤ 100 mA	≤ 100 mA
Switching current	200 mA	200 mA
Switching type	Dark switching	Dark switching
Short-circuit protection/reverse polarity protection	Yes/Yes	Yes/Yes
Adjustment	2× Potentiometer, 270°	2× Potentiometer, 270°
Light source	LED, infrared	LED, infrared
Switching frequency	880 Nm	880 Nm
Resolution	1.5 mm	1.5 mm
Indicator	Green LED	Green LED
	Red LED	Red LED
Response time	0.4 ms	0.4 ms
	5...300 ms adjustable	5...300 ms adjustable
	3...100 Hz	3...100 Hz
	Dynamic	Dynamic
Protection rating	IP 67	IP 67
Ambient temperature	–10...+55 °C	–10...+55 °C
Standard conformity	EN 60947-5-2	EN 60947-5-2
Housing material	Anodized aluminum	Anodized aluminum
	PMMA	PMMA
Connection	M8 connector, 3-pin	M8 connector, 4-pin

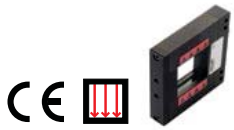


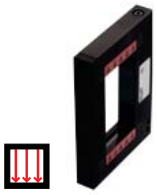




Note when using for ambient light:
The receiver is located on the connector side.

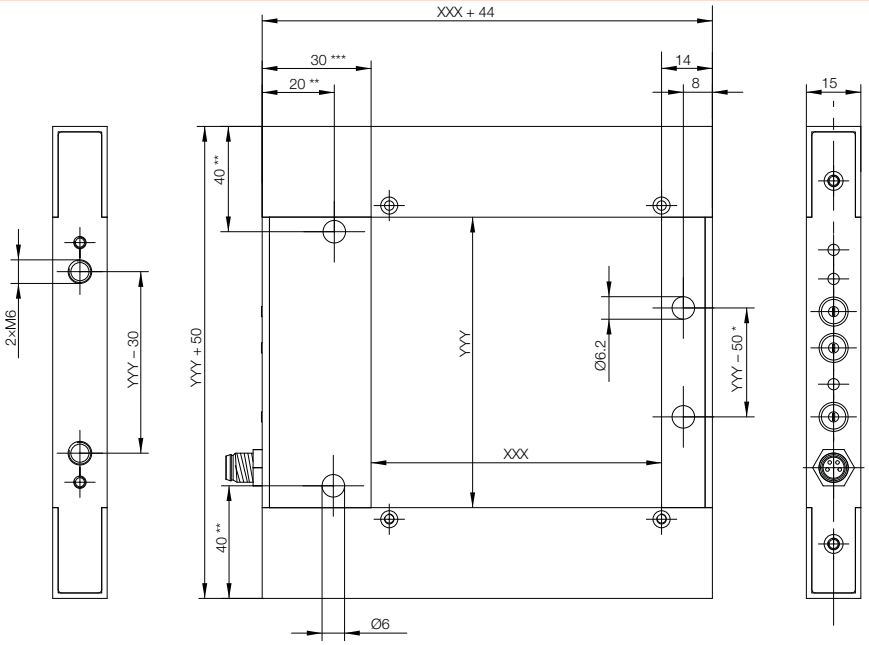
Static optical window sensors BOW (Modular)





Type		**BOW**	**BOW**
Active area (YYY x XXX)		**40×40 mm**	**80×40 mm**
Switching delay		**0.25 ms**	**0.25 ms**
Counting frequency		**2000 Hz**	**2000 Hz**
PNP/ NC/	**Order code**	**BOW002U**	**BOW002W**
NPN NO	Part number	BOW B-0404-DU-C-S75	BOW B-0804-DU-C-S75
Resolution	High (H)	2 mm	2 mm
Switch setting:	Medium (M)	4 mm	4 mm
	Low (L)	8 mm	8 mm
Supply voltage U_S		15...30 VDC	15...30 VDC
Intrinsic current consumption		< 400 mA	< 400 mA
Output		PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
Function principle		Static	Static
Switching type		Dark switching, NO/NC selection	Dark switching, NO/NC selection
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Light type		Infrared, clocked	Infrared, clocked
Function indicator	Operation	Green LED	Green LED
	Output signal	Yellow LED	Yellow LED
	Alarm	Red LED	Red LED
Pulse stretching (only dyn. function)		50 ms, selectable	50 ms, selectable
Degree of protection as per IEC 60529		IP 65	IP 65
Ambient temperature T_a		–10...+55 °C	–10...+55 °C
Housing Material		Anodized aluminum	Anodized aluminum
Filter material		PMMA	PMMA
Connection		M8 connector, 4-pin	M8 connector, 4-pin

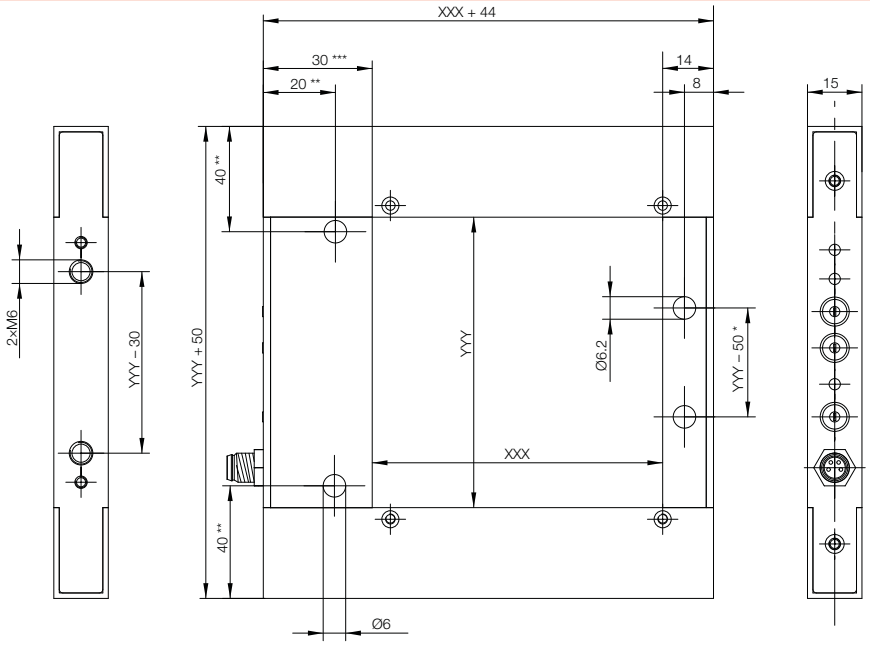
Connection and operating elements on page 118.



XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

	BOW	BOW	BOW
	80×80 mm	**120×80 mm**	**40x120 mm**
	0.5 ms	**0.5 ms**	**0.75 ms**
	1000 Hz	**1000 Hz**	**667 Hz**
	BOW002Y	**BOW002Z**	**BOW003K**
	BOW B-0808-DU-C-S75	BOW B-1208-DU-C-S75	BOW B-0412-DU-C-S75
	2 mm	2 mm	2 mm
	4 mm	4 mm	4 mm
	8 mm	8 mm	8 mm
	15...30 VDC	15...30 VDC	15...30 VDC
	< 400 mA	< 400 mA	< 400 mA
	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
	Static	Static	Static
	Dark switching, NO/NC selection	Dark switching, NO/NC selection	Dark switching, NO/NC selection
	Yes/Yes	Yes/Yes	Yes/Yes
	Infrared, clocked	Infrared, clocked	Infrared, clocked
	Green LED	Green LED	Green LED
	Yellow LED	Yellow LED	Yellow LED
	Red LED	Red LED	Red LED
	50 ms, selectable	50 ms, selectable	50 ms, selectable
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Anodized aluminum	Anodized aluminum	Anodized aluminum
	PMMA	PMMA	PMMA
	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin



XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

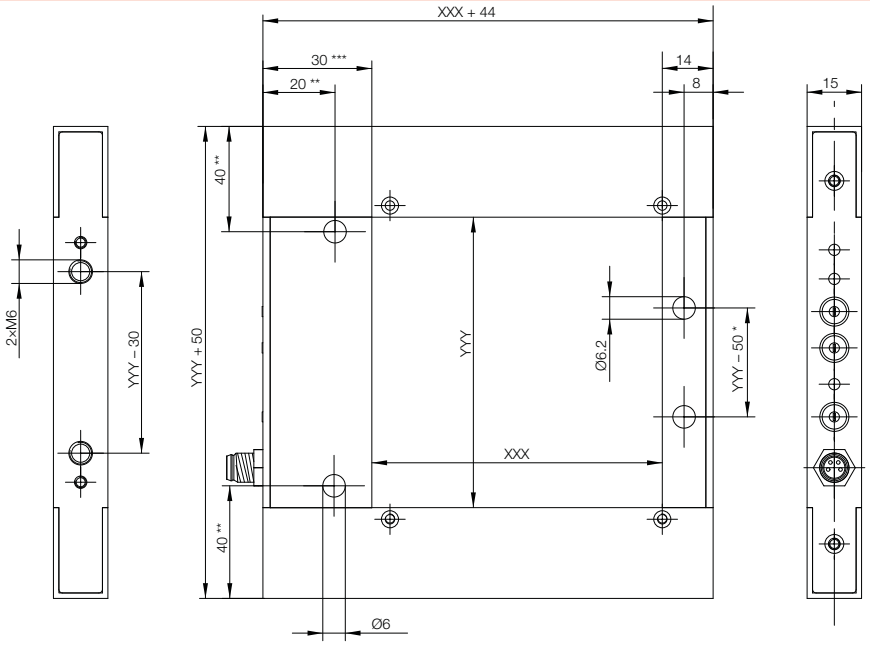
Note when using for ambient light:
The receiver is located on the connector side.

Optical Window, Fork and Angle Sensors

Static optical window sensors BOW (Modular)

Type			**BOW**	**BOW**
Active area (YYY x XXX)			**80×120 mm**	**120×120 mm**
Switching delay			**0.75 ms**	**0.75 ms**
Counting frequency			**667 Hz**	**667 Hz**
PNP/ NC/		**Order code**	**BOW0030**	**BOW0031**
NPN NO		Part number	BOW B-0812-DU-C-S75	BOW B-1212-DU-C-S75
Resolution		High (H)	2 mm	2 mm
Switch setting:		Medium (M)	4 mm	4 mm
		Low (L)	8 mm	8 mm
Supply voltage U_S			15...30 VDC	15...30 VDC
Intrinsic current consumption			< 400 mA	< 400 mA
Output			PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
Function principle			Static	Static
Switching type			Dark switching, NO/NC selection	Dark switching, NO/NC selection
Polarity reversal/short-circuit protected			Yes/Yes	Yes/Yes
Light type			Infrared, clocked	Infrared, clocked
Function indicator		Operation	Green LED	Green LED
		Output signal	Yellow LED	Yellow LED
		Alarm	Red LED	Red LED
Pulse stretching (only dyn. function)			50 ms, selectable	50 ms, selectable
Degree of protection as per IEC 60529			IP 65	IP 65
Ambient temperature T_a			–10...+55°C	–10...+55 °C
Housing Material			Aluminum, black anodized	Anodized aluminum
Filter material			PMMA	PMMA
Connection			M8 connector, 4-pin	M8 connector, 4-pin

Connection and operating elements on page 118.

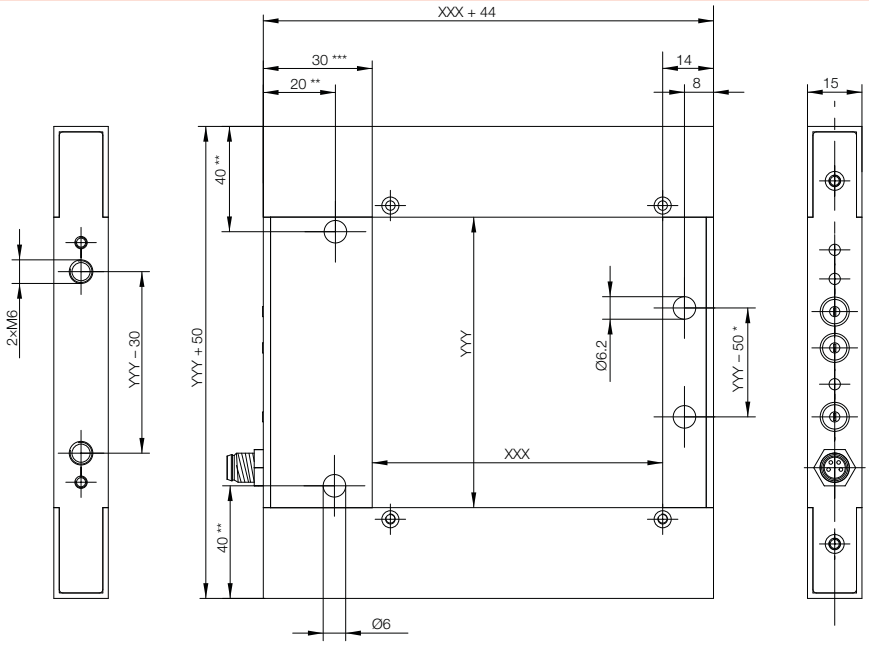


XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

Static optical window sensors BOW (Modular)

	BOW	BOW	BOW
	160×120 mm	**200×120 mm**	**120×160 mm**
	0.75 ms	**0.75 ms**	**1.0 ms**
	667 Hz	**667 Hz**	**500 Hz**
	BOW0032	**BOW003L**	**BOW0033**
	BOW B-1612-DU-C-S75	BOW B-2012-DU-C-S75	BOW B-1216-DU-C-S75
	2 mm	2 mm	2 mm
	4 mm	4 mm	4 mm
	8 mm	8 mm	8 mm
	15...30 VDC	15...30 VDC	15...30 VDC
	< 400 mA	< 400 mA	< 400 mA
	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
	Static	Static	Static
	Dark switching, NO/NC selection	Dark switching, NO/NC selection	Dark switching, NO/NC selection
	Yes/Yes	Yes/Yes	Yes/Yes
	Infrared, clocked	Infrared, clocked	Infrared, clocked
	Green LED	Green LED	Green LED
	Yellow LED	Yellow LED	Yellow LED
	Red LED	Red LED	Red LED
	50 ms, selectable	50 ms, selectable	50 ms, selectable
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Anodized aluminum	Anodized aluminum	Anodized aluminum
	PMMA	PMMA	PMMA
	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin



XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

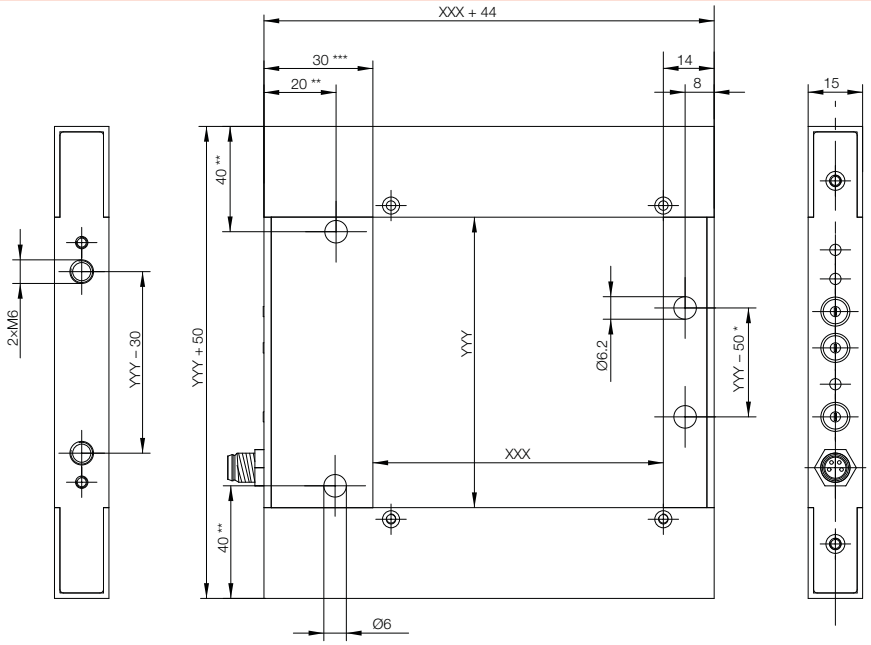
* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

Note when using for ambient light:
The receiver is located on the connector side.

Static optical window sensors BOW (Modular)

Type			**BOW**	**BOW**
Active area (XXX × YYY)			**160×160 mm**	**200×160 mm**
Switching delay			**1.0 ms**	**1.0 ms**
Counting frequency			**500 Hz**	**500 Hz**
PNP/ NPN	NC/ NO	**Order code**	**BOW0034**	**BOW0035**
		Part number	BOW B-1616-DU-C-S75	BOW B-2016-DU-C-S75
Resolution		High (H)	2 mm	2 mm
Switch setting:		Medium (M)	4 mm	4 mm
		Low (L)	8 mm	8 mm
Supply voltage U_S			15...30 VDC	15...30 VDC
Intrinsic current consumption			< 400 mA	< 400 mA
Output			PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
Function principle			Static	Static
Switching type			Dark switching, NO/NC selection	Dark switching, NO/NC selection
Polarity reversal/short-circuit protected			Yes/Yes	Yes/Yes
Light type			Infrared, clocked	Infrared, clocked
Function indicator		Operation	Green LED	Green LED
		Output signal	Yellow LED	Yellow LED
		Alarm	Red LED	Red LED
Pulse stretching (only dyn. function)			50 ms, selectable	50 ms, selectable
Degree of protection as per IEC 60529			IP 65	IP 65
Ambient temperature T_a			–10...+55 °C	–10...+55°C
Housing Material			Anodized aluminum	Aluminum, black anodized
Filter material			PMMA	PMMA
Connection			M8 connector, 4-pin	M8 connector, 4-pin

Connection and operating elements on page 118.

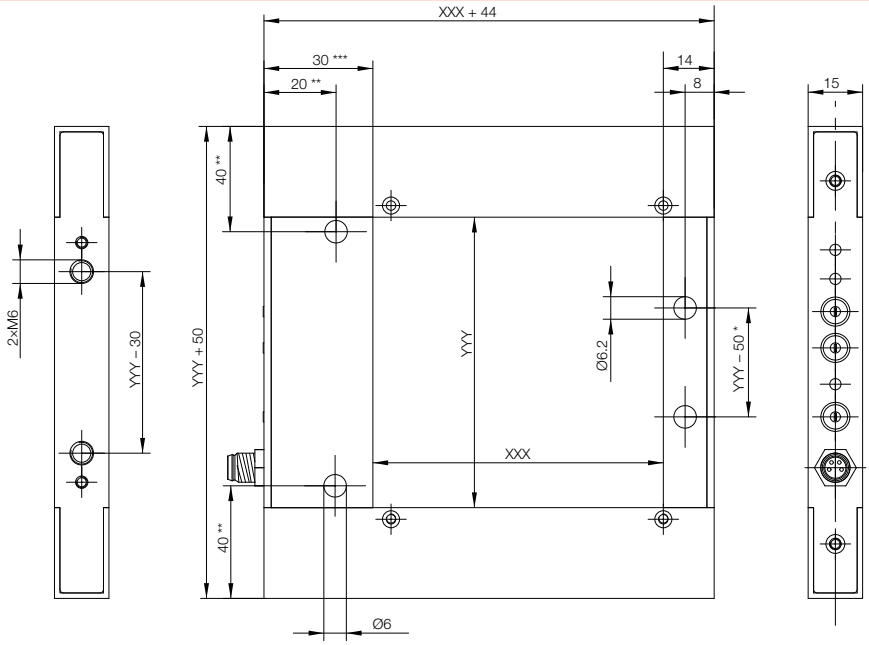


XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

Static optical window sensors BOW (Modular)

	BOW	BOW	BOW
	160×200 mm	**200×200 mm**	**240x200 mm**
	1.25 ms	**1.25 ms**	**1.25 ms**
	400 Hz	**400 Hz**	**400 Hz**
	BOW0036	**BOW0037**	**BOW003M**
	BOW B-1620-DU-C-S75	BOW B-2020-DU-C-S75	BOW B-2420-DU-C-S75
	2 mm	2 mm	2 mm
	4 mm	4 mm	4 mm
	8 mm	8 mm	8 mm
	15...30 VDC	15...30 VDC	15...30 VDC
	< 400 mA	< 400 mA	< 400 mA
	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
	Static	Static	Static
	Dark switching, NO/NC selection	Dark switching, NO/NC selection	Dark switching, NO/NC selection
	Yes/Yes	Yes/Yes	Yes/Yes
	Infrared, clocked	Infrared, clocked	Infrared, clocked
	Green LED	Green LED	Green LED
	Yellow LED	Yellow LED	Yellow LED
	Red LED	Red LED	Red LED
	50 ms, selectable	50 ms, selectable	50 ms, selectable
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Anodized aluminum	Anodized aluminum	Anodized aluminum
	PMMA	PMMA	PMMA
	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin



XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

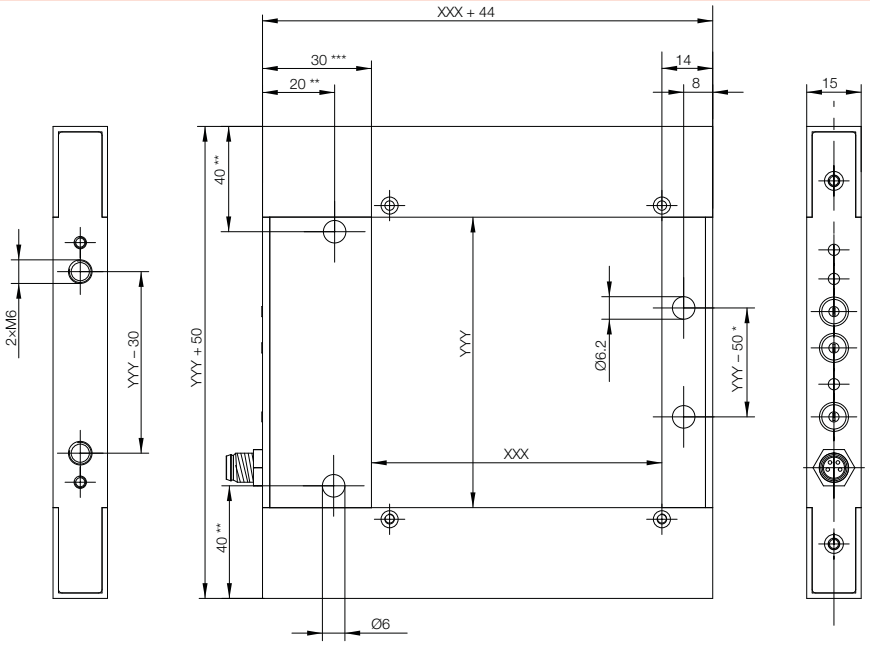
Note when using for ambient light:
The receiver is located on the connector side.

Optical Window, Fork and Angle Sensors

Static optical window sensors BOW (Modular)

Type			**BOW**	**BOW**
Active area (XXX × YYY)			**240×240 mm**	**280×280 mm**
Switching delay			**0.75 ms**	**0.88 ms**
Counting frequency			**667 Hz**	**570 Hz**
PNP/ NPN	NC/ NO	**Order code**	**BOW003N**	**BOW003P**
		Part number	BOW B-2424-DU-C-S75	BOW B-2828-DU-C-S75
Resolution		High (H)	4 mm	4 mm
Switch setting:		Medium (M)	8 mm	8 mm
		Low (L)	16 mm	16 mm
Supply voltage U_S			15...30 VDC	15...30 VDC
Intrinsic current consumption			< 400 mA	< 400 mA
Output			PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
Function principle			Static	Static
Switching type			Dark switching, NO/NC selection	Dark switching, NO/NC selection
Polarity reversal/short-circuit protected			Yes/Yes	Yes/Yes
Light type			Infrared, clocked	Infrared, clocked
Function indicator		Operation	Green LED	Green LED
		Output signal	Yellow LED	Yellow LED
		Alarm	Red LED	Red LED
Pulse stretching (only dyn. function)			50 ms, selectable	50 ms, selectable
Degree of protection as per IEC 60529			IP 65	IP 65
Ambient temperature T_a			–10...+55 °C	–10...+55 °C
Housing Material			Anodized aluminum	Anodized aluminum
Filter material			PMMA	PMMA
Connection			M8 connector, 4-pin	M8 connector, 4-pin

Connection and operating elements on page 118.



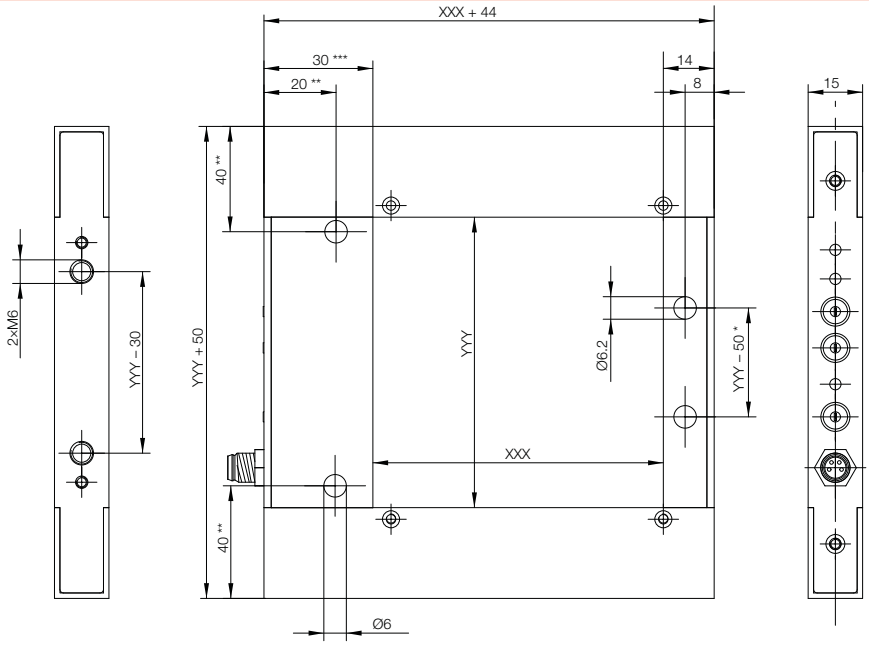
XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

Optical Window, Fork and Angle Sensors

Static optical window sensors BOW (Modular)

	BOW	**BOW**	**BOW**
	360×360 mm	**400x360 mm**	**400x400 mm**
	1.125 ms	**1.125 ms**	**1.25 ms**
	444 Hz	**444 Hz**	**400 Hz**
	BOW003R	**BOW003T**	**BOW003U**
	BOW B-3636-DU-C-S75	BOW B-4036-DU-C-S75	BOW B-4040-DU-C-S75
	4 mm	4 mm	4 mm
	8 mm	8 mm	8 mm
	16 mm	16 mm	16 mm
	15...30 VDC	15...30 VDC	15...30 VDC
	< 400 mA	< 400 mA	< 400 mA
	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected	PNP and NPN simultaneously, 200 mA, short-circuit protected
	Static	Static	Static
	Dark switching, NO/NC selection	Dark switching, NO/NC selection	Dark switching, NO/NC selection
	Yes/Yes	Yes/Yes	Yes/Yes
	Infrared, clocked	Infrared, clocked	Infrared, clocked
	Green LED	Green LED	Green LED
	Yellow LED	Yellow LED	Yellow LED
	Red LED	Red LED	Red LED
	50 ms, selectable	50 ms, selectable	50 ms, selectable
	IP 65	IP 65	IP 65
	–10...+55 °C	–10...+55 °C	–10...+55 °C
	Anodized aluminum	Anodized aluminum	Anodized aluminum
	PMMA	PMMA	PMMA
	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin



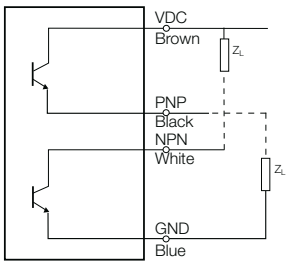
XXX = Length of active bracket (carries emitter or receiver) = integer multiple of 40 mm
YYY = Length of passive bracket (emitter/receiver distance) = integer multiple of 40 mm

* Mounting holes for YYY < 080 not present
** Mounting holes for YYY < 120 not present
*** 40 mm for YYY = 040

Note when using for ambient light:
The receiver is located on the connector side.

Static optical window sensors BOW (Modular)
Connection, operating elements

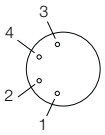
Wiring diagrams



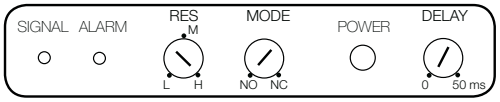
PNP/NPN

Connection configuration

1 (brown)	VDC
2 (white)	signal output NPN
3 (blue)	GND
4 (black)	signal output PNP

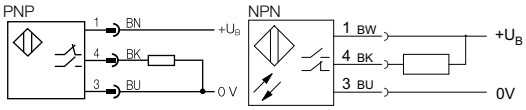


Operating elements

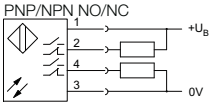


■ Power indicator	(Power)	Green LED
■ Function indicator	(Signal)	Yellow LED
■ Warning indicator	(Alarm)	Red LED
■ Object resolution	(Res)	Low (L), Medium (M), High (H)
■ Switching function	(Mode)	Normally Open (NO), Normally Closed (NC)
■ Pulse stretching	(Delay)	Off (0), 50 ms

3-Pin
Wiring diagram



4-Pin
Wiring diagram



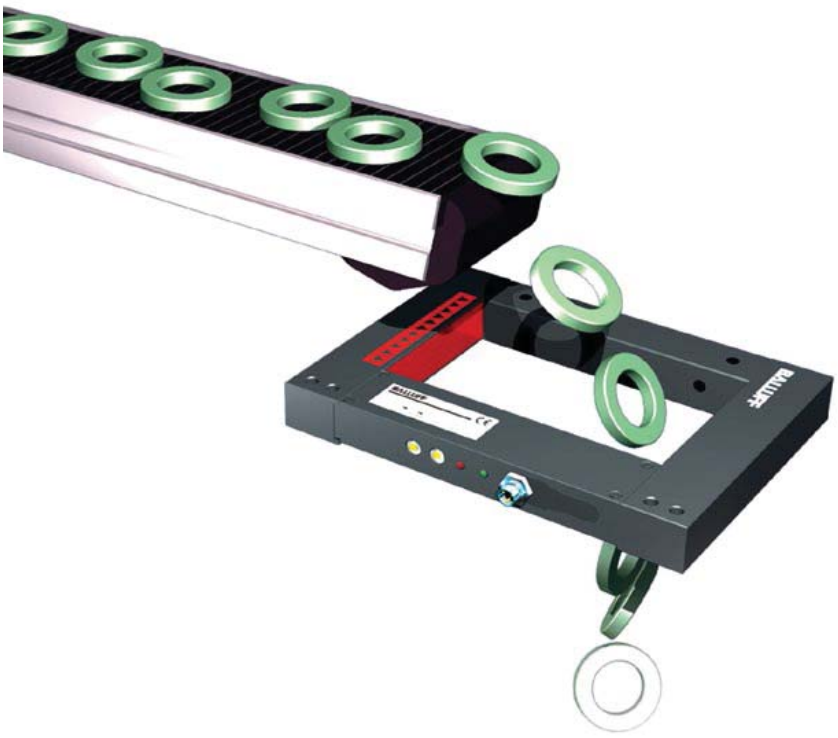
Suitable connector
(please order separately)

Size	Design	Cable material	Color	Length	Ordering code
M8, 3-pin	Straight	PVC	Yellow	2 m	**BCC050Y**
M8, 3-pin	Straight	TPE	Yellow	2 m	**BCC050L**
M8, 3-pin	Angled	PVC	Yellow	2 m	**BCC055N**
M8, 3-pin	Angled	TPE	Yellow	2 m	**BCC0555**
M8, 4-pin	Straight	PVC	Yellow	2 m	**BCC0542**
M8, 4-pin	Straight	TPE	Yellow	2 m	**BCC053U**
M8, 4-pin	Angled	PVC	Yellow	2 m	**BCC059W**
M8, 4-pin	Angled	TPE	Yellow	2 m	**BCC0AN6**

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.**

Static optical window sensors BOW (Modular)
Connection, operating elements



Analog fork sensors BGL

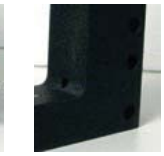
In-process correction

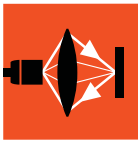
Thanks to their band of light, analog fork sensors not only detect objects with absolute reliability, they determine the positions of the objects with extreme precision as well. This makes readjustment in an ongoing process a snap. Process reliability and product quality increase significantly – and more efficiency is a welcome side effect.

Technical highlights

- Analog signal proportional to the skin depth of the object
- Constant value, even in the event of height variations
- High degree of soiling resistance and compensation
- Fieldbus connection with IO-Link
- Ideal for web edge control

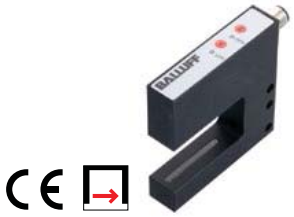
Integral air rinsing nozzle to prevent dust from accumulating on the emitter and receiver optics. Simple connection via standard pneumatic system.





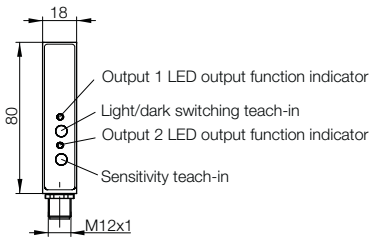
Type		Fork opening	Resolution	Light type		Output							Switching type		Switching frequency	U_S	Connection		Page
Ordering code / Part number				Red light		0–10 V	4-20 mA	1× PNP	1× NPN	2× PNP	2× NPN	IO-Link	Light switching	Dark switching		18...30 V DC	M12 plug, 4-pin		
Fork sensors																			
BGL002Z	BGL 30C-001-S4	30 mm	80 µm	■						■			■	■	500 Hz	■	■		122
BGL0030	BGL 30C-002-S4	30 mm	80 µm	■							■		■	■	500 Hz	■	■		122
BGL0031	BGL 30C-003-S4	30 mm	80 µm	■			■	■					■	■	500 Hz	■	■		122
BGL0032	BGL 30C-004-S4	30 mm	80 µm	■			■		■				■	■	500 Hz	■	■		122
BGL0033	BGL 30C-005-S4	30 mm	80 µm	■		■		■					■	■	500 Hz	■	■		123
BGL0034	BGL 30C-006-S4	30 mm	80 µm	■		■							■	■	500 Hz	■	■		123
BGL0035	BGL 30C-007-S4	30 mm	80 µm	■								■	■	■	500 Hz	■	■		124
BGL0037	BGL 50C-001-S4	50 mm	80 µm	■						■			■	■	500 Hz	■	■		123
BGL0038	BGL 50C-002-S4	50 mm	80 µm	■							■		■	■	500 Hz	■	■		123
BGL0039	BGL 50C-003-S4	50 mm	80 µm	■			■	■					■	■	500 Hz	■	■		123
BGL003A	BGL 50C-004-S4	50 mm	80 µm	■			■		■				■	■	500 Hz	■	■		123
BGL003C	BGL 50C-005-S4	50 mm	80 µm	■		■		■					■	■	500 Hz	■	■		123
BGL003E	BGL 50C-006-S4	50 mm	80 µm	■		■			■				■	■	500 Hz	■	■		123
BGL003F	BGL 50C-007-S4	50 mm	80 µm	■								■	■	■	500 Hz	■	■		124

Analog fork sensors BGL

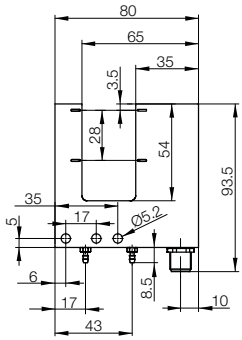


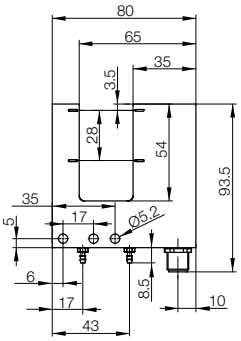
Series			**BGL**	**BGL**
Fork opening			**30 mm**	**30 mm**
Fork depth			**54 mm**	**54 mm**
PNP 2 switching outputs	NC/NO	Part number	BGL 30C-001-S4	
NPN		Part number	BGL 30C-002-S4	
PNP 1 analog and	NC/NO	Part number		BGL 30C-003-S4
NPN 1 switching/error output		Part number		BGL 30C-004-S4
Supply voltage U_B			18...30 V DC	18...30 V DC
No-load supply current I_0 max.			≤ 20 mA	≤ 20 mA
Output current			100 mA	100 mA
Analog output				4...20 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			Red light	Red light
Wavelength			633 nm	633 nm
Edge resolution			≤ 80 µm	≤ 80 µm
Repeat accuracy			0.15 mm	0.15 mm
Switching hysteresis			< 0.4 mm	< 0.4 mm
Output function indicator			2× Yellow LEDs	2× Yellow LEDs
Response time			2 ms	2 ms
Switching frequency			500 Hz	500 Hz
Measurement field length			28 mm	28 mm
Degree of protection as per IEC 60529			IP 65	IP 65
Ambient temperature T_a			–5...+55°C	–5...+55°C
Ambient light limit according to			EN 60947-5-2	EN 60947-5-2
Housing Material			Anodized aluminum	Anodized aluminum
Optical surface			PMMA	PMMA
Connection			M12 connector, 4-pin	M12 connector, 4-pin

Ordering codes on page 121.



Connection and operating elements on page 118.

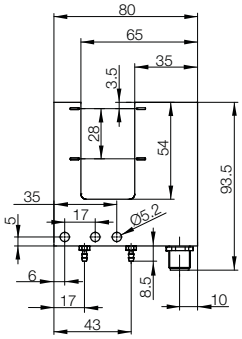


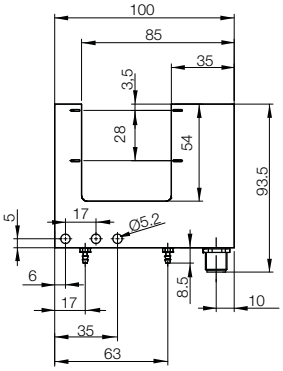


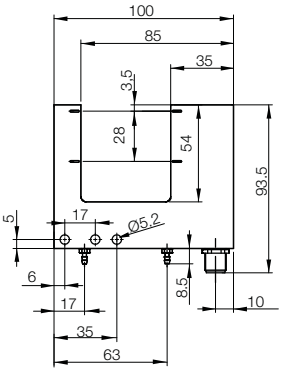
Analog fork sensors BGL

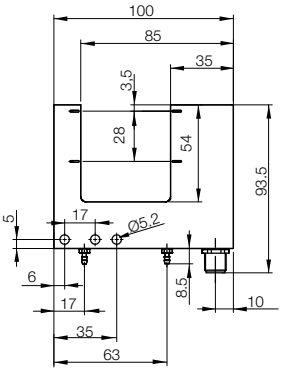



	BGL 30 mm 54 mm	BGL 50 mm 54 mm	BGL 50 mm 54 mm	BGL 50 mm 54 mm
		BGL 50C-001-S4		
		BGL 50C-002-S4		
	BGL 30C-005-S4		BGL 50C-003-S4	BGL 50C-005-S4
	BGL 30C-006-S4		BGL 50C-004-S4	BGL 50C-006-S4
	18...30 V DC	18...30 V DC	18...30 V DC	18...30 V DC
	≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA
	100 mA	100 mA	100 mA	100 mA
	0...10 V DC		4...20 mA	0...10 V DC
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
	Teach-in	Teach-in	Teach-in	Teach-in
	Red light	Red light	Red light	Red light
	633 nm	633 nm	633 nm	633 nm
	≤ 80 µm	≤ 80 µm	≤ 80 µm	≤ 80 µm
	0.15 mm	0.15 mm	0.15 mm	0.15 mm
	< 0.4 mm	< 0.4 mm	< 0.4 mm	< 0.4 mm
	2× Yellow LEDs	2× Yellow LEDs	2× Yellow LEDs	2× Yellow LEDs
	2 ms	2 ms	2 ms	2 ms
	500 Hz	500 Hz	500 Hz	500 Hz
	28 mm	28 mm	28 mm	28 mm
	IP 65	IP 65	IP 65	IP 65
	–5...+55°C	–5...+55°C	–5...+55°C	–5...+55°C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	Anodized aluminum	Anodized aluminum	Anodized aluminum	Anodized aluminum
	PMMA	PMMA	PMMA	PMMA
	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin



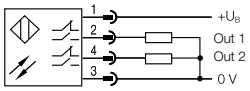




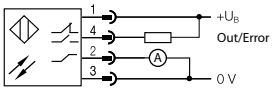


Wiring diagrams

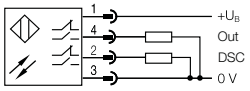
BGL... 002-S4



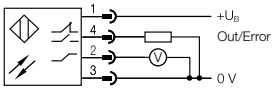
BGL... 004-S4



BGL... 009-S4



BGL... 006-S4



Optical Window, Fork and Angle Sensors

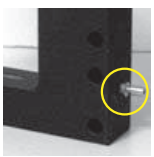
Fork sensors BGL with IO-Link

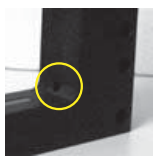
Series			**BGL analog, Series C Premium**	**BGL analog, Series C Premium**
Fork opening			**30 mm**	**50 mm**
Fork depth			**54 mm**	**54 mm**
PNP	With IO-Link	**Order code**	**BGL0035**	**BGL003F**
		Part number	BGL 30C-007-S4	BGL 50C-007-S4
Supply voltage U_S			18...30 V DC	18...30 V DC
No-load supply current I_0 max.			≤ 20 mA	≤ 20 mA
Output current			Max. 100 mA per output	Max. 100 mA per output
Analog output			4...20 mA	4...20 mA
Switching type			Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected			Yes/Yes	Yes/Yes
Response time			≤ 1 ms	≤ 1 ms
Settings			2× teach button	2× teach button
Emitter, light type			Red light	Red light
Wavelength			633 Nm	633 Nm
Edge resolution			0.1 mm	0.1 mm
Repeat accuracy			0.15 mm	0.15 mm
Switching hysteresis			< 0.4 mm	< 0.4 mm
Hysteresis			±0.8%	±0.8%
Output function indicator			2× yellow LED	2× yellow LED
Response time			2 ms	2 ms
Switching frequency			500 Hz	500 Hz
Measurement field length			28 mm	28 mm
Degree of protection as per IEC 60529			IP 67	IP 67
Ambient temperature T_a			–5...+55 °C	–5...+55 °C
Ambient light limit according to			EN 60947-5-2	EN 60947-5-2
Housing Material			Anodized aluminum	Anodized aluminum
Optical surface			PMMA	PMMA
Connection			M12 connector, 4-pin, A-coded	M12 connector, 4-pin, A-coded

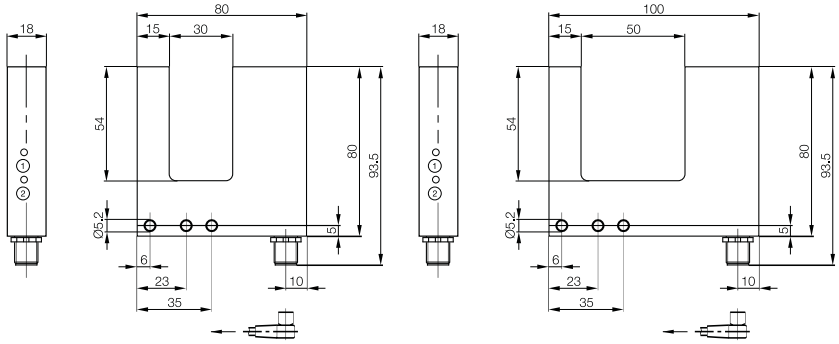
IO-Link

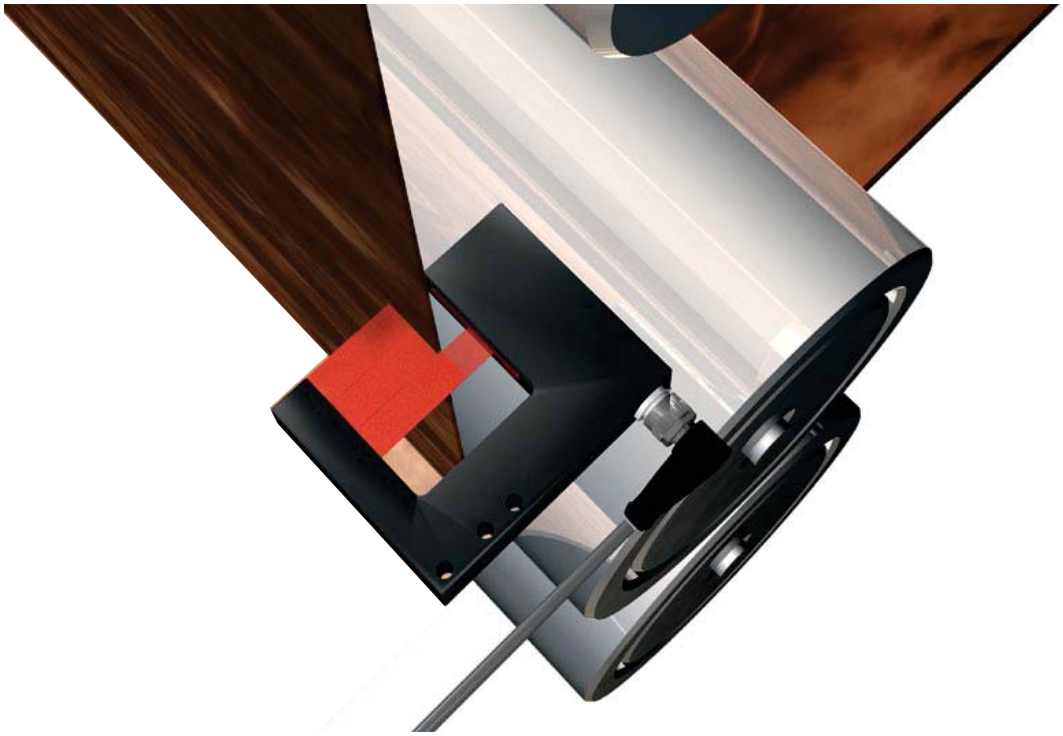
Mode	COM 2	COM 2
Transfer rate	38.4 kbaud	38.4 kbaud
IO-Link process data length	2 input bytes	2 input bytes
Value range	000 H...03FF H	000 H...03FF H
Diagnostics	Contamination	Contamination
Parameters	Switching points/switching range, button disable, NO/NC switch, analog value characteristics	Switching points/switching range, button disable, NO/NC switch, analog value characteristics

Integrated air rinsing nozzles for the emitter and receiver optics, so that no dust can accumulate. Connection via standard pneumatic system.



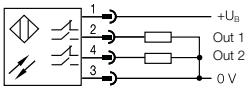




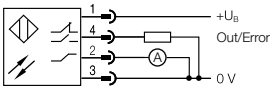


Wiring diagrams

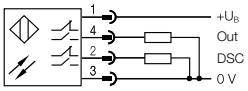
BGL... 001-S4



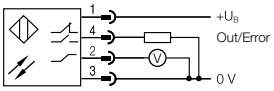
BGL... 003-S4



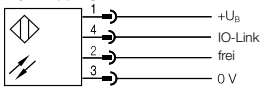
BGL... 009-S4



BGL... 005-S4



BGL... 007-S4



Suitable connectors
(please order separately)

Size	Design	Cable material	Color	Length	Order code
M12, 4-pin	Straight	PUR	Black	2 m	**BCC032F**
M12, 4-pin	Straight	PVC	Gray	2 m	**BCC0367**
M12, 4-pin	Angled	PUR	Black	2 m	**BCC032Y**
M12, 4-pin	Angled	PVC	Gray	2 m	**BCC036N**

Connectors without LED are suitable for PNP and NPN sensors.

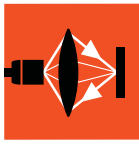
More electric accessories: A large selection of connectors and cables in a wide range of cable materials, colors and lengths can be found in our **Industrial Networking and Connectivity catalog.**

Through-beam sensors are unsurpassed in their accuracy, their ability to distinguish small parts and fine detail and their operating reliability. However, they do take some time to install and configure. This does not apply to fork sensors, since the emitter and receiver are self-contained in one housing. Nevertheless, their accuracy, ability to distinguish small parts and fine detail and their operating reliability is outstanding. Laser fork sensors achieve the best results in these kinds of tasks. Balluff laser through-beam fork sensors are ideally used for precisely positioning and reliably detecting fast-moving processes and small parts. This opens a vast range of applications in robotics and automation.

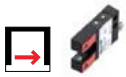
Features
- Integrated unit
- Rugged metal housing
- Glass optical surface
- High resolution
- Available in red light, laser light, IR or pin point
- Identical housing dimensions for all light types
- 10×10 mm fork arm, even for large fork openings
- Stackable
- Laser Class 1

Applications
- Parts sensing on conveyor and feed belts
- Label sensing on transparent backing material
- Part dimension checking
- Counting parts in assembly lines
- Tool break monitoring
- Position checking
- Feed control on automatic assembly equipment
- Checking for completeness (e.g. connector pins)
- Level monitoring of containers
- Handling and assembly

Type		Fork opening	Resolution	Light type					Output		Switching type		Switching frequency	U_S	Connection		Features		Page
■ **Ordering code** □ Part number				Red light	Red light, pin point	Laser light	Infrared	Red and green light	PNP	NPN	Light switching	Dark switching		10...30 V DC	M8 plug, 3-pin	M8 plug, 4-pin	Transparency detection	Fluid detection	
Fork sensors																			
BGL001W	BGL 5A-001-S49	5 mm	0.3 mm	■					■		■	■	3 kHz	■	■				128
BGL001Y	BGL 5A-002-S49	5 mm	0.3 mm	■						■	■	■	3 kHz	■	■				128
BGL001Z	BGL 5A-005-S49	5 mm	0.2 mm		■				■		■	■	5 kHz	■	■				132
BGL0020	BGL 5A-006-S49	5 mm	0.2 mm		■					■	■	■	5 kHz	■	■				132
BGL0021	BGL 5A-007-S49	5 mm	0.8 mm				■		■		■	■	3 kHz	■	■				136
BGL0022	BGL 5A-008-S49	5 mm	0.8 mm				■			■	■	■	3 kHz	■	■				136
BGL0001	BGL 10A-001-S49	10 mm	0.3 mm	■					■		■	■	3 kHz	■	■				128
BGL0002	BGL 10A-002-S49	10 mm	0.3 mm	■						■	■	■	3 kHz	■	■				128
BGL0003	BGL 10A-005-S49	10 mm	0.2 mm		■				■		■	■	5 kHz	■	■				132
BGL0004	BGL 10A-006-S49	10 mm	0.2 mm		■					■	■	■	5 kHz	■	■				132
BGL0005	BGL 10A-007-S49	10 mm	0.8 mm				■		■		■	■	3 kHz	■	■				136
BGL0006	BGL 10A-008-S49	10 mm	0.8 mm				■			■	■	■	3 kHz	■	■				136
BGL000R	BGL 20A-001-S49	20 mm	0.3 mm	■					■		■	■	1.5 kHz	■	■				129
BGL000T	BGL 20A-002-S49	20 mm	0.3 mm	■						■	■	■	1.5 kHz	■	■				129
BGL000U	BGL 20A-005-S49	20 mm	0.2 mm		■				■		■	■	5 kHz	■	■				133
BGL000W	BGL 20A-006-S49	20 mm	0.2 mm		■					■	■	■	5 kHz	■	■				133
BGL000Y	BGL 20A-007-S49	20 mm	0.8 mm				■		■		■	■	2 kHz	■	■				137
BGL000Z	BGL 20A-008-S49	20 mm	0.8 mm				■			■	■	■	2 kHz	■	■				137
BGL0016	BGL 30A-001-S49	30 mm	0.3 mm	■					■		■	■	1.5 kHz	■	■				129
BGL0018	BGL 30A-002-S49	30 mm	0.3 mm	■						■	■	■	1.5 kHz	■	■				129
BGL0019	BGL 30A-003-S49	30 mm	50 µm			■			■		■	■	5 kHz	■	■				140
BGL001A	BGL 30A-004-S49	30 mm	50 µm			■				■	■	■	5 kHz	■	■				140
BGL001C	BGL 30A-005-S49	30 mm	0.2 mm		■				■		■	■	5 kHz	■	■				133



Type		Fork opening	Resolution	Light type					Output		Switching type		Switching frequency	U_S	Connection		Features		Page
■ Ordering code □ Part number				Red light	Red light, pin point	Laser light	Infrared	Red and green light	PNP	NPN	Light switching	Dark switching		10...30 V DC	M8 plug, 3-pin	M8 plug, 4-pin	Transparency detection	Fluid detection	
Fork sensors																			
BGL001E	BGL 30A-006-S49	30 mm	0.2 mm		■					■	■	■	5 kHz	■	■				133
BGL001F	BGL 30A-007-S49	30 mm	0.8 mm				■		■		■	■	2 kHz	■	■				137
BGL001H	BGL 30A-008-S49	30 mm	0.8 mm				■			■	■	■	2 kHz	■	■				137
BGL003J	BGL 30A-011-S49	30 mm	0.6 mm				■		■		■	■	2 kHz	■	■			■	142
BGL003K	BGL 30A-012-S49	30 mm	0.6 mm				■			■	■	■	2 kHz	■	■			■	142
BGL001J	BGL 50A-001-S49	50 mm	0.4 mm	■					■		■	■	1.5 kHz	■	■				129
BGL001L	BGL 50A-002-S49	50 mm	0.4 mm	■						■	■	■	1.5 kHz	■	■				129
BGL001M	BGL 50A-003-S49	50 mm	80 µm			■			■		■	■	5 kHz	■	■				141
BGL001N	BGL 50A-004-S49	50 mm	80 µm			■				■	■	■	5 kHz	■	■				141
BGL001P	BGL 50A-005-S49	50 mm	0.3 mm		■				■		■	■	5 kHz	■	■				133
BGL001R	BGL 50A-006-S49	50 mm	0.3 mm		■					■	■	■	5 kHz	■	■				133
BGL001T	BGL 50A-007-S49	50 mm	1.0 mm				■		■		■	■	2 kHz	■	■				137
BGL001U	BGL 50A-008-S49	50 mm	1.0 mm				■			■	■	■	2 kHz	■	■				137
BGL0023	BGL 80A-001-S49	80 mm	0.4 mm	■					■		■	■	1.5 kHz	■	■				130
BGL0024	BGL 80A-002-S49	80 mm	0.4 mm	■						■	■	■	1.5 kHz	■	■				130
BGL0025	BGL 80A-003-S49	80 mm	0.1 mm			■			■		■	■	5 kHz	■	■				141
BGL0026	BGL 80A-004-S49	80 mm	0.1 mm			■				■	■	■	5 kHz	■	■				141
BGL0027	BGL 80A-005-S49	80 mm	0.4 mm		■				■		■	■	5 kHz	■	■				134
BGL0028	BGL 80A-006-S49	80 mm	0.4 mm		■					■	■	■	5 kHz	■	■				134
BGL0029	BGL 80A-007-S49	80 mm	1.2 mm				■		■		■	■	2 kHz	■	■				138
BGL002A	BGL 80A-008-S49	80 mm	1.2 mm				■			■	■	■	2 kHz	■	■				138
BGL002T	BGL 80A-009-S49	80 mm	50 µm			■			■		■	■	5 kHz	■	■		■		143
BGL002U	BGL 80A-010-S49	80 mm	50 µm			■				■	■	■	5 kHz	■	■		■		143
BGL003L	BGL 80A-011-S49	80 mm	0.8 mm				■		■		■	■	2 kHz	■	■			■	142
BGL003M	BGL 80A-012-S49	80 mm	0.8 mm			■				■	■	■	2 kHz	■	■	■		■	142
BGL0007	BGL 120A-001-S49	120 mm	0.5 mm	■					■		■	■	1.5 kHz	■	■				130
BGL0008	BGL 120A-002-S49	120 mm	0.5 mm	■						■	■	■	1.5 kHz	■	■				130
BGL0009	BGL 120A-003-S49	120 mm	0.15 mm			■			■		■	■	5 kHz	■	■				141
BGL000A	BGL 120A-004-S49	120 mm	0.15 mm			■				■	■	■	5 kHz	■	■				141
BGL000C	BGL 120A-005-S49	120 mm	0.5 mm		■				■		■	■	5 kHz	■	■				134
BGL000E	BGL 120A-006-S49	120 mm	0.5 mm		■					■	■	■	5 kHz	■	■				134
BGL000F	BGL 120A-007-S49	120 mm	1.5 mm				■		■		■	■	1 kHz	■	■				138
BGL000H	BGL 120A-008-S49	120 mm	1.5 mm				■			■	■	■	1 kHz	■	■				138
BGL000J	BGL 180A-001-S49	180 mm	0.6 mm	■					■		■	■	1.5 kHz	■	■				131
BGL000K	BGL 180A-002-S49	180 mm	0.6 mm	■						■	■	■	1.5 kHz	■	■				131
BGL000L	BGL 180A-005-S49	180 mm	0.6 mm		■				■		■	■	5 kHz	■	■				135
BGL000M	BGL 180A-006-S49	180 mm	0.6 mm		■					■	■	■	5 kHz	■	■				135
BGL000N	BGL 180A-007-S49	180 mm	1.5 mm				■		■		■	■	2 kHz	■	■				139
BGL000P	BGL 180A-008-S49	180 mm	1.5 mm				■			■	■	■	2 kHz	■	■				139
BGL0010	BGL 220A-001-S49	220 mm	0.6 mm	■					■		■	■	1.5 kHz	■	■				131
BGL0011	BGL 220A-002-S49	220 mm	0.6 mm	■						■	■	■	1.5 kHz	■	■				131
BGL0012	BGL 220A-005-S49	220 mm	0.6 mm		■				■		■	■	5 kHz	■	■				135
BGL0013	BGL 220A-006-S49	220 mm	0.6 mm		■					■	■	■	5 kHz	■	■				135
BGL0014	BGL 220A-007-S49	220 mm	1.5 mm				■		■		■	■	2 kHz	■	■				139
BGL0015	BGL 220A-008-S49	220 mm	1.5 mm				■			■	■	■	2 kHz	■	■				139

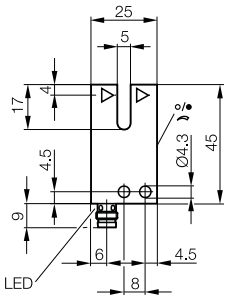


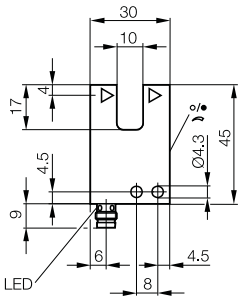
Series		**BGL**	**BGL**
Fork opening		**5 mm**	**10 mm**
Fork depth		**17 mm**	**17 mm**
PNP NO/NC	Part number	BGL 5A-001-S49	BGL 10A-001-S49
NPN NO/NC	Part number	BGL 5A-002-S49	BGL 10A-002-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		LED, red light	LED, red light
Wavelength		640 nm	640 nm
Resolution (smallest discernible part)		0.3 mm	0.3 mm
Repeat accuracy		20 µm	20 µm
Switching hysteresis		≤ 0.1 mm	≤ 0.1 mm
Output function indicator		Yellow LED	Yellow LED
Response time		0.166 ms	0.166 ms
Switching frequency		3 kHz	3 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

Ordering codes on pages 126-127.

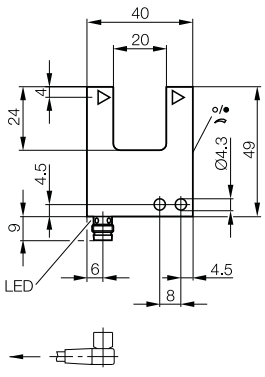
Connection and operating elements on page 118.

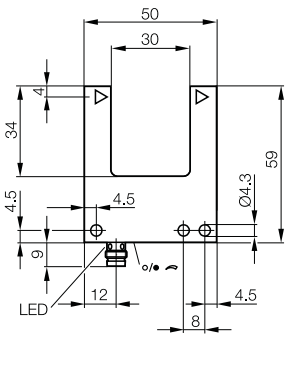


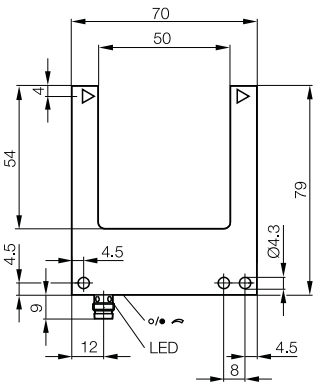


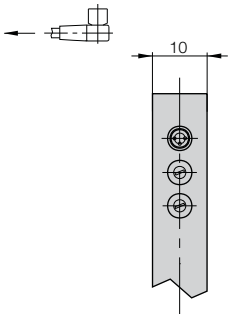


	BGL **20 mm** **24 mm**	BGL **30 mm** **34 mm**	BGL **50 mm** **54 mm**
	BGL 20A-001-S49	BGL 30A-001-S49	BGL 50A-001-S49
	BGL 20A-002-S49	BGL 30A-002-S49	BGL 50A-002-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 35 mA	≤ 35 mA	≤ 35 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	LED, red light	LED, red light	LED, red light
	640 nm	640 nm	640 nm
	0.3 mm	0.3 mm	0.4 mm
	20 µm	20 µm	40 µm
	≤ 0.1 mm	≤ 0.1 mm	≤ 0.15 mm
	Yellow LED	Yellow LED	Yellow LED
	0.33 ms	0.33 ms	0.33 ms
	1.5 kHz	1.5 kHz	1.5 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin









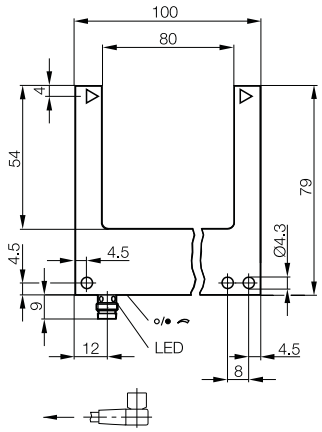
Plug, LED output function indicator
Potentiometer light/dark switching
Potentiometer, sensitivity

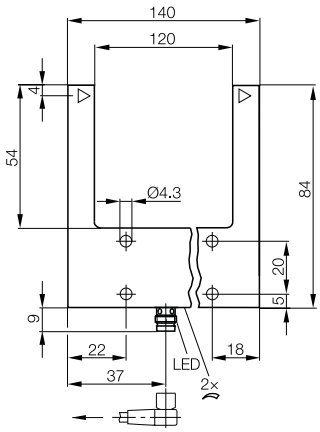
Series		**BGL**	**BGL**
Fork opening		**80 mm**	**120 mm**
Fork depth		**54 mm**	**54 mm**
PNP NO/NC	Part number	BGL 80A-001-S49	BGL 120A-001-S49
NPN NO/NC	Part number	BGL 80A-002-S49	BGL 120A-002-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		LED, red light	LED, red light
Wavelength		640 nm	640 nm
Resolution (smallest discernible part)		0.4 mm	0.5 mm
Repeat accuracy		60 µm	80 µm
Switching hysteresis		≤ 0.2 mm	≤ 0.2 mm
Output function indicator		Yellow LED	Yellow LED
Response time		0.33 ms	0.33 ms
Switching frequency		1.5 kHz	1.5 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

Ordering codes on pages 126-127.

Connection and operating elements on page 118.



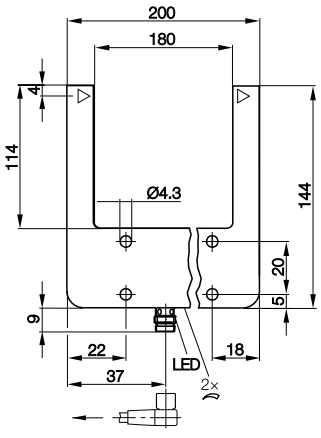


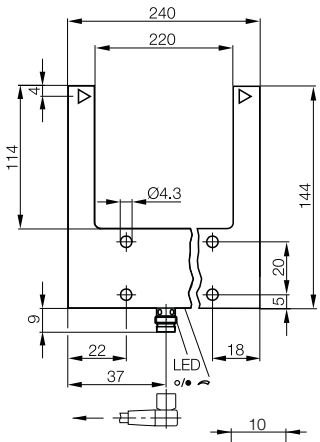
Optical Window, Fork and Angle Sensors

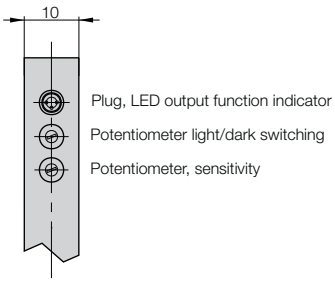
Fork sensors BGL

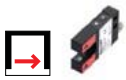
Connection, accessories

	BGL	BGL	
	180 mm	**220 mm**	
	114 mm	**114 mm**	
	BGL 180A-001-S49	BGL 220A-001-S49	
	BGL 180A-002-S49	BGL 220A-002-S49	
	10...30 V DC	10...30 V DC	
	≤ 35 mA	≤ 35 mA	
	200 mA	200 mA	
	Light/dark switching (selectable)	Light/dark switching (selectable)	
	Yes/Yes	Yes/Yes	
	Potentiometer, 270°	Potentiometer, 270°	
	LED, red light	LED, red light	
	640 nm	640 nm	
	0.6 mm	0.6 mm	
	80 µm	80 µm	
	≤ 0.2 mm	≤ 0.2 mm	
	Yellow LED	Yellow LED	
	0.33 ms	0.33 ms	
	1.5 kHz	1.5 kHz	
	IP 67	IP 67	
	–10...+60 °C	–10...+60 °C	
	EN 60947-5-2	EN 60947-5-2	
	GD-Zn	GD-Zn	
	Glass	Glass	
	M8 connector, 3-pin	M8 connector, 3-pin	

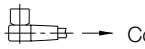






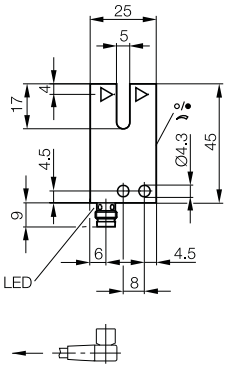


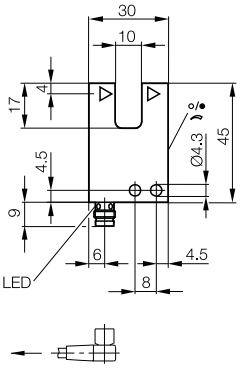
Series		**BGL**	**BGL**
Fork opening		**5 mm**	**10 mm**
Fork depth		**17 mm**	**17 mm**
PNP NO/NC	Part number	BGL 5A-005-S49	BGL 10A-005-S49
NPN NO/NC	Part number	BGL 5A-006-S49	BGL 10A-006-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		Red light, pin point	Red light, pin point
Wavelength		640 nm	640 nm
Resolution (smallest discernible part)		0.2 mm	0.2 mm
Repeat accuracy		20 µm	20 µm
Switching hysteresis		≤ 70 µm	≤ 70 µm
Output function indicator		Yellow LED	Yellow LED
Response time		0.1 ms	0.1 ms
Switching frequency		5 kHz	5 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

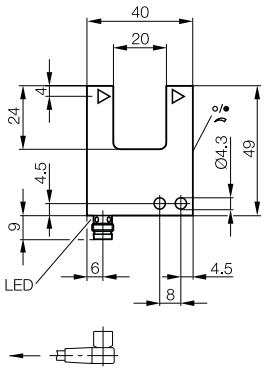
Ordering codes on pages 126-127.

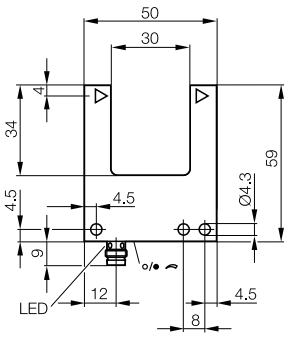
Connection and operating elements on page 118.

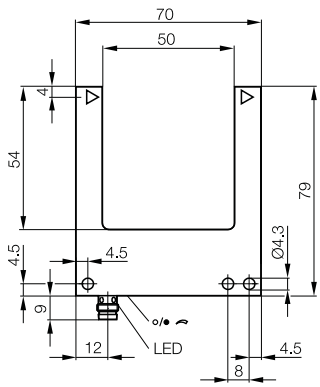


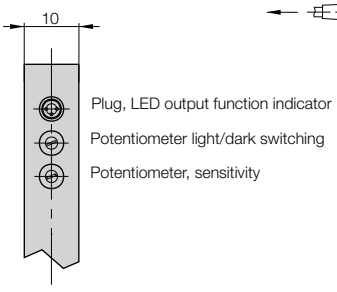


	BGL	**BGL**	**BGL**
	20 mm	**30 mm**	**50 mm**
	24 mm	**34 mm**	**54 mm**
	BGL 20A-005-S49	BGL 30A-005-S49	BGL 50A-005-S49
	BGL 20A-006-S49	BGL 30A-006-S49	BGL 50A-006-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 35 mA	≤ 35 mA	≤ 35 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	Red light, pin point	Red light, pin point	Red light, pin point
	640 nm	640 nm	640 nm
	0.2 mm	0.2 mm	0.3 mm
	20 µm	20 µm	30 µm
	≤ 70 µm	≤ 70 µm	≤ 0.1 mm
	Yellow LED	Yellow LED	Yellow LED
	0.1 ms	0.1 ms	0.1 ms
	5 kHz	5 kHz	5 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin

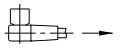






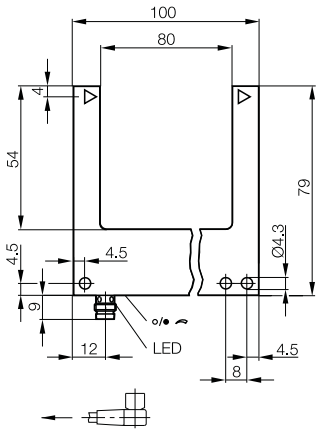


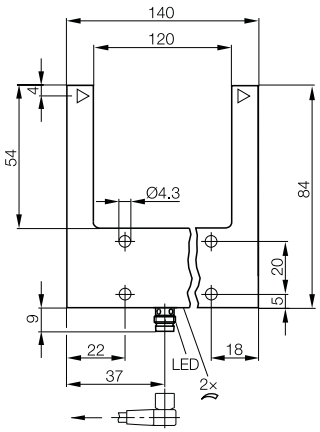
Series		**BGL**	**BGL**
Fork opening		**80 mm**	**120 mm**
Fork depth		**54 mm**	**54 mm**
PNP NO/NC	Part number	BGL 80A-005-S49	BGL 120A-005-S49
NPN NO/NC	Part number	BGL 80A-006-S49	BGL 120A-006-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		Red light, pin point	Red light, pin point
Wavelength		640 nm	640 nm
Resolution (smallest discernible part)		0.4 mm	0.5 mm
Repeat accuracy		40 µm	50 µm
Switching hysteresis		≤ 0.15 mm	≤ 0.15 mm
Output function indicator		Yellow LED	Yellow LED
Response time		0.1 ms	0.1 ms
Switching frequency		5 kHz	5 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

Ordering codes on pages 126-127.

Connection and operating elements on page 118.



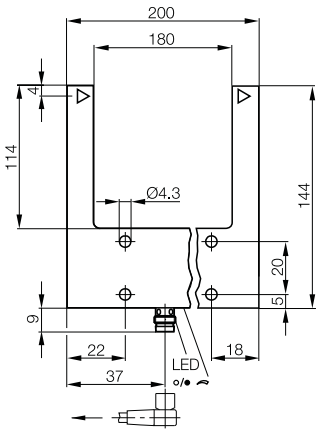


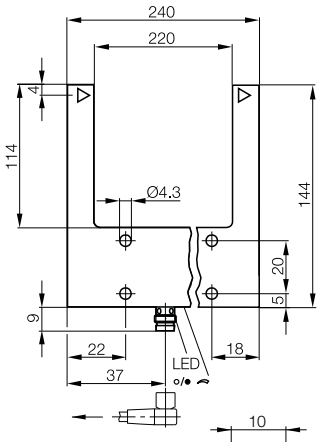
Optical Window, Fork and Angle Sensors

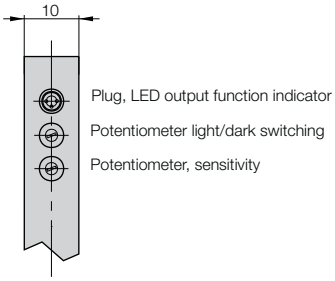
Fork sensors BGL

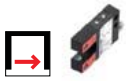
Connection, accessories

	BGL	BGL	
	180 mm	**220 mm**	
	114 mm	**114 mm**	
	BGL 180A-005-S49	BGL 220A-005-S49	
	BGL 180A-006-S49	BGL 220A-006-S49	
	10...30 V DC	10...30 V DC	
	≤ 35 mA	≤ 35 mA	
	200 mA	200 mA	
	Light/dark switching (selectable)	Light/dark switching (selectable)	
	Yes/Yes	Yes/Yes	
	Potentiometer, 270°	Potentiometer, 270°	
	Red light, pin point	Red light, pin point	
	640 nm	640 nm	
	0.6 mm	0.6 mm	
	60 µm	60 µm	
	≤ 0.2 mm	≤ 0.2 mm	
	Yellow LED	Yellow LED	
	0.1 ms	0.1 ms	
	5 kHz	5 kHz	
	IP 67	IP 67	
	–10...+60 °C	–10...+60 °C	
	EN 60947-5-2	EN 60947-5-2	
	GD-Zn	GD-Zn	
	Glass	Glass	
	M8 connector, 3-pin	M8 connector, 3-pin	

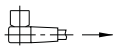






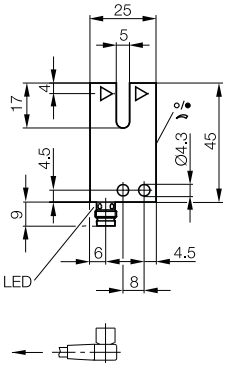


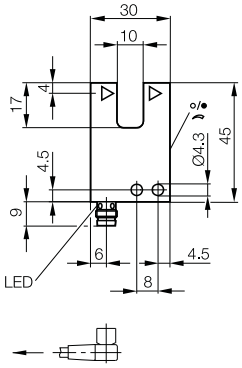
Series		**BGL**	**BGL**
Fork opening		**5 mm**	**10 mm**
Fork depth		**17 mm**	**17 mm**
PNP NO/NC	Part number	BGL 5A-007-S49	BGL 10A-007-S49
NPN NO/NC	Part number	BGL 5A-008-S49	BGL 10A-008-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		Infrared	Infrared
Wavelength		880 nm	880 nm
Resolution (smallest discernible part)		0.8 mm	0.8 mm
Repeat accuracy		0.1 mm	0.1 mm
Switching hysteresis		≤ 0.3 mm	≤ 0.3 mm
Power-on indicator		Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED
Response time		0.166 ms	0.166 ms
Switching frequency		3 kHz	3 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

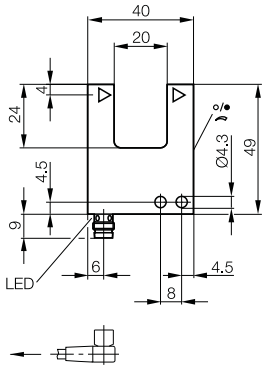
Ordering codes on pages 126-127.

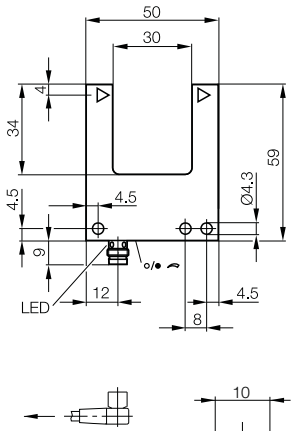
Connection and operating elements on page 118.

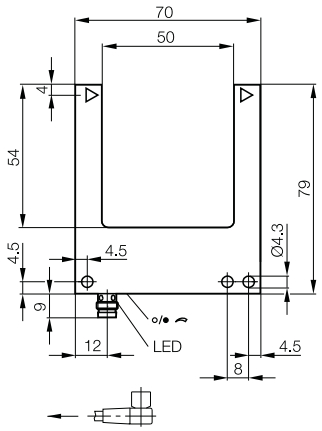


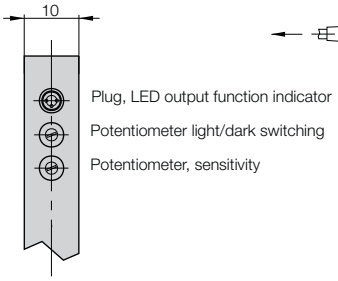


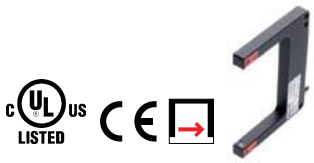
	BGL **20 mm** **24 mm**	BGL **30 mm** **34 mm**	BGL **50 mm** **54 mm**
	BGL 20A-007-S49	BGL 30A-007-S49	BGL 50A-007-S49
	BGL 20A-008-S49	BGL 30A-008-S49	BGL 50A-008-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 35 mA	≤ 35 mA	≤ 35 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	Infrared	Infrared	Infrared
	880 nm	880 nm	880 nm
	0.8 mm	0.8 mm	1 mm
	0.1 mm	0.1 mm	0.12 mm
	≤ 0.3 mm	≤ 0.3 mm	≤ 0.3 mm
	Green LED	Green LED	Green LED
	Yellow LED	Yellow LED	Yellow LED
	0.25 ms	0.25 ms	0.25 ms
	2 kHz	2 kHz	2 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin



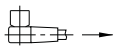






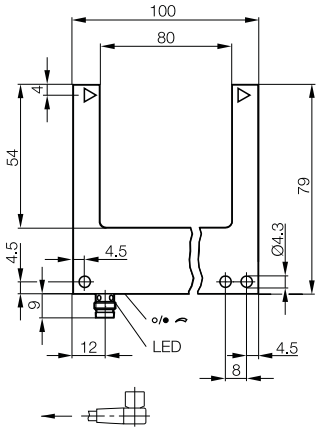


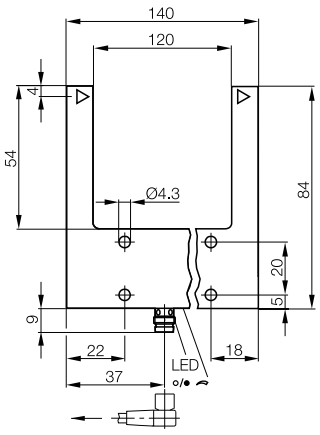
Series		**BGL**	**BGL**
Fork opening		**80 mm**	**120 mm**
Fork depth		**54 mm**	**54 mm**
PNP NO/NC	Part number	BGL 80A-007-S49	BGL 120A-007-S49
NPN NO/NC	Part number	BGL 80A-008-S49	BGL 120A-008-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		Infrared	Infrared
Wavelength		880 nm	880 nm
Resolution (smallest discernible part)		1.2 mm	1.5 mm
Repeat accuracy		0.15 mm	0.2 mm
Switching hysteresis		≤ 0.4 mm	≤ 0.5 mm
Power-on indicator		Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED
Response time		0.33 ms	0.5 ms
Switching frequency		2 kHz	1 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

Ordering codes on pages 126-127.

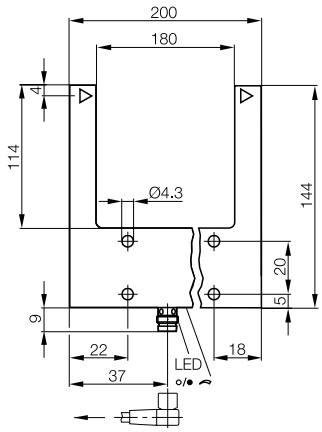
Connection and operating elements on page 118.

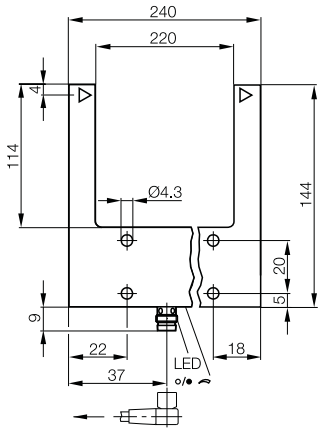


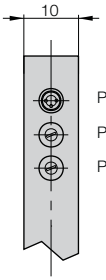


Fork sensors BGL
Connection, accessories

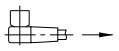
	BGL	BGL	
	180 mm	**220 mm**	
	114 mm	**114 mm**	
	BGL 180A-007-S49	BGL 220A-007-S49	
	BGL 180A-008-S49	BGL 220A-008-S49	
	10...30 V DC	10...30 V DC	
	≤ 35 mA	≤ 35 mA	
	200 mA	200 mA	
	Light/dark switching (selectable)	Light/dark switching (selectable)	
	Yes/Yes	Yes/Yes	
	Potentiometer, 270°	Potentiometer, 270°	
	Infrared	Infrared	
	880 nm	880 nm	
	1.5 mm	1.5 mm	
	0.2 mm	0.2 mm	
	≤ 0.5 mm	≤ 0.5 mm	
	Green LED	Green LED	
	Yellow LED	Yellow LED	
	0.25 ms	0.25 ms	
	2 kHz	2 kHz	
	IP 67	IP 67	
	–10...+60 °C	–10...+60 °C	
	EN 60947-5-2	EN 60947-5-2	
	GD-Zn	GD-Zn	
	Glass	Glass	
	M8 connector, 3-pin	M8 connector, 3-pin	





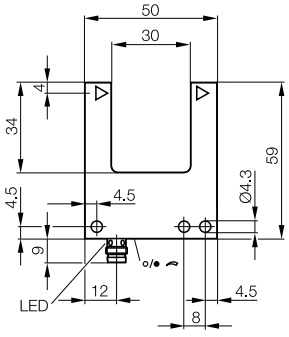


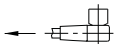
Series			**BGL**
Fork opening			**30 mm**
Fork depth			**34 mm**
PNP	NO/NC	Part number	BGL 30A-003-S49
NPN	NO/NC	Part number	BGL 30A-004-S49
Supply voltage U_B			10...30 V DC
No-load supply current I_0 max.			≤ 20 mA
Output current			200 mA
Switching type			Light/dark switching (selectable)
Polarity reversal/short-circuit protected			Yes/Yes
Settings			Potentiometer, 270°
Emitter, light type			Laser, red light
Wavelength			650 nm
Laser class			1
Resolution (smallest discernible part)			50 µm
Repeat accuracy			10 µm
Switching hysteresis			20 µm
Output function indicator			Yellow LED
Response time			0.1 ms
Switching frequency			5 kHz
Degree of protection as per IEC 60529			IP 67
Ambient temperature T_a			–10...+60 °C
Ambient light limit according to			EN 60947-5-2
Housing Material			GD-Zn
Optical surface			Glass
Connection			M8 connector, 3-pin


Connector orientation

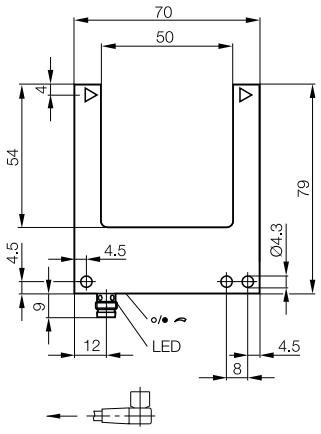
Ordering codes on pages 126-127.

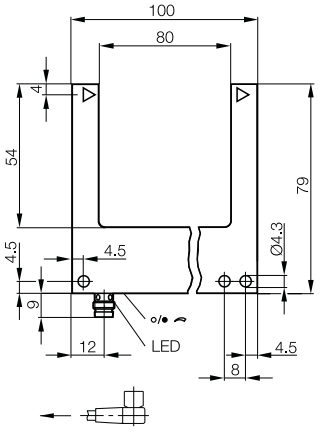
Connection and operating
elements on page 118.

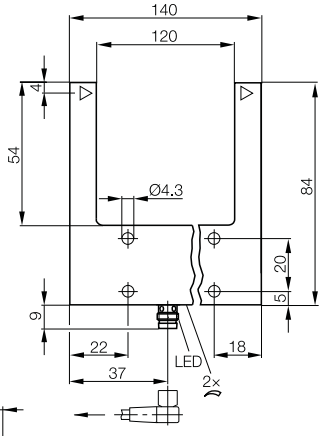


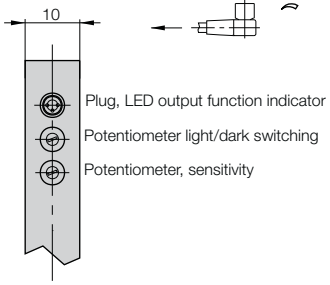


	BGL	BGL	BGL
	50 mm	**80 mm**	**120 mm**
	54 mm	**54 mm**	**54 mm**
	BGL 50A-003-S49	BGL 80A-003-S49	BGL 120A-003-S49
	BGL 50A-004-S49	BGL 80A-004-S49	BGL 120A-004-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 20 mA	≤ 20 mA	≤ 20 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	Laser, red light	Laser, red light	Laser, red light
	650 nm	650 nm	650 nm
	1	1	1
	80 µm	0.1 mm	0.15 mm
	10 µm	10 µm	10 µm
	25 µm	30 µm	50 µm
	Yellow LED	Yellow LED	Yellow LED
	0.1 ms	0.1 ms	0.1 ms
	5 kHz	5 kHz	5 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin

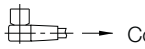






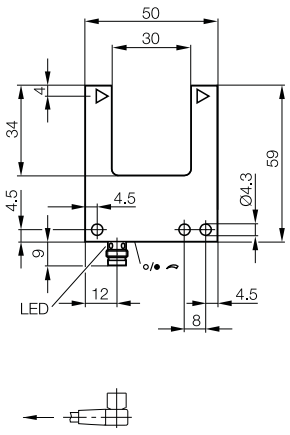


Series		**BGL**	
Fork opening		**30 mm**	
Fork depth		**34 mm**	
PNP NO/NC	Part number		
NPN NO/NC	Transparency detection	Part number	
PNP NO/NC		Part number	BGL 30A-011-S49
NPN NO/NC	Fluid detection	Part number	BGL 30A-012-S49
Supply voltage U_B		10...30 V DC	
No-load supply current I_0 max.		≤ 35 mA	
Output current		200 mA	
Switching type		Light/dark switching (selectable)	
Polarity reversal/short-circuit protected		Yes/Yes	
Settings		Potentiometer, 270°	
Emitter, light type		Infrared	
Wavelength		1480 nm	
Resolution (smallest discernible part)		0.6 mm	
Repeat accuracy		0.1 mm	
Switching hysteresis		≤ 0.2 mm	
Power-on indicator		Green LED	
Output function indicator		Yellow LED	
Response time		0.25 ms	
Switching frequency		2 kHz	
Degree of protection as per IEC 60529		IP 67	
Ambient temperature T_a		–10...+60 °C	
Ambient light limit according to		EN 60947-5-2	
Housing Material		GD-Zn	
Optical surface		Glass	
Connection		M8 connector, 3-pin	

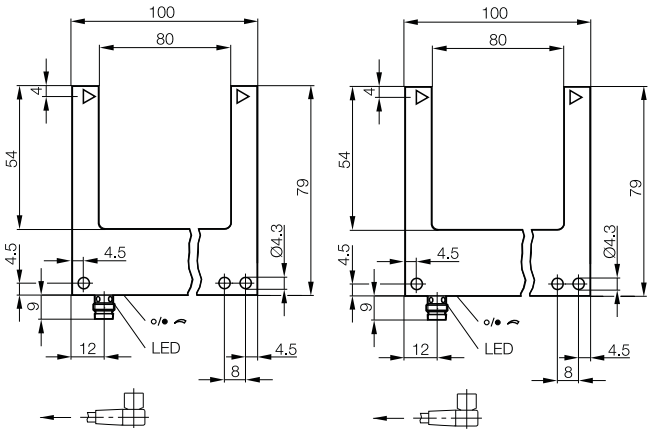

Connector orientation

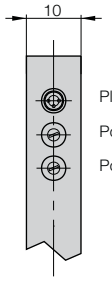
Ordering codes on pages 126-127.

Connection and operating elements on page 118.



	BGL	**BGL**		
	80 mm	**80 mm**		
	54 mm	**54 mm**		
		BGL 80A-009-S49		
		BGL 80A-010-S49		
	BGL 80A-011-S49			
	BGL 80A-012-S49			
	10...30 V DC	10...30 V DC		
	≤ 35 mA	≤ 20 mA		
	200 mA	200 mA		
	Light/dark switching (selectable)	Light/dark switching (selectable)		
	Yes/Yes	Yes/Yes		
	Potentiometer, 270°	Potentiometer, 270°		
	Infrared	Laser, red light		
	1480 nm	650 nm		
	0.8 mm	50 µm		
	0.1 mm	10 µm		
	≤ 0.2 mm	30 µm		
	Green LED			
	Yellow LED	Yellow LED		
	0.25 ms	0.1 ms		
	2 kHz	5 kHz		
	IP 67	IP 67		
	–10...+60 °C	–10...+60 °C		
	EN 60947-5-2	EN 60947-5-2		
	GD-Zn	GD-Zn		
	Glass	Glass		
	M8 connector, 3-pin	M8 connector, 3-pin		



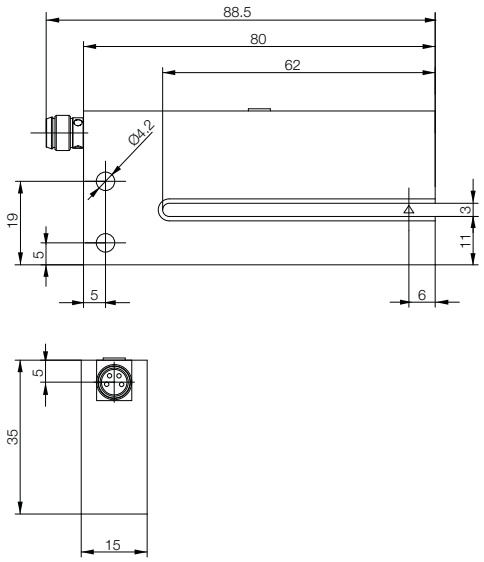


Plug, LED output function indicator
Potentiometer light/dark switching
Potentiometer, sensitivity

Fork sensors BGL for label detection

Series			**BGL for label detection**	**BGL for label detection**
Fork opening			**3 mm**	**3 mm**
Fork depth			**62 mm**	**62 mm**
PNP/NPN	NO/	**Order code**	**BGL003Y**	**BGL003Z**
Push/Pull	NC	Part number	BGL 3D-002-S75	BGL 3D-001-S75
Supply voltage U_S			10...30 V DC	10...30 V DC
No-load supply current I_0 max.			≤ 40 mA	≤ 40 mA
Output current			200 mA	200 mA
Switching type			Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected			Yes/Yes	Yes/Yes
Emitter, light type			Infrared	Infrared
Wavelength			880 Nm	880 Nm
Resolution (smallest discernible part)			**0.5 mm**	**1 mm**
Repeat accuracy			50 µs	50 µs
Switching hysteresis			< 0.4 mm	< 0.4 mm
Power-on indicator			Green LED	Green LED
Function principle			Unclocked	Unclocked
Switching frequency			10 kHz	10 kHz
Sensitivity setting			**Multiple potentiometer**	**Teach via button/ ext. input**
Degree of protection as per IEC 60529			IP 65	IP 65
Ambient temperature T_a			–10...+60 °C	–10...+60 °C
Permissible ambient light			3000 lux	3000 lux
Housing Material			Anodized aluminum	Anodized aluminum
Connection			M8 connector, 4-pin	M8 connector, 4-pin

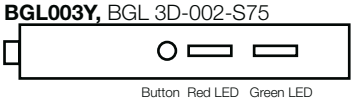
Connection and operating elements on page 118.



Fork sensors BGL for label detection
Setting instructions, connection

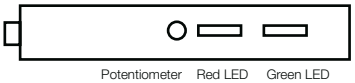
Setting

BGL003Y, BGL 3D-002-S75



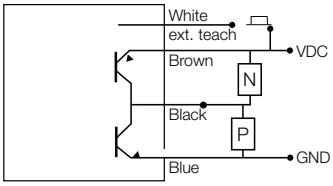
1. Insert labels, press button briefly (or external: min. 50 ms)	Red LED begins to flash, regardless of whether or not the button is still pressed. Teach process begins.
2. Transport label carrier web through the sensor, at least 3 labels	Teach process continues
3. Briefly press button, (or external: min. 50 ms)	Teach process is ended
4. If there is no object detection,	The red LED flashes quickly
5. After object detection	Green LED illuminates without label

BGL003Z, BGL 3D-001-S75

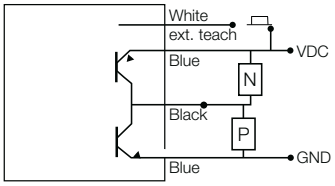


1. Insert label carrier
2. Turn potentiometer to the left, until red LED lights up
3. Turn potentiometer to the right, until green LED illuminates
4. Turn potentiometer another 1 to 3 revolutions turn to the right
5. After object detection:
   - Red LED illuminates with label
   - Green LED illuminates without label

Wiring diagrams



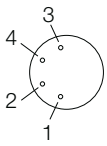
PNP: light switching
NPN: dark switching



PNP: dark switching
NPN: light switching

Connection configuration

1	(brown	VDC (GND)
2	(white)	ext. teach
3	(blue)	GND (VDC)
4	(black)	Signal output



Suitable connector
(please order separately)

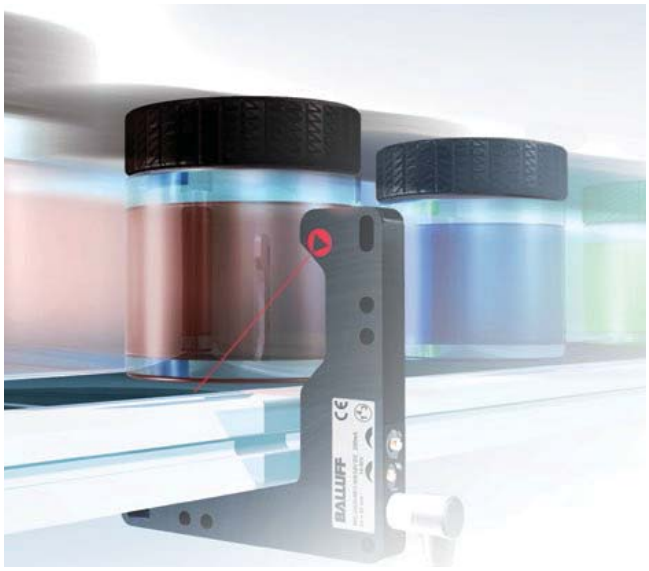
Size	Design	Cable material	Color	Length	Ordering code
M8, 4-pin	Straight	PVC	Yellow	2 m	**BCC0542**
M8, 4-pin	Straight	TPE	Yellow	2 m	**BCC053U**
M8, 4-pin	Angled	PVC	Yellow	2 m	**BCC059W**
M8, 4-pin	Angled	TPE	Yellow	2 m	**BCC0AN6**

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.**

BWL standard angle sensors are needed whenever space is too tight for fork sensors. The design and beam geometry allow objects to be approached and scanned from almost any direction, while red light and laser variants ensure versatile use.

Applications
- Assembly and handling technology
- Robotic systems
- Position and location control

Benefits
- High accuracy
- Visible light spot for easy alignment
- Can be installed even in tight mounting conditions



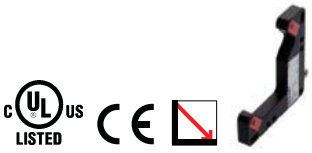
The Balluff angle sensor **BWL Robust** is a powerful photoelectric sensor designed for harsh industrial use. Its housing is tough and allows for variable mounting options.
Objects are reliably detected, even under extremely difficult conditions.
A strong infrared emitter ensures a large function reserve and various designs allow for flexible use, allowing the creation of elegant solutions for a vast number of applications.

Applications
- Robotic systems
- Position and location control

Type		Optical axis	Resolution	Light type				Output		Switching type		Switching frequency	U_S	Connection		Page
■ Ordering code □ Part number				Infrared	Red light	Red light, pin point	Laser	PNP	NPN	Light switching	Dark switching		10...30 V DC	M8 plug, 3-pin	M12 connector, 4-pin	
Angle sensors Standard																
BWL000F	BWL 4040D-R011-S49	40/40 mm	0.4 mm		■			■		■	■	1.5 kHz	■	■		148
BWL000H	BWL 4040D-R012-S49	40/40 mm	0.4 mm		■				■	■	■	1.5 kHz	■	■		148
BWL000J	BWL 4040D-R013-S49	40/40 mm	0.3 mm			■		■		■	■	5 kHz	■	■		150
BWL000K	BWL 4040D-R014-S49	40/40 mm	0.3 mm			■			■	■	■	5 kHz	■	■		150
BWL0009	BWL 4040D-I011-S49	40/40 mm	1.0 mm	■				■		■	■	2 kHz	■	■		152
BWL000A	BWL 4040D-I012-S49	40/40 mm	1.0 mm	■						■	■	2 kHz	■	■		152
BWL000C	BWL 4040D-L011-S49	40/40 mm	80 µm				■	■		■	■	5 kHz	■	■		154
BWL000E	BWL 4040D-L012-S49	40/40 mm	80 µm				■		■	■	■	5 kHz	■	■		154

Angle sensors BWL
Product overview

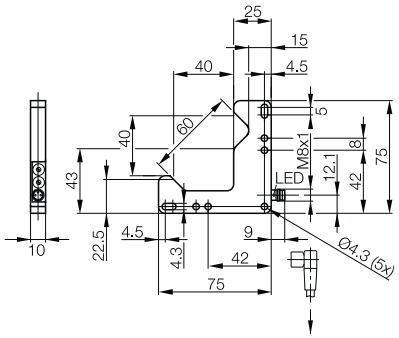
Type Ordering code Part number		Optical axis	Resolution	Light type				Output		Switching type		Switching frequency	U_S	Connection		Page
				Infrared	Red light	Red light, pin point	Laser	PNP	NPN	Light switching	Dark switching		10...30 V DC	M8 plug, 3-pin	M12 connector, 4-pin	
Angle sensors Standard																
BWL000R	BWL 5454D-R011-S49	54/54 mm	0.4 mm		■			■		■	■	1.5 kHz	■	■		148
BWL000T	BWL 5454D-R012-S49	54/54 mm	0.4 mm		■				■	■	■	1.5 kHz	■	■		148
BWL000U	BWL 5454D-R013-S49	54/54 mm	0.4 mm			■		■		■	■	5 kHz	■	■		150
BWL000W	BWL 5454D-R014-S49	54/54 mm	0.4 mm			■			■	■	■	5 kHz	■	■		150
BWL000L	BWL 5454D-I011-S49	54/54 mm	1.2 mm	■				■		■	■	2 kHz	■	■		152
BWL000M	BWL 5454D-I012-S49	54/54 mm	1.2 mm	■					■	■	■	2 kHz	■	■		152
BWL000N	BWL 5454D-L011-S49	54/54 mm	100 µm				■	■		■	■	5 kHz	■	■		154
BWL000P	BWL 5454D-L012-S49	54/54 mm	100 µm				■		■	■	■	5 kHz	■	■		154
BWL0012	BWL 6868D-R011-S49	68/68 mm	0.5 mm		■			■		■	■	1.5 kHz	■	■		149
BWL0013	BWL 6868D-R012-S49	68/68 mm	0.5 mm		■				■	■	■	1.5 kHz	■	■		149
BWL001N	BWL 6868D-R013-S49	68/68 mm	0.4 mm			■		■		■	■	5 kHz	■	■		151
BWL0014	BWL 6868D-R014-S49	68/68 mm	0.4 mm			■			■	■	■	5 kHz	■	■		151
BWL000Y	BWL 6868D-I011-S49	68/68 mm	1.5 mm	■				■		■	■	2 kHz	■	■		153
BWL000Z	BWL 6868D-I012-S49	68/68 mm	1.5 mm	■					■	■	■	2 kHz	■	■		153
BWL0010	BWL 6868D-L011-S49	68/68 mm	120 µm				■	■		■	■	5 kHz	■	■		155
BWL0011	BWL 6868D-L012-S49	68/68 mm	120 µm				■		■	■	■	5 kHz	■	■		155
BWL0019	BWL 9090D-R011-S49	90/90 mm	0.6 mm		■			■		■	■	1.5 kHz	■	■		149
BWL001A	BWL 9090D-R012-S49	90/90 mm	0.6 mm		■				■	■	■	1.5 kHz	■	■		149
BWL001C	BWL 9090D-R013-S49	90/90 mm	0.5 mm			■		■		■	■	5 kHz	■	■		151
BWL001E	BWL 9090D-R014-S49	90/90 mm	0.5 mm			■			■	■	■	5 kHz	■	■		151
BWL0015	BWL 9090D-I011-S49	90/90 mm	1.5 mm	■				■		■	■	1 kHz	■	■		154
BWL0016	BWL 9090D-I012-S49	90/90 mm	1.5 mm	■					■	■	■	1 kHz	■	■		154
BWL0017	BWL 9090D-L011-S49	90/90 mm	150 µm				■	■		■	■	5 kHz	■	■		155
BWL0018	BWL 9090D-L012-S49	90/90 mm	150 µm				■		■	■	■	5 kHz	■	■		155
BWL0005	BWL 110110D-R011-S49	110/110 mm	0.6 mm		■			■		■	■	1.5 kHz	■	■		149
BWL0006	BWL 110110D-R012-S49	110/110 mm	0.6 mm		■				■	■	■	1.5 kHz	■	■		149
BWL0007	BWL 110110D-R013-S49	110/110 mm	0.6 mm			■		■		■	■	5 kHz	■	■		151
BWL0008	BWL 110110D-R014-S49	110/110 mm	0.6 mm			■			■	■	■	5 kHz	■	■		151
BWL0001	BWL 110110D-I011-S49	110/110 mm	1.5 mm	■				■		■	■	2 kHz	■	■		154
BWL0002	BWL 110110D-I012-S49	110/110 mm	1.5 mm	■					■	■	■	2 kHz	■	■		154
BWL0003	BWL 110110D-L011-S49	110/110 mm	0.2 mm				■	■		■	■	5 kHz	■	■		155
BWL0004	BWL 110110D-L012-S49	110/110 mm	0.2 mm				■		■	■	■	5 kHz	■	■		155

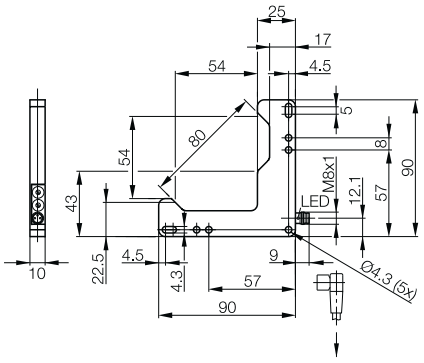


Series		**BWL**	**BWL**
Optical axis		**40/40 mm**	**54/54**
PNP NO/NC	Part number	BWL 4040D-R011-S49	BWL 5454D-R011-S49
NPN NO/NC	Part number	BWL 4040D-R012-S49	BWL 5454D-R012-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		LED, red light	LED, red light
Wavelength		640 nm	640 nm
Resolution (smallest discernible part)		0.4 mm	0.4 mm
Repeat accuracy		40 µm	60 µm
Switching hysteresis		≤ 0.15 mm	≤ 0.2 mm
Output function indicator		Yellow LED	Yellow LED
Response time		0.33 ms	0.33 ms
Switching frequency		1.5 kHz	1.5 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin

Ordering codes on pages 146-147.

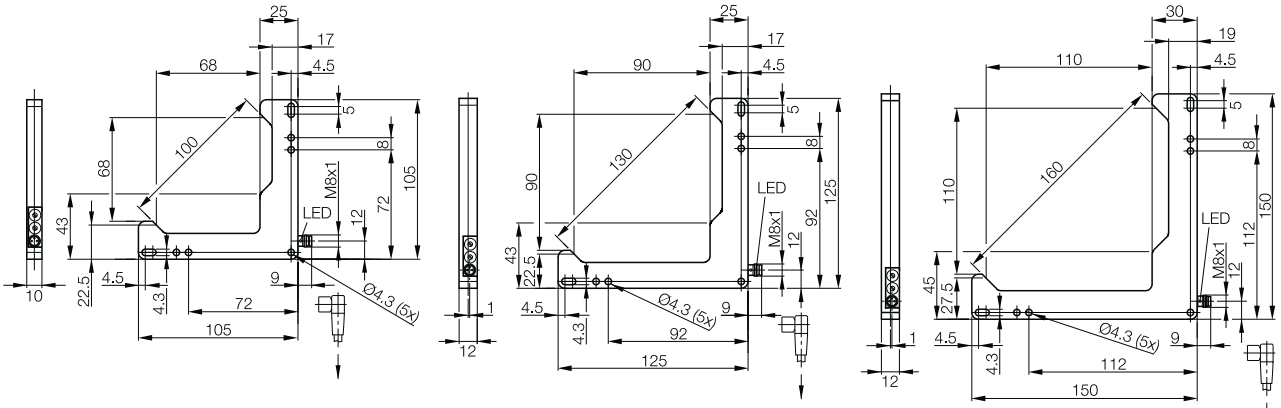
Connection and operating elements on page 118.

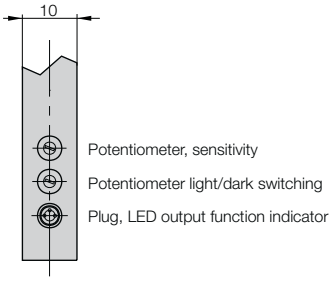




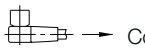
Angle sensors BWL
68/68 mm, 90/90 mm, 110/110 mm

	BWL	BWL	BWL
	68/68 mm	**90/90 mm**	**110/110 mm**
	BWL 6868D-R011-S49	BWL 9090D-R011-S49	BWL 110110D-R011-S49
	BWL 6868D-R012-S49	BWL 9090D-R012-S49	BWL 110110D-R012-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 35 mA	≤ 35 mA	≤ 35 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	LED, red light	LED, red light	LED, red light
	640 nm	640 nm	640 nm
	0.5 mm	0.6 mm	0.6 mm
	80 µm	80 µm	80 µm
	≤ 0.2 mm	≤ 0.2 mm	≤ 0.2 mm
	Yellow LED	Yellow LED	Yellow LED
	0.33 ms	0.33 ms	0.33 ms
	1.5 kHz	1.5 kHz	1.5 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin



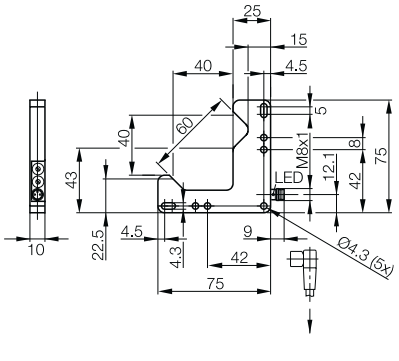


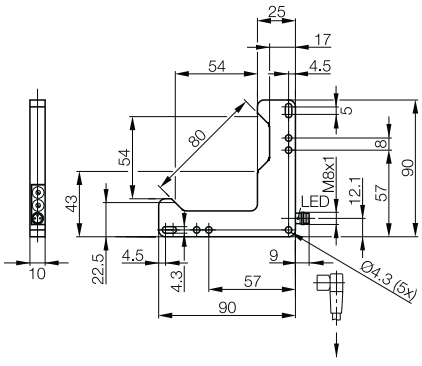
Series		**BWL**	**BWL**
Optical axis		**40/40 mm**	**54/54**
PNP NO/NC	Part number	BWL 4040D-R013-S49	BWL 5454D-R013-S49
NPN NO/NC	Part number	BWL 4040D-R014-S49	BWL 5454D-R014-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		Red light, pin point	Red light, pin point
Wavelength		640 nm	640 nm
Resolution (smallest discernible part)		0.3 mm	0.4 mm
Repeat accuracy		30 µm	40 µm
Switching hysteresis		≤ 0.1 mm	≤ 0.15 mm
Output function indicator		Yellow LED	Yellow LED
Response time		0.1 ms	0.1 ms
Switching frequency		5 kHz	5 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

Ordering codes on pages 146-147.

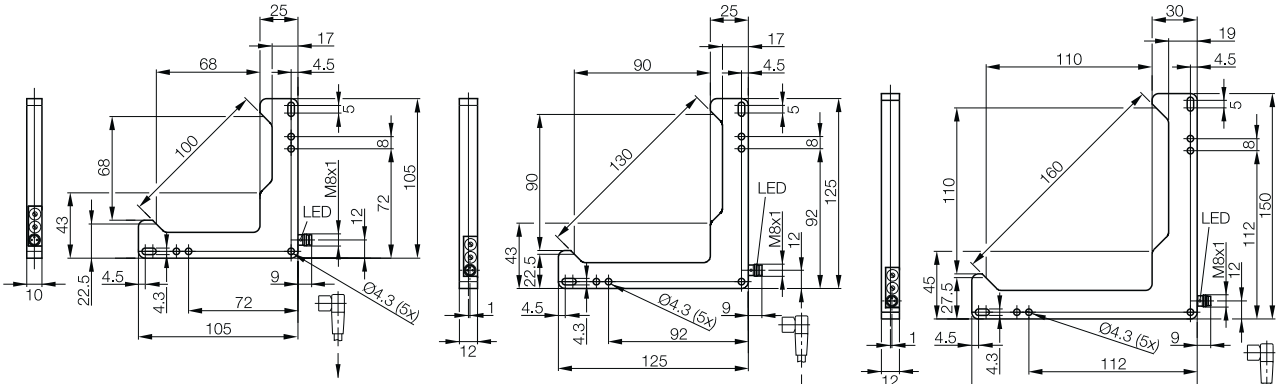
Connection and operating elements on page 118.

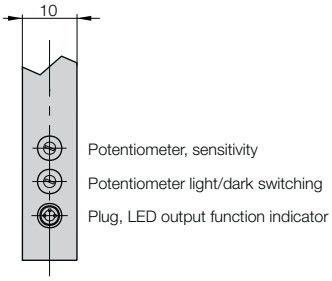




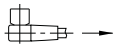
Angle sensors BWL
68/68 mm, 90/90 mm, 110/110 mm

	BWL	BWL	BWL
	68/68 mm	**90/90 mm**	**110/110 mm**
	BWL 6868D-R013-S49	BWL 9090D-R013-S49	BWL 110110D-R013-S49
	BWL 6868D-R014-S49	BWL 9090D-R014-S49	BWL 110110D-R014-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 35 mA	≤ 35 mA	≤ 35 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	Red light, pin point	Red light, pin point	Red light, pin point
	640 nm	640 nm	640 nm
	0.4 mm	0.5 mm	0.6 mm
	40 µm	50 µm	60 µm
	≤ 0.15 mm	≤ 0.15 mm	≤ 0.2 mm
	Yellow LED	Yellow LED	Yellow LED
	0.1 ms	0.1 ms	0.1 ms
	5 kHz	5 kHz	5 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin



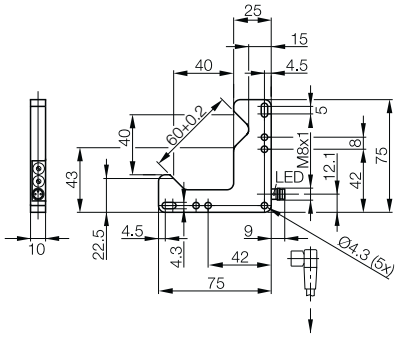


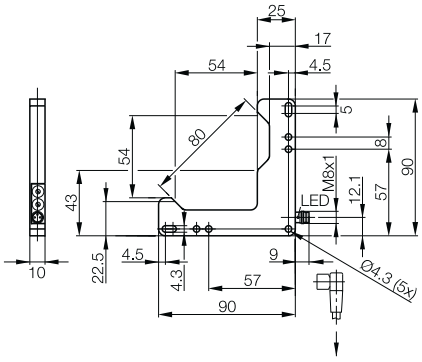
Series		**BWL**	**BWL**
Optical axis		**40/40 mm**	**54/54**
PNP NO/NC	Part number	BWL 4040D-I011-S49	BWL 5454D-I011-S49
NPN NO/NC	Part number	BWL 4040D-I012-S49	BWL 5454D-I012-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 35 mA	≤ 35 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		Infrared	Infrared
Wavelength		880 nm	880 nm
Resolution (smallest discernible part)		1 mm	1.2 mm
Repeat accuracy		0.12 mm	0.15 mm
Switching hysteresis		≤ 0.3 mm	≤ 0.4 mm
Operating function indicator		Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED
Response time		0.25 ms	0.25 ms
Switching frequency		2 kHz	2 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin


Connector orientation

Ordering codes on pages 146-147.

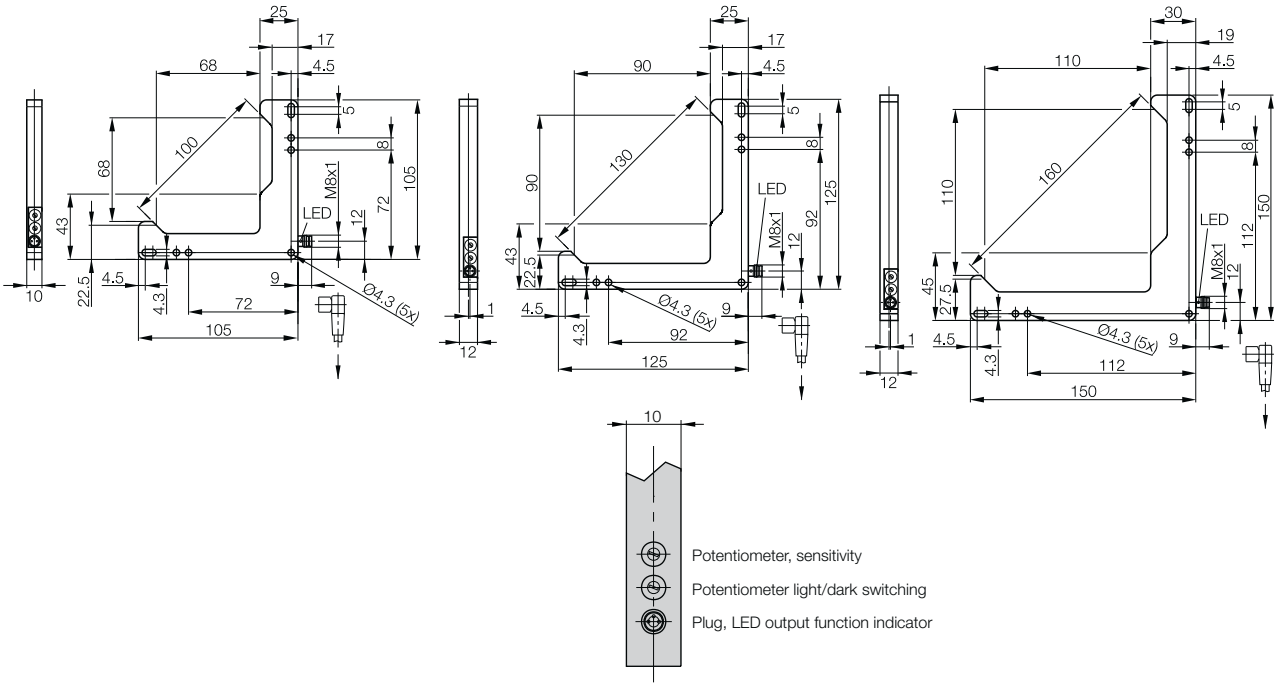
Connection and operating elements on page 118.

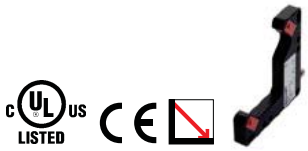




Angle sensors BWL
68/68 mm, 90/90 mm, 110/110 mm

	BWL	BWL	BWL
	68/68 mm	**90/90 mm**	**110/110 mm**
	BWL 6868D-I011-S49	BWL 9090D-I011-S49	BWL 110110D-I011-S49
	BWL 6868D-I012-S49	BWL 9090D-I012-S49	BWL 110110D-I012-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 35 mA	≤ 35 mA	≤ 35 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	Infrared	Infrared	Infrared
	880 nm	880 nm	880 nm
	1.5 mm	1.5 mm	1.5 mm
	0.2 mm	0.2 mm	0.2 mm
	≤ 0.5 mm	≤ 0.5 mm	≤ 0.5 mm
	Green LED	Green LED	Green LED
	Yellow LED	Yellow LED	Yellow LED
	0.25 ms	0.33 ms	0.25 ms
	2 kHz	1 kHz	2 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin

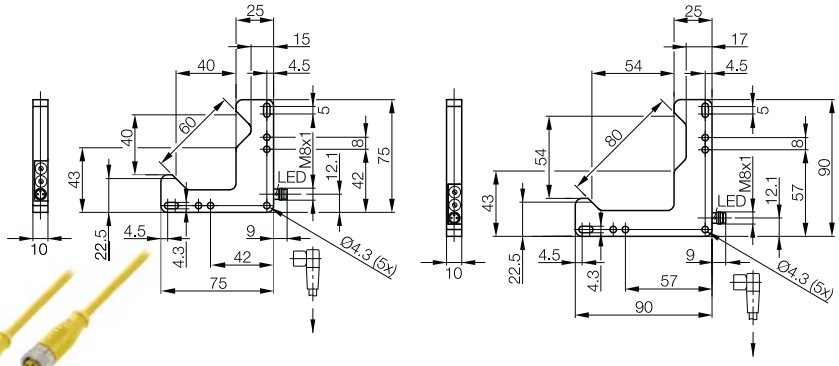




Series		**BWL**	**BWL**
Optical axis		**40/40 mm**	**54/54 mm**
PNP NO/NC	Part number	BWL 4040D-L011-S49	BWL 5454D-L011-S49
NPN NO/NC	Part number	BWL 4040D-L012-S49	BWL 5454D-L012-S49
Supply voltage U_B		10...30 V DC	10...30 V DC
No-load supply current I_0 max.		≤ 20 mA	≤ 20 mA
Output current		200 mA	200 mA
Switching type		Light/dark switching (selectable)	Light/dark switching (selectable)
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Settings		Potentiometer, 270°	Potentiometer, 270°
Emitter, light type		Laser, red light	Laser
Wavelength		640 nm	640 nm
Laser class		1	1
Resolution (smallest discernible part)		80 µm	100 µm
Repeat accuracy		≤ 10 µm	10 µm
Switching hysteresis		≤ 25 µm	≤ 35 µm
Output function indicator		Yellow LED	Yellow LED
Response time		0.1 ms	0.1 ms
Switching frequency		5 kHz	5 kHz
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Ambient light limit according to		EN 60947-5-2	EN 60947-5-2
Housing Material		GD-Zn	GD-Zn
Optical surface		Glass	Glass
Connection		M8 connector, 3-pin	M8 connector, 3-pin

Ordering codes on pages 146-147.

Connection and operating elements on page 118.



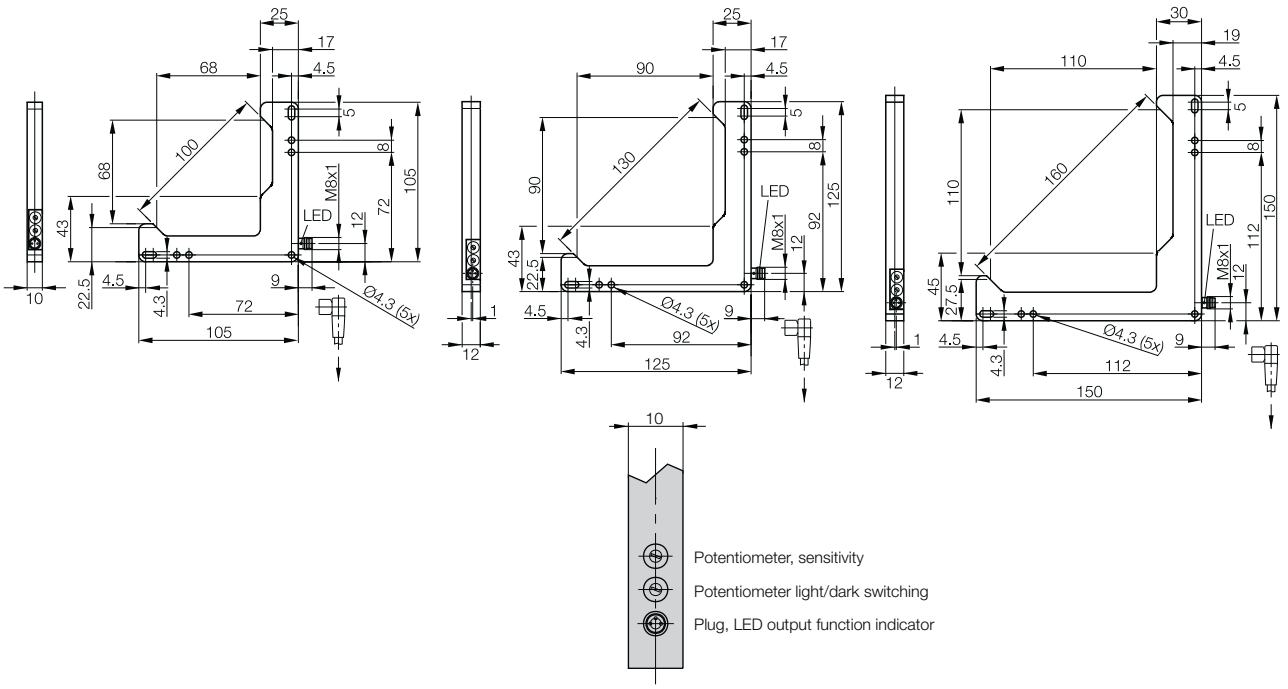
Suitable connector
(please order separately)

Size	Design	Cable material	Color	Length	Ordering code
M8, 3-pin	Straight	PVC	Yellow	2 m	**BCC050Y**
M8, 3-pin	Straight	TPE	Yellow	2 m	**BCC050L**
M8, 3-pin	Angled	PVC	Yellow	2 m	**BCC055N**
M8, 3-pin	Angled	TPE	Yellow	2 m	**BCC0555**

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.**

Angle sensors BWL
68/68 mm, 90/90 mm, 110/110 mm

	BWL	BWL	BWL
	68/68 mm	**90/90 mm**	**110/110 mm**
	BWL 6868D-L011-S49	BWL 9090D-L011-S49	BWL 110110D-L011-S49
	BWL 6868D-L012-S49	BWL 9090D-L012-S49	BWL 110110D-L012-S49
	10...30 V DC	10...30 V DC	10...30 V DC
	≤ 20 mA	≤ 20 mA	≤ 20 mA
	200 mA	200 mA	200 mA
	Light/dark switching (selectable)	Light/dark switching (selectable)	Light/dark switching (selectable)
	Yes/Yes	Yes/Yes	Yes/Yes
	Potentiometer, 270°	Potentiometer, 270°	Potentiometer, 270°
	Laser	Laser	Laser
	640 nm	640 nm	640 nm
	1	1	1
	120 µm	150 µm	0.2 mm
	≤ 15 µm	≤ 15 µm	≤ 20 µm
	≤ 40 µm	≤ 50 µm	≤ 70 µm
	Yellow LED	Yellow LED	Yellow LED
	0.1 ms	0.1 ms	0.1 ms
	5 kHz	5 kHz	5 kHz
	IP 67	IP 67	IP 67
	–10...+60 °C	–10...+60 °C	–10...+60 °C
	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
	GD-Zn	GD-Zn	GD-Zn
	Glass	Glass	Glass
	M8 connector, 3-pin	M8 connector, 3-pin	M8 connector, 3-pin



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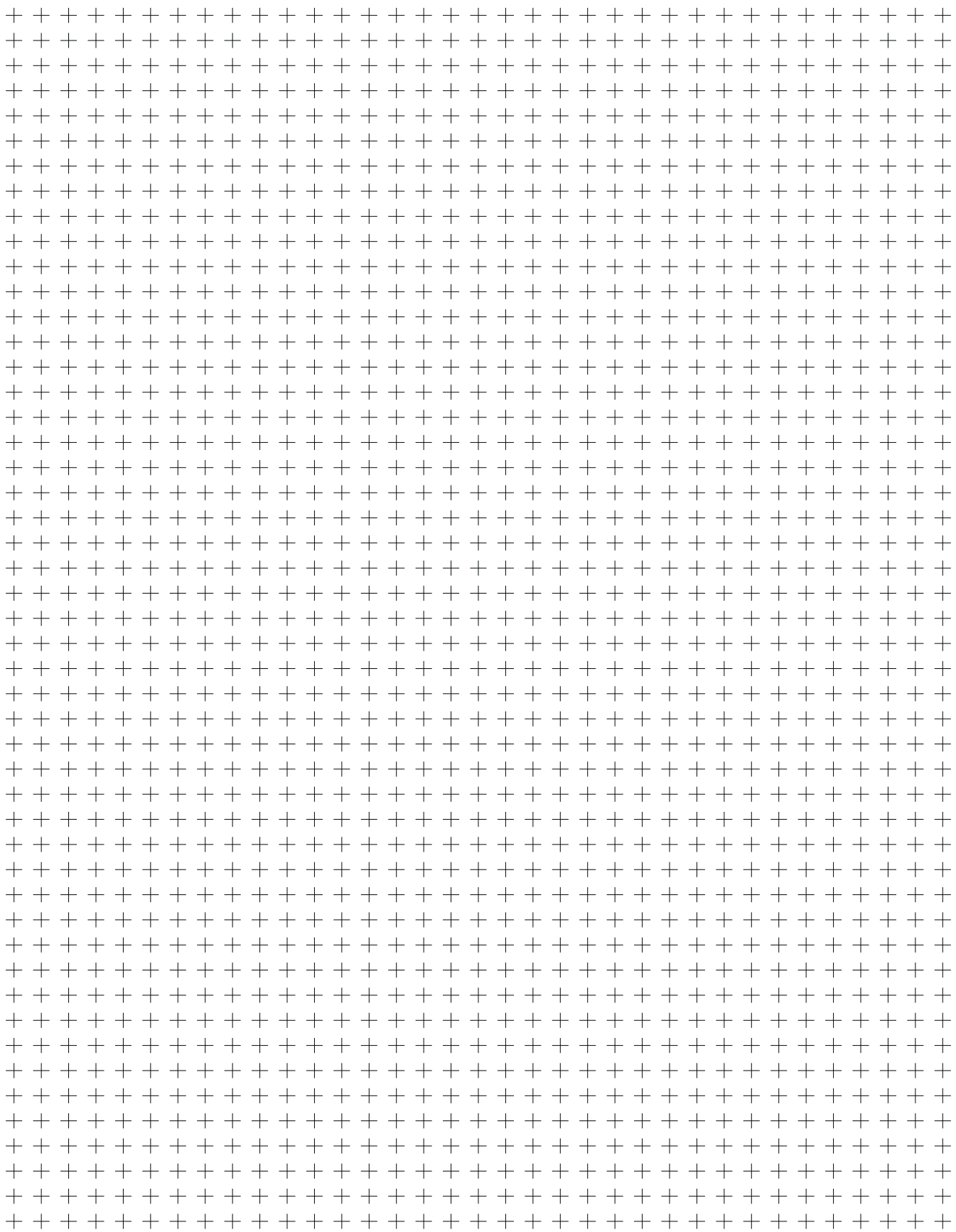

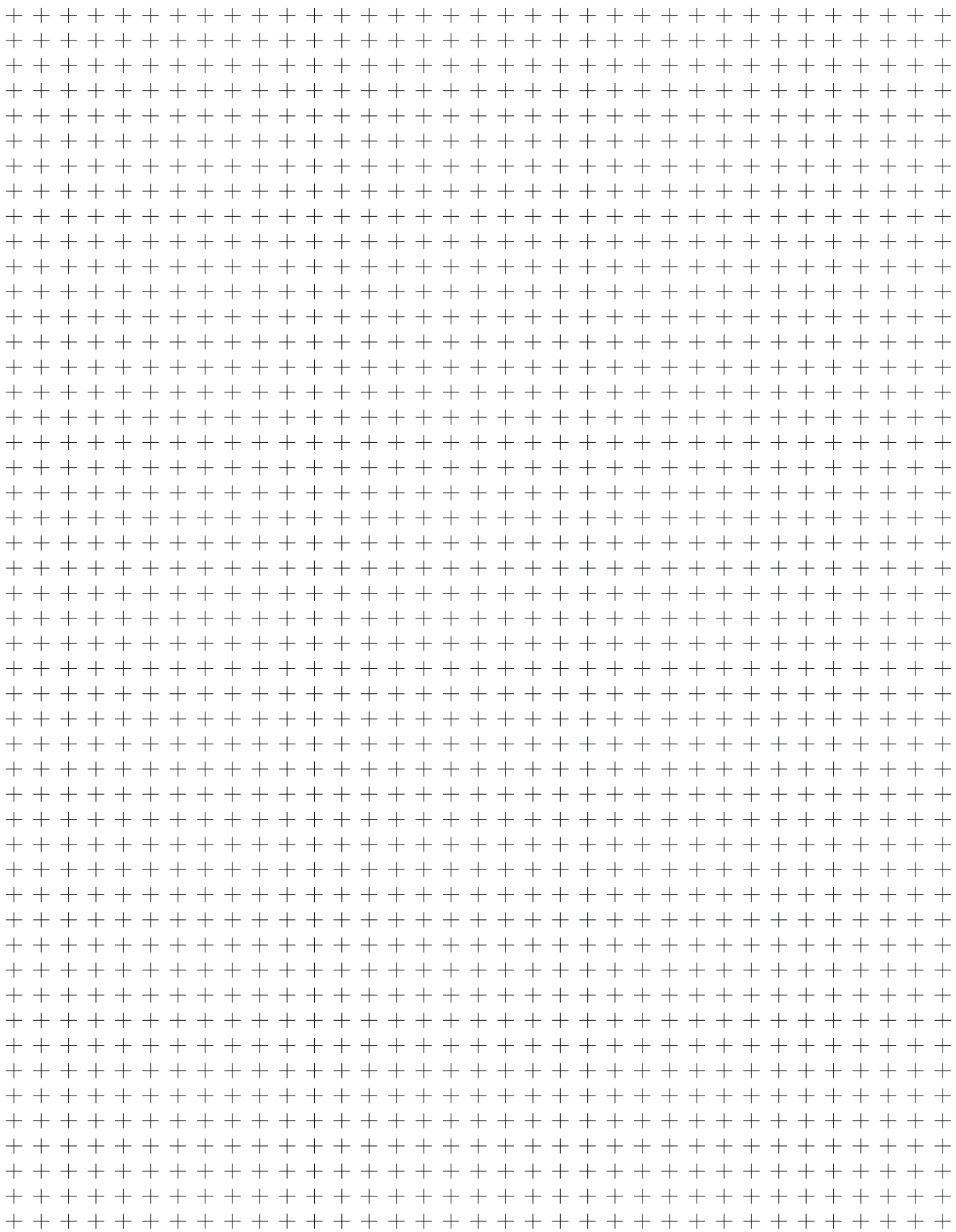

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