

Photoelectric Special Sensors

Angle sensors BWL

Product overview



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

Contrast sensor

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

Light grids

Photoelectric distance sensors for analog distance measurement

Special accessories for photoelectric sensors

Type	Optical axis	Resolu- tion	Light type				Output		Switching type		Switch- ing fre- quency	U _s	Connec- tion		Page
			Infrared	Red light	Red light, pin point	Laser	PNP transistor		Light switching	Dark switching			10...30V DC	M8 plug, 3-pin	
Angle sensors Standard															
BWL000F	BWL 4040D-R011-S49	40/40 mm	0.4 mm	■				■		■	■	1.5 kHz	■	■	336
BWL000J	BWL 4040D-R013-S49	40/40 mm	0.3 mm		■			■		■	■	5 kHz	■	■	338
BWL000C	BWL 4040D-L011-S49	40/40 mm	80 μm				■	■		■	■	5 kHz	■	■	342
BWL0009	BWL 4040D-I011-S49	40/40 mm	1.0 mm	■				■		■	■	2 kHz	■	■	340
BWL000R	BWL 5454D-R011-S49	54/54 mm	0.4 mm		■			■		■	■	1.5 kHz	■	■	336
BWL000U	BWL 5454D-R013-S49	54/54 mm	0.4 mm			■		■		■	■	5 kHz	■	■	338
BWL000N	BWL 5454D-L011-S49	54/54 mm	100 μm				■	■		■	■	5 kHz	■	■	342
BWL000L	BWL 5454D-I011-S49	54/54 mm	1.2 mm	■				■		■	■	2 kHz	■	■	340
BWL0012	BWL 6868D-R011-S49	68/68 mm	0.5 mm		■			■		■	■	1.5 kHz	■	■	337
BWL001N	BWL 6868D-R013-S49	68/68 mm	0.4 mm			■		■		■	■	5 kHz	■	■	339
BWL0010	BWL 6868D-L011-S49	68/68 mm	120 μm				■	■		■	■	5 kHz	■	■	343
BWL000Y	BWL 6868D-I011-S49	68/68 mm	1.5 mm	■				■		■	■	2 kHz	■	■	341
BWL0019	BWL 9090D-R011-S49	90/90 mm	0.6 mm		■			■		■	■	1.5 kHz	■	■	337
BWL001C	BWL 9090D-R013-S49	90/90 mm	0.5 mm			■		■		■	■	5 kHz	■	■	339
BWL0017	BWL 9090D-L011-S49	90/90 mm	150 μm				■	■		■	■	5 kHz	■	■	343
BWL0015	BWL 9090D-I011-S49	90/90 mm	1.5 mm	■				■		■	■	1 kHz	■	■	341
BWL0005	BWL 110110D-R011-S49	110/110 mm	0.6 mm		■			■		■	■	1.5 kHz	■	■	337
BWL0007	BWL 110110D-R013-S49	110/110 mm	0.6 mm			■		■		■	■	5 kHz	■	■	339
BWL0003	BWL 110110D-L011-S49	110/110 mm	0.2 mm				■	■		■	■	5 kHz	■	■	343
BWL0001	BWL 110110D-I011-S49	110/110 mm	1.5 mm	■				■		■	■	2 kHz	■	■	341
Angle sensors Automotive															
BWL001F	BWL 2222B-001-S4	22/22 mm		■				■		■	■	1 kHz	■	■	344
BWL001H	BWL 2222C-001-S4	22/22 mm		■				■		■	■	1 kHz	■	■	344
BWL001J	BWL 4241A-001-S4	43/43 mm		■				■		■	■	1 kHz	■	■	345
BWL001K	BWL 4241A-001-S49	43/43 mm		■				■		■	■	1 kHz	■	■	345
BWL001L	BWL 4260A-001-S4	42/62 mm		■				■		■	■	1 kHz	■	■	345
BWL001M	BWL 4260A-001-S49	42/62 mm		■				■		■	■	1 kHz	■	■	345

NPN on request

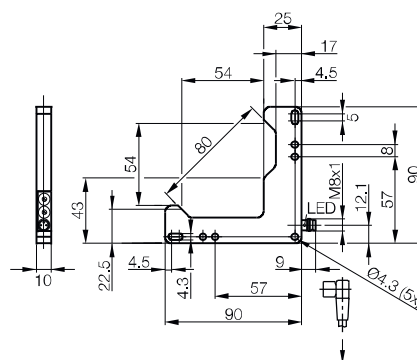
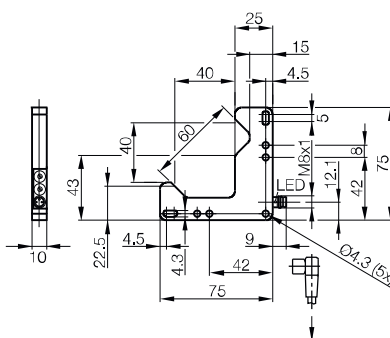
Photoelectric Special Sensors
Angle sensors BWL
40/40 mm, 54/54 mm

Angle Sensors Red light



Series	BWL	BWL
Optical axis	40/40 mm	54/54
PNP NO/NC	Ordering code	BWL000F
	Part number	BWL 4040D-R011-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 μ m	60 μ m
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
Material	Housing GD-Zn	GD-Zn
	Optical surface Glass	Glass
Connection	M8 connector, 3-pin	M8 connector, 3-pin

Connector orientation



Photoelectric Special Sensors

Angle sensors BWL

68/68 mm, 90/90 mm, 110/110 mm



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

Contrast sensor

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

Light grids

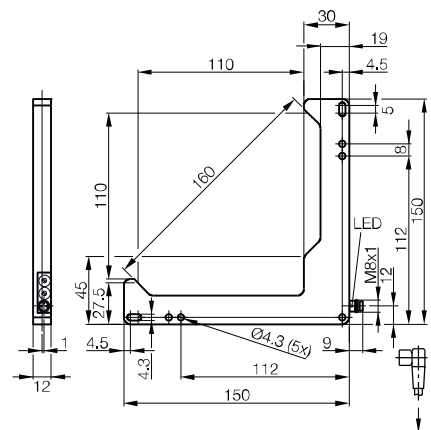
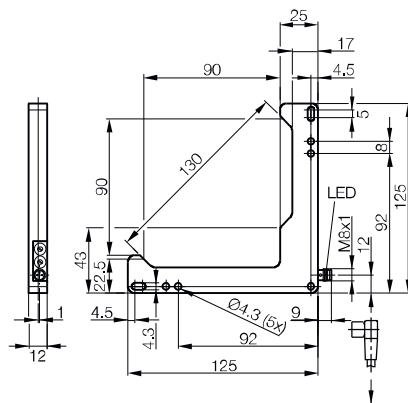
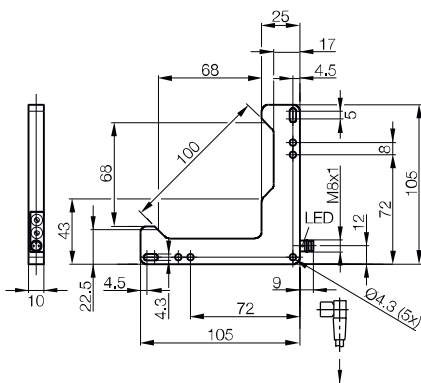
Photoelectric distance sensors

sensors for analog distance measurement

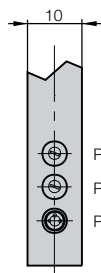
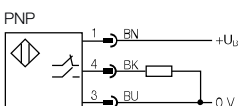
Special accessories for photoelectric sensors



BWL 68/68 mm BWL0012	BWL 90/90 mm BWL0019	BWL 110/110 mm BWL0005
BWL 6868D-R011-S49	BWL 9090D-R011-S49	BWL 110110D-R011-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



Wiring diagram

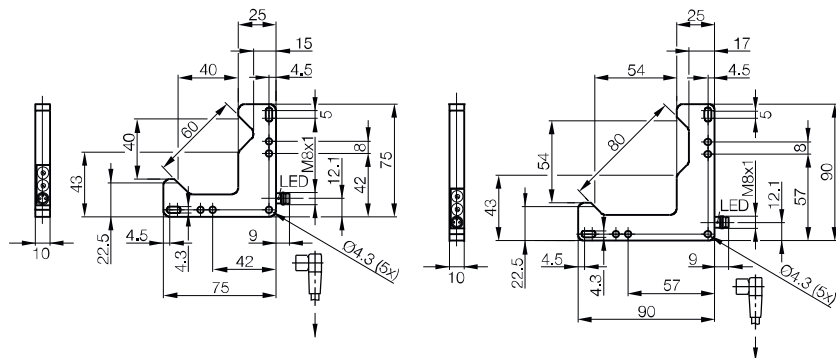


- Potentiometer, sensitivity
- Potentiometer light/dark switching
- Plug, LED output function indicator



Series	BWL	BWL
Optical axis	40/40 mm	54/54
PNP NO/NC	Ordering code	BWL000J
	Part number	BWL 4040D-R013-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 μ m	40 μ m
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
Material	Housing: GD-Zn	GD-Zn
	Optical surface: Glass	Glass
Connection	M8 connector, 3-pin	M8 connector, 3-pin

 Connector orientation



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Light grids

Photoelectric distance sensors

for analog distance measurement

Special accessories for photoelectric sensors

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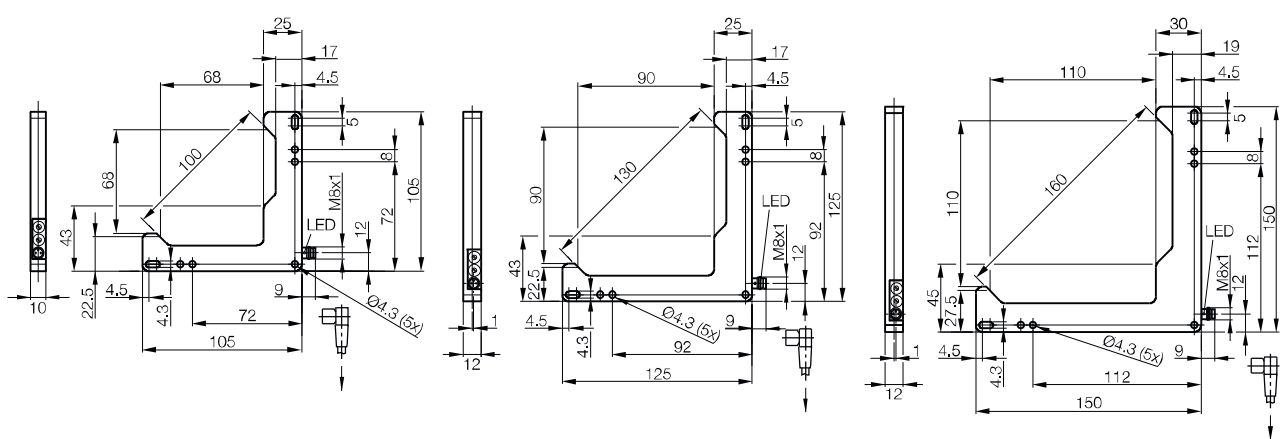
Special accessories for photoelectric sensors

Special accessories for photoelectric sensors

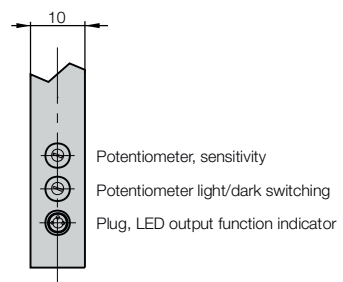
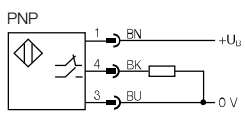
Special accessories for photoelectric sensors



BWL 68/68 mm BWL001N	BWL 90/90 mm BWL001C	BWL 110/110 mm BWL0007
BWL 6868D-R013-S49	BWL 9090D-R013-S49	BWL 110110D-R013-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



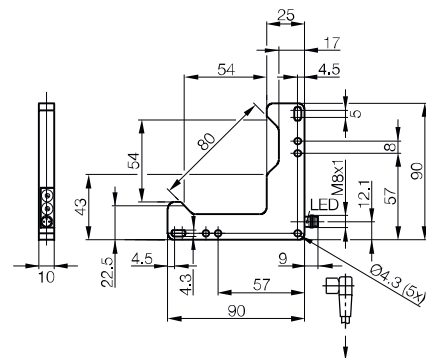
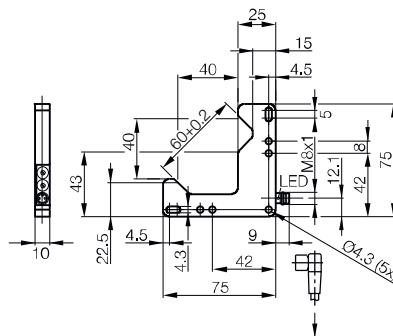
Wiring diagram





Series	BWL	BWL
Optical axis	40/40 mm	54/54
PNP NO/NC	BWL0009	BWL000L
Ordering code		
Part number	BWL 4040D-I011-S49	BWL 5454D-I011-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
Material		
Housing	GD-Zn	GD-Zn
Optical surface	Glass	Glass
Connection	M8 connector, 3-pin	M8 connector, 3-pin

 → Connector orientation



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Angle sensors BWL

68/68 mm, 90/90 mm, 110/110 mm



Photoelectric sensors

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Fiber optics

Contrast sensor

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

Light grids

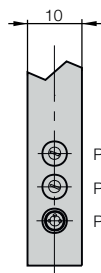
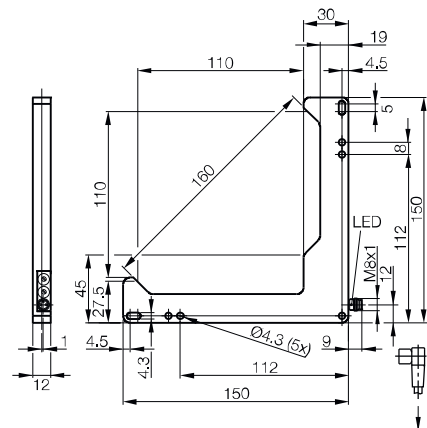
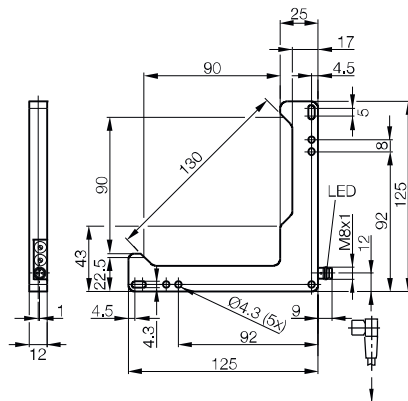
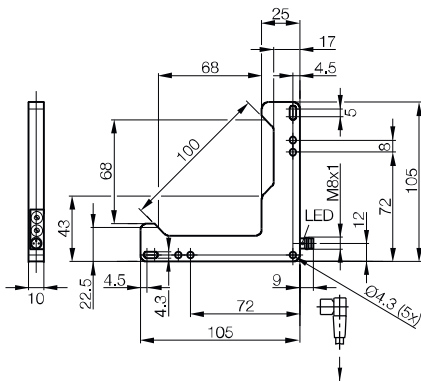
Photoelectric distance sensors

for analog distance measurement

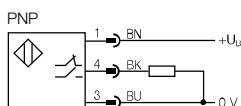
Special accessories for photoelectric sensors



BWL 68/68 mm BWL000Y	BWL 90/90 mm BWL0015	BWL 110/110 mm BWL0001
BWL 6868D-I011-S49	BWL 9090D-I011-S49	BWL 110110D-I011-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



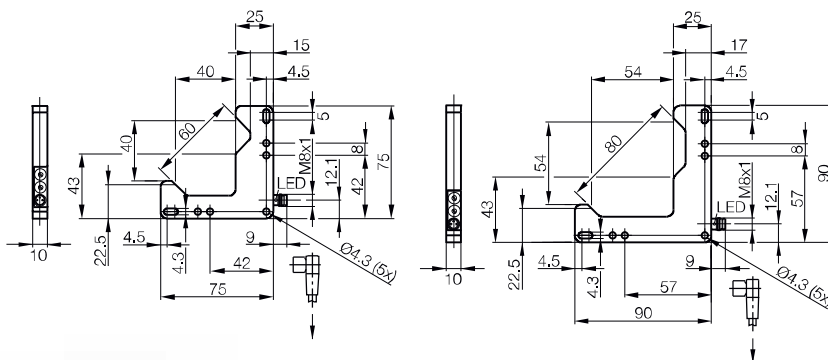
Wiring diagram





Series	BWL	BWL
Optical axis	40/40 mm	54/54 mm
PNP NO/NC	Ordering code	BWL000C
	Part number	BWL 4040D-L011-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 μ m	100 μ m
Repeat accuracy	≤ 10 μ m	10 μ m
Switching hysteresis	≤ 25 μ m	≤ 35 μ m
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
Material	Housing: GD-Zn Optical surface: Glass	GD-Zn Glass
Connection	M8 connector, 3-pin	M8 connector, 3-pin

Connector orientation



Suitable connector
 (please order separately)

Size	Design	Cable material	Color	Length	Ordering code
M8, 3-pin	Straight	PUR	Black	2 m	BCC02M8
M8, 3-pin	Straight	PVC	Gray	2 m	BCC02NU
M8, 3-pin	Angled	PUR	Black	2 m	BCC02ML
M8, 3-pin	Angled	PVC	Gray	2 m	BCC02P5

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**.



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68/68 mm, 90/90 mm, 110/110 mm



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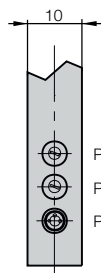
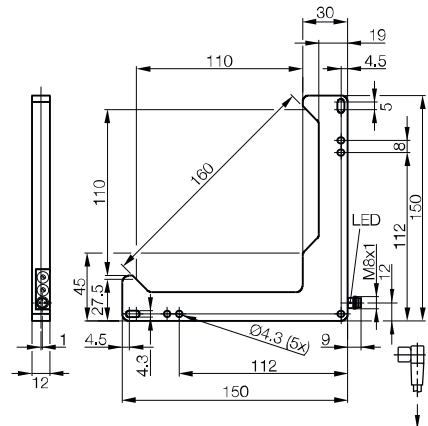
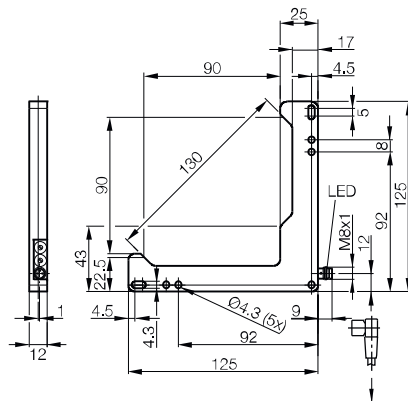
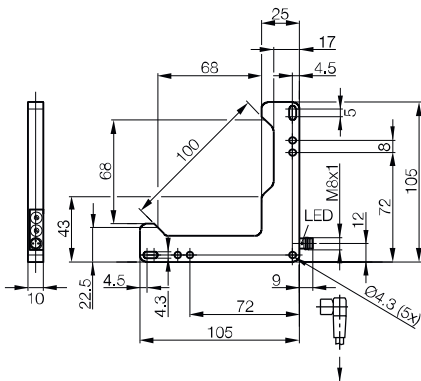
Photoelectric distance sensors

for analog distance measurement

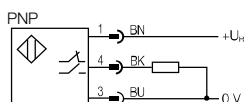
Special accessories for photoelectric sensors



BWL 68/68 mm	BWL 90/90 mm	BWL 110/110 mm
BWL0010	BWL0017	BWL0003
BWL 6868D-L011-S49	BWL 9090D-L011-S49	BWL 110110D-L011-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



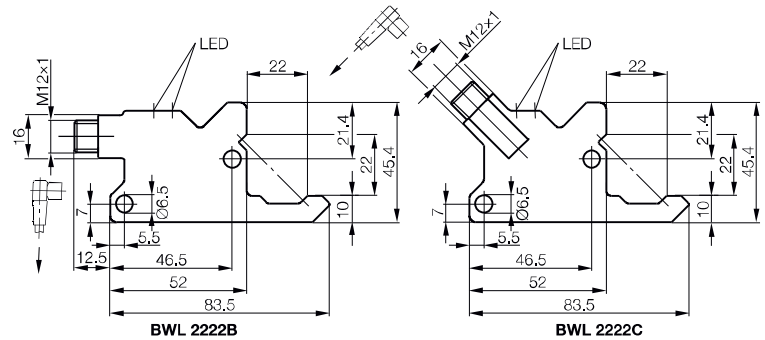
Wiring diagram




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



Series		BWL	BWL
Optical axis		22/22 mm	22/22 mm
PNP NO/NC	Ordering code	BWL001F	BWL001H
	Part number	BWL 2222B-001-S4	BWL 2222C-001-S4
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		Dark switching	Dark switching
Polarity reversal/short-circuit protected		Yes/Yes	Yes/Yes
Emitter, light type		Infrared	Infrared
Wavelength		880 nm	880 nm
Power-on indicator		Green LED	Green LED
Output function indicator		Yellow LED	Yellow LED
Ready delay		100 ms	100 ms
Response time		≤ 0.5 ms	≤ 0.5 ms
Switching frequency		1 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
Material	Housing	Corrosion-resistant steel	Corrosion-resistant steel
	Optical surface	PMMA	PMMA
Connection		M12 connector, 4-pin	M12 connector, 4-pin




 **Suitable connector**
 (please order separately)



Size	Design	Cable material	Color	Length	Ordering code
M8, 3-pin	Straight	PUR	Black	2 m	BCC02M8
M8, 3-pin	Straight	PVC	Gray	2 m	BCC02NU
M8, 3-pin	Angled	PUR	Black	2 m	BCC02ML
M8, 3-pin	Angled	PVC	Gray	2 m	BCC02P5

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**.

 **Suitable connector**
 (please order separately)



Size	Design	Cable material	Color	Length	Ordering 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 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**.

Photoelectric Special Sensors

Angle sensors BWL

43/43 mm, 42/62 mm



Photoelectric sensors

Photoelectric standard sensors

Photoelectric special sensors

Optical fiber base units

Fiber optics

Contrast sensor

Luminescence sensor

Color sensors

Fork sensors

Angle sensors

Dynamic optical windows

Light grids

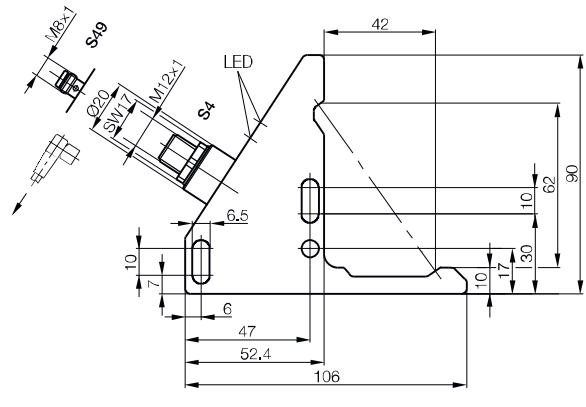
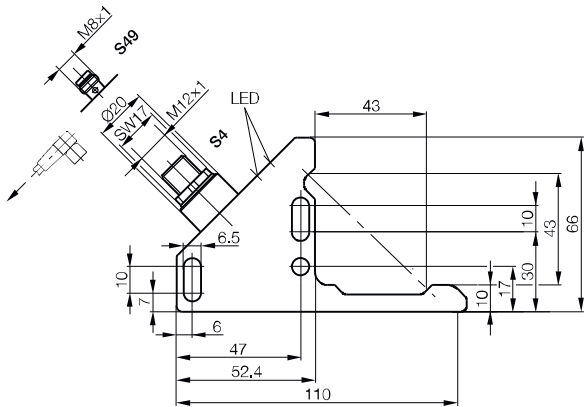
Photoelectric distance sensors

for analog distance measurement

Special accessories for photoelectric sensors



BWL 43/43 mm BWL001J	BWL 43/43 mm BWL001K	BWL 42/62 mm BWL001L	BWL 42/62 mm BWL001M
BWL 4241A-001-S4	BWL 4241A-001-S49	BWL 4260A-001-S4	BWL 4260A-001-S49
10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
≤ 35 mA	≤ 35 mA	≤ 35 mA	≤ 35 mA
≤ 200 mA	≤ 200 mA	≤ 200 mA	≤ 200 mA
Dark switching	Dark switching	Dark switching	Dark switching
Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
Infrared	Infrared	Infrared	Infrared
880 nm	880 nm	880 nm	880 nm
Green LED	Green LED	Green LED	Green LED
Yellow LED	Yellow LED	Yellow LED	Yellow LED
100 ms	100 ms	100 ms	100 ms
≤ 0,5 ms	≤ 0,5 ms	≤ 0,5 ms	≤ 0,5 ms
1 kHz	1 kHz	1 kHz	1 kHz
IP 67	IP 67	IP 67	IP 67
-10...+60 °C	-10...+60 °C	-10...+60 °C	-10...+60 °C
EN 60947-5-2	EN 60947-5-2	EN 60947-5-2	EN 60947-5-2
Corrosion-resistant steel	Corrosion-resistant steel	Corrosion-resistant steel	Corrosion-resistant steel
PMMA	PMMA	PMMA	PMMA
M12 connector, 4-pin	M8 connector, 3-pin	M12 connector, 4-pin	M8 connector, 3-pin



Wiring diagrams

