

# Slot Sensors

## Photoelectric Sensors

## Slot & Angle Sensors Contents

# Photoelectric

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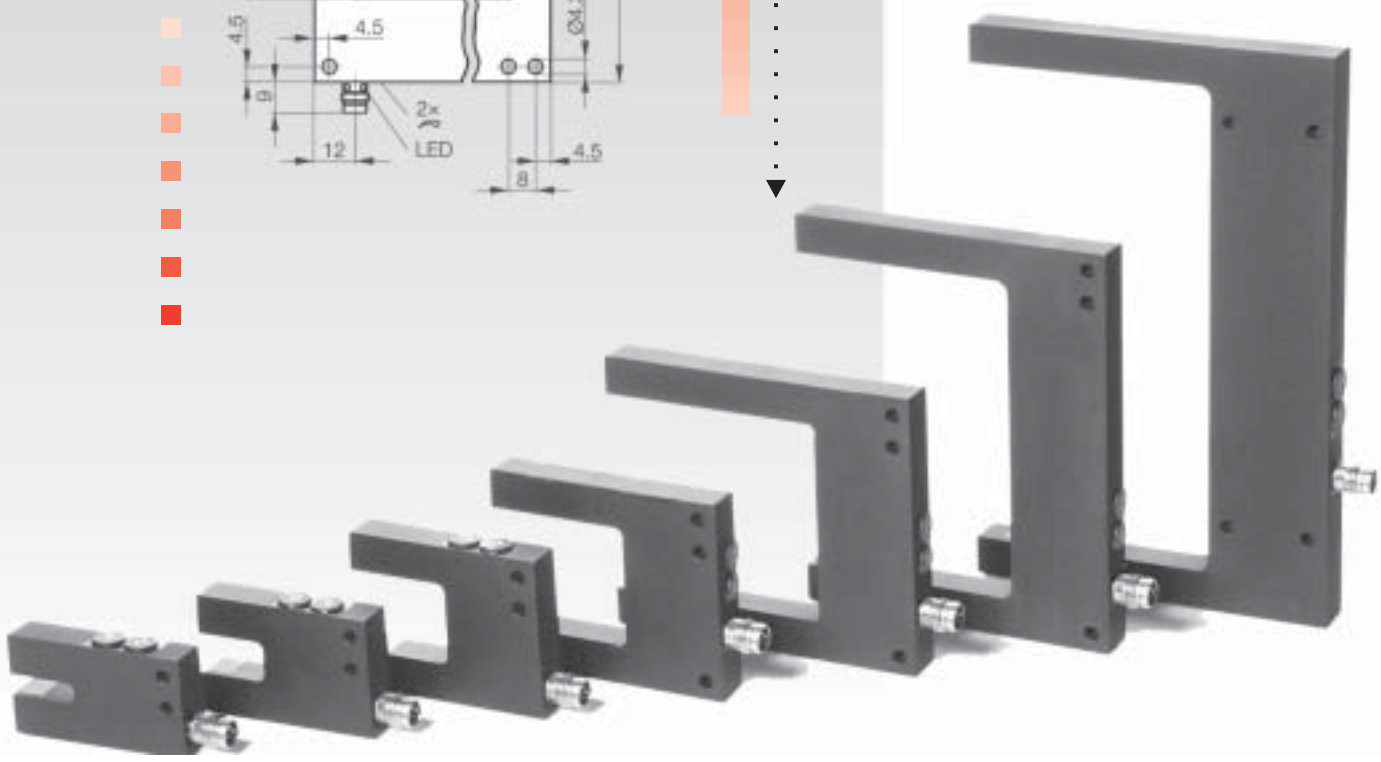
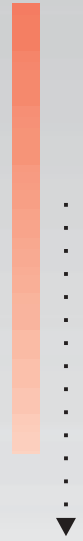
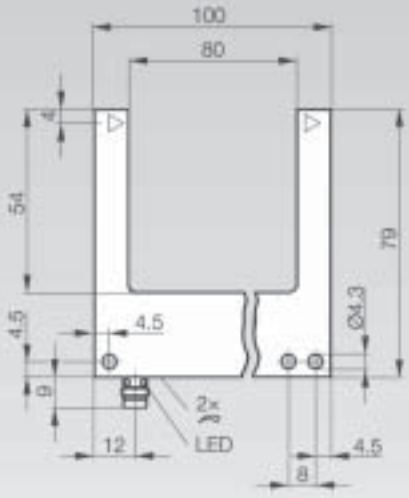
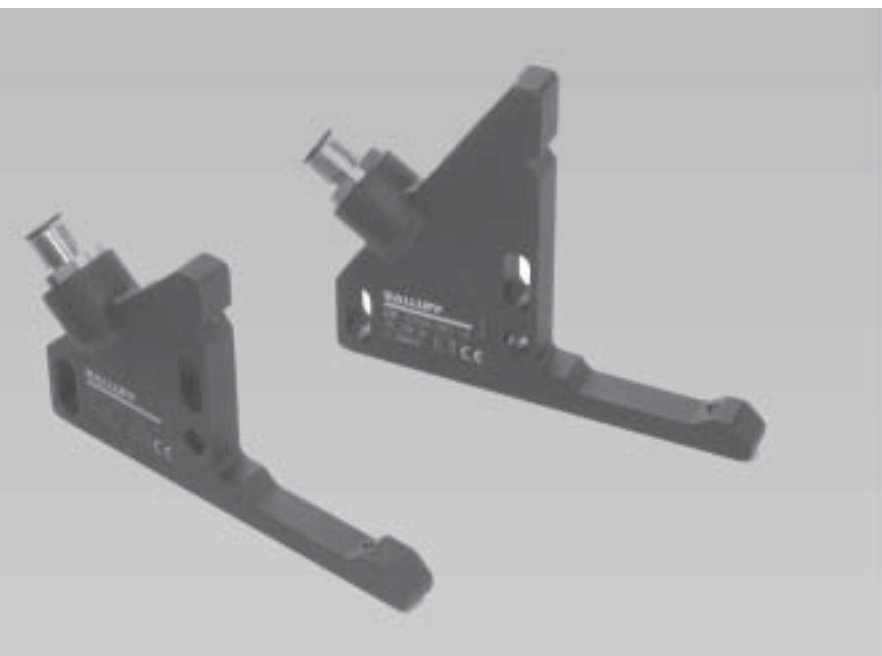
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### Slot & Angle Sensors

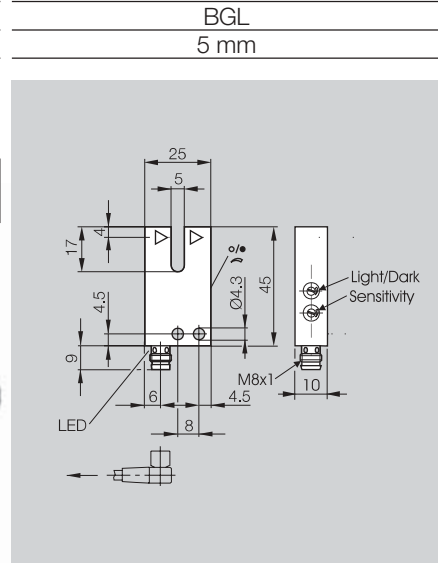
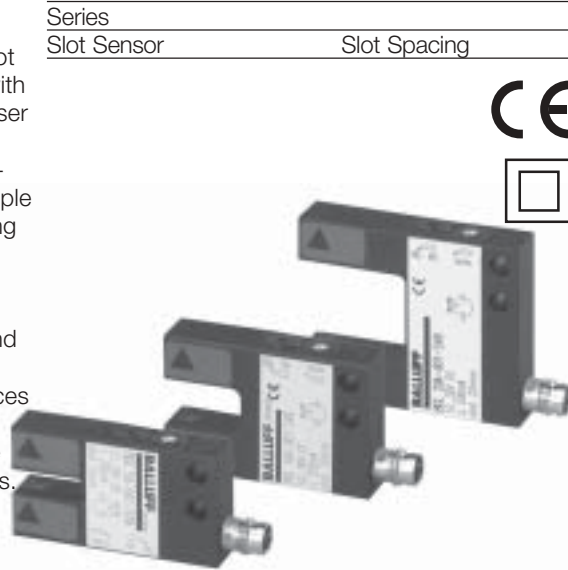
Slot sensors are self contained thru-beam sensors in a simple "U" or "L" shaped housing design which saves time in mounting and setting up in your machine. Slot sensors solve contrast mark applications with their high resolution and "U" or "L" shaped design offering thru-beam accuracy in translucent or transparent mark applications.

- 2.142** BGL series
- 2.146** BGL 21
- 2.147** BWL Series *NEW*



**BGL Series**

The BGL series of photoelectric slot sensors offer laser-like accuracy with highly visible red LED or Class II laser emission for resolutions down to 0.3mm. These self-contained thru-beam sensors, configured in a simple "U" shaped housing, save mounting and machine setup time. Typical thru-beam fiber optic applications can be solved using BGL slot sensors, saving installation time and cost. Since the BGL slot sensor is completely self-contained, it replaces the two thru-beam cables and the fiber optic amplifier, eliminating the need for special mounting brackets.



**Features**

- Highly visible emission
- Extremely rugged single piece metal housing
- High resolution
- Light/Dark operation selectable
- High switching frequency
- Adjustable sensitivity
- M8 connection with 360° LED indicator

**Applications**

- Parts sensing on conveyer rails and conveying belts
- Label discrimination with transparent substrates
- Parts dimension verification
- Parts counting in assembly lines
- Tool break monitoring
- Position verification
- Feed verification on automatic assembly equipment
- Checking for complete count
- Level monitoring in tanks
- Handling and assembly technology

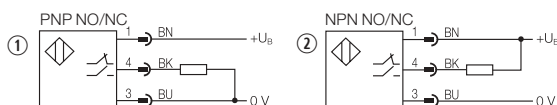
**Visible Red**

PNP NO/NC Dark-on 270° Pot.	①
NPN NO/NC Dark-on 270° Pot.	②
<b>Class II Visible Red Laser</b>	
PNP NO/NC Dark-on 270° Pot. <b>NEW</b> ⚠	①
NPN NO/NC Dark-on 270° Pot. <b>NEW</b> ⚠	②

Supply Voltage $U_B$	10...30 Vdc
Voltage Drop $U_d$ at $I_e$	≤ 3.0 V PNP/ < 2.5 V
Rated Isolation voltage $U_i$	75 Vdc
Rated Output Current $I_e$	≤ 200 mA
Current Consumption $I_o$ (No Load)	≤ 35 mA
Utilization Category (IEC 60-947-4-1)	DC 13
Output Duty Cycle	
Emitter Light Source	Visible Red Class II Laser
Ambient Light Immunity (EN 60947-5-2)	Visible Red Class II Laser
LED Output	Red LED
Switching Frequency $f$	Visible Red Class II Laser
Response Time (On/Off Delay)	Visible Red Class II Laser
Switching Hysteresis	Visible Red Class II Laser
Resolution	Visible Red Class II Laser
Repeatability	Visible Red Class II Laser
Ambient Temperature range $T_a$	-10° C to +60° C
Electrical Shock Protection	Class 2
Degree of Protection per IEC 60529	IP 65
Short Circuit Protection	Yes
Reverse Polarity Protection	Yes
Housing Material	Anodized Aluminum
Sensing Face Material	Glass
Connection	M8 3-Pin Connector
Recommended Connector	C49A or C49B
Weight	20 g

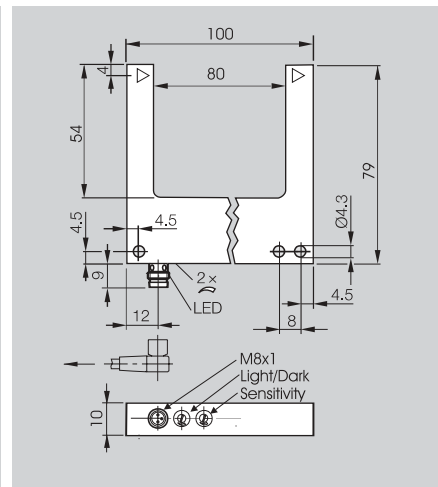
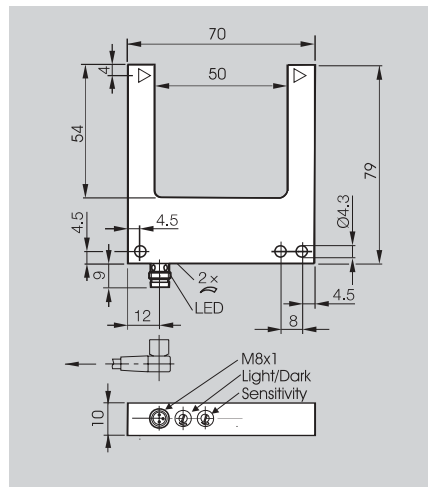


**Wiring Diagrams**





Series	BGL	BGL
Slot Sensor	50 mm	80 mm
Slot Spacing		



**Visible Red**

PNP NO/NC Dark-on 270° Pot.	①	BGL 50A-001-S49	BGL 80A-001-S49
NPN NO/NC Dark-on 270° Pot.	②	BGL 50A-002-S49	BGL 80A-002-S49
<b>Class II Visible Red Laser</b>			
PNP NO/NC Dark-on 270° Pot. <b>NEW</b> ⚠	①	BGL 50A-003-S49	BGL 80A-003-S49
NPN NO/NC Dark-on 270° Pot. <b>NEW</b> ⚠	②	BGL 50A-004-S49	BGL 80A-004-S49

Supply Voltage $U_B$		10...30 Vdc	10...30 Vdc
Voltage Drop $U_d$ at $I_e$		$\leq 3.0$ V PNP/ $< 2.5$ V	$\leq 3.0$ V PNP/ $< 2.5$ V
Rated Isolation voltage $U_i$		75 Vdc	75 Vdc
Rated Output Current $I_e$		$\leq 200$ mA	$\leq 200$ mA
Current Consumption $I_o$ (No Load)		$\leq 35$ mA	$\leq 35$ mA
Utilization Category (IEC 60-947-4-1)		DC 13	DC 13
Output Duty Cycle			
Emitter Light Source	Visible Red	Visible Red 640 nm	Visible Red 640 nm
	Class II Laser	Class II Visible Red Laser 650 nm	Class II Visible Red Laser 650 nm
Ambient Light Immunity (EN 60947-5-2)	Visible Red	5k Lux.	5k Lux.
	Class II Laser	10k Lux.	10k Lux.
LED Output		Red LED	Red LED
Switching Frequency $f$	Visible Red	1500 Hz	1500 Hz
	Class II Laser	3000 Hz	3000 Hz
Response Time (On/Off Delay)	Visible Red	333 ms	333 ms
	Class II Laser	167 ms	167 ms
Switching Hysteresis	Visible Red	$\leq 150$ $\mu$ m	$\leq 200$ $\mu$ m
	Class II Laser	$\leq 10$ $\mu$ m	$\leq 10$ $\mu$ m
Resolution	Visible Red	$\leq 500$ $\mu$ m	$\leq 800$ $\mu$ m
	Class II Laser	$\leq 100$ $\mu$ m	$\leq 200$ $\mu$ m
Repeatability	Visible Red	$\leq 40$ $\mu$ m	$\leq 60$ $\mu$ m
	Class II Laser	$\leq 15$ $\mu$ m	$\leq 15$ $\mu$ m
Ambient Temperature range $T_a$		-10°C to +60°C	-10°C to +60°C
Electrical Shock Protection		Class 2	Class 2
Degree of Protection per IEC 60529		IP 65	IP 65
Short Circuit Protection		Yes	Yes
Reverse Polarity Protection		Yes	Yes
Housing Material		Anodized Aluminum	Anodized Aluminum
Sensing Face Material		Glass	Glass
Connection		M8 Connector 3 Pin	M8 Connector 3 Pin
Recommend Connector		C49A or C49B	C49A or C49B
Weight		54 g	77 g



# Slot Sensors

## Photoelectric Sensors

BGL Series  
120, 180, 220 mm

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Contents  
Selection Guide  
Applications  
Tubular  
Block  
Laser  
Distance (Analog)  
**Slot & Angle**  
Fiber Optics  
Full Color Detection  
Contrast (Color Mark) Detection  
Luminescence Detection  
Transparent Detection  
Optical Windows  
Dimensional Light Grids

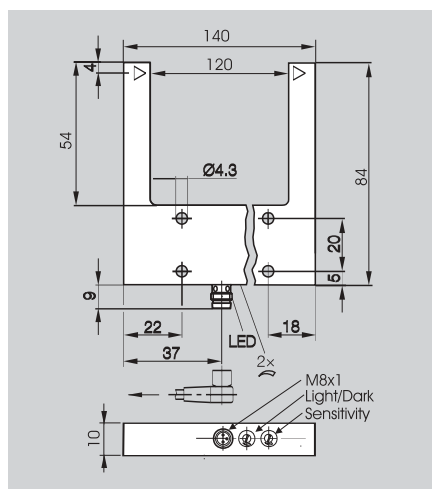
6 Connectors

7 Accessories

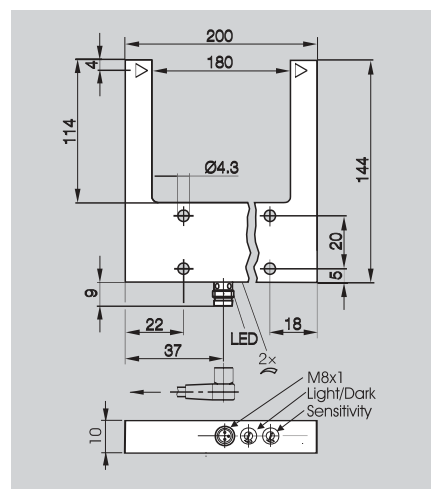
t Technical Reference

p Part Number Index

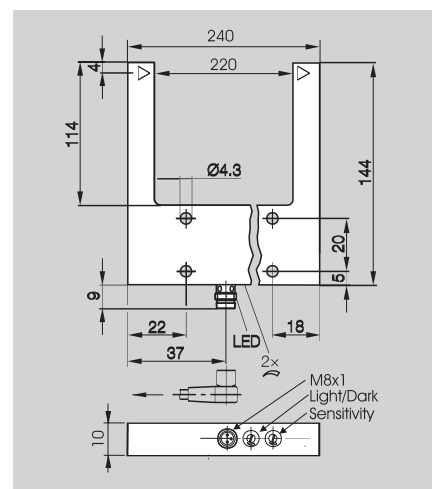
BGL  
120 mm



BGL  
180 mm



BGL  
220 mm

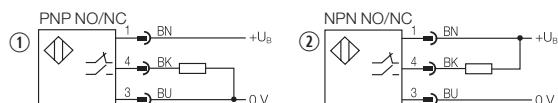


BGL 120A-001-S49
BGL 120A-002-S49
BGL 120A-003-S49
BGL 120A-004-S49
10...30 Vdc
≤ 3.0 V PNP/ < 2.5 V
75 Vdc
≤ 200 mA
≤ 35 mA
DC 13
Visible Red 640 nm
Class II Visible Red Laser 650 nm
5k Lux.
10k Lux.
Red LED
1500 Hz
3000 Hz
333 ms
167 ms
≤ 200 μm
≤ 10 μm
≤ 800 μm
≤ 300 μm
≤ 80 μm
≤ 15 μm
-10° C to +60° C
Class 2
IP 65
Yes
Yes
Anodized Aluminum
Glass
M8 Connector 3 Pin
C49A or C49B
118 g

BGL 180A-001-S49
BGL 180A-002-S49
BGL 180A-003-S49
BGL 180A-004-S49
10...30 Vdc
≤ 3.0 V PNP/ < 2.5 V
75 Vdc
≤ 200 mA
≤ 35 mA
DC 13
Visible Red 640 nm
5k Lux.
Red LED
1500 Hz
333 ms
≤ 200 μm
≤ 800 μm
≤ 80 μm
-10° C to +60° C
Class 2
IP 65
Yes
Yes
Anodized Aluminum
Glass
M8 Connector 3 Pin
C49A or C49B
190 g

BGL 220A-001-S49
BGL 220A-002-S49
BGL 220A-003-S49
BGL 220A-004-S49
10...30 Vdc
≤ 3.0 V PNP/ < 2.5 V
75 Vdc
≤ 200 mA
≤ 35 mA
DC 13
Visible Red 640 nm
5k Lux.
Red LED
1500 Hz
333 ms
≤ 200 μm
≤ 800 μm
≤ 80 μm
-10° C to +60° C
Class 2
IP 65
Yes
Yes
Anodized Aluminum
Glass
M8 Connector 3 Pin
C49A or C49B
220 g

### Wiring Diagrams



**BGL 21 Advanced Series Slot Sensors**

The BGL 21 advanced series is designed to solve difficult contrast mark applications with a microprocessor based set-up and a EEPROM to store settings. Using a single push button, the BGL 21 stores information about the contrast mark, background, and sensitivity settings. It will even select the color of the emission source (Red LED or Green LED), and store all the settings in the EEPROM for error-free operation. The BGL 21 offers extremely fast switching speeds up to 15 kHz in a rugged metal housing along with a small, controlled 2 mm sensing gap.

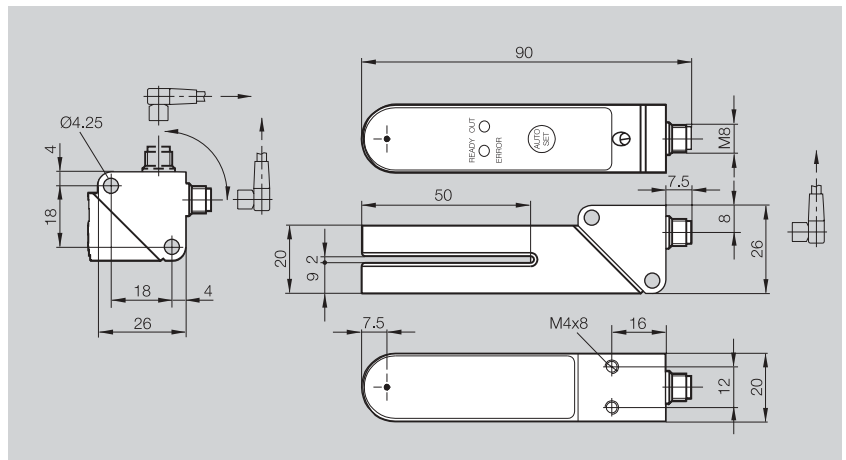
**Features**

- Automatic set-up with single pushbutton
- Extremely fast response time
- 2 mm sensing gap
- Universal PNP/NPN output
- Setting are stored in a EEPROM for error-free operation
- Rugged metal housing
- Rotatable M8 connection

**Applications**

- Recognizing colored markings on transparent carrier material
- Label detection
- Guide control on tracks
- Tape break control
- Thread tear/slack monitoring
- Hole checking in thin materials

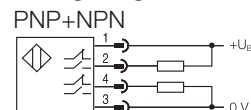
Series	BGL 21
Slot Sensor	slot spacing 2 mm



Typical Targets	Visible Red/Visible Green	BGL 21-AH
Dark Targets	IR	BGL 21-AR
Translucent Targets	IR (Low hysteresis)	BGL 21-AV
Translucent Targets	IR	BGL 21-AS
Supply voltage $U_B$		10...30 Vdc
Voltage drop $U_d$ at $I_o$		1.2 V
Rated isolation voltage $U_i$		75 V
Rated operational current $I_o$		100 mA
No-load supply current $I_o$		55 mA
Short-circuit protected		yes
Permissible capacitance		1 $\mu$ F
On/Off delay	66 $\mu$ s	33 $\mu$ s
Operating frequency f	7.5 KHz (AH, AR, AV)	15 KHz (AS)
Utilization category	DC 13	
Output	PNP/NPN on separate pins	
Output function	Light-on/Dark-on automatically switched	
Permissible ambient light	3000 Lux artificial light/10,000 Lux sunlight	
Sensitivity adjustment	auto set (teach-in)	
Output function indication	Yellow LED	
Operating/Error indication	Red/Green LED	
Ambient temperature range $T_a$	0...55° C	
Degree of protection per IEC 529	IP 65	
Housing material	anodized aluminum	
Material of sensing face	glass	
Emitter light source (AH)	Visible Red (635nm) and Visible Green (835 nm)	
Emitter light source (AR, AV, AS)	Infrared (880 nm)	
Max. object width	1.5 mm	
Min. object width	1 mm	
Connection	M8 4-Pin Connector	
Weight	100 g	
Recommended connector	C75A/C75B	



**Wiring Diagram**



# Slot Sensors

## Photoelectric Sensors

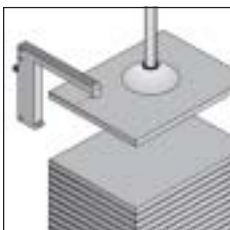
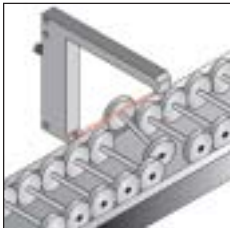
BWL Series  
22 mm

### BWL Angle Sensor

The Balluff BWL angle sensor is a high performance thru-beam sensor for harsh industrial applications. Its housing is rugged and offers a variety of mounting variations. Objects are reliably detected even under extremely difficult conditions. An intense infrared beam emitter ensures a high degree of function reserve. The BWL represents an effective solution to a variety of practical problems. Various configurations are available for increased versatility.

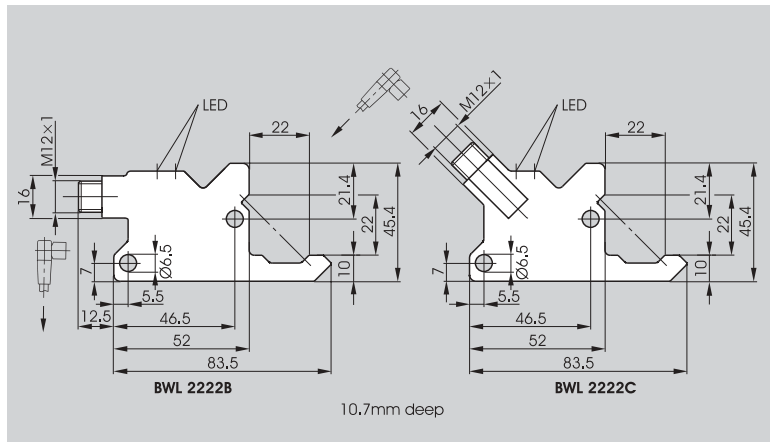
### Applications

- Assembly and handling
- Robotics
- Position and orientation control



Series  
Optical axis

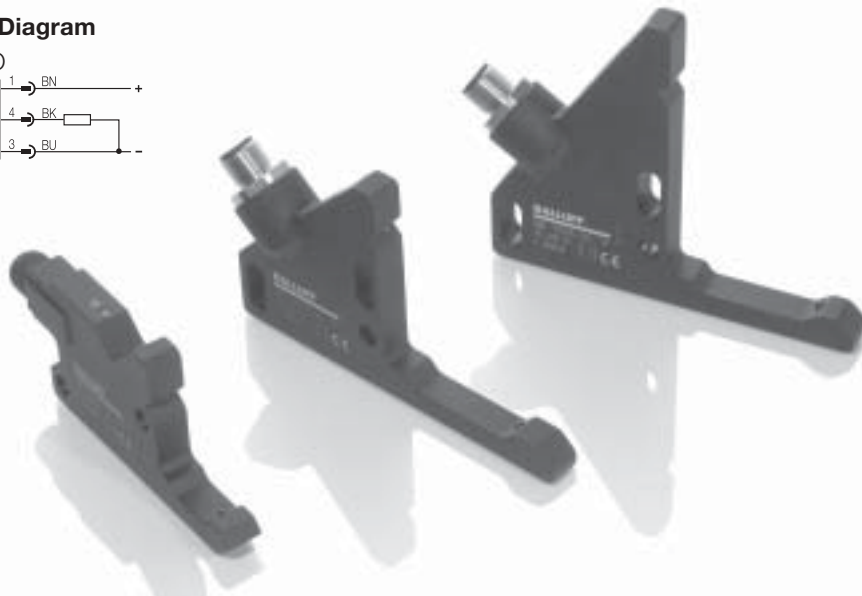
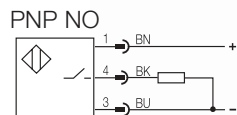
BWL 2222  
22 mm/22 mm



### Angle Sensor

PNP	BWL 2222B-001-S4	BWL 2222C-001-S4
Supply Voltage $U_B$	10...30 Vdc	
Ripple	15%	
Voltage drop $U_d$ at $I_e$	$\leq 2.5$ V	
No-load supply current $I_0$ max.	$\leq 35$ mA	
Short circuit protected	yes	
On-time delay	100 ms	
Switching frequency $f$	1000 Hz	
Response time	$\leq 0.5$ ms	
Output	PNP	
Output current	$\leq 200$ mA	
Switching type	dark-on	
Permissible ambient light	EN 60947-5-2	
Power indicator	Green LED	
Output function indicator	Yellow LED	
Ambient temp. range $T_a$	$-10...+60^\circ$ C	
Degree of protection per IEC 60529	IP 67	
Protected against polarity reversal	yes	
Housing Material	Corrosion-resistant steel	
Lens material	PMMA	
Emitter, light type	Infrared (880 nm)	
Dimensions	45.4x83.5x10.7 mm	
Connection	M12 4-Pin Connector	
Weight	120 g	
Recommended connector	C04A/C04B	

### Wiring Diagram



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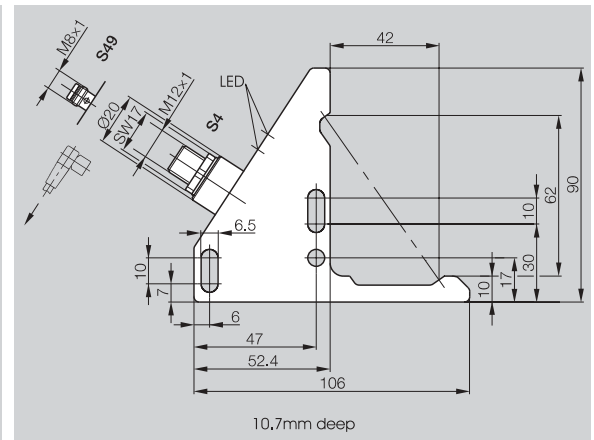
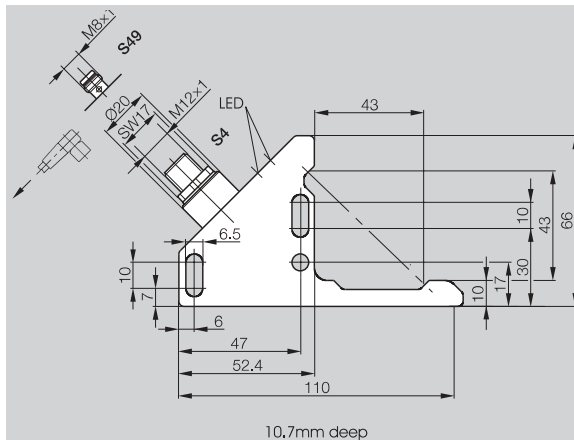
6 Connectors

7 Accessories

t Technical Reference

p Part Number Index

Series	BWL 4241A	BWL 4260A
Optical axis	43 mm/43 mm	42 mm/62 mm



**Angle Sensor**

PNP	BWL 4241A-001-S49	BWL 4241A-001-S4	BWL 4260A-001-S49	BWL 4260A-001-S4
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Supply Voltage $U_b$	10...30 Vdc		10...30 Vdc	
Ripple	15%		15%	
Voltage drop $U_d$ at $I_b$	$\leq 2.5$ V		$\leq 2.5$ V	
No-load supply current $I_b$ max.	$\leq 35$ mA		$\leq 35$ mA	
Short circuit protected	yes		yes	
On-time delay	100 ms		100 ms	
Switching frequency $f$	1000 Hz		1000 Hz	
Response time	$\leq 0.5$ ms		$\leq 0.5$ ms	
Output	PNP		PNP	
Output current	$\leq 200$ mA		$\leq 200$ mA	
Switching type	dark-on		dark-on	
Permissible ambient light	EN 60947-5-2		EN 60947-5-2	
Power indicator	Green LED		Green LED	
Output function indicator	Yellow LED		Yellow LED	
Ambient temp. range $T_a$	$-10...+60^\circ$ C		$-10...+60^\circ$ C	
Degree of protection per IEC 60529	IP 67		IP 67	
Protected against polarity reversal	yes		yes	
Housing Material	Corrosion-resistant steel		Corrosion-resistant steel	
Lens material	PMMA		PMMA	
Emitter, light type	Infrared (880 nm)		Infrared (880 nm)	
Dimensions	66x110x10.7 mm		90x106x10.7 mm	
Connection	M8 3-Pin Connector	M12 4-Pin Connector	M8 3-Pin Connector	M12 4-Pin Connector
Weight	150 g		150 g	
Recommended connector	C49A/C49B	C04A/C04B	C49A/C49B	C04A/C04B

**Wiring Diagram**

