

The Balluff **BWL Standard** angle sensors are a further development of the BGL slot sensors. With virtually identical technical data, these use a new form factor to solve even more applications. The form factor and beam geometry enable approach and detection of objects from virtually any direction. Red light and laser versions are of course available.

Applications

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

Advantages

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





The Balluff **BWL Auto-motive** angle sensor is a powerful through-beam designed for harsh industrial use. Its housing is tough and allows for variable mounting options.

Applications

- Robotic systems
- Position and location control

Objects are reliably detected, even under extremely difficult conditions. A powerful infrared emitter ensures high function reserve. This product represents an elegant solution for a variety of applications. Various form factors provide for optimum flexibility.



Type	Optical axis	Light type			Output		Output function		Switching frequency	U _B	Connec-tion		Page
		Infrared	Red light	Laser	PNP- Transistor	NPN- Transistor	Dark-on	Light-on			10...30 V DC	M8 connector, 3-pin	
 Angle sensors Standard													
BWL 4040D-R011-S49	40/40 mm		■		■		■	■	1.5 kHz	■	■		2.2.94
BWL 4040D-R012-S49	40/40 mm		■			■	■	■	1.5 kHz	■	■		2.2.94
BWL 4040D-L011-S49	40/40 mm			■	■		■	■	5 kHz	■	■		2.2.96
BWL 4040D-L012-S49	40/40 mm			■		■	■	■	5 kHz	■	■		2.2.96
BWL 5454D-R011-S49	54/54 mm		■		■		■	■	1.5 kHz	■	■		2.2.94
BWL 5454D-R012-S49	54/54 mm		■			■	■	■	1.5 kHz	■	■		2.2.94
BWL 5454D-L011-S49	54/54 mm			■	■		■	■	5 kHz	■	■		2.2.96
BWL 5454D-L012-S49	54/54 mm			■		■	■	■	5 kHz	■	■		2.2.96
BWL 6868D-R011-S49	68/68 mm		■		■		■	■	1.5 kHz	■	■		2.2.95
BWL 6868D-R012-S49	68/68 mm		■			■	■	■	1.5 kHz	■	■		2.2.95
BWL 6868D-L011-S49	68/68 mm			■	■		■	■	5 kHz	■	■		2.2.97
BWL 6868D-L012-S49	68/68 mm			■		■	■	■	5 kHz	■	■		2.2.97
BWL 9090D-R011-S49	90/90 mm		■		■		■	■	1.5 kHz	■	■		2.2.95
BWL 9090D-R012-S49	90/90 mm		■			■	■	■	1.5 kHz	■	■		2.2.95
BWL 9090D-L011-S49	90/90 mm			■	■		■	■	5 kHz	■	■		2.2.97
BWL 9090D-L012-S49	90/90 mm			■		■	■	■	5 kHz	■	■		2.2.97
BWL 110110D-R011-S49	110/110 mm		■		■		■	■	1.5 kHz	■	■		2.2.95
BWL 110110D-R012-S49	110/110 mm		■			■	■	■	1.5 kHz	■	■		2.2.95
BWL 110110D-L011-S49	110/110 mm			■	■		■	■	5 kHz	■	■		2.2.97
BWL 110110D-L012-S49	110/110 mm			■		■	■	■	5 kHz	■	■		2.2.97
 Angle sensors Automotive													
BWL 2222B-001-S4	22/22 mm		■		■		■		1 kHz	■		■	2.2.98
BWL 2222C-001-S4	22/22 mm		■			■	■		1 kHz	■		■	2.2.98
BWL 4241A-001-S4	43/43 mm		■		■		■		1 kHz	■		■	2.2.99
BWL 4241A-001-S49	43/43 mm		■			■	■		1 kHz	■	■		2.2.99
BWL 4260A-001-S4	42/62 mm		■		■		■		1 kHz	■		■	2.2.99
BWL 4260A-001-S49	42/62 mm		■		■		■		1 kHz	■	■		2.2.99

2.2

2.3

Photoelectric sensors accessories page 2.3.2 ...

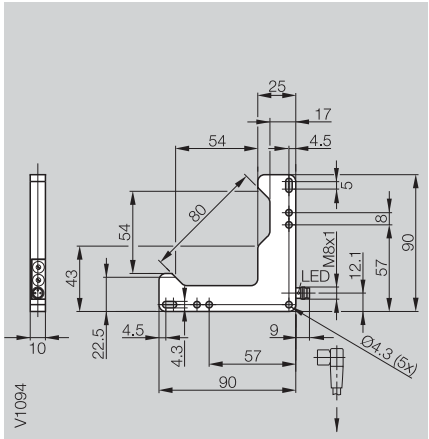
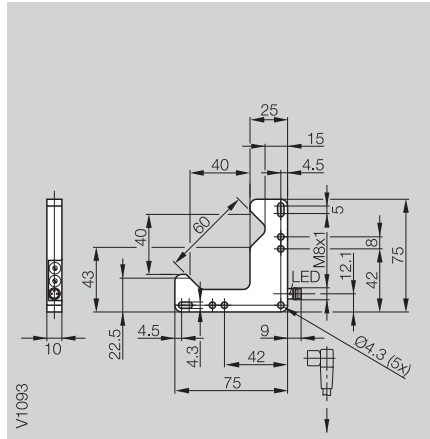
5

Connectors ... page 5.2 ...

Series	BWL
Optical axis	40/40 mm

BWL	40/40 mm
-----	----------

BWL	54/54 mm
-----	----------



Angle Sensor

PNP	BWL 4040D-R011-S49	BWL 5454D-R011-S49
NPN	BWL 4040D-R012-S49	BWL 5454D-R012-S49

Electrical data

Supply voltage U_B	10...30 V DC
Ripple	10 %
No-load supply current I_0 max.	≤ 35 mA
Switching output	PNP- or NPN-Transistor
Output type	Light-/dark-on (selectable)
Output current	200 mA
Voltage drop U_d at I_0	≤ 3 V (PNP)/ ≤ 2.5 V (NPN)
Settings	Potentiometer 270°

10...30 V DC	10 %	≤ 35 mA	PNP- or NPN-Transistor	Light-/dark-on (selectable)	200 mA	≤ 3 V (PNP)/ ≤ 2.5 V (NPN)	Potentiometer 270°
--------------	------	--------------	------------------------	-----------------------------	--------	--------------------------------------	--------------------

10...30 V DC	10 %	≤ 35 mA	PNP- or NPN-Transistor	Light-/dark-on (selectable)	200 mA	≤ 3 V (PNP)/ ≤ 2.5 V (NPN)	Potentiometer 270°
--------------	------	--------------	------------------------	-----------------------------	--------	--------------------------------------	--------------------

Optical data

Emitter, light type	LED, red light
Wavelength	640 nm
Resolution (smallest discernible part)	0.4 mm
Repeat accuracy	≤ 40 μ m
Switching hysteresis	≤ 0.15 mm

LED, red light	640 nm	0.4 mm	≤ 40 μ m	≤ 0.15 mm
----------------	--------	--------	-------------------	----------------

LED, red light	640 nm	0.4 mm	≤ 60 μ m	≤ 0.2 mm
----------------	--------	--------	-------------------	---------------

Time data

Response time	0.33 ms
Switching frequency f	1.5 kHz

0.33 ms	1.5 kHz
---------	---------

0.33 ms	1.5 kHz
---------	---------

Indicators

Output function indicator	LED yellow
---------------------------	------------

LED yellow

LED yellow

Mechanical data

Dimensions	
Connection	M8 connector, 3-pin
Housing material	GD-Zn
Optical surface	Glass
Weight	94 g

M8 connector, 3-pin	GD-Zn	Glass	94 g
---------------------	-------	-------	------

M8 connector, 3-pin	GD-Zn	Glass	125 g
---------------------	-------	-------	-------

Ambient data

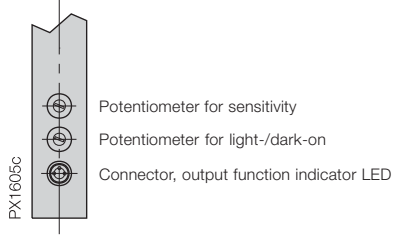
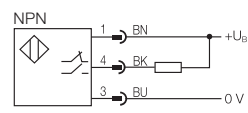
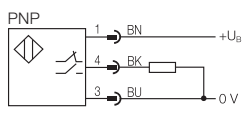
Degree of protection per IEC 60529	IP 67
Polarity reversal protected	yes
Short circuit protected	yes
Ambient temperature range T_a	-10...+60 °C
Ambient light rejection per	EN 60947-5-2

IP 67	yes	yes	-10...+60 °C	EN 60947-5-2
-------	-----	-----	--------------	--------------

IP 67	yes	yes	-10...+60 °C	EN 60947-5-2
-------	-----	-----	--------------	--------------



Wiring diagrams

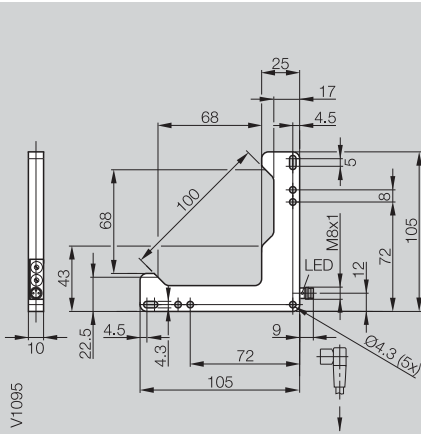


Standard Angle Sensors

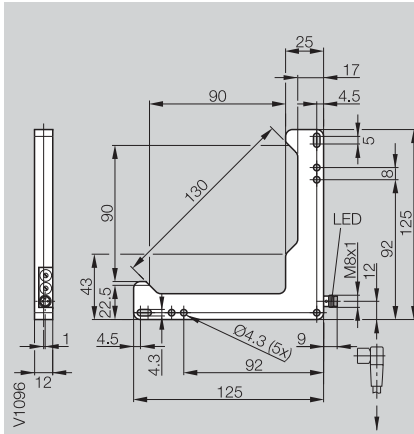
Photoelectric Sensors

BWL Standard Angle Sensors

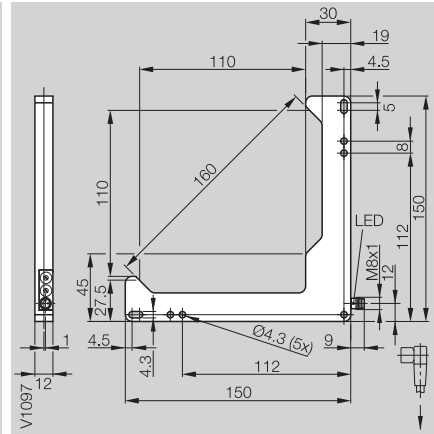
BWL
68/68 mm



BWL
90/90 mm



BWL
110/110 mm



BWL 6868D-R011-S49
BWL 6868D-R012-S49

BWL 9090D-R011-S49
BWL 9090D-R012-S49

BWL 110110D-R011-S49
BWL 110110D-R012-S49

10...30 V DC
10 %
≤ 35 mA

PNP- or NPN-Transistor
Light-/dark-on (selectable)

200 mA
≤ 3 V (PNP)/≤ 2.5 V (NPN)
Potentiometer 270°

LED, red light
640 nm
0.5 mm
≤ 80 µm
≤ 0.2 mm

0.33 ms
1.5 kHz

LED yellow

M8 connector, 3-pin
GD-Zn
Glass
150 g

IP 67
yes
yes
-10...+60 °C
EN 60947-5-2

10...30 V DC
10 %
≤ 35 mA

PNP- or NPN-Transistor
Light-/dark-on (selectable)

200 mA
≤ 3 V (PNP)/≤ 2.5 V (NPN)
Potentiometer 270°

LED, red light
640 nm
0.6 mm
≤ 80 µm
≤ 0.2 mm

0.33 ms
1.5 kHz

LED yellow

M8 connector, 3-pin
GD-Zn
Glass
233 g

IP 67
yes
yes
-10...+60 °C
EN 60947-5-2

10...30 V DC
10 %
≤ 35 mA

PNP- or NPN-Transistor
Light-/dark-on (selectable)

200 mA
≤ 3 V (PNP), ≤ 2.5 V (NPN)
Potentiometer 270°

LED, red light
640 nm
0.6 mm
≤ 80 µm
≤ 0.2 mm

0.33 ms
1.5 kHz

LED yellow

M8 connector, 3-pin
GD-Zn
Glass
334 g

IP 67
yes
yes
-10...+60 °C
EN 60947-5-2

2.2

2.3

Photoelectric
sensors
accessories
page 2.3.2 ...

5

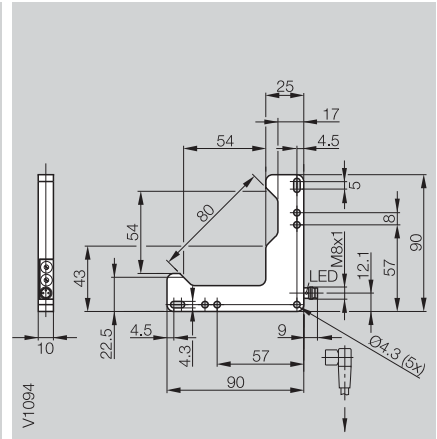
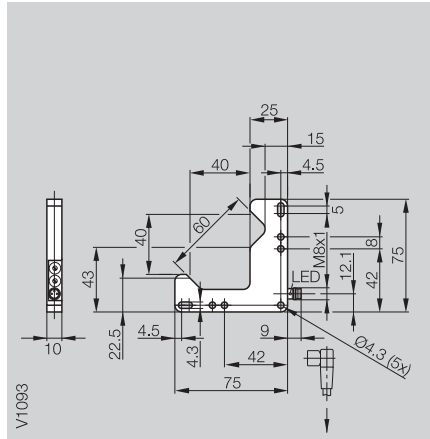
Connectors ...
page 5.2 ...

**Recommended
accessories**
please order separately

Connector
Straight BKS-_ 48
Right-angle BKS-_ 49



Series	BWL	BWL
Optical axis	40/40 mm	54/54 mm



Angle sensor

PNP	BWL 4040D-L011-S49	BWL 5454D-L011-S49
NPN	BWL 4040D-L012-S49	BWL 5454D-L012-S49

Electrical data

Supply voltage U_B	10...30 V DC	10...30 V DC
Ripple	10 %	10 %
No-load supply current I_0 max.	≤ 35 mA	≤ 35 mA
Switching output	PNP- or NPN-Transistor	PNP- or NPN-Transistor
Output type	Light-/dark-on (selectable)	Light-/dark-on (selectable)
Output current	200 mA	200 mA
Voltage drop U_d at I_0	≤ 3 V (PNP)/ ≤ 2.5 V (NPN)	≤ 3 V (PNP)/ ≤ 2.5 V (NPN)
Settings	Potentiometer 270°	Potentiometer 270°

Optical data

Emitter, light type	Laser, red light	Laser, red light
Wavelength	640 nm	640 nm
Laser class	1	1
Resolution (smallest discernible part)	80 μ m	0.1 mm
Repeat accuracy	≤ 10 μ m	≤ 10 μ m
Switching hysteresis	≤ 25 μ m	≤ 35 μ m

Time data

Response time	0.16 ms	0.16 ms
Switching frequency f	5 kHz	5 kHz

Indicators

Output function indicator	LED yellow	LED yellow
---------------------------	------------	------------

Mechanical data

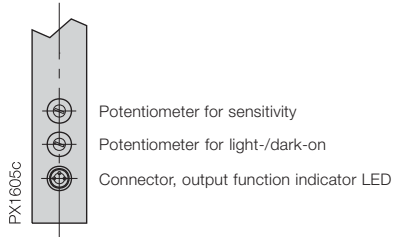
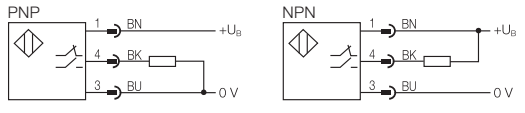
Dimensions		
Connection	M8 connector, 3-pin	M8 connector, 3-pin
Housing material	GD-Zn	GD-Zn
Optical surface	Glass	Glass
Weight	94 g	125 g

Ambient data

Degree of protection per IEC 60529	IP 67	IP 67
Polarity reversal protected	yes	yes
Short circuit protected	yes	yes
Ambient temperature range T_a	-10...+60 °C	-10...+60 °C
Ambient light rejection per	EN 60947-5-2	EN 60947-5-2



Wiring diagrams



Standard Laser Angle Sensors



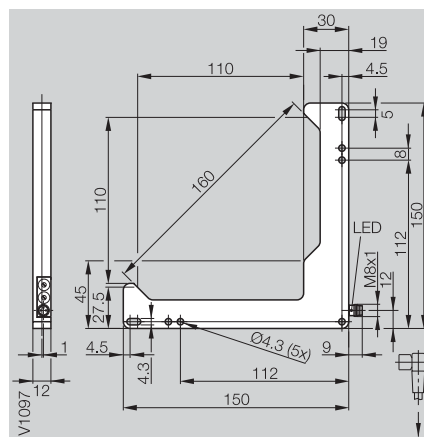
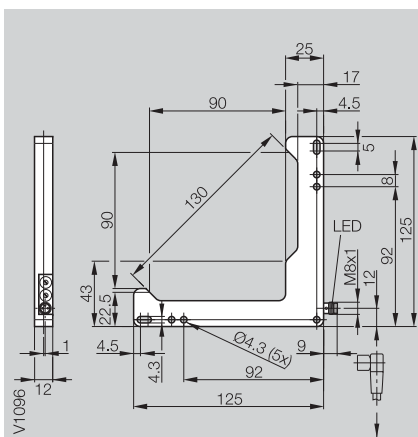
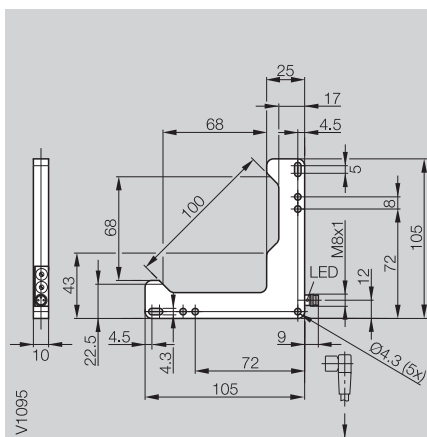
Photoelectric Sensors

BWL Standard Laser Angle Sensors

BWL
68/68 mm

BWL
90/90 mm

BWL
110/110 mm



BWL 6868D-L011-S49
BWL 6868D-L012-S49

BWL 9090D-L011-S49
BWL 9090D-L012-S49

BWL 110110D-L011-S49
BWL 110110D-L012-S49

10...30 V DC

10 %

≤ 35 mA

PNP- or NPN-Transistor
Light-/dark-on (selectable)

200 mA

≤ 3 V (PNP)/≤ 2.5 V (NPN)

Potentiometer 270°

Laser, red light

640 nm

1

0.12 mm

≤ 15 μm

≤ 40 μm

0.16 ms

5 kHz

LED yellow

M8 connector, 3-pin

GD-Zn

Glass

150 g

IP 67

yes

yes

-10...+60 °C

EN 60947-5-2

LED yellow

50×59×10 mm

M8 connector, 3-pin

GD-Zn

10...30 V DC

10 %

≤ 35 mA

PNP- or NPN-Transistor
Light-/dark-on (selectable)

200 mA

≤ 3 V (PNP)/≤ 2.5 V (NPN)

Potentiometer 270°

Laser, red light

640 nm

1

0.15 mm

≤ 15 μm

≤ 50 μm

0.16 ms

5 kHz

LED yellow

M8 connector, 3-pin

GD-Zn

Glass

233 g

IP 67

yes

yes

-10...+60 °C

EN 60947-5-2

LED yellow

10...30 V DC

10 %

≤ 35 mA

PNP- or NPN-Transistor
Light-/dark-on (selectable)

200 mA

≤ 3 V (PNP), ≤ 2.5 V (NPN)

Potentiometer 270°

Laser, red light

640 nm

1

0.2 mm

≤ 20 μm

≤ 70 μm

0.16 ms

5 kHz

LED yellow

M8 connector, 3-pin

GD-Zn

Glass

334 g

IP 67

yes

yes

-10...+60 °C

EN 60947-5-2

Recommended accessories

please order separately

Connector
Straight BKS-_ 48
Right-angle BKS-_ 49



2.2

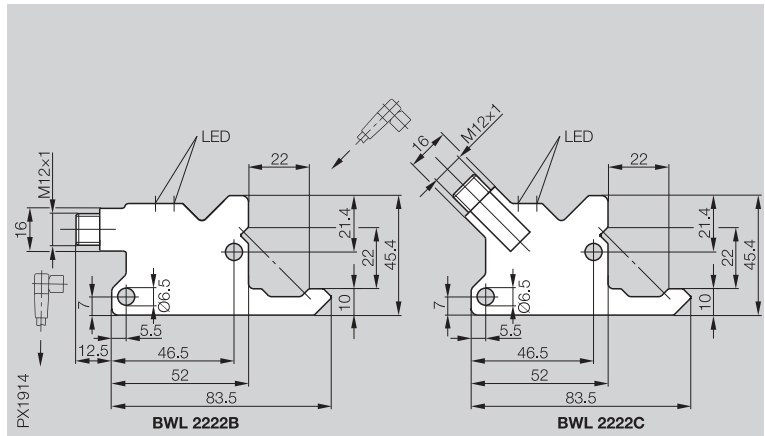
2.3

Photoelectric
sensors
accessories
page 2.3.2 ...

5

Connectors ...
page 5.2 ...

Series	BWL	BWL
Optical axis	22 mm/22 mm	22 mm/22 mm



Angle sensor

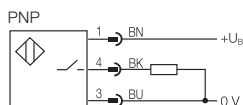


	BWL 2222B-001-S4	BWL 2222C-001-S4
PNP		
Electrical data		
Supply voltage U_B	10...30 V DC	10...30 V DC
Ripple	15 %	15 %
No-load supply current I_0 max.	≤ 35 mA	≤ 35 mA
Switching output	PNP-Transistor	PNP-Transistor
Output current	≤ 200 mA	≤ 200 mA
Switching type	Dark-on	Dark-on
Voltage drop U_d at I_e	≤ 2.5 V	≤ 2.5 V
Optical data		
Emitter, light type	LED, infrared	LED, infrared
Wavelength	880 nm	880 nm
Time data		
Ready delay	100 ms	100 ms
Response time	≤ 0.5 ms	≤ 0.5 ms
Switching frequency f	1 kHz	1 kHz
Indicators		
Power-on indicator	LED green	LED green
Output function indicator	LED yellow	LED yellow
Mechanical data		
Dimensions	45.4x83.5x10.7 mm	45.4x83.5x10.7 mm
Connection	M12 connector, 4-pin	M12 connector, 4-pin
Housing material	corrosion-resistant steel	corrosion-resistant steel
Optical surface	PMMA	PMMA
Weight	106 g	99 g
Ambient data		
Degree of protection per IEC 60529	IP 67	IP 67
Polarity reversal protected	yes	yes
Short circuit protected	yes	yes
Ambient temperature range T_a	-10...+60 °C	-10...+60 °C
Ambient light rejection per	EN 60947-5-2	EN 60947-5-2



Connector orientation

Wiring diagram



Angle Sensors

Photoelectric Sensors

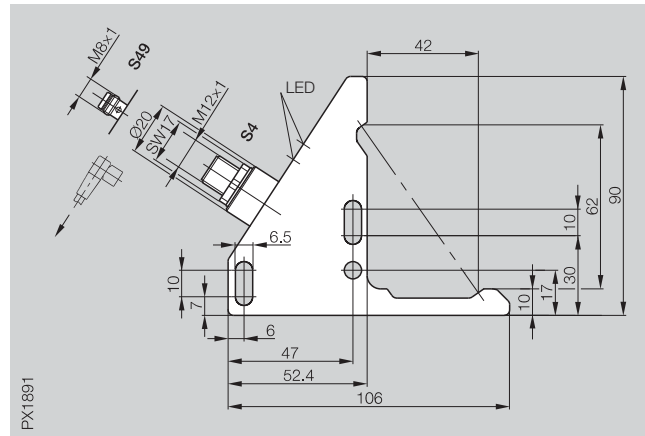
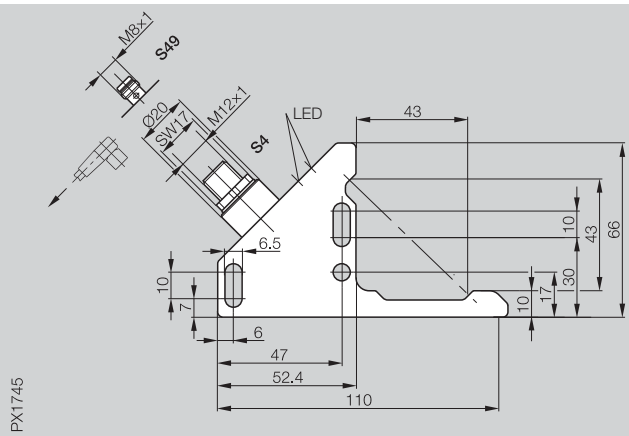
BWL
Angle Sensors

BWL
43 mm/43 mm

BWL
43 mm/43 mm

BWL
42 mm/62 mm

BWL
42 mm/62 mm



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

15 %

15 %

15 %

15 %

≤ 35 mA

≤ 35 mA

≤ 35 mA

≤ 35 mA

PNP-Transistor

PNP-Transistor

PNP-Transistor

PNP-Transistor

≤ 200 mA

≤ 200 mA

≤ 200 mA

≤ 200 mA

Dark-on

Dark-on

Dark-on

Dark-on

≤ 2.5 V

≤ 2.5 V

≤ 2.5 V

≤ 2.5 V

LED, infrared
880 nm

LED, infrared
880 nm

LED, infrared
880 nm

LED, infrared
880 nm

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

LED green
LED yellow

LED green
LED yellow

LED green
LED yellow

LED green
LED yellow

66×110×10.7 mm
M12 connector, 4-pin
corrosion-resistant steel

66×110×10.7 mm
M8 connector, 3-pin
corrosion-resistant steel

90×106×10.7 mm
M12 connector, 4-pin
corrosion-resistant steel

90×106×10.7 mm
M8 connector, 3-pin
corrosion-resistant steel

PMMA

PMMA

PMMA

PMMA

148 g

124 g

181 g

155 g

IP 67

IP 67

IP 67

IP 67

yes

yes

yes

yes

yes

yes

yes

yes

-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

Recommended accessories

please order separately

Connector
Straight BKS-_ 19
Right-angle BKS-_ 20



Connector
Straight BKS-_ 48
Right-angle BKS-_ 49



2.2

2.3

Photoelectric sensors
accessories
page 2.3.2 ...

5

Connectors ...
page 5.2 ...