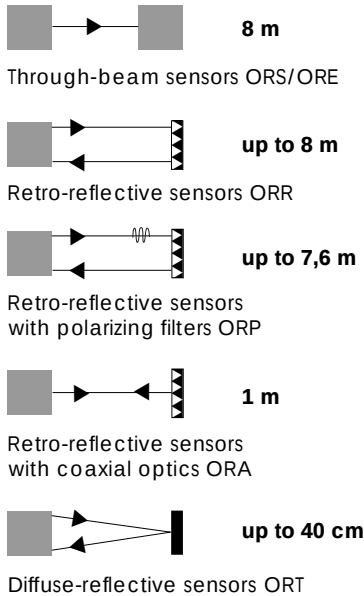


Series OR

Industrial – proven – graceful sensors in a robust metal housing



High functionality

Diverse principles with large ranges

ELESTA's OR sensors are available as through-beam sensors, retro-reflective sensors with and without polarizing filters, as well as diffuse-reflective sensors. Additionally, retro-reflective sensors with *coaxial optics* and diffuse-reflective sensors with *background suppression* are available.

Sensors with *coaxial optics*

The ORA sensors work according to the coaxial optics principle (see page 6). Because they have no blind range, they are very effective code-readers.

Light reserve warning indicator

All of the sensors in the OR series contain a *light-reserve warning indicator* (blinking function indicator) for controlling dirt build-up on the lenses and as an *alignment aid*.

High switching frequency

All OR sensors have a 1000 Hz switching frequency, allowing for the reliable detection of even fast moving objects.

Wide supply voltage range

The allowable supply voltage range is 10...45 VDC.

Low power consumption

The OR sensors distinguish themselves with an extremely small power consumption of less than 20 mA.

Test input as option

As an option, the OR sensors are available with *test input*, for confirming that the sensor is operating properly. A sensor with *test input* has only one output, either *light-on* or *dark-on*.

Simple installation and operation

Adjustable range

The optical *range* of each OR sensor can be adjusted to meet the specific application.

Versatile mounting options

The OR sensors have two large counter-sunk holes for flat mounting, as well as an M4 thread for mounting from the back.

Various connection versions

All OR sensors are available standard with a 2m cable or an M8 connector.

Compact housing with low lying optics and function indicator in front

The OR sensors distinguish themselves especially with a compact 12 mm wide housing. A very bright *function indicator* at the top of the optical filter is easily seen from the front and side of the sensor. These sensors can therefore be mounted into tight slots.



Reliable for the highest demands

Robust construction with IP 67 sealing

The OR photoelectric sensors are built in a die-cast zinc housing, and are protected against water and dust. The sensors meet the *sealing* requirements of IP 67.

EMC-tested

The OR sensors are tested according to IEC 801, EN50081-1 and EN50082-2. This assures trouble free use even in high electromagnetically contaminated environments.

High ambient light rejection

Thanks to pulse modulation and a multi-level disturbance rejection, the OR sensors are extremely insensitive to foreign light sources.

Reverse polarity protection

All of the OR sensor's electrical connections are protected against reverse wiring.

Short-circuit protection

The OR sensor's transistor outputs are electronically protected against short circuit.

Power-up output suppression

During power-up the outputs of the OR sensors are blocked for typically 30 msec.

Glass-protected optics

Partially standard, but also as an option, the OR sensors are available with a glass window to protect the optics against aggressive chemicals and mechanical damage (scratching).

Designation code

OR x xxx xxx xx

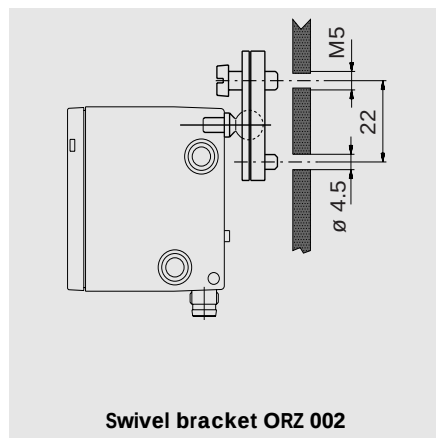
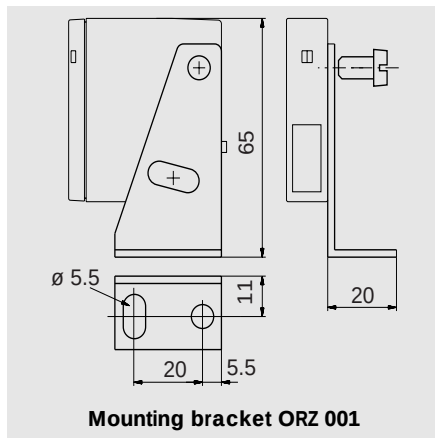
Principle	Supply	Outputs	Connection	Electr. option	Light	Range
A: Retro-reflective with coaxial optics	2: 10-45 VDC	KA: No output	0: Cable special length	00: Range adjustable	I: Infrared	ORS/ORE: 1: 8 m
E: Through-beam receiver		NA: NPN <i>light- and dark-on</i>	1: Cable 2 m	01: Range adjustable, <i>test input</i>	R: Red	ORP/ORR/ORR: 1: 3,5 m 2: 4 m 3: 1 m
P: Retro-reflective with polarizing filters		ND: NPN <i>dark-on</i>	5: Connector M8	40: Range not adjustable		ORT: 1: 5 cm 2: 10 cm 3: 20 cm 4: 40 cm
R: Retro-reflective		NH: NPN <i>light-on</i>	6: Connector Torson (on a 20 cm long cable)	41: Range not adjustable, <i>test input</i>		
S: Through-beam emitter		PA: PNP <i>light- and dark-on</i>				
T: Diffuse-reflective		PD: PNP <i>dark-on</i>				
Z: Accessory		PH: PNP <i>light-on</i>				

Accessories

Retroreflectors: see page 130

Connector cables: see page 128

Mounting:



Through-beam sensors, in a metal housing



- Robust die-cast zinc housing
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- Test input
- Connections: Cable, 2 meter
Connector, M8
Connector, Torson, on 20 cm long cable (option)
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation¹⁾

Output
Connection
Range adjustment

Optical data²⁾

Max. range
Emitter

Electrical data²⁾

Supply voltage U _s
Allowable ripple
Current consumption (without load)
Max. load current I _L
Residual voltage
Max. switching frequency
Test input: emitter on emitter off
Test input inverse: emitter on emitter off

Environmental data

Sealing
Temperature T _A (operating and storage)
Weight

Emitter		Receiver			
ORS 2KA 101 I1	ORS 2KA 501 I1	ORE 2NA 140 I1	ORE 2NA 540 I1	ORE 2PA 140 I1	ORE 2PA 540 I1
		NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M8	Cable 2 m	Connector M8	Cable 2 m	Connector M8
Yes		No			
8 m					
Infrared-LED, 880 nm, pulsed					
10...45 VDC					
+/- 10% of U _s					
< 25 mA		< 20 mA			
		250 mA			
		< 1,6 V			
		1000 Hz			
> 8 V or open < 1,5 V					
open or < 1,5 V > 8 V					
IP 67					
-20...+60 °C					
ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g

1) For product designation of sensors with options see designation code on page 67.
2) When not otherwise noted, all technical data at T_A = 25 °C and U_s = 24 V.

10...45 VDC

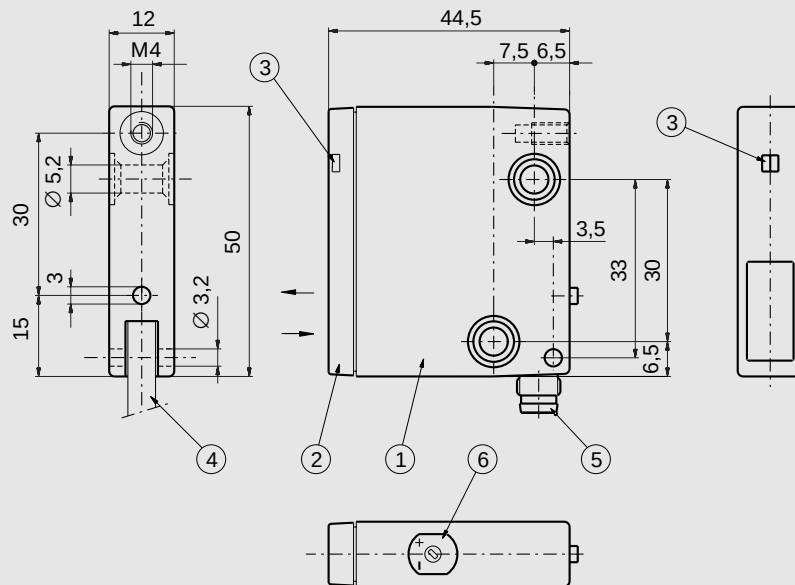
NPN / PNP
light-on and
dark-on output



8 m

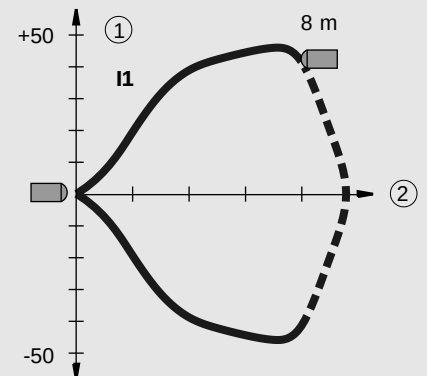
ORS/ORE

Dimensions (50 mm x 44,5 mm x 12 mm)



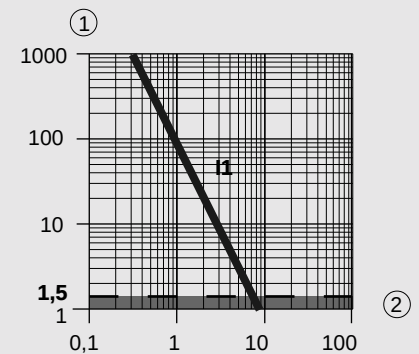
- | | |
|--|--------------------|
| ① Housing | ④ Cable |
| ② Lens/filter | ⑤ Connector M8 |
| ③ Emitter: operation indicator
Receiver: function indicator | ⑥ Range adjustment |

Optical diagrams



Typical beam diameter

- ① Diameter in (cm)
② Range in (m)

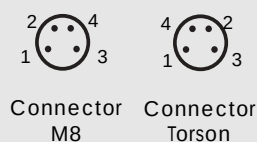
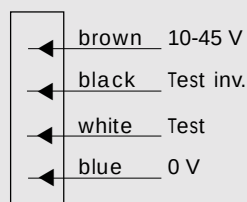


Typical excess gain curve

- ① Gain factor
② Range in (m)

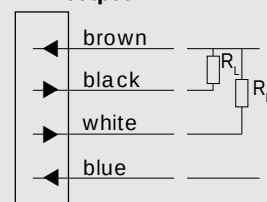
Wiring diagram

Emitter



Receiver

NPN-output



Connection for connector M8	Wire color
1	brown
2	white
3	blue
4	black

⊕ Supply voltage 10...45 V

Light-on output

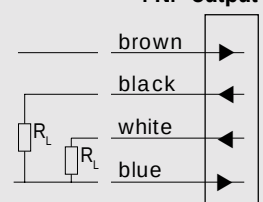
Dark-on output

⊖ Supply voltage

Light-on output:
Output energized when no object is present.

Dark-on output:
Output energized when object is present.

PNP-output



Retro-reflective sensors, in a metal housing



- Robust die-cast zinc housing
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- Test input (option)
- Connections: Cable, 2 meter
Connector, M8
Connector, Torson, on 20 cm long cable (option)
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation¹⁾

Output
Connection
Range adjustment

Optical data²⁾

Range
Emitter

Electrical data²⁾

Supply voltage U _s
Allowable ripple
Current consumption (without load)
Max. load current I _L
Residual voltage
Max. switching frequency

Environmental data

Sealing
Temperature T _A (operating and storage)
Weight

Option¹⁾

Test input: emitter on
emitter off

ORR 2NA 100 I2	ORR 2NA 500 I2	ORR 2PA 100 I2	ORR 2PA 500 I2
NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M8	Cable 2 m	Connector M8
Yes			
0,1...4 m (retroreflector OZR 001)			
Infrared-LED, 950 nm, pulsed			
10...45 VDC			
+/- 10% of U _s			
< 20 mA			
250 mA			
< 1,6 V			
1000 Hz			
IP 67			
-20...+60 °C			
ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g

+ U _s or open	
< 1,5 V	< U _s - 8 V

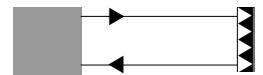
1) For product designation of sensors with options see designation code on page 67.
2) When not otherwise noted, all technical data at T_A = 25 °C and U_s = 24 V.

Retro-reflector ●	Range	Retro-reflector ■	Range	Retro-reflective tape	Range
OZR 001	0.10 – 4.0 m	OZR 101	0.05 – 6.2 m	OZR 201*	0.25 – 1.3 m
OZR 002	0.09 – 3.5m	OZR 102	0.10 – 2.2 m	OZR 202	0.35 – 3.1 m
OZR 003	0.15 – 1.5 m	OZR 103	0.05 – 4.8 m	OZR 203	0.25 – 2.2 m
		OZR 104	0.05 – 8.0 m	OZR 204*	0.25 – 2.0 m
				OZR 205*	0.25 – 3.0 m

* 30 cm long

10...45 VDC

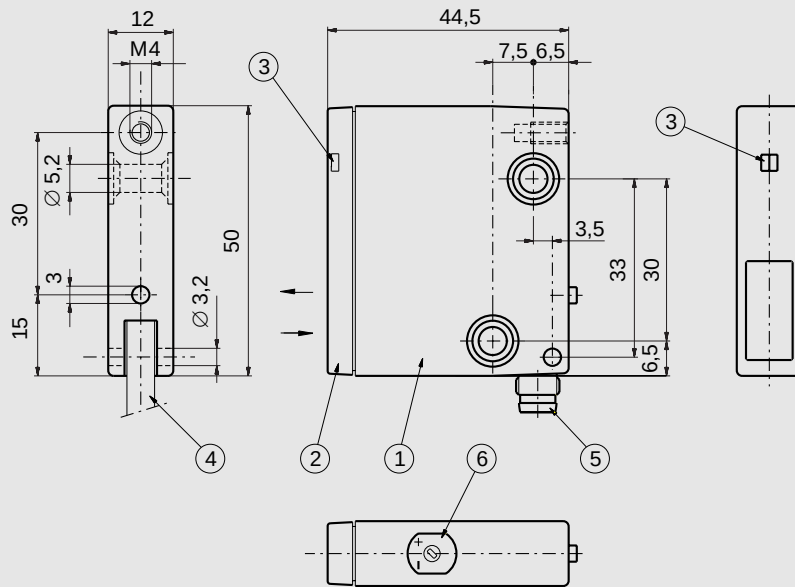
NPN / PNP
light-on and
dark-on output



up to 8 m

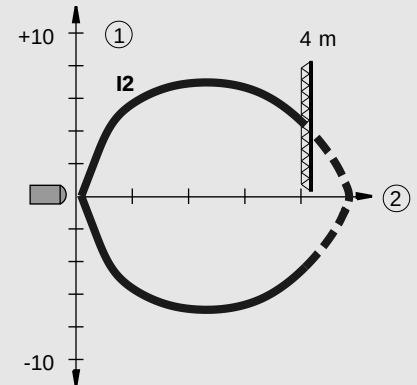
ORR

Dimensions (50 mm x 44,5 mm x 12 mm)



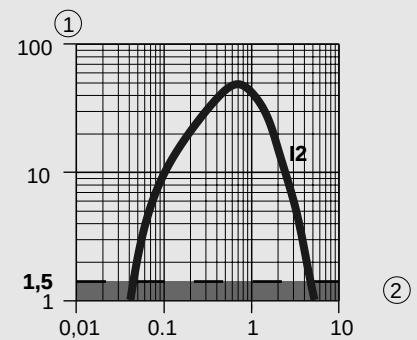
- ① Housing
- ② Lens/filter
- ③ Function indicator
- ④ Cable
- ⑤ Connector M8
- ⑥ Range adjustment

Optical diagrams



Typical beam diameter
(with retroreflector OZR 001)

- ① Diameter in (cm)
- ② Range in (m)

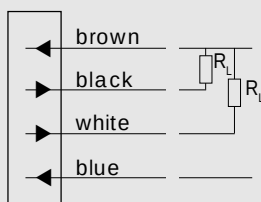


Typical excess gain curve
(with retroreflector OZR 001)

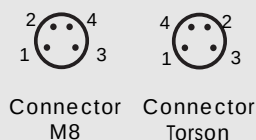
- ① Gain factor
- ② Range in (m)

Wiring diagram

NPN-output

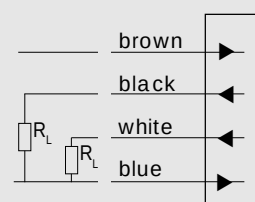


- ⊕ Supply voltage 10...45 V
- Light-on output
- Dark-on output
- ⊖ Supply voltage



Connection for connector M8	Wire color	Connection for test input
1	brown	Supply+
2	white	Test input
3	blue	Supply-
4	black	Output

PNP-output



Light-on output:
Output energized when no object is present.

Dark-on output:
Output energized when object is present.

Retro-reflective sensors with polarizing filters, in a metal housing



- Robust die-cast zinc housing
- Glass protected optics
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- Test input (option)
- Connections: Cable, 2 meter
Connector, M8
Connector, Torson, on 20 cm long cable (option)
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation¹⁾

Output
Connection
Range adjustment

Optical data²⁾

Range
Emitter

Electrical data²⁾

Supply voltage U_s
Allowable ripple
Current consumption (without load)
Max. load current I_L
Residual voltage
Max. switching frequency

Environmental data

Sealing
Temperature T_A (operating and storage)
Weight

Option¹⁾

Test input: emitter on
emitter off

ORP 2NA 100 R1	ORP 2NA 500 R1	ORP 2PA 100 R1	ORP 2PA 500 R1
NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M8	Cable 2 m	Connector M8
Yes			
0,3...3,5 m (retroreflector OZR 001)			
Visible-red LED, 660 nm, pulsed, with polarizing filter			
10...45 VDC			
+/- 10% of U_s			
< 20 mA			
250 mA			
< 1,6 V			
1000 Hz			
IP 67			
-20...+60 °C			
ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g

+ U_s or open	
< 1,5 V	< U_s - 8 V

1) For product designation of sensors with options see designation code on page 67.

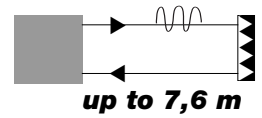
2) When not otherwise noted, all technical data at $T_A = 25\text{ °C}$ and $U_s = 24\text{ V}$.

Retro-reflector ●	Range	Retro-reflector ■	Range	Retro-reflective tape	Range
OZR 001	0.30 – 3.5 m	OZR 101	0.15 – 5.0 m	OZR 201	0 m
OZR 002	0.15 – 3.4 m	OZR 102	0.20 – 1.9 m	OZR 202	0 m
OZR 003	0.25 – 1.4 m	OZR 103	0.15 – 4.8 m	OZR 203	0.35 – 1.7 m
		OZR 104	0.15 – 7.6 m	OZR 204*	0.35 – 1.3 m
				OZR 205*	0.35 – 1.7 m

* 30 cm long

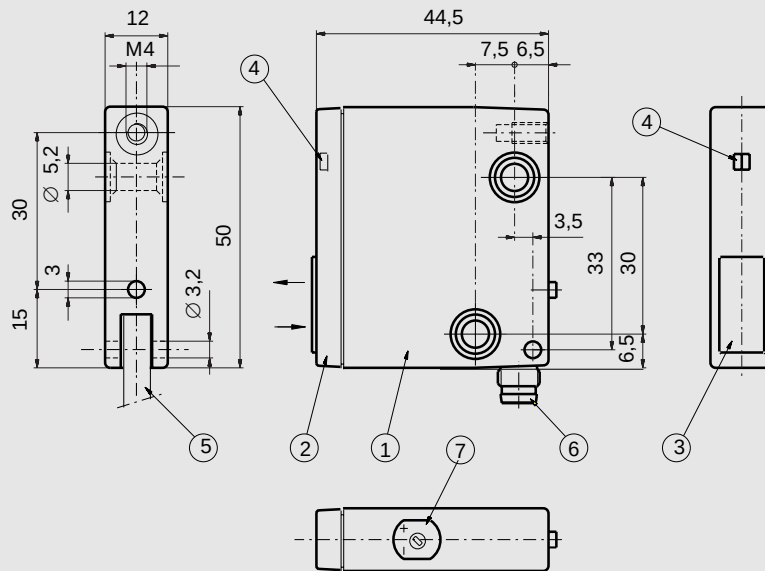
10...45 VDC

NPN / PNP
light-on and
dark-on output



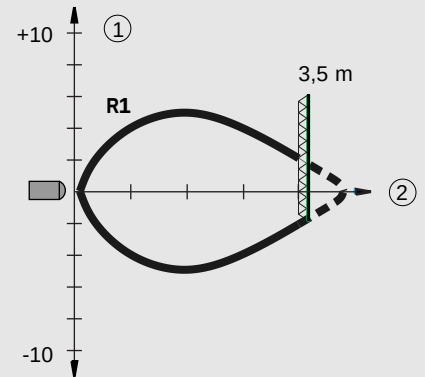
ORP

Dimensions (50 mm x 44,5 mm x 12 mm)



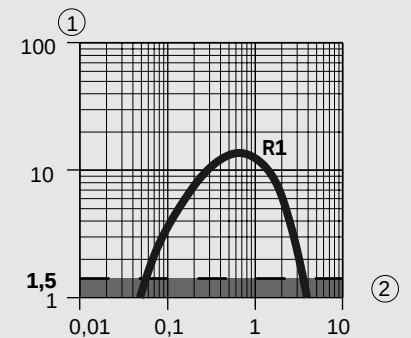
- ① Housing
- ② Lens/filter
- ③ Glass cover
- ④ Function indicator
- ⑤ Cable
- ⑥ Connector M8
- ⑦ Range adjustment

Optical diagrams



Typical beam diameter
(with retroreflector OZR 001)

- ① Diameter in (cm)
- ② Range in (m)

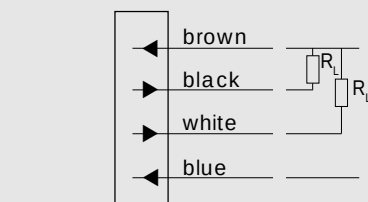


Typical excess gain curve
(with retroreflector OZR 001)

- ① Gain factor
- ② Range in (m)

Wiring diagram

NPN-output

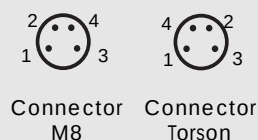


⊕ Supply voltage 10...45 V

Light-on output

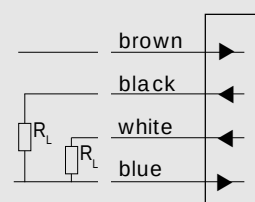
Dark-on output

⊖ Supply voltage



Connection for connector M8	Wire color	Connection for test input
1	brown	Supply+
2	white	Test input
3	blue	Supply-
4	black	Output

PNP-output



Light-on output:
Output energized when no object is present.

Dark-on output:
Output energized when object is present.

Retro-reflective sensors with coaxial optics, in a metal housing



- Robust die-cast zinc housing
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- Test input (option)
- Connections: Cable, 2 meter
Connector, M8
Connector, Torson, on 20 cm long cable (option)
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation¹⁾

Output
Connection
Range adjustment

Optical data²⁾

Range
Emitter

Electrical data²⁾

Supply voltage U_s
Allowable ripple
Current consumption (without load)
Max. load current I_L
Residual voltage
Max. switching frequency

Environmental data

Sealing
Temperature T_A (operating and storage)
Weight

Option¹⁾

Test input: emitter on
emitter off

ORA 2NA 100 I3	ORA 2NA 500 I3	ORA 2PA 100 I3	ORA 2PA 500 I3
NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M8	Cable 2 m	Connector M8
Yes			
0...1 m (retroreflector OZR 001)			
Infrared-LED, 950 nm, pulsed			
10...45 VDC			
+/- 10% of U_s			
< 20 mA			
250 mA			
< 1,6 V			
1000 Hz			
IP 67			
-20...+60 °C			
ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g

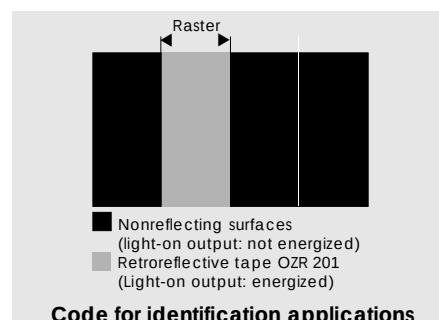
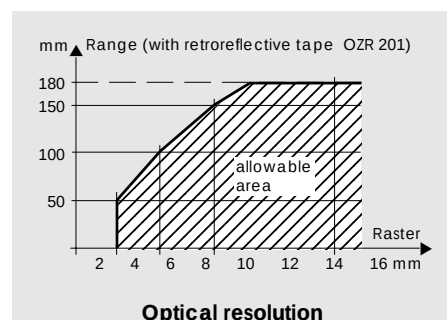
+ U_s or open	
< 1,5 V	< U_s - 8 V

1) For product designation of sensors with options see designation code on page 67.

2) When not otherwise noted, all technical data at $T_A = 25^\circ\text{C}$ and $U_s = 24\text{ V}$.

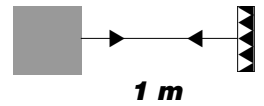
ORA as a code reader

The retro-reflective sensor with coaxial optics is particularly suitable for simple identification applications. For identification purposes a code raster, created from retroreflective tape OZR 201 and nonreflecting surfaces, is necessary. The range for reading this code is dependent on the raster width (↔ Optical resolution).



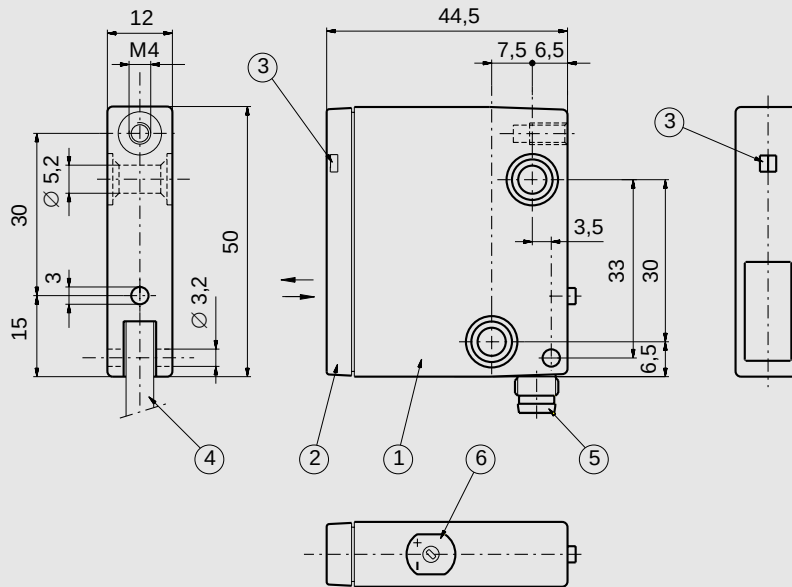
10...45 VDC

NPN / PNP
light-on and
dark-on output



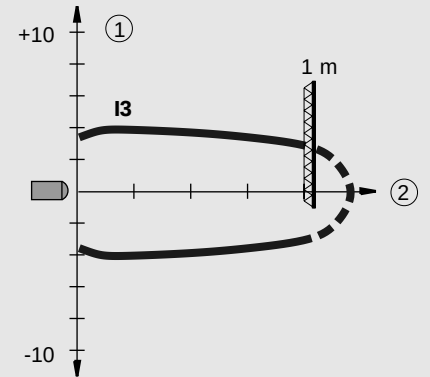
ORA
code reader

Dimensions (50 mm x 44,5 mm x 12 mm)



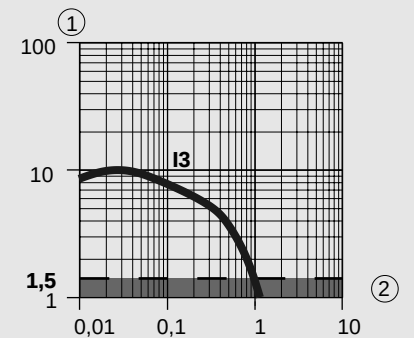
- ① Housing
- ② Lens/filter
- ③ Function indicator
- ④ Cable
- ⑤ Connector M8
- ⑥ Range adjustment

Optical diagrams



Typical beam diameter
(with retroreflector OZR 001)

- ① Diameter in (cm)
- ② Range in (m)

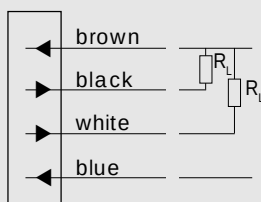


Typical excess gain curve
(with retroreflector OZR 001)

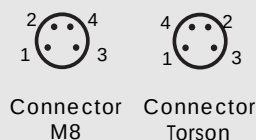
- ① Gain factor
- ② Range in (m)

Wiring diagram

NPN output

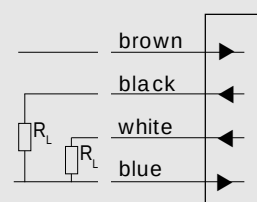


- ⊕ Supply voltage 10...45 V
- Light-on output
- Dark-on output
- ⊖ Supply voltage



Connection for connector M8	Wire color	Connection for test input
1	brown	Supply+
2	white	Test input
3	blue	Supply-
4	black	Output

PNP output



Light-on output:
Output energized when no object is present.

Dark-on output:
Output energized when object is present.

Diffuse-reflective sensors, range 5/10 cm, with background suppression, in a metal housing



- Robust die-cast zinc housing
- Background suppression
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- 1000 Hz switching frequency
- Connections: Cable, 2 meter
Connector, M8
Connector, Torson, on 20 cm long cable (option)
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation¹⁾

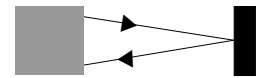
Output
Connection
Range adjustment
Optical data ²⁾
Max. range
Emitter
Electrical data ²⁾
Supply voltage U _s
Allowable ripple
Current consumption (without load)
Max. load current I _L
Residual voltage
Max. switching frequency
Environmental data
Sealing
Temperature T _A (operating and storage)
Weight

ORT 2NA 100 I1	ORT 2NA 500 I1	ORT 2PA 100 I1	ORT 2PA 500 I1	ORT 2NA 100 I2	ORT 2NA 500 I2	ORT 2PA 100 I2	ORT 2PA 500 I2
NPN (light-/dark-on)		PNP (light-/dark-on)		NPN (light-/dark-on)		PNP (light-/dark-on)	
Cable 2 m	Connector M8	Cable 2 m	Connector M8	Cable 2 m	Connector M8	Cable 2 m	Connector M8
Yes							
5 cm (Kodak card white, 10 x 10 cm)				10 cm (Kodak card white, 10 x 10 cm)			
Infrared-LED, 880 nm, pulsed							
10...45 VDC							
+/- 10% of U _s							
< 20 mA							
250 mA							
< 1,6 V							
1000 Hz							
IP 67							
-20...+60 °C							
ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g

1) For product designation of sensors with options see designation code on page 67.
2) When not otherwise noted, all technical data at T_A = 25 °C and U_s = 24 V.

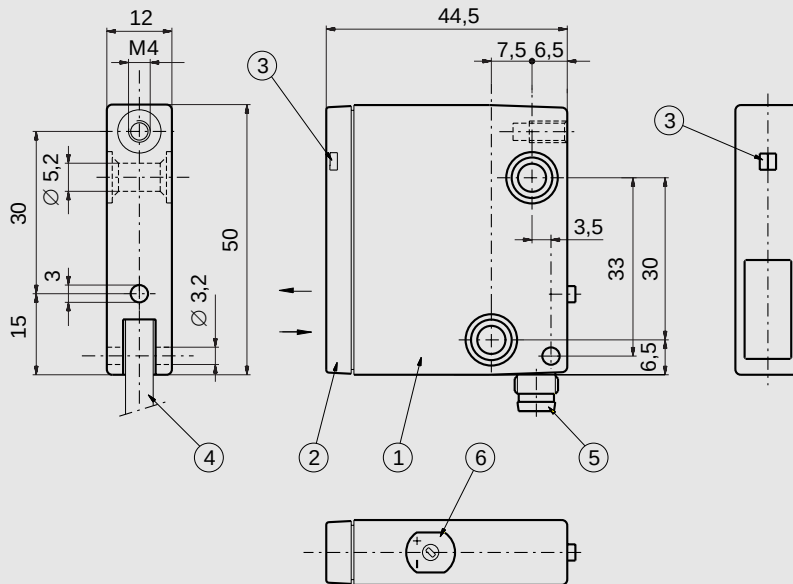
10...45 VDC

NPN / PNP
light-on and
dark-on output



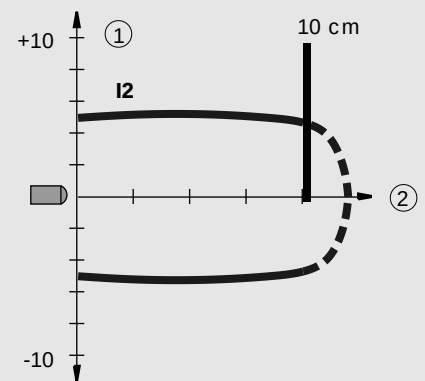
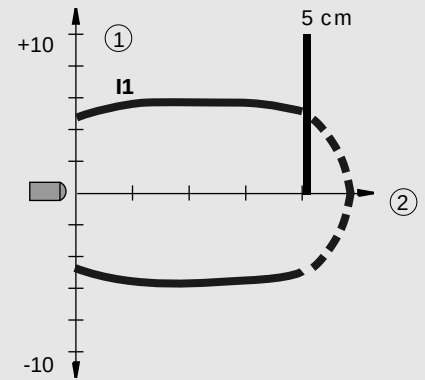
ORT

Dimensions (50 mm x 44,5 mm x 12 mm)



- | | |
|----------------------|--------------------|
| ① Housing | ④ Cable |
| ② Lens/filter | ⑤ Connector M8 |
| ③ Function indicator | ⑥ Range adjustment |

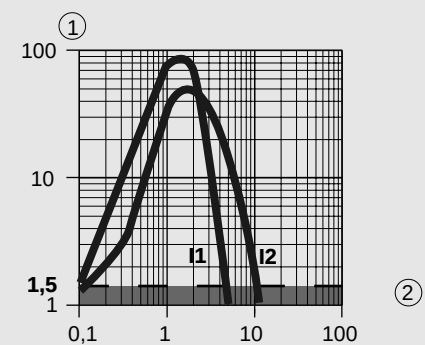
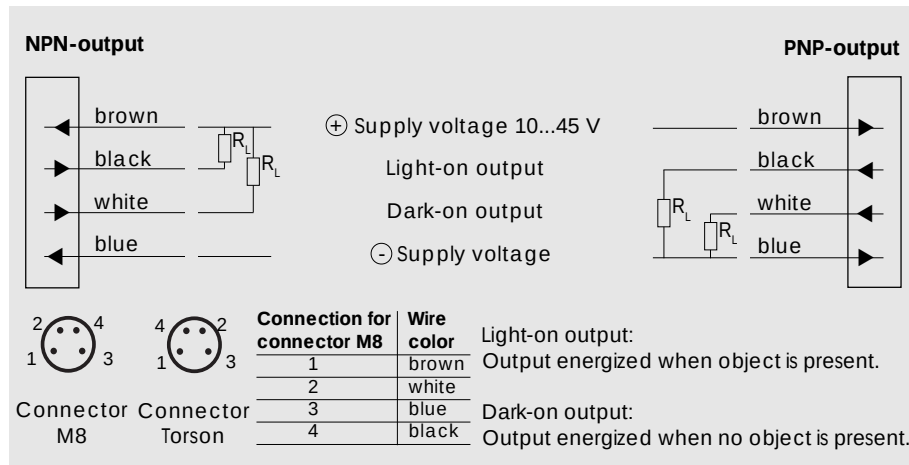
Optical diagrams



Typical beam diameter
(with Kodak card white, 10 x 10 cm)

- ① Diameter in (cm)
② Range in (cm)

Wiring diagram



Typical excess gain curve
(with Kodak card white, 10 x 10 cm)

- ① Gain factor
② Range in (cm)

Diffuse-reflective sensors, range 20/40 cm, in a metal housing



- Robust die-cast zinc housing
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- 1000 Hz switching frequency
- Connections: Cable, 2 meter
Connector, M8
Connector, Torson, on 20 cm long cable (option)
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation¹⁾

Output
Connection
Range adjustment
Optical data ²⁾
Max. range
Emitter
Electrical data ²⁾
Supply voltage U_s
Allowable ripple
Current consumption (without load)
Max. load current I_L
Residual voltage
Max. switching frequency
Environmental data
<i>Sealing</i>
Temperature T_A (operating and storage)
Weight

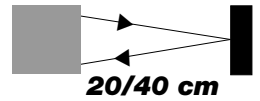
ORT 2NA 100 I3	ORT 2NA 500 I3	ORT 2PA 100 I3	ORT 2PA 500 I3	ORT 2NA 100 I4	ORT 2NA 500 I4	ORT 2PA 100 I4	ORT 2PA 500 I4
NPN (light-/dark-on)		PNP (light-/dark-on)		NPN (light-/dark-on)		PNP (light-/dark-on)	
Cable 2 m	Connector M8	Cable 2 m	Connector M8	Cable 2 m	Connector M8	Cable 2 m	Connector M8
Yes							
20 cm (Kodak card white, 10 x 10 cm)				40 cm (Kodak card white, 10 x 10 cm)			
Infrared-LED, 880 nm, pulsed							
10...45 VDC							
+/- 10% of U _s							
< 20 mA							
250 mA							
< 1,6 V							
1000 Hz							
IP 67							
-20...+60 °C							
ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g	ca. 150 g	ca. 85 g

1) For product designation of sensors with options see designation code on page 67.

2) When not otherwise noted, all technical data at $T_A = 25\text{ °C}$ and $U_s = 24\text{ V}$.

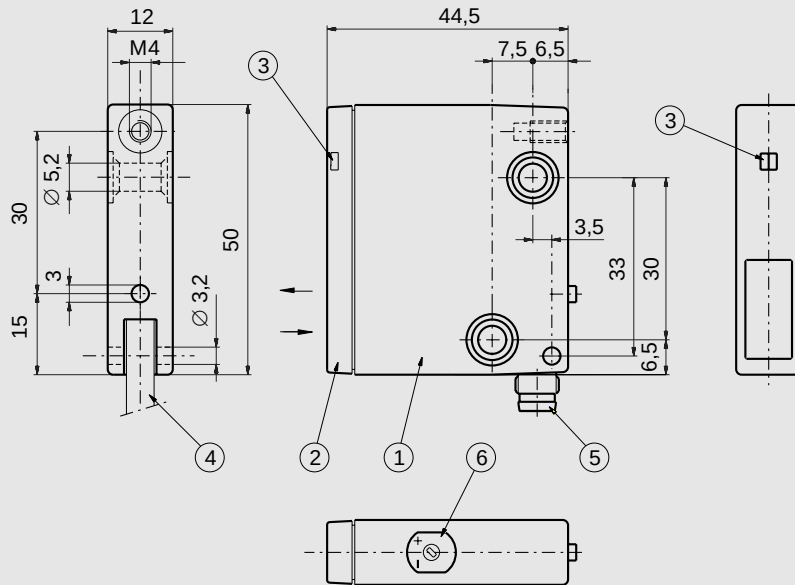
10...45 VDC

NPN / PNP
light-on and
dark-on output



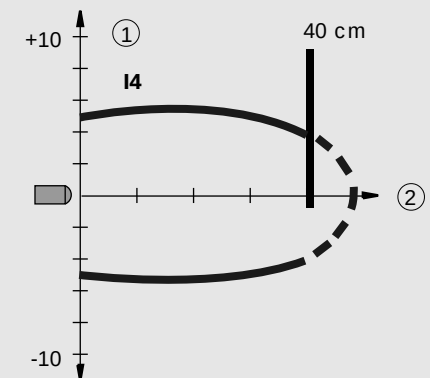
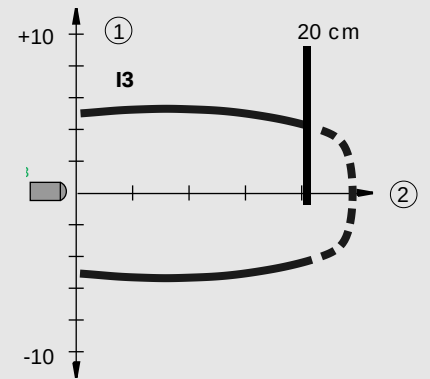
ORT

Dimensions (50 mm x 44,5 mm x 12 mm)



- ① Housing
- ② Lens/filter
- ③ Function indicator
- ④ Cable
- ⑤ Connector M8
- ⑥ Range adjustment

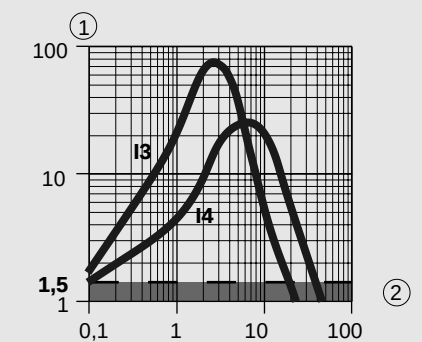
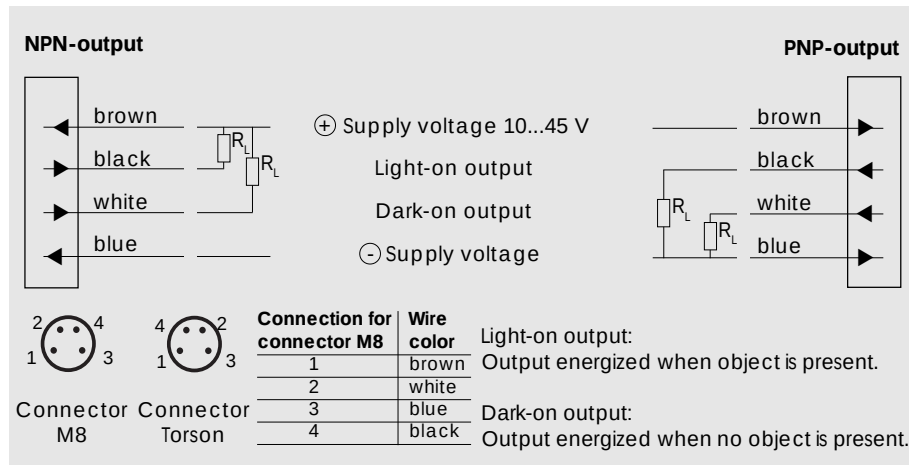
Optical diagrams



Typical beam diameter
(with Kodak card white, 10 x 10 cm)

- ① Diameter in (cm)
- ② Range in (cm)

Wiring diagram



Typical excess gain curve
(with Kodak card white, 10 x 10 cm)

- ① Gain factor
- ② Range in (cm)