

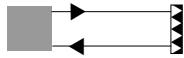
# Series M1

## Short and sweet – the metric M18, a highlight among many



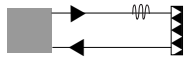
up to 35 m

Through-beam sensors M1S/M1E



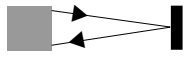
up to 6,2 m

Retro-reflective sensors M1R



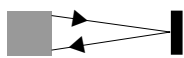
up to 5,4 m

Retro-reflective sensors  
with polarizing filters M1P and M1C



up to 55 cm

Diffuse-reflective sensors M1T



10 cm

Diffuse-reflective sensors  
with background rejection M1H



### High functionality

#### Diverse operating principles

ELESTA's M1 sensors are available as through-beam sensors, retro-reflective sensors with and without polarizing filters, diffuse-reflective sensors, as well as retro-reflective sensors for transparent objects. Additionally, diffuse-reflective sensors with background rejection are available.

#### Light reserve warning indicator

All of the sensors in the M1 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 M1 sensors have a 1000 Hz switching frequency, allowing for the reliable detection of even fast moving objects.

#### Low power consumption

The M1 sensors distinguish themselves with an extremely small power consumption of less than 15 mA.

#### Test input

The M1 through-beam sensors are available standard with *test input*, for confirming that the sensor is operating properly.

### Simple installation and operation

#### Unique angle optics

The diameter of the right angle optics head is no greater than that of the sensor housing. Therefore, the right angle optics sensors are very easy to bore mount. These sensors are optionally available with an extended stainless steel case for protection of the right angle optic head.



#### Various connection versions

All M1 sensors are available standard with a 4 wire 2 m cable or a 4 pin M12 connector.

#### User friendly adjustment button with integrated function indicator

The optical range of each M1 sensor can be adjusted to meet the specific application. The range is comfortably adjusted with a Nr. 2 screwdriver on a robust range adjustment button. The function indicator is integrated in the adjustment button and is visible over a wide angle even under bright ambient light conditions.



### Reliable for the highest demands

#### Robust construction with IP 67 sealing

The M1 photoelectric sensors are built with a polyamide 12 or stainless steel housing, and are protected against water and dust. The sensors meet the *sealing* requirements of IP 67.

#### EMC-tested

The M1 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 multilevel disturbance rejection, the M1 sensors are extremely insensitive to foreign light sources.

#### Reverse polarity protection

All of the M1 sensor's electrical connections are protected against reverse wiring.

#### Short-circuit protection

The M1 sensor's transistor outputs are electronically protected against short circuit.

#### Power-up output suppression

During power-up the outputs of the M1 sensors are blocked for typically 30 msec.

#### Glass-protected optics

As an option, the M1 sensors are available with a glass window to protect the optics against aggressive chemicals and mechanical damage (scratching).

**Designation code**

M1 X XXX XXX XXX

Housing
: Polyamid
M: Stainless steel
S: Stainless steel (protected angle optic head)

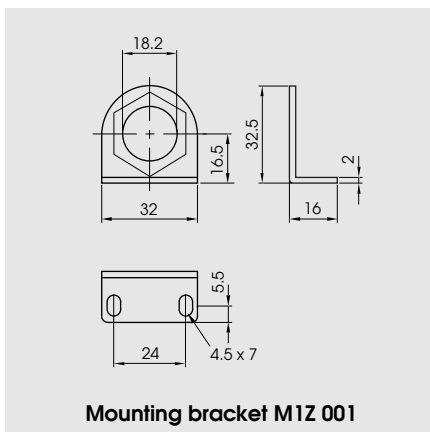
Principle	Supply	Outputs	Connection	Electr. option	Light	Range
C: Retro-reflective for transparent objects E: Through-beam receiver H: Diffuse-reflective with background rejection P: Retro-reflective with polarizing filters R: Retro-reflective S: Through-beam emitter T: Diffuse-reflective Z: Accessory	1: 10-30 VDC	KA: No output NA: NPN <i>light- and dark-on</i> PA: PNP <i>light- and dark-on</i>	1: Cable 2 m 4: Connector M12	00: Range adjustable 01: Range adjustable, <i>test input</i> 40: Range not adjustable 41: Range not adjustable, <i>test input</i>	A: Right angle optic, red I: Straight optic, infrared R: Straight optic, red W: Right angle optic, infrared	M1S/M1E: 1: 15 m 2: 10 m 3: 10 m 4: 35 m M1R/M1P/M1C: 1: 2,5 m 2: 3 m 3: 2 m 4: 2,5 m 5: 1,5 m M1T/H: 1: 10 cm 2: 20 cm 3: 40 cm 4: 55 cm 5: 5 cm 6: 10 cm

**Accessories**

**Retroreflectors:** see page 130

**Connector cables:** see page 128

**Mounting:**



# Retro-reflective sensors with polarizing filters, M18 housing



- Range adjustable
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- 1000 Hz switching frequency
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- Connections: Straight cable, 2 meter Connector, M12
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation Plastic housing <sup>1)</sup>

Product designation Stainless steel <sup>1)</sup>

Output

Connection

Range adjustment

Optical data <sup>2)</sup>

Range

Emitter

Electrical data <sup>2)</sup>

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 Plastic/Stainless steel

M1P 1NA 100 R1	M1P 1NA 400 R1	M1P 1PA 100 R1	M1P 1PA 400 R1
M1P 1NA 100 R1M	M1P 1NA 400 R1M	M1P 1PA 100 R1M	M1P 1PA 400 R1M
NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M12	Cable 2 m	Connector M12
Yes			
0,15...2,5 m (retroreflector OZR 001)			
Visible-red LED, 660 nm, pulsed, with polarizing filter			
10...30 VDC			
+/- 10% of $U_{sp}$			
< 15 mA			
100 mA			
< 1,6 V			
1000 Hz			
IP 67			
-25...+65 °C			
Connector M12: ca.15/25 g , Cable 2 m: ca. 100/110 g			

1) For product designation of sensors with options see designation code on page 23.

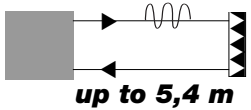
2) When not otherwise noted, all technical data at  $T_A = 25\text{ °C}$  and  $U_s = 24\text{ V}$ .

Retro-reflector ●	Range	Retro-reflector ■	Range	Retro-reflective tape	Range
OZR 001	0.15 – 2.5 m	OZR 101	0.03 – 4.0 m	OZR 201	0 m
OZR 002	0.06 – 2.3 m	OZR 102	0.09 – 1.5 m	OZR 202	0 m
OZR 003	0.09 – 1.0 m	OZR 103	0.03 – 3.2 m	OZR 203	0.25 – 1.3 m
		OZR 104	0.03 – 5.4 m	OZR 204*	0.25 – 0.9 m
				OZR 205*	0.25 – 1.3 m

\* 30 cm long

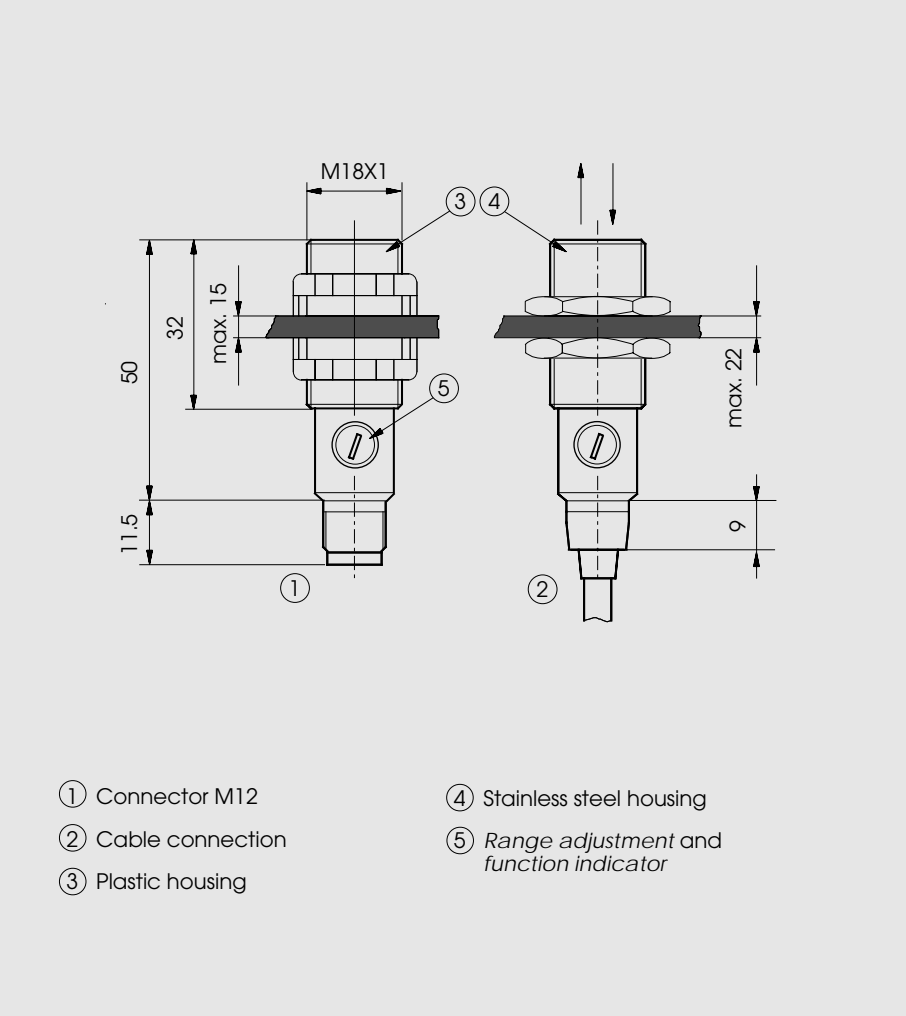
10...30 VDC

NPN / PNP  
light-on and  
dark-on output

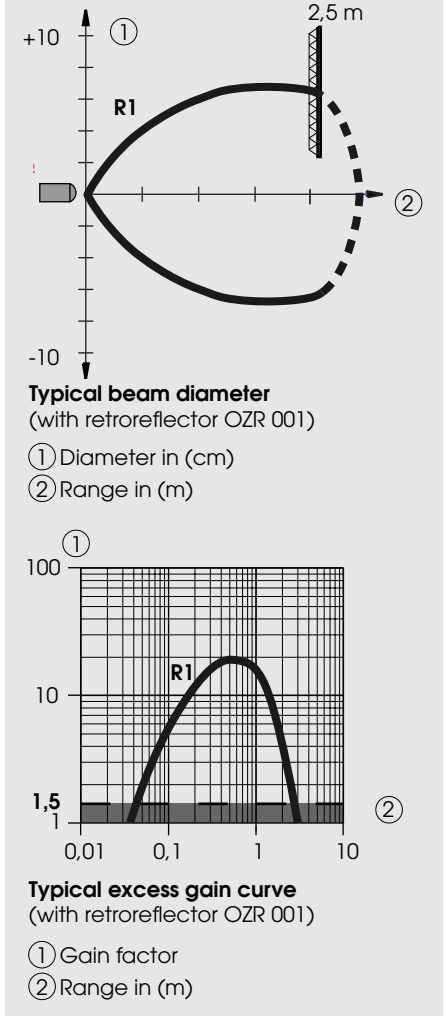


**M1P**

**Dimensions (50 mm, M18 x 1)**



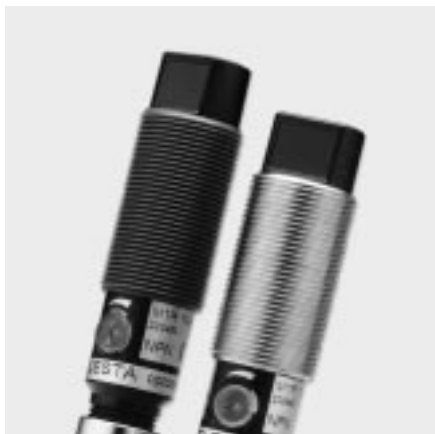
**Optical diagrams**



**Wiring diagram**



# Retro-reflective sensors with polarizing filters, right angle optics, M18 housing



- Range adjustable
- Glass protected optics
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- 1000 Hz switching frequency
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- Extended stainless steel case for protection of angle optic head (option)
- Connections: Straight cable, 2 meter  
Connector, M12
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation Plastic housing <sup>1)</sup>

Product designation Stainless steel <sup>1)</sup>

Output

Connection

Range adjustment

Optical data <sup>2)</sup>

Range

Emitter

Electrical data <sup>2)</sup>

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 Plastic/Stainless steel

M1P 1NA 100 A3	M1P 1NA 400 A3	M1P 1PA 100 A3	M1P 1PA 400 A3
M1P 1NA 100 A3M	M1P 1NA 400 A3M	M1P 1PA 100 A3M	M1P 1PA 400 A3M
NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M12	Cable 2 m	Connector M12
Yes			
0,09...2 m (retroreflector OZR 001)			
Visible-red LED, 660 nm, pulsed, with polarizing filter			
10...30 VDC			
+/- 10% of $U_{sp}$			
< 15 mA			
100 mA			
< 1,6 V			
1000 Hz			
IP 67			
-25...+65 °C			
Connector M12: ca.15/25 g , Cable 2 m: ca. 100/110 g			

1) For product designation of sensors with options see designation code on page 23.

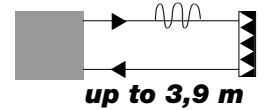
2) When not otherwise noted, all technical data at  $T_A = 25\text{ °C}$  and  $U_s = 24\text{ V}$ .

Retro-reflector ●	Range	Retro-reflector ■	Range	Retro-reflective tape	Range
OZR 001	0.09 – 2.0 m	OZR 101	0.03 – 3.1 m	OZR 201	0 m
OZR 002	0.08 – 1.9 m	OZR 102	0.08 – 1.1 m	OZR 202	0 m
OZR 003	0.08 – 0.8 m	OZR 103	0.03 – 2.6 m	OZR 203	0.15 – 1.0 m
		OZR 104	0.03 – 3.9 m	OZR 204*	0.15 – 0.7 m
				OZR 205*	0.15 – 1.0 m

\* 30 cm long

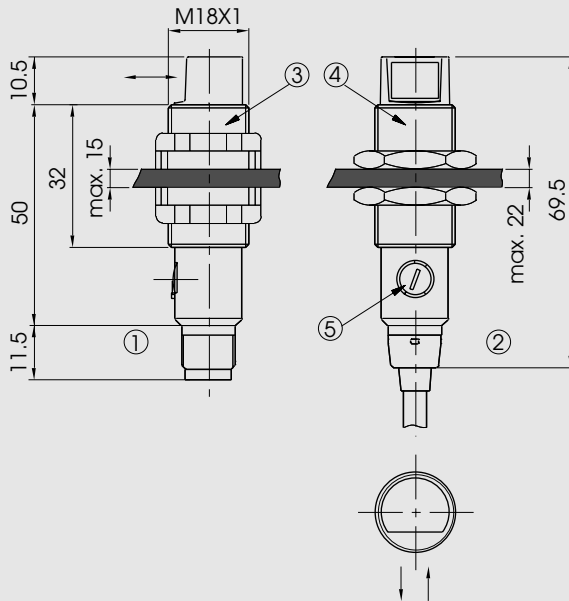
10...30 VDC

NPN / PNP  
light-on and  
dark-on output



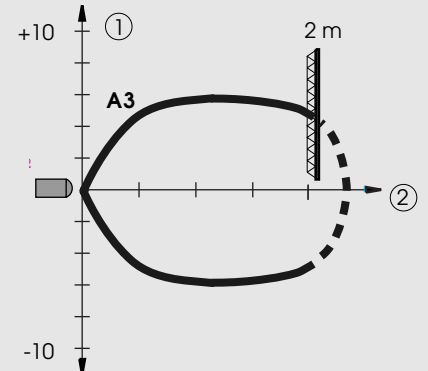
## M1P right angle optics

### Dimensions (60.5 mm, M18 x 1)



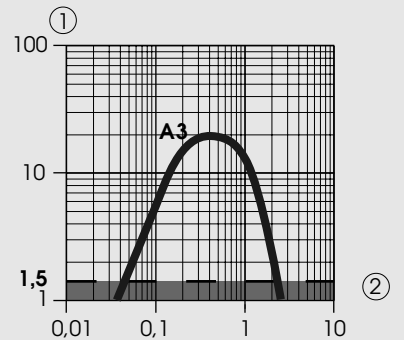
- ① Connector M12
- ② Cable connection
- ③ Plastic housing
- ④ Stainless steel housing
- ⑤ Range adjustment and function indicator

### Optical diagrams



**Typical beam diameter**  
(with retroreflector OZR 001)

- ① Diameter in (cm)
- ② Range in (m)

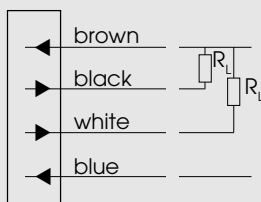


**Typical excess gain curve**  
(with retroreflector OZR 001)

- ① Gain factor
- ② Range in (m)

### Wiring diagram

#### NPN output



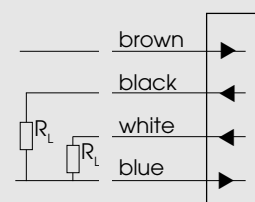
⊕ Supply voltage 10...30 V

Light-on output

Dark-on output

⊖ Supply voltage

#### PNP output



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

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



Connection for connector M12	Wire color
1	brown
2	white
3	blue
4	black

# Retro-reflective sensors with polarizing filters, for transparent objects, M18 housing



- Increased switching accuracy for detecting glass or transparent plastics
- Range adjustable
- Light reserve warning indicator
- Dual transistor outputs, NPN or PNP
- 1000 Hz switching frequency
- Short-circuit protection, reverse polarity protection, and power-up output suppression
- Connections: Straight cable, 2 meter Connector, M12
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation Plastic housing <sup>1)</sup>

Product designation Stainless steel <sup>1)</sup>

Output

Connection

Range adjustment

Optical data <sup>2)</sup>

Range

Emitter

Electrical data <sup>2)</sup>

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 Plastic/Stainless steel

M1C 1NA 100 R5	M1C 1NA 400 R5	M1C 1PA 100 R5	M1C 1PA 400 R5
M1C 1NA 100 R5M	M1C 1NA 400 R5M	M1C 1PA 100 R5M	M1C 1PA 400 R5M
NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M12	Cable 2 m	Connector M12
Yes			
0,05...3,5 m (retroreflector OZR 104)			
Visible-red LED, 660 nm, pulsed, with polarizing filter			
10...30 VDC			
+/- 10% of $U_{sp}$			
< 15 mA			
100 mA			
< 1,6 V			
1000 Hz			
IP 67			
-25...+65 °C			
Connector M12: ca.15/25 g , Cable 2 m: ca. 100/110 g			

1) For product designation of sensors with options see designation code on page 23.

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

## Technical explanation

To detect very transparent objects, best results are obtained, when decreasing the range adjustment of the sensor to the threshold, between a continuously lit function indicator and a blinking function indicator. In this condition (function indicator blinking) a glass window inserted into the optical path, will be reliably detected.

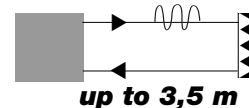
Retro-reflector ●	Range	Retro-reflector ■	Range	Retro-reflective tape	Range
OZR 001*	0.25 – 1.5 m	OZR 101	0.08 – 1.5 m	OZR 201	0 m
OZR 002	0.10 – 1.4 m	OZR 102	0.08 – 1.1 m	OZR 202	0 m
OZR 003	0 m	OZR 103	0.03 – 2.6 m	OZR 203	0.14 – 1.0 m
		OZR 104	0.05 – 3.5 m	OZR 204	0 m
				OZR 205**	0.4 – 0.8 m

\* not recommended for bottle detection

\*\* 30 cm long

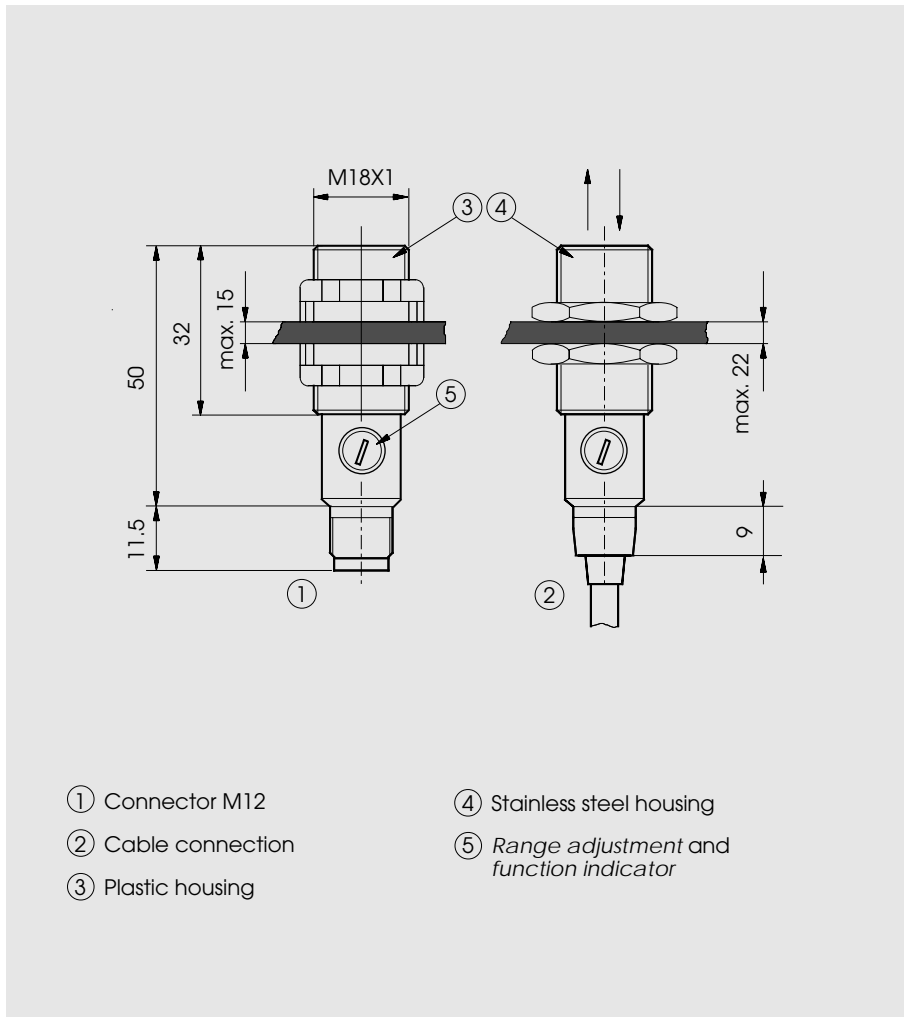
10...30 VDC

NPN / PNP  
light-on and  
dark-on output



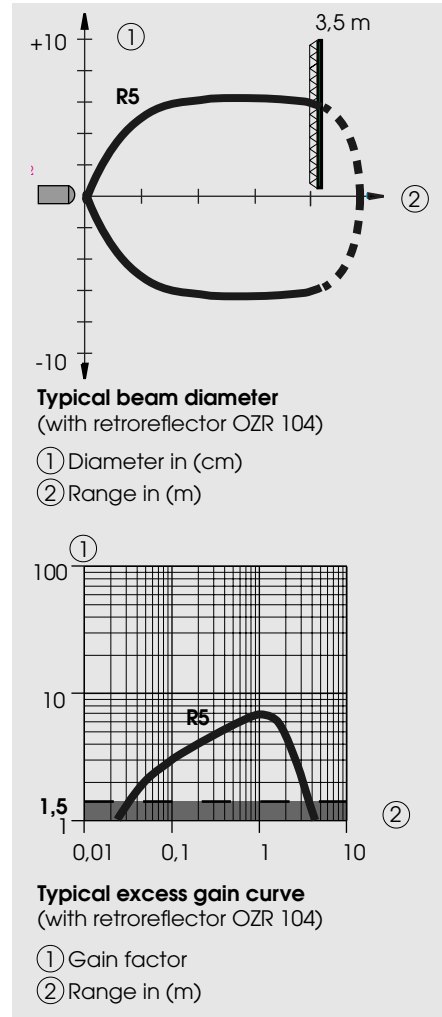
**M1C**

**Dimensions (50 mm, M18 x 1)**



- ① Connector M12
- ② Cable connection
- ③ Plastic housing
- ④ Stainless steel housing
- ⑤ Range adjustment and function indicator

**Optical diagrams**



**Wiring diagram**

