

Fiber optic sensors and cables



Fiber optic sensors OPG, OPK, OMT and fiber optic cables



High functionality

Diverse operating principles

For OP and OM fiber optic sensors, there are fiber optic cables available for through-beam systems, as well as diffuse-reflective systems.

Glass and plastic fiber optic cables

There are fiber optic sensors in the OP series with a glass fiber optic connection (OPG) and sensors with plastic fiber optic connection (OPK). The OM fiber optic sensors are only usable with glass fiber optic cables.

Light reserve warning indicator

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

High switching frequencies

All OP and OM fiber optic sensors have a 1000 Hz switching frequency, allowing for the reliable detection of even fast moving objects.

Low power consumption

The OP and OM fiber optic sensors distinguish themselves with an extremely small power consumption of less than 15 mA.

Test input as option

As an option, the OP and OM fiber optic 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 fiber optic sensor can be adjusted to meet the specific application.

Various connection versions

All fiber optic sensors are available standard with a 2m cable or an M12 connector. As an option, an M8 connector (OP), or a Torson connector (OP,OM) or a right angle 2m cable (OM) are available.

Shortening plastic fiber optics

A few of the plastic fiber optic cables are easily cut to the desired length. To create a clean connection, cutters are available as an accessory.

Convenient fiber optic connection

The glass fiber optic cables are mounted with a screw connection, the plastic fiber optic cables with a special clamping terminal.



Reliable for the highest demands

Robust construction

The OP and OM fiber optic sensors are built with a glass-sphere reinforced polyamide housing.

EMC-tested

The OP and OM fiber optic 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 OP and OM fiber optic sensors are extremely insensitive to foreign light sources.

Reverse polarity protection

All of the OP and OM fiber optic sensor's electrical connections are protected against reverse wiring.

Short-circuit protection

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

Power-up output suppression

During power-up the outputs of the OP and OM fiber optic sensors are blocked for typically 30 msec.

Designation code OPG, OPK

OP x xxx xxx xx

Principle	Supply	Outputs	Connection	Electr. option	Light	Range
G: Fiber optic sensor for glass fiber optics K: Fiber optic sensor for plastic fiber optics	1: 10-30 VDC	NA: NPN <i>light- and dark-on</i> ND: NPN <i>dark-on</i> NH: NPN <i>light-on</i> PA: PNP <i>light- and dark-on</i> PD: PNP <i>dark-on</i> PH: PNP <i>light-on</i>	1: Cable 2 m 4: Connector M12 5: Connector M8 6: Connector Torson	00: Range adjustable 01: Range adjustable, <i>test input</i> 40: Range not adjustable 41: Range not adjustable, <i>test input</i>	I: Infrared R: Red	1: Standard (range depends on fiber optic cable)

Designation code fiber optic cables

OZL xxx x xxx

Material: fiber/sheath	Principle	Fiber cross section	Connection	Length	Sensing head	Head diameter
0: Glass/Metal tube 1: Glass/Plastic 2: Glass/Metal $T_A < 250\text{ }^\circ\text{C}$ 5: Single plastic fiber/Plastic	1: Through-beam 4: Diffuse-reflective mixed 6: Diffuse-reflective 50/50	1: 0,5 mm 2: 1 mm 5: 3 mm 6: 4 mm	A: M18 for OMT B: M12 for OPG C: 2,2 mm plastic fiber, cuttable D: 2,2 mm plastic fiber, not cuttable	0: 10 cm 1: 25 cm 2: 50 cm 3: 100 cm	0: Tube 4: Ferruled 5: Threaded 6: Threaded plus bendable tube 7: Threaded plus lens	0: 1,5 mm 1: 3 mm/M3 2: 4 mm/M4 4: M6 6: M8

Accessories

Connector cables: see page 128

Mounting: see page 132

Fiber optic sensors OPG for glass fiber optics and OPK for plastic fiber 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)
- Versions with up to 5000 Hz switching frequency available
- Connections: Cable, 2 meter
Connector, M12
Connector, M8 (option)
Connector, Torson (option)
- EMC tested according to IEC 801 and EN 50081-1/EN 50082-2



Product designation ¹⁾

Output

Connection

Range adjustment

Optical data ²⁾

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

OPG 1NA 100 I1	OPG 1NA 400 I1	OPG 1PA 100 I1	OPG 1PA 400 I1	OPK 1NA 100 R1	OPK 1NA 400 R1	OPK 1PA 100 R1	OPK 1PA 400 R1
NPN (light-/dark-on)		PNP (light-/dark-on)		NPN (light-/dark-on)		PNP (light-/dark-on)0	
Cable 2 m	Connector M12	Cable 2 m	Connector M12	Cable 2 m	Connector M12	Cable 2 m	Connector M12
Yes							
depends on the selected fiber optic cable							
Infrared LED, 880 nm, pulsed				Visible-red LED, 660 nm, pulsed			
10...30 VDC							
+/- 10% of U_s							
< 15 mA							
200 mA							
< 1,6 V							
1000 Hz							
IP 65				IP 50			
-25...+65 °C							
ca. 100 g	ca. 35 g	ca. 100 g	ca. 35 g	ca. 100 g	ca. 35 g	ca. 100 g	ca. 35 g

Option ¹⁾

Test input: emitter on

emitter off

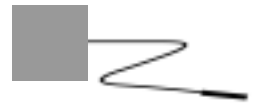
+ U_s or open			
< 1,5 V	< U_s - 8 V	< 1,5 V	< U_s - 8 V

1) For product designation of sensors with options see designation code on page 117.

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

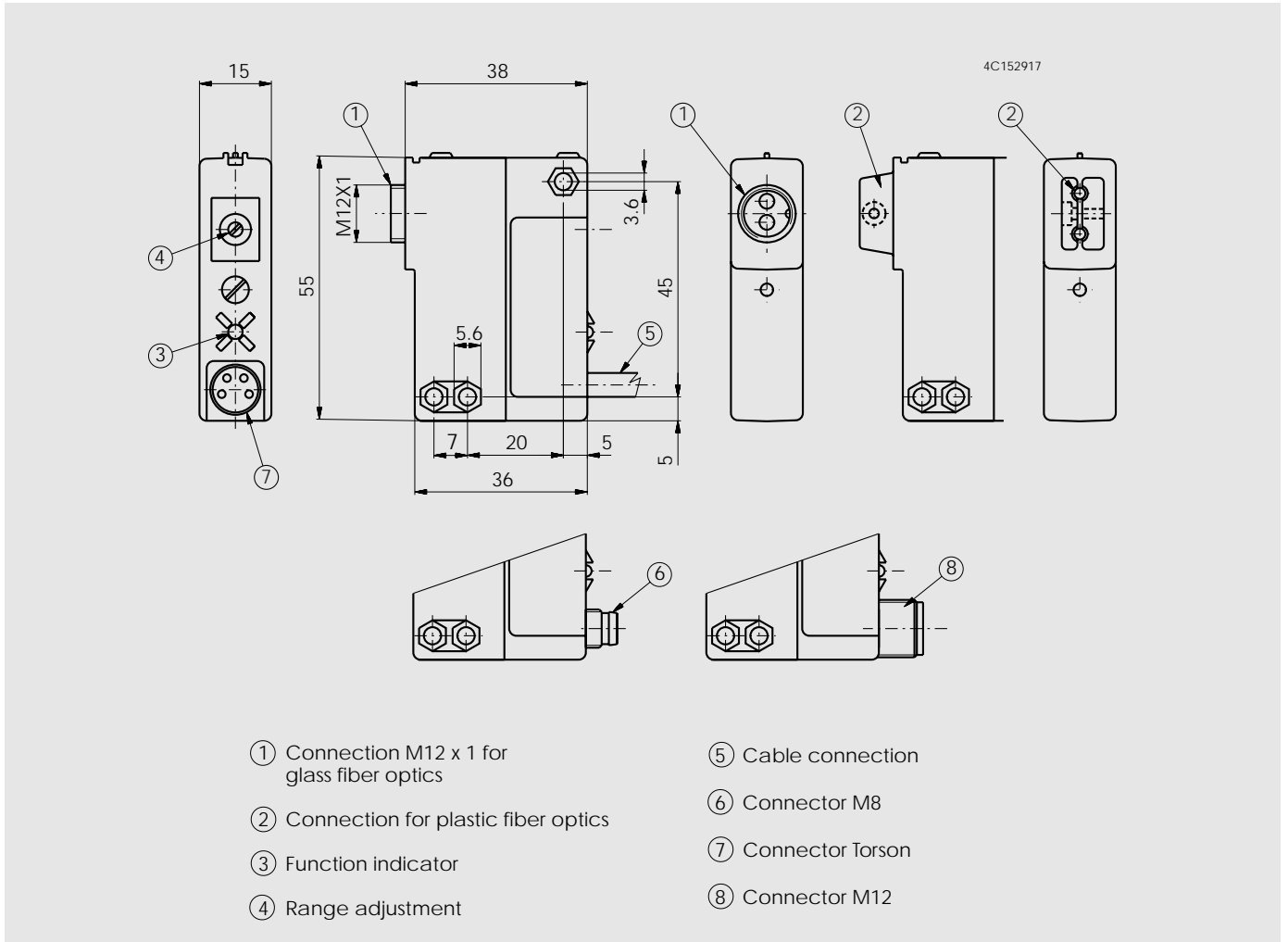
10...30 VDC

NPN / PNP
light-on and
dark-on output

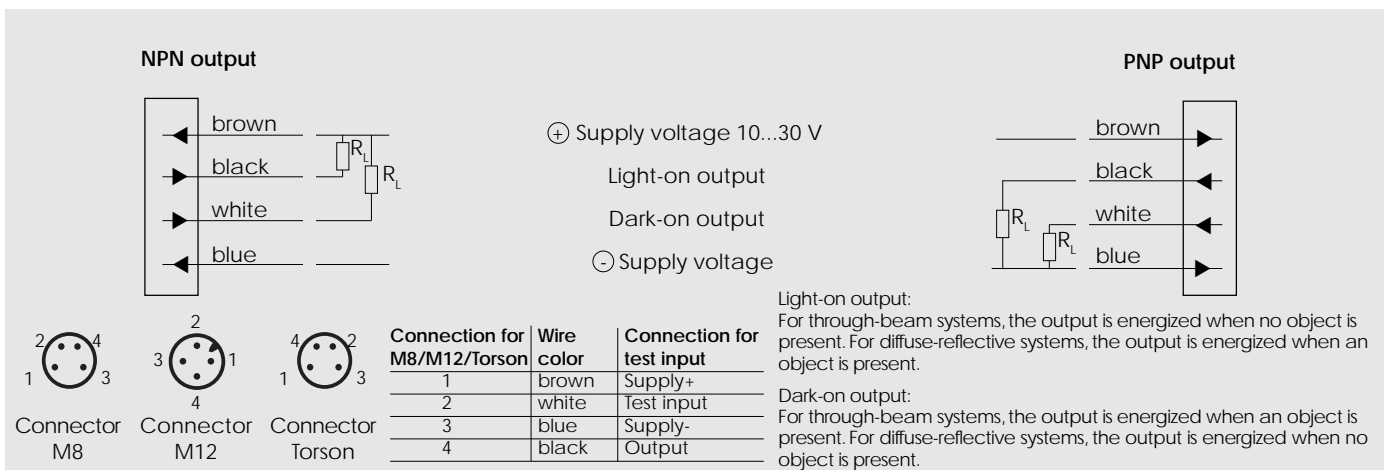


OPG, OPK

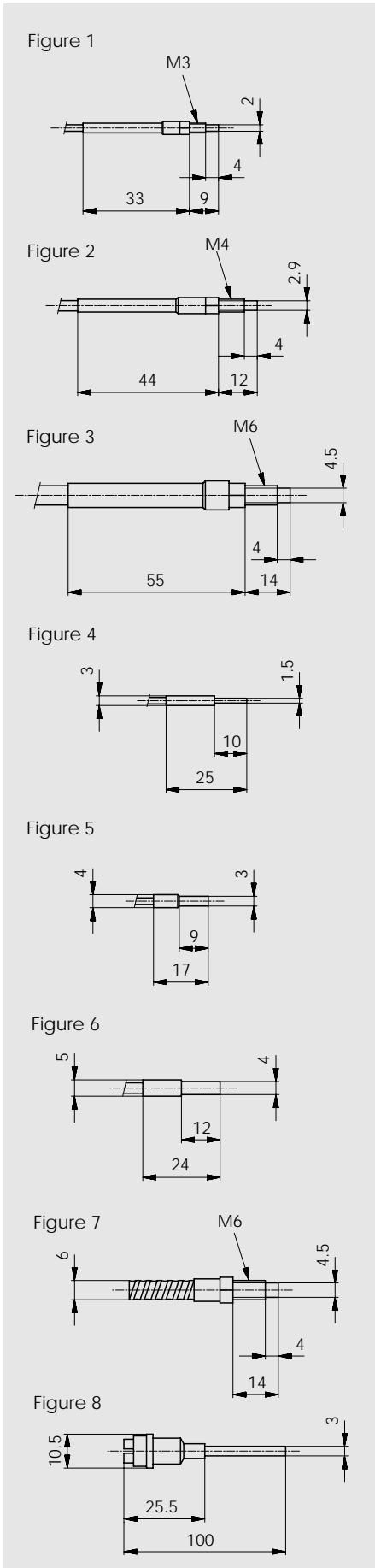
Dimensions (55 mm x 38 mm x 15 mm)



Wiring diagram



Dimensions



Through-beam

Fig.	Sensing head	Sheathing material	Cross section	Length	Range	Product designation
2	Threaded M4	Plastic (-25...+80 °C)	2 x 4 mm ²	50 cm	500 mm	OZL 116 B 252
5	Ferruled 3 mm	Plastic (-25...+80 °C)	2 x 1 mm ²	50 cm	200 mm	OZL 112 B 241
6	Ferruled 4 mm	Plastic (-25...+80 °C)	2 x 4 mm ²	50 cm	500 mm	OZL 116 B 242
6	Ferruled 4 mm	Metal (-25...+250 °C)	2 x 4 mm ²	50 cm	500 mm	OZL 216 B 242

Diffuse-reflective

Fig.	Sensing head	Sheathing material	Cross section	Length	Range ¹⁾	Product designation
1	Threaded M3	Plastic (-25...+80 °C)	2 x 0,5 mm ²	25 cm	15 mm	OZL 141 B 151
2	Threaded M4	Plastic (-25...+80 °C)	2 x 1 mm ²	25 cm	30 mm	OZL 142 B 152
3	Threaded M6	Plastic (-25...+80 °C)	2 x 4 mm ²	25 cm	90 mm	OZL 146 B 154
4	Ferruled 1,5 mm	Plastic (-25...+80 °C)	2 x 0,5 mm ²	25 cm	15 mm	OZL 141 B 140
7	Threaded M6	Metal (-25...+250 °C)	2 x 3 mm ²	50 cm	80 mm	OZL 245 B 254
8	Ferruled 3 mm	Tube (-25...+120 °C)	2 x 1 mm ²	10 cm	30 mm	OZL 042 B 001

1) Measured with Kodak card white, 10 x10 cm

Important mounting instructions:

Do not bend the glass fiber optic cables sharply. The bending radius may not be smaller than three times the sheathing diameter. Do not subject the fiber optic cables to mechanical forces (i.e. pulling, pressure, or twisting). The light emitting surfaces must also be protected from mechanical damage.

These glass fiber optic cables are only for use with fiber optic sensors OPG.

Dimensions

Figure 1

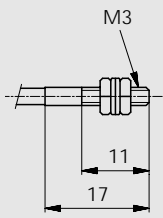


Figure 2

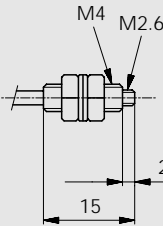


Figure 3

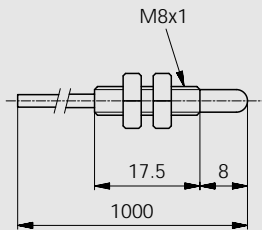


Figure 4

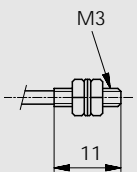


Figure 5

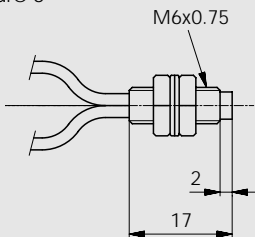
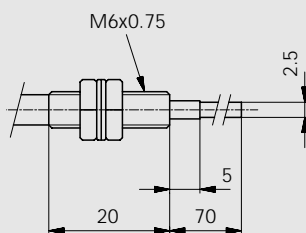


Figure 6



Through-beam

Fig.	Sensing head	Sheathing material	Diameter	Length	Range	Product designation
1	Threaded M3	Plastic (-30...+70 °C)	2 x 0,5 mm	1 m	40 mm	OZL 511 D 351
2	Threaded M4	Plastic (-30...+70 °C)	2 x 1 mm	1 m	100 mm	OZL 512 C 352
3	Threaded M8	Plastic (-30...+70 °C)	2 x 1 mm with lens	1 m	1500 mm	OZL 511 C 376

Diffuse-reflective

Fig.	Sensing head	Sheathing material	Diameter	Length	Range ¹⁾	Product designation
4	Threaded M3	Plastic (-30...+70 °C)	2 x 0,5 mm	1 m	25 mm	OZL 561 D 351
5	Threaded M6	Plastic (-30...+70 °C)	2 x 1 mm	1 m	45 mm	OZL 562 C 354
6	Threaded M6	Plastic (-30...+70 °C)	2 x 1 mm bendable sensing head	1 m	45 mm	OZL 562 C 364

1) Measured with Kodak card white, 10 x10 cm

Important mounting instructions:

Do not bend the plastic fiber optic cables sharply. The bending radius may not be smaller than 25 mm. Do not subject the fiber cables to mechanical forces (i.e. pulling, pressure, or twisting). The light emitting surfaces must also be protected from mechanical damage.

Plastic fiber optic cables with a fiber diameter of 1 mm may be easily cut to the desired length with an appropriate cutter.

These plastic fiber optic cables are only for use with fiber optic sensors OPK.

Fiber optic sensors OMT for glass fiber optics



- Combined surface and bore mounting
- 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: Cable, 2 meter
Connector, M12
Right angle cable, 2 meter cable, (option)
Connector, Torson (option)
- EMC tested according to IEC 801 and EN50081-1/EN 50082-2



Product designation¹⁾

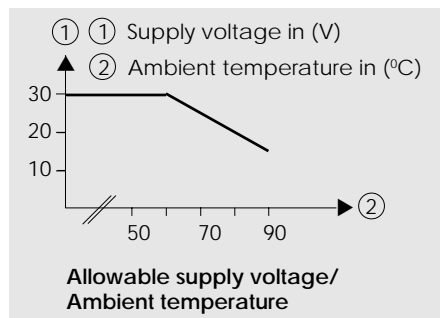
Output
Connection
Range adjustment
Optical data²⁾
Range
Emitter
Electrical data²⁾
Supply voltage U_s
Allowable ripple
Current consumption (without load)
Max. load current I_L
Residual voltage
Max. switching frequency
Environmental data
Sealing
Temperature T_A (operating and storage)
Weight

OMT 1NA 100 G2	OMT 1NA 400 G2	OMT 1PA 100 G2	OMT 1PA 400 G2
NPN (light- and dark-on)		PNP (light- and dark-on)	
Cable 2 m	Connector M12	Cable 2 m	Connector M12
Yes			
depends on the selected fiber optic cable			
Infrared LED, 880 nm, pulsed			
		10...30 VDC	
		+/- 10% of U_s	
		< 15 mA	
		200 mA	
		< 1,6 V	
		1000 Hz	
IP 67			
-20...+90 °C (☛ Tech. explanation)			
ca. 90 g	ca. 20 g	ca. 90 g	ca. 20 g

1) For product designation of sensors with options see designation code on page 47.

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

Technical explanation

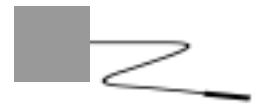


Allowable supply voltage as a function of ambient temperature

The specified operating temperature is only usable if the supply voltage is reduced at higher temperatures (☛ Diagram "Allowable supply voltage/Ambient temperature").

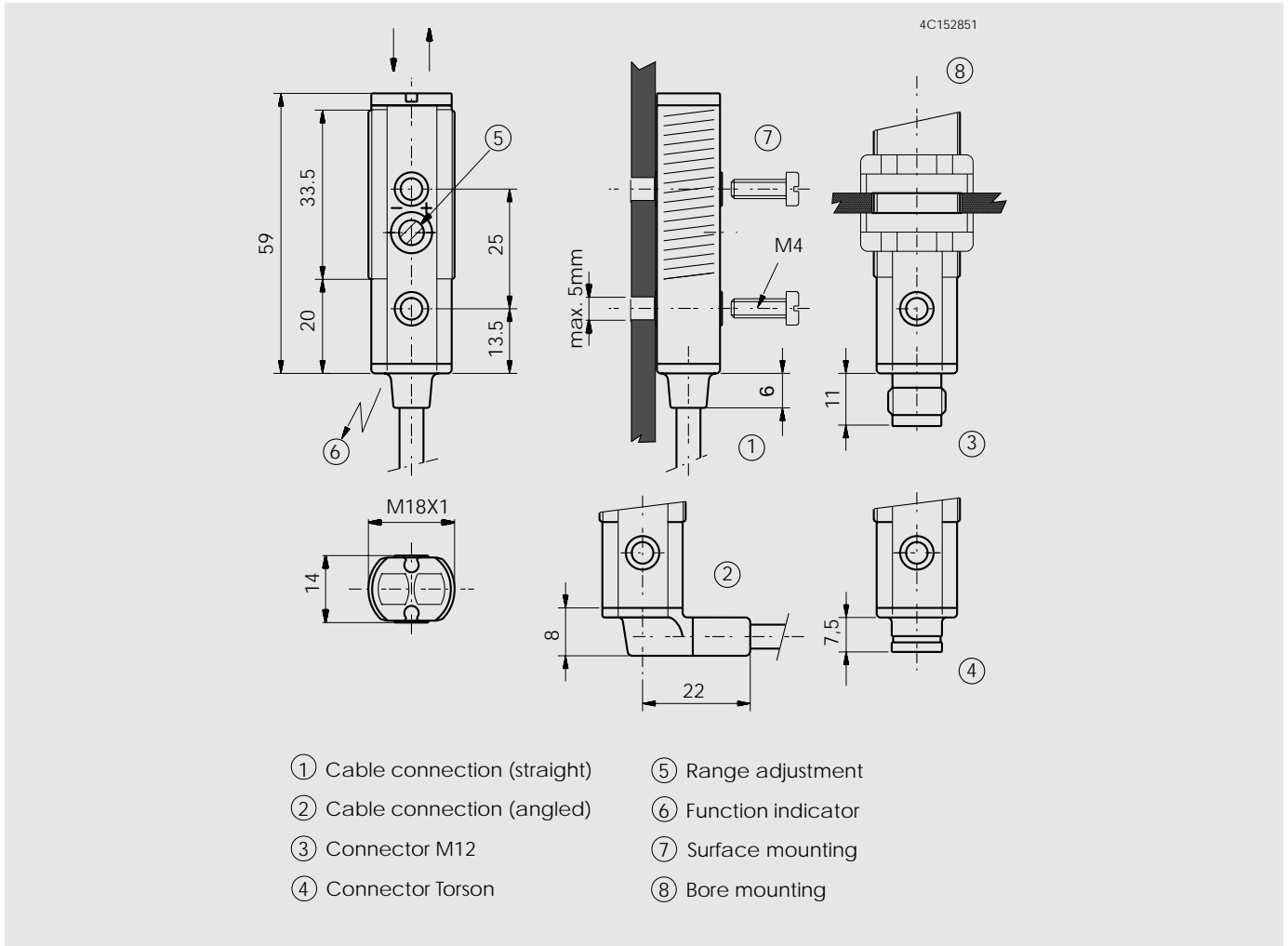
10...30 VDC

NPN / PNP
light-on and
dark-on output

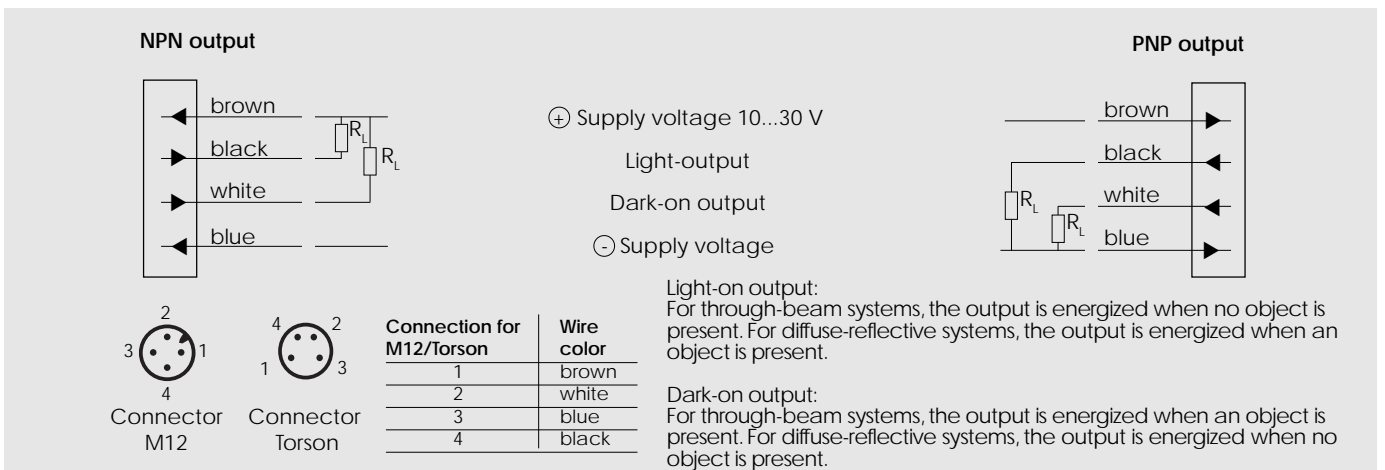


OMT

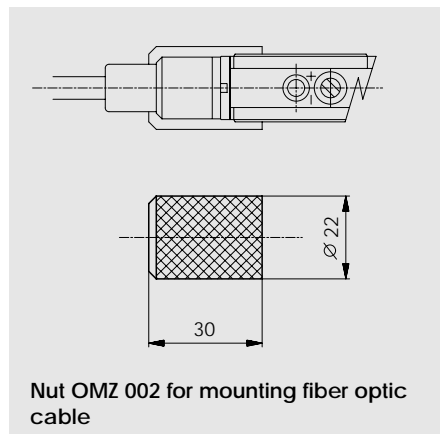
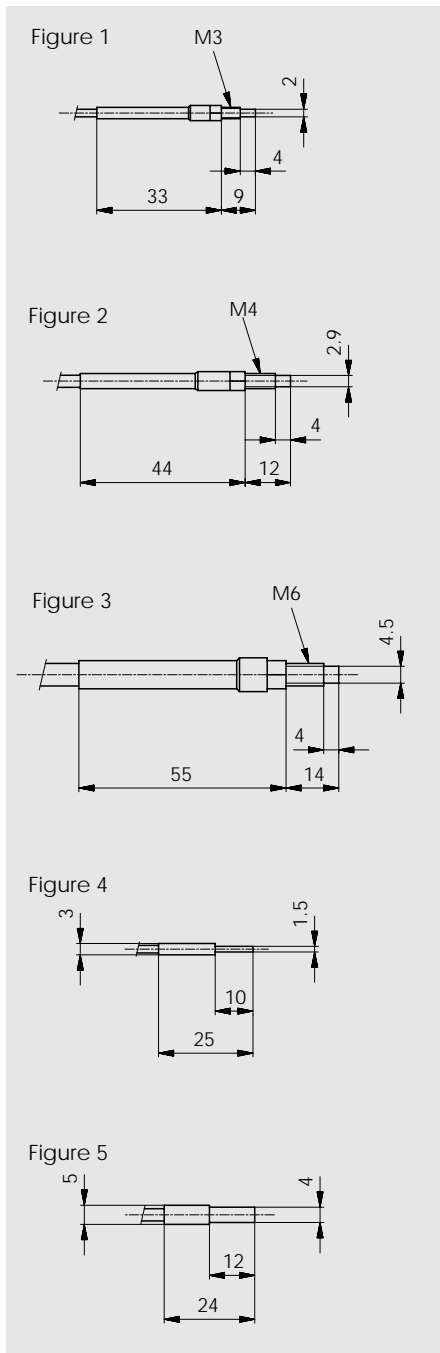
Dimensions (59 mm, M18 x 1)



Wiring diagram



Dimensions



Through-beam

Fig.	Sensing head	Sheathing material	Cross section	Length	Range	Product designation
1	Threaded M3	Plastic (-25...+80 °C)	2 x 1 mm ²	50 cm	70 mm	OZL 112 A 251
1	Threaded M3	Plastic (-25...+80 °C)	2 x 1 mm ²	100 cm	40 mm	OZL 112 A 351
2	Threaded M4	Plastic (-25...+80 °C)	2 x 4 mm ²	50 cm	200 mm	OZL 116 A 252
2	Threaded M4	Plastic (-25...+80 °C)	2 x 4 mm ²	100 cm	150 mm	OZL 116 A 352
4	Ferruled 1,5 mm	Plastic (-25...+80 °C)	2 x 1 mm ²	50 cm	120 mm	OZL 112 A 240
5	Ferruled 4 mm	Plastic (-25...+80 °C)	2 x 4 mm ²	50 cm	200 mm	OZL 116 A 242
2	Threaded M4	Metal (-25...+250 °C)	2 x 4 mm ²	50 cm	200 mm	OZL 216 A 252

Diffuse-reflective

Fig.	Sensing head	Sheathing material	Cross section	Length	Range ¹⁾	Product designation
1	Threaded M3	Plastic (-25...+80 °C)	2 x 0,5 mm ²	50 cm	4 mm	OZL 141 A 251
2	Threaded M4	Plastic (-25...+80 °C)	2 x 1 mm ²	50 cm	7 mm	OZL 142 A 252
2	Threaded M4	Plastic (-25...+80 °C)	2 x 1 mm ²	100 cm	6 mm	OZL 142 A 352
3	Threaded M6	Plastic (-25...+80 °C)	2 x 4 mm ²	50 cm	40 mm	OZL 146 A 254
3	Threaded M6	Plastic (-25...+80 °C)	2 x 4 mm ²	100 cm	32 mm	OZL 146 A 354
4	Ferruled 1,5 mm	Plastic (-25...+80 °C)	2 x 0,5 mm ²	50 cm	4 mm	OZL 141 A 240
3	Threaded M6	Metal (-25...+250 °C)	2 x 4 mm ²	50 cm	40 mm	OZL 246 A 254

1) Measured with Kodak card white, 10 x10 cm

Important mounting instructions:

These glass fiber optic cables are only for use with fiber optic sensor OMT.

Do not bend the glass optic cables sharply. The bending radius may not be smaller than three times the sheathing diameter. Do not subject the fiber optic cables to mechanical forces (i.e. pulling, pressure, or twisting). The light emitting surfaces must also be protected from mechanical damage.