



More Precision

CFS // Sensor configuration



Sensor configuration

CFS sensor

➔ All sensors can be customized. We would be pleased to manufacture your sensor according to your specifications/requirements and your drawing. Please contact Micro-Epsilon Eltrotec directly for this.



Examples of customer-specific modifications

Function

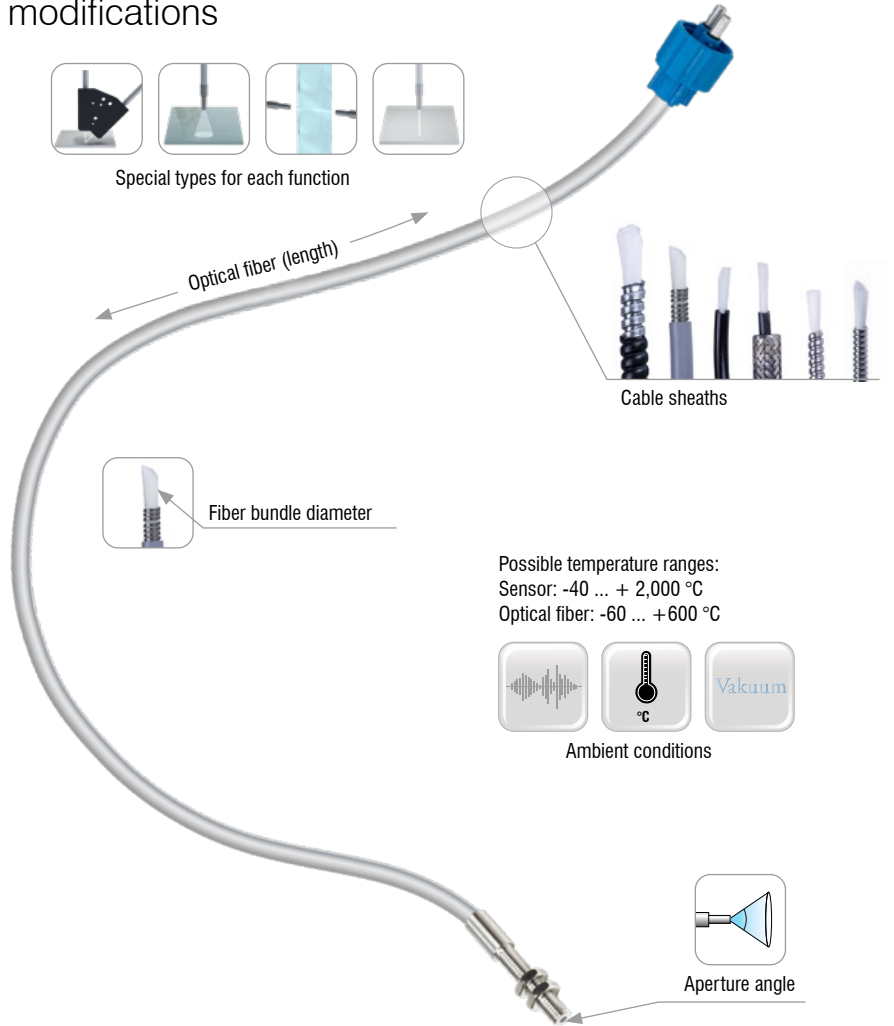
- Special types for CFS4 reflex sensor
- Special types for CFS3 transmission sensor or CFS1 angle sensor
- Special types for CFS5 receiver sensor



Special types for each function

Optical fiber sheath

- Silicone-metal sheath
- VA stainless-steel sheath
- Metal sheath
- PVC metal sheath
- PVC special sheath
- BOA special sheath
- MA-radius-limiting special sheath



Fiber bundle diameter

- 0.6 / 1 / 1.5 / 2.5 / 3 mm

Optical fiber (length)

- Available from 300 mm
- Standard length 1,200 mm
- 600, 1,800 and 2,400 mm optionally available
- CFO: Individual lengths from 0.3 ... 2.4 m possible
- CLS: Individual lengths from 0.3 ... 10 m possible

Aperture angle

- Standard 67°
- Optional 22° / 35°

Ambient conditions

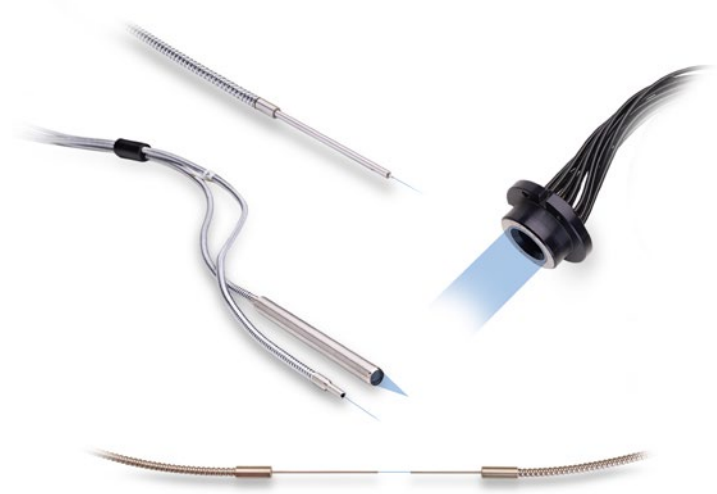
- Special versions with increased vibration resistance (VS)
- Special variants with special bonding for high temperatures (T250 / T400)
- Pressure-tight special variants with vacuum feedthrough (up to 10⁻⁵ mbar)
- Pressure resistance up to 10 bar

Mountable lenses

- Focusing for small light spots (> 0.8 mm)
- Large object distances (= distance between sensor and measuring object) up to 200 mm
- Distances > 300 mm with C-mount lens

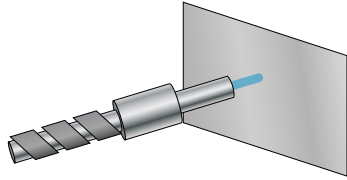
One of the strengths of Micro-Epsilon Eltrotec's fiber optic production is the manufacture of very complex, small and large probe heads, including those with several segments and special adapters.

Micro-Epsilon Eltrotec can draw on many years of experience in the field of special fiber optics production. Tell us your task or send us a sketch with the necessary data. We will find the right solution together with you.



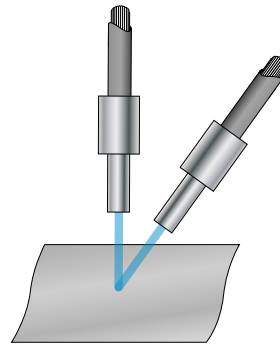
Notes on the function of the CFS sensors

Application instructions on selecting the appropriate function.



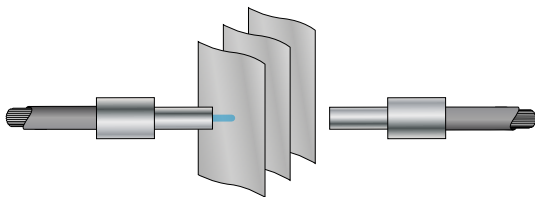
Reflex mode

- CFO: measurement distance max. 200 mm
- CLS: measurement distance max. 1200 mm
- Easy and fast installation
- Detection of smallest objects from 0.2mm
- Color evaluation to determine color, gloss level, gray value presence detection
- Ideal for parts recognition, sorting tasks, presence monitoring, color inspection



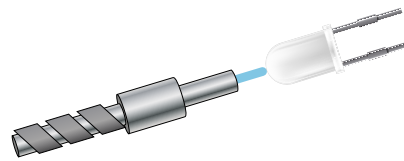
Reflex mode V arrangement

- CFO: Measurement distance max. 200 mm (for reflective surfaces)
- CLS: Measurement distance max. 1200 mm
- Easy adjustment due to mounting accessories
- Very precise positioning of the detection point possible
- Immune to dust and particles in the beam path



Transmitted light mode

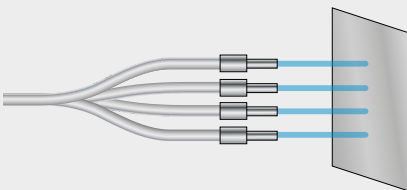
- CFO: Distance between receiver and sensor element up to 50 mm
- CLS: Distance between receiver and sensor element up to 2000 mm
- Color recognition of transparent objects
- Arbitrary point of light transmission
- Ideal for part detection, color inspection, sorting tasks, presence monitoring



Receiving mode self-luminous objects (for CFO)

- Max. measurement distance 30 mm
- Detection of the smallest color and intensity variations
- For color sensor with external illumination
- Ideal for testing LED, illumination and self-luminous objects

Available on request



Special types for multiple reflex mode

Transmitting and receiving units are statistically mixed in two or more separate sensor heads. Therefore, several positions can be detected using only one sensor.



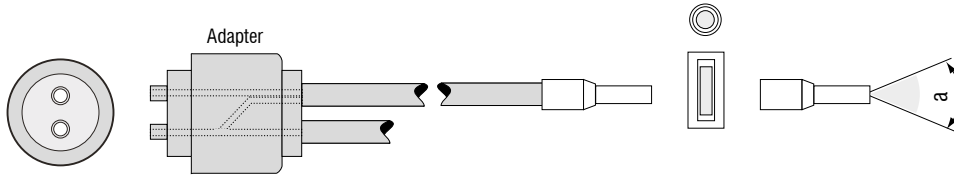
Special types for multiple transmitted light mode

The light path of the axially opposite probe head ferrules is interrupted or attenuated by one or more objects.

Sensor types

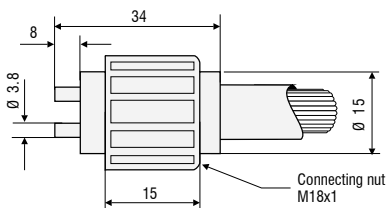
Optical glass fibers

Order code for optical fibers



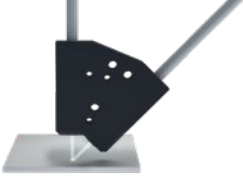

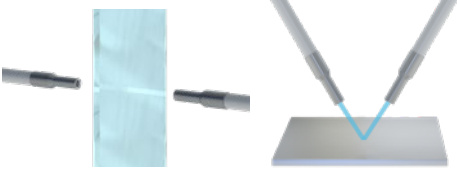

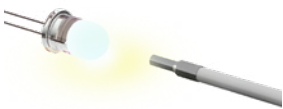
| Function | Ferrule | Sheath | Fiber bundle Ø | Total length | Aperture angle | Max. Temp. range | Vibration protection | Drag chain suitability | |
|----------|---------|--------|----------------|--------------|----------------|------------------|----------------------|------------------------|---|
| CFS | 3 | A20 | T | 2.5 | 1200 | 67° | TXXX | VS | D |

- 1** Specification of the function:
1 = angle sensor; 2 = circular sensor; 3 = transmission sensor;
4 = reflex sensor; 5 = receiver sensor
- 2** Specification of the ferrule.
Addition "/90" for 90° beam path
- 3** Specification of sheath based on ambient conditions.
Not applicable for T-sheath, as it is a standard sheath
- 4** Specification of fiber bundle diameter. Only if this deviates from the values listed in the tables.
- 5** Length of optical fiber
Not applicable for standard length of 1200 mm
- 6** Specification of aperture angle
Not applicable when standard aperture angle is 67°
- 7** If available, specify temperature bonding with the maximum possible temperature
- 8** If available, specify the vibration protection
VS = Vibration protection
- 9** If available, specify suitability for drag chains
D = suitable for drag chains



CFS: FA-Adapter System FASOP

1 Function

| Series | Special features |
|---|---|
| <p>1 CFS1-Vxx</p>  | <p>Standard sensor</p> <ul style="list-style-type: none"> ▪ For high-gloss surfaces, diffuse reflection without gloss ▪ Ideally suited to solid colors, anti-reflective coating or chrome colors ▪ Max. working distance of 125 mm (with reflecting surfaces) ▪ Very precise positioning of the detection point |
| <p>2 CFS2-Mxx</p>  | <p>Circular sensor</p> <ul style="list-style-type: none"> ▪ For structured and metallic-effect surfaces ▪ Ideally suited for textile, paper, metallic paint, metallic nail polish, sand, granulate or masterbatch ▪ Homogeneous illumination of the measuring point ▪ Max. working distance of 100 mm (with reflecting surfaces) ▪ Very precise positioning of the detection point ▪ Measurement spot diameter up to 114 mm |
| <p>3 CFS3-Axx / CFS3-Cxx</p>  | <p>Transmission sensor</p> <ul style="list-style-type: none"> ▪ For transparent surfaces ▪ Ideally suited for films, glasses, translucent liquids (e.g., detergents), filters or PET bottles ▪ Max. working distance between receiver and transmitter unit 50 mm ▪ No exact positioning necessary ▪ Transmission sensor in reflex mode in V arrangement |
| <p>4 CFS4-Axx CFS4-Cxx CFS4-Dxx CFS4-Fxx CFS4-Jxx CFS4-Kxx</p>  | <p>Reflex sensor</p> <ul style="list-style-type: none"> ▪ For individual surfaces, direct reflection with gloss ▪ Ideally suited for metal (differentiation), plastic parts, thread locking, coating or packaging ▪ For detection of gloss and material differences ▪ Ideal for part recognition, sorting tasks, presence control, color inspections ▪ Detection of the smallest of objects from 0.8 mm ▪ Working distance 5 ... 200 mm and larger possible on reflective surfaces |
| <p>5 CFS5-Axx CFS5-Cxx CFS5-xx</p>  | <p>LED test sensor</p> <ul style="list-style-type: none"> ▪ Ideal for testing LED, illumination and self-luminous objects ▪ For color sensor with external illumination ▪ Max. measurement distance 30 mm ▪ Detection of smallest color and intensity variations ▪ For self-luminous, diffuse reflection incl. gloss |

Sensor types

Optical glass fibers

2 Sensor variants and fiber bundles

Please select the sensor variant and make sure that the sensor head is compatible with the fiber bundle diameter $\varnothing F$ and the sheath (see 3).

Standard sensor bonding for $-10\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$

For special variants (T250, T400) see technical data.

All data in mm; tolerances: typically $\pm 0.1\text{ mm}$

Black anodized aluminum sleeves


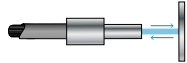
Customization is possible by arrangement, please contact us.

Detection ranges and CFO sensor variants

| Fiber bundle $\varnothing F$ mm | | Working distance | | Measurement spot for 67° fiber; approx. \varnothing mm |
|---------------------------------|-----|------------------|----|--|
| CFS3 | 0.6 | Start | 5 | 0.6 |
| | | Optimal | 10 | |
| | | End | 15 | |
| | 1.5 | Start | 5 | 1.5 |
| | | Optimal | 10 | |
| | | End | 15 | |
| | 2.5 | Start | 5 | 2.5 |
| | | Optimal | 10 | |
| | | End | 20 | |
| | 3 | Start | 5 | 3 |
| | | Optimal | 10 | |
| | | End | 20 | |
| CFS4 | 0.6 | Start | 5 | 8 |
| | | Optimal | 5 | 8 |
| | | End | 15 | 20 |
| | 1 | Start | 5 | 8 |
| | | Optimal | 5 | 8 |
| | | End | 15 | 20 |
| | 1.5 | Start | 5 | 8 |
| | | Optimal | 5 | 8 |
| | | End | 15 | 22 |
| | 2.5 | Start | 5 | 10 |
| | | Optimal | 5 | 10 |
| | | End | 20 | 28 |
| | 3 | Start | 5 | 10 |
| | | Optimal | 5 | 10 |
| | | End | 20 | 28 |

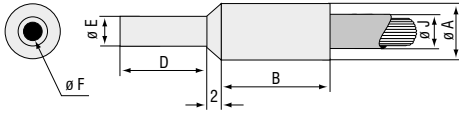
Typical values determined with colorSENSOR CFO200

Surface-dependent detection and operating ranges CLS

| | | | | | | |
|--|-----------------------|-------------|---------------|---------------|-------------|----------|
|  Range Transmission mode (typ.) | 90 mm | 200 mm | 500 mm | 1700 mm | 2000 mm | |
| Min. object size (typ.) | 0.05 mm | 0.1 mm | 0.1 mm | 0.2 mm | 0.3 mm | |
|  Range Reflex mode (typ.) * | Copper | 35 mm | 76 mm | 217 mm | 820 mm | >1200 mm |
| | Raw aluminum | 24 mm | 61 mm | 164 mm | 514 mm | 457 mm |
| | Stainless steel | 21 mm | 50 mm | 135 mm | 412 mm | 415 mm |
| | White, rough plastics | 13 mm | 33 mm | 84 mm | 260 mm | 260 mm |
| | Mat black cardboard | 6 mm | 16 mm | 44 mm | 130 mm | 135 mm |
| Required fiber bundle $\varnothing F$ | 0.6 mm | 1 mm | 1.5 mm | 2.5 mm | 3 mm | |

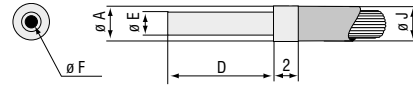
*Analog output 5 V and maximum amplification

A Type A ferrule, stainless steel



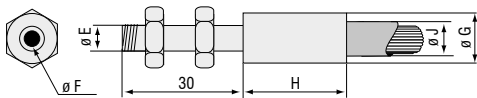
| Ø F | Type | Ø A | B | D | Ø E | P | Ø J M | T |
|-----|------|-----|----|----|-----|---|----------|-----|
| 1.5 | A10 | 4.6 | 8 | 11 | 2.5 | 4 | 4 | - |
| 1.5 | A11 | 6.6 | 8 | 11 | 2.5 | - | 5 | 4.4 |
| 2.5 | A20 | 6.6 | 10 | 12 | 4.5 | 6 | 6 | 5.8 |
| 3 | A30 | 8.5 | 11 | 15 | 6 | 7 | 7 | 7.5 |

B Type B ferrule
(only suitable for PVC sheath)



| Ø F | Type | Ø A | D | Ø E | Ø J P | Ferrule |
|-----|------|-----|----|-----|----------|-----------------|
| 0.6 | B11 | 2 | 30 | 1 | 2 | Stainless steel |
| 0.6 | B12 | 2 | 10 | 1 | 2 | Stainless steel |
| 1 | B20 | 3 | 10 | 2 | 3 | Alu |
| 2.5 | B30 | 5 | 12 | 4 | 5 | Alu |
| 3 | B40 | 8 | 12 | 6 | 8 | Alu |

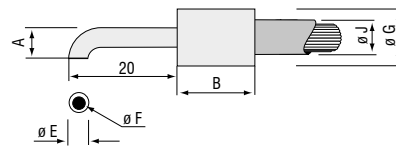
C Type C ferrule, stainless steel



| Ø F | Type | E | Ø G | H | P | Ø J M | T |
|-----|------|-----|-----|----|---|----------|-----|
| 1.0 | C10 | M4 | 6 | 13 | 5 | 5 | 4.4 |
| 2.5 | C20 | M6 | 8 | 15 | 6 | 6 | 5.8 |
| 3 | C30 | M10 | 11 | 12 | 7 | 7 | 7.5 |

D Type D ferrule, stainless steel

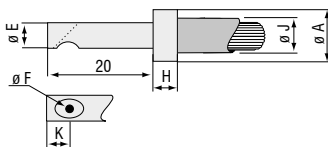
With angular probe heads, a reduction in range can be expected compared to axially emerging versions.



| Ø F | Type | Ø A | B | Ø E | Ø G | r | P | Ø J M | T |
|-----|--------|-----|----|-----|-----|-----|---|----------|-----|
| 0.6 | D10/90 | 2.5 | 10 | 1 | 3 | 1.5 | 2 | - | - |
| 0.6 | D11/90 | 2.5 | 13 | 1 | 6 | 1.5 | - | - | 4.4 |
| 1.5 | D20/90 | 6 | 13 | 2 | 6 | 4 | 5 | 5 | 4.4 |
| 2.5 | D30/90 | 15 | 17 | 5 | 9 | 10 | 7 | 7 | 6.5 |

* D10/90 only suitable for PVC sheath

E Type E ferrule, stainless steel

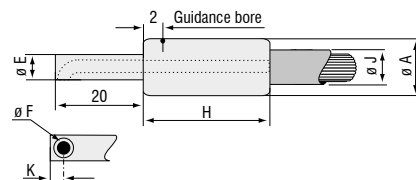


| Ø F | Type | Ø A | Ø E | H | K | P | Ø J M | T |
|-----|--------|-----|-----|-----|---|---|----------|-----|
| 1.5 | E10/90 | 4 | 3 | 1.5 | 4 | 4 | - | - |
| 2.5 | E20/90 | 5 | 4 | 1.5 | 4 | 5 | 5 | - |
| 2.5 | E21/90 | 7 | 4 | 10 | 4 | - | - | 5.8 |
| 3 | E30/90 | 8 | 6 | 1.5 | 5 | 7 | 7 | - |

* E10/90 only suitable for PVC sheathing

F Type F ferrule, stainless steel

With angular probe heads, a reduction in range can be expected compared to axially emerging versions.

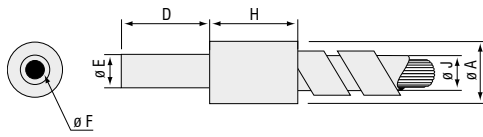


| Ø F | Type | Ø A | Ø E | H | K | P | Ø J M | T |
|-----|--------|-----|-----|----|---|---|----------|-----|
| 1.5 | F10/90 | 8 | 6 | 9 | 3 | 5 | 5 | 5.8 |
| 2.5 | F20/90 | 10 | 8 | 10 | 4 | 6 | 6 | 6.5 |
| 3 | F30/90 | 12 | 10 | 10 | 5 | 7 | 7 | 7.5 |

Sensor types

Optical glass fibers

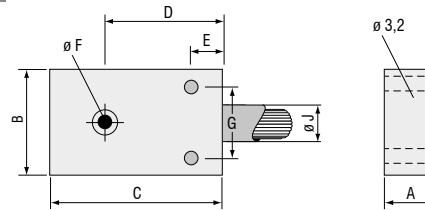
M Ferrule type M, aluminum / stainless steel



| Ø F | Type | Ø A | D | Ø E | H | Ø J | | Ferrule |
|-----|------|-----|----|-----|----|-----|------|-----------------|
| | | | | | | M | T | |
| 0.6 | M11 | 6 | 30 | 1 | 10 | 5 | 4.4 | Stainless steel |
| 0.6 | M12 | 6 | 10 | 1 | 10 | 5 | 4.4 | Stainless steel |
| 1 | M20 | 6 | 10 | 2 | 10 | 5 | 4.4 | Alu |
| 2.5 | M30 | 7 | 12 | 4 | 12 | 6 | 5.8 | Alu |
| 3.5 | M40 | 9 | 12 | 6 | 12 | 7 | 7.5 | Alu |
| 5 | M50 | 12 | 16 | 7 | 16 | 9 | 9 | Alu |
| 6 | M60 | 13 | 16 | 8 | 18 | 10 | 11.5 | Alu |
| 8 | M80 | 16 | 20 | 10 | 20 | 13 | 13.5 | Alu |
| 10 | M100 | 18 | 20 | 12 | 20 | 15 | - | Alu |

Larger fiber cross-sections possible

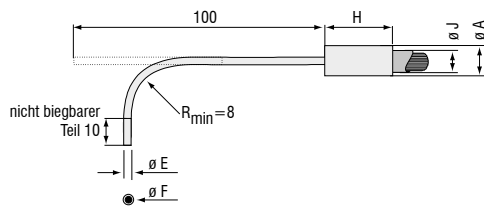
N End sleeve type N, aluminum



| F | Type | A | B | C | D | G | P | Ø J | |
|-----|--------|----|----|----|----|------|---|-----|-----|
| | | | | | | | | M | T |
| 0.6 | N10/90 | 6 | 15 | 25 | 20 | 0.6 | 4 | 5 | 4.4 |
| 1.5 | N21/90 | 8 | 18 | 25 | 20 | 1.5 | 5 | 5 | 5.8 |
| 2.5 | N31/90 | 12 | 20 | 25 | 20 | 20.5 | 6 | 6 | 6.5 |

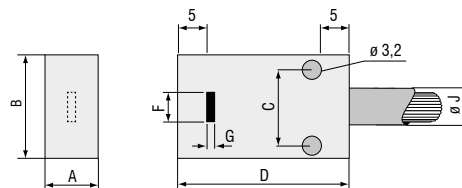
O Type O ferrule, bendable to a certain extent

With angular probe heads, a reduction in range can be expected compared to axially emerging versions.



| Ø F | Type | Ø A | Ø E | H | P | Ø J | |
|-----|------|-----|-----|----|---|-----|-----|
| | | | | | | M | T |
| 0.6 | O10 | 2 | 1 | 10 | 2 | - | - |
| 0.6 | O11 | 7 | 1 | 20 | - | 5 | 4.4 |
| 1 | O20 | 3 | 1.3 | 10 | 3 | - | - |
| 1 | O21 | 7 | 1.3 | 20 | - | 5 | 4.4 |

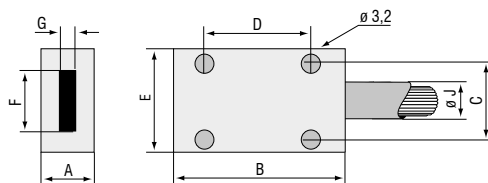
P Type P ferrule, aluminum



| F | G | Type | A | B | C | D | P | Ø J | |
|----|-----|--------|----|----|----|----|---|-----|-----|
| | | | | | | | | M | T |
| 3 | 0.1 | P10/90 | 8 | 15 | 9 | 25 | 4 | 5 | 4.4 |
| 6 | 0.3 | P21/90 | 8 | 17 | 11 | 30 | 4 | 6 | 6.5 |
| 10 | 0.5 | P31/90 | 12 | 17 | 11 | 30 | 6 | 6 | 6.5 |

Q Type Q, aluminum

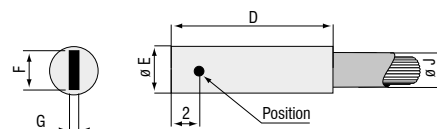
Also available in stainless steel



| F | G | Type | A | B | C | D | E | Ø J |
|----|------|------|----|----|----|----|-----|--------------------------------|
| 5 | 0.5 | Q1 | 12 | 25 | 9 | 15 | 15 | depends on fiber cross-section |
| 10 | 0.3 | Q2 | 12 | 30 | 14 | 20 | 20 | |
| 18 | 0.3 | Q3 | 12 | 35 | 24 | 25 | 30 | |
| 28 | 0.2 | Q4 | 12 | 55 | 34 | 40 | 40 | |
| 38 | 0.15 | Q5 | 12 | 55 | 44 | 40 | 50 | |
| 48 | 0.15 | Q6 | 12 | 55 | 54 | 40 | 60 | |
| 58 | * | Q7 | 16 | 75 | 64 | 60 | 70 | |
| 68 | * | Q8 | 16 | 75 | 74 | 60 | 80 | |
| 78 | * | Q9 | 20 | 90 | 84 | 75 | 90 | |
| 88 | * | Q10 | 20 | 90 | 94 | 75 | 100 | |

FxG max. 9.62 mm²; F=3.5 mm as special variant
Q7 to Q10 only available as FAR special model

R Type R ferrule, aluminum



| F | G max. | Type | D | Ø E | P | Ø J | |
|---|--------|------|----|-----|---|-----|-----|
| | | | | | | M | T |
| 3 | 0.5 | R10* | 25 | 4 | 3 | - | - |
| 3 | 0.5 | R11 | 30 | 7 | 6 | 6 | 5.8 |
| 6 | 1 | R20 | 25 | 7 | 6 | - | - |
| 6 | 1 | R21 | 30 | 10 | - | 7 | 7.5 |

* R10 and R20 only suitable for PVC sheath

3 Sheath

Please determine the sheath and the bonding of the optical fiber based on the prevailing environmental conditions and mechanical stress. Please contact us for high-temperature applications or use under extreme mechanical stress.

Silicone-metal sheath

Metal spiral hose with glass-fiber braiding and silicone rubber sheath ¹⁾

Characteristics:

- Very flexible, ideal for frequent bends
- Highly resistant to folding, tension and torsion;
- Temperature-stable from -60 °C to +180 °C
- Liquid-tight



VA stainless-steel sheath

Flexible stainless steel spiral hose ¹⁾

Characteristics:

- Flexible
- Protection against mechanical stress
- Temperature-stable to 400 °C
- Stainless



Metal sheath

Flexible brass spiral hose, chrome-plated ¹⁾

Characteristics:

- Flexible
- Protection against mechanical stress
- Temperature-stable to 300 °C



PVC metal sheath

Flexible brass spiral-reinforced hose coated with PVC sheath ¹⁾

Characteristics:

- Flexible
- Protection against mechanical stress such as pressure and tension
- Temperature-stable from -20 °C to +80 °C



PVC special sheath

Plastic hose ²⁾

Characteristics:

- For rigid installation
- Small sheath diameter
- Temperature-stable to 80 °C



BOA special sheath

Corrugated tube with stainless steel braiding ³⁾

Characteristics:

- Protection against mechanical stress
- Ideal for drag-chain applications
- Temperature-stable from -50 °C to +600 °C



¹⁾ Bending radius corresponds to three times the outer diameter of the sheath.

²⁾ Bending radius corresponds to twice the outer diameter of the sheath.

³⁾ Bending radius corresponds to at least 80 - 100 mm, depending on the outer diameter of the sheath.

Details about sheath diameters can be found in section 2.

Special variants

VS

Fiber optics with increased vibration protection - VS option

For mechanical stresses such as impacts, accelerations and movements, the fiber optics can be manufactured with increased vibration protection.

This special treatment reduces the friction between the fibers and absorbs shocks. The fibers are embedded in a gel cushion.

Sensor types

Optical glass fiber

→ All sensors can be customized. We would be pleased to manufacture your sensor according to your specification/requirements.
Please contact us directly for more information!

4 Fiber bundle

Specification of the fiber bundle diameter. Only specified if this deviates from the values listed in the table

5 Length



Standard lengths are: 600*, 1200*, 1800 and 2400 mm.

* Bearing types

For CLS also > 2400 mm possible.

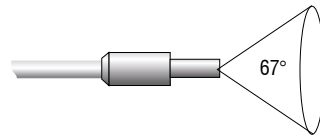
Length tolerance typ.: $\pm 4\%$

Cable lengths from 200 mm are available on request.

Recommended maximum cable length:

CFO up to 2,400 mm; CLS up to a maximum of 10,000 mm

6 Aperture angle



The standard aperture angle is 67°.

Other opening angles such as 35° or 122° are also available on request.

7 Bonding temperature range

The glass fibers can be bonded in several stages for high temperature ranges.

Standard bonding is suitable for temperatures up to 80 °C.

With special adhesives, temperatures of up to 250 °C can be reached in the first stage and up to 400 °C in the second stage. Special versions with temperature ranges of up to 600 °C are also possible.

T250

T400

T600

| Technical data // Optical fibers | | |
|---|--|--|
| 5 Length | Standard lengths: 600, 1200, 1800 and 2400 mm, up to 30 m on request | |
| 6 Aperture angle | Standard fiber | 67° (NA 0.56) ¹⁾ |
| | Special fibers on request | 22° (NA 0.21/ glass fibers) 80° (NA 0.64/ glass fibers) 120° (NA 0.86/ glass fibers) 25° (NA 0.22/ quartz fibers UV-VIS and VIS-IR) 14° (NA 0.12/ quartz fibers UV-VIS and VIS-IR) |
| Material | Optical glass; quartz glass or sapphire glass on request | |
| Dielectric strength | 50 kV/m with PVC protective sheath | |
| 7 Ferrule temperature range Fiber bonding | Standard | -10 °C to +80°C |
| | T250 | -40 °C to +250°C |
| | T400 | -40 °C to +400°C |
| | T600 special model | 0 °C to +600°C |
| | T2000 special model | 0 °C to +2000°C |
| 3 Permissible temperature range with sheath that has appropriate fiber bonding | PVC (Type P / Type Z) | -20 °C to +80 °C |
| | Metal (type M) | -40 °C to +300°C |
| | Metal with special bonding (Type E) | -40 °C to +400 °C |
| | Metal/silicone (Type T) | -60 °C to +180°C |
| | Corrugated tube with stainless steel braiding (type BOA) | -50 °C to +600°C |
| Fiber transmission | Different types for wavelengths from UV 180nm to IR 3500nm. We can provide the most suitable solution depending on your requirements. Transmission curves on request. | |
| 8 Increased vibration protection (VS option) | Especially for fiber optics that are exposed to difficult conditions, there is the option of increased vibration protection. A special treatment minimizes the friction of the glass fibers and shocks are cushioned. This results in a longer service life. | |
| 9 Cable drag chain / energy guiding chain | Fiber optic sensors from Micro Epsilon can be used, among other things, wherever permanent linear movement or moving guidance by drag chains or energy guiding chains is required. | |

¹⁾ Fiber transmission standard fiber 390 - 1390 nm

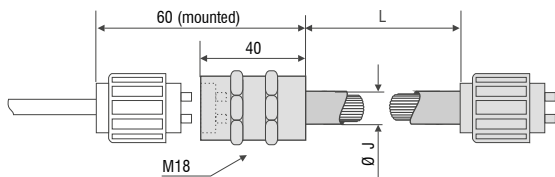
Sensor types

Optical glass fibers

Extensions / feedthrough

For extension or feedthrough of the optical fibers please use the Type LV ferrule.

LV Type LV ferrule
Fiber optic extension / feedthrough



| Fiber bundle Ø | P | Ø J M | T | L |
|------------------|----|----------|------|----------|
| (3 mm) / channel | 12 | 13 | 13.5 | variable |

Available on request

Pressure density feed-through up to 10 bar ^{2) 3)}

Housing feed-through

Adapter fiber optics CFS to CFS

Suitable for use in vacuums

For use with drag cable

Vibration protection

Single channel

Multi-channel

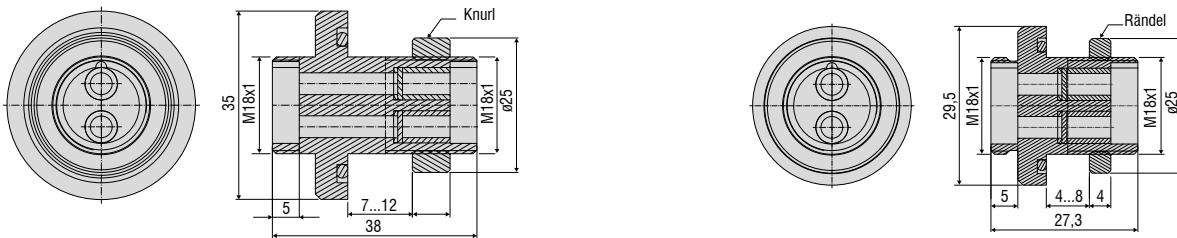
Adaptation for C-mount lenses

Special fiber optics according to customer requirements/drawing

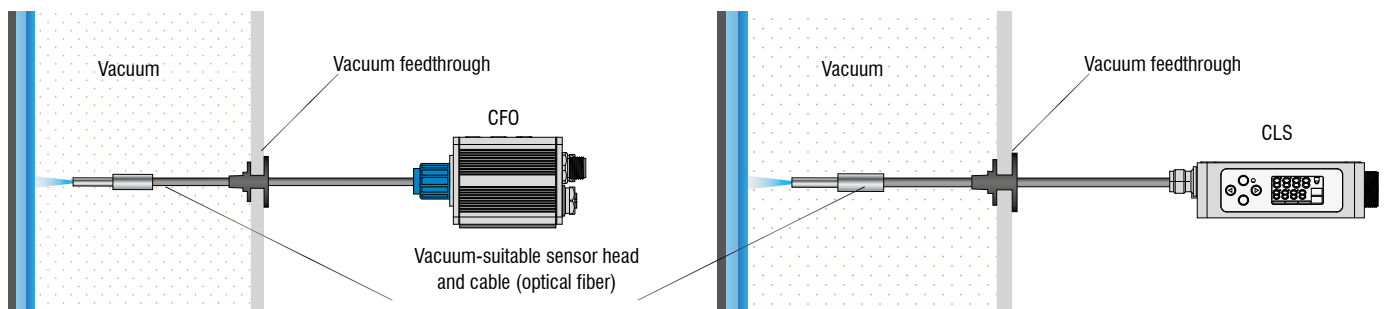
²⁾ In conjunction with adapter fiber optics CFS3-CFS3

³⁾ Also for use with vacuum up to 10⁻⁵

Pressure-proof feedthrough



Vacuum suitability



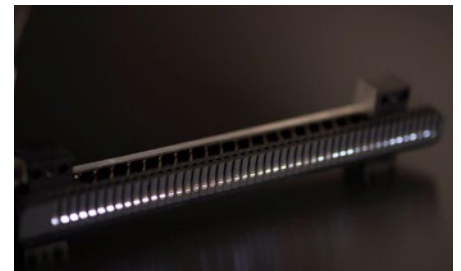
The fiber optic sensors, color sensors and optical fibers are constructed with passive components and do not emit any heat to the environment.

In vacuum, sensors (temperature bonding T250), optical fibers (stainless steel sheath), and the vacuum feedthrough up to 10⁻⁵ mbar can be used.

Special sensors CFS-SL

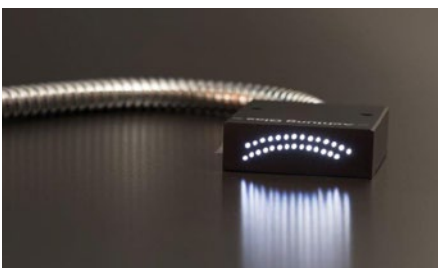
A wide variety of applications and installation situations require a sensor that is perfectly matched to the application. On request, we can manufacture individual sensors with special fiber optics and probe heads according to your specifications and dimensions.

In addition to a wide range of standard sensors, we work directly with our customers to create complex fiber optic components for the respective application. Whether in conjunction with evaluation electronics, for object illumination or special applications - the full spectrum of possibilities offered by fiber optic technology is demonstrated here.



Special sensors from standardized applications

In cooperation with our customers, we have manufactured a large number of special sensors in recent years.



Mountable lenses for optical fibers (CFO)

KL-xx/xx series

Focusing of color and fiber optic sensors

Improving the efficiency of the application

Many possible applications



Features:

- Working distances from 8 mm to 200 mm
- Scratch-resistant glass lens
- Robust aluminum housing (black anodized)
- Bundling to a small light spot
- Increased range with C-mount lens > 300 mm distance
- Minimum color change when the distance is altered
- High luminous efficiency
- Special designs according to customer requirements
- Color measurement on small objects at a relatively large distance (KI-3, KL-4)
- Detection of highly absorbent objects (KL-5, KL-14, KL-17)

| | Type probe LWL | Article number | Object distance (typ.) | Detection range (typ.)* | Dimensions |
|---|------------------------------|----------------|--|---|---|
|  | KL-3-A2.0 ³⁾ | 10823012 | 8 mm - 20 mm | Ø 1 mm - 5 mm Ø 1 mm at 10 mm | L x Ø approx. 60 mm x 15 mm |
|  | KL-M18-A2.0 ¹⁾ | 10823020 | 20 mm - 50 mm | Ø 3 mm - 10 mm Ø 3 mm at 20 mm | L x Ø approx. 51 mm x M18 x 1 |
|  | KL-M18-XL-A2.0 ¹⁾ | 10824358 | Pos1 50 - 120 mm Pos2 10 - 180 mm Pos3 10 - 160 mm | Pos1 Ø 4 - 7 mm Ø 4 mm at 80 mm Pos2 Ø 7 - 11 mm Ø 7 mm at 110 mm Pos3 Ø 7 - 11 mm Ø 7 mm at 120 mm | L x Ø approx. 90 mm x M18x1 (L=50 mm) |
|  | KL-M34-A2.0 ¹⁾ | 10823278 | 100 mm - 180 mm | Ø 15 mm - 18 mm Ø 15 mm at 100 mm | L x Ø approx. 85 mm x M34 x 1.5 |
|  | KL-M34/62-A2.0 ¹⁾ | 10824196 | 80 mm - 200 mm | Ø 3 mm - 5 mm Ø 3 mm at 120 mm | L x Ø approx. 170 mm x 62 mm |
|  | KL-4-A1.1 ¹⁾ | 10823262 | 8 mm - 20 mm | Ø 0.6 mm - 3 mm Ø 0.6 mm at 10 mm | L x Ø approx. 60 mm x 15 mm |
|  | KL-M18-A1.1 ¹⁾ | 10824140 | 10 mm - 50 mm | Ø 2 mm - 7 mm Ø 2 mm at 10 mm | L x Ø approx. 51 mm x M18 x 1 |
|  | KL-D-40-A2.0 ²⁾ | 10824143 | 15 mm - 25 mm | Ø 3 mm - 6 mm Ø 3 mm at 15 mm | L x W x H approx. 43.4 x 49.5 x 12 mm |
|  | KL-D-28-A2.0 ²⁾ | 10824197 | 20 mm - 30 mm | Ø 5 mm - 8 mm Ø 5 mm at 20 mm | L x W x H approx. 31.7 x 40.5 x 15 mm |
|  | KL-D-20-A2.0 ²⁾ | 10823021 | 10 mm - 50 mm | Ø 4 mm - 10 mm Ø 4 mm at 10 mm | L x W x H approx. 21.4 x 33 x 12 mm |
|  | KL-D-17-A2.0 ²⁾ | 10823220 | 30 mm - 80 mm | Ø 8 mm - 25 mm Ø 8 mm at 30 mm | L x W x H approx. 36.5 x 25.5 x 15 mm |
|  | KL-D-14-A2.0 ²⁾ | 10823022 | 60 mm - 120 mm | Ø 10 mm - 20 mm Ø 10 mm at 60 mm | L x W x H approx. 37 x 50 x 20 mm |
|  | KL-D-6-A2.0 ²⁾ | 10823409 | 100 mm - 200 mm | Ø 15 mm - 30 mm Ø 15 mm at 100 mm | L x W x H approx. 31.1 x 45.1 x 20 mm |
|  | KL-5-R1.1 ¹⁾ | 10824198 | 8 mm - 20 mm | 2 x 0.3mm up to 15 x 3 mm 2 x 0.3 mm at 10 mm | L x Ø approx. 60 mm x 15 mm |
|  | KL-8-R2.1 ¹⁾ | 10823920 | 8 mm - 20 mm | 4 x 0.7 mm up to 30 x 5 mm 4 x 0.7 mm at 10 mm | L x Ø approx. 60 mm x 15 mm |

*The smallest specification in the table refers to the typ. smallest optical diameter that is generated.

This corresponds approximately to the smallest detection area for color or fiber optic sensors.

¹⁾ Fiber-optic reflex mode cable (FAR)

²⁾ Transmitted-light optical fiber (FAD)

³⁾ In conjunction with FAR-X-A2.0-0.6-XXXX-67° fiber-optic reflex mode cable, measurement spot of approx. 0.2 mm possible

Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



Measuring and inspection systems for metal strips, plastics and rubber



Optical micrometers and fiber optics, measuring and test amplifiers



Color recognition sensors, LED analyzers and inline color spectrometers



3D measurement technology for dimensional testing and surface inspection

