MICRO-EPSILON

More Precision

optoCONTROL CLS1000 // Fiber optic sensor for industrial applications

Fiber optic sensors
optoCONTROL CFS

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

Examples of customer-specific modifications

Function
- Special types for transmission sensor CFS3
- Special types for CFS4 reflex sensor

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

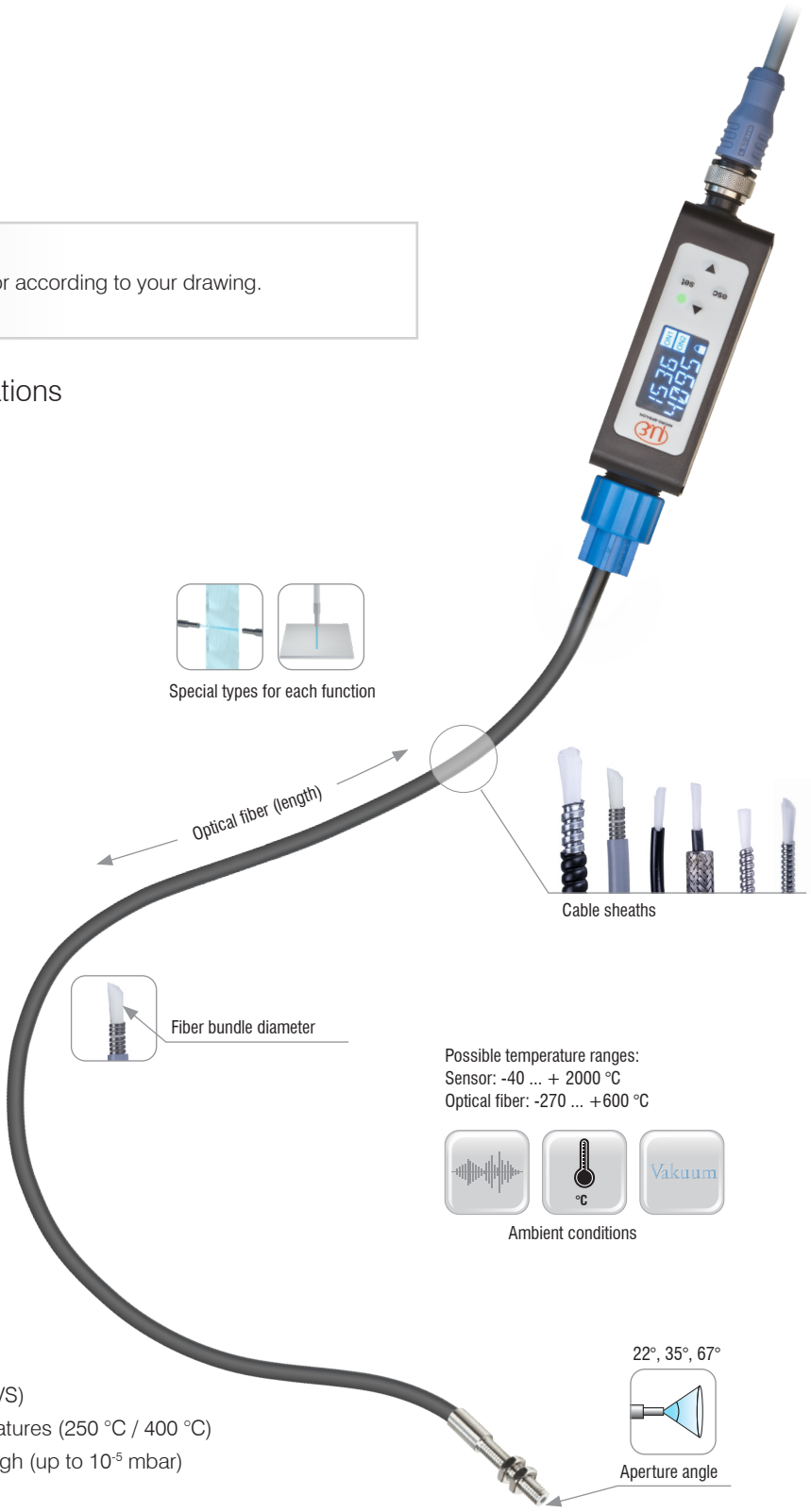
Fiber bundle diameter
- 0.6 / 1 / 1.5 / 2.5 / 3 mm

Optical fiber (length)
- Available from 300 mm
- Standard length 1,200 mm
- 600, 1,800 and 2,400 mm optionally available
- Individual length from 0.3 to 2.4 m possible

Aperture angle
- Standard 67°
- Optional 22° / 35°

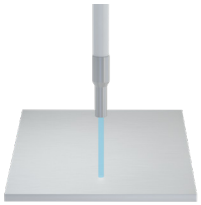
Ambient conditions
- Special versions with increased vibration resistance (VS)
- Special variants with special bonding for high temperatures (250 °C / 400 °C)
- Pressure-tight special variants with vacuum feedthrough (up to 10^{-5} mbar)

Sensor heads
- Straight sensor heads with a viewing direction of 0 degree
- 90° output for confined installation spaces
- Sensor head with wide light band (possible width between 3 and 88 mm)
- Sensor heads with and without external thread
- Thin sensor heads with bendable head
- Sensor heads in angular arrangement (CFS1)



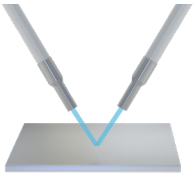
Notes on the function of the CFS sensors

Application instructions on selecting the appropriate function.



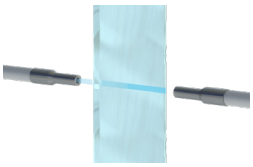
Reflex sensor (one-way system)

- Detection range max. 1200 mm
- Quick and easy installation
- Detection of the finest structures
- Presence detection
- Ideal for level monitoring, position and location determination



Reflex mode V-arrangement (two-way system)

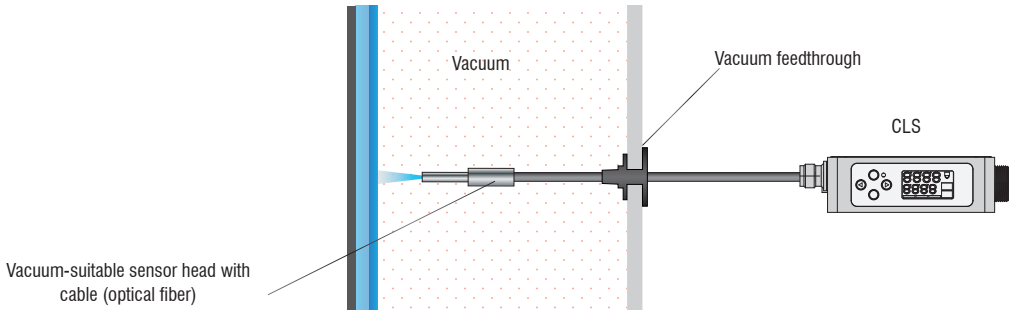
- Detection range max. 1200 mm
- Very exact positioning of the switching point
- Two objects generate highest intensity on the intersection
- Suitable for light dust and particles flying in the path of the beam
- Gloss detection



Transmission mode (two-way system)

- Large distance between receiving and transmission unit up to 2000 mm
- Objects are detected by interruption of light beam
- Arbitrary point of light transmission
- Detection of transparent objects
- Ideal for part recognition, counting tasks, edge detection, presence monitoring

Vacuum suitability

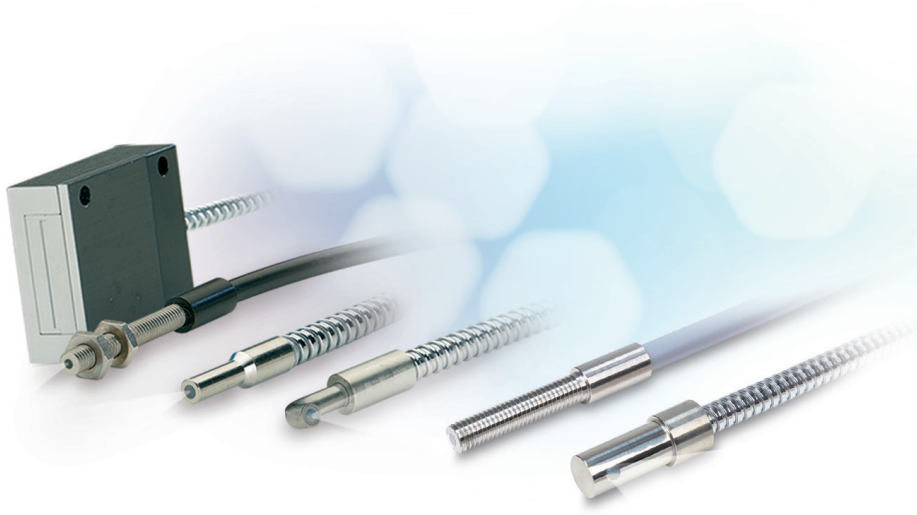


The fiber optic sensors and fiber optic cables are built with passive components and do not emit heat to the environment.

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

Reflex sensor for the distinction of materials and parts
optoCONTROL CFS4

- Detection range up to 430 mm
- Options with light band and 90° output
- Simple and space-saving mounting
- Models with and without external thread



In the case of the reflex sensor, the infrared light emitted by the controller is guided to the detecting object via the sensor's fiber-optic light guides and reflected there. Both diffuse and directly reflected components are present in the back-reflected infrared light. The reflected light components of the object to be detected are received by the same sensor and transmitted back to the controller via the optical fiber for evaluation.

The high-quality reflective sensor, in combination with the performance of the CLS1000 series, delivers even more precise detection of a wide variety of objects and structures. The sensors are available with a wide range of detection ranges, temperature ranges and lengths. This enables a wide range of applications. The fiber optic cable has a sensor head, which is available in different versions:

These sensor heads can be easily mounted in the machine on a bracket using M4, M6, and M10 threads.

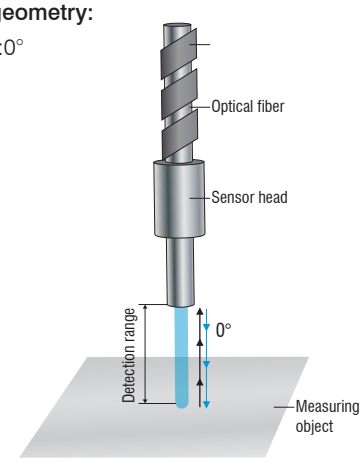
With external thread: For example, threaded sensors can be easily fixed on a mounting bracket.

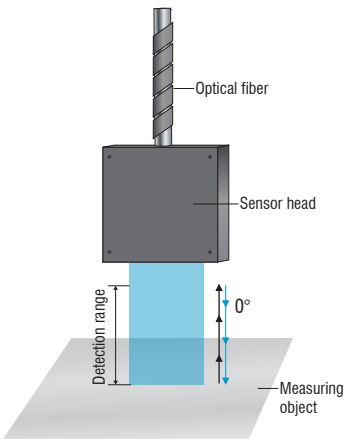
Without external thread: Cylindrical sensor heads are suitable for space-saving mounting. This is achieved by simply setting a grub screw.

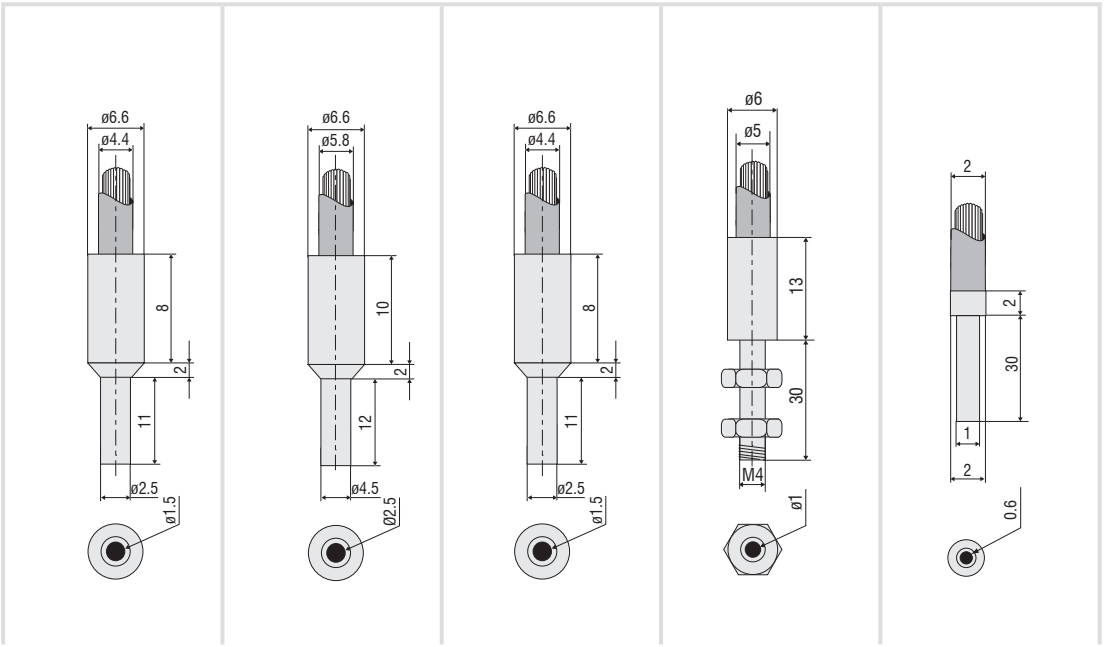
90° deflection: If the installation depth and the mounting space are very limited, sensors with integrated 90° deflection are the optimal solution.

Flat sensor head: Thanks to the light band, flat sensor heads are best suited for detecting larger objects. These can be located anywhere in the light band.

Measurement geometry:
Reflex sensor 0°:0°



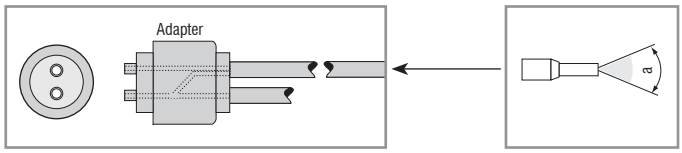




Model		CFS4-A11	CFS4-A20	CFS4-A30	CFS4-C10-M	CFS4-B11-P
Article number		10810487	10810351	10810584	10810383	10810254
Sensor type		Reflex sensor				
Detection range [1]	Start	1 mm	1 mm	1 mm	1 mm	1 mm
	End	132 mm	394 mm	430 mm	50 mm	19 mm
Measurement geometry		0°:0°				
Connection		Screwable fiber optic cable via FA socket (M18x1), standard length 1.2 m				
		max. bending radius 13.2 mm	max. bending radius 17.4 mm	max. bending radius 22.5 mm	max. bending radius 13.2 mm	max. bending radius 6 mm
Mounting		FA (M18x1)				
Temperature range	Storage	Sensor head: -10 ... +80 °C; Fiber optic cable: -60 ... +180 °C			Sensor head: -10 ... +80 °C Fiber optic cable: -40 ... +300 °C	Sensor head: -10 ... +80 °C; Fiber optic cable: -20 ... +80 °C
	Operation					
Humidity (non-condensing)		20 … 80 % RH			20 … 60 % RH	20 … 80 % RH
Protection class (DIN EN 60529)		IP64			IP40	IP64
Material	Sensor head	Stainless steel				
	Optical fibers	integrated glass fiber (Ø1.5 mm) and metal-silicone coating (T)		integrated glass fiber (Ø3.0 mm) and metal-silicone (T) sheathing	integrated glass fiber (Ø1.0 mm) and metal (M) sheathing	integrated glass fiber (Ø0.6 mm) and PVC plastic (P) sheathing
Weight		50 g	90 g	114 g	60 g	15 g
Compatibility		compatible with all CLS and CFO controllers				
Special features		All variants are also available with different sheath, length 0.3 ... 10 m, vibration protection, IP protection, suitable for drag chains and available for temperature ranges up to 2000 °C. In combination with a pressure-tight feedthrough, a stainless steel sheath and T250° bonding, vacuum applications down to 10^{-5} mbar are also possible.				

[1] Detection range refers to polished stainless steel.

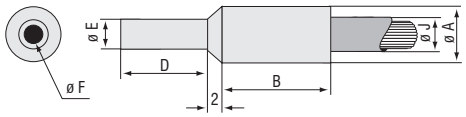
Standard sensor types for individual configuration
Optical glass fibers



Fiber optics types CFS3 or CFS4 + Ferrule

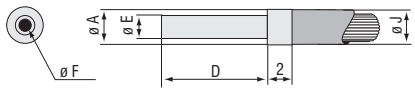
The end ferrule gives the fiber optic bundle its defined measurement geometry, e.g., as a point or line. This also enables 90° deflections or defines the mechanical fastening (screw connection, clamping, integrated thread).

A Type A ferrule, stainless steel



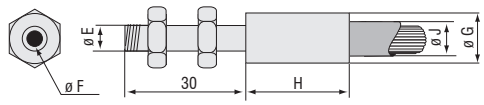
Ø F	Type	Ø A	B	D	Ø E	Ø J P	Ø J M	Ø J T
1.5	A10	4.6	8	11	2.5	4	4	–
1.5	A11	6.6	8	11	2.5	–	5	4.4
2.5	A20	6.6	10	12	4.5	6	6	5.8
3	A30	8.5	11	15	6	7	7	7.5

B Type B ferrule
(only suitable for PVC sheath)



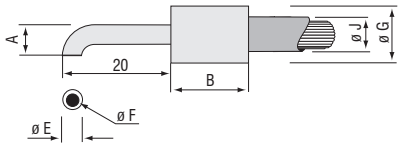
Ø F	Type	Ø A	D	Ø E	Ø J P	Ferrule
0.6	B11	2	30	1	2	Stainless steel
0.6	B12	2	10	1	2	Stainless steel
1	B20	3	10	2	3	Alu
2.5	B30	5	12	4	5	Alu
3	B40	8	12	6	8	Alu

C Type C ferrule, stainless steel



Ø F	Type	E	Ø G	H	Ø J P	Ø J M	Ø J 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

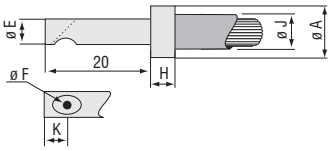
D Type D ferrule, stainless steel
With angular probe heads, a reduction in range can be expected compared to axially emerging versions.



Ø F	Type	Ø A	B	Ø E	Ø G	r	Ø J P	Ø J M	Ø J 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

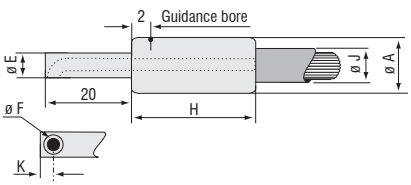
E Type E ferrule, stainless steel



Ø F	Type	Ø A	Ø E	H	K	Ø J P	Ø J M	Ø J 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	–

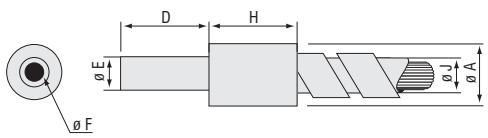
* E10/90 only suitable for PVC sheathing

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	Ø J P	Ø J M	Ø J 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

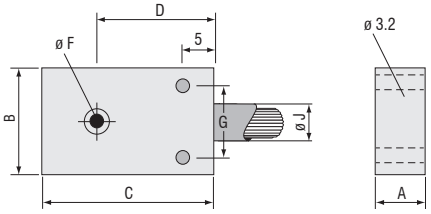
M Ferrule type M, aluminum / stainless steel



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

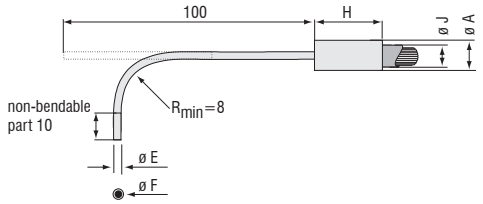
N End sleeve type N, aluminum



F	Type	A	B	C	D	G	Ø J		
							P	M	T
0.6	N10/90	6	15	25	20	9	4	5	4.4
1.5	N21/90	8	18	25	20	11	5	5	5.8
2.5	N31/90	12	20	25	20	13	6	6	6.5

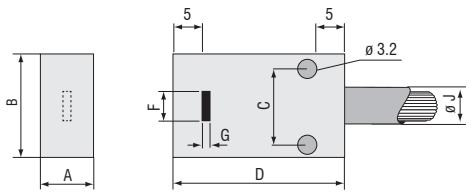
O Type O ferrule, bendable to a certain extent

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



Ø F	Type	Ø A	Ø E	H	Ø J		
					P	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

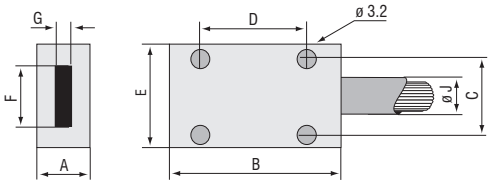
P Type P ferrule, aluminum



F	G	Type	A	B	C	D	Ø J		
							P	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

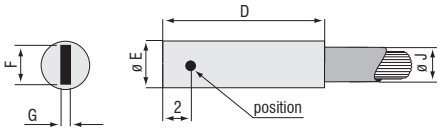
Also available in stainless steel



F	G	Type	A	B	C	D	E	Ø J
5	0.5	Q1	12	25	9	15	15	
10	0.3	Q2	12	30	14	20	20	depends on fiber cross-section
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	Ø J		
					P	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

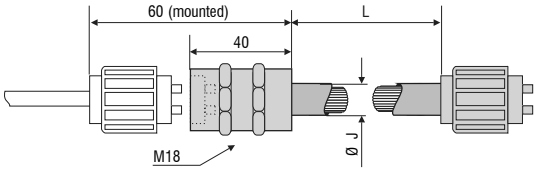
* R10 and R20 only suitable for PVC sheath

Extensions / feedthrough

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

LV Type LV ferrule

Fiber optic extension / feedthrough

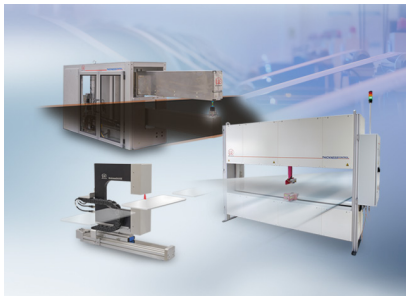


Fiber bundle Ø	P	Ø J		L
		M	T	
(3 mm)/ channel	12	13	13.5	variable

Sensors and Systems from Micro-Epsilon

Sensors and systems for displacement, distance and position

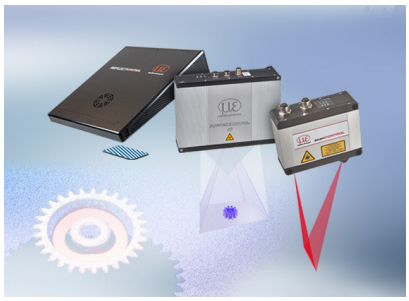
Sensors and measurement devices for non-contact temperature measurement



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

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