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Business Hours: Monday - Friday 8:30AM - 6:15PM

More Precision

colorSENSOR // Sensor Configuration



Customer-specific adaptations are possible for all sensors. We would be pleased to manufacture your sensor according to your specification/requirements. Please contact Micro-Epsilon Eltrotec!

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 receiving 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



Cable sheaths

Fiber bundle diameter

- 0.6 / 1 / 1.5 / 2.5 / 3 mm



Fiber bundle diameter

Optical fiber (length)

- Available from 300 mm
- Standard length 1,200 mm
- 600, 1,800 and 2,400 mm optionally available
- Individual length of 0.3 ... 2.4 m possible

Optical fiber (length)

Possible temperature ranges:
Sensor: -40 °C ... + 2.000 °C
Optical fiber: -270 ... +600 °C



Ambient conditions

Aperture angle

- Standard 67°
- Optional 22° / 35°



Aperture Angle

Ambient conditions

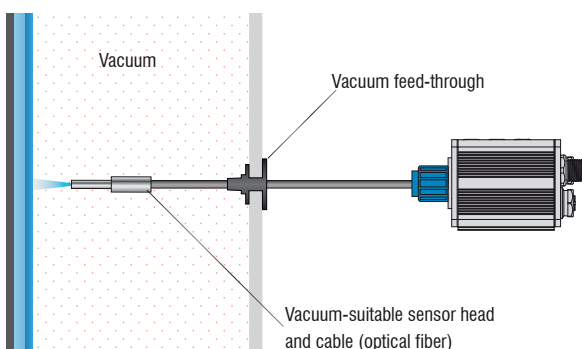
- Special versions with increased vibration resistance (VS)
- Special variants with special bonding for high temperatures (T250 / T400)
- Pressure-tight special variants with vacuum feed-through (up to 10⁻⁵ mbar)

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



Mountable lenses



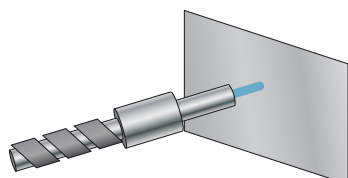
Vacuum suitability

The color sensors and optical fibers consist of passive components and do not give off heat. In vacuum, sensors (temperature bonding T250), optical fibers (stainless steel sheath), and the vacuum feed-through up to 10⁻⁵ mbar can be used.

Functions of the fiber optics

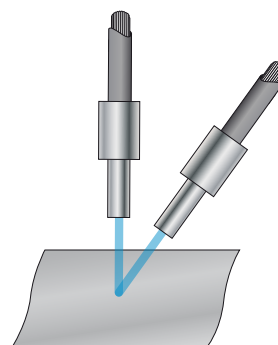


Application instructions on selecting the appropriate function.



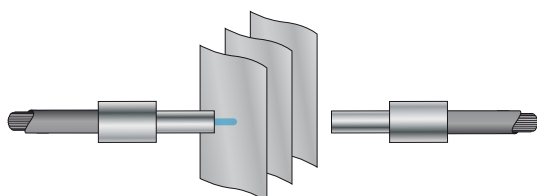
Reflex mode

- Max. measurement distance 200 mm
- Easy and fast installation
- Detection of smallest objects from 0.2 mm
- Color evaluation to determine color, gloss level, gray value, presence
- Ideal for part recognition, sorting tasks, presence monitoring, color tests



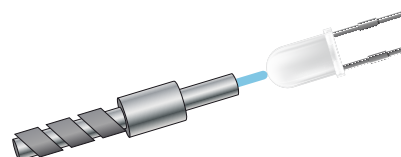
Reflex mode V arrangement

- Max. measurement distance 200 mm (with reflecting surfaces)
- Easy adjustment due to mounting accessories
- Very exact positioning of the detection point
- Immune to dust and particles in the beam path



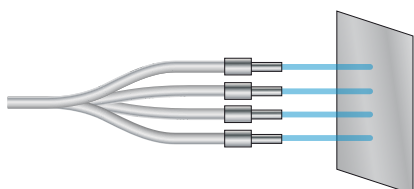
Transmitted light mode

- Distance between receiving and transmission unit up to 50 mm
- Color recognition of transparent objects
- Arbitrary point of light transmission
- Ideal for part recognition, color tests, sorting tasks, presence monitoring



Receive mode with self-luminous objects

- Max. measurement distance 30 mm
- Recognition of slightest variations in color and intensity
- For color sensor with external illumination
- Ideal for testing LED illumination and self-luminous objects



Available on request

Special types for multiple reflex mode

Transmission and receiving fibers are, statistically mixed, guided in two or more separated fiber optics. Therefore, several positions can be detected using only one sensor.

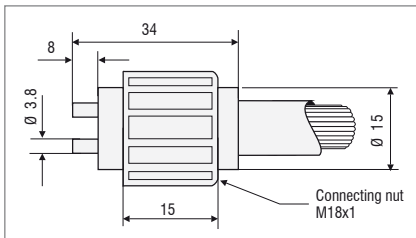
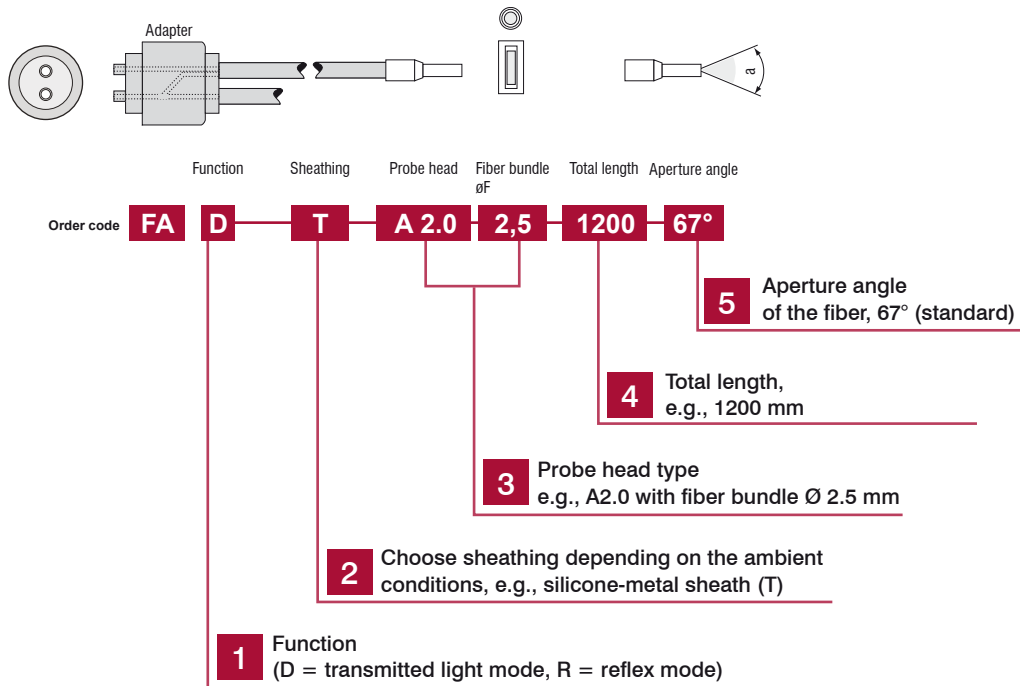


Available on request

Special types for multiple transmitted light mode

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

Order code for fiber optics

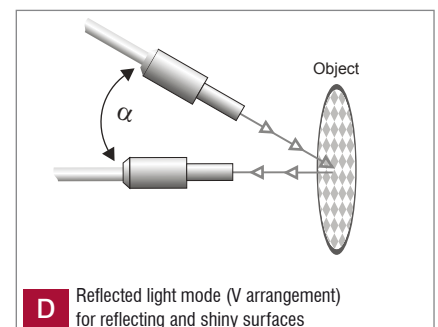
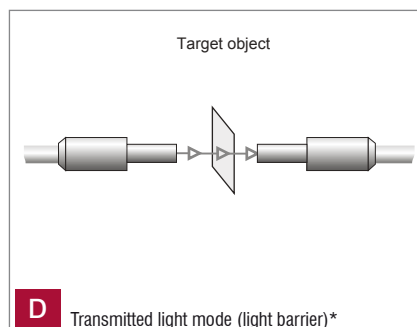
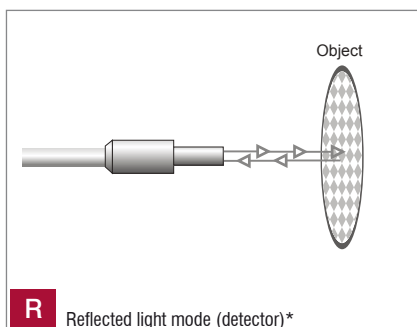


Adapter, FA System FASOP

1 Function of the fiber optics

(D = transmitted light mode, R = reflex mode)

Please define the accessibility of the measuring site and the size of the measurement object in order to specify the function of the fiber optics and the diameter of the glass fiber bundle.



* All functions can also be performed as multiple reflex and transmitted light functions

2 Sheathing



Please determine the sheathing and the bonding of the fiber optics based on the prevailing environmental conditions and mechanical stress. Please contact us in case of high temperature applications or extreme, mechanical stress.

Silicone-metal sheath

Metal wire-spiral-reinforced hose with glass-fiber braiding and silicone rubber sheathing ¹⁾

Characteristics:

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

T



VA stainless-steel sheath

Flexible stainless steel wire-spiral-reinforced hose ¹⁾

Characteristics:

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

E



Metal sheath

Flexible brass wire-spiral-reinforced hose, chrome-plated ¹⁾

Characteristics:

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

M



PVC-metal sheath

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

Characteristics:

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

Z



PVC special sheath

Plastic hose ²⁾

Characteristics:

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

P



BOA special sheath

Corrugated tube with stainless steel braiding ²⁾

Characteristics:

- Protection against mechanical stress
- Ideal for drag-chain applications
- Temperature-stable from -270 °C to +600 °C

BOA



Special models

Fiber optics with increased vibration protection - VS option

Fiber optics can be manufactured with increased vibration protection for use with mechanical loads such as shock, acceleration, and movement. This special treatment minimizes friction between fibers and reduces shocks. The fibers are embedded into a gel cushion.

Special models

Fiber optics with special bonding for high temperatures

Standard bonding is suitable for maximum temperatures up to 80 °C. Special adhesives allow for temperatures of up to 250 °C and even 400 °C. These higher temperature ranges require the use of Type E stainless steel sheathing. With quartz and sapphire fibers and appropriate adhesive, special fiber optics for use in environments up to 2000 °C can be produced.

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

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

Details about sheath diameters can be found in section 3: (probe head types)

3 Probe heads and fiber bundles



Please choose a probe head type and ensure that the probe head is compatible with the fiber bundle diameter $\varnothing F$ (see 1) and the sheath (see 2).

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

Please refer to the technical data for special models (T250, T400).

All details in mm; tolerances: typ. $\pm 0.1\text{ mm}$

Alu ferrules, black anodized

Please contact us if you require other dimensions.

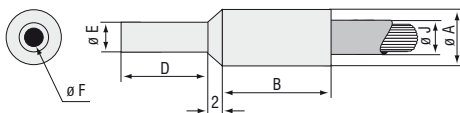
Detection ranges of the probe heads

Fiber bundle $\varnothing F$ mm	Working distance mm	Light spot for 67° fiber approx. \varnothing mm	Light spot for 22° fiber approx. \varnothing mm
0.6	5	3	3
	10	5	4
	15	8 ¹⁾	6
	20	12 ¹⁾	8
1	5	3	3
	10	7	5
	15	11	8 ¹⁾
	20	15 ¹⁾	11 ¹⁾
1.5	5	4	3
	10	7	5
	15	11	8
	20	19 ¹⁾	11
2.5	5	5	4
	10	10	8
	15	13	10
	20	19 ¹⁾	13
3	5	8	5
	10	12	7
	15	15	10
	20	18 ¹⁾	13

Typical values determined with colorSENSOR LF-2

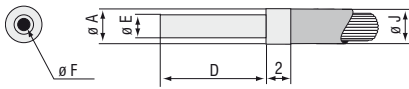
¹⁾ Only under certain circumstances

A Type A ferrule, stainless steel



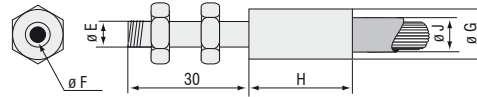
$\varnothing F$	Type	$\varnothing A$	B	D	$\varnothing E$	P	$\varnothing J$ M	T
1.5	A 1.0	4.6	8	11	2.5	4	4	-
1.5	A 1.1	6.6	8	11	2.5	-	5	4.4
2.5	A 2.0	6.6	10	12	4.5	6	6	5.8
3	A 3.0	8.5	11	15	6	7	7	7.5

B Type B ferrule
(only suitable for PVC sheathing)



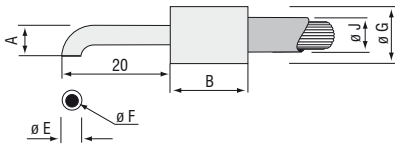
Ø F	Type	Ø A	D	Ø E	Ø J P	Ferrule
0.6	B 1.1	2	30	1	2	Stainless steel
0.6	B 1.2	2	10	1	2	Stainless steel
1	B 2.0	3	10	2	3	Alu
2.5	B 3.0	5	12	4	5	Alu
3	B 4.0	8	12	6	8	Alu

C Type C ferrule, stainless steel



Ø F	Type	E	Ø G	H	P	Ø J M	T
1.0	C 1.0	M4	6	13	5	5	4.4
2.5	C 2.0	M6	8	15	6	6	5.8
3	C 3.0	M10	11	12	7	7	7.5

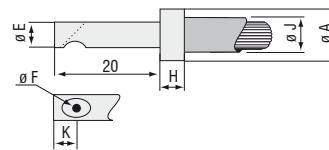
D Type D ferrule, stainless steel
With angular probe heads, a reduction in range can be expected compared to axially emerging versions.



Ø F	Model	Ø A	B	Ø E	Ø G	r	P	Ø J M	T
0.6	D 1.0	2.5	10	1	3	1.5	2	-	-
0.6	D 1.1	2.5	13	1	6	1.5	-	-	4.4
1.5	D 2.0	6	13	2	6	4	5	5	4.4
2.5	D 3.0	15	17	5	9	10	7	7	6.5

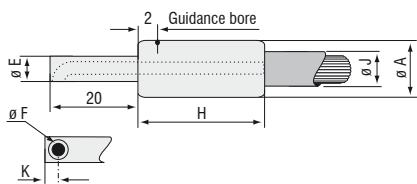
* D1.0 only suitable for PVC sheathing

E Type E ferrule, stainless steel
(* E1.0 only suitable for PVC sheathing)



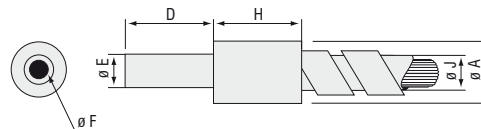
Ø F	Model	Ø A	Ø E	H	K	P	Ø J M	T
1.5	E 1.0	4	3	1.5	4	4	-	-
2.5	E 2.0	5	4	1.5	4	5	5	-
2.5	E 2.1	7	4	10	4	-	-	5.8
3	E 3.0	8	6	1.5	5	7	7	-

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



Ø F	Model	Ø A	Ø E	H	K	P	Ø J M	T
1.5	F 1.0	8	6	9	3	5	5	5.8
2.5	F 2.0	10	8	10	4	6	6	6.5
3	F 3.0	12	10	10	5	7	7	7.5

M Type M ferrule, aluminum / stainless steel

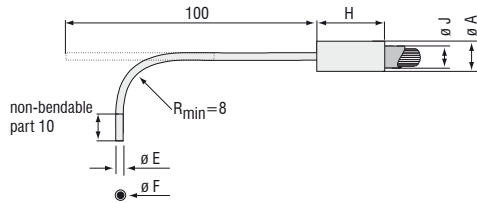


Ø F	Model	Ø A	D	Ø E	H	Ø J M	T	Ferrule
0.6	M 1.1	6	30	1	10	5	4.4	Stainless steel
0.6	M 1.2	6	10	1	10	5	4.4	Stainless steel
1	M 2.0	6	10	2	10	5	4.4	Alu
2.5	M 3.0	7	12	4	12	6	5.8	Alu
3.5	M 4.0	9	12	6	12	7	7.5	Alu

Larger fiber cross-sections are possible

O Type O ferrule, bendable to a certain extent

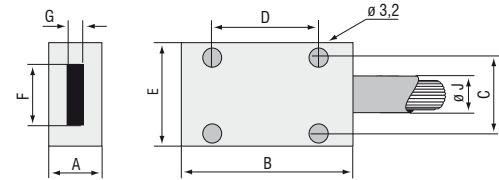
With angular probe heads, a reduction in range can be expected compared to axially emerging versions.



Ø F	Type	Ø A	Ø E	H	P	Ø J M	T
0.6	O 1.0	2	1	10	2	-	-
0.6	O 1.1	7	1	20	-	5	4.4
1	O 2.0	3	1.3	10	3	-	-
1	O 2.1	7	1.3	20	-	5	4.4

Q Type Q, aluminum

Also available in stainless steel

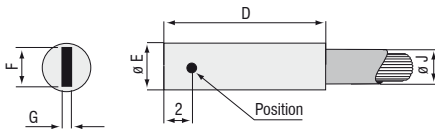


Model	A	B	C	D	E	F	G	Ø J M	T
Q1	12	25	9	15	15	5	0.5	-	-
Q2	12	30	14	20	20	10	0.3	-	-
Q3	12	35	24	25	30	18	0.3	-	-
Q4	12	55	34	40	40	28	0.2	-	-
Q5	12	55	44	40	50	38	0.15	-	-
Q6	12	55	54	40	60	48	0.15	-	-
Q7	16	75	64	60	70	58	*	-	-
Q8	16	75	74	60	80	68	*	-	-
Q9	20	90	84	75	90	78	*	-	-
Q10	20	90	94	75	100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

FxG max. 9.62 mm²

F=3.5 mm as special model

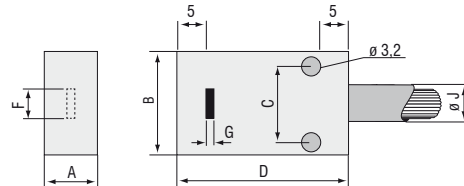
Q7 to Q10 only available as FAR special model

R Type R ferrule, aluminum

Model	D	Ø E	F	G max.	P	Ø J M	T
R 1.0*	25	4	3	0.5	3	-	-
R 1.1	30	7	3	0.5	6	6	5.8
R 2.0	25	7	6	1	6	6	5.8**
R 2.1	30	10	6	1	-	7	7.5

* R1.0 and R2.0 only suitable for PVC sheathing

** at 6x1 mm², can be made to a length of 1200

P Type P ferrule, aluminum

Model	A	B	C	D	F	G	P	Ø J M	T
P 1.0	8	15	9	25	3	0.1	4	5	4.4
P 2.1	8	17	11	30	6	0.3	4	6	6.5
P 3.1	12	17	11	30	10	0.5	6	6	6.5

4 Length

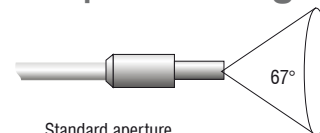
Standard lengths are: 600*, 1200*, 1800 and 2400 mm.

*Bearing types

Length tolerance typ.: ±4%

Cable lengths of up to 200 mm can be supplied on request.

The recommended max. cable length for color inspection 2,400 mm.

5 Aperture angle

Standard aperture angle 67°

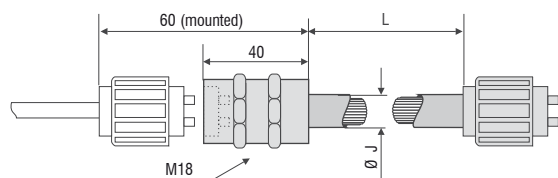
Technical data // Fiber optics		
Length	Standard lengths: 600, 1200, 1800 and 2400 mm, up to 30 m on request	
Aperture angle	Standard fiber	67° (NA 0.56) ¹⁾
	Special fibers on request	22° (NA 0.21/ glass fibers) 80° (NA 0.64/glass fibers) 120° (NA 0.86/glass fibers) 25° (NA 0.22/UV-VIS and VIS-IR quartz fibers) 14° (NA 0.12/UV-VIS and VIS-IR quartz fibers)
Material	Optical glass; quartz glass or sapphire glass on request	
Dielectric strength	50 kV/m with PVC protective sheath	
Probe head 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
Permissible temperature range with sheathing 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)	-270 °C to +600 °C
Fiber transmission	Different types for wavelengths from UV 180 nm to IR 3500 nm. We can provide the most suitable solution depending on your requirements. Transmission curves on request.	
Vibration protection	Increased vibration protection (VS option)	

¹⁾ Fiber transmission with standard fiber 390 - 1390 nm

Extensions / feed-through

For extension or feed-through of the fiber optics please use the Type LV ferrule.

LV Type LV ferrule Fiber optic extension / feed-through



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

Available on request

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

Housing feed-through

Adapter for optical fiber FA on FA

Suitable for use in vacuum

Suitable for use with drag cable

Vibration protection

Tomography

Single-channel

Multi-channel

Adaption for C-mount lenses

Special fiber optics according to customer requirements/drawing

²⁾ In combination with FAD-X-FAD adapter for optical fiber

³⁾ Also suitable for use in vacuum up to 10⁻⁵



- *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
- Extension of the range with C-mount lens to a distance > 300 mm
- 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)
- Recognition of highly absorbent objects (KL-5, KL-14, KL-17)

	Probe head type	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 with 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 with 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 with 80 mm Pos2 Ø 7-11 mm Ø 7 mm with 110 mm Pos3 Ø 7-11 mm Ø 7 mm with 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 with 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 with 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 with 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 with 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 with 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 with 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 with 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 with 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 with 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 with 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 0.3 mm up to 15 x 3 mm 2 x 0.3 mm with 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 with 10 mm	L x Ø approx. 60 mm x 15 mm

*The smallest figure in the table relates to the smallest typical optical diameter that is generated.

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

¹⁾ Reflected-light optical fiber (FAR)

²⁾ Transmitted-light optical fiber (FAD)

³⁾ Possible with FAR-X-A2.0-0.6-XXXX-67° reflected-light optical fiber (spot size of approx. 0.2 mm)

Sensors and Systems from Micro-Epsilon



Sensors and systems for displacement, distance and position



Sensors and measurement devices for non-contact temperature measurement



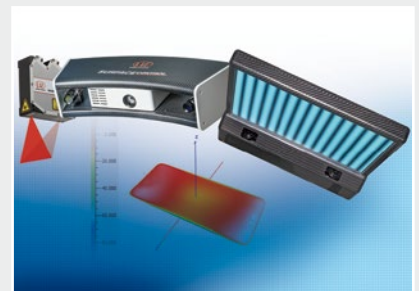
Measuring and inspection systems for metal strips, plastics and rubber



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



SCIGATE AUTOMATION (S) PTE LTD

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