FT 25-R(L)A

Miniature distance sensors

FT 25 – optical short-range distance sensors

The compact class for measurement and regulatory tasks

FT 25-R(L)A for dancer roll regulation
The precise control of the FT 25-R(L)A ensures a constant tension of the paper roll during unwinding.

TYPICAL FT 25-R(L)A

- Operating range: 20...80 mm / 20...100 mm / 30...200 mm
- Distance sensor with 1 … 10 V analogue output
- Easily integratable ultra-compact ABS housing: 34 x 12 x 20 mm
- High precision and high repeatability – especially for control tasks
- Resolution: from 0.12 mm
- Two adjustable switching points as window mode for 2-point control
- Teach-in operation

In a miniature housing
The FT 25-R(L)A is also suitable for limited installation spaces thanks to its compact dimensions of 34 x 12 x 20 mm.

In addition to its analogue voltage output the small distance sensors also have a switching output and offer the possibility of defining a switching window by means of two switching points. Thanks to their easy operation, these sensors are particularly suitable for simple measurement and regulatory tasks at distances of up to 200 mm. Our laser and LED variants cover a very broad range of applications.

Key applications:

- Dancer roll regulation, sag monitoring (LED / laser)
- Determining the roll diameter of an unwinding machine (LED / laser)
- Stacking height measurement, double layer detection and height measurements in the wood processing, packaging- and handling industry (LED / laser)
- Distance measurement and positioning on robot grippers in „pick & place“ applications (LED / laser)
- Small part measurement, e.g. O-rings and electronic components (laser)
- Measurement on multicoloured and high-contrast objects, e.g. packages (laser)

FT 25-R(L)A – Product Overview

	Operating range	Special features	Page
FT 25-RLA	20 … 100 mm	Laser, small housing	8
FT 25-RA	20 … 80 mm / 30 ... 200 mm	Small housing with long range	10

FT 25-RLA

Precise miniature laser distance sensor

The FT 25-RLA inspects the presence and thickness of sealing rings. The MBD F25ST2 dovetail bracket ensures easy mounting and adjustment.

TYPICAL FT 25-RLA

- Smallest laser distance sensor of its kind
- Small laser light spot for reliable measurement of small objects
- Low weight - suitable for robotic applications
- High repeatability for precise control tasks on nearly all surfaces
- Full eye safety thanks to laser class 1
- High flexibility due to large measurement ranges

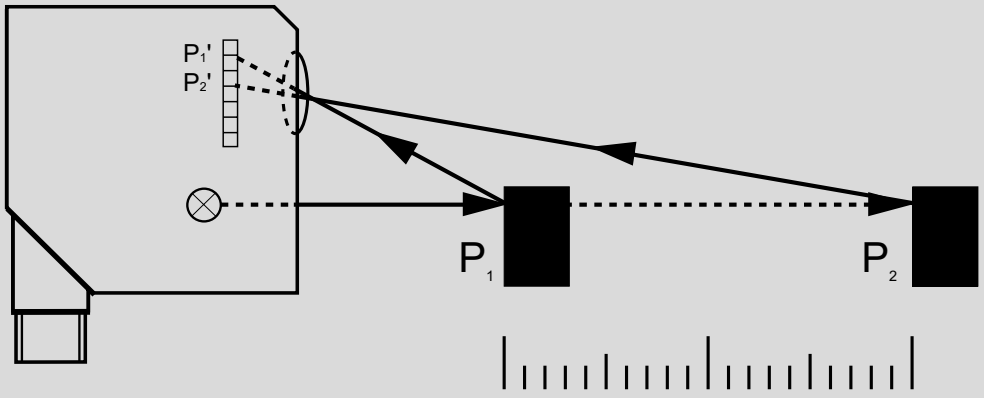
Distance measurement using triangulation

The measurement principle of optical triangulation is suitable for the precise determination of distances at close range. With the help of special receiver optics and a position-sensitive detector (e.g. a photodiode line), the sensor can determine the object distance regardless of its reflectivity (see illustration below). The colour and surface properties (e.g. highly reflective) thus have practically no effect on measurement accuracy.

The FT 25-R(L)A distance sensors provide a signal proportional to the distance, transmitted via the analogue output (1 ... 10 V). Additionaly, an arbitrary switching window is adjustable within the measuring range (via the teach-in button). The output of the two switching points is supplied at the digital switching output.

The triangulation process: with the help of a line-shaped position-sensitive detector, the distance sensor measures the distance to the object regardless of the amount of light reflected.

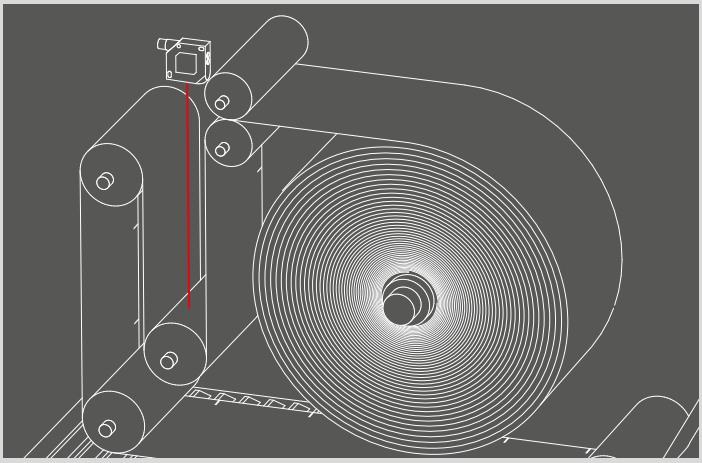
The light reflected back from the object (P_1) hits the line at point P_1. The sensor determines the distance signal from this. The light correspondingly hits the detector at a different point (P_2) at object distance P_2.



Dancer roll regulation and sag monitoring

Due to its high repeatability, the **FT 25-R(L)A distance sensor** accurately detects the change of position of the dancer roll. This ensures a precise control of the unwinding.

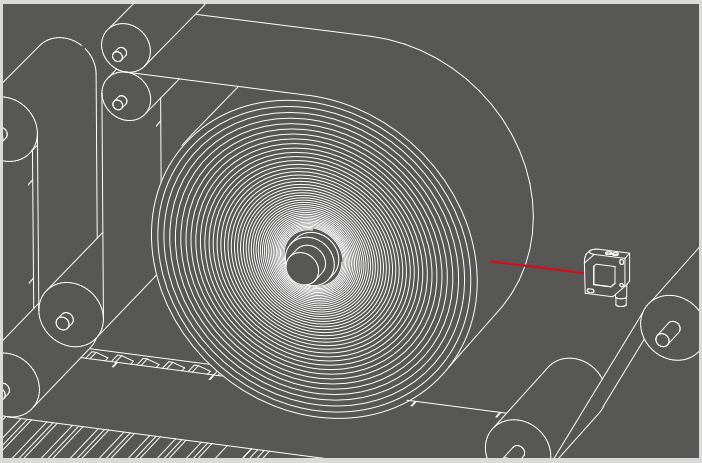
- Precise determination of dancer roll position for active traction force regulation of the web being wound
- Reliable detection regardless of the target object's surface properties
- Short response time for rapid processes
- Measurement ranges up to 200 mm
- Analogue and switching output for precise two-step control tasks



Determining the roll diameter of an unwinding machine

The **FT 25-R(L)A distance sensor** precisely determines the diameter of the unwinding machine to provide an early information for an upcoming roll change.

- Small housing for easy integration
- High accuracy regardless of target object's surface properties
- Short response time



Further key applications of the FT 25-R(L)A include:

- Stacking height measurement, double layer detection and height measurements in the wood processing, packaging- and handling industry
- Distance measurement and positioning on robot grippers at „pick & place" applications

FT 25-RLA

Miniature laser distance sensor

PRODUCT HIGHLIGHTS

- Small laser light spot for reliable distance measurement of small objects part detection
- Miniature housing and low weight - suitable for robotic applications
- High linearity and high repeatability for precise control tasks
- Invertible analogue characteristic
- Window mode e.g. for two-step controls separately adjustable

Optical data	
Measurement range	20 … 100 mm[1]
Resolution	0.12 mm (12-bit)
Linearity	± 0.25 mm[2]
Repeatability	< 0.25 mm[2, 3]
Type of light	Laser, red, 650 nm
Light spot size	See diagram
Laser class (DIN EN 60825-1:2008-5)	1

Functions	
Indicator LED, green	Operating voltage indicator
Indicator LED, yellow	Switching output indicator
Measurement range adjustment	Via Teach-in button
Adjustment possibilities	Analogue measurement range Q_A Invertible analogue characteristic Switching output Q (window mode) N.O. / N.C. and Auto-Detect / NPN / PNP via teach-in button
Default settings	See Table

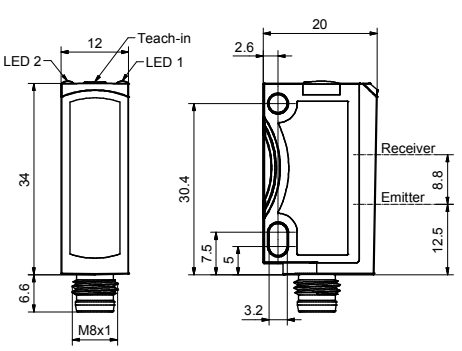
Electrical data	
Operating voltage, $+U_B$	13 … 30 V DC
No-load current, I_0	≤ 30 mA
Output current, le Q	≤ 100 mA
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)
Protection Class	2
Power On Delay	< 300 ms
Switching output, Q	Auto-Detect (NPN / PNP)[4]
Output function	N.O. / N.C.
Max. capacitive load Q	10 nF
Switching frequency, f (ti/tp 1:1) Q	≤ 1000 Hz
Response time Q	500 µs
Analogue output Q_A	1 … 10 V / max. 3 mA
Response time Q_A	3.4 ms
Warm-up time	10 min.
Temperature drift	< 0.1 mm/K

Mechanical data	
Dimensions	34 x 20 x 12 mm
Enclosure rating	IP 67 / IP 69K[5]
Material, housing	ABS
Material, front screen	PMMA
Type of connection	See Selection Table
Ambient temperature: operation	-20 … +60 °C[6]
Ambient temperature: storage	-20 … +80 °C
Weight (metal plug device)	10 g
Resistance to vibrations and impacts	EN 60947-5-2

[1] Reference material: 6…90 % reflectivity [2] Reference material, 18 % reflectivity [3] At 6 σ, at constant ambient conditions, typ. values see diagram [4] Auto-Detect: Automatic selection of PNP or NPN by the sensor, PNP or NPN can be fixed [5] With connected IP 67 / IP 69K plug [6] UL: -20°C...+50 °C

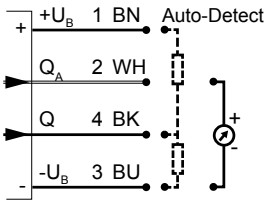
Measurement range	Analogue output	Switching output	Type of connection	Part number	Article number
20 ... 100 mm	1 ... 10 V	Auto-Detect	Metal plug, M8x1, 4-pin	FT 25-RLA-80-PNSU-M4M	604-41010

Plug connection



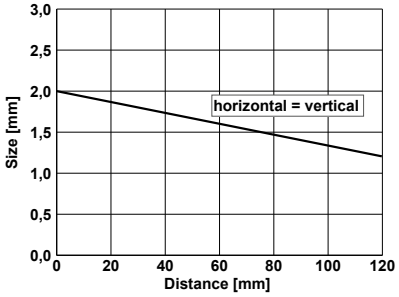
153-00934

Connection, 4-pin



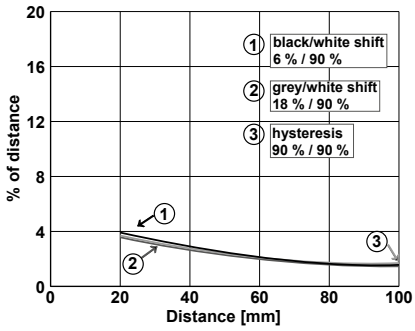
154-00547

Light spot size



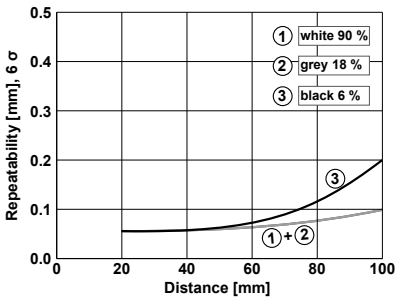
155-01394

Scanning properties



155-01966

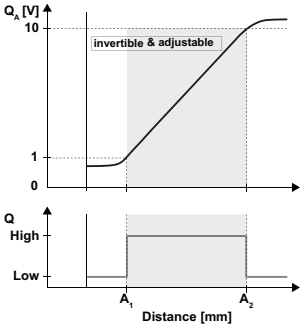
Repeatability[1] (typ.)



155-01968

[1] At constant ambient conditions

Characteristics



155-01661

155-01681

Default settings

Analogue output Q_A (1 ... 10 V)	20 ... 100 mm
Switching output Q (A1 ... A2), N.O.	20 ... 100 mm

FT 25 RA

Miniature distance sensor

PRODUCT HIGHLIGHTS

- Miniature housing with measurement ranges up to 200 mm for an easy integration and high flexibility
- High linearity and high repeatability for precise control tasks
- Almost surface independant detection on homogeneous object surfaces
- Invertible analogue characteristic
- Window mode e.g. for two-step controls separately adjustable

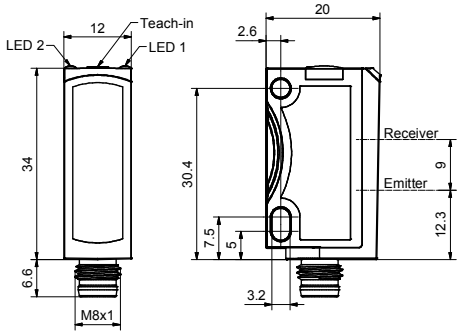
Optical data			Functions	
Measurement range	20 … 80 mm[1]	30 … 200 mm[1]	Indicator LED, green	Operating voltage indicator
Resolution	0,12 mm	0,68 mm	Indicator LED, yellow	Switching output indicator
Linearity	± 0.4 mm[2]	± 2 mm[2]	Measurement range adjustment	Via Teach-in button
Repeatability	< 0.4 mm[2, 3]	< 1 mm[2, 3]	Adjustment possibilities	Analogue measurement range Q_A Invertible analogue characteristic Switching output Q (window mode) N.O./N.C. via teach-in button
Type of light	LED, red, 632 nm	LED, red, 632 nm	Default settings	See Table

Electrical data		Mechanical data	
Operating voltage, $+U_B$	13 … 30 V DC	Dimensions	34 x 20 x 12 mm
No-load current, I_0	≤ 30 mA	Enclosure rating	IP 67 / IP69 K[4]
Output current, le Q	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U_B / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	(See Selection Table)
Time to readiness	< 300 ms	Ambient temperature: operation	-20 … +60 °C[5]
Switching output, Q	PNP/NPN (See Selection Table)	Ambient temperature: storage	-20 … +80 °C
Output function	N.O./N.C.	Weight (plug device)	10 g
Max. capacitive load Q	10 nF	Resistance to vibrations and impacts	EN 60947-5-2
Switching frequency, f (ti/tp 1:1) Q	≤ 1000 Hz		
Response time Q	500 µs		
Analogue output Q_A	1 … 10 V / max. 3 mA		
Response time Q_A	400 µs (FT 25-RA-60) 3.4 µs (FT 25-RA-170)		
Warm-up time	10 min.		
Temperature drift	< 0.1 mm/K (FT 25-RA-60) < 0.2 mm/K (FT 25-RA-170)		

[1] Reference material: 6…90 % reflectivity, [2] Reference material grey, 18 % reflectivity, [3] at constant ambient conditions,
[4] with connected IP 67 / IP 69K plug, [5] UL: -20°C...+50 °C

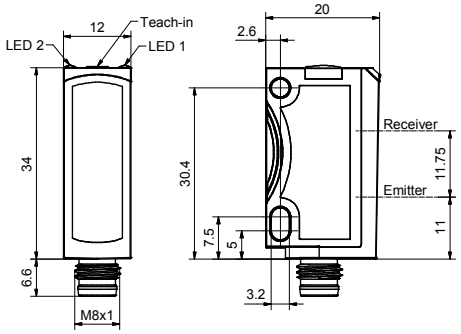
Measurement range	Analogue output	Switching output	Type of connection	Part number	Article number
20 ... 80 mm	1 ... 10 V	PNP	Metal plug, M8x1, 4-pin	FT 25 RA-60-PSU-M4M	604-41000
20 ... 80 mm	1 ... 10 V	NPN	Metal plug, M8x1, 4-pin	FT 25 RA-60-NSU-M4M	604-41001
30 ... 200 mm	1 ... 10 V	PNP	Metal plug, M8x1, 4-pin	FT 25 RA-170-PSU-M4M	604-41002
30 ... 200 mm	1 ... 10 V	NPN	Metal plug, M8x1, 4-pin	FT 25 RA-170-NSU-M4M	604-41003

Plug connection (20 ... 80 mm)



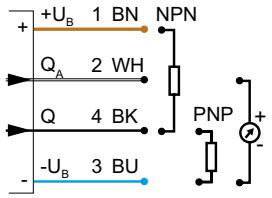
153-00839

Plug connection (30 ... 200 mm)



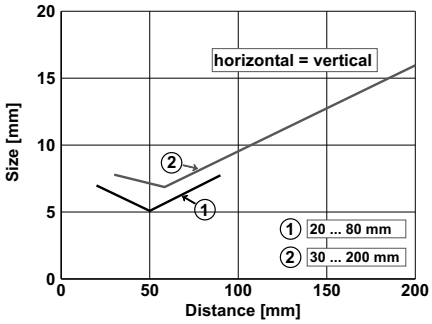
153-00837

Connection, 4-pin



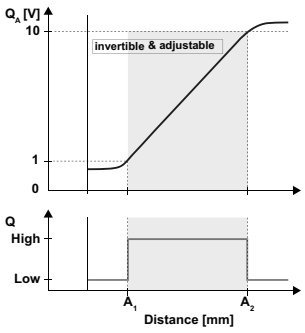
154-00329

Light spot size



155-01663

Characteristics



155-01661

155-01681

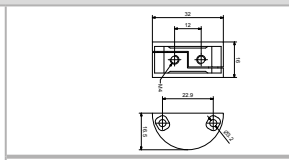
Default settings

	FT 25-RA-60	FT 25-RA-170
Analogue output Q_A (1 ... 10 V)	20 ... 80 mm	30 ... 200 mm
Switching output Q (A1 ... A2), N.O.	20 ... 80 mm	30 ... 200 mm

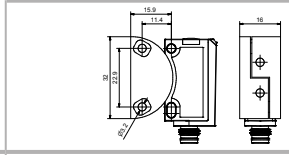
Accessories

Brackets

Brackets for F 25 series

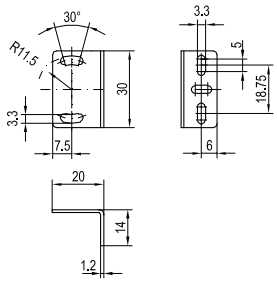


153-00945



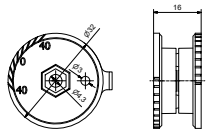
153-00946

Part number / Article number	MBD F 25 / 661-01000
Description	Dovetail clamp mounting, adjustable ± 15°, with screws Material: anodised aluminium
Suitable for	F 25

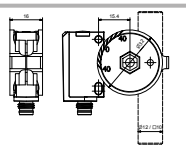


153-00241

Part number / Article number	MS F 20 / 558-41000
Description	Mounting bracket with screws 1x retaining strip Material: nickel-plated steel
Suitable for	F 20 F 25 UT 20 FL 20

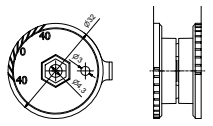


153-01155

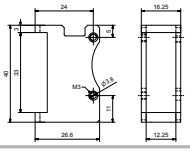


153-01156

Part number / Article number	MBD F 25ST2 / 661-01005
Description	Clamping bracket for Ø 12 mm mounting rod and 10 x 10 mm square profile, with M4 screw and M3 nut Material: die-cast zinc
Suitable for	F 25

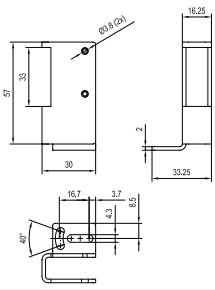


153-01155



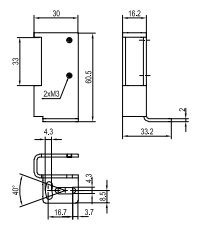
153-01163

Part number / Article number	Set: MBD F 25STP / 661-01004
Description	Clamping bracket for Ø 12 mm mounting rod and 10 x 10 mm square profile, with protective casing, M4 screw, M4 thumbscrew, M4 nut, 2x M3 screw Material: die-cast zinc Casing Material: stainless steel V2A
Suitable for	F 25



153-01017

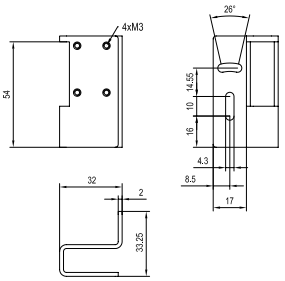
Part number / Article number	MSP F 20-11 / 558-41006
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 UT 20-150 F 25 UT 20-S150 FL 20 UT 20-240



153-00296

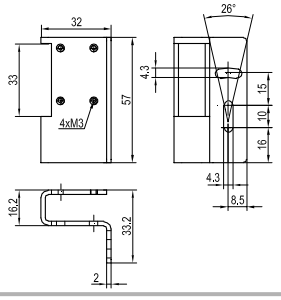
Part number / Article number	MSP F 20-1 / 558-41004
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 F 25 UT 20 FL 20

Brackets for F 25 series



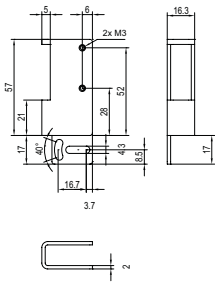
153-00908

Part number / Article number	MSP F 20-23 / 558-41011
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 F 25 UT 20 FL 20



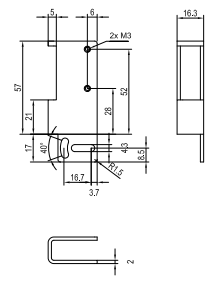
153-00297

Part number / Article number	MSP F 20-2 / 558-41005
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 UT 20-150 F 25 UT 20-S150 FL 20 UT 20-240



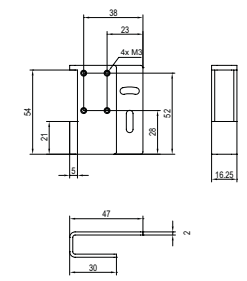
153-00973

Part number / Article number	MSP F 20-13 / 558-41008
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 UT 20-150 F 25 UT 20-S150 FL 20 UT 20-240



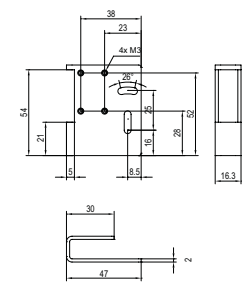
153-00972

Part number / Article number	MSP F 20-12 / 558-41007
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 UT 20-150 F 25 UT 20-S150 FL 20 UT 20-240



153-00974

Part number / Article number	MSP F 20-21 / 558-41009
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 UT 20-150 F 25 UT 20-S150 FL 20 UT 20-240



153-00975

Part number / Article number	MSP F 20-22 / 558-41010
Description	Protective sensor angle bracket with screws, very robust Material: stainless steel V2A
Suitable for	F 20 UT 20-150 F 25 UT 20-S150 FL 20 UT 20-240

Accessories

Cables

Straight connectors	90° connectors	90° connectors with LED	Shielded connectors

Part number	Article number	Description
M8, 4-pin		
K4-2m-G-PUR	902-50801	2 m, straight, PUR, suitable for drag chains
K4-5m-G-PUR	902-51617	5 m, straight, PUR, suitable for drag chains
K4-10m-G-PUR	902-51610	10 m, straight, PUR, suitable for drag chains
K4-2m-W-PUR	902-50803	2 m, 90°, PUR, suitable for drag chains
K4-5m-W-PUR	902-51618	5 m, 90°, PUR, suitable for drag chains
K4-10m-W-PUR	902-51629	10 m, 90°, PUR, suitable for drag chains
K4-2m-W-PL-PUR	902-51642	2 m, 90°, PUR, with indicator LED
K4-5m-W-PL-PUR	902-51643	5 m, 90°, PUR, with indicator LED
CM4 FG-E-5m-PVC	902-50221	5 m, straight, PVC, with hex nut SW 9 stainless steel (IP 69K), suitable for drag chains
CM4 FW-E-5m-PVC	902-50222	5 m, 90°, PVC, with hex nut SW 9 stainless steel (IP 69K), suitable for drag chains

VISOR® and sensors

Practical and effective automation solutions

SENSOPART

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You can very easily call up this catalogue with your smart phone – using the code opposite.

SensoPart sets new standards for industrial sensors with the optoelectronic sensors of the **F 10, F 25** *and* **F 55** *series: all three housing sizes share excellent optical performance data, very precisely adjustable background suppression, intuitive and comfortable operation, and excellent quality – made in Germany. And our application-specific pre-configured – and thus immediately usable – all-in-one solutions in the* **VISOR®** *series show what is now possible in the vision segment.*

We look ahead.

Yesterday, today and in the future.

SENSOPART

"We gauge ourselves not by what is possible today, but by our vision of what can be achieved" – this has been our motto since the foundation of SensoPart in 1994. Our goal is to always be a step ahead and to be able to offer our customers the most innovative sensor for industrial automation.

With our easy to integrate VISOR® Vision sensors and our compact laser sensors with an amazing background suppression made in Germany, we stick up to this motto.

Get ready – we still have a lot of ideas for the future.

SENSOR TECHNOLOGY

- Light barriers
- Proximity switches
- Laser sensors
- Miniature sensors
- Distance sensors
- Colour sensors
- Contrast sensors
- Anti-collision sensors
- Slot sensors
- Fibre-optic amplifiers
- Inductive sensors
- Capacitive sensors
- Ultrasonic sensors

VISION

- Vision sensors
- Smart cameras
- Vision systems
- Object detection
- Object measurement
- Colour detection
- Code reading
- Lighting
- Lenses

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