

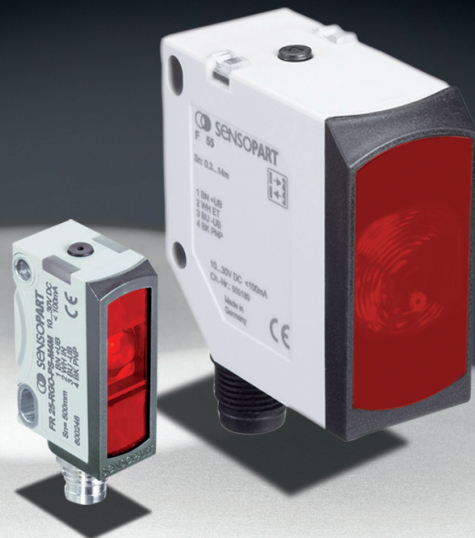
## Maximum precision


FR 25-RLO & FR 55-RLO – Autocollimation laser retroreflective photoelectric sensor

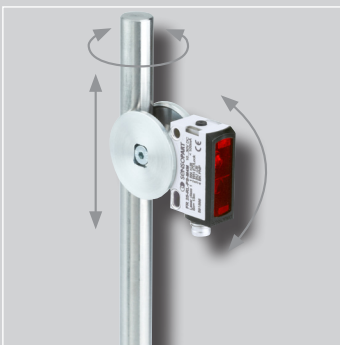


# FR 25-RLO & FR 55-RLO

Autocollimation laser retroreflective photoelectric sensor



 made in Germany




FR 25 with bracket MBD F 25ST.

**Simple mounting, precise adjustment:**  
The robust mounting accessories together with the dovetail guide which is integrated in the housing permit fine retro-adjustment of the laser sensors.

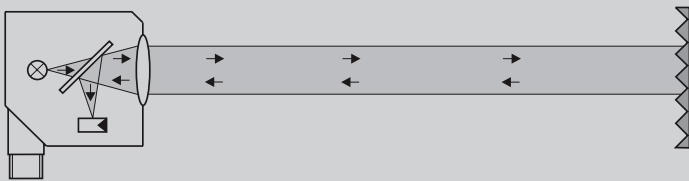


FR 25 with bracket MBD-S94.

## TYPICAL RLO

- Safe operation due to laser class 1 
- Reliable small-part detection from a size of 0.2 mm
- High switching frequency of 10 kHz with miniature housing
- High positioning accuracy thanks to minimum response time and constant detection position with lateral object approach
- Reliable object detection from a range of 0 mm thanks to autocollimation
- Dynamic, static or external teach-in

### Precise object detection via autocollimation principle

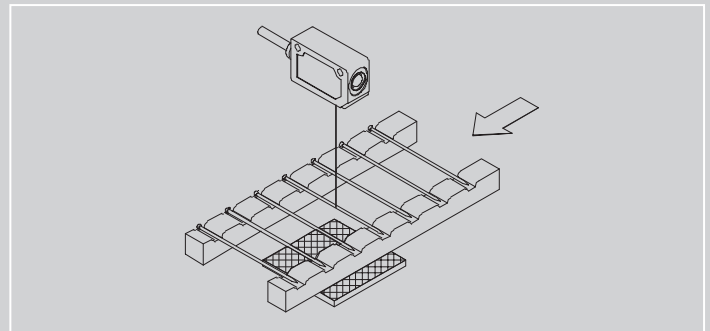


With retroreflective photoelectric sensors one speaks of the autocollimation principle when the light reflected from the reflector travels parallel to itself (i.e. within itself). The light emitted by the sensor hits a reflector and is reflected. The reflected light is then deflected to a receiver by a semi-transparent mirror and evaluated.

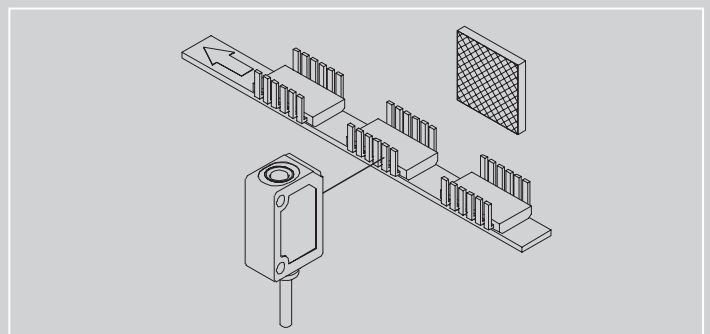
The FR 25-RLO and FR 55-RLO autocollimation laser retroreflective photoelectric sensors have a small homogeneous light spot over the entire detection range. As transmitter beam and receiver beam are on a single axis, it is possible to detect even the smallest of parts through small drilled holes and from a range of 0 mm. Adjustment takes place using teach-in – either via button or via external control line. In combination with the function „dynamic teach-in“, setting via control line is also possible when the sensor is placed in an inaccessible location.

The FR 25-RLO miniature retroreflective photoelectric sensor is particularly characterised by its excellent performance. The FR 25-RLO can detect small parts from an object size of 0.2 mm over the entire detection range. With its high switching frequency of 10 kHz and a minimum response time of 50 µs, the sensor masters even the fastest automation processes. It guarantees maximum precision in positioning tasks thanks to the constant detection position of objects with lateral approach over the entire operating range. With these features, the FR 25-RLO is unique in the market for sensors of this size when it comes to speed and precision.

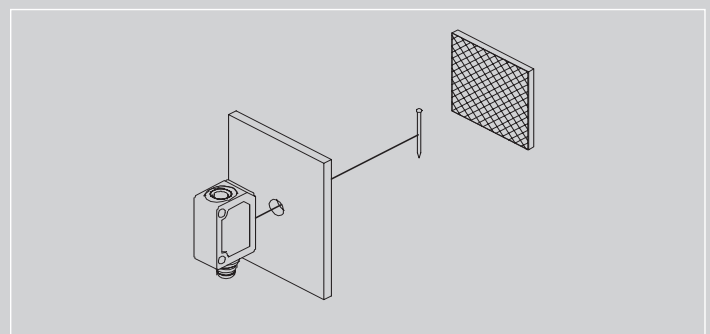
### Typical applications



Detection of pins within a range of tenths of a millimetre.



Detection of IC-Pins.



Detection of small parts behind drilled holes.

### Further applications:

- Precise front-edge detection
- Small part detection

# FR 25-RLO

## Autocollimation laser retroreflective photoelectric sensor



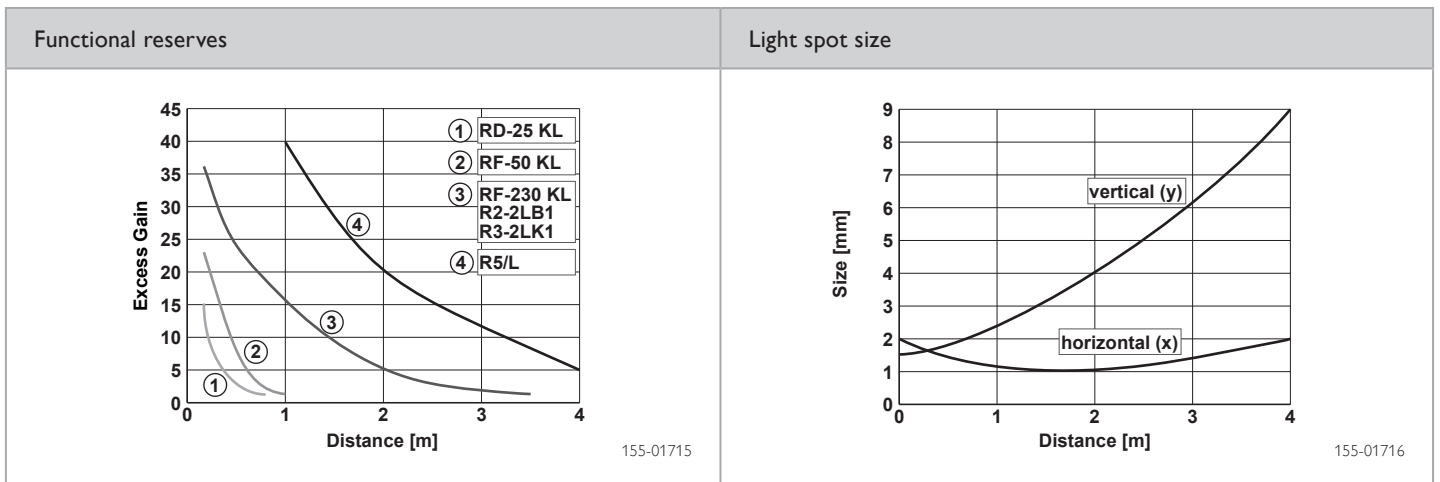
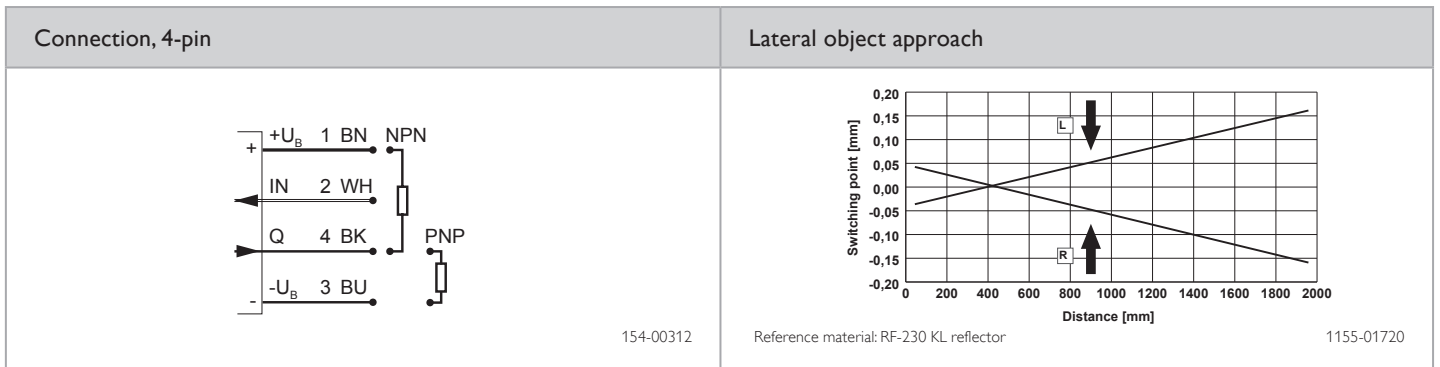
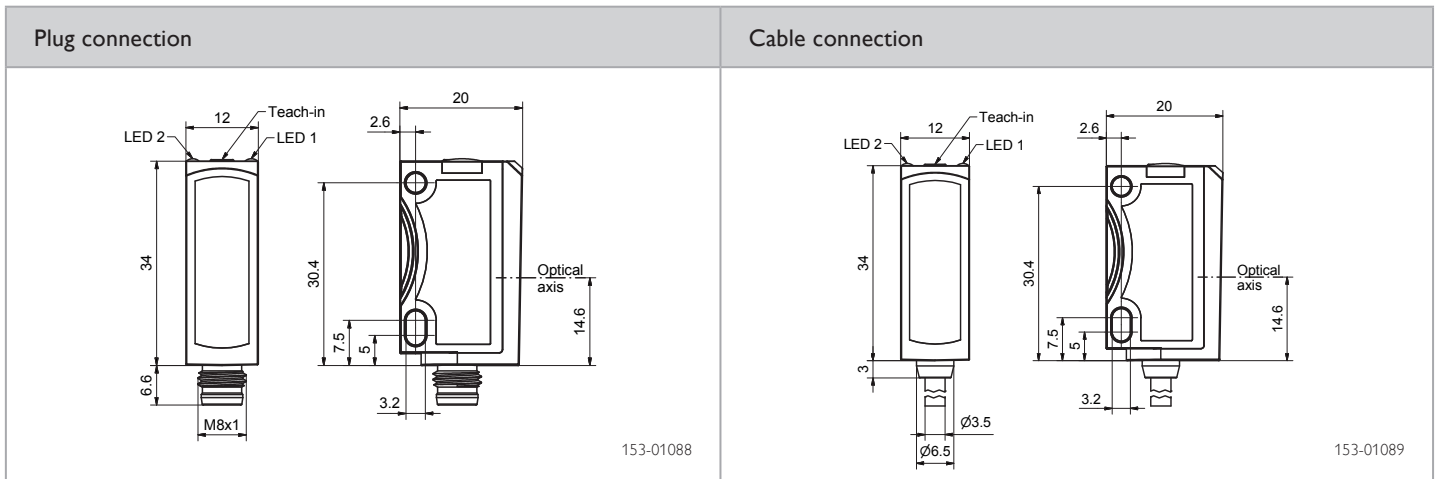
### PRODUCT HIGHLIGHTS

- Reliable small-part detection over the entire operating range from a size of 0.2 mm
- Precise front-edge detection even in fastest automation processes thanks to a high switching frequency of 10 kHz
- Constant detection position with lateral object approach over the entire operating range for maximum switching point and positioning accuracy

Optical data		Functions	
Limit range	0 ... 5 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 4 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator
Type of light	Laser, red, 650 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process
Laser Class (DIN EN 60825-1:2008-5)	1	Adjustment possibilities	Mode 2: during standing process
Polarising filter	Yes	Default settings	N.O./N.C. via Teach-in button and control input
			Button lock via control input
			Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	34 × 20 × 12 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69K & IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	(see Selection Table)
Standby time	< 300 ms	Ambient temperature: operation	-20 ... +60 °C <sup>5</sup>
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
Switching frequency, f (ti/tp 1:1)	(see Selection Table)	Weight (metal plug device <sup>5</sup> )	10 g
Response time	(see Selection Table)	Weight (cable device)	40 g
Control input, I <sub>N</sub> <sup>3</sup>	+ U <sub>B</sub> = teach-in - U <sub>B</sub> = button locked Open = normal operation	Vibration and impact resistance	EN 60947-5-2

<sup>1</sup> Reference material: R5/L reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> With connected IP 67 / IP 69K plug    <sup>4</sup> UL: -20 °C... + 50 °C    <sup>5</sup> no Ecolab

Switching frequency, f (ti/tp 1:1) <sup>2</sup>	Response time	Switching output	Type of connection	Part number	Article number
≤ 10 kHz	50 μs	PNP	Metal plug, M8x1, 4-pin	FR 25-RLO1-PS-M4M	609-31003
≤ 10 kHz	50 μs	NPN	Metal plug, M8x1, 4-pin	FR 25-RLO1-NS-M4M	609-31004
≤ 10 kHz	50 μs	PNP	Cable, 2 m, 4-wire	FR 25-RLO1-PS-K4	609-31005
≤ 10 kHz	50 μs	NPN	Cable, 2 m, 4-wire	FR 25-RLO1-NS-K4	609-31006
≤ 4 kHz	125 μs	PNP	Plug, M8x1, 4-pin	FR 25-RLO2-PS-M4	609-31007
≤ 4 kHz	125 μs	NPN	Plug, M8x1, 4-pin	FR 25-RLO2-NS-M4	609-31008
≤ 4 kHz	125 μs	PNP	Cable, 2 m, 4-wire	FR 25-RLO2-PS-K4	609-31009
≤ 4 kHz	125 μs	NPN	Cable, 2 m, 4-wire	FR 25-RLO2-NS-K4	609-31010



Small part detection			
Reflector	Reflector distance	Scanning distance	Smallest detectable part
R5L	1000 ... 4000 mm	0 ... 4000 mm	≥ 1 mm
RD-25 KL	50 ... 500 mm	50 ... 500 mm	≥ 0.2 mm
RF-230 KL	500 ... 2500 mm	0 ... 500 mm	≥ 0.2 mm
R2-2LB1	500 ... 2500 mm	0 ... 500 mm	≥ 0.2 mm
R3-2LK1	500 ... 2500 mm	0 ... 500 mm	≥ 0.2 mm
RF-50 KL	100 ... 500 mm	100 ... 500 mm	≥ 0.2 mm

Reflector	Operating range (min./max. reflector distance)
R5L	0 ... 4000 mm
RD-25 KL	50 ... 600 mm
RF-230 KL	0 ... 2500 mm
R2-2LB1	0 ... 2500 mm
R3-2LK1	0 ... 2500 mm
RF-50 KL	0 ... 800 mm

# FR 55-RLO

## Autocollimation laser retroreflective photoelectric sensor



### PRODUCT HIGHLIGHTS

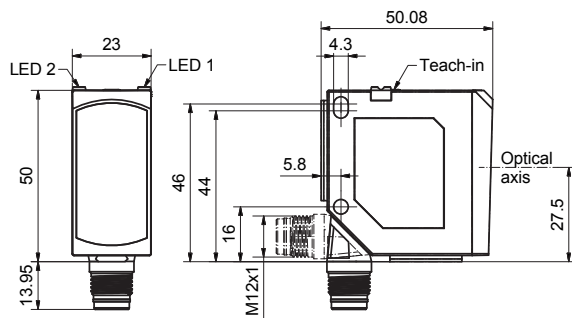
- Reliable small-part detection from a size of 0.2 mm at a scanning distance of 0–5 m
- Precise front-edge detection even in fastest automation processes thanks to a high switching frequency of 5 kHz
- Reliable detection of objects through the smallest of openings thanks to autocollimation; therefore sensor can be placed outside any danger zone
- No blind zone - detection from a range of 0 mm

Optical data		Functions	
Limit range	0 ... 25 m <sup>1</sup>	Indicator LED, green	Operating voltage indicator
Operating range	0 ... 20 m <sup>1</sup>	Indicator LED, yellow	Switching output indicator / contamination indicator
Type of light	Laser, red, 655 nm	Sensitivity adjustment	Via Teach-in button and control input
Light spot size	See diagram	Teach-in modes	Mode 1: during running process Mode 2: during standing process
Laser Class (DIN EN 60825-1:2008-5)	1	Adjustment possibilities	N.O./N.C. via Teach-in button and control input Button lock via control input
Polarising filter	Yes	Default settings	Max. range and N.O.
Electrical data		Mechanical data	
Operating voltage, +U <sub>B</sub>	10 ... 30V DC <sup>2</sup>	Dimensions	50 × 50.08 × 23 mm <sup>3</sup>
No-load current, I <sub>0</sub>	≤ 30 mA	Enclosure rating	IP 69K & IP 67 <sup>3</sup>
Output current, I <sub>e</sub>	≤ 100 mA	Material, housing	PC-ABS
Protective circuits	Reverse-polarity protection, U <sub>B</sub> / short-circuit protection (Q)	Material, front screen	PMMA
Protection Class	2	Type of connection	(see Selection Table)
Standby time	< 300 ms	Ambient temperature: operation	-20 ... +60 °C
Switching output, Q	PNP/NPN (see Selection Table)	Ambient temperature: storage	-20 ... +80 °C
Output function	N.O./N.C.	Weight (plug device)	35 g
Switching frequency, f (ti/tp 1:1)	(see Selection Table)	Vibration and impact resistance	EN 60947-5-2
Response time	(see Selection Table)		
Control input, IN	+U <sub>B</sub> = teach-in -U <sub>B</sub> = button locked Open = normal operation		

<sup>1</sup> Reference material: R10 reflector    <sup>2</sup> Max. 10 % ripple, within U<sub>B</sub>, ~ 50 Hz / 100 Hz    <sup>3</sup> With connected IP 67 / IP 69K plug

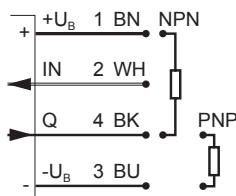
Switching frequency f (ti/tp 1:1) <sup>2</sup>	Response time	Switching output	Type of connection	Part number	Article number
≤ 5 kHz	100 μs	PNP	Plug M12x1, 4-pin	FR 55-RLO1-PS-L4	621-11021
≤ 5 kHz	100 μs	NPN	Plug M12x1, 4-pin	FR 55-RLO1-NS-L4	621-11022
≤ 2,5 kHz	200 μs	PNP	Plug M12x1, 4-pin	FR 55-RLO2-PS-L4	621-11023
≤ 2,5 kHz	200 μs	NPN	Plug M12x1, 4-pin	FR 55-RLO2-NS-L4	621-11024

### Plug connection



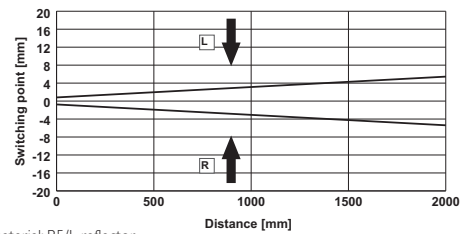
153-01090

### Connection, 4-pin



154-00312

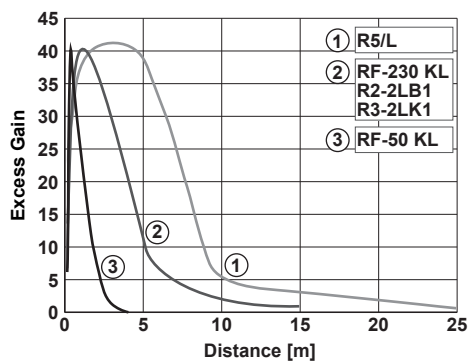
### Lateral object approach



Reference material: R5/L reflector

155-01724

### Functional reserves



155-01723

### Light spot size



155-01722

Reflector	Operating range (min./max. reflector distance)
R5/L	0 ... 20 m
RF-230 KL	0 ... 15 m
R2-2LB1	0 ... 15 m
R3-2LK1	0 ... 15 m
RF-50 KL	0 ... 3 m



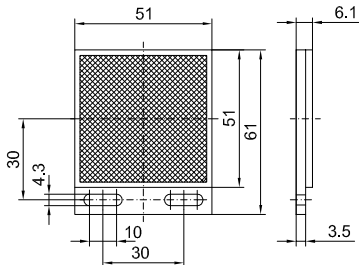
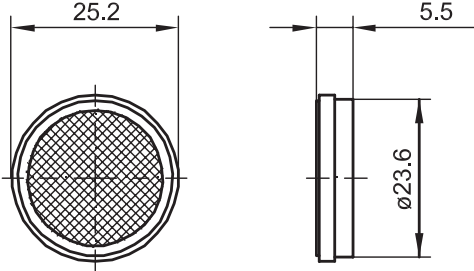
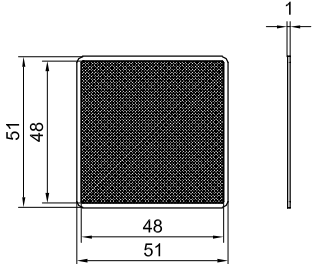
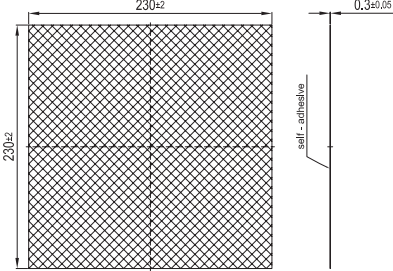
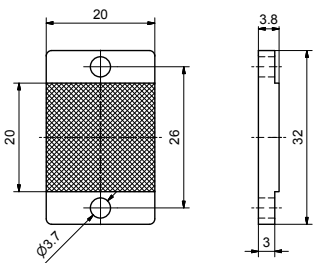
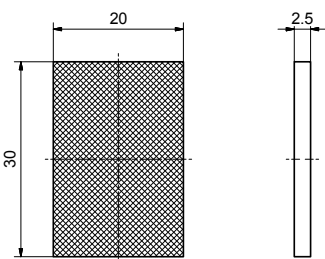






# Accessories

## Reflectors

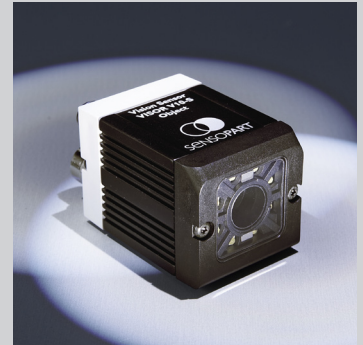
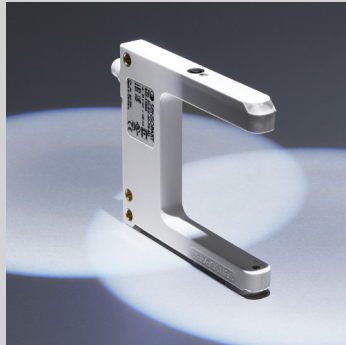
Reflectors		
 <p>153-00242</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>R5L / 904-51543</p> <p>Reflector in housing 51 × 61 × 6.1 mm<sup>3</sup> 2 mounting holes (slots) -20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (laser)</p>
 <p>153-00699</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>RD-25 KL / 904-51589</p> <p>Reflector in housing Ø 25.2 × 5.5 mm<sup>3</sup> Self-adhesive -20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (laser)</p>
 <p>153-00701</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>RF-50 KL / 904-51590</p> <p>Reflective tape 51 × 51 mm<sup>2</sup> Self-adhesive -40 ... +70 °C</p> <p>Retroreflective photoelectric sensor (laser)</p>
 <p>153-00923</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>RF-230 KL / 904-51593</p> <p>Reflective tape, to cut to size 230 × 230 mm<sup>2</sup> Self-adhesive -40 ... +70 °C</p> <p>Retroreflective photoelectric sensor (laser)</p>
 <p>153-01046</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>R2-2LB1 / 904-51595</p> <p>Reflector in housing, with very fine structure 20 × 32 × 3.8 mm<sup>3</sup> 2 mounting holes -20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (laser)</p>
 <p>153-01047</p>	<p>Part number / Article number</p> <p>Description</p> <p>Dimensions</p> <p>Mounting</p> <p>Temperature range</p> <p>Suitable for</p>	<p>R3-2LK1 / 904-51596</p> <p>Reflector in housing with very fine structure 20 × 30 × 2.5 mm<sup>3</sup> Self-adhesive -20 ... +60 °C</p> <p>Retroreflective photoelectric sensor (laser)</p>

## Cables

Cables for F 25		
Part number	Article number	Description
<b>M8, 4-pin</b>		
K4-2m-G-PUR	902-50801	2 m, straight, PUR
K4-5m-G-PUR	902-51617	5 m, straight, PUR
K4-10m-G-PUR	902-51610	10 m, straight, PUR
K4-2m-W-PUR	902-50803	2 m, 90°, PUR
K4-5m-W-PUR	902-51618	5 m, 90°, PUR
K4-10m-W-PUR	902-51629	10 m, 90°, PUR
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)
CM4 FW-E-5m-PVC	902-50222	5 m, 90°, PVC, with hex nut SW 9 stainless steel (IP 69K)
Cables for F 55		
Part number	Article number	Description
<b>M12, 4-pin</b>		
L4-2m-G-PUR	902-50805	2 m, straight, PUR
L4-5m-G-PUR	902-51612	5 m, straight, PUR
L4-10m-G-PUR	902-51628	10 m, straight, PUR
L4-2m-W-PUR	902-50807	2 m, 90°, PUR
L4-5m-W-PUR	902-51602	5 m, 90°, PUR
L4-2m-W-PL-PUR	902-50808	2 m, 90°, PUR, with indicator LED
L4-5m-W-PL-PUR	902-51603	5 m, 90°, PUR, with indicator LED
L4-10m-W-PL-PUR	902-51604	10 m, 90°, PUR, with indicator LED
L4S-2m-G-PVC	902-51632	2 m, straight, PVC, shielded
L4S-5m-G-PVC	902-51634	5 m, straight, PVC, shielded
L4S-2m-W-PVC	902-51633	2 m, 90°, PVC, shielded
L4S-5m-W-PVC	902-51635	5 m, 90°, PVC, shielded
CL4 FG-E-5m-PVC	902-50219	5 m, straight, PVC, with hex nut SW 14 stainless steel (IP 69K)
CL4 FW-E-5m-PVC	902-50220	5 m, 90°, PVC, with hex nut SW 14 stainless steel (IP 69K)
L4F/L4M-0,48 PUR	902-51670	Extension cable, M12 (90°) to M12 (straight), 0.48 m, PUR
L4F/L4M-0,6 PVC	902-51645	Connection adapter, M12 (female) to M8 (male), 4-pin

# We look ahead.

Yesterday, today and in the future.



“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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