Optoelectronic sensors

FESTO

Key features and product range overview

Product range overview

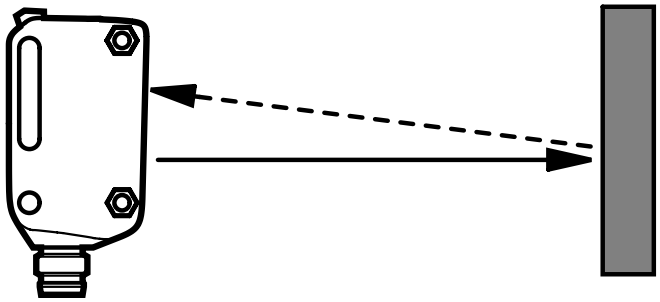
Design	SOOD LED	SOOD laser	SOOE LED	SOOE laser	→ Page/Internet
Diffuse sensor with background suppression	■	■	■	■	12, 24
Through-beam sensor	■	■	■	■	18, 28
Retro-reflective sensor	■	■	■	■	21, 32
Retro-reflective sensor for transparent objects	–	–	■	–	35
Diffuse sensor	–	–	■	–	38
Laser, contrast sensor	–	–	–	■	42
Laser, distance sensor	–	–	■	■	46

Detection method

Diffuse sensor SOOE-DS

With these sensors, which are sometimes referred to as energetic sensors, the transmitter and the receiver are located in the same housing. The light beam transmitted is reflected directly onto the receiver by the object. The intensity of the reflected light is evaluated. The switching distance can be adjusted by changing the sensitivity of the receiver (using IO-Link, potentiometer or the teach-in method). Diffuse sensors are one of the most cost-effective solutions and are very quick to install.

However, these sensors are not suitable for some applications, e.g. the detection of slightly reflective objects against a highly reflective background. In addition, objects with different surfaces (in terms of material, colour or surface) are detected at different distances because of the different reflective properties.
Benefits of diffuse sensors with intensity differentiation



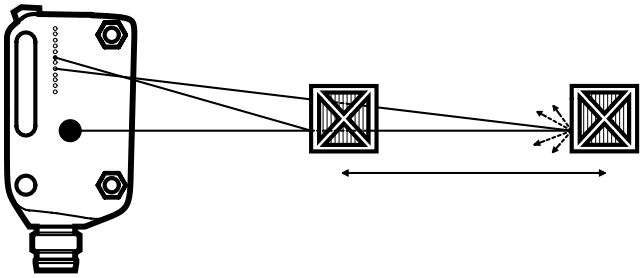
- Longer switching distance
- More economical
- More reliable for detecting slightly reflective objects

Key features

Diffuse sensor with background suppression

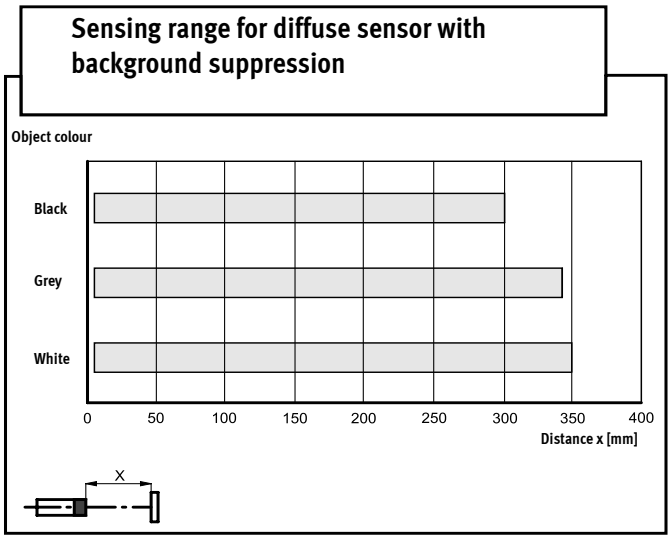
The switching distance is not set based on energy, but using optical triangulation. The new and extremely precise multi-pixel technology (SOOE) enables a lot of flexibility and setting via IO-Link. The integrated receiver with signal pre-processing of 160 x 16 pixels is the key for precise detection and distance measurement. This receiver has a unique setting performance in the upper detection range due to a high resolution and linearisation.

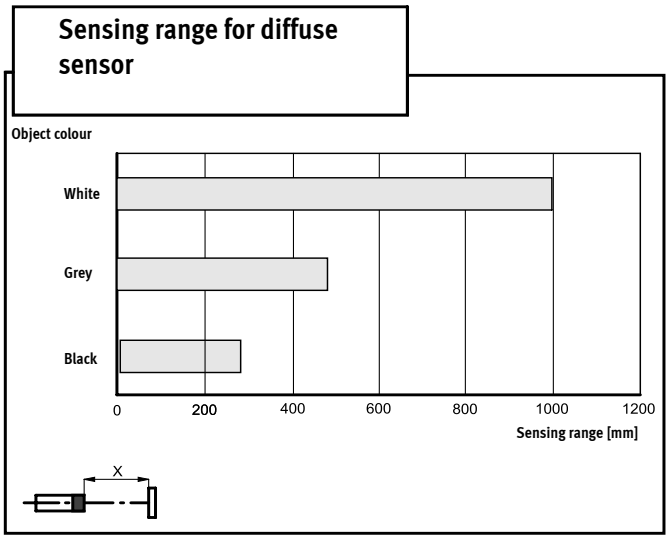
Object detection is therefore virtually independent of other objects in the background as well as colour, size or surface. Only a very small diffuse remission is required for these devices.



Benefits of diffuse sensors with background suppression

- Switching distance practically independent of colour and surface
- Can also be used with a shiny or reflective background
- Detection of small differences in distance
- Easy adjustment





Retro-reflective sensors

With these sensors, the transmitter and the receiver are located in the same housing as well. The light transmitted is bounced back to the receiver by a reflector. An object located between the sensor and the reflector interrupts the light beam and is thus detected. All Festo retro-reflective sensors use polarised light to prevent problems from occurring with reflective objects.

There are two different types of retro-reflective sensor, depending on the design:

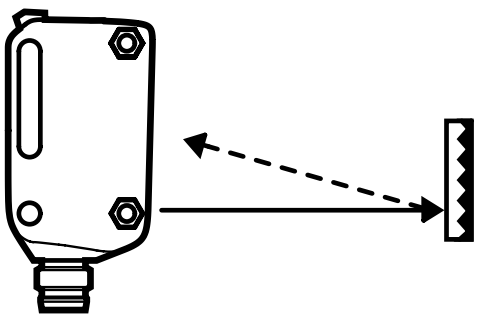
- Retro-reflective sensors with two lenses
- Retro-reflective sensors with autocollimation

Retro-reflective sensors with two lenses

The light is transmitted by the sensor through a lens. The reflected light is bounced back to the sensor through a second lens. The switching point can vary slightly depending on the distance. The following sensors are retro-reflective sensors with two lenses.

- SOOD-RS
- SOOE-RS

The retro-reflective sensors with two lenses are particularly economical.



Key features

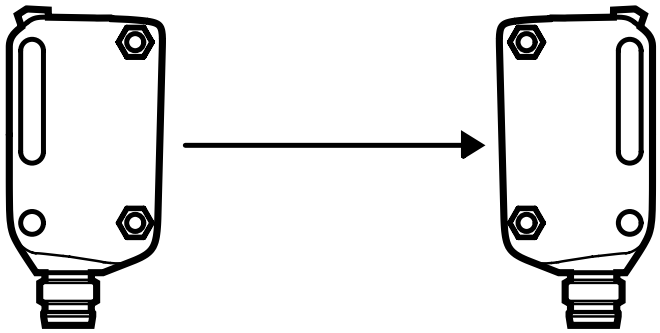
Retro-reflective sensors with autocollimation

With the principle of autocollimation, the optical axes of the transmitting and the receiving channel are identical. This is possible, since the light from one channel is deflected using a semi-transparent mirror. With this principle very short distances between the sensor and the reflector can be chosen. Retro-reflective sensors with autocollimation are ideally suited to transparent objects.

SOOE-RG are retro-reflective sensors with autocollimation. Further benefits of autocollimation:

- No blind zone
- High precision across the entire sensing range
- Radially symmetrical sensing range
- Good repeatability
- Low hysteresis
- Detection of transparent objects

Through-beam sensors



In the case of through-beam sensors, the transmitter and receiver are located in different housings, which must be installed opposite one another. Each object that interrupts the light beam between the transmitter and the receiver is detected. This is one of the most reliable principles in harsh environmental conditions. The disadvantage is that two separate components (transmitter and receiver) have to be wired and set up.

Distance sensors

Similarly to diffuse sensors with background suppression, which use multi-pixel technology, these sensors evaluate the distance and transmit the value through IO-Link.
Distance sensors SOOE-MS have no analogue output. The switching output can be programmed as a window comparator.

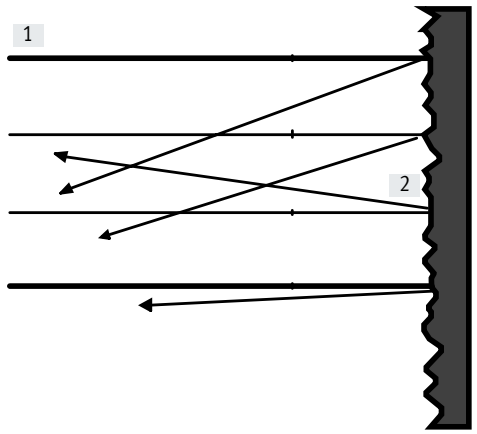
Contrast sensor

In principle, the laser contrast sensor SOOE-KS is a highly precise, energetic laser diffuse sensor. It detects small contrast differences at various grey levels, trigger marks, etc. within a working range up to 120 mm.

Key features

Types of reflection

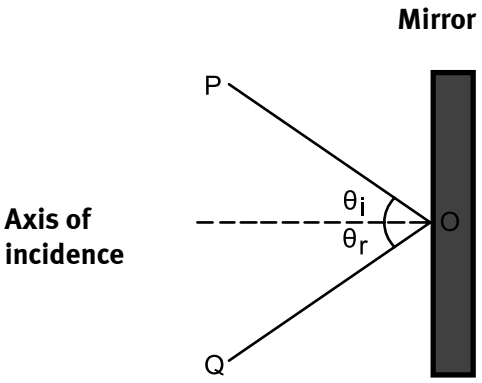
Diffuse reflection



Diffuse reflection is the reflection of light from an uneven or grained surface when an incident beam is reflected at many different angles.
This type of reflection is in contrast to specular reflection (total reflection). If a surface is completely non-specular, the reflected light is distributed evenly over a hemispherical surface.

[1] Incident light beams
[2] Reflected light beams

Specular reflection (total reflection)



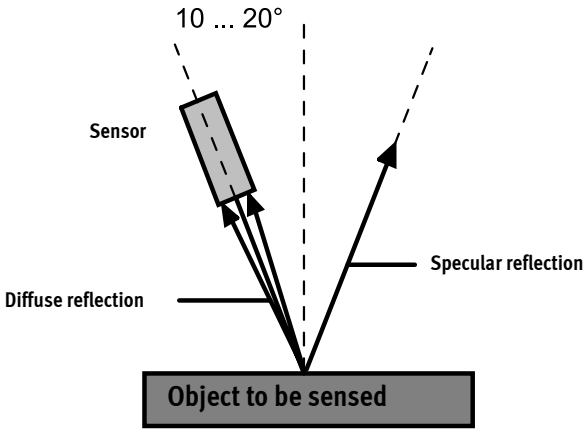
Specular reflection is the perfect reflection of light (or other kinds of wave) from a surface, when incident light from a single direction is reflected in a single direction.
Such behaviour is described by the law of reflection. According to this law, the direction of the reflected light and the direction of the incident light form the same angle with respect to the axis of incidence; this is commonly expressed as $\Theta_i = \Theta_r$.

Retro-reflection

Retro-reflection is the reflection of light back in the direction of the light source irrespective of the angle of incidence.
However, this is only true in the case of a mirror when the mirror is exactly perpendicular to the light beam.

This type of reflection can only be achieved using special reflectors (see: Reflectors).

Why are the types of reflection important when using optoelectronic sensors?



In the case of diffuse sensors with intensity differentiation, diffuse sensors with background suppression and distance and colour sensors, sensing is based on diffuse reflection. These sensors therefore require as much diffuse reflection as possible. Total reflection makes detection difficult and must therefore be avoided. The type of reflection is not relevant for retro-reflective sensors and through-beam sensors.
In this case, the object must only interrupt the light beam. With retro-reflective sensors, polarising filters can be used to achieve perfect differentiation between the reflection from the object and the reflection from the reflector.

The sensors should not be mounted perpendicular to the surface of shiny objects in order to prevent total reflection on the receiver.

Key features

Glossary

Extraneous light limit

Extraneous light is the light radiation generated by external light sources. The illumination intensity is measured on the light entry surface. Use of modulated light makes the devices insensitive to extraneous light. There is, however, an upper limit to the permitted intensity of external light radiation. This limit is also referred to as the extraneous light limit. It is specified in the individual data sheets for sunlight (unmodulated light) and for halogen lamps (with double the mains frequency for modulated light). If the illumination intensity is above the respective extraneous light limit, reliable operation of the devices can no longer be guaranteed.

Modulated light

The devices in this catalogue use modulated light, i.e. the phototransmitter is only switched on briefly and remains switched off for a much longer time (ratio of approx.1:25). With diffuse sensors and retro-reflective sensors, the receiver is only active during the light pulse. It is closed between the pulses. Operation with modulated light offers the following benefits:

- The devices are largely insensitive to extraneous light
- Greater switching distances are possible
- Small temperature rise of the transmitter diodes and therefore longer service life

Laser

SOOD and SOOE sensors comply with laser safety class 1 to EN 60825-1:2007.
Devices of laser safety class 1 are safe due to their radiation level; these devices cannot pose a threat to humans.
Protective eyewear is not required when using these devices; the use of optical instruments for direct observation of the laser beam is also harmless.

Polarising filter

Natural light (and light from the transmitter diodes) is unpolarised. However, when light goes through a polarising filter, only the portion of the original light that moves in the polarising direction of the filter is still available. Polarisation is retained with reflection on reflective surfaces; only the polarising direction can change. On the other hand, diffuse reflection destroys polarisation. This difference is used for suppression of the interference effects on retro-reflective sensors caused by reflective surfaces.

Switching frequency

The maximum switching frequency is determined with the aid of a rotating slotted disc. The disc, which is positioned in the light beam, is designed to produce a bright/dark ratio of 1:1.
The maximum switching frequency is achieved when no output signal pulses are lost.

Magnetic fields

Permanent magnetic fields and low-frequency alternating fields do not normally affect the function of optoelectrical sensors.

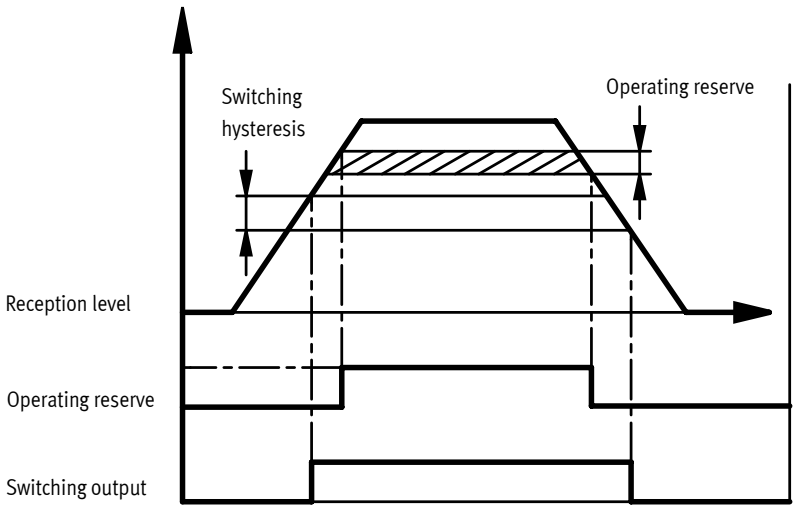
Temperature influence

The set switching distances are subject to a minor temperature influence. Most devices have temperature compensation, so that the influence is typically below 0.4%/K.

Key features

Operational reserve display

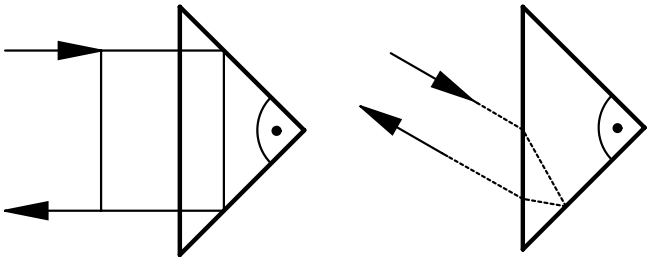
The display of the operating reserve detects the excess radiant energy that falls on the receiver and is processed by the photoreceiver. Operating reserve may diminish over a period of time due to contamination, changing reflection factor of the object to be scanned and ageing of the transmitter diode, so that reliable operation is no longer assured.
The sensors are therefore equipped with an LED that indicates if less than approx. 80% of the available switching distance is used. In addition, SOOE sensors emit a corresponding signal via IO-Link.
Conditions in which reliable operation is no longer guaranteed can therefore be recognised at an early stage.



Reflectors

Retro-reflective sensors are equipped with polarising filters that ensure that they respond only to light returned by special reflectors. These reflectors function according to the principle of a corner cube.
The choice of the right reflector for a specific application will be determined by the required switching distance and the available mounting facilities. The reflector should be installed perpendicular to the optical axis (tolerance ±15°).
SARA reflectors and reflective foils are available in various sizes and with different optical structures. The resolution of the structure approximately corresponds to the size of the corner cube.

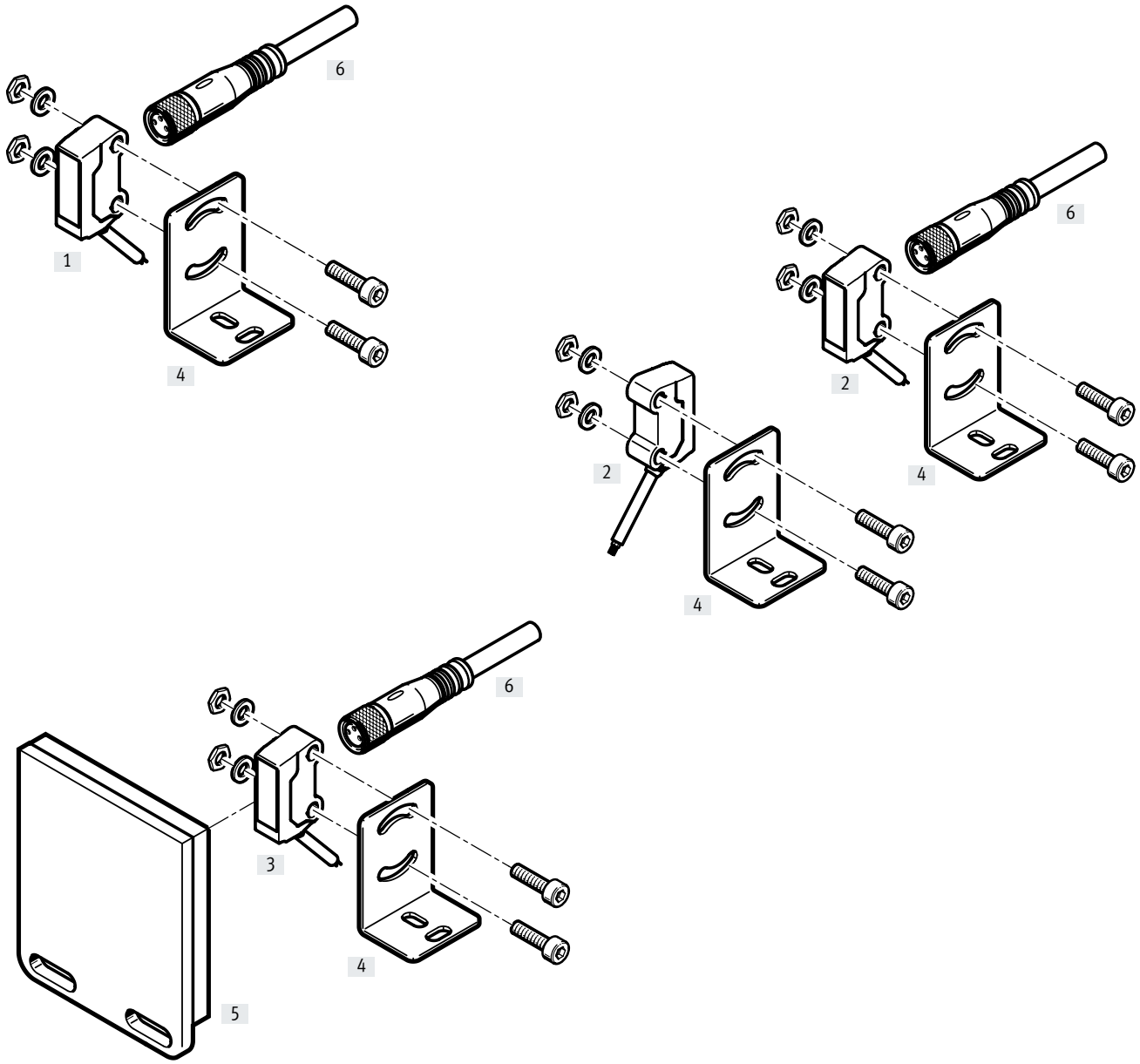
- Structural width of reflector > 2 mm - standard
- Structural width of reflector 1 ... 2 mm - mini
- Structural width of reflector < 1 mm - micro



Small optical structures (mini/micro) are very well suited for laser sensors, but have the disadvantage that they reflect slightly less light and therefore have a smaller detection range.

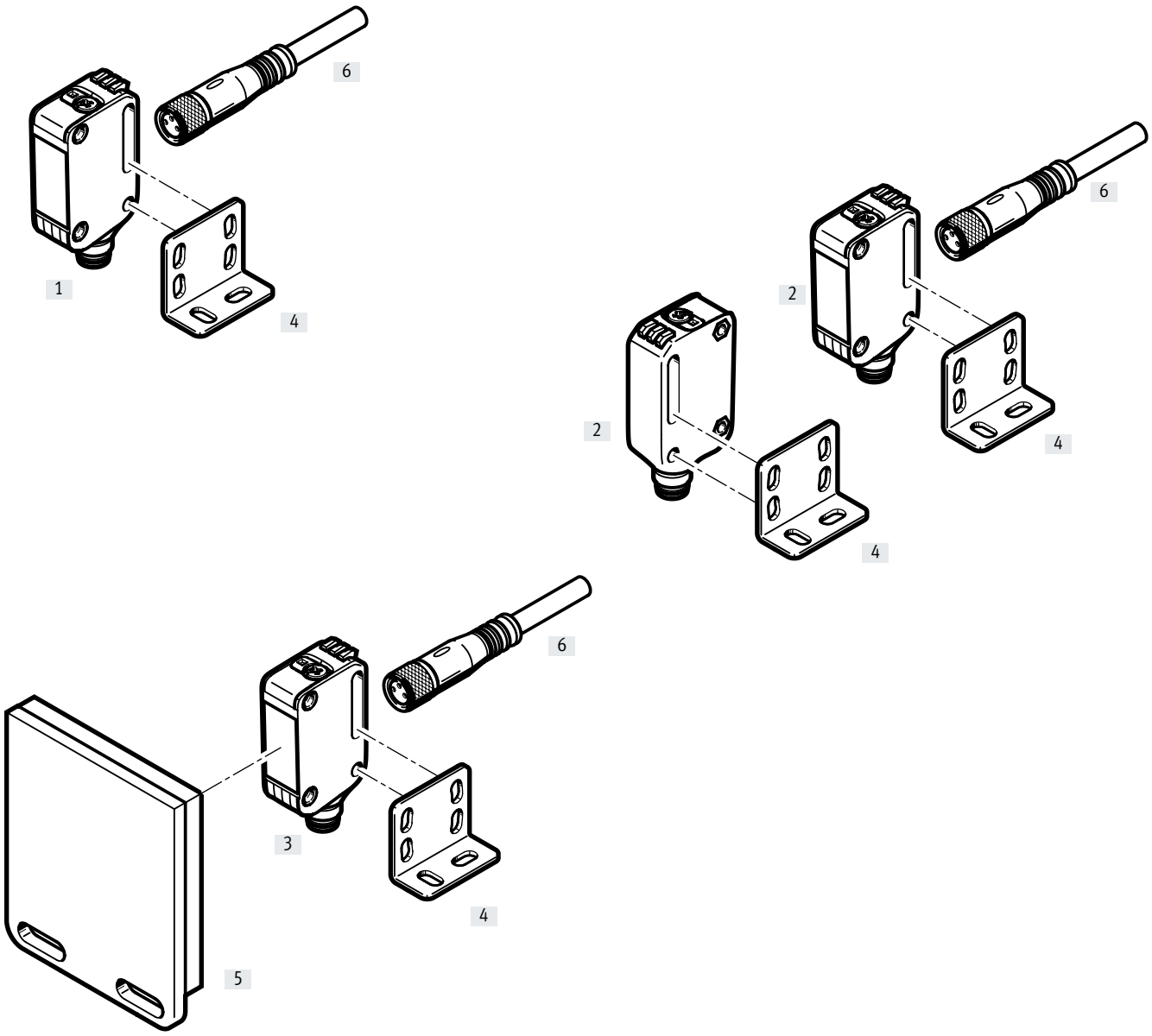
Laser sensors should not be used at extremely short distances with reflectors having large optical structures (standard). For detailed information, see the operating instructions for the sensors on the Support Portal.

Peripherals overview



Accessories		Brief description	→ Page/Internet
[1]	SOOD-BS-...	Laser diffuse sensor with background suppression	12
[2]	SOOD-TB-...	Through-beam sensor	18
[3]	SOOD-RS-...	Retro-reflective sensor	21
[4]	SAMH-L2-...	Mounting bracket	50
[5]	SARA-R-...	Reflector, reflective foil	54
[6]	NEBU-M8G3-...	Connecting cables M8x1	57

Peripherals overview



Accessories		Brief description	→ Page/Internet
[1]	SOOE-RS-...	Retro-reflective sensor	32
[2]	SOOE-TB-...	Through-beam sensor	28
[3]	SOOE-BS-...	Retro-reflective sensor with background suppression	24
[4]	SAMH-L3-...	Mounting bracket	52
[5]	SARA-R-...	Reflector, reflective foil	54
[6]	NEBU-M8G3-...	Connecting cables M8x1	57

Type codes

001	Series	
SOOD	Optoelectronic sensor	

002	Sensor function	
BS	Diffuse sensor with background suppression	
RS	Retro-reflective sensor	
TB	Through-beam sensor, transmitter/receiver	

003	Type of light	
L	Laser red	
R	Red	

004	Electrical output 1	
PN	PNP/NPN	

005	Working range	
30	30 mm	
50	50 mm	
80	80 mm	
1000	1000 mm	
2000	2000 mm	
10000	10000 mm	

Type codes

001	Series	
SOOE	Optoelectronic sensor	

002	Sensor function	
BS	Diffuse sensor with background suppression	
DS	Diffuse sensor	
KS	Contrast sensor	
MS	Distance sensor	
RG	Retro-reflective sensor for transparent objects	
RS	Retro-reflective sensor	
TB	Through-beam sensor, transmitter/receiver	

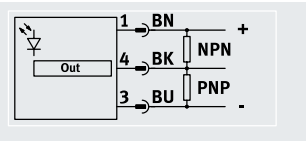
003	Type of light	
L	Laser red	
R	Red	

004	Electrical output 1	
PNLK	PNP/NPN/IO-Link	

005	Setting options	
T	Teach-in	

Data sheet

Function
SOOD-BS-R-...



General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

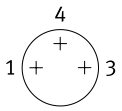
Input signal/measuring element		SOOD-BS-R-PN-30	SOOD-BS-R-PN-50	SOOD-BS-R-PN-80
Measuring principle		Optoelectronic		
Detection method		Diffuse sensor with background suppression		
Type of light		Red LED		
Max. light spot		2 mm at sensing range 30 mm	3.5 mm at sensing range 50 mm	5 mm at sensing range 80 mm
Minimum object diameter	[mm]	2	3.5	5
Working range	[mm]	1 ... 30	3 ... 50	15 ... 80
Ambient temperature	[°C]	–25 ... 60		

Signal processing		SOOD-BS-R-PN-30	SOOD-BS-R-PN-50	SOOD-BS-R-PN-80
Max. black/white difference	[%]	7	15	20
Reference material		Standard white 90%, 100x100 mm		

Switching output		SOOD-BS-R-PN-30	SOOD-BS-R-PN-50	SOOD-BS-R-PN-80
Switching output		Push-pull		
Switching element function		PNP, light switching		
		NPN, dark switching		
Hysteresis	[mm]	0.3	0.5	2.4
Max. switching frequency	[Hz]	800		
Max. output current	[mA]	50		
Voltage drop	[V]	0 ... 1.5		

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	10
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Data sheet

Electromechanical systems		
Electrical connection 1		
Plug pattern		
Connection type		Cable with plug
Connection technology		M8x1, A-coded to EN 61076-2-104
Number of pins/wires		3
Type of mounting		Screw-type lock
Material of pin contacts		Gold-plated brass
Cable length	[mm]	150
Cable characteristic		Standard
Cable sheath material		TPE-U(PUR)

Mechanics		
Type of mounting		With through-hole
Tightening torque	[Nm]	0.5
Mounting position		Any
Product weight	[g]	10
Housing material		ABS
		PC
		TPE-U(PU)

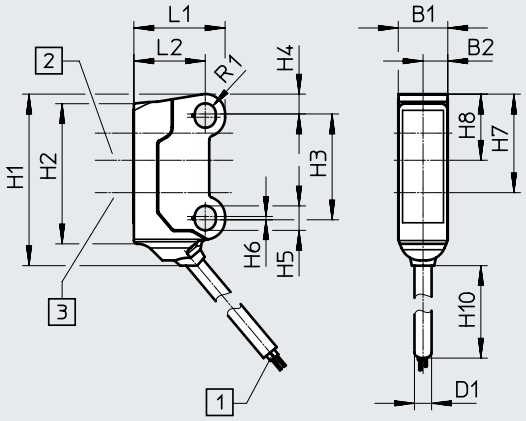
Display/operation	
Ready status indication	Green LED
Switching status indication	Yellow LED

Immission/emission		
Degree of protection		IP65, IP67
Laser safety class		–
Insulation voltage	[V]	500
Surge resistance	[kV]	1
Pollution degree		3
Corrosion resistance class CRC[1)]		1

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

Dimensions Download CAD data ➔ www.festo.com



[1] Plug M8x1, 3-pin
[2] Receiver
[3] Transmitter

Type	B1	B2	D1 ø	H1	H2	H3	H4	H5
SOOD-BS-R-PN-30	7.5	3.8	2.6	26	21.2	16	3	3.7
SOOD-BS-R-PN-50								
SOOD-BS-R-PN-80								

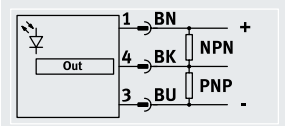
Type	H6	H7	H8	H10	L1	L2	R1
SOOD-BS-R-PN-30	0.5	14.9	10	150 (+20)	13.8	10.8	1.6
SOOD-BS-R-PN-50			10				
SOOD-BS-R-PN-80			5.9				

Ordering data

		Part no.	Type
	Diffuse sensor with background suppression	**8075653**	**SOOD-BS-R-PN-30**
		8075654	**SOOD-BS-R-PN-50**
		8075655	**SOOD-BS-R-PN-80**

Data sheet

Function
SOOD-BS-L-...



General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

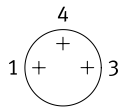
Input signal/measuring element		SOOD-BS-L-PN-30	SOOD-BS-L-PN-50	SOOD-BS-L-PN-80
Measuring principle		Optoelectronic		
Detection method		Diffuse sensor with background suppression		
Type of light		Red laser		
Max. light spot		1 mm at sensing range 30 mm	1.5 mm at sensing range 50 mm	2 mm at sensing range 80 mm
Minimum object diameter	[mm]	1	1.5	2
Working range	[mm]	7 ... 30	7 ... 50	20 ... 80
Ambient temperature	[°C]	–20 ... 60		

Signal processing		SOOD-BS-L-PN-30	SOOD-BS-L-PN-50	SOOD-BS-L-PN-80
Max. black/white difference	[%]	8	13	15
Reference material		Standard white 90%, 100x100 mm		

Switching output		SOOD-BS-L-PN-30	SOOD-BS-L-PN-50	SOOD-BS-L-PN-80
Switching output		Push-pull		
Switching element function		PNP, light switching		
		NPN, dark switching		
Hysteresis	[mm]	0.3	1	2.4
Max. switching frequency	[Hz]	2000		
Max. output current	[mA]	50		
Voltage drop	[V]	0 ... 1.5		

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	10
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Data sheet

Electromechanical systems		
Electrical connection 1		
Plug pattern		
Connection type		Cable with plug
Connection technology		M8x1, A-coded to EN 61076-2-104
Number of pins/wires		3
Type of mounting		Screw-type lock
Material of pin contacts		Gold-plated brass
Cable length	[mm]	150
Cable characteristic		Standard
Cable sheath material		TPE-U(PUR)

Mechanics		
Type of mounting		With through-hole
Tightening torque	[Nm]	0.5
Mounting position		Any
Product weight	[g]	10
Housing material		ABS
		PC
		TPE-U(PU)

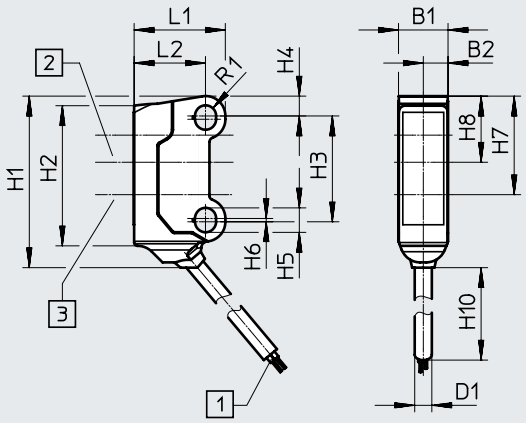
Display/operation	
Ready status indication	Green LED
Switching status indication	Yellow LED

Immission/emission		
Degree of protection		IP65, IP67
Laser safety class		1
Insulation voltage	[V]	500
Surge resistance	[kV]	1
Pollution degree		3
Corrosion resistance class CRC[1)]		1

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

Dimensions Download CAD data ➔ www.festo.com



[1] Plug M8x1, 3-pin
[2] Receiver
[3] Transmitter

Type	B1	B2	D1 ø	H1	H2	H3	H4	H5
SOOD-BS-L-PN-30	7.5	3.8	2.6	26	21.2	16	3	3.7
SOOD-BS-L-PN-50								
SOOD-BS-L-PN-80								

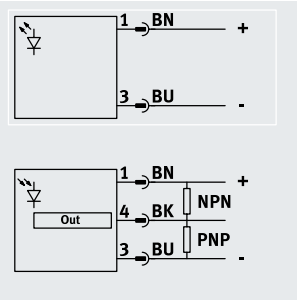
Type	H6	H7	H8	H10	L1	L2	R1
SOOD-BS-L-PN-30	0.5	14.9	10	150 (+20)	13.8	10.8	1.6
SOOD-BS-L-PN-50			10				
SOOD-BS-L-PN-80			5.9				

Ordering data

		Part no.	Type
	Laser diffuse sensor with background suppression	**8075658**	**SOOD-BS-L-PN-30**
		8075659	**SOOD-BS-L-PN-50**
		8075660	**SOOD-BS-L-PN-80**

Data sheet

Function
SOOD-TB-...



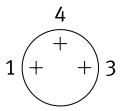
General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

Input signal/measuring element		SOOD-TB-R-PN	SOOD-TB-L-PN
Measuring principle		Optoelectronic	
Detection method		Through-beam sensor	
		Transmitter	
		Receiver	
Type of light		Red LED	Red laser
Max. light spot		150 mm at 2000 mm	20 mm at 10000 mm
Working range	[mm]	0 ... 2000	0 ... 10000
Ambient temperature	[°C]	–25 ... 60	–20 ... 60

Switching output		SOOD-TB-R-PN	SOOD-TB-L-PN
Switching output		Push-pull	
Switching element function		PNP, dark switching	
		NPN, light switching	
Max. switching frequency	[Hz]	800	2000
Max. output current	[mA]	50	
Voltage drop	[V]	0 ... 1.5	

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	11
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Data sheet

Electromechanical systems		
Electrical connection 1		
Plug pattern		
Connection type		Cable with plug
Connection technology		M8x1, A-coded to EN 61076-2-104
Number of pins/wires		3
Type of mounting		Screw-type lock
Material of pin contacts		Gold-plated brass
Cable length	[mm]	150
Cable characteristic		Standard
Cable sheath material		TPE-U(PUR)

Mechanics		
Type of mounting		With through-hole
Tightening torque	[Nm]	0.5
Mounting position		Any
Product weight	[g]	20
Housing material		ABS
		PC
		TPE-U(PU)

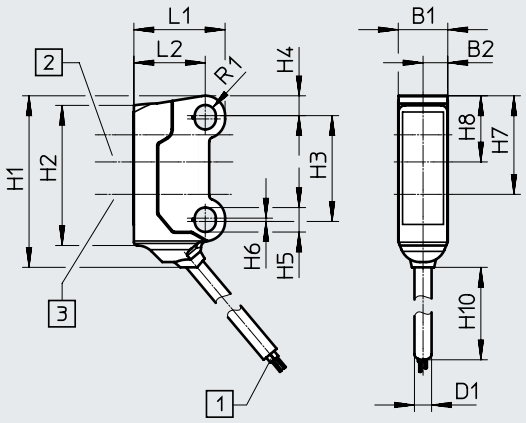
Display/operation	
Ready status indication	Green LED
Switching status indication	Yellow LED
Function reserve indication	Flashing yellow LED

Immission/emission		SOOD-TB-R-PN	SOOD-TB-L-PN
Degree of protection		IP65, IP67	
Laser safety class		–	1
Insulation voltage	[V]	500	
Surge resistance	[kV]	1	
Pollution degree		3	
Corrosion resistance class CRC[1)]		1	

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

Dimensions Download CAD data ➔ www.festo.com



[1] Plug M8x1, 3-pin
[2] Receiver
[3] Transmitter

Type	B1	B2	D1 ø	H1	H2	H3	H4	H5
SOOD-TB-R-PN	7.5	3.8	2.6	26	21.2	16	3	3.7
SOOD-TB-L-PN								

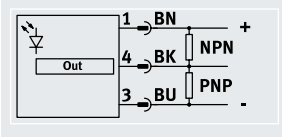
Type	H6	H7	H8	H10	L1	L2	R1
SOOD-TB-R-PN	0.5	14.9	10	150 (+20)	13.8	10.8	1.6
SOOD-TB-L-PN		10					

Ordering data

	Part no.	Type
Through-beam sensor (transmitter and receiver included in the delivery)	**8075656**	**SOOD-TB-R-PN**
Laser through-beam sensor (transmitter and receiver included in the delivery)	**8075661**	**SOOD-TB-L-PN**

Data sheet

Function
SOOD-RS-...



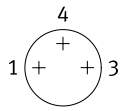
General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

Input signal/measuring element		SOOD-RS-R-PN	SOOD-RS-L-PN
Measuring principle		Optoelectronic	
Detection method		Retro-reflective sensor	
Type of light		Red LED	Red laser
Max. light spot		60 mm at 800 mm	35 mm at 2000 mm
Working range	[mm]	0 ... 1000	0 ... 2000
Reference material		Reference reflector (SARA-R-Q50-S)	
Ambient temperature	[°C]	–25 ... 60	–20 ... 60

Switching output		SOOD-RS-R-PN	SOOD-RS-L-PN
Switching output		Push-pull	
Switching element function		PNP, dark switching	
		NPN, light switching	
Max. switching frequency	[Hz]	800	2000
Max. output current	[mA]	50	
Voltage drop	[V]	0 ... 1.5	

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	10
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Data sheet

Electromechanical systems		
Electrical connection 1		
Plug pattern		
Connection type		Cable with plug
Connection technology		M8x1, A-coded to EN 61076-2-104
Number of pins/wires		3
Type of mounting		Screw-type lock
Material of pin contacts		Gold-plated brass
Cable length	[mm]	150
Cable characteristic		Standard
Cable sheath material		TPE-U(PUR)

Mechanics		
Type of mounting		With through-hole
Tightening torque	[Nm]	0.5
Mounting position		Any
Product weight	[g]	10
Housing material		ABS
		PC
		TPE-U(PU)

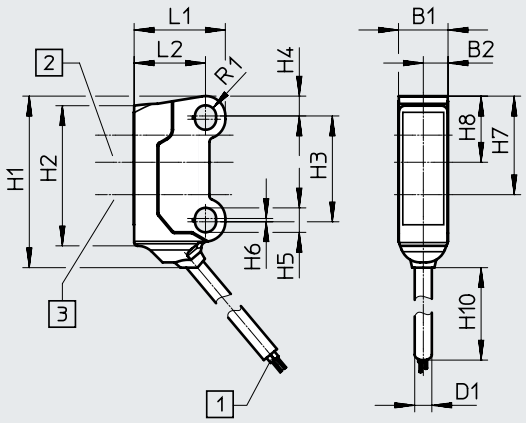
Display/operation	
Ready status indication	Green LED
Switching status indication	Yellow LED
Function reserve indication	Flashing yellow LED

Immission/emission		SOOD-RS-R-PN	SOOD-RS-L-PN
Degree of protection		IP65, IP67	
Laser safety class		–	1
Insulation voltage	[V]	500	
Surge resistance	[kV]	1	
Pollution degree		3	
Corrosion resistance class CRC[1)]		1	

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

Dimensions Download CAD data ➔ www.festo.com



[1] Plug M8x1, 3-pin
[2] Receiver
[3] Transmitter

Type	B1	B2	D1 ø	H1	H2	H3	H4	H5
SOOD-RS-R-PN	7.5	3.8	2.6	26	21.2	16	3	3.7
SOOD-RS-L-PN								

Type	H6	H7	H8	H10	L1	L2	R1
SOOD-RS-R-PN	0.5	14.9	10	150 (+20)	13.8	10.8	1.6
SOOD-RS-L-PN							

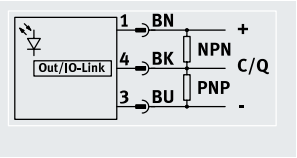
Ordering data

		Part no.	Type
	Retro-reflective sensor	**8075657**	**SOOD-RS-R-PN**
	Laser retro-reflective sensor	**8075662**	**SOOD-RS-L-PN**

Accessories	**Min./max. distance sensor reflector [mm]**		Part no.	Type
	SOOD-RS-R-PN	**SOOD-RS-L-PN**		
Reflector	40 ... 1000	100 ... 2000	**8084159**	**SARA-R-Q50-S**
Reflector	100 ... 1200	150 ... 1800	**8084160**	**SARA-R-Q50-MC**
Reflective foil	100 ... 800	250 ... 600	**8084162**	**SARA-RF-Q100-S**
Reflective foil	100 ... 2000	150 ... 2000	**8084163**	**SARA-RF-Q100-MC**
Reflector	40 ... 1000	200 ... 1500	**8084164**	**SARA-R-Q20-S**
Reflector	100 ... 800	150 ... 1500	**8084165**	**SARA-R-Q20-MC**
Reflector	100 ... 500	150 ... 1000	**8084167**	**SARA-R-Q14-M**
Reflector	100 ... 800	250 ... 1200	**8084168**	**SARA-R-D20-M**

Data sheet

Function
SOOE-BS...



General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

Input signal/measuring element		SOOE-BS-R-PNLK-T	SOOE-BS-L-PNLK-T
Measuring principle		Optoelectronic	
Detection method		Diffuse sensor with background suppression	
Type of light		Red LED	Red laser
Max. light spot		20 mm at sensing range 350 mm	1 mm at sensing range 200 mm
Minimum object diameter	[mm]	10	2
Working range	[mm]	5 ... 350	7 ... 300
Ambient temperature	[°C]	–40 ... 60	

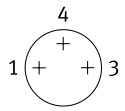
Signal processing		SOOE-BS-R-PNLK-T	SOOE-BS-L-PNLK-T
Max. black/white difference	[%]	15	45
Reference material		Standard white 90%, 100x100 mm	

Switching output		SOOE-BS-R-PNLK-T	SOOE-BS-L-PNLK-T
Switching output		Push-pull	
Switching element function		Switchable	
		PNP light switching	
		NPN, dark switching	
Hysteresis	[mm]	21	18
Max. switching frequency	[Hz]	500	1650
Max. output current	[mA]	100	
Voltage drop	[V]	0 ... 1.5	

Data sheet

Communication interface		
Protocol		IO-Link
IO-Link, profile		Smart sensor profile
IO-Link, function classes		Process data variable (PDV)
		Identification
		Diagnostics
		Teach channel
		Switching signal channel (SSC)
IO-Link, protocol version		Device V 1.1
IO-Link, communication mode		COM2 (38.4 kBd)
IO-Link, SIO mode support		Yes
IO-Link, port class		A
IO-Link, process data width OUT		2 bit
IO-Link, process data content OUT		1 bit (emitter disable)
		1 bit (hold)
IO-Link, process data width IN		1 bit
IO-Link, process data contents IN		1 bit SSC (switching signal)
IO-Link, minimum cycle time	[ms]	2.3
IO-Link, data memory required		2 KB

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	25
Timer function		Via IO-Link
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Electromechanical systems	
Electrical connection 1	
Plug pattern	
Connection type	Plug
Connection technology	M8x1, A-coded to EN 61076-2-104
Number of pins/wires	3
Material of pin contacts	Gold-plated brass

Data sheet

Mechanics		
Type of mounting		Screw-type lock with through-hole for screw M3
Tightening torque	[Nm]	0.8
Mounting position		Any
Product weight	[g]	10
Housing material		PMMA
		PC

Display/operation		SOOE-BS-R-PNLK-T	SOOE-BS-L-PNLK-T
Setting options		Teach-in	
		Potentiometer	
		IO-Link	
Setting range, lower limit	[mm]	25	25
Setting range, upper limit	[mm]	350	300
Ready status indication		Green LED	
Switching status indication		Yellow LED	

Immission/emission		SOOE-BS-R-PNLK-T	SOOE-BS-L-PNLK-T
Degree of protection		IP65, IP67, IP69K	
Laser safety class		–	1
Insulation voltage	[V]	500	
Surge resistance	[kV]	1	
Pollution degree		3	
Corrosion resistance class CRC[1)]		1	

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

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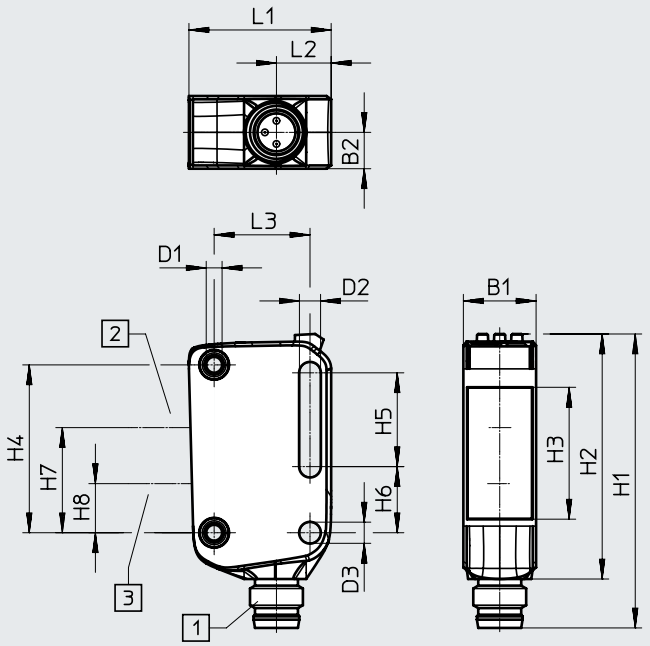


[1] Electrical connection M8x1, plug
[2] Receiver
[3] Transmitter

Type	B1	B2	D1	D2	D3 ø	H1	H2	H3
SOOE-BS-R-PNLK-T	11	5.5	M3	3.2	3.2	44.5	37.1	20
SOOE-BS-L-PNLK-T								

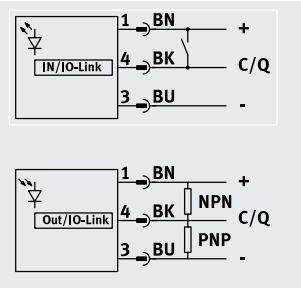
Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-BS-R-PNLK-T	25.4	14.2	10	15.9	7.4	21.5	8.3	14.5
SOOE-BS-L-PNLK-T								

Ordering data

		Part no.	Type
	Diffuse sensor with background suppression	**8075664**	**SOOE-BS-R-PNLK-T**
	Laser diffuse sensor with background suppression	**8075670**	**SOOE-BS-L-PNLK-T**

Data sheet

Function
SOOE-TB-...



General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

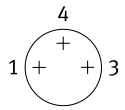
Input signal/measuring element		SOOE-TB-R-PNLK-T	SOOE-TB-L-PNLK-T
Measuring principle		Optoelectronic	
Detection method		Through-beam sensor	
		Transmitter	
		Receiver	
Type of light		Red LED	Red laser
Max. light spot		65 mm at 1000 mm	50 mm at 20000 mm
Working range	[mm]	0 ... 12000	0 ... 20000
Ambient temperature	[°C]	–40 ... 60	

Switching output		SOOE-TB-R-PNLK-T	SOOE-TB-L-PNLK-T
Switching output		Push-pull	
Switching element function		Switchable	
		PNP dark switching	
		NPN, light switching	
Max. switching frequency	[Hz]	1000	1250
Max. output current	[mA]	100	
Voltage drop	[V]	0 ... 1.5	

Data sheet

Communication interface		
Protocol		IO-Link
IO-Link, protocol version		Device V 1.1
IO-Link, communication mode		COM2 (38.4 kBd)
IO-Link, SIO mode support		Yes
IO-Link, port class		A
IO-Link, process data width OUT		2 bit (receiver)
		1 bit (emitter)
IO-Link, process data content OUT		1 bit (emitter disable)
		1 bit (hold)
IO-Link, process data width IN		2 bit (receiver)
IO-Link, process data contents IN		1 bit (stability alarm)
		1 bit SSC (switching signal)
IO-Link, minimum cycle time	[ms]	2.3
IO-Link, data memory required		2 KB

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	14
Timer function		Via IO-Link
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Electromechanical systems	
Electrical connection 1	
Plug pattern	
Connection type	Plug
Connection technology	M8x1, A-coded to EN 61076-2-104
Number of pins/wires	3
Material of pin contacts	Gold-plated brass

Data sheet

Mechanics		
Type of mounting		Screw-type lock with through-hole for screw M3
Tightening torque	[Nm]	0.8
Mounting position		Any
Product weight	[g]	20
Housing material		PMMA
		PC

Display/operation	
Ready status indication	Green LED
Switching status indication	Yellow LED
Function reserve indication	Flashing yellow LED
Setting options	Teach-in
	Potentiometer
	IO-Link

Immission/emission		SOOE-TB-R-PNLK-T	SOOE-TB-L-PNLK-T
Degree of protection		IP65, IP67, IP69K	
Laser safety class		–	1
Insulation voltage	[V]	500	
Surge resistance	[kV]	1	
Pollution degree		3	
Corrosion resistance class CRC[1)]		1	

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

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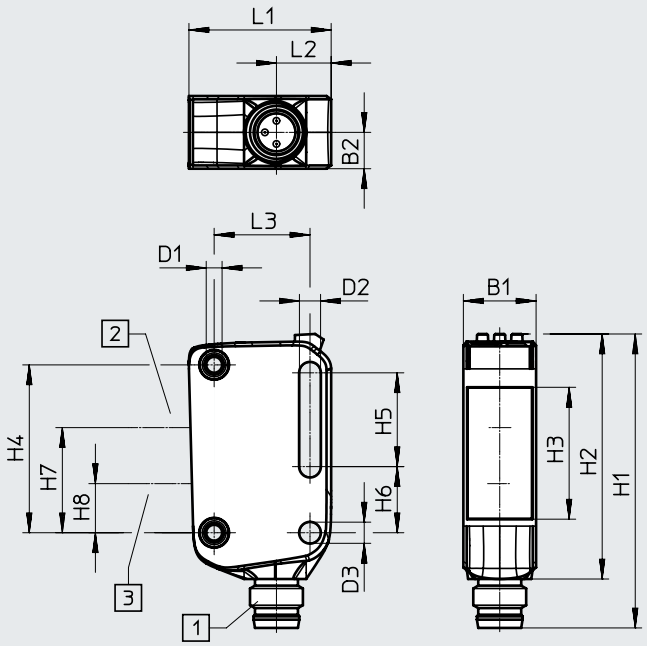


[1] Electrical connection M8x1, plug
[2] Receiver
[3] Transmitter

Type	B1	B2	D1	D2	D3 ø	H1	H2	H3
SOOE-TB-R-PNLK-T	11	5.5	M3	3.2	3.2	44.5	37.1	20
SOOE-TB-L-PNLK-T								

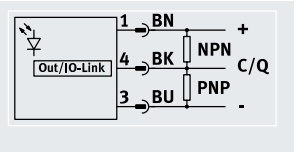
Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-TB-R-PNLK-T	25.4	14.2	10	7.4	7.4	21.5	8.3	14.5
SOOE-TB-L-PNLK-T								

Ordering data

	Part no.	Type
Through-beam sensor (transmitter and receiver included in the delivery)	**8075665**	**SOOE-TB-R-PNLK-T**
Laser through-beam sensor (transmitter and receiver included in the delivery)	**8075671**	**SOOE-TB-L-PNLK-T**

Data sheet

Function
SOOE-RS-...



General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

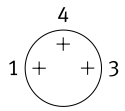
Input signal/measuring element		SOOE-RS-R-PNLK-T	SOOE-RS-L-PNLK-T
Measuring principle		Optoelectronic	
Detection method		Retro-reflective sensor	
Type of light		Red LED	Red laser
Max. light spot		60 mm at 1000 mm	30 mm at 12000 mm
Working range	[mm]	0 ... 6500	0 ... 12000
Reference material		Reference reflector SARA-R-Q50-S	
Ambient temperature	[°C]	–40 ... 60	

Switching output		SOOE-RS-R-PNLK-T	SOOE-RS-L-PNLK-T
Switching output		Push-pull	
Switching element function		Switchable	
		PNP dark switching	
		NPN, light switching	
Max. switching frequency	[Hz]	1000	2000
Max. output current	[mA]	100	
Voltage drop	[V]	0 ... 1.5	

Communication interface		
Protocol		IO-Link
IO-Link, protocol version		Device V 1.1
IO-Link, communication mode		COM2 (38.4 kBd)
IO-Link, SIO mode support		Yes
IO-Link, port class		A
IO-Link, process data width OUT		2 bit
IO-Link, process data content OUT		1 bit (emitter disable)
		1 bit (hold)
IO-Link, process data width IN		2 bit
IO-Link, process data contents IN		1 bit (stability alarm)
		1 bit SSC (switching signal)
IO-Link, minimum cycle time	[ms]	2.3
IO-Link, data memory required		2 KB

Data sheet

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	25
Timer function		Via IO-Link
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Electromechanical systems	
Electrical connection 1	
Plug pattern	
Connection type	Plug
Connection technology	M8x1, A-coded to EN 61076-2-104
Number of pins/wires	3
Material of pin contacts	Gold-plated brass

Mechanics		
Type of mounting		Screw-type lock with through-hole for screw M3
Tightening torque	[Nm]	0.8
Mounting position		Any
Product weight	[g]	10
Housing material		PMMA
		PC

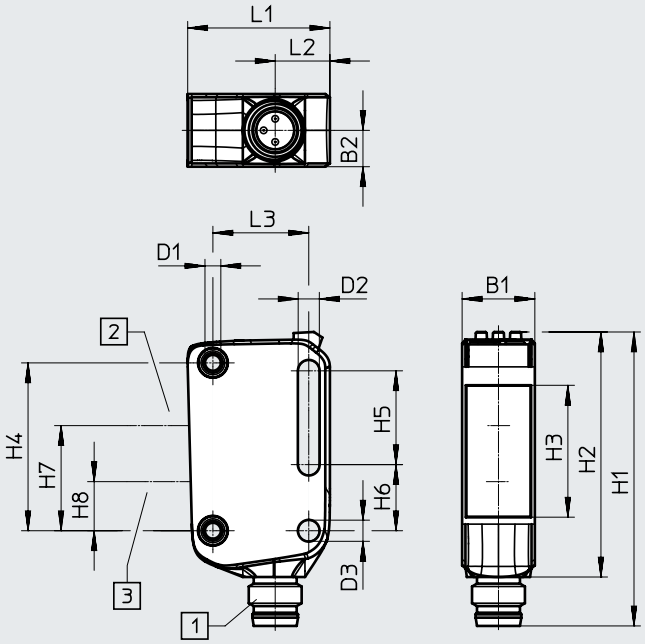
Display/operation	
Setting options	Teach-in
	Potentiometer
	IO-Link
Ready status indication	Green LED
Switching status indication	Yellow LED
Function reserve indication	Flashing yellow LED

Immission/emission		SOOE-RS-R-PNLK-T	SOOE-RS-L-PNLK-T
Degree of protection		IP65, IP67, IP69K	
Laser safety class		–	1
Insulation voltage	[V]	500	
Surge resistance	[kV]	1	
Pollution degree		3	
Corrosion resistance class CRC[1)]		1	

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

Dimensions Download CAD data ➔ www.festo.com



[1] Electrical connection M8x1, plug
[2] Receiver
[3] Transmitter

Type	B1	B2	D1	D2	D3 ø	H1	H2	H3
SOOE-RS-R-PNLK-T	11	5.5	M3	3.2	3.2	44.5	37.1	20
SOOE-RS-L-PNLK-T								

Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-RS-R-PNLK-T	25.4	14.2	10	15.9	7.4	21.5	8.3	14.5
SOOE-RS-L-PNLK-T								

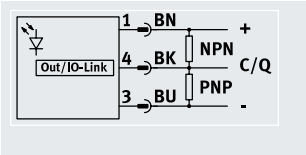
Ordering data

		Part no.	Type
	Retro-reflective sensor	**8075666**	**SOOE-RS-R-PNLK-T**
	Laser retro-reflective sensor	**8075672**	**SOOE-RS-L-PNLK-T**

Accessories	**Min./max. distance sensor reflector [mm]**		Part no.	Type
	SOOE-RS-R-PNLK-T	**SOOE-RS-L-PNLK-T**		
Reflector	40 ... 6500	300 ... 12000	**8084159**	**SARA-R-Q50-S**
Reflector	100 ... 4000	250 ... 10000	**8084160**	**SARA-R-Q50-MC**
Reflective foil	100 ... 2700	300 ... 2000	**8084162**	**SARA-RF-Q100-S**
Reflective foil	100 ... 6000	250 ... 10000	**8084163**	**SARA-RF-Q100-MC**
Reflector	40 ... 2500	300 ... 10000	**8084164**	**SARA-R-Q20-S**
Reflector	100 ... 2500	250 ... 10000	**8084165**	**SARA-R-Q20-MC**
Reflector	100 ... 1200	250 ... 8000	**8084167**	**SARA-R-Q14-M**
Reflector	100 ... 1600	300 ... 7500	**8084168**	**SARA-R-D20-M**

Data sheet

Function
SOOE-RG-R-PNLK-T



General technical data		
Design		Block design
Conforms to standard		EN 60947-5-2
Certification		RCM
		c UL us - Recognized (OL)
CE marking (see declaration of conformity)		To EU EMC Directive
		To EU RoHS Directive
UKCA marking (see declaration of conformity)		To UK instructions for EMC
		To UK RoHS instructions
Certificate issuing authority		UL E232949
Note on materials		RoHS-compliant
PWIS conformity		VDMA24364 zone III

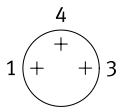
Input signal/measuring element		
Measuring principle		Optoelectronic
Detection method		Retro-reflective sensor for transparent objects
Type of light		Red LED
Max. light spot		300 mm at 3500 mm
Working range	[mm]	0 ... 3500
Reference material		Reference reflector SARA-R-Q50-S
Ambient temperature	[°C]	–20 ... 60

Switching output		
Switching output		Push-pull
Switching element function		Switchable
		PNP dark switching
		NPN, light switching
Max. switching frequency	[Hz]	500
Max. output current	[mA]	100
Voltage drop	[V]	0 ... 1.5

Communication interface		
Protocol		IO-Link
IO-Link, protocol version		Device V 1.1
IO-Link, communication mode		COM2 (38.4 kBd)
IO-Link, SIO mode support		Yes
IO-Link, port class		A
IO-Link, process data width OUT		2 bit
IO-Link, process data content OUT		1 bit (emitter disable)
		1 bit (hold)
IO-Link, process data width IN		2 bit
IO-Link, process data contents IN		1 bit (stability alarm)
		1 bit SSC (switching signal)
IO-Link, minimum cycle time	[ms]	2.3
IO-Link, data memory required		2 KB

Data sheet

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	25
Timer function		Via IO-Link
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Electromechanical systems	
Electrical connection 1	
Plug pattern	
Connection type	Plug
Connection technology	M8x1, A-coded to EN 61076-2-104
Number of pins/wires	3
Material of pin contacts	Gold-plated brass

Mechanics		
Type of mounting		Screw-type lock with through-hole for screw M3
Tightening torque	[Nm]	0.8
Mounting position		Any
Product weight	[g]	10
Housing material		PMMA
		PC

Display/operation	
Setting options	Teach-in
	Potentiometer
	IO-Link
Ready status indication	Green LED
Switching status indication	Yellow LED
Function reserve indication	Flashing yellow LED

Immission/emission		
Degree of protection		IP65, IP67, IP69K
Laser safety class		–
Insulation voltage	[V]	500
Surge resistance	[kV]	1
Pollution degree		3
Corrosion resistance class CRC[1)]		1

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

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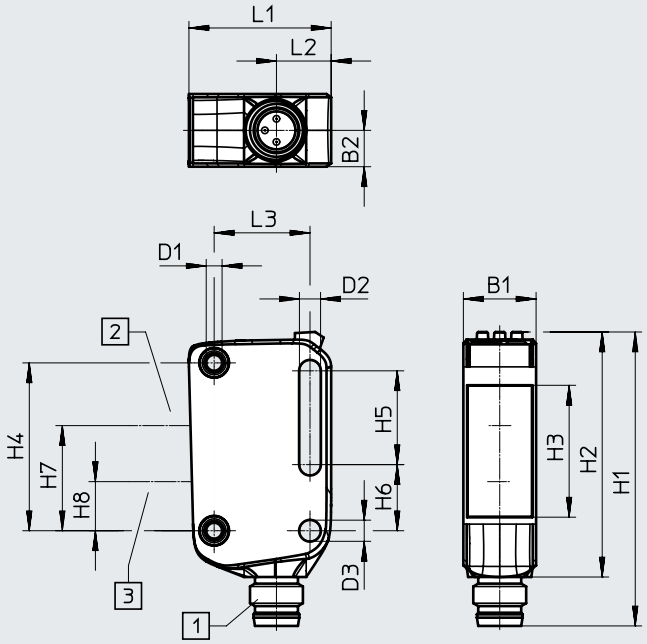


[1] Electrical connection M8x1, plug
[2] Receiver
[3] Transmitter

Type	B1	B2	D1	D2	D3 ø	H1	H2	H3
SOOE-RG-R-PNLK-T	11	5.5	M3	3.2	3.2	44.5	37.1	20

Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-RG-R-PNLK-T	25.4	14.2	10	7.4	7.4	21.5	8.3	14.5

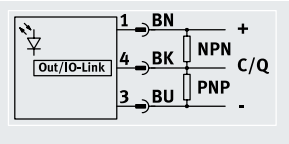
Ordering data

		Part no.	Type
	Retro-reflective sensor for transparent objects	**8075667**	**SOOE-RG-R-PNLK-T**

Accessories	**Min./max. distance sensor reflector [mm]**	Part no.	Type
Reflector	1 ... 5000	**8084159**	**SARA-R-Q50-S**
Reflector	1 ... 2000	**8084160**	**SARA-R-Q50-MC**
Reflective foil	1 ... 1800	**8084162**	**SARA-RF-Q100-S**
Reflective foil	1 ... 3300	**8084163**	**SARA-RF-Q100-MC**
Reflector	1 ... 2000	**8084164**	**SARA-R-Q20-S**
Reflector	1 ... 1800	**8084165**	**SARA-R-Q20-MC**
Reflector	1 ... 1100	**8084167**	**SARA-R-Q14-M**
Reflector	1 ... 1400	**8084168**	**SARA-R-D20-M**

Data sheet

Function
SOOE-DS-R-PNLK-T



General technical data		
Design		Block design
Conforms to standard		EN 60947-5-2
Certification		RCM
		c UL us - Recognized (OL)
CE marking (see declaration of conformity)		To EU EMC Directive
		To EU RoHS Directive
UKCA marking (see declaration of conformity)		To UK instructions for EMC
		To UK RoHS instructions
Certificate issuing authority		UL E232949
Note on materials		RoHS-compliant
PWIS conformity		VDMA24364 zone III

Input signal/measuring element		
Measuring principle		Optoelectronic
Detection method		Diffuse sensor
Type of light		Red LED
Max. light spot		65 mm at sensing range 1000 mm
Minimum object diameter	[mm]	10
Working range	[mm]	2 ... 1000
Ambient temperature	[°C]	–40 ... 60

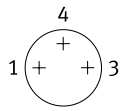
Signal processing		
Max. black/white difference	[%]	15
Reference material		Standard white 90%, 100x100 mm

Switching output		
Switching output		Push-pull
Switching element function		Switchable
		PNP light switching
		NPN, dark switching
Hysteresis	[mm]	200
Max. switching frequency	[Hz]	1000
Max. output current	[mA]	100
Voltage drop	[V]	0 ... 1.5

Data sheet

Communication interface		
Protocol		IO-Link
IO-Link, profile		Smart sensor profile
IO-Link, function classes		Process data variable (PDV)
		Identification
		Diagnostics
		Teach channel
		Switching signal channel (SSC)
IO-Link, protocol version		Device V 1.1
IO-Link, communication mode		COM2 (38.4 kBd)
IO-Link, SIO mode support		Yes
IO-Link, port class		A
IO-Link, process data width OUT		2 bit
IO-Link, process data content OUT		1 bit (emitter disable)
		1 bit (hold)
IO-Link, process data width IN		1 bit
IO-Link, process data contents IN		1 bit SSC (switching signal)
IO-Link, minimum cycle time	[ms]	2.3
IO-Link, data memory required		2 KB

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	25
Timer function		Via IO-Link
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Electromechanical systems	
Electrical connection 1	
Plug pattern	
Connection type	Plug
Connection technology	M8x1, A-coded to EN 61076-2-104
Number of pins/wires	3
Material of pin contacts	Gold-plated brass

Data sheet

Mechanics		
Type of mounting		Screw-type lock with through-hole for screw M3
Tightening torque	[Nm]	0.8
Mounting position		Any
Product weight	[g]	10
Housing material		PMMA
		PC

Display/operation		
Setting options		Teach-in
		Potentiometer
		IO-Link
Setting range, lower limit	[mm]	75
Setting range, upper limit	[mm]	1000
Ready status indication		Green LED
Switching status indication		Yellow LED

Immission/emission		
Degree of protection		IP65, IP67, IP69K
Laser safety class		–
Insulation voltage	[V]	500
Surge resistance	[kV]	1
Pollution degree		3
Corrosion resistance class CRC[1)]		1

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

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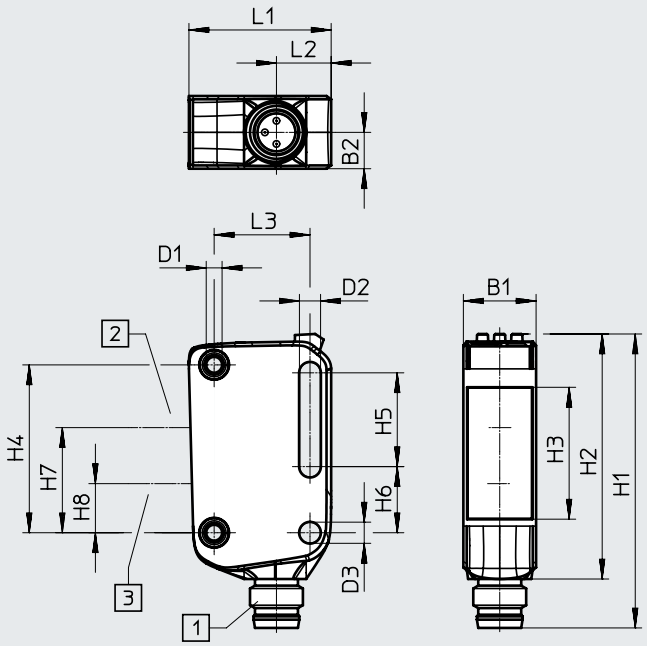


[1] Electrical connection M8x1, plug
[2] Receiver
[3] Transmitter

Type	B1	B2	D1	D2	D3 ø	H1	H2	H3
SOOE-DS-R-PNLK-T	11	5.5	M3	3.2	3.2	44.5	37.1	20

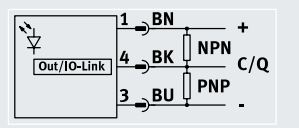
Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-DS-R-PNLK-T	25.4	14.2	10	15.9	7.4	21.5	8.3	14.5

Ordering data

		Part no.	Type
	Diffuse sensor	**8075663**	**SOOE-DS-R-PNLK-T**

Data sheet

Function
SOOE-KS-L-PNLK-T



General technical data		
Design		Block design
Conforms to standard		EN 60947-5-2
Certification		RCM
		c UL us - Recognized (OL)
CE marking (see declaration of conformity)		To EU EMC Directive
		To EU RoHS Directive
UKCA marking (see declaration of conformity)		To UK instructions for EMC
		To UK RoHS instructions
Certificate issuing authority		UL E232949
Note on materials		RoHS-compliant
PWIS conformity		VDMA24364 zone III

Input signal/measuring element		
Measuring principle		Optoelectronic
Detection method		Laser contrast sensor
Type of light		Red laser
Max. light spot		1 mm at sensing range 60 mm
Minimum object diameter	[mm]	1
Working range	[mm]	25 ... 120
Ambient temperature	[°C]	–40 ... 60

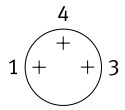
Signal processing		
Max. black/white difference	[%]	15
Reference material		Standard white 90%, 100x100 mm

Switching output		
Switching output		Push-pull
Switching element function		Switchable
		PNP light switching
		NPN, dark switching
Max. switching frequency	[Hz]	3300
Max. output current	[mA]	100
Voltage drop	[V]	0 ... 1.5

Data sheet

Communication interface		
Protocol		IO-Link
IO-Link, protocol version		Device V 1.1
IO-Link, communication mode		COM2 (38.4 kBd)
IO-Link, SIO mode support		Yes
IO-Link, port class		A
IO-Link, process data width OUT		2 bit
IO-Link, process data content OUT		1 bit (emitter disable)
		1 bit (hold)
IO-Link, process data width IN		1 bit
IO-Link, process data contents IN		1 bit SSC (switching signal)
IO-Link, minimum cycle time	[ms]	2.3
IO-Link, data memory required		2 KB

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	25
Timer function		Via IO-Link
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Electromechanical systems	
Electrical connection 1	
Plug pattern	
Connection type	Plug
Connection technology	M8x1, A-coded to EN 61076-2-104
Number of pins/wires	3
Material of pin contacts	Gold-plated brass

Data sheet

Mechanics		
Type of mounting		Screw-type lock with through-hole for screw M3
Tightening torque	[Nm]	0.8
Mounting position		Any
Product weight	[g]	10
Housing material		PMMA
		PC

Display/operation		
Setting options		Teach-in
		Potentiometer
		IO-Link
Ready status indication		Green LED
Switching status indication		Yellow LED

Immission/emission		
Degree of protection		IP65, IP67, IP69K
Laser safety class		1
Insulation voltage	[V]	500
Surge resistance	[kV]	1
Pollution degree		3
Corrosion resistance class CRC[1)]		1

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

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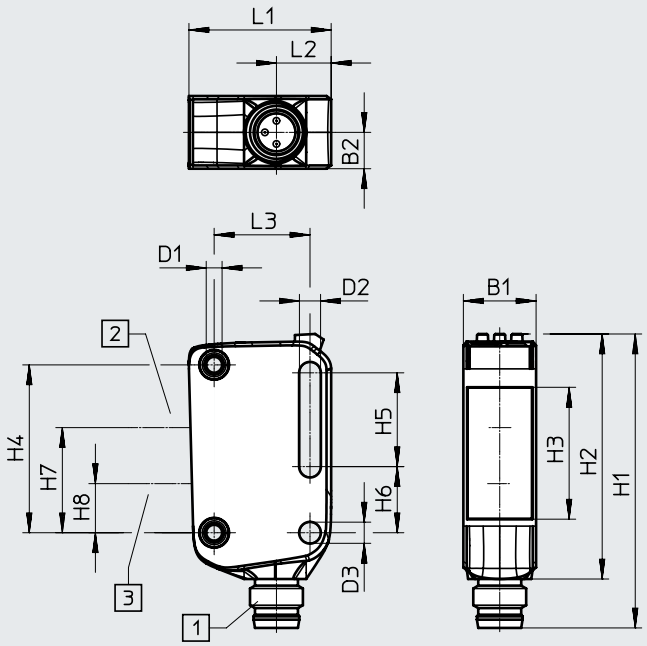


[1] Electrical connection M8x1, plug
[2] Receiver
[3] Transmitter

Type	B1	B2	D1	D2	D3 ø	H1	H2	H3
SOOE-KS-L-PNLK-T	11	5.5	M3	3.2	3.2	44.5	37.1	20

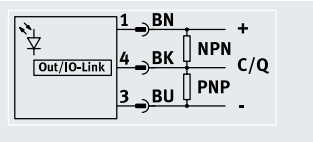
Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-KS-L-PNLK-T	25.4	14.2	10	15.9	7.4	21.5	8.3	14.5

Ordering data

		Part no.	Type
	Laser contrast sensor	**8075669**	**SOOE-KS-L-PNLK-T**

Data sheet

Function
SOOE-MS-...



The distance measured value is transmitted via

IO-Link

only.

The switching output can be programmed as a window comparator.

General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM
	c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive
	To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC
	To UK RoHS instructions
Certificate issuing authority	UL E232949
Note on materials	RoHS-compliant
PWIS conformity	VDMA24364 zone III

Input signal/measuring element		SOOE-MS-R-PNLK-T	SOOE-MS-L-PNLK-T
Measuring principle		Optoelectronic	
Measuring method		Distance sensor	
Type of light		Red LED	Red laser
Max. light spot		8 mm at sensing range 100 mm	3 mm at sensing range 100 mm
Position measuring range	[mm]	40 ... 100	
Minimum object diameter	[mm]	10	4
Ambient temperature	[°C]	10 ... 60	

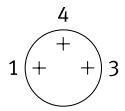
Signal processing		SOOE-MS-R-PNLK-T	SOOE-MS-L-PNLK-T
Reference material		Standard white 90%, 100x100 mm	
Path resolution	[mm]	0.1	
Repetition accuracy	[mm]	0.5	
Temperature coefficient	[%/K]	0.03	

Switching output		SOOE-MS-R-PNLK-T	SOOE-MS-L-PNLK-T
Switching output		Push-pull	
Switching element function		Switchable	
		PNP light switching	
		NPN, dark switching	
Max. switching frequency	[Hz]	135	270
Max. output current	[mA]	100	
Voltage drop	[V]	0 ... 1.5	
Linearity error FS	[%]	0.75	

Data sheet

Communication interface		
Protocol		IO-Link
IO-Link, profile		Smart sensor profile
IO-Link, function classes		Process data variable (PDV)
		Identification
		Diagnostics
		Teach channel
		Switching signal channel (SSC)
IO-Link, protocol version		Device V 1.1
IO-Link, communication mode		COM2 (38.4 kBd)
IO-Link, SIO mode support		Yes
IO-Link, port class		A
IO-Link, process data width OUT		2 bit
IO-Link, process data content OUT		1 bit (emitter disable)
		1 bit (hold)
IO-Link, process data width IN		3 bytes
IO-Link, process data contents IN		1 bit (signal quality indicator)
		2 bit SSC (switching signal)
		16 bit PDV (distance)
IO-Link, minimum cycle time	[ms]	3
IO-Link, data memory required		2 KB

Electronics		
Operating voltage range	[V DC]	10 ... 30
Residual ripple	[%]	10
No-load supply current	[mA]	25
Timer function		Via IO-Link
Short circuit current rating		Pulsed
Reverse polarity protection		For all electrical connections

Electromechanical systems	
Electrical connection 1	
Plug pattern	
Connection type	Plug
Connection technology	M8x1, A-coded to EN 61076-2-104
Number of pins/wires	3
Material of pin contacts	Gold-plated brass

Data sheet

Mechanics		
Type of mounting		Screw-type lock with through-hole for screw M3
Tightening torque	[Nm]	0.8
Mounting position		Any
Product weight	[g]	10
Housing material		PMMA
		PC

Display/operation	
Setting options	Teach-in
	Potentiometer
	IO-Link
Ready status indication	Green LED
Switching status indication	Yellow LED

Immission/emission		SOOE-MS-R-PNLK-T	SOOE-MS-L-PNLK-T
Degree of protection		IP65, IP67, IP69K	
Laser safety class		–	1
Insulation voltage	[V]	500	
Surge resistance	[kV]	1	
Pollution degree		3	
Corrosion resistance class CRC[1)]		1	

1) Corrosion resistance class CRC 1 to Festo standard FN 940070
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).

Data sheet

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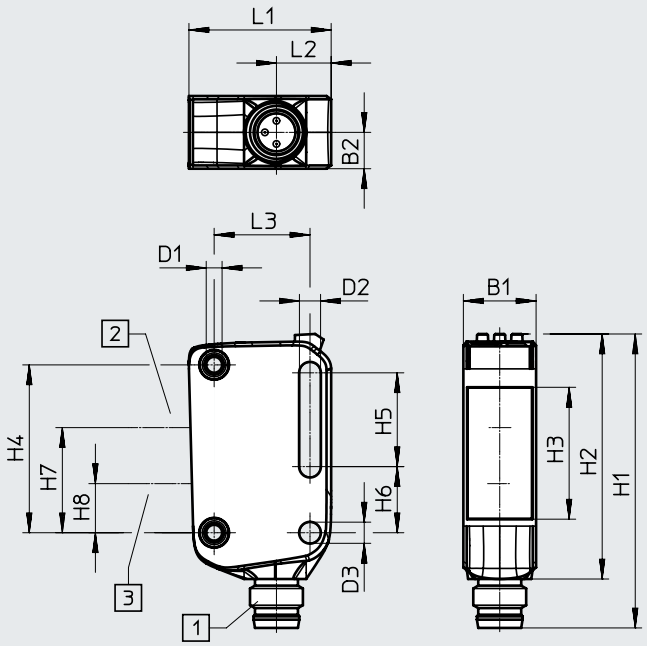


[1] Electrical connection M8x1, plug
[2] Receiver
[3] Transmitter

Type	B1	B2	D1	D2	D3 ø	H1	H2	H3
SOOE-MS-R-PNLK-T	11	5.5	M3	3.2	3.2	44.5	37.1	20
SOOE-MS-L-PNLK-T								

Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-MS-R-PNLK-T	25.4	14.2	10	15.9	7.4	21.5	8.3	14.5
SOOE-MS-L-PNLK-T								

Ordering data

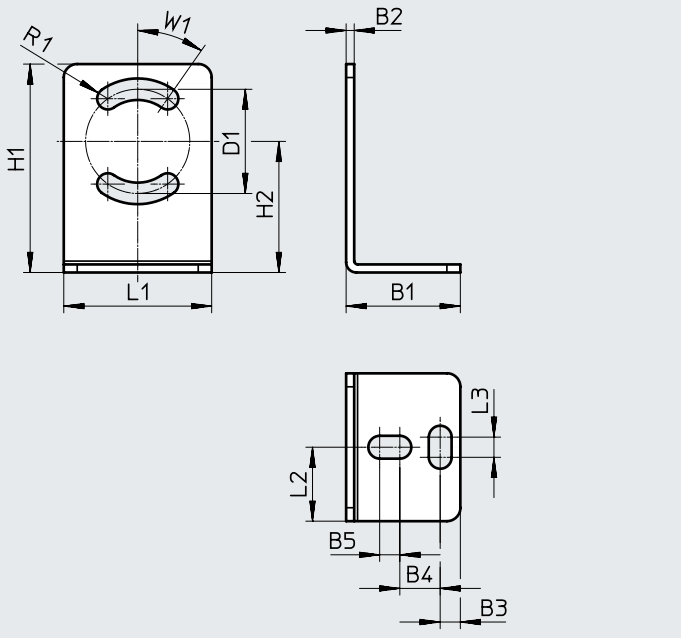
		Part no.	Type
	Distance sensor	**8075668**	**SOOE-MS-R-PNLK-T**
	Laser distance sensor	**8075673**	**SOOE-MS-L-PNLK-T**

Accessories – Ordering data

Mounting bracket
SAMH-L2-L-A

Mounting components for
sensors SOOD
Size: 22 x 31 x 17 mm
Material: High-alloy stainless steel
RoHS-compliant

Scope of delivery: 2 screws
M3x14 mm, 2 nuts M3, 2 snap rings,
4 washers, 1 Allen key



Dimensions and ordering data

Type	B1	B2	B3	B4	B5	D1 ø	H1	H2	L1
SAMH-L2-L-A	17	1.2	3	6	3	15.5	31	19.5	22

Type	L2	L3	R1	W1	CRC[1)]	Weight [g]	Part no.	Type
SAMH-L2-L-A	11	3	1.6	35°	2	15	**8077963**	**SAMH-L2-L-A**

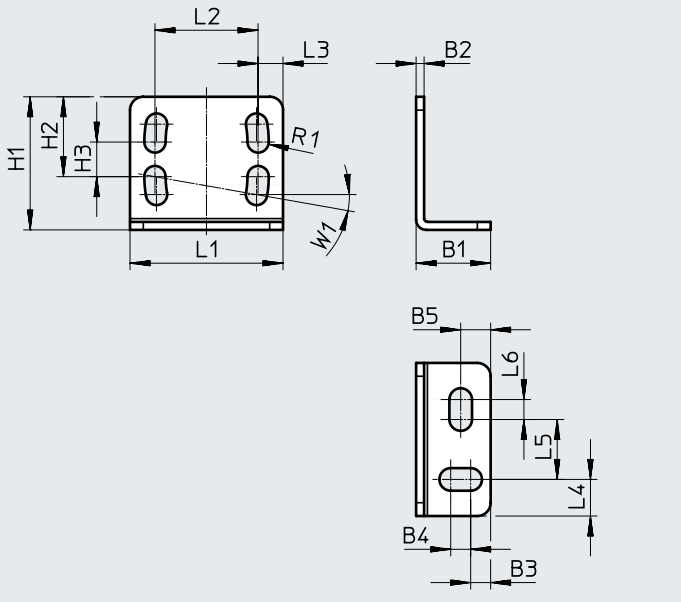
1) Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories – Ordering data

Mounting bracket
SAMH-L2-A

Mounting components for
sensors SOOD
Size: 23 x 20 x 11.2 mm
Material: High-alloy stainless steel
RoHS-compliant

Scope of delivery: 2 screws
M3x14 mm, 2 nuts M3, 2 snap rings,
4 washers, 1 Allen key



Dimensions and ordering data

Type	B1	B2	B3	B4	B5	H1	H2	H3	L1	L2
SAMH-L2-A	11.2	1.2	3	3	4.5	20	12	5.3	23	15.5

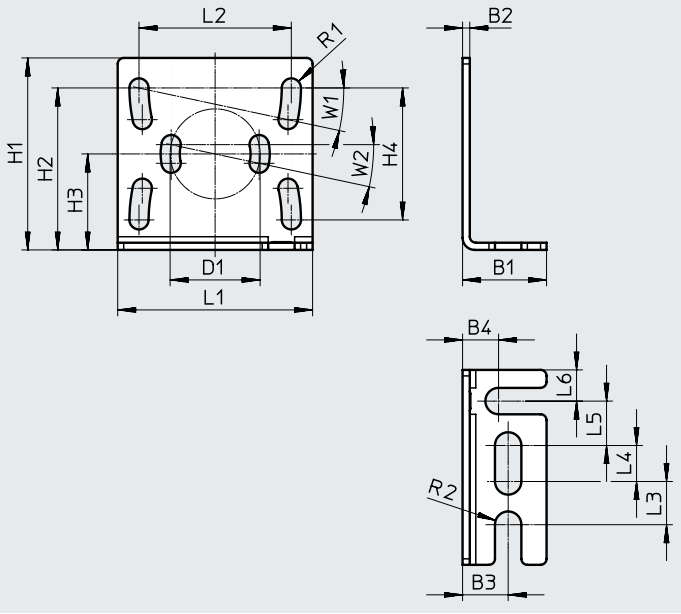
Type	L3	L4	L5	L6	R1	W1	CRC[1)]	Weight [g]	Part no.	Type
SAMH-L2-A	3.8	5.5	9	3	1.6	10°	2	15	**8077964**	**SAMH-L2-A**

1) Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories – Ordering data

Mounting bracket
SAMH-L3-A

Mounting components for
sensors SOOE
Size: 32 x 32, 5 x 14 mm
Material: High-alloy stainless steel
RoHS-compliant



Dimensions and ordering data

Type	B1	B2	B3	B4	D1 ø	H1	H2	H3	H4	L1	L2	L3
SAMH-L3-A	14	1.2	7.6	6	15	32	27	16	22	32.5	25.4	7.2

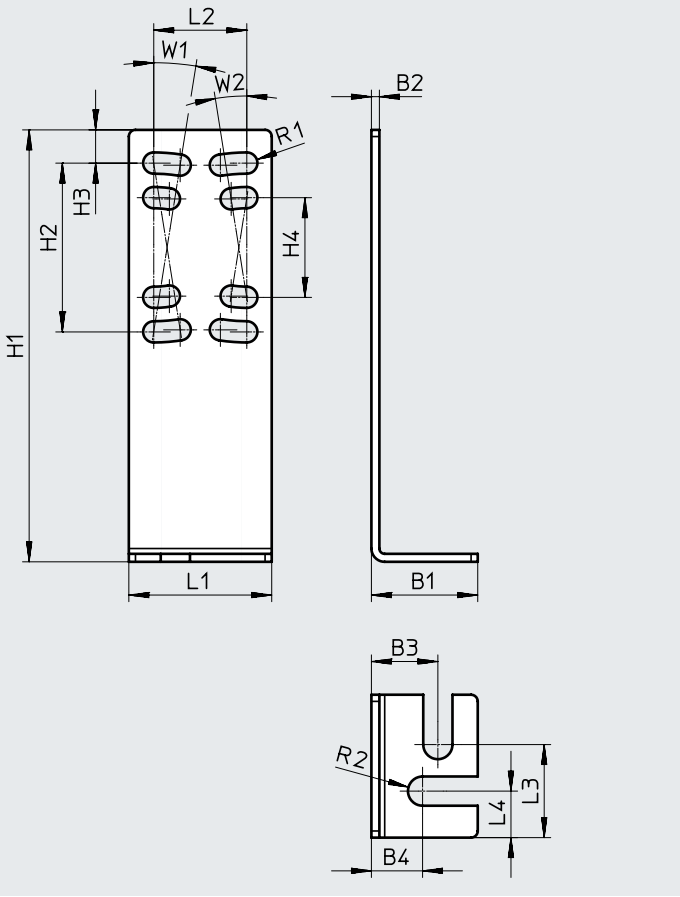
Type	L4	L5	L6	R1	R2	W1	W2	CRC[1]	Weight [g]	Part no.	Type
SAMH-L3-A	6	7.4	5.2	1.6	2.2	12°	12°	2	11	**8077965**	**SAMH-L3-A**

1) Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories – Ordering data

Mounting bracket
SAMH-L3-L-A

Mounting components for
sensors SOOE
Size: 62 x 21, 5 x 16 mm
Material: High-alloy stainless steel
RoHS-compliant



Dimensions and ordering data

Type	B1	B2	B3	B4	H1	H2	H3	H4	L1	L2
SAMH-L3-L-A	16	1.2	10	7.7	65	25.4	5	15	21.5	14

Type	L3	L4	R1	R2	W1	W2	CRC[1)]	Weight [g]	Part no.	Type
SAMH-L3-L-A	14	7	1.6	2.2	9°	9°	2	14	**8077966**	**SAMH-L3-L-A**

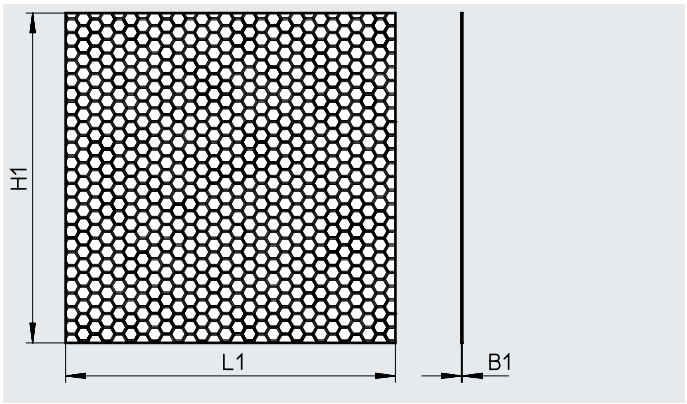
1) Corrosion resistance class CRC 2 to Festo standard FN 940070
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

Accessories – Ordering data

Reflective foil
SARA-RF-Q100

Size: 22 x 31 x 17 mm
Type of mounting: Glued
Material: PMMA foil
RoHS-compliant

Reflective foil SARA-RF-Q-100-MC is suitable for laser sensors.



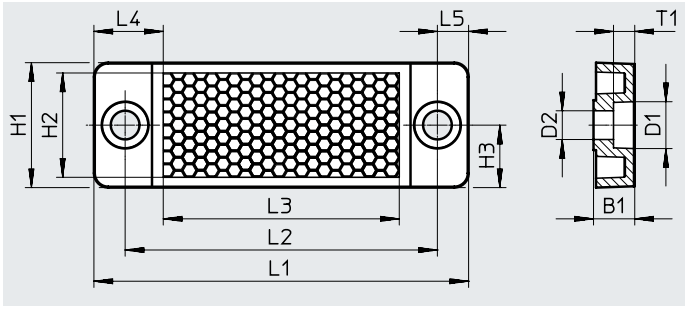
Dimensions and ordering data

Type	B1	H1	L1	Structural width of reflector	Ambient temperature	Weight [g]	Part no.	Type
SARA-RF-Q100-S	0.3	100	100	Standard	–40 ... 80°C	4.4	**8084162**	**SARA-RF-Q100-S**
SARA-RF-Q100-MC				Micro	–40 ... 70°C	5.6	**8084163**	**SARA-RF-Q100-MC**

Reflector
SARA-R-Q20

Type of mounting: Screwed into place
Housing material: PMMA
RoHS-compliant

Reflector SARA-R-Q20-MC is suitable for laser sensors.



Dimensions and ordering data

Type	B1 ±0.3	D1 ø	D2 ø	H1	H2	H3	L1	L2	L3
SARA-R-Q20-S	6.6	7.5	4.6	20	16.7	10	60	50	37.8
SARA-R-Q20-MC									

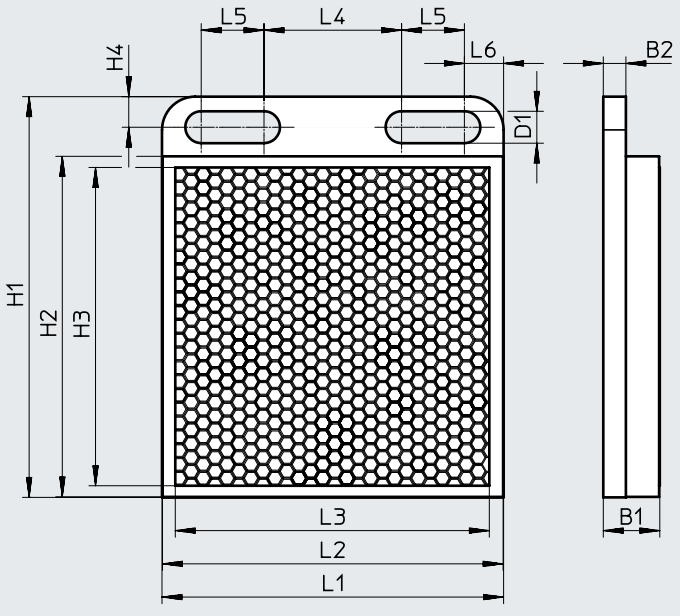
Type	L4	L5	T1	Structural width of reflector	Ambient temperature	Weight [g]	Part no.	Type
SARA-R-Q20-S	11.1	5	3.4	Standard	–40 ... 65°C	5.4	**8084164**	**SARA-R-Q20-S**
SARA-R-Q20-MC				Micro		5.95	**8084165**	**SARA-R-Q20-MC**

Accessories – Ordering data

Reflector
SARA-R-Q50

Type of mounting: Screwed into place
Housing material: PMMA
RoHS-compliant

Reflector SARA-R-Q50-MC is suitable for laser sensors.



Dimensions and ordering data

Type	B1 ±0.5	B2	D1	H1	H2	H3	H4	L1	L2
SARA-R-Q50-S	8.5	3.4	4.8	60.3	51.3	47.9	4.6	51.4	51.3
SARA-R-Q50-MC	6.5								

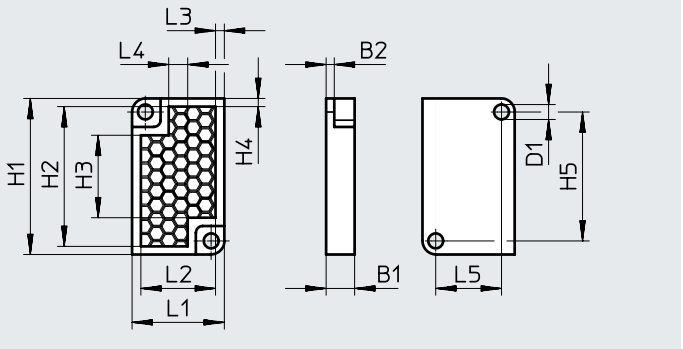
Type	L3	L4	L5	L6	Structural width of reflector	Ambient temperature	Weight [g]	Part no.	Type
SARA-R-Q50-S	47.3	20.7	9.5	5.9	Standard	–40 ... 65°C	10.35	**8084159**	**SARA-R-Q50-S**
SARA-R-Q50-MC					Micro		14.9	**8084160**	**SARA-R-Q50-MC**

Accessories – Ordering data

Reflector
SARA-R-Q14-M

Type of mounting: Screwed into place
Housing material: PMMA
RoHS-compliant

Reflector SARA-R-Q14-M is suitable for laser sensors.



Dimensions and ordering data

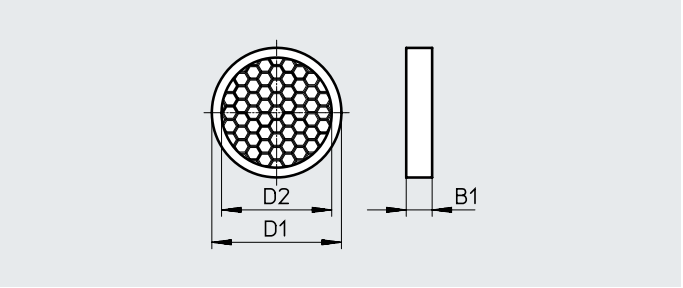
Type	B1 ±0.3	B2	D1 ø	H1	H2	H3	H4	H5	L1
SARA-R-Q14-M	4.2	1.2	2.2	23	20.6	12.2	1.2	19	13.6

Type	L2	L3	L4	L5	Structural width of reflector	Ambient temperature	Weight [g]	Part no.	Type
SARA-R-Q14-M	11	1.3	2.8	9.7	Mini	–40 ... 65°C	1.25	**8084167**	**SARA-R-Q14-M**

Reflector
SARA-R-D20-M

Type of mounting: Glued
Housing material: PMMA
RoHS-compliant

Reflector SARA-R-D20-M is suitable for laser sensors.

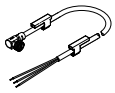


Dimensions and ordering data

Type	B1 ±0.3	D1 ø	D2 ø	Structural width of reflector	Ambient temperature	Weight [g]	Part no.	Type
SARA-R-D20-M	4	20	17	Mini	–40 ... 65°C	1.1	**8084168**	**SARA-R-D20-M**

Accessories – Ordering data

Ordering data – Connecting cables M8x1

Type	Number of wires	Cable length [m]	Part no.	Type
Straight socket				
	3	2.5	**541333**	**NEBU-M8G3-K-2.5-LE3**
		5	**541334**	**NEBU-M8G3-K-5-LE3**
Angled socket				
	3	2.5	**541338**	**NEBU-M8W3-K-2.5-LE3**
		5	**541341**	**NEBU-M8W3-K-5-LE3**
Rotatable socket				
	3	2.5	**8001660**	**NEBU-M8R3-K-2.5-LE3**
		5	**8001661**	**NEBU-M8R3-K-5-LE3**