

## Optoelectronic sensors

**FESTO**



## Key features and product range overview

Product range overview					
Design	S00D LED	S00D laser	S00E LED	S00E 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

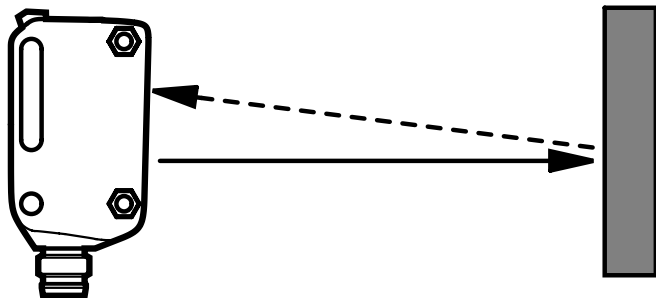
### Detection method

#### Diffuse sensor S00E-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



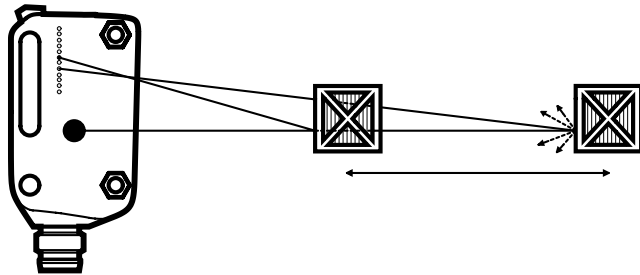
- Longer switching distance
- More economical
- More reliable for detecting slightly reflective objects

## 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.

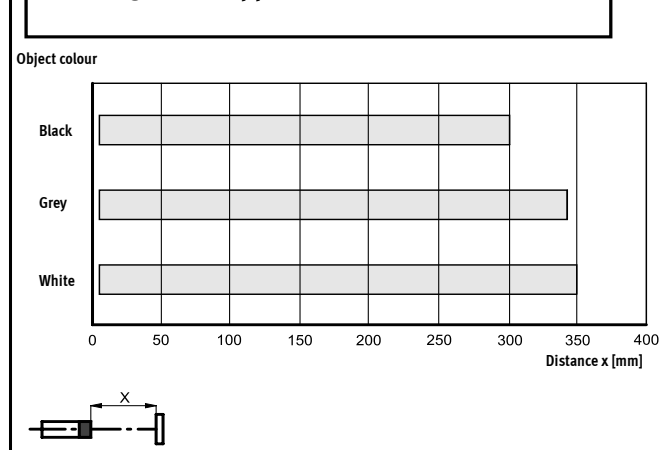
Object detection is therefore virtually independent of other objects in the background as well as colour, size or surface. Only a very small diffuse remission is required for these devices.



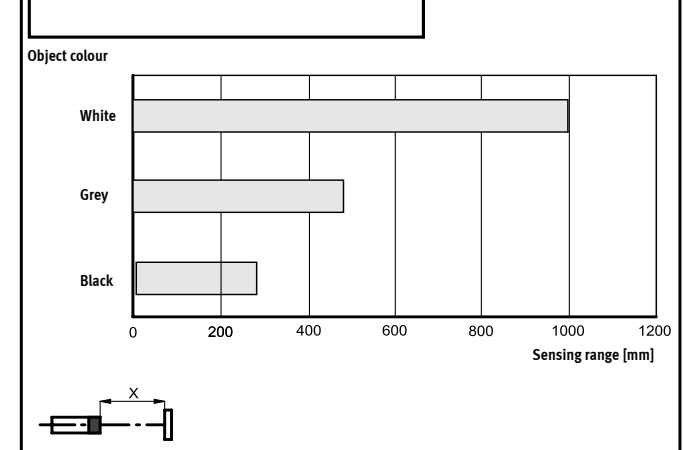
### Benefits of diffuse sensors with background suppression

- 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

### Sensing range for diffuse sensor with background suppression



### Sensing range for diffuse sensor



### 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:

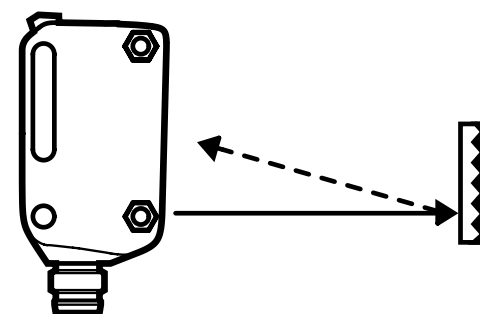
- Retro-reflective sensors with two lenses
- Retro-reflective sensors with autocollimation

### 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.

- S00D-RS
- S00E-RS

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



### Key features

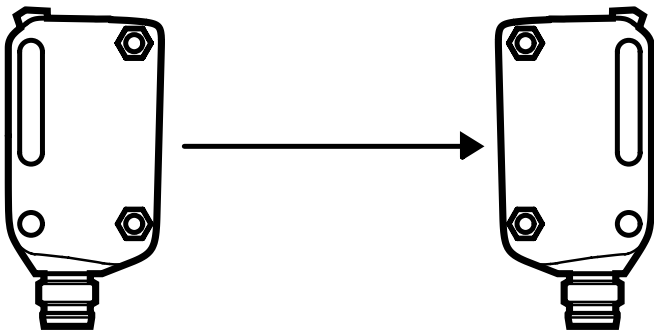
#### Retro-reflective sensors with autocollimation

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.

S00E-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 S00E-MS have no analogue output. The switching output can be programmed as a window comparator.

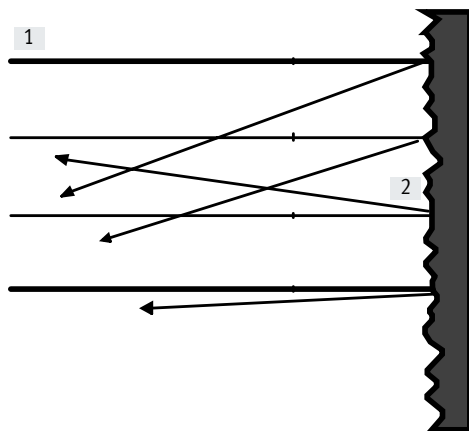
#### Contrast sensor

In principle, the laser contrast sensor S00E-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



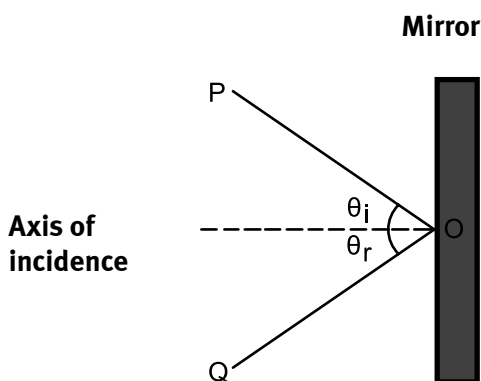
Diffuse reflection is the reflection of light from an uneven or grained surface when an incident beam is reflected at many different angles.

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  $\theta_i = \theta_r$ .

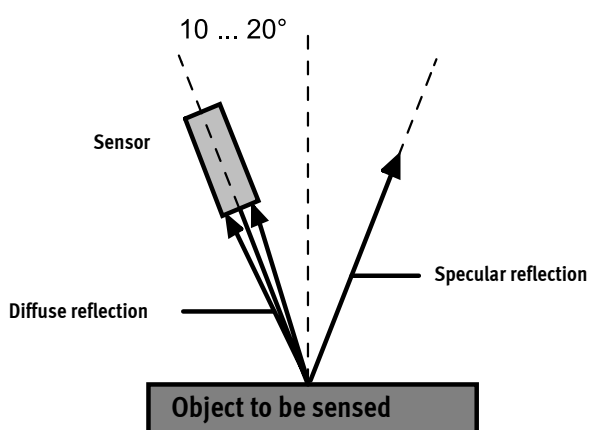
#### Retro-reflection

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

S00D and S00E 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

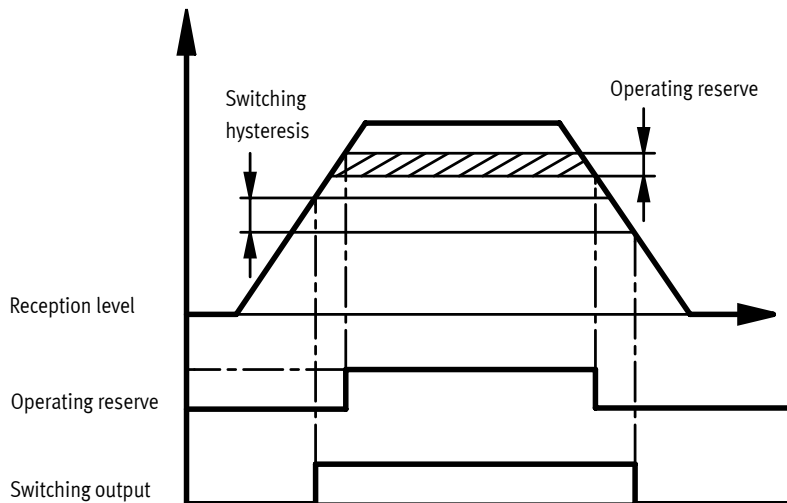
### Operational reserve display

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, S00E 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

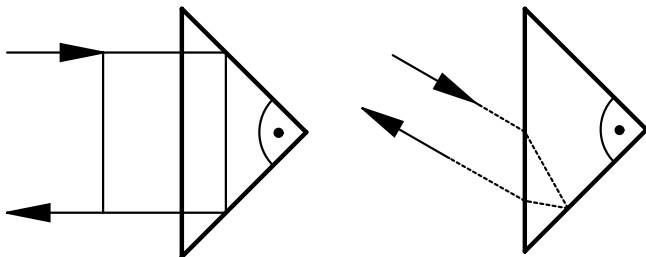
Retro-reflective sensors are equipped with polarising filters that ensure that they respond only to light returned by special reflectors. These reflectors function according to the principle of a corner cube.

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  $\pm 15^\circ$ ). 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.

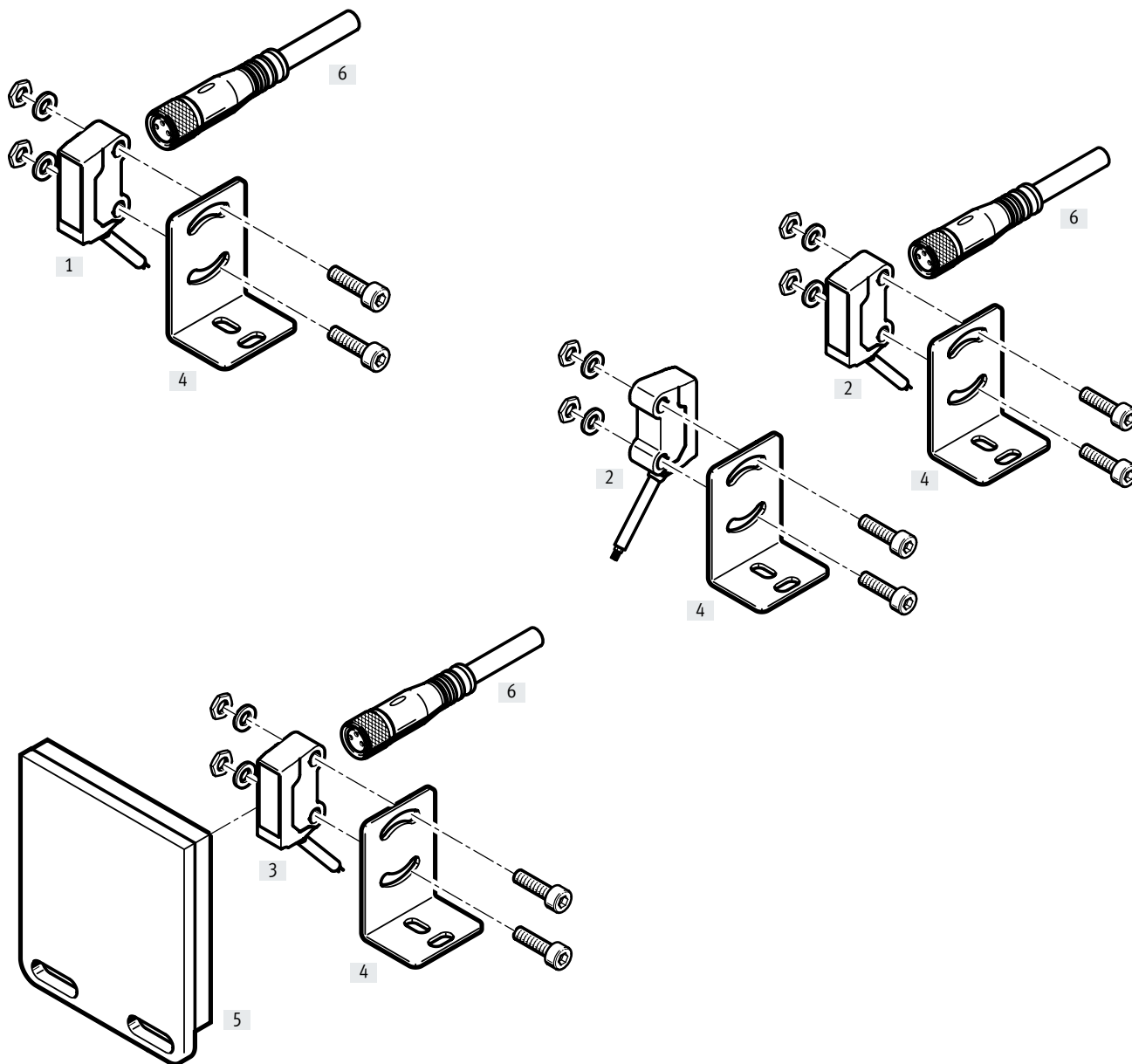
Small optical structures (mini/micro) are very well suited for laser sensors, but have the disadvantage that they reflect slightly less light and therefore have a smaller detection range.

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.

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



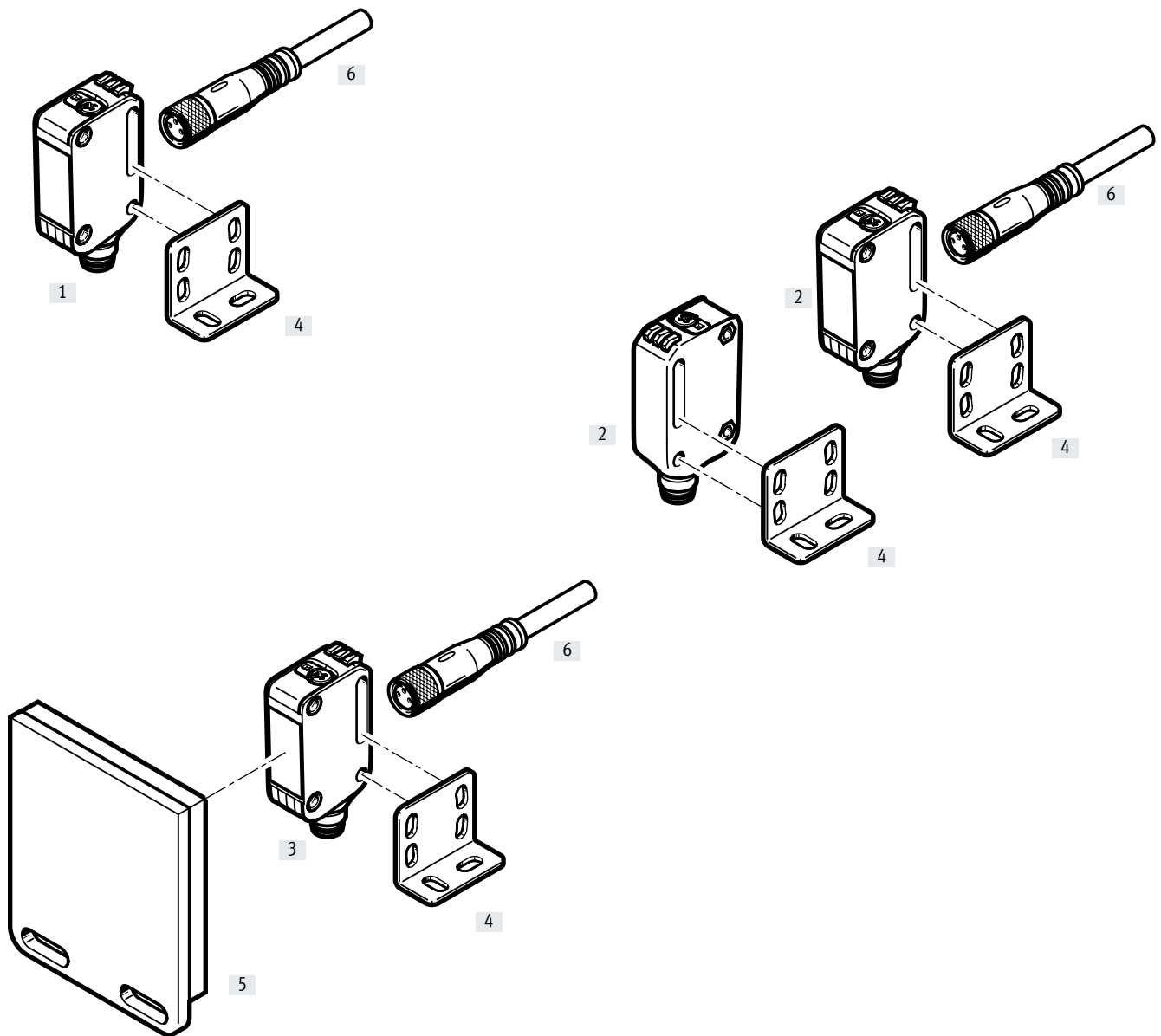
Peripherals overview



Accessories	Brief description	→ Page/Internet
[1] S00D-BS-...	Laser diffuse sensor with background suppression	12
[2] S00D-TB-...	Through-beam sensor	18
[3] S00D-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

<b>001</b>	Series	
<b>S00D</b>	Optoelectronic sensor	

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

<b>003</b>	Type of light	
<b>L</b>	Laser red	
<b>R</b>	Red	

<b>004</b>	Electrical output 1	
<b>PN</b>	PNP/NPN	

<b>005</b>	Working range	
<b>30</b>	30 mm	
<b>50</b>	50 mm	
<b>80</b>	80 mm	
<b>1000</b>	1000 mm	
<b>2000</b>	2000 mm	
<b>10000</b>	10000 mm	

## Type codes

001	Series
<b>SOOE</b>	Optoelectronic sensor

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

003	Type of light
<b>L</b>	Laser red
<b>R</b>	Red

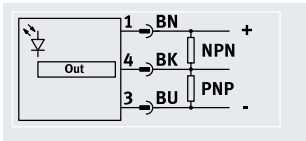
004	Electrical output 1
<b>PNLK</b>	PNP/NPN/IO-Link

005	Setting options
<b>T</b>	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		

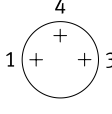
  

Switching output	SOOD-BS-R-PN-30	SOOD-BS-R-PN-50	SOOD-BS-R-PN-80
Switching output	Push-pull		
Switching element function	PNP, light switching NPN, dark switching		
Hysteresis [mm]	0.3	0.5	2.4
Max. switching frequency [Hz]	800		
Max. output current [mA]	50		
Voltage drop [V]	0 ... 1.5		

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	
<b>Electrical connection 1</b>	
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)
<b>Mechanics</b>	
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)
<b>Display/operation</b>	
Ready status indication	Green LED
Switching status indication	Yellow LED
<b>Immission/emission</b>	
Degree of protection	IP65, IP67
Laser safety class	-
Insulation voltage	[V] 500
Surge resistance	[kV] 1
Pollution degree	3
Corrosion resistance class CRC <sup>1)</sup>	1

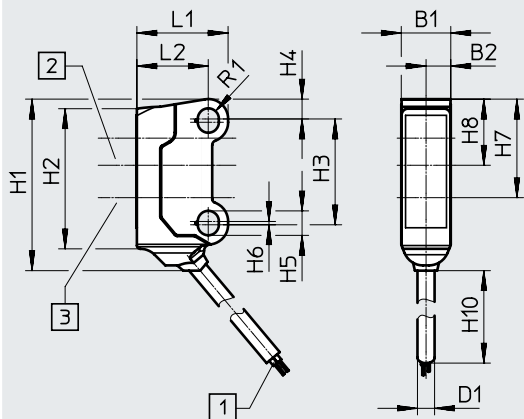
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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](http://www.festo.com)



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

Type	B1	B2	D1 ∅	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								

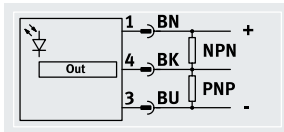
Type	H6	H7	H8	H10	L1	L2	R1
SOOD-BS-R-PN-30	0.5	14.9	10	150 (+20)	13.8	10.8	1.6
SOOD-BS-R-PN-50			10				
SOOD-BS-R-PN-80			5.9				

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

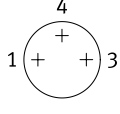
Input signal/measuring element	SOOD-BS-L-PN-30	SOOD-BS-L-PN-50	SOOD-BS-L-PN-80
Measuring principle	Optoelectronic		
Detection method	Diffuse sensor with background suppression		
Type of light	Red laser		
Max. light spot	1 mm at sensing range 30 mm	1.5 mm at sensing range 50 mm	2 mm at sensing range 80 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	
<b>Electrical connection 1</b>	
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)
<b>Mechanics</b>	
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)
<b>Display/operation</b>	
Ready status indication	Green LED
Switching status indication	Yellow LED
<b>Immission/emission</b>	
Degree of protection	IP65, IP67
Laser safety class	1
Insulation voltage [V]	500
Surge resistance [kV]	1
Pollution degree	3
Corrosion resistance class CRC <sup>1)</sup>	1

1) Corrosion resistance class CRC 1 to Festo standard FN 940070

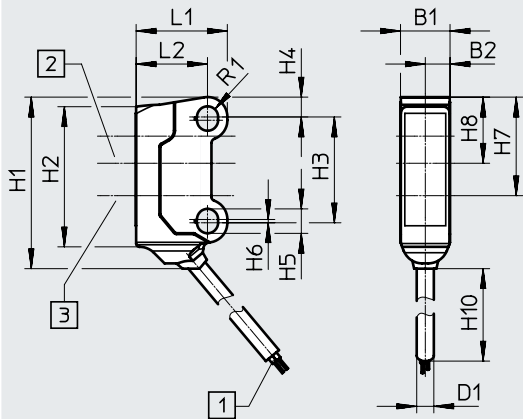
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).



Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)



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

Type	B1	B2	D1 ∅	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								

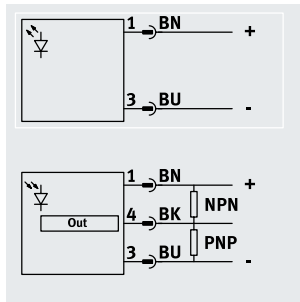
Type	H6	H7	H8	H10	L1	L2	R1
SOOD-BS-L-PN-30	0.5	14.9	10	150 (+20)	13.8	10.8	1.6
SOOD-BS-L-PN-50			10				
SOOD-BS-L-PN-80			5.9				

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

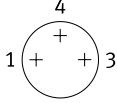
## Data sheet

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		
<b>Electrical connection 1</b>		
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)	
<b>Mechanics</b>		
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)	
<b>Display/operation</b>		
Ready status indication	Green LED	
Switching status indication	Yellow LED	
Function reserve indication	Flashing yellow LED	
<b>Immission/emission</b>		
	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 <sup>1)</sup>	1	

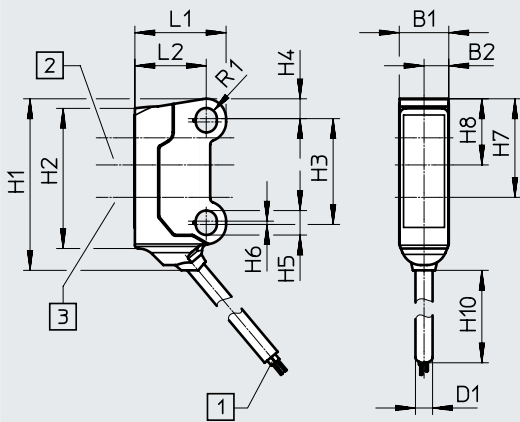
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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

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

Type	B1	B2	D1 ∅	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								

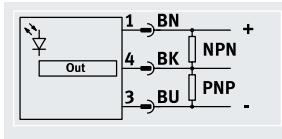
Type	H6	H7	H8	H10	L1	L2	R1
SOOD-TB-R-PN	0.5	14.9	10	150 (+20)	13.8	10.8	1.6
SOOD-TB-L-PN		10					

Ordering data

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

## Data sheet

Function  
SOOD-RS-...



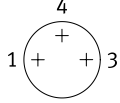
General technical data	
Design	Block design
Conforms to standard	EN 60947-5-2
Certification	RCM c UL us - Recognized (OL)
CE marking (see declaration of conformity)	To EU EMC Directive To EU RoHS Directive
UKCA marking (see declaration of conformity)	To UK instructions for EMC To UK RoHS instructions
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	
<b>Electrical connection 1</b>	
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)
<b>Mechanics</b>	
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)
<b>Display/operation</b>	
Ready status indication	Green LED
Switching status indication	Yellow LED
Function reserve indication	Flashing yellow LED
<b>Immission/emission</b>	S00D-RS-R-PN   S00D-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 <sup>1)</sup>	1

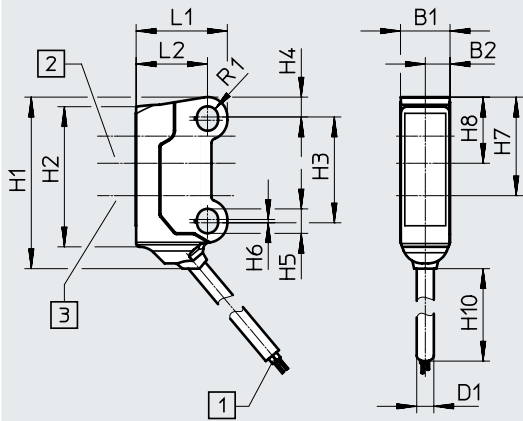
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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

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

Type	B1	B2	D1 ∅	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

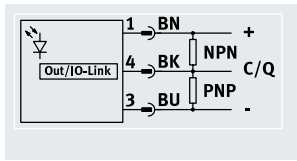
		Part no.	Type
	Retro-reflective sensor	8075657	SOOD-RS-R-PN
	Laser retro-reflective sensor	8075662	SOOD-RS-L-PN

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-PNLKT	SOOE-BS-L-PNLKT
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-PNLKT	SOOE-BS-L-PNLKT
Max. black/white difference [%]	15	45
Reference material	Standard white 90%, 100x100 mm	

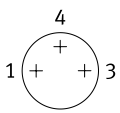
Switching output	SOOE-BS-R-PNLKT	SOOE-BS-L-PNLKT
Switching output	Push-pull	
Switching element function	Switchable PNP light switching NPN, dark switching	
Hysteresis [mm]	21	18
Max. switching frequency [Hz]	500	1650
Max. output current [mA]	100	
Voltage drop [V]	0 ... 1.5	



## 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-PNLKT	SOOE-BS-L-PNLKT
Setting options	Teach-in	
	Potentiometer	
	IO-Link	
Setting range, lower limit	[mm]	25
Setting range, upper limit	[mm]	300
Ready status indication	Green LED	
Switching status indication	Yellow LED	
Immission/emission		
	SOOE-BS-R-PNLKT	SOOE-BS-L-PNLKT
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 <sup>1)</sup>	1	

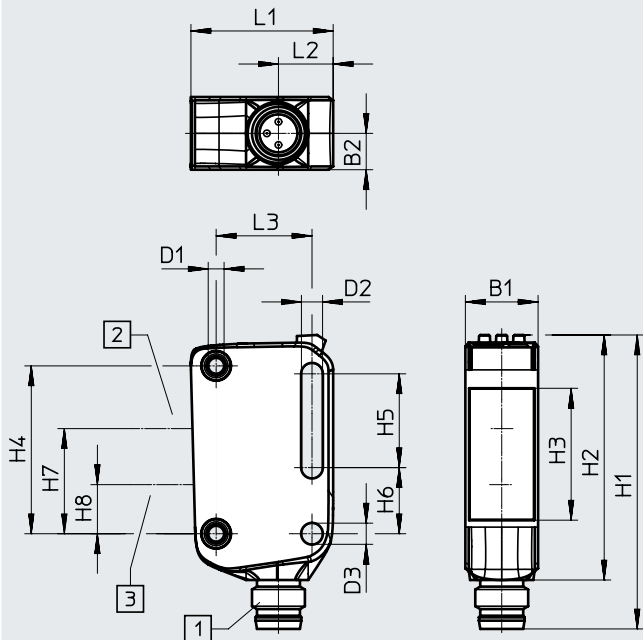
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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

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

Type	B1	B2	D1	D2	D3 ∅	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								

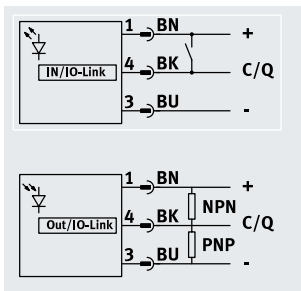
Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-BS-R-PNLK-T	25.4	14.2	10	15.9	7.4	21.5	8.3	14.5
SOOE-BS-L-PNLK-T								

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-...



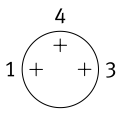
### General technical data

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-PNLKT	SOOE-TB-L-PNLKT
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-PNLKT	SOOE-TB-L-PNLKT
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-PNLKT	SOOE-TB-L-PNLKT
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 <sup>1)</sup>	1	

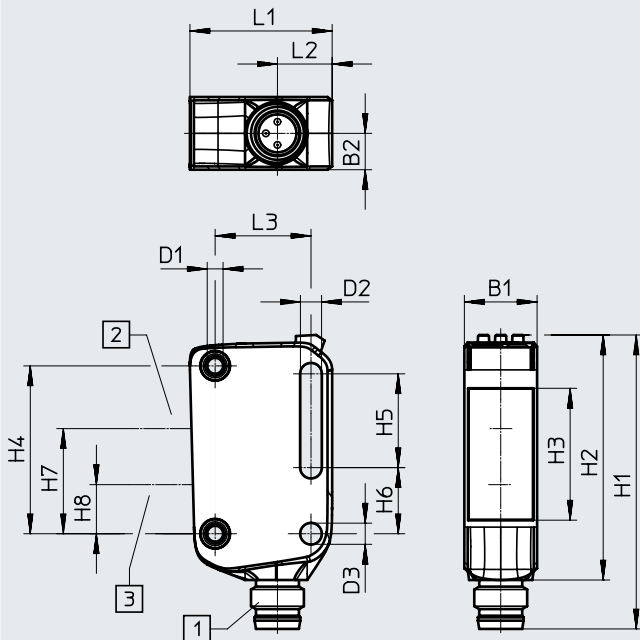
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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

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


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

Type	B1	B2	D1	D2	D3 ∅	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								

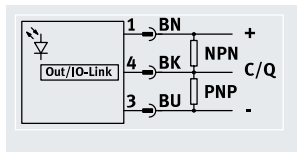
Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-TB-R-PNLK-T	25.4	14.2	10	7.4	7.4	21.5	8.3	14.5
SOOE-TB-L-PNLK-T								

Ordering data

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

## 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

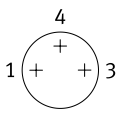
Input signal/measuring element	SOOE-RS-R-PNLKT	SOOE-RS-L-PNLKT
Measuring principle	Optoelectronic	
Detection method	Retro-reflective sensor	
Type of light	Red LED	Red laser
Max. light spot	60 mm at 1000 mm	30 mm at 12000 mm
Working range [mm]	0 ... 6500	0 ... 12000
Reference material	Reference reflector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

Switching output	SOOE-RS-R-PNLKT	SOOE-RS-L-PNLKT
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	-	
Insulation voltage	[V]	500
Surge resistance	[kV]	1
Pollution degree	3	
Corrosion resistance class CRC <sup>1)</sup>	1	

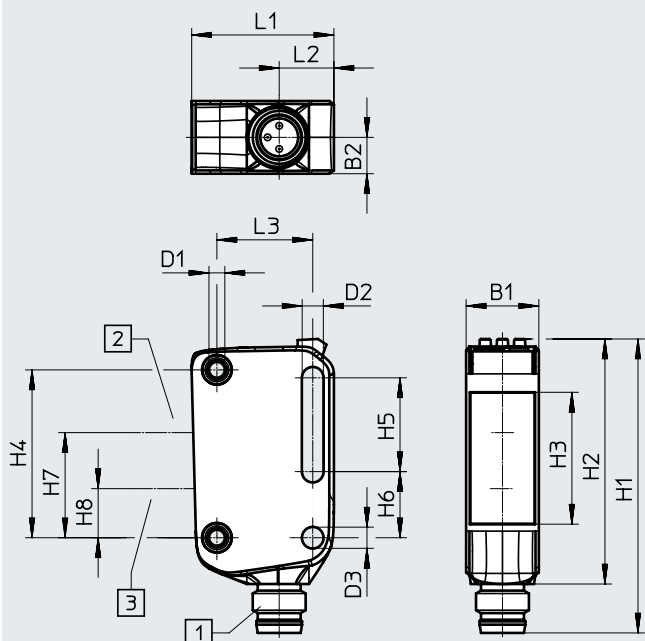
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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

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- [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

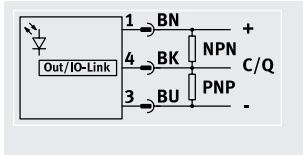
		Part no.	Type
	Retro-reflective sensor	8075666	SOOE-RS-R-PNLK-T
	Laser retro-reflective sensor	8075672	SOOE-RS-L-PNLK-T

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

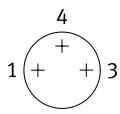
## Switching output

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 <sup>1)</sup>	1	

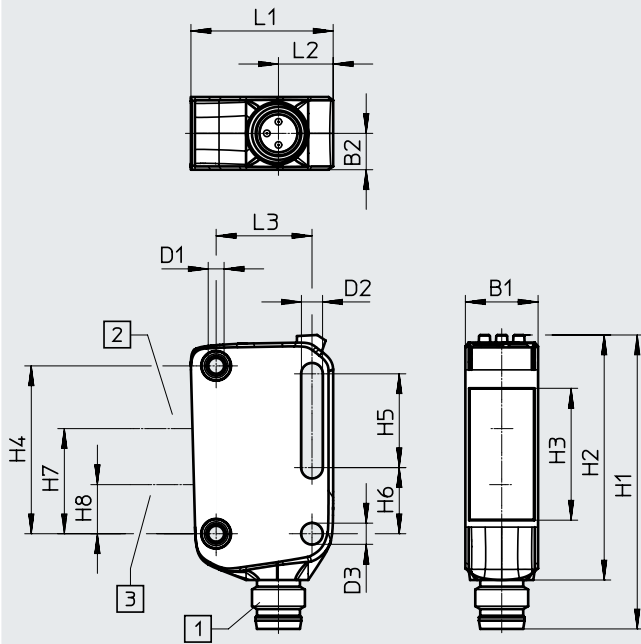
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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

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

Type	B1	B2	D1	D2	D3 ∅	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

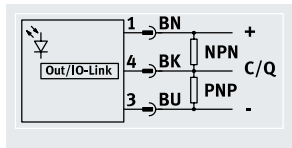
Ordering data

		Part no.	Type
	Retro-reflective sensor for transparent objects	<b>8075667</b>	<b>SOOE-RG-R-PNLK-T</b>

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

## 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

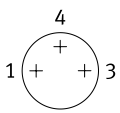
Signal processing	
Max. black/white difference [%]	15
Reference material	Standard white 90%, 100x100 mm

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 <sup>1)</sup>		1

1) Corrosion resistance class CRC 1 to Festo standard FN 940070

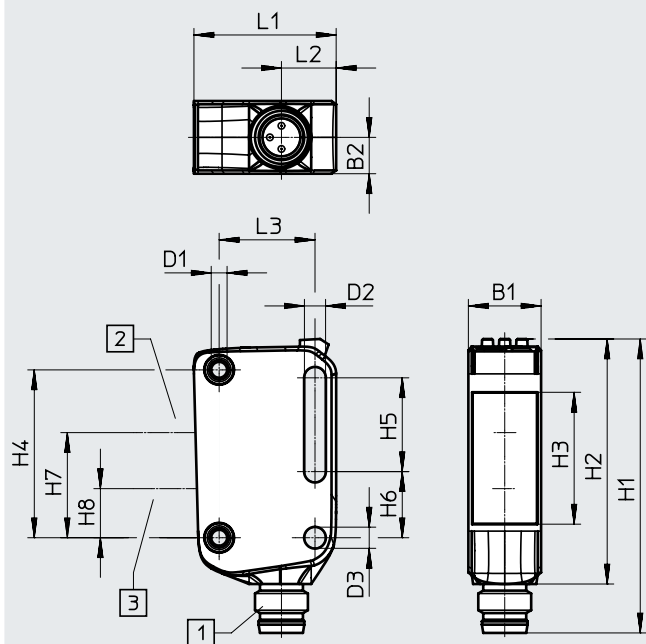
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).



Data sheet

Dimensions

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

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

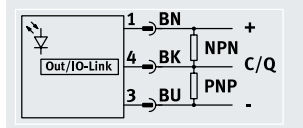
Type	H4	H5	H6	H7	H8	L1	L2	L3
SOOE-DS-R-PNLK-T	25.4	14.2	10	15.9	7.4	21.5	8.3	14.5

Ordering data

		Part no.	Type
	Diffuse sensor	<b>8075663</b>	<b>SOOE-DS-R-PNLK-T</b>

## 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

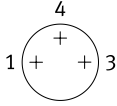
### Signal processing

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

<b>Mechanics</b>	
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
<b>Display/operation</b>	
Setting options	Teach-in
	Potentiometer
	IO-Link
Ready status indication	Green LED
Switching status indication	Yellow LED
<b>Immission/emission</b>	
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 <sup>1)</sup>	1

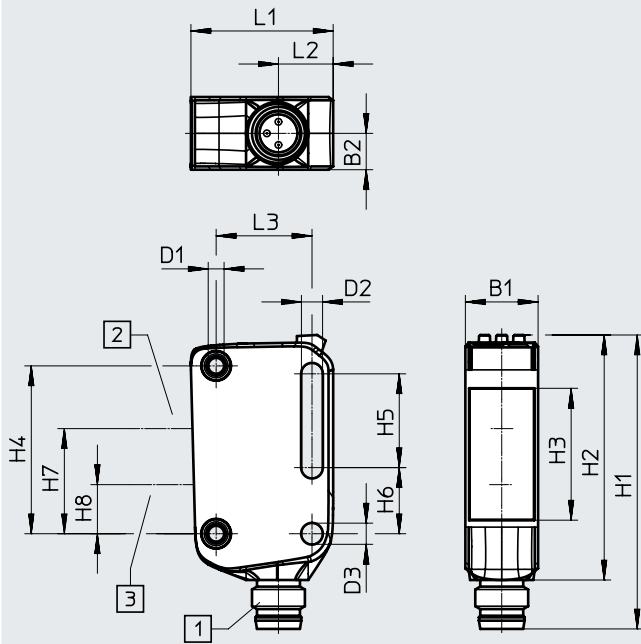
1) Corrosion resistance class CRC 1 to Festo standard FN 940070

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

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

Type	B1	B2	D1	D2	D3 ∅	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	<b>8075669</b>	<b>SOOE-KS-L-PNLK-T</b>

## Data sheet

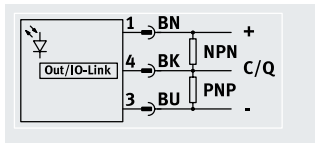
Function  
SOOE-MS-...

The distance measured value  
is transmitted via



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	

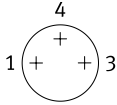
Signal processing	SOOE-MS-R-PNLK-T	SOOE-MS-L-PNLK-T
Reference material	Standard white 90%, 100x100 mm	
Path resolution [mm]	0.1	
Repetition accuracy [mm]	0.5	
Temperature coefficient [%/K]	0.03	

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 <sup>1)</sup>	1	

1) Corrosion resistance class CRC 1 to Festo standard FN 940070

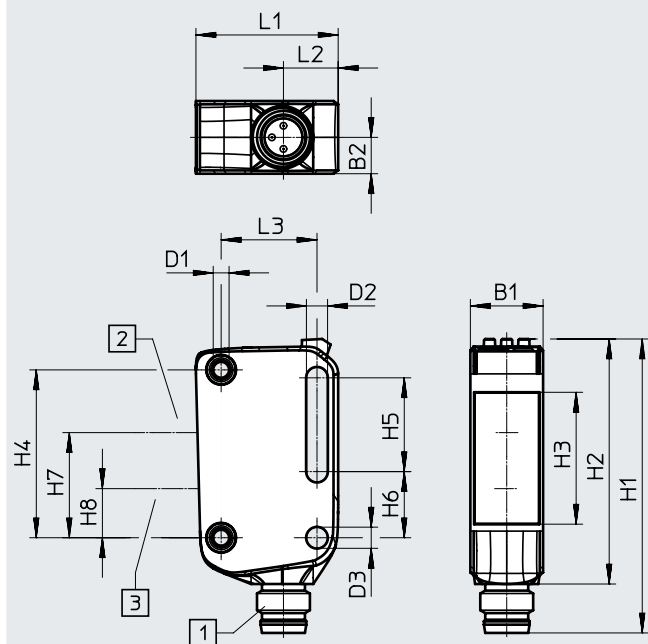
Low corrosion stress. Dry indoor application or transport and storage protection. Also applies to parts behind covers, in the non-visible interior area, and parts which are covered in the application (e.g. drive trunnions).



Data sheet

Dimensions

Download CAD data → [www.festo.com](http://www.festo.com)




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

Type	B1	B2	D1	D2	D3 ∅	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 S00D

Size: 22 x 31 x 17 mm

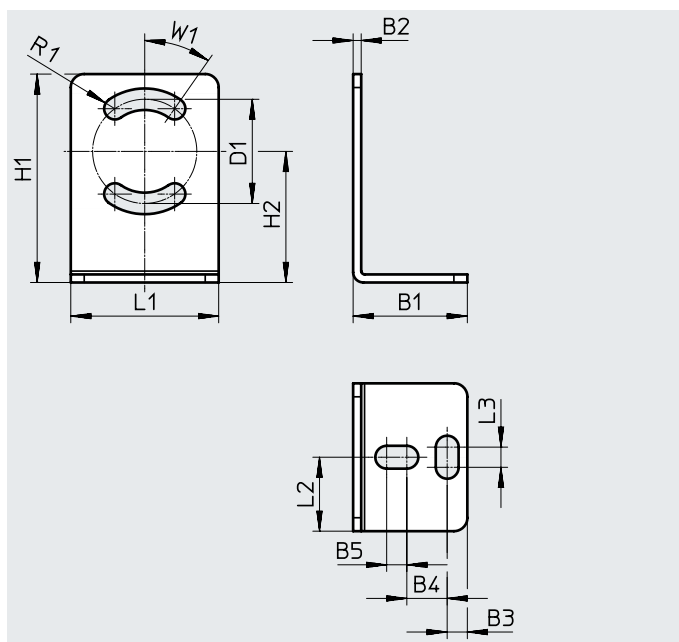
Material: High-alloy stainless steel

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 ∅	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 <sup>1)</sup>	Weight [g]	Part no.	Type
SAMH-L2-L-A	11	3	1.6	35°	2	15	<b>8077963</b>	<b>SAMH-L2-L-A</b>

1) Corrosion resistance class CRC 2 to Festo standard FN 940070

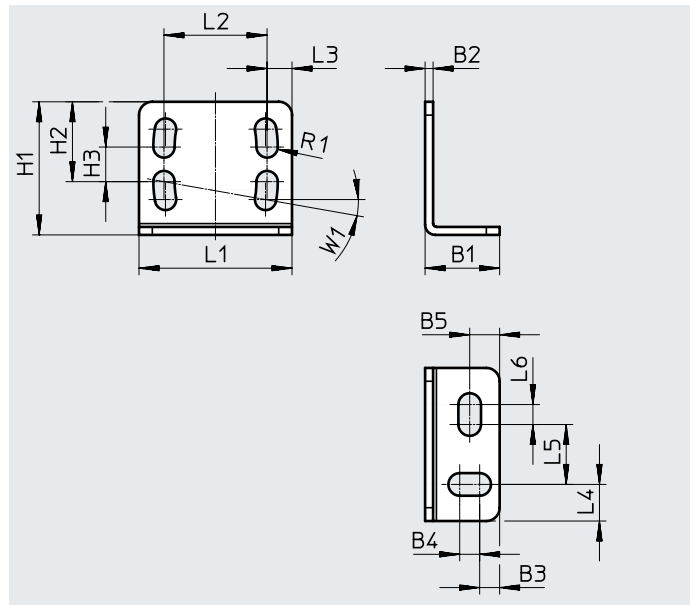
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

## Accessories – Ordering data

### Mounting bracket SAMH-L2-A

Mounting components for  
sensors S00D  
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 <sup>1)</sup>	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

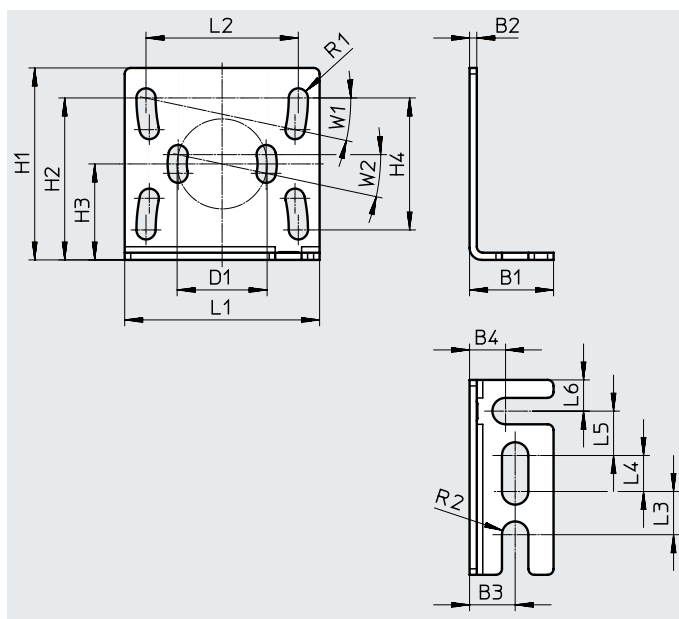
### Mounting bracket SAMH-L3-A

Mounting components for  
sensors S00E

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 ∅	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 <sup>1)</sup>	Weight [g]	Part no.	Type
SAMH-L3-A	6	7.4	5.2	1.6	2.2	12°	12°	2	11	<b>8077965</b>	<b>SAMH-L3-A</b>

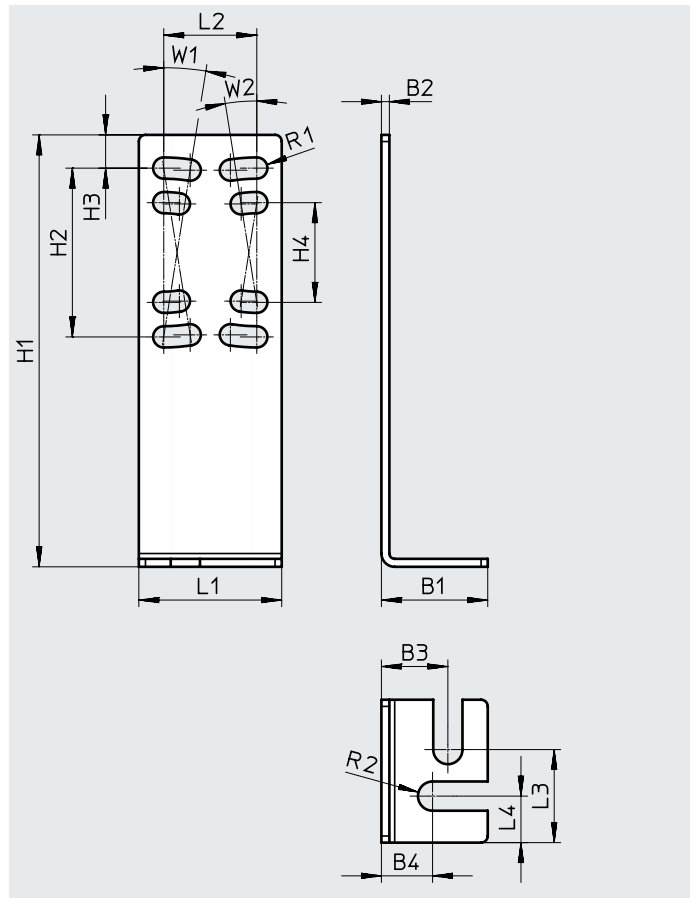
1) Corrosion resistance class CRC 2 to Festo standard FN 940070

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 S00E  
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 <sup>1)</sup>	Weight [g]	Part no.	Type
SAMH-L3-L-A	14	7	1.6	2.2	9°	9°	2	14	<b>8077966</b>	<b>SAMH-L3-L-A</b>

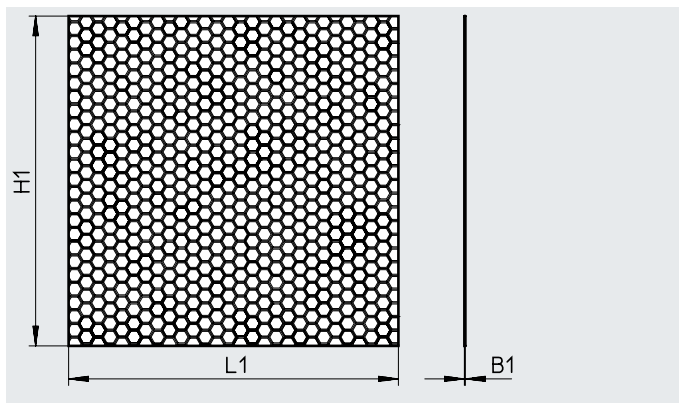
1) Corrosion resistance class CRC 2 to Festo standard FN 940070  
Moderate corrosion stress. Indoor applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment.

## 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.

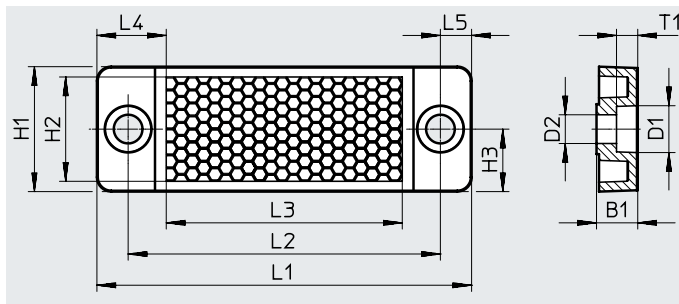


Dimensions and ordering data								
Type	B1	H1	L1	Structural width of reflector	Ambient temperature	Weight [g]	Part no.	Type
SARA-RF-Q100-S	0.3	100	100	Standard	-40 ... 80°C	4.4	8084162	SARA-RF-Q100-S
SARA-RF-Q100-MC				Micro	-40 ... 70°C	5.6	8084163	SARA-RF-Q100-MC

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

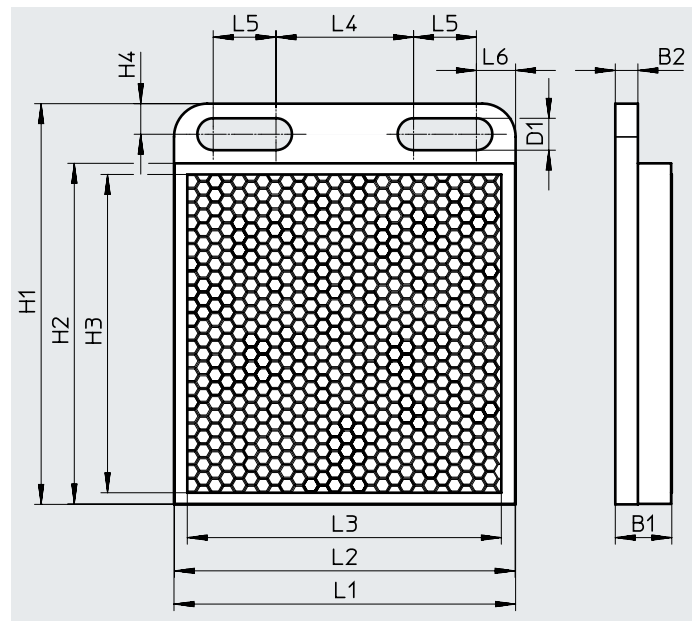
Type	L4	L5	T1	Structural width of reflector	Ambient temperature	Weight [g]	Part no.	Type
SARA-R-Q20-S	11.1	5	3.4	Standard	-40 ... 65°C	5.4	8084164	SARA-R-Q20-S
SARA-R-Q20-MC				Micro		5.95	8084165	SARA-R-Q20-MC

## 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

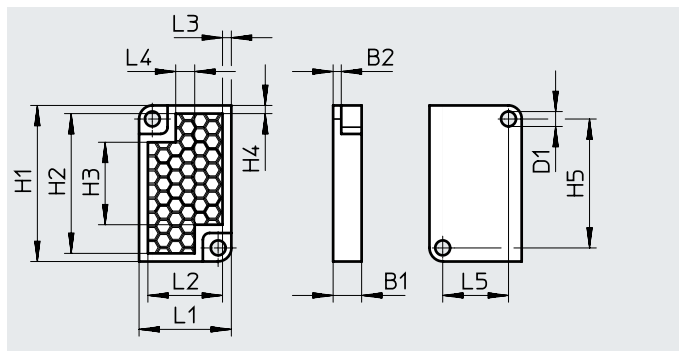
#### SARA-R-Q14-M

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 ∅	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

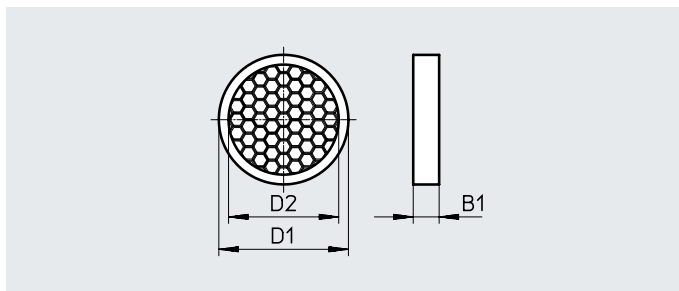
#### SARA-R-D20-M

Type of mounting: Glued

Housing material: PMMA

RoHS-compliant



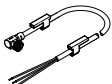
Reflector SARA-R-D20-M is suitable for laser sensors.



Dimensions and ordering data									
Type	B1 ±0.3	D1 ∅	D2 ∅	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
<b>Straight socket</b>				
	3	2.5	541333	NEBU-M8G3-K-2.5-LE3
		5	541334	NEBU-M8G3-K-5-LE3
<b>Angled socket</b>				
	3	2.5	541338	NEBU-M8W3-K-2.5-LE3
		5	541341	NEBU-M8W3-K-5-LE3
<b>Rotatable socket</b>				
	3	2.5	8001660	NEBU-M8R3-K-2.5-LE3
		5	8001661	NEBU-M8R3-K-5-LE3