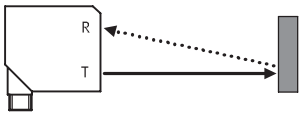
Opto-electronic sensors

Opto-electronic sensors

Key features

Detection method

Diffuse sensor
SOEG-RT, energetic

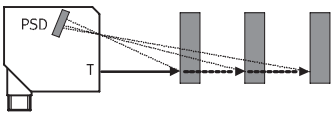


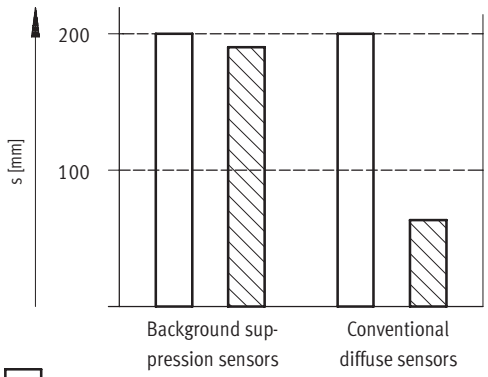
With these sensors, which are sometimes referred to as energetic sensors, the transmitter and the receiver are located in the same housing. The light beam transmitted is reflected directly onto the receiver by the object. The intensity of the reflected light is then evaluated. The operating distance can be adjusted by changing the sensitivity of the receiver (using a potentiometer or the teach-in method). Diffuse sensors are one of the most cost-effective solutions and can be installed in a very short time. 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 (with respect to material or colour) are detected at different distances because of the different reflective properties.

Benefits of diffuse sensors (energetic)

- Longer operating distance
- More cost-effective
- Greater reliability in the detection of slightly reflective objects

SOEG-RTH with background suppression





The operating distance is not adjusted according to the sensitivity of the receiver, but instead by means of optical triangulation, mechanical modification of the lens and receiver angle (size Q50) or electronically using PSD (Position-Sensitive Detector) elements. Object detection is therefore virtually independent of other objects in the background as well as colour, size or surface finish. Only a very small diffuse reflection is required for these devices. They are therefore not suitable for objects with shiny or slightly reflective surfaces.

Benefits of diffuse sensors with background suppression

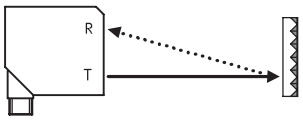
- Operating distance practically independent of colour and surface finish
- Can also be used with a shiny or reflective background
- Detection of small differences in distance
- Easy adjustment

Retro-reflective sensors

With these sensors the transmitter and the receiver are located in the same housing. The light transmitted is thrown back to the receiver by means of a reflector. An object located between the sensor and the reflector breaks 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 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 using a lens. The reflected light is transmitted back to the sensor via a second lens. The switching point can vary slightly depending on the distance.

The following sensors are retro-reflective sensors with two lenses:
SOEG-RSP-M12/M18/M18W,
SOEG-RSP-Q20/Q30 and
SOEL-RSP-Q20 (laser).

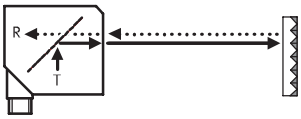
Benefits of retro-reflective sensors with two lenses

- Cost-effective

Opto-electronic sensors

Key features

Retro-reflective sensors with autocollimation

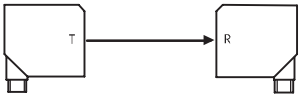


With the principle of autocollimation, the optical axes of the send channel and the receive channel are identical. This is possible, since the light from one channel is deflected using a semi-transparent mirror. This principle allows very short distances between the sensor and the reflector to be chosen. Retro-reflective sensors with autocollimation are ideally suited to transparent materials.
The following sensors are retro-reflective sensors with autocollimation:
SOEG-RSP-Q50,
SOEL-RSP-Q50 (laser) and
SOEG-RSG-Q20 (for transparent objects)

Benefits of retro-reflective sensors with autocollimation

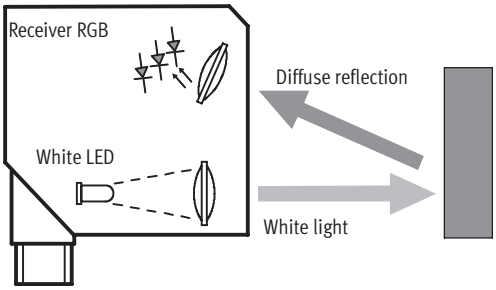
- No blind zone
- High precision across the entire sensing range
- Radially symmetrical sensing range
- Good repeatability
- Low hysteresis
- Detection of transparent objects (SOEG-RSG-Q20)

Through-beam sensors SOEG-S/E



The transmitter and receiver are located in different housings, and must be installed opposite one another. Each object that breaks 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 lies in the fact that two separate components (transmitter and receiver) have to be wired.
Some transmitters for through-beam sensors have a test input. This can be used to switch the light on and off. The through-beam sensor can therefore be checked on the receiver side at regular intervals to ensure that it is functioning correctly.

Colour sensor



The operational principle of the colour sensor SOEC-RT is based on the use of just one light source. The LED transmits visible white light. Objects can be detected over a long distance irrespective of their size. The colour to be detected is simply set in the teach-in procedure. The sensor is then ready for operation immediately. It compares the object to be scanned with the learned reference colour and if they match it sets one of the three available switch outputs. With five adjustable tolerance values, the colour sensor can be optimally adapted to the colour to be scanned and to deviations from this colour. The sensor also supports sensing of an entire colour range. This is a very flexible method, which offers advantages in the case of irregular colour structures in imprints and paint finishes in particular.

Distance sensors

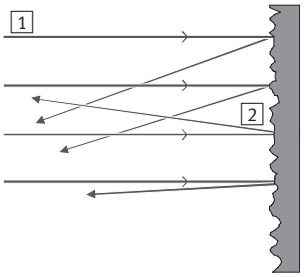
Like light sensors with background suppression, which use Position-Sensitive Detectors (PSD), these sensors transmit light to the object, evaluate the diffuse reflection detected by the sensor and thus calculate the distance. At the analogue output there is a signal that is proportional to the distance between the object and the sensor.

Mounting

Opto-electronic sensors must not be allowed to interfere with each other during operation. A certain minimum distance must thus be maintained between the devices. This distance depends primarily on the level of sensitivity set for the sensors. For sensors equipped with fibre-optic cables, the distance basically depends on the type of fibre-optic cable used. It is therefore not possible to define general values in this case.

Types of reflection

Diffuse reflection

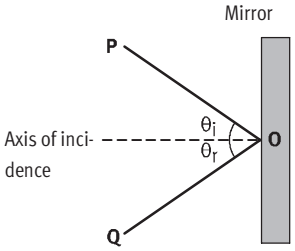


Diffuse reflection is the reflection of light from an uneven or grained surface when an incident beam is reflected in many different directions.

This type of reflection is in contrast to specular reflection (total reflection). If a surface is absolutely non-specular, the reflected light is distributed evenly over a hemispherical surface.

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

Specular reflection (total reflection)

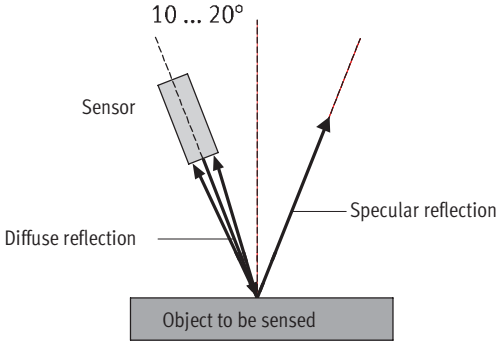


Specular reflection is the perfect reflection of light (or other kinds of wave) from a surface, in which incident light from a single direction is reflected in a single direction. Such behaviour is described by the law of reflection. According to the law of reflection, the direction of the reflected light and the direction of the incident light make 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. In contrast, 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 types of reflection important when using opto-electronic sensors?



In the case of diffuse sensors (energetic), sensors with background suppression and distance and colour sensors, sensing is based on diffuse reflection. These sensors therefore require diffuse reflection to the greatest possible extent. Total reflection makes sensing difficult and must therefore be avoided.

The type of reflection has no relevance in the case of retro-reflective sensors and through-beam sensors. In these cases the object only has to break the light beam. With retro-reflective sensors, polarising filters are used to achieve perfect differentiation between the reflection from the object as opposed to the reflector.

- Note

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

Opto-electronic sensors

Key features

Glossary

Ambient light limit

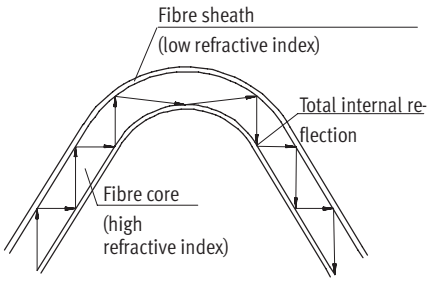
Ambient light is the luminous radiation generated by external light sources. The illumination intensity is measured on the receiver. Use of modulated light makes the devices insensitive to ambient light. There is, however, an upper limit to the permitted intensity of external luminous radiation. This limit is also referred to as the ambient light limit. It is specified in the technical data for sunlight (unmodulated light) and for halogen lamps (with double the mains frequency for modulated light). If the illumination intensity is above the respective ambient 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 advantages:

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

Fibre-optic cable



A fibre-optic cable can consist of a bundle of glass fibres, or one or more polymer fibres. It is used to conduct light from one place to another, even around bends and curves. This is made possible via the phenomenon of total internal reflection. Total internal reflection occurs whenever light from a material with a high refractive index impinges on the boundary between this material and a medium with a lower refractive index at an angle less than the maximum angle for total internal reflection.

Laser

The laser components currently offered by Festo comply with laser protection class 1 or 2 according to EN 60825-1/94

Laser protection class 1
Devices of laser protection class 1 are safe due to their low radiation level; these devices cannot pose a threat to human life.
Protective eyewear is not required when using these devices; use of optical instruments for direct observation of the laser beam is also harmless.
For devices of laser protection class 1 there is no obligation for identification provided the key laser data is included in the operating instructions.

Laser protection class 2
Maximum radiant energy 1 mW (cw).
(cw = continuous wave)

- Beam only in the visible spectral range
- Due to the high light intensity, the eye is protected by what is termed the lid shutting reflex (≤ 0.25 s)
- Suitable laser warnings must be attached to the device
- No protective measures required (cover, encapsulation, etc.)
- Class 2 lasers are completely harmless to use. No safety precautions are therefore required for devices of laser protection class 2.
- The presence of a laser protection officer is not required during use.

Operating distance

The operating distance is the maximum possible distance between: The transmitter and receiver (through-beam sensor), device and reflector (retro-reflective sensor) or device and object (diffuse sensor and sensor with background suppression). To obtain this maximum, a suitable setting must be made using a potentiometer or the teach-in procedure.
In the case of retro-reflective sensors the specified reflector must be used.
Unless otherwise specified in the technical data, the operating distance for diffuse sensors is determined using white paper (degree of reflection 90%) with the format 200 x 200 mm.

With diffuse sensors, the compensation factors listed below apply to objects that differ from the standard object.

- Test card: 100%
- White paper: 80%
- Grey PVC: 57%
- Newsprint: 60%
- Light wood: 73%
- Cork: 65 %
- White plastic: 70%
- Black plastic: 22%
- Black neoprene: 20%
- Car tyres: 15%
- Raw aluminium: 200%
- Black anodised aluminium: 150%
- Matt (brushed) aluminium: 120%
- Polished stainless steel: 230%

Opto-electronic sensors

Key features

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 may change in this case. 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.

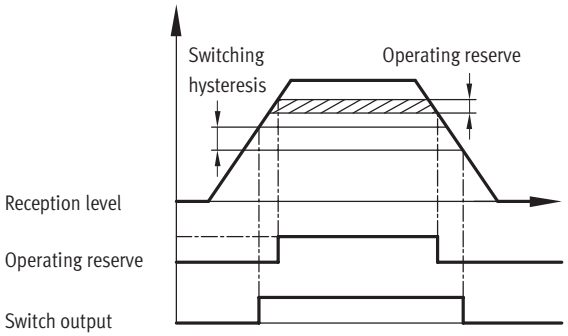
Magnetic fields

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

Temperature influence

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

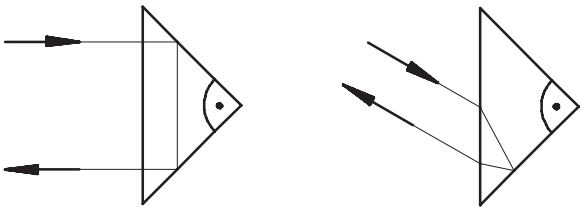
Operational reserve display



The indicating circuit for the operating reserve detects the excess radiant energy which falls on the receiver. 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.

Some devices are therefore equipped with a second LED, which indicates if less than approx. 80% of the available operating distance is used. In other devices, the yellow LED flashes when the available operating reserve is insufficient. With Q50 sensors, insufficient operating reserve is indicated by means of a red LED. 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 which 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 given by the required operating distance and the available mounting facilities. The reflector should be installed perpendicular to the optical axis (tolerance ±15°).

Sensors SOE..., opto-electronic

Product overview

- Diffuse sensors and retro-reflective sensors
- Sensors with background suppression
- Fibre-optic units
- Distance sensors
- Laser contrast sensors, diffuse sensors and retro-reflective sensors
- Colour sensors
- Ranges up to 20 m
- Adjustment using teach-in or potentiometer

Detailed product information
➔ www.festo.com/catalogue/soe

Product overview

Variant	Type	Operating voltage	Switch output	Analogue output	Design	➔ Page
Diffuse sensor	SOEG-RT Basic version	10 ... 36 V DC 10 ... 30 V DC	PNP NPN	–	Round Block-shaped	139
	SOEG-RTZ With cylindrical light beam		PNP NPN	–	Round	141
Sensor with back-ground suppression	SOEG-RTH	10 ... 36 V DC 10 ... 30 V DC	PNP NPN	–	Round Block-shaped	142
Retro-reflective sensor	SOEG-RSP Basic version	10 ... 36 V DC 10 ... 30 V DC	PNP NPN	–	Round Block-shaped	144
	SOEG-RSG For transparent objects		PNP NPN	–	Block-shaped	146
Through-beam sensor	SOEG-S Transmitter	10 ... 36 V DC 10 ... 30 V DC	–	–	Round Block-shaped	147
	SOEG-E Receiver	10 ... 36 V DC 10 ... 30 V DC	PNP NPN	–	Round Block-shaped	147
Fibre-optic unit	SOEG-L Basic version	10 ... 30 V DC	PNP NPN	–	Block-shaped	149
Distance sensor	SOEG-RTD	15 ... 30 V DC	PNP	0 ... 10 V	Block-shaped	150
Laser diffuse sensor	SOEL-RT Contrast sensor	10 ... 30 V DC	PNP NPN	–	Block-shaped	151
Laser sensor with back-ground suppression	SOEL-RTH		PNP NPN	–	Block-shaped	151
Laser retro-reflective sensor	SOEL-RSP	10 ... 30 V DC	PNP NPN	–	Block-shaped	152
Laser distance sensor	SOEL-RTD	16 ... 30 V DC	2x PNP	4 ... 20 mA	Block-shaped	153
Colour sensor	SOEC-RT	10 ... 30 V DC	3x PNP	–	Block-shaped	154

Sensors SOE..., opto-electronic

Type codes

SOE	G	–	RSP	–	Q20	–	PP	–	K	–	2L	–	TI

Type	
SOE	Opto-electronic sensors

Design	
G	Standard sensor
L	Laser sensor
C	Colour sensor

Function	
RT	Diffuse sensor
RSP	Retro-reflective sensor
S	Through-beam sensor, transmitter
E	Through-beam sensor, receiver
L	Fibre-optic unit
RTH	Sensor with background suppression
RTZ	Diffuse sensor with cylindrical light beam
RTD	Distance sensor
RSG	Retro-reflective sensor for transparent objects

Design, size, version	
4	Round, dia. 4 mm
M5	Round, M5
M12	Round, M12
M18	Round, M18, beam exit straight
M18W	Round, M18, beam exit angled
Q20	Block design, 20x32x12 mm
Q30	Block design, 30x30x15 mm
Q50	Block design, 50x50x17 mm

Switch output	
PS	PNP, normally open
NS	NPN, normally open
PA	PNP, antivalent
NA	NPN, antivalent
PP	PNP, switchable
NP	NPN, switchable
PU	Analogue 0 ... 10 V

Electrical connection	
K	Cable
S	Plug

Indication	
L	1 LED
2L	2 LEDs
3L	3 LEDs
7L	7 LEDs

Options	
	Standard version
TI	Teach-in by means of a button and via electrical connection

Diffuse sensors SOEG-RT

Technical data

FESTO

General technical data								
Size		∅ 4 mm	M5	M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm
Working range	[mm]	50		70 ... 300	40 ... 600	0 ... 600	10 ... 300	0 ... 600
Light type		Infrared		Red			Red	Infrared
Setting options		–		Potentiometer			Teach-in Teach-in via electrical connection	Potentiometer

Electrical data								
Size		∅ 4 mm	M5	M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm
Electrical connection	Cable	3-wire			4-wire	3-wire	4-wire	3-wire
	Plug	M8x1, 3-pin		M12x1, 3-pin	M12x1, 4-pin	M12x1, 3-pin	M8x1, 4-pin	M8x1, 3-pin
Operating voltage range	[V DC]	10 ... 30		10 ... 36			10 ... 30	
Max. output current	[mA]	100		200			100	200
Max. switching frequency	[Hz]	250		1,000			1,000	
Protection against short circuit		Pulsed						
Protection against polarity reversal		For all electrical connections						
Protection class		IP67		IP65, IP67			IP67	IP65

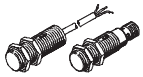
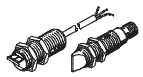
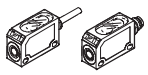
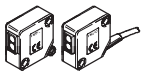
Materials								
Size		∅ 4 mm	M5	M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm
Housing		High-alloy stainless steel		Brass, chrome-plated			Acrylic butadiene styrene	Polybutylene terephthalate, reinforced
Cable sheath		Polyurethane						

Operating and environmental conditions								
Size		∅ 4 mm	M5	M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm
Ambient temperature	[°C]	0 ... 55		–25 ... +55			–20 ... +60	–25 ... +55
Ambient temperature with flexible cable installation	[°C]	0 ... 55		–5 ... +55			–5 ... +60	–5 ... +55
CE mark (see declaration of conformity)		In accordance with EU EMC directive						
Certification		C-Tick					c UL us - Listed (OL) C-Tick	C-Tick

Diffuse sensors SOEG-RT

Technical data

FESTO

Ordering data							
Size	Working range [mm]	Switching element function	Switch output	Electrical connection			
				Cable		Plug	
				Part No.	Type	Part No.	Type
∅ 4 mm							
	50	Light switching	PNP	**537 671**	**SOEG-RT-4-PS-K-L**	**537 673**	**SOEG-RT-4-PS-S-L**
			NPN	**537 674**	**SOEG-RT-4-NS-K-L**	**537 676**	**SOEG-RT-4-NS-S-L**
M5							
	50	Light switching	PNP	**537 677**	**SOEG-RT-M5-PS-K-L**	**537 679**	**SOEG-RT-M5-PS-S-L**
			NPN	**537 680**	**SOEG-RT-M5-NS-K-L**	**537 682**	**SOEG-RT-M5-NS-S-L**
M12							
	70 ... 300	Light switching	PNP	**547 908**	**SOEG-RT-M12-PS-K-2L**	**547 909**	**SOEG-RT-M12-PS-S-2L**
			NPN	**547 906**	**SOEG-RT-M12-NS-K-2L**	**547 907**	**SOEG-RT-M12-NS-S-2L**
M18, beam exit straight							
	40 ... 600	Antivalent	PNP	**547 912**	**SOEG-RT-M18-PA-K-2L**	**547 913**	**SOEG-RT-M18-PA-S-2L**
			NPN	**547 910**	**SOEG-RT-M18-NA-K-2L**	**547 911**	**SOEG-RT-M18-NA-S-2L**
M18, beam exit angled							
	0 ... 600	Light switching	PNP	**537 701**	**SOEG-RT-M18W-PS-K-2L**	**537 702**	**SOEG-RT-M18W-PS-S-2L**
			NPN	**537 717**	**SOEG-RT-M18W-NS-K-2L**	**537 718**	**SOEG-RT-M18W-NS-S-2L**
20x32x12 mm							
	10 ... 300	Switchable	PNP	**537 732**	**SOEG-RT-Q20-PP-K-2L-TI**	**537 731**	**SOEG-RT-Q20-PP-S-2L-TI**
			NPN	**537 734**	**SOEG-RT-Q20-NP-K-2L-TI**	**537 733**	**SOEG-RT-Q20-NP-S-2L-TI**
30x30x15 mm							
	0 ... 600	Light switching	PNP	**165 350**	**SOEG-RT-Q30-PS-K-2L**	**165 351**	**SOEG-RT-Q30-PS-S-2L**
			NPN	**165 348**	**SOEG-RT-Q30-NS-K-2L**	**165 349**	**SOEG-RT-Q30-NS-S-2L**

Diffuse sensors SOEG-RTZ, with cylindrical light beam

Technical data

General technical data			
Size		∅ 4 mm	M5
Working range	[mm]	10	
Light type		Infrared	
Setting options		–	

Electrical data			
Size		∅ 4 mm	M5
Electrical connection		Cable, 3-wire	
Operating voltage range	[V DC]	10 ... 30	
Max. output current	[mA]	100	
Max. switching frequency	[Hz]	250	
Protection against short circuit		Pulsed	
Protection against polarity reversal		For all electrical connections	
Protection class		IP67	

Materials		
Size	∅ 4 mm	M5
Housing	High-alloy stainless steel	
Cable sheath	Polyurethane	

Operating and environmental conditions			
Size		∅ 4 mm	M5
Ambient temperature	[°C]	0 ... 55	
Ambient temperature with flexible cable installation	[°C]	0 ... 55	
CE mark (see declaration of conformity)		In accordance with EU EMC directive	
Certification		C-Tick	

Ordering data

Size	Working range [mm]	Switching element function	Switch output	Electrical connection	
				Cable	
				Part No.	Type
∅ 4 mm					
	10	Light switching	PNP	**537 672**	**SOEG-RTZ-4-PS-K-L**
			NPN	**537 675**	**SOEG-RTZ-4-NS-K-L**
M5					
	10	Light switching	PNP	**537 678**	**SOEG-RTZ-M5-PS-K-L**
			NPN	**537 681**	**SOEG-RTZ-M5-NS-K-L**

Sensors SOEG-RTH, with background suppression

Technical data

FESTO

General technical data						
Size		M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Working range	[mm]	10 ... 120	10 ... 120	25 ... 100	15 ... 150	30 ... 300
Light type		Red				
Setting options		Potentiometer		Teach-in Teach-in via electrical connection	Potentiometer	Potentiometer

Electrical data						
Size		M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Electrical connection	Cable	3-wire		4-wire	3-wire	4-wire
	Plug	M12x1, 3-pin		M8x1, 4-pin	M12x1, 3-pin	M12x1, 4-pin
Operating voltage range	[V DC]	10 ... 36		10 ... 30	10 ... 36	10 ... 30
Max. output current	[mA]	200		100	200	
Max. switching frequency	[Hz]	500		1,000	500	1,000
Protection against short circuit		Pulsed				
Protection against polarity reversal		For all electrical connections				
Protection class		IP65, IP67		IP67	IP65	IP67

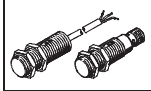
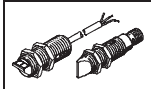
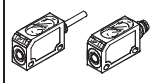
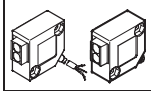
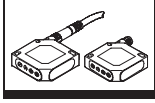
Materials					
Size	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Housing	Brass, chrome-plated		Acrylic butadiene styrene	Polybutylene terephthalate, reinforced	Acrylic butadiene styrene
Cable sheath	Polyurethane				

Operating and environmental conditions						
Size		M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Ambient temperature	[°C]	–25 ... +55		–20 ... +60	–25 ... +55	–20 ... +60
Ambient temperature with flexible cable installation	[°C]	–5 ... +55		–5 ... +60	–5 ... +55	–5 ... +60
CE mark (see declaration of conformity)		In accordance with EU EMC directive		In accordance with EU EMC directive In accordance with EU Low Voltage Directive	In accordance with EU EMC directive	In accordance with EU EMC directive In accordance with EU Low Voltage Directive
Certification		C-Tick		c UL us - Listed (OL) C-Tick	C-Tick	c UL us - Listed (OL) C-Tick

Sensors SOEG-RTH, with background suppression

Technical data

FESTO

Ordering data							
Size	Working range [mm]	Switching element function	Switch output	Electrical connection			
				Cable		Plug	
				Part No.	Type	Part No.	Type
M18, beam exit straight							
	10 ... 120	Antivalent	PNP	**537 687**	**SOEG-RTH-M18-PS-K-2L**	**537 689**	**SOEG-RTH-M18-PS-S-2L**
			NPN	**537 705**	**SOEG-RTH-M18-NS-K-2L**	**537 707**	**SOEG-RTH-M18-NS-S-2L**
M18, beam exit angled							
	10 ... 120	Light switching	PNP	**537 688**	**SOEG-RTH-M18W-PS-K-2L**	**537 690**	**SOEG-RTH-M18W-PS-S-2L**
			NPN	**537 706**	**SOEG-RTH-M18W-NS-K-2L**	**537 708**	**SOEG-RTH-M18W-NS-S-2L**
20x32x12 mm							
	25 ... 100	Switchable	PNP	**537 724**	**SOEG-RTH-Q20-PP-K-2L-TI**	**537 723**	**SOEG-RTH-Q20-PP-S-2L-TI**
			NPN	**537 726**	**SOEG-RTH-Q20-NP-K-2L-TI**	**537 725**	**SOEG-RTH-Q20-NP-S-2L-TI**
30x30x15 mm							
	15 ... 150	Light switching	PNP	**537 719**	**SOEG-RTH-Q30-PS-K-2L**	**537 720**	**SOEG-RTH-Q30-PS-S-2L**
			NPN	**537 721**	**SOEG-RTH-Q30-NS-K-2L**	**537 722**	**SOEG-RTH-Q30-NS-S-2L**
50x50x17 mm							
	30 ... 300	Light switching	PNP	**537 771**	**SOEG-RTH-Q50-PA-K-3L**	**537 773**	**SOEG-RTH-Q50-PA-S-3L**
			NPN	**537 772**	**SOEG-RTH-Q50-NA-K-3L**	**537 774**	**SOEG-RTH-Q50-NA-S-3L**

Retro-reflective sensors SOEG-RSP

Technical data

FESTO

General technical data							
Size		M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Working range	[mm]	1,500	2,000	2,000	0 ... 2,500	0 ... 2,000	0 ... 5,500
Light type		Red polarised					
Setting options		–			Teach-in Teach-in via electrical connection[1)]	Potentiometer	

1) Low-cost variants without the teach-in and programming functionality available

Electrical data							
Size		M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Electrical connection	Cable	3-wire			4-wire	3-wire	4-wire
	Plug	M12x1, 3-pin			M8x1, 4-pin	M8x1, 3-pin	M12x1, 4-pin
Operating voltage range	[V DC]	10 ... 36			10 ... 30		
Max. output current	[mA]	200			100	200	
Max. switching frequency	[Hz]	1,000					
Protection against short circuit		Pulsed					
Protection against polarity reversal		For all electrical connections					
Protection class		IP65, IP67			IP67	IP65	IP67

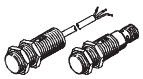
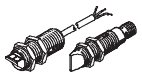
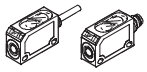
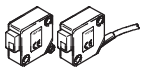
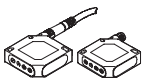
Materials						
Size	M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Housing	Brass, chrome-plated			Acrylic butadiene styrene	Polybutylene terephthalate, reinforced	Acrylic butadiene styrene
Cable sheath	Polyurethane					

Operating and environmental conditions							
Size		M12x1	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Ambient temperature	[°C]	–25 ... +55			–20 ... +60	–25 ... +55	–20 ... +60
Ambient temperature with flexible cable installation	[°C]	–5 ... +55			–5 ... +60	–5 ... +55	–5 ... +60
CE mark (see declaration of conformity)		In accordance with EU EMC directive			In accordance with EU EMC directive In accordance with EU Low Voltage Directive	In accordance with EU EMC directive	In accordance with EU EMC directive In accordance with EU Low Voltage Directive
Certification		C-Tick			c UL us - Listed (OL) C-Tick	C-Tick	c UL us - Listed (OL) C-Tick

Retro-reflective sensors SOEG-RSP

Technical data

FESTO

Ordering data							
Size	Working range [mm]	Switching element function	Switch output	Electrical connection			
				Cable		Plug	
				Part No.	Type	Part No.	Type
M12							
	1,500	Dark switching	PNP	537 683	SOEG-RSP-M12-PS-K-2L	537 684	SOEG-RSP-M12-PS-S-2L
			NPN	537 685	SOEG-RSP-M12-NS-K-2L	537 686	SOEG-RSP-M12-NS-S-2L
M18, beam exit straight							
	2,000	Dark switching	PNP	537 697	SOEG-RSP-M18-PS-K-2L	537 699	SOEG-RSP-M18-PS-S-2L
			NPN	537 713	SOEG-RSP-M18-NS-K-2L	537 715	SOEG-RSP-M18-NS-S-2L
M18, beam exit angled							
	2,000	Dark switching	PNP	537 698	SOEG-RSP-M18W-PS-K-2L	537 700	SOEG-RSP-M18W-PS-S-2L
			NPN	537 714	SOEG-RSP-M18W-NS-K-2L	537 716	SOEG-RSP-M18W-NS-S-2L
20x32x12 mm							
	2,500	Switchable	PNP	537 750	SOEG-RSP-Q20-PP-K-2L-TI	537 749	SOEG-RSP-Q20-PP-S-2L-TI
			NPN	537 752	SOEG-RSP-Q20-NP-K-2L-TI	537 751	SOEG-RSP-Q20-NP-S-2L-TI
	2,500	Switchable	PNP	537 784	SOEG-RSP-Q20-PS-S-2L[1)]	–	
30x30x15 mm							
	0 ... 2,000	Dark switching	PNP	165 330	SOEG-RSP-Q30-PS-K-2L	165 331	SOEG-RSP-Q30-PS-S-2L
			NPN	165 328	SOEG-RSP-Q30-NS-K-2L	165 329	SOEG-RSP-Q30-NS-S-2L
50x50x17 mm							
	0 ... 5,500	Antivalent	PNP	537 763	SOEG-RSP-Q50-PA-K-3L	537 765	SOEG-RSP-Q50-PA-S-3L
			NPN	537 764	SOEG-RSP-Q50-NA-K-3L	537 766	SOEG-RSP-Q50-NA-S-3L

1) Low-cost variants without the teach-in and programming functionality

Retro-reflective sensors SOEG-RSG, for transparent objects

Technical data

FESTO

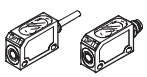
General technical data		
Size		20x32x12 mm
Working range	[mm]	5 ... 500
Light type		Red polarised
Setting options		Teach-in Teach-in via electrical connection

Electrical data		
Size		20x32x12 mm
Electrical connection	Cable	4-wire
	Plug	M8x1, 4-pin
Operating voltage range	[V DC]	10 ... 30
Max. output current	[mA]	100
Max. switching frequency	[Hz]	1,000
Protection against short circuit		Pulsed
Protection against polarity reversal		For all electrical connections
Protection class		IP67

Materials	
Size	20x32x12 mm
Housing	Acrylic butadiene styrene
Cable sheath	Polyurethane

Operating and environmental conditions		
Size		20x32x12 mm
Ambient temperature	[°C]	–20 ... +60
Ambient temperature with flexible cable installation	[°C]	–5 ... +60
CE mark (see declaration of conformity)		In accordance with EU EMC directive In accordance with EU Low Voltage Directive
Certification		c UL us - Listed (OL) C-Tick

Ordering data

Size	Working range [mm]	Switching element function	Switch output	Electrical connection			
				Cable		Plug	
				Part No.	Type	Part No.	Type
20x32x12 mm							
	5 ... 500	Switchable	PNP	**537 754**	**SOEG-RSG-Q20-PP-K-2L-TI**	**537 753**	**SOEG-RSG-Q20-PP-S-2L-TI**

Through-beam sensors SOEG-S/E

Technical data

FESTO

General technical data							
Size			M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Working range		[mm]	20,000	20,000	6,000	2,000	15,000
Light type			Red			Infrared	
Setting options			–		Teach-in Teach-in via electrical connection	Potentiometer	

Electrical data							
Size			M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Electrical connection	Transmitter	Cable	3-wire		4-wire	3-wire	4-wire
		Plug	M12x1, 3-pin		M8x1, 4-pin	M8x1, 3-pin	M12x1, 4-pin
	Receiver	Cable	4-wire		4-wire	3-wire	4-wire
		Plug	M12x1, 4-pin		M8x1, 4-pin	M8x1, 3-pin	M12x1, 4-pin
Operating voltage range		[V DC]	10 ... 36		10 ... 30		
Max. output current		[mA]	200		100	200	
Max. switching frequency		[Hz]	1,000		500	1,000	
Protection against short circuit			Pulsed				
Protection against polarity reversal			For all electrical connections				
Protection class			IP65, IP67		IP67	IP65	IP67

Materials						
Size	M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Housing	Brass, chrome-plated		Acrylic butadiene styrene	Polybutylene terephthalate, reinforced	Acrylic butadiene styrene
Cable sheath	Polyurethane				

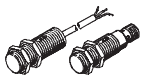
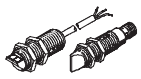
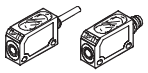
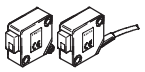
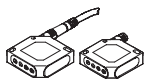
Operating and environmental conditions						
Size		M18x1, straight	M18x1, angled	20x32x12 mm	30x30x15 mm	50x50x17 mm
Ambient temperature	[°C]	–25 ... +55		–20 ... +60	–25 ... +55	–20 ... +60
Ambient temperature with flexible cable installation	[°C]	–5 ... +55		–5 ... +60	–5 ... +55	–5 ... +60
CE mark (see declaration of conformity)		In accordance with EU EMC directive		In accordance with EU EMC directive In accordance with EU Low Voltage Directive	In accordance with EU EMC directive	In accordance with EU EMC directive In accordance with EU Low Voltage Directive
Certification		C-Tick		c UL us - Listed (OL) C-Tick	C-Tick	c UL us - Listed (OL) C-Tick

Through-beam sensors SOEG-S/E

Technical data

FESTO

Ordering data

Size	Working range [mm]	Function	Switching element function	Switch output	Electrical connection			
					Cable		Plug	
					Part No.	Type	Part No.	Type
M18, beam exit straight								
	20,000	Transmitter	–	–	**537 691**	**SOEG-S-M18-K-L**	**537 703**	**SOEG-S-M18-S-L**
		Receiver	Antivalent	PNP	**537 692**	**SOEG-E-M18-PA-K-2L**	**537 704**	**SOEG-E-M18-PA-S-2L**
				NPN	**537 709**	**SOEG-E-M18-NA-K-2L**	**537 711**	**SOEG-E-M18-NA-S-2L**
M18, beam exit angled								
	20,000	Transmitter	–	–	**537 693**	**SOEG-S-M18W-K-L**	**537 695**	**SOEG-S-M18W-S-L**
		Receiver	Antivalent	PNP	**537 694**	**SOEG-E-M18W-PA-K-2L**	**537 696**	**SOEG-E-M18W-PA-S-2L**
				NPN	**537 710**	**SOEG-E-M18W-NA-K-2L**	**537 712**	**SOEG-E-M18W-NA-S-2L**
20x32x12 mm								
	6,000	Transmitter	–	–	**537 744**	**SOEG-S-Q20-K-L-TI**	**537 743**	**SOEG-S-Q20-S-L-TI**
		Receiver	Switchable	PNP	**537 746**	**SOEG-E-Q20-PP-K-2L-TI**	**537 745**	**SOEG-E-Q20-PP-S-2L-TI**
				NPN	**537 748**	**SOEG-E-Q20-NP-K-2L-TI**	**537 747**	**SOEG-E-Q20-NP-S-2L-TI**
30x30x15 mm								
	2,000	Transmitter	–	–	**165 352**	**SOEG-S-Q30-K-L**	**165 353**	**SOEG-S-Q30-S-L**
		Receiver	Dark switching	PNP	**165 322**	**SOEG-E-Q30-PS-K-2L**	**165 323**	**SOEG-E-Q30-PS-S-2L**
				NPN	**165 320**	**SOEG-E-Q30-NS-K-2L**	**165 321**	**SOEG-E-Q30-NS-S-2L**
50x50x17 mm								
	15,000	Transmitter	–	–	**537 779**	**SOEG-S-Q50-K-L**	**537 781**	**SOEG-S-Q50-S-L**
		Receiver	Antivalent	PNP	**537 780**	**SOEG-E-Q50-PA-K-3L**	**537 782**	**SOEG-E-Q50-PA-S-3L**

Fibre-optic units SOEG-L

Technical data

FESTO

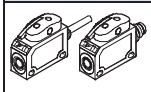
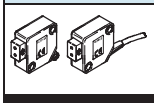
General technical data			
Size		20x32x12 mm	30x30x15 mm
Working range	[mm]	0 ... 250	0 ... 120
Light type		Red	
Setting options		Teach-in Teach-in via electrical connection	Potentiometer

Electrical data			
Size		20x32x12 mm	30x30x15 mm
Electrical connection	Cable	4-wire	
	Plug	M8x1, 4-pin	
Operating voltage range	[V DC]	10 ... 30	
Max. output current	[mA]	100	200
Max. switching frequency	[Hz]	1,000	
Protection against short circuit		Pulsed	
Protection against polarity reversal		For all electrical connections	
Protection class		IP67	IP65

Materials		
Size	20x32x12 mm	30x30x15 mm
Housing	Acrylic butadiene styrene	Polybutylene terephthalate, reinforced
Cable sheath	Polyurethane	

Operating and environmental conditions			
Size		20x32x12 mm	30x30x15 mm
Ambient temperature	[°C]	0 ... 60	–25 ... +55
Ambient temperature with flexible cable installation	[°C]	0 ... 60	–5 ... +55
CE mark (see declaration of conformity)		In accordance with EU EMC directive In accordance with EU Low Voltage Directive	In accordance with EU EMC directive
Certification		c UL us - Listed (OL) C-Tick	C-Tick

Ordering data

Size	Working range [mm]	Switching element function	Switch output	Electrical connection			
				Cable		Plug	
				Part No.	Type	Part No.	Type
20x32x12 mm							
	0 ... 250	Switchable	PNP	**537 740**	**SOEG-L-Q20-PP-K-2L-TI**	**537 739**	**SOEG-L-Q20-PP-S-2L-TI**
			NPN	**537 742**	**SOEG-L-Q20-NP-K-2L-TI**	**537 741**	**SOEG-L-Q20-NP-S-2L-TI**
30x30x15 mm							
	0 ... 120	Antivalent	PNP	**165 326**	**SOEG-L-Q30-P-A-K-2L**	**165 327**	**SOEG-L-Q30-P-A-S-2L**
			NPN	**165 324**	**SOEG-L-Q30-NA-K-2L**	**165 325**	**SOEG-L-Q30-NA-S-2L**

Distance sensors SOEG-RTD

Technical data

FESTO

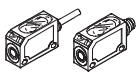
General technical data		
Size		20x32x12 mm
Working range	[mm]	20 ... 80
Displacement resolution	[mm]	0.5
Light type		Red
Setting options		Teach-in Teach-in via electrical connection

Electrical data		
Size		20x32x12 mm
Analogue output	[V]	0 ... 10
Electrical connection	Cable	4-wire
	Plug	M8x1, 4-pin
Operating voltage range	[V DC]	15 ... 30
Max. output current	[mA]	100
Max. switching frequency	[Hz]	200
Protection against short circuit		Pulsed
Protection against polarity reversal		For all electrical connections
Protection class		IP67

Materials	
Size	20x32x12 mm
Housing	Acrylic butadiene styrene
Cable sheath	Polyurethane

Operating and environmental conditions		
Size		20x32x12 mm
Ambient temperature	[°C]	0 ... 60
Ambient temperature with flexible cable installation	[°C]	0 ... 60
CE mark (see declaration of conformity)		In accordance with EU EMC directive In accordance with EU Low Voltage Directive
Certification		c UL us - Listed (OL) C-Tick

Ordering data

Size	Working range [mm]	Switching element function	Switch output	Electrical connection			
				Cable		Plug	
				Part No.	Type	Part No.	Type
20x32x12 mm							
	20 ... 80	Switchable	PNP	**537 758**	**SOEG-RTD-Q20-PP-K-2L-TI**	**537 757**	**SOEG-RTD-Q20-PP-S-2L-TI**

Laser sensors SOEL-RT...

Technical data

FESTO

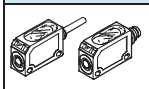
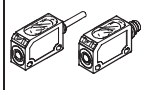
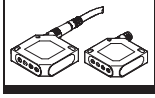
General technical data				
Method of measurement		Contrast sensor (diffuse)	With background suppression	
Size		20x32x12 mm	20x32x12 mm	50x50x17 mm
Working range	[mm]	10 ... 150	30 ... 110	50 ... 300
Light type		Laser, red		
Laser protection class		2		
Setting options		Teach-in Teach-in via electrical connection	Teach-in Teach-in via electrical connection	Potentiometer

Electrical data				
Method of measurement		Contrast sensor (diffuse)	With background suppression	
Size		20x32x12 mm	20x32x12 mm	50x50x17 mm
Electrical connection	Cable	4-wire	4-wire	4-wire
	Plug	M8x1, 4-pin	M8x1, 4-pin	M12x1, 4-pin
Operating voltage range	[V DC]	10 ... 30	10 ... 30	
Max. output current	[mA]	100	100	200
Max. switching frequency	[Hz]	4,000	1,000	2,500
Protection against short circuit		Pulsed		
Protection against polarity reversal		For all electrical connections		
Protection class		IP67		

Materials	
Housing	Acrylic butadiene styrene
Cable sheath	Polyurethane

Operating and environmental conditions				
Method of measurement		Contrast sensor (diffuse)	With background suppression	
Size		20x32x12 mm	20x32x12 mm	50x50x17 mm
Ambient temperature	[°C]	–20 ... +60	–20 ... +60	–20 ... +45
Ambient temperature with flexible cable installation	[°C]	–5 ... +60	–5 ... +60	–5 ... +45
CE mark (see declaration of conformity)		In accordance with EU EMC directive In accordance with EU Low Voltage Directive		
Certification		c UL us - Listed (OL) C-Tick		

Ordering data

Size	Working range [mm]	Switching element function	Switch output	Electrical connection: Cable Part No.	Cable Type	Plug Part No.	Plug Type
20x32x12 mm, contrast sensor (diffuse)							
	10 ... 150	Switchable	PNP	**537 736**	**SOEL-RT-Q20-PP-K-2L-TI**	**537 735**	**SOEL-RT-Q20-PP-S-2L-TI**
			NPN	**537 738**	**SOEL-RT-Q20-NP-K-2L-TI**	**537 737**	**SOEL-RT-Q20-NP-S-2L-TI**
20x32x12 mm, with background suppression							
	30 ... 110	Switchable	PNP	**537 729**	**SOEL-RTH-Q20-PP-K-2L-TI**	**537 727**	**SOEL-RTH-Q20-PP-S-2L-TI**
			NPN	**537 730**	**SOEL-RTH-Q20-NP-K-2L-TI**	**537 728**	**SOEL-RTH-Q20-NP-S-2L-TI**
30x30x15 mm, with background suppression							
	50 ... 300	Antivalent	PNP	**537 777**	**SOEL-RTH-Q50-PA-K-3L**	**537 775**	**SOEL-RTH-Q50-PA-S-3L**
			NPN	**537 778**	**SOEL-RTH-Q50-NA-K-3L**	**537 776**	**SOEL-RTH-Q50-NA-S-3L**

Laser retro-reflective sensors SOEL-RSP

Technical data

FESTO

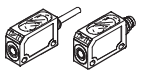
General technical data			
Size		20x32x12 mm	50x50x17 mm
Working range	[mm]	100 ... 1,000	20,000
Light type		Laser, red polarised	
Laser protection class		2	1
Setting options		Teach-in Teach-in via electrical connection	Potentiometer

Electrical data			
Size		20x32x12 mm	50x50x17 mm
Electrical connection	Cable	4-wire	4-wire
	Plug	M8x1, 4-pin	M12x1, 4-pin
Operating voltage range	[V DC]	10 ... 30	
Max. output current	[mA]	100	200
Max. switching frequency	[Hz]	4,000	2,500
Protection against short circuit		Pulsed	
Protection against polarity reversal		For all electrical connections	
Protection class		IP67	

Materials		
Size	20x32x12 mm	50x50x17 mm
Housing	Acrylic butadiene styrene	
Cable sheath	Polyurethane	

Operating and environmental conditions			
Size		20x32x12 mm	50x50x17 mm
Ambient temperature	[°C]	–20 ... +60	–20 ... +45
Ambient temperature with flexible cable installation	[°C]	–5 ... +60	–5 ... +45
CE mark (see declaration of conformity)		In accordance with EU EMC directive In accordance with EU Low Voltage Directive	
Certification		c UL us - Listed (OL) C-Tick	

Ordering data

Size	Working range [mm]	Switching element function	Switch output	Electrical connection			
				Cable		Plug	
				Part No.	Type	Part No.	Type
20x32x12 mm							
	100 ... 1,000	Switchable	PNP	**537 760**	**SOEL-RSP-Q20-PP-K-2L-TI**	**537 759**	**SOEL-RSP-Q20-PP-S-2L-TI**
			NPN	**537 762**	**SOEL-RSP-Q20-NP-K-2L-TI**	**537 761**	**SOEL-RSP-Q20-NP-S-2L-TI**
30x30x15 mm							
	20,000	Antivalent	PNP	**537 769**	**SOEL-RSP-Q50-PA-K-3L**	**537 767**	**SOEL-RSP-Q50-PA-S-3L**
			NPN	**537 770**	**SOEL-RSP-Q50-NA-K-3L**	**537 768**	**SOEL-RSP-Q50-NA-S-3L**

Laser distance sensors SOEL-RTD

Technical data

General technical data		
Size		50x50x17 mm
Working range	[mm]	80 ... 300
Displacement resolution	[mm]	0.3
Light type		Laser, red
Laser protection class		2
Setting options		Teach-in Teach-in via electrical connection

Electrical data		
Size		50x50x17 mm
Analogue output	[mA]	4 ... 20
Electrical connection		Plug M12x1, 8-pin
Operating voltage range	[V DC]	16 ... 30
Max. output current	[mA]	100
Max. switching frequency	[Hz]	1,000
Protection against short circuit		Pulsed
Protection against polarity reversal		For all electrical connections
Protection class		IP67

Materials	
Size	50x50x17 mm
Housing	Acrylic butadiene styrene

Operating and environmental conditions		
Size		50x50x17 mm
Ambient temperature	[°C]	0 ... 45
CE mark (see declaration of conformity)		In accordance with EU EMC directive In accordance with EU Low Voltage Directive
Certification		c UL us - Listed (OL) C-Tick

Ordering data

Size	Working range [mm]	Switching element function	Switch output	Electrical connection Plug Part No.	Type
50x50x17 mm					
	80 ... 300	Switchable	2x PNP	**537 823**	**SOEL-RTD-Q50-PP-S-7L**

Colour sensors SOEC

Technical data

FESTO

General technical data		
Size		50x50x17 mm
Working range	[mm]	12 ... 32
Light type		White
Setting options		Teach-in Teach-in via electrical connection

Electrical data		
Size		50x50x17 mm
Electrical connection		Plug M12x1, 8-pin
Operating voltage range	[V DC]	10 ... 30
Max. output current	[mA]	100
Max. switching frequency	[Hz]	500
Protection against short circuit		Pulsed
Protection against polarity reversal		For all electrical connections
Protection class		IP67

Materials	
Size	50x50x17 mm
Housing	Acrylic butadiene styrene

Operating and environmental conditions		
Size		50x50x17 mm
Ambient temperature	[°C]	–10 ... +55
CE mark (see declaration of conformity)		In accordance with EU EMC directive In accordance with EU Low Voltage Directive
Certification		c UL us - Listed (OL) C-Tick

Ordering data					
Size	Working range [mm]	Switching element function	Switch output	Electrical connection	
				Plug	
				Part No.	Type
50x50x17 mm					
	12 ... 32	Light switching	3x PNP	**538 236**	**SOEC-RT-Q50-PS-S-7L**

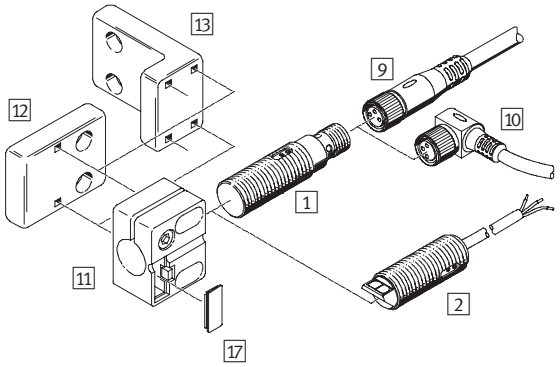
Sensors SOE..., opto-electronic

Peripherals overview

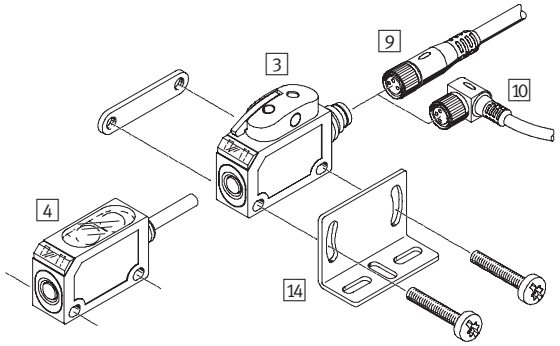
FESTO

Peripherals overview

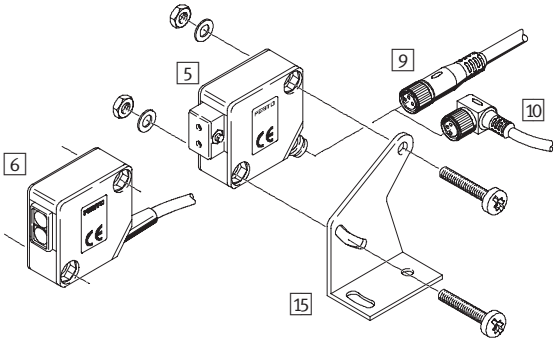
Round design, ∅ 4 mm, M12, M18, M18W



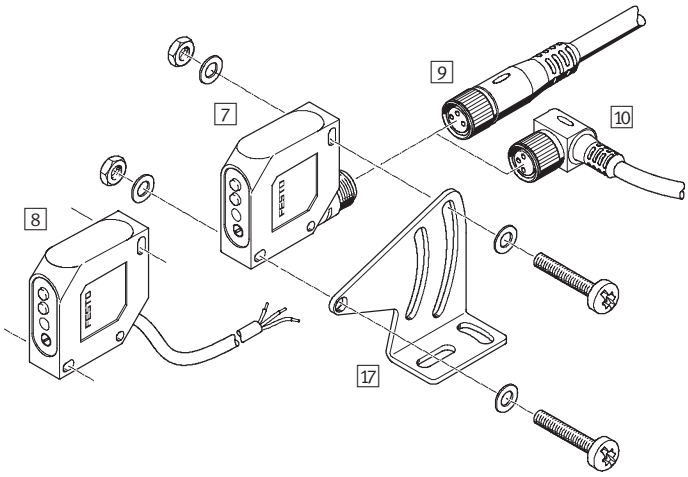
Block design, 20x32x12 mm



Block design, 30x30x15 mm



Block design, 50x50x17 mm



Mounting attachments and accessories	
Sensors	
1	Round design, ∅ 4 mm, M12, M18..., with plug
2	Round design, ∅ 4 mm, M12, M18..., with cable
3	Block design, 20x32x12 mm, with plug
4	Block design, 20x32x12 mm, with cable
5	Block design, 30x30x15 mm, with plug
6	Block design, 30x30x15 mm, with cable
7	Block design, 50x50x17 mm, with plug
8	Block design, 50x50x17 mm, with cable
Connecting cables	
9	NEBU-M...G...
	SIM-M...-...G
10	NEBU-M...W...
	SIM-M...-...W
Sensor retainers	
11	SIEZ-NB-...
12	SIEZ-UV
13	SIEZ-UH

Mounting attachments and accessories	
Mounting brackets	
14	SOEZ-HW-Q20
15	SOEZ-HW-Q30
16	SOEZ-HW-Q50
Inscription label	
17	SIEZ-LB
Fibre-optic cables, polymer	
–	SOEZ-LLK-RT, diffuse sensor
	SOEZ-LLK-SE, through-beam sensor
Fibre-optic cables, glass fibre	
–	SOEZ-LLG-RT, diffuse sensor
	SOEZ-LLG-SE, through-beam sensor
Reflectors	
–	Reflector
	Reflector foil
	Reflector for laser light

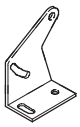
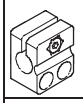
Ordering data – Connecting cables M8x1 Technical data ➔ 169

	Number of wires	Cable length [m]	Part No.	Type
Straight plug socket				
	3	2.5	**541 333**	**NEBU-M8G3-K-2.5-LE3**
		5	**541 334**	**NEBU-M8G3-K-5-LE3**
	4	2.5	**541 342**	**NEBU-M8G4-K-2.5-LE4**
		5	**541 343**	**NEBU-M8G4-K-5-LE4**
Angled plug socket				
	3	2.5	**541 338**	**NEBU-M8W3-K-2.5-LE3**
		5	**541 341**	**NEBU-M8W3-K-5-LE3**
	4	2.5	**541 344**	**NEBU-M8W4-K-2.5-LE4**
		5	**541 345**	**NEBU-M8W4-K-5-LE4**

Ordering data – Connecting cables M12x1 Technical data ➔ 172

	Number of wires	Cable length [m]	Part No.	Type
Straight plug socket				
	3	2.5	**541 363**	**NEBU-M12G5-K-2.5-LE3**
		5	**541 364**	**NEBU-M12G5-K-5-LE3**
	4	5	**541 328**	**NEBU-M12G5-K-5-LE4**
	8	2	**525 616**	**SIM-M12-8GD-2-PU**
		5	**525 618**	**SIM-M12-8GD-5-PU**
Angled plug socket				
	3	2.5	**541 367**	**NEBU-M12W5-K-2.5-LE3**
		5	**541 370**	**NEBU-M12W5-K-5-LE3**
	4	5	**541 329**	**NEBU-M12W5-K-5-LE4**

Ordering data – Mounting attachments

	For design	Part No.	Type
Mounting bracket			
	Q20	**537 785**	**SOEZ-HW-Q20**
	Q30	**165 355**	**SOEZ-HW-Q30**
	Q50	**537 786**	**SOEZ-HW-Q50**
Sensor retainer			
	4	**535 343**	**SIEZ-NB-4**
	M12	**535 348**	**SIEZ-NB-12**
	M18, M18W	**535 350**	**SIEZ-NB-18**
	M12, M18, M18W	**535 354**	**SIEZ-UH**
		535 355	**SIEZ-UV**
Inscription label			
	M12, M18, M18W, M30	**535 353**	**SIEZ-LB**

Ordering data – Fibre-optic cables

	Use	Part No.	Type
Polymer			
	RT[1]	**165 358**	**SOEZ-LLK-RT-2,0-M6**
	S/E[2]	**165 360**	**SOEZ-LLK-SE-2,0-M4**
Glass fibre			
	RT[1]	**165 356**	**SOEZ-LLG-RT-0,5-M6**
	S/E[2]	**165 357**	**SOEZ-LLG-SE-0,5-M4**
Fibre-optic cable cutter			
	For polymer fibre-optic cables	**36 479**	**SOE-LKS**

1) Diffuse sensor
2) Through-beam sensor

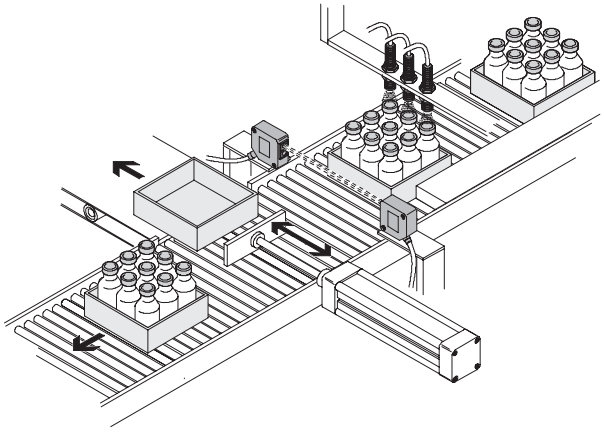
Ordering data – Reflectors

	Size [mm]	Part No.	Type
Reflector			
	∅ 20	**165 363**	**SOEZ-RFS-20**
	∅ 40	**165 364**	**SOEZ-RFS-40**
	∅ 84	**165 365**	**SOEZ-RFS-80**
Reflector foil			
	100 x 100	**165 362**	**SOEZ-RFF-100**
Reflector for laser light			
	50 x 50	**537 788**	**SOEZ-RFL-50**
	10 x 50	**537 787**	**SOEZ-RFL-10**

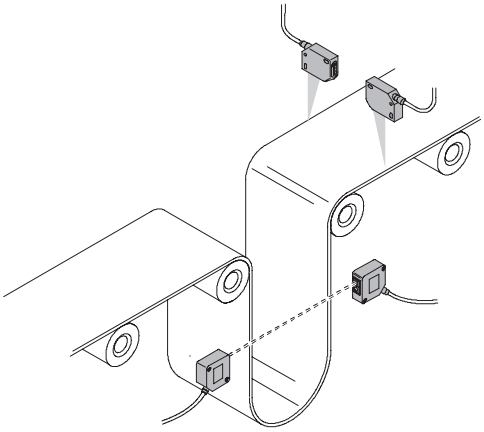
Sensors SOE..., opto-electronic

Application examples

General application examples

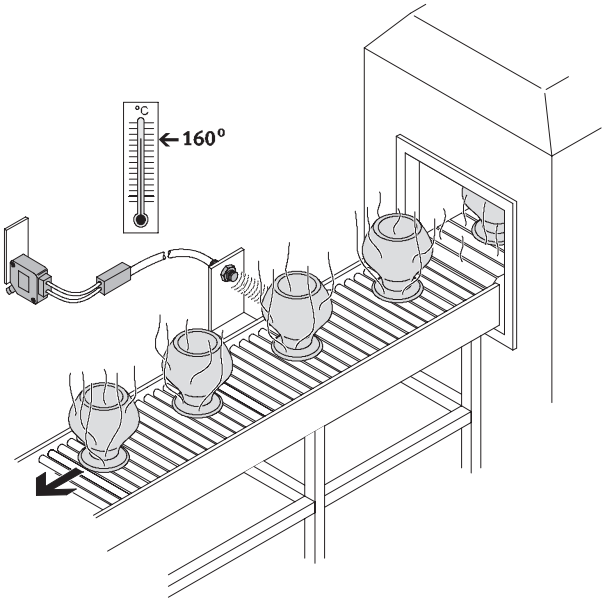


- Opto-electronic sensors SOEG check whether the boxes are filled.

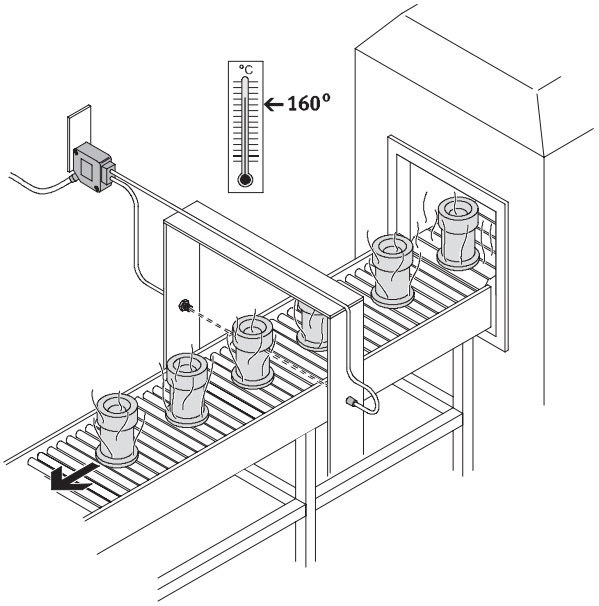


- Edge detection using opto-electronic sensors SOEG

Fibre-optic technology for high-temperature ranges



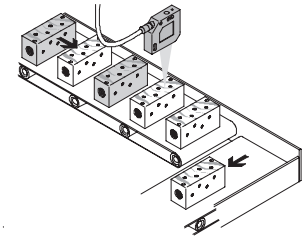
- SOEG-L can be combined with SOEZ-LLG glass fibre-optic cables to detect objects in high-temperature environments.



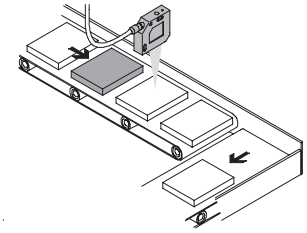
Sensors SOE..., opto-electronic

Application examples

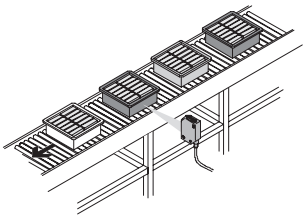
Sensors with background suppression



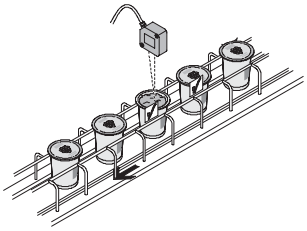
- Sensors SOEG-RTH with background suppression detect objects on the basis of their geometric position rather than the strength of the reflection.
- The objects are detected practically independently of their colour. It makes no difference how shiny any objects in the background are.



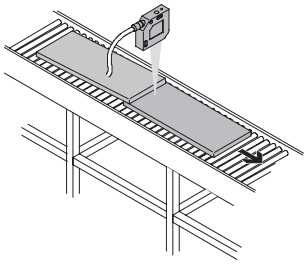
- Detection of objects of different colours at the same distance and close to the background.



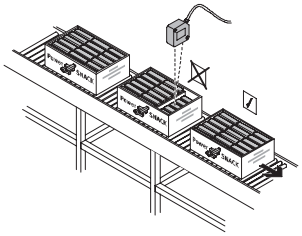
- Colour-independent detection of trays.



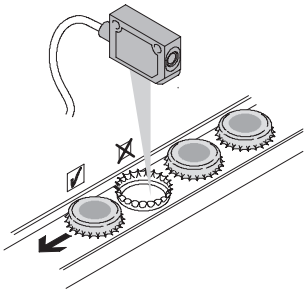
- Detection of lids of different colours on yogurt pots with a sensor SOEG-RTH with background suppression. Metallic lids can also be detected by inductive sensors SIEF.



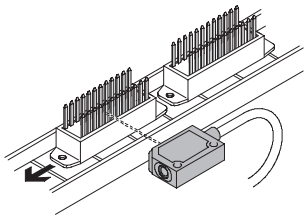
- Detection of overlaps with SOEG-RTH-Q30/Q50.



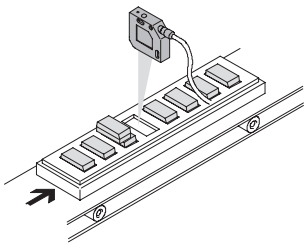
- Checking that snack food quantities are correct using sensors SOEG-RTH with background suppression.
- The distance sensor SOEG-RTD can also check that the number of items is correct.



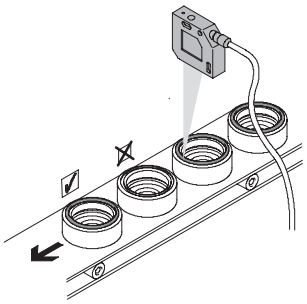
- Checking that the position of bowls is correct using sensors SOEG-RTH with background suppression.
- Metallic bowls can also be detected by inductive sensors SIE....



- Counting of connections using the laser sensor SOEL-RTH with background suppression.



- The presence or absence of small objects can be detected easily using the laser sensor SOEL-RTH with background suppression.



- Detection of O-rings using the laser sensor SOEL-RTH with background suppression.

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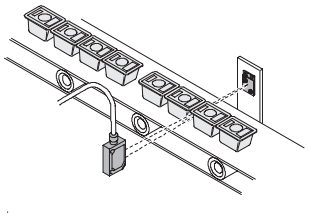
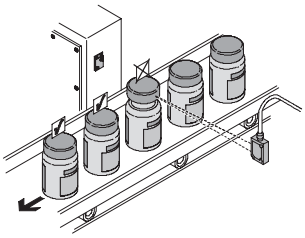
Application examples

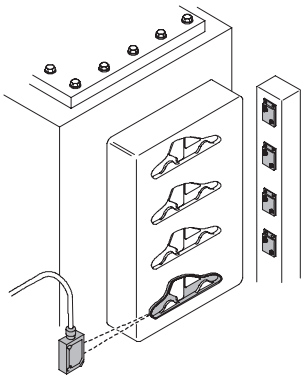
Retro-reflective sensors



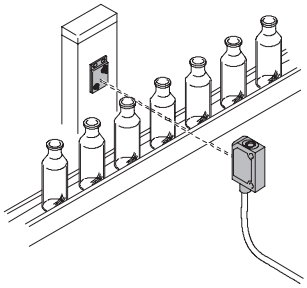
- The laser retro-reflective sensors SOEL-RSP detect small gaps between objects.



- The laser beam of a retro-reflective sensor SOEL-RSP can thus be set to detect variations in alignment.

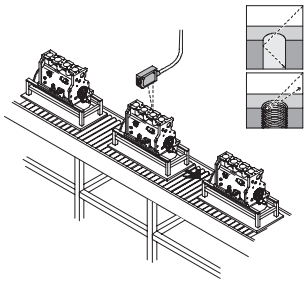


- After moulding, the laser retro-reflective sensor SOEL-RSP detects whether the workpieces are still in the metallic mould.



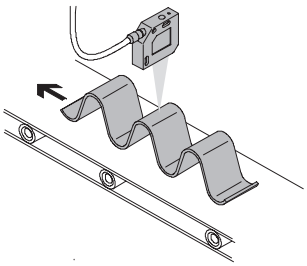
- SOEG-RSG – the perfect retro-reflective sensor for transparent objects.

Contrast sensor



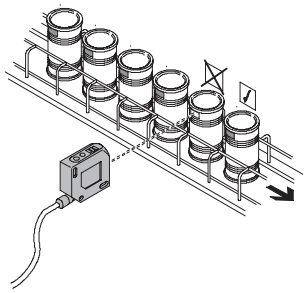
- The laser contrast sensor SOEL-RT-Q20 can detect a thread, even in a hole.

Distance sensor

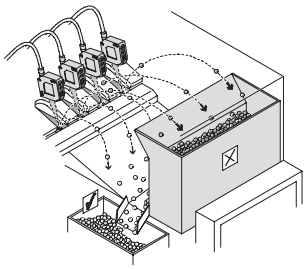


- The laser distance sensors SOEL-RTD can gauge the shapes of different workpieces.

Colour sensor



- The colour sensor SOEC-RT-Q50 has three channels. Each of these channels can be adjusted separately by means of a simple teach-in procedure.



- Parts are sorted by colour using the colour sensor SOEC-RT-Q50.

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