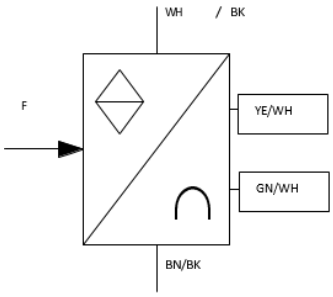
NOMBRE	CODIGO FESTO	CODIGO HOMOLOGADO
Sensor de fuerza	15041	167054
Barrera foto eléctrica receptor	150514	167067
Sensor de proximidad inductivo, cilíndrico M12	150507	177464
Sensor de proximidad inductivo, cilíndrico M18	150508	177466
Sensor proximidad capacitivo cilíndrico, M18	150517	177470
Sensor inductivo análogo de distancia	150532	184117
Sensor de proximidad ultrasónico, cilíndrico M18	150511	184118
Barrera foto eléctrica emisor	150513	167 064
sensor analógico de presión	150558	184 128
Sensor óptico de reflexión directa rectangular	15015	SOE-RS-Q-PS/O-S-LED 35 540
Sensor óptico de reflexión directa rectangular	150512	SOE-RT-Q-PS/O-S-LED 35 542

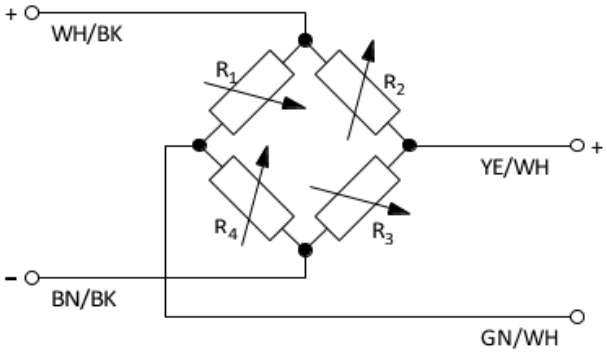
167054
Sensor de fuerza



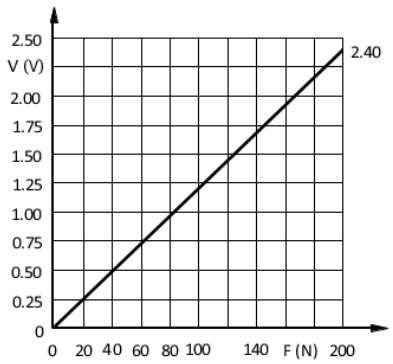
DESIGN:	The force sensor is fitted with a short rounded stem to enable the load to be applied centrally. The sensor is mounted in a hollow box profile made of steel. There is a hole in the hollow profile opposite the force sensor, through which a force can be introduced in the form of a calibration device, or a pneumatic cylinder. The hollow profile can be mounted on to the profile plate by means of a knurled screw or a Thead nut. The weight support is used for calibrating and consists of a metal rod with screwedon disk, on to which the circular weights of the set can be placed.
FUNCTION:	The force sensor is a strain gauge diaphragm sensor. The strain gauges are fitted to the strain gauge diaphragm in the form of a full-bridge. Under load, the diaphragm becomes deformed, resulting in the strain gauge full-bridge becoming unbalanced. The resulting signal which is in the millivolt range can be amplified and evaluated.

NOTE: The wires and plugs of the connection cable are colour coded as follows:

SIGNAL	WIRE	ABBREVIATION	PLUG	ABBREVIATION
Positive supply voltage	WHITE	(WH)	BLACK	(BK)
Negative supply voltage	BROWN	(BN)	BLACK	(BK)
Positive signal output	YELLOW	(YE)	WHITE	(WH)
Negative signal output	GREEN	(GN)	WHITE	(WH)



In the characteristic curve below, the sensor signal, balanced and amplified by the measuring bridge amplifier, is plotted against the force.



167054
Sensor de fuerza

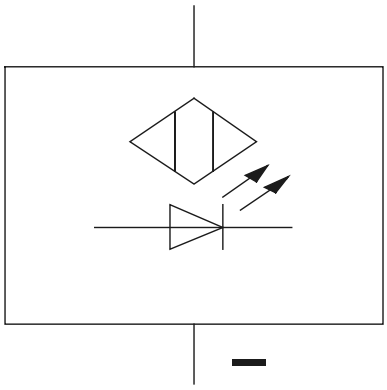
TECHNICAL DATA

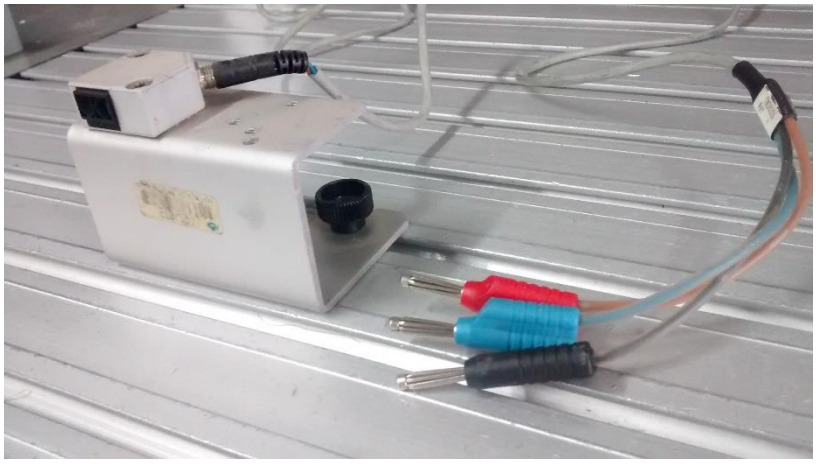
MECHANICAL VALUES	Measuring range	0 – ±200 N
	Measuring error*	≤1 % of final value
	Sensitivity (nominal)	1 mV/V
	Overload	130 % of measuring range
	Breaking load	≥200 % of measuring range
	Distance moved under nominal load (Pressure direction)	0.1 mm max.
	Dyn. load rating recommended	50 % of measuring range
	Dyn. load rating permitted	170 % of measuring range
	Material	Force sensor: Al Hollow profile: Steel, galvanized
	Weight	750 g
ENVIRONMENTAL CONDITIONS	Operating temperature range	-30 – +70 °C
	Compensated temperature range	0 – +70 °C
	Thermal zero point shift	±0.04 % of final value /K
	Thermal sensitivity change	+0.07 % of scale value /K
	Protection class to DIN 40 050	IP 54
ELECTRICAL VALUE	Bridge resistance (Full bridge)	350 Ω (nominal)
	Supply voltage permissible	3 – 10 V = or ≈
	Supply voltage recommended	5 V
	Isolation resistance	>10 MΩ
	Electrical connection	shielded, 4-core cable, highly flexible, 2 m long
	Bending radius of connection cable	≥15 mm
	Connection	4 mm-safety plugs

* The measuring error is defined as the sum of the errors for non-linearity, hysteresis and reproducibility. 1N = 1 kg m s^{-2} = 0.1019 kp = 0.2248 lbf

167064

Barrera foto-electrica emisor





DESIGN:	The through-beam sensor emitter is mounted on an aluminium mounting bracket.Attachment to the profile plate is effected by two T-head nuts and two knurled screws. Electrical connection is established by means of the socket and the provided cable with 4mm safety plugs.
FUNCTION:	Optical proximity sensors consist of two principal modules, the emitter and the receiver. In the case of the through-beam sensor, these are accommodated in two separate housings. The emitter emits pulsating infra red light from the invisible spectral range.The object to be detected may reflect any amount of light but allow through only a minimal amount of light

NOTE: The polarity of the applied voltage is critical for satisfactory operation. The cable terminals are colour coded. The sensor is protected against incorrect polarity, overload and short circuit.

SIGNAL	PLUG
+24V	RED (RD)
0V	BLUE (BL)

The emitter's black cable with black safety plug serves to simulate light beam interruption. The emitter's light source is deactivated by applying a 24 V DC control voltage to this plug.

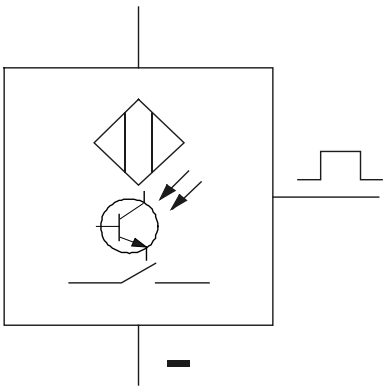
167064
Barrera foto-electrica emisor

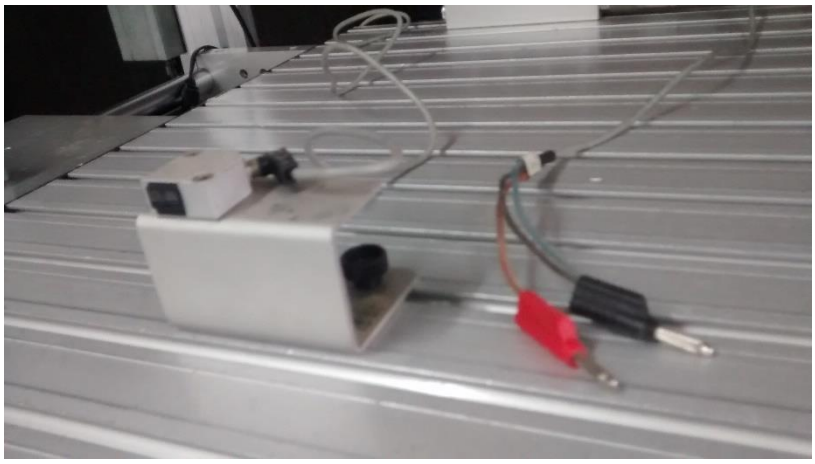
TECHNICAL DATA

ELECTRICAL	
Operating voltage	10 V DC to 30 V DC
Type of light	Infrared
Nominal switching distance	6000 mm
Current consumption (no load)	25 mA
Permissible ambient operating temperature	-5 °C to +55 °C
Protection against wrong polarity	integrated
Protection against short circuit	yes
Protection class	IP 65
Weight	0.25 kg
Electrical connection	Socket for cable with 4 mm safety plugs
Emitted interference	tested to EN 500 81-1
Noise immunity	tested to EN 500 82-1

167067

Barrera foto-electrica receptor





DESIGN:	The through-beam sensor emitter is mounted on an aluminium mounting bracket.Attachment to the profile plate is effected by two T-head nuts and two knurled screws. Electrical connection is established by means of the socket and the provided cable with 4mm safety plugs.
FUNCTION:	Optical proximity sensors consist of two principal modules, the emitter and the receiver. In the case of the through-beam sensor, these are accommodated in two separate housings. The receiver receives the infra red light from the invisible spectral range, coming from the emitter. If the emitted light path is interrupted by an object, the switching status of the electrical output changes. The object to be detected may reflect any amount of light, but allow through only a minimal amount of light. With translucent, light permeable objects, a reduction of the emission level can, within certain limits, be adjusted by means of the potentiometer at the receiver. The proximity sensor has a PNP output, i.e., the signal line is switched to positive potential in the switched state. The load is connected between the proximity sensor output and earth (0 V). A yellow light emitting diode (LED) indicates the switching status.

NOTE: The polarity of the applied voltage is critical for satisfactory operation. The cable terminals are colour coded. The sensor is protected against incorrect polarity, overload and short circuit . The switch is designed as normally closed. If no object is detected, the black signal line is at positive potential.

For reliable operation, the green LED (function reserve indicator) must light up as well as the yellow LED (switching status indicator), when the sensor is detecting an object.

167067

Barrera foto-electrica receptor

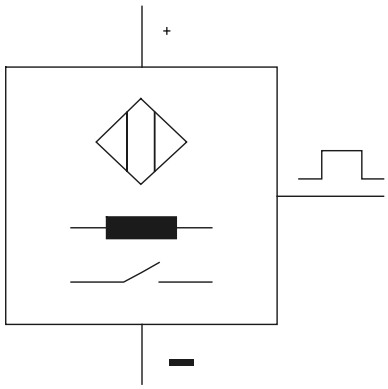
SIGNAL	PLUG
+24V	RED (RD)
0V	BLUE (BL)
Load output Normally closed	BLACK (BK)

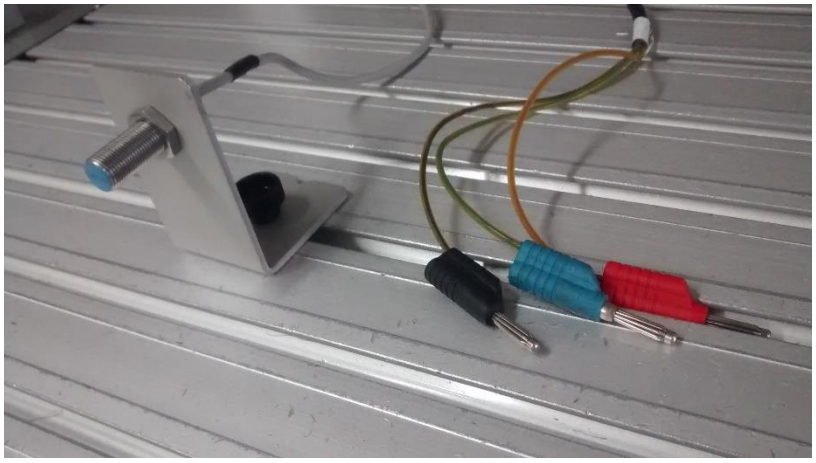
TECHNICAL DATA

ELECTRICAL	
Permissible operating voltage	10 V DC to 30 V DC
Type of light	Infrared light
Switching output	PNP, normally closed
Nominal switching distance	6000 mm
Operational switching distance	100 mm to 4800 mm
Hysteresis	≤10%
Reproducibility	±10%
Maximum switching current	200 mA
Maximum switching frequency	1000 Hz
Current consumption (no load)	30 mA
Permissible ambient operating temperature	-5 °C to +55 °C
Protection against wrong polarity	integrated
Protection against short circuit	yes
Protection class	IP 65
Weight	0.25 kg
Electrical connection	Socket for cable with 4 mm safety plugs
Emitted interference	tested to EN 500 81-1
Noise immunity	tested to EN 500 82-1

177464

Sensor de proximidad inductivo, cilíndrico M12





DESIGN:	The inductive proximity sensor is mounted on an aluminium bracket. Attachment to the profile plate is effected by a T-head nut and a knurled screw. Electrical contact is established by a cable with 4 mm safety plugs
FUNCTION:	Inductive proximity switches contain an oscillator circuit, consisting of a parallel resonance circuit with coil and condenser, as well as an amplifier. The electromagnetic field is directed outwards from the ferrite core. If an electrically conductive material penetrates into the area of the stray electromagnetic field, the law of induction causes eddy currents to be generated in the material, and results in the sensor field being attenuated. Depending on the conductivity, the dimensions, and the proximity of the conductive object, the resonant field may be attenuated to such an extent, that oscillation ceases. The damping of the oscillator is evaluated electronically (demodulator) and a switching signal is supplied by the triggering stage. The proximity sensor has an PNP output, i.e. upon activation,the switch, which is designed as normally open, connects the signal line to the positive potential. The load is connected between the proximity sensor output and earth (0 V). The active switching surface is identified by a blue plastic disc. A yellow light emitting diode (LED) indicates the switching status. The proximity sensor is suitable for flush fitting in metals.

177464

Sensor de proximidad inductivo, cilíndrico M12

NOTE: The polarity of the applied voltage is critical for satisfactory operation. The cable terminals are colour coded. The sensor is protected against incorrect polarity, overload and short circuit.

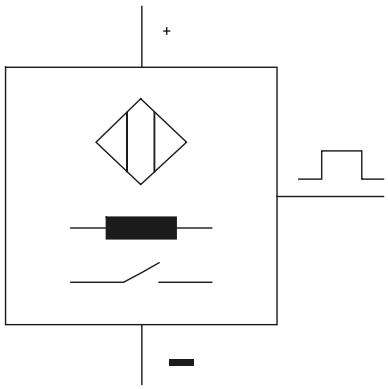
SIGNAL	PLUG
+24V	RED (RD)
0V	BLUE (BL)
Load output Normally open	BLACK (BK)

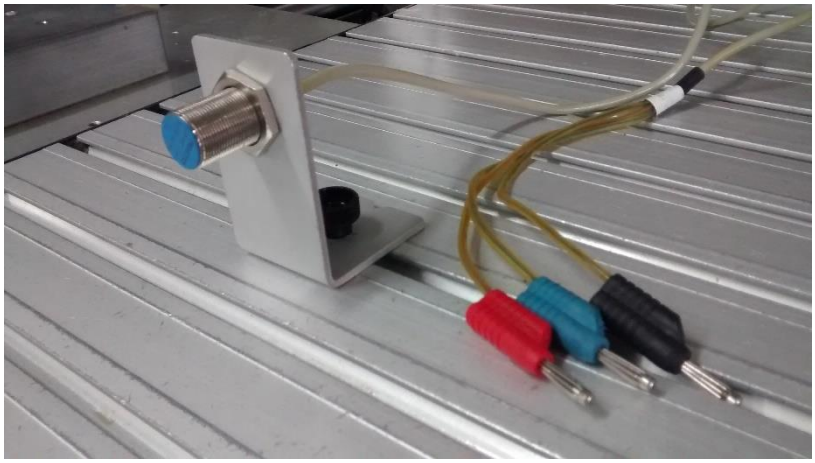
TECHNICAL DATA

ELECTRICAL	
Permissible operating voltage	10 V DC to 30 V DC
Switching output	PNP, normally open
Nominal switching distance (mild steel)	7 mm
Hysteresis (ref. to nominal switching distance)	≤10%
Maximum switching current	150 mA
Maximum switching frequency	250 Hz
Current consumption (no load)	30 mA
Size of sensor	M 18 x 1
Installation	flush-fitting
Permissible ambient operating temperature	-25 °C to +85 °C
Protection against wrong polarity	integrated
Protection against short circuit	yes
Protection class	IP 67
Weight	0.18 kg
Electrical connection	Cable with 4 mm safety plugs
Emitted interference	tested to EN 500 81-1
Noise immunity	tested to EN 500 82-1

177466

Sensor de proximidad inductivo, cilíndrico M18





DESIGN:	The inductive proximity sensor is mounted on an aluminium bracket. Attachment to the profile plate is effected by a T-head nut and a knurled screw. Electrical contact is established by a cable with 4 mm safety plugs.
FUNCTION:	Inductive proximity switches contain an oscillator circuit, consisting of a parallel resonance circuit with coil and condenser, as well as an amplifier. The electromagnetic field is directed outwards from the ferrite core. If an electrically conductive material penetrates into the area of the stray electromagnetic field, the law of induction causes eddy currents to be generated in the material, and results in the sensor field being attenuated. Depending on the conductivity, the dimensions, and the proximity of the conductive object, the resonant field may be attenuated to such an extent, that oscillation ceases. The damping of the oscillator is evaluated electronically (demodulator) and a switching signal is supplied by the triggering stage. The proximity sensor has an PNP output, i.e. upon activation,the switch, which is designed as normally open, connects the signal line to the positive potential. The load is connected between the proximity sensor output and earth (0 V). The active switching surface is identified by a blue plastic disc. A yellow light emitting diode (LED) indicates the switching status. The proximity sensor is suitable for flush fitting in metals.

177466

Sensor de proximidad inductivo, cilíndrico M18

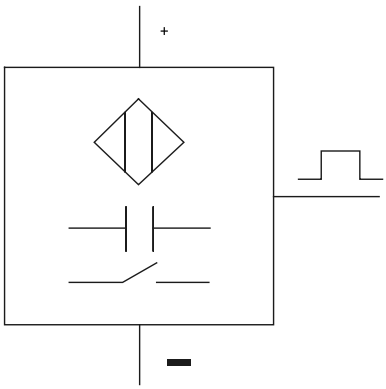
NOTE: The polarity of the applied voltage is critical for satisfactory operation. The cable terminals are colour coded. The sensor is protected against incorrect polarity, overload and short circuit.

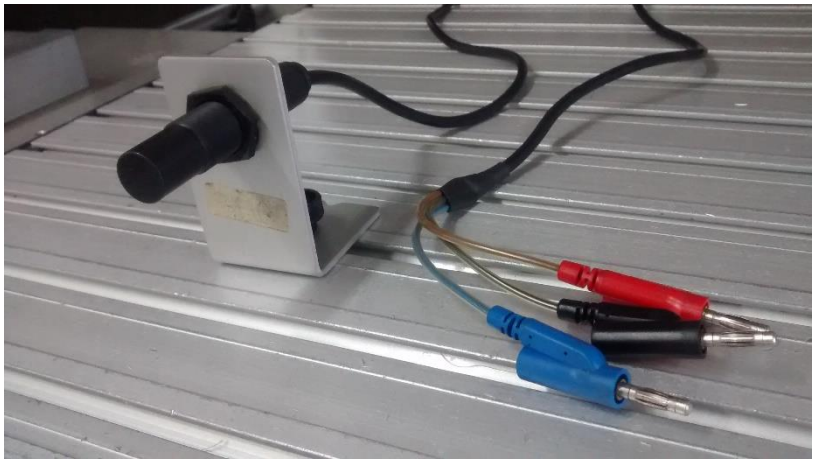
SIGNAL	PLUG
+24V	brown (RD)
0V	Blue (BL)
Load output Normally open	Black Bk)

TECHNICAL DATA

ELECTRICAL	
Permissible operating voltage	10 V DC to 30 V DC
Switching output	PNP, normally open
Nominal switching distance (mild steel)	7 mm
Hysteresis (ref. to nominal switching distance)	≤10%
Maximum switching current	150 mA
Maximum switching frequency	250 Hz
Current consumption (no load)	30 mA
Size of sensor	M 18 x 1
Installation	flush-fitting
Permissible ambient operating temperature	-25 °C to +85 °C
Protection against wrong polarity	integrated
Protection against short circuit	yes
Protection class	IP 67
Weight	0.18 kg
Electrical connection	Cable with 4 mm safety plugs
Emitted interference	tested to EN 500 81-1
Noise immunity	tested to EN 500 82-1

177470
Sensor proximidad capacitivo cilíndrico, M18





DESIGN:	The inductive proximity sensor is mounted on an aluminium bracket. Attachment to the profile plate is effected by a T-head nut and a knurled screw. Electrical contact is established by a cable with 4 mm safety plugs.
FUNCTION:	The operational principle of a capacitive proximity sensor is based on the evaluation of the change of capacitance of a condenser in an RC resonant circuit. If any kind of material is introduced into the active field of the proximity sensor the capacitance of the condenser increases. This leads to a measurable change of the oscillatory behaviour of the RC resonant circuit. The change in capacitance depends substantially on the distance, the dimensions, and on the dielectric constant of the material in question. The proximity sensor has a PNP output, i.e. upon activation, the switch, which is designed as normally open, connects the signal line to the positive potential. The load is connected between the proximity sensor signal output and earth (0 V). A yellow light emitting diode (LED) indicates the switching status. The capacitive proximity sensor cannot be flush mounted.

NOTE: The polarity of the applied voltage is critical for satisfactory operation. The cable terminals are colour coded. The sensor is protected against incorrect polarity, overload and short circuit.

SIGNAL	PLUG
+24V	RED (RD)
0V	BLUE (BL)
Load outputNormally open	BLACK (BL)

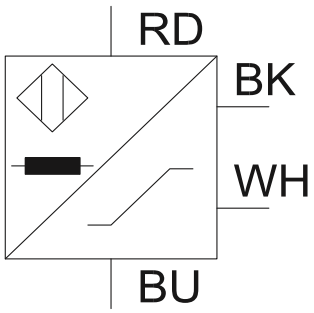
177470
Sensor proximidad capacitivo cilíndrico, M18

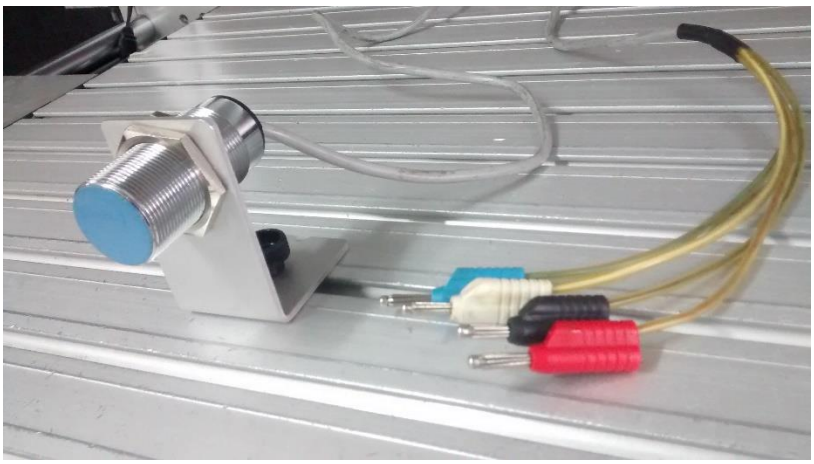
TECHNICAL DATA

ELECTRICAL	
Permissible operating voltage	10 V DC to 36 V DC
Switching output	PNP, normally open
Nominal switching distance	4 mm
Hysteresis (ref. to nominal switching distance)	≤10%
Maximum switching current	200 mA
Maximum switching frequency	100 Hz
Current consumption (no load)	30 mA
Size of sensor	M12 x 1
Installation	not flush-fitting
Permissible ambient operating temperature	-25 °C to +85 °C
Protection against wrong polarity	integrated
Protection against short circuit	yes
Protection class	IP 67
Weight	0.18 kg
Electrical connection	Cable with 4 mm safety plugs
Emitted interference	tested to EN 500 81-1
Noise immunity	tested to EN 500 82-1

184117

Sensor inductivo análogo de distancia





DESIGN:	The analogue inductive sensor is mounted on an aluminium bracket. Assembly on to the profile plate is effected by means of a T-head nut and a knurled screw.
FUNCTION:	The analogue inductive sensor contains an oscillator circuit, which consists of a parallel resonant circuit with coil and capacitor as well as an amplifier. The electromagnetic field is directed outwardly by means of a ferrite shell core. If an electrically conductive material is introduced into the active zone of the stray field, eddy currents are induced into the material according to the laws of inductance, which attenuate oscillation. Attenuation of the oscillator varies according to the conductivity, permeability, dimensions and proximity of the conductive object. The output signal, within a defined range, is proportional to the distance between workpiece and sensor if the workpiece material and dimensions remain unchanged.

NOTE: The polarity of the applied voltage is critical for satisfactory operation. The cable terminals are colour coded. The sensor is protected against incorrect polarity, overload and short circuit.

SIGNAL	PLUG
+24V	Red (RD)
0 V	Blue (BL)
Analogue output signals Voltage plug	Black (BK)
Analogue output signals Current plug	White (WH)

184117

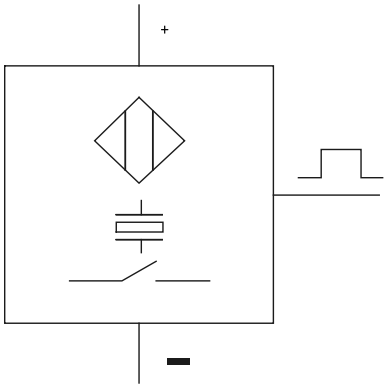
Sensor inductivo análogo de distancia

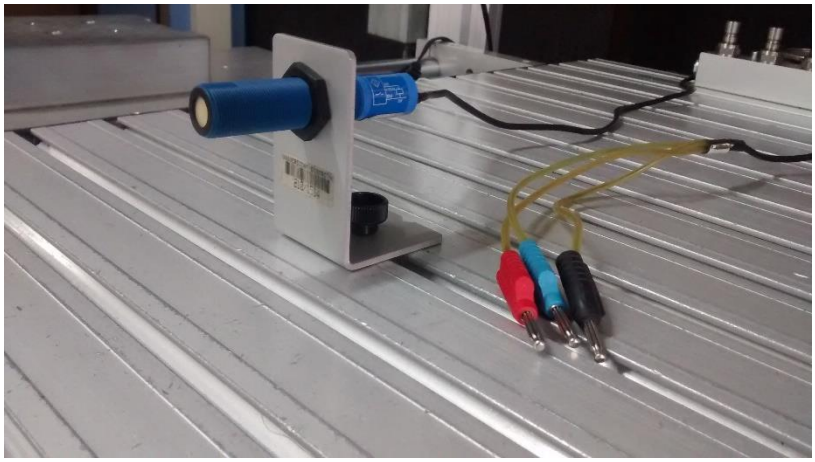
TECHNICAL DATA

ELECTRICAL	
Permissible operating voltage	15 – 30 V DC
Current consumption (without load)	≤8 mA
Voltage output	0 – 10 V
Load resistance	≤4.7 kΩ
Current output	0 – 20 mA
Load resistance	≤500 Ω
Measuring range	3 – 8 mm
Max. switching frequency	80 Hz
Ambient operating temperature	-10 – +70 °C
Temperature error	±5 % full scale deflection
Linearity error	±3 % full scale deflection
Reproducibility	≤2 % full scale deflection
Protection class (DIN 40 050)	IP 67
Reverse polarity and short circuit protection	yes
Material	Housing CuZn, chromium plated
Weight	260 g
Connection	Cable with 4 mm safety connector plugs

184118

Sensor de proximidad ultrasónico, cilíndrico M18





DESIGN:	The ultrasonic proximity sensor is mounted in an aluminium bracket. The angle bracket is attached to the profile plate by a T-head nut and a knurled screw. Electrical connection is established by means of a cable with 4 mm safety plugs.
FUNCTION:	The operational principle of an ultrasonic proximity sensor is based on the generation of sound waves and their detection after reflection by an object. The sound waves, generated by the sensor, are transmitted through the atmosphere. A piezoelectric sound generator is excited to generate ultrasonic pulsations inaudible to the human ear. After emission, the sound emitter is switched to receiver mode, i.e. it now functions as a microphone. The time elapsed between the emission of an ultrasonic pulse and the reception of the pulse reflected by an object is evaluated. If an object is located within the range indicated, it causes a change in switching status. Objects of various types of material can be detected. Shape, colour and form, i.e. whether solid, liquid or powder, have little or no influence on detection. Objects with a smooth, flat surface must be placed such that their surface is orientated at a right angle to the ultrasonic emission. The proximity sensor has a PNP output, i.e. the signal line is switched to positive potential in the switched state. The switch is designed as normally open. The load is connected between the sensor output line and earth (0 V). A red LED indicates the switching status.

184118

Sensor de proximidad ultrasónico, cilíndrico M18

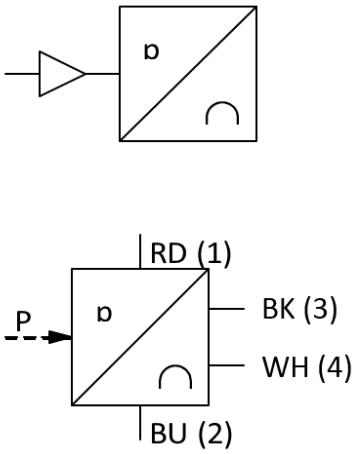
NOTE: The polarity of the applied voltage is critical for satisfactory operation. The cable terminals are colour coded. The sensor is protected against incorrect polarity, overload and short circuit.

SIGNAL	PLUG
+24 V	RED (RD)
0 V	BLUE (BL)
Load output Normally open	BLACK (BK)

TECHNICAL DATA

ELECTRICAL	
Permissible operating voltage	19 V DC to 29 V DC
Switching output	PNP, normally open
Ultrasonic emitter frequency	215 kHz
Range	100 mm to 200 mm
Hysteresis	≤5%
Maximum switching current	100 mA
Maximum switching frequency	6 Hz
Current consumption (no load)	1 mA
Size of sensor	M18
Installation	flush-fitting
Permissible ambient operating temperature	0 °C to +70 °C
Protection against wrong polarity	integrated
Protection against short circuit	yes
Protection class	IP 67
Weight	0.20 kg
Electrical connection	Cable with 4 mm safety plugs
Emitted interference	tested to EN 500 81-1
Noise immunity	tested to EN 500 82-1

184128
Sensor de presión



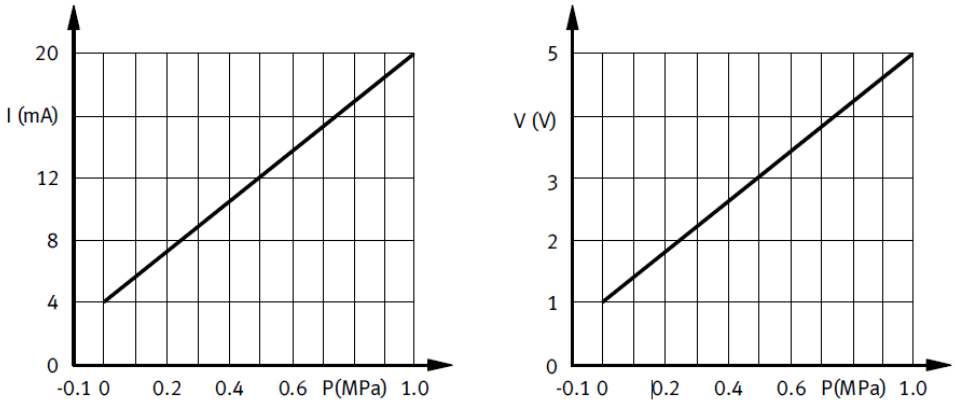
DESIGN:	This unit consists of a pressure sensor with quick push-pull connector fitted to a mounting bracket. The mounting bracket can be attached to the profile plate by means of a knurled screw and a T-head nut.
FUNCTION:	The piezoresistive analogue pressure sensor with built-in amplifier and temperature compensator are fitted into a single aluminium housing. The pressure to be measured is transmitted to a piezoresistive element via a silicone layer. The signal thus generated is amplified and output as a current or voltage at the electrical connector. The output signal is calibrated, so that sensors may later be interchanged.

NOTE: The wires and plugs of the connection cable are colour coded as follows:

SIGNAL	PLUG
+24V	RED (RD)
0V	BLUE (BL)
Analogue output signals Voltage plug	BLACK (BK)
Analogue output signals Current plug	WHITE (WH)

184128
Sensor de presión

CHARACTERISTIC CURVES



TECHNICAL DATA

Pressure range*	0 – 1.0 MPa (0 – 10 bar)
Max. permitted pressure	1.4 MPa (14 bar)
Supply voltage V_S	12 – 30 V DC
Residual ripple of V_S	10 % to DIN 41 755
Current consumption	With current output approx. 35 mA With voltage output approx. 15 mA
Load resistance	Current output 300 Ω max.
	$R_L \leq (V_S - 3\ V)/30\ mA$
	Voltage output 4 kΩ min.
Total error	±1 % of final value
Temperature. drift zero point	<0.3 % of final value/10 K
Temperature. drift final value	<0.3 % of final value/10 K
Max. measuring frequency	100 Hz
Medium	Compressed air (lubricated or unlubricated)
Ambient operating temperature	0 – +85 °C
Compensation range	+10 – +70 °C
Storage temperature	-25 – +125 °C
Electrical protection	Short circuit proof, polarity-safe. Overvoltage-proof up to 50 V DC (short-term)
Protection class	IP65
Material	Al, anodised; silicone
Weight	265 g
Connection cable	4-cable wire, 2 m
Electrical connection	4 mm-safety plugs
Pneumatic connection	QS-1/8-4-I

*** Sensor provides a signal even if pressure is <0 bar. Linearity and proportionality are not guaranteed in this case.**

Diffuse sensor

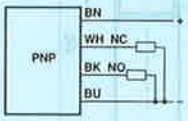
with integral transmitter and receiver, built in protective circuit (short circuit proof), and LED.

with grey cable:

Type SOE-RT-Q-PS/O-K-LED

with grey plug and light emitting diode:

Type SOE-RT-Q-PS/O-S-LED

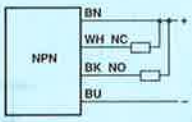


with black cable:

Type SOE-RT-Q-NS/O-K-LED

with black plug and light emitting diode:

Type SOE-RT-Q-NS/O-S-LED



Colour identification
br = brown
w = white
blk = black
bl = blue

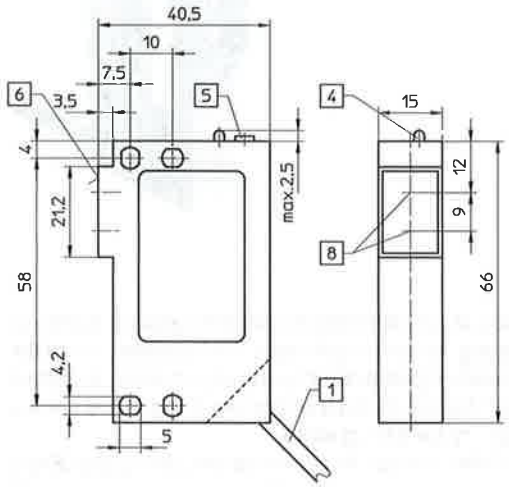
Contactless detection of objects is achieved by the diffuse sensor's transmitter projecting a beam of pulsating infra-red light from the invisible part of the spectrum. When the emitted beam is penetrated by the object to be detected, the light reflected by its surface, impinges on the receiver fitted in the sensor housing, and causes a change in switching state.
Depending on the reflectivity of the surface, the nominal switching gap (Sn) is reduced by taking a correction factor into account.

8

Accessories:
Mounting bracket, type SOE-BW-Q
Cable with socket for sensors with plug connection.
Special version:
90 deg. angle socket (WD) or straight socket (GD)
Order code:
35 543 SIM-K-4-GD-2.5, cable length 2.5 m
35 544 SIM-K-4-WD-2.5
35 545 SIM-K-4-GD-5, cable length 5 m
35 546 SIM-K-4-WD-5
see sheet 2.385

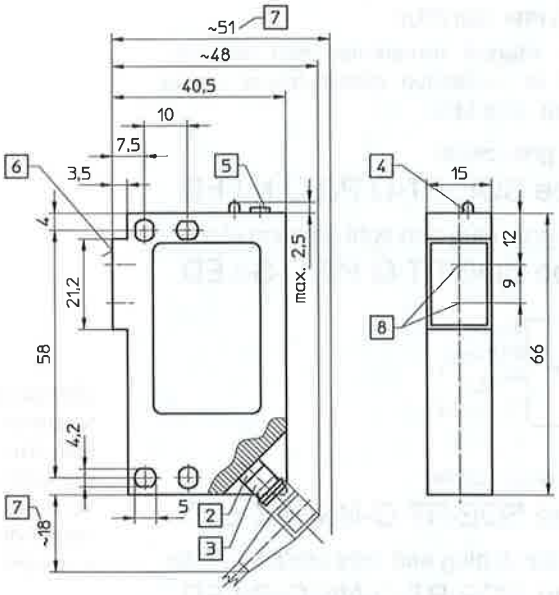
Order code	PNP output	31 323 SOE-RT-Q-PS/O-K-LED	35 542 SOE-RT-Q-PS/O-S-LED
	NPN output	31 324 SOE-RT-Q-NS/O-K-LED	35 541 SOE-RT-Q-NS/O-S-LED
Part No./Type	Mounting bracket	31 797 SOE-BW-Q	
Medium		Electric current	
Design		Opto-electronic proximity switch	
Mounting		4 through holes in housing	
Connection		4-wire cable, 2.5 m long	plug connection
Switching voltage		10 to 30 V DC	
Residual ripple		max. ±10%	
Switching current		max. 200 mA	
Contact rating		max. 6 W	
Switching frequency		max. 250 Hz	
Response time		min. 1.5 ms optical influence	
Drop-off time		min. 2.5 ms optical influence	
Nominal switching gap (S_n)		360 mm	
Effective switching gap (S_a)		Potentiometer in l.h. stop (min.) 0 to 200 mm	
		Potentiometer in r.h. stop (max.) 1 to 360 mm	
Switching loop		Approach curve and switching hysteresis, see diagram (overleaf)	
Switching hysteresis		2 to 15% of S_n with axial approach	
Reproducible switching accuracy		±10% of S_n	
Degree of protection (DIN 40050)		IP 65	
Temperature range		0 to +60 °C	
Materials		Housing: die-cast Al; Lens: optical mirror glass	
Weight		0.192 kg	0.110 kg

Type SOE-RT-Q-...-K-LED

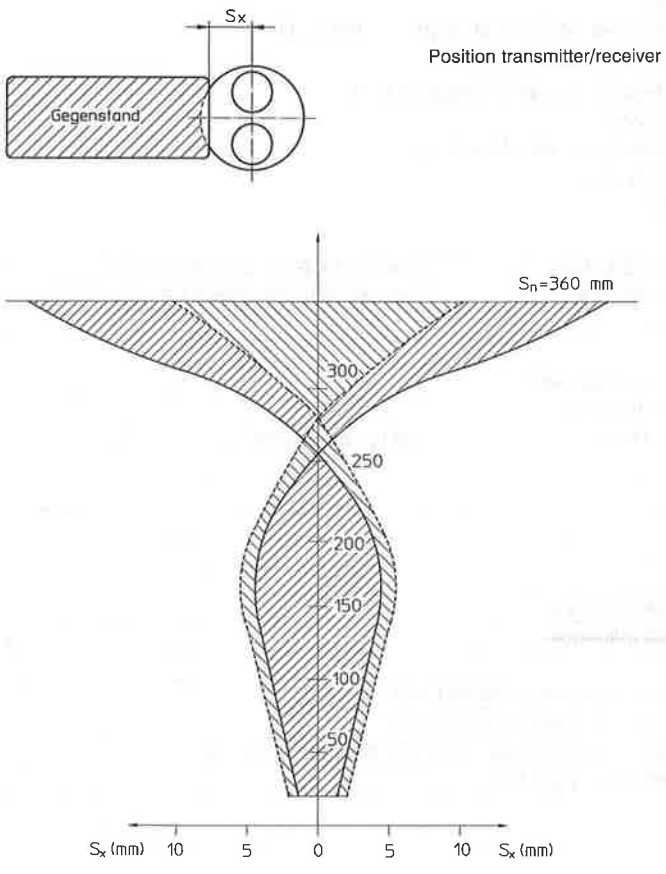


1 4-wire cable, 2.5 m long
4.6 mm dia (4 × 0.25 mm²)
PNP = grey
NPN = black
2 Plug PNP = grey
NPN = black
3 Light emitting diode, green
4 Light emitting diode, yellow
5 Potentiometer
6 Datum face for nominal switching gap (S_n)
7 Mounting space for 90° angle socket
8 Centre of light beams

Type SOE-RT-Q-...-S-LED

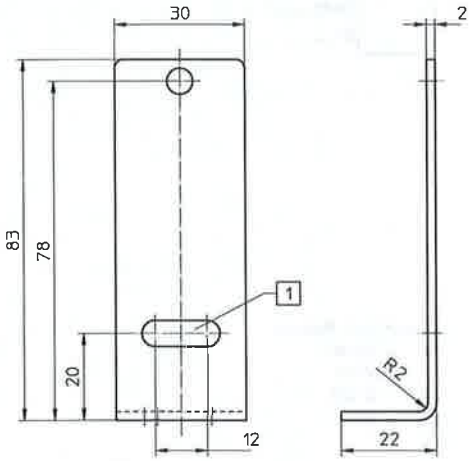


Approach curve and switching hysteresis (switching loop)



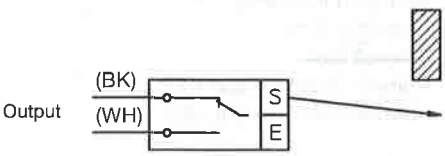
- - - - - - off: Sensor not attenuated
——— on: Sensor attenuated

Mounting bracket
Type SOE-BW-Q



1 for M4 screws
2 for M5 screws

Circuit diagram
Change-over switch function with PS and NS version No object:



Object present: