Altech Corp.®

Serving the Automation & Control Industry since 1984

Quality System

Quality Endorsed Company

Altech Corp.®
by BERNSTEIN

Complete Range Sensor Systems

Altech Corp.®

Since 1984, Altech Corporation has grown to become a leading supplier of automation and industrial control components. Headquartered in Flemington, NJ, Altech has an experienced staff of engineering, manufacturing and sales personnel to provide the highest quality products with superior service. This is the Altech Commitment!

With experienced Product Engineers and Customer Service personnel, Altech provides solutions to your most pressing application challenges. All with one thought in mind - ***to ensure that we solve your problem the first time!***

Altech's Commitment

Altech's Automation and Control components meet applicable national and international standards, such as UL, NEC, CSA, IEC and VDE. Altech provides these products with superior customer service and delivery through a ISO 9001 Quality Management system, which stresses continuous process improvement. We perform these services with honesty and integrity. All Altech employees are trained in this Quality Management System and are dedicated to achieve these goals. Altech's quality system has been ISO approved since 1999.

Altech Corp.®
by BERNSTEIN

Product Line
Sensor Systems

Sensor systems – Compact intelligence

BERNSTEIN is an established manufacturer of high quality electromechanical and electronic low voltage switching devices and sensors. Our products are used in the most diverse range of applications, ranging from lift construction through wood-working and packaging machines through to machine tools.

Contactless sensors are characterised by absolute reliability, suitability for a wide range of applications and optimum cost-benefit ratio. Their main purpose is to convert mechanical movement into electrical signals that are processed in control systems.

In modern day applications, however, sensors directly connected to bus systems are being used to an ever greater extent to monitor mechanical movement and convert it into digital information.

Selecting the right sensor for the job depends on the prevailing ambient and operating conditions as well as corresponding technical requirements. In addition to the detection method (inductive, capacitive, optical, ultrasonic or magnetic) it is also necessary to select the corresponding output function (PNP, NPN, AC, normally-closed or normally-open contact). Sensing distances as well as the direction and type of approach are also important selection criteria. In view of the large number of possible combinations, the scope of application is virtually unlimited.

Maximum functions – minimum space

The range of applications in which limit switches are used has changed in line with increasing automation. Sensors are no longer used purely for the purpose of detecting position but rather they must be able to output analogue values for the purpose of calculating the distance with the necessary signal processing already taking place in the sensor itself. A sensor can also be used to sample two switching points in order to reduce the number of components in machines and systems.

This functionality is achieved by the use of state-of-the-art microcontrollers and advanced sensor technologies. Modern sensors from BERNSTEIN therefore open up new applications, extend the range of functions and as a result significantly increase efficiency.

Complementing our product range we offer attractive customer services:

- Assistance in assessing risk and configuring safety functions
- Preassembly of products with standard power supply lines or customised cables
- Supply of M8 or M12 connection technology
- Development of sensors to customer specifications
- Development and manufacture of customer-specific system solutions

Inductive Sensors

Capacitive Sensors

Optoelectronic Sensors

Magnetic Switches

Slot Sensors

Contactless safety technology

Ultrasonic Sensors

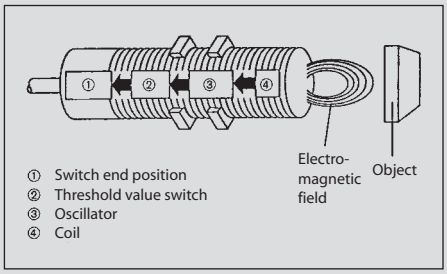
Float Switches

Accessories

Annex

Functional principle

In general, inductive proximity switches consist of four basic elements: a coil, an oscillator, a threshold switch and an output stage with short-circuit protection. The oscillator generates a high frequency, electromagnetic alternating field which is emitted from the active face of the coil. Eddy currents are induced in a metal object that enters this field. These eddy currents draw energy from both the electromagnetic field and from the oscillator which is consequently attenuated. The more energy taken the closer the metal object moves towards the active face. The threshold switch switches on the output stage at a defined attenuation value. In proximity switches with a DC voltage supply, this switch is designed as an NPN transistor which switches the connected load to the negative pole or as a PNP transistor which switches the load to the positive pole. The output stage is a thyristor or a triac in AC voltage switches.

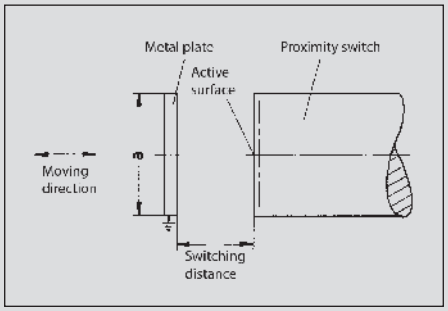


Sensing distance

The sensing distance (gap) is determined by the coil diameter, i.e. larger sensors are required for larger sensing distances. The sensing distance is also dependent on the size of the metal object to be detected as well as the material it is made from.

Target

The sensing distance is measured with a 1 mm thick square measuring plate made of steel (ST 37) referred to as a target. The edge length is equal to the diameter of the active face or equal to three times the sensing distance depending on which value is greater.



Nominal sensing distance: (Sn)

The nominal sensing distance is a device-specific characteristic value that is dependent on the coil diameter.

Real sensing distance: (Sr)

The real sensing distance is measured at nominal voltage and nominal temperature. It must be between 90 % – 110 % of the nominal sensing distance.

Useable sensing distance: (Su)

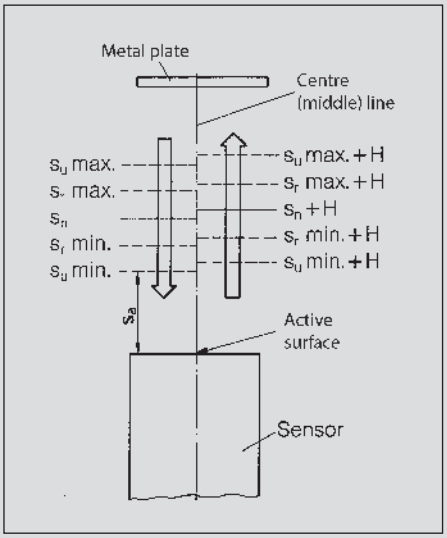
The useable sensing distance is measured within the permissible temperature and voltage ranges and is 90 % – 110 % of the real sensing distance.

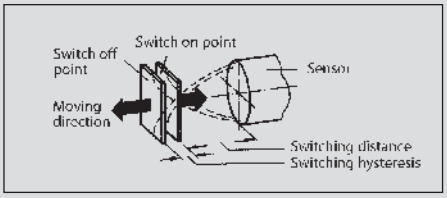
Operational sensing distance: (Sa) (Assured operation distance)

The operational sensing distance takes into account the influence of the supply voltage, temperature and control systems. Reliable switching under all permissible operating conditions is assured within 0 % – 81 % of the nominal sensing distance. Sa ~ 0.81 Sn.

Hysteresis: (H)

Hysteresis refers to the difference between the switch-on point as an object approaches and the switch-off point as the object moves away. This hysteresis is specified as a percentage of the nominal sensing distance and is typically 10 %. It is required to prevent the output chattering in response to slowly approaching objects, temperature drift, electrical interference or vibration.



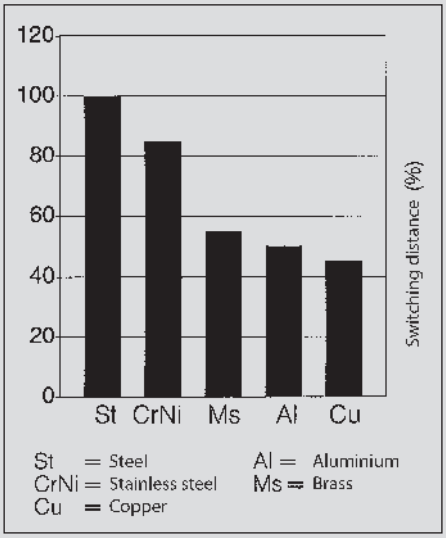


Repeatability

Repeatability is the ability of a sensor to repeatedly detect and object at the same distance away from the sensing surface. The typical deviation is < 5 %.

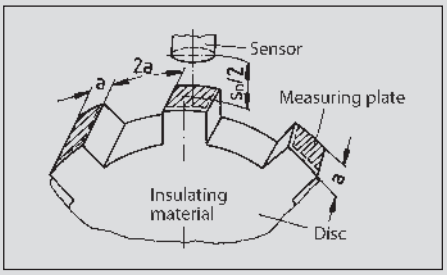
Reduction factors

The definition of the sensing distance is based on the measurement performed with a standardised square target made of steel. If other materials with the same dimensions are used, the sensing distance will be reduced as shown in the following graphic.



Switching frequency

The switching frequency is measured with a redating, non-conductive plate, on which the standard targets are mounted as illustrated (size of targets as previously defined).



The distance between the targets and sensor is equal to half the nominal sensing distance. The maximum switching frequency is reached when the switch-on or switch-off signal time drops below 50 µs.

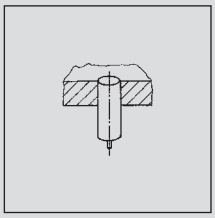
Temperaturee range

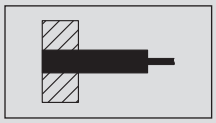
For most sensors, the permissible ambient temperature range is between –25 °C and +70 °C (–13 °F to +158 °F). Sensors with an extended temperature range of – 40 °C to +100 °C are also available.

Assembly

Inductive sensors contain a coil on a ferromagnetic core that bundles the electromagnetic alternating field. The core is installed into the enclosure in such a way that the field emerges from the switch at the active face. A part of the magnetic field, however, also emerges from the side of the core. The sensor in a flush mount arrangement would already be influenced by the metal on the sides. For this reason, a metal band is fitted about the core in plastic enclosures, thus restricting the lateral magnetic field in a flush mount configuration. Due to the pre-attenuation attributed to the metal ring or a metal enclosure, flush mount versions have a shorter sensing distance than non-flush mount sensors and can be mounted closer to each other.

Flush mount

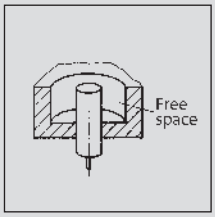


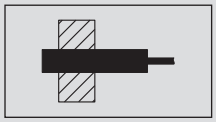


Catalogue symbol for flush mount

The active face can be flush with a metal surface.

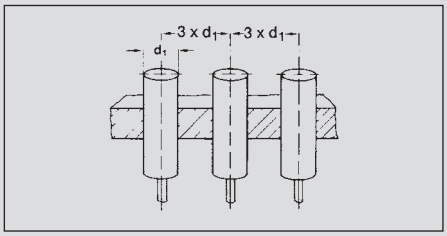
Non-flush mount



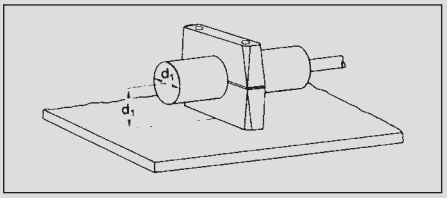


Catalogue symbol for non-flush mount

Sensors for non-flush mount require a clearance equal to three times the sensor enclosure diameter and a min. depth of 2x Sn.



Minimum spacing between non-flush mount sensors



Installation with a mounting bracket parallel to a steel wall

NAMUR sensors

(Standardization association for measurement and control in chemical industries)

Protection class

Corresponding to their ID code, the enclosures are dustproof and waterproof in accordance with IP 65 or IP 67 (EN 60529).

Short-circuit protection

Standard sensors are predected against short-circuit (cyclic) and polarity reversal.

Tightening torque requirements

BERNSTEIN supplies corresponding mounting nuts with its sensors. Refer to the respective datasheets for the required tightening torque.

Tightening torque examples for sensors in brass enclosure:	
M4	0.8 Nm
M5	1.5 Nm
M8	8 Nm
M12	10 Nm
M18	25 Nm
M30	70 Nm

Materials

The sensors are predected by a glass fibre reinforced thermoplastic, brass or stainless steel enclosure. The connection cable has a PVC or PU sheathing.

Connection systems

The following connection systems are available for standard sensors:

- ⌘ Cable variants (2 m) with PVC or PUR sheathing
- ⌘ Connector variants with M8, M12 connector or connector conforming to DIN 43650
- ⌘ Quick-connect system with Ultralock connectors

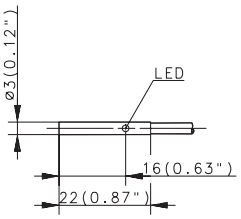
Standards and approvals

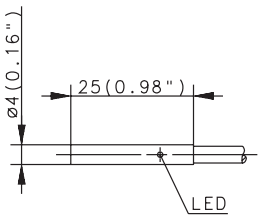
All sensors are CE-certified. The following European standards apply in accordance with CENELEC:

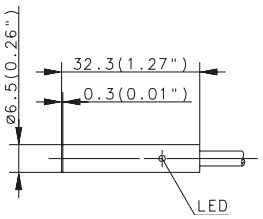
- ⌘ EN 60947-5-2 Proximity switches
- ⌘ EN 60947-5-6 NAMUR sensors

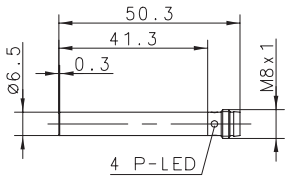
Inductive Sensors (Type Ø 3 mm, Ø 4 mm, Ø 6.5 mm, M4, M5)

Type			Ø 3 mm	Ø 4 mm	Ø 6.5 mm	
Type of installation			Flush	Flush	Flush	Flush
Nominal sensing distance			0.6 mm	0.8 mm	1.5 mm	1.5 mm
Type of connection			Cable 2 m	Cable 2 m	Cable 2 m	Connector M8
Special feature						









PNP	DC	NO contact	6502999019	6502999004	6502999010	6502999012
		Type	KIB-D03PS/0,6-KL2PU	KIB-D04NS/0,8-KL2PU	KIB-D06PS/1,5-KL2	KIB-D06PS/1,5-KLSM8
		NC contact	6502799007	6502799002	6502799011	
		Type	KIB-D03PÖ/0,6-KL2PU	KIB-D04PÖ/0,8-KL2PU	KIB-D06PÖ/1,5-KL2	
		Antivalent NO/NC				
NPN	DC	NO contact		6502399004		
		Type		KIB-D04NS/0,8-KL2PU		
		NC contact				
		Antivalent NO/NC				
PNP/NPN	DC	NO/NC prog.				
		push-pull operation				
NAMUR	DC					
		Type				
Analogue	DC					
2-wire	DC	NO contact				
		NC contact				
	AC	NO contact				
		NC contact				
		Changeover contact				

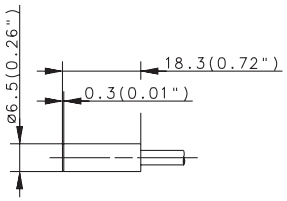
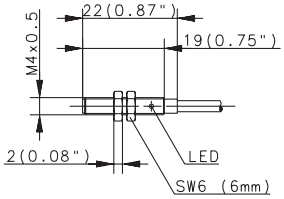
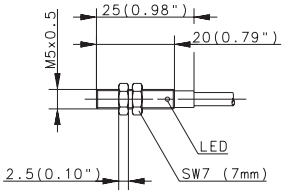
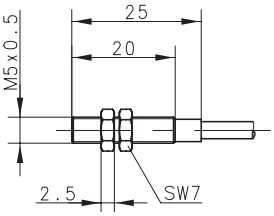
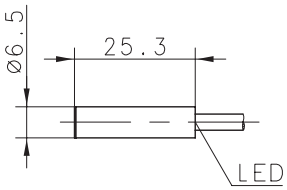
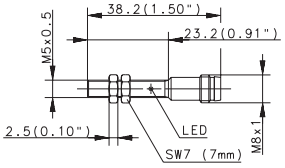
Technical data

Rated operating voltage	U_B	10–30 VDC	10–30 VDC	10–36 VDC	10–36 VDC
Rated operating current	I_B	100 mA	200 mA	200 mA	200 mA
Switching frequency (max)	F	3000 Hz	3000 Hz	1000 Hz	1000 Hz
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable					

Mechanical data

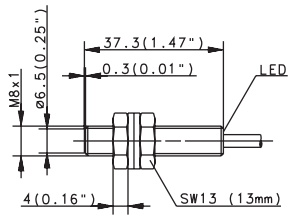
Ambient temperature (min/max)		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67
Enclosure material		Stainless steel 1.4305	Stainless steel 1.4401	Stainless steel 1.4401	Stainless steel 1.4401
Connection		3 x 0.055 mm²	3 x 0.14 mm²	3 x 0.14 mm²	M8 x 1

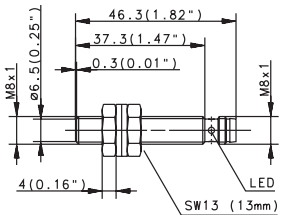
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

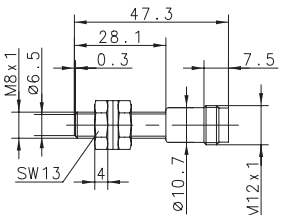
Ø 6.5 mm		M4		M5		M5
Flush	Flush	Flush		Flush	Flush	Flush
1.5 mm	1.5 mm	0.6 mm		1 mm	1 mm	1 mm
Cable 2 m	Cable 5 m	Cable 2 m		Cable 2 m	Connector M8	Cable 2 m NAMUR
						
						
6502999034 KIB-D06PS/1,5-K2VPU	6602999460 KIB-D06PS/1,5-KL5V	6502999020 KIB-M04PS/0,6-KL2PU		6502999003 KIB-M05NS/001-KL2PU 6502799001 KIB-M05PÖ/001-KL2PU	6502999018 KIB-M05PS/001-KLSM8 6502799019 KIB-M05PÖ/001-KLSM8	
				6502399003 KIB-M05NS/001-KL2PU		
						6501699008 KIB-M05EA/001-2
10–36 VDC	10–36 VDC	10–30 VDC		10–30 VDC	10–30 VDC	5–25 VDC
200 mA	200 mA	100 mA		200 mA	200 mA	–
1000 Hz	1000 Hz	3000 Hz		3000 Hz	3000 Hz	3 kHz
Cyclic	Cyclic	Cyclic		Cyclic	Cyclic	–
–/–	LED/–	LED/–		LED/–	LED/–	–/–
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
IP67	IP67	IP67		IP67	IP67	IP67
Stainless steel 1.4401	Stainless steel 1.4401	Stainless steel 1.4305		CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.055 mm²		3 x 0.14 mm²	M8 x 1	2 x 0.14 mm²

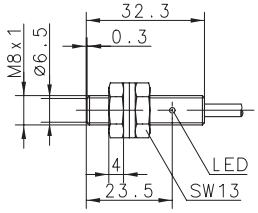
Inductive Sensors (Type M8)

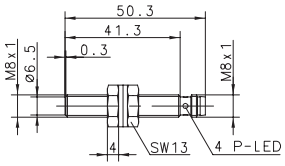
Type			M8		M8		M8
Type of installation			Flush	Flush	Flush	Flush	Flush
Nominal sensing distance			1.5 mm	1.5 mm	1.5 mm	1.5 mm	1.5 mm
Type of connection			Cable 2 m	Cable 6 m	Connector M8	Connector M8	Connector M12
Special feature							











PNP	DC	NO contact	6932901001	6502901004	6932942001		6502942007	
		Type	KIB-M08PS/1,5-KL2	KIB-M08PS/1,5-KL6	KIB-M08PS/1,5-KLSM8		KIB-M08PS/0,1-KS12	
		NC contact		6502701001		6502742001		
		Type		KIB-M08PÖ/1,5-KL2		KIB-M08PÖ/1,5-KLSM8		
		Antivalent NO/NC						
NPN	DC	NO contact	6932301001		6932342001			
		Type	KIB-M08NS/1,5-KL2		KIB-M08PS/1,5-KLSM8			
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		push-pull operation						
NAMUR	DC							
		Type						
Analogue	DC							
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact						
		NC contact						
		Changeover contact						

Technical data

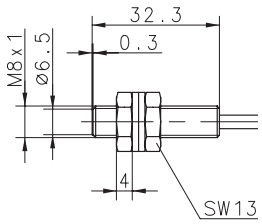
Rated operating voltage	U_B	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC
Rated operating current	I_B	200 mA	200 mA	200 mA	200 mA	200 mA
Switching frequency (max)	F	1000 Hz	1000 Hz	1000 Hz	1000 Hz	1000 Hz
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	–/–
Sensing distance, adjustable						

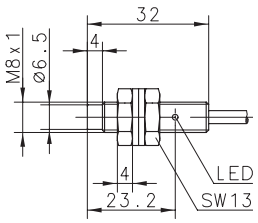
Mechanical data

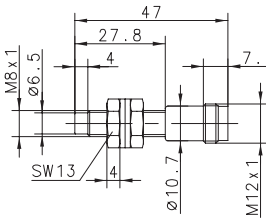
Ambient temperature (min/max)	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67	IP67
Enclosure material	Stainless steel 1.4305	Stainless steel 1.4305	Stainless steel 1.4305	Stainless steel 1.4305	Stainless steel 1.4305
Connection	3 x 0.14 mm²	3 x 0.14 mm²	M8 x 1	M8 x 1	M12 x 1

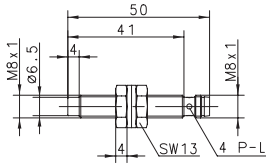
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

M8	M8		M8	
Flush 1.5 mm Cable 2 m NAMUR	Non-flush 2 mm Cable 2 m	Non-flush 2 mm Connector M8	Non-flush 2 mm Connector M12	









		6502916003 KIN-M08PS/002-KL2	6502942006 KIN-M08PS/002-KLSM8	6502942008 KIN-M08PS/002-KS12			
6501601003 KIB-M08EA/1,5-2							

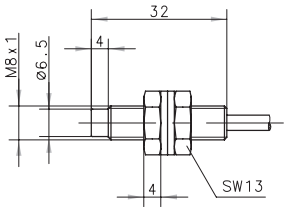
5–25 VDC	10–36 VDC	10–36 VDC	10–36 VDC	
–	200 mA	200 mA	200 mA	
1 kHz	750 Hz	750 Hz	750 Hz	
–	Cyclic	Cyclic	Cyclic	
–/–	LED/–	LED/–	–/–	

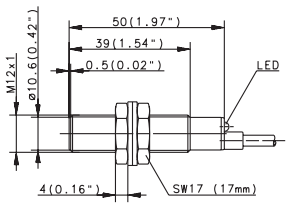
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	
IP67	IP67	IP67	IP67	
Stainless steel 1.4305	Stainless steel 1.4305	Stainless steel 1.4305	Stainless steel 1.4305	
2 x 0.25 mm²	3 x 0.14 mm²	M8 x 1	M12 x 1	

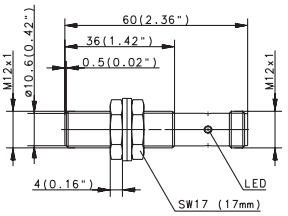
You will find detailed data sheets to the products under www.bernstein.eu

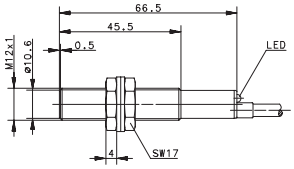
Inductive Sensors (Type M8, M12)

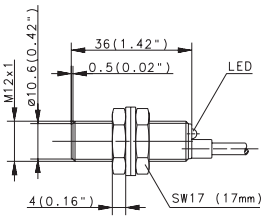
Type			M8	M12		M12	
Type of installation			Non-flush	Flush	Flush	Flush	Flush
Nominal sensing distance			2 mm	2 mm	2 mm	2 mm	2 mm
Type of connection			Cable 2 m	Cable 2 m	Cable 2 m	Connector M12	Cable 2 m
Special feature			NAMUR				











PNP	DC	NO contact			6932903001		6932943001	6502903016
		Type			KIB-M12PS/002-KL2		KIB-M12PS/002-KLS12	KIB-M12PS/002-KL2V
		NC contact					6602743112	6502703005
		Type					KIB-M12PÖ/002-KLS12	KIB-M12PÖ/002-KL2V
		Antivalent NO/NC						
NPN	DC	NO contact			6932303001		6932343001	
		Type			KIB-M12NS/002-KL2		KIB-M12NS/002-KLS12	
		NC contact						6502103003
		Type						KIB-M12NÖ/002-KL2V
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		push-pull operation						
NAMUR	DC		6501601005					
		Type	KIN-M08EA/002-2					
Analogue	DC							
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact				6503503001		
		Type				KIB-M12AS/002-L2		
		NC contact						
		Changeover contact						

Technical data

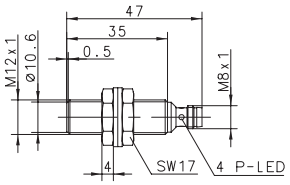
Rated operating voltage	U_B	5–25 VDC		10–36 VDC	76–250 V AC	10–36 VDC	10–36 VDC
Rated operating current	I_B	–		200 mA	200 mA	200 mA	200 mA
Switching frequency (max)	F	1 kHz		800 Hz	10 Hz	800 Hz	800 Hz
Short circuit-protection		–		Cyclic	–	Cyclic	Cyclic
Function/operating voltage indicator		–/–		LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable							

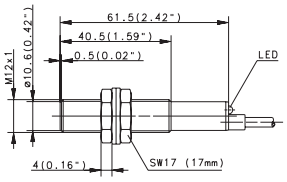
Mechanical data

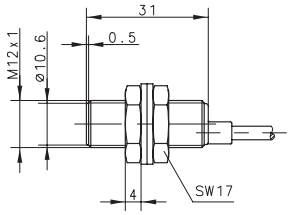
Ambient temperature (min/max)	–25°C/+70°C		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67		IP67	IP67	IP67	IP67
Enclosure material	Stainless steel 1.4305		CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
Connection	2 x 0.25 mm²		3 x 0.14 mm²	2 x 0.14 mm²	M12 x 1	3 x 0.14 mm²

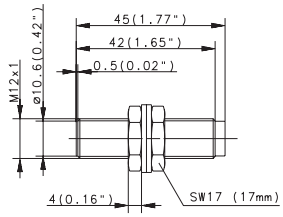
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

M12		M12	M12	
Flush 2 mm Connector M8	Flush 2 mm Connector M12	Flush 2 mm Cable 2 m 4000 Hz	Flush 2 mm Cable 2 m NAMUR	









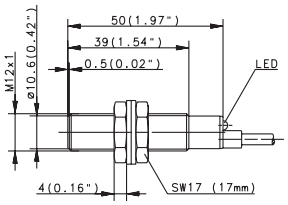
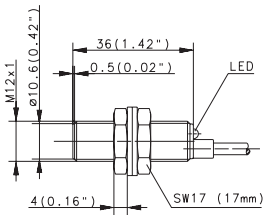
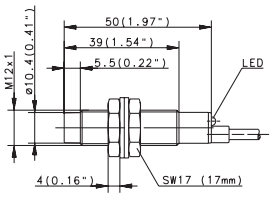
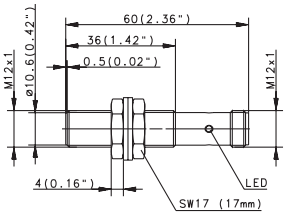
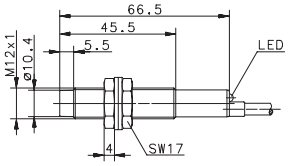
6502943008 KIB-M12PS/002-KLSM8V	6502943006 KIB-M12PS/002-KS12V 6502743005 KIB-M12PÖ/002-KS12V	6502903012 KIB-M12PS/002-KL2F					
				6501624760 KIB-M12EA/002-2			

10–30 VDC	10–36 VDC	10–60 VDC	5–25 VDC	
200 mA	200 mA	200 mA	–	
800 Hz	800 Hz	4000 Hz	800 Hz	
Cyclic	Cyclic	Cyclic	–	
LED/–	–/–	LED/–	–/–	

–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	
IP67	IP67	IP67	IP67	
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	
M8 x 1	M12 x 1	3 x 0.14 mm²	2 x 0.25 mm²	

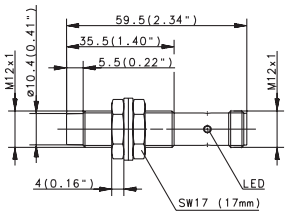
You will find detailed data sheets to the products under www.bernstein.eu

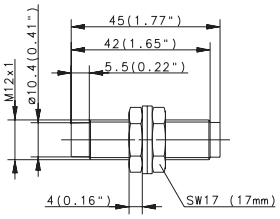
Inductive Sensors (Type M12)

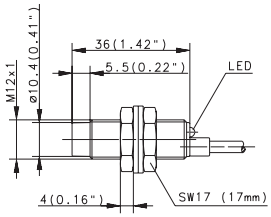
Type			M12		M12		M12	
Type of installation			Flush	Flush	Flush		Non-flush	Non-flush
Nominal sensing distance			4 mm	4 mm	4 mm		4 mm	4 mm
Type of connection			Cable 2 m	Connector M12	Cable 2 m		Cable 2 m	Cable 2 m
Special feature			Sensing dist.	Sensing dist.	Sensing dist.			
								
								
PNP	DC	NO contact	6502903025	6502943015	6502903023		6932904001	
		Type	KIB-M12PS/004-KL2E	KIB-M12PS/004-KLS12E	KIB-M12PS/004-KL2VE		KIN-M12PS/004-KL2	
		NC contact					6932704001	
		Type					KIN-M12PÖ/004-KL2	
		Antivalent NO/NC						
NPN	DC	NO contact					6932304001	
		Type					KIN-M12NS/004-KL2	
		NC contact					6932104001	
		Type					KIN-M12NÖ/004-KL2	
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		push-pull operation						
NAMUR	DC							
Analogue	DC							
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact						6503504001
		Type						KIN-M12AS/004-L2
		NC contact						6503404001
		Type						KIN-M12AÖ/004-L2
		Changeover contact						
Technical data								
Rated operating voltage		U_B	10–30 VDC	10–36 VDC	10–36 VDC		10–36 VDC	76–250 V AC
Rated operating current		I_B	200 mA	200 mA	200 mA		200 mA	200 mA
Switching frequency (max)		F	800 Hz	800 Hz	800 Hz		400 Hz	10 Hz
Short circuit-protection			Cyclic	Cyclic	Cyclic		Cyclic	–
Function/operating voltage indicator			LED/–	LED/–	LED/–		LED/–	LED/–
Sensing distance, adjustable								
Mechanical data								
Ambient temperature (min/max)			–25°C/+70°C	–25°C/+70°C	–25°C/+70°C		–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529			IP67	IP67	IP67		IP67	IP67
Enclosure material			CuZn39Pb3	CuZn39Pb3	CuZn39Pb3		CuZn39Pb3	CuZn39Pb3
Connection			3 x 0.14 mm²	M12 x 1	3 x 0.14 mm²		3 x 0.14 mm²	2 x 0.14 mm²

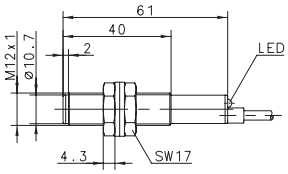
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

M12		M12			
Non-flush 4 mm Connector M12	Non-flush 4 mm Cable 2 m	Non-flush 4 mm Connector M12	Non-flush 4 mm Cable 2 m Plastic		









6932944001 KIN-M12PS/004-KLS12 6502744003 KIN-M12PÖ/004-KLS12	6502904014 KIN-M12PS/004-KL2V	6502944006 KIN-M12PS/004-KS12V	6502919001 KIN-T12PS/004-KL2				
6932344001 KIN-M12NS/004-KLS12							

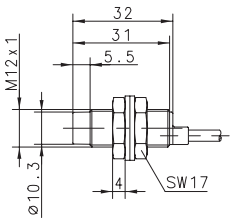
10–36 VDC	10–36 VDC	10–36 VDC	10–30 VDC		
200 mA	200 mA	200 mA	200 mA		
400 Hz	400 Hz	400 Hz	400 Hz		
Cyclic	Cyclic	Cyclic	Cyclic		
LED/–	LED/–	–/–	LED/–		

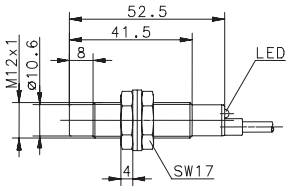
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C		
IP67	IP67	IP67	IP67		
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	PA, red		
M12 x 1	3 x 0.14 mm²	M12 x 1	3 x 0.14 mm²		

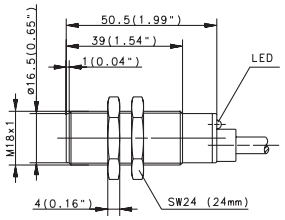
You will find detailed data sheets to the products under www.bernstein.eu

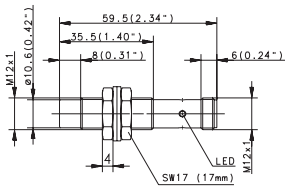
Inductive Sensors (Type M12, M18)

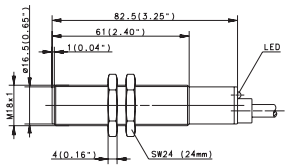
Type			M12	M12		M18	
Type of installation			Non-flush	Non-flush	Non-flush	Flush	Flush
Nominal sensing distance			4 mm	8 mm	8 mm	5 mm	5 mm
Type of connection			Cable 2 m	Cable 2 m	Connector M12	Cable 2 m	Cable 2 m
Special feature			NAMUR	Sensing dist.	Sensing dist.		











PNP	DC	NO contact			6502904021	6502944013	6932905001
		Type			KIN-M12PS/008-KL2E	KIN-M12PS/008-KLS12E	KIB-M18PS/005-KL2
		NC contact					6932705001
		Type					KIB-M18PÖ/005-KL2
		Antivalent NO/NC					
		Type					
NPN	DC	NO contact				6602344458	
		Type				KIN-M12NS/008-KLS12E	
		NC contact					6932105001
		Type					KIB-M18NÖ/005-KL2
		Antivalent NO/NC					
PNP/NPN	DC	NO/NC prog.					
		push-pull operation					
NAMUR	DC		6501625761				
		Type	KIN-M12EA/004-2				
Analogue	DC						
2-wire	DC	NO contact					
		NC contact					
	AC	NO contact					6503505004
		Type					KIB-M18AS/005-L2
		NC contact					6503405001
		Type					KIB-M18AÖ/005-L2
		Changeover contact					

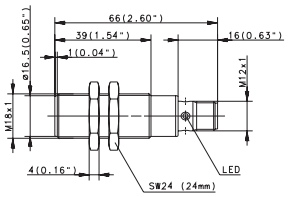
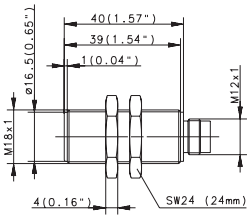
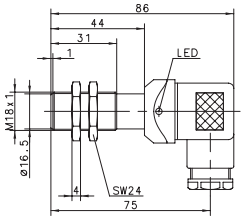
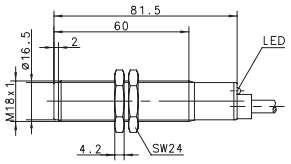
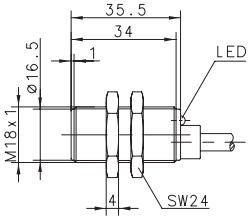
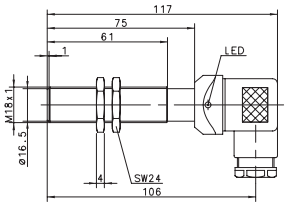
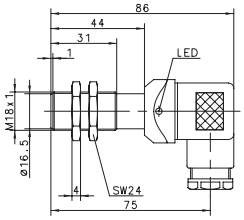
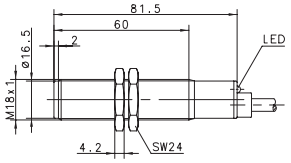
Technical data

Rated operating voltage	U_B	5–25 VDC	10–36 VDC	10–36 VDC	10–36 VDC	20–250 V AC
Rated operating current	I_B	–	200 mA	200 mA	200 mA	400 mA
Switching frequency (max)	F	400 Hz	400 Hz	400 Hz	500 Hz	10 Hz
Short circuit-protection		–	Cyclic	Cyclic	Cyclic	–
Function/operating voltage indicator		–/–	LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable						

Mechanical data

Ambient temperature (min/max)	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67	IP67
Enclosure material	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
Connection	2 x 0.25 mm²	3 x 0.14 mm²	M12 x 1	3 x 0.5 mm²	2 x 0.5 mm²

Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

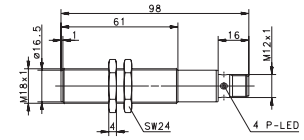
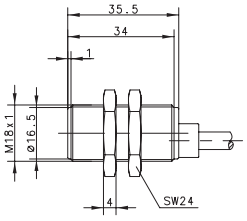
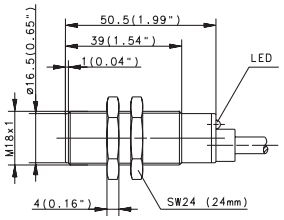
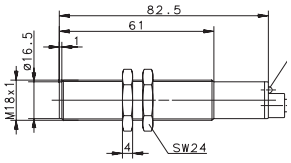
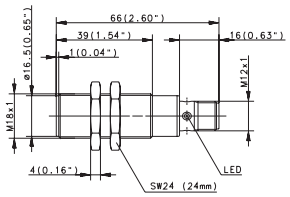
M18		M18		M18		M18	
Flush	Flush	Flush	Flush	Flush	Flush	Flush	Flush
5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm	5 mm
Connector M12	Cable 6 m	Connector M12	DIN Connector	DIN Connector	DIN Connector	Cable 2 m Plastic	Cable 2 m Plastic
							
							
6932905004 KIB-M18PS/005-KLS12	6502905013 KIB-M18PS/005-KL6V	6502905012 KIB-M18PS/005-KS12V 6502705007 KIB-M18PÖ/005-KS12V	6602905662 KIB-M18PS/005-KLSD 6502705001 KIB-M18PÖ/005-KLSD	6502940001 KIB-M18PS/005-KLSDV	6502840002 KIB-M18PU/005-KSDV	6502920990 KIB-T18PS/005-KL2	
6932305004 KIB-M18NS/005-KLS12							
							6503520697 KIB-T18AS/005-L2

10–36 VDC	10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC	24–250 V AC
200 mA	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA
500 Hz	500 Hz	500 Hz	500 Hz	500 Hz	500 Hz	500 Hz	10 Hz
Cyclic	Cyclic	Cyclic	–	Cyclic	Cyclic	Cyclic	–
LED/–	LED/–	–/–	LED/–	LED/–	–/–	LED/–	LED/–

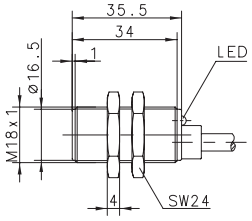
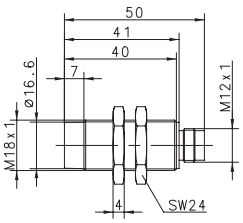
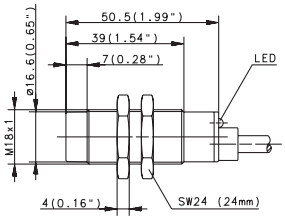
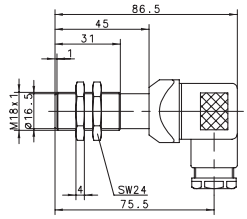
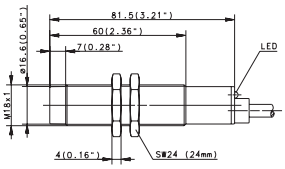
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
IP67	IP67	IP67	IP65	IP65	IP65	IP67	IP67
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	PA, red	PA, red
M12 x 1	3 x 0.5 mm²	M12 x 1	DIN 43650	DIN 43650	DIN 43650	3 x 0.5 mm²	2 x 0.5 mm²

You will find detailed data sheets to the products under www.bernstein.eu

Inductive Sensors (Type M18)

Type			M18		M18	M18	
Type of installation			Flush	Flush	Flush	Flush	Flush
Nominal sensing distance			5 mm	5 mm	5 mm	8 mm	8 mm
Type of connection			Connector M12	Cable 2 m	Cable 2 m	Cable 2 m	Connector M12
Special feature			Temperature	Temperature	NAMUR	Sensing dist.	Sensing dist.
							
							
PNP	DC	NO contact	6502940006	6502905023			6502905022	6502940005
		Type	KIB-M18PS/005-KLS12T	KIB-M18PS/005-KL2PUT			KIB-M18PS/008-KL2E	KIB-M18PS/008-KLS12E
		NC contact						
		Type						
		Antivalent NO/NC						
		Type						
NPN	DC	NO contact						
		Type						
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		push-pull operation						
NAMUR	DC				6501626762			
		Type			KIB-M18EA/005-2			
Analogue	DC							
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact						
		Type						
		NC contact						
		Type						
		Changeover contact						
Technical data								
Rated operating voltage		U_B	10–30 VDC	10–30 VDC	5–25 VDC		10–36 VDC	10–36 VDC
Rated operating current		I_B	200 mA	200 mA	–		200 mA	200 mA
Switching frequency (max)		F	500 Hz	500 Hz	400 Hz		500 Hz	500 Hz
Short circuit-protection			Cyclic	Cyclic	–		Cyclic	Cyclic
Function/operating voltage indicator			LED/–	LED/–	–/–		LED/–	LED/–
Sensing distance, adjustable								
Mechanical data								
Ambient temperature (min/max)			–40°C/+100°	–40°C/+100°	–25°C/+70°C		–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529			IP67	IP67	IP67		IP67	IP67
Enclosure material			CuZn39Pb3	CuZn39Pb3	CuZn39Pb3		CuZn39Pb3	CuZn39Pb3
Connection			M12 x 1	3 x 0.5 mm²	2 x 0.5 mm²		3 x 0.5 mm²	M12 x 1

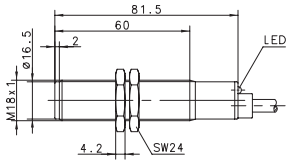
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

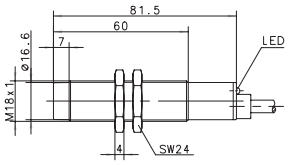
M18		M18		M18		
Flush	Flush	Flush		Non-flush	Non-flush	
8 mm	8 mm	8 mm		8 mm	8 mm	
Cable 2 m	DIN Connector	Connector M12		Cable 2 m	Cable 2 m	
Sensing dist.	Sensing dist.	Sensing dist.				
						
						
6502905010 KIB-M18PS/008-KL2VE	6602840128 KIB-M18PU/008-KSDVE	6502906009 KIB-M18PS/008-KS12V		6932906001 KIN-M18PS/008-KL2 6932706001 KIN-M18PÖ/008-KL2		
				6932306001 KIN-M18NS/008-KL2		
					6503506002 KIN-M18AS/008-L2 6503406001 KIN-M18AÖ/008-L2	
10–36 VDC	12–48 VDC	10–60 VDC		10–36 VDC	20–250 V AC	
200 mA	400 mA	200 mA		200 mA	400 mA	
500 Hz	500 Hz	200 Hz		200 Hz	10 Hz	
Cyclic	–	Cyclic		Cyclic	–	
LED/–	–/–	–/–		LED/–	LED/–	
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C		–25°C/+70°C	–25°C/+70°C	
IP67	IP65	IP67		IP67	IP67	
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3		CuZn39Pb3	CuZn39Pb3	
3 x 0.5 mm²	DIN 43650	M12 x 1		3 x 0.5 mm²	2 x 0.5 mm²	

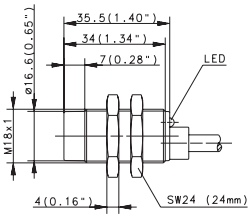
You will find detailed data sheets to the products under www.bernstein.eu

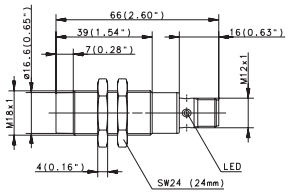
Inductive Sensors (Type M18)

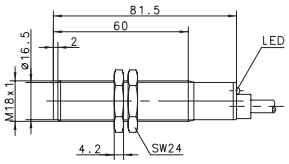
Type			M18		M18		M18
Type of installation			Non-flush	Non-flush	Non-flush	Non-flush	Non-flush
Nominal sensing distance			8 mm	8 mm	8 mm	8 mm	8 mm
Type of connection			Cable 2 m	Connector M12	Cable 2 m	Cable 2 m	Cable 2 m
Special feature			Plastic			Plastic	











PNP	DC	NO contact		6932906004		6502921975	6502906006	
		Type		KIN-M18PS/008-KLS12		KIN-T18PS/008-KL2	KIN-M18PS/008-KL2V	
		NC contact		6932706002			6502706002	
		Type		KIN-M18PÖ/008-KLS12			KIN-M18PÖ/008-KL2V	
		Antivalent NO/NC						
		Type						
NPN	DC	NO contact		6932306004			6502306004	
		Type		KIN-M18NS/008-KLS12			KIN-M18NS/008-KL2V	
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		push-pull operation						
NAMUR	DC							
Analogue	DC							
		Type						
2-wire	DC	NO contact			6501306001			
		NC contact						
		Type			KIN-M18ZS/008-L2			
	AC	NO contact	6503521705					
		Type	KIN-T18AS/008-L2					
		NC contact	6503421704					
		Type	KIN-T18AÖ/008-L2					
		Changeover contact						

Technical data

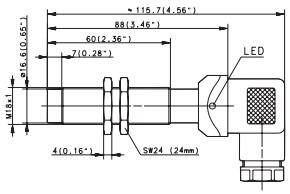
Rated operating voltage	U_B	24–250 V AC	10–36 VDC	10–60 VDC	10–60 VDC	10–60 VDC
Rated operating current	I_B	200 mA	200 mA	200 mA	200 mA	200 mA
Switching frequency (max)	F	10 Hz	200 Hz	200 Hz	200 Hz	200 Hz
Short circuit-protection		–	Cyclic	–	Cyclic	Cyclic
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable						

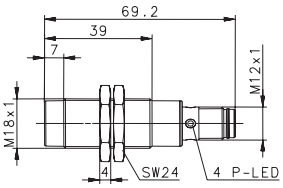
Mechanical data

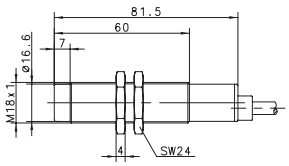
Ambient temperature (min/max)	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67	IP67
Enclosure material	PA, red	CuZn39Pb3	CuZn39Pb3	PA, red	CuZn39Pb3
Connection	2 x 0.5 mm²	M12 x 1	2 x 0.5 mm²	3 x 0.5 mm²	3 x 0.5 mm²

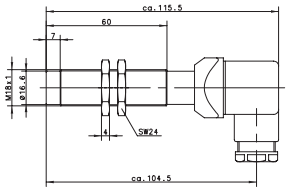
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

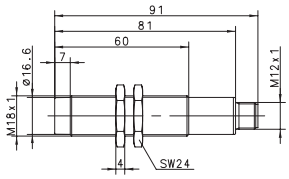
M18		M18		M18		
Non-flush	Non-flush	Non-flush		Non-flush	Non-flush	
8 mm	8 mm	8 mm		8 mm	8 mm	
DIN Connector	DIN Connector	Connector M12		Cable 2 m	Connector M12	
		Ultralock				











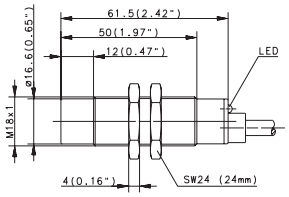
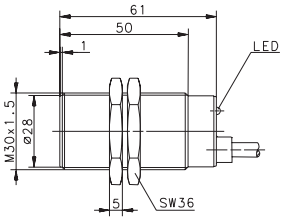
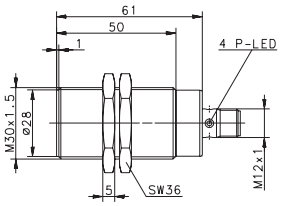
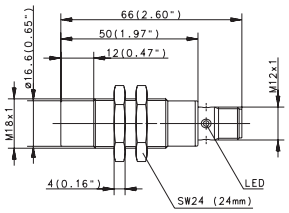
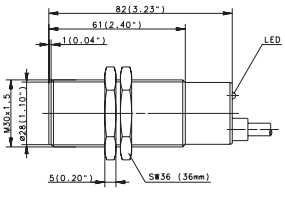
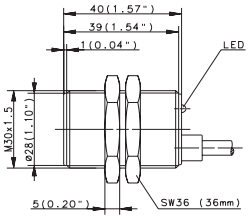
6502941001 KIN-M18PS/008-KLSD 6502741001 KIN-M18PÖ/008-KLSD	6602841421 KIN-M18PU/008-KSD					
		6502306011 KIN-M18NS/008-KLS12U				
				6502006001 KIN-M18PA/008-2	6602006111 KIN-M18PA/008-S12	

10–60 VDC	10–60 VDC	10–36 VDC		10–36 VDC	10–36 VDC	
200 mA	200 mA	200 mA		–	–	
200 Hz	200 Hz	200 Hz		–	–	
Cyclic	–	Cyclic		Cyclic	–	
LED/–	–/–	LED/–		–/–	–/–	

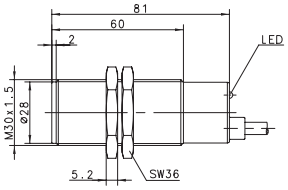
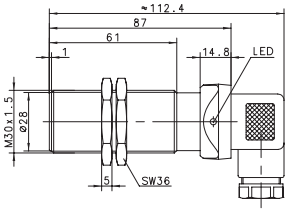
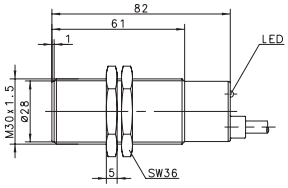
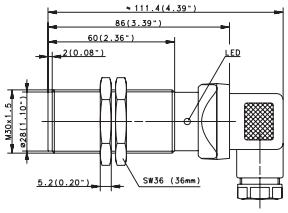
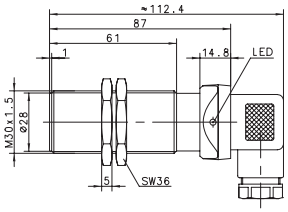
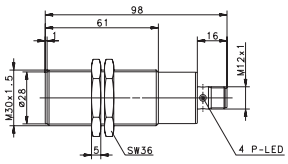
–25°C/+70°C	–40°C/+80°C	–25°C/+70°C		–25°C/+70°C	–25°C/+70°C	
IP65	IP65	IP67		IP67	IP67	
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3		CuZn39Pb3	CuZn39Pb3	
DIN 43650	DIN 43650	M12 x 1		3 x 0.5 mm²	M12 x 1	

You will find detailed data sheets to the products under www.bernstein.eu

Inductive Sensors (Type M18, M30)

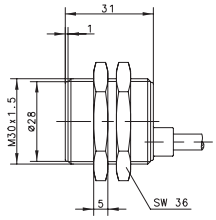
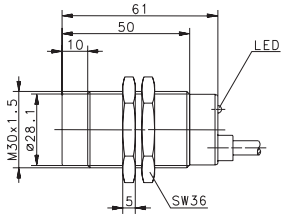
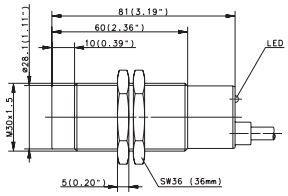
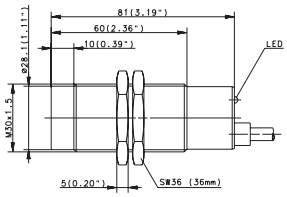
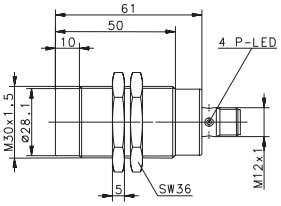
Type			M18		M30		M30	
Type of installation			Non-flush	Non-flush	Flush	Flush	Flush	Flush
Nominal sensing distance			16 mm	16 mm	10 mm	10 mm	10 mm	10 mm
Type of connection			Cable 2 m	Connector M12	Cable 2 m	Cable 2 m	Connector M12	Cable 2 m
Special feature			Sensing dist.	Sensing dist.				
								
								
PNP	DC	NO contact	6502906018	6502941004	6932907001		6932907002	6502907003
		Type	KIN-M18PS/016-KL2E	KIN-M18PS/016-KLS12E	KIN-M18PS/016-KLS12E		KIB-M30PS/010-KLS12	KIB-M30PS/010-KL2V
		NC contact						6502707001
		Type						KIB-M30PÖ/010-KL2V
		Antivalent NO/NC						
NPN	DC	NO contact						
		Type						
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		Type						
		push-pull operation						
NAMUR	DC							
Analogue	DC							
		Type						
2-wire	DC	NO contact						
		NC contact						
		Type						
	AC	NO contact				6503507378		
		Type				KIB-M30AS/010-L2		
		NC contact				6503407240		
		Type				KIB-M30AÖ/010-L2		
		Changeover contact						
Technical data								
Rated operating voltage		U_B	10–36 VDC	10–36 VDC	10–36 VDC	20–250 V AC	10–36 VDC	10–60 VDC
Rated operating current		I_B	200 mA	200 mA	200 mA	400 mA	200 mA	200 mA
Switching frequency (max)		F	200 Hz	200 Hz	300 Hz	10 Hz	300 Hz	300 Hz
Short circuit-protection			Cyclic	Cyclic	Cyclic	–	Cyclic	Cyclic
Function/operating voltage indicator			LED/–	LED/–	LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable								
Mechanical data								
Ambient temperature (min/max)			–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529			IP67	IP67	IP67	IP67	IP67	IP67
Enclosure material			CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
Connection			3 x 0.5 mm²	M12 x 1	3 x 0.5 mm²	2 x 0.5 mm²	M12 x 1	3 x 0.5 mm²

Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

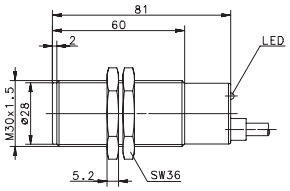
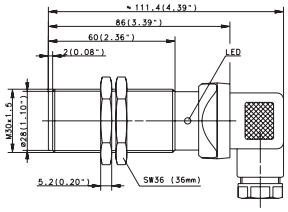
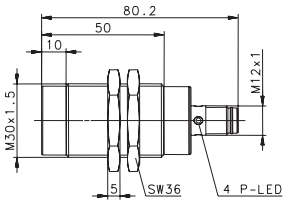
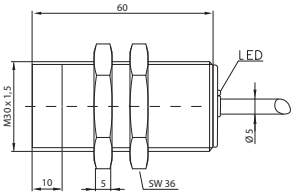
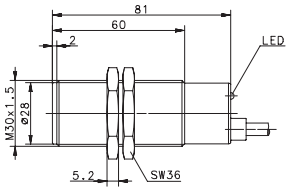
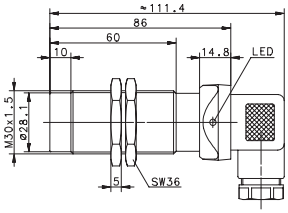
M30		M30		M30		
Flush	Flush	Flush	Flush	Flush	Flush	
10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	
Cable 2 m	DIN Connector	DIN Connector	DIN Connector	Cable 2 m	Connector M12	
Plastic	Plastic			Temperature	Temperature	
						
						
6502722708 KIB-T30PÖ/010-KL2		6502939001 KIB-M30PS/010-KLSD		6502907013 KIB-M30PS/010-KL2PUT	6502939006 KIB-M30PS/010-KLS12T	
	6502822862 KIB-T30PP/010-KLSD					
			6503535960 KIB-M30AS/010-LSD 6503435959 KIB-M30AÖ/010-LSD			
10–60 VDC	10–60 VDC	10–60 VDC	20–265 V AC	10–30 VDC	10–30 VDC	
200 mA	200 mA	200 mA	500 mA	200 mA	200 mA	
300 Hz	300 Hz	300 Hz	20 Hz	300 Hz	300 Hz	
Cyclic	Cyclic	Cyclic	–	Cyclic	Cyclic	
LED/–	LED/–	LED/–	LED/–	LED/–	LED/–	
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–40°C/+100°	–40°C/+100°	
IP67	IP65	IP65	IP65	IP67	IP67	
PA, red	PA, red	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	
3 x 0.5 mm²	DIN 43650	DIN 43650	DIN 43650	3 x 0.5 mm²	M12 x 1	

You will find detailed data sheets to the products under www.bernstein.eu

Inductive Sensors (Type M30)

Type			M30	M30		M30	
Type of installation			Flush	Non-flush	Non-flush	Non-flush	Non-flush
Nominal sensing distance			10 mm	15 mm	15 mm	15 mm	15 mm
Type of connection			Cable 2 m	Cable 2 m	Cable 2 m	Cable 2.5 m	Connector M12
Special feature			NAMUR				
							
							
PNP	DC	NO contact			6932908001	6502908002		6932908002
		Type			KIN-M30PS/015-KL2	KIN-M30PS/015-KL2		KIN-M30PS/015-KLS12
		NC contact						6602308459
		Type						KIN-M30NS/015-KLS12
		Antivalent NO/NC				6502808001		
		Type				KIN-M30PU/015-KL2		
NPN	DC	NO contact				6502308001		
		Type				KIN-M30NS/015-KL2		
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		Type						
		push-pull operation						
NAMUR	DC		6501699012					
		Type	KIB-M30EA/010-2					
Analogue	DC							
		Type						
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact					6503508246	
		Type					KIN-M30AS/015-L2,5	
		NC contact						
		Changeover contact						
Technical data								
Rated operating voltage		U_B	5–25 VDC	10–36 VDC	10–60 VDC	20–250 V AC	10–36 VDC	
Rated operating current		I_B	–	200 mA	200 mA	400 mA	200 mA	
Switching frequency (max)		F	300 Hz	100 Hz	100 Hz	10 Hz	100 Hz	
Short circuit-protection			–	Cyclic	Cyclic	–	Cyclic	
Function/operating voltage indicator			–/–	LED/–	LED/–	LED/–	LED/–	
Sensing distance, adjustable								
Mechanical data								
Ambient temperature (min/max)			–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	
Protection class in accordance with IEC 529, EN 60529			IP67	IP67	IP67	IP67	IP67	
Enclosure material			CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	
Connection			2 x 0.5 mm²	3 x 0.5 mm²	3 x 0.5 mm²	2 x 0.5 mm²	M12 x 1	

Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

M30		M30		M30	M30
Non-flush	Non-flush	Non-flush	Non-flush	Non-flush	Non-flush
15 mm	15 mm	15 mm	15 mm	15 mm	40 mm
Cable 2 m	Cable 2.5 m	DIN Connector	DIN Connector	Connector M12	Cable 2 m
Plastic	Plastic	Plastic		Analogue	Sensing dist.
					
					
6502923981 KIN-T30PS/015-KL2			6502935001 KIN-M30PS/015-KLSD		6502908009 KIN-M30PS/040-KL2E
		6502836860 KIN-T30PP/015-KLSD			
				6502008001 KIN-M30PA/015-2	
	6503523956 KIN-T30AS/015-L2,5				
10–60 VDC	20–250 V AC	10–60 VDC	10–60 VDC	10–36 VDC	10–30 VDC
200 mA	400 mA	200 mA	200 mA	200 mA	200 mA
100 Hz	10 Hz	100 Hz	100 Hz	100 Hz	100 Hz
Cyclic	–	Cyclic	Cyclic	Cyclic	Cyclic
LED/–	LED/–	LED/–	LED/–	LED/–	LED/–
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
IP67	IP67	IP65	IP65	IP67	IP67
PA, red	PA, red	PA, red	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
3 x 0.5 mm²	2 x 0.5 mm²	DIN 43650	DIN 43650	M12 x 1	3 x 0.34 mm²

You will find detailed data sheets to the products under www.bernstein.eu

Inductive Sensors (Type Ø 34 mm, 5 x 5, 8 x 8, 12 x 12, 27 x 10, 28 x 16)

Type			Ø 34 mm	5 x 5 x 25 mm	8 x 8 x 40 mm		8 x 8 x 56 mm
Type of installation			Non-flush	Flush	Flush	Flush	Flush
Nominal sensing distance			20.0 mm	1.5 mm	1.5 mm	1.5 mm	1.5 mm
Type of connection			Cable 2 m	Cable	Cable 2 m	Cable 2 m	Connector M8
Special feature							
PNP	DC	NO contact	6502915002	6502999026	6502980004	6602980087	6502980002
		Type	KIN-R34PS/020-KL2	KIB-Q05PS/001-K2PU	KIB-Q08PS/1,5-K2	KIB-Q08PS/1,5-K2T	KIB-Q08PS/1,5-KLSM8
		NC contact		6502799010	6502780001		6502780002
		Type		KIB-Q05PÖ/001-K2PU	KIB-Q08PÖ/1,5-K2		KIB-Q08PÖ/1,5-KLSM8
		Antivalent NO/NC					
NPN	DC	NO contact					
		Type					
		NC contact					
		Type					
		Antivalent NO/NC					
PNP/NPN	DC	NO/NC prog.	6502915001				
		Type	KIN-R34PP/020-KLSD				
		push-pull operation					
NAMUR	DC						
Analogue	DC						
2-wire	DC	NO contact					
		NC contact					
	AC	NO contact					
		NC contact					
		Changeover contact					

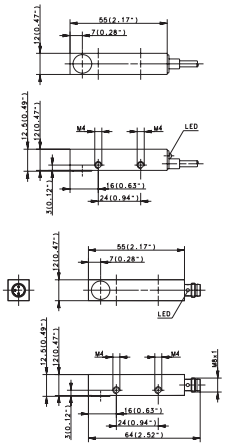
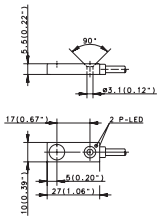
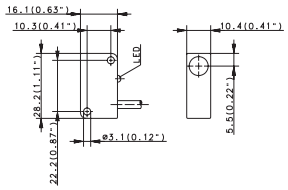
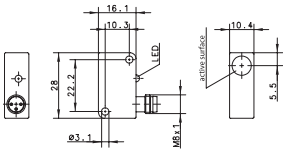
Technical data

Rated operating voltage	U_B	10–60 VDC	10–30 VDC	10–36 VDC	10–36 VDC	10–36 VDC
Rated operating current	I_B	200 mA	200 mA	200 mA	200 mA	200 mA
Switching frequency (max)	F	100 Hz	1000 Hz	1000 Hz	1000 Hz	1000 Hz
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/–	–/–	–/–	–/–	LED/–
Sensing distance, adjustable						

Mechanical data

Ambient temperature (min/max)		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	0°C/+100°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67
Enclosure material		PBT, red	CuZn39PB3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
Connection		3 x 0.5 mm²	3 x 0.05 mm²	3 x 0.14 mm²	3 x 0.14 mm²	M8 x 1

Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

12 x 12 x 55 mm		27 x 10 x 5 mm		28 x 16 x 11 mm		
Flush 4 mm Cable 2 m	Flush 4 mm Connector M8	Flush 1.5 mm Cable 2 m		Flush 2 mm Cable 2 m	Flush 2 mm Connector M8	
						
						
6502999028 KIB-Q12PS/004-KL2E	6502999030 KIB-Q12PS/004-KLSM8E	6502993001 KIB-E27PS/1,5-KL2PU		6502973001 KIB-E28PS/002-KL2	6502973002 KIB-E28PS/002-KLSM8 6502773001 KIB-E28PÖ/002-KLSM8	
	6502399021 KIB-Q12NS/004-KLSM8E					
10–60 VDC 200 mA 800 Hz Cyclic LED/–	10–60 VDC 200 mA 800 Hz Cyclic LED/–	10–30 VDC 200 mA 1000 Hz Cyclic LED/–		10–30 VDC 200 mA 800 Hz Cyclic LED/–	10–30 VDC 200 mA 800 Hz Cyclic LED/–	
–25°C/+70°C IP67 CuZn39Pb3 3 x 0.14 mm²	–25°C/+70°C IP67 CuZn39Pb3 M8 x 1	–25°C/+70°C IP67 PA, black 3 x 0.14 mm²		–25°C/+70°C IP67 PA, black 3 x 0.14 mm²	–25°C/+70°C IP67 PA, black M8 x 1	

You will find detailed data sheets to the products under www.bernstein.eu

Inductive Sensors (Type 28 x 16 mm, 40 x 26 mm, 50 x 25 mm, 60 x 36 mm)

Type			40 x 26 x 12 mm		40 x 26 x 12 mm		40 x 26 x 12 mm	
Type of installation			Flush	Flush	Flush	Non-flush	Non-flush	Non-flush
Nominal sensing distance			2 mm	2 mm	2 mm	4 mm	4 mm	4 mm
Type of connection			Cable 2 m	Cable 2 m	Connector M8	Cable 2 m	Cable 2 m	Connector M8
Special feature								
PNP	DC	NO contact	6502984023		6502984025	6502984024		6502984026
		Type	KIB-E40PS/002-KL2		KIB-E40PS/002-KLSM8	KIN-E40PS/004-KL2		KIN-E40PS/004-KLSM8
		NC contact	6502784006			6502784007		6502784008
		Type	KIB-E40PÖ/002-KL2			KIN-E40PÖ/004-KL2		KIN-E40PÖ/004-KLSM8
		Antivalent NO/NC						
		Type						
NPN	DC	NO contact						
		Type						
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		Type						
		push-pull operation						
NAMUR	DC							
		Type						
Analogue	DC							
		Type						
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact		6503584004			6503584005	
		Type		KIB-E40AS/002-L2			KIN-E40AS/004-L2	
		NC contact						
		Changeover contact						

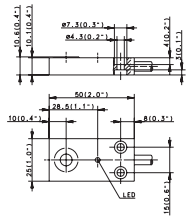
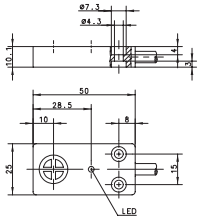
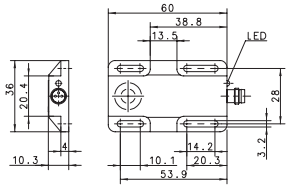
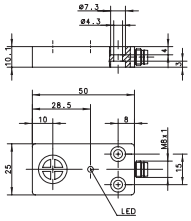
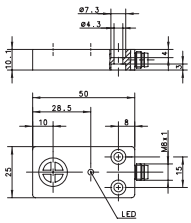
Technical data

Rated operating voltage	U_B	10–36 VDC	20–250 V AC	10–36 VDC	10–36 VDC	20–250 V AC	10–36 VDC
Rated operating current	I_B	200 mA	300 mA	200 mA	200 mA	300 mA	200 mA
Switching frequency (max)	F	800 Hz	10 Hz	800 Hz	400 Hz	10 Hz	400 Hz
Short circuit-protection		Cyclic	–	Cyclic	Cyclic	–	Cyclic
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable							

Mechanical data

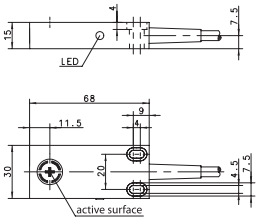
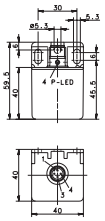
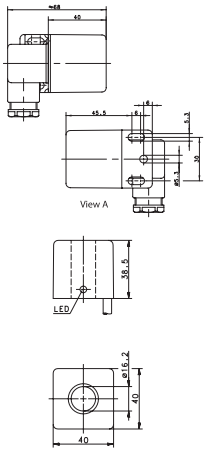
Ambient temperature (min/max)		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67	IP67
Enclosure material		PBT, black	PBT, black	PBT, black	PBT, black	PBT, black	PBT, black
Connection		3 x 0.5 mm²	2 x 0.5 mm²	M8 x 1	3 x 0.5 mm²	2 x 0.5 mm²	M8 x 1

Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

50 x 25 x 10 mm		50 x 25 x 10 mm		60 x 36 x 10 mm			
Flush 5 mm Cable 2 m	Flush 5 mm Connector M8	Non-flush 8 mm Cable 2 m	Non-flush 8 mm Connector M8	Non-flush 8 mm Connector M8			
							
							
6502990001 KIB-E50PS/005-KL2	6502990005 KIB-E50PS/005-KLSM8	6502990003 KIN-E50PS/008-KL2 6502790002 KIN-E50PÖ/008-KL2	6502990006 KIN-E50PS/008-KLSM8	6602799048 KIN-E60PÖ/008-KLSM8			
6502390001 KIB-E50NS/005-KL2		6502390002 KIN-E50NS/008-KL2					
10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC			
200 mA	200 mA	200 mA	200 mA	400 mA			
500 Hz	500 Hz	200 Hz	200 Hz	200 Hz			
Cyclic	Cyclic	Cyclic	Cyclic	Cyclic			
LED/–	LED/–	LED/–	LED/–	LED/–			
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C			
IP67	IP67	IP67	IP67	IP67			
PA, black	PA, black	PA, black	PA, black	PA, black			
3 x 0.5 mm²	M8 x 1	3 x 0.5 mm²	M8 x 1	M8 x 1			

You will find detailed data sheets to the products under www.bernstein.eu

Inductive Sensors (Type 68 x 30 mm, 40 x 40 mm)

Type			68 x 30 x 15 mm	40 x 40 mm	40 x 40 mm	
Type of installation			Non-flush	Non-flush	Non-flush	Non-flush
Nominal sensing distance			7 mm	20 mm	15 mm	0 mm
Type of connection			Cable 2 m	Connector M12	DIN Connector	Cable 6 m
Special feature						Ring sensor
						
PNP	DC	NO contact	6502956076	6502982003		6502999036
		Type	KIN-E68PS/007-KL2	KIN-N40PS/020-KLS12		KIR-N40PS/000-KL6
		NC contact				
		Type				
		Antivalent NO/NC				
NPN	DC	NO contact				
		Type				
		NC contact	6502156058			
		Type	KIN-E68NÖ/007-KL6			
		Antivalent NO/NC				
PNP/NPN	DC	NO/NC prog.			6502982001	
		Type			KIN-N40PP/015-KLSD	
		push-pull operation				
NAMUR	DC					
Analogue	DC					
2-wire	DC	NO contact				
		NC contact				
	AC	NO contact				
		NC contact				
		Changeover contact				

Technical data

Rated operating voltage		U_B	10–60 VDC	10–36 VDC	10–60 VDC	10–30 VDC
Rated operating current		I_B	200 mA	200 mA	400 mA	200 mA
Switching frequency (max)		F	200 Hz	50 Hz	100 Hz	–
Short circuit-protection			Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator			LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable						

Mechanical data

Ambient temperature (min/max)			–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529			IP67	IP67	IP65	IP67
Enclosure material			PBT, black	PA, red/black	PA, red	PA, black
Connection			3 x 0.5 mm²	M12 x 1	DIN 43650	3 x 0.5 mm²

Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

Altech Corp.® by BERNSTEIN

Notes

Functional principle

Capacitive proximity switches detect conductive and non-conductive materials that can be in a solid or liquid state. They serve the purpose of monitoring product levels in containers, checking contents in filling and packaging systems as well as detecting, positioning, monitoring and counting objects, e.g. in sequence control systems, conveyor belts.

Used for detecting media such as:

- ⌘ solid:
  wood, ceramic, glass, paper stacks, plastic, stone, rubber, ice, nonferrous metals, potatoes
- ⌘ liquid:
  water, oil, beverages, adhesives, paints
- ⌘ granular:
  plastic pellets, granulated products, grain, fodder, wood chip
- ⌘ powder:
  dyes, detergents, sand, cement, fertilizer, salt, sugar, flour, coffee

Technical description

The function of the capacitive proximity switch is based on evaluating the influence exerted by an actuator on the electrical field at the active face of the switch. The approach of an influencing object increases the capacitance of the capacitor, which consists of a sensor electrode located behind the active face and the actuator connected to earth / mass. This increase in capacitance is dependent on the conductance and the dielectric constant of the actuator as well as its mass, surface area and its distance from the sensor electrode. The capacitive limit switch is equipped with an RC oscillator with a gain factor that increases as a result of the rise in capacitance of the previously described capacitor to such an extent that oscillation is induced. In limit switches, the capacitance required to induce oscillation can be determined by the built-in potentiometer intervening in the feedback of the oscillator.

The response sensitivity, i.e. the sensing distance with a given actuator can be adjusted in this way. The oscillator output signal is fed to an evaluation circuit that actuates the switching amplifier.

In response to the approach of conductive material the actuating object and the active face of the sensor form the plates of a capacitor. The change in capacitance and the consequently achievable sensing distance are large.

In response to the approach of non-conductive material > 1 only the change in the dielectric constant is effective. The increase in capacitance is less than is the case for conductive materials. The resulting sensing distance is small.

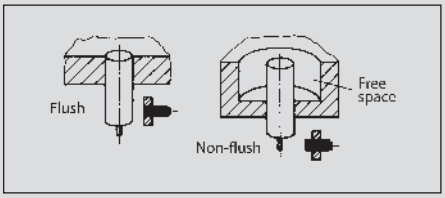
Sensitivity table	
St37 or other metals, earthed	1.00
Surface of water	1.00
St37 150 x 150 x 1 mm, not earthed	0.85
Marble 150 x 150 x 12.5 mm	0.65
Glass 150 x 150 x 7.5 mm	0.55
Stack of paper DIN A 4, 80 g/m^2, 500 sheets	0.55
Fibre board 150 x 150 x 16 mm	0.45
Ceramic tile 150 x 150 x 6 mm	0.25
PVC 150 x 150 x 4 mm	0.15

These values only indicate the expected magnitude of the response sensitivity as the specific properties of the actuating object and of the surroundings in actual applications have a considerable influence on the response distance. It is important to take into account the influence of moisture in order to ensure trouble-free operation. A high water content in the material to be detected, e.g. wood or paper, increases the sensing distance considerably.

In terms of capacitive proximity switches a distinction is made between

- ⌘ flush mount and
- ⌘ non-flush mount

limit switches.



In the case of non-flush mount limit switches a clearance that must contain no influencing material must be created about the switch. Due to the adjustment facility available in capacitive proximity switches, the installation of non-flush mount devices is not problematic in connection with reduced clearance. Non-flush mount capacitive proximity switches are characterised by low sensitivity to soiling or condensation.

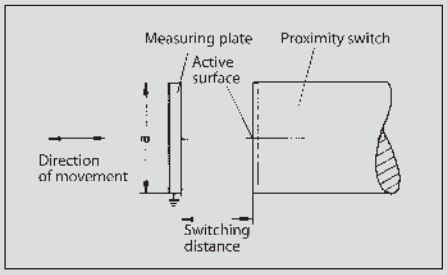
A screening electrode built into flush mount limit switches is connected to circuit ground. As both electrodes of the capacitor are now close together, flush mount capacitive proximity switches are particularly suitable for sensing dielectrics. The disadvantage is that this configuration has an increased sensitivity to condensation or soiling.

Capacitive proximity switches can mutually influence each other if they are mounted next to or opposite each other. In such configurations, the response of flush mount switches is considerably less sensitive than non-flush mount switches. Trials under actual application conditions should be carried out at distances from > 2x to <8x enclosure diameter. Arrangements with distances > 8x enclosure diameter are not problematic.

Active face: The active face of a capacitive proximity switch is the point at which the electrical field emerges. This point is located at the end face on types designed as threaded sleeves or smooth cylinders. Non-cylindrical limit switches are identified by a symbol on the corresponding face.

Influencing: In relation to a capacitive proximity switch the term influencing refers to the change in the switching status in response to the medium to be detected entering the electrical field.

Standard target: The standard target is defined as a square plate, 1 mm thick and made from FE 360.



The side length "a" of the square target corresponds to the diameter of the circle described by the active face. The length of its side is defined as the larger of either the active face diameter or three times the nominal sensing distance. The target must be earthed in order to ensure comparable sensing distances. The sensing distance of rectangular, capacitive proximity switches is determined by means of an earthed target with a size equal to the surface of the active side of the limit switch.

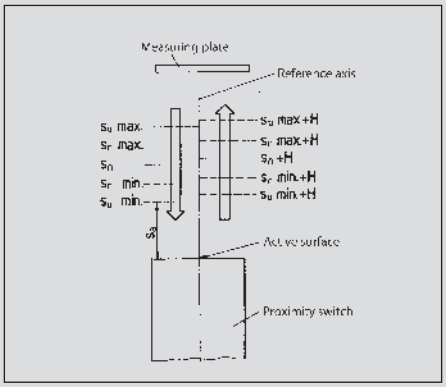
Sensing distance: The sensing distance, that changes the status of the output stage, is the distance of the influencing object in relation to the active face.

Nominal sensing distance (s_n): This is a device-specific characteristic value that does not take into account influences such as tolerance, temperature and changes in voltage.

Real sensing distance (s_r): The real sensing distance is measured at a rated voltage and an ambient temperature of 23 °C +/–5 °C. It must be between 90 % and 110 % of the nominal sensing distance.

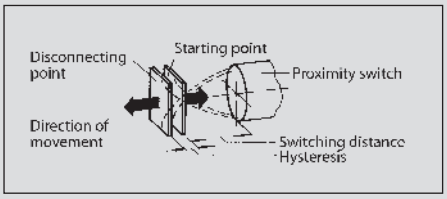
Useable sensing distance (s_u): The useable sensing distance is measured within the permissible temperature and voltage ranges and is 80 % – 120 % of the real sensing distance.

Assured sensing distance (s_a) (operational sensing distance): This is the distance that can be used effectively under the influence of temperature, voltage as well as tolerance variables. It is between 0 % and 72 % of the nominal sensing distance.

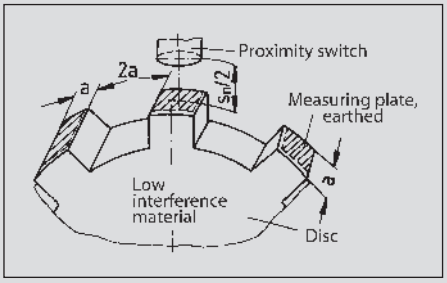


Reproducibility: The reproducibility of the switching distance is the repeat accuracy of the real sensing distance of two successive switching operations within a period of 8 hours at an ambient temperature between 18 °C and 28 °C and a supply voltage that may not deviate by more than 5 % from the rated voltage. The difference between any two measurements must not be more than 10 % of the real sensing distance.

Switching hysteresis: The switching hysteresis refers to the difference between the switch-on point as an object approaches the target and the switch-off point as the object moves away from the proximity switch. The value is specified as a percentage of the real sensing distance.



Switching frequency: The switching frequency is measured in accordance with EN 60947-5-2. The standard targets with the side length "a" are mounted on a plate that exerts minimum influence at "2a" intervals and are moved passed the proximity switch to be tested at half the nominal sensing distance. The maximum switching frequency is reached when the switch-on or switch-off time of the proximity switch is 50 µs. In the case of AC proximity switches, the maximum switching frequency is reached when the switch-on and switch-off time is equal to the half wave period of the supply frequency.



Temperature range: In accordance with DIN, the temperature range is from –25 °C to +70 °C. Reliable operation is ensured within this range.

Protection class

Corresponding to their ID code, the enclosures are dustproof and waterproof in accordance with IP 65 or IP 67 (DIN 40050).

Connection cable

A PVC-insulated connection cable is supplied as standard. Special versions with silicone sheathing, polyurethane sheathing, irradiation cross-linked PVC or Teflon insulation are also available.

Plug connection

Nowadays the plug connection is just as significant as the fixed cable on electronic proximity switches. The capacitive proximity switches in the BERNSTEIN range can be equipped with a wide variety of plug connections. As standard, this catalogue contains connector versions of virtually all types of limit switch.

Standards

All sensors conform to EN 60947-5-2

CE

Capacitive Sensors

Important information

Capacitive sensors are able to detect conductive and non-conductive materials in solid, liquid, granular or powder form. However, certain criteria must be taken into account in practical applications.

Sensing distance

The nominal sensing distances are specified and set at the factory in accordance with DIN EN 60947-5-2/98. The maximum sensing distance is achieved on approach of conductive materials of corresponding size.

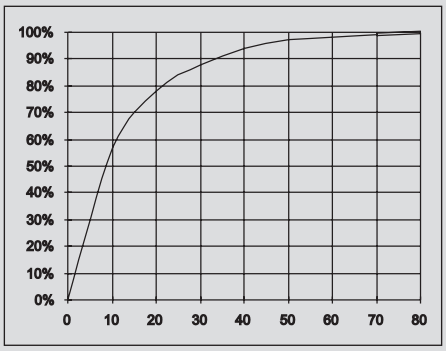
On approach of non-conductive materials, the dielectric constant of the material to be detected is of decisive significance. Depending on the application, the specified sensing distances vary by a certain factor in relation to the dielectric constant. The values determined according to the table only indicate the expected magnitude of the response sensitivity as the specific properties of the actuating object (diameter, thickness, moisture content etc.) and of the surroundings (earthing) in actual applications have a considerable influence on the response distance. In most cases adaptation to the specific application can be achieved by adjustment with the built-in potentiometer.

Clearance

In the case of non-flush mount capacitive sensors a clearance that must contain no influencing material must be created about the sensor. Non-flush mount capacitive sensors are characterised by low sensitivity to soiling or condensation. On account of their design, flush mount capacitive sensors are particularly suitable for sensing dielectrics. The increased sensitivity, however, may be detrimental in terms of the above mentioned parasitic effects.

If capacitive proximity switches are to be mounted opposite or next to each other, trials under actual application conditions should be carried out at distances between 2x and 8x enclosure diameter. Thanks to the adjustment facility, however, adaptation to specific applications is almost always possible.

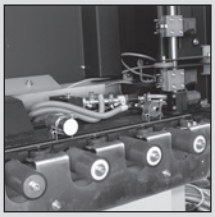
Examples of dielectric constants	
Glass	3 ... 14
Rubber	2.5 ... 3
Laminated paper	3.5 ... 6
Wood	2.5 ... 6.8
Marble	8.4 ... 14
Mineral oil	2.15
Epoxy resin	3.3 ... 3.6
Petroleum	2.2
Plexiglas	3.6
Polyamide	3 ... 8
PVC	3.3 ... 4.1
Porcelain	4.2 ... 6.5
Teflon PTFE	2
Air	1
Water	80.8
Paper (dry)	2



Variance of sensing distance as a function of

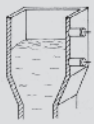
Application descriptions

A particular application of capacitive proximity switches is to detect levels in non-metallic containers from the outside. Advantage: There is no need to make a hole in the container wall for the purpose of detecting product level. The medium to be detected does not come in contact with the limit switch. The prerequisite is that the dielectric constant and the mass of the material to be detected are greater than that of the container. The response sensitivity of the proximity switch must be reduced with the built-in potentiometer to such an extent that the limit switch does not respond to the container wall but rather to the medium to be detected.

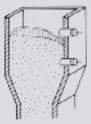


Above: Insulation glass production lines equipped with BERNSTEIN capacitive sensors

Further fields of application are illustrated below.



Level monitoring in non-metallic containers



Level monitoring of bulk material, e.g. granulated material, fodder

Stack height scanning, e.g. paper, chip board

Fill level monitoring in paint and adhesive containers

Registering, counting, sorting or monitoring in conveyor belt systems

Detecting, positioning in sequence control systems

Detection in woodworking applications

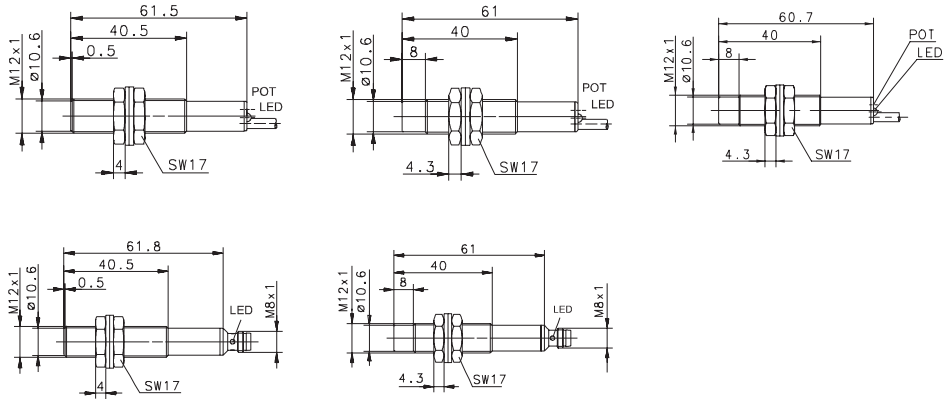
Belt breakage signalling

Level monitoring in packing systems

Notes

Capacitive Sensors (Type M12, M18)

Type	M12		M12		M12
Type of installation	Flush	Flush	Non-flush	Non-flush	Non-flush
Nominal sensing distance	2 mm	2 mm	4 mm	4 mm	6 mm
Type of connection	Cable 2 m	Connector M8	Cable 2 m	Connector M8	Cable 2 m
Special feature					Sensing dist.



PNP	DC	NO contact	6507903001	6507903004	6507919001	6507919004	6607919110
		Type	KCB-M12PS/002-KLP2	KCB-M12PS/002-KLSM8	KCN-T12PS/004-KLP2	KCN-T12PS/004-KLSM8	KCN-T12PS/006-KLP2E
		NC contact	6507703001				
		Type	KCB-M12PÖ/002-KLP2				
		Antivalent NO/NC					
		Type					
NPN	DC	NO contact	6507303001		6507319001		
		Type	KCB-M12NS/002-KLP2		KCN-T12NS/004-KLP2		
		NC contact					
		Antivalent NO/NC					
PNP/NPN	DC	NO/NC prog.					
		push-pull operation					
NAMUR	DC						
Analogue	DC						
2-wire	DC	NO contact					
		NC contact					
	AC	NO contact					
		Type					
		NC contact					
		Type					
		Changeover contact					

Technical data

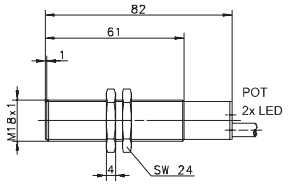
Rated operating voltage	U_B	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC
Rated operating current	I_B	200 mA	200 mA	200 mA	200 mA	200 mA
Switching frequency (max)	F	25 Hz	25 Hz	25 Hz	25 Hz	25 Hz
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	LED/–
Sensing distance, adjustable		Poti	–	Poti	–	Poti

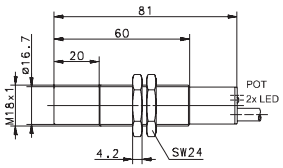
Mechanical data

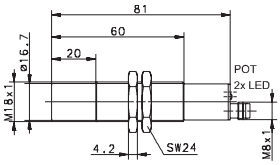
Ambient temperature (min/max)	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP65	IP65	IP65	IP65	IP65
Enclosure material	CuZn39Pb3	CuZn39Pb3	PBT, black	PBT, black	PBT, black
Connection	3 x 0.14 mm²	M8 x 1	3 x 0.14 mm²	M8 x 1	3 x 0.14 mm²

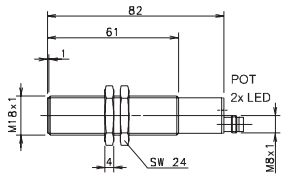
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

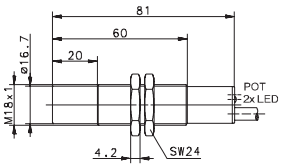
M18		M18		M18		
Flush 5.0 mm Cable 2 m	Flush 5.0 mm Connector M8	Non-flush 8.0 mm Cable 2 m	Non-flush 8.0 mm Cable 2 m	Non-flush 8.0 mm Connector M8	Non-flush 13.5 mm Connector M12 Sensing dist.	

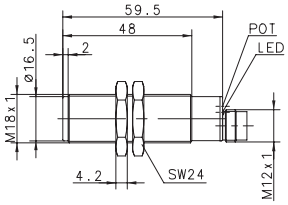












6507905001 KCB-M18PS/005-KLP2	6507905004 KCB-M18PS/005-KLPSM8	6507921724 KCN-T18PS/008-KLP2 6507821001 ① KCN-T18PU/008-KLP2V		6507921002 KCN-T18PS/008-KLPSM8	6507921004 KCN-T18PS/013-KLPS12V		
6507305001 KCB-M18NS/005-KLP2		6507321723 KCN-T18NS/008-KLP2					
			6508521001 KCN-T18AS/008-LP2 6508421001 KCN-T18AÖ/008-LP2				

10–60 VDC	10–60 VDC	10–60 VDC	20–250 V AC	10–60 VDC	10–60 VDC	
200 mA	200 mA	200 mA	300 mA	200 mA	200 mA	
25 Hz	25 Hz	25 Hz	15 Hz	25 Hz	25 Hz	
Cyclic	Cyclic	Cyclic	–	Cyclic	Cyclic	
LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	
Poti	Poti	Poti	Poti	Poti	Poti	

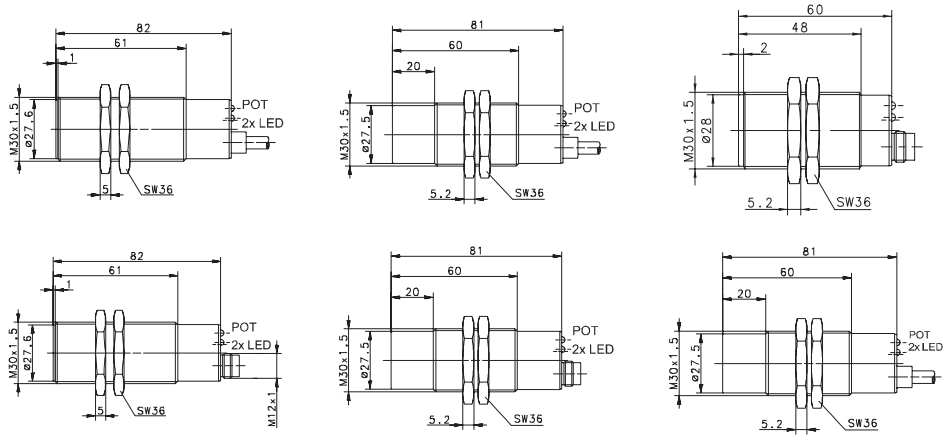
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	
IP65	IP65	IP65	IP65	IP65	IP65	
CuZn39Pb3	CuZn39Pb3	PBT, black	PBT, black	PBT, black	PBT, black	
3 x 0.5 mm²	M8 x 1	3 x 0.5 mm²	2 x 0.5 mm²	M8 x 1	M12 x 1	

You will find detailed data sheets to the products under www.bernstein.eu

① Length 65 mm

Capacitive Sensors (Type M30, M32)

Type			M30		M30		M30	
Type of installation			Flush	Flush	Non-flush	Non-flush	Non-flush	Non-flush
Nominal sensing distance			10 mm	10 mm	20 mm	20 mm	20 mm	20 mm
Type of connection			Cable 2 m	Connector M12	Cable 2 m	Connector M12	Connector M12	Cable 2 m
Special feature							Short form	



PNP	DC	NO contact	6507907001	6507907004	6507923727	6507923004	6507923006	
		Type	KCB-M30PS/010-KLP2	KCB-M30PS/010-KLPS12	KCN-T30PS/020-KLP2	KCN-T30PS/020-KLPS12	KCN-T30PS/020-KLPS12V	
		NC contact						
		Antivalent NO/NC	6507707001					
		Type	KCB-M30PÖ/010-KLP2					
NPN	DC	NO contact			6507323001			
		Type			KCN-T30NS/020-KLP2			
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		Type						
		push-pull operation						
		Type						
NAMUR	DC							
Analogue	DC							
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact						6508523001
		Type						KCN-T30AS/020-LP2
		NC contact						6508423001
		Type						KCN-T30AÖ/020-LP2
		Changeover contact						
		Type						

Technical data

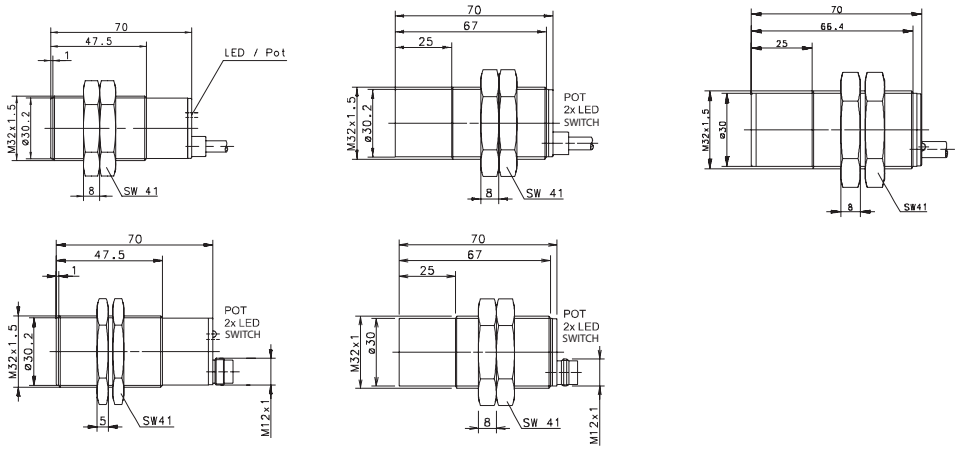
Rated operating voltage	U_B	10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC	20–250 V AC
Rated operating current	I_B	400 mA	400 mA	400 mA	400 mA	400 mA	300 mA
Switching frequency (max)	F	25 Hz	25 Hz	25 Hz	25 Hz	25 Hz	15 Hz
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	–
Function/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED
Sensing distance, adjustable		Poti	Poti	Poti	Poti	Poti	Poti

Mechanical data

Ambient temperature (min/max)		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP65	IP65	IP65	IP65	IP65	IP65
Enclosure material		CuZn39Pb3	CuZn39Pb3	PBT, black	PBT, black	PBT, black	PBT, black
Connection		3 x 0.5 mm²	M12 x 1	3 x 0.5 mm²	M12 x 1	M12 x 1	2 x 0.5 mm²

Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

M32		M32		M32	
Flush 15 mm Cable 6 m	Flush 15 mm Connector M12	Non-flush 30 mm Cable 2 m	Non-flush 30 mm Connector M12	Non-flush 30 mm Cable 2 m Timer/Relay	



6507013013 KCB-M32DP/015-KLP6 6507013012 KCB-M32GP/015-KLP2	6507013015 KCB-M32DP/015-KLPS12	6507013001 KCN-T32DP/030-KLP2	6507013004 KCN-T32DP/030-KLPS12				
				6508613001 KCN-T32RU/030-LP2			

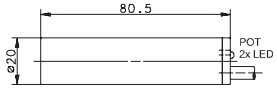
10–60 VDC	10–60 VDC	10–60 VDC	10–60 VDC	180–250 V AC	
400 mA	400 mA	400 mA	400 mA	8 A	
25 Hz	25 Hz	25 Hz	25 Hz	–	
Cyclic	Cyclic	Cyclic	Cyclic	–	
LED/LED	LED/–	LED/–	LED/–	LED/LED	
Poti	Poti	Poti	Poti	Poti	

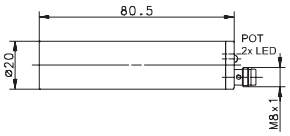
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	
IP65	IP65	IP65	IP65	IP65	
CuZn39Pb3	CuZn39Pb3	PBT, black	PBT, black	PBT, black	
3 x 0.5 mm²	M12 x 1	3 x 0.5 mm²	M12 x 1	5 x 0.5 mm²	

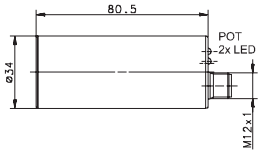
You will find detailed data sheets to the products under www.bernstein.eu

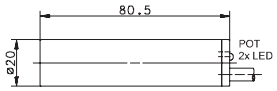
Capacitive Sensors (Type Ø 20 mm, Ø 34 mm, E50, E68)

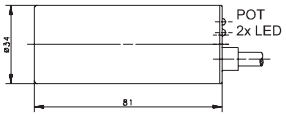
Type			Ø 20 mm		Ø 20 mm	Ø 34 mm	
Type of installation			Non-flush	Non-flush	Non-flush	Flush	Non-flush
Nominal sensing distance			15 mm	15 mm	15 mm	20 mm	30 mm
Type of connection			Cable 2 m	Cable 2 m	Connector M8	Connector M12	Cable 2 m
Special feature							











PNP	DC	NO contact	6507910001		6507910004		6507915006	6507915001
		Type	KCN-R20PS/015-KLP2		KCN-R20PS/015-KLPSM8		KCB-D34PS/020-KLPS12	KCN-R34PS/030-KLP2
		NC contact						
		Antivalent NO/NC						
NPN	DC	NO contact						6507315001
		Type						KCN-R34NS/030-KLP2
		NC contact						
		Antivalent NO/NC						
PNP/NPN	DC	NO/NC prog.						
		push-pull operation						
NAMUR	DC							
Analogue	DC							
2-wire	DC	NO contact						
		NC contact						
	AC	NO contact						
		Type						
		NC contact		6508410001				
		Type		KCN-R20AÖ/015-LP2				
		Changeover contact						

Technical data

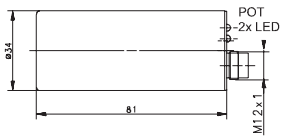
Rated operating voltage	U_B	10–60 VDC	20–250 V AC	10–60 VDC	10–60 VDC	10–60 VDC
Rated operating current	I_B	400 mA	300 mA	400 mA	200 mA	400 mA
Switching frequency (max)	F	25 Hz	15 Hz	25 Hz	25 Hz	25 Hz
Short circuit-protection		Cyclic	–	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED	LED/LED
Sensing distance, adjustable		Poti	Poti	Poti	Poti	Poti

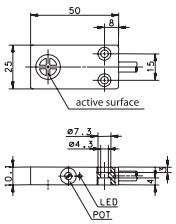
Mechanical data

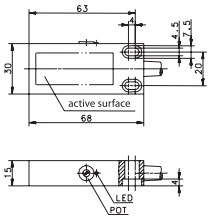
Ambient temperature (min/max)		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP65	IP65	IP65	IP65	IP65
Enclosure material		PBT, red	PBT, red	PBT, red	CuZn39Pb3	PBT, red
Connection		3 x 0.5 mm²	2 x 0.5 mm	M8 x 1	M12 x 1	3 x 0.5 mm²

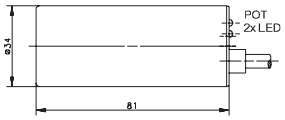
Please refer to Accessories for cable couplers, mounting brackets and sensor tester.

Ø 34 mm		E50	E68	
Non-flush 30 mm Connector M12	Non-flush 30 mm Cable 2 m	Flush 8 mm Cable 2 m	Flush 10 mm Cable 2 m	









6507915004 KCN-R34PS/030-KLPS12		6507990001 KCB-E50PS/008-KLP2		6507956001 KCB-E68PS/010-KLP2			
		6507390001 KCB-E50NS/008-KLP2					
	6508515001 KCN-R34AS/030-LP2 6508415001 KCN-R34AÖ/030-LP2						

10–60 VDC	20–250 V AC	10–36 VDC	10–36 VDC	
400 mA	300 mA	200 mA	200 mA	
25 Hz	15 Hz	25 Hz	25 Hz	
Cyclic	–	Cyclic	Cyclic	
LED/LED	LED/LED	LED/–	LED/–	
Poti	Poti	Poti	Poti	

–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	
IP65	IP65	IP65	IP65	
PBT, red	PBT, red	PBT, black	PBT, black	
M12 x 1	2 x 0.5 mm²	3 x 0.34 mm²	3 x 0.5 mm²	

You will find detailed data sheets to the products under www.bernstein.eu

BERNSTEIN optoelectronic sensors can be divided into three basic types (operating modes):

⌘ Through-beam sensor Type T
⌘ Retro-reflective sensor Type R
⌘ Diffuse-reflection sensor Type D

In accordance with EN 60947-5-2 the sensors are described as "photoelectric proximity switches" and CE-certified.

The use of the sensor systems depends primarily on the specific application and operating environment.

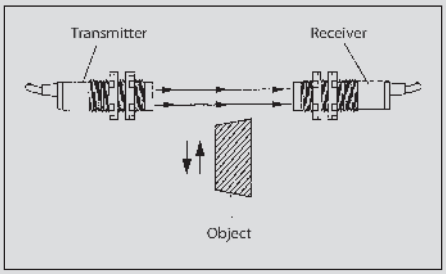
Several applications are outlined on these pages, illustrating the advantages and disadvantages of the individual operating modes.

Dividing all optoelectronic sensors into type groups simplifies device selection. The distinguishing criteria for the type families are the shape and material of the enclosure. The available operating modes of the individual type groups are specified in the Technical Data section of this catalogue.

In general, BERNSTEIN optoelectric sensors operate using pulsating red or infrared light. This technology offers the following advantages:

⌘ High immunity to ambient light
⌘ Maximum sensing range
⌘ Lower heat built-up and therefore longer service life of transmit diodes

Through-beam sensors



Through-beam sensors consist of an light transmitter (light source) and a spatially separated receiver. The light emitted by the transmitter is analysed by the receiver. An interruption in the light path, e.g. by an object, is evaluated and causes the output to switch.

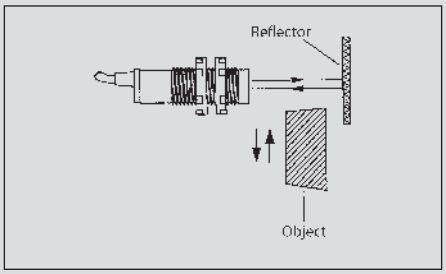
Advantages:

⌘ Long sensing distance; the light beam needs only to travel in one direction from the transmitter to the receiver
⌘ High operational reliability; interference reflections rarely trigger the receiver
⌘ Detection of even the smallest objects by additionally mounting lenses or screens

Disadvantages:

⌘ High installation cost with two devices having to be mounted, wired and adjusted

Retro-reflective sensors



The light transmitter and receiver in retro-reflective sensors are accommodated in one enclosure. The light beam emitted by the transmitter is reflected back to the receiver by a reflector (e.g. triple reflector or reflective film). An interruption in the light paths is evaluated and changes the output signal at the receiver.

The ranges of these types of sensor specified in the Technical Data section in this catalogue relate to an 83 mm diameter triple reflector. Different ranges by using other types or sizes of reflector are available on request.

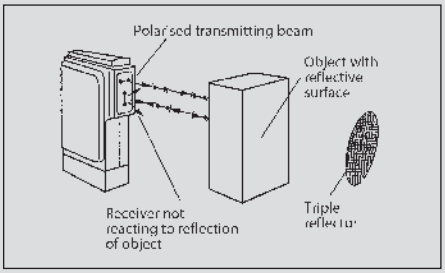
Advantages:

⌘ Easy installation of light barrier and reflector
⌘ The reflector can be used as a moving signal generator, e.g. in conveyor systems

Disadvantages:

⌘ Shorter sensing range than a through-beam system since the light beam has to travel from the transmitter (light source) to the reflector and back to the receiver
⌘ Highly polished objects can act as reflectors and may cause malfunctions

Retro-reflective sensors with polarisation filter



This is a special type of retro-reflective sensor. A special linear or circular polarised filter element (film) is placed between the transmit or receive elements and the glass light emitting face of the sensor.

Advantages:

⌘ Reflections from specular or transparent objects are suppressed

Disadvantages:

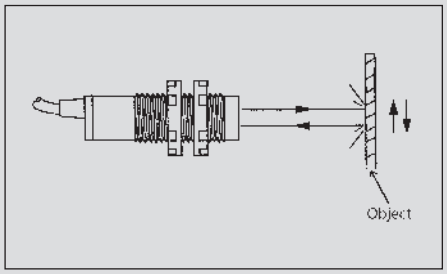
⌘ The sensing range is reduced compared to standard sensors without polarisation filter

Special versions with autocollimation

Advantages:

⌘ Transmit and receive channel use the same light source, i.e. no dead zone with reflectors in short distance range

Diffuse-reflection sensor



The light transmitter and receiver in a diffuse-reflection sensor are accommodated in one common enclosure. The light emitted from the transmitter is reflected diffused from the detected object. A part of this diffused reflection returns to the receiver and changes the switching status at the output when a certain intensity is exceeded. Accordingly, the texture and the colour of the object surface has a considerable influence on the object detection characteristics (presence – absence).

The sensing ranges specified in the Technical Data section of this catalogue are defined in accordance with DIN EN 60947-5-2: Sensing ranges up to 400 mm refer to a 100 x 100 m white Kodak paper test card. 200 x 200 mm test cards are used for sensing ranges 400 mm.

The reflectivity of the object surface to be sensed affects the sensing distance so that a correction or remission factor has to be specified. This value may vary from less than 10 % for matt-black plastic to 200 % for raw sheet aluminium (special values on request).
An application-dependent test of the specific object is usually recommended to take ambient conditions such as dust and humidity into consideration for the selection of the optimum sensor.

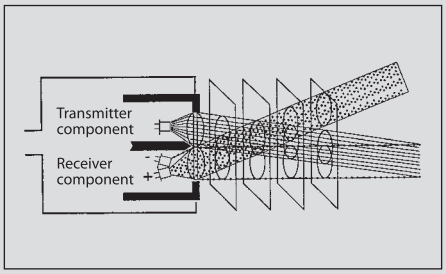
Advantages:

⌘ Easy installation
⌘ No reflector necessary

Disadvantages:

⌘ Different sensing distances and sensitivity settings are required for different objects (surface, colour)

Diffuse-reflection sensor with background suppression



This is a special type of diffuse-reflection sensor. It is based on two receive modules or segmented receivers.
Using the triangulation principle, reflections of objects beyond the target do not reach the active face of the receiver modules.

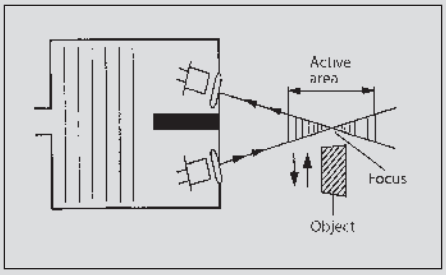
Advantages:

⌘ No background effect on object detection (e.g. a faintly reflecting object may be detected in front of a high-gloss background)

Disadvantages:

⌘ Short sensing distance
⌘ Considerable technical expenditure

Convergent beam sensors, fixed focus



Convergent beam sensors, fixed focus
The transmit and receive modules of convergent beam sensors are arranged at a defined angle to each other. The light cone of the transmitter and receiver are joined at a fixed focal point. This results in the active zone for the detection of objects being defined around this focal point.

Advantages:

⌘ Foreground / background suppression
⌘ Defined active zone

Disadvantages:

⌘ Short sensing distances (due to limited base width of sensor enclosure)

Angular optical system

The M18 series is available with a radial optical system (light outlet offset by 90°) for confined installation conditions. Compared to versions with an axial optical system, the sensing range of these sensors is slightly reduced due to optical displacement loss.

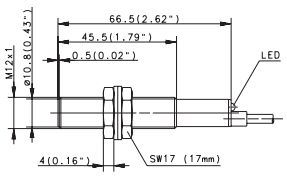
Reflectors

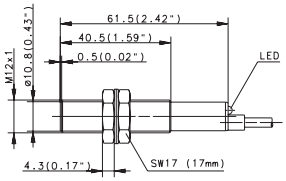
BERNSTEIN triple reflectors that consist of several triple mirrors arranged in a pyramid configuration are best suited for reflecting light in light barrier systems. The pyramid-like structure of these triple mirrors allows the reflector to be pivoted by up to 30° from the optical axis (e.g. caused by vibration or slight movement).

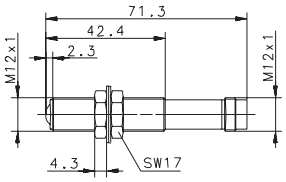
The specified sensing ranges of the retro-reflective sensors refer to the Ø 83 mm reflector (6572107003); the range is reduced accordingly with smaller reflectors.

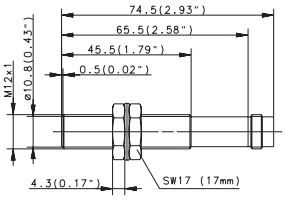
Essentially, the size of the reflector should be selected according to the sensing range and the size of the object to be detected. The object should ideally be larger than the reflector so that it completely covers the reflector.

Type			M12	M12		M12
Operating mode			Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D	Through-beam sensor Type T
Sensing range			60 mm	60 mm	60 mm	6 m
Type of connection			Cable 2 m	Cable 2 m	Connector M12	Connector M12
Special feature						









PNP		Light activated	6557928002		6557930002	6557929002		
		Type	OM12RT-DHTP-0060-CL		OT12RT-DHTP-0060-CL	OT12RT-DHTP-0060-S		
		Dark activated						
		Programmable						
		Type						
NPN		Light activated						
		Dark activated						
		Programmable						
Transmitter							6551029001	
		Type					OT12SE-DOOS-06.0-S	
Relay output								
NAMUR								
Analogue		Current output						
		Voltage output						
2-wire	DC							
	AC							

Technical data

Rated operating voltage	U_B	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC
Rated operating current	I_B	50 mA	50 mA	50 mA	50 mA
Switching frequency (max)	F	> 100 Hz	> 100 Hz	> 100 Hz	> 100 Hz
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/–	LED/–	–/–	–/–
Sensitivity adjustable		–	–	–	–
Teachable					
Timer function					
Diagnostic function					
Type of light		IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm

Mechanical data

Ambient temperature (min/max)	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67
Enclosure material	CuZn39Pb3	PA	PA	PA, red
Connection	3 x 0.14 mm²	3 x 0.14 mm²	M12 x 1	M12 x 1

Please refer to Accessories for reflectors, mounting brackets, cable couplers and sensor tester.

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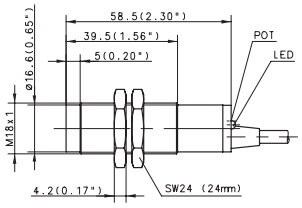
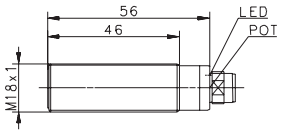
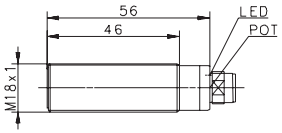
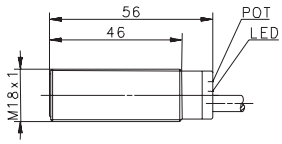
Optoelectronic Sensors (Type M18)

Type		M18	M18	M18	
Operating mode		Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D
Sensing range		200 mm	300 mm	300 mm	300 mm
Type of connection		Cable 2 m	Connector M12	Connector M12	Cable 2 m
Special feature					









PNP	Light activated								
	Dark activated								
	Programmable								
	Type	6557819001	OT18RT-DATP-0200-CEL		6557821002	ON18RT-DPTP-0300-SLE		6557816002	6557819005
								OM18RT-DPTP-0300-SLE	OT18RT-DPTP-0300-CLE
NPN	Light activated								
	Dark activated								
	Programmable								
	Type	6557219002	OT18RT-DATN-0200-CEL						
Transmitter									
	Type								
Relay output									
NAMUR									
Analogue	Current output								
	Voltage output								
2-wire	DC								
	AC								

Technical data

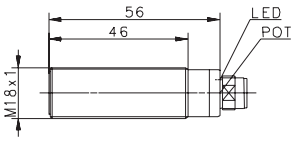
Rated operating voltage	U_B	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC
Rated operating current	I_B	200 mA	200 mA	200 mA	200 mA
Switching frequency (max)	F	> 250 Hz	500 Hz	500 Hz	500 Hz
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–
Sensitivity adjustable		Yes	Yes	Yes	Yes
Teachable					
Timer function					
Diagnostic function					
Type of light		IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm

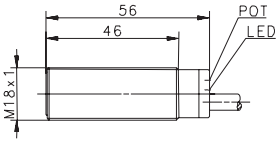
Mechanical data

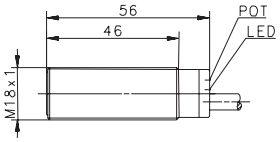
Ambient temperature (min/max)	–20°C/+80°C	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP65	IP67	IP67	IP67
Enclosure material	PA, red	Stainless steel 1.4305	CuZn39Pb3	PBT
Connection	4 x 0.25 mm²	M12 x 1	M12 x 1	4 x 0.34 mm²

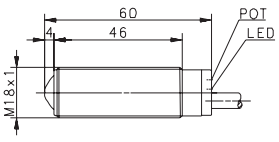
Please refer to Accessories for reflectors, mounting brackets, cable couplers and sensor tester.

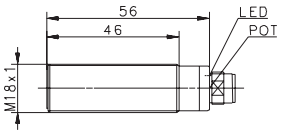
M18	M18		M18		M18	
Diffuse-reflection sensor Type D 300 mm Connector M12	Diffuse-reflection sensor Type D 500 mm Cable 2 m	Diffuse-reflection sensor Type D 500 mm Connector M12	Diffuse-reflection sensor Type D 500 mm Cable 2 m	Diffuse-reflection sensor Type D 500 mm Connector M12	Retro-reflective sensor Type R 2.5 m Cable 2 m Glass lens	Retro-reflective sensor Type R 2.5 m Connector M12 Glass lens

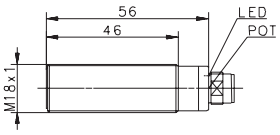


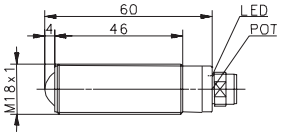












6557818003 OT18RT-DPTP-0300-SLE		6557817004 OM18RT-DPTP-0500-CLE	6557816006 OM18RT-DPTP-0500-SLE	6557819006 OT18RT-DPTP-0500-CLE	6557818006 OT18RT-DPTP-0500-SLE	6555819003 OT18PS-DPTP-02.5-CLE	6555818001 OT18PS-DPTP-02.5-SLE
6557218005 OT18RT-DPTN-0300-SLE		6557217003 OM18RT-DPTN-0500-CLE					

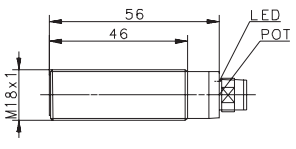
10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC
200 mA	200 mA	200 mA	200 mA	200 mA	200 mA	200 mA
500 Hz	500 Hz	500 Hz	500 Hz	500 Hz	500 Hz	500 Hz
Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
LED/–	LED/–	LED/–	LED/–	LED/–	LED/–	LED/–
Yes	Yes	Yes	Yes	Yes	Yes	Yes
IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm	red 660 nm	red 660 nm

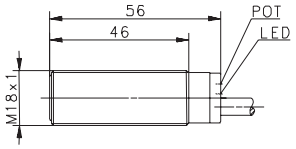
–20°C/+70°C	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C
IP67	IP67	IP67	IP67	IP67	IP67	IP67
PBT	CuZn39Pb3	CuZn39Pb3	PBT	PBT	PBT, black	PBT, black
M12 x 1	4 x 0.34 mm²	M12 x 1	4 x 0.34 mm²	M12 x 1	4 x 0.34 mm²	M12 x 1

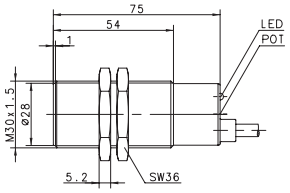
You will find detailed data sheets to the products under www.bernstein.eu

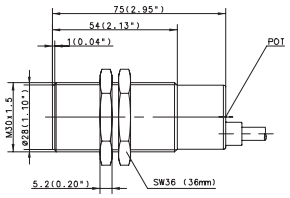
Optoelectronic Sensors (Type M18, M30)

Type			M18	M18	M30	
Operating mode			Through-beam sensor Type T	Through-beam sensor Type T	Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D
Sensing range			8 m	8 m	200 mm	500 mm
Type of connection			Connector M12	Cable 2 m	Cable 6 m	Cable 2 m
Special feature						









PNP	Light activated							6557005006
	Type							OT30RT-DDAP-0500-CE
	Dark activated						6557905008	
	Type						OT30RT-DHTP-0200-6LE	
	Programmable		6551821001		6551819001			
	Type		ON18EE-DPTP-08.0-SL		OT18EE-DPTP-08.0-CL			
NPN	Light activated							
	Dark activated							
	Programmable							
Transmitter			6551021001		6551019001			
	Type		ON18SE-DOOS-08.0-SCV		OT18SE-DOOS-08.0-CCV			
Relay output								
NAMUR								
Analogue	Current output							
	Voltage output							
2-wire	DC							
	AC							

Technical data

Rated operating voltage	U_B	10–36 VDC	10–36 VDC	10–36 VDC	10–30 VDC
Rated operating current	I_B	200 mA	200 mA	200 mA	–
Switching frequency (max)	F	500 Hz	500 Hz	> 250 Hz	–
Short circuit-protection		Cyclic	Cyclic	Yes	Yes
Function/operating voltage indicator		LED/–	LED/–	LED/–	–/–
Sensitivity adjustable		–	–	Yes	Yes
Teachable					
Timer function					
Diagnostic function					
Type of light		IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm

Mechanical data

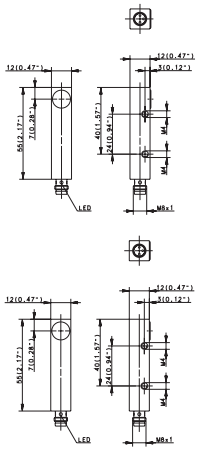
Ambient temperature (min/max)	–20°C/+70°C	–20°C/+70°C	–20°C/+80°C	–20°C/+80°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP65	IP65
Enclosure material	Stainless steel 1.4305	PBT, black	PA	PA
Connection	M12 x 1	4 x 0.34 mm²	3 x 0.5 mm²	3 x 0.5 mm²

Please refer to Accessories for reflectors, mounting brackets, cable couplers and sensor tester.

Notes

Optoelectronic Sensors (Type 12 x 12 mm, 30 x 30 mm)

Type			12 x 12 x 55 mm		12 x 12 x 55 mm		12 x 12 x 60 mm	
Operating mode			Through-beam sensor Type T	Through-beam sensor Type T	Through-beam sensor Type T		Diffuse-reflection sensor Type D	
Sensing range			1 m	1 m	6 m		200 mm	
Type of connection			Connector M8	Connector M8	Connector M8		Connector M8	
Special feature			Core beam					
PNP	Light activated		6551955002		6551955001		6557955001	
	Type		OR12EE-DHTP-01.0-SL		OR12EE-DHTP-06.0-SL		OR12RT-DHTP-0200-SLE	
	Dark activated		6551755002	6551755004	6551755001			
	Type		OR12EE-DDTP-01.0-SL	OR12EE-DDTP-01.0-SLE	OR12EE-DDTP-06.0-SL			
	Programmable							
	Type							
NPN	Light activated				6551355001			
	Type				OR12EE-DHTN-06.0-SL			
	Dark activated							
	Programmable							
Transmitter			6551055003		6551055002			
	Type		OR12SE-DOOS-01.0-SVC		OR12SE-DOOS-06.0-SVC			
Relay output								
NAMUR								
Analogue	Current output							
	Voltage output							
2-wire	DC							
	AC							



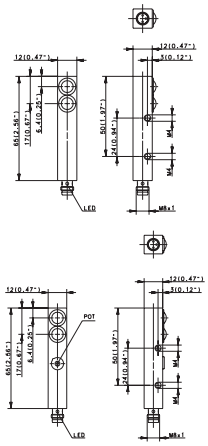
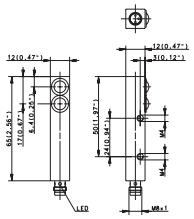
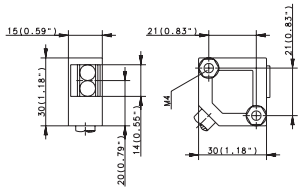
Technical data

Rated operating voltage	U_B	10–36 VDC	10–36 VDC	10–36 VDC		10–36 VDC	
Rated operating current	I_B	200 mA	200 mA	200 mA		200 mA	
Switching frequency (max)	F	100 Hz	100 Hz	100 Hz		100 Hz	
Short circuit-protection		Cyclic	Cyclic	Cyclic		Cyclic	
Function/operating voltage indicator		LED/–	LED/–	LED/–		LED/–	
Sensitivity adjustable		–	Yes	–		Yes	
Teachable							
Timer function							
Diagnostic function		Yes		Yes			
Type of light		IR 880 nm	IR 880 nm	IR 880 nm		IR 880 nm	

Mechanical data

Ambient temperature (min/max)		–5°C/+70°C	–5°C/+70°C	–5°C/+70°C		–5°C/+70°C	
Protection class in accordance with IEC 529, EN 60529		IP65	IP65	IP65		IP65	
Enclosure material		CuZn39Pb3	CuZn39Pb3	CuZn39Pb3		CuZn39Pb3	
Connection		M8 x 1	M8 x 1	M8 x 1		M8 x 1	

Please refer to Accessories for reflectors, mounting brackets, cable couplers and sensor tester.

12 x 12 x 65 mm		12 x 12 x 65 mm	30 x 30 x 15 mm	
Diffuse-reflection sensor Type D 50 mm Connector M8 Fixed focus/...	Diffuse-reflection sensor Type D 1.2 m Connector M8	Retro-reflective sensor Type R 4 m Connector M8	Diffuse-reflection sensor Type D 1.2 m Cable 3 m Antivalent ②	
				
6558955001 OR12FF-DHTP-0050-SL	6557955002 OR12RT-DHTP-01.2-SLE	6554955001 OR12RS-DHTP-04.0-SL 6554755001 OR12RS-DDTP-04.0-SL	6557875003 ② OR05RT-DATP-01.2-3DE	
10–36 VDC	10–36 VDC	10–36 VDC	10–36 VDC	
200 mA	200 mA	200 mA	200 mA	
100 Hz	100 Hz	100 Hz	< 1 kHz	
Cyclic	Cyclic	Cyclic	Yes	
LED/–	LED/–	LED/–	LED/LED	
–	Yes	–	Yes	
IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm	
–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–25°C/+70°C	
IP65	IP65	IP65	IP67	
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	PBTB	
M8 x 1	M8 x 1	M8 x 1	4 x 0.14 mm²	

You will find detailed data sheets to the products under www.bernstein.eu

② Antivalent output

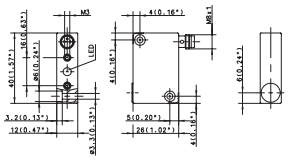
Optoelectronic Sensors (Type 30 x 30 mm, 40 x 26 mm)

Type		30 x 30 x 15 mm		30 x 30 x 15 mm		30 x 30 x 15 mm	
Operating mode		Diffuse-reflection sensor Type D	Retro-reflective sensor Type R	Retro-reflective sensor Type R		Through-beam sensor Type T	
Sensing range		1.2 m	4 m	4 m		12 m	
Type of connection		Connector M8/Ø 8	Cable 2 m	Cable 3 m		Cable 3 m	
Special feature			polarised	polarised			
PNP	Light activated	6557975003	6555975002				
	Type	OR05RT-DHTP-01.2-SLFE	OR05PS-DHTP-04.0-3LFE				
	Dark activated						
	Programmable			6555875001 ②		6551875003 ②	
	Type			OR05PS-DATP-04.0-3DE		OR05EE-DATP-12.0-3DE	
NPN	Light activated						
	Dark activated						
	Programmable						
Transmitter						6551075003	
	Type					OR05SE-DOOS-12.0-3C	
Relay output							
NAMUR							
Analogue	Current output						
	Voltage output						
2-wire	DC						
	AC						
Technical data							
Rated operating voltage	U_B	10–36 VDC	10–36 VDC	10–36 VDC		10–36 VDC	
Rated operating current	I_B	200 mA	200 mA	200 mA		–	
Switching frequency (max)	F	< 1000 Hz	< 1 kHz	< 1 kHz		–	
Short circuit-protection		Yes	Yes	Yes		–	
Function/operating voltage indicator		LED/LED	LED/LED	LED/LED		LED/LED	
Sensitivity adjustable		Yes	Yes	Yes		Yes	
Teachable							
Timer function							
Diagnostic function							
Type of light		IR 880 nm	red 660 nm	red 660 nm		IR 880 nm	
Mechanical data							
Ambient temperature (min/max)		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C		–25°C/+70°C	
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67		IP67	
Enclosure material		PBTB	PBTB	PBTB		PBTB	
Connection		4-pin	4 x 0.14 mm²	4 x 0.14 mm²		4 x 0.14 mm²	

Please refer to Accessories for reflectors, mounting brackets, cable couplers and sensor tester.

② Antivalent output

40 x 26 x 12 mm			
Diffuse-reflection sensor Type D 40 mm Connector M8			



6557950006 OR15RT-DHTP-0040-SL							

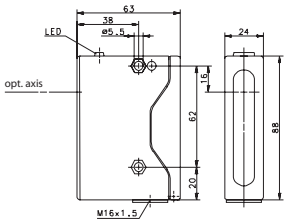
10–36 VDC			
200 mA			
> 100 Hz			
Cyclic			
LED/–			
–			
IR 880 nm			

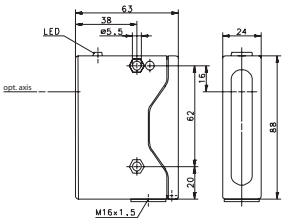
–5°C/+70°C			
IP65			
PA			
M8 x 1			

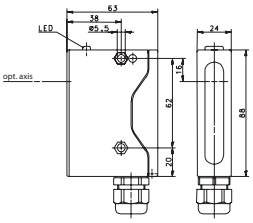
You will find detailed data sheets to the products under www.bernstein.eu

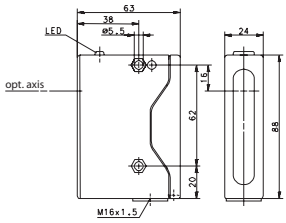
Optoelectronic Sensors (Type 88 x 63 mm)

Type			88 x 63 x 24 mm	88 x 63 x 24 mm		88 x 63 x 24 mm
Operating mode			Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D	Diffuse-reflection sensor Type D
Sensing range			400 mm	600 mm	1.5 m	1.5 m
Type of connection			Connect. space	Connect. space	Connect. space	Connect. space
Special feature			①			









PNP		Light activated Type				
		Dark activated Programmable Type			6557886003 OR20RT-DPTP-01.5-ALET	
NPN		Light activated				
		Dark activated Programmable				
Transmitter						
Relay output		Type	6558686002 OR20RH-MAR5-0400-ALET		6557686001 OR20RT-MAR5-0600-ALET	6557686004 OR20RT-MAR5-01.5-ALET
NAMUR						
Analogue		Current output				
		Voltage output				
2-wire	DC					
	AC					

Technical data

Rated operating voltage	U_B	12–265V AC/DC	12–265V AC/DC	10–36 VDC	12–265V AC/DC
Rated operating current	I_B	3 A	3 A	200 mA	3 A
Switching frequency (max)	F	> 50 Hz	> 50 Hz	> 100 Hz	> 50 Hz
Short circuit-protection		SCPD external	SCPD external	Cyclic	SCPD external
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–
Sensitivity adjustable		Yes	Yes	Yes	Yes
Teachable					
Timer function		Yes	Yes	Yes	Yes
Diagnostic function					
Type of light		IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm

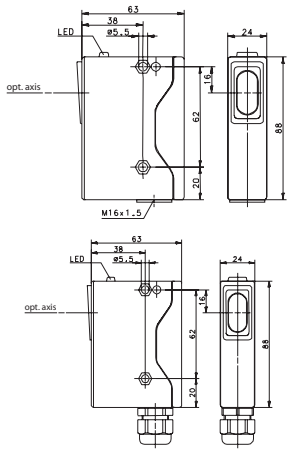
Mechanical data

Ambient temperature (min/max)	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP65	IP65	IP65	IP65
Enclosure material	PA	PA, red	PA	PA, red
Connection	Connect. space	Connect. space	Connect. space	Connect. space

Please refer to Accessories for reflectors, mounting brackets, cable couplers and sensor tester.

① Background suppression

88 x 63 x 24 mm				
Retro-reflective sensor Type R 6 m Connect. space polarised	Retro-reflective sensor Type R 6 m Connect. space polarised			



6555886001 OR20PS-DPTP-06.0-ALET							
	6555686002 OR20PS-MAR5-06.0-ALET						

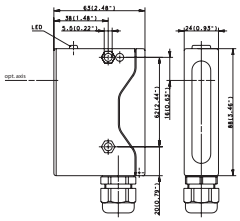
10–36 VDC	12–265V AC/DC			
200 mA	3 A			
> 100 Hz	> 50 Hz			
Cyclic	SCPD external			
LED/–	LED/–			
Yes	Yes			
IR 880 nm	IR 880 nm			

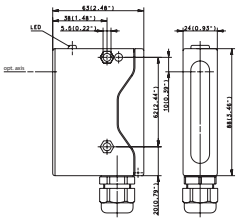
–20°C/+70°C	–20°C/+70°C			
IP65	IP65			
PA, red	PA, red			
Connect. space	Connect. space			

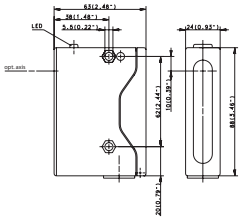
You will find detailed data sheets to the products under www.bernstein.eu

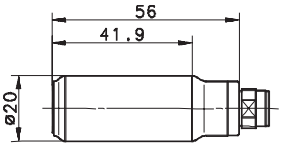
Optoelectronic Sensors (Type 88 x 63 mm, Ø 20 mm)

Type		88 x 63 x 24 mm	88 x 63 x 24 mm		Ø 20 mm
Operating mode		Retro-reflective sensor Type R	Through-beam sensor Type T	Through-beam sensor Type T	Diffuse-reflection sensor Type D
Sensing range		8 m	20 m	20 m	200 mm
Type of connection		Connect. space	Connect. space	Connect. space	Connector M12
Special feature					









PNP	Light activated					
	Dark activated					
	Programmable					
	Type			6551886003 OR20EE-DPTP-20.0-ALET		
NPN	Light activated					
	Dark activated					
	Programmable					
Transmitter						
	Type			6551086003 OR20SE-DOOS-20.0-AV	6551086002 OR20SE-MOOS-20.0-AV	
Relay output						
	Type	6554686002 OR20RS-MAR5-08.0-ALET			6551686004 OR20EE-MAR5-20.0-ALET	
NAMUR						
Analogue	Current output					
	Voltage output					
	Type					6557000001 OZ20RT-DPAP-0200-SE
2-wire	DC					
	AC					

Technical data

Rated operating voltage	U_B	12–265V AC/DC	10–36 VDC	12–265V AC/DC	10–30 VDC
Rated operating current	I_B	3 A	200 mA	–	200 mA
Switching frequency (max)	F	> 50 Hz	> 100 Hz	–	–
Short circuit-protection		SCPD external	Cyclic	SCPD external	–
Function/operating voltage indicator		LED/–	LED/–	–/LED	–/–
Sensitivity adjustable		Yes	Yes	–	Yes
Teachable					
Timer function		Yes	Yes	Yes	
Diagnostic function					
Type of light		IR 880 nm	IR 880 nm	IR 880 nm	IR 880 nm

Mechanical data

Ambient temperature (min/max)	–20°C/+70°C	–20°C/+70°C	–20°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP65	IP65	IP65	IP67
Enclosure material	PA, red	PA, red	PA, red	Stainless steel 1.4305
Connection	Connect. space	Connect. space	Connect. space	M12 x 1

Please refer to Accessories for reflectors, mounting brackets, cable couplers and sensor tester.

Altech Corp. by BERNSTEIN

Notes

General Information on BERNSTEIN Magnetic Switches

Electromechanical and electronic variants

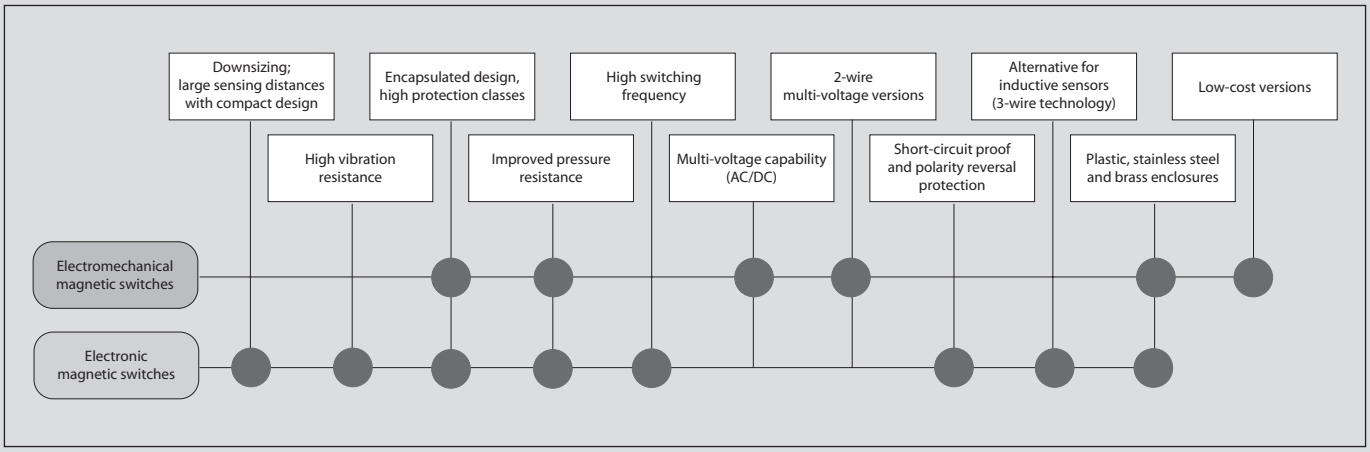
BERNSTEIN has extended its range of electromechanical magnetic switches with electronic versions which operate according to the Hall and magnetoresistive principle.

Electromechanical and electronic magnetic switches have special properties which ensure optimum use in their respective environments.

The electronic versions are characterised by their enhanced mechanical properties (extremely high resistance to vibration, shock or impact) and are not prone to wear in operation.
Thanks to the use of only one single "active" component (reed contact), "traditional" electromechanical magnetic switches are extremely reliable in operation. The universal current capability and low procurement costs allow these switches to be used in a wide range of applications.
The matrix below highlights the main features of each functional principle and helps you to decide on which magnetic switch to use for your application.

Technical features and applications

More detailed information on the technical features and applications relating to the different functional principles are provided in the following sections.



Electromechanical Magnetic Switches

Special features of electromechanical magnetic switches

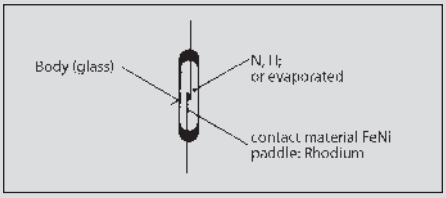
- ⌘ Reliable under extreme ambient conditions such as dirt, humidity, gas, dust, etc.
- ⌘ Protection class up to IP 67
- ⌘ Stable switching point, reproducible switching point accuracy of approx. 0.1 mm
- ⌘ Can be operated from several directions
- ⌘ Can be mounted in any position
- ⌘ High operational reliability ensured by the use of only one single component
- ⌘ Easy to install
- ⌘ Long electrical service life (depending on the load to be switched) more than 10^8 switching cycles if contacts are suitably protected
- ⌘ Special versions available for extreme temperatures from –40 °C to +150 °C
- ⌘ Can be connected to direct and alternating voltage sources

Design, function and operating principle of an electromechanical magnetic switch

The basic elements of this type of switch are the components which change their electrical characteristics in response to the approach of an actuating magnet. The contact paddles assume opposing polarity (north and south pole) under the influence of a magnetic field.

The approach can be made by either permanent magnets or electromagnets; the sensitivity of the switch and the field strength of the magnet determine the distance between the switch and magnet. Opening and closing of the contact studs is determined by the magnet correspondingly approaching or moving away from the switch. Normally-closed, normally-open and changeover contacts as well as bistable versions are included in our range of products.

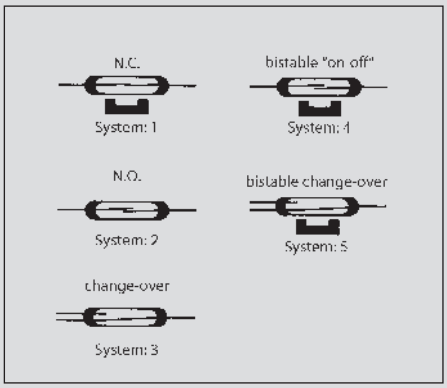
The magnetically influenced parts and their auxiliary components (resistor, diode, triac, output stage, etc.) are cast in high quality insulating material or casting compound to increase the vibration / impact strength and guarantee a protection class up to IP 67. Metal versions (stainless steel, aluminium and brass) as well as standard plastic versions are available for use under extreme ambient conditions such as wider temperature ranges.



Design of a reed contact

Biasing (bistable)

Bias magnets energise or hold the contact closed. The contact of the bistable normally-open or normally-closed contact is held closed until a stronger magnet with opposite polarity neutralises the biasing.



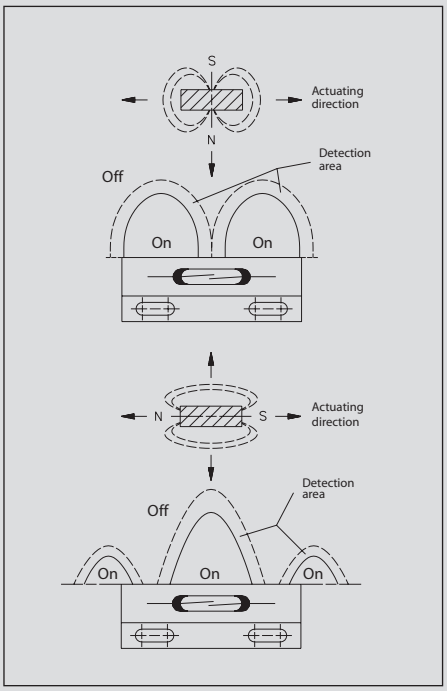
Types of reed contact switches

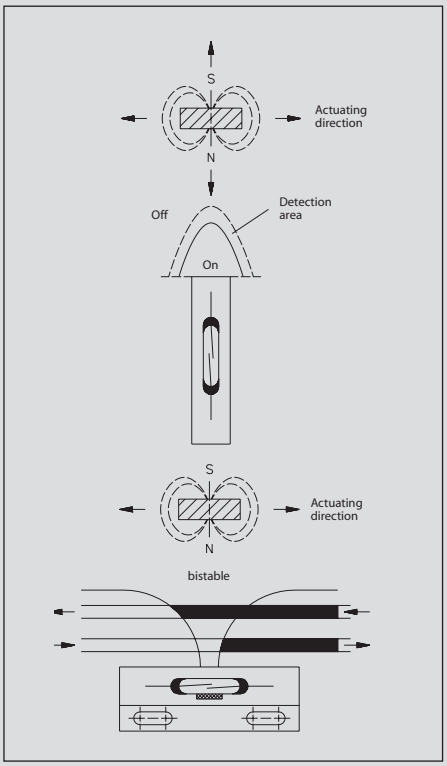
Actuation and switching characteristics

The switching characteristics are principally determined by the approach and polarity of the magnet. The following drawings show typical characteristics. Materials and external dimensions are specified in the product overview. Magnetic switches with reed contact output are identified by an "A" in the second position of the type code (MA...).

Switching frequency

Up to 200 Hz, depending on the size of load to be switched (considerably faster than relays, contactors etc.).





Switching distances

Refer to the tables in this catalogue to identify which switching magnets may be used as well as the minimum achievable switching distance.

Temperature ranges

The standard version may be used in a temperature range from –5 °C to +70 °C. Special types are also available offering an extended operating temperature range from –40 °C to +150 °C.

Electrical service life

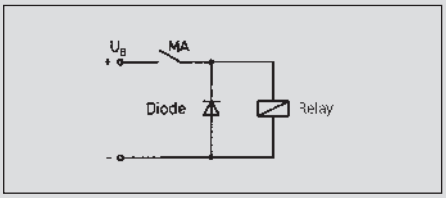
To maintain a long service life of the electrical contacts, it is important to ensure the maximum supply voltage and maximum switching current are not exceeded. Refer to the diagrams on Page 67 for the load values.

Guidelines for reed contact protection

The values for current, voltage and power specified in the catalogue apply only to purely resistive loads. Very often, however, these loads are exposed to inductive or capacitive components. In these cases it is advisable to protect the reed contacts against voltage and current peaks. Whilst it is not possible to recommend a safe contact protection concept that applies to all load ranges (each individual case will require its own evaluation), we would like to present general guidelines on how reed contacts may be connected to different loads in order to avoid premature failure.

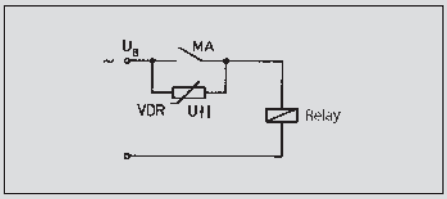
1. Inductive loads

In DC applications, contact protection is relatively easy to realise with the aid of a free-wheeling diode connected in parallel to the load. The diode polarity must be selected so that it blocks when normal operating voltage is applied but will short-circuit the voltage induced after the switch is opened (voltage peaks can significantly exceed the operating voltage).



Suppression of voltage peaks with a free-wheeling diode

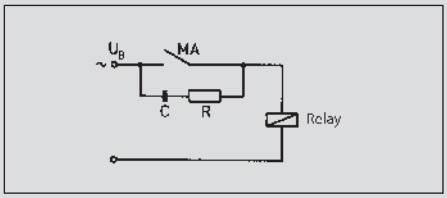
1) Voltage peaks induced by switching off inductive loads are suppressed by connecting a voltage-dependent resistor (VDR) in parallel to the reed contact.



Suppression of voltage peaks with a VDR

2) In AC voltage applications effective protection is achieved with a combination of a resistor and a capacitor (RC element).

Generally, the RC element is connected parallel to the contact and therefore in series to the load (vice versa is also possible).



Suppression of voltage peaks with RC element

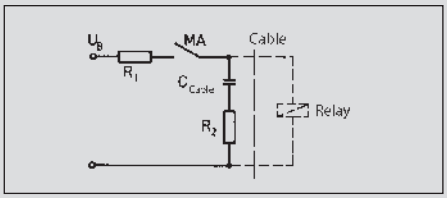
2. Capacitive loads

In contrast to inductive loads, an increase of making currents can occur in connection with capacitive loads and lamp loads that could damage and even weld contacts closed. When capacitors are switched (e.g. cable capacitance) a very high peak current occurs with its intensity depending on the capacitance and length of the cable leading to the switch.

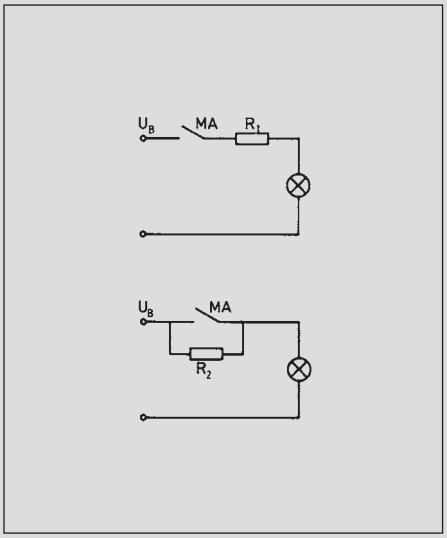
A resistor connected in series to the contact will reduce this current. The size of the resistor is determined by the characteristics of the corresponding electric circuit.

It should, however, be as large as possible to reduce the current to a permissible value, thus ensuring reliable contact protection.

Contact protection with resistors for limiting current:

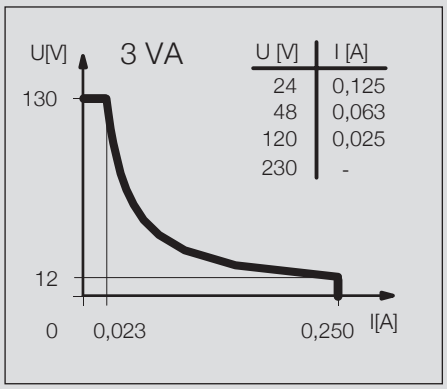


Capacitive load

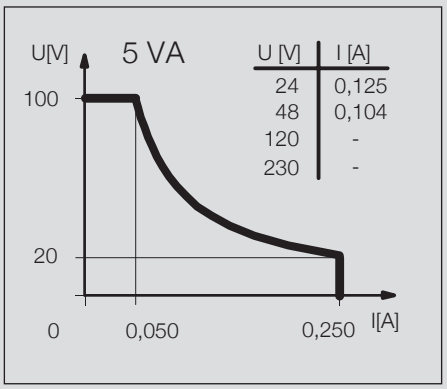


Lamp load

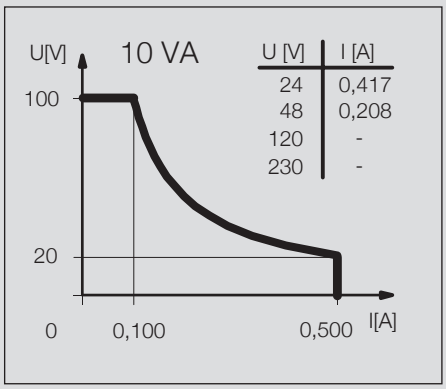
Performance diagrams for electromechanical magnetic switches



(1)



(2)



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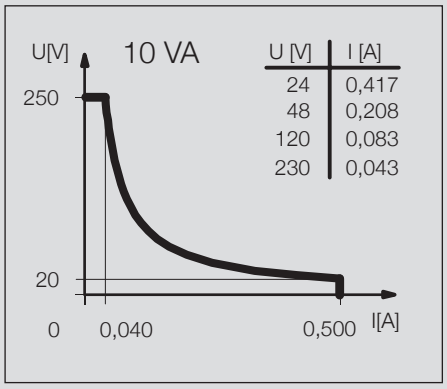

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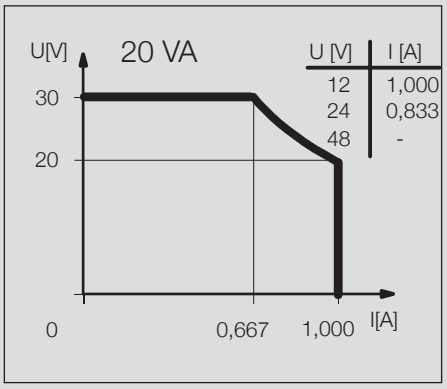
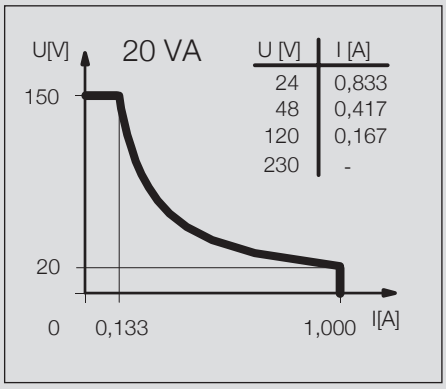
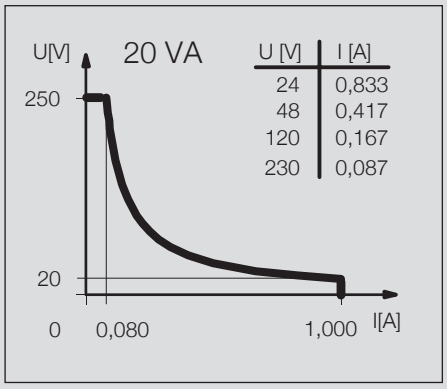


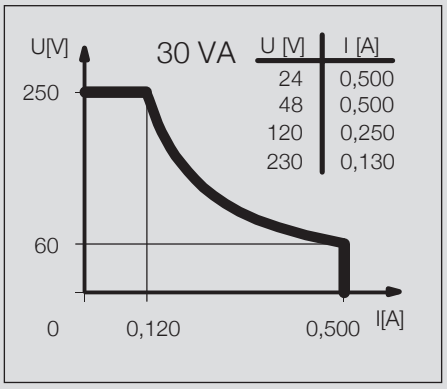
(5)



(6)



(7)



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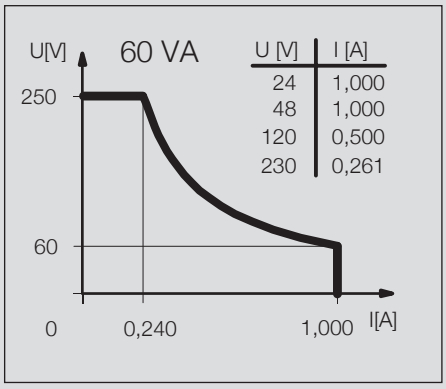

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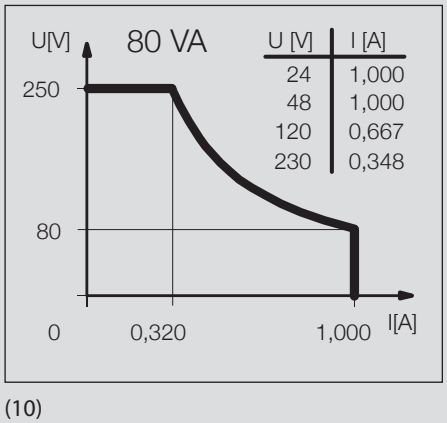

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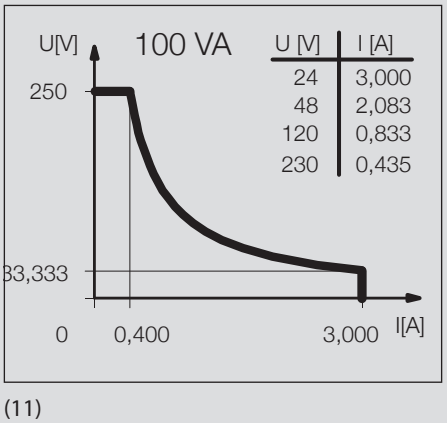

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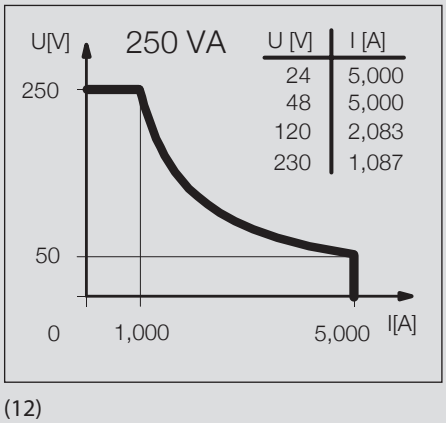
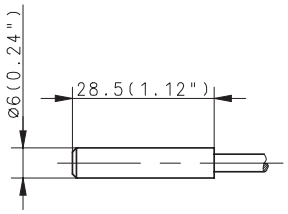
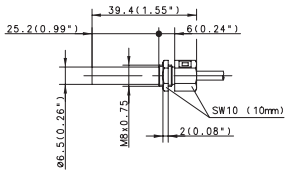


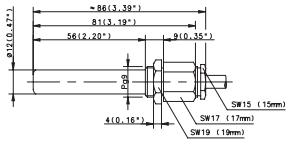
(12)

Magnetic Switches (Type Ø 6 mm, Ø 6.5 mm, Ø 12 mm, Ø 13 mm)

Type	Ø 6 mm		Ø 6.5 mm		Ø 12 mm	
Nominal switching distance (San)	19 mm	19 mm	18 mm		6 mm	7 mm
Type of connection	Cable 1 m	Cable 1 m	Cable 2 m		Cable 1 m	Cable 1 m
Reference magnet (Page)	T-62 N/S	T-62 N/S	T-62 N/S		T-62 N/S	T-62 N/S
Special feature						



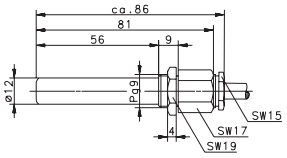


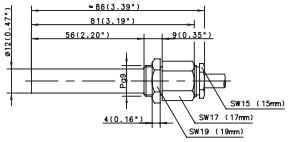


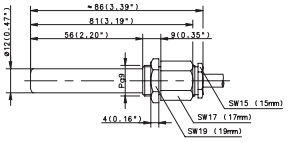
Switching function						
	NO contact		6311230571	6310246500		6314206246
	Type		MAK-3012-B-1	MAK-4612-A-2		MAA-0612-F-1
	NC contact					
	Type					
	Changeover contact	6310330572			6317306315	
	Type	MAK-3013-X-1			MAA-0613-M-1	
	Bistable					
	Type					
Technical data						
Max. switching voltage		100 V	250 V	250 V	250 V	250 V
Switching current (max)		0.25 A	0.5 A	0.5 A	1 A	3 A
Performance class (diagram No.)		5 VA	10 VA	20 VA	80 VA	100 VA
Shock resistance			50 g (11 ms)			
Mechanical data						
Ambient temperature (min/max)		–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67
Enclosure material		PA	PA	PA	Aluminium	Al/CuZn39Pb3
Connection		3 x 0.14 mm²	2 x 0.14 mm	2 x 0.14 mm²	4 x 0.75 mm²	3 x 0.75 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

Type	Ø 12 mm		Ø 12 mm		Ø 12 mm	
Nominal switching distance (San)	7 mm	7 mm	7 mm	7 mm	8 mm	12 mm
Type of connection	Cable 1 m	Cable 3 m	Cable 8 m	Cable 2 m	Cable 1 m	Cable 1 m
Reference magnet (Page)	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S
Special feature			Temperature			

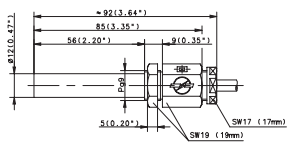
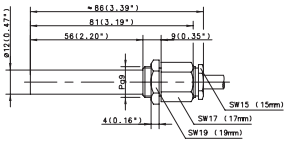
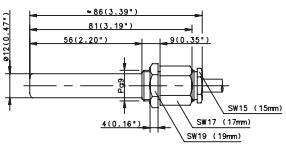
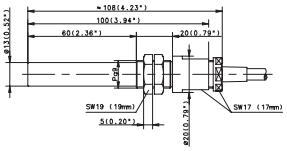






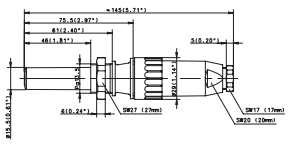
Switching function						
	NO contact	6312206321	6314216476	6314216585	6314226423		
	Type	MAA-0612-D-1	MAN-1612-F-3	MAN-1612-FT-8	MAK-2612-F-1		
	NC contact						
	Changeover contact					6315306314	6316316259
	Type					MAA-0613-K-1	MAN-1613-L-1
	Bistable						
Technical data							
Max. switching voltage		250 V	250 V	250 V	250 V	250 V	250 V
Switching current (max)		0.5 A	3 A	3 A	3 A	0.5 A	1 A
Performance class (diagram No.)		30 VA	100 VA	100 VA	100 VA	30 VA	60 VA
Shock resistance		50 g (11 ms)					
Mechanical data							
Ambient temperature (min/max)		–5°C/+70°C	–5°C/+70°C	–40°C/+150°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67	IP67
Enclosure material		Aluminium	Stainless steel 1.4305	Stainless steel 1.4305	PA, red	Al/CuZn39Pb3	Stainless steel 1.4305
Connection		3 x 0.75 mm²	3 x 0.75 mm²	3 x 0.75 mm²	2 x 0.5 mm²	4 x 0.75 mm²	4 x 0.75 mm²

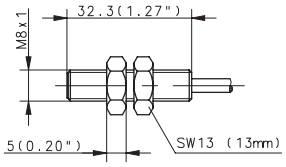
Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

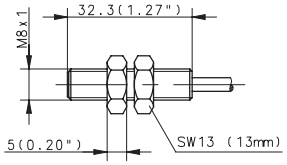
Ø 12 mm		Ø 12 mm		Ø 12 mm		Ø 13 mm	
12 mm Cable 1 m T-62 N/S	12 mm Cable 1 m T-62 N/S	16 mm Cable 4 m T-62 N/S Temperature	18 mm Cable 1m T-62 N/S	19 mm Cable 1 m T-69 N/S	19 mm Cable 1 m T-69 N/S Temperature	9 mm Cable 1 m T-62 N/S	20 mm Cable 1 m T-62 N/S
							
6316326426 MAK-2613-L-1	6315326425 MAK-2613-K-1	6410206399 MAA-0612-NT-4	6310406554 MAA-0614-P-1	6316306248 MAA-0613-L-1	6316306004 MAA-0613-LT-1	6310136616 MAK-3611-P-1	6310536617 MAK-3615-L-1
250 V	250 V	250 V	250 V	250 V	250 V	250 V	250 V
1 A	0.5 A	1.5 A	5 A	1 A	1 A	5 A	1 A
60 VA	30 VA	50 VA	250 VA	60 VA	60 VA	250 VA	60 VA
–5°C/+70°C	–5°C/+70°C	–40°C/+150°C	–5°C/+70°C	–5°C/+70°C	–40°C/+150°C	–5°C/+70°C	–5°C/+70°C
IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67
PA, red	PA, red	Al/CuZn39Pb3	Al/CuZn39Pb3	Al/CuZn39Pb3	Al/CuZn39Pb3	PA, black	PA, black
3 x 0.5 mm²	3 x 0.5 mm²	3 x 0.75 mm²	3 x 0.75 mm²	4 x 0.75 mm²	4 x 0.75 mm²	2 x 0.75 mm²	3 x 0.75 mm²

Magnetic Switches (Type Ø 15.5 mm, M8, M12, PG9, 28.6 x 18 mm)

Type	Ø 15.5 mm	M8		M8
Nominal switching distance (San)	6 mm	13 mm	13 mm	18 mm
Type of connection	Connector	Cable 1 m	Connector	Cable 1 m
Reference magnet (Page)	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S
Special feature				



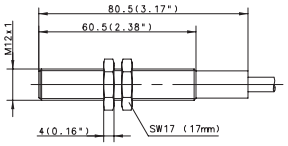


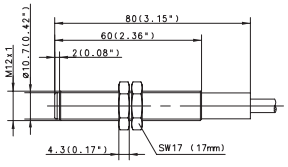


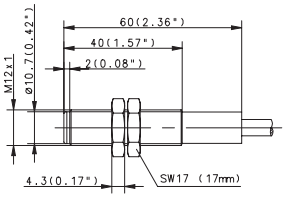
Switching function						
	NO contact					6311208596
	Type					MAN-0812-B-1
	NC contact					
	Type					
	Changeover contact	6317304313		6310308597	6310308595	
	Type	MAK-0413-M-S		MAN-0813-Y-1	MAN-0813-STK	
	Bistable					
	Type					
Technical data						
Max. switching voltage		250 V		100 V	30 V	250 V
Switching current (max)		1 A		0.5 A	1 A	0.5 A
Performance class (diagram No.)		80 VA		10 VA	20 VA	10 VA
Shock resistance						
Mechanical data						
Ambient temperature (min/max)		–5°C/+70°C		–20°C/+70°C	–5°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP65		IP67	IP65	IP67
Enclosure material		PC, grey		Stainless steel 1.4305	Stainless steel 1.4305	Stainless steel 1.4305
Connection		Amphenol		3 x 0.14 mm²	Ø 6.5 mm	2 x 0.14 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

Type	M12		M12		M12	
Nominal switching distance (San)	7 mm	7 mm	10 mm	12 mm	15 mm	18 mm
Type of connection	Cable 1 m	Cable 2 m	Cable 1 m	Cable 1 m	Cable 3 m	Cable 1 m
Reference magnet (Page)	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-68
Special feature						

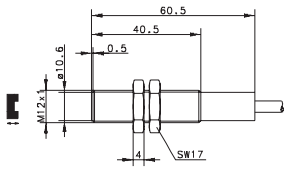
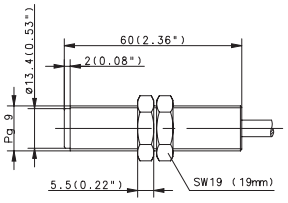
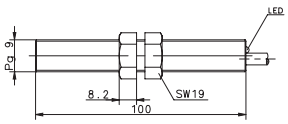
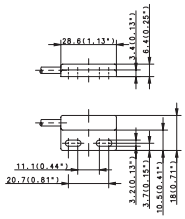






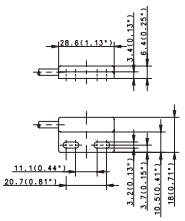
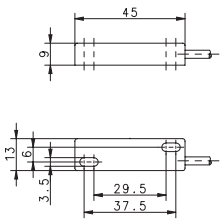
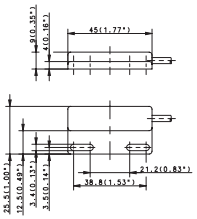
Switching function							
	NO contact	6314223268	6314233002			6416228260	6311218294
	Type	MAM-2312-F-1	MAK-3312-F-2			MAK-2812-L-3	MAM-1812-B-1
	NC contact						
	Changeover contact			6316333005	6316318002		
	Type			MAK-3313-L-1	MAM-1813-L-1		
	Bistable						
Technical data							
Max. switching voltage		250 V	250 V	250 V	250 V	250 V	250 V
Switching current (max)		3 A	3 A	1 A	1 A	1 A	0.5 A
Performance class (diagram No.)		100 VA	100 VA	60 VA	60 VA	60 VA	10 VA
Shock resistance			50 g (11 ms)				50 g (11 ms)
Mechanical data							
Ambient temperature (min/max)		–5°C/+70°C	–25°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67	IP67
Enclosure material		CuZn39Pb3	PA, red	PA, red	CuZn39Pb3	PA, red	CuZn39Pb3
Connection		2 x 0.5 mm²	2 x 0.5 mm²	3 x 0.5 mm²	3 x 0.5 mm²	2 x 0.5 mm²	2 x 0.34 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

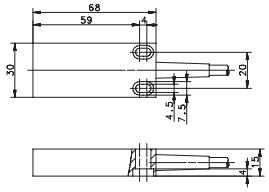
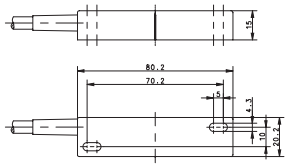
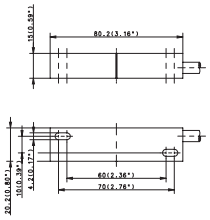
M12		PG9		PG9		28.6x18x6.4 mm	
18 mm Cable 2 m T-62 N/S	22 mm Cable 2 m T-62 N/S	17 mm Cable 2 m T-62 N/S		20 mm Cable 2 m T-62 N/S D		8 mm Cable 1 m TK-11-11	8 mm Cable 1.5 m TK-11-11
							
6310118626 MAM-1811-2		6316343544 MAM-4313-L-2		6310431569 MAM-3114-2-LED		6310311615 MAK-1113-1	6410311368 MAK-1113-1,5
	6410433350 MAK-3314-P-2						
175 V	250 V	250 V		250 V		130 V	130 V
0.25 A	1.5 A	1 A		1 A		0.25 A	0.25 A
5 VA	250 VA	60 VA		120 VA		3 VA	3 VA
50 g (11 ms)							
–5°C/+70°C	–25°C/+70°C	–5°C/+80°C		–5°C/+80°C		–5°C/+70°C	–20°C/+70°C
IP67	IP67	IP65		IP65		IP67	IP67
CuZn39Pb3	PA, red	CuZn39Pb3		CuZn39Pb3		PA, black	PA
2 x 0.34 mm²	2 x 0.5 mm²	3 x 0.5 mm²		2 x 0.5 mm²		3 x 0.14 mm²	3 x 0.14 mm²

You will find detailed data sheets to the products under www.bernstein.eu

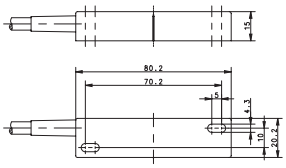
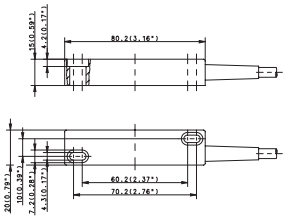
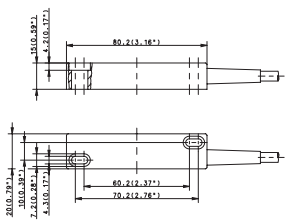
Magnetic Switches (Type 28.6 x 18, 45 x 13, 45 x 25.5, 68 x 30, 80 x 20)

Type		28.6x18x6.4mm		45x13x9mm		45x25.5x9mm	
Nominal switching distance (San)		10 mm	25 mm	10 mm		5 mm	10 mm
Type of connection		Cable 1 m	Cable 5 m	Cable 2 m		Cable 1 m	Cable 1 m
Reference magnet (Page)		TK-11-11	T-67 N/S	TK-11-01		TK-45	TK-45
Special feature							
							
Switching function	NO contact	6311211541		6311201095			6311245539
	Type	MAK-1112-B-1		MAK-0112-B-2			MAK-4512-B-1
	NC contact						
	Type						
	Changeover contact					6316345540	
	Type					MAK-4513-L-1	
	Bistable		6311411603				
	Type		MAK-1114-B-5				
Technical data							
Max. switching voltage		250 V	250 V	250 V		250 V	250 V
Switching current (max)		0.5 A	0.5 A	0.5 A		1 A	0.5 A
Performance class (diagram No.)		10 VA	10 VA	10 VA		60 VA	10 VA
Shock resistance							50 g (11 ms)
Mechanical data							
Ambient temperature (min/max)		–5°C/+70°C	–5°C/+70°C	–5°C/+70°C		–5°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67		IP67	IP67
Enclosure material		PA, black	PA, black	PA, black		PA	PA
Connection		2 x 0.14 mm	2 x 0.14 mm	2 x 0.14 mm		2 x 0.34 mm²	2 x 0.14 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

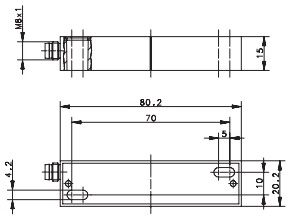
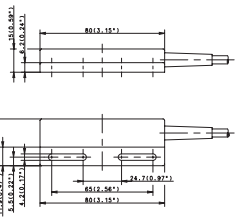
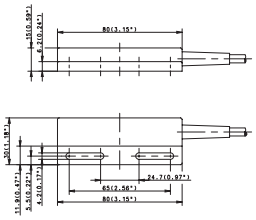
Type		68x30x15mm		80x20x15mm		80x20x15mm	
Nominal switching distance (San)		8 mm		18 mm	18 mm	20 mm	10 mm
Type of connection		Cable 1 m		Cable 1 m	Cable 1 m	Cable 3 m	Cable 3 m
Reference magnet (Page)		T-62 N/S		TK-21-02	TK-21-02	T-62 N/S	T-67
Special feature						Temperature	
							
Switching function	NO contact						
	Type						
	NC contact						
	Changeover contact	6316313004		6315302309	6315312196	6314402566	6419402397
	Type	MAK-1313-L-1		MAK-0213-K-1	MAK-1213-K-1	MAA-0214-FT-3	MAK-0214-P-3
	Bistable						
Technical data							
Max. switching voltage		250 V		250 V	250 V	250 V	250 V
Switching current (max)		1 A		0.5 A	0.5 A	3 A	5 A
Performance class (diagram No.)		60 VA		30 VA	30 VA	100 VA	250 VA
Shock resistance							10 g (11 ms)
Mechanical data							
Ambient temperature (min/max)		–5°C/+70°C		–5°C/+70°C	–5°C/+70°C	–40°C/+150°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67		IP67	IP67	IP67	IP67
Enclosure material		PC, red		PA, black	PA, red	GDAlSi12, red	PA, black
Connection		3 x 0.5 mm²		3 x 0.75 mm²	3 x 0.75 mm²	3 x 0.75 mm²	2 x 0.5 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

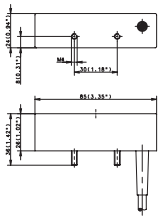
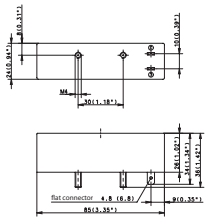
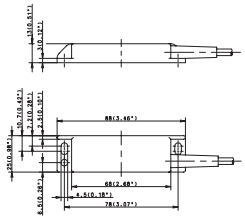
80 x 20 x 15 mm		80 x 20 x 15 mm		80 x 20 x 15 mm		
21 mm Cable 1 m TK-21-02	21 mm Cable 1 m TK-21-02	21 mm Cable 1 m TK-21-12	24 mm Cable 1 m TA-21-02	24 mm Cable 1 m TK-21-12	25 mm Cable 1 m T-62 N/S	
						
6312202316 MAK-0212-L-1	6314202204 MAK-0212-F-1	6314212217 MAK-1212-F-1	6316302206 MAK-0213-L-1	6316312220 MAK-1213-L-1	6410412143 MAK-1214-L-2	
250 V	250 V	250 V	250 V	250 V	250 V	
0.5 A	3 A	3 A	1 A	1 A	1 A	
30 VA	100 VA	100 VA	60 VA	60 VA	60 VA	
–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	
IP67	IP67	IP67	IP67	IP67	IP67	
PA, black	PA, black	PA, red	PA, black	PA, red	PA, red	
2 x 0.75 mm²	2 x 0.75 mm²	2 x 0.5 mm²	3 x 0.5 mm²	3 x 0.5 mm²	2 x 0.5 mm²	

You will find detailed data sheets to the products under www.bernstein.eu

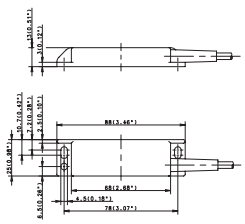
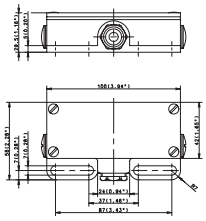
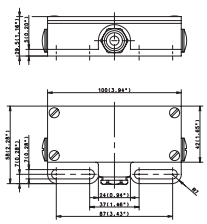
Magnetic Switches (Type 80 x 20 mm, 80 x 30 mm, 85 x 24 mm, 88 x 25 mm, 100 x 58 mm)

Type		80x20x15mm		80x30x15mm		80x30x15mm	
Nominal switching distance (San)		25 mm	30 mm	8 mm	19 mm	20 mm	22 mm
Type of connection		Connector M8	Cable 1 m	Cable 1 m	Cable 1 m	Cable 1 m	Cable 1 m
Reference magnet (Page)		Ø 10 x 50 Neod	TA-21-02	TK-44	TK-44	T-62 N/S	TK-44
Special feature			Temperature				
							
Switching function	NO contact				6314244536		
	Type				MAK-4412-F-1		
	NC contact			6314144542			
	Type			MAK-4411-F-1			
	Changeover contact	6310302636	6316302389				6317344538
	Type	MAA-0213-STK	MAA-0213-LT-1				MAK-4413-M-1
	Bistable					6310444537	
	Type					MAK-4414-P-1	
Technical data							
Max. switching voltage		60 V	250 V	250 V	250 V	250 V	250 V
Switching current (max)		1 A	1 A	3 A	3 A	5 A	1 A
Performance class (diagram No.)		3 VA	60 VA	100 VA	100 VA	250 VA	80 VA
Shock resistance			10 g (11 ms)				
Mechanical data							
Ambient temperature (min/max)		–30°C/+80°C	–40°C/+150°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP65	IP67	IP67	IP67	IP67	IP67
Enclosure material		GDAlSi 12, red	GDAlSi12, red	PA, black	PA, black	PA, black	PA
Connection		M8 x 1	4 x 0.75 mm²	2 x 0.5 mm²	2 x 0.5 mm²	2 x 0.5 mm²	3 x 0.5 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

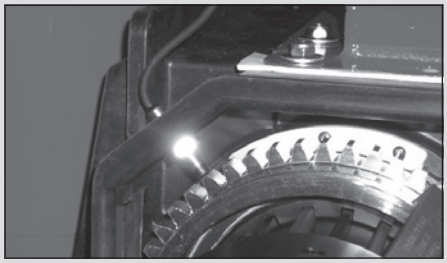
Type		85x24x26mm		85x24x26mm		88x25x13mm	
Nominal switching distance (San)		15 mm	24 mm	24 mm		22 mm	25 mm
Type of connection		Cable 3 m	Cable 1 m	Flat plug		Cable 1 m	Cable 1 m
Reference magnet (Page)		T-67 N/S	T-69 N/S	T-69 N/S		TK-42	TK-42
Special feature				K4.8			
							
Switching function	NO contact						6314242533
	Type						MAK-4212-F-1
	NC contact						
	Changeover contact					6317342535	
	Type					MAK-4213-M-1	
	Bistable	6314432609	6310432598	6310432590			
	Type	MAK-3214-F-3	MAK-3214-P-1	MAK-3214-P-STK4.8			
Technical data							
Max. switching voltage		250 V	250 V	250 V		250 V	250 V
Switching current (max)		3 A	5 A	5 A		1 A	3 A
Performance class (diagram No.)		100 VA	250 VA	250 VA		80 VA	100 VA
Shock resistance							
Mechanical data							
Ambient temperature (min/max)		–25°C/+70°C	–5°C/+70°C	–20°C/+70°C		–5°C/+70°C	–5°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67		IP67	IP67
Enclosure material		PBT	PA, black	PBT, black		PA, black	PA, black
Connection		2 x 0.5 mm²	2 x 0.75 mm²	4.8 mm		3 x 0.5 mm²	2 x 0.5 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

88 x 25 x 13 mm		100 x 58 x 29.5		100 x 58 x 29.5	
25 mm Cable 1 m T-69 N/S	25 mm Cable 3 m T-69 N/S	10 mm Screw terminal TA-31	10 mm Screw terminal TA-31	15 mm Screw terminal T-62 N/S	
					
6310442534 MAK-4214-P-1	6310442622 MAK-4214-P-3	6317303312 MAA-0313-M	6314203232 MAA-0312-F	6319403532 MAA-0314-P	
250 V	250 V	250 V	250 V	250 V	
5 A	5 A	1 A	3 A	5 A	
250 VA	250 VA	80 VA	100 VA	250 VA	
–5°C/+70°C	–5°C/+70°C	–5°C/+70°C	–25°C/+70°C	–25°C/+70°C	
IP67	IP67	IP67	IP65	IP65	
PA, black	PA, black	Aluminium	Aluminium	Aluminium	
2 x 0.5 mm²	2 x 0.5 mm²	max. 1.5 mm²	max. 1.5 mm²	max. 1.5 mm²	

Electronic Magnetic Sensors

Thanks to their special properties, electronic magnetic switches with magnetoresistive or Hall elements are ideal for use in many different applications. They are used to detect position, angle and / or speed and are immune to shock, impact, vibration and wear. High switching frequencies, long switching distances, a broad temperature range and excellent reproducibility are other advantageous features of this technology which in many cases make them the technically superior alternative to electromechanical reed contacts.



The fact that many non-magnetic metals allow magnetic fields to pass unhindered also extends the fields of application for magnetic sensors. This makes it possible to encapsulate sensors in a sturdy pressure-proof metal enclosure. Sensors can, however, also be mounted in tubing or concealed behind non-magnetic metal surfaces.

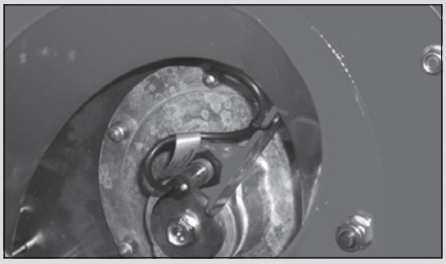
Advantages of electronic magnetic sensors over electromechanical reed contacts

- ⌘ Reliable and immune to vibration
- ⌘ Bounce-free switching
- ⌘ Unlimited service life
- ⌘ High repeat accuracy
- ⌘ Short response times
- ⌘ High sensitivity
- ⌘ Thermal stability

Select the sensor and the technical principle that best meet your requirements from the comprehensive BERNSTEIN range of magnetic sensors: Hall sensors with minimum circuitry, standard Hall sensors with integrated sensor electronics or magnetoresistive sensors. Round, square or metric bodies in plastic, brass, brass / plastic or stainless enclosures.

Fundamentals of Hall sensor technology

The BERNSTEIN range of magnetic sensors is based on a modular system comprising an encapsulated Hall element with the EMC protective circuitry. These sensors therefore conform to the requirements of EN-60947-5-2 for non-mechanical magnetic proximity switches. Sensors of various designs are available for a wide variety of applications.



- ⌘ Output circuitry NPN, NO contact or bistable
- ⌘ Voltage range 4.5 – 24 V DC
- ⌘ Polarity reversal protected
- ⌘ Switching frequencies up to 20 kHz
- ⌘ Size ranging from 6 mm diameter to 50 x 25 x 10 mm
- ⌘ Unipolar version

Standard range of Hall sensors

In contrast to the more basic BERNSTEIN Hall sensors, the functionality and modularity have been enhanced in these Hall sensors by integrating comprehensive sensor electronics. In this segment BERNSTEIN also offers a complete modular system that can be adapted to suit your specific needs.

- ⌘ Output circuitry PNP, NC or NO contact or bistable
- ⌘ Voltage range 10 – 39 V DC
- ⌘ Output current 400 mA, short-circuit proof
- ⌘ Polarity reversal protected
- ⌘ Switching frequencies up to 10 kHz
- ⌘ Size ranging from M10 diameter to 50 x 25 x 10 mm
- ⌘ Unipolar version

Single-channel speed sensors with high frequency range

BERNSTEIN offers a high performance series of gearwheel sensors designed as electronic magnetic sensors with Hall elements that detect the rotation of near-engine ferromagnetic gearwheels with sensing distances of up to 2 mm. A specific feature of these single-channel speed sensors is their high switching frequency. Based on the BERNSTEIN modular range of magnetic sensors, switching frequencies of up to 20 kHz can be realised. Switching frequencies up to 10 kHz can be achieved in the standard range. The sensors are available in M12 and M18 versions. The characteristic versatility of Hall sensors is fully utilised in these applications:

Outstanding immunity to shock, impact, vibration, non-wearing and silent, high switching frequencies, broad temperature range, exceptional repeat accuracy.

Technical data

- ⌘ Output circuitry PNP or NPN
- ⌘ Voltage range 10 – 36 V DC
- ⌘ Switching frequencies up to 20 kHz
- ⌘ Sensing distance 0 – 2 mm on ferromagnetic material

Standard range of magnetoresistive sensors

Magnetoresistive sensors are more sensitive than Hall-effect sensors by a factor of 10. Not only can they be very small but they can also detect especially low field strengths.

In addition to their high measuring accuracy even at high ambient temperatures, these sensors are also characterised by a high degree of reliability and by the fact that they occupy little space. Since they are designed to be independent of polarity, the countermagnet does not need to be mounted with pole orientation. With corresponding encapsulation, BERNSTEIN magnetoresistive sensors have proven effective even in demanding environments such as lift construction or agricultural technology.

- ⌘ Output circuitry PNP, NC or NO contact
- ⌘ High sensitivity (up to sensing distance of 60 mm)
- ⌘ Voltage range 10 – 39 V DC/10 – 30 V DC
- ⌘ Output current 400 mA/200 mA, short-circuit proof
- ⌘ Polarity reversal protected
- ⌘ Polarity independent
- ⌘ Size 6 mm diameter to M18

Microsensors

Ever more complex and above all more compact measuring and control configurations require components that occupy even less space. In line with this trend, BERNSTEIN has expanded its comprehensive range of sensors for determining position, angle and / or speed in industrial applications in two branches of development: Compared to the previous smallest model (RD = 6 mm), the diameter in this series of magnetoresistive sensors has been further reduced by 30 % yet the smallest model RD = 4 mm or 5 x 5 mm still achieves the parameters of the larger sensors. As part of the second development stage, the basic and standard range of electronic magnetic sensors has been expanded to include the latch functionality (bistable switching characteristic) which utilises the magnetic field only for the corresponding switching operation. As a result, this functionality has been added to a wide range of enclosure variants in the current modular range.

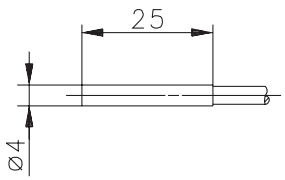
Sensing distances of electronic magnetic sensors

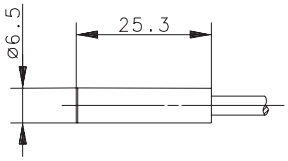
Since the sensing distances of magnetic sensors are influenced by the combination of sensor and magnet, it is appropriate to consider them as a complete system. The overview below shows the expected sensing distances (Sn) when using different magnets from the BERNSTEIN range.

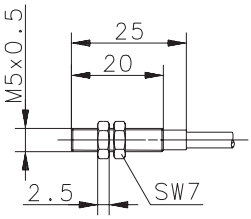
Magnet	Size	Article number	Sn of Hall sensors	Sn of magneto-resistive sensors
T 75	Ø 5 mm	6301175057	5 mm	10 mm
T 06	Ø 6 mm	6301106065	5 mm	15 mm
T 61	Ø 20 mm	6301261035	10 mm	35 mm
T 62	Ø 23 mm	6301262039	17 mm	45 mm
T 67	Ø 20 mm	6301167054	15 mm	40 mm
T 69	Ø 31 mm	6301269031	20 mm	60 mm

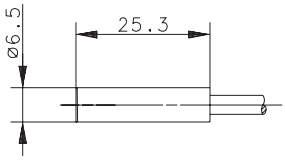
Electronic Magnetic Sensors (Type D04, D06, M05, M08, M10, M12)

Type	D04	D06		M05
Operating mode	MR	Hall	MR	MR
Magnetic sensitivity (mT)	3 mT	10 mT	2 mT	3 mT
Sensing distance (Sn)	30 mm	17 mm	45 mm	30 mm
Reference magnet (Page)	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S
Type of connection	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m
Special feature				









PNP	NO contact	6373299132			6373270105	6373299133	
	Type	MEN-D04PS/M03-K2			MEN-D06PS/M02-K2	MEM-M05PS/M03-K2	
	NC contact						
	Type						
	Bistable						
	Type						
NPN	NO contact			6362670001			
	Type			MEN-D06NS/H10-K2			
	NC contact						
	Bistable			6363870032			
	Type			MEN-D06NB/H11-K2			
Analogue	Current output						
	Voltage output						

Technical data

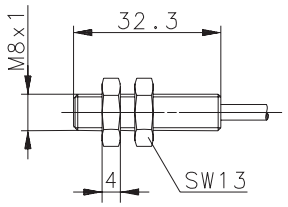
Rated operating voltage	U_B	4.5–30 VDC	4.5–24 VDC	10–30 VDC	4.5–30 VDC
Rated operating current	I_B	200 mA	25 mA	200 mA	200 mA
Max. switching voltage	F	10 kHz	20 kHz	1500 Hz	10 kHz
Function/operating voltage indicator		–/–	–/–	–/–	–/–
Sensitivity adjustable					
Short circuit-protection		Current limiter	Current limiter	Cyclic	Current limiter
Teachable					

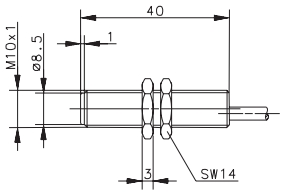
Mechanical data

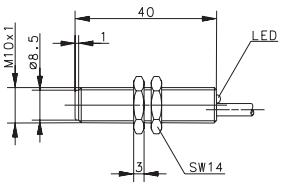
Ambient temperature (min/max)	–20°C/+70°C	–25°C/+70°C	–25°C/+70°C	–20°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67
Enclosure material	Stainless steel 1.4401	Stainless steel 1.4401	Stainless steel 1.4401	CuZn39Pb3
Connection	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²

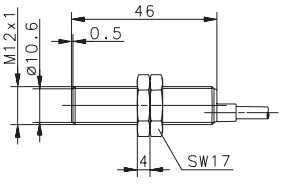
Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

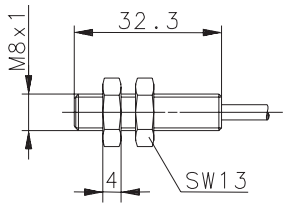
M08		M10		M10		M12	
Hall	MR	Hall	Hall	MR		Hall	Hall
10 mT	2 mT	10 mT	10 mT	1 mT		10 mT	10 mT
17 mm	45 mm	17 mm	17 mm	45 mm		17 mm	17 mm
T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S		T-62 N/S	T-62 N/S
Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m		Cable 2 m	Cable 2 m
			All-metal	All-metal			

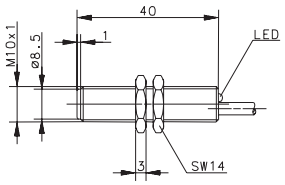


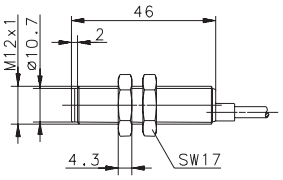








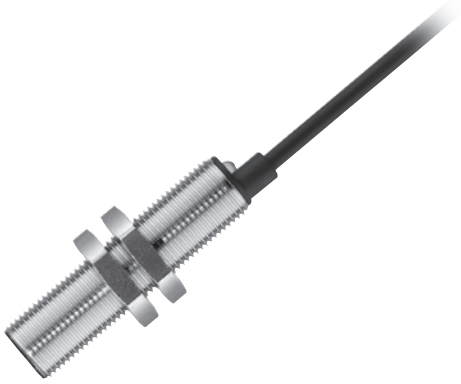




	6373260107 MEM-M08PS/M02-K2		6372261085 MEM-M10PS/H10-KL2 6372161086 MEM-M10PÖ/H10-KL2 6373461124 MEM-M10PB/H11-KL2	6373261087 MEM-M10PS/M01-KL2 6373161088 MEM-M10PÖ/M01-KL2			
6362660002 MEM-M08NS/H10-K2 6363860033 MEM-M08NB/H11-K2		6362661003 MEM-M10NS/H10-K2 6363861034 MEM-M10NB/H11-K2				6362662004 MEM-M12NS/H10-K2 6363862035 MEM-M12NB/H11-K2	6362662005 MEK-M12NS/H10-K2 6363862036 MEK-M12NB/H11-K2

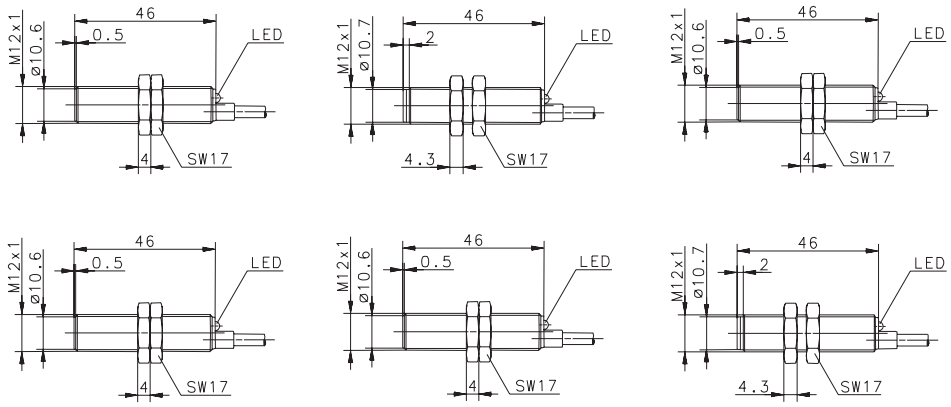
4.5–24 V	10–30 V	4.5–24 V	10–39 V	10–39 V		4.5–24 V	4.5–24 V
25 mA	200 mA	25 mA	400 mA	400 mA		25 mA	25 mA
20 kHz	1500 Hz	20 kHz	10 kHz	10 kHz		20 kHz	20 kHz
–/–	–/–	–/–	LED/–	LED/–		–/–	–/–
Current limiter	Cyclic	Current limiter	Cyclic	Cyclic		Current limiter	Current limiter

–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C		–25°C/+70°C	–25°C/+70°C
IP67	IP67	IP67	IP67	IP67		IP67	IP67
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3		CuZn39Pb3	PA
3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²		3 x 0.14 mm²	3 x 0.14 mm²



Electronic Magnetic Sensors (Type M12, M18)

Type		M12		M12		M12	
Operating mode		Hall	Hall	Hall	MR	MR	MR
Magnetic sensitivity (mT)		10 mT	10 mT	10 mT	1 mT	1 mT	1 mT
Sensing distance (Sn)		17 mm	17 mm	17 mm	45 mm	45 mm	45 mm
Reference magnet (Page)		T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S
Type of connection		Cable 2 m	Cable 10 m	Cable 2 m	Cable 2 m	Cable 5 m	Cable 2 m
Special feature							



PNP	NO contact	6372262090	6472262077	6372262089	6373262094	6373262123	6373262093
	Type	MEM-M12PS/H10-KL2	MEM-M12PS/H10-KL10	MEK-M12PS/H10-KL2	MEM-M12PS/M01-KL2	MEM-M12PS/M01-KL5	MEK-M12PS/M01-KL2
	NC contact	6372162092		6372162091	6373162096		6373162095
	Type	MEM-M12PÖ/H10-KL2		MEK-M12PÖ/H10-KL2	MEM-M12PÖ/M01-KL2		MEK-M12PÖ/M01-KL2
	Bistable	6373462126		6373462125			
	Type	MEM-M12PB/H11-KL2		MEK-M12PB/H11-KL2			
NPN	NO contact						
	Type						
	NC contact						
	Bistable						
	Type						
Analogue	Current output						
	Voltage output						

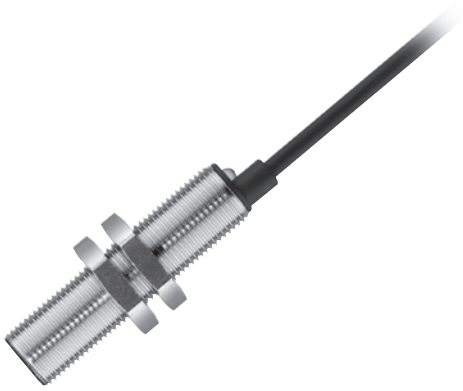
Technical data

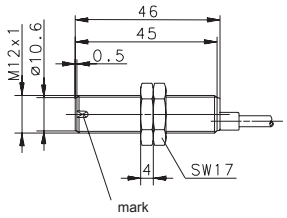
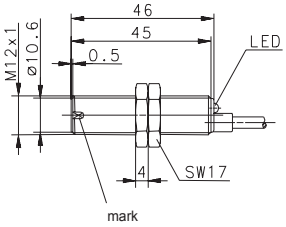
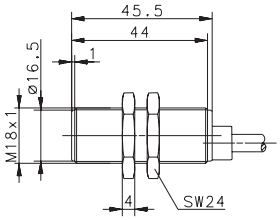
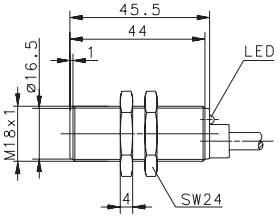
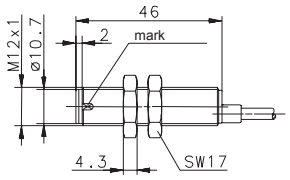
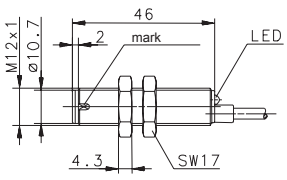
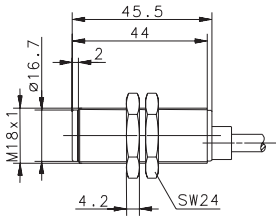
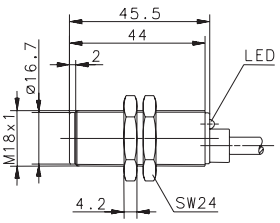
Rated operating voltage	U_B	10–39 VDC	10–39 VDC	10–39 VDC	10–39 VDC	10–39 VDC	10–39 VDC
Rated operating current	I_B	400 mA	400 mA	400 mA	400 mA	400 mA	400 mA
Max. switching voltage	F	10 kHz	10 kHz	10 kHz	10 kHz	1500 Hz	10 kHz
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	LED/–	LED/–
Sensitivity adjustable							
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Teachable							

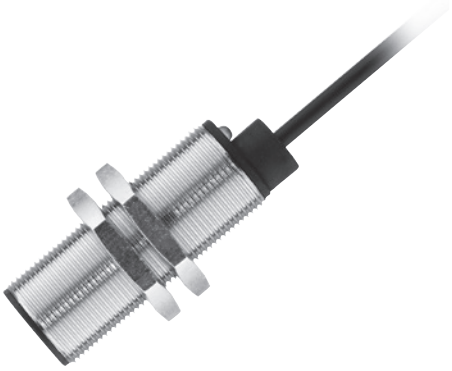
Mechanical data

Ambient temperature (min/max)		–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67	IP67
Enclosure material		CuZn39Pb3	CuZn39Pb3	PA	CuZn39Pb3	CuZn39Pb3	PA
Connection		3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

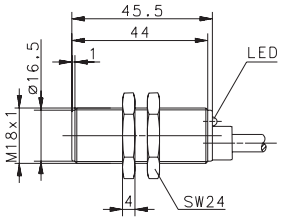


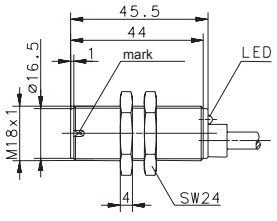
M12		M12		M18		M18	
Hall	Hall	Hall	Hall	Hall	Hall	Hall	Hall
–	–	–	–	10 mT	10 mT	10 mT	10 mT
0–2 mm	0–2 mm	0–2 mm	0–2 mm	17 mm	17 mm	17 mm	17 mm
–	–	–	–	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S
Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m
Speed	Speed	Speed	Speed				
							
							
		6379262120 MEM-M12PD/H-KL2	6379262119 MEK-M12PD/H-KL2			6372263098 MEM-M18PS/H10-KL2 6372163100 MEM-M18PÖ/H10-KL2 6373463128 MEM-M18PB/H11-KL2	6372263097 MEK-M18PS/H10-KL2 6372163099 MEK-M18PÖ/H10-KL2 6373463127 MEK-M18PB/H11-KL2
6369662028 MEM-M12ND/H-K2	6369662027 MEK-M12ND/H-K2			6362663006 MEM-M18NS/H10-K2 6363863037 MEM-M18NB/H11-K2	6362663007 MEK-M18NS/H10-K2 6363863038 MEK-M18NB/H11-K2		
10–36 V	10–36 V	10–39 V	10–39 V	4.5–24 V	4.5–24 V	10–39 V	10–39 V
< 20 mA	< 20 mA	400 mA	400 mA	25 mA	25 mA	400 mA	400 mA
20 kHz	20 kHz	10 kHz	10 kHz	20 kHz	20 kHz	10 kHz	10 kHz
–/–	–/–	LED/–	LED/–	–/–	–/–	LED/–	LED/–
Cyclic	Cyclic	Cyclic	Cyclic	Current limiter	Current limiter	Cyclic	Cyclic
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67
CuZn39Pb3	PA, red	CuZn39Pb3	PA, red	CuZn39Pb3	PBT	CuZn39Pb3	PBT
3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²

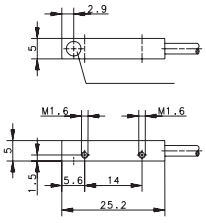


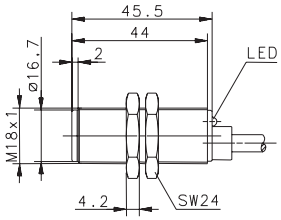
Electronic Magnetic Sensors (Type M18, Q05, Q08, Q12, E27, E29)

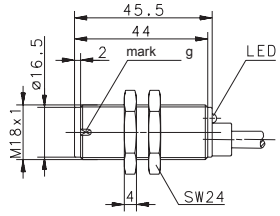
Type		M18		M18		Q05
Operating mode		MR	MR	Hall	Hall	MR
Magnetic sensitivity (mT)		1 mT	1 mT	–	–	3 mT
Sensing distance (Sn)		45 mm	45 mm	0 – 2 mm	0 – 2 mm	10 mm
Reference magnet (Page)		T-62 N/S	T-62 N/S	–	–	T-62 N/S
Type of connection		Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m
Special feature				Speed	Speed	











PNP	NO contact	6373263102	6373263101	6379263122	6379263121	6373299134	
	Type	MEM-M18PS/M01-KL2	MEK-M18PS/M01-KL2	MEM-M18PD/H-KL2	MEK-M18PD/H-KL2	MEM-Q05PS/M03-K2	
	NC contact	6373163104	6373163103				
	Type	MEM-M18PÖ/M01-KL2	MEK-M18PÖ/M01-KL2				
	Bistable						
	Type						
NPN	NO contact						
	Type						
	NC contact						
	Bistable						
	Type						
Analogue	Current output						
	Voltage output						

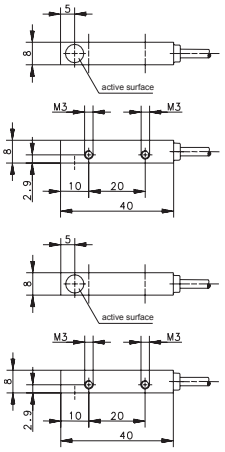
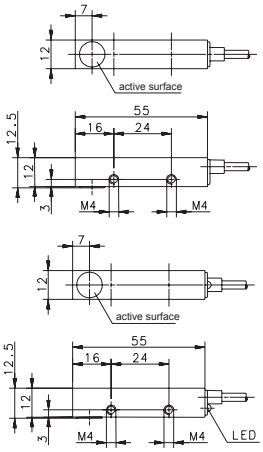
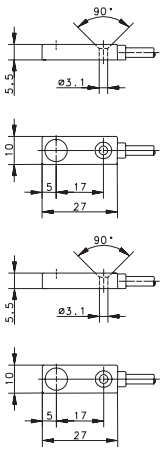
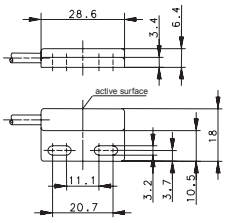
Technical data

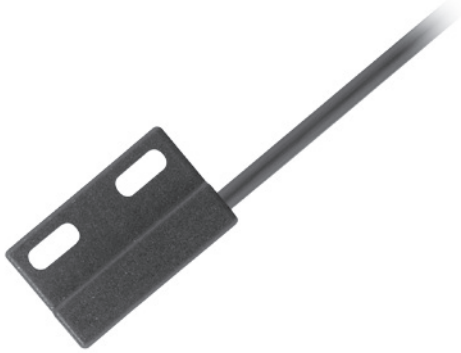
Rated operating voltage	U_B	10–39 VDC	10–39 VDC	10–39 VDC	10–39 VDC	4.5–30 VDC
Rated operating current	I_B	400 mA	400 mA	400 mA	400 mA	200 mA
Max. switching voltage	F	10 kHz	10 kHz	10 kHz	10 kHz	10 kHz
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	–/–
Sensitivity adjustable						
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Current limiter
Teachable						

Mechanical data

Ambient temperature (min/max)	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–20°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67	IP67
Enclosure material	CuZn39Pb3	PBT	CuZn39Pb3	PBT, black	CuZn39Pb3
Connection	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.05 mm²

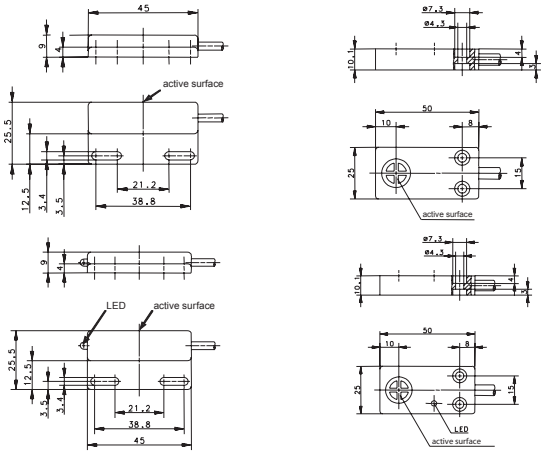
Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

Q08		Q12		E27		E29
Hall	MR	Hall	Hall	Hall	Hall	Hall
10 mT	2 mT	10 mT	10 mT	10 mT	2 mT	10 mT
17 mm	45 mm	17 mm	17 mm	17 mm	30 mm	17 mm
T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S
Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m
						
	6373280106 MEM-Q08PS/M02-K2		6372255083 MEM-Q12PS/H10-KL2 6372155084 MEM-Q12PÖ/H10-KL2 6373455131 MEM-Q12PB/H11-KL2			
6362680012 MEM-Q08NS/H10-K2		6362655013 MEM-Q12NS/H10-K2		6362693010 MEK-E27NS/H10-K2		6362611008 MEK-E29NS/H10-K2
6363880043 MEM-Q08NB/H11-K2		6363855044 MEM-Q12NB/H11-K2		6363893041 MEK-E27NB/H11-K2	6363893031 MEK-E27NB/H02-K2	6363811039 MEK-E29NB/H11-K2
4.5–24 VDC	10–30 VDC	4.5–24 VDC	10–39 VDC	4.5–24 VDC	4.5–24 VDC	4.5–24 VDC
25 mA	200 mA	25 mA	400 mA	25 mA	25 mA	25 mA
20 kHz	1500 Hz	20 kHz	10 kHz	20 kHz	20 kHz	20 kHz
–/–	–/–	–/–	LED/–	–/–	–/–	–/–
Current limiter	Cyclic	Current limiter	Cyclic	Current limiter	Current limiter	Current limiter
–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
IP67	IP67	IP67	IP67	IP67	IP67	IP67
CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	PA	PA	PA
3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.14 mm²



Electronic Magnetic Sensors (Type E45, E50)

Type		E45		E50			
Operating mode		Hall	Hall	Hall	Hall		
Magnetic sensitivity (mT)		10 mT	10 mT	10 mT	10 mT		
Sensing distance (Sn)		17 mm	17 mm	17 mm	17 mm		
Reference magnet (Page)		T-62 N/S	T-62 N/S	T-62 N/S	T-62 N/S		
Type of connection		Cable 2 m	Cable 2 m	Cable 2 m	Cable 2 m		
Special feature							



PNP	NO contact		6372245079		6372290081		
	Type		MEK-E45PS/H10-KL2		MEK-E50PS/H10-KL2		
	NC contact		6372145080		6372190082		
	Type		MEK-E45PÖ/H10-KL2		MEK-E50PÖ/H10-KL2		
	Bistable		6373445129		6373490130		
	Type		MEK-E45PB/H11-KL2		MEK-E50PB/H11-KL2		
NPN	NO contact	6362645009		6362690011			
	Type	MEK-E45NS/H10-K2		MEK-E50NS/H10-K2			
	NC contact						
	Bistable	6363845040		6363890042			
	Type	MEK-E45NB/H11-K2		MEK-E50NB/H11-K2			
Analogue	Current output						
	Voltage output						

Technical data

Rated operating voltage	U_B	4.5–24 VDC	10–39 VDC	4.5–24 VDC	10–39 VDC	
Rated operating current	I_B	25 mA	400 mA	25 mA	400 mA	
Max. switching voltage	F	20 kHz	10 kHz	20 kHz	10 kHz	
Function/operating voltage indicator		–/–	LED/–	–/–	LED/–	
Sensitivity adjustable						
Short circuit-protection		Current limiter	Cyclic	Current limiter	Cyclic	
Teachable						

Mechanical data

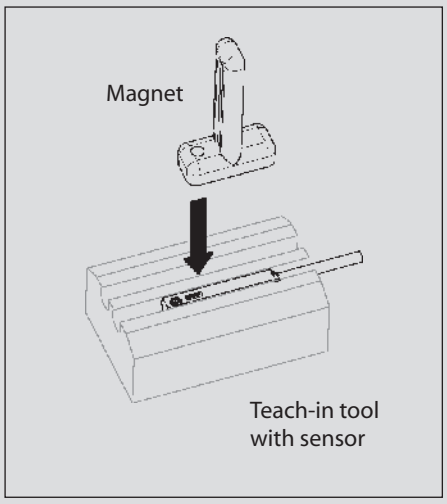
Ambient temperature (min/max)	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C	–25°C/+70°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67
Enclosure material	PA	PA	PBT	PBT
Connection	3 x 0.14 mm²	3 x 0.14 mm²	3 x 0.50 mm²	3 x 0.50 mm²

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

Programmable Miniature Position Sensors with Fully Integrated Electronics

The teachable magnetic sensors are characterised by one or two freely programmable, independent switching points. Despite this high degree of functionality, BERNSTEIN has succeeded in integrating the entire electronics into a compact sensor enclosure with the smallest possible dimensions. This design feature renders additional protection (e.g. for the cable electronics or high-cost safeguards) unnecessary.

The compact design is suitable for installation in all standard T- and C-slots (e.g. FESTO or SMC). In an installed position, the freely programmable switching points can be quickly and easily set with the aid of the easy-to-use teach-in tool.



- The installed sensor assumes programming mode when the teach-in tool is placed over it
- The positions of the magnet are assigned to the respective outputs by correspondingly aligning the tool
- The programmable switching points are stored in the sensor
- The switching points can be changed by repeating the teach-in procedure

This configuration largely avoids unintentional changes to the settings and substantially increases the resistance to environmental influences while retaining the protection class rating.

Manually searching for the switching points has been replaced by rapid electronic balancing with the sensor installed in position. LEDs at the top of the sensor serve as the function indicator, provide information on the programming status and also signal faults. In addition to featuring effective polarity reversal protection as standard, the sensors also have an internal EEPROM that stores the switching points in the event of power failure.

Advantages

- Completely integrated electronic solution
- Permanent protection rating
- No need for additional electronics
- Fully immersed and therefore protected installation in the slot
- Suitable for standard C- and T-slots
- Available as cable or plug version
- Occupies only one slot
- Freely programmable switching points
- Straightforward teach-in procedure
- Reduced installation and wiring requirements
- Can be fitted from above
- High switching accuracy

Technical data

- PNP/NO contact
- Magnetic sensitivity ±1.5 mT to ±13.5 mT
- Sensing distance up to 50 mm (depending on magnet/air gap)
- Repeat accuracy 0.1 mT
- Hysteresis 1 mT H 1.35 mT
- Operating voltage range 10 – 30 V DC
- Output current Ie 50 mA (one output switched) 25 mA per output (both outputs switched)
- Ambient temperature –20 °C to +80 °C
- Protection class IP67

Other slot sensors

Sensors with only one output can also be used for applications that require only one switching point. For this purpose BERNSTEIN offers a range of Hall sensors with set sensitivity or reed contact versions that do not require auxiliary energy.

All sensors come with the following accessories:

- 1x setscrew M2 x 3 (E22), M3 x 6 (E30), DIN 913
- 1x Offset screwdriver (E22)
- 1x Teach-in tool
- 1x Operating and installation instructions

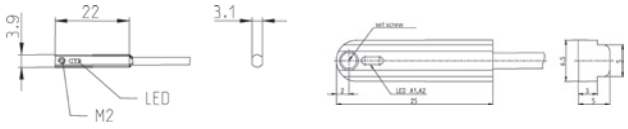
Standards and approvals

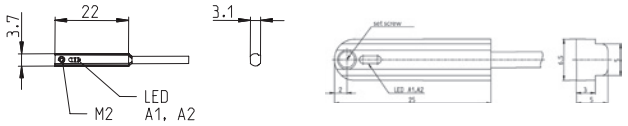
MEK E-22/MEA E30
EN 60947-5-2

CE

Teachable Electronic Slot Sensors

Type	E22		E30			
Operating mode	Hall	Hall	Hall	Hall		
Magnetic sensitivity (mT)	1.5 – 13.5 mT	1.5 – 13.5 mT	1.5 – 13.5 mT	1.5 – 13.5 mT		
Switching function	PNP NO / 0 – 10 V	PNP NO / 0 – 10 V	PNP NO / 0 – 10 V	PNP NO / 0 – 10 V		
Reference magnet (Page)						
Type of connection	Cable 2 m	Connector M8	Cable 2 m	Connector M8		





Type	C-slot SMC	6370281183	6370281184				
Double-chanel	Type	MEK-E22PS/HP2-KL2	MEK-E22PS/HP2-KL0,3S8				
	C-slot Festo	6370281185	6370281186				
	Type	MEK-E22PS/HP2-KL2	MEK-E22PS/HP2-KL0,3S8				
	T-slot			6370299187	6370299188		
	Type			MEA-E30PS/HP2-KL2	MEA-E30PS/HP2-KL0,3S8		
Type	C-slot SMC	6372281177	6372281178				
Single-chanel	Type	MEK-E22PS/HP1-KL2	MEK-E22PS/HP1-KL0,3S8				
	C-slot Festo	6372281179	6372281180				
	Type	MEK-E22PS/HP1-KL2	MEK-E22PS/HP1-KL0,3S8				
	T-slot			6372299181	6372299182		
	Type			MEA-E30PS/HP1-KL2	MEA-E30PS/HP1-KL0,3S8		
Analogue 0 – 10 V	T-slot				6370099169		
	Type				MEA-E30A10/H50-KL0,3S8		

Technical data

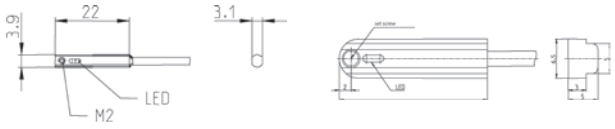
Rated operating voltage	U_B	10–30 VDC	10–30 VDC	10–30 VDC	10–30 VDC	
Rated operating current	I_B	50 mA	50 mA	50 mA	50 mA	
Max. switching voltage	F					
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	
Sensitivity adjustable		Yes	Yes	Yes	Yes	
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	
Teachable		Yes	Yes	Yes	Yes	

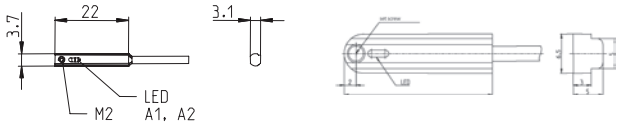
Mechanical data

Ambient temperature (min/max)					
Single-chanel / Double-chanel	–20°C/+80°C	–20°C/+80°C	–20°C/+80°C	–20°C/+80°C	
Analogue 1 – 10 V				+5°C/+55°C	
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67	
Enclosure material	PA	PA	Aluminium	Aluminium	
Connection	4 x 0.05 mm²	M8 x 1	4 x 0.05 mm²	M8 x 1	

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

Type	E22		E30		
Operating mode	Hall	Hall	Hall	Hall	
Magnetic sensitivity (mT)	3 mT	3 mT	3 mT	3 mT	
Switching function	PNP NO	PNP NO	PNP NO	PNP NO	
Reference magnet (Page)					
Type of connection	Cable 2 m	Connector M8	Cable 2 m	Connector M8	





Type							
	C-slot SMC	6372281171	6372281172				
	Type	MEK-E22PS/H03-KL2	MEK-E22PS/H03-KL0,3S8				
	C-slot Festo	6372281173	6372281174				
	Type	MEK-E22PS/H03-KL2	MEK-E22PS/H03-KL0,3S8				
	T-slot			6372299175	6372299176		
	Type			MEA-E30PS/H03-KL2	MEA-E30PS/H03-KL0,3S8		

Technical data

Rated operating voltage	U_B	10–30 VDC	10–30 VDC	10–30 VDC	10–30 VDC	
Rated operating current	I_B	50 mA	50 mA	50 mA	50 mA	
Max. switching voltage	F					
Function/operating voltage indicator		LED/–	LED/–	LED/–	LED/–	
Sensitivity adjustable		Yes	Yes	Yes	Yes	
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	
Teachable		–	–	–	–	

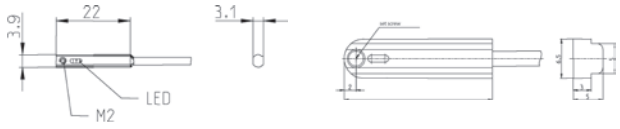
Mechanical data

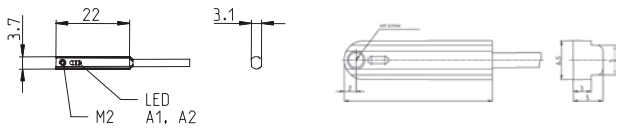
Ambient temperature (min/max)	–20°C/+80°C	–20°C/+80°C	–20°C/+80°C	–20°C/+80°C
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67
Enclosure material	PA	PA	Aluminium	Aluminium
Connection	3 x 0.05 mm²	M8 x 1	3 x 0.05 mm²	M8 x 1

Please refer to Accessories for magnets, mounting brackets, cable couplers and sensor tester.

Slot Sensors with Reed Contact

Type	E22		E30		
Operating mode	Reed	Reed	Reed	Reed	
Magnetic sensitivity (mT)	3 mT	3 mT	3 mT	3 mT	
Switching function	NO	NO	NO	NO	
Switching power	10 VA	10 VA	10 VA	10 VA	
Type of connection	Cable 2 m	Connector M8	Cable 2 m	Connector M8	





Type							
	C-slot SMC	6310281741	6310281742				
	Type	MAK-E22S/R20-2	MAK-E22S/R20-0,3S8				
	C-slot Festo	6310281743	6310281744				
	Type	MAK-E22S/R20-2	MAK-E22S/R20-0,3S8				
	T-slot			6310299745	6310299746		
	Type			MAA-E30S/R20-2	MAA-E30S/R20-0,3S8		

Technical data

Rated operating voltage U_B	120 V	120 V	120 V	120 V	
Performance class (diagram No.)	10 VA	10 VA	10 VA	10 VA	
Shock resistance	30 g (11 ms)	30 g (11 ms)	30 g (11 ms)	30 g (11 ms)	
Reproducibility	+/– 1 mm	+/– 1 mm	+/– 1 mm	+/– 1 mm	
Mechanical service life (switching operations)	3 x 10^8	3 x 10^8	3 x 10^8	3 x 10^8	

Mechanical data

Ambient temperature (min/max)	–25°C/+80°C	–25°C/+80°C	–25°C/+80°C	–25°C/+80°C	
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP67	IP67	
Enclosure material	PA	PA	Aluminium	Aluminium	
Connection	3 x 0.05 mm²	M8 x 1	3 x 0.05 mm²	M8 x 1	

You will find detailed data sheets to the products under www.bernstein.eu

Notes

To complement the extensive range of mechanical safety switches offered by BERNSTEIN, a new series of contactless safety switches is now available. These safety sensors ensure that safety doors and protective guards remain closed when danger is present.

The contactless safety technology offers the following advantages:

- Wear-free actuating
- Very easy to clean
- No actuator, therefore:
  - No mechanical damage possible
  - No hazards or restrictions caused by protruding actuator
- Switching function not affected by contaminants

BERNSTEIN offers two different technologies in the field of contactless safety technology:

- Safety sensors on magnetic basis, MAK series
- Safety sensors on RFID basis, CSMS series

Safety sensors CSMS

The CSMS can directly be connected to contactors or to an evaluation unit (dependent on the respective model). The RRS version integrates an evaluation of a return circuit and start button with direct connection to contactors. With the CSMS, PL e and SIL 3 is achieved.
This is the case with only one CSMS and also with series circuits with up to 32 sensors the case.

Product features

- Performance Level e
- Up to 32 series circuits without leaving the PL e
- Power supply 24 V DC
- High coding level corresponding to the draft DIN EN ISO 14119
- No need of any additional external monitoring (dep. on the type)
- Connection of return circuit and start button possible (dep. on the type)
- Output current up to 250 mA per safety output
- Large diagnostic possibility
- 3 LEDs for status information of the CSMS
- Switching distance: 13 mm
- Dimensions: 110 mm x 30 mm x 15 mm
- IP 67

Safety sensors MAK

To achieve a PL or SIL value with the MAK safety sensors, it is necessary to connect them to a safety evaluation unit. The magnetic safety sensors are dual channel versions. The evaluation unit (BERNSTEIN designation: MÜZ) monitors the correct switching of the two MAK channels and a defined time window in which the two channels must switch.

With the combination of MAK and MÜZ, a PL D and a SIL 3 can be reached. Besides the 3 different types of magnetic safety switches, BERNSTEIN also offers two different evaluation units.

Product features

- Performance Level d
- Redundancy with NO and NC contacts
- Switching distance: 6 mm
- IP 67

Comparison CSMS – MAK

Product characteristics	CSMS	MAK
Operating principle	elektro-magnetic, RFID	magnetic, Reed
Safety parameters	PL e, SIL3	PL d, SIL 3
Safety outputs	electrical outputs	mechanical contacts
Can be switched in series	yes, when a constant safety level is guaranteed	yes, with falling safety level
Evaluation unit required	no	yes
Actuator coding	high	low
Sensing distance	13 mm	3–4 mm
Diagnostic interface	via LED and electronically	no
Mechanical sensitivity	low	very high
Approach possibility of the actuator	4	1
Safety outputs	2	1
Return circuit evaluation	yes	partially (depending on the evaluation unit)
Start button monitoring	yes	partially (depending on the evaluation unit)

CSMS C ontactless Safety Monitoring Sensor

The CSMS is a future-proofed safety product. The CSMS is a contactless safety sensor that uses RFID technology. It can be used as a single device as well as being connected in series up to PL e and SIL 3. BERNSTEIN offers two general product versions.

⌘ CSMS-…-RRS… ❶

With this product version, safety sensors can be connected to contactors without using an evaluation device. The product has an integrated evaluation of the return circuit and allows connection of a start button.

⌘ CSMS-…-R… ❷

This product version can be connected to a safety evaluation unit. Optionally, another safety sensor can be connected to the first CSMS with OSSD output (e.g. light curtains).

Both versions have extensive diagnostic capabilities. This is transmitted over a communication channel to a diagnostic device. This is displayed via PNP outputs if the CSMS is opened or closed. Moreover, it is possible to obtain information about the system and the sensor via integrated LEDs.

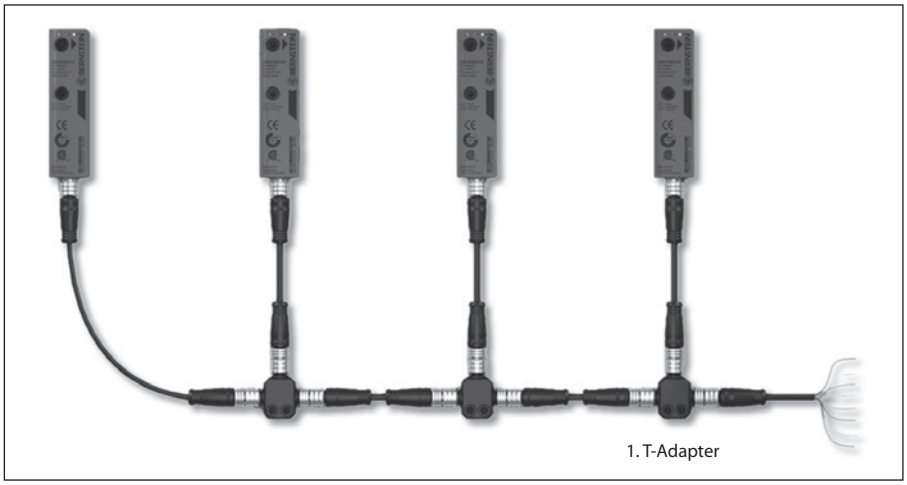
In order to ensure a particularly high manipulation protection (according to draft DIN EN ISO 14119), each sensor is assigned to one actuator. Thus, it is ensured that the CSMS cannot be “tricked” with different actuators.

The fast and accurate connection of the CSMS is realised by M12 connector cables and T-pieces.

⌘ CSMS-…-A… ❸

This product version allows a direct connection of several safety sensors to the safety controller by parallel wiring.

Connection example



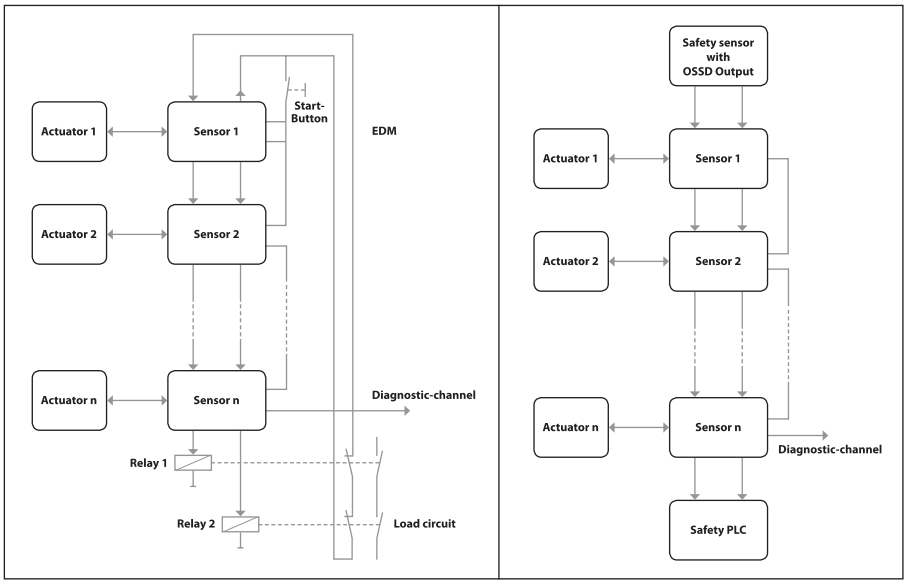
T-Adapters to be used

Versions	Start function	1. T-Adapter	Following T-Adapter
Version RRS	Manual start Automatic start	Grey Black	Black Black
Version R		Grey	Black

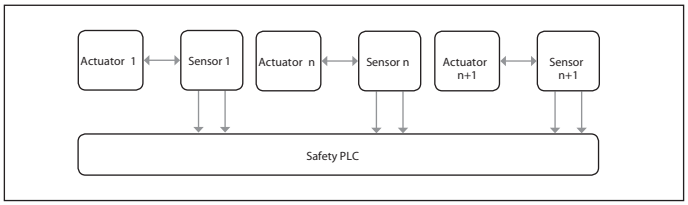
Application examples

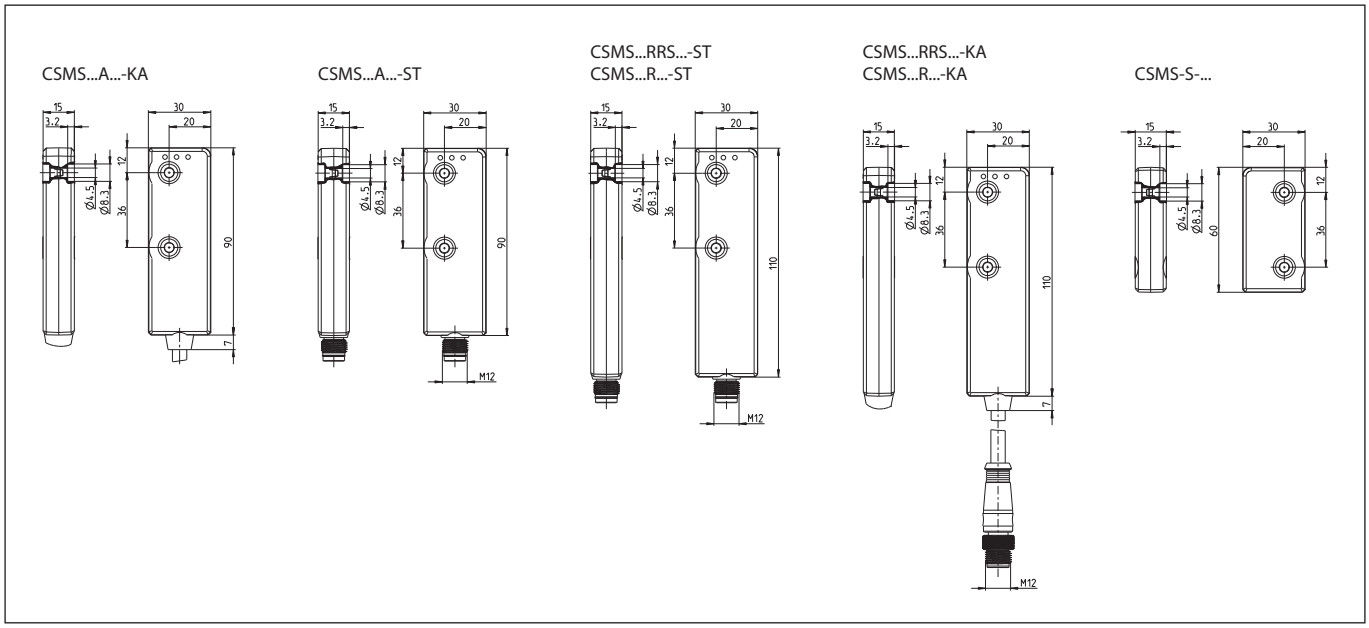
❶ CSMS
Series circuits without additional evaluation

❷ CSMS
Series circuits with evaluation device



❸ CSMS
Parallel connection to a safety controller





According to ISO 14119, interlocking devices are mechanical or electrical devices which are designed to prevent the operation of a machine element for as long as the movable safety guard is left open.

The CSMS based on RFID is contactless and fulfils the highest requirement (high-level coding) of protection against manipulation of ISO 14119.

The BERNSTEIN CSMS offers both a high-level coding and a low-level coding, in order to provide the optimum protection against manipulation for each application.

The safety-related capacity of the CSMS is demonstrated through full observation of the following standards:

- ⌘ Requirements for safety-related parts of control systems up to PL e in accordance with ISO 13849-1
- ⌘ Functional safety up to SIL 3 in accordance with IEC 62061
- ⌘ Choice and use of safety-related interlocking devices of type 4 in accordance with ISO 14119

unicode/high coding:
Sensor accepts only one actuator
multicode/low coding:
Sensor accepts several actuators

CSMS - SET - RRS - H - ST

- ST M12 connector
- KA Cable

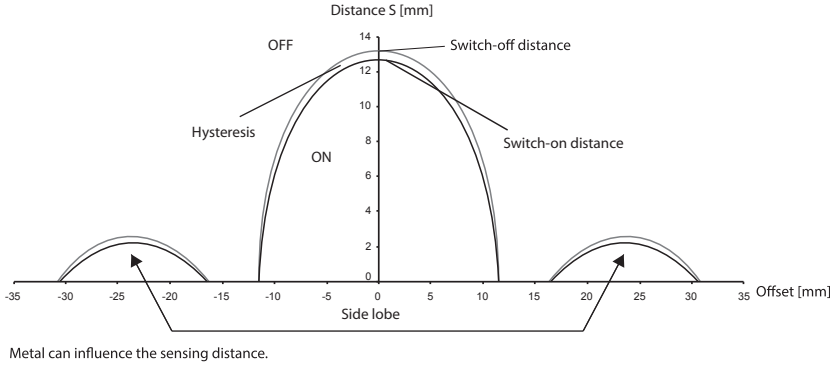
- H High-level coding (unicode)
- L Low-level coding (multicode)

- RRS Serial connection, with evaluation of a return circuit
- R Serial connection, without evaluation of a return circuit
- A Stand-Alone application, without evaluation of a return circuit

- SET Set, comprising the master and slave
- M Master
- S Slave

CSMS Contactless Safety Monitoring Sensor

Sensing distance		
Rated sensing distance	S_n	13 mm
Assured sensing distance – (On)	S_{ao}	min. 10 mm
Hysteresis	H	0,5 mm
Assured sensing distance – (Off)	S_{ar}	max. 19 mm



Metal can influence the sensing distance.

To achieve the stated sensing distances on metal substrates, CSMS spacers must be used.

CSMS-RRS
with evaluation of a return circuit

Advantages

- ⌘ Individual CSMS or safe serial connection with max. 32 CSMS up to PL e
- ⌘ Manual or automatic start
- ⌘ No external safety evaluation unit required
- ⌘ Uni- or multi-coding
- ⌘ Integrated evaluation of a return circuit and start button with direct connection to contactors

Unicode	Multicode	M12 connector	2 m cable + M12 connector	Article number	Designation
x			x	6075988057	CSMS-SET-RRS-H-KA
x		x		6075988058	CSMS-SET-RRS-H-ST
	x	x		6075988066	CSMS-SET-RRS-L-ST
	x		x	6075988068	CSMS-SET-RRS-L-KA
x			x	6075985048	CSMS-M-RRS-H-KA
x		x		6075986050	CSMS-M-RRS-H-ST
	x		x	6075985061	CSMS-M-RRS-L-KA
	x	x		6075986062	CSMS-M-RRS-L-ST
	Replacement actuator Multicode			6075980065	CSMS-S-L
	Replacement actuator Unicode			6075980052	CSMS-S-H*

*Must be taught in with 6075989056 (CSMS SLAVE TEACHADAPTER) for the master.

CSMS-R
for the connection to a safety evaluation unit

Advantages

- ⌘ Safe serial connection with max. 32 CSMS up to PL e
- ⌘ Connection to an external safety evaluation unit for ex. SCR ON
- ⌘ Optional: Connection of a safety sensor (for ex. safety light curtain) with OSSD output to the first CSMS
- ⌘ Uni- or multi-coding

Unicode	Multicode	M12 connector	2 m cable + M12 connector	Article number	Designation
x			x	6075988059	CSMS-SET-R-H-KA
x		x		6075988060	CSMS-SET-R-H-ST
	x	x		6075988067	CSMS-SET-R-L-ST
	x		x	6075988069	CSMS-SET-R-L-KA
x			x	6075985049	CSMS-M-R-H-KA
x		x		6075986051	CSMS-M-R-H-ST
	x		x	6075985063	CSMS-M-R-L-KA
	x	x		6075986064	CSMS-M-R-L-ST
	Replacement actuator Multicode			6075980065	CSMS-S-L
	Replacement actuator Unicode			6075980052	CSMS-S-H*

*Must be taught in with 6075989056 (CSMS SLAVE TEACHADAPTER) for the master.

CSMS-A
for direct connection to a control unit

Advantages

- ⌘ Up to PL e / SIL 3
- ⌘ Multi-coding
- ⌘ Compact construction
- ⌘ Connection to an external safety evaluation unit for ex. SCR ON

Unicode	Multicode	M12 connector	2 m cable	Article number	Designation
	x	x		6075988072	CSMS-SET-A-L-ST
	x		x	6075988073	CSMS-SET-A-L-KA
	x		x	6075985070	CSMS-M-A-L-KA
	x	x		6075986071	CSMS-M-A-L-ST
	Replacement actuator Multicode			6075980065	CSMS-S-L

CSMS diagnosis

The CSMS product family offers one of the largest diagnostic options on the market. Opened protective devices or actuators in the transitional area as well as system failures can be rapidly and precisely identified. Due to the optional diagnostic devices, the status of each CSMS appears in the security chain.

- Status display of each CSMS in the security chain
- Electronical outputs or bus interface

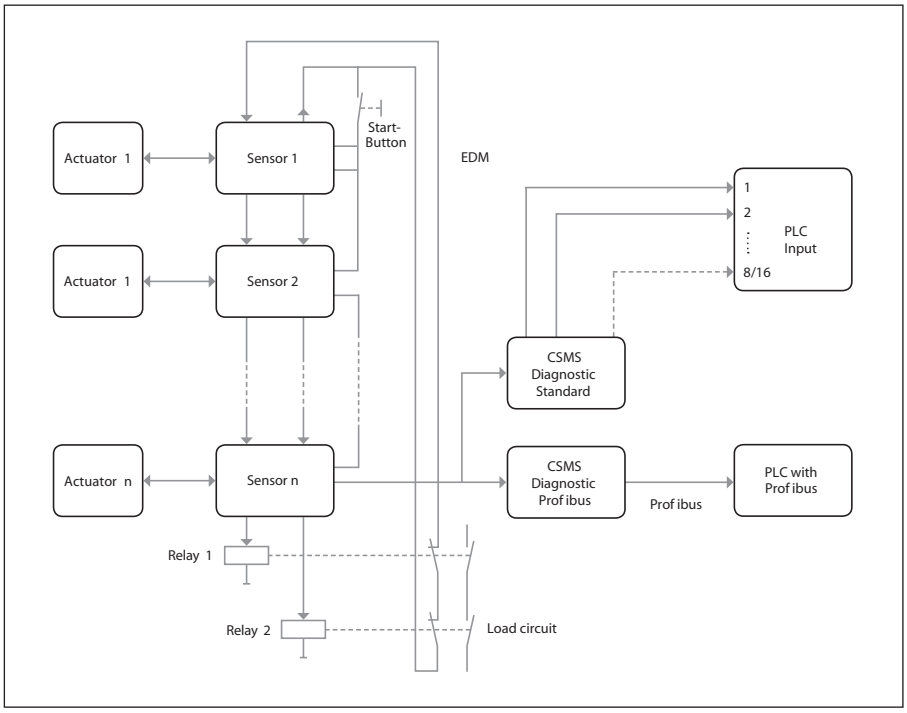
CSMS Standard Diagnosis

The CSMS Standard Diagnosis has 8 or 16 electronic outputs. Each output is assigned to one CSMS. It is possible to switch on the output, even at the maximum operating distance. The output is switched on by dip switches on the diagnostic device.
In maximum system conception, the status of all 32 CSMS can be displayed simply by cascading the diagnostic devices.

CSMS Diagnosis Profibus

The CSMS Diagnosis Profibus with Profibus interface ensures the direct transmission of the diagnostic information from each CSMS to the control unit.
Advantages include considerably reduced wiring expenses, a clearer arrangement and a substantially higher functionality.
As well as protective devices in an open position or in the transitional area, attempts to tamper with the machine and system errors can also be detected.
The machine down time can be reduced to a minimum by the extensive diagnostic options.
Further bus systems on request.

Parallel connection



Article number	Designation	Description
6075989031	CSMS DIAGNOSE STANDARD 8	Diagnosis for 8 CSMS
6075989032	CSMS DIAGNOSE STANDARD 16	Diagnosis for 16 CSMS
6075989033	CSMS DIAGNOSE PROFIBUS	Profibus Gateway

Safety Magnetic Controllers

Magnetic controllers for safety functions

BERNSTEIN offers magnetic controllers for safety functions that fulfill performance level d according to EN 13849-1 and SIL 3 according to EN 61508 or rather EN 62061.

A safety system consists of the safety magnetic controllers and a coded transducer unit.

The anti-tamper security of the transducer unit is achieved by variable coding of the actuator magnets and magnetic switches.

Depending on the type of device, one or two coded transducer units (magnetic switch with corresponding magnet) of type:

- MAK-4236
- MAK-5236
- MAK-5336

can be connected to and monitored by the safety magnetic controllers.

The safety magnetic controller processes the NC or NO contact signals coming from the coded magnetic switches. Thereby, it is possible to detect the opening of the safety guard (door, hatch, protective hood etc.) and to turn off the safety output. Thanks to the redundant evaluation, the magnetic controller is switched to the “safe state” should a fault or manipulation occur, or if the time difference is exceeded between the NC contact signal and the NO contact signal. An LED indicates that the safety magnetic controller is in the “safe state”.

To ensure fault detection of the switch-off device, the MÜZ-102 offers the possibility to connect a return circuit. The system additionally features a NC contact for signalling purposes.

- Redundancy by NO and NC contacts
- Manipulation safety by coding
- Monitoring of the return circuit (depending on device type)

MAK-4236-x with magnet TK-42-CD

MAK-5236-x with magnet TK-52-CD / 2

MAK-5336-x with magnet TK-43-CD

Magnetic controllers for safety functions

TÜV certified

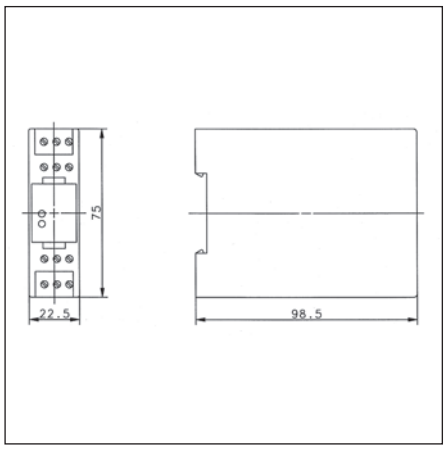
⌘ EN ISO 13849-1 Performance Level d
⌘ EN 61508 and EN 62061 SIL 3
⌘ EN 60947-5-3 Single fault security S

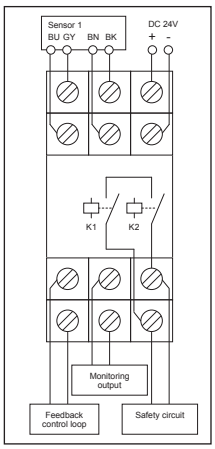
Coded transducer units

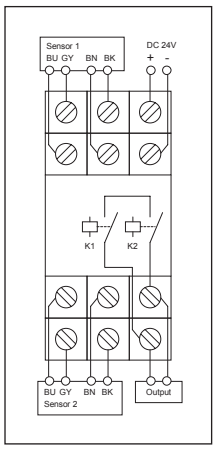
Magnetic switches

Type designation		MÜZ-102/D24-FL-DA	MÜZ-202/D24-FL
Article number		6392701306	6392702307
Max. number of connectable transducer units		1	2
Safety output, NO contact			
Feedback circuit			–
Data output (NC contact)			–
Technical data			
Operating voltage		24 V DC	24 V DC
Operating current		60 mA	60 mA
Switching capacity, safety output			
Switching voltage	max	AC 250 V	AC 250 V
Switching current	max	8 A	8 A
Switching power	max	1700 VA	1700 VA
LED: Hazard status/switching status		/–	/–
LED: Supply voltage/ON			–
Relay: Positive-action/standard		/–	/–
Ambient conditions			
Temperature range	min/max	0 °C/+55 °C	0 °C/+55 °C
		32 °F/+131 °F	32 °F/+131 °F
Protection class (to IEC 529, EN 60529)		IP20	IP20
Enclosure material		PC	PC
Mounting system (DIN 50022)		TS 35	TS 35
Type of connection: Terminal block		max. 2.5 mm^2	max. 2.5 mm^2

Type designation		
Article number		
Cable length		
Type designation		
Article number		
Cable length		
Type designation		
Article number		
Cable length		
Type designation		
Article number		
Cable length		
Ambient conditions		
Temperature range		min/max
Protection class (to IEC 529, EN 60529)		
Enclosure material		
Sensing distance	S on	min
	S on	max
Actuating magnet		
Type designation		
Article number		
Use: safety magnetic controller		
Article number		







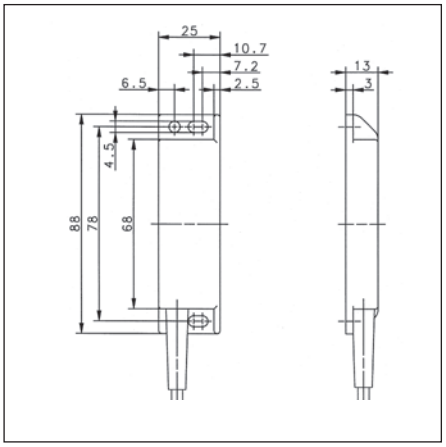
All dimensions in mm

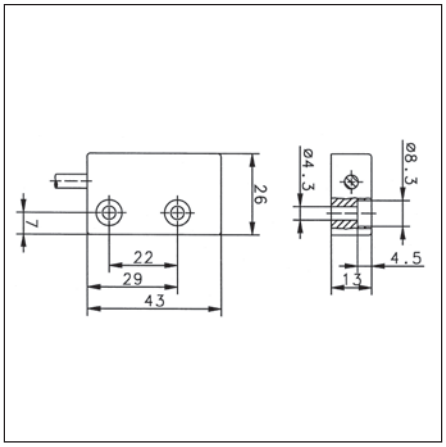
Other types available on request.

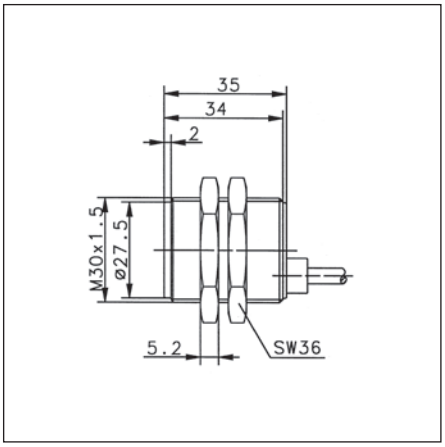
MAK-4236-3	MAK-5236-3	MAK-5336-3
6490642315	6490652316	6490653317
3 m PVC cable	3 m PVC cable	3 m PVC cable
MAK-4236-6	MAK-5236-6	MAK-5336-6
6490642302	6490652307	6490653311
6 m PVC cable	6 m PVC cable	6 m PVC cable
MAK-4236-9	MAK-5236-9	MAK-5336-9
6490642303	6490652308	6490653312
9 m PVC cable	9 m PVC cable	9 m PVC cable
MAK-4236-STK	MAK-5236-STK	MAK-5336-STK
6490642305	6490652309	6490653313
4-pin connector	4-pin connector	4-pin connector

–5 °C/+70 °C	–5 °C/+70 °C	–5 °C/+70 °C
+23 °F/+158 °F	+23 °F/+158 °F	+23 °F/+158 °F
IP67	IP67	IP67
PA 6.6	PBT	PA 6.6
4 mm	3 mm	3 mm
14 mm	14 mm	14 mm

TK-42-CD	TK-52-CD/2	TK-43-CD
6402042310	6402052311	6402043312
6392701306	6392701306	6392701306
6392702307	6392702307	6392702307







Ultrasonic Sensors

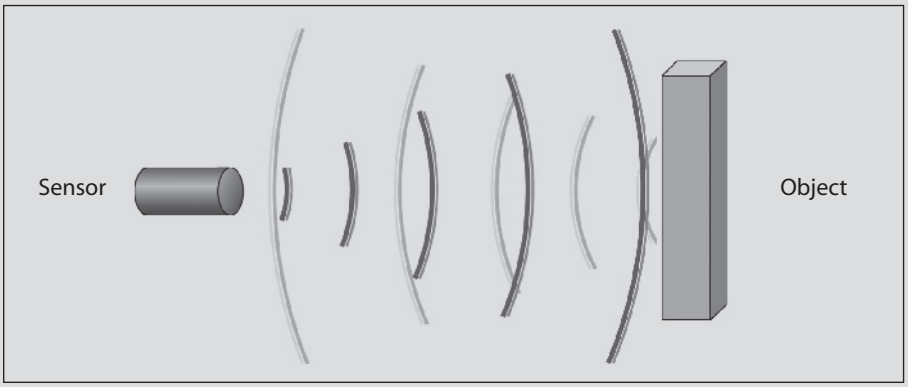
Ultrasonic sensors are used to precisely detect the position of objects of any material and colour, irrespective of external light levels even in harsh industrial environments. The sensors are characterised by high sound intensity that makes it possible to detect even the smallest of objects.

In addition to their high precision, outstanding repeatability and high degree of linearity their strengths also include their suitability for use in universal applications, irrespective of light conditions, as well as colour and material of the objects and substances to be detected.

Ultrasonic sensors produce accurate results even in connection with highly transparent objects such as film or glass surfaces and are completely unaffected by normal levels of soiling on the sensor surface. High performance under the most difficult operating conditions, even in suspended particle or water vapour environments, is a characteristic feature as is their ruggedness under harsh operating conditions.

Thanks to their outstanding properties ultrasonic sensors are used in a diverse range of applications and sectors of industry.

Measuring principle



The sensor emits a sound pulse that is reflected from the object to be detected. The sensor reads in the reflected pulse and the distance to the object is determined by means of a runtime measurement routine.

Advantages

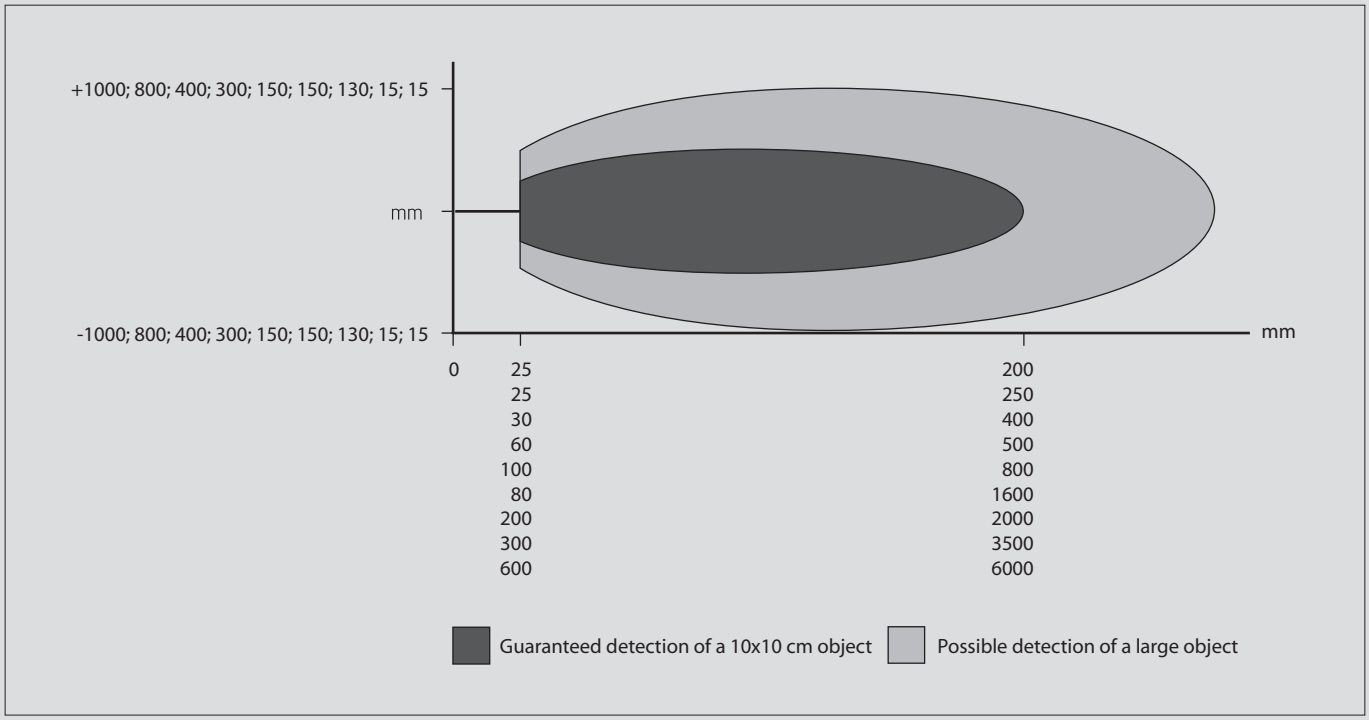
- ⌘ Protection class IP 67
- ⌘ Large detection range of up to 6000 mm (depending on type)
- ⌘ High linearity
- ⌘ High repeat accuracy
- ⌘ Narrow sound beam of 8°
- ⌘ Adaptive 0–10 V voltage or 4–20 mA current output (analogue sensors)
- ⌘ Two adaptive switching outputs, can be used individually or combined in connection with switching sensors (depending on type)

Technical data*

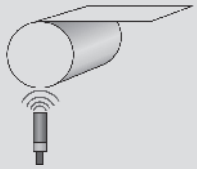
- ⌘ One analogue 0 ...10 V/4 ... 20 mA output or two switching outputs.
- ⌘ Rated operating voltage range 12 V – 30 V DC
- ⌘ Enclosure: PBT/ GF30
- ⌘ Ambient temperature –15 °C…70 °C
- ⌘ Repeat accuracy ±0.2 % ±2 mm
- ⌘ Hysteresis 1 %

* Please refer to the following catalogue pages and the corresponding datasheets for technical information on the individual products

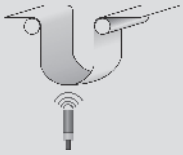
Detection range:



Application examples:



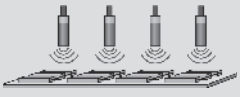
Wind-on and wind-off control
Detection of the diameter of coils in the paper, plastics and textile as well as metal working industries.



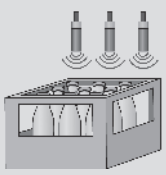
Sag control
Detection of sag loop for controlling material tension or controlling quantity of material for the downstream production process.

Level measurement
Level measurement of liquids of bulk materials in containers and silos.

Thickness measurement
Thickness measurement of objects.



Completeness check
For checking completeness of objects in containers.

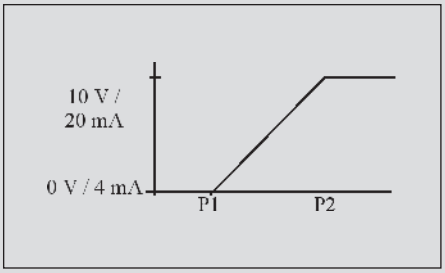


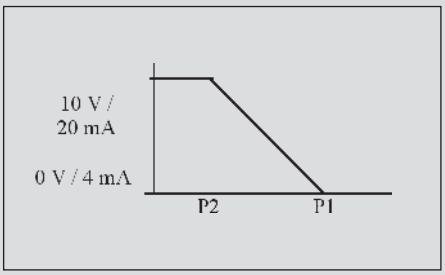
Completeness check of bottles in crates
For checking the presence and height of bottles in crates.

Teach-in procedure

Analogue sensors

Any interval within the measuring range can be selected for the analogue output by means of TeleTeach. The slope of the characteristic curve – positive or negative – can, of course, be set to any value.





The points P1 and P2 determine the position of the analogue characteristic curve: P1 defines the point at which the characteristic curve assumes the value 0 V/4 mA, P2 defines the 10 V/20 mA point. In the case of a "positive characteristic curve", the sensor is programmed in such a way that the sensor-P1 distance is smaller than the sensor-P2 distance. Correspondingly, sensor-P2 distance is smaller than sensor-P1 distance for a "negative characteristic curve".

Switching sensors

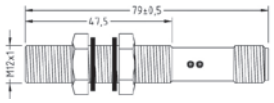
The two switching outputs are taught-in accurate to the millimetre via a teach-in input. Independent of each other, they can be optionally adapted with 1 % hysteresis as complementary windows (NO / NC) or as complementary switching outputs (NO / NC) with hysteresis adjustable to any value. P1 and P2 define the position of the switching points. The switching point has NO characteristic if the corresponding LED is on while teaching in the switching point and conversely, it has NC characteristic when the LED is off. Two LEDs indicate the switching status of the sensor.

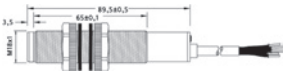
Standards and approvals:

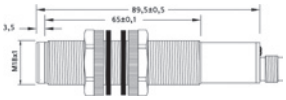
EN 60947-5-2

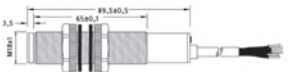
Ultrasonic Sensors (Type M12, M18)

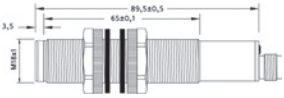
Type			M12	M18		M18	
Detection range			25–200 mm	30–400 mm	30–400 mm	30–400 mm	30–400 mm
Output			1 x NO/NC	2 x NO/NC	Analogue	2 x NO/NC	Analogue
Type of connection			Connector M12	Cable 2 m	Cable 2 m	Connector M12	Connector M12
Special feature							











PNP	DC	NO/NC Type	6712101001 UN12I-DPE0-0200-S30		6711102005 UT18I-DPE0-0400-C30		6712102005 UT18I-DPE0-0400-S30	
NPN	DC	NO/NC Type	6712201001 UN12I-DNE0-0200-S30		6711202005 UT18I-DNE0-0400-C30		6712202005 UT18I-DNE0-0400-S30	
Analogue	DC	0–10 V Type				6711402005 UT18I-D00U-0400-C30		6712402005 UT18I-D00U-0400-S30
		4–20 mA Type				6711302005 UT18I-D00I-0400-C30		6712302005 UT18I-D00I-0400-S30

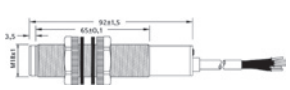
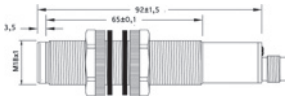
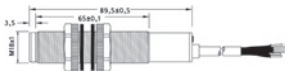
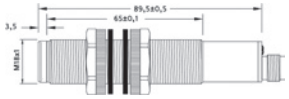
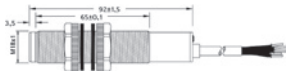
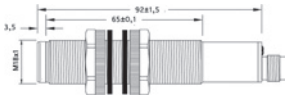
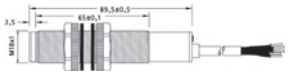
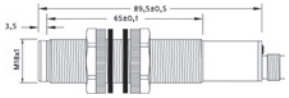
Technical data

Rated operating voltage	U_B	12–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC
Rated operating current	I_B	100 mA	500 mA	–	500 mA	–
Switching frequency (max)	F	20 Hz	15 Hz	–	15 Hz	–
Resolution		–	–	0.125 mm	–	0.125 mm
Linearity error		–	–	< 0.5 %	–	< 0.5 %
Response times		–	–	60 ms	–	60 ms
Repeatability		±0.3 %	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm
Sound beam		12°	8°	8°	8°	8°
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Funcion/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED	LED/LED

Mechanical data

Ambient temperature (min/max)		–20°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67
Enclosure material		Stainless steel	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
Connection		M12 x 1	5 x 0.14 mm²	4 x 0.14 mm²	M12 x 1	M12 x 1

Please refer to Accessories for cable couplers and sensor tester.

M18		M18		M18		M18	
60–500 mm 2 x NO/NC Cable 2 m	60–500 mm Analogue Cable 2 m	60–500 mm 2 x NO/NC Connector M12	60–500 mm Analogue Connector M12	80–1600 mm 2 x NO/NC Cable 2 m	80–1600 mm Analogue Cable 2 m	80–1600 mm 2 x NO/NC Connector M12	80–1600 mm Analogue Connector M12
							
							
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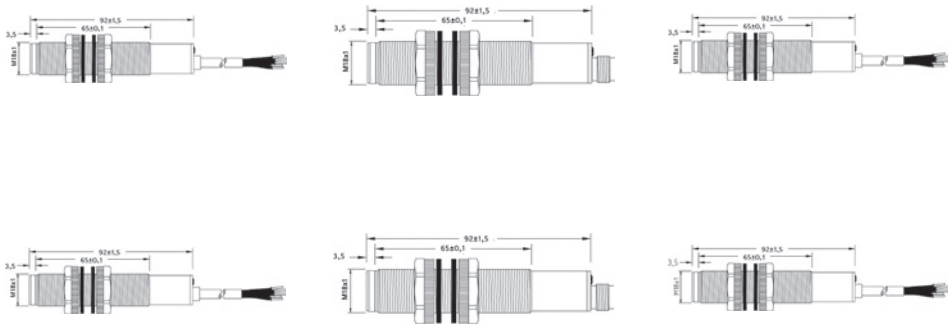
6711202004 UT18I-DNE0-0500-C30		6712202004 UT18I-DNE0-0500-S30		6711202002 UT18I-DNE0-01.6-C30		6712202002 UT18I-DNE0-01.6-S30	
	6711402004 UT18I-D00U-0500-C30 6711302004 UT18I-D00I-0500-C30		6712402004 UT18I-D00U-0500-S30 6712302004 UT18I-D00I-0500-S30		6711402002 UT18I-D00U-01.6-C30 6711302002 UT18I-D00I-01.6-C30		6712402002 UT18I-D00U-01.6-S30 6712302002 UT18I-D00I-01.6-S30
12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC
500 mA	–	500 mA	–	500 mA	–	500 mA	–
10 Hz	–	10 Hz	–	6 Hz	–	6 Hz	–
–	0.25 mm	–	0.25 mm	–	1 mm	–	1 mm
–	< 0.5 %	–	< 0.5 %	–	< 0.5 %	–	< 0.5 %
–	100 ms	–	100 ms	–	140 ms	–	140 ms
±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm
8°	8°	8°	8°	8°	8°	8°	8°
Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED
–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C
IP67	IP67	IP67	IP67	IP67	IP67	IP67	IP67
PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
5 x 0.14 mm²	4 x 0.14 mm²	M12 x 1	M12 x 1	5 x 0.14 mm²	4 x 0.14 mm²	M12 x 1	M12 x 1

You will find detailed data sheets to the products under www.bernstein.eu

Ultrasonic Sensors (Type M18, M30)

Type			M18		M18		M18	
Detection range			100–800 mm	100–800 mm	100–800 mm	100–800 mm	200–2000 mm	200–2000 mm
Output			2 x NO/NC	Analogue	2 x NO/NC	Analogue	2 x NO/NC	Analogue
Type of connection			Cable 2 m	Cable 2 m	Connector M12	Connector M12	Cable 2 m	Cable 2 m
Special feature								



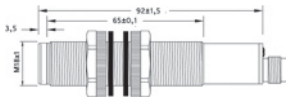
PNP	DC	NO/NC Type	6711102003 UT18I-DPE0-0800-C30		6712102003 UT18I-DPE0-0800-S30		6711102001 UT18I-DPE0-02.0-C30	
NPN	DC	NO/NC Type	6711202003 UT18I-DNE0-0800-C30		6712202003 UT18I-DNE0-0800-S30		6711202001 UT18I-DNE0-02.0-C30	
Analogue	DC	0–10 V Type		6711402003 UT18I-D00U-0800-C30		6712402003 UT18I-D00U-0800-S30		6711402001 UT18I-D00U-02.0-C30
		4–20 mA Type		6711302003 UT18I-D00I-0800-C30		6712302003 UT18I-D00I-0800-S30		6711302001 UT18I-D00I-02.0-C30

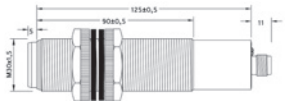
Technical data							
Rated operating voltage	U_B	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC
Rated operating current	I_B	500 mA	–	500 mA	–	500 mA	–
Switching frequency (max)	F	10 Hz	–	10 Hz	–	5 Hz	–
Resolution		–	0.25 mm	–	0.25 mm	–	1 mm
Linearity error		–	< 0.5 %	–	< 0.5 %	–	< 0.5 %
Response times		–	100 ms	–	100 ms	–	200 ms
Repeatability		±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±1 mm	±0.2 % ±2 mm	±0.2 % ±2 mm
Sound beam		8°	8°	8°	8°	8°	8°
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic
Funcion/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED

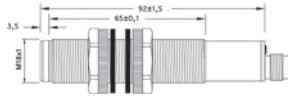
Mechanical data							
Ambient temperature (min/max)		–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C
Protection class in accordance with IEC 529, EN 60529		IP67	IP67	IP67	IP67	IP67	IP67
Enclosure material		PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30
Connection		5 x 0.14 mm²	4 x 0.14 mm²	M12 x 1	M12 x 1	5 x 0.14 mm²	4 x 0.14 mm²

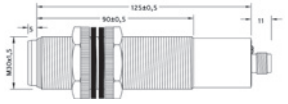
Please refer to Accessories for cable couplers and sensor tester.

M18		M30		M30		
200–2000 mm 2 x NO/NC Connector M12	200–2000 mm Analogue Connector M12	300–3500 mm 2 x NO/NC Cable 2 m	300–3500 mm Analogue Cable 2 m	300–3500 mm 2 x NO/NC Connector M12	300–3500 mm Analogue Connector M12	









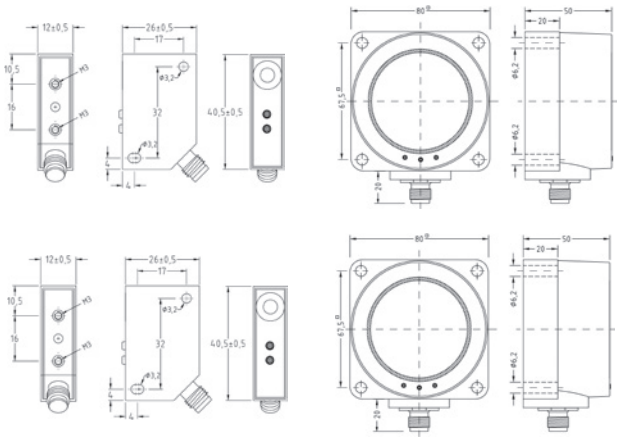
6712102001 UT18I-DPE0-02.0-S30		6711103001 UT30I-DPE0-03.5-C30		6712103001 UT30I-DPE0-03.5-S30			
6712202001 UT18I-DNE0-02.0-S30		6711203001 UT30I-DNE0-03.5-C30		6712203001 UT30I-DNE0-03.5-S30			
	6712402001 UT18I-D00U-02.0-S30 6712302001 UT18I-D00I-02.0-S30		6711403001 UT30I-D00U-03.5-C30 6711303001 UT30I-D00I-03.5-C30		6712403001 UT30I-D00U-03.5-S30 6712303001 UT30I-D00I-03.5-S30		

12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	12–30 VDC	15–30 VDC	
500 mA	–	500 mA	–	500 mA	–	
5 Hz	–	2.5 Hz	–	2.5 Hz	–	
–	1 mm	–	1 mm	–	1 mm	
–	< 0.5 %	–	< 0.5 %	–	< 0.5 %	
–	200 ms	–	400 ms	–	400 ms	
±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	
8°	8°	8°	8°	8°	8°	
Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	Cyclic	
LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	LED/LED	

–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	–15°C/+70°C	
IP67	IP67	IP67	IP67	IP67	IP67	
PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	
M12 x 1	M12 x 1	5 x 0.14 mm²	4 x 0.14 mm²	M12 x 1	M12 x 1	

Ultrasonic Sensors (Type 40.5 x 26 x 12 mm, 80 x 80 x 50 mm)

Type			40.5 x 26 x 12 mm		80 x 80 x 50 mm			
Detection range			25–250 mm	25–250 mm	600–6000 mm	600–6000 mm		
Output			1 x NO/NC	Analogue	2 x NO/NC	Analogue		
Type of connection			Connector M8	Connector M8	Connector M12	Connector M12		
Special feature								



PNP	DC	NO/NC Type	6713111001 UT25I-DPE0-0250-V30		6712112001 UT80I-DPE0-06.0-S30			
NPN	DC	NO/NC Type	6713211001 UT25I-DNE0-0250-V30		6712212001 UT80I-DNE0-06.0-S30			
Analogue	DC	0–10 V Type 4–20 mA Type		6713411001 UT25I-D00U-0250-V30		6712412001 UT80I-D00U-06.0-S30 6712312001 UT80I-D00I-06.0-S30		

Technical data

Rated operating voltage	U_B	10–30 VDC	12–30 VDC	12–30 VDC	15–30 VDC	
Rated operating current	I_B	100 mA	–	500 mA	–	
Switching frequency (max)	F	20 Hz	–	1 Hz	–	
Resolution		–	0.125 mm	–	1.5 mm	
Linearity error		–	< 0.3 %	–	< 0.5 %	
Response times		–	40 ms	–	700 ms	
Repeatability		±0.2 % ±0.2 mm	±0.2 % ±0.2 mm	±0.2 % ±2 mm	±0.2 % ±2 mm	
Sound beam		8°	8°	8°	8°	
Short circuit-protection		Cyclic	Cyclic	Cyclic	Cyclic	
Funcion/operating voltage indicator		LED/LED	LED/LED	LED/LED	LED/LED	

Mechanical data

Ambient temperature (min/max)	–10°C/+70°C	–10°C/+70°C	–15°C/+70°C	–15°C/+70°C	
Protection class in accordance with IEC 529, EN 60529	IP67	IP67	IP65	IP65	
Enclosure material	PBT/GF30	PBT/GF30	PBT/GF30	PBT/GF30	
Connection	M8 x 1	M8 x 1	M12 x 1	M12 x 1	

Please refer to Accessories for cable couplers and sensor tester.

Notes

Design and Function

BERNSTEIN float switches are designed as contactless magnetic switches. They are used to control level in containers / tanks with non-flowing and / or flowing liquids such as water, oils, caustic solutions etc.

Float switches consist of a connection head, an immersion tube with one to four magnetic sensor elements and a float. Versions with straight or elbow immersion tube are available.

Rising or falling liquid levels carry the float equipped with a ring magnet into the detection zone of a magnetic sensor element, where the magnetic field of the float is evaluated and a switching pulse generated.

The range of BERNSTEIN float switches extends from miniature float switches through to heavy-duty, pressure-proof versions.

The combination options between various enclosure materials, floats and connection heads make it possible to create the optimum configuration for virtually any application.

Based on a comprehensive modular system of adjustable float switches, the product range offers an enormous problem solution potential. It allows the user to adjust the required switching points to individual applications, thus creating a customised product ideally adaptable to specific operating conditions.

BERNSTEIN additionally offers many other specific solutions that cannot all be illustrated in one catalogue. For more demanding applications it is therefore recommended to contact BERNSTEIN using a fax enquiry / Order form at the end of this section.

BERNSTEIN miniature
float switches

To ensure smooth running operating processes, in many devices and industrial systems it is necessary to monitor product level in the most confined spaces.

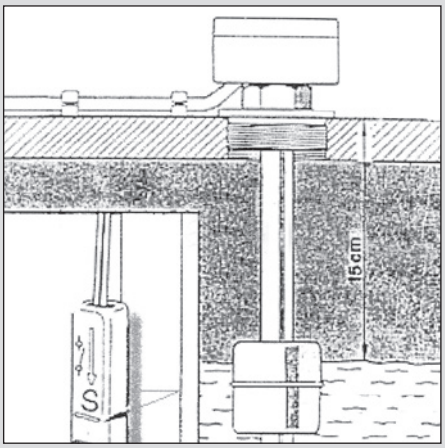
These miniature float switches have been specially developed for small tanks / reservoirs as used in the automotive industry, drinks vending machines, air conditioning systems etc.

The NC / NO contact switching function in many miniature switches can be selected by simply turning the float by 180°.

This type of miniature float switch is also available with individual lengths of immersion tube.

BERNSTEIN adjustable
float switches

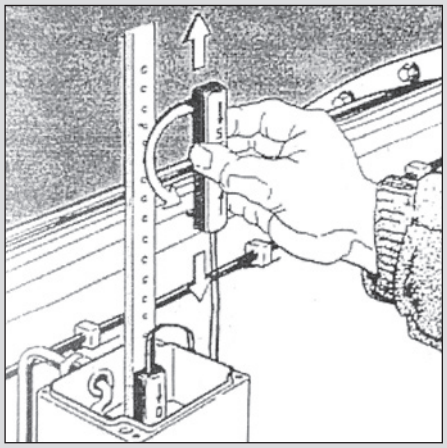
Up to four encapsulated magnetic sensor elements can be placed in any position at 10 mm intervals in the immersion tube of BERNSTEIN adjustable float switches.



Thanks to their extremely user-friendly design, each of these universally used devices can replace several conventional switches.

Instead of keeping a large assortment of different switches in stock, the user requires only one single device.

The NC or NO contact switching function can be easily adapted to specific operating conditions.



All versions are available as standard in four lengths (250, 500, 750 and 1000 mm). Other lengths are possible on request.

BERNSTEIN standard
float switches

For over 25 years it has been hard to imagine fluid level regulation, control and monitoring systems without BERNSTEIN standard float switches. In addition to being used to simply provide a signal when a liquid level drops below or exceeds a defined value, they also ideally serve as signal generators in automatically operating filling systems.

With a wide range of different floats, enclosure materials and connection heads to choose from, the optimum float switch can be configured for virtually any application. Lengths of up to 2 m are possible. Versions are available with an elbow immersion tube in the connection head or even with a specially developed switching device.

Terminology and Basic Theory

Connection cable
Temperature resistant up to +70 °C, special versions up to +150 °C also available. Switches with cables come in the standard length of 1 m, other lengths are also possible on request.

Radian (y)
The radian is the length measured from the contact surface of the connection head to the neutral phase of the vertical immersion tube.

Chemical resistance
See "Chemical Resistance" table (Page 133).

Pressure
Up to 25 bar depending on type of float.

Disruptive breakdown voltage
Each float switch undergoes a high voltage test in accordance with DIN VDE 0160.

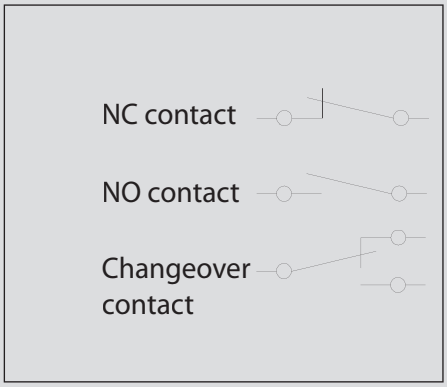
Maximum making current
From 0.5 A – 5 A depending on type of sensor used.

Immersion depth (h1)
Designates how far the float is immersed in the medium. This parameter is dependent on the density of the liquid as well as the size and weight of the float. The values listed in the catalogue refer to a density of 1.

End length (e)
From 36 mm to 50 mm depending on the type of float.

Electrical service life
To maintain a long service life of the float switches, it is important to ensure the maximum supply voltages and switching currents are not exceeded.

Spark quenching
On request, all BERNSTEIN float switches can be equipped with protection circuitry which prevents wear caused by switching sparks when switching inductive or capacitive loads (please refer to protective circuitry for reed contacts).



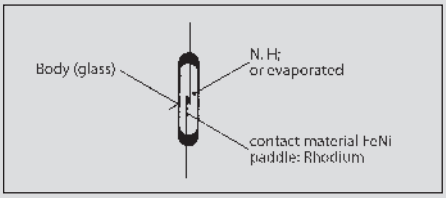
Contact function

Performance diagram
The performance diagram shows the switching capacity as a function of the switching current (please refer to Page 67).

Miniature float switches
Favourable design and compact dimensions allow these float switches to be used in smallest containers.

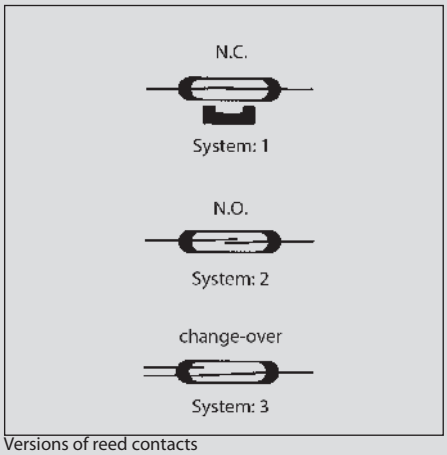
Mechanical wear
Thanks to the contactless operating principle, mechanical wear is not an issue.

Reed contact
A reed contact is a magnetically or electromagnetically operated switch. The pair of ferromagnetic contact studs are housed in a hermetically sealed glass tube filled with inert gas. Under the influence of a magnetic field, the contact paddles assume opposing polarity (north and south pole) and close when a sufficient force is applied. This procedure can be repeated millions of times even at extremely short time intervals.



Design of a reed contact

BERNSTEIN float switches are equipped with barium ferrite magnets that are located in the float. Opening and closing of the contact studs is determined by the magnet in the float correspondingly approaching or moving away. The delivery range includes normally-closed contacts, normally-open contacts and changeover contacts.



Versions of reed contacts

Switching distances (o/m/u)
The switching distances are defined with

⌘ o = Top
⌘ m = Middle
⌘ u = Bottom

(please refer to Float Switch Enquiry and Order form on Page 134).

Switch length (x)
This is the length from the connection head up to the lower end of the tube.
x (max.) = 2000 mm

Maximum switching power
3 VA – 250 VA depending on type of reed contact (please refer to Page 130).

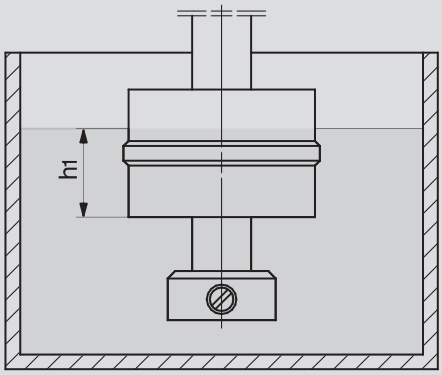
Immersion tube
Available in PVC, MS63, stainless 1.4571.

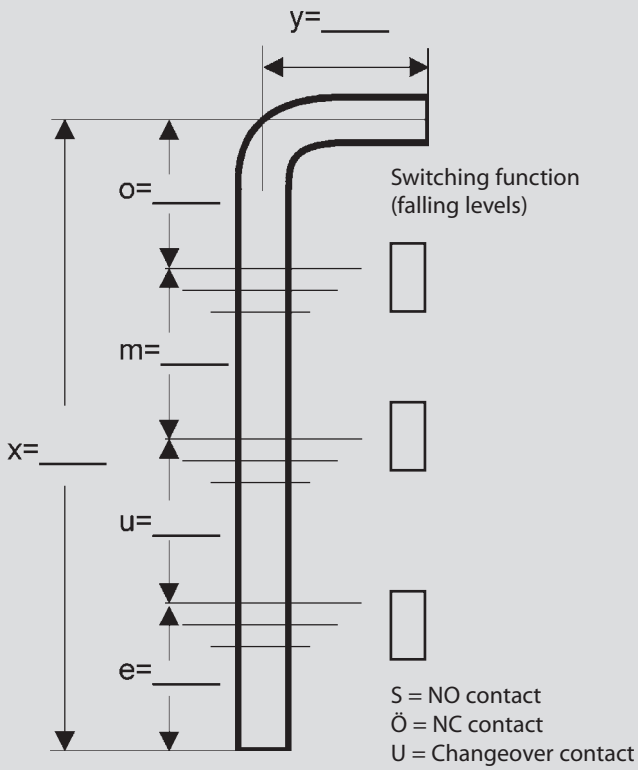
Maximum switching voltage
100 V – 250 V depending on type of reed contact (please refer to Page 130).

Switching point
The float magnet initiates a switching signal by magnetising the contact studs of the reed contact. Three switching points per switch are possible (more on request).

Switching path
This corresponds to the path, on which the contact remains active while the float is moving in the same direction.

Protection classes
Corresponding to their ID code, the switches are dustproof and waterproof in accordance with IP 65 or IP 67 (EN 60529, IEC 529).





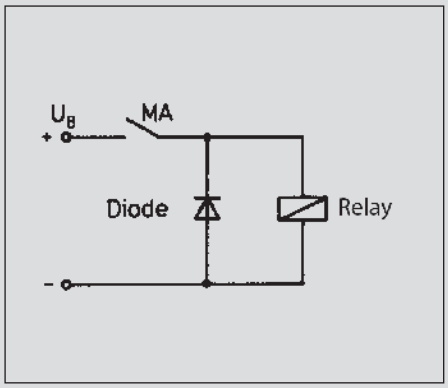
Guidelines for reed contact protection

The values for current, voltage and power specified in the catalogue apply only to purely resistive loads. Very often, however, these loads are exposed to inductive or capacitive components. In these cases it is advisable to protect the reed contacts against voltage and current peaks. Whilst it is not possible to recommend a safe contact protection concept that applies to all load ranges (each individual case will require its own evaluation), we would like to present general guidelines on how reed contacts may be connected to different loads in order to avoid premature failure.

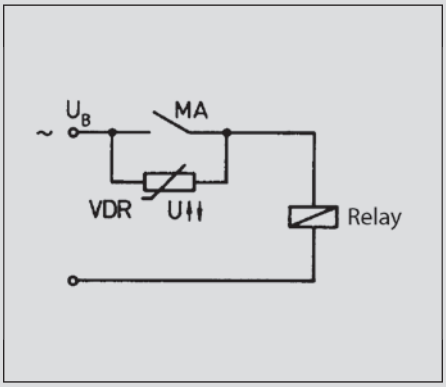
1. Inductive loads

In DC applications, contact protection is relatively easy to realise with the aid of a free-wheeling diode connected in parallel to the load. The diode polarity must be selected so that it blocks when normal operating voltage is applied but will short-circuit the voltage induced after the switch is opened (voltage peaks can significantly exceed the operating voltage).

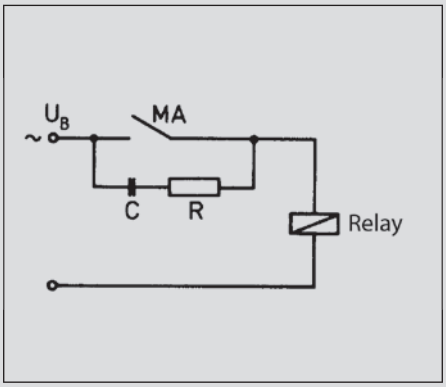
This can amount to a multiple of the operating voltage and initially cause a switching spark between the opening contact studs.



Suppression of voltage peaks with a free-wheeling diode



1) Voltage peaks induced by switching off inductive loads are suppressed by connecting a voltage-dependent resistor (VDR) in parallel to the reed contact.



2) In AC voltage applications effective protection is achieved with a combination of a resistor and a capacitor (RC element).

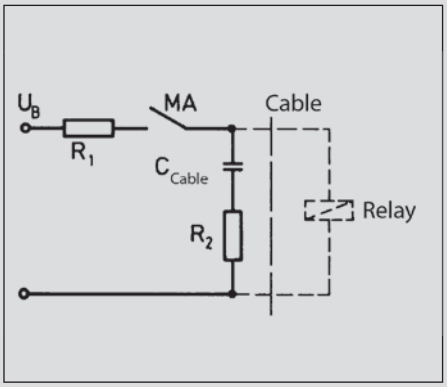
Generally, the RC element is connected in parallel to the contact and therefore in series to the load (vice versa is also possible).

2. Capacitive loads

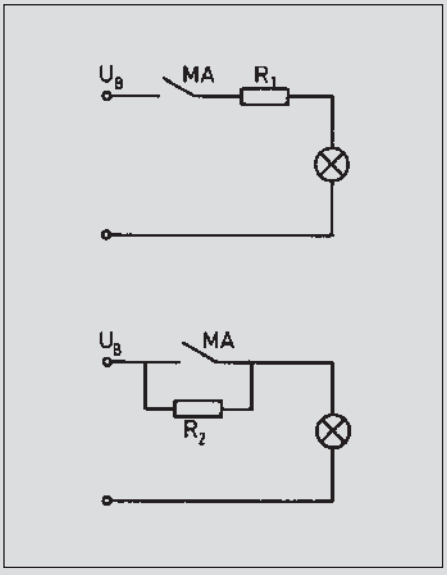
In contrast to inductive loads, an increase of making currents could occur in connection with capacitive loads and lamp loads that can damage and even weld contacts closed. When capacitors are switched (e.g. cable capacitance) a very high peak current occurs with its intensity depending on the capacitance and length of the cable leading to the switch.

A resistor connected in series to the contact will reduce this current. The size of the resistor is determined by the characteristics of the corresponding electric circuit.
It should, however, be as large as possible to reduce the current to a permissible value, thus ensuring reliable contact protection.

Contact protection with resistors for limiting current:

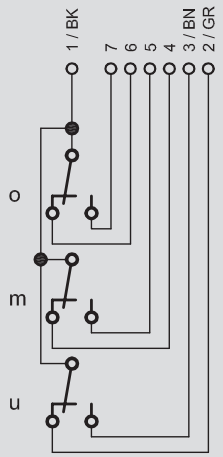
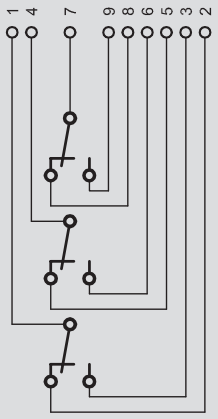
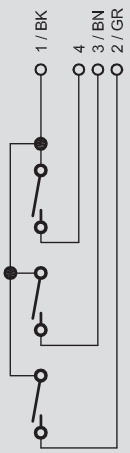
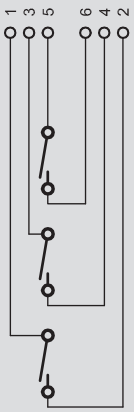


1) Capacitive load



2) Lam load

Wiring diagram

Switching points	Changeover contact		NC or NO contact	
	Up to 3 switching points	Separate contacts	Up to 3 switching points	Separate contacts
3				
2				
1				

The letters o, m and u identify the position of the contact.
o = top, m = middle, u = bottom

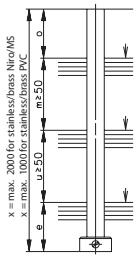
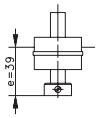
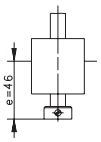
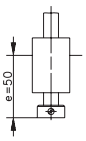
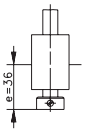
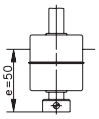
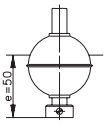
Standard float switches

Ordering example:
See Page 118

Position	1	2	3	4
Version	Magnetic float switch	Output type reed contact	Float switch – float combination	
Type	M	A		–

Min./max. dimensions

Float switch – float combination

Switching distance for falling levels	Float material: Connection head material	Float material: Float switch material	POM ø 40 x 27	PVC ø 42 x 44	PP ø 30 x 44	NBR ø 30 x 44	1.4571 ø 45 x 47	1.4571 ø 52
								
Half cable gland R3/8″ 	1.4571	1.4571	A	V	T	R	N	E
	MS 59	MS63	M	L	C	S	P	F
	PVC	PVC	K	D	I	U	—	—
Cable gland PG9 	1.4571	1.4571	A	V	T	R	N	E
	MS 58	MS63	M	L	C	S	P	F
	PVC	PVC	K	D	I	U	—	—
ø 75 flange with connector 	PC	1.4571	A	V	T	R	N	E
	PC	MS63	M	L	C	S	P	F
	PC	PVC	K	D	I	U	—	—

5	6	7	8	9	10	11	12	13
General design	Number of switching points	Switching function		Switching power	Connection head	Standard range		Special features (see Page 119)
7						S		

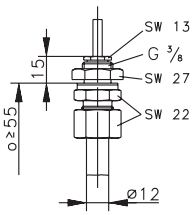
Number of switching points

Switching function

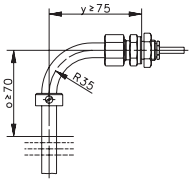
Switching power

Connection head

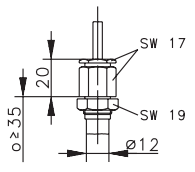
1.4571 ø 62	1.4571 ø 84	1 Switching point 2 Switching points 3 Switching points	1 NC contact 2 NO contact 3 Changeover contact 4 Mixed version (CO, NC, NO)	max. 0.5 A – 30 VA – 250 V max. 1 A – 60 VA – 250 V min. switching power = 3 VA	ID letter for connection head	Straight type Type in illustration in 1.4571 material. Slight dimensional variations may occur in PVC and brass versions.	ID letter for connection head	Elbow version Type in illustration in 1.4571 material. Slight dimensional variations may occur in PVC versions.
B	G	1/2/3	1/2/3/4	K	L	A		
O	H	1/2/3	1/2/3/4	K	L	A		
—	—	1/2/3	1/2/3/4	K	L	A		



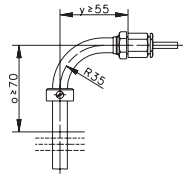
							C	
							—	
							C	



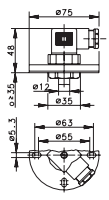
B	G	1/2/3	1/2/3/4	K	L	V		
O	H	1/2/3	1/2/3/4	K	L	V		
—	—	1/2/3	1/2/3/4	K	L	V		



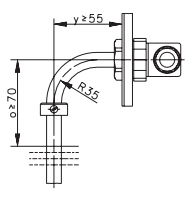
							H	
							—	
							H	



B	G	1/2/—	1/2/3/4	K	L	T		
O	H	1/2/—	1/2/3/4	K	L	T		
—	—	1/2/—	1/2/3/4	K	L	T		



							W	
							—	
							W	



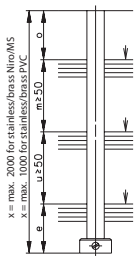
Standard float switches

Ordering example:
See Page 118

Position	1	2	3	4
Version	Magnetic float switch	Output type reed contact	Float switch – float combination	
Type	M	A		–

Min. / max. dimensions

Float switch – float combination

Switching distance for falling levels	Float material: Connection head material	Float material: Float switch material	POM ø 40 x 27	PVC ø 42 x 44	PP ø 30 x 44	NBR ø 30 x 44	1.4571 ø 45 x 47	1.4571 ø 52
								
Oval flange with connector 	PC	1.4571	A	V	T	R	N	E
	PC	MS63	M	L	C	S	P	F
	PC	PVC	K	D	I	U	—	—
Flange enclosure ø 78 	G-Al Si 12	1.4571	A	V	T	R	N	E
	G-Al Si 12	MS63	M	L	C	S	P	F
	G-Al Si 12	PVC	K	D	I	U	—	—

5	6	7	8	9	10	11	12	13
General design	Number of switching points	Switching function		Switching power	Connection head	Standard range		Special features (see Page 119)
7						S		

Number of switching points

Switching function

Switching power

Connection head

1.4571 ø 62	1.4571 ø 84	1 Switching point 2 Switching points 3 Switching points	1 NC contact 2 NO contact 3 Changeover contact 4 Mixed version (CO, NC, NO)	max. 0.5 A – 30 VA – 250 V max. 1 A – 60 VA – 250 V min. switching power = 3 VA	ID letter for connection head	Straight type Type in illustration in 1.4571 material. Slight dimensional variations may occur in PVC and brass versions.	ID letter for connection head	Elbow version Type in illustration in 1.4571 material. Slight dimensional variations may occur in PVC versions.
B	G	1/2	1/2/3/4	K	L	TO	TW	
O	H	1/2	1/2/3/4	K	L	TO	—	
—	—	1/2	1/2/3/4	K	L	TO	TW	

B	G	1/2/3	1/2/3/4	K	L	S		
O	H	1/2/3	1/2/3/4	K	L	S		
—	—	1/2/3	1/2/3/4	K	L	S		

Standard float switches

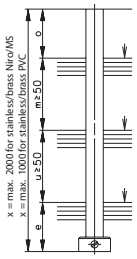
Ordering example:
See Page 118

Position	1	2	3	4
Version	Magnetic float switch	Output type reed contact	Float switch – float combination	
Type	M	A		–

Min. / max. dimensions

Float switch – float combination

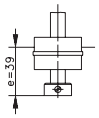
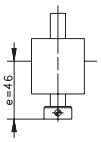
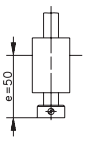
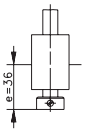
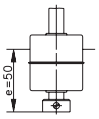
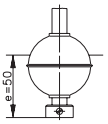
Switching distance for falling levels



Float material

Connection head material

Float switch material

		POM ø 40 x 27	PVC ø 42 x 44	PP ø 30 x 44	NBR ø 30 x 44	1.4571 ø 45 x 47	1.4571 ø 52
							
Flange enclosure DN50 ø 165 	1.4571/ G-Al Si 12	1.4571	A	V	T	R	N	E
	PVC/ G-Al Si 12	PVC	K	D	I	U	—	—
Flange enclosure DN65 ø 185 	1.4571/ G-Al Si 12	1.4571	A	V	T	R	N	E
	PVC/ G-Al Si 12	PVC	K	D	I	U	—	—
Tank cable gland R1,5 ″ 	G-Al Si 12	1.4571	A	V	T	R	N	E
	PVC/ Polyester	PVC	K	D	I	U	—	—

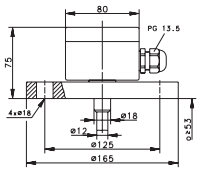
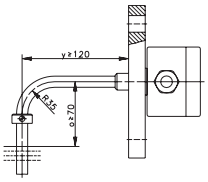
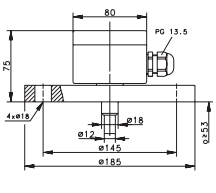
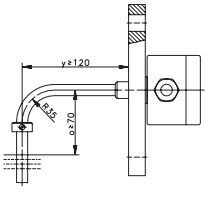
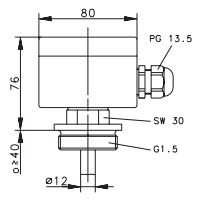
5	6	7	8	9	10	11	12	13
General design	Number of switching points	Switching function		Switching power	Connection head	Standard range		Special features (see Page 119)
7						S		

Number of switching points

Switching function

Switching power

Connection head

1.4571 ø 62	1.4571 ø 84	1 Switching point 2 Switching points 3 Switching points	1 NC contact 2 NO contact 3 Changeover contact 4 Mixed version (CO, NC, NO)	max. 0.5 A – 30 VA – 250 V max. 1 A – 60 VA – 250 V min. switching power = 3 VA	ID letter for connection head	Straight type Type in illustration in 1.4571 material. Slight dimensional variations may occur in PVC and brass versions.	ID letter for connection head	Elbow version Type in illustration in 1.4571 material. Slight dimensional variations may occur in PVC versions.
B	G	1/2/3	1/2/3/4	K	L	DN 50		WDN 50 
—	—	1/2/3	1/2/3/4	K	L	DN 50		WDN 50
B	G	1/2/3	1/2/3/4	K	L	DN 65		WDN 65 
—	—	1/2/3	1/2/3/4	K	L	DN 65		WDN 65
B	G	1/2/3	1/2/3/4	K	L	R 1,5		
—	—	1/2/3	1/2/3/4	K	L	R 1,5		

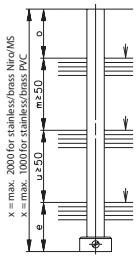
Standard float switches

Ordering example:
MAK-721 KR2S

Position	1	2	3	4
Version	Magnetic float switch	Output type reed contact	Float switch – float combination	
Type	M	A	Ⓚ	–

Min. / max. dimensions

Float switch – float combination

Switching distance for falling levels	Float material: Connection head material	Float material: Float switch material	POM ø 40 x 27	PVC ø 42 x 44	PP ø 30 x 44	NBR ø 30 x 44	1.4571 ø 45 x 47	1.4571 ø 52
	1.4571/ G-Al Si 12	1.4571	A	V	T	R	N	E
	PVC/ Polyester	PVC	Ⓚ	D	I	U	—	—

With specification o = _____ ; u = _____ (see Order form on Page 134)

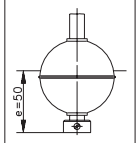
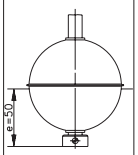
5	6	7	8	9	10	11	12	13
General design	Number of switching points	Switching function		Switching power	Connection head	Standard range		Special features (see below)
7	②	①		Ⓚ	R2	S		

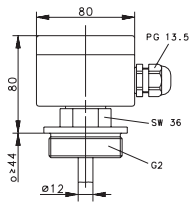
Number of switching points

Switching function

Switching power

Connection head

1.4571 ø 62 	1.4571 ø 84 	1 Switching point 2 Switching points 3 Switching points	1 NC contact 2 NO contact 3 Changeover contact 4 Mixed version (CO, NC, NO)	max. 0.5 A – 30 VA – 250 V max. 1 A – 60 VA – 250 V min. switching power = 3 VA	ID letter for connection head	Straight type Type in illustration in 1.4571 material. Slight dimensional variations may occur in PVC and brass versions.

B	G	1 /②/ 3	①/ 2 / 3 / 4	Ⓚ	L	R2	
—	—	1/2/3	1/2/3/4	K	L	R2	

Special features

⌘ Temperature monitoring PT100 (P1)/ PT1000 (P10)

⌘ Bi-metal switch

We can produce tailor-made designs for specific applications to suit individual customer requirements.

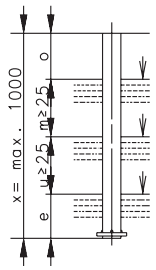
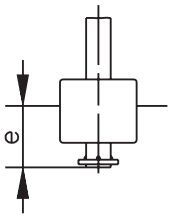
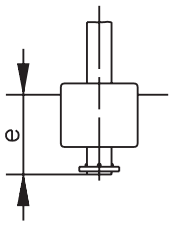
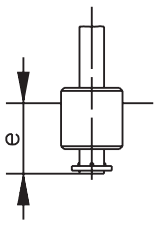
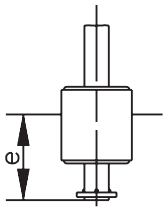
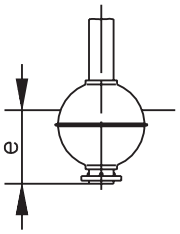
Miniature float switches

Ordering example:
See Page 118

Position	1	2	3
Version	Miniature float switches	Float	
Type	**MS**		–

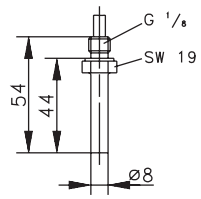
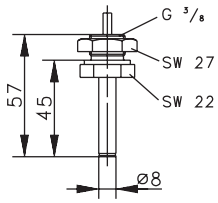
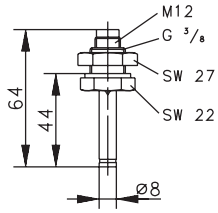
Min. / max. dimensions

Float

Switching distance for falling levels	PP ø 25 x 21	PVC ø 25 x 21	NBR ø 20 x 20	NBR ø 23 x 25	1.4571 ø 30
	 e = 20 (NC contact) e = 17 (NO contact)	 e = 26 (NC contact) e = 23 (NO contact)	 e = 23 (NC contact) e = 23 (NO contact)	 e = 28 (NC contact) e = 22 (NO contact)	 e = 24 (NC contact) e = 23 (NO contact)
Connection thread R1/8″ 	K1	K2	K3	K4	N1
	K1	K2	K3	K4	N1
	K1	—	K3	K4	—
	—	K2	K3	K4	—
Connection thread R3/8″ 	K1	K2	K3	K4	N1
	K1	K2	K3	K4	N1
	K1	—	K3	K4	—
	—	K2	K3	K4	—
Connection thread R3/8″ with connector 	K1	K2	K3	K4	N1
	K1	K2	K3	K4	N1
	K1	—	K3	K4	—
	—	K2	K3	K4	—

4	5	6	7	8	9	10
Enclosure material		Connection head		Switching function		Special features (see Page 119)
	–		–			

Enclosure material ⬇ Connection head ⬇ Switching function ⬇

Ni (stainless) = 1.4571 MS (brass) = MS63 PP = Polypropylene PVC = Polyvinyl chloride	Version	S = NO contact (250 V– 0,5 A– 10 VA) max. = 10 VA	O = NC contact (100 V; 0,3 A; 3 VA)	U = Changeover contact (100 V; 0,3 A; 3 VA)	X = max. overall length (mm)	Max. number of switching points	Cable length (m)
Ni	R 1/8 	S	O	U	1000	3	1
MS		S	O	U	1000	3	1
PP		S	O	U	40,5	1	1
PVC		S	O	U	500	3	1
Ni	R 3/8 	S	O	U	1000	3	1
MS		S	O	U	1000	3	1
PP		S	O	U	40,5	1	1
PVC		S	O	U	500	3	1
Ni	R 3/8ST 	S	O	U	1000	3	–
MS		S	O	U	1000	3	–
PP		PP			40,5	1	–
PVC		PVC			500	3	–

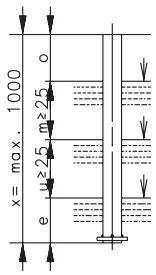
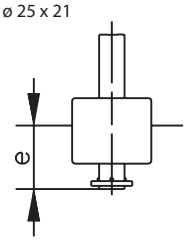
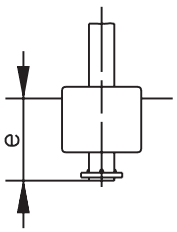
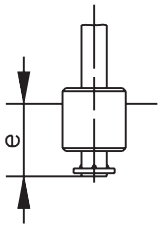
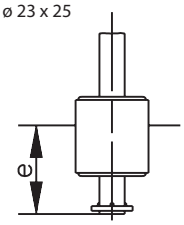
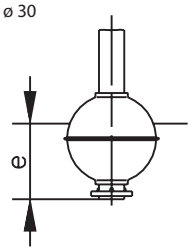
Miniature float switches

Ordering example:
See Page 118

Position	1	2	3
Version	Miniature float switches	Float	
Type	**MS**		–

Min. / max. dimensions

Float

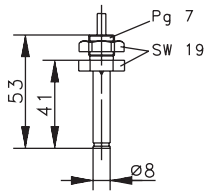
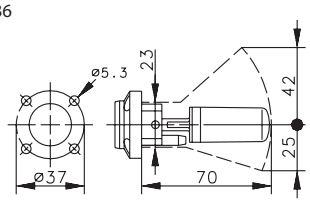
Switching distance for falling levels	PP ø 25 x 21	PVC ø 25 x 21	NBR ø 20 x 20	NBR ø 23 x 25	1.4571 ø 30
	 e = 20 (NC contact) e = 17 (NO contact)	 e = 26 (NC contact) e = 23 (NO contact)	 e = 23 (NC contact) e = 23 (NO contact)	 e = 28 (NC contact) e = 22 (NO contact)	 e = 24 (NC contact) e = 23 (NO contact)
Connection thread PG7 	K1	K2	K3	K4	N1
	K1	K2	K3	K4	N1
	K1	—	K3	K4	—
	—	K2	K3	K4	—
MSKS-PA-FL36-OS 	–	–	–	–	–

4	5	6	7	8	9	10
Enclosure material		Connection head		Switching function		Special features (see Page 119)
	–		–			

Enclosure material

Connection head

Switching function

Ni (stainless) = 1.4571 MS (brass) = MS63 PP = Polypropylene PVC = Polyvinyl chloride	Version	S = NO contact (250 V– 0,5 A– 10 VA) max. = 10 VA	O = NC contact (100 V; 0,3 A; 3 VA)	U = Changeover contact (100 V; 0,3 A; 3 VA)	X = max. overall length (mm)	Max. number of switching points	Cable length (m)
Ni	PG7 	S	O	U	1000	3	1
MS					45 (fixed length)	1	
PP		S	O	U	40,5	1	1
PVC		S	O	U	500	3	1
PA12 (Enclosure & float)	FL36 	S	O (with 1 m cable)	–	For lateral mounting		

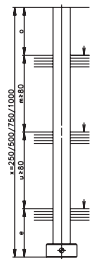
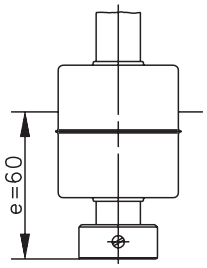
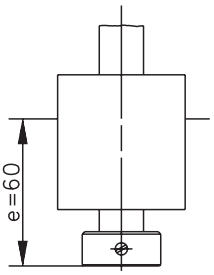
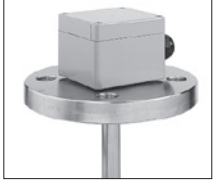
Adjustable float switches

Ordering example:
See Page 118

Position	1	2	3	4
Version	Magnetic float switch	Output type reed contact	Float switch – float combination	
Type	M	A		–

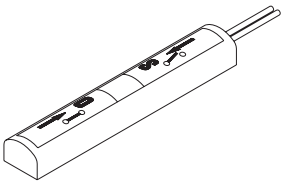
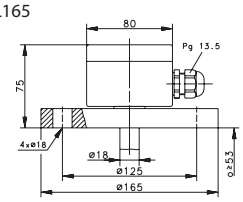
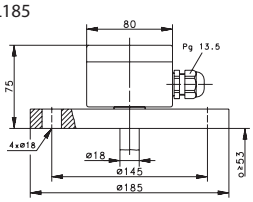
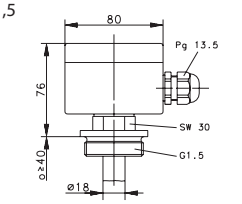
Min./max. dimensions

Float switch – float combination

Switching distance for falling levels	Float material: Connection head material	Float material: Float switch material	1.4571 ø 52 x 55	PVC ø 52 x 55
				
Flange enclosure DN50 ø 165 	1.4571/ G-Al Si 12	1.4571	N	V
	PVC/ Polyester	PVC	—	D
Flange enclosure DN65 ø 185 	1.4571/ G-Al Si 12	1.4571	N	V
	PVC/ Polyester	PVC	—	D
Tank cable gland R1,5" 	G-Al Si 12	1.4571	N	V
	PVC/ Polyester	PVC	—	D

5	6	7	8
Adjustable	Connection head		Length
VST		/	

Important! Please order switching devices without switching modules separately!

Connection head	Length	Switching module	Max. number of switching modules / switching devices
Version	Other lengths (mm) on request	 NC / NO contact Bistable / Changeover contact	NC / NO contact: Lengths 250 mm / 500 mm / 750 mm / 1000 mm; Changeover contact: Lengths 250 mm / 500 mm / 750 mm / 1000 mm
FL165 	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
FL185 	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
R1,5 	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
	250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3

Adjustable float switches

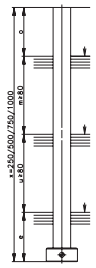
Ordering example:
See Page 118

Position	1	2	3	4
Version	Magnetic float switch	Output type reed contact	Float switch – float combination	
Type	M	A		–

Min. / max. dimensions

Float switch – float combination

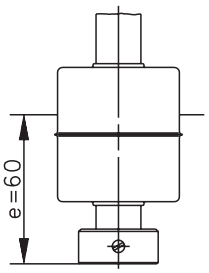
Switching distance for falling levels



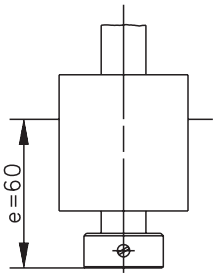
Float material

Connection head material / Float switch material

1.4571
ø 52 x 55



PVC
ø 52 x 55



Tank cable gland R2"

1.4571/ G-Al Si 12	1.4571	N	V
PVC/ Polyester	PVC	—	D

5	6	7	8
Adjustable	Connection head		Length
VST		/	

Important! Please order switching devices without switching modules separately!

Connection head

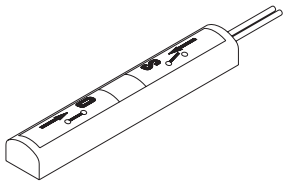
Length

Switching module

Max. number of switching modules / switching devices

Version

Other lengths (mm) on request



NC / NO contact Bistable

Changeover contact

NC / NO contact

Lengths

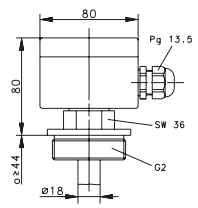
250 mm | 500 mm | 750 mm | 1000 mm

Changeover contact

Lengths

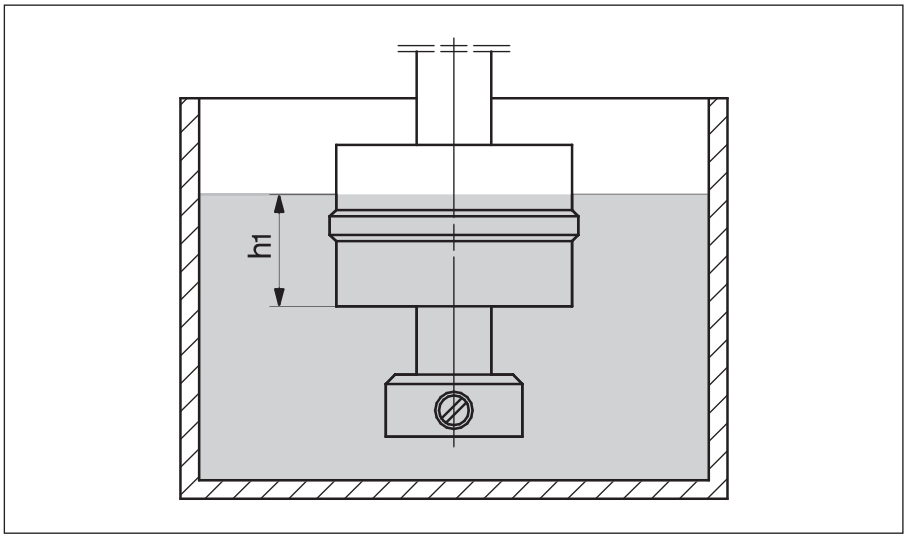
250 mm | 500 mm | 750 mm | 1000 mm

R2



250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3
250 / 500 / 750 / 1000	4910007069	4916007075	2 / 3 / 4 / 4	2 / 3 / 3 / 3

Floats
Standard Float Switches



ID lette r	A/M/K
Dimensions (mm)	Ø 40 x 27
Material	POM
Immersion depth h1 (mm)	Density (g/cm ³)
18	1
20	0.9
22,5	0.8
26	0.7
Art. No.:	4945206009

ID lette r	T/C/I
Dimensions (mm)	Ø 30 x 44
Material	PP
Immersion depth h1 (mm)	Density (g/cm ³)
27,5	1
30,5	0.9
34,5	0.8
39,5	0.7
Art. No.:	4945203019

ID lette r	R/S/U
Dimensions (mm)	Ø 30 x 44
Material	NBR
Immersion depth h1 (mm)	Density (g/cm ³)
19,5	1
22	0.9
24,5	0.8
28	0.7
Art. No.:	4945203031

ID lette r	V/L/D
Dimensions (mm)	Ø 42 x 44
Material	PVC
Immersion depth h1 (mm)	Density (g/cm ³)
25	1
27,5	0.9
30,5	0.8
35	0.7
Art. No.:	4945215029

ID lette r	N/P
Dimensions (mm)	Ø 44 x 45
Material	1.4571
Immersion depth h1 (mm)	Density (g/cm ³)
32	1
35	0.9
39	0.8
45	0.7
Art. No.:	4942104002

ID lette r	E/F
Dimensions (mm)	Ø 52
Material	1.4571
Immersion depth h1 (mm)	Density (g/cm ³)
32	1
34	0.9
37	0.8
43	0.7
Art. No.:	4942105003

ID lette r	B/O
Dimensions (mm)	Ø 62
Material	1.4571
Immersion depth h1 (mm)	Density (g/cm ³)
33	1
35	0.9
38	0.8
42	0.7
Art. No.:	4942102001

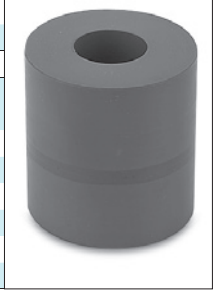
ID lette r	G/H
Dimensions (mm)	Ø 84
Material	1.4571
Immersion depth h1 (mm)	Density (g/cm ³)
33	1
35	0.9
38	0.8
42	0.7
Art. No.:	4942101004

Floats
Adjustable Float Switches

ID lette r	V/L/D
Dimensions (mm)	Ø 52 x 55
Material	PVC

Immersion depth h1 (mm)	Density (g/cm ³)
29	1
32	0.9
36	0.8
42	0.7

Art. No.: 4945216032



ID lette r	N/P
Dimensions (mm)	Ø 52 x 55
Material	1.4571

Immersion depth h1 (mm)	Density (g/cm ³)
33	1
36	0.9
40,5	0.8
46	0.7

Art. No.: 4942299023

Floats
Miniature Float Switches

ID lette r	K1
Dimensions (mm)	Ø 25 x 21
Material	PP

Immersion depth h1 (mm)	Density (g/cm ³)
12	1
13	0.9
14,5	0.8
16,5	0.7

Art. No.: 4945207021

ID lette r	K2
Dimensions (mm)	Ø 25 x 21
Material	PVC

Immersion depth h1 (mm)	Density (g/cm ³)
15	1
16	0.9
18,5	0.8
–	0.7

Art. No.: 4945207022

ID lette r	K4
Dimensions (mm)	Ø 23 x 25
Material	NBR

Immersion depth h1 (mm)	Density (g/cm ³)
16	1
17,5	0.9
19,5	0.8
22	0.7

Art. No.: 4945211024

ID lette r	K3
Dimensions (mm)	Ø 20 x 20
Material	NBR

Immersion depth h1 (mm)	Density (g/cm ³)
15	1
17	0.9
–	0.8
–	0.7

Art. No.: 4945210020

ID lette r	N1
Dimensions (mm)	Ø 30
Material	1.4571

Immersion depth h1 (mm)	Density (g/cm ³)
18	1
19	0.9
21	0.8
24	0.7

Art. No.: 4942109018

Standard
Float switches

Electrical data							
Switching function	Changeover / NC / NO contacts			Changeover / NC / NO contacts			
Contact ID letter	K			L (min. Switching power 3 VA)			
Switching voltage (max)	250 V AC/DC			250 V AC/DC			
Switching current (max)	0.5 A			1 A			
Switching power (max)	30 VA			60 VA			
Switching power (min)				3 VA			
Mechanical data							
Container connection options	Flange enclosure RD 77 mm			Flange enclosure RD 77 mm			
	Flange enclosure RD 165 mm			Flange enclosure RD 165 mm			
	Flange enclosure RD 185 mm			Flange enclosure RD 185 mm			
	Cable gland PG9			Cable gland PG9			
	Cable gland R3/8"			Cable gland R3/8"			
	Cable gland R1/5" with connector DIN 43650			Cable gland R1/5" with connector DIN 43650			
	Oval flange 75 x 50 mm with connector DIN 43650			Oval flange 75 x 50 mm with connector DIN 43650			
Float switch material	Stainless steel 1.4571			Stainless steel 1.4571			
	Brass MS63			Brass MS63			
	PVC			PVC			
Float variants	A/M/K	Cylinder float	RD 40 x 27 mm (POM)	A/M/K	Cylinder float	RD 40 x 27 mm (POM)	
	T/C/I	Cylinder float	RD 30 x 44 mm (PP)	T/C/I	Cylinder float	RD 30 x 44 mm (PP)	
	V/D	Cylinder float	RD 42 x 44 mm (NBR)	V/D	Cylinder float	RD 42 x 44 mm (NBR)	
	R/S	Cylinder float	RD 30 x 44 mm (NBR)	R/S	Cylinder float	RD 30 x 44 mm (NBR)	
	N/P	Cylinder float	RD 44 x 45 mm (stainless steel)	N/P	Cylinder float	RD 44 x 45 mm (stainless steel)	
	E/F	Ball float	RD 52 mm (stainless steel)	E/F	Ball float	RD 52 mm (stainless steel)	
	B/O	Ball float	RD 62 mm (stainless steel)	B/O	Ball float	RD 62 mm (stainless steel)	
	G/H	Ball float	RD 84 mm (stainless steel)	G/H	Ball float	RD 84 mm (stainless steel)	
Ambient conditions							
Protection class (DIN 40050)	IP 65 (up to IP 68 on request)			IP 65 (up to IP 68 on request)			
Temperature range	–5 °C to +60 °C (from –30 °C to +150 °C on request)			–5 °C to +60 °C (from –30 °C to +150 °C on request)			
Pressure	5 bar (up to 25 bar on request)			5 bar (up to 25 bar on request)			

Miniature
Float Switches

Electrical data						
Switching function	NO contacts			Changeover / NC contacts		
Contact ID letter	B			X		
Switching voltage (max)	250 V AC/DC			150 V AC/DC		
Switching current (max)	0.5 A			1 A		
Switching power (max)	10 VA			20 VA		
Mechanical data						
Container connection options	Cable gland PG7			Cable gland PG7		
	Cable gland R1/8"			Cable gland R1/8"		
	Cable gland R3/8"			Cable gland R3/8"		
	Cable gland R3/8" with connector			Cable gland R3/8" with connector		
Float switch material	Stainless steel 1.4571			Stainless steel 1.4571		
	PP			PP		
	PVC			PVC		
	Brass MS63			Brass MS63		
Float variants	K1	Cylinder float	RD 25 x 20 mm (PP)	K1	Cylinder float	RD 25 x 20 mm (PP)
	K2	Cylinder float	RD 25 x 20 mm (PVC)	K2	Cylinder float	RD 25 x 20 mm (PVC)
	K3	Cylinder float	RD 20 x 20 mm (NBR)	K3	Cylinder float	RD 20 x 20 mm (NBR)
	K4	Cylinder float	RD 23 x 25 mm (NBR)	K4	Cylinder float	RD 23 x 25 mm (NBR)
	N1	Ball float	RD 30 mm (stainless steel)	N1	Ball float	RD 30 mm (stainless steel)
Ambient conditions						
Protection class (DIN 40050)	IP 65 (up to IP 68 on request)			IP 65 (up to IP 68 on request)		
Temperature range	–5 °C to +60 °C (from –30 °C to +150 °C on request)			–5 °C to +60 °C (from –30 °C to +150 °C on request)		
Pressure	5 bar (up to 15 bar on request)			5 bar (up to 15 bar on request)		

Adjustable Float Switches

Electrical data		
Contact ID letter	P	L
Switching module, type designation	REEDK. KPL. F. MA	REEDK. KPL. F. MA
Article number	4910007069	4916007075
Switching function	NC / NO contact (bi)	Changeover contact (bi)
Switching voltage (max)	250 V AC / DC	250 V AC / DC
Switching current (max)	5 A	1 A
Switching power (max)	250 VA	60 VA
Mechanical data		
Container connection options	Flange DN 50 (PVC/stainless steel)	Flange DN 50 (PVC/stainless steel)
	Flange DN 65 (PVC/stainless steel)	Flange DN 65 (PVC/stainless steel)
	Cable gland R1.5" (PVC/stainless steel)	Cable gland R1.5" (PVC/stainless steel)
	Cable gland R2" (PVC/stainless steel)	Cable gland R2" (PVC/stainless steel)
Float switch material	Stainless steel 1.4571	Stainless steel 1.4571
	Brass MS63	Brass MS63
	PVC	PVC
Float variants	N/P Cylinder float RD 52 x 55 mm (stainless steel)	N/P Cylinder float RD 52 x 55 mm (stainless steel)
	V/D/L Cylinder float RD 52 x 55 mm (PVC)	V/D/L Cylinder float RD 52 x 55 mm (PVC)
Ambient conditions		
Protection class (DIN 40050)	IP 65 (up to IP 68 on request)	IP 65 (up to IP 68 on request)
Temperature range	–5 °C to +60 °C (from –30 °C to +150 °C on request)	–5 °C to +60 °C (from –30 °C to +150 °C on request)
Pressure	5 bar (up to 15 bar on request)	5 bar (up to 15 bar on request)

Chemical Resistance
Float switch materials at +20 °C

Chemical substance	Conc. in %	POM	PP	NBR	PVC	Brass MS63	1.4571
Acetone	100	+	+	U	U	+	+
Aluminium sulphate	10	/	+	+	+	U	+
Aluminium chloride	10	/	+	+	+	U	+
Formic acid	85	+	+	U	+	U	+
Ammonia	10	+	+	U	O	U	+
Aniline	100	/	+	U	U	O	+
Ethyl acetate	100	O	O	U	U	+	+
Ethyl ether	100	+	+	U	/	+	+
Ethylene chloride	100	/	U	U	U	/	+
Benzine	100	+	U	+	+	+	+
Benzene	100	+	U	O	U	+	+
Boric acid	10	/	+	+	+	+	+
Butyl acetate	100	+	O	U	U	/	+
Calcium chloride	10	+	+	+	+	U	+
Chlorobenzene	100	+	+	U	U	/	+
Chlorine water	–	/	+	U	O	U	+
Chloroform	100	/	U	U	U	+	+
Chromic acid	10	O	+	U	+	U	+
Ferrous chloride	10	O	+	+	+	U	U
Acetic acid	10	+	+	U	+	U	+
Acetic acid	80	O	+	U	+	U	+
Formaldehyde	20	+	+	+	+	O	+
Glycerine	90	+	+	+	+	+	+
Urea	10	/	+	+	+	/	+
Iodine	–	/	+	+	U	/	+
Potassium bichromate	5	/	+	O	+	U	+
Potassium nitrate	10	/	+	+	+	/	+
Potassium permanganate	1	+	+	O	+	/	+
Copper sulphate	10	/	/	+	+	U	+
Magnesium chloride	10	/	+	+	+	U	+
Methylene chloride	100	U	U	U	O	/	+
Lactic acid	10	+	+	O	+	O	+
Mineral oil	100	+	+	+	+	+	+
Sodium bisulphite	10	/	+	U	O	U	+
Sodium carbonate	10	+	+	+	+	O	+
Sodium chloride	10	+	+	+	+	O	+
Sodium sulphate	10	/	+	+	+	+	+
Oxalic acid	40	/	O	U	+	O	O
Phenol, aqueous	10	U	+	U	+	/	+
Phosphoric acid	10	+	+	O	+	U	+
Mercury	100	/	+	+	+	U	+
Mercuric chloride	5	/	+	+	O	U	+
Nitric acid	65	U	U	U	+	U	+
Nitric acid	10	U	O	U	+	U	+
Hydrochloric acid	10	U	+	U	+	U	U
Hydrochloric acid	2	U	+	U	+	U	U
Carbon disulphide	100	+	U	U	U	+	+
Sulphuric acid	10	+	+	+	+	U	+
Sulphuric acid	98	U	O	U	O	U	+
Hydrogen sulphide	2	/	+	+	+	O	+
Soap solution	1	+	+	+	+	+	+
Carbon tetrachloride	100	+	U	U	O	+	+
Trichloroethylene	100	O	O	U	U	O	+
Wine	–	/	+	+	+	O	+
Zinc chloride	10	/	+	+	+	U	+

+ = Resistant

The material remains fully resistant to the medium or is minimally affected. The effect of pressure and temperature changes on the materials must be taken into account.

O = Conditionally resistant

The material is affected by the medium; sealing materials swell. Application may be possible if concentration, pressure, temperature, service life or other influencing factors are restricted.

U = Non-resistant

The material may not be used in the specified medium or at the given temperature unless under very clearly defined preconditions.

/ = No data available

Enquiry and Order Form
Float Switches

❑ Enquiry

❑ Order

Date: _____

Receiver

BERNSTEIN AG
Tieloser Weg 6
D-32457 Porta Westfalica

Telephone: +49-(0)571/793-0
Fax: +49-(0)571/793-555
info@de.bernstein.eu

Sender

Company:

Customer No.:

Contact:

Department:

Street:

Town:

Telephone:

Fax:

E-mail:

Operational environment

Medium: _____ Temperature: from _____ °C to _____ °C

Pressure: min. _____ bar max. _____ bar

❑ One-off ❑ Batch order ❑ Sample

Batch size: _____ pcs.

Annual quantity: _____ pcs.

Electrical data

Voltage: _____ V ❑ AC ❑ DC Current: _____ A

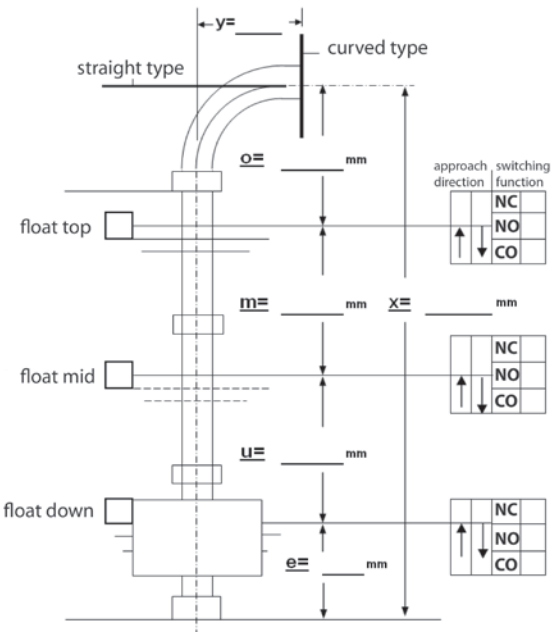
Power: min. _____ VA max. _____ VA

Technical data

Cable length*: _____ m ❑ Separate contacts

Mounting: ❑ From top ❑ From bottom ❑ From side

*Standard 1 m



Type

1	2	3	4	5	6	7	8	9	10	11	12	13

Special features

Remarks

Notes

Magnets

1. Hard ferrite magnets

Barium and strontium hard ferrites are economically priced, reliable components that are also widely used in automation, control and measurement applications. When operated in high temperature ranges, the specified switching distance will decrease by a factor of 0.2 % per 1 °C.

Chemical properties:

Ferrite magnets are oxide ceramics. They are made of approx. 80 % iron oxide and 20 % barium oxide or strontium oxide. The magnets are resistant to a large number of chemicals, including solvents, caustic solutions and weak acids. If strong organic and inorganic acids, e.g. hydrochloric, sulphuric and hydrofluoric acid, are used, their resistance will basically be determined by the temperature, concentration and reaction time of the medium. In general, the resistance should first be determine by means of longterm tests.

Mechanical properties:

Due to their ceramic characteristic, ferrites are brittle and sensitive to shock and bending loads.

2. Rare-earth magnets

Permanent magnets made from samarium cobalt and neodymium iron boron are high performance and high quality components that are widely used in drive and control engineering. When operated in high temperature ranges, the specified switching distance will decrease by a factor of 0.02 % per 1 °C.

Chemical properties:

All rare-earth magnets are metallic materials and show the corresponding characteristics associated with these materials, e.g. the polished shine immediately after being machined. The magnets are surface-treated (e.g. nickel coating) to protect them from environmental influences.

Mechanical properties:

Minor chips may occur if rare-earth magnets are subjected to impact stress. They respond very sensitively to vibrations and may become demagnetised.

3. Plastic-bound magnets

Plastic-bound permanent magnets have an attractive price-performance ratio and thanks to the way they are formed they can be produced with complex geometries.

Injection-moulded magnets are typical composite materials. The magnetic powder is embedded in thermoplastic materials (polyamides). One of the main advantages of plastic-bound magnets is that they can be formed into a diverse range of shapes.

Chemical properties:

Surface corrosion can rarely be found on plastic bound magnets. For this reason, they can be used in most fields of application without additional coating.

Mechanical properties:

Plastic-bound magnets can be subjected to buckling and bending without breaking or chipping.

Use in potentially explosive atmospheres

Magnets must not be used in potentially explosive atmospheres as they can cause sparks. Grinding dust and chips from rare-earth magnets are self-igniting and burn off at high temperatures. They should therefore only be machined using ample water and never in dry conditions since even dried grinding dust can ignite.

Strong magnetic fields

Strong magnetic fields can interfere with or even damage electronic or mechanical equipment. This includes cardiac pacemakers. Appropriate safety distances are specified in the corresponding manuals or may be requested from the manufacturers.

Radioactive radiation

Permanent magnets must not be exposed to longterm radioactive radiation otherwise they may lose their magnetism.

Effects on persons

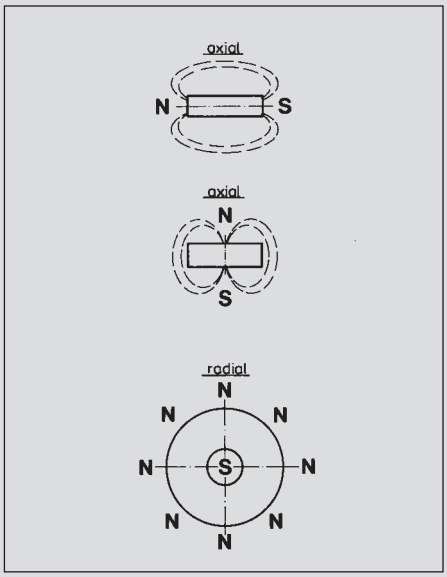
There are no known side-effects caused by touching magnet materials.

Magnet shapes

Rectangular, circular and cylindrical magnets are the most common shapes of permanent magnets manufactured in a press-shaping process. In addition to these standard geometries, permanent magnets may be manufactured in many other shapes. The shape should preferably be defined during the pressing process since subsequent shaping can only be performed using complex diamond tools. Holes and openings can only be made in the pressing direction.

Directions of magnetisation

The term preferred direction refers to the alignment of the magnetic crystals in a certain direction. The magnet achieves its highest magnetic values in this preferred direction and must therefore be magnetised in this direction.



The preferred direction is achieved by subjecting the magnetic powder to a strong external magnetic field (coil) during the pressing process. As magnets have no preferred direction, the magnetisation direction and type can be freely selected.

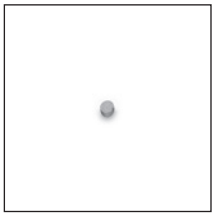
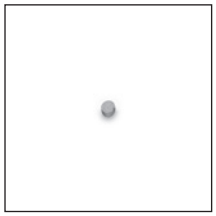
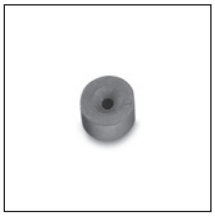
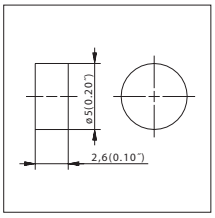
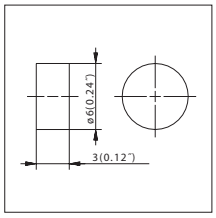
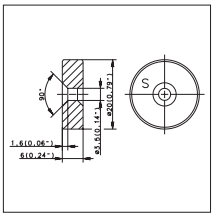
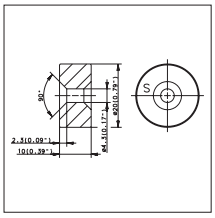
Mounting a magnetic switch system on ferromagnetic materials

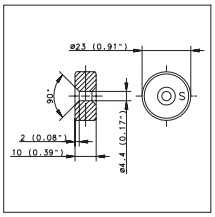
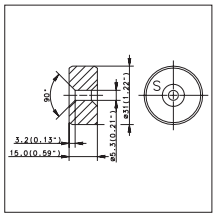
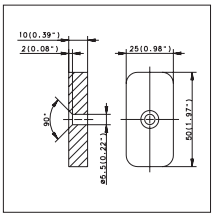
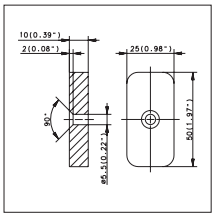
The nominal distance may be reduced when magnetic limit switches and their actuating magnets are mounted on magnetisable material (Fe, etc.). To ensure trouble-free operation, a minimum gap of 15 mm between the magnetic switch and any material that can be magnetised should be maintained as a reference value. The same applies to the actuating magnets.

Applications

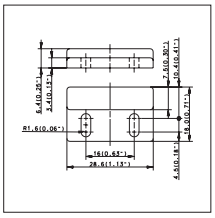
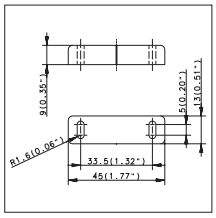
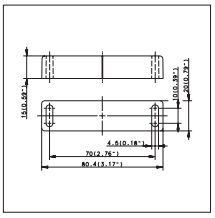
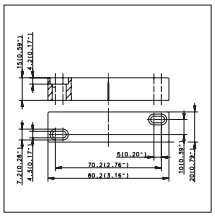
- ⌘ Counting
- ⌘ Position indication in lifts
- ⌘ End position switches in pneumatic and hydraulic installations
- ⌘ Position indication on butterfly valves, slide valves and valves in general
- ⌘ Conveyors in high-bay shelving
- ⌘ Position detection in textile, packaging and meat cutting machines
- ⌘ Machine runtime and downtime monitoring
- ⌘ Control of machine tools
- ⌘ Level monitoring of liquids (see Float Switches)

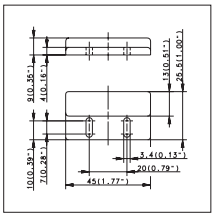
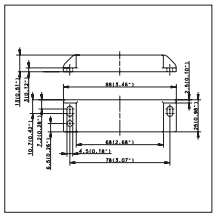
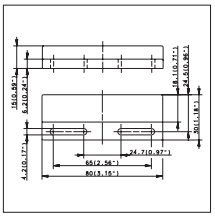
Actuating Magnets without Encapsulation

Actuating magnets without encapsulation	T-75	T-06N/S	T-61N/S	T-67N/S
				
Magnet material	Rare-earth	Neodymium iron boron (NdFeB)	Barium ferrite	Barium ferrite
Temperature range (magnetic switch operation)	–40 °C ... +150 °C –40 °F ... +302 °F	–40 °C ... +150 °C –40 °F ... +302 °F	–40 °C ... +150 °C –40 °F ... +302 °F	–40 °C ... +150 °C –40 °F ... +302 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K	0.2 %/K
Enclosure material	–	–	–	–
Article number	6301175057	6301106065	6301261035	6301167054
Dimensioned drawing				
		Marking slots on north pole side		

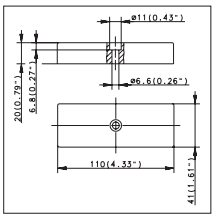
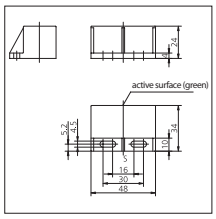
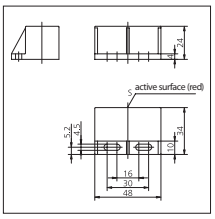
Actuating magnets without encapsulation	T-62N/S	T-69N/S	T-68N	T-68S
				
Magnet material	Barium ferrite	Barium ferrite	Barium ferrite	Barium ferrite
Temperature range (magnetic switch operation)	–40 °C ... +150 °C –40 °F ... +302 °F	–40 °C ... +150 °C –40 °F ... +302 °F	–40 °C ... +150 °C –40 °F ... +302 °F	–40 °C ... +150 °C –40 °F ... +302 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K	0.2 %/K
Enclosure material	–	–	–	–
Article number	6301262039	6301269031	6301268028	6301368033
Dimensioned drawing				
			90° countersink on north pole side	90° countersink on south pole side

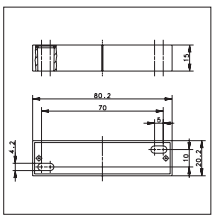
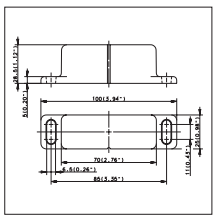
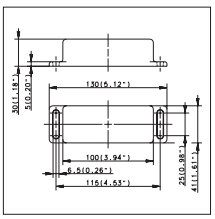
Actuating Magnets in Plastic Enclosure

Actuating magnets in plastic enclosure	TK-11-11	TK-11-01	TK-21-02	TK-21-12
				
Magnet material	AlNiCo-500	AlNiCo-500	AlNiCo-500	AlNiCo-500
Temperature range (magnetic switch operation)	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K	0.2 %/K
Enclosure material	PA 6.6	PA 6.6	PA 6.6	PA 6.6
Article number	6302111047	6303111001	6303121002	6302121030
Dimensioned drawing				

Actuating magnets in plastic enclosure	TK-45	TK-42	TK-44
			
Magnet material	AlNiCo-500	AlNiCo-500	AlNiCo-500
Temperature range (magnetic switch operation)	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K
Enclosure material	PA 6.6	PA 6.6	PA 6.6
Article number	6302145048	6302142049	6302144050
Dimensioned drawing			

Actuating Magnets

Actuating magnets in plastic enclosure	TK-50	TK-57N	TK-57S
			
Magnet material	Barium ferrite	Barium ferrite	Barium ferrite
Temperature range (magnetic switch operation)	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K
Enclosure material	PA 6.6	PBT	PBT
Article number	6302100053	6302257060	6302357061
Dimensioned drawing			

Actuating magnets in metal enclosure	TA-21-02	TA-31	TA-33
			
Magnet material	AlNiCo-500	AlNiCo-500	Barium ferrite
Temperature range (magnetic switch operation)	–40 °C ... +150 °C –40 °F ... +302 °F	–20 °C ... +80 °C –4 °F ... +176 °F	–20 °C ... +80 °C –4 °F ... +176 °F
Temperature coefficient	0.2 %/K	0.2 %/K	0.2 %/K
Enclosure material	Al	Al	Al
Article number	6305121064	6303131005	6303133034
Dimensioned drawing			

Mounting Brackets

Mounting brackets	BWN-M06NI/40 x 47	BWN-M06NI/27 x 38	BWN-M36NI
			
Material	Niro 1.4301	Niro 1.4301	Niro 1.4301
For series	MA-06, MA-16, MA-26, MA-15	MA-06, MA-16, MA-26, MA-15	MA-06, MA-16, MA-26, MA-15
Article number	4102802001	4102802002	4904700035
Dimensioned drawing			

Miniature
Snap-In Connectors

Miniature snap-in connectors		Ø 6.5 mm	Ø 6.5 mm
Contact assignments 1 = Brown 2 = Black 3 = Blue			
Cable material		PUR	PUR
Coupler material		PA 12	PA 12
Coupling ring material		POM	POM
Temperature range		–25 °C … +90 °C –13 °F … +194 °F	–25 °C … +90 °C –13 °F … +194 °F
Switching function		Universal	Universal
Cable structure		3 x 0.25 mm²	3 x 0.25 mm²
Protection class		IP67/NEMA 4	IP67/NEMA 4
Article number	2,5 m	4139100219	4139100221
Type		GDK-R06US/SO0-2,5PU	WDK-R06US/SO0-2,5PU
	5 m	4139100220	4139100222
Type		GDK-R06US/SO0-5PU	WDK-R06US/SO0-5PU
	10 m	4139100239	4139100267
Type		GDK-R06US/SO0-10PU	WDK-R06US/SO0-10PU

Connectors

Cable connector M8 x 1		M8	M8	M8
Contact assignments 1 = Brown 2 = Black 3 = Blue				
Cable material		PVC	PVC	PVC
Coupler material		TPU	PUR	PUR
Coupling ring material		CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
Temperature range		–25/+90 °C	–25/+90 °C	–25/+90 °C
Switching function		PNP/LED	Universal	Universal
Cable structure		3 x 0.25 mm²	3 x 0.25 mm²	3 x 0.25 mm²
Protection class		IP67	IP68	IP68
Article number	2 m	4139100213	4139100795	4139100798
Type		WDK-M08PS/LL2-2	GDK-M08US/WO0-2	WDK-M08US/WO0-2
	5 m	4139100216	4139100796	4139100799
Type		WDK-M08PS/LL2-5	GDK-M08US/WO0-5	WDK-M08US/WO0-5
	10 m		4139100797	4139100800
Type			GDK-M08US/WO0-10	WDK-M08US/WO0-10

Cable connector M12 x 1		M12 3-wire	M12 3-wire	M12 4-wire	M12 4-wire
Contact assignments 1 = Brown 2 = White 3 = Blue 4 = Black					
Cable material		PVC	PVC	PVC	PUR
Coupler material		PUR	PUR	PA	PUR
Coupling ring material		CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
Temperature range		–25/+90 °C	–25/+90 °C	–25/+90 °C	–25/+90 °C
Switching function		Universal	Universal	Universal	PNP/LED
Cable structure		3 x 0.34 mm²	3 x 0.34 mm²	4 x 0.25 mm²	4 x 0.25 mm²
Protection class		IP68	IP68	IP68	IP67
Article number	2 m	4139100801	4139100804		4139100244
Type		GDK-M12US/WO0-2	WDK-M12US/WO0-2		WDK-M12PA/SL2-2PU
	5 m	4139100802	4139100468	4139100903	4139100245
Type		GDK-M12US/WO0-5	WDK-M12US/WO0-5	WDK-M12UA/WO0-5	WDK-M12PA/SL2-5PU
	10 m	4139100803	4139100805	4139100467	4139100254
Type		GDK-M12US/WO0-10	WDK-M12US/WO0-10	WDK-M12UA/WO0-10	WDK-M12PA/SL2-10PU

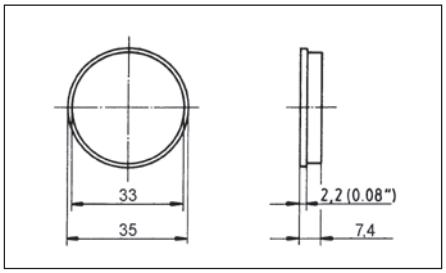
Cable connector M12 x 1		M12	M12	M12 3-wire	M12 5-wire
Contact assignments 1 = Brown 2 = White 3 = Blue 4 = Black					
Cable material		–	–	PVC	PUR
Coupler material		PA	PA	TPU	PUR
Coupling ring material		CuZn39Pb3	CuZn39Pb3	CuZn39Pb3	CuZn39Pb3
Temperature range		–25/+90 °C	–25/+90 °C	–25/+90 °C	–25/+90 °C
Switching function		Universal	Universal	PNP/LED	Universal
Cable structure		–	–	3 x 0.4 mm²	5 x 0.34 mm²
Protection class		IP67	IP67	IP68	IP68
Article number	2 m	4139100102	4139100101	4139100553	4139100956
Type		GDA-M12UA/LO	WDA-M12UA/LO	WDK-M12PS/LL2-2	GDK-M12UU/HO-2PU
	5 m			4139100554	
Type				WDK-M12PS/LL2-6	
	10 m				
Type					

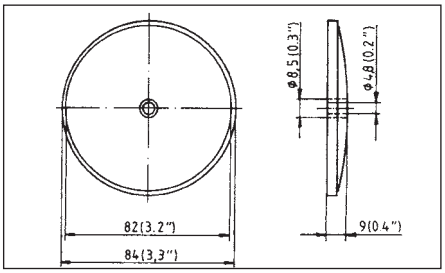
Reflectors

Triple reflectors are best suited for the purpose of reflecting light in light barrier systems. Reflective films are only used as a second choice alternative. Triple reflectors are designed as small, pyramid-shaped triple mirrors, joined to provide a reflection surface. Three pyramid-shaped mirror surfaces joined at 90° reflect the incident light three times on one mirror surface. They reflect the light beam by 180° back in the source direction. Vibration, slight movement and displacement up to 30° with respect to the optical axis of the triple reflector do not interrupt the light beam.

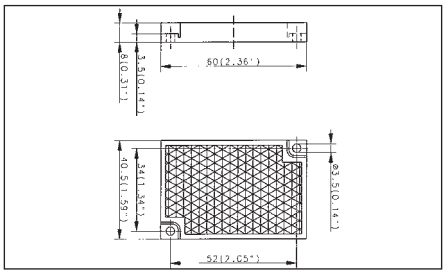
A reflective film can also be tilted or displaced. In this case, in contrast to the triple reflector, the degree of reflection diminishes considerably as such films use small mirrors together with micro glass pearls to reflect light. An advantage of reflective film, however, is its flexibility in installation. Although its reflection quality can be improved by means of a triple structure in the film, it still does not match the degree of reflection achieved by a triple reflector. In general, a plane mirror must not be displaced. The angle of incidence of the light beam directed at such mirrors must precisely correspond to the angle of reflection about the optical axis to ensure effective reflection in the light barrier receiver (optoelectric sensor).

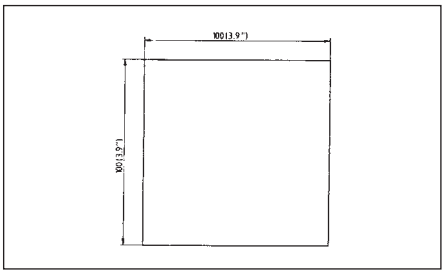
The specified ranges of the reflection light barriers refer to the RTS-083 KK and RTS-060 KK reflector. Essentially, the size of the reflector should be selected according to the sensing range and the size of the object to be detected. The object should ideally be larger than the reflector so that it completely covers the reflector.





Type designation	RTS-D33 KK	RTS-D83 KK
Article number	6572110010	6572107003
Diameter	33 mm	83 mm





Type designation	RTS-60 KK	RFS-100 KK
Article number	6572100007	6572300001
Structure	60 x 41 mm	100 x 100 mm Self-adhesive film

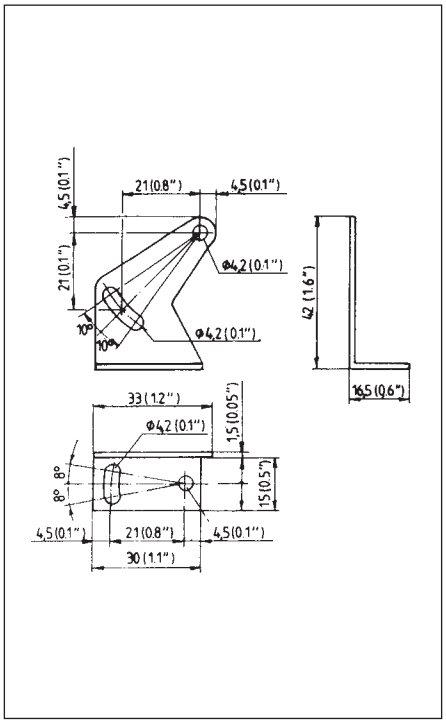
Example: OR20RS

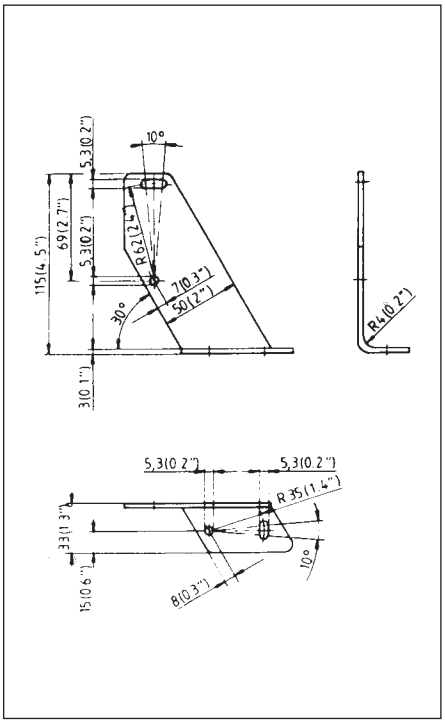
Reflector	Range
RTS-D33 KK	4.0 m
RTS-D83 KK	8.0 m
RTS-60 KK	8.0 m
RFS-100 KK	6.0 m

Ranges of other reflection light barriers available on request.

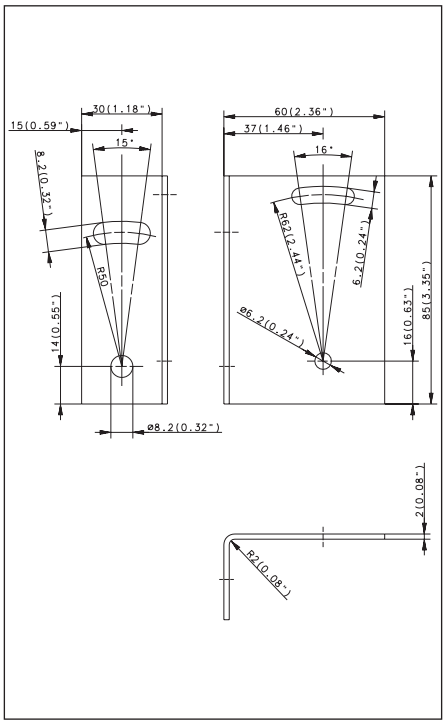
Mounting Material

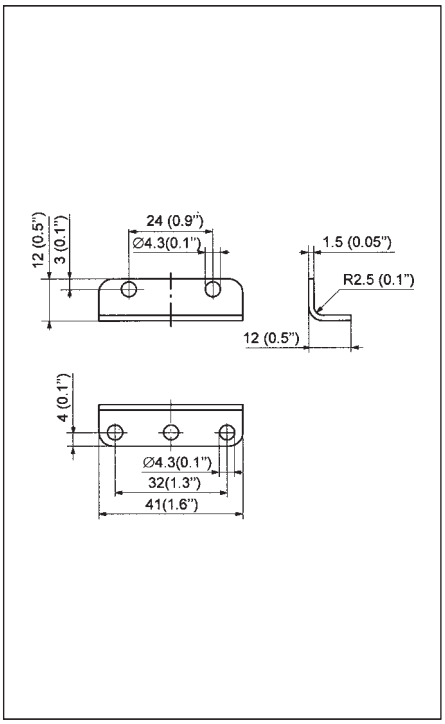
Other mounting brackets available on request.





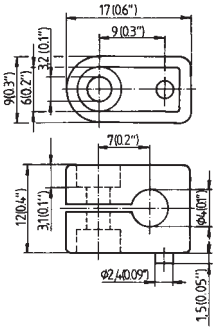
Type designation	BWN-L05ST KPL	BWN-L20NI KPL
Article number	6571300003	6571200002



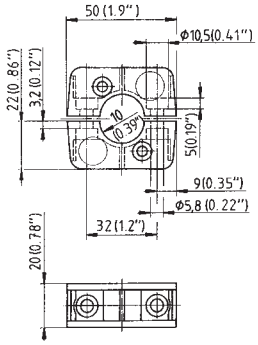


Type designation	BWN-L20NI KPL	BWN-L12AL KPL
Article number	6571200007	6571500006

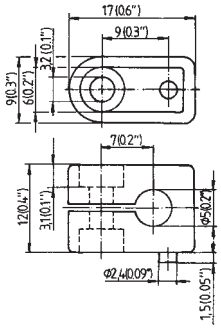
Mounting Brackets



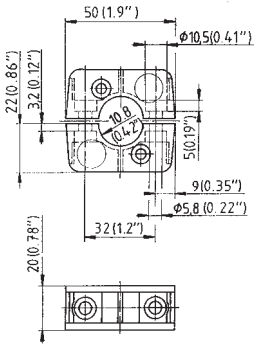
Type BKB-D04PA
Art. No. 5960223069



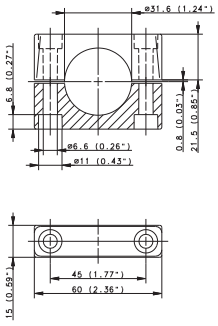
Type BKS-D20PA
Art. No. 5960223085



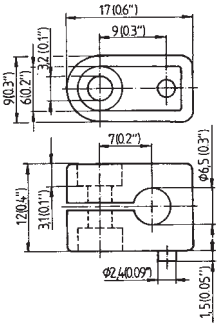
Type BKB-D05PA
Art. No. 5960223070



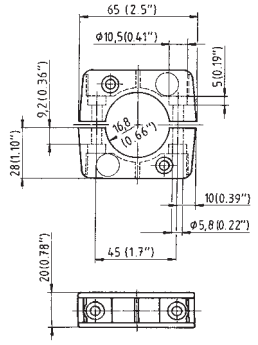
Type BKS-D22PA
Art. No. 5960223040



Type BKS D32 PA
Art. No. 5960223002
Including 2 screws M 6 x 45 mm, DIN 912



Type BKB-D06PA
Art. No. 5960223071



Type BKS-D34PA
Art. No. 5960223041

Sensor Tester

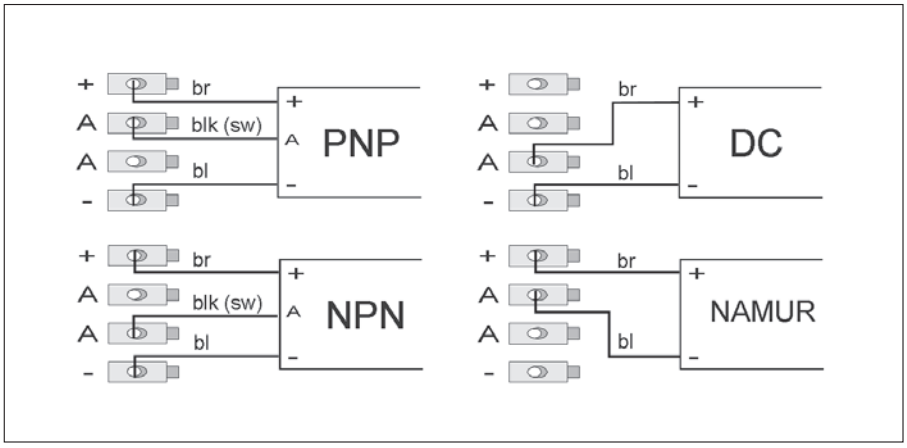
Technical data		
Type designation		Sensor Tester
Article number		6510000048
Function		Sensor tester for DC 2-wire and 3-wire
		proximity switches
		Test function: Checking and indicating the
		switching status of a sensor with
		visual and acoustic signal
Power supply		9 V block battery (6LR61)
Output voltage		15 VDC, 20 mA stabilised
Enclosure		Modified enclosure of Series OR20
Temperature range	min/max	–25 °C/+70 °C
Input signals		NPN/PNP 3-wire, DC 2-wire, NAMUR

The sensor tester is used for checking 2-wire and 3-wire DC proximity switches. Coloured LEDs and an acoustic signal are used to indicate the switching statuses.

Green LED:	Operating voltage
Red LED:	Low battery
Yellow LED:	Sensor switching status

When not in use, the sensor tester switches off automatically after approx. 30 s.

Connection assignments



Inductive Sensors

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	+
K	I	N	-	T	1	2	N	S	/	0	0	4	-	K	L	2			
Product group				Type of enclosure			Output			Sensing distance				Options					

Product group		
1	K	Non-contact proximity switch
2	I	Inductive
3	B	Flush mount
	N	Non-flush mount
	R	Ring sensor
4	-	Dash (fixed)
Type of enclosure		
5	M	Metric thread (metal enclosure)
	T	Metric thread (plastic enclosure)
	D	Round enclosure (metal)
	R	Round enclosure (plastic)
	Q	Cuboid enclosure (metal)
	P	PG thread (metal)
	E	Rectangular enclosure (plastic)
	S	Slot proximity switch (plastic)
	N	Standard mounting (to DIN 50025/50037)
	C	Compact enclosure
6 – 7		Two-digit number for:
		Round types = Ø as specified
		Threaded types = standard designation
		Rectangular types = consecutive type numbers

Design examples		
	D08	Ø 8 mm (metal)
	R22	Ø 22 mm (plastic)
	M12	Threaded barrel M12 x 1
Rectangular and other types		
	E16	16 x 5 x 5 mm
	E27	27 x 10 x 5.5 mm
	E28	28 x 16 x 11 mm
	E40	40 x 26 x 12 mm
	E50	50 x 25 x 10 mm
	E68	68 x 30 x 15 mm
	G00	Tube thread, general
	N44	41.5 x 41.5 x 120 mm
	Q05	5 x 5 x 25 mm
	Q08	8 x 8 x 40 mm, Side active
	Q12	12 x 12 x 55 mm

Output		
8	P	PNP
	N	NPN
	A	AC 2-wire
	E	NAMUR
	Z	DC 2-wire
	R	Relay
	G	Push-pull
	D	Dual output stage (NPN/PNP selectable)
9	S	NO contact
	Ö	NC contact
	P	Programmable
	A	Analogue
	U	Antivalent (selectable)
10	/	Slash (fixed)
Sensing distance		
11 – 13	f. ex. 1.5	1.5 mm
	f. ex. 002	2.0 mm
	f. ex. 040	40 mm
14	-	Dash (fixed)
Options		
15 – 17		See type code "OPTIONS", p. 173

Capacitive Sensors

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	+
K	C	N	-	T	1	2	N	S	/	0	0	4	-	K	L	P	2		
Product group				Type of enclosure			Output			Sensing distance				Options					

Product group		
1	K	Non-contact proximity switch
2	C	Capacitive
3	B	Flush mount
	N	Non-flush mount
4	-	Dash (fixed)
Type of enclosure		
5	M	Metric thread (metal enclosure)
	T	Metric thread (plastic enclosure)
	D	Round enclosure (metal)
	R	Round enclosure (plastic)
	Q	Cuboid enclosure (metal)
	P	PG thread (metal)
	E	Rectangular enclosure (plastic)
	N	Standard mounting (to DIN 50025/50037)
6 – 7		Two-digit number for:
		Round types = Ø as specified
		Threaded types = standard designation
		Rectangular types = consecutive type numbers

Design examples		
	12	Thread M12 x 1
	18	Thread M18 x 1
	30	Thread M30 x 1,5
	32	Thread M32 x 1,5
	34	Ø 34 mm (metal/plastic)
	20	Ø 20 mm (plastic)
	22	Ø 22 mm (plastic)
	50	50 x 25 x 10 mm
	68	68 x 30 x 15 mm
	44	41.5 x 41.5 x 120 mm (Euro standard enclosure)
Output		
8	p	PNP
	N	NPN
	A	AC 2-wire
	E	NAMUR
	Z	DC 2-wire
	R	Relay
	G	Push-pull
	D	Dual output stage (NPN/PNP selectable)

Output		
9	S	NO contact
	Ö	NC contact
	P	Programmable
	A	Analogue
	U	Antivalent (selectable)
10	/	Slash (fixed)
Sensing distance		
11 – 13	e.g. 1.5	1.5 mm
	e.g. 002	2.0 mm
	e.g. 040	40 mm
14	-	Dash (fixed)
Options		
15 – 19		See type code "OPTIONS", p. 173

Optoelectronic Sensors

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
O	M	1	2	R	T	-	D	H	T	P	-	0	2	0	0	-	C	L	
Product group		Enclosure size		Operating principle			Type of voltage	Output				Sensing range					Type of connec-tion	Op-tions	

Product group		
1	O	Optoelectronic sensor
2	M	Metric brass enclosure
	N	Metric stainless steel enclosure
	T	Metric thermoplastic enclosure
	R	Rectangular type
	Z	Cylindrical type
Enclosure size details		
3 – 4	e.g. 12	M12
	e.g. 18	M18
	e.g. 20	Type 20
Operating principle		
5 – 6	ES	Through-beam sensor assy (set)
	EE	Receiver, through-beam sensor
	SE	Transmitter, through-beam sensor
	LC	Fibre optic switching amplifier (light barrier with fibre optic cable connection)
	RH	Diffuse-reflection sensor with background suppression
	RS	Retro-reflective sensor
	RT	Diffuse –reflection sensor
	FF	Convergent beam sensor, fixed focus
	PS	Retro-reflective sensor, polarised
7	-	Dash (fixed)
Type of voltage		
8	A	AC
	D	DC
	M	Multi-voltage
	P	Programmable (AC or DC)

Output function		
9	A	Antivalent (light and dark activated)
	D	Dark activated
	H	Light activated
	O	No output (transmitter for through-beam sensors)
	P	Programmable (light and dark activated)
	X	Customer-specific output
Type of output		
10	A	Analogue output
	N	NAMUR
	O	No output
	Q	Triac
	R	Relay
	S	Other
	T	Transistor
	Y	Thyristor
11	N	NPN transistor output
	P	PNP transistor output
	G	Push-pull output stage
	S	Transmitter, through-beam sensor
	U	PNP/NPN selectable
	X	Customer-specific output
	2	2-wire output
	3	3-wire output
	4	4-wire output
12	-	Dash (fixed)

Sensing range		
13 – 16	The range and sensing distance are always a 4-digit specification – Millimetre values with no decimal point – Metre values with decimal point	
	e.g. 06.0	6 m
	e.g. 15.0	15 m
	e.g. 0500	500 mm
17	-	Dash (fixed)
Type of connection		
18	A	Connection space
	B	Self-configured cable connector
	C	Cable type (standard C = 2 m or length in m)
	S	Plug connector
Options		
19	C	Control input
	D	LED for switching status and operating reserve
	E	Adjustable sensitivity
	I	Electrically programmable
	F	Operating reserve output and LED
	G	LED for switching status, operating voltage indicator and light path monitoring
	H	LED for indicating operating voltage and switching status
	L	LED for switching status
	T	Adjustable time stage
	V	LED for indicating operating voltage
	W	Radial optical system
	X	Customer-specific option
	Z	Inbuilt time stage

Magnetic Switches

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
M	A	K	-	0	1	1	2	-	D	-	1	-	S	O	K			
Product group				Type		Contact specifications					Cable length		Special features					

Product group		
1	M	Magnetic switch
2	Type of output	
	A	Reed contact
	R	Relay
3	Enclosure material	
	A	Aluminium
	N	Stainless steel
	M	Brass, nickel-plated
	K	Plastic, general
	O	Other materials
4	-	Dash (fixed)
Type		
5 – 6	01 – 99	Cylindrical and rectangular types (see next page for details)
Contact specifications		
7	Number of contacts	
	e.g. 1	1 Reed contact
	e.g. 2	2 Reed contacts
	...	etc.

8	Contact function	
	1	NC contact
	2	NO contact
	3	Changeover contact
	4	Bistable (ON/OFF)
	5	Bistable (changeover contact)
	6	NC, NO contact; separate contacts
	7	Coded, BG
	8	Currently not used
	9	Currently not used
	0	Other outputs
9	-	Dash (fixed)
10	Contact type/power of reed contacts	
	A	250 VDC ; 0.5 A; 20 VA
	B	250 VDC ; 0.5 A; 10 VA
	C	250 VDC ; 0.5 A; 30 VA
	D	250 VDC ; 0.5 A; 30 VA
	E	250 VDC ; 1.5 A; 30 VA
	F	250 VDC ; 3.0 A; 100 VA
	G	250 VDC ; 5.0 A; 250 VA
	H	250 VDC ; 1.0 A; 60 VA
	K	250 VDC ; 0.5 A; 30 VA
	L	250 VDC ; 1.0 A; 60 VA
	M	250 VDC ; 1.0 A; 80 VA
	N	250 VDC ; 1.0 A; 60 VA
	O	120 VDC ; 0.5 A; 10 VA
	P	250 VDC ; 5.0 A; 250 VA
	R	28 VDC ; 0.25 A; 3 VA
	W	250 VDC ; 1.0 A; 60 VA
	X	100 VDC ; 0.25 A; 5 VA
	Y	100 VDC ; 0.5 A; 10 VA

	TRIAC	
	K	24 – 250 VDC ; 1.5 A a. 300 VA b. 330 VA
	Hall	
11	-	Dash (fixed)
Cable length in metres		
12	e.g. 1	1 m cable
	e.g. 2	2 m cable
	...	etc.
13	-	Dash (fixed)
Special features		
14 – 17	T	Temperature resistant from –40 °C to +150 °C
	SI	With miniature fuse
	VDR	With VDR
	WID	With resistor
	LED	With LED
	SPK	Spiral cable
	SK	Special cable
	SOK	Connector type without head (without device socket)
	SMK	Connector type with head (with device socket)
	PG11	Type of thread
	RZ	Time delay with relay
	220 V	220 Volt version
	24 V	24 Volt version
	STK	Connector

Magnetic Switches

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
M	A	K	-	0	1	1	2	-	D	-	1	-	S	O	K			
Product group				Type		Contact specifications					Cable length		Special features					

Type		
5 – 6	01 – 99	Cylindrical and rectangular types
	01	45 x 13 x 9 mm [MA-01] PA
	02	80 x 20 x 15 mm [MA-02] PA/AL
	03	110 x 58 x 29 mm [MA-03] AL
	04	Ø 15.5 x 87 mm [MA-04] PC
	05	Currently not used
	06	Ø 12 x 81 mm [MA-06] AL
	07 – 10	Currently not used
	11	28.6 x 18 x 6.4 mm [MA-11] PA
	12	80 x 20 x 15 mm [MA-12] PA
	13	68 x 30 x 15 mm [MA-13] PC
	14	Currently not used
	15	Ø 12 x 81 mm [MA-15] PA
	16	Ø 12 x 81 mm [MA-13] VA
	17	PG9 x 60 mm [MA-17] PA
	18	M12 x 1 x 60 mm [MA-18] Ms
	19	M18 x 1 x 80 mm [MA-19] Ms
	20	Currently not used
	21	PG9 x 80 mm [MA-21] PA
	22	Currently not used
	23	M12 x 1 x 80 mm [MA-23] Ms
	24/25	Currently not used
	26	Ø 12 x 81 mm [MA-26] PA
	27	Currently not used
	28	M12 x 1 x 60 mm [MA-28] PA
	29	M18 x 1 x 80 mm [MA-29] PA
	30	Ø 6 x 30 mm [MA-30] PA
	31	Currently not used
	32	85 x 26 x 26 mm [MA-32] PBT
	33	M12 x 1 x 80 mm [MA-33] PA
	34/35	Currently not used
	36	Ø 13 x 96 mm [MA-36] PA
	37–39	Currently not used
	40	M10 x 1 x 40 mm [MA-40] PPE
	41	50 x 31 x 11 mm [MA-41] PA
	42	88 x 25 x 13 mm [MA-42] PA
	43	PG9 x 80 mm [MA-43] Ms
	44	80 x 30 x 15 mm [MA-44] PA
	45	45 x 25.5 x 9 mm [MA-45] PA
	46	Ø 6.5 x 39.34 mm [MA-46] PA
	47	Currently not used
	48	80 x 30 x 15 mm [MA-48] PA
	49–51	Currently not used
	52	43 x 26 x 13 mm [MA-52] PBT
	53	M30 x 1.5 mm [MA-53] PA
	54	Currently not used
	55	12 x 12 x 55 mm [MA-55] S
	56–59	Currently not used
	60	M8 x 1 mm [MA-60] S
	61	M10 x 1 mm [MA-61] S
	62	M12 x 1 mm [MA-62] S
	63	M18 x 1 mm [MA-63] S
	64	M30 x 1.5 mm [MA-64] S
	65–69	Currently not used
	70	Ø 6.5 mm [MA-70] S
	71/72	Currently not used
	73	68 x 30 x 15 mm [MA-73] S
	74–79	Currently not used
	80	8 x 8 x 40 mm [MA-80] S
	81–98	Currently not used
	99	other [MA-99] S

Magnetic Switch Monitoring Devices

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
M	Ü	Z	-	1	0	2	/	U	2	4	-	F	L	-	2	S	-	E	2	0	-	H	G
Product group				Numb. of magnetic switches	Number of relays			Voltage				Special features											

Product group		
1	M	Magnetic limit switch, general
2	Ü	Monitoring
	C	Controller
3	Z	Control station
	S	Interface
	N	Power supply unit
4	-	Dash (fixed)
Number of connectable magnetic switches		
5	1	1 unit
	2	2 units
	...	etc.
Number of relays		
6 – 7	01	1 unit
	02	2 units
	03	Constant current source
	04	4 units
	...	etc.
8	/	Slash (fixed)

Voltage		
9	A	AC
	D	DC
	U	UC
	1	Mains voltage
	2	Mains voltage
10 – 11	24	24 Volt
	The following applies when there is a "1" in the 9th position:	
	10	110 Volt
	20	120 Volt
	30	130 Volt
	The following applies when there is a "2" in the 9th position:	
	10	210 Volt
	20	220 Volt
	30	230 Volt

Special features		
13 – 24	FL	Flat design
	2S	NO contact signal (to outside)
	E20	20 transducer units, externally
	HG	Hall sensor
	VC	Voltage control
	PRT	Print version
	DA	Data output
	Special features are separated by a dash with no specific position assignment.	

Magnetic Sensors / Teachable Slot Sensors / Electronic

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
M	E	K	-	M	1	2	P	S	/	H	1	0	-	K	L	2			
Product group				Type of enclosure			Output			Sensitivity				Options					

Product group		
1	M	Magnetic sensor
2	E	Electronic
3	K	Plastic
	M	Brass
	N	Stainless steel
4	-	Dash (fixed)
Type of enclosure		
5	M	Metric thread
	D	Round enclosure
	E	Rectangular enclosure
	Q	Cuboid enclosure
6 – 7		Two-digit number for:
		Metric enclosure = standard designation
		Round enclosure = Ø as specified
		Rectangular enclosure = enclosure width
		Cuboid enclosure = edge length

Output		
8	P	PNP
	N	NPN
9	S	NO contact
	Ö	NC contact
	B	Bistable
	A	Analogue
	D	Speed
10	/	Slash (fixed)
Sensitivity		
11	H	Hall
	M	Magnetoresistive
12 – 13		Sensitivity in mT
	z. B. 10	10 mT
	z. B. 01	1 mT
14	-	Dash (fixed)
Options		
15		See type code "OPTIONS", see page 173

Ultrasonic Sensors

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
U	T	1	8	I	-	D	P	E	0	-	0	6	.	0	-	C	3	I	
Product group		Enclosure size		Instal-lation/ use		Type of voltage	Output				Range					Type of connec-tion	Teach-in	Inter-face	Options

Product group		
1		Ultrasonic sensor
2	T	Thermoplastic enclosure
	N	Stainless steel enclosure
Enclosure size details		
3 – 4	e.g. 12	M12 (stainless steel)
	e.g. 15	M30 (stainless steel)
	e.g. 18	M18 (stainless steel)
	e.g. 30	M30 (plastic)
	e.g. 25	30 x 25 x 11 (plastic)
	e.g. 80	80 x 80 x 43 (plastic)
	e.g. 36	101 x 36 x 22 (plastic)
Installation/use		
5	I	Internal transductor
	S	True scan transmitter and receiver
6	-	Dash (fixed)
Type of voltage		
7	A	AC
	D	DC 12–30 V

Digital output		
8	0	None
	P	PNP
	N	NPN
9	0	None
	E	Electrically programmable NC/NO
	...	etc.
Analogue output		
10	0	None
	I	Current – analogue
	U	Voltage – analogue
11	-	Dash (fixed)
Range		
12 – 15	The range and sensing distance are always a 4-digit specification – Millimetre values with no decimal point – Metre values with decimal point	
	e.g. 06.0	6 m
	e.g. 15.0	15 m
	e.g. 0500	500 mm
16	-	Dash (fixed)

Type of connection		
17	C	Cable type (standard C = 2 m or length in m)
	S	Connector (M12, 5-pin)
	V	Connector (M8, 4-pin)
	B	Connector (M16, 8-pin)
Teach-in method		
18	0	None
	1	Button
	2	Serial interface
	3	Contact
	...	etc.
Serial interface		
19	0	None
	1	RS232
	2	RS485
	3	I/O link
	4	CANopen
	...	etc.
Options		
20 on-wards	e.g.	Preset switching points
	...	etc.

Float Switches, Standard Range

1	2	3	4	5	6	7	8	9	10	11	12	13					
M	A	A	-	7	1	3		K	S	S		1	0	0	0		
Product group		Immersion tube/float combination		General design	Number of switching points	Contact function		Switching power	Connection head	Range		Switch length in mm					

Product group		
1	M	Magnetic switch
2	Type of output	
	A	Reed contact
	I	Triac
Immersion tube/float combination		
3	Immersion tube material 1.4571	
	A	Cylindrical float rd. 40 x 27 POM
	V	Cylindrical float rd. 42 x 44 PVC
	T	Cylindrical float rd. 30 x 44 PP
	R	Cylindrical float rd. 30 x 44 NBR
	N	Cylindrical float rd. 45 x 47 1.4571
	E	Ball float rd. 52 1.4571
	B	Ball float rd. 62 1.4571
	G	Ball float rd. 84 1.4571
	Immersion tube material brass MS63	
	M	Cylindrical float rd. 40 x 27 POM
	L	Cylindrical float rd. 42 x 44 PVC
	C	Cylindrical float rd. 30 x 44 PP
	S	Cylindrical float rd. 30 x 44 NBR
	P	Cylindrical float rd. 45 x 47 1.4571
	F	Ball float rd. 52 1.4571
	O	Ball float rd. 62 1.4571
	H	Ball float rd. 84 1.4571
	Immersion tube material PVC	
	K	Cylindrical float rd. 40 x 27 POM
	D	Cylindrical float rd. 42 x 44 PVC
	I	Cylindrical float rd. 30 x 44 PP
	U	Cylindrical float rd. 30 x 44 NBR
4	-	Dash (fixed)

General design		
5	7	Float switch
Number of switching points		
6	1	1 switching point
	2	2 switching points
	...	etc.
Contact function		
7	1	NC contact
	2	NO contact
	3	Changeover contact
	4	Mixed configuration (NC, NO, CO)
8		Space (fixed)
Switching power		
9	B	250 V; 0.5 A; 10 VA
	F	250 V; 3.0 A; 100 VA
	K	250 V; 0.5 A; 30 VA
	L	250 V; 1.0 A; 60 VA
	P	250 V; 5.0 A; 250 VA
	X	100 V; 0.25 A; 5 VA
Connection head		
10	Straight immersion tube	
	A	Half cable gland G3/8"
	V	Cable gland PG9
	D	Degussa plastic enclosure
	F	Aluminium enclosure DIN 43729
	K	PVC screw connection R2" connector DIN 43650
	N	PVC screw connection R1.5" connector Amphenol
	O	PVC screw connection R2" connector Amphenol
	R	PVC screw connection R1,5" connector DIN 43650

	S	Flange enclosure rd. 78
	T	PC flange rd. 75 connector DIN 43650
	TO	PC oval flange connector DIN 43650
	FL120	Flange enclosure rd. 120
	DN50	Flange DN50 with enclosure 80 x 80
	DN65	Flange DN65 with enclosure 80 x 80
	R1,5	Tank cable gland R1.5" with enclosure 80 x 80
	R2	Tank cable gland R2" with enclosure 80 x 80
	Elbow immersion tube	
	C	Half cable gland G3/8"
	H	Cable gland PG9
	E	Degussa plastic enclosure
	G	Aluminium enclosure DIN 43729
	L	PVC screw connection R2" connector DIN 43650
	M	PVC screw connection R1.5" connector Amphenol
	P	PVC screw connection R2" connector Amphenol
	I	PVC screw connection R1.5" connector DIN 43650
	B	Flange enclosure rd. 78
	W	PC flange rd. 75 connector DIN 43650
	TW	PC oval flange connector DIN 43650
	WFL120	Flange enclosure rd. 120
	WDN50	Flange DN50 with enclosure 80 x 80
	WDN65	Flange DN65 with enclosure 80 x 80
Range		
11	S	Standard range
12		Space (fixed)
Switch length in mm		
13		Switch length – X

Adjustable Float Switches

1	2	3	4	5	6	7	8	9	10	11	12	13						
M	A	N	-	V	S	T	-	R	2,	0	/	0	2	5	0			
Product group		Immersion tube/float combination		Type				Connection head				Switch length in mm						

Product group		
1 – 2	MA	Magnetic switch, reed contact
Immersion tube/float combination		
3	Immersion tube material 1.4571	
	N	Cylindrical float rd. 52 x 55 1.4571
	V	Cylindrical float rd. 52 x 55 PVC
	Immersion tube material brass MS63	
	P	Cylindrical float rd. 52 x 55 1.4571
	L	Cylindrical float rd. 52 x 55 PVC
	Immersion tube material brass MS63	
	D	Cylindrical float rd. 52 x 55 PVC
4	-	Dash (fixed)

Type		
5 – 7	VST	Adjustable
8	-	Dash (fixed)
Connection head		
9 – 11	R2,0	Tank cable gland R2" with enclosure 80 x 80
	R1,5	Tank cable gland R1.5" with enclosure 80 x 80
	FL165	Flange DN50 with enclosure 80 x 80
	FL185	Flange DN65 with enclosure 80 x 80
	FL120	Flange enclosure rd. 120
	FLS120	Flange enclosure rd. 120 with protective tube
12	/	Slash (fixed)
Switch length in mm		
13		Switch length – X

Miniature Float Switches

1	2	3	4	5	6	7	8	9	10				
MS	K1	-	PVC	-	R1/8	-	OSO		0	3	5	0	
Range	Float		Immersion tube material		Connection head		Position and number of switching points, with switching function		Switch length in mm				

Range		
1	MS	Miniature float switches
Float		
2	K1	rd. 25 x 20, PP
	K2	rd. 25 x 20, PVC
	K3	rd. 20 x 20, NBR
	K4	rd. 23 x 25, NBR
	K5	rd. 23 x 32, NBR
	K6	rd. 17,5 x 25, NBR
	K7	rd. 25 x 20, PVDF
	K8	rd. 25 x 20, PTFE
	N1	rd. 30, 1.4571
	KS	Pivoted float
3	-	Dash (fixed)
Immersion tube material		
4	NI	Stainless steel 1.4571
	MS	Brass MS63
	PVC	Polyvinyl chloride
	PP	Polypropylene
	POM	Polyacetal

Immersion tube material		
	PVDF	Polyvinyl idenfluoride
	PTFE	Polytetrafluoroethylene
	PA	Polyamide
5	-	Dash (fixed)
Connection head		
6	R1/8	Screw connection R1/8"
	R1/4	Screw connection R1/4"
	R3/8	Screw connection R3/8"
	R1	Screw connection R1"
	R1,5	Screw connection R1,5"
	PG7	Screw connection PG7
	PG9	Screw connection PG9
	M12X1	Screw connection M12x1
	M24X1	Screw connection M24x1
	F40	Flange, rd. 40
	FL75	Flange, rd. 75
	FL36	Flange, 36 x 36 with cable
	FL36ST	Flange, 36 x 36 with connector
	TO	Oval flange
	OV	No connection head

7	-	Dash (fixed)
Position and number of switching points, with switching function		
8	Switching function	
	O	NC contact
	S	NO contact
	U	Changeover contact
	Position and number	
	3 switching points	e.g. NC/NO/NC = top/middle/bottom
	2 switching points	e.g. CO/NO = top/bottom
	1 switching point	e.g. NC = bottom
9		Space
Switch length in mm		
10		Switch length – X

Options

1	2	3	4	5	6	7	8	9	10	11	12	13	14				
K	L	2	E	V	P	S	N	T	F	Z	I	D	G				

1	K	Short circuit-proof
2	L	LED
3	2	Cable length in m
4	E	Extended sensing distance (sn large)
5	V	Shortened type
6	P	Potentiometer
7	S	Device connector (terminals)
	PU	PUR cable
	SD	Connector to DIN 43650 (including socket)
	SM	Mini snap-in device connector
	S8	M8 device connector with union nut
	S12	M12 device connector with union nut
	SM8	Mini snap-in / M8 screw-on device connector
	S12A	M12 device connector with union nut, AC version
	S16S	M16 device connector with union nut and dust cap
	S12U	M12 Ultra-Lock device connector
	S5	M5 x 0,5 device connector Screw-connection with cable

8	N	Stainless steel enclosure
9	T	Extended temperature range
10	F	Extended switching frequency
11	Z	Time-delayed
12	I	Programmable (intelligent)
13	D	ATEX products, dust Ex
14	G	ATEX products, gas Ex

Cable Connectors

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
W	D	K	-	M	1	2	P	S	/	L	L	2	-	2	P	U			
Device specifications				Type of connection			Classification				LEDs			Cable length	Options				

Device specifications		
1		Cable output
	W	Elbow
	G	Straight
2		Product group
	D	Socket
	S	Connector (the sensor connections should always be used as the basis for connecting lines with different outputs)
	A	Adapter (socket and connector)
3		Preassembly
	K	Fixed cable
	A	Connection space, self-configurable
	V	Connecting line (extension)
4	-	Dash (fixed)
Type of connection		
5 – 7		Always related to the socket / connector
	M12	Union nut M12 x 1
	M08	Union nut M8 x 1
	R06	Round snap-in connection Ø 6.5 mm
	R12	Round snap-in connection, Ultra-Lock M12
	M05	M5 x 0.5 screw-on connection

Classification		
8		Configuration for switch output
	P	PNP (LED to negative)
	N	N = NPN (LED to positive)
	U	Universal (no LED)
	A	AC (M12 special coding Pin 1 + 2)
9		Pin assignments of cable sockets for switch output
	S	NO contact 1 - 3 - 4 for M12 1 - 3 - 2 for Mini 1 - 2 for M12 AC
	Ö	NC contact 1 - 3 - 2 for M12
	A	Antivalent 1 - 3 - 4 - 2 for M12
	N	NAMUR 1 - 3 for M12
	U	More than 4 connections
	T	Teach-in function
10	/	Slash (fixed)
Manufacturer		
11		Internal information

LEDs		
12	L	Integrated LED
	O	Without LED
13		Number of LEDs
	0	No LED
	1	1 LED
	2	2 LEDs etc.
14	-	Dash (fixed)
Cable length		
15		In m (moulded cable)
Options		
16 – 17	PU	Polyurethane cable
	HF	Highly flexible cable
	SD	Connector/socket
	BD	Socket both ends
	R	Vibration safeguard
	Without	PVC cable

Mounting Material

1	2	3	4	5	6	7	8	9											
B	K	S	-	D	2	0	P	A											
Product group				Type group			Material												

Product group		
1	B	Mounting material
2		Type of product
	K	Retaining bracket
	W	Mounting bracket
	H	Retaining plate
3		Specification
	S	Bracket, 2-piece
	B	Block, 1-piece
	R	Reducer
	N	90° elbow
4	-	Dash (fixed)

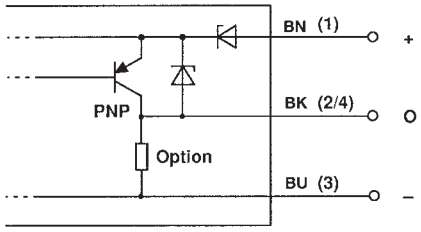
Type group		
5 – 7		For clips:
		Diameter in mm corresponding to matching sensor
		For elbows: Type group
	e.g. L05	Light barrier OR05
	e.g. M06	Magnetic switch M06
Material		
8 – 9		Material
	ST	Steel
	NI	Stainless steel
	AL	Aluminium
	PA	Polyamide
	PP	Polypropylene

Types of Output DC 1

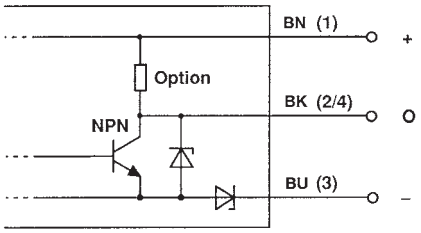
Cable colour abbreviations

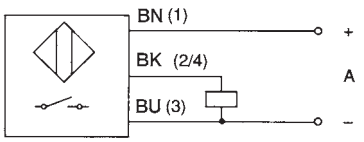
BN = Brown
BU = Blue
BK = Black (switch output)

PNP output
(circuit schematic)

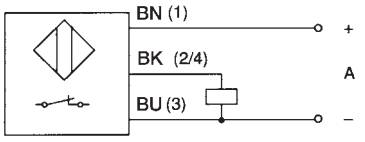


NPN output
(circuit schematic)

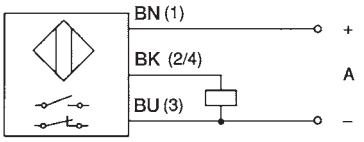




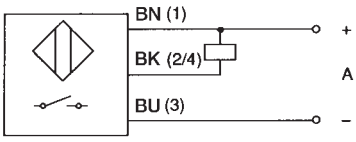
1) PNP normally-open contact
When actuated, a PNP transistor applies the output to positive.



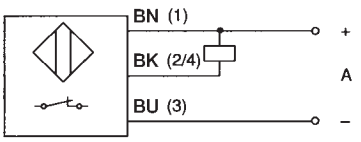
2) PNP normally-closed contact
When actuated, a PNP transistor disconnects the output from positive.



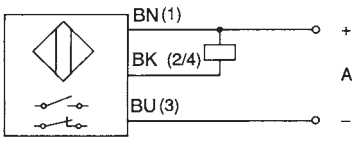
3) PNP programmable
The PNP NO contact 1) or PNP NC contact 2) function can be selected by means of a built-in changeover switch.



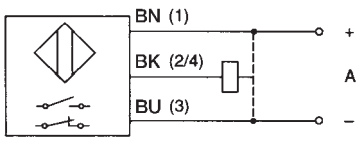
4) NPN normally-open contact
When actuated, a NPN transistor applies the output to negative.



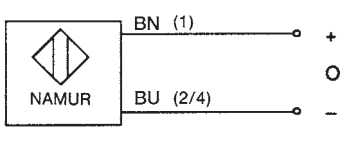
5) NPN normally-closed contact
When actuated, an NPN transistor disconnects the output from negative.



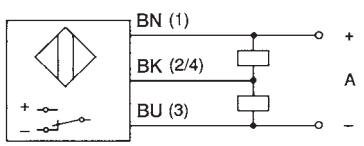
6) NPN programmable
The NPN NO contact 4) or NPN NC contact 5) function can be selected by means of a built-in changeover switch.



7) PNP/NPN programmable
Two built-in changeover switches are used to select between PNP or NPN switching and between NC or NO function.



8) NAMUR
Current change to DIN EN 60947-5-6



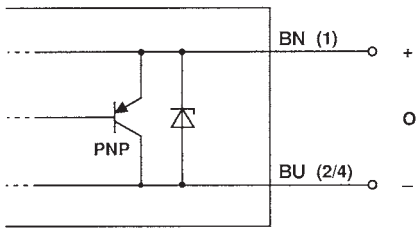
9) Push-pull programmable
When actuated, the output changes from negative to positive or, selectable with a built-in changeover switch, from positive to negative.

Types of Output DC 2

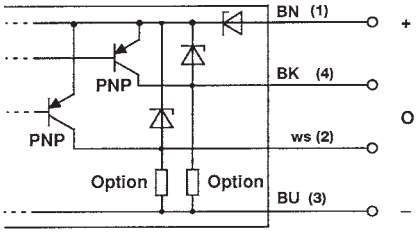
Cable colour abbreviations

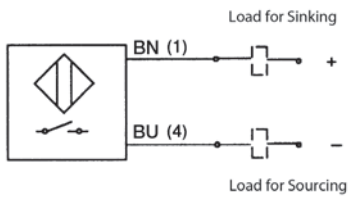
BN = Brown
BU = Blue
BK = Black (switch output)
WH = White (switch output)

DC 2-wire
(circuit schematic)

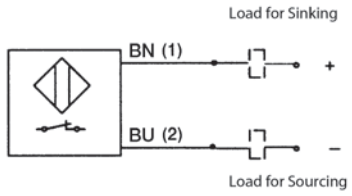


DC 4-wire
(circuit schematic)

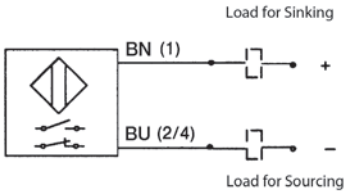




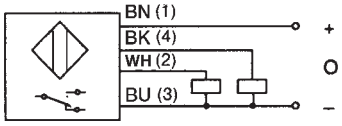
1) NO contact DC 2-wire
When actuated, the contacts are bridged.



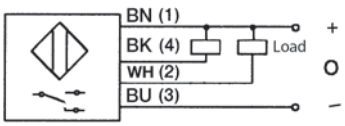
2) NC contact DC 2-wire
When actuated, the contacts are disconnected.



3) NC/NO contact programmable
DC 2-wire
The NO contact 1) or NC contact 2) function can be selected by means of a built-in changeover switch.



4) Changeover output DC (antivalent)
PNP 4-wire
When actuated, the positive operating voltage is alternatively applied to one of the two outputs.



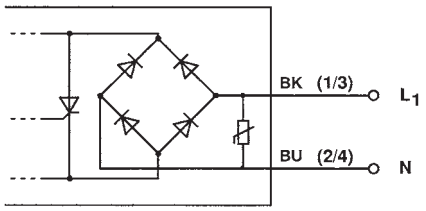
5) Changeover output DC (antivalent)
NPN 4-wire
When actuated, the negative operating voltage is alternatively applied to one of the two outputs.

Types of Output AC 1

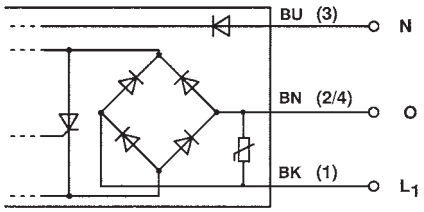
Cable colour abbreviations

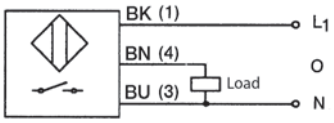
BN = Brown
BU = Blue
BK = Black

AC 2-wire
(circuit schematic)

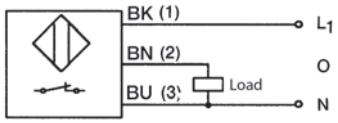


AC 3-wire
(circuit schematic)

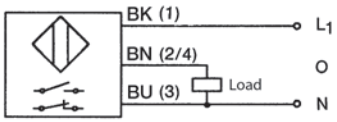




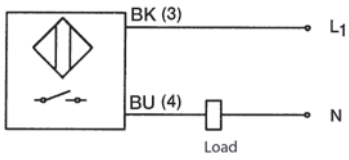
1) NO contact AC 3-wire
When actuated, a thyristor connected across a rectifier bridge applies the operating voltage to the output.



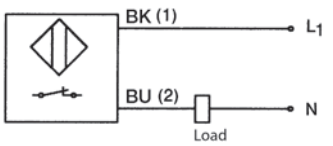
2) NC contact AC 3-wire
When actuated, a thyristor connected across a rectifier bridge disconnects the operating oltage from the output.



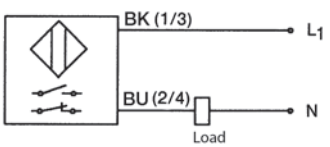
3) NC/NO contact programmable
AC 3-wire
The AC NO contact 1) or AC NC contact 2) function can be selected by means of a built-in changeover switch.



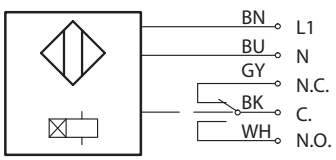
4) NO contact AC 2-wire
When actuated, a thyristor connected across a rectifier bridge applies the load to the operating voltage.



5) NC contact AC 2-wire
When actuated, a thyristor connected across a rectifier bridge disconnects the load from the operating voltage.

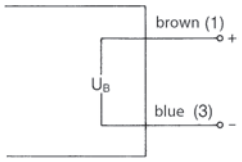


6) NC/NO contact programmable
AC 2-wire
The AC NO contact 4) or AC NC contact 5) function can be selected by means of a built-in changeover switch.

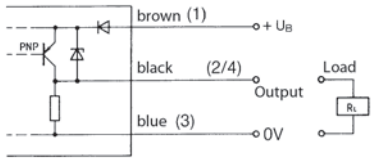


7) AC relay output
With adjustable pickup delay

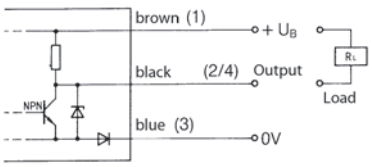
Optoelectronic Sensors 1



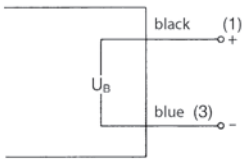
Transmitter



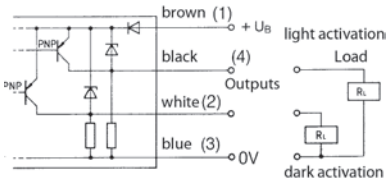
PNP
Light activated or dark activated



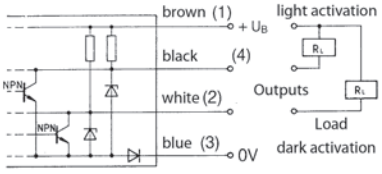
NPN
Light activated or dark activated



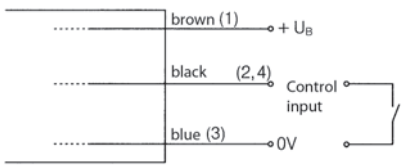
Transmitter



PNP antivalent
Light activated and dark activated

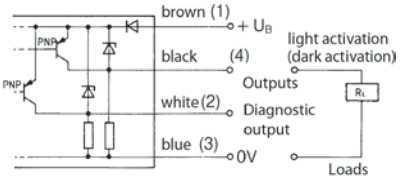


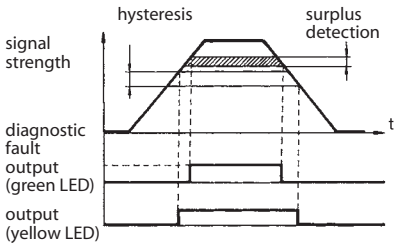
NPN antivalent
Light activated and dark activated



Transmitter

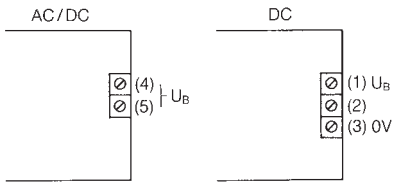
Operating reserve



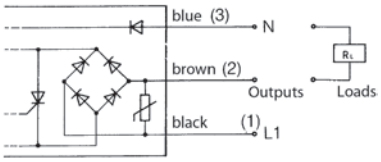


PNP
Light activated and operating reserve output

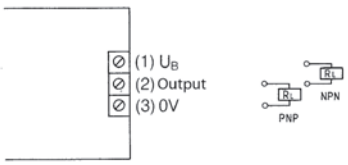
Optoelectronic Sensors 2



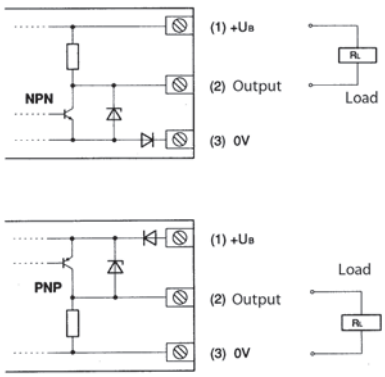
Transmitter



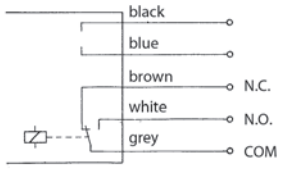
AC 3-wire



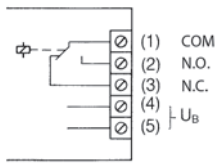
NPN or PNP



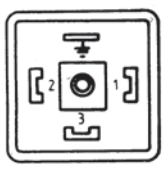
NPN or PNP



Relay output



Relay output



	DC	AC
(1)	U_B	L1
(2)	0V	Output
(3)	Output	N

DIN connector

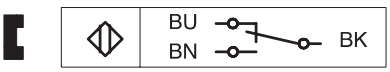
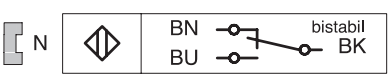
Type of Contact

Electric Loading Capacity of Reed Contacts AC/DC

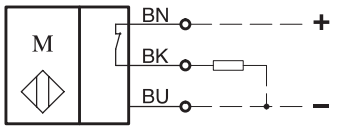
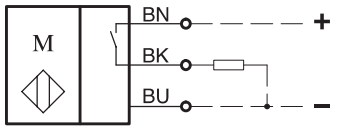
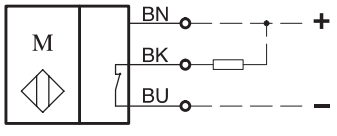
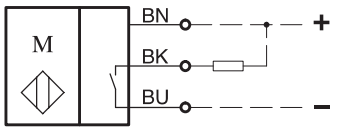
Contact type ID	Power	Voltage	Current
R	3 VA	28 V	0.25 A
X	5 VA	100 V	0.25 A
B	10 VA	250 V	0.5 A
Y	10 VA	100 V	0.5 A
A	20 VA	250 V	0.5 A
K	30 VA	250 V	0.5 A
H	60 VA	250 V	1.0 A
L	60 VA	250 V	1.0 A
M	80 VA	250 V	1.0 A
F	100 VA	250 V	3.0 A
G	250 VA*	250 V	5.0 A*
P	250 VA*	250 V	5.0 A*

* Maximum make current for the duration of 2 ms
2.5 A; 100 W/VA in continuous operation

Wiring Diagrams Electromechanical Magnetic Switches

contact	
NO contact	
Changeover contact	
Bistable ON-OFF	
Bistable Changeover contact	

Wiring Diagrams Electronic Magnetic Switches

NC contact, PNP	
NO contact, PNP/PNP, bistable	
NC contact, NPN	
NO contact, NPN	

TITLE - Title to the products of ALTECH shall remain with ALTECH until payment is made in full by Customer. Such reservation of title is for the purpose of securing the purchase price and shall not relieve Customer of the duty to inspect the products upon receipt, to notify ALTECH of any deficiencies or defects, and to exercise due care in the use, installation, operation, and maintenance of the products when on the premise of the Customer or under the control of the Customer. Notwithstanding any reservation of title by ALTECH, risk of loss shall pass to customer at any time of shipment.

SHIPMENT AND DELIVERY - All orders for destination in the mainland United States (less Hawaii, Alaska and non-continental United States possessions) will be shipped F.O.B. Flemington, N.J. All destination, shipping and other charges shall be paid by the Customer in accordance with ALTECH's then current shipping and billing practices.

Delivery dates given in the acceptance of any order are approximate. ALTECH shall not be liable for delays in delivery or in performance due to causes beyond its reasonable control including acts of God, acts of Customer, acts of civil or military authority, fires, strikes or other labor disturbances, war, riot or delays in transportation. In the event of such delay, the date of delivery or performance shall be extended for a period equal to the time lost by reason of the delay.

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PAYMENT - Customer agrees to make payment within thirty (30) days of date of the invoice from ALTECH. Customer agrees to pay a late payment charge of one and one-half percent (1.5% per month, or the maximum late payment charge permitted by applicable law, whichever is less, on any unpaid amount for each calendar month (or fraction thereof) that such payment is in default. Orders amounting to less than $100.00 will be billed at $100.00 plus freight. Full carton purchases are required. In the event of referral to an attorney for collection, reasonable attorney's fees for collection of the overdue amount shall be paid by Customer. In the event payment is not received within 30 days from the date of invoice, any discount shall be cancelled and the full list price will be due.

LIMITED WARRANTY - ALTECH warrants to Customer that the equipment purchases shall be free from defects in material and workmanship under normal use and service for a period of one year from shipment.

Written notice as an explanation of the circumstances of any claim that the equipment has proved defective in material or workmanship shall be given promptly by the Customer to ALTECH.

ALTECH will not be liable for any misuse, improper operations, improper installation, improper maintenance, alteration, modification, accident or unusual degradation of the equipment or parts due to an unsuitable installation environment.

No representation of other affirmation of facts,
including but not limited to statements regarding capacity, suitability for use or performance of the equipment, shall be or be deemed to be a warranty or representation by ALTECH for any purpose, nor give rise to any liability or obligation of ALTECH whatsoever.

Customer's sole and exclusive remedy in the event of breach of warranty, as set forth herein, is expressly limited to (1) the correction of the defect by adjustment, repair, modification, or replacement, or (2) issuance of a credit or refund of the purchase price for the defective equipment at ALTECH's election and sole expense.

EXCEPT AS SPECIFICALLY PROVIDED IN THIS AGREEMENT, THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

THIS WARRANTY EXTENDS ONLY TO THE CUSTOMER FROM ALTECH OR ITS AUTHORIZED DISTRIBUTOR.

LIMITATION OF LIABILITY - IN NO EVENT, SHALL ALTECH BE LIABLE FOR LOSS OF PROFITS, INDIRECT, SPECIAL, CONSEQUENTIAL OR OTHER SIMILAR DAMAGES ARISING OUT OF ANY BREACH OF THIS AGREEMENT OR OBLIGATIONS UNDER THE AGREEMENT.

ALTECH SHALL NOT BE LIABLE FOR ANY DAMAGES CAUSED BY DELAY IN SHIPMENT, INSTALLATION OR FURNISHING OF EQUIPMENT OR SERVICES UNDER THIS AGREEMENT.

No action arising out of any claimed breach of this Agreement may be brought by either party more than two (2) years after the cause of action has accrued.

PATENT INDEMNITY - ALTECH shall defend or settle any suit or proceeding brought against Customer based on a claim that any equipment made to ALTECH design and furnished hereunder constitutes an infringement of any existing United States patent, provided (ALTECH) is notified promptly in writing and is given complete authorization and information required for the defense, and ALTECH shall pay all damages and costs awarded against Customer, but shall not be responsible for any costs, expense or compromise incurred or made by Customer without ALTECH's prior written consent. If any equipment is in ALTECH's opinion likely to or does become the subject of a claim for patent infringement, ALTECH may at its option and expense procure for Customer the right to continue using the device, modify it to become non-infringing, but in the event ALTECH is not reasonably able to modify, substitute, or otherwise procure for Customer the right to continue using it, ALTECH will remove such equipment and refund to Customer the amount paid in excess of a reasonable rental for past use.

ALTECH shall not be liable for any infringement or claim based upon use of the equipment in combination with other equipment not supplied by ALTECH or with modifications made by Customer.

The foregoing states the entire liability of ALTECH to Customer arising from patent infringement.

SELLER'S REMEDIES - Should Customer fail to make any payment within ten (10) days of its due date, or fail to perform any other of the Customer's obligation hereunder upon thirty (30) days written notice, or should Customer be or become insolvent or be a party to any bankruptcy receivership proceeding prior to full payment of all amounts payable hereunder, ALTECH may: (a) with or without demand or notice to customer declare the entire amount unpaid immediately due and payable; (b) enter upon the premises where the equipment may be found and remove it (Customer shall assemble the equipment and make it available to ALTECH at a place reasonably convenient to both parties and shall permit and assist ALTECH in effecting the retaking and removal of the equipment); and (c) sell any or all the equipment as permitted under applicable law, applying the proceeds of the sale to payment of the expenses of retaking, repairing and selling the equipment, reasonable attorney fees and to the satisfaction of all indebtedness then due and unpaid under this Agreement. Any surplus shall be paid to Customer and any deficiency shall be paid to ALTECH by Customer.

The remedies provided herein shall be cumulative and in addition to all other remedies provided by law or equity or under the Uniform Commercial Code.

GOVERNING LAW - This agreement will be governed by the Laws of the State of New Jersey.

GENERAL - This Agreement shall only become effective and binding when either (a) it has been accepted and executed by an authorized representative of ALTECH, or (b) the equipment has been shipped to Customer, with or without acceptance in writing hereon. Notice of acceptance is hereby waived by Customer. Customer hereby acknowledges receipt of a true and complete copy hereof.

No addition to or modification of any of the Terms and Conditions of Sale as they appear herein shall be binding upon ALTECH unless signed in writing by duly authorized representative of ALTECH in Flemington, N.J.

Typographical and clerical errors in quotations, orders and acknowledgments are subject to correction.

This Agreement is not assignable without the prior written consent of ALTECH. Any attempt to assign any of the rights, duties or obligations of this Agreement without such consent is void.

If any provision or provisions of this Agreement shall be held to be invalid, illegal or unenforceable, the validity, legality and enforceability, of the remaining provisions shall not in any way be affected or impaired thereby.

ALTECH is not responsible for failure to fulfill its obligation under this Agreement due to causes beyond its control, or except as agreed herein.

THE CUSTOMER ACKNOWLEDGES THAT HE HAS READ THE AGREEMENT, UNDERSTANDS IT, AND AGREES TO BE BOUND BY ITS TERMS AND CONDITIONS. FURTHERMORE, THE CUSTOMER AGREES THAT IT IS THE COMPLETE AND EXCLUSIVE STATEMENT OF THE AGREEMENT BETWEEN THE PARTIES, WHICH SUPERSEDES ALL PROPOSALS OR PRIOR AGREEMENTS, ORAL OR WRITTEN, EXPRESSED OR IMPLIED, AND ALL OTHER COMMUNICATIONS BETWEEN THE PARTIES RELATING TO THE SUBJECT MATTER OF THIS AGREEMENT.

altechcorp.com

Altech Corporation
35 Royal Road
Flemington, NJ 08822-6000
P 908.806.9400 • F 908.806.9490
www.altechcorp.com
Altech Corp.® 278-112015
Web Only November 2015