

Electronic magnetic switches

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The electronic magnetic switches from Bernstein are based on two different physical operating principles: the Hall effect and magneto-resistive (MR) effect. The sensors are characterised by their high sensing range and the absolute non-sensitivity to mechanical influences.

MR sensor technology

The prime elements of MR sensors are magnetic field dependent, ferromagnetic thin-film resistors. The base material of such a unit is made from silicon to which the ferromagnetic film is applied using electron gun vaporisation.

Fields of use for MR sensors

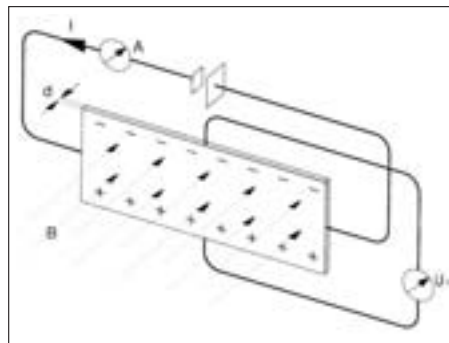
The main application areas for MR sensors are in the detection of current, angles, speed of rotation, position and magnetic fields. Detecting very low magnetic fields is possible with such sensors. An output voltage proportional to the magnetic field can be electrically conditioned. The ability to set the sensitivity or hysteresis allows these sensors to be used in a wide range of applications.



Hall element technology

The Hall effect is defined as the generation of a voltage difference on the opposing sides of a thin gold wafer through which a current is flowing. This effect also occurs in some semiconductors when certain geometrical conditions are fulfilled. The thickness of the wafer must be very small in relation to the length and width.

Signal Hall elements are used in all types of controllers as contact-free signal sensors. Since the signal voltage is independent of the speed of motion, and in contrast to inductive systems, targets with a very low speed, almost stopped, can be detected.



Schematic description of the Hall effect

Fields of use for Hall sensors

Since, when the sensor is suitably installed, only the polarity of the Hall voltage or the zero crossing is evaluated, InSb is used as the sensitive material for these Hall elements as its high sensitivity to temperature is not a problem for this application. Having designed the Hall elements for various application areas, they can be used for:

- measuring induction
- measuring tangential and axial components of magnetic induction
- measurements at low temperatures
- contact-free signal generation
- replacing inductive sensors (large sensing distance)

Selection guide electronic magnetic switches in smooth and threaded barrels and rectangular housings




Designation	Switching current I_{max}	Operating voltage U_b	Switching distance S_n^*	Activity: N = North Pole S = South Pole O = Omnipolar	Output- and switching function: N.O. N.C. bi = bistable	Housing material	Connection
MA-70 ø 6.5 x 25 mm	200 mA	10...30 V	45 mm	O	PNP N.O.	stainless steel 1.4401	cable
MA-61 M 10 x 1 x 40 mm	200 mA	10...30 V	17 mm	N N	PNP N.O. PNP N.C.	plastic PPE, red brass, nickel-plated	cable
MA-62 M 12 x 1 x 46 mm	400 mA	10...30 V	17 mm 35 mm	N N N/S***	PNP N.O. PNP N.C. PNP bi	plastic PA 6, red brass, nickel-plated	cable**
MA-63 M 18 x 1 x 35 mm	400 mA	10...30 V	17 mm 35 mm	N N N/S***	PNP N.O., NPN N.O. PNP N.C., NPN N.C. PNP bi	plastic PA 6, red brass, nickel-plated	cable**
MA-80 8 x 8 x 40 mm	200 mA	10...30 V	45 mm	O	PNP N.O.	brass, nickel-plated	cable
MA-55 12 x 12 x 55 mm	400 mA	10...30 V	17 mm 35 mm	N N N/S***	PNP N.O. PNP N.C. PNP bi	brass, nickel-plated	cable**
MA-52 26 x 13 x 43 mm	200 mA	10...30 V	60 mm	O O	PNP N.O. PNP N.O. PNP N.C. PNP N.C.	plastic PA 12, black	cable**



* Switching distance referring to magnet T-62N/S
for magnet T-67N/S approx. 10 % lower switching distance
for magnet T-69N/S approx. 30 % higher switching distance


** Plug on request

*** Activity:
south-pole – switches on
north-pole – switches off



Overview electronic magnetic switches in smooth and threaded barrels

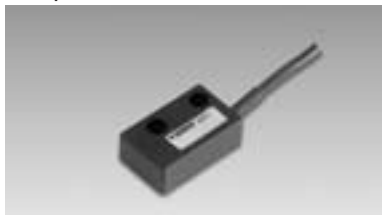
Smooth and threaded barrels		MA-70, Ø 6.5 x 25 mm Stainless steel 1.4401		MA-61, M 10 x 1 x 40 mm PPE, red		MA-61, M 10 x 1 x 40 mm CuZn39Pb3, nickel-plated	
							
Switching distance (S_{an})		45 mm		17 mm		17 mm	
Mag. sensitivity		0.5 mT		10 mT		10 mT	
Referring magnet (page)		T-62N/S (212)		T-62N/S (212)		T-62N/S (212)	
Switching function		N.O.		N.C.		N.C.	
PNP	Designation	MEN-70OP2-01.2-2/K		MEK-61NP1-10.2-2/KL		MEK-61NP2-10.2-2/KL	
	Part number	637.3270.067		637.1161.040		637.1261.041	
						637.1161.043	
						637.1261.042	

Smooth and threaded barrels		MA-62, M 12 x 1 x 46 mm PA 6, red			MA-62, M 12 x 1 x 46 mm CuZn39Pb3, nickel-plated		
							
Switching distance (S_{an})		17 mm		17 mm		35 mm	
Mag. sensitivity		10 mT		10 mT		2.5 mT	
Referring magnet (page)		T-62N/S (212)		T-62N/S (212)		T-62N/S (212)	
Switching function		N.C.		N.O.		bistable	
PNP	Designation	MEK-62NP1-10.4-2/KL		MEK-62NP2-10.4-2/KL		MEK-62SP4-03.4-2/KL	
	Part number	637.1162.047		637.1262.048		637.3462.049	
						637.1162.044	
						637.1262.045	
						637.3462.046	

Smooth and threaded barrels		MA-63, M 18 x 1 x 35 mm PA 6, red			MA-63, M 18 x 1 x 35 mm CuZn39Pb3, nickel-plated		
							
Switching distance (S_{an})		17 mm		17 mm		35 mm	
Mag. sensitivity		10 mT		10 mT		2.5 mT	
Referring magnet (page)		T-62N/S (212)		T-62N/S (212)		T-62N/S (212)	
Switching function		N.C.		N.O.		bistable	
PNP	Designation	MEK-63NP1-10.4-2/KL		MEK-63NP2-10.4-2/KL		MEK-63SP4-03.4-2/KL	
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						637.1163.050	
						637.1263.051	
						637.3463.052	
NPN	Designation	MEK-63NN1-10.4-2/KL		MEK-63NN2-10.4-2/KL		MEM-63NN1-10.4-2/KL	
	Part number	637.1563.069		637.1663.070		637.1563.071	
						637.1663.072	

Overview electronic magnetic switches in rectangular housings

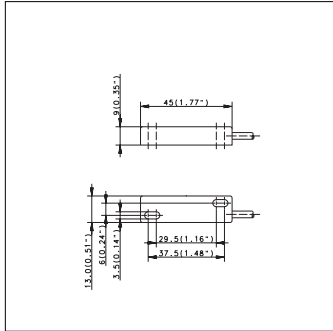
Rectangular housings		MA-80, 8 x 8 x 40 mm CuZn39Pb3, nickel-plated		MA-55, 12 x 12 x 55 mm CuZn39Pb3, nickelé		
						
Switching distance (S_{an})		45 mm		17 mm	17 mm	35 mm
Mag. sensivity		0.5 mT		10 mT	10 mT	2.5 mT
Referring magnet (page)		T-62N/S (212)		T-62N/S (212)	T-62N/S (212)	T-62N/S (212)
Switching function		N.O.		N.C.	N.O.	bistable
PNP	Designation	MEM-80OP2-01.2-2/K		MEM-55NP1-10.4-2/KL	MEM-55NP2-10.4-2/KL	MEM-55SP4-03.4-2/KL
	Part number	637.3280.057		637.1155.058	637.1255.059	637.3455.060

Rectangular housings		MA-52, 43 x 26 x 13 mm PA 12, noir	
			
Switching distance (S_{an})		60 mm	60 mm
Mag. sensivity		0.1 mT	0.1 mT
Referring magnet (page)		T-62N/S (212)	T-62N/S (212)
Switching function		N.C.	N.O.
PNP	Designation	MEK-52OP1-00.4-2/KL	MEK-52OP2-00.4-2/KL
	Part number	637.3152.075	637.3252.068
NPN	Designation	MEK-52ON1-00.4-2/KL	MEK-52ON2-00.4-2/KL
	Part number	637.3552.073	637.3652.074

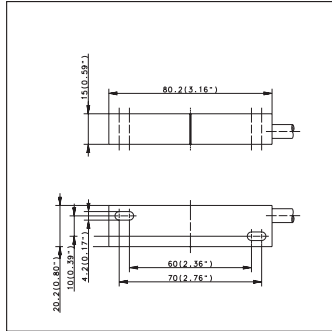
Technical data standard versions electronic magnetic switches

		MA-70	MA-61	MA-62	MA-63	MA-80	MA-55	MA-52
Operating voltage	U_B	10 V...30 V	10 V...30 V	10 V...30 V	10 V...30 V	10 V...30 V	10 V...30 V	10 V...30 V
Rated operating current	I_B	≤ 200mA	≤ 200mA	≤ 400mA	≤ 400mA	≤ 200mA	≤ 200mA	≤ 200mA
Switching frequency		≥ 5000 Hz						
Output		short-circuit and overload protection						
Reverse polarity protection		yes						
LED for output function		•	•	•	•	•	•	•
Temperature range		-20 °C/+70 °C						
Protection class		IP 65/IP 67						
Cable (2 m)		•	•	•	•	•	•	•
Plug on request				•	•	•	•	•

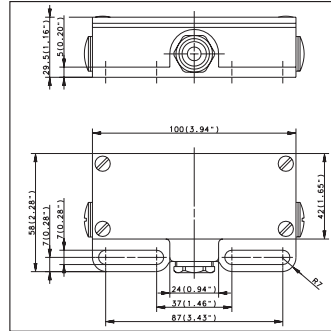
Dimension diagrams magnetic switches



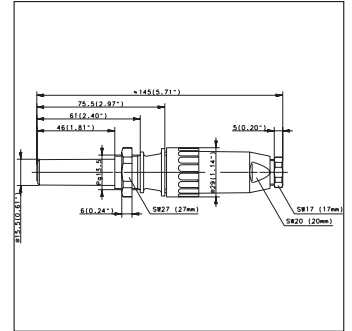
MA-01 Page 202



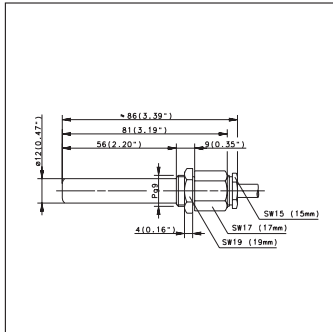
MA-02 Page 202



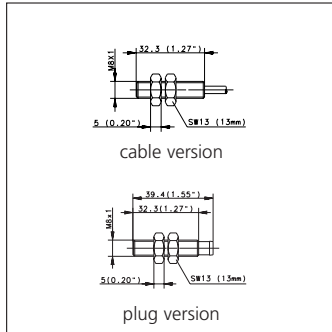
MA-03 Page 203



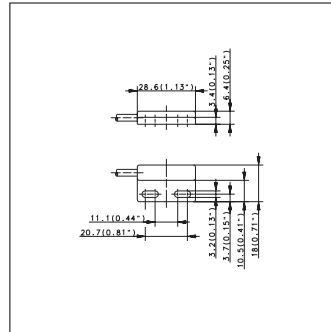
MA-04 Page 199



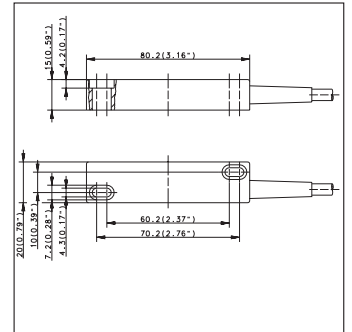
MA-06 Page 199



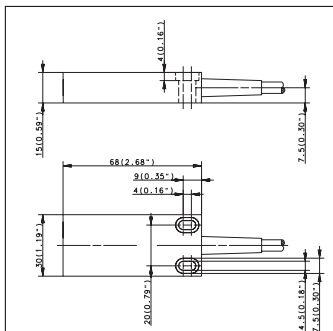
MA-08 Page 200



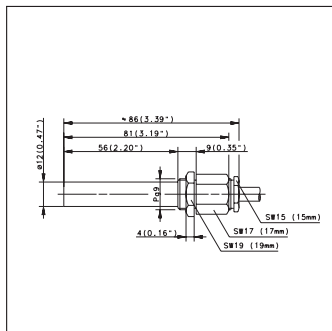
MA-11 Page 202



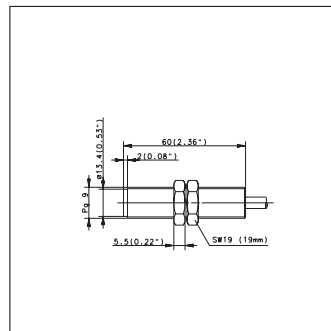
MA-12 Page 202



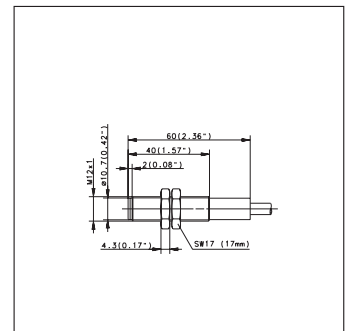
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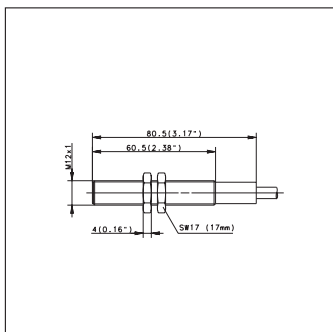
MA-16 Page 199



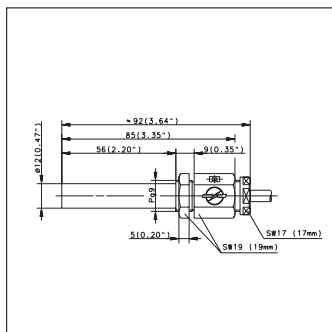
MA-17 Page 200



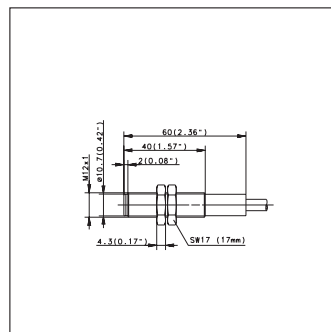
MA-18 Page 200



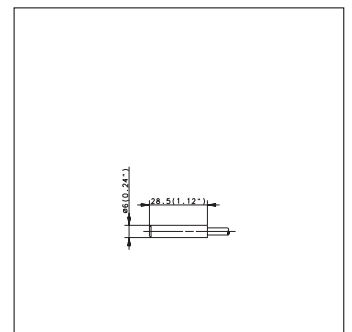
MA-23 Page 200



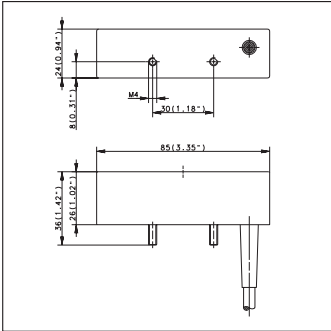
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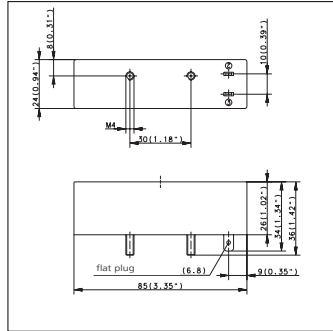


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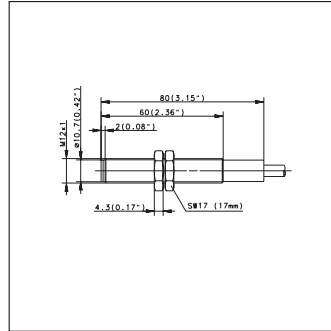
MA-32 (cable)

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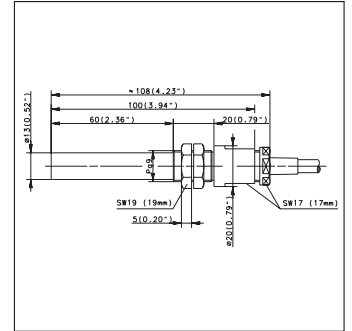
MA-32 (plug)

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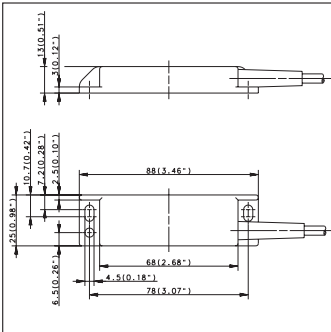
MA-33

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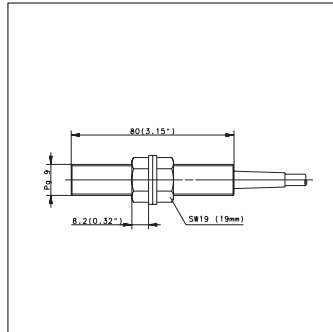
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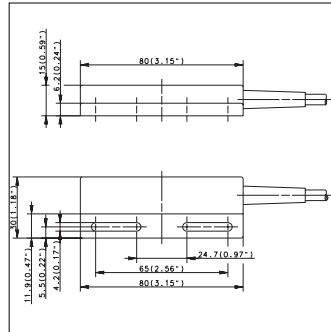
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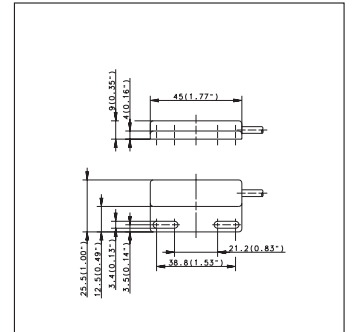
MA-43

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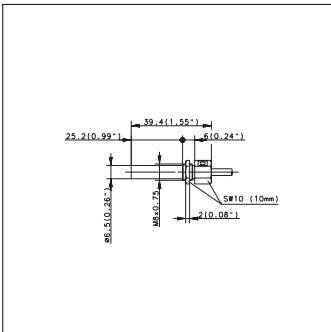
MA-44

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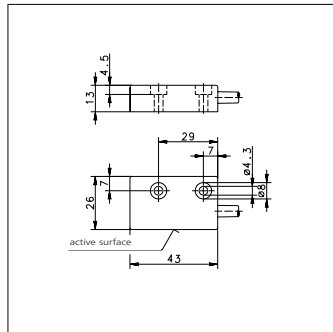
MA-45

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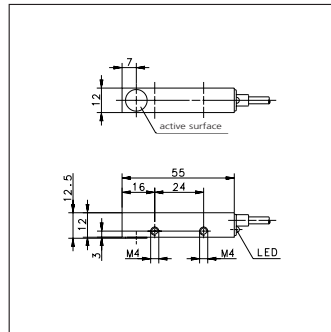
MA-46

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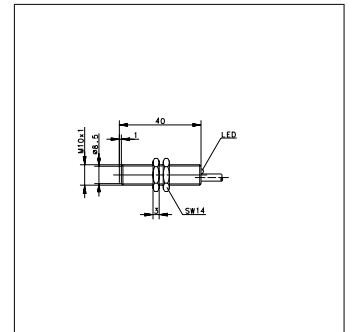
MA-52

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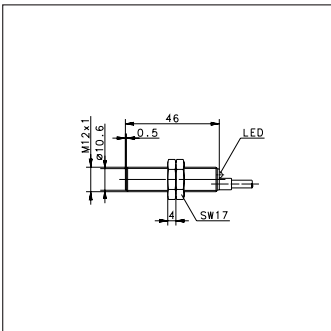
MA-55

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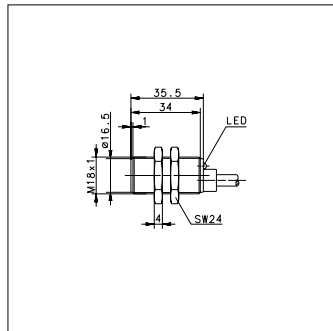
MA-61

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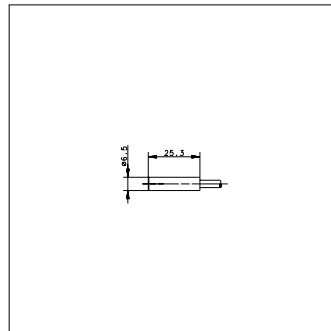
MA-62

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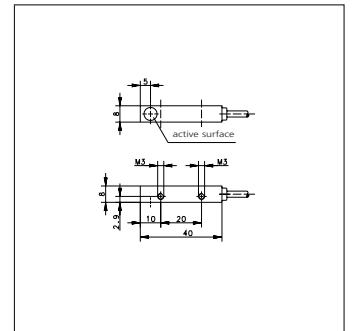
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