

### **Function principle**

Magneto-resistive materials can change their resistivity in an external magnetic field. The variation of the resistivity is determined by the rotation of magnetisation with respect to the direction of the current flow. Permalloy ( $\text{Ni}_{81}\text{Fe}_{19}$ ) is commercially used as magneto-resistive material. The relative change of resistivity is 2-3 % for this material. The high sensitive and small size magneto-resistive sensor consists of the chip 174B covered with thin film permalloy stripes. These stripes form a Wheatstone bridge, whose output voltage is proportional to the magnetic field component  $H_y$ .

### **Characteristic**

The bridge imbalance is a value for the magnetic field component  $H_y$  in the plane of the chip. It is of advantage to apply an auxiliary field  $H_x = 3 \text{ kA/m}$  which avoids flipping of the magnetisation of the stripes caused by disturbing magnetic fields. A perpendicular field  $H_x$  is necessary to stabilize sensor operation. This can be done by using a small permanent magnet. Magnetic fields vertical to the chip surface have no influence on the output voltage.

### **Special feature**

The sensor KMZ 20 M1 has a small permanent magnet which is glued on the package. The sensor is ready to use. No external auxiliary fields are required for safe operation in a disturbing field up to 30 kA/m.

## ***Sensors in thin film technology***

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## Technical data

### Absolute maximum ratings

Parameter	Symbol	Unit	Value
Supply voltage	$V_B$	V	12
Total power dissipation	$P_{to}$	mW	120
Operating temperature range	$T_{amb}$	°C	-40 ... + 125
Storage temperature range	$T_{stg}$	°C	-65 ... +150
Disturbing field	$H_d$	kA/m	$\leq 30$

### Electrical characteristics ( $T_{amb} = 25^\circ\text{C}$ )

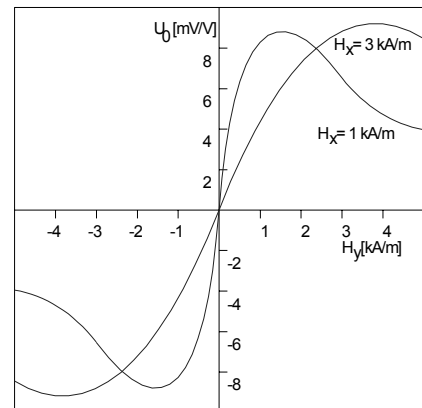
Parameter	Symbol	Unit	Value
Bridge resistance	$R_B$	kOhm	1.4 .. 2.2
Open circuit sensitivity	$S_V$	(mV/V)/(kA/m)	$4.0 \pm 0.8$
Output voltage range	$\Delta V_O / V_B$	mV/V	$20.0 \pm 4.0$
Hysteresis of output voltage	$V_{OH} / V_B$	$\mu\text{V/V}$	$\leq 50$
Offset voltage	$V_{OFF} / V_B$	mV/V	$\leq \pm 1.0$
Permanent auxiliary field	$H_x$	kA/m	$3.6 \pm 0.4$

### Temperature coefficients ( $-25^\circ\text{C} < T_{amb} < 125^\circ\text{C}$ ) of

Parameter	Symbol	Unit	Value
Bridge resistance	$T_{CBR}$	%/K	$0.30 \pm 0.05$
Open circuit sensitivity			
( $V_B = \text{const}$ )	$T_{CSV}$	%/K	$-0.25 \pm 0.05$
( $I_B = \text{const}$ )	$T_{CSI}$	%/K	$0.05 \pm 0.05$
Offset voltage	$T_{COFF}$	( $\mu\text{V/V}$ )/K	$\leq \pm 3$
Difference of offset voltage for sensor pair	$\Delta T_{COFF}$	( $\mu\text{V/V}$ )/K	$\leq \pm 0.5$

## Applications

- detection of weak magnetic fields, e.g. earth magnetic field
- contactless mechanical switch
- displacement measurement with high resolution
- revolution speed detection on ferromagnetic gear wheels
- contactless angle measurement
- galvanically separated current measurement



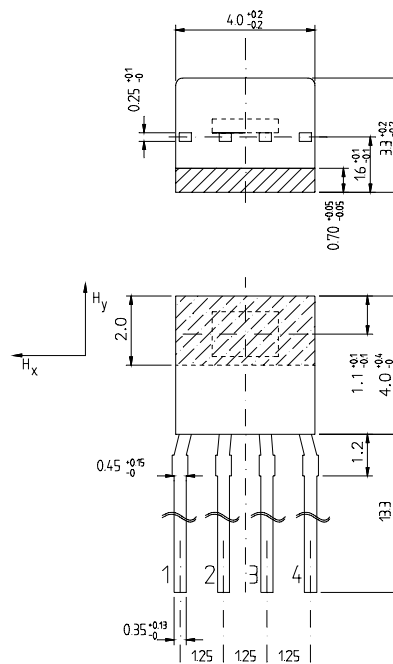
Output voltage versus field component  $H_Y$  for different stabilizing magnetic fields  $H_X$

## Housing of KMZ 20 M: E-Line 4-Pin

1:  $+V_O$  3:  $-V_O$   
2:  $-V_B$  4:  $+V_B$

$V_O$  : output voltage  
 $V_B$  : input voltage

metric dimensions



## 2 KMZ 20 M1

We also offer selected pairs of KMZ 20 M1. These pairs have a similar temperature characteristic of the voltage offset and are well suited for differential measuring techniques. The temperature drift of the magnetoresistive sensor is strongly reduced by applying this technique.

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