SIEMENS

Differential Magnetoresistive Sensor

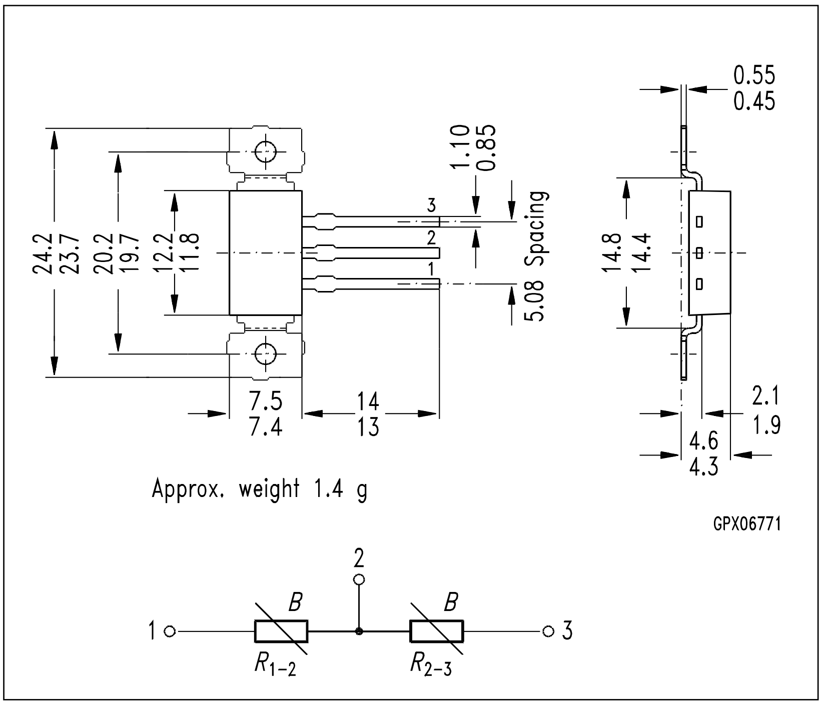
FP 201 L 100

Features

- Extremely high output voltage
- 2 independently biased magnetic circuits
- Robust housing
- Signal amplitude independent of operating speed
- Screw mounting possible

Typical applications

- Detection of speed
- Detection of position
- Detection of sense of rotation



Dimensions in mm

Type	Ordering Code
FP 201 L 100	Q65210-L101

The differential magnetoresistive sensor FP 201 L 100 consists of two magnetically biased magneto resistors made from L-type InSb/NiSb, which in their unbiased state each have a basic resistance of about 125 Ω. They are series coupled as a voltage divider and are encapsuled in plastic as protection against mechanical stresses. This magnetically actuated sensor can be implemented as a direction dependent contactless switch where it shows a voltage change of about 1.3 V/mm in its linear region.

Maximum ratings

Parameter	Symbol	Value	Unit
Operating temperature	T_A	– 25 / + 100	°C
Storage temperature	T_{stg}	– 25 / + 110	°C
Power dissipation[1)]	P_{tot}	600	mW
Supply voltage[2)]	V_{IN}	10	V
Insulation voltage between terminals and casing	V_I	> 100	V
Thermal conductivity	G_{thcase} G_{thA}	≥ 10 ≥ 5	mW/K mW/K

Characteristics (T_A = 25 °C)

Nominal supply voltage	$V_{IN\,N}$	5	V
Total resistance, ($\delta = \infty$, $I \leq 1$ mA)	$R_{1\text{-}3}$	700…1400	Ω
Center symmetry[3)] ($\delta = \infty$)	M	≤ 10	%
Offset voltage[4)] (at $V_{IN\,N}$ and $\delta = \infty$)	V_0	≤ 130	mV
Open circuit output voltage[5)] ($V_{IN\,N}$ and δ = 0.5 mm)	$V_{out\,pp}$	> 2.2	V
Cut-off frequency	f_c	> 7	kHz

This sensor is operated by a permanent magnet. Using the arrangement as shown in **Fig. 1**, the permanent magnet increases the internal biasing field through the righthand side magneto resistor (connections 2-3), and reduces the field through the left side magneto resistor (connections 1-2). As a result the resistance value of $MR_{2\text{-}3}$ increases while that of $MR_{1\text{-}2}$ decreases. When the permanent magnet is moved from left to right the above-mentioned process operates in reverse.

1) Corresponding to diagram $P_{tot} = f(T_{case})$
2) Corresponding to diagram $V_{IN} = f(T)$
3)

$$M = \frac{R_{1-2} - R_{2-3}}{R_{1-2}} \times 100\% \text{ for } R_{1\text{-}2} > R_{2\text{-}3}$$

4) Corresponding to measuring circuit in **Fig. 3**
5) Corresponding to measuring circuit in **Fig. 3** and arrangement as shown in **Fig. 2**

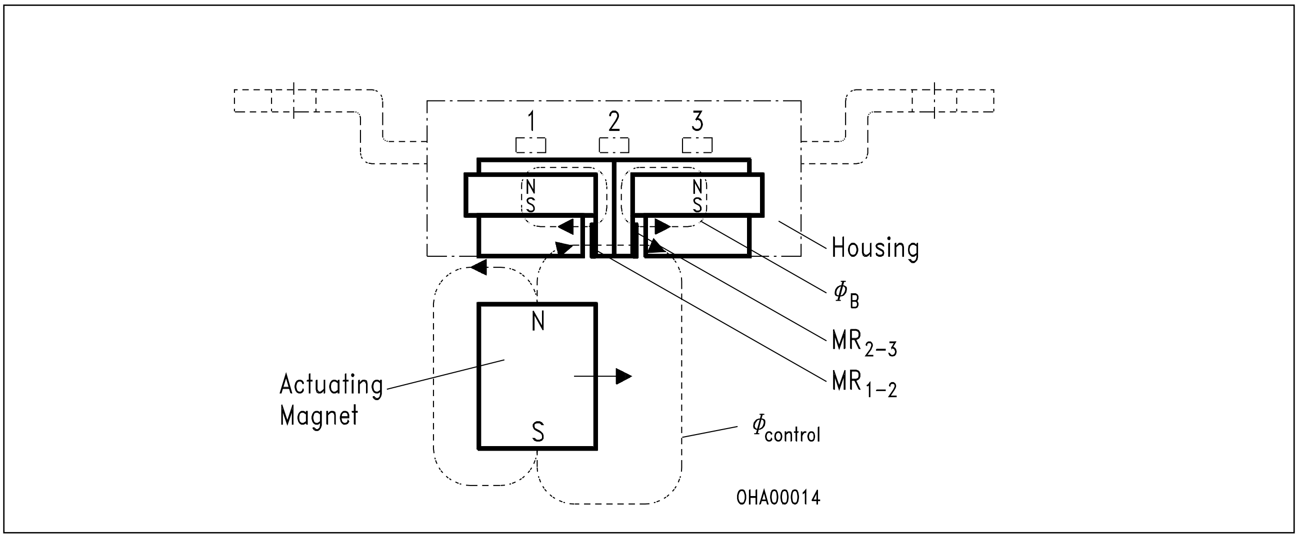


Fig. 1
Sensor operating by external permanent magnet

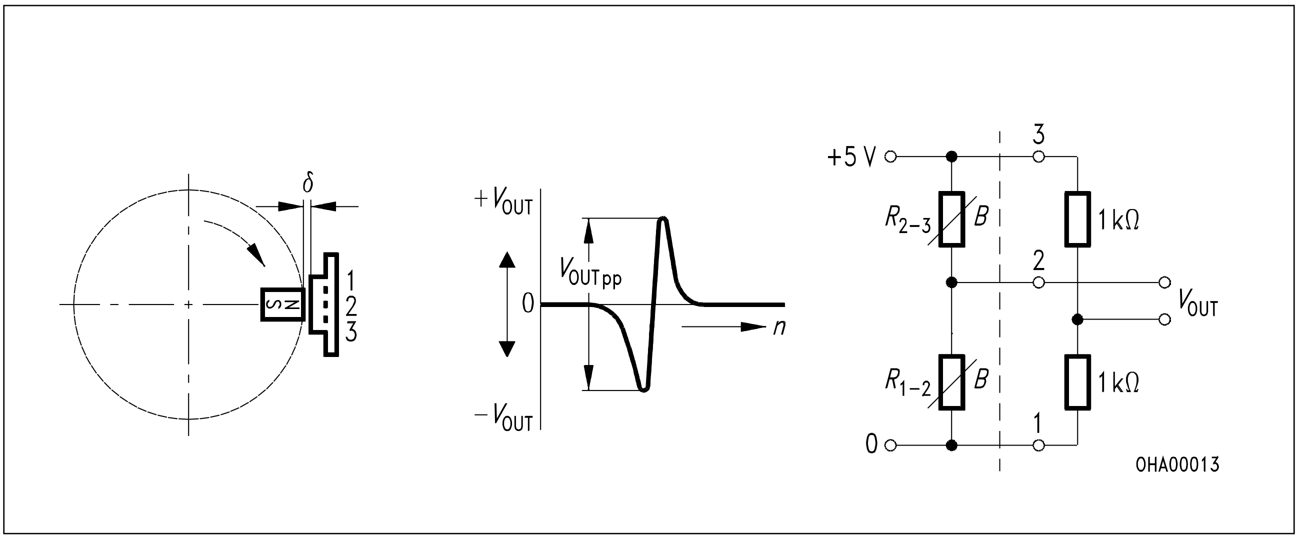
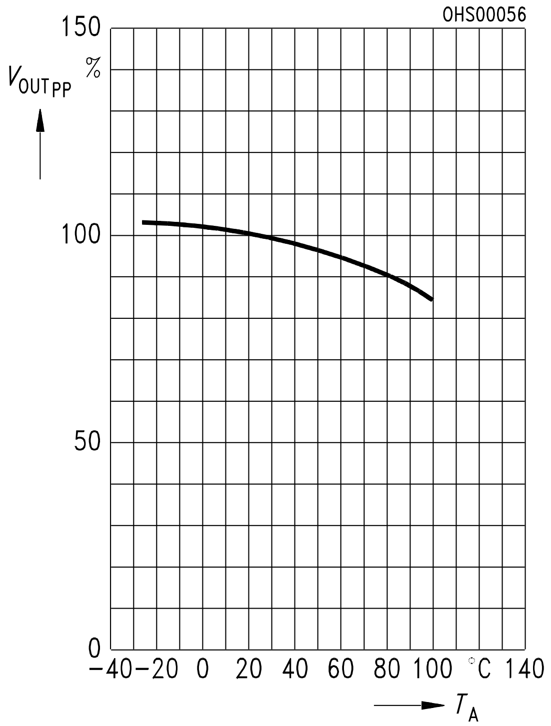


Fig. 2
Measuring arrangement with a permanent magnet Alnico 450
∅ = 4 mm, 6 mm long

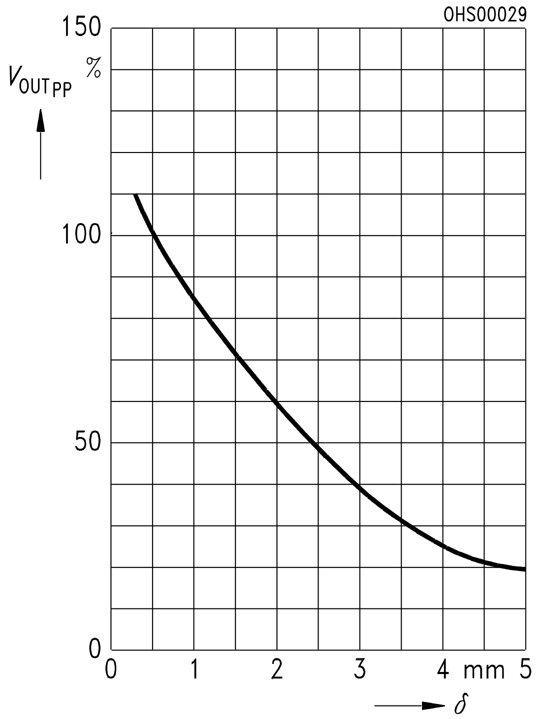
Fig. 3
Measuring circuit and output waveform

A steeper gradient is achieved when using a horseshoe magnet.

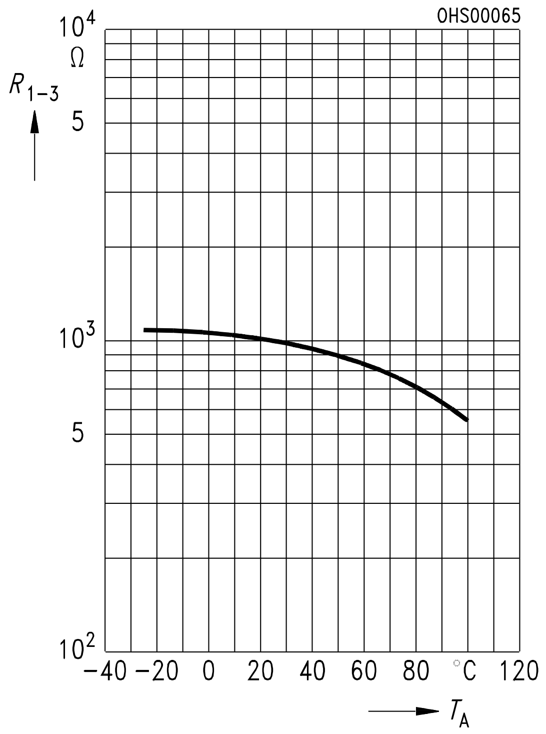
Output voltage (typical) versus temperature $V_{OUTpp} = f(T_A)$, δ = 0.5 mm
V_{OUTpp} at T_A = 25 °C ≙ 100%



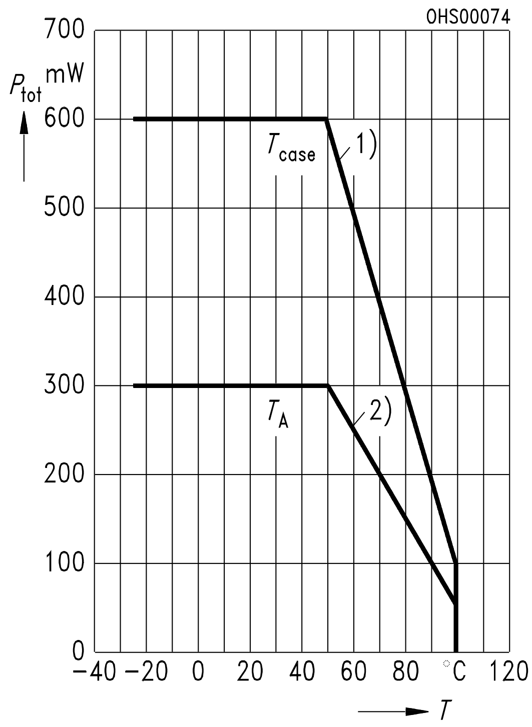
Output voltage (typical) versus airgap $V_{OUTpp} = f(\delta)$, T_A = 25 °C
V_{OUTpp} at δ = 0.5 mm ≙ 100%



Total resistance (typical) versus temperature
$R_{1\text{-}3} = f(T_A)$, $\delta = \infty$

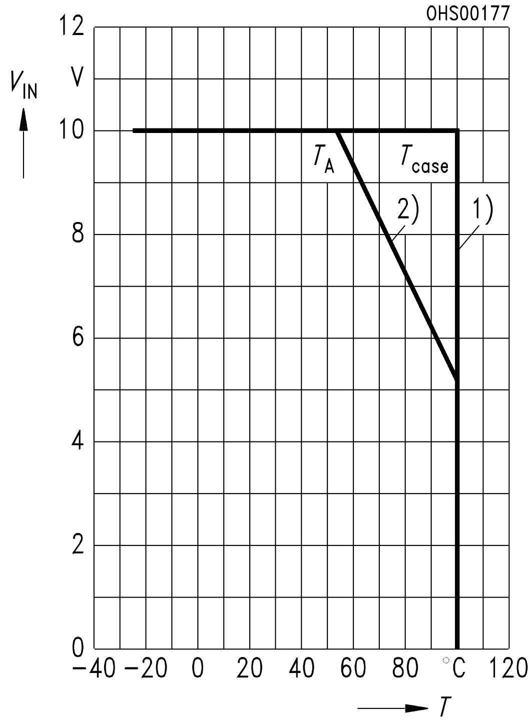


Max. power dissipation versus temperature
$P_{tot} = f(T)$, $\delta = \infty$, $T = T_{case}$, T_A



Maximum supply voltage versus temperature

$V_{IN} = f(T)$, $\delta = \infty$, $T = T_{case}$, T_A



1) Sensor mounted with good thermal contact to a heat sink
2) Operation in still air