

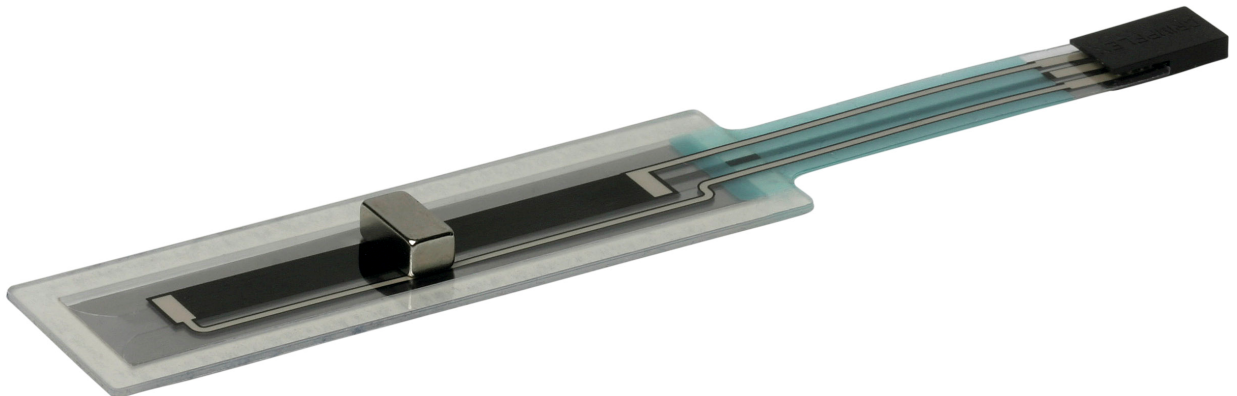
## Press Release

### Consistent further development of the proven MetaPot-Foilpotentiometer: Sensors for contact-free linear- and rotary measurement

Korb, Germany, 20. October 2008 – Metallux AG in Korb developed a Foilpotentiometer with contact-free function. This cost efficient sensor will meet the high requirements in precision, demanded for industrial applications in distance measurements from 50 to 500 mm.

Based on Metallux AG's MetaPot-Foilpotentiometer-Technology, the MMP unites all advantages of this proven technology, with a contact-free and therefore absolutely wearless function.

Especially for high adjustment speeds, rough environmental conditions as well as cramped assembly conditions, the MMP recommends itself splendidly. The new sensor is therefore a costeffective solution for measuring defined lengths, reliable in robust conditions.



Sketch 1: Metallux MMP

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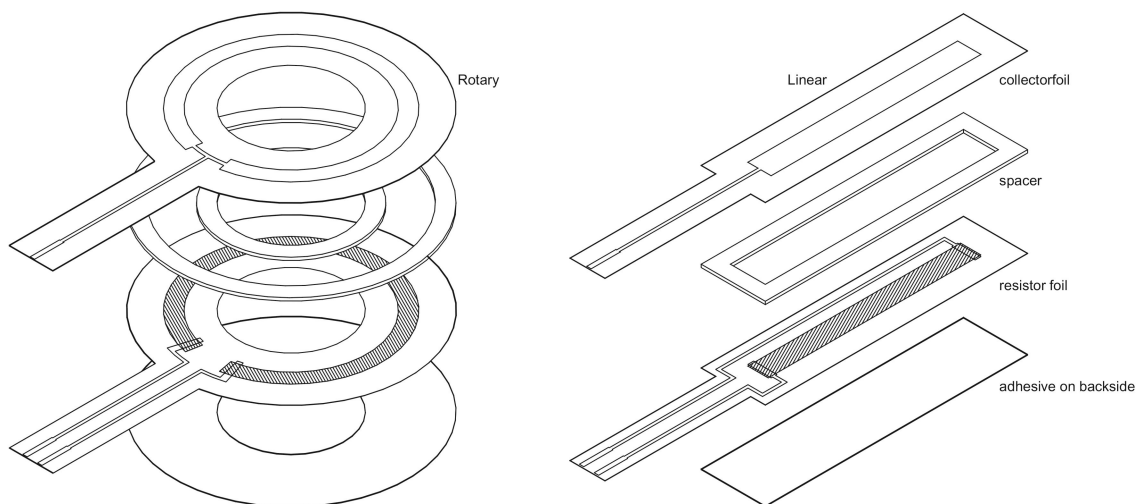
#### Technical Background

Suitable sensors to measure translatory and rotary movements are necessary in machine-construction, plant engineering and more and more so in the automotive industry.

Depending on demands and conditions the sensor must fulfill at least following criteria: ease of fitment, required precision, consistent against environmental influence, lifetime cycles asked for and last but not least value for price.

The MetaPot-Foilpotentiometer does indeed all that.

#### State of Technology: The MetaPot-Foilpotentiometer



Sketch 2: set-up of a potentiometer

The linear and rotary sensors are made up of different foils, electrically isolated, joined

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by a spacer. The resistor foil contains a high resistance print whilst the opposite foil has been screen printed with a low resistance layer – the collector. Mechanical pressure then makes contact between the collector- and resistor foil.



Sketch 3: Sectional view; how contact is achieved

In this way, as with any other potentiometer, the relevant voltage will be drawn. Contrary to existing potentiometers, no sliding contact is required to activate contact. With minimal contact pressure only the foils are pressed together. Wear and tear therefore does not occur. A mechanical life cycle of several million can be achieved; hardly possible with conventional methods.

The resistor technology enables a very high resolution which is better than 10 $\mu$ m. The signal conditioning takes place via voltage divider.

The height of a foilpotentiometer is less than 1mm, therefore the sensor is anywhere insertable. Fitment effort, due to self adhesion, is negligible. Another advantage is the hermetically sealing of the single foils. Dirt, dust or humidity cannot penetrate; ideal for use in difficult climate.

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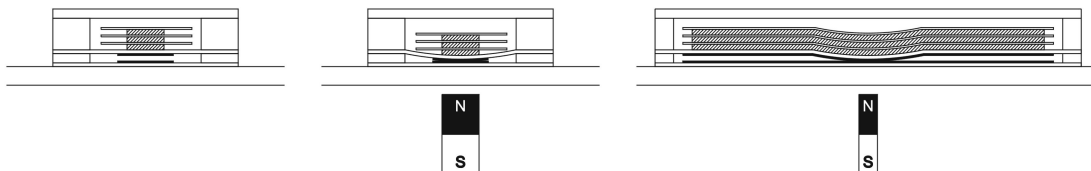
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Foilpotentiometers can be adhered onto level surfaces. Apart from linear versions rotary (angular) ones are also available, which means next to linear measurements angle measuring is also possible. Temperature range depends on type of foils used. Standard versions made out of high quality polyester foil will function up to 85°C.

#### MMP-Sensors for contact free linear measurements

Consistent ongoing development by Metallux AG in Korb, Germany, of the proven and tested MetaPot-family resulted in achieving the MMP-Sensor. The contact between collector and resistor is absolutely contact-free. Especially at very dynamic applications requiring a high number of cycles the demand for a wearless potentiometer becomes apparent.

Origin for the MMP is a conventional MetaPot-Foilpotentiometer, where mechanical pressure compresses the foils and thereby activates contact. Onto the cover foil, a batch consisting of several thin high-elastic ferromagnetic metalfoils is arranged. The thickness of the single foils is typically less than 50µm.



Sketch 3: Principle of MMP

Placing a permanent magnet below the foilpotentiometer, the ferromagnetic batch of foils is drawn by the magnetic field and create thereby contact. Depending on the quantity of metalfoils as well as the strength of the magnet, working distances of up to 10mm are realised.

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#### MMP-Advantages

Significant advantages of the MMP-Foilpotentiometers can be summarised as follows:

##### Absolutely no wear and tear

As the sensor requires no mechanical wiper no wear and tear through abrasion takes place, resulting in high reliability and long life cycle.

##### High Movement Speed

The magnetic foilsensor is suitable for applications requiring high movement speed. The sensor still works reliable with adjustment speed of 3m/sec.

##### Analogue Measuring System

The MMP-Foilpotentiometer used as a displacement- or position sensor, delivers an analogue output signal of very high resolution. A permanent voltage supply to the sensor - as required by many other, contact-free measuring principles - is not needed. After voltage supply has been switched on the position of the magnet can immediately be shown, without any previous calibration travel.

##### Low power requirement

Due to potentiometric measuring principles and the high resistance value, the MMP-Foilpotentiometer excels by needing low power consumption. This makes the sensor an ideal candidate in battery powered installations and systems.

##### Flat design

Foil technology permits manufacture of extremely flat sensors. With a thickness of less than 2mm the sensor can be used in tight and concealed conditions. Furthermore, as the foils are glued together forming a hermetically sealed system, protecting against environmental influence.

#### Applications

The new sensor is a price efficient solution for applications, measuring absolute lengths in a robust environment. The new sensor is suitable for automotive and industrial applications where reliability, low weight and tight measurements are of importance.

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A few examples:

- . Adjustmentsystems for car-and truck seats, window lifting, sliding doors
- . Distance measurements in construction machinery
- . Location of piston in pneumatic-and hydraulic cylinder
- . Detection of position in cutting machines,
- . Determination of position in ventilation louvres for building automation
- . Determination of position of thread roll in textile machinery
- . Determination of position of stabilisers in boats
- . Determination of distance in packaging machinery
- . Replacement of "reed-contacts chains" in level measurement
- . Determination of position in medical-technical equipment

#### A Summary of technical specifications:

##### **Electrical Characteristics**

- |   |                           |
|---|---------------------------|
| • Effective electrical strokes                                | 50....500mm               |
| • Resistance range (Rn)                                       | 2,5 kOhm/100 mm           |
| • Resistance tolerance  | +/- 30%                   |
| • Independent linearity<br>(depending on working temperature) | +/- 2% f.s... +/- 5% f.s. |
| • Repeatability   | < 0,1 f.s.                |
| • Hysteresis  | < 1.5% f.s.               |
| • Resolution  | < 10µm                    |
| • Wiperload   | min. 100* Rn              |
| • Max.load current in event of fault                          | 1 mA                      |
| • Max. Connection voltage                                     | 30 V                      |

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#### **Mechanical Characteristics**

- |  |                    |
|--|--------------------|
| • Life cycle                                 | 100.000.000 cycles |
| • Geometrical measurements (width x height ) | 22 x 2 [mm]        |
| • Operating speed                            | ≤ 3m/s             |
| • Magnetic field strength                    | 200 mT             |
| • Max.measurement distance magnet-sensor     | ≤ 2 mm             |

#### **Operating Conditions**

- |                       |                |
|-----------------------|----------------|
| • Temperature range   | -20°C... +85°C |
| • Storage temperature | -30°C... +85°C |

#### **Material**

- |                       |   |
|-----------------------|---|
| • Sensor              | Polyester   |
| • Electr. Connections | crimp contacts optional<br>custom specific connection |

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#### About Metallux

Metallux is a high performance manufacturer of electronic components in Tick-Film Technology. The comprehensive product portfolio consists apart from Standard Pressure-, Linear-, Rotary- as well as Foil Sensors, High Voltage- and Power Resistors to custom specific complete solutions as well as Potentiometers and Joysticks. Customer orientated solutions and the right ideas result in satisfied customers.

Innovative products together with long term experience – numerous well known customers ranging from the automotive, electrostatic, medical, industrial and sensoric industry rely for more than 22 years on the company situated near Stuttgart.

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