

POSITION SENSOR

Description D013



Figure 1. The Position Sensor

Short description

The Position Sensor is a potentiometer, which has a pulley to attach a string to. The sensor is suitable for detecting angle changes and (small) displacements. By a displacement of the string, the potentiometer is rotated and the output voltage is adapted.

The range is 240° of turn or a displacement of about 120-mm.

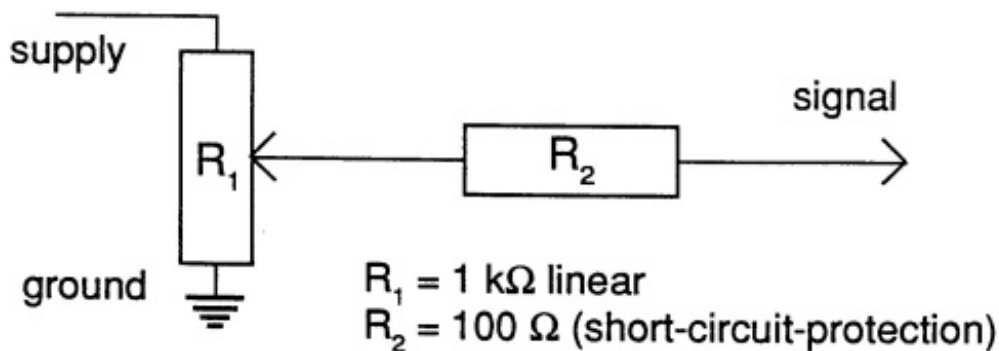


Figure 2. The circuitry of the potentiometer

The position sensor is delivered with a BT plug and can be connected to the following interfaces:

- UIA/UIB boards through the Measuring Console (via 0520 adapter)
- CoachLab
- CoachLab II
- SMI (via 0520 adapter)
- Texas Instruments CBL™ data-logger.

There is an adapter (art. 0520) to connect sensors with BT-plugs to 4-mm inputs.

Suggestion for experiments

- Studying the swing of the pendulum.
- Measurements of small displacement.
- Measurement of positions of the light sensor in the interference and diffraction patterns.

Calibration

Figure 3 shows the displacement of a thread.

Figure 4 shows the calibration graph of the output voltage of the sensor versus the angle over which the disc is rotated.

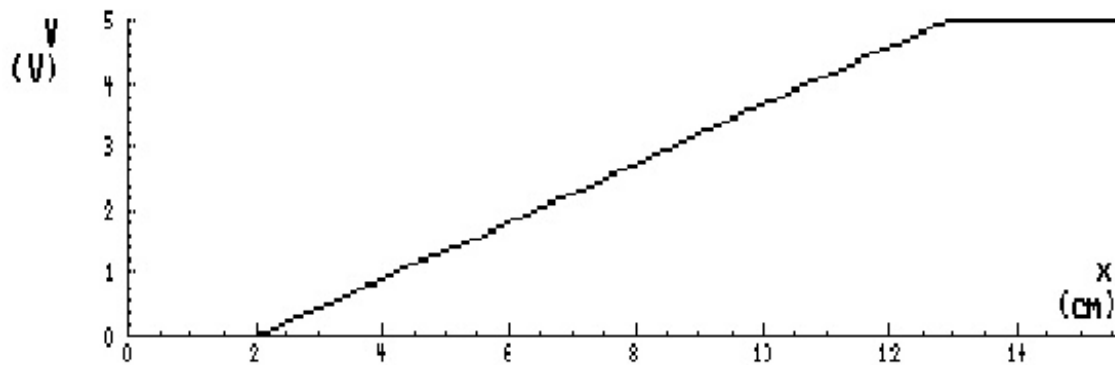


Figure 3. Displacement versus output voltage of the position sensor, 46 mV per mm.

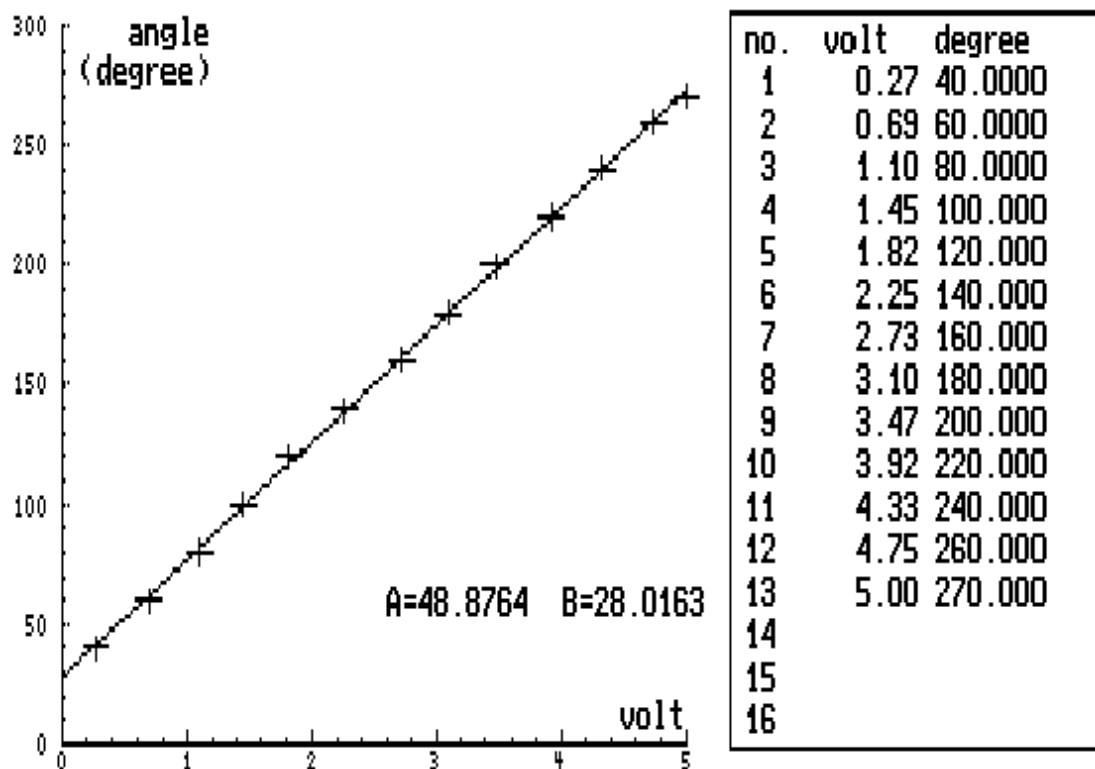


Figure 4. Calibration graph of the sensor: 20.5 mV per degree (rotation).

The name of the position sensor in the sensor library of Coach 5 program is **Angle position sensor (013&bt) (CMA)**.


The sensor has two calibrations between -120°..120°, and between 0°..360°.

Technical data

1. The potentiometer can be rotated over 300 degrees, with on both sides a free end of 30 degrees. At the free ends no voltage change is measured.
2. When using the measuring console in combination with the UIA/UIB-board, the input resistance (100 k Ω) of the UIA-board is parallel to a part of the 1 k Ω resistance of the sensor.

Warning

To avoid damage of the sensor, in pendulum experiments don't burden the disc with masses of more than 100 g.

Sensitivity	21 mV/degree
Output voltage	0 - 5 V
Angle range	0 - 240°
Resolution using 10 bit 5V A/D converter	0.24°
Position range	0 - about 120 mm
Resolution using 10 bit 5V A/D converter	0.15 mm
Tube Disc	Length = 9 cm Diameter = 2.6 cm Diameter = 6 cm Groove = 0.2 cm
Connection	 BT (British Telecom) plug

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