ANGLE POSITION SENSOR 013I
0..270° (0..140 MM)
User's Guide

Figure 1. The Angle position sensor

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Description

The 013i Angle position sensor contains a potentiometer with a pulley to attach a string to. The sensor is suitable for detecting angles, and (small) displacements. By a displacement of a string, the potentiometer is rotated and the output voltage is adapted. The range of the sensor is 270° of turn or a displacement of about 140 mm. The sensor is equipped with a BT plug and can be connected to the following CMA interfaces: €Lab**,** CoachLab II/II$^+$ and **U**LAB. Furthermore the sensor can be used with Texas Instruments CBL™, CBL2™ and Vernier LabPro.

Sensor specifications

The Angle position sensor has a memory chip (EEPROM) with information about the sensor. Through a simple protocol (I^2C) the sensor transfers its data: name, quantity, unit and calibration to the interface[1].

Examples of experiments

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

Calibration

The output of the 013i Angle position sensor is linear with respect to angle.
To collect data you can:

1. Use the calibration supplied by the sensor's EEPROM memory.
2. Use the calibration supplied in the standard sensor library of the Coach program.
   The name of the angle sensor in the sensor library of Coach is
   Angle position sensor (013i) (CMA).
   The sensor has three calibrations:
   - between 0º.. 270º
   - between -135º.. 135º
   - between 0 .. 140 mm.
3. Calibrate the angle sensor. The calibration can be performed in the Coach software.

For most experiments it will suffice to use the standard calibration. For very precise angle measurements, it is advised to calibrate the sensor. For precise position experiments it is also advised to calibrate the sensor, since the position will depend on the thickness of the string that is used.

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[1] This is valid for the following interfaces: CMA €Lab**,** BT inputs of CoachLab II/II$^+$ and **U**LAB, TI CBL™and CBL2™, and Vernier LabPro.

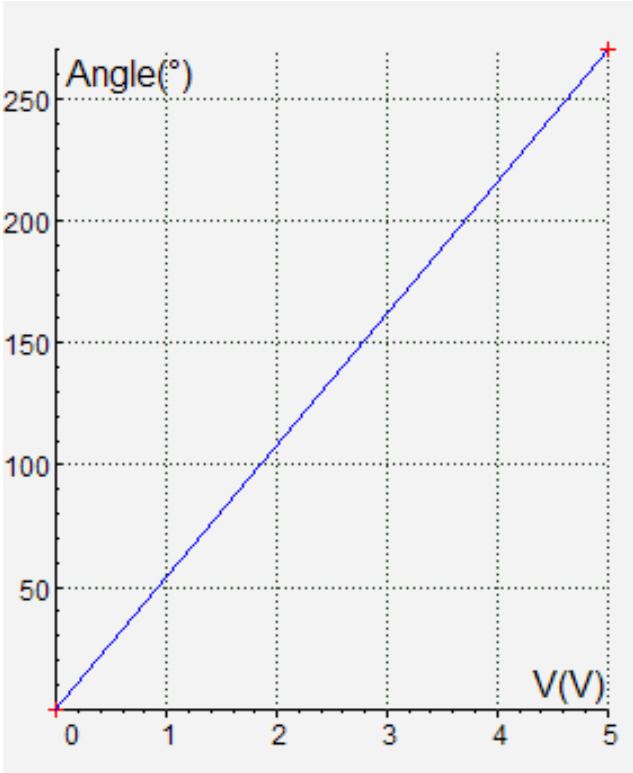

Figure 2.
The calibration graph of the angle position sensor for the 0º..270º range (used in the standard Coach sensor library and in the sensor's memory).

Angle (°) = 54 * V_{out} (V)

Coefficients of this calibration function:
a = 54; b = 0.

Technical data

Warning: to avoid excessive wear of the sensor, don't burden the disc with masses of more than 100g.

Mechanic rotation angle Electric rotation angle	300º ± 5º 270º ± 10º
Angle range Position range	270º ± 10º 140 mm ± 5 mm
Resolution using 12 bit 5V A/D converter	0.07º 0.03 mm
Linearity	± 5 %
Voltage output range	0..5 V
Calibration functions range 0º..270º range -135º..135º range 0..140 mm	 Angle (°) = 54 * V_{out} (V) Angle (°) = 54 * V_{out} (V) − 135 Position (mm) = 28 * V_{out} (V)
Dimensions	Tube length: 9 cm Tube diameter: 2.5 cm Disc diameter inside groove: 60 mm Disc diameter outside: 64 mm Disc thickness: 4 mm Groove width (inside): 1 mm Groove width (outside): 2 mm
Connection	Right-hand BT (British Telecom) connector

Warranty:

The 013i Angle position sensor is warranted to be free from defects in materials and workmanship for a period of 12 months from the date of purchase provided that it has been used under normal laboratory conditions. This warranty does not apply if the sensor has been damaged by accident or misuse.

Note: *This product is to be used for educational purposes only. It is not appropriate for industrial, medical, research, or commercial applications.*

Rev. 1/11/12