PRESSURE SENSOR 023I
0 .. 700 KPA
User's Guide

Figure 1. The Pressure sensor 0..700 kPa

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Description

The Pressure sensor (023i) is designed to measure absolute gas pressure in the range between 0 and 700 kPa (0 to 7 atm). The pressure is measured via a pressure port located on the side of the sensor box.
The Pressure sensor uses the Motorola MPX5700AP pressure chip. This element has a membrane that flexes as pressure changes. It is arranged to measure absolute pressure, so one side of the membrane is a vacuum. The sensor produces an output voltage that varies in a linear way with absolute pressure. Special circuitry minimizes the errors that might be caused by changes in temperature.
The pressure sensor is fairly durable but it is designed only for use with non-corrosive, non-ionic working gasses such as air, dry gases and the like.
Do not get it wet.

The 023i Pressure sensor is delivered with the following accessories:

- one plastic 20-ml syringe with Luer-lock, for use in a simple Boyle experiment;
- two plastic tubes with an inside diameter of 3.2 mm (5 cm and 45 cm long), which can be attached to the port of the pressure sensor;
- one three-way valve with Luer-lock connectors, when the blue "Off" handle is aligned with one of the valve stems, it closes off this stem;
- two Luer-lock connectors.

The 023i Pressure 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 023i Pressure 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

The Pressure sensor can be used in various experiments such as:

- measurements of pressure changes in gas-law experiments (Boyle's law and Gay-

[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.

Lussac's law
- measurements of reaction rates as a gas is produced in a chemical reaction
- measurements of vapor pressure of various liquids and solutions.

Calibration

The output of the Pressure sensor is linear with respect to absolute pressure. To collect data you can:

1. Use the calibration supplied by the sensor (EEPROM memory).
2. Use the calibration supplied in the standard sensor library of the Coach program. The name of the pressure sensor in the sensor library of Coach is Pressure sensor (023i) (CMA) (0..700 kPa).
3. Calibrate the pressure sensor. The calibration can be performed in the Coach software. You can prepare a two-point calibration using two different pressures measured with another pressure gauge. For the first calibration point you can use atmospheric pressure as measured by barometer. For the second point you can apply pressure with a pump, measuring it at the same time with a pressure gauge.

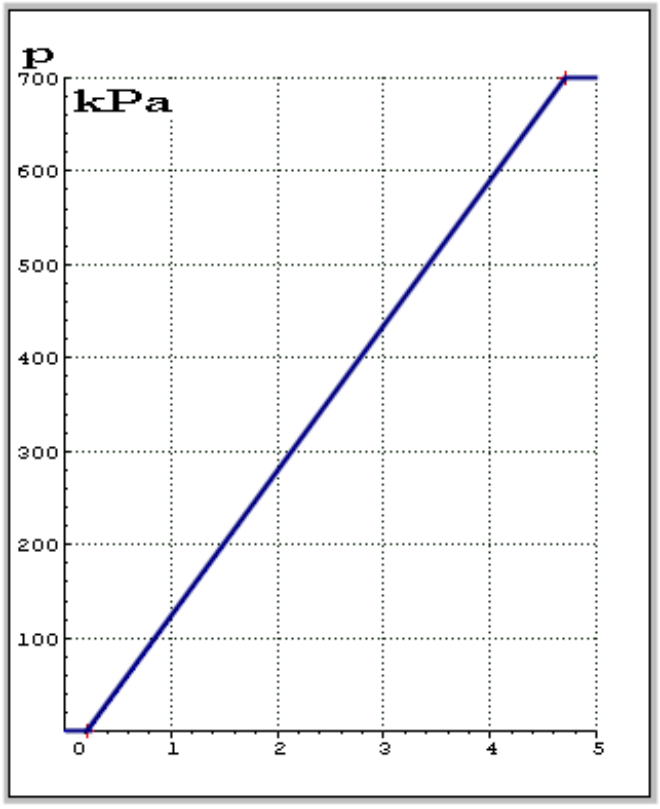

Figure 2.
Default calibration graph of the 023i Pressure sensor (used in the standard Coach sensor library and in the sensor memory).
p (kPa) = 156.25 * V_{out} (V) - 34.375

Coefficients of the calibration function:
a= 156.25; b= -34.375.

Technical data

Pressure range	0 – 700 kPa (0 - 7 atm)
Voltage output range	0.2 - 4.7 V
Calibration function	p (kPa) = 156.25 * V_{out}(V) - 34.375
Resolution using 12 bit AD converter	0.19 kPa (0.0019 atm)
Max. pressure	1000 kPa without permanent damage
Connection	Pressure port for use with standard plastic tubing
Usage	Only for non-corrosive gasses, non-ionic working gasses such as air, dry gases and the like. Keep the sensor dry!
Long term stability	± 0.1 % full scale reading
Response time	1 ms
Sensor information for Auto-ID and calibration	256 byte serial EEPROM
Connection	Right-hand BT (British Telecom) connector

Warranty:

The 023i Pressure 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.*

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