IA 110
Calibrating a pressure sensor

Description

- **test-pressure generated with dead-weight piston manometer**
- **electronic pressure sensor with ceramic measuring cell**
- **plotting a calibration curve**
- **compact experimental unit for group working or demonstration**

The experimental unit IA 110 can be used to calibrate an electronic pressure sensor under practical conditions.

The test pressure is generated with a conventional piston manometer. The piston is loaded with weight rings and generates a defined test pressure $p = F_G/A_P$, where F_G is the force due to the weights and A_P is the cross-sectional area of the piston. A hand-operated spindle is used to relieve the pressure after measurement allowing the piston to return to a rest position. The influence of friction is minimised by rotating the piston during measurement. The test pressure generated in this way is applied to the diaphragm of a pressure sensor. The pressure-dependent electrical output signal is indicated on a digital display.

The pressure sensor used is a state-of-the-art ceramic measuring cell, in which strain-dependent piezo resistors are mounted on a ceramic diaphragm. The resistors are configured to form a measuring bridge. An integrated amplifier circuit evaluates the pressure-dependent detuning of the measuring bridge and outputs a proportional voltage signal.

The kit also includes a second pressure sensor in the form of a cutaway model for enhanced clarity. The entire experimental unit is contained in a compact housing, and is easy to handle.

Learning objectives/experiments

- familiarisation with, and carrying out of the calibration of an electronic pressure sensor
- plotting the sensor output signal dependent on the pressure applied
- familiarisation with the design and operation of a piezo-resistive electronic pressure sensor
- familiarisation with the installation and connection of the pressure sensor
- information on applications, measuring ranges and accuracies of typical electronic pressure sensors

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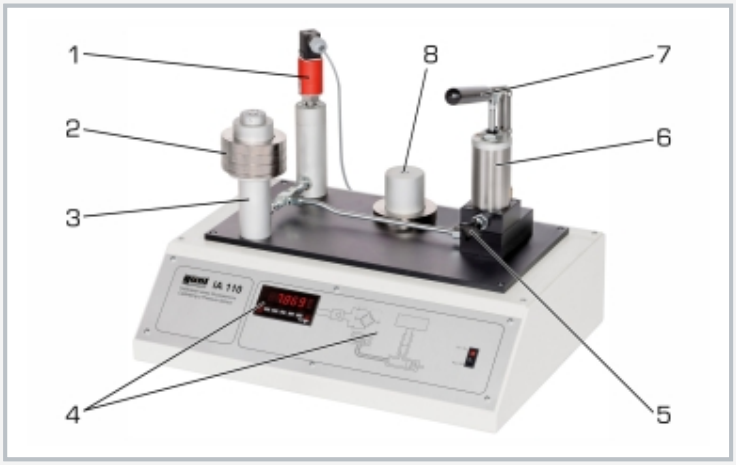
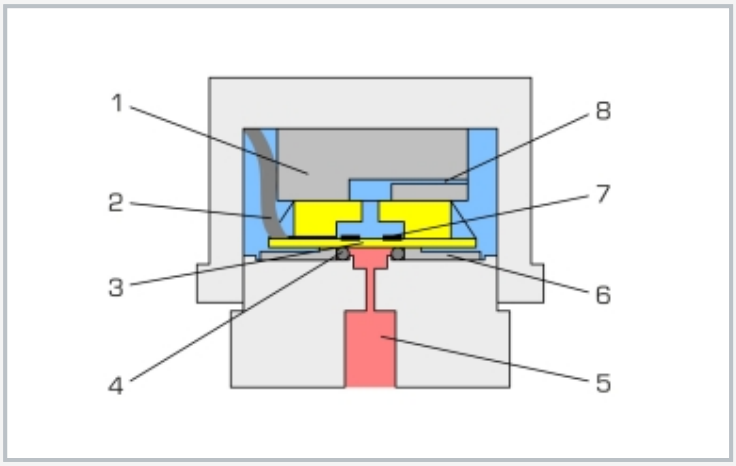
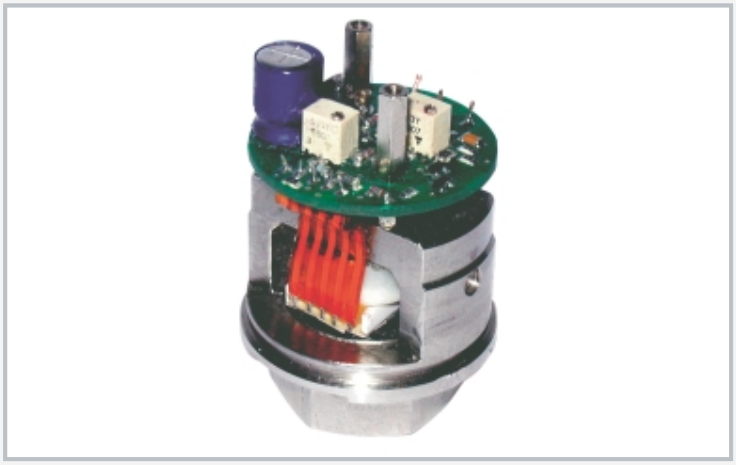


1 pressure sensor being calibrated, 2 loading device: weight carrier with piston and weights, 3 cylinder, 4 digital display for displaying the output signal and process schematic, 5 manual adjustment to relieve the pressure, 6 compensating cylinder, 7 pump lever for the compensation cylinder, 8 holder for weight carrier



1 brace, 2 connecting cable, 3 ceramic measuring cell with diaphragm, 4 sealing ring, 5 pressure connection, 6 pressure plate, 7 piezo resistors, 8 pressure equalisation bore for relative pressure measurement



Interior layout of an electronic pressure sensor

Specification

[1] calibration unit with dead-weight piston manometer and hand-operated spindle
[2] electronic pressure sensor with ceramic measuring cell, integrated amplifier and voltage output
[3] digital display for output signal
[4] additional pressure sensor as cutaway model
[5] set of weights
[6] transmission medium: hydraulic oil
[7] process schematic on front panel

Technical data

Pressure sensor
- measuring range: 0...2,5bar
- supply: 24VDC
- output signal: 0...10VDC

Piston manometer with pressure piston
- diameter: 12mm
- number of weights: 5
- pressure graduations:
  - 0,5bar
  - 1,0bar
  - 1,5bar
  - 2,0bar
  - 2,5bar

Digital display: 4 1/2 digits

Hydraulic oil: HLP ISO 32

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase
120V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 440x600x435mm
Weight: approx. 20kg

Scope of delivery

1 experimental unit
1 set of weights
1 oil (1L)
1 cutaway model
1 set of instructional material

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Optional accessories

020.30009	WP 300.09	Laboratory trolley