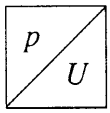
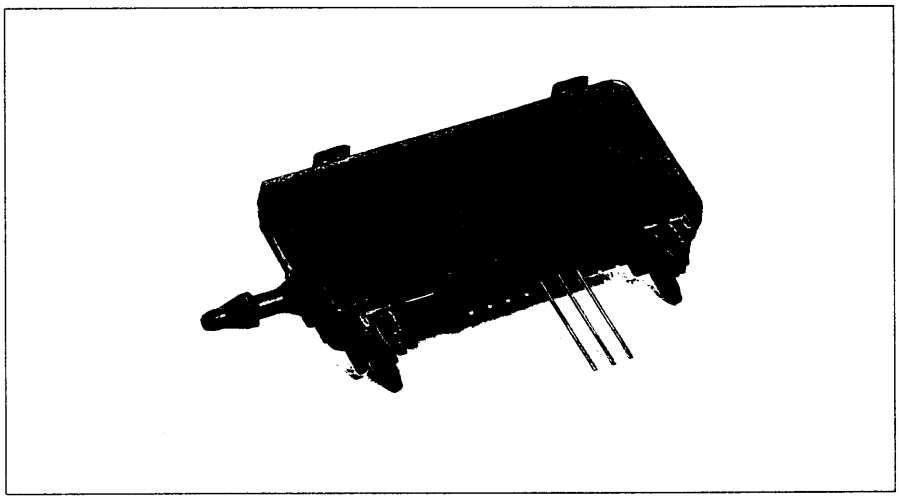
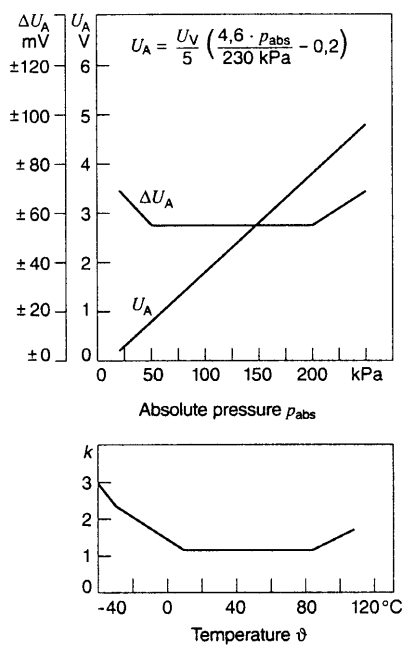
Piezoresistive absolute-pressure sensors (contd.)
Measurement of gas pressures up to 300 kPa



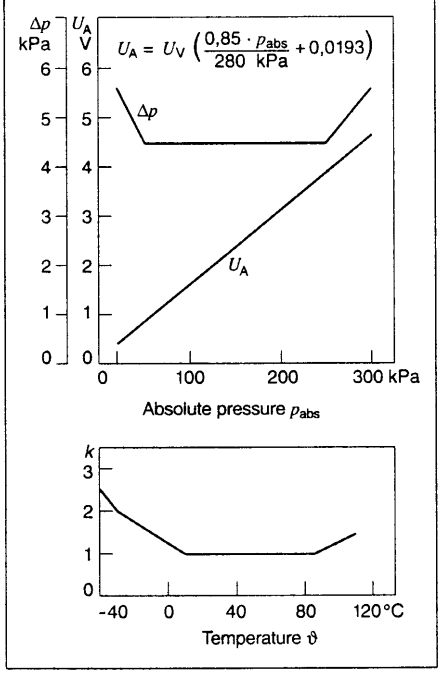
- Thick-film pressure-measuring element ensures a high degree of measurement sensitivity
- Thick-film sensor element and IC on the same substrate guarantee problem-free signal transmission
- Integrated evaluation circuit for signal amplification, temperature compensation, and characteristic-curve adjustment
- Suitable for pcb mounting



Characteristic curves 1 (U_V = 5 V).



Characteristic curves 2 (U_V = 5 V).



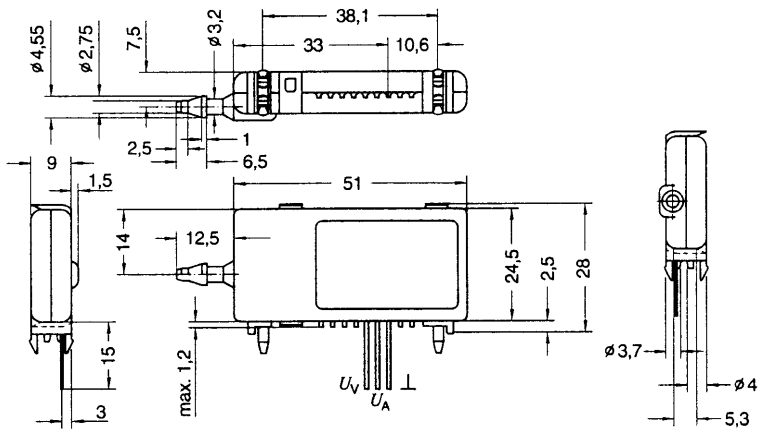
Technical data / Range

Measuring range p_{abs} kPa	Measuring range p_{abs} bar	Max. pressure (1 s, 30 °C) p_{max} kPa	Pressure-change time [1] (10...90%) ms	Deviation from measuring excursion [2] %	Operating temperature range °C	Load impedance kΩ	Output voltage at U_V = 5V U_A V	Supply voltage U_V V	Supply voltage Max. (1 min) U_{Vmax} V	Input current U_V = 5.25 I_V mA	Characteristic curves	Part number
20...250	0.2...2.5	600	4...8	1.6	–40...+110	≥ 50	0.2...4.8	4.75...5.25	16	≤ 10	1	**0 273 003 210**
20...300	0.2...3.0	500	6...10	1.6	–40...+110	≥ 50	0.25...4.8	4.75...5.25	16	≤ 10	2	**0 273 003 211**

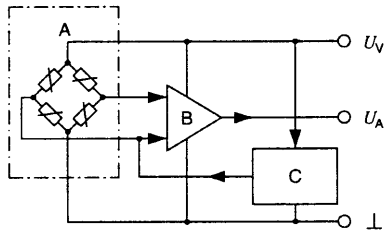
[1] Rise time of the output voltage U_A, which occurs for a "pressure jump" from 0...100 % of the pressure range; whereby the output voltage changes from 10...90 % of its total range.

[2] At +10...+85 °C.

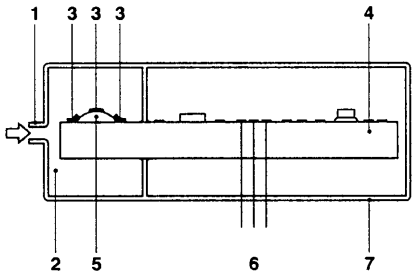
Dimension drawing



Block diagram
A Strain-gauge pressure-measuring cell, B Amplifier, C Temperature-compensation circuit.



Design
1 Pressure connection, 2 Pressure-housing interior, 3 Piezo-resistive resistors, 4 Thick-film substrate, 5 Reference pressure bubble, 6 Electrical connections, 7 Housing.



Design and function

The heart of this sensor is the "sensor bubble" (pressure-measuring element) produced using 100% thick-film techniques. It is hermetically sealed on a ceramic substrate and contains a given volume of air at a reference pressure of approx. 20 kPa. Piezo-resistive thick-film strain gauges are printed onto the bubble and protected with glass against aggressive media. The strain gauges are characterized by high measurement sensitivity (gauge factor approx. 12), as well as by linear and hysteresis-free behavior. When pressure is applied, they convert mechanical strain into an electric signal. A full-wave bridge circuit provides a measurement signal which is proportional to the applied pressure, and this is amplified by a hybrid circuit on the same substrate. DC amplification and individual temperature compensation in the –40...+110 °C range, produce an analog, ratiometric (i.e. proportional to the supply voltage U_V) output voltage U_A. The pressure sensors are resistant to gauge pressures up to 600 kPa.
Outside the temperature range 10...85 °C the permissible tolerance increases by the tolerance multiplier. To protect the sensors, the stipulated maximum values for supply voltage, operating-temperature, and maximum pressure are not to be exceeded.

Installation instructions

A hose is used for the connection between the sensor and the gas pressure to be measured. Upon installation, the sensor pressure connection should point downwards to prevent the ingress of moisture. Four spring feet are provided for attachment to the pcb. Electrical connection is via 3 pins in 1/10″ raster.

Explanation of symbols

U_V Supply voltage
U_A Output voltage
ΔU_A Permissible output-voltage deviation in the range 10...85 °C
k Tolerance multiplier
ϑ Temperature
p_{abs} Absolute pressure
Δp Permissible accuracy in the range 10...85 °C