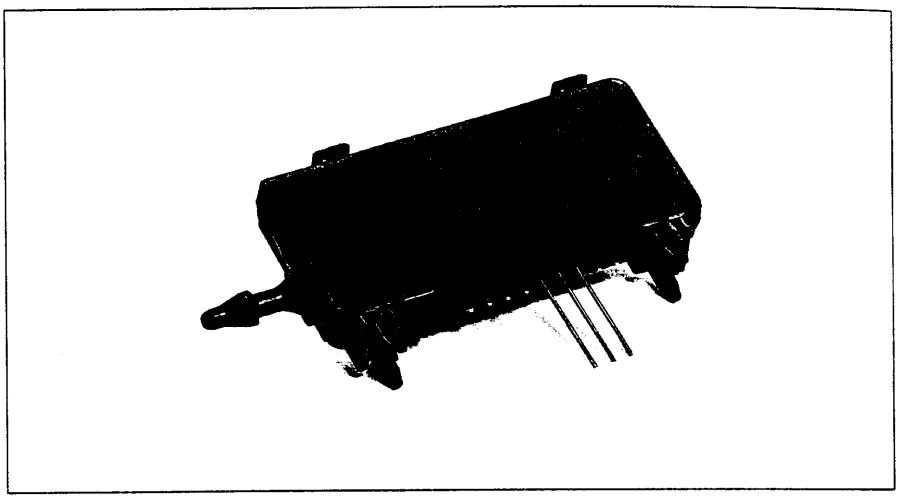
711 9847

Piezoresistive absolute-pressure sensors

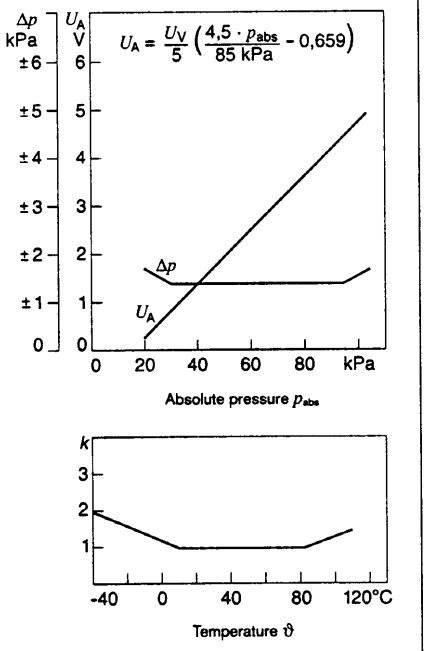
Measurement of gas pressures up to 2.5 bar

p/U

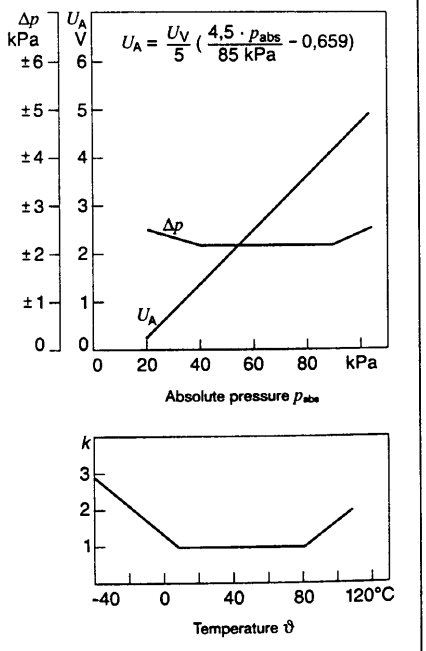
- Thick-film pressure-measuring element ensures a high degree of measurement sensitivity
- Thick-film sensor element and IC on the same substrate guarantee problem-free signal transmission
- Integrated evaluation circuit for signal amplification, temperature compensation, and characteristic-curve adjustment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



Characteristic curves 1 (U_V = 5 V).



Characteristic curves 2 (U_V = 5 V).



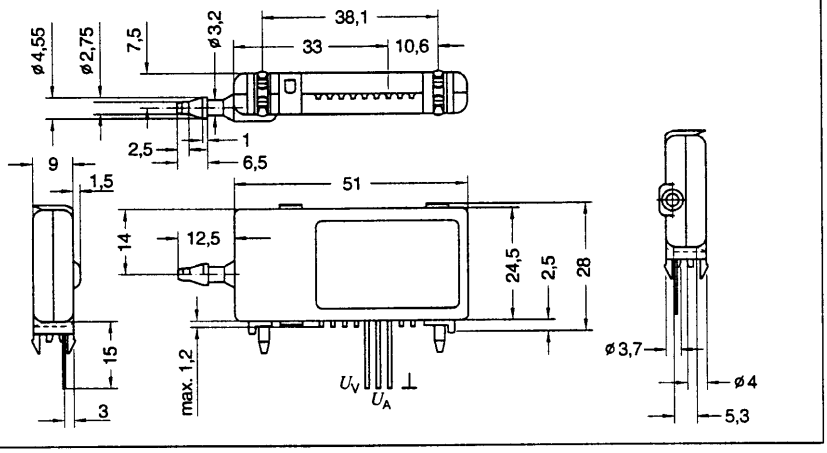
Technical data / Range

Measuring range p_{abs} kPa	Measuring range p_{abs} bar	Max. pressure (1s, 30 °C) p_{max} kPa	Pressure-change time [1] (10...90%) ms	Deviation from measurement range [2] %	Operating-temperature range °C	Load impedance ≥ kΩ	Output voltage at U_V = 5V U_A V	Supply voltage Rated U_V V	Supply voltage Max. (1min) U_{Vmax} V	Input current U_V = 5.25 I_V mA	Characteristic curves	Part No.
20...105	0.2...1.05	600	4...8	1.6	–40...+110	50	0.4...4.9	4.75...5.25	16	≤ 10	1	0 273 003 206
20...105	0.2...1.05	600	≤ 10	2.6	–40...+110	50	0.4...4.9	4.75...5.25	16	≤ 10	2	0 273 003 203
20...200	0.2...2	600	4...8	1.6	–40...+110	50	0.25...4.8	4.75...5.25	16	≤ 10	3	0 273 003 209
20...200	0.2...2	600	≤ 10	2.2	–40...+110	50	0.25...4.8	4.75...5.25	16	≤ 10	4	0 273 003 204

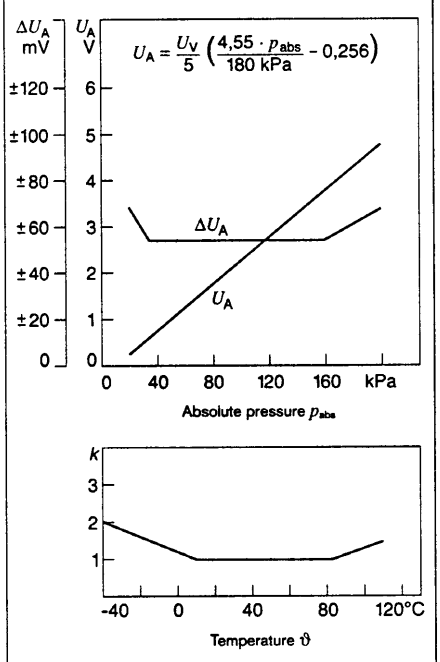
[1]) Output-voltage rise time U_A which occurs upon a pressure jump from 0 ... 100 % of the total pressure range; whereby the output voltage changes from 10 ... 90 % of its total range.

[2]) At + 10 ... + 85 °C.

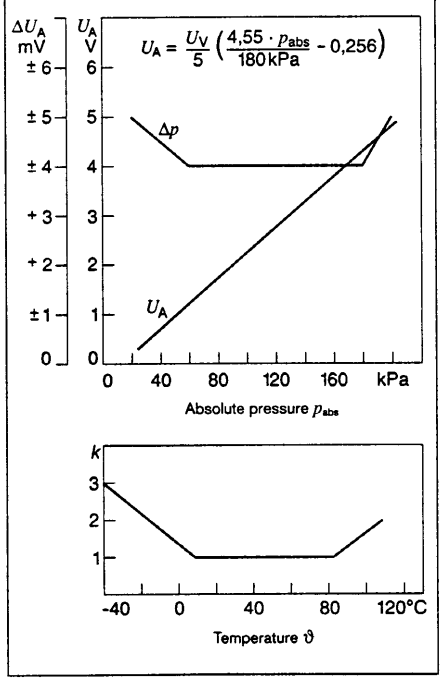
Dimension drawing



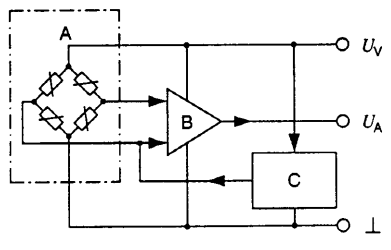
Characteristic curves 3 (U_V = 5 V).



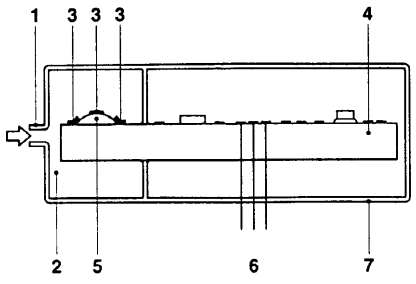
Characteristic curves 4 (U_V = 5 V).



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



Design
1 Pressure connection, 2 Pressure-housing interior, 3 Piezoresistive resistor, 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. Piezoresistive thick-film strain gauges are printed onto the bubble and protected with glass to guard against aggressive media. These strain gauges are characterized by a high level of measurement sensitivity (gauge factor approx. 12), as well as by linear and hysteresis-free behaviour. Upon application of pressure, they convert mechanical strain into an electric signal. A full-wave bridge circuit provides a measurement signal which is proportional to the pressure and 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 deviation increases by the tolerance multiplier. In order to protect the sensors, the stipulated maximum values for supply voltage, operating-temperature range, and maximum pressure are not to be exceeded.

Installation instructions

A hose forms the connection between the sensor and the gas pressure to be measured. Upon installation, the sensor pressure connection should face downwards, so as to prevent the ingress of moisture. 4 spring feet are provided for fastening to the pcb. Electrical connection is via 3 pins in 1/10″ raster.

Explanation of symbols

U_V Supply voltage
U_A Output voltage for U_V = 5 V
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