ZIROX
Sensoren und Elektronik GmbH

ZIROX® Vacuum Probe

Properties

Main part of the ZIROX® vacuum probe is a potentiometric zirconia solid electrolyte cell. Due to the several oxygen partial pressure (inside and outside the vacuum recipient) a voltage occurs between measuring and reference electrode. This voltage is proportional to the logarithm of the oxygen partial pressures. From the cell voltage the oxygen partial pressure at measuring electrode can be calculated according to the NERNST equation.

The connection head contains the electronic for heating control and signal processing and the membrane pump fort he reference gas supply.

In contrast to the ZIROX® normal pressure probes the vacuum probe is not calibration free. The reason are the special sensor heating (inside the probe tube) and several conditions at the measuring electrode (energy removal depends on gas pressure and thermal conductivity). Therefore isothermal electrodes, necessary for the correct using of the NERNST equation can not be realized. But for a process control the using of empiric determined values is mostly enough.
For the measurement of oxygen partial pressures the probe must be calibrated by user (test measurements).
Under normal pressure the probe voltage, determined in a stationary state (surrounding air) can be subtracted as constant offset.

Applications

The ZIROX® vacuum probe serves for the determination of oxygen partial pressures in low pressure equipments. Typical examples are measurements in vacuum processes (PVD, CVD or other plasma processes), in surface treatment applications as well for measurements for material-scientific investigations.

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Technical Data

Inbuilt length	140…300 mm
Diameter	6 mm, with protection tube 16 mm
Mass	1.5 kg
Dimension clamp head	150 x 63 x 35 mm
Protection degree	IP54
Flange	KF40, others on request
Max. temperature at flange	60 °C
Power supply	24 V DC +/- 10 %
Current consumption	1.2 A
Heating power	30 W
Pressure range	$1{,}5 \times 10^{5}$…1×10^{-5} Pa
Sensor voltage range	0…400 mV or 0…1200 mV (range changing on curcuit board)
Range (oxygen partial pressure)	1×10^{5}…1×10^{-21} Pa
Output signal	0-20 mA
Accuracy	< 5 % rel. error
Sensor working temperature	700 °C (electronically controlled)
Offset (with protection sleeve)	-15…-20 mV
Helium leak rate	< 10^{-8} mbar l/s
Gas flow	max. 10 m/s
Reference gas	surrounding air
Reference gas flow	5…10 l/h (by internal pump)

Plug assignment (Type 423 6pol., Fa. Binder, Best.-Nr.: 99-5622-15-06):

1	+ 24 V	
2	GND	
3	+ Iout	20 mA corresponds to 400 or 1200 mV (as adjusted)
4	- Iout	
5	Ready contact (potential free)	60V/1A DC or 125V/1A AC
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