

## ZIROX Vacuum Probe

### Properties

Main part of the ZIROX vacuum probe is a potentiometric zirconia solid electrolyte cell. Due to the several oxygen partial pressures (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 the measuring electrode can be calculated according to the NERNST equation.

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

In contrast to the ZIROX normal pressure probes, the vacuum probe is not calibration-free. The reason are the special sensor heater (inside the probe tube) and several conditions at the measuring electrode (energy removal depends on gas pressure and thermal conductivity). Therefore, isothermal electrodes cannot be provided for the correct use of the NERNST equation. For process control, however, the use of empirically determined values is mostly sufficient.

For measuring oxygen partial pressures, the user must calibrate the probe (test measurements). Under normal pressure the probe voltage, determined in a stationary state (ambient air), can be subtracted as constant offset.

### Applications

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



ZIROX Vacuum Probe

Sensoren und Elektronik GmbH



## Technical Data

Inbuilt length .....	140...300 mm
Diameter .....	6 mm, with protection tube 16 mm
Weight .....	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 x 10 <sup>5</sup> ...1 x 10 <sup>-5</sup> Pa
Sensor voltage range .....	0...400 mV or 0...1200 mV (range switchover on circuit board)
Range (oxygen partial pressure) .....	1 x 10 <sup>5</sup> ...1 x 10 <sup>-21</sup> Pa
Output signal .....	0-20 mA
Accuracy .....	< 5 % rel. error
Sensor operating temperature.....	700 °C (electronically controlled)
Offset (with protection sleeve).....	-15...-20 mV
Helium leak rate.....	< 10 <sup>-8</sup> mbar l/s
Gas flow.....	max. 10 m/s
Reference gas .....	ambient 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	60V/1A DC or 125V/1A AC
6	(potential-free)	

