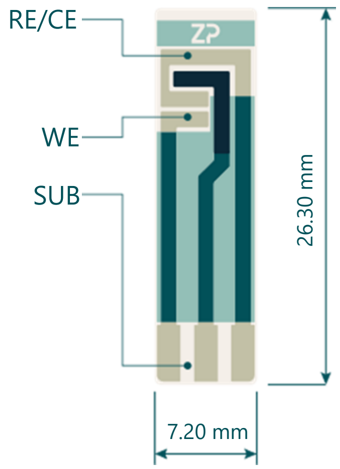
Technical Datasheet

CONDUCTIVITY SENSOR



Sensor

REFERENCE ELECTRODE (RE) / COUNTER ELECTRODE (CE)
Silver/Silver Chloride

WORKING ELECTRODE (WE)
Silver/Silver Chloride

SUBSTRATE (SUB)
PET

Dimensions

Length	26.30 ± 0.10 mm
Width	7.20 ± 0.10 mm
Substrate thickness	0.30 ± 0.02 mm
Thickness print	0.05 ± 0.02 mm
Weight	0.087 ± 0.004 g
Width between Electrodes	0.34 ± 0.10 mm

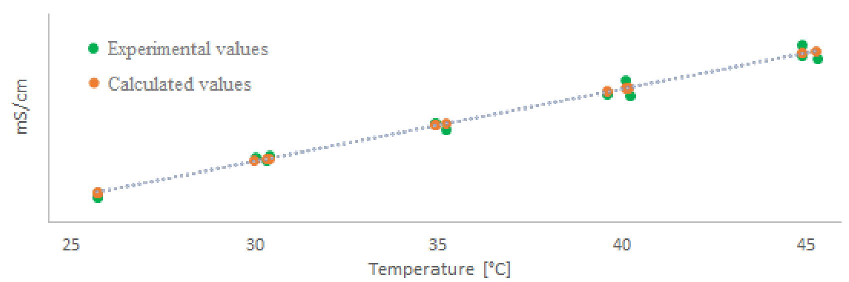
General description

Sensor Name:	Conductivity Sensor
Sensor Product Code:	ZPS CON-000-00238
Revision number:	ZPS CON-003-00238 v0.3

Production description

Conductivity sensors suitable for disposable applications and continuous monitoring. They can typically be reused when operated under recommended conditions.

Performance



For the best possible outcome, we recommend using the sensor with ZP supplied EIS potentiostats and our on-cloud data management system, djuli.

Figure: Applied conditions: Applied ac potential 5 (mV), frequency range 100-100 000 (Hz). Obtained values: Cell constant of 2.258 (1/cm) and temperature coefficient, α, 0.02 (1/°C) and ≤ 400 (mM) of total dissolved salts in aqueous media.

Conductivity measurements are temperature dependent. The degree to which temperature affects conductivity in comparison to the calibration temperature can be calculated using the Equation 1:

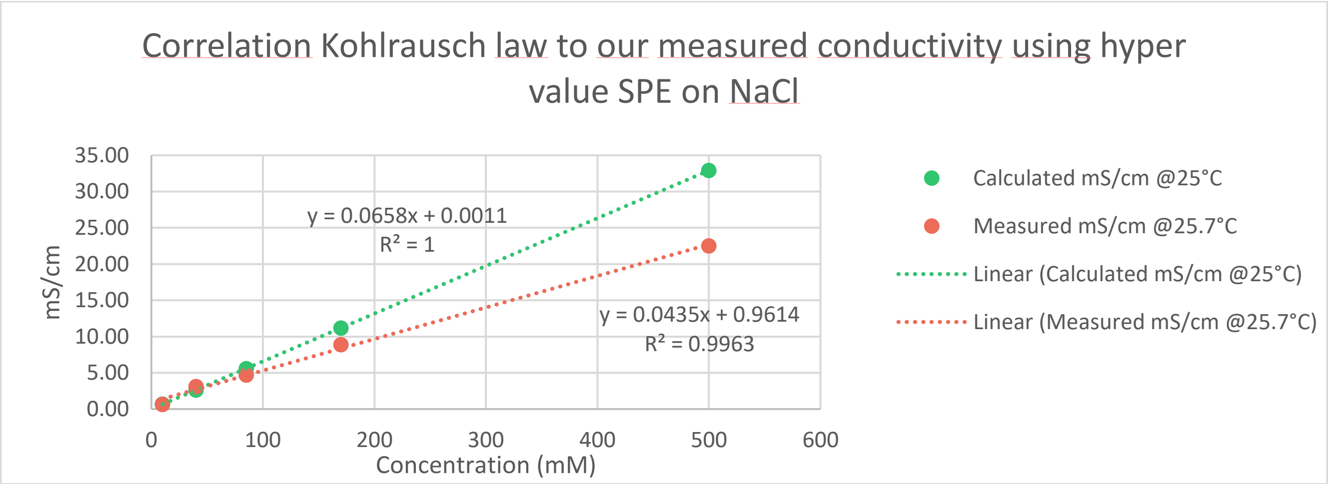
Equation 1 $$G_t = G_{tcal}\{1 + \alpha(t - t_{cal})\}$$

Where: G_t : conductivity at any temperature t (°C), G_{tcal} = conductivity at calibration temperature tcal (°C), & α = temperature coefficient of solution at tcal (°C).

The molar conductivity of strong electrolytes is expected to follow the Kohlrausch law (Equation 2). For sufficiently diluted solutions, thus the molar conductivity is expected to be approximately constant and equal to the molar conductivity at infinite dilution. In other words, the plot of the conductivity as a function of the concentration gives a linear correlation with similar slope. In Figure x we display the results obtained at our labs.

Equation 2: $$\Lambda_m = \Lambda_m^0 - K\sqrt{c}$$

Where Λ_m^0 is the molar conductivity at infinite dilution and *c* is the concentration of the solution. *K* is an empirical proportionality constant to be obtained from the experiment.



The molar conductivity of weak electrolytes, is dependent on the degree of dissociation of the electrolyte. At the limit of very dilute solutions, the Ostwald dilution law (Equation 3) is expected to be followed,

Equation 3 $$\frac{1}{\Lambda_m} = \frac{1}{\Lambda_m^0} + \frac{\Lambda_m}{(\Lambda_m^0)^2}\frac{C_A}{K_d}$$

Where C_A is the analytical concentration of the electrolyte and K_d is the dissociation constant.

The molar conductivity at infinite dilution can be decomposed into the contributions of each ion, (Equation 4)

Equation 4

$$\Lambda_m^0 = \nu^+\lambda^+ + \nu^-\lambda^-$$

Where λ^+ and λ^- are the ionic conductivities of the positive and negative ions, respectively, and ν^+ and ν^- are their stoichiometric coefficients in the salt molecular formula. From the concentration dependence of the molar conductivity of each salt, it is possible to obtain the molar conductivities at infinite dilution through Equation 1. If salts sharing the same type of ions are studied, it is possible to obtain ionic conductivities, which are intrinsic properties of the transport of each ion in the solvent studied.

Components and hazards

Ingredients to be disclosed according to regulations:

Component (CAS nr.)	**Hazards classification**	**Weight percent [%]**
Silver (7440-22-4)	H400, H410	1-6 %
Silver Chloride (7783-90-6)	H400, H410	1-6 %

Take caution when handling these sensors, as there might be sharp parts and hazardous chemicals. Use personal protective equipment. Handle with gloves.

Storage

Recommended storage temperature 2-25°C, 20-50% RH. Keep dark, protect from exposure to UV-light. Keep sensor container tightly closed in a dry and well-ventilated place. Proper storage of sensors requires the sensing area to be facing upwards, free from any contact or interference. Recommended shelf life of 6 months.

Disclaimer

This product is for research applications only. This product is not suitable for drug, food or household applications. The product is not tested for biocompatibility and ZP takes no responsibility for in-vivo usage. It is intended to be used in aqueous systems. Please contact ZP for further discussion of your intended application.

Take caution when handling the sensors, as there might be sharp parts and chemical hazards. Use personal protective equipment.

Developer note

Zimmer and Peacock can also make customized sensors with the option to target other analytes than those listed in respective datasheet. We can offer different electrode configurations, geometry, and materials. Sensors are also available as microwell and microfluidic cavity formats. Please contact us through the contact form on www.zimmerpeacock.com or by e-mail on sales@zimmerpeacock.com for questions regarding customized sensors.