Knowledge Beyond Measure.

Electrical Ionizer

Model 1090

Conditioning the electrical charge on aerosol particles to a Boltzmann equilibrium charge.

The Electrical Ionizer 1090 is an aerosol charge conditioner for conditioning the electrical charge on aerosol particles to a Boltzmann equilibrium charge equivalent to that produced by a radioactive ionizer, but without the use of radioactivity. It uses an AC corona discharge to generate high concentrations of positive and negative ions for aerosol charge conditioning without generating undesirable contaminant particles. When operated within the design flow rate of 0.5 to 2.5 L/min, the model 1090 can be used confidently as a replacement for radioactive ionizers for high accuracy aerosol measurement by electrical mobility.

The model 1090 can be used as a stand-alone ionizer for charge-conditioning in experimental research. It can also be used as a charge-conditioner for aerosol concentration and size distribution measurement by differential mobility and/or scanning mobility analysis. It is also offered as an accessory for the 1000XP Wide-Range Particle Spectrometer (WPS) from MSP® to measure aerosol concentration and size distribution from 10 to 10,000 nm.

Applications

- Charge conditioning for electrical mobility aerosol spectrometers
- Aerosol neutralization for aerosol generators
- Aerosol neutralization for filter testing

Performance

For aerosols in Boltzmann charge equilibrium, the charge distribution is described by

$$f_n = \frac{exp(-n^2e^2 / d_pkT)}{\sum_{n=-\infty}^{\infty} exp(-n^2e^2 / d_pkT)}$$

where e is the elementary unit of charge, dp is the particle diameter, k is the Boltzmann constant, T is the absolute temperature, n is the number of elementary units of charge on the particles and f_n is the fraction of particles in the aerosol carrying n elementary units of charge. Figure 1 shows the particle charge distribution according to the Boltzmann's law.

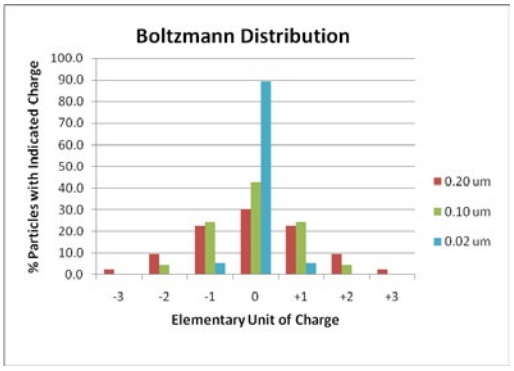

Figure 1. Charge distribution according to Boltzmann law

Figure 2 shows the room air size distribution measured by scanning mobility spectrometry using the WPS and the electrical ionizer and Po^{210} neutralizer as a charge conditioner.

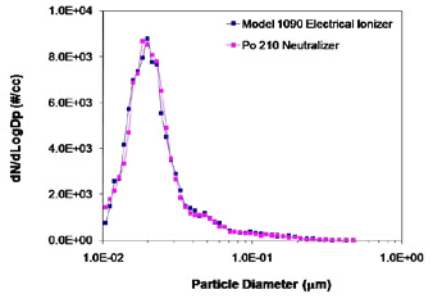

Figure 2. Room air comparison using electrical ionizer and a Po^{210} neutralizer as a charge conditioner

Figure 3 shows the size distribution analysis of 100.7 nm PSL spheres by scanning mobility spectrometry using the WPS comparing the result using the electrical ionizer and the Po^{210} neutralizer.

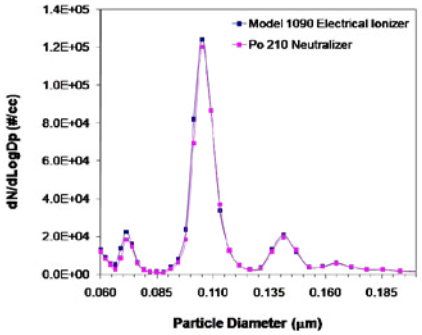

Figure 3. Comparison for 100.7 nm PSL using the electrical ionizer and a Po^{210} neutralizer as a charge conditioner

Specifications are subject to change without notice.

Figure 4 shows the size distribution of a high concentration NaCl aerosol measured by the WPS when using an electrical ionizer and the Po^{210} neutralizer as a charge conditioner.

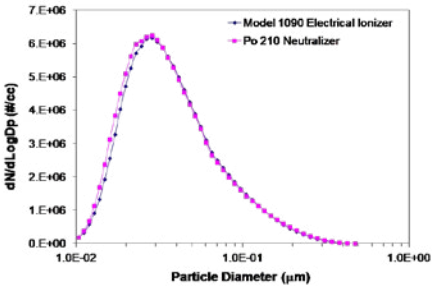

Figure 4. Comparison for NaCl aerosol using the electrical ionizer and a Po^{210} neutralizer as a charge conditioner

Specifications

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Aerosol Flow Rate	0.5 to 2.5 L/min
Aerosol Diameter	10 nm to 10 µm
Inlet Port	¼" OD Tube
Outlet Port	¼" Swagelok nut with nylon ferrules
Input Voltage	115 or 230 VAC
Input Frequency	50 or 60 Hz
Input Current	<0.2 A @ 115VAC; <0.1 A @ 230 VAC
Dimensions (WxHxD)	25.5 cm x 15.5 cm x 23.2 cm
Weight	5.4 kg.

To Order

Specify	Description
1090	Electrical Ionizer

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