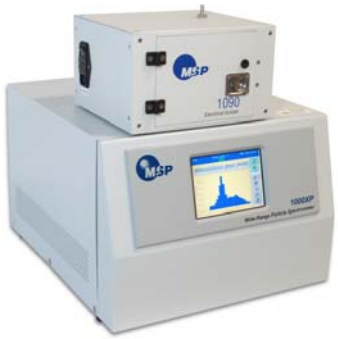
PRODUCT INFORMATION

Model 1090—Electrical Ionizer

- For charge conditioning to generate a Boltzmann equilibrium charge on aerosol particles without radioactivity
- High accurate charge conditioning for aerosol concentration and size distribution measurement by electrical mobility
- Electrical ionizer shown mounted on the WPS™ (right)



DESCRIPTION

The Model 1090 Electrical Ionizer is an aerosol charge conditioner for conditioning the electrical charge on aerosol particles to a Boltzmann equilibrium charge similar to that produced by a radioactive ionizer, but without the use of radioactivity.

The Model 1090 uses an AC corona discharge to generate high concentrations of positive and negative ions for aerosol charge conditioning without generating undesirable extraneous particles. When operated within the design flow rate of 0.5 to 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 Model 1000XP Wide-Range Particle Spectrometer (WPS™) from MSP to measure aerosol concentration and size distribution from 5 – 10,000nm, with the same ease of use as the of a radioactive ionizer but without the use of radioactivity.

PERFORMANCE

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

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

where e is the elementary unit of charge, d is the particle diameter, k is the Boltzmann constant, T is the absolute temperature, n is the number of elementary unit 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.

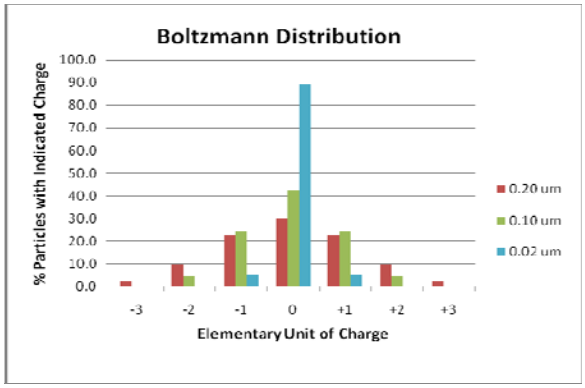


Figure 1. Charge distribution according to Boltzmann law

Figure 2 shows the room air size distribution measured by scanning mobility spectrometry using the WPS and the electrical ionizer and Po210 ionizer as a charge conditioner.

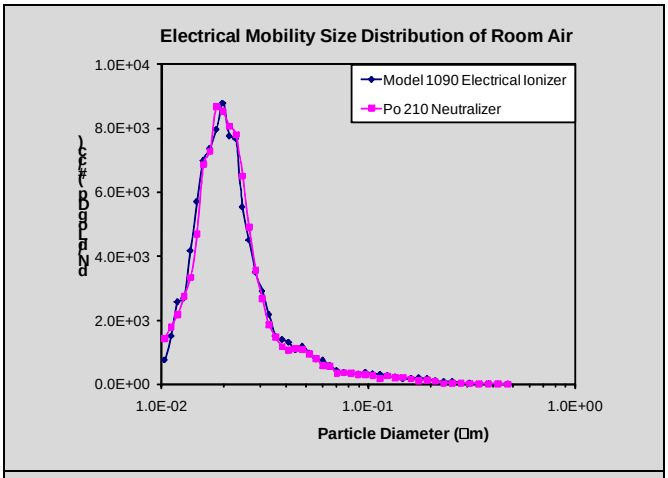


Figure 2. Room air comparison using electrical ionizer and a Po210 Ionizer as a charge conditioner

Figure 3 shows the size distribution analysis of 100.7nm PSL spheres by scanning mobility spectrometry using the WPS comparing the result using the electrical ionizer and the Po210 ionizer.

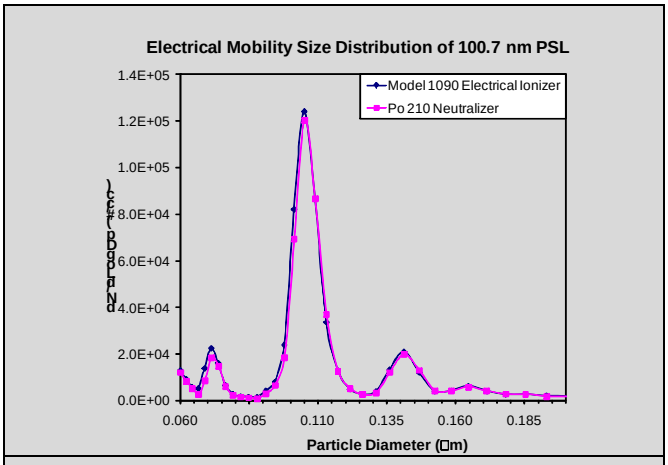


Figure 3. Comparison for 100.7 nm PSL using the electrical ionizer and a Po210 ionizer as a charge conditioner

Figure 4 shows the discrepancy that can develop when using an electrical ionizer outside its normal operating range in comparison with the Po 210 ionizer.

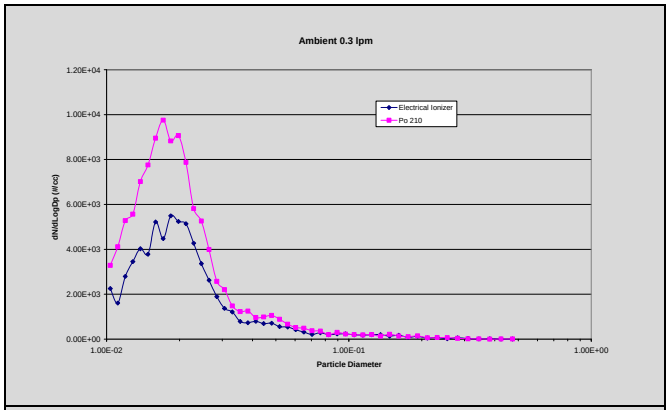


Figure 4. Room air comparison outside electrical ionizer normal operating range with a Po210 Ionizer

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SPECIFICATIONS

Subject to change without notice

1	Aerosol Flow Rate (L/min)	0.5 to 5.0 L/min
2	Aerosol Diameter	10 nm to 10 μm
3	Inlet Port	¼" OD Tube
4	Outlet Port	¼" Swagelok Nut with nylon ferrules
5	Input Voltage (V)	115 or 230 VAC
6	Input Frequency (Hz)	50 or 60 Hz
7	Input Current (A)	<0.2 A @ 115VAC; <0.1 A @ 230 VAC
8	Dimensions (cm x cm x cm)	25.5 W x 15.5 H x 23.2 D
9	Weight (kg)	5.32