SIMCO ION™
An ITW Company

APPLICATION NOTE

Electrical Ionizer EMF

Electric Fields Associated with Ionizers

Electrical ionizers use high voltage to produce electric fields capable of creating gas ions to reduce electrostatic charges. These fields are produced largely around the ionizer emitter points. It is quite rare for electrical ionizers to interact negatively with manufacturing processes, tools and product. This application note will briefly discuss the nature of electric fields associated with corona ionizers (electrical).

Electric Field Potential

Classically, electromagnetic fields are characterized as smooth and continuous waves propagating away from their source. All electrical equipment produces electromagnetic waves as a byproduct of applied voltages and currents. These electromagnetic waves oscillate at the frequency of the source that produces them.

Corona ionizers typically require high voltages applied to emitter points or wires in the range of 5 kV to 15 kV to produce the electric fields necessary to create gas ions. Due to impedance factors, the near field (which extends approximately a distance of 1/6 wavelength from the ionizer) attenuates the electric field voltage at a rate of 1/r3. This is a very rapid fall off in field voltage.

An example of a wire corona ionizer produced electric field is shown below. In this case, the high voltage wire emitter produces a near electric field of approximately 28V/m (see below). Other ionizer types produce much higher fields.

Measuring the Electromagnetic Field

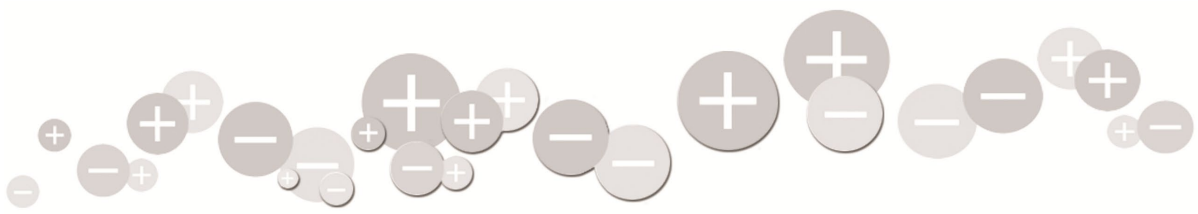
It is typically not easy to accurately measure field strength, especially below the 100 kHz frequency of most ionizers. Some of the reasons are as follows:

- Specialized equipment in the form of spectrum analyzers and appropriate antennas is needed
- Antenna frequency response is critical to accurate measurements
- Detailed knowledge is required of how spectrum analyzers work and how different settings affect measurements
- Influence of nearby structures on propagating electromagnetic fields can affect measurements (as can the equipment itself)
- Many ionizers use modulation technologies which complicates measurement techniques

Avoiding Interference Issues

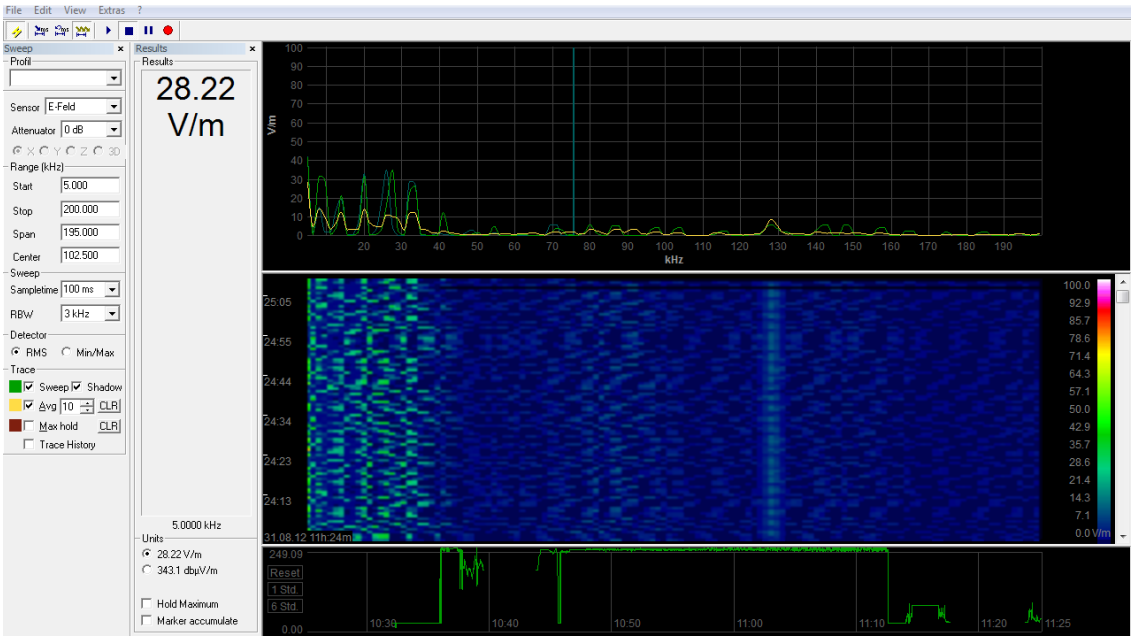
For any product appearing in the ionization field, the induced voltage on conductive elements usually results in equal electric potential. Since the propagating electric field has a fairly gentle gradient over several meters from the ionizer, differences in induced electric potential on product are very minimal.

Many millions of sensitive products have undergone close proximity ionization during manufacturing operations.



There are only a few cases where there is evidence that ionizers have caused either product damage or interference with product testing tools. In all of these cases, repositioning of the ionizer to a greater distance from product has removed the problem. With the introduction of new ultra-low EMI ionizers (e.g., 5710 μWire), this is no longer necessary.

Ionizer high voltage frequencies are well below the operating band for manufacturing tool system components. This separation usually avoids frequency (vs. amplitude) interference problems.



Simco-Ion 5710 µWire Ionizing Bar at 5" Distance from Antenna

SIMCO ION™
An ITW Company

Technology Group
1141 Harbor Bay Pkwy, Ste 201
Alameda, CA 94502
Tel: +1 (800) 367-2452 (in USA)
Tel: +1 (510) 217-0460
ioninfo@simco-ion.com
www.simco-ion.com

AN-015_V2 - 12/20