

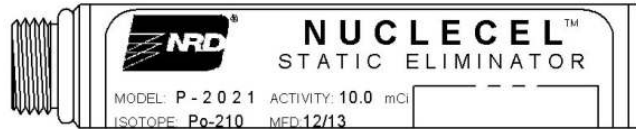


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Instruction Manual

for

Nuclecel™ P-2021 Series Ionizers



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1. Introduction

Since 1969, NRD has produced ionizing radioactive sources that are used in static control, smoke detectors, physics research, space exploration, and instrumentation. NRD is the world's largest and one of the oldest suppliers of radioactive metallic foils. Specially designed equipment and facilities enable us to produce a sealed source device that is safe and is highly effective in eliminating static.

1.1 Our Thanks

Thank you for choosing NRD for your static control needs. You have chosen a highly effective static eliminator device that is reliable, requires no calibration, and is safe. Please review the information in this manual to maximize the benefit of NRD's In-Line Ionizers.

1.2 Other NRD Products

NRD offers static eliminator devices and accessories to eliminate or control electrostatic charges. The many product configurations we offer will fit a wide field of applications. Just call us with your application and we can provide a solution.

The electronics industry uses air ionizers to reduce product damage and loss. Application of ionizers in the printing, converting and graphics industries allow in-process cleaning of product and faster process speeds. Higher productivity, better quality, and enhanced reliability help make your company a success.

Here is the range of products we offer:

- **Nuclestat® Bars** offered in lengths of 4" to 142".
- **Nuclecel™ In-Line Ionizers** for parts blow-off and surface preparations.
- **Nuclespot™ Ionizer** provides focused concentration of ions to the product.
- **Tabletop Blowers** for electronic assembly.

Detailed data sheets and informational notes are available upon request. Consult the main catalog for listing.

1.3 Customer Support

Toll Free Number	1-800-525-8076	8:30 AM – 5:00 PM Eastern Time (M-F)
General Listing	1-716-773-7634	
Fax Number	1-716-773-7744	

2.0 Important Information

All radioactive devices using Polonium-210 are leased for one (1) year. It is important to keep track of these units so that they can be returned to NRD for proper disposal. If the device is misplaced, please call NRD for information on how to report the lost device.

2.1 Safety of NRD Ionizers

The radioactive material (Polonium-210) is 100% encapsulated using a pressure welded metallurgy technique. The result is an encapsulation that is insoluble and inert to most chemicals. Vibration and impact normal to industrial applications will not adversely affect product integrity.

The alpha particles come from the natural decay of the radioactive source and collide with air molecules to create ions. However, alpha particles are unable to penetrate a thin piece of paper or human skin! Complete safety is ensured when the ionizers are used in accordance with normal mounting and operating conditions. Normal use and conditions of the ionizer include:

- Temperature not to exceed 212° F (100° C).
- Use clean dry air, nitrogen or inert gas.
- You can safely handle the outside of cell. Do not insert any object or attempt to clean the inside of the cell.
- Mount the ion cell in a normal way by using the threaded connections or the sealing surface provided on the cell. Do not alter the ionizer in any way, i.e. drilling holes.

Review the enclosed **Safety Brochure** for a more detailed description of how the ionizers work, where they are typically used, and the general safety of NRD ionizers.

2.2 Lease Agreement

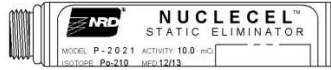
All ionizers containing Polonium-210 are leased, not purchased. The devices are leased for two main reasons: 1.) Federal Regulations state that the device must be tested for radiation leakage prior to shipping and before 13 months from the date of manufacture. NRD performs these leak tests and provides you with a Leak Test Certificate as documentation. 2.) The activity of the ion cell decreases over time. At the end of 12 months, the cell needs to be replaced (or renewed) in order to maintain its effectiveness.

NRD will notify you when it is time to renew the device. To renew the lease when the device reaches its 12 month expiration (the manufactured date is printed on the label of device), simply provide us with a new purchase order to make the original lease valid for another 12 months. Upon delivery of the renewed device, remove the old cell from service and ship it back in accordance with the **Return Shipping Instructions**.

2.3 Return of Expired Devices

Expired P-2021 Ionizers (12 months or older) can be returned to NRD for proper disposal according to the “Return Shipping Instructions” included in this manual. A Return Authorization (RA) is not required prior to sending a device back for disposal.

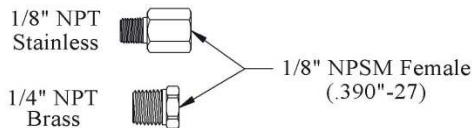
3.0 In-line Ionizers



The P-2021 Nuclecel™ In-Line Ionizers neutralize static charges and removes dust and other foreign particulate by providing a powerful stream of ionized gas across affected parts. They are designed for applications where high gas pressure and velocity are desirable.

3.1 Installation & Operation

- A. The P-2021 Nuclecel™ In-Line Ionizers can be operated with the flow of gas in either direction. Mounting connections are 1/8" NPSM (.390"-27) male and female thread. On the male end an "O"-ring is included for sealing. Provide a suitable mating connector at the end of the gas supply hose to connect to the ionizer. The In-Line Ionizer can be attached to a gun handle, manifold, or as part of your production equipment. See below for optional mounting adapters.



Optional Adapters

Note: Ensure that the gas supply is properly filtered and that attached hoses are clean and dry. Inquire about filter options. The gas can be air or an inert gas such as nitrogen.

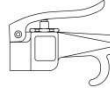
- B. Attach the ionizer to the hose fitting and tighten securely. An O-ring is provided on the threaded end of the cell to seal the connection. If the parts become loosened, apply a small amount of removable adhesive (Loctite 242) to the threads.
- C. When attaching an exit tube on the ionizer, keep the tube length as short as possible and avoid attaching a very small tube diameter. Long exit tube lengths or very small tube diameters are not recommended for this will restrict gas flow and reduce ionizer effectiveness.
- D. Apply gas pressure and regulate it to the desired level. Do not exceed an inlet pressure of 100 psig. A powerful stream of ionized gas will flow over objects and quickly neutralize electrostatic charges, and remove dust and other foreign particulate clinging due to static attraction.

4.0 Accessories

4.1 Gun Handles



ST1



NY1



SA1 / SA2 / SA4



PK1

Usage

An In-Line Ionizer will connect to a gun handle to control air activation and direct the flow where it is needed. The gun system will neutralize static charges and remove dust and other foreign particulate by providing a powerful stream of ionized air across affected parts. All accessories including gun handles are purchased and can be replaced as needed.

- A. Screw the nozzle tip into the P-2021 Ion Cell and tighten.
- B. Hand tighten the Ion Cell onto the gun handle so that the “O”-ring provides sealing. If the ionizer becomes loosened, apply a small amount of adhesive to the threads-Loctite 242. (Note: Model P-2021-2002 cell does not require an “O”-ring when used with the PK1 Cleanroom Gun.)
- C. Provide a 1/4” NPT male fitting to the end of an airline to be connected to the gun.

Note: Ensure that the air supply is appropriately filtered and that attached hoses are clean and dry. Inquire about filter options.

- D. Attach the gun to the 1/4” NPT hose fitting by screwing the base of the handle securely into the fitting. Use teflon tape as needed.
- E. Set pressure to 40 psig first to determine if this supplies sufficient air volume and pressure to remove static and debris from surface. You can adjust the pressure depending on your application. **MAXIMUM PRESSURE 100 PSIG** Note: Model PK1 cleanroom handle max. 80 psig. (50 psig with filter option)
- F. Always use an OSHA approved safety tip to prevent air pressure injury in the case the end is dead ended against a person’s skin. All tips provided by NRD meet OSHA requirements. The Ion Air Gun is now ready to remove static charges.
- G. Point the gun up to three feet away from the object and squeeze the trigger. A powerful stream of ionized air will flow over the objects and quickly neutralize electrostatic charges and remove dust and other foreign particulate clinging due to static attraction.

5.0 Maintenance & Troubleshooting

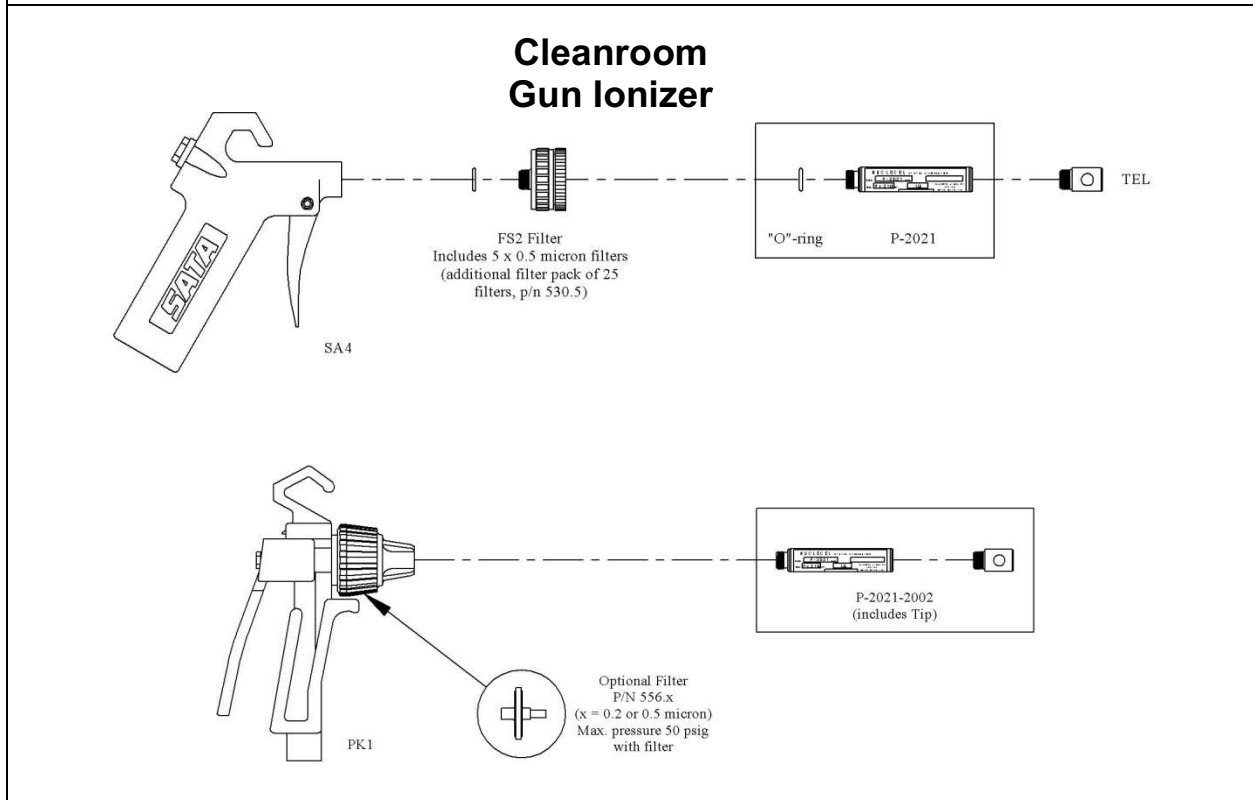
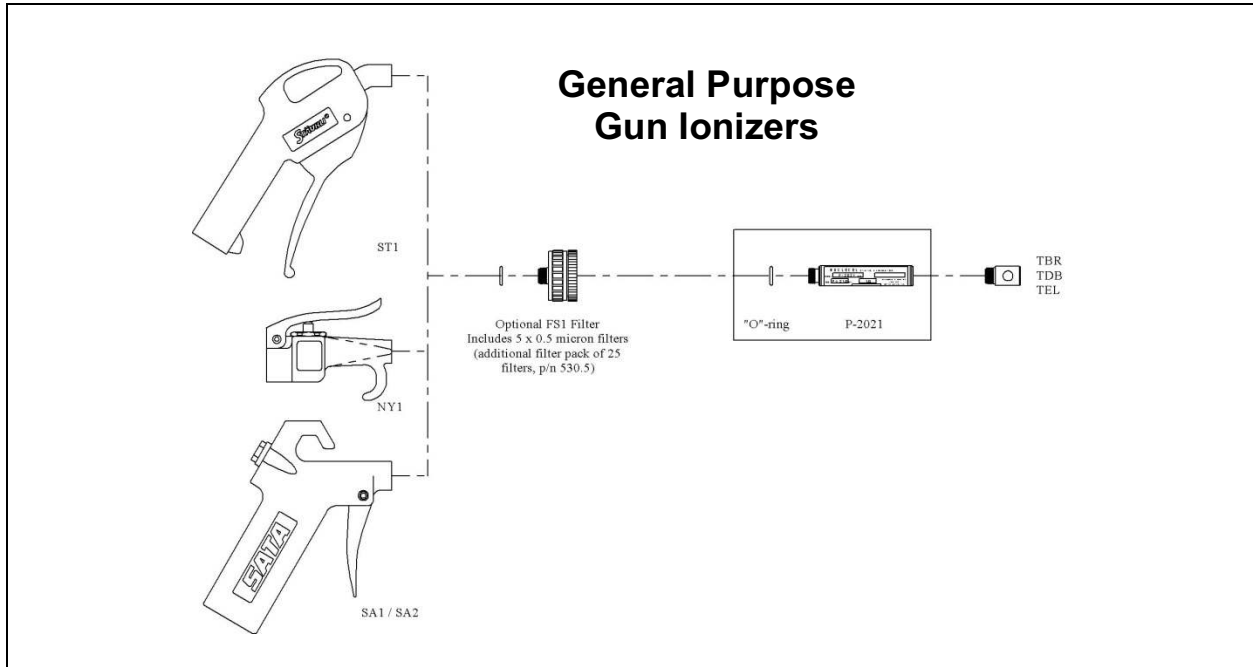
Maintenance

- The only maintenance required is the annual replacement of the device to ensure maximum effectiveness of the ionizer. Return the expired device to NRD for proper disposal.
- Calibration is not required.
- Air pressure not to exceed 100 psig at the inlet of device.

Trouble Shooting Guide

<u>Symptom</u>	<u>Probable Cause</u>	<u>Corrective Action</u>
1. Static charges are not eliminated	<p>Ion cell may be out of date and need replacement.</p> <p>Possible oil contamination of ion cell.</p> <p>Ions generated are being recombined before they reach the charged surface.</p>	<p>Call NRD for Ion Cell replacement.</p> <p>Return cell to NRD for evaluation. Do not attempt to clean the device.</p> <p>The Ionizer air exit needs to be closer to the charged surface.</p>
2. Air flow is reduced.	Upstream filter(s) are plugged and/or gas pressure is low.	Replace upstream filter(s) and/or increase gas pressure (100 psig max.)
3. Squeezing gun handle trigger does not initiate gas flow.	<p>Gas line is shut off or obstructed.</p> <p>Trigger plunger mechanism damaged.</p>	<p>Open all shutoff valves and check for kink in line or other obstructions.</p> <p>Contact NRD for replacement gun.</p>
4. Releasing trigger does not stop the gas flow.	Foreign matter trapped in the shutoff valve of the gun.	Clean gas hoses, replace upstream filter(s) and contact NRD for replacement gun.

ASSEMBLY & INSTALLATION IN-LINE IONIZERS



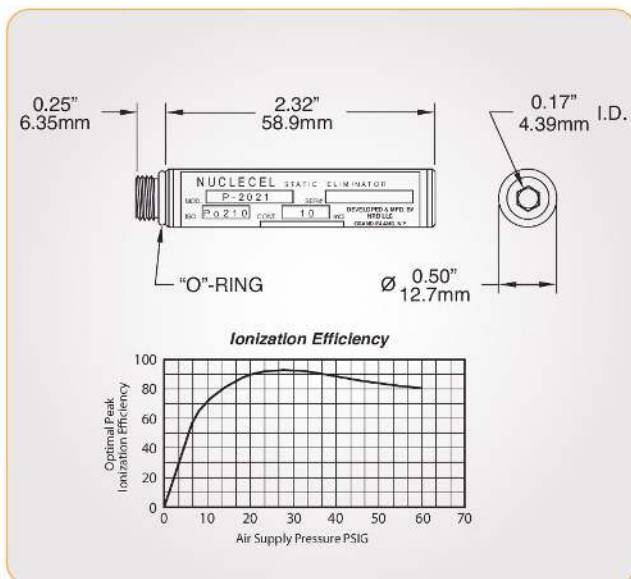
Staticmaster®

End-of-Line Alpha Ionizers

(Model P-2021)



The model P-2021 is a simple, reliable, efficient and effective means of eliminating static in a variety of industries, including electronics, optics, graphics and finishing. Easy to install on any clean, dry compressed air or inert gas line, the P-2021 emits a powerful stream of ions to quickly neutralize electrostatic charges. By design, the P-2021 never goes out of balance, so it does not require periodic calibration. In addition, it requires no electrical power to operate, so it's intrinsically safe for use in flammable or explosive environments.



Model P-2021 End-of-Line Ionizer Specifications

DIAMETER: 0.50" (12.7 mm)
WEIGHT: 1.3 oz (37 g)
MATERIAL: Stainless steel
GAS: Clean, dry compressed air or inert gas
PRESSURE: Optimal: 25-30 psig (1.7-2.1 bar)
 Maximum: 100 psig (6.9 bar)
ISOTOPE: Polonium-210
EMISSION: Alpha
ACTIVITY: 10 mCi (370 MBq)
LINE CONNECTIONS: 1/8" – 27 NPSM thread male/female
AVAILABLE MODELS: P-2021-1000, P-2021-2000, P-2021-5000 and P-2021-8000
DECAY TIME: 0.7 seconds (ESD Association 3.1 @ 30 psig, 12" distance, 1,000 to 100 V)

Note on Ion Source

All NRD ion sources are encapsulated in precious metals by means of a patented process. This results in a static eliminator which resists oxidation, solvents, heat, cold and vibration. To maintain peak performance and conform to government regulations, ionizers are available on a one-year lease.

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NOTICE: NRD warrants that these materials are reasonably fit for the purpose described. We believe that specifications and technical information presented are based on test methods that produce accurate results. The foregoing limited warranty is expressly made in lieu of, and no other express and no implied warranty of merchantability or fitness for a particular purpose is made. NRD, LLC will not be liable for incidental, consequential, special, exemplary or punitive damages. The limited warranty will not apply to defects or damage due to accidents, neglect, misuse, alterations, error or failure to properly maintain, clean or repair products.

2021 4/14

Staticmaster®

Ionizing Gun Kits

(Shown with Model P-2021)



Clean Room Gun
(P-2021-5942)

APPLICATION: This gun is ideal for clean room applications. It utilizes a 0.5 micron filter and 316 electropolished ionizing cartridge and tip.

REPLACEMENT IONIZATION CELL: P-2021-5002

FILTER: 0.5 MICRON

TIP: 316 ELECTROPOLISHED OSHA TIP

NRD's full line of GUN KITS feature ergonomic designs and rugged construction for reliable performance in a variety of applications.



Neutralizer™ Refinishing Gun
(P-2021-Z705)

APPLICATION: The Neutralizer™ was designed specifically as an antistatic refinishing gun for the auto body, boat building and furniture industries. It neutralizes static charges as it removes dust and dirt, allowing for a superior product in the end.

REPLACEMENT IONIZATION CELL: P-2021-Z003

FILTER: NONE **TIP:** NYLON OSHA TIP



General Purpose Gun (P-2021-8201)

APPLICATION: This is a high quality pistol grip gun ideally suited for a wide variety of industrial applications. It's intended for use with clean, dry compressed air or other inert gases such as Nitrogen or Argon.

REPLACEMENT IONIZATION CELL: P-2021-8001

FILTER: NONE **TIP:** BRASS OSHA TIP



General Purpose Gun (P-2021-1112)

APPLICATION: This gun is ideal for less stringent "clean" area applications. It includes an in-line 0.4 micron filter, 316 stainless steel ionizing cartridge and an electropolished OSHA compliant tip.

REPLACEMENT IONIZATION CELL: P-2021-1002

FILTER: FS1 WITH 0.4 MICRON

TIP: 316 ELECTROPOLISHED OSHA TIP



General Purpose Gun (P-2021-8101)

APPLICATION: This general purpose gun utilizes a thumb actuated trigger and is ideally suited for a wide variety of industrial applications. It's intended for use with clean, dry compressed air.

REPLACEMENT IONIZATION CELL: P-2021-8001

FILTER: NONE **TIP:** BRASS OSHA TIP

Note on Ion Source

All NRD ion sources are encapsulated in precious metals by means of a patented process. This results in a static eliminator which resists oxidation, solvents, heat, cold and vibration. To maintain peak performance and conform to government regulations, ionizers are available on a one-year lease.

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Ionizing Gun Kits 5/14

Alpha Ionization Innovative Solutions for Static Control

Electrostatic discharge is one of the leading causes of industrial production problems. By disrupting production and destroying sensitive materials, static can cost your business huge amounts of time and money. **But there is an answer.** Alpha ionization from NRD. It is fast, reliable and highly effective. Based upon safe alpha technology, our ionizers are powered by their own internal energy source, Polonium-210. This naturally occurring isotope is locked inside a metallurgically bonded foil of gold and silver using NRD's proprietary encapsulation process, assuring you of a safe, sealed source of alpha ionization. (See Figure 1.)

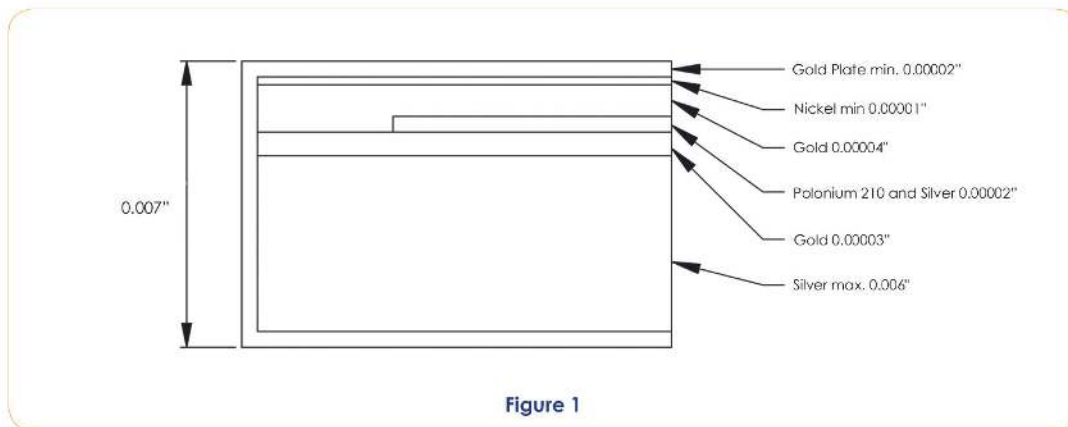
Alpha energy delivers an intrinsically balanced cloud of ions that are extremely effective in eliminating static charges, reducing product damage and yield loss in the electronics, plastics, graphics, printing and converting industries.

NRD's advanced alpha ionization technology has withstood the test of time having over forty years of field use. All of our products meet stringent quality and production testing as well as ANSI N542 and ISO 2919 standards.

To maintain peak performance and conform to government regulations, NRD alpha ionizers are available on a one-year lease. The leaseholder is notified prior to lease expiration and provided all the necessary information to obtain a replacement ionizer.

Our in-house Applications Engineers can analyze your specific applications and offer targeted recommendations to solve individual problems. Additionally, our knowledgeable Customer Service Team provides a level of customer support that exceeds expectations.

At NRD we work hard to establish a strong relationship with our customers. Ultimately, we work as your partner providing you with solutions for your static control problems. **Expertise. Innovation. Information. That is what you can expect from an industry leader.**



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Alpha Ionization Innovative Solutions for Static Control

Advanced Ionization Technology

NRD has a long history of producing and supplying a wide variety of ionization sources. Specially designed equipment and facilities enable us to mass produce standardized commercial ionization sources and to develop unique single or short run products.

What are the Benefits?

Unlike other ionization technologies, alpha ionizers produce a particulate free, inherently balanced cloud of ions. Therefore, they do not require periodic calibration and maintenance is limited to the annual change-out of the ionizing cell. In addition because alpha ionizers do not require a high voltage power supply to produce ions, NRD devices can be used in flammable and explosive processing areas.

Product Reliability

Since 1970 NRD technology has been employed for static control, smoke detection, security, physics research, space exploration and instrumentation. All over the world, companies in various industries use NRD products to obtain better quality and higher productivity.

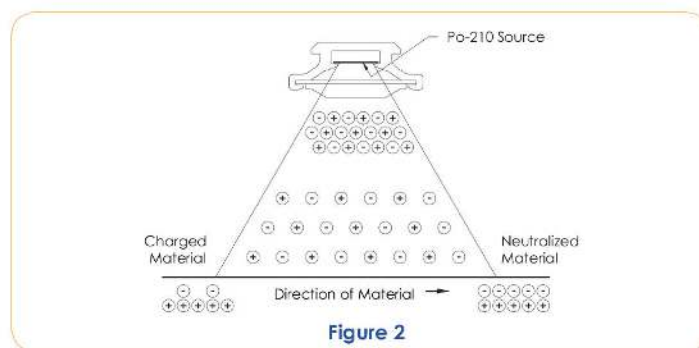
Higher levels of reliability and efficiency are inherent in NRD ionizers due to their uniqueness of design. Our products are simple to install and easy to operate unlike other technologies, alpha ionizers do not require "feed back" loops to ensure that they are working properly. All NRD devices are designed to withstand the types of environments commonly encountered in industrial settings.

In addition, we use a proprietary process that locks the radioisotope inside a metallic foil of pressure welded gold and silver, assuring its resistance to oxidation.

How It Works

Safely situated inside the static control device, NRD's alpha ionizers emit a form of energy that strips electrons from gas molecules, creating free positive and negative ions. Alpha ionization is a very effective and predictable source of static elimination because it generates a positive ion for every negative ion produced.

Static charges are neutralized right at the source, with the ionization process remaining in constant balance. (See Figure 2.)



Alpha Ionization Innovative Solutions for Static Control

Product Features

Here are a few other facts about alpha ionizers that may interest you:

- They require no outside power source to produce ionization.
- They require no calibration because they provide an inherently zero-volts balanced output.
- They are intrinsically safe for use in volatile or solvent-laden environments.
- There is no risk of electrical shock.
- Maintenance is limited to a "once-per-year" replacement of the ionization source.

Curious about isotopes and radiation? Did you know that...

Many everyday products, materials and activities can produce minute, yet measurable exposures, including:

- Clocks
- Televisions
- Medical X-rays
- Bricks and masonry

(See Figure 3.)

Typical Sources of Natural And Man-Made Radiation*

Many everyday objects contain trace amounts of radioactive substances. There is americium in some smoke detectors; radium or tritium in clocks; polonium in tobacco; and uranium or thorium in brick houses.

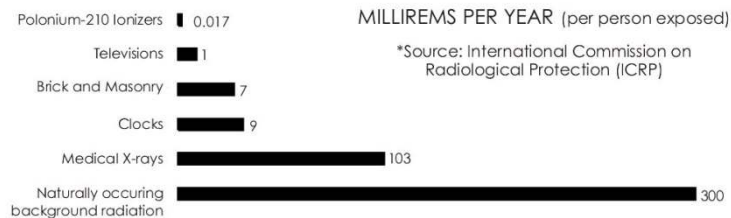


Figure 3