



BEAM HANDLING COMPONENTS

National Electrostatics Corp.

Positive RF Ion Source

APPLICATIONS

The NEC Positive RF ion source has been used primarily to produce H^+ and He^+ ion beams. However, it has produced modest currents of oxygen ions, chlorine ions, and other positive ion beams from gaseous elements. This source can be used in up to 100 psi insulating gas, and is ideal for use in the high voltage terminals of electrostatic accelerators.

DESIGN

This RF source has two unique features that separate it from the older style RF ion sources. The first is a unique clamping structure that allows complete disassembly of the RF bottle from the flange for cleaning without return to the factory. The other feature is a RF sealed enclosure that surrounds the oscillator and RF bottle. This enclosure protects sensitive electronics in the area from RF interference.

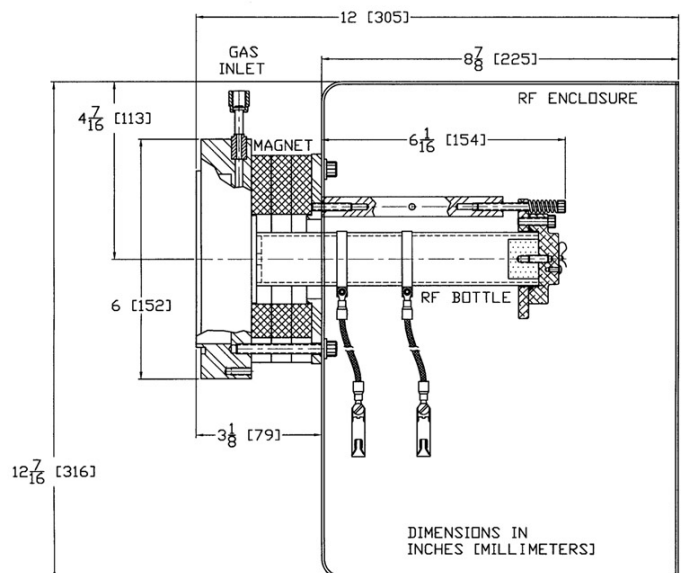
PERFORMANCE

Running the RF ion source in a 3 MV Pelletron[®] accelerator terminal, the source produced an analyzed H^+ beam on target of $94\mu A$. The actual source output is not known. It is expected to be much greater than $94\mu A$ because of the low potential and long beam path length involved.

OPTIONS

The standard positive RF ion source utilizes a permanent magnet. Also available is a version that utilizes adjustable solenoid magnets. This allows for better control and higher current. For more information on this option, please contact NEC.

Source gas bottle assemblies with mass flow controllers are available in single, double and triple unit sizes. Double or triple unit assemblies are recommended when a gas mixture is required. Separate source gas metering units allow the precise mixing of the gasses in the RF plasma.



ACCESSORIES

NEC also manufactures complete light link control systems and double shielded power supplies for ion sources in the terminal of electrostatic machines.

**Fred A. Rose, P.B. Tollefsrud and H.T. Richards, I.E.E.E. Transactions on Nuclear Science, Vol. NS-14 (1967), page 78.*

SPECIFICATIONS

Bottle:	Quartz
Canal Exit Diameter:	1 mm standard, 2 mm optional
Canal Material:	Aluminum
RF Power Supply Output:	150W
Typical RF Bottle Gas Pressure:	10 to 30 microns
Typical Gas Flow:	About 1 standard cc/hr (with 1 mm exit)
Beam Emittance:	3-5 π mm mR (MeV) ^{1/2} for H ⁺ (1 mm exit)
Beam Energy Spread:	50-100 eV
Beam Current:	500 μ A for H ⁺ under ideal conditions. Expected beam current decreases as beam mass increases by m ^{-1/2} <i>Note: Source lifetime decreases as beam mass increases due to increase in sputtering of exit canal.</i>

Recommended Supplies:

Probe power supply, +10kV, 12mA
Focus power supply, +20kV, 6mA
Extractor power supply, +20kV, 6mA
Isolation Transformer, 50kVDC, 1.5kVA

ORDERING INFORMATION

Catalog No.: **2JA066280** on NEC flange

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