# 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.

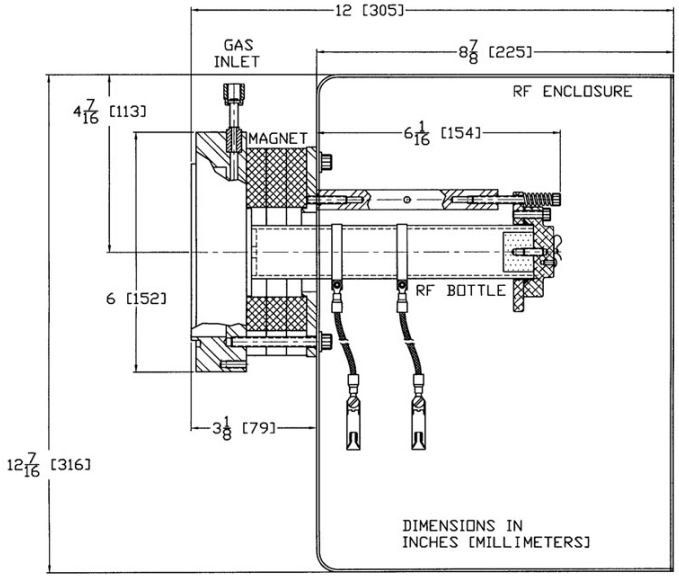
## Performance

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

## Options

The Positive RF ion source can be coupled with an extractor with ConFlat or NEC flanges. For more information, 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 $\pi$mm mR $(MeV)^{½}$ for $H^+$ (1 mm exit) |
| Beam Energy Spread: | 50-100 eV |
| Beam Current: | 500 µA for H+ under ideal conditions. Expected beam current decreases as beam mass increases by $m^{-½}$<br><br>*Note: Source lifetime decreases as beam mass increases due to increase in sputtering of exit canal.* |

### Recommended Supplies:

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


## Contact NEC

www.pelletron.com +1 (608) 831-7600 nec@pelletron.com

7540 Graber Rd, Middleton, WI 53562-0310 USA