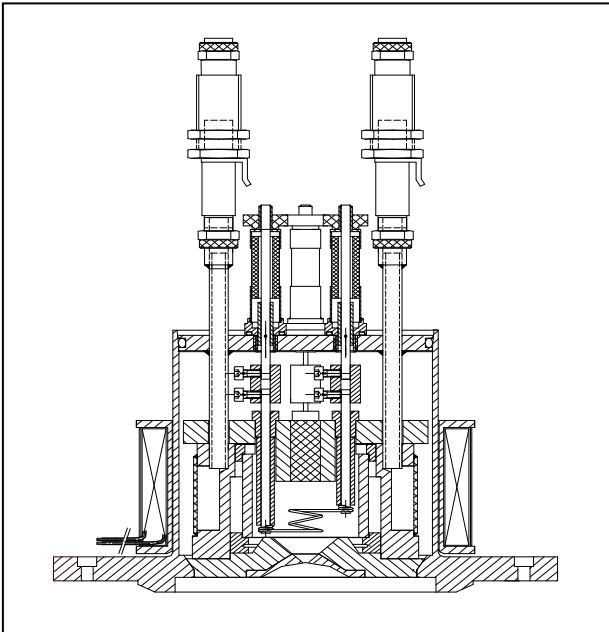


HOT CATHODE PENNING ION SOURCE

Model SO-100



Features

- Easy operation and maintenance
- Low power consumption
- Long filament lifetime
- Low beam emittance
- Beams from noble gases

General description

The HVEE SO-100 high current ion source is a hot filament Penning discharge source to produce, among others, ions like B^+ , Si^+ , P^+ and As^+ from fluorinated gases like BF_3 , PF_5 (PF_3), SiF_4 and AsF_5 . Beams from noble gases as well as from gases like O_2 are also readily produced.

The discharge is sustained by electrons emitted from a hot tungsten filament and an arc power supply that accelerates the electrons into the plasma region where they serve to ionize and break up the molecules from the feed gas. A solenoid creates a magnetic field that is shaped by soft iron within the source and that serves to confine the plasma. From the plasma boundary, the ions are extracted by the electric field in the extraction region to form a low divergent ion beam.

Spare parts to cover the first needs are included with each SO-100 ion source.

Other types of penning ion sources available from High Voltage Engineering Europa B.V. are:

- The Model SO-60 Cold Cathode Penning ion source
- The Model SO-90 Sputter Penning ion source

HIGH VOLTAGE ENGINEERING

Particle Accelerators Systems for the scientific, educational and industrial research communities



HIGH VOLTAGE ENGINEERING EUROPA B.V.

Amsterdamseweg 63, 3812 RR Amersfoort, P.O. Box 99, 3800 AB Amersfoort, The Netherlands

Phone: +31 33 4619741 Fax: +31 33 4615291 E-mail: info@highvolteng.com Web: www.highvolteng.com



SPECIFICATIONS

The source is standard equipped with a 2 mm diameter outlet aperture, and the specifications apply to this outlet aperture diameter. However, the outlet aperture can be enlarged to approx. 6 mm, resulting in substantially higher beam currents, typically in the mAmps range. For such applications, an accel-decel extraction geometry is strongly recommended, and an extraction power supply with larger current capability is needed.

* Typical beam currents are measured after the analyzing magnet of a 400 or 500 kV HVEE ion implantation system for energies between 80-400/500keV. Extraction energy 15-40 keV, analyzed beam current (30keV)

Ion	Current (μ A) (25mm magnet gap)	Current (μ A) (35mm magnet gap)	From feed gas
B ⁺	100	150	BF ₃
P ⁺	200	250	PF ₅
Si ⁺	200	250	SiF ₄
Ar ⁺	500	800	Ar
Ar ⁺⁺	70	100	Ar

Extraction distance : 8mm
Extraction electrode diameter : 5mm
Emittance (30keV, 100 μ A B⁺ beam) : approx. 15 mm mrad (MeV)^{1/2}

POWER, GAS AND COOLING REQUIREMENTS

Anode power supply : 150 V / 3 A floating output terminal, current stabilized
Magnet power supply : +10 V / 2 A DC current stabilized
Filament power supply : +10 V / 40 A DC current stabilized
Extraction power supply : +15-40 kV / 3mA DC voltage stabilized

The Model SO-100 Hot Cathode Penning Ion Source normally operates at 15-40 kV with respect to (terminal) ground. Therefore the source must be insulated from (terminal) ground. The source power supplies must be connected to a 15-40 kV isolation transformer.

Cooling : 2 l/min minimum de-ionized water (10M Ω -cm or higher) or other isolating cooling liquid.
Gas supply : Customer should take care to meet local safety regulations concerning the application of toxic gases.
The gas feed system to supply up to approx. 0.1 sccm gas (in case of 2mm diameter outlet aperture).

Options

1. Ion source power supplies & extraction power supply.
2. Isolation flanges, standard and special designs.
3. Extraction electrode.
4. Spare parts kits.

Sales offices in Europe and Japan

HCPS-4

HIGH VOLTAGE ENGINEERING EUROPA B.V. reserves the right to change specifications and features without prior notice unless part of a quotation or order.

