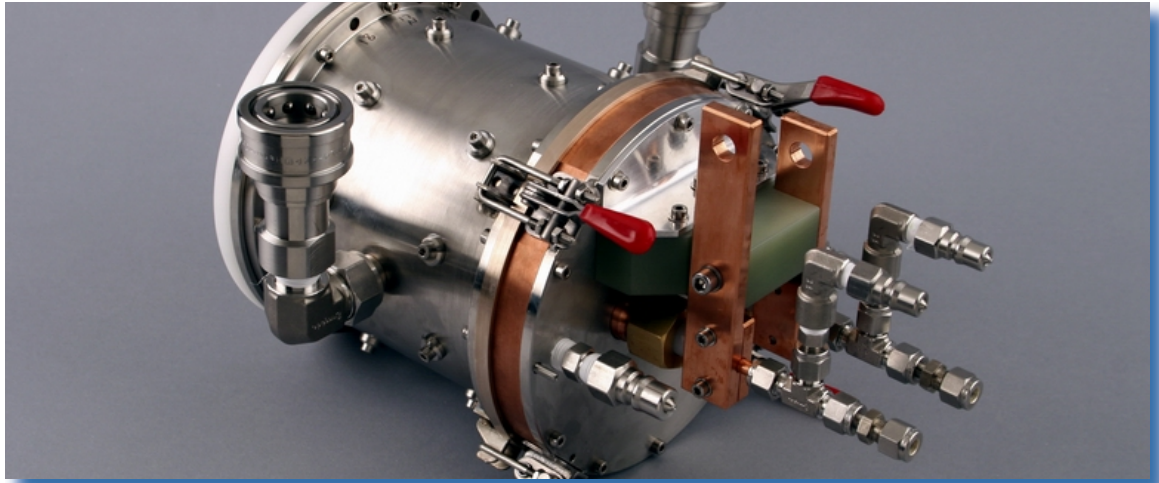




# TRIUMF Type DC Volume-Cusp $H^-$ Ion Source



## Model: IS•5mA•30keV•H<sup>-</sup>

The **TRIUMF Type DC Volume-Cusp  $H^-$  Ion Source**, Model IS•5mA•30keV•H<sup>-</sup> produces stable and reproducible  $H^-$  ion beams with low emittance and high brightness.

### Features:

- Yields a maximum  $H^-$  current greater than 5 mA DC in the 20 – 30 keV energy range.
- Low maintenance with long filament lifetime (> 500 hours at peak current).
- Due to the optimized lens ion-optics, and low emittance, lens wear is negligible.
- Clean due to non-hydro-carbon based pumping. Material deposition inside the source is minimal.

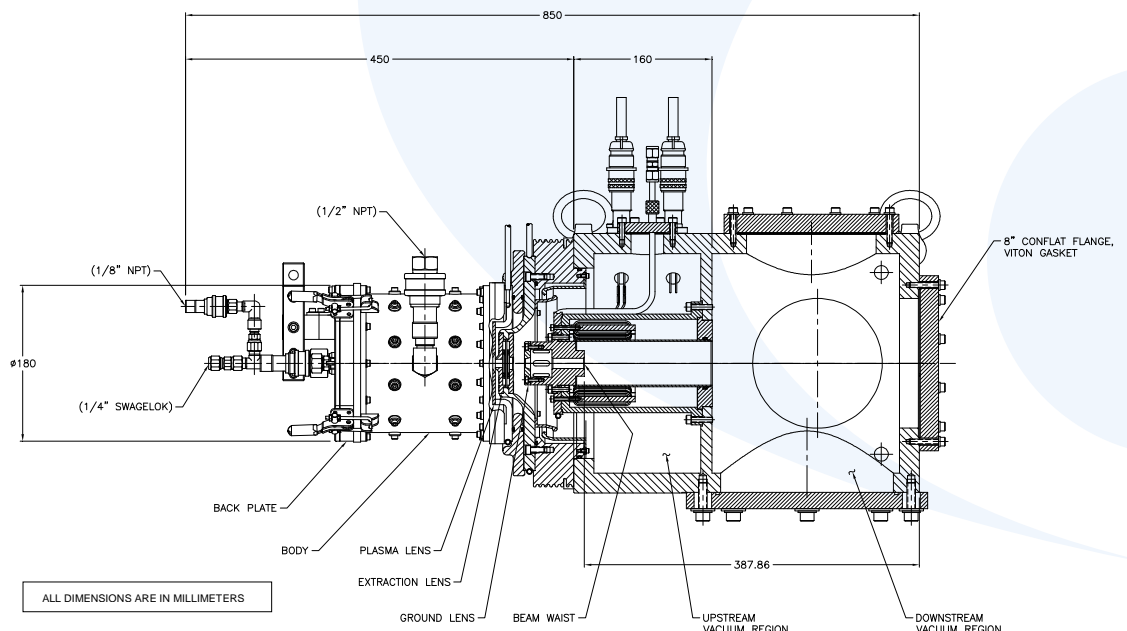
The IS•5mA•30keV•H<sup>-</sup> Ion Source Model is supplied as:

- Ion Source, Lenses, and Vacuum Box with internal X-Y Steering Magnet Hardware as pictured, or
- a Turnkey system including power supplies, vacuum system, control system and computer.

As an option D-Pace will customize the system to meet special customer requirements. Customization work could include, but is not limited to:

- mechanical design modifications for proper interfacing of the ion source to the user's system, or
- the design and supply of a complete injection line system to provide an ion-optics interface as well as a mechanical interface, or
- D<sup>+</sup>, or H<sup>-</sup> ion sources with custom energy and current ratings.

## TRIUMF Type DC Volume-Cusp $H^-$ Ion Source Model: IS•5mA•30keV•H<sup>-</sup>



High Performance  
Charged Particle  
Transport Solutions

## Representative Performance Data - TRIUMF Type DC Volume-Cusp H<sup>-</sup> Ion Source, Model: IS•5mA•30keV•H<sup>-</sup>

Beam Current H <sup>-</sup> (mA)	Arc Supply (A, V)	Filament Supply (A, V)	Plasma Lens Supply (A, V)	Extraction Lens Supply (mA, kV)	Bias Supply (mA, kV)	Steering Magnets (X: A, Y: A)	H <sub>2</sub> (sccm)	Ion Source Vacuum (Torr)	Vacuum Box Vacuum (Torr)
1.15	2.4, 101.7	172, 2.91	1.5, 2.0	6, 1.55	4.5, 25.000	3.02, 0.00	9.71	7.2 x 10 <sup>-5</sup>	1.00 x 10 <sup>-6</sup>
2.0	4.8, 101.6	172, 2.93	3.0, 2.8	7, 1.8	6.0, 25.000	3.43, 0.00	15.00	1 x 10 <sup>-4</sup>	1.40 x 10 <sup>-6</sup>
3.0	7.5, 101.6	174, 3.04	4.7, 3.1	12, 2.2	9.0, 25.000	2.70, 0.00	15.00	1 x 10 <sup>-4</sup>	1.45 x 10 <sup>-6</sup>
4.1	12.2, 101.7	173, 3.11	8.2, 4.0	15, 2.4	11.0, 25.000	2.72, 0.00	15.00	1 x 10 <sup>-4</sup>	1.55 x 10 <sup>-6</sup>
5.1	18.7, 101.5	168, 3.12	12.5, 4.4	31, 2.6	13.0, 25.000	2.49, 0.00	15.00	1 x 10 <sup>-4</sup>	1.60 x 10 <sup>-6</sup>

Beam Current H <sup>-</sup> (mA)	Arc Current (A)	Beam Kinetic Energy (keV)	Beam ½ Size @ Waist (mm)	Beam ½ Divergence @ Waist (mrad)	Unnormalized 4rms Emittance* (mm-mrad)	Normalized 4rms Emittance* (mm-mrad)
1.15	2.4	25.000	1.94	24.7	48.04	0.35
2.0	4.8	25.000	2.28	21.5	48.96	0.36
3.0	7.5	25.000	2.84	20.8	58.94	0.43
4.1	12.2	25.000	3.18	23.0	73.16	0.53
5.1	18.7	25.000	3.74	23.1	86.40	0.63

\*Phase Space Area = πEmittance

### Model: IS•5mA•30keV•H<sup>-</sup> SPECIFICATIONS

#### Ion Source Specifications

Particle Type:	H <sup>-</sup>
Beam Current:	0 to 5 mA
Beam Kinetic Energy:	20 to 30 keV
Normalized 4rms Emittance:	<0.65 mm×mrad
Beam Purity:	>98%
Filament Lifetime:	>500 hours at peak current
Beam Current Stability:	±3% over 24 hours

#### Power Supply Specifications

	Current	Voltage
Arc:	22 Amp,	150 Volt
Filament:	200 Amp,	10 Volt
Plasma Lens:	20 Amp,	10 Volt
Extraction Lens:	75 milli-Amp,	5 kiloVolt
Bias:	20 milli-Amp,	30 kiloVolt
X Steering Magnet:	6 Amp,	10 Volt
Y Steering Magnet:	6 Amp,	10 Volt

#### Cooling Water Specifications

	Inlet Pressure	Flow
Source Body	40 psi,	8 litres/minute
Filament	70 psi,	1 litres/minute
Back Plate	70 psi,	1.5 litres/minute
Plasma Lens	70 psi,	1.5 litres/minute
Extraction Lens	70 psi,	1.5 litres/minute
XY Steering magnet	70 psi,	1 litres/minute

#### Vacuum Pumping Specifications

	Rate (H <sub>2</sub> )	Flange
Turbo Pump (Upstream, Source)	450 litres/second,	ISO NW100
Cryo Pump (Downstream, Vacuum Box)	2,500 litres/second,	6" ANSI, or 8" CF

#### Gas Flow Specifications

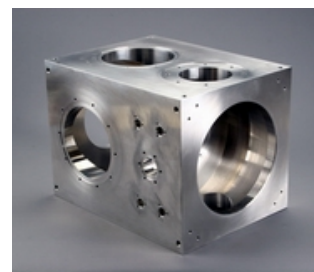
	Type	Rate
Mass Flow Controller	H <sub>2</sub>	20 sccm



Ion Source



Lenses



Vacuum Box

#### D-Pace Licenses Technology

The TRIUMF Type DC Volume-Cusp H<sup>-</sup> Ion Source technology has been licensed from TRIUMF by Dehnel – Particle Accelerator Components & Engineering, Inc. (D-Pace). The license agreement gives D-Pace the right to manufacture and sell this ion source technology on a worldwide basis, and is backed with TRIUMF's technical support.

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