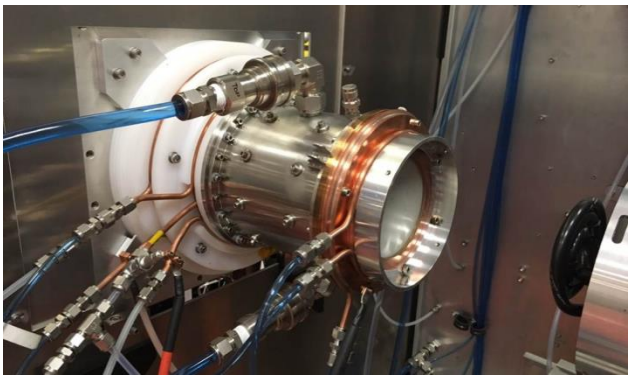
RF-POWERED TURNKEY NEGATIVE ION SOURCE SYSTEM

ISV.RF-040

TRIUMF & University of Jyväskylä licensed[1], volume-cusp

- Long intervals between maintenance[2] (1 year) – no filaments to replace
- RF powered - no metal sputtering due to filaments (important for ion implantation)
- Ability to pulse beam
- Extensive beam instrumentation options



RF window (L) and antenna (R), shown separated

ION	BEAM CURRENT (mA)	BEAM ENERGY (keV)
H^-	0-7.5	20-30
D^-	0-3	20-30
C_2^-	0-0.05	20-30
C_2H^-	0-0.05	20-30
$C_2H_2^-$	0-0.05	20-30

Beam Intensities for Various Ions

SPECIFICATION: ISV.RF-040	
ION SOURCE	
Particle	H^-, D^-, C_2^-, C_2H^-, $C_2H_2^-$
Beam Kinetic Energy	20 to 30 keV
Normalized 4rms Emittance	< 0.7 mm·mrad
Beam Purity	> 99%
RF Window Lifetime[2,3]	> 1 year
Beam Current Stability[2]	± 1% over 24 hours
Beamline Flange	ISO 100
Instrument Port[4]	ISO 250
POWER SUPPLIES	
Max Bias Supply	40 mA, 30 keV
RF Amplifier[5,6]	3 kW, 13.56 MHZ
Plasma Lens	12 A, 70 V
Extraction Lens	60 mA, 5 kV
X & Y Steering Magnet	10 V, 10 A
VACUUM SYSTEM SPECIFICATIONS	
Turbo Pumps, 1X Upstream & 1X Downstream	1700 l/s Flange ISO250F
Dry Scroll Roughing, 1X Upstream & 1X Downstream	35 m^3/hr
GAS FLOW	
Mass Flow Controller	11-30 sccm
CONTROLS	
Control PLC	Phoenix Contact ILC, Ethernet
User Interface Options	D-Pace standalone or OPC command library for customer integration
COOLING WATER, DEIONIZED, 20˚C (> 1.0 MOhm.cm)	
XY Steering Magnet	1.0 LPM, 70 PSI (480 kPa)
Turbo Pumps	2.0 LPM, 70 PSI (480 kPa)
COOLING WATER, DEIONIZED, 20˚C (>1.0 MOhm.cm)	
Source Body	5.0 LPM, 40 PSI (275 kPa)
RF Amplifier	5.0 LPM, 40 PSI (275 kPa)
RF Antenna	1.0 LPM, 70 PSI (480 kPa)
RF Window	1.5 LPM, 70 PSI (480 kPa)
Plasma Lens	1.5 LPM, 70 PSI (480 kPa)
Extraction Lens	1.5 LPM, 70 PSI (480 kPa)
Faraday Cup	5.0 LPM, 40 PSI (275 kPa)

TUNE DATA FOR MAXIMUM BEAM CURRENT:					
	IONS				
	H^-	D^-	C_2^-	C_2H^-	$C_2H_2^-$
Max. Beam Current (mA)	**8**	**3**	**0.05**	**0.05**	**0.02**
Bias Supply (mA, kV)	11, 30	4.5, 30	0.68, 10	0.68, 10	0.68, 10
RF Power (kW)	3.1	2.6	0.5	0.5	0.5
Plasma Lens Supply (A,V)	5.9, 36	5.3, 50	1.0, 0	1.0, 0	1.0, 0
Extraction Lens Supply (mA, kV)	34, 3.0	39, 2.3	14, 1.2	14, 1.2	14, 1.2
Steering Magnet X (A)	0.5	3.0	0.0	0.0	0.0
Steering Magnet Y (A)	3.2	0.0	0.0	0.0	0.0
H_2 (sccm)	16	9	30	30	30
Vacuum, Ion Source (Upstream) (10^{-4} Torr)	0.54	0.32	1.06	1.06	1.06
Vacuum, V-Box (Downstream) (10^{-5} Torr)	0.39	0.082	3.30	3.30	3.30
½ Beam Diameter at Waist (mm)	1.8	2.1	3.7	3.7	3.7
½ Beam Divergence at Waist (mrad)	37.8	53.3	41.7	41.7	41.7
Geometric 4rms Emittance (mm·mrad)	69	112	154	154	154
Normalized 4rms Emittance (mm·mrad)	0.89	0.89	0.71	0.71	0.71

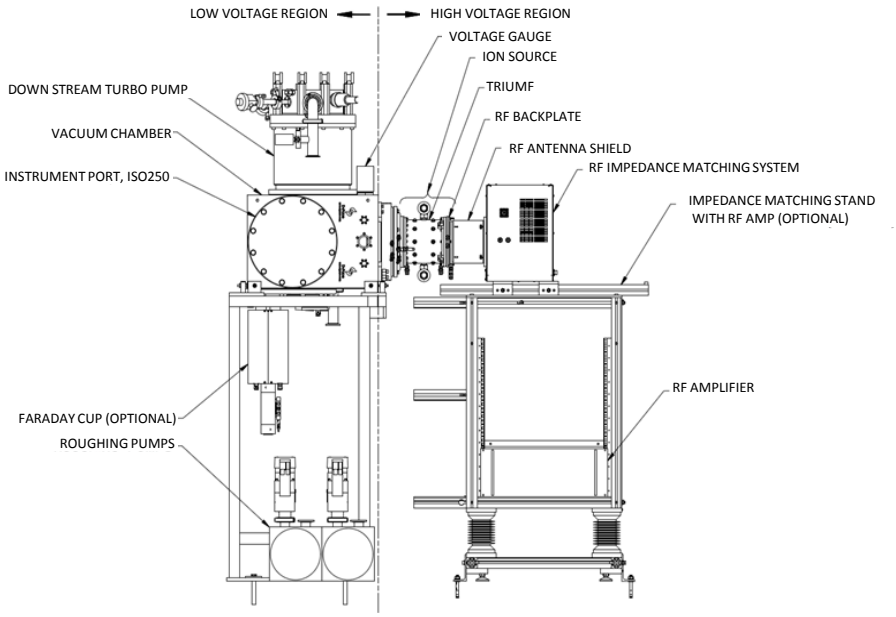
The ISV.RF-040 Ion Source system includes the following:

- Ion source & vacuum box
- Vacuum system & gauges
- Power supplies, PLC controls & software
- Low voltage and high voltage racks
- 40 kV isolation transformer
- Interlocks and HV grounding system
- User interface & Ethernet-based remote controls
- Ion source stand and RF stand
- Personnel access control interlocks
- Water flow gauges and interlocks
- Mass flow controller for feed gasses
- RF amplifier & impedance matching systems

Optional:

- High-voltage Faraday cage / enclosure
- Water de-ionization and cooling system
- Sliding Faraday cup
- UniBEaM fiber optic beam profile monitor
- TRIUMF-licensed emittance scanner
- 1:500 mass spectrometer with slits

Enquire about other negative and positive ion beams, and our Filament ion sources



1. Ion Source licenced from TRIUMF. RF technology licenced from the University of Jyväskylä.
2. Estimates - testing in progress.
3. Window lifetime estimate based on 10% RF transmission degradation.
4. Suitable for installation of optional pneumatically-actuated Faraday cup and D-Pace ES-4 Allison type emittance scanner.
5. 5kW amplifier recommended for beam currents > 5mA.
6. RF Amplifier can be installed in the RF as rack shown or installed remotely.
7. D-Pace reserves the right to update specifications as part of its ongoing product improvement program.