

**TECHNICAL SPECIFICATIONS FOR**  
**ULTRA HIGH VACUUM FIELD ION MICROSCOPE MODULE**

The detailed specifications for the Ultra High Vacuum Field Ion Microscope Module are given in the below,

**DETAILED SPECIFICATIONS**

<b>S.No.</b>	<b>Item</b>	<b>Description</b>
1.	Primary Ultra High Vacuum (UHV) chamber	<ul style="list-style-type: none"> <li>• Ultra high vacuum range: <math>10^{-9}</math> to <math>10^{-12}</math> mbar</li> </ul> <p><b>Chamber Dimension:</b></p> <p style="padding-left: 20px;">Inner Diameter: 500 mm Length: 700-900 mm Chamber material: SS304L</p> <ul style="list-style-type: none"> <li>• Outgassing rate: <math>&lt; 10^{-11}</math> mbar <math>\times</math> ltr/cm<sup>2</sup>s<sup>-1</sup></li> <li>• Leak Rate: <math>&lt; 1 \times 10^{-10}</math> mbar l/s for He</li> <li>• Hydrocarbon free vacuum</li> <li>• View ports: 2 glass sealed (63 – 100 CF flange)</li> <li>• Port for sample transfer: 1 (200 - 300 CF flange)</li> <li>• Appropriate load lock with transfer arm needs to be provided for sample exchange.</li> <li>• Port for cryostat: 1(35 – 63 CF flange)</li> <li>• Port for power supply: 1(35 – 63 CF flange)</li> <li>• Appropriate vacuum gauges (35 CF flanges) and transmitter, Pirani Penning and BA/nude gauge sensor need to be provided.</li> <li>• Suitable frame to mount the chamber and vacuum controllers to be provided.</li> </ul> <p><b>Internal design requirements (Need not be quoted):</b></p> <ul style="list-style-type: none"> <li>• Sample holding base (Design will be provided).</li> <li>• Detector holding base (Design will be provided).</li> </ul>
2.	Turbomolecular Pump	<ul style="list-style-type: none"> <li>• Ultra High Vacuum generation (<math>1 \times 10^{-9}</math> to <math>5 \times 10^{-10}</math> mbar)</li> <li>• Oil free hybrid bearings</li> <li>• Multi orientation installation</li> <li>• Pumping speed <math>&gt; 800</math> l/s for gases like He, Ar, N</li> <li>• Appropriate flange for connecting pump to UHV chamber needs to be provided.</li> <li>• Appropriate power supply, UHV compatible connection cables to be provided.</li> <li>• Air cooling preferred.</li> <li>• Appropriate dry screw backing pump.</li> </ul>

3.	Ion Pump	<ul style="list-style-type: none"> <li>• Ultra high vacuum (<math>1 \times 10^{-9}</math> to <math>5 \times 10^{-10}</math> mbar)</li> <li>• Hydrocarbon free system</li> <li>• Pumping speed: 400 - 500 l/s</li> <li>• Appropriate flange for connecting pump to UHV chamber needs to be provided.</li> <li>• Appropriate power supply, UHV compatible connection cables and feed through to be provided.</li> <li>• Provision for integration of TSP.</li> </ul>
4.	UHV gate valve	<ul style="list-style-type: none"> <li>• Pressure Range: <math>10^{-10}</math> mbar to 1 bar</li> <li>• Service life: Around 50,000 cycles</li> <li>• Appropriate flange for connecting pump to UHV chamber needs to be provided.</li> </ul>
5.	Load Lock chamber requirements.	<ul style="list-style-type: none"> <li>• Chamber volume: 50 – 70 litre</li> <li>• Turbo pumping system Pumping speed: &gt; 80 l/s (For gases He, Ar and N)</li> <li>• Appropriate flange for connecting pump to UHV chamber needs to be provided.</li> <li>• Appropriate power supply, UHV compatible connection cables to be provided.</li> <li>• Air cooling preferred.</li> <li>• Vent valve for Nitrogen supply required.</li> <li>• Appropriate horizontal transfer arm.</li> <li>• Appropriate Pirani Penning gauge to be provided.</li> </ul>
6.	Controller and Vacuum Sensors	<ul style="list-style-type: none"> <li>• Active vacuum sensors with three channel measurement.</li> <li>• Digital display for chamber pressure.</li> <li>• Appropriate vacuum gauges (35 CF flanges) and transmitter, Pirani penning and BA/nude gauge sensor need to be provided.</li> </ul>
7.	Chamber Roughing system	<ul style="list-style-type: none"> <li>• Dry screw: 35 m<sup>3</sup> per hr</li> <li>• Ultimate pressure: &lt; 0.01 mbar</li> <li>• Appropriate power supply to be provided.</li> <li>• Air cooling preferred.</li> </ul>
8.	UHV leak valve	<ul style="list-style-type: none"> <li>• Tightness range: <math>&gt;10^{-10}</math> mbar <math>\times</math> l/s</li> <li>• Leak rate: <math>\leq 1 \times 10^{-10}</math> mbar <math>\times</math> l/s</li> <li>• Service life: <math>\geq 20,000</math> cycles</li> </ul>
9.	Helium Leak Detector	<ul style="list-style-type: none"> <li>• Leak rate measurement range <math>\leq 10^{-12}</math> mbar <math>\times</math> l/s</li> <li>• 180° Magnetic sector field</li> </ul>

10.	Mass flow controller	<ul style="list-style-type: none"> <li>• Appropriate controller for injecting gases such as He, N, Ar, H, Ne needs to be provided.</li> </ul>
11.	Pre-requisites and Mandatory Requirements.	<ol style="list-style-type: none"> <li>1. Supplier should be able to provide complete solution including pumps and vacuum chamber.</li> <li>2. Supplier should have minimum of 20 years of experience in Ultra high vacuum system fabrication will be able to provide.</li> <li>3. List of such Ultra high vacuum system installations in India (minimum 10) or elsewhere to be provided.</li> <li>4. Installation, commissioning and after sales are on the part of supply.</li> <li>5. Supplier should have local service centre in India for after sales and service support.</li> <li>6. All necessary parts, spares, and accessories to be readily available for replacement during preventive maintenance and repairs for atleast 5 years from the day of installation.</li> <li>7. Model system demonstrating the required capabilities to be presented to the end user for technical compliance, system efficiency and cutting-edge performance verification.</li> <li>8. Final decision on technical compliance will be based on live or online demonstration of the model system.</li> </ol>
12.	Warranty and AMC	1 year warranty with cost for 5-year AMC especially for pumps and valves to be quoted.