



Manufacturers of Ion Beam Equipment and Components

Source Installation Guide General Requirements

1. Pumping Station

The ion beam source needs to operate in a high vacuum environment. A typical vacuum system will have a base pressure of 2×10^{-6} Torr (or lower). Operation of the ion beam source requires a process gas, and for most applications ultra high purity argon is used. The established flow rate of gas will depend upon the size of the source (3 to 20 sccm typical). However, the pumping speed of the system should be adequate to maintain an operating pressure of 5×10^{-4} Torr (or lower).

2. Gas Supply and Control

Operation of an ion beam source requires a process gas, and for most applications, ultra high purity argon (99.995%) is used. The gas pressure is reduced from the supply bottle using a 2-stage regulator so the inlet pressure is maintained to about 20 psi. For stable operation and reproducible results, the gas flow control using mass flow controllers and positive shut off valves is highly recommended. The typical range of the flow control is 3 to 20 sccm to within 0.1% total flow. Less critical applications can use needle valves to adjust the flow and monitor the background vacuum pressure.

3. Source Cooling

The typical operating temperature of an ion beam source is about 350°C. Some source designs use water cooled shrouds that help reject the heat. Coolant should be supplied at 50 psi and 20°C inlet pressure and temperature and have a minimum flow rate of about 0.5 l/min.

4. Electrical Requirements

The IBEAM power supply requires 208 VAC, 50/60 Hz, 16 A, 1 phase input. A summary of the electrical connections is provided in the IBEAM manual. A shielded connection cable from the power supply to the high voltage cover is required to operate the ion beam source. The high voltage cover is attached to the electrical feedthrough on the vacuum system.

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5. Safety

The ion beam source operates at LETHAL VOLTAGES and CURRENTS. The IBEAM power supply has an external interlock which MUST BE interfaced to the vacuum system and associated electronic cabinets to ensure safe operation. The interlock must be connected so the source cannot be operated if it is exposed at atmospheric pressure or a cabinet door is open.

6. Shielding

The downstream environment of the ion beam source is an electrically conductive gas, or plasma. Other electronic equipment, such as quartz lamps, probes, and electron beam guns must have insulated and shielded leads. Additional magnetic shielding, such as 400 series stainless steel, between the ion beam source and electron beam gun is necessary to prevent plasma shorting between the two devices. Clean, aluminum foil can be used as a temporary shield.

7. Internal and Flange Mount

The configurations of ion beam sources can be either described as internal or flange mount styles. The flange mount style has the ion beam source attached to a single vacuum flange. The flange mates directly to the vacuum chamber. The orientation of the flange mount source cannot be adjusted and therefore, the ion beam is directed downstream on the flange centerline. An internal mount source will have an additional 30 to 45 cm of electrical leads inside the vacuum system. Additional hardware to support and orientate the internal mount source is required. The internal mount source will utilize additional feedthrough(s) for electrical and gas connections.

Please let us know if you have specific questions and concerns about the installation of a ion beam source in your system!

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