

真空电极 Feedthrough



真空电极，也就是 feedthrough，是用于在真空环境中传输信号、电力或其他物理量的装置。它们通常安装在真空腔体的壁上，允许内部和外部之间的连接，同时保持真空密封性。真空电极通常由导体、绝缘体、密封组件构成。导体是传输信号或电力，常用无氧铜、不锈钢、钨等材料，需兼顾导电性与真空兼容性。绝缘体是隔离导体与真空腔体，常用氧化铝陶瓷、玻璃或聚四氟乙烯 (PTFE)，确保高绝缘性和耐高温。密封组件是金属焊接（如铜 - 陶瓷封接）用于超高真空，弹性密封圈（氟橡胶）适用于低真空或动态密封。

Feed through is a device used to transmit electrical signals, electricity, or other physical quantities in a vacuum environment. They are usually installed on the walls of vacuum chambers, allowing for connections between the inside and outside while maintaining vacuum sealing. Feed through are usually composed of conductors, insulators, and sealed components. Conductors are materials commonly used for transmitting electrical signals or power, such as oxygen free copper, stainless steel, tungsten, etc., and must balance conductivity and vacuum compatibility. Insulators are commonly used to isolate conductors from vacuum chambers, such as alumina ceramics, glass, or polytetrafluoroethylene (PTFE), to ensure high insulation and high temperature resistance. The sealing component is metal welded (such as copper ceramic sealing) for ultra-high vacuum, and the elastic sealing ring (FKM) is suitable for low vacuum or dynamic sealing.



Semi Serve Feedthrough Type 赛米瑟真空电极类型

电源电极：用于将高电压、高电流、高功率等电力信号引出真空室，例如电弧或火花放电实验。

Power feedthrough: Used to lead out high-voltage, high-current, and high-power electrical signals from the vacuum chamber, such as in arc or spark discharge experiments.
Signal Electrode: Used to lead out low-voltage, low-current control signals, such as those for measurement, sensors, and regulation.

信号电极：用于引出低电压、低电流的控制信号，例如测量、传感器和调节信号等。

Signal feedthrough: Used to lead out low-voltage, low-current control signals, such as those for measurement, sensors, and regulation.

热电偶电极：用于热电偶测量，可以将热电偶引出真空室，检测真空室内的温度。

Thermocouple feedthrough: Used for thermocouple measurements, allowing the thermocouple to be led out of the vacuum chamber to detect the temperature inside the chamber.

光纤电极：将光纤引出真空室，用于激光切割、激光焊接、激光打标等应用。

Fiber Optic feedthrough: Used to lead out fiber optics from the vacuum chamber for applications such as laser cutting, laser welding, and laser marking.

流体电极：气体或液体进出真空腔，如冷却水、工艺气体等流体。

Fluid feedthrough: Allows gases or liquids to enter or exit the vacuum chamber, such as cooling water or process gases.

RF 射频电极：用于高频信号传输，如射频等离子体激发。

RF (Radio Frequency) feedthrough: Used for high-frequency signal transmission, such as in radio frequency plasma excitation.

运动传输电极：通过磁流体密封旋转或波纹管直线运动，提供从腔室空气侧到真空侧的旋转控制和直线控制。

Motion Transmission feedthrough: Provides rotational and linear control from the air side of the chamber to the vacuum side through magnetic fluid seals or bellows linear motion.

同轴电极：通常包含外层金属管或屏蔽导体，及同心的圆柱形中心导体，内外部导体由氧化铝陶瓷隔离并绝缘。大部分同轴馈通可提供单端和双端两种几何形状，屏蔽方式分为接地屏蔽和浮地屏蔽两种。

Coaxial feedthrough: Typically consists of an outer metal tube or shield conductor and a concentric cylindrical center conductor, with the internal and external conductors isolated and insulated by alumina ceramic. Most coaxial feedthroughs can provide both single-ended and double-ended geometric shapes, with shielding methods divided into grounded shielding and floating shielding.

多针电极：多针电极通常用于电信号或低功率应用的传输，主要用于仪器，如电子显微镜，表面分析和半导体工艺控制。

Multi-Pin feedthrough: Multi-pin electrodes are commonly used for the transmission of electrical signals or low-power applications, primarily in instruments such as electron microscopes, surface analysis, and semiconductor process control.

陶瓷隔离电极：陶瓷金属真空隔离和陶瓷金属液体隔离可用于各种额定电压和连接法兰。

Ceramic break feedthrough: Ceramic-metal vacuum isolation and ceramic-metal liquid isolation can be used for various rated voltages and connecting flanges.

