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Ion Pump Rebuilding Process

Creating the purest vacuum environments on Earth

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Rebuilding Services

The most important step in rebuilding an ion pump is assessing its condition prior to disassembly

An aged ion pump can perform in a variety of ways that deter from its original specifications. The solution can range between zero-cost procedures up to complete replacement.

With the assistance of our customers, the required level of rebuilding is determined

Gamma Vacuum offers technical support in determining what level of rebuilding is required. The value of rebuilding an ion pump is created by reusing high cost components of the ion pump and replacing warn, low cost items. Fortunately ion pumps have no moving parts and wear is strictly limited to ionization activity.

Rebuilt ion pumps go through the same vacuum processing as new ion pumps

Time can be sensitive on any UHV system that does not have a primary pump. Gamma Vacuum maintains separate processing facilities to aid in expediting the rebuilding process. This facility duplicates the processing steps used in manufacturing new ion pumps. Specifications for a rebuilt ion pump meet those of a new ion pump.

Rebuilding Process

Contamination

Prior to the return of any ion pump, a contamination form is required. This form is precautionary against ion pumps that are potentially exposed to hazardous chemicals.

Initial Inspection

The initial inspection of an ion pump consists of observing and documenting wear of:

Mounting hardware Magnets
Pole Pieces Flanges
Feedthrough Welds (heat stress)

As these parts are inspected, they are removed from the stainless steel body of the ion pump. Replacement parts are issued from new stock as required. Major damage will constitute notification of the customer.

Internal Inspection

Internal inspection reveals the wear on the pumping elements of the ion pump. Depending on their condition, the elements can either be rebuilt or replaced. If the recommendation of Gamma Vacuum is different from the initial assessment quotation , the customer will be notified of the revised recommendation.

UHV Cleaning

The cleaning process is by far the most important aspect of any UHV system. Ion pumps produced by Gamma Vacuum are subjected to an extensive descaling, chemical etching, and electrical polishing process. Ion pumps that have already received this process require much less effort to clean after they have been subjected to the sputter deposits created in an ion pumps. Regardless of original manufacturer particulate matter is not introduced into the ion pump body. Ion pumps that have been bead blasted by the original manufacturer will be re-cleaned using a combination of etching and polishing to achieve UHV surface standards.

Primary Leak Check

Once clean, the ion pump is ready for a primary leak check to 1 x 10-10 STD CC/Sec He or better. This process ensures that the pump is free from minor heat stress cracking or other gas sources.

Clean Assembly	After the body of the ion pump has been cleaned to UHV standards, it will be placed in a class 10,000 clean room environment. The assembly process reinstalls the elements (new or rebuilt) and high voltage feedthrough (new or original).
UHV Processing	After all UHV cleaned components are installed, the ion pump is sealed and routed for UHV processing with our production ion pumps. A. Initial 12-hour, 250 C bake into separate system B. Cool down, start-up C. Achieve steady pumping D. Isolation of Ion Pump E. Second 12-hour, 250 C bake into ion pump F. Cool down, achieve steady state of <1 uA G. Final magnetic and pole piece assembly
Packaging and Shipment	The ion pump will then be packaged suitable for heavy shipments. Dimensions allow for ample room around the ion pump to insure no damage.