This lightweight pump with no moving parts eliminates the need for a backup pump.

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This design offers a larger surface area for pumping of active gases and reduces the mass of the pump by eliminating the additional vacuum enclosure. There are three main components to this ion pump: the cathode and anode pumping elements assembly, the vacuum enclosure (made completely of titanium and used as the cathode and maintained at ground potential) containing the assembly, and the external magnet. These components are generally put in a noble diode (or differential) configuration of the ion pump technology. In the present state of the art, there are two cathodes, one made of titanium and the other of tantalum. The anodes are made up of an array of stainless steel cylinders positioned between the two cathodes.

All the elements of the pump are in a vacuum enclosure. After the reduction of pressure in this enclosure to a few microns, a voltage is applied between the cathode and the anode elements. Electrons generated by the ionization are accelerated toward the anodes that are confined in the anode space by the axial magnetic field. For the generation of the axial field along the anode elements, the magnet is designed in a C-configuration and is fabricated from rare earth magnetic materials (Nd-B-Fe or Sm-Co) possessing high energy product values, and the yoke is fabricated from the high permeability material (Hiperco-50A composed of Fe-Co-V). The electrons in this region collide with the gas molecules and generate their positive ions. These ions are accelerated into the cathode and eject cathode material (Ti). The neutral atoms deposit on the anode surfaces. Because of the chemical activity of