Liquid gas pump

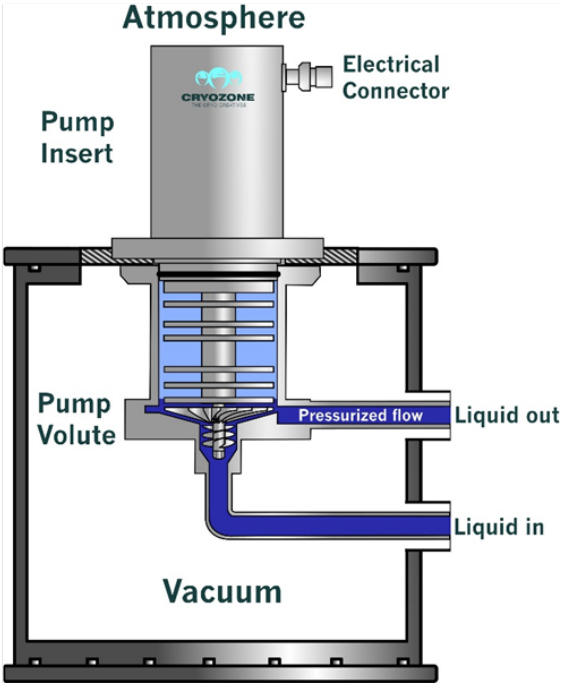
Providing liquid flow for closed loop cooling systems

Managing your cryogenic challenges

Through years of experience Stirling Cryogenics has developed a lot of cryogenic knowledge. Especially regarding handling cold and delivering it to the customers' application. This results in one of Stirling's leading-edge products created and optimized for cryogenic gas flow distribution, The CryoFan, for efficient cold transport.

High efficiency gas flow for closed loop cooling systems

Stirling Cryogenics offers a range of gas circulation that have been optimized for closed loop cooling systems. These pumps are used to circulate a liquid gas in order to transport cooling power from a cold source into and through an application. Examples are superconducting cables and thermal shields in vacuum chambers or other (large) devices. The required cooling power usually comes from a cryogenic system using a cooling machine or bulk liquid. In either of these cases there is a limited budget of cooling power which makes the efficiency of the pump of the utmost importance. The efficiency of Stirling Cryogenics' liquid gas pumps ranges from 30 to more than 50%, depending on the set-up of the closed loop system. Important factors are the required flow versus the pressure drop over the system. By balancing these at the system design phase, the total set-up can be optimized.



Heat-exchangers for cryocoolers

The liquid gas pumps are based on the generic design concept of Stirling Cryogenics' successful CryoFans.
Like all centrifugal pumps, the main parts are the impeller and the volute. Their dimensional shape determines the functionality and efficiency of the pump. The impeller is driven by a high rpm air-cooled electric motor to create the flow. All of the components are integrated into a single housing with the motor installed inside the pressurized gas volume. This solution does not require a rotating seal so there is no possibility of leakage

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Design concept of the liquid gas pumps

In order to create a thermal barrier between the motor at ambient temperature and the cold impeller, the latter is mounted on a long thin stainless-steel shaft. This cantilever set-up with a high-precision balanced shaft and impeller, is used to avoid the necessity of a cold bearing. This set-up ensures a MTBM of over 20.000 hours.

The design concept of the Stirling Cryogenics liquid gas pumps is such that they can also be used as a gas circulator. When they are used as a circulator, the motor is set at a higher velocity to achieve sufficient gas flow. This feature is of interest during the cooling down phase of a system. Instead of pumping cold liquid into the application, which causes thermal shock, cold gas is circulated to cool down the application gradually and reduce the thermal shock.

Once a sufficiently low temperature has been reached, the system can be switched to liquid mode and the pump will be set to run slower for use with liquid. The motor of the pump is driven using a VFD so its pumping capacity can be regulated as required.

The liquid pump concept is easy to integrate into a system cryostat. Only a central bore with a flange pattern is required. This pattern can be machined in the cryostat flange or in an ISO-K or CF blind flange. Then the pressure housing with pump volute is mounted inside the cryostat and the circuit lines are connected. The motor with shaft and impeller can now be mounted from the outside. This means that the complete impeller unit can be removed without breaking the vacuum of the application.