Changing State Technologies
Auckland, New Zealand
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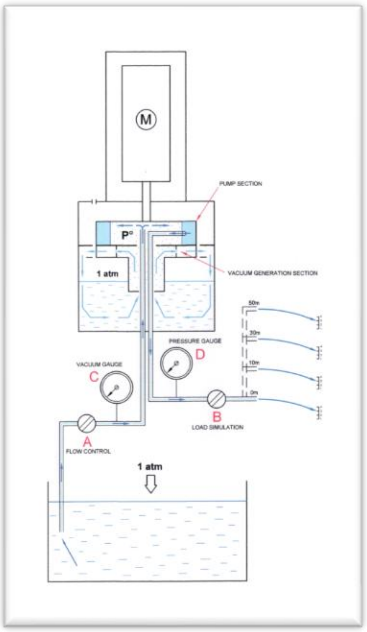
The Changing State Technologies pump utilises our patented **MPR™** (**Multi-phase Rotor™**) technology to develop a **Stable-Vapour-Cavity™** (SVC). This SVC is at the Vapour-pressure (Vp) of the pumped liquid, e.g. for 20^{0}C water this is theoretically 2.3kPa. For the MPR pump there is a purposeful and sufficiently large stable Vp vapour cavity within the rotor. This allows the following functionalities, when applied to pumping:

- The versatile physical operational behaviours of a centrifugal pump
- The 'pump curve' (pressure/flow characteristics) of a positive displacement pump
- No NPSH considerations/limitations
    - Providing continuous availability of Vp pressure on intake to drive
        - In-flow and/or
        - Lift height on intake
        - Flow restricting applications e.g. filter, on the intake
- True self-priming up to ~9.5m (@stp)
- None of the typical seal requirements of the conventional centrifugal pump
    - Motor shaft through volute
    - Rotor to volute



These characteristics are generated from the managed progression through the cavitation zone of the liquid into our SVC operational environment. For the pump, this allows an intake system and an output system which are not directly connected and are not hindered or limited by cavitation – all within the one rotor.

Atmospheric pressure (101.3kPa @stp) drives liquid into the 2.3kPa SVC.

Output is by way of a pitot device within the pump rotor which accesses both velocity and pressure heads of the rotating liquid to deliver output performance.

These functional properties allow:

- a fully variable flow rate (zero - max) via valve on intake
- a constant output pressure on the variable flow rate
- a variable output pressure demand with constant flow rate
- ability to operate seamlessly with gas in the supply liquid

This rotor performance is defined by a pump "plane" versus the conventional pump "curve". Its potential performance is limited by material and mechanism strengths, not by the physics associated with tensional stress on a liquid as conventionally applied by the vaned centrifugal rotor.