

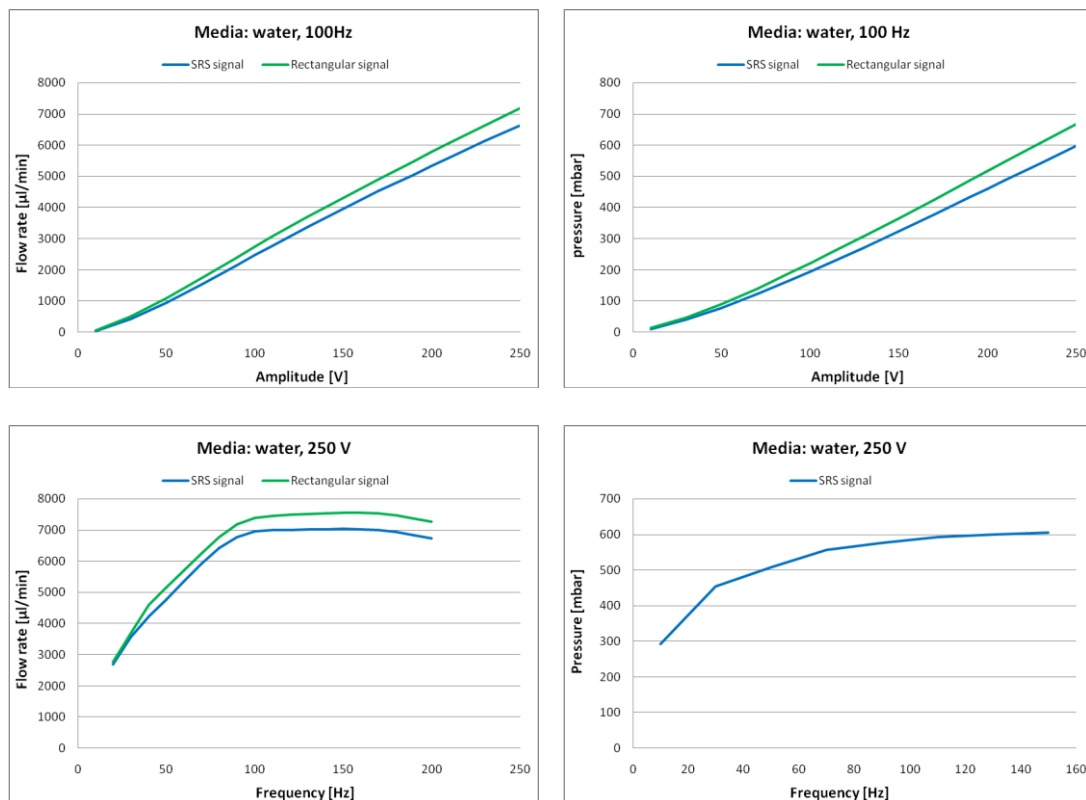
TechNote mp6

Flow and pressure performance

Based on the diaphragm pump principle the micropump mp6 has a typical flow and pressure performance. By controlling the piezo actuator deflection the performance can be varied. The amplitude determines the height of the piezo deflection and thereby the displaced volume and the frequency the number of deflections. Displaced volume per pump stroke is approximately 1.6 μl at 100 Hz, 250 V, SRS signal.

As the general behavior depends on the viscosity of the pumping media the maximum achievable flow and pressure rates are fluid specific. Here in detail the behavior for water is discussed. The viscosity behavior is discussed in a separate TechNote.

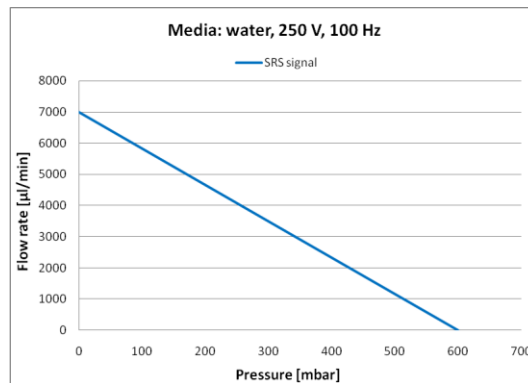
The flow rate of the pump depends linearly on the amplitude. Up to 100 Hz the frequency increases linearly and then decays into a maximum at 150 Hz, the resonance frequency. Details are shown in the graphs below:



By adjusting the two parameters, amplitude and frequency, all flow rates between the maximum flow of 7 ml/min and minimum flow rate of about 20 $\mu\text{l}/\text{min}$ can be achieved.

In order to ensure stable pump performance at the low flow rates, the frequency should be lowered first and the amplitude should be kept as high as possible. If necessary a precision orifice can be used to limit the outlet flow additionally. With this setup also flow rates below 20 $\mu\text{l}/\text{min}$ can be achieved (see our application note: Operating Micropumps at Low Flow Rates).

Furthermore the achievable performance is depending on the fluidic resistance of the overall fluidic system. Of importance is the back pressure within the system, as the flow rate of the pump exhibits a linear dependency on the back pressure. At 0 mbar back pressure the pumps achieve the maximum pump rate, at maximum back pressure the flow rate of the pumps decreases to 0 ml/min.



If the flow changes due to changing pressure conditions in the application are not acceptable, a closed-loop controlled pump can be used. Please contact us for further details.

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 Servoflo Corporation
 75 Allen Street
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