Piezomembrane pump flow

Product: Pulsed Flow Sensor

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This application note shows how the **Pulsed Flow Sensor (PFS)** can be used to measure the strong pulsating flow from a piezo-membrane micro pump.

Used Material:

- Pulsed Flow Sensor
- PFS controller with User Interface
- Bartels mp6 pump and controller (www.bartels-mikrotechnik.de)
- Water container 50 ml
- Silicone Tubing

Experiment setup:

The PFS was connected to a Bartels mp6 with a silicone tubing of about 6 cm in lenght. The tubing was then connected to a distilled water reservoir to build a pumping circuit.

The pump was actuated with different pulseforms and frequencies. The measurement mode of the PFS was set to "Droplet Mode" to produce measurement sequences at very high sampling rates of 10 to 20 kHz.

Figure 1: Bartels mp6 and ReseaTech Pulsed Flow Sensor.

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more than dosing!

Pulse measurements:

To measure single pumping pulses, a pumping frequency of 50 Hz was chosen, and the PFS was triggered with a sampling time of 60 milliseconds to capture three consecutive pulses.

Even with the rather flexible tube of 60 mm between the pump and the sensor, the pulses are detected very sharply with a high resolution of 10 kHz.

The pulse volume of 1.63 microliters can easily be evaluated from the integral of three measured pulses.

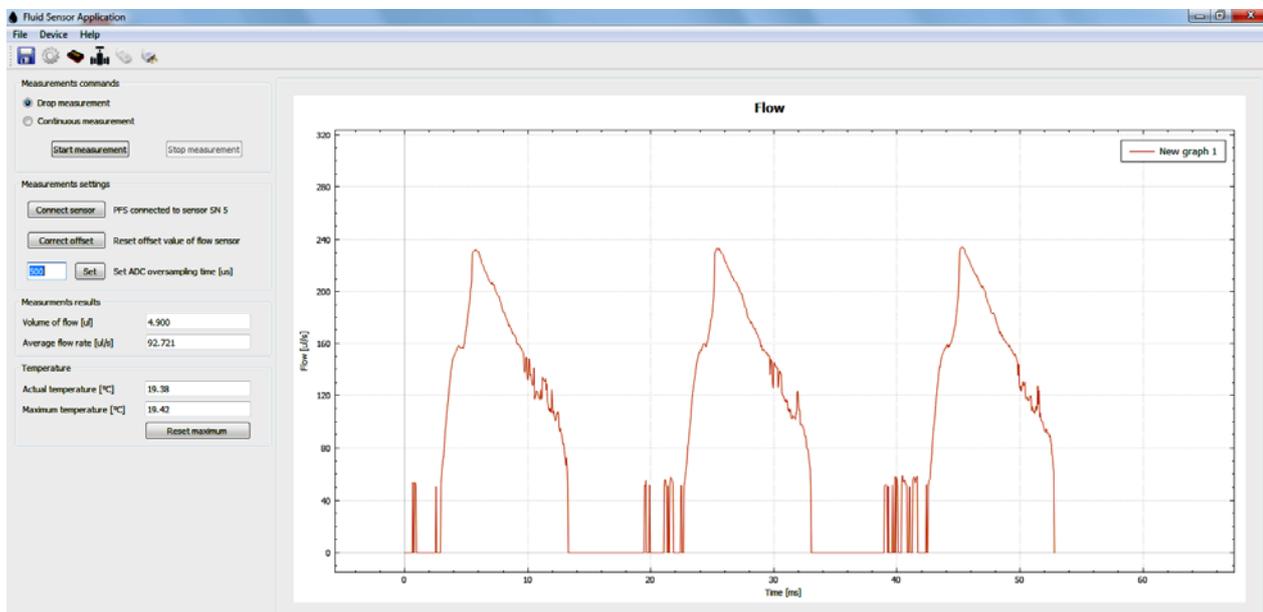Between the pulses the flow rate goes down to zero (negative flow rates are not measured).

Figure 2: Volume flow produced by the Bartels mp-6 pump at 50 Hz and 250 V with a rectangular pulse form.

Voltage modulation:

To characterize the influence of the pulse Voltage, the pump was run at 100 Hz. In 4 consecutive measurements, the voltage was raised from 100 to 250 Volts. An overlay of the sequences (65 ms) shows how the voltage influences the volume flow.
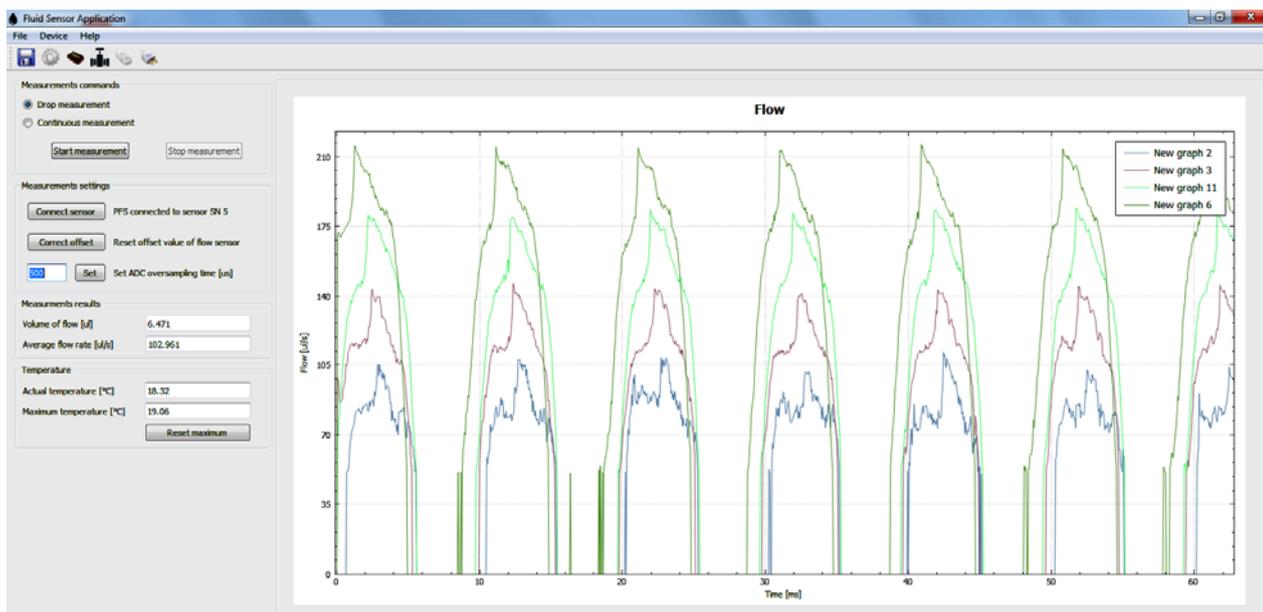

Figure 3: Rectangle pulseform at 100, 150, 200 and 250 Volts. (The time-axis of different pulses were not triggered to match)