



## Application Note: How to Measure Low Viscosity Solutions – Including Water and Low Water Based Calibration Fluid (2 cP)

When working with our clients, we do not recommend using water as a standard. The main reasons for not using water as a standard due to:

- Distilled water sources vary from source to source so it's hard to use it as a standard
  - Always try to use a NIST traceable standard
- Water has high surface tension causing measurements to be unstable when bubbles can easily form or get trapped

However, in the case water measurements are needed or when you are working with low water based calibration fluid (2 cP), this protocol can help optimize your measurement experience.

### How the bubbles are introduced?

Bubbles in the samples are sources. Also, small amount of bubble can be introduced when the tip of the pipette is inserted into the inlet of the chip.

### What indicates if bubbles are trapped?

There are two possible indicators that tell if air bubbles are trapped in the channel.

- The value of  $R^2$  indicates how good the linearity of pressure profile is. Trapped air bubbles distort the linearity. Values of  $R^2$  less than ~0.99 suggests that there are bubbles trapped in the channel.
- Another indicator is repeatability of viscosity measurement in consecutive measurements.

Trapped bubbles could move during pumping. In this case, viscosity value changes with measurements.

### Recommended Protocol to Use to Measure Low Viscosity Solutions

\*This can be used with or without your Temperature Controller (TC)

1. Prime your flow channel with 1% Aquet
  - a. Run in Auto mode
  - b. 1% Aquet should read at 1 cP at 25 °C
2. After the priming OR step 1, click on HOME first to ensure that the pusher block retracts back into its initial position
3. Load a new pipette with water or your water based calibration fluid (2 cP) and quickly push the pipette latch to release the previous pipette (of 1% Aquet), and insert your new pipette (with water or water based calibration fluid – 2 cP)
4. Do not use auto mode (see note below). In advanced mode, set flow rate at 450  $\mu\text{L}/\text{min}$  (or about 5,000 1/s in shear rate for HA01-01 chip).
5. Load the sample and run.
6. Repeat the test at the shear rate to check the repeatability if needed.

Note: With auto mode, automatic priming sequence takes place whenever a new sample is loaded in the pipette. In the automatic priming sequence, flow rate is ramped up. At this early stage of flow rate ramping up, most of bubbles are trapped in the flow channel.

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