

## HIGH PRECISION VOLUME DELIVERY

**Keywords:** stepping motors, sub-microliter delivery, reproducibility

Precision of volume injection is important in stopped flow investigations, and determines the experiment reproducibility. Stopped-flow systems using stepping motor technology offer the best precision in sample delivery<sup>(1)</sup> as delivery can be controlled with a sub-microliter precision.

Bio-logic's stopped-flow systems offer outstanding reproducibility of volume delivery, even when using micro-liters of solutions. This is critical when studies require highly asymmetric mixing ratios. The stepper motor drive provides volume step sizes of 100 nl and 11 nl for the most popular syringes (10 ml and 1.9 ml) respectively. It is important to notice that tens or thousands of steps are done for each stopped-flow injection so you never work on single steps.

The figure below illustrates the sample delivery precision of SFM-2000/3000/4000 with the titration accessory:

1ml of water in a standard quartz cuvette (1x1 cm) is fitted into the observation head. 280µM Dichloro indophenol (DCIP) is used as titrant and loaded in syringe 1. Automatic injections of DCIP are programmed in Biokine software, with volumes varying from 40µL to 2µL at each titration step.

The resulting absorbance measured at 524 nm at each is plotted below.

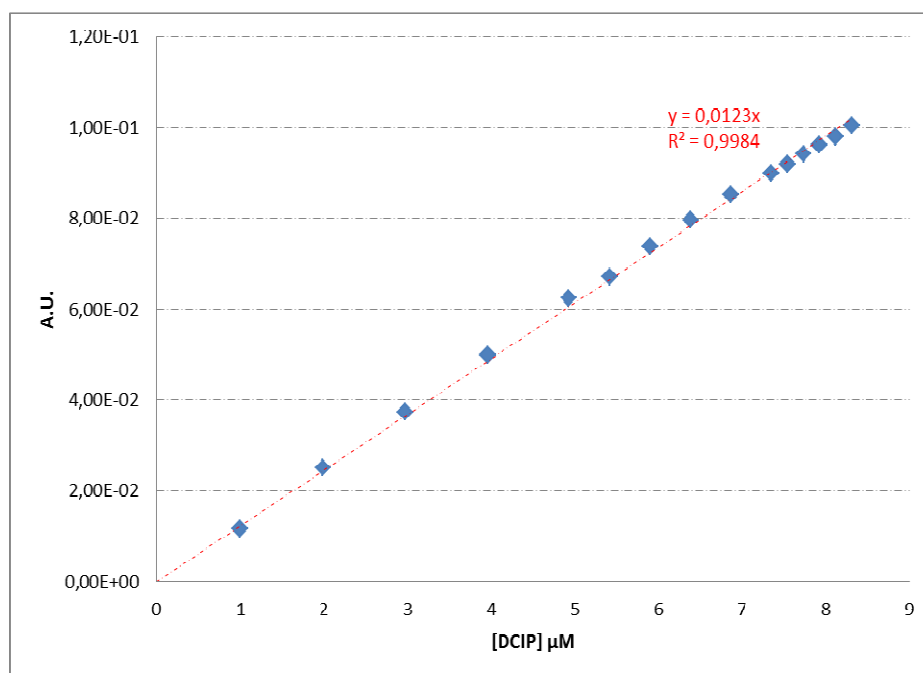


Figure 1: absorbance vs [DCIP] for 40µL to 2µL injection

The results display excellent linearity of the absorbance value vs. DCIP concentration, including low injection volumes of 2µL. [Accuracy and reproducibility](#) of volume delivery are outstanding, and prove the excellent performance of independent stepping motors for high precision mixing applications.

(1): stopped-flow based on pneumatic drive do not provide a direct control of volume per syringes as volumes are set by changing the position of the piston of stop syringe, for this reason they can also not be used for titration experiments.