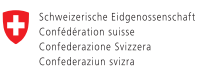


Measurement curve (liquid dispense)

Project partner



This project was supported by:



Project Outline

A novel approach for the verification of liquid handling systems

Introduction

The transfer of exact liquid volumes is crucial in life science research and diagnostics to ensure reliable and reproducible results. Liquids are transferred with the aid of manually operated pipettes or liquid handling workstations depending on the number of samples to be analysed. Both manual pipettes and liquid handling systems need to be calibrated regularly in order to ascertain proper function. For manual pipettes calibration is usually done by gravimetical means. Gravimetical calibration of automated liquid handling systems which work with a plurality of pipetting channels is much too time consuming and hence too expensive. Although reagent systems exist that work by determining the fluorescence or absorbance of transferred liquids there is still a need for an easy-to-use and inexpensive device to verify system functionality.

Aims of the project

The project aimed at the development of a verification tool that can be used to online control the function of liquid handling devices. This verification tool should be applicable for calibration purposes of manual pipettes and automated liquid handling systems, respectively.

Approach

A miniaturized liquid flow sensor has been integrated into a disposable pipette tip. Standard commercially available sensors were used which consist of a CMOS microchip bonded to a fine silica capillary. These sensors are based on the principle of thermal mass flow measurements and enable fast, non-invasive measurements of the liquid flow rate. The applicability of the approach was tested with prototypes on an automated Hamilton liquid handling system. For data acquisition and analysis of measurement data a LabView program has been created. The pipetted liquid volume was determined by integration of the flow rate and the time interval of the measurements. Experimental results demonstrated that the measurement of the liquid flow rate by a thermal liquid flow sensor can be used to determine the transferred liquid volume. This value can then be compared to the requested volume to check for the functionality of liquid handling systems.

Advantages

- online determination of transferred liquid volumes
- verification of the functionality of liquid handling systems
- less time consuming than gravimetical controls
- no need for additional reagents