

Gausstec Flash Nr. 01/22, Dezember 2022, Andreas Reinmann

Gravimetric Leak Test (EN 60601-2-24:2016) With CPC-Intervention

Masseverlauf über 190h

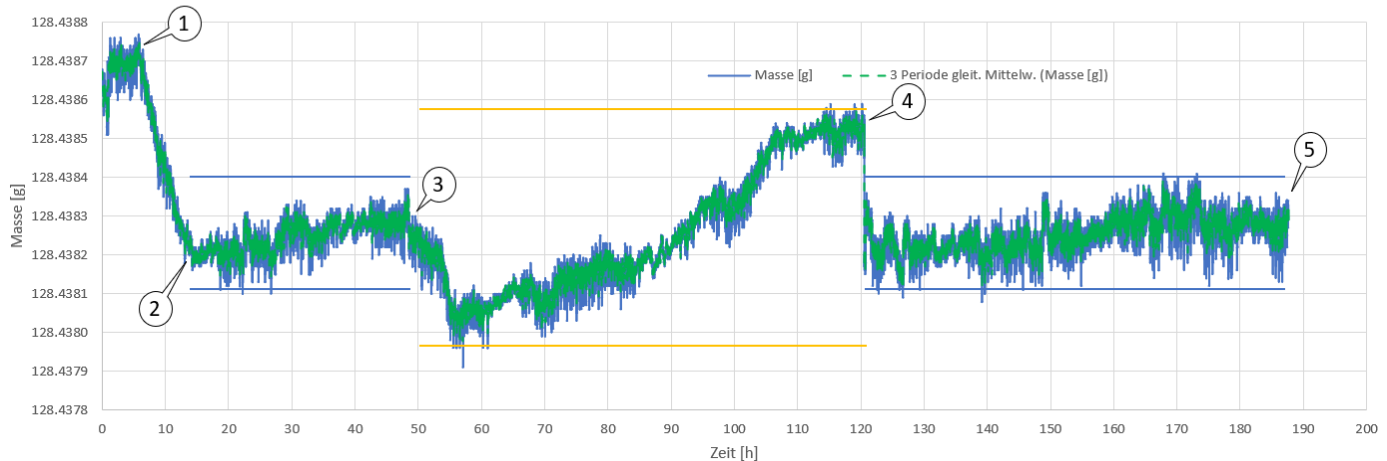


Abbildung 1: Start evaporation (1) End evaporation (2) Stop CPC (3), Restart CPC (4) End (5)

In this paper we demonstrate the efficiency of the CPC compensation method for long-term weighing. The field of application is gravimetric measurement of mass migration, evaporation, oxidation, leak testing, discharge. We record mass changes with a resolution of 0.01mg.

CPC «Climatic and Physic Compensation»

When weighing is in progress, the ambient conditions are compensated at regular intervals, e.g. every hour. The compensation applies to all subsequent measurements. This has two benefits. Firstly, the measurement uncertainty is reduced and secondly, the need for room air conditioning is eliminated in order to be able to measure at this high level at all.

Efficiency

To demonstrate the effectiveness of the procedure, we weighed a mass of 128g three times per minute over a period of 190 hours. For illustration, the CPC function was suspended for several days.

Six hours after the start of the experiment (1), we let a drop of water of 0.5ul evaporate. After approx. 8 h, values between the blue restriction bars are found, 128.43825g \pm 0.15mg.

48 hours after the start of the experiment, we deactivate the CPC function (3) for three days. As the orange bars show, there are unexpected fluctuations in the measurement results. The problem is not the scatter between the measured values but changes over hours and days.

Now we activate the CPC function again. The values immediately jump to the original level.

Significance for testing micro-metering pumps according to EN 60601-2-24:2016

Assuming a pump delivers insulin 100 U/cm³ at a basal rate of 0.01U/h to a vessel next to the weighing table, we would measure a mass slope that is slightly steeper than that of phase (1-2). We could follow the weight over days with a maximum deviation of \pm 0.15mg.

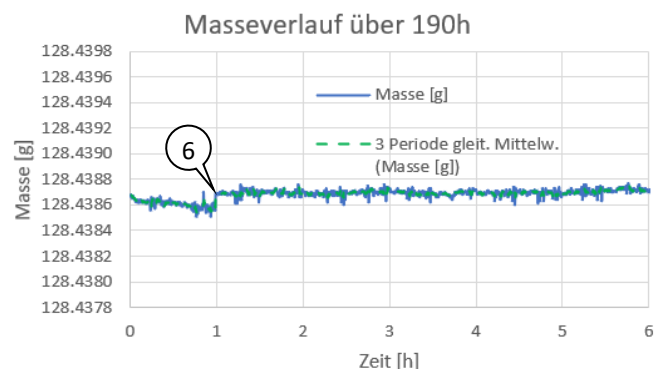


Abbildung 2: CPC-Interventionen (6) after one hour measuring time

Setup mass testing

Long-term mass test with 3 measurements per minute, maximum total mass 170g with CPC compensation on laboratory balance.