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# Normal force option for Thermo Scientific HAAKE CaBER 1

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## Key-words

- Capillary breakup extensional rheometer
- Thermo Scientific HAAKE CaBER
- Normal force

The capillary breakup technique as used in the extensional rheometer Thermo Scientific HAAKE CaBER 1 is a powerful tool to determine the extensional properties of fluids by measuring the decline of the diameter of a stretched fluid filament, which is narrowed down by the capillary force as a function of time. For certain samples however, the physical properties of the sample, e.g. a specific sample structure or the lack of a substantial surface tension, limit the use of this technique. In order to be able to measure the extensional properties of such samples with the CaBER a different measuring approach is needed.

With the normal force option, a compact module has been developed to investigate the normal forces that arise in the fluid filament during the initial stretching. Any existing CaBER 1 instrument can be equipped with this sensor.

A Kistler normal force sensor is mounted under the lower plate of the CaBER 1 extensional rheometer using an especially made adapter (see Fig. 1). The normal force signal which has a force resolution of 0.05 mN (for the lowest force range) and a time resolution of 0.2 ms is measured using a Kistler charge amplifier. This excellent resolution is realized by using a raw data acquisition rate of  $10^5$  points per second and subsequent oversampling. The Kistler charge amplifier is triggered by the CaBER 1 and the normal force signal is measured by the CaBER 1.

The normal force option for the extensional rheometer enables the investigation of even the most complex and delicate samples. Measurements can be performed on samples that exhibit a strong yield stress such as emulsions, suspensions, adhesives, food etc.

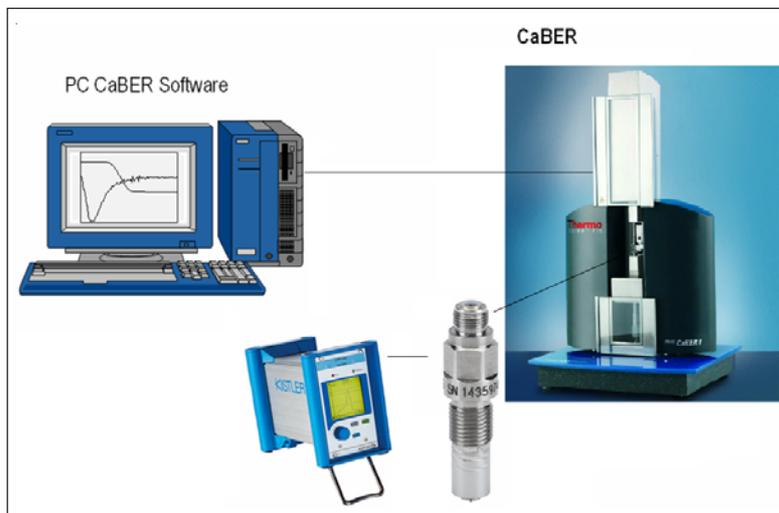


Fig.1: Schematic view of the experimental setup

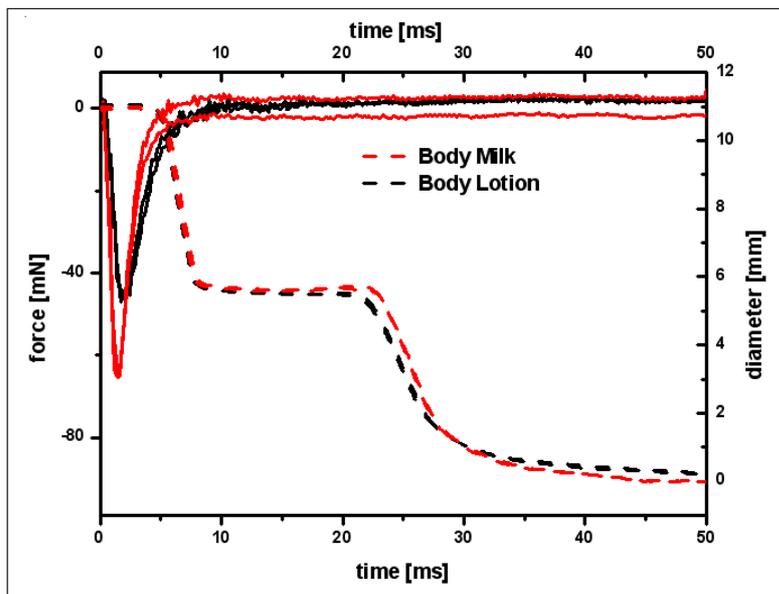


Fig.2: Typical experimental result: in this case measurements on a w/o and o/w emulsions

## Order information

222-2021 CaBER 1 normal force option consisting of a Kistler type 9215 force sensor, a Kistler 5015A charge meter (or suitable alternative models) as well as an adapter shaft (603-0466) for mounting the Kistler force sensor in the CaBER 1.

## Necessary accessories:

398-0001 Extensional rheometer CaBER 1 as PC-version

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