

## Mütek™ SZP-16

### System Zeta Potential



#### FEATURES

- ▶ Detects the zeta potential of fibers and solid particles
- ▶ Fully automatic measurement sequence
- ▶ Easy access to all parts in sample contact
- ▶ Compact and light for comfortable travelling
- ▶ Automatic cleaning
- ▶ Intuitive 7" user interface
- ▶ Automatic lifting of sample beaker
- ▶ Optional temperature measurement

#### BENEFITS

- ▶ Confirms wanted additive reactions on fibers – and reveals unwanted ones
- ▶ Identifies additive overdosages for responsible resource deployment
- ▶ Locates weak spots in a process to allow purposeful improvements
- ▶ Merges you with a team of BTG application and service experts around the world

## GENERAL

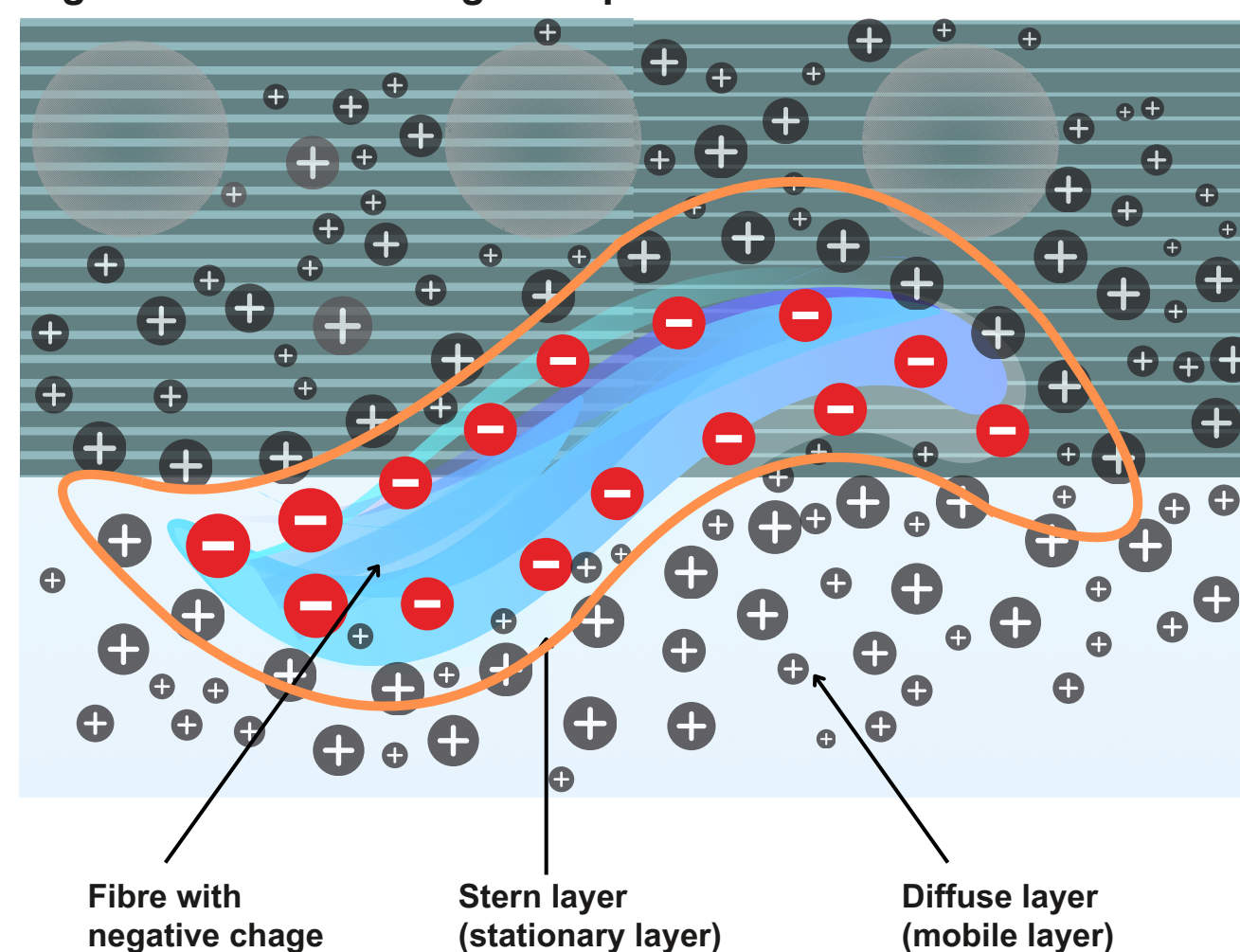
The Mütek™ SZP-16 System Zeta Potential identifies the surface charges of fibers, pigments and other solid materials. Measuring samples before and after chemical contact, it evaluates the performance of e.g. wet strength agents, sizing agents, dispersants or coatings in a manufacturing process. The SZP-16 is a well-accepted standard tool for chemical suppliers of the pulp and paper industry, especially because it measures process samples without further sample preparation, as would be necessary, e.g. for electrophoresis.

The device has been successfully employed to assess chemical additives in the papermaking process as well as for evaluating filter aids for beverages, other separation technologies or to control textile finishing.

The Mütek™ SZP-16 System Zeta Potential detects the surface charge of solid materials. The surface charge is the overall charge of a solid particle in an aqueous system.

This charge influences the interaction of the sample material with chemical additives.

**Figure 1: Surface charge of a particle**



Use QR code or link for more information  
<https://www.btg.com/files/szp-16/>

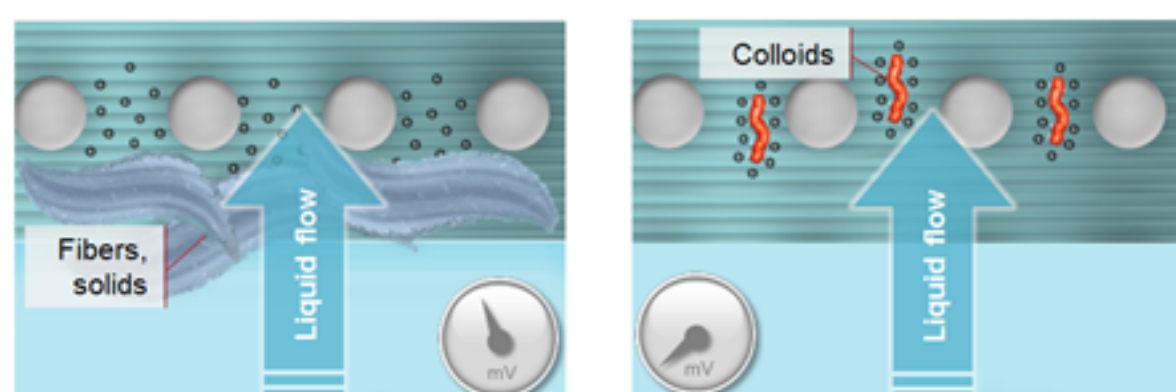
## MEASURING PRINCIPLE

Practically all colloids and solid particles carry electric charges when dissolved in water. This leads to a concentration of oppositely charged ions, the so called counterions, at the particle surface. If these counterions are separated from the particle, a streaming potential can be measured. In the Mütek™ SZP-16 solid particles are fixed at a screen while their surrounding counterions are separated by a liquid flow.



**Figure 2: Measuring cell cut view SZP-16 with sample**

This principle will not take colloiddally dissolved substances into account as colloids can pass the screen.



**Figure 3: Separation of counterions in the SZP-16 cell**

The so induced streaming potential is measured, as well as the conductivity and the vacuum difference. After several vacuum cycles, the zeta potential is calculated out of these measured values. The measurement sequence ends with blowing-out the fiber plug back into the beaker.

With an optional available temperature measurement a temperature compensation is possible - this makes zeta potential comparable, even when measured at different temperatures.

## APPLICATION EXAMPLES

The Mütek™ SZP-16 is suitable for a wide range of industrial applications as well as R&D as for example in:

### PAPERMAKING

Optimization of fiber active chemicals like sizing agents, optical brighteners, wet strength agents and fillers.

### SEPARATION TECHNOLOGY

Characterization of filter aids and filtration materials for wastewater treatment, mining applications and selective adsorption of interfering substances in the food and beverage industry or for pharmaceutical applications.

### PIGMENTS

Characterization of pigment (e.g. TiO<sub>2</sub>) dispersions in view of pH dependency, stability and process ability.

### TEXTILE FINISHING

Control of refinement process (finish) of textiles regarding coatings (water-repellent, heat resistant etc.) and colors.

### FIBER TECHNOLOGY

Quality control and optimization of fiber treatments like sizing of glass fibers

## 2CHARGE STRATEGY

Combining the Mütek™ PCD with a Mütek™ SZP will allow the user a comprehensive knowledge of the charge reactions taking place in a process. The measurement results of the PCD and the SZP complement each other. Whereas the PCD measures the colloidal dissolved substances, SZP results investigate the used fibers and prove whether or not chemical additives react with the fiber.

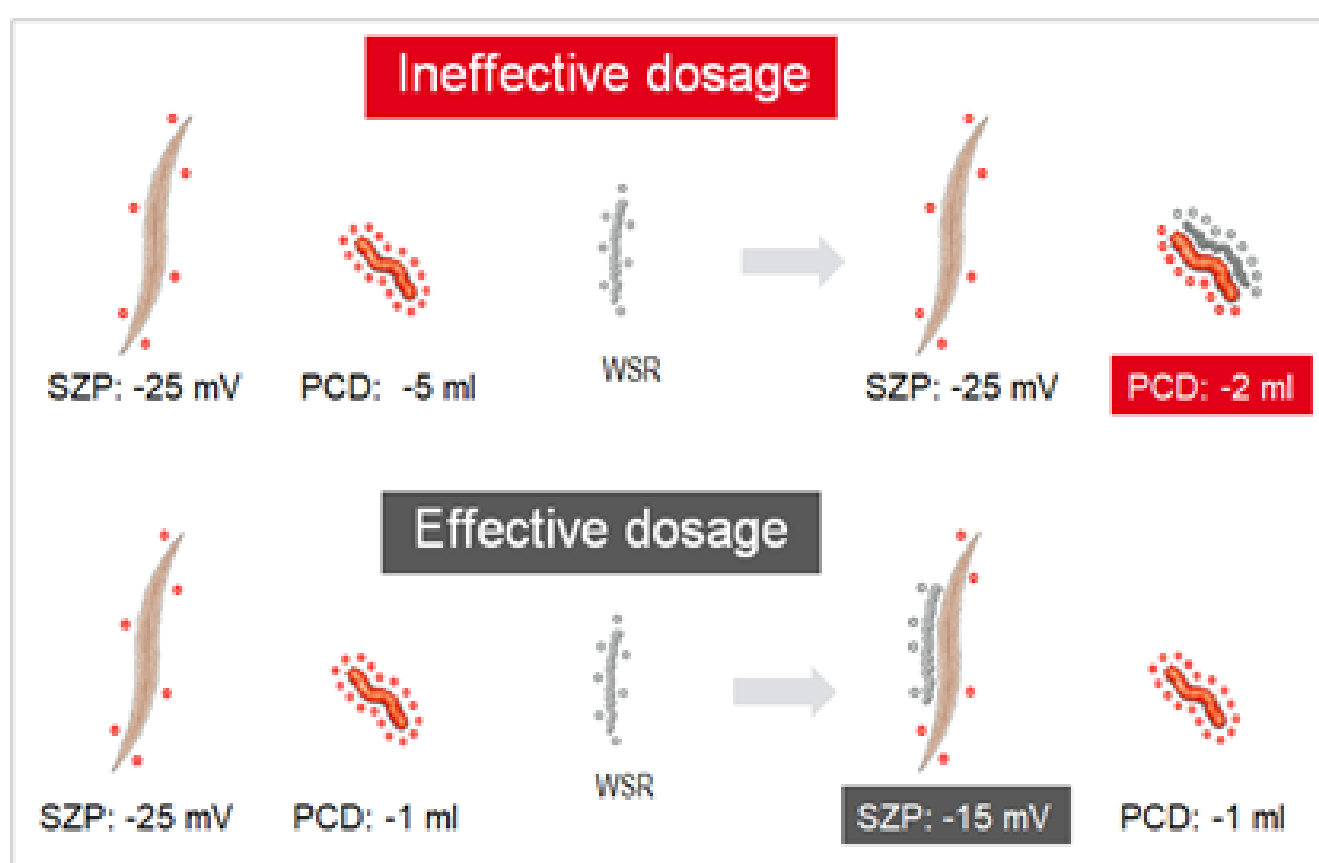


Figure 4: 2Charge Strategy

## SAMPLE SPECIFICATION

Generally, a streaming potential can be measured for particles larger than the openings (308 µm or 40 µm) of the used screen. To measure samples containing particles smaller than 40 µm, a suitable filter material has to be inserted.

### PULP FIBER MATERIALS

Samples with 4% solids content can be measured directly. Higher concentrated samples might require dilution with own filtrate. Conductivity should be between 100 µS/cm and 7 mS/cm.

### SOLID PARTICLE SUSPENSIONS

Suspensions of 1% up to approx. 50% depending on hydrophilic/ hydrophobic characteristics of the sample material.

### PIGMENTS

Pigment slurries of up to 60% solids content can be measured.

### TEXTILES, FILTER PLATES, FIBER MATS

Cut in small pieces then suspended in water (~1% suspension). Alternatively, a piece of sample material can be punched out and clamped into the measuring cell.

## ACCESSORIES

### Calibration set SZP-16

Anionic ZETA pad with a test liquid for use as control substance for zeta potential determination.

### MEASURING CELL

The measuring cell features 3 built-in ring electrodes for accurate potential and conductivity measurement. Depending on the sample properties it can be equipped with a standard screen or a fine screen.

### SCREEN FOR FILTRATING FIBER SUSPENSION

Sample materials with high solids content (> 4 %) should be diluted with their own filtrate. To gain filtrate, the beaker with screen can be pressed into the thick stock.

### TRANSPORTATION BOX (OPTIONAL)

All Mütek™ lab devices are available with tailor-made carrying cases.

## SUPPORT

### ANALYTICAL SERVICES

Besides its service to measure customer's sample material, our application lab is dedicated to development of special applications for many different industries. For further information please contact us at [instruments@btg.com](mailto:instruments@btg.com).

## TECHNICAL DATA / SPECIFICATIONS

### GENERAL

#### Dimension W / D / H

223 / 270 / 337  
[8.7 / 10.6 / 13.3]

#### Weight

6.5kg [14.33lb]

#### Power supply

100–240VAC/1.5A / 50–60Hz

#### Ambient temperature

15 – 40°C [50 – 104°F]  
No condensation

#### Storage temperature

5 – 40°C [41 – 104°F]

#### Sample temperature

5 – 40°C [41 – 104°F]

#### Measuring values

Streaming potential [mV]  
Conductivity [mS/cm]  
Pressure difference [mbar]  
Temperature [°C] (optional)

#### Results

Zeta potential [mV]  
Temperature [°C] (optional)

#### Sample volume

500ml / min. 20 ml

#### Consistency

0.1% – 4% Fiber sample  
(depending on the sample properties, higher consistent  
samples can be measured)  
Up to 60% pigment slurry

#### Data management

User interface storage with capacity for 100  
measurements. Export via USB-A Pen drive.  
Internal data drive with capacity for >5000  
measurements. Connection for data read-out to PC  
via USB-C.

#### Output data format

CSV file results  
CSV file single measurement  
CSV file with parameter

#### Reproducibility

#### Standard deviation SD(x)

0.5% – 5% depending on sample

#### Detection limit

0.05mV streaming potential

#### Communication standard

IEEE802.3  
(Ethernet)

## SAFETY & DIRECTIVES

#### Safety and protection class

#### Standards

DIN EN 61326  
DIN EN 61010

#### Quality Assurance

Quality-assured in accordance with ISO 9001.

## YOUR LOCAL BTG OFFICE



Use QR code or link for more information  
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