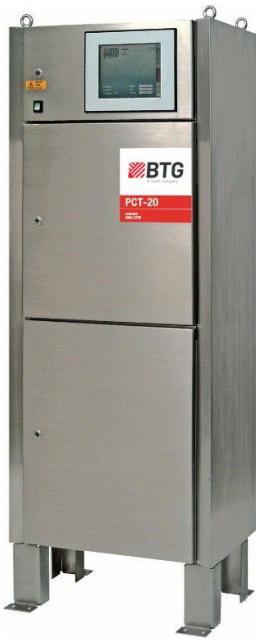
Product sheet

PCT-20

Charge Analyzer

Measures anionic trash for optimum chemical and machine performance



FEATURES

- **Closed loop fixative control**
- **Optimum performance of functional additives**
- **Chemical savings**
- **Improves retention and drainage**
- **Higher product quality and quantity**
- **Improves process stability and runnability**

BENEFITS

- **Precision measurement**
- **Results directly comparable to PCD**
- **Patented automatic cleaning**
- **4 sampling points**
- **User-friendly operation via touch screen**
- **No calibration**
- **Easy servicing due to modular structure**

GENERAL / BACKGROUND

The main application of the PCT-20 Charge Analyzer is closed loop fixative control in paper production. Applying online polyelectrolyte titration, the PCT-20 continuously monitors the total surface charges of all dissolved and undissolved substances present in an aqueous sample.

Colloidal dissolved substances and particles in a fiber suspension carry electrical charges. The large charged surfaces of these colloidal substances enable interactions between the fiber suspension and functional additives.

The charge demand measurement is based on the streaming current method, where a piston moving up and down in a specially designed measuring cell causes a liquid stream between the cell wall and the piston. This distorts the surface charges of the colloidal substances so that a current is induced. To determine the charge level in the process a polyelectrolyte titration – i.e. neutralization by an oppositely charged polyelectrolyte – is performed.

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MEASURING PRINCIPLE / MEASUREMENT

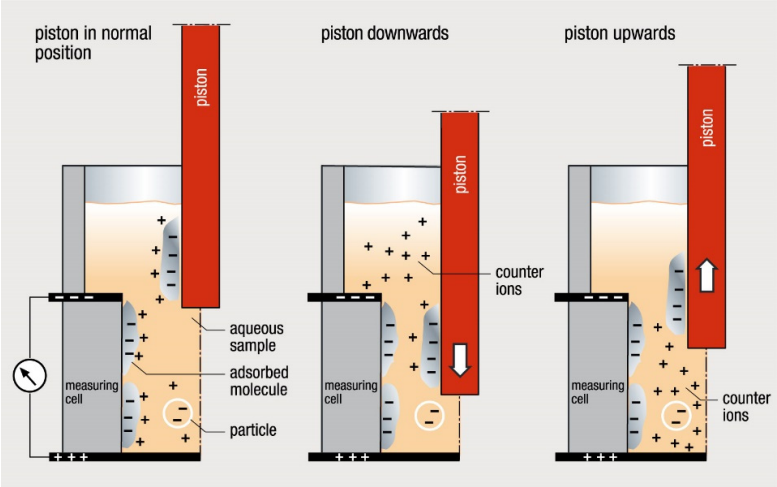

Figure 1: Measuring principle of a PCT-20 Charge Analyzer

The streaming current measurement with the PCT-20 Charge Analyzer is based on the following principle: The central element is a teflon measuring cell with a fitted displacement piston. If an aqueous sample is filled into the measuring cell, colloidal dissolved molecules will adsorb at the teflon surface of the piston and on the wall of the measuring cell under the action of van der Waal forces. The counterions remain comparatively free. A defined narrow gap is provided between measuring cell wall and piston.
Driven by a motor, the teflon piston oscillates in the measuring cell and creates an intensive liquid flow which entrains the free counterions, thus separating them from the adsorbed sample material.

At the built-in electrodes, the counterions induce a current which is rectified and amplified electronically. The streaming current is shown on the display with an appropriate mV-signal.

FUNCTIONAL PRINCIPLE

The multiplex module switches among two to four sample lines to measure either thick and thin stock samples prepared with the TSS-71 Filtration Sampler or samples drawn directly from the white water. After rinsing with water, ultrasonic cleaning is applied to the measuring cell in combination with specially developed cleaning solutions. The cell is then flushed with sample before the measurement is taken. The dosing module serves to pump sample, water and cleaning solution.

The measured mV-signal indicates to the titration module whether a cationic or anionic polyelectrolyte is required for titration. The charge demand results from the polyelectrolyte dosage needed to reach a potential of 0 mV.

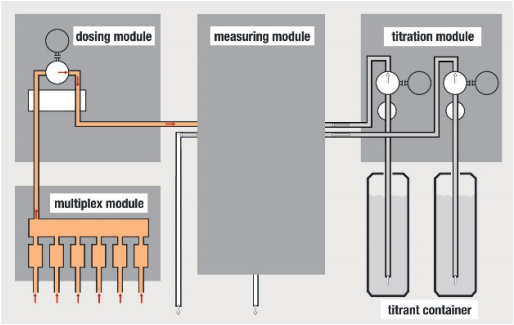

Figure 2: Functional principle of the PCT-20 Charge Analyzer

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INSTALLATION

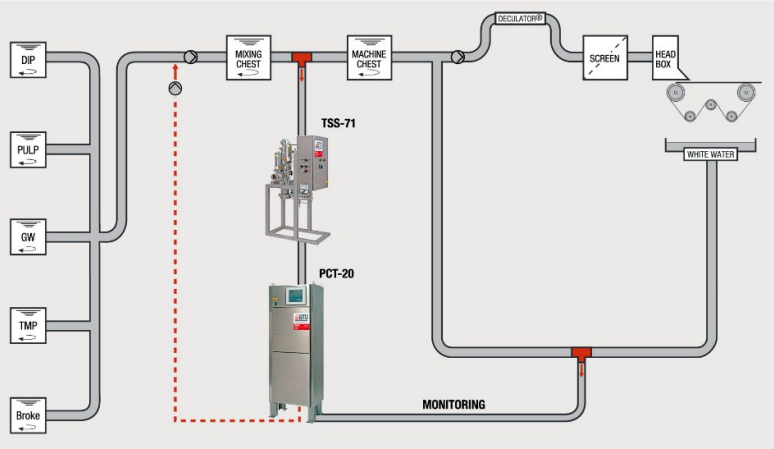

Figure 3: In most applications the PCT-20 Charge Analyzer requires stock filtration with a TSS-71 Filtration Sampler

With the PCT-20 different control strategies are possible, but nearly every installation requires stock filtration with a TSS-71.
Typical sampling points for the PCT-20 are the incoming furnishes directly or after mixing or machine chest. Online results from these sampling points serve to enable closed loop fixative control.
White water installations are only suitable for monitoring purposes or in tissue applications to control wet strength resin additions.

BENEFITS OF FILTRATION

The main reason for measuring the colloidal dissolved charge in paper and board production with a PCT-20 is to determine anionic trash variation in order to stabilize it by closed loop fixative control. Stabilizing the anionic trash level greatly enhances the performance of charged functional additives such as starch, wet strength resin (WSR) or retention aids. An overall stabilization of paper or board machine processes is thus achieved. For this purpose it is of highest importance to measure the colloidal dissolved charge in a reproducible high quality thick stock filtrate sample as is obtained from a TSS-71.

If by comparison the colloidal dissolved charge is measured in an unfiltered white water sample, measurement results not only reflect changes in anionic trash levels, but also variations in retention and filler addition. Less retention means a higher content of fillers and fines in the white water. These particles carry a high anionic charge which contributes significantly to the measured charge. This means that variations in the filler / fines content are detected, not however changes in anionic trash. In most applications, these results make fixative control impossible. Another drawback of white water measurements is the buffer effect of charged functional additives on the result. White water samples are not sufficient to determine anionic trash variations.
If the colloidal dissolved charge is measured in a diluted sample the ion background and pH's are changed so that variations in anionic trash are no longer detectable. The charge results highly depend on pH and conductivity. To measure the real anionic trash level in a sample, filtration without dilution is required.
The conclusion is that a filtered thick stock sample ahead of the dosing points of charged functional additives is a must if anionic trash levels are to be determined and controlled with fixatives. In the majority of applications, white water samples should only be used for monitoring reasons. There are very few applications where an unfiltered white water sample could be used for control purposes. One of these applications is WSR control in tissue production.

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TECHNICAL DATA / SPECIFICATIONS

GENERAL

System description	Charge measurement
Measuring principle	Streaming current measurement
Measuring range	± 20 ml (standard solution)
Measuring interval	1 – 10 measurement/h
Ambient temperature	5 – 50 °C [41 – 122 °F]
Humidity	up to 95 %
Weight	approximately 80 kg [176 lbs]

Supplies

Sample	
Temperature	15 – 60 °C [59 – 140 °F]
pH	1 – 12
Consistency	
in white water	up to 1 %
with TSS	0.5 % – 8 %
Conductivity	0 – 10 mS/cm
Pressure	
in white water	0.2 – 10 bar [2.9 – 145 psi]
with TSS	0.5 – 1 liters/cycle [0.13 – 0.26 gal/cycle]
Consumption	
in white water	2 – 6 liters/min [0.53 – 1.59 gal/min]
with TSS	0.5 – 1 liters/cycle [0.13 – 0.26 gal/cycle]
Water	
Temperature	10 – 50 °C [50 – 122 °F]
Pressure	2 – 10 bar [29 – 145 psi]
Consumption	3 liters/cycle [0.79 gal/ cycle]
Power	
Input voltage	88 –132 V AC / 176 – 264 V AC
Frequency	47 – 63 Hz
Input current	2.5 A at 230 V AC 3.5 A at 115 V AC
Consumption	up to 240 W
Chemical	
Detergent conc.	0.3 – 1 liter/month [0.08 – 0.26 gal/month] depending on cleaning cycles
Polyelectrolyte	approx. 4 liters/month [1.06 gal/month] anionic or cationic standard solution

External connections

Analog outputs	4 x 4 – 20 mA
Digital outputs	error, warning
Digital input	remote control
Serial ports	RS 232 / RS 485
TSS connections	4
Wetted material	AISI316L, PTFE, PVDF, PE, PP, NBR, Silicon, PETP

SAFETY & DIRECTIVES

Safety and protection class

Protection class 1

IP65

EU directives

Designed in accordance with relevant CE standards.

Quality Assurance

Quality-assured in accordance with ISO 9001.

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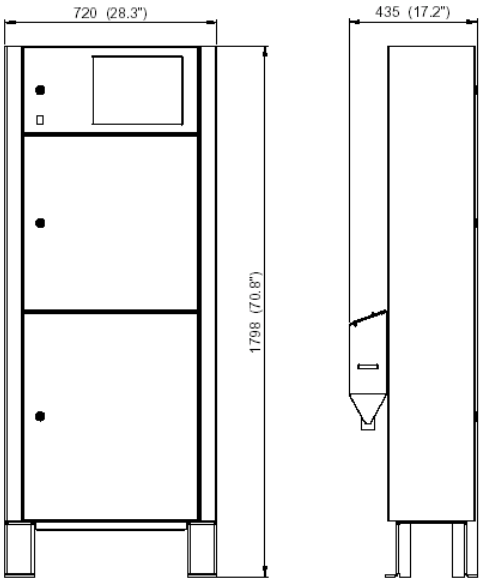
DIMENSION DRAWINGS



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