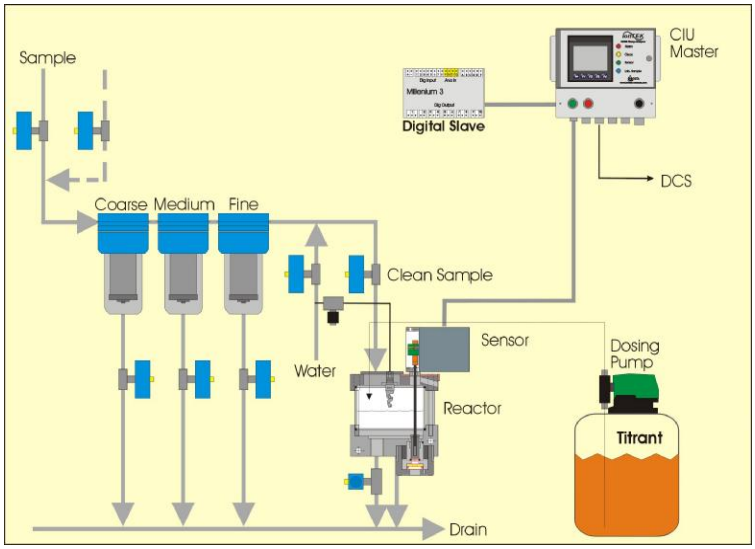
On-line Charge Demand Measurement

Invista's ***ion*TEK** SCD charge sensor enclosed within a CSU package measures the ionic charge demand in the wet end. This measurement of colloidal dissolved materials at the wet end of a paper machine provides an indication of the charge balance affected by material and chemical additives. Conditioning the feedstock at the wet end can reduce process variability to help stabilise machine production.



The ***ion*TEK** charge sensor measures the a.c. streaming current caused by the hydraulic shear of a reciprocating probe within a measurement cell. A process sample is taken and the solids reduced by 3 stages of cross-filters to leave a colloidal sample. The sample is then transferred to a reactor vessel and a precision dosing pump is used to titrate a polyelectrolyte to a zero charge-potential end-point. The amount of titrant chemical used to charge neutralise the sample is a measure of the ionic demand (µ.equiv/Ltr). Each batch takes between 5 to 7 mins.

*ion*TEK SCDM features

The unit is designed to measure the charge level for up to two process points.
It is easy to install, operate and maintain. All component design is modular to allow mill personnel to service the unit.
A stainless steel, enclosure provides a protected environment for; hardware, control equipment, measurement sensor and cross-filter separators. Side panels can be removed for service access.

Sealed electronic enclosures are mounted integral to the main cabinet. These enclosures house; the SCD sensor electronics, a slave processor (for sample preparation) and a sealed power enclosure, as well as; interface relays, level controller and terminals.

Each sample is prepared using three stages of cross-filter separators. The cross-filters remove solids from the sample using; a coarse (200 micron), a medium (125micron) and fine (75-50 micron) filter(s) in series. Each sample cycle starts with a pressure water clean and drain. The sample flows to drain initially before filling the filter to ensure a fresh process sample.

The Sensor Interface Unit (SIU) automatically controls the sample preparation, sample titration and calculates the charge demand. Each sample titration is trended for analysis. The SIU provides; on screen measurement trending (upto 2 points), data-logging and optional remote data communications.

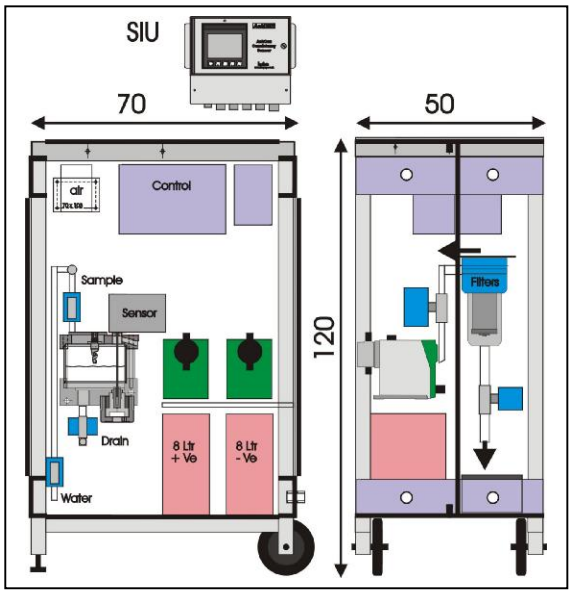
Measurement and (Lab.) standardisation

A single integral measurement unit includes; reactor vessel, SCD sensor and mixer.

The reactor vessel allows the titrant to be dosed into a fixed sample volume and mixed by a stirrer. The sample is transferred from the filter separator via a transfer shut-off valve into the reactor. A capacitive level probe and overflow tube ensures that a constant volume of sample is added to the vessel. The vessel (overflow) is calibrated to hold 600mls of sample. At this volume; potential contamination errors from water flushing and previous sample carry-over is reduced through dilution.
A large diameter cover allows easy access for cleaning. The stirrer is mounted on the cover and can be reobved for cleaning with the level probe. The sensor body can be removed for inspection and cleaning. The detector cell can be unscrewed and removed for cleaning. The addition of titrant(s) can be observed during the sample titration.

A separate **Lab. Check** sequence allows manual samples to be measured either for measurement verification or as a laboratory instrument replacement. A 1.5 Litre sample is prepared to a standard Laboratory preparation and this is titrated (sample soak and sample titration). The pulse count should match the measurement standard. Titration standards can be prepared for both an anionic or cationic titration.

The processor first determines if the sample is +ve or –ve after the stabilising time and then commences the titration by pulsing the dosing pump (cationic or anionic) The number of pulses required to drive the sensor reading to the zero point are logged. The pulse-rate is varied (interval between each pulse) from 2 secs/pulse for a sample with a high ionic charge reading down to 10 secs/pulse as the sensor reading approaches zero. This prevents overshoot of the zero and provides a more accurate result. The titration is measured in units of micro (µ) equivalents of titrant in a litre of sample. A second dosing module can be used for an anionic (-ve) titrant. Typically polyDADMAC is used as a positive titrant on negatively charged samples. CMC is normally used as an anionic titrant or PVSK (non-pH dependent).



This measurement has been proven on a full range of applications over long periods. The unit is robust, reliable and simple to use. The use of Industry standard components has kept costs low and has allowed this useful measurement application to be more widely used on; Paper, Tissue and environmental applications.

Invista Limited
Unit 16, BVEC Ivy Road
Aldershot
Hampshire GU12 4QW
United Kingdom
Tel: +44 1276 691030
Fax: +44 1276 691030
www.invista-sensors.com

Contact :