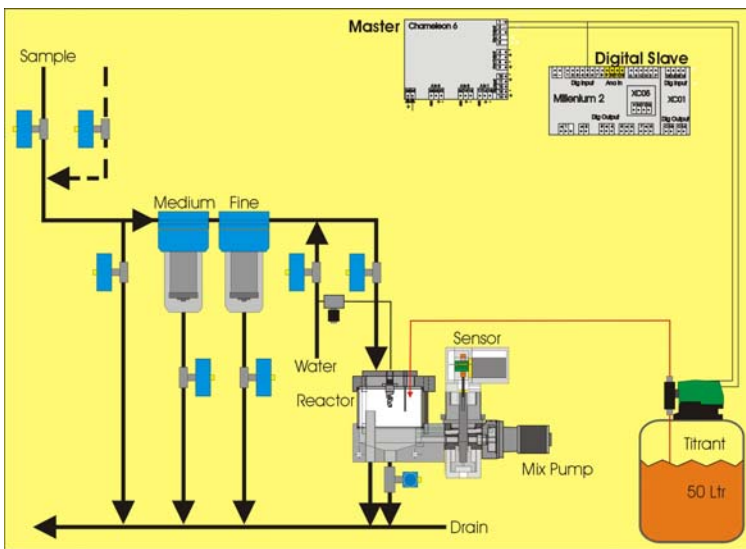


On-line Charge Demand Measurement

The **ionTEK** 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 **ionTEK** 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 2 or 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 ($\mu\text{equiv/Ltr}$). Each batch takes between 5 to 7 mins.

ionTEK SCD-Lite features

Construction

The CSU is designed to measure the charge level for up to two process points.

The unit is easy to install, operate and maintain. All component design is modular to allow local users to service the unit.

A stainless steel, enclosure provides a protected environment for; hardware, control equipment, measurement sensor and cross-filter separators. Locked side panels can be removed for service access.



A sealed electronics enclosure is mounted integral to the main cabinet. This enclosure houses; the SCD sensor electronics, master processor (controls the titration) and a slave processor (controls sample preparation) sealed power enclosure, as well as; interface relays, level controllers and terminals. The sensor electronics and master processor have quick disconnect plugs for exchange as required.

The enclosure is divided into three main sections :-

The Sample preparation section for the 2-stage cross- filter separators .

The cross-filter separator removes solids from the sample using a medium (125micron) and fine (75micron) filters. 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 Measurement section contains; the reactor vessel, sensor and mixing pump. Control interface modules for the pneumatic solenoids, water solenoid and interface enclosure are mounted above the reactor.

The drain outlets lay across the base of the cabinet and drain through 25mm hose connectors. All drain outlets flow downwards by gravity.

A precision dosing pump is mounted on a 50 litre polypropylene tank containing the titrant. PolyDADMAC (+ve) is used as the standard cationic titrant (0.025N), although this can be adjusted in concentration to suit high or low demand applications. Each pump pulse is recorded and the dose rate per pulse is used to calculate the quantity of titrant used. A second pump module can be used for an anionic (-ve) titrant. Either PVSU or more commonly CMC is used, made up to an equivalent ionic strength. Each titrant pump module includes a bund tank and a pump cover. The titrant pump modules should be located within 5 metres of the main cabinet.

Measurement

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



The reactor vessel allows the titrant to be dosed into a fixed sample volume and mixed before being drawn across the sensor by the mixing pump. 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 1 litre 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 sensor body can be removed to inspect and clean the probe as required. The detector cell can be unscrewed and removed for inspection. The addition of titrant(s) can be observed during the sample 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 pulse count for the measured sample can then be multiplied by the dose rate per pulse (0.08mls/pulse) x ionic strength of the titrant to give a reading of charge demand. This is measured in units of micro (μ) equivalents of titrant in a litre of sample.