

# Automatic On-Line $\text{Ca}^{++}$ Analyser System



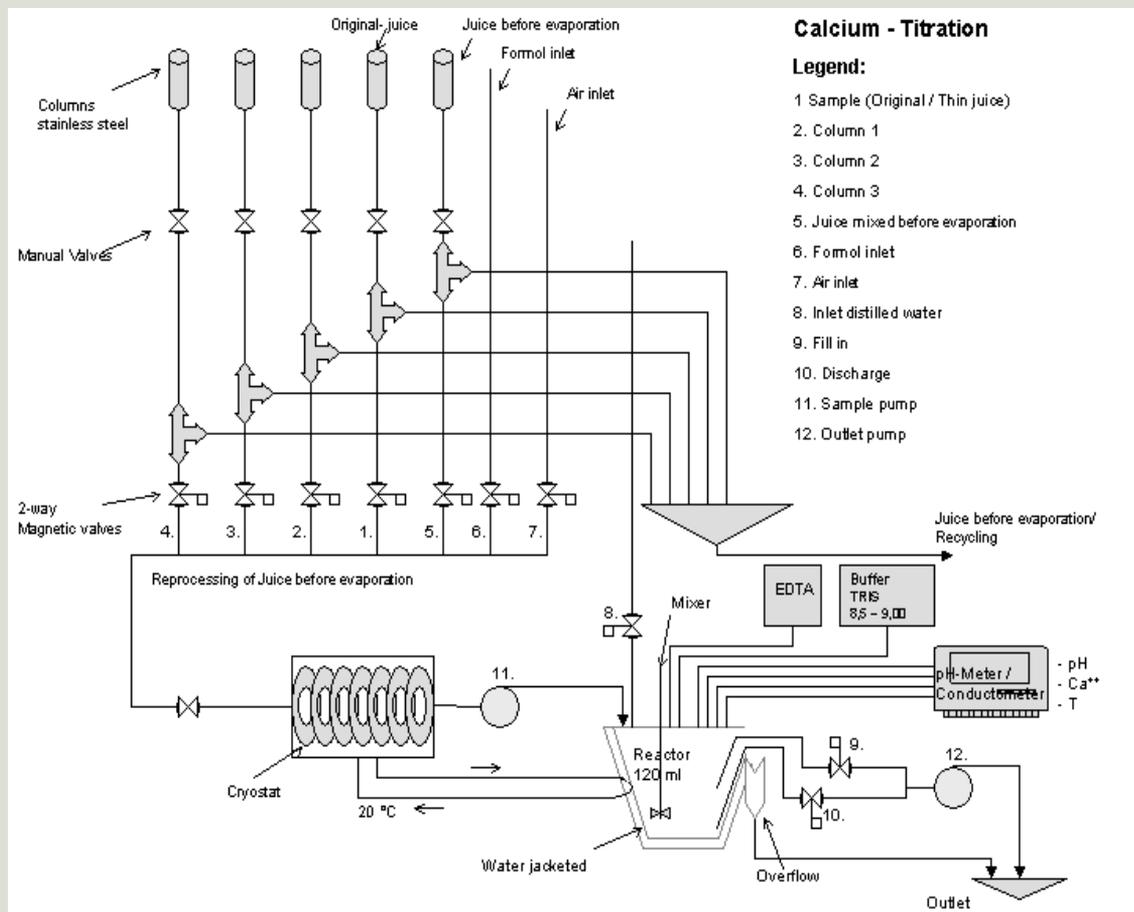
A fast and reliable Analysis of relevant process parameters is decisive in order to guarantee an optimal process control. The on-line process analysis enables the continuous process monitoring and fast retroactive adjustment, control and optimisation of the process, in contrast to time shifted and time consuming laboratory analysis.

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## Principle of the Method

The PC-controlled system enables the analysis of up to 5 different products in a defined operated sequence, depending on the factory. The automatic on-line  $\text{Ca}^{++}$  analyser system measures and calculates the  $\text{Ca}^{++}$  contents of thin juices by means of a complexometric titration. The active decalcification column will trigger the analyser via the customer's data monitoring system. The data sequences need to be defined by Schmidt+Haensch, a RS 232 bi-directional interface will be provided. The automatic  $\text{Ca}^{++}$  analyser system measures the  $\text{Ca}^{++}$  content by means of an EDTA titration system. The titration will be monitored using a combined  $\text{Ca}^{++}$  electrode. The automatic on-line  $\text{Ca}^{++}$  analyser system consists of a sample collection and selection module, an analysis module and a system control module. After collection and selection, the samples are pumped to a central measuring reactor of the analysis module. A defined volume of the product is measured and tempered to 20 °C. A buffer solution is injected towards a defined pH value, which initially will be monitored. Then, it is automatically titrated with EDTA and the point with the largest slope determined.



## Sample selection

Hot samples have to be pre-cooled with a flow-through heat exchanger. Up to 5 different products are conducted to the sampling station. The sample that is going to be analysed is selected automatically via the customer's monitoring system. The customer will provide a stainless steel circuit line with an electrical driven valve (24V). The diameter of the circuit should be  $\frac{3}{4}$ ". The customer guarantees for the continuous flow of the juice within the circuit line, Schmidt+ Haensch is responsible for the juice propulsion from the valve onwards. The samples are further pre-cooled with a flow-through heat exchanger before they reach the titration reactor.

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## Titration

The sample flows from the sampling station to the titration reactor. This is a water-jacketed glass vessel that is tempered to 20 °C using a thermostat; on one side it has an overflow funnel. First, the reactor is rinsed and then filled with the sample. A glass tube is positioned in such a way, that excess fluid is removed by suction using a water-jet or peristaltic pump, a defined volume of the sample (e.g. 50 ml) are measured off. A combined electrode, temperature sensor and a mixer dip into the reactor. When the temperature of the sample is close enough to 20 °C a buffer solution is injected towards a defined pH value, which initially will be monitored. Then, the titration with EDTA as a titration reagent starts, an end point titration according to the customer's parameters is carried out automatically. With the obtained values the  $\text{Ca}^{++}$  of the samples is calculated.

## System control

The personal computer governs all modules and components of the system. The parameters of the control program can be set individually and controls the following process steps:

- Sample selection
- Sample feeding and rinsing of system with the sample
- Filling of titration reactor
- Measuring of sample volume via removing excess fluid by suction
- Titration procedure using an automatic burette
- Output of measuring values and calculation of results
- Cleaning cycle.

## S+H's Standard Extent of Delivery

- Automatic measurement of up to 5 process fluids
- Display and record of measuring data in the titration computer
- Individually adjustable titration sequence
- Results: pH,  $\text{Ca}^{++}$
- Automatic storing of the measuring routines for control
- Adjustable analysis plan
- Error-report line if action by user necessary
- Service program
- Protection class IP 54

## Extra Performance (upon order, extra charged)

- Data transmission with 4 – 20 mA connections
- Data transmission to a data bank



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