Application Report
Phase Separation Fruit Juice / Water

◀S SIGRIST
PROCESS-PHOTOMETER

The PhaseGuard In-line interface monitor consists of 3 models for various applications. One such application is the Interface detection during the processing of Fruit Juice manufacture within the soft drinks industry.

Technically, this is a simple measurement, where the application within the filling station can easily be identified.

Benefits

The increasing demand and variety of soft drink products and/or bottle types has increased in many soft drink processing plants in recent years. This has resulted in frequent product changeovers at the bottling/filling stations Such changeovers are time consuming, increase product loss, have a high water demand for water chasing operations and therefore reduce the productivity of the filling station and increase the effluent volume and associated costs. Early interface detection by installing a PhaseGuard C, will improve the efficiency of the filling station and increase the overall profitability

Lower water consumption and power costs, will lead to a lower carbon foot print.

Typical Application

Early interface detection between product/water/product is an essential measure needed to optimise the water usage associated with product changeovers.

The ultimate goal of an efficient product switch is fast real-time interface detection. At the same time, the amount of pre-rinse and post-rinse water needs to be kept to a minimum, but also these cycles need to provide an effective barrier between the different juices. The possibility of cross contamination by different products cannot be tolerated.

This goal will be achieved by the implementation of an interface monitor PhaseGuard C. The working principle of the PhaseGuard C is based on light absorbance, whereby light from a LED light source with a wavelength of 430nm is transmitted through the medium to be measured. The instrument response is faster than conductivity measurement and has a more dynamic measuring characteristic. This means, even smallest amounts of water or cleaning detergents can be detected. So, besides the optimization of the product change, the PhaseGuard C will also act as a QA-tool, since any turbidity present will have an impact on the signal, resulting that the product-specific switching point will be moved.

The installation is easy and can be done prior to the bottling or packaging filling station. The installation is done using a Varivent® or compatible inline housing. The design complies with the CIP and SIP requirements.

For simple applications and system integration the instrument configuration and communication can be done easily using the integrated USB interface with a parameter file in combination with the existing outputs. Optionally available is a version with integrated bus connection.

For more comfortable installations the optional control unit SICON can be used, allowing connection of several sensors on one control unit.

Example of phase changes

The grey areas above represent water, whilst the Yellow, Green and Orange represent three discrete juices , the objective is the early detection of both the start and end of the coloured juices, and then to determine appropriate set points within the coloured areas for control purposes.
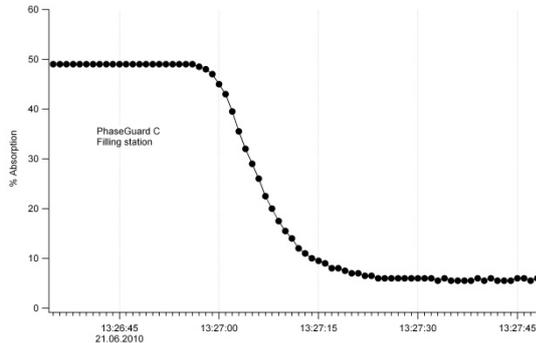
Grey areas (water) will be the 4 mA control, whilst the coloured phases will give a mA signal based upon the absorption at 430 nm.

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Practical Measurement (Example):

This diagram shows a typical pattern of a phase change from Juice to water, which takes place within about 20 seconds. The PhaseGuard C picks up this interface change quickly and with high precision. It allows the user to select the switching point which he believes is the optimum (compromise between juice loss or amount of water for the rinsing). Up to now timers have been used and times often set to ensure an over-rinse condition.

Typical example to calculate the savings

To calculate possible savings, some information is necessary which are relevant at the customer's actual measuring point (some typical values are inserted in brackets as an example):
- Pipe diameter (DN100)
- Flow rate in m/sec (2.0)
- Number of switching cycles per day (4)
- Time saving compared to the current method in seconds (typical 2.5)
- Number of production days per year (220)
- Sales revenue for 1 litre of Juice (1.2 Euro)
- Current method

Savings/ROI-Calculation

Based on the figures used in this example, a yearly saving of approx. 32.000 EUR can be expected. Taking into account the cost for the instrument and the installation, the return on investment (ROI) is achieved already within less than 2 months! SIGRIST can provide a program which allows you to calculate the savings and the revenue individually.

Products

SIGRIST Product und Configuration for this Application:
- PhaseGuard C
- Optional: SICON control unit

Parameter Setting
- Selection of the desired switching point (% Absorption)
- Setting of the configuration is done using a PC via the USB connection and a parameter file, or by connecting the optional available SICON control unit

Advantage of the SIGRIST PhaseGuard C
- LED light source, only 2W power consumption
- No purge air needed
- Sealless design
- Extremely low cost for maintenance

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