Optical Measurement Technology for the Beverage Industry

SIGRIST
PROCESS-PHOTOMETER

MONITORING EXCELLENCE.

SIGRIST. Your competent partner.

The measurement of turbidity in the beverage industry is firmly connected with the name SIGRIST. Today SIGRIST instruments are successfully used in the wine, spirits and soft drink industries.

Numerous useful innovations can be attributed to SIGRIST: the introduction of LED technology which no longer requires regular lamp replacement whilst being extremely energy efficient, the increase of the usefulness of the measurement of turbidity by introducing the dual-angle measurement, a rapid and simple inspection of the instruments with a checking unit, the automated measurement of turbidity in the laboratory at pre-defined temperatures and the user friendliness of the operating units by means of a colour touch screen, to name but a few examples.

SIGRIST process photometers distinguish themselves by low total cost of ownership in addition to their universally acknowledged quality. The secret of their high quality standard lies in their "Swissness": the instruments are being developed, manufactured and tested individually in Switzerland prior to their despatch in accordance with the strict quality standards of the ISO 9000:2008. SIGRIST offers a guarantee of 24 months after installation of their instruments without an additional charge.

Anyone who chooses SIGRIST products places particular value on quality, high value creation, sustainability and low energy consumption.

SIGRIST process photometer in the wine and spirits industry

APPLICATIONS IN THE WINE INDUSTRY

Of special interest here are the applications in large wine bottling plants where a continuously high quality has to be guaranteed. This necessitates reliable monitoring of various processes which include: the drainage of tanks during the delivery of grape juice, the fining process to eliminate unwanted turbidity or the filtration of the wine. In the applications above we are always dealing with turbidity measurement. It is therefore necessary to use turbidity monitors that include a means of colour compensation.

Monitoring grape juice

When grape juice is drained from the tank, it is important to determine the phase transition from clear to slightly turbid grape juice down to the sediment so that selective draining is possible and thus undesirable product contamination and loss of product is prevented. Due to the strong natural colours, especially in the red grape juice, a purely visual differentiation is practically impossible. The values measured lie within a range of relatively low turbidity values of a few NTU to the sediment with more than 1000 NTU. This measuring range is ideally covered by the **TurbiGuard**. As a result of the compact design of the sensor, the instrument can also be easily integrated in a mobile pumping station which can be moved to the respective monitoring points.



Monitoring filtration

Filtration separates/removes undesired particles that cause turbidity in wine. During pre-filtration, cross-flow filters are often used which allow the removal of turbidity down to about 0.2 µ in one step. The best solution here would be to use a **TurBiScat 90°** which is sufficient for this application (single-angle instrument).

The second separation of the yeast from the young wine (2nd racking) is carried out via pre-coating the filter with Kieselguhr. For monitoring the Kieselguhr pre-coat, filtration and control of the filtration process, the dual-angle **TurBiScat 90/25°** is ideally suited. The additional measuring angle of 25° is much more sensitive to larger particles such as Kieselguhr and allows a rapid detection of any filter break-through events.

What is important here is the fact that the measurement of turbidity correctly occurs irrespective of the colour. The automatic colour compensation in the **TurBiScat** ensures correct measurement in light white wines as well as in extremely dark red wines.

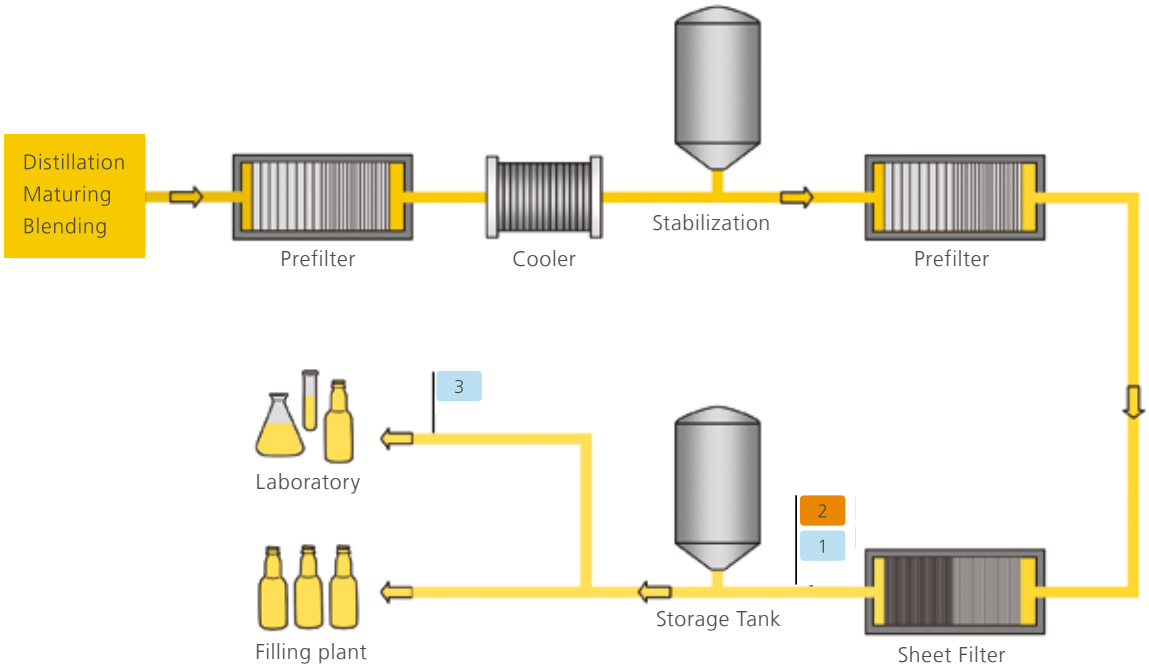
Monitoring bottling

In large, industrial wine bottling plants, different types of wine are processed from storage tanks. During the change of products, several hectolitres of product are lost per week as a result of the intermediate line flushing with water between the products. The use of an in-line phase switch on an optical basis reduces both loss of product and water consumption and increases product safety. Such an instrument is capable of detecting gradual water ingress and it would react even in case of undesired turbidity. The switching point is detected in a faster and more precise manner than in case of timers or conductivity sensors. Moreover, extensive maintenance work and costs are omitted. For this application, the **PhaseGuard C** is used; the return on investment (ROI) can be expected in a few months.

APPLICATIONS IN THE SPIRITS INDUSTRY

Filtration control and monitoring

SIGRIST has a long association within the distilling industry with the main focus being on the whisky industry; however, in the production of cognac or soju applications can also be found. The main applications are the control and monitoring of the filtration process as well as ensuring the quality of the product by laboratory measurements. Particularly in the case of whisky and cognac, cold (or chill) filtration after the precipitation of fatty acids esters is a process step which ensures the quality of the product.
Filtration monitoring in high percentage alcohols necessitates ex-protected measuring instruments. Since the turbidity to be measured is extremely low, highly sensitive and stable measuring instruments are indispensible. In this case, the **DualScat ex** with the corresponding control unit **SIREL ex** is used.

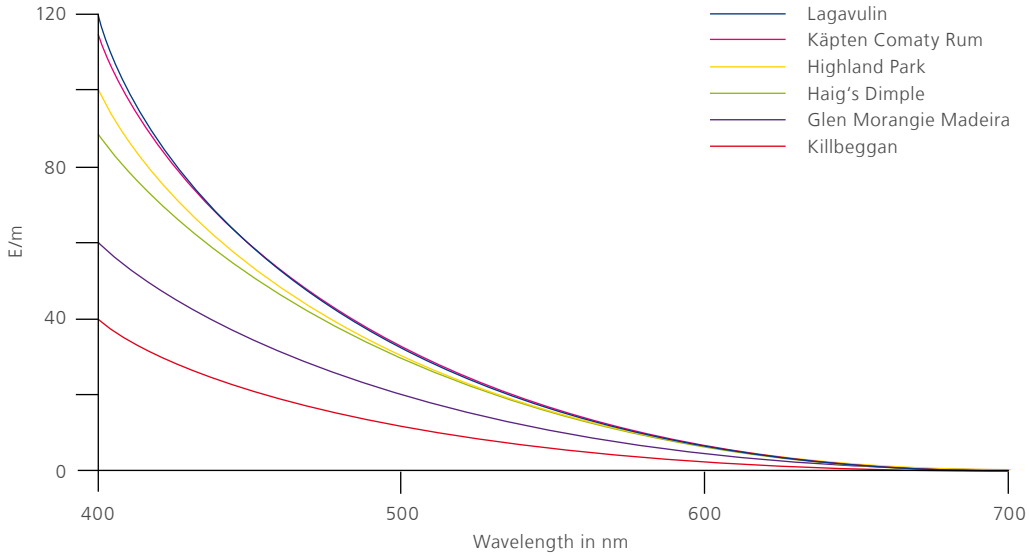


1	DualScat Ex	Turbidity after fine filter
2	ColorPlus Ex	Colour at the blending plant
3	LabScat	Turbidity in the laboratory

Measurement of colour

In large-scale industrial whisky production, whisky obtains its characteristic colour as a result of its maturing in wooden casks on the one hand. However, in some cases whisky also obtains colorants after maturing, e.g. by colouring: some distilleries add minute amounts of caramel as a colorant to their products in order to maintain the same colour or to provide a more consistent and high value appearance. For constant colour intensity, an in-line colour measurement for controlling and monitoring quality can be installed in the blending plant. It is mostly the spectral absorption coefficient which is measured at a given wave length. The colour can vary from a very pale yellow to intensive amber. For this application the in-line colour monitor **ColorPlus ex** with the control unit **SIREL ex** is available.

Absorption coefficient
of different spirits



Process monitoring and quality assurance

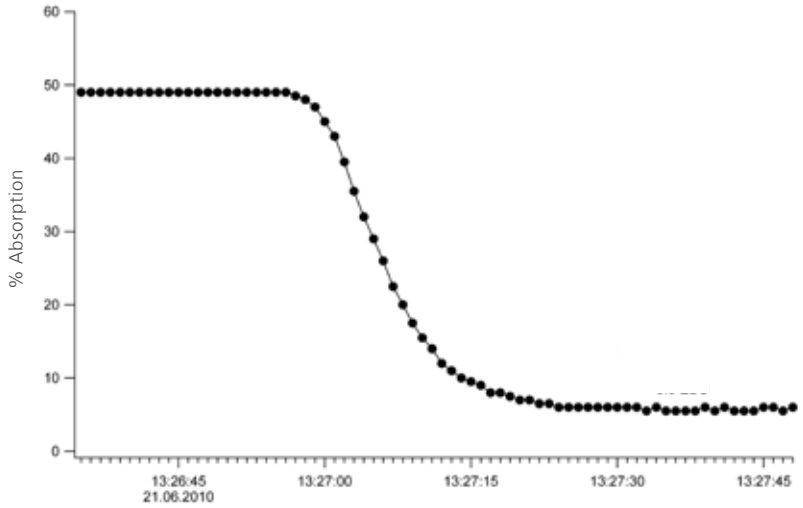
In the laboratory, the measurement of turbidity in whisky has to be checked at a defined temperature for quality control. For this, the sample undergoes controlled cooling from room temperature to about 4°C. This process can be automated with an additional option of the **LabScat**. Thus, several advantages result: the time needed for manual cooling to the desired temperature can be used for other tasks; the measurement is carried out precisely and can be reproduced at the pre-set temperature; and the values obtained are automatically documented for quality assurance.

SIGRIST process photometer in the soft drink industry

Phase separation

The most important application is the detection of phase transitions in the filling plant. During the filling of fruit juices, the pipes are flushed with water during the change from one juice to the next. Fruit juices concentrates can be very expensive so that it is of the utmost importance to avoid loss of product. Also process water is used in large volumes, and it is always possible to make further savings with lower water consumption and even lower effluent discharge costs. In this application, the **PhaseGuard C** is used, which clearly and with rapid effect detects the various product interfaces. Savings of 10% are realistic so that the ROI is achieved within a short timeframe.

PhaseGuard C
Filling plant



Monitoring filtration of sugar solution

The raw sugar delivered for the production of soft drinks has to be purified in a filtration process with Kieselguhr in most cases. The monitoring of this filtration process is carried out with the **TurBiScat** turbidimeter.

ICUMSA colour measurement

If the colour of the sugar solution is above 25 ICUMSA units, the melanoids (raw material from molasses) can be tasted in the final product. Thus the sugar solution is decolourized with activated carbon to remove those unpleasant flavour impurities. The measurement of the ICUMSA value is carried out with the **ColorPlus** at 420 nm and turbidity compensation at 700 nm. The signal of the refractometer necessary for the measurement can be directly fed into the control unit **SIREL**, the measured data is then supplied directly in ICUMSA units.

SIGRIST process photometer in water treatment

Turbidity measurement and UV absorption measurement
Water is an important raw material in every beverage industry. Perfect water quality is, for example, a decisive criterion for the good quality of fruit juices which are produced from concentrated fruit juice or in the process water for the production of whisky. The measurement of turbidity for monitoring the quality of raw water or for monitoring and controlling filtration and the measurement of UV absorption for monitoring organic loads are two important measurement options that should be strongly considered.

In mineral water production plants, optical clarity – in addition to its mineral content and its bacteriological safety – is an important criterion for consumer acceptance. In this respect, the continuous measurement of turbidity provides quality assurance and documentation of perfect water quality.

The corresponding measuring instruments are the **AquaScat** for the measurement of turbidity and the **ColorPlus** for the measurement of UV absorption at 254 nm (SAK/DOC).

Many water utilities place their trust in SIGRIST measuring instruments for drinking water purification. Detailed information is available in our brochure “Optical measuring technology for water treatment”.

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