# Application report
# Turbidity for Beer Filtration Monitoring

SIGRIST PROCESS-PHOTOMETER

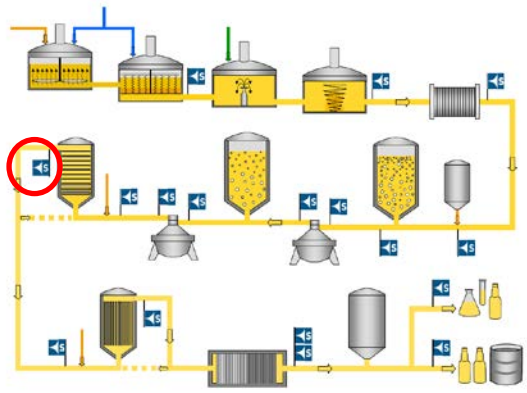
Since 1946 the name SIGRIST has been synonymous with measuring turbidity in beer filtration. With its combination of features such as dual angle light measurement, colour measurement option and no maintenance, the SIGRIST TurBiScat is the preferred instrument for this application.

## Benefits

Filtration of beer should result in brilliant clarity which is then microbiologically acceptable.
To achieve this, fully colour-compensated turbidity measurement is necessary which is capable of measuring the whole range of turbidity-relevant substances such as colloidal and particulate turbidities.
Since turbidity problems resulting from deteriorating qualities of malt occur more frequently, good turbidity measurement is becoming increasingly important.

## Typical application

Classical beer filtration consists of at least one Kieselguhr filter which is mostly followed by a fine filter and, in larger breweries, also by a PVPP-filter for stabilization. The outlet of the Kieselguhr filter is the most important location for measuring turbidity.
In the filter, the highly porous Kieselguhr frees the turbid non-filtered beer from a large number of turbidity producing substances. This includes particulate substances such as yeast as well as dissolved (colloidal) turbidity producing substances such as proteins and glucans.



Picture 1: Process diagram of beer production.
The red circle marks the point of measurement at the outlet of the Kieselguhr filter

Turbidity measurement also has to permanently detect small changes in the turbidity of the filtrate in order to inform the operator as to how the filter has to be controlled. If the 90° proportion of the turbidity rises, e.g. the Kieselguhr mixture consisting of coarse and fine Kieselguhr has to be altered. If the 25° turbidity value rises relatively suddenly, this can mean a so-called filter breakdown. The filter then automatically changes to recirculation with continuing dosage of Kieselguhr until the damage to the filter cake has been closed.
Thus, the measured turbidity values are the most important indicators for the amount and mixture of the filter additives.
In general, one can say that the 90° value covers turbidities of below 1µm. The consumer sees these turbidities as slight haziness (opalescence) in the beer and sees this as a reason to complain.
The 25° value, on the other hand, is more sensitive to larger particles. Thus it is a measure for the state of the filter elements.

Picture 2: Typical Kieselgur filtration plant

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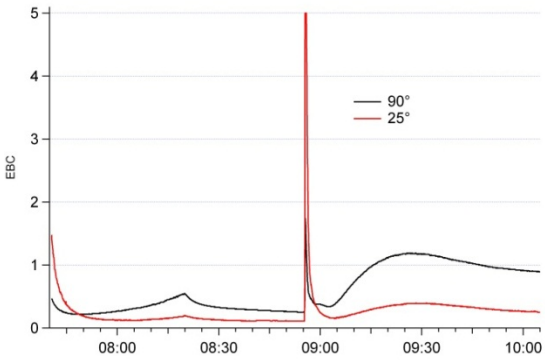
## Practical measurement (example):




The diagram shows the typical course of a Kieselguhr filtration. What is typical (and good) is the ratio of 90°/25° of ≤ 2/1. In the middle of the filtration, a "hard" change of tanks can be seen which resulted in a pressure push and in particular in an increase in the 25° turbidity value.

## Which savings can be effected?

The saving potential of this application cannot be directly calculated. The advantages, however, can be made clear using several aspects.
The best filtration is reached when the turbidity is as good as necessary, the trub volume of the filter is filled to the maximum with filter additives at the end of the filtration, and the filter has reached its optimal possible pressure. To achieve this, Kieselguhr dosage has to be controlled permanently. In this, the turbidity and the rise in pressure over time are most important.
If, as a result of monitoring these measured values, good filtrations can be extended to 24 or more hours, it becomes clear that, as compared to bad filtrations of only a few hours duration, the set-up times, cleaning agent consumption and, last but not least, the loss caused by the first running and the after running can be significantly reduced.
Furthermore, filter additives can be saved if filtration is not carried out to the extreme. The aspect of quality is self-evident even if it is difficult to put an exact monetary value to it.

## Products

**SIGRIST products and configuration for this application:**

- TurBiScat 90°/25° *or*
- TurBiScat 90/25° with colour
  (If the colour monitoring option is included, the possibility of roasted malt beer dosage exists and thus fine adjustment of colour).
- SICON control unit
- Suitable Varivent® housing

## Parameter adjustments

- Limit formation of the mA signal in the PLC (by the customer)

## Advantages of the Sigrist TurBiScat

- EBC/MEBAK compliant turbidity measurement
- LED light source, only 8W power consumption
- Sealless design with sapphire glass
- Extremely low maintenance costs
- No purge air necessary
- Adjustment with secondary turbidity standard, no Formazin required
- It is the turbidity monitor most frequently used after the Kieselguhr filter thus it is best for comparative analyses worldwide.
- The LabScat offers an ideal supplement for laboratory measurement.
- Optional: EBC compliant colour measurement


Picture 3: TurBiScat with SICON