

# Application report

## Turbidity at Separator

One of the most frequent applications of the PhaseGuard T is the control of separators in the fermentation and storage cellar. The following description particularly refers to the application at the separator; however, it can also be applied to the whirlpool and the centrifuges.

### Benefits

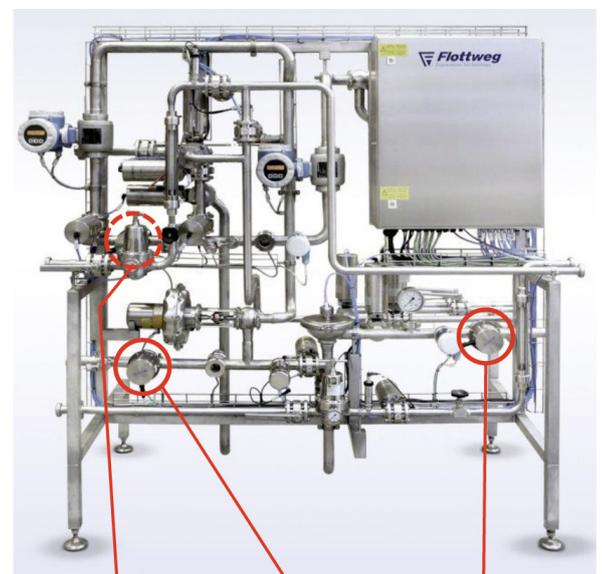
The main benefit in clarifying the beer during fermentation and storage lies in the fact that the production time is shortened, beer losses are reduced and the working cycle of the filter is improved so that the total brewing process becomes optimized as regards costs. In order to optimally operate the separators, reliable turbidity sensors are needed.

### Typical application

At a separator, turbidity can be measured at up to three positions. Different objectives can be achieved at the three possible measuring points:

- 1) Inlet turbidity measurement:  
This instrument measures the turbidity of young beer, also called green beer, as it arrives from the fermentation or storage tank. The signal of this instrument controls the intake of the separator and reduces it if turbidity is too high. Thus, the separator is protected from clogging and the efficiency of the plant is increased. The risk of having to clean the plant is thus minimized; costs are saved. Accordingly, it is the turbidimeter with which money can be saved at the separator in a relatively simple manner.
- 2) Outlet turbidity measurement:  
This instrument measures turbidity at the outlet. When the trub chamber of the separator is filled with yeast, it has to be emptied. When the trub chamber is full, turbidity increases rapidly since the separator cannot take in any more yeast. If this point is reached, the turbidity sensor gives a signal for briefly opening a valve. This results in the trub chamber being promptly emptied and turbidity decreases again etc.

- 3) Bypass turbidity measurement:  
This instrument is positioned after the separator and measures the turbidity of the clarified beer. For other technological reasons (improvement of the filter's working cycle by a small proportion of yeast in the filter cake, or the expectations of customers in case of yeast beer), it is sometimes desirable to maintain a defined, reproducible turbidity. This turbidity measurement controls the position of a control valve and adds unseparated beer to clarified beer.



Meas.point 1:  
Inlet turbidity  
(rear side)

Meas.point 2:  
Outlet turbidity

Meas.point 3:  
Bypass turbidity

**Separator control with installed PhaseGuard**

Which of these measurements are put to use depends on the customer's philosophy and budget.

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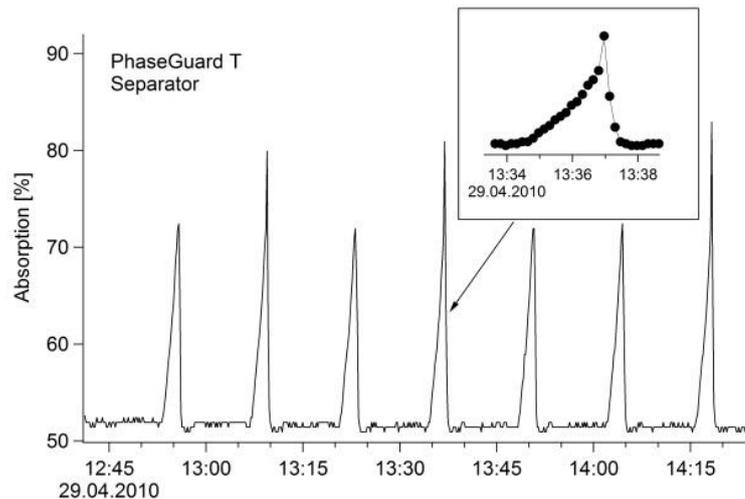
Measurement 1 can significantly save money when large amounts of hops are used (North American craft beers). A separator clogged with hops has to be dismantled and cleaned by hand («... three times clogged equals a PhaseGuard ...» quotation of a manufacturer of separators).

Measurement 2 is the minimum requirement and a must. A time-related control results in considerable loss of beer.

Measurement 3 is necessary:

- if maximum use is to be made of the working cycle of the filter. The cost-saving potential here relates more to the filter cellar.
- if wheat beer or German-style «Kellerbier» with defined amounts of yeast are to be produced.

### Practical measurement (example):



### Turbidity at the outlet of a separator

This diagram shows the typical course of the outlet turbidity measurement at a separator. The rapid rise in turbidity at a full trub chamber and the lowering of the turbidity values after the chamber is emptied can clearly be seen.

### Cost-benefit analysis

Saving potential:

- 1) The storage time of the beer can be shortened. If it had previously taken 4 weeks to have the beer finished and in bottles, this can now be achieved within two weeks. That means an increase in capacity, less consumption of cooling energy and less storage volume.
- 2) A significantly longer working cycle of the filter, which lowers the filter costs per hl and reduces beer losses.
- 3) Reduced loss of beer, better yeast management.
- 4) The risk of clogging the separator is reduced.

### SIGRIST products and configurations for this application:

- PhaseGuard T (signal output in absorption percentage)
- PhaseGuard HT (signal output in absorption percentage)
- TurbiGuard (signal output calibrated in EBC)
- Suitable Varivent® housing ( $\geq$ DN 40)
- Optionally: SICON control unit

### Parameter settings

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

### Advantages of the SIGRIST PhaseGuard

- LED light source, only 2W power consumption
- No purge air required
- Sealless design
- Extremely low maintenance costs



PhaseGuard T