Spherical lens ensures very high measuring accuracy and reproducibility

NIR backscatter sensor

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Hygienic solution: due to the flow in the water. process, which is made of hard-wearing sapphire STS 05 spherical lens produced continuously lustrated

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Exner Process Equipment and Seli have jointly developed the NIR backscatter sensor STS 05. It is equipped with a patented spherical lens, which offers the user of the measuring device various advantages. In this article you will find out what these are and how the sensor is integrated into the process.

In many areas of the food industry, turbidity measurements are part of the standard measurement procedure in order to separate different media phases, monitor product quality or optimize cleaning processes. Devices are often used that operate according to the backscattering principle, i. e. transmit light waves into the medium and evaluate the reflected portion for the measurement. The backscattering principle is an extremely reliable measuring method, especially for high turbidity values such as in milk, cream or whey. The well-known transmitted light sensors, which work according to the principle of absorption measurement, reach their physical limits at the high turbidity values.

Preventing interference

Due to the continuous optimization of the processes, the requirements on the measuring instruments and especially on turbidity measurement for phase separation and product control are becoming more and more stringent. Highest accuracy and reproducibility of the measured values are self-evident

requirements. At the same time, disturbances caused by possible air bubbles in the process, deposits on the measuring window or mechanical wear and tear should be avoided as far as possible. Hygienic process integration is just as essential as simple operation and integration into a process control system.

It is also important that the devices used can be easily checked over the entire measuring range in order to be able to prove correct functioning. All of these are legitimate user requirements to ensure reliable process control, but so far hardly any device has been able to meet them.

With patented spherical lens

Together with its development and sales partner Seli Automatisierungstechnik, Exner Process Equipment has developed a NIR backscatter sensor that meets the high market requirements. The sensor STS 05, which is sold exclusively by Seli in the food industry, has received a completely new measuring optics. The patented spherical lens directly combines several advantages. Due to the special lens shape, measurements are taken directly at the interface to the product, which eliminates faulty measurements due to a combination of absorption and reflection, especially at high turbidity values. The spherical shape also prevents strong turbulences at the interface. This results in extremely high measuring accuracy and reproducibility. Furthermore, unlike flat measuring windows, air bubbles cannot collect on the spherical lens and thus falsify the measurement.

Made of highly resistant sapphire, the lens is insensitive to abrasion. It is located directly in the measuring medium, which ensures continuous cleaning. Since a spherical lens is much more pressure-stable than a disc, splintering of the optics is impossible even under extreme pressure shocks. This enables the sensor to be used directly in the end product.

Hygienic advantages

Even in view of the high hygiene requirements of the production processes in the food industry, the spherical lens offers clear advantages over all previous backscatter measurement systems equipped with measuring windows. There is no return or gap between the optics and the housing in which deposits could form. The flow in the process continuously cleans the optics of the sensor. Thanks to the new sensor design, the user can now also choose between a "new" EHEDG-tested polymer-sealed installation variant or the tried-and-tested, seal-free Seli process connection system. Both installation variants fit into the same weld-in socket or modular process connections, so there is no need to convert existing systems.

Exner and Seli go completely new ways in checking the sensor and thus in the traceability of the measured values. Whereas with most of the turbidity meters used up to now only unreliable single-point verification in distilled water was possible, different calibration standards with defined turbidity values over the entire measuring range are available for the STS 05. The calibration standards are integrated in slip-on caps. If the cap is plugged onto the sensor, it can be easily checked and readjusted if necessary. This allows the verification by the user to be carried out easily and reproducibly over the entire measuring range.

Simple local operation

The compact sensor STS 05 incorporates the latest amplifier technology and is equipped with a colour touch display, which allows a clear indication of the measured value and easy on-site operation. The process integration is carried out via an analog 0/4... 20mA output and two switching contacts or digitally via RS485 Modbus. Basic settings of the sensor can be easily made by means of a parameterization software on the PC via USB interface. It is also easy to copy parameterization data or "clone" existing sensors.

The compact sensor STS 05 has been designed to meet the exact requirements of the food industry. For example, it enables clear phase separation during CIP cleaning or optimum yeast management in brewing processes. Thanks to its ease of use, long-term stability and low entry costs, a return on investment is guaranteed within a few weeks.

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