

Optical Oxygen System

With ISM[®]... a powerful combination

Intelligent optical measurement for highest performance and ease-of-use

One of the most critical factors affecting beer quality, in terms of taste characteristics and shelf life, is the level of dissolved oxygen (DO) present in the final product. The reliability and accuracy of the oxygen measurement during manufacturing are a constant focus in the brewing industry. The optical technology offers significant advantages compared to current solutions on the market: Lower drift, no flow dependence and less and easier maintenance are only a few of them. The unique combination of the Intelligent Sensor Management (ISM) technology with the optical technology opens a new level of operational safety and ease of use to the user.

The optical oxygen Sensor InPro 6970i from METTLER TOLEDO is designed to fulfill the highest requirements for accurate measurement at trace oxygen level in breweries. Low detection limit combined with fast response to small changes of oxygen are the key success factors, especially in filler lines. The newest generation of METTLER TOLEDO's oxygen sensors with optical measurement principle offers significant advantages compared to traditional amperometric systems. Process safety, reliability and ease of use were the key prerequisites for the new development. The unique combination of this optical technology with METTLER TOLEDO's ISM concept for efficient maintenance results into the most efficient and reliable oxygen measurement system in the market.



Trouble-free handling and higher reliability

Oxygen measurement in filler lines need instruments with high accuracy at low oxygen levels. Filler lines are running more or less permanently. Interruptions of the filling process, for e.g. change of the beer brand or Cleaning-In-Place (CIP) processes must be performed in the shortest time possible. The time for sensor maintenance must be kept very short as unplanned process interruptions are very costly. Here, the short response time of the optical sensors translate into higher productivity of the filler line.

Optical oxygen sensors are characterized by easy maintenance. Instead of membrane body, inner body and electrolyte that have to be maintained on an amperometric sensor, there is only one component, the OptoCap, that has to be replaced. Due to the easy and error free replacement and the fast calibration, the system is available in less than a minute. Alternatively, precalibrated sensors can be mounted to the process and a correct oxygen reading is available immediately.

After calibration, the system status information is displayed at the transmitter in real time, increasing the reliability of the loop.

The longer lifetime of the OptoCap together with the fast and easy replacement, reduces maintenance costs and the risk of handling errors drastically.

Plug and Measure for highest Loop Availability

All sensor data, including calibration history, are stored in the sensor itself. After performing the maintenance and cali-

bration in the lab under controlled and clean conditions, installation in the process is straight forward. Upon connecting the sensor to the transmitter, all relevant data are automatically transferred to the transmitter and an oxygen reading is available immediately. No polarization is necessary anywhere.

ISM – Intelligence starts in the head

Unscheduled downtime of a filler line caused by a malfunction of a sensor is time consuming and very costly. The reliability and stability of the sensor at this measurement point is therefore one of the most critical factors. Therefore it is essential to have reliable information of the sensor status, before starting the process, and up-to-date information during the batch.

To maximize the reliability, METTLER TOLEDO implemented a highly sophisticated diagnostic tool, the Dynamic Lifetime Indicator (DLI). This feature measures the quality of the OptoCap after each calibration, and together with the current process conditions (temperature and oxygen level) calculates the remaining lifetime of the system. With the DLI, unscheduled downtimes due to sudden sensor failure are avoided.



Features overview

- Plug and Measure
- High accuracy
- Fast response time
- Low drift
- Enhanced Diagnostics
- DLI (Dynamic Lifetime Indicator)
- ACT (Adaptive Calibration Timer)
- Sensor history
- CIP/SIP/autoclave counter

The highest stress for an optical oxygen sensor is during CIP and SIP. Thanks to the ISM technology the inPro 6970 i detects CIP and SIP cycles automatically and the cycles are stored in the sensor. The user is able to predefine a maximum number of CIP and SIP for this measurement point. The sensor automatically recognizes if this limit is reached, and generates a maintenance request. As a result, the unwanted use of a potentially failing sensor is very unlikely. There is no need for manual documentation of the SIP/CIP cycles for each sensor. The information is always available in the sensor and the data can be accessed at any time using the transmitter.



Highest sensor performance for optimized process control

In the filler line of breweries, very low oxygen levels have to be measured and the detection of changing oxygen levels has to be very fast to prevent from filling “out of spec” beer in bottles. Oxygen is very important for the taste and the shelf life of beer. Flavorings can be oxidized or microorganisms can grow and reduce the shelf life. The increasing demand on the oxygen content due to longer distribution channels leads to METTLER TOLEDO’s optical sensors with its outstanding measuring performance. Excellent signal stability, low drift and low noise reduce the need of recalibration. The fast response time enables the user to start the filling process much faster and reduces beer losses.

Some of the existing DO sensors today show a very strong stop of flow effect. The increased oxygen reading of the sensor is often the reason for unnecessary alarms in the process control system. The optical oxygen sensor is less flow dependent and stop-of-flow effect is negligible.

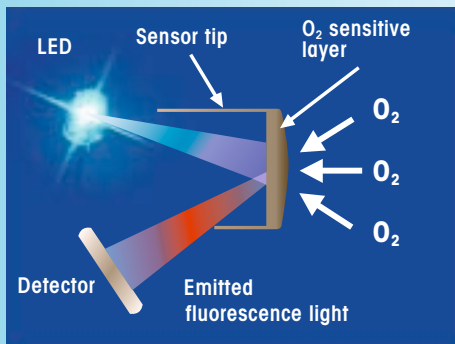
Compared to traditional systems, the risk of errors caused by the sensing element is less likely. The performance of the OptoCap decreases slowly and a failure caused by membrane leakage or electrolyte is excluded

At a Glance

The optical measurement principle

The heart of the optical sensor is an oxygen sensitive layer containing immobilized marker molecules. They absorb light from a light emitting diode and are able to release this energy as light at a different wavelength (fluorescence).

The fluorescence depends on the amount of oxygen that is present in the environment of the marker molecules. This effect allows determination of the oxygen concentration in the sample media.



An oxygen-sensitive layer containing immobilized marker molecules is the "heart" of the optical sensor.

ISM



InPro 6870i



M400 for high versatility and advanced process control

For more information:

- ▶ [www.mt.com/InPro6970 i](http://www.mt.com/InPro6970i)
- ▶ www.mt.com/O2
- ▶ www.mt.com/Beer