

Give Your Beer the Right Sparkle Unequalled Reliability in CO₂ Monitoring

Maintaining the desired dissolved carbon dioxide concentrations in brewery processes gives beer the sparkle that consumers like. Dissolved CO₂ sensors based on thermal conductivity determination provide accurate measurements, but a decrease in sensor membrane integrity or the required purge gas supply can easily cause problems. METTLER TOLEDO's new CO₂ system has the answers.

Importance of CO₂ control

For consumers, the mouthfeel and foam of beer is as important as its taste. Monitoring and controlling dissolved carbon dioxide concentrations helps ensure consumers experience the sight and effervescence of your products the way you want them to. Consequently, typical applications for in-line CO₂ measurement systems in breweries include carbonation control, and measurements in filling lines.

CO₂ measurement principles

The market for in-line CO₂ measuring systems is dominated by sensors based on two measurement principles: pressure/temperature (p/T), and thermal conductivity (TC). These principles are well established in the brewery industry and are recommended by international

committees for standardized beverage analysis.

p/T-based sensors provide accurate measurements, but they contain moving parts for sample withdrawal / return and chamber expansion that require regular servicing.

Advantages of thermal conductivity measurement

A major advantage of TC-based sensors is the complete avoidance of moving parts. The partial CO₂ pressure level is acquired using a TC measurement chip that determines the thermal conductivity of the CO₂ present in a chamber within the sensor. The chip is separated from the liquid stream by a CO₂-permeable membrane. When in operation, air is first blown





through the measuring chamber to remove CO₂ that has passed through the membrane. Next, air purging stops and the TC chip measures the increase in thermal conductivity as CO₂ begins to permeate through from the beer. By repeating this purging/measuring cycle the sensor provides accurate dissolved CO₂ measurements.

The TC measurement principle is immune to the presence of background gases, which results in high CO₂ selectivity. Also, it exhibits high comparability with established reference methods.

Solution for purge gas and membrane issues

As good as TC-based CO₂ sensors are, their performance relies on two main aspects: the reliability of the air purge supply, and the integrity of the CO₂-permeable mem-

brane. A drop in the supply of purge gas or deterioration of the membrane results in inaccurate CO₂ measurements. Operators will often not be able to distinguish between an actual change in the dissolved CO₂ concentration in the beer and a problem with the CO₂ measurement system, and may erroneously adjust CO₂ dosing. This compromises plant efficiency and can impact the quality of the beer. In addition, if the membrane fails and liquid comes into contact with the TC chip, costly servicing will be required. The new InPro 5500 i sensor from METTLER TOLEDO has solved these problems.

Intelligent Sensor Management

The InPro 5500 i dissolved CO₂ sensor incorporates METTLER TOLEDO's Intelligent Sensor Management (ISM) technology. The ISM concept simplifies sensor handling, enhances reliability, and reduces sensor lifecycle costs. ISM's features include diagnostics tools that constantly monitor a sensor's condition. On the InPro 5500 i, these tools provide an immediate alarm should the purge gas supply decrease or membrane integrity drop. This means corrective action can be taken before the situation deteriorates further. If the fault is not rectified quickly, the TC sensing element will even shut down to protect itself from damage.

Hygienic design and quick maintenance

Accurate measurement and ISM are not

Best Practice

White paper on measuring dissolved CO₂

Get your complimentary copy of our white paper on safeguarding CO₂ measurements at:

► www.mt.com/CO2-wp

the only valuable features of the InPro 5500 i: The single-piece membrane cap has been designed for fast, simple replacement, and high cleanability-in-place to prevent contamination. The sensor is available with Tuchenhausen Varinline, TriClamp, and 28mm M42 process connections.

Easy operation and more process uptime

With the InPro 5500 i sensor, the unique combination of an industry-accepted measurement principle and the ISM concept leads to substantial benefits regarding simple operation and process uptime.

Find out more at:

► www.mt.com/InPro5500i

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Less Water Use and Greater Product Safety Conductivity During CIP

Conductivity measurements are an excellent indicator of contaminants. A single conductivity sensor for Clean-in-Place monitoring can save costs by minimizing water consumption, and ensure product safety and quality.



Water consumption and time management in CIP processes

In many cases, a CIP rinse cycle is based on a programmed timed sequence. This method typically results in longer than necessary rinse times, increasing water costs. Concern for water conservation is driving breweries to look at ways to reduce water consumption.

Conductivity measurement to optimize rinse cycle

At the end of a CIP process, many breweries manually sample the fluid to ensure

the line is properly rinsed. To prevent time spent in taking multiple samples, technicians tend to wait until they are fairly certain the caustic cleaning solution has been thoroughly flushed through. This can mean the sample is taken some time after rinsing is no longer required, resulting in water being wasted and reduced production uptime.

One sensor for medium to high conductivity

In-line conductivity measurement is an excellent indicator of contaminants in

fresh water. It can also be used to monitor the concentration of caustic during CIP to confirm that the cleaning fluid is of sufficient strength.

METTLER TOLEDO's InPro 7108 has been designed for conductivity measurements throughout the CIP process. WideRange technology means a single InPro 7108 can accurately measure caustic concentration as well as confirming the absence of caustic after rinsing.

Data from the in-built temperature sensor allows the connected transmitter to adjust the conductivity signal so that the true conductivity measurement is displayed.

Reduce costs and protect product

Confirmation that rinsing is complete the moment it happens minimizes water use, allows increased production, and prevents cleaning fluid contaminating product.

To improve efficiency of your CIP processes, go to:

► www.mt.com/conductivity



Longer Beer Shelf Life Thanks to High-Performance DO Monitoring

In order to maximize beer shelf life, oxygen must be removed after wort aeration and kept to a minimal level right through to bottling. High-performance, in-line dissolved oxygen sensors are essential for providing instant notification of out-of-spec DO levels. METTLER TOLEDO optical sensors for real-time DO monitoring are rugged, accurate in measurement, and are simple to maintain.

Control of DO is vital

Assurance that consumers will enjoy your beers whether they purchased them one, six or nine months after they left your brewery is largely down to control of dissolved oxygen during production.

Amperometric DO measurement sensors have served the brewery industry well for many years. However, developments in technology do not stop, and neither does METTLER TOLEDO. We are dedicated to helping our customers improve their processes and increase their productivity.

Improved technology delivers faster response

When it comes to monitoring DO in brewery processes, speed of response is vital, that is why optical measuring technology is becoming the new standard in DO measurement. Quicker response is not the only benefit of this technique: lower drift and significantly less maintenance make optical sensors the obvious choice when installing or replacing DO measurement loops.

In addition, METTLER TOLEDO optical DO sensors are highly resistant to pressure shocks, rapid temperature changes, and stop-of-flow affects that can cause amperometric probes to generate false alarms. Optical sensors have no electrolyte and do not require polarization, only periodic replacement of the sensing element, the OptoCap, is required. This one-minute

procedure means maintenance on METTLER TOLEDO optical DO sensors sets a new benchmark in ease of use.

As a partnering transmitter, the M400 is a simple to operate, flexible unit. It is a multi-parameter transmitter, so can be used for a wide range of brewery processes.



M400 transmitter

Intelligent system

The InPro 6960i and 6970i optical DO sensors, and M400 transmitter feature METTLER TOLEDO's unique Intelligent Sensor Management (ISM) technology. Among its features, ISM means that sensors contain a set of advanced diagnostic tools. For example, on the InPro 6960i and 6970i sensors the Dynamic Lifetime Indicator monitors the quality of the OptoCap after each calibration and, together with measurements of the current process conditions, calculates and displays on the M400 the remaining number of days until the OptoCap should be replaced.

Plug and Measure start up

All sensor data, including calibration history, are stored in the sensor itself. After performing maintenance and calibration, installation in the process is simple. Thanks to ISM's Plug and Measure feature, upon connecting the sensor to an M400, all relevant data is automatically transferred to the transmitter and an oxygen reading is available immediately – no pre-polarization is required. Sensors can even be pre-calibrated and stored ready for

use, making sensor replacement even quicker and more convenient.

Efficient and reliable operation

The combination of optical measurement technology, ISM, and METTLER TOLEDO's years of experience in designing sensors for the brewery industry means that the InPro 6960i and InPro 6970i are two of the most efficient and reliable oxygen sensors on the market.

Discover more at:

► www.mt.com/DO



InPro 6960i optical DO sensor

Optical DO sensor InPro 6960i for wort aeration

- Long maintenance intervals thanks to robust design of sensing element
- One-minute maintenance
- Full ISM functionality for fast start up and proactive maintenance
- Hygienic design minimizes contamination risks
- No polarization time or electrolyte required

Optical trace level DO sensor InPro 6970i for cold block applications and filling lines

- Detection down to 2 ppb in beer and water
- Fast response time minimizes beer losses
- Sensing element is immune to pressure shocks and extreme CIP cycle conditions
- Plug and Measure simplifies handling and ensures fast flawless start up
- Predictive diagnostics for proactive maintenance
- No polarization time or electrolyte required

Less Product Loss and More Production

Product loss due to inefficient monitoring of the transition of yeast/beer/water is very costly. The InPro 8300 RAMS optical product monitors from METTLER TOLEDO are an extremely cost-efficient tool for ensuring product transition is identified the instant it happens.

Cost savings

To increase production during the brewing process, you need to know exactly when the yeast to beer transition is complete. To reduce losses at the filling line, you must determine the precise moment beer and not water is flowing through the line. And you want to do all this with minimum expenditure.

RAMS does it all

Using LEDs to detect changes in turbidity and color (yellowness) in liquids, the InPro 8300 RAMS (Reflection Absorption Multi-Switch) is a unique and versatile instrument. The absorption of near-infrared (NIR) light is utilized to accurately and instantly determine when the transition of yeast to beer is complete. For identifying beer in filling lines, the absorption of blue and NIR light is measured.

Simple installation, minimal maintenance

All members of the InPro 8300 RAMS product family are easily installed on Tuchenhausen VARINLINE housings. They are further characterized by a reduced maintenance requirement thanks to the use of long-life LEDs and CIP-resistant materials. A PC software package is available for the product identification functionality via the integrated RS 232 interface. The only calibration procedure necessary for all versions of InPro 8300 RAMS is a simple in-line zero point correction.

Benefits

Minimal product loss:

- Instant recognition of pure product or water ensures neither are wasted

Low installation cost:

- Fast and easy installation on Tuchenhausen VARINLINE housings

Reliable operation:

- Use of silica gel capsules in optical housings eliminates error-prone usage of air purge installation

Fast, easy calibration:

- Simple in-line calibration correction with clear water

Very low maintenance cost:

- Uses long-life LEDs, not bulbs

Excellent value:

- Extremely attractive price/performance ratio

Find out more at:

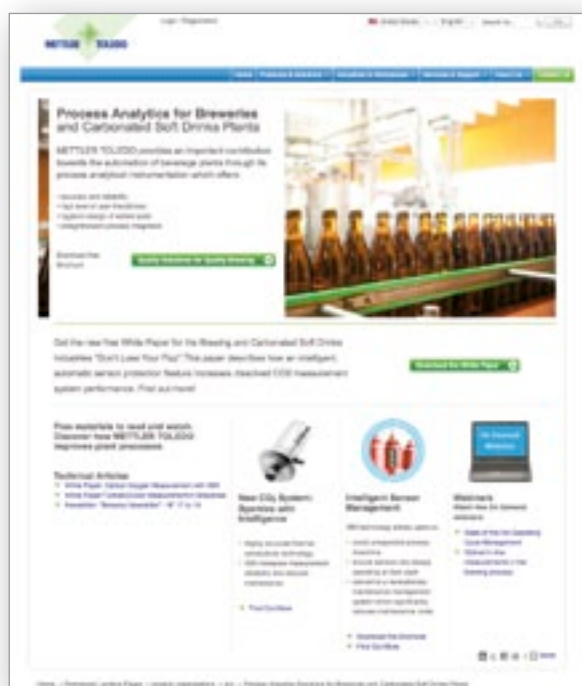
► www.mt.com/InPro8300RAMS



InPro 8300 RAMS
turbidity sensor

The Information You Want is at www.mt.com/pro-beer

Our website for the brewery industry is full of information on how our analytical measurement solutions can help you improve your processes, maintain product quality, and reduce costs.



- Download our Brewery brochure
- Read free white papers
- Watch on-demand webinars
- Discover our latest products
- plus more ...

► www.mt.com/pro-beer

New Webinar
"State-of-the-Art Operating
Cycle Management"
www.mt.com/pro-co2webinar

Quality and Reputation Safeguarded From Mill to Bottle

For one award-winning distillery, replacing manual inspection with automatic vision inspection has resulted in 100 % quality assurance of their prize-winning product. Since implementation of a vision inspection system, they have experienced reduced rework costs, minimized down-time and realized a significant decrease in labor costs.

Ensuring Tradition and Quality

Since 1787, Buffalo Trace Distillery has been perfecting their reputation of being one of America's finest bourbon producers. Using proven traditions and strict quality control, Buffalo Trace continues to produce premium bourbons and award-winning spirits. From the first stages of milling to the bottling process, the best quality standards are put into place throughout the production process to guarantee their bourbon. Buffalo Trace implemented a METTLER TOLEDO CI-Vision Inspection solution to ensure the highest level of product quality.

A Vision Inspection Solution

When Buffalo Trace decided to automate their processes, a vision inspection system was a more than ideal replacement for manual inspection, offering greater inspection and accuracy capabilities. Buffalo Trace implemented a 4-camera vision inspection solution that inspects for proper cap seal & fill level, and correctness of neck, front and back labels on unoriented glass bottles. With tight adherence to inspection standards, barcode readability is



The 4-camera vision inspection solution inspects for proper cap seal & fill level, and correctness of neck, front and back labels on un-oriented glass bottles.

also a major inspection priority. Since automating their inspection process, Buffalo Trace has had reductions in rework costs, minimized downtime, and realized a significant decrease in labor costs. Buffalo Trace was able to reduce their four manual inspections to one line operator, providing opportunities for other value-added tasks to be accomplished in the production process.

Quality control through accuracy & repeatability

According to Dale Mason, the Distillery Engineer for Buffalo Trace, "One of the biggest benefits of a vision inspection solution over the human aspect, is the assurance of repeatability with the ability to measure the same day to day." The system offers a variety of inspection capabilities including automatic changeovers for a wide variety of packaging. Buffalo Trace continues to see repeatability even with a





Vision inspection works hard for Buffalo Trace: 13 different product changeovers, and 24 different label variations, all running on a high-speed line of 300 bpm.

demanding 13 different product changeovers and 24 different label variations all running on a high-speed line of 300 bottles per minute (bpm).

CI-Vision's added value

CI-Vision possessed the expert technology and turnkey capabilities that Buffalo Trace demanded from an automated solution provider. The software technology, CIVCore, is designed not only to capture and eliminate products with defects on the production line, but provide useful statistical feedback to support process optimization. Using CI-Vision's intuitive CIVCore technology, Buffalo Trace's line technicians and label operators have taken complete ownership of the system. The concern of a steep-learning curve in vision technology is virtually eliminated.

In today's manufacturing climate, any reduction in labor costs can be considered a highly competitive advantage. According to Dale Mason, a huge advantage to implementing a vision solution has been "getting people off the line fast and efficiently, and eliminating the variable risk that exists with manual inspections."

► www.mt.com/ci-vision



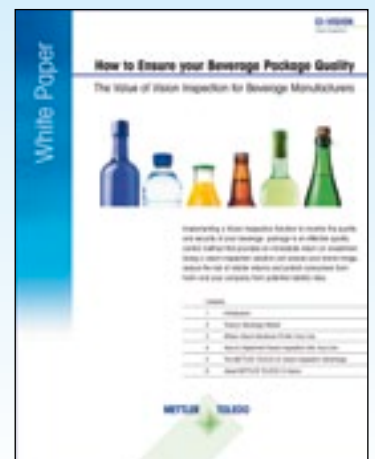
CIVCore is designed not only to capture and eliminate product defects, but provide useful statistical feedback to support process optimization.

White Paper – How to Ensure Your Beverage Package Quality

Implementing a Vision Inspection Solution to monitor the quality and security of your beverage package is an effective quality control method that provides an immediate return on investment.

The ability of vision inspection to detect package defects and prevent defective product from being distributed to the consumer is invaluable. This new white paper describes how a properly implemented and managed vision solution can reduce rework, safeguard your brand from recalls, increase retailer confidence and protect consumers from defective bottled product and your company from potential liability suits.

For more information and to download the FREE white paper visit:



► www.mt.com/vision-beverage

Higher Turbidity Accuracy Lower Installation Costs

The InPro 8600 series accurately measures turbidity through highly sensitive scattered-light detection. With a measurement range of 0 to 100 EBC, the sensor identifies unwanted particles, even in apparently clear liquids. The wireless version does not need a transmitter, simplifying set up and reducing costs.

Reliably measuring the cloudiness of low turbidity beers and beverages requires sophisticated optics. The innovative InPro 8600 turbidity sensor combines accurate optical technology with advanced measurement electronics in one compact sensor head, and provides highly dependable measurements at a reduced installation expenditure.

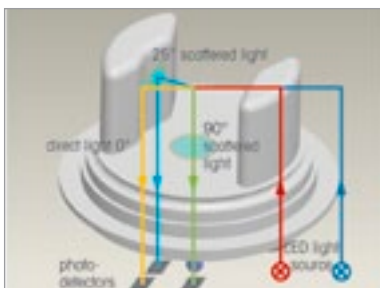
The Bluetooth-configurable option operates without a transmitter as a stand-alone system.

Intelligent Sensor Management (ISM) technology provides simple and fast configuration.

Find out more at:

► www.mt.com/InPro8600

Your benefits



Attractive price/performance ratio

Available in combined turbidity and color monitoring unit.



Minimal maintenance

Sapphire optical window and absence of O-rings means maintenance is very low.



Wide range of measurement options

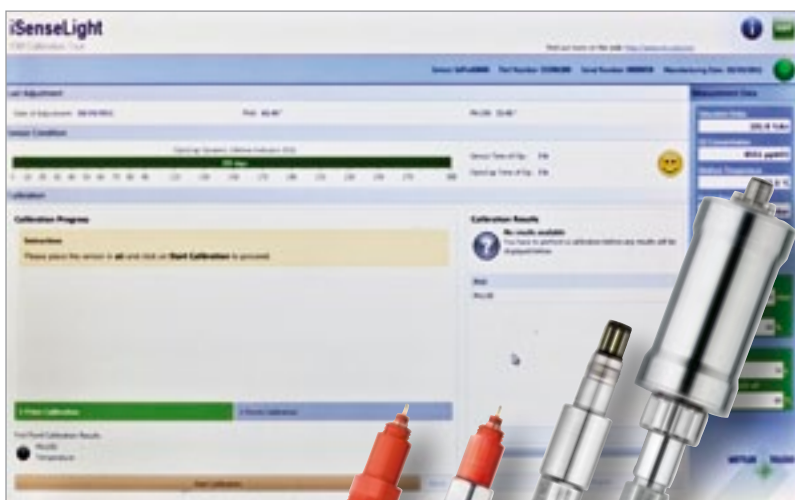
Measures in EBC, FTU, ASBC, ppm, and EBC color units.



InPro 8600
turbidity sensor



Get in-line with METTLER TOLEDO



Easy Sensor Calibration with Free Maintenance Software

Intelligent Sensor Management (ISM) is helping to improve productivity in process industry companies the world over.

iSense Asset Suite, the partnering software for ISM sensors, allows easy sensor calibration in a convenient location away from the process, sensor diagnostics for increased process uptime, traceability over a sensor's lifetime, and much more.

A free version of iSense, iSenseLight, has all the main features of the full software. No license is required and there is no need for registration.

With iSenseLight, ISM sensors and transmitter, and an iLink USB cable you immediately get all these benefits:

- Fast and easy sensor calibration in a convenient location
- Predictive maintenance diagnostics
- Configuration of optical oxygen sensors
- Printable calibration reports

► www.mt.com/iSenseLight

ISM

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