Brewery
Perspectives in Liquid Process Analytics

9
News

INGOLD
Leading Process Analytics

Successful Test of New Turbidity System in Beer Filtration

The new turbidity measurement system from METTLER TOLEDO incorporating the dual angle sensor InPro 8600 was able to fully meet all performance criteria set by a large international brewery chain, providing precise and verifiable results throughout the entire test phase.

Critical turbidity measurement during filtration

Turbidity measurement in breweries is commonplace. However, the requirements and importance attached to such measurement in beer during filtration are exceptionally high, playing a decisive role in controlling the quality and shelf life of the final product. All large breweries today perform online turbidity measurement upstream of the filling line. However, the market offers very little high-quality equipment able to meet the required performance level, and that over an extended period of time. High-quality is understood to describe a sensor that is able to fulfill all hygiene regulations, provides highly accurate measurement results, is easy to install, of rugged construction, and – not least – incorporates comprehensive diagnostic features to supervise the quality of the measurement.

The new INGOLD turbidity measurement system

Mettler-Toledo Ingold has developed a new generation of turbidity measurement systems for hygienic applications, focused on the highly-accurate measurement of undissolved particles at the low-end concentration range (0 to 100 EBC). The most up-to-date technical techniques and designs were developed, tested and elaborated, an important requisite for a product destined for success. The striking result is a combination of forward and sideward scattered light technology using two light detectors, one with an angle of 25°, the other of 90°. As need may be, a transmitter can be dispensed with. In such case,

METTLER TOLEDO

sensor recognition and configuration are carried out wireless via Bluetooth. This provides savings both in investment and installation costs, without any loss of functionality.

Successful test phase

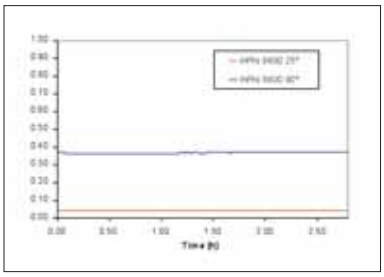
During a 3-month test phase, an InPro 8600 turbidity measurement system was run under actual operating conditions. The system was installed downstream of Kieselguhr filtration and blending. Using a Tuchenhagen Varivent adapter, the sensor was fitted inline via a standard connection in a very short time. The system came factory-calibrated. The ISM®-function (Intelligent Sensor Management) enabled online operation of the measurement point within seconds of a transmitter being connected to the sensor.

ISM® (Intelligent Sensor Management)

The principle feature of ISM® is the ability to communicate static identification and dynamic process data from the sensor to the transmitter. The sensor is automatically recognized by the transmitter and, for instance, factory-set calibration data directly transferred. Comprehensive diagnostic functions provide continuous information on the status of the sensor.

High stability and measurement precision

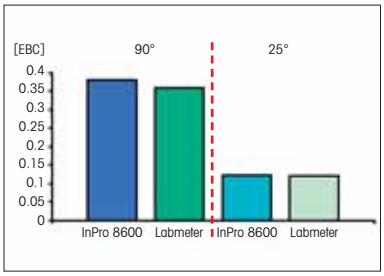
CIP solutions were employed once daily under normal operating conditions. The sensor thereby received sufficient cleaning, rendering additional cleaning of the standard sapphire windows unnecessary. The diagram clearly illustrates the measurement stability and accuracy. The measurement signal is constant and shows only very slight fluctuations, possibly coming from the process itself.



Field Test InPro 8600 D.

Measurement verified by competing product

In order to verify the inline measurement values, comparative measurements were made in the brewery laboratory. As expected, the values delivered by both systems, 25° and 90° scatter angles, and infrared at 650 nm, correlated extremely well.



Comparison with turbidity measurements in the laboratory.

A satisfied customer

The customer was fully satisfied with performance and accuracy of the system. Ease of installation and compact design contributed to the overall highly positive impression left by the complete measurement point.

Customer benefits that make a decision easy

- Reliable measurement results
  As shown during testing, the measurement values not only remained stable but were also verified by arbitrary measurements. Due to hygienic design certification, product contamination can be ruled out, an essential prerequisite for hygienic processes. The InPro 8600 fully meets the MEBAK requirements on measurement technology based on forward scattered light.
- Reduced costs per measurement system
  The ISM function enables "Plug and Measure" installation, thereby saving time and hassle.
- Low maintenance effort
  Since neither O-rings nor diodes have to be replaced, and the measuring window is made as standard out of sapphire glass, no substantial maintenance costs arise.

www.mt.com/turb

Publisher / Production
Mettler-Toledo AG
Process Analytics
Im Hackacker 15
CH-8902 Urdorf
Switzerland

Illustrations
Archive MarCom
CH-8902 Urdorf
Switzerland
Archive Forschungszentrum
Weihenstephan, TU München

Reliable Process Connections
with INGOLD Sanitary Sockets™

The INGOLD Sanitary Socket™ now offers significant improvements in hygienic operations, operator safety and cleanability.

INGOLD sockets – industry standard since the 1960s

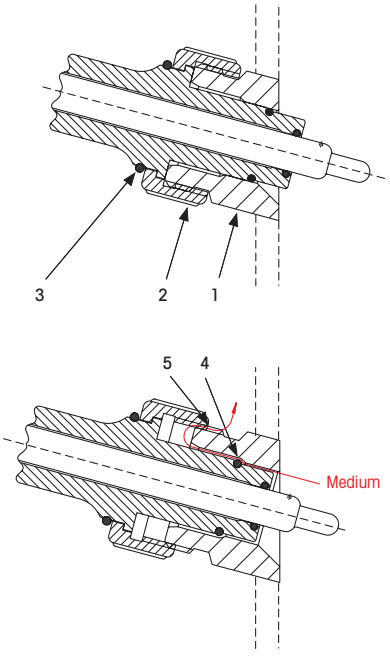
Mettler-Toledo's Ingold sockets have been an industry standard instrument port since the 1960s. Since its inception, it has also been successfully installed in applications in the beverage industry. Tens of thousands of installations exist worldwide.

Functionality

Sensors are connected to the socket either directly or through the use of housings in piping/tubing systems, vessel or reactor side-walls, and top-entry of vessels or reactors. The non-tapered straight thread with a wide pitch provides consistent and repeatable depth of insertion. The threads are non-wetted with sealing against the wall of the INGOLD socket.

Installation options

The INGOLD socket is available in 316L stainless steel, but also in Hastelloy C-22, Titanium, PVDF, and PP. The available length varies from 40 – 60mm (1.57" – 2.36"). For liquid-based, electro-chemical processes an optional socket with an integral 15° slope is available.



The INGOLD Sanitary Socket™

The INGOLD Sanitary Socket™, initially known as the safety socket, provides numerous advantages to hygienic applications within the brewing industry. The advantages stem from two main design enhancements:

1. A safety feature to prevent accidental release of housings under unexpected system pressure
2. A conical, internal bevel at the point of insertion

Safety features

The INGOLD Safety Socket™ provides increased protection in the event of any premature attempt to remove the housing when the reactor or pipe is still under pressure or filled with medium.

Function (see figure)

When the ring nut (2) is turned in order to release the housing from the socket (1), the housing retracts slightly due to the effect of the spring snap ring (3). This movement causes the O-ring (4) of the housing to dislocate from the 25 mm diameter area, and it no longer seals. The ring nut (2) is still lightly engaged on the thread. The medium under pressure flows past the O-ring (4) and leaks out through the thread (5). This is a sign that the process has not been shut down. By retightening the ring nut (2), escape of medium and pressure can be stopped.

Mandatory requirement

The safety function is effective only if the appropriately housing (InFit 761/NC) or 25 mm DO sensor (InPro 6800) is used. All previous types of housings or 25 mm DO sensors can still be used, but without the benefit of the safety feature.

Many imitation INGOLD sockets exists in today's market. These sockets do not all share the stringent quality demand, nor have the safety functionality of the INGOLD Sanitary Socket™.

Hygienic design

Through the beveled interior and relocated point of sealing more efficient hygienic performance is provided. Housing or sensor O-rings are optimally located to prevent media hold-up and contamination. Sealing on the interior edge of the bevel allows SIP or CIP processes to more thoroughly clean and sterilize the entire wetted surface. The result is superior hygienic performance during production and through cleaning/sterilization procedures.

www.mt.com/housing

InPro 3253 SG pH Electrode
Successful in Hot Wort Application

One of the most demanding pH inline measurements in a brewery is pH regulation during boiling of the wort. In the past, reliability of the measurement was somewhat limited due to the extremely harsh conditions. Modern pH measuring systems now offer a viable, cost-effective solution.

This report is based on practical experience gained at an installation in a German brewery, and the result of a joint assessment carried out with the Research Centre for Brewing and Food Quality at Weihenstephan, Germany.

Why a pH measurement?

During wort boiling, protein and hop tannins are released, which coagulate in the so-called hot break process. Optimal of these substances separation (e.g. through precipitation) is important for the stability of the flavor of the beer. Coagulation of the proteins can be improved if, at the end of the boiling process, the pH value is reduced to 5-5.2 by adding acid. This is achieved by adding mineral acids or, if brewed according to the German Purity Law, by means of biological acidification, i.e. by adding lactic acid. The acidification is regulated through monitoring the pH value.

What are the conditions?

Temperatures of about 100 °C, high suspended solids contents, and extreme pH jumps between the CIP cycles are a tremendous challenge for pH electrodes. Too fast wearout of the electrode would indeed make inline measurement unprofitable. These "stress factors" can also cause a creeping loss of measurement performance and eventually lead to measurement errors, with a negative impact on the hot break process..

What are the expectations?

In the light of these considerations, the lifetime of the electrode should be at least last three months, whereby its operational behavior is to be continuously monitored and any need for maintenance promptly indicated to the user. In addition, continuous measurement, as opposed to offline grab sample measurement, provides the possibility of creating a pH profile for every boiling process, i.e. a "fingerprint" of the process, which can then be used for quality assurance procedures.

What does the METTLER TOLEDO solution look like?

For wort kettles with an external boiler, the InPro 3253 SG 9H electrode can be installed in the piping system of the boiler using a retractable housing InTrac 777. For kettles with an internal boiler, direct installation into the kettle is also possible. The pH electrode can remain in the measuring position during the CIP cycles. For long production downtimes, the pipe should be filled with water so that the electrode does not dry out. The transmitter M 700 type is suitable for either wall or panel mounting (see Fig. 1 and 2).

What are the results?

Practice has shown that the InPro 3253SG provides reliable and reproducible values over the desired period of three months due to the special membrane glass and self-cleaning diaphragm. The recommended interval for the calibration with conventional buffer solutions is one week. The retractable housing InTrac777 enables safe removal of the electrode without process interruption. In interaction with the M 700 transmitter, the electrode's operational behavior is constantly monitored, and any deviations from plant-typical characteristics are immediately reported to the user, so that optimal operational performance can be re-established without much loss of time.

What is the benefit for the user?

The electrode's long life cycle under these demanding measurement conditions results in a significant reduction in costs for

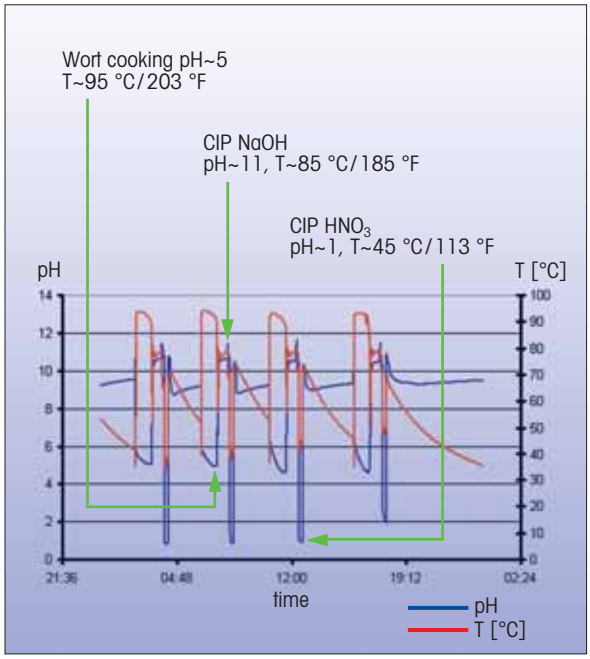
Fig. 1 Retractable housing InTrac 777 mounted in a Tuchenhagen Varivent® housing.

replacement electrodes. Over and above this, continuous pH measurement allows optimal acidification for the extraction of protein and hop tannins – and in the case of biological acidification, even at fluctuating concentration of lactic acid in the batch tank. Operational behavior and availability of the measuring point are significantly improved by the integral diagnostics functions.

www.mt.com/pro-pH

Fig. 3 pH electrode InPro 3253 SG – with solution ground for enhanced diagnostics.

Fig. 2 Transmitter M 700 installed in conjunction with the InTrac 777.

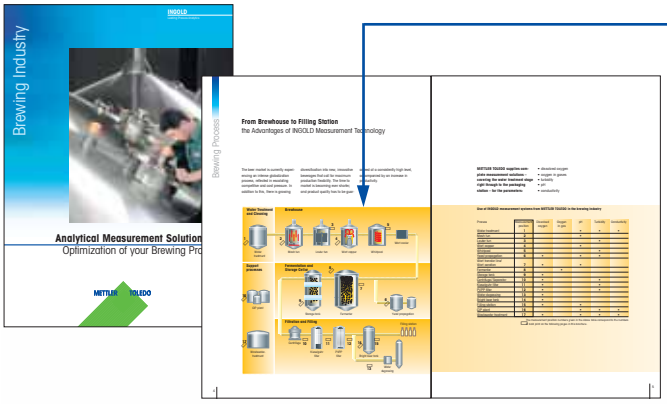


pH-measurement in Wort cooking.

METTLER TOLEDO Expertise in Brewing Processes:
Analytics and Weighing Measurement

METTLER TOLEDO is now introducing two new tools for technical personnel in the brewing industry, which clearly explain where state-of-the-art process analytics and weighing technology can help to improve process reliability and to minimize maintenance effort.

The new brewery brochure: Successful process analytical solutions for brewing applications



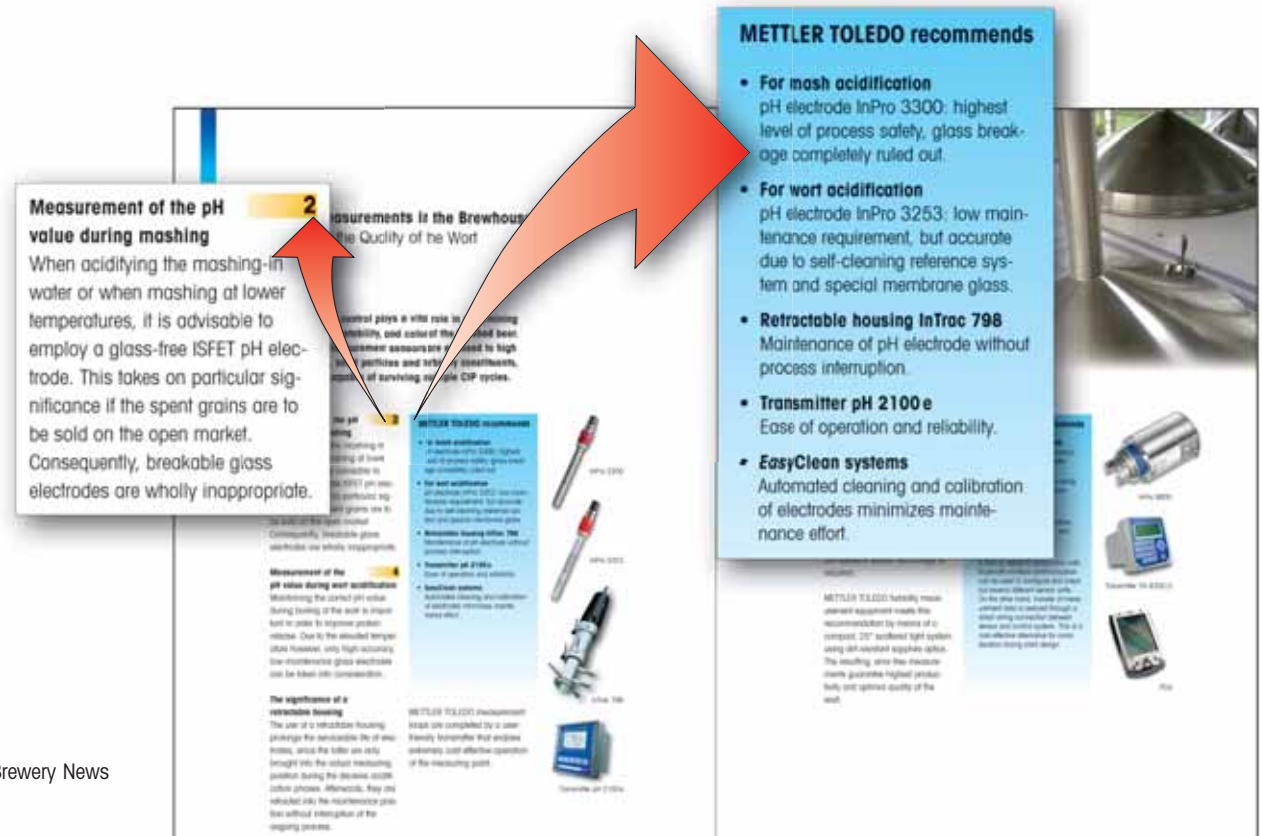
Everything at a glance!

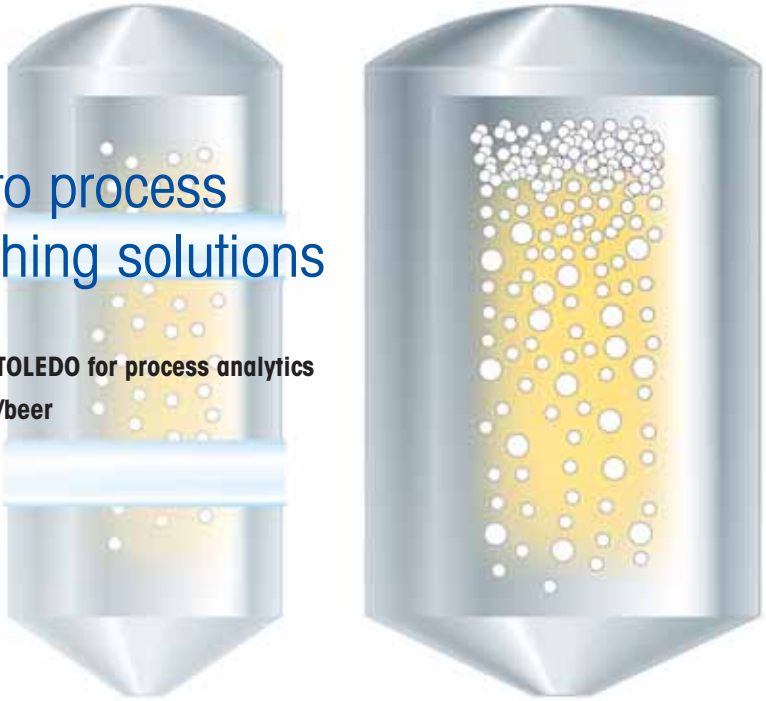
A flow diagram points out those process steps in which selected parameters support you to achieve operational improvement of the brewing process. Detailed information in reference to the table facilitates the orientation.

12 pages for quick readers

The benefits gained by process analytics measurement explained. In fields with blue background, you will find recommendations for selected products and applications (see below).

Brochures and supplementary documentation
covering individual products or subject matter can be obtained from your METTLER TOLEDO representative.





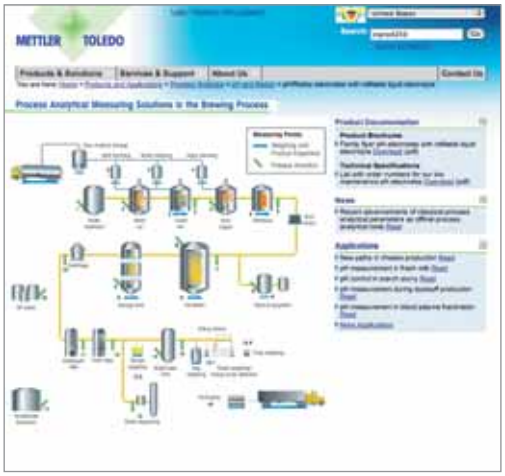
Interactive access to process analytics and weighing solutions

Find the complete offering of METTLER TOLEDO for process analytics and weighing solutions at www.mt.com/beer

www.mt.com/beer – to click through
Move the cursor over the graphic and click on any icon. A window will pop-up immediately offering you short information to the selected measuring point and indicating the benefits METTLER TOLEDO will provide.

Are you interested in the products mentioned?
With a further click in the pop-up, you can gain direct access to the comprehensive product information on our homepage.

Key topics – quickly to download
In the right-hand column you will find important supplementary information relative to beer brewing.



www.mt.com/beer

Brewing without weighing is unthinkable! Two typical weighing solutions out of numerous applications represent a highly versatile spectrum of products.

Statistical Quality Control
Compact standalone solutions and PC based/networked solutions help to save money by reducing overfilling, avoid legal complaints and streamline QA-procedures
see also: www.mt.com/sac

Tank/silo weighing solutions
Smart process terminals and top quality weighing modules for faster, precise batching processes, easy connectivity and improved uptime
see also: www.mt.com/batching

Original INGOLD Accessories
Keep your Measuring Systems Running

METTLER TOLEDO not only provides complete measuring systems to control parameters such as pH/ORP, dissolved and gaseous oxygen, CO_2, conductivity and turbidity, it also offers you a comprehensive and well-balanced package of accessories.

pH and ORP Accessories

METTLER TOLEDO offers a wide selection of pH buffers, electrolytes, cleaning and storage solutions to facilitate operation and maintenance of its high-accuracy pH measurement systems.

Oxygen Accessories and Maintenance

To maintain the membrane integrity of oxygen sensors, kits of multiple membrane types, including membrane body, electrolytes and O-rings are offered.

Continued Support

Many customers still rely on our previous generations of products. We are committed to continue to provide maintenance materials, service and technical support for all of these products.

For more information, we invite you to visit:

www.mt.com/pro-service

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