To ensure that the new O₂ sensors work smoothly under process conditions of diverse or even extreme nature, only the highest quality materials have been used to manufacture the sensors.

The sensors are equipped with the industrially-proven VarioPin (VP) connector and are ideally suited for use in moist or even wet environments. This connector is absolutely watertight (IP 68), extremely robust, and fully sterilizable. In a test procedure, the VP connector was immersed for 1000 hours in water at 1 bar (14.5 psi) excess pressure (corresponding to a depth of 10 meters). Result: The VarioPin connector remained absolutely impervious.

This new range of DO sensors offers a substantially improved set of features. Apart from the above mentioned cable connection, the differences are primarily to be found in the design of the sensor inner bodies. The special low-ppb version (InPro 6900) has a detection limit of 1 ppb at enhanced signal stability. This has been made possible by a newly developed annular cathode with protection ring. The basic InPro 6800 can be easily converted/ upgraded to an InPro 6900 version at any time. The inner body of the low-ppb InPro 6900 enables:

- lower DO detection limit of 1 ppb accuracy
- faultless measurement values even at fluctuation of flow

The new InPro series of dissolved oxygen (DO) sensors has been specially developed to provide dependable inline measurements in processes operating under sterile and hygienic conditions. Apart from the basic InPro® 6800, an enhanced version is also available to meet higher requirements- the InPro® 6900. In both cases, durable material and robust construction guarantee high process reliability.
No chance of contamination – all hygiene tests passed with flying colors

The DO sensors have been subjected to rigorous trials by leading testing organizations and have stood up successfully to all challenges. These METTLER TOLEDO DO sensors are the first (and so far only sensors worldwide) with EHEDG and 3-A hygiene certification. Construction and manufacture are both carried out in accordance with the most exacting standards for surface finishing. This ensures complete fulfillment of the EHEDG and FDA guidelines relating to smooth surfaces for particularly high standards of hygiene.

Validation included: complete traceability of source of steel

Together with every DO sensor, METTLER TOLEDO also supplies a 3.1B certificate, standard and free-of-charge. The 3.1B certificate provides evidence of the steel’s quality so that those steel parts which come into contact with media can be traced back even as far as the steel producer, if need be.

Intelligent accessories

The O₂ Sensor-Master enables fast and simple testing of a sensor prior to its use, and the O₂ Sensor-Simulator is specially designed for checking the transmitter and the cable. For maintenance professionals, these are important aids which make reliable functional tests fast and uncomplicated.
Precise, rugged, simple to use
Oxygen measurement made easy

With the InTap 4000/4004 series, METTLER TOLEDO brings to the market a portable oxygen analyzer ideally suited for use in the beverage industry. Three main features characterize this practical “lightweight” unit - rugged construction, precise measurement and ease of operation. Even under the harshest operating conditions, this fully waterproof instrument consistently provides reliable measurement data due to the perfect functional compatibility of the optimized measuring chamber and robust sensor. Neither a fluctuation in flow rate, nor extremely low dissolved oxygen concentrations have any influence on the stability of the measurement results. The North American version of the InTap 4000 (InTap 4004) is specially designed with an incorporated quick-connect Zwickel adapter, which is a standard connection for North American breweries.

The integrated software offers a variety of different functions. Not only is it possible to store the measurement data, but also, by using the accompanying “Paraly” software, the data generated are easily transferred to a computer for subsequent processing and evaluation. The data can then be processed either with “Excel” or any other preferred spreadsheet program. A high degree of user ergonomics is built in, such as a menu-driven, step-by-step maintenance routine and many other similar productivity-enhancing operational features.

Due to the modular concept of our oxygen sensors, membranes can be exchanged in a matter of a couple of minutes, with little effort. On a practical basis this means that the spare parts for the sensor employed in conjunction with the InTap unit are exactly the same as those used worldwide for the other proven (in-line) oxygen sensors from METTLER TOLEDO. Users are alerted by the Senso-Check function if the sensor needs service attention or the instrument requires (re-) calibration.

The oxygen analyzer InTap 4000/4004 in its protective housing made of high-impact PU is delivered ready for use, complete with a cleaning and conditioning set, all other necessary accessories, and is conveniently packed in a practical, transportable case.
“Cleaning-in-Place” (CIP) and “Sterilization-in-Place” (SIP) are cleaning methods commonly used in the food and beverage industry. During such procedures, the sensor is subject to severe material stress. Caustic and acidic concentrations of up to 5%, pH values ranging from 0 - 14, temperatures of up to 140 °C / 284 °F and pressures reaching 4 bar/158 psi (at 140 °C/284 °F) are only some of the extreme conditions confronting a sensor in a CIP/SIP environment. Over and above this, the sensor must be made of FDA-listed materials and be able to withstand scouring in order to qualify for unrestricted use in the industrial food sector.

One sensor that meets these requirements is the new METTLER TOLEDO InPro 7108 4-electrode sensor. In addition to performing in such harsh conditions, the InPro 7108 has a measuring range from 20 µS/cm up to 800 mS/cm. For direct measurement of (process) temperature and for temperature compensation, this sensor is equipped with a Pt1000 element.

The measurement signal is routed via a VarioPin (VP) connector (protection rating IP 68). The sensor is designed for direct process adaption through an INGOLD 25 mm weld-in socket.

In numerous beverages such as beer, mineral water or sparkling wine, dissolved CO2 is present in large concentrations. This carbon dioxide content acts as a stimulant as well as having an aseptic effect. The degree of purity of the CO2 used has to be checked, since the presence of impurities such as oxygen can have a negative influence on both flavor and shelf life of the product. If the CO2 comes from an outside source, the supplier assumes responsibility for the quality of the gas. In breweries and also in champagne production, the natural CO2 emitted during the in-house fermentation process is utilized. The purity of the gas is then a matter for the producer. Contamination from oxygen can be extremely well detected by using the proven inline oxygen sensors of the InPro 6800/6900 series from METTLER TOLEDO. Use of these sensor is not limited to the liquid phase alone- reproducible and precise measurement is also possible in the gas phase. This multipurpose functionality makes these sensors an ideal solution for CO2 recovery plants. Uniform design of the equipment and spare parts, such as membranes and cables, reduces the learning curve for individuals responsible for operation and maintenance procedures.
Oxygen and pH measurement in wort

During preparation of the wort, careful supervision of pH values and dissolved oxygen content is an essential factor in controlling the flavor of the final product in beer production. In breweries these parameters are best measured using online systems, whereby the values can be documented and evaluated. When selecting in-line sensors for wort production, it is critical to select systems that function perfectly at elevated temperatures and in the presence of high solids content. For cost-efficiency, the sensors should also be able to withstand repeated cleaning cycles with hot caustic solutions.

Online measurement systems certainly pay off, by avoiding the additional labor and time of grab samples followed by laboratory analysis. Even more important, often by the time a sample is analyzed in the laboratory the pH or dissolved oxygen content may have deviated from the conditions in the controlled process environment. Online measurement ensures perfect, continuous process documentation. Only in this way is it possible to maintain a consistent and reproducible, high-quality product.

The highly valued online sensors of the InPro 6800/6900 series, widely employed for checking the (very low) rest oxygen concentration in the final beer, are also extremely well suited for determining the (high) oxygen values in wort. The robust, pressurized InPro 2000 pH electrodes have also proved extremely suitable for measuring pH values in wort.

For maximum return on investment and highest operational efficiency, these sensors can be mounted to the process using manual or automated retractable housings, which allow withdrawal of a sensor from an ongoing process for inspection and calibration. The stringently tested, sterilizable double lock system of the housing allows subsequent reinsertion of the sensors under fully aseptic conditions.
Repair or replacement?

Sensors directly in contact with the sample medium are subject to continuous wear and tear, which at some point reaches such an advanced stage that the sensors must be repaired or replaced.

Fouling of the glass membrane or diaphragm(s) of a pH electrode has negative effects on the performance of the electrode generally. However, fouling does not always lead to an irreparable defect. Through special cleaning procedures, many electrodes can be restored to a satisfactory operating condition.

Oxygen sensors too, are subject to a natural aging process and are then no longer able to fulfill the specifications guaranteed at the time of delivery. This is particularly true in respect of the insulation resistance of the inner body, which deteriorates over time due to mechanical and thermal stress. One result of a deteriorated inner body is over-range transmitter readings. By replacing the inner body, the sensor can be returned to original specifications.

Service technicians from METTLER TOLEDO are equipped with sophisticated diagnostic equipment to verify defective sensors and to issue a written report on the findings. Please contact your local Mettler-Toledo Service office or your local authorized METTLER TOLEDO agent for more information.

Our service technicians will be pleased to advise you about suitable O-ring material.
pH measurement in beer

The pH value of beer is an important quality criterion that has a lasting affect on the taste. As an alternative to mobile sample measurement or test measurements analyzed in the laboratory, continuous measurement directly in the beer processing equipment offers many advantages.

- Permanent monitoring of the pH value allows continuous product control.
- The results of in-line measurement are not altered due to sampling errors or through other influences on the sample to be measured.
- Automatic intervention in the process is possible via the pH transmitter’s control functions.
- Alarm limits can be programmed to prevent filling when the product is outside of a user-defined tolerance range.
- The use of a pH electrode with integrated temperature sensor allows simultaneous temperature monitoring, and results in correct measurement values through automatic temperature compensation.

What are the essential points?

The appropriate sensor

Most successful of all has been a pH electrode with FRISCOLYT®, a liquid electrolyte that is well tolerated with foodstuffs and drinks. Its special composition prevents contamination of the electrode, which is a basic prerequisite for correct measurement results. The pH electrode InPro® 2000 is additionally equipped with a Pt100 or Pt1000 temperature probe.

Correct installation

In addition to multiple other locations in the process, a final pH check is usually performed just prior to the filling process. Since considerable fluctuations in pressure can occur at this point in the beer line, the pH electrode has to be installed on the inlet side of the pump. The InFit 764-50 CIP housing accepts the pH sensor and allows pressurization up to 6 bar (187 psi). It can be fitted directly into the beer line via a flange or the INGOLD DN25 weld-in socket. Alternatively, there is also a retractable housing InTrac 776 available, which allows cleaning, maintenance and calibration of the sensor even when the beer feed line is in production.

The appropriate measuring device

The pH 2100 e transmitter offers a high degree of performance with very simple operation. Calibration, programming and configuration are carried out under menu control in plain language. Four different user levels allow access to only those authorized via password number. The backlit display is always easy to read even in poor light conditions. The device corresponds in design, construction and layout to the familiar O2 4500 oxygen transmitter that is commonplace in many breweries, i.e. the same instrument philosophy for different measurement parameters.
Oxygen, conductivity and pH transmitters with PROFIBUS PA interface

Communication systems in the field of (process) analytical measurement are moving more and more towards the use of digital technology. The advantages over conventional analog data transfer via 0/4...20 mA lie mainly in the ability, along with the actual measurement signal itself, to exchange additional information between the process control system (PCS) and the analytical measurement device on a two-way communication basis.

For some years, METTLER TOLEDO has been offering transmitters with HART® Communication which superimposes a digital signal on the customary 4 - 20 mA DC analog signal. This enables the transfer of additional information than just a measurement signal.

From now on, transmitter units are also available which incorporate a fully digital PROFIBUS PA interface according to the “Profile for Analytical Devices, Version 3”, suitable for measurement of dissolved oxygen, electrolytic conductivity (conductive and inductive) and pH value.

Simple connection to the PCS through Plug & Play.

Connection to the PROFIBUS DP level is possible either by direct linkage or through a segment coupler. The maximum bit rate of 12 Mbits/s on the DP lane is thereby preserved. The instrument interface employs the FISCO model to ensure intrinsically safe networks. The existing well-proven functions such as automatic calibration (Calimatic®), sensor diagnostics (SensoCheck®) and parameterization can be accessed via the PCS just as easily and comfortably as before.

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