

## Almost Instant Response to O<sub>2</sub> Level Changes



p. 4

## Reduce Corrosion with Optical DO Measurement



p. 6

## Real-Time Microscopy Supports Process Optimization



p. 8

## Rugged Handheld pH Meter for Easy, At-line Monitoring



p. 10



## Preventing Precipitation on pH Sensors for Greater Process Consistency

**Build-up of contaminants on pH sensors affects measurements. It also reduces sensor lifetime. For a leading pigment company, intelligent pH sensors and sophisticated cleaning greatly reduce process variability, improve product consistency, and reduce costs.**

### Titanium dioxide production demands accurate pH control

A major global chemical company based in the UK produces pigments and performance additives. Continuous innovation and superior product performance are its key differentiators. The company is highly committed to safe, sustainable, and responsible manufacturing.

The main chemical produced at one of their UK sites is titanium dioxide (TiO<sub>2</sub>), the most important white pigment used in the world. Titanium dioxide quality is strongly related to pH

control during production. But maintaining an accurate pH measurement in reactor vessels is problematic. Process-tolerant METTLER TOLEDO sensors combined with efficient sensor cleaning, has transformed pH measurement for the company.

### Surface treatment process is central to product quality

The chemical and photochemical performance properties of TiO<sub>2</sub> mainly depend on particle size and the chemical composition on the particles' surface. The latter is achieved through a critical surface treatment process in



ISM®

InPro 4260i pH sensor

which the particles are coated with various inorganic compounds.

### Minimizing precipitation on sensors is vital

At the production facility, precipitation of coating compounds during TiO<sub>2</sub> production is controlled through carefully adjusting the pH in the reactor.

The plant's Process and Production Chemist, emphasizes that pH control is extremely important but problematic: "The difficulty is that certain compounds not only precipitate onto the surface of the TiO<sub>2</sub> particles but also onto the in-line pH sensors, reducing their response time and accuracy. This causes variability in the process and adversely affects final product quality and consistency."

The Instrument Development Engineer at the site recognized the need for change in their pH measurement approach. When the coating process was addressed in a meeting with METTLER TOLEDO, a solution in three parts was devised.

### pH sensor for high performance in slurries

First, a pH sensor for service in slurries and high particle load media was selected. Conventional pH sensors feature a diaphragm on their reference side. The diaphragm can quickly clog with precipitate, leading to drift and reduced response time.

METTLER TOLEDO's InPro® 4260i sensor features a solid polymer reference electrolyte and an open junction. This opening is much more resistant to clogging than traditional diaphragms. The sensor therefore measures accurately for long periods.

### Sensor cleaning and exchange during running process

However, precipitation of solids onto the sensor cannot be avoided. The second part of the proposed solution therefore consisted of a retractable housing assembly to enable sensor cleaning and exchange without process interruption.

This InTrac® 777e-295 enables automatic sensor insertion and retraction. Its 295 mm insertion length means the assembly can be mounted easily on a ball valve or nozzle with a long stand-off, and still reach the process.

The housing features an internal flushing chamber that enables thorough sensor cleaning. The Instrument Development Engineer confirms that, using water only: "Cleaning is now so efficient that the number of times the sensor is withdrawn is far lower than originally envisaged."

### Hot swapping sensors maximizes uptime

The final part of the solution was METTLER TOLEDO's Intelligent Sensor Management (ISM®) technology for in-line sensors.

Among ISM's features is the ability to calibrate pH sensors away from the process in any convenient location. ISM sensors store calibration data on an on-board microprocessor. When a calibrated sensor is connected to an ISM-equipped transmitter, the calibration data is uploaded to the transmitter, which then configures itself automatically. This Plug and Measure feature maximizes measurement availability as sensors can be hot swapped whenever required.

#### Publisher/Production

Mettler-Toledo GmbH  
Process Analytics  
Im Hackacker 15  
CH-8902 Urdorf  
Switzerland

#### Illustrations

Mettler-Toledo GmbH

ISM, iSense, InPro, InTrac, EasyClean, GPro, Pro2Go and OptoCap are trademarks of the METTLER TOLEDO Group. All other trademarks are the property of their respective holders. Subject to technical changes.  
© Mettler-Toledo GmbH 08/19. Printed in Switzerland.

**Four-fold increase in sensor lifetime and better process control**

After a test installation, the site's senior staff were delighted with the METTLER TOLEDO solution's performance.

The Instrument Development Engineer said: "We now have longer periods of accurate pH measurement and increased time between pH probe

changes. Besides being able to exchange the electrode during the cycle, we are also seeing an extended life of the pH probes, which looks to be at least a four-fold increase."

An additional five reactor vessels have been equipped with the same solution, and other METTLER TOLEDO measurement applications are currently being evaluated.

Find out more about ISM in our sensor maintenance white paper:

► [www.mt.com/chem-ism-wp](http://www.mt.com/chem-ism-wp)

## Hot Swap of ISM Sensors



## 5 Advantages



**90 % time saving on maintenance efforts**

Precalibrate sensors with iSense™ software and swap them when necessary. Analog sensor calibration in the field needs 1 hour. Digital sensor calibration with iSense in a controlled environment takes only a few minutes.



**Eliminate the risk of human error**

Guided calibration and automatic audit trail. No more manual transcription of data.



**100 % signal reliability**

No interferences from electromagnetic fields or presence of moisture.



**No more measurement downtime**

Swap sensors before they fail thanks to predictive diagnostics.



**No unnecessary exposure to process hazards**

Pre-calibrated sensors limit maintenance staff exposure time in the field.

## Rapid Response to Oxygen Changes and Tolerance of Harsh Gas Samples

**When fast response to rising oxygen levels is required, sample conditioning equipment causes unacceptable measurement delay. For a Japanese specialty chemical company, the GPro® 500 oxygen analyzer provides continuous, rapid measurements, and tolerates their harsh process gas.**

### Unique production process requires tight O<sub>2</sub> control

AGC Engineering Co., Ltd. manufactures ion exchange membranes using flammable monomers. Because flammable monomers may cause explosive fires in the presence of oxygen, the oxygen concentration needs to be strictly controlled.

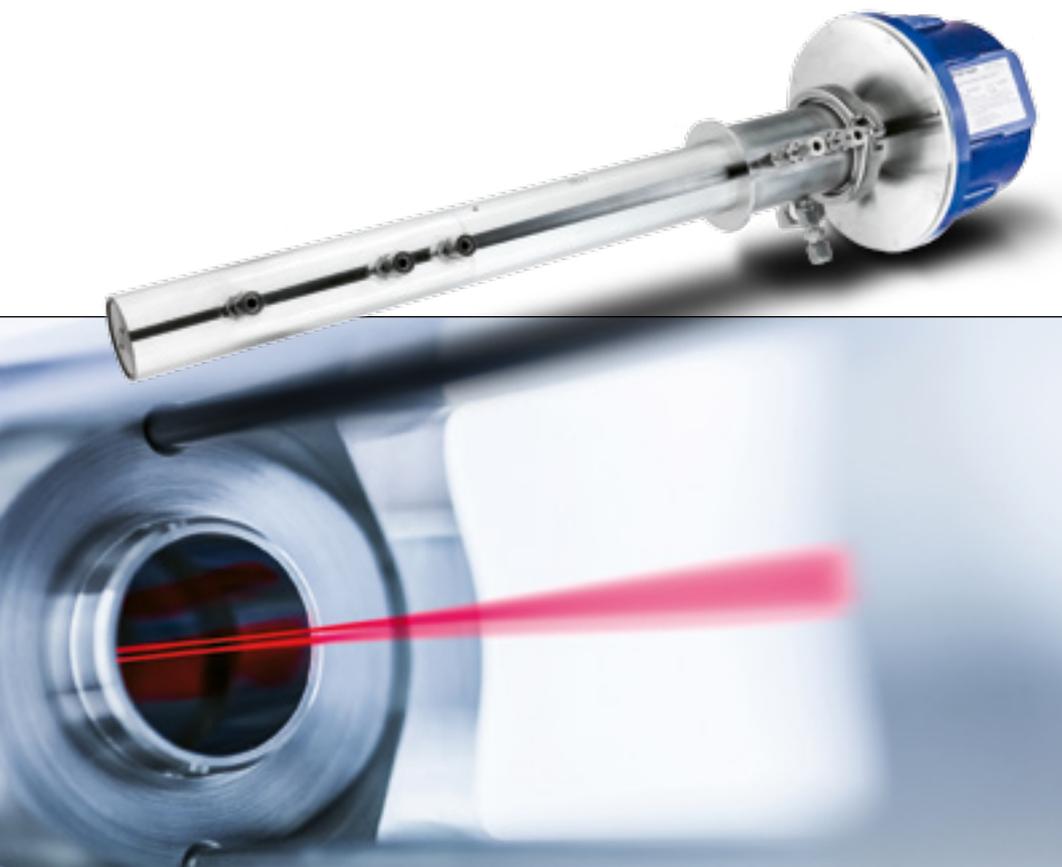
### In-situ measurement is the answer

For monitoring and controlling oxygen levels, AGC Engineering Co., Ltd. evaluated two analyzers: a galvanic oxygen analyzer, and the METTLER TOLEDO GPro 500 tunable diode laser analyzer.

It quickly became apparent to AGC Engineering Co., Ltd. that the galvanic analyzer would not be suitable. The measurement cell in such analyzers can easily become contaminated. Therefore, pretreatment of the gas sample would be required to remove hazardous monomers. This would significantly lengthen the response time of the analyzer and run the risk of late detection of rising O<sub>2</sub> levels. Further, the local fire department has strict regulations on the storage of such waste liquid from sample conditioning equipment.

In contrast, the METTLER TOLEDO GPro 500 tunable diode laser (TDL) analyzer, is a non-contacting method of measuring oxygen. TDLs use the absorption of laser light to determine target gas concentration. As analyzer internals are separated from the sample by optical windows, GPro 500 tolerates harsh process gas streams.

With no need for sample conditioning and its rapid, continuous O<sub>2</sub> measurement and other valuable benefits, the GPro 500 analyzer was an excellent alternative.



“The METTLER TOLEDO analyzer’s measurements are accurate and reliable and there’s almost no maintenance to perform.”



### **Analyzer that meets all requirements**

The presence of oxygen is a problem in many chemical manufacturing processes. In order to ensure an anoxic environment, regular inspection of valves and other devices that may allow oxygen ingress, and continuous monitoring of the process itself, is required.

AGC Engineering’s requirements for oxygen analyzers include explosion proof certification and resistance to corrosive gases.

The GPro 500 is approved for use in explosion risk areas in Japan and most other countries. It is available with a range of adaptations to meet the requirements of a very wide variety of applications. For AGC Engineering Co., Ltd.’s process, a GPro 500 with an ex-

tractive cell constructed from corrosion-resistant perfluoroalkoxy alkane (PFA) was required. And as the GPro 500 uses a non-contacting measurement method, it tolerates moisture in the sample.

GPro 500 fulfills the needs of AGC Engineering Co., Ltd. in all of these areas, and proved to be the solution that the company needed.

### **High customer satisfaction**

The technical expert who installed a GPro 500 O<sub>2</sub> analyzer in a pilot plant at AGC Engineering Co., Ltd. commented: “The METTLER TOLEDO analyzer’s measurements are accurate and reliable and there’s almost no maintenance to perform. It’s also much more affordable than the galvanic analyzer we were looking at, and its running cost is also much lower.”

He was also pleased with the responsiveness of METTLER TOLEDO sales and service staff during the test period.

Such was AGC Engineering Co., Ltd.’s satisfaction with the GPro 500 that the test unit, plus seven additional units have now been installed at the plant.

Learn more about the GPro 500 at:

► [www.mt.com/GPro500](http://www.mt.com/GPro500)

# Reduce Costs and Increase Safety with Automated Sensor Cleaning



Manual cleaning of pH sensors can be time consuming and cumbersome. In addition, if process fluids are hazardous, extracting sensors for cleaning can risk staff safety. But in order for pH sensors to measure accurately, they have to be clean.

Switching from manual to automated sensor cleaning is the solution to this laborious, costly, and often risky maintenance task.

EasyClean™ 200e is METTLER TOLEDO's fully automated rinsing and cleaning system for in-line pH sensors. The compatible InTrac® 777 e retractable housing allows sensors to be ex-

changed without process interruption or compromising operator safety.

This guide summarizes why automated sensor cleaning with EasyClean 200e improves overall pH sensor maintenance operations and reduces expenditure.

► [www.mt.com/easyclean-3reasons](http://www.mt.com/easyclean-3reasons)



Find this guide, white papers and more in our Expertise Library.

► [www.mt.com/pro-library-chem](http://www.mt.com/pro-library-chem)