



**Simplify Workflows in Process Analytics**  
with Sensors That Learn™

**METTLER TOLEDO**



# Visionary technology for today's processes

**Imagine knowing well in advance when a process pH sensor will need to be replaced, or when an oxygen probe will need to be calibrated. Imagine these data being available wherever you need it. Imagine a sensor that can actually adapt to process conditions in order to give you better performance. This is not a vision of the future. This is available today.**

## **Trusted across the globe**

METTLER TOLEDO has been producing innovative process analytical solutions for over 60 years. Our in-line sensors and transmitters for measuring pH, oxygen and other critical parameters are trusted by companies worldwide for their accuracy and reliability.

Our continuing mission is to find new and better ways of helping you increase product quality and yield, at lower expenditure.

## **Unrivalled process confidence**

Intelligent technology is changing industry. It's being deployed across all stages of manufacturing and it's revolutionizing process analytics.

METTLER TOLEDO has developed a new paradigm for in-line analysis, Intelligent Sensor Management (ISM®). By integrating intelligence into our measurement solutions, we deliver a level of performance and reliability that was never previously possible.

## **Sensors that learn from and adapt to your processes**

How can you be confident that the data from a sensor is reliable? How do you know when a probe will need servicing? How can you be sure a sensor is not going to fail unexpectedly?

ISM answers all these concerns. For the first time, you will have more than just a measurement. You will be able to see how your sensors are performing, and when they will need to be calibrated, serviced or replaced.

With predictive data you can confidently act on, available wherever you require it, sudden measurement point failure and doubts over the need for sensor maintenance will become a thing of the past.

## **Forward thinking**

The combination of high-performance sensors and ISM technology, gives you worry-free analytical measurement solutions that will help you stay ahead of the curve.



Intelligent sensors that learn  
Valuable information you can act on  
Worry-free process analytics



# Peak performance and highest convenience

**You want to increase process reliability and safety, reduce maintenance, lower operating costs, and minimize the risk of human error. Sounds like a tall order, but hundreds of companies across the world trust ISM to achieve exactly this.**

## **What exactly is ISM?**

It's a digital technology for in-line process analytics that incorporates intelligent algorithms into the sensor.

Every ISM sensor carries an on-board microprocessor. It is this that allows ISM to deliver benefits and a level of performance that analog systems simply can't provide, including ...

## **Increased accuracy**

With ISM the process parameter value is calculated directly in the sensor, resulting in higher accuracy than analog probes, to give you greater assurance in your processes.

## **Calibration wherever it's convenient**

Taking buffer solutions and calibration gases to the measurement point is inconvenient and can compromise staff safety. ISM sensors can be quickly and accurately calibrated away from the process in any suitable location.

## **Rapid and simple start up**

ISM sensors store their own calibration data. When one is connected to an ISM transmitter, this data is uploaded and the transmitter configures itself automatically. This means measurement point start up is always fast and error free.

## **Robust signal for measurement confidence**

Analog probes output a signal that's prone to degradation caused by surrounding equipment, moisture in the environment and cable length. ISM sensors output a digital signal which is unaffected by plant conditions and is stable over long cable runs.

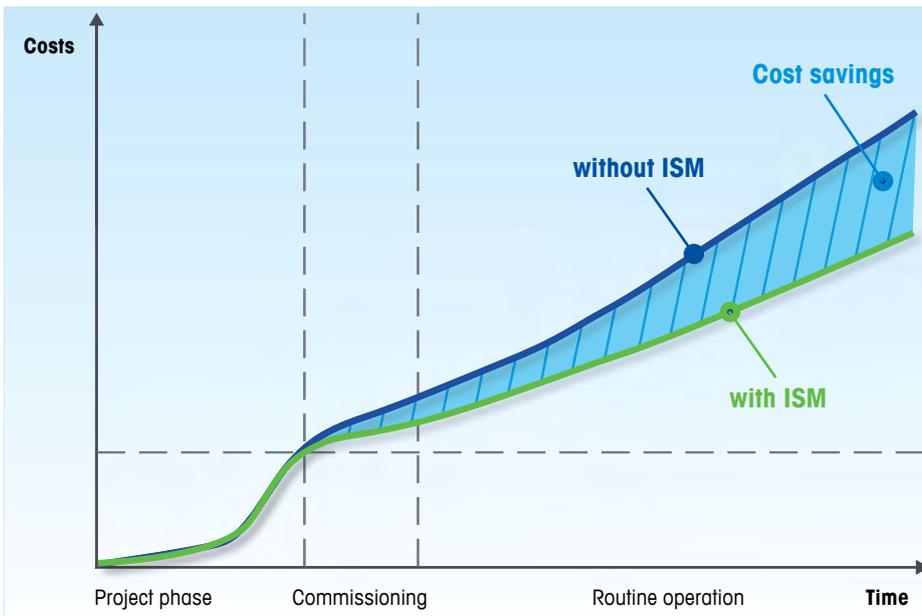
**However, what really sets ISM apart from other process analytical technologies, is the ability of sensors to learn ...**

**“We’re saving hundreds of hours in maintenance.”**



Greater process reliability  
Easy sensor handling  
Lower operating costs

 **Explore your ISM benefits**  
[www.mt.com/ism-app](http://www.mt.com/ism-app)



A single measurement loop can cost up to four times its initial costs over its entire lifetime. Thanks to lower maintenance, reduced use of consumables and less measurement point downtime, ISM significantly reduces operating expenditure.

# Sensors that learn from your processes

**To maximize product quality and yield, you need to know what's going on in your processes and if instruments are performing correctly. More than that, you need this information fast and continuously. That's why we've always made diagnostics the main focus of ISM. And with our new version of ISM we offer a world's first – Sensors That Learn.**

## **Learning power for process analytical sensors**

We launched ISM in 2006 with the only in-line sensors that used algorithms to monitor their own "health". With our new, advanced algorithms we provide another breakthrough innovation – sensors that actually learn from and adapt to processes. Why is that important? Because it gives you exceptionally reliable diagnostics that are specific for every single process.

## **No more guesswork**

ISM sensor diagnostics don't give you raw data that has to be interpreted: they provide easy-to-read tools that tell operators what needs to be done and when, to keep sensors, and your processes, running reliably.

Now you can confidently plan maintenance for when it's actually needed – neither late, which can damage production; nor early, when it's not required.

## **Keep your processes in the lead**

There's a huge variation in processes found across manufacturing, so the new ISM sensors actually adapt to the conditions they operate in. As a consequence, ISM diagnostics represent each and every process more accurately than ever before. This enables you to further optimize maintenance and calibration procedures to get the most out of your resources.

## **Diagnostics speed saves time**

Exchanging sensors can lead to risk exposure as a measurement point is taken off-line. So a fast ramp-up and getting back to reliable operation is key. To always ensure your sensors are up and running quickly, Sensors That Learn include new accelerated algorithms that provide accurate diagnostics in only 24 hours.

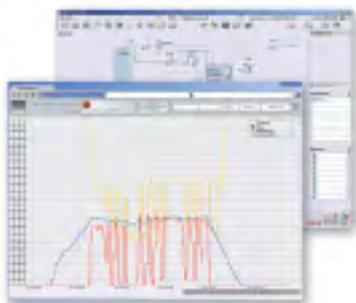
## **They not only learn – they teach**

With Sensors That Learn the knowledge from one sensor can be transferred to another. Now you can be prepared with application/process specific sensor stock at any time. As soon as they're installed, pre-conditioned sensors will provide the most accurate diagnostics information ever, from the first minute.

**“This sensor knows my process within 24 hours.”**



Diagnostics that adapt to process conditions  
Optimized maintenance scheduling  
Full use of sensor life



### What you can gain from Sensors That Learn™



#### Fast reaction time

Highest confidence in process control and maintenance decisions.

Sensors That Learn adapt their diagnostics to varying process conditions within only 24 hours. This exceptionally fast adjustment allows you to

- more accurately plan maintenance windows
- avoid unplanned process interruptions or even shutdowns.

#### Relevant diagnostics for your operations

Always take the right action, before processes are affected.

Counters or generic indicators do not provide reliable sensor diagnostics. ISM's learning diagnostics are different. Uniquely, they calculate how past and current process conditions are stressing your sensors. This gives you:

- A more accurate Dynamic Lifetime Indicator (DLI)
- Diagnostics that actually tell you when to calibrate or clean a sensor
- Maintenance costs reduced by up to 80%

#### Never waste a sensor

Optimize sensor yield with iSense

Simplified and error-free workflows for off-line sensor operations with iSense help you get the maximum from your sensors. Don't waste sensor life, thanks to

- more systematic sensor checks
- consistent handling
- further adjustment of diagnostics during calibrations.



# iSense

## your digital sensor expert

**iSense software is a support and maintenance tool for ISM sensors. With its intuitive interface and comprehensive features, it gives you a fully controllable method of managing your sensors and maximizing their use from first installation to disposal.**

### **What's the problem and how do you fix it?**

iSense's iMonitor screen allows you to evaluate a sensor in an instant. Using traffic light color coding it tells you if a sensor is not performing correctly, what the issue is, and shows you how to restore it.

### **Easy calibration, wherever it's convenient**

An analog probe must be calibrated at the measurement point while being connected to the transmitter. A procedure that is often cumbersome, prone to error, and which requires specialist training.

ISM sensors are different. They store their own calibration data, so they can be calibrated in any convenient location using iSense.

What's more, data on a sensor obtained during calibration is used to fine-tune the DLI diagnostic tool, for greater remaining lifetime accuracy.

### **eDocumentation provides a convenient audit trail**

All sensor-related activities, such as calibration or maintenance, are recorded on iSense and can be documented electronically or as a hard copy. iSense's electronic log-

book allows control and tracking of all probe activities giving you complete documentation of ISM sensors over their lifetime.

For the pharmaceutical industry, iSense is compliant with 21 CFR part 11.

### **iSense for smart phones**

iSense Mobile for smart phones (Android, iOS) allows you to do a process calibration at the measurement point and check a sensor's diagnostics. You can also send a sensor diagnostics report as an email.



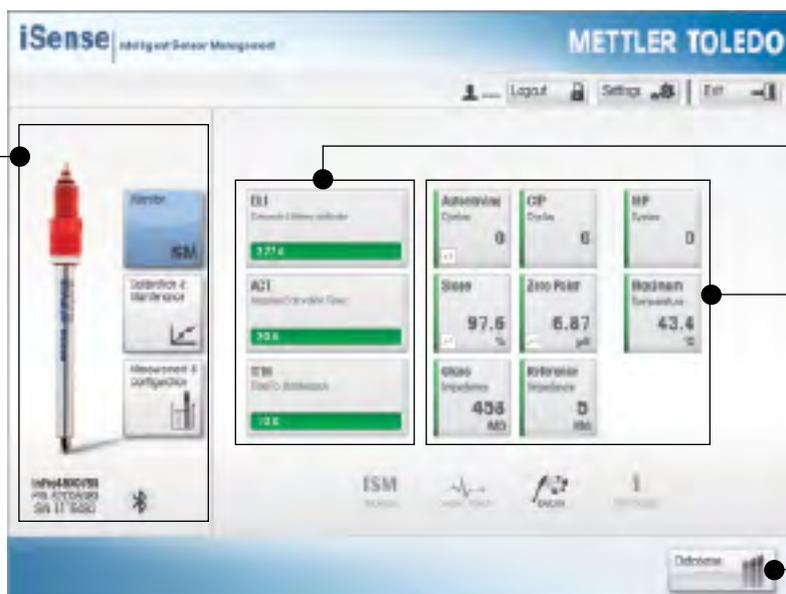


At-a-glance view of sensor condition  
 Convenient calibration  
 Electronic sensor documentation

 [Find out more on iSense](http://www.mt.com/iSense)  
[www.mt.com/iSense](http://www.mt.com/iSense)

Diagnostics on the connected sensor that can be interpreted at a glance

Information on the currently connected sensor, and quick access to calibration/maintenance and configuration menus



Detailed sensor data including glass impedance and slope

Database of all your ISM sensors

Display of all important information on a sensor allows you to instantly evaluate a probe and tells you how to restore it if necessary.

# Simplify workflows with user-friendly technology

**ISM sensors not only learn from your processes and tell you when they'll need to be maintained or replaced, using iSense you can pass the knowledge from one sensor to another. iSense also simplifies maintenance planning, and guides users through all service operations.**

## **Application profiling for greater performance**

In some applications the process conditions mean that it can take some time for algorithms to stabilize and give you precise diagnostics data.

We've solved this by giving ISM sensors the ability to learn from other sensors that have already been used in applications. For example, when a pH probe is removed from a process and is connected to iSense, information on the conditions of that particular process can be stored as an application profile. This profile can then be transferred into a different pH sensor.

When this second sensor is installed in the same process, because it carries the knowledge of its predecessor, it doesn't need time to acclimatize. And if conditions in the process alter, the sensor diagnostics adjust themselves appropriately.

## **Sensor maintenance exactly when it's needed**

Now diagnostics are accurate as soon as a sensor's installed. You can be sure you're not conducting maintenance when it's not needed or when it's late and your process is being affected. Which means that you can be certain your sensors are always performing at their best.

## **Beyond Plug and Measure**

With the application profile database on iSense and the ability to calibrate away from the process, you can build a stock of ready-to-go application specific sensors. This means you can replace a sensor at the measurement point in seconds, without having to adjust the transmitter.

## **Guided servicing**

Simple animations guide even inexperienced users step-by-step through all calibration and maintenance routines.

**“I can transfer the knowledge of one sensor to another with just a click.”**



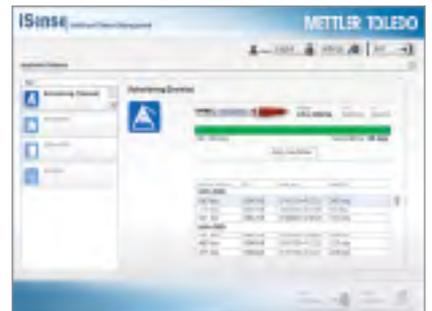
Database for all your applications  
Transfer knowledge between sensors  
Maintain sensors only when it's needed



**Calibration away from the process**  
Perform accurate and error-free sensor calibration wherever it's convenient.



**Guided servicing**  
Whether you're an expert or a first-time user, guided animations will ensure every maintenance procedure is performed without mistakes or missed steps.



**Application database on iSense**  
The application database gives you a complete overview of all available sensors that have been used in the same process.

# All the information you need to keep production on track

Through a wide range of communication and integration tools, the data from ISM sensors are always available to give plant personnel the information they need, wherever it's required, to keep processes running smoothly.

## Your requirements, our solution

No two plants are the same, so we've made ISM flexible to fit your particular system architecture and needs.

Through transmitters, integration tools, fieldbus protocols and mobile communication, measurement data and sensor diagnostics are available wherever you choose: from a mobile device on the plant floor to your asset management software in a maintenance room.

This ability means a technician in a maintenance room instantly sees advance notice of any impending sensor issue, allowing corrective action before production or safety is compromised.

## Seamless integration

It can be very difficult to feed the data from analog measurement devices into process control systems. With digital ISM solutions, a wide range of sensor data including history and diagnostics information can be easily integrated into all common control architectures.

## Information today for your plant tomorrow

Now instrumentation engineers, production staff and plant operators will have access to all the measurement point and sensor data they could ever require. Which helps you stay ready for future challenges.





Easily available sensor diagnostics data  
 Seamless control system integration  
 Flexibility to meet your plant requirements



**Check diagnostics over HART and FF**  
 METTLER TOLEDO HART and FF transmitters provide quick and easy visibility of ISM sensor diagnostics.

**Process Control Level**

Operator

Engineering

Maintenance



**Field Level**



**ISM®**

**Seamless integration of ISM into control systems**

2-way digital data exchange via bus transmitters (HART, Profibus, Fieldbus, Modbus) with ISM sensor diagnostics (DLI, ACT, TTM) are available from field to control level.

\* only available for optical dissolved oxygen

# Don't take our word for it

**ISM is rapidly gaining acceptance in all process industries around the globe. Hundreds of companies are already benefitting from Plug and Measure sensor installation, reliable digital measurement, and higher confidence in their processes thanks to predictive maintenance information.**



The successful application of the METTLER TOLEDO DO sensor with ISM mean that the dissolved oxygen index of all filtered beer is maintained below 50 ppb, and both beer quality and output have improved.

**Tsingtao Brewery**



The combination of the process-tolerant dual-membrane sensor design, and digital signal and other features of ISM have reduced sensor maintenance by around 80 %, and have also improved process performance.

**Evonik Industries Fine Chemicals Co.**



When ISM indicates sensor replacement is required, thanks to Plug and Measure it's a quick and simple procedure.

**Teva Pharmaceuticals**



Bringing an already calibrated sensor to the fermentation vessel saves us 20 minutes for each batch.

**Novozymes**



Compared with our original sodium analyzer, the measurement results from the METTLER TOLEDO analyzer with ISM are more stable and reliable, and are very fast, clearly indicating changes in the amount of sodium in the steam system.

**Jiahua Energy and Chemical Co.**



We've seen real gains in terms of precision, reliability and maintenance. This has produced an increase in quality and productivity. These results confirm without hesitation that investing in ISM was a good decision.

**Procter & Gamble**

# The solution you've been looking for

**Whatever your industry, we have an ISM solution for your particular needs. Our ISM product portfolio includes process-tolerant sensors, easy to use transmitters with fieldbus communication, and automatic sensor cleaning systems.**

## Wide Parameter Breadth

### pH/ORP

- Wide sensor range to suit all applications
- Choice of electrolyte for longer lifetime and high resistance to poisoning

### Dissolved oxygen and CO<sub>2</sub>

- Robust optical, polarographic and potentiometric sensors for accurate measurement in high and low concentration levels

### Conductivity

- Flexible sensors for controlling harsh processes, and water purity analysis

### Turbidity

- Broad measurement range from low to medium and medium to high turbidity

### TOC

- Rapid on-line TOC measurement for reliable water cycle chemistry control

### Gas O<sub>2</sub>, CO and moisture

- Tunable diode laser (TDL) analyzers for chemical process and safety applications



## Extensive transmitter portfolio

**Single-channel, multi-channel, multi-parameter, compact no-display**

- Multi-parameter and multi-channel transmitters to suit any application
- Advanced sensor diagnostics information available over HART®, FOUNDATION fieldbus™, PROFIBUS® PA and Modbus®



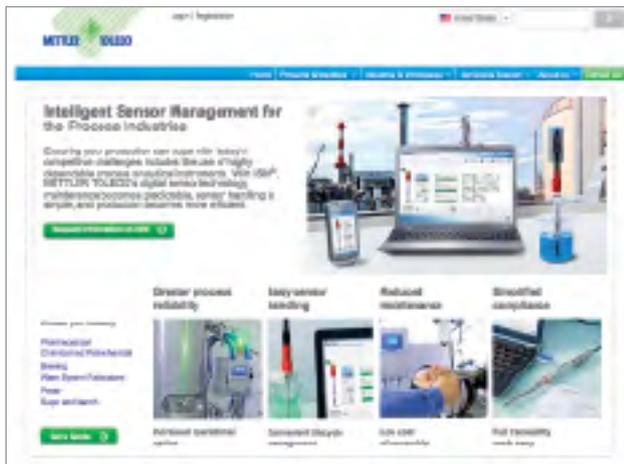
## Housings and sensor cleaning systems

**Flow-through, stationary, retractable housings, automatic sensor cleaning and calibration units**

- Automated sensor cleaning and calibration systems
- Retractable housings for sensor maintenance without process interruption

 **See our product portfolio**  
[www.mt.com/pro](http://www.mt.com/pro)

# Discover more about ISM and Sensors That Learn™



**Interested?** To find out how ISM can simplify process analytics workflows and reduce costs at your facility, please visit

[www.mt.com/ism](http://www.mt.com/ism)

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