



**INGOLD**

Leading Process Analytics

## Retractable pH systems meet environmental criteria for effluent discharge

**To ensure the integrity of their active biomass wastewater treatment, and to meet water environmental compliance standards, Meadow Foods has chosen to use the METTLER TOLEDO pH electrode InPro 4250. This is installed in a retractable housing for ease of maintenance.**

### The Company



Meadow Food Ltd is one of the UK's leading dairy processing companies. The company was formed in 1992 and processes ten million liters of milk and cream each week at its two sites in Chester and Yorkshire to produce milk fat and associated products for the food manufacturing industry, which includes clients across Europe and in North America. Current annual turnover approaches £200 million with 280 employees.

The Chester facility also produces butter-milk, and has successfully used METTLER TOLEDO turbidity measurement for monitoring moisture content within this product.

### What was then the problem?

Although not a common experience, an accidental spillage of CIP chemicals in the factory resulted in the breakdown of their active biological effluent treatment plant which could have resulted in contravention of local authority outflow consent limits.

### What solution did we suggest and why?

The customer had identified pH as the critical measurement for identifying occurrences of accidental chemical spillages into the factory waste treatment system. Consequently, METTLER TOLEDO were commissioned to install two pH loops, each with a retractable housing, one to monitor the effluent tank pH level, and one to divert any out-of-specification



**METTLER TOLEDO**

wastewater from the 10" delivery pipe to a holding vessel for additional neutralization.

### What equipment is being used?

The two pH loops were each made up of a pH electrode InPro 4250, retractable housing InTrac 777 and transmitter 2050 e. The InPro 4250 electrode was selected as it has a solid polymer reference system that eliminates junction clogging in dirty media. The electrodes were installed in retractable housings InTrac 777 incorporating our TRI-LOCK™ safety system that reliably prevents any release of media via the housing. Calibration and monitoring of the

electrodes is carried out using our cost-effective pH transmitters 2050 e that facilitate 4-20mA output signals for both pH and temperature. This transmitter model also features an advanced PI controller and alarm relay.

### The benefits gained from our equipment

The client now feels much more confident concerning safe operation of the effluent plant. The METTLER TOLEDO loops provide a more precise pH control of the effluent treatment process, and crucially protect the active bio process against damage that could lead to system failure.

### Why did the client choose our products?

Due to the satisfactory results with METTLER TOLEDO equipment in the past and as acknowledged leader in process analytical process measurement, we were identified by Meadow Foods as the ideal partner to provide a cost-effective solution that would avoid future failures within the biological effluent treatment plant and resulting expensive system rectifications. Reliable measuring equipment is today more important than ever.

 [www.mt.com/pro-pH](http://www.mt.com/pro-pH)



### InPro 4250 a proven pH electrode from METTLER TOLEDO

#### General

pH-range	0...14
Temperature range	0...130 °C (32...266 °F)
Pressure resistance	16 bar / 25 °C (232 psi / 77 °F);

#### Reference

Reference junction	Open aperture junction
Number of junctions	2
Reference electrolyte	Polymer

#### Others

Temperature compensation	Pt 100 or Pt 1000
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#### Certificates

Quality (end control)	Yes
EEx	Yes
FM	Yes

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## ISFET Technology Enables Switch to In-line Measurement in Milk Quality Monitoring

**In-line pH measurement helps to control production processes in real-time and to monitor product quality during the entire process. METTLER TOLEDO's InPro 3300 ISFET electrode was chosen following a six-month test due to its superior accuracy and performance.**

### An Italian key player

Our customer, with several tens of thousands of employees in over one hundred production centers worldwide, is a global player in the F&B industry. The company's goal is to produce milk and foods of high quality, achieved through research and innovation. This explains our customer's aim to switch to non-glass, in-line pH measurement in quality monitoring processes.

### Consistent quality during the production of UHT milk

Ultra high temperature (UHT) milk is fresh milk subjected to heat treatment in order to extend its shelf life. The UHT treatment ensures maximum microbiotic inactivation, while preserving maximum flavor, taste, and nutritional value. The most common heating procedure nowadays is "direct steam injection": After preconditioning of standardized milk to 80 °C (176 °F), the milk is heated up to 127 °C (261 °F) within a flash of a second by the injection of steam. This is followed by cooling down to 5 °C (41 °F) before bottling. Vessels and conduits for cooling are not exposed to steam and therefore have to undergo a "cleaning in place" (CIP) procedure regularly. It also has to be ensured that no CIP medium which could potentially remain in the vessels or conduits contaminates the milk and arrives in the bottles.

"Therefore we planned to monitor the pH of milk inline in the vessel just before bottling", explains the food engineer respon-

sible. The case was clear from the beginning: "We could not accept the risk of glass breakage and associated contamination of huge batches in a late stage of production. We even think that within a short period of time, EU regulations will allow only non-glass measurement in inline processes", clarifies the engineer.

### InPro 3300: superior accuracy and long lifetime

The customer started a comprehensive test with METTLER TOLEDO's InPro 3300 in combination with the InTrac 798 retractable housing, and a competitor product, respectively. As long as the ISFET electrode is not compatible with CIP treatment, the electrodes had to be retracted into the housing for removal during CIP. In order to evaluate the deviation and drift behavior of the sensor, the customer dismantled the electrode every day, cleaned it manually and performed a two-point calibration. Comparison with a sample manually taken from the process and measured with a glass electrode in the laboratory revealed the outstanding accuracy of InPro 3300:

**Over a period of six months, the deviation between the glass and the ISFET values was lower than 0.05 pH units!**

"From the beginning of the test, our goal was to be within 0.1 pH units of deviation. But we were not surprised that the METTLER TOLEDO electrode is even more accurate", admits the engineer, and allows

the assumption that the accuracy of the InPro 3300 is truly superior.

It took seven months of operation of the InPro 3300 until it had to be replaced. The product manager of METTLER TOLEDO explained: "We are satisfied with the oper-



The responsible food engineer is pleased because the METTLER TOLEDO's InPro 3300 guarantees high quality of his product.



When milk is filled into bottles, it must be 100% certain that no contamination is present. This necessitates inline monitoring.



ational life of the electrode in this special application and consider it as normal”.

The customer declared this test period as very successful and was convinced having made the right decision.

electrode prevents air bubble coverage of the sensor surface and assures reliability.

- FDA-compliant materials facilitate process validation.
- VP connector IP68 makes the electrode easy to clean.

**Customer benefits**

- InPro 3300 eliminates the risk of glass breakage and contamination.
- This allows safe inline measurement for the customer and therefore saves time and money.
- InPro 3300 is compliant with existing (FDA) possible future regulations.
- The InPro 3300 shows high accuracy in comparison with glass electrodes
- Long lifetime of the electrodes saves the customer money.
- The 45° design of the tip of the

**Key data of InPro 3300**

- Measuring range: pH 0 -14
- Temperature range: 0 - 80 °C (130 °C); 32 - 176 °F (266 °F)
- Pressure range: 0-6 bar (0 - 85 psi)
- Reference gel electrolyte
- One ceramic diaphragm
- Shaft PEEK (FDA-compliant)
- VarioPin (VP) IP68 connection
- Insertion length 120 mm
- Temperature sensor: Pt1000



InTrac 798.



InPro 3300.

pH 2100e transmitter.



The pH electrode InPro 3300: Successful application in the dairy industry in order to establish non-glass, inline pH measurement for quality monitoring.

[www.mt.com/pro-ph](http://www.mt.com/pro-ph)

## pH-Controlled Ion Elimination Guarantees High Quality in Whey Processing

**A specific pH measurement approach was used in order to optimize an ion exchange process during the production of tinned milk. Our client achieved consistent product quality at lower costs.**

### The Mexican dairy market

Mexico is number two in the Latin American Dairy Market. With 10 billion US\$ the Mexican market is dominated by liquid milks, which represents more than half of the dairy products sold, followed by cheese. As a result of strong forecasts for Mexico, the Latin American dairy industry is set to grow by nearly 11% until 2007.

### Type of application

The client is a large producer of formula food, some of which is based on whey. One of its specialities requires the elimination of Ca<sup>2+</sup> -ions from the raw whey. This procedure is carried out in an ion-exchange column. The pH value of the product is measured at the outlet of the column. The indicated value serves to assess the efficiency of the "cleaning" process. If necessary, the product is recirculated through the ion-exchanger column one or more times until the required pH value has been reached.

### Customer's expectations

The customer, who depends greatly on this process, insisted that the measurements should be reproducible, that the electrodes had a long operational life, and that the measurement accuracy was at least +/- 0,3 %.

### Chosen MT solution

Four complete measuring points were installed, each consisting of a pH electrode InPro 2000, a retractable housing InTrac 776e, and transmitter pH 2100e. The measurement systems run at an operating temperature of 5 °C (41 °F). The diaphragms of the InPro 2000 are cleaned with pepsin every six months in order to remove protein deposits. The electrodes are replaced no more than once a year at the very least!

### Reasons for implementation of this solution

Rapid response time, durability, and consistent quality of measurement were the most important factors in the decision to implement the solution proposed by METTLER TOLEDO. A particularly high degree of process consistency and stability was achieved, which contributed significantly to the atmosphere of confidence.

### Impressive benefits

The four measurement loops installed for this application have proven their worth in no less way than our previous installations for other applications at this customer, amounting to 60 pH and 4 conductivity measurement systems in all. Straightforward handling and operation as well as reliability and measurement accuracy were

always in the foreground. The payback benefit of this new installation is primarily the long operational life of the pH electrodes InPro 2000 of over one year.

### InPro 2000 – the problem-solver

- Robust design for long-term stability
- No diaphragm clogging
- Precise and fast measurements due to flowing liquid junction
- Ease-of-maintenance
- Fast response resistance temperature detector

### InTrac 776 e – for liquid-filled pH glass electrodes

- Multiple process connections available
- Advanced TRI-LOCK™ safety system
- Removes sensor without interruption of the process
- MaxCert™ certification package
- Increased operational safety



InPro 2000.

[www.mt.com/pro-pH](http://www.mt.com/pro-pH)

# 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<sub>2</sub>, 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](http://www.mt.com/pro-service)

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