

High-quality fuels through use of an automated pH measurement system at BAYERNOIL, Germany

BAYERNOIL decided in favor of the cleaning and calibration system EasyClean 300 X from METTLER TOLEDO. This system, specially developed for use in processes operating in hazardous areas, enables automation of the cleaning of measuring electrodes as well as semi-automated calibration.

BAYERNOIL Raffineriegesellschaft mbH

BAYERNOIL with locations in Neustadt, Ingoldstadt and Vohburg produces alongside various liquid gases, heating oils and bitumen, a whole variety of different grades of motor fuel. In the processing of motor fuels, a highly important segment is gasoline refinement. Desulfurization is one of the central processes in fulfilling the stringent environmental and production requirements of BAYERNOIL.

Process problematic

During the desulfurization process by way of scrubbing with sodium hydroxide solution, an interfacial layer of gasoline and washwater forms in the reactor. In order to be able to feed this scrubber water to the effluent treatment system without

reservations, pH control is of decisive importance. The high demands placed on quality by the BAYERNOIL Raffineriegesellschaft compel regular flushing and cleaning of the pH measuring electrode.

Integration

In cooperation with the Service Department of Mettler-Toledo GmbH, an automated pH measuring system was incorporated into the desulfurization process on an ideal basis. The complete system consisted of a pH electrode, retractable housing, pH Transmitter and a Cleaning and Calibration System EasyClean. Measurement of the pH value was taken in a bypass to the scrubber water circuit. To guard the measuring system from external influences, the Project Depart-



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Service XXL – the METTLER TOLEDO service concept

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ment of BAYERNOIL integrated the equipment in a specially designed and heatable protective cabinet.

Control

Monitoring and control of the measurement system is carried out via a higher-level process control system (PCS), whereby link-up was planned and carried out in line with the strictest specifications regarding safety. As soon as the housing has moved pneumatically into the maintenance position, the signal from the inductive position indicator is transferred to the PCS. On commencement of the flushing and cleaning cycle of the EasyClean 300X, the pH value of the cleaning solution or calibration solution is transmitted to the PCS. This pH value is different to that of the value of the sample medium. This provides an additional supervisory element for the measuring system in the event that the signal of the inductive position indication of the retractable housing is not accurately transmitted.

Measurement system

The complete pH measuring system is made up of the following products from METTLER TOLEDO:

- pH electrode InPro 4250
- retractable housing, InTrac 777
- pH-Transmitter 2220 X, and
- automatic Cleaning and Calibration System EC300 X.

The whole is installed in a specially manufactured and heatable cabinet.

Automation

The elevated safety requirements were met in full by effecting linkage of the measuring system to the process control system in accordance with the specific stipulations of the customer. In particular, BAYERNOIL required that the pH value during cleaning and calibration of the pH electrode be continuously transmitted



Automated system for pH measurement.

EasyClean 300 X
for use in
hazardous zone.



to the PCS. The pH value registered during flushing or calibration served as a warning factor. The warning is supported by the signal "Housing out" emitted by the retractable housing. If the signal "Housing out" is transmitted to the PCS, then the last relevant measurement value is automatically detected. As soon as flushing and/or calibration has been completed, the housing automatically moves into the measuring position again, and transmission of the signal "Housing out" ceases. ■

Auto-cleaning of pH electrodes improves productivity at Acrinor in Brazil

Chemical companies may suffer from pH measurement problems due to electrode coating in polymer processes. With the described cleaning method, the pH-electrodes were kept free from coating which dramatically improved the measuring results.

Acrinor – Acrilonitrila do Nordeste S.A., Brazil

Acrinor – located at the Basic Complex of the Northeast Petrochemical Pole, in Camaçari, state of Bahia, is the only company that produces acrylonitrile in the Southern Hemisphere (more than 80.000 metric tons per year), which is the basic raw material for the production of acrylic fibers, paints, resins, high performance plastics and several other products.

pH measurement reduces solids deposition

The pH measurement in acrylonitrile production process is important because if the value is not within the specified range, the deposit of solids on the distillation column plates will be very heavy, leading to considerably high maintenance levels. Productivity is extremely reliant on a good pH measurement. Lower maintenance results in greater productivity; this was the reason why Acrinor decided to search for an effective pH measurement solution.

Problem analysis

The main problem for the customer was the coating of polymeric material on pH electrodes due to the production process itself. The measurement media is a mix of

ammoniated fluid with strong acid, whose pH range varies between pH 4.0 and 4.5, at a temperature of 80 °C (176 °F) and at 1.5bar (21.75psi) pressure. After evaluating the process conditions and the application history, it was decided to proceed with a test using a new solution. Instead of the static process adaption, we proposed testing with a retractable housing system, because it allows an automated cleaning of the contaminated pH electrode.

Higher productivity due to retractable systems

Based on trial results, and due to the fact that METTLER TOLEDO has products with excellent durability in its program, we were able to provide Acrinor with 2 pH retractable systems and Proquigel (another company of Unigel Group) with 3 pH retractable systems, each system consisting of:

- Transmitter pH 2100
- Housing InTrac 777-SLP flow chamber
- Electrode InPro 3200

The transmitter is ATEX and FM approved and is specifically recommended for hazardous environments, such as commonly found in the chemical industry. This market sector is particularly sensitive

to process safety and quality. Among the many strong features of the pH 2100 is the SensoCheck (continuous analyses of sensor performance) and the user-friendly operation due to the pictograms and large LCD. Calibration can be carried out with automatic buffer recognition or through manual buffer input. As regards the proposed housings, the advantage is that the sensor can be removed from the process for maintenance or even for replacement, at any time, without stopping the process. In addition, there is no need to remove the sensor to be cleaned; this procedure takes place at the housing flow chamber.

Cleaning procedure enhances electrode life cycle by three times

The housing used was the pneumatic version, so that the customer could automate the cleaning process. The automated cleaning was controlled via the customer's SDCD and works as follows: the electrode is cleaned with water at 90 °C (194 °F) every 2 hours for a 2-minute period. That enables the system to work for a longer time in the automatic control mode, which increases the electrode life cycle to 6 months (previously, the durability was of just 2 months) and also caused the



Fig.1 Dirty electrode before cleaning.



Fig.2 Electrode after cleaning.

plant campaign to increase, from 4 to 5 months, consequently achieving higher productivity.

The cleaning water temperature was defined with the process temperature (80 °C/176 °F) in mind in order to avoid sensor damage.

The same retractable housing is also available in a manual version, but it could not be used in the fully automated process.



pH 2100 e transmitter.



InPro 3200.

InTrac 777 SLP.

Mettler-Toledo Ingold integrates your analytical measurement into your control system

Open field integration to your control system with “FOUNDATION Fieldbus” technology for liquid analytical measurements.

INGOLD, your leading partner for liquid analytical measurement solutions, offers you a wide variety of sensors and transmitters for various applications. Distributed automation and control solutions based on open fieldbuses like FOUNDATION Fieldbus are currently the standard in many sectors of the process industry. Only fieldbuses permit full use of the functional advantages of digital communication such as improved resolution of measured values, remote diagnostics and configuration.

Three certified transmitters are available:

- pH 2100 eFF
- O₂ 4100 eFF and
- Cond 7100 eFF



pH 2100 e transmitter.

Less maintenance costs with EC 100 for wastewater treatment at EMS (Switzerland) AG

A pH loop including a cleaning system was installed at the chemical plant EMS in Switzerland to control the wastewater process. To reduce the maintenance costs, the EasyClean 100 with its integrated regular cleaning function of the pH- electrode was installed. With this instrumentation, the electrode no longer had to be cleaned manually, resulting in a significant reduction in maintenance costs. The life of the electrode increased by a factor of three!

EMS-Group Holding (Switzerland) AG

EMS-Group with production units in Domat/Ems, situated in “the beautiful mountain canton of the Grisons” in Switzerland, produces polymers, fibers, and such like. The products are today used in many different fields of business such as the automobile, electro/electronics, optical as well as packaging industries. The production unit in Domat/Ems has approx. 1500 employees. EMS-GRIVORY, one of the leading manufacturers of high-performance polyamides, offers a product range especially adapted to suit requirements in the fields of construction, pneumatic systems and mechanical engineering. They are focused on niche applications where, along with expert product knowledge, the company has gathered specialized application know-how.

With innovative ideas, pioneering, high-performance polymers and application-specific, tailor-made specialty polyamides, EMS-Chemie can provide support for customers enabling them to penetrate new markets.

pH measurement with electrode cleaning requirement

In the industrial waste water treatment plant in Domat/Ems, the pH value is continuously measured in order to control the water cleaning processes. Before installation of the EasyClean, the normal operational life of a pH electrode was around 2-3 months, and then it had to be replaced by a new one. The electrode had frequently

to be cleaned manually with water, and the whole procedure was quite time-consuming. The operating personnel were interested in trying to optimize this process and to automate it in order to save costs. Different systems were offered, normally with water flushing, but only when the service group at EMS realized that METTLER TOLEDO also offers a cleaning system with air cleaning, was a real test installation made. An EasyClean100 module was installed together with the appropriate pH-transmitter. For several months the pH value was measured using the same METTLER TOLEDO pH electrode (InPro3200) as usual. Electrode flushing was carried out automatically by the EC100 flushing system, triggered via signals from the transmitter, with adjustable cleaning intervals and cleaning time periods. A specially designed sprayhead directs a jet of compressed air (or water) at the sensing end of the electrode. Through the cavitation effect induced by air bubbles impacting around the sensitive membrane glass of the sensor tip, any deposits on the glass are loosened and swept away. Installation

of the EC100 with pH transmitter from METTLER TOLEDO

The lifetime of the electrode increased by three times.

The results were very positive! Not once did the electrode have to be cleaned manually during the whole test period of several months. It remained permanently clean, thanks to the air cleaning system! The impact of these results was obvious: less maintenance work, due to the fact that the electrode no longer had to be demounted for cleaning by hand. It was cleaned automatically with the EC100 system. The life of the electrode increased dramatically, instead of a replacement every third month, it was now possible to keep the electrode in operation for more than 9 months (factor 3 longer). Also, operation of the wastewater treatment plant was improved, with better safety and control. The customer was very satisfied, and convinced by the customer benefits. This resulted in the investment in a further three EasyClean systems from METTLER TOLEDO for wastewater treatment in Domat/Ems.



InPro 3200.



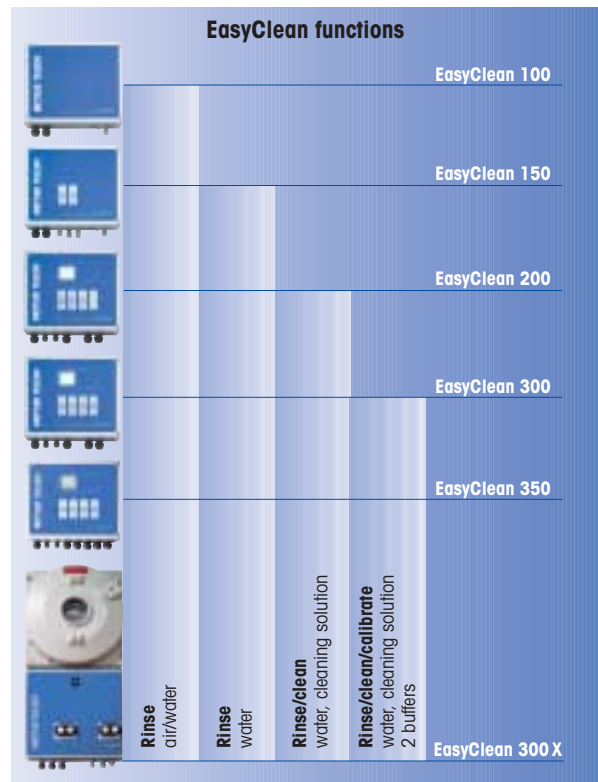
The EC100 from METTLER TOLEDO offers high performance and reduced maintenance costs

The EC100 is a specially designed module within the EasyClean family for use in wastewater processes. The family offers a modular cleaning and calibration system for process pH-electrodes in wastewater or in chemical processes.

Benefits provided by the use of EasyClean:

- Minimal maintenance costs
- Higher productivity
- Increased process reliability
- Reduced downtimes
- Longer operational life of the electrode
- More precise process control
- Choice of cleaning media

With the EasyClean product family, METTLER TOLEDO offers solutions for the most diverse application requirements. EasyClean 100 and EasyClean 150 are both suitable for the regular flushing of electrodes subject to light to medium contamination. The EasyClean versions 200 and 300 as well as EasyClean 350 offer solutions for measuring points with a potential for heavy fouling. The EasyClean 300X version allows the cleaning system to be employed in hazardous areas. ■



Range of applications for the different EasyClean models from METTLER TOLEDO.

Foto folgt

New Premium Line Transmitter M 700

The new M 700 transmitter line is based on a completely new concept. So far, conventional in-line measuring systems for analytical parameters consisted of a transmitter and the corresponding sensor. The M 700 is different and based on a modular concept, allowing the simultaneous measurement of up to three parameters.

Versatile Transmitter with PROFIBUS concept

The basic unit of the M 700 transmitter is designed to accept modules for pH, conductivity and dissolved oxygen. A special high-resolution module for dissolved oxygen is offered to enable measurements to be taken at ppb level. Additional modules for PID control, output and limit contacts, as well as a PROFIBUS® communication module complete the M 700 concept. This remarkably versatile transmitter line guarantees an elevated standard of measurement together with optimal safety in the management of your process.

Wide range of operating and maintenance functions

The instruments offer a range of powerful features through a menu-driven setup program supported by graphical pictograms. The large and clear backlit LC display shows 2 process parameters. The display can be configured to show process temperature, sensor-related data, differential measurement and much other important information. Special attention has been paid to the many maintenance functions and sensor diagnostic tools implemented in the basic unit of the M 700.

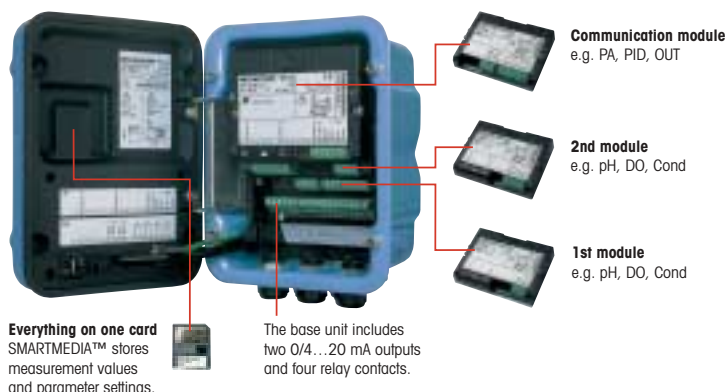


SmartMedia™ data storage feature

A variety of options, such as an extended logbook, a 2-channel measuring recorder, a service scope function, and others, are available to optimize the functionality of the M 700 according to customer needs. All data and configurations are stored on a SmartMedia™ card. This storage medium is used worldwide as standard and allows easy data processing in peripheral computer systems.

Basic and Ex versions available

The M 700 system comes in two designs. One version features a coated stainless steel enclosure which is mainly used in harsh process applications like in sugar production. The enclosure is available for standard power supply, is intrinsically safe and with ATEX approval as Ex versions for use in hazardous areas. ■



Comprehensive Product Catalog for 2005

The new 2005 Mettler-Toledo Ingold product catalog is a comprehensive guide for products, markets and services in the INGOLD product portfolio. All product pages have full color photos along with detailed specifications and ordering information. The process solutions catalog offers the end user the opportunity to quickly and easily choose the proper product solution for their demanding process analytic requirements.

Six parameter sections including:

- pH
- Dissolved Oxygen
- Dissolved CO₂
- Conductivity
- Turbidity
- Automation

Dissolved Oxygen Sensors

InPro® 6800 12mm Dissolved Oxygen Sensors



The InPro 6800 dissolved oxygen sensor with 12 mm diameter body provides maximum accuracy and ultimate flexibility for vessels with limited space or in containers with smaller volumes. The sensor is available with the side-of-the-head MP connector or T&C connector in straight or angled versions. A durable 316L stainless steel construction allows for CIP, steam sterilization or autoclaving in place, and the high carbon finish virtually eliminates contamination of the process. INGOLD's Submicron membrane has been designed with an internal dead mesh that reduces the membrane mess lodged and dramatically increases membrane life.

Specifications	
Performance	
Operating range:	0 up to saturation
Accuracy:	±0.4% FSO
Response time at 25 °C:	90% of final value in < 90s
Span: signal at 25 °C:	4.0 to 10.0 mg/L
Reactor signal in oxygen-free media:	< 0.1% of the signal in oxygen at 0.5%.
Construction	
Measuring principle:	Paramagnetic Clark electrode
Cell construction:	Ø 12 mm
Connector design:	Straight or angled
Material body:	316L stainless steel
Electronics system:	Submicron membrane (optional with stainless steel)
Surface treatment of metal parts:	High purity, highly reflective (CK Positive Select)
Cable material:	PVC, Teflon, or stainless steel
Lead diameter:	12 mm
Working Conditions	
Temperature compensation:	Automatic
Measuring temperature range:	0 to 60 °C
Maximum operating range:	4 to 140 °C (optional steel construction)
Maximum pressure resistance:	0.2 to 6.0 bar (0.3 to 87 psi absolute)
Maximum pressure resistance:	maximum 1.2 bar (17.4 psi absolute)

Features Overview:

- Submicron "super-reduced oxygen" allows for transfer in vacuum
- Detector shell depth is 8 g/g
- Intrinsic measurement and quick response
- Long lasting and easy to maintain membrane
- PTFE positive head reduces oil contamination
- High purity polished stainless steel (316L, 316Ti, highly)
- INPRO certified for accuracy and 24 compatibility
- Submicron and clean membrane

Other highlights:


- 12 mm diameter allows versatile space
- ISO 15.5 threads for standard ISO fittings
- Comes with other material of construction or T&C connector
- Angled connector available also for easy removal from fermenter and reduce depth in vessel
- Variety of sensor lengths available

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