

pH in Pulp and Paper processes

Measurement of pH in the pulp and paper industry is important for economical, ecological and quality control reasons. The measurement is done at different stages of the process, such as in bleaching, paper refinement, and in the wastewater stream.

Process

There are many different types of process flows in the pulp and paper industry such as the kraft or sulfate pulping, sulfite pulping, semi-chemical pulping, etc. A typical process flow sheet is shown in Fig.1, indicating the sites where pH measurements are important.

The difficulty of measuring pH in pulp and paper applications is the high level of solids and the presence of sulfides in the process stream. The pulp consistency typically is 3% solids or more. Sulfides are used as cooking chemicals in the digester and are therefore present at every stage of the process.

Pulp coats the pH sensor and blocks the diaphragm within a short time, result-

ing in the need for frequent cleaning. Sulfides clog the ceramic diaphragm of conventional pH sensors by formation of non-soluble silver sulfides. Therefore the lifetime of conventional pH sensors is very short.

METTLER TOLEDO solution

The InPro® 4250 pH electrode with Xerolyt®PLUS solid polymer reference system from METTLER TOLEDO has been developed for this type of application and is now used successfully in many paper and pulp processing plants.

The Xerolyt reference system features a pressure-resistant solid polymer electrolyte and an open aperture junction, which allows the electrolyte and the sample solution to be in direct contact with one



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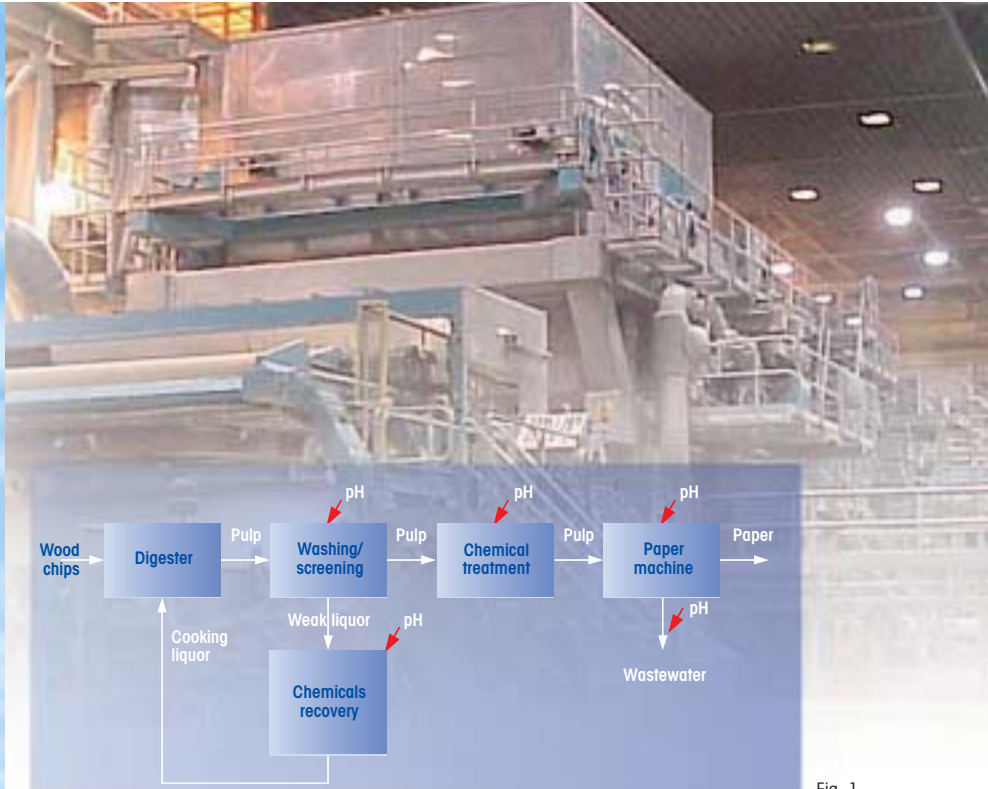


Fig. 1

another. The Xerolyt polymer is free from AgCl and therefore protected against contamination caused by silver sulfide precipitate that can clog the junction of ordinary pH sensors. This ensures accurate measurements and longer electrode lifetimes.

Products

InPro® 4250 combination pH electrode

- Integrated temperature sensor for optimal measurement performance
- Increased lifetime in the presence of organic solvents, acids and alkali
- Low maintenance pH-electrode, no refilling of electrolyte
- Ex-certificated
- Rugged IP68 rated quick connect Vario Pin (VP) connector

InTrac® 777-SL retractable housing

- Rugged 316L SS and PVDF construction for maximum chemical resistance
- Flushing chamber for automatic cleaning and calibration reduces overall system downtime
- Patented immersion tube design isolates the sensor on retraction and guarantees complete separation of the process from the outside environment.

- Safety interlocks prevent sensor removal from housing while in measuring position
- Manual or pneumatic operation

InTrac® 787 Hot Tap retractable housing

- Fast and easy sensor maintenance or replacement without process interruption
- Double O-ring process seals
- Integrated blow-out protection
- Mechanical linkage ensures safe operation
- Self-wiping retractable tube reduces O-ring wear

pH 2100e transmitter

- Operational safety and reliability due to continuous sensor and transmitter diagnostics
- Easy installation and self-explanatory operation through pictographic user interface and Sensorface®
- Loop autonomy and maintenance-free pH measurement due to integrated PID controller
- Flexibility with 4 wire installation or alternatively 2-wire execution with HART® and/or Profibus communication and EEx applications



pH 2100e transmitter.

Conductivity measurement for monitoring liquid process media

Conductivity is a highly favored parameter for monitoring liquid process media because of the low-maintenance measurement techniques involved. Whether in areas relating to water or feedstock preparation, process streams, effluent treatment or water recycling, conductivity is the preferred parameter. This cumulative measurement parameter is used for control or monitoring purposes in order to ensure consistent conditions, to register changes and to document the same.



Conductivity transmitter 7050 e has been introduced to offer our customers efficient and economic conductivity measurements. This transmitter is easy to operate and offers, apart from basic functions, a range of additional new features. Installation is possible either directly in a panel cut-out or together with an optional field-type enclosure.

Features

- 2 galvanically isolated current outputs 0/4...20 mA
- 2 limit value contacts with delay timer (alarm contact or wash contact)
- IP 54 splashwater-protected enclosure for panel mounting
- IP 65 field enclosure
- PI controller function
- Password protection
- Parameterizable cell constant
- 2- and 4-sensor conductivity electrodes can be connected

This instrument, a unit from the ValueLine Series of transmitters covering specific parameters (pH, dissolved oxygen and conductivity), is an ideal solution for routine applications. It offers an outstanding price/performance ratio and is easily installed, even for use in the open. For basic conductivity measurement applications there are available, alongside versions with VP connector, sensors from the dedicated InPro 701 x range with fixed cable and different cell constants. The conductivity sensor InPro 7012 is particularly robust and is characterized by its capability to cover a very broad measurement range. ■

Conductivity sensor
InPro 7010.



Cond 7050 e.

Our Service Tip: What to watch out for during servicing of sensor housings

If there is no space limitation sensor housings inserted into the process vessel show the advantages of an indirect sensor adaption: optimal sealing against the process medium and protection of the cable connection against moisture and dust.



As with valve devices generally, housings for sensors must undergo regular servicing. Professional maintenance of housings is a complicated procedure and includes cleaning, optical inspection, replacement of O-ring(s), greasing, as well as testing of overall function and tightness. Such procedures should only be carried out by appropriately trained personnel, with the use of original spare parts only.

Cleaning

Before a housing can be completely and thoroughly cleaned, it must first be stripped down into its individual components. Care should be taken that no

cleaning agents are employed which could damage any of the housing materials, e.g. plastic components. In addition, the use of supplementary cleaning aids, for instance files or rough abrasive paper, is to be avoided under all circumstances. These can have a negative affect on the manufactured equipment tolerances such that it is no longer possible to achieve effective sealing.

Optical inspection

Following comprehensive cleaning, in particular of the O-ring grooves, careful inspection of the housing is essential. Attention should to be paid to any indication of damage from blows or corrosion, signs of cracks, abrasion or wear of the O-rings. Any part which could impair functioning and/or sealing of the housing should, for safety reasons, be renewed. Where possible, it is advisable to use more durable materials such as Hastelloy instead of stainless steel, Kalrez instead of Viton, etc.

O-Ring replacement

O-rings are all subject to a continuous wear and tear process, and have to be

replaced periodically, however at least once a year. Only those O-rings with dimensions and material elasticity recommended by the manufacturer offer the necessary guarantee that the housing will be able to meet prescribed pressure and temperature specifications.

Greasing

After fitting the appropriate O-rings, the housing has to be greased. The use of oil is not recommended due to its low viscosity, only able to sustain the necessary sliding/gliding features for a short term. The grease employed, must be compatible both with the O-ring materials and with the actual process medium itself.

Functional test

After the components have been fully reassembled, a functional test of the housing is necessary. Some of the features to be noted during a professional test are mountability and function according to specification, smooth jolt-free insertion and retraction motion, and correct pneumatic check-back indication.

Sealing test

Finally, the housing has to be checked for tightness. This includes pressure stability of the flushing chamber as well as of the pressure chamber of the liquid-filled electrode. ■



System integration made easy

Analytical measuring systems from METTLER TOLEDO are particularly easy to link to modern process control systems and allow substantial cost savings for installation, configuration and maintenance. The communication protocols HART®, FOUNDATION Fieldbus and PROFIBUS® are fully supported by a variety of transmitters from METTLER TOLEDO.

METTLER TOLEDO offers measuring systems with standardized interfaces for HART®, PROFIBUS® and FOUNDATION Fieldbus. This enables full exploitation of the advantages of digital communication for ease of instrument parameterization and maintenance.

HART® Integration

METTLER TOLEDO transmitters use registered device description (DD) technology for the hand-held instrument HART® Communicator 275. Various instruments are also suited to the Management Software included in process control systems, e.g. AMS™ Suite from Emerson.

METTLER TOLEDO transmitters available for HART® are:

- pH 2100 e and pH 2220
- O₂ 4100 e and O₂ 4220
- Cond 7100 e and Cond 7220
- Cond Ind 7100 e and Cond Ind 7220

PROFIBUS® PA Integration

PROFIBUS® PA (Process Automation) is a standardized, open digital communication system for all fields of application in process automation. PROFIBUS PA (EN 50 170 P4) is a further development of PROFIBUS DP and includes two special features for process automation, namely bus powering and communication of field units using 2-wire technology. The transmitter units listed are also suitable for use in hazardous areas.

METTLER TOLEDO instruments are fully integrated into PDM (Process Device Manager) from SIEMENS.

METTLER TOLEDO offers a choice of PROFIBUS® transmitters including:

- pH 2100 PA
- O₂ 4100 PA
- Cond 7100 PA
- Cond Ind 7100 PA
- M 700 for pH, O₂ and Cond

FOUNDATION Fieldbus Integration

FOUNDATION Fieldbus (FF) is also a vendor-neutral, standardized and open digital communication protocol for all application fields. From the homepage of fieldbus.org, all relative integration data sets for the new FF transmitters from METTLER TOLEDO, pH 2100e and O₂ 4100e, can be downloaded.

METTLER TOLEDO transmitters suited to FOUNDATION Fieldbus are:

- pH 2100 e
- O₂ 4100 e
- Cond 7100 e
- Cond Ind 7100 e

Emerson has also tied in METTLER TOLEDO transmitters to its AMS™ Suite software.

Complete product offering

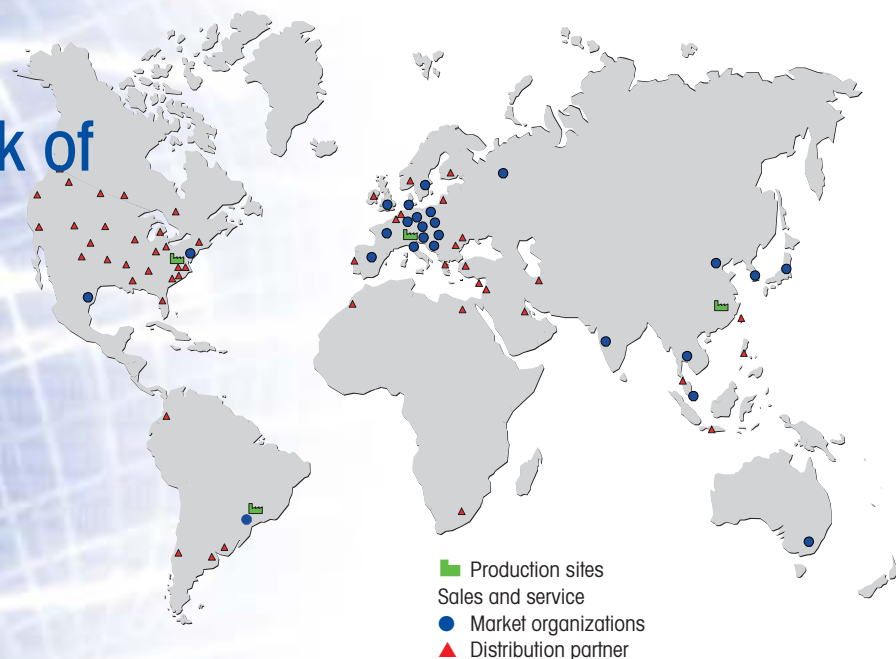
With HART®, PROFIBUS® and FOUNDATION Fieldbus, METTLER TOLEDO now has at its command state-of-the-art digital fieldbus protocols able to be linked to the respective process control system without any difficulty. ■



pH 2100 e transmitter.

A worldwide network of experts at service

METTLER TOLEDO provides full sales and service coverage worldwide. Wherever our customers are, we are the competent partner. Many global industrial manufacturers rely on our longstanding experience.



- Production sites
- Sales and service
- Market organizations
- ▲ Distribution partner

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Distribution network

Based on its several global production sites, more than 20 market organizations, and numerous sales representatives,

METTLER TOLEDO maintains a wide distribution network all over the world. Satisfaction of our customers is based on three pillars:

Consulting

With the knowledge of our experts, we support you in finding the best solution, including planning, product selection, and installation of our measurement solution.

Top products

A complete range of products and systems to meet measurement requirements

After-sales service

With our customized, lifelong service management, we are able to assist in maintaining measurement loops throughout their whole life-cycle.

Mettler-Toledo Process Analytics' four producing organizations are close to our customers all over the world and provide:

- Faster logistics
- Fast response time to market demands

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