ProTrode pH sensors

Enhance your process insights with inline pH measurements

PUSHING THE LIMITS TOGETHER

Metrohm Process Analytics

Innovators in process analytics

Smart and robust solutions for optimal inline pH measurements in your process

Metrohm Process Analytics is known as a pioneer in process analysis as one of the global process industry’s preferred solution providers for monitoring key parameters in large scale industrial manufacturing processes.

The first multipurpose process analyzer was developed by Metrohm in the 1970's. Since then, Metrohm Process Analytics has continued to push the limits together with our customers by providing the best customized online analytical solutions on the market.

Metrohm Process Analytics products are the most versatile products on the market. They enable 24/7 inline, online or atline monitoring of chemical industrial processes, water and wastewater and a multitude of different liquids and gases.

Metrohm is a pioneer when it comes to precise laboratory pH measurements. From the early design and development of the first pH meters to a scaled up production of a broad range of pH sensors. Until now, Metrohm's pH sensor focus was mainly on laboratory offline and industrial online applications. Now, Metrohm Process Analytics have expanded their product portfolio to include an inline pH sensors to meet the requirements of the challenging and expanding sensor technology world.

By choosing an inline pH sensor from Metrohm Process Analytics, higher efficiency and optimization of your process control is guaranteed, as well as years of application knowledge and reliable expert support. «**ProTrode sensors**» are the next evolution of inline sensors in Metrohm Process Analytics.

ProTrode pH sensors

Decades of experience have given Metrohm Process Analytics unique know-how of various applications, and pH is no exception. Four versions are available for the ProTrode sensor series, each of them highly accurate, effective, and robust – ideal for many industrial applications.

Metrohm Process Analytics' ProTrode series enables fast and accurate inline pH measurements in various processes across many industries.

KEY BENEFITS

- Reliable: correct and trusted results across the entire lifetime of the sensor.
- Flexible: adaptable for measurements in vessels, tanks, or pipes.
- Robust: designed for a wide range of process environments.
- Maintenance-free: the ProTrode sensors are always ready to use.

FIVE SENSORS FOR YOUR INLINE pH ANALYSIS

PROTRODE 300 & 350

PROTRODE 200 & 250

PROTRODE 400

Do not worry about pressure
The ProTrode 250, 300 and 350 are pre-pressurized sensors and thus can measure in process conditions of up to 4 bar, without any complications.

Avoid silver interference
All Metrohm Process Analytics' ProTrodes are equipped with a silver scavenger that prevents silver ions from entering the sample solutions.

Guaranteed reproducibility
Sleeve diaphragms are ideal for applications with variable process flows, or applications where the samples are stirred. This type of diaphragm creates a stable outflow of electrolytes around the sensor. This ensures stable and consistent results.

Accurate measurements 24/7
The ProTrodes 250, 350, and 400 are made with a high alkaline H glass, which makes them high pH range and, thus, suitable for a wide range of applications.

Unaffected by particles
The design of the open junction diaphragm minimizes the risk of clogging. This ensures reliable performance even in media with high particle content, such as slurries.

A new era of Metrohm pH sensors

Robust connection
Safe and rugged VarioPin sensor connection for IP68, protecting the VarioPin connection from damage.

Fast and reliable data transmission
The VarioPin sensor connector guarantees reliable signal transmission from the sensor to the 2060 Process Analyzer or the transmitter.

Length options
Broad range of sensors lengths [mm]: 120, 225, 325, 360, 425.

Multiple installation options
Metrohm Process Analytics offers multiple solutions to integrate the ProTrode into the process. For example, installation of the ProTrode in vessels, tanks, pipes or reactors.

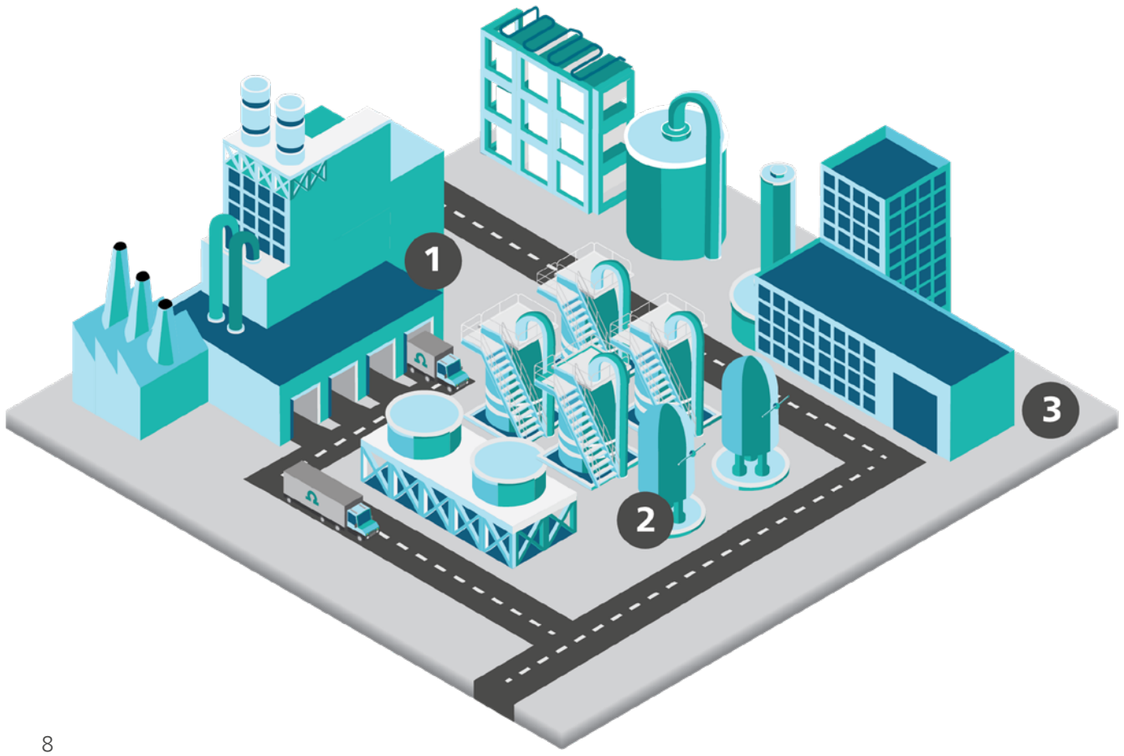
Integrated reference and temperature electrodes make the ProTrode sensors easy to use. Furthermore, the ProTrode sensors can be integrated with any Metrohm Process Analyzer.

Optimize your plant performance

Process Analytical Technology's (PAT) framework is a valuable guide for many organizations and operations regarding optimization of process efficiency while ensuring adherence to environmental and safety standards, compliance requirements, and product quality. «Real-time» results from process analyzers and inline sensors as part of continuous process control can minimize reject rates and material waste revealing process variation instantly. Gaining a clearer understanding of how a process is actually operating and where improvements are needed can lead to valuable savings.

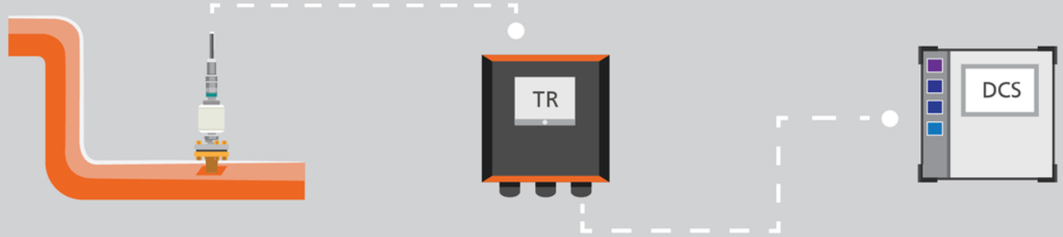
Inline sensors can be mounted directly in the process and require no sample preparation or reagents. These non-invasive, direct measurements provide «real-time» results. Metrohm Process Analytics' ProTrode pH sensors can be installed to measure pH in a sample and provide instant sample data to the distributed control system (DCS) early in a process when results start to trend. Additionally, multiple ProTrode pH sensors can be installed in different parts of a process and connected to a 2060 Process Analyzer for continuous, complete, and unattended monitoring.

Every process is different and has different needs. Metrohm is able to provide different ProTrode sensors connection systems. Each system guarantees process efficiency, reveals process variation, reduces waste, and minimizes production delays by providing continuous and comprehensive monitoring



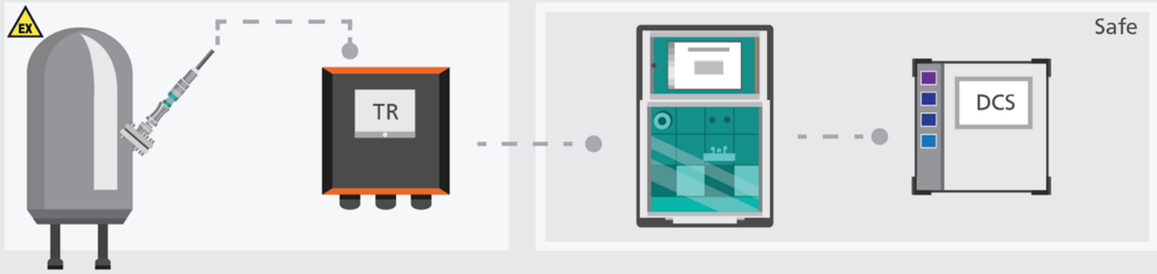
1 Typical measurement setup

In a typical measurement setup, one or more inline pH sensors (which are installed into the process) are connected to a transmitter, which communicates to the DCS using Analog output and discrete signals. It does not matter whether you need to measure inside a reaction tank, pipeline, or overflow vessel - the ProTrode sensors guarantee accurate, fast, and reliable results.



2 Analyzer connection

Measuring pH alone is not always enough. The ProTrode pH sensors from Metrohm Process Analytics can be connected to one or more transmitters, which can be connected to the 2060 Process Analyzer as part of a multi-parameter system. The advantage of this setup is that the analyzer can read and interpret the pH data (and other parameters) and take actions if necessary. Additionally, the 2060 Process Analyzer can take over certain DCS functionalities, reducing overall costs.



3 SmartConnection

Communication is always evolving, and Metrohm Process Analytics keeps up with that trend. With SmartConnectors on our ProTrode sensors, data can easily be transfered to the 2060 Process Analyzer using Analog output or Modbus protocols. The advantage of this setup is that an external transmitter is no longer required, due to the direct connection to the ProTrode pH sensor itself. Besides this, calibration is easy. The ProTrode sensors calibration can be performed with ease in a clean safe environment, with the resulting calibration data stored securely in the «SmartConnector» , so that it can be easily applied to new measurements.

Inline pH sensors for all industries

The ProTrode sensors from Metrohm Process Analytics are the perfect solution for a wide range of industrial applications. Our Swiss quality sensors offer type HT and H quality glass, which enable stable readings and accurate measurements over a broad pH range.

Chemical

A wide range of processes with different process conditions are used in the chemical industry. The ProTrode 250, 350, and 400 have been designed with glass type H to withstand the most challenging environments. Additionally, all these ProTrode sensors fulfill **EU ATEX directives**, making them safe for use in locations classified as hazardous areas.

Pharmaceutical & Biotechnology

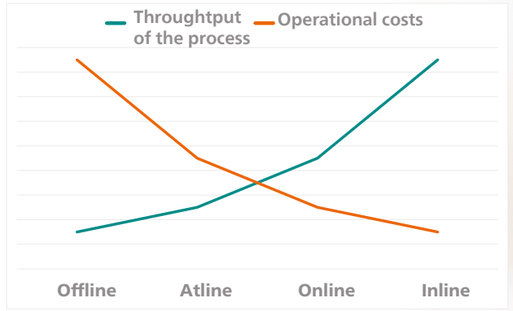
It is important to monitor and verify the amount of reagents and other components in pharmaceutical and biotechnology manufacturing plants, both to ensure correct concentrations of chemicals as well as compliance with official regulations. All ProTrodes have been designed with a silver scavenger to prevents silver ions from contaminating the process sample and interfering with the process.

Every minute counts

In laboratories, sample analyses are mostly carried out offline. However, this does not apply to high throughput industrial processes, as offline analysis does not represent the most current process conditions due to the delay between sampling and testing. Any process adjustments are delayed by hours or even days after an out-of-specification reading, causing losses of raw materials, final products, and even company assets (e.g. corrosion due to ion exchanger breakthrough).

Inline analysis with industrial process analyzers and inline sensors saves time by automating measurements directly at the sample point. This reduces manual sampling **lowers costs, increases the safety** of plant operations, and much more:

- High analysis frequency leads to high quality products.
- Protection of your company assets .
- Increase your company profits.
- Avoid incidents with process automation.



Product and process optimization differences between offline, atline, online, and inline analysis.

TECHNICAL SPECIFICATIONS

Model	200	300	250	350	400
Industry / application	Pharmaceuticals, biotechnology	Pharmaceuticals, biotechnology	Pharmaceuticals, biotechnology, chemistry	Pharmaceuticals, biotechnology, chemistry	Chemistry
Measuring range	0-12 pH	0-12 pH	0-14 pH	0-14 pH	0-14 pH
Membrane	HT glass	HT glass	H glass	H glass	H glass
Shaft material	Glass	Glass	Glass	Glass	Glass
Diaphragm	Glass sleeve	Ceramic pin	Glass sleeve	Ceramic pin	Open junction
Temperature sensor	Pt1000	Pt1000	Pt1000	Pt1000	Pt1000
Electrolyte	KCl saturated gel	3 mol/L KCl gel (pre-pressurized)	3 mol/L KCl gel (pre-pressurized)	3 mol/L KCl gel (pre-pressurized)	KCl saturated polymer, hydrogel
Reference system	Ag/AgCl with Ag-scavenger	Ag/AgCl with Ag-scavenger	Ag/AgCl with Ag-scavenger	Ag/AgCl with Ag-scavenger	Ag/AgCl
Operating temperature	0-80 °C	0-120 °C	0-120 °C	0-120 °C	0-130 °C
Autoclaving	<20 min @135 °C	<20 min @135 °C	<20 min @135 °C	<20 min @135 °C	N/A
Max. operating pressure	1 bar	4 bar	4 bar	4 bar	10 bar
Shaft diameter	12 mm	12 mm	12 mm	12 mm	12 mm
Sensor connector	VarioPin, PG13.5	VarioPin, PG13.5	VarioPin, PG13.5	VarioPin, PG13.5	VarioPin, PG13.5
Output signal	Analog / digital	Analog / digital	Analog / digital	Analog / digital	Analog / digital
Min. immersion depth	25 mm	25 mm	25 mm	25 mm	25 mm
Lengths	120, 225, 325, 425 mm	120, 225, 325, 425 mm	120, 225, 325, 425 mm	120, 225, 325, 425 mm	120, 225, 325, 425 mm
Certificates and approvals*	IP68, CE	IP68, CE	IP68, CE, ATEX	IP68, CE, ATEX	IP68, CE, ATEX

*additional certificates on request

Subject to change without prior notice
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