Instrumentation
Let’s hope it’s glass-lined
Pfaudler

The international expertise network for fluid processes

100 YEARS OF TRADITION
In the chemical and pharmaceutical industries, Pfaudler has been synonymous with glass-lined vessels and products for decades. But our company, which was established in 1884 in the USA by a German master brewer, offers much more than that. Its worldwide locations form an international network of expertise in optimised fluid processes. Customers from a wide range of industries and even consumers benefit from our ideas and solutions.

The group has a tradition in the manufacturing and processing of enamel and glass linings going back more than 100 years. This unique combination of experience and know-how gives rise to progressive ideas that result in new products and tailor-made solutions. We also provide a full range of services from technical advice to maintenance.

Internationally, our company is represented in many markets with manufacturing facilities, branch offices and sales partners.
Sectors

In the chemical and pharmaceutical industries, Pfaudler has been synonymous with glass-lined vessels and components for decades. But glass-lined measurement technology offers decisive benefits in other sectors as well.

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Applications

Did you know that many daily consumer products are made using Pfaudler technology? Here are just a few examples.

Beer · Yoghurt · Cheese · Rice · Sugar · Mayonnaise · Cheese spread · Herb butter · Ketchup · Mustard · Crème fraîche · Jam · Syrup · Paper · Glue · Cream · Shampoo/shower gel · Hair perming products · Plant protection products
Technology

Glass lining is a unique composite material that optimally combines the advantages of steel and glass. As a result, it not only offers outstanding protection against many aggressive media, but it is also abrasion-, pressure- and temperature-resistant. This makes glass lining the perfect material for protecting measurement technology in demanding applications.

But glass lining can do even more. Specially developed formulations react to H⁺ ions in liquid media, which makes them suitable for pH measurement.

Embedding sensors in the glass lining not only delivers redox potential and conductivity measurements but also ultra-fast reacting temperature measurements and corrosion monitoring.

Benefits

Highly resistant glass layer
- Resistant to aggressive acids, organic solvents and proteins
- Resistant to Cleaning In Place (CIP) and Sterilisation In Place (SIP) processes
- Resistant to abrasion
- Resistant to high temperatures
- Resistant to thermal shocks
- No catalytic or biological effects

Self-cleaning
- Prevents deposit formation with adequate flow velocity
- Suitable for adhesive products

Durable
- Service life limited only by glass corrosion or abrasion

Robust steel body
- Withstands turbulences, shear forces and high process pressures
- Allows continuous inline monitoring
- No need for bypass lines, pumps, shut-off devices or retractable holders

Low maintenance
- No change in the pH characteristic curve over the entire service life
- Lower costs for recalibrations and cleaning processes
- Positive pressure effectively prevents diaphragm and electrolyte section contamination
- Maintenance intervals of up to one year
- Can be stored dry
Early recognition of process temperatures enables you to regulate it precisely and minimise fluctuations. Lower energy input and lower energy losses result in well-balanced energy management and therefore lower costs. Various technologies are available, depending on the application.
**Fused-in resistance thermometer**

The functionality of Pfaudler’s type TW temperature probe relies on the temperature dependence of the electric resistance of platinum. The platinum measuring unit, a PT 100 resistance thermometer, is fused into the glass lining of baffles or thermometer wells, providing an **optimal heat transfer**.

- Fastest glass-lined temperature probe
- Permits exact reactor temperature regulation
- No sealing elements – optimal operational reliability
- Long service life, excellent long-term stability and maintenance free
- Certified for explosion zone 0

**Fused-in thermocouple**

In the Pfaudler type T temperature probe, the temperature is measured exactly where it is needed. A Pallaplat thermocouple is fused into the glass lining of C-baffles or valve cones, providing an **optimal heat transfer**.

- Permits exact reactor temperature regulation
- No sealing elements – optimal operational reliability
- Up to six measurement points can be arranged on a single probe carrier
- Long service life, excellent long-term stability and maintenance free
- Certified for explosion zone 0

**Inserted temperature sensor**

Pfaudler’s type TMI temperature probe is a **robust, simple and cost-effective solution** for measuring temperature. The measuring insert – a resistance thermometer – is pressed by spring action to the bottom of the baffle or valve cone.

- Reduced wall thickness and coated contact point for improved heat transfer
- Fully glass lined probe carrier – no gasket in the product space
- Measuring insert is easy to replace and recalibrate
- Accuracy at 1/3 class B to DIN 43 760 / IEC 751
Online liquid analysis permits automated monitoring and regulation of industrial processes in many sectors. In addition to pH, other important process control parameters include redox potential and conductivity. Pfaudler offers solutions for challenging applications in this field – because anyone can do the easy ones!
pH measurement
Whenever robustness and chemical resistance are key, Pfaudler’s low-maintenance and durable pH measurement systems are your first choice.

We supply probes in various designs for virtually all process engineering applications. For hygienic processes, we offer specially developed probes with EHEDG certification.

- High mechanical strength and suitable for use in high temperatures
- Proof against glass breakage
- Can be used without a retractable system or bypass installation
- CIP and SIP compliant
- Self-cleaning and low-maintenance

Redox potential measurement
The redox potential generated in oxidation and reduction processes can be determined by means of robust glass-lined probes. For this purpose, a rhodium electrode is embedded in the glass lining.

By combining two measurement systems on one probe you can measure the pH and the redox potential concurrently.

- High mechanical strength and chemical resistance through the use of glassed steel and fused-in rhodium electrodes
- Suitable for high temperatures
- Dirt-resistant
- Two functionalities at one vessel nozzle possible
- Certified for explosion zone 0

Conductivity measurement
The conductivity of a medium can be determined with a durable glass-lined probe in a 4-conductor circuit. To achieve this, four rhodium electrodes are arranged behind each other on a measuring probe and fused into the probe carrier’s glass lining.

- Wide measurement range 0.01 mS to 2000 mS
- Suitable for high temperatures
- Standard use at up to 40 bar positive pressure
- Dirt-resistant
- Suitable as ring probe for phase separation and ‘empty’ signal
- Certified for explosion zone 0
Corrosion monitoring must be above all – reliable! With Pfaudler technology, false alarms are a thing of the past. Whether you monitor your equipment continuously or check it periodically, you can depend on the result every time.
Continuous corrosion monitoring

Continuous corrosion monitoring can be carried out with measuring electrodes fused into the glass lining of baffles and valve cones – the P probe – in conjunction with the associated electronics – the Corrosion Detector.

This not only enables you to monitor glass-lined surfaces but also other corrosion-resistant coatings (e.g. PTFE) of reactors and their fittings. Thanks to the implemented logic, false alarms are ruled out and you can obtain reliable information about the condition of the reactor and the systems connected to it in all viable cases.

- Principle of decomposition voltage analysis
- Measurement not influenced by electrically conductive fittings
- Monitors all corrosion-resistant surfaces
- Control measurements rule out false alarms
- Displays operating conditions based on defined current thresholds
- Certified for explosion zone 0

Mobile corrosion testing

The Corrosion Detector Portable offers corrosion testing according to a maintenance plan or when required, and tolerates electrically conductive fittings. The hand-held device is supplied with a PTFE dip probe, a reference electrode and an earthing clamp. Measurements can be transmitted to a PC using the USB adapter cable provided. The associated software is provided on a USB stick.

- Principle of decomposition voltage analysis
- Measurement not influenced by electrically conductive fittings
- Monitors all corrosion-resistant surfaces
- Control measurements rule out false alarms
- Earthing clamp with electronic contact monitoring
- Can store up to 10,000 measurements
- Certified for explosion zone 1
Continuous level measurement

Capacitive
Our FS probe type uses the capacitive method. A fused-in electrode strip forms a capacitor with the steel tube. If the probe comes into contact with product instead of air in the vicinity of the electrode, the capacitance changes.

- High mechanical strength and chemical resistance through the use of glassed steel
- No sealing elements – optimal operational reliability
- The measuring circuit is intrinsically safe

Radar
Levelpuls radar sensors emit microwave signals, and are used for continuous level monitoring of corrosive fluids in reactors.

- Low transmission frequency – insensitive to product deposits
- Accurate measurement even in the presence of temperature fluctuations
- Adjustment without filling or emptying the reactor

Limit level measurement

Capacitive
The FT measuring probes follow the capacitive principle. The electrode used for this purpose is annular. Applications range from full and empty alerts for vessels and detection of interlayers to protecting pumps from running dry.

- High mechanical strength and chemical resistance through the use of glassed steel
- No sealing elements – optimal operational reliability
- The measuring circuit is intrinsically safe

Vibration
Safety Swings rely on the tuning fork principle to achieve a limit level measurement that is accurate to the millimetre – regardless of the medium’s density and viscosity. The probe can be used as a maximum limit switch, as an additional overfill safety device, as a minimum limit switch or as protection against running dry.

- High mechanical strength and chemical resistance through the use of glassed steel
- Works perfectly even in foam, bubbles and suspended particles
- Certified as an overfill safety device under WHG (German Water Management Act)
Sampling systems

Reliable, maintenance free, variable

fleXampler

The fleXampler sampling system is the ideal solution for reliable, closed sampling of fluid media from reactors and vessels – fast and without interrupting the process!

- Modular design
- Main valve with low clearance volume and cylinder tap
- Ball seat made of perfluoroelastomer (FDA-certified), soft sealing, ensures reliable sealing of the PTFE hollow ball
- Large outlet for sampling
- Parts with PFA internal coating (FDA-certified)
- TA Luft (Clean Air Act) compliant
- Options
  - Design with recirculating pump
  - Automatic control with motorised valves
  - Sampling flask cage

fleXampler loop

The fleXampler loop continuous sampling system really comes into its own when used with a Quatro-Pipe baffle, as this configuration only requires one vessel nozzle for two or more functions.

- Maintenance-free and self-cleaning for representative results
- Variable sampling quantity
- Also suitable for viscous substances
- Sampling valve with watchdog safety circuit
- Piston syringe with glass cylinder for quick visual inspection
- No escape of gas or product
- Compressed air diaphragm pump with diaphragm monitoring designed for zone 0
- Surfaces in contact with product have highly corrosion-resistant coating (glass lining, PFA, PTFE)
Our company is ISO 9001 certified. This ensures that all processes are designed and implemented with our customers’ requirements in mind, and always with the focus on the quality of our products and services.

These services range from expert product and application advice to commissioning and maintenance and training. Yet another of our services is lining measurement technology made by other manufacturers.
Product and application advice

Measuring tasks and operating conditions in the process industry cover a wide range of situations. As a result, selecting a suitable measurement system is often a complex undertaking that requires an in-depth understanding of applications and products.

With more than 40 years’ experience as measurement technology manufacturers and suppliers under our belts, we are always on hand to provide our customers with expert advice.

Commissioning, maintenance and training

Competent commissioning and maintenance of complex measurement systems is a fundamental requirement for ensuring that your measuring equipment works perfectly and smoothly.

Our servicing specialists are specially trained and have many years of experience with glass-lined measurement technology. So you can rest assured that problems will be identified and rectified in plenty of time.

To ensure that the equipment is used properly during ongoing operation, our experts also offer on-site training.

Glass lining of measurement technology

For many processes in modern process engineering, a combination of chemical resistance and mechanical strength is indispensable.

So there are many reasons why you should choose Pfaudler glassed steel!

- Reliable and durable protection against virtually all aggressive chemical attacks
- Mechanical stability at high flow velocities, high pressures and pressure surges
- Absolutely neutral behaviour, no catalytic or biological effects
- Outstanding germ inhibition potency
- Permits cleaning procedures that prevent the development of pathogens from the outset

The outstanding features of glass lining make it the perfect protective shield for measurement technology in demanding applications.