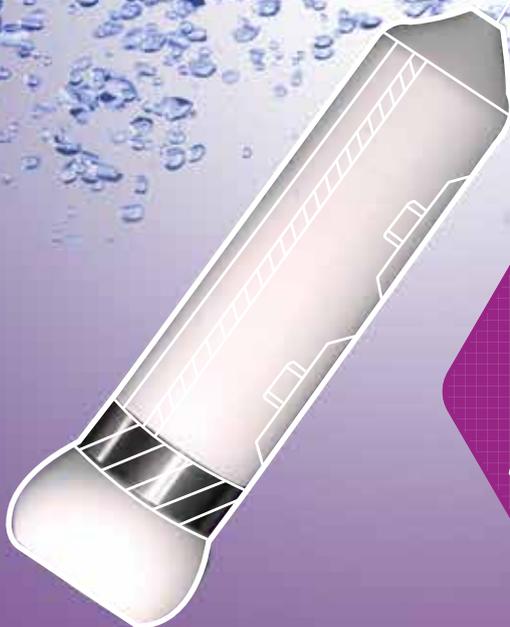


GLASS-LINED
INSTRUMENTATION

CORROSION MONITORING

FOR HIGHEST
STANDARDS



Pfautler Group

One single source responsibility with access to all Pfautler Technologies, Solutions, Services worldwide



Since 1884, Pfautler has grown to be a truly **global, multinational and diverse company** with approximately 1,400 employees and manufacturing facilities in nine countries on four continents, encompassing the Pfautler, Montz, Edlon, GMM Pfautler and Mavag brands.

Pfautler Technologies and Solutions can be found around the globe. They are installed in more than **100 countries and across six continents**. Chemical and pharmaceutical companies around the world rely on the quality, durability and performance of our Technologies to ensure their chemical process systems are efficient, reliable, profitable and safe.

The name Pfautler has become synonymous with chemical processing and corrosion resistance. You will find examples

of the results of our advanced thinking throughout all areas of typical chemical and pharmaceutical plants because our portfolio of technologies covers all chemical unit operations.

Years of experience and highly qualified services are the basis for innovative and economic solutions for your requirements in the area of process equipment and systems.



Pfautler Technologies

We help make the world around us. Much of what you see, taste and touch in the world was created or improved using Pfautler Technologies

Pfautler Services

We provide 24/7 support for your entire plant

Pfautler Solutions

We design and build turn-key process

Pfautler Innovation

Our innovative spirit continuously drives us to develop the next great technology

Corrosion Monitoring

The right decision

The Pfaudler technology not only enables to monitor glass-lined surfaces but also other corrosion-resistant surfaces (e.g. PTFE-coated) of reactors including fittings.

Thanks to the implemented algorithm false alarms are ruled out. Reliable information about the condition of the reactor are obtained and the systems connected components. Solutions are available for continuous corrosion monitoring and systems for periodical

mobile corrosion testing. It is thus possible to storage vessels regularly for corrosion damage at low costs and effort.

Corrosion monitoring must be above all – **reliable!**

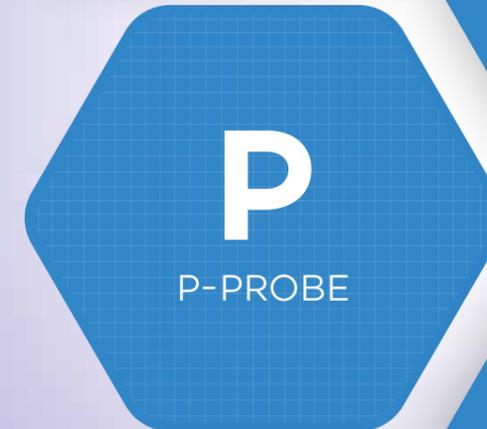
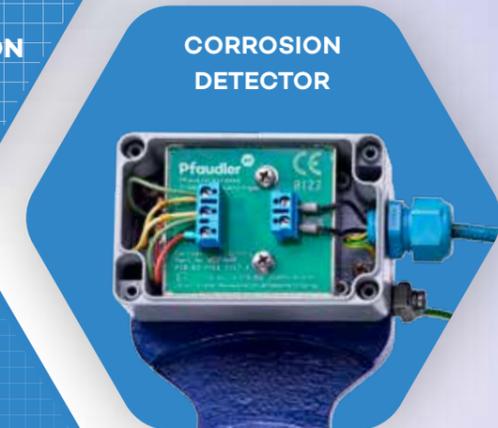
Continuous corrosion monitoring

Continuous corrosion monitoring can be carried out with measuring electrodes fused into the glass lining – the **P probe** – in conjunction with the associated electronics – the **Corrosion Detector**. The measuring electronics are connected to the parts being monitored by means of **two rhodium point-type electrodes** and the product. These can be embedded in glass-lined baffles, thermo-wells or glass-lined valve stems.

Corrosion Detector (CD)

The Corrosion Detector works on the **principle of the decomposition voltage analysis**. This enables the use of corrosion-resistant conductive fittings without causing a false alarm. The electronics provides four output signals – stand-by, ready, alarm, error.

- 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

Corrosion Detector Portable (CDP)

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.

The **operating principle of the decomposition voltage analysis** is the same as in the stationary measurement system.



Mobile corrosion testing

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 helps to administrate the measuring results and to create a test certificate if required.

- 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**

Regular and preventive control play a key role in terms of avoiding long downtimes and detect potential damages in an early stage.



CryCo-Lock

Corrosion monitoring on turbines

Continuous monitoring of the glass lining inside a vessel during operation is indispensable in highly corrosive processes, in order to rule out large and costly tantalum repairs or even rupture of vessels. A corrosion detection system is the solution. Where multi-piece glass-lined agitators are used, it has never before been possible to monitor the entire agitator assembly.

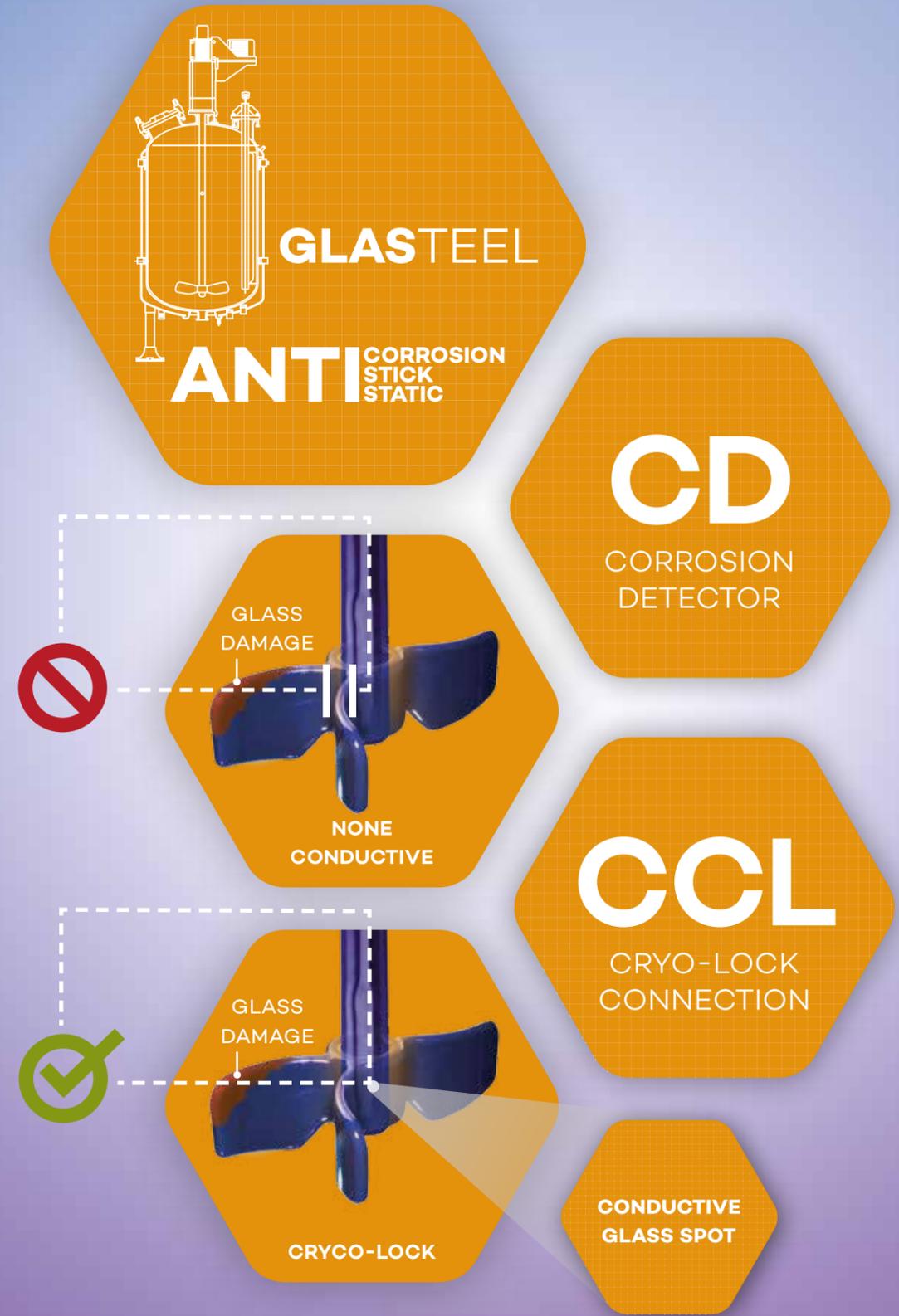
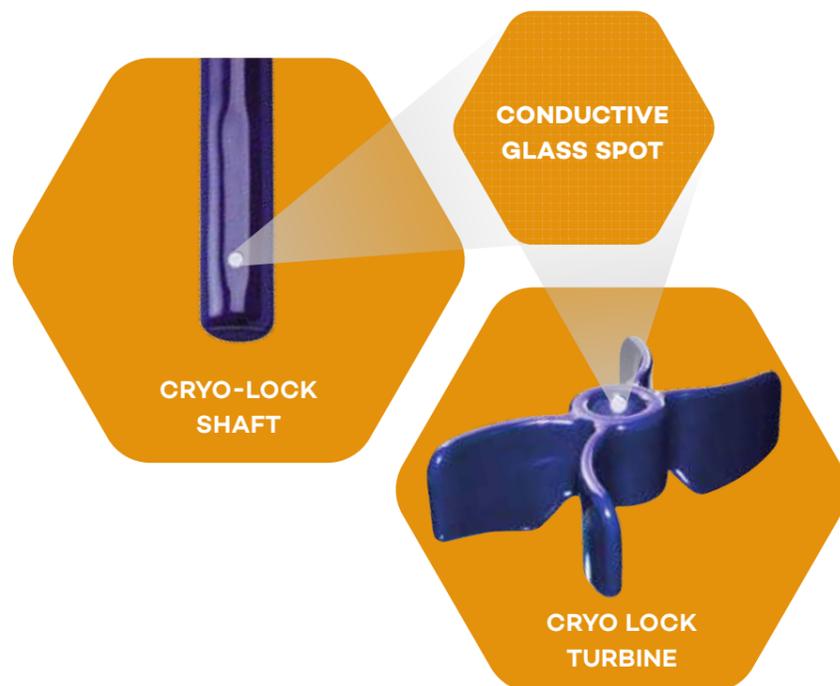
The use of the Corrosion Detector in conjunction with Pfaudler's new Conductive Cryo-Lock (CryCo-Lock) technology has now made this possible.

Conductive Cryo-Lock Connection

The moving parts in a reactor are most prone to damage, but can now be monitored for integrity with Pfaudler's new Conductive Cryo-Lock technology. This continuous in-process glass lining monitoring system is **suitable for all Pfaudler Cryo-Lock agitators.**



- **Monitoring of all wetted parts** incl. the turbine
- **Homogeneous surface** due to the same thermal expansion coefficients
- **Zero weak point** compared to competitive solutions?
- **Reduces the need to enter the vessel** for maintenance purposes to a minimum



Functional Principle

Features and benefits

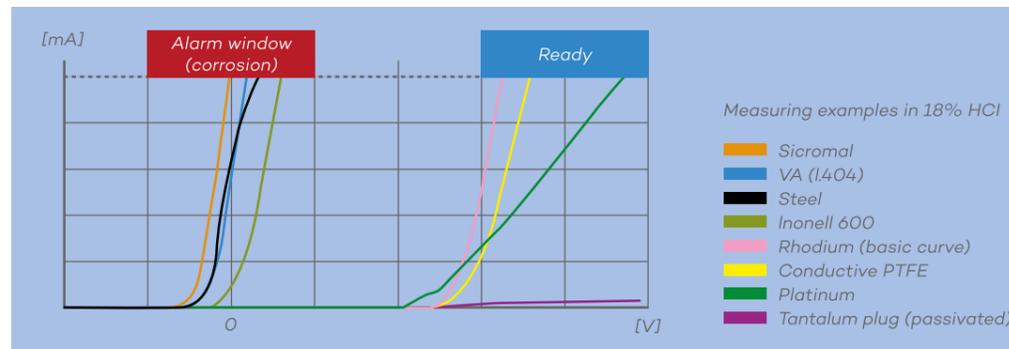
The analysis of the decomposition voltage happens in a recurring cycle as changing conditions like the temperature or the pH value have to be considered.

A voltage is applied at regular intervals between the two rhodium electrodes of the P probe, and a base curve is created. Starting from this reference line, the Corrosion Detector calculates a so-called Corrosion Alarm Window. If the current/voltage values are within the Corrosion Alarm Window in two successive control cycles, an alarm message is provided.

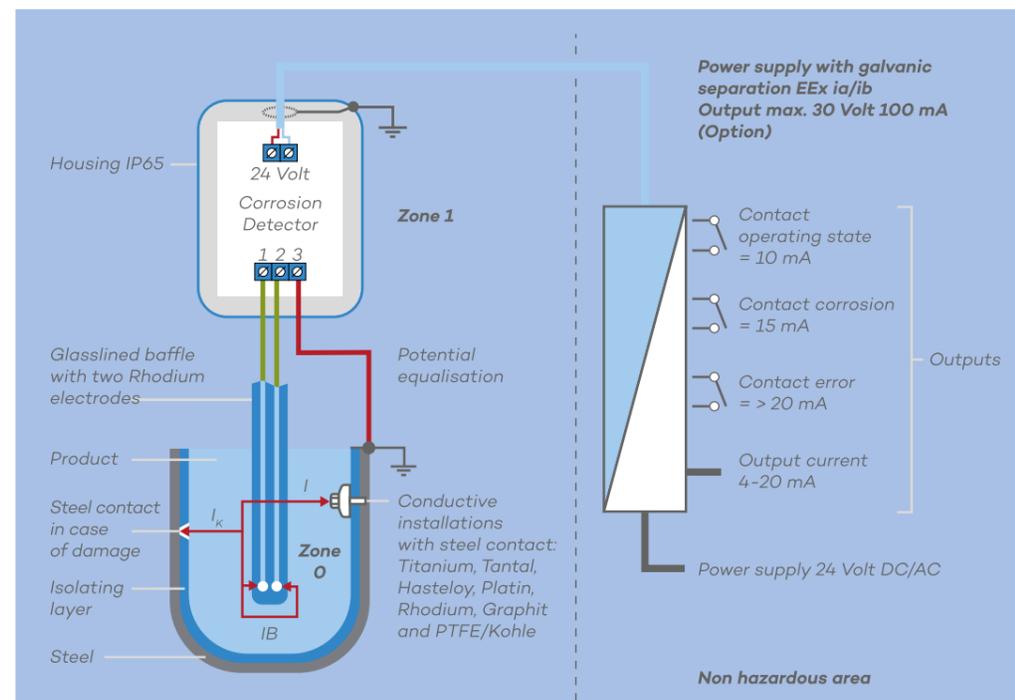
Corrosion monitoring must be above all – reliable!

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.

Potentiometric glass-lined monitoring



Function in a typical installation situation



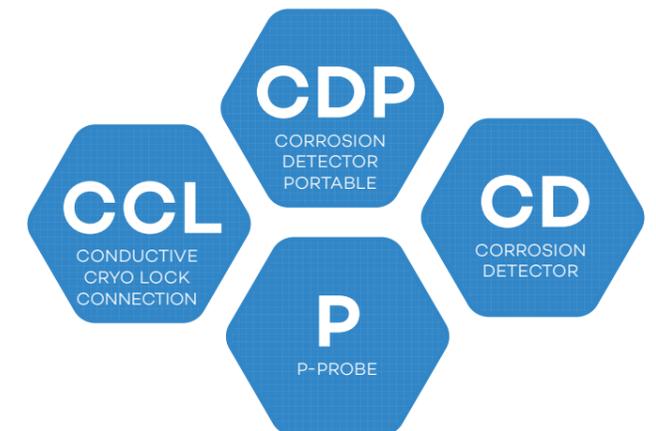
Features and benefits

Features	P / CD	CDP
Principle of decomposition voltage analysis	•	•
Displays operating conditions based on defined current thresholds	•	
Electronics is integrated into the probe's IP65 terminal box	•	
Earthing clamp with electronic contact monitoring		•
Damage localisation possible to a limited extent	•	•
Integrated conductivity calculator for easier quantitative calculation of conductive additives		•
Can store up to 10,000 measurements		•
Data transmission via a USB interface		•

Benefits		
Monitors all corrosion-resistant surfaces	•	•
No false alarms – unambiguous alarm message only if corrosion is detected	•	•
Installation of corrosion-resistant metals is tolerated	•	•

Type	P probe (P) / Corrosion Detector (CD)	Corrosion Detector Portable (CDP)
Measuring task	Continuous corrosion monitoring	Mobile corrosion testing
Technology	Decomposition voltage analysis	Decomposition voltage analysis
Measuring range (mS/cm)	>= 6-7	>= 0.8
Operating temperature (°C)	-60 to +200	0 to +50
Operating pressure (bar)	-1 to +40*	-
Explosion protection	II 1/2 G EEx ia IIB T6 or II 2G EEx ia IIC T6	II 2 G Ex ib IIB T3

* depending on component or nozzle size





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Defining the standard