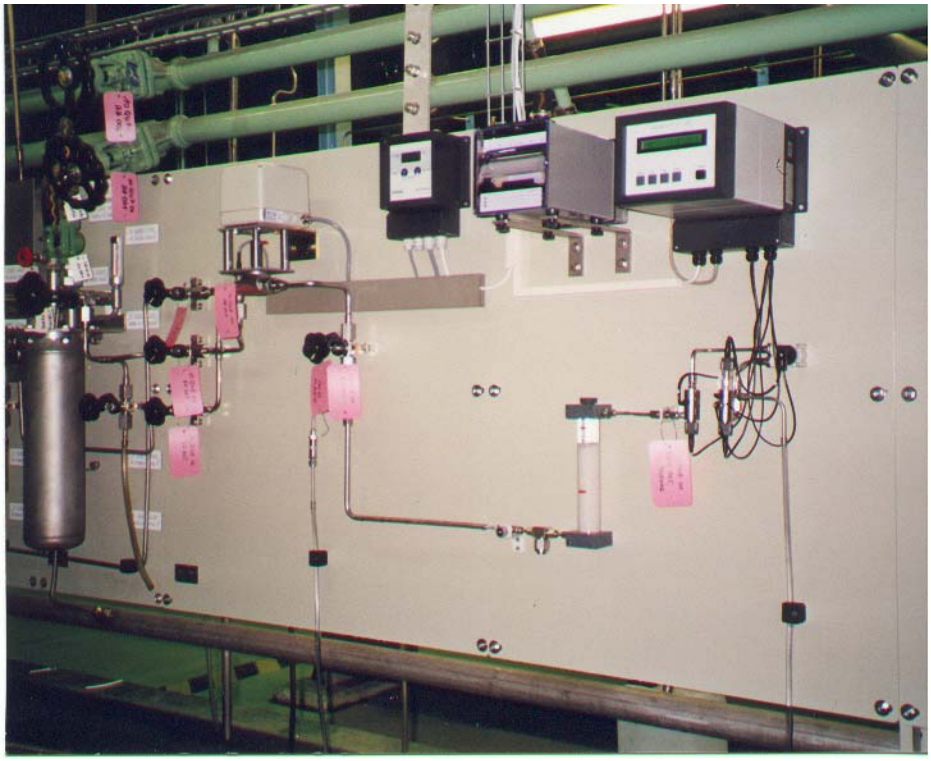
INGENIEURBÜRO U. GRONOWSKI
Measurement and Control Engineering Chemical Analysis Engineering Technical Support

Fehmarner Str. 23 – D-13353 Berlin – Tel. +49(0)30 39838088 –3943997 Fax. +49(0)30 39838089
Email: info@gronowswki.com Internet: www.gronowski.com

Hydrogen analyzer

HYDROLYT LP 100



Applications

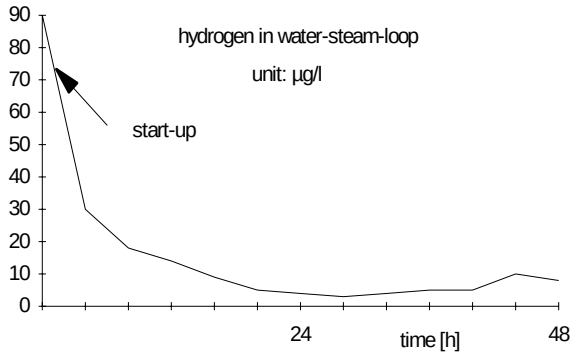
The HYDROLYT LP 100 hydrogen analyzer is used for the automatic, continuos measurement and control of hydrogen concentration in aqueous solution. For example, the determination of residue hydrogen concentration in boiler feed-water in power plants, monitoring of hydrogen concentration during the denitrification (removal nitrate NO^-_3) of drinking water, indication of hydrogen concentration during catalytic reduction of oxygen on noble metal surfaces in water treatment plants etc. The measuring range is between some µg/l (trace areas) up to saturation levels.

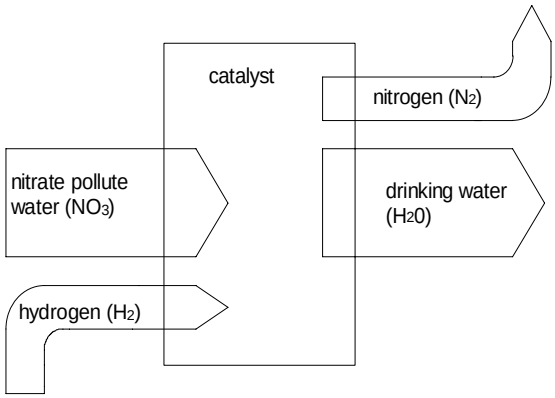
The hydrogen in a water-steam-loop of a power plant is produced mainly due to the reaction between iron and water or steam. Thus the hydrogen concentration gives quantitative and qualitative evidence of the rate of corrosion and therefore corresponds to the building or destruction of the protective layer in the pipes and boilers. The hydrogen concentration ranges between a few µg/l (normal operating conditions) and hundreds of µg/l during start-up.

The denitrification is based on the process where by hydrogen is added to nitrate polluted water and then the water flows through a solid bed reactor filled with a noble metal catalyst. As a result water and nitrogen are produced.

The catalytic reduction of oxygen is based on the reaction between dissolved oxygen in water and hydrogen in the presence of a noble metal surface (oxyhydrogen gas reaction). Typical applications for oxygen free water there are in breweries, beverage industry and in the preparation of boiler feedwater in power plants.

In general, it is important for the correct operation of the process to dose the exact amount of hydrogen.





scheme for nitrate removing

Description

During the measurement of dissolved hydrogen (molecular hydrogen H_2) the sample flows through a coaxial designed measurement cell by a platinum measuring electrode. If the measurement electrode has a characteristical potential, in the boundary layer (interphase) the measurement reaction takes place. The electrochemical reaction may be represented qualitatively as:

$$H_2 + 2H_2O \Leftrightarrow 2H_3O^+ + 2e^-$$

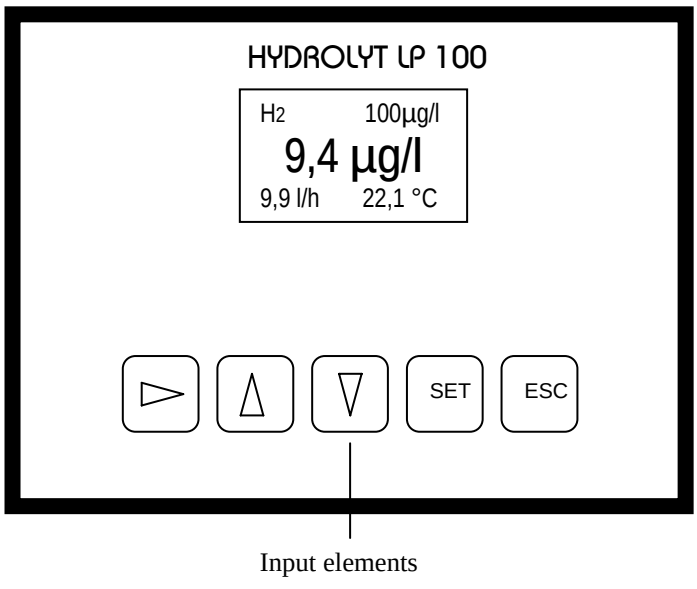
The electrochemical sensor functions in a potentiostatic mode with an open three electrode system (no membrane). Consequently exact and reliable measurements can be accomplished at low pressures (up to 8 bar) and also in areas where pressure spiking takes place.
The analyzer has automatic in-line calibration. At a stainless steel electrode is used in the calibration process. This electrode produces a certain amount of H_2 by electrolysis. The fully automatic calibration is activated at the push of a single button. As no other external calibration devices or procedures are required; it is not necessary to shut down operation during calibration. This sturdy and reliable measurement system makes possible to operate very accurately even under extremely harsh operating conditions.
The measuring electrode is a cylindrical electrode with platinum surface. The sensitivity of the electrode can be restored easily by cleaning of the electrode with a mild detergent.

HYDROLYT LP 100

Features

- measurement range from the traces area up to saturation levels
- high resolution and quick response time (no membrane)
- no zero point adjustment needed
- sturdy, durable and reliable measuring device (low maintenance)
- fully automatic in-line calibration; (no additional calibration equipment required)
- automatic compensation for effects of flow and temperature
- on-line unit available as a either portable instrument or wall mounted instrument
- withstands pressure up to 8 bar (116 psi)
- analogue and digital interface; data logging function
- measurement data processing through modern microprocessing; user friendly

Front view



Input elements

Technical data

Measurement principle:..... microprocessor based, potentiostatic three electrode system

Calibration:..... build-in, single button operation and autocal

Auto-calibration:..... option

Measuring range:

measuring group I:..... 0,0.....1000,0 µg/l

range selectable between 20....1000 µg/l

measuring group II:..... 0,00.....20,00 mg/l

range selectable between 4....20 mg/l

analog output:..... 0(4).....20 mA; shunt max. 500 Ohm

digital output:..... serial interface RS 232

data logging:..... option

limit:..... power relay

Alarming:..... power relay; Flow and Calibration

Measuring electrode:..... platinum

Counter electrode:..... stainless steel 1.4571 (314)

Reference electrode:..... Ag/AgCl in saturated KCl-solution

Calibration electrode:..... stainless steel 1.4571 (314)

Response time t_{90}:..... 30 sec

Probe conductivity:..... ≥ 2 µS/cm; (if conductivity is less a salt cell is required)

Ambient temperature:..... 0.....+55 °C

Probe temperature:..... 0.....+60 °C

Probe pressure:..... ≤ 10 bar (145 psi)

Probe flow:..... 3 l/h .....18 l/h

Probe fittings:..... tube fittings for tube ∅ 6 mm

Error limits:..... ± 3%

Protection class:..... IP 54

Color:..... basic parts RAL 7035; front and rear parts RAL 7024

Voltage:..... 100..240 VAC, 50/60 Hz

Power consumption:..... 10 VA

Technical subject to change without notice