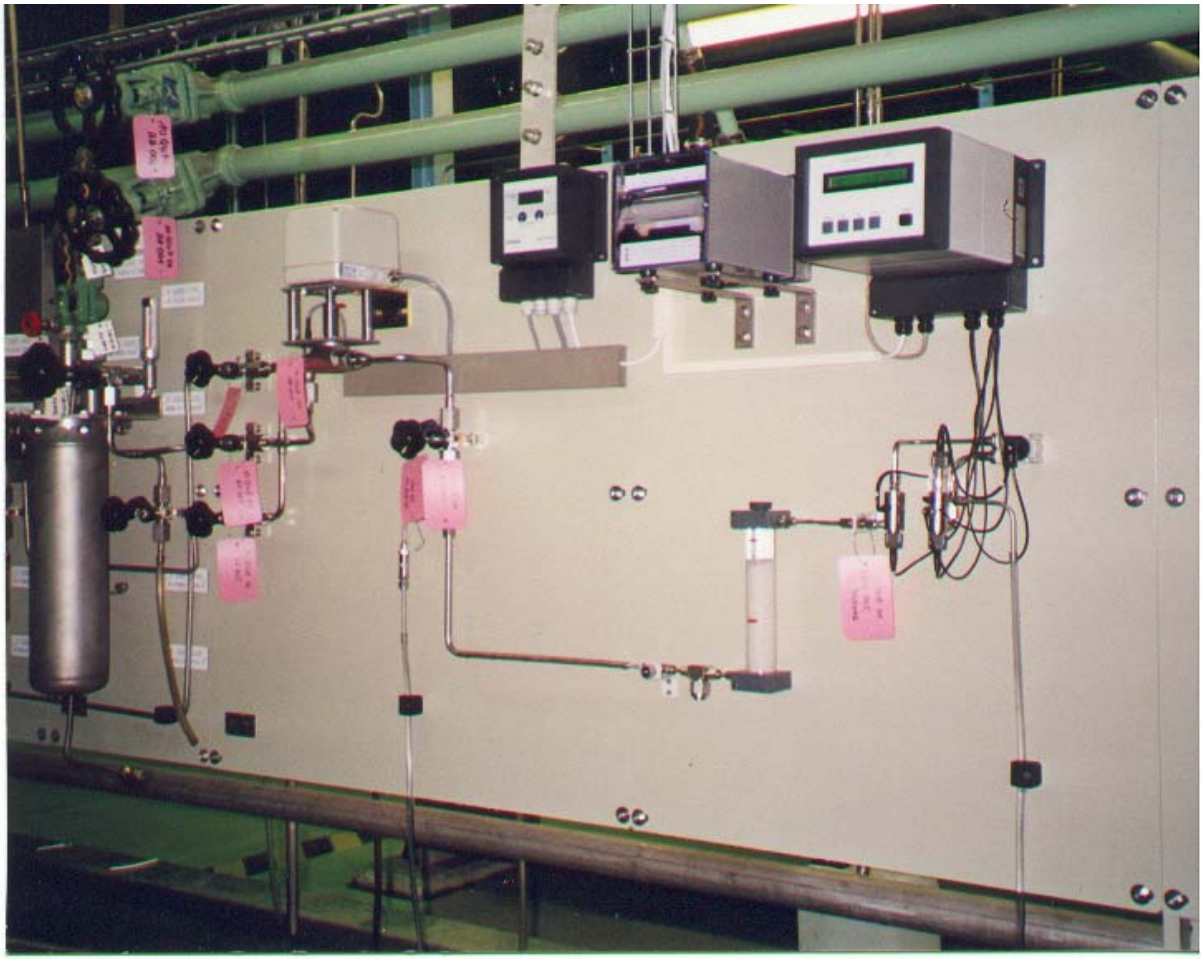
INGENIEURBÜRO U. GRONOWSKI
Measurement and Control Engineering Chemical Analysis Engineering Technical Support

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

Hydrazine analyzer

HYDROLYT LP 100



Applications

The new patented HYDROLYT LP 100 electrochemical hydrazine sensor functions in a potentiostatic mode with an open three-electrode system. The measuring electrode is made from solid titanium coated with gold, the counter electrode is made of stainless steel and the reference electrode is silver/silverchloride. The use of open measuring electrode mean there are no membranes to block.

For the measurement of dissolved hydrazine (N_2H_4) the fluid medium flows into the coaxial measurement cell between the platinum measuring electrode and counter electrode. If the measuring electrode is at the correct potential, hydrazine is oxidized in the interphase boundary layer. The characteristic potential for this reaction - the potential at which hydrazine oxidation occur in preference to other competing reactions - is measured by holding the potential of the measuring electrode steady with a potentiostat and comparing its value with that reference electrode. Under these conditions the rate of the electrochemical reaction is limited by the rate of diffusion of hydrazine molecules to the electrode.

This current, which is measured by the instrument's electronic processing unit, is known as the diffusion-limiting current, I_{diff}:

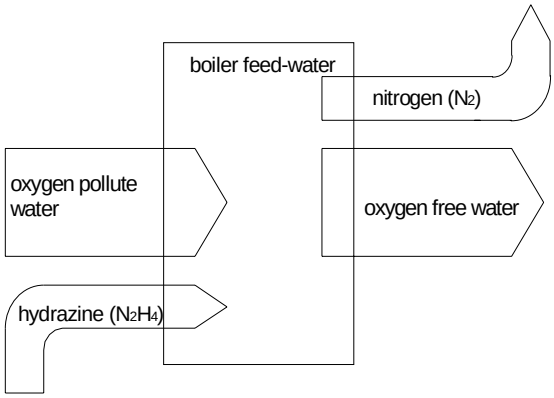
$$c_{N_2H_4} = k \bullet I_{diff}$$

This diffusion-limiting current depends on mainly on the mass transport of the electrochemically active components, and hence on the hydrodynamics in the measuring cell.

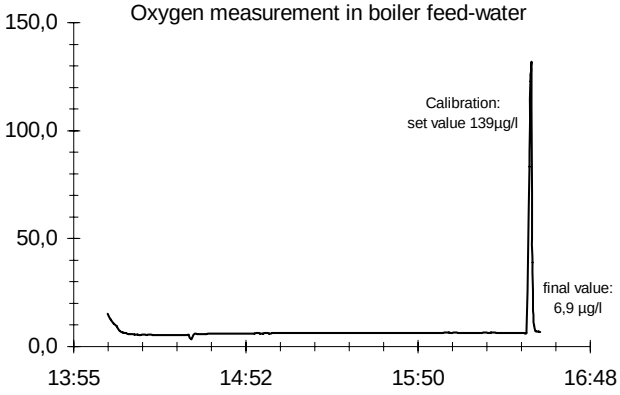
For boilers that operate at pressure above 62 bar (900 psi) hydrazine is often dose for oxygen scavenging. Hydrazine (N_2H_4) reacts with oxygen as follows:

$$N_2H_4 + O_2 \Rightarrow H_2O + N_2$$

Appearing flow- and temperature effects of the measuring signal are recorded through installed flow meter and temperature sensor and compensates if necessary by modern microprocessor.



Scheme for oxygen removing



Description

During the on-line measurement of dissolved hydrazine the sample flows through a coaxial designed measurement cell by a gold covered 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:

$$N_2H_5OH + 4OH^- \Leftrightarrow N_2 + H_2O + 4e^-$$

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 in-line calibration. A single parallel determination of concentration value is setting via key broad to the instrument. The calibration is activated at the push of a single button. Also a calibration with a dosage of certain amount of calibration solution is possible. No shut down operation during calibration necessary. This sturdy and reliable measurement system makes possible to operate very accurately even under extremely harsh operating conditions.

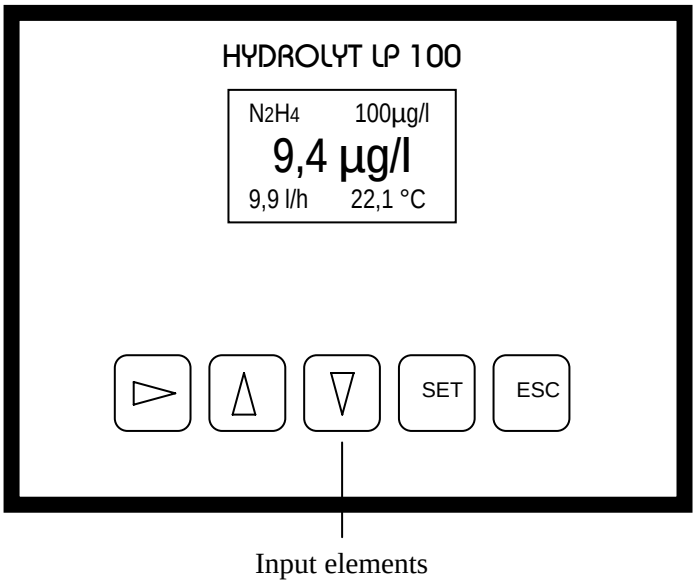
The measuring electrode is a solid cylindrical electrode. The sensitivity of the electrode can be restored easily by cleaning of the electrode with a mild detergent.

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 hydrazine sensor

Measurement principle:.....	microprocessor based, potentiostatic three electrode system
Calibration:.....	build-in, single button operation
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
Auto-changing-range.....	option
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:.....	gold
Counter electrode:.....	stainless steel 1.4571 (314)
Reference Electrode:.....	Ag/AgCl in saturated KCl-solution
Calibration electrode:.....	-
Response time t_{90}:.....	30 sec
Probe conductivity:.....	≥ 3 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 65
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