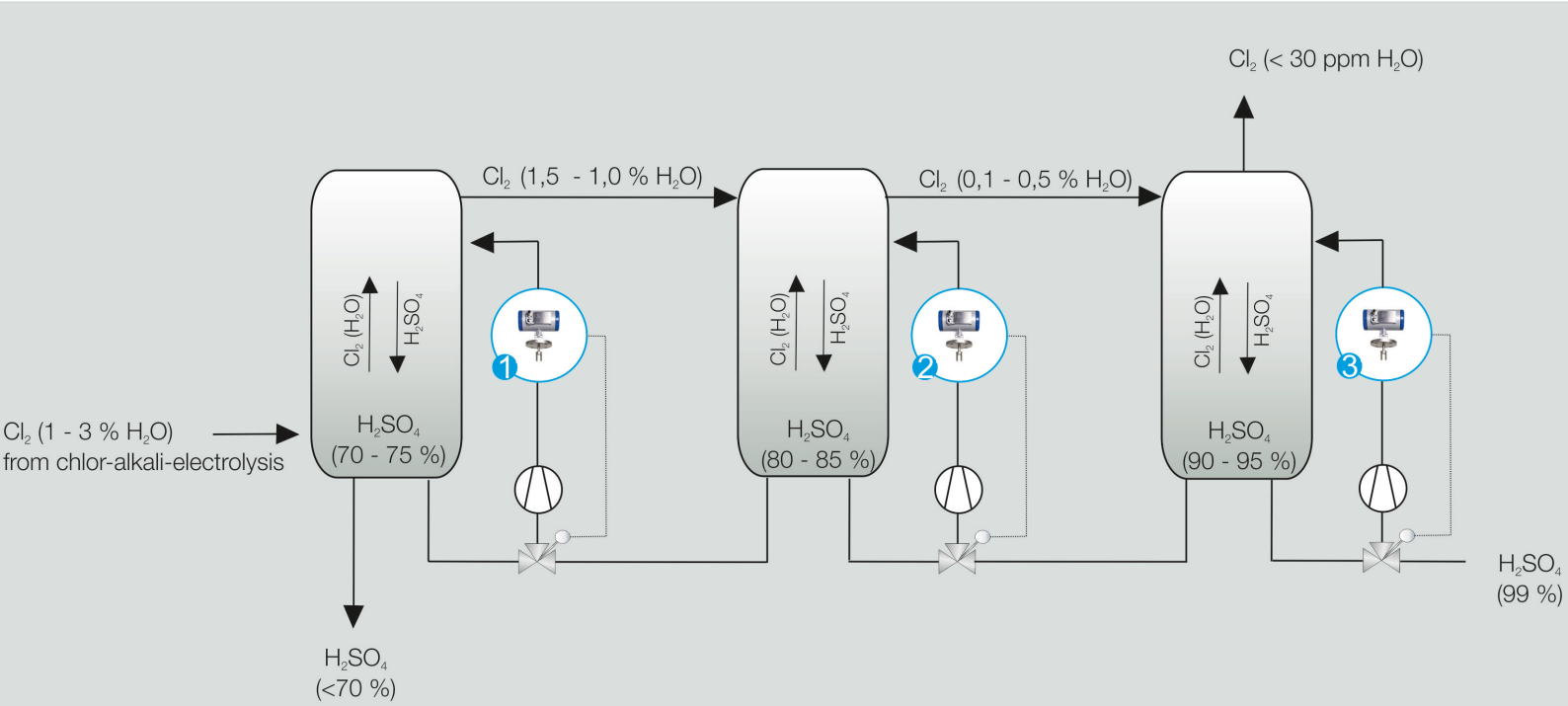
SensoTech
In liquids, we set the measure.



Measuring point	Installation	Measuring task
1- 3	circulation line	concentration measurement and fresh acid redosing control

Chlorine drying

Introduction

Chlorine is one of the most important and most produced chemicals worldwide. It is produced industrially by the chlor-alkali electrolysis. The starting material for the electrolysis is an aqueous solution of sodium chloride (NaCl). Hydrogen and hydroxide solution are generated as byproducts, which are also used in the chemical industry. The chlor-alkali process uses different electrolytic methods. The most common types are the diaphragm, membrane or amalgam method.

The LiquiSonic® analyzer is used in different methods and product flows to detect the concentration and to optimize the quality as well as productivity. Another field of the LiquiSonic® application is the chlorine gas drying in the downstream process. The chloric gas must be removed from its water components to avoid a formation of chlorine hydrate and an increase of the corrosion behavoir at a moist content over 30 ppm.

Application

The stage of dehydration typically takes place in absorption tower (scrubber), where the remaining humidity of chlorine gas is captured by highly concentrated sulfuric acid. Sulfuric acid is used as characteristic drying agent because it has hygroscopic properties; this means a strong attraction to water.

The humid chlorine passes several scrubbers during the drying and the concentration of the H2SO4 increases from scrubber to scrubber. The higher the concentration, the more efficient is the drying efficiency. In this regard, a high concentrated H2SO4 (90-96%) is in the last scrubber, because the water components are reduced in the chloric gas to < 30 ppm. By removing the water components in the chlorine gas, the sulfuric acid is being diluted in the scrubber. The dilute H2SO4 is escorted in each case in the previous scrubber with lower H2SO4 concentrations.

The effectiveness of the process decisively influences the productivity and quality of the gas. Hence, a reliable measurement of the sulfuric acid concentration is of particular importance.

The measuring system LiquiSonic® 30 allows the measurement of the sulfuric acid concentration as well as a highly accurate temperature measurement by the means of sonic velocity. Through the inline concentration analysis with LiquiSonic® 30 sensors, the process of chlorine gas drying can be analyzed around the clock. It further guarantees an accurate real time analysis of the sulfuric acid concentration. A precise monitoring of the sulfuric acid concentration in the absorption towers through the LiquiSonic® 30 measurement system guarantees the desired effectiveness of the chlorine gas drying at all times.

Customer benefits

LiquiSonic® enables a reducing of labor costs by elimination of manual process steps and labor analysis:

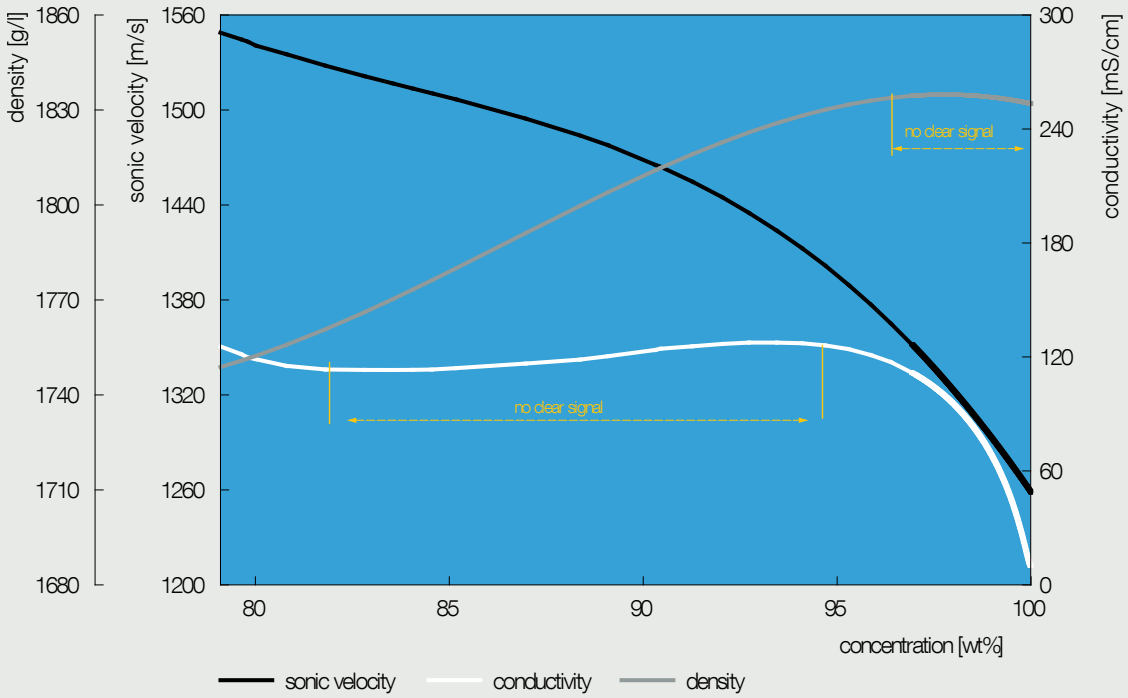
- time saving: 3 h per day
- labor costs per hour: 50 €
- total cost saving: 30.000 € per yeat

investment: approx. 20.000 €
amortization: approx. 7 months

To protect equipment against corrosion, the water content must be less than 30 ppm in the chlorine gas. Through the continuous monitoring of the sulfuric acid concentration in the respective scrubber, the required purity of the chlorine gas (< 30 ppm H_20) can be ensured.

As it can see in the diagram, the LiquiSonic® measurement shows a clear signal with respect to the density and conductivity, in the concentration range of 80 - 100 m% (range where the effective drying takes place).

Advantage of sonic velocity over conductivity and density

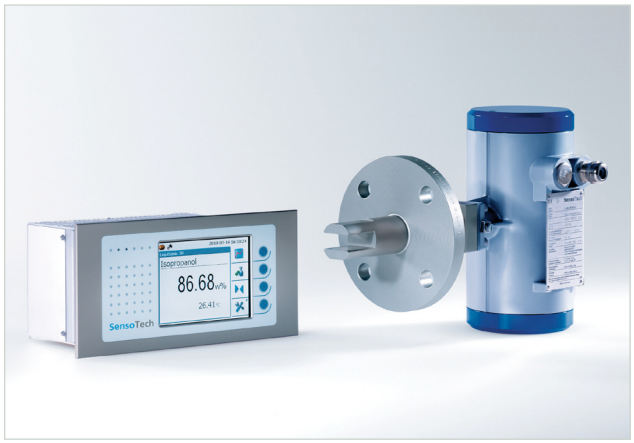


Installation

The installation of the sensors is in the transport pipe-line DN80 of the scrubber.

concentration range of H_2SO_4: 70 wt% to 100 wt%
temperature range of H_2SO_4: 20 °C to 60 °C

The liquid-wetted sensor parts are made of HC2000.



LiquiSonic® controller and immersion type sensor

Devices

	21001301 controller 30 V8
BUS	21004435 bus connection: Profibus DP
	21003210 immersion sensor 40-14, DIN DN50, L092
	21005012 material extra charge wetted parts in hastelloy C2000 (immersion sensor per 100 mm)
	21004115 high efficient ultrasonic ceramic
	21004202 bus cable indoor (100 m)

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