Electrolyzer Solution

Instruments and Solution for Ion-Membrane Electrolyzer Plant Application
Fundamental Materials for Industries
Caustic soda and hydrochloric acid, produced in electrolyzer plants, are fundamental materials used in varieties of industries; chemicals, pharmaceuticals, petrol-chemicals, pulp and papers, etc.

Profitability from Efficient Production
Profit is the result of the effective production with minimized running / maintenance cost.

Effective Production
Proper control of the process brings you stabilized quality of products with the vast operational profit. The process condition may vary often. When conditions are changed, the process controller and sensors have to follow well.

Energy Cost
Ion-Membrane electrolysis bath is the most effective among all types of electrolyzer in caustic soda production. But it still consumes huge energy. Energy consumption has to be reduced to minimize the environmental stress like CO₂ emissions, for increasing your profitability.

Maintenance Cost of Membrane
A Membrane has life time. It should be maintained periodically. To prolong operating life, the electrolyzer plant should be monitored for optimized control.

Tough Environments
There is an intensive electromagnetic field around electrolysis bath. In addition chlorine and other by-products are corrosive. Sensing devices have to be tough against such environment with providing accurate measurement all the time.

Total Cost of Ownership (TCO)
Maintenance costs for these sensing devices should be considered as TCO, next to the initial cost of your investment. Those should be in good balance.

Why Buy Yokogawa?
Our devices can afford to perform accurate measurements under tough condition in electrolyzer plant application. You can minimize these maintenance costs, achieving the maximum profit from the control of the process with accurate measurement.
**Electrolyzer Plant Flow Measurements**

**Overview and Problems**
- Flow measurement in electrolyzer plants
- The stray current from electrolysis bath harms the measurement by magnetic flowmeter
- High corrosive liquids such as caustic soda, sulfuric acid etc.

**Solution**
- Dedicated DC Noise Cut Filter to minimize the stray current
- 0.35% of reading, highly accurate and stable measurement by Dual Frequency Coil Excitation Method

**Benefits**
- High accurate and stable flow measurement is realized in electrolyzer plant
- Simple maintenance

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**Liners and Electrodes**
Yokogawa can prepare wide variety of wetted Parts Materials

- **Lining:** PFA, Ceramic, and more
- **Electrode and Earth Ring:** SUS316L, Platinum, Tantalum, and more

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**Electrolysis Bath**

**Overview and Problems**
- Need multi-channel data logging with fast sampling measuring each cell voltage

**Benefits**
- Rapid detection of pin hole of membrane
- Longer maintenance period of each cell
- Less maintenance of relays
- Can accept other process inputs: pressure, temperature, pH, ...

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**Cell Voltage Monitoring**

**Solution**
- 10 msec sampling fastest
- Isolated inputs, High Withstand Voltage: 600 V<sub>Peak</sub>/V<sub>cc</sub> (cont.)
- Up to 60 ch per system, Ethernet interface for expandability
- Individual cell-voltage measurement with ±0.004 V accuracy
- Long-life semiconductor relay
**Electrolyzer Plant for the World**

**Monitoring HCl Concentration**

**Overview and Problems**
- HCl concentration monitoring
- High concentration HCl easily deteriorate the sensor

**Solution**
- Special electrode material resistant to concentrated HCl
- Concentration (Weight %) free programmable

**Benefits**
- High stability and accuracy for quality control

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**Final Production Monitoring NaOH Concentration**

**Overview and Problems**
- NaOH concentration monitoring after electrolysis tank and concentrate drum
- Need accurate measurement not affected by temperature variation

**Solution**
- Special tuning fork sensor
- Stable density measurement against temperature change

**Benefits**
- High stability and accuracy, for quality control of Caustic Soda

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**Chlorine Gas Drying Process Monitoring H2SO4**

**Overview and Problems**
- H2SO4 concentration monitoring
- High concentration H2SO4 easily deteriorate sensor
- Various measurement range

**Benefits**
- High stability and accuracy to improve efficiency of drying process
- Only 1 spare sensor for 3 steps drying tower tank

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**Sensor for Conductivity**

Yokogawa can prepare wide variety of sensors and fittings

**Sensor Materials:**
- PEEK
- PFA

**Fittings:**
- Direct Insertion
- Flow Holder, and more
Our Goal

Our shared goal is customer satisfaction through operational excellence. Yokogawa has brought true innovations to industry. We are committed to ensuring accuracy, reliability, and safety of your production system throughout your business life cycle. Our comprehensive solutions and expertise help you achieve more results with less total costs of ownership. Below key technologies shall aim for your operational excellence.

Inductive Conductivity Sensors

ISC sensors use a high performance engineering plastic of PEEK (polyetheretherketone) that provides abrasion and corrosion resistance. The sensor has a large bore (17 mm) for optimal resistance to fouling processes and when properly installed, the flow will keep the sensor clean, to help avoid measuring errors. This large bore also allows quick response even on low flow measurement. Also available upon request is a PFA lined sensor that provides excellent heat and chemical resistance.

Dual Frequency Coil Excitation

Magnetic Flowmeters measure flow volume with Faraday’s law. The frequency of excitation current given to coils affects in the measurement accuracy and response time. Dual Frequency Coil Excitation is Yokogawa’s original technology to ensure ± 0.35% accurate measurement as well as 0.1 second fast response simultaneously. Our signal processing technique enables us to bring the benefits of an AC & DC magnetic flowmeter into a single magnetic flowmeter.

ASIC for Accurate Measurement

The measurement engine for DAQMaster series is requested to ensure accurate measurement even under the sampling speed as fast as 10 msec measurement interval. This performance is achieved with by Yokogawa-developed special A/D converter.

High Withstand Voltage

For performing accurate monitoring for each of cell voltage as well as other parameters like temperature, isolation between channels is the key. A/D circuits of DAQMaster input modules use special transformers. Semiconductor relay, designed by Yokogawa, is another key component for tough isolation. This enables high-speed scanning, while eliminating the periodic replacement of relay board. In addition, DAQMaster’s input modules employ integrating A/D converters with superior noise rejection performance.
For Your Operational Excellence

Inductive Conductivity Transmitter

**ISC202**
- Single stain-resistant sensor covers a wide measuring range
- Process-independent customized temperature compensation
- Fieldbus communication capability
- Intrinsically safe version

pH Transmitter

**PH202**
- Designed for two-wire system configuration
- Fieldbus communication capability
- Event logbook
- Intrinsically safe version

Liquid Density Analyzers

**DM8**
- Measures liquid density with high sensitivity and excellent stability
- Measuring range of 0.5 to 2.0 g/cm³, unaffected by flow rate and viscosity
- Sanitary and flameproof detector also available

Data Acquisition

**DAQMaster Series**
- Modular layout up to 60 channels
- High speed sampling: 10 msec fastest
- High Withstand Voltage (Reinforced Insulation): 600 Vrms/Vcc (cont.)
- CF Card for data backup
- Expandability over Ethernet

Magnetic Flowmeter

**ADMAG AXF Series**
- Best-in-class performance with dual frequency excitation method
- Predictive electrodes adhesion diagnostics
- Variety of liners & electrode materials
- Fieldbus communication capability

Pressure Transmitter

**DPharp EJA/EJX Series**
- Best installed performance
- Compact and rugged design
- Multi-sensing digital sensor
- SIL2 as standard (EJX)
- Fieldbus communication capability

Temperature Transmitter

**YTA Series**
- High resolution, high stability and high versatility
- Dual compartment housing for harsh environments
- SIL2 safety as standard feature
- Fieldbus communication capability

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vigilantplant®
The clear path to operational excellence

VigilantPlant is Yokogawa’s automation concept for safe, reliable, and profitable plant operations. VigilantPlant aims to enable an ongoing state of Operational Excellence where plant personnel are watchful and attentive, well-informed, and ready to take actions that optimize plant and business performance.

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