# EMOS®
# SAFETY PLUS

## IMPROVE PLANT SAFETY with early, automatic event detection and recommended actions.



Preventive alert by **EMOS® Safety Plus** of possible brine contamination with recommendation to check the brine quality.

## KEY FEATURES AND BENEFITS

| BENEFITS | FEATURES |
|----------|----------|
| Safeguards Against Some of the Most Frequent / Critical Faults | Early Detection of 6 Common Critical Events |
| Fewer Unplanned Shutdowns | Detects Brine Impurities and Insufficient Electrolyte Flow to Cells |
| Shorter Downtime to Resolve Incidents | Specific Event Identification |
| Increased Plant Utilization Rate | Recommended Corrective Action for Each Event |
| Improved Operator Effectiveness and Efficiency | Designed for the Chlor-Alkali Industry |

## THE CHALLENGE OF AVOIDING COMMON CRITICAL EVENTS

Under constant competitive pressures, chlor-alkali plant managers strive to maintain good profitability. A single harmful event like **brines impurities** can stop production for several days or weeks, seriously jeopardizing the plant operation and revenue stream. That is why so many efforts are devoted to preventing critical and frequent faults.

Moreover, the chlor-alkali is undergoing a major generational shift, as experienced and highly skilled employees retire and are replaced by a younger generation. In this context, plant safety hinges on successful transfer of know-how and expertise from retiring workers to new hires. Unfortunately, it is probably not possible to fully transfer to a new colleague all the knowledge acquired over 20 or 30 years of work experience.



## EARLY EVENT DETECTION, IDENTIFICATION, AND CORRECTIVE ACTION

EMOS Safety Plus provides the answer to these challenges by preventing frequent, critical events and by giving operators or process engineers the necessary guidance to respond to incidents like chlor-alkali experts. Indeed, Safety Plus detects hours or days in advance some of the most common and critical events that can affect chlor-alkali plants, it precisely identifies each event, and provides clear corrective action so that the operator can take immediate action.

Leveraging machine learning, Safety Plus compares the measured cell voltage with the predicted voltage, for the specific process conditions. Any major gap between the two values triggers an alarm, which enables operators to quickly respond and prevent an emergency shutdown.

Safety Plus was specifically designed and optimized for the needs of the chlor-alkali industry using proprietary algorithms and AI-assisted models based on R2's unique experience of monitoring and analyzing over tens of thousands of electrolyzer cells worldwide.

**R2**

PRODUCT DATA SHEET                                    *MKD0091 v1.0*    2

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## FAULTS DETECTED

| Fault | Description | Frequency | Impact |
|---|---|---|---|
| Insufficient Electrolyte Flow to Individual Cell | Brine or catholyte flow to cell is insufficient du to a plugged inlet tube or other reasons. It can cause membrane damage. | **HIGH** | **SEVERE** |
| Severe Brine Impurities | High concentration of brine impurities degrades membrane quality via precipitation of hydroxides or salts. Current efficiency decreases. | AVERAGE | **SEVERE** |
| Startup with Corrosives | Corroded cell impurities are polluting membranes because nickel impurities were not completely flushed from the anodic compartment during the last shutdown. Applying current will damage the membranes. | AVERAGE | MODERATE |
| Electrolysis without Flow | The electrolyzer is energized (main power supply or polarization rectifier switched on) without brine or/and catholyte flow. Cells are damaged and can explode, because the inerting gas (nitrogen) is only fed to individual cells when there is electrolyte flow. | AVERAGE | **SEVERE** |
| Brine Purge Incomplete | Brine flow is stopped, but the anodic compartment is not completely free of chlorine. Cell corrosion, and membrane or cathode coating damage may occur. | **HIGH** | MODERATE |
| Feed brine pH Too High During Startup | Cells are not generating chlorine with 10% of the full load reached. Brine feed pH is too high or all membranes are damaged, and the cells may explode. | AVERAGE | **SEVERE** |

## SYSTEM REQUIREMENTS

| EMOS® Server Minimum Requirements | |
|---|---|
| Operating System | Windows Server 2012 |
| RAM | 16 Gb |
| Hard Drive | 1 TB SSD – RAID 1 |
| Network | At Least 3 Adapters: 1 GB/s Each |
| Communication | OPC Link with DCS |
| EMOS® Safety Plus will be provided by R2 on the EMOS® AI Server | |
| **NOTE: Since computer technologies are constantly changing, please contact us to verify if your server can run EMOS® Safety Plus.** | |

## ORDERING INFORMATION

| Part # | Description |
|---|---|
| SW440 | EMOS® Safety Plus License |

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