R2 SILCAM: LOGIC SOLVER AND COMMUNICATION MANAGER

OVERVIEW

Especially designed for the cellroom, the **SILCAM** is the brain of the **EMOS SIL2 Safety System**. It contains three (3) building blocks:

- SFOCOM: Logic Solver
- SIL2 Algorithms: Protects against all known events
- IFOCOM: Communication Manager

SFOCOM

Developed and built by R2 and certified by TÜV to SIL2, the SFOCOM receives the voltage data from the **MODA Intelligent Data Acquisition Sensors** and compares the measurement with the calculated set points. If a problematic situation is detected the SFOCOM will trigger alarms and trips through dry contacts connected directly to the plant ESD or DCS and will stop the process within one second.

4 LEVELS OF ALARMS/TRIPS

- **LO-LO:** Dynamic and following the load, this trip algorithm protects the electrolyzer against the most dangerous events which are a membrane tear and a short circuit.
- **THERMAL INDIVIDUAL HI/HIHI:** Based on the heat production of a single cell compared with its neighboring cells, this trip algorithm will protect you under all conditions.
- **ABSOLUTE HI/HIHI:** Traditional, fixed high trip.
- **GLOBAL HI:** In case ALL cells are going up at the same time.
- **No false trips (system integrity diagnosis):** The system recognizes the difference between a loose cable/bad contact and a dangerous event that will bring the voltage down. Because cellrooms need to be protected against the worst without the fear of false trips.

SIL2 ALGORITHMS

From an extensive hazop study conducted with several years of data from plants around the world, R2 has developed and integrated advanced detection algorithms into the SFOCOM that detects all known events that can occur in a cellroom such as:

- Anode loss of coating
- Cathode loss of coating
- Electrode passivation
- Membrane poisoning
- Insufficient electrolyte feed
- Cell temperature control fails
- Electrolyte concentration control fails
- Differential pressure out of range
- Leaking cells
- Membrane pinholes, tears and bllsters
- Short circuits

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TECHNICAL SPECIFICATIONS

General	
Supply Input Range:	100-240 Vac, 50 60Hz nominal
Current Consumption:	300mA @ 240Vac, 600mA @ 120Vac
Electrical Isolation:	2200V between power supply & measurement input channels.
Analog Signal Input:	Up to (2) 4 20mA, CAT I, maximum 50VAC, 120VDC overvoltage.
Accuracy:	±10 µA
Field Communication:	Digital Optical Communication Bus (R2 Protocol)
Copper Communication Port:	Standard Ethernet 10/100Mb with RJ45 connectors
Optical Communication Port:	Standard Ethernet 100Mb @ 1300nm with ST connectors
Dry Contacts Ratings:	Maximum 6A @ 30Vac / 60Vdc (SELV)

Environmental	
Operating Temperature:	-20 to 40°C
Storage Temperature:	-20 to 60°C
Altitude:	2000m max.
Vibrations:	Displacement: 0.75mm Acceleration: 2 m/s^2 Frequency: 1-150 Hz
Shocks:	Acceleration: 50 m/s^2 Duration: 6 ms

Approvals
cTÜVus
CB Report
CE
Functional Safety (TÜVFS) pending

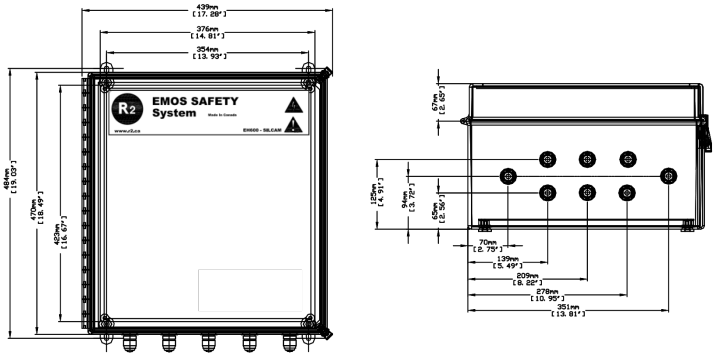
Mechanical	
Degree of Protection:	IPX7
Weight:	10 Kg (22 lbs)
Dimensions W x H x D (mm)	457 x 406 x 254 (18” x 16” x 10”)

Standards
IEC 61508, Safety Integrity Level (Designed to SIL2 requirements)
IEC 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use
IEC 61000-6-2, EMC Interference Immunity for Industrial Environments
IEC 61326-3-1, Immunity requirements for safety related systems and for equipment intended to perform safety related functions (Pending)
IEC 61000-6-4, Emission Standard for Industrial Environments
IEC 60068-2, Environmental Testing

ORDERING INFORMATION

Part Number	Description
EH600 1-1	SILCAM Assembly Complete with Enclosure, (1) IFOCOM & (1) SFOCOM
EH600 1-2	SILCAM Assembly Complete with Enclosure, (1) IFOCOM & (2) SFOCOM
EH600 1-4	SILCAM Assembly Complete with Enclosure, (1) IFOCOM & (4) SFOCOM

DIMENSIONAL DRAWING



ACCESSORIES & SPARE PARTS

Part Number	Description
EH630	Spare SFOCOM Logic Solver
EH631	Spare IFOCOM Communication Unit

ADDITIONAL INFORMATION

*R2’s **SILCAM Logic Solver & Communication** is part of the **R2 EMOS SIL2 SAFETY MAINTENANCE & OPTIMIZATION SYSTEM**. Contact R2 for more information.*

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