

# High-power EIS Analysis System

For fuel cell stacks

For electrolyzers

Simultaneous multi-channel EIS Acquisition

MegaEIS Product Family



Up to 1000 V | 2000 A | 20/250 kW | 1000 EIS channels



## Applications

Typical applications include hydrogen fuel cells, water electrolyzers, solid-oxide cells, redox-flow batteries, and lithium batteries with high-current and high-power requirements. Additionally, EIS is utilized in applied research, manufacturing testing, and quality control.

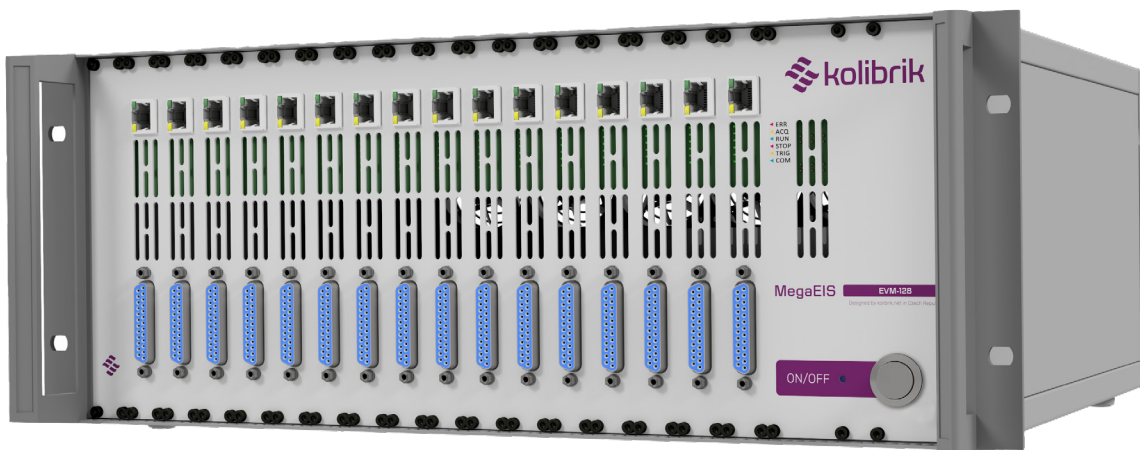
## MegaEIS Product Family Description

**MegaEIS** product family is a precise modular testing system for **EIS analysis** of **fuel-cell stacks** and **electrolyzers**. System consists of power stage which handles the power, and EIS acquisition system which can perform impedance spectroscopy analysis at all cells simultaneously.

**For fuel-cell stacks**, power stage is built from EIS load modules. Your stack can have up to **1 000 cells** and provide current up to **2 kA**. System is designed for cooperation with external DC load which may handle most of the stack power (up to 300 kW). Maximum internal power dissipation of MegaEIS power stage can be up to **20 kW**. System is **water-cooled**.

**For electrolyzers**, power stage is extended by internal or external power supply, so the system works as regulated power source, capable of EIS measurement.

**EIS acquisition** runs simultaneously on all channels, so the system is suitable for rapid and precise analysis in R&D, for QA in manufacturing, or in service diagnostics. MegaEIS also provides **DC cell voltage monitoring** and enables characterization using important electrochemical methods – **Polarization Curves, Chronopotentiometry and Chronoamperometry, Load Cycling, Current Interrupt Technique**, etc.



## Unlock Power with EIS Analysis

**Electrochemical Impedance Spectroscopy (EIS)** analysis is the ultimate technique to unlock the secrets of your electrochemical devices. Whether you are working with hydrogen fuel cells, electrolyzers, batteries, or any other system that involves electric current and chemical reactions,

EIS analysis can give you a complete picture of what’s going on inside your devices. A standout feature of the EIS method is its unique ability to analyze your device seamlessly, during its standard operating conditions.



## Technical Parameters

Power supply	110 ... 230 VAC / 50 ... 60 Hz, 3x 400 VAC for high-power devices	
Dimensions	Modular design for 19" rack cabinet	
Protection rating	IP20	
Input voltage	Up to 1000 V *)	
Total input current (internal + external load)	Up to 2000 A *)	
Internal load current	Up to 2000 A *)	
Maximum internal load power dissipation	20 kW *)	
Cooling	Water	
Stack electrometer voltage range	Up to $\pm 1000$ V	
Sampling	24-bit ADCs, low-noise 50/60 Hz filtered sampling for DC measurements 24-bit ADCs, up to 1.25 Msps for EIS measurements	
Measurement resolution	0.001% of selected range	
Accuracy Voltage	Voltage	$\leq 0.1\%$ of range + 0.1% of reading
	Current	$\leq 0.1\%$ of range + 0.5% of reading
Acquisition methods	constant V, I, open circuit, manual control chronoamperometry, chronopotentiometry linear sweeps, polarization curves, current interruption load cycling/profiling EIS – electrochemical impedance spectroscopy programmable sequences of all available methods	
EIS frequency	1 mHz ... 100 kHz	
EIS amplitude	Up to 20% of maximum internal current for < 1 kHz	
EIS channel voltage range	$\pm 3$ V (can be customized)	
Number of EIS channels	Up to 1000 (limited by max. voltage) 8 channels per one module	
Connection	USB 2.0, Ethernet	
Software	Control software for MS Windows Features: measurement setup and control, data acquisition, processing and visualization, pascal or python scripting, remote control by TCP/IP server for integration with top-level control system, examples for remote control using python or LabVIEW.	

\*) According to particular model



## Sample Configurations

### Sample configurations of multi-channel EIS analyzers

Voltage	Internal current	Booster / Total current	Max. internal power dissipation	Number of cell channels	Mode	Applications
600 V	120 A	800 A	16 kW	512	Load	H2FC stacks up to 250 kW
30 V	200 A	-	4 kW	24	Load	H2FC stacks up to 4 kW
200 V	300 A	300 A	6 kW	24	Load	H2FC stacks up to 80 kW
1000 V	600 A	1200 A	4 kW	128	Load	H2FC stacks up to 50 kW
250 V	400 A	400 A	8 kW	256	Load	H2FC stacks up to 100 kW
20 V	500 A	-	10 kW	8	Source	Electrolyzers up to 10 kW
200 V	200 A	200 A	4 kW	8	Load	Redox-flow batteries

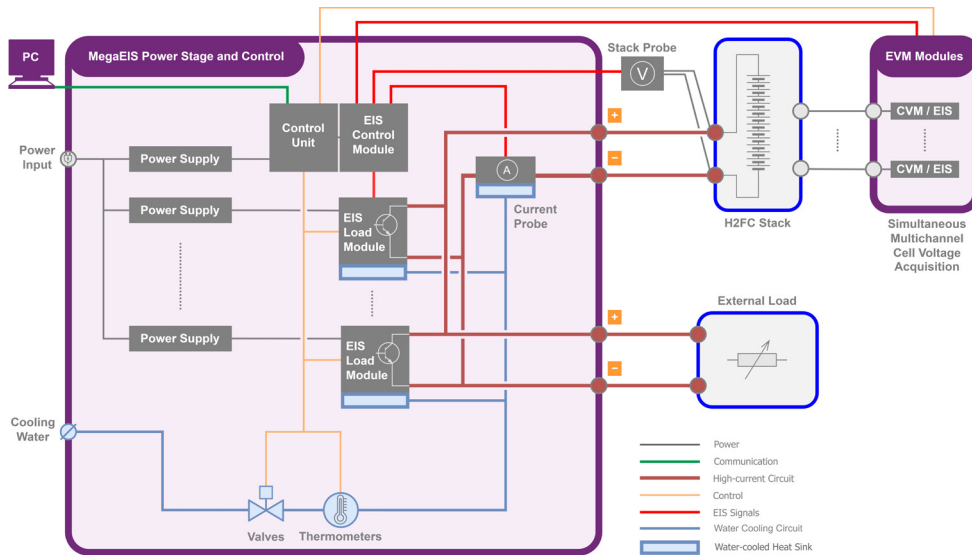
### Sample configurations of Kolibrik product family of single-channel EIS devices

Voltage	Internal current	Booster / Total current	Max. int. power dissip.	P/G *) module	Mode *)	Applications
10 V	800 A	-	8 kW	5 V, 100 A	Zeroload + P/G	Single Cells, short stacks
40 V	1200 A	-	20 kW	5 V, 100 A	Load + P/G	Single Cells, stacks
40 V	1200 A	1200 A	12 kW	5 V, 100 A	Load + P/G	Single Cells, stacks
10 V	200 A	-	2 kW	10 V, 50 A	Load + Source + P/G	Redox-flow batteries, electrolyzers
55 V	150 A	-	4 kW	-	Load + Source 8 kW	Solid-oxide FC/EL cells/ stacks
20 V	800 A	-	8 kW	-	Zeroload	Large-area cells, short stacks
120 V	50 A	500 A	400 W	-	Load	Stacks up to 5 kW
5 V	100 A	-	1 kW	5 V, 100 A	P/G	Cells, electrolyzers, batteries, ...
20 V	200 A	-	4 kW	-	Source	Electrolyzers

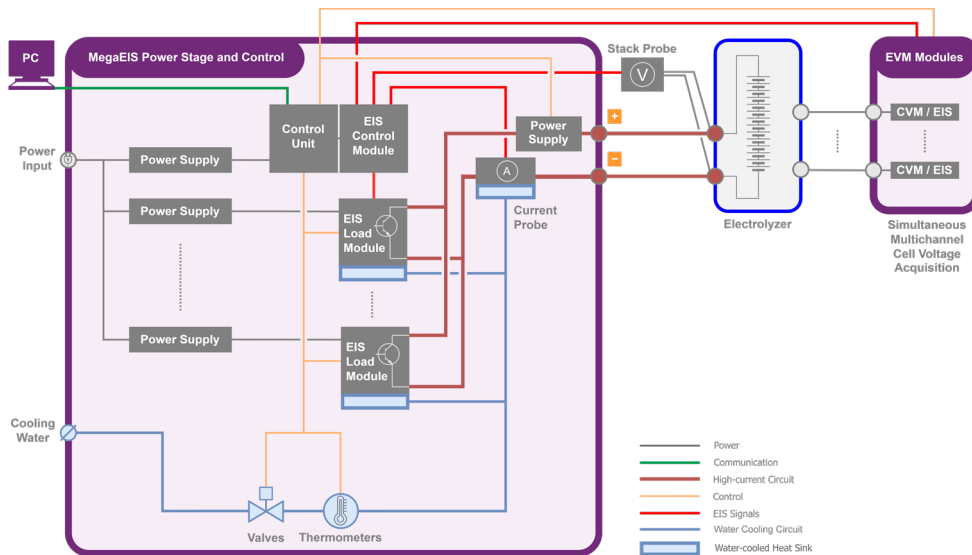
\*) P/G - Full 4-quadrant Potentiostat/Galvanostat. Zeroload - optional true zero-voltage operation for single cells.



# MegaEIS for Fuel-cell Stacks



**Block diagram of system configuration for fuel-cell stacks.**  
External load connection and CVM / EIS blocks are optional.



**Block diagram of system configuration for electrolyzers.**  
Power supply can be optionally external. CVM / EIS blocks are optional.

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