

FEV Signature Solutions Custom Industrial Automation & Programmable Logic Control Solutions



Profit from our ready-to-use automation and programmable logic control (PLC) solutions for testing purposes and industrial applications

FEV offers

- ▶ Services from planning to realization and commissioning of industrial automation according to your instrumentation diagrams, requirements and specific needs
- ▶ Separate or joint development of hardware and software (including Matlab/Simulink models) with white box option for the software to enable you to use FEV's solution as basis for your own development
- ▶ Additional services: modification/extension, integration, commissioning and calibration of existing and legacy control systems

Why FEV

- ▶ 20+ years of expertise in control and diagnostic software for various kinds of mobile and stationary applications
- ▶ We provide hardware systems based on market-leading brands and certified state-of-the-art technology and safety
- ▶ From concept to series maturity, including design, simulation, prototyping, testing and implementation
- ▶ Solutions highly customized to your specific application and according to EU-, UL- and CSA-directives



Reference project FEV energy + resources

DryHy – Turnkey control system development for solid oxide electrolysis

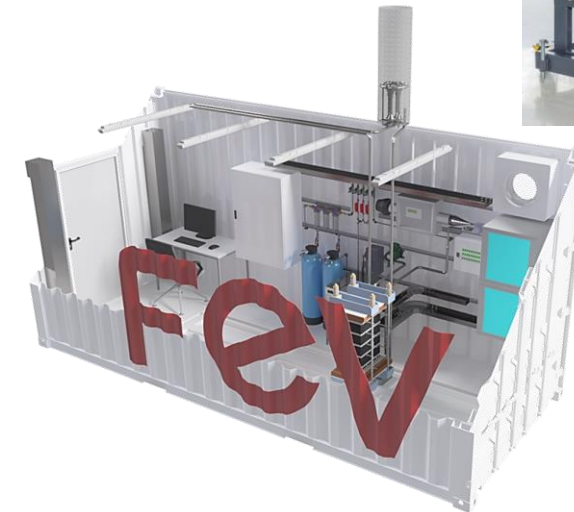
BACKGROUND: Project shows feasibility of methanol synthesis using synthesis gas from a SOEC electrolysis system and CO₂ from direct air capture. FEV integrates the control system to operate the SOEC system.

FEV involvement

- Development and design of a complete solid oxide electrolysis system
- Development of Control strategy and safety functions
- Cabinet planning and build
- Build-up and configuration of E/E system hardware
- Controls Software implementation
- Commissioning of full system
- CE Certification



Control of SOEC system with industrial grade Beckhoff PLC



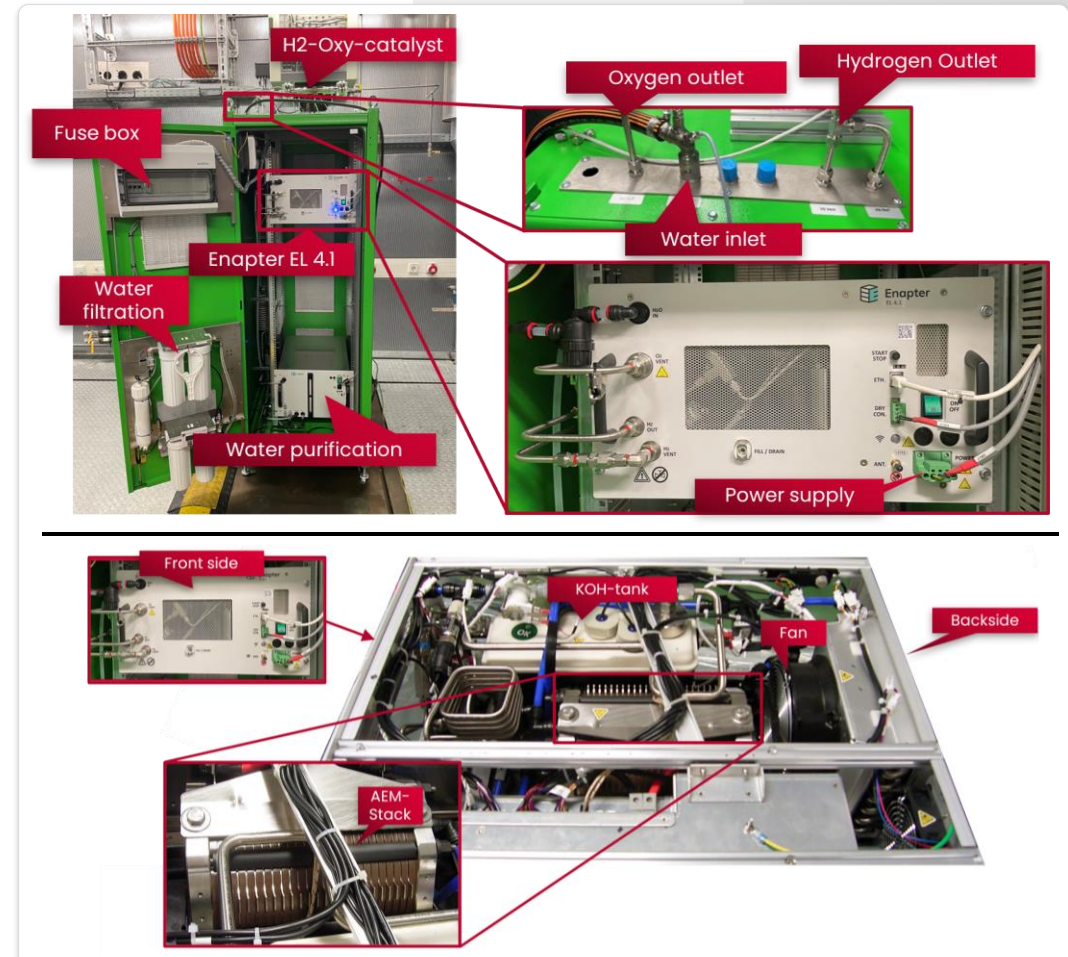
Reference project FEV energy + resources

Testing and benchmarking study of an anion exchange membrane (AEM) electrolyzer system

BACKGROUND: A turnkey and modular electrolyzer system is used to utilize self-generated excess energy (e.g., PV or wind). This requires a detailed understanding of the system under all environmental conditions, particularly for the startup.

Deliverables

- Commissioning of the electrolyzer system and data logging with pre-defined user-interfaces
- Basic measurements of the external system interfaces
 - Mass flows
 - Power supply
- Advanced measurements of internal system components
 - Cell voltages
 - Local pressure levels, temperature and currents
- System and component characteristics under various loads, during startup and shutdown phase as well as different ambient temperature levels
- Standardized FEV testing and benchmarking report



Reference project FEV energy + resources

HynnoAEM – Anion exchange membrane water electrolysis with integrated electrodes and an innovative stack design

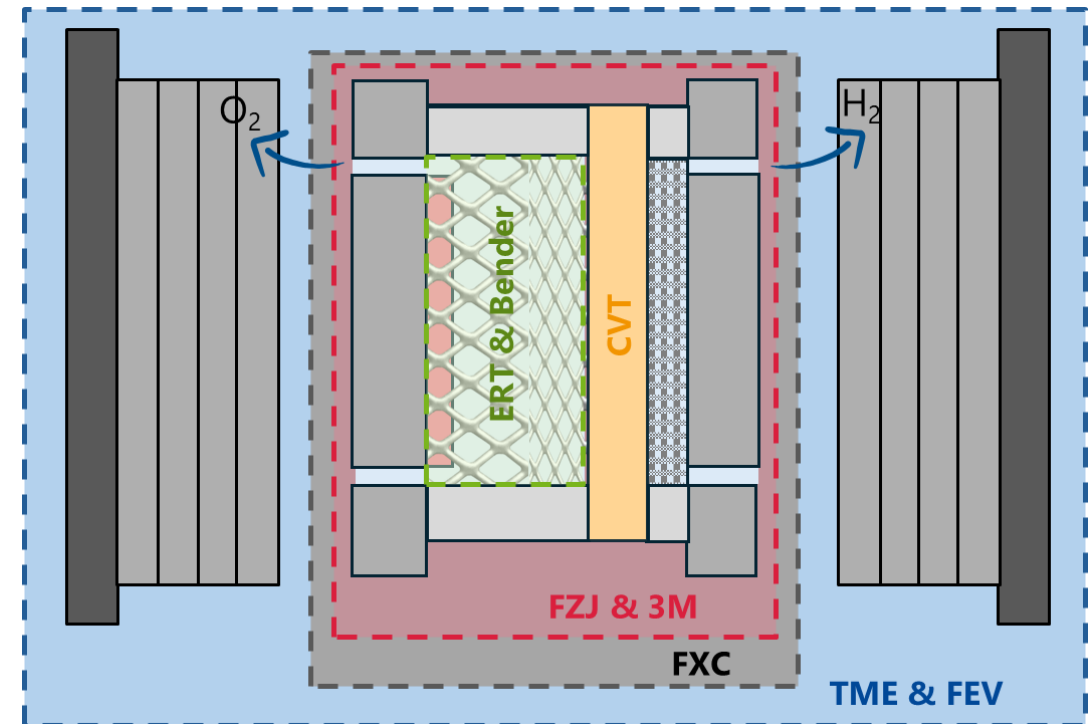
BACKGROUND: Funded project to improve Anion Exchange Membrane (AEM) technologies, scaling study for a MW system and advanced predictive function development

FEV involvement

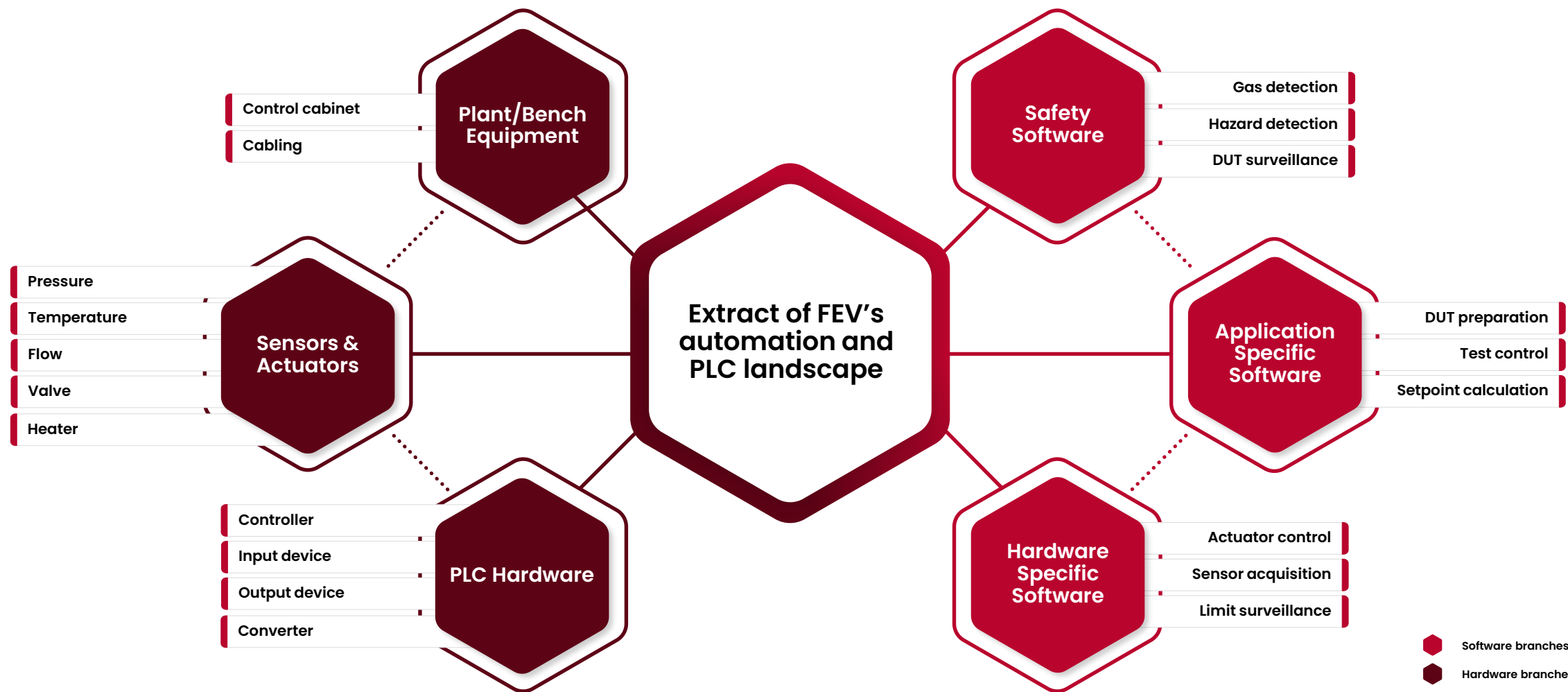
- Test protocol setup for single AEM membrane and reference turn-key system testing
- Operation AEM electrolyzer system under various operation conditions and environmental influences
- Advanced EIS measurements to investigate degradation effects, its impact parameters and stack state of health
- Function development to improve durability and performance for a scaled MW system
- Diagnosis concept and predictive control strategy



Client: Federal Ministry of Education and Research



Our automation and PLC landscape – including both hardware & software



Highlighted services

CUSTOM INDUSTRIAL AUTOMATION & PLC SOLUTIONS

Hardware Selection	Always executed based on the overall analysis of customer's requirements, environmental target conditions, applicable regulations of the target market, necessary precisions of sensors and actuators, required safety level at the target location etc.
Schematics & Documentation	All kinds of complexities can be realized, from simple sketches with Microsoft Visio to full EPLAN Electric P8 incl. Pro Panel
Software Architecture	Derived from a given software landscape of a system to be enhanced or developed from scratch for a completely new system, a software architecture is always the key point for starting safety reviews and programming the appropriate subfunctions
Higher-Level Automation Interface	Detailed analysis of the target environment of the control system will lead to a common definition of the hard- and software interface between the system in development and its higher-level controls to ensure proper desired functionality and safety
Safety Functionalities	Starting with different analyses of the target system, safety related additional hard- & software requirements will be defined and must be implemented in an early project stage to ensure verifiable testability, robustness and functionality of these measures

Get in touch with us for further information



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