

Electrochemical Synthesis Equipment Manufacturer

OVERVIEW

Existing power supply compromising Global compatibility and ability to remain competitive

A leading global manufacturer of direct electrochemical synthesis equipment has developed a range of autonomous, electrochemical hydrogen peroxide (H₂O₂) generators. High-purity H₂O₂ is produced locally using only water, electrical power, and air, with no undesirable waste. Generators are deployed into medical, agricultural, industrial, and other applications that require water treatment, wastewater treatment, or disinfection in textiles, chip board, fibre board and film or other primary production systems.

The original power supply solution had several critical issues resulting from limited functionality and flexibility. Problems that compromised both global compatibility of their generators, and their ability to confidently deliver the most competitive, compact, reliable, and cost-effective solution possible.



The HPA Series

THE CHALLENGE

Complex hardware modifications negatively impacting costs, footprint, and reliability

These on-going challenges required the customer to design in external circuits and modify the power supply hardware to achieve the specific features and requirements they vitally needed. This extra circuitry not only increased cost, complexity, and footprint, but also required more components and inventory management. Additionally, it reduced reliability.

The issues, as detailed below, could all be resolved by adopting the HPA1K5 power supply module as a single-component solution.

- The generators' global distribution calls for a wide AC input voltage range
- I2C communications are needed for highly efficient control
- The system requires an Enable control for optimal safe operation
- The H₂O₂ electrolysis stacks need constant current mode power management
- These functions should be delivered from a highly reliable, compact, and cost-effective product

THE SOLUTION

A single power solution providing flexible, programable and scalable integration

When the customer engaged with XP Power it soon became clear that the low profile and programable HPA1K5 power module offered an ideal solution – a single product that overcame each of the customer's critical challenges.

This contrasted with alternative solutions, which required an additional controller for communications, and extra circuitry to implement the Enable control. The HPA1K5's ability to eliminate both external circuits were critical to the customer's purchase decision.

The HPA1K5 power module has a single phase wide input range of 80 – 264 VAC allowing global usage with near zero impact on output throughout the input range. Additionally, it was able to meet the customer's other requirements so readily because of its inbuilt DSP platform. This allows the user to configure the features, in firmware, to optimise their specific application – immediately, without need for component changes, hardware modifications, or factory returns. XP Power provides a GUI for this, for programming the DSP via a digital bus.

Constant current mode, steady-state current level, and parameters for a current soft start that allows a controlled system start up are all standard user-defined options. Another is the Enable – rather than Inhibit – control, to ensure system safety. If the Enable signal fails, the system defaults to safe shutdown.

The customer used the GUI to fulfil their system development and power supply settings, backed by XP Power's technical support teams understanding of the application and capabilities of the power supply.

After completing development, the customer passed their optimized settings to XP Power, allowing them to factory configure the production power supplies. The customer receives these ready for installation, straight out of the box.

Another advantage of this approach was that the customer developed the control software and algorithms for control of the scalable electrolysis stacks in real time, using the comprehensive communication specification and user manual, with expert help from XP Power.

They have also integrated the HPA1K5 into their cloud-based communication system. Connecting the power module's I2C bus to a credit card sized single board computer (SBC, which in turn provided a gateway onto their cloud network. This allows the customer to manage the H2O2 generators for their users worldwide, from their European control centre.

RESULTS

High reliability and optimal performance enabling the customer to stay a market leader

The customer is using the HPA solution across a broad range of their products worldwide. They no longer require an additional circuit for hardware Enable or control hardware for electrolysis current control as they use digital controls through the power supply. By eliminating external control hardware and simplifying the digital interface, overall expense has been dramatically reduced, making the HPA a cost effective and long-term solution.

They are now looking at larger applications, such as water purification, with increased power demands. XP Power can help them scale either by offering larger power supplies, or by aggregating several power modules on a single Power Management Bus (PMBus), using I2C protocol.

By reducing complexity, component count, footprint, and cost – and removing a barrier to sales for their systems, the customer is now in a strong competitive position.