

HIL test for fuel cell controller

Micronova developed the Novacarts Fuel Cell simulation platform. It is a hardware-in-the-loop (HIL) simulator for testing of fuel cell control units used e.g. in alternative vehicles.



Novacarts Fuel Cell simulation platform (Source: Micronova)

The scalable HIL system is dedicated for validating of functions in fuel cell control units (FCCUs). It simulates the fuel cell stack as well as the environment of the associated control unit within the vehicle. The modular design and enhancement options allow the system to be adapted to various test requirements (e.g. power emulation, powerless simulation). Diverse CAN-capable modules are available for system extension. For example, the top-hat-rail Novacarts CAN switching control module NC-SWM1011 provides control functions for up to 24 relay modules NC-SWM1400. The latter controls up to eight high-voltage (max. 1000 V) relays.

The parameters and controllers used for each simulation may be modified via software thus eliminating the need for hardware replacement. In addition, firmware updates allow test engineers to adapt the simulator to future requirements, such as further communication interfaces or updated HV (high-voltage) architectures. The HIL simulator uses an open model platform with cycle times of a few ms and dynamic I/O functions. This enables the development of FCCU algorithms as well as use of real parts, dummy loads, and rest bus simulation. In addition to the SAE standard J2799 for communication between vehicle and hydrogen filling station, resistance simulations may also be carried out to simulate temperature sensors.

In combination with the Novacarts Battery HIL system, it is possible to simulate functions of the connected battery (e.g. state-of-charge, state-of-health) as well as cell balancing mechanisms. The two test systems combined may be used to test the complete fuel cell stack and the traction battery.

“With this new high-performance platform, we are specifically supporting the development of alternative and electrified drives,” emphasized Martin Bayer, head of testing solutions at Micronova. “We attach great importance to a cost-effective and time-efficient application for test service providers and test departments in automotive development. For example, Novacarts Fuel Cell HIL systems and Novacarts components can be fast and easily configured thanks to the use of the

same tool chain.” The company is part of the Embedded World 2020.

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