

New kid on the block: Heliocentris introduces successor to Nexa module

The popular Nexa[®] Power Module from Ballard has set a standard for uncomplicated integration. With that system no longer available, Heliocentris is now introducing a successor, as described here.

System comparison

The world's first series production 1.2 kW fuel cell module, the Nexa[®] Power Module from Ballard Power Systems, has become one of the most widely used fuel cell systems worldwide, because of the high quality and user-friendliness of the system. The news that Ballard is stopping production of the system, as a result of its strategic focus on the development and manufacture of fuel cell stacks, was received by many customers with disappointment in 2008. In 2009 – a little over a year after the official announcement from Ballard – the reliable and attractively priced system still continues to enjoy widespread popularity.

With the sale of the last units, this success story is coming to an end, and it is time to look

for alternatives. One of these is now available: In the fourth quarter of 2009, Heliocentris will launch the Heliocentris Nexa[®] 1200, a completely new fuel cell module developed by Heliocentris but based on the FCgen[™]-1020ACS stack from Ballard, with a power output of 1.2 kW. As the name suggests, it is positioned as a follow-up model to the Nexa Power Module from Ballard.

As a partner of Ballard Power Systems, Heliocentris has sold the Nexa Power Module around the world for the past five years. Heliocentris has integrated the fuel cell modules not only in training systems for fuel cell technology, but also in numerous turnkey projects commissioned by its customers.

For independent integration of the fuel cell module by the customer, Heliocentris has

also developed matching integration components. In this way, the company has sold hundreds of Nexa Power Modules, and will continue to service the systems in the future. More than five years of experience in sales and servicing of the Nexa Power Module has created the ideal basis for the development of a proprietary system.

A new generation of modules

The goal of the Heliocentris development team was to create a follow-up generation for the popular fuel cell module, that can not only match the power output of the former system, but also offer significant improvements. 'The development of a mere replacement was never a desirable goal for us,' says Klaus Rupprecht, Head of Product Development at Heliocentris.

The development engineers succeeded in reducing the parasitic power consumption of the system by up to 50%, significantly increasing the overall system efficiency of the Heliocentris Nexa 1200 compared with the former model. This was achieved by the concept of atmospheric air supply in combination with the air-cooled stack.

The Nexa Power Module from Ballard uses a compressor for the reaction air supply, to overcome the higher pressure loss on the cathode side of the stack. A fan is provided for the separate supply of cooling air. But in the Heliocentris Nexa 1200, a single fan on the back of the system draws in ambient air for even distribution through the entire system. In addition to improved cooling, this makes it possible to eliminate components such as a compressor or cooling water pump, which cause significant parasitic loads. The FCgen-1020 stack is optimized for industrial production, and features a self-moistening cathode and other design features that work to full advantage in the Heliocentris system.

The system is therefore especially suitable for applications requiring long operating times with a limited hydrogen supply, for example in backup systems for stand-alone photovoltaic systems or uninterrupted power

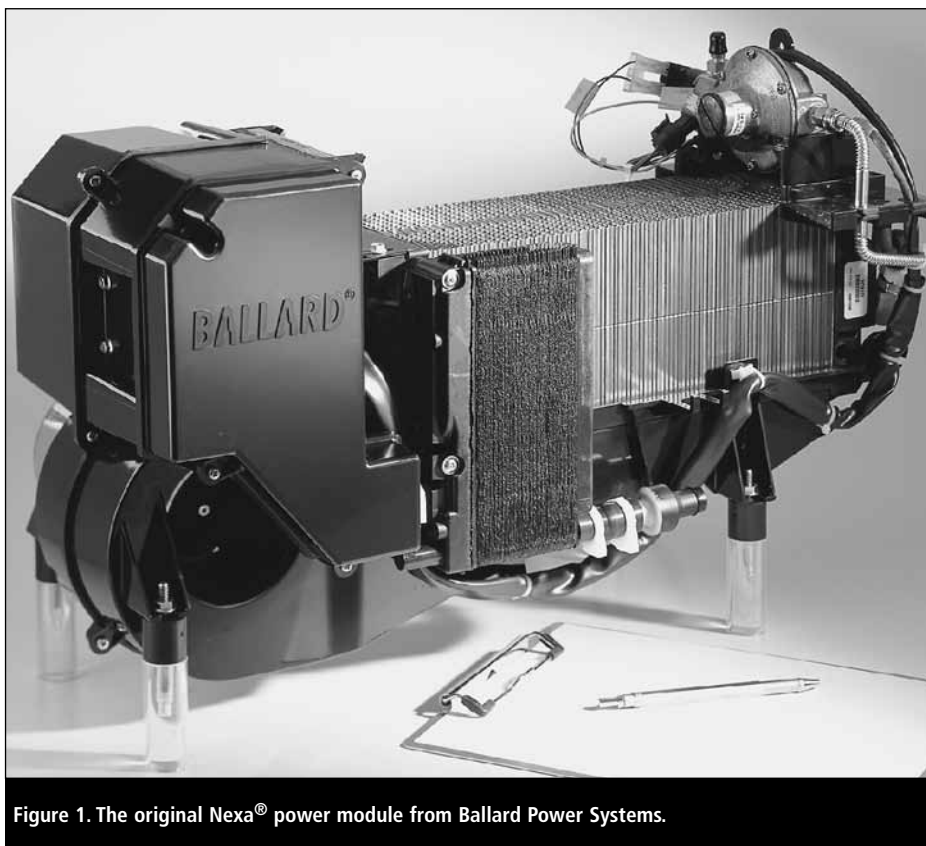


Figure 1. The original Nexa[®] power module from Ballard Power Systems.

| Dimensions | |
|------------------------|--|
| Width × depth × height | 400 × 550 × 220 mm |
| Weight | ca. 22 kg |
| Stack | |
| Model | FCgen™-1020ACS |
| Construction | PEM, air-cooled, open cathode |
| Power output | |
| Rated power | 1.2 kW |
| Rated current | 52 A |
| Output voltage | 23 to 36 V |
| Media | |
| Hydrogen quality | 99.95% or higher |
| Hydrogen consumption | 15 slpm (at rated output) |
| Air flow rate | 3000 slpm (at rated output and 30°C ambient temperature) |

Table 1. Technical data for the Heliocentris Nexa 1200.

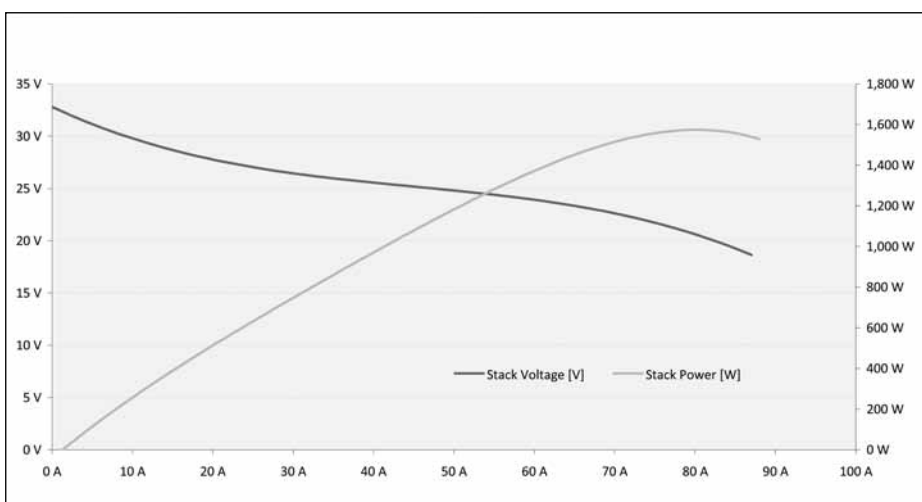


Figure 2. Efficiency curve for the Heliocentris Nexa 1200.



Figure 3. The Heliocentris Nexa 1200 fuel cell module.

supply (UPS) systems. According to Ballard, the service life of the FCgen-1020 stack is up to 4000 h, which is more than twice the life of the stack in the old Nexa system.

Easy integration

Although the fuel cell module from Ballard has already set standards with respect to ease of integration, Heliocentris has also made significant improvements in this area.

The Heliocentris Nexa 1200, as a fully integrated system, contains all system components in a stable plastic housing, which also functions as a component rack and air baffle system. This provides optimal protection for the stack and the other system components. The user need not worry about inadvertent manipulation or short-circuits on the stack, which can be caused by falling objects, for example.

Nor is it necessary to enclose the system prior to integration. In this respect, the Heliocentris Nexa 1200 eliminates complex integration processes. ‘Solely for the purpose of directed dissipation of cooling air, many of our customers have integrated the system from Ballard in a box,’ explains Klaus Rupprecht. ‘With the Heliocentris Nexa 1200 we have already solved this problem. The air outlet is designed for easy attachment of an exhaust air duct.’

The work of the integrators in draining the water accumulated during the reaction is also facilitated by the Heliocentris system. While the Nexa system from Ballard gives off water in condensed, liquid form, since it requires a humidifier, the water in the Heliocentris Nexa 1200 evaporates with the cooling air. Therefore, it is not necessary to drain the water from the application.

The module from Ballard was also somewhat more complicated in terms of the connections, with media, power output and communication interfaces positioned at different places on the unit. The Heliocentris Nexa 1200, on the other hand, has a central interface unit on the back.

With respect to orientation of the fuel cell module in the application, the system is likewise more flexible. While the system from Ballard could be installed only in an upright position, the Heliocentris Nexa 1200 can be installed vertically, horizontally and even overhead. The profile rails embedded in the housing enable easy mounting of the system in an upright or suspended position. The system is also optimized for integration in 19-inch racks.

Fit for the series

Especially for use in series applications, it is necessary that the fuel cell module fulfills the

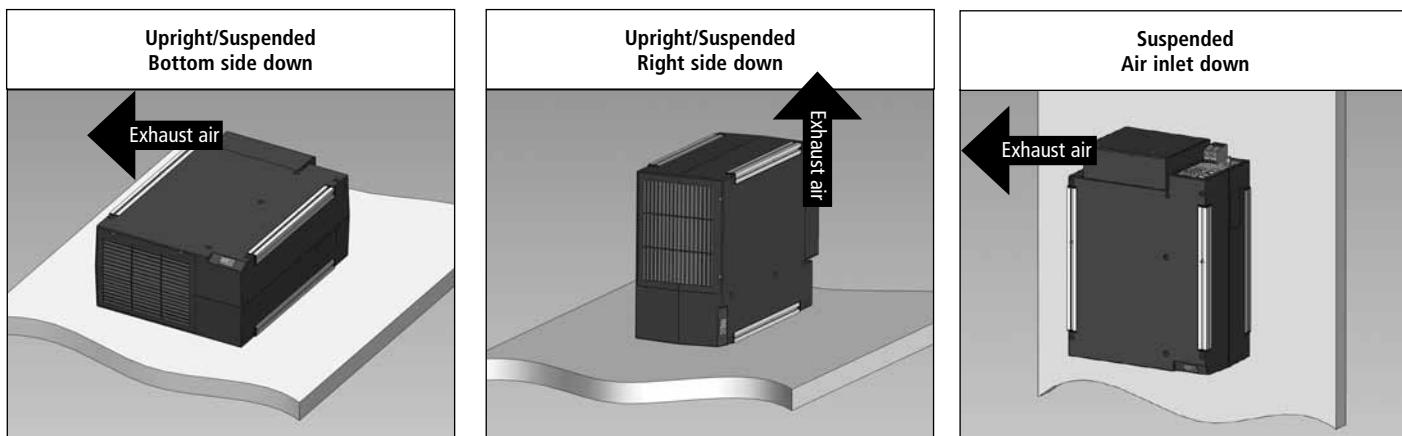


Figure 4. Possible orientation variants for integration of the Heliocentris Nexa 1200.

requirements of integrators for safety and maintenance. The Heliocentris Nexa 1200 features several innovative improvements over the original system from Ballard in this respect, and also conforms to the fuel cell standard EN 62282.

The system is equipped with an internal safety loop. If the loop is interrupted, for example in case of danger, the hydrogen source is automatically closed and the system switches to a safe state. It is also possible to integrate external components – such as an external hydrogen warning system – in the safety loop, and therefore in the overall safety concept of the application.

Simple maintenance tasks, such as changing filters, can even be carried out by the user. An

integrated error memory facilitates diagnosis in the event of an outage.

Summary

In a direct comparison with the reference system from Ballard, it becomes obvious that the Heliocentris Nexa 1200 is a fuel cell module for the next generation, which is clearly designed for the requirements of integrators. Its compact design, high degree of flexibility in the orientation of the system, mounting rails, and a central interface unit facilitate integration of the module. In combination with the improved system efficiency and the longer service life of the stack, the

system is expected to be a successful follow-up system to the Nexa Power Module from Ballard.

Outlook for 2010

The Heliocentris Nexa 1200 will be available in Europe starting in the fourth quarter of 2009, initially as a lab system. In addition to the fuel cell module, the product bundle includes a startup kit for fast and easy system startup, as well as monitoring software. Heliocentris will also offer an optional electronic load.

Towards the end of the first quarter of 2010, various qualified integration components will follow, to provide support to users in integrating the system in their own applications. In addition to the Overall System Controller (OSC) for the control of complex energy systems, consisting of several sources and drains, the products offered will include a DC converter for battery hybridization and matching components for the hydrogen supply.

A Drive Set, for the fast assembly of an electric drive unit, is already being planned. It will consist of a control unit, a disk armature motor, and an accelerator pedal. As customers have come to expect from Heliocentris, all components are matched to facilitate integration by the user.

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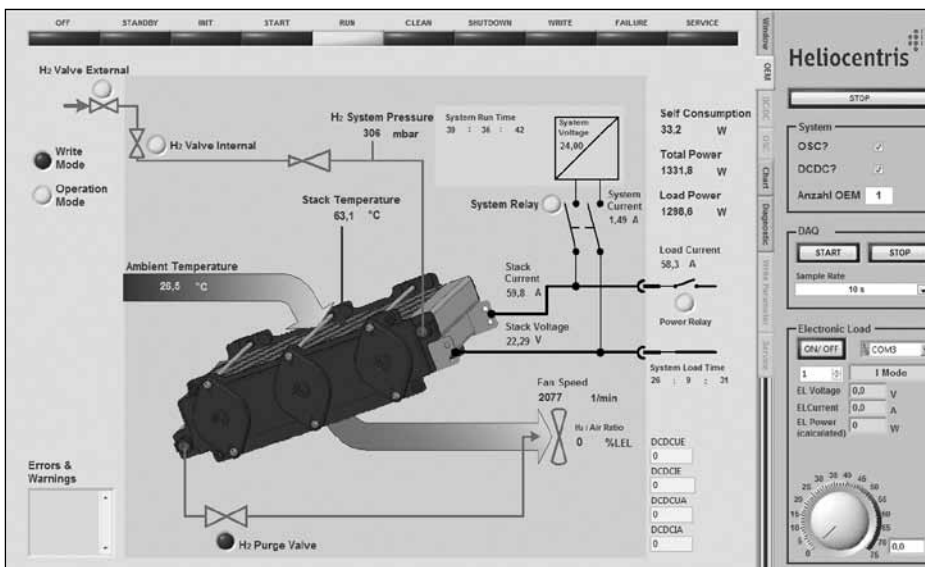


Figure 5. Monitoring software for the Heliocentris Nexa 1200.

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