

Market Electromedical

The energy demand for portable medical equipment has increased significantly, driven by the need for efficient decentralized care centers. For example, immediate medical assistance at disaster sites and car accident must be supported by reliable lightweight power sources. There are a wide range of devices such as defibrillators, X-ray diagnostic units, portable electrocardiographes, ultrasounds and ventilators, remote medical diagnostic devices, wheel-chairs, which have to operate close to patients' point of treatment even in extreme environmental conditions and for a long time.

GENIOL is the ideal high energy density lithium battery technology to be hosted into the portable medical equipment. It is based on a proprietary Battery Management System, a wide range of selected lithium cells and connectors. Our battery technology enables to design custom solutions with reduced time and cost to market.

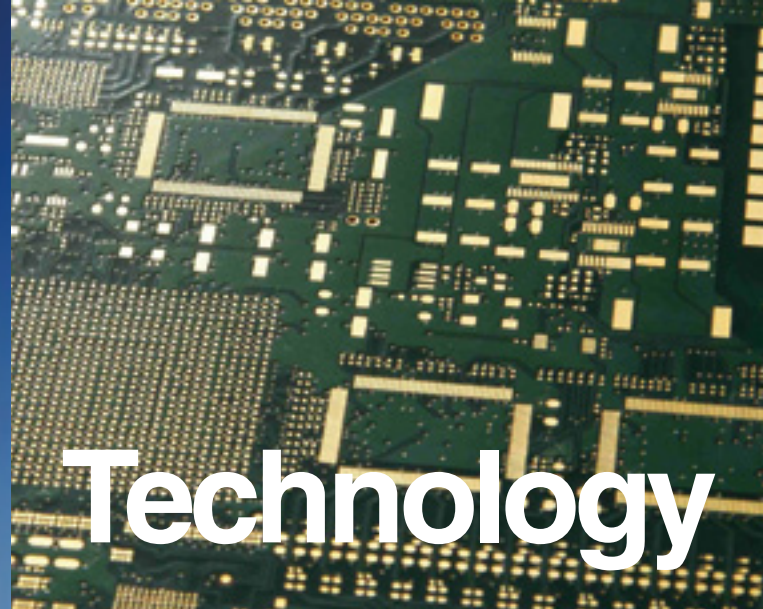
GENPORT 300 HFC utilized as a battery charger or internal power source in medical devices, provides constant, reliable, long term power as a stand-alone generator, as well as integrated as an internal power unit.

Sailing is a great and exhilarating experience, but direct contact with nature can be compromised by unreliable, short-term and noisy diesel and secondary battery power sources. In recent times there has been an increased call for mounted devices on board, requesting additional power sources. A unique adventure may be even more compromised by an inadequate power source; experience of smell and noise for a long voyage affects the entire spirit of the adventure and eventually the limited residual capacity of the battery obliges one to limit a sailing plan.

GENPORT 300 HFC provides the required energy, in a compact, smooth, vibration-free generator. **G300 SERIES** can be utilized as an auxiliary power unit to feed all the internal devices, providing a constant, reliable, long term, silent power as a stand-alone generator using small GENFUEL cartridges, metal hydrides canister, as well as integrated with existing renewable energy systems.



Market Nautical



Technology

Portable Fuel Cell generators are electrochemical devices that continuously convert the chemical energy of the fuel (hydrogen) and an oxidant (air) into DC electrical energy.



A polymeric membrane fuel cell conventionally comprises a negative electrode (anode) and a positive electrode (cathode) including a suitable catalyst and arranged with a stacked relationship in a polymeric electrolyte. In these cells hydrogen operates as a fuel and it supplies the anode, whereas oxygen or simply air enters the fuel cell from the cathode side. More specifically, hydrogen atoms are split into protons and electrons which migrate toward the cathode through different paths, protons through the polymeric electrolyte whereas electrons provide a continuous or direct current which can supply an outer circuit. Near the cathode, protons and electrons are recombined with oxygen to again provide water molecules. This reaction is facilitated by the provision of a catalyst, a chemical substance speeding up the process and intervening into the reaction

without being consumed. From a chemical energy to electric energy transforming standpoint, the system can be nearly assimilated to a battery, however it is not subjected to discharges, and the reactor merely produces electric power due to the presence of fuel. Thus, if the fuel cell is used instead of a secondary battery, the recharging time will be related to the time necessary for replacing the cartridge, instead of several hours which would be necessary for recharging an accumulator pack. Moreover, transforming chemical energy into electric energy, without combustion, provides an absolutely clean and non-polluting process since the single residue will consists of water steam. Conventional portable power generators convert chemical energy of the fuel into heat and then to mechanical energy, which is finally converted into electrical energy. A portable fuel cell by-passes all these energy conversion processes and provides a reliable, constant supply of electrical energy without moving parts and operating at low temperatures. Lithium-ion batteries (sometimes abbreviated Li-ion batteries) are a type of rechargeable battery in which the cathode (positive electrode) contains lithium, and the anode (negative electrode) is made of a type of porous carbon. Lithium-ion batteries are common in portable consumer electronics because of their high energy-to-weight ratios, lack of memory effect, and slow self-discharge when not in use. In addition to consumer electronics, lithium-ion batteries, usually integrated in packs of several cells, are increasingly used in defense, automotive, and aerospace applications due to their high energy density. However, certain kinds of mistreatment may cause conventional Li-ion batteries to explode. For this reason it is necessary to design an adequate battery management system which ensures the protection and control of the battery pack. The combination of PEMFC (which mainly provides high energy density) with high power density batteries allows to extend the utilization of portable devices to un-precedented users' applications. This is the concept behind the hybrid fuel cell technology. Genport is one of the worldwide key designers currently bringing into the market advanced and cost effective solutions for the portable power generation based on this concept.



Products

genport 300 hybrid fuel cell



GENPORT 300 Hybrid Fuel Cell is a lightweight portable fuel cell system designed to maximize power density and reduce to zero noise, thermal signature, pollution and vibration. It provides a constant and reliable source of power for any off-the-grid application as Battery Charger (BC) and Auxiliary Power Unit (APU).

- Main Features of GENPORT 300 Hybrid Fuel Cell**
- 300 Watts nominal power output (400 Watts peak power)
 - Voltage: 24 Vdc, 230/110 Vac
 - Extreme Operating Temperature Range
 - No thermal or acoustic signature
 - Lightweight
 - Green Hydrogen Fuels: GENFUEL, Metal Hydrides, Compressed Hydrogen
 - Rugged water-proof case
 - CE Marked

genport 300 hybrid PEM solar

GENPORT 300 Hybrid PEM Solar is a configurable portable power unit, integrating a retractable photovoltaic primary energy source, with a PEM fuel cell and a PEM electrolyzer.

- Main Features of GENPORT 300 Hybrid PEM Solar**
- Portable continuous power source
 - 1400 Watts peak power output
 - Voltage: 24 Vdc, 230/110 Vac
 - No need of battery bank
 - Higher energy density than traditional PV units
 - Runtime 24 Hours/7 days without external fuel
 - No thermal and acoustic signature
 - Rugged water-proof case

genfuel H₂ on demand

GENFUEL is an innovative fuel concept, available in safe, economical and zero impact cartridges. The cartridge must be inserted into a stand-alone case and while the fuel cell is running, it starts to produce hydrogen. A hot swapping system allows to continuously generate hydrogen.

- Main Features of GENFUEL**
- Solid H₂ in cartridges
 - Safe H₂ storage and generation
 - Zero environmental impact
 - H₂ generation on demand
 - High energy density (1000 Wh/kg)
 - Recyclable by-products

genH₂

- Main Features of GenH₂**
- PEM H₂ generator
 - Safe H₂ storage and generation
 - Zero environmental impact
 - Power Supply: 15-35V DC / 220 V AC
 - Power: 570W
 - Flow Rate: 1360 cc/min
 - Pressure output: 16 Bar
 - Operating temperature: 3 °C - 45 °C
 - Hydrogen production purity: 99.999 %
 - Direct hydrogen Storage into Metal Hydrides canisters (760 sl)
 - Rugged water-proof case

genPV

GenPV integrates configurable photovoltaic lightweight modules with GENIOL lithium batteries. It is an ideal primary energy source for remote off grid application to extend runtimes of electronic devices for a few hours after daylight.

- Main Features of GenPV 50W single module**
- GenIOL 3S1P Battery Pack
 - Zero environmental impact
 - Efficiency: 22.5%
 - Dimensions: 560 x 570 mm
 - Peak power: 50 W
 - Open circuit voltage: 12 Vdc.
 - Short circuit current: 6.0 A
 - Max power voltage: 9.20 V
 - Max power current: 5,51 A

Ion Lithium Battery Packs

GENPORT has an equipped electrochemical laboratory to engineer Battery Management Systems (BMS) for rechargeable batteries, carry on Polarization Test, Impedance Spectroscopy Analysis, Battery Cycling Tests.

- CC / CV Charge/Discharge Cycling Test, Stress Test, Life Analysis, SOC Testing, Storage Self Discharge Test
- Designing of packs with minimum weight and volume
- Engineered directly into the host equipment
- Several lithium cell configurations as well as wide range of connectors
- Packs designed using cells extensively tested in a broad range of harsh environments
- Power source compliant to Smart Battery Interface allowing communication via SMBus



genport
Power Solutions



we power

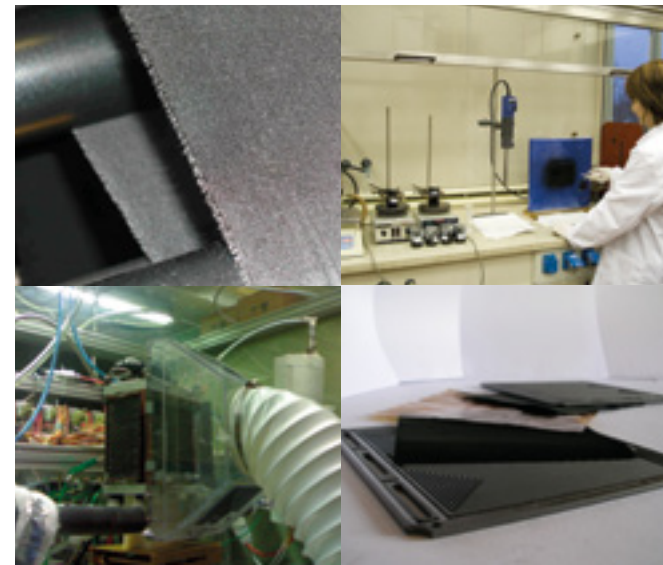
About us

GENPORT is the Italian progressive spin-off of Politecnico di Milano, developer and manufacturer of an advanced, lightweight technologies for portable generation and energy storage in medical, defense, emergency, telecommunication, industrial, leisure, agriculture applications.

GENPORT combines Proton Exchange Membrane Fuel Cell (PEMFC) and Ion Lithium technologies to provide advanced power solutions to any off-grid external equipment up to 1500 Watt, with superior performance and reliability satisfying such requirements as long life, design flexibility, high energy density, compact configuration, high cycling, high rate discharge, reducing to zero both noise and emissions and operating in extreme environmental conditions.

GENPORT brings the strong expertise and mutual beneficial partnerships of an academic and Industrial value chain.

GENPORT research team has long-term experience in the Batteries and Fuel Cell technologies. A strong international scientific activity has resulted in more than 100 scientific publications and 8 patents; 16 years in international and national programs focused on breakthrough technologies and methodologies for improving durability, performance and future mass production of portable fuel cells generators makes Genport a leading designer, developer and manufacturer of advanced, lightweight solution for portable high energy density electric generation.



History Research Technology

These are our major milestones.

- Ceramic materials technologies for Solid Oxide Fuel Cells (SOFC).
- YSZ and alumina-based composites
- Simulation and prediction of behaviour of ionic conductors
- Synthesis of Sr,Mg-doped lanthanum gallates
- Composite materials for cathodes (LSGM - LSM)
- Polymeric materials technologies for Proton Exchange Fuel Cells (PEMFC).
- Characterization and modeling of materials for Polymer Fuel Cells (PEM).
- Synthesis and electrical, physico-chemical characterization of Polymeric Membranes.
- Production of first prototype of gas-diffusion-layers carbon cloth.
- Innovative plasma based surface engineering for GDL (Patent: PCT/IT2005/200297).
- Development of Catalyst Coated Membrane and Micro Porous Layer.



- Development of Gas Diffusion Medium and Gas Diffusion Electrode.
- Integration of 5-MEA proprietary configuration into 500 W stacks series.
- Development of 500 W stack based on innovative and owned MEA technology.
- Foundation of GENPORT srl.
- Development of GENFUEL concept.
- Release of the first generation of GENPORT 300 Hybrid Fuel Cell (6 pending patents).
- Development of the first generation of GENPORT 300 Hybrid PEM Solar (2 pending patents).
- Release of the GenIOL Ion Lithium Battery Packs.
- GENPORT 300 Hybrid Fuel Cell CE marked.
- Foundation of Genport North America Corp. in West Lafayette (US).

Market Emergency

There are situations in which you cannot wait for a replacement of a power source, in which human life may depend on the capability to communicate without interruptions. Cell phones, two-way radios, charged and ready, are of vital importance during any disaster. Navigation systems, SA computers have to constantly assist rescue operators in remote locations.

GENPORT 300 HFC can be utilized as battery charger. With a small GENFUEL cartridge of solid hydrogen as well as a metal hydrides canister associated with GENPORT 300 HFC, police operators, search and rescue teams in the Alps as well as in the desert, can continue to operate with vital equipment safely powered.



A modern Army is based on highly capable soldiers. The success of these warriors will depend on sensors, communication capabilities. Power supply is the most critical system to allow the new electronics-based equipment to function effectively for a long mission. Traditional generators cause both a logistical problem and a serious danger, as associated noise, heat signature and emissions can be detected by the enemy.

GENPORT systems has been designed for a modern land warrior system; it is based on a distinctive wearable cutting-edge technology, which enables soldiers to carry fewer batteries, simplify the logistics and provide a limited but reliable and constant power source.

GENPORT series utilized as battery chargers as well as an integrated internal power source for portable terminal communication systems, provide a constant, reliable source of power available for extended period of time, reducing to zero heat signature and noise.

Market Professional & Defence



Market Telecommunication

Remote telecommunications systems displaced in off-grid locations, such as islands or deserts, where temperature variations are relevant, coping with reduced maintenance, pile pressure on network operators to perform without fail. Off-grid installations, as well as longer UPS back-up periods, stretch the ability of current technology to cost-effectively deliver reliable performance. A conventional power solution is a noisy, bulky and high-emission diesel generator. Remote mobile telecommunications and temporary telephone booths, for which it is essential a longer autonomy time of the power source, can all benefit from fuel cell.

GENPORT 300 Hybrid Solar PEM can power continuously for long-term a small tactical communications system utilized in actions of rapid deployment.



Market Industrial Automation

The energy demand for a lightweight power source in industrial equipment has been gradually increasing over the past years. There are several categories of industrial applications that all require higher energy density sources. Industrial robots, motion control units, field instruments, remote sensors and control system devices are some of possible applications that can benefit from longer runtime, lighter weight power sources enabled by **GENPORT 300 HFC** technology.



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