



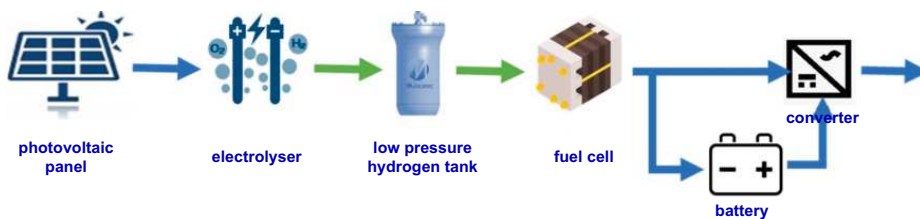
# SHYAM: HYDROGEN STATION AUTONOMOUS MULTIFUNCTION

Training tool for production  
and consumption of green hydrogen

**MINCATEC Energy** offers a multifunctional autonomous hydrogen station (100 W) dedicated to the production of green hydrogen via an electrolyser, powered by a solar panel.

Hydrogen storage is carried out in a low-pressure metal hydride tank, technology developed by MINCATEC Energy.

The tank powers a fuel cell for the production of electricity on demand. This station is equipped with a power outlet to connect electrical appliances to simulate residential electricity consumption.



*MINCATEC Energy, solutions for a new energy world*

# SHYAM: AUTONOMOUS MULTIFUNCTION HYDROGEN STATION

## PEDAGOGICAL TOOLS for CAP/BAC PRO, BTS/LICENCE and MASTER/ENGINEER

### LEARNING OBJECTIVES:

- **Hydrogen life cycle:** production of hydrogen by electrolysis (green hydrogen), storage of hydrogen (here in low pressure), its use via a fuel cell
- Operating principle of a solar station, production of electricity **via renewable energies**
- Introduction of the concept of **hybrid systems:** multi-energy sources, chemical batteries, hydrogen, photovoltaic panels
- Principles of **control of a complex system:** sensors, actuators
- Operating principles of **Can Bus communication protocols**
- Principles of a **multi-source energy management strategy**
- Notions of **voltage conversion:** DC/DC & DC/AC

### FUNCTIONING PRINCIPLES:

Electricity is generated by a hybrid electrical system consisting of a photovoltaic panel, a LiFePO4 battery and a PEM fuel cell. The electricity produced has two main functions. On the one hand, it is used to supply the electrical loads connected to the socket and on the other hand, it supplies an electrolyser which is used to produce hydrogen. The latter is stored in a low pressure metal hydride hydrogen tank, designed and manufactured by Mincatec Energy, to be used afterwards according to the needs of the user.

All these functionalities are controlled by a supervision system and energy management developed by MINCATEC Energy: HMI, control laws and energy management. These functions are provided by an IQAN module from Parker. In addition to the control, this module has a 10" touch screen to ensure an interactive display.

### PRODUCT DETAILS:

- 100 Wc **photovoltaic panel** module
- 100 W **electrolyser**
- **Metal hydride H2 tank** with a capacity of 10 g developed by MINCATEC Energy
- 12V 20Ah **LiFePO4 battery** with integrated BMS
- 100W **fuel cell**
- 12V-230 Vac **converter**
- Parker brand **IQAN controller**, this module has a 10" touch screen for interactive display. The HMI allows manual or automatic touch control of the system, to understand energy flows and **energy management strategies**.

### PRODUCT BENEFITS:

- **Easy to use, graphic and didactic interface: tablet type**
- **Clear electrical diagram.** Students can, from the first sight, quickly understand the electrical diagram: analog controls and CAN Bus
- **Simple hydrogen diagram** for students to examine the complete circuit from the output of the electrolyser to the fuel cell through the tank.



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