www.dmseducation.com

General and technological education

# DMS Formation

*Creative engineering for quality teaching*

real-time data acquisition software
(Temperatures, pressure, U, I, power etc...)

metal hydride tank
(Capacity 18 grams & regulator 18gr)
Production station (PEM electrolyzer) included: 800 ml/min


electrical connections available:
-2 USB 5V, 2.4A
- 2 12V, 2.5A sockets

fuel cell
with open cathode
(30W continuous and 60W peak) assembled by the only French battery manufacturer!

safety of use :
-Low hydrogen pressure
- safety valve
- automatic purge
- control lights

video presentation

# TREKHY : GENERATOR AUTONOMOUS ELECTRIC HYDROGEN FUEL CELL

PRAGMA INDUSTRIES
INGENIOUS FUEL CELLS

General and technological education

# DESCRIPTION

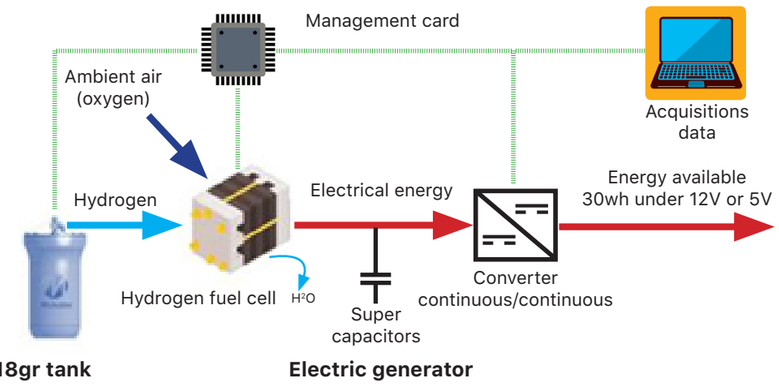
This training material was developed from a product actually manufactured and distributed by the French company: PRAGMA INDUSTRIES. It allows you to discover the "hydrogen" energy vector and to acquire knowledge around the conversion of hydrogen/electric energy.

This system makes it possible to address the
teaching in Engineering Sciences, the field of STI2D and Laboratory Sciences and Technologies
and covers more particularly:
- the different methods of producing hydrogen,
- energy conversion from a fuel cell,
- the different battery technologies available on the market,
- the use of fuel cell management electronics,
- the study of securing a system using hydrogen,
- analysis of the life cycle of a fuel cell.

8 activities offered

Used in the military context, humanitarian missions or operations in natural disasters, this product is an industrial, robust, portable and autonomous solution for producing electrical energy available to rescue intervention personnel. (For example, distributed in Japan to deal with the consequences of earthquakes, in Ukraine etc...)

On 5V USB or 12V "cigarette lighter" sockets, this autonomous product provides power supply for small electronic equipment, charging smartphones, LED lighting, etc.




Electrolyzer + tank :
- Production capacity: 800ml/min
- Hydrogen purity: >= 99.999%
- Power: < 500W
- Output pressure: 1.5 MPa
- Metal hydride tank equipped with 0.5 bar pressure reducer

Fuel cell electric generator (0.5 bars) :
- dehumidifier,
- instrumented open cathode hydrogen cell 30W, 60W peak,
- ventilation and automatic purge of the battery,
- electronic control and energy management card equipped with supercapacitors,
- provision of measured physical quantities,
- dimensions 19cm x 27cm x 27cm for a weight of 3.7Kg.

Advantage of this solution: autonomous, compact & light, transportable by plane, long storage life, maintenance-free, simple and safe handling, without CO2 emissions, and without lithium battery. The materials used for the PAC membranes allow long storage times without special maintenance.

This product is designed for indoor or outdoor use.

The **"Trekhy – Autonomous hydrogen fuel cell electric generator"** educational support covers:

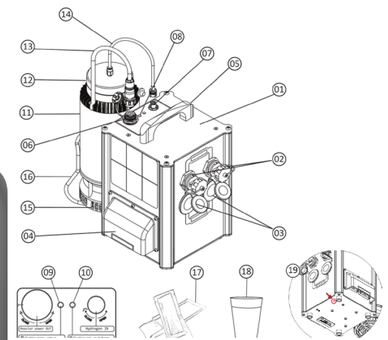
| Activités | Utilisation du support / séance |
|---|---|
| **1 - Commissioning of the autonomous electric generator** | Using the manufacturer's instructions, commission the system for one operating cycle.<br>From technical documents (Diagrams and 3D), identify the functional architecture of the support, visualize the circulation of flows.<br>Observe the behavior of the system under load (discovery approach). |
| **2 - Energy balance (characteristics measurements)** | Carry out an energy balance for a charging cycle with digital tools.<br>Implement an experimental approach to evaluate performance energy efficiency of the Trekhy using digital diagnostic tools provided by the manufacturer.<br>Measure pressures and electrical quantities at fixed load and at load variable. (use of rheostat). |
| **3 - Principle and characteristic of a fuel cell** | Use resource documents to visualize chemical processes and the electrical production system. |
| **4 - Performance on autonomous electric generator** | Check performance (temperatures, power, duration, regulation) using the measurement acquisition software integrated into the system.<br>Deduce the efficiency of the DC/DC converter.<br>Study performance during peak loads (role of supercapacitors). |
| **5 - Ecological balance** | Analyze the different types of hydrogen production (green, yellow classification, etc.)<br>Analyze the release of water from the fuel cell: measure and analyze the PH.<br>Validate the product technical sheet. |
| **Projects (tracks)** | - Recovery of thermal energy for co-generation.<br>- Connect an electric storage battery.<br>- Set up an acquisition device (Arduino card + sensor) to: ==> detect a fault, ==> measure the generator output power in real time. |


supervision


piloting


Hydrogen fuel cell PRAGMA INDUSTRIES


acquisitions



# DIGITAL **ACCOMPANYING DOCUMENTS**

The **"Trekhy"** system is supplied with accompanying documents in digital form :

- **A technical file** with the presentation of the system, its functional and structural description. The technical characteristics of all components are indicated very exhaustively.
- **A complete educational file,** with completely written and corrected practical activities.
- **A resource file** containing educational and technological resources, presenting additional information likely to enrich the scientific and technological culture of learners.


## TO **ORDER**

The *Trekhy* system (autonomous hydrogen fuel cell electric generator) is offered :

- The refrence **SIDD7000** corresponds to the complete didactic system.

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