

Sustainable Energy
Single Board Trainer
for the NI ELVIS™

Emona Solar Cell and Hydrogen Fuel Cell Trainer ETT-411



Overview:

- ☞ Fully self contained trainer board for NI ELVIS
- ☞ Students build many experiments with one system
- ☞ Hands-on experience with PV Solar Cells
- ☞ Hands-on experience with high quality Heliocentris hydrogen fuel cells
- ☞ Focus on teaching students good engineering practice and experimental skills

'HELEX': Solar-Hydrogen Electricity Experimenter

The Emona 'HELEX' extends the functionality of your NI ELVIS I and II/+ Workstation and LabVIEW interface with a sustainable energy trainer to teach the fundamentals of solar cells, electrolysis and hydrogen fuel cell theory.

With HELEX students will enter the fascinating world of generating electrical energy from sunlight, storing that energy as hydrogen gas, and then regenerating electricity from hydrogen and oxygen in an electrochemical reaction.

The comprehensive experiment manual supports students with step-by-step instructions designed to foster scientific enquiry and critical response skills.

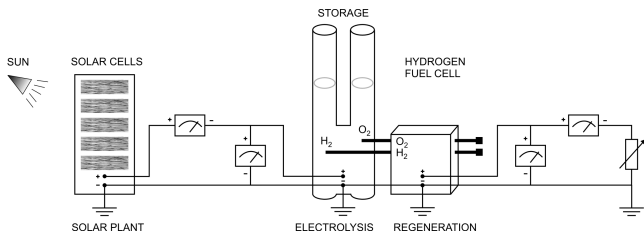


EMONA INSTRUMENTS
www.emona-tims.com



THE EMONA HELEX TRAINER

The Emona HELEX trainer extends the functionality of your NI ELVISTM I/II/III+ to incorporate a graded series of hands-on experiments in sustainable energy technologies.



HELEX trainer sample experiment diagram

SELF CONTAINED, COMPLETE SOLUTION

The Emona ETT-411 kit is a complete solution, including all equipment, accessories, NI LabVIEWTM software, user and experiment manuals.

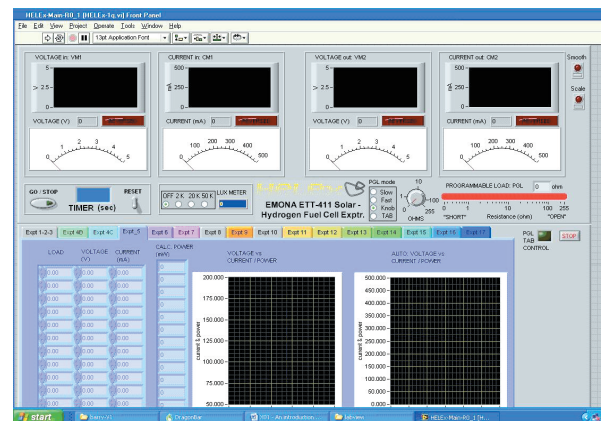
Experiments fully utilize the NI ELVIS instrumentation for manual AND automated control, data acquisition as well as data analysis, using NI LabVIEW.

The HELEX Soft Front Panel (SFP) incorporates both the custom NI ELVIS based instrumentation in the top half of the SFP window, while the lower half of the window includes a pre-defined experiment layout for each of the 17 experiments. Each experiment screen is accessible by a tab. These pre-defined experiment screens assist the student in quickly getting involved with the essential experiment activities and minimising tedious data computation chores.

Experiments are dynamic and highly interactive, as the HELEX SFP utilizes the powerful functionality of NI LabVIEW. Measurements are plotted and processed as they are entered, so that students are able to better understand and interpret the data.

MANIPULATION & OBSERVATION SKILLS

Students are guided through experiments which develop skills of scientific methodology associated with the setting up of equipment, scientific safety and method, taking of measurements, as well as interpreting results and critical response skills.



HELEX Soft Front Panel window

Emona HELEX Solar-Hydrogen Fuel Cell Trainer Experiment Capabilities



INTRODUCTION

- 1 - An introduction to the NI ELVIS II/II+
- 2 - An introduction to the EMONA HELEX add-on board

SECTION A - SOLAR ENERGY: light to electricity

- 3 - The visible spectrum and photometry
- 4 - Measuring solar energy, intensity & angle of incidence
- 5 - Maximum Power Point & Fill Factor measurements
- 6 - Photovoltaic cell internal characteristics measurement
- 7 - Multiple solar cell configurations & performance

SECTION B - ELECTROLYSIS: water to gases

- 8 - Electrolysis in action
- 9 - Electrolyser decomposition voltage & load matching
- 10 - Avogadro's number & Faraday efficiency measurements

SECTION C - HYDROGEN FUEL CELLS: gases to electricity

- 11 - Introducing the Hydrogen Fuel Cell: reversing the electrolytic process
- 12 - Faraday's 1st Law using fuel cells and consumption measurement
- 13 - System efficiency and fuel cell characteristic curves
- 14 - Dismantlable fuel cells: impact of oxidant supply & catalyst
- 15 - Modeling a fuel cell power plant
- 16 - Mathematically modeling a fuel cell using LabVIEW & MULTISIM
- 17 - Stacking multiple fuel cells in series & parallel

* Experiments include optional NI LabVIEW programming tasks for students projects