

The Armfield advanced renewable energies range is a specialised learning system for the technical education in universities and vocational training centres.

The kits cover Photovoltaic and Wind Energy generation, Fuel Cell and Battery Technology, Thermal Energy and the construction of a controllable Smart Grid on a laboratory scale.

PROVIDES AN IN-DEPTH UNDERSTANDING OF STORAGE TECHNOLOGIES FOR RENEWABLE ENERGY

“The RE24 Advanced Battery Technology system provides students with a self-contained modular system, covering the physical fundamentals of storage technology necessary for the transition to sustainable energy.

The system allows the characteristics of different battery types to be analysed along with their relevant suitable application.

The system is supplied with different battery technologies such as lead, NiMH and Lithium-Polymer(LiPo) as well as a PEM-Fuel Cell Charger Module and for the correct determination of internal resistance four-terminal sensing is possible.”



Supplied in an aluminium case

Features / benefits

- ▶ Training system for storing renewable energy
- ▶ Battery types: NiMH, NiZn, Pb, LiFePo, LiPo, capacitor (super cap) and fuel cell
- ▶ All components are prepared for four terminal sensing
- ▶ Including charger module
- ▶ Modular design
- ▶ Supplied in a self-contained aluminium case
- ▶ Includes in-depth manual and predefined experiments

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Issue: 1
URL: <http://www.armfield.co.uk/re>

Applications

ME ChE CE IP

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Experimental content

- ▶ Setup of a simple circuit
- ▶ Ohm's law
- ▶ Series connection of ohmic resistances
- ▶ Parallel connection of ohmic resistances
- ▶ Start-up and idling behaviour of a motor
- ▶ Nominal voltage and capacity of voltage sources
- ▶ Four-terminal sensing
- ▶ Internal resistance of voltage sources
- ▶ Series connection of voltage sources
- ▶ The capacitance of a battery module
- ▶ The energy density of battery modules
- ▶ The Ri efficiency of a battery module
- ▶ The total efficiency of a battery module
- ▶ Temperature-dependent behaviour of the lithium-polymer cell
- ▶ The charging process of a capacitor
- ▶ The discharge process of a capacitor
- ▶ I-V characteristics of the single NiMH battery module
- ▶ I-V characteristics of the NiZn battery module
- ▶ I-V characteristics of the LiFePo battery module
- ▶ I-V characteristics of the lead battery module
- ▶ I-V characteristics of the lithium-polymer battery module
- ▶ I-V characteristics of the triple NiMH battery module
- ▶ The charging process of the NiMH battery
- ▶ The charging process of the NiZn battery
- ▶ The charging process of the LiFePo battery
- ▶ The charging process of the lead battery
- ▶ The charging process of the lithium-polymer battery
- ▶ The discharging process of a battery module
- ▶ Hydrogen production in the reversible hydrogen fuel cell
- ▶ Characteristic curve of the electrolyzer
- ▶ Hydrogen consumption of a fuel cell
- ▶ Characteristic curve of the fuel cell
- ▶ The efficiency of the hydrogen fuel cell
- ▶ Operation of the electric car with several battery modules
- ▶ Operation of the electric car with the reversible fuel cell

Requirements

Scale



Electrical supply: 110-230V AC 50-60Hz

- ▶ Level and stable work surface

Overall dimensions

Tray

Length	0.640m
Width	0.165m
Height	0.370m

Packed and crated shipping specifications

Volume	0.038m ³
Gross weight	7Kg

Related curriculums

- ▶ Renewable Energies
- ▶ Electrical Engineering
- ▶ Automotive Engineering

Ordering specification

- ▶ 1 x Motor module Pro
- ▶ 1 x Battery module NiMH 3xAAA Pro
- ▶ 1 x Capacitor module Pro
- ▶ 1 x Base unit Professional
- ▶ 1 x Resistor module (triple) Pro
- ▶ 1 x Resistor plug element 1 Ohm
- ▶ 1 x Resistor plug element 100 Ohm
- ▶ 3 x Resistor plug element 10 Ohm
- ▶ 1 x Resistor plug element 33 Ohm
- ▶ 1 x Lithium-polymer (LiPo) battery module
- ▶ 1 x Battery module holder 1xAAA Pro
- ▶ 1 x Battery adapter cable
- ▶ 1 x Fuel cell holder Pro
- ▶ 1 x Lead (Pb)-battery module Pro
- ▶ 1 x Electric model car
- ▶ 1 x LiFePo-battery AAA
- ▶ 1 x Charger module
- ▶ 1 x AV-module
- ▶ 1 x Potentiometer module 110 Ohm Pro
- ▶ 1 x Distilled water (100ml)
- ▶ 1 x Propeller
- ▶ 1 x Safety test lead, 50cm, red
- ▶ 1 x Safety test lead, 50cm, black
- ▶ 1 x Safety test lead, 25cm, red
- ▶ 1 x Safety test lead, 25cm, black
- ▶ 1 x NiZn-battery AAA
- ▶ 3 x Safety short-circuit plug, with mid socket
- ▶ 1 x Digital multimeter
- ▶ 1 x Reversible fuel cell
- ▶ 1 x Aluminium case
- ▶ 1 x NiMH battery AAA

Fuel Cell



Other products in the advanced renewable energies range

- ▶ **RE10:** Advanced Photovoltaic Energy
- ▶ **RE12:** Advanced Wind Energy
- ▶ **RE14:** Advanced Fuel Cell Technology
- ▶ **RE16:** Advanced Thermal Energy
- ▶ **RE18:** Advanced Smart Grid Technology

Operational conditions

- ▶ Storage Temperature: -10°C to +70°C
- ▶ Operating temperature range: +10°C to +50°C
- ▶ Operating relative humidity range: 0 to 95%, non-condensing

Ordering codes

- ▶ **RE24:** Advanced Battery Technology

Armfield standard warranty applies with this product

Knowledge base

- > 28 years expertise in research & development technology
- > 50 years providing engaging engineering teaching equipment

Benefit from our experience, just call or email to discuss your laboratory needs, latest project or application.

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Aftercare

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Training
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