

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 THE COMPLEX INTERACTIONS BETWEEN RENEWABLE ENERGIES, ENERGY STORAGE AND CONSUMERS ON A LABORATORY SCALE

“The RE18 Advanced Smart Grid Technology system provides students with a self-contained modular system, allowing an in-depth understanding of the complex interactions between renewable energies, energy storage and consumers on a laboratory scale.

The system allows the construction of a controllable Smart Grid on a laboratory scale. Providing multiple pre-set scenarios but additionally allows for bespoke or user-created setups.

Contained in the system are multiple components for renewable energies such as wind and photovoltaics as well as energy stores such as lithium-iron-phosphate batteries / fuel cells that allow a large variety of fundamental experiments to be conducted in conjunction with smart grid experiments.”

Supplied in an aluminium case



Features / benefits

- ▶ Setup of a complete smart grid on a laboratory scale
- ▶ Investigating the influence of renewable energies on grid stability
- ▶ Additional fundamental experiments on wind, photovoltaics, fuel cells and energy storage
- ▶ Laboratory scale
- ▶ Modular design
- ▶ Supplied in a self contained aluminium case
- ▶ Includes in-depth manual and predefined experiments

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Applications

ME ChE CE IP

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Experimental content

Smart grid experiments:

- ▶ Daily power fluctuations of a photovoltaic (PV) power plant
- ▶ Daily power fluctuations of a wind power plant
- ▶ Energy supply of a building by conventional power plants
- ▶ Energy supply of a building by conventional and PV power plants
- ▶ Energy supply of a building by conventional and PV power plants with storage
- ▶ Voltage behaviour and grid stability in a radial distribution system
- ▶ Grid stability with PV power plants
- ▶ Grid stability with PV power plants depending on consumer load
- ▶ Grid stability with PV power plants depending on wire length
- ▶ Grid stability with PV power plants and smart transformer stations
- ▶ Grid stability with PV power plants and storages
- ▶ Grid integration of E-Mobility
- ▶ Conductor rope management

Fundamental experiments:

Photovoltaics

- ▶ IV-Characteristics of solar panels
- ▶ IV-Characteristics depending on illumination
- ▶ IV-Characteristics depending on temperature
- ▶ MPP-Tracking

Wind energy

- ▶ Turbine power dependent on blade shape and pitch angle
- ▶ Turbine power dependent on number of blades
- ▶ Turbine power dependent on wind direction

Fuel cell and electrolyzer

- ▶ Functionality of an electrolyzer
- ▶ IV-characteristics of an electrolyzer
- ▶ Functionality of a fuel cell
- ▶ IV-characteristics of a fuel cell

Storage technologies

- ▶ Charge and discharge characteristics of a capacitor
- ▶ Functionality and charge procedure of a LiFePo battery
- ▶ Operation of fuel cells and electrolyzers

Related curriculums

- ▶ Renewable Energies
- ▶ Electrical Engineering

Ordering specification

- ▶ 2 x Base unit Professional
- ▶ 2 x Smart meter
- ▶ 1 x Wind turbine module Pro
- ▶ 1 x Solar module 5.33V, 370mA
- ▶ 1 x Wind machine
- ▶ 1 x Motor module Pro
- ▶ 1 x Base for solar panel
- ▶ 2 x Power module
- ▶ 1 x Wind rotor set
- ▶ 2 x Light bulb module Pro
- ▶ 1 x Capacitor module Pro
- ▶ 1 x AV-module
- ▶ 1 x Battery module holder 1xAAA Pro
- ▶ 1 x LiFePo-battery AAA
- ▶ 1 x Fuel cell holder Pro
- ▶ 1 x MPP Tracker Pro
- ▶ 2 x Grid module Pro
- ▶ 1 x Diode module Pro
- ▶ 1 x Potentiometer module 110 Ohm Pro
- ▶ 1 x Bulb 120W, 12°
- ▶ 1 x Lamp housing
- ▶ 6 x Safety short-circuit plug, with mid socket
- ▶ 1 x Aluminium case
- ▶ 5 x Safety test lead, 25cm, red
- ▶ 4 x Safety test lead, 25cm, black
- ▶ 4 x Safety test lead, 50cm, red
- ▶ 4 x Safety test lead, 50cm, black
- ▶ 1 x Propeller
- ▶ 1 x Reversible fuel cell
- ▶ 1 x Azimuth angle scale

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
- ▶ **RE24:** Advanced Battery 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

- ▶ **RE18:** Advanced Smart Grid Technology

Armfield standard warranty applies with this product

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	10Kg

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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