



# *Hilton Combined Wind and Solar Power Demonstrator*

## *RE580*



**RE580 Shown with Optional Battery RE580A and Optional Anemometer RE580F**

- *Demonstrates the Practical Application of a Solar Power and Wind Powered Generation System***
- *Allows Investigation Of System Performance Inside The Laboratory Irrespective Of Outside Conditions.***
- *Investigation of Solar Panel Characteristics and Operation Limitations***
- *Investigation of Control of a Wind Generator***
- *Safe for Student Operation.***
- *Two Year Warranty.***



## ***Introduction***

The use of combined wind and solar power generation has become increasingly common, not only from an energy conservation point of view but also for practical applications. For remote locations, the use of combined wind and solar systems gives a commercially economic solution to providing power for communications, warning signs, water pumping and marine applications etc.

A combined system involves the use of a charge controller that can allow for the daily steady and potentially small input from a solar panel and the potentially large but intermittent input from a wind generator.

In all cases however the use of some means of power storage (battery) is essential for periods when neither renewable source is available.

The **Hilton Combined Wind and Solar Power Demonstrator RE580** will provide interesting and instructive experimental work for all students, and will be of particular interest to those studying:

- Environmental Engineering
- Energy Conservation
- Mechanical Engineering
- Architecture
- Building Services
- Electronics
- Electrical and Electronic Engineering
- Automotive Engineering
- Plant & Process Engineering.

## ***Description***

A small (12V Nominal) solar panel with nominal 10W output is connected to a battery charge control system. The charge controller is also connected to a small (500mm diameter) wind turbine. The charge controller can be connected to a locally sourced lead 12V lead acid battery or alternatively the optional RE580A deep cycle lead acid battery.

The solar panel is supplied with a 500W solar simulator that allows the panel to be irradiated and generate power within the laboratory. This allows students to investigate the relative magnitude of incoming solar radiation, relative to power generated.

To allow investigation of the wind generator inside the laboratory a small but powerful axial fan is supplied that will allow the generator to be run up to a realistic speed. The 500mm diameter wind turbine can generate up to 25W at 19 knots (approximately 10 m/s).

Optional instrumentation and accessories (which can alternatively be locally sourced) are available to investigate the detailed performance of both wind and solar components and to investigate the use of DC power for practical applications. A handheld digital voltmeter is supplied as standard.

Both the solar panel and wind generator connect to a digital combined charge controller that allows the output power from both the solar panel and the wind generator to be investigated.

## ***Safety***

- The integral charge control system provides overload protection and battery protection.
- Excluding the fan and solar simulator options all components are low voltage (10-20v DC).
- Wind Generator comprises guarded rotor tip for operator safety
- Where appropriate components are protected by electronic cut outs or fuses.

## ***Specification***

### ***General***

A combined solar and wind power generation system with a purpose made combined digital charge controller with digital readout of both solar and wind generated power. The unit includes a simple solar simulator and high powered axial fan that allows the unit to be operated within the laboratory.

Various instrumentation and accessories to further extend the experimental capabilities can be supplied as optional extras or alternatively locally sourced.

### ***Dimensions***

Height: 700mm Depth: 750mm  
Width: 527mm Weight: 42 kg

#### **Wind Source Dimensions**

Height: 50cm  
Depth: 35cm  
Width: 35cm

#### **Turbine Dimensions (inc. Perspex surround)**

Height: 60cm  
Depth: 56cm  
Length: 50cm

#### **Noise Level**

Ambient Noise Level of Room at 1.5m from equipment: 30DB (equipment switched off)

Ambient Noise Level of Room at 1.5m from equipment = 78-79DB (equipment switched on)



## Accessories and Spares

### Unit supplied with:

One experimental operating and maintenance manual in English, Spanish, French.  
Accessories and spares for 2 years normal operation. List available on request.

## Services Required

### Electrical: A:

Either: 600W 220-240 Volts, Single Phase 50 Hz (with earth / ground). Line current up to 3.0A at 230v.  
Or:

**B:** 600W 110-120 Volts, Single Phase, 60Hz (with earth /ground). Line current up to 6.0A at 110V.

## Experimental Capabilities

### RE580 (without Optional Extras)

- Investigation of the components of a combined wind and solar power generation system
- Investigation of the effects of shading on a practical solar installation.
- Investigation of the wind generator output voltage and power with wind variation.
- Investigation of the panel output voltage and power with solar irradiation and an investigation of panel efficiency.
- Investigation of the effect of wind direction on generator performance.

### Order as:

RE580 Combined Wind and Solar power Generator

### Optional Items:

Deep Cycle Battery	RE580A
Tachometer	RE580B
Solarimeter	RE580C
Water Pump	RE580D
Single Phase Inverter	RE580E
Anemometer	RE580F

## Optional Extra RE580A Deep Cycle Battery

**ESSENTIAL IF NOT LOCALLY AVAILABLE**



A deep cycle lead acid paste battery designed for solar and wind generation systems.

### Experimental Capabilities

- Examination of a battery charge management system.
- Attachment of Optional DC Loads.

### Ordering Information

Order as: Optional Deep Cycle Battery RE580A

## Optional Extra RE580B Tachometer

Allows turbine rotational speed to be evaluated.



### Experimental Capabilities

- Allows relationship between turbine output power and rotational speed to be evaluated.
- Allows relationship between turbine rotational speed and output voltage to be investigated
- Allows relationship between turbine speed and air velocity to be investigated (Anemometer required)

### Ordering Information

Order as: Optional Tachometer RE580B



**Optional Extra RE580C**  
**Solarimeter**

Allows solar insolation (thermal radiation) reaching the solar panel to be quantified.



***Experimental Capabilities***

- Investigation of the solar irradiation level across the solar panel to be investigated and averaged.
- Investigation of the solar panel conversion efficiency (Incident radiation v Electrical power output)

***Ordering Information***

Order as: Optional Solarimeter RE580C

**Optional Extra RE580D**  
**Water Pump**

A 12v DC water pump specifically designed for use with solar installations.



***Experimental Capabilities***

- Demonstration of a practical application of solar power.
- Evaluation of the efficiency of solar water pumping (measurement of the time taken to transfer a known mass of water from one height to another)

***Ordering Information***

Order as: Optional Water Pump RE580D

**Optional Extra RE580E**  
**Single Phase Inverter**

A single phase inverter designed to provide a single phase AC mains source from the solar/battery system.



***Experimental Capabilities***

- Investigation of the practicalities of creating a useable AC source from a DC battery.

***Ordering Information***

Order as: Optional Single Phase Inverter RE580E

**Optional Extra RE580F**  
**Anemometer**

Allows more detailed investigation of the wind speed before and after the turbine.



***Experimental Capabilities***

- Investigation of the change in air momentum before and after the generator:-
  - When generating power
  - When not generating power.
- Examination of approach velocity and turbine rotational speed (Tachometer required)

***Ordering Information***

Order as: Optional Anemometer RE580F

**P.A.HILTON Ltd.**

Horsebridge Mill, King's Somborne,  
Stockbridge, Hampshire, SO20 6PX,  
England.



Telephone: National (01794) 388382  
International +44 1794 388382

Fax: National (01794) 388129  
International +44 1794 388129

E-mail: [sales@p-a-hilton.co.uk](mailto:sales@p-a-hilton.co.uk)  
Website: [www.p-a-hilton.co.uk](http://www.p-a-hilton.co.uk)

