

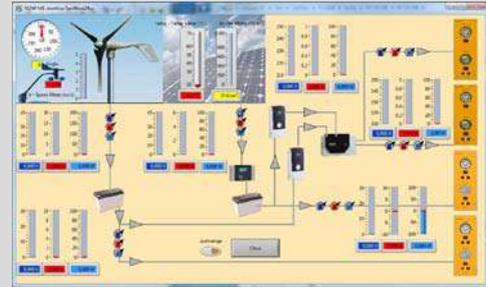


## HYBRID SOLAR / WIND ENERGY TRAINER



### DL SUN-WIND24V and DL SUN-WIND12V

The main target of a hybrid power system is to combine multiple sources to deliver non-intermittent electric power, trying to take advantage of multiple available renewable energies.



Complete with connecting cables, experiment manual and **software for data acquisition and processing**.

#### TRAINING OBJECTIVES

##### Solar energy:

- Measurement of solar irradiation
- Measurement of the voltage of the photovoltaic panel at no-load
- Measurement of the short circuit current of the photovoltaic module
- Graph of current – voltage of the photovoltaic panel
- Measurement of voltage and current of the panel in overload
- Regulation and charge of the battery
- DC solar plant
- AC installation

##### Wind energy:

- Activating the braking action
- Regulating and charging the battery
- DC wind installation
- AC installation: standby function investigation

##### Hybrid system:

- Low voltage parallel connected, AC separated
- Low voltage separated, AC parallel connected
- Low voltage and AC parallel connected

#### GENERAL FEATURES

The Trainer is composed of two sub-systems, one for the generation of electric energy from solar photovoltaic energy through a solar panel and the other for the generation of electric energy from wind energy through a wind turbine.

In this trainer, one of the two inverters, acting as master, synchronizes the frequency of the second inverter, acting as slave, to allow creating a connection between the two outputs that operate as a single line with double available power.

Average training hours: 12h.

Approx. packing dimensions:

1.77 x 1.02 x 0.96 m.

Net weight: 93 kg.

Gross weight: 189 kg.



The trainers are composed of:

		<b>24V version</b>	<b>12V version</b>
<b>PFS</b>	Photovoltaic module mounted on a support with wheels and complete with graduated scale on one side for adjustment of the inclination and calibrated cell in the upper part for measuring the solar irradiation.	185W, 24V	90W, 12V
<b>AEROGEN</b>	160W wind turbine, with anemometer and wind direction sensor mounted on a stand. The wind turbine is provided with a motor kit in order to use the trainer inside the classroom or in case of absence of wind.		
<b>DL 9012</b>	Electronic regulator module for battery charging, with LCD display for information on the status of the subsystem. It is able to display both solar voltage and battery voltage as well as charging current, Amp-Hour charge accumulation and temperature.		
<b>DL 9013MS</b>	DC/AC converter module, with sinusoidal output to generate an electrical network (mains). With a circuit breaker to switch on and off the inverter. It operates as master or slave. Complete with control panel.	Two of 900W each with four 12V batteries	Two of 450W each with two 12V batteries
<b>DL 9015</b>	Module for the parallel of the inverters. It allows up to one master and 4 slaves.		
<b>DL 9044</b>	Load module with a 20 W, 12Vdc halogen lamps and a 3W, 12Vdc LED lamp. Each lamp incorporates an On/Off control independent switch.	4 supplied	2 supplied
<b>DL 9017</b>	Load module with a 35W, mains halogen lamp and a 3W, mains LED lamp. Each lamp incorporates an On/Off control independent switch.		
<b>DL 9018</b>	Variable logarithmic rheostat module, 80Ω, 6A max., to load the photovoltaic panel in order to detect the voltage-current characteristic curves.		
<b>DL 9021</b>	Instruments module for measuring solar parameters. It displays: voltages and currents, solar irradiance, temperature of the solar panel, electric power.		
<b>DL 9022</b>	Instruments module for measuring wind parameters. It displays: voltages and currents, wind speed, wind direction, electric power.		
<b>DL SIMSUN</b>	Set of lamps to light the photovoltaic solar panel in order to use the trainer inside the classroom or in case of a cloudy sky. The intensity of the light can be controlled by the operator locally through a potentiometer or remotely through a DC signal.	2 supplied	1 supplied
<b>DL 2100-3M</b>	Frame for the modules.		