SOLAR AND WIND TURBINE HYBRID STATION - NETWORK INJECTION

EDUCATIONAL OBJECTIVES

- **Understanding the different elements of a photovoltaic and wind turbine system.**
- **Understanding the safety components involved in the system.**
- **Electrical measurements of different parameters.**
- **Analyzing and interpreting results.**
- **Studying the efficiency and impacts related to the positioning of the solar panels.**
- **Studying of the chain of solar energy (production, consumption, resale, energetic behavior).**
- **Wiring of a hybrid system.**

TEACHING RESOURCES STUDENT & TEACHER

ref. SOLEOL-2	Composition next page

PARTIAL OR TOTAL RESALE OPERATION

In the cabinet a DC/AC inverter converts the DC from the photovoltaic panels or the wind turbine to AC 220VAC 50Hz, and injects its power in synchronism into the network through an isolation transformer. This inverter is protected against any polarity reversal and any overload on the DC or AC side. When the panels are not lit, the inverter consumes no current.

Technical characteristic for the inverter coupled to the public network.

INVERTER	Voltage	Max current	Power
INPUT	65~125VDC	8A	
OUTPUT	230VAC-50Hz	2,25A	500W

1. ELECTRICAL CABINET

Technical cabinet of standardized solar central unit on wheeled frame.
Dimensions: 810 x 600 x 1890mm

Comprises
- 2 disconnectors
- 1 500mA -30A differential
- 1 30mA differential
- 1 lightning arrester + fuses
- 1 Mushroom head emergency stop
- 3 100 Wh resolution meters
- 1 set of photovoltaic connectors
- 1 500W inverter for network synchronisation

1. LINK CABLE

30-m cable for connecting the solar panels to any type of solar system.

2 PHOTOVOLTAIC SOLAR PANEL 215WC ON TILTING FRAME (FOR EACH PANEL)

- Open circuit voltage: 46V DC
- Short-circuit current: 6.3A
- Optimum operating voltage: 37V DC
- Optimum operating current: 5.7A
- Maximum power: 215Wc (variation of ± 10% depending on the series)
- Sealed connections IP65 – 1000V on the rear of the panel.
- Type of cells: Monocrystalline silicon
- Robust aluminium frame.
- Useful surface area of the cells 1.5m².
- Output 37VDC – 5.2A – 215Wc per panel on 2 photovoltaic terminals.
- Device for measuring the tilt angle
- Tilt adjustable from 5° to 70°
- Two ball joints with clamping levers for positioning the panel to the required tilt angle.
- Light and easy to move.
  Folded position: 1600 x 800 x 100mm (± 10% depending on the series)

1 PYRANOMETER

The pyranometer measures the power of solar radiation in W per m2: W / m2

1 3-PHASE WIND TURBINE 400W

Wind turbine features
- Three-phase output 3 x 85V AC - 400W at 440 rpm on safety terminals.
- Direct current output 110V DC - 400W at 440 rpm on safety terminals.
- Selection of these outputs by using an included rectifier or by direct connection.

Features of the wind simulation
- Squirrel-cage three-phase asynchronous motor.
- Speed controller simulating wind turbine speed 0-440 rpm.
- Using the supplied SOMOVE software, the PC operations are:
  - Acceleration of the wind speed.
  - Deceleration of the wind speed.

General features
- Wheeled frame with brakes
- Overall dimensions: 750 x 670 x (h) 1500 mm
- Top cover made with aluminium frame and Lexan sides (translucent and unbreakable).
- Power supply 2P+N+E 230V AC - 50/60 Hz (5m lead with mains plug)
- Supplied with: Practical assignments in the form of measurements/tests; RJ45-USB cable for linking between the speed controller and the PC. **Schneider® SoMove software.**