

RP-100 PHOTOVOLTAIC MEASUREMENT SYSTEM EXPERIMENT SET



Solar energy is renewable energy type which is an important subject in the world today. This is a modular type experiment set. The location of the modules can be changed. With safe electrical cables these modules are connected. There is solar panel on the set. There is a siren, fan and lamp which are functioning with the produced energy. DC current and AC current can be produced. For that an inverter is used. The amperage, voltage and other sensor value can be read directly on the data screen.

The students can make with this experiment set:

- the understanding the characteristics of solar cells,
- observation and experimenting the behaviour of PV solar panels under various effects and to study the conversion of solar energy into electric energy
- investigating the effects of different angles of solar panels,
- determining the effects of a bypass diode,
- various connection applications,

Technical Specification:

The components of the modular system ensure that the effects of the variables such as, illumination, irradiation, voltage and current, serial and parallel connections, grid-connected use of photovoltaic power, comparison of AC output/DC input shall be observed.

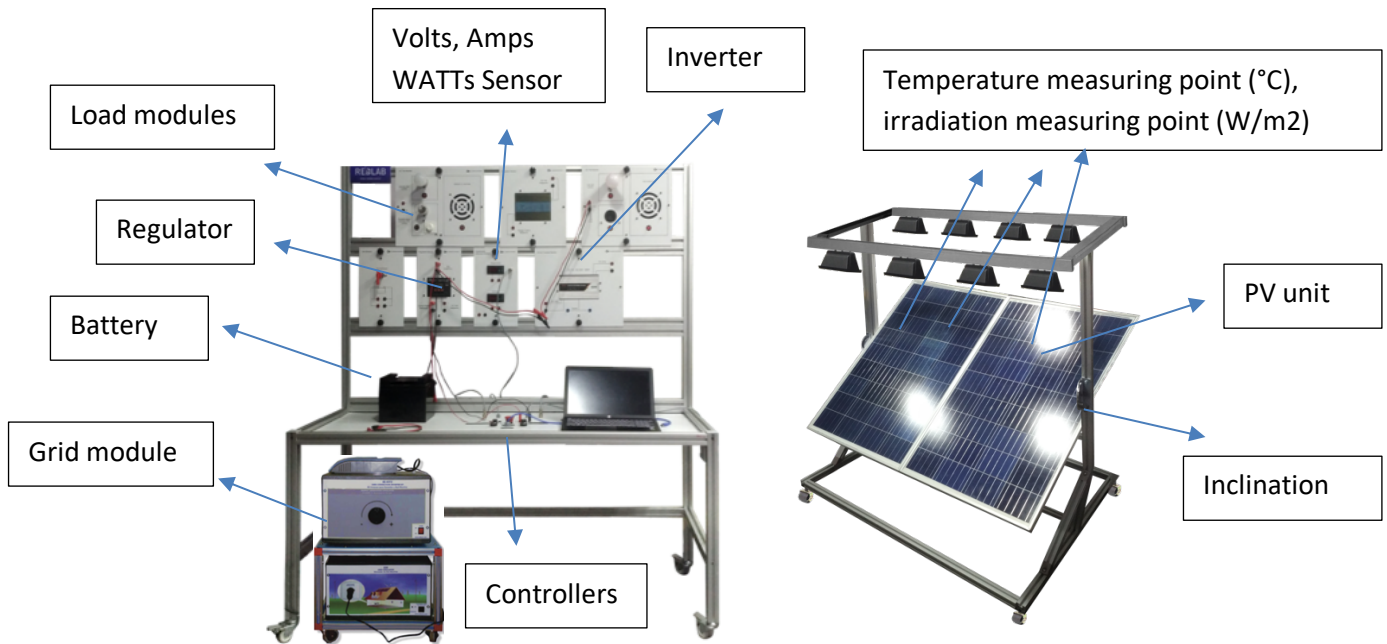
The module instruments and sensors also be monitored realtime by software over a PC with simulation capabilities or measuring amplifier.

System Components:

- Mobile metallic carriage trolley table for parts and modules.
- Halogen Lamp (4x2) units mounted on separate metallic frame stand.
- Double PV solar panels.
- Battery unit.
- AC and DC load modules
- Sensors including AC voltage and current sensors.
- Simulation module / data logging solution for software connection.
- Grid Connection Module, inverter, wattmeter and switches
- Set of cables for parallel and series connection.
- Software and PC with necessary connections.
- Other auxiliary connection components, cabling needed for operation of the equipment.
- System have an inclination system to demonstrate relationship between module inclination, illuminance, short-circuit current and electrical output.

The system is mounted on a metal frame wheeled carriage trolley unit. The PV and halogen lamps, if externally used, is mounted on similar construction wheeled carriage trolley.

Layout of the system showing connections including PV unit, battery, load modules, grid module, sensor locations, controllers and measuring points



The solar panel solution is integrated into the system with the following features:

- Solar panels are polycrystalline.
- The solar panels are tempered glass and has aluminium frame.
- Solar panels are able to work open circuit.
- Number of solar panel cells are min. 36.
- The total module area are min. 0.5 m².
- Output value of the panels are minimum 65W.
- Maximum voltage value are minimum 17V.
- Maximum current are minimum 3.5A.

The Unit Contains:

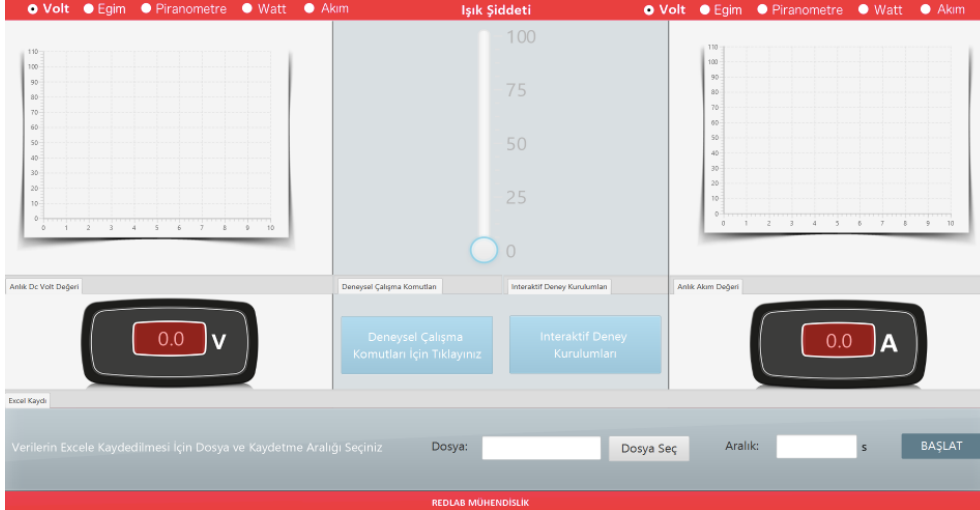
- Photovoltaic solar panels.
- Solar simulator composed of solar lamps.
- Ventilation system.
- DC load and battery charger regulator.
- Auxiliary battery charger.
- Battery.
- DC Loads module.
- Sensors (temperature, light radiation, DC current and DC voltage).

Other Specifications:

- The system have total of 8 (4x2) halogen lamps mounted on a metal frame where they can be tilted and their intensity adjusted.
- Halogen lamps are 400W each and distributed into voltage circuits.
- The system have integrated sensor display solution: Temperature, irradiation, current and voltage.
- The system have DC load and battery charger regulator regulating power generated in the photovoltaic solar panels. The unit have a charge level display.
- The system have DC and AC load modules and a lamp unit. AC voltage and current sensors are readable. DC load module is directly connected to panels. AC load module is used for grid connection simulations.
- Intensity of Halogen lamp is adjustable. Regulation of the light intensity of lamps and circuits are possible.
- Every load have independent connection.
- The system have overvoltage, short circuit, overload protection and battery overvoltage shutdown.

- The system ensure that the user can control parameters involved in the process in real time. PCs have PCI Express Data acquisition board if necessary for fulfilment of the requirements.
- The software ensure simultaneous visualization of all parameters involved in the process and the control of the actuators.

Scada Software:



A separate grid connection inverter module is integrated into the system. Inverter haven an output power of min 100W. System have overvoltage protection. Inverter efficiency is calculable.

All cables, modules, data acquisition system, software and related accessories required for fully operation of the system within a classroom network is provided. The components are integrated to each other.

The system comply with CE Marking and conformity declarations are provided.

Symbols for the relevant equipment or circuit diagrams conforming to latest DIN/ISO standards are screen-printed on the front panel of the modules. If necessary, front panels are supplemented with colour graphics or photographs at applicable locations on the modules and panels.