Heliocentris

Renewable Energy Training Set

Experiment Set for Energy Production, Energy Storage and Energy Supply

ACADEMIA OFFERING

The Renewable Energy Training Set is prepared for the purpose of experiment in solar, wind and hydrogen in which based electricity production. The experiment set is designed in accordance with the curricula of all institutions requiring technical education in which can be listed as technical university, technical high school and any institution in need of technical education.

In the experiment set, user safety is prioritized in accordance with legal regulations. Laser technology is used in drawing the symbols and writing technical brief above the modules. The content of the training set is applicable for advanced technical training, including basic training. The entire set of experiment unit consists of modules that can be easily attached and removed to main unit depending on the experimental work to be carried out. All of the components used in the modules are products or their counterparts in which produced for industrial purposes.

Movable Main Unit

- Mobile stand made of 45x90 sigma aluminum profile
- 140x80x3 cm table in which suitable for laboratory conditions
- 5 corrugated cable holder with 40 cable capacity
- 3 aluminum areas where the modules can be located in the main unit
- Mobile casters

Solar Energy Experiments

- Photovoltaic Panel Experiments
- Measurement of Photovoltaic Panel Open Circuit Voltage
- Measurement of Photovoltaic Panel Short Circuit Current
- Photovoltaic Panel Current Voltage Characterization
- Examination of Photovoltaic Panels No-load Output Voltage Relative to the Whole-Day Movement
- Examination of Photovoltaic Panels Loaded Output Voltage Relative to the Whole-Day Movement
- Examination of Photovoltaic Panels Seasonal No-load Output Voltage
- Examination of Photovoltaic Panels Seasonal Loaded Output Voltage
- Series Connection of Photovoltaic Panels
- Examination of Parallel Connection of Photovoltaic Panels
- Examination of Photovoltaic Panel Simulator
- Examination of Shadow Effect on Photovoltaic Panels
- Examination of Bypass Diode Effect on Photovoltaic Panels
- Examination of Mismatching Effect on Photovoltaic Panels
- Examination of the Effect of Blocking Diodes on Photovoltaic Panels
- Photovoltaic Panel Emulator Examination
- Photovoltaic System Experiments
- Directly Connecting Photovoltaic Panel to Load
- OFF GRID Inverter Startup (No-Load)
- Installation of the Basic Photovoltaic System (DC Load)
- Installation of Basic Photovoltaic System (AC Load)
- Examination of OFF GRID Inverter Output Signal with DAQ Module
- OFF GRID Inverter Output Signal Measurement by Energy Analyzer
- Measurement of Energy Taken from OFF GRID Inverter
- Measurement of OFF GRID Inverter Output Power and its Efficiency
- OFF GRID Inverter SCADA Application
- Examination of ON GRID Inverter

Wind Power Experiments

- Examination of the Relationship between Turbine Speed and Wind Turbine Output Voltage (No-load Operation)
- Examination of the Relationship between Turbine Speed and Wind Turbine Output Voltage (Loaded Operation)
- Examining Wind Turbine Controller Effect on the Relation Between Turbine Speed and Turbine Output Voltage (No Load Operation)
- Examining Wind Turbine Controller Effect on the Relation Between Turbine Speed and Turbine Output Voltage (Loaded Operation)
- Examination of Wind Turbine Output Voltage
- Examination of Wind Turbine Output Voltage with DAQ Module
- Examination of Wind Energy System

Hydrogen Energy Experiments

- Examination of Hydrogen Fuel Cell Output Voltage with Oscilloscope
- Examination of Hydrogen Fuel Cell Output Voltage with DAQ Module

SOLAR PANEL EMULATOR MODULE

» Operation voltage: 88-264 VAC, 47 ... 63 Hz

» Output voltage: 20V

» Short circuit current: 2 A

» Bypass diode connection

» The connection of blocking diode

» Connection terminals: 4mm safety sockets

ELECTRONIC POTENTIOMETER MODULE

» Touch screen

» 0-1K / 100W linear adjustable resistance

» 1 Ohm adjustment range

» Screening feature for different time intervals and resistance levels

» Connection terminals: 4mm safety sockets

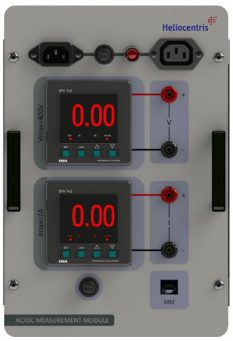
SOLAR CHARGE REGULATOR MODULE

» 12/24V automatic input voltage switched

» 10 A Charging / Discharge current

» Solar, Battery and DC load connection terminals

» Connection terminals: 4mm safety sockets



AC/DC MEASUREMENT MODULE

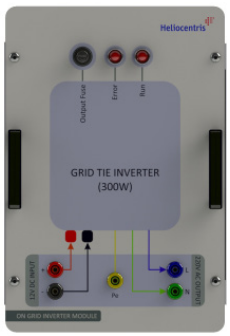
» Ammeter (0-5A, AC and DC)

» Voltmeter (0-500 V, AC and DC)

» Operation voltage 230V, 50Hz

» Communicating with the training set software via RS 485 port

» Connection terminals: 4mm safety sockets



ON-GRID INVERTER MODULE

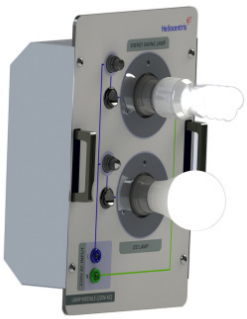
» Input voltage 12V DC, output voltage 230V AC

» Maximum input current: 4A

» Output power: 300W

» Fuse protection

» Connection terminals: 4mm safety sockets



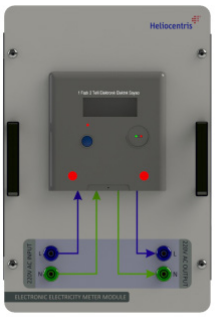
220V AC LAMP MODULE

» E27 or E14 lampholder

» Energy saving lamp

» LED Lamp

» Connection terminals: 4mm safety sockets



ELECTRONIC METER MODULE

» 3 phase measurement specifications

» Rated voltage: 220/400V

» Frequency: 50 Hz

» Operation current: 0.2 - 5 A

» Connection terminals: 4mm safety sockets

LIGHT ANGLE ADJUSTABLE SOLAR PANEL

» Mobile stand made of 45x45 sigma aluminum

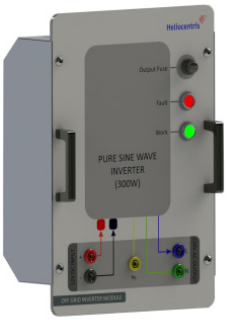
» 2 pieces 10W polycrystalline panel

» 3 different settings for solar position simulation

» Scale indicating the setting value

» 500W Projector

» Connection terminals: 4mm safety sockets



OFF-GRID INVERTER MODULE

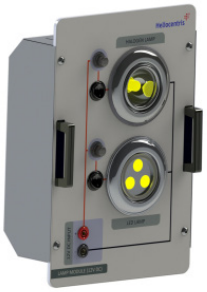
» Input voltage 12V DC, output voltage 230V AC

» Output voltage is full sine, output power 300W

» Thermal and overload protection

» Protection of short circuit and reverse connection

» Connection terminals: 4mm safety sockets



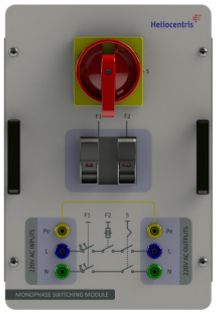
12V DC LAMP MODULE

» Halogen Lamp 20W

» LED lamp 2W

» Operation voltage: 12V

» Connection terminals: 4mm safety sockets



MONOPHASE SWITCHING MODULE

» O-1 switch

» Protection of leakage current and fuse

» Connection terminals: 4mm safety sockets

ACCUMULATOR MODULE

» Maintenance-free type

» Voltage: 12V

» Capacity: 7Ah

» Overcurrent protection

» Connection terminals: 4mm safety sockets

WIND TURBINE CHARGE CONTROL MODULE

» Rated voltage of the battery: 12 / 24V

» Wind turbine braking voltage: 15 / 30V

» Aluminum body with coolant specification

» Connection terminals: 4mm safety sockets

PC INTERFACE MODULE

» Module has IEC connector, lamp and fuse

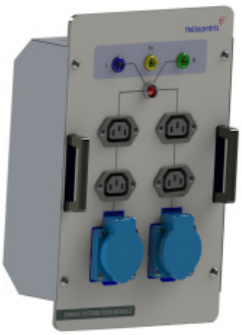
» 2 pcs independent analog signal outputs (0-5V)

» 1 pcs USB terminal

» 2 pcs RS 485 ports

» 1 pcs RS 232 port

» Connection terminals: 4mm safety sockets

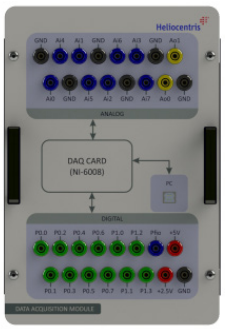


ENERGY DISTRIBUTION MODULE

» 4 pcs IEC sockets

» 2 pcs grounded sockets

» Connection terminals: 4mm safety sockets



DATA ACQUISITION MODULE

» 8 pcs analog inputs (14 bits, 20 kS/s)

» 2 pcs static analog outputs (12 bit, 9.1 mV)

» 12 pcs digital inputs / outputs

» Digital counter

» USB connection

» Connection terminals: 4mm safety sockets

WIND TURBINE MODULE

» Power: 200W

» Aluminum body

» 150W driven by DC motor

» Connection terminals: 4mm safety sockets

WIND SUMULATOR MODULE

» Module has IEC connector, lamp and fuse

» Selection switch for manual and PC operation

» Manually adjusting the DC engine rpm

» Ability to adjust DC motor rpm with computer

» Control power 200W

» Connection terminals: 4mm safety sockets

ANALOG MEASUREMENT MODULE

» Analog ammeter 0-5A

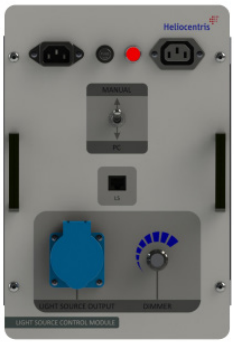
» Analog voltmeter at least 0-20V

» Connection terminals: 4mm safety sockets

DIODE MODULE

» 6 pcs high-current diodes

» Connection terminals: 4mm safety sockets



LIGHT SOURCE CONTROL MODULE

» PC and manual adjustment options

» Analog input connector for manual control

» 1000W output power

» Connection terminals: 4mm safety sockets

AC ENERGY ANALYZER MODULE

» Operation voltage: 100-240V AC, 110-250V DC

» Current inputs: 5A

» Measurement accuracy: ± 1%

» Module has IEC connector, lamp and fuse

» PC connection

» Connection terminals: 4mm safety sockets

ISOLATED MEASUREMENT MODULE

» Measuring voltage: 0-500V

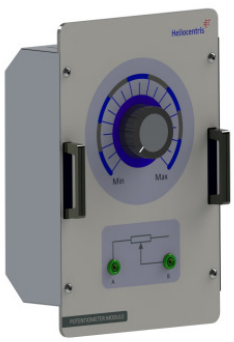
» Measuring ranges: 0-500V, 0-50V, 0-5V

» Measuring current: 0-5A

» Number of channels: 2

» Module has IEC connector, lamp and fuse

» Connection terminals: 4mm safety sockets



LINEAR POTENTIOMETER MODULE

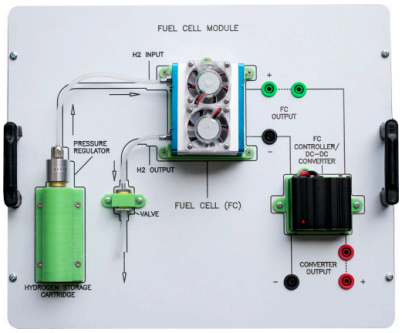
» 0-1K Ohm

» 0-50 Ohm maximum 6A

» 51-200 Ohm maximum 2A

» 201-1K Ohm max 0.6A

» Connection terminals: 4mm safety sockets



HYDROGEN ENERGY MODULE

» Fuel cell rated power: 30W

» Number of Cells: 14

» Rated performance: 8.4V, 3.6A

» Purge valve voltage: 6V

» Fan voltage: 5V

» Hydrogen pressure: 0.45 - 0.55 bar

» Fan with coolant

» Maximum output gas flow amount: 0.42L / min

» Hydrogen purity (%): 99,995 (dry hydrogen)

» System efficiency: at least 39% at Full power

» Connection terminals: 4mm safety sockets

ELECTRONIC POTENTIOMETER MODULE

» Touch screen

» Power: 100 W

» Ability to set operation voltage and current via touch screen

» Adjustable via PC

» Connection terminals: 4mm safety sockets

DC POWER SUPPLY MODULE

» 0-30V adjustable short circuit and over current protection, programmable power supply

» The DC source current can be set in the range 0-5A.

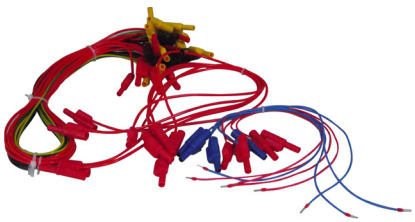
» Power supply with color LCD monitor shows current, voltage and instantaneous power values.

» The front panel of the energy unit is made of 4 mm compact laminate.

» Text and figures on the panel are formed by mechanical scraping.

» The body of the energy unit is made of 0.8 mm sheet metal and painted with electrostatic paint.

» Connection terminals: 4mm safety sockets



CABLE SET

» Isolated cable suitable for 4mm born jack

» Cable sizes are 50 cm and 100 cm

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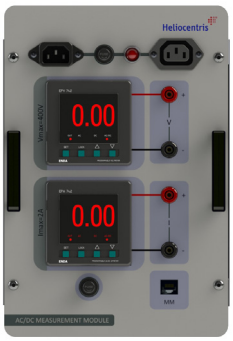

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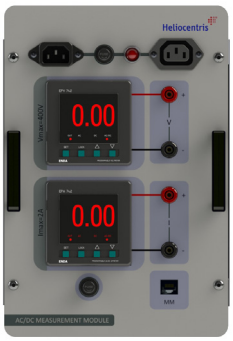

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