

ET 250.02

Stand-alone operation of photovoltaic modules



Learning objectives/experiments

- familiarisation with practical components for stand-alone use of photovoltaic electricity
- functioning of a circuit breaker and over voltage protection
- functioning of a charge controller with integrated maximum power point tracking
- influence of the workload on the efficiency of components
- influence of fluctuations in solar energy and/or electricity usage on the overall system efficiency

Description

- unit with practical components for stand-alone usage of solar electricity
- charge controller providing functions for maximum power point tracking and accumulator safety
- inverter for use of typical AC consumers
- dimmable halogen lamp for experiments under varying electrical load

Stand-alone operation of photovoltaic modules excludes any access to a public mains grid. This kind of photovoltaic usage is chosen typically for applications in remote locations.

ET 250.02 is conceptualized as an extension for ET 250 and provides typical components for stand-alone photovoltaic systems. This includes a charge controller, an inverter, and an accumulator as storage for electricity.

These components enable conversion of the solar electricity, provide supply on demand, and ensure system safety.

A connection cable feeds the photovoltaic DC current from ET 250 to the input of ET 250.02. Inside ET 250.02 the DC current passes safety devices and enters the charge controller. The charge controller with maximum power point tracking adapts the voltage level for accumulator charging or for direct consumption. An inverter enables usage of typical AC consumers.

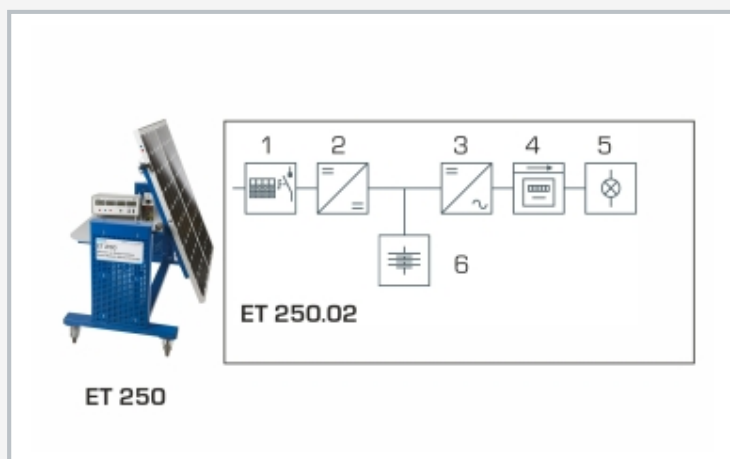
Measurements of current and voltage at predefined points of the system circuit allows detailed energy balances. Thus, the performance of system components under varying demand and supply of electrical power can be studied.

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1 connector for photovoltaic modules, 2 circuit breaker, 3 over voltage protection, 4 charge controller with maximum power point tracking, 5 accumulator as storage, 6 inverter, 7 electricity meter, 8 dimmer, 9 halogen lamp



1 circuit breaker with over voltage protection, 2 charge controller with maximum power point tracking, 3 inverter, 4 electricity meter, 5 halogen lamp, 6 accumulator as storage



The illustration shows ET 250.02 together with ET 250 and the artificial light source HL 313.01

Specification

- [1] extension for the trainer ET 250
- [2] practical electrical components for photovoltaic stand-alone operation
- [3] circuit board with integrated measuring points for current and voltage
- [4] combiner box with circuit breaker and over voltage protection
- [5] charge controller with integrated maximum power point tracking
- [6] accumulator for storage of solar electricity
- [7] inverter for use of AC consumers
- [8] socket with electricity meter

Technical data

Circuit breaker

- max. current: 30A
- rated voltage: 1000V

Over voltage protection

- leakage impulse current limit: 40kA

Charge controller

- charge current: 20A
- charge stop voltage: 14V

Inverter

- input voltage: 12V
- output power: 150W

Accumulator as storage

- rated voltage: 12V
- rated capacity: 12Ah

LxWxH: 560x420x820mm

Weight: approx. 30kg

Scope of delivery

- 1 experimental unit
- 1 set of instructional material

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Required accessories

ET 250 Photovoltaic modules measurements