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 DC switch-disconnector and over voltage protection
- functioning of a charge regulator 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 elctrical 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. These components enable conversion of the solar electricity, provide supply on demand and ensure system safety.

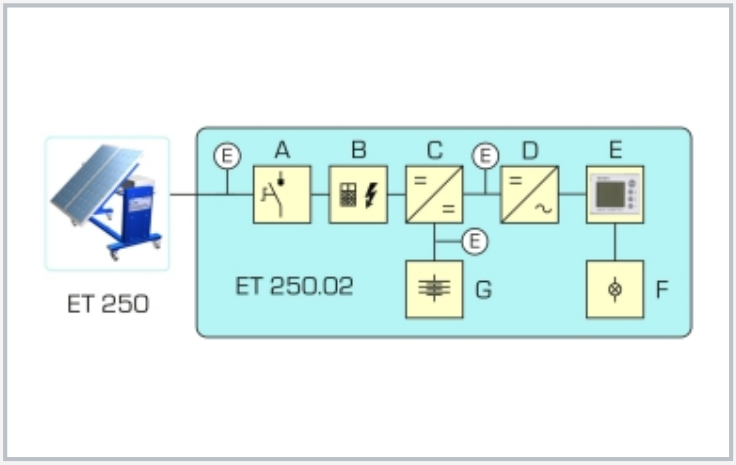
A connection cable feeds the photovoltaic DC current from ET 250 to the input of ET 250.02. Inside ET 250.02 the DC current passes safety devices and enters the charge controller. The charge controller adapts the voltage level for accumulator charging or for direct consumption. An inverter enables usage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

ET 250.02

Stand-alone operation of photovoltaic modules

1 connector for photovoltaic modules, 2 DC switch-disconnector, 3 over voltage protection, 4 charge regulator, 5 accumulator, 6 inverter, 7 energy meter, 8 dimmer, 9 halogen lamp



A DC switch-disconnector, B over voltage protection, C charge regulator, D inverter, E energy meter, F halogen lamp, G accumulator

Specification

[1] extension for ET 250 Solar Module Measurements
[2] electrical components for photovoltaic stand-alone operation from practice
[3] circuit board with integrated measuring points for current and voltage
[4] combiner box with DC switch-disconnector and over voltage protection
[5] charge regulator with integrated maximum power point tracking
[6] accumulator for storage of solar electricity
[7] inverter for use of AC consumers
[8] socket with energy meter

Technical data

DC switch-disconnector
- max. current: 30A
- rated voltage: 1000V

Over voltage protection
- rated impulse current 20kA

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

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

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

LxWxH: 560x420x820mm
Weight: approx. 30kg

Scope of delivery

1 experimental unit
1 set of instructional material

ET 250.02

Stand-alone operation of photovoltaic modules

Required accessories

ET 250	Solar module measurements