

# ET 250.01

## Photovoltaic in grid-connected operation



### Learning objectives/experiments

- familiarisation with components from grid-connected use of photovoltaic power
- functioning of a DC switch-disconnector and over voltage protection
- functioning of a grid-connected inverter with maximum power point tracking
- dependence of the inverter efficiency on the workload
- function of modern energy meters

### Description

- unit with practical components for grid-connected usage of solar electricity
- inverter providing grid control and maximum power point tracking
- modern twoway energy meter for capture of energy transferred to and from the mains grid
- dimmable halogen lamp for experiments under varying electrical load

Feeding electricity from photovoltaic solar modules into the mains grid requires several special system components. These components enable conversion and capture of the solar electricity and ensure system safety.

The ET 250.01 unit contains these components and is conceptualized as an extension for the ET 250 trainer.

The photovoltaic DC current from ET 250 is fed to the input of ET 250.01 via a connection cable. Inside ET 250.01 the DC current passes safety devices and enters the inverter. The inverter transforms the DC into AC current. The inverter also optimizes voltage and current to ensure that the photovoltaic modules produce maximum possible power.

The inverter output provides an AC voltage with appropriate level and frequency to enable feeding into the mains grid. The amount of fed in electricity is captured by a modern two way electricity meter and the own consumption is captured by an energy logger.

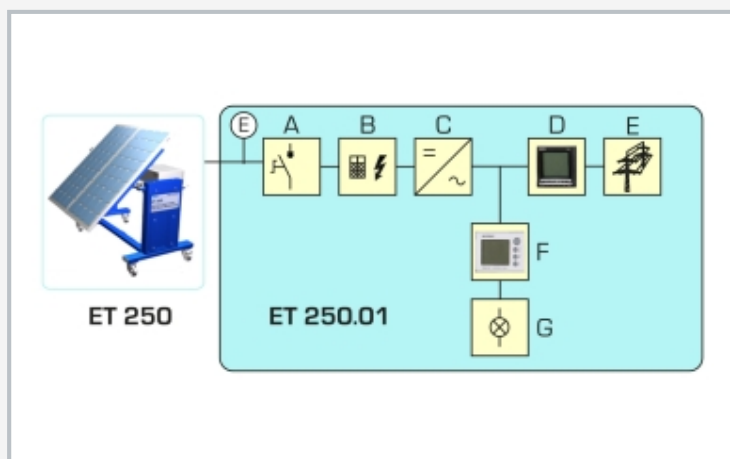
Comparing electrical power of the DC input and the AC output enables determination of the inverter efficiency. The dependence of the inverter efficiency on the total electrical power can be measured in further experiments.

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## Photovoltaic in grid-connected operation



1 connector for photovoltaic modules, 2 DC switch-disconnector, 3 over voltage protection, 4 inverter, 5 halogen lamp, 6 dimmer, 7 fuses, 8 energy meter own consumption, 9 two way energy meter grid, 10 grid connection



A DC switch-disconnector, B over voltage protection, C inverter, D two way energy meter grid, E grid connection, F energy meter own consumption, G halogen lamp with dimmer



The illustration shows ET 250.01 together with ET 250 and the artificial light source HL 313.01

### Specification

- [1] extension for ET 250 Solar Module Measurements
- [2] electrical components for grid-connected usage of photovoltaics
- [3] combiner box with DC switch-disconnector and over voltage protection
- [4] inverter for grid operation with maximum power point tracker
- [5] two way energy meter connecting to the mains grid
- [6] socket with energy meter for own consumption
- [7] dimmable halogen lamp for experiments under varying electrical load

### Technical data

#### DC switch-disconnector

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

#### Over voltage protection

- rated impulse current 20kA

#### Inverter for mains grid operation

- rated input power: 150W
- max output power: 125W
- max. efficiency: 89%

#### Two way energy meter

- rated frequency: 50Hz
- rated voltage: 230V

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

230V, 60Hz, 3 phases

UL/CSA optional

LxWxH: 570x320x820mm

Weight: approx. 28kg

### Scope of delivery

- 1 experimental unit
- 1 set of instructional material

# ET 250.01

## Photovoltaic in grid-connected operation

Required accessories

061.25000      ET 250      Solar module measurements