ET 255

Operating options for modular solar electricity systems

Network capable GUNT software: control and operation via 1 PC. Observation, acquisition, analysis of the experiments at any number of workstations via the customer's own LAN/WLAN network.

Learning objectives/experiments

- investigate components of modern systems for use of photovoltaics
- function of modules for performance optimisation (MPP tracker)
- function of inverters and charge controllers
- operating behaviour with varying illuminance and temperature
- efficiency and dynamic behaviour of system components
- energy management systems for optimising self-consumption in grid operation
- battery management systems for the optimised use of storage systems
- use cases with changing grid availability
- experiments with specified generation and consumption profiles

Description

- **networked system components**
- **supply- and demand-controlled consumption with changing grid availability**
- **optimised self-consumption through storage utilisation with energy management system**
- **operation with real photovoltaic modules ET 255.02 or a photovoltaic simulator ET 255.01**

Solar electricity from photovoltaic installation can be used to feed into a public power grid (grid-connected operation) or for local consumption (stand-alone operation). Modern solar electricity systems combine both options, being controlled according to demand and availability. Storage systems and energy management systems are used to control the energy flows.

ET 255 contains networked components of a solar electricity system such as charge controller, grid inverter, accumulator as storage for electricity, bidirectional electricity meter, as well an energy management system (EMS). Various controllable consumers can be integrated into the solar electricity system. Data from the networked components are recorded in the central communication and control unit (CCU).

Either the ET 255.01 photovoltaic simulator or real photovoltaic modules, such as ET 255.02, can be used as the solar electricity source. The optional accessory ET 255.03 contains two controllable electrical loads that are prioritized differently when supplied by ET 255. Used in conjunction with the accessories, the behaviour of a solar electricity system can be investigated under varying operating conditions.

In order to ensure there is sufficient illuminance, the trainer should be operated with sunlight or the optionally available artificial light source HL 313.01.

Operating data from the solar electricity system is displayed on a touch screen. It is also possible to retrieve operating data via the manufacturer's web portal.

The trainer is controlled via the GUNT software on an external PC (not included), which is connected via a network interface. The GUNT software also allows you to operate and configure the optional ET 255.01 photovoltaic simulator. Typical generation and consumption profiles can be specified via time-controlled sequences. The network-capable software makes it possible to follow and analyse the experiments at any number of workstations via a LAN/WLAN connection to the local network.

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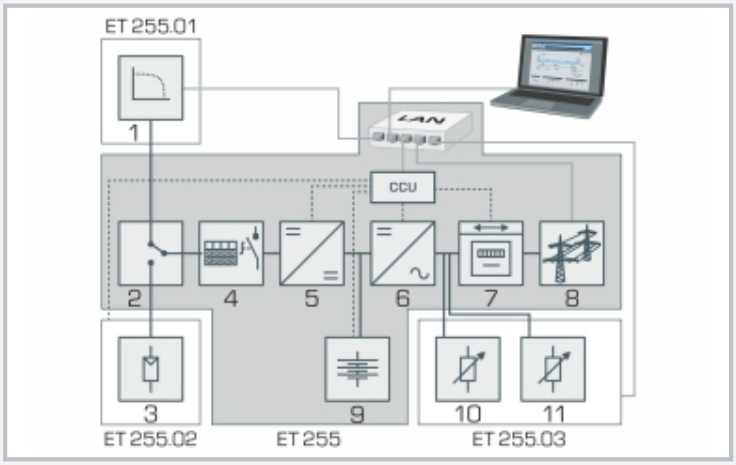
1 circuit breaker and overvoltage protection, 2 photovoltaic simulator connection, 3 toggle switch between photovoltaic simulator/photovoltaic modules, 4 photovoltaic modules connection, 5 MPP charge controller, 6 LiFePO accumulator, 7 alternating current consumers connection, 8 bidirectional electricity meter, 9 grid inverter, 10 communication and control unit, 11 touch screen



1 photovoltaic simulator, 2 photovoltaic modules, 3 toggle switch, 4 circuit breaker and overvoltage protection, 5 MPP charge controller, 6 grid inverter, 7 bidirectional electricity meter, 8 grid connection, 9 accumulator as storage, 10 consumer priority I, 11 consumer priority II, CCU: central communication and control unit for recording of data

Software screenshot

Specification

[1] investigate typically networked electronic components of a practical photovoltaic application
[2] operation with photovoltaic simulator ET 255.01 or real photovoltaic modules ET 250.02
[3] generator connection box with circuit breaker and overvoltage protection as a safety device
[4] charge controller with module for power optimisation (MPP tracker)
[5] grid inverter with certified grid disconnection device
[6] operation with changing grid availability: grid-connected or stand-alone or emergency power operation
[7] connection options for prioritising different alternating current consumer
[8] system monitoring with data transfer of individual system components as an energy management system
[9] time-controlled specification of generation and consumption profiles
[10] bidirectional electricity meter
[11] LiFePO accumulator with battery manag. system
[12] system control and operating states displayed in the GUNT software
[13] network capability: observe, acquire, analyse experiments at any number of workstations with GUNT software via the customer's own LAN/WLAN network

Technical data

Charge controller with power optimisation
- voltage, accumulator: 48V; rated power: 1160W
- max. PV voltage: 100V; max. PV current: 20A
- max. charging current: 20A
- charging voltage (absorption): 57,6V

Inverter for grid feed-in and stand-alone operation
- DC – input voltage range: 38...66V
- AC – input voltage range: 187...265V
- cont. output power at 25°C: 2,4kW
- peak power: 5,5kW; zero load power: 11W
- max. charging current, accumulator: 35A
- charging voltage (absorption): 57,6V

Accumulator as storage
- rated capacity: 2400Wh; usable capacity: 2280Wh
- discharge voltage: 44,5...53,5V
- charging voltage: 52,5...53,5V
- recommended charging/discharging current: up to 25A

230V, 50Hz, 1 phase; 230V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 1520x790x1760mm; Weight: approx. 165kg

Required for operation

PC with Windows

Scope of delivery

trainer, GUNT software + LAN cable, set of instructional material

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Required accessories

ET 255.01	Photovoltaic simulator
or	
ET 255.02	Photovoltaic modules for solar electricity systems

Optional accessories

ET 255.03	Consumers in solar electricity systems
HL 313.01	Artificial light source