

## One device - double benefit: Innovative PV measurement equipment for use at the training system and at real PV plants



### The PV training system Solartrainer Profi for vocational education and training was expanded with an innovative Photovoltaic measurement equipment

The background: Today PV plants are working very reliable. Nevertheless they often generate only a part of the maximum possible power. The causes are multiple and it is not rare that they can be traced back before the period of the actual installation. Because even on the way to the installation site micro cracks can arise because of incorrect storage or as a result of incautious transport. The micro cracks cannot be seen with the naked eye, however the consequences have far reaching implications: If water has penetrated or soldered bonds were interrupted the efficiency of solar modules can be noticeably reduced. The financial losses for private operators as well as investors in large solar systems may be substantial. In practice the possibility of monitoring the characteristic curves of single solar modules, strings and the test of complete photovoltaic installations becomes more and more important.

### PV vocational education and training

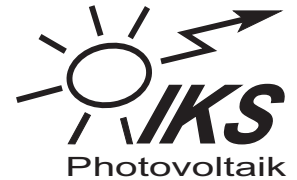
However, this also means that this subject has to be an integral part of the vocational education and training in the field of photovoltaic. A development, that was taken up with our latest product innovation. The well-known PV training system Solartrainer Profi was expanded with a measurement equipment, consisting of an innovative multifunction instrument, remote datalogger with radio transmission, transducer clamps and an ISET Sensor irradiation sensor with dimmable halogen spot for setting of irradiation values, as well as practice-oriented didactic materials.

### Double benefit

The particular feature: The newly into the PV training system integrated Photovoltaic measurement equipment can be used afterwards for measurements and tests at real photovoltaic installations. A system with double benefit. Because as always before we have focused on a high practical relevance when selecting the components.

# SOLARTRAINER

## Profi



### Scope of delivery PV measurement equipment

- Multifunction instrument with tool pocket

Measuring range performance analysis:

Voltage DC: 15,0 V - 999,9 V

Voltage AC: 50,0 V - 265,0 V

Current DC (über Stromzange): 50 mA - 1100 A

Current AC (über Stromzange): 10 mA - 1200 A

Power DC: 1 W - 999,9 kW

Power AC: 1 W - 999,9 kW

Measuring range I-U curve measurement:

Voltage DC: 5,0 V - 999,9 V

Current DC: 0,1 A - 10,0 A

Power DC: 50 W - 999,9 W / 1.000 kW - 9.999 kW

Irradiance (with ST 36) 1,0 mV - 100,0 mV

- Remote datalogger with radio transmission for irradiance and temperature

- Transd. clamp DC 10 A / 100 A

- Transd. clamp AC 5 A / 100 A

- Training panel

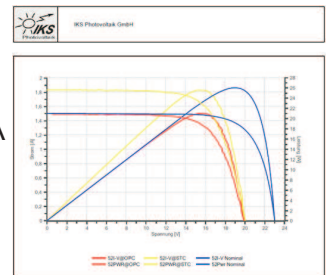
- ST 36 Solar radiation sensor (sensor removable)

- Module temperature sensor and ambient temperature sensor -20 bis 100 °C

- Measuring cables and adapter plugs

- Data transfer software and evaluation software

- Experimental instructions



### Experiments

- I-U curve recording of different solar modules

- I-U curve recording of different solar modules at different irradiation intensities

- Temperature influence on the I-U curve of different solar modules

- I-U curve recording of a series connection of solar modules

- I-U curve recording of a parallel connection of solar modules

- Shading of a series connection of solar modules without bypass diode, I-U curve recording

- Shading of a series connection of solar modules with bypass diode, I-U curve recording

- Photovoltaic plant mains parallel operation, measuring of the inverter efficiency

- Test of a photovoltaic plant mains parallel operation, measuring also the irradiation and temperature. Measuring of the inverter efficiency, solar modules efficiency and the overall efficiency (performance ratio) and issue of a test report

- Test of a photovoltaic plant mains parallel operation. Simulation of system failures: PV power too low / irradiation sensor failure / Irradiation value too low for evaluation

- I-U curve recording and evaluation of a solar module (solar module simulated) also measuring the irradiation and temperature. Detection of underperformance

- I-U curve recording and evaluation of a string (solar module simulated) also measuring the irradiation and temperature. Detection of underperformance

- I-U curve recording and evaluation of a solar module (solar module outdoor) also measuring the irradiation and temperature and considering the position of the sun. Detection of underperformance

- Rapid test on solar modules and strings with and without measuring the irradiation and temperature

- Measuring the internal resistance of a solar module

- Reading out and processing of the data with a PC

Subject to technical modifications. Stand: June 2014

Reseller

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