



PIDcheck

portable in field PID (Potential Induced Degradation) tester for different types and sizes of c-Si modules without dismantling and within 8 hours test time (measurement will be less than 8 hours).

PIDcheck was developed in cooperation with Fraunhofer CSP Halle, Germany.

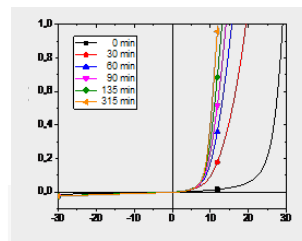


Benefits and features of PIDcheck

- + **Quality check after installation or before purchasing PV power plants**
PIDcheck is the only tool that is able find whether installed PV modules are PID sensitive or not.
- + **Power and yield forecast**
If PID has already occurred, only PIDcheck measurements can provide projections on future yield.
- + **Evaluation of countermeasures against PID**
The PIDcheck device is able to simulate the application of recovery equipment ("offset boxes", "float controllers") and therefore helps to evaluate the recovery effect before their installation. Reversible high voltage polarity for PID recovery in the field
- + **Measurable parameters**
Shunt resistance, power loss, conductivity, leakage current, humidity and temperature
- + **Easy to use portable device**

Standard test conditions

- › Voltage: 1 to 1.5 kV
- › Elevated temperature for accelerated PID test (typical: 85 °C)
- › Test duration: 4 hours (typical), less than 8 hours including preparation and recovery after PID test
- › Measurement of:
 - i. Leakage current
 - ii. Dark current in forward direction
 - iii. Dark I-V curves for estimation of power loss



Dark current measurements during PID test

Typical users

- › Service/Maintenance companies
- › Solar power plant owners
- › Insurance companies and others

Laboratory vs. In field PID test

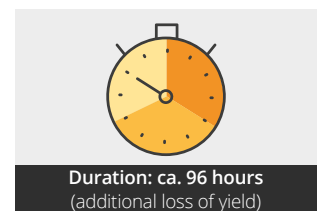
Laboratory test



Dismount and transport to laboratory

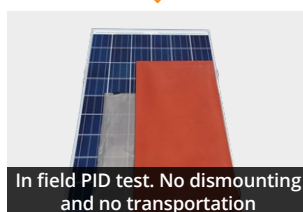


Expensive and huge climate chamber

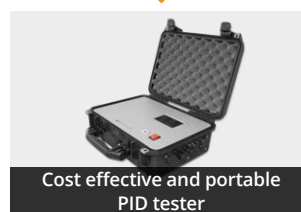


Duration: ca. 96 hours (additional loss of yield)

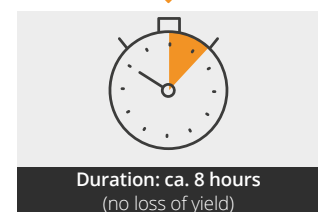
In field test



In field PID test. No dismantling and no transportation



Cost effective and portable PID tester



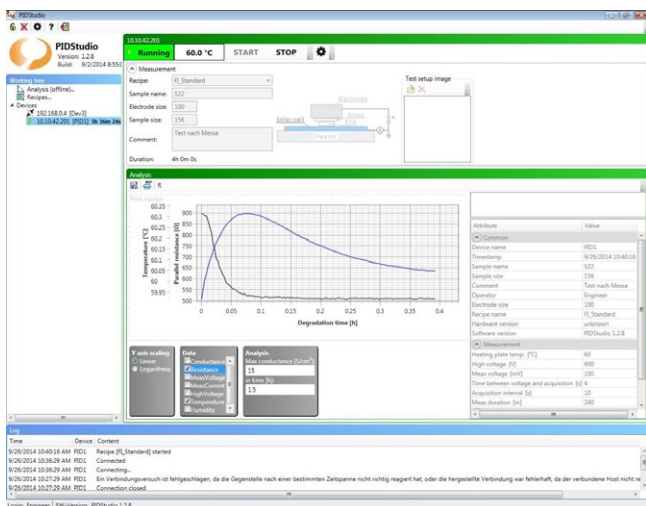
Duration: ca. 8 hours (no loss of yield)

Background

Failures of crystalline silicon solar modules under the influence of high voltage have been first reported in 2010. Affected solar cells show an extreme decrease of the shunt resistance. The effect was termed Potential Induced Degradation (PID).

Until now, when PID is suspected to develop in PV power plants, the modules have to be dismantled and tests are conducted in certified laboratories in a climate chamber.

With PIDcheck the test can be performed in the field without any dismantling, with realistic PID test conditions and within few hours (typically 8 h). Hence a lot of money and time can be saved. The PIDcheck has been developed in cooperation with Fraunhofer CSP, Halle, Germany.



Publications

V. Naumann, D. Lausch, N. Schüler, C. Hagendorf, *Outdoor PID testing of modules in PV systems, 26th International Photovoltaic Science and Engineering Conference (PVSEC-26), Singapore, 2016*

V. Naumann, D. Lausch, N. Schüler, C. Hagendorf, *Accelerated on-site PID testing of c-Si PV modules in solar power plants, EU PVSEC 2017, 25 - 29 Sept. 2017, Amsterdam, The Netherlands*

Technical specifications

Sample size	different sizes of modules, default: 60 cell modules
No. of stressed cells	depending on cell size, default: 24 cells
Temperature range	ambient temperature to 85 °C
Waterproof	IP 65 - protected from low pressure water jets from any direction
Electrode	flexible metal grid, ± 0.1 to 1.5 kV
Heat pad	2000 W
Power requirements	110/230 V AC, 50/60 Hz, 2.3 kW
Dimensions	430 × 368 × 185 mm (control unit)
Weight	ca. 20 kg
Certification	manufactured under ISO 9001 guidelines, CE conform



Comparison of different PID assessment methods

	Time to result	Significance	PID forecast possible?	Control of test conditions	Cost per test (incl. equipment)
In-field measurement					
› thermography	+++	--	--	o	++
› EL	++	-	--	+	+
PID regeneration box with V_{mp} monitoring	--	o	+	o	-
PID test in lab					
› standard	o	+	+	+	-
› cyclic PID/recovery	o	++	++	+	--
PIDcheck	+	+	+	+	+

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In cooperation with

