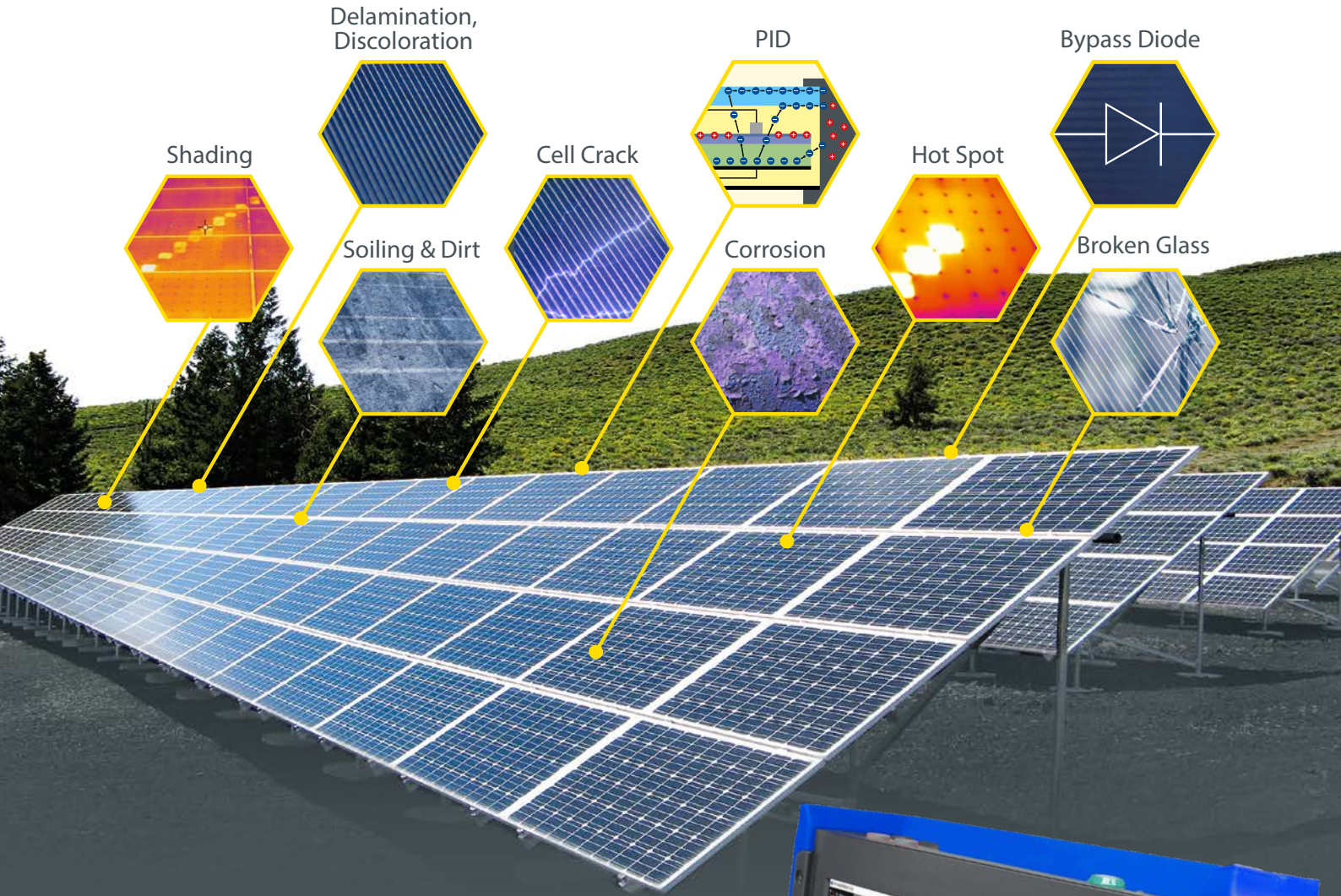


**MULTI-CHANNEL IV CURVE TRACER**

**MESSTECHNIK**

World's most versatile Solar Power Plant diagnostic system

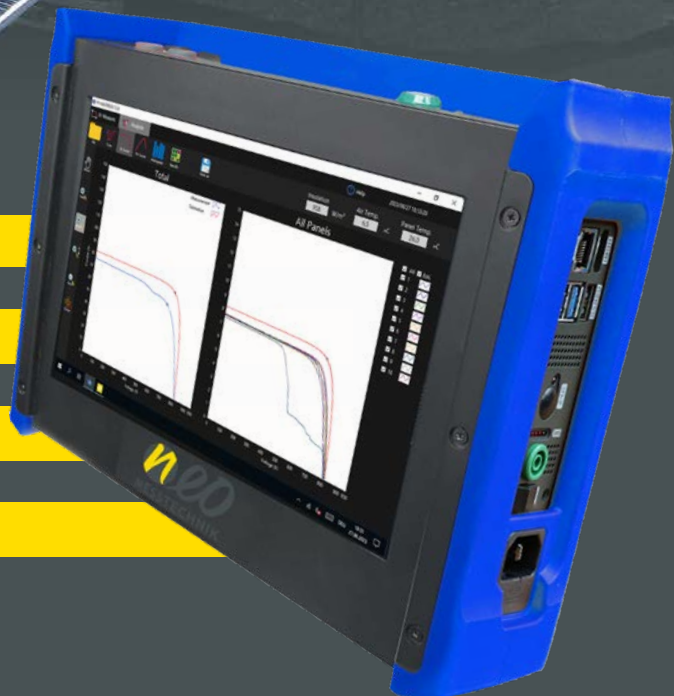


**POWER PERFORMANCE**

**IV-CURVE-TRACING**

**DISTANCE-TO-FAULT**

**LEAKAGE MEASUREMENT**



## How does the PV Master unleash your solar power potential?

**Performance:** Testing ensures that PV modules, and other components perform as expected under various conditions. The PV Master assesses their efficiency, power output, and reliability.

**Safety Compliance:** Early fault detection through a combination of leakage current measurement and IV curve tracing.

## Inspection methods

There are already a few methods to carry out PV inspections. The ones mainly used in the field are thermal imaging and electroluminescence but since they often need a lot of time and know how to use, they aren't flawless.

Diagnosis	Optical Inspection	Thermal Imaging	Electro-luminescence	1-Channel IV-Curve Tracing	Multichannel IV-Curve Tracing
Faults					
PID	×	△	✓	✓	✓
Bypass open	×	×	×	✓	✓
Bypass shorted	×	✓	✓	✓	✓
Hot Spots	×	✓	△	✓	✓
Cell Crack	×	△	✓	△	△
Disconnection	×	✓	-	✓	✓
Snail Trail	✓	△	-	✓	✓
parallel Mismatch	×	×	×	×	✓
Needed Time	-	High	High	High	Low

× no detection    △ partly detection    ✓ full detection

## World's only instrument to detect parallel Mismatch-Losses

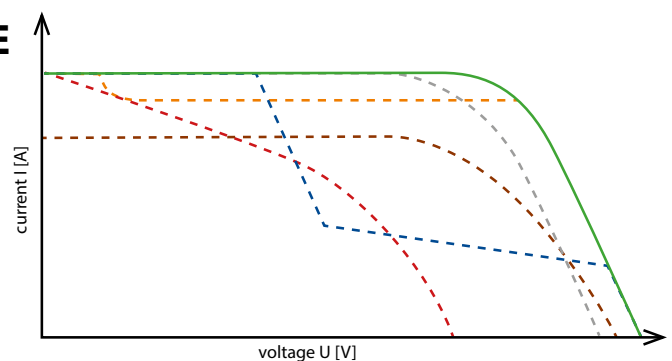
### Exemplary faults detected by IV – CURVE

■ Standard Test Conditions  
Expected curve when no damage or aging is present.

■ Hotspots  
When solar cells within a module no longer supply current due to partial shading they heat up strongly due to the current of the other cells connected in series. In the worst case, a hot spot can lead to fires, but in any case, it results in a power reduction.

■ PID – Potential Induced Degradation  
PID occurs when a voltage difference prevails between panel and ground. The primary circuit thereby produces a partial voltage discharge which then results in an output power reduction.

■ LID - Light Induced Degradation  
The degradation of photovoltaic modules describes the reduction in performance due to aging effects. This mainly includes browning, cell bleaching blistering or cell corrosion.



■ Bypass-Diode Breakage  
Bypass-Diodes can break due to production faults, thunderstorms, overheating, mechanical damage or continuous shading. When that happens the system voltage will be reduced leading to output power reduction.

■ Shading  
Shaded modules do not only reduce the power output but also lead to bigger problems like Hotspots or breakage of the bypass diode.



## Why is it the world's most versatile Solar Power Plant diagnostic system?

**ADAPTIVE SWITCHING**  
Precise IV-Curve tracing for both - Single PV modules or full strings up to 1500 V beginning at 400 W/m<sup>2</sup> solar radiation.

**IV CURVE TRACING**  
1500 V / 30 A  
High Power Rating (optional 45 A)

**LEAKAGE DETECTION & DISTANCE TO FAULT FUNCTION**

**DIAGNOSIS**  
Automatic detection of many types of performance-reducing faults, such as Mismatch, PID, Hotspots, Cell Cracks, BPD breakage and others.

**EXTENSION BOX**  
For measuring up to 20 strings simultaneously - IV and Leakage measurement.

**SENSOR BOX EXPERT**  
Bifacial PV module support. Exact temperature and irradiance measurement.

- Multimeter Mode (U, I, P)
- Mobile Operation up to 4 hours
- Easy Remote Connection (LAN, WLAN, UMTS)
- Direct Analysis on the Instrument using the 10.1 inch Multi-Touch-Screen

## The best IV-Curve Tracer

**Efficiency**  
Power & efficiency according to IEC62446-2

1 String

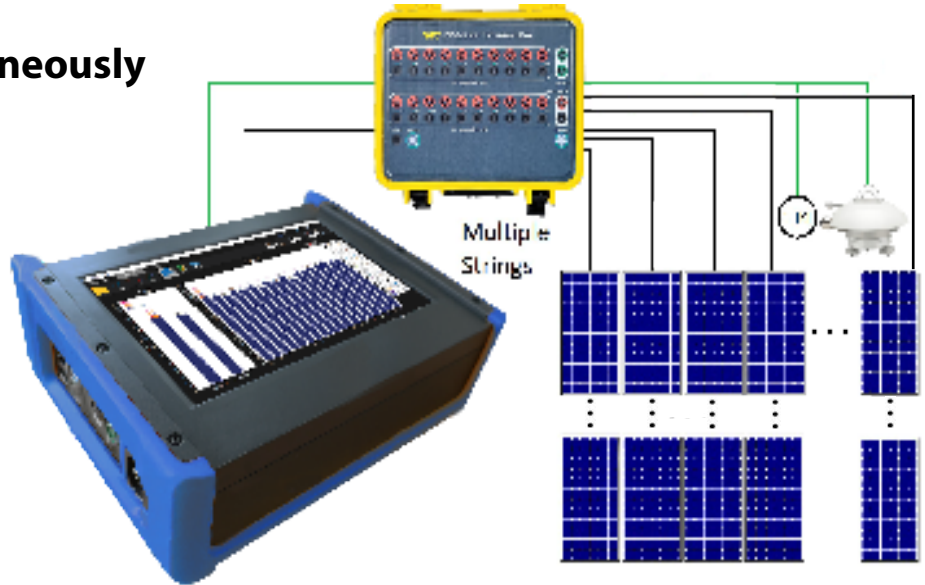
**Sensor Box Options:**

**Sensor Box Lite**  
Integrated Class C Pyranometer, ambient and module temperature (PT100/PT1000)

**Sensor Box Expert**  
- up to 2x Radiation (Pyra Class A, B or C)  
- up to 5x Temperature (PT100/1000 or Thermocouple Typ K)  
- wired or wireless (up to 100m)  
- Touch-Screen Display and battery powered  
- Bifacial Module support

## Up to 20 strings simultaneously

The modular system of the PV Master series offers the best possible flexibility for the user. 1, 4, or 20 input channels can be connected to the device via an external switchbox.



**PM-10: 1 Channel**  
**Extension Box:**  
**Option 1: 4 Channels**  
**Option 2: 20 Channels**

### PV MASTER 10



#### 1 Channel IV-curve tracing

Highly precise measurement diagnostics an report tool for PV systems.

#### up to 1500 V / 30 A or 45 A

Designed for high-power applications (high voltage / high current)

### 20 CHANNEL EXTENSIONBOX



#### AUTOMATIC SWITCHING

Switches automatically through all connected Channels.

- 20x IV-curve measurement
- 20x Leakage measurement

### PV MASTER 70



#### 20 Channels with 1600 V / 40 A

### PV MASTER 80



#### 24 Channels with 1100 V / 40 A