Mobile Lab 2.0

Technical Specification

Mobile PV-Testcenter 2.0
Date: 2018/02/01

-New full spectrum LED Flasher
-Certified to IEC 60904-9 Ed2 by TÜV Rheinland (see last page)

IEC 60904-9
Regular Surveillance
www.tuv.com
ID 0000049145

Class A+ for spectrum
Class A for non-homogeneity
Class A+ for stability of the flash pulse (LTI)

-Air condition unit included
-300µm pixel resolution for EL / up to 20 megapixel per panel

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General Description

The Mobile Lab 2.0 (former Mobile PV-Testcenter 2.0) is designed for use in the field at installation sites for an in-depth quality analysis of photovoltaic panels. The mobile inspection system is providing Electroluminescence inspection, IV-curve measuring using an A+ / A / A+ LED flasher, and Infrared Imaging. Accuracy of testing and measurement is designed and optimized for the requirements which are needed to measure and test PV modules on site. The second generation version is including an air condition unit, being able to stabilize the system towards STC temperature of 25°C.

General Technical Data

Module sizes (W x L)	Min.: 590mm x 890mm Max.: 1060mm x 1980mm
Module types	Framed modules, mono-crystalline or multi-crystalline and thin film
Frame thickness	6mm to 55mm
Cell formats	5 and 6 inch
Contacting of modules	Manual
User interface	24“ TFT Display with Lenovo keyboard and track point
Configuration	Module type based configuration of all system parameters through SW

Technical Data Electroluminescence

Cameras	2 MBJ NIR-CCD cameras, each 2 Megapixel, adaptive and active cooled CCD Panel is scanned through camera movement on a linear axis
Resolution	~300 µm/pixel (equivalent to ~20 MPixel for the full PV-panel)
Image acquisition time	< 20s (for a full panel image)
Power supply unit	Power supply up to 250V, up to 12A for module power supply. Voltage and current controlled by software
Operation mode	Full automatic image acquisition, manual cell/module judgment through operator

Technical Data
Flasher and I/V Curve Measurement

LED panel area (W x L)	1280mm x 2140mm
Angle of light emission	+/- 60° for UV,KW,WW / +/- 45° for the IR channels
Homogenous area (W x L)	1000mm x 1940mm (at least Class A IEC60904-9 Ed2) (at module plane, around center mark)
Technology	Full spectrum long pulse LED Flasher, LED lifetime more than 1 Million Flashes
Spectrum	Class A+ IEC60904-9 Ed2
Long term instability (LTI)	< +/- 0.25% / Class A+ IEC60904-9 Ed2)
Short term instability (STI)	Class A (simultaneous acquisition of current, voltage and irradiation)
Non uniformity	< +/- 2% / Class A IEC60904-9 Ed2
Total irradiance	200-1200 W/m² (in 200W steps configurable)
Repeatability of Pmax (Flash to Flash)	< +/- 0.2% (absolute)
Current measurement	1-6A, 2-14A (Automatic adjustment based on Isc)
Current accuracy	Better +/- 0.2% (FullScaleRange)
Voltage measurement	5-80V / 10-260V (Automatic adjustment based on Uoc)
Voltage accuracy	Better +/- 0.2% (FSR)
Sampling	16Bit / 50kHz fully synchronously / configurable IV data recording time
Flash pulse duration	Long pulse, >200 ms at full irradiance
Charging time	First flash: 2 minutes / flash to flash: 40 seconds
Contacting	4 wire
Load element	Adjustable capacitive load, Automatic adjustment based on Isc and Uoc
Reference cell	Fraunhofer WPVS mono crystalline, multi-crystalline spectral response, calibrated with +/- 2% accuracy shunt voltage is measured with better +/- 0.1% (FSR, 60mV)
Accuracy of Pmax	Better +/- 3% based on in system reference cell usage, measurement is done at 25°C system and module temperature. Correction of irradiance and temperature to STC conditions is done according to IEC 60891 Procedure 2
Panel temperature sensor	Two Optris IR sensors with accuracy of +/- 1°C, optional up to 3 additional ones
Operation mode	Full automatic measurement, no operator interaction needed

Technical Data
Infrared Imaging

Camera	Optris based MBJ IR camera, attached via IP68 USB plug to the trailer
Resolution	160x120 pixels
Sensor	Optris Microbolometer / accuracy better +/- 2°C
Display	Live view on 24” TFT monitor, various color schemes selectable
Operation mode	Manual operation, IR image acquisition while panel is under current

Technical Data
Electrical tests

Connection test	Electrical connection test to assure proper connection to and inside of the module. Configurable current and voltage. Configurable limits.
Diode test	Reverse current of 10A will be used to check the diodes. Voltage measurement accuracy is >0.2V, identification of all possible diode states. (diode missing/not connected or diode shortcut)
HiPot test	Dielectric withstands test according IEC 61730-2 / MST16. Testing voltage 6 kV, testing for current below 50µA. Configurable voltage, duration and limits. (As option available, not included into standard scope!)
GND connectivity test	Ground continuity test according to IEC 61730-2 / MST13. Testing current 30A, resistance measurements between all 4 frame parts. Configurable current duration and limits. (As option available, not included into standard scope!)

Software

Operating system	Microsoft Windows 7® 64 Bit
User interface	Windows compliant graphical user interface. Easy to operate. Displays results, stores result data on SSD hard disk drive, and controls the system. User interface facilitates grading the module und test. Two user levels available.
Data Interfaces	File transfer via USB storage device / Ethernet connection available
System control	Control of the cameras and the digital I/O signals via dedicated Gigabit Ethernet network

Operation Performance

Tact time	Less than 2 minutes for a combined measurement / 40s system limit
Operators	One operator for the system, one to three persons to load/unload (optional)
Daily throughput	With just the operator, including loading and unloading, 100 modules in 8h With two persons up to 150 modules in 8h working time With three persons up to 250 modules in 8h working time With four persons up to 350 modules in 8h working time

Dimensions of the trailer

Height	2950 mm (standard trailer)
Width	2060 mm
Length	4500 mm (trailer body 3150mm plus 1350mm drawbar)
Max driving speed	100 km/h (applicable only for Germany)
Weight	approx. 1400 kg, 1500kg total maximum weight (standard trailer)

Ambient conditions for operation

Ambient temperature	-15°C to 45°C (heating and cooling of the interior with included AC unit)
Relative humidity	20% to 99% not condensing

Power requirements

Voltage	200V-240V, 50-60Hz
Current	16A fused / peak current approx. 12A / average current approx. 8A

Documentation and training

User manual	Operation guide and safety information in English
Training	Basic training included

Options

Generator	Optional HONDA EU30i gas driven power generator supplying the standard system, attached to the trailer with cover for transport (on standard trailer)
Label printer	Label printer option for the Mobile PV-Testcenter series. Including Software upgrade for enhanced database search functionality. Including 1000 special labels 70x32mm, for labeling the tested PV-panels.
HighPot testing	Dielectric withstands test according IEC 61730-2 / MST16. Testing voltage 6 kV, testing for current below 50µA. Ground continuity test according to IEC 61730-2 / MST13. Testing current 30A, resistance measurements between all 4 frame parts. Fully integrated into the system, additional contacts to the module frame have to be placed. Fully integrated into the software, automatic reporting.
System Container	System will be built into a system container (see next page), having foldable and height adjustable stands. The container can be moved with a fork lift.
Trailer for System Container	Trailer chassis for transporting the system container, system is attached with container mounts

Standards

Machinery Directive	2006/42/EG
Low Voltage Directive	2006/95/EG
EMC-Directive	2004/108/EG

System Container (HxWxL: 2650mm x 1750mm x 3650mm, 1500kg maximum weight)

Trailer with System Container (HxWxL: 3050mm x 2060mm x 4500mm, 2000kg gr. weight)

TÜVRheinland®

Certificate

 Report No.: 21229229.003

Manufacturer
MBJ Services GmbH
Neuer Höltigbaum 15
22143 Hamburg
Germany

Product:
Turn-key Solar Simulator System
Type:
MBJ Mobile PV-Testcenter 2.0

Basis:

☒ **TÜV Specification QMA 2.584.02**
"Classification of Turn-key Solar Simulator Systems for PV Module Measurements"

☒ **Regular Surveillance**
To ensure a constant quality, periodic inspections are carried out.

TÜVRheinland® CERTIFIED
IEC 60904-9
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ID 0000049145

Remarks:
The system was found to comply with Class A+/A/A+ as specified in the report. Class A+ is twice as good as class A requirements of test standard IEC 60904-9 Edition 2.
Class A+ or Class A requirements are met for
- Spectral match – Class A+
- Non-uniformity of irradiance – Class A
- Long-term temporal instability LTI – Class A+
- Short-term temporal instability STI – Class A

for the settings specified in the report.

Conditions:
The product test is voluntary and has been done in accordance with the valid technical regulations. Any change concerning the design, materials, components or production may require the repetition of single or all qualification tests in order to sustain the qualification (certificate).

The certificate has a validity of 5 years counting from date of issue.

Solar Energy

Cologne, 29 February 2016

Dipl.-Ing. M. Adrian

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