Brochure

Machine Name	TEST RIG – PV DIODE – V4.0
Machine Description	Photo Voltaic Junction Box Diode Test rig
Date	July 2024

The Company

Aes has been Designing and Manufacturing Industrial End-of-Line Test systems and Software for managing these tests from 1998 at our India facility located in the city of Bangalore.

Design and manufacturing of Testing systems in various manufacturing industry and assembly lines has been one of the core business of AES.

Machine Design expertise combined with latest Software products that complements and provides force multiplier effect for the quality and production management has been the uniqueness of our business.

The Machine Description

The test rig tests the PHOTOVOLTAIC DIODE JUNCTION BOXES DEVICE UNDER TEST (PVJB) . The PVJB consists of either one, 2 diodes or 3 diodes.

The test criteria is to test determine the healthiness of the PVJB and identify faulty ones and their probable reason.

The following faults are automatically evaluated in the test rig.

1. PVJB open circuit
2. PVJB short circuit
3. PVJB diode forward drop voltage abnormality
4. PVJB diode reverse leakage current abnormality.

The following tests are conducted on the PVJB
1. FORWARD TEST
2. REVERSE TEST.

In the FORWARD TEST the PVJB is preset with a DC current of a set value which forward biases the diodes in the PVJB. The diode drop voltages are measured and the test results determined.

In the REVERSE TEST the PVJB is preset with a DC voltage of a set value for each diode separately one at a time in a sequential manner which reverse biases the diodes in the PVJB. The leakage current is measured for each diode separately and the test results determined.

The test rig is parametrised and run through the HMI system.

The HMI system with touch screen is programmed to have different files of parameters for tests to be stored. The operator can select any file for testing.

During the operation of the rig various alarms are evaluated by the system.

Test Name	Set Parameter	Monitored parameter	Pass Criteria
Forward Test / Bypass Test	Forward Current into the module through the MC-4 Connectors.	1. Voltage applied for the set current 2. Actual current applied. 3. Forward drop voltage in each diode	1. Voltage applied to be within set limits 2. Applied current to be above set limit. 3. Forward drop voltage in each diode to be within set limits 4. Total drop voltage to be within set limits.
Reverse Test / Blocking test	Reverse voltage applied to each diode individually	1. Leakage current in each diode	1. Leakage current to be within limits for each diode.

Specifications

Number of Diodes in the JB	1,2,3
Current for Forward Test	1-30 Amps DC
Voltage for Forward Test	0-5 Volts DC
Voltage for Reverse Test	45 Volts DC
Max Reverse Leakage Current	100 Milli amps
Test Cycle Time	6.5 Seconds
Control System	Industrial PC and PAC
Data Storage	Parameters and Test data
Communication	LAN RJ-45
USB	1 x 2.0 for USB Pen Drive
Pokayoke	By sensor and Password
Type of Components Change	Change by Two Part Fixture change on the machine
Number of Test parameter File	500
Alarm Log	Yes
Part counter	Yes – OK / Not ok / Total
Cycle time	Yes
Power	230V AC 1 Phase 50/60 Hz (+10% to - 15%)
Construction	MS powder coated control cabinet for electronics. Fixtures made of Hylam and Delrin.
Operator Safety	Emergency Stop
Diagnostics	Integrated with Calibration entry via HMI.
Component Marking	Bar code Printer (Optional) or Laser Head (Optional)
Data Logging of Test Data	In the Test rig PC as database for storage upto 5 years data.