A Remote Supervision Fault Diagnosis Meter for Photovoltaic Power Generation Systems

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PII: S0263-2241(17)30177-X
DOI: http://dx.doi.org/10.1016/j.measurement.2017.03.017
Reference: MEASUR 4654

To appear in: *Measurement*

Received Date: 23 June 2015
Revised Date: 21 January 2017
Accepted Date: 7 March 2017

Please cite this article as: K-H. Chao, C-T. Chen, A Remote Supervision Fault Diagnosis Meter for Photovoltaic Power Generation Systems, *Measurement* (2017), doi: http://dx.doi.org/10.1016/j.measurement.2017.03.017

A Remote Supervision Fault Diagnosis Meter for Photovoltaic Power Generation Systems

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ABSTRACT

The main purpose of this paper is to develop a fault diagnostic meter for photovoltaic (PV) power generation systems. First, Solar Pro software package is used for a photovoltaic power generation system analysis, and then the power generation data of photovoltaic modules during normal operations and during malfunctions is collected. Then, this paper establishes a photovoltaic power generation system fault diagnosis method based on extension theory. The power generation data collected previously is used to construct a matter-element model for PV generation systems during normal operations and during malfunction. This matter-element model and the PV power generation system fault diagnosis program are implemented using a PIC microcontroller. The PV power generation system fault diagnosis based on extension theory discussed previously requires only small amounts of data in order to construct matter-element models for normal operations and different fault situations. This diagnosis method does not require learning procedures to be used in fault diagnosis of PV power generation systems. Moreover, the method provided high accuracy. As PV power generation systems are typically installed on outdoor roofs, this paper also utilizes the ZigBee wireless sensor network transmission technology to transmit the power generation data of outdoor PV power generation systems to the PIC microcontroller in order diagnose malfunctions in