

Development of “SANUPS PV Monitor”

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1. Introduction

In the recent years, global warming is recognized as the environmental problem world-wide, and reduction target of greenhouse effect gas by 2020 was introduced at the International Conference of the United Nations Framework Convention on Climate Change last year.

In such circumstance, photovoltaic power generation that does not exhaust any greenhouse effect gas, such as carbon dioxide which can cause the global warming, is getting attention, and spreading over the world.

Also, expansion of the photovoltaic power generation system is accelerating, making the mega solar popular. Requirements and importance of the maintenance and monitoring of the system is becoming more important with the larger scale of the photovoltaic power generation system.

In this document, outline of the newly developed product, photovoltaic power generation inverter LAN adapter “SANUPS PV Monitor” is introduced.

2. Background of the Development

With the expansion of scale of photovoltaic power generation system, a requirement to maintain and monitor the system efficiently from remote location has evolved. Therefore, a monitoring method to monitor the power generation status from the Web browser in the equipment connected via network is being requested.

To answer these requests, there was an urgent need of making the photovoltaic power generator inverter network-compatible.

This is the reason why we developed the LAN adapter “SANUPS PV Monitor” to make the photovoltaic power generation inverter network-compatible.

3. Product Overview

Fig. 1 and Fig. 2 show the appearances of the “SANUPS PV Monitor”. This product has adopted a new logo for photovoltaic power generation related equipment. Fig. 3 shows the logo. Fig. 2 is the appearance of the rear panel of the equipment with the RS-485 interface, RS-232C interface, and LAN interface.

It can be installed stationary as shown in Fig. 1, and it can also be hung on the wall.



Fig. 1: Appearance of the
“SANUPS PV Monitor” (Front)



Fig. 2: Appearance of the
“SANUPS PV Monitor” (Rear)

SANUPS
PV Monitor

Fig. 3: Logo

Fig. 4 shows the system configurations of this product.

This product is connected to the photovoltaic power generator inverter via RS-485 communication, and performs the data collection by receiving information required for maintenance and monitoring of the photovoltaic power generator system. This product can

connect up to 27 photovoltaic power generator inverters. By connecting this product to network, it is possible to monitor the output of the photovoltaic power generation system and the status of the photovoltaic power generator inverter from the networking equipment.

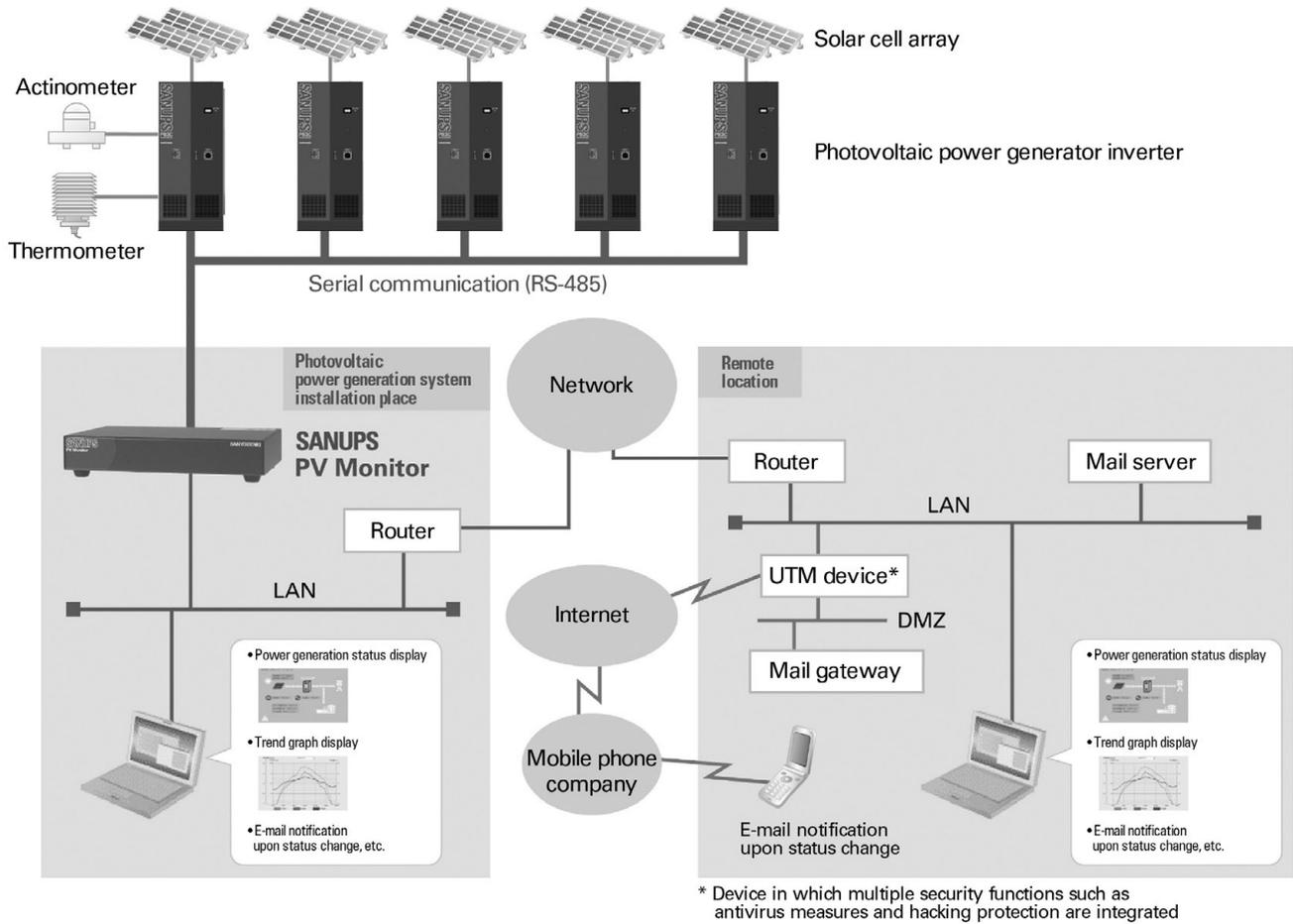


Fig. 4: Example of system structure

4. Features

4.1 Monitoring function

This product has 3 monitoring functions, and it is possible to construct the monitoring system for the photovoltaic power generation system by utilizing these functions.

(1) Realtime display function

It is possible to display the power generation status of the photovoltaic power generation system in real time by accessing this product from the Web browser of the equipment on the network.

Fig. 5 shows the power generation status.

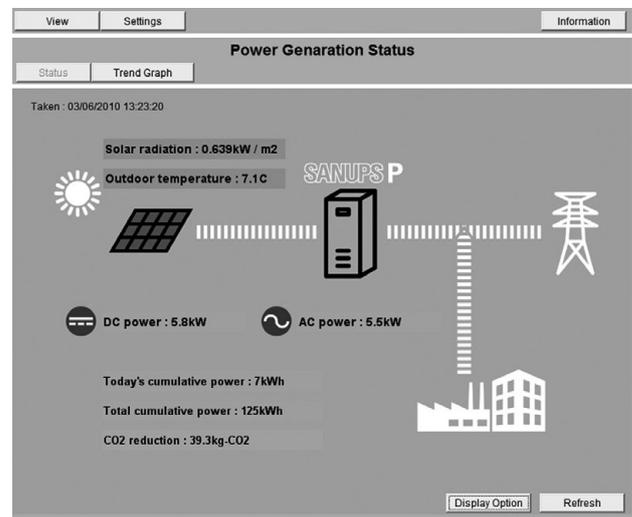


Fig. 5: Power generation status

(2) E-mail monitoring function

(a) Event mail function

This product can send e-mails to specified addresses (up to 5 addresses) when there is a malfunction of photovoltaic power generation system, such as a malfunction of the photovoltaic power generator inverter, non-communication status, etc.

(b) Request mail function

This product can reply the event information and status/measurement value information when it receives an information request mail.

An example of a sent mail from this product is shown in Fig. 6.

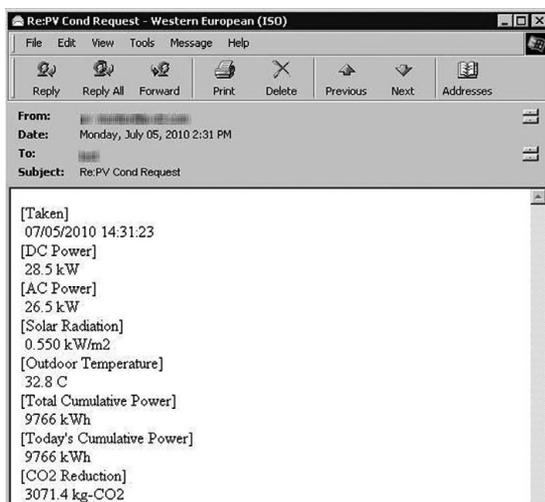


Fig. 6: Contents of the sent mail

(3) SNMP monitoring function

This product has a SNMP agent function, so it is possible to perform remote monitoring using the commercially available SNMP manager.

4.2 Data collection function

This product can collect and save the data received from the photovoltaic power generator inverter. It also can download the saved data to the equipment on the network.

(1) Data collection function

This product can collect the measurement data of the whole photovoltaic power generation system (AC power, solar radiation, Outdoor temperature) every 10 minutes, and it can be viewed as a trend graph on the Web browser. Fig. 7 shows the trend graph.

Also, it can collect the measurement data of the whole system (AC power, solar radiation, Outdoor temperature), and the measurement data of each photovoltaic power generator inverter (DC voltage,

DC current, DC power, AC voltage, AC current, cumulative power) every 1 hour. These collected results can be obtained by the data download function (discussed later).

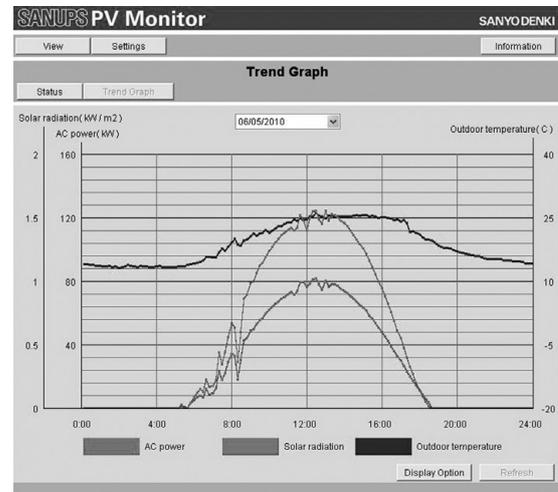


Fig. 7: Trend graph

(2) Data download function

This product has a FTP server function, and the data collected with the data collection function can be downloaded to the equipment on the network using the FTP commands.

4.3 Compatible with multiple countries power supplies

Considering the commercial power supply for each country, power supply is compatible with multiple countries, with rated power voltage of AC 100 to 240 V, and allowable voltage range of AC 85 to 264 V.

Also, the power supply cable is removable, making it possible to attach the power cable that matches the outlet for each country.

4.4 Support for standards

Acquisition of safety standard is one of the criteria for selecting the equipment in international market, so it is essential to acquire the foreign safety standards.

This product was designed to be compatible with Safety Standard of Information-Processing Equipment (IEC60950-1) and EMC Directive, and acquired the CE Marking.

4.5 Support for the Monitoring system

The Monitoring system is a system that ultimately gathers measurement information from the photovoltaic power generator system inverter installed in Korea into central servers and performs integrated control.

This product is compatible with communication protocol for the Monitoring system RTU (transfer equipment).

Therefore, the Monitoring system can easily be constructed when installing the photovoltaic power generation system.

Fig. 8 shows the overview diagram of the Monitoring system.

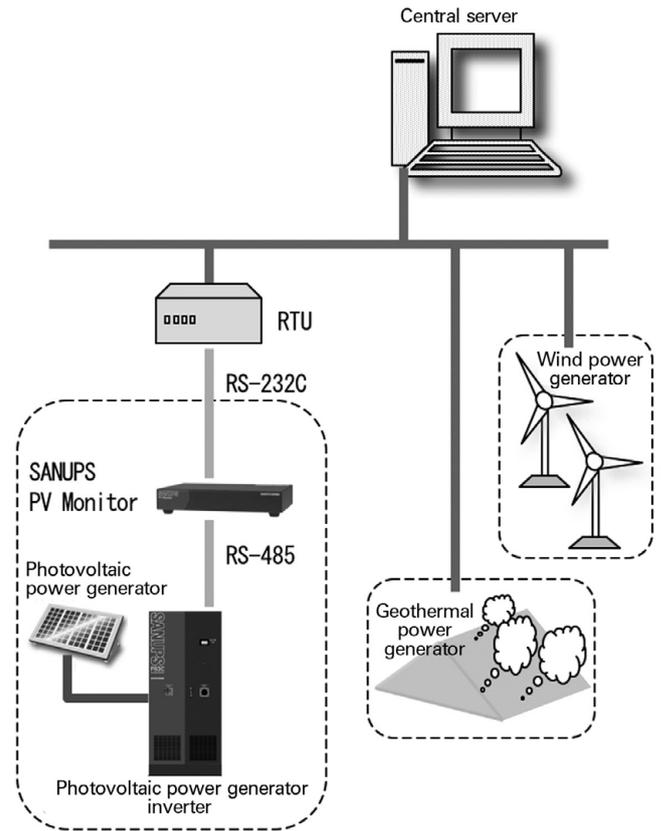


Fig. 8: Overview diagram of the Monitoring system

5. Specifications of the “SANUPS PV Monitor”

Table 1 shows the specifications of the “SANUPS PV Monitor”.

Table 1: Specifications of the “SANUPS PV Monitor”

Item	Specifications	Remarks	
Input voltage	AC 100 to 240 V		
Input allowable voltage range	AC 85 to 264 V		
Input frequency	50/60 Hz		
Maximum power consumption	10 W		
External interface	Photovoltaic power generator inverter interface	Plug-in terminal, 3 pins	RS-485
	LAN interface	RJ-45	100BASE-Tx / 10BASE-T
	RTU interface or setup port	D-Sub 9 pins male	RS-232 Selection of communication destination is done by the dip switch.
Operational environment	Ambient temperature	0 to 40°C	
	Relative humidity	20 to 90%	
Dimensions	220 × 150 × 40 mm (W × D × H)	Stationary installation	
Mass	1.2 kg		

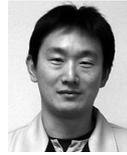
6. Conclusion

This document described the outline of the “SANUPS PV Monitor”.

We believe that the development of this product realizing the networking of the photovoltaic power generator inverter will contribute to the expansion of the sales.

It is expected that the requirement to maintain and monitor the photovoltaic power generation system will increase in the future, so we will continue to develop higher performance products to answer these requirements, and keep on providing the products to satisfy our customers.

We sincerely thank the many people involved in the development and realization of this product for their advice and support.



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