# Power Systems Division

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The Synthesis Report of the Fifth Assessment Report[*1] released by IPCC[*2] November 2014 clearly states that there is no doubt regarding the progression of global warming and the impact it is having on climate change. Furthermore, the report warns that, in order to suppress the temperature rise by 2100 to less than 2˚C of what it was pre-industrialization[*3], it will be necessary to significantly reduce greenhouse gas emissions for several decades to come.

For Sanyo Denki and other members of the electrical device manufacturing industry, it is an important mission to help achieve a low-carbon society through promoting use of reusable energies and offering devices which can use energy without difficulty, without waste and in an intelligent manner.

The Power Systems Division is striving to achieve this mission through the development of technologies relating to high efficiency and high reliability of power conversion devices and gathering these technologies to develop user-friendly products.

This document summarizes the products that were developed by the Power Systems Division in 2014.

In the expanding field of power conditioners for photovoltaic power generation, we developed the "SANUPS P61B" (5.5 kW) a power conditioner for photovoltaic power generation with optimal output for application in domestic low-voltage utility connected systems and the "SANUPS P73J" (9.9 kW/10 kW) which adopts a high-frequency insulation method.

In the uninterruptible power supply field, we developed the UPS "SANUPS A11J" 3-phase, 4-wire model, which is compatible with the low-voltage distribution method used overseas. Moreover, we developed the "SANUPS SOFTWARE" and the "LAN Interface Card" which are UPS control products that are compatible with IPv6.

Furthermore, in the field of microgrid related devices, we developed the "SANUPS K23A M type host communications function support" which communicates with the host device.

This document provides an overview and features of each product.

*1 The Synthesis Report of the Fifth Assessment Report: Every 5 to 6 years, IPCC releases an assessment report with the latest findings of scientific research relating to climate change. The Fifth Assessment Report comprises of three working group reports and a synthesis report, with the latter looking comprehensively at all the fields covered in the assessment report. The Ministry of Environment has released a summary of this report.

*2 IPCC (Intergovernmental Panel on Climate Change): An intergovernmental panel relating to climate change run under the auspices of the United Nations.

*3 Pre-industrialization: Refers to the period between 1850 and 1900.

## ■ Development of "SANUPS P61B", 5.5 kW Power Conditioner for Photovoltaic Power Generation

As part of the power conditioner for photovoltaic power generation "SANUPS P61B" series, we developed a model type with 5.5 kW output volume and added it to our lineup.

The "SANUPS P61B" 5.5 kW inherits all of the superior features of the conventional 5 kW model from the same series, such as a high level of quietness, environmental-resistance due to adoption of IP65*1, a junction box of up to 4 circuits and isolated operation. As well as this, an output volume of 5.5 kW has been achieved by revising the thermal discharge design. Through these efforts, a system capacity of 49.5 kW is possible by installing 9 units, thus achieving the optimal system volume for low-voltage utility connected systems.

Moreover, by adding an operation portion to the side of the main unit, we improved operability compared with the conventional model.

In regards to the new requirements of distributed power supply, we equipped an islanding detection function conforming to JEM 1498, and satisfied the JEAC9701-2012 "utility connected system code" FRT requirement.

As the new model has already obtained JET certification*2 for multiple-unit connected support models, our customers do not need to spend as much time and money in discussion with power companies regarding utility connected systems.

*1 IP65: No ingress of dust and water jets from any direction shall have no harmful effects.
*2 JET: Japan Electrical Safety & Environment Technology Laboratories


## ■ Development of "SANUPS P73J", 9.9/10 kW Power Conditioner for Photovoltaic Power Generation

Sanyo Denki developed the "SANUPS P73J" (9.9/10 kW) which adopts a high-frequency insulation method.

The "SANUPS P73J" has achieved the highest conversion efficiency in its class*1 at 93.5%*2 through optimization of the transformer and switching frequency of the insulation converter. The section between the input and output of this device is insulated, therefore systems do not require an insulation transformer if a direct current circuit is grounded or the grounding method differs to the system side.

By combining a 9.9 kW and 10 kW version of the "SANUPS P73J", it is possible to achieve 49.9 kW, the optimal system volume for low-voltage utility connected systems.

Moreover, as a countermeasure for the distribution systems accompanying the large-scale introduction of photovoltaic power generation equipment, it is possible to change the output power factor at the time of utility connected operation within a range of 0.8 to 1.0. Furthermore, the new model satisfies the FRT requirement under JEAC9701-2012 "utility connected system code".

Also offering the option of electric current measurement on photovoltaic panel strings for up to seven circuits*3, drops in power generation due to module errors can be detected early. By connecting with our product "SANUPS PV Monitor" or using the status monitoring service "SANUPS NET", it is possible to collect and analyze measurement data through the Internet.

By adopting IP65*4 as a power conditioner for outdoor use, we have achieved in developing a product which prevents penetration of rain, dust, insects, etc., offers high reliability and greater peace of mind.

*1 As of August 2014. As a power conditioner for high-frequency insulation photovoltaic power generation with the same capacity. Results from Sanyo Denki inspection. At rated output with a power factor setting of 1.0.
*2 Rated load efficiency based on "JIS C 8961 Measuring procedure of power conditioner efficiency for photovoltaic systems". Excluding junction box circuit.
*3 String: One series circuit of a photovoltaic module.
*4 IP65: No ingress of dust and water jets from any direction shall have no harmful effects.

## ■ Development of Uninterruptible Power Supply "SANUPS A11J" 3-phase, 4-wire Model (15 kVA, 30 kVA, 45 kVA)

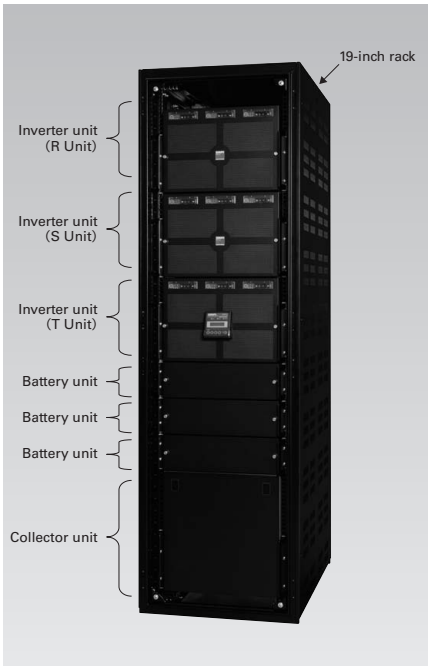
For the "SANUPS A11J" we developed 3-phase, 4-wire models ranging from 15 kVA to 45 kVA in order to support the distribution method and voltage used overseas. On the "SANUPS A11J" 3-phase, 4-wire models, by arranging a single phase 5 kVA to 15 kVA inverter in each of the 3 phases, it is possible to build a 3-phase, 4-wire UPS up to 45 kVA. Customers can choose input/output voltages of either 380/220 V, 398/230 V or 415/240 V (phase voltage/line voltage), which support the power environments of Asia and Europe.

This device inherits the characteristics of the single-phase model, which is the conventional model of the series, and has the following features as a 3-phase model.

The UPS consists of inverter units, a collector unit, and battery units, and it is equipped in a 19-inch rack. The inverter unit contains an inverter module, while the battery unit contains a battery module and by making blocks out of each of these sections, they can be made lighter and less effort is required for their transportation and maintenance.

Each module is a plug-in system, therefore even in the unlikely event of an error, they can be replaced with the inverter power feeding as is. Moreover, with a built-in maintenance by-pass circuit, modules can be serviced or replaced without stopping power feeding.

In the case of this device, the number of inverter modules installed in the inverter unit can be adjusted to build a 15 kVA, 30 kVA or 45 kVA UPS system and also flexibly support the increase/decrease of load equipment.




## ■ Development of IPv6 Compatible "SANUPS SOFTWARE" and "LAN Interface Card"

With the high volume introduction of information communications devices, IPv4[*1] address stock has already been used up, and now idle IPv4 addresses which have already been allocated are used. In order to completely solve this problem, transfer to IPv6[*2] is necessary. Today, there is an increasing volume of devices and software that are compatible with IPv6 and an environment accommodating the transfer has been created.

In line with such changes in the market, Sanyo Denki developed the "SANUPS SOFTWARE" and the "LAN Interface Card" that are compatible with IPv6.

All of the functions of these products are compatible with both IPv6 and IPv4 and both can be operated simultaneously. For this reason, these products can be used seamlessly even in environments where old and new devices are combined, and environments in which gradual transfer is necessary, thus alleviating user burden.

*1 IPv4 (Internet Protocol version 4): Expresses addresses as 32-bit data and is capable of generating up to approx. 4.3 billion addresses.

*2 IPv6 (Internet Protocol version 6): Expresses addresses as 128-bit data and is capable of generating up to approx. $3.4 \times 10^{38}$addresses (an infinite number for practical purposes).

## ■ Development of the "SANUPS K23A M Type Host Communications Function Support"

Often in the cases of buildings and factories, host devices such as BEMS*1 and FEMS*2 (hereinafter referred to as "EMS" *3) manage energy for the entire building and for some time now, there has been a request from the market to manage grid management devices with an EMS.

In order to meet these requests, Sanyo Denki developed the "SANUPS K23A M Type Host Communications Function Support" – a grid management device which offers a feature to perform serial communication with the EMS.

This device can communicate various information and control signals with the EMS including the measurement data such as input/output voltage/current of the device and charging/discharging current of the storage battery, status information such as operation mode and errors, setting information such as scheduled operations and information on operation mode changeover control from the EMS.

If the EMS supports remote monitoring, the visualization and remote monitoring of power information, operational status, etc. of the grid management device is possible.

*1, 2, 3 Systems which store and analyze the operational data and energy consumption data of a building's equipment and/or devices and optimize/reduce energy consumption are called "EMS" (Energy Management Systems). The system targeting office buildings is referred to as a "BEMS" (Building Energy Management System), while the system targeting factories is referred to as a "FEMS" (Factory Energy Management System).

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