

Power Systems Division

Satoru Shimizu

Fifth-generation mobile communication system (hereinafter, "5G") services started in 2020. 5G is expected to advance IoT and AI by enabling "high-speed and large-capacity" data transmission, "low latency," and "multi-device connections." Edge computing will particularly benefit from the features of 5G and is expected to be increasingly deployed in a wide range of fields, including manufacturing, ICT, and medicine. Since edge computing enables servers to be distributed in areas in close proximity to user terminals, it is expected that there will be growing demand for uninterruptible power supplies (UPSs) with excellent environmental durability and maintainability.

Many world leaders believe that greenhouse gas emissions are the main cause of the increasingly severe natural disasters that are occurring throughout the world. As a result, environmental initiatives are being taken in earnest to achieve

a "decarbonized society" that reduces greenhouse gas emissions to zero by 2050. These initiatives are expected to increase the deployment of renewable energy power generation systems, such as those that use hydroelectric, geothermal, and biomass sources. It is anticipated that these systems will be able to operate stably in all types of natural conditions despite environmental and installation site restrictions.

In the global market, an increasing number of equipment are being installed in locations where there is an unstable supply of power. To prevent equipment from being failed due to power outages and prevent harmonics generated by equipment from affecting utility power, these types of locations need to be provided with equipment that can prevent instantaneous voltage dips and harmonics. Furthermore, these types of equipment are increasingly required to meet European safety standards.

It is against this backdrop that the Power Systems Division released the following new products in 2020.

For starters, the division expanded its lineup of *SANUPS E11B* small-capacity hybrid UPSs to include a 3 kVA model. Furthermore, the division developed the *SANUPS E11B-Li* lithium-ion battery equipped hybrid UPS and the *SANUPS A11M-Li* parallel redundant double conversion online UPS.

In terms of products for renewable energy, the division developed the *SANUPS W75A* as a rectifier unit that converts the AC output of generators, such as those of wind power and hydro power generation systems of 10 kW or less, into DC power.

The division also expanded its lineup of *SANUPS C23A* voltage dip compensators to include models that comply with European safety standards.

This article provides an overview of each of these products.

■ Expanding the Lineup of the *SANUPS E11B* Hybrid UPS

The *SANUPS E11B* hybrid UPS constantly monitors the status of the input power source and automatically selects the optimal power supply mode to provide a stable supply of high-quality power. This UPS achieves both high-quality power supply and energy savings.

We added a 3 kVA model to our original lineup of 1 kVA, 1.5 kVA⁽¹⁾, and 2 kVA products.

Figure 1 shows the appearance of the *SANUPS E11B*.

The *SANUPS E11B* has a wider input range than previous models.

The input specifications include input voltage ranges of 55 to 150 V for the 100 V model and 110 to 300 V for the 200 V model. In addition, this

product has an input frequency range from 40 to 120 Hz. This enables it to be installed in environments with unstable power conditions. This also reduces the amount of switching operations required during battery usage and prevents battery depletion and degradation.

Furthermore, its environmental temperature range of -10 to +55°C allows the unit to be installed in environments susceptible to large temperature changes.

A detailed introduction of the performance, functions, and features of the *SANUPS E11B* is provided in the New Products Introduction section of this Technical Report.



Fig. 1 *SANUPS E11B*

(1) 1.5 kVA model is available for 100 V only.

■ Development of the *SANUPS E11B-Li* Hybrid UPS and the *SANUPS A11M-Li* Double Conversion Online UPS

The *SANUPS E11B-Li* and *SANUPS A11M-Li* are UPSs that come equipped with lithium-ion batteries.

Figure 2 shows the appearance of the *SANUPS A11M-Li*.

The *SANUPS E11B-Li* is available in 1 kVA, 1.5 kVA⁽¹⁾, and 2 kVA products. The *SANUPS A11M-Li* can be expanded to 8 kVA by combining 1 kVA units. Moreover, by using one of the units as a backup unit, operators can configure a parallel redundant system capable of supplying highly reliable power.

The input voltage specifications include a lineup of single-phase 2-wire 100 V and 200 V products⁽¹⁾.

Since the expected life of lithium-ion batteries is 10 years, we simply revised the lead-acid battery specifications of the *SANUPS E11B* and *SANUPS A11M* to enable them to use lithium-ion batteries to achieve 10 years of maintenance-free operation. This means that these units contribute to both cost and labor savings.

The input specifications and environmental temperature range are the same as those of the *SANUPS E11B* and *SANUPS A11M*. Therefore, they can be installed in environments with unstable power supply conditions or large temperature changes.



Fig. 2 *SANUPS A11M-Li*

(1) 1.5 kVA model is available for 100 V only.

■ Development of the *SANUPS W75A* Rectifier for Wind Power and Hydro Power Generation Systems

The *SANUPS W75A* is a rectifier for wind power and hydro power generation systems.

Figure 3 shows the appearance of the *SANUPS W75A*.

The *SANUPS W75A* has a rated output capacity of 11 kW.

The main circuit uses full-wave rectification to convert the AC power of the generator into DC power that can be input to the power conditioner. It achieves the industry's highest level of conversion efficiency⁽²⁾.

The *SANUPS W75A* was developed to be used in combination with our three-phase 9.9 kW *SANUPS W73A* power conditioner for wind power and hydro power generation systems.

The main feature of this unit is its DC voltage rise control function (brake function). This function prevents voltage above the specification range from being applied to the power conditioner. With a sealed structure and fanless passive air cooling system, the *SANUPS W75A* achieves excellent environmental durability via IP65 water and dust protection.

Since it comes with a wide AC input voltage range and DC output voltage range, it can be flexibly used as a rectifier for renewable energy power generation systems that use generators, such as those that use biomass and geothermal power sources as well as wind and hydroelectric.



Fig. 3 *SANUPS W75A*

(2) Based on our own research as of January 29, 2020, conducted among 3-phase rectifiers for wind power and hydro power generation systems.

References

Ryu Yoshizawa and 3 others: Development of the *SANUPS W75A* Rectifier Unit for Wind Power and Hydro Power Generation Systems

SANYO DENKI Technical Report, No.50, pp.21-24 (2020.11)

■ Expanding the Lineup of the *SANUPS C23A* Voltage Dip Compensator

The *SANUPS C23A* voltage dip compensator is available in a lineup of 10 kVA, 20 kVA, 30 kVA, 50 kVA, 100 kVA, and 200 kVA products.

Figure 4 shows the appearance of the *SANUPS C23A* (200 kVA model).

The *SANUPS C23A* can supply stable power to equipment without interruption even when there are instantaneous voltage dips or momentary outages. Furthermore, it uses an active filter to prevent harmonics from affecting utility power. This power supply unit can use these features to supply highly efficient and high-quality power using a parallel processing topology (parallel inverter feed).

Our new lineup of 50 kVA, 100 kVA, and 200 kVA *SANUPS C23A* products complies with European safety standards, including the Low Voltage Directive, EMC Directive, and RoHS Directive.

This means that these products can be used as equipment power supplies not only in Japan, but in many countries throughout the world.

A detailed introduction of the performance, functions, and features of the *SANUPS C23A* is provided in the New Products Introduction section of this Technical Report.



Fig. 4 *SANUPS C23A*
(200 kVA model)

Author

Satoru Shimizu

Design Dept., Power Systems Div.
Works on the development and design
of UPS.