Development of the Mid-Capacity UPS "SANUPS"A23C

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1. Introduction

Recently, equipment that requires a high-quality power supply has been expanding rapidly with the development of IT. Their expectations are not only for high quality but also further energy conservation, resource saving, and miniaturization from an environmental point of view.

To meet those needs, we developed and commercialized the miniaturized, light weighted, and highly efficient continuous inverter power supply method uninterruptive power supply, "SANUPS" A23C.

This text is going to introduce the "SANUPS"A23C uninterruptive power supply.

2. Background of the Development

As a power supply for communication tools such as a data center, the demand for the continuous inverter power supply method uninterruptive power supply that has neither an instant power failure nor a voltage drop is always deep-rooted, and demand for higher-reliability of the power supply is also growing more and more.

On the other hand, with the demand for saving resources and energy conservation, not only reducing the price of the UPS itself but also reducing the running cost is requested.

Fig. 1 "SANUPS"A23C 100kVA

3. Features

The "SANUPS" A23C was miniaturized, light weighted, and achieved high efficiency, by making I/O to be non-insulation, deleting the conventional inverter output transformer, as well as directly connecting the battery with the INV input part without using the chopper circuit which rises direct current. Fig. 1 shows the external view of the "SANUPS"A23C, 100kVA.

3.1 Small・Lightweight

The inverter output transformer was mounted on the conventional UPS to insulate I/O, but it was eliminated in the "SANUPS" A23C, making it transformerless, and improving the cooling efficiency of semiconductors and reactors to realize 30% in size and installation space and 50% in weight compared with the "SANUPS" AMA. Table 1 shows the external size and weight of each capacity.

Table 1 "SANUPS" A23C Size / Weight

		"SANUPS"A23C Series			Conventional Device
Model		A23C503	A23C104	A23C204	AMA1000T3
Capacity (kVA)		50	100	200	100
Size	W(mm)	600	800	1500	1000
	D(mm)	700	700	800	800
	H(mm)	1775	1950	1950	1950
Weight (kg)		400	650	1500	1300

3.2 Economy

The "SANUPS" A23C decreased the loss by using the IGBT module with a low loss for the electric power conversion part. In addition, the loss of the IGBT and the reactor of the filter are decreased by connecting the neutral point of the filter of the exchange I/O and matching a timing of the switching in the rectifier and the inverter part to reduce the high frequency ripple element which flows in the filter. As a result, the loss on driving was suppressed to about 50% compared with the conventional model, and the integrated efficiency of 92%, which is first rate among the mid-capacity class, was achieved. This will bring the effect of a decrease of 6% converting into the electricity cost throughout a year. Even better effect can be expected, considering the cost of air-conditioning, etc.

3.3 High Reliability

The "SANUPS"A23C is a continuous inverter power supply, and gives priority to improving the reliability of power supply more, in addition to having a constantly stable output voltage and frequency. The device is a by-pass starting method, to always switch to a by-pass power supply whenever the inverter power supply stops. As a result, even when an abnormality occurs on the device, it will not switch to a by-pass power supply and the possibility of the system down almost becomes 0.

The system can be prevented beforehand from being stopped due to the deterioration of the battery at the time of black out by adding the function that UPS regularly and automatically checks the battery. Battery check can be done without switching to a by-pass power supply even if the battery is deteriorated since it is done without stopping the rectifier.

3.4 Specifications

The "SANUPS"A23C is I/O of 3 phases 3 lines 200V, and has the 3 lineups of 50kVA, 100kVA, and 200kVA. Table 2 shows the main specifications.

Table 2 Main Specifications of "SANUPS" A23C

Item		Standard Specification
Rated Capacity		50,100,200kVA
Method	Operation Method	Commercial Synchronized Continuous Inverter Power Supply
	Rectifier Method	High Power Factor Converter
	Inverter Method	PWM Inverter
AC Input	Frequency	50/60Hz±5%
	Number of Phases	3 Phase 3 Line
	Voltage	200V±15%
	Power Factor	0.98 以上
	Currency Distortion Factor	5%以下
AC Output	Frequency	50/60Hz
	Number of Phases	3 Phase 3 Line
	Voltage	200V
	Voltage Accuracy	±1%≧
	Transient Voltage Fluctuation	Within±3%≦
	Voltage Distortion Factor	5%≧(with 100% rectifier load)
	Voltage Unbalance Ratio	Within ±2%
	Load Power Factor	0.9
	Overload Capacity	125% (10 min.) 150% (1 min.)
Battery	Backup Time	Approx. 10 min.
	Type	Small Sealed Lead-Acid Battery

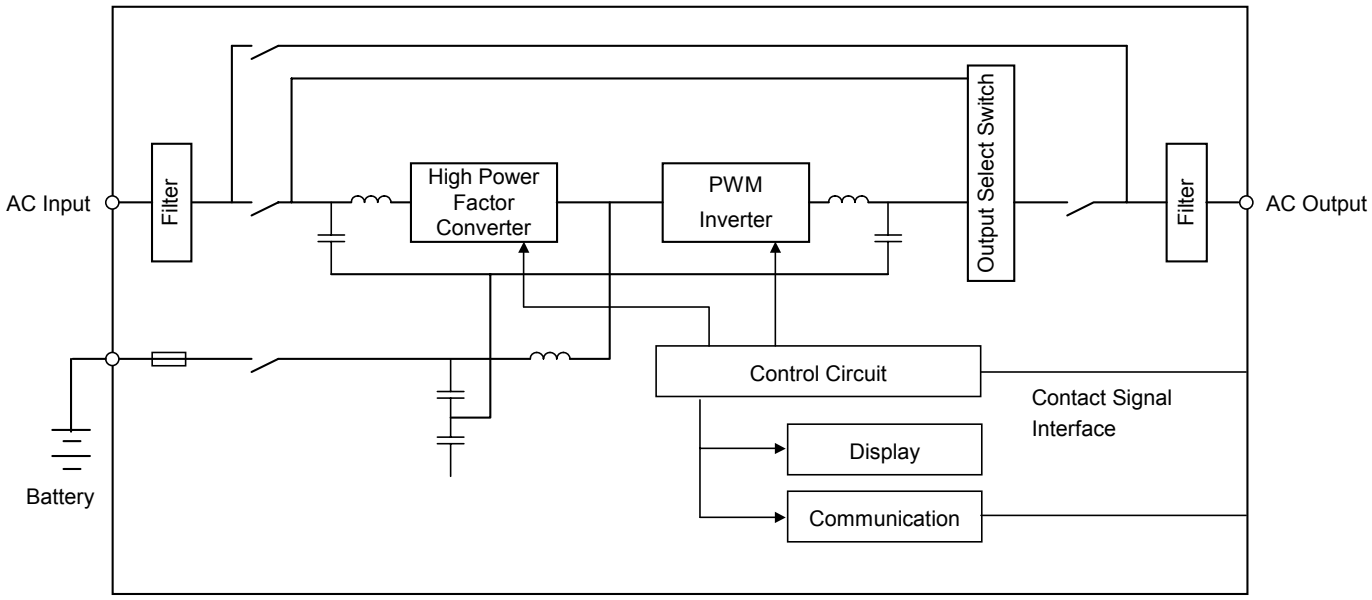

Fig. 2 Circuit Block "SANUPS" A23C

4. Circuit Structure

Fig. 2 shows the circuit block chart of the “SANUPS" A23C. A main circuit is composed of an I/O filter, high power factor converter, PWM inverter, and output select circuit, etc.

The earth voltage of the AC output and battery output line is stabilized and the generation of the noise is suppressed by connecting the neutral point of the AC input part, output part, and direct current input part, and inserting a reactor between the battery and direct current buses.

As for the control circuit, the control part where the converter and the inverter part were controlled, and the intelligent part where the state of the device is monitored and displayed are compactly put, and the contact signal and the external interface by communication are prepared as a standard.

5. Conclusion

The outline of the “SANUPS” A23C was introduced above. It seems that the demands for miniaturization and for high reliability are going to keep growing in the future. We will continuously make efforts in an expansion of the variation and construction of a highly reliable system.

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