

"San Ace B97" 97mm Sq. × 33mm thickness Large Air Volume Blower

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1. Introduction

In recent years, the enhanced data flow-through rates and advanced functions of many servers, storage devices, photocopiers, and other electric and electronic devices have led to drastic increases in heat dissipation and heat density inside these devices.

In the past, forced-air cooling was the primary solution for cooling these devices, and products such as our "San Ace" axial flow were the norm. The basic performance requirements for these fans were sufficient air volume for cooling, and static pressure for airflow through the devices.

Gradually, higher static pressure was needed for cooling increasingly compact devices, with higher densities and higher resistance against airflow than before. Generally speaking, centrifugal fans offer higher static pressure than that of axial flow fans; Table 1 shows a comparison of some of the features of axial flow and blowers.

As the density of devices continues to rise, greater air volumes and higher static pressures are in demand, not only for axial flow fans but also for blowers.

Facing such demand, Sanyo Denki initiated the development of an improved, large air volume blower measuring 97mm sq. by 33mm thick. This product offers significant improvements in performance in comparison to other, conventional models; its performance and features are discussed here in this report.

2. Development Background

Before this point, Sanyo Denki had already released a 97mm sq. by 33mm thick blower (PN# 109BM12GA2) into the market. However, as discussed above, in recent years the demand for larger air volumes and reduced noise had risen to the point where conventional models of this size and type of blowers were no longer sufficient.

Table 1: Types and Features of Fans

Fan Type	Features
Axial flow fans	<ul style="list-style-type: none"> - Low static pressure - Large air volume - Suited for medium to low density devices with low airflow resistance
Blowers	<ul style="list-style-type: none"> - High static pressure - Small air volume - Suited for high density devices with high airflow resistance

For this reason, we developed and released the "San Ace B97" Blower, which offers increased air volume and reduced noise. To increase its rotating speed it uses the same high-torque motor as the current 92mm sq. G-type axial flow fan models, together with newly developed fan blades and frame.

3. Product Details

3.1 Dimensions

Fig. 1 shows the external appearance of the new "San Ace B97" large air volume fan, and Fig. 2 shows its dimensions. To ensure interchangeability, the pitch between holes for mounting and the locations of the intake and outlet ports are the same as conventional models.

3.2 Characteristics

3.2.1 General Characteristics

Table 2 shows the general characteristics of the new product. The new "San Ace B97" is available in two rated voltages (12V and 24V), as well as four rated rotating speeds: a large air volume G speed (5800min^{-1}), S speed (5300min^{-1}), H speed (4700min^{-1}) and F speed (4300min^{-1}) types. In total, the product lineup consists of eight different models.

In addition to the eight models described above, these products are also compatible with variable speed fans that utilize PWM control.



Fig. 1: 97mm Sq. × 33mm Thickness Large Air Volume Blower

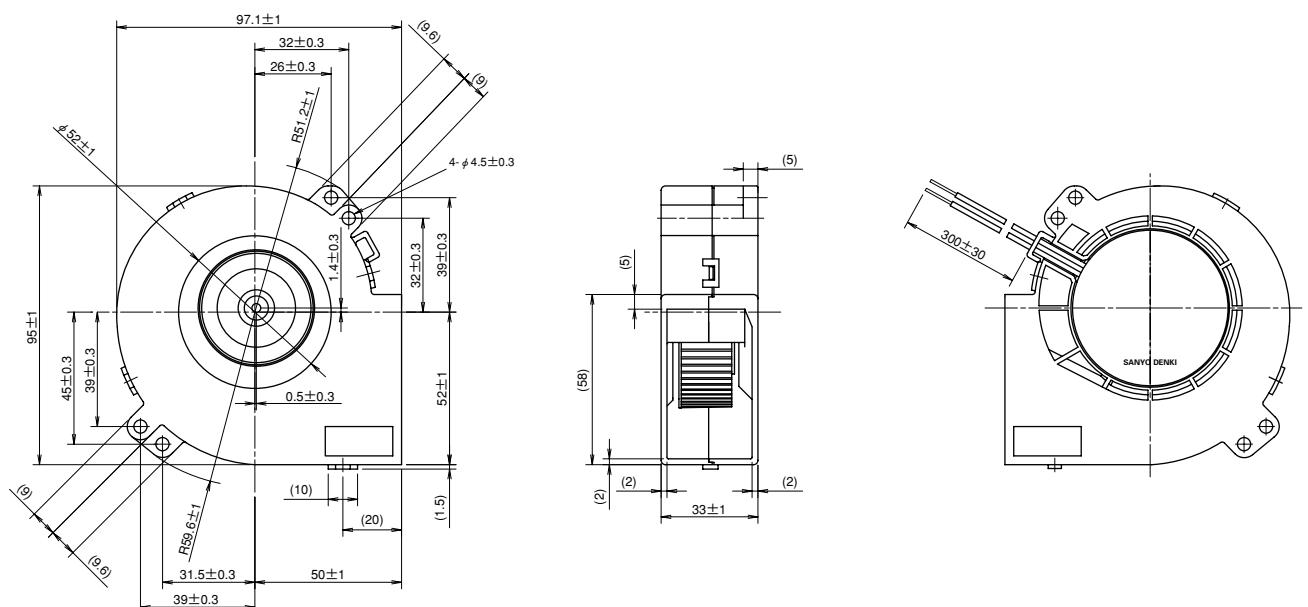


Fig. 2: Dimensions of the new "San Ace B97" Series

Table 2: General Characteristics of the new "San Ace B97" Series

Model	Rated Voltage (V)	Operating Voltage Range	Rated Current (A)	Rated Input (W)	Rated Rotating Speed (min ⁻¹)	Maximum Air Volume		Maximum Static Pressure (Pa)	Sound Pressure Level (dB[A])	Mass (g)
		(V)	(A)	(W)	(min ⁻¹)	(m ³ /min)	(CFM)	(Pa)	(dB[A])	
9BAM12GA2	12	8.4~13.2	1.85	22.2	5,800	1.37	48.4	760	62	170
9BAM12SA2		8.4~13.2	1.45	17.4	5,300	1.25	44.2	610	60	
9BAM12HA2		8.4~13.2	1.20	14.4	4,700	1.10	38.9	490	58	
9BAM12FA2		8.4~13.2	0.98	11.8	4,300	1.00	35.3	410	56	
9BAM24GA2	24	12.0~26.4	0.90	21.6	5,800	1.37	48.4	470	62	170
9BAM24SA2		12.0~26.4	0.71	17.0	5,300	1.25	44.2	610	60	
9BAM24HA2		14.4~26.4	0.60	14.4	4,700	1.10	38.9	490	58	
9BAM24FA2		14.4~26.4	0.49	11.8	4,300	1.00	35.3	410	56	

3.2.2 Air Volume and Static Pressure

Fig. 3 shows examples of air volume versus static pressure

3.2.3 Life Expectancy

The expected service life of the new "San Ace B97" in an ambient temperature of 60°C (with a survival rate of 90%, under continuous operation at the rated voltage in a free air state and normal humidity) is 40,000 hours.

4. Comparison with the conventional products

The new product embodies significant improvement in air volume and static pressure compared to the conventional models.

The new product adopts a high-torque motor developed for the 92mm sq. G-type axial fan. The design of electronic circuit has been updated, thereby enabling large air volume and high static pressure to be attained.

The shapes of the blades and frame have been optimized to reduce noise.

The specific differences from conventional products are indicated in the following paragraphs.

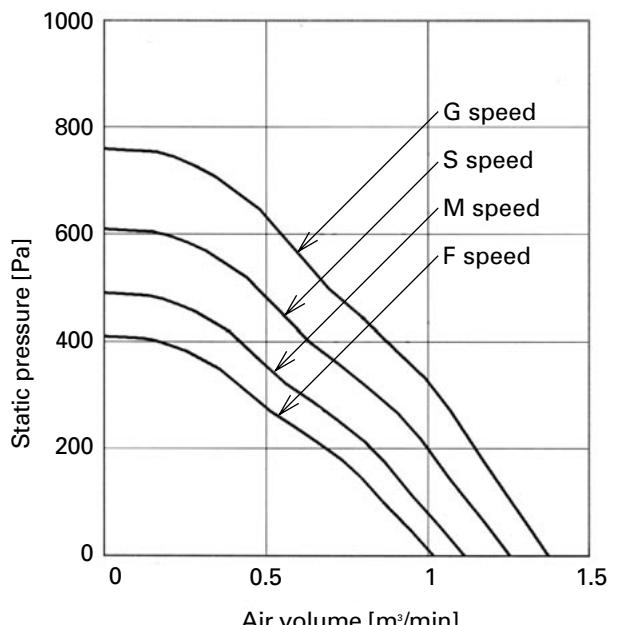


Fig. 3 Air Volume vs. Static Pressure
(Measured with SANYO DENKI Double Chamber)

4.1 Increased Air Volume

Fig. 4 compares the air volume versus static pressure relationship of both new and conventional products.

While the maximum air volume of a conventional fan is $0.76\text{m}^3/\text{min}$, the new design achieves $1.37\text{m}^3/\text{min}$. The maximum static pressure of a conventional fan is 281Pa; the new product reaches 760Pa. Maximum air volume has improved by 1.8 times, and maximum static pressure by 2.7 times.

Performance has also improved relative to the 120mm sq. \times 32mm thickness blower, which has a maximum air volume of $0.78\text{m}^3/\text{min}$ and the maximum static pressure of 175.4Pa.

In summary, the new "San Ace B97" offers equivalent or superior cooling capacities even in comparison to larger devices that purport increased air volumes. Choosing this product over larger fans would also contribute naturally to greater compactness in finished devices.

4.2 Reduced Noise

Though at its rated rotation speed the noise level of the new product is 62dB (A), compared to 52dB (A) for a conventional fan, as the rotating speed is lowered to provide the identical air volume ($0.76\text{m}^3/\text{min}$) of a conventional fan, the noise level decreases to 3dB (A) less than that of a conventional fan.

4.3 Air Speed Distribution

Fig. 5 compares the air speed distribution of both new and conventional products at the identical air speed.

Blowers are mostly used for localized forced-air cooling, and the cooling capacity is known to be generally proportional to the air speed. As can be seen from Fig. 5, the new "San Ace B97" allows the identical air speed to move further compared to the conventional product, thus cooling the air over a larger area.

5. Conclusion

In conclusion, this report outlined the performance and features of the new "San Ace B97" (97mm sq. \times 33mm thickness) large air volume blower.

This new product offers 1.8 times the maximum air volume and 2.7 times the maximum static pressure compared to current fan models with the same dimensions, while reducing the noise level by 3dB (A) for the identical air volume ($0.76\text{m}^3/\text{min}$).

This new product has been certified as a product offering an environmentally-friendly design (ECO PRODUCTS) intended to conserve natural resources, thanks to lower electricity consumption and improved performance per volume and mass. (Fig. 6)

The authors wish to express their deep gratitude to those who offered guidance and cooperation throughout the course of new product development.



ECO PRODUCTS

Fig. 6: Symbol Mark for Environment Compatible Design Certified Product.

Reference

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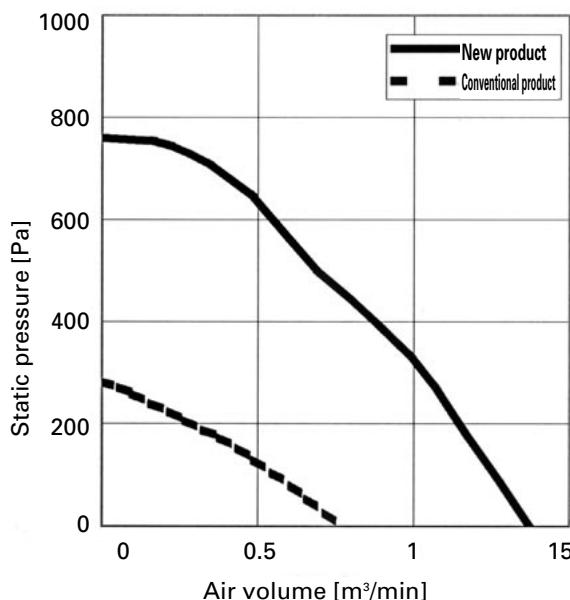


Fig. 4: Comparison of Air Volume vs. Static Pressure (Measured with SANYO DENKI Double Chamber)

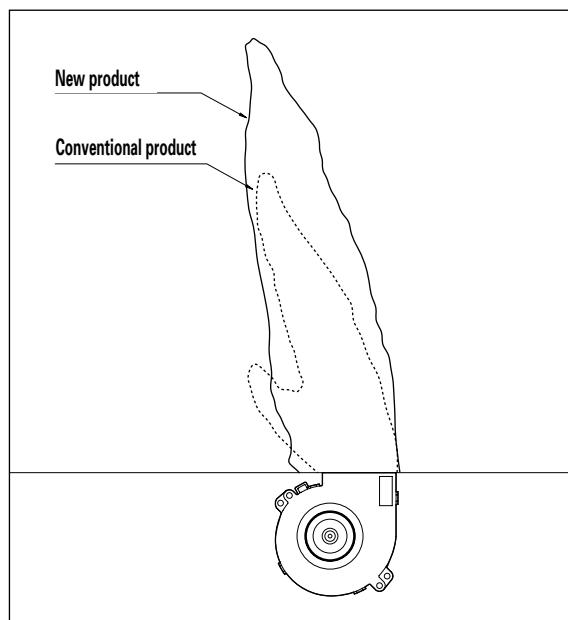


Fig. 5: Comparison of Air Speed Distribution



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