

Low Power Consumption Fan “San Ace 92” GA Type

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1. Introduction

In recent years, many people have gained very high level of interest in the conservation of the global environment, and therefore systems for energy conservation and ecology have become indispensable. This holds true for information systems such as servers, storage, and telecommunication equipment. In particular, the reduction of power consumption is a large issue for these devices. With this trend, there is an increasing demand for reduction of power consumption in cooling fans. Looking at the process extending from the fan production, through usage, and until disposal, the power consumption during operations comprises the largest percentage of the environmental burden. Therefore, it is the manufacturer's duty for conservation of the global environment to reduce the fan's power consumption.

This document introduces the features and performance of the low power consumption “San Ace 92” GA type fan that was developed from the environmental perspective and to meet market needs.

2. Background of the Development

We have previously developed the 92 mm sq., 25 mm thick DC cooling fan “San Ace 92” AH type. When it first went on sale, this model had the lowest power consumption in the industry for the same-sized models, but as noted previously, the current market demands even lower power consumption.

To meet these needs, we developed the new “San Ace 92” GA type. This document introduces the model in detail. This fan retains compatibility with the conventional model, including size and mounting holes, and it realizes the lowest power consumption in the industry.

3. Product Features

Fig. 1 shows a photograph of the “San Ace 92” GA type fan.



Fig. 1: “San Ace 92” GA type

The features of this new model are as follows:

- (1) Low power consumption
- (2) Low SPL (sound pressure level)
- (3) PWM speed control function

The blade, frame and motor were newly developed for the “San Ace 92” GA type (referred to below as the new model) in order to achieve low power consumption and low SPL.

4. Product Overview

4.1 Dimensions

Fig. 2 shows the dimensions of the new model. The new model has the same mounting dimensions as the conventional model, making it compatible.

4.2 Characteristics

4.2.1 General characteristics

Table 1 shows the general characteristics for the new model. There are two types of rated voltage, 12 VDC and

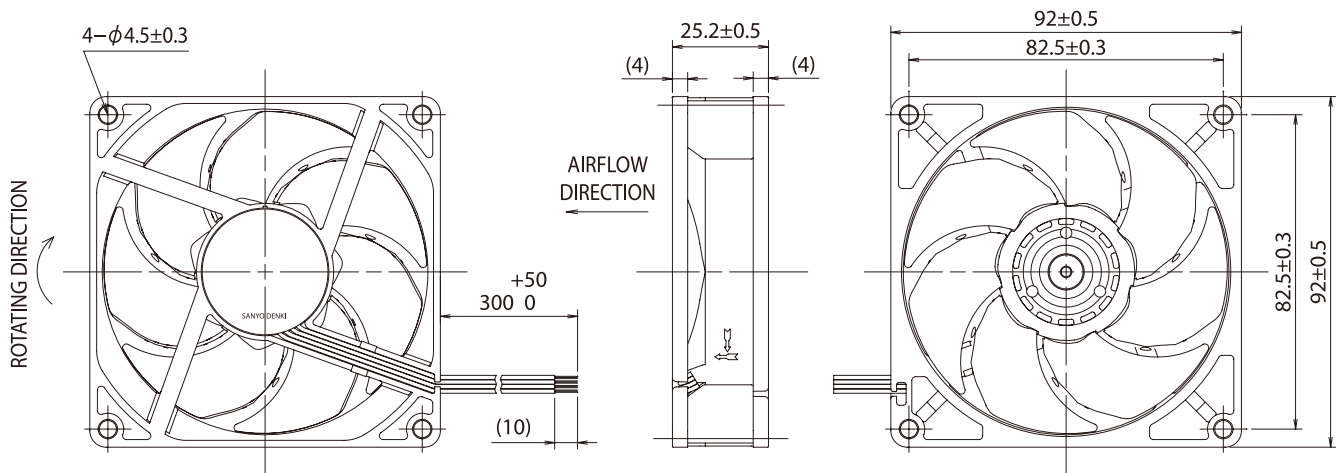


Fig. 2: "San Ace 92" GA type dimensions, ribbed frame (unit: mm)

Table 1: "San Ace 92" GA type general characteristics

Model No.	Rated voltage [V]	Operating voltage range [V]	PWM duty cycle* [%]	Rated current [A]	Rated input [W]	Rated speed [min ⁻¹]	Max. air flow		Max. static pressure		Sound pressure level [dB(A)]
							[m ³ /min]	[CFM]	[Pa]	[inchH ₂ O]	
9GA0912P4J03 (9GA0912P4J031)	12	10.2 to 13.8	100	0.39	4.68	5,000	2.20	77.7	105	0.42	43
			0	0.06	0.72	1,500	0.66	23.3	9.5	0.04	14
9GA0912P4G03 (9GA0912P4G031)			100	0.28	3.36	4,400	1.93	68.2	81	0.33	39
			0	0.06	0.72	1,500	0.66	23.3	9.5	0.04	14
9GA0912P4S03 (9GA0912P4S031)			100	0.2	2.4	3,800	1.67	59.0	60.6	0.24	35
			0	0.06	0.72	1,500	0.66	23.3	9.5	0.04	14
9GA0924P4J03 (9GA0924P4J031)	24	20.4 to 27.6	100	0.2	4.80	5,000	2.20	77.7	105	0.42	43
			0	0.04	0.96	1,500	0.66	23.3	9.5	0.04	14
9GA0924P4G03 (9GA0924P4G031)			100	0.15	3.60	4,400	1.93	68.2	81	0.33	39
			0	0.04	0.96	1,500	0.66	23.3	9.5	0.04	14
9GA0924P4S03 (9GA0924P4S031)			100	0.12	2.88	3,800	1.67	59.0	60.6	0.24	35
			0	0.04	0.96	1,500	0.66	23.3	9.5	0.04	14

() : Ribless frame

*Input PWM frequency: 25kHz

24 VDC, and each type of rated voltage is available in three types of rated speed: J speed (5,000 min⁻¹), G speed (4,400 min⁻¹) and S speed (3,800 min⁻¹).

4.2.2 Air flow vs. static pressure characteristics

Fig. 3 shows the air flow versus static pressure characteristics for the new model.

4.2.3 PWM speed control function

The new model has a PWM control function that controls the fan speed from an external source.

If the fan is not always used at full speed, and the speed is controlled depending on the state of the heat, the power consumption and SPL can be reduced for the entire device. Therefore, the demand has drastically increased for fans

with a PWM speed control function.

Fig. 4 shows the air flow versus static pressure for PWM duty of the new model.

4.3 Expected life

The new model has an expected life of 60,000 hours at 60°C (survival rate of 90% with continuous operation at the rated voltage under free air conditions and at normal humidity).

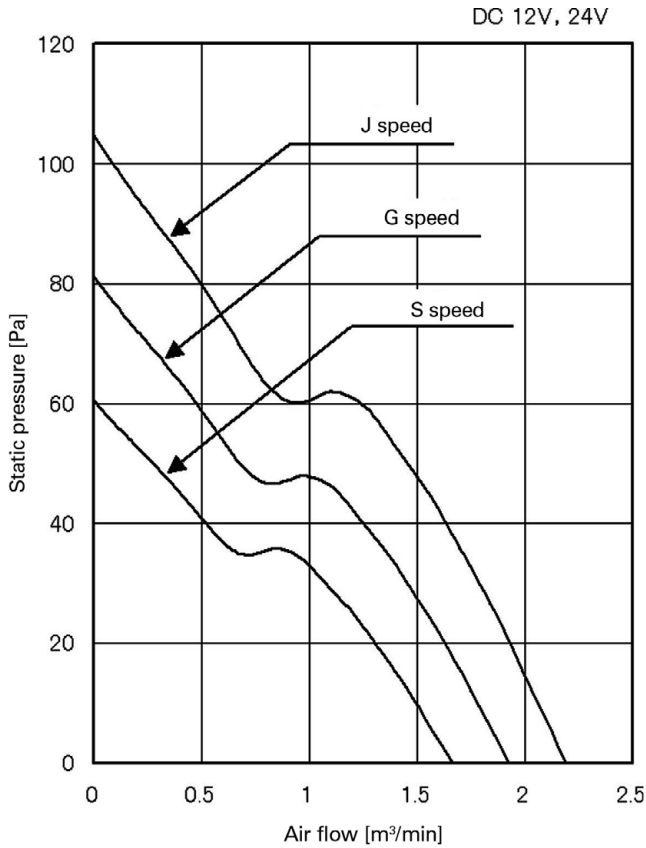


Fig. 3: Air flow vs. static pressure

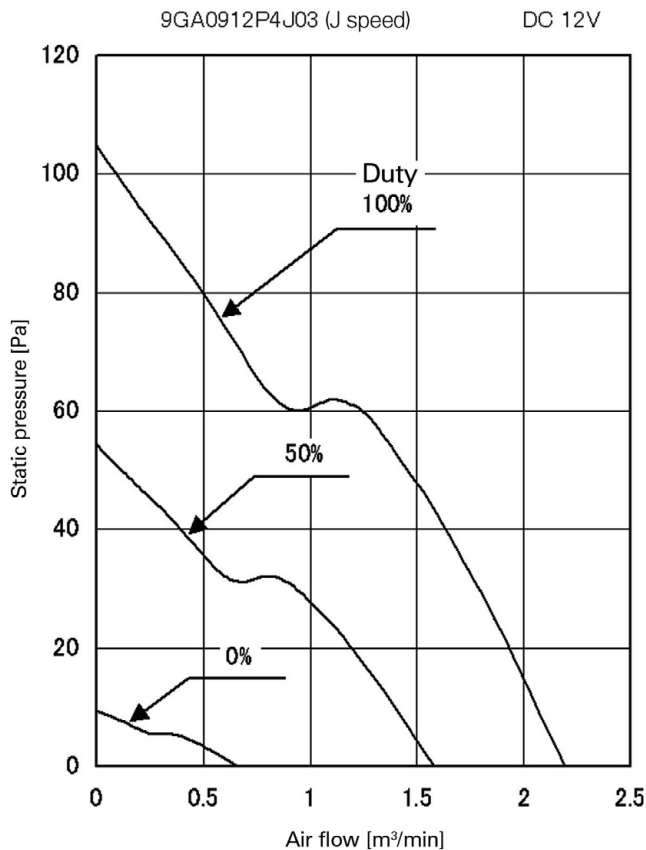


Fig. 4: Air flow and static pressure characteristics at individual PWM duty

5. Comparisons with Conventional Models

The new model adopts optimized blade and frame shape and a new design for the motor in order to realize low power consumption and low noise.

The below introduces the specific differences between the new model "San Ace 92" GA type and the conventional model "San Ace 92" AH type.

5.1 Comparison of air flow versus static pressure

Fig. 5 shows a comparison of air flow versus static pressure for the highest performance conventional model (9AH0912P4G03) and the new model (9GA0912P4J03).

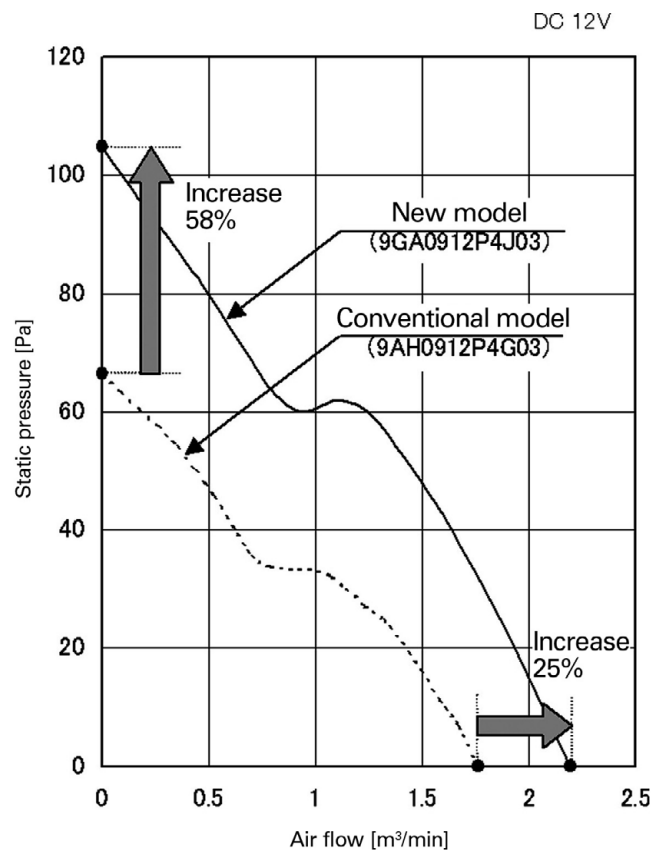


Fig. 5: Comparison of air flow vs. static pressure

We sought blade shape and frame shape with excellent air flow and static pressure properties for the new model. Compared to the conventional model, which has a maximum air flow of 1.76 m³/min, the new model has a maximum air flow of 2.2 m³/min, which is a 25% increase. Furthermore, the maximum static pressure for the conventional model is 66.5 Pa, while it is 105 Pa for the new model, which is a 58% increase.

5.2 Comparison of power consumption

Assuming that the equipment has system impedance as shown in Fig. 6, we compared the power consumption when the new model runs at the same operation point as the conventional model (in other words, when both products operate with the same cooling performance). The results, shown in Fig. 7, show that the power consumption for the new model is 17% less than the conventional model during free air and 16% less at the operation point.

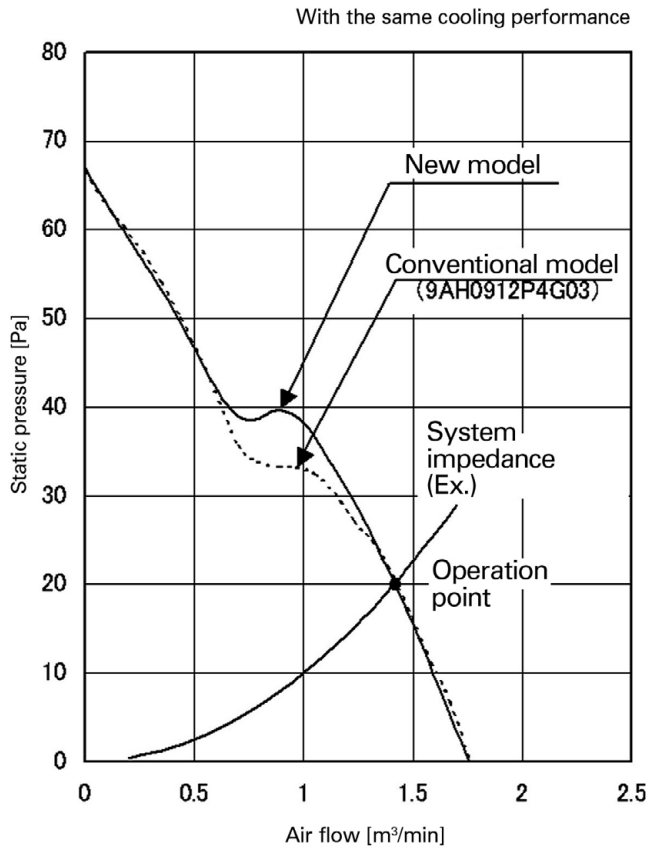


Fig. 6: Comparison of air flow vs. static pressure, power consumption
(With the same cooling performance as the conventional model)

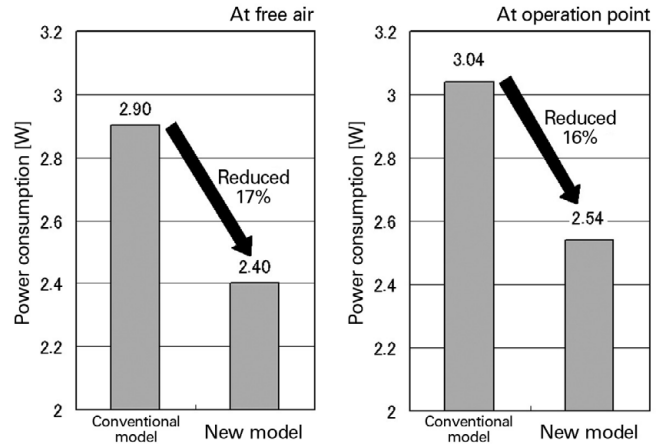


Fig. 7: Comparison of power consumption

5.3 Comparison of sound pressure level

Just as described in the previous section, Fig. 8 shows a comparison of the sound pressure level when the new model runs at the same operation point as the conventional model. As a result, the sound pressure level for the new model is 3 dB(A) less than the conventional model during free air and 2.5 dB(A) less at the operation point.

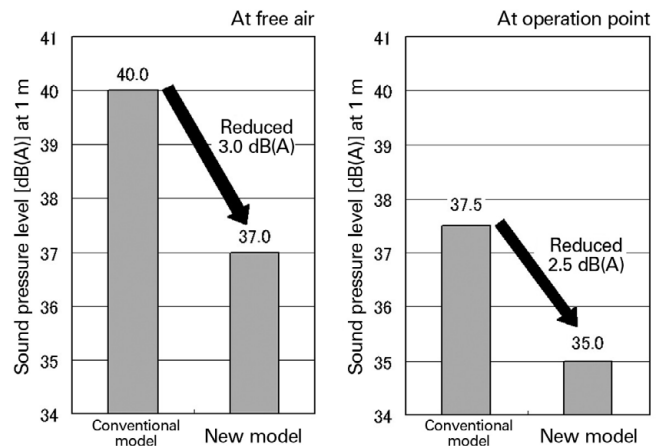


Fig. 8: Comparison of sound pressure level

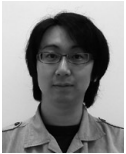
6. Conclusion

This document introduced some of the features and abilities of the newly developed low power consumption “San Ace 92” GA type fan.

With the new design on the blades, frame, and motor, the new model achieves enormous improvements to the air flow versus static pressure compared to conventional models. Furthermore, it achieves lower power consumption and sound pressure level while maintaining the same cooling performance. This model has the top performance in the industry for 92 mm sq., 25 mm thick fans.

In the future, there is likely to be even more of an

increased demand for low power consumption for information systems such as servers, storage, and telecommunication equipment, making reduced power consumption for fans essential. As a cooling fan, the new model can greatly contribute to solving the problem of creating low power consumption equipment.



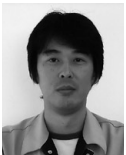
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