Large Air Flow Counter Rotating Fan “San Ace 60” CR Type

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1. Introduction

As information telecommunication equipment such as servers provide higher speed and performance, the devices also experience an increase in heat and density. In particular, user-friendly 60 mm sq. fan are often used in 2U servers to provide greater air flow and static pressure.

Sanyo Denki has developed a new 60 mm sq., 76 mm thick large air flow and high static pressure counter rotating fan. This document introduces the features and performance of the “San Ace 60” CR type fan.

2. Development Background

The 1U size equipment has a height of 44.45 mm, which means that the possible size for a fan motor is limited to 40 mm sq. or less. Therefore, the 2U size equipment, which is twice the size of 1U with a height of 88.9 mm, is limited to using fans that are 80 mm sq. or less. In particular, user-friendly 60 mm sq. fans are in high demand for cooling in 2U servers to give a more flexibility for design in the server chassis.

The 60 mm sq. fans that are used in 2U servers are normally 38 mm thick, but recently as servers provide higher speed and performance, the devices also experience an increase in heat and greater density.

The conventional 60 mm sq., 38 mm thick fan from Sanyo Denki (referred to below as the conventional fan) has been incorporated into products on the market in recognition of its abilities to provide large air flow and high static pressure. However, there were instances where one fan did not provide sufficient cooling, so two fans were used in series to solve this problem. However, as noted previously, the demands for even larger air flow and higher static pressure have increased dramatically, so there are situations when even two conventional fans in series cannot achieve the necessary performance.

In order to meet customer demands, the following goals were set during development to solve this situation.

(1) Develop a product that can fit into the same space as two conventional fans.

(2) Develop a product that provides higher abilities during operation when compared to two conventional fans.

In order to meet these goals, the counter rotating method that was used in the Sanyo Denki 40 mm sq., 56 mm thick fan was used to develop the 60 mm sq., 76 mm thick “San Ace 60” CR type fan.

Counter rotating fans combine two axial flow fans and use a method where the front and back driving blades rotate in opposite directions.

3. Product Features

Fig. 1 shows a photograph of the “San Ace 60” CR type fan.

Fig. 1: “San Ace 60” CR type

The features of this product are as follows.

(1) Large air flow and high static pressure

(2) Low noise

(3) PWM control function

The blade and frame shape were newly developed for the “San Ace 60” CR type (referred to below a San Ace 60) in order to achieve large air flow, high static pressure, and low noise. In addition, the San Ace 60 includes the PWM control function to handle a wide variety of environments.

4. Product Overview

4.1 Dimensions

Fig. 2 shows the dimensions of the San Ace 60.

4.2 Characteristics

4.2.1 General characteristics

There are two types of products with rated voltage of 12 VDC and a rated rotating speed of either S speed or H speed.

Table 1 shows the general characteristics for the San Ace 60.

4.2.2 Air flow vs. static pressure characteristics

Fig. 3 shows the air flow versus static pressure characteristics for San Ace 60.

4.3 Expected lifetime

The San Ace 60 has an expected life of 40,000 hours at 60°C (survival rate of 90% with continuous operation at the rated voltage under free air conditions and at normal humidity).

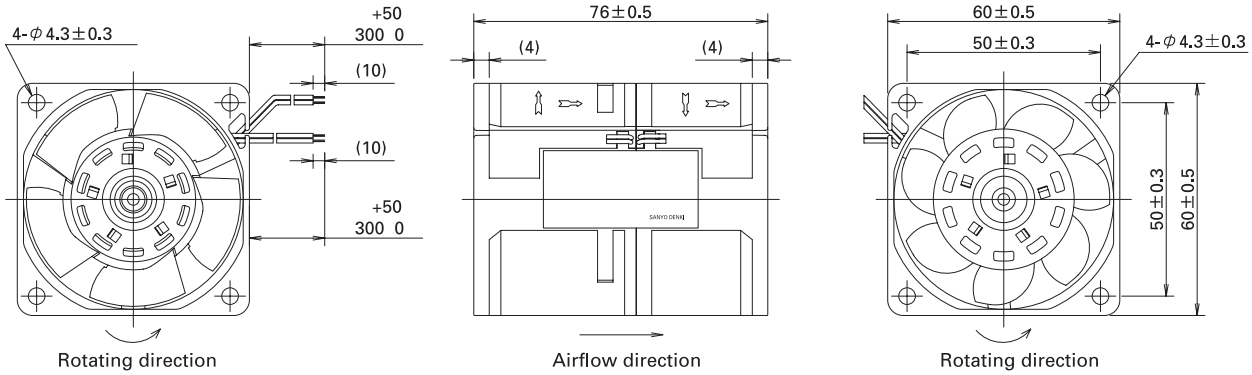

Fig. 2: “San Ace 60” CR type dimensions (unit: mm)

Table 1: “San Ace 60” CR type general characteristics

Model No.	Rated voltage	Operating voltage range	Rated current	Rated power	Rated rotating speed Inlet / Outlet	Max. air flow	Max. static pressure	Sound pressure level
	(V)	(V)	(A)	(W)	(min^{-1})	(m^3/min)	(Pa)	(dB[A])
9CR0612S002	12	10.8～13.2	3.2	38.4	11500 / 7000	2.26	550	66
9CR0612H002	12	10.8～13.2	2.7	32.4	10300 / 6500	1.98	450	64

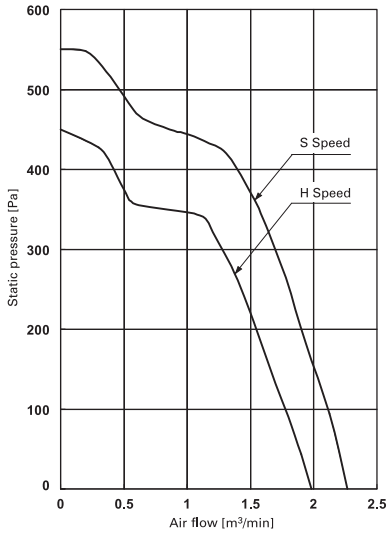

Fig. 3: Air Flow vs. Static Pressure

5. Comparisons with Conventional Models

The blade and the frame shape for the San Ace 60 were designed to improve the aerodynamic characteristics, thus providing large air flow and high static pressure while ensuring low noise.

The following information shows the difference between the San Ace 60 and two conventional fans connected in series when using the highest performance 60 mm sq., 38 mm thick conventional fan (referred to below as 9G0612G102).

5.1 Large air flow and high static pressure

Fig. 4 compares the characteristics for San Ace 60 and two 9G0612G102 fans in series.

For San Ace 60, 3D-CAD modeling and careful testing were used

to pursue a blade and frame shape that produces optimal aerodynamic characteristics. For example, assuming that the system impedance in the device acts as shown in Fig. 4, compare operation point A for the San Ace 60 and operation point B for two units of 9G0612G102 in series. The values at operation point A have 20% higher air flow, 46% higher static pressure, and increased cooling performance.

5.2 Low noise

Assuming that the system impedance in the device is the same as used in section 5.1, compare the values for the San Ace 60 and the two units of 9G0612G102 in series. Although the air flow is 20% higher and the static pressure is 46% higher, the sound pressure level is the same at operation point A and operation point B, thus realizing low noise.

By using the PWM control function to control the rotating speed for the fan, it can be suppressed to the minimum necessary speed for the load, which means that the noise can be lowered. At the same time, the control reduces the heat generated from the fan, which increases the fan’s reliability and improves the reliability of the entire device.

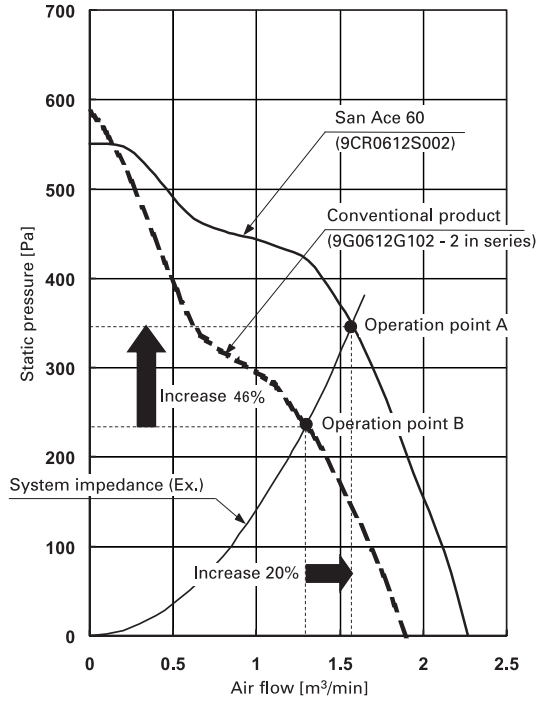

Fig. 4: Comparison of Air Flow vs. Static Pressure

6. Conclusion

This document introduces some of the features and abilities of the newly developed “San Ace 60” CR type fan.

This fan has improved performance compared to the Sanyo Denki conventional models with larger air flow, higher static pressure, and lower noise. This product is sure to contribute as a cooling fan for information communication devices and other equipment that features increased heat and higher density.

This product offers reduced power consumption along with reduced size and mass as well as improved environmental impact. Because of its smaller environmental footprint, it has earned our ECO PRODUCTS mark (Fig. 5).

ECO PRODUCTS

Fig. 5: ECO PRODUCTS symbol

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