

# Large Air Volume Counter Rotating Fan “San Ace 40” CRA Type

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## 1. Introduction

The increasing speed and improving functionality of today’s communication equipment, especially servers, goes hand in hand with greater heat generation and greater density. Because of this, the 40 mm square × 56 mm thickness fans that are in great demand in the information technology sector need to have the very best air volume and the highest possible static pressure.

We therefore developed 40 mm square × 56 mm thickness fans with large air volume and high static pressure and much greater functionality than fans of conventional series.

This document outlines the features and functions of these large air volume and high static pressure fans.

## 2. Development Background

Sanyo Denki has been developing and selling 40 mm square × 56 mm thickness fans of the CR type that are the best in their size category for cooling performance. However, as we mentioned before, the requirements for air volume and static pressure have become much more stringent and many current products cannot meet these demands.

In response to this situation, Sanyo Denki has developed the 40 mm square × 56 mm thickness large air volume and high static pressure “San Ace 40” CRA type fans.

## 3. Product Outline

Figure 1 shows the exterior view of the “San Ace 40” CRA type fan.

The following are the features of the “San Ace 40” CRA type.

- (1) Large air volume and high static pressure
- (2) Low power consumption
- (3) PWM control function
- (4) Optimized for a 1U Rack (Height 44.45 mm)

The “San Ace 40” CRA type includes newly developed fan blades as well as a newly developed frame, motor and drive circuit, creating a fan with large air volume, high static pressure, and low power consumption. Additionally, the “San Ace 40” CRA type provides PWM control functions to control the speed of the fan.



Figure 1. Exterior view of the “San Ace 40” CRA type

## 4. Product Outline

### 4.1 Dimensions

The “San Ace 40” CRA type fan has the same dimensions as conventional products and thus maintains compatibility. Additionally, a 1U server chassis will not cause interference with the fan or the leads. Figure 2 shows the dimensions of the product.

### 4.2 Characteristics

#### 4.2.1 General characteristics

The rated voltage is 12 V, the most common type supplied by 1U servers. The rated rotating speed comes at two different ratings, either the high air volume J speed or the conventional G speed.

The general characteristics of the “San Ace 40” CRA type fan are shown in table 1.

#### 4.2.2 Air volume vs. static pressure characteristics

The air volume versus static pressure characteristics are shown in figure 3.

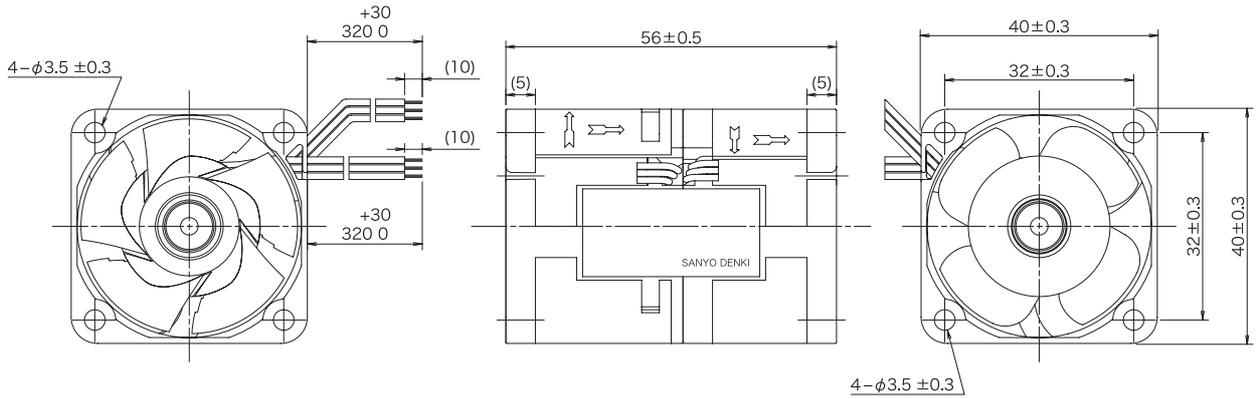


Figure 2 Dimensions of the "San Ace 40" CRA Type

Table 1 Characteristics of the "San Ace 40" CRA Type

Model No.	Rated Voltage	Operating Voltage Range	Rated Current	Rated Input	Rated Rotating Speed Inlet / Outlet	Maximum Air Volume		Maximum Static Pressure		Sound Pressure Level
	(V)	(V)	(A)	(W)	(min <sup>-1</sup> )	(m <sup>3</sup> /min)	(CFM)	(Pa)	[InchH <sub>2</sub> O]	(dB [A])
9CRA0412J501	12	10.8~13.2	1.4	16.8	15800 / 12200	0.90	31.8	570	2.28	62
9CRA0412G501	12	10.8~13.2	1.0	12.0	14000 / 10400	0.77	27.2	435	1.74	59

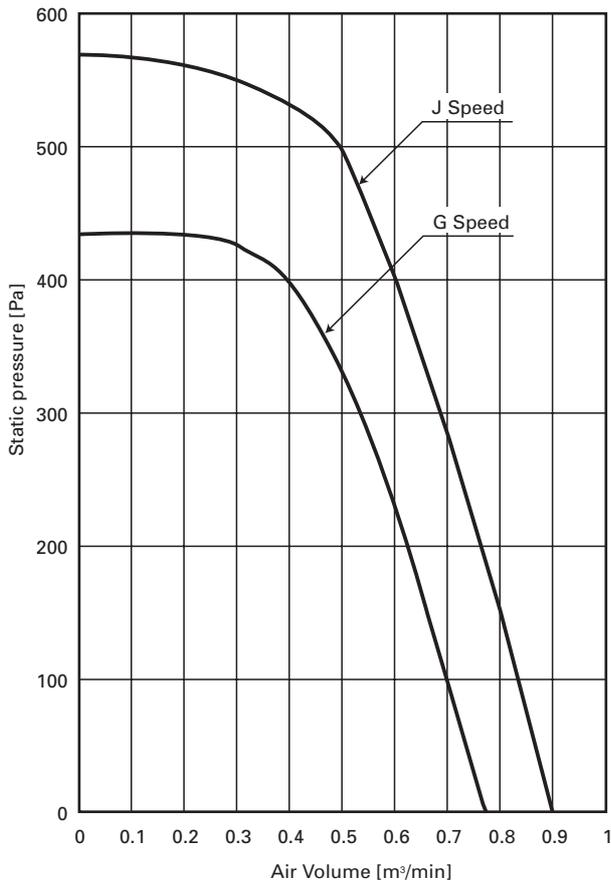


Figure 3 Air volume vs. static pressure characteristics

### 4.3 Expected life

"San Ace 40" CRA type fans have 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).

## 5. Comparisons with Conventional Models

The "San Ace 40" CRA type has larger air volume, higher static pressure, and lower power consumption than conventional models. It also provides PWM for speed control.

This development has led us to large air volume, high static pressure and higher aerodynamic efficiency through advances in frame and fan blade shape. Additionally, the new motor and drive circuit that we developed have resulted in greater motor efficiency and decreased power consumption.

The following shows the differences between the "San Ace 40" CRA type and the highest performing product that is currently available (9CR0412S501).

### 5.1 Increased air volume

Figure 4 shows the differences in air volume vs. static pressure characteristics between the "San Ace 40" CRA type and the highest performing product that is currently available.

During this development, we used 3-D CAD modeling and rapid prototyping to design a frame and fan blades that maximize aerodynamic efficiency. The result is that when a fan uses this new technology at an air volume of 0.7m<sup>3</sup>/min, the speed in the inlet is

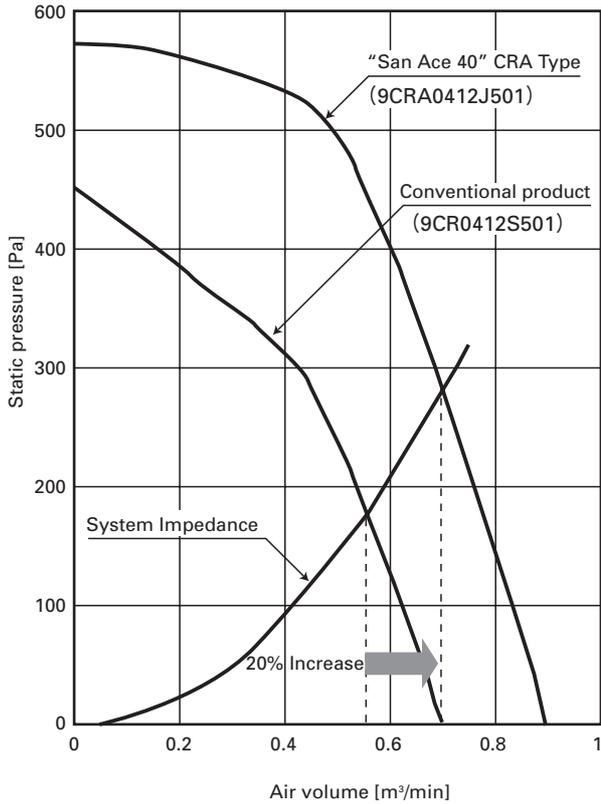


Figure 4 Comparison of air volume vs. static pressure characteristics

reduced by 20% and the speed in the outlet is reduced 12% compared to a conventional fan running at the same speed.

In addition, new designs for the motor and the drive circuit have made possible higher rotating speeds which in turn increase air volume by 28% so that a currently available fan will offer an air volume of 0.7 m<sup>3</sup>/min while a comparable unit using this new technology will have an air volume of 0.9 m<sup>3</sup>/min.

For example, if a system impedance is assumed as shown in figure 4, the "San Ace 40" CRA type fan has 20% higher operating air volume than the currently available unit. In other words, this new technology offers more cooling performance than current technology.

### 5.2 Reduced power consumption

The "San Ace 40" CRA type uses a new motor and drive circuit that were designed for efficiency. The unit therefore uses 40% less power than currently available fans (at an air volume of 0.70 m<sup>3</sup>/min).

## 6. Conclusion

These are some of the characteristics and functions of the "San Ace 40" CRA type fan.

This product offers larger air volume and higher static pressure as well as lower power consumption than conventional models, while offering better performance. As electronic devices generate more and more heat and high packaging density 1U servers and communication devices continue to grow, we feel that we can continue to improve the cooling needed to operate these devices.

This product offers increased performance and decreased power consumption along with improved environmental impact while maintaining the same form factor as its predecessors. Because of its smaller environmental footprint, it has earned our ECO PRODUCTS mark (figure 5).



Figure 5 ECO PRODUCTS Symbol

### References

- (1) Honami Oosawa et al: "San Ace 40" Counter Rotating Fan SANYO DENKI Technical Report, No. 16 (2003-11)
- (2) Yoshihiko Aizawa: Cooling System Technology That Changes The Conventional Trend SANYO DENKI Technical Report, No. 16 (2003-11)



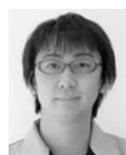
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