

40 × 40 × 28 mm *San Ace 40L 9LG* Type High Static Pressure Long Life Fan

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1. Introduction

ICT equipment is becoming increasingly important in supporting our society and economy. Our Long Life Fans have been widely used in mission-critical facilities and remotely installed equipment as they require high reliability and long service life to ensure long-term, reliable operation.

As equipment rapidly advances in performance, it's becoming denser and generating more heat, requiring fans with both high cooling performance and long service life. To address these needs, we had offered our 40 × 40 × 28 mm 9L type Long Life Fan (hereafter, "current product") for a while. In recent years, however, it has become increasingly more difficult for this fan to meet the latest market demands.

In response, we have developed and launched the *San Ace 40L 9LG* type High Static Pressure Long Life Fan (hereinafter, "new product").

This article introduces the features and performance of the new product.

2. Product Features

Figure 1 shows the appearance of the new product.



Fig. 1 40 × 40 × 28 mm *San Ace 40L 9LG* type

The new product achieves high airflow, high static pressure, and long service life while maintaining the same size as the current product.

The new product is available in two voltages of 12 and 24 V, while the current product only offers 12 V.

3. Product Overview

3.1 Dimensions

Figure 2 shows the dimensions of the new product. The new product was designed to be compatible in size and mounting with the current product.

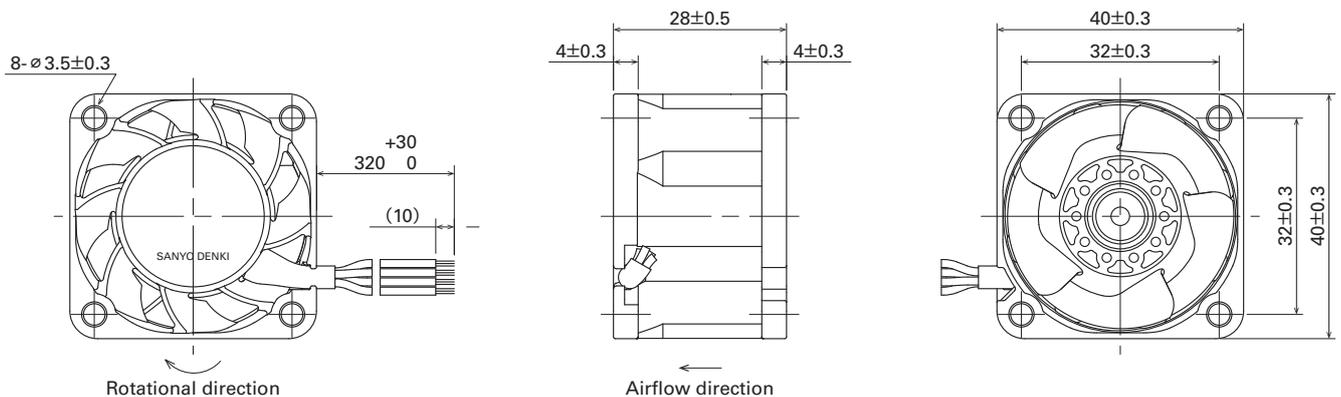


Fig. 2 Dimensions of the *San Ace 40L 9LG* type (Unit: mm)

3.2 Specifications

3.2.1 General specifications

Table 1 shows the general specifications of the new product.

Table 1 General specifications of the *San Ace 40L 9LG* type

Model no.	Rated voltage [V]	Operating voltage range [V]	PWM duty cycle* [%]	Rated current [A]	Rated input [W]	Rated speed [min ⁻¹]	Max. airflow		Max. static pressure		Sound pressure level [dB(A)]	Operating temperature range [°C]	Expected life [h]
							[m ³ /min]	[CFM]	[Pa]	[inchH ₂ O]			
9LG0412P3G001	12	10.2 to 13.8	100	1.9	22.8	33500	0.93	32.9	1780	7.15	68	-20 to +70	80000 at 60°C (115000 at 40°C)
			20	0.09	1.08	7500	0.2	7.07	89	0.36	33		
9LG0412P3S001			100	1.23	14.8	28000	0.77	27.2	1290	5.18	65		100000 at 60°C (135000 at 40°C)
			20	0.07	0.84	5700	0.15	5.3	53	0.21	28		
9LG0412P3H001			100	0.69	8.28	22500	0.62	21.9	830	3.33	62		
			20	0.07	0.84	5700	0.15	5.3	53	0.21	28		
9LG0424P3G001	24	21.6 to 26.4	100	0.95	22.8	33500	0.93	32.9	1780	7.15	68	-20 to +70	80000 at 60°C (115000 at 40°C)
			20	0.07	1.68	6800	0.18	6.36	73	0.29	32		
9LG0424P3S001			100	0.61	14.6	28000	0.77	27.2	1290	5.18	65		100000 at 60°C (135000 at 40°C)
			20	0.05	1.2	5000	0.13	4.59	41	0.16	27		
9LG0424P3H001			100	0.34	8.16	22500	0.62	21.9	830	3.33	62		
			20	0.05	1.2	5000	0.13	4.59	41	0.16	27		

Speed is 0 min⁻¹ at 0% PWM duty cycle for models without ratings at 0% listed.

Note: The expected life at an ambient temperature of 40°C is for reference purposes only.

3.2.2 Airflow vs. static pressure characteristics

Figure 3 shows the airflow vs. static pressure characteristics of the new product, between different models.

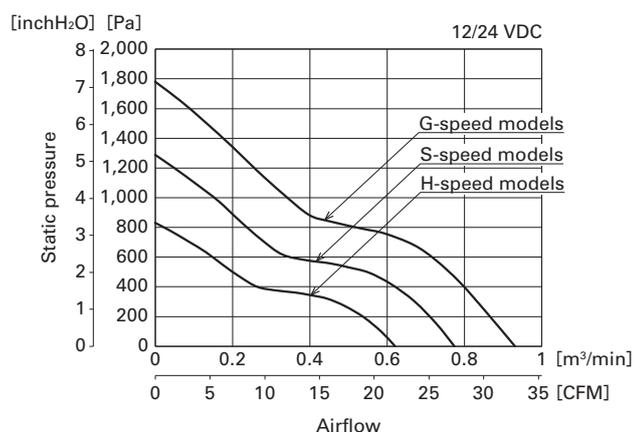


Fig. 3 Airflow vs. static pressure characteristics of the *San Ace 40L 9LG* type (different models)

3.2.3 PWM control

The new product comes with PWM control for controlling fan speed.

3.3 Expected life

The new product is available in three speed variations. G-speed models, the fastest with significantly improved cooling performance, have an expected life of 80,000 hours at 60°C (survival rate of 90%, run continuously at rated voltage and normal humidity in free air). S-speed and H-speed models have improved airflow and static pressure while maintaining the same expected life of 100,000 hours as the current product.

4. Key Points of Development

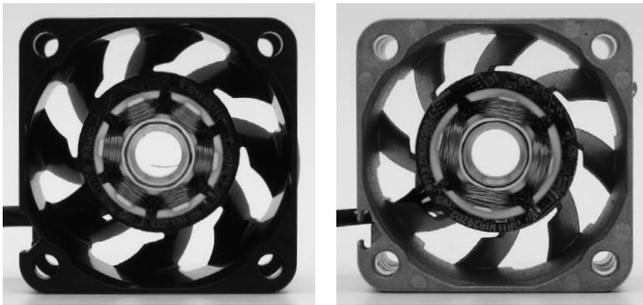
The new product achieves faster speed of up to 33,500 min⁻¹, higher airflow, higher static pressure, and longer service life, thanks to its highly efficient 3-phase drive motor, new impeller and frame shapes designed for better aerodynamic performance, and effective cooling and heat dissipation.

The key points of development are as follows.

4.1 Motor design

Achieving higher airflow and static pressure required a faster speed than the current product. To ensure longer service life, it was essential to suppress the temperature rise in the bearings and improve the motor efficiency. To achieve these, the new product uses a 3-phase drive motor, which is suitable for achieving both high speed and high efficiency, while a bipolar drive (single-phase full-wave) motor is used in the current product.

Figure 4 compares the motors of the new and current San Ace 40L fans.



New product

Current product

Fig. 4 Motors of the new and current products

4.2 Impeller and frame design

To achieve the impeller’s target durability required for the increased fan speed, we leveraged simulations to design an impeller with improved strength and excellent aerodynamic performance. Also, the impeller has vent holes for better heat dissipation of the motor.

The frame uses the same aluminum material as the current product for strength and effective heat dissipation. Furthermore, the shape of the stator blades was optimally designed to match the impeller shape.

Figure 5 compares the impeller and frame shape between the new and current products.



New product

Current product

Fig. 5 Appearance of the new and current products compared

5. Comparison of New and Current Products

5.1 Comparison of airflow vs. static pressure characteristics

Figure 6 compares the airflow vs. static pressure characteristics of the new (with different models) and current products.

The new fastest model, 9LG0412P3G001, has 1.8-times maximum airflow and 8.7-times higher maximum static pressure, compared to the current product. Its expected life is 80,000 hours, which is close to that of the current product, while significantly improving airflow and static pressure.

The new 9LG0412P3S001 model, with the same expected life of 100,000 hours as the current product, achieves 1.5-times higher maximum airflow and 6.3-times higher maximum static pressure.

5.2 Power consumption comparison

Figure 7 compares power consumption between the new and current products at the same airflow.

At the estimated system impedance (equipment ventilation resistance) shown in the figure, the new product consumes 46% less power than the current product demonstrating a high efficiency.

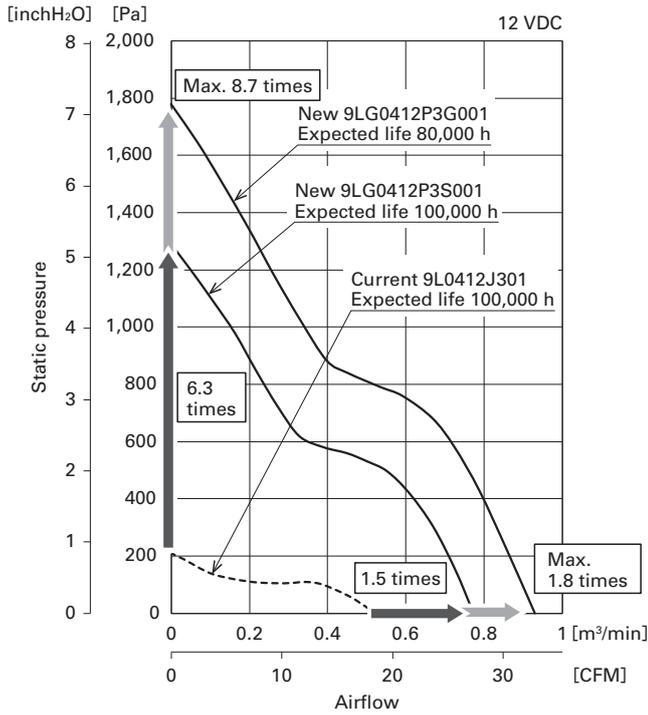


Fig. 6 Airflow vs. static pressure characteristics of the new and current products

5.3 Environmental impact comparison

Figure 8 compares the CO₂ emissions of the new and current products over their life cycles.

The new product produces 50% less CO₂ emissions over its product life cycle compared to the current product thanks to its greatly reduced power consumption.

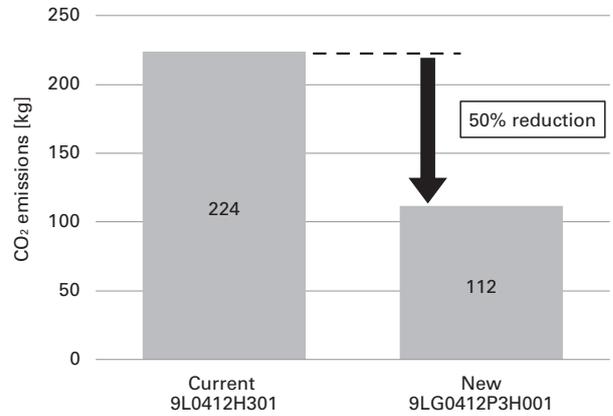


Fig. 8 CO₂ emissions comparison using our LCA calculation software (100,000 hours, when operating with the same operating airflow)

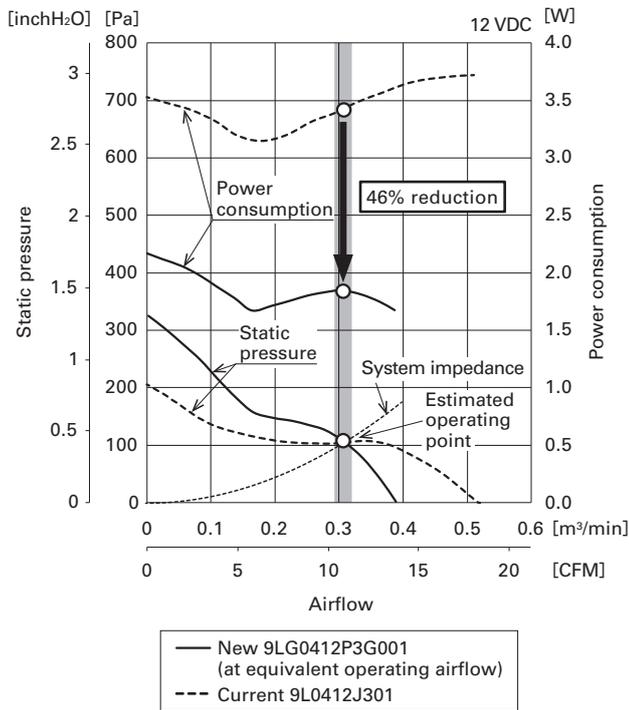


Fig. 7 Power consumption comparison between the new and current products

6. Conclusion

This article introduced the features and performance of the *San Ace 40L 9LG* type High Static Pressure Long Life Fan.

The new product achieves significantly higher airflow and static pressure than the current product while maintaining a long service life.

Furthermore, it is available in 12 and 24 V voltages, and this extends the range of applications, contributing to improving performance, extending service life, and reducing size of various types of equipment.

We will continue to help our customers create new value by providing products that promptly address market demand.

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