

# San Ace 120

## 9RA type

### DC Fan

#### Features

##### Low Noise and Energy Saving

Compared to our current model,<sup>(1)</sup> noise level has been reduced by 3 dB(A) and power consumption has been reduced by 28%.<sup>(2)</sup> Moreover, the models with PWM control, which enables the control of fan speed, provide further optimized noise level and efficiency.

##### Rich Lineup

The product lineup is available in a wide variety in 12/24/48 voltage, cooling performance, noise level, and PWM control. This allows users to choose the most suitable one for their applications.

(1) Current model: 120 x 120 x 38 mm *San Ace 120* 9G type DC Fan (model: 9G1212G101).  
 (2) For models 9RA1212G1001, 9RA1224G1001, and 9RA1248G1001



## 120 x 120 x 38 mm

#### Specifications

The models listed below **have ribs and pulse sensors with PWM control function**. For models without ribs, append "1" to the end of model numbers.

| Model no.     | Rated voltage [V] | Operating voltage range [V] | PWM duty cycle* [%] | Rated current [A] | Rated input [W] | Rated speed [min <sup>-1</sup> ] | Max. airflow [m <sup>3</sup> /min] [CFM] | Max. static pressure [Pa] [inchH <sub>2</sub> O] | SPL [dB(A)] | Operating temperature [°C] | Expected life [h]          |
|---------------|-------------------|-----------------------------|---------------------|-------------------|-----------------|----------------------------------|--|--|-------------|----------------------------|----------------------------|
| 9RA1212P1K001 | 12                | 10.8 to 13.2                | 100                 | 0.96              | 11.5            | 4700                             | 4.5 158                                  | 170 0.683  | 50          | -20 to +70                 | 30000/60°C<br>(53000/40°C) |
|               |                   |                             | 25                  | 0.12              | 1.4             | 1800                             | 1.7 60                                   | 24 0.096   | 25          |                            |                            |
| 9RA1224P1K001 | 24                | 21.6 to 26.4                | 100                 | 0.48              | 11.5            | 4700                             | 4.5 158                                  | 170 0.683  | 50          |                            |                            |
|               |                   |                             | 25                  | 0.06              | 1.4             | 1800                             | 1.7 60                                   | 24 0.096   | 25          |                            |                            |
| 9RA1248P1K001 | 48                | 43.2 to 52.8                | 100                 | 0.25              | 12.0            | 4700                             | 4.5 158                                  | 170 0.683  | 50          |                            |                            |
|               |                   |                             | 25                  | 0.04              | 1.9             | 1500                             | 1.4 50                                   | 17 0.069   | 21          |                            |                            |

\* PWM frequency is 25 kHz. Models without ratings for 0% PWM duty cycle have zero speed at 0%. When control terminal is open, speed is the same as at 100% duty cycle.

The models listed below **have ribs and pulse sensors**. For models without ribs, append "1" to the end of model numbers.

| Model no.    | Rated voltage [V] | Operating voltage range [V] | Rated current [A] | Rated input [W] | Rated speed [min <sup>-1</sup> ] | Max. airflow [m <sup>3</sup> /min] [CFM] | Max. static pressure [Pa] [inchH <sub>2</sub> O] | SPL [dB(A)] | Operating temperature [°C] | Expected life [h]          |
|--------------|-------------------|-----------------------------|-------------------|-----------------|----------------------------------|--|--|-------------|----------------------------|----------------------------|
| 9RA1212G1001 | 12                | 7 to 13.8                   | 0.70              | 8.4             | 4200                             | 4.0 141                                  | 135 0.542  | 46          | -20 to +70                 | 40000/60°C<br>(70000/40°C) |
| 9RA1212E1001 |                   |                             | 0.47              | 5.6             | 3600                             | 3.4 120                                  | 100 0.402  | 43          |                            |                            |
| 9RA1212H1001 |                   |                             | 0.25              | 3.0             | 3000                             | 2.8 99                                   | 70 0.281   | 37          |                            |                            |
| 9RA1224G1001 | 24                | 14 to 27.6                  | 0.35              | 8.4             | 4200                             | 4.0 141                                  | 135 0.542  | 46          |                            |                            |
| 9RA1224E1001 |                   |                             | 0.24              | 5.8             | 3600                             | 3.4 120                                  | 100 0.402  | 43          |                            |                            |
| 9RA1224H1001 |                   |                             | 0.13              | 3.1             | 3000                             | 2.8 99                                   | 70 0.281   | 37          |                            |                            |
| 9RA1248G1001 | 48                | 40.8 to 55.2                | 0.18              | 8.6             | 4200                             | 4.0 141                                  | 135 0.542  | 46          |                            |                            |
| 9RA1248E1001 |                   |                             | 0.12              | 5.8             | 3600                             | 3.4 120                                  | 100 0.402  | 43          |                            |                            |
| 9RA1248H1001 |                   |                             | 0.07              | 3.4             | 3000                             | 2.8 99                                   | 70 0.281   | 37          |                            |                            |

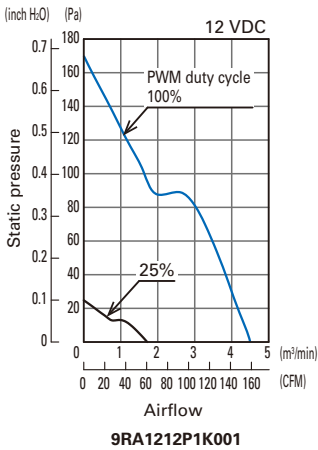
Models with the following sensor specifications are also available as options: **Without sensor** **Lock sensor**

#### Common Specifications

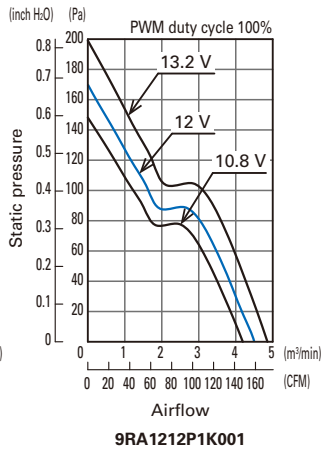
- Material ..... Frame: Plastic (Flammability: UL 94V-0), Impeller: Plastic (Flammability: UL 94V-0)
- Expected life ..... Refer to specifications  
(L10 life: 90% survival rate for continuous operation in free air at 60°C, rated voltage)  
Expected life at 40°C is for reference only.
- Motor protection function ..... Locked rotor burnout protection, Reverse polarity protection
- Dielectric strength ..... 50/60 Hz, 500 VAC, for 1 minute (between lead wire conductors and frame)
- Insulation resistance ..... 10 MΩ min. at 500 VDC (between lead wire conductors and frame)
- Sound pressure level (SPL) ..... A-weighted sound pressure level (SPL) at 1 m away from the air inlet.
- Operating temperature ..... Refer to specifications (Non-condensing)
- Storage temperature ..... -30 to +70°C (Non-condensing)
- Lead wire ..... ⊕ Red ⊖ Black **Sensor** Yellow **Control** Brown  
(For models without PWM control function, there is no speed control wiring.)
- Mass ..... 320 g

## Airflow - Static Pressure Characteristics

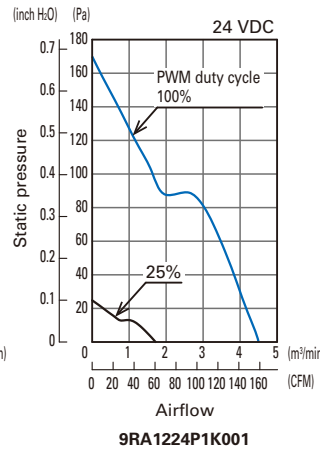
PWM duty cycle



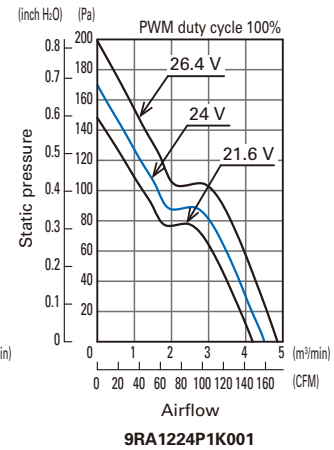
Operating voltage range



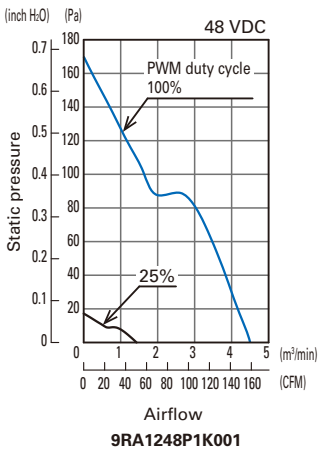
PWM duty cycle



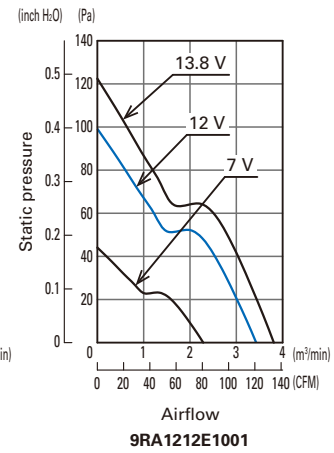
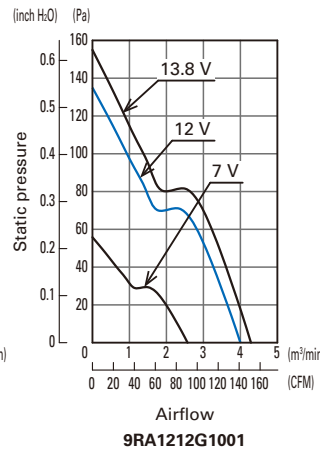
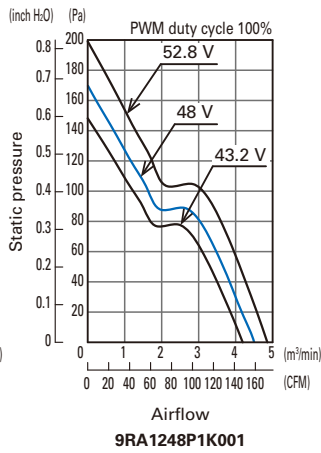
Operating voltage range



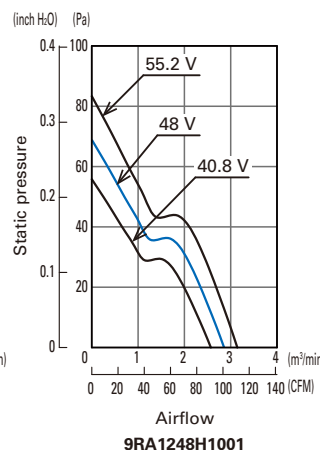
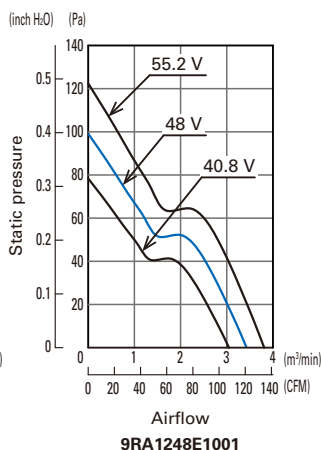
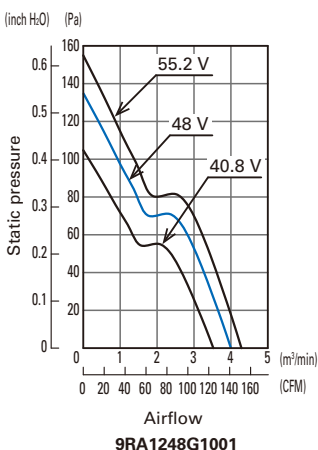
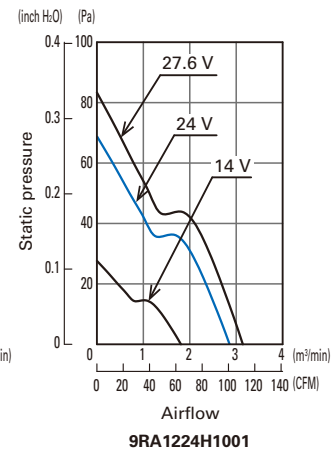
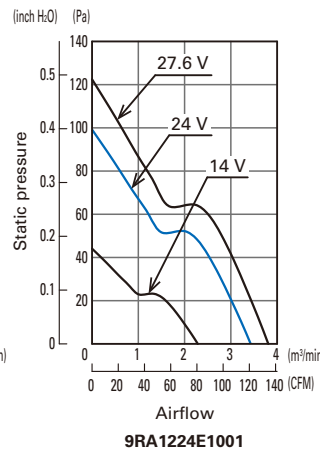
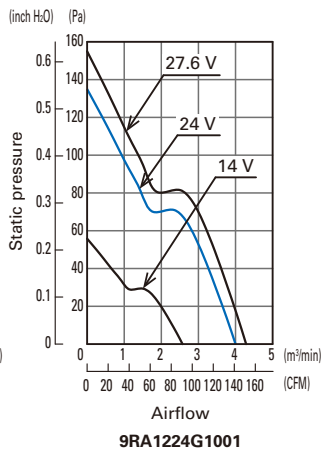
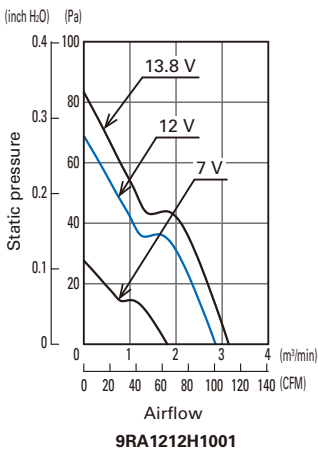
PWM duty cycle



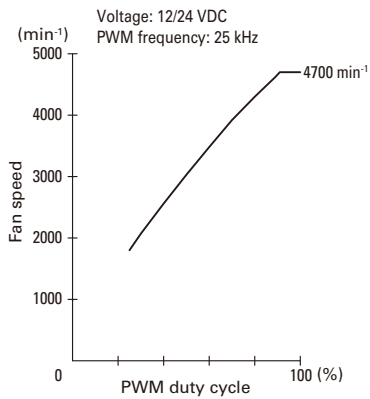
Operating voltage range



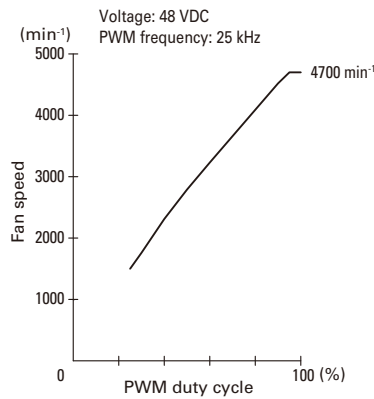
Operating voltage range



## PWM Duty - Speed Characteristics Example



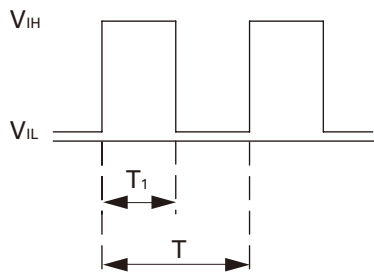
9RA1212P1K001  
9RA1224P1K001



9RA1248P1K001

## PWM Input Signal Example

Input signal waveform



$V_{IH} = 4.75 \text{ to } 5.25 \text{ V}$     $V_{IL} = 0 \text{ to } 0.4 \text{ V}$

PWM duty cycle (%) =  $\frac{T_1}{T} \times 100$    PWM frequency 25 (kHz) =  $\frac{1}{T}$

Current source ( $I_{source}$ ) = 1.0 mA max. (when control voltage is 0 V)

Current sink ( $I_{sink}$ ) = 1.0 mA max. (when control voltage is 5.25 V)

When the PWM control terminal is open,

the fan speed is the same as the speed at 100% PWM duty cycle.

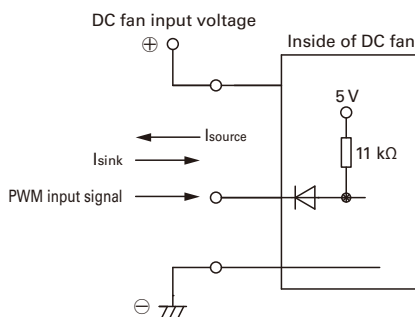
The PWM signal can be used with open collector or drain input.

Note that when using an open collector or drain input,

or inputting a different voltage or frequency,

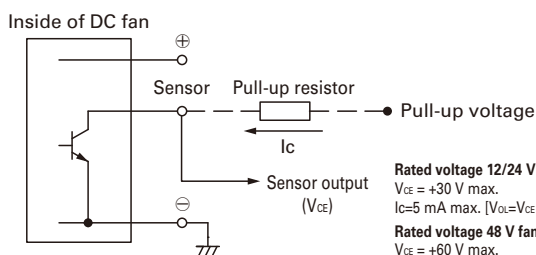
the speed relative to the PWM duty cycle may differ from this specification.

## Example of Connection Schematic



## Specifications for Pulse Sensors

Output circuit: Open collector



**Rated voltage 12/24 V fan** (With PWM control function)  
 $V_{CE} = +30 \text{ V max.}$   
 $I_C = 5 \text{ mA max.}$  [ $V_{OL} = V_{CE} \text{ (SAT)} = 0.6 \text{ V max.}$ ]

**Rated voltage 48 V fan** (With PWM control function)  
 $V_{CE} = +60 \text{ V max.}$   
 $I_C = 5 \text{ mA max.}$  [ $V_{OL} = V_{CE} \text{ (SAT)} = 0.6 \text{ V max.}$ ]

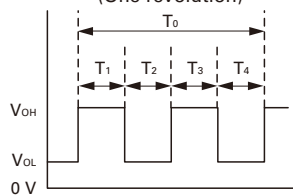
**Rated voltage 12/24 V fan** (Without PWM control function)  
 $V_{CE} = +30 \text{ V max.}$   
 $I_C = 10 \text{ mA max.}$  [ $V_{OL} = V_{CE} \text{ (SAT)} = 0.4 \text{ V max.}$ ]

**Rated voltage 48 V fan** (Without PWM control function)  
 $V_{CE} = +60 \text{ V max.}$   
 $I_C = 10 \text{ mA max.}$  [ $V_{OL} = V_{CE} \text{ (SAT)} = 0.4 \text{ V max.}$ ]

Output waveform (Need pull-up resistor)

In case of steady running

(One revolution)



$$T_{1 \text{ to } 4} \approx (1/4) T_0$$

$$T_{1 \text{ to } 4} \approx (1/4) T_0 = 60/4N \text{ (s)}$$

$$N = \text{Fan speed (min}^{-1}\text{)}$$