

# Oil Proof Fan "San Ace 40WF" "San Ace 60WF" "San Ace 120WF"

Hidetoshi Kato Masato Murata Minoru Fujiwara Naruhiko Kudou

## 1. Introduction

In manufacturing environments where servo amplifiers control factory automation machine tools and industrial robots, cooling fans are generally used in an effort to reduce operating temperatures in harsh conditions full of oil mist.

Typically, conventional cooling fans have not been able to meet all of the reliability requirements for use in this environment, leading to the frequent replacement of these fans each time facility maintenance is conducted. From the perspective of cost and production efficiency, this is not a satisfactory solution, and therefore an increasing need for fans with higher reliability in oil mist environments has developed.

To respond to this need, SANYO DENKI has developed the "San Ace 40WF", "San Ace 60WF" and "San Ace 120WF" Oil-proof Fans. They are offered in sizes traditionally used with FA machine tools and industrial robots, specifically 40mm sq. × 20mm thickness, 60mm sq. × 25mm thickness and 120mm sq. × 38mm thickness.

This report serves as an introduction to the main features of the San Ace WF Series Oil-proof Fans.

## 2. Development Background

Although in the past we have developed rugged, durable waterproof fans, as discussed above, the need for fans with high reliability related specifically to oil mist environments has increased recently. Thus, the San Ace WF Series Oil-proof Fans were developed, in order to offer greater protection against oil mist than conventional products.

Development of these products was undertaken with a focus on the following aspects, for which a strong market demand currently exists:

- (i) Robust protection against oil mist
- (ii) Prevention of stiffness in blades used with small torque fans, caused by accumulation of oil mist and dust in the outer circumference of the blades and frame

## 3. Product Features

The main features of the San Ace WF Series Oil-proof Fans are described below.

### 3.1 Structural Features

The structural features of the San Ace WF Series Oil-proof Fans are described below.

- (1) The San Ace WF Series employs resins with excellent resistance

to oil. The electrically active portion (the stator section and circuit base board) of the fan is completely sealed with oil-proof resin, thereby providing a significant oil-resistant capability. (Fig. 1)

(2) Because 40mm sq. and 60mm sq. fans generally have small torque, the design of blades was improved to allow sufficient clearance between the outer circumference of the blades and the inner circumference of the frame, in order to inhibit adhesion of oil mist and dust.

(3) Revisions to circuits and components has increased the upper limit of the ambient operating temperature to over 70°C, significantly greater than conventional waterproof fans. (Table 1)

### 3.2 Dimensions and General Characteristics

Figures 2, 3 and 4 show the dimensions of the San Ace WF Series Oil-proof Fans, and Figure 5 shows their general external appearance. Table 2 describes the general characteristics of these products.

The maximum air volumes attained are 0.26m<sup>3</sup>/min (for "San Ace 40WF" H speed), 0.67m<sup>3</sup>/min (for "San Ace 60WF" H speed) and 3.24m<sup>3</sup>/min (for "San Ace 120WF" H speed).



Fig. 1: Resin Sealing of Electrically Active Portions

Table 1: Comparison of Ambient Operating Temperatures

|             | Range of ambient operating temperatures (°C) |
|-------------|--|
| 9WF1224H102 | -10 to +70                                   |
| 9W1224H102  | -10 to +60                                   |
| 9WS1224H102 | -10 to +60                                   |

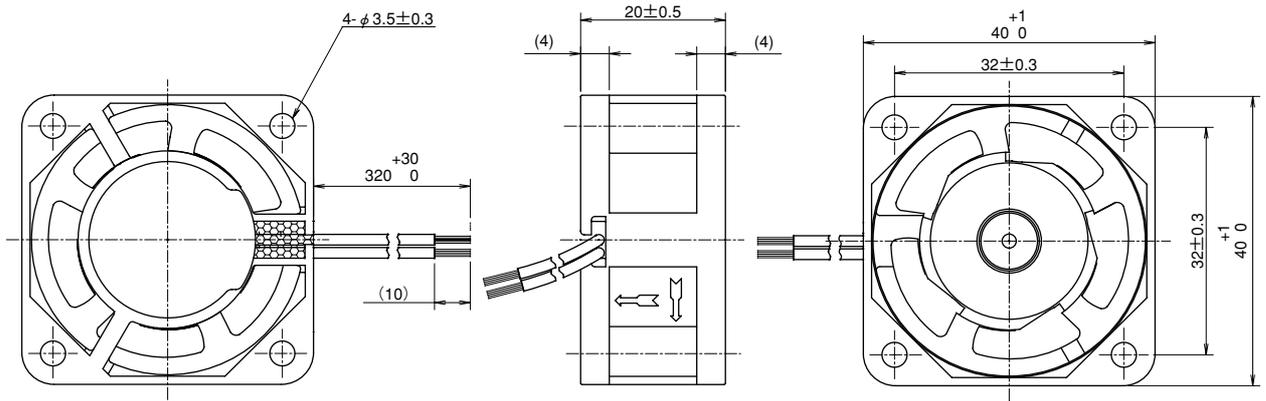


Fig. 2: Dimensions of the Oil Proof Fan, "San Ace 40WF"

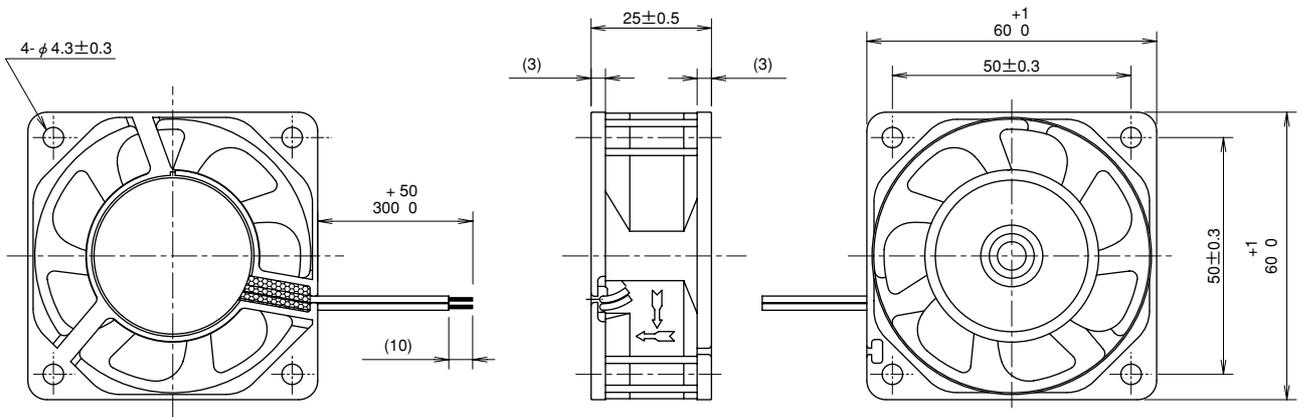


Fig. 3: Dimensions of the Oil Proof Fan, "San Ace 60WF"

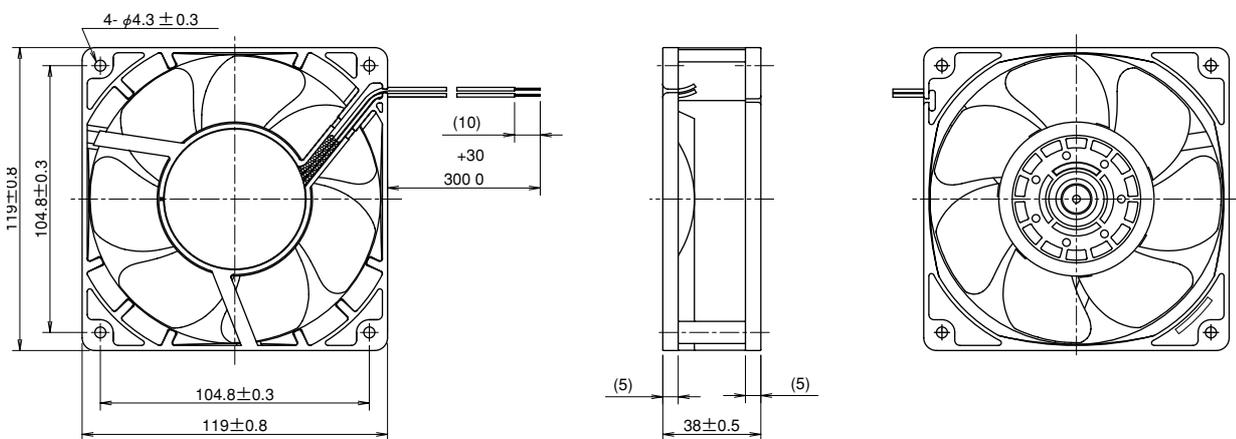


Fig. 4: Dimensions of the Oil Proof Fan, "San Ace 120WF"

### 3.3 Oil-proof and Waterproof Capabilities

(1) These products have successfully completed 1000 hours of continuous operation testing in an oil mist environment.

Oils used for evaluation:

(2) The waterproofing capability is equivalent to the "IP55" protection grade.

### 3.4 Life Expectancy

The life expectancy of these products in an ambient temperature of 60°C (survival rate 90%, at rated voltage in continuous operation, under free air conditions and typical temperatures) is 40,000 hours.



Fig. 5: San Ace WF Series Oil-proof Fans

Table 2: General Characteristics of the San Ace WF Series Oil-proof Fans

| Model       | Rated Voltage | Operating Voltage Range | Rated Current | Rated Input | Rated Rotating Speed | Maximum Air Volume |                       | Maximum Static Pressure | Sound Pressure Level | Mass |
|-------------|---------------|-------------------------|---------------|-------------|----------------------|--------------------|-----------------------|-------------------------|----------------------|------|
|             | (V)           |                         |               |             |                      | (V)                | (m <sup>3</sup> /min) |                         |                      |      |
| 9WF0424H602 | 24            | 20.4~27.6               | 0.11          | 2.64        | 13,100               | 0.26               | 9.2                   | 91                      | 42                   | 50   |
| 9WF0624H402 |               |                         | 0.15          | 3.6         | 6,500                | 0.67               | 23.6                  | 97                      | 41                   | 110  |
| 9WF1224H102 |               |                         | 0.32          | 7.68        | 3,100                | 3.24               | 114                   | 101                     | 46                   | 355  |

## 4. Conclusion

In summary, this report outlined the features of San Ace WF Series Oil-proof Fans, developed to meet increased needs for oil-proof fans. These products eliminate the need for the constant maintenance and replacement of typical fans used in an oil mist environment.

The authors believe that these new products will satisfy the needs of those customers requiring reliable fans for use in increasingly demanding environments.



#### Hidetoshi Kato

Joined Sanyo Denki in 2002.

Cooling Systems Division, Design Department

Area of Expertise: Development and design of fan motors



#### Masato Murata

Joined Sanyo Denki in 1984.

Cooling Systems Division, Design Department.

Area of Expertise: Development and design of fan motors



#### Minoru Fujiwara

Joined Sanyo Denki in 1981.

Cooling Systems Division, Design Department

Area of Expertise: Development and design of fan motors



#### Naruhiko Kudou

Joined Sanyo Denki in 1997.

Cooling Systems Division, Design Department

Area of Expertise: Development and design of fan motors