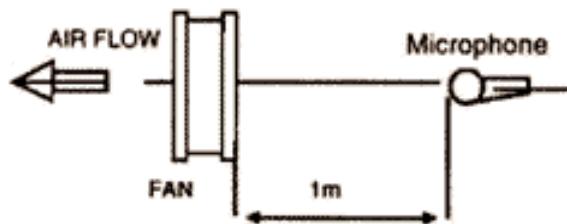


## How to Achieve Low Noise

### Acoustical Noise Level

Acoustical sound measurement of SUNON fans is made in anechoic room with background noise less than 15 dBA. The measured fan is running in free air with a microphone at a distance of one meter from the fan intake.



Sound Pressure Level (SPL), which is environmentally dependent, and Sound Power Level (SPL) are defined as following :

$$SPL = 20 \log P / P_{ref}$$

$$\text{and } SWL = 10 \log W / W_{ref}$$

P = Pressure

Pref = A reference pressure

W = Acoustic power of the source

Wref = An acoustic reference power

Fan noise data is usually plotted as SPL against the octave frequency bands. The following provides an indication of the effect of dBA changes :

3 dBA Barely Noticeable

5 dBA Noticeable

10 dBA Twice as loud

Noise levels :

0 ~ 20 dBA Very Faint

20 ~ 40 dBA Faint

40 ~ 60 dBA Moderate

60 ~ 80 dBA Loud

80 ~ 100 dBA Very Loud

100 ~ 140 dBA Deafening

## How to Achieve Low Noise

### 1. System Impedance

As known, the area between inlet and outlet ports of a cabinet make up 60% to 80% of the total system impedance. In addition, the greater the air flow is, the higher the noise level is. The higher the total system impedance is, the more air flow is required to provide the necessary cooling. Therefore, system impedance must be reduced to the lowest possible level in order to reduce noise to the least.

### 2. Flow Disturbance

Obstructions along the path of the flow of the turbulent air generated noise. Thus, obstructions, especially in the critical inlet and outlet area, must be avoided to reduce noise level.

### 3. Fan Speed and Size

Since a high speed fan usually generates greater noise than a low speed fan does, a low speed fan should be tried and used whenever possible. Very often, a larger, slower fan is quieter than a smaller, faster fan while delivering the same air flow.

### 4. Temperature Rise

Air flow is inversely proportional related to allowable temperature rise within a system. A little change in the allowable temperature rise leads to a significant change in air flow required. Therefore, if there is a little compromise to the limit imposed on allowable temperature rise, there will be a considerably less amount of air flow required. As a result, noise is remarkably reduced.

### 5. Vibration

In some cases, the system is light in weight or specified in some certain operating methods, a soft and flexible isolator is highly recommended to avoid the vibration transmission.

### 6. Voltage Variation

Voltage variation affects the level of acoustic noise. When the higher voltage is applied to the fan, the higher vibration is generated due to the increased RPM. Thus, the higher noise level is generated.

### 7. Design Considerations

The design of every component of the fan affects the level of acoustic noise. Low noise levels can be achieved by dimension of winding core, by design of impeller blades and housing and by precision manufacturing and balance.