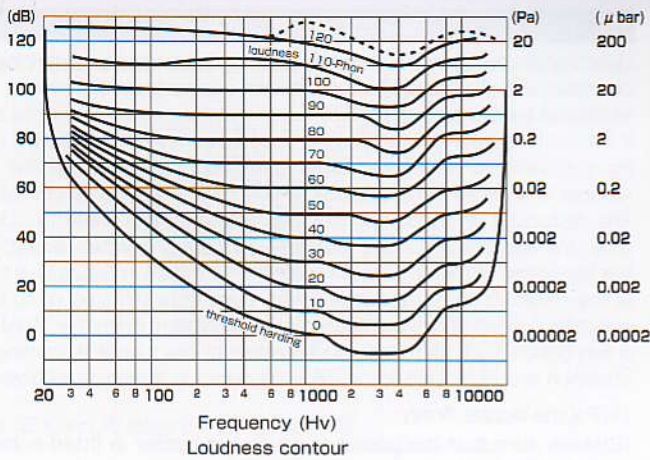


# SOUND PRESSURE & TONE



## dB AND PHON

1. Sound pressure level is referred to as Sound Output and rated in dB (decibel). dB is defined as the sound pressure level in logarithmic ratio to a sound pressure on the basis of the minimal sound pressure ( $20 \mu\text{Pa}$ ) whose 1 KHz sound that a person in good condition can hear out. The sound pressure level is calculated as shown below in measuring an unspecified sound pressure  $P$  ( $\mu\text{Pa}$ ).

$$\text{Sound pressure level (dB)} = 20 \log (P/0.0002)$$

2. The term phon is a unit which describes loudness level as is the case of the decibel. Generally, even the sound level being equal, it is hard for us to hear out the sound clearly due to frequencies. "Loudness contour" is a statistically calculated collection comprising sounds of the same loudness with every frequency based on the 1 KHz sound. The phon is formed through corrections of the sound pressure levels, basing the contour.

For measurement of the sound pressure, the sound level meter possessing the A weighting is employed, which shows relatively corrected values in accordance with the loudness contour. This way the term dB is considered to be phon in specifications.

The formula is :

$$B = A + 20 \log (L_a/L_b)$$

A : sound pressure value at distance  $L_a$   
B : sound pressure value at distance  $L_b$

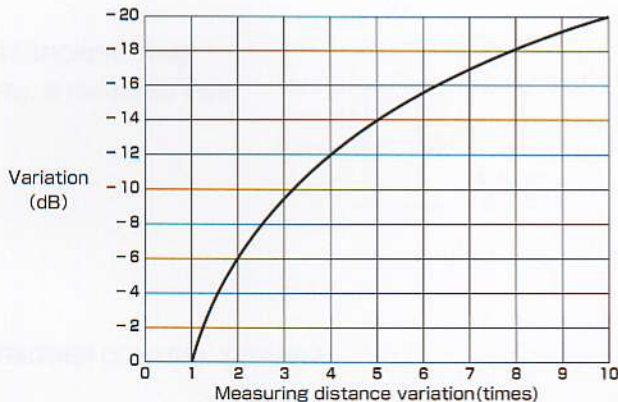
The table below is to shape up relations between the measuring distance variation and the sound pressure variation for reference.

Measuring distance variation	2 times	3 times	4 times	5 times	6 times	7 times	8 times	9 times	10 times
Sound pressure variation (db)	-6.02	-9.54	-12.04	-13.98	-15.56	-16.90	-18.06	-19.08	-20.00

## ■ SOUND PRESSURE AND DISTANCE

As there are differences in the measuring distances when manufacturers make the measurement of sound pressure, the following formula is recommended for calculation on occasions when a buzzer itself is tested or compared with a planned finished product.

However, as for as the calculated is concerned, it is a theoretical one and therefore subject to change, depending upon circumstances and conditions.



<Example> 10cm : 80dB → 30cm :  $80 - 9.54 = 70.46$ (dB)