



# Microphone Sensitivity

## Open Circuit Sensitivity

Cardioid:	-35.0 dB (17.8 mV)
Supercardioid:	-33.5 dB (21.1 mV)
Omnidirectional:	-27.5 dB (42.2 mV)

1 Pascal = 94 dB SPL

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A microphone is a transducer that converts sound waves into electrical waves. Condenser microphones generate a high electrical output for a given sound volume (air pressure), while Dynamic microphones will have a much lower electrical output for that same sound volume (air pressure).

Microphones that generate a high electrical output have what we call a “high sensitivity”. These can capture more fine detail in a sound, exactly like a high pixel rate on a digital photo. Why? Because high frequencies, which represent the freshness and clarity in a sound, are very low in volume and microphones with high sensitivity are more able to pick up these lower volumes.

Manufacturers give us the sensitivity, for a particular microphone model, on the microphone’s Specification Sheet. This will clearly say an **electrical output** for a given **sound pressure** (volume).

The sound pressure (sound volume) may be measured in several ways... Pascals, Microbars, Dynes and dB SPL. They are interchangeable. *Basically 1 Pascal is 10  $\mu$ B, which is 10 dyne/cm<sup>2</sup>, which is approximately 94dB SPL.*

The electrical output is generally measured in millivolts (thousandths of a volt).

***Putting it all together:***

AKG C414 Condenser microphone sensitivity is 12.5mV/Pa which means it generates 12.5 millivolts electrical output for 1 Pascal of sound pressure (volume).  
AKG D330 Dynamic microphone is 1.2mV/Pa, so it only generates 1.2 millivolts for 1 Pascal, and will capture less detail than the condenser.

**But... Attention!** While highly sensitive microphones can pick up smaller fluctuations in a sound, and therefore give us more detail, and consequently better sound; if you have many loud musicians side by side and you are trying to capture them in separate microphones, you don’t really want over sensitive microphones that will pick up the sound from all the neighbouring instruments as well.

Understanding that microphones are sensitive, just like humans, helps us choose better the right microphone for the task.

Some actual microphone examples:



Royer R-121  
Ribbon

**1 V/pa**



Neumann U87  
Condenser

**28 mV/Pa**



AKG CK99I  
Lavaliere

**8.8 mV/Pa**



Sennheiser e614  
Condenser

**3 mV/Pa**



SHURE SM58  
Dynamic

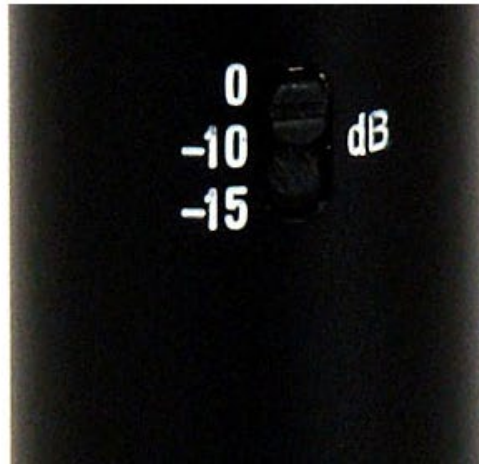
**1.8 mV/Pa**



AKG D112  
Dynamic

**1.8 mV/Pa**

## Attenuation (Atten) Pad



Some microphones offer an attenuation switch that will lower the sensitivity of the microphone. This is intended for use when it will be placed in front of a sound source with a high volume (high air pressure). Now the microphone will generate less voltage.

Because, electronically speaking, it is achieved using several resistors in a 'Pad' formation, Attenuation (**Atten**) switches are sometimes labelled as **Pad**.

## CREDITS

*This material is offered freely to the Christian Churches; downloadable at [Pietango.com](http://Pietango.com)*

**Text:** *Original, by the Author, a Christian Recording Engineer.*

**Images:** *Designed by the Author. Some photographs were sourced from the Internet, then re-worked.*

Ever since the creation of the world, God's invisible attributes and divine nature have been evident. They are clearly understood through his workmanship, and all the wonderful things that he has made. Therefore, those who fail to believe and trust in him are without excuse, or defence. **Romans 1:20**

All of us have sinned and fallen short of God's glory, but God treats us much better than we deserve.

Because of Christ Jesus, he freely accepts us and sets us free from our sins. God sent Christ to be our sacrifice. Christ offered his life's blood, so that by faith in him we could come to God. **Romans 3:23**

If you declare with your mouth, "Jesus is lord," and believe in your heart that God raised him from the dead, you will be saved. For it is with your heart that you believe and are justified, and it is with your mouth that you profess your faith and are saved. **Romans 10:9**

For the Scripture (*Isaiah 28:16*) says, "Whoever believes in Him will not be disappointed." **Romans 10:11**

These things have been written so that you may believe that Jesus is the Christ, the son of God; and that by believing, and relying on him, you may have new life in his name. **John 20:31**