

Are there any differences between externally polarized and prepolarized microphone capsules?

A microphone capsule that is classified as a measurement microphone, as defined in IEC 61094 standard family, is of the condenser (also known as capacitor) type.



Figure 1. Condenser/capacitor type measurement microphone diagrams.

In the condenser microphone there are two plates, diaphragm and backplate (See Figure 8), that are separated by an air gap. The backplate is fixed and the diaphragm is the moving part that will move depending on the acoustic pressure in the sound field. When the diaphragm moves up and down it will change the distance (h) between the two plates, changing also the capacitance of the plate capacitor. When this happens the microphone will output a voltage signal variation that will be proportional to the acoustic pressure present in the sound field.

But, just like any other plate capacitor, in order for this to work it is necessary to polarize it. There are two main ways of polarizing a condenser measurement microphone: One is using an external voltage source. The other is adding a layer of pre-polarized electret material on top of the microphone's backplate that provides polarization voltage without the need of an external voltage source.

Depending on the method used to polarize the microphone capsule, the measurement microphones are divided between these two categories:

- 1) Externally polarized: They require an external source of polarization voltage (usually +200V). These microphone capsules are also called "Traditional" type as they were the first technology of measurement microphone available.

GRAS examples: [40AC](#), [40AF](#), [40AG](#), [40BF](#), [40BP](#), [40DP](#) and [40EN](#).

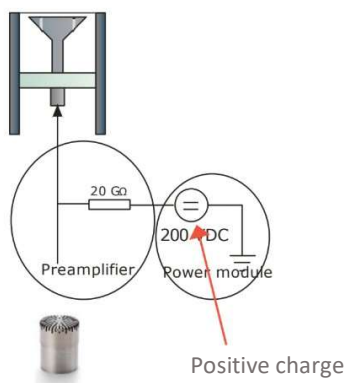
- 2) Prepolarized: Also known as electret measurement microphones. These types of microphones have a thin layer of electrically charged material on its backplate that will provide the polarization voltage needed for the plate capacitor to work. This means that the microphone capsule itself won't need any external equipment to provide polarization voltage. As seen in Figure 9, it is possible to differentiate a Prepolarized microphone from an externally polarized thanks to a pair of parallel lines usually present in the Prepolarized capsule.

GRAS examples: [40AE](#), [40AM](#), [40AO](#), [40BD](#), [40BE](#) and [40DD](#).



Figure 2. Left: 1/2" externally polarized microphone capsule. Right: 1/2" Prepolarized microphone capsule

Externally polarized



Prepolarized

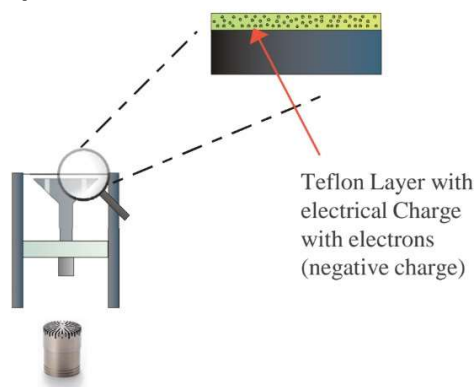


Figure 3. Left: Externally polarized microphone layout with external positive charge polarizing the capsule. Right: Prepolarized microphone with internal negative charge polarizing the capsule.

Figures 10 Left and Right above illustrate basic differences between Externally polarized and Prepolarized microphone capsules.