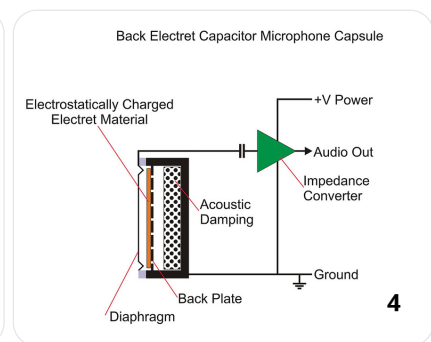
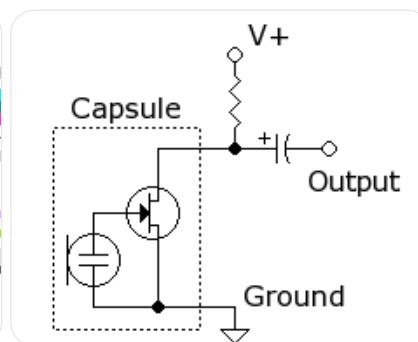
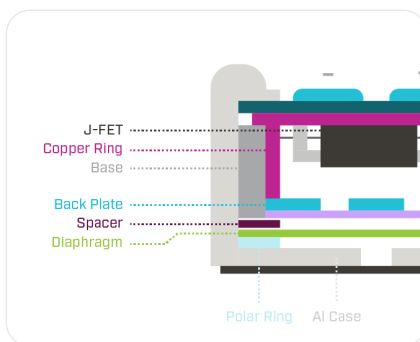


how does an electret microphone work

An **electret microphone** is a type of condenser (capacitor) microphone that uses a **permanently charged material** instead of requiring an external high-voltage polarization supply.

Here's how it works:

1 Basic Structure



An electret mic capsule contains:

- **Diaphragm** – a very thin, flexible membrane
- **Backplate** – a rigid metal plate behind the diaphragm
- **Electret material** – a permanently charged dielectric (usually embedded in or attached to the diaphragm or backplate)
- **Built-in FET transistor** – acts as an impedance converter

Together, the diaphragm and backplate form a **capacitor**.

2 The Key Idea: A Moving Capacitor

A capacitor's capacitance depends on:

- The area of the plates
- The distance between them

When sound waves hit the diaphragm:

- The diaphragm vibrates

- The distance between diaphragm and backplate changes
- The capacitance changes

Because the electret material holds a **permanent electric charge**, these capacitance changes produce a changing voltage — which is your **audio signal**.

3 Why It's Called "Electret"

An **electret** is like the electrical equivalent of a magnet:

- A magnet has a permanent magnetic field
- An electret has a permanent electric field

This eliminates the need for the high external polarization voltage required by traditional condenser microphones.

4 The Role of the FET (Important!)

The raw signal from the capsule has:

- Very **high impedance**
- Very **low current**

So electret microphones include a tiny built-in **Field Effect Transistor (FET)** that:

- Buffers the signal
- Lowers the output impedance
- Makes it usable by mixers, sound cards, and amplifiers

This is why electret mics still require **power (usually 1.5–10V)** — not to charge the capsule, but to power the FET.

5 Simple Step-by-Step Summary

1. Sound waves hit the diaphragm
 2. Diaphragm moves
 3. Capacitance changes
 4. Voltage changes (due to permanent charge)
 5. FET buffers the signal
 6. Audio output is produced
-

6 Why They're So Common

Electret microphones are used in:

- Smartphones
- Laptops
- Lavalier mics
- Headsets
- Cheap USB microphones

Because they are:

- Small
- Inexpensive
- Sensitive
- Reliable
- Low power

If you'd like, I can also explain how they compare to dynamic microphones or traditional condenser microphones.

