

Bridge Name	Simple Function	Best for...	The Interview Hook
Wheatstone Bridge	Measures medium resistances.	Medium-sized resistors (the R values you see most often).	"It's the classic bridge, used everywhere from simple resistors to basic fault finding in cables."
Kelvin's Double Bridge	Measures Low resistances.	Very small resistors (less than 1 Ω).	"It's the essential upgrade to the Wheatstone; it's designed to cancel out the error from the test leads themselves, ensuring a perfect reading for low values."
Maxwell's Bridge	Measures Inductors (L).	Coils with medium quality (not too lossy).	"It's smart because it measures an unknown L by using a known C—capacitors are cheaper and more stable standards than inductors."
Schering Bridge	Measures Capacitors (C) and quality.	High-voltage insulation testing.	"This is the power system bridge; its main job is to measure the insulation quality (loss angle) of big things like cables and bushings."
Wien's Bridge	Measures Frequency (f).	Creating a stable, single audio frequency.	"This bridge is different—it actually measures the frequency of the AC signal itself, and it's the core circuit for many audio oscillators."

Concept	DC Bridges	AC Bridges
What does it measure?	Resistance (R) only.	Impedance (L,C) and Frequency (f).
Power Source?	Battery (DC supply).	AC Oscillator (AC supply).
Complexity?	Simple, easier to use.	More complex, need special shielding (like a Wagner Earth Device) to block stray noise.
Detector?	Galvanometer (detects DC null).	Headphones or CRO (detects AC null/silence).

Advantages (Applicable to most bridges)

High Accuracy: Measurement is based on the **null indication** principle (zero current or zero voltage), which does not depend on the calibration of the detector itself, leading to very high precision.

Independence: The final balance equation is typically independent of the source voltage and its impedance.

Comparison Method: Unknown quantity is accurately compared against a known, precise standard component.

Disadvantages (General)

Sensitivity: The accuracy depends heavily on the sensitivity of the null detector (galvanometer for DC, or CRO/Headphone for AC).

Time Consumption: Achieving the exact null balance can be a **time-consuming and tedious** manual process.

Heating Effects (DC): In DC bridges measuring low resistance, the current can cause I^2R heating, altering the resistance and introducing errors.

Shielding (AC): AC bridges are prone to errors from stray magnetic fields and stray capacitance, necessitating complicated and costly shielding and earthing arrangements (like the Wagner earth circuit)