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Wheatstone Bridge – Quick Reference Guide

A Wheatstone Bridge is one of the most sensitive and precise ways to measure **small changes in resistance**. It's used throughout instrumentation in pressure transmitters, strain gauges, and micro-sensors.

This guide gives you a clear, simple explanation of how the Wheatstone Bridge works and why it's so effective at detecting tiny changes in pressure, stress, or temperature.

"A simple circuit used to measure small changes in resistance of a transducer."

What a Wheatstone Bridge Is

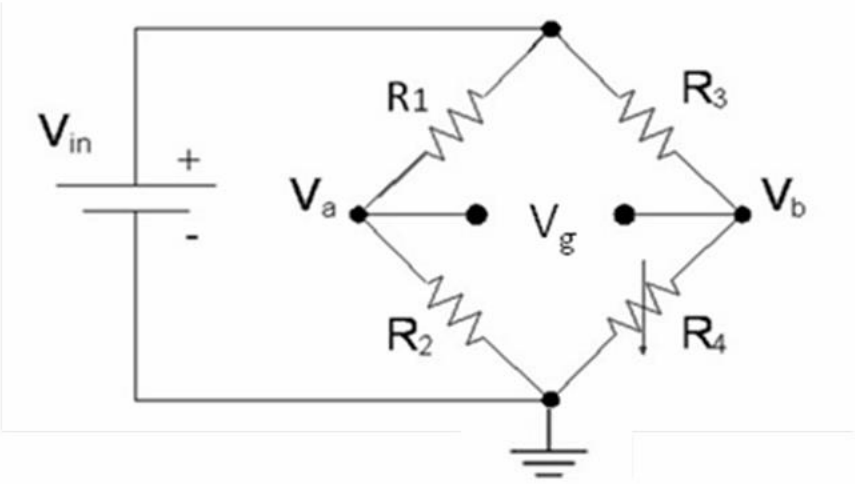
A Wheatstone Bridge is made from **four resistors** arranged in a diamond shape. One or more of these resistors can be **variable**, meaning their resistance changes when the environment changes.

Common causes of resistance change include:

- pressure
- strain
- temperature
- mechanical stress

When one resistor changes value, the bridge becomes **unbalanced**, producing a small output voltage that can be measured.

Classic configuration consists of four resistors… the variable resistor is the sensing element.



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How the Bridge Works

- **R1 + R2** form one voltage divider
- **R3 + R4** form the second voltage divider
- The output is the **difference** between the two divider voltages (Va – Vb)

Balanced vs Unbalanced

- **Balanced Bridge:** All resistors equal → output = 0 V
- **Unbalanced Bridge:** One resistor change → output rises or falls

This is how pressure transmitters detect diaphragm movement the strain changes resistance, which changes the bridge output.

Get the Full Wheatstone Bridge Pack

This guide covers the fundamentals. The full version goes deeper and gives you everything you need to properly understand and apply Wheatstone Bridges in real instrumentation work.

Included in the full pack:

- ✓ Full Wheatstone Bridge theory
- ✓ One-variable and two-variable resistor configurations
- ✓ How micro pressure sensors use Wheatstone Bridges
- ✓ How diaphragm strain changes resistance
- ✓ Worked examples and calculations
- ✓ Voltage divider analysis
- ✓ Ohm's Law + Kirchhoff's Law applied to the bridge
- ✓ Graphs showing Vout vs resistance change
- ✓ Practical instrumentation examples
- ✓ Printable reference sheets

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