

# Ohm's Law – Conceptual Overview

## Introduction

Electric circuits are systems that allow electric current to flow. The behavior of a simple electric circuit can be understood using three core concepts: voltage, current, and resistance.

## Key Concepts

### Voltage

Voltage is the electrical potential difference between two points in a circuit. It represents the amount of energy available to move electric charges.

### Current

Current is the rate at which electric charge flows through a conductor. It is measured in amperes.

### Resistance

Resistance is a property of a material that opposes the flow of electric current. Materials with higher resistance reduce the flow of current.

## Ohm's Law

Ohm's Law defines the relationship between voltage, current, and resistance in a simple electrical circuit. It states that the current flowing through a conductor is directly proportional to the voltage across it and inversely proportional to its resistance.

Mathematically, Ohm's Law is expressed as:

$$I = V / R$$

where:

- I is the current
- V is the voltage
- R is the resistance

## Cause-and-Effect Relationships

If the voltage across a circuit increases while the resistance remains constant, the current in the circuit increases.

If the resistance in a circuit increases while the voltage remains constant, the current decreases.

If both voltage and resistance increase proportionally, the current remains unchanged.

## Conceptual Interpretation

Ohm's Law shows that voltage acts as the driving force of electric current, while resistance acts as a limiting factor. Understanding this relationship allows engineers to predict how changes in one variable affect the behavior of the entire circuit.

## Practical Example

Consider a simple circuit with a fixed voltage source and a variable resistor. As the resistance is adjusted, the current flowing through the circuit changes accordingly. This principle is widely used in electronic devices to control current flow.

## Summary

Voltage, current, and resistance are fundamentally interconnected. Ohm's Law provides a simple yet powerful model for understanding and predicting the behavior of electrical circuits.