Circuit symbols

The schematic symbols for the parts you meet first, with what each one does.

LearnEE
CHEAT SHEET

Wires and power



Wire
Joins parts

Wires joined
The dot marks a joint

Wires crossing
No dot: not joined

Cell
Long plate is +

Battery
Two or more cells

AC supply
Alternating current

Switches and protection



Switch
Opens or closes the loop

Push button
Closed while pressed

Fuse
Melts if too much current flows

Ground (0 V)
Where voltages are measured from

Resistors and sensors



Resistor
Zigzag style (US)

Resistor
Box style (IEC)

Variable resistor
Turn to change R

Potentiometer
Wiper taps a voltage

Light sensor (LDR)
Less R in bright light

Thermistor
R changes with heat

Capacitors, coils and diodes



Capacitor
Stores charge

Electrolytic capacitor
Polarised: + side marked

Inductor (coil)
Stores energy in a field

Diode
Flow one way: the arrow

LED
A diode that gives light

Zener diode
Holds a set voltage

Transistors and op-amps



NPN transistor
Arrow points out

PNP transistor
Arrow points in

N-channel MOSFET
The gate switches it

Op-amp
Amplifies V+ − V−

Outputs and meters



Lamp
Gives light

Motor
Turns

Speaker
Makes sound

Buzzer
Beeps

Voltmeter
Across a part

Ammeter
In the loop

Lines are wires: anything touching the same line is connected. Resistors are drawn as a zigzag (US, and in LearnEE) or a box (IEC, used in UK and European schools). Both mean the same part.