Transformer Equations

Electrical Engineering

Turns ratio for voltage, current and impedance, and why DC destroys one.

The turns ratio sets voltage directly, inverts current, and squares for referred impedance.

$$V_1/V_2 = N_1/N_2 = I_2/I_1 \cdot Z\_ref = Z\,(N_1/N_2)^2$$

230 V down to 12 V — **Ratio 19.2 to 1**

Ideal case.

1 A on the secondary — **52 mA primary**

Current inverts.

8 Ω through 10:1 — **800 Ω referred**

Ratio squared.

THE COMMON MISTAKE

× **Expecting a transformer to work from DC**

✓ **Remembering it needs a changing flux**

Steady DC gives constant flux and no induced EMF, so the primary is only a low resistance and the winding overheats.

Educational reference. Mains transformers are live equipment; qualified supervision and local electrical regulations govern practical work.