RING FINAL CIRCUITS: THE THREE STEPS

WHY CAN'T YOU STOP AT STEP TWO?

A ring is tested in **three steps**, in order, and each step proves something the one before it could not. The drawing for step 2 is at Guidance Note 3 · p.64.

1. **Step 1 — end to end.** Measure r_1, r_n and r_2 separately, each conductor end to end, before anything is cross-connected. Both leads on one conductor each time.
2. **Step 2 — line to neutral.** Cross-connect the legs and measure at every socket.
3. **Step 3 — line to cpc.** Cross-connect the other way and measure again at every socket. This is the reading you record as $R_1 + R_2$.

$$\text{Expected step 2} = (r_1 + r_n) \div 4 \quad \cdot \quad \text{expected step 3} = (r_1 + r_2) \div 4$$

Why divide by four? With the cross-connection made, the ring becomes **one loop** of resistance $r_1 + r_n$ (or $r_1 + r_2$ at step 3). Wherever you plug in, you are measuring **two halves of that loop in parallel**: each half is $(r_1 + r_n) \div 2$, and two equal halves in parallel give half of that again — $(r_1 + r_n) \div 4$.

WORKED EXAMPLE

r_1 measured = 0.3 Ω
r_n = 0.3 Ω (same csa, same length, same cable)

Expected $R_1 + R_n$ = (0.3 + 0.3) ÷ 4
= 0.15 Ω

r_n should match r_1 within 0.05 Ω

— line and neutral are the same size and the same length. That figure is in the On-Site Guide · 10.3.2 step 1 · p.127 ("within 0.05 Ω if the conductors are all of the same size"), not in Guidance Note 3 — and the On-Site Guide is not an exam book.

Cross-connecting in practice.

Connector blocks, or thin crocodile test leads (about £10 a set). Whatever extra leads you use, **they must be nulled** like any other.

You do not record $R_1 + R_n$.

Step 2 is a check, not a recorded value — it is step 3 that goes on the schedule. If you want it on record, it can go in the remarks.

✋ **Step 2 alone is not enough to prove polarity.** Step 1 only shows the conductors are present. Step 2 shows up a line or neutral swapped with the cpc at an outlet; a line and neutral swapped only shows itself at **step 3**. You need both.

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