RCBOS AND HOW THEY CONNECT

WHERE DOES AN RCBO'S NEUTRAL GO?

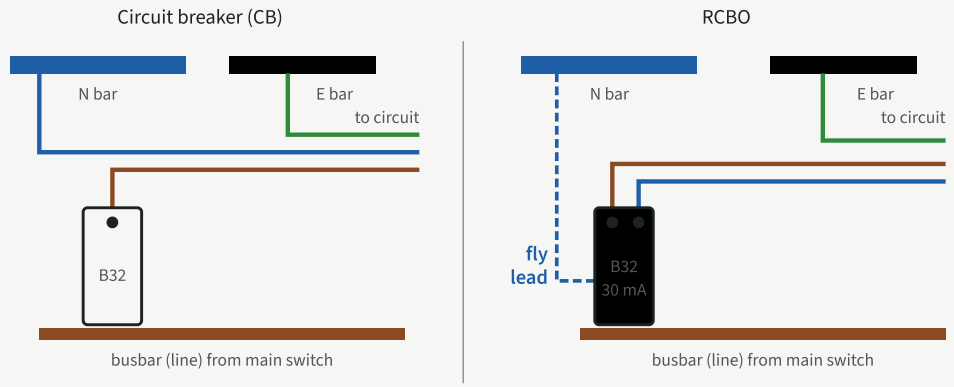
An **RCBO** looks almost identical to a circuit breaker. The difference is inside: it has an **RCD built in**, using a **toroid coil** rated in **milliamps**.

- Ours is a **B32, 30 mA**: a Type B 32 A circuit breaker with a 30 mA RCD included, which makes it right for **additional protection**.
- The RCD part is **Type A**: the symbol is a **sine wave plus a pulsating-DC (half-wave) symbol**. A plain sine wave on its own is the Type AC mark. Type A is now the **most common** type and is right for most circuits. Types **B** and **F** exist for more specific circuits.
- You can still buy **Type AC**, but note that Chapter 53 of BS 7671 limits where AC can be used. Type A is the **go-to**.

> **Watch out: what Type A detects**A common mix-up is that a Type A detects "both AC and DC faults". Strictly, a Type A detects **AC** and **pulsating DC** residual currents. Only **Type B** detects **smooth DC**.

BS 7671 · Chapter 53 · Reg 531.3.3 · RCD types (Type AC only where the load has no DC components)

WIRING A CB VERSUS AN RCBO



Only the LINE goes in the CB

LINE and NEUTRAL go in the RCBO

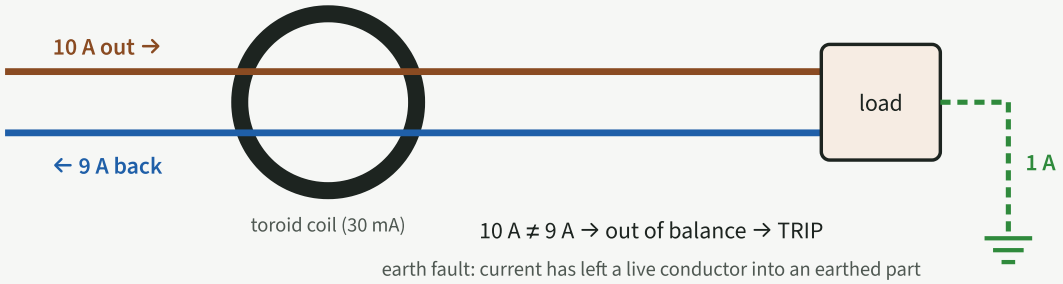
With a CB, the circuit's neutral goes to the **matching numbered** terminal on the neutral bar (way 1 → neutral terminal 1) and the CPC to earth terminal 1. With an RCBO, the circuit's line **and** neutral go into the RCBO ("Load" and "N" terminals), and the RCBO's own **fly lead** goes to the neutral bar.

- The RCBO clips on and is tightened exactly like a CB (with a **torque screwdriver**).
- The blue **fly lead** connects to the neutral bar, in the terminal matching its way (ours is in way 2, so neutral terminal 2). It comes with slack. You **can** shorten it, but many people leave it so the RCBO can be moved around the board later. That's personal preference.

- The **CPC** still goes to the **earth bar**, the same as every other circuit.

WHY BOTH LINE AND NEUTRAL GO THROUGH IT

The toroid coil only works if **both** the line and the neutral pass through it. By **Kirchhoff's current law**, a healthy circuit has the **same current** in the neutral as in the line.



Our numbers: a B32 RCBO with 10 A flowing. A healthy circuit has 10 A back in the neutral. If 1 A goes to earth, only 9 A returns and the RCBO trips very quickly. (A 30 mA device would trip long before a full 1 A leak.)

OUR WORKED EXAMPLE: THE OUT-OF-BALANCE COIL

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Healthy:      line 10 A → neutral 10 A   (Kirchhoff: in = out)
                difference = 10 - 10 = 0 A  → stays on
Earth fault:  1 A leaks into an earthed part
                neutral = 10 - 1 = 9 A
                difference = 10 - 9 = 1 A = 1000 mA
                1000 mA » 30 mA  → trips very quickly
A CB has no toroid coil, so it can't see this imbalance.
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