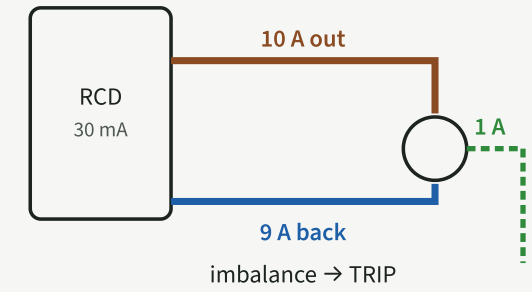
PROTECTIVE DEVICES

WHAT'S THE DIFFERENCE BETWEEN AN RCD AND AN RCBO?

Consumer units contain devices that protect the **final circuits (cable and equipment)** against **overloads**, **short circuits** and **earth faults**.

DEVICE	STANDS FOR	OVERLOAD	SHORT CIRCUIT	EARTH FAULT (BY ADS)	EARTH LEAKAGE (RESIDUAL CURRENT)
CB (MCB)	Circuit breaker, now just called "CB"	✔	✔	✔ if Zs is low enough	–
Fuse	e.g. BS 88, BS 3036, BS 1362	✔	✔	✔ if Zs is low enough	–
RCD (RCCB)	Residual current device	–	–	✔	✔
RCBO	Residual current circuit breaker with overcurrent protection	✔	✔	✔	✔

OCPD = overcurrent protective device. It's the family name for CBs, RCBOs and fuses.



How an RCD works

- It compares the current in the **line** with the current in the **neutral**. If some current is leaking to earth they don't match, and it **trips**.
- A domestic RCD is typically rated **30 mA** for additional protection, e.g. an **80 A** device protecting circuit breakers totalling up to 80 A.
- Press the **test button six-monthly**. That is what the RCD test notice at the board says (Reg 514.12.2): “Test six-monthly by pressing the relevant test button(s)”.
- A small amount of normal earth leakage is fine, but keep it below about **30% of the rating** to avoid nuisance tripping. That's why too many circuits on one RCD cause problems.

WORKED EXAMPLE: NUISANCE TRIPPING

RCD rating IΔn = 30 mA
30% of 30 mA = 0.3 × 30 = 9 mA
→ keep total standing earth leakage on that RCD below ~9 mA

- **Split-load board** (CBs grouped under RCDs): if one circuit has an earth fault, the RCD trips **every circuit on that side**. An **RCBO board** trips **only the faulty circuit**. That costs more, but prices are coming down. A split-load board is **still compliant**, so you can't tell a client they must upgrade.
- **Overload example:** a 4-way extension lead full of 13 A appliances in one socket, or a kettle and a toaster on the same double socket. That causes overheating and melted accessories.

SPD: surge protective device

Protects against

transient overvoltages

from

lightning strikes

and from the power coming back on after a

power cut

. The kind of surge that kills laptop and games console chargers. There are three types,

T1, T2 and T3

. Worth looking up what each is for and where it goes. Once an SPD has diverted a big surge it may need replacing, and its indicator shows this.

AFDD: arc fault detection device

Detects

small arcs

, where electricity jumps between loose or poor contacts, like a plug not fully pushed into a socket, which can start fires. AFDDs are

required

on single-phase AC final circuits supplying socket-outlets up to 32 A in

higher-risk residential buildings

,

HMOs

(houses in multiple occupation),

purpose-built student accommodation

and

care homes

. A higher-risk residential building is one “over 18 m in height or in excess of six storeys, whichever is met first”. In all other premises they are recommended.

BS 7671 · Reg 421.1.7 AFDDs · p.93

BEAMA guides (free online) · AFDDs and SPDs: where and why they're installed

Breaking capacity (Icn) is the largest fault current a device can safely break. A typical domestic CB or RCBO is **6 kA** (6,000 A), and some are 10 kA or more. The DNO's main cut-out fuse is rated much higher, e.g. **33 kA**.

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