RCD Types AC, A, F and B — Matching the Device to the Load, Plus RCCB vs RCBO

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The four RCD types and the residual-current waveforms each can actually detect, why frequency converters and EV chargers demand Type B, the 30 mA / 300 mA sensitivity split, what the Nordic HPFI and PFI labels mean, and the RCCB-versus-RCBO decision — with stocked examples of each class.

The type letter is a waveform question

An RCD only trips on fault currents it can detect, and modern electronics push fault currents into shapes the older types are blind to:

Type | Detects | Where it is enough |

AC | Sinusoidal AC residual current only | Plain resistive/linear circuits — a shrinking category, already phased out of several national codes |

A | AC + pulsating DC (single-phase rectifiers) | The general-purpose standard: socket circuits, household and most commercial loads — e.g. the Eaton PFIM-63/4/003-A, 63 A 30 mA Type A |

F | A + mixed-frequency residuals | Single-phase inverter appliances: heat pumps, inverter washing machines and air-conditioners |

B | A/F + smooth DC residual current | Three-phase frequency converters, EV charging points, PV inverters, UPS input stages — e.g. the Siemens 5SV3322-4 Type B, 25 A 30 mA |

The failure mode worth understanding: a smooth-DC earth fault downstream of a drive can magnetically saturate a Type AC or A core, so the device not only misses the DC fault — it can stop seeing ordinary AC faults on the same circuit. That is why codes put Type B (or a drive-maker-approved Type F) in front of converters, and why the 5SV3322-4 above is the SIGRES execution — Siemens' condensation- and pollution-resistant build, the variant to specify for coastal plant rooms and marine distribution boards.

Sensitivity, selectivity and the Nordic labels

30 mA = personnel protection (additional protection for sockets); 300 mA = fire protection and distribution; S (selective) versions add a time delay so an upstream RCD rides through a downstream trip.

Nordic boards label the split differently: HPFI is the 30 mA personnel-protection grade, PFI the lower-sensitivity grade — both names appear verbatim on the Acti9 iID RCCB range stocked here.

Test monthly with the device's own button; a trip that will not reset with everything disconnected is a device fault, not a wiring fault.

RCCB or RCBO?

An RCCB is residual-current protection only — it must sit in series with a breaker that handles overload and short circuit. An RCBO folds an MCB into the same housing, one circuit per device, so a single fault takes down one way instead of everything behind a shared RCCB. The reference then carries two selections at once: the RCD type and sensitivity, plus the thermal curve and rating — a B-curve 6 A 30 mA Acti9 iCV40 reads as both halves, and the curve half follows the ordinary rules in the MCB curve guide. Around 1,700 RCD and 1,600 RCBO line items are quotable from stock across Eaton, Schneider, Siemens and ABB; send the board schedule or the old device's full reference and the matching type, sensitivity and pole count come back confirmed within 24 hours.

Frequently asked questions
Do I need a Type B RCD for an EV charger?For a charging point without its own built-in DC fault detection, yes — smooth DC leakage can blind Type AC and A cores. Many wallboxes integrate 6 mA DC detection precisely so the upstream device can stay Type A; the charger's manual states which.Why does the RCD trip when the frequency converter starts?Converter filters produce capacitive leakage at switching frequencies that a 30 mA device may read as a fault. The fixes are a Type B or F device rated for mixed-frequency residuals, not a bigger Type AC — and never a removed RCD.What is the practical difference between 30 mA and 300 mA?30 mA is calibrated to disconnect before a shock through a person becomes lethal; 300 mA exists to cut fire-risk earth faults in distribution. A 300 mA device is not personnel protection.Is an RCBO better than an RCCB plus MCB?Per circuit, an RCBO isolates faults to one way and saves the shared-RCCB blackout; a group RCCB is cheaper across many lightly loaded ways. Mixed boards commonly run RCBOs on critical circuits and grouped RCCBs elsewhere.What does HPFI mean on a Scandinavian board?The 30 mA high-sensitivity personnel-protection residual device — what IEC terminology calls a 30 mA RCCB; PFI denotes the lower-sensitivity grade used for fire protection.

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