Contactor Sizing — AC-1 vs AC-3 Ratings, Coil Voltages and the Checks That Matter

cBallast Technical Sourcing · Power contactors · issued 2026-10-06 · cballast.com/documents/contactor-sizing-ac1-vs-ac3-coil-voltages

Why one contactor carries two different ampere ratings (AC-1 for resistive loads, AC-3 for motors), how to size against the motor's full-load current, the coil-voltage codes across TeSys, SIRIUS and ABB AF, and the auxiliary-contact and coordination details that decide whether a starter survives a fault.

One device, two ampere ratings

Contactor datasheets quote utilization categories from IEC 60947-4-1, and the two that cover most panels differ sharply:

Category | Load | What the contacts must survive | Rating consequence |

AC-1 | Resistive / slightly inductive (heaters, distribution) | Make and break near rated current | The higher number on the label |

AC-3 | Squirrel-cage motors, breaking while running | Make the starting inrush (~6 × In), break rated current | The lower, motor-valid number |

AC-4 | Inching / plugging duty | Make and break at starting current | Derate further or upsize the frame |

Sizing a motor starter from the AC-1 figure is the classic early-failure mistake — the contacts weld on the first heavy start. Rule: AC-3 rating "e motor full-load current at the operating voltage, taken from the motor nameplate, with the maker's kW table as the cross-check. A TeSys LC1D 65 A 3-pole is a 30 kW/400 V AC-3 device but carries a far higher AC-1 figure; conversely a 4-pole switching a resistive bank is honestly an AC-1 application (TeSys Deca 4P AC-1 example).

Coils: the half of the reference people get wrong

The power side rarely causes wrong deliveries — the coil does. Each maker encodes it differently:

Schneider TeSys: trailing letter pair — LC1D12BD = 24 V DC, P7 = 230 V AC; the full table is in the Schneider code decoder.

Siemens SIRIUS 3RT2: coil group sits in the suffix of the MLFB — read it from the old unit's face, never assumed from the panel voltage (ships commonly run 110 or 220 V control off a 440 V main). Catalogue depth: over 900 3RT2 items including complete contactors and coil-connection modules; prefixes decoded in the Siemens decoder.

ABB AF: the electronically controlled coil accepts a wide band — an AF40-40-00-13 runs on anything from 100 to 250 V, AC or DC, which is why the AF series is the usual answer when the control voltage is uncertain or dirty.

Four checks before the order goes out

AC-3 ampere and kW figures both match the motor at its actual voltage — kW ratings printed for 400 V shrink at 230 V.

Coil voltage AND kind (AC vs DC are different part numbers everywhere).

Auxiliary contacts: count the NO/NC the control scheme uses; add-on blocks (LADN on TeSys, 3RH2 companions on SIRIUS) are separate references.

Coordination with the short-circuit device: Type 2 keeps the starter serviceable after a fault and ties the contactor to a specific breaker — covered with the motor-protection breaker guide and the selectivity explainer.

Over 4,000 contactor line items are quotable from stock across TeSys, SIRIUS, AF and others — send the complete reference from the unit's face, including the coil code, and mismatches get caught before dispatch.

Frequently asked questions
Is the AC-1 or AC-3 rating the right one for a motor?AC-3 — it is the rating proven against motor inrush and running-current interruption. AC-1 applies to resistive loads; using it for a motor undersizes the contactor.How do I size a contactor for a 15 kW 400 V motor?Match the maker's AC-3 kW table at 400 V and confirm the AC-3 ampere rating covers the nameplate full-load current — around 30 A for a typical 15 kW squirrel-cage machine — then pick the coil code for the actual control voltage.Can a 230 V coil contactor run on 220 V control?Usually yes — coils accept a tolerance band around nominal (commonly " 15 %/+10 %) and 220 V sits inside a 230 V coil's band; a 110 V coil on 230 V control, by contrast, fails immediately.What does AC-4 mean and when does it bite?Inching, plugging and reversing duty where contacts break full starting current — crane and hoist work. The same contactor carries a much lower AC-4 rating, so frequent-jog applications size on that figure.Why did my contactor contacts weld?Most often undersizing against inrush (AC-1 sizing on a motor load), a chattering coil from undervoltage, or a short circuit beyond the coordination type the combination was tested for.

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