

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Low-voltage switchgear and controlgear –
Part 4-1: Contactors and motor-starters – Electromechanical contactors and
motor-starters**

**Appareillage à basse tension –
Partie 4-1: Contacteurs et démarreurs de moteurs – Contacteurs et démarreurs
électromécaniques**



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.120.99, 29.130.20

ISBN 978-2-8322-7773-7

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –**Part 4-1: Contactors and motor-starters –
Electromechanical contactors and motor-starters**

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This fifth edition cancels and replaces the fourth edition published in 2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) objective in the scope;
- b) instantaneous only motor protective switching device IMPSD (3.5.33);
- c) kinds of equipment (5.2.1);

- d) methods of overload protection of motors (5.2.6);
- e) adoption of the AC-7d from IEC 61095:2023 (in 5.4.2);
- f) separately mounted overload relay of a starter (in 5.7.3 b));
- g) starter and contactor suitable for use downstream to basic drive module (6.1.2 w));
- h) reference to IEC TS 63058 for environmental aspects (in 6.4);
- i) wiring subject to movement (in 8.1.3);
- j) use of voltage transient limiting device (8.1.18);
- k) accessible parts subject to temperature limits (in 8.2.2.3);
- l) reference to Annex X of IEC 60947-1:2020 for the co-ordination of MPSD with SCPD (8.2.5.4);
- m) reference to IEC TR 63216 with different EMC environments (8.3.1);
- n) reference to IEC TR 63201 for the embedded software design (8.4);
- o) reference to IEC TS 63208 for cybersecurity aspects (8.5);
- p) update and completion of the measurement method of the power consumption of the electromagnet (9.3.3.2.1.2);
- q) update of Annex C including rational about AC-3e;
- r) determination of the critical load current for photovoltaic applications (M.8.7).

The text of this International Standard is based on the following documents:

Draft	Report on voting
121A/571/FDIS	121A/580/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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This document shall be read in conjunction with IEC 60947-1:2020, *Low voltage switchgear and controlgear – Part 1: General rules*. The provisions of the general rules are applicable to this document, where specifically called for.

The provisions of the general rules dealt with IEC 60947-1 are applicable to this part of IEC 60947 series where specifically called for. Clauses and subclauses, tables, figures and annexes of the general rules thus applicable are identified by reference to IEC 60947-1:2020. For example, 5.3.4.1 of IEC 60947-1:2020, Table 4 of IEC 60947-1:2020, or Annex A of IEC 60947-1:2020.

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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters

1 Scope

This part of IEC 60947 is applicable to the following equipment:

- electromechanical contactors and starters including motor protective switching devices (MPSD and IMPSD);
- actuators of contactor relays;
- contacts dedicated exclusively to the coil circuit of the contactor or the contactor relay;
- dedicated accessories (e.g. dedicated wiring, dedicated latch accessory);

intended to be connected to distribution circuits, motors circuits and other load circuits, the rated voltage of which does not exceed 1 000 V AC or 1 500 V DC.

This document does not apply to:

- starters for DC motors;
- auxiliary contacts of contactors and contacts of contactor relays. These are covered by IEC 60947-5-1;
- the short-circuit protective device integrated within starters, other than MPSDs. This is covered by IEC 60947-2 and IEC 60947-3;
- motor overload protection function performed by control units for built-in thermal protection (PTC). They are covered by IEC 60947-8;
- the use of the equipment with additional measures within explosive atmospheres. These are given in IEC 60079 series;

The objective of this document is to state:

- the characteristics and composition of the equipment (Clause 5);
- the conditions applicable to the equipment with reference to:
 - its operation (5.2.5) and protection functions (5.2.6, 5.7, 5.8),
 - its intended environments (6.5, 8.3.1) and applications (5.4, Annex C, Annex D, Annex G, Annex H, Annex I, Annex M, Annex O) including safety applications (Annex F, Annex K, Annex L),
 - its construction and performance (Clause 8) including requirements to reduce risks of electric shock, thermal hazard, energy hazard, fire hazard and mechanical hazard, reasonably foreseeable misuse, electromagnetic compatibility (EMC) issues, software errors and security issues;
- the tests intended for confirming that these conditions have been met, and the methods to be adopted for these tests (Clause 9);
- the information to be included with the equipment or in the product documentation (Clause 6).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60034-1:2022, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-12:2016, *Rotating electrical machines – Part 12: Starting performance of single-speed three-phase cage induction motors*

IEC 60034-30-1:2014, *Rotating electrical machines – Part 30-1: Efficiency classes of line operated AC motors (IE code)*

IEC 60068-2-14:2023, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60079-14, *Explosive atmospheres – Part 14: Electrical installations design, selection and erection*

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

IEC 60364-1:2005, *Low-voltage electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60715:2017, *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories*

IEC 60730-1, *Automatic electrical controls – Part 1: General requirements*

IEC 60947-1:2020, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-2:2016, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

IEC 61051-2, *Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors*

IEC 61095:2023, *Electromechanical contactors for household and similar purposes*

IEC 61140:2016, *Protection against electric shock – Common aspects for installation and equipment*

IEC 61439 (all parts), *Low-voltage switchgear and controlgear assemblies*

IEC 61643-331, *Components for low-voltage surge protection – Part 331: Performance requirements and test methods for metal oxide varistors (MOV)*

IEC 61800-5-1:2022, *Adjustable speed electrical power drive systems – Part 5-1: Safety requirements – Electrical, thermal and energy*

IEC 61810-1, *Electromechanical elementary relays – Part 1: General and safety requirements*

IEC TS 63058, *Switchgear and controlgear and their assemblies for low voltage – Environmental aspects*

IEC TS 63208, *Low-voltage switchgear and controlgear – Security aspects*

IEC TR 63216:2019, *Low-voltage switchgear and controlgear – Electromagnetic compatibility assessment for switchgear and controlgear and their assemblies*

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 11:2015/AMD1:2016

CISPR 11:2015/AMD2:2019

ISO 2859-1:1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 3864-2, *Graphical symbols – Safety colours and safety signs – Part 2: Design principles for product safety labels*

3 Terms, definitions, symbols and abbreviated terms

3.1 General

For the purposes of this document, the terms and definitions of Clause 3 of IEC 60947-1:2020, as well as the following terms, definitions, symbols and abbreviated terms apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.2 Alphabetical index of terms

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