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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

**Low-voltage switchgear and controlgear - Part 4-1: Contactors
and motor-starters - Electromechanical contactors and motor-
starters
(IEC 60947-4-1:2023)**

Appareillage à basse tension - Partie 4-1: Contacteurs et
démarreurs de moteurs - Contacteurs et démarreurs
électromécaniques
(IEC 60947-4-1:2023)

Niederspannungsschaltgeräte - Teil 4-1: Schütze und
Motorstarter - Elektromechanische Schütze und
Motorstarter
(IEC 60947-4-1:2023)

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EN IEC 60947-4-1:2025 (E)**European foreword**

The text of document 121A/571/FDIS, future edition 5 of IEC 60947-4-1, prepared by SC 121A "Low-voltage switchgear and controlgear" of IEC/TC 121 "Switchgear and controlgear and their assemblies for low voltage" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60947-4-1:2025.

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In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60068-2-2:2007	NOTE	Approved as EN 60068-2-2:2007 (not modified)
IEC 60072-1:2022	NOTE	Approved as EN IEC 60072-1:2022 (not modified)
IEC 60079 series	NOTE	Approved as EN IEC 60079 series
IEC 60079-7	NOTE	Approved as EN 60079-7
IEC 60079-29-3:2014	NOTE	Approved as EN 60079-29-3:2014 (not modified)
IEC 60204-1	NOTE	Approved as EN 60204-1
IEC 60269-1:2006	NOTE	Approved as EN 60269-1:2007 (not modified)
IEC 60269-2:2013	NOTE	Approved as HD 60269-2:2013
IEC 60384-17:2019	NOTE	Approved as EN IEC 60384-17:2019 (not modified)
IEC 60664-1:2020	NOTE	Approved as EN IEC 60664-1:2020 (not modified)
IEC 60721-3-3	NOTE	Approved as EN IEC 60721-3-3
IEC 60812:2018	NOTE	Approved as EN IEC 60812:2018 (not modified)

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IEC 60947-3:2020	NOTE	Approved as EN IEC 60947-3:2021 (not modified)
IEC 60947-4-2	NOTE	Approved as EN IEC 60947-4-2
IEC 60947-6-2	NOTE	Approved as EN IEC 60947-6-2
IEC 60947-8	NOTE	Approved as EN IEC 60947-8
IEC 60990:2016	NOTE	Approved as EN 60990:2016 (not modified)
IEC 61000-6-5	NOTE	Approved as EN 61000-6-5
IEC 61032	NOTE	Approved as EN 61032
IEC 61508-2	NOTE	Approved as EN 61508-2
IEC 61508-3	NOTE	Approved as EN 61508-3
IEC 61508-4:2010	NOTE	Approved as EN 61508-4:2010 (not modified)
IEC 61508-6:2010	NOTE	Approved as EN 61508-6:2010 (not modified)
IEC 61557-12:2018	NOTE	Approved as EN IEC 61557-12:2022 (not modified)
IEC 61557-12:2018/A1:2021	NOTE	Approved as EN IEC 61557-12:2022/A1:2022 (not modified)
IEC 61649	NOTE	Approved as EN 61649
IEC 61915-2:2011	NOTE	Approved as EN 61915-2:2012 (not modified)
IEC 62061	NOTE	Approved as EN IEC 62061
IEC 62443 series	NOTE	Approved as EN IEC 62443 series
IEC 62477-1:2022	NOTE	Approved as EN IEC 62477-1:2023 (not modified)
IEC 62683-1	NOTE	Approved as EN 62683-1
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IEC 63404	NOTE	Approved as EN IEC 63404
ISO/IEC 80079-34	NOTE	Approved as EN ISO/IEC 80079-34

EN IEC 60947-4-1:2025 (E)**Annex ZA**
(normative)**Normative references to international publications
with their corresponding European publications**

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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	EN 60034-12	2017
IEC 60034-30-1	2014	Rotating electrical machines - Part 30-1: Efficiency classes of line operated AC motors (IE code)	EN 60034-30-1	2014
IEC 60068-2-14	2023	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN IEC 60068-2-14	2023
IEC 60079-14	-	Explosive atmospheres - Part 14: Electrical installation design, selection and installation of equipment, including initial inspection	EN IEC 60079-14	-
IEC 60085	2007	Electrical insulation - Thermal evaluation and designation	EN 60085	2008
IEC 60364-1 (mod)	2005	Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions	HD 60364-1	2008
-	-		+ A11	2017
IEC 60715	2017	Dimensions of low-voltage switchgear and controlgear - Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories	EN 60715	2017
IEC 60730-1	-	Automatic electrical controls - Part 1: General requirements	EN IEC 60730-1	-
IEC 60947-1	2020	Low-voltage switchgear and controlgear - Part 1: General rules	EN IEC 60947-1	2021
IEC 60947-2	2016	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers	EN 60947-2	2017

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60947-5-1	2016	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1	2017
IEC 61051-2	-	Varistors for use in electronic equipment - Part 2: Sectional specification for surge suppression varistors	EN IEC 61051-2	-
IEC 61095	2023	Electromechanical contactors for household and similar purposes	EN IEC 61095	2025
IEC 61140	2016	Protection against electric shock - Common aspects for installation and equipment	EN 61140	2016
IEC 61439	series	Low-voltage switchgear and controlgear assemblies	EN IEC 61439	series
IEC 61643-331	-	Components for low-voltage surge protection - Part 331: Performance requirements and test methods for metal oxide varistors (MOV)	EN IEC 61643-331	-
IEC 61800-5-1	2022	Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy	EN IEC 61800-5-1	2023
IEC 61810-1	-	Electromechanical elementary relays - Part 1: General and safety requirements	EN 61810-1	-
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	CLC IEC/TR 63216	2020
CISPR 11 (mod)	2015	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2016
+ A1	2016		+ A1	2017
-	-		+ A11	2020
+ A2	2019		+ A2	2021
ISO 2859-1	-	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	-	-



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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
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

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

FOREWORD

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IEC 60947-4-1 has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage. It is an International Standard.

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.

A list of all parts of the IEC 60947 series can be found, under the general title *Low-voltage switchgear and controlgear*, on the IEC website.

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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

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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*

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