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Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

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

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 04/25

Obsahuje: EN IEC 60947-2:2025, IEC 60947-2:2024

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

EN IEC 60947-2

February 2025

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Supersedes EN 60947-2:2017; EN 60947-2:2017/A1:2020

English Version

Low-voltage switchgear and controlgear - Part 2: Circuit-breakers (IEC 60947-2:2024)

Appareillage à basse tension - Partie 2: Disjoncteurs (IEC 60947-2:2024)

Niederspannungsschaltgeräte - Teil 2: Leistungsschalter (IEC 60947-2:2024)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 60947-2:2025 E

European foreword

The text of document 121A/608/FDIS, future edition 6 of IEC 60947-2, 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 60947-2:2025.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2026-02-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2028-02-29

This document supersedes EN 60947-2:2017 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60947-2:2024 was approved by CENELEC as a European Standard without any modification.

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

IEC 60051 series	NOTE	Approved as EN IEC 60051 series
IEC 60112	NOTE	Approved as EN IEC 60112
IEC 60269-1:2006	NOTE	Approved as EN 60269-1:2007 (not modified)
IEC 60269-1:2006/A1:2009	NOTE	Approved as EN 60269-1:2007/A1:2009 (not modified)
IEC 60269-1:2006/A2:2014	NOTE	Approved as EN 60269-1:2007/A2:2014 (not modified)
IEC 60335-1:2020	NOTE	Approved as EN IEC 60335-1:2023 (not modified) +A11:2023
IEC 60364 series	NOTE	Approved as HD 60364 series
IEC 60364-5-52	NOTE	Approved as HD 60364-5-52
IEC 60695-2-11:2021	NOTE	Approved as EN IEC 60695-2-11:2021 (not modified)
IEC 60898 series	NOTE	Approved as EN 60898 series
IEC 60898-1	NOTE	Approved as EN 60898-1
IEC 60934	NOTE	Approved as EN IEC 60934
IEC 60947-3	NOTE	Approved as EN IEC 60947-3

IEC 60947-5-1	NOTE	Approved as EN 60947-5-1
IEC 61000-3-2	NOTE	Approved as EN IEC 61000-3-2
IEC 61000-3-3	NOTE	Approved as EN 61000-3-3
IEC 61000-4-13	NOTE	Approved as EN 61000-4-13
IEC 61008-1:2010	NOTE	Approved as EN 61008-1:2012 +A11:2015
IEC 61008-1:2010/A1:2012	NOTE	Approved as EN 61008-1:2012/A1:2014
IEC 61008-1:2010/A2:2013	NOTE	Approved as EN 61008-1:2012/A2:2014
IEC 61009-1:2010	NOTE	Approved as EN 61009-1:2012 +A11:2015
IEC 61009-1:2010/A1:2012	NOTE	Approved as EN 61009-1:2012/A1:2014
IEC 61009-1:2010/A2:2013	NOTE	Approved as EN 61009-1:2012/A2:2014
IEC 61131-1:2003	NOTE	Approved as EN 61131-1:2003 (not modified)
IEC 61238-1 series	NOTE	Approved as EN IEC 61238-1 series
IEC 61439 series	NOTE	Approved as EN IEC 61439 series
IEC/TR 63201	NOTE	Approved as CLC IEC/TR 63201
IEC/TR 63216:2019	NOTE	Approved as CLC IEC/TR 63216:2020 (not modified)

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.

Publication	Year	Title	EN/HD	Year
IEC 60068-2-14	-	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN IEC 60068-2-14	-
IEC 60068-2-30	-	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	-
IEC 60228	-	Conductors of insulated cables	EN IEC 60228	-
IEC 60664-1	2020	Insulation coordination for equipment within low-voltage supply systems - Part 1: Principles, requirements and tests	EN IEC 60664-1	2020
-	-		+AC	2020
IEC 60947-1	2020	Low-voltage switchgear and controlgear - Part 1: General rules	EN IEC 60947-1	2021
IEC 60947-4-1	-	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters	EN IEC 60947-4-1	-
IEC 61000-4-2	2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2	2009
IEC 61000-4-3	2020	Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN IEC 61000-4-3	2020
IEC 61000-4-4	2012	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4	2012
IEC 61000-4-5	2014	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2014
+ A1	2017		+ A1	2017

Publication	Year	Title	EN/HD	Year
IEC 61000-4-6	2023	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN IEC 61000-4-6	2023
IEC 61000-4-11	2020	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase	EN IEC 61000-4-11	2020
-	-		+AC	2020
-	-		+AC	2022
IEC 61140	2016	Protection against electric shock - Common aspects for installation and equipment	EN 61140	2016
IEC 61545	1996	Connecting devices - Devices for the connection of aluminium conductors in clamping units of any material and copper conductors in aluminium bodied clamping units	-	-
IEC 62475	2010	High-current test techniques - Definitions and requirements for test currents and measuring systems	EN 62475	2010
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
CISPR 32	2015	Electromagnetic compatibility of multimedia equipment - Emission requirements	EN 55032	2015
-	-		+AC	2016
-	-		+A11	2020

IEC 60947-2

Edition 6.0 2024-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low-voltage switchgear and controlgear – Part 2: Circuit-breakers

Appareillage à basse tension – Partie 2: Disjoncteurs

IEC 60947-2:2024-09(en-fr)

IEC 60947-2

Edition 6.0 2024-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low-voltage switchgear and controlgear – Part 2: Circuit-breakers

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 2: Circuit-breakers

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60947-2 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 sixth edition cancels and replaces the fifth edition published in 2016 and its Amendment 1: 2019. This edition constitutes a technical revision.

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

a) suitability for isolation (see Clause 1);
b) removal of the classification according to the interrupting medium, according to the design, according to the suitability for isolation (see Clause 4);
c) adjustment of current settings with an external device connectable to the release (see 5.7.3);

d) requirements for circuits with protective separation (see 8.2.3.8);
e) additional tests for ground-fault overcurrent releases (see 9.3.4.2.5);
f) additional tests concerning dielectric properties in tripped position (see 9.3.4.3);
g) use of DC voltage for dielectric tests (see 9.3.4.6.2 and 9.4.6);
h) tests of individual pole breaking capacity under phase-to-neutral AC voltage (see 9.3.11);
i) improvement of measurement of power loss in Annex G;
j) changes in EMC tests (see Annex J);
k) introduction of CBI class W in Annex L.

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

Draft	Report on voting
121A/608/FDIS	121A/621/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 in the IEC 60947 series, published under the general title *Low-voltage switchgear and controlgear*, can be found on the IEC website.

This International Standard is to be used in conjunction with IEC 60947-1:2020.

The provisions of the general rules dealt with in IEC 60947-1 are applicable to this document, 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.

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, or
- revised.

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 2: Circuit-breakers

1 Scope

This document applies to circuit-breakers, intended to be installed and operated by instructed or skilled persons, the main contacts of which are intended to be connected to circuits, the rated voltage of which does not exceed 1 000 V AC or 1 500 V DC; it also contains additional requirements for integrally fused circuit-breakers.

This document also applies to circuit-breakers with ratings at or below 1 000 V AC, additionally having one or more ratings above 1 000 V AC but not exceeding 1 500 V AC.

It applies whatever the rated currents, the method of construction or the proposed applications of the circuit-breakers may be.

Circuit-breakers per this document are suitable for isolation.

The requirements for circuit-breakers which are also intended to provide residual current protection are contained in Annex B.

Additional requirements for circuit-breakers intended for connection of aluminium conductors are contained in Annex D.

The additional requirements for circuit-breakers with electronic overcurrent protection are contained in Annex F.

The additional requirements for circuit-breakers for IT systems are contained in Annex H.

The requirements and test methods for electromagnetic compatibility of circuit-breakers are contained in Annex J.

The requirements for circuit-breakers not fulfilling the requirements for overcurrent protection are contained in Annex L.

The requirements for modular residual current devices (without integral current breaking device) are contained in Annex M.

The requirements and test methods for electromagnetic compatibility of circuit-breaker auxiliaries are contained in Annex N.

The requirements for instantaneous trip circuit-breakers are contained in Annex O.

The requirements and test methods for DC circuit-breakers for use in photovoltaic (PV) applications are contained in Annex P.

The requirements and test methods for circuit-breakers incorporating residual current protection with automatic reclosing functions are contained in Annex R.

Supplementary requirements for circuit-breakers used as direct-on-line starters are given in IEC 60947-4-1, applicable to low-voltage contactors and starters.

The requirements for circuit-breakers for overcurrent protection for household and similar installations, and designed for use by uninstructed persons, are contained in IEC 60898 series.

The requirements for circuit-breakers for equipment (for example electrical appliances) are contained in IEC 60934.

For certain specific applications (for example traction, rolling mills, marine service, downstream of variable frequency drives, use in explosive atmospheres), particular or additional requirements can be applicable.

NOTE 1 Circuit-breakers can have dedicated accessories.

NOTE 2 Circuit-breakers which are dealt with in this document can be provided with devices for automatic opening under predetermined conditions other than those of overcurrent and undervoltage as, for example, reversal of power or current. This document does not deal with the verification of operation under such pre-determined conditions.

The object of this document is to state:

a) the characteristics of circuit-breakers;
b) the requirements for circuit-breakers with reference to:
    1) operation and behaviour in normal service;
    2) operation and behaviour in case of overload, operation and behaviour in case of short-circuit, including co-ordination in service (selectivity and back-up protection), as well as the operation and behaviour in case of ground-fault;
    3) dielectric properties;
    4) requirements on electromagnetic compatibility, where applicable;
c) tests intended for confirming that these conditions have been met and the methods to be adopted for these tests;
d) information to be marked on or given with the circuit-breakers.

NOTE 3 For cybersecurity requirements, see IEC TS 63208.

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

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h ± 12 h cycle)*

IEC 60228, *Conductors of insulated cables*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

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

IEC 60947-4-1, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2020, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*
IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:2023, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-11:2020, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase*

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

IEC 61545:1996, *Connecting devices – Devices for the connection of aluminium conductors in clamping units of any material and copper conductors in aluminium bodied clamping units*

IEC 62475:2010, *High-current test techniques – Definitions and requirements for test currents and measuring systems*

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

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*