MADALPINGELISED LÜLITUS- JA JUHTIMISAPARAADID. OSA 5-1: JUHTIMISAHELASEADMED JA LÜLITUSELEMENDID. ELEKTROMEHAANILISED JUHTIMISAHELASEADMED

Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices

EESTI STANDARDIMIS- JA AKREDITEERIMISKESKUS
ESTONIAN CENTRE FOR STANDARDISATION AND ACCREDITATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 60947-5-1:2025 sisaldab Euroopa standardi EN IEC 60947-5-1:2025 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 60947-5-1:2025 consists of the English text of the European standard EN IEC 60947-5-1:2025.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 25.04.2025.	Date of Availability of the European standard is 25.04.2025.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 29.120.40, 29.130.20

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60947-5-1

April 2025

ICS 29.120.40; 29.130.20

Supersedes EN 60947-5-1:2017; EN 60947-5-1:2017/AC:2020-05

English Version

Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices (IEC 60947-5-1:2024)

Appareillage à basse tension - Partie 5-1: Appareils et éléments de commutation pour circuits de commande - Appareils électromécaniques pour circuits de commande (IEC 60947-5-1:2024)

Niederspannungsschaltgeräte - Teil 5-1: Steuergeräte und Schaltelemente - Elektromechanische Steuergeräte (IEC 60947-5-1:2024)

This European Standard was approved by CENELEC on 2025-02-26. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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 60947-5-1:2025 E

European foreword

The text of document 121A/585/FDIS, future edition 5 of IEC 60947-5-1, 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 60947-5-1:2025.

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) 2026-04-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2028-04-30

This document supersedes EN 60947-5-1:2017 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.

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZZ, which is an integral part of this document.

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 60947-5-1:2024 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 60068-2-75:2014	NOTE	Approved as EN 60068-2-75:2014 (not modified)
IEC 60073:2002	NOTE	Approved as EN 60073:2002 (not modified)
IEC 60079 (series)	NOTE	Approved as EN IEC 60079-7 (series)
IEC 60255 (series)	NOTE	Approved as EN 60255 (series)
IEC 60947-5-3:2013	NOTE	Approved as EN 60947-5-3:2013 (not modified)
IEC 60947-5-4:2002	NOTE	Approved as EN 60947-5-4:2003 (not modified)
IEC 61000 (series)	NOTE	Approved as EN IEC 61000 (series)
IEC 61810 (series)	NOTE	Approved as EN 61810 (series)
IEC 61672-1:2013	NOTE	Approved as EN 61672-1:2013 (not modified)

IEC 62246-1:2015	NOTE	Approved as EN 62246-1:2015 (not modified)
IEC 62246-1-1:2018	NOTE	Approved as EN IEC 62246-1-1:2018 (not modified)
IEC 62246-4:2023	NOTE	Approved as EN IEC 62246-4:2023 (not modified)
IEC 62443 (series)	NOTE	Approved as EN IEC 62443 (series)
IEC/TR 63201:2019	NOTE	Approved as CLC IEC/TR 63201:2020 (not modified)
ISO 7731:2003	NOTE	Approved as EN ISO 7731:2008 (not modified)

IEC 60947-5-1

Edition 5.0 2024-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low- voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices

Appareillage à basse tension – Partie 5-1: Appareils et éléments de commutation pour circuits de commande – Appareils électromécaniques pour circuits de commande

IEC 60947-5-1:2024-03(en-fr)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC
La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC
Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform
La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, …). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished
Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc
Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org
Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

IEC 60947-5-1

Edition 5.0 2024-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low- voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices

Appareillage à basse tension – Partie 5-1: Appareils et éléments de commutation pour circuits de commande – Appareils électromécaniques pour circuits de commande

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

ICS 29.120.40, 29.130.20

ISBN 978-2-8322-8326-4

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
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 60947-5-1 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 2016. This edition constitutes a technical revision.

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

a) update of the scope structure and exclusions;
b) requirements for control circuits;
c) update of the normal service conditions (e.g. shock and vibration);
d) update of information and marking requirements including environmental information requirements referencing IEC TS 63058:2021;

e) update of the constructional requirements and the corresponding tests considering safety aspects (e.g. artificial optical radiation, security aspects, limited energy source, stored charge energy circuit);

f) update of the EMC requirements according to the generic documents;

g) new requirements for reed contact magnetic switches in Annex D;

h) requirements for class II circuit devices achieved by double or reinforced insulation in Annex F;

i) update of pull-out tests in Annex G;

j) information requirements for audible signalling device in Annex J;

k) insertion of new Annex O.

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

Draft	Report on voting
121A/585/FDIS	121A/598/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.

This International Standard should be used in conjunction with IEC 60947-1.

The provisions of the general rules, IEC 60947-1, are applicable to this document, where specifically called for. General rules, clauses and subclauses thus applicable, as well as tables, figures and annexes are identified by a reference to IEC 60947-1, for example 1.2.3, Table 4 or Annex A of IEC 60947-1:2020.

The following differing practices of a less permanent nature exist in the countries indicated below.

– 8.2.4.1: Making and breaking capacities (United States of America and Canada).

– 9.3.3.5.2: Test circuits and connections (United States of America and Canada).

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

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 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices

1 Scope

This part of IEC 60947 applies to control circuit devices and switching elements intended for controlling, signalling, interlocking, etc., of switchgear and controlgear.

It applies to control circuit devices having a rated voltage not exceeding 1 000 V AC (at a frequency not exceeding 1 000 Hz) or 600 V DC.

This document applies to specific types of control circuit devices as contained in the following non exhaustive list:

– manually operated control switches;
– electromagnetically operated control switches, either time-delayed or instantaneous;
– contactor relays;
– pilot switches;
– pressure switches;
– temperature sensitive switches (thermostats);
– programmers;
– position switches;
– control switches operated by part of a machine or mechanism;
– associated control circuit equipment, for example indicator lights;
– control circuit devices incorporating semiconductor switching elements;
– control circuit devices incorporating a built-in single drop digital communication interface.

NOTE 1 Control circuit devices and switching elements are referred to as "equipment" or "device" equally in this document.

This document also applies to specific types of control circuit switching elements associated with other devices (whose main circuits are covered by other standards) as contained in the following non exhaustive list:

– auxiliary contacts of a switching device (e.g. contactor, circuit breaker) which are not dedicated exclusively for use with the coil of that device;
– interlocking contacts of enclosure doors;
– control circuit contacts of rotary switches;
– control circuit contacts of overload relays.

This document does not apply to:

– relays covered in the IEC 60255 or IEC 61810 series;
– automatic electrical control devices for household and similar purposes;
– the use of control circuit devices and switching elements with additional measure within explosive atmospheres. These are given in the IEC 60079 series;

This document does not address specific colour requirements or actuating force values.

NOTE 2 Colour requirements can be found in IEC 60073 and also in CIE S004/E-2001.

The object of this document is to state:

– definitions;
– classification;
– characteristics;
– product information;
– normal service, mounting and transport conditions;
– constructional and performance requirements, including electromagnetic compatibility (EMC) and all related product safety measures;
– tests to verify the requirements and the rated characteristics.

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 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

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

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60417, *Graphical symbols for use on equipment*,
available at http://www.graphical-symbols.info/equipment

IEC 60695-2-10:2021, *Fire hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60695-2-12:2021, *Fire hazard testing – Part 2-12: Glowing/hot-wire based test methods – Glow-wire flammability index (GWFI) test method for materials*

IEC 60730-1:2022, *Automatic electrical controls – Part 1: General requirements*

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

IEC 60947-4-1:2018, *Low-voltage switchgear and controlgear – Part 4-1: Contactors and motor-starters – Electromechanical contactors and motor-starters*

IEC 60947-5-2:2019, *Low-voltage switchgear and controlgear – Part 5-2: Control circuit devices and switching elements – Proximity switches*

IEC 60947-5-5:1997, *Low-voltage switchgear and controlgear – Part 5-5: Control circuit devices and switching elements – Electrical emergency stop device with mechanical latching function*
IEC 60947-5-5:1997/AMD1:2005
IEC 60947-5-5:1997/AMD2:2016

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm^2 up to 35 mm^2 (included)*

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 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test*

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 61131-9:2022, *Programmable controllers – Part 9: Single-drop digital communication interface for small sensors and actuators (SDCI)*

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

IEC 62262:2002, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

IEC 62471:2006, *Photobiological safety of lamps and lamp 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*
CISPR 32:2015/AMD1:2019

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 14159:2002, *Safety of machinery – Hygiene requirements for the design of machinery*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

3.1.1 General

For the purposes of this document, the terms and definitions given in IEC 60947-1:2020, as well as the following 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

3.1.2 Basic terms and definitions

3.1.2.1
control circuit device
electrical device intended for the controlling, signalling, interlocking, etc., of switchgear and controlgear

Note 1 to entry: Control circuit devices include control switches and associated devices such as indicator lights.

Note 2 to entry: Control circuit devices can also include associated devices dealt with in other standards, such as instruments, potentiometers, relays, in so far as associated devices are used for the purposes specified above.

3.1.2.2
control switch
<control and auxiliary circuits> mechanical switching device which serves the purpose of controlling the operation of switchgear or controlgear, including signalling, electrical interlocking, etc.

Note 1 to entry: A control switch consists of one or more contact elements with a common actuating system.

Note 2 to entry: A control switch may include semiconductor elements or contact elements (see 3.1.5.2 and 3.1.5.3).

[SOURCE: IEC 60050-441:1984, 441-14-46, modified – Addition of a new Note 2 to entry.]

3.1.2.3
control switch suitable for isolation
control switch which, in the open position, complies with the requirements specified for the isolating function (see 3.3.19 and 8.1.7 of IEC 60947-1:2020)

Note 1 to entry: Such control switches are intended to provide a higher degree of safety to personnel when working on the equipment controlled. For this reason, they have to be manually actuated relying on the intelligence of instructed persons to react in case they would fail to operate, for example in case of insufficiently opened contacts.