

**MADALPINGELISED LÜLITUSAPARAADID.
OSA 4-2: KONTAKTORID JA MOOTORIKÄIVITID.
POOLJUHT-MOOTORIKONTROLLERID, -KÄIVITID JA -
SUJUVKÄIVITID**

**Low-voltage switchgear and controlgear -
Part 4-2: Contactors and motor-starters - Semiconductor
motor controllers, starters and soft-starters
(IEC 60947-4-2:2020 +
IEC 60947-4-2:2020/AMD1:2024)**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

| | |
|---|---|
| See Eesti standard EVS-EN IEC 60947-4-2:2023+A1:2024 sisaldab Euroopa standardi EN IEC 60947-4-2:2023 ja selle muudatuse A1:2024 ingliskeelset teksti. | This Estonian standard EVS-EN IEC 60947-4-2:2023+A1:2024 consists of the English text of the European standard EN IEC 60947-4-2:2023 and its amendment A1:2024. |
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| Muudatusega A1 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega A1 A1 . | The start and finish of text introduced or altered by amendment A1 is indicated in the text by tags A1 A1 . |
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English Version

**Low-voltage switchgear and controlgear - Part 4-2: Contactors
and motor-starters - Semiconductor motor controllers, starters
and soft-starters
(IEC 60947-4-2:2020 + IEC 60947-4-2:2020/AMD1:2024)**

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(IEC 60947-4-2:2020 + IEC 60947-4-2:2020/AMD1:2024)

Niederspannungsschaltgeräte - Teil 4-2: Schütze und
Motorstarter - Halbleiter-Motor-Steuergeräte, Starter und
Sanftstarter
(IEC 60947-4-2:2020 + IEC 60947-4-2:2020/AMD1:2024)

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European foreword

The text of document 121A/353/FDIS, future edition 4 of IEC 60947-4-2, 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 60947-4-2:2023.

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| | |
|--------------------|---|
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| IEC 60079 (series) | NOTE Approved as EN IEC 60079-7 (series) |
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| IEC 60947-3 | NOTE Approved as EN IEC 60947-3 |
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| IEC 62477-1:2012 | NOTE Approved as EN 62477-1:2012 (not modified) +A11:2014 |
| IEC 62683-1 | NOTE Approved as EN 62683-1 |
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A1 Amendment A1 European foreword

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INTERNATIONAL STANDARD



**Low-voltage switchgear and controlgear –
Part 4-2: Contactors and motor-starters – Semiconductor motor controllers,
starters and soft-starters**



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INTERNATIONAL STANDARD



**Low-voltage switchgear and controlgear –
Part 4-2: Contactors and motor-starters – Semiconductor motor controllers,
starters and soft-starters**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –**Part 4-2: Contactors and motor-starters –
Semiconductor motor controllers, starters and soft-starters**

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International Standard IEC 60947-4-2 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.

This fourth edition cancels and replaces the third edition published in 2011. This edition constitutes a technical revision.

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

- scope exclusions;
- editorial correction of notes and hanging paragraphs;
- reference to IEC 62683-1;
- safety aspects related to:

- general aspects;
- limited energy circuits;
- electronic circuits;
- mention of dedicated wiring accessories;
- power consumption measurement;
- alignment to IEC 60947-1:2020.

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.

The text of this standard is based on the following documents:

| FDIS | Report on voting |
|---------------|------------------|
| 121A/353/FDIS | 121A/360/RVD |

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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A1 Amendment A1 FOREWORD

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Amendment 1 to IEC 60947-4-2:2020 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.

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

- Requirement for starter intended to be used with high efficiency motors.
- Requirements and tests for abnormal conditions equivalent to Annex DVE of the UL version.
- Alignment to the EMC environments defined in IEC TR 63216 and more detailed emission limit requirements.
- Reference to IEC TS 63058 for environmental information.
- Reference to IEC 63404 for the integration of radio communication.

The text of this Amendment is based on the following documents:

| | |
|---------------|------------------|
| Draft | Report on voting |
| 121A/615/FDIS | 121A/626/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 Amendment 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.

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,
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INTRODUCTION

This document covers low-voltage semiconductor motor controllers, starters and soft-starters that have many capabilities and features beyond the simple starting and stopping of an induction motor, such as controlled starting and stopping, manoeuvring and controlled running.

The generic term “controller” is used in this document wherever reference is made to elements of power semiconductor switching devices.

The generic term “starter” is used in this document wherever reference is made to the elements of power semiconductor switching devices together with suitable overload protective devices.

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 4-2: Contactors and motor-starters – Semiconductor motor controllers, starters and soft-starters

1 Scope

This part of IEC 60947 applies to semiconductor motor controllers, starters and soft-starters which can include a series mechanical switching device, intended to be connected to circuits the rated voltage of which does not exceed 1 000 V AC.

This document characterizes semiconductor motor controllers and starters with and without bypass means.

This document does not apply to:

- semiconductor motor controllers and starters used for continuous operation of AC motors at motor speeds other than the normal speed ~~A1~~ deleted text ~~A1~~;
- electromechanical contactors and external overload relays (see IEC 60947-4-1);
- short-circuit protective device associated with semiconductor motor controllers and starters (see IEC 60947-4-1 (MPSD), IEC 60947-2 and IEC 60947-3);
- semiconductor equipment, including semiconductor contactors (3.4.13 of IEC 60947-1:2020) controlling non-motor loads (see IEC 60947-4-3);
- semiconductor motor controllers and starters used for rotor circuits ~~A1~~ deleted text ~~A1~~;
- adjustable speed electrical power drive systems (see IEC 61800 series);
- use of the product within explosive atmospheres (see IEC 60079 series);
- software and firmware requirements ~~A1~~ deleted text ~~A1~~;

NOTE 1 Guidance on embedded software is given in IEC TR 63201.

- cyber security aspects (see IEC TS 63208).

Contactors, overload relays and control circuit devices used in semiconductor motor controllers and starters are considered compliant with the requirements of their relevant product standard. Where mechanical switching devices are used, they are considered meeting the requirements of their own IEC product standard, and the additional requirements of this document.

The object of this document is to state as follows:

- the characteristics of semiconductor motor controllers, starters and soft-starters and associated equipment;
- the conditions with which semiconductor motor controllers, starters and soft-starters comply with reference to
 - a) their operation and behaviour in normal and abnormal operating conditions including overcurrent operating conditions;
 - b) their dielectric properties;
 - c) the degrees of protection provided by their enclosures where applicable;
 - d) their construction including safety measures against electric shock, fire hazard and mechanical hazard;
- the tests intended for confirming that these conditions have been met, and the methods to be adopted for these tests;

– the information to be given with the equipment, or in the manufacturer's literature.

NOTE 2 For the purpose of this document, the term "controller" is used instead of "semiconductor motor controller".

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 60034-1:2017, *Rotating electrical machines – Part 1: Rating and performance*

A1 IEC 60445:2021, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors* **A1**

IEC 60715, *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 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*

IEC 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

IEC 61000-3-11, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤ 75 A and subject to conditional connection*

IEC 61000-3-12, *Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase*

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

A1 IEC 63404:2024, *Switchgear and controlgear and their assemblies for low voltage – Integration of radiocommunication device above 380 MHz into an equipment*

IEC TS 63058, *Environmental aspects for low-voltage switchgear and controlgear and their assemblies* **A1**

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
CISPR 11:2015/AMD1:2016

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*