



NSAI
Standards

Irish Standard
I.S. EN 60947-4-3:2014

Low-voltage switchgear and controlgear --
Part 4-3: Contactors and motor-starters - AC
semiconductor controllers and contactors for
non-motor loads

I.S. EN 60947-4-3:2014

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English Version

**Low-voltage switchgear and controlgear - Part 4-3: Contactors
and motor-starters - AC semiconductor controllers and
contactors for non-motor loads
(IEC 60947-4-3:2014)**

Appareillage à basse tension - Partie 4-3: Contacteurs et
démarreurs de moteurs - Gradateurs et contacteurs à
semiconducteurs pour charges, autres que des moteurs, à
courant alternatif
(CEI 60947-4-3:2014)

Niederspannungsschaltgeräte - Teil 4-3: Schütze und
Motorstarter - Halbleiter-Steuergeräte und -Schütze für
nichtmotorische Lasten für Wechselspannung
(IEC 60947-4-3:2014)

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 121A/2/FDIS, future edition 2 of IEC 60947-4-3, prepared by SC 17B "Low-voltage switchgear and controlgear" of IEC/TC 17 "Switchgear and controlgear" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60947-4-3:2014.

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) 2015-03-11
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-06-11

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EU Directive 2004/108/EC.

For relationship with EU Directive(s), see informative Annex ZZ, which is an integral part of this document.

This document supersedes EN 60947-4-3:2000.

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

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 60947-4-3:2014 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 standards indicated:

IEC 60085:2007	NOTE	Harmonized as EN 60085:2008 (modified).
IEC 60146 (series)	NOTE	Harmonized as EN 60146 (series) (not modified).
IEC 60664 (series)	NOTE	Harmonized as EN 60664 (series) (not modified).
IEC 60947-4-2:2011	NOTE	Harmonized as EN 60947-4-2:2012 (modified).
IEC 61439 (series)	NOTE	Harmonized as EN 61439 (series) (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When 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.cenelec.eu

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60269-1	2006	Low-voltage fuses -- Part 1: General requirements	EN 60269-1	2007
IEC 60410	1973	Sampling plans and procedures for inspection by attributes	-	-
IEC 60947-1	2007	Low-voltage switchgear and controlgear -- Part 1: General rules	EN 60947-1	2007
+A1	2010		+A1	2011
IEC 61000-4 (series)	-	Electromagnetic compatibility (EMC) -- Part 4-1: Testing and measurement techniques (series) - Overview of IEC 61000-4 series	EN 61000-4	-
IEC 61000-4-5	2005	Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5	2006
CISPR 11 (mod)	2009	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2009
CISPR 11:2009/A1	2010		EN 55011:2009/A1	2010

Annex ZZ
(informative)

Coverage of Essential Requirements of EU Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers protection requirements of Annex I Article 1 of the EU Directive 2004/108/EC.

Compliance with this standard provides presumption of conformity with the specified essential requirements of the Directives concerned.

NOTE: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.



IEC 60947-4-3

Edition 2.0 2014-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage switchgear and controlgear –
Part 4-3: Contactors and motor-starters – AC semiconductor controllers and
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**Appareillage à basse tension –
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IEC 60947-4-3

Edition 2.0 2014-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage switchgear and controlgear –
Part 4-3: Contactors and motor-starters – AC semiconductor controllers and
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Partie 4-3: Contacteurs et démarreurs de moteurs – Gradateurs et contacteurs à
semiconducteurs pour charges, autres que des moteurs, à courant alternatif**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –**Part 4-3: Contactors and motor-starters –
AC semiconductor controllers and
contactors for non-motor loads**

FOREWORD

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International Standard IEC 60947-4-3 has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This second edition cancels and replaces the first edition published in 1999, Amendment 1:2006 and Amendment 2:2011. This edition constitutes a technical revision.

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

- a) Update of the marking requirements (6.1);
- b) Update of the EMC requirements (8.3.2); and
- c) Update of the tests requirements (9.3.1, 9.4, 9.4.1.1, 9.4.1.2, 9.4.2.1, 9.4.2.2, 9.4.2.3, 9.4.2.4, 9.4.2.6).

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

FDIS	Report on voting
121A/2/FDIS	121A/14/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 parts in the IEC 60947 series, published under the general title *Low-voltage switchgear and controlgear*, can be found on the IEC website.

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

The provisions of the general rules (IEC 60947-1) are applicable to this standard, where specifically called for. Clauses and subclauses thus applicable, as well as tables, figures, and annexes, are identified by reference to IEC 60947-1, for example 1.2.3 of IEC 60947-1:2007, Amendment 1 (2010), Table 4 of IEC 60947-1:2007, Amendment 1 (2010) or Annex A of IEC 60947-1:2007.

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
- amended.

INTRODUCTION

This part of IEC 60947 covers low-voltage a.c. semiconductor controllers and contactors (solid-state contactors) intended for the use with non-motor loads. As controllers, they have many capabilities beyond the simple switching on and off of non-motor loads. As contactors, they perform the same functions as mechanical contactors, but utilize one or more semiconductor switching devices in their main poles.

The devices may be single-pole or multi-pole (see 2.3.1 of IEC 60947-1:2007,). This standard refers to complete devices rated as a unit incorporating all necessary heat-sinking material and terminals. It includes devices with all necessary terminals, which are supplied with or without heat-sink in knocked-down form for combination by the users, when the manufacturer gives with the device detailed information about choosing the heat-sink and mounting the device on the heat-sink.

The generic term, "controller", is used in this standard wherever the unique features of the power semiconductor switching elements are the most significant points of interest. The generic term "contactor" is used in this standard wherever the feature of simple switching on and off is the most significant point of interest. Specific designations (for example, form 4, form HxB, etc.) are used wherever the unique features of various configurations comprise significant points of interest.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 4-3: Contactors and motor-starters – AC semiconductor controllers and contactors for non-motor loads

1 Scope

This part of IEC 60947 applies to a.c. semiconductor non-motor load controllers and contactors intended for performing electrical operations by changing the state of a.c. electric circuits between the ON-state and the OFF-state. Typical applications are classified by utilization categories given in Table 2.

As controllers, they may be used to reduce the amplitude of the r.m.s. a.c. voltage on the load terminals from that of the applied voltage – either continuously or for a specified period of time. The half-wave period of the a.c. wave form remains unchanged from that of the applied voltage.

They may include a series mechanical switching device and are intended to be connected to circuits, the rated voltage of which does not exceed 1 000 V a.c.

This standard characterizes controllers and contactors for use with or without bypass switching devices.

The semiconductor controllers and contactors dealt with in this standard are not normally intended to interrupt short-circuit currents. Therefore, suitable short-circuit protection (see 8.2.5) should form part of the installation but not necessarily of the controller itself.

In this context, this standard gives requirements for semiconductor controllers and contactors associated with separate short-circuit protective devices.

This standard does not apply to:

- operation of a.c. and d.c. motors;
- low-voltage a.c. semiconductor motor controllers and starters covered by IEC 60947-4-2;
- electronic a.c. power controllers covered by the IEC 60146 series;
- all-or-nothing solid-state relays.

Contactors and control-circuit devices used in semiconductor controllers and contactors should comply with the requirements of their relevant product standard. Where mechanical switching devices are used, they should meet the requirements of their own IEC product standard and the additional requirements of this standard.

The object of this standard is to state

- a) the characteristics of semiconductor controllers and contactors and associated equipment;
- b) the conditions with which semiconductor controllers and contactors should comply with reference to:
 - their operation and behaviour;
 - their dielectric properties;
 - the degrees of protection provided by their enclosures, where applicable;

- their construction;
- c) the tests intended for confirming that these conditions have been met, and the methods to be adopted for these tests;
- d) the information to be given with the equipment or in the manufacturer's literature.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60269-1:2006, *Low-voltage fuses – Part 1: General requirements*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*
Amendment 1:2010

IEC 61000-4 (all parts), *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques*

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

CISPR 11:2009, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*
Amendment 1:2010

3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms and definitions given in Clause 2 of IEC 60947-1:2007, Amendment 1 (2010), as well as the following additional terms and definitions apply:

	Reference
	A
AC semiconductor controller	3.1.1.1
	B
Bypassed controller	3.1.24
	C
Current-limit function	3.1.3
	D
Defined-point switching (of a semiconductor controller)	3.1.14.4.1
	F
Full-on (state of controllers)	3.1.10
	H
Hybrid controllers or contactors, form HxA (where $x = 4$ or 5)	3.1.2.1
Hybrid controllers or contactors, form HxB	3.1.2.2
	I
Instantaneous switching function	3.1.14.3
	L
Load control	3.1.4
	M

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