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Standards

Irish Standard
I.S. EN 60947-5-2:2008

Low-voltage switchgear and controlgear --
Part 5-2: Control circuit devices and
switching elements - Proximity switches
(IEC 60947-5-2:2007 (EQV))

I.S. EN 60947-5-2:2008

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EUROPEAN STANDARD

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November 2012

ICS 29.120.40; 29.130.20

English version

**Low-voltage switchgear and controlgear -
Part 5-2: Control circuit devices and switching elements -
Proximity switches
(IEC 60947-5-2:2007/A1:2012)**

Appareillage à basse tension -
Partie 5-2: Appareils et éléments de
commutation pour circuits de commande -
DéTECTEURS DE PROXIMITÉ
(CEI 60947-5-2:2007/A1:2012)

Niederspannungsschaltgeräte -
Teil 5-2: Steuergeräte und Schaltelemente -
NÄHERUNGSSCHALTER
(IEC 60947-5-2:2007/A1:2012)

This amendment A1 modifies the European Standard EN 60947-5-2:2007; it was approved by CENELEC on 2012-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 17B/1733/CDV, future amendment 1 to edition 3 of IEC 60947-5-2, prepared by SC17B "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 60947-5-2:2007/A1:2012.

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) 2013-08-01
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-11-01

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).

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

Endorsement notice

The text of the International Standard IEC 60947-5-2:2007/A1:2012 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

Replacements and addition in Annex ZA of EN 60947-5-2:2007:

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--|----------------------|---|------------------------------|----------------------|
| <i>In Annex ZA of EN 60947-5-2:2007 replace the existing references to the following publications as follows:</i> | | | | |
| IEC 60068-2-6 | 2007 | Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal) | EN 60068-2-6 | 2008 |
| IEC 60068-2-14 | 2009 | Environmental testing - Part 2-14: Tests - Test N: Change of temperature | EN 60068-2-14 | 2009 |
| IEC 60068-2-27 | 2008 | Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock | EN 60068-2-27 | 2009 |
| IEC 60947-1 + A1 | 2007 2010 | Low-voltage switchgear and controlgear - Part 1: General rules | EN 60947-1 + A1 | 2007 2011 |
| IEC 61000-3-2 + A1 + A2 | 2005 2008 2009 | Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) | EN 61000-3-2 + A1 + A2 | 2006 2009 2009 |
| IEC 61000-3-3 | 2008 | 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 | EN 61000-3-3 | 2008 |
| 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 + A1 + A2 | 2006 2007 2010 | Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test | EN 61000-4-3 + A1 + A2 | 2006 2008 2010 |
| IEC 61000-4-6 | 2008 | Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields | EN 61000-4-6 | 2009 |
| IEC 61000-4-8 | 2009 | Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test | EN 61000-4-8 | 2010 |

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| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|------------------------|--------------|--|-----------------------|--------------|
| IEC 61000-4-13 + A1 | 2002 2009 | Electromagnetic compatibility (EMC) - Part 4-13: Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests | EN 61000-4-13 + A1 | 2002 2009 |
| CISPR 11 (mod) + A1 | 2009 2010 | Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement | EN 55011 + A1 | 2009 2010 |

*In Annex ZA of EN 60947-5-2:2007 **replace** IEC 60446:2007 by the following:*

| | | | | |
|-----------|------|---|----------|------|
| IEC 60445 | 2010 | Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors | EN 60445 | 2010 |
|-----------|------|---|----------|------|

*In Annex ZA of EN 60947-5-2:2007 **replace** ISO 630:1995 by the following:*

| | | | | |
|---------|--------|-------------------|---|---|
| ISO 630 | Series | Structural steels | - | - |
|---------|--------|-------------------|---|---|

*In Annex ZA of EN 60947-5-2:2007 **add** the following new reference:*

| | | | | |
|-----------|--------|--|------------|--------|
| IEC 61076 | Series | Connectors for electronic equipment - Product requirements - Part 2: Circular connectors | EN 61076-2 | Series |
|-----------|--------|--|------------|--------|

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EUROPEAN STANDARD

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DéTECTEURS de proximité
(CEI 60947-5-2:2007)

Niederspannungsschaltgeräte -
Teil 5-2: Steuergeräte
und Schaltelemente -
NÄHERUNGSSCHALTER
(IEC 60947-5-2:2007)

This European Standard was approved by CENELEC on 2007-11-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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CENELEC

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

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Foreword

The text of document 17B/1570/FDIS, future edition 3 of IEC 60947-5-2, 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 was approved by CENELEC as EN 60947-5-2 on 2007-11-01.

This European Standard supersedes EN 60947-5-2:1998 + A1:1999 + A2:2004.

The main changes with respect to EN 60947-5-2:1998 are as follows:

- modification of Table 3;
- modifications of voltage dips and voltage interruptions immunity tests, in Table 8;
- modification of status of Annex A, now informative.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2008-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2010-11-01

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 EC Directive 2004/108/EC. See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60947-5-2:2007 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--------------------------------|----------------------|---|--|------------------------------|
| IEC 60050-441 A1 | 1984 2000 | International Electrotechnical Vocabulary (IEV) - Chapter 441: Switchgear, controlgear and fuses | - | - |
| IEC 60068-2-6 + corr. March | 1995 1995 | Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal) | EN 60068-2-6 | 1995 |
| IEC 60068-2-14 + A1 | 1984 1986 | Environmental testing - Part 2: Tests - Test N: Change of temperature | EN 60068-2-14 | 1999 |
| IEC 60068-2-27 | 1987 | Basic environmental testing procedures - Part 2: Tests - Test Ea and guidance: Shock | EN 60068-2-27 | 1993 |
| IEC 60068-2-30 | 2005 | Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) | EN 60068-2-30 | 2005 |
| IEC 60364 (mod) | Series | Low-voltage electrical installations | HD 384 HD 60364 | Series |
| IEC 60446 | 2007 | Basic and safety principles for man-machine interface, marking and identification - Identification of conductors by colours or alphanumerics | EN 60446 | 2007 |
| IEC 60947-1 | 2007 | Low-voltage switchgear and controlgear - Part 1: General rules | EN 60947-1 | 2007 |
| IEC 61000-3-2 | 2005 | Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase) | EN 61000-3-2 | 2006 |
| IEC 61000-3-3 A1 A2 | 1994 2001 2005 | 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 | EN 61000-3-3 + corr. July A1 A2 | 1995 1997 2001 2005 |
| IEC 61000-4-2 A1 A2 | 1995 1998 2000 | Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test | EN 61000-4-2 A1 A2 | 1995 1998 2001 |

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EN 60947-5-2:2007

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| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|------------------------------------|----------------------|--|--------------------------------|--------------|
| IEC 61000-4-3 | 2006 | Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test | EN 61000-4-3 | 2006 |
| IEC 61000-4-4 | 2004 | Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test | EN 61000-4-4 | 2004 |
| IEC 61000-4-6 + A1 + A2 | 2003 2004 2006 | Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields | EN 61000-4-6 + corr. August | 2007 2007 |
| IEC 61000-4-8 A1 | 1993 2000 | Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test | EN 61000-4-8 A1 | 1993 2001 |
| IEC 61000-4-11 | 2004 | Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests | EN 61000-4-11 | 2004 |
| IEC 61000-4-13 | 2002 | Electromagnetic compatibility (EMC) - Part 4-13: Testing and measurement techniques - Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests | EN 61000-4-13 | 2002 |
| IEC 61140 A1 (mod) | 2001 2004 | Protection against electric shock - Common aspects for installation and equipment | EN 61140 A1 | 2002 2006 |
| CISPR 11 (mod) + A1 (mod) A2 | 2003 2004 2006 | Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement | EN 55011 A2 | 2007 2007 |
| ISO 630 A1 | 1995 2003 | Structural steels - Plates, wide flats, bars, sections and profiles | - | - |

Annex ZZ
(informative)

Coverage of Essential Requirements of EC 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 all relevant essential requirements as given in Article 1 of Annex I of the EC Directive 2004/108/EC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directive concerned.

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 5-2: Control circuit devices and switching elements –
Proximity switches**

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

This consolidated version of IEC 60947-5-2 consists of the third edition (2007) [documents 17B/1570/FDIS and 17B/1576/RVD] and its amendment 1 (2012) [documents 17B/1733/CDV and 17B/1774/RVC]. It bears the edition number 3.1.

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.

International Standard IEC 60947-5-2 has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

The document 17B/1570/FDIS, circulated to the National Committees as Amendment 3, led to the publication of the new edition.

The main changes with respect to the previous edition are as follows:

- modification of Table 3;
- modifications of voltage dips and voltage interruptions immunity tests, in Table 8;
- modification of status of Annex A, now informative.

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 the base publication and its amendments 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.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-2: Control circuit devices and switching elements – Proximity switches

1 General

The provisions of the general rules in IEC 60947-1 are applicable to this standard, where specifically called for. General rules clauses and subclauses thus applicable, as well as tables, figures and annexes, are identified by references to IEC 60947-1, e.g. subclause 7.1.9.3 of IEC 60947-1 or Annex C of IEC 60947-1.

Clauses 1 to 8 contain the general requirements. Specific requirements for the various types of proximity switches are given in Annex A.

1.1 Scope and object

This part of IEC 60947 applies to inductive and capacitive proximity switches that sense the presence of metallic and/or non-metallic objects, ultrasonic proximity switches that sense the presence of sound reflecting objects, photoelectric proximity switches that sense the presence of objects and non-mechanical magnetic proximity switches that sense the presence of objects with a magnetic field.

These proximity switches are self-contained, have semiconductor switching element(s) and are intended to be connected to circuits, the rated voltage of which does not exceed 250 V 50 Hz/60 Hz a.c. or 300 V d.c. This Standard is not intended to cover proximity switches with analogue outputs.

The object of this standard is to state for proximity switches:

- definitions;
- classification;
- characteristics;
- product information;
- normal service, mounting and transport conditions;
- constructional and performance requirements;
- tests to verify rated characteristics.

1.2 Normative references

The following referenced documents are indispensable for the application 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 60050(441):1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*
Amendment 1 (2000)

IEC 60068-2-6:1995 2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14:1984 2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*
Amendment 1 (1986)

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