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Nizkonapetostne stikalne in krmilne naprave - 5-3. del: Krmilne naprave in stikalni elementi - Zahteve za približevalne naprave z določenim obnašanjem ob pogojih za okvare (PDDB)

Low-voltage switchgear and controlgear - Part 5-3: Control circuit devices and switching elements - Requirements for proximity devices with defined behaviour under fault conditions (PDDB)

Niederspannungsschaltgeräte - Teil 5-3: Steuergeräte und Schaltelemente - Anforderungen für Näherungsschalter mit definiertem Verhalten unter Fehlerbedingungen (PDDB)

Appareillage à basse tension - Partie 5-3: Appareils et éléments de commutation pour circuits de commande - Exigences pour dispositifs de détection de proximité à comportement défini dans des conditions de défaut (PDDB)

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121A/640/CDV

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OF INTEREST TO THE FOLLOWING COMMITTEES: TC 44,TC 65	HORIZONTAL FUNCTION(S):
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<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING
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TITLE: Low-voltage switchgear and controlgear – Part 5-3: Control circuit devices and switching elements – Requirements for proximity devices with defined behaviour under fault conditions (PDDB)	
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –**Part 5-3: Control circuit devices and switching elements –
Requirements for proximity devices
with defined behaviour under fault conditions (Pddb)**

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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International Standard IEC 60947-5-3 has been prepared by subcommittee SC121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

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

- Update of the scope, refined fault performance aspects and relation to standards of functional safety.
- The 'safe state' is generally determined as 'OFF-state' (see 3.1.8).
- Update of EMC requirements in clause 8.2.6 with references to IEC 60947-5-2 for acceptance criteria A, B and C and requirements of Table 15 for acceptance criterion DS.
- Interface types for binary interfaces are introduced. (See 4.6.2 and Annex B).

- Functional safety device types according to ISO 13849-1:2022 Annex O (See 4.9).
- Interlocking device type and coding level according to ISO 14119 are adapted (see 4.10 and 4.11).
- The operating modes Target Present (4.12.2) and Target Absent (4.12.3) are introduced.
- The ‘switching distance’ replaces the terms ‘release’ and ‘operating’. The behaviour of the PDDB is described according to the operating mode (clause 4.12).
- The context and verification of the switching distances are considered according to ISO/IEC Guide 98-3:2008 (GUM) and IEC TR 6xxxx:2025 (See 8.2.1.3 and 9.4.2).
- Requirements for electrical equipment class III are refined.
- The risk time is replaced with the safety response time (3.1.11).
- Annex A gives a new example of safety related control system.
- The test sequences (see 9.3.1) are updated for the specific behaviour of a PDDB.

This standard is to be read in conjunction with IEC 60947-1, Low voltage switchgear and controlgear – Part 1: General rules and IEC 60947-5-2, Low-voltage switchgear and controlgear – Part 5-2: Control circuit devices and switching elements – Proximity switches. The provisions of Part 1 and Part 5-2 are only applicable to this standard where specifically called for. The numbering of the subclauses of this standard is sometimes not continuous because it is based on the numbering of the subclauses of IEC 60947-1 or IEC 60947-5-2.

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

FDIS	Report on voting
xxx	xxx

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.

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.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 5-3: Control circuit devices and switching elements – Requirements for proximity devices with defined behaviour under fault conditions (PDDB)

1 Scope

This part of IEC 60947 series provides additional requirements to those given in IEC 60947-5-2 and IEC 60947-5-1:2024 Annex D (reed contact magnetic switches). It addresses the fault performance aspects of proximity devices with a defined behaviour under fault conditions (PDDB). It does not address any other characteristics that can be required for specific applications.

This document does not apply to protective equipment to directly detect the presence of persons, that are covered by IEC 61496 series or IEC/TS 62998 series.

NOTE A PDDB device can be used to detect indirectly the presence of a person, for example by detecting the position of a platform on which the operator stands (example, garbage trucks).

This product standard does not specify requirements for the analogue output of PDDB, if any.

This product standard does not deal with any specific requirements on acoustic noise as the noise emission of proximity devices is not considered to be a relevant hazard.

A PDDB product is intended to be used as sensing subsystem of a safety related control system according to IEC 62061 or ISO 13849-1. Depending on construction principles and complexity, this standard is based on product development of IEC 61508 series in order to meet the product specific requirements of IEC 61508 series, IEC 62061 and/or ISO 13849 series.

NOTE The Functional Safety Device Type classification regarding functional safety correlates with IEC 62683-2-3 DB.

This standard includes requirements for PDDBs when designed for use as part of an interlocking devices according to ISO 14119.

This document does not consider aspects of:

- software updates and self-evolving behaviour
- explosive atmospheres

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 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

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

- 40 IEC 60204-1:2016, *Safety of machinery – Electrical equipment of machines – Part 1: General*
41 *requirements*
- 42 IEC 60529:1989+AMD1:1999+AMD2:2013 CSV, *Degrees of protection provided by enclosures*
43 *(IP Code)*
- 44 IEC 60812:2018, *Failure modes and effects analysis (FMEA and FMEDA)*
- 45 IEC 60947-1:2020, *Low-voltage switchgear and controlgear – Part 1: General rules*
- 46 IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices*
47 *and switching elements – Electromechanical control circuit devices*
- 48 IEC 60947-5-2:2019, *Low-voltage switchgear and controlgear – Part 5-2: Control circuit devices*
49 *and switching elements – Proximity switches*
- 50 IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and*
51 *measurement techniques – Electrostatic discharge immunity test*
- 52 IEC 61000-4-3:2020, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and*
53 *measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*
- 54 IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and*
55 *measurement techniques – Electrical fast transient/burst immunity test*
- 56 IEC 61000-4-5:2014+AMD1:2017 CSV, *Electromagnetic compatibility (EMC) – Part 4-5: Testing*
57 *and measurement techniques – Surge immunity test*
- 58 IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and*
59 *measurement techniques – Immunity to conducted disturbances, induced by radio-frequency*
60 *fields*
- 61 IEC 61000-4-8:2009, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and*
62 *measurement techniques – Power frequency magnetic field immunity test*
- 63 IEC 61000-4-11:2020, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and*
64 *measurement techniques – Voltage dips, short interruptions and voltage variations immunity*
65 *tests*
- 66 IEC 61131-2:2017, *Programmable controllers – Part 2: Equipment requirements and tests*
- 67 IEC 61140:2016, *Protection against electric shock – Common aspects for installation and*
68 *equipment*
- 69 IEC 61508-1:2010, *Functional safety of electrical/electronic/programmable electronic safety-*
70 *related systems – Part 1: General requirements*
- 71 IEC 61508-2:2010, *Functional safety of electrical/electronic/programmable electronic safety-*
72 *related systems – Part 2: Requirements for electrical/electronic/programmable electronic*
73 *safety-related systems*
- 74 IEC 61508-3:2010, *Functional safety of electrical/electronic/programmable electronic safety-*
75 *related systems – Part 3: Software requirements*

76 IEC 62061:2021, *Safety of machinery – Functional safety of safety-related electrical, electronic*
77 *and programmable electronic control systems*

78 IEC 62683-2-3 DB, *Product data and properties for information exchange – Engineering data –*
79 *Part 2-3: Functional safety and reliability*

80 ISO 13849-1:2023, *Safety of machinery – Safety-related parts of control systems – Part 1:*
81 *General principles for design*

82 ISO 14119:2024, *Safety of machinery – Interlocking devices associated with guards – Principles*
83 *for design and selection*

84 ISO/IEC Guide 98-3:2008, *Uncertainty of measurement – Part 3: Guide to the expression of*
85 *uncertainty in Measurement (GUM)*

86 ISO/IEC Guide 99:2007, *International vocabulary of metrology – basic and general concepts*
87 *and associated terms (VIM)*

88 IEC Guide 115:2021, *Application of uncertainty of measurement to conformity assessment*
89 *activities in the electrotechnical sector*

90 **3 Terms and definitions**

91 For the purposes of this document, the terms and definitions given in IEC 60947-1 and
92 IEC 60947-5-2 and the following apply.

93 ISO and IEC maintain terminology databases for use in standardization at the following
94 addresses:

- 95 • IEC Electropedia: available at <https://www.electropedia.org/>
- 96 • ISO Online browsing platform: available at <https://www.iso.org/obp>

97 **3.1 General terms and definitions**

98 **3.1.1**

99 **PDDB proximity device with a defined behaviour**

100 proximity switch used as a safety-related sensing subsystem to detect the presence of an object
101 or the position of a part

102 Note 1 to entry: In a safety function, the PDDB is a device and a safety related subsystem characterized according
103 to clause 4.9 (Functional Safety Device Type).

104 Note 2 to entry: A PDDB is often used as interlocking device according to ISO 14119:2023, 3.1).

105 **3.1.2**

106 **interlocking device**

107 mechanical, electrical or other type of device, the purpose of which is to prevent the operation
108 of hazardous machine functions under specified conditions (generally as long as a guard is not
109 closed)

110 Note 1 to entry: An interlocking device may be combined with a guard locking device.

111 [SOURCE: ISO 14119:2024, 3.1]