
Nizkonapetostne stikalne in krmilne naprave - 6-2. del: Večfunkcijska oprema - Krmilne in zaščitne stikalne naprave (ali oprema) (CPS) (IEC 60947-6-2:2020 + COR1:2021)

Low-voltage switchgear and controlgear - Part 6-2: Multiple function equipment - Control and protective switching devices (or equipment) (CPS) (IEC 60947-6-2:2020 + COR1:2021)

Niederspannungsschaltgeräte - Teil 6-2: Mehrfunktions-Schaltgeräte - Steuer- und Schutz-Schaltgeräte (CPS) (IEC 60947-6-2:2020 + COR1:2021)

Appareillage à basse tension - Partie 6-2: Matériels à fonctions multiples - Appareils (ou matériel) de connexion de commande de protection (ACP) (IEC 60947-6-2:2020 + COR1:2021)

Ta slovenski standard je istoveten z: EN IEC 60947-6-2:2023

ICS:

29.130.20	Nizkonapetostne stikalne in krmilne naprave	Low voltage switchgear and controlgear
-----------	---	--

SIST EN IEC 60947-6-2:2023 en

EUROPEAN STANDARD

EN IEC 60947-6-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2023

ICS 29.120.40; 29.130.20

Supersedes EN 60947-6-2:2003;
EN 60947-6-2:2003/A1:2007

English Version

Low-voltage switchgear and controlgear - Part 6-2: Multiple
function equipment - Control and protective switching devices (or
equipment) (CPS)
(IEC 60947-6-2:2020 + COR1:2021)

Appareillage à basse tension - Partie 6-2: Matériels à
fonctions multiples - Appareils (ou matériel) de connexion
de commande de protection (ACP)
(IEC 60947-6-2:2020 + COR1:2021)

Niederspannungsschaltgeräte - Teil 6-2: Mehrfunktions-
Schaltgeräte - Steuer- und Schutz-Schaltgeräte (CPS)
(IEC 60947-6-2:2020 + COR1:2021)

This European Standard was approved by CENELEC on 2021-01-19. 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.

<https://standards.iteh.ai/catalog/standards/sist/f3d9462f-2e87-4675-8929->

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

EN IEC 60947-6-2:2023 (E)**European foreword**

The text of document 121A/384/FDIS, future edition 3 of IEC 60947-6-2, 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 60947-6-2:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2023-12-03 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2026-03-03 document have to be withdrawn

This document supersedes EN 60947-6-2:2003 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 given to CENELEC by the European Commission and the European Free Trade Association.

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

<https://standards.iteh.ai/catalog/standards/sist/f3d9462f-2e87-4675-8929-66e2948c68e9/sist-en-iec-60947-6-2-2023>

The text of the International Standard IEC 60947-6-2:2020 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 60034-12:2016 NOTE Approved as EN 60034-12:2017 (not modified)
- IEC 60034-30-1 NOTE Approved as EN 60034-30-1
- IEC 60068-2-2:2007 NOTE Approved as EN 60068-2-2:2007 (not modified)
- IEC 60076-1:2011 NOTE Approved as EN 60076-1:2011 (not modified)
- IEC 60079 (series) NOTE Approved as EN IEC 60079 (series)
- IEC 60269-1:2006 NOTE Approved as EN 60269-1:2007 (not modified)
- IEC 60269-2:2013 NOTE Approved as HD 60269-2:2013
- IEC 60381-1:1982 NOTE Approved as HD 452.1 S1:1984 (not modified)
- IEC 60664-1:2020 NOTE Approved as EN IEC 60664-1:2020 (not modified)
- IEC 60947-4-1:2018 NOTE Approved as EN IEC 60947-4-1:2019 (not modified)
- IEC 60990:2016 NOTE Approved as EN 60990:2016 (not modified)

IEC 61000-6-5	NOTE Approved as EN 61000-6-5
IEC 61032	NOTE Approved as EN 61032
IEC 61439 (series)	NOTE Approved as EN IEC 61439 (series)
IEC 61649:2008	NOTE Approved as EN 61649:2008 (not modified)
IEC 62061	NOTE Approved as EN IEC 62061
IEC 62477-1:2012	NOTE Approved as EN 62477-1:2012 (not modified) +A11:2014
IEC 62683-1	NOTE Approved as EN 62683-1
IEC/TR 63201	NOTE Approved as CLC IEC/TR 63201

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 60947-6-2:2023](https://standards.iteh.ai/catalog/standards/sist/f3d9462f-2e87-4675-8929-66e2948c68c9/sist-en-iec-60947-6-2-2023)

<https://standards.iteh.ai/catalog/standards/sist/f3d9462f-2e87-4675-8929-66e2948c68c9/sist-en-iec-60947-6-2-2023>

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where 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 60034-1	2017	Rotating electrical machines - Part 1: Rating and performance	-	-
IEC 60085	2007	Electrical insulation - Thermal evaluation and designation	EN 60085	2008
IEC 60417	-	Graphical symbols for use on equipment	-	-
IEC 60617	-	Graphical symbols for diagrams	-	-
IEC 60715	2017	Dimensions of low-voltage switchgear and controlgear - Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories	EN 60715	2017
IEC 60730-1	-	Automatic electrical controls - Part 1: General requirements	EN 60730-1	-
IEC 60947-1	2020	Low-voltage switchgear and controlgear - Part 1: General rules	EN IEC 60947-1	2021
IEC 60947-2	2016	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers	EN 60947-2	2017
+ A1	2019		+ A1	2020
IEC 60947-5-1	2016	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices	EN 60947-5-1	2017
IEC 61000-6-2	-	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments	EN IEC 61000-6-2	-
IEC 61051-2	-	Varistors for use in electronic equipment - Part 2: Sectional specification for surge suppression varistors	EN IEC 61051-2	-
CISPR 11	2015	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	EN 55011	2016

+ A1	2016		+ A1	2017
-	-		+ A11	2020
+ A2	2019		+ A2	2021
CISPR 32	-	Electromagnetic compatibility of multimedia equipment - Emission requirements	EN 55032	-
ISO 3864-2	-	Graphical symbols - Safety colours and safety signs - Part 2: Design principles for product safety labels	-	-

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 60947-6-2:2023](https://standards.iteh.ai/catalog/standards/sist/f3d9462f-2e87-4675-8929-66e2948c68c9/sist-en-iec-60947-6-2-2023)

<https://standards.iteh.ai/catalog/standards/sist/f3d9462f-2e87-4675-8929-66e2948c68c9/sist-en-iec-60947-6-2-2023>



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage switchgear and controlgear –
Part 6-2: Multiple function equipment – Control and protective switching devices
(or equipment) (CPS)**

**Appareillage à basse tension –
Partie 6-2: Matériels à fonctions multiples – Appareils (ou matériel) de connexion
de commande de protection (ACP)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.120.40; 29.130.20

ISBN 978-2-8322-9161-0

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	7
1 Scope.....	10
2 Normative references	10
3 Terms and definitions	11
3.1 General.....	11
3.2 Terms and definitions related to the equipment.....	12
3.3 Terms and definitions concerning characteristic quantities.....	13
3.4 Terms and definitions concerning safety aspects	14
4 Classification.....	15
5 Characteristics	15
5.1 Summary of characteristics.....	15
5.2 Type of equipment	15
5.2.1 Number of poles	15
5.2.2 Kind of current (alternating current or direct current).....	15
5.2.3 Method of operation.....	15
5.2.4 Method of control.....	16
5.2.5 Method of resetting after overload	16
5.2.6 Method of rearming after short-circuit	16
5.3 Rated and limiting values of the main circuit	16
5.3.1 Rated voltages	16
5.3.2 Currents and powers	16
5.3.3 Rated frequency	16
5.3.4 Rated duties	16
5.3.5 Normal load and overload characteristics – Rated making and breaking capacities	17
5.3.6 Short circuit characteristics – Rated service short-circuit breaking capacity (I_{CS}).....	17
5.3.7 Pole impedance of a CPS (Z).....	17
5.4 Utilization categories.....	17
5.4.1 General	17
5.4.2 Assignment of utilization categories based on the results of tests	18
5.4.3 Application of utilization categories for motor control duty.....	19
5.5 Control circuits.....	19
5.6 Auxiliary circuits.....	20
5.7 Relays or releases	20
5.7.1 Summary of characteristics.....	20
5.7.2 Types of relays or releases.....	20
5.7.3 Characteristic values	21
5.7.4 Designation and current setting of overload relays or releases	21
5.7.5 Time-current characteristics of over current relays or releases	21
5.7.6 Influence of ambient air temperature.....	22
6 Product information	22
6.1 Nature of information	22
6.1.1 Identification.....	22
6.1.2 Characteristics.....	22
6.2 Marking.....	23
6.3 Instructions for installation, operation and maintenance	24

6.4	Environmental information	24
7	Normal service, mounting and transport conditions	24
8	Constructional and performance requirements	25
8.1	Constructional requirements	25
8.1.1	General	25
8.1.2	Materials	25
8.1.3	Current-carrying parts and their connections	26
8.1.4	Clearances and creepage distances	26
8.1.5	Actuator	26
8.1.6	Indication of the contact position	27
8.1.7	Additional requirements for equipment suitable for isolation	27
8.1.8	Terminals	27
8.1.9	Additional requirements for equipment provided with a neutral pole	27
8.1.10	Provisions for protective earthing	27
8.1.11	Enclosures for equipment	27
8.1.12	Degrees of protection of enclosed equipment	28
8.1.13	Conduit pull-out, torque and bending with metallic conduits	28
8.1.14	Limited energy source	28
8.1.15	Stored charge energy circuit	30
8.1.16	Fault and abnormal conditions	30
8.1.17	Short-circuit and overload protection of ports	31
8.2	Performance requirements	31
8.2.1	Operating conditions	31
8.2.2	Temperature-rise	37
8.2.3	Dielectric properties	39
8.2.4	Performance under no load, normal load and overload conditions	39
8.2.5	Ability to make, carry and break short-circuit currents	45
8.2.6	Pole impedance	46
8.2.7	Leakage currents of equipment suitable for isolation	46
8.2.8	Coil power consumption	46
8.2.9	Co-ordination between a CPS and another short-circuit protective device	46
8.3	Electromagnetic compatibility (EMC)	46
8.3.1	General	46
8.3.2	Immunity	47
8.3.3	Emission	47
9	Tests	48
9.1	Kind of tests	48
9.1.1	General	48
9.1.2	Type test	48
9.1.3	Routine tests	48
9.1.4	Sampling tests	48
9.1.5	Special tests	48
9.2	Compliance with constructional requirements	49
9.2.1	General	49
9.2.2	Electrical performance of screwless-type clamping units	49
9.2.3	Ageing test for screwless-type clamping units	50
9.2.4	Limited energy source test	50
9.2.5	Breakdown of components	51

9.3	Compliance with performance requirements	51
9.3.1	Test sequences	51
9.3.2	General test conditions	52
9.3.3	Performance under no load, normal load and overload conditions.....	52
9.3.4	Performance under short-circuit conditions	61
9.4	EMC tests	63
9.4.1	General	63
9.4.2	Immunity.....	64
9.4.3	Emission.....	69
9.5	Test sequences	70
9.5.1	General	70
9.5.2	Test sequence I: temperature-rise, operating limits, dielectric properties	71
9.5.3	Test sequence II: performance under normal load and overload conditions	75
9.5.4	Test sequence III: operational performance before and after operating sequences at conventional prospective current I_{Cr} and conventional prospective current "r" test	76
9.5.5	Test sequence IV: operational performance before and after operating sequences at I_{CS}	77
9.5.6	Test sequence V: additional breaking capacity	78
9.5.7	Test sequence VI: additional test sequence for four-pole CPS's.....	78
9.5.8	Test sequence VII: additional test sequence for CPS's intended for use in an individual enclosure	79
9.5.9	Test sequence VIII: EMC	79
9.6	Routine tests.....	79
9.6.1	General	79
9.6.2	Operation and operating limits	80
9.6.3	Dielectric tests.....	80
Annex A (normative)	Special tests	81
A.1	General.....	81
A.2	Mechanical durability	81
A.2.1	General	81
A.2.2	Verification of mechanical durability.....	81
A.3	Electrical durability	83
Annex B (xxx)	Vacant	84
Annex C (normative)	Marking and identification of CPS terminals	85
C.1	General.....	85
C.2	Marking and identification of terminals of main circuits.....	85
C.2.1	General	85
C.2.2	Marking and identification of terminals of auxiliary circuits	85
Annex D (informative)	Items subject to agreement between manufacturer and user	86
Annex E (xxx)	Vacant	87
Annex F (normative)	Requirements for auxiliary contact linked with power contact (mirror contact)	88
F.1	Application and object.....	88
F.1.1	Application.....	88
F.1.2	Object.....	88
F.2	Terms and definitions.....	88
F.3	Characteristics.....	88

F.4	Product information.....	88
F.5	Normal service, mounting and transport conditions	89
F.6	Constructional and performance requirements	89
F.7	Tests	89
F.7.1	General	89
F.7.2	Tests on products in a new condition	89
F.7.3	Test after conventional operational performance (defined under Table 10) ...	90
Annex G (normative)	Test sequence for CPS's for IT systems	91
G.1	General.....	91
G.2	Individual pole short circuit	91
G.3	Verification of dielectric withstand	92
G.4	Verification of overload releases	92
G.5	Marking.....	92
Annex H (xxx)	Vacant	93
Annex I (informative)	Glossary of symbols and graphical representation of characteristics	94
Annex J (xxx)	Vacant	95
Annex K (normative)	Procedure to determine data for electromechanical CPS used in functional safety applications	96
K.1	General.....	96
K.2	Test requirements	96
K.3	Characterization of a failure mode	96
K.4	Failure ratios of a CPS	96
Annex L (xxx)	Vacant.....	98
Annex M (informative)	Load monitoring indicators.....	99
M.1	General.....	99
M.2	Indicators list	99
M.3	Uncertainty	101
M.4	Tests	102
M.4.1	Routine tests	102
M.4.2	Type tests.....	102
Annex N (normative)	Additional requirements and tests for equipment with protective separation.....	104
N.1	General.....	104
N.2	Terms and definitions.....	104
N.3	Requirements	104
N.3.1	Test method for implementing protective impedance.....	104
N.3.2	Touch current measurement	105
Bibliography	107
Figure 1	Multiple of current setting limits for ambient air temperature time-delay overload relays or releases (see 8.2.1.5.1)	34
Figure 2	Thermal memory test	36
Figure 3	Voltage drop measurement at contact point of the clamping terminal	50
Figure 4	Example of a pole impedance measurement for a three-pole CPS.....	59
Figure 5	Representation of test current produced by back-to-back thyristors.....	67
Figure 6	Test current for the verification of the influence of the current dips and interruptions.....	68

Figure F.1 – Mirror contact.....	89
Figure M.1 – Example of quantification of a process change.....	101
Figure N.1 – Protection by means of protective impedance.....	105
Figure N.2 – Measuring instrument.....	106
Table 1 – Utilization categories.....	18
Table 20 – Limits for limited energy sources without an over-current protective device.....	29
Table 21 – Limits for limited energy sources with an over-current protective device.....	29
Table 22 – Limits for limited energy source with current limiting impedance.....	30
Table 2 – Limits of operation of inverse time-delay overload relays or releases when energized on all poles.....	33
Table 3 – Trip classes of overload relays or releases for utilization categories AC-2, AC-3, AC-3e, AC-4, DC-3, DC-5.....	34
Table 4 – Limits of operation of three-pole inverse time-delay overload relays or releases when energized on two poles only.....	35
Table 5 – Temperature-rise limits of terminals.....	37
Table 6 – Temperature-rise limits for insulated coils in air.....	38
Table 7 – Intermittent duty test cycle data.....	38
Table 8 – Rated making and breaking capacities – Making and breaking conditions corresponding to the utilization categories.....	40
Table 9 – Relationship between current broken I_C and OFF-time for the verification of rated making and breaking capacities.....	41
Table 10 – Conventional operational performance after making/breaking capacity tests – Making and breaking conditions according to utilization category.....	43
Table 11 – Operational performance before and after short-circuit tests at I_{CR} and I_{CS} – Making and breaking conditions according to utilization category.....	44
Table 12 – Value of the prospective test current according to the rated operational current.....	45
Table 13 – Value of the prospective test current according to the rated operational current (harmonized table).....	46
Table 14 – Performance criteria when EM disturbances are present.....	47
Table 15 – EMC immunity tests.....	64
Table 16 – Test parameters for harmonics and interruptions.....	68
Table 17 – Terminal disturbance voltage limits for conducted radio-frequency emission (for mains ports).....	69
Table 18 – Radiated emission test limits.....	70
Table 19 – Test sequences.....	70
Table F.1 – Test voltage according to altitude.....	90
Table G.1 – Individual pole.....	91
Table K.1 – Failure mode of CPS.....	96
Table K.2 – Typical failure ratios for CPS.....	97
Table M.1 – AC monitoring indicators list.....	100
Table M.2 – Different possibilities authorized for verification of indicators.....	102
Table M.3 – Reference for verification conditions.....	103
Table M.4 – Harmonic levels.....	103

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 6-2: Multiple function equipment –
Control and protective switching devices (or equipment) (CPS)**

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) 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.

International Standard IEC 60947-6-2 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 third edition cancels and replaces the second edition published in 2002 and its Amendment 1:2007. This edition constitutes a technical revision.

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

- editorial changes according to ISO/IEC directives Part 2,
- alignments with IEC 60947-1:2020:
 - markings ("s", "sol", "r" or "f");
 - constructional requirements including material requirements;
 - requirements for screwless terminals;