SLOVENSKI STANDARD
oSIST prEN IEC 60669-2-1:2019

01-april-2019

Stikala za gospodinjstva in podobne nepremične električne inštalacije - 2-1. del: Posebne zahteve - Elektronska stikala

Switches for household and similar fixed electrical installations - Part 2-1: Particular requirements - Electronic switches

Schalter für Haushalt und ähnliche ortsfeste elektrische Installationen - Teil 2-1: Besondere Anforderungen - Elektronische Schalter

Interrupteurs pour installations électriques fixes domestiques et analogues - Partie 2-1: Prescriptions particulières - Interrupteurs électroniques

Ta slovenski standard je istoveten z: **prEN IEC 60669-2-1:2019**

ICS:

29.120.40	Stikala	Switches

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IEC SC 23B : PLUGS, SOCKET-OUTLETS AND SWITCHES

SECRETARIAT:	SECRETARY:
Italy	Mr Cristiano Masini
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD:
TC 34	☐
	Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☒ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY

☒ SUBMITTED FOR CENELEC PARALLEL VOTING ☐ NOT 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.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Switches for household and similar fixed electrical installations - Part 2-1: Particular requirements - Electronic switches

PROPOSED STABILITY DATE: 2023

NOTE FROM TC/SC OFFICERS:

This document includes the following main changes:

- Complete proposal for merging IEC 60669-2-1 ed.4.2 and IEC 60669-2-5 ed.1.0
- All modifications approved by MT 6 as indicated in document 23B/1272A/CC
- Inputs from SC3C

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Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic control devices

1 Scope

This Clause of Part 1 is completely replaced by:

This Part of IEC 60669 applies to electronic control devices which is used as a general term to cover electronic switches, HBES/BACS switches and electronic extension units.

It applies to electronic switches and to HBES/BACS switches, for alternating current (AC) only with a rated switching voltage not exceeding 250 V and a rated current not exceeding 16 A, intended for household and similar fixed electrical installations, either indoors or outdoors.

It also applies to electronic extension units with a rated supply voltage not exceeding 250 V AC and 120 V DC, such as sensors and push buttons controlling the electronic switches, or the HBES/BACS switches or similar control devices used in lighting systems in the building environment.

NOTE 1 An example of lighting systems is DALI.

This Part of IEC 60669 also applies to electronic RCS and electronic TDS. Particular requirements are given in Annex FF.

Switches including only passive components such as resistors, capacitors, inductors, PTC and NTC components, varistors, printed wiring boards and connectors are not considered as electronic control devices.

This Part of IEC 60669 also applies to electronic switches and HBES/BACS switches for the operation of lighting equipment circuits and the control of the brightness of lighting equipment (dimmers) as well as the control of the speed of motors (for example, those used in ventilating fans) and for other purposes (for example, heating controls).

The operation and/or control as mentioned above may be transmitted by an electronic signal via several media, e.g. powerline (mains), twisted pair, optical fibre, radio frequency, infra-red, etc. and are performed:

- intentionally by a person via an actuating member, a key, a card, etc., via a sensing surface or a sensing unit, by means of touch, proximity, turn, optical, acoustic, thermal;
- by physical means, e.g. light, temperature, humidity, time, wind velocity, presence of people;
- by any other influence.

This standard covers only those requirements for mounting boxes which are necessary for the tests on the electronic control devices.

Requirements for general purpose mounting boxes are given in IEC 60670.

This standard is not intended to cover devices falling within the scope of IEC 60730.

Electronic control devices complying with this standard are suitable for use at ambient temperature not normally exceeding 25 °C but occasionally reaching 35 °C with a lower limit of the ambient air temperature of –5 °C.

NOTE 2 For lower temperatures see ANNEX E.

Functional safety aspects are not covered by this standard. Functional safety requirements are covered by the standards of the controlled devices.

In locations where special conditions prevail, such as in ships, vehicles and the like and in hazardous locations, for example where explosions are liable to occur, special construction and/or additional requirements may be required.

NOTE 3 This standard is not intended to cover devices which are designed to be incorporated in appliances or are intended to be delivered together with a specific appliance and which are within the scope of IEC 60730 or IEC 61058-1.

Examples of designs of electronic switches and functions are shown in annex AA.

NOTE 4 Electronic switches and HBES/BACS switches without a mechanical switch in the main circuit do not provide a "full off-state". Therefore, the circuit on the load side should be considered to be live.

2 Normative references

This Clause of Part 1 applies except as follows.

Addition:

IEC 60050 (all parts) International Electrotechnical Vocabulary, available at: <http://www.electropedia.org>

IEC 60127 (all parts) *Miniature fuses*

IEC 60317 (all parts) *Specifications for particular types of winding wires*

IEC 60317-0-1:2013 *Specifications for particular types of winding wires – Part 0: General requirements – Section 1: Enamelled round copper wire1)*

IEC 60364-4-41 *Low-voltage electrical installations– Part 4-41: Protection for safety - Protection against electric shock*

IEC 60384-14 *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60664-1:2007 *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3 *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60669-1:2017 *Switches for household and similar fixed-electrical installations – Part 1: General requirements*

IEC 60669-2-2:2006 *Switches for household and similar fixed electrical installations – Part 2-2: Particular requirements - Electromagnetic remote-control switches (RCS)*

IEC 60669-2-3:2006 *Switches for household and similar fixed electrical installations – Part 2-3: Particular requirements - Time-delay switches (TDS)*

IEC 60670 (All parts) *Boxes and enclosures for electrical accessories for household and similar fixed electrical installations – Part 1: General requirements*

IEC 60715 *Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations*

IEC 60730 (all parts) *Automatic electrical controls for household and similar use*

IEC 60990 *Methods of measurement of touch current and protective conductor current*

IEC 60999-1 *Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units - Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm^2 up to 35 mm^2*

IEC 61000-2-2 *Electromagnetic compatibility (EMC) – Part 2-2: Environment – Compatibility levels for low-frequency conducted disturbances and signaling in public low-voltage power supply systems*

IEC 61000-3-2:2018 *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16A per phase) 1)*

IEC 61000-3-3:2017 *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 61000-4-2 *Electromagnetic compatibility (EMC) − Part 4: Testing and measurement techniques − Section 2: Electrostatic discharge immunity test 1)*

IEC 61000-4-3 *Electromagnetic compatibility (EMC) − Part 4-3: Testing and measurement techniques − Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4 *Electromagnetic compatibility (EMC) − Part 4: Testing and measurement techniques − Section 4: Electrical fast transient/burst immunity test*

IEC 61000-4-5 *Electromagnetic compatibility (EMC) − Part 4: Testing and measurement techniques − Section 5: Surge immunity test 1)*

IEC 61000-4-6 Electro*magnetic compatibility (EMC) − Part 4: Testing and measurement techniques − Section 6: Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8 *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 8: Power frequency magnetic field immunity test*

IEC 61000-4-11 Electromagnetic compatibility (EMC) − Part 4: Testing and measurement techniques − Section 11: Voltage dips, short interruptions and voltage variations immunity tests

IEC 61000-4-20:2010 *Electromagnetic compatibility (EMC) – Part 4-20: Testing and measurement techniques – Emission and immunity testing in transverse electromagnetic (TEM) waveguides*

IEC 61058-1:2016 *Switches for appliances – Part 1: General requirements*

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

IEC 61558-2-6 *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*

IEC 61558-2-16 *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V - Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units*

IEC 62756-1 *Digital load side transmission lighting control – Part 1: Basic requirements*

CISPR 14-1:2016 *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus*

CISPR 15:2018 *Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment*

CISPR 32:2015 *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

ISO 306:2013 *Plastics – Thermoplastic materials – Determination of Vicat softening temperature (VST)*

IEC 63044-3:2017 *Home and Building Electronic Systems (HBES) and Building Automation and Control Systems (BACS) - Part 3: Electrical safety requirements*

3 Terms and definitions

This Clause of Part 1 applies except as follows.

Add the following definitions:

3.101

electronic switch
stand-alone device designed to make or break and/or control directly the current in one or more electric circuits either through mechanical switching element(s) via an electronic control circuit, or through an electronic switching element via a mechanical / electronic control circuit.

NOTE 1 to entry A stand-alone device can still be controlled remotely via RF, IR or a dedicated electronic extension unit.

NOTE 2 to entry To make or break and/or to control directly means that an actuator makes or breaks the current and/or controls the current.

3.102
HBES/BACS
combination of HBES/BACS products (including their separate connected/detachable devices) linked together via one or more HBES/BACS networks

NOTE 1 to entry Other names used such as "home control network", "home control systems", "home and building electronic systems", "building systems", "building automation system", etc. describe types of HBES/BACS system.

[SOURCE: IEC 63044-1: 2017, 3.1.3]

3.103
HBES/BACS switch
network operated electronic device intended to be used in an HBES/BACS, using two-way communication and designed to make or break and/or to control directly the current in one or more electric circuits

NOTE 1 to entry The communication can use different media e.g. Twisted Pair (TP), Power Line (PL), Infra-Red (IR) and Radio Frequency (RF).

NOTE 2 to entry To make or break and/or to control directly means that an actuator makes or breaks the current and/or controls the current.

3.104
electronic extension unit
a device connected to an electronic switch, a HBES/BACS switch, and lighting products used in lighting systems in the building environment in order to remotely control and/or to monitor the electronic switch, the HBES/BACS switch, and lighting products used in lighting systems in the building environment

NOTE 1 to entry The electronic extension unit does not control directly the current in one or more circuits (e.g. sensors, HBES/BACS push buttons, status display)

3.105
ELV
Extra-Low Voltage

nominal voltage in the electrical installation of buildings according to the voltage band I specified in IEC 61140:2016

NOTE 1 to entry Voltage band I according to IEC 61140 is a voltage below or equal to 50 V a.c. or 120 V d.c.

[SOURCE: IEC 63044-3:2017, 3.1.7]

3.106
FELV
Functional Extra-Low Voltage
electrical circuit in which the nominal voltage cannot exceed ELV under normal conditions

NOTE 1 to entry FELV has simple separation from mains.

NOTE 2 to entry A FELV circuit is not safe to touch and may be connected to protective earth.

[SOURCE: IEC 63044-3:2017, 3.1.9]

3.107
SELV circuit
Safety Extra-Low-Voltage circuit
electrical circuit in which the nominal voltage cannot exceed ELV
– under normal conditions,
– under single-fault conditions, including earth fault in other circuits

NOTE 1 to entry SELV has simple separation from PELV and other SELV systems, and earth and protective separation from all other circuits.

NOTE 2 to entry Under normal conditions and single-fault conditions in a dry location inside a building, a SELV circuit with a voltage not higher than 25 V AC or 60 V DC is safe to touch.

[SOURCE: IEC 63044-3:2017, 3.1.10]

3.108
PELV circuit
Protected Extra-Low-Voltage circuit
electrical circuit in which the nominal voltage cannot exceed ELV
– under normal conditions,
– under single-fault conditions, except earth fault in other circuits

NOTE 1 to entry PELV has protective separation from all circuits other than PELV, SELV or earth.

NOTE 2 to entry PELV circuit is safe to touch within the same equipotential bonding area inside a building under the following conditions: under normal and single-fault conditions in dry locations and with no large contact area with a voltage not higher than 25 V AC or 60 V DC; otherwise not higher than 12 V AC or 30 V DC.

[SOURCE: IEC 63044-3:2017, 3.1.11]

3.109
simple separation
separation between circuits or between a circuit and earth by means of basic insulation

[SOURCE: IEC 63044-3:2017, 3.1.12]

3.110
protective separation
separation of one electric circuit from another by means of
– double insulation, or
– basic insulation and protective screening, or
– reinforced insulation

[SOURCE: IEC 63044-3:2017, 3.1.13]

3.111
basic insulation
insulation of hazardous-live-parts which provides basic protection

NOTE 1 to entry This concept does not apply to insulation used exclusively for functional purposes.

[SOURCE: IEC 63044-3:2017, 3.1.14]

3.112
supplementary insulation
independent insulation applied in addition to basic insulation, for fault protection

[SOURCE: IEC 63044-3:2017, 3.1.16]

3.113
double insulation
insulation comprising both basic insulation and supplementary insulation

[SOURCE: IEC 63044-3:2017, 3.1.15]

3.114
reinforced insulation
insulation of hazardous-live-parts which provides a degree of protection against electric shock equivalent to double insulation

NOTE 1 to entry Reinforced insulation may comprise several layers which cannot be tested singly as basic insulation or supplementary insulation

[SOURCE: IEC 63044-3:2017, 3.1.18]

3.115
rated load
load assigned to the electronic switch, HBES/BACS switch, electronic TDS switch or electronic RCS switch by the manufacturer

3.116
minimum load
lowest load at which the electronic switch, HBES/BACS switch, electronic TDS switch or electronic RCS switch still operates correctly

3.117
minimum current
lowest current at which the electronic switch, HBES/BACS switch, electronic TDS switch or electronic RCS switch still operates correctly

3.118
electromechanically operated contact mechanism
component which operates the parts used to open and close the circuit electromechanically

3.119
semiconductor switching device
switching device designed to make or break the current in an electric circuit by means of the controlled conductivity of a semiconductor in that circuit

NOTE 1 to entry In a circuit where the current passes through zero (periodically or otherwise) the effect of “not making” the current following such a zero value is equivalent to breaking the current.

NOTE 2 to entry Typical examples of semiconductor switching devices are:

− electronic switching devices using the phase-cut-on principle to control the load by electronic switching on the current at any phase angle at or after zero crossing in each half-wave, for example, by a thyristor;

− electronic switches or HBES/BACS switches using the phase-cut-off principle to control the load by switching off the current at any phase angle after zero crossing in each half-wave, for example, by a transistor in a diode bridge.

3.120
mechanical control unit
unit directly adjustable by mechanical means (for example, potentiometer) which controls the output via electronic components

3.121
electronic output control unit
unit adjustable by other than mechanical means (for example, sensing unit), containing electronic components and controlling the output via electronic components

3.122
protective impedance
impedance connected between hazardous live parts and accessible conductive parts, of such value that the current, in normal use and under likely fault conditions in the electronic switch, is limited to a safe value, and which is so constructed that the reliability is maintained throughout the life of the electronic switch or HBES/BACS switch.

3.123
external flexible cable
cable, a part of which is external to the electronic output control unit.

NOTE 1 to entry Such cable may either be a supply cable or a connecting cable between separate parts of an accessory.

3.124
live part
conductive part intended to be energized in normal operation

3.125
hazardous live part
live parts with a voltage higher than 25 V AC or 60 V DC ripple free in dry conditions or 12 V AC or 30 V DC in wet conditions

NOTE 1 to entry Ripple free is conventionally an r.m.s. ripple voltage not more than 10 % of the DC component

3.126
Looping through function
means on the line or both line and neutral terminals to power other devices in the circuit

4 General requirements

This Clause of Part 1 applies.

5 General remarks on tests

This Clause of Part 1 applies except as follows.

Replace Table 1 by the following:

Table 1 – Number of specimens needed for the tests

	Clauses and subclauses	Number of specimens	Notes
6	Ratings	A	
7	Classification	A	
8	Marking	A	
9	Checking of dimensions	ABC	
10	Protection against electric shock	ABC	a
11	Provision for earthing	ABC	b
12	Terminals	ABC	c, d, e
13	Constructional requirements	ABC	f, g
14	Mechanism	ABC	
15	Resistance to ageing, protection provided by enclosures of switches, and resistance to humidity	ABC	
16	Insulation resistance and electric strength	ABC	h
17	Temperature rise	ABC	
18	Making and breaking capacity	ABC	i, j
19	Normal operation	ABC	i, j
20	Mechanical strength	ABC	k, l
21	Resistance to heat	ABC	m
22	Screws, current-carrying parts and connections	ABC	
23	Creepage distances, clearances and distances through sealing compound	ABC	
24	Resistance of insulating material to abnormal heat, to fire and to tracking	DEF	n, o
25	Resistance to rusting	DEF	
26	EMC requirements	G	
101	Abnormal conditions	HIJ	p, q, r
102	Components	HIJ	s
	TOTAL	10	

One extra set of specimens of touch sensitive electronic control devices with a protective impedance may be used for the tests of 10.2.

One extra set of specimens of electronic control devices with printed conductors used to provide protective earthing continuity is needed for the tests of 11.101.

Five extra screwless terminals are used for the test of 12.3.11 and one extra set of specimens is used for the test of 12.3.12.

Two extra set of specimens of terminals suitable for rigid and flexible conductors are required for 12.2.5, 12.2.6 and 12.2.7.

Number of specimens required for insulation-piercing terminals (IPTs) are shown in Table D.1.

An extra set of membranes are needed for each of the tests of 13.15.1 and 13.15.2.

For switches with pilot light units if the electronic circuitry is so enclosed that the short-circuiting or disconnecting of components is impossible or difficult, the manufacturer shall provide additional prepared test specimens.

One extra set of specimens of switches fitted with pilot light may be used for the tests of Clause 16.

Only the complete contact mechanism may be submitted.

For electronic switches and HBES/BACS switches with mechanical and electromechanical switching devices, one extra set of specimens is needed for each additional type of load (see also Table 103).

One extra set of specimens of cord-operated switches is needed for the test of 20.10.

Extra sets of specimens are needed for the tests of 20.5.2 and 20.5.3.

One extra set of specimens may be used for the tests of 21.2 and 21.3. In this case the specimens shall be subjected first to the tests of 15.1.

The test is made on one specimen (D). In case of doubt, the test shall be repeated on two further specimens (E and F).

For electronic control devices with an IP code higher than IPX0, one extra set of specimens may be used for the test of 24.2.

It may be necessary to provide 3 additional specimens for the test of 101.1.1.2.

It may be necessary to provide 6 additional set of 3 specimens for the test of 101.3.

It may be necessary to provide 3 additional specimens for the test of 101.5.

For electronic control devices with a cut-out, one extra set of specimens may be used for the tests of 102.4.1.1 or 102.4.1.2.

5.101 Particular requirements

All measurements shall be carried out by methods which are suitable for the purpose, which do not appreciably affect the values to be measured and which are not affected by factors such as waveform.

NOTE Care should be taken to use instruments giving true r.m.s. indications.

If the electronic circuitry is so enclosed that the short-circuiting or disconnecting of components is impossible or difficult, the manufacturer shall provide one additional test specimen with leads connected for measurements, short-circuiting, etc.

It is not necessary to connect leads to the interior of hybrid and monolith integrated circuits.

It may be necessary to disconnect electronic components for tests.

For electronic switches and HBES/BACS switches equipped with cut-outs, it may be necessary to provide three additional specimens for the test of 102.4.1.

6 Ratings

This Clause of Part 1 applies except as follows.

Replacement and additions:

6.1 Rated voltage

Preferred rated voltages of the load circuits are 110 V, 120 V, 130 V, 220 V, 230 V and 240 V.

NOTE:For electronic extension units other AC or DC voltages are common for the power supply and communication

6.2 Rated current

This subclause of Part 1 does not apply.

6.3 Preferred combinations of number of poles and ratings

This subclause of Part 1 does not apply.

6.101 Preferred rated supply frequency

The preferred rated supply frequencies are 50 Hz and/or 60 Hz.

7 Classification

This Clause of Part 1 applies except as follows.

7.5 according to the method of actuating the switch:

Addition:

– touch;
– proximity;
– optical;
– acoustic;
– other external influences.

NOTE Actuating the electronic control devices includes on/off operation, and/or regulating the brightness of lamps or speed of motors.

7.6 according to the method of mounting the switch:

Addition:

– electronic control devices only intended to be mounted at a height greater than 1,7 m.

7.7 according to the method of installation, as a consequence of the design of the switch:

Addition:

NOTE This classification is not applicable for SELV electronic control devices

7.8 according to the type of terminal:

Addition:

– electronic control devices without terminals equipped with connecting leads.

Add the following new classifications:

7.101 according to the type of product:

– electronic control devices classified as electronic switch

– electronic control devices classified as HBES/BACS switch

– electronic control devices classified as electronic extension unit

NOTE The classification is given by the manufacturer

7.102 according to the kind of load intended to be controlled by the electronic switch or HBES/BACS switch:

7.102.1 for general purpose use according to Part 1 up to and including 16 A

7.102.2 for dedicated loads:

– incandescent lamps;

– externally ballasted lamps (e.g. fluorescent lamps, CFL, LED);

– motors;

– self ballasted lamps (e.g. CFLi, LEDi);

– load for heating installations (e.g. resistive load, a motor load with a power factor not less than 0,6 or a combination of both);

– declared load.

7.103 according to the presence of SELV, PELV or FELV parts:

– electronic control devices with SELV, PELV or FELV parts only,

– electronic control devices without SELV, PELV or FELV parts,

– electronic control devices having a combination of parts connected to the mains and SELV, PELV or FELV parts.

7.104 according to the installation environment:

– electronic control devices intended to be used in SELV/PELV environment only;

– electronic control devices intended to be used in FELV environment only;

– electronic control devices intended to be used in SELV/PELV, FELV and/or mains environment.

7.105 according to the connection to the network port based on SELV/PELV:

– connected to a network which is installed wholly within the same equipotential earthing system;

– connected to a network which is not installed wholly within the same equipotential earthing system.

7.106 according to the electrical interface for mains voltage phase-cut dimmers:

– electronic switches and HBES/BACS switches with the standardized electrical interface;

– electronic switches and HBES/BACS switches with a non-standardized electrical interface.

8 Marking

This Clause of Part 1 applies except as follows.