

Switches for household and similar fixed electrical installations—

Part 2-1: Particular requirements — Electronic switches

ICS 29.120.40

National foreword

This British Standard is the UK implementation of EN 60669-2-1:2004+A12:2010, incorporating corrigendum December 2007. It is derived from IEC 60669-2-1:2002, incorporating amendment 1:2008 and corrigendum May 2012. It supersedes BS EN 60669-2-1:2004+A12:2010 which will be withdrawn on 1 June 2013.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags [C] [C].

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by [A1] [A1].

Where a common modification to an IEC amendment has been introduced, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC to IEC amendment 1 are indicated by [C1] [C1].

Where a common modification has been introduced by amendment, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC amendment A12 are indicated by [C12] [C12].

The National Annex NA reproduces Interpretation Sheets December 2011 and February 2012, issued by IEC.

The UK participation in its preparation was entrusted to Technical Committee PEL/23, Electrical accessories.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Amendments/corrigenda issued since publication

Date	Comments
30 April 2008	Implementation of CENELEC corrigendum December 2007 (replacement of the reference of the Swedish A-deviation)
31 December 2009	Supersession information updated
30 November 2010	Implementation of IEC amendment 1:2008 with CENELEC modifications, and implementation of CENELEC amendment A12:2010
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Switches for household and similar fixed electrical installations
Part 2-1: Particular requirements –
Electronic switches
(IEC 60669-2-1:2002+A1:2008, modified)

Interrupteurs pour installations électriques
fixes domestiques et analogues
Partie 2-1: Prescriptions particulières -
Interrupteurs électroniques
(CEI 60669-2-1:2002+A1:2008, modifiée)

Schalter für Haushalt und ähnliche
ortsfeste elektrische Installationen
Teil 2-1: Besondere Anforderungen -
Elektronische Schalter
(IEC 60669-2-1:2002+A1:2008, modifiziert)

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CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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Foreword

The text of the International Standard IEC 60669-2-1:2002, prepared by SC 23B, Plugs, socket-outlets and switches, of IEC TC 23, Electrical accessories, together with the common modifications prepared by the Technical Committee CENELEC TC 23B, Switches for household and similar fixed electrical installations, was submitted to the formal vote and was approved by CENELEC as EN 60669-2-1 on 2004-07-01.

This European Standard supersedes EN 60669-2-1:2000 + A2:2001 + IS1:2004.

This part 2-1 of EN 60669 is to be used in conjunction with EN 60669-1:1999. It lists the changes necessary to convert that standard into a specific standard for electronic switches.

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) 2005-07-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2009-07-01

This European Standard was prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and supports the essential requirements of Directive 89/336/EEC.

Annexes ZA, ZB and ZC have been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60669-2-1:2002 was approved by CENELEC as a European Standard with agreed common modifications.

Foreword to amendment A1

The text of document 23B/894/FDIS, future amendment 1 to IEC 60669-2-1:2002, prepared by SC 23B, Plugs, socket-outlets and switches, of IEC TC 23, Electrical accessories, was submitted to the IEC-CENELEC parallel vote.

A draft amendment (FprA11) prepared by the Technical Committee CENELEC TC 23BX, D.C. plugs and socket outlets and switches for household and similar fixed electrical installations, was submitted to the Unique Acceptance Procedure.

The combined texts were approved by CENELEC as amendment A1 to EN 60669-2-1:2004 on 2009-04-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2012-04-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of amendment 1:2008 to the International Standard IEC 60669-2-1:2002 was approved by CENELEC as an amendment to the European Standard with agreed common modifications.

Foreword to amendment A12

This amendment to the European Standard EN 60669-2-1:2004 was prepared by the Technical Committee CENELEC TC 23BX, D.C. plugs and socket outlets and switches for household and similar fixed electrical installations.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A12 to EN 60669-2-1:2004 on 2010-06-01.

The amendment A11 was merged within EN 60669-2-1:2004/A1:2009.

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

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2011-06-01
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SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 2-1: Particular requirements – Electronic switches

1 Scope

This clause of part 1 applies except as follows.

Replacement:

This standard applies to electronic switches and to associated electronic extension units for household and similar fixed electrical installations either indoors or outdoors.

It applies to electronic switches for a.c. only, for the operation of lamp circuits and the control of the brightness of lamps (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), with a rated voltage not exceeding 250 V and a rated current not exceeding 16 A.

A1 The operation and/or control as mentioned **A1** above are performed by a person via an actuating member, a sensing surface or a sensing unit, by means of touch, proximity, turn, optical, acoustic, thermal or any other influence.

A1 This standard also applies to general purpose electronic switches with included automatic functions where the operation and/or the control is initiated by a change of a physical quantity, for example light, temperature, humidity, time, wind velocity, presence of persons, etc. **A1**

This standard also applies to boxes for electronic switches, with the exception of mounting boxes for flush-type electronic switches.

A1 This standard also applies to electronic RCS and electronic TDS with a rated voltage not exceeding 440 V and a rated current not exceeding 25 A, intended for household and similar fixed electrical installations, either indoors or outdoors.

NOTE 1 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 switches.

NOTE 2 Electronic switches may have control circuits with a.c. or d.c. rated control voltages. **A1**

Electronic switches complying with this standard are suitable for use at ambient temperature not normally exceeding 25 °C but occasionally reaching 35 °C.

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 constructions may be required.

NOTE **A1** 3 **A1** 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 **A1** 4 **A1** Electronic 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

- [A1]** 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 60317 (all parts), *Specifications for particular types of winding wires*

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 60669-2-2:2006, *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 60998-2-1, *Connecting devices for low-voltage circuits for household and similar purposes - Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units*

IEC 61558-2-6, *Safety of power transformers, power supply units and similar – Part 2: Particular requirements for safety isolating transformers for general use* **[A1]**

- [C]** NOTE Normative references to international publications are listed in Annex ZA (normative). **[C]**

3 Definitions

This clause of part 1 applies with the following additions.

Addition, after the first paragraph:

The term “electronic switch” is used as a general term to cover both electronic switching and control devices.

3.101

rated load

load assigned to the electronic switch by the manufacturer

3.102

minimum load

lowest load at which the electronic switch still operates correctly

3.103

minimum current

lowest current at which the electronic switch still operates correctly

3.104

electromechanically operated contact mechanism

component which operates the parts used to open and close the circuit electromechanically

3.105

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 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 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 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.

3.106

electronic momentary contact switch

electronic switch with an electromechanical switching mechanism or a semiconductor switching device which returns automatically to the initial state after operation

3.107**mechanical control unit**

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

3.108**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

3.109**electronic extension unit**

unit permitting the control of an electronic switch from a distance

3.110**protective impedance**

impedance connected between 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.

3.111**external flexible cable**

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

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

A1 3.112**RCS****remote controlled switch**

switch intended to be operated from a distance

3.112.1**electromagnetic RCS**

RCS provided with a coil which is operated by means of impulses or which may be permanently energized by means of a control circuit

NOTE These devices are covered by IEC 60669-2-2.

3.112.2**electronic RCS**

electronic switch providing the function, markings and connection configuration of an RCS according to IEC 60669-2-2, but containing electronic components and/or a combination of electronic components and a coil or coils, which is operated by means of an electronic extension unit or units

NOTE This electronic RCS may for example be used as a look alike replacement for RCS according to IEC 60669-2-2.

3.113**rated control voltage**

the voltage assigned to the external control circuit by the manufacturer

3.114**switching circuit**

the circuit which contains the parts which allow the rated current to flow through the RCS or TDS

3.115**control circuit**

the circuit which includes electrical parts to actuate the switching mechanism

3.116**control mechanism**

mechanism which includes all the parts which are intended for the operation of the RCS or TDS **A1**

A1 3.117**incorporated hand-operated device**

device incorporated in the switch which allows the switching circuit to be operated, directly or indirectly. This device is not intended for the normal operation of the RCS or TDS

3.118**rated control current**

current required for the initiation of the electronic RCS assigned to the control circuit by the manufacturer

3.119**bistable electronic RCS**

electronic RCS containing a control mechanism which, when not initiated electrically or actuated mechanically, remains stable in its operating position and will change its operating position on initiation or actuation

3.120**monostable electronic RCS**

electronic RCS containing a control mechanism which, on electrical initiation or mechanical actuation, changes the operating position of the switch which remains in this condition while the electronic RCS is initiated or actuated, and returns to the position prior to initiation or actuation of the electronic RCS after initiation or actuation is discontinued

3.121**priority electronic RCS**

electronic RCS used to operate directly or indirectly a first load circuit or group of load circuits the use of which at times can be dispensed with, and where the control circuit of the electronic RCS is influenced by or connected to a second circuit or group of circuits (priority or circuits) which when energized will thus initiate the control circuit of the electronic RCS to de-energize the first load circuit or circuits for the time during which the second circuit or group of circuits is energized

NOTE The electronic RCS may have a means for adjusting the sensitivity of the electronic RCS control circuit to initiate the electronic RCS depending on the total load or current delivered to any part of the circuits (priority switch with current coil) or be sensitive to the voltage (priority switch with voltage coil) applied to the second load or group of loads.

3.122**TDS****time delayed switch**

switch provided with a time-delay device which operates for a certain time (the delay time). It may be either manually actuated and/or remotely electrically initiated

3.123**electronic TDS**

electronic switch providing the function, markings and connection configuration of a TDS according to IEC 60669-2-3, but containing electronic components

NOTE This electronic TDS may for example be used as a look alike replacement for TDS according to IEC 60669-2-3.

3.124**delay time**

period during which the switching circuit(s) is (are) kept closed. Any time taken for the decreasing of the voltage (e.g. to reduce the light) at the end of the delay period is included within the delay time

3.125**delay device**

all components which have an influence on the delay time. The delay time may be adjustable 

4 General requirements

This clause of part 1 applies.

5 General notes on tests

This clause of part 1 applies except as follows.

5.4 Addition

The number of test specimens is shown in table 101.

Table 101 – Number of specimens

Type of electronic switch	Number for general tests	Additional specimens for clause or subclause					
		18.2	19.101	19.102	24	26	101 and 102
Marked with one rated current and							
– one rated voltage	3	3 ^a	3 ^a	3 ^a	3	3	3 ^c
– two rated voltages	6	6 ^a	6 ^a	6 ^a	6	6	6 ^{b,c}
^a Only for electronic switches with mechanical and electromechanical switching devices; only the complete contact mechanism may be submitted. ^b It may be necessary to provide three additional specimens for the test of 101.3. ^c When the tests of Clause 26 have been passed successfully, the specimens can be used for these tests.							

A1

5.101 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.

5.102 *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.

5.103 *It may be necessary to disconnect electronic components for tests.*

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

A1 5.105 If an electronic RCS or electronic TDS is provided with an incorporated hand-operated device, it shall be tested as specified in Clause 19.

NOTE 1 During the making and breaking capacity tests and the normal operation tests, switching at the same phase angle should be avoided, as this may give misleading results.

NOTE 2 Precautions should be taken when using combinations equipped with synchronous motors and similar operating devices.

5.106 In the case of an electronic TDS for which the control and the switching circuits have no common point, the test is made with the circuits supplied with the rated voltages which are declared by the manufacturer. **A1**

6 Rating

This clause of part 1 applies except as follows.

A1 Addition:

For electronic RCS, Clause 6 of IEC 60669-2-2 is applicable.

For electronic TDS, Clause 6 of IEC 60669-2-3 is applicable. **A1**

Replacement:

6.1 Preferred rated voltages are 110 V, 120 V, 130 V, 220 V, 230 V and 240 V.

6.2 This subclause of part 1 does not apply.

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

7 Classification

7.1 This subclause of part 1 applies except as follows.

A1 Addition:

For electronic TDS, Subclause 7.1.1 of IEC 60669-2-3 applies. **A1**

7.1.5 Addition:

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

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

A1 Addition:

For electronic RCS, Subclause 7.1.5 of IEC 60669-2-2 is applicable.

For electronic TDS, Subclause 7.1.5 of IEC 60669-2-3 is applicable. **A1**



7.1.6 *Addition:*

- electronic switches only intended to be mounted at a height greater than 1,7 m.

7.1.101 according to the kind of load intended to be controlled by the electronic switch:

- incandescent lamps;
- fluorescent lamps;
- motors;
- declared load.

 **7.101** For electronic RCS, Subclause 7.101 of IEC 60669-2-2 is applicable.

7.102 For electronic RCS, Subclause 7.102 of IEC 60669-2-2 is applicable.

7.103 Electronic RCS or electronic TDS having a SELV- or PELV-circuit. 

7.2 This subclause of part 1 does not apply.

8 Marking

This clause of part 1 applies except as follows.

8.1 Replacement:

Electronic switches shall be marked with

- rated voltage in volts;
- rated current in amperes or rated load in volt-amperes or watts;
- symbol for nature of supply;
- manufacturer's or responsible vendor's name, trade mark or identification mark;
- type reference, which may be a catalogue number;
- symbol for mini-gap construction, if applicable;
- symbol for micro-gap construction, if applicable;
- symbol for semiconductor switching device, if applicable;
- first characteristic numeral for the degree of protection against access to hazardous parts and against harmful effects due to ingress of solid objects, if declared higher than 2, in which case the second characteristic numeral shall also be marked;
- second characteristic numeral for the degree of protection against harmful effects due to ingress of water, if declared higher than 0, in which case the first characteristic numeral shall also be marked.

NOTE 1 Marking of the pattern number given in 7.1.1 is recommended if the connections are not clear from an inspection of the electronic switch; this pattern number may be part of the type reference.

NOTE 2 If a base carries two or more electronic switches with separate operating devices, marking with the pattern numbers is recommended, for example 1+6 or 1+1+1.

NOTE 3 For electronic switches suitable for more than one type of rated load, see 8.3.

In addition, electronic switches shall be marked with

- rated frequency in hertz, unless the electronic switch is designed for both 50 Hz and 60 Hz;
- rating and type of any fuse incorporated in the electronic switch;
- symbols for the kind of load (see 8.2);
- the term “extension unit”, if applicable, or the relevant translation in the official language(s) of the country in which the product is to be sold, followed by the identifying reference;
- the minimum height for mounting the electronic switch shall be indicated in the installation instruction of the manufacturer if there is a restriction (see 10.1).

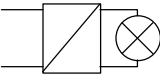
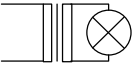
In addition, electronic switches with screwless terminals shall be marked with an indication of the suitability to accept rigid conductors only, for those electronic switches having this restriction. This information may be put on the electronic switch and/or on the packaging unit.

A1 For general purpose electronic switches with included automatic function the number of operations shall be stated in the accompanying instruction sheet when the manufacturer declares the number of operations is higher than indicated in Subclauses 19.101, 19.102 and 19.104.

In addition,

- for electronic RCS, Subclause 8.1 of IEC 60669-2-2 applies;
- for electronic TDS, Subclause 8.1 of IEC 60669-2-3 applies. **A1**

8.2 Addition:

Volt-ampere	VA
Watt	W
Hertz	Hz
Terminal for regulated load	
Type of load:	
Incandescent lamps	
Fluorescent lamps.....	
Motors	
Electronic step-down converter for extra low-voltage incandescent lamps (for example, halogen)	
Iron core transformer for extra low-voltage incandescent lamps (for example, halogen)	

NOTE The rating and type of any fuse may be marked with symbols (see IEC 60127).

If other particular symbols are used, they shall be explained in the installation instructions.

A1 In addition,

- for electronic RCS, Subclause 8.2 of IEC 60669-2-2 applies;
- for electronic TDS, Subclause 8.2 of IEC 60669-2-3 applies. **A1**

8.3 Replacement of the first paragraph:

The following marking shall be placed on the main part of the electronic switch:

- A1** – the rated current or rated load, rated voltage, symbol for nature of supply, rated frequency (if required by 8.1), at least one type of load, the rating and type of any incorporated fuse (this shall be marked on the fuse-holder or in the proximity of the fuse), **A1**
- either the name, trade mark or identification mark of the manufacturer or of the responsible vendor,
 - length of insulation to be removed before the insertion of the conductor into the screwless terminal, if any,
 - symbol for mini-gap construction, micro-gap construction or semiconductor device, if applicable,
 - the type reference.

NOTE 1 The type reference may be the series reference only.

Where an electronic switch is suitable for more than one type of load if not already marked on the electronic switch, the information concerning these shall be stated in the accompanying instruction sheet. In addition, the minimum and the maximum current or the minimum and the maximum load in volt-ampere or watt shall be stated for each type of load.

Addition:

If an electronic switch is intended to be used together with an iron core transformer, information shall be given in the instruction sheet that only a transformer intended to be used with an electronic switch shall be used.

8.4 Addition:

If there are more than two terminals, the load terminal shall be marked with an arrow pointing away from the terminal or with one of the symbols mentioned in 8.2 and any other terminals shall be marked corresponding to the installation instructions.

Unless the installation of the electronic switch is made clear by the markings of the terminals, a wiring diagram shall be provided with each electronic switch.

A1 In addition,

- for electronic RCS, Subclause 8.4 of IEC 60669-2-2 applies;
- for electronic TDS, Subclause 8.4 of IEC 60669-2-3 applies. **A1**

8.6 Addition:

The off-state shall not be marked with an “O” if the circuit on the load side is considered as live, in accordance with clause 10.

8.6.101 It is recommended that the actual state of the electronic switch intended to control the brightness of lamps be indicated when used as intended. This can be achieved either

- with marking on the on-/off-state position, or
- with an indicator lamp, or
- by adjusting the lamp dimmer so that at the lowest control state and at rated voltage minus 10 %, the light is still visible.

NOTE A test to verify that the light is still visible is under consideration.

When the indication of the electronic switch state is given only by the lamp, adjustment of the lamp at the lowest control state is made as specified in the following:

- for incandescent lamps, the adjustment of lamp dimmers shall be made by the manufacturer. It shall not be possible to reduce the lowest setting without a tool;
- for fluorescent lamps, the adjustment of lamp dimmers shall be made by the manufacturer. It may, however, be possible for the installer to alter the lowest setting if such an adjustment is indicated in an installation instruction.

8.8 Addition after the second paragraph:

If an electronic switch containing a viewing window (lens) for a sensing device is intended to be mounted at a height greater than 1,7 m, this information shall be stated in the instruction sheet.

Addition to note 2:

- information concerning external, directly associated fuses/current limiting devices, where applicable.

9 Checking of dimensions

This clause of part 1 applies except as follows.

Addition:

Electronic switches may be of dimensions other than those specified in the standard sheets (if any) provided they are supplied with suitable boxes.