BRITISH STANDARD

BS EN
60669-2-2:2006

Switches for household and similar fixed electrical installations —

Part 2-2: Particular requirements — Electromagnetic remote-control switches (RCS)

The European Standard EN 60669-2-2:2006 has the status of a British Standard

ICS 29.120.40

BSI
British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 60669-2-2:2006. It is identical with IEC 60669-2-2:2006. It supersedes BS EN 60669-2-2:1998, which will be withdrawn on 1 September 2009.

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

A list of organizations represented on PEL/23 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.

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English version

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

(IEC 60669-2-2:2006)

Interrupteurs pour installations électriques fixes domestiques et analogues
Partie 2-2: Prescriptions particulières - Interrupteurs à commande électromagnétique à distance (télérupteurs)
(CEI 60669-2-2:2006)

Schalter für Haushalt und ähnliche ortsfeste elektrische Installationen
Teil 2-2: Besondere Anforderungen - Fernschalter
(IEC 60669-2-2:2006)

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

The text of document 23B/825/FDIS, future edition 3 of IEC 60669-2-2, prepared by SC 23B, Plugs, socket-outlets and switches, of IEC TC 23, Electrical accessories, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60669-2-2 on 2006-09-01.

This European Standard supersedes EN 60669-2-2:1997 + A1:1997.

It includes the following significant technical changes with respect to EN 60669-2-2:1997:

– clarification of the scope to exclude electronic RCS (to be covered by EN 60669-2-1);

– introduction of symbols under Clause 8;

– introduction of requirements for SELV/PELV.

This part 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 electromagnetic remote-control switches.

In this publication, the following print types are used:

– requirements proper: in roman type;

– *test specifications: in italic type;*

– notes: in smaller roman type.

Subclauses, figures or tables which are additional to those in Part 1 are numbered starting from 101.

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)	2007-06-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-09-01

Annex ZA has been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 60669-2-2:2006 was approved by CENELEC as a European Standard without any modification.

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CONTENTS

SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

Part 2-2: Particular requirements – Electromagnetic remote-control switches (RCS)

1 Scope

This clause of part 1 is applicable except as follows:

Replacement of the first sentence:

This part of IEC 60669 applies to electromagnetic remote-control switches (hereinafter referred to as RCS) with a rated voltage not exceeding 440 V and a rated current not exceeding 63 A, intended for household and similar fixed electrical installations, either indoors or outdoors.

The RCS coil may or may not be permanently energized.

Electronic RCS are within the scope of IEC 60669-2-1.

RCS including only passive components such as resistors, capacitors, PTC and NTC components and printed wiring boards are not considered to be electronic RCS.

Contactors are not covered by this standard.

2 Normative references

This clause of part 1 is applicable with the following additions:

IEC 60085:2004*, Electrical insulation - Thermal classification*

IEC 60317, *Specifications for particular types of winding wires*

IEC 60445:1999, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system*

IEC 60669-2-1:2002, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic switches*

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

IEC 61558-2-6:1997 *Safety of power transformers, power supply units and similar – Part 2-6: Particular requirements for safety isolating transformers for general use*

3 Terms and definitions

This clause of part 1 is applicable with the following additions:

3.17 *Addition of the following note:*

NOTE This definition is only applicable to the switching circuit.

3.18 *Addition of the following note:*

NOTE This definition is only applicable to the switching circuit.

Addition of the following new definitions:

3.101
remote control switch
RCS
switch intended to be operated from a distance

3.101.1
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

3.101.2
electronic RCS
RCS containing electronic component(s)

3.102
rated control voltage
voltage assigned to the control circuit by the manufacturer. This is generally the operating voltage of the electromagnetic control coil

3.103
switching circuit
circuit which contains the parts which allow the rated current to flow through the RCS

3.104
control circuit
circuit which includes electrical parts to actuate the switching mechanism

3.105
control mechanism
mechanism which includes all the parts which are intended for the operation of the RCS

3.106
incorporated hand-operated device
device which allows the switching circuit to be operated, directly or indirectly. This device is not intended for the normal operation of the RCS

3.107
latching RCS
RCS which is mechanically locked in either of the two positions, having a separate coil for each position

3.108
disconnectable RCS
RCS including two parts, the first being used as a base and including the terminals, the other being removable and including the switching and the control circuits, the two parts being resiliently connected together using a means which allows joining and/or separating with or without the use of a tool

3.109
rated control current
current required for initiation of the RCS, assigned to the current coil in the control circuit by the manufacturer (only for an RCS provided with a current sensitive coil)

3.110
bistable RCS
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

3.111
monostable RCS
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 RCS is initiated or actuated, and returns to the position prior to initiation or actuation of the RCS after initiation or actuation is discontinued

3.112
priority RCS
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 RCS is influenced by or connected to a second circuit or group of circuits (priority circuits or circuits) which when energized will thus initiate the control circuit of the 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 1 The RCS may have a means for adjusting the sensitivity of the RCS control circuit to initiate the 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.

NOTE 2 These devices are used to limit the total current into a home installation by disconnecting/connecting certain load circuits in the installation while leaving others (the priority circuits) connected.

3.113
sequential operated RCS
RCS which includes several switching or reversing contacts generally operated by means of a cam allowing different circuit combinations by successive impulses. The number of impulses is given by the number of lobes

4 General requirements

This clause of part 1 is applicable with the following addition:

Addition after the first paragraph:

The operation of an RCS shall not be impaired when it is mounted at an angle deviating by not more than 5° from the specified position of use.

5 General notes on tests

This clause of part 1 is applicable with the following additions:

5.4 *Addition after the last paragraph:*

For the tests of clause 101, three additional specimens are necessary.

Addition of the following new subclause:

5.101 *If an RCS 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, the application of the voltage to the RCS coil always at the same phase angle is to be avoided, as this application may give misleading results.

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

6 Ratings

This clause of part 1 is applicable except as follows:

6.1 *Replacement:*

Preferred rated voltages are:

– a.c. : 6 V, 8 V, 9 V, 12 V, 24 V, 42 V, 48 V, 110 V, 130 V, 220 V, 230 V and 240 V.

6.2 *Addition, after the last paragraph, of the following note:*

NOTE In certain types of RCS, auxiliary contacts designed for a current lower than the rated current of the switching circuit may be added. Relevant ratings and requirements are under consideration.

Addition of the following new subclause:

6.101 Preferred rated control voltages are:

– a.c. : 6 V, 8 V, 9 V, 12 V, 24 V, 42 V, 48 V, 110 V, 130 V, 220 V, 230 V and 240 V;
– d.c. : 6 V, 9 V, 12 V, 24 V, 48 V, 60 V, 110 V and 220 V.

7 Classification

This clause of part 1 is applicable with the following additions:

7.1.5 *Addition of the following:*

– current coil (for priority RCS);
– voltage coil (for priority RCS).

7.1.7 *Addition of the following:*

– disconnectable RCS;

Addition of the following new subclauses:

7.101 According to the type of switching mechanism:

– directly operated mechanism;
– sequentially operated mechanism;
– bistable mechanism;
– monostable mechanism.

NOTE 1 Directly operated RCS are those which, for each impulse, show an ON or OFF state, these states occurring for each impulse on 1, 2, 3 or 4 poles, either as a switch or as a reversing switch.

NOTE 2 This allows the RCS to be classified according to the pattern number of 7.1.1.

NOTE 3 Pattern number 5 may be met by two RCS pattern numbers 1 or 6 and wiring in accordance with Figure 8 of IEC 60669-1.

NOTE 4 Pattern number 7 may be met by pattern number 6/2 and wiring with external connections in accordance with Figure 8 of IEC 60669-1.

7.102 According to the kind of energization of the control circuit:

– RCS energized by impulses;
– RCS permanently energized.

8 Marking

This clause of part 1 is applicable with the following additions:

8.1 *Addition after the second dashed text:*

– rated control voltage in volts, if different from the rated voltage.

8.2 *Addition of the following symbols:*

Control mechanism .....

Switch ..... or or or

Monostable mechanism .....

Bistable mechanism .....

Priority RCS ..... I > or U >

8.4 *Addition after the last paragraph:*

If necessary, the wiring diagram on which the terminal references are clearly indicated shall be fixed to the accessory or inside the protective cover for the terminals.

The terminals for the control circuit shall be marked according to IEC 60445 and/or with the symbols according to 8.2.

The terminals for the control circuit of a priority RCS with a current sensitive coil or voltage sensitive coil shall be marked with the appropriate symbol indicated in 8.2.

8.6 *Addition, at the end of the subclause, of the following paragraph:*

This subclause is only applicable to an RCS equipped with an incorporated hand-operated device, acting directly on the switching circuit.

8.7 This subclause of part 1 does not apply.

9 Checking of dimensions

This clause of part 1 is applicable.

10 Protection against electric shock

This clause of part 1 is applicable.

11 Provision for earthing

This clause of part 1 is applicable.

12 Terminals

This clause of part 1 is applicable.

13 Constructional requirements

This clause of part 1 is applicable with the following addition:

Addition of the following new subclause:

13.101 Transformers intended for SELV circuits shall be of the safety isolating type and shall comply with the relevant requirements of IEC 61558-2-6.

NOTE For the use of SELV and PELV see IEC 61140 and IEC 60364-4-41.

14 Mechanism

This clause of part 1 is applicable with the following addition:

Addition of the following new subclause:

14.101 If an RCS is equipped with an incorporated hand-operated device, and if a position indicator is used, it shall indicate the position of the switching circuit clearly and without ambiguity.

15 Resistance to ageing, protection provided by enclosures of switches and resistance to humidity

This clause of part 1 is applicable.

16 Insulation resistance and electric strength

This clause of part 1 is applicable with the following addition:

16.2 *Addition of the following items in Table 14:*

101 Between switching circuit(s) and control circuit(s) if they are separated	5	2 000	3 000
102 Between SELV/PELV circuits and other circuit(s) having a higher voltage than SELV/PELV	7	2 500	4 000
103 Between two SELV/PELV circuits	5	500	500

17 Temperature rise

This clause of part 1 is applicable with the following addition:

17.1 *Addition, at the end of the subclause, of the following paragraphs:*

For RCS energized by impulses, the test is carried out without connecting the coil.

For permanently energized RCS, the coil is connected to a voltage equivalent to 1,06 times its rated voltage at rated frequency.

The temperature of the coil is calculated in accordance with the resistance method by means of the following formula:

$$\text{Temperature rise} = \frac{R_2 - R_1}{R_1} (234{,}5 + t_1) - (t_2 - t_1)$$

where

R_2 *is the resistance in the warm condition;*

R_1 *is the resistance in the cold condition;*

t_1 *is the ambient temperature at the beginning of the test;*

t_2 *is the ambient temperature at the end of the test.*

The windings of coils shall not exceed the limits specified in Table 101.

Table 101 – Temperature-rise limits for insulated coils in air

Class of insulating material	Temperature-rise limit (measured by resistance variation) K
A	85
E	100
B	110
F	135
H	160
NOTE The limits given in this table are based on an ambient temperature of 20 °C.	

18 Making and breaking capacity

This clause of part 1 is applicable with the following addition:

18.1 *Addition of the following at the end of the subclause:*

During the tests of 18.1 and 18.2, the rated control voltage is applied to the control circuit with an impulse duration as declared by the manufacturer.

19 Normal operation

This clause of part 1 is applicable with the following additions:

19.1 *Addition after the last paragraph, of the following:*

For RCS equipped with an incorporated hand-operated device, acting directly on the switching circuit, 10 % of the operations indicated in Table 16 are made by hand or in an equivalent manner and for those for a.c. operation, the test is followed by that of 14.3.

For the remaining 90 % of the operations, the control circuit is supplied as specified in Clause 18.

During the normal operation test, failures of correct operation are allowed to occur within 1 %, but, no more than three consecutive failures are allowed.

Addition of the following new subclauses:

19.101 An RCS energized by impulses shall operate as intended at a control voltage between 0,9 and 1,1 times the rated value with an impulse duration as declared by the manufacturer.

Compliance is checked by the following test.

Under no-load conditions, 20 operations are carried out on each of the three specimens with a control voltage of 0,9 times the rated value, and 20 operations with a control voltage of 1,1 times the rated value.

The RCS shall operate as intended.

19.102 Permanently energized RCS shall operate as intended at any value between 85 % and 110 % of their rated control voltage. Where a range is declared, 85 % shall apply to the lower value and 110 % to the higher.

The limits between which permanently energized RCS shall drop out and open fully are 75 % to 20 % of their rated control voltage. Where a range is declared, 20 % shall apply to the higher value and 75 % to the lower.

Limits for closure are applicable after the coils have reached a stable temperature corresponding to steady-state conditions of 100 % of the rated control voltage in an ambient temperature of 40 °C.

Limits for drop-out are applicable with the coil circuit at –5 °C. This can be verified by calculation using values obtained at normal ambient temperature.

Compliance is checked by performing one test at each of the limits on three separate specimens.

The RCS shall operate as intended.

20 Mechanical strength

This clause of part 1 is applicable.

21 Resistance to heat

This clause of part 1 is applicable with the following addition:

Addition of the following note before 21.1:

NOTE The requirements of this clause are applicable to both switching and control circuits.

22 Screws, current-carrying parts and connections

This clause of part 1 is applicable.

23 Creepage distances, clearances and distances through sealing compound

This clause of part 1 is applicable with the following additions:

23.1 *Addition of the following items to Table 20 for creepage distances and clearances:*

Description		mm
Creepage distances		
101	For creepage distances across which nominal voltages up to 50 V a.c. or d.c. occur [a) b)], and which voltages are generated in a circuit by supply from a safety isolating transformer according to IEC 61558-2-6 or by a supply separated from the mains supply in an equally effective manner:	
	– on printed wiring material - pollution degree 1	0,025
	– on printed wiring material - pollution degree 2	0,04
	– on other insulating material - across insulating material Group I	0,6
	– on other insulating material - across insulating material Group II	0,85
	– on other insulating material - across insulating material Group III	1,2
Clearances		
102	For clearance distances across which nominal voltages up to 50 V a.c. or d.c. occur [a)], and which voltages are generated in a circuit by supply from a safety isolating transformer according to IEC 61558-2-6 or by a supply electrically separated from the mains supply in an equally effective manner:	
	- pollution degree 1	0,1 mm
	- pollution degree 2	0,2 mm

NOTE 1 – The values for the clearances are based on IEC 60664-1, Table 2, using as input:

– the rated impulse voltage of 800 V derived from IEC 60664-1, Table 1, for a line-to-neutral voltage of 50 V a.c. or d.c. and overvoltage category III and Case A (inhomogeneous field);

– pollution degrees 1 and 2.

The values for creepage distances are based on IEC 60664-1 Table 4 with the input of voltage rationalized for Table 4 of 50 V r.m.s from IEC 60664-1, Table 3, for a supply system having a nominal voltage of 50 V.

NOTE 2 For the definition of nominal voltage, see IEV 601-01-21.

a) For the purposes of this standard, the following applies (taken from IEC 60664-1):

micro environment: the immediate environment of the insulation which particularly influences the dimensioning of creepage distances (IEC 60664-1, 1.3.12.2).

Pollution degree: a numeral characterizing the expected pollution of the micro environment (IEC 60664-1, 1.3.13).

Pollution degree 1*:* No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

On printed wiring boards of RCS, it is acceptable to use pollution degree 1, if the printed wiring board is protected against any occurrence of condensation and deposition of conductive, hydroscopic, or soluble dust. This usually can be achieved only if the printed wiring board and/or circuits are coated and the coating complies with the specifications of IEC 60664-3 and an additional encapsulation, or by sealing of the whole printed wiring board assembly by a protective coating.

Pollution degree 2*:* Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected (see IEC 60664-1, 2.5.1).

On printed wiring boards of RCS, it is acceptable to use pollution degree 2, if the printed wiring board and/or circuit is coated and the coating complies with the specifications of IEC 60664-3.

This standard classifies insulating materials according to their PTI values into four groups:

Material Group I 600 ≤ PTI

Material Group II 400 ≤ PTI < 600

Material Group IIIa 175 ≤ PTI < 400

Material Group IIIb 100 ≤ PTI < 175

Material Group III includes Material Group IIIa and Material Group IIIb.

A material shall be included in one of the four groups above on the basis that its PTI, established by the method of IEC 60112 using solution A is equal or greater than the lower value specified for the group.

b) Values of creepage distances for printed wiring boards are given for pollution degrees 1 and 2. For other insulating materials, only the values for creepage distances for pollution degree 2 are allowed.

Addition of the following new subclauses:

23.101 For RCS having a control circuit suitable for connection to a SELV supply, the switching circuit being supplied with a voltage greater than the SELV, creepage distances and clearances between control and switching circuits shall be not less than 6 mm.

23.102 If the wire enamel is at least Grade 1 according to IEC 60317, the clearances between the wire of the control coil, live parts of different polarity and the exposed conductive parts may be reduced to a value equal to two-thirds of the clearances required in the absence of enamel.

24 Resistance of insulating material to abnormal heat, to fire and to tracking

This clause of part 1 is applicable with the following addition:

Addition of the following note before 24.1:

NOTE The requirements of this clause are applicable to both switching and control circuits.

25 Resistance to rusting

This clause of part 1 is applicable.

26 EMC requirements

This clause of part 1 is applicable.

Addition of the following new clause:

101 Abnormal operation of the control circuit

RCS shall be so constructed that their behaviour during abnormal operation of the control circuit (e.g. when the push-button is jammed) is not dangerous to their surroundings and the user.

For permanently energized RCS, this test does not apply.

Compliance is checked by the following test which is made on three additional specimens of RCS meeting with the requirements ofClauses 15 and 16.

The RCS is mounted as in normal use, on a matt black painted pine plywood support having a thickness of approximately 20 mm.

The control circuit is continuously energized at its rated voltage, the switching circuit being loaded with rated current (at rated voltage) for 1 h.

Immediately after this test, the RCS shall still operate and shall meet the following conditions:

– *the temperature rise of any part of the RCS enclosure and plywood support, which may be touched by the standard test finger, test probe B of IEC 61032, shall not exceed 75 K;*

– *the temperature rise of the plywood support which cannot be touched by the test finger, test probe B of IEC 61032, shall not exceed 100 K;*

– *the RCS shall not emit flames, melted material, glowing particles or burning drops of insulating material.*

After cooling down to ambient temperature:

– *the RCS shall withstand a dielectric test between switching and control circuits as specified in Clause 16, the test voltage being reduced to 75 % of the relevant values specified in Table 13 of IEC 60669-1;*

– *the RCs shall still meet the requirements of 10.1.*

The RCS coil is then intermittently energized for 1 h using a voltage equal to its rated control voltage, the switching circuit being supplied with rated current at rated voltage. The duration of an operating cycle is 2 s, i.e. 1 s "on" and 1 s "off".

The temperature rise of the coil is determined according to the resistance method and its value shall not exceed the appropriate value given in IEC 60085.

NOTE If one specimen fails, the requirement is considered not met.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60085	2004	Electrical insulation - Thermal classification	EN 60085	2004
IEC 60317	Series	Specifications for particular types of winding wires	EN 60317	Series
IEC 60445	1999	Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system	EN 60445	2000
IEC 60669-2-1 (mod)	2002	Switches for household and similar fixed electrical installations Part 2-1: Particular requirements - Electronic switches	EN 60669-2-1	2004
IEC 61140	-[1)]	Protection against electric shock - Common aspects for installation and equipment	EN 61140	2002[2)]
IEC 61558-2-6	1997	Safety of power transformers, power supply units and similar Part 2-6: Particular requirements for safety isolating transformers for general use	EN 61558-2-6	1997

[1)] Undated reference.

[2)] Valid edition at date of issue.

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