

INTERNATIONAL STANDARD



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

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED
ELECTRICAL INSTALLATIONS –****Part 2-2: Particular requirements –
Electromagnetic remote-control switches (RCS)****FOREWORD**

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60669-2-2:2006. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 60669-2-2 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2006. This edition constitutes a technical revision.

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

- a) Revision of the present edition with reference to IEC 60669-1:2017 (Edition 4);
- b) Introduction of a revision to Annex E "Additional requirements and tests for switches intended to be used at a temperature lower than –5 °C".

The text of this International Standard is based on the following documents:

Draft	Report on voting
23B/1486/FDIS	23B/1500/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This part of IEC 60669 is to be used in conjunction with IEC 60669-1:2017. It lists the changes necessary to convert that standard into a specific standard for electromagnetic remote-control switches.

When a particular subclause of IEC 60669-1:2017 is not mentioned in this document, that subclause applies as far as reasonable.

In this document, 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 or notes which are additional to those in IEC 60669-1:2017 are numbered starting from 101.

A list of all parts of IEC 60669 series, under the general title *Switches for household and similar fixed electrical installations*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

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

1 Scope

IEC 60669-1:2017, Clause 1 is applicable except as follows:

Replacement of the first ~~sentence~~ paragraph with the following:

This part of IEC 60669 applies to electromagnetic remote control switches (hereinafter referred to as **electromagnetic RCS**) with a rated voltage not exceeding 440 V AC and a rated current not exceeding 63 A, intended for household and similar fixed electrical installations, either indoors or outdoors. For the control circuit, the rated control voltage does not exceed 440 V AC or 220 V DC.

The RCS coil ~~may or may not~~ can be either permanently energized or not permanently energized.

Electronic RCS are within the scope of IEC 60669-2-1 but not of this document.

RCS including only passive components such as resistors, capacitors, positive temperature coefficient (PTC) and negative temperature coefficient (NTC) components and printed ~~wiring~~ circuit boards are not considered to be electronic RCS.

~~Contactors are not covered by this standard.~~

Electromechanical contactors for household and similar purposes are within the scope of IEC 61095.

2 Normative references

IEC 60669-1:2017, Clause 2 is applicable with the following additions:

IEC 60085:2004/2007, *Electrical insulation – Thermal ~~classification~~ evaluation and designation*

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

IEC 60445:1999/2021, *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~~, conductor terminations and conductors*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3:2016, *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 60669-2-1:2002, 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 61558-2-6:1997/2021, *Safety of power transformers, reactors, power supply units and similar combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general use applications*

3 Terms and definitions

IEC 60669-1:2017, Clause 3 is applicable with the following additions:

3.1711 **rated voltage**

Addition of the following note:

Note 101 to entry: This definition is ~~only~~ applicable to the switching circuit only.

3.1812 **rated current**

Addition of the following note:

Note 101 to entry: This definition is ~~only~~ applicable to the switching circuit only.

Addition of the following new ~~definitions~~ terminological entries:

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~~ can 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

Note 101 to entry: The rated control voltage 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

[SOURCE: IEC 60050-442:1998, 442-04-28, modified – the term "switch" has been replaced by "RCS".]

3.106

incorporated hand-operated device

device which allows the switching circuit to be operated, directly or indirectly

Note 101 to entry: An incorporated hand-operated 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~~107

~~**disconnectable RCS**~~

~~RCS including~~ consisting of 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~~108

~~**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~~109

~~**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~~110

~~**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~~111

~~**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 101 to entry: 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—2 102 to entry: 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.

3.112

sequentially operated RCS

RCS which includes several switching or reversing contacts generally operated by means of a cam allowing different circuit combinations by successive impulses

Note 101 to entry: The number of impulses is given according to the number of lobes of the cam.

4 General requirements

IEC 60669-1:2017, Clause 4 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 remarks on tests

IEC 60669-1:2017, Clause 5 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 to Table 1:

Table 1 – Number of specimens needed for the tests

Clauses and subclauses	Number of specimens	Number of additional specimens for dual current rating
101 Abnormal operation of the control circuit	PQR	

Addition of the following new subclause:

5.101 Incorporated hand-operated device

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~~ should be avoided, as this application ~~may~~ can give misleading results.

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

6 Ratings

IEC 60669-1:2017, Clause 6 is applicable except as follows:

6.1 Rated voltage

Replacement of the first paragraph with the following:

Preferred values of rated voltage are:

- AC: 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 Rated control voltage

Preferred values of rated control voltage are:

- AC: 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;
- DC: 6 V, 9 V, 12 V, 24 V, 48 V, 60 V, 110 V and 220 V.

7 Classification

IEC 60669-1:2017, Clause 7 is applicable with the following additions:

~~7.1.5~~ according to the method of actuating the switch:

Addition of the following:

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

~~7.1.7~~ according to the method of installation, as a consequence of the design of the switch:

Addition of the following:

- disconnectable RCS

Addition of the following new subclauses:

7.101 according to the type of switching mechanism:

- directly operated ~~mechanism~~ RCS;
- sequentially operated ~~mechanism~~ RCS;
- bistable ~~mechanism~~ RCS;
- monostable ~~mechanism~~ RCS.

~~NOTE 1~~ 101 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 60669-1:2017.

~~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 60669-1:2017.

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

- RCS energized by impulses;
- RCS permanently energized.

8 Marking

IEC 60669-1:2017, Clause 8 is applicable with the following additions:

8.1 General

Addition after the second dashed text:

~~— rated control voltage in volts, if different from the rated voltage.~~

Replacement of list item b) with the following:

- b) rated voltage(s) in volts and rated control voltage(s) in volts, if different from the rated voltage(s) or rated control current in amperes according to classification 7.5;

8.2 Symbols

Addition of the following symbols:

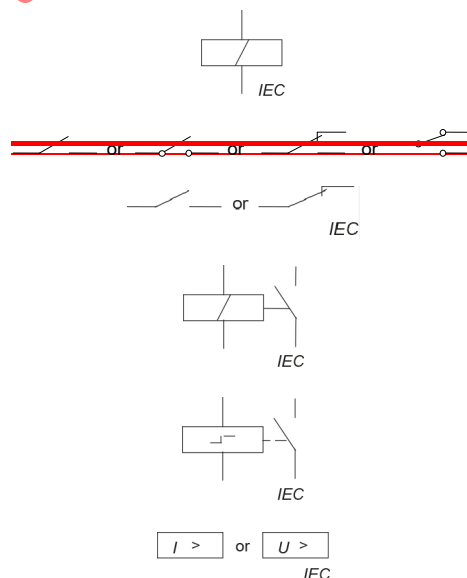
Control mechanism (IEC 60417-6457:2023-08)

Switch

Monostable ~~mechanism~~ RCS

Bistable ~~mechanism~~ RCS

Priority RCS



8.4 Marking on terminals for phase conductors

Addition after the last paragraph (before Note 1) of the following:

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 either IEC 60445 ~~and~~ or with the symbols according to 8.2, or both.

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 Marking of the switch position

Addition, at the ~~end~~ beginning of the subclause, of the following paragraph:

This Subclause 8.6 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

IEC 60669-1:2017, Clause 9 is applicable.

10 Protection against electric shock

IEC 60669-1:2017, Clause 10 is applicable.

11 Provision for earthing

IEC 60669-1:2017, Clause 11 is applicable.

12 Terminals

IEC 60669-1:2017, Clause 12 is applicable.

13 Constructional requirements

IEC 60669-1:2017, Clause 13 is applicable with the following addition:

Addition of the following new subclause:

13.101 Transformers intended for SELV circuits

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

IEC 60669-1:2017, Clause 14 is applicable with the following addition:

Addition of the following new subclause:

14.101 Hand-operated device with position indicator

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

IEC 60669-1:2017, Clause 15 is applicable.

16 Insulation resistance and electric strength

IEC 60669-1:2017, Clause 16 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

16.3 Electric strength test

Addition to Table 15:

Table 15 – Test voltage, points of application and minimum values of insulating resistance for the verification of electric strength

Insulation to be tested		Minimum value of insulation resistance MΩ	Test voltage	
			V	
			Switches having a rated voltage not exceeding 130 V	Switches having a rated voltage exceeding 130 V
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	3 000	3 750
103	Between two SELV/PELV circuits	5	500	500

17 Temperature rise

IEC 60669-1:2017, Clause 17 is applicable with the following addition:

17.1 General

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:

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

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

IEC 60669-1:2017, Clause 18 is applicable with the following ~~addition~~ modification:

18.42 Overload

Addition of the following at the end of the subclause:

During the tests of 18.42 and 18.23, the rated control voltage is applied to the control circuit with an impulse duration as declared by the manufacturer.

19 Normal operation

IEC 60669-1:2017, Clause 19 is applicable with the following ~~additions~~ modifications:

19.1 Test for switches intended for inductive loads

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~~ 17 are made by hand or in an equivalent manner and for those for AC 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 RCS energized by impulses

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 RCS permanently energized

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.~~ When a rated voltage is declared, the drop out shall appear between 75 % and 20 % of this rated voltage. When a voltage range is declared, the voltage drop shall appear between 20 % of the higher value and 75 % of the lower value (of the range).

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

IEC 60669-1:2017, Clause 20 is applicable.

21 Resistance to heat

IEC 60669-1:2017, Clause 21 is applicable with the following ~~addition~~ modification:

~~Addition of the following note before 21.1:~~

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

21.1 General

Addition of the following sentence at the end of 21.1 after b):

The requirements of this Subclause 21.1 are applicable to both switching and control circuits.

22 Screws, current-carrying parts and connections

IEC 60669-1:2017, Clause 22 is applicable.

23 Creepage distances, clearances and distances through sealing compound

IEC 60669-1:2017, Clause 23 is applicable with the following ~~additions~~ modifications:

23.1 General

~~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 — on printed wiring material – pollution degree 2 — on other insulating material – across insulating material Group I — on other insulating material – across insulating material Group II — on other insulating material – across insulating material Group III	0,025 0,04 0,6 0,85 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 — pollution degree 2	0,1 mm 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 IEC 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, hygroscopic, 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 — $600 \leq \text{PTI}$~~
- ~~— Material Group II — $400 \leq \text{PTI} < 600$~~
- ~~— Material Group IIIa — $175 \leq \text{PTI} < 400$~~
- ~~— Material Group IIIb — $100 \leq \text{PTI} < 175$~~
- ~~— 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 items to Table 23 for creepage distances and clearances.

Table 23 – Creepage distances, clearances and distances through insulating sealing compound

Description	mm		
	normal gap	mini-gap	micro-gap
Creepage distances			
101 For creepage distances across which nominal voltages up to 50 V AC or 50 V DC occur ^{f,9} , 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	0,025	0,025
– on printed wiring material – pollution degree 2	0,04	0,04	0,04
– on other insulating material – across insulating material Group I	0,6	0,6	0,6
– on other insulating material – across insulating material Group II	0,85	0,85	0,85
– on other insulating material – across insulating material Group III	1,2	1,2	1,2
102 For clearance distances across which nominal voltages up to 50 V AC or 50 V DC occur ^f , 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	0,1	0,1
– pollution degree 2	0,2	0,2	0,2
NOTE 101 The values for the clearances are based on IEC 60664-1:2020, Table F.2, using as input: – the rated impulse voltage of 800 V derived from IEC 60664-1:2020, Table F.1, for a line-to-neutral voltage of 50 V AC or 50 V DC and overvoltage category III and Case A (inhomogeneous field); – pollution degrees 1 and 2. The values for creepage distances are based on IEC 60664-1:2020, Table F.5 with the input of voltage rationalized for IEC 60664-1:2020, Table F.5 of 50 V RMS from IEC 60664-1:2020, Table F.4, for a supply system having a nominal voltage of 50 V. NOTE 102 For the definition of nominal voltage, see IEC 601-01-21.			

^f	For the purposes of this document, the following applies (taken from IEC 60664-1): Micro-environment: the immediate environment of the insulation which particularly influences the dimensioning of creepage distances. Ambient conditions which immediately influence the dimensioning of the clearance and creepage distances (IEC 60664-1:2020, 3.1.23). Pollution degree: a numeral characterizing the expected pollution of the micro-environment (IEC 60664-1:2020, 3.1.25). 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, hygroscopic, or soluble dust. This can usually 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 with a protective coating. Pollution degree 2: Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected. This condensation may occur during periods of on-off load cycles of the equipment (see IEC 60664-1:2020, 4.5.2). 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 document classifies insulating materials according to their PTI values into four groups: <table> <tr> <td>Material Group I</td><td>$600 \leq \text{PTI}$</td></tr> <tr> <td>Material Group II</td><td>$400 \leq \text{PTI} < 600$</td></tr> <tr> <td>Material Group IIIa</td><td>$175 \leq \text{PTI} < 400$</td></tr> <tr> <td>Material Group IIIb</td><td>$100 \leq \text{PTI} < 175$</td></tr> </table> 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 to or greater than the lower value specified for the group.	Material Group I	$600 \leq \text{PTI}$	Material Group II	$400 \leq \text{PTI} < 600$	Material Group IIIa	$175 \leq \text{PTI} < 400$	Material Group IIIb	$100 \leq \text{PTI} < 175$
Material Group I	$600 \leq \text{PTI}$								
Material Group II	$400 \leq \text{PTI} < 600$								
Material Group IIIa	$175 \leq \text{PTI} < 400$								
Material Group IIIb	$100 \leq \text{PTI} < 175$								
^g	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 Control circuits suitable for connections to a SELV

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 Use of enamel wires

If the wire enamel is at least grade 1 according to IEC 60317 (all parts), 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

IEC 60669-1:2017, Clause 24 is applicable with the following ~~addition~~ modification:

~~Addition of the following note before 24.1:~~

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

Add the following sentence at the beginning of 24.1 and 24.2:

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

25 Resistance to rusting

IEC 60669-1:2017, Clause 25 is applicable.

26 EMC requirements

IEC 60669-1:2017, Clause 26 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~~ or to 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 the requirements of Clause 15 and Clause 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~~ 15 of IEC 60669-1:2017;*
- *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. *If one specimen fails, the requirement is considered not met.*

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

Annexes

Annexes of IEC 60669-1:2017 apply except as follows:

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Annex B
(informative)

Changes planned for the future in order to align IEC 60669-1 with the requirements of IEC 60998 (all parts), IEC 60999 (all parts) and IEC 60228

IEC 60669-1:2017, Annex B does not apply.

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Annex E (informative)

Additional requirements and tests for switches intended to be used at a temperature lower than –5 °C

IEC 60669-1:2017, Annex E applies with the following modifications.

Replace 19.4 with the following text:

19.4 Test for RCS intended to be used in ambient temperature below –5 °C

The following additional test shall be carried out on RCS intended to be used below the normal temperature ranges if marking for low temperature is used:

- *wire the RCS with a signal circuit including an indicator to easily evaluate that the switch is working as intended during the test.*
- *the RCS are then kept for 24 h at a temperature of (-25 ± 2) °C.*
- *the test of 19.101 or 19.102, as applicable, is then performed at (-25 ± 2) °C and for 20 operations at rated control voltage.*
- *after these tests the RCS shall show no visible harmful deformation, cracks or similar damage which would lead to non-compliance with this document.*
- *verification of operation is checked by the test described in 19.4, immediately followed by the measurement of the insulation resistance of 16.2 and the electric strength test specified in 16.3.*

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Addition:

Bibliography

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

IEC 60364-4-41:2005, *Low voltage electrical installation – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60364-4-41:2005/AMD1:2017

IEC 60669-2-1:2021, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic control devices*

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Interrupteurs pour installations électriques fixes domestiques et analogues –
Partie 2-2: Exigences particulières – Interrupteurs à commande à distance
(télérupteurs)**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED
ELECTRICAL INSTALLATIONS –****Part 2-2: Particular requirements –
Electromagnetic remote-control switches (RCS)****FOREWORD**

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IEC 60669-2-2 has been prepared by subcommittee 23B: Plugs, socket-outlets and switches, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This fourth edition cancels and replaces the third edition published in 2006. This edition constitutes a technical revision.

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

- a) Revision of the present edition with reference to IEC 60669-1:2017 (Edition 4);
- b) Introduction of a revision to Annex E "Additional requirements and tests for switches intended to be used at a temperature lower than –5 °C".

The text of this International Standard is based on the following documents:

Draft	Report on voting
23B/1486/FDIS	23B/1500/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This part of IEC 60669 is to be used in conjunction with IEC 60669-1:2017. It lists the changes necessary to convert that standard into a specific standard for electromagnetic remote-control switches.

When a particular subclause of IEC 60669-1:2017 is not mentioned in this document, that subclause applies as far as reasonable.

In this document, 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 or notes which are additional to those in IEC 60669-1:2017 are numbered starting from 101.

A list of all parts of IEC 60669 series, under the general title *Switches for household and similar fixed electrical installations*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

SWITCHES FOR HOUSEHOLD AND SIMILAR FIXED ELECTRICAL INSTALLATIONS –

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

1 Scope

IEC 60669-1:2017, Clause 1 is applicable except as follows:

Replacement of the first paragraph with the following:

This part of IEC 60669 applies to electromagnetic remote control switches (hereinafter referred to as electromagnetic RCS) with a rated voltage not exceeding 440 V AC and a rated current not exceeding 63 A, intended for household and similar fixed electrical installations, either indoors or outdoors. For the control circuit, the rated control voltage does not exceed 440 V AC or 220 V DC.

The RCS coil can be either permanently energized or not permanently energized.

Electronic RCS are within the scope of IEC 60669-2-1 but not of this document.

RCS including only passive components such as resistors, capacitors, positive temperature coefficient (PTC) and negative temperature coefficient (NTC) components and printed circuit boards are not considered to be electronic RCS.

Electromechanical contactors for household and similar purposes are within the scope of IEC 61095.

2 Normative references

IEC 60669-1:2017, Clause 2 is applicable with the following additions:

IEC 60085:2007, *Electrical insulation – Thermal evaluation and designation*

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

IEC 60445:2021, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors*

IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3:2016, *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 61558-2-6:2021, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications*

3 Terms and definitions

IEC 60669-1:2017, Clause 3 is applicable with the following additions:

3.11

rated voltage

Addition of the following note:

Note 101 to entry: This definition is applicable to the switching circuit only.

3.12

rated current

Addition of the following note:

Note 101 to entry: This definition is applicable to the switching circuit only.

Addition of the following new terminological entries:

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 can 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

Note 101 to entry: The rated control voltage 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

[SOURCE: IEC 60050-442:1998, 442-04-28, modified – the term "switch" has been replaced by "RCS".]

3.106

incorporated hand-operated device

device which allows the switching circuit to be operated, directly or indirectly

Note 101 to entry: An incorporated hand-operated device is not intended for the normal operation of the RCS.

3.107**disconnectable RCS**

RCS consisting of 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

3.108**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)

3.109**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

3.110**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

3.111**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 101 to entry: 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 102 to entry: 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.

3.112**sequentially operated RCS**

RCS which includes several switching or reversing contacts generally operated by means of a cam allowing different circuit combinations by successive impulses

Note 101 to entry: The number of impulses is given according to the number of lobes of the cam.

4 General requirements

IEC 60669-1:2017, Clause 4 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 remarks on tests

IEC 60669-1:2017, Clause 5 is applicable with the following additions:

Addition to Table 1:

Table 1 – Number of specimens needed for the tests

Clauses and subclauses	Number of specimens	Number of additional specimens for dual current rating
101 Abnormal operation of the control circuit	PQR	

Addition of the following new subclause:

5.101 Incorporated hand-operated device

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

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 should be avoided, as this application can give misleading results.

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

6 Ratings

IEC 60669-1:2017, Clause 6 is applicable except as follows:

6.1 Rated voltage

Replacement of the first paragraph with the following:

Preferred values of rated voltage are:

- AC: 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.

Addition of the following new subclause:

6.101 Rated control voltage

Preferred values of rated control voltage are:

- AC: 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;
- DC: 6 V, 9 V, 12 V, 24 V, 48 V, 60 V, 110 V and 220 V.

7 Classification

IEC 60669-1:2017, Clause 7 is applicable with the following additions:

7.5 according to the method of actuating the switch:

Addition of the following:

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

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

Addition of the following:

- disconnectable RCS.

Addition of the following new subclauses:

7.101 according to the type of switching mechanism:

- directly operated RCS;
- sequentially operated RCS;
- bistable RCS;
- monostable RCS.

NOTE 101 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.

Pattern number 5 may be met by two RCS pattern numbers 1 or 6 and wiring in accordance with Figure 8 of IEC 60669-1:2017.

Pattern number 7 may be met by pattern number 6/2 and wiring with external connections in accordance with Figure 8 of IEC 60669-1:2017.

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

- RCS energized by impulses;
- RCS permanently energized.

8 Marking

IEC 60669-1:2017, Clause 8 is applicable with the following additions:

8.1 General

Replacement of list item b) with the following:

- b) rated voltage(s) in volts and rated control voltage(s) in volts, if different from the rated voltage(s) or rated control current in amperes according to classification 7.5;

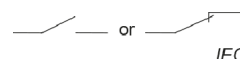
8.2 Symbols

Addition of the following symbols:

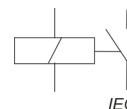
Control mechanism (IEC 60417-6457:2023-08)



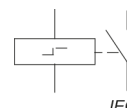
Switch



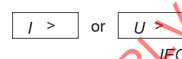
Monostable RCS



Bistable RCS



Priority RCS



8.4 Marking on terminals for phase conductors

Addition after the last paragraph (before Note 1) of the following:

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 either IEC 60445 or with the symbols according to 8.2, or both.

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 Marking of the switch position

Addition, at the beginning of the subclause, of the following paragraph:

This Subclause 8.6 is only applicable to an RCS equipped with an incorporated hand-operated device, acting directly on the switching circuit.

9 Checking of dimensions

IEC 60669-1:2017, Clause 9 is applicable.

10 Protection against electric shock

IEC 60669-1:2017, Clause 10 is applicable.

11 Provision for earthing

IEC 60669-1:2017, Clause 11 is applicable.

12 Terminals

IEC 60669-1:2017, Clause 12 is applicable.

13 Constructional requirements

IEC 60669-1:2017, Clause 13 is applicable with the following addition:

Addition of the following new subclause:

13.101 Transformers intended for SELV circuits

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 see IEC 61140 and IEC 60364-4-41.

14 Mechanism

IEC 60669-1:2017, Clause 14 is applicable with the following addition:

Addition of the following new subclause:

14.101 Hand-operated device with position indicator

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

IEC 60669-1:2017, Clause 15 is applicable.

16 Insulation resistance and electric strength

IEC 60669-1:2017, Clause 16 is applicable with the following addition:

16.3 Electric strength test

Addition to Table 15:

Table 15 – Test voltage, points of application and minimum values of insulating resistance for the verification of electric strength

Insulation to be tested		Minimum value of insulation resistance MΩ	Test voltage	
			V	
			Switches having a rated voltage not exceeding 130 V	Switches having a rated voltage exceeding 130 V
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	3 000	3 750
103	Between two SELV/PELV circuits	5	500	500

17 Temperature rise

IEC 60669-1:2017, Clause 17 is applicable with the following addition:

17.1 General

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:

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

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

IEC 60669-1:2017, Clause 18 is applicable with the following modification:

18.2 Overload

Addition of the following at the end of the subclause:

During the tests of 18.2 and 18.3, the rated control voltage is applied to the control circuit with an impulse duration as declared by the manufacturer.

19 Normal operation

IEC 60669-1:2017, Clause 19 is applicable with the following modifications:

19.1 Test for switches intended for inductive loads

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 17 are made by hand or in an equivalent manner and for those for AC 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 RCS energized by impulses

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 RCS permanently energized

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. When a rated voltage is declared, the drop out shall appear between 75 % and 20 % of this rated voltage. When a voltage range is declared, the voltage drop shall appear between 20 % of the higher value and 75 % of the lower value (of the range).

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

IEC 60669-1:2017, Clause 20 is applicable.

21 Resistance to heat

IEC 60669-1:2017, Clause 21 is applicable with the following modification:

21.1 General

Addition of the following sentence at the end of 21.1 after b):

The requirements of this Subclause 21.1 are applicable to both switching and control circuits.

22 Screws, current-carrying parts and connections

IEC 60669-1:2017, Clause 22 is applicable.

23 Creepage distances, clearances and distances through sealing compound

IEC 60669-1:2017, Clause 23 is applicable with the following modifications:

23.1 General

Addition of the following items to Table 23 for creepage distances and clearances.

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Table 23 – Creepage distances, clearances and distances through insulating sealing compound

Description	mm		
	normal gap	mini-gap	micro-gap
Creepage distances			
101 For creepage distances across which nominal voltages up to 50 V AC or 50 V DC occur ^{f,9} , 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	0,025	0,025
– on printed wiring material – pollution degree 2	0,04	0,04	0,04
– on other insulating material – across insulating material Group I	0,6	0,6	0,6
– on other insulating material – across insulating material Group II	0,85	0,85	0,85
– on other insulating material – across insulating material Group III	1,2	1,2	1,2
102 For clearance distances across which nominal voltages up to 50 V AC or 50 V DC occur ^f , 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	0,1	0,1
– pollution degree 2	0,2	0,2	0,2
NOTE 101 The values for the clearances are based on IEC 60664-1:2020, Table F.2, using as input: – the rated impulse voltage of 800 V derived from IEC 60664-1:2020, Table F.1, for a line-to-neutral voltage of 50 V AC or 50 V DC and overvoltage category III and Case A (inhomogeneous field); – pollution degrees 1 and 2. The values for creepage distances are based on IEC 60664-1:2020, Table F.5 with the input of voltage rationalized for IEC 60664-1:2020, Table F.5 of 50 V RMS from IEC 60664-1:2020, Table F.4, for a supply system having a nominal voltage of 50 V. NOTE 102 For the definition of nominal voltage, see IEC 601-01-21.			
^f For the purposes of this document, the following applies (taken from IEC 60664-1): Micro-environment: the immediate environment of the insulation which particularly influences the dimensioning of creepage distances. Ambient conditions which immediately influence the dimensioning of the clearance and creepage distances (IEC 60664-1:2020, 3.1.23). Pollution degree: a numeral characterizing the expected pollution of the micro-environment (IEC 60664-1:2020, 3.1.25). 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, hygroscopic, or soluble dust. This can usually 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 with a protective coating. Pollution degree 2: Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected. This condensation may occur during periods of on-off load cycles of the equipment (see IEC 60664-1:2020, 4.5.2). 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 document 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 to or greater than the lower value specified for the group. ⁹ 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 Control circuits suitable for connections to a SELV

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 Use of enamel wires

If the wire enamel is at least grade 1 according to IEC 60317 (all parts), 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

IEC 60669-1:2017, Clause 24 is applicable with the following modification:

Add the following sentence at the beginning of 24.1 and 24.2:

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

25 Resistance to rusting

IEC 60669-1:2017, Clause 25 is applicable.

26 EMC requirements

IEC 60669-1:2017, Clause 26 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 or to 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 the requirements of Clause 15 and Clause 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 15 of IEC 60669-1:2017;*
- *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. If one specimen fails, the requirement is considered not met.

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Annexes

Annexes of IEC 60669-1:2017 apply except as follows:

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Annex B (informative)

Changes planned for the future in order to align IEC 60669-1 with the requirements of IEC 60998 (all parts), IEC 60999 (all parts) and IEC 60228

IEC 60669-1:2017, Annex B does not apply.

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Annex E

(informative)

Additional requirements and tests for switches intended to be used at a temperature lower than $-5\text{ }^{\circ}\text{C}$

IEC 60669-1:2017, Annex E applies with the following modifications.

Replace 19.4 with the following text:

19.4 Test for RCS intended to be used in ambient temperature below $-5\text{ }^{\circ}\text{C}$

The following additional test shall be carried out on RCS intended to be used below the normal temperature ranges if marking for low temperature is used:

- *wire the RCS with a signal circuit including an indicator to easily evaluate that the switch is working as intended during the test.*
- *the RCS are then kept for 24 h at a temperature of $(-25 \pm 2)\text{ }^{\circ}\text{C}$.*
- *the test of 19.101 or 19.102, as applicable, is then performed at $(-25 \pm 2)\text{ }^{\circ}\text{C}$ and for 20 operations at rated control voltage.*
- *after these tests the RCS shall show no visible harmful deformation, cracks or similar damage which would lead to non-compliance with this document.*
- *verification of operation is checked by the test described in 19.4, immediately followed by the measurement of the insulation resistance of 16.2 and the electric strength test specified in 16.3.*

Addition:

Bibliography

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

IEC 60364-4-41:2005, *Low voltage electrical installation – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60364-4-41:2005/AMD1:2017

IEC 60669-2-1:2021, *Switches for household and similar fixed electrical installations – Part 2-1: Particular requirements – Electronic control devices*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

INTERRUPTEURS POUR INSTALLATIONS ÉLECTRIQUES FIXES DOMESTIQUES ET ANALOGUES –

Partie 2-2: Exigences particulières – Interrupteurs à commande à distance (télerrupteurs)

AVANT-PROPOS

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L'IEC 60669-2-2 a été établie par le sous-comité 23B: Prises de courant et interrupteurs, du comité d'études 23 de l'IEC: Petit appareillage. Il s'agit d'une Norme internationale.

Cette quatrième édition annule et remplace la troisième édition parue en 2006. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) révision de la présente édition avec référence à l'IEC 60669-1:2017 (Édition 4);
- b) introduction d'une révision de l'Annexe E "Exigences et essais supplémentaires pour les interrupteurs à utiliser à une température inférieure à -5°C ".

Le texte de cette Norme internationale est issu des documents suivants:

Projet	Rapport de vote
23B/1486/FDIS	23B/1500/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/standardsdev/publications.

La présente partie de l'IEC 60669 est destinée à être utilisée conjointement avec l'IEC 60669-1:2017. Elle énumère les modifications nécessaires pour transformer cette norme en une norme spécifique pour les interrupteurs à commande à distance.

Lorsqu'un paragraphe particulier de l'IEC 60669-1:2017 n'est pas mentionné dans le présent document, ce paragraphe s'applique pour autant que cela soit raisonnable.

Dans le présent document, les caractères d'imprimerie suivants sont utilisés:

- exigences proprement dites: caractères romains;
- *modalités d'essais*: caractères italiques;
- notes: petits caractères romains.

Les paragraphes, figures, tableaux ou notes qui sont ajoutés à ceux de l'IEC 60669-1:2017 sont numérotés à partir de 101.

Une liste de toutes les parties de la série IEC 60669, publiées sous le titre général *Interrupteurs pour installations électriques fixes domestiques et analogues*, se trouve sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous webstore.iec.ch dans les données relatives au document recherché. À cette date, le document sera

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INTERRUPTEURS POUR INSTALLATIONS ÉLECTRIQUES FIXES DOMESTIQUES ET ANALOGUES –

Partie 2-2: Exigences particulières – Interrupteurs à commande à distance (télérupteurs)

1 Domaine d'application

L'Article 1 de l'IEC 60669-1:2017 s'applique, avec les exceptions suivantes:

Remplacement du premier alinéa par le suivant:

La présente partie de l'IEC 60669 s'applique aux interrupteurs à commande à distance (désignés ci-après télérupteurs électromagnétiques) de tension assignée qui ne dépasse pas 440 V en courant alternatif et de courant assigné qui ne dépasse pas 63 A, prévus pour installations électriques fixes domestiques et analogues intérieures ou extérieures. Pour le circuit de commande, la tension de commande assignée ne dépasse pas 440 V en courant alternatif ou 220 V en courant continu.

La bobine du télérupteur peut être alimentée en permanence ou non alimentée en permanence.

Les télérupteurs électroniques sont couverts par le domaine d'application de l'IEC 60669-2-1, mais pas par celui du présent document.

Les télérupteurs qui comportent uniquement des composants passifs tels que des résistances, des condensateurs, des composants à coefficient de température positif (CTP) et coefficient de température négatif (CTN) et des cartes de circuits imprimés ne sont pas considérés comme des télérupteurs électroniques.

Les contracteurs électromécaniques pour usages domestiques et analogues relèvent du domaine d'application de l'IEC 61095.

2 Références normatives

L'Article 2 de l'IEC 60669-1:2017 s'applique, avec les ajouts suivants:

IEC 60085:2007, *Isolation électrique – Évaluation et désignation thermiques*

IEC 60317 (toutes les parties), *Spécifications pour types particuliers de fils de bobinage*

IEC 60445:2021, *Principes fondamentaux et de sécurité pour les interfaces homme-machines, le marquage et l'identification – Identification des bornes de matériels, des extrémités de conducteurs et des conducteurs*

IEC 60664-1:2020, *Coordination de l'isolement des matériels dans les réseaux d'énergie électrique à basse tension – Partie 1: Principes, exigences et essais*

IEC 60664-3:2016, *Coordination de l'isolement des matériels dans les systèmes (réseaux) à basse tension – Partie 3: Utilisation de revêtement, d'empotage ou de moulage pour la protection contre la pollution*

IEC 60669-1:2017, *Interrupteurs pour installations électriques fixes domestiques et analogues – Partie 1: Exigences générales*

IEC 61558-2-6:2021, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers for general applications* (disponible en anglais uniquement)

3 Termes et définitions

L'Article 3 de l'IEC 60669-1:2017 s'applique, avec les ajouts suivants:

3.11 tension assignée

Ajout de la note suivante:

Note 101 à l'article: Cette définition s'applique au circuit de l'interrupteur seulement.

3.12 courant assigné

Ajout de la note suivante:

Note 101 à l'article: Cette définition s'applique au circuit de l'interrupteur seulement.

Ajout des nouveaux articles terminologiques suivants:

3.101 interrupteur à commande à distance télérupteur interrupteur destiné à être commandé à distance

3.101.1 télérupteur électromagnétique télérupteur équipé d'une bobine qui est commandée au moyen d'impulsions ou qui peut être alimentée en permanence au moyen d'un circuit de commande

3.101.2 télérupteur électronique télérupteur qui comporte un ou plusieurs composants électroniques

3.102 tension de commande assignée tension assignée au circuit de commande par le fabricant

Note 101 à l'article: Généralement, la tension de commande assignée est la tension de fonctionnement de la bobine de commande électromagnétique.

3.103 circuit de l'interrupteur circuit qui comporte les parties qui permettent le passage du courant assigné dans le télerupteur

3.104 circuit de commande circuit qui comporte les parties électriques pour la commande du mécanisme de commutation

3.105

mécanisme de commande

mécanisme qui comprend toutes les parties destinées au fonctionnement du télerupteur

[SOURCE: IEC 60050-442:1998, 442-04-28, modifié – Les mots "de l'interrupteur" ont été remplacés par "du télerupteur".]

3.106

commande manuelle incorporée

dispositif qui permet de faire fonctionner le circuit de l'interrupteur directement ou indirectement

Note 101 à l'article: Une commande manuelle incorporée n'est pas prévue pour le fonctionnement normal du télerupteur.

3.107

télerupteur débrochable

télerupteur composé de deux parties, l'une servant de base et comportant les bornes, l'autre amovible comportant le circuit de l'interrupteur et le circuit de commande, les deux parties s'adaptant l'une dans l'autre par des connexions élastiques, en utilisant un moyen qui permet de les solidariser et/ou séparer avec ou sans l'aide d'un outil

3.108

courant de commande assigné

courant nécessaire pour l'excitation du télerupteur, assigné par le fabricant à la bobine du circuit de commande (seulement pour les télerupteurs équipés d'une bobine de courant)

3.109

télerupteur bistable

télerupteur qui contient un mécanisme de commande qui, en l'absence d'excitation électrique ou de manœuvre mécanique, reste dans sa position de fonctionnement et qui, sur excitation électrique ou manœuvre mécanique, modifie sa position de fonctionnement

3.110

télerupteur monostable

télerupteur qui comprend un mécanisme de commande qui, sous une excitation électrique ou une manœuvre mécanique, change la position de fonctionnement de l'interrupteur qui reste dans cette condition tant que le télerupteur est excité ou manœuvré et qui retourne à la position initiale après interruption de l'excitation ou de la manœuvre

3.111

télerupteur à priorité

télerupteur utilisé pour faire fonctionner directement ou indirectement un premier circuit de charge ou un groupe de circuits de charge dont l'utilisation peut être arrêtée à certains moments, le circuit de commande du télerupteur étant influencé par ou raccordé à un second circuit ou groupe de circuits (circuits prioritaires ou circuits) qui, lorsqu'ils sont mis sous tension, activent le circuit de commande du télerupteur qui coupe l'alimentation du premier circuit de charge ou des premiers circuits pour une durée qui correspond à la durée d'alimentation du second circuit ou groupe de circuits

Note 101 à l'article: Le télerupteur peut disposer de moyens pour régler la sensibilité du circuit de commande du télerupteur en fonction de la charge totale ou du courant fourni à tous les éléments des circuits (interrupteur à priorité avec bobine ampérométrique) ou être sensible à la tension (interrupteur à priorité avec bobine de tension) appliquée à la seconde charge ou au groupe de charges.

Note 102 à l'article: Ces dispositifs sont utilisés pour limiter le courant total dans une installation de foyer domestique pour déconnecter/connecter certains circuits de charge de l'installation tandis que d'autres (les circuits prioritaires) demeurent connectés.

3.112**télerupteur à fonctionnement séquentiel**

télerupteur qui inclut plusieurs contacts interrupteurs ou inverseurs généralement mis en fonctionnement au moyen d'une came qui permet différentes combinaisons de circuits par impulsions successives

Note 101 à l'article: Le nombre d'impulsions est donné en fonction du nombre de bossages de la came.

4 Exigences générales

L'Article 4 de l'IEC 60669-1:2017 s'applique, avec l'ajout suivant:

Addition après le premier alinéa:

Le fonctionnement d'un télerupteur ne doit pas être perturbé quand il est monté avec un angle qui ne s'écarte pas de plus de 5° de la position spécifiée d'utilisation.

5 Généralités sur les essais

L'Article 5 de l'IEC 60669-1:2017 s'applique, avec les ajouts suivants:

Ajout au Tableau 1:

Tableau 1 – Nombre d'échantillons nécessaires pour les essais

Articles et paragraphes	Nombre d'échantillons	Nombre d'échantillons supplémentaires pour deux courants assignés
101 Fonctionnement anormal du circuit de commande	PQR	

Ajout du nouveau paragraphe suivant:

5.101 Commande manuelle incorporée

Si un télerupteur est équipé d'une commande manuelle incorporée, il doit être soumis à l'essai comme cela est spécifié à l'Article 19.

Lors des essais de pouvoir de fermeture et de coupure et des essais de fonctionnement normal, il convient d'éviter d'appliquer la tension à la bobine du télerupteur toujours au même angle de phase, ce qui peut fausser les résultats.

Il convient de prendre des précautions lors de l'utilisation de combineurs équipés de moteurs synchrones et de dispositifs de commande qui ont des caractéristiques de fonctionnement similaires.

6 Caractéristiques assignées

L'Article 6 de l'IEC 60669-1:2017 s'applique, avec les exceptions suivantes:

6.1 Tension assignée

Remplacement du premier alinéa par ce qui suit:

Les valeurs préférentielles de la tension assignée sont les suivantes:

- en courant alternatif: 6 V, 8 V, 9 V, 12 V, 24 V, 42 V, 48 V, 110 V, 130 V, 220 V, 230 V et 240 V.

Ajout du nouveau paragraphe suivant:

6.101 Tension de commande assignée

Les valeurs préférentielles de la tension de commande assignée sont les suivantes:

- en courant alternatif: 6 V, 8 V, 9 V, 12 V, 24 V, 42 V, 48 V, 110 V, 130 V, 220 V, 230 V et 240 V;
- en courant continu: 6 V, 9 V, 12 V, 24 V, 48 V, 60 V, 110 V et 220 V.

7 Classification

L'Article 7 de l'IEC 60669-1:2017 s'applique, avec les ajouts suivants:

7.5 selon la méthode de commande de l'interrupteur:

Ajout de ce qui suit:

- bobine de courant (pour télérupteur à priorité);
- bobine de tension (pour télérupteur à priorité).

7.7 selon la méthode d'installation, comme conséquence de la conception de l'interrupteur en:

Ajout de ce qui suit:

- télérupteur débrochable.

Ajout des nouveaux paragraphes suivants:

7.101 selon le type de mécanisme de commutation:

- télérupteur à mécanisme à action simple;
- télérupteur à fonctionnement séquentiel;
- télérupteur bistable;
- télérupteur monostable.

NOTE 101 Les télérupteurs à mécanisme à action simple sont ceux qui, à chaque impulsion, donnent un état soit fermé soit ouvert, ces états se répétant à chaque impulsion sur 1, 2, 3 ou 4 pôles, soit en interrupteur, soit en inverseur.

La fonction numéro 5 peut être réalisée par deux télérupteurs de numéro de fonction 1 ou 6 et câblés conformément à la Figure 8 de l'IEC 60669-1:2017.

La fonction numéro 7 peut être réalisée par la fonction numéro 6/2 en réalisant le câblage avec connexions extérieures conformément à la Figure 8 de l'IEC 60669-1:2017.