

SLOVENSKI STANDARD

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SIST EN 60730-1:2001/A11:2002

SIST EN 60730-1:2001/A12:2004

SIST EN 60730-1:2001/A13:2005

SIST EN 60730-1:2001/A14:2005

SIST EN 60730-1:2001/A15:2007

SIST EN 60730-1:2001/A16:2007

SIST EN 60730-1:2001/A2:2009

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Automatic electrical controls for household and similar use - Part 1: General requirements

Automatische elektrische Regel- und Steuergeräte für den Hausgebrauch und ähnliche Anwendungen - Teil 1: Allgemeine Anforderungen

Dispositifs de commande électrique automatiques à usage domestique et analogue - Partie 1: Exigences générales

Ta slovenski standard je istoveten z: EN 60730-1:2011

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97.120

Avtomatske krmilne naprave
za dom

Automatic controls for
household use

SIST EN 60730-1:2012

en

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EUROPEAN STANDARD

EN 60730-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2011

ICS 97.120

Supersedes EN 60730-1:2000 + corr. Aug.2007 + A1:2004 + A2:2008 + A12:2003 + A13:2004
+ A14:2005 + A16:2007 + corr. Mar.2010

English version

**Automatic electrical controls for household and similar use -
Part 1: General requirements
(IEC 60730-1:2010, modified)**

Dispositifs de commande électrique
automatiques à usage domestique et
analogue -
Partie 1: Exigences générales
(CEI 60730-1:2010, modifiée)

Automatische elektrische Regel- und
Steuergeräte für den Hausgebrauch und
ähnliche Anwendungen -
Teil 1: Allgemeine Anforderungen
(IEC 60730-1:2010, modifiziert)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of the International Standard IEC 60730-1:2010, prepared by IEC/TC 72, Automatic controls for household use, together with the common modifications prepared by the Technical Committee CENELEC TC 72, Automatic controls for household use, was submitted to the CENELEC Unique Acceptance Procedure and approved by CENELEC as EN 60730-1:2011.

This document supersedes EN 60730-1:2000 + corr. Aug.2007 + A12:2003 + A1:2004 + A13:2004 + A14:2005 + A16:2007 + corr. Mar.2010 + A2:2008.

The main technical modifications of this European Standard since the above previous edition are listed below:

- changes to the low temperature test requirements for in-line cords;
- revision to the pollution degree for the environment surrounding contacts;
- addition to the use of screwless terminals on printed circuit boards and revisions to creepage distances;
- additions of EN 55011 EMC requirements;
- incorporation of EMC test levels from EN 60335 series;
- additional testing for flexible cords;
- revisions to the requirements for resistance to heat, fire and tracking including replacement of Clause 21 and Annexes F and G;
- new requirements in H.27.1 for first and second fault approach to ensure functional safety;
- incorporation of software techniques from EN 61508-3 in H.11.12;
- updates to the references and bibliography;
- the keyword index was deleted as unnecessary due to the availability of search functions for electronic editions of the standard.

Additionally, this European Standard is the editorial result of the combined texts of EN 60730-1:2000 and its amendments, except where CENELEC common modifications have already been incorporated in IEC 60730-1:2010, together with the deletion of additional ‘in some countries’ paragraphs and ‘under consideration’ paragraphs which have been introduced in IEC 60730-1:2010.

The following dates are 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) 2012-10-24
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) – *

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

* *Justification for no dow:*

This European Standard replaces EN 60730-1:2000 and its amendments. However, EN 60730-1:2000 remains valid until all the Part 2's which are used in conjunction with it have been withdrawn. No date of withdrawal (dow) has been given pending the updating of all the Part 2's to align with this EN 60730-1:2011. The applicable date of withdrawal is given in each Part 2. It is intended the dow for this Part 1 will be fixed once all the Part 2's have been updated.

This Part 1 is to be used in conjunction with the appropriate Part 2 for a particular type of control, or for controls for particular applications. This Part 1 may also be applied, so far as reasonable, to controls not mentioned in a Part 2, and to controls designed on new principles, in which case additional requirements may be necessary.

Subclauses which are additional to those in IEC 60730-1:2010 are numbered 601, 602 etc. Annexes which are additional to those in IEC 60730-1:2010 are prefixed "Z".

Where reference is made to other international or harmonized standards, the edition of that standard quoted in Annex ZA (normative) is applicable.

Special national conditions causing a deviation from this European Standard are listed in Annex ZB (normative) which forms part of this standard.

National deviations from this European Standard are listed in Annex ZC (informative).

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EU Directive 2004/108/EC. See Annex ZZ.

NOTE In this standard the following print types are used:

- Requirements proper: in roman type
- *Test specifications: in italic type.*
- Explanatory matter: in smaller roman type.

Endorsement notice

The text of the International Standard IEC 60730-1:2010 was approved by CENELEC as a European Standard with the following common modifications.

COMMON MODIFICATIONS

General common modification valid for the entire document

If an explanatory statement does not start with NOTE, **add** in front of this explanatory statement "NOTE" and **number** it if more than one note is given in the same subclause.

Contents

Annexes **Add** the following after Annex U:

Annex ZA (normative) Normative references to international publications with their corresponding European publications

Annex ZB (normative) Special national conditions

Annex ZC (informative) A-deviations

Annex ZD (normative) EMC immunity for controls

Annex ZZ (informative) Coverage of Essential Requirements of EC Directives

Figures **Delete** Figures 25 to 30 and Figures H.3 and H.4.
After Figure R.3, **add** "Figure ZD.1 – EMC test framework for controls".

Tables **Delete** Table 2.

In the title of Table 14, **delete** "(this table applies in all countries except Canada, and the USA)."

After Table 14, **add** "Table Z1".

Delete Tables 15 to 18, Table 25 and Table H.16.

After Table P.1, **add** the following:

Table ZD.1 – Classification and test overview

Table ZD.2 – Compliance criteria

Table ZD.3 – Test levels for voltage surges

Table ZD.4 – Test levels for burst

Table ZD.5 – Test application for electrical fast transient burst test

Table ZD.6 – Test levels for conducted disturbances on mains, I/O lines and DC power lines

Table ZD.7 – Test levels for electrostatic discharge

Table ZD.8 – Test levels for radiated electromagnetic field on enclosure

Table ZD.9 – Test levels for radiated electromagnetic field on enclosure

Table ZD.10 – Voltage dips (50 Hz / 60 Hz)

Table ZD.11 – Voltage interruption (50 Hz/60 Hz)

1 Scope

1.1.1 **Replace** the fourth paragraph by the following:

NOTE 1 Throughout this standard the word "equipment" means "appliance and equipment".

Replace Note 1 and Note 2 by the following:

NOTE 2 These requirements are referred to by IEC 61810-1:2008, Clause 1.

NOTE 3 This standard is intended to be used for the testing of any stand-alone relay which is intended to be used as a control of an appliance according to IEC 60335-1. It is not intended to be used for any other stand-alone relay, or to replace the IEC 61810 series of standards.

1.1.3 **Add** the following note:

NOTE Starting relays are tested as voltage sensing or current sensing controls.

1.5 **Add** the following normative reference after IEC 60695-10-2:

EN 60730 series, *Automatic electrical controls for household and similar use*
(IEC 60730 series)

Add the following normative reference before CISPR 22:2008:

EN 55016-1:2010 + A1:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus* (CISPR 16-1-1:2010 + A1:2010)

Add the following normative references after IEC 62326

HD 21.5 S3:1994 + A1:1999 + A2:2001, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)*
(IEC 60227-5:1979, mod.)

HD 22.4 S4:2004, *Cables of rated voltages up to and including 450/750 V and having cross-linked insulation – Part 4: Cords and flexible cables*

2 Definitions

2.1.5 **Delete** Note 2.

2.1.15 **Delete** "(conductive) shield (US)".

2.1.16 **Delete** "(electrically) protective shield (US)".

2.1.17 **Delete** "(electrically) protective shielding (US)".

2.2.8 **Replace** the two last paragraphs by:

NOTE 1 A thermal cut-out may be of the automatic, manual reset or non-resettable type.

NOTE 2 Normally a thermal cut-out will provide a type 2 action.

2.7.2 **Replace** the two last paragraphs by:

NOTE 1 See Annex ZB.

NOTE 2 An earthing terminal is only allowed if it is for continuity or functional (as distinct from protective) purposes.

2.7.3 **Replace** the two last paragraphs by:

NOTE 1 See Annex ZB.

NOTE 2 An earthing terminal is only allowed if it is for continuity (as distinct from protective) purposes.

2.7.5.3 **Replace** the paragraph by:

NOTE 1 The enclosure of an all-insulated class II control may form a part or the whole of the supplementary insulation or of the reinforced insulation. If a control with double insulation and/or reinforced insulation throughout has an earthing terminal or earthing contact, it is deemed to be of class 0I or class I construction.

NOTE 2 See Annex ZB.

2.13.9 **Delete** “Explanatory” in front of the four notes.

2.14.2 **Delete** the explanatory paragraph.

4 **General notes on tests**

4.2.1 **Replace** the first sentence by:

One sample is used for the tests in Clauses 5 to 11 and 18 to 27 including the relevant annexes.

Delete the third explanatory paragraph.

4.3.3.1 **Add** “See Annex ZB.” at the end of the paragraph.

4.3.3.3 **Add** “See Annex ZB.” at the end of the paragraph.

5 **Rating**

5.1 **Add** a new requirement paragraph after the 1st paragraph:

The rated voltage of controls, having terminals intended to be directly connected to the supply mains single phase, shall cover usage at 230 V and to the supply mains multi-phase, 400 V.

6 **Classification**

6.6.1 **Delete** the explanatory paragraph.

6.8.2.1 **Add** “(see Annex ZB)” before the semi column.

6.8.2.2 **Add** “(see Annex ZB)” before the semi column.

6.8.3.1 **Add** “(see Annex ZB)” before the semi column.

6.8.3.2 **Add** “(see Annex ZB)” before the semi column.

7 Information

Table 1 In Requirement 7, **replace** the wording by "The type of load and rated current ⁷⁾".

In Requirement 19, **delete** "9)".

In Requirement 23, **add** to the wording "if more than 20 K above T_{max} ".

In Requirement 78, **replace** the second column by:

"Table 20 (19.1 of the previous edition), Note 1"

After requirements 91 and 92, **add** the following new requirements:

601	EMC standard/test method	23.1	X
602	Declared voltage and declared current for the purposes of EMC emission tests ⁶⁰¹⁾	23.1.1	D

In Note ⁴⁾, **replace** the text before the table by:

4) α_1 = minimum rising rate

β_1 = minimum falling rate

The rate of change (α_1 and β_1) of the activating quantity are those applicable to normal use.

α_2 = maximum rising rate (for Type 2 actions only)

β_2 = maximum falling rate (for Type 2 actions only)

For test purposes, α_1 and β_1 shall be as declared but not lower than the limit(s) indicated in the appropriate Part 2s for Type 1 actions and/or Type 2 actions. The values α_2 and β_2 are for test purposes only, and may alternatively be declared as a maximum cycling rate. The rates of change for the purpose of this standard shall be expressed in the units as shown in the following table*:

Replace Note ⁷⁾ by:

⁷⁾ For each circuit of the control, the type of load and rated current. For controls with more than one circuit it shall be made clear to which circuit or terminal the information applies. For circuits for resistive and inductive loads, the rated current, or the rated load in VA, at power factors as indicated in Table 14 (17.2.1 of the previous edition).

Replace the text of note ⁹⁾ by 'Void'.

After Note ²¹⁾, **add** the following new note:

⁶⁰¹⁾ These declarations are intended to cover normal use.

7.4.3 **Replace** the explanatory paragraph by

NOTE See Annex ZB.

7.4.3.2 **Replace** all four explanatory paragraphs by.

NOTE See Annex ZB.

8 Protection against electric shock

8.1.1.1 **Delete** the explanatory paragraph (NOTE).

8.3.2.4 **Replace** the first sentence by:

The voltage shall not exceed 34 V peak.

8.4 **Delete** the two explanatory paragraphs.

9 Provision for protective earthing

9.1.1 **Add** "See Annex ZB." after the 1st paragraph.

9.1.2 **Add** "See Annex ZB." after the 1st paragraph.

9.3.2 **Delete** the two explanatory paragraphs and Table 2 (9.3.2 of the previous edition).

9.3.3 **Format** the text as a proper requirement.

9.3.4 **Delete** the explanatory paragraph.

9.5.2 **Delete** the entire subclause.

10 Terminals and terminations

Table 3 **Delete** "1)" in the heading row and replace the text of Note 1) by 'Void'.

10.1.4.2 **Delete** the entire subclause.

10.1.4.3 **Delete** the entire subclause.

10.1.8.3 **Replace** the last sentence as follows:

The conductor is inserted into the terminal in the position most likely to assist a wire to escape and then the screw is tightened with a torque equal to two-thirds of the torque specified in Table 20 (19.1 of the previous edition).

10.1.9.1 **Modify** the first sentence by:

The terminals are fitted with conductors of the smallest and largest nominal cross-sectional areas used in 10.1.4, fixed or flexible, whichever is appropriate, or the more unfavourable and the terminal screws are tightened, the torque applied being equal to two-thirds of the torque specified in Table 20 (19.1 of the previous edition).

10.1.14 **Delete** the explanatory paragraph.

10.1.16 **Delete** the entire subclause including 10.1.16.1.

10.2.1 **Add** a new requirement paragraph after the 1st paragraph:

A terminal or termination is not required if a conductor is permanently connected to the control by the control manufacturer.

Table 6 **Delete** "1)" in the heading row and replace the text of Note 1) by 'Void'.

11 Constructional requirements

11.2.1.1 **Delete** the explanatory paragraph.

11.3.2 **Delete** in the sixth line the word “or”.

Add “(7.2 of the previous edition)” after “Table 1” in two places.

11.5 **Delete** the last explanatory paragraph.

11.8.1 **Replace** “60245 IEC 53” by “H05RR-F of HD 22.4”.

Replace “60227 IEC 53” by “H05VV-F of HD 21.5”.

Table 10 **Delete** “¹⁾” in the heading row and replace the text of Note ¹⁾ by 'Void'.

11.10.3 **Delete** the explanatory paragraph (NOTE).

11.11.1.2 **Delete** all the explanatory paragraphs.

11.11.1.3 **Replace** text by “Void”.

11.11.1.4 **Replace** text by “Void”.

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12 Moisture and dust resistance

12.1.6 **Delete** the explanatory paragraph.

12.1.6.2 **Replace** the last sentence by:

The glands and other sealing means are then tightened with a torque equal to two-thirds of that given in Table 20 (19.1 of the previous edition).

12.3 **Delete**, including subclauses 12.3.1 to 12.3.7.

13 Electric strength and insulation resistance

Table 12 In the row for supplementary insulation, in the second column, **add** “ – ”.

In the row for reinforced insulation, in the second column, **add** “ – ”.

In the row for electronic disconnection, in the second column, **add** “100”.

Replace the text of note ⁴⁾ by 'Void'.

Add “See Annex ZB.” to note ¹⁰⁾.

Delete “¹⁴⁾” in the title and **replace** the text of Note ¹⁴⁾ by 'Void'.

13.3 **Delete** including subclauses 13.3.1 to 13.3.4.

14 Heating

14.1.1 **Delete** the explanatory paragraph.

14.4 **Replace** text including the explanatory paragraph by:

All circuits and terminals intended to control external loads shall be loaded as declared in Table 1 (7.2 of the previous edition), requirement 3, such that each circuit or terminal carries that current between 0,9 and 1,1 of its declared rating that will prove most arduous. All controls shall be tested at a voltage between 0,9 and 1,1 times rated voltage but controls that are not sensitive to voltage may be tested at a lower voltage provided that 1,1 times rated current is passed. Internal circuits shall be connected as specified by the manufacturer.

14.6.2 **Add** "(7.2 of the previous edition)" after "Table 1".

Table 13 **Delete** the second sentence of note ¹⁾.

Delete the last two sentences of note ⁷⁾.

After Table 13, **add** the following:

14.Z1 If the maximum permitted temperature of a winding or core lamination exceeds the value specified for the test described in 14.1 six additional samples shall be subjected to the following tests:

Moving parts, if any, are locked and a current is passed individually through each winding, this current being such that the temperature of the relevant winding is equal to the maximum temperature measured under the conditions specified in 14.1. This temperature is increased by whichever value is chosen from the following table. The total time during which the current is passed is as indicated in Table Z1 for the temperature increase chosen.

Table Z1

Temperature increase °C (K)	Total time h
0 ± 3	p ¹⁾
10 ± 3	0,5 p
20 ± 3	0,25 p
30 ± 3	0,125 p

¹⁾ In general, p equals 8 000 for controls for EN 60335-1 applications.

The total time is divided into four equal periods, each of them being followed by a period of 48 h during which the control is subjected to a humidity treatment as specified in 12.2. After the final humidity treatment, the insulation shall withstand an electric strength test as specified in Clause 13, the test voltage for the electric strength being, however, reduced to 50 % of the values specified in the table of that clause.

Failure of only one of the six samples during the first of the four periods of the test is ignored.

If one of the six samples fails during the second, third or fourth period of the test, the remaining five samples are subjected to an additional fifth period of passing current and humidity treatment, followed by an electric strength and insulation resistance test as specified before.

Failure of any of the remaining five controls will entail a rejection.

The controls are then subjected to the test of 17.8, but only for half the number of cycles specified in that subclause. All controls shall then withstand an electric strength test as specified before.

NOTE 1 Examples of cases where there may be doubt with regard to the classification of the insulating system of a winding are those cases where well-known insulating materials are used in an unconventional way, where combinations of materials of different temperature classes are used at a temperature higher than that allowed for the lowest class used or where materials are used for which no sufficient experience is available, as may be the case for integral core insulation.

NOTE 2 If it is desired to establish that the insulation system falls within the temperature class claimed by the manufacturer, the winding temperature must be equal to the temperature limit for the class of insulation claimed, increased by the temperature increase chosen from the table.

NOTE 3 The temperature increase chosen from the table should be agreed with the manufacturer.

15 Manufacturing deviation and drift

15.1 **Delete** the explanatory paragraph.

16 Environmental stress

16.2.1 **Add** "See Annex ZB." at the end of the first dashed paragraph.

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Delete the explanatory paragraph.

17 Endurance

17.1.3 **Add** an explanatory paragraph:

NOTE For the test sequence and conditions of non-resettable thermal cut-outs, see 17.16.

17.1.3.1 **Delete** in the second and fifth dashed paragraphs the text in brackets.

17.2.2 **Replace** the text by:

The electrical loads to be used are those specified in Table 14 (17.2.1 of the previous edition) at rated voltage V_R , with this voltage then being increased to $1,15 V_R$ for the overvoltage test of 17.7 and 17.10.

17.2.3 **Replace** up to 17.2.3.2 inclusive by "Void".

Table 14 **Delete** the words in brackets at the end of the title.

Delete "2)" in the last cell of the last row and **replace** the text of Note 2) by "Void".

Add ⁶⁰¹⁾ in the column 'Type of circuit' to the cell for 'Declared specific load' and add the following note to the table:

⁶⁰¹⁾ For the tests of tungsten filament lamp load the load and test of EN 60669-1:1999, 18.2 and for fluorescent lamp load the load of EN 60669-1:1999, 19.2 shall be used, under the conditions as specified in 17.16 in the relevant Part 2.

Table 15 **Delete.**

Table 16 **Delete.**

17.3.1 **Replace** the last sentence of the third dashed paragraph by:

If T_{min} is less than 0 °C, the following additional tests shall be carried out with the switch head maintained between T_{min} and $(T_{min} - 5)$ °C:

– Controls with Type 1 action – Clauses 16 and 17;

– Controls with Type 2 action – Clauses 15, 16 and 17.

Three additional samples required.

17.5.1 **Delete** the explanatory paragraph.

17.6.2 **Delete** the explanatory paragraph.

17.7 **Delete** the words in brackets.

17.7.1 **Delete** the words in brackets.

17.7.3 In the last dash, **add** "(7.2 of the previous edition)" after "Table 1".

17.7.7 **Delete** the explanatory paragraph.

17.8.4.1 **Delete** the explanatory paragraph.

17.10 **Delete** the words in brackets.

17.10.1 **Delete** the words in brackets.

17.10.4 **Delete.**

17.12.5 **Delete.**

17.14 **Delete** the second sentence in the second dashed paragraph.

18 Mechanical strength

18.1.6 **Delete** 18.1.6 to 18.1.6.3 inclusive.

18.2.1 **Delete** “, except as provided in 18.4,”.

18.4 **Replace** by “Void”.

Table 17 **Delete.**

Table 18 **Delete.**

18.4.1 **Delete.**

19 Threaded parts and connections

19.1.7 **Replace** “screws” by “threaded parts”.

19.2.4.1 **Delete** the explanatory paragraph.

19.2.5.1 **Delete** the explanatory paragraph.

20 Creepage distances, clearances and distances through solid insulation

Delete the explanatory paragraph after NOTE 4.

20.1 **Replace** in the fifth line “impulse withstand test” by “impulse voltage test”.

Replace in NOTE 2 “impulse test” by “impulse voltage test”.

Replace Table 22 except the notes by the following:

Rated impulse voltage from Table 21 (20.1 of the previous edition) ¹⁾	Clearances in air up to 2 000 m above sea-level ³⁾							
	mm							
	Case A				Case B (impulse test required – see 20.1.12)			
	Pollution degree ²⁾				Pollution degree ²⁾			
kV	1	2	3	4	1	2	3	4
0,33	0,01	0,20	0,8	1,6	0,01	0,2	0,8	1,6
0,50	0,04				0,04			
0,80	0,10				0,1			
1,5	0,5				0,3	0,3		
2,5	1,5	1,5	1,5	3	0,6	0,6	1,2	2
4,0	3	3	3		1,2	1,2		
6,0	5,5	5,5	5,5		2	2	2	2
8,0	8	8	8	8	3	3	3	3

20.1.7 **Replace** in the second line “impulse withstand test” by “impulse voltage test”.

Replace in the note “impulse test” by “impulse voltage test”.