

**ELEKTRILISED AUTOMAATJUHTIMISSEADMED. OSA 1:  
ÜLDNÕUDED**

**Automatic electrical controls - Part 1: General  
requirements**

**EESTI STANDARDI EESSÕNA****NATIONAL FOREWORD**

See Eesti standard EVS-EN 60730-1:2016 sisaldab Euroopa standardi EN 60730-1:2016 ingliskeelset teksti.	This Estonian standard EVS-EN 60730-1:2016 consists of the English text of the European standard EN 60730-1:2016.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
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English Version

Automatic electrical controls -  
Part 1: General requirements  
(IEC 60730-1:2013 , modified + COR1:2014)

Dispositifs de commande électrique automatiques -  
Partie 1: Exigences générales  
(IEC 60730-1:2013 , modifiée + COR1:2014)

Automatische elektrische Regel- und Steuergeräte -  
Teil 1: Allgemeine Anforderungen  
(IEC 60730-1:2013 , modifiziert + COR1:2014)

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

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## European foreword

This document (EN 60730-1:2016) consists of the text of IEC 60730-1:2013 + corrigendum 1:2014 prepared by IEC/TC 72 "Automatic electrical controls", together with the common modifications prepared by CLC/TC 72 "Automatic controls for household use".

The following dates are fixed:

- latest date by which the document has to be implemented at national level (dop) 2017-01-29  
by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) - \*

*\* Justification for no dow:*

*This European Standard supersedes EN 60730-1:2011. However, EN 60730-1:2011 remains valid until all the Part 2's which are used in conjunction with it have been withdrawn.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 60730-1:2016. 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 document supersedes EN 60730-1:2011.

EN 60730-1:2016 includes the following significant technical changes with respect to EN 60730-1:2011:

- changes of the title of the Standard into "*Automatic electrical controls – Part 1: General requirements*";
- revisions to Clause H.26 based on changes in technology, applications, and to improve consistency and layout;
- modification to Table H.12 to align with CISPR 22;
- revisions to Annex J to correlate the fault modes of thermistors, and to exempt thermistors used in conjunction with type 1 controls in SELV low power circuits from the tests specified in Annex J;
- new requirements covering battery-powered controls, and the use of batteries in controls;
- revision addressing the relay faults in Table H.24;
- new/updated requirements in Clause 24, for switch mode power supplies;
- revisions covering the allowance of screwless-type clamping units complying with IEC 60999-1;
- new requirements addressing remotely actuated control functions;
- addition of a new/updated leakage current diagram to align the Annex E diagram with the diagram in IEC 60990;
- updated requirements for temperature sensing controls.

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 considered to be necessary.

Where, for a particular clause or subclause, the text of Part 2 indicates:

**Addition:** the Part 1 text applies with the additional requirement indicated in a Part 2;

**Modification:** the Part 1 text applies with a minor change as indicated in a Part 2;

**Replacement:** the Part 2 text contains a change which replaces the Part 1 text in its entirety.

Where no change is necessary, the Part 2 indicates that the relevant clause or subclause applies.

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.
- Defined terms: **bold type.**

Some table titles contain reference in brackets to table numbers in IEC 60730-1:1999 (edition 3) for ease of correlation between Parts 2 and the Part 1.

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 60730-1:2013 are prefixed “Z”.

Special national conditions are listed in Annex ZB (normative) which forms part of this standard.

National deviations are listed in Annex ZC (informative).

### Endorsement notice

The text of the International Standard IEC 60730-1:2013 was approved by CENELEC as a European Standard with agreed common modifications.

### COMMON MODIFICATIONS

#### Contents

Annexes After Annex V, **add** the following:

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

Figures **Delete** Figures 25 to 30 and Figures H.3 and H.4.

After Figure S.1, **add** the following:

Figure ZD.1 – EMC test framework for controls

Tables **Delete** Table 2.

After Table 13, **add** "Table Z1".

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

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

After Table H.23, **add** the following:

Table H.Z1 (21.4 of edition 3) – Mercury switch short-circuit conditions

After Table S.2, **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 power-frequency magnetic field on enclosure

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

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

## 1 Scope and normative references

### 1.1.3 Add the following note:

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

### 1.2 Add the following normative references:

EN 50525-2-11, *Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U<sub>o</sub>/U) – Part 2-11: Cables for general applications – Flexible cables with thermoplastic PVC insulation*

EN 50525-2-21, *Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U<sub>o</sub>/U) – Part 2-21: Cables for general applications – Flexible cables with crosslinked elastomeric insulation*

EN 55016-1-1, *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)*

EN 60669-1:1999 + A1:2002 + A2:2008, *Switches for household and similar fixed-electrical installations – Part 1: General requirements (IEC 60669-1:1998, mod. + A1:1999, mod. + A2:2006, mod.)*

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

## 2 Terms and definitions

2.1.5 **Replace** the text of Note 3 to entry by “Void”.

2.1.15 **Delete** “(conductive) shield (US)”.

2.1.16 **Delete** “(electrically) protective shield (US)”.

2.1.17 **Delete** “(electrically) protective shielding (US)”.

2.7.2 **Replace** Note 2 to entry by:

Note 2 to entry: See Annex ZB.

2.7.3 **Replace** Note 1 to entry by:

Note 1 to entry: See Annex ZB.

2.7.5.3 **Add** the following Note 2 to entry:

Note 2 to entry: See Annex ZB.

2.14.2 **Delete** Note 1 to entry.

## 4 General notes on tests

**Delete** the NOTE.

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 1<sup>st</sup> 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 NOTE.

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

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

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

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

## 7 Information

Table 1 In Requirement 7, **replace** the wording by “The type of load and rated current<sup>b</sup>”.

In Requirement 19, **delete** “<sup>d</sup>”.

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

After requirements 95, **add** the following new requirements:

Z1	EMC standard/test method	23.1	X
Z2	Declared voltage and declared current for the purposes of EMC emission tests <sup>Za</sup>	23.1.1	D

**Replace** footnote <sup>b</sup> by:

<sup>b</sup> 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 3<sup>rd</sup> edition).

**Replace** the text of footnote <sup>d</sup> by 'Void'.

After footnote <sup>m to t</sup>, **add** the following new note:

<sup>Za</sup> These declarations are intended to cover normal use.

7.4.3 **Replace** the NOTE by

NOTE See Annex ZB.

7.4.3.2 **Replace** NOTE 1 to NOTE 4 by.

NOTE See Annex ZB.

## 8 Protection against electric shock

8.1.1.1 **Delete** the NOTE.

8.4 **Delete** NOTE 1 and NOTE 2.

## 9 Provision for protective earthing

9.1.1 **Add** "See Annex ZB." after the 1<sup>st</sup> paragraph.

9.1.2 **Add** "See Annex ZB." after the 1<sup>st</sup> paragraph.

9.3.2 **Delete** NOTE 1, NOTE 2 and Table 2 (9.3.2 of edition 3).

9.3.4 **Delete** the NOTE.

9.5.2 **Delete** the entire subclause.

## 10 Terminals and terminations

Table 3 **Delete** "<sup>b</sup>" in the heading row and **replace** the text of footnote <sup>b</sup> by 'Void'.

10.1.4.1 **Delete** NOTE 1 and NOTE 2.

10.1.14 **Delete** the NOTE.

- 10.1.16 **Delete** the entire subclause including 10.1.16.1.
- 10.2.1 **Add** a new requirement paragraph after the 1<sup>st</sup> paragraph:  
A terminal or termination is not required if a conductor is permanently connected to the control by the control manufacturer.
- Table 6 **Delete** "b" in the heading row and **replace** the text of footnote <sup>b</sup> by 'Void'.
- 11 Constructional requirements**
- 11.2.1.1 **Delete** the NOTE.
- 11.3.2 **Delete** in the sixth line the word "or".
- 11.5 **Delete** NOTE 3.
- 11.8.1 **Replace** "60245 IEC 53" by "EN 50525-2-21".  
**Replace** "60227 IEC 53" by "EN 50525-2-11".
- Table 10 **Delete** "b" in the heading row and **replace** the text of footnote <sup>b</sup> by 'Void'.
- 11.9.4 **Add** "see Annex ZB" at the end of the first sentence.
- 11.10.3 **Delete** the NOTE.
- 11.11.1.2 **Delete** NOTE 1 and NOTE 2.
- 11.11.1.3 **Replace** the text of the NOTE by "Void".
- 11.11.1.4 **Replace** the text of the NOTE by "Void".
- 12 Moisture and dust resistance**
- 12.1.6 **Delete** the NOTE.
- 12.3 **Delete** the entire subclause, including 12.3.1 to 12.3.7.

**13 Electric strength and insulation resistance**

Table 12 **Replace** the text of footnote <sup>a</sup> by 'Void'.

**Add** “See Annex ZB.” to footnote <sup>d</sup>.

**Replace** the text of footnote <sup>i</sup> by 'Void'.

13.3 **Delete** the entire subclause, including 13.3.1 to 13.3.4.

**14 Heating**

14.4 **Replace** the text including the NOTE by:

*All circuits and terminals intended to control external loads shall be loaded as declared in Table 1, 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.*

Table 13 **Delete** the last two sentences of footnote <sup>f</sup>.

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 text 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 Table Z1. 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 <sup>a</sup>
10 ± 3	0,5 p
20 ± 3	0,25 p
30 ± 3	0,125 p

<sup>a</sup> 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.*

**EXAMPLES** 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.

If it is desired to establish that the insulation system falls within the temperature class claimed by the manufacturer, the winding temperature shall be equal to the temperature limit for the class of insulation claimed, increased by the temperature increase chosen from Table Z1.

The temperature increase chosen from Table Z1 should be agreed with the manufacturer.

## **15 Manufacturing deviation and drift**

15.1 **Delete** the NOTE.

## **16 Environmental stress**

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

**Delete** the NOTE.

## **17 Endurance**

17.1.3 **Add** the following NOTE:

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 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** "C<sup>n</sup>" in the last cell of the last row and **replace** the text of footnote <sup>c</sup> by 'Void'.

**Add** 'Za' in the column 'Type of circuit' to the cell for 'Declared specific load' and **add** the following footnote to the table:

<sup>Za</sup> 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 NOTE.

17.7 **Delete** the words in brackets.

17.7.1 **Delete** the words in brackets.

17.7.7 **Delete** the NOTE.

17.8.4.1 **Delete** the NOTE.

17.10 **Delete** the words in brackets.

17.10.1 **Delete** the words in brackets.

17.10.4 **Delete.**

17.12.5 **Delete.**

## **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 NOTE.

19.2.5.1 **Delete** the NOTE.

## 20 Creepage distances, clearances and distances through solid insulation

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

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

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”.

## 21 Resistance to heat, fire and tracking

21.1 **Delete** the NOTE.

21.2.7 **Replace** the test specification by:

*Compliance is checked by the tests of Clause G.4, carried out at a voltage corresponding to the PTI value declared for Table 1, requirement 30.*

21.3 **Replace** the existing text by:

The test sequence of 21.2.1 through 21.2.7 applies, preceded by the preconditioning of 21.3.1.

For parts that maintain or retain in position electrical connections, the glow-wire test shall be carried-out at a temperature of 850 °C.

21.4 **Delete** the entire subclause, including Table 25.

## 23 Electromagnetic compatibility (EMC) requirements - Emission

23.1 **Replace** the first line of the third paragraph by:

*Compliance is checked by one of the following methods as declared by the manufacturer (Table 1, requirement Z1) (see also Table H.10).*

23.1.1 **Add** the following before the first dashed paragraph:

- *the test is conducted at the lowest declared voltage and lowest declared current (Table 1, requirement Z2);*

23.1.2 **Replace** the second paragraph by:

*The duration of radio interference is measured by an oscilloscope, or the measuring equipment specified in EN 55016-1-1 but with the capability to measure 20 ms, connected to the control so as to measure the voltage drop across the contacts.*

**24 Components**

24.1.1 In the 1<sup>st</sup> paragraph, **delete** ", 17.2.3.1 and 17.2.3.2".

**27 Abnormal operation**

27.2 **Replace** the title "Burnout test" by "Locked mechanism test".

27.2.1 In the 1<sup>st</sup> paragraph, **delete** ", 17.2.3.1 and 17.2.3.2".

27.2.3.1 **Delete** the NOTE.

**Figures**

Figure 14 **Replace** footnote <sup>a</sup> by:

<sup>a</sup> Tabs may have an optional detent for latching. Round dimple detents, rectangular dimple detents and hole detents shall be located in the area bounded by dimensions  $b_1$ ,  $l_3$  and  $l_4$  along the centre line of the tab.

Figure 15 **Delete** the reference 'r', and the words "Flatness tolerance" (in two places).

Figure 25 **Delete**.

Figure 26 **Delete**.

Figure 27 **Delete**.

Figure 28 **Delete**.

Figure 29 **Delete**.

Figure 30 **Delete**.

**Annexes**

**Annex C** **Replace** the text by 'Void'.

**Annex D** **Replace** the text by 'Void'.

**Annex H**

H.7 In requirement 36, **add** H.2.4.6,' after "11.3.2,"in the second column

H.7 In requirement 60, **delete** in the second column "Annex R".

H.26.1 After the last paragraph, **add** the following:

For EMC immunity of **operating controls** of **Type 1 action** intended to be used as "**free standing controls, independently mounted and/or in-line cord controls**", the tests of Annex ZD apply instead of those of Clause H.26.

H.26.7 **Replace** by "Void".

H.26.10 **Replace** the entire subclause including Figure H.3, Figure H.4, Table H.18 and the NOTE by "Void".

H.27.1.1.3 **Delete** NOTE 1.

H.27.1.1.3a) **Replace** the text of the NOTE 2 by the following:

The wrapping tissue paper is specified in ISO 4046:1978 as thin, soft, relatively tough paper, generally intended for packing delicate articles, its substance being between 12 g/m<sup>2</sup> and 25 g/m<sup>2</sup>.

#### Annex J

J.17.17 a) **Replace** in the 7<sup>th</sup> dashed line "*Thermal runaway*" by "*Thermal runaway by increased voltage*".

J.17.18.5 **Replace** the title of this subclause by "Thermal runaway by increased voltage".

#### Annex K

Table K.1 In row for 150 V, **delete** "120/208<sup>b</sup>" in the second column and "c" in the fifth column.

**Delete** footnote <sup>b</sup> and footnote <sup>c</sup>.

Table K.2 In row for 150 V, **delete** "120/208<sup>b</sup>" in the second column.

**Delete** footnote <sup>b</sup>.

#### Annex T

T.3.2 **Delete** NOTE 2.