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STANDARD**

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Automatic electrical controls for household and similar use -- Part 1: General requirements (IEC 60730-1:1986 modified)

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EUROPEAN STANDARD
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May 1991

+ A1 + A11
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+ A12 + A14
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English version

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

(Includes Amendment A1:1991 + Amendment A11:1991 + A12:1993 + A14:1995)
(IEC 730-1:1986, modified)

Dispositifs de commande électrique
automatiques à usage domestique et analogue
Première partie: Règles générales
(CEI 730-1:1986, modifiée)

(Inclut les amendement A1:1991 + A11:1991
+ A12:1993 + A14:1995)

Automatische elektrische Regel- und
Steuergeräte für den Hausgebrauch und
ähnliche Anwendungen

Teil 1: Allgemeine Anforderungen

(IEC 730-1:1986, modifiziert)

(Einschließlich Änderung A1:1991 + A11:1991
+ A12:1993 + A14:1995)

This European Standard was approved by CENELEC on 11 September 1990. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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

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Ref. No. EN 60730-1:1991 + A1:1991 + A11:1991 + A12:1993 + A14:1995 E

Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 730-1:1986 could be accepted without textual changes, has shown that some common modifications were necessary for the acceptance as European Standard.

The reference document, together with the common modifications prepared by the CENELEC Technical Committee TC 72: Automatic controls for household use, was submitted to the CENELEC members for formal vote.

The text of the draft was approved by CENELEC on 11 September 1990.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1992-07-01
- latest date of withdrawal of conflicting standards (dow) 1995-07-01

For products which have complied with the relevant national standard before 1995-07-01 as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-07-01.

This document supplements or modifies the corresponding clauses of IEC 730-1:1986, so as to convert it into the European Standard EN 60730-1.

In using this standard, reference must also be made to all appropriate amendments to this standard which contain additional common modifications.

Subclauses which are in addition to those in the IEC 730-1 are numbered 501, 502 etc. New annexes are numbered Annex ZA, Annex ZB etc.

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

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

This standard will be in two parts:

Part 1: General requirements, comprising clauses of a general character for automatic electrical controls for use in, on, or with household and similar electrical appliances.

It applies only when there is a Part 2 for a particular type of control, or for controls for particular application.

Part 2: Particular requirements, dealing with particular types of controls or controls for particular application. The clauses of these particular requirements supplement or modify the corresponding clauses of Part 1.

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

- supplement — the Part 1 text applies with the additional requirement indicated in Part 2;
- amendment — the Part 1 text applies with a minor change as indicated in Part 2;
- replacement — the Part 2 text contains a change which replaces the Part 1 text in its entirety;
- deletion — the Part 1 text does not apply.

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

NOTE In this document, the following print types are used:

- requirements proper: in roman type;
- test specifications: in italic type;
- explanatory matter: in smaller roman type.

Foreword to amendment A1

The CENELEC questionnaire procedure, performed for finding out whether or not amendment No. 1:1990 to the International Standard IEC 730-1:1986 could be accepted without textual changes, has shown that some common modifications were necessary for the acceptance as amendment to the European Standard.

The reference document, together with the common modifications prepared by the CENELEC Technical Committee TC 72: Automatic controls for household use, was submitted to the CENELEC members for formal vote.

The text of the draft was approved by CENELEC as amendment A1 on 11 September 1990.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1992-07-01
- latest date of withdrawal of conflicting standards (dow) 1995-07-01

This document supplements or modifies the corresponding clauses of amendment No. 1:1990 to IEC 730-1:1986, so as to convert it into amendment A1 to EN 60730-1.

Subclauses which are in addition to those in the IEC Standard 730-1 are numbered 501, 502 etc. New annexes are numbered Annex ZA, Annex ZB etc.

Special national conditions (snc) causing a deviation from this amendment are listed in Annex ZA (normative) which forms part of this standard.

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

Foreword to amendment A11

The CENELEC questionnaire procedure, performed for finding out whether or not the IEC Central Office documents IEC 72(CO)38, 72(CO)40, 72(CO)42, and 72(CO)24 as amended by 72(CO)35, could be accepted without textual changes, has shown that some common modifications were necessary for the acceptance as amendment to the European Standard.

The reference documents, together with the common modifications prepared by the CENELEC Technical Committee TC 72: Automatic controls for household use, were submitted to the CENELEC members for formal vote as draft amendments prAA, prAB, prAC and prAD to EN 60730-1. All four documents received sufficient positive votes for submission to the Technical Board for ratification.

Amendment No. 2 to IEC Publication 730-1 will include the above referenced Central Office documents. However, because of delays in printing this amendment, it has been found necessary to issue the present amendment to EN 60730-1 as amendment A11.

When IEC Amendment No. 2 becomes available, CENELEC/TC 72 will discuss this amendment again with the object of re-issuing it as an endorsement of IEC Amendment No. 2. The separate sections of this document will then be eliminated.

The texts of the drafts were approved by CENELEC as amendment A11 on 11 September 1990.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1992-07-01
- latest date of withdrawal of conflicting standards (dow) 1995-07-01

This document supplements or modifies the corresponding clauses of the IEC Central Office documents IEC 72(CO)38, 72(CO)40, 72(CO)24 as amended by 72(CO)35, so as to convert them into amendment A11 to EN 60730-1.

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

Foreword to amendment A12

This amendment A12 to EN 60730-1:1991 has been prepared by the CENELEC Technical Committee TC 72: Automatic controls for household use.

It was agreed for submission to the CENELEC formal vote at the meeting of CLC/TC 72 in Brussels on 26 and 27 November 1991.

At that meeting it was considered necessary to issue a correction to clause 6 of EN 60730-1.

At that same meeting, a proposal from the Danish Committee (CLC/TC 72(DK)5) to delete note 12 to Table 20.1 because this is a North American requirement which should not have appeared in the EN, was accepted.

The text of the draft was approved by CENELEC as amendment A12 to EN 60730-1 on 9 December 1992.

The following dates are fixed:

- latest date of publication of an identical national standard (dop) 1994-01-01
- latest date of withdrawal of conflicting standards (dow) 1995-07-01

Foreword to amendment A14

At the request of the British Electrotechnical Committee, a draft for an amendment to EN 60730-1:1991 was submitted to the CENELEC members for acceptance in January 1995.

The text of the draft was accepted by CENELEC as amendment A14 to EN 60730-1:1991 on 1995-03-20.

The following dates were fixed:

- latest date by which the existence of the amendment has to be announced at national level (doa) 1995-06-20
- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1995-09-20

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1 Scope

1.1 In general, this standard applies to automatic electrical controls for household and similar use, including electrical controls for heating, air conditioning, and similar applications.

1.1.1 This standard applies to the inherent safety; to the operating values, operating times, and operating sequences where such are associated with equipment safety; and to the testing of automatic electrical control devices used in, or in association with, household or similar equipment.

This standard is also applicable to controls for appliances within the scope of EN 60335-1: Safety of Household and Similar Electrical Appliances, Part 1: General requirements.

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

1.1.2 This standard applies to automatic electrical controls, mechanically or electrically operated, responsive to or controlling such characteristics as temperature, pressure, passage of time, humidity, light, electrostatic effects, flow, or liquid level, current, voltage or acceleration. It also applies to controls incorporating electronic parts.

1.1.3 This standard applies to starting relays, which are a specific type of automatic electrical control, designed to switch the starting winding of a motor. Such controls may be built into, or be separate from, the motor.

1.1.4 This standard applies to manual controls when such are electrically and/or mechanically integral with automatic controls.

Requirements for manual switches not forming part of an automatic control are contained in IEC Publication 1058: Switches for Appliances.

1.2 This standard applies to controls with a rated voltage not exceeding 660 V and with a rated current not exceeding 63 A.

1.3 This standard does not take into account the response value of an automatic action of a control, if such a response value is dependent upon the method of mounting the control in the equipment. Where a response value is of significant purpose for the protection of the user, or surroundings, the value defined in the appropriate household equipment standard or as determined by the manufacturer shall apply.

1.4 This standard applies also to controls incorporating electronic devices, requirements for which are contained in Appendix H.

2 Definitions

The following definitions apply for the purpose of this standard. Where the terms "voltage" and "current" are used, they imply the r.m.s. values unless otherwise specified.

2.1 Definitions relating to ratings, voltages, currents, frequency and wattages

2.1.1

rated voltage, current, frequency or wattage

rated voltage, current, frequency or wattage denotes the voltage, current, frequency or wattage assigned to a control by the manufacturer. For three-phase supply, the rated voltage is the line voltage

2.1.2

rated voltage, current, frequency or wattage range

rated voltage, current, frequency or wattage range denotes the voltage, current, frequency or wattage ranges assigned to the control by the manufacturer and expressed by lower and upper values

2.1.3

working voltage

working voltage denotes the maximum voltage to which the part under consideration is subjected when the control is operating at its rated voltage under conditions of normal use or likely fault

When determining working voltage, normal use includes such likely faults as those either within the control or associated load, which produce a voltage change on the part under consideration.

A typical likely fault is when a filament lamp, supplied through a series resistor from a higher voltage, burns out, so producing the higher voltage across the lamp holder terminations.

When considering working voltage, the effect of possible transient voltages on the mains is ignored.

**2.1.4
extra-low voltage**

extra-low voltage denotes a nominal voltage not exceeding 42 V between conductors and between conductors and earth, or for three-phase connection not exceeding 42 V between line conductors and 24 V between line conductors and neutral

**2.1.5
safety extra-low voltage**

safety extra-low voltage denotes a nominal voltage between conductors and between conductors and earth not exceeding 42 V between conductors, or in the case of three-phase circuits, not exceeding 24 V between conductors and neutral, the no-load voltage of the circuit not exceeding 50 V and 29 V, respectively when safety extra-low voltage is obtained from supply mains of higher voltages, it shall be through a safety isolating transformer or a converter with separate windings providing equivalent insulation
The voltage limits are based on the assumption that the safety isolating transformer is supplied at its rated voltage.

**2.1.6
safety isolating transformer**

safety isolating transformer denotes a transformer, the input winding of which is electrically separated from the output winding by an insulation at least equivalent to double or reinforced insulation, and which is designed to supply safety extra-low voltage circuits

**2.1.7
same polarity**

same polarity denotes a relationship between two live parts such that an interconnection between them allows a flow of current through a load, and which current is thus limited by the load

**2.1.8
opposite polarity**

opposite polarity denotes a relationship between two live parts such that an interconnection between them allows a flow of current which is limited by the impedance of the electrical supply circuit

**2.1.9
isolated limited secondary circuit**

isolated limited secondary circuit denotes a circuit derived from an isolated secondary winding of a transformer having a maximum capacity of 100 volt-amperes and an open-circuit secondary voltage rating not exceeding 1 000 volts

2.2 Definitions of types of control according to purpose

**2.2.1
electrical control**

electrical control (hereinafter referred to as "control") denotes a device used in, on or in association with an equipment for the purpose of varying or modifying the output from such equipment, and which embodies the aspects of initiation, transmission and operation. At least one of these aspects shall be electrical or electronic

**2.2.2
manual control**

manual control denotes a control in which the initiation is by actuation and in which the transmission and the operation are both direct and without any intentional time delay

**2.2.3
automatic control**

automatic control denotes a control in which at least one aspect is non-manual

2.2.4**sensing control**

sensing control denotes an automatic control in which initiation is by an element sensitive to the particular activating quantity declared; for example, temperature, current, humidity, light, liquid level, position, pressure or velocity

2.2.5**thermally operated control**

thermally operated control denotes an automatic control in which the transmission is by a thermal prime mover

2.2.6**thermostat**

thermostat denotes a cycling temperature sensing control, which is intended to keep a temperature between two particular values under normal operating conditions and which may have provision for setting by the user

2.2.7**temperature limiter**

temperature limiter denotes a temperature sensing control which is intended to keep a temperature below or above one particular value during normal operating conditions and which may have provision for setting by the user

A temperature limiter may be of the automatic or of the manual reset type. It does not make the reverse operation during the normal duty cycle of the appliance.

2.2.8**thermal cut-out**

thermal cut-out denotes a temperature sensing control intended to keep a temperature below or above one particular value during abnormal operating conditions and which has no provision for setting by the user

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

Normally a thermal cut-out will provide a Type 2 action.

2.2.9**non-resettable thermal cut-out**

non-resettable thermal cut-out denotes a thermal cut-out which operates only once and then requires partial or complete replacement

2.2.10**energy regulator**

energy regulator denotes a self-cycling control which alters the energy supplied to a load by making and breaking the circuit, and which may be set by the user to change the average energy supplied

The ratio of the on-time, to the on-plus-off-time, determines the average energy supplied.

2.2.11**time-based control**

time-based control denotes an automatic control in which the transmission is effected by a time-based prime mover or a time-based electrical circuit

2.2.12**electrically operated control**

electrically operated control denotes an automatic control in which the transmission is effected by an electrical prime mover and in which the operation controls an electric circuit, and is without intentional significant time-delay

An example is a relay.

A slugged-relay may be either an electrically operated control, or a time-based control, by agreement between testing authority and manufacturer.

2.2.13**timer**

timer denotes a time-based control which requires actuation before the next cycle can take place

During a cycle it may require an external electrical or mechanical signal before moving from a rest position to allow the cycle to continue. An example is a programmer.

**2.2.14
time switch**

time switch denotes a time-based control which continues with a subsequent cycle when the preceding one has been completed

An example is a 24 h control on a storage heater.

**2.2.15
motor protector**

motor protector denotes an automatic control that is specifically designed to protect the windings of an electric motor from overheating

**2.2.16
thermal motor protector**

thermal motor protector denotes an automatic control, built-in or on a motor, that is specifically designed to protect the motor against overheating due to running overload and failure to start. The control carries motor current and is sensitive to motor temperature and current

The control is capable of being reset (either manually or automatically) when its temperature falls to the reset value.

**2.2.17
electrically operated valve**

electrically operated valve denotes an automatic control in which the transmission is effected by an electrical prime mover and in which the operation controls the flow of a liquid or a gas

**2.2.18
electrically operated mechanism**

electrically operated mechanism denotes an automatic control in which the transmission is effected by an electrical prime mover in which the operation controls a mechanical device

An example is an electrically operated interlock for a spin dryer lid.

An electric motor is not included in this definition.

2.3 Definitions relating to the function of controls

**2.3.1
initiation**

initiation denotes the alteration to that aspect of a control which is required to produce transmission and operation

**2.3.2
transmission**

transmission denotes the essential coupling between initiation and operation which is required to enable the control to fulfil its purpose

**2.3.3
operation**

operation denotes a change in that aspect of a control which modifies the input to the equipment or part of the equipment

**2.3.4
automatic action**

automatic action denotes that action of an automatic control in which the transmission and operation are produced by initiation which is not the result of actuation

**2.3.5
slow-make slow-break automatic action**

slow-make slow-break automatic action denotes a mode of operation where the rate of contact make and/or break is directly proportional to the rate of change of the activating quantity, or to the speed of movement of a prime mover

This action may be applicable to either the make, or the break, or both.

2.3.6**manual action**

manual action denotes that action of an automatic control or of a manual control in which the transmission and operation are produced by initiation which is the result of actuation

2.3.7**actuation**

actuation denotes a movement of the actuating member of the control by the user, by hand, by foot or by any other human activity

2.3.8**located position**

located position denotes a position of the actuating member to which it will return if it is released after being moved slightly

2.3.9**intermediate position**

intermediate position denotes any position of any actuating member which is adjacent to a located position, and in which the actuating member will remain and in which the operation of the control is indeterminate

2.3.10**activating quantity**

activating quantity denotes a physical characteristic of a medium, the variation or stability of which is being sensed

2.3.11**operating value**

operating value denotes the value of the relevant temperature, pressure, current, etc. at which a sensing control operates on a rise or fall of the activating quantity

2.3.12**operating time**

operating time denotes the duration of time, or the difference of time, between any two functions, electrical or mechanical, occurring during the automatic action of a time-based control

2.3.13**operating sequence**

operating sequence denotes the designed sequence, order or pattern in which the operation of the electrical or mechanical functions of a control are intended to occur as a result of either an automatic or a manual action of a control

It includes the pattern of opened or closed contacts in any located position, intermediate position or position of setting by manufacturer or user.

2.3.14**response value**

response value denotes the operating value, the operating time or the operating sequence which relates a control to a particular equipment

2.3.15**trip-free**

trip-free denotes an automatic action, with a reset actuating member, so designed that the automatic action is independent of manipulation or position of the reset mechanism

2.3.16**leakage current**

leakage current denotes all currents, including capacitively coupled currents, which may be conveyed between exposed conductive surfaces of a device and earth or other exposed conductive surfaces of a device

2.4 Definitions relating to disconnection and interruption

Some controls may incorporate more than one form of circuit disconnection or interruption.

2.4.1

all-pole disconnection

all-pole disconnection denotes, for single-phase a.c. appliances and for d.c. appliances, disconnection of both supply conductors by a single switching action or, for appliances to be connected to more than two supply conductors, disconnection of all supply conductors, except the earthed (grounded) conductor, by a single switching action

The protective earthing conductor is not considered to be a supply conductor.

2.4.2

full-disconnection

full-disconnection denotes contact separation in all supply poles other than earth so as to ensure the equivalent of basic insulation between the supply mains and those parts intended to be disconnected

There are electric strength and dimensional requirements.

Where the number of poles on the control is equal to the number of supply poles of the appliance to which it is connected, full-disconnection provides all-pole disconnection.

2.4.3

micro-disconnection

micro-disconnection denotes adequate contact separation in at least one pole so as to ensure functional security

There is a requirement for the electric strength of the contact gap but no dimensional requirement.

Micro-disconnection ensures that for non-sensing controls the function controlled by the disconnection is secure, and that for sensing controls is secure between the limits of activating quantity declared in Sub-clause 7.2 requirement number 36.

2.4.4

micro-interruption

micro-interruption denotes an interruption of a circuit by contact separation, by a cycling action or by a non-cycling action which does not ensure full-disconnection or micro-disconnection

There are no electric strength or dimensional requirements for the contact gap.

2.4.5

OFF position

OFF position denotes a position providing a visible or implied indication of a full-disconnection or micro-disconnection

2.5 Definitions of type of control according to construction

2.5.1

integrated control

integrated control denotes a control which is dependent on its correct mounting and fixing in an equipment, and which can only be tested in combination with the relevant parts of that equipment

The equipment may use electricity, gas, oil, solid fuel or a combination thereof.

Integrated control also denotes a control which is part of a more complex control (electrical or non-electrical).

2.5.2

incorporated control

incorporated control denotes a control intended for incorporation in, or on, an equipment, but which can be tested separately

The fact that an incorporated control can be tested separately does not imply that it may not be tested in an equipment as specified in Sub-clause 4.3.1.1.

The equipment may use electricity, gas, oil, solid fuel or a combination thereof.

Incorporated control also denotes a control intended for incorporation in or on a more complex control (electrical or non-electrical).

2.5.3

in-line cord control

in-line cord control denotes a separately cased control designed to be connected to the supply and to the equipment by means of flexible cords, equipment inlets or socket-outlets; and is intended to be manually actuated

2.5.4**free-standing control**

free-standing control denotes an in-line cord control intended to stand on a table or on the floor. It may be actuated by hand, by foot or by other similar human activity

2.5.5**independently mounted control**

independently mounted control denotes a control designed for permanent connection to fixed wiring, but intended to be mounted away from the controlled equipment. It may be either:

- for surface mounting such as on to a wall;
- for flush mounting, such as into a wall cavity, when installation shall be possible from the front;
- for panel mounting, such as onto or into a control panel, when installation may be from the rear.

2.5.6**pull-cord actuated control**

pull-cord actuated control denotes a control intended to be mounted in, or on, an equipment and actuated by means of a pull-cord

2.6 Definitions of type of automatic action of a control according to test procedure**2.6.1****type 1 action**

type 1 action denotes an automatic action for which the manufacturing deviation and the drift of its operating value, operating time or operating sequence have not been declared and tested under this standard

A Type 1 action is sub-classified as specified in Sub-clause 6.4.

2.6.2**type 2 action**

type 2 action denotes an automatic action for which the manufacturing deviation and the drift of its operating value, operating time or operating sequence have been declared and tested under this standard

A Type 2 action is sub-classified as specified in Sub-clause 6.4.

2.7 Definitions relating to protection against electric shock**2.7.1****live part**

live part denotes a conductive part, contact with which may cause a significant electric shock

2.7.2**class 0 control**

class 0 control denotes a control in which protection against electric shock relies upon basic insulation. This implies that there are no means for the connection of accessible conductive parts, if any, to the protective conductor in the fixed wiring of the installation; reliance in the event of a failure of the basic insulation is placed upon the environment

Class 0 controls have either an enclosure of insulating material which may form a part, or the whole, of the basic insulation, or a metal enclosure which is separated from live parts by basic insulation. If a control with an enclosure of insulating material has provision for earthing internal parts, it is deemed to be of Class 0I or Class I construction. Class 0 controls may have parts with double insulation or reinforced insulation, or parts operating at safety extra-low voltage.

In some countries Class 0 controls are not allowed.

Refer snc

2.7.3**class 0I control**

class 0I control denotes an in-line cord control having at least basic insulation throughout and provided with an earthing terminal but with a non-detachable cord without earthing conductor, and a plug without earthing contact which cannot be introduced into a socket-outlet with earthing contact

Class 0I controls may have parts with double insulation or reinforced insulation or parts operating at safety extra-low voltage.

Refer snc