

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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

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



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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE **XH**
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**AUTOMATIC ELECTRICAL CONTROLS
FOR HOUSEHOLD AND SIMILAR USE –****Part 1: General requirements**

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International Standard IEC 60730-1 has been prepared by IEC technical committee 72: Automatic controls for household use.

This fourth edition cancels and replaces the third edition published in 1999, Amendment 1 (2003), and Amendment 2 (2007).

The main technical modifications of this standard since this previous publication 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 of the use of screwless terminals on printed circuit boards and revisions to creepage distances;
- additions of CISPR 11 EMC requirements;

- incorporation of EMC test levels from IEC 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 Annex T for additional requirements for non-SELV supplied sensor cable or cord;
- new requirements in H.27.1 for first and second fault approach to ensure functional safety;
- incorporation of software techniques from IEC 61508-3 in H.11.12;
- replacement of Annex D (Canada and USA) with a reference to UL 746C;
- 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.

The text of this standard is based on the following documents:

FDIS	Report on voting
72/789/FDIS	72/790/RVD

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

A list of all parts of the IEC 60730 series, under the general title: *Automatic controls for household and similar use*, can be found on the IEC website.

In the development of a fully international standard to cover automatic controls for household and similar use, it has been necessary to take into consideration the differing requirements resulting from practical experience in various parts of the world and to recognize the variation in national electrical systems and wiring rules.

The “in some countries” notes regarding differing national practices are contained in the following subclauses:

2.1.5	12.1.6	18.1.6.2
2.7.2	12.3	18.1.6.3
2.7.3	Table 12 (13.2.1), Note 14	18.4
2.14.2	13.3.4	19.2.4.1
4.2.1	14.1.1	19.2.5.1
6.6.1	Table 13 (14.7.4), Notes 1, 7	20
Table 1 (7.2), Note 9	14.4	21.1
7.4.3	15.1	21.4
7.4.3.2	16.2.1	27.2.3.1
8.1.1	17.1.3.1	Annex C
8.4	Table 14 (17.2.5)	Annex D
9.3.2	17.2.2	
9.3.4	Table 15 (17.2.5)	H.26.10
9.5.2	17.2.3	Table H.16 (H.26.10.4)
Table 3 (10.1.4), Note 1	17.2.3.1	
10.1.4.2	Table 16 (17.2.5)	
10.1.4.3	17.5.1	Table H.21 (H.27.1), Note 7
10.1.14	17.6.2	Table K.1
10.1.16	17.7.7	Table K.2

10.1.16.1	17.8.4.1	R.1
Table 6 (10.2.1), Note 1	17.10	T.3.2
11.5	17.10.4	
Table 10 (11.8.2), Note 1	17.12.5	
11.11.1.2	17.14	
11.11.1.3	18.1.6	
11.11.1.4	18.1.6.1	

It is envisaged that in the next edition of this standard it will be found possible to remove those differences that are covered by new IEC standards now being prepared by other technical committees.

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 cases additional requirements may be considered to be necessary.

See also 4.3.5.2 and 4.3.5.3.

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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
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AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE –

Part 1: General requirements

1 Scope and normative references

1.1 In general, this International Standard applies to automatic electrical controls for use in, on, or in association with equipment for household and similar use, including controls for heating, air-conditioning and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof.

1.1.1 This International 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 IEC 60335-1.

This standard is also applicable to controls for building automation systems within the scope of ISO 16484-2

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

This standard does not apply to automatic electrical controls intended exclusively for industrial applications unless explicitly mentioned in the relevant part 2.

This standard is also applicable to individual controls utilized as part of a control system or controls which are mechanically integral with multifunctional controls having non-electrical outputs.

Automatic electrical controls for equipment not intended for normal household use, but which nevertheless may be used by the public, such as equipment intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

See also Annex J.

This standard is also applicable to relays when used as controls for IEC 60335 appliances. Additional requirements for the safety and operating values of relays when used as controls for IEC 60335 appliances are contained in Annex U.

NOTE 1 These requirements are referred to by IEC 61810-1, Scope.

NOTE 2 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.

1.1.2 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, acceleration, or combinations thereof.

1.1.3 This standard applies to starting relays, which are a specific type of automatic electrical control, intended 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 61058-1.

1.2 This standard applies to controls with a rated voltage not exceeding 690 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 Annex H.

This standard applies also to controls using NTC or PTC thermistors, requirements for which are contained in Annex J.

1.5 Normative references

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

IEC 60038, *IEC standard voltages*

IEC 60065:2001, *Audio, video and similar electronic apparatus – Safety requirements*¹⁾
Amendment 1 (2004)

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

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

IEC 60099-1, *Surge arresters – Part 1: Non-linear resistor type gapped arresters for a.c. systems*

IEC 60112:2003, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

IEC 60127-1:2006, *Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links*

IEC 60227-1, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60245-1, *Rubber insulated cables – Rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60269-1, *Low-voltage fuses – Part 1: General requirements*

¹⁾ There exists a consolidated edition 7.1 including IEC 60065:2001 and its Amendment 1 (2004).

IEC 60335-1:2001, *Household and similar electrical appliances – Safety – Part 1: General requirements*²⁾

Amendment 1 (2004)

Amendment 2 (2006)

IEC 60364 (all parts), *Low-voltage electrical installations*

IEC 60384-14, *Fixed capacitors for use in electronic equipment – Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains*

IEC 60384-16, *Fixed capacitors for use in electronic equipment – Part 16: Sectional specification: Fixed metallized polypropylene film dielectric d.c. capacitors*

IEC 60384-17, *Fixed capacitors for use in electronic equipment – Part 17: Sectional specification: Fixed metallized polypropylene film dielectric a.c. and pulse capacitors*

IEC 60417 (all parts), *Graphical symbols for use on equipment*

IEC 60423, *Conduit systems for cable management – Outside diameters of conduits for electrical installations and threads for conduits and fittings*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP code)*³⁾
Amendment 1 (1999)

IEC 60539 (all parts), *Directly heated negative temperature coefficient thermistors*

IEC 60664-1:2007, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60664-3:2003, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

IEC 60695-2-10, *Fire Hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure*

IEC 60695-2-11:2000, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products*

IEC 60695-10-2, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test*

IEC 60738-1, *Thermistors – Directly heated positive step-function temperature coefficient – Part 1: Generic specification*

IEC 60738-1-1, *Thermistors – Directly heated positive step-function temperature coefficient – Part 1-1: Blank detail specification – Current limiting application – Assessment level EZ*

IEC 60947-1:2007, *Low-voltage switchgear and controlgear – Part 1: General rules*

²⁾ There exists a consolidated edition 4.2 including IEC 60335-1:2001 and its Amendments 1 (2004) and 2 (2006).

³⁾ There exists a consolidated edition 2.1 including IEC 60529:1989 and its Amendment 1 (1999).

IEC 60998-2-2, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units*

IEC 60998-2-3:2002, *Connecting devices for low-voltage circuits for household and similar purposes – Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units*

IEC 61000 (all parts), *Electromagnetic compatibility (EMC)*

IEC 61000-3-2:2005, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
Amendment 1 (2008)
Amendment 2 (2009)⁴⁾

IEC 61000-3-3:2008, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2008, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-4:2004, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2005, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-6:2008, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61000-4-8:1993, *Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test⁵⁾*
Amendment 1 (2000)

IEC 61000-4-11:2004, *Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests*

IEC 61000-4-13:2002, *Electromagnetic compatibility (EMC) – Part 4-13: Testing and measurement techniques – Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests⁶⁾*
Amendment 1 (2009)

4) There exists a consolidated edition 3.2 including IEC 61000-3-2:2005 and its Amendments 1 (2008) and 2 (2009).

5) There exists a consolidated edition 1.1 including IEC 61000-4-8:1993 and its Amendment 1 (2000).

6) There exists a consolidated edition 1.1 including IEC 61000-4-13:2002 and its Amendment 1 (2009).

IEC 61000-4-28:1999, *Electromagnetic compatibility (EMC) – Part 4-28: Testing and measurements techniques – Variation of power frequency, immunity test*⁷⁾
Amendment 1 (2001)
Amendment 2 (2009)

IEC 61058-1, *Switches for appliances – Part 1: General requirements*

IEC 61210, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*

IEC 61249 (all parts), *Materials for printed boards and other interconnecting structures*

IEC 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V – Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*

IEC 61558-2-16, *Safety of transformers, reactors, power supply units and similar products for voltages up to 1 100 V – Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units*

IEC 62326 (all parts), *Printed boards*

CISPR 11:2009, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 14-1:2005, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*⁸⁾
Amendment 1 (2008)

CISPR 22:2008, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement*

ISO 16484-2, *Building automation and control systems (BACS) – Part 2: Hardware*

2 Definitions

For the purposes of this document, the following terms and definitions apply. 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, frequencies, and wattages

2.1.1

rated voltage, current, frequency or wattage

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

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

⁷⁾ There exists a consolidated edition 1.1 including IEC 61000-4-28:1999, its Amendment 1 (2001) and Amendment 2 (2009).

⁸⁾ There exists a consolidated edition 5.1 including CISPR 14-1:2005 and its Amendment 1 (2008).