UL 60730-2-10

STANDARD FOR SAFETY

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays

UL Standard for Safety for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays, UL 60730-2-10

Second Edition, Dated November 8, 2013

Summary of Topics

This revision of ANSI/UL 60730-2-10 is being issued to reaffirm approval as an American National Standard. No changes in requirements are involved.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the preface. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a ″SUPERSEDED REQUIREMENTS″ notice.

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UL 60730-2-10

Standard for Automatic Electrical Controls for Household and Similar Use;

Part 2: Particular Requirements for Motor Starting Relays

The previous edition of the Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays was numbered UL 60730-2-10A.

First Edition – February, 2002

Second Edition

November 8, 2013

This ANSI/UL Standard for Safety consists of the Second Edition including revisions through January 23, 2018.

The most recent designation of ANSI/UL 60730-2-10 as an American National Standard (ANSI) occurred on January 23, 2018. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or Preface. The National Difference Page and IEC Foreword are also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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Preface (UL)

This UL Standard, UL 60730-2-10, Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays, is to be used in conjunction with UL 60730-1. The requirements for motor starting relays are contained in this part 2 standard and UL 60730-1.

Requirements of this Part 2 Standard, where stated, amend the requirements of UL 60730-1.

Where a particular subclause of UL 60730-1 is not mentioned in UL 60730-2-10, the UL 60730-1 subclause applies.

The text, figures and tables of the IEC Standard for Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays, 60730-2-10, copyright 2007, are used in this Standard with the consent of the IEC and the American National Standards Institute (ANSI). The IEC copyrighted material has been reproduced with permission from ANSI. ANSI should be contacted regarding the reproduction of any portion of the IEC material. The IEC Foreword and Introduction are not a part of the requirements of this Standard but are included for information purposes only. Copies of IEC Publication 60730-2-10 may be purchased from ANSI, 25 West 43rd Street, 4th Floor, New York, NY 10036, (212) 642-4900.

Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

UL effective date

The effective date for UL 60730-2-10, second edition, is October 19, 2018. A UL effective date is one established by Underwriters Laboratories Inc. and is not part of the ANSI approved standard.

NATIONAL DIFFERENCES

GENERAL

National Differences from the text of International Electrotechnical Commission (IEC) Publication 60730-2-10, Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays, copyright 2006, are indicated by notations (differences) and are presented in bold text.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

Deletion / Delete - A deletion entails complete deletion of an entire numbered clause, subclause, table, figure, or annex without any replacement text.

INTERNATIONAL ELECTROTECHNICAL COMMISSION

AUTOMATIC ELECTRICAL CONTROLS FOR HOUSEHOLD AND SIMILAR USE – Part 2-10: Particular Requirements for Motor Starting Relays

FOREWORD

The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as ″IEC Publication(s)″). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60730-2-10 has been prepared by IEC technical committee 72: Automatic controls for household use.

This second edition cancels and replaces the first edition published in 1991, Amendment 1 (1994) and amendment 2 (2001). This second edition constitutes a technical revision and updates the standard to current practices as well as to the applicable horizontal standards.

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

FDIS	Report on voting
72/711/FDIS	72/724/RVD

Full information on the voting for the approval of this part can be found in the Report on Voting indicated in the above table.

This publication has been drafted in accordance with ISO/IEC Directives, Part 2.

This Part 2-10 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the third edition of that standard (1999) and its amendment 1 (2003). Consideration may be given to future editions of, or amendments to IEC 60730-1.

This part 2-10 supplements or modifies the corresponding clauses in IEC 60730-1, so as to convert that publication into the IEC standard: Particular requirements for electrically operated motor-starting relays.

Where this Part 2-10 states ″addition″, ″modification″ or ″replacement″, the relevant requirements, test specification or explanatory matter in Part 1 should be adapted accordingly.

Where no change is necessary, this Part 2-10 indicates that the relevant clause or subclause applies.

In the development of a fully international standard 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.

In this publication, the following print types are used:

– Requirements proper: in roman type;

– *Test specifications: in italic type;*

– Explanatory matter: in smaller roman type.

Subclauses, notes, tables or figures which are additional to those in part 1 are numbered starting from 101, additional annexes are lettered AA, BB, etc.

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

The committee has decided that the contents of the publication will remain unchanged until the maintenance result 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,
- replaced by a revised edition, or
- amended.

101DV DE *Addition to the part 2:*

The numbering system in the Standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

102DV DE *Modification of the paragraph starting with, "In this publication"*

– words in SMALL ROMAN CAPITALS in the text are defined in clause 2.

103DV D2 *Modification of the of the 6th paragraph after item (9) by replacing it with the following paragraph:*

This Part 2-10 is intended to be used in conjunction with UL 60730-1, edition 4.

Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Motor Starting Relays

1 Scope and normative references

This clause of Part 1 is applicable except as follows:

1.1 Replacement:

This part of IEC 60730 applies to controls for automatically controlling the starting windings of single phase motors associated with equipment for household and similar use.

This standard applies to motor-starting relays using NTC or PTC thermistors, additional requirements for which are contained in Annex J.

1.1DV D2 *Addition of the following text to 1.1:*

This standard also covers centrifugal switches intended to be integrated into motors. Such devices are tested with the intended motor as an integrated control.

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 motor starting relays used in, or in association with, household or similar equipment.

Motor-starting relays 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.

This standard does not apply to motor-starting relays designed exclusively for industrial applications.

Throughout this standard, the word ″equipment″ means ″appliance and equipment.″ The words ″starting relay″ mean ″motor-starting relay.″

1.1.2 This standard applies to starting relays incorporating electronic devices, and starting relays using thermistor elements, thermal elements and magnetic elements.

1.1.3 This standard does not apply to general purpose relays or to contactors and motor starters of the type covered by the IEC 60947 series[1)]. This standard does not apply to mechanical TIMERS or mechanically operated motor-starting devices.

1.1.3DV D2 *Deletion of the following text from the second sentence of 1.1.3:*

″*or mechanically operated motor-starting devices*″

[1)] IEC 60947 (all parts), Low-voltage switchgear and controlgear

1.1.4 This standard applies to MANUAL CONTROLS when such are electrically and/or mechanically integral with starting relays.

Requirements for manual switches not forming part of a starting relay are contained in IEC 61058-1.

1.2 Replacement:

This standard applies to starting relays with a RATED VOLTAGE not exceeding 690 V and with a RATED CURRENT not exceeding 63 A.

1.2DV D2 *Addition of the following text to 1.2:*

The maximum voltage is 600 V. The maximum current is unlimited.

1.3 Replacement:

This standard does not take into account the RESPONSE VALUE of an AUTOMATIC ACTION of a starting relay, if such a RESPONSE VALUE is dependent upon the method of mounting the starting relay 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 Replacement:

This standard applies also to motor-starting relays incorporating electronic devices, requirements for which are contained in annex H.

2 Definitions

This clause of Part 1 is applicable except as follows:

2.2 *Definitions of types of control according to purpose*

Additional definition:

2.2.101 MOTOR STARTING RELAY: ELECTRICALLY OPERATED CONTROL intended for integration or incorporation in an appliance and used within a motor circuit to control the connection between the main winding and the auxiliary starting winding for the purpose of starting single-phase motors in household appliances and similar applications.

Normally a MOTOR STARTING RELAY will provide a TYPE 1 ACTION.

2.2.101ADV D2 *Addition of the following definition:*

2.2.101ADV.1 MOTOR STARTING CENTRIFUGAL SWITCHES: ELECTRICALLY OPERATED CONTROL intended for integration in a motor and operates as a function of the rotational speed of the motor shaft using the centrifugal force created from the rotating shaft.

2.3 Definitions relating to the function of controls

2.3DV D2 *Addition of the following definitions:*

2.3DV.101 PICK-UP VALUE: PICK-UP VALUE denotes the declared value of voltage or current at which an electro-magnetic starting relay operates on a rise in voltage or current.

Note – This is also referred to as the ″make value″.

2.3DV.102 DROP-OUT VALUE: DROP-OUT VALUE denotes the declared value of voltage or current at which an electro-magnetic starting relay operates on a fall in voltage or current.

Note – This is also referred to as the ″break value″.

2.3DV.103 CONTACT CHANGE VALUE: CONTACT CHANGE VALUE denotes the declared value of voltage or current at which an electro-thermal starting relay operates on a rise in voltage or current.

2.3DV.104 CONTACT HOLD VALUE: CONTACT HOLD VALUE denotes the declared value of voltage or current at which an electro-thermal starting relay operates on a fall in voltage or current.

3 General requirements

This clause of Part 1 is applicable.

4 General notes on tests

This clause of Part 1 is applicable.

5 Rating

This clause of Part 1 is applicable.

6 Classification

This clause Part 1 is applicable except as follows:

6.3 *According to their purpose*

Additional subclauses:

6.3.101 – MOTOR STARTING RELAYS;

6.3.101.1 – VOLTAGE SENSING;

6.3.101.2 – CURRENT SENSING;

6.3.101.3 – PTC;

6.3.101.4 – THERMALLY OPERATED.

6.3.101.4DV D2 *Addition of the following text:*

MOTOR STARTING CENTRIFUGAL SWITCHES

6.13 *According to value of proof tracking index (PTI) for the insulation material used*

6.13.1 Not applicable.

6.15 *According to construction*

Replacement:

6.15 *Integrated or incorporated*

6.15.1 – ELECTRONIC;

6.15.2 – ELECTRO-MAGNETIC;

6.15.3 – PTC THERMISTOR;

6.15.4 – THERMALLY OPERATED.

The constructions in 6.15.2 to 6.15.4 inclusive may incorporate electronic parts even though their primary construction is as indicated.

7 Information

This clause of Part 1 is applicable except as follows:

Addition:

Table 7.2

Requirement	Information	Clause or subclause	Method
101	Steady state motor run current	14.4	X

Table 7.2DV D2 *Modification of Table 7.2 with the following seven national differences:*

DV.1 Insert row 101A, with the first column being "101A", the second column being "Pick-up value", the third column being "2.3DV.101, 17", and the fourth column being "X".

DV.2 Insert row 102A, with the first column being "102A", the second column being "Drop-out value", the third column being "2.3DV.102, 17", and the fourth column being "X".

DV.3 Insert row 103A, with the first column being "103A", the second column being "Contact change value", the third column being "2.3DV.103, 17", and the fourth column being "X".

DV.4 Insert row 104A, with the first column being "104A", the second column being "Contact hold value", the third column being "2.3DV.104, 17", and the fourth column being "X".

DV.5 Revise row 101, with the first column being "105A", the second column being "Steady state motor run current", the third column being "14.4", and the fourth column being "X".

DV.6 Insert row 106A, with the first column being "106A", the second column being "Date code of manufacturing[106A]", the third column being "blank", and the fourth column being "C".

DV.7 Add: "Note 106A The date code shall be the date or other dating period of manufacture not exceeding any three consecutive months. The date of manufacture may be abbreviated; or may be in a nationally accepted conventional code or in a code affirmed by the manufacturer, provided that the code:

a) Does not repeat in less than 20 years, and

b) Does not require reference to the product records of the manufacturer to determine when the product was manufactured."

8 Protection against electric shock

This clause of Part 1 is applicable.

9 Provision for protective earthing

This clause of Part 1 is applicable.

10 Terminals and TERMINATIONS

This clause of Part 1 is applicable.

11 Constructional requirements

This clause of Part 1 is applicable.

12 Moisture and dust resistance

This clause of Part 1 is applicable.

13 Electric strength and insulation resistance

This clause of Part 1 is applicable.

14 Heating

This clause of Part 1 is applicable except as follows:

14.4 Replacement:

The coil of the motor starter shall be loaded 1,06 x I_r with the steady state motor run current declared in Requirement 101 of Table 7.2. The contacts shall not be loaded.

14.4DV D2 Modification of the above requirement by replacing it with the following:

The heating test of clause 14 is applicable for Current Sensing and PTC Motor Starting devices. For current sensing motor starting devices, the coil of the motor starter shall be loaded to the steady state motor run current declared in Requirement 105A of Table 7.2, at the declared maximum operating voltage.

For a PTC Motor Starting device, the loading shall be the same as a current motor starting device except that the PTC shall be in its tripped state.

The contacts shall not be loaded. For Voltage Sensing and Centrifugal motor starting devices, the heating test of clause 14 is not required since an insignificant heating of coils or other parts are expected due to the inherent intermittent operation of these devices.

14.4.3.1 Not applicable.

14.4.3.2 Not applicable.

15 MANUFACTURING DEVIATION and DRIFT

This clause of Part 1 is applicable.

16 Environmental stress

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable except as follows:

17.9 Not applicable.

17.10 Not applicable.

17.11 Not applicable.

17.12 Not applicable.

17.13 Not applicable.

17.16DV D2 *Additions to the part 2:*

NOTE – In the USA, the required overload cycles are 50 and the required endurance cycles are 100,000 cycles or as declared, whichever is higher.

18 Mechanical strength

This clause of Part 1 is applicable.

19 Threaded parts and connections

This clause of Part 1 is applicable.

20 CREEPAGE DISTANCES, CLEARANCES and distances through solid insulation

This clause of Part 1 is applicable.

21 Resistance to heat, fire and tracking

This clause of Part 1 is applicable.

22 Resistance to corrosion

This clause of Part 1 is applicable.

23 Electromagnetic compatibility (EMC) requirements – Emission

This clause of Part 1 is applicable.

24 Components

This clause of Part 1 is applicable.

25 Normal OPERATION

This clause of Part 1 is applicable.

26 Electromagnetic compatibility (EMC) requirements – Immunity

This clause of Part 1 is applicable.

27 Abnormal OPERATION

This clause of Part 1 is applicable except as follows:

Addition:

27.2 Burnout test

Modify the explanatory paragraph:

For motor-starting relays, compliance with this requirement is established by successful completion of the test of Clause 17.

Replacement:

27.3 Overvoltage and undervoltage test

Not applicable.

28 Guidance on the use of electronic disconnection

This clause of Part 1 is applicable.

Figures

The figures of part 1 are applicable.

Annexes

The annexes of part 1 are applicable except as follows: