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REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Automatic electrical controls ~~for household and similar use~~ – Part 2-14: Particular requirements for electric actuators

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AUTOMATIC ELECTRICAL CONTROLS ~~FOR HOUSEHOLD AND SIMILAR USE~~ –

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FOREWORD

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International Standard IEC 60730-2-14 has been prepared by IEC technical committee 72: Automatic electrical controls.

This second edition cancels and replaces the first edition, published in 1995, its Amendment 1 (2001) and its Amendment 2 (2007). This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- adapting it to the 5th Ed of IEC 60730-1,
- addition of checking electric actuators with action 1.AB or 2AB, and
- modification of tests under abnormal condition.

This Part 2-14 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the 5th edition of that standard (2013). Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This part 2-14 supplements or modifies the corresponding clauses in IEC 60730-1, so as to convert that publication into the IEC standard: Particular requirements for electric actuators.

Where this part 2-14 states "addition", "modification" or "replacement", the relevant requirement, test specification or explanatory matter in part 1 should be adapted accordingly.

Where no change is necessary part 2-14 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.

The "in some countries" notes regarding differing national practice are contained in the following subclauses:

- Table 1,
- 27.2.3.1.

In this publication:

1) 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**.
2) Subclauses, notes or items which are additional to those in Part 1 are numbered starting from 101, additional annexes are lettered AA, BB, etc.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
72/1079/FDIS	72/1100/RVD

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

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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AUTOMATIC ELECTRICAL CONTROLS ~~FOR HOUSEHOLD AND SIMILAR USE~~ –

Part 2-14: Particular requirements for electric actuators

1 Scope and normative references

This clause of Part 1 is applicable except as follows:

1.1 *Replacement:*

This part 2-14 applies to **electric actuators** for use in, on, or in association with equipment for household and similar use ~~for heating, air-conditioning and ventilation~~. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof.

~~This part 2 applies to electric actuators using NTC or PTC thermistors, additional requirements for which are contained in annex J.~~

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

EXAMPLE 1 **Electric actuators** for appliances within the scope of IEC 60335.

This International Standard is applicable to **controls** for building automation within the scope of ISO 16484.

This part 2-14 also applies to automatic **electrical controls** for equipment that may be used by the public, such as equipment intended to be used in shops, offices, hospitals, farms and commercial and industrial applications.

EXAMPLE 2 **Controls** for commercial catering, heating and air-conditioning equipment.

This part 2-14 is also applicable to individual **electric actuators** utilized as part of a **control system** or **controls**, which are mechanically integral with **multifunctional controls** having non-electrical outputs.

EXAMPLE 3 Independently mounted water valves, **controls** in smart grid **systems** and **controls** for building automation systems within the scope of ISO 16484-2.

This part 2-14 does not apply to automatic **electric actuators** intended exclusively for industrial process applications unless explicitly mentioned in the relevant part 2 or the equipment standard.

1.1.1 This part 2-14 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 **electric actuators** used in ~~, on~~ or in association with equipment ~~for household and similar use for heating, air-conditioning and ventilation~~.

NOTE Requirements for specific **operating values**, **operating times** and **operating sequences** may be given in the standards for appliances and equipment.

~~Electric actuators 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 part 2.~~

This standard is also applicable to the **functional safety** of **low complexity safety related systems** and **controls**.

~~This part 2 does not apply to electric actuators designed exclusively for industrial applications.~~

This part 2-14 does not apply to **electric actuators** which are mechanically ~~integral~~ integrated with valves covered by a separate part 2, e.g. IEC 60730-2-8.

~~See IEC 60730-2-8, Particular requirements for electrically operated valves, including mechanical requirements and IEC 60730-2-17, Particular requirements for electrically operated gas valves (in progress).~~

This part 2-14 does not apply to electric motors, requirements for which are contained in IEC 60034.

1.1.2 Requirements for manual switches not integral with an **electric actuator** are contained in IEC 61058-1.

1.1.3 *Replacement*

This part 2-14 applies to a.c. or d.c. powered **electric actuators** with a rated voltage not exceeding ~~660 V and with a rated current not exceeding 63 A~~ 690 V a.c. or 600 V d.c.

1.1.4 *Replacement*

This part 2-14 does not take into account the **response value** of an **automatic action** of an **electric actuator**, if such a **response value** is dependent upon the method of mounting the **electric actuator** 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 or as determined by the manufacturer shall apply.

~~**1.4** *Replacement:*~~

~~This part 2 applies also to electric actuators incorporating electronic devices, requirements for which are contained in annex H.~~

2 Terms and 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
electric actuator
device in which a **prime mover** is mechanically linked to a valve, damper or similar device and which responds to **initiation** from a **control** or switch

Note 1 to entry: The **electric actuator** moves the valve, damper or similar device to defined positions and may also incorporate other functions, such as electric interlock switches and/or feedback.

2.3 Definitions relating to the function of controls

Additional definitions:

2.3.101
multi-position action
action denoting that the **electric actuator** operates in such a manner that only two or more defined positions can be reached

2.3.102
modulating action
action denoting that the **electric actuator** operates in such a manner that every position between two defined limits can be reached

2.3.103
travel time
time taken by an **electric actuator** to move from one defined position to another

2.3.104
stroke
distance travelled by a linear actuator

2.3.105
angular rotation
operating movement of a rotary actuator given in radians or degrees

~~**2.13 Miscellaneous definitions**~~

~~*Additional definition:*~~

~~**2.13.101**~~
~~**linkage**~~
~~those parts which mechanically connect the electric actuator with a valve, damper or similar device~~

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 of Part 1 is applicable, except as follows:

6.1 According to nature of supply

6.1.1 ~~*Delete the two explanatory paragraphs.*~~

Control for a.c. only

Replacement:

Electric actuators which are designed for a.c. supply only shall not be used on d.c. supply.

6.3 According to their purpose

Additional subclauses:

6.3.101 – electric actuator;

6.3.102 – electric actuator as a component of a multi-purpose control or **system**.

NOTE See also H.6.18 according to classes of **control** functions.

6.4 According to features of automatic action

Additional subclauses:

6.4.101 Type of action

6.4.101.1 Multi-position action

6.4.101.2 Modulating action

6.4.102 Type of movement

6.4.102.1 Rotary movement

6.4.102.2 Linear movement

6.4.3 *Additional subclauses:*

6.4.3.101 –an action in which the **electric actuator** assumes a predefined position upon loss of the electrical supply and/or upon loss of the **control** signal (type 1.AA or type 2.AA);

6.4.3.102 – an action in which the **electric actuator** operates normally between 1,1 V_R and 0,85 V_R inclusive and in which it either operates normally or assumes a predefined position between 0,85 V_R and a declared lower percentage of rated voltage (type 1.AB or type 2.AB).

6.11 According to number of automatic cycles (A) of each automatic action

Modification:

~~*Delete*~~ *Subclauses 6.11.8 to 6.11.12 inclusive are not applicable.*

7 Information

This clause of part 1 is applicable except as follows:

Table 1 (7.2 of edition 3) – Required information and methods of providing information

Information	Clause or subclause	Method
Modifications:		
7 The type of load controlled by each external circuit ~~102)~~	6.2, 14	D
22 Temperature limits of the actuator, if T_{min} lower than 0 °C or $\boldsymbol{T}_{\mathbf{max}}$ other than 60 °C	6.7, 14,5, 14.7, 17.3	D
23 Temperature limits of mounting surfaces (T_s)	6.12.2, 14.1, 17,3	D
27 Number of automatic cycles (A) for each **automatic action** [102]	6.11	X
28 Not applicable		
34 Detail of any limitation of **operating time** [101, 103]	14, 17	C
37 Not applicable		
38 Not applicable		
43 Not applicable		
44 Not applicable		
47 Not applicable		
Additional requirements:		
101 Impedance protected motor ~~102)~~	14.4.101	D
102 Thermally protected motor ~~102)~~	14.4.102	D
103 Type of movement	2.3.104, 2.3.105, 6.4.102	D
104 Type of action	2.3.101, 2.3.102, 6.4.101	D
105 Maximum rated mechanical load	14.4, 15.5.102	D
106 **Travel time**	2.3.103, 15.5.101, 15.5.102	D
107 **Stroke**	2.3.104	D
108 **Angular rotation**	2.3.105	D
109 Response time and method of measurement (for types 1.AA or 2.AA)	6.4.3.101 15.5.102	D
110 Lower percentage of rated voltage (for types 1.AB or 2.AB)	6.4.3.102	D

Additional notes:

101 This may be given as a maximum percentage of ON time of the power supply to avoid over-heating of the windings in a declared period of time.

~~102) In the USA, for independently mounted actuators, the marking method is C.~~

102 **Electric actuators** are subjected to a minimum of 6 000 cycles.

103 For integrated and incorporated **electric actuators**, the method is D.

7.3.1 *Addition:*

NOTE Actuators of class II construction provided with a cord for connection to the **fixed wiring** which does not have a plug fitted may carry the symbol for class II construction.

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 except as follows:

11.4 Actions

Additional subclauses:

11.4.101 A type 1.AA or 2.AA action shall operate such that for any duration of voltage interruption which is greater than the response time declared in Table 1, requirement 109, the actuator assumes the predefined position and resumes normal **operation** upon restoration of the supply.

Compliance is checked by test.

11.4.102 A type 1.AB or 2.AB action shall operate normally between 1,1 V_R and 0,85 V_R inclusive and shall respond as declared by the manufacturer at voltages below 0,85 V_R and the voltage declared in Table 1, requirement 110.

Compliance is checked by test.

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:

14.3 Not applicable.

14.4 *Replacement of the first paragraph by the following:*

The tests based on an action type 1.AB or 2.AB shall be checked by the lowest (0,85 V_R) and the highest (1,1 V_R) rated voltage as declared by the manufacturer. During this test, the temperature shall not exceed the values specified in Table 13 (14.1 of edition 3.)

*The actuator shall be loaded with the maximum rated mechanical load. Each **duty cycle** shall be operated at the declared maximum **stroke** or **angular rotation**.*

14.4.3.1 to **14.4.3.3** Not applicable.

14.4.4 Not applicable.

~~**14.4** *Addition:*~~

~~In the USA, the test is conducted at the voltages specified in 17.2.3.1 and 17.2.3.2.~~

Additional subclauses:

14.4.101 If stalling of the **electric actuator** drive shaft is part of normal **operation**, then the drive shaft of motorized actuators shall be stalled and temperatures measured after steady-state conditions are reached. The temperatures shall comply with the limits of Table 13. In addition, if any protective device provided does not cycle under stalled conditions, then the **electric actuator** is also considered to comply with the requirements of the ~~blocked output~~ burnout test of 27.2.

14.4.102 If stalling of the **electric actuator** drive shaft is not part of normal **operation**, then Table 13 limits do not apply during stalling. The **electric actuator** shall comply with the requirements of the ~~blocked output~~ burnout test of 27.2.

14.5.1 *Replacement:*

Change "switch head" to "**electric actuator**".

14.5.2 Not applicable.

14.6 *Replacement:*

The temperatures specified for the **electric actuator** shall be attained in approximately 1 h.

14.7 *Replacement:*

The temperature of the medium in which the **electric actuator** is located shall be measured as near as possible to the centre of the space occupied by the samples and at a distance of approximately 50 mm from the actuator.

15 Manufacturing deviation and drift

This clause of Part 1 is applicable except as follows:

15.5 *Additional subclauses:*

15.5.101 The **travel time** shall be measured at 0,85 V_R.

15.5.102 The **travel time** and the response time shall be measured with the maximum rated mechanical load declared by the manufacturer and in the most unfavourable mounting position declared by the manufacturer.

15.6 Not applicable.

16 Environmental stress

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable except as follows: