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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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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

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

Part 2-14: Particular requirements for electric actuators

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 T_{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:

17.4 Manual and mechanical conditions for the tests

17.4.2 *Replacement:*

The speed of movement of the **electric actuator** drive shaft shall be as declared by the manufacturer.

17.4.4 *Replacement:*

The method of acceleration shall be as agreed between the manufacturer and the testing authority.

17.6 Not applicable.

Additional subclause:

17.8.101 The tests based on an action type 1.AB or 2.AB shall be checked with 50 % of the cycles at 0,85 of the minimum V_R at ambient temperature or T_{min}, if lower than 0 °C, and 50 % of the cycles at 1,1 of the maximum V_R at T_{max}.

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 ~~Radio interference suppression~~ 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. ~~See also annex H.~~

26 ~~Operations with mains borne perturbations, magnetic and electromagnetic disturbances~~ Electromagnetic compatibility (EMC) requirements – Immunity

This clause of Part 1 is applicable. ~~See also annex H.~~

27 Abnormal operation

This clause of Part 1 is applicable except as follows:

27.2 Burnout test

Replacement of the first sentence by the following:

This clause is applicable to actuators where an external mechanical blockage will not cause an internal overload of the actuator. If means (e.g. a **clutch**) is used to decouple the external blockage to the internal mechanical structure, then a blockage of the mechanical parts between the motor and the decoupling means shall be tested according 27.2.1.

27.2.2 *Replacement:*

After this test, the actuator shall comply with the items a) to g) of H.27.1.1.3 .

27.2.3 Blocked mechanical output test (abnormal temperature test)

Replacement of the first paragraph by the following:

Electric actuators shall withstand the effects of blocked output without exceeding the temperatures indicated in Table 26. Temperatures are measured by the method specified in 14.7.1.

This test is not conducted on **electric actuators** which meet the requirements of 14.4.101.

~~**27.2.1** *The electric actuator is tested for 24 h with the output blocked at rated voltage and in a room temperature in the range of 15 °C to 30 °C, the resulting measured temperature being corrected to a 25 °C reference value.*~~

~~In some countries, the room temperature may be higher.~~

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

~~For electric actuators declared for three-phase operation, the test is to be carried out with any one phase disconnected.~~

~~**Table 27.2 – Maximum permitted temperatures for test of blocked output conditions**~~

~~Condition~~	~~Temperature of insulation in °C by class~~				
	~~A~~	~~E~~	~~B~~	~~F~~	~~H~~
~~During first hour – maximum value[1) 2)]~~	~~200~~	~~215~~	~~225~~	~~240~~	~~260~~
~~After first hour – maximum value[1)]~~	~~175~~	~~190~~	~~200~~	~~215~~	~~235~~
~~– arithmetic average[1) 3)]~~	~~150~~	~~165~~	~~175~~	~~190~~	~~210~~
~~NOTE 1 Applicable to actuators with thermal motor protection.~~ ~~NOTE 2 Applicable to actuators protected by incorporated fuses or thermal cut-outs.~~ ~~NOTE 3 Applicable to actuators with no protection.~~					

~~**27.2.2** The average temperature shall be within the limits during both the second and the twenty-fourth hours of the test.~~

~~The average temperature of a winding is the arithmetic average of the maximum and minimum values of the winding temperature during the one hour period.~~

~~**27.2.3** During the test, power shall be continually supplied to the actuator.~~

~~**27.2.4** Immediately upon completion of the test, the electric actuator shall be capable of withstanding the electric strength test specified in clause 13, without first applying the humidity treatment of 12.2.~~

27.2.3.1

Replacement of the first and second paragraph, including the NOTE, by the following:

***Electric actuators** are tested for 24 h or until thermal equilibrium has been reached with the output blocked in the most unfavorable position at rated voltage and in a room temperature in the range of 15 °C to 30 °C, the resulting measured temperature being corrected to a 25 °C reference value.*

NOTE For the test with disconnected phase on three phase actuators, see 27.101.

27.3 Not applicable.

27.101 Test with disconnected phase on three phase actuators

27.101.1 *With any one phase disconnected, the actuator is operated under normal **operation** and supplied at **rated voltage**. For asymmetrical motor windings, the test is to be repeated until all phases have been singly opened.*

27.101.1.1 *The test duration shall be such that the first and second hour winding temperatures are recorded or until temperatures stabilize, whichever is longer. Temperatures are measured by the method specified in 14.7.1.*

27.101.1.2 *The temperature of the winding shall not exceed the temperatures indicated in Table 26.*

27.102 Running overload

27.102.1 *A running overload test is carried out on electrical actuators that are intended to be remotely or automatically controlled or liable to be operated continuously in unattended mode. If present, overload protective devices relying on electronic circuits to protect the motor*

windings are also subjected to the running overload test. This test is not applicable to integrated actuators.

27.102.2 *The electrical actuator is operated under normal **operation**, carrying its rated load and supplied at rated voltage until the temperature of the motor windings stabilizes. The protector or protective circuit shall not operate or open the circuit while the actuator is operating under the above conditions.*

27.102.2.1 *For all actuators where the trip point in the sensing variable is not known or cannot be quickly determined (for example, temperature sensing, impedance protected motors, sensor-less motor protection, position sensing, etc.), the load to the actuator is increased in increments of 10 % of the rated value (torque, current, etc.) and operated until temperatures of the winding stabilize. If the protector or the protective circuit does not operate under this overload condition, the load to the actuator is again increased by 10 % of the previous load setting and the actuator is operated until temperatures of the windings stabilize. This process is continued until the protective device or protective circuit operates.*

When the protector or protective circuit operates, the load is slowly decreased until the protector or protective circuit is not activated. The loading parameters (torque, current, etc.) shall be measured and recorded. The actuator is then run at this load until the temperature of the winding stabilizes.

*Any mechanical protection, such as a **clutch**, shall be defeated for this test.*

27.102.2.2 *For actuators where the trip point in the sensing variable is known or can be quickly determined (example, current sensing), the load to the actuator is gradually increased, in a controlled manner, until the protective device or protective circuit is activated. This is the trip point and the loading parameters (torque, current etc.) shall be measured and recorded. Then, the load is slowly decreased until the protector or protective circuit is not activated. The actuator is then run at this load until the temperature of the winding stabilizes.*

NOTE A brake dynamometer can be used to gradually increase the torque on the actuator shaft in a controlled manner.

27.102.3 *During the test, the winding temperature prior to the operation of the protective device or protective circuit shall not exceed*

- *140 °C, for class 105 (A) winding insulation;*
- *155 °C, for class 120 (E) winding insulation;*
- *165 °C, for class 130 (B) winding insulation;*
- *180 °C, for class 155 (F) winding insulation;*
- *200 °C, for class 180 (H) winding insulation;*
- *220 °C, for class 200 (N) winding insulation;*
- *240 °C, for class 220 (R) winding insulation;*
- *270 °C, for class 250 winding insulation.*

NOTE If the load cannot be increased in appropriate steps, the motor and the protective electronics, if applicable, can be removed from the appliance and tested separately.

27.102.3.1 *During the test, the **maximum temperature** recorded on insulating parts shall not exceed 1,5 times the relevant values specified in Clause 14.*

27.102.4 *For electrical actuators which are used in a continuous **operation** for longer than 24 h without interruption the load is again increased and the test is repeated until the protective device operates or the motor stalls.*

27.102.5 *For electrical actuators which are used in **operation** mode which will not exceed 24 h without interruption, the test is repeated after the winding temperature has reached environmental temperature conditions. The test will be performed with an increased load so that the current through the motor windings is raised by 10 % increments. The electrical actuator is operated again until steady conditions are established, the supply voltage being maintained at its original value. This procedure will be repeated until the protective device operates or the motor stalls.*

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:

~~**Annex D**~~

~~**Heat, fire and tracking**~~

~~This annex of part 1 is applicable in the USA except as follows:~~

~~**D.2 Polymeric materials used for enclosures for portable, stationary and fixed controls**~~

~~*Addition:*~~

~~For electric actuators intended to be installed in a compartment handling conditioned air for circulation through a duct system, see D.2.3.2.~~

~~**D.2.3.2** *Addition:*~~

~~Polymeric enclosures for stationary and fixed controls and for exposed polymeric parts of electric actuators intended to be installed in a compartment handling conditioned air for circulation through a duct system shall be of a material with the flammability class as determined by the tests of D.2.5.~~

Annex H
(normative)

Requirements for electronic controls

This annex of Part 1 is applicable except as follows:

H.11 Constructional requirements

H.11.12 Controls using software

H.11.12.2.6 *Addition:*

The values declared in Table 1, requirement 71, may be given in the applicable equipment standard.

Additional subclause:

H.11.12.2.6.101

The **control** response(s) declared in Table 1, requirement 72, may be given in the applicable equipment standard.

H.26 Electromagnetic compatibility (EMC) requirements – Immunity

H.26.1 *Addition:*

If an **electric actuator** is a component of a multi-purpose control or **system** and provides a **protective control** function, then the **electric actuator** shall be treated as a **protective control** throughout Clause H.26.

~~**H.26.4 Test of the influence of signal voltages in the power supply networks**~~

~~Under consideration.~~

~~**H.26.5 Test of the influence of voltage dips and short voltage interruptions in the power supply network**~~

~~**H.26.5.4 Severity levels**~~

~~*Modifications:*~~

~~*Delete the words "At minimum" from the first sentence.*~~

~~*Delete the explanatory paragraph.*~~

~~*Additional subclause:*~~

~~**H.26.5.4.101** Each test is performed three times.~~

H.26.5 Voltage dips, voltage interruptions and voltage variations in the power supply network

H.26.5.1.2 Test procedure for voltage dips and interruptions

Addition:

Each test is performed three times.

Additional subclause:

H.26.5.1.2.101 Compliance

*After the test according to H.26.5.2 of all the voltage dips and the voltage interruption of more than one cycle of the supply wave form, the **electric actuator** shall provide normal **operation**.*

*During the test according to H.26.5.2 of an interruption of one cycle of the supply wave form, the **control** shall continue to operate after restoration of the supply voltage from the position the **electric actuator** was in right before the interruption.*

H.26.5.2.2 Test procedure

Addition:

The test shall be performed in the fully open, fully closed, and if possible, in a partly open position.

H.26.6 Not applicable.

~~**H.26.7** *Test of the influence of d.c. in a.c. networks*~~

~~Under consideration for electric actuators with type 2 action.~~

H.26.8 Surge immunity test

H.26.8.3 Test procedure

Addition:

The five pulses in each polarity shall be distributed in the following operating modes:

– *1 pulse in the closed position;*
– *3 pulses during energized movement in the most surge sensitive position;*
– *1 pulse in the open position.*

Additional subclause:

H.26.8.101 Compliance

*The **electric actuator** shall tolerate the surge immunity test on the mains supply and signal lines, so that, when tested in accordance with H.26.9.3,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop*

operating and shall indicate that it has done so to the protective multi-purpose control or ***system****.*

NOTE The acceptability of the indication to the protective multi-purpose control or **system** is dependent on the application.

c) *if declared according to Table 1, requirement 90 after the tests,*

- *shall comply with H.27.1.1.3,*
- *surge protective components shall not be destroyed.*

H.26.9 Electrical Fast transient/burst immunity test

~~*Replacement:*~~

~~This test is under consideration in Canada and the USA.~~

~~*Additional subclause:*~~

~~**H.26.9.101 Test procedure**~~

~~The control is subjected to five tests.~~

H.26.9.3 Test procedure

Addition:

Operating modes are:

– being in the closed position;
– during energized movement in the most surge sensitive position;
– being in the open position.

The test shall be performed in each operating mode for 1 min each with positive and negative polarity.

Additional subclause:

H.26.9.3.101 Compliance

The ***electric actuator*** *shall tolerate electrical fast/transient bursts on the mains supply and signal lines, so that, when tested in accordance with H.26.9.3,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the* ***electric actuator*** *is recognized;*

b) *for the value of test level 3: for a protective* ***electric actuator*** *used as a component of a protective multi-purpose control or* ***system****, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or* ***system****.*

NOTE The acceptability of the indication to the protective multi-purpose control or **system** is dependent on the application.

c) *if declared according to Table 1, requirement 90: after the tests,*

- *shall comply with H.27.1.1.3,*
- *surge protective components shall not be destroyed.*

~~**H.26.10 Ring wave test**~~

~~*Addition:*~~

~~This test is applicable in Canada and the USA.~~

H.26.11 Electrostatic discharge test

~~*Clause 8 - Replacement:*~~

~~**8.2.1** *Delete the first, fifth, sixth, seventh paragraphs, the note and the eighth paragraph*~~

~~*as well as the second sentence of the ninth paragraph, replace by:*~~

~~Five discharges are applied to all accessible surfaces.~~

~~Accessible parts include parts which are accessible after the removal of detachable parts as described in 8.1.9.5 of IEC 730-1.~~

~~In Canada and the USA, accessible parts may include parts which can be contacted during installation and service.~~

Additional subclause:

H.26.11.101 Compliance

*The **electric actuator** shall tolerate the electrostatic discharge test, so that, when tested in accordance with H.26.11,*

a) *for the value of test level 3: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *if declared according to Table 1, requirement 90: after the tests,*

- *shall comply with H.27.1.1.3,*
- *surge protective components shall not be destroyed.*

H.26.12 Radio-frequency electromagnetic field immunity

H.26.12.2 Immunity to conducted disturbances

Additional subclause:

H.26.12.2.101 Compliance

*The **system** shall tolerate conducted electromagnetic fields so that, when tested in accordance with H.26.12.2.1,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

H.26.12.3 Immunity to radiated disturbances

Additional subclause:

H.26.12.3.101 Compliance

*The **system** shall tolerate radiated electromagnetic fields so that, when tested in accordance with H 26.12.3.2,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or system, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

~~**H.26.13 Evaluation of compliance**~~

~~*Addition:*~~

~~The electric actuator may return to its initial state and thereafter resume normal operation.~~

H.26.13 Test of influence of supply frequency variations

Addition:

This subclause is applicable for **electric actuators** where the **travel time depends** on the supply frequency.

H.26.13.3 Test procedure

Addition:

The **travel time** to move the electric actuator from the closed position to the open position as well as in the other direction shall be verified for each of the frequencies of Table H.19.

Additional subclause:

H.26.13.101 Compliance

*The **system** shall tolerate supply frequency variations so that, when tested in accordance with H 26.12.3.2,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized. The percentage of the **travel time** deviation shall not be higher than the percentage of the frequency variation;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

H.26.14 Power frequency magnetic field immunity test

Modification:

Replace the second paragraph with the following new paragraph:

Compliance is checked by H.26.14.3.101 after the test of H.26.14.2.

H.26.14.3 Test procedure

Addition:

Operating modes are:

- being in the closed position;

- moving between the closed and open position and vice-a-versa (being in **operation**);
- being in the open position.

The test shall be performed in all three operating modes.

Additional subclause:

H.26.14.3.101 Compliance

*The **electric actuator** shall tolerate power frequency magnetic field, so that, when tested in accordance with H.26.14.3,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** shall be recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that is has done so to the protective multi-purpose control or **system**.*

NOTE The acceptability of the indication to the protective multi-purpose control or **system** is dependent on the application.

H.26.15.4 *Addition:*

*The **electric actuator** shall tolerate the various effects, so that, when tested in accordance with Clause H.26,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** shall be recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that is has done so to the protective multi-purpose control or **system**.*

*The electric actuator may return to its initial state and thereafter resume normal **operation**.*

Annex AA
(normative)

Regional differences

Canada

27 Abnormal operation

27.2.3.1 *Add the following note:*

NOTE 2 The test is conducted at the voltages indicated in 17.2.3.1 and 17.2.3.2.

United States

7 Information

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

Add the following to footnote e:

For independently mounted actuators, the marking method is C.

27 Abnormal operation

27.2.3.1 *Add the following note:*

NOTE 2 The test is conducted at the voltages indicated in 17.2.3.1 and 17.2.3.2.

Annex BB
(informative)

Specific regional requirements in Japan

BB.1 Scope and normative reference

For the purposes of this International Standard, the specific regional requirements given as follows are applicable in Japan.

Addition:

NOTE 4 This regional Annex BB shows that JIS C 9730-2-14:2010 is identical to IEC 60730-2-14/Ed.2 based on ISO/IEC Guide 21-1,8.2 Table 1, as Designation “identical” a) and b), Abbreviation “IDT” .

BB.1.5 Normative references

Subclause 1.5 is applicable with following modifications:

Reference in clause 1.5	Replaced by	IDT/MOD
IEC 60730-1 Ed. 5.0:2013	JIS C 9730-1:2016	MOD

Replacements:

Referenced standards are replaced as follows:

Reference in clauses	Replaced by	Clauses
IEC 60335	JIS C 9335	1.1 Example 1
IEC 60730-2-8	JIS C 9730-2-8	1.1.1
IEC 61058-1	JIS C 4526-1	1.1.2

Annexes

Annex H – Requirements for electronic controls

H.26.10 Ring wave immunity test

This subclause is not applicable in Japan.

Bibliography

Bibliography of Part 1 is applicable except as follows:

Addition:

IEC 60034 (all parts), *Rotating electrical machines*

IEC 60730-2-8:2000, *Automatic electrical controls for household and similar use – Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements*[1]
IEC 60730-2-8:2000/AMD1:2002
IEC 60730-2-8:2000/AMD2:2015

JIS C 9730-2-14:2010, *Automatic electrical controls for household and similar use – Part 2-14: Particular requirements for electric actuators*

[1] A consolidated edition 2.2:2015 exists, that comprises IEC 60730-2-8:2000 and its Amendments 1 and 2.

IEC 60730-2-14

Edition 2.0 2017-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Automatic electrical controls –
Part 2-14: Particular requirements for electric actuators

Dispositifs de commande électrique automatiques –
Partie 2-14: Exigences particulières pour les actionneurs électriques

IEC 60730-2-14:2017-08(en-fr)

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

AUTOMATIC ELECTRICAL CONTROLS –

Part 2-14: Particular requirements for electric actuators

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.

AUTOMATIC ELECTRICAL CONTROLS –

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. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc., or a combination thereof.

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 or in association with equipment.

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

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

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

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 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.

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

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 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:

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	6.2, 14	D
22	Temperature limits of the actuator, if T_{min} lower than 0 °C or T_{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	14.4.101	D
102	Thermally protected motor	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	**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.

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 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 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:

17.4 Manual and mechanical conditions for the tests

17.4.2 *Replacement:*

The speed of movement of the **electric actuator** drive shaft shall be as declared by the manufacturer.

17.4.4 *Replacement:*

The method of acceleration shall be as agreed between the manufacturer and the testing authority.

17.6 Not applicable.

Additional subclause:

17.8.101 The tests based on an action type 1.AB or 2.AB shall be checked with 50 % of the cycles at 0,85 of the minimum V_R at ambient temperature or T_{min}, if lower than 0 °C, and 50 % of the cycles at 1,1 of the maximum V_R at T_{max}.

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:

27.2 Burnout test

Replacement of the first sentence by the following:

This clause is applicable to actuators where an external mechanical blockage will not cause an internal overload of the actuator. If means (e.g. a **clutch**) is used to decouple the external blockage to the internal mechanical structure, then a blockage of the mechanical parts between the motor and the decoupling means shall be tested according 27.2.1.

27.2.2 *Replacement:*

After this test, the actuator shall comply with the items a) to g) of H.27.1.1.3 .

27.2.3 Blocked mechanical output test (abnormal temperature test)

Replacement of the first paragraph by the following:

Electric actuators shall withstand the effects of blocked output without exceeding the temperatures indicated in Table 26. Temperatures are measured by the method specified in 14.7.1.

This test is not conducted on **electric actuators** which meet the requirements of 14.4.101.

27.2.3.1

Replacement of the first and second paragraph, including the NOTE, by the following:

Electric actuators *are tested for 24 h or until thermal equilibrium has been reached with the output blocked in the most unfavorable position at rated voltage and in a room temperature in the range of 15 °C to 30 °C, the resulting measured temperature being corrected to a 25 °C reference value.*

NOTE For the test with disconnected phase on three phase actuators, see 27.101.

27.3 Not applicable.

27.101 Test with disconnected phase on three phase actuators

27.101.1 *With any one phase disconnected, the actuator is operated under normal **operation** and supplied at **rated voltage**. For asymmetrical motor windings, the test is to be repeated until all phases have been singly opened.*

27.101.1.1 *The test duration shall be such that the first and second hour winding temperatures are recorded or until temperatures stabilize, whichever is longer. Temperatures are measured by the method specified in 14.7.1.*

27.101.1.2 *The temperature of the winding shall not exceed the temperatures indicated in Table 26.*

27.102 Running overload

27.102.1 *A running overload test is carried out on electrical actuators that are intended to be remotely or automatically controlled or liable to be operated continuously in unattended mode. If present, overload protective devices relying on electronic circuits to protect the motor windings are also subjected to the running overload test. This test is not applicable to integrated actuators.*

27.102.2 *The electrical actuator is operated under normal **operation**, carrying its rated load and supplied at rated voltage until the temperature of the motor windings stabilizes. The protector or protective circuit shall not operate or open the circuit while the actuator is operating under the above conditions.*

27.102.2.1 *For all actuators where the trip point in the sensing variable is not known or cannot be quickly determined (for example, temperature sensing, impedance protected motors, sensor-less motor protection, position sensing, etc.), the load to the actuator is increased in increments of 10 % of the rated value (torque, current, etc.) and operated until temperatures of the winding stabilize. If the protector or the protective circuit does not operate under this overload condition, the load to the actuator is again increased by 10 % of the previous load setting and the actuator is operated until temperatures of the windings stabilize. This process is continued until the protective device or protective circuit operates.*

When the protector or protective circuit operates, the load is slowly decreased until the protector or protective circuit is not activated. The loading parameters (torque, current, etc.) shall be measured and recorded. The actuator is then run at this load until the temperature of the winding stabilizes.

*Any mechanical protection, such as a **clutch**, shall be defeated for this test.*

27.102.2.2 *For actuators where the trip point in the sensing variable is known or can be quickly determined (example, current sensing), the load to the actuator is gradually increased, in a controlled manner, until the protective device or protective circuit is activated. This is the trip point and the loading parameters (torque, current etc.) shall be measured and recorded. Then, the load is slowly decreased until the protector or protective circuit is not activated. The actuator is then run at this load until the temperature of the winding stabilizes.*

NOTE A brake dynamometer can be used to gradually increase the torque on the actuator shaft in a controlled manner.

27.102.3 *During the test, the winding temperature prior to the operation of the protective device or protective circuit shall not exceed*

– *140 °C, for class 105 (A) winding insulation;*
– *155 °C, for class 120 (E) winding insulation;*
– *165 °C, for class 130 (B) winding insulation;*

– *180 °C, for class 155 (F) winding insulation;*
– *200 °C, for class 180 (H) winding insulation;*
– *220 °C, for class 200 (N) winding insulation;*
– *240 °C, for class 220 (R) winding insulation;*
– *270 °C, for class 250 winding insulation.*

NOTE If the load cannot be increased in appropriate steps, the motor and the protective electronics, if applicable, can be removed from the appliance and tested separately.

27.102.3.1 *During the test, the **maximum temperature** recorded on insulating parts shall not exceed 1,5 times the relevant values specified in Clause 14.*

27.102.4 *For electrical actuators which are used in a continuous **operation** for longer than 24 h without interruption the load is again increased and the test is repeated until the protective device operates or the motor stalls.*

27.102.5 *For electrical actuators which are used in **operation** mode which will not exceed 24 h without interruption, the test is repeated after the winding temperature has reached environmental temperature conditions. The test will be performed with an increased load so that the current through the motor windings is raised by 10 % increments. The electrical actuator is operated again until steady conditions are established, the supply voltage being maintained at its original value. This procedure will be repeated until the protective device operates or the motor stalls*

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:

Annex H
(normative)

Requirements for electronic controls

This annex of Part 1 is applicable except as follows:

H.11 Constructional requirements

H.11.12 Controls using software

H.11.12.2.6 *Addition:*

The values declared in Table 1, requirement 71, may be given in the applicable equipment standard.

Additional subclause:

H.11.12.2.6.101

The **control** response(s) declared in Table 1, requirement 72, may be given in the applicable equipment standard.

H.26 Electromagnetic compatibility (EMC) requirements – Immunity

H.26.1 *Addition:*

If an **electric actuator** is a component of a multi-purpose control or **system** and provides a **protective control** function, then the **electric actuator** shall be treated as a **protective control** throughout Clause H.26.

H.26.5 Voltage dips, voltage interruptions and voltage variations in the power supply network

H.26.5.1.2 Test procedure for voltage dips and interruptions

Addition:

Each test is performed three times.

Additional subclause:

H.26.5.1.2.101 Compliance

*After the test according to H.26.5.2 of all the voltage dips and the voltage interruption of more than one cycle of the supply wave form, the **electric actuator** shall provide normal **operation**.*

*During the test according to H.26.5.2 of an interruption of one cycle of the supply wave form, the **control** shall continue to operate after restoration of the supply voltage from the position the **electric actuator** was in right before the interruption.*

H.26.5.2.2 Test procedure

Addition:

The test shall be performed in the fully open, fully closed, and if possible, in a partly open position.

H.26.6 Not applicable.

H.26.8 Surge immunity test

H.26.8.3 Test procedure

Addition:

The five pulses in each polarity shall be distributed in the following operating modes:

– *1 pulse in the closed position;*
– *3 pulses during energized movement in the most surge sensitive position;*
– *1 pulse in the open position.*

Additional subclause:

H.26.8.101 Compliance

*The **electric actuator** shall tolerate the surge immunity test on the mains supply and signal lines, so that, when tested in accordance with H.26.9.3,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*
b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

NOTE The acceptability of the indication to the protective multi-purpose control or **system** is dependent on the application.

c) *if declared according to Table 1, requirement 90 after the tests,*
   - *shall comply with H.27.1.1.3,*
   - *surge protective components shall not be destroyed.*

H.26.9 Electrical fast transient/burst immunity test

H.26.9.3 Test procedure

Addition:

Operating modes are:

– being in the closed position;
– during energized movement in the most surge sensitive position;
– being in the open position.

The test shall be performed in each operating mode for 1 min each with positive and negative polarity.

Additional subclause:

H.26.9.3.101 Compliance

*The **electric actuator** shall tolerate electrical fast/transient bursts on the mains supply and signal lines, so that, when tested in accordance with H.26.9.3,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

NOTE The acceptability of the indication to the protective multi-purpose control or **system** is dependent on the application.

c) *if declared according to Table 1, requirement 90: after the tests,*

- *shall comply with H.27.1.1.3,*
- *surface protective components shall not be destroyed.*

H.26.11 Electrostatic discharge test

Additional subclause:

H.26.11.101 Compliance

*The **electric actuator** shall tolerate the electrostatic discharge test, so that, when tested in accordance with H.26.11,*

a) *for the value of test level 3: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *if declared according to Table 1, requirement 90: after the tests,*

- *shall comply with H.27.1.1.3,*
- *surge protective components shall not be destroyed.*

H.26.12 Radio-frequency electromagnetic field immunity

H.26.12.2 Immunity to conducted disturbances

Additional subclause:

H.26.12.2.101 Compliance

*The **system** shall tolerate conducted electromagnetic fields so that, when tested in accordance with H.26.12.2.1,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

H.26.12.3 Immunity to radiated disturbances

Additional subclause:

H.26.12.3.101 Compliance

*The **system** shall tolerate radiated electromagnetic fields so that, when tested in accordance with H 26.12.3.2,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or system, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

H.26.13 Test of influence of supply frequency variations

Addition:

This subclause is applicable for **electric actuators** where the **travel time depends** on the supply frequency.

H.26.13.3 Test procedure

Addition:

The **travel time** to move the electric actuator from the closed position to the open position as well as in the other direction shall be verified for each of the frequencies of Table H.19.

Additional subclause:

H.26.13.101 Compliance

*The **system** shall tolerate supply frequency variations so that, when tested in accordance with H 26.12.3.2,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** is recognized. The percentage of the **travel time** deviation shall not be higher than the percentage of the frequency variation;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that it has done so to the protective multi-purpose control or **system**.*

H.26.14 Power frequency magnetic field immunity test

Modification:

Replace the second paragraph with the following new paragraph:

Compliance is checked by H.26.14.3.101 after the test of H.26.14.2.

H.26.14.3 Test procedure

Addition:

Operating modes are:

- being in the closed position;
- moving between the closed and open position and vice-a-versa (being in **operation**);

- being in the open position.

The test shall be performed in all three operating modes.

Additional subclause:

H.26.14.3.101 Compliance

*The **electric actuator** shall tolerate power frequency magnetic field, so that, when tested in accordance with H.26.14.3,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** shall be recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that is has done so to the protective multi-purpose control or **system**.*

NOTE The acceptability of the indication to the protective multi-purpose control or **system** is dependent on the application.

H.26.15.4 *Addition:*

*The **electric actuator** shall tolerate the various effects, so that, when tested in accordance with Clause H.26,*

a) *for the value of test level 2: it shall continue to function in accordance with the requirements of this standard. No influence to the actual position of the **electric actuator** shall be recognized;*

b) *for the value of test level 3: for a protective **electric actuator** used as a component of a protective multi-purpose control or **system**, it shall either perform as in a) or it may stop operating and shall indicate that is has done so to the protective multi-purpose control or **system**.*

*The electric actuator may return to its initial state and thereafter resume normal **operation**.*

Annex AA
(normative)

Regional differences

Canada

27 Abnormal operation

27.2.3.1 *Add the following note:*

NOTE 2 The test is conducted at the voltages indicated in 17.2.3.1 and 17.2.3.2.

United States

7 Information

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

Add the following to footnote e:

For independently mounted actuators, the marking method is C.

27 Abnormal operation

27.2.3.1 *Add the following note:*

NOTE 2 The test is conducted at the voltages indicated in 17.2.3.1 and 17.2.3.2.

Annex BB
(informative)

Specific regional requirements in Japan

BB.1 Scope and normative reference

For the purposes of this International Standard, the specific regional requirements given as follows are applicable in Japan.

Addition:

NOTE 4 This regional Annex BB shows that JIS C 9730-2-14:2010 is identical to IEC 60730-2-14/Ed.2 based on ISO/IEC Guide 21-1,8.2 Table 1, as Designation “identical” a) and b), Abbreviation “IDT” .

BB.1.5 Normative references

Subclause 1.5 is applicable with following modifications:

Reference in clause 1.5	Replaced by	IDT/MOD
IEC 60730-1 Ed. 5.0:2013	JIS C 9730-1:2016	MOD

Replacements:

Referenced standards are replaced as follows:

Reference in clauses	Replaced by	Clauses
IEC 60335	JIS C 9335	1.1 Example 1
IEC 60730-2-8	JIS C 9730-2-8	1.1.1
IEC 61058-1	JIS C 4526-1	1.1.2

Annexes

Annex H – Requirements for electronic controls

H.26.10 Ring wave immunity test

This subclause is not applicable in Japan.

Bibliography

Bibliography of Part 1 is applicable except as follows:

Addition:

IEC 60034 (all parts), *Rotating electrical machines*

IEC 60730-2-8:2000, *Automatic electrical controls for household and similar use – Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements*[1]
IEC 60730-2-8:2000/AMD1:2002
IEC 60730-2-8:2000/AMD2:2015

JIS C 9730-2-14:2010, *Automatic electrical controls for household and similar use – Part 2-14: Particular requirements for electric actuators*

[1] A consolidated edition 2.2:2015 exists, that comprises IEC 60730-2-8:2000 and its Amendments 1 and 2.

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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DISPOSITIFS DE COMMANDE ÉLECTRIQUE AUTOMATIQUES –

Partie 2-14: Exigences particulières pour les actionneurs électriques

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La Norme internationale IEC 60730-2-14 a été établie par le comité d'études 72 de l'IEC: Commandes électriques automatiques.

Cette deuxième édition annule et remplace la première ésition, parue en 1995, son Amendement 1 (2001) et son Amendement 2 (2007). Cette édition constitue un révision technique. Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- l'adaptation à la 5ème édition de l'IEC 60730-1,
- l'ajout du contrôle des actionneurs électriques avec l'action 1.AB ou 2AB, et
- la modification des essais dans les conditions anormales.

La présente Partie 2-14 doit être utilisée conjointement avec l'IEC 60730-1. Elle a été établie sur la base de la 5ème édition de cette publication. Les éditions futures de l'IEC 60730-1,ou ses amendements, pourront être pris en considération.

La présente Partie 2-14 complète ou modifie les articles correspondants de l'IEC 60730-1, de façon à la transformer en norme IEC: Exigences particulières pour les actionneurs électriques.

Lorsque la présente Partie 2-14 spécifie «addition», «modification» ou «remplacement», il convient d'adapter l'exigence, la modalité d'essai ou le commentaire correspondant de la Partie 1 en conséquence.

Afin de constituer une norme vraiment internationale, il a été nécessaire de prendre en compte des exigences différentes résultant de l'expérience pratique acquise dans plusieurs parties du monde et de reconnaître les différences des systèmes électriques et des règles d'installation nationales.

Les commentaires concernant des pratiques nationales différentes ("dans certains pays…") sont contenus dans les paragraphes suivants:

- Tableau 1,
- 27.2.3.1.

Dans la présente publication:

1) Les caractères d'imprimerie suivants sont utilisés:
   - exigences proprement dites: caractères romains;
   - *modalités d'essais: caractères italiques;*
   - commentaires: petits caractères romains.
   - termes définis: **gras**.
2) Les paragraphes, notes ou articles complémentaires à ceux de la Partie 1 sont numérotés à partir de 101 et les annexes supplémentaires sont nommées AA, BB, etc.

Le texte de cette Norme internationale est issu des documents suivants:

FDIS	Rapport de vote
72/1079/FDIS	72/1100/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives au document recherché. A cette date, le document sera

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DISPOSITIFS DE COMMANDE ÉLECTRIQUE AUTOMATIQUES –

Partie 2-14: Exigences particulières pour les actionneurs électriques

1 Domaine d'application et références normatives

L'article de la Partie 1 s'applique avec les exceptions suivantes:

1.1 *Remplacement:*

La présente partie 2-14 s'applique aux **actionneurs électriques** utilisés dans, sur ou avec les matériels pour usage domestique et analogue. Le matériel peut utiliser l'électricité, le gaz, le pétrole, des combustibles solides, l'énergie thermique solaire, etc. ou une combinaison de ces sources d'énergie.

NOTE Dans la présente norme, le terme «matériel» signifie «appareil et matériel».

EXEMPLE 1 **Actionneurs électriques** pour appareils relevant du domaine d'application de l'IEC 60335.

La présente Norme internationale s'applique aux **dispositifs de commande** pour l'automatisation du bâtiment relevant du domaine d'application de l'ISO 16484.

La présente partie 2-14 s'applique également aux **dispositifs de commande électrique** automatiques des matériels qui peuvent être utilisés par le public tels que les matériels destinés à être utilisés dans des magasins, des bureaux, des hôpitaux, des fermes et des applications commerciales et industrielles.

EXEMPLE 2 **Dispositifs de commande** pour les installations de restauration, de chauffage et d'air conditionné.

La présente partie 2-14 est applicable également aux **actionneurs électriques** individuels utilisés comme partie d'un **système de commande** ou de **dispositifs de commande** solidaire mécaniquement de **dispositifs de commande multifonctions** ayant des sorties non électriques.

EXEMPLE 3 Les vannes hydrauliques montées indépendamment, les **dispositifs de commande** des **systèmes** de réseau électrique intelligent et les **dispositifs de commande** des systèmes d'automatisation des bâtiments relevant du domaine d'application de l'ISO 16484-2.

La présente partie 2-14 ne s'applique pas aux **actionneurs électriques** automatiques prévus exclusivement pour des applications industrielles, sauf mention particulière dans la partie 2 applicable ou la norme du matériel.

1.1.1 La présente partie 2-14 s'applique à la sécurité intrinsèque, aux **valeurs de fonctionnement**, aux **temps de fonctionnement** et aux **séquences de fonctionnement** dans la mesure où ils interviennent dans la sécurité du matériel, ainsi qu'aux essais des **actionneurs électriques** utilisés dans, ou avec le matériel.

NOTE Des exigences relatives à des **valeurs de fonctionnement, temps de fonctionnement** et **séquences de fonctionnement** spécifiques peuvent être données dans les normes relatives aux appareils et matériels.

La présente norme s'applique également aux **systèmes** et **dispositifs de commande de sécurité fonctionnelle** et de **sécurité peu complexe**.

La présente partie 2-14 ne s'applique pas aux **actionneurs électriques** qui sont mécaniquement intégrés dans des vannes, couverts par une partie 2 distincte, par exemple l'IEC 60730-2-8.

La présente partie 2-14 ne s'applique pas aux moteurs électriques dont les exigences font l'objet de l'IEC 60034.

1.1.2 Les exigences relatives aux interrupteurs manuels ne faisant pas partie d'un **actionneur électrique** sont contenues dans l'IEC 61058-1.

1.1.3 *Remplacement*

La présente partie 2-14 s'applique aux **actionneurs électriques** à courant alternatif ou continu dont la tension assignée ne dépasse pas 690 V en courant alternatif et 600 V en courant continu.

1.1.4 *Remplacement*

La présente partie 2-14 ne prend pas en considération la **valeur de réponse** d'une **action automatique** d'un **actionneur électrique** lorsque cette **valeur de réponse** est influencée par la méthode de montage de l'**actionneur électrique** dans le matériel. Lorsqu'une **valeur de réponse** est importante du point de vue de la protection de l'**utilisateur** ou de l'environnement, la valeur spécifiée dans le matériel domestique approprié ou déterminée par le fabricant doit s'appliquer.

2 Termes et définitions

L'article de la Partie 1 s'applique avec les exceptions suivantes:

2.2 Définitions des différents types de dispositifs de commande en fonction de l'application

Définition complémentaire:

2.2.101
actionneur électrique
dispositif dans lequel un **moteur primaire** est mécaniquement lié à une vanne, un amortisseur ou dispositf analogue et prévu pour répondre à la **mise en marche** d'un **dispositif de commande** ou d'un interrupteur

Note 1 à l'article: L'**actionneur électrique** déplace la vanne, l'amortisseur ou dispositif analogue vers des positions définies et peut aussi incorporer d'autres fonctions, telles que des interrupteurs à verrouillage électrique et/ou des boucles de retour.

2.3 Définitions concernant les fonctions des dispositifs de commande

Définitions complémentaires:

2.3.101
action multiposition
action signifiant que l'**actionneur électrique** fonctionne de telle façon que seules deux ou plusieurs positions définies peuvent être atteintes

2.3.102
action modulée
action signifiant que l'**actionneur électrique** fonctionne de telle façon que toutes les positions entre deux limites définies peuvent être atteintes

2.3.103
temps de déplacement
temps mis par un **actionneur électrique** pour se déplacer d'une position définie à une autre

2.3.104
déplacement
distance parcourue par un actionneur électrique linéaire

2.3.105
rotation angulaire
déplacement d'un actionneur électrique rotatif, exprimé en radians ou en degrés

3 Exigences générales

L'article de la Partie 1 s'applique.

4 Généralités sur les essais

L'article de la Partie 1 s'applique.

5 Caractéristiques assignées

L'article de la Partie 1 s'applique.

6 Classification

L'article de la Partie 1 s'applique avec les exceptions suivantes:

6.1 Selon leur alimentation

6.1.1 Dispositifs pour courant alternatif seulement

Remplacement:

Les **actionneurs électriques** conçus pour courant alternatif seulement ne doivent pas être utilisés avec du courant continu.

6.3 Selon leurs fonctions

Paragraphes complémentaires:

6.3.101 – actionneur électrique;

6.3.102 – actionneur électrique composant d'un **système** ou d'un dispositif de commande multiusage.

NOTE Voir aussi H.6.18 selon les classes des fonctions des **dispositifs commande**.

6.4 Selon les caractéristiques du fonctionnement automatique

Paragraphes complémentaires:

6.4.101 Type d'action

6.4.101.1 Action multiposition

6.4.101.2 Action modulée

6.4.102 Type de mouvement

6.4.102.1 Mouvement rotatif

6.4.102.2 Mouvement linéaire

6.4.3 *Paragraphes complémentaires:*

6.4.3.101 – action par laquelle l'**actionneur électrique** prend une position prédéterminée sur perte de l'alimentation électrique et/ou du signal de **commande** (type 1.AA ou type 2.AA);

6.4.3.102 – action par laquelle l'**actionneur électrique** fonctionne normalement entre 1,1 V_R et 0,85 V_R inclus, et par laquelle soit il fonctionne normalement, soit il prend une position prédéterminée entre 0,85 V_R et un pourcentage plus faible déclaré de la tension assignée (type 1.AB ou type 2.AB).

6.11 Selon le nombre de cycles automatiques (A) pour chaque action automatique

Modification:

Les Paragraphes 6.11.8 à 6.11.12 inclus ne s'appliquent pas.

7 Information

L'article de la Partie 1 s'applique avec les exceptions suivantes:

Tableau 1 – (7.2 de l'édition 3) – Information requise et méthodes pour fournir les informations

	Information	Article ou paragraphe	Méthode
Modifications:			
7	Type de charge contrôlée par chaque circuit externe	6.2, 14	D
22	Limites de température applicables à l'actionneur si T_{min} est inférieure à 0 °C ou T_{max} autre que 60 °C	6.7, 14,5, 14.7, 17.3	D
23	Limites de la température des surfaces de montage (T_s)	6.12.2, 14.1, 17,3	D
27	Nombre de cycles automatiques (A) pour chaque **action automatique** [102]	6.11	X
28	Ne s'applique pas		
34	Détail de toute limitation du **temps de fonctionnement** [101, 103]	14, 17	C
37	Ne s'applique pas		
38	Ne s'applique pas		
43	Ne s'applique pas		
44	Ne s'applique pas		
47	Ne s'applique pas		
Exigences complémentaires:			
101	Moteur protégé par impédance	14.4.101	D
102	Moteur protégé thermiquement	14.4.102	D
103	Type de mouvement	2.3.104, 2.3.105, 6.4.102	D
104	Type d'action	2.3.101, 2.3.102, 6.4.101	D
105	Charge mécanique assignée maximale	14.4, 15.5.102	D
106	**Temps de déplacement**	2.3.103, 15.5.101, 15.5.102	D
107	**Déplacement**	2.3.104	D
108	**Rotation angulaire**	2.3.105	D
109	Temps de réponse et méthode de mesure (pour le type 1.AA ou 2.AA)	6.4.3.101 15.5.102	D
110	Pourcentage inférieur de la tension assignée (pour le type 1.AB ou 2.AB)	6.4.3.102	D
Notes complémentaires:			
101	Cela peut être exprimé en pourcentage maximal du temps de fonctionnement (en marche) de l'alimentation pour éviter la surchauffe des enroulements pendant une période de temps déclarée.		
102	Les **actionneurs électriques** sont soumis à un minimum de 6 000 cycles.		
103	Pour les **actionneurs électriques** intégrés ou incorporés, la méthode est la méthode D.		

7.3.1 *Addition:*

NOTE Les actionneurs de construction de classe II fournis avec un cordon pour le raccordement au **câblage fixe** qui n'est pas équipé d'une fiche peuvent porter le symbole de la construction de classe II.

8 Protection contre les chocs électriques

L'article de la Partie 1 s'applique.

9 Dispositions en vue de la mise à la terre de protection

L'article de la Partie 1 s'applique.

10 Bornes et connexions

L'article de la Partie 1 s'applique.

11 Exigences de construction

L'article de la Partie 1 s'applique avec l'exception suivante:

11.4 Actions

Paragraphes complémentaires:

11.4.101 Une action de type 1.AA ou 2.AA doit fonctionner de telle façon que pour toute durée d'interruption de tension supérieure au temps de réponse déclaré au Tableau 1, exigence 109, l'actionneur prend la position prédéterminée et recommence à fonctionner normalement après rétablissement de l'alimentation.

La conformité est vérifiée par essai.

11.4.102 Une action de type 1.AB ou 2.AB doit fonctionner normalement entre 1,1 V_R et 0,85 V_R inclus, et doit répondre conformément aux déclarations du fabricant à des tensions inférieures à 0,85 V_R et à la tension déclarée au Tableau 1, exigence 110.

La conformité est vérifiée par essai.

12 Résistance à l'humidité et à la poussière

L'article de la Partie 1 s'applique.

13 Résistance d'isolement et rigidité diélectrique

L'article de la Partie 1 s'applique.

14 Echauffements

L'article de la Partie 1 s'applique avec les exceptions suivantes:

14.3 Ne s'applique pas.

14.4 *Remplacement du premier alinéa par le suivant:*

Les essais basés sur un type d'action 1.AB ou 2.AB doivent être réalisés en fonction de la tension assignée la plus faible (0,85 V_R) et la plus élevée (1,1 V_R) selon les déclarations du fabricant. Pendant cet essai, la température ne doit pas dépasser les valeurs spécifiées dans le Tableau 13 (14.1 de l'édition 3).

L'actionneur doit être chargé avec la charge mécanique assignée maximale. Chaque ***cycle de fonctionnement*** *doit être appliqué au* ***déplacement*** *maximal déclaré ou à la* ***rotation angulaire*** *déclarée.*

14.4.3.1 à **14.4.3.3** Ne s'appliquent pas.

14.4.4 Ne s'applique pas.

Paragraphes complémentaires:

14.4.101 Si le blocage de l'arbre de l'**actionneur électrique** fait partie du **fonctionnement** normal, l'arbre des actionneurs électriques motorisés doit alors être bloqué et les