

INTERNATIONAL STANDARD



Automatic electrical controls ~~for household and similar use~~ –
Part 2-11: Particular requirements for energy regulators



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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IEC 60730-2-11

Edition 3.0 2019-05
REDLINE VERSION

INTERNATIONAL STANDARD



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Part 2-11: Particular requirements for energy regulators

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 97.120

ISBN 978-2-8322-6979-4

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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HOUSEHOLD AND SIMILAR USE~~****Part 2-11: Particular requirements for energy regulators****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 60730-2-11 has been prepared by IEC technical committee 72: Automatic electrical controls.

This third edition cancels and replaces the second edition published in 2006. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) revision to the title to remove “for household and similar use”;
- b) changes to the scope and related modifications;
- c) changes to definitions in Annex H.

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

CDV	Report on voting
72/1137/CDV	72/1167/RVC

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

This Part 2-11 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the fifth edition of that standard (2013) including Amendment 1 (2015). Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This Part 2-11 supplements or modifies the corresponding clauses in IEC 60730-1 so as to convert that publication into the IEC standard: Particular requirements for energy regulators.

Where this Part 2-11 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, this Part 2-11 indicates that the relevant clause or subclause applies.

In this publication, the following print types are used:

- requirements proper: in roman type,
- *test specifications*: in italic type,
- explanatory matter: in smaller roman type,
- defined terms: **bold type**.

Subclauses, notes, tables and figures which are additional to those in Part 1 are numbered starting from 101.

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

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

Part 2-11: Particular requirements for energy regulators

1 Scope and normative references

This clause of Part 1 is applicable except as follows:

1.1 Scope

Replacement:

In general, this part of IEC 60730 applies to energy regulators for use in, on, or in association with equipment ~~for household and similar use~~, including energy regulators for heating, air conditioning and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc. or a combination thereof.

NOTE These energy regulators ~~may~~ can be thermally, mechanically or electrically operated.

~~1.1.1 Replacement:~~

This standard applies to the inherent safety, to the operating values, operating times and operating sequence where ~~such~~ these are associated with equipment safety, and to the testing of automatic electrical energy regulator devices used in, or in association with, ~~household or similar~~ equipment.

This standard is also applicable to energy regulators for appliances within the scope of IEC 60335-1.

Throughout this standard the word “equipment” means “appliance and equipment”.

This standard also applies to automatic electrical energy regulators 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.

This standard does not apply to automatic electrical energy regulators designed exclusively for industrial process applications unless explicitly mentioned in the equipment standard.

This standard does not apply to equipment that are specifically within the scope of building automation equipment.

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

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

This standard applies to **controls** powered by primary or secondary batteries, requirements for which are contained within the standard, including Annex V.

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

This standard applies to **controls** using **thermistors**, see also Annex J.

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

1.1.2 ~~Not applicable.~~

This standard applies to energy regulators as defined in 2.2.10 of Part 1.

1.1.3 Not applicable.

1.1.4 *Replacement:*

This standard applies to manual energy regulators ~~when such~~ which are electrically and/or mechanically integral with automatic controls.

Requirements for manual switches not forming part of an automatic energy regulator are contained in IEC 61058-1.

~~4.2~~**1.1.5** *Replacement:*

This standard applies to energy regulators with a rated voltage not exceeding 690 V ~~and with a rated current not exceeding 63 A~~ AC or 600 V DC.

~~4.3~~**1.1.6** Not applicable.

~~4.4~~**1.1.7** *Replacement:*

This standard applies also to energy regulators incorporating electronic devices, requirements for which are contained in Annex H.

1.1.8 This standard applies also to energy regulators using **NTC** or **PTC thermistors**, additional requirements for which are contained in Annex J.

1.1.9 This standard applies to the electrical and **functional safety** of **controls** capable of receiving and responding to communications signals, including signals for power billing rate and demand response.

The signals may be transmitted to or received from external units being part of the **control** (wired), or to and from external units which are not part of the **control** (wireless) under test.

1.1.10 This standard does not address the integrity of the output signal to the network devices, such as interoperability with other devices unless it has been evaluated as part of the **control system**.

2 Terms and definitions

This clause of Part 1 is applicable except as follows:

2.2 Definitions of types of controls according to purpose

~~2.2.19 Addition:~~

~~In general, an energy regulator is an operating control.~~

2.2.20 protective control

Addition:

Note 1 to entry: In general, energy regulators using software have functions classified as software class A.

2.5 Definitions of type of control according to construction

Addition:

2.5.101

push-and-turn actuation

~~Push-and-turn actuation denotes a~~ two-step actuation accomplished by first pushing, and then ~~rotating~~ turning, the actuating member of the control

2.5.102

pull-and-turn actuation

~~Pull-and-turn actuation denotes a~~ two-step actuation accomplished by first pulling, and then rotating, the actuating member of the control

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:

6.4 According to features of automatic action

~~6.4.3 Addition:~~

6.4.3.101 – an action which is initiated only after a push-and-turn or pull-and-turn actuation and in which only rotation is required to return the actuating member to the off or rest position (type 1.X and 2.X);

6.4.3.102 – an action which is initiated only after a push-and-turn or pull-and-turn actuation (type 1.Z or 2.Z).

6.7 According to ambient temperature limits of the switch head

Addition:

6.7.101 Energy regulator for use in or on cooking appliances.

7 Information

This clause of Part 1 is applicable except as follows:

Table 7.2

Table 1 – Required information and methods of providing information

Addition to ~~Note 4~~ item i):

For energy regulators, limits of the activating quantity are not declared (see 17.7 and 17.8).

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:

11.3.9 Pull-cord actuated control

Addition:

~~The second explanatory paragraph~~ Note 2 is not applicable to energy regulators classified as type 1.X or 2.X or type 1.Z or 2.Z.

11.4 Actions

Addition:

11.4.101 Type 1.X or 2.X

A type 1.X or 2.X action shall be so designed that a turn action can only be accomplished after the completion of a push action or a pull action. Only rotation shall be required to return the actuating member of the energy regulator to the off or rest position.

Compliance is checked by the tests of 18.101.

11.4.102 Type 1.Z or 2.Z

A type 1.Z or 2.Z action shall be so designed that a turn action can only be accomplished after the completion of a push action or a pull action.

Compliance is checked by the tests of 18.101.

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:

Addition:

14.101 Energy regulators for use in or on cooking appliances

14.101.1 The following is applicable to energy regulators classified under 6.7.101.

14.101.2 As a means of complying with note ~~12)~~ I) of Table 13, if the temperature of insulating parts exceeds that permitted in Table ~~14.1~~ 13, then the test of 17.16.101 may be conducted after the conditioning of 14.102 ~~and 14.102.1~~.

14.102 A previously untested sample of the energy regulator is conditioned for 1 000 h in an oven maintained at a temperature between $1,02 T_1 + 20$ °C and 1,05 times that temperature, where T_1 is the maximum measured temperature on the insulating part during the test of Clause 14. The energy regulator shall not be energized during the test.

If the elevated temperature is localized, such as at or near a bimetal heater, the 1 000 h conditioning is conducted with the energy regulator between $T_{\max}$ and $T_{\max} + 5$ % for normal conditions, but with the contacts closed and non-cycling. If necessary, the contacts may be forced closed to provide the most arduous temperature conditions. A bimetal heater across the mains is energized at 1,1 times rated voltage. A series bimetal heater shall conduct at 1,1 times rated current.

15 Manufacturing deviation and drift

This clause of Part 1 is applicable.

16 Environmental stress

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable except as follows:

~~17.16 Tests for particular purpose controls~~

~~Replacement:~~

~~17.1 to 17.5 Applicable.~~

~~17.6 Applicable to actions classified as Type 1.M or 2.M.~~

Modification:

17.7 and 17.8 are applicable, except that actuating members are placed in the position that produces the fastest natural cycling rate at the beginning of the test. The rate can be adjusted to the fastest natural cycling rate during the test. *Limits of the activating quantity are not declared.*

17.9 Not applicable.

17.10 to 17.13 inclusive are applicable, except that for actuating members which have been tested during the automatic action tests of 17.7 and 17.8, the number of cycles of actuation is reduced in 17.13 by the number of cycles carried out during those tests.

17.14 Applicable.

17.15 Not applicable

17.16 Test for particular purpose controls

Addition:

17.16.101 Evaluation of materials

The following tests are conducted as indicated in 14.101.1.

The energy regulator is subjected to the tests of 17.7 for 50 operations and 17.8 for 1 000 operations. The tests of 17.7 and 17.8 are conducted at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$.

After these tests, the energy regulator shall comply with 17.5.

18 Mechanical strength

This clause of Part 1 is applicable except as follows:

Addition:

18.101 Push-and-turn or pull-and-turn actuation

Energy regulators with actions classified as type 1.X or 2.X or type 1.Z or 2.Z shall be subjected to the tests of 18.101.1 and 18.101.2.

One new sample is used for the tests. After these tests, the energy regulator shall comply with the requirements of 18.1.5.

18.101.1 Energy regulators with actions classified as type 1.X or 2.X or type 1.Z or 2.Z shall be subjected to the tests.

- The axial force required to push or pull the actuating member shall not be less than 10 N.
- An axial push or pull force of 140 N applied to the actuating member shall not effect compliance with 18.1.5.
- For an energy regulator intended for use with a knob having a grip diameter or length of 50 mm or less, the means preventing rotation of the shaft prior to the push or pull actuation shall withstand, without damage or effect on the energy regulator function, a torque of 4 Nm.
- Alternatively, if the means preventing the rotation of the shaft is defeated when a torque of at least 2 Nm is applied, the effect shall be such that either:
 - the means is not damaged but overridden to close the contacts, in which case subsequent actuation at a torque less than 2 Nm shall require both push-and-turn or pull-and-turn to operate the contacts, or
 - no operation of the contacts occurs nor can be made to occur.
- The torque required to reset the energy regulator to the initial contact condition, if necessary after the application of the push or pull, shall not be greater than 0,5 Nm.
- A torque of 6 Nm is applied to the setting means. Any breakage or damage to the means preventing rotation of the shaft shall not result in failure to comply with the requirements of Clauses 8, 13 and 20.
- For energy regulators intended for use with a knob having a grip diameter or length greater than 50 mm, the values of torque are increased proportionally.

18.101.2 Energy regulators with actions classified as type 1.X or 2.X, or type 1.Z or 2.Z shall be actuated for the declared number of manual cycles.

After this test, the energy regulator shall comply with the requirements of 18.101.1. For the case in which the means preventing rotation is not damaged but is overridden to operate the contacts, the first one-sixth of the declared manual cycles shall be performed without first pushing or pulling the actuating member.

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

~~See Annex H.~~

This clause of Part 1 is applicable.

26 Electromagnetic compatibility (EMC) requirements – Immunity

~~See Annex H.~~

This clause of Part 1 is applicable.

27 Abnormal operation

This clause of Part 1 is applicable.

~~See also Annex H.~~

28 Guidance on the use of electronic disconnection

~~See Annex H.~~

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.6 Classification

H.6.18 According to ~~software~~ classes of control functions

H.6.18.1 – Control of class A control functions

Addition:

NOTE In general, energy regulators ~~using software have functions classified as software~~ perform class A control function.

H.11.12 Controls using software

Modification:

After the second paragraph, add the following note:

NOTE The value(s) given in Table 1, item 71 can be taken from the equipment standard.

H.23.1.2 Radio frequency emission

Addition:

Integrated and incorporated energy regulators are not subjected to the tests of this subclause, as the results of these tests are influenced by the incorporation of the energy regulator into the equipment and the use of measures to control emissions used therein. ~~They~~ The tests of this subclause may, however, be carried out under declared conditions if so requested by the manufacturer.

H.26 Electromagnetic compatibility (EMC) requirements – Immunity

H.26.2 *Addition.*

The tests of H.26.4 to H.26.14 are performed with the energy regulator at its highest setting, its lowest and at the OFF setting, if provided.

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

Modification:

~~H.26.5.3 Test procedure~~

~~Delete the paragraph beginning "In the case of three-phase equipment..."~~

H.26.6 Test of influence of voltage unbalance

Not applicable.

H.26.8 Surge immunity test

H.26.8.3 Test procedure

Addition:

H.26.8.3.101 Two pulses each are performed with the energy regulator at the high and low settings and one is performed at the OFF setting.

H.26.9 Electrical fast transient/burst immunity test

Addition:

H.26.9.3.101 Test procedure

Two tests each are performed with the energy regulator at the high and low settings, and one is performed at the OFF setting.

H.26.12 Radio-frequency electromagnetic field immunity

H.26.12.2 Immunity to conducted disturbances

H.26.12.2.2 Test procedure

Addition:

The energy regulator is subjected to three sweeps of the frequency range from minimum to maximum at the indicated severity level. One sweep each is applied when the energy regulator is at the high setting, the low setting and the OFF setting.

H.26.12.3 Immunity to radiated disturbances

H.26.12.3.2 Test procedure

Addition:

The energy regulator is subjected to three sweeps of the frequency range from minimum to maximum at the indicated severity level. One sweep each is applied when the energy regulator is at the high setting, the low setting and the OFF setting.

H.26.13 Test of influence of supply frequency variations

H.26.13.3 Test procedure

Addition:

The test shall be performed three times each, at the high, low and OFF settings.

H.26.15 Evaluation of compliance

H.26.15.1 Addition:

In the case of multiple testing on a single sample as allowed in H.26.3, the requirements of Clauses 8 and 20 and of 17.5 shall be applied once at the conclusion of H.26.4 through H.26.14 testing performed on the sample subjected to multiple tests.

H.26.15.4 Replacement:

After the tests, if the energy regulator is operational, it shall continue to operate as intended with no loss of protective function and the operation of the protective function shall be verified by the requirements of Clause 15. If the energy regulator is not operational, there shall be no energy output.

H.27 Abnormal operation*Modification:***H.27.1.1.2 Replace the first line by:**

The energy regulator shall be operated under the following conditions. In addition, the energy regulator shall be tested at the high, low and OFF settings.

H.27.1.2.2.2 First fault*Modification:*

Replace the sentence after item d) as follows:

The **fault reaction time** is declared by the manufacturer referenced to Table 1, item 91.

H.27.1.2.3 Class C control function**H.27.1.2.3.2 First fault***Modification:*

Replace the sentence after item d) as follows:

The **fault reaction time** is declared by the manufacturer referenced to Table 1, item 91.

Annex AA (normative)

Regional differences

7 Information

This clause of Part 1 is applicable except as follows:

Table 1 – Required information and methods of providing information

Addition to item i):

For energy regulators, limits of the activating quantity are not declared (see 17.7 and 17.8).

In Canada, the following applies:

Item 26: for manual action (M) 6 000 cycles.

Item 27: for automatic action (A) 100 000 cycles.

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Automatic electrical controls

Part 2-11: Particular requirements for energy regulators

Dispositifs de commande électrique automatiques

Partie 2-11: Exigences particulières pour les régulateurs d'énergie

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CDV	Report on voting
72/1137/CDV	72/1167/RVC

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

This Part 2-11 is intended to be used in conjunction with IEC 60730-1. It was established on the basis of the fifth edition of that standard (2013) including Amendment 1 (2015). Consideration may be given to future editions of, or amendments to, IEC 60730-1.

This Part 2-11 supplements or modifies the corresponding clauses in IEC 60730-1 so as to convert that publication into the IEC standard: Particular requirements for energy regulators.

Where this Part 2-11 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, this Part 2-11 indicates that the relevant clause or subclause applies.

In this publication, the following print types are used:

- requirements proper: in roman type,
- *test specifications: in italic type*,
- explanatory matter: in smaller roman type,
- defined terms: **bold type**.

Subclauses, notes, tables and figures which are additional to those in Part 1 are numbered starting from 101.

A list of all parts of the IEC 60730 series, under the general title *Automatic electrical controls*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

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

AUTOMATIC ELECTRICAL CONTROLS

Part 2-11: Particular requirements for energy regulators

1 Scope and normative references

This clause of Part 1 is applicable except as follows:

1.1 Scope

Replacement:

In general, this part of IEC 60730 applies to energy regulators for use in, on, or in association with equipment, including energy regulators for heating, air conditioning and similar applications. The equipment may use electricity, gas, oil, solid fuel, solar thermal energy, etc. or a combination thereof.

NOTE These energy regulators can be thermally, mechanically or electrically operated.

This standard applies to the inherent safety, to the operating values, operating times and operating sequence where these are associated with equipment safety, and to the testing of automatic electrical energy regulator devices used in, or in association with, equipment.

This standard is also applicable to energy regulators for appliances within the scope of IEC 60335-1.

Throughout this standard the word “equipment” means “appliance and equipment”.

This standard also applies to automatic electrical energy regulators 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.

This standard does not apply to automatic electrical energy regulators designed exclusively for industrial process applications unless explicitly mentioned in the equipment standard.

This standard does not apply to equipment that are specifically within the scope of building automation equipment.

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

This standard applies to **controls** powered by primary or secondary batteries, requirements for which are contained within the standard, including Annex V.

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

This standard applies to **controls** using **thermistors**, see also Annex J.

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

1.1.2 This standard applies to energy regulators as defined in 2.2.10 of Part 1.

1.1.3 Not applicable.

1.1.4 *Replacement:*

This standard applies to manual energy regulators which are electrically and/or mechanically integral with automatic controls.

Requirements for manual switches not forming part of an automatic energy regulator are contained in IEC 61058-1.

1.1.5 *Replacement:*

This standard applies to energy regulators with a rated voltage not exceeding 690 V AC or 600 V DC.

1.1.6 Not applicable.

1.1.7 *Replacement:*

This standard applies also to energy regulators incorporating electronic devices, requirements for which are contained in Annex H.

1.1.8 This standard applies also to energy regulators using **NTC** or **PTC thermistors**, additional requirements for which are contained in Annex J.

1.1.9 This standard applies to the electrical and **functional safety** of **controls** capable of receiving and responding to communications signals, including signals for power billing rate and demand response.

The signals may be transmitted to or received from external units being part of the **control** (wired), or to and from external units which are not part of the **control** (wireless) under test.

1.1.10 This standard does not address the integrity of the output signal to the network devices, such as interoperability with other devices unless it has been evaluated as part of the **control system**.

2 Terms and definitions

This clause of Part 1 is applicable except as follows:

2.2 Definitions of types of control according to purpose

2.2.20 protective control

Addition:

Note 1 to entry: In general, energy regulators using software have functions classified as software class A.

2.5 Definitions of type of control according to construction

Addition:

2.5.101**push-and-turn actuation**

two-step actuation accomplished by first pushing, and then turning, the actuating member of the control

2.5.102**pull-and-turn actuation**

two-step actuation accomplished by first pulling, and then rotating, the actuating member of the control

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:

6.4 According to features of automatic action

Addition:

6.4.3.101 – an action which is initiated only after a push-and-turn or pull-and-turn actuation and in which only rotation is required to return the actuating member to the off or rest position (type 1.X and 2.X);

6.4.3.102 – an action which is initiated only after a push-and-turn or pull-and-turn actuation (type 1.Z or 2.Z).

6.7 According to ambient temperature limits of the switch head

Addition:

6.7.101 Energy regulator for use in or on cooking appliances.

7 Information

This clause of Part 1 is applicable except as follows:

Table 1 – Required information and methods of providing information

Addition to item i):

For energy regulators, limits of the activating quantity are not declared (see 17.7 and 17.8).

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:

11.3.9 Pull-cord actuated control

Addition:

Note 2 is not applicable to energy regulators classified as type 1.X or 2.X or type 1.Z or 2.Z.

11.4 Actions

Addition:

11.4.101 Type 1.X or 2.X

A type 1.X or 2.X action shall be so designed that a turn action can only be accomplished after the completion of a push action or a pull action. Only rotation shall be required to return the actuating member of the energy regulator to the off or rest position.

Compliance is checked by the tests of 18.101.

11.4.102 Type 1.Z or 2.Z

A type 1.Z or 2.Z action shall be so designed that a turn action can only be accomplished after the completion of a push action or a pull action.

Compliance is checked by the tests of 18.101.

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:

Addition:

14.101 Energy regulators for use in or on cooking appliances

14.101.1 The following is applicable to energy regulators classified under 6.7.101.

14.101.2 As a means of complying with note l) of Table 13, if the temperature of insulating parts exceeds that permitted in Table 13, then the test of 17.16.101 may be conducted after the conditioning of 14.102.

14.102 A previously untested sample of the energy regulator is conditioned for 1 000 h in an oven maintained at a temperature between $1,02 T_1 + 20\text{ °C}$ and 1,05 times that temperature, where T_1 is the maximum measured temperature on the insulating part during the test of Clause 14. The energy regulator shall not be energized during the test.

If the elevated temperature is localized, such as at or near a bimetal heater, the 1 000 h conditioning is conducted with the energy regulator between $T_{\max}$ and $T_{\max} + 5\%$ for normal conditions, but with the contacts closed and non-cycling. If necessary, the contacts may be forced closed to provide the most arduous temperature conditions. A bimetal heater across the mains is energized at 1,1 times rated voltage. A series bimetal heater shall conduct at 1,1 times rated current.

15 Manufacturing deviation and drift

This clause of Part 1 is applicable.

16 Environmental stress

This clause of Part 1 is applicable.

17 Endurance

This clause of Part 1 is applicable except as follows:

Modification:

17.7 and 17.8 are applicable, except that actuating members are placed in the position that produces the fastest natural cycling rate at the beginning of the test. The rate can be adjusted to the fastest natural cycling rate during the test. Limits of the activating quantity are not declared.

17.9 Not applicable.

17.10 to 17.13 inclusive are applicable, except that for actuating members which have been tested during the automatic action tests of 17.7 and 17.8, the number of cycles of actuation is reduced in 17.13 by the number of cycles carried out during those tests.

17.14 Applicable.

17.15 Not applicable

17.16 Test for particular purpose controls

Addition:

17.16.101 Evaluation of materials

The following tests are conducted as indicated in 14.101.1.

The energy regulator is subjected to the tests of 17.7 for 50 operations and 17.8 for 1 000 operations. The tests of 17.7 and 17.8 are conducted at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$.

After these tests, the energy regulator shall comply with 17.5.

18 Mechanical strength

This clause of Part 1 is applicable except as follows:

Addition:

18.101 Push-and-turn or pull-and-turn actuation

Energy regulators with actions classified as type 1.X or 2.X or type 1.Z or 2.Z shall be subjected to the tests of 18.101.1 and 18.101.2.

One new sample is used for the tests. After these tests, the energy regulator shall comply with the requirements of 18.1.5.

18.101.1 Energy regulators with actions classified as type 1.X or 2.X or type 1.Z or 2.Z shall be subjected to the tests.

- The axial force required to push or pull the actuating member shall not be less than 10 N.
- An axial push or pull force of 140 N applied to the actuating member shall not effect compliance with 18.1.5.
- For an energy regulator intended for use with a knob having a grip diameter or length of 50 mm or less, the means preventing rotation of the shaft prior to the push or pull actuation shall withstand, without damage or effect on the energy regulator function, a torque of 4 Nm.
- Alternatively, if the means preventing the rotation of the shaft is defeated when a torque of at least 2 Nm is applied, the effect shall be such that either:
 - the means is not damaged but overridden to close the contacts, in which case subsequent actuation at a torque less than 2 Nm shall require both push-and-turn or pull-and-turn to operate the contacts, or
 - no operation of the contacts occurs nor can be made to occur.
- The torque required to reset the energy regulator to the initial contact condition, if necessary after the application of the push or pull, shall not be greater than 0,5 Nm.
- A torque of 6 Nm is applied to the setting means. Any breakage or damage to the means preventing rotation of the shaft shall not result in failure to comply with the requirements of Clauses 8, 13 and 20.
- For energy regulators intended for use with a knob having a grip diameter or length greater than 50 mm, the values of torque are increased proportionally.

18.101.2 Energy regulators with actions classified as type 1.X or 2.X, or type 1.Z or 2.Z shall be actuated for the declared number of manual cycles.

After this test, the energy regulator shall comply with the requirements of 18.101.1. For the case in which the means preventing rotation is not damaged but is overridden to operate the contacts, the first one-sixth of the declared manual cycles shall be performed without first pushing or pulling the actuating member.

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.

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.6 Classification

H.6.18 According to classes of control functions

H.6.18.1 – Control of class A control functions

Addition:

NOTE In general, energy regulators perform class A control function.

H.11.12 Controls using software

Modification:

After the second paragraph, add the following note:

NOTE The value(s) given in Table 1, item 71 can be taken from the equipment standard.

H.23.1.2 Radio frequency emission

Addition:

Integrated and incorporated energy regulators are not subjected to the tests of this subclause, as the results of these tests are influenced by the incorporation of the energy regulator into the equipment and the use of measures to control emissions used therein. The tests of this subclause may, however, be carried out under declared conditions if so requested by the manufacturer.

H.26 Electromagnetic compatibility (EMC) requirements – Immunity

H.26.2 Addition:

The tests of H.26.4 to H.26.14 are performed with the energy regulator at its highest setting, its lowest and at the OFF setting, if provided.

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

Modification:

H.26.6 Test of influence of voltage unbalance

Not applicable.

H.26.8 Surge immunity test

H.26.8.3 Test procedure

Addition:

H.26.8.3.101 Two pulses each are performed with the energy regulator at the high and low settings and one is performed at the OFF setting.

H.26.9 Electrical fast transient/burst immunity test

Addition:

H.26.9.3.101 Test procedure

Two tests each are performed with the energy regulator at the high and low settings, and one is performed at the OFF setting.

H.26.12 Radio-frequency electromagnetic field immunity

H.26.12.2 Immunity to conducted disturbances

H.26.12.2.2 Test procedure

Addition:

The energy regulator is subjected to three sweeps of the frequency range from minimum to maximum at the indicated severity level. One sweep each is applied when the energy regulator is at the high setting, the low setting and the OFF setting.

H.26.12.3 Immunity to radiated disturbances

H.26.12.3.2 Test procedure

Addition:

The energy regulator is subjected to three sweeps of the frequency range from minimum to maximum at the indicated severity level. One sweep each is applied when the energy regulator is at the high setting, the low setting and the OFF setting.

H.26.13 Test of influence of supply frequency variations

H.26.13.3 Test procedure

Addition:

The test shall be performed three times each, at the high, low and OFF settings.

H.26.15 Evaluation of compliance

H.26.15.1 Addition:

In the case of multiple testing on a single sample as allowed in H.26.3, the requirements of Clauses 8 and 20 and of 17.5 shall be applied once at the conclusion of H.26.4 through H.26.14 testing performed on the sample subjected to multiple tests.

H.26.15.4 Replacement:

After the tests, if the energy regulator is operational, it shall continue to operate as intended with no loss of protective function and the operation of the protective function shall be verified by the requirements of Clause 15. If the energy regulator is not operational, there shall be no energy output.

H.27 Abnormal operation

Modification:

H.27.1.1.2 *Replace the first line by:*

The energy regulator shall be operated under the following conditions. In addition, the energy regulator shall be tested at the high, low and OFF settings.

H.27.1.2.2.2 First fault

Modification:

Replace the sentence after item d) as follows:

The **fault reaction time** is declared by the manufacturer referenced to Table 1, item 91.

H.27.1.2.3 Class C control function

H.27.1.2.3.2 First fault

Modification:

Replace the sentence after item d) as follows:

The **fault reaction time** is declared by the manufacturer referenced to Table 1, item 91.

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Annex AA

(normative)

Regional differences

7 Information

This clause of Part 1 is applicable except as follows:

Table 1 – Required information and methods of providing information

Addition to item i):

For energy regulators, limits of the activating quantity are not declared (see 17.7 and 17.8).

In Canada, the following applies:

Item 26: for manual action (M) 6 000 cycles.

Item 27: for automatic action (A) 100 000 cycles.

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

DISPOSITIFS DE COMMANDE ÉLECTRIQUE AUTOMATIQUES**Partie 2-11: Exigences particulières pour les régulateurs d'énergie****AVANT-PROPOS**

- 1) La Commission Electrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 60730-2-11 a été établie par le comité d'études 72 de l'IEC: Commandes électriques automatiques.

Cette troisième édition annule et remplace la deuxième édition parue en 2006. Cette édition constitue une révision technique. Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) révision du titre pour supprimer "à usage domestique et analogue";
- b) modifications du domaine d'application et modifications associées;
- c) modifications des définitions à l'Annexe H.

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

CDV	Rapport de vote
72/1137/CDV	72/1167/RVC

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.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

La présente Partie 2-11 est destinée à être utilisée conjointement avec l'IEC 60730-1. Elle a été établie sur la base de la cinquième édition de cette norme (2013) et de son Amendement 1 (2015). Les éditions futures de l'IEC 60730-1, ou ses amendements, pourront être pris en considération.

La présente Partie 2-11 complète ou modifie les articles correspondants de l'IEC 60730-1, de façon à transformer cette publication en Norme IEC: Exigences particulières pour les régulateurs d'énergie.

Lorsque la présente Partie 2-11 mentionne "addition", "modification" ou "remplacement", il convient d'adapter l'exigence, la spécification d'essai ou la note correspondante de la Partie 1 en conséquence.

Lorsqu'aucune modification n'est nécessaire, la présente Partie 2-11 indique que l'article ou le paragraphe approprié s'applique.

Dans la présente publication, les caractères d'imprimerie suivants sont utilisés:

- exigences proprement dites: caractères romains,
- *modalités d'essais: caractères italiques,*
- notes: petits caractères romains,
- termes définis: **en gras**.

Les paragraphes, notes, tableaux et figures qui s'ajoutent à ceux de la Partie 1 sont numérotés à partir de 101.

Une liste de toutes les parties de la série IEC 60730, publiées sous le titre général *Dispositifs de commande électrique automatiques*, peut être consultée sur le site web de l'IEC.

Les futures normes de cette série porteront dorénavant le nouveau titre général cité ci-dessus. Le titre des normes existant déjà dans cette série sera mis à jour lors de la prochaine édition.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de maintenance indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite;
- supprimée;
- remplacée par une édition révisée, ou
- amendée.

DISPOSITIFS DE COMMANDE ÉLECTRIQUE AUTOMATIQUES

Partie 2-11: Exigences particulières pour les régulateurs d'énergie

1 Domaine d'application et références normatives

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

1.1 Domaine d'application

Remplacement:

En général, la présente partie de l'IEC 60730 s'applique aux régulateurs d'énergie destinés à être utilisés dans, sur ou avec du matériel, y compris les régulateurs d'énergie pour le chauffage, le conditionnement d'air et les applications analogues. 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 Ces régulateurs d'énergie peuvent être actionnés par commande électrique, mécanique ou thermique.

La présente norme s'applique à la sécurité intrinsèque, aux valeurs de fonctionnement, aux temps de fonctionnement et aux séquences de fonctionnement, dans la mesure où ces éléments interviennent dans la sécurité du matériel, ainsi qu'aux essais des régulateurs d'énergie électriques automatiques utilisés dans ou avec du matériel.

La présente norme s'applique également aux régulateurs d'énergie pour appareils relevant du domaine d'application de l'IEC 60335-1.

Partout où il est utilisé dans la présente norme, le terme "matériel" signifie "appareil et équipement".

La présente norme s'applique également aux régulateurs d'énergie électriques automatiques pour les matériels qui peuvent être utilisés par le grand public, tels que les matériels destinés à être utilisés dans les magasins, bureaux, hôpitaux, exploitations agricoles, ainsi que les applications commerciales et industrielles.

Sauf indication contraire explicite dans la norme applicable au matériel, la présente norme ne s'applique pas aux régulateurs d'énergie électriques automatiques conçus exclusivement pour les applications de processus industriels.

La présente norme ne s'applique pas aux matériels qui relèvent spécifiquement du domaine d'application des matériels d'automatisation du bâtiment.

La présente norme s'applique également aux régulateurs d'énergie individuels utilisés comme élément d'un système de commande ou aux régulateurs d'énergie qui sont mécaniquement intégrés à des dispositifs de commande multifonctions dont les sorties ne sont pas électriques.

La présente norme s'applique aux **dispositifs de commande** alimentés par piles ou accumulateurs dont les exigences sont spécifiées dans la présente norme, notamment à l'Annexe V.

1.1.1 La présente Norme internationale s'applique à la sécurité intrinsèque, aux **valeurs de fonctionnement**, aux **temps de fonctionnement** et aux **séquences de fonctionnement**, dans

la mesure où ces éléments interviennent dans la sécurité du matériel, ainsi qu'aux essais des dispositifs de **commande électrique** automatiques utilisés dans ou avec du matériel.

La présente norme s'applique aux **dispositifs de commande** utilisant des **thermistances** (voir également l'Annexe J).

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

1.1.2 La présente norme s'applique aux régulateurs d'énergie définis en 2.2.10 de la Partie 1.

1.1.3 Non applicable.

1.1.4 *Remplacement:*

La présente norme s'applique aux régulateurs d'énergie manuels qui sont électriquement et/ou mécaniquement intégrés à des dispositifs de commande automatiques.

Les exigences relatives aux interrupteurs manuels ne faisant pas partie d'un régulateur d'énergie automatique figurent dans l'IEC 61058-1.

1.1.5 *Remplacement:*

La présente norme s'applique aux régulateurs d'énergie dont la tension assignée ne dépasse pas 690 V en courant alternatif ou 600 V en courant continu.

1.1.6 Non applicable.

1.1.7 *Remplacement:*

La présente norme s'applique également aux régulateurs d'énergie incorporant des dispositifs électroniques, dont les exigences figurent à l'Annexe H.

1.1.8 La présente norme s'applique également aux régulateurs d'énergie utilisant des **thermistances CTN** ou **CTP**, dont les exigences complémentaires sont contenues à l'Annexe J.

1.1.9 La présente norme s'applique à la sécurité électrique et la **sécurité fonctionnelle** des **dispositifs de commande** capables de recevoir et de répondre à des signaux de communication, y compris les signaux propres au taux de facturation de l'électricité et à la gestion de la demande.

Les signaux peuvent être transmis à des unités externes qui font partie intégrante du **dispositif de commande** (câblé) en essai ou reçus de telles unités, ou bien ils peuvent être transmis à des unités externes qui ne font pas partie intégrante du **dispositif de commande** (non câblé) en essai ou reçus de telles unités.

1.1.10 La présente norme ne traite pas de l'intégrité du signal de sortie transmis aux dispositifs de réseau, comme l'interopérabilité avec d'autres dispositifs, à moins qu'elle n'ait été évaluée comme faisant partie intégrante du **système de commande**.

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

2.2.20 dispositif de commande de protection

Addition:

Note 1 à l'article: En général, les régulateurs d'énergie utilisant des logiciels ont des fonctions classées comme des logiciels de Classe A.

2.5 Définitions des différents types de dispositifs de commande en fonction de la construction

Addition:

2.5.101

commande pousser-tourner

commande en deux phases effectuée tout d'abord en poussant puis en tournant l'organe de manœuvre du dispositif de commande

2.5.102

commande tirer-tourner

commande en deux phases effectuée tout d'abord en tirant puis en tournant l'organe de manœuvre du dispositif de commande

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:

6.4 Selon les caractéristiques du fonctionnement automatique

Addition:

6.4.3.101 – action initiée seulement après une commande pousser-tourner ou tirer-tourner et pour laquelle seule une rotation est exigée pour ramener l'organe de manœuvre en position de repos ou d'arrêt (type 1.X et 2.X);

6.4.3.102 – action initiée seulement après une commande pousser-tourner ou tirer-tourner (type 1.Z ou 2.Z).

6.7 Selon les limites de température ambiante imposées à la tête de commande

Addition: