

INTERNATIONAL STANDARD

NORME INTERNATIONALE

High-voltage switchgear and controlgear –
Part 106: Alternating current contactors, contactor-based controllers and motor-
starters

Appareillage à haute tension – [IEC 62271-106:2011](https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-)
Partie 106: Contacteurs, combinés de démarrage à contacteurs et démarreurs de
moteurs, pour courant alternatif



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2011 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

[IEC 62271-106:2011](http://www.iec.ch/online_news/justpub)

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: www.iec.ch/searchpub/cur_fut-f.htm

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: www.iec.ch/online_news/justpub

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: www.iec.ch/webstore/custserv/custserv_entry-f.htm

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: csc@iec.ch
Tél.: +41 22 919 02 11
Fax: +41 22 919 03 00



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**High-voltage switchgear and controlgear –
Part 106: Alternating current contactors, contactor-based controllers and motor-
starters**

**Appareillage à haute tension –
Partie 106: Contacteurs, combinés de démarrage à contacteurs et démarreurs de
moteurs, pour courant alternatif**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

CONTENTS

| | |
|--|--------|
| FOREWORD..... | 3 |
| 1 General..... | 5 |
| 2 Normal and special service conditions..... | 7 |
| 3 Terms and definitions | 7 |
| 4 Ratings | 19 |
| 5 Design and construction | 32 |
| 6 Type tests | 36 |
| 7 Routine tests..... | 57 |
| 8 Guide to the selection of contactors and motor-starters for service | 58 |
| 9 Information to be given with enquiries, tenders and orders | 62 |
| 10 Transport, storage, installation, operation and maintenance | 63 |
| 11 Safety | 63 |
| 12 Influence of the product on the environment..... | 63 |
| Annex A (normative) Records and reports of type tests for making, breaking and short-time current performance | 70 |
| Annex B (normative) Tolerances | 73 |
| Annex C (informative) List of symbols and abbreviations..... | 79 |
| Bibliography | 80 |
| Figure 1 – Examples of speed/time curves..... | 64 |
| Figure 2 – Test duties A and B – preferred earth point..... | 65 |
| Figure 3 – Test duties A and B – alternative earth point..... | 65 |
| Figure 4 – Test duty C – preferred earth point | 66 |
| Figure 5 – Test duty C – alternative earth point | 66 |
| Figure 6 – Representation by two parameters of a prospective TRV of a circuit..... | 67 |
| Figure 7 – Representation of the specified TRV by a two-parameter reference line and a delay line..... | 67 |
| Figure 8 – Determination of power frequency recovery voltage | 68 |
| Figure 9 – Characteristics for determining take-over current | 69 |
| Table 1 – Ratings and characteristics..... | 20 |
| Table 2 – Utilization categories | 26 |
| Table 3 – Characteristics dependent on starter type | 31 |
| Table 4 – Applicable type tests | 37 |
| Table 5 – Intermittent duty operating cycles..... | 40 |
| Table 6 – Verification of rated making and breaking capacities – Conditions for making and breaking corresponding to the several utilization categories at rated voltage U_r | 44 |
| Table 7 – Relationship between current broken I_C and OFF time..... | 47 |
| Table 8 – Overload current withstand requirements | 48 |
| Table 9 – Transient recovery voltage characteristics..... | 53 |
| Table 10 – Verification of the number of on-load operating cycles – Conditions for making and breaking corresponding to the several utilization categories | 55 |
| Table B.1 – Tolerances on test quantities for type test..... | 73 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

**Part 106: Alternating current contactors,
contactor-based controllers and motor-starters**

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62271-106 has been prepared by subcommittee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

This standard cancels and replaces the second edition of IEC 60470 published in 1999. It constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 60470:1999:

- Scope and object: The voltage range covered by the standard was expanded from 12 kV to 24 kV. Overload relay calibration and testing is not covered by this standard.
- 3 Terms and definitions: Added definitions for capacitor switching classes.
- 4.1 Rated voltage: Added 15, 17,5 and 24 kV as standard voltage values.
- 4.109.2 Starting duty of reduced-voltage starters: Added ratings for autotransformer and reactor starters (was in the testing section).

- 4.112 Rated capacitive switching currents: Added capacitor switching current ratings.
- 5.101 Protective relays: Removed the requirements for overload relays. This section is obsolete since there are only a few MV starters fitted with thermal overload relays and electronic relays have their own standards.
- 6.2.5 Application of the test voltage and test conditions (former 6.2.2 b)): Changed wording of requirement for impulse across the open gap of vacuum contactors.
- 6.4.2 Auxiliary circuits: The requirement for resistance checks of auxiliary circuits was deleted.
- 6.5.5.104 Temperature rise of the auto-transformer or reactor for two-step auto-transformer or reactor starters: Reworded to transfer ratings to subclause 4.109.2.
- 6.102.9 Condition following making and breaking tests: Gave specific direction as to what the tolerance should be based on where the resistance was to be checked.
- 6.104 Short-circuit current making and breaking tests: Clarified test conditions for short-circuit testing.
- 6.109 Capacitive current switching tests: Added capacitive current switching tests.
- Annex B: Added Table B.1 – Tolerances on test quantities for type test.

This standard is to be read in conjunction with IEC 62271-1:2007, to which it refers and which is applicable unless otherwise specified in this standard. In order to simplify the indication of corresponding requirements, the same numbering of clauses and subclauses is used as in IEC 62271-1. Amendments to these clauses and subclauses are given under the same references whilst additional subclauses are numbered from 101.

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

| | |
|-------------------------|------------------|
| FDIS IEC 62271-106:2011 | Report on voting |
| 17A/971/FDIS | 17A/976/RVD |

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

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

The list of all parts of the IEC 62271 series under the general title, *High-voltage switchgear and controlgear*, can be found on the IEC website.

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

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

The contents of the corrigendum of February 2014 have been included in this copy.

HIGH-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 106: Alternating current contactors, contactor-based controllers and motor-starters

1 General

1.1 Scope and object

This part of IEC 62271 is applicable to a.c. contactors and/or contactor-based controllers and motor-starters designed for indoor installation and operation at frequencies up to and including 60 Hz on systems having voltages above 1 000 V but not exceeding 24 000 V.

It is applicable only to three-pole devices for use in three-phase systems, and single-pole devices for use in single-phase systems. Two-pole contactors and starters for use in single-phase systems are subject to agreement between manufacturer and user.

Contactors and/or starters dealt with in this standard typically do not have adequate short-circuit interruption capability. In this context, this standard gives requirements for

- motor starters associated with separate short-circuit protective devices;
- controllers - contactors combined with short-circuit protective devices (SCPD).

Contactors intended for closing and opening electric circuits and, if combined with suitable relays, for protecting these circuits against operating overloads are covered in this standard.

This standard is also applicable to the operating devices of contactors and to their auxiliary equipment.

Motor-starters intended to start and accelerate motors to normal speed, to ensure continuous operation of motors, to switch off the supply from the motor and to provide means for the protection of motors and associated circuits against operating overloads are dealt with.

Motor-starter types included are

- direct-on-line starters;
- reversing starters;
- two-direction starters;
- reduced kVA (voltage) starters;
 - auto-transformer starters;
 - rheostatic starters;
 - reactor starters.

This standard does not apply to

- circuit-breaker-based motor-starters;
- single-pole operation of multi-pole contactors or starters;
- two-step auto-transformer starters designed for continuous operation in the starting position;
- unbalanced rheostatic rotor starters, i.e. where the resistances do not have the same value in all phases;

- equipment designed not only for starting, but also for adjustment of speed;
- liquid starters and those of the "liquid-vapour" type;
- semiconductor contactors and starters making use of semiconductor contactors in the main circuit;
- rheostatic stator starters;
- contactors or starters designed for special applications.

This standard does not deal with components contained in contactors and contactor-based motor-starters, for which individual specifications exist.

NOTE 1 Thermal electrical relays are covered by IEC 60255-8.

NOTE 2 High-voltage current-limiting fuses are covered by IEC 60282-1 and IEC 60644.

NOTE 3 Metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV are covered by IEC 62271-200.

NOTE 4 Disconnectors and earthing switches are covered by IEC 62271-102.

NOTE 5 High-voltage switches above 1 kV and less than 52 kV are covered by IEC 62271-103¹.

The object of this standard is to state

- a) the characteristics of contactors and starters and associated equipment;
- b) the conditions with which contactors or starters shall comply with reference to:
 - 1) their operation and behaviour,
 - 2) their dielectric properties, [IEC 62271-106:2011](http://standards.iteh.ai/catalog/standards/sist/9c4570e6-138-409-811-9b4d96e6e893/iec-62271-106-2011)
 - 3) the degrees of protection provided by their enclosures, where applicable,
 - 4) their construction,
 - 5) for controllers, interactions between the various components, for example SCPD co-ordination;
- c) the tests intended for confirming that these conditions have been met, and the methods to be adopted for these tests;
- d) the information to be given with the equipment or in the manufacturer's literature.

1.2 Normative references

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

IEC 60282-1, *High-voltage fuses – Part 1: Current-limiting fuses*

IEC 60417, *Graphical symbols for use on equipment*

IEC 60644, *Specification for high-voltage fuse-links for motor circuit applications*

IEC 62271-1:2007, *High-voltage switchgear and controlgear – Part 1: Common specifications*

IEC 62271-100:2008, *High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers*

¹ To be published

IEC 62271-102, *High-voltage switchgear and controlgear – Part 102: Alternating current disconnectors and earthing switches*

IEC 62271-200:2003, *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

2 Normal and special service conditions

2.1 Normal service conditions

Subclause 2.1 of IEC 62271-1 is applicable with the following addition:

For outdoor installations, refer to 8.102.6.

2.2 Special service conditions

Subclause 2.2 of IEC 62271-1 is applicable with the following exception:

2.2.1 Altitude

Subclause 2.2.1 of IEC 62271-1 is applicable with the following addition:

NOTE Above 1 000 m it is often necessary to make adjustments. See 8.102.7.

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in Clause 3 of IEC 62271-1, as well as the following, apply.

3.1 General terms and definitions

3.1.101

controlgear

general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended in principle for the control of electric energy consuming equipment

[IEC 60050-441:1984, 441-11-03]

3.1.102

over-current

current exceeding the rated current

[IEC 60050-441:1984, 441-11-06]

3.1.103

short-circuit current

over-current resulting from a short circuit due to a fault or an incorrect connection in an electric circuit

[IEC 60050-441:1984, 441-11-07]

iTeh STANDARD PREVIEW
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011>

**3.1.104
overload**

operating conditions in an electrically undamaged circuit, which cause an over-current

[IEC 60050-441:1984, 441-11-08]

**3.1.105
conductive part**

part which is capable of conducting current although it may not necessarily be used for carrying service current

[IEC 60050-441:1984, 441-11-09]

**3.1.106
ambient air temperature**

temperature, determined under prescribed conditions, of the air surrounding the complete switching device or fuse

NOTE For switching devices or fuses installed inside an enclosure, it is the temperature of the air outside the enclosure.

[IEC 60050-441:1984, 441-11-13]

3.2 Assemblies of switchgear and controlgear

Clause 3.2 of IEC 62271-1 applies

3.3 Parts of assemblies (standards.iteh.ai)

Clause 3.3 of IEC 62271-1 applies.

[IEC 62271-106:2011](#)

3.4 Switching devices

<https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011>

**3.4.101
switching device**

device designed to make or break the current in one or more electric circuits

[IEC 60050-441:1984, 441-14-01]

**3.4.102
mechanical switching device**

switching device (such as a contactor or a disconnector) designed to close and open one or more electric circuits by means of separable contacts

[IEC 60050-441:1984, 441-14-02, modified]

**3.4.103
disconnector**

mechanical switching device which provides, in the open position, an isolating distance in accordance with specified requirements

NOTE 1 A disconnector is capable of opening and closing a circuit either when negligible current is broken or made, or when no significant change in the voltage across the terminals of each of the poles of the disconnector occurs. It is also capable of carrying currents under normal circuit conditions and carrying for a specified time currents under abnormal conditions such as those of short circuit.

NOTE 2 A withdrawable contactor assembly may be used as a disconnector.

NOTE 3 In North America, this device is also called an isolating means or an isolating switch.

[IEC 60050-441:1984, 441-14-05, modified]

**3.4.104
earthing switch**

mechanical switching device for earthing parts of a circuit, capable of withstanding for a specified time currents under abnormal conditions such as those of short circuit, but not required to carry current under normal conditions of the circuit

NOTE An earthing switch may have a short-circuit making capacity.

[IEC 60050-441:1984, 441-14-11]

**3.4.105
contactor (mechanical)**

mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including operating overload conditions

NOTE Contactors may be designated according to the method by which the force for closing the main contacts is provided.

[IEC 60050-441:1984, 441-14-33]

**3.4.106
electromagnetic contactor**

contactor in which the force for closing or opening the main contacts is provided by an electromagnet

**3.4.107
vacuum contactor**

contactor in which the main contacts open and close within a highly evacuated envelope

**3.4.108
SF₆ contactor**

contactor in which the main contacts open and close within an SF₆ gas-filled compartment

**3.4.109
latched contactor**

contactor, the moving elements of which are prevented by means of a latching arrangement from returning to the position of rest when the operating means are de-energized

NOTE The latching, and the release of the latching, may be mechanical, electromagnetic, pneumatic, etc.

[IEC 60050-441:1984, 441-14-34, modified]

**3.4.110
starter**

combination of all the switching means necessary to start and stop a motor in combination with suitable overload protection

[IEC 60050-441:1984, 441-14-38, modified]

**3.4.110.1
direct-on-line starter**

starter which connects the line voltage across the motor terminals in one step

[IEC 60050-441:1984, 441-14-40]

**3.4.110.2
reversing starter**

starter intended to cause the motor to reverse the direction of rotation by reversing the motor primary connections even when the motor is running

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[IEC 62271-106:2011](https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011)

[https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-](https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011)

[9b4d96e6e893/iec-62271-106-2011](https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011)

3.4.110.3

two-direction starter

starter intended to cause the motor to reverse the direction of rotation by reversing the motor primary connections only when the motor is not running

3.4.110.4

reduced kVA (voltage) starter

starter which reduces the starting kVA of the motor

NOTE Reduced kVA starters may include auto-transformer, reactor, rheostatic starters.

3.4.110.5

auto-transformer starter

starter which uses one or more reduced voltages derived from an auto-transformer

3.4.110.6

rheostatic starter

starter utilizing one or several resistors for obtaining, during starting, stated motor torque characteristics and for limiting the current

NOTE A rheostatic starter generally consists of three basic parts, which may be supplied either as a composite unit or as separate units to be connected at the place of utilization:

- the mechanical switching devices for supplying the stator (generally associated with an overload protective device);
- the resistor(s) inserted in the rotor circuit;
- the mechanical switching devices for cutting out the resistor(s) successively.

[IEC 60050-441:1984, 441-14-42, modified]

3.4.110.7

rheostatic rotor starter

rheostatic starter for an asynchronous wound-rotor motor which, during the starting period, cuts out successively one or several resistors previously provided in the rotor circuit

[IEC 60050-441:1984, 441-14-43]

3.4.110.8

reactor starter

primary reactor starter

starter that includes a reactor connected in series with the stator winding of an alternating current motor to furnish reduced voltage for starting

3.4.110.9

electromagnetic starter

starter in which the force for closing the main contacts is provided by an electromagnet

3.4.110.10

***n*-step starter**

starter in which there are ($n - 1$) intermediate accelerating positions between the off and full on positions

NOTE 1 A starter in which there is no intermediate accelerating position between the OFF and ON positions is a single step or direct-on-line starter (see 3.4.110.1).

NOTE 2 A starter in which there is only one intermediate accelerating position between the OFF and ON positions is known as a two-step starter.

NOTE 3 A three-step rheostatic starter has two sections of resistors used for starting.

[IEC 60050-441:1984, 441-14-41, modified]

3.4.111 controller combination starter

equipment consisting of a contactor, overload protection, a manual externally operated disconnecter and a short-circuit protective device (SCPD), mounted and wired in a dedicated enclosure

NOTE 1 A dedicated enclosure is an enclosure specifically designed and dimensioned for its application, in which all tests are conducted, and which may also include an earthing function.

NOTE 2 A controller may be used for functions other than motor starting, for example transformer control and protection.

3.4.111.1 transformer controller

combination of all the switching means necessary to energize and de-energize a transformer in combination with suitable overload protection

3.4.111.2 capacitor controller

combination of all the switching means necessary to energize and de-energize a capacitor or capacitor bank in combination with suitable protection

3.4.112 short-circuit protective device SCPD

device intended to protect a circuit or parts of a circuit against short-circuit currents by interrupting them

[IEC 62271-106:2011](https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011)

NOTE Usually this function is provided by fuses.
<https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011>

3.4.113 contactor class C1

contactor with a low probability of restriking during capacitive current breaking as demonstrated by the type tests (see 4.112)

3.4.114 contactor class C2

contactor with a very low probability of restriking during capacitive current breaking as demonstrated by type tests (see 4.112)

3.5 Parts of contactors and motor starters

3.5.101 pole of a switching device

portion of a switching device associated exclusively with one electrically separated conducting path of its main circuit and excluding those portions which provide a means for mounting and operating all poles together

NOTE A switching device is called single-pole if it has only one pole. If it has more than one pole, it may be called multipole (two-pole, three-pole, etc.) provided the poles are or can be coupled in such a manner as to operate together.

[IEC 60050-441:1984, 441-15-01]

3.5.102 main circuit (of a switching device)

all the conductive parts of a switching device included in the circuit which it is designed to close or open

[IEC 60050-441:1984, 441-15-02]

3.5.103

control circuit (of a switching device)

all the conductive parts (other than the main circuit) of a switching device which are included in a circuit used for the closing operation or opening operation, or both, of the device

[IEC 60050-441:1984, 441-15-03]

3.5.104

auxiliary circuit (of a switching device)

all the conductive parts of a switching device which are intended to be included in a circuit other than the main circuit and the control circuits of the device

NOTE Some auxiliary circuits fulfil supplementary functions such as signalling, interlocking, etc., and, as such, they may be part of the control circuit of another switching device.

[IEC 60050-441:1984, 441-15-04]

3.5.105

main contact

contact included in the main circuit of a mechanical switching device, intended to carry, in the closed position, the current of the main circuit

[IEC 60050-441:1984, 441-15-07]

iTeh STANDARD PREVIEW

3.5.106

control contact

contact included in a control circuit of a mechanical switching device and mechanically operated by this device

[IEC 62271-106:2011](https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011)

[IEC 60050-441:1984, 441-15-09]

<https://standards.iteh.ai/catalog/standards/sist/9c4570e6-13f3-49f9-8d4c-9b4d96e6e893/iec-62271-106-2011>

3.5.107

auxiliary contact

contact included in an auxiliary circuit and mechanically operated by the switching device

[IEC 60050-441:1984, 441-15-10]

3.5.108

"a" contact

make contact

control or auxiliary contact which is closed when the main contacts of the mechanical switching device are closed and open when they are open

[IEC 60050-441:1984, 441-15-12]

3.5.109

"b" contact

break contact

control or auxiliary contact which is open when the main contacts of a mechanical switching device are closed and closed when they are open

[IEC 60050-441:1984, 441-15-13]

3.6 Operation

3.6.101

operation (of a mechanical switching device)

transfer of the moving contact(s) from one position to an adjacent position

NOTE 1 For a circuit-breaker, this may be a closing operation or an opening operation.

NOTE 2 If distinction is necessary, an operation in the electrical sense, e.g. make or break, is referred to as a switching operation, and an operation in the mechanical sense, e.g. close or open, is referred to as a mechanical operation.

[IEC 60050-441:1984, 441-16-01]

3.6.102

operating cycle (of a mechanical switching device)

succession of operations from one position to another and back to the first position through all other positions, if any

NOTE 1 This may be a closing operation followed by an opening operation.

NOTE 2 A succession of operations not forming an operating cycle is referred to as an operating series.

[IEC 60050-441:1984, 441-16-02, modified]

3.6.103

closing operation (of a mechanical switching device)

operation by which the device is brought from the open position to the closed position

[IEC 60050-441:1984, 441-16-08]

3.6.104

opening operation (of a mechanical switching device)

operation by which the device is brought from the closed position to the open position

[IEC 60050-441:1984, 441-16-09]

3.6.105

closed position (of a mechanical switching device)

position in which the predetermined continuity of the main circuit of the device is secured

[IEC 60050-441:1984, 441-16-22]

3.6.106

open position (of a mechanical switching device)

position in which the predetermined clearance between open contacts in the main circuit of the device is secured

[IEC 60050-441:1984, 441-16-23]

3.6.107

position of rest (of a contactor)

position which the moving elements of the contactor take up when its electromagnet or its compressed-air device is not energized

[IEC 60050-441:1984, 441-16-24]

3.6.108

overload relay or release

over-current relay or release intended for protection against overloads (including, where applicable, operating transformer(s) and interconnections)

3.6.109

thermal overload relay or release

inverse time-delay overload relay or release depending for its operation (including its time delay) on the thermal action of the current flowing in the relay or release