ICS 01.100.25

ISBN 0-626-12476-x

NRS 002:2000

Second edition

Rationalized User Specification

GRAPHICAL SYMBOLS FOR ELECTRICAL DIAGRAMS

Preferred requirements for applications in the Electricity Supply Industry

N R S

Gr 21

NRSNRSNRSNRSNRSNRSNRSNRSNRSNRSNRSNRS

This Rationalized User Specification is
issued by the NRS Project
on behalf of the
User Group given in the foreword
and is not a standard as contemplated in the Standards Act, 1993 (Act 29 of 1993).

Rationalized user specifications allow user organizations to define the performance and quality requirements of relevant equipment.

Rationalized user specifications may, after a certain application period, be introduced as national standards.

Amendments issued since publication

Amdt No.	Date	Text affected

Correspondence to be directed to

South African Bureau of Standards
(Electrotechnical Standards)
Private Bag X191
Pretoria 0001

Printed copies obtainable from

South African Bureau of Standards
Private Bag X191
Pretoria 0001

Telephone: (012) 428-7911
Fax: (012) 344-1568
E-mail: sales@sabs.co.za
Website: http://www.sabs.co.za

COPYRIGHT RESERVED

Printed on behalf of the NRS Project in the Republic of South Africa
by the South African Bureau of Standards
1 Dr Lategan Road, Groenkloof, Pretoria

Contents

Page

Foreword 4

Introduction 4

1 Scope 5

2 Normative references 5

3 Definitions 6

4 General 6

4.1 General structure 6
4.2 Terminology 7
4.3 Presentation of symbols 7
4.4 Numbering of symbols 7
4.5 Use of symbols 8

5 Symbols 9

5.1 Symbol elements, qualifying symbols and other symbols having general application 9

5.1.1 Symbol elements – Outlines and enclosures 9

5.1.2 Qualifying symbols 10

5.1.2.1 Types of current and voltage 10
5.1.2.2 Variability 12
5.1.2.3 Direction of force or motion 13
5.1.2.4 Direction of flow 14
5.1.2.5 Operational dependence on a characteristic quantity 15
5.1.2.6 Effect or dependence 16
5.1.2.7 Radiation 16
5.1.2.8 Signal waveforms 17

5.1.3 Other symbols having general application 17

5.1.3.1 Mechanical controls 17
5.1.3.2 Operating devices and methods 19
5.1.3.3 Control by non-electrical quantities 21
5.1.3.4 Earth and frame connections, equipotentiality 22
5.1.3.5 Miscellaneous 22

5.2 Conductors and connecting devices 24

5.2.1 Conductors 24
5.2.2 Terminals and connections of conductors 25
5.2.3 Connecting devices 27
5.2.4 Cable fittings 29

5.3 Passive components 29

5.3.1 Resistors 29
5.3.2 Capacitors 31
5.3.3 Inductors 31

Contents (continued)

Page

5.4 Semiconductor devices ... 32
5.4.1 Symbol elements ... 32
5.4.2 Qualifying symbols particular to semiconductor devices ... 35
5.4.3 Examples of semiconductor diodes ... 35
5.4.4 Examples of thyristors ... 36
5.4.5 Examples of transistors ... 37
5.4.6 Examples of photosensitive and magnetic field sensitive devices ... 39
5.5 Production and conversion of electrical energy ... 39
5.5.1 Qualifying symbols for winding interconnections ... 39
5.5.1.1 Separate windings ... 39
5.5.1.2 Internally connected windings ... 40
5.5.2 Machines ... 41
5.5.2.1 Elements of machines ... 41
5.5.2.2 Types of machines ... 41
5.5.2.3 Examples of direct current machines ... 42
5.5.2.4 Examples of alternating current commutator machines ... 42
5.5.2.5 Examples of synchronous machines ... 43
5.5.2.6 Examples of induction type (asynchronous) machines ... 43
5.5.3 Transformers and reactors ... 44
5.5.3.1 General symbols ... 45
5.5.3.2 Example of transformers with separate windings ... 46
5.5.3.3 Examples of auto-transformers ... 51
5.5.3.4 Examples of induction regulators ... 52
5.5.3.5 Examples of measuring transformers and pulse transformers ... 52
5.5.4 Power converters ... 54
5.5.5 Primary cells and accumulators ... 54
5.6 Switchgear, controlgear and protective devices ... 55
5.6.1 General ... 55
5.6.2 Contacts ... 55
5.6.2.1 Qualifying symbols ... 55
5.6.2.2 Contacts with two or three positions ... 56
5.6.2.3 Passing contacts with two positions ("fleeting" contacts) ... 57
5.6.2.4 Early and late operating contacts ... 57
5.6.2.5 Examples of contacts with intentional delay ... 58
5.6.2.6 Examples of spring-return and non-spring-return (stay put) contacts ... 59
5.6.3 Switches, switchgear and starters ... 59
5.6.3.1 Single-pole switches ... 60
5.6.3.2 Position and limit switches ... 60
5.6.3.3 Temperature-sensitive switches ... 61
5.6.3.4 Examples of multipole and multiposition switches ... 62
5.6.3.5 Block symbols for complex switches ... 65
5.6.3.6 Switchgear and controlgear ... 66
5.6.3.7 Block symbols for motor starters ... 67

Contents (concluded)

Page

5.6.4 Electromechanical all-or-nothing relays 68
5.6.5 Measuring relays and related devices 69
5.6.5.1 Block symbol and qualifying symbols 69
5.6.5.2 Examples of measuring relays 70
5.6.5.3 Other devices 72
5.6.6 Proximity and touch-sensitive devices 72
5.6.6.1 Sensors and detectors 72
5.6.6.2 Switches 73
5.6.7 Protective devices 73
5.6.7.1 Fuses and fuse switches 73
5.6.7.2 Gaps and arresters 74
5.7 Measuring instruments, lamps and signalling devices 75
5.7.1 Indicating, recording, integrating instruments and general symbols 75
5.7.2 Examples of indicating instruments 76
5.7.3 Examples of recording instruments 78
5.7.4 Examples of integrating instruments 78
5.7.5 Counting devices 80
5.7.6 Thermocouples 80
5.7.7 Telemetering devices 81
5.7.8 Electric clocks 81
5.7.9 Lamps and signalling devices 82
5.8 Architectural and topographical installation plans and diagrams 84
5.8.1 Generating stations and substations 84
5.8.1.1 General symbols 84
5.8.1.2 Specific types of generating stations and substations 85
5.8.2 Installations in buildings 86
5.8.2.1 Identification of specific conductors for schematic diagrams 86
5.8.2.2 Wiring for layout diagrams 86
5.8.2.3 Socket outlets for layout diagrams 87
5.8.2.4 Switches for layout diagrams 88
5.8.2.5 Lighting outlets and fittings for layout diagrams 89
5.8.2.6 Miscellaneous symbols for layout diagrams 90
5.8.3 Reticulation systems 91
Bibliography 95
General index 96

Foreword

This specification has been prepared by the NRS Project Management Agency for use in the Electricity Supply Industry in South Africa as a compilation of a subset of internationally accepted symbols: it has not been specifically approved by a technical committee or user group. It is intended to be a ready source of reference for the industry.

This second edition of NRS 002 has been prepared to incorporate amendments to the relevant parts of IEC 60617 that have been published since the first edition of NRS 002 was prepared.

The specific contribution of Dott Browse of Eskom in the compilation of this specification is acknowledged.

Comments are invited from interested parties and correspondence should be directed to the NRS Standardization Manager, c/o the Electrotechnical Standards Manager, SABS, Private Bag X191, Pretoria, 0001.

Introduction

The objective of this specification, which details preferred symbols for use on electrical diagrams and drawings, is to reduce the number of variations in symbols.

The numbering of symbols is in accordance with the IEC reference numbers.

In an attempt to establish a degree of uniformity and in order to standardize,

a) the choice of alternative symbols has been rationalized;

b) the letter "V" for voltage/volts is used throughout in preference to the alternative "U";

c) the symbol "θ" for temperature is used throughout in preference to the alternative "t";

d) a black dot, symbol 03-02-01, is used for all connections;

e) a small circle is used throughout to represent the hinge-point of symbols representing contacts and switchgear; and

f) the line representing the moving contact part of switchgear is drawn thicker than the other lines.

The symbols have been created in electronic format for use in a computer-aided design (CAD) cell library and are available, on disks, with this edition of NRS 002. The cells were developed in Microstation SE® and can be used with various drawing software packages through conversion.

The symbols have been selected from different parts of IEC 60617. The graphical symbols for diagrams used are those that are most common. Certain graphical symbols for reticulation system plans have been added.

SPECIFICATION

Graphical symbols for electrical diagrams

Preferred requirements for applications in the Electricity Supply Industry

1 Scope

This specification contains graphical symbols, typically for use in electrotechnical diagrams for heavy current equipment and associated control equipment.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this specification. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below. Information on currently valid national and international standards and specifications can be obtained from the South African Bureau of Standards.

IEC 60027-1:1995, *Letter symbols to be used in electrical technology – Part 1: General.*

IEC 60050:(all parts), *International Electrotechnical Vocabulary (IEV).*

IEC 60076-1:1993, *Power Transformers – Part 1: General.*

IEC 60375:1972, *Conventions concerning electric and magnetic circuits.*

IEC 60445:1988, *Identification of equipment terminals and of terminations of certain designated conductors, including general rules of an alphanumeric system.*

IEC 60617-2:1996, *Graphic symbols for diagrams – Part 2: Symbol elements, qualifying symbols and other symbols having general application.*

IEC 60617-8:1996, *Graphic symbols for diagrams – Part 8: Measuring instruments, lamps and signalling devices.*

IEC 60617-11:1966, *Graphic symbols for diagrams – Part 11: Architectural and topographical installation plans and diagrams.*

ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange.*

3 Definitions

For the purposes of this specification, the following definitions apply:

3.1 block symbol: A simple graphical symbol, representing an assembly of items and intended to indicate the function of the assembly, neither giving details about the items nor taking account of all connections.

NOTE Block symbols are generally used in diagrams where a single-line representation is applied. They may also be used in diagrams with all input connections shown.

3.2 general symbol: A symbol, usually simple, common to a whole family of items, and characteristic of that family.

3.3 graphical symbol: A figure, mark or character conventionally used on a diagram or other document to represent an item or a concept.

3.4 qualifying symbol: A symbol added to another to provide additional information.

NOTE 1 Qualifying symbols cannot normally be used on their own but a general symbol may sometimes be used for qualifying purposes. Thus the general symbol for an auto-transformer may be added to that for a motor starter to produce the symbol for an auto-transformer starter.

NOTE 2 The term "supplementary symbol" has been used in the past with the same meaning as qualifying symbol.

3.5 symbol element: A simple figure with a defined meaning, which has to be combined with other figures to form the complete symbol for a device or a concept.

For example, the symbol for a d.c. compound wound generator is assembled from symbol elements representing the machine, series and shunt field windings, bushes and terminals. When symbol elements are combined in this way, their arrangement is not necessarily related to the physical structure of the device symbolized.

4 General

4.1 General structure

Clause 5, which has the general heading *Symbols*, is structured as follows:

5.1 Symbol elements, qualifying symbols and other symbols having general application

It relates to outlines and enclosures, qualifying symbols for types of current and voltage, variability, direction of force, motion and flow, etc., mechanical controls, earth and frame connections.

5.2 Conductors and connecting devices

It relates to conductors, flexible, screened or twisted, coaxial, terminals, junctions, plugs, sockets and cable sealing ends.

5.3 Passive components

It relates to resistors, capacitors, inductors and delay lines.

5.4 Semiconductors

It relates to diodes, transistors and thyristors.

5.5 Production and conversion of electrical energy

It relates to windings, generators, motors, transformers and power converters.

5.6 Switchgear, controlgear and protective devices

It relates to contacts, switches, temperature-sensitive and touch-sensitive switches, proximity switches, switchgear and controlgear, motor starters, all-or-nothing relays, measuring relays, fuses, gaps and arresters.

5.7 Measuring instruments, lamps and signalling devices

It relates to indicating, integrating and recording instruments, thermocouples, telemetering devices, clocks, lamps, horns and bells.

5.8 Architectural and topographical installation plans and diagrams

It relates to generating stations, substations, conductors, wiring, socket outlets, switches, lighting outlets and fittings, light poles, ducts and water mains.

4.2 Terminology

Whenever possible, the names of the devices and concepts symbolized in this specification correspond to those used in IEC 60050.

4.3 Presentation of symbols

The symbols in this specification have been drawn to a size convenient for comprehension, but efforts have also been made to give them suitable sizes relative to each other. The symbols are laid out in such a way that the distance between connecting lines is a multiple of a certain modulus. The multiple of the modulus has been chosen to provide enough space for the usual terminal designations.

In most cases, the symbols are directly applicable on a diagram and they can be put on a grid in a CAD system (see Introduction).

Although the symbols are presented without a background grid, a grid was used in their preparation.

4.4 Numbering of symbols

Each symbol has a serial number, which is the same number as the corresponding symbol in IEC 60617. This number is composed of three groups:

a) the first group (two digits) identifies the part number of IEC 60617 in which that symbol is specified. Numbers for symbols not specified in any part of IEC 60617 start with the digits "00";

b) the second group (two digits) identifies the number of the section in that part; and

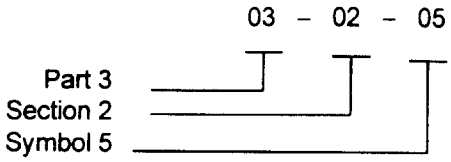
c) the third group (two digits) identifies the number of the symbol in that section.

Each one of these groups is separated from the next group by a hyphen.

In each part of IEC 60617, the sections are numbered from 01 to 99.

In each section, the symbols are numbered from 01 to 99 (not always consecutively, since some symbols of IEC 60617 have not been included).

Example:



Some symbols have serial numbers with a suffix, for example, "-A" or "-02A". This suffix identifies a symbol that does not appear in IEC 60617, but that is related to the symbols adjacent to it.

NOTE Such symbols are included because they are used at present, but their further use should be avoided if possible.

4.5 Use of symbols

The list of symbol elements, qualifying symbols and general symbols has been made as complete as possible, but only a limited number of examples of combined symbols are given. If the symbol for a particular device or design cannot be found in this specification, it should be possible to produce it by an appropriate combination of accompanying symbols or by further reference to IEC 60617.

The sizes of symbols relative to one another may be changed to suit the circumstances of a given diagram or application, for example different symbol sizes are often used for power transformers and measuring transformers. Also, if a symbol is used to qualify another, its size is often reduced. The relative proportions of the symbols should be retained when they are reduced or enlarged.

Different line thicknesses may be used for conductor symbols. The minimum size of symbol and line thickness shall conform to microfilm standards and shall be the minimum permitted by the reproduction method used, as in the case of technical publications.

Symbols may be turned or mirror-imaged if this does not affect their meaning. Unless otherwise stated, the orientation shown in this specification is not mandatory.

For clarity, symbols are usually shown with connecting lines. Unless otherwise stated, the arrangement shown is only one example of the ways in which connecting lines may be drawn.

Supplementary information can be added to most symbols. This specification gives examples of this practice only in those cases where there is a recommended method for the presentation of such information.

5 Symbols

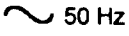
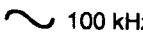
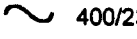
5.1 Symbol elements, qualifying symbols and other symbols having general application

5.1.1 Symbol elements – Outlines and enclosures

IEC No.	Symbol	Description	Remarks
02-01-01	Form 1 	Item Equipment Functional Unit	Suitable symbols or legends shall be inserted in or added to the symbol outline to indicate the item, equipment or function.
02-01-02	Form 2 		
02-01-03	Form 3 		
02-01-04	Form 1 	Envelope (tank) Enclosure	An outline of another shape may be used. If the enclosure has special protective features, attention may be drawn to these by a note. The use of the envelope symbol is optional. It may be omitted if no confusion will arise. The envelope shall be shown if there is a connection to it. If necessary, the envelope may be split.
02-01-05	Form 2 		
02-01-06		Boundary line	Used to indicate items associated physically, mechanically or functionally. Any combination of short and long strokes may be used.
02-01-07		Screen (shield)	The screen may be drawn in any convenient shape.

5.1.2 Qualifying symbols

5.1.2.1 Types of current and voltage

IEC No.	Symbol	Description	Remarks
02-02-03	Form 2	Direct current	Symbol 02-02-01 and 02-02-02 shall not be used.
02-02-04		Alternating current	The numerical value of the frequency or frequency range may be added at the right-hand side of the symbol.
02-02-05	 50 Hz	Alternating current of 50 Hz	
02-02-06	 100 kHz to 600 kHz	Alternate current of frequency range 100 kHz to 600 kHz	The voltage may also be indicated at the right-hand side of the symbol.
02-02-07	3/N  400/230 VHz	Alternating current: three-phase with neutral, 50 Hz, 400 V (230 V between phase and neutral) 3N may be replaced by 3 + N	The number of phases and the presence of a neutral may be indicated at the left-hand side of the symbol.

5.1.2.1 (concluded)

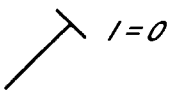
IEC No.	Symbol	Description	Remarks
02-02-09		Alternating current, different frequency ranges The following symbols may be used when it is necessary on a given drawing to distinguish between the different frequency ranges. Relatively low frequencies (example: power frequencies or sub-audio frequencies)	
02-02-10		Medium frequencies (example: audio)	
02-02-11		Relatively high frequencies (example: super audio, carrier and radio frequencies)	
02-02-13	+	Positive polarity	
02-02-14	—	Negative polarity	
02-02-15	N	Neutral	
02-02-16	M	Mid-wire	

5.1.2.2 Variability

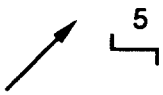
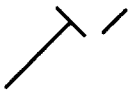
Variability is non-inherent when the variable quantity is controlled by an external device, for example, when the resistance is controlled by a regulator.

Variability is inherent when the variable quantity depends on qualities of the device itself, for example, when the resistance changes with change of voltage or with change of temperature.

The sign for variability should be drawn across the main symbol at about 45° to the centre line of the symbol.

IEC No.	Symbol	Description	Remarks
02-03-01		Variability, non-inherent	
02-03-02		Variability, non-inherent, non-linear	
02-03-03		Variability, inherent	Information on the controlling quantity, e.g. voltage or temperature, may be shown near the symbol.
02-03-04		Variability, inherent, non-linear	The remark on symbol 02-03-03 applies.
02-03-05		Pre-set adjustment	Information on the conditions under which adjustment is permitted may be shown near the symbol.
02-03-06		Pre-set adjustment permitted only at zero current	

5.1.2.2 (concluded)

IEC No.	Symbol	Description	Remarks
02-03-07		Variability in steps Stepping action	A figure indicating the number of steps may be added.
02-03-08		Variability, non-inherent in five steps	
02-03-09		Continuous variability	
02-03-10		Pre-set adjustment, continuously variable	

5.1.2.3 Direction of force or motion

An arrow may be used to indicate the direction in which the movable part of a symbol has to move to give a required effect (see, for example, symbol 02-04-02).

An arrow may also indicate the direction of a force or the direction of motion of the physical part symbolized. In such cases, a note to indicate the viewpoint may be required.

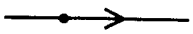
The effect caused by movement may be explained by means of symbols or text.

IEC No.	Symbol	Description	Remarks
02-04-01		Rectilinear force or motion in the direction of the arrow	
02-04-02		Bidirectional rectilinear force or motion Frequency is increased when wiper 3 is moved towards terminal 2	
02-04-03		Unidirectional rotation in the direction of the arrow, e.g. clockwise	

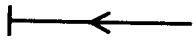
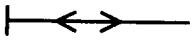
5.1.2.3 (concluded)

IEC No.	Symbol	Description	Remarks
02-04-04		Bidirectional rotation	
02-04-05		Bidirectional rotation, limited in both directions	
02-04-06		Reciprocating motion	

5.1.2.4 Direction of flow

IEC No.	Symbol	Description	Remarks
02-05-01		Propagation, energy flow, signal flow, one way, e.g. of energy, signal, information	
02-05-02		Propagation, both ways, simultaneously Simultaneous transmission and reception	
02-05-03		Propagation, both ways, not simultaneously Alternate transmission and reception	
02-05-04		Transmission	The dot may be omitted if the sense is unambiguously given by the arrowhead in combination with the symbol to which it is applied.
02-05-05		Reception	The dot may be omitted if the sense is unambiguously given by the arrowhead in combination with the symbol to which it is applied.

5.1.2.4 (concluded)

IEC No.	Symbol	Description	Remarks
02-05-06		Energy flow from the busbars	
02-05-07		Energy flow towards the busbars	
02-05-08		Bidirectional energy flow	

5.1.2.5 Operational dependence on a characteristic quantity

IEC No.	Symbol	Description	Remarks
02-06-01	$>$	Operating when the characteristic quantity is higher than the setting value	
02-06-02	$<$	Operating when the characteristic quantity is lower than the setting value	
02-06-03	$\gtrless$	Operating when the characteristic quantity is either higher than a given high setting or lower than a given low setting	
02-06-04	$= 0$	Operating when the value of the characteristic quantity becomes zero	
02-06-05	≈ 0	Operating when the value of the characteristic quantity differs from zero by an amount that is very small compared with the normal value	

5.1.2.6 Effect or dependence

IEC No.	Symbol	Description	Remarks
02-08-01		Thermal effect	
02-08-02		Electromagnetic effect	
02-08-04		Magnetic field effect or dependence	
02-08-05		Delay	

5.1.2.7 Radiation

Arrows pointing towards a symbol denote that the device symbolized will respond to incident radiation of the indicated type.

Arrows pointing away from a symbol denote the emission of the indicated type of radiation by the device symbolized.

Arrows located within a symbol denote a self-contained radiation source.

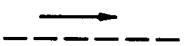
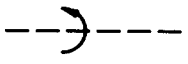
IEC No.	Symbol	Description	Remarks
02-09-01		Radiation, non-ionizing, electromagnetic (e.g. radio waves, visible light or light emission)	
02-09-02		Coherent radiation, non-ionizing (e.g. coherent light)	

5.1.2.8 Signal waveforms

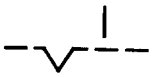
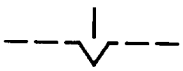
IEC No.	Symbol	Description	Remarks
02-10-01		Positive-going pulse	
02-10-02		Negative-going pulse	
02-10-03		Pulse of alternating current	
02-10-04		Positive-going step function	
02-10-05		Negative-going step function	
02-10-06		Sawtooth wave	

5.1.3 Other symbols having general application

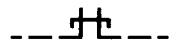
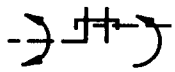
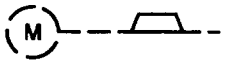
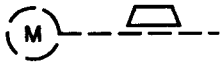
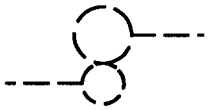
5.1.3.1 Mechanical controls

IEC No.	Symbol	Description	Remarks
02-12-01	Form 1	Mechanical connection (link) Pneumatic connection (link) Hydraulic connection (link)	
02-12-02		Mechanical connection with indication of force or motion	
02-12-03		Mechanical connection with indication of direction of rotation	The arrow is assumed to be placed in front of the connection symbol.
02-12-04	Form 2		Symbol 02-12-04 is to be used if the space is too restricted to permit the use of 02-12-01.

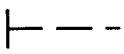
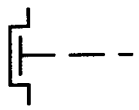
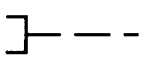
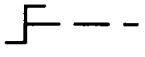
5.1.3.1 (continued)

IEC No.	Symbol	Description	Remarks
02-12-05 02-12-06	Form 1  Form 2 	Delayed action	Delayed action in the direction of movement from the arc towards its centre ("Parachute" effect).
02-12-07		Automatic return	The triangle is pointed in the return direction.
02-12-08		Detent Non-automatic return Device for maintaining a given position	
02-12-09		Detent, disengaged	
02-12-10		Detent, engaged	
02-12-11		Mechanical interlock between two devices	
02-12-12		Latching device, disengaged	
02-12-13		Latching device, engaged	
02-12-14		Blocking device	
02-12-15		Blocking device engaged, movement to the left is blocked	
02-12-16		Clutch Mechanical coupling	

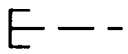
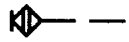
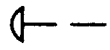
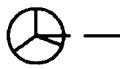
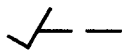
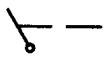
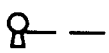
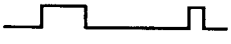
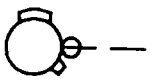
5.1.3.1 (concluded)

IEC No.	Symbol	Description	Remarks
02-12-17		Mechanical coupling, disengaged	
02-12-18		Mechanical coupling, engaged	
02-12-19		Bidirectional and rotating coupling devices (free wheel)	
02-12-20		Brake	
02-12-21		Electric motor with brake applied	
02-12-22		Electric motor with brake released	
02-12-23		Gearing	

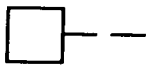
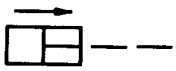
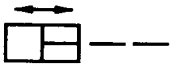
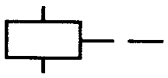
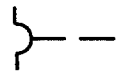
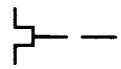
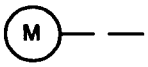
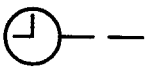
5.1.3.2 Operating devices and methods

IEC No.	Symbol	Description	Remarks
02-13-01		Manually operated control, general case	
02-13-02		Manually operated control with restricted access	
02-13-03		Operated by pulling	
02-13-04		Operated by turning	

5.1.3.2 (continued)

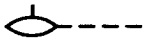
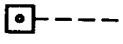
IEC No.	Symbol	Description	Remarks
02-13-05		Operated by pushing	
02-13-06		Operated by proximity effect	
02-13-07		Operated by touching	
02-13-08		Emergency switch (mushroom-head safety feature)	
02-13-09		Operated by handwheel	
02-13-10		Operated by pedal	
02-13-11		Operated by lever	
02-13-12		Operated by removable handle	
02-13-13		Operated by key	
02-13-14		Operated by crank	
02-13-15		Operated by roller	
02-13-16		Operated by cam	If desired, a more detailed drawing of the cam may be shown. This applies also to a profile plate.
02-13-17		Cam profile	
02-13-18		Profile plate Cam profile (developed representation)	
02-13-19		Operated by cam and roller	

5.1.3.2 (concluded)

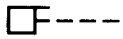
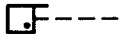
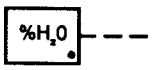
IEC No.	Symbol	Description	Remarks
02-13-20		Operated by stored mechanical energy	Information showing the form of stored energy may be added in the square.
02-13-21		Operated by pneumatic or hydraulic control, single acting	
02-13-22		Operated by pneumatic or hydraulic control, double acting	
02-13-23		Operated by electromagnetic actuator	
02-13-24		Operated by electromagnetic over-current protection	
02-13-25		Operated by thermal actuator, e.g. thermal relay, thermal over-current protection	
02-13-26		Operated by electric motor	
02-13-27		Operated by electric clock	

5.1.3.3 Control by non-electrical quantities

Letter symbols from IEC 60027-1 may be used to denote operating quantities other than those shown below (for example, pressure or speed). They should be enclosed in a rectangle if ambiguity could otherwise arise.

IEC No.	Symbol	Description	Remarks
02-14-01		Control by fluid level	
02-14-02		Control by number of events Control by a counter	

5.1.3.3 (concluded)

IEC No.	Symbol	Description	Remarks
02-14-03		Control by flow	
02-14-04		Control by gas flow	
02-14-05		Control by relative humidity	

5.1.3.4 Earth and frame connections, equipotentiality

IEC No.	Symbol	Description	Remarks
02-15-01		Earth	General symbol. Supplementary information may be given to define the status or the purpose of the earth if this is not readily apparent.
02-15-02		Noiseless earth	
02-15-04		Frame Chassis	

5.1.3.5 Miscellaneous

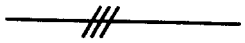
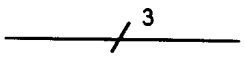
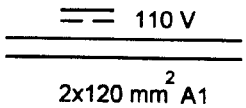
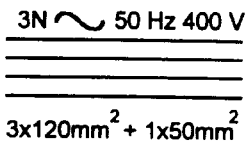
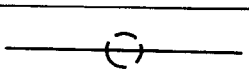
IEC No.	Symbol	Description	Remarks
02-17-01		Fault (indication of assumed fault location)	
02-17-02		Flashover Breakthrough	
02-17-03		Permanent magnet	

5.1.3.5 (concluded)

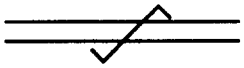
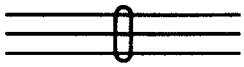
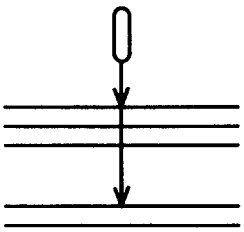
IEC No.	Symbol	Description	Remarks
02-17-04		Moving (e.g. sliding) contact	
02-17-05		Test point indicator	
02-17-06		Changer Converter	General symbol. If the direction of change is not obvious, it may be indicated by an arrow-head on the outline of the symbol, e.g. see symbol 06-14-06. A symbol or legend indicating the input or output quantity, waveform, etc., may be inserted in each half of the general symbol to show the nature of the change (see 5.5). The diagonal line from this symbol is used in the form of a solidus to show a converting function.
02-17-08		Identifier of analogue signals	The symbol shall be used only when it is necessary to distinguish between analogue and digital signals.
02-17-09		Identifier of digital signals	Digital. This symbol shall be used only when it is necessary to distinguish between digital and other forms of signals and connections See also clause 1 in ISO/IEC 646.

5.2 Conductors and connecting devices

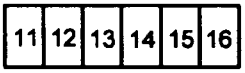
5.2.1 Conductors

IEC No.	Symbol	Description	Remarks
03-01-01		Conductor Group of conductors Line Cable Circuit Transmission path	Single-line representation of conductors. When a single line represents a group of conductors, their number may be indicated by adding either small strokes or one stroke and a figure.
03-01-02	Form 1 	*Example:* Three conductors	Additional information may be indicated as follows: *Above the line:* type of current, system of distribution, frequency and voltage.
03-01-03	Form 2 		*Below the line:* the number of conductors of the circuit followed by a multiplication sign and the cross-sectional area of each conductor. If different sizes of conductors are used, their particulars should be separated by a plus sign. The conductor material may be indicated by its chemical symbol.
03-01-04		*Examples:* Direct current circuit, 110 V, two aluminium conductors of 120 mm²	
03-01-05		Three-phase circuit, 50 Hz, 400 V, three conductors of 120 mm² with neutral of 50 mm²	
03-01-06		Flexible conductor	
03-01-07		Screened conductor	

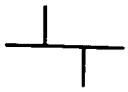
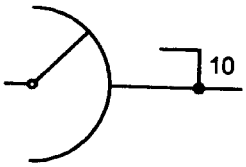
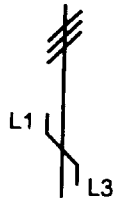
5.2.1 (concluded)

IEC No.	Symbol	Description	Remarks
03-01-08		Twisted conductors, two conductors shown	
03-01-09		Conductors in a cable, three conductors shown	
03-01-10		*Example:* Two conductors out of five in a cable	If several conductors are in a cable (or twisted together or in a screen) but the lines representing them on a diagram are not adjacent to each other, the method shown below may be used.
03-01-11		Coaxial pair	If the coaxial structure is not maintained, the tangential line should be drawn on the coaxial side only.
03-01-12		*Example:* Coaxial pair connected to terminals	
03-01-13		Coaxial pair with screen	

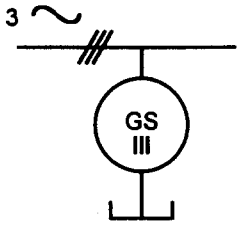
5.2.2 Terminals and connections of conductors

IEC No.	Symbol	Description	Remarks
03-02-01	•	Connection of conductors	
03-02-02	o	Terminal	Used on schematic and key diagrams.
03-02-03	 	Terminal strip (examples shown with terminal markings) Terminal markings may be added	Used on wiring and cabling diagrams.

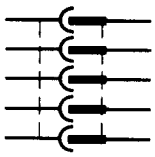
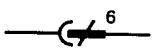
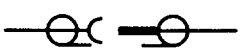
5.2.2 (continued)

IEC No.	Symbol	Description	Remarks
03-02-04		T- connection	
03-02-05		Symbol 03-02-04 shown with junction symbol	Other than at a terminal.
03-02-06		Junction of conductors at a terminal	
03-02-07	Form 1 	Double junction of conductors	Other than at a terminal.
03-02-08	Form 2 	Form 2 shall only be used if required by layout considerations	
03-02-09		Connection common to a group of similar items "n" shall be replaced by the total number of circuits	The total number of similar items may be indicated by a figure near the common connection symbol.
03-02-10		*Example:* Multiplied uniselector banks shown for 10 banks	Deleted. Transferred to annex A: 03-A1-02 (see IEC 60617)
03-02-11		Interchange of conductors, change of phase sequence or inversion of polarity, shown for n conductors in single-line representation	The interchanged conductors may be indicated.
03-02-12		*Example:* Change phase of sequence	For the identification of the conductors, IEC 60445 applies.

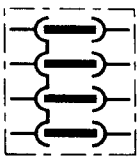
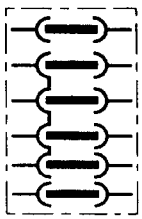
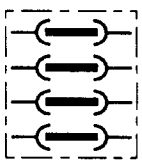
5.2.2 (concluded)

IEC No.	Symbol	Description	Remarks
03-02-13		Neutral point Point at which multiple conductors are connected together to form the neutral point in a multiphase system	
03-02-14		*Example:* Synchronous generator, three-phase, both leads of each phase brought out, shown with external neutral point	

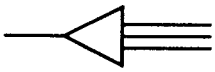
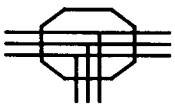
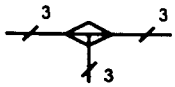
5.2.3 Connecting devices

IEC No.	Symbol	Description	Remarks
03-03-01		Socket (female) Pole of a socket	
03-03-03		Pole of a plug Plug (male)	
03-03-05		Plug and socket (male and female)	
03-03-07		Multipole plug and socket, shown with six poles: multi-line representation	
03-03-08		Single-line representation	
03-03-15		Coaxial plug and socket	If the coaxial plug or socket is connected to a coaxial pair, the tangential line(s) should be appropriately extended.

5.2.3 (concluded)

IEC No.	Symbol	Description	Remarks
03-03-17	Form 1 	Connecting link, closed	
03-03-46	Form 2 	Connecting link, open	Vertical representation. Horizontal representation.
03-03-47			
03-03-20		Plug and socket type connector, e.g. U-link: male-male *Example of test blocks:*	
03-03-48		Four-way test block with auxiliary short-circuiting contacts	Used in current transformer circuits.
03-03-49		Six-way test block with auxiliary short-circuiting contacts on four of the ways	Used in current transformer circuits.
03-03-50		Four-way test block	Used in voltage circuits. The dotted lines drawn between the socket symbol examples denote an auxiliary short-circuiting device that operates on the withdrawal of the plug from the socket.

5.2.4 Cable fittings

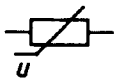
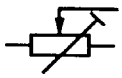
IEC No.	Symbol	Description	Remarks
03-04-01		Cable sealing end, shown with one three-core cable	Multi-line representation.
03-04-50			Single-line representation.
03-04-03		Straight-through joint box, shown with three conductors	Multi-line representation.
03-04-04			Single-line representation.
03-04-05		Junction box, shown with three conductors with T-connections	Multi-line representation.
03-04-06			Single-line representation.

5.3 Passive components

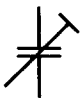
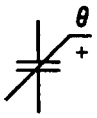
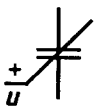
5.3.1 Resistors

IEC No.	Symbol	Description	Remarks
04-01-01		Resistor	General symbol.
04-01-03		Variable resistor Adjustable resistor	
04-01-04		Voltage dependent resistor Varistor (Resistor with inherent non-linear variability, voltage dependent)	Metrosil.

5.3.1 (concluded)

IEC No.	Symbol	Description	Remarks
04-01-49		Temperature dependent resistor with negative resistance-temperature coefficient	Thermistor.
04-01-50		Temperature dependent resistor with positive resistance-temperature coefficient	Ballast resistor. Vertical representation.
04-01-05		Resistor with sliding contact	
04-01-06		Resistor with sliding contact and off-position	
04-01-07		Potentiometer with sliding contact	
04-01-08		Potentiometer, pre-set	
04-01-09		Resistor with fixed tappings (taps), two shown	
04-01-10		Shunt Resistor with separate current and voltage terminals	
04-01-11		Carbon-pile resistor	
04-01-12		Heating element	

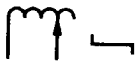
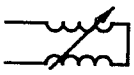
5.3.2 Capacitors

IEC No.	Symbol	Description	Remarks
04-02-01		Capacitor	General symbol.
04-02-03		Lead-through capacitor Feed-through capacitor	
04-02-05		Polarized capacitor, e.g. electrolytic	
04-02-07		Variable capacitor Adjustable capacitor	
04-02-09		Capacitor with pre-set adjustment	
04-02-15		Temperature dependent polarized capacitor, where deliberate use is made of the temperature coefficient, e.g. ceramic capacitor	
04-02-16		Voltage dependent polarized capacitor where deliberate use is made of the voltage dependent characteristic, e.g. semiconductor capacitor	

5.3.3 Inductors

IEC No.	Symbol	Description	Remarks
04-03-01		Inductor Coil Winding Choke NOTE If it is desired to show that the inductor has a magnetic core, a single line may be annotated to indicate non-magnetic materials and it may be interrupted to indicate a gap in the core	For transformer windings, see 5.5.
04-03-03		*Examples:* Inductor with magnetic core	
04-03-04		Inductor with gap in magnetic core	

5.3.3 (concluded)

IEC No.	Symbol	Description	Remarks
04-03-05		Continuously variable inductor, shown with magnetic core	
04-03-06		Inductor with fixed tappings, two shown	
04-03-07		Inductor with moving contact, variable in steps	
04-03-08		Variometer	

5.4 Semiconductor devices

5.4.1 Symbol elements

IEC No.	Symbol	Description	Remarks
05-01-01		Semiconductor region with one ohmic connection	The horizontal line is the semiconductor region and the vertical line is the ohmic connection.
05-01-02	Form 1 	Semiconductor region with several ohmic connections, example shown with two ohmic connections	
05-01-03	Form 2 		
05-01-04	From 3 		
05-01-05		Conduction channel for depletion type devices	
05-01-06		Conduction channel for enhance-ment devices	
05-01-07		Rectifying junction	

5.4.1 (continued)

IEC No.	Symbol	Description	Remarks
		Junction than influences a semi-conductor layer by means of an electric field, e.g. in a junction field effect transistor	
05-01-09		P-region that influences an N-layer	
05-01-10		N-region that influences a P-layer	
		Indication of the conductivity type of the channel for insulated gate field effect transistors (IGFETS)	
05-01-11		N-type channel on a P-type substrate, shown for a depletion type IGFET	
05-01-12		P-type channel on an N-type substrate, shown for an enhance-ment type IGFET	
05-01-13		Insulated gate	For an example with multi-ple gates, see symbol 05-05-17.
		Emitter on a region of dissimilar conductivity type	
05-01-14		P-emitter on N-region	The slanting line with arrow represents the emitter.
05-01-15		Several P-emitters on N-region	
05-01-16		N-emitter on P-region	
05-01-17		Several N-emitters on P-region	

5.4.1 (concluded)

IEC No.	Symbol	Description	Remarks
05-01-18		Collector on a region of dissimilar conductivity type	The slanting line represents the collector.
05-01-19		Several collectors on a region of dissimilar conductivity type	
05-01-20		Transition between regions of dissimilar conductivity types, either P to N, or N to P	The short slanting line indicates the point of change along the horizontal from P to N, or from N to P. No ohmic connection shall be made to the short slanting line.
05-01-21		Intrinsic region separating regions of dissimilar conductivity type thus giving either a PIN or a NIP structure	The intrinsic region lies between the linked slanting lines. Any ohmic connection to the region 1 shall be made between the short slanting lines and not to them.
05-01-22		Intrinsic region between regions of similar conductivity type giving either a PIP or a NIN structure	
05-01-23		Intrinsic region between a collector and a region of dissimilar conductivity type giving either a PIN or a NIP structure	The connection to the collector is made to the long slanting line.
05-01-24		Intrinsic region between a collector and a region of similar conductivity type giving either a PIP or a NIN structure	

5.4.2 Qualifying symbols particular to semiconductor devices

If necessary, a special function or property essential for circuit operation may be indicated by a qualifying symbol placed adjacent to, or forming part of the symbol of, the device.

IEC No.	Symbol	Description	Remarks
05-02-01		Schottky effect	
05-02-02		Tunnel effect	
05-02-03		Unidirectional breakdown effect	
05-02-04		Bidirectional breakdown effect	
05-02-05		Backward effect (unitunnel effect)	

5.4.3 Examples of semiconductor diodes

IEC No.	Symbol	Description	Remarks
05-03-01		Semiconductor diode	General symbol.
05-03-02		Light-emitting diode (LED)	General symbol. See also symbol 08-10-01.
05-03-03		Temperature testing diode Diode where use is made of its temperature dependence	
05-03-04		Variable capacitance diode	Varactor.
05-03-05		Tunnel diode	
05-03-06		Breakdown diode, unidirectional Voltage regulator diode	Esaki diode. Zener diode.
05-03-07		Breakdown diode, bidirectional	

5.4.3 (concluded)

IEC No.	Symbol	Description	Remarks
05-03-08		Backward diode	Unitunnel diode.
05-03-09		Bidirectional diode	Diac. Varistor.

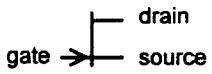
5.4.4 Examples of thyristors

IEC No.	Symbol	Description	Remarks
05-04-01		Reverse blocking diode thyristor	
05-04-02		Reverse conducting diode thyristor	
05-04-03		Bidirectional diode thyristor	Diac.
05-04-04		Triode thyristor, type unspecified	This symbol is used to represent a reverse blocking triode thyristor, if it is not necessary to specify the type of gate.
05-04-05		Reverse blocking triode thyristor, N-gate	Anode-side controlled.
05-04-06		Reverse blocking triode thyristor, P-gate	Cathode-side controlled.
05-04-07		Turn-off triode thyristor, gate not specified	
05-04-08		Turn-off triode thyristor, N-gate	Anode-side controlled.
05-04-09		Turn-off triode thyristor, P-gate	Cathode-side controlled.
05-04-10		Reverse blocking thyristor, tetrode type	
05-04-11		Bidirectional triode thyristor	Triac.

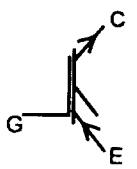
5.4.4 (concluded)

IEC No.	Symbol	Description	Remarks
05-04-12		Reverse conducting triode thyristor, gate not specified	
05-04-13		Reverse conducting triode thyristor, N-gate	Anode-side controlled.
05-04-14		Reverse conducting triode thyristor, P-gate	Cathode-side controlled.

5.4.5 Examples of transistors

IEC No.	Symbol	Description	Remarks
05-05-01		PNP transistor	
05-05-02		NPN transistor with collector connected to the envelope	
05-05-03		NPN avalanche transistor	
05-05-04		Unijunction transistor with P-type base	
05-05-05		Unijunction transistor with N-type base	
05-05-06		NPN transistor with transverse biased base	
05-05-07		PNIP transistor with ohmic connection to the intrinsic region	
05-05-08		PNIN transistor with ohmic connection to the intrinsic region	
05-05-09		Junction field effect transistor with N-type channel	The gate and source connections shall be drawn in line. 

5.4.5 (concluded)

IEC No.	Symbol	Description	Remarks
05-05-10		Junction field effect transistor with P-type channel	
05-05-11		IGFET, enhancement type, single gate, P-type channel without substrate connection	For an example with multiple gates, see symbol 05-05-17.
05-05-12		IGFET, enhancement type, single gate, N-type channel without substrate connection	
05-05-13		IGFET, enhancement type, single gate, P-type channel with substrate connection brought out	
05-05-14		IGFET, enhancement type, single gate, N-type channel with substrate internally connected to source	
05-05-15		IGFET, depletion type, single gate, N-type channel without substrate connection	
05-05-16		IGFET, depletion type, single gate, P-type channel without substrate connection	
05-05-17		IGFET, depletion type with two gates, N-type channel with sub-strate connection brought out	In the case of multiple gates, the primary gate and the source connection shall be drawn in line.
05-05-18		Insulated gate bipolar transistor (IGBT), enhancement type, P-channel	The letters E, G and C which represent the ter-minal names "emitter", "gate", and "collector" res-pectively, may be omitted unless confusion is likely.

5.4.6 Examples of photosensitive and magnetic field sensitive devices

IEC No.	Symbol	Description	Remarks
05-06-01		Light dependent resistor Photoconductive device with asymmetrical conductivity	
05-06-02		Photodiode Photoconductive device with symmetrical conductivity	
05-06-03		Photovoltaic cell	
05-06-04		Phototransistor, PNP type shown	

5.5 Production and conversion of electrical energy

5.5.1 Qualifying symbols for winding interconnections

5.5.1.1 Separate windings

IEC No.	Symbol	Description	Remarks
06-01-01		One winding	The number of separate windings should be indicated: - either by the number of strokes drawn, or - by adding a figure to the symbol.
06-01-02		*Examples:* Three separate windings	Symbol 06-01-01 may also be used to represent windings that can be externally connected in various ways.
06-01-03		Six separate windings	
06-01-04		*Examples:* Three-phase winding, phases not interconnected	
06-01-05		*m*-phase winding, phases not interconnected	
06-01-06		Two-phase winding, four-wire	

5.5.1.2 Internally connected windings

The method of connecting transformer windings may also be indicated by codes (see IEC 60076-1).

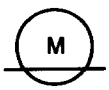
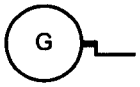
IEC No.	Symbol	Description	Remarks
06-02-05		Three-phase winding, delta	This symbol may be used to symbolize a multiphase polygon connection of windings by adding a figure to denote the number of phases.
06-02-06		Three-phase winding, open delta	
06-02-07		Three-phase winding, star	This symbol may be used to symbolize a multiphase star connection of windings by adding a figure to denote the number of phases.
06-02-08		Three-phase winding, star, with neutral brought out	
06-02-09		Three-phase winding, zigzag or interconnected star	
06-02-10		Six-phase winding, double delta	
06-02-11		Six-phase winding, polygon	
06-02-12		Six-phase winding, star	
06-02-13		Six-phase winding, fork with neutral brought out	

5.5.2 Machines

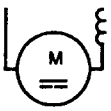
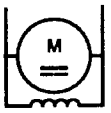
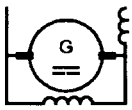
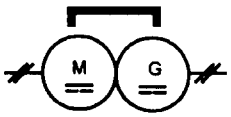
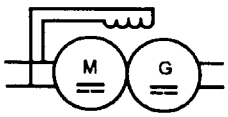
5.5.2.1 Elements of machines

IEC No.	Symbol	Description	Remarks
		Differentiation between windings having different functions	
06-03-01		Commutating or compensating winding	
06-03-02		Series winding	
06-03-03		Shunt winding or separate winding	
06-03-04		Brush (on slip ring or commutator)	Brushes are shown only if necessary. For example of application, see symbol 06-05-03.

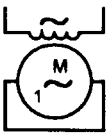
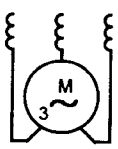
5.5.2.2 Types of machines

IEC No.	Symbol	Description	Remarks
06-04-01		Machine The asterisk* shall be replaced by a letter designation as follows: C: Rotary converter G: Generator GS: Synchronous generator M: Motor MG: Machine capable of use as a generator or motor MS: Synchronous motor	General symbol. Symbol 02-02-04 may be added, as shown in 5.1.2.1.
06-04-02		Linear motor	General symbol.
06-04-03		Stepping motor	General symbol.
06-04-04		Hand generator (magneto caller)	

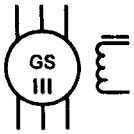
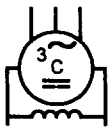
5.5.2.3 Examples of direct current machines

IEC No.	Symbol	Description	Remarks
06-05-01		Series motor, DC	
06-05-02		Shunt motor, DC	
06-05-03		Generator, DC, compound excited (short shunt), shown with terminals and brushes	
06-05-04		Rotary converter, d.c. to d.c. with common permanent magnet field	
06-05-05		Rotary converter, d.c. to d.c. with common field winding	Rotary converter, d.c. to d.c. with common exitation winding.

5.5.2.4 Examples of alternating current commutator machines

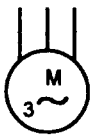
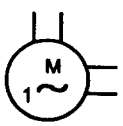
IEC No.	Symbol	Description	Remarks
06-06-01		Series motor, single-phase	
06-06-02		Repulsion motor, single-phase	
06-06-03		Series motor, three-phase	

5.5.2.5 Examples of synchronous machines

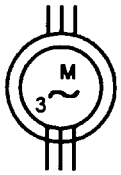
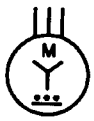
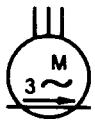
IEC No.	Symbol	Description	Remarks
06-07-01		Synchronous generator, three-phase, permanent magnet	
06-07-02		Synchronous motor, single-phase	
06-07-03		Synchronous generator, three-phase, star-connected, with neutral brought out	
06-07-04		Synchronous generator, three-phase, both leads of each phase winding brought out	
06-07-05		Synchronous rotary converter, three-phase, shunt excited	

5.5.2.6 Examples of induction type (asynchronous) machines

The general symbol for a machine (06-04-01) should be used to represent an asynchronous machine if no external connections to the rotor exist, for example, in a squirrel cage motor. An inner circle, representing the rotor, should be shown in those cases where external connections exist (see, for example, symbol 06-08-03).

IEC No.	Symbol	Description	Remarks
06-08-01		Induction motor, three-phase, squirrel cage	
06-08-02		Induction motor, single-phase, squirrel cage	

5.5.2.6 (concluded)

IEC No.	Symbol	Description	Remarks
06-08-03		Induction motor, three-phase, with wound rotor	
06-08-04		Induction motor, three-phase, star-connected, with automatic starter in the rotor	
06-08-05		Linear induction motor, three-phase, movement limited to one direction	

5.5.3 Transformers and reactors

Two forms of symbol are shown for the same type of transformer:

Single-line form – Form 1
Multi-line form – Forms 2 and 3

Forms 1 and 3 use a circle to represent each winding. Its use is preferably restricted to single-line representation. Symbols for transformer cores are not used with this form.

Form 2 uses symbol 04-03-01 to represent each winding. The number of half circles may be varied to differentiate between certain windings.

Form 3 is an alternative symbol form for three-phase transformers and induction regulators.

For the representation of transformer cores, see note to symbol 04-03-01.

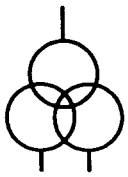
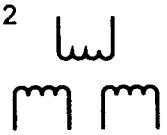
In the case of symbols for current and pulse transformers, straight lines, representing windings, may be used with either form (see 5.5.3.5).

IEC 60375 gives a method of indicating the instantaneous voltage polarities of coupled electric circuits. For an example of application, see symbol 06-09-03.

The strokes on the leads on the single-line form may be omitted if so desired.

The appropriate vector symbols for transformer winding connections are used in accordance with IEC 60076-1.

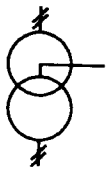
5.5.3.1 General symbols

IEC No.	Symbol	Description	Remarks
06-09-01	Form 1 	Transformer with two windings The instantaneous voltage polarities may be indicated in form 2 of the symbol. *Example:*	Single-line form.
06-09-02	Form 2 		Multi-line form.
06-09-03		Transformer with two windings, shown with instantaneous voltage polarity indicators	Instantaneous currents entering the marked ends of the windings produce aiding fluxes.
06-09-04	Form 1 	Transformer with three windings	Single-line form.
06-09-05	Form 2 		Multi-line form.
06-09-06	Form 1 	Auto-transformer	HV side. Single-line form. LV side.
06-09-07	Form 2 		Multi-line form.
06-09-08	Form 1 	Choke Reactor	Single-line form.
06-09-09	Form 2 Use symbol 04-03-01		Multi-line form.

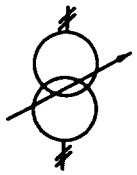
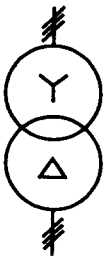
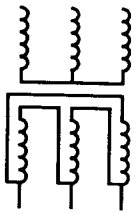
5.5.3.1 (concluded)

IEC No.	Symbol	Description	Remarks
06-09-10	Form 1 	Current transformer Pulse transformer	Single-line form.
06-09-11	Form 2 		Multi-line form.

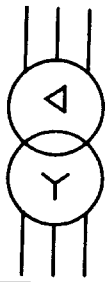
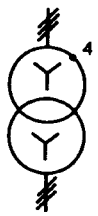
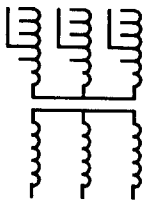
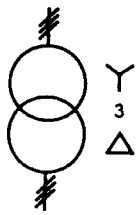
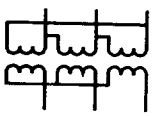
5.5.3.2 Examples of transformers with separate windings

IEC No.	Symbol	Description	Remarks
06-10-01	Form 1 	Single-phase transformer with two windings and screen	Single-line form
06-10-02	Form 2 		Multi-line form
06-10-03	Form 1 	Transformer with centre tapping on one winding	Single-line form.
06-10-04	Form 2 		Multi-line form.

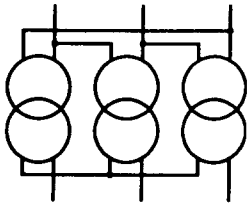
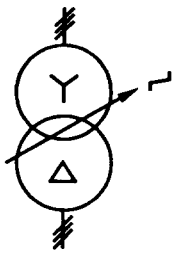
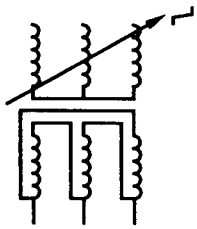
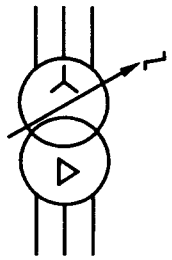
5.5.3.2 (continued)

IEC No.	Symbol	Description	Remarks
06-10-05	Form 1 	Transformer with variable coupling	Single-line form.
06-10-06	Form 2 		Multi-line form.
06-10-07	Form 1 	Three-phase transformer, connection star-delta Yd 11	Single-line form.
06-10-08	Form 2 		Multi-line forms.

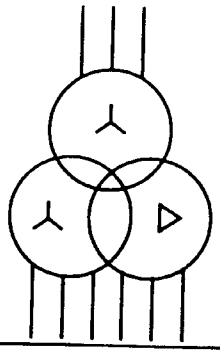
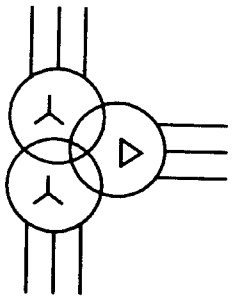
5.5.3.2 (continued)

IEC No.	Symbol	Description	Remarks
06-10-50	Form 3 		Multi-line forms.
06-10-09	Form 1 	Three-phase transformer without four tappings (taps), connection star-star	Each primary winding is shown with four available connection points in addition to those at winding ends.
06-10-10	Form 2 		
06-10-11	Form 1 	Three-phase bank of single-phase transformers, connection star-delta	
06-10-12	Form 2 		

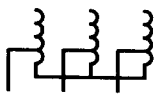
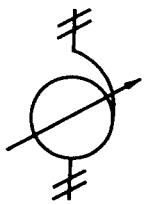
5.5.3.2 (continued)

IEC No.	Symbol	Description	Remarks
06-10-49			Multi-line forms.
06-10-13 Form 1		Three-phase transformer with on-load tap changer, connection star-delta	
06-10-14 Form 2			
06-10-48 Form 3			Multi-line form.
06-10-15 Form 1			Single-line form.

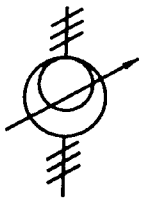
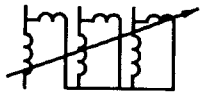
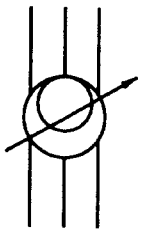
5.5.3.2 (concluded)

IEC No.	Symbol	Description	Remarks
06-10-47		Three-phase transformer, connection star-star-delta	Alternative to symbol 06-10-18
06-19-46			Alternative to symbol 06-10-47

5.5.3.3 Examples of auto-transformers

IEC No.	Symbol	Description	Remarks
06-11-01	Form 1 	Auto-transformer, single-phase	HV side. Single-line form. LV side.
06-11-02	Form 2 		Multi-line form.
06-11-03	Form 1 	Auto-transformer, three-phase, connection star	Single-line form.
06-11-04	Form 2 		
06-11-05	Form 1 	Auto-transformer, single-phase with voltage regulation	Single-line form.
06-11-06	Form 2 		Multi-line form.

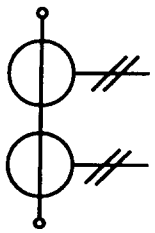
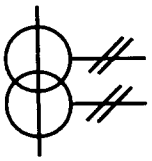
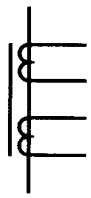
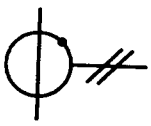
5.5.3.4 Examples of induction regulators

IEC No.	Symbol	Description	Remarks
06-12-01	Form 1 	Three-phase induction regulator	Single-line form.
06-12-02	Form 2 		
06-12-50	Form 3 		Multi-line form.

5.5.3.5 Examples of measuring transformers and pulse transformers

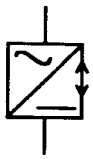
IEC No.	Symbol	Description	Remarks
	Use appropriate symbol in 5.5.3.1	Voltage transformer	
06-13-01	Form 1 	Voltage transformer	
06-13-50	Form 2 		

5.5.3.5 (concluded)

IEC No.	Symbol	Description	Remarks
06-13-02	Form 1 	Current transformer with two cores with one secondary winding on each core	The terminal symbols shown at the end of the primary circuit indicate that only a single device is represented. The terminal symbols may be omitted if terminal designations are used. In form 2, core symbols may be omitted.
06-13-03	Form 2 		
06-13-04	Form 1 	Current transformer with two secondary windings on one core	In form 2, the core symbol shall be drawn.
06-13-49	Form 2 		
06-13-05	Form 1 	Current transformer with one secondary winding with one tapping	Single-line form.
06-13-06	Form 2 		Multi-line form.

5.5.4 Power converters

The symbols 06-14-02 to 06-14-06 (inclusive) are shown in the horizontal representation. For vertical representation, the connecting lines are to be drawn in a vertical plane, without the symbol. For an example of application, see symbol 06-14-06A.

IEC No.	Symbol	Description	Remarks
06-14-01		Converter	General symbol.
06-14-02		D.C./D.C. converter	
06-14-03		Rectifier	
06-14-04		Rectifier in full wave (bridge) connection	
06-14-05		Inverter	
06-14-06		Rectifier/inverter	Horizontal representation.
06-14-50			Vertical representation.

5.5.5 Primary cells and accumulators

IEC No.	Symbol	Description	Remarks
06-15-01		Primary cell and accumulator Secondary cell Battery of primary or secondary cells	The longer line represents the positive pole, the shorter one the negative pole.

5.6 Switchgear, controlgear and protective devices

5.6.1 General

Subclauses 5.6.2 and 5.6.3 give preferred symbols for contact units and switchgear. Each symbol depicts the function of a contact or a switching device, without necessarily being related to the construction of the device it represents.

The movement of all two-position contacts, switches and controlgear from the unoperated to the operated position is from left to right for the vertical representation shown. For horizontal representation, the symbol is rotated counter-clockwise through 90°, the movement then being from below to above, or clockwise.

The line representing the moving contact is drawn thicker for clarity.

5.6.2 Contacts

5.6.2.1 Qualifying symbols

IEC No.	Symbol	Description	Remarks
07-01-01		Contact function	
07-01-02		Circuit-breaker function	
07-01-03		Disconnector (isolator) function	
07-01-04		Switch-disconnector (isolating-switch) function	
07-01-05		Automatic release function	
07-01-06		Position switch function Limit switch function	This qualifying symbol can be applied to simple contact symbols to indicate position or limit switches if there is no need to show the means of operating the contact. In complicated cases, where it is desirable to show the means of operation, symbols 02-13-16 to 02-13-19 should be used instead. This symbol is placed on both sides of the contact symbol when the contact is mechanically operated in both directions.

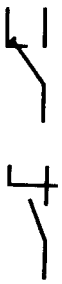
5.6.2.1 (concluded)

IEC No.	Symbol	Description	Remarks
07-01-07	◁	Spring-return function	This symbol may be used to indicate spring-return function. When this convention is invoked, its use should be appropriately referenced. This symbol should not be used together with qualifying symbols 07-01-01, 07-01-02, 07-01-03 and 07-01-04. In many cases, symbol 02-12-07 may be used.
07-01-08	o	Non-spring-return (stay put) function	This symbol may be used to indicate non-spring-return function. When this convention is invoked, its use should be appropriately referenced. This symbol should not be used together with qualifying symbols, 07-01-01, 07-01-02, 07-01-03 and 07-01-04. In many cases, symbol 02-12-08 may be used.

5.6.2.2 Contacts with two or three positions

IEC No.	Symbol	Description	Remarks
07-02-01	Form 1 	Make contact	
07-02-02	Form 2 		This symbol is also used as the general symbol for a switch.
07-02-03		Break contact	
07-02-04		Change-over break-before-make contact	
07-02-05		Change-over contact with off-position in the centre	

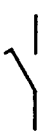
5.6.2.2 (concluded)

IEC No.	Symbol	Description	Remarks
07-02-06 07-02-07	Form 1 Form 2 	Change-over make-before-break contact (bridging)	
07-02-08		Contact with two makes	
07-02-09		Contact with two breaks	

5.6.2.3 Passing contacts with two positions ("fleeting" contacts)

IEC No.	Symbol	Description	Remarks
07-03-01		Passing make contact closing momentarily when its operating device is actuated	
07-03-02		Passing make contact closing momentarily when its operating device is released	
07-03-03		Passing make contact closing momentarily when its operating device is actuated or released	

5.6.2.4 Early and late operating contacts

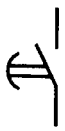
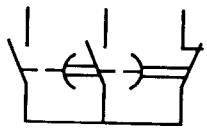
IEC No.	Symbol	Description	Remarks
07-04-01		Make contact (of a multiple contact assembly), which is early to close relative to the other contacts of the assembly	
07-04-02		Make contact (of a multiple contact assembly), which is late to close relative to the other contacts of the assembly	

5.6.2.4 (concluded)

IEC No.	Symbol	Description	Remarks
07-04-03		Break contact (of a multiple contact assembly), which is late to open relative to the other contacts of the assembly	
07-04-04		Break contact (of multiple contact assembly), which is early to open relative to the other contacts of the assembly	

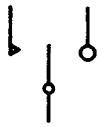
5.6.2.5 Examples of contacts with intentional delay

For the sake of uniformity, the qualifying symbols 02-12-05 and 02-12-06 shall be placed on the left-hand side of the appropriate make or break contact symbol.

IEC No.	Symbol	Description	Remarks
07-05-01		Make contact, delayed when the device containing the contact is being activated	
07-05-02		Make contact, delayed when the device containing the contact is being deactivated	
07-05-03		Break contact, delayed when the device containing the contact is being activated	
07-05-04		Break contact delayed when the device containing the contact is being deactivated	
07-05-05		Make contact, delayed both when the device containing the contact is being activated and when it is being deactivated	
07-05-06		*Example:* Contact assembly with one make contact not delayed, one make contact delayed when the device containing the contact is being activated and one break contact delayed when the device containing the contact is being deactivated	

5.6.2.6 Examples of spring-return and non-spring-return (stay put) contacts

The remarks on symbols 07-01-07 and 07-01-08 apply. Other qualifying symbols shall be placed on the left-hand side of the main symbol.

IEC No.	Symbol	Description	Remarks
07-06-01		Make contact with automatic return	
07-06-02		Make contact without automatic return Stay put make contact	
07-06-03		Break contact with automatic return	
07-06-04		Two-way contact with off-position in the centre and automatic return from one position (shown to the left), and without automatic return in the opposite position	

5.6.3 Switches, switchgear and starters

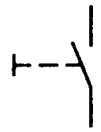
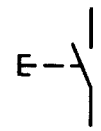
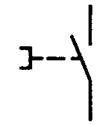
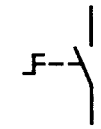
Devices with "push" or "pull" operation normally have automatic return. It is therefore not necessary to show the automatic return symbol (02-12-07). On the other hand, a detent symbol (02-12-08) should be shown in those cases where non-return exists.

Devices operated by turning do not usually have automatic return. It is therefore not necessary for the detent symbol (02-12-08) to be shown. On the other hand, the automatic return symbol (02-12-07) should be shown in those cases where an automatic return exists.

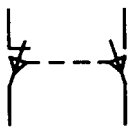
The use of symbol 02-12-04 (form 2) is preferred in conjunction with symbols for single-pole switches.

Qualifying symbols shall be placed on the left-hand side of the main symbol.

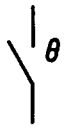
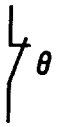
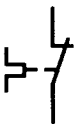
5.6.3.1 Single-pole switches

IEC No.	Symbol	Description	Remarks
07-07-01		Manually operated switch	General symbol.
07-07-02		Push-button switch, make contact and automatic return	
07-07-03		Pull-switch with make contact and automatic return	
07-07-04		Turn-switch and make contact without automatic return	

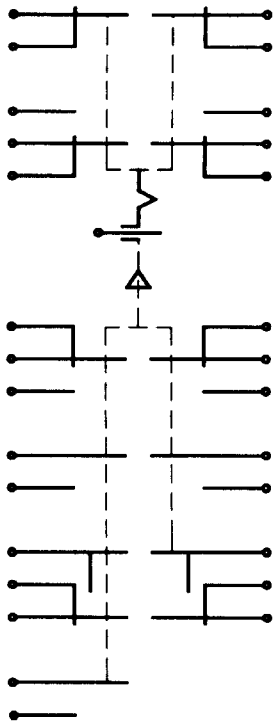
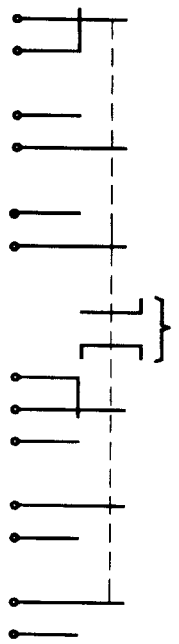
5.6.3.2 Position and limit switches

IEC No.	Symbol	Description	Remarks
07-08-01		Position switch, make contact	
07-08-02		Position switch, break contact	
07-08-03		Position switch mechanically operated in both directions with two separate circuits	
07-08-04		Position switch with positive opening operation of the break contact	

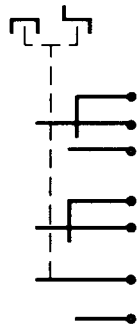
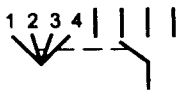
5.6.3.3 Temperature-sensitive switches

IEC No.	Symbol	Description	Remarks
07-09-01		Temperature-sensitive switch, make contact	θ may be replaced by the operating temperature conditions.
07-09-02		Temperature-sensitive switch, break contact	θ may be replaced by the operating temperature conditions.
07-09-03 07-09-03		Self-operating thermal switch (e.g. bi-metal), break contact	It is important to distinguish between a contact as shown and a contact of a thermal relay, which in detached representation may be shown as follows: 
07-09-04		Gas discharge tube with thermal element Starter for fluorescent lamp	

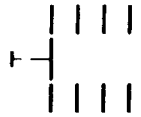
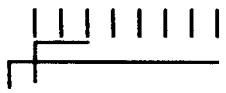
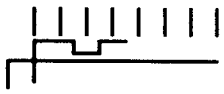
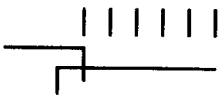
5.6.3.4 Examples of multipole and multiposition switches

IEC No.	Symbol	Description	Remarks
07-11-01		Three-position lever-operated switch, locking in the upper position and with spring return from the lower position to the middle one, shown with the terminals	
07-11-02		Button-operated switch in which one set of contacts is operated by pushing the button (non-locking) and another set by turning it (locking), shown with the terminals	The bracket indicates that there is only one actuator.

5.6.3.4 (continued)

IEC No.	Symbol	Description	Remarks
07-11-03		Button-operated switch in which the same set of contacts may be operated in two different ways: either by turning (with locking) or pushing (with spring return), shown with the terminals	
07-11-04		Multi position switch (6 positions shown)	
07-11-05		Multi position switch	To be used with a small number of positions (4 positions shown).
07-11-06		Example with position diagram  The operating device (for example, hand-wheel) can be turned only from positions 1 to 4 and back  The operating device can be turned in the clockwise direction only  The operating device can be turned in the clockwise direction, without limitation and may be turned in the counter-clockwise direction only between positions 3 and 1	It is sometimes convenient to indicate the purpose of each switch position by adding text to the position diagram. It is also possible to indicate limitations of movement of the operating device as in the examples.

5.6.3.4 (concluded)

IEC No.	Symbol	Description	Remarks
07-11-07		Four-position switch, manually operated, having four independent circuits	
07-11-08		Single-pole, four-position switch in which position 2 cannot be connected	
07-11-09		Single-pole, six-position switch with a wiper that bridges only while passing from one position to the next	
07-11-10		Single-pole, multiposition switch with a wiper that bridges three consecutive terminals in each switch position	
07-11-11		Multiposition switch A wiper bridges three non-consecutive terminals in each position, but omits one intermediate terminal in each switch position	
07-11-12		Single-pole, multiposition switch for cumulative parallel switching	
07-11-13		One pole of a six-position, multipole switch The pole shown makes early than the other poles when the wiper moves from position 2 to 3, and breaks later than the other poles when the wiper moves from positions 5 to 6. When the wiper moves in the opposite direction the early make becomes a late break and vice versa	

5.6.3.5 Block symbols for complex switches

There are many ways in which complex switching functions can be achieved mechanically, for example, by rotary wafer switches, slide switches, drum controllers and cam-operated contact assemblies. There are also many ways in which the switching functions may be symbolized on circuit diagrams.

Studies have shown that there is no unique system of symbolization that is superior in every application. The system used should be chosen with due regard to the purpose of the diagram and the degree of complexity of the switching device it is desired to symbolize.

This section presents one possible method of symbolizing complex switches. To facilitate understanding, each example includes a constructional drawing of the device symbolized. The method shown here uses a general symbol for a complex switch, which has to be supplemented by a table of connections. Two examples are shown.

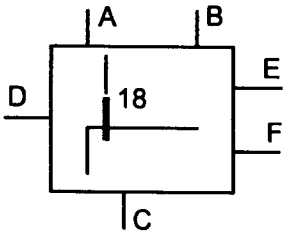
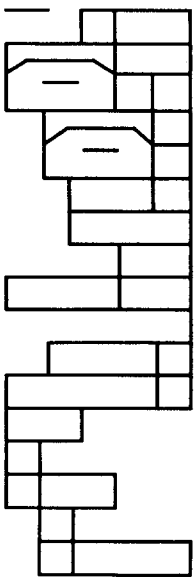
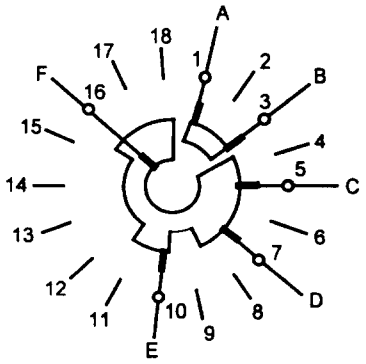
<table>
<tr><th>IEC No.</th><th>Symbol</th><th>Description</th><th>Remarks</th></tr>
<tr><td>07-12-01</td><td></td><td>Complex switch</td><td>General symbol.</td></tr>
<tr><td>07-12-02</td><td>

Table of connections</td><td>Examples:

18-position rotary wafer switch with six terminals, here designated A to F, constructed as shown below (switch shown in position 1)</td><td></td></tr>
<tr><td>Position</td><td>Interconnections of terminals
A B C D E F</td><td></td><td></td></tr>
<tr><td>07-12-50

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18</td><td></td><td>07-12-49

</td><td></td></tr>
</table>

5.6.3.5 (concluded)

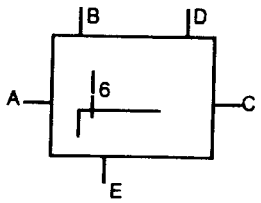
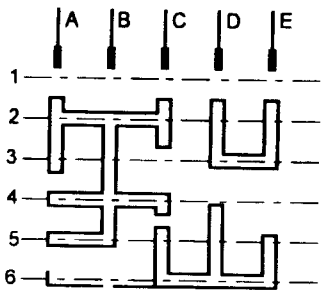
<table>
<tr><th>IEC No.</th><th>Symbol</th><th>Description</th><th>Remarks</th></tr>
<tr><td>07-12-03</td><td>


Table of connections
<table>
<tr><th>Position</th><th colspan="5">Interconnections of terminals</th></tr>
<tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th></tr>
<tr><td>1</td><td>+</td><td></td><td>+</td><td>0</td><td>0</td></tr>
<tr><td>2</td><td>+</td><td>+</td><td>+</td><td>0</td><td>0</td></tr>
<tr><td>3</td><td>+</td><td>+</td><td></td><td>0</td><td>0</td></tr>
<tr><td></td><td></td><td>+</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>+</td><td>+</td><td>+</td><td></td><td></td></tr>
<tr><td></td><td></td><td>+</td><td>+ -</td><td>-</td><td></td></tr>
<tr><td>5</td><td>+</td><td>+</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>6</td><td></td><td></td><td>-</td><td>-</td><td>-</td></tr>
</table>
</td><td>Six-position rotary drum switch with five terminals, constructed as shown below:

</td><td>The symbols + - and 0 indicate the terminals that are connected together at any position (rest position or intermediate position) of the switch, i.e. terminals having the same indicating symbols, e.g. +, are inter-connected.

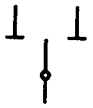
Where additional symbols are required, the characters available on a typewriter should be used, e.g. ×, =.

The letters shown are not part of the symbol.</td></tr>
</table>

5.6.3.6 Switchgear and controlgear

IEC No.	Symbol	Description	Remarks
07-13-02		Contactor	Main make contact of a contactor (contact opened in the unoperated position).
07-13-03		Contactor with automatic tripping initiated by a built-in measuring relay or release	
07-13-04		Contactor Main break contact of a contactor (contact closed in the unoperated position)	
07-13-05		Circuit-breaker	

5.6.3.6 (concluded)

IEC No.	Symbol	Description	Remarks
07-13-06		Disconnector (isolator)	
07-13-07		Two-way disconnector (isolator) with off-position in the centre	
07-13-08		Switch-disconnector (on-load isolating switch)	
07-13-09		Switch-disconnector with automatic tripping initiated by a built-in measuring relay or release	

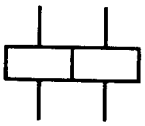
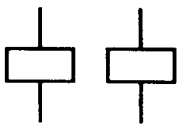
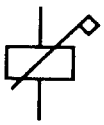
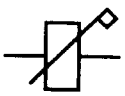
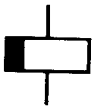
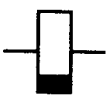
5.6.3.7 Block symbols for motor starters

IEC No.	Symbol	Description	Remarks
07-14-01		Motor starter	General symbol. Qualifying symbols may be shown inside the general symbol to indicate particular types of starters. See symbols 07-14-05, 07-14-07 and 07-14-08.
07-14-02		Starter operated in steps	The number of steps may be indicated.
07-14-03		Starter regulator	
07-14-04		Starter with automatic release	
07-14-05		Direct on line contactor starter for reversing motor	

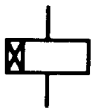
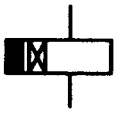
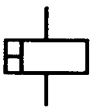
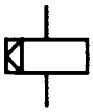
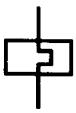
5.6.3.7 (concluded)

IEC No.	Symbol	Description	Remarks
07-14-06		Star-delta starter	
07-14-07		Auto-transformer starter	
07-14-08		Starter regulator with thyristors	

5.6.4 Electromechanical all-or-nothing relays

IEC No.	Symbol	Description	Remarks
07-15-01		Operating device	General symbol.
		Examples:	
07-15-03		Operating device with two separate windings, assembled representation	
07-15-05		Operating device with two separate windings, detached representation	
07-15-50		Operating device with flag indicator. Horizontal representation	
07-15-49		Vertical representation	
07-15-07		Relay coil of a slow-releasing relay. Horizontal representation	
07-15-48		Vertical representation	

5.6.4 (concluded)

IEC No.	Symbol	Description	Remarks
07-15-08		Relay coil of a slow-operating relay	
07-15-09		Relay coil of a slow-operating and slow-releasing relay	
07-15-10		Relay coil of a high speed relay (fast operating and fast releasing)	
07-15-14		Relay coil of a mechanically latched relay	
07-15-21		Operating device of a thermal relay	

5.6.5 Measuring relays and related devices

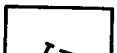
5.6.5.1 Block symbol and qualifying symbols

IEC No.	Symbol	Description	Remarks
07-16-01		Measuring relay or relative device The asterisk has to be replaced by one or more letters or qualifying symbols indicating the parameters of the device, in the following order: a) characteristic quantity and its mode of variation; b) direction of energy flow; c) setting range; d) resetting ratio; e) delayed action; and f) value of time delay.	Letter symbols for characteristic quantities should be in accordance with IEC 60027. Qualifying symbols will be found in 5 of IEC 60617-2. Symbols 07-16-02, 07-16-04 and 07-16-07 show how a letter and qualifying symbols may be combined. A figure giving the number of similar measuring elements may be included in the symbol, as shown in symbol 07-17-05. The symbol may be used as a functional symbol representing the whole of the device, or as a symbol representing only the actuating element of the device.

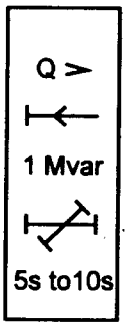
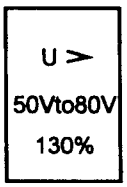
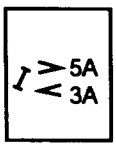
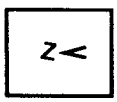
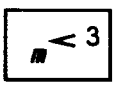
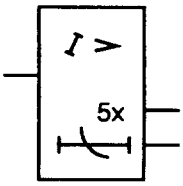
5.6.5.1 (concluded)

IEC No.	Symbol	Description	Remarks
07-16-02	$U \not\perp$	Voltage failure-to-frame (frame potential in case of fault)	
07-16-03	U^{rsd}	Residual voltage	
07-16-04	$I\!\leftarrow$	Reverse current	
07-16-05	$I\,\text{d}$	Differential current	
07-16-07	$I\,\perp$	Earth fault current	
07-16-08	$I\,\text{N}$	Current in the neutral conductor	
07-16-11		Inverse time-lag characteristic	

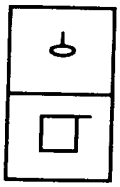
5.6.5.2 Examples of measuring relays

IEC No.	Symbol	Description	Remarks
07-17-01	$U = 0$	No voltage relay	
07-17-02	$I\!\leftarrow$	Reverse current relay	
07-17-03	$P >$	Underpower relay	
07-17-04	$I >$ 	Delayed over-current relay	
07-17-05	2 ($I >$) 5A to10A	Over-current relay with two current elements and a setting range of 5 A to 10 A	

5.6.5.2 (concluded)

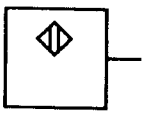
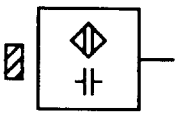
IEC No.	Symbol	Description	Remarks
07-17-06		Maximum reactive power relay: – energy flow towards the busbars – operating value 1 Mvar – time-lag adjustable from 5 s to 10 s	
07-17-07		Undervoltage relay: – setting range 50 V to 80 V – resetting ratio 130 %	
07-17-08		Current relay with maximum and minimum settings, shown with limits 3 A and 5 A	
07-17-09		Under-impedence relay	
07-17-10		Relay detecting short-circuits between windings	
07-17-12		Phase-failure detection relay in a three-phase system	
07-17-13		Locked-rotor detection relay operating by current measuring	
07-17-14		Over-current relay with two outputs, one active when the current is above five times the setting value, the other is active depending on the inverse time-lag characteristic setting of the device	

5.6.5.3 Other devices

IEC No.	Symbol	Description	Remarks
07-18-01		Buchholz protective device (gas relay)	
07-18-02		Auto-reclose device	

5.6.6 Proximity and touch-sensitive devices

5.6.6.1 Sensors and detectors

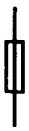
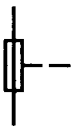
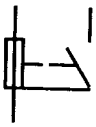
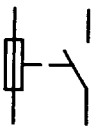
IEC No.	Symbol	Description	Remarks
07-19-01		Proximity sensor	
07-19-02		Proximity sensing device, block symbol	The method of operating may be indicated.
07-19-03		*Example:* Capacity proximity detector operating on the approach of solid material	
07-19-04		Touch sensor	

5.6.6.2 Switches

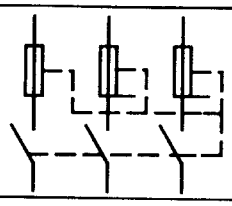
IEC No.	Symbol	Description	Remarks
07-20-01		Touch-sensitive switch, make contact	
07-20-02		Proximity switch, make contact	
07-20-03		Proximity switch, operated on the approach of a magnet, make contact	
07-20-04		Proximity switch, operated on the approach of iron, break contact	

5.6.7 Protective devices

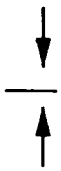
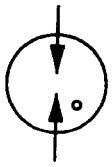
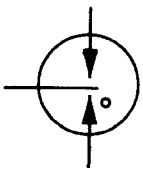
5.6.7.1 Fuses and fuse switches

IEC No.	Symbol	Description	Remarks
07-21-01		Fuse	General symbol.
07-21-02		Fuse with the side that remains live after blowing, indicated by a thick line	
07-21-03		Fuse with mechanical linkage (striker fuse)	
07-21-04		Fuse with alarm contact, three terminals	
07-21-05		Fuse with separate alarm circuit	

5.6.7.1 (concluded)

IEC No.	Symbol	Description	Remarks
07-21-06		Three-phase switch with automatic release by any one of the striker fuses	
07-21-07		Fuse switch	
07-21-08		Fuse disconnector (fuse isolator)	
07-21-09		Fuse switch disconnector (on-load isolating fuse switch)	

5.6.7.2 Gaps and arresters

IEC No.	Symbol	Description	Remarks
07-22-01		Gap	
07-22-02		Double spark-gap	
07-22-03		Surge arrester	
07-22-04		Protective gas discharge tube	
07-22-05		Symmetric protective gas discharge tube	

5.7 Measuring instruments, lamps and signalling devices

5.7.1 Indicating, recording, integrating instruments and general symbols

The asterisk within the symbols of this section shall be replaced with one of the following:

a) the letter symbol for the unit of the quantity measured, or a multiple or submultiple thereof (see symbols 08-02-01 and 08-02-07);

b) the letter symbol for the quantity measured (see symbols 08-02-05 and 08-02-06);

c) the chemical formula (see symbol 08-02-13);

d) graphical symbol (see symbol 08-02-08).

The symbol or formula used should be related to the information displayed by the instrument regardless of the means used to obtain the information.

Letter symbols for units and for quantities shall be selected from IEC 60027-1.

Provided IEC 60027-1, or the letter symbols for chemical elements, do not apply, other letter symbols may be used, if they are explained on the diagram or in referenced documents.

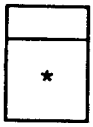
If the letter symbol for the unit of the quantity measured is used, it may be necessary to show the letter symbol for the quantity as supplementary information. It should be placed below the unit letter symbol (see symbol 08-02-02).

Supplementary information concerning the quantity measured, and any necessary qualifying symbol may be shown below the quantity letter symbol.

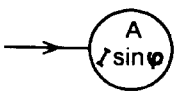
If for more than one quantity is indicated or recorded by an instrument, the appropriate symbol outlines shall be placed attached in line, horizontally or vertically (see symbols 08-03-02 and 08-04-14).

IEC No.	Symbol	Description	Remarks
08-01-01		Indicating instrument The asterisk shall be replaced in accordance with the rules given in 5.7.1	
08-01-50		Recording instrument The asterisk shall be replaced in accordance with the rules given in 5.7.1	

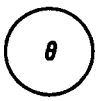
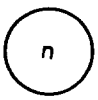
5.7.1 (concluded)

IEC No.	Symbol	Description	Remarks
08-01-02		Integrating instrument Energy meter The asterisk shall be replaced in accordance with the rules given in 5.7.1	The symbol may also be used for a remote instrument that repeats a reading transmitted from an integrating meter (e.g. see symbol 08-04-11). The outline may be combined with that for a recording instrument to represent a combined instrument (e.g. see symbol 08-04-14). Symbol elements, qualifing symbols and other symbols having general application may be used to specify the direction of energy flow (e.g. see symbols 08-04-04 to 08-04-07). The number of rectangles at the top of the symbol indicates the number of different summations by a multi-rate meter (e.g. see symbol 08-04-08).

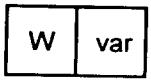
5.7.2 Examples of indicating instruments

IEC No.	Symbol	Description	Remarks
08-02-01		Voltmeter	
08-02-02		Reactive current ammeter	
08-02-03		Maximum demand indicator actuated by an integrating meter	

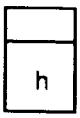
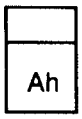
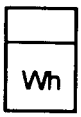
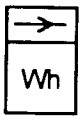
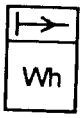
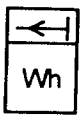
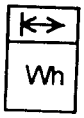
5.7.2 (concluded)

IEC No.	Symbol	Description	Remarks
08-02-04		Varmeter	
08-02-05		Power-factor meter	
08-02-06		Phase meter	
08-02-07		Frequency meter	
08-02-08		Synchronoscope	
08-02-09		Wavemeter	
08-02-10		Oscilloscope	
08-02-11		Differential voltmeter	
08-02-12		Galvanometer	
08-02-13		Salinity meter	
08-02-14		Thermometer Pyrometer	
08-02-15		Tachometer	

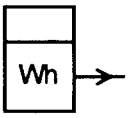
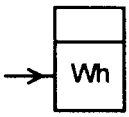
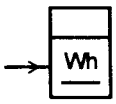
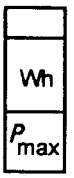
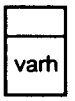
5.7.3 Examples of recording instruments

IEC No.	Symbol	Description	Remarks
08-03-01		Recording wattmeter	
08-03-02		Combined recording wattmeter and varmeter	
08-03-03		Oscillograph	

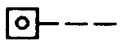
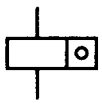
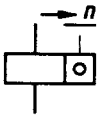
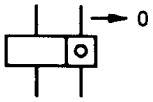
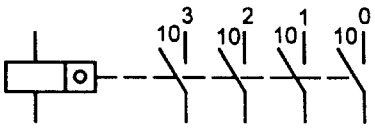
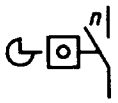
5.7.4 Examples of integrating instruments

IEC No.	Symbol	Description	Remarks
08-04-01		Hour meter	
08-04-02		Ampere-hour meter	
08-04-03		Watt-hour meter	
08-04-04		Watt-hour meter, measuring energy transmitted in one direction only	
08-04-05		Watt-hour meter, measuring the energy flow from the busbars	
08-04-06		Watt-hour meter, measuring the energy flow towards the busbars	
08-04-07		Watt-hour meter, counting in both energy flow directions (towards or from busbars)	

5.7.4 (concluded)

IEC No.	Symbol	Description	Remarks
08-04-08		Multi-rate watt-hour meter, two-rate shown	
08-04-09		Excess watt-hour meter	
08-04-10		Watt-hour meter with transmitter	
08-04-11		Remote meter (repeater), actuated by a watt-hour meter	
08-04-12		Remote meter (repeater) with printing device, actuated by a watt-hour meter	
08-04-13		Watt-hour meter with maximum demand indicator	
08-04-14		Watt-hour meter with maximum demand recorder	
08-04-15		Var-hour meter	

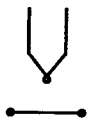
5.7.5 Counting devices

IEC No.	Symbol	Description	Remarks
08-05-01	Use symbol 02-14-02: 	Counting function of a number of events	Qualifying symbol.
08-05-02		Pulse meter (electrically operated counting device)	
08-05-03		Pulse meter manually pre-set to *n* (reset if *n* = 0)	
08-05-04		Pulse meter electrically reset to 0	
08-05-05		Pulse meter with multiple contacts	Respective contacts close once at every unit (10°), ten (10^1), hundred (10^2), thousand (10^3) events registered by the counter.
08-05-06		Counting device, cam driven and closing a contact at every *n* events	

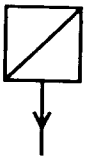
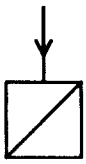
5.7.6 Thermocouples

IEC No.	Symbol	Description	Remarks
08-06-01		Thermocouple, shown with polarity symbols	
08-06-03		Thermocouple with non-insulated heating element	
08-06-04	Simplified form 		

5.7.6 (concluded)

IEC No.	Symbol	Description	Remarks
08-06-05		Thermocouple with insulated heating element	
08-06-06	Simplified form 		

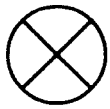
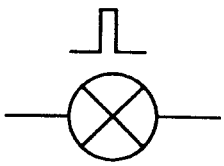
5.7.7 Telemetering devices

IEC No.	Symbol	Description	Remarks
08-07-01	Use symbol 02-17-06: 	Signal translator	General symbol.
08-07-02 Delete		Telemetering transmitter	
08-07-03 Delete		Telemetering receiver	

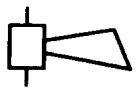
5.7.8 Electric clocks

IEC No.	Symbol	Description	Remarks
08-08-01		Clock Secondary clock	General symbol.
08-08-02		Master clock	
08-08-03		Clock with contact	

5.7.9 Lamps and signalling devices

IEC No.	Symbol	Description	Remarks
08-10-01		Lamp Signal lamp	General symbol. If it is desired to indicate the colour, a notation using the following codes is placed adjacent to the symbol: RD : red YE : yellow GN : green BU : blue WH : white If it is desired to indicate the type of lamp, a notation using the following code is placed adjacent to the symbol: Ne : neon Xe : xenon Na : sodium vapour Hg : mercury I : iodine IN : incandescent EL : electroluminescent ARC : arc FL : fluorescent IR : infra-red UV : ultraviolet LED : light-emitting diode
08-10-02		Signal lamp, flashing type	
08-10-03		Indicator, electromechanical Annunciator element	
08-10-04		Electromechanical position indicator with one de-energized (shown) and two operated positions	

5.7.9 (concluded)

IEC No.	Symbol	Description	Remarks
08-10-05		Horn	
08-10-06	Preferred form 	Bell	
08-10-08		Single-stroke bell	
08-10-09		Siren	
08-10-10	Preferred form 	Buzzer	
08-10-12		Whistle, electrically operated	Horizontal representation.
08-10-13		Indicator lamp energized by a built-in transformer	

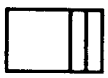
5.8 Architectural and topographical installation plans and diagrams

5.8.1 Generating stations and substations

5.8.1.1 General symbols

A rectangular outline may be used instead of a square.

On small-scale maps it may be desirable to replace the hatched areas in the symbols by completely filled-in areas.

IEC No.	Symbol	Description	Remarks
11-01-01		Generating station (planned)	
11-01-02		Generating station (in service)	
11-01-03		Combined electric and heat generating station (planned)	
11-01-04		Combined electric and heat generating station (in service)	
11-01-05		Substation (planned)	
11-01-06		Substation (in service)	

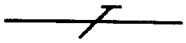
5.8.1.2 Specific types of generating stations and substations

IEC No.	Symbol	Description	Remarks
11-02-01		Hydroelectric generating station (planned)	
11-02-02		Hydroelectric generating station (in service)	
11-02-03		Thermoelectric generating station (coal, lignite, oil, gas, etc.) (planned)	
11-02-04		Thermoelectric generating station (coal, lignite, oil, gas, etc.) (in service)	
11-02-07		Geothermic generating station (planned)	
11-02-08		Geothermic generating station (in service or unspecified)	
11-02-09		Solar generating station (planned)	
11-02-10		Solar generating station (in service)	
11-02-11		Wind generating station (planned)	
11-02-12		Wind generating station (in service)	

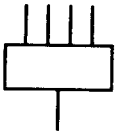
5.8.2 Installations in buildings

5.8.2.1 Identification of specific conductors for schematic diagrams

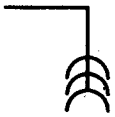
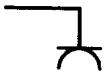
The symbols shown in this section may be replaced by letter symbols given in IEC 60445.

IEC No.	Symbol	Description	Remarks
11-11-01		Neutral conductor	
11-11-02		Protective conductor	
11-11-03		Combined protective and neutral conductor	
11-11-04		*Example:* Three-phase wiring with neutral conductor and protective conductor	

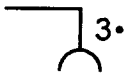
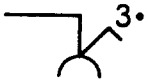
5.8.2.2 Wiring for layout diagrams

IEC No.	Symbol	Description	Remarks
11-12-01		Wiring going upwards	
11-12-02		Wiring going downwards	
11-12-03		Wire passing through vertically	
11-12-04		Box, general symbol	
11-12-05		Connection or junction box	
11-12-06		Consumer's terminal with wiring Service entrance equipment	
11-12-07		Distribution centre shown with five conduits	

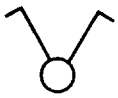
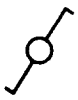
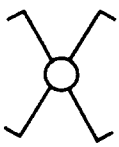
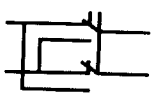
5.8.2.3 Socket outlets for layout diagrams

IEC No.	Symbol	Description	Remarks
11-13-01		Socket outlet (power) Receptacle outlet (power)	Symbol 03-03-01 is used.
11-13-03		Multiple socket outlet (power), three outlets shown	
11-13-04		Socket outlet (power) with protective contact	
11-13-05		Socket outlet (power) with shutter	
11-13-06		Socket outlet (power) with single pole switch	
11-13-07		Socket outlet (power) with interlocked switch	
11-13-08		Socket outlet (power) with isolating transformer, e.g. shaver outlet	
11-13-09		Socket outlet (telecommunications) NOTE Designations are used to distinguish different types of outlet in accordance with the following: TP : telephone M : microphone ◀ : loudspeaker FM : frequency modula-tion TV : television TX : telex DP : data processing	General symbol.

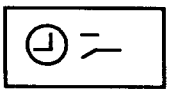
5.8.2.3 (concluded)

IEC No.	Symbol	Description	Remarks
00-13-01		Socket outlet Three-phase	Not in IEC 60617.
00-13-02		Socket outlet Three-phase switched	Not in IEC 60617.
00-13-03		Dedicated socket outlet	Non-standard. Not in IEC 60617.

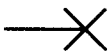
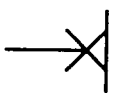
5.8.2.4 Switches for layout diagrams

IEC No.	Symbol	Description	Remarks
11-14-01		Switch, general symbol	
11-14-02		Switch with pilot light	
11-14-03		Period limiting switch, single-pole	
11-14-04		Switch, two-pole	
11-14-05		Multiposition switch, e.g. for different degrees of lighting. Single-pole	
11-14-06		Two-way switch. Single-pole	For schematic (see symbol 07-02-05).
11-14-07		Intermediate switch	Equivalent circuit diagram. 
11-14-08		Dimmer	

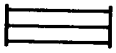
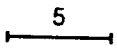
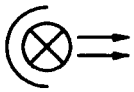
5.8.2.4 (concluded)

IEC No.	Symbol	Description	Remarks
11-14-09		Pull-cord switch, single-pole	
11-14-10		Push-button	
11-14-11		Push-button with indicator lamp	
11-14-12		Push-button with restricted access (glass cover, etc.)	
11-14-13		Period limiting equipment	
11-14-14		Time switch	
11-14-15		Key-operated switch Watchman's system device	

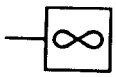
5.8.2.5 Lighting outlets and fittings for layout diagrams

IEC No.	Symbol	Description	Remarks
11-15-01		Lighting outlet position. The symbol is shown with wiring	
11-15-02		Lighting outlet on wall. The symbol is shown with wiring from the left	
11-15-03		Lamp general symbol The symbol may be qualified as shown in IEC 60617-8	Symbol 08-10-01 is used.

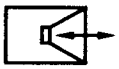
5.8.2.5 (concluded)

IEC No.	Symbol	Description	Remarks
11-15-04		Luminaire, general symbol Fluorescent lamp	
11-15-05		*Examples:* Luminaire with three fluorescent lamps	
11-15-06		Luminaire with five fluorescent lamps	
11-15-07		Projector, general symbol	
11-15-08		Spotlight	
11-15-09		Floodlight	
11-15-10		Auxiliary apparatus for discharge lamp The symbol shall be used only when the auxiliary apparatus is not incorporated in the luminaire	
11-15-11		Emergency lighting luminaire on special circuit	
11-15-12		Self-contained emergency lighting luminaire	

5.8.2.6 Miscellaneous symbols for layout diagrams

IEC No.	Symbol	Description	Remarks
11-16-01		Water heater, shown with wiring	
11-16-02		Fan, shown with wiring	

5.8.2.6 (concluded)

IEC No.	Symbol	Description	Remarks
11-16-03		Time clock	For schematic diagram, see 08-08-01.
11-16-04		Electric lock	
11-16-05		Intercommunication instrument	
00-16-01		Disconnector (isolator)	Used with water heaters, fans, coolers, etc. Not in IEC 60617.

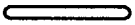
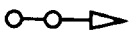
5.8.3 Reticulation systems

The symbols shown in this section are not included in IEC 60617and have been selected from symbols used by certain of the larger supply authorities in the Republic of South Africa.

NOTE Certain items are designated as planned items to cater for the drawing and installation instruction systems of certain supply authorities.

IEC No.	Symbol	Description	Remarks
00-17-01		Underground cable	
00-17-02		Planned underground cable	
00-17-03	Form 1 	Cable joint	Form 1 is the preferred symbol for a cable joint. Form 2 may be used where there is a space constraint on the plan.
00-17-04	Form 2		
00-17-05		Underground services The asterisk * shall be replaced by a qualifying letter designation Standard qualifying letters are: T : Telkom services W : water pipes S : sewerage pipes SW : storm water pipes	General symbol. Other letters may be used to suit a specific application, however, a suitable legend shall appear on the plan.

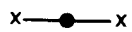
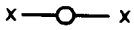
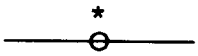
5.8.3 (continued)

IEC No.	Symbol	Description	Remarks
00-17-06		Cable ducts	If required, a user may label the symbol to indicate the number and size of ducts.
00-17-07		Planned cable ducts	
00-17-08		Overhead mains	The position of the symbol on the plan does not necessarily indicate the "in-situ" pole position.
00-17-09		Planned overhead mains	The gap in the line may be used to indicate pole separation distances.
00-17-10		Pole	
00-17-11		Planned pole	
00-17-12		Earth spike	
00-17-13		Pole-mounted transformer	Further intelligence may be added by adaptation of the basic symbol, e.g. a pole on each side of the transformer would indicate an "H" pole mounting.
00-17-14		Planned pole-mounted transformer	A label may be added to indicate the transformer rating.
00-17-15		Aerial stay	
00-17-16		Planned aerial stay	
00-17-17		Strut	
00-17-18		Planned strut	
00-17-19		Stay	
00-17-20		Planned stay	

5.8.3 (continued)

IEC No.	Symbol	Description	Remarks
00-17-21		Miniature substation	The transformer rating may be inserted in the centre block.
00-17-22		Planned miniature substation	
00-17-23		Substation	General symbol.
00-17-24		Planned substation The asterisk * shall be replaced by a qualifying letter designation. Standard qualifying letters are: T : transformer substation D : distribution substation MVC : medium-voltage consumer MSC : multiple service connection	General symbol. Other letters may be used to suit a specific application, however, a suitable legend shall appear on the plan.
00-17-25		Service pillar	General symbol.
00-17-26		Planned service pillar The asterisk * shall be replaced by a qualifying letter designation. Standard qualifying letters are: D : distribution pillar M : multiple metering unit I : multiple metering unit with individual isolation	General symbol. Other letters may be used to suit a specific application, however, a suitable legend shall appear on the plan.
00-17-27		Consumer's distribution unit	
00-17-28		Planned consumer's distribution unit	

5.8.3 (concluded)

IEC No.	Symbol	Description	Remarks
00-17-29		Shackle pole	
00-17-30		Planned shackle pole	
00-17-31		Pole with double outreach streetlights	
00-17-32		Planned pole with double outreach streetlights	
00-17-33		Pole with single outreach streetlight	
00-17-34		Planned pole with single outreach streetlight	
00-17-35		Pole with floodlight	
00-17-36		Planned pole with floodlight	
00-17-37		High mast floodlights	
00-17-38		Planned high mast floodlights	
00-17-39		Post-top luminaire	
00-17-40		Planned post-top luminaire	
00-17-41		Earth fault indicator	General symbol.
00-17-42		Pole-mounted line break equipment The asterisk *shall be replaced by a qualifying letter designation. Standard qualifying letters are: A/R : auto-recloser SEC : sectionalizer L/L : line link F/S : fused switch	General symbol. Other letters may be used to suit a specific application, however, a suitable legend shall appear on the plan.

Bibliography

IEC 60617:(all parts), *Graphical symbols for diagrams.*

IEC 61346-1, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules.*

General index

The letter codes for the type of item in the third column of the general index conform to Table E.1 of IEC 61346-1. However, 2.5 of that standard permits the use of alternative codes, depending on the item's use. The codes shown in the index are those most commonly used.

Description	Symbol No	Letter Code
A		
Accumulator	06-15-01	G
Accumulators; Battery of	06-15-01	G
Adjustable capacitor	04-02-07	C
Adjustable resistor	04-01-03	R
Adjustment, pre-set	02-03-05	
Alternating current	02-02-04	
Ampere-hour meter	08-04-02	P
Annunciator element	08-10-03	H
Arrester, surge arrester	07-22-03	F
Auto-reclose device	07-18-02	A,K
Auto-transformers		
single-phase		
form 1	06-11-01	T
form 2	06-11-02	T
single-phase with voltage regulation		
form 1	06-11-05	T
form 2	06-11-06	T
three-phase, connection star		
form 1	06-11-03	T
form 2	06-11-04	T
B		
Backward diode	05-03-08	V
Bell	08-10-06	
Bell, single-stroke	08-10-08	
Boundary line	02-01-06	
Box (For architectural diagrams) (general symbol)	11-12-04	
Box		
cable sealing end	03-04-01	X
junction	03-04-05	X
straight-through joint	03-04-03	X
Brake	02-12-20	
Break contact	07-02-03	
delayed when reclosing	07-05-04	
early to open	07-04-04	
late to open	07-04-03	
with spring return	07-06-03	
with two breaks	07-02-09	
Breakthrough, flashover	02-17-02	
Breakdown diode, bidirectional	05-03-07	V
Breakdown diode, unidirectional	05-03-06	V
Brush	06-03-04	
Buchholz protective device	07-18-01	F,S
Button-operated multipole switch (one set of contacts)	07-11-03	S
Button-operated multipole switch (two sets of contacts)	07-11-02	S
Buzzer	08-10-10	H
C		
Cable fittings		
cable sealing end	03-04-01	X
junction box	03-04-05	X
straight-through joint box	03-04-03	X

Description	Symbol No.	Letter code
C (continued)		
Cables		
ducts (see Reticulation systems)		
general symbol	03-01-01	W
joint (see Reticulation systems)		
underground (see Reticulation systems)		
Capacitor		
adjustable	04-02-07	C
feed-through	04-02-03	C
general symbol	04-02-01	C
lead-through	04-02-03	C
polarized	04-02-05	C
variable	04-02-07	C
with pre-set adjustment	04-02-09	C
Cell		
photovoltaic	05-06-03	B,G
primary	06-15-01	G
Change-over contact		
break before make	07-02-04	
make before break (bridging)	07-02-06	
Changer		
general symbol	02-17-06	U
Chassis (connection)	02-15-04	
Choke	04-03-01	L
Circuit-breaker	07-13-05	Q
Circuit (general symbol)	03-01-01	W
Clock; Electric		
general symbol	08-08-01	P
master	08-08-02	P
secondary	08-08-01	P
with switch	08-08-03	P
Coaxial plug and socket	03-03-15	X
Coaxial pair		
connected to terminals	03-01-12	
general symbol	03-01-11	W
with screen	03-01-13	
Coil	04-03-01	L
Collector for semiconductor devices	05-01-18	
Complex switch		
eighteen-position rotary wafer switch with six terminals	07-12-02	S
six-position rotary drum switch with five terminals	07-12-03	S
Conductor		
flexible	03-01-06	W
general symbol	03-01-01	W
group of	03-01-01	W
in cable	03-01-09	W
screened	03-01-07	W
twisted	03-01-08	W
Conductor; Identification of (For architectural diagrams)		
combined protective and neutral	11-11-03	
neutral	11-11-01	
protective	11-11-02	
Connecting devices		
coaxial plug and socket	03-03-15	X
connecting link		
closed	03-03-17	X
open	03-03-19	X
multipole plug and socket		
multi-line representation	03-03-07	X
single-line representation	03-03-08	X
plug (male)	03-03-03	X
plug and socket	03-03-05	X
plug and socket type connector		
male-male	03-03-20	X

Description	Symbol No.	Letter code
C (continued)		
pole of a socket	03-03-01	X
socket (female)	03-03-01	X
Connecting link		
closed	03-03-17	X.S
open	03-03-19	X.S
Connection of conductor		
change of phase sequence	03-02-11	
common to group of similar items	03-02-09	
connection	03-02-01	
interchange of conductors	03-02-11	
inversion of polarity	03-02-11	
junction	03-02-05	
junction double		
form 1	03-02-06	
form 2	03-02-07	
neutral point in multiphase system	03-02-13	
Connector, male-male	03-03-20	
Consumer's distribution unit (see Reticulation systems)		
Consumer's terminal	11-12-06	
Contact		
break	07-02-03	
break, which is early to open	07-04-04	
break, which is late to open	07-04-03	
break, delayed when reclosing	07-05-04	
break, with automatic return	07-06-03	
change-over make before break (bridging)	07-02-06	
make	07-02-02	
make delayed when closing	07-05-02	
make delayed when opening and closing	07-05-05	
make which is early to close	07-04-01	
make which is late to close	07-04-02	
make with automatic return	07-06-01	
make without automatic return (stay put)	07-06-02	
passing make closing momentarily during operation	07-03-01	
passing make closing momentarily during operation and release	07-03-03	
passing make closing momentarily during release	07-03-02	
two-way with centre-off position	07-02-05	
with two breaks	07-02-09	
with two makes	07-02-08	
Contact moving	02-17-04	
Contactor (contact closed)	07-13-04	K.Q
Contactor (contact open)	07-13-02	K.Q
Contactor with automatic release	07-13-03	K.Q
Contacts (qualifying symbols)		
function		
automatic release	07-01-05	
circuit-breaker	07-01-02	
contactor	07-01-01	
disconnector	07-01-03	
isolating-switch	07-01-04	
isolator	07-01-03	
limit switch	07-01-06	
non-spring return	07-01-08	
position switch	07-01-06	
spring return	07-01-07	
stay put	07-01-08	
switch-disconnector	07-01-04	
Continuous variability	02-03-09	
Control of non-electrical quantities		
by counter	02-14-02	
by flow	02-14-03	
by fluid level	02-14-01	
by number of events	02-14-02	
by relative humidity	02-14-05	

Description	Symbol No.	Letter code
C (concluded)		
Controls; Mechanical		
automatic return	02-12-07	
brake	02-12-20	
clutch	02-12-16	
delayed action	02-12-05	
detent	02-12-08	
disengage	02-12-09	
engaged	02-12-10	
device		
blocking	02-12-14	
blocking engaged	02-12-15	
for maintaining a given position	02-12-08	
latching disengaged	02-12-12	
latching engaged	02-12-13	
gearing	02-12-23	
hydraulic connection (link)	02-12-01	
mechanical connection (link)	02-12-01	
mechanical coupling	02-12-16	
disengaged	02-12-17	
engaged	02-12-18	
mechanical interlock	02-12-11	
non-automatic return	02-12-08	
pneumatic connection (link)	02-12-01	
Converters		
d.c. to d.c. rotary, with common field winding	06-05-05	G.U
d.c.to d.c. rotary, with common permanent magnetic field	06-05-04	G.U
dynamotor	06-05-04	G.U
general symbol	02-17-06	U.B
rotary transformer d.c./d.c.	06-05-04	G.U
synchronous, three-phase, shunt excited	06-07-05	G.U
Converter; Power		
direct current	06-14-02	U
general symbol	06-14-01	U
inverter	06-14-05	U
rectifier	06-14-03	U
rectifier in full wave (bridge) connection	06-14-04	
rectifier/inverter	06-14-06	U
Counting device, cam driven	08-05-06	P
Counting function (qualifying symbol)	08-05-01	
Current and voltage; Types of (qualifying symbols)		
alternating	02-02-04	
medium frequencies	02-02-10	
relatively high frequencies	02-02-11	
relatively low frequencies	02-02-09	
direct		
form 2	02-02-03	
mid-wire	02-02-16	
negative polarity	02-02-14	
neutral	02-02-15	
positive polarity	02-02-13	
D		
Delay	02-08-05	
Dependence		
magnetic field effect	02-08-04	
Detent	02-12-08	
disengaged	02-12-09	
engaged	02-12-10	
Diac	05-03-09	V
Differential voltmeter	08-02-11	P
Dimmer	11-14-08	Q.S

Description	Symbol No.	Letter code
D (concluded)		
Diodei Semiconductor		
Esaki	05-03-06	V
Varactor	05-03-04	V
backward	05-03-08	B
bidirectional	05-03-09	V
breakdown, bidirectional	05-03-07	V
breakdown, unidirectional	05-03-06	V
general symbol	05-03-01	V
light-emitting (general symbol)	05-03-02	V.H
photo-	05-06-02	B.V
tunnel	05-03-05	V
unitunnel	05-03-08	V
variable capacitance	05-03-04	V
voltage regulator	05-03-06	V
where use is made of its temperature dependence	05-03-03	V
Direction		
of flow (see Flow)		
of force (see Force)		
of motion (see Motion)		
of rotation (see Rotation)		
Disconnector	07-13-06	Q
two-way with centre-off position	07-13-07	Q
(isolator) used with water heater, fans, coolers, etc.	00-16-01	
Distribution centre (For architectural diagrams)	11-12-07	A
Double spark gap	07-22-02	F
E		
Earth and frame connections		
chassis	02-15-04	
frame	02-15-04	
general symbol	02-15-01	
noiseless	02-15-02	
Earth fault indicator (see Reticulation systems)		
Earth spike (see Reticulation systems)		
Effect		
electromagnetic	02-08-02	
magnetic field	02-08-04	
thermal	02-08-01	
Electric lock	11-16-04	Y
Electromagnetic		
effect	02-08-02	
radiation, non-ionizing	02-09-01	
Emergency lighting luminaire		
on special circuit	11-15-11	E
self-contained	11-15-12	E
Emergency switch	02-13-08	S.Q
Enclosure (symbol element)		
form 1	02-01-04	
form 2	02-01-05	
Envelope (symbol element)		
form 1	02-01-04	
form 2	02-01-05	
Equipment (symbol element)	02-01-01	
Esaki diode	05-03-06	
F		
Fan	11-16-02	E
Fault	02-17-01	

Description	Symbol No.	Letter code
F (concluded)		
Feed-through capacitor	04-02-03	C
Field effect transistor		
with N-type channel	05-05-09	V
with P-type channel	05-05-10	V
Flashover		
Flow; Direction of		
alternate transmission and reception	02-05-03	
bidirectional energy flow	02-05-08	
energy flow, from the busbars	02-05-06	
energy flow, one way	02-05-01	
energy flow towards the busbars	02-05-07	
propagation, both ways, not simultaneously	02-05-03	
propagation, both ways, simultaneously	02-05-02	
propagation, one way	02-05-01	
reception	02-05-05	
signal flow, one way	02-05-01	
simultaneous transmission and reception	02-05-02	
transmission	02-05-04	
Force; Direction of		
bidirectional	02-04-02	
unidirectional	02-04-01	
Four-position switch, manually operated with four independent circuits	07-11-07	S
Frame (connection)	02-15-04	
Frequency meter	08-02-07	P
Functional unit (symbol element)	02-01-01	
Fuse disconnector	07-21-08	Q.F
Fuse isolator	07-21-08	Q.F
Fuse switch disconnector	07-21-09	Q.F
Fuse		
general symbol	07-21-01	F
striker	07-21-03	F
with alarm contact	07-21-04	F
with mechanical linkage	07-21-03	F
with separate alarm circuit	07-21-05	F
Fuse disconnector	07-21-08	Q.F
Fuse switch	07-21-07	Q.F
disconnector	07-21-09	Q.F
on-load isolating	07-21-09	Q.F
three-phase with automatic release	07-21-06	Q.F
G		
Galvanometer	08-02-12	P
Gap	07-22-01	F
double spark	07-22-02	F
Gas relay	07-18-01	F.B
Gearing	02-12-23	
Generating stations (general symbols)		
combined electric and heat		
in service	11-01-04	
planned	11-01-03	
station		
in service	11-01-02	
planned	11-01-01	
substation		
in service	11-01-06	
planned	11-01-05	

Description	Symbol No.	Letter code
G (concluded)		
Generating stations; Specific types		
hydroelectric in service		
planned	11-02-02	
solar	11-02-01	
in service		
planned	11-02-10	
thermoelectric	11-02-09	
in service		
planned	11-02-04	
wind	11-02-03	
in service		
planned	11-02-12	
Generator	11-02-11	
d.c. compound excited (short shunt)		
hand	06-05-03	G
magneto caller	06-04-04	G
Ground and frame connections	06-04-04	G
chassis		
frame	02-15-04	
general symbol	02-15-04	
noiseless	02-15-01	
Group of conductors	02-15-02	
	03-01-01	
H		
Hand generator		
Heating element	06-04-04	G
High mast floodlight (see Reticulation systems)	04-01-12	R.E
Horn		
Hour meter	08-10-05	H
Hydroelectric generating station	08-04-01	P
	11-02-01	
I		
Identifier		
of analogue signals		
of digital signals	02-17-08	
IGFET transistor	02-17-09	
depletion type with two gates, N-type channel		
depletion type, single gate, N-type channel	05-05-17	V
enhancement type, single gate, P-type channel	05-05-15	V
Indicating instrument	05-05-11	V
differential voltmeter		
frequency meter	08-02-11	P
galvanometer	08-02-07	P
general symbol	08-02-12	P
maximum demand indicator	08-01-01	P
oscilloscope	08-02-03	P
phase meter	08-02-10	P
power-factor meter	08-02-06	P
pyrometer	08-02-05	P
reactive current ammeter	08-02-14	P
salinity meter	08-02-02	P
synchronoscope	08-02-13	P
tachometer	08-02-08	U.C
thermometer	08-02-15	P
varmeter	08-02-14	P
voltmeter	08-02-04	P
wavemeter	08-02-01	P
Indicator; Test point	08-02-09	P
Indicator (Instrument)	02-17-05	
electromechanical		
electromechanical position	08-10-03	H
	08-10-04	H

Description	Symbol No.	letter code
I (concluded)		
Induction motor		
single-phase, squirrel cage	06-08-02	M
three-phase, star-connected, with automatic starter in the rotor	06-08-04	M
three-phase, with wound rotor	06-08-03	M
three-phase, squirrel cage	06-08-01	M
Induction regulator, three-phase		
form 1	06-12-01	T
form 2	06-12-02	T
Inductor		
choke	04-03-01	L
continuously variable	04-03-05	L
variometer	04-03-08	L
with fixed tappings	04-03-06	L
with gap in magnetic core	04-03-04	L
with magnetic core	04-03-03	L
with moving contact, variable in steps	04-03-07	L
Interview variability	02-03-03	S
Inherent, non-linear variability	02-03-04	
Instrument, intercommunication	11-16-05	A.B
Instruments; Integrating (see Integrating instruments)		
Instruments; Measuring (general symbols)		
energy meter	08-01-03	P
indicating	08-01-01	P
integrating	08-01-03	P
recording	08-01-02	P
Instruments; Recording (see Recording instrument)		
Instruments; Indicating (see Indicating instrument)		
Integrating instruments		
ampere-hour meter	08-04-02	P
excess watt-hour meter	08-04-09	P
general symbol	08-01-03	P
hour meter	08-04-01	P
import-export watt-hour meter	08-04-07	P
multi-rate watt-hour meter	08-04-08	P
remote meter (repeater) with printing device, actuated by a watt-hour meter	08-04-12	P
remote meter (repeater), actuated by a watt-hour meter	08-04-11	A
var-hour meter	08-04-15	P
watt-hour meter	08-04-03	P
watt-hour meter, measuring energy transmitted in one direction only	08-04-04	P
watt-hour meter, measuring the energy flow towards the busbars	08-04-06	P
watt-hour meter, measuring the energy flow from the busbars	08-04-05	P
watt-hour meter with maximum demand indicator	08-04-13	P
watt-hour meter with maximum demand recorder	08-04-14	P
watt-hour meter with transmitter	08-04-10	P
Intercommunication instrument	11-16-05	A.B
Intermediate switch	11-14-07	Q.S
Inverter	06-14-05	U
Isolator, with centre-off position	07-13-07	Q
J		
Junction box	03-04-05	X
Junction		
of conductors	03-02-05	
of conductors, double	03-02-06	
K		
Key-operated switch	11-14-15	Q.S

Description	Symbol No.	Letter code
L		
Lamp		
general symbol	11-15-04	E
signal (general symbol)	08-10-01	E.H
Latching device	08-10-01	H
disengaged		
engaged	02-12-12	
Light dependent resistor	02-12-13	
Light-emitting diode (general symbol)	05-06-01	B.R
Lighting outlet and fitting	05-03-02	V.H
auxiliary apparatus for discharge lamp		
emergency lighting luminaire on special circuit	11-15-10	E
floodlight	11-15-11	E
fluorescent lamp (general symbol)	11-15-09	E
lamp (general symbol)	11-15-04	E
luminaire (general symbol)	11-15-03	E
pole-mounted (see Reticulation systems)	11-15-04	E
position		
position on wall	11-15-01	X
post top (see Reticulation systems)	11-15-02	X
projector (general symbol)		
self-contained emergency lighting luminaire	11-15-07	E
spotlight	11-15-12	E
Limit switch	11-15-08	E
break contact		
make contact	07-08-02	S.Q
mechanically operated in both directions with two separate circuits	07-08-01	S.Q.
Line-break equipment, pole mounted (see Reticulation systems)	07-08-03	S
Line		
general symbol		
Line boundary	03-01-01	W
Linear motor	02-01-06	
general symbol		
three-phase, movement limited to one direction	06-04-02	M
Link	06-08-05	M
hydraulic		
mechanical	02-12-01	
pneumatic	02-12-01	
Lock, electric	02-12-01	
Luminaire (general symbol)	11-16-04	
	11-15-04	E
M		
Machines		
general symbol		
hand generator	06-04-01	
linear motor(general symbol)	06-04-04	G
Magneto caller	06-04-02	M
stepping motor(general symbol)	06-04-04	G
Machines; Elements of	06-04-03	M
brush		
commutating winding	06-03-04	
compensating winding	06-03-01	
separate winding	06-03-01	
series winding	06-03-03	
shunt winding	06-03-02	
Magnet permanent	06-03-03	
Magnetic	02-17-03	
field dependence		
field effect	02-08-04	
	02-08-04	

Description	Symbol No.	Letter code
M (concluded)		
Magneto caller	06-04-04	G
Make contact	07-02-02	
delayed when closing	07-05-02	
delayed when opening and closing	07-05-05	
early to close	07-04-01	
late to close	07-04-02	
passing closing momentarily during operation	07-03-01	
passing closing momentarily during operation and release	07-03-03	
passing closing momentarily during release	07-03-02	
without spring return	07-06-02	
with spring return	07-06-01	
with two makes	07-02-08	
Master clock	08-08-02	P
Maximum demand indicator	08-02-03	P
Measuring instrument (general symbols)		
energy meter	08-01-03	P
indicating instrument	08-01-01	P
integrating instrument	08-01-03	P
recording instrument	08-01-02	P
Measuring relays (see Relays; Measuring)		
Measuring transformers (see Transformers; Measuring)		
Mechanical controls (see Controls)		
Mid-wire (qualifying symbol)	02-02-16	
Motion; Direction of		
bidirectional	02-04-02	
bidirectional rotation	02-04-04	
limited in both directions	02-04-05	
reciprocating	02-04-06	
unidirectional	02-04-01	
unidirectional rotation	02-04-03	
Motor		
a.c. series, single-phase	06-06-01	M
a.c. series, three-phase	06-06-03	M
d.c. two-wire series	06-05-01	M
d.c. two-wire shunt	06-05-02	M
induction, linear, three-phase, movement limited to one direction	06-08-05	M
induction, single-phase, squirrel cage	06-08-02	M
induction, three-phase, star-connected, with automatic starter in rotor	06-08-04	M
induction, three-phase, squirrel cage	06-08-01	M
induction, three-phase, with wound rotor	06-08-03	M
linear (general symbol)	06-04-02	M
repulsion, single-phase	06-06-02	M
stepping (general symbol)	06-04-03	M
synchronous, single-phase	06-07-02	M
Moving contact	02-17-04	
Multiposition switch		
bridging	07-11-10	S
for cumulative parallel switching	07-11-12	S
Multiposition switch (in architectural diagrams)	11-14-05	Q.S
Mushroom-head safety feature	02-13-08	
N		
Negative polarity	02-02-14	
Neutral	02-02-15	
Non-inherent non-linear variability	02-03-02	
Non-inherent variability	02-03-01	
Non-linear, inherent variability	02-03-04	
Non-linear, non-inherent variability	02-03-02	

Description	Symbol No.	Letter code
N (concluded)		
NPN transistor		
avalanche	05-05-03	V
with collector connected to the envelope	05-05-02	V
with transverse biased base	05-05-06	V
O		
On-load isolating fuse switch	07-21-09	Q.F
On-load isolating switch	07-13-08	Q
Operating device of a relay		
general symbol	07-15-01	
with two separate windings		
assembled representation	07-15-03	
detached representation	07-15-05	
Operation; Methods of		
by cam	02-13-16	
by cam and roller	02-13-19	
by crank	02-13-14	
by electric clock	02-13-27	
by electric motor	02-13-26	
by electromagnetic actuator	02-13-23	
by electromagnetic over-current protection	02-13-24	
by emergency push-button switch	02-13-08	
by hand wheel	02-13-09	
by key	02-13-13	
by lever	02-13-11	
by pedal	02-13-10	
by proximity effect	02-13-06	
by pulling	02-13-03	
by pushing	02-13-05	
by removable handle	02-13-12	
by roller	02-13-15	
by stored mechanical energy	02-13-20	
by thermal actuator	02-13-25	
by touching	02-13-07	
by turning	02-13-04	
hydraulic control, double acting	02-13-22	
hydraulic control, single acting	02-13-21	
manual, general case	02-13-01	
manual, with restricted access	02-13-02	
pneumatic control, double acting	02-13-22	
pneumatic control, single acting	02-13-21	
Operational dependence on a characteristic quantity becoming zero	02-06-04	
differing from zero by an amount which is very small compared with the normal value	02-06-05	
either higher than a given high setting or lower than a given low setting	02-06-03	
higher than the setting value	02-06-01	
lower than the setting value	02-06-02	
Oscillograph	08-03-03	P
Oscilloscope	08-02-10	
Outlet		
on wall	11-15-02	X
position, lighting	11-15-01	X
receptacle (power) (general symbol)	11-13-01	X
receptacle (telecommunication) (general symbol)	11-13-09	X
socket (power) (general symbol)	11-13-01	X
socket (telecommunication) (general symbol)	11-13-09	X
Outlines and enclosures (symbol elements)		
enclosure	02-01-04	
envelope	02-01-04	
equipment	02-01-01	
functional unit	02-01-01	
item	02-01-01	
tank	02-01-04	

Description	Symbol No.	Letter Code
O (concluded)		
Overcurrent		
relay delayed	07-17-04	K
relay with two current elements	07-17-05	K
relay with two outputs	07-17-14	K
Overhead mains (see Reticulation systems)		
P		
Period limiting equipment	11-14-13	Q.S
Permanent magnet	02-17-03	
Phase meter	08-02-06	P
Photoconductive device		
with asymmetrical conductivity	05-06-01	B.V
with symmetrical conductivity	05-06-02	B.R
Photodiode	05-06-02	B.V
Phototransistor	05-06-04	B.V
Photovoltaic cell	05-06-03	B.G
Plug (male)	03-03-03	X
Plug and socket	03-03-05	X
coaxial	03-03-15	X
multipole	03-03-07	X
Plug and socket type connector, male-male	03-03-20	X
PNIN transistor	05-05-08	V
PNIP transistor	05-05-07	V
PNP transistor	05-05-01	V
Polarity		
negative	02-02-14	
positive	02-02-13	
Polarized capacitor	04-02-05	C
temperature dependent	04-02-15	C
voltage dependent	04-02-16	C
Pole	00-17-10	
Pole-mounted equipment (see Reticulation systems)		
Pole-mounted transformer (see Reticulation systems)		
Position switch		
break contact	07-08-02	S.Q
make contact	07-08-01	S.Q
mechanically operated in both directions with two separate circuits	07-08-03	S.Q
Positive polarity	02-02-13	
Potentiometer		
pre-set	04-01-08	R
with sliding contact	04-01-07	R
Power-factor meter	08-02-05	P
Pre-set adjustment	02-03-05	
Primary cell	06-15-01	G
Primary cells; Battery of	06-15-01	G
Propagation		
both ways, not simultaneously	02-05-03	
both ways, simultaneously	02-05-02	
one way	02-05-01	
Protective gas discharge tube	07-22-04	F.V
Protective gas discharge tube, symmetric	07-22-05	F.V
Proximity detector, capacitive	07-19-03	B
Proximity sensing device (block symbol)	07-19-02	B
Proximity sensor	07-19-01	B
Proximity switch	07-20-02	S
operated on the approach of a magnet	07-20-03	S
operated on the approach of iron	07-20-04	S
Pull-switch	07-07-03	S
Pulse meter	08-05-02	P
electrically reset to zero	08-05-04	P
manually pre-set to *n*	08-05-03	P
with multiple contacts	08-05-05	P

Description	Symbol No.	Letter code
P (concluded)		
Push-button emergency switch	02-13-08	
Push-button switch	07-07-02	
with indicator lamp	11-14-11	Q.S
with restricted access	11-14-12	Q.S
Pyrometer	08-02-14	P
R		
Radiation		
coherent, non-ionizing	02-09-02	
electromagnetic, non-ionizing	02-09-01	
Reactive current ammeter	08-02-02	P
Receiver; telemetering	08-07-03	U
Receptacle outlet (power)	11-13-01	X
Receptacle outlet (telecommunications)	11-13-09	X
Recording instrument		
combined recording wattmeter and varmeter	08-03-02	P
general symbol	08-01-02	P
oscillograph	08-03-03	P
recording wattmeter	08-03-01	P
Recording wattmeter	08-03-01	P
Recording wattmeter and varmeter, combined	08-03-02	P
Rectifier		
inverter	06-14-06	U
general symbol	06-14-03	U
in full wave (bridge) connection	06-14-04	U
Regulator, three-phase induction		
form 1	06-12-01	T
form 2	06-12-02	T
Relay coil of a		
high speed relay	07-15-10	
mechanically latched relay	07-15-14	
slow-operating and slow-releasing relay	07-15-09	
slow-operating relay	07-15-08	
slow-releasing relay	07-15-07	
thermal relay	07-15-21	
Relays and related devices; Measuring (block symbol)	07-16-01	K
qualifying symbols		
current in the neutral conductor	07-16-08	
differential current	07-16-05	
earth fault current	07-16-07	
inverse time-lag characteristic	07-16-11	
residual voltage	07-16-03	
reverse current	07-16-04	
voltage failure to frame	07-16-02	
Relays; Measuring; Examples of		
current	07-17-08	K
delayed over-current	07-17-04	K
detecting inter-turn short-circuits	07-17-10	K
locked-rotor detection	07-17-13	K
maximum reactive power	07-17-06	K
no voltage	07-17-01	K
over-current relay with two outputs	07-17-14	K
over-current with two current elements	07-17-05	K
phase-failure detection	07-17-12	K
reverse current	07-17-02	K
under-impedance	07-17-09	K
underpower	07-17-03	K
undervoltage	07-17-07	K

Description	Symbol No.	Letter code
R (continued)		
Remote meter (repeater)	08-04-11	P
with printing device	08-04-12	P
Repulsion motor, single-phase	06-06-02	M
Resistor		
adjustable	04-01-03	R
carbon-pile	04-01-11	R
general symbol	04-01-01	R
light dependent	05-06-01	B.R
variable	04-01-03	R
voltage dependent	04-01-04	R
with fixed tappings (taps)	04-01-09	R
with separate current and voltage terminals	04-01-10	R
with sliding contact	04-01-05	R
with sliding contact and off-position	04-01-06	R
Reticulation systems, symbols for plans		
aerial stay	00-17-15	
aerial stay, planned	00-17-16	
cable ducts	00-17-06	
cable ducts, planned	00-17-07	
cable joint		
form 1	00-17-03	
form 2	00-17-04	
consumer's distribution unit	00-17-27	
consumer's distribution unit, planned	00-17-28	
earth fault indicator	00-17-41	
earth spike	00-17-12	
high mast floodlight	00-17-37	
high mast floodlight, planned	00-17-38	
miniature substation	00-17-21	
miniature substation, planned	00-17-22	
overhead mains	00-17-08	
overhead mains, planned	00-17-09	
pole	00-17-10	
pole, planned	00-17-11	
pole, shackle	00-17-29	
pole shackle, planned	00-17-30	
pole-mounted line-break equipment (general symbol), with qualifying letters for type	00-17-42	
pole-mounted transformer	00-17-13	
pole-mounted transformer, planned	00-17-14	
pole with floodlight	00-17-35	
pole with floodlight, planned	00-17-36	
pole with double outreach streetlight	00-17-31	
pole with double outreach streetlight, planned	00-17-32	
pole with single outreach streetlight	00-17-33	
pole with single outreach streetlight, planned	00-17-34	
post top	00-17-39	
post top, planned	00-17-40	
service pillar	00-17-25	
service pillar, planned	00-17-26	
stay	00-17-19	
stay, planned	00-17-20	
strut	00-17-17	
strut, planned	00-17-18	
substation (general symbol), with qualifying letters for type	00-17-23	
substation, planned (general symbol), with qualifying letters for type	00-17-24	
underground cable	00-17--01	
underground cable, planned	00-17-02	
underground services (general symbol), with qualifying letters for type of service	00-17-05	

Description	Symbol No.	Letter code
R (concluded)		
Reverse blocking		
diode thyristor	05-04-01	V
thyristor, tetrode type	05-04-10	V
triode thyristor, N-gate	05-04-05	V
triode thyristor, P-gate	05-04-06	V
Reverse conducting		
diode thyristor	05-04-02	V
triode thyristor, gate not specified	05-04-12	V
triode thyristor, N-gate	05-04-13	V
triode thyristor, P-gate	05-04-14	V
Rotation; Direction of		
bidirectional	02-04-04	
limited in both directions	02-04-05	
unidirectional	02-04-03	
S		
Salinity meter	08-02-13	P
Screen	02-01-07	
Secondary clock	08-08-01	B
Semiconductor devices (qualifying symbols)		
backward effect	05-02-05	
breakdown effect		
bidirectional	05-02-04	
unidirectional	05-02-03	
Schottky effect	05-02-01	
tunnel effect	05-02-02	
unitunnel effect	05-02-05	
Semiconductor diode	05-03-01	
Esaki	05-03-06	V
bidirectional	05-03-09	V
breakdown, bidirectional	05-03-07	V
breakdown, unidirectional	05-03-06	V
general symbol	05-03-01	V
light-emitting (general symbol)	05-03-02	V.H
tunnel	05-03-05	V
unitunnel	05-03-08	V
Varactor	05-03-04	V.C
variable capacitance	05-03-04	V.C
voltage regulator	05-03-06	V
where use is made of its temperature dependence	05-03-03	V.B
Semiconductors (symbol elements)		
channel for transistor IGFET		
N-type on P-type substrate	05-01-11	
P-type on N-type substrate	05-01-12	
collector		
on a region of dissimilar conductivity type	05-01-18	
several collectors on a region of dissimilar conductivity type	05-01-19	
conduction channel		
for depletion type devices	05-01-05	
for enhancement devices	05-01-06	
emitter		
N on P-region	05-01-16	
P on N-region	05-01-14	
several N on P-region	05-01-17	
several P on N-region	05-01-15	
gate, insulated	05-01-13	
junction		
N-region that influences a P-layer	05-01-10	
P-region that influences an N-layer	05-01-09	
rectifying	05-01-07	

Description	Symbol No.	Letter code
S (continued)		
Semiconductors (Symbol elements) (continued)		
region		
with one ohmic connection	05-01-01	
with several ohmic connections		
form 1	05-01-02	
form 2	05-01-03	
form 3	05-01-04	
region, intrinsic, separating		
a collector and a region of dissimilar conductivity type	05-01-23	
a collector and a region of similar conductivity type	05-01-24	
regions of dissimilar conductivity	05-01-21	
regions of similar conductivity type	05-01-22	
transitions between regions of dissimilar conductivity types	05-01-20	
Sensor		
proximity	07-19-01	B
touch	07-19-04	B
Shackle pole (see Reticulation systems)		
Shield	02-01-07	R
Shunt	04-01-10	
Signal lamp		
flashing type	08-10-02	H
general symbol	08-10-01	H
Signal waveforms		
negative-going pulse	02-10-02	
negative-going step function	02-10-05	
positive-going pulse	02-10-01	
positive-going step function	02-10-04	
pulse of alternating current	02-10-03	
sawtooth	02-10-06	
Siren	08-10-09	H
Socket (female)	03-03-01	X
dedicated	00-13-03	
general symbol	11-13-01	X
multiple	11-13-03	X
receptacle outlet (general symbol)	11-13-01	X
three-phase	00-13-01	
three-phase, switched	00-13-02	
with interlocked switch	11-13-07	X
with isolating transformer	11-13-08	X
with protective contact	11-13-04	X
with shutter	11-13-05	X
with single-pole switch	11-13-06	X
Socket outlet (telecommunications)	11-13-09	X
Solar generating station, in service	11-02-10	
Solar generating station, planned	11-02-09	
Spark gap, double	07-22-02	F
Starter; Motor (block symbols)		
auto-transformer	07-14-07	A,Q
direct on line contactor, for reversing motor	07-14-05	A,Q
full voltage contactor, for reversing motor	07-14-05	A,Q
general symbol	07-14-01	A,Q
operated in steps	07-14-02	A,Q
regulator	07-14-03	A,Q
regulator with thyristors	07-14-08	A,Q
star-delta	07-14-06	A,Q
with automatic release	07-14-04	A,Q
Stay (see Reticulation systems)		
Stepping action	02-03-07	
Stepping motor (general symbol)	06-04-03	M
Strut (see Reticulation systems)		
Substation; Generating stations		
general symbol	11-01-05	
Substation (specific) with qualifying letters for type (see Reticulation systems)		
Substation, miniature (see Reticulation systems)		

Description	Symbol No.	Letter code
S (continued)		
Switch (for architectural diagrams)		
dimmer	11-14-08	Q.S
general symbol	11-14-01	Q.S
intermediate	11-14-07	Q.S
key-operated	11-14-15	Q.S
multiposition	11-14-05	
period limiting, single-pole	11-14-03	Q.S
pull cord, single-pole	11-14-09	Q.S
push-button	11-14-10	Q.S
period limiting	11-14-13	Q.S
time	11-14-14	Q.S
with indicator lamp	11-14-11	Q.S
with restricted access	11-14-12	Q.S
time	11-14-14	Q.S
two-pole	11-14-04	Q.S
two-way, single-pole	11-14-06	Q.S
watchman's system device	11-14-15	Q.S
with pilot light	11-14-02	Q.S
Switch (Proximity and touch sensitive)		
proximity, make contact	07-20-02	S
operated on the approach of a magnet, make contact	07-20-03	S
operated on the approach of iron, break contact	07-20-04	S
touch-sensitive, make contact	07-20-01	S
Switch; Complex		
eighteen-position rotary wafer switch with six terminals	07-12-02	S
six-position rotary drum with five terminals	07-12-03	S
Switch; Diverse		
limit		
break contact	07-08-02	S.Q
make contact	07-08-01	S.Q
mechanically operated in both directions with two separate circuits	07-08-03	S.Q
position		
break contact	07-08-02	S.Q
make contact	07-08-01	S.Q
temperature-sensitive		
break contact	07-09-02	S.Q
make contact	07-09-01	S.Q
thermal, self-operating, break contact	07-09-03	S.Q
Switch; Multipole and multiposition		
button-operated, one set of contacts operated by pushing and another by turning	07-11-02	S
button-operated, the same set of contacts operated in two different ways	07-11-03	S
single-pole		
four-position, manually operated with four independent circuits	07-11-07	S
multiposition, bridging	07-11-10	S
multiposition for cumulative parallel switching	07-11-12	S
six-position, bridging	07-11-09	S
three-position lever-operated and non-identical return conditions	07-11-01	S
Switch; Single-pole		
emergency push-button	02-13-08	S.Q
manually operated, general symbol	07-07-01	S.Q

Description	Symbol No.	Letter code
S (concluded)		
pull-switch	07-07-03	S
push-button	07-07-02	S
turn-switch	07-07-04	S.Q
Switch-disconnector	07-13-08	Q
with automatic release	07-13-09	Q
Switchgear and controlgear		
circuit-breaker	07-13-05	Q
contactor (contact closed in the unoperated position)	07-13-04	K.Q
contactor (contact open in the unoperated position)	07-13-02	K.Q
contactor with automatic release	07-13-03	K.Q
disconnector	07-13-06	Q
two-way with centre-off position	07-13-07	Q
isolator	07-13-06	Q
with centre-off position	07-13-07	Q
on-load isolating switch	07-13-08	Q
switch-disconnector	07-13-08	Q
with automatic release	07-13-09	Q
Synchronoscope	08-02-08	P
Synchronous machines		
converter, three-phase, shunt excited	06-07-05	G
generator, three-phase, both leads of each phase winding brought out	06-07-04	G
generator, three-phase, permanent magnet	06-07-01	G
generator, three-phase, star-connected with neutral brought out	06-07-03	M
T		
Tachometer	08-02-15	P
Tank (symbol element)	02-01-04	
Telemetering devices		
signal translator (general symbol)	08-07-01	U
receiver	08-07-03	U.B
transmitter	08-07-02	U.B
Temperature-sensitive switch		
break contact	07-09-02	S
make contact	07-09-01	S
Terminal	03-02-02	X
Terminal strip	03-02-03	X
Test point indicator	02-17-05	
Thermal		
actuating device, relay	07-15-21	
effect	02-08-01	
Thermal switch, self-operating, break contact	07-09-03	S.Q
Thermocouple		
shown with polarity symbols	08-06-01	B
with insulated heating element	08-06-05	B
simplified form	08-06-06	B
with non-insulated heating element	08-06-03	B
simplified form	08-06-04	B
Thermoelectric generating station	11-02-03	
Thermometer	08-02-14	P
Three-position lever-operated multiposition switch	07-11-01	S
Thyristor		
diode, bidirectional	05-04-03	V
diode, reverse blocking	05-04-01	V
diode, reverse conducting	05-04-02	V
tetrode type, reverse blocking	05-04-10	V
triode, bidirectional	05-04-11	V

Description	Symbol No.	Letter code
T (continued)		
triode, reverse blocking, N-gate	05-04-05	V
triode, reverse blocking, P-gate	05-04-06	V
triode, reverse conducting, gate not specified	05-04-12	V
triode, reverse conducting, N-gate	05-04-13	V
triode, reverse conducting, P-gate	05-04-14	V
triode, turn-off, gate not specified	05-04-07	V
triode, turn-off, N-gate	05-04-08	V
triode, turn-off, P-gate	05-04-09	V
triode, type unspecified	05-04-04	V
Time clock	11-16-03	P
Time switch	11-14-14	Q.S
Touch-sensitive switch, make contact	07-20-01	S
Touch sensor	07-19-04	B
Transformer		
single-phase with two windings and screen		
form 1	06-10-01	T
form 2	06-10-02	T
three-phase bank of single-phase, connection star-delta		
form 1	06-10-11	T
form 2	06-10-12	T
three-phase, connection star-zigzag		
form 1	06-10-15	
form 2	06-10-16	
three-phase with four tappings		
form 1	06-10-09	T
form 2	06-10-10	T
three-phase with on-load tap charger, connection star-delta		
form 1	06-10-13	T
form 2	06-10-14	T
three-phase, connection star-delta		
form 1	06-10-07	T
form 2	06-10-08	T
three-phase, three winding, connection star-star-delta		
form 1	06-10-17	T
form 2	06-10-18	T
with centre tapping on one winding		
form 1	06-10-03	T
form 2	06-10-04	T
with variable coupling		
form 1	06-10-05	T
form 2	06-10-06	T
Transformer; Measuring		
current, with one secondary winding with one tapping		
form 1	06-13-06	T
form 2	06-13-07	T
current, with two cores and two secondary windings		
form 1	06-13-02	T
form 2	06-13-03	T
current, with two secondary windings on one core		
form 1	06-13-04	T
form 2	06-13-05	T
voltage	06-13-01	T
Transformers (general symbols)		
auto-transformer		
form 1	06-09-06	T
form 2	06-09-07	T

Description	Symbol No.	Letter code
T (concluded)		
Transformers (general symbols) (continued)		
choke		
form 1	06-09-08	
form 2	06-09-09	
current		
form 1	06-09-10	T
form 2	06-09-11	T
pulse		
form 1	06-09-10	T
form 2	06-09-11	T
reactor		
form 1	06-09-08	L
form 2	06-09-09	L
with three windings		
form 1	06-09-04	T
form 2	06-09-05	T
with two windings		
form 1	06-09-01	T
form 2	06-09-02	T
with two windings, shown with instantaneous voltage polarity indicators	06-09-03	
Transistor		
IGFET depleted one gate, N-type, without substrate connection	05-05-15	V
IGFET depleted one gate, P-type, without substrate connection	05-05-16	V
IGFET depleted two gates, N-type, with substrate connection brought out	05-05-17	V
IGFET enhanced one gate, N-type, channel with substrate internally connected	05-05-14	V
IGFET enhanced one gate, P-type, with substrate connection brought out	05-05-13	V
IGFET enhanced one gate, N-type without substrate connection	05-05-12	V
IGFET enhanced one gate, P-type without substrate connection	05-05-11	V
NPN avalanche	05-05-03	V
NPN with collector connected to the envelope	05-05-02	V
NPN with transverse biased base	05-05-06	V
PNIN with ohmic connection to the intrinsic region	05-05-08	V
PNIP with ohmic connection to the intrinsic region	05-05-07	V
PNP	05-05-01	V
junction field effect with N-type channel	05-05-09	V
junction field effect with P-type channel	05-05-10	V
photo-	05-06-04	B.V
unijunction with N-type base	05-05-05	V
unijunction with P-type base	05-05-04	V
Translator, signal (general symbol)	08-07-01	U
Transmitter (Instrument)		
telemetering	08-07-02	U.B
Transmitter, telemetering	08-07-02	U.B
Triac	05-04-11	V
Tube		
protective gas discharge	07-22-04	F
protective gas discharge, symmetric	07-22-05	F
Tunnel diode	05-03-05	V
Turn-off		
triode thyristor, gate not specified	05-04-07	V
triode thyristor, N-gate	05-04-08	V
triode thyristor, P-gate	05-04-09	V
Turn-switch	07-07-04	S.Q
Two-way contact with centre-off position	07-02-05	
Two-way switch, single-pole	11-14-06	Q.S
U		
Unijunction transistor with N-type base	05-05-05	V
Unijunction transistor with P-type base	05-05-04	V
Unitunnel diode	05-03-08	V

Description	Symbol No.	Letter code
V		
Var-hour meter	08-04-15	P
Varactor	05-03-04	V.C
Variability		
continuous	02-03-09	
in steps	02-03-07	
inherent	02-03-03	
inherent, non-linear	02-03-04	
non-inherent	02-03-01	
non-inherent, non-linear	02-03-02	
pre-set adjustment	02-03-05	
stepping action	02-03-07	
Variable capacitance diode	05-03-04	V.C
Variable capacitor	04-02-07	C
Variable resistor	04-01-03	R
Variometer	04-03-08	L
Varistor	04-01-04	R
Varmeter	08-02-04	P
Voltage dependent resistor	04-01-04	R
Voltage regulator diode	05-03-06	V
Voltmeter	08-02-01	P
differential	08-02-11	P
W		
Watchman's system device	11-14-15	Q.S
Water heater	11-16-01	E
Watt-hour meter	08-04-03	P
Wattmeter and varmeter combined, recording	08-03-02	P
Wattmeter, recording	08-03-01	P
Waveform of signals (see Signal waveforms)		
Wavemeter	08-02-09	P
Whistle, electrically operated	08-10-12	H
Wind generating station	11-02-11	
Winding	04-03-01	L
Winding; Internally connected		
six-phase, double delta	06-02-10	
six-phase, fork with neutral brought out	06-02-13	
six-phase, polygon	06-02-11	
six-phase, star	06-02-12	
three-phase, delta	06-02-05	
three-phase, interconnected star	06-02-09	
three-phase, open delta	06-02-06	
three-phase, star	06-02-07	
three-phase, star, with neutral brought out	06-02-08	
three-phase, zigzag	06-02-09	
Winding; Separate		
m-phase, phases not interconnected	06-01-05	
one winding	06-01-01	
six separate	06-01-03	
three-phase , phases not interconnected	06-01-04	
three separate	06-01-02	
two-phase, four-wire	06-01-06	
Winding for machines		
commutating	06-03-01	
compensating	06-03-01	
separate	06-03-03	

Description	Symbol No.	Letter code
W (concluded)		
Winding for machines (continued)		
series	06-03-02	
shunt	06-03-03	
Wiring (for architectural)		
box (general symbol)	11-12-04	X
connection box	11-12-05	X
consumer's terminal with wiring	11-12-06	X.A
distribution centre	11-12-07	A
going downwards	11-12-02	
going upwards	11-12-01	
junction box	11-12-05	X
passing through vertically	11-12-03	
service entrance equipment	11-12-06	X.A