

TECHNICAL REPORT



Graphical symbols for diagrams – Part 1: General, qualifying and generic symbols

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TECHNICAL REPORT



Graphical symbols for diagrams – Part 1: General, qualifying and generic symbols

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

GRAPHICAL SYMBOLS FOR DIAGRAMS –

Part 1: General, qualifying and generic symbols

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The text of this Technical Report is based on the following documents:

Draft	Report on voting
3/1488/DTR	3/1539/RVDTR

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

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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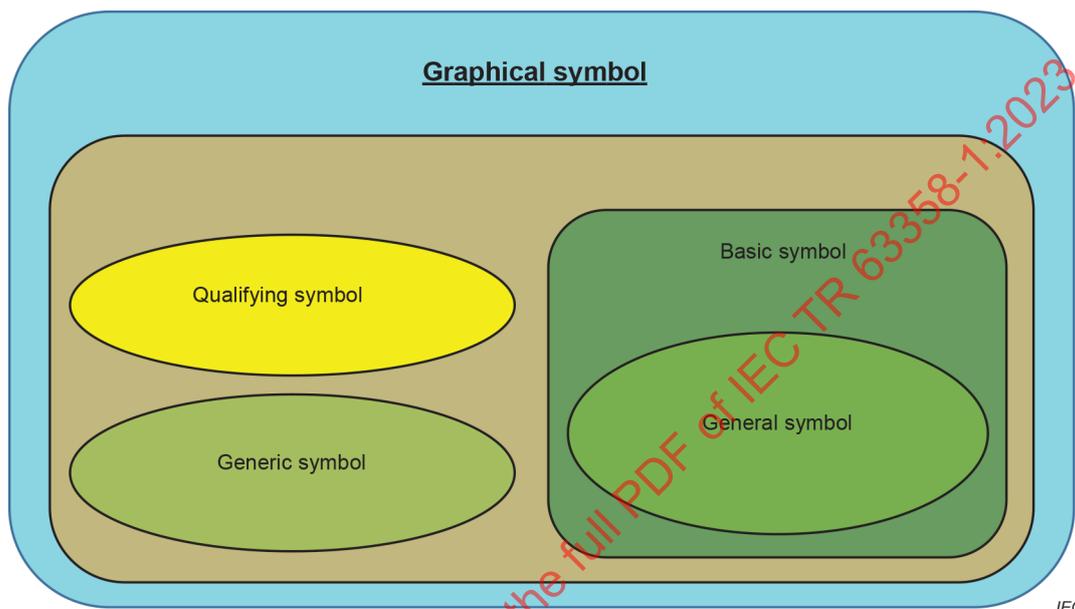
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INTRODUCTION

Initial work was done by TC 3 Maintenance Team 60617 with the aim to clarify the terminology used in the naming of some of the graphical symbols for diagrams standardized in IEC 60617. This document also highlights improved naming of some graphical symbols categorized according to the concepts of generic symbol, general symbol and qualifying symbol, where the symbol "name" is recognized as giving a short description of the meaning of the graphical symbol for diagrams. Figure 1 provides the relationship among types of graphical symbols for diagrams.



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Figure 1 – Relationship among types of graphical symbols for diagrams

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GRAPHICAL SYMBOLS FOR DIAGRAMS –

Part 1: General, qualifying and generic symbols

1 Scope

This document contains, by way of example, a collection of generic symbols, general symbols and qualifying symbols for diagrams taken from IEC 60617. Some of the wording of entries in the IEC 60617 database are annotated and/or modified for the purpose of clarification. Existing symbols in the IEC 60617 database are classified according to the classification proposed in this document.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

graphical symbol

visually perceptible figure with a particular meaning used to transmit information independently of language

Note 1 to entry: The graphical symbol may represent objects of interest, such as products, functions or requirements for manufacturing, quality control, etc.

Note 2 to entry: A graphical symbol is not to be confused with the simplified representation of products which is normally drawn to scale and which can look like a graphical symbol.

[SOURCE: ISO 81714-1:2010, 3.1]

3.2

basic symbol

graphical symbol representing a defined concept, applicable for use in diagrams

Note 1 to entry: A basic symbol can be:

- used alone; or
- qualified by qualifying symbols or other basic symbols; or
- used as a qualifier to another basic symbol.

3.3

general symbol

basic symbol that forms the basis for other basic symbols representing the same main concept but with different specific characteristics

Note 1 to entry: IEC 60617 graphical symbols S00001, S00227, S00457, S00555, S00567, S00583, S00641, S00841, and S00842 are examples of the concept of "general symbol".

3.4 qualifying symbol

graphical symbol applicable only for providing additional information to a basic symbol

Note 1 to entry: IEC 60617 categories "Qualifiers only" and "Functional attribute only" provide a list of qualifying symbols, e.g., S00077, S00120 and S00223.

3.5 generic symbol

graphical symbol that represents a main concept and is intended to be adapted with characters, qualifying symbols or basic symbols when being applied

Note 1 to entry: IEC 60617 graphical symbols S00066, S00819, S00910, S00911, S00912, S01870, S01921 are examples of the concept of "generic symbol".

3.6 name

short description of the meaning of the graphical symbol for diagram

[SOURCE: IEC 60617, General description, modified – the introductory "a" has been removed, and "meaning of the symbol" has been replaced with "meaning of the graphical symbol for diagram".]

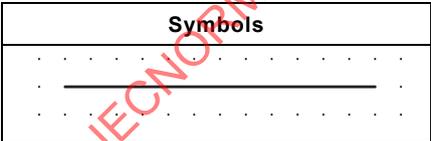
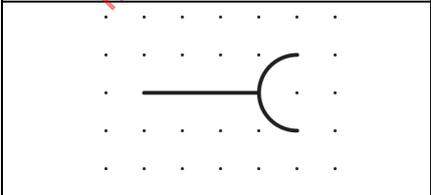
4 Classification of graphical symbols

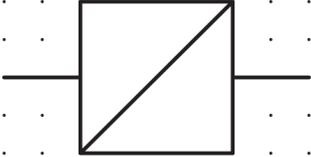
4.1 General symbols

General symbols are the bases for a set of other basic symbols representing the same main concept but with different specific characteristics. Table 1 provides examples of general symbols for concepts applicable to all domains, for use in diagrams. Table 2 provides examples of general symbols for the domain of binary logic elements.

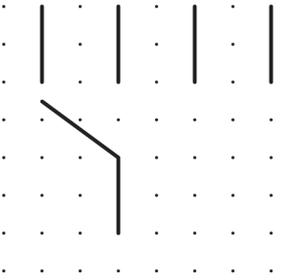
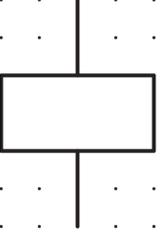
NOTE In Table 1 and Table 2, the column with the heading "Name" of graphical symbols sometimes includes additional wording after the comma which is not included in IEC 60617 at the time of publication of this document. Such additional wording will form part of the information to be used when a complete maintenance of IEC 60617 takes place. It is useful to keep consistency of naming. Therefore, any additions or deletions are highlighted in red.

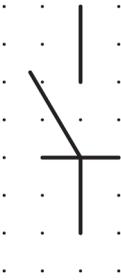
Table 1 – Examples of general symbols applicable in all domains

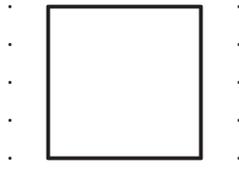
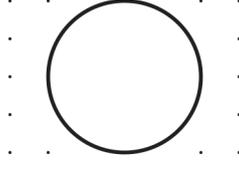
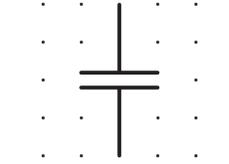
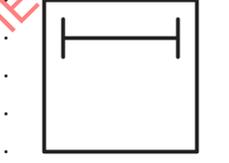
Symbols	ID	Name
	S00001	Connection, general symbol
	S00031	Contact, female (of a socket or plug), general symbol
	S00032	Contact, male (of a socket or plug), general symbol

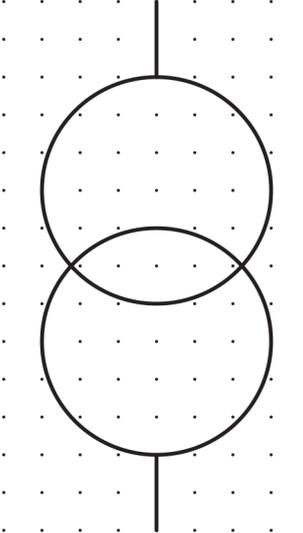
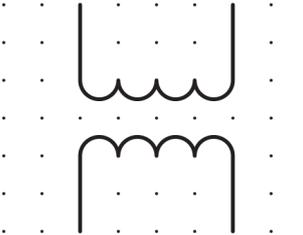
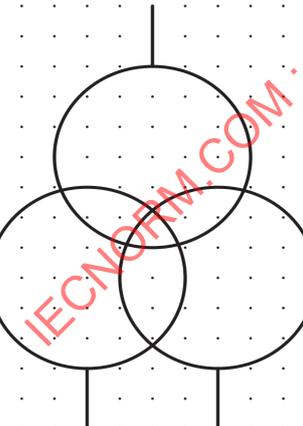
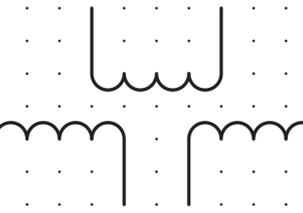
Symbols	ID	Name
	S00213	Converter, general symbol
	S00227	Make contact, general symbol; Switch, general symbol
	S00229	Break contact, general symbol
	S00230	Change-over break before make contact, general symbol
	S00270	Multi-position switch, general symbol

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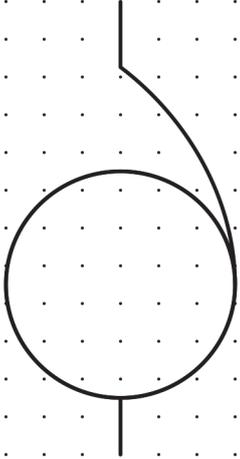
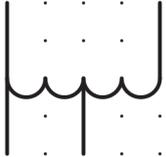
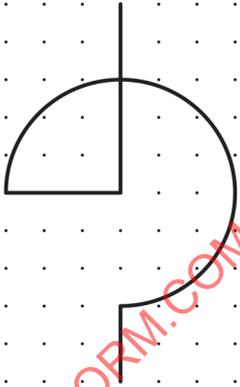
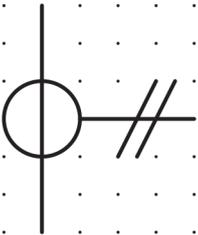
Symbols	ID	Name
	S00271	Multi-position switch, maximum four positions, general symbol
	S00297	Motor starter, general symbol
	S00305	Operating device, general symbol; Relay coil, general symbol
	S00362	Fuse, general symbol
	S00371	Spark gap, general symbol

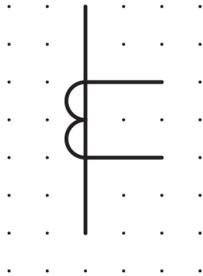
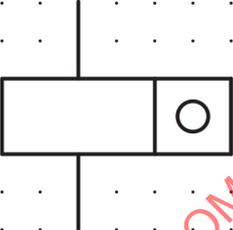
Symbols	ID	Name
	S00376	Static switch, general symbol
	S00453	Box, general symbol
	S00457	Socket outlet (power) general symbol
	S00465	Socket outlet (telecommunications), general symbol
	S00466	On/Off switch, general symbol for installation diagrams
	S00484	Luminaire, general symbol; Fluorescent lamp, general symbol
	S00487	Projector, general symbol
	S00498	Straight section, general symbol

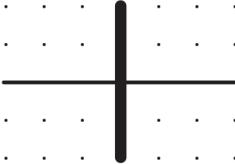
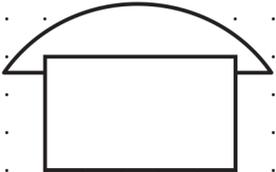
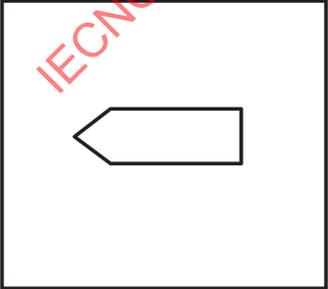
Symbols	ID	Name
	S00533	Aeronautical ground light, elevated, general symbol
	S00534	Aeronautical ground light, surface, general symbol
	S00552	Warning sign, general symbol; Guidance sign, general symbol
	S00555	Resistor, general symbol
	S00567	Capacitor, general symbol
	S00583	Coil, general symbol; Winding, general symbol
	S00608	Delay line, general symbol; Delay element, general symbol
	S00641	Semiconductor diode, general symbol

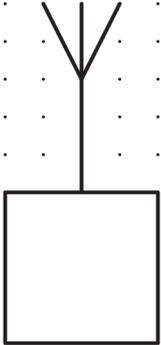
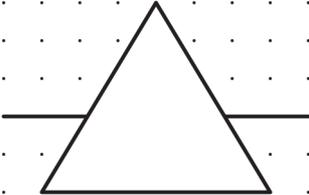
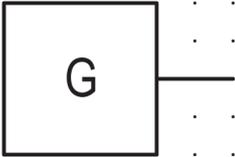
Symbols	ID	Name
	S00841	Transformer with two windings, general symbol /Form 1
	S00842	Transformer with two windings, general symbol /Form 2
	S00844	Transformer with three windings, general symbol /Form 1
	S00845	Transformer with three windings, general symbol /Form 2

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Symbols	ID	Name
	S00846	Auto-transformer, general symbol /Form 1
	S00847	Auto-transformer, general symbol /Form 2
	S00848	Reactor, general symbol /Form 1
	S00849	Reactor, general symbol /Form 2
	S00850	Current transformer, general symbol /Form 1

Symbols	ID	Name
	S00851	Current transformer, general symbol /Form 2
	S00899	Static generator, general symbol
	S00900	Heat source, general symbol
	S00947	Pulse counting device, general symbol
	S00959	Clock, general symbol
	S00965	Lamp, general symbol

Symbols	ID	Name
	S00981	Connecting stage, general symbol
	S01017	Telephone set, general symbol
	S01053	Microphone, general symbol
	S01059	Loudspeaker, general symbol
	S01061	Transducer head, general symbol
	S01075	Recorder, general symbol Reproducer; general symbol

Symbols	ID	Name
	S01102	Antenna, general symbol
	S01125	Radio station, general symbol
	S01156	Discontinuity, two-port, general symbol
	S01212	Maser, general symbol
	S01225	Signal generator, general symbol
	S01246	Filter, general symbol

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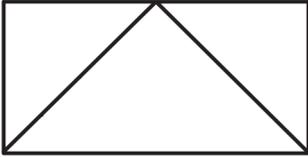
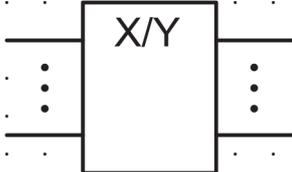
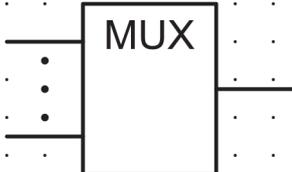
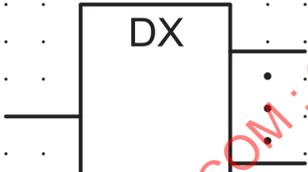
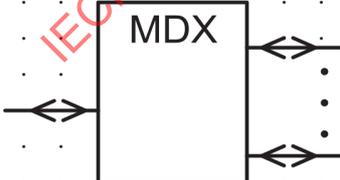
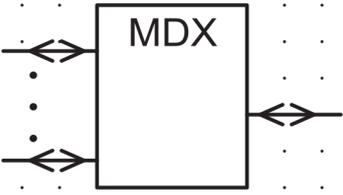
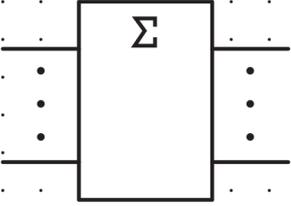
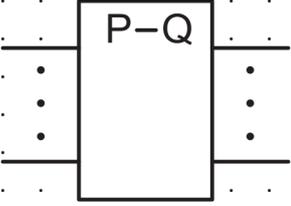
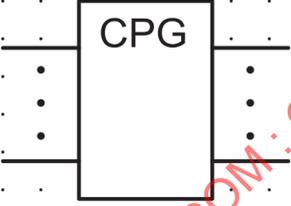
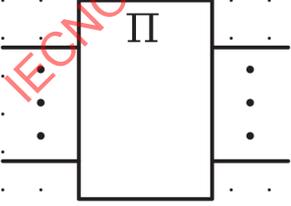
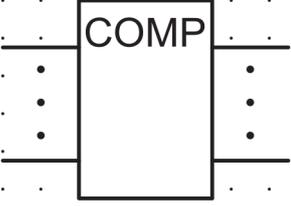
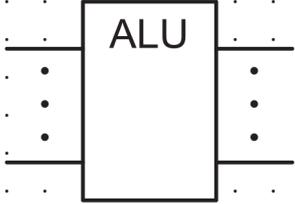
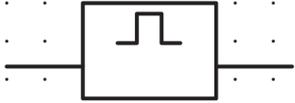
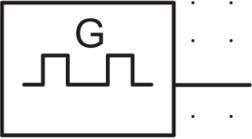
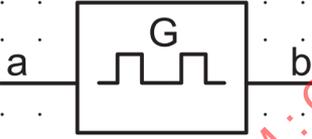
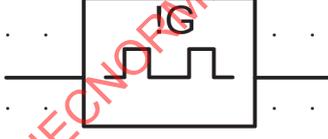
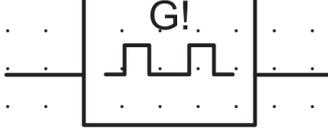
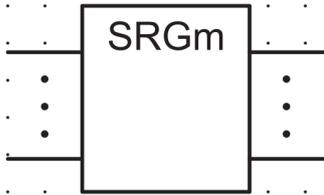
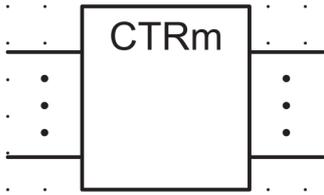
Symbols	ID	Name
	S01278	Modulator, general symbol; Demodulator, general symbol; Discriminator, general symbol

Table 2 – Examples of applicable general symbols specific to binary logic elements

Symbols	ID	Name
	S01610	Coder, general symbol
	S01626	Multiplexer, general symbol
	S01627	Demultiplexer, general symbol
	S01628	Bidirectional multiplexer/demultiplexer (selector), general symbol

Symbols	ID	Name
	S01629	Bidirectional multiplexer/demultiplexer (selector), general symbol
	S01636	Adder, general symbol
	S01637	Subtractor, general symbol
	S01638	Look-ahead carry generator (carry, propagate and generate), general symbol
	S01639	Multiplier, general symbol
	S01640	Magnitude comparator, general symbol

Symbols	ID	Name
	S01641	Arithmetic logic unit, general symbol
	S01674	Monostable, retriggerable (during the output pulse), general symbol
	S01675	Monostable, non-retriggerable (during the output pulse), general symbol
	S01678	Astable element, general symbol
	S01679	Controlled astable element, general symbol
	S01680	Astable element, synchronously starting, general symbol
	S01681	Astable element stopping after completing the last pulse, general symbol
	S01682	Astable element, synchronously starting, stopping after completing the last pulse, general symbol

Symbols	ID	Name
	S01685	Shift register, general symbol
	S01686	Counter with cycle length 2 to the power m, general symbol
	S01687	Counter with cycle length m, general symbol

4.2 Qualifying symbols

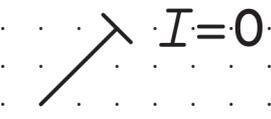
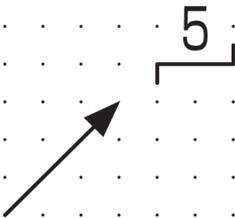
Graphical symbols categorized as qualifiers and functional attributes are only used to provide additional information when combined with the basic symbols. Qualifying symbols are taken from IEC 60617 and shown in Table 3.

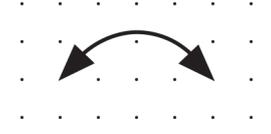
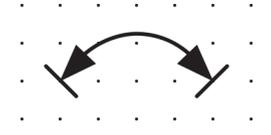
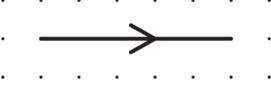
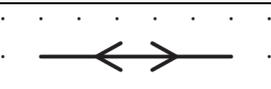
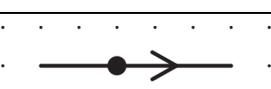
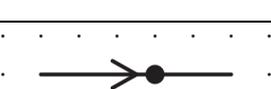
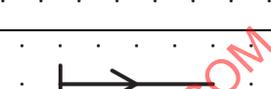
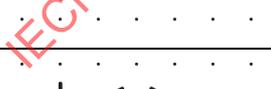
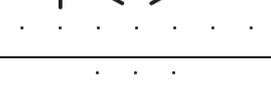
NOTE In Table 3, the column with the heading "Name" of graphical symbols sometimes includes additional wording after the comma which is not included in IEC 60617 at the time of publication of this document. Such additional wording will form part of the information to be used when a complete maintenance of IEC 60617 takes place. It is useful to keep consistency of naming. Therefore, any additions or deletions are highlighted in red.

Table 3 – Examples of qualifying symbols

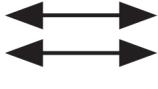
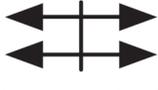
Symbol	ID	Name
	S00073	Alternating current (indication of frequency range: low)
	S00074	Alternating current (indication of frequency range: medium)
	S00075	Alternating current (indication of frequency range: high)

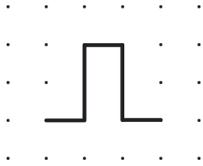
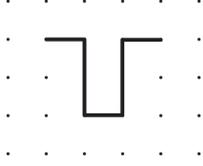
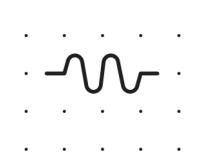
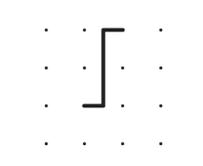
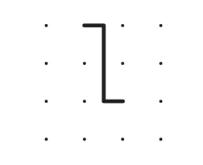
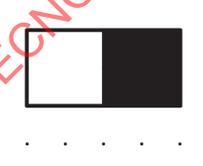
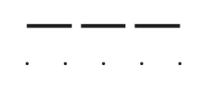
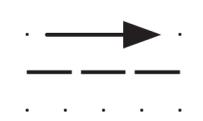
Symbol	ID	Name
	S00076	Rectified current with alternating component
	S00077	Positive polarity
	S00078	Negative polarity
	S00079	Neutral
	S00080	Mid-wire
	S00081	Adjustability, general symbol
	S00082	Adjustability, non-linear
	S00083	Variability, general symbol
	S00084	Variability, non-linear
	S00085	Adjustability, pre-set

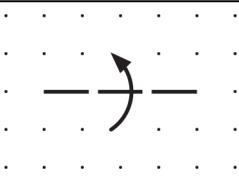
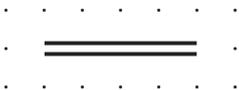
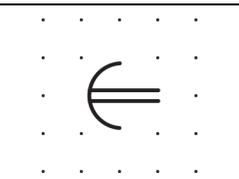
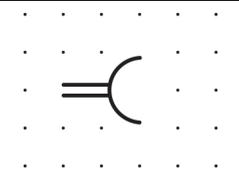
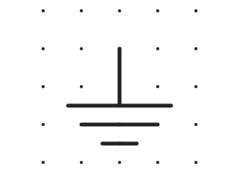
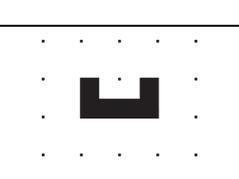
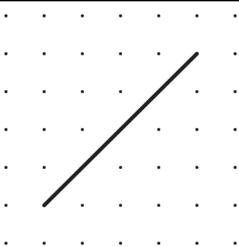
Symbol	ID	Name
	S00086	Pre-set adjustability
	S00087	Action in steps
	S00088	Adjustability step by step
	S00089	Continuous variability
	S00090	Continuous variability, pre-set
	S00091	Automatic control
	S00093	Rectilinear motion (unidirectional)
	S00094	Rectilinear motion (bidirectional)
	S00095	Circular motion (unidirectional)

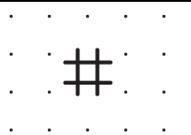
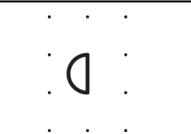
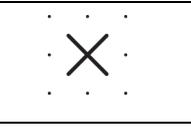
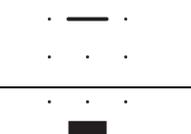
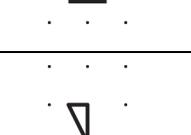
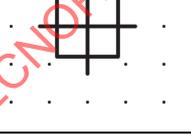
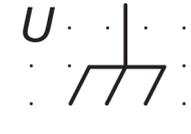
Symbol	ID	Name
	S00096	Circular motion (bidirectional)
	S00097	Circular motion (bidirectional and limited)
	S00098	Oscillating motion
	S00099	Propagation (one way)
	S00100	Propagation, both ways, simultaneously
	S00101	Propagation, both ways, not simultaneously
	S00102	Transmission
	S00103	Reception
	S00104	Energy flow from the busbars
	S00105	Energy flow towards the busbars
	S00106	Energy flow, bidirectional (towards and from the busbars)
	S00108	Actuating (higher than)
	S00109	Actuating (lower than)

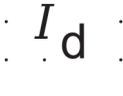
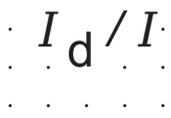
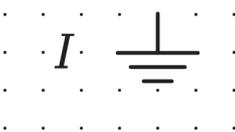
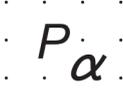
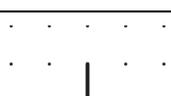
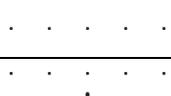
Symbol	ID	Name
	S00110	Actuating (either higher than or lower than)
	S00111	Actuating (equal to zero)
	S00112	Actuating (approximately equal to zero)
	S00114	Material, solid
	S00115	Material, liquid
	S00116	Material, gas
	S00117	Material, electret
	S00118	Material, semiconducting
	S00119	Material, insulating
	S00120	Thermal effect

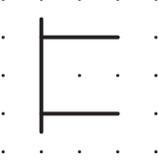
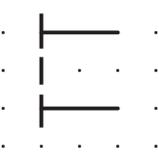
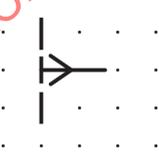
Symbol	ID	Name
	S00121	Electromagnetic effect
	S00122	Magnetostrictive effect
	S00123	Magnetic field effect or dependence
	S00124	Delay
	S00125	Semiconductor effect
	S00126	Coupling effect with electrical separation
	S00127	Radiation, electromagnetic, non-ionizing
	S00128	Radiation, coherent, non-ionizing
	S00129	Radiation, ionizing
	S00130	Radiation, electromagnetic, non-ionizing, bidirectional
	S00131	Radiation, coherent, non-ionizing, bidirectional

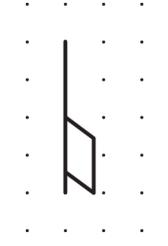
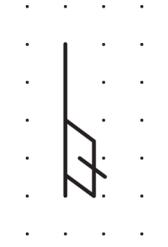
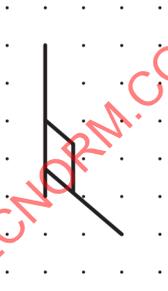
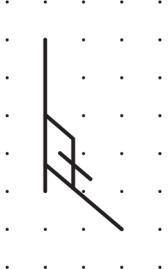
Symbol	ID	Name
	S00132	Pulse, positive-going
	S00133	Pulse, negative-going
	S00134	Pulse, alternating current
	S00135	Step function, positive going
	S00136	Step function, negative going
	S00137	Saw-tooth wave
	S00138	Printing, tape
	S00143	Facsimile
	S00144	Link /Form 1
	S00145	Mechanical link (force or motion)

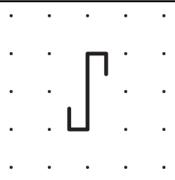
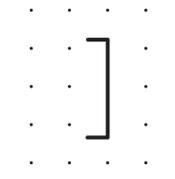
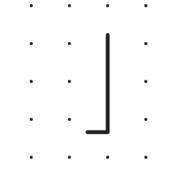
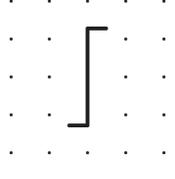
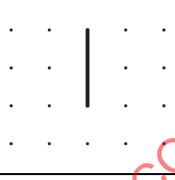
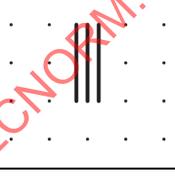
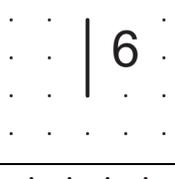
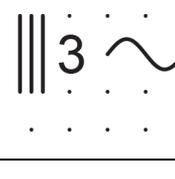
Symbol	ID	Name
	S00146	Mechanical link (rotation)
	S00147	Link /Form 2
	S00148	Delayed action /Form 1
	S00149	Delayed action /Form 2
	S00200	Earth, general symbol
	S00210	Permanent magnet
	S00211	Movable contact
	S00212	Test point indicator
	S00214	Conversion, general symbol

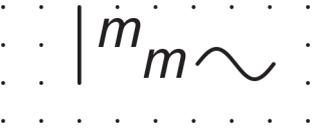
Symbol	ID	Name
	S00216	Analogue
	S00217	Digital
	S00218	Contactor function
	S00219	Circuit breaker function
	S00220	Disconnecter (isolator) function
	S00222	Automatic tripping function
	S00223	Position switch function
	S00226	Positive operation of a switch
	S00293	Trip-free mechanism
	S00328	Voltage failure to frame; Frame potential in case of fault
	S00329	Residual voltage

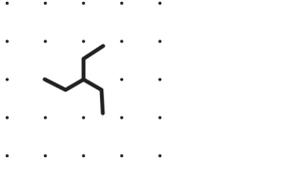
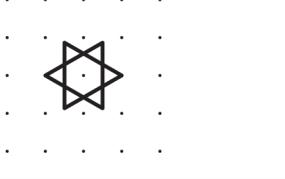
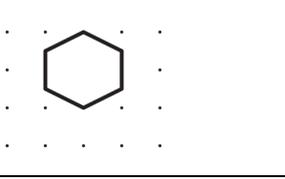
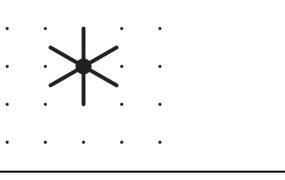
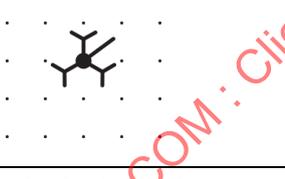
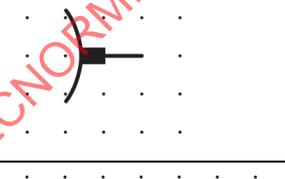
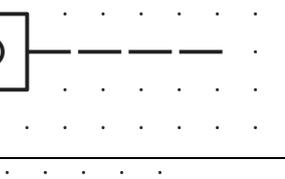
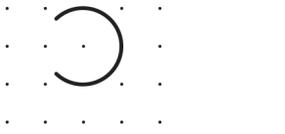
Symbol	ID	Name
	S00330	Reverse current
	S00331	Differential current
	S00332	Percentage differential current
	S00333	Earth fault current
	S00334	Current in the neutral conductor
	S00335	Current between neutrals of two polyphase systems
	S00336	Power at phase angle "alpha"
	S00337	Inverse time-lag characteristic
	S00613	Semiconductor region, one connection
	S00614	Semiconductor region, several connections /Form 1
	S00615	Semiconductor region, several connections /Form 2

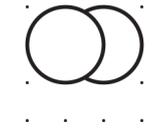
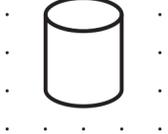
Symbol	ID	Name
	S00616	Semiconductor region, several connections /Form 3
	S00617	Conduction channel for depletion devices
	S00618	Conduction channel for enhancement devices
	S00619	Rectifying junction
	S00620	Junction which influences a semiconductor layer, P-region which influences an N-layer
	S00621	Junction which influences a semiconductor layer, N-region which influences a P-layer
	S00622	Conductivity type of the channel, N-type channel on a P-type substrate
	S00623	Conductivity type of the channel, P-type channel on an N-type substrate
	S00624	Insulated gate
	S00625	Emitter on a region of dissimilar conductivity type, P emitter on an N region

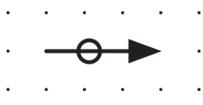
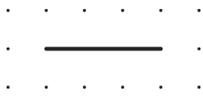
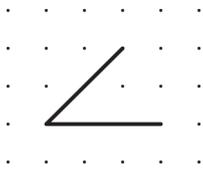
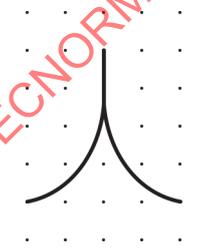
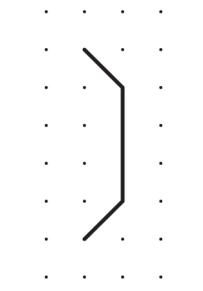
Symbol	ID	Name
	S00627	Emitter on a region of dissimilar conductivity type, N emitter on a P region
	S00629	Collector on a region of dissimilar conductivity type
	S00631	Transition between regions of dissimilar conductivity types
	S00632	Intrinsic region separating regions of dissimilar conductivity type
	S00633	Intrinsic region between regions of similar conductivity type
	S00634	Intrinsic region between a collector and a region of dissimilar conductivity type
	S00635	Intrinsic region between a collector and a region of similar conductivity type

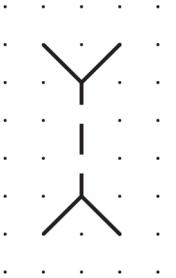
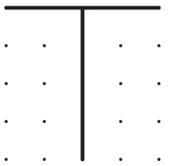
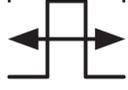
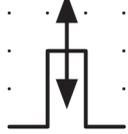
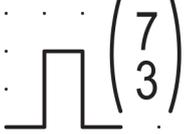
Symbol	ID	Name
	S00636	Schottky effect
	S00637	Tunnel effect
	S00638	Unidirectional breakdown effect
	S00639	Bidirectional breakdown effect
	S00640	Backward effect
	S00796	One winding
	S00797	Three separate windings
	S00798	Six separate windings
	S00799	Three-phase winding, phases not interconnected

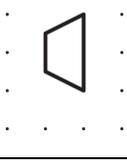
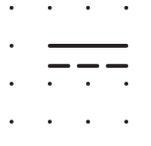
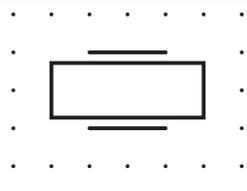
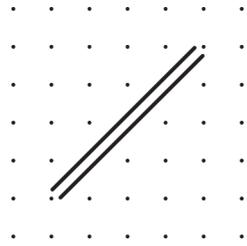
Symbol	ID	Name
	S00800	m-phase winding, phases not interconnected
	S00801	Two-phase winding, four-wire
	S00802	Two-phase winding
	S00803	Three-phase winding, V (60°)
	S00804	Four-phase winding with neutral brought out
	S00805	Three-phase winding, T
	S00806	Three-phase winding, delta
	S00807	Three-phase winding, open delta
	S00808	Three-phase winding, star

Symbol	ID	Name
	S00809	Three-phase winding, star, with neutral brought out
	S00810	Three-phase winding, zigzag or interconnected star
	S00811	Six-phase winding, double delta
	S00812	Six-phase winding, polygon
	S00813	Six-phase winding, star
	S00814	Six-phase winding, fork with neutral brought out
	S00818	Brush (on slip-ring or commutator)
	S00946	Counting function of a number of events
	S01042	Magnetic type indication

Symbol	ID	Name
	S01043	Moving coil indication; Ribbon type indication
	S01044	Moving iron type indication
	S01045	Stereo type indication
	S01046	Disc type indication
	S01047	Tape type indication; Film type indication
	S01048	Drum type indication
	S01049	Recording indication; Reproducing indication
	S01050	Recording and reproducing indication
	S01051	Erasing indication
	S01052	Surface-acoustic-wave (SAW) indication
	S01094	Plane polarization

Symbol	ID	Name
	S01095	Circular polarization
	S01096	Direction of radiation fixed in azimuth
	S01097	Direction of radiation variable in azimuth
	S01098	Direction of radiation fixed in elevation
	S01099	Direction of radiation variable in elevation
	S01100	Direction of radiation fixed in azimuth and elevation
	S01101	Direction finder; Radio beacon
	S01153	Resonator
	S01154	Reflector, reflecting totally

Symbol	ID	Name
	S01155	Reflector, reflecting partially
	S01169	Transition, general symbol
	S01218	Pulse-position or pulse-phase modulation
	S01219	Pulse-frequency modulation
	S01220	Pulse-amplitude modulation
	S01221	Pulse-interval modulation
	S01222	Pulse-duration modulation
	S01224	Pulse-code modulation in 3-out-of-7 code

Symbol	ID	Name
	S01282	Concentrating function
	S01283	Expanding function
	S01286	Multiplexing function
	S01287	Demultiplexing function
	S01288	Multiplexing and demultiplexing function
	S01401	Direct current /Form 1
	S01402	Direct current /Form 2
	S01403	Alternating current /Form 1
	S01404	Alternating current /Form 2
	S01405	Piezo-electric effect
	S01407	Conversion with electrical separation