

Guide for

Graphical symbols for electrical power, telecommunications and electronics diagrams —

Part 1: General information, general
index

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Foreword

This Part of BS 3939, prepared under the direction of the General Electrotechnical Engineering Standards Committee, gives general information on, and a general index to, the whole of BS 3939, which recommends graphical symbols, with definitions, for use on electrical power, telecommunications and electronics diagrams. Together with Parts 2 to 13, this Part of BS 3939 supersedes the previous edition, which has been withdrawn in its entirety. The titles of the other Parts in the BS 3939 series are given in 1.2. Titles to any further Parts will be added in due course.

To take account of the development of computer draughting, the symbols in Parts 2 to 12 have been designed to a grid. A transparent over-lay with this grid is included with this Part of BS 3939.

Relationship with international publications. BS 3939-2 to BS 3939-13 are identical with the English texts of Parts 2 to 13 respectively of IEC Publication 617 “Graphical symbols for diagrams” except that the English texts have been rearranged typographically as a consequence of deleting the French text. This Part is based on IEC Publication 617-1 “Graphical symbols for diagrams” Part 1:1985 “General information, general index. Cross-reference tables”, but some of the cross-references in this IEC Publication are to IEC Publications which have not been implemented as British Standards and which the Technical Committee considers are not suitable for use in conjunction with this Part of BS 3939. In particular, the references to IEC Publications 113 “Diagrams, charts, tables” and 750 “Item designation in electrotechnology” in 1.3 have been replaced by a reference to BS 5070, which is not technically equivalent; the letter codes for kind of item taken from Table 1 of IEC Publication 750 were given in section 2 of IEC 617-1 but have been deleted from this standard since they are not considered to be acceptable by the Technical Committee; and Appendix B of IEC 617-1, which gives tables of cross-references between IEC Publications 617 and 117, has not been included in this standard since the numbering system used in the previous edition of BS 3939 differed from that in IEC Publication 117.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 31 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1.1 Scope

BS 3939 contains symbols for use in electrotechnical diagrams.

No distinction is made between light and heavy current application. Although many symbols have been grouped in parts of this publication relating to specific electrotechnical fields they may be used also in other fields.

1.2 Structure

BS 3939 consists of several parts as set out below:

Part 1: General information, general index.

Cross-reference tables.

Part 2: Symbol elements, qualifying symbols and other symbols having general application.

(For example: outlines and enclosures, qualifying symbols for kind of current and voltage, variability, direction of force, motion and flow etc., mechanical controls, earth and frame connections, ideal circuit elements.)

Part 3: Conductors and connecting devices.

(For example: conductors; flexible, screened or twisted, coaxial conductor, terminals, junctions, plugs and sockets, cable sealing ends.)

Part 4: Passive components.

(For example: resistors, capacitors, inductors, ferrite cores, magnetic storage matrices, piezoelectric crystals, electret, delay lines.)

Part 5: Semiconductors and electron tubes.

(For example: diodes, transistors, thyristors, electronic tubes, radiation detectors.)

Part 6: Production and conversion of electrical energy.

(For example: windings, generators, motors, transformers, power converters.)

Part 7: Switchgear, controlgear and protective devices.

(For example: contacts, switches, temperature-, proximity- and touch-sensitive switches, switchgear and controlgear, motorstarters, all-or-nothing relays, measuring relays, fuses, gaps, arresters.)

Part 8: Measuring instruments, lamps and signalling devices.

(For example: indicating, integrating and recording instruments, thermocouples, telemetering devices, clocks, position and pressure transducers, lamps, horn, bell.)

Part 9: Telecommunications: Switching and peripheral equipment.

(For example: switching systems, selectors, telephone sets, telegraph and data apparatus, transducers, recorders and reproducers.)

Part 10: Telecommunications: Transmission.

(For example: telecommunication circuits, antennas, radio stations, waveguides, one-two or multi-port devices, masers, lasers, signal generators, changers, threshold devices, modulators, demodulators, discriminators, concentrators, multiplexers, frequency spectrum diagrams, fibre optics transmission lines and devices.)

Part 11: Architectural and topographical installation plans and diagrams.

(For example: generating stations and substations, networks, cabled distribution systems for sound and television, installation symbols for switches, socket outlets, lighting outlets, etc.)

Part 12: Binary logic elements.

(For example: qualifying symbols, dependency notation, combinative and sequential elements such as buffers, drivers, coders, arithmetic elements, delay elements, bistable, monostable and astable elements, shift registers and counters, memories.)

Part 13: Analogue elements.

(For example: amplifiers with qualifying symbols, function generators, coordinate converters, electronic switches.)

1.3 Related publication

More detailed guidance on the use of graphical symbols and the preparation of various types of diagrams will be found in BS 5070.

1.4 Terminology

Whenever possible the names of the devices and concepts symbolized in this standard correspond with those used in BS 4727.

As an aid to the understanding of BS 3939, terms for the various types of graphical symbols are defined below.

1.4.1 Graphical symbol

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

1.4.2 Symbol element

A simple figure with a defined meaning which must be combined with other figures to form the complete symbol for a device or a concept.

For example, the symbol for an electronic tube is assembled from symbol elements representing the heater, grid, anode, envelope, etc. When symbol elements are combined in this way their arrangement is not necessarily related to the physical structure of the device symbolized.

1.4.3 General symbol

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

1.4.4 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 a capacitor may be added to that for a microphone to produce the symbol for a capacitor microphone.

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

1.4.5 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 single-line representation is applied. They may also be used in diagrams with all input and output connections shown.

1.5 Presentation of symbols

The symbols in this standard 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 computer-aided draughting system, see Clause 1.8. For the symbols in Part 11, intended to be used on diagrams based on layout drawings or maps, it may be necessary to adapt the scale to that used on the drawings and maps.

Although the symbols are presented without a background grid, a grid was used in their preparation. A transparent overlay with a grid is included in this part of the standard.

1.6 Numbering of symbols

Each symbol has a serial number. This number is composed of three groups:

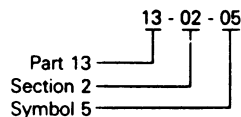
- the first one (two digits) is the number of the part of BS 3939;
- the second one (two digits or one letter and one digit) is the number of the section in the part;
- the third one (two digits) is the number of the symbol in the section.

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

In each part the sections are numbered from 01 to 99 or, in the annexes, from A1 to A9.

In each section the symbols are numbered from 01 to 99 consecutively.

Example:



1.7 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 the standard it should be possible to produce it by an appropriate combination of the published symbols.

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.

Symbols may be turned or mirror-imaged if their meaning will not be changed thereby. The orientation shown in this standard is not mandatory.

Different line thickness may be used for conductor symbols.

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 standard gives examples of the practice only in the cases where there is a recommended method for the presentation of such information.

1.8 Adaption of symbols to computer-aided draughting systems

In order to facilitate the use of the symbols in this standard with a computer-aided system:

- the symbols have been designed so that they can be used on a grid system with a modulus *M*. The modulus used in this standard, 2.5 mm, is not mandatory;
- connecting lines to a symbol coincide with the grid lines and end at grid line intersections;

- the sides of rectangles and the diameter of circles have been made multiples of 2 M. For smaller symbols also dimensions equal to 1.5 M, 1 M and 0.5 M have been used;
- a distance of at least 2 M has been provided between connecting lines to meet the requirements of BS 308, for a minimum character height of 2.5 mm.

It is an additional requirement of computer-aided systems that each symbol should have a reference point located at a grid intersection. Although there is no general rule stating exactly where such a reference point should be located, the transparent overlay facilitates the selection of a suitable point.

Section 2. General Index

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<i>Description</i>	<i>Symbol No.</i>	<i>Description</i>	<i>Symbol No.</i>
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<i>Description</i>	<i>Symbol No.</i>	<i>Description</i>	<i>Symbol No.</i>
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ideal current source	02-16-01	buffer without specially amplified output	12-27-10
ideal gyrator	02-16-03	distributed connection	12-27-13
ideal voltage source	02-16-02	exclusive-OR	12-27-09
Circuit(s)		inverter	12-27-12
general symbol	03-01-01	LOGIC IDENTITY	12-27-06
Circuits-Telecommunication		logic threshold	12-27-03
(see: Telecommunication circuits)		m and only m	12-27-04
		majority	12-27-05