
Graphical symbols for diagrams —

Part 1:

General information and indexes

Symboles graphiques pour schémas —

Partie 1: Informations générales et index

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 14617 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14617-1 was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 10, *Process plant documentation and tpd-symbols*.

ISO 14617 consists of the following parts, under the general title *Graphical symbols for diagrams*:

- Part 1: General information and indexes
- Part 2: Symbols having general application
- Part 3: Connections and related devices
- Part 4: Actuators and related devices
- Part 5: Measurement and control devices
- Part 6: Measurement and control functions
- Part 7: Basic mechanical components
- Part 8: Valves and dampers
- Part 9: Pumps, compressors and fans
- Part 10: Fluid power converters
- Part 11: Devices for heat transfer and heat engines
- Part 12: Devices for separating, purification and mixing
- Part 15: Installation diagrams and network maps

Other parts are under preparation.

Annexes A, B and C of this part of ISO 14617 are for information only.

Introduction

The purpose of ISO 14617 in its final form is the creation of a library of harmonized graphical symbols for diagrams used in technical applications. This work has been, and will be, performed in close cooperation between ISO and IEC. The ultimate result is intended to be published as a standard common to ISO and IEC, which their technical committees responsible for specific application fields can use in preparing International Standards and manuals.

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Graphical symbols for diagrams —

Part 1: General information and indexes

1 Scope

This part of ISO 14617 serves as an introduction to all the other parts. In particular, it gives information on the creation and use of registration numbers for identifying graphical symbols used in diagrams, rules for the presentation and application of these symbols, and examples of their use and application. It includes three indexes: an alphabetic index and an index of registration numbers, both concerned uniquely with ISO 14617-2 to ISO 14617-12, and an index of cross-references to related items found in other International Standards.

For the fundamental rules of creation and application of graphical symbols in diagrams, see ISO 81714-1.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 14617. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 14617 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 81714-1:1999, *Design of graphical symbols for use in the technical documentation of products — Part 1: Basic rules*

3 Terms and definitions

For the purposes of this part of ISO 14617, the following terms and definitions apply.

NOTE The list has been restricted to terms whose meaning is not obvious and which have not been defined elsewhere in an International Standard, or which have been defined in various ways in different standards. In preparing these definitions, ISO and IEC standards on terminology have been consulted; see the references in parentheses. However, most of the definitions in those standards were prepared by different technical committees within a restricted scope. This means that many terms so defined have to be given more general or neutral definitions when applied in the context of graphical symbols.

3.1

function

activity proper to anything, mode of action by which it fulfils its purpose

EXAMPLE To measure, to control, to indicate.

3.2

product

thing produced by natural process or manufacture; result

EXAMPLE An element, a component or a device.

**3.3
component**

constituent part of equipment that cannot be physically divided into smaller parts without losing its character

[IEC 60050-131]

**3.4
device**

assembly of components to perform a required function

EXAMPLE An actuating device, a centrifuge.

[IEC 60050-151]

**3.5
element**

part of a component

EXAMPLE A filter element in a filter, a contact in an electromechanical relay.

**3.6
graphical symbol**

visually perceptible figure used to transmit information independently of language

[ISO 81714-1]

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**3.7
terminal line**

line of a graphical symbol ending at a connect node

NOTE A connect node is a location on a graphical symbol intended for connection (ISO 81714-1).
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[ISO 81714-1]

**3.8
connecting line**

graphical symbol representing a functional connection, a mechanical link, a pipeline, a duct, or an electric connection

[IEC 61082-1]

4 Arrangement of ISO 14617

4.1 Domains of application

The complete ISO 14617 is to consist of a number of other parts in addition to those listed in the foreword. Among the parts under preparation are ISO 14617-13, concerned with graphical symbols for material processing, and ISO 14617-14, concerned with the symbols representing devices for transport and handling of material.

This part of ISO 14617 is an introduction to all the other parts. ISO 14617-2 to ISO 14617-6 cover graphical symbols for use in most technical fields. ISO 14617-7 to ISO 14617-12 cover those for use in all fields except the electrotechnical. ISO 14617-15 comprises graphical symbols for use in installation diagrams and on network maps for pipelines, ducts and electric connections.

4.2 Subdivision of parts

Each part of ISO 14617 is divided into clauses that each deal with graphical symbols for a particular group of generic products or functions. When appropriate, clauses are given subclauses, as follows using the example of clause 7 from ISO 14617-2:

| | |
|---------------|--|
| Clause 7 | Directions |
| Subclause 7.1 | Symbols of basic nature |
| Subclause 7.2 | Application rules for the symbols in 7.1 |
| Subclause 7.3 | Symbols giving supplementary information |
| Subclause 7.4 | Application rules for the symbols in 7.3 |
| Subclause 7.5 | Application examples |

Where certain subclauses are further subdivided, this has been done along the following lines. Take, for example, 4.3 in ISO 14617-2:

| | |
|-----------------|--|
| Subclause 4.3 | Symbols giving supplementary information |
| Subclause 4.3.1 | Input and output labels |
| Subclause 4.3.2 | General functions |
| Subclause 4.3.3 | Mathematical operations |
| Subclause 4.3.4 | Change of discrete state at specified values of a characteristic quantity |
| Subclause 4.3.5 | Logic negation, logic inversion, inputs and outputs for auxiliary power supply |

When a cross-reference is made to a particular graphical symbol or application rule or application example, its location is given within parentheses after the registration number of the symbol, rule or example.

EXAMPLE 1 “See R101 (4.2.1)” directs the reader to application rule R101, located in subclause 4.2.1.

When cross-referencing to another part, the part number is also included.

EXAMPLE 2 A cross-reference to symbol 142 in ISO 14617-2 is given as “See 142 (2-4.3.2.28)”.

5 Registration numbers

IMPORTANT — A direct relationship does not necessarily exist between graphical symbols, application rules and application examples using registration numbers that share the same numerals. For example, while graphical symbol 101 correlates to both application rule R101 and application example X101, it correlates as well to application examples X102 to X114; whereas symbol 114, to take just one other example, is unrelated to R114 and X114.

5.1 Graphical symbol

Each graphical symbol is assigned a unique registration number. In principle, this number is arbitrarily chosen. No information can be derived from it. The registration number will remain unchanged throughout the lifetime of the corresponding graphical symbol, including in future revisions of this publication. If a graphical symbol is changed in the future, the registration number shall be supplemented with one or more characters. If the graphical symbol is substantially changed, it shall instead be given a new registration number.

5.2 Application rule

Each application rule has a registration number in the same way as the graphical symbols, except that the registration number starts with the letter R (e.g. R101).

5.3 Application example

Each application example has a registration number in the same way as the graphical symbols, except that the registration number starts with the letter X (e.g. X101).

6 Presentation of graphical symbols

6.1 General

ISO 14617 establishes graphical symbols to be used in diagrams such as overview diagrams, flow diagrams and circuit diagrams.

6.2 Graphical symbols of same shape but different meaning

Graphical symbols having the same shape but different meanings have different registration numbers. This implies that it is possible to distinguish between same-shape graphical symbols in a CAD (computer-aided design) system, provided that each symbol has been recalled from a CAD library using the appropriate registration number.

For a person reading a diagram, the intended meaning can normally be recognized by the context of the diagram. When this is not possible, graphical symbols having the same shape shall be provided with supplementary information. For examples, see the symbols for connections in ISO 14617-3 and the rules for adding symbols giving supplementary information such as application rule R402 in the same part.

6.3 Different forms of graphical symbols

In some cases, different forms of a graphical symbol can occur. These different forms are given separate registration numbers. The primary reason for having two or more forms for the same symbolization is that they convey differing amounts of information.

Symbols having different forms and differing amounts of information (e.g. those for use in overview diagrams and those for use in circuit diagrams) are marked Form 1, Form 2, etc. This marking is also used in some cases where the different forms contain the same amount of information, but where more than one form is justified because of different application methods in the rules for preparing diagrams.

6.4 Dimensions of graphical symbols

The graphical symbols in ISO 14617 have been designed in accordance with the rules given in ISO 81714-1. The module size $M = 2,5$ mm has been used. For small graphical symbols, the symbol is shown double its normal size, applying the same module and the same line width. Such symbols are marked "200 %".

For the auxiliary grid system defined in ISO 81714-1, the module 0,25 M has been used.

6.5 Descriptions

In those cases where ISO and IEC have the same term for different items, the term has been provided with ISO and IEC superscripts, for example, line^{ISO} and line^{IEC}.

7 Application rules and examples

The application rules give information on how to design composite symbols and how to apply the graphical symbols in a diagram. The application examples are to be regarded as guidelines.

In order to facilitate their use, the application examples are accompanied by information on which graphical symbols have been used to compose the examples shown.

EXAMPLE “101, 123” in 2-4.5.8 signifies that the example X108 is built up from graphical symbols 101 and 123.

8 Use of graphical symbols

8.1 Choice of graphical symbols

Rules for the choice of graphical symbols are given in the standards for the preparation of diagrams.

8.2 Dimensions of graphical symbols

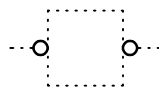
Symbols may be increased in size, for example, in order to allow all terminals to be represented. They may also be reduced in size. In both cases, the original line width shall be maintained.

Further rules for the use of graphical symbol sizes and line widths are given in the standards dealing with the preparation of diagrams.

8.3 Auxiliary lines

In some cases the symbol has been shown together with auxiliary lines in order to indicate its correct location in relation to other symbols or the recommended location of connecting lines. Such auxiliary lines are not part of the symbol and are shown dotted (very short dashes).

EXAMPLE 1 Symbol 181 — logic negation — shown at an outline of a symbol indicated by a dotted rectangle.



EXAMPLE 2 An auxiliary line indicating the correct location of the symbol for a connection to a two-way valve, symbol 2101.



8.4 Variants of graphical symbols

The rules for diagram layout give the possibility of arranging circuits horizontally or vertically, and of arranging circuits for feedback and similar signals in a direction opposite to the normal one. For that purpose, different variants of the graphical symbols exist. The rules for the creation of the different variants are given in ISO 81714-1.

9 Lettering

For lettering, see ISO 81714-1.

10 Indexes

The alphabetic index given in annex A can be used to find a graphical symbol for a certain component, device or function wherever the meaning (description) is known. This index also covers the application examples.

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The registration number index given in annex B can be used to locate a graphical symbol whose registration number is already known.

The cross-reference index given in annex C is intended as a link between the registration numbers and the corresponding descriptions in other, existing ISO and IEC standards.

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Annex A (informative)

Alphabetical index

This alphabetical index can be used to find a graphical symbol for a certain component, device, or function if its meaning (description) is already known. The index also covers the application examples.

| Description | Regis- tration number | Location (Part- subclause) | Description | Regis- tration number | Location (Part- subclause) |
|--|-----------------------------|----------------------------------|---|-----------------------------|----------------------------------|
| Acoustic signalling device..... | 866 | 5-10.1.4 | – Manual ~ operated by pushing..... | 682 | 4-5.1.2 |
| Active area | | | – Manual ~ operated by pushing and pulling..... | 684 | 4-5.1.4 |
| – Double-acting hydraulic actuator with different ~s..... | 721 | 4-6.1.11 | – Manual ~ operated by turning..... | 685 | 4-5.1.5 |
| – Double-acting pneumatic actuator with different ~s..... | 722 | 4-6.1.12 | – Manual ~ with special shape for safety purpose..... | 691 | 4-5.1.11 |
| Actuating device..... | 741 | 4-7.1.1 | – operating when actual temperature is less than set value..... | X717 | 4-6.5.5 |
| – of double-acting diaphragm actuator type..... | X743 | 4-7.5.3 | – Single-acting diaphragm ~..... | 725 | 4-6.1.15 |
| – of electric motor type..... | X2131 | 8-4.5.4.1 | | X2136 | 8-4.5.4.6 |
| – of pneumatic motor type..... | X742 | 4-7.5.2 | | X2138 | 8-4.5.4.8 |
| – of single-acting fluid cylinder type..... | X741 | 4-7.5.1 | | X2152 | 8-5.5.2 |
| – operated by pneumatic power stored inside actuator..... | X747 | 4-7.5.7 | – Single-acting hydraulic ~..... | 717 | 4-6.1.7 |
| – operating with touch effect..... | X744 | 4-7.5.4 | – Single-acting pneumatic ~..... | 718 | 4-6.1.8 |
| – Spring-operated ~ with manual spring charging..... | X745 | 4-7.5.5 | Actuators | | |
| – Spring-operated ~ with spring charging by electric motor..... | X746 | 4-7.5.6 | – Automatic ~..... | – | 4-6 |
| – Spring-loaded ~..... | X2005 | 7-4.5.5 | – See also <i>Hydraulic actuators, Pneumatic actuators, Manually operated actuators</i> | | |
| Actuating devices..... | – | 4-7.5.5 | Additional simplifications..... | – | 3-9 |
| Actuator | | | Adjustability..... | 201 | 2-5.1.1 |
| – Cam-operated ~..... | 714 | 4-6.1.4 | | | 8-4.3.1.3 |
| – Device for restricted access to ~..... | 692 | 4-5.1.12 | | | 8-5.3.3 |
| – Double-acting diaphragm ~..... | 726 | 4-6.1.16 | | | 9-4.3.1 |
| – Double-acting ~ of fluid cylinder type..... | X2107 | 8-4.5.1.7 | – Non-linear ~..... | 202 | 2-5.1.2 |
| – Double-acting hydraulic ~..... | 719 | 4-6.1.9 | – Pre-set ~..... | 203 | 2-5.1.3 |
| – Double-acting, hydraulic ~ with different active areas..... | 721 | 4-6.1.11 | | | 8-4.3.1.4 |
| – Double-acting, pneumatic ~..... | 720 | 4-6.1.10 | | | 8-5.3.4 |
| – Double-acting pneumatic ~ with different active areas..... | 722 | 4-6.1.12 | – Resistor with continuous ~..... | X203 | 2-5.5.3 |
| – Flow-target-operated ~..... | 716 | 4-6.1.6 | – Resistor with electric-motor-operated ~..... | X205 | 2-5.5.5 |
| | | 7-4.1.5 | – Resistor with manual ~..... | X204 | 2-5.5.4 |
| – Fluid-level-operated ~..... | 715 | 4-6.1.5 | – Resistor with pre-set ~..... | X201 | 2-5.5.1 |
| | | 7-4.1.4 | – Resistor with ~ in five steps..... | X202 | 2-5.5.2 |
| – in the form of a double-acting fluid cylinder..... | 724 | 4-6.1.14 | See also <i>Variability</i> | | |
| | X713 | 4-6.5.3 | Adjustable capacity | | |
| | X2107 | 8-4.5.1.7 | – Hydraulic pump with ~..... | X2401 | 10-4.5.1 |
| – in the form of a hydraulic motor with alternative directions of flow..... | 2407 | 4-6.1.17 | | X2402 | 10-4.5.2 |
| – in the form of a pneumatic motor..... | X712 | 4-6.5.2 | – Liquid pump with ~..... | X2301 | 9-4.5.1 |
| – in the form of a pneumatic motor with alternative directions of flow..... | 2408 | 4-6.1.18 | | X2302 | 9-4.5.2 |
| – in the form of a single-acting fluid cylinder..... | 723 | 4-6.1.13 | – Over-centre hydraulic pump with ~..... | X2407 | 10-4.5.7 |
| – Manual ~..... | 681 | 4-5.1.1 | Adjustable gain | | |
| – Manual ~ in the form of key..... | 687 | 4-5.1.7 | – Amplifier with ~..... | X207 | 2-5.5.7 |
| – Manual ~ in the form of lever..... | 688 | 4-5.1.8 | Adjustable hydraulic rotary torque converter..... | X2431 | 10-5.5.1 |
| – Manual ~ in the form of pedal..... | 689 | 4-5.1.9 | Adjustable restrictor (valve)..... | X2211 | 8-6.5.3.1 |
| – Manual ~ in the form of removable handle..... | 686 | 4-5.1.6 | | X2212 | 8-6.5.3.2 |
| – Manual ~ in the form of treadle..... | 690 | 4-5.1.10 | – with adjustable flow in one direction and restricted flow in the other..... | X2213 | 8-6.5.3.3 |
| – Manual ~ operated by pulling..... | 683 | 4-5.1.3 | Adjustable speed | | |
| | | | – Hydraulic motor with ~..... | X2415 | 10-4.5.15 |
| | | | – Hydraulic pump driven by shaft with ~..... | X2404 | 10-4.5.4 |
| | | | – Liquid pump driven by shaft with ~..... | X2303 | 9-4.5.3 |

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| | | | | | |
|---|-------|------------|---|----------|------------|
| Adsorption pump | 2335 | 9-5.1.5 | Anti-siphon trap | 2038 | 7-5.1.12 |
| | 2336 | 9-5.1.6 | Approximately constant force, motion, or | | |
| Affected area | 2177 | 8-6.3.7 | flow | 223 | 2-6.1.3 |
| Air conditioner for pneumatic systems | 2691 | 12-7.1.1 | Area | | |
| Air fin cooler with induced draft | X2505 | 11-4.5.5 | – Affected ~ | 2177 | 8-6.3.7 |
| Air lubricator | X2674 | 12-6.5.4 | Areas | | |
| Alarm | | | – Double-acting hydraulic actuator | | |
| – High pressure ~ | X1062 | 6-7.5.22 | with different active ~ | 721 | 4-6.1.11 |
| – Indicating and transmitting of level, | | | – Double-acting pneumatic actuator | | |
| registering, and ~ | X1065 | 6-7.5.25 | with different active ~ | 722 | 4-6.1.12 |
| Alarming | 1051 | 6-7.3.1.1 | Arrestor | | |
| All-or-nothing relay | | | – Flame ~ | 2036 | 7-5.1.10 |
| – Electromechanical ~ with some | | | Automatic actuators | – | 4-6 |
| contacts delayed | X653 | 4-4.5.3 | Automatic closing | | |
| – Electromechanical ~, the whole relay | | | – Quick-release coupling element of | | |
| delayed when coil is energized | X654 | 4-4.5.4 | female type with ~ | 567 | 3-8.1.6 |
| Alternative directions | | | – Quick-release coupling element of | | |
| – Direction of propagation, energy, or | | | male type with ~ | 566 | 3-8.1.5 |
| signal flow, ~ (half-duplex) | 250 | 2-7.1.8 | – Quick-release coupling element | | |
| | | 6-4.3.3 | which fits into another coupling | | |
| – Gas pump, compressor, fan with ~ of | | | element of the same type with ~ | 568 | 3-8.1.7 |
| flow | 2304 | 9-4.1.4 | Automatic operation | 144 | 2-4.3.2.30 |
| – Hydraulic pump/motor with ~ of flow | 2413 | 10-4.1.13 | – of final controlling element | 1022 | 6-6.1.2 |
| – Hydraulic motor with ~ of flow | 2407 | 10-4.1.7 | – of pump | X1031 | 6-6.5.11 |
| – Hydraulic pump with ~ of flow | 2403 | 10-4.1.3 | – of valve controlled by analogue signal | X1028 | 6-6.5.8 |
| – in general, except for energy and | | | X1035 | 6-6.5.15 | |
| signal flow | 245 | 2-7.1.5 | – of valve with infinite number of stable | | |
| | 246 | 2-7.1.6 | positions | X1034 | 6-6.5.14 |
| – Limited circular motion in ~ | X253 | 2-7.5.8 | X1036 | 6-6.5.16 | |
| – Liquid pump with ~ of flow | 2303 | 9-4.1.3 | – of valve with automatic return to | | |
| – of circular motion | 256 | 2-7.1.14 | closed position | X1026 | 6-6.5.6 |
| – of propagation, energy, or signal flow | | | of valve with automatic return to | | |
| (half-duplex) | 250 | 2-7.1.8 | open position | X1027 | 6-6.5.7 |
| – Pneumatic motor with ~ of flow | 2408 | 10-4.1.8 | of valve with automatic return | | |
| – Pneumatic pump, compressor with ~ | | | towards closed position | X1029 | 6-6.5.9 |
| of flow | 2404 | 10-4.1.4 | – of valve with automatic return | | |
| – Pneumatic pump/motor with ~ of flow | 2414 | 10-4.1.14 | towards open position | X1030 | 6-6.5.10 |
| – Rectilinear motion in ~ with | | | – of valve with two stable positions, | | |
| intermediate dwell | X256 | 2-7.5.11 | open and closed | X1032 | 6-6.5.12 |
| Amplification | 115 | 2-4.3.2.5 | X1033 | 6-6.5.13 | |
| | | 6-7.3.3.1 | Automatic return | | |
| Amplifier | 891 | 5-12.1.1 | – Control-switch operated by turning | | |
| | 892 | 5-12.1.2 | with ~ from two extreme positions | X686 | 4-5.5.6 |
| – Differential ~ | X910 | 5-12.5.10 | – device | 654 | 4-4.1.9 |
| – Summing ~ | X909 | 5-12.5.9 | | | 6-6.3.4 |
| – with adjustable gain | X207 | 2-5.5.7 | – Directional control valve with ~ | X688 | 4-5.5.8 |
| – with return channel | 893 | 5-12.1.3 | – Single-acting hydraulic cylinder with ~ | X2442 | 10-6.5.2 |
| | 894 | 5-12.1.4 | – Manually operated control-switch | | |
| – with the gain compensated for | | | with ~ | X685 | 4-5.5.5 |
| frequency variations | X110 | 2-4.5.10 | – Manually operated valve with ~ | X1022 | 6-6.5.2 |
| Analogue signal | 234 | 2-6.1.14 | – Valve with diaphragm actuator and ~ | X2101 | 8-4.5.1.1 |
| | | 6-4.3.5 | Auxiliary location | | |
| Analogue signal processing | | | – in central control room | 1102 | 6-7.3.4.2 |
| – Devices for ~ | – | 5-12 | – in local control room or on local | | |
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