INTERNATIONAL STANDARD

ISO 14617-9

First edition
2002-09-01

Graphical symbols for diagrams —

Part 9: Pumps, compressors and fans

Symbols graphiques pour schémas —

Partie 9: Pompes, compresseurs et ventilateurs

Reference number
ISO 14617-9:2002(E)

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Printed in Switzerland

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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 14617-9 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.

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.

Graphical symbols for diagrams —

Part 9:
Pumps, compressors and fans

1 Scope

This part of ISO 14617 specifies graphical symbols for pumps, compressors and fans, used mainly for transportation, in diagrams (for pumps and compressors used mainly for energy conversion, such as those in fluid power systems, see ISO 14617-10).

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

For an overview of ISO 14617, 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, see ISO 14617-1.

2 Normative references

The following normative documents contain 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 editions of the normative documents 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 5598:1985, *Fluid power systems and components — Vocabulary*

ISO 14617-1:2002, *Graphical symbols for diagrams — Part 1: General information and indexes*

ISO 14617-2:2001, *Graphical symbols for diagrams — Part 2: Symbols having general application*

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
(positive) displacement pump
pump in which the fluid energy is increased in a working chamber that increases and decreases in volume

[ISO 5598]

3.2
rotodynamic pump
pump in which the fluid energy is increased by a rotating impeller

[ISO 5598]

NOTE The term “centrifugal pump” is sometimes used instead, but that term corresponds to a rotodynamic pump with radial liquid flow.

3.3
turbo-molecular pump
rotodynamic vacuum pump in which the rotor is provided with discs provided with slots or blades rotating between corresponding discs in the stator

[ISO 3529-2]

3.4
capacity
displacement
swept volume
volume absorbed or displaced per stroke or cycle

[ISO 5598]

3.5
over-centre pump
pump in which the direction of flow may be reversed without changing the direction of rotation of the drive shaft

[ISO 5598]

3.6
uni-flow pump
pump in which the direction of flow is independent of the direction of rotation of the drive shaft

[ISO 5598]

3.7
entrainment pump
vacuum pump in which a momentum is imparted to the gas molecules in such a way that the molecules are transferred continuously from the inlet to the outlet

[ISO 3529-2]

3.8
entrapment pump
vacuum pump in which the gas molecules are retained by sorption or condensation on internal surfaces

[ISO 3529-2]

3.9
ejector pump
entrainment pump which uses the pressure decrease due to a Venturi effect and in which the fluid is entrained in a high speed liquid stream towards to outlet

[ISO 3529-2, ISO 5598]

3.10
diffusion pump
entrainment pump in which a low-pressure, high-speed vapour stream provides the entrainment fluid

[ISO 3529-2]

3.11
adsorption pump
entrapment pump in which the gas is retained mainly by physical adsorption of a material of large real area (for example, a porous substance)

[ISO 3529-2]

3.12
getter pump
entrapment pump in which the gas is retained principally by chemical combination with a getter

[ISO 3529-2]

3.13
getter ion pump
entrapment pump in which the gas molecules are ionized and then transferred towards a surface of the pump on which they are retained by a getter, by means of electric fields, combined or not with a magnetic field

[ISO 3529-2]

3.14
cryopump
entrapment pump consisting of surfaces refrigerated to a low temperature (normally less than 120 K) sufficient to condense residual gases

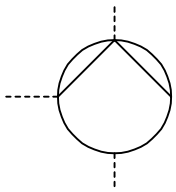
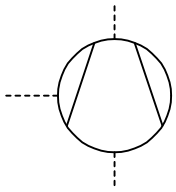
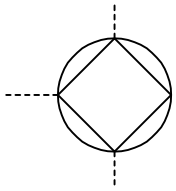
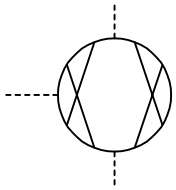
[ISO 3529-2]

3.15
electric pump
pump working by feeding electric power directly into the pump

3.16
induction pump
pump without rotating parts, in which electromagnetic fields exert the necessary force on the pumped medium (normally metals in liquid form)

4 Mechanically driven pumps, compressors and fans

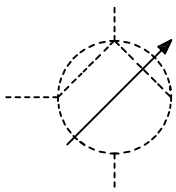
4.1 Symbols of a basic nature

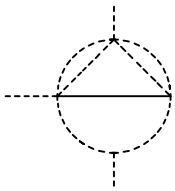
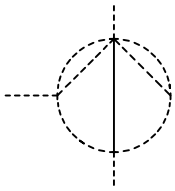
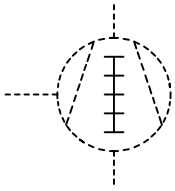
4.1.1	**2301**		Liquid pump
4.1.2	**2302**		Gas pump (including vacuum pump), compressor, fan
4.1.3	**2303**		Liquid pump with alternative directions of flow
4.1.4	**2304**		Gas pump, compressor, fan with alternative directions of flow

4.2 Application rule for the symbols in 4.1

None.

4.3 Symbols giving supplementary information

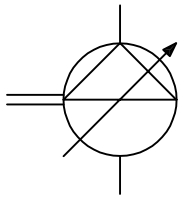
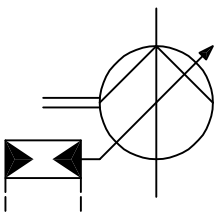
4.3.1	**201**		Adjustability See R201 (4.4.1) and R2311 (4.4.3).
4.3.2	**221**	Form 1 	Constant force, motion, or flow See R221 (4.4.2).
4.3.3	**222**	Form 2 	
4.3.4	**225**		Pulse-shaped force, motion, or flow

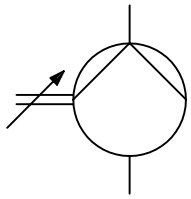
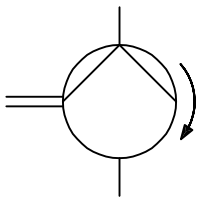
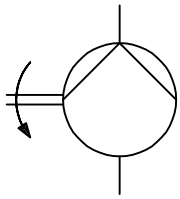
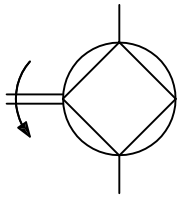
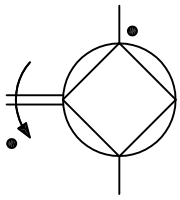
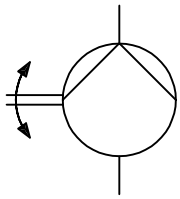
4.3.5	**2321**		Positive-displacement type
4.3.6	**2322**		Rotodynamic type
4.3.7	**2323**		Turbo-molecular type

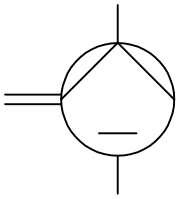
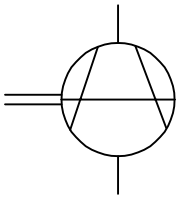
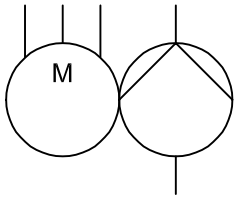
4.4 Application rules for the symbols in 4.3

4.4.1	**R201**	The symbol should cross the centre of the symbol to which it is added. For examples, see X201 (2-5.5.1) to X206 (2-2.5.6) and X2301 (4.5.1) to X2303 (4.5.3). If this symbol consists of an outline in the form of a square, rectangle or circle and a symbol inside indicating the function, another location could be more appropriate. For an example, see X207 (2-5.5.7).
4.4.2	**R221**	Form 2 may be used if confusion is unlikely.
4.4.3	**R2311**	Applied to symbols for pumps, compressors, and fans, the symbol indicates adjustability of the capacity as defined in ISO 5598, if not otherwise indicated.

4.5 Application examples

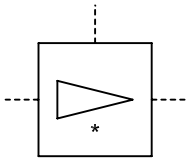
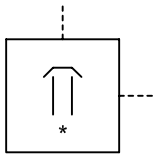
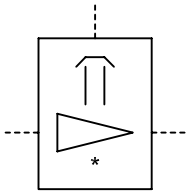
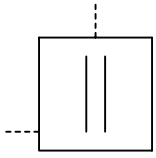
4.5.1	**X2301**	 201, 402, 2301, 2321	Liquid pump of positive-displacement type with adjustable capacity
4.5.2	**X2302**	 201, 402, 403, 719, 2301, 2322	Liquid pump of rotodynamic type with adjustable capacity The actuator is shown.

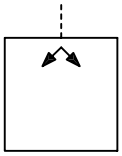
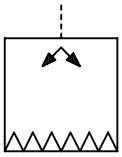
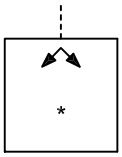
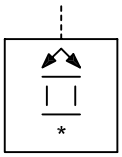
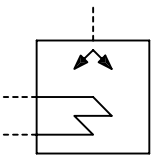
4.5.3	**X2303**	 201, 402, 2301	Liquid pump driven by shaft with adjustable speed
4.5.4	**X2304**	 255, 402, 2301	Liquid pump with clockwise rotation when seen towards shaft end NOTE For the interpretation of the arrow, see R249 (2-7.2.8).
4.5.5	**X2305**	 255, 402, 2301	
4.5.6	**X2306**	 255, 402, 2303	Over-centre liquid pump Clockwise rotation shown.
4.5.7	**X2307**	 256, 263, 402, 2303	Reversible liquid pump Corresponding directions of rotation and of flow indicated.
4.5.8	**X2308**	 256, 402, 2301	Uni-flow liquid pump

4.5.9	**X2309**	 222, 402, 2301	Liquid pump with substantially even flow
4.5.10	**X2310**	 402, 2302, 2321	Gas pump, compressor of positive displacement type
4.5.11	**X2311**	 2301, IEC	Liquid pump with built-in electric motor (wet rotor)

5 Entrainment and entrapment pumps

5.1 Symbols of a basic nature

5.1.1	**2331**		Ejector pump See R2331 (5.2.1).
5.1.2	**2332**		Diffusion pump See R2331 (5.2.1).
5.1.3	**2333**		Diffusion-ejector pump See R2331 (5.2.1).
5.1.4	**2334**		Gas-lift pump

5.1.5	**2335**		Entrapment pump EXAMPLE Adsorption pump, getter pump.
5.1.6	**2336**		Adsorption pump
5.1.7	**2337**		Getter pump See R2332 (5.2.2).
5.1.8	**2338**		Getter ion pump See R2332 (5.2.2).
5.1.9	**2339**		Cryopump

5.2 Application rules for the symbols in 5.1

5.2.1	**R2331**	The asterisk shall be replaced with a chemical symbol for the fluid, or else shall be omitted.
5.2.2	**R2332**	The asterisk shall be replaced with the chemical symbol for the sorbent concerned.

5.3 Symbol giving supplementary information

None.

5.4 Application rule for the symbol in 5.3

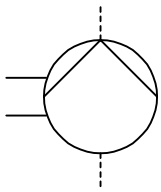
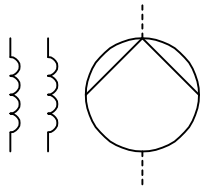
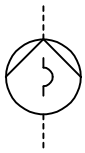
None.

5.5 Application example

None.

6 Electric pumps

6.1 Symbols of a basic nature

6.1.1	**2351**		Electric liquid pump, for example, working by piezoelectric effect
6.1.2	**2352**	Form 1 	Electric induction liquid pump Detailed and simplified forms shown.
6.1.3	**2353**	Form 2 	

6.2 Application rule for the symbols in 6.1

None.

6.3 Symbol giving supplementary information

None.

6.4 Application rule for the symbol in 6.3

None.

6.5 Application example

None.

Bibliography

[1] ISO 3529-2:1981, *Vacuum technology — Vocabulary — Part 2: Vacuum pumps and related terms*

[2] ISO 14617-10:2002, *Graphical symbols for diagrams — Part 10: Fluid power converters*

ICS 01.080.30

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