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**Graphical symbols for diagrams —**  
**Part 6:**  
**Measurement and control functions**

*Symboles graphiques pour schémas —*

*Partie 6: Fonctions de mesurage et de contrôle*

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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 14617-6 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.

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# Graphical symbols for diagrams —

## Part 6: Measurement and control functions

### 1 Scope

This part of ISO 14617 specifies graphical symbols for measurement and control functions in diagrams, with the same symbols in simple applications possibly representing instead components or devices implementing such functions. For graphical symbols for measurement and control components and devices, see ISO 14617-5.

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 31-11:1992, *Quantities and units — Part 11: Mathematical signs and symbols for use in the physical sciences and technology*

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

ISO 14617-2:2002, *Graphical symbols for diagrams — Part 2: Symbols having general application*

ISO 14617-3:2002, *Graphical symbols for diagrams — Part 3: Connections and related devices*

ISO 14617-4:2002, *Graphical symbols for diagrams — Part 4: Actuators and related devices*

ISO 14617-5:2002, *Graphical symbols for diagrams — Part 5: Measurement and control devices*

ISO 14617-8:2002, *Graphical symbols for diagrams — Part 8: Valves and dampers*

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

IEC 60617-12:1997, *Graphical symbols for diagrams — Part 12: Binary logic elements*

IEC 60617-13:1993, *Graphical symbols for diagrams — Part 13: Analogue elements*

IEC 61175:1993, *Designations for signals and connections*

### 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

##### **control**

purposeful action on or in a system to meet specified objectives

[IEC 60050-351]

**NOTE** Control may include monitoring and safeguarding in addition to the control action itself.

#### 3.2

##### **operation**

transfer of mechanical parts

[IEC 60050-441]

**EXAMPLE** The closing member of a shut-off valve or the contacts of an electromechanical switching device.

**NOTE 1** The transfer direction may be defined as an opening operation, closing operation, ON-operation, OFF-operation, etc.

**NOTE 2** The term has a specific meaning in conjunction with electric measuring relays. An over/under- relay is operating when its characteristic quantity reaches the set value by increasing/decreasing in value (IEC 60050-448).

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#### 3.3

##### **manual control**

control of an operation by human intervention

[ISO 5598, IEC 60050-351]

#### 3.4

##### **automatic**

(control, operation) self-acting (not needing human intervention)

[ISO 5598, IEC 60050-351]

#### 3.5

##### **final controlling element**

element which directly changes the output variable of a controlling system (manipulated variable)

[IEC 60050-351]

#### 3.6

##### **delay device**

device providing a time interval between the instant when an actuating force is applied or removed and the instant when the consequent change of position or state of the affected parts start

#### 3.7

##### **automatic return device**

device for returning movable parts, such as those of a valve to initial position (at-rest position), after an actuating force has been removed



**3.8****detent**

device which retains movable parts, for example, those of a valve, in a certain position until sufficient force is applied to overcome the detaining force in order to move the parts to another position

[ISO 5598]

**3.9****latching device**

mechanical device giving movable parts, for example, those of a valve, the possibility to move in one direction but preventing them from returning until the latch has been released

[ISO 5598]

**3.10****blocking device**

mechanical device preventing movable parts, for example, those of a valve, from moving in any direction until the blocking device has been released

**3.11****interlocking device**

mechanical device making the operation of movable parts of one component, for example, a contactor, dependent on the position or state of another component with movable parts

[IEC 60050-441]

**3.12****information processing**

performing of operations on data to obtain or treat information

**3.13****primary location**

location of measuring instruments, potentiometers etc. accessible to an operator

cf. auxiliary location (3.14)

**3.14****auxiliary location**

location of measuring instruments, potentiometers etc. not accessible to an operator, for example, behind a panel.


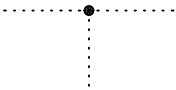
cf. primary location (3.13)

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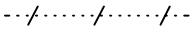
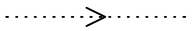





**4 Functional links and junctions****4.1 Symbols of a basic nature**

<b>4.1.1</b>	<b>401</b>		Functional connection See R401 (4.2.1) and R402 (4.2.2).
<b>4.1.2</b>	<b>501</b>		Joint of connections See R501 (4.2.3).

## 4.2 Application rules for the symbols in 4.1

4.2.1	R401	Symbols for connections may cross each other.
4.2.2	R402	When confusion between symbols 401 (4.1.1) and 405 (3-4.1.5) to 410 (3-4.1.10) for other types of connections is likely, symbol 431 (4.3.1) shall be added.
4.2.3	R501	The diameter of the dot should be five times the width of the line.  The symbol may be omitted in a T-joint. For an example, see X505 (3-5.5.5).

## 4.3 Symbols giving supplementary information

4.3.1	431		Pure functional type
4.3.2	249		Direction of propagation, energy, or signal flow (simplex)  See R247 (4.4.1).
4.3.3	250		Direction of propagation, energy, or signal flow, alternative directions (half-duplex)  See R247 (4.4.1).
4.3.4	251		Direction of propagation, energy, or signal flow simultaneously in both directions possible (full-duplex)  See R247 (4.4.1).
4.3.5	234		Analogue signal
4.3.6	235		Digital signal
4.3.7	236		Binary signal

## 4.4 Application rules for the symbols in 4.3


4.4.1	R247	The symbol shall be shown on the connecting line and located such that it does not touch any other symbol.  The symbol may also be used to indicate the transfer direction of a component or device, in which case the symbol should be located on the outline of the basic symbol.
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## 4.5 Application examples

See clause 10.

## 5 Point of measurement

### 5.1 Symbol of a basic nature

5.1.1	1011		Point of measurement See R1011 (5.2.1).
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### 5.2 Application rule for the symbol in 5.1

5.2.1	R1011	The symbol shall be used if it is necessary to clearly indicate the location of the point of measurement. For an example, see X1011 (5.5.1).	
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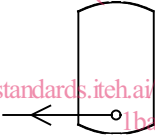
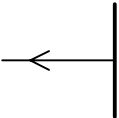
### 5.3 Symbol giving supplementary information

None.

### 5.4 Application rule for the symbol in 5.3



None.

### 5.5 Application examples

5.5.1	X1011	 <p>ISO 14617-6:2002  <a href="https://standards.itech.ai/catalog/standards/sist/6ce5ee21-22f4-42cb-9836-1b40f54473e2/iso-14617-6-2002">https://standards.itech.ai/catalog/standards/sist/6ce5ee21-22f4-42cb-9836-1b40f54473e2/iso-14617-6-2002</a></p> <p>249, 401, 1011, 2062</p>	Measurement inside and near the bottom of a pressure vessel
5.5.2	X1012	 <p>249, 401, 405</p>	Measurement in a pipeline The use of symbol 1011 (5.1.1) is not regarded as necessary.

## 6 Operation of final controlling elements











### 6.1 Symbols of a basic nature

6.1.1	1021		Manual operation of a final controlling element
6.1.2	1022		Automatic operation of a final controlling element The input may be a binary (#) or an analogue (∩) signal. See R1021 (6.2.1).

## 6.2 Application rules for the symbols in 6.1

<b>6.2.1</b>	<b>R1021</b>	<p>If necessary, the input or inputs shall be provided with signal designations (see IEC 61175) indicating the action of the signals.</p> <p>When the final controlling element is of the bistable type, two input signals are needed. For an example, see X1032 (6.5.12). In many cases the diagram may be simplified by indicating the two inputs by only one functional link provided with two signal names. For an example, see X1033 (6.5.13).</p>
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## 6.3 Symbols giving supplementary information

<b>6.3.1</b>	<b>651</b>	Form 1  200 %	Delay device where the action is delayed when the direction of movement is towards the centre of the arc  See R651 (6.4.1).
<b>6.3.2</b>	<b>652</b>	Form 2  200 %	
<b>6.3.3</b>	<b>653</b>	 200 %	Delay device where the action is delayed in both directions  See R651 (6.4.1).
<b>6.3.4</b>	<b>654</b>	 200 %	Automatic return device  The return direction is towards the apex.  See R652 (6.4.2) and R1022 (6.4.3).
<b>6.3.5</b>	<b>655</b>	 200 %	Detent for detaining in a discrete position  See R652 (6.4.2).
<b>6.3.6</b>	<b>659</b>	 200 %	Detent for detaining in any position  See R652 (6.4.2).
<b>6.3.7</b>	<b>660</b>	 200 %	Detent for detaining in any position, drift to the left permitted  See R1023 (6.4.4).
<b>6.3.8</b>	<b>661</b>	 200 %	Latching device
<b>6.3.9</b>	<b>664</b>	 200 %	Blocking device
<b>6.3.10</b>	<b>666</b>	 200 %	Interlocking device

## 6.4 Application rules for the symbols in 6.3

<b>6.4.1</b>	<b>R651</b>	The double line shall be attached to the symbol for the element of a component or device that is delayed. For examples, see X653 (4-4.5.3), X654 (4-5.5.4) and X1023 (6.5.3).
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