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INTERNATIONAL STANDARD



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**Process measurement control functions and instrumentation —  
Symbolic representation —  
Part I : Basic requirements**

*Fonctions et instrumentation pour la mesure et la régulation des processus industriels — Représentation  
symbolique —  
Partie I : Principes de base*

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## FOREWORD

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3511/1 was developed by Technical Committee ISO/TC 10, *Technical drawings*, and was circulated to the member bodies in October 1974.

It has been approved by the member bodies of the following countries :

Australia	Hungary	Romania
Austria	India	South Africa, Rep. of
Belgium	Ireland	Spain
Bulgaria	Mexico	Sweden
Chile	Netherlands	Switzerland
Denmark	New Zealand	Turkey
France	Norway	United Kingdom
Germany	Poland	Yugoslavia

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Canada  
Finland  
Italy  
U.S.A.

# Process measurement control functions and instrumentation — Symbolic representation — Part I : Basic requirements

## 0 INTRODUCTION

This International Standard has been devised to provide a universal means of communication between the various interests involved in the design, manufacture, installation and operation of measurement and control equipment used in the process industries.

Requirements within the industries vary considerably, and in recognition of this, this International Standard is presented in three parts as follows :

Part I : Basic requirements (directed towards the needs of those whose prime interest is in basic measurement and control means).

Part II : Extension of basic requirements.

Part III : Detailed symbols.

The three parts together are intended

a) to meet the requirements of those who, possibly employing more sophisticated measurement and control means, may wish to depict such aspects as the measurement techniques embodied in a particular instrument, or the means — hydraulic, pneumatic, electrical, mechanical — used for its actuation;

b) to provide standard symbolic representation for process measurement control functions and instrumentation. These symbols are not intended to replace graphic symbols for electrical equipment as contained in IEC Publication 117.

## 1 SCOPE AND FIELD OF APPLICATION

Part I of this International Standard establishes a symbols system for use in depicting the basic functions of measurement and control equipment in relation to the plant with which it is associated. The system has been intentionally limited to the identification of instrument functions and does not provide means of illustrating specific instruments.

## 2 DEFINITIONS

The following definitions are used solely for the purpose of this International Standard to assist in the application and understanding of the symbol system.

**2.1 point of measurement** : The point in a process at which a measurement is or may be made.

**2.2 instrument** : A device or combination of devices used directly or indirectly to measure, display and/or control a variable. This term does not apply to internal components of the instruments, for example resistor or receiver bellows.

**2.3 panel-mounted instrument** : An instrument that is mounted in a group normally accessible to the operator.

**2.4 locally mounted instrument** : An instrument that is not panel mounted.

**2.5 correcting unit** : The unit comprising those elements (actuating and correcting) which adjust the correcting conditions, in response to a signal from the controller.

**2.6 actuating element** : That part of the correcting unit which adjusts the correcting element, for example a response to a signal from the controller.

**2.7 correcting element** : That part of the correcting unit which directly adjusts the value of the correcting conditions.

**2.8 alarm** : A device which is intended to attract attention to a defined abnormal condition by means of a discrete audible and/or visible signal, but which does not itself institute corrective action.

**2.9 set value** : The value of the controlled condition to which the controller is set.

### 3 SIZE AND OUTLINE OF BASIC SYMBOLS

The symbol requirements given below have been adopted to provide for legibility and ease of drawing. If diagrams are to be photographically reduced, then these sizes should be correspondingly larger.

#### 3.1 Point of measurement

The symbol is a thin line connected to a flow line or to a plant equipment outline. If not connected to an instrument symbol, an identifying letter shall be placed close to this to designate the measurable property. The letters used shall comply with the table.

The location of the symbol shall be functionally correct and placed in the correct process sequence but need not illustrate the geographical position.

However, where it is desirable, for clarification, to identify the location of the point of measurement within a plant equipment outline, a small circle of approximately 2 mm diameter may be used at this point at the end of the thin line as shown in the figures in 6.1.7 and 6.9.

#### 3.2 Instrument

The symbol comprises :

- a thin line circle of approximately 10 mm diameter;
- a letter code showing the property measured and function (see clause 4).

A number may be included to facilitate identification. Where the letter code/identification number cannot be accommodated within the circle, the circle may be broken.

#### 3.3 Panel-mounted instrument

The symbol is a thin line circle of approximately 10 mm diameter with a horizontal thin line across it. The line may be located at any height within the circle.



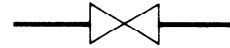
NOTE - For an instrument mounted inside a control panel, the above symbol may include a second horizontal line.

#### 3.4 Correcting element

The symbol for a correcting element of unspecified type is an equilateral triangle with sides of approximately 5 mm length.



When the type of correcting element is known, established symbols depicting particular correcting elements may be used, for example for a valve :



#### 3.5 Actuating element

##### 3.5.1 Automatic actuating element

The basic symbol is a thin line circle of approximately 5 mm diameter, with a thin line to connect it to the correcting element symbol.



##### 3.5.2 Automatic actuating element with integral manual actuating element

The letter H shall be inserted in the circle if there is a manual as well as an automatic facility for positioning the correcting unit.



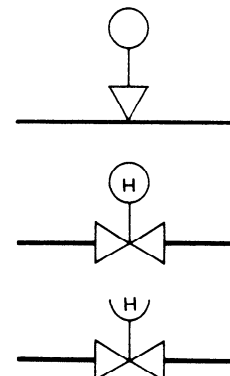
##### 3.5.3 Manual actuating element

Where there is only a manual facility for positioning the correcting unit, the symbol consists of a semi-circle of approximately 5 mm diameter beneath a letter H, with a thin line to connect it to the correcting element.



#### 3.6 Correcting unit

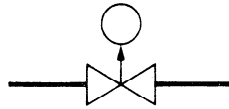
The symbol is the combination of the symbols for the actuator and the correcting element, for example :



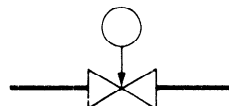
**3.7 Actuating element operation**

Response of the actuator to failure of the actuating energy may be indicated by an additional symbol, illustrated here for the particular example of a control valve.

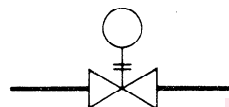
- Control valve opens on failure of actuating energy :



- Control valve closes on failure of actuating energy :



- Control valve retains position on failure of actuating energy :



- A combination of the above symbols could be used to indicate the safe and permitted direction of drift :



**4 LETTER CODE**

**4.1 Identifying letters**

The purpose of the instrument shall be defined by a letter code contained within the instrument symbol circle; this letter code shall be constructed on the following basis :

**4.1.1** The first letter shall denote the measured or initiating variable, and shall be in accordance with column 2 of the table, but should be modified, if necessary, by the addition of a letter in accordance with column 3.

**4.1.2** Succeeding letters shall be in accordance with column 4 of the table.

**4.1.3** Where there are two or more succeeding letters, they shall be placed one after the other, in the sequence I R C T Q S Z A. (This does not apply to the letters corresponding to the modifiers in column 3 of the table.) The letter I may be omitted in the case of a self-indicating recorder.

**4.1.4** For the use of the letter H to denote HAND (manual) operation, see 3.5.

**4.2 Qualifying letters**

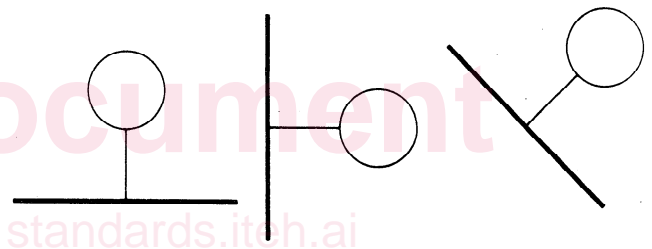
Where it is required to denote HIGH or LOW, the qualifying letters H or L may be used in association with the instrument symbol (see 6.1.5 and 6.1.8).

**5 TYPES OF LINE AND ASSEMBLY OF SYMBOLS**

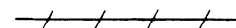
**5.1 Types of line** (see also ISO/R 128, *Engineering drawing – Principles of presentation*<sup>1)</sup>.)

The types of lines used in the symbol system shall be as follows, it being conventional for a continuous thick line to represent the flow line of a process or the outline of a plant vessel, etc.

**5.1.1** The symbol for an instrument connection to a process is a continuous thin line, thinner than the lines used to delineate the plant.

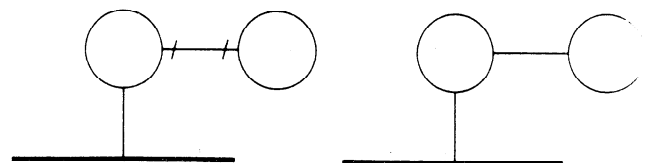


**5.1.2** The preferred general symbol for an instrument signal line is a continuous thin line, having a stroke repeated along its length. These strokes are inclined at approximately 60° to the line.



Alternatively, a continuous thin line without strokes may be used where there is no risk of confusion.

Instrument signal lines shall be drawn thinner than process lines.



**NOTE** – No attempt is made in this part of this International Standard to distinguish between types of instrument actuation (for example electrical, pneumatic and hydraulic), such a distinction being unnecessary for an understanding of the function of the instrumentation.

1) At present under revision.