

Industrial systems, installations and equipment and industrial products — Designation of signals

The European Standard EN 61175:2005 has the status of a
British Standard

ICS 29.020

National foreword

This British Standard is the official English language version of EN 61175:2005. It is identical with IEC 61175:2005. It supersedes BS EN 61175:1993 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/3, Documentation and graphical symbols, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its 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, the EN title page, pages 2 to 46, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 15 February 2006

© BSI 15 February 2006

English version

**Industrial systems, installations
and equipment and industrial products —
Designation of signals
(IEC 61175:2005)**

Systèmes, installations, appareils
et produits industriels —
Désignation des signaux
(CEI 61175:2005)

Industrielle Systeme, Anlagen und
Ausrüstungen und Industrieprodukte —
Kennzeichnung von Signalen
(IEC 61175:2005)

This European Standard was approved by CENELEC on 2005-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 3/753/FDIS, future edition 2 of IEC 61175, prepared by IEC TC 3, Information structures, documentation and graphical symbols, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61175 on 2005-11-01.

This European Standard supersedes EN 61175:1993.

It includes the following significant technical changes with respect to EN 61175:1993:

The structure of the signal designation has been extended and specified in more detail:

- the term “item designation” has been replaced by “reference designation” with the same meaning as before;
- the term “basic signal name” has been extended. It has been replaced by “signal name”; then subsequently consisting of “class”, “short name” and “basic signal name”, where “basic signal name” has the same meaning as before;
- classification codes have been introduced in order to facilitate the understanding of the signal name, for example the type of signal and hence the “signal direction” can be recognized by the code;
- the concept of “signal name domain” has been introduced for improved identification of signal name in relation to an applicable object;
- the term “version identifier” has been changed to “variant” with the same meaning as before;
- the earlier possibility to provide additional information on “signal level” has been generalized to an area of “additional information” to be used to supplement information on “version”, “time stamp”, “level” and other system related parameters. The additional information is stated to belong to a variant of the signal (not to the signal designation in general).

The following dates were fixed:

- | | | |
|--|-------|------------|
| – latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2006-08-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2008-11-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61175:2005 was approved by CENELEC as a European Standard without any modification.

CONTENTS

INTRODUCTION.....	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Basic rules	8
4.1 Structure of the signal designation	8
4.2 Recommended characters	11
5 Signal classification	12
5.1 General	12
5.2 Signal classes	12
5.3 Reporting signal kind	12
5.4 Controlling signal kind	16
6 Rules for the identification of the signal transfer	18
6.1 General	18
6.2 Variants.....	18
6.3 Binary logic representation	20
6.4 Numerical data communication and software programming	22
7 Signal presentation.....	22
7.1 Human System Interface, HSI	22
7.2 Documentation	23
8 Application	23
8.1 Presentation of signals in signal property lists	23
9 Conformance classes	26
9.1 Conformance class 1	26
9.2 Conformance class 2	27
Annex A (informative) Letter codes and mnemonics for use in signal names	28
A.1 Letter codes for variables	28
A.2 Special letter codes for electrical variables.....	28
A.3 Letter codes used as modifiers	29
A.4 Identification of terminations of certain designated conductors.....	29
A.5 Mnemonics for use in the basic signal name.....	30
Annex B (informative) The signal concept.....	37
B.1 Description and clarification of the signal concept	37
B.2 Signal information model	37
B.3 Signal transfer (connection)	42
Annex ZA (normative) Normative references to international publications with their corresponding European publications.....	46

Bibliography	45
Figure 1 – Signal naming structure 9	
Figure 2 – Examples of typical reporting signals	13
Figure 3 – Example of an indication signal.....	13
Figure 4 – Example of an event signal.....	14
Figure 5 – Example of measuring signals	14
Figure 6 – Example of an analogue signal	15
Figure 7 – Example of additional information	15
Figure 8 – Example of parts of an analogue signal.....	16
Figure 9 – Example of constant level signals	16
Figure 10 – Examples of typical controlling signals	17
Figure 11 – Example of a command signal	18
Figure 12 – Example of a signal for setting value	18
Figure 13 – Signal variants in a signal connection chain	19
Figure 14 – Signal variants using manufacturer defined signal names	20
Figure 15 – Signal states of binary signals	21
Figure 16 – Example of a negated signal.....	22
Figure 17 – Signal property presentation list and a corresponding XML file	23
Figure 18 – Voltage measurement, reporting signal class (M)	25
Figure 19 – Command signal for a disconnector, controlling signal class (C)	26
Figure 20 – Example of signal designation corresponding to conformance class 1	27
Figure 21 – Example of signal designation corresponding to conformance class 2	27
Figure B.1 – Reporting signal.....	38
Figure B.2 – Controlling signal	39
Figure B.3 – Use of signal designations within objects	40
Figure B.4 – Example of signal designation with “time stamp”	41
Figure B.5 – A typical signal connection chain	42
Figure B.7 – The static representation of the signal transfer.....	43
Figure B.8 – The dynamic appearance of the signal transfer	43
Table 1 – Letter codes for signal classes.....	12
Table A.1 - Letter codes for variables	28
Table A.2 – Special letter codes for electrical variables	29
Table A.3 – Letter codes used as modifiers	29
Table A.4 – Identification of certain designated conductors	29
Table A.5 – Mnemonics for use in descriptive signal messages.....	30

INTRODUCTION

The intention of this International Standard is to make rules and requirements for the designation of signals, and furthermore to make recommendations on useful presentations of these.

Basically, a signal designation is associated to the signal over its whole lifetime, which means: from the beginning of the design stage until the signal is no more needed.

Designation of a signal, in accordance with this standard, means that the source and the destination of the signal are identified, also in intermediate interfaces where the signal is delivered from one system/media to another, but the identification itself is independent of the media used for transfer of the signal.

To comply with rules and procedures for different systems and media transferring signals, it is described in this standard how to handle special information in a system and/or in between systems as “additional information” if needed.

The change of medium for the transfer of a signal because of a physical rebuilding of an installation will not cause a change of the identification of this signal if its meaning is maintained. The kind of physical transportation of a signal has no influence on the identification of it, unless this physical transportation is a part of the signal purpose.

Rebuilding of installations might lead to wishes to transfer more signals in the same physical medium. All of such additional signals will be identified in accordance with their purpose and the rules stated in this standard.

As the identification of a signal has nothing to do with the physical transportation of it, the lines in the figures in this standard will be read as “signals” more than “connections”.

INDUSTRIAL SYSTEMS, INSTALLATIONS AND EQUIPMENT AND INDUSTRIAL PRODUCTS – DESIGNATION OF SIGNALS

1 Scope

This International Standard provides rules for the composition of designations and names for the identification of signals and signal connections. This includes the designation of power supply circuits.

The standard is applicable to all types of signals within an industrial system, installation and equipment.

The standard is not applicable for the identification of wiring, terminals and other hardware for connections.

The standard does not establish rules for

- the graphical/physical representation of a signal on devices, nor
- the graphical representation of signals in documentation.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60417, *Graphical symbols for use on equipment*

IEC 60445, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system*

IEC 60447, *Basic and safety principles for man-machine interface, marking and identification – Actuating principles*

IEC 60747, *Semiconductor devices - Discrete devices*

IEC 61082-11, *Preparation of documents used in electrotechnology – Part 1: Rules*

IEC 61131 (all parts), *Programmable controllers*

IEC 61346 (all parts), *Industrial systems, installations and equipment and industrial products Structuring principles and reference designations*

ISO/IEC 646: 1991, *Information technology ISO 7-bit coded character set for information processing interchange*

¹ To be published.

ISO/IEC 8859-1: 1998, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

3 Terms and definitions

For the purposes of this document, the following definitions apply.

3.1

signal

unit of information conveyed from one *object* to another

NOTE Messages (units of signals) may be sent in a communication network in the form of telegrams. Such messages may represent one or several signals.

3.2

signal designation

unambiguous identifier of a *signal* within a system

3.3

signal connection

path on which the *signal* is transferred between the interface points

NOTE The connection can be identified as logical or physical, and can be realized in different connection media. A complete signal connection chain may include different media.

3.4

signal connection chain

group of coherent *signal connections* belonging to the same *signal*

NOTE The signal connection chain will typically describe the complete connection of the signal transfer.

3.5

signal connection medium

medium in which the *signal* is transferred from one point to another

NOTE The medium can be identified as logical or physical, and a complete signal connection chain may include different media.

Examples:

- Physical media: electric wire, optic fibre.
- Logical media: single data transfer, communication bus or network.

3.6

signal name domain

chosen *object* in which each signal name is unambiguous without using the *reference designation*

3.7

signal presentation

way of presentation of a reporting signal

NOTE 1 Example: digital display, analogue indication, lamp, semaphore.

NOTE 2 The complete signal designation does not have to be used in the presentation (but it can be). It is recommended that the complete signal designation should be possible to find from the signal presentation.

3.8

signal kind

super-type of the *signal class* defining direction of information in the *signal connection*

NOTE Two signal kinds are used:

- reporting signals; and
- controlling signals.

3.9**signal class**

groups of *signals* defined in accordance with a classification scheme based on the purpose of the signals

NOTE The signal class is indicated by a code in the signal designation.

3.10**signal variant**

identified section of the *signal connection chain*

NOTE There is always at least one variant in a signal connection chain.

3.11**object**

entity treated in the process of design, engineering, realization, operation, maintenance and demolition

[IEC 61346-1:1996, definition 3.1]

3.12**object designation**

identifier of a specific *object*

[IEC 61355:1997, definition 3.12]

3.13**reference designation**

identifier of a specific *object* with respect to the system of which the *object* is a constituent, based on one or more aspects of that system

[IEC 61346-1:1996, definition 3.7]

3.14**data point**

physical point in the *signal connection chain*, where a message can be inspected and the current value of a *signal* can be accessed

3.15**data object**

signal group composed of one or more data items (signals)

NOTE A data object is used to represent the specific elements of functionality of a device.

3.16**version**

identification of a specific edition/version of the information

NOTE Example:

- Version 1 is the message for time 0; and
- Version 2 is the message for time 0 + 1 s.

4 Basic rules**4.1 Structure of the signal designation**

A signal designation shall unambiguously identify a signal among a set of points (terminal, junction, data point) within a system (see IEC 61346-1) and may also classify the signal..

The structure of a signal designation shall be based on standardized and system related parts and their sub-parts for identification and classification, following each other in an organized and specified way. All parts may be represented for different purposes textually for human presentation or by codes for other purposes according to a documented principle.

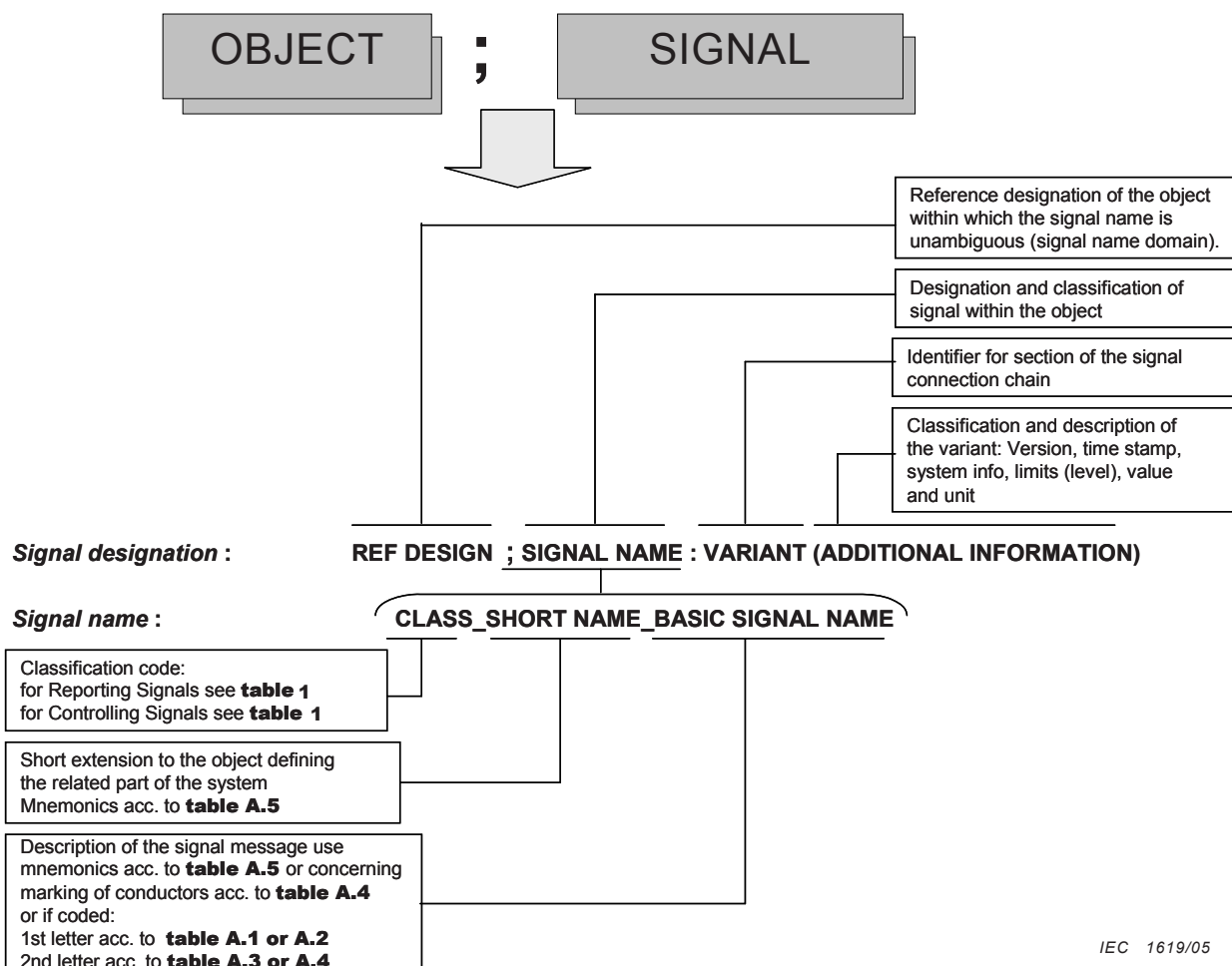


Figure 1 – Signal naming structure

The structure of the signal designation shall be:

REF. DES. ; SIGNAL NAME : VARIANT (ADDITIONAL INFORMATION)

See Figure 1, where:

REF. DES. is the designation of the object (the signal name domain) inside which the signal name is unambiguous and valid (see 4.1.1);

;

SIGNAL NAME is the unambiguous designator of a signal, valid inside a specified object (the signal name domain) (see 4.1.2);

:

is the separator between SIGNAL NAME and VARIANT or ADDITIONAL INFORMATION if a variant is not used;

VARIANT is the designation of the variant of the signal (see 4.1.3);

() indicates a additional information;

ADDITIONAL INFORMATION

is the description and possible subclass of the variant of the signal (see 4.1.4).

4.1.1 Reference designation

The signal name domain shall be represented by a *reference designation*. This shall preferably be in accordance with IEC 61346-1 (see also descriptions in Annex B). This reference designation shall not be part of the *signal name* used inside the signal name domain.

4.1.2 Signal name

The *signal name* shall designate, and may classify and describe the signal generally. The signal name shall include a *basic signal name* and may include a *short name* and a *class* as described below. The signal name shall be preceded by the prefix (;) The prefix shall be presented in documents. The prefix may be omitted in a document in which signal names are undoubtedly identified as such, for example in a signal list.

The structure of the signal name shall be:

CLASS – **SHORT NAME** – **BASIC SIGNAL NAME**

where

CLASS is the code of the signal class (see Clause 5);

NOTE Subclasses are to be placed (found) in ADDITIONAL INFORMATION

SHORT NAME is a short textual description of the reporting object respectively the controlled object;

BASIC SIGNAL NAME is the short description of the signal defining the special function of the signal (see Annex A for abbreviations recommended to be used in BASIC SIGNAL NAME).

NOTE For enhanced readability, it is recommended to use the underscore sign for separation between the sub-parts of the signal name.

4.1.3 Variant

The variant part of the signal designation shall be used to identify a section of the signal on the way from the source to the destination where necessary. If there is only one section, it is not required to use variant numbers or codes, but the separator in front of the variant part shall be used if additional information is added to the signal name. See also the description of variants in 6.2 and Clause B.3.

Examples of cases where the separation in different variants is applicable are:

- from one functional representation to another;
- from one electrical net to another;
- from one component to another;
- from one signal connection medium to another.

4.1.4 Additional information

The additional information of the signal designation shall describe the characteristics of the signal variant. See also Figure 7 and B.2.1.3.

NOTE The additional information part should be used only where necessary.

The additional information of a signal variant, if used, may include data for

- version, time stamp or level, etc.;
- system information, for example protocol related parameters; and also
- other system information.

Version number or time stamp in the additional information may be used to create an unambiguous identifier of a specific version.

4.2 Recommended characters

Signal designations should be composed from standard character sets.

Different mnemonics, abbreviations, identifiers, suffixes, etc. within a name may be separated by a single space or by an underscore (_) to enhance readability. To maintain compatibility with computer processing, character sets should be restricted to those characters in the ISO/IEC 646 7-bit character set, basic code table, excluding control characters and national replacement characters.

If the computer and communication systems that are to be used are restricted to those that can process 8-bit character sets, ISO 8859-1 is recommended for supplementary characters.

The recommended characters include the following:

- capital letters **A** through **Z**;
- lower case letters **a** through **z**;
- digits **0** through **9**;
- negation: see 6.3.2;
- spacing characters: underscore (_) or space;
- name prefix: semicolon (;);
- variant separator: colon (:);
- indicator of additional information: ();
- Boolean operators: raised dot (.);
- special characters: ! “ % & ‘ * , . / < = > – + ?

5 Signal classification

5.1 General

It is recommended to use signal classification based on the kind and the purpose of the signal.

5.2 Signal classes

If used, the signal class shall be represented by a letter code in the signal name (see 4.1.2). The code shall be selected in accordance with this clause.

NOTE The use of the classification code was not a part of the first edition of this standard.

Two major kinds of signals can be recognized, **reporting signals** and **controlling signals**; the two kinds being characterized based on the direction of the signal information between controlling and controlled object.

The following letter codes shall be used as introduction to the signal name to identify the signal class.

Table 1 – Letter codes for signal classes

Code	Class	Kind	Reference
A	Alarm signal	Reporting signal	See 5.3.2
C	Command	Controlling signal	See 5.4.1
E	Event signal	Reporting signal	See 5.3.2
I	Indication signal	Reporting signal	See 5.3.1
L	Constant level signal	Reporting signal	See 5.3.4
M	Measuring signals	Reporting signal	See 5.3.3
S	Setting value	Controlling signal	See 5.4.2
X(n)	Additional class	Reporting signal	
Y(n)	Additional class	Controlling signal	

NOTE “Additional class” is specified and documented for a specific application, and numbers are used if more than one additional class is required.

The classification, including additional class, shall not be related to the appearance of a specific variant of the signal, but to the signal itself. If a signal representation in a variant of the signal should be classified, it may be identified by a code (subclass) in “Additional Information” (see 4.1).

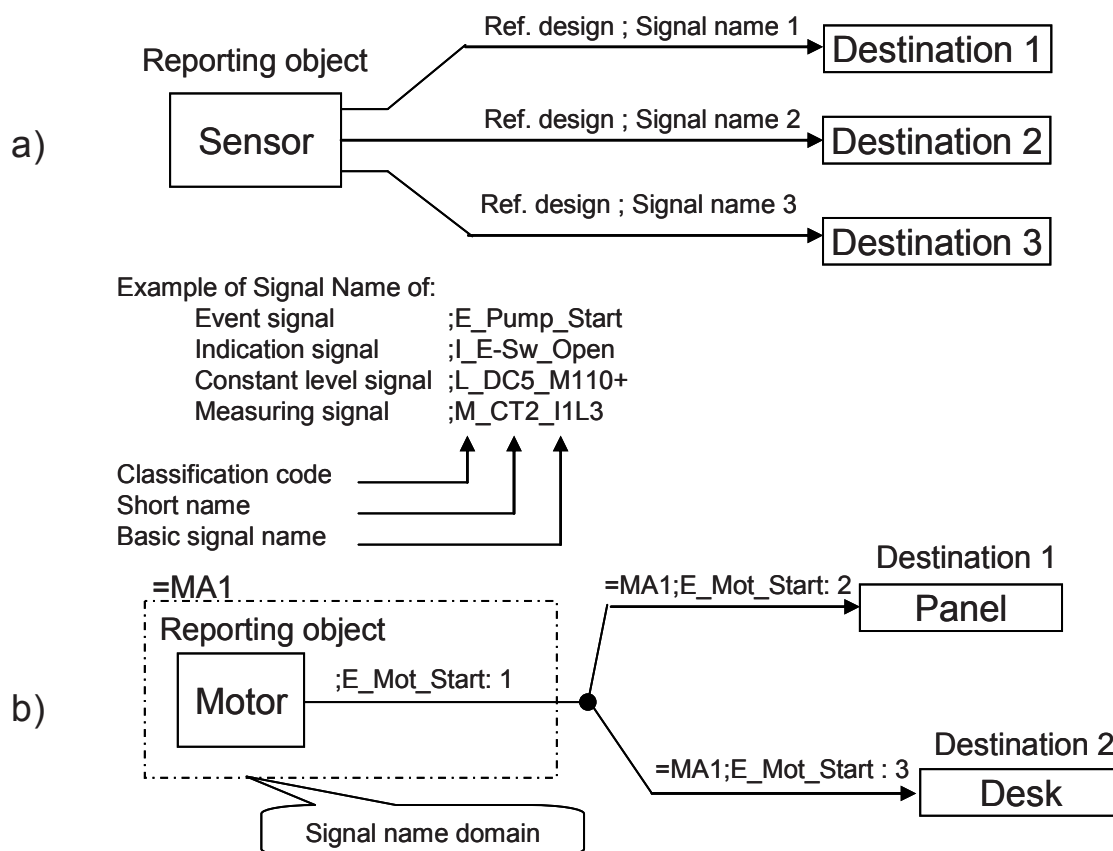
5.3 Reporting signal kind

A reporting signal shall transfer information from the reporting object (source) to one or more destinations (receivers of the message). The reference designation of the signal name domain in which the reporting object is situated shall be used to identify a reporting signal.

The destination of a reporting signal will often be a human person but can also be a mechanical or computerized system, etc.

Figure 2 shows examples of

- a) different reporting signals from one source to several destinations, and
- b) several variants of the same reporting signal to two destinations.



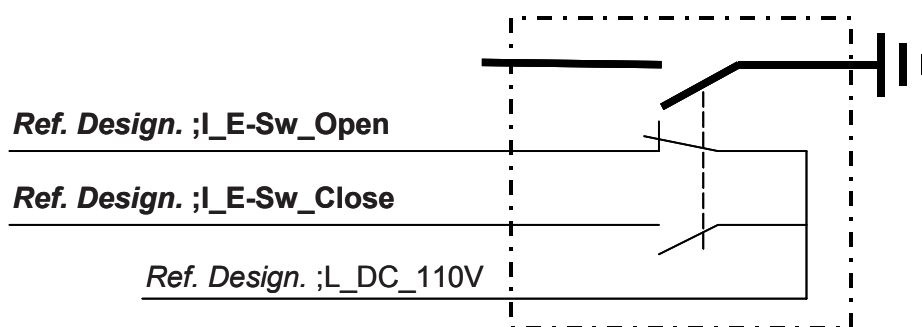
IEC 1620/05

Figure 2 – Examples of typical reporting signals

5.3.1 Indication signal (I)

An indication signal is a reporting signal that has two states, active or not active. The basic signal name shall be related to the active state. If information about two positions is needed, two signals have to be defined.

NOTE The two states may be indicated by one device and transmitted by one electric conductor where energised conductor means one position and non-energised means the opposite position. However, this method of transferring indication signals is not recommended because the non-energised conductor will both indicate a position and loss of connection.



IEC 1621/05

Figure 3 – Example of an indication signal