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**Industrial systems, installations and equipment and industrial products –
Designation of signals –
Part 1: Basic rules** (standards.iteh.ai)

IEC 61175-1:2015
**Systemes, installations, appareils et produits industriels –
Désignation des signaux –
Partie 1: Règles de base**





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**Industrial systems, installations and equipment and industrial products –
Designation of signals – (standards.iteh.ai)
Part 1: Basic rules**

IEC 61175-1:2015
**Systemes, installations, appareils et produits industriels –
Désignation des signaux – ec8d00bb859b/iec-61175-1-2015
Partie 1: Règles de base**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL SYSTEMS, INSTALLATIONS AND
EQUIPMENT AND INDUSTRIAL PRODUCTS –
DESIGNATION OF SIGNALS –****Part 1: Basic rules**

FOREWORD

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International Standard IEC 61175-1 has been prepared by IEC technical committee 3: Information structures and elements, identification and marking principles, documentation and graphical symbols.

It has the status of a horizontal standard in accordance with IEC Guide 108.

This first edition cancels and replaces the second edition of IEC 61175 published in 2005. This edition constitutes a technical revision.

Further parts of IEC 61175 may be added as Technical Specifications relating to different domains. Additional parts may be application guides for designation of signals in specific applications such as communication protocols and other software systems.

This edition includes the following significant technical changes with respect to IEC 61175:2005:

- an improved description of the principles for use; and
- a strict separation between the physical aspect of a signal and its associated information, focusing on the latter.

The text of this standard is based on the following documents:

FDIS	Report on voting
3/1214A/FDIS	3/1221/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61175 series, published under the general title *Industrial systems, installations and equipment and industrial products – Designation of signals*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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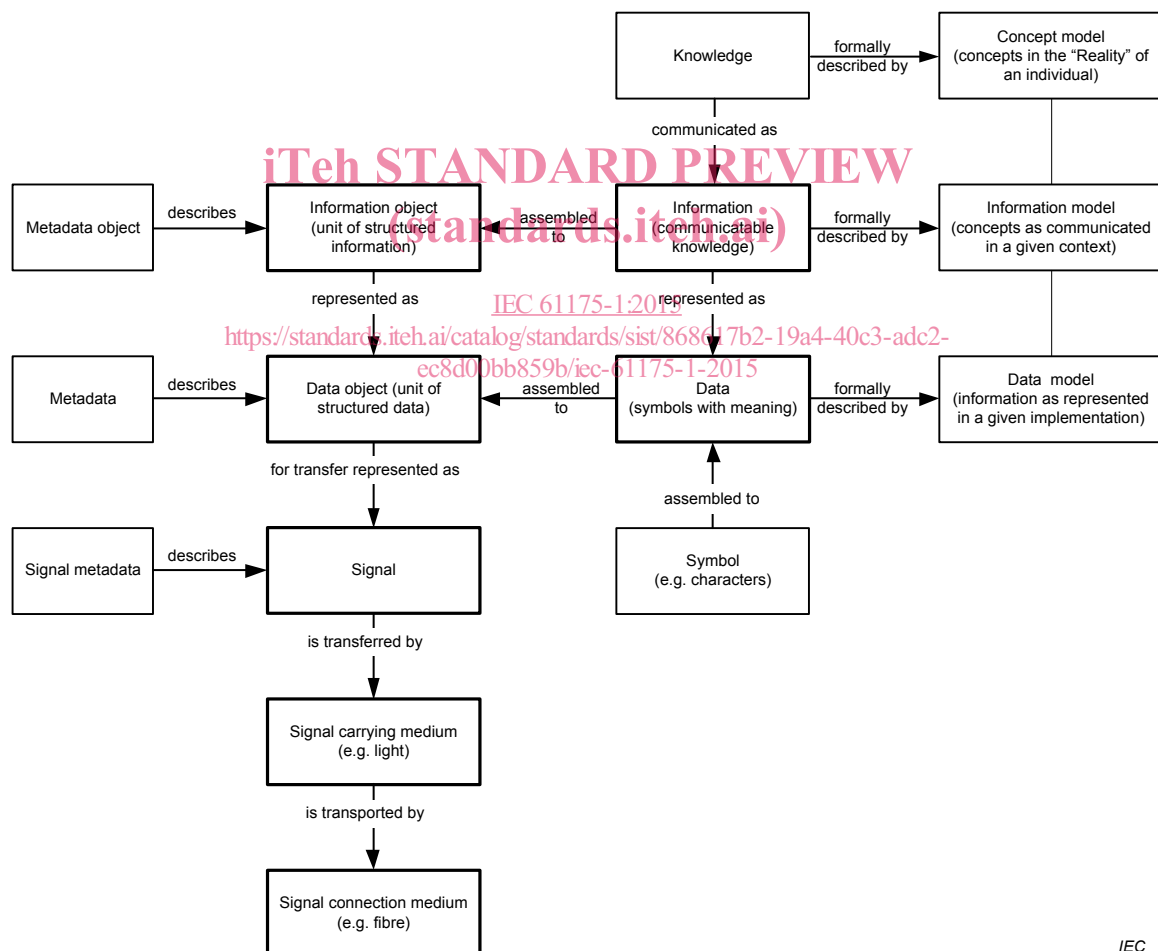
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INTRODUCTION

The intention of this part of IEC 61175 is to establish rules and requirements for the designation of signals, and furthermore to make recommendations on useful presentations of these.

Basically, a signal designation is associated with the signal over its whole lifetime, which means from the beginning of the design stage until the signal is no longer 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 semantic meaning is maintained. Signals represent information. For communication purposes the information has to be represented as data. The information can be more or less complex. In simple cases, the information can be represented as a single Boolean variable, without internal structure. In more complex cases, like in computer communication via data networks, the information can be packaged in more complex objects, with internal structure, which are transferred with suitable protocols. The implementation can be done in different ways depending on which technology, protocol, etc. is being used. Figure 1 illustrates the terminology.



IEC

Figure 1 – Illustration of relationship of terminology

The principles described in this part of IEC 61175 are closely related to other International Standards such as IEC 81346-1, IEC 81346-2, IEC 61666 and IEC 81714-3. An information model for the interrelations is provided in IEC TS 62771.

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

Part 1: Basic rules

1 Scope

This part of IEC 61175 provides rules for the composition of designations for the identification of signals and signal connections. This includes the designation of power supply.

This part of IEC 61175 is applicable to all types of signals within an industrial system, installation and equipment and industrial products. It deals with the information aspect of signals and not with their physical implementation.

Excluded from the scope are general rules for the presentation of information in human machine interfaces. This part of IEC 61175 is also not applicable for the identification of wiring, terminals, piping and other hardware connections.

NOTE For the purpose of marking of wires, see IEC 62491.

This horizontal standard is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 108.

One of the responsibilities of a technical committee is, wherever applicable, to make use of horizontal standards in the preparation of its publications. The contents of this horizontal standard will not apply unless specifically referred to or included in the relevant publications.

2 Normative references

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

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

IEC 81346-1, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic principles*

IEC 62720, *Identification of units of measurement for computer-based processing*

3 Terms and definitions

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

3.1

object

entity treated in a process of development, implementation, usage and disposal

Note 1 to entry: The object may refer to a physical or non-physical “thing”, i.e. anything that might exist, exists or did exist.

Note 2 to entry: The object has information associated with it.

[SOURCE: IEC 81346-1:2009, definition 3.1]

3.2 information object

fixed and structured amount of information that can be managed and interchanged as a unit among users and systems

Note 1 to entry: This unit need not be human perceptible. Information objects are often stored as data.

Note 2 to entry: “Users” refers in this definition to users of information and “systems” refers to systems managing information and documentation.

3.3 data object

collection of data that has an agreed grouping between the sender and the receiver and can be identified as a complete entity

[SOURCE: ISO 21549-7:2007, 3.12, modified — “Natural grouping” has been changed to “agreed grouping between sender and receiver”.]

3.4 signal

agreed representation of an information object conveyed among objects

Note 1 to entry: The agreed representation is a data object. The information object can be used to express a binary state or analogue variable or have a more complex structure.

Note 2 to entry: The representations of the information object e.g. potential level, current level, data format, protocol, etc., are conveyed in a suitable signal connection medium.

Note 3 to entry: Complex information objects usually need a number of successive conversions until they reach a representation suitable for transfer in a signal connection medium.

Note 4 to entry: The agreement between sender(s) and receiver(s) is necessary in order to generate and interpret the representation correctly. In simple cases it is implicit, in other cases it has to be explicitly specified as a protocol, etc.

Note 5 to entry: The representations of the information object can be conveyed directly from source to destination (synchronous communication) on the signal connection medium, or intermediately stored (by the sender) in a place where the intended receivers can get them (asynchronous communication).

3.5 signal name

identifier of the information object represented by a signal

3.6 signal designation

unambiguous identifier of a signal within a system

3.7 object designation

identifier of a specific object in a given context

EXAMPLES Reference designation, type number, serial number, name.

[SOURCE: IEC 61355-1:2008, definition 3.13]

3.8 reference designation

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

[SOURCE: IEC 81346-1:2009, definition 3.11]

3.9

signal connection

established communication path between different objects used for transmission of signals

Note 1 to entry: A signal connection uses one signal connection medium only. Change of medium takes place in the objects.

3.10

signal connection network

signal connections that transfer the same information object

Note 1 to entry: A signal connection network can use different media.

3.11

signal connection identifier

identifier of a specific signal connection

Note 1 to entry: The term for this definition was formerly "signal variant", which is now deprecated.

3.12

signal connection medium

(physical) medium on which the signal is transported from one (physical interface) point to another

EXAMPLES Electric wire, optic fibre, space.

3.13

signal carrying medium

physical quantity or data transfer protocol used to transfer the signal

EXAMPLES Current, potential, bus protocol.

3.14

domain

distinguished part of an abstract or physical space where something exists

3.15

signal name domain

domain in which signal names are unambiguously distinguished

3.16

signal presentation

means of communicating an information object in human-interpretable form

3.17

signal class

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

3.18

signal class code

coded designation of a signal class

3.19

signal connection characteristics

optional description of technical characteristics of the signal connection

Note 1 to entry: The term for this definition was formerly "additional information", which is now deprecated.

4 Basic principles

4.1 General principles on signal transfer and signal naming

Signals are representations of information objects that are exchanged among objects. Normally a signal has one source and one or many destinations (see Figure 2).

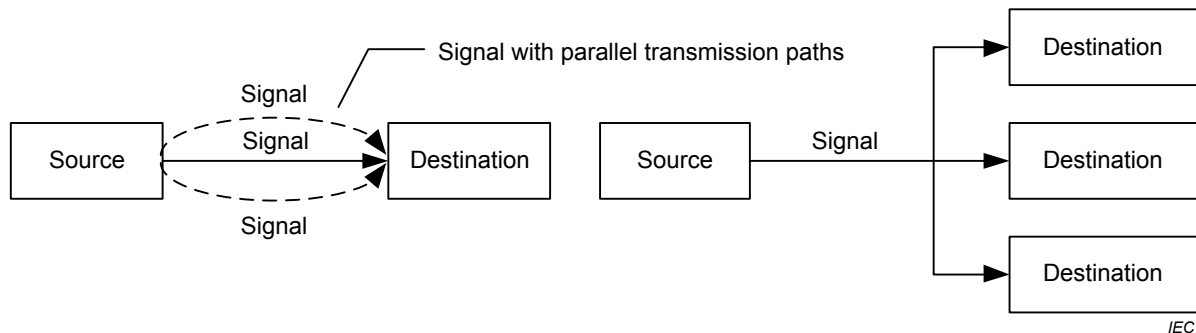
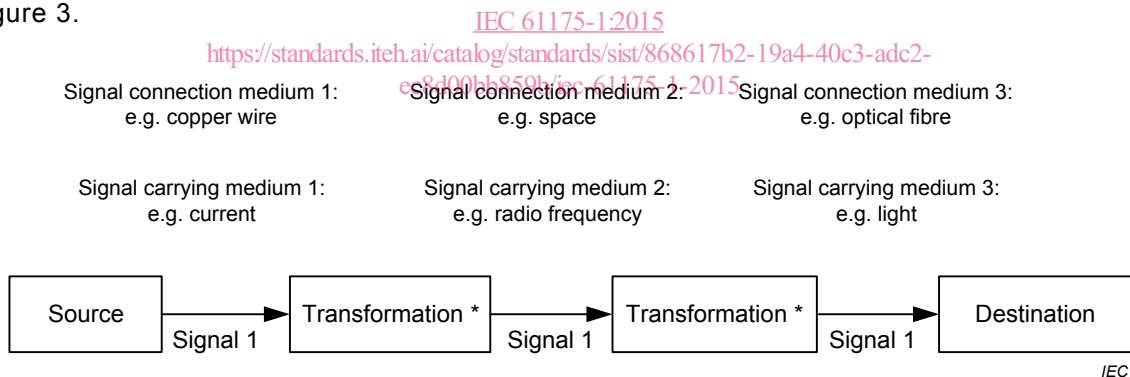


Figure 2 – Signal with source and destination(s)

The transmission of a signal from source to destination may require one or many signal carrying media, see Figure 3, which in turn requires signal connection media in order to operate.

If a change of a signal carrying medium to another or a change of a signal connection medium to another is required, transformations can be necessary.

At such transformations, the represented information object shall remain unchanged, see Figure 3.



* without change of information object

Figure 3 – Information object transmitted via different signal carrying and connection media

If the information object of a signal is intentionally processed, for example the information object being delayed or being subject to a logic condition, a new signal shall be created, see Figure 4.

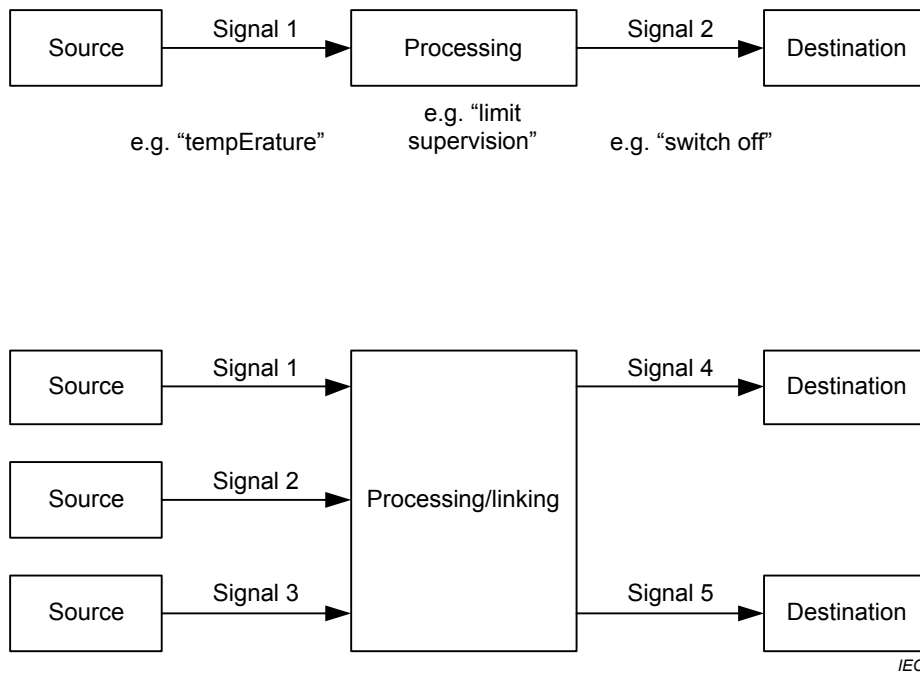


Figure 4 – Different signals caused by processing/logical linking

If the information object with respect to the intended information exchange is modified, a different signal name shall be applied.

The identification of the information object – the signal name – is therefore the most basic issue in the construction of the signal designation (see Clause 5).

4.2 Signal classification

The signal may be classified according to different characteristics. The signal classification provided in this part of IEC 61175 is based on the purpose of the signal.

Two groups of signals exist with respect to their treatment in designations:

- reporting signals, and
- controlling signals.

The characterization of these two groups is based on the direction of the information flow related to the considered objects (see Figure 5). As a signal is transmitted between two or more objects, one of the objects needs to be appointed as the main object (see 5.1).

The “main object” is an object that is in most cases associated with the main process concerned, as opposed to, for example controlling or monitoring processes. Those are considered to be related to auxiliary processes.

EXAMPLES:

A switch in a control panel provides a signal for closing a circuit breaker in the main process. The circuit breaker is then considered as the main object and the signal is a controlling one. The circuit breaker provides a signal representing its closed position for indication in a control panel. The circuit breaker is also in this case considered the main object and therefore the signal is a reporting one.

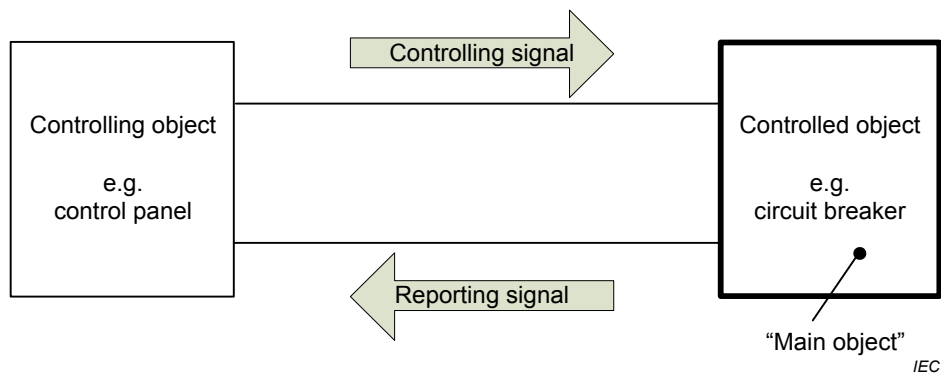


Figure 5 – Relation between controlling and reporting signals

The two groups are further split into signal classes:

- Reporting signal group contains the following classes:
alarm signal, event signal, indication signal, measuring signal (including power supply);
- Controlling signal group contains the following classes:
command signal, setting value signal.

Table 1 provides these signal classes together with associated letter codes to be used as part of the signal name.

4.3 Signal name domain

The signal name domain defines the domain inside which a given signal name shall be unambiguous. For identification of signal name domains see 5.1.2. As a consequence signal names may be repeatedly used if existing in different unambiguously identified signal name domains. Different possibilities exist for defining such a domain:

- Both, source and destination of the signal are constituents of the object serving as domain (see Figure 6 a). This shall be applicable for all signals if such a common object exists.
- The object that constitutes or contains the destination of a signal is chosen as domain (see Figure 6 b). This is mainly applicable for controlling signals.
- The object that constitutes or contains the source of a signal is chosen as domain (see Figure 6 c). This is mainly applicable for reporting signals.