BS EN 61666:2010

BSI Standards Publication

Industrial systems, installations and equipment and industrial products – Identification of terminals within a system

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National foreword

This British Standard is the UK implementation of EN 61666:2010. It is identical to IEC 61666:2010. It supersedes BS EN 61666:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/3, Documentation and graphical symbols.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 62301 1

ICS 01.080.40; 01.080.50; 29.120.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2010.

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61666

September 2010

ICS 01.080.30

Supersedes EN 61666:1997

English version

Industrial systems, installations and equipment and industrial products - Identification of terminals within a system

(IEC 61666:2010)

Systèmes industriels, installations et appareils, et produits industriels - Identification des bornes dans le cadre d'un système
(CEI 61666:2010)

Industrielle Systeme, Anlagen und Ausrüstungen und Industrieprodukte - Identifikation von Anschlüssen in Systemen
(IEC 61666:2010)

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European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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Ref. No. EN 61666:2010 E

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Foreword

The text of document 3/1001/FDIS, future edition 2 of IEC 61666, 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 61666 on 2010-09-01.

This European Standard supersedes EN 61666:1997.

This European Standard includes the following substantial changes with respect to EN 61666:1997:

– the terminology used in the publication has been adapted to the one used in EN 81346-1;

– a more comprehensive description of the designation principles is provided;

– additional examples illustrating terminal designations related to the function aspect and location aspect are provided;

– an additional example illustrating the use of terminal designation sets is provided;

– the former informative Annex A has been turned into a clause in the standard.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

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)	2011-06-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-09-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61666:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60034-8:2007	NOTE	Harmonized as EN 60034-8:2007 (not modified).
IEC 60191-3:1999	NOTE	Harmonized as EN 60191-3:1999 (not modified).

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
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, conductor terminations and conductors	EN 60445	-
IEC 60757	-	Code for designation of colours	HD 457	-
IEC 61082-1	2006	Preparation of documents used in electrotechnology - Part 1: Basic rules	EN 61082-1	2006
IEC 81346-1	-	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 1: Rules	EN 81346-1	-
IEC 81714-3	-	Design of graphical symbols for use in the technical documentation of products - Part 3: Classification of connect nodes, networks and their encoding	-	-

CONTENTS

INDUSTRIAL SYSTEMS, INSTALLATIONS AND EQUIPMENT AND INDUSTRIAL PRODUCTS – IDENTIFICATION OF TERMINALS WITHIN A SYSTEM

1 Scope

This International Standard establishes general principles for the identification of terminals of objects within a system, applicable to all technical areas (for example mechanical engineering, electrical engineering, construction engineering, process engineering). They can be used for systems based on different technologies or for systems combining several technologies.

Requirements for marking of terminal designations on products are not part of this publication.

NOTE The standard is based on the general principles for the structuring of systems including structuring of the information about systems, established in the International Standard ISO/IEC 81346 series, published jointly by IEC and ISO.

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 conductor terminations*

IEC 60757, *Code for designation of colours*

IEC 61082-1:2006, *Preparation of documents used in electrotechnology – Part 1: Basic rules*

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

IEC 81714-3, *Design of graphical symbols for use in the technical documentation of products – Part 3: Classification of connect nodes, networks and their encoding*

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

NOTE 2 The object has information associated to it..

[IEC 81346-1, definition 3.1]

3.2
system
set of interrelated objects considered in a defined context as a whole and separated from their environment

NOTE 1 A system is generally defined with the view of achieving a given objective, e.g. by performing a definite function.

NOTE 2 Elements of a system may be natural or man-made material objects, as well as modes of thinking and the results thereof (e.g. forms of organisation, mathematical methods, programming languages).

NOTE 3 The system is considered to be separated from the environment and from the other external systems by an imaginary surface, which cuts the links between them and the system.

NOTE 4 The term “system” should be qualified when it is not clear from the context to what it refers, e.g. control system, colorimetric system, system of units, transmission system.

NOTE 5 When a system is part of another system, it may be considered as an object as defined in this standard.

[IEV 151-11-27, modified]

3.3
aspect
specified way of viewing an object

[IEC 81346-1, definition 3.3]

3.4
function
intended or accomplished purpose or task

[IEC 81346-1, definition 3.5]

3.5
product
intended or accomplished result of labour, or of a natural or artificial process

[IEC 81346-1, definition 3.6]

3.6
component
product used as a constituent in an assembled product, system or plant

[IEC 81346-1, definition 3.7]

3.7
identifier
attribute associated with an object or system to unambiguously distinguish it from other objects or systems within a specified domain

[IEC 81346-1, definition 3.10, modified]

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 more aspects of that system

[IEC 81346-1, definition 3.11]

3.9
terminal
point of access to an object intended for connection to an external network

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NOTE 1 The connection may refer to: a) a physical interface between conductors and/or contacts, or piping and/or duct systems to provide a signal, energy or material flow path; b) an association of functional nature established between logical elements, software modules, etc. for conveying information.

NOTE 2 The external networks may be of different nature and accordingly they may be classified. IEC 81714-3 provides such classifications.

3.10
terminal designation
identifier of a terminal with respect to the object to which it belongs, related to one defined aspect

3.11
terminal designation set
group of terminal designations, each identifying the same terminal from different aspects

3.12
object designation
identifier of a specific object in a given context

NOTE Examples of such designations are: reference designation, type number, serial number, name.

[IEC 61355, 3.13]

4 Terminal designation

4.1 General

Terminals establish the interface of objects for connecting them to other objects in a network, for example connecting to an electrical network, logic function network, logic network in software, piping network, etc.

An object may be associated with any number of terminals.

Each terminal shall be unambiguously identified with respect to the object itself as well as to the system to which this object belongs.

Figure 1 illustrates the principle of constructing an unambiguous terminal designation.

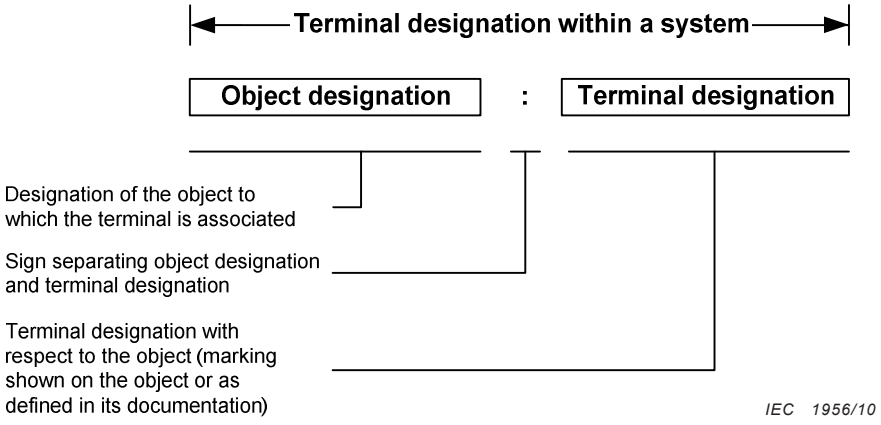

Figure 1 – Principle of terminal designation

The terminal designation shall consist of the terminal marking as defined by the manufacturer or designer of the object used as component in the system or of the identifier as defined in the documentation of the object.

If it is necessary to indicate the aspect of the terminal that the terminal designation relates to (for example within human readable presentations), the terminal designation shall be preceded by a prefix sign identifying the aspect.

NOTE 1 This prefix sign will exist in addition to the separator sign.

NOTE 2 The prefix sign is considered to be part of the terminal designation.

The terminal designation shall be formed according to 4.2, 4.3, or 4.4.

The terminal designation shall be presented, in documentation, in accordance with IEC 61082-1.

The object designation shall unambiguously identify the object to which a terminal is assigned. This implies that an object designation shall be (or be made) unambiguous in a specified context, i. e. within the considered network.

NOTE 3 This requirement can be fulfilled by reference designations in accordance with IEC 81346-1 and such designations are therefore used in the following text.

4.2 Designation of terminals with respect to the product aspect

A terminal designation provided with respect to the product aspect shall consist of the designation of the physical terminal that is:

- marked on the product; or
- assigned by the manufacturer; or
- defined in relevant IEC publications; or
- known from convention.

Examples of the three last possibilities are a dual-in-line package or a contactor.

NOTE 1 Some product standards such as IEC 60034-8, IEC 60191-3 and IEC 60616 include requirements for terminal markings of products.

If indication of the product aspect is needed in the terminal designation, the prefix sign “-“ shall be applied.

NOTE 2 The prefix sign is considered to be part of the terminal designation.

If there is no designation of the physical terminal assigned by the manufacturer of the product, arbitrary terminal designations shall be assigned and shall be explained in the document or in supporting documentation. The same applies also if the designation assigned by the manufacturer is, for some reason, insufficient for unambiguous identification. See also Annex A .

If the designation of the physical terminal has the form of a graphical symbol or colour, an equivalent standardized letter symbol may be used in the documentation, for example, PE instead of the graphical symbol for protective earth (see IEC 60445), BU for blue colour. Letter codes for colours shall be in accordance with IEC 60757.

Figure 2 shows an example of designation of terminals for a motor.

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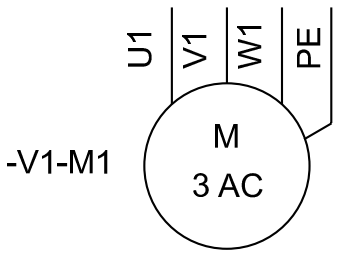


-V1-M1	Reference designation for the motor related to the system of which it is a constituent
U1, V1, W1	Terminal designations, as marked on the motor
PE	Terminal designation, for which the graphical symbol IEC 60417-5019 (2006-08), ⏚ may be used on the motor

Example of designation of terminals: -V1-M1:U1 and -V1-M1:PE

NOTE In this example it has not been considered necessary to indicate to which aspect the terminal designation relates.

IEC 1957/10

Figure 2 – Example of designation of terminals for a 3-phase squirrel-cage motor

4.3 Designation of terminals with respect to the function aspect

A terminal designation provided with respect to the function aspect shall consist of a designation based on the function(s) related to the terminal.

For functions of devices described by a data sheet or similar supporting document, a function terminal designation should be based on the function label associated with terminal name defined in the data sheet or the similar supporting document.

NOTE 1 Such terminal designations are for example defined in accordance with application note A00317 of IEC 60617-S00317 (2001-07).

NOTE 2 Examples in IEC 60617 do not always provide labels that are unambiguous function terminal designations. Whenever used as terminal designations, such labels need to be made unambiguous.

If indication of the function aspect is needed in the terminal designation, the prefix sign "=" shall be applied.

NOTE 3 The prefix sign is considered to be part of the terminal designation.

Figure 3 shows an example of a device with function labels and terminal markings of the terminals shown.

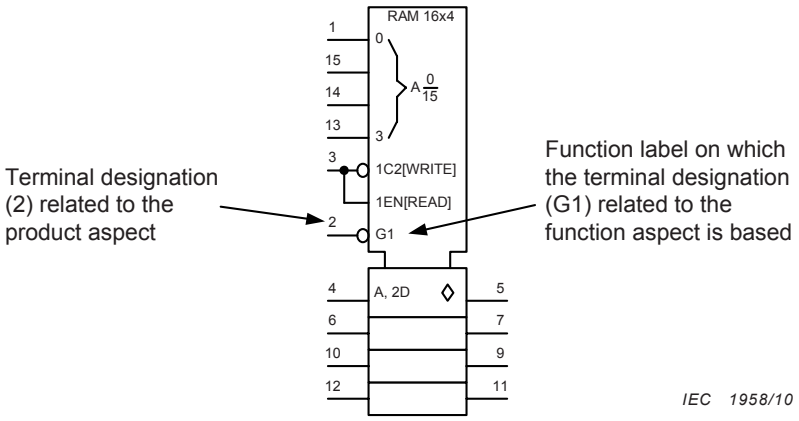


Figure 3 – A device shown with function labels on which the terminal designations related to the function aspect are based, as well as terminal designations (pins) related to the product aspect

Figure 4 shows an example of a motor starter used as component with known functionality but unknown physical implementation (i.e. the product to be used has not yet been selected). The terminal designations are assigned from the function aspect by the designer of the complete system in which such a motor starter may form part. These designations are used during the system design and, during the detailed engineering, supplemented or replaced (by computer-aided automatic means) by the terminal designations from the product aspect assigned by the manufacturer of the product used for the implementation in each specific case.

NOTE 4 Clause 11 of IEC 61082-1 describes a mapping method for this.

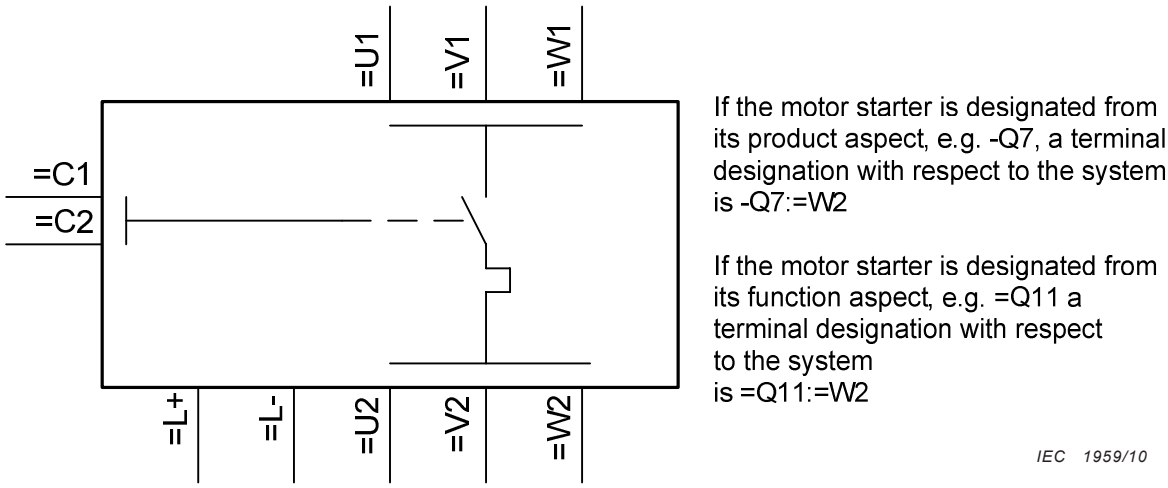


Figure 4 – Example of a symbol for a motor starter provided with terminal designations related to the function aspect

4.4 Designation of terminals with respect to the location aspect

A terminal designation provided with respect to the location aspect shall consist of a designation based on the location related to the terminal.

If the indication of the location aspect is needed in the terminal designation, the prefix sign “+“ shall be applied.

NOTE 1 The prefix sign is considered to be part of the terminal designation.

The method used (e.g. a grid system) for location designation of terminals should be explained in the document or in supporting documentation.

NOTE 2 Some methods for assigning location designations are provided in IEC 81346-1.

Figure 5 shows an example of a terminal board used for cross connection with a number of terminals organized in a matrix where the rows along the x-axis are identified by letters and the rows along the y-axis by numbers. Any terminal on the board can be identified by its xy position.

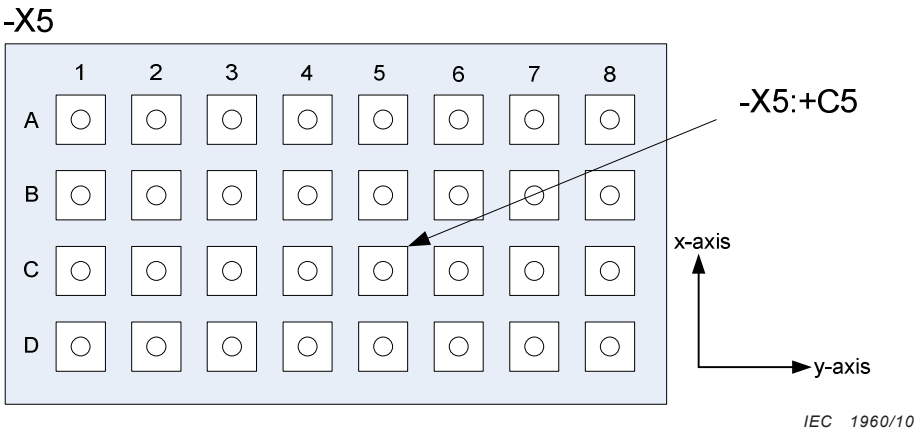


Figure 5 – Example of a terminal board for cross-connection where the terminals are designated related to their location aspect

4.5 Terminal designation set

A terminal of an object can be associated with more than one terminal designation, and the object to which the terminal belongs can at the same time be associated with a reference designation set. This means that basically each member of the reference designation set can be combined with each of the different terminal designations, each combination establishing an identifying “terminal designation within a system”. If more than one of these terminal designations needs to be indicated together, a terminal designation set shall be provided.

For a terminal designation set the following applies:

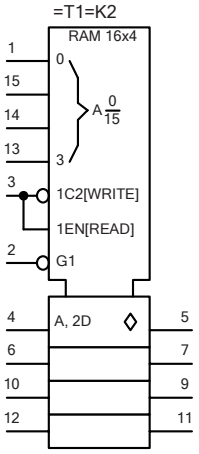
- each terminal designation shall be constructed according to the rules defined in 4.1, 4.2, 4.3, and 4.4;
- each terminal designation shall be clearly distinguishable from the others.

Figure 6 shows an example of a device with a terminal associated with a terminal designation set.

Figure 7 shows an example of a design with terminal designations related to the function aspect indicated.

Figure 8 shows an implementation of the same design, now with terminal designations related to the product aspect indicated.

Figure 9 shows the implementation of the design with terminal designation sets indicated.

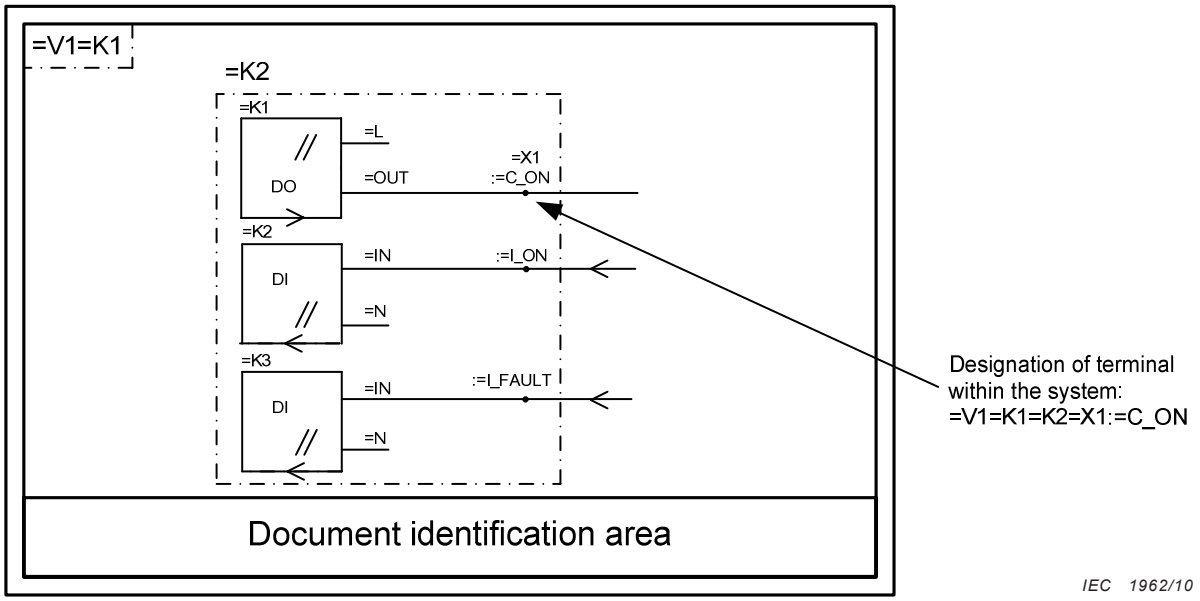


Terminal designation set:

=T1=K2:=1EN terminal designation related to the function aspect
=T1=K2:-3 terminal designation related to the product aspect

IEC 1961/10

Figure 6 – Example of a terminal designation set



IEC 1962/10

Figure 7 – Example of a design with terminal designations related to the function aspect

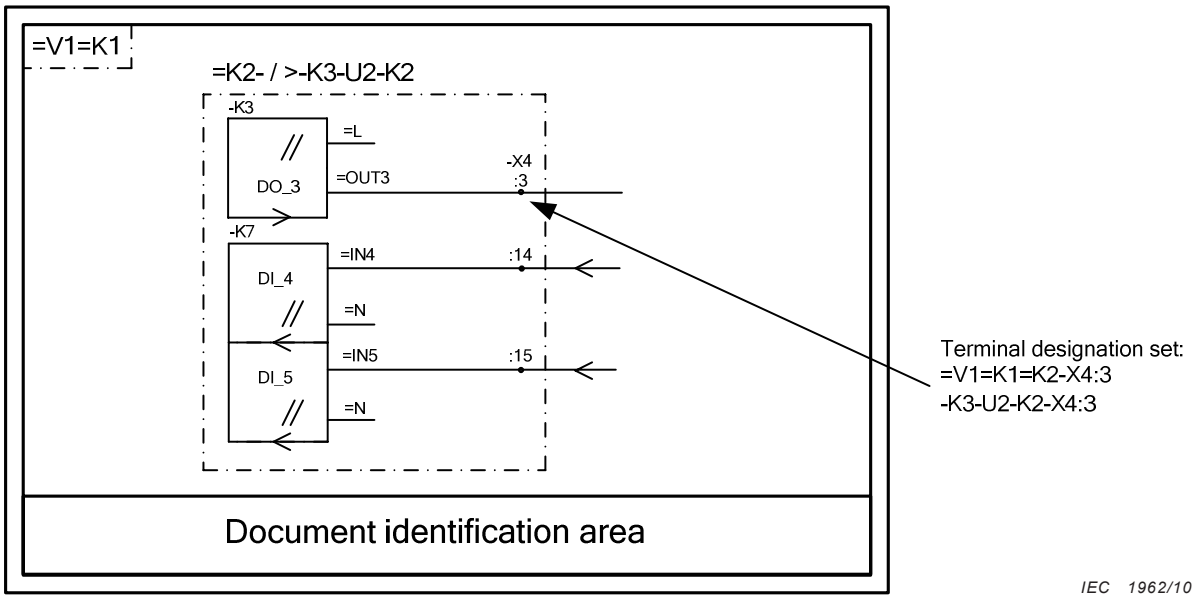


Figure 8 – Example of an implemented design based on Figure 7 with terminal designations related to the product aspect

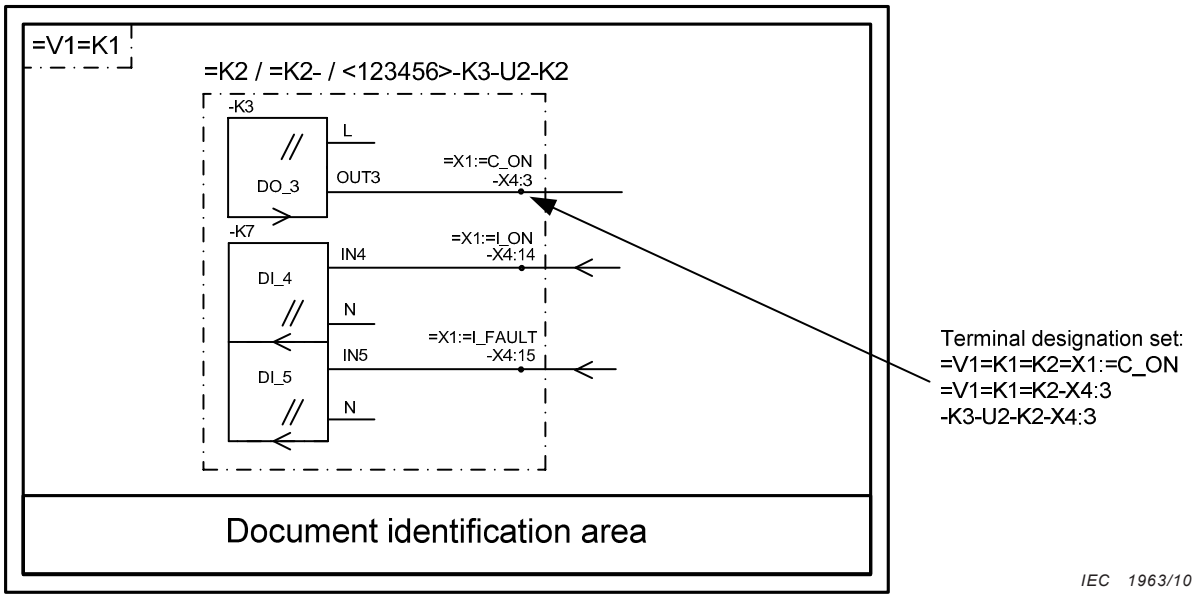


Figure 9 – Example of an implemented design based on Figure 7 with terminal designation sets related to the function and product aspects

5 Classification of terminals

Products may be provided with multiple kinds of terminals designed for connection to different kinds of networks, e.g. electrical, mechanical etc. These kinds of terminals shall be classified according to IEC 81714-3. In such cases, where an object is equipped with different kinds of terminals and presented in a common documentation, the accompanying documentation shall clearly indicate what kind of terminal is provided. For this purpose the connect node code given in IEC 81714-3 shall be used.

Annex A
(informative)

Examples of terminal designations not specified by a manufacturer

Clause 4 specifies that a terminal designation shall be unambiguous with respect to the object the terminal belongs to. For the correct interpretation of this statement, it is necessary to consider what the object is in a specific case. When that is clarified, it is often experienced that the marking provided by the manufacturer does not identify a terminal sufficiently for its application in a system.

Objects designated by reference designations appear in parts lists; terminals of these objects appear in connection tables. In circuit diagrams, the designated objects appear together with their terminals.

The following provides some examples with identical functionality:

a) assembly composed of four terminal blocks; each containing two terminals, see Figure A.1;
b) terminal block containing eight terminals, see Figure A.2;
c) terminal block containing 16 terminals, eight of which adapted to be connected to a conductor with a larger cross-section, and eight of which adapted to be connected to a conductor with a smaller cross-section, see Figure A.3.

Figure A.1 shows an example of a terminal assembly composed of four terminal blocks; each terminal block has two terminals. In this case, the purchased terminal block often does not include any designation of the terminals, but provides space where to mark the terminal block. Normally, the terminal blocks are designated when the assembly is created. In such cases, the terminal designations have to be assigned and described in the document or supporting documentation. Possible conventions may be:

- 1 for one side, 2 for the other side, etc.;
- A for one side, B for the other side, etc.

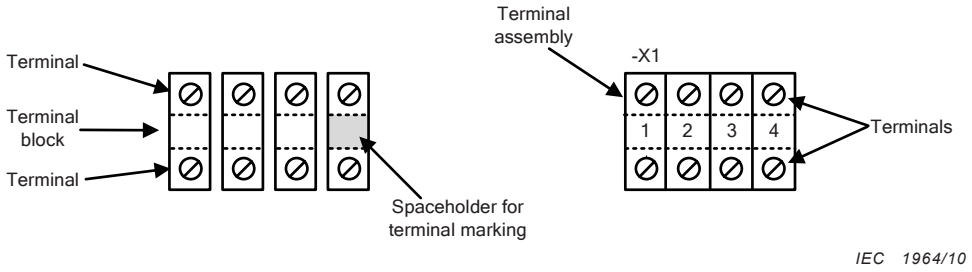


Figure A.1 – Four terminal blocks composing one terminal assembly
(each terminal block is considered as an object)

In this case, each singular terminal block is considered as one object, designated –X1–1, –X1–2, –X1–3 and –X1–4. Consequently, the identification of the terminals may be –X1–1:1, –X1–1:2, etc, or –X1–1:A, –X1–1:B, etc.

Note that it is also possible to handle the terminal designation of the ”on-site” constructed terminal assembly shown in Figure A.1 in the same way as indicated in Figure A.2 if the terminal assembly is considered as the referenced designated object in the documentation.

Figure A.2 shows an example of a terminal block containing eight terminals. In this case the purchased terminal block includes markings according to Figure A.2 a) or Figure A.2 b). The complete unit is considered as the object that is reference designated –X1.

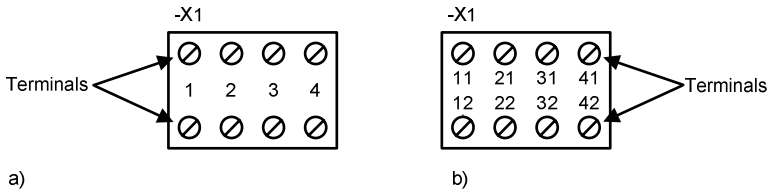


Figure A.2 – One terminal block with eight terminals
(the complete unit is an object)

In the case of Figure A.2 a), the markings provided do not sufficiently identify each terminal, and terminal designations have to be assigned and described in the document or in supporting documentation. Possible conventions may be, using the character FULL STOP (.) as a separator sign behind the markings on the product:

- 1 for one side, 2 for the other side, etc.;
- A for one side, B for the other side, etc.

Consequently, the identification of the terminals are –X1:1.1, –X1:1.2, etc, or –X1:1.A, –X1:1.B, etc.

In the case of Figure A.2 b), the terminals are sufficiently marked and shall be used as they are. The identification of the terminals are –X1:11, –X1:12, –X1:21, –X1:22, etc.

Figure A.3 shows an example of a terminal block containing eight terminals, each of which is adapted to be connected to a conductor with a larger cross-section, and also to be connected to a conductor with a smaller cross-section. This creates a total of 16 entry points for conductors that must be provided with designations so they can be distinguished from one another.

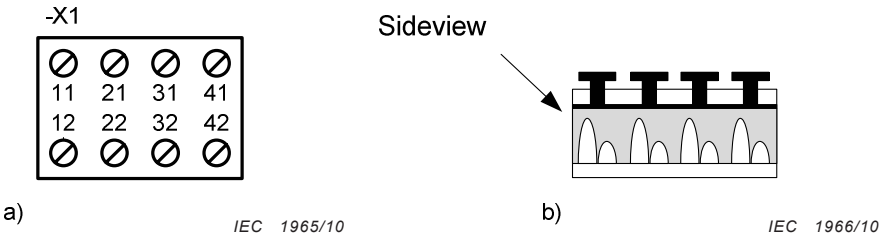


Figure A.3 – One terminal block with eight terminals with two entry points each

In this case, the terminal designations have to be assigned and described in the document or in supporting documentation. Possible conventions for designating multiple entry points on one terminal may be, using the character FULL STOP (.) as a separator sign behind the markings on the product:

- 1, 2, 3, etc.;
- A, B, C, etc.

Consequently, the identification of the terminals are –X1:11.1, –X1:11.2, etc, or –X1:11.A, –X1:11.B, etc.

Bibliography

IEC 60034-8:2007, *Rotating electrical machines – Part 8: Terminal markings and direction of rotation*

IEC 60050-151*, International Electrotechnical Vocabulary – Part 151: Electrical and magnetic devices*

IEC 60191-3:1999, *Mechanical standardization of semiconductor devices – Part 3: General rules for the preparation of outline drawings of integrated circuits*

IEC/TR 60616:1978, *Terminal and tapping markings for power transformers*

IEC 60617, *Graphical symbols for diagrams*

IEC 61355, *Classification and designation of documents for plants, systems and equipment – Part 1: Rules and classification tables*

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