SLOVENSKI STANDARD
SIST EN 61082-2:1997

01-december-1997

Preparation of documents used in electrotechnology - Part 2: Function-oriented diagrams (IEC 1082-2:1993)

Preparation of documents used in electrotechnology -- Part 2: Function-oriented diagrams

Dokumente der Elektrotechnik -- Teil 2: Funktionsbezogene Schaltpläne

Etablissement des documents utilisés en électrotechnique -- Partie 2: Schémas adaptés à la fonction

Ta slovenski standard je istoveten z: **EN 61082-2:1994**

ICS:

01.110	Tehnična dokumentacija za izdelke	Technical product documentation
29.020	Elektrotehnika na splošno	Electrical engineering in general

SIST EN 61082-2:1997 **en**

EUROPEAN STANDARD

NORME EUROPEENNE

EUROPÄISCHE NORM

EN 61082-2

January 1994

UDC 621.3.061:003.62

Supersedes HD 246.7 S1:1984

Descriptors: Functions, charts, diagrams, function oriented diagrams

ENGLISH VERSION

Preparation of documents used in electrotechnology
Part 2: Function-oriented diagrams
(IEC 1082-2:1993)

Etablissement des documents utilisés en électrotechnique
Partie 2 : Schémas adaptés à la fonction

(CEI 1082-2:1993)

Erstellung von in der Elektrotechnik verwendeten Dokumenten
Teil 2: Funktionsorientierte Schaltpläne
(IEC 1082-2:1993)

This European Standard was approved by CENELEC on 1993-07-06. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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

Ref. No. EN 61082-2:1994 E

FOREWORD

The text of document 3B(CO)49, as prepared by Sub-Committee 3B: Documentation, of IEC Technical Committee N° 3: Documentation and graphical symbols, was submitted to the IEC-CENELEC parallel vote in July 1992.

The reference document was approved by CENELEC as EN 61082-2 on 6 July 1993.

This European Standard replaces HD 246.7 S1:1984.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1994-12-01
- latest date of withdrawal of conflicting national standards	(dow)	1994-12-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given only for information.
In this standard, annex A is informative and annex ZA is normative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 1082-2:1993 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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

IEC Publication	Date	Title	EN/HD	Date
375	1972	Conventions concerning electric and magnetic circuits	-	-
617-1	1985	Graphical symbols for diagrams Part 1: General information, general index - Cross-reference tables	-	-
617-2	1983	Part 2: Symbol elements, qualifying symbols and other symbols having general application	-	-
617-3	1983	Part 3: Conductors and connecting devices	-	-
617-4	1983	Part 4: Passive components	-	-
617-5	1983	Part 5: Semiconductors and electron tubes	-	-
617-6	1983	Part 6: Production and conversion of electrical energy	-	-
617-7	1993	Part 7: Switchgear, controlgear and protective devices	-	-
617-8	1983	Part 8: Measuring instruments, lamps and signalling devices	-	-
617-9	1983	Part 9: Telecommunications: Switching and peripheral equipment	-	-
617-10	1983	Part 10: Telecommunications: Transmission	-	-
617-11	1983	Part 11: Architectural and topographical installation plans and diagrams	-	-

IEC Publication	Date	Title	EN/HD	Date
617-12	1991	Part 12: Binary logic elements	-	-
617-13	1993	Part 13: Analogue elements	EN 60617-13	1993
750	1983	Item designation in electrotechnology	-	-
848	1988	Preparation of function charts for control systems (corrigendum September 1990)	-	-
1082-1	1991	Preparation of documents used in electrotechnology - Part 1: General requirements (corrigendum November 1993)	EN 61082-1	1993
1175	1993	Designations for signals and connections	EN 61175	1993

Other publications:

ISO 3511-1:1977 - Process measurement control functions and instrumentation Symbolic representation - Part 1: Basic requirements

ISO 3511-2:1984 - Process measurement control functions and instrumentation Symbolic representation - Part 2: Extension of basic requirements

ISO 3511-4:1985 - Industrial process measurement control functions and instrumentation - Part 4: Basic symbols for process computer, interface, and shared display/control functions

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Partie 2:
Schémas adaptés à la fonction

Preparation of documents used in electrotechnology

Part 2:
Function-oriented diagrams

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

PREPARATION OF DOCUMENTS USED IN ELECTROTECHNOLOGY

Part 2: Function-oriented diagrams

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 1082-2 has been prepared by sub-committee 3B: Documentation, of IEC technical committee 3: Documentation and graphical symbols.

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

DIS	Report on voting
3B(CO)49	3B(CO)53

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

IEC 1082 consists of the following parts, under the general title: Preparation of documents used in electrotechnology:

- Part 1: 1991, General requirements;
- Part 2: 1993, Function-oriented diagrams;
- Part 3: 1993, Connection diagrams, tables and lists;
- Part 4, Location and installation documents *(under consideration).*

Other subjects are under consideration:

- *Parts lists;*
- *Spare parts lists;*
- *Instructions.*

IEC 1082 cancels and replaces IEC 113. Due to restructuring and extensions of the material, there is no exact correspondence between the parts of IEC 1082 and those of IEC 113. However, the following list gives an approximate indication:

- IEC 1082-1 corresponds to IEC 113-1, 113-3 and parts of 113-7 and 113-8;
- IEC 1082-2 corresponds to IEC 113-4 and parts of 113-7 and 113-8;
- IEC 1082-3 corresponds to IEC 113-5 and 113-6.

Annex A is for information only.

PREPARATION OF DOCUMENTS USED IN ELECTROTECHNOLOGY

Part 2: Function-oriented diagrams

Section 1 - General

1.1 Scope

This International Standard provides rules for function-oriented diagrams such as overview diagrams, function diagrams, and circuit diagrams.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 1082. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and the parties to agreements based on this part of IEC 1082 are encouraged to investigate the possibility of applying the most recent editions of the normative documents listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 375: 1972,	Conventions concerning electric and magnetic circuits
IEC 617-1: 1985,	Graphical symbols for diagrams - Part 1: General information, general index. Cross-reference tables
IEC 617-2: 1983,	Graphical symbols for diagrams - Part 2: Symbol elements, qualifying symbols and other symbols having general application
IEC 617-3: 1983,	Graphical symbols for diagrams - Part 3: Conductors and connecting devices
IEC 617-4: 1983,	Graphical symbols for diagrams - Part 4: Passive components
IEC 617-5: 1983,	Graphical symbols for diagrams - Part 5: Semiconductors and electron tubes
IEC 617-6: 1983,	Graphical symbols for diagrams - Part 6: Production and conversion of electrical energy
IEC 617-7: 1983,	Graphical symbols for diagrams - Part 7: Switchgear, controlgear and protective devices
IEC 617-8: 1983,	Graphical symbols for diagrams - Part 8: Measuring instruments, lamps and signalling devices
IEC 617-9: 1983,	Graphical symbols for diagrams - Part 9: Telecommunications: Switching and peripheral equipment
IEC 617-10: 1983,	Graphical symbols for diagrams - Part 10: Telecommunications: Transmission
IEC 617-11: 1983,	Graphical symbols for diagrams - Part 11: Architectural and topographical installation plans and diagram
IEC 617-12: 1991,	Graphical symbols for diagrams - Part 12: Binary logic elements
IEC 617-13: 1993,	Graphical symbols for diagrams - Part 13: Analogue elements
IEC 750: 1983,	Item designation in electrotechnology
IEC 848: 1988,	Preparation of function charts for control systems
IEC 1082-1: 1991,	Preparation of documents used in electrotechnology - Part 1: General requirements
IEC 1175: 1993,	Designations for signals and connections
ISO 3511-1: 1977,	Process measurement control functions and instrumentation - Symbolic representation - Part 1: Basic requirements
ISO 3511-2: 1984,	Process measurement control functions and instrumentation - Symbolic representation - Part 2: Extension of basic requirements
ISO 3511-4: 1985,	Industrial process measurement control functions and instrumentation - Part 4: Basic symbols for process computer, interface, and shared display/control functions

Section 2 - Common rules for function-oriented diagrams

2.1 General

Function-oriented diagrams shall be prepared in accordance with the rules in IEC 1082-1 and in accordance with the rules given in this part of IEC 1082.

2.2 Layout

Graphical symbols and circuits should be arranged to emphasize the process and/or signal flow and the functional relations according to 4.2 in IEC 1082-1. Topographical information may be added, if relevant, but should not govern the layout.

To emphasize the signal flow, the connecting lines of the circuits should be kept as straight as practicable. For certain fundamental circuits, the layouts referred to in 2.9 should be adopted.

To emphasize the functional relations, the symbols for functionally related items should be grouped close to one another. For example, see figure 1.

The two requirements may in some cases lead to different results, and priority has to be given to one of them.

- Within functional groups, and for equipment of limited size and complexity, priority should be given to the signal flow.

- For systems and complex equipment, the overall function-oriented structure should be emphasized and priority given to the functional grouping. The signal flow between the functional groups may thus be more complicated than within the groups.

Parallel paths of equal importance should be symmetrically displaced with respect to the common path. For example, see figure 2.

Similar items in parallel vertical [horizontal] paths should be aligned horizontally [vertically]. For example, see figure 3.

2.3 Location reference systems

If it would otherwise be difficult to locate a symbol or an end of an interrupted connecting line in a diagram, the diagram shall incorporate a location reference system such as:

1) a grid reference system according to 4.8.2 in IEC 1082-1;

2) a circuit reference system, wherein the branches of a circuit are identified by numbers. For example, see figure 3;

3) an item designation tabular reference system wherein, along one edge of the diagram, the item designations are repeated in line with the corresponding symbols. The item designations should be arranged in columns (or rows), one for each of the most frequently used types of parts (capacitors, resistors, relays, etc.), and one for all other types of parts. For example, see figure 4.

2.4 Graphical symbols

2.4.1 *General*

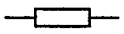
Symbols can represent functions, devices, or assemblies of functions or devices, and shall be chosen according to 4.3 in IEC 1082-1.

For some devices, there may be alternative ways of describing the function. For example, the same device might be represented either as an AND-element or as an OR-element. Another device might be represented as a multiplier or as a squarer (e.g., symbols 13-07-01 and 13-07-02 in IEC 617). The symbol chosen should depict the function actually performed by the device in the system.

2.4.2 *Functions and real components or devices* [1]

Many of the symbols in IEC 617 can represent functions as well as real components or devices capable of carrying out these functions.

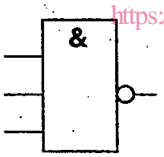
EXAMPLES



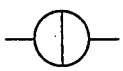
(04-01-01) Resistance (function), resistor (component)

(04-02-01) Capacitance (function), capacitor (component)

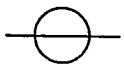
(04-03-01) Inductance (function), inductor (component)



(12-28-01) AND-element with negated output (function or component)



(02-16-01) Current source (function or component)



(02-16-02) Voltage source (function or component)

NOTE - Regarding 02-16-01 and 02-16-02: For the indication of polarity and current reference direction, see IEC 375.

Another method of representing a function is to use a rectangle (symbol 02-01-02), supplemented with a qualifying symbol or legend inside. This method should only be used where no specific symbol in IEC 617 exists. If necessary, the symbol derived shall be explained in the diagram or in supporting documents.

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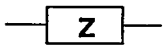
[1] This sub-clause (2.4.2) is proposed to be transferred to IEC 617-1, but is included here until IEC 617 has been revised.

EXAMPLE



Impedance (function)

NOTE - The Z may be replaced by a mathematical expression, for example, R + jωL.

2.4.3 *Functions performed with the help of software*

If it is necessary to indicate that functions are performed with the help of software, the hexagon symbol in ISO 3511-4 shall be used as a qualifying symbol. For example, see figure 5.

2.4.4 *Methods of the representation of components*

2.4.4.1 *General*

Any or all of the six methods for the representation of components defined in 2.1.3.1 through 2.1.3.6 in IEC 1082-1 may be used in the same diagram. In simple cases, it may be satisfactory to use attached or grouped representation. In more complex circuits, the other methods may be necessary. Repeated, grouped and dispersed representations are useful, especially with integrated circuits.

IEC 617 shows the symbols in attached or grouped representation. For the other methods, the following rules apply.

2.4.4.2 *Semi-attached representation*

In semi-attached representation, linkages and connections among the functionally dependent parts that are internal to the device and not externally accessible shall be shown explicitly.

Semi-attached representation is traditionally applied to components having a mechanical functional linkage. However, the method may also be used for, for example, binary logic elements. This concept is illustrated in figure 6.

Internal connections, for example, the one shown in figure 6 between the AND-gate and the OR-gate, shall be shown as solid lines.

The internal connections shall be implied:

- by the absence of terminal designations at the ends of the internal connections if no ambiguity is likely, or
- by a notation, such as INT (INT = internal) at the usual location for terminal designations, or
- by special identifiers explained in the diagram or in a supporting document.

The connecting lines representing the internal connections may be interrupted, provided the requirements of 4.4.6 in IEC 1082-1 are met. For example, see figure 7.

2.4.4.3 *Detached representation*

In detached representation, internal linkages and connections among the functionally dependent parts are only implied. Detached representation shall be used only if the internal linkages are substantially obvious, as in the case of an electromechanical relay coil and its corresponding contacts.

Each of the symbols representing a part of the component shall have an item designation that relates it to all other symbols representing the same component.

If necessary, location references from the actuating or affecting parts to the other parts and vice versa shall be shown in accordance with 2.3.

The referencing from the actuating or affecting parts to the other parts may be carried out as inset diagrams or inset tables, adjacent to the actuating or affecting part. If this location is not practical, they may be located elsewhere in the diagram or in a separate document. In the latter case a reference to that document shall be added to the symbol for the actuating or affecting part.

Examples: Figure 8 gives an example of the use of inset diagrams. In figure 9 the inset diagrams are replaced with inset tables.

The symbols for individual characteristics of actuated or affected parts shall be shown with the symbols for these parts. Symbols showing the characteristics of the actuator or the affecting part, or common to the whole component should be shown with the symbol for the actuator or the affecting part. For examples, see table 1. For manually operated devices, simplified repeated representation (see 2.4.4.4) may also be used. For example, see figure 10.

2.4.4.4 *Repeated representation*

In repeated representation, each functionally independent part of a component is shown in attached representation in several places, partially connected in each place. As a consequence, the same terminal may appear more than once in a diagram. Each appearance shall be labelled with a terminal designation that relates it to all other appearances of the same terminal, but a connection to the repeated terminals need be shown in only one place. However, a connecting line or another indication of the connection may be present at all additional occurrences of the terminal, provided no confusion is likely. For simplification, see 4.6.4 in IEC 1082-1. See also figure 10.

If it is necessary to identify repetitive information, this shall be done by placing the repeated terminal designation in parentheses or by a special identifier explained in the diagram.

2.4.4.5 *Dispersed representation*

If there are no connections[1] or linkages among the parts of a component, which means that these parts are functionally independent, the symbols for these parts may be shown in dispersed representation. Each of the symbols representing a part of the component shall have an item designation that relates it to all other symbols representing the same component.

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[1] The individual parts of a component may have a common *power supply connection.*