BRITISH STANDARD

BS EN 61082-3:1994
IEC 1082-3: 1993

Preparation of documents used in electrotechnology —

Part 3: Connection diagrams, tables and lists

The European Standard EN 61082-3:1994 has the status of a British Standard

UDC 621.3.061:003.62

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the national committees of the following countries:

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The following BSI references relate to the work on this standard:
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Contents

National foreword

This British Standard has been prepared under the direction of the General Electrotechnical Standards Policy Committee and is the English language version of EN 61082-3:1994 *Preparation of documents used in electrotechnology. Part 3: Connection diagrams, tables and lists,* published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 1082-3:1993 published by the International Electrotechnical Commission (IEC).

IEC 1082 consists of several Parts as follows:

IEC 1082-1:1991, *General requirements.*

IEC 1082-2:1993, *Function-oriented diagrams.*

IEC 1082-3:1993, *Connection diagrams, tables and lists.*

IEC 1082-4, *Location and installation documents* (in preparation).

Other Parts under consideration are:

— Parts' lists

— Spare parts' lists

— Instructions

It is envisaged that all Parts of IEC 1082 will be adopted by CENELEC as Parts of EN 61082. British Standards identical in number and title will be published as further Parts of BS EN 61082 in due course.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their 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, pages i to iv, the EN title page, pages 2 to 22, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61082-3

January 1994

UDC 621.3.061:003.62

Supersedes HD 246.5 S1:1977 and HD 246.6 S2:1988

Descriptors: Electrotechnology, documents, connections, diagrams

English version

Preparation of documents used in electrotechnology Part 3: Connection diagrams, tables and lists

(IEC 1082-3:1993)

Etablissement des documents utilisés en électrotechnique
Partie 3: Schémas, tableaux et listes des connexions
(CEI 1082-3:1993)

Erstellung von in der Elektrotechnik verwendeten Dokumenten
Teil 3: Schaltpläne, Tabellen und Listen
(IEC 1082-3:1993)

This European Standard was approved by CENELEC on 1993-09-22. 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.

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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 3B(CO)50, as prepared by Subcommittee 3B: Documentation, of IEC Technical Committee No. 3: Documentation and graphical symbols, was submitted to the IEC-CENELEC parallel vote in November 1992.

The reference document was approved by CENELEC as EN 61082-3 on 22 September 1993.

This European Standard replaces HD 246.5 S1:1977 and HD 246.6 S2:1988.

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. In this standard, Annex ZA is normative.

Contents

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Section 1. General

1.1 Scope

This International Standard provides rules for connection diagrams, tables and lists.

NOTE According to IEC 1082-1, no difference between the terms *table* and *list exists*.

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 445:1988, *Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system.*

IEC 446:1989, *Identification of conductors by colours or numerals.*

IEC 617-3:1983, *Graphical symbols for diagrams — Part 3: Conductors and connecting devices.*

IEC 750:1983, *Item designation in electrotechnology.*

IEC 757:1983, *Code for designation of colours.*

IEC 1082-1:1991, *Preparation of documents used in electrotechnology — Part 1: General requirements.*

IEC 1082-2:1993, *Preparation of documents used in electrotechnology — Part 2: Function-oriented diagrams.*

Section 2. Common rules for connection diagrams, tables and lists

2.1 General

Connection documents provide information on physical connections among, for example, components, devices, assemblies, and installations. Connection documents are used when assembling, installing or maintaining equipment.

Connection documents shall include information identifying the connection points of each connection and the conductors or cables used to make the connections. In the case of terminal connection documents, only one end need be shown.

Other information may be included as needed or as appropriate, and shall be included to the extent that is required for the intended use of the document. The following types of information shall be considered for inclusion:

— conductor or cable type information (for example, a recognized type designation, catalogue or part number, material, construction, size, colour of insulation, voltage rating, number of conductors, other technical data);

— conductor or cable number or item designation;

— identification or representation of the connection points (for example, item and/or terminal designation, pictorial representations, remote end designation);

— instruction for, or methods of, laying, routing, termination, attachment, twisting, screening, etc.;

— length of conductor or cable;

— signal designation and/or technical data about the signal; and

— special classification or information.

For identification of conductors by means of colours or numerals, see IEC 446. Colour codes shall be in accordance with IEC 757. For identification of items, see IEC 750.

The information may be given in diagrammatic or tabular form, or a combination of these, provided clarity is maintained.

Connection documents 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.

If any special convention is used, for example, to indicate methods for attachment or removal, it should be shown or referenced in the document or in supporting documents.

2.2 Connection diagrams

2.2.1 Layout

Connection diagrams should use topographical layout but need not be to scale.

2.2.2 Representation and identification of devices and terminals

Devices should be represented by simple outlines, such as squares, rectangles, or circles, or by simplified pictorial representations. Graphical symbols according to IEC 617 may also be used. Terminals shall be clearly indicated but symbols for terminals need not be shown unless special conditions require their depiction.

2.2.3 Representation and identification of conductors

Conductors shall be represented using one of the following methods:

a) *Continuous line* — where continuous lines represent the actual conductors between terminals. See Figure 1. Conductor groups, cables, cable bundles, etc. may be represented by a single line. See Figure 3.

If a unit or installation contains several conductor groups, cables, cable bundles, etc., these may be separated from one another and designated by item designations. See Figure 3, cable bundles –W1 and –W2.

b) *Interrupted line* — where the lines representing the conductors are interrupted and provision is made for the association of the interrupted lines. See Figure 2.

Symbols 03-02-04 and 03-02-05 in IEC 617 for a junction of conductors (“T-junction”) shall not be used unless there is a physical junction.

Figure 4 shows a number of examples of how connections to various types of cables should be represented.

2.2.4 Matrix form

If there are a large number of connections to be shown in a small space, as for example for the connections in a rack or subassembly containing printed circuit boards, a matrix form of layout may be advantageous.

The symbols for the terminals to be connected shall be arranged in a grid format, and each shall be identified.

All of the terminal symbols for a single device shall be aligned vertically [horizontally] in a sequence that provides a clear presentation of the connection information. The sequence need not conform to the physical sequence of the terminals on the device.

The columns [rows] of terminal symbols thus formed shall be arranged horizontally [vertically].

Each conductor shall be represented by a horizontal [vertical] connecting line passing through the symbols for the terminals to be connected. Conductors carrying named signals shall have the signal designations shown at one end of the connecting line on diagrams intended for installation, operation, or maintenance. See Figure 6.

If individual (point-to-point) conductors are to be shown exactly, each individual conductor shall be shown with a separate connecting line, if necessary. Conductor numbers may be shown, and, if shown, shall be placed above [to the left of] the respective horizontal [vertical] connecting lines.

2.3 Connection tables and lists

2.3.1 Layout

Connection tables shall be prepared in one of the following forms:

— terminal-oriented form. See Figure 16.

— connection-oriented form. See Figure 5 and Figure 15.

In the *terminal-oriented form*, each device to be connected shall be presented one by one together with its terminals. For each terminal, the attached connection(s) shall be shown. For example, see Figure 16.

In the *connection-oriented form*, each connection (wire, cable, cable conductor, etc.) shall be presented one by one, each wire or each individual cable conductor grouped together with the other conductors in that cable. For each conductor, the connected terminals or end points shall be shown. For examples, see Figure 5, Figure 12, and Figure 15.

2.3.2 Representation and identification of devices and terminals

Devices shall be represented and identified by the item designations.

Terminals shall be represented and identified by the terminal designations marked on the device or, as with a dual-in-line package or an electronic tube, assigned by the manufacturer or by convention.

If there is no terminal designation assigned by the manufacturer to the device, arbitrary terminal designations shall be assigned and shall be explained in the table or in referenced supporting documents. The same terminal designation shall be used for the same terminal in all other documents in which a designation for the terminal appears.

If the terminal designation has the form of a graphical symbol or colour, an equivalent standardized letter symbol may be used, for example, **PE** instead of the graphical symbol for protective earth (see IEC 445), **BU** for blue colour (see IEC 757).

2.3.3 Representation and identification of conductors

Conductors shall be represented and identified by using one or more of the following:

— an item designation. See –W108 in Figure 8 and Figure 9.

— a unique marking or colour found on the physical connection itself. See Figure 4.

— an arbitrarily assigned identification number. See Figure 2, Figure 3, and Figure 5.

— the set of terminals connected by the connection. See Figure 3 and Figure 15.

Section 3. Unit connection diagrams and tables

3.1 General

Unit connection diagrams and tables shall provide all information required about the internal connections within a single constructional unit or assembly of units. Information about the external connections among units need not be included, but references to the appropriate interconnection diagram or table may be provided.

3.2 Layout of diagrams

Symbols for devices should be arranged to generally correspond with the view of the equipment as seen when making the connections. More than one view may be required if the equipment is viewed from different directions when making the connections.

Terminals need not be shown arranged in the same way as they are in the actual device.

If devices are located above each other at several levels, these devices may be shown in the diagram as flipped, turned, or moved in such a way that the devices can be seen by the user of the diagram. The method used should be indicated. For example, see Figure 3, which contains a note indicating that the movable part to the right of the boundary line is wired from the front of the bay.

3.3 Examples

Figure 1 shows an example of a simple unit connection diagram where the conductors are depicted by individual lines and identified by conductor numbers.

Figure 2 shows an example of the unit shown in Figure 1, but with interrupted lines and with the graphical symbols for the terminals left out.

Figure 3 shows an example where the diagram shows the conductors grouped in two cable bundles, –W1 and –W2. The wires entering or leaving a cable bundle are shown in such a way that they are easily identifiable.

Figure 5 shows an example of a connection-oriented unit connection table for the unit shown in Figure 1. The notation TWIST 1 for conductors 44 and 45 in the instruction column indicates that these conductors form a twisted pair. The conductors 46 and 47 form another twisted pair. The notation in the remarks column indicate that a second conductor or device is connected to the same terminal.

A short dash in the conductor designation column indicates that no separate conductor is needed, i.e. the terminals of two components are directly connected, in this case each of the terminals of diode –V1 to terminals of –K13. The designation LINK indicates a physical link or a short wire without conductor number.

Figure 6 shows an example of a unit connection diagram in matrix or grid form. It should be noted that the symbols for the terminals of each printed circuit board have been placed to suit the layout of the diagram. Compare the diagram in Figure 7, which shows the same equipment. A comparison between the two diagrams shows that, in this case, it has not been regarded necessary to show the exact physical connections.

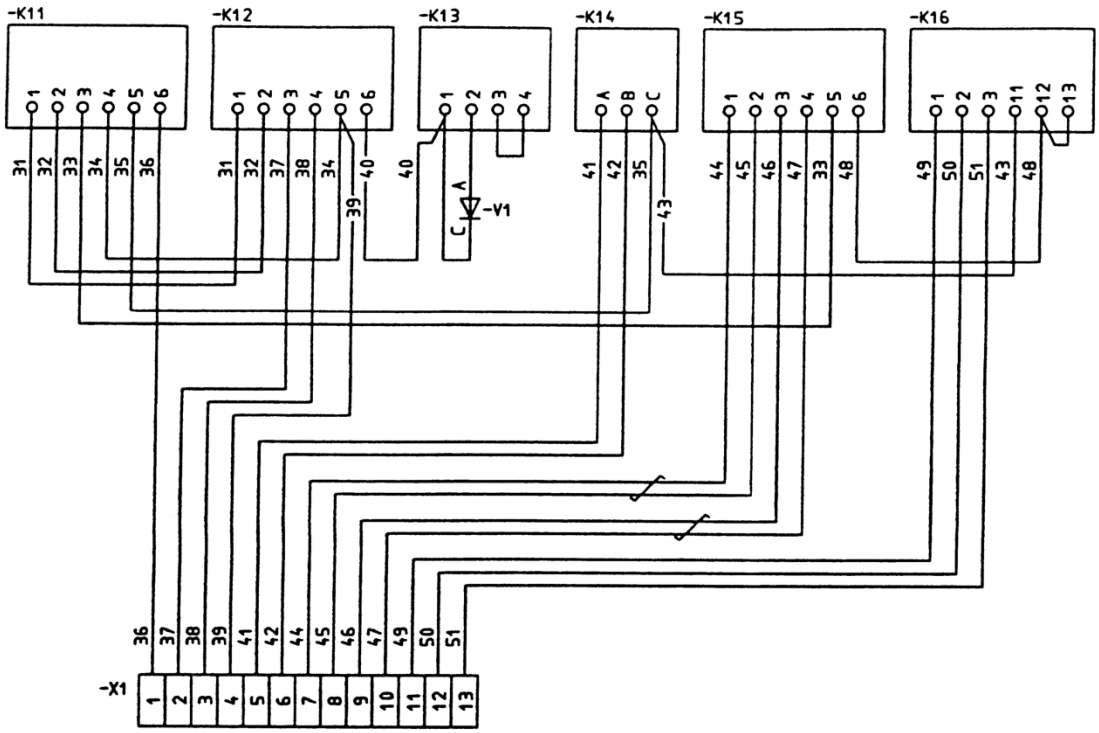


Figure 1 — Example of a unit connection diagram using continuous lines

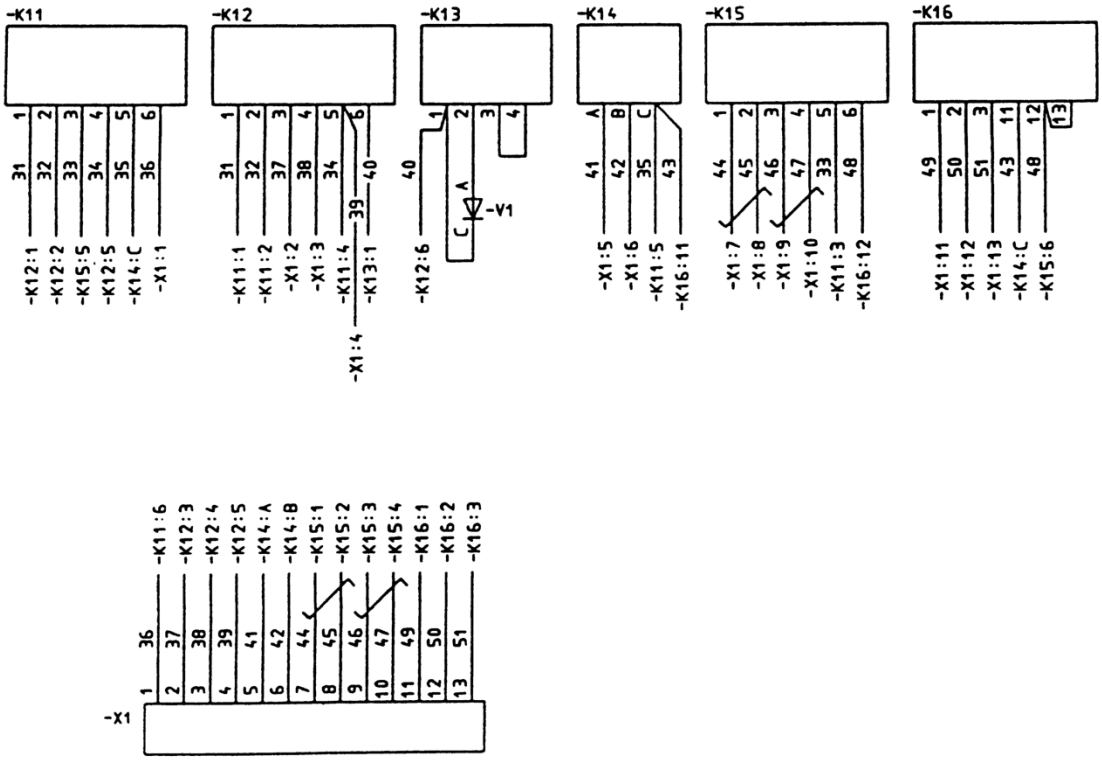


Figure 2 — Example of a unit connection diagram using interrupted lines

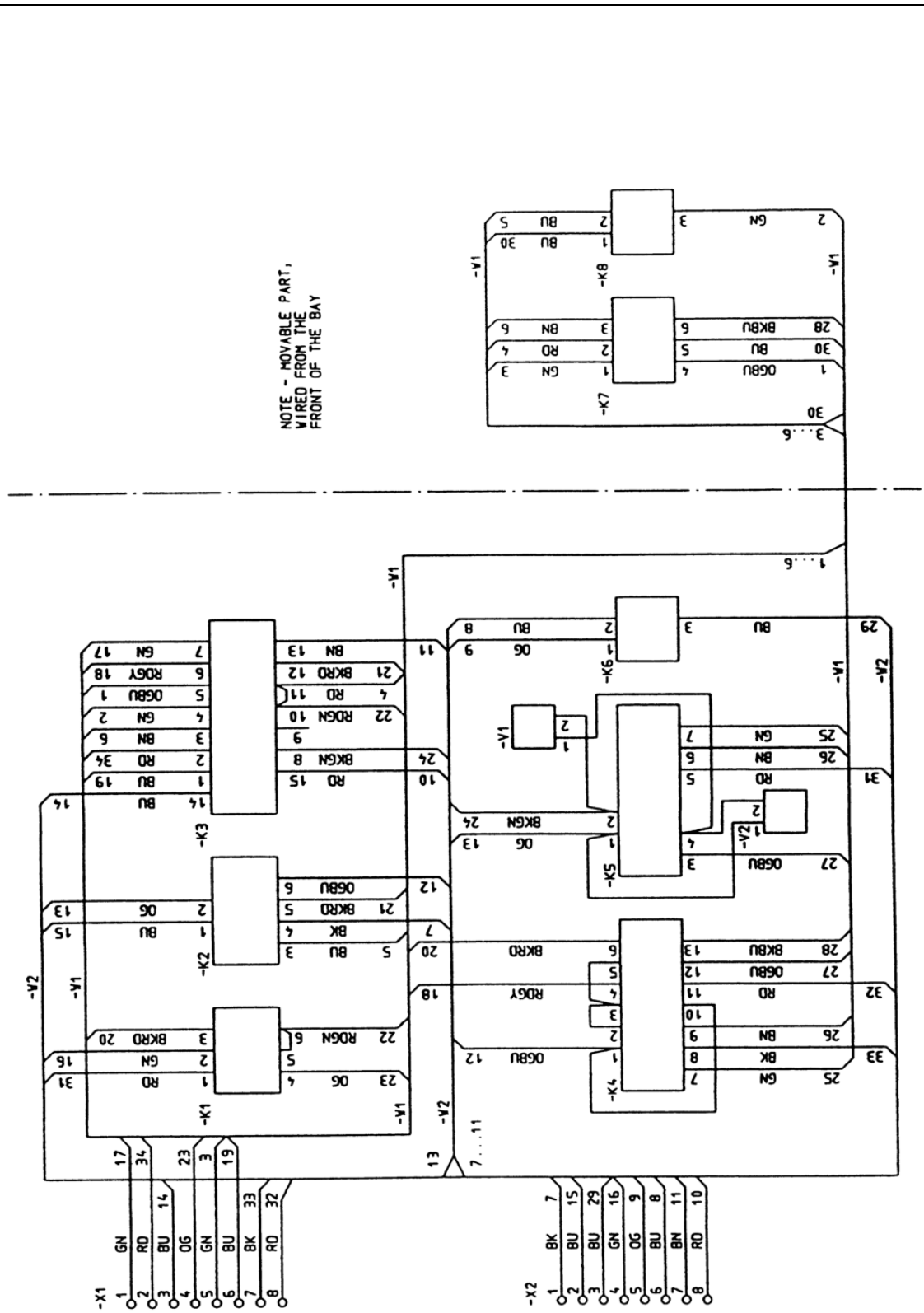


Figure 3 — Example of a unit connection diagram with the conductors arranged in different cable bundles, using continuous lines

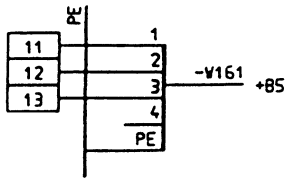
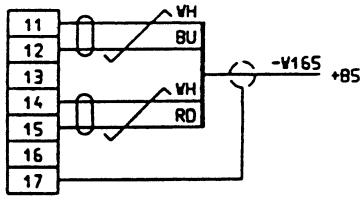
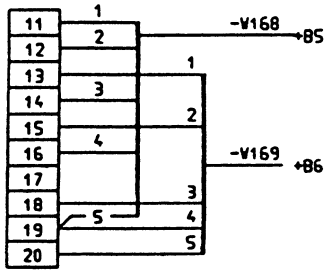
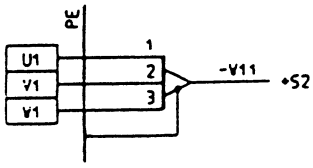
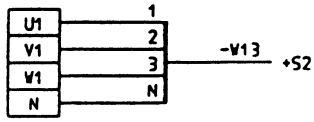
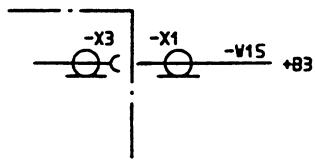
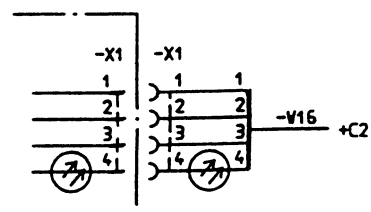
Ex.	Diagram	Description
1		Cable –W161, coming from unit +B5; Cable cores 1,2, and 3 connected to terminals 11, 12, and 13. The protective earth conductor PE connected to protective earth bar. The line representing the cable may be located at any point of the thick line at the splitting point.
2		Screened cable –W165 with two twisted and screened pairs
3		Two cables, interlaced on the diagram; The cable cores of cable –W168 connected to terminals 11, 12, 14, 16, and 19, those of cable –W169 connected to terminals 13, 15, 18, 19, and 20.
4		Power cable –W11 with sealing end; The sealing end and the metallic armour, if any, connected to a protective earth bar.
5		Power cable –W13 with a neutral conductor. NOTE The neutral conductor may be designed as the other three conductors or as a concentric conductor.
6		Coaxial cable –W15, provided with a coaxial plug –W15X1 connected to a corresponding socket –X3 in an assembly.
7		Cable –W16 consisting of four conductors, one of which is an optical fibre, provided with a plug –W16X1, connected to a corresponding socket –X1 in an assembly.

Figure 4 — Examples of representations of connections using various types of cables

Connection			Connection points					
Type	Designation	Instruction	Unit	Term.	Rem.	Unit	Term.	Rem.
	31		–K11	:1		–K12	:1	
	32		–K11	:2		–K12	:2	
	33		–K11	:3		–K15	:5	
	34		–K11	:4		–K12	:5	39
	35		–K11	:5		–K14	:C	43
	36		–K11	:6		–X1	:1	
	37		–K12	:3		–X1	:2	
	38		–K12	:4		–X1	:3	
	39		–K12	:5	34	–X1	:4	
	40		–K12	:6		–K13	:1	–V1
	–		–K13	:1	40	–V1	:C	
	–		–K13	:2		–V1	:A	
	LINK		–K13	:3		–K13	:4	
	41		–K14	:A		–X1	:5	
	42		–K14	:B		–X1	:6	
	43		–K14	:C	35	–K16	:11	
	44	TWIST 1	–K15	:1		–X1	:7	
	45	TWIST 1	–K15	:2		–X1	:8	
	46	TWIST 2	–K15	:3		–X1	:9	
	47	TWIST 2	–K15	:4		–X1	:10	
	48		–K15	:6		–K16	:12	LINK
	LINK		–K16	:12	48	–K16	:13	
	49		–K16	:1		–X1	:11	
	50		–K16	:2		–X1	:12	
	51		–K16	:3		–X1	:13	

Figure 5 — Example of a connection-oriented unit connection table. See subclause 3.3 for an explanation of the notation

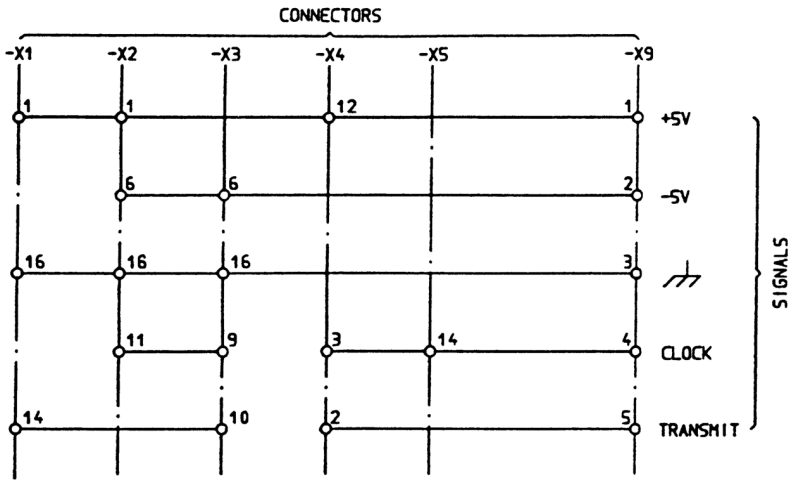


Figure 6 — Example of a unit connection diagram in matrix form for a sub-rack

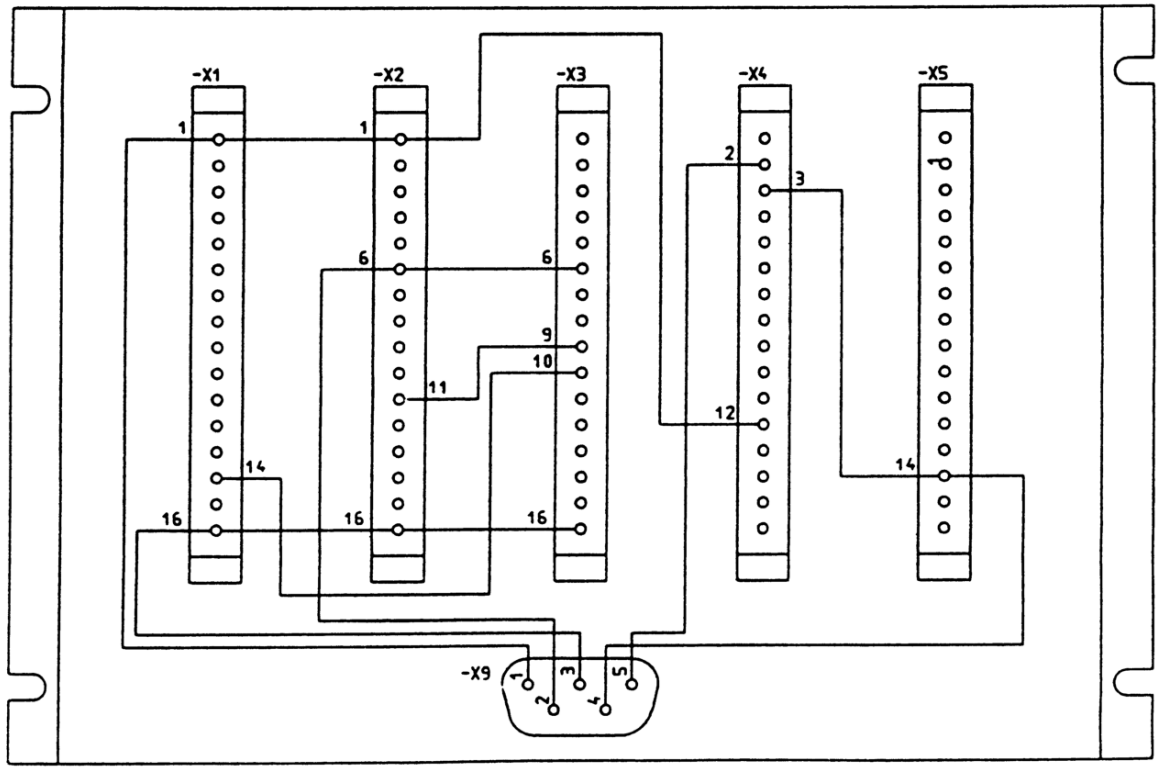


Figure 7 — Example of a unit connection diagram for a sub-rack

Section 4. Interconnection diagrams and tables

4.1 General

Interconnection diagrams and tables shall provide the information required about the connections among different constructional units of equipment or installations. Information about the internal connections in the units need not be included, but appropriate references (for example reference to unit connection diagram or table or references to internal components by means of their item designations), may be provided.

4.2 Layout of diagrams

All devices and connections should be shown as though they were all in one plane.

4.3 Examples

Figure 8 shows an example of an interconnection diagram using multi-line representation. The information for the cable end of –W109 has been supplemented with an item designation for the remote end.

Figure 9 shows an example of an interconnection diagram using partly single-line representation for the same equipment as depicted in Figure 8.

Figure 10 shows an example of an interconnection diagram in which the prefabricated cable –W3 is terminated by means of a connector at each end.

Figure 11 shows an example of an interconnection diagram for the cable shown in Figure 10. Single-line representation has been used and the information on the individual connections has been supplemented with information on the kind of current and voltage.

Figure 12 shows an example of a connection-oriented interconnection table for the same installation as shown in Figure 8.

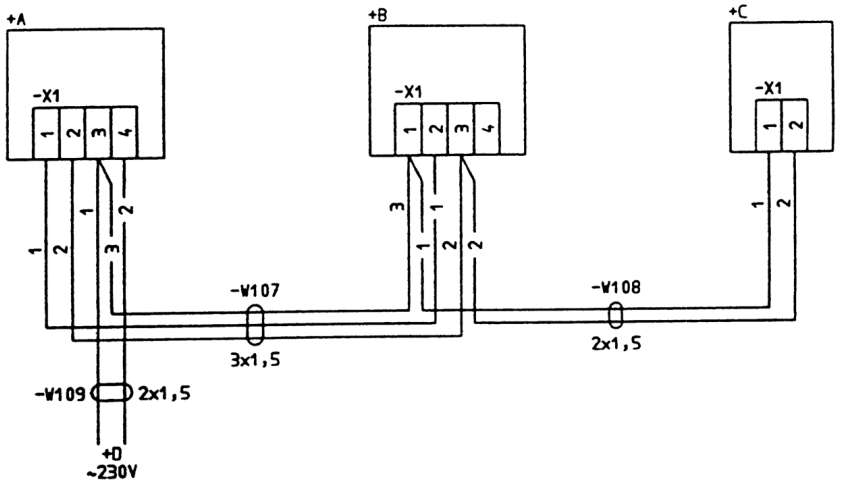


Figure 8 — Example of an interconnection diagram using multi-line representation

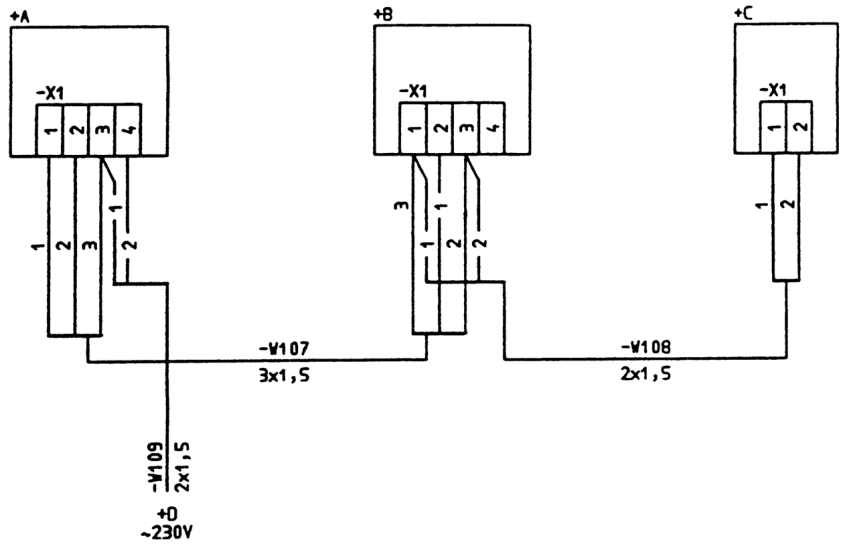


Figure 9 — Example of an interconnection diagram using partly single-line representation

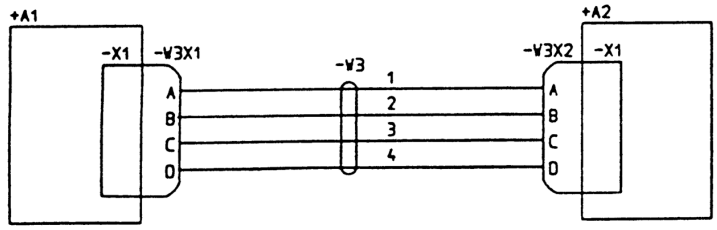


Figure 10 — Example of an interconnection diagram with cable end connectors

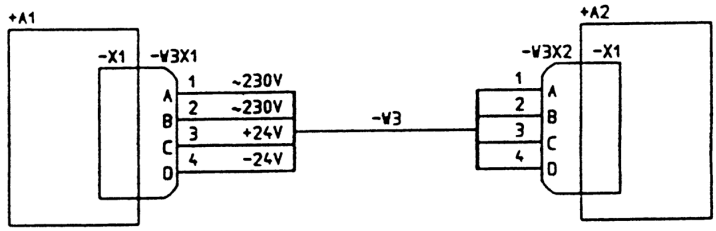


Figure 11 — Example of an interconnection diagram in single-line representation, showing cable connectors

Cable type	Cable Core No.	Connection points						Remark
		Item	Term.	Rem.	Item	Term.	Rem.	
HO5VV–U3×1.5	–W107 .1 .2 .3	+A–X1	 1 2 3	 –W109.1	+B–X1	 2 3 1	 –W108.2 –W108.1	
HO5VV–U2×1.5	–W108 .1 .2	+B–X1	 1 3	 –W107.3 –W107.2	+C–X1	 1 2		
HO5VV–U31.5	–W109 .1 .2	+A–X1	 3 4	 –W107.3	+D			Aux. volt. supply AC 230 V

Figure 12 — Example of a connection-oriented interconnection table

Section 5. Terminal connection diagrams and tables

5.1 General

A terminal connection diagram or table shall provide the information required to make the external connections to a single constructional unit or equipment.

A set of terminal connection diagrams or tables providing information about the connections to a corresponding set of units shall contain the same information in the same form as an interconnection diagram or table for the connections among the same units, i.e. the same rules apply.

5.2 Examples

Figure 13 shows two terminal connection diagrams, one for constructional unit +A4 and the other for constructional unit +B5. Each cable end is designated by its item designation and each core by its core number. Spare terminals with or without connections are indicated by the letters **RES** (reserved).

Figure 14 shows the same two terminal connection diagrams, supplemented with terminal designations of the remote end.

Figure 15 shows two connection-oriented terminal connection tables with terminal designations for the remote end, based on Figure 14. The symbol dash (–) indicates that there is no connection. Spare cores, whether or not connected to terminals, are denoted by the letters **RES**.

Figure 16 shows a terminal-oriented terminal connection table, based on the terminal diagram for unit +A4 in Figure 13.

Figure 17 shows an example of a terminal connection table of grid type, based on Figure 13. The number of cores of a cable is noted in a column, adjacent to the cable number and the spare cores in the last column on the same line.

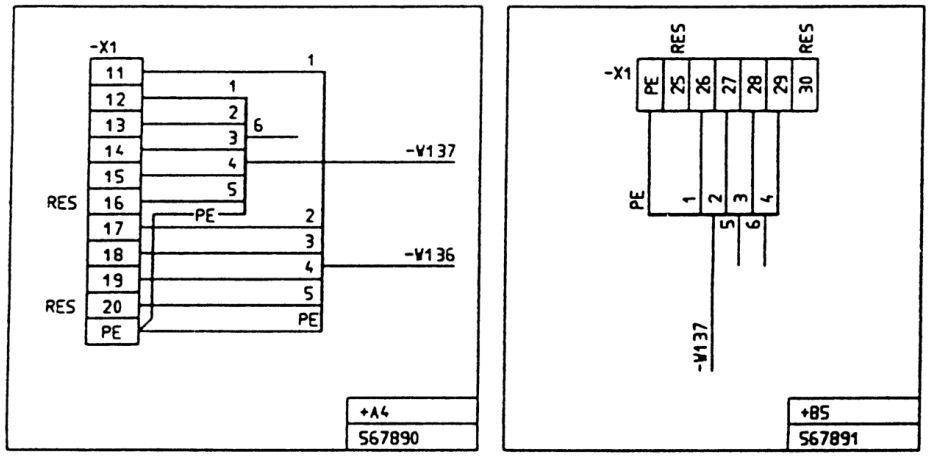


Figure 13 — Example of two terminal connection diagrams

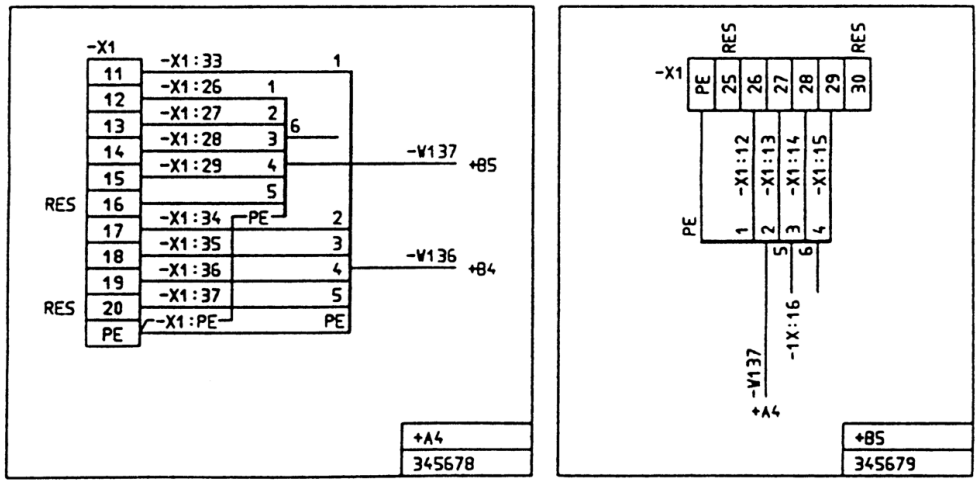


Figure 14 — Example of two terminal connection diagrams with remote end designations

Cable No.	Core No.	Terminal	Remote end	Rem.
–Wt136			+B4	
	PE	–X1:PE	–X1:PE	
	1	–X1:11	–X1:33	
	2	–X1:17	–X1:34	
	3	–X1:18	–X1:35	
	4	–X1:19	–X1:36	
	5	–X1:20	–X1:37	
				RES
–W137			+B5	
	PE	–X1:PE	–X1:PE	
	1	–X1:12	–X1:26	
	2	–X1:13	–X1:27	
	3	–X1:14	–X1:28	
	4	–X1:15	–X1:29	
	5	–X1:16	–	RES
	6	–	–	RES

+A4
234567

Cable No.	Core No.	Terminal	Remote end	Rem.
–W 137			+A4	
	PE	–X1:PE	–X1:PE	
	1	–X1:26	–X1:12	
	2	–X1:27	–X1:13	
	3	–X1:28	–X1:14	
	4	–X1:29	–X1:15	
	5	–	–X1:16	RES
	6	–	–	RES

+B5
234568

Figure 15 — Example of two connection-oriented terminal connection tables with remote end designations

Item	Terminal	Cable	Core
–X1	:11	–W136	1
	:12	–W137	1
	:13	–W137	2
	:14	–W137	3
	:15	–W137	4
	:16	–W137	5
	:17	–W136	2
	:18	–W136	3
	:19	–W136	4
	:20	–W136	5
	:PE	–W136	PE
	:PE	–W137	PE
	RES	–W137	6

+A4
345778

Figure 16 — Example of a terminal-oriented terminal connection table

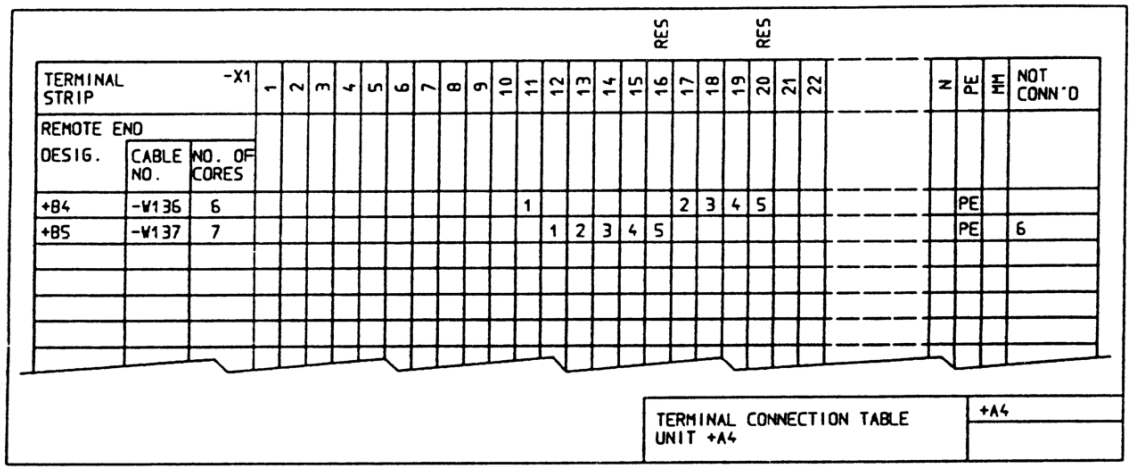


Figure 17 — Example of terminal connection table of grid type with remote end designations

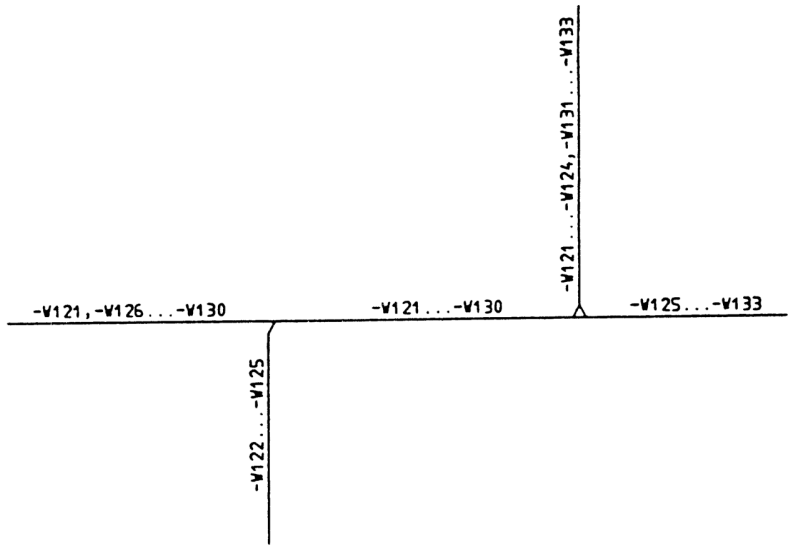


Figure 18 — Example of part of a cable diagram where groups of cables have been represented by single lines

Section 6. Cable diagrams, tables and lists

6.1 General

Cable diagrams and tables shall provide all information required for laying the cables among constructional units of equipment or installations. Information about the cable routes shall be included if necessary. Groups of cables may be shown in single-line representation with cable item designations. See Figure 18.

6.2 Examples

Figure 19 shows an example of a cable diagram, based on Figure 8.

Figure 20 shows an example with three units –A1, –A2, and –A3. Units –A1 and –A2 are provided with socket outlets whereas unit –A3 is provided with non-removable cables –W1 and –W2, each ending with a plug, –X1 and –X2 respectively.

Units –A1 and –A2 are interconnected by the screened 5-core cable –W1, provided with plugs –X1 and –X2.

Units –A1 and –A3 are interconnected by the 9-core screened cable –W1, which is a part of unit –A3.

Figure 21 shows an example of a cable table for the same equipment as that shown in Figure 19.

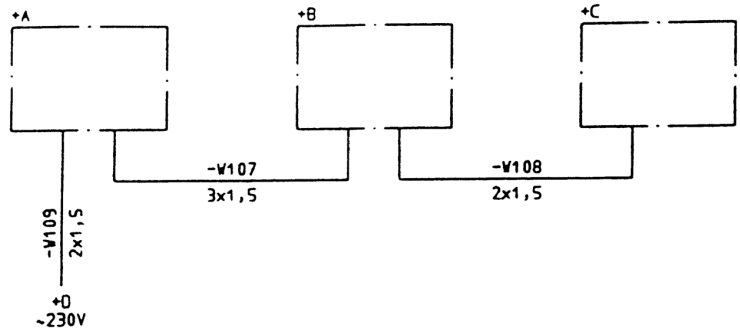


Figure 19 — Example of a cable diagram

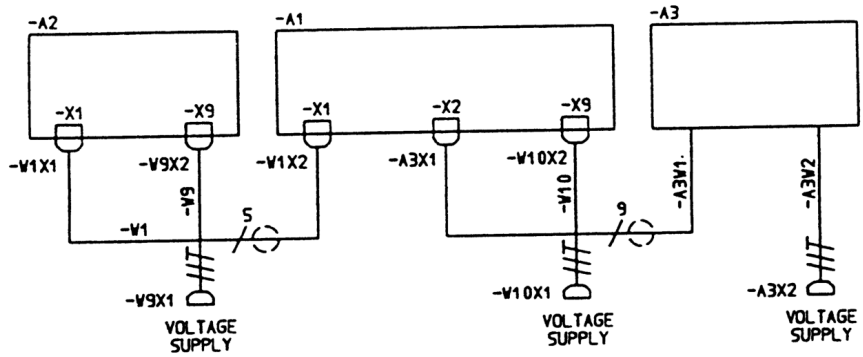


Figure 20 — Example of a cable diagram showing prefabricated cables provided with connectors

Cable No.	Cable type	End points		Remarks
–W107	HO5VV–U3×1.5	+A	+B	
–W108	HO5VV–U2×1.5	+B	+C	
–W109	HO5VV–U2×1.5	+A	+D	Aux. volt. supply AC 230V

Figure 21 — Example of a cable table

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
445	1988	*Identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system*	EN 60445	1990
446	1989[a]	*Identification of conductors by colours or numerals*	—	—
617-3	1983	*Graphical symbols for diagrams* Part 3: *Conductors and connecting devices*	—	—
750	1983	*Item designation in electrotechnology*	—	—
757	1983	*Code for designation of colour*	HD 457 S1	1985
1082-1	1991	*Preparation of documents used in electrotechnology* Part 1: *General requirements* (corrigendum November 1993)	EN 61082-1	1993
1082-2	1993	*Preparation of documents used in electrotechnology* Part 2: *Function-oriented diagrams*	EN 61082-2	1994

[a] IEC 446:1973 is harmonized as HD 324 S1:1977.

National annex NA (informative)
Committees responsible

The United Kingdom participation in the preparation of this European Standard was entrusted by the General Electrotechnical Standards Policy Committee (GEL/-) to Technical Committee GEL/3 upon which the following bodies were represented:

British Photographic Association

Consumer Policy Committee of BSI

EEA (the Association of Electronics, Telecommunications and Business Equipment Industries) GAMBICA (BEAMA Ltd.)

Transmission and Distribution Association (BEAMA Ltd.)

National annex NB (informative)
Cross-references

Publication referred to	Corresponding British Standard
IEC 445:1988	BS 5559:1991 *Specification for identification of equipment terminals and of terminations of certain designated conductors, including general rules for an alphanumeric system*
IEC 617-3:1983	BS 3939 *Graphical symbols for electrical power, telecommunications and electronics diagrams*
	Part 3:1985 *Conductors and connecting devices*
	BS EN 61082 *Preparation of documents used in electrotechnology*
IEC 1082-1:1991	BS EN 61082-1:1993 *General requirments*
IEC 1082-2:1993	BS EN 61082-2:1994 *Function-oriented diagrams*

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