

Connectors for use in d.c. low-frequency analogue and digital high speed data applications —

**Part 4-103: Printed board connectors
with assessed quality — Detail
specification for two-part connectors
with shielding and a basic grid
of 2,5 mm**

The European Standard EN 61076-4-103:1999 has the status of a
British Standard

ICS 31.220.10

National foreword

This British Standard is the English language version of EN 61076-4-103:1999. It is identical with IEC 61076-4-103:1999. The UK participation in its preparation was entrusted by Technical Committee EPL/48, Electromechanical components for electronic equipment, to Subcommittee EPL/48/2, Connectors for electronic equipment, which has the responsibility to:

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

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From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27-1 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 60 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.

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English version

Connectors for use in d.c. low-frequency analogue and
digital high speed data applications
Part 4-103: Printed board connectors with assessed quality
Detail specification for two-part connectors with shielding
and a basic grid of 2,5 mm

(IEC 61076-4-103:1999)

Connecteurs pour applications
analogiques en courant continu et à
basse fréquence et pour applications
numériques utilisant des débits élevés
pour le transfert des données
Partie 4-103: Connecteurs pour cartes
imprimées sous assurance de la qualité
Spécification particulière pour
connecteurs en deux parties avec
blindage au pas de base de 2,5 mm
(CEI 61076-4-103:1999)

Steckverbindungen für
Gleichspannungs- und
Niederfrequenzanwendungen sowie
digitale Anwendungen mit hoher
Übertragungsrate
Teil 4-103: Steckverbinder für gedruckte
Schaltungen mit bewerteter Qualität
Bauartspezifikation für geschirmte
indirekte Steckverbinder, Raster 2,5 mm
(IEC 61076-4-103:1999)

This European Standard was approved by CENELEC on 1999-04-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

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Foreword

The text of document 48B/737/FDIS, future edition 1 of IEC 61076-4-103, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61076-4-103 on 1999-04-01.

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- latest date by which the
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have to be withdrawn (dow) 2002-01-01

Annexes designated “normative” are part of the body of the standard.

In this standard, Annex ZA is normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61076-4-103:1999 was approved by CENELEC as a European Standard without any modification.

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Information on the availability of components qualified to this detail specification is given in the qualified products list.

1.1 Recommended method of mounting

Depending on the application the fixed board connectors shall be attached to the backplane or to the front panel through the press-in connections of their shielding frames.

Application a: for rear plug-up connections, the empty shroud of the fixed board connector accommodates the rear plug-up terminations of the fixed connector, which is mounted on the frontside of the backplane (for example a fixed board connector according to IEC 61076-4-100).

Application b: for backplane connections, the fixed board connector shall be equipped with male contacts, which are pressed into the backplane, together with the press-in terminations of its shielding frames.

Application c: for front panel connections, the fixed board connector shall be equipped with male contacts and rear plug-up terminations, which connect to a free connector on the printed board (for example a free board connector according to IEC 61076-4-100).

1.1.1 Number of contacts and contact cavities

Table 1 — Number of contacts and contact cavities for free cable connectors

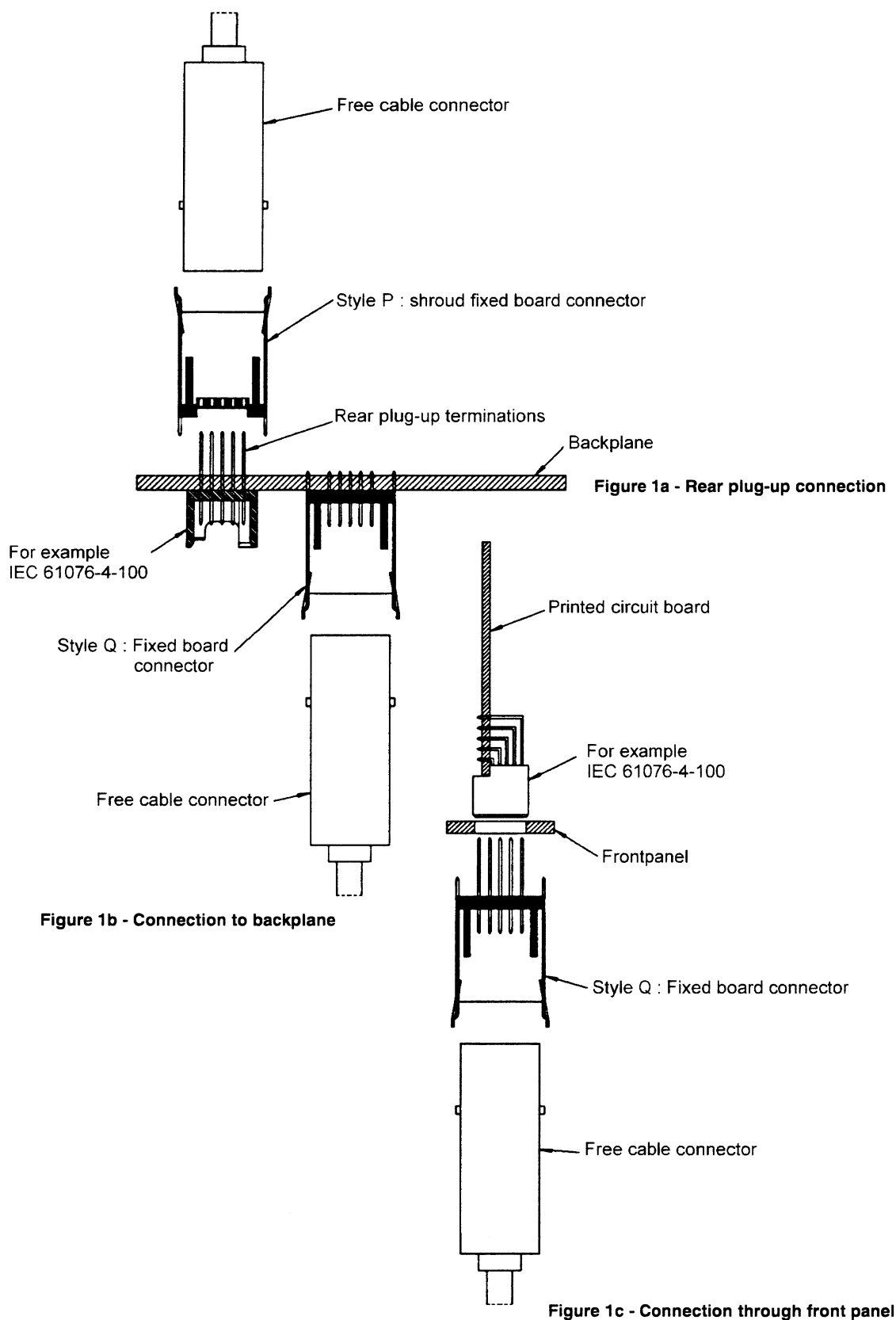
Styles (see 2.2.1)	Shape of housing	Connection	½ SU	1 SU	2 SU	4 SU
A	Straight, short	IDC or crimp	20	45	90	180
B	Straight, long	Angled press-in	—	35	70	140
		IDC or crimp	—	45	90	180
C	35° angled	IDC or crimp	—	45	90	180

Table 2 — Number of contacts and contact cavities for fixed board connectors

Styles (see 2.2.1)	1 SU	2 SU	4 SU	6 SU	8 SU	9 SU	10 SU
P and Q	45	90	180	270	360	405	450
R and T	40	80	160	240	320	360	400

1.2 Ratings and characteristics

Rated voltage:	contact/contact 500 V r.m.s.
Current rating:	1 A at 70 °C (all signal contacts loaded)
Insulation resistance:	5 GΩ min.
Climatic category:	PL 1: 40/100/56 PL 2: 40/100/21
Shielding effectiveness:	initial 70 dB min. average value
Electrostatic discharge:	induced voltage 250 mV maximum by 8 kV contact discharge
Printed board:	plated-through hole diameter 0,94 mm to 1,09 mm
Backplane	thickness: — for rear plug-up applications 3,0 mm to 5,0 mm — other than rear plug-up applications 1,4 mm to 5,6 mm



IEC 1 883/98

Figure 1 — Three recommended applications for cable-to-board connectors

1.3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61076. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 61076, are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing — Part 1: General and guidance*.

IEC 60352-5:1995, *Solderless connections — Part 5: Solderless press-in connections — General requirements, test methods and practical guidance*.

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*.

IEC 60512:—, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods*.

IEC 60512-2:1985, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 2: General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests*.

IEC 60512-3:1976, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 3: Current carrying capacity tests*.

IEC 60512-4:1976, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 4: Dynamic stress tests*.

IEC 60512-5:1992, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 5: Impact tests (free components), static load tests (fixed components), endurance tests and overload tests*.

IEC 60512-7:1993, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 7: Mechanical operating tests and sealing tests*.

IEC 60512-8:1993, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 8: Connector tests (mechanical) and mechanical tests on contacts and terminations*.

IEC 60512-9:1992, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 9: Miscellaneous tests*.

IEC 60512-23-3:—, *Electromechanical components for electronic equipment — Basic testing procedures and measuring methods — Part 23: Electromagnetic compatibility — Section 3: Test 23c: Shielding effectiveness, from 10 kHz to 1 000 kHz, on connectors with cables affixed¹⁾*.

IEC 60917:1988, *Modular order for the development of mechanical structures for electronic equipment practices*.

IEC 60917-2-2:1994, *Modular order for the development of mechanical structures for electronic equipment practices — Part 2: Sectional specification — Interface coordination dimensions for the 25 mm equipment practice — Section 2: Detail specification — Dimensions for subracks, chassis, backplanes, front panels and plug-in units*.

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 2: Electrostatic discharge immunity test — Basic EMC publication*.

IEC 61076-1:1995, *Connectors with assessed quality, for use in d.c., low frequency analogue and in digital high speed data applications — Part 1: Generic specification*.

¹⁾ To be published.

IEC 61076-4:1995, *Connectors with assessed quality, for use in d.c., low frequency analogue and in digital high speed data applications — Part 4: Sectional specification — Printed board connectors.*

IEC 61076-4-100:1994, *Connectors with assessed quality, for use in d.c., and low frequency analogue applications and in digital applications with high speed data — Part 4: Sectional specification — Printed board connectors — Section 100: Detail specification for two-part connectors having a basic grid of 2,5 mm, for printed boards and backplanes.*

ISO 468:1982, *Surface roughness — Parameters, their values and general rules for specifying requirements.*

1.4 Marking

The marking of the connector and the package shall be in accordance with 2.6 of IEC 61076-4.

1.5 IEC type designation

See 2.1 for definitions and 2.2 for designation of styles and variants.

The designation shall be derived in accordance with 2.5 of IEC 61076-4.

Example for free cable connector:

A straight 1 SU free cable connector with cable adapter for cables Ø 10 mm, fully loaded with palladium and gold-flash plated contacts in all five rows with 90° angled press-in terminations for internal printed board, meeting performance level 2 and assessment level G, is designated as follows:

IEC 61076-4-103 — B035F510 — L140202G

Example for fixed connector:

A 10 SU fixed board connector, fully loaded in all five rows with signal contacts level 1 and 12 mm rear plug-up spills, palladium and gold-flash plated, and with silver alloy plated shielding contacts, meeting performance level 1 and assessment level G, is designated as follows:

IEC 61076-4-103 — Q450M511 — U100231G

Example for single contacts:

A single female contact, with crimp termination, palladium and gold-flash plated, meeting performance level 2 and assessment level G, is designated as follows:

IEC 61076-4-103 — S001F000 — C100202G

1.6 Ordering information

For ordering connectors according to this detail specification, the IEC type designation described in **1.5** shall be used.

2 Technical data

2.1 Definitions

For the purpose of this part the following definitions apply:

2.1.1 Mechanical features

internal printed board

printed board which is mounted inside the free cable connector housing, connected to the free connector insert by means of angled press-in terminations

location pegs

posts, protruding from the connector housing, fitting into corresponding holes in the printed board or backplane, preventing a wrong assembly and giving an accurate position

locking device

device which retains the free cable connector in its mated state and withstands the specified static load

locking latches

elastic levers which snap under the noses of the free cable connector housing on full insertion

system unit (SU)

modular pitch of 25 mm, which is the basis for the design of all mechanical features

2.1.2 Contacts and terminations

contact range

the minimum to maximum distance between the reference planes of the fixed and free board connectors, within which the specified contact resistance is met

chess pattern

contact arrangement where the loaded and the unloaded positions alternate in rows and columns, like the fields on a chess-board

chess pattern, odd in a

chess pattern having loaded contacts on odd positions in row a

rear plug-up contact

termination post, usually being pressed-in into the backplane and emerging on the rear side as a male contact, to be connected to a free board connector

press-in shoulders

flanges on both sides of the male contact, supporting the mechanical forces to press the contact into the backplane

2.1.3 Engagement sequence

contact level

group of contacts which engage/separate simultaneously, within the limits required by a reliable engaging sequence

engaging sequence

distinct order in the engaging/separating process of contacts belonging to different contact levels

first possible contact point

depth dimension of the first point on the female contact, which can possibly be touched by the incoming male contact

first reliable contact point

depth dimension of the point on the female contact, from where the specified contact resistance with the incoming male contact is met

2.1.4 Mechanical coding

coding devices

accessories allowing the user to make specific pairs of connectors by providing them with matching coding devices

only connector pairs equipped with matching coding devices are intermateable, pairs with interfering coding devices are blocked off during insertion, preventing all electrical contact

default code

solid, pre-set coding configuration in the free-cable and fixed-board connectors, making them a matching pair, and protecting them in the future from mating with specific code settings

2.2 Survey of styles and variants

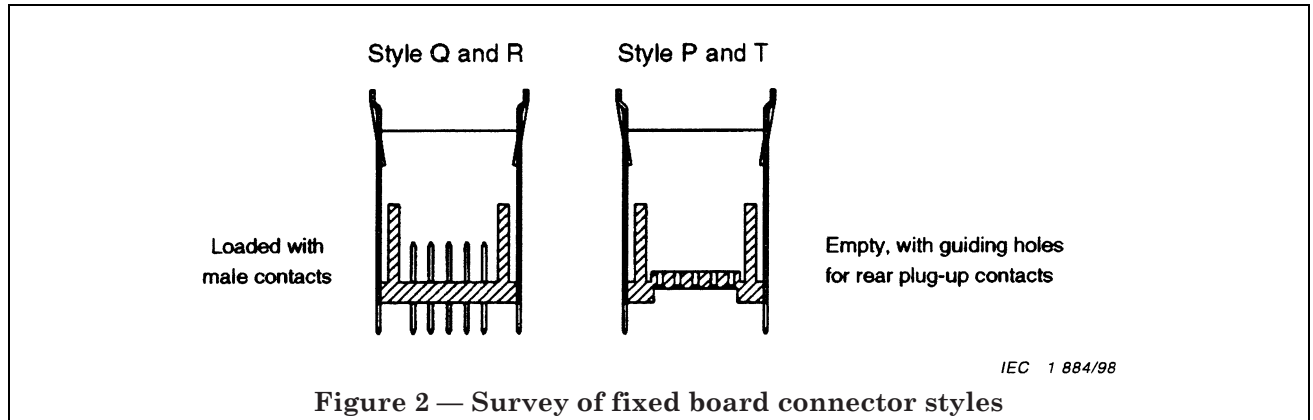
2.2.1 Styles of connectors

Free cable connectors

Table 3 — Survey of free cable connector styles

Style	½ SU	1 SU	2 SU	4 SU
A Straight short, for crimp or IDC terminations				
B Straight long, for crimp or IDC terminations and for angled press-in connection of internal printed board				
C Angled 35° upwards, for crimp or IDC terminations				

Fixed board connector shrouds



2.2.2 Survey of termination variants

Table 4 — Termination variants

	Basic type of termination	Variant	Length or wire gauge (see 3.4.3 and 3.5.3)
C	Crimp connection, according to IEC 60352-2	C1	Stranded wire 0,09 mm ² to 0,14 mm ²
		C2	Stranded wire 0,22 mm ² to 0,35 mm ²
I	Insulation displacement connection according to IEC 60352-3	I1	Solid wire: Ø 0,25 mm to 0,40 mm 7-stranded wire: 0,09 mm ² to 0,14 mm ²
		I2	Solid wire: Ø 0,40 mm to 0,63 mm 7-stranded wire: 0,22 mm ² to 0,35 mm ²
L	90° angled compliant press-in connection for plated-through hole Ø 1, according to IEC 60352-5	L1	3 mm
P	Straight compliant press-in connection for plated-through hole Ø 1, according to IEC 60352-5	P1	4,5 mm
		P2	6 mm
U	Straight, with rear plug-up contact area	U1	12 mm

2.2.3 Survey of cable diameters

Table 5 — Cable diameters

Style of housing	Designation in 1.5 (= Ø × 4)	Nominal cable diameter mm	Tolerance range of cable Ø mm
All	00	Blind	—
All	20	5	+0,4 -0,8
	24	6	
	28	7	
	32	8	
	36	9	
	40	10	
1 SU, 2 SU, 4 SU	44	11	+0,5 -1,0
	48	12	
	52	13	

2.3 Information on application

2.3.1 Complete connectors (pairs)

Description

The connector family has a basic grid of 2,5 mm and a mounting pitch of 25 mm (System Unit = SU).

It consists of a fixed connector with a modular shielded shroud, where a plurality of shielded free cable connectors may be plugged-in.

The fixed connector shroud has up to 10 slots of 25 mm long.

The free connector housings may have up to four inserts of 25 mm long, they may be stacked end to end, and fit in all slots of the modular shroud.

The smallest free connector housings, with only half an insert (12,5 mm), are used in pairs, and together fit in one slot of the modular shroud.

Electrically, the shielding braid of the round cables is connected to the housing shells of the free connectors. These shells make contact with the shielding frames on four sides in the slots of the modular shroud. The shielding frames of the modular shroud are pressed-in the backplane or the front panel of the equipment practice.

Mechanically, the round cables are clamped to the housing shells of the free connectors. These housings snap under the locking latches of the modular shroud. The locking latches are part of the shielding frames of the modular shroud, and are mechanically fixed to the backplane or the front panel by means of the press-in connections.

The free connectors may only be released from the modular shroud with an extraction tool.

Contact designation

The three recommended methods of mounting (see 1.1) allow opposite mating directions in relation to the equipment, therefore the designation of the contact rows shall be inverted in the rear plug-up shroud.

The contact rows and columns shall be designated according to the following figure:

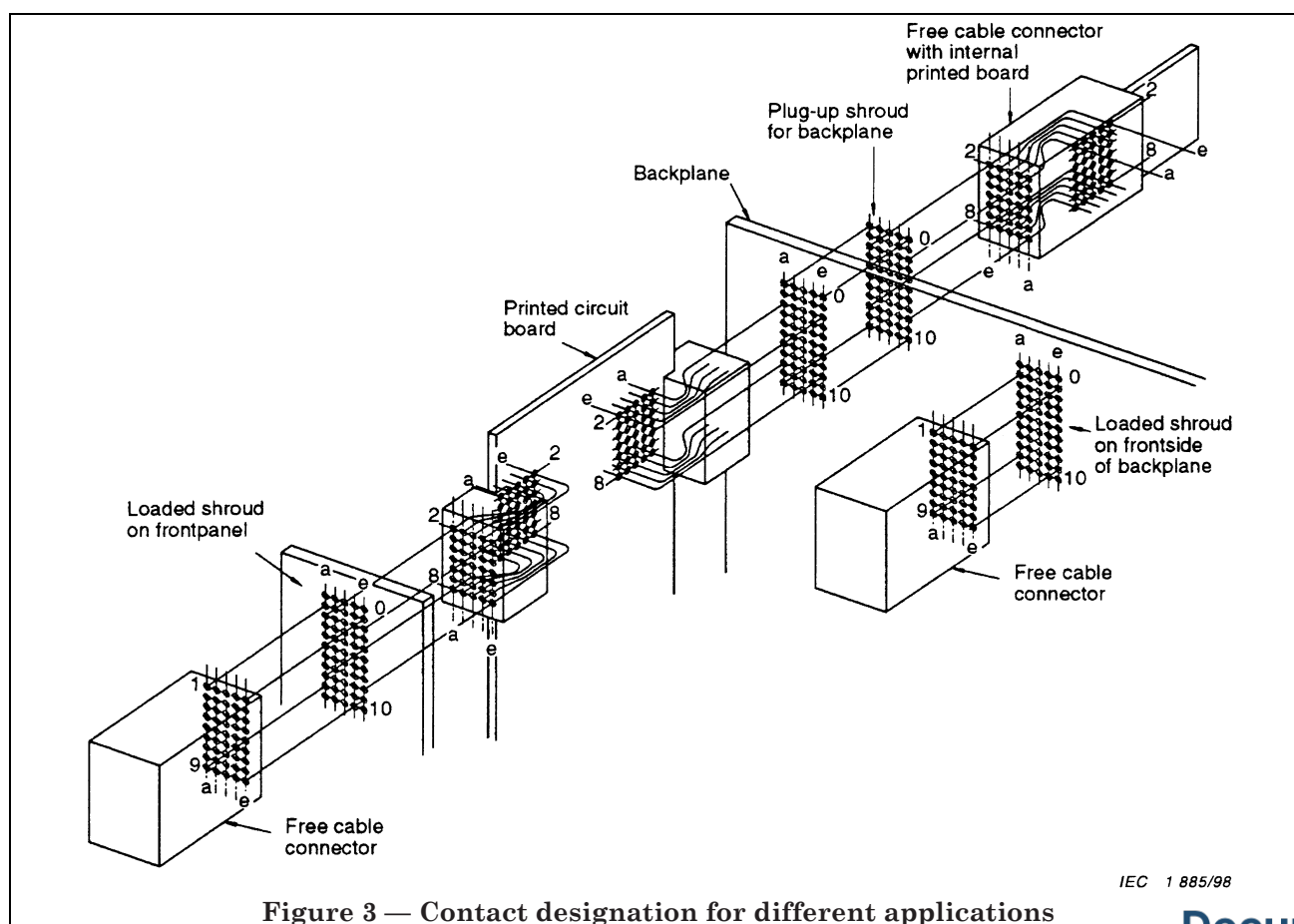


Figure 3 — Contact designation for different applications