

Connectors for electronic equipment —

**Part 4-108: Printed board connectors
with assessed quality — Detail
specification for cable-to-board
connectors, with a modular pitch of
25 mm and integrated shielding
function, applicable for transverse
packing density of 15 mm, having a
basic grid of 2,5 mm in accordance with
IEC 60917-1**

The European Standard EN 61076-4-108:2002 has the status of a
British Standard

ICS 31.220.10

National foreword

This British Standard is the official English language version of EN 61076-4-108:2002. It is identical with IEC 61076-4-108:2002.

The UK participation in its preparation was entrusted by Technical Committee EPL/48, Electromechanical components and mechanical structures 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 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.

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

Cross-references

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This British Standard, was published under the authority of the Standards Policy and Strategy Committee on 2 June 2003

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 71 and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

© BSI 2 June 2003

ISBN 0 580 41934 7

Connectors for electronic equipment
Part 4-108: Printed board connectors with assessed quality -
Detail specification for cable-to-board connectors,
with a modular pitch of 25 mm and integrated shielding function,
applicable for transverse packing density of 15 mm,
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(IEC 61076-4-108:2002)

Connecteurs pour équipements électroniques
Partie 4-108: Connecteurs pour cartes imprimés sous assurance de la qualité -
Spécification particulière pour connecteurs câble-circuit imprimé avec un pas de module de 25 mm et une fonction de blindage intégré, pour densité de boîtier de 15 mm, ayant une grille au pas de 2,5 mm conformément à la CEI 60917-1 (CEI 61076-4-108:2002)

Steckverbinder für elektronische Einrichtungen
Teil 4-108: Steckverbinder für gedruckte Schaltungen mit bewerteter Qualität - Bauartspezifikation für Kabel-Leiterplattensteckverbinder mit 25 mm modularer Teilung und integrierter Schirmfunktion für seitliche Packungsdichte von 15 mm in Raster 2,5 mm nach IEC 60917-1 (IEC 61076-4-108:2002)

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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 48B/1122FDIS, future edition 1 of IEC 61076-4-108, 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 61076-4-108 on 2002-03-01.

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) 2002-12-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-03-01

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

Endorsement notice

The text of the International Standard IEC 61076-4-108:2002 was approved by CENELEC as a European Standard without any modification.

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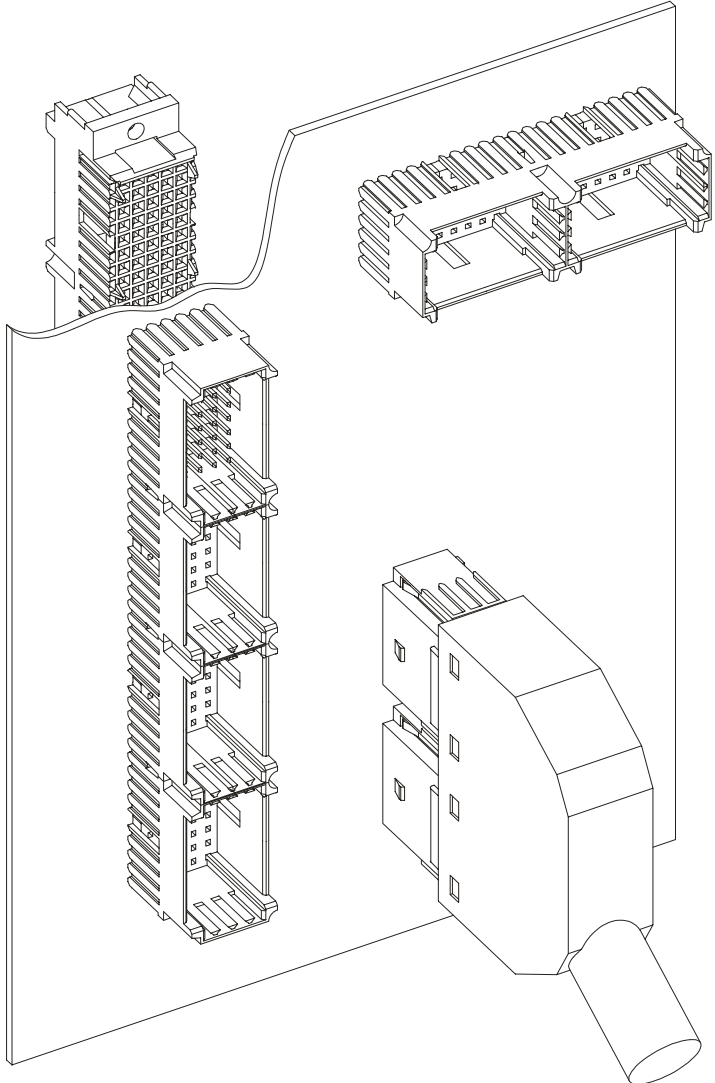
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CONNECTORS FOR ELECTRONIC EQUIPMENT –

Part 4-108: Printed board connectors with assessed quality –
Detail specification for cable-to-board connectors, with a modular pitch
of 25 mm and integrated shielding function, applicable for transverse
packing density of 15 mm, having a basic grid of 2,5 mm
in accordance with IEC 60917-1

IEC SC 48B – Connectors Specification available from: IEC Central Office or from the addresses shown on the inside cover. ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION in accordance with IEC 61076-1:1995.	IEC 61076-4-108 QC 480301XX0009
 IEC 395/02	Cable connector system, – 15 mm mounting pitch –, for printed boards and backplanes, grid of 2,5 mm in accordance with IEC 60917-1, integrated shielding function. Modular, five row connector, with shielding, ground contacts and coding features. Fixed board connectors 50 mm to 250 mm length Free cable connectors, 25 mm to 100 mm length. Performance levels (PL): 1, 2 Assessment level: G

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

1 General data

This specification describes adapter connectors of modular metric construction in conformance with IEC 60917-1.

Interface connectors and cable connectors are used to make the electrical connection between a closed functional unit, for example a subrack, and its environment. The modular construction and the various connector styles enable a suitable connector to be used in equipment practices for electronic equipment such as data systems, communications technology, telecommunications engineering and safety and security systems, power engineering and automation technology.

Throughout this specification all dimensions are in millimetres.

1.1 Recommended method of mounting

The connectors are used for connecting a printed board to a cable (see also figure 1).

The connectors are matched to the 2,5 mm contact grid. They can be mounted in an existing grid coordinate system horizontally or vertically or overlapping from module to module or from subrack to subrack. Care shall be taken to ensure that the contact areas of the male contacts match the position of the female contacts. The engaging areas of the male contacts on the rear of a backplane correspond to the male contact dimensions according to IEC 61076-4-100.

NOTE In view of the large number of different mounting and application options, the contact quality between male and female contacts must be guaranteed.

In the case of a subrack, for example, there are three mounting options:

- a) Rear of the backplane
- b) Module side of the backplane
- c) Front of the module

Fixed connectors:

For application on the rear of a backplane, a male connector body (preferably of flanged construction) is pushed over the rear plug-in connections of male contacts which have already been pressed in, for example over the terminals of a male connector according to IEC 61076-4-100, and secured in position.

For use on the module side of a backplane, a male connector body can be mounted in the same way over press-in male contacts.

Apart from flange mounting, the male connector body can also be fixed unsupported or directly to the male contacts.

For application on the side of a module or at the rear of a backplane, an interface male connector (preferably without flange) can be pressed into metal-plated holes in the backplane.

For application at the front of a module, a male connector body shall be equipped with male contacts which are mounted, for example pressed in, on the module printed board with terminals bent at right angles.

Free connectors:

The female connector equipped with female contacts is secured in a connector housing at which the cable is mounted with strain relief. The shielding braid of a cable shall be conductively connected to the connector housing consisting of shielded metal caps. The individual wires of a cable shall be connected at the female contacts directly by means of

crimped or insulation displacement connections.

1.1.1 Maximum number of contacts

Fixed board connector

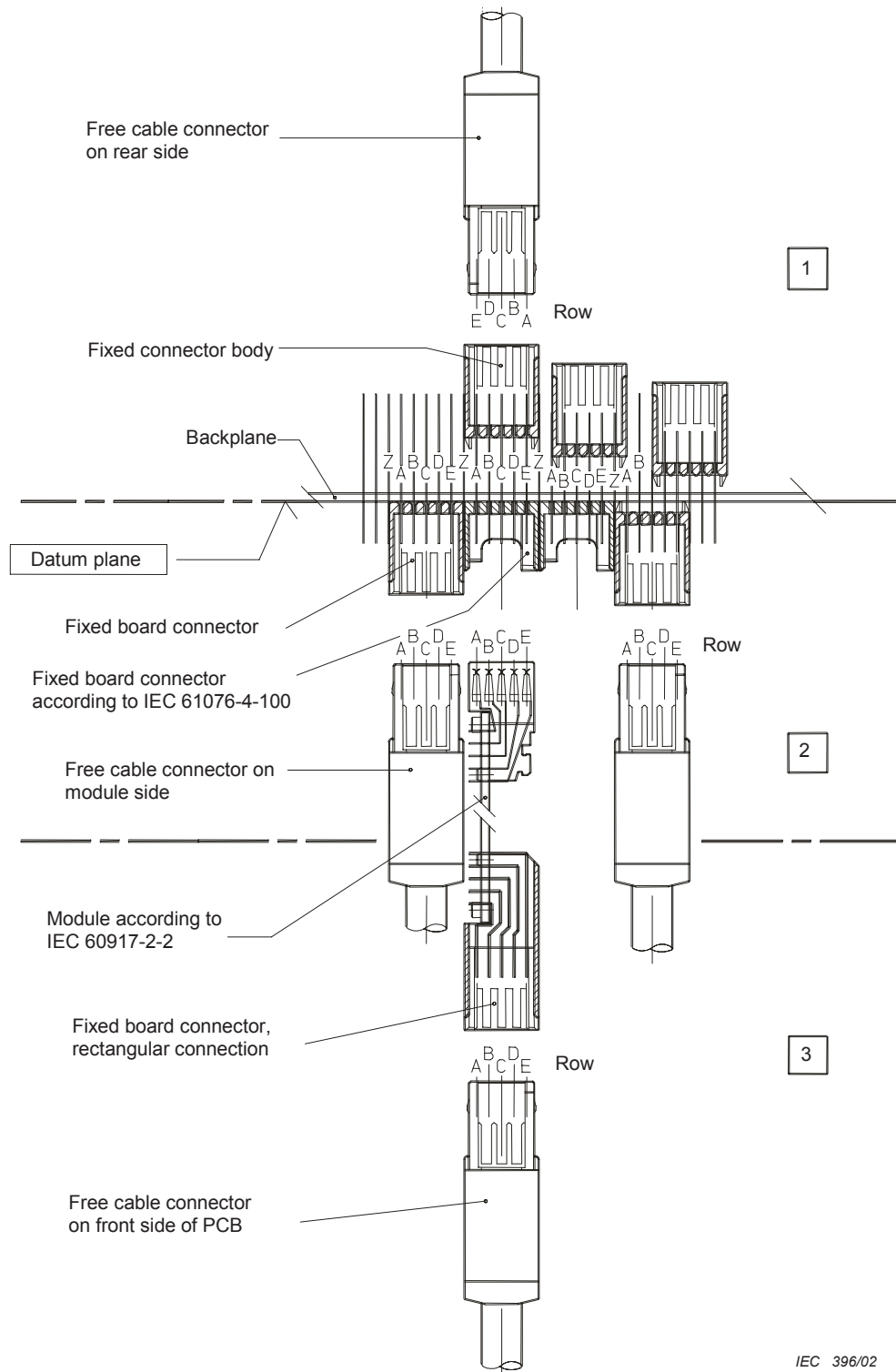
Table 1 – Maximum number of contacts – fixed connector

System units (Height = Coordination dimension)	1 SU (25)	2 SU (50)	4 SU (100)	9 SU (225)	10 SU (250)
Styles (see 2.2.1.1)	J	B;P;K	D;L;R	G;U	H;V
Signal contacts	41	82	164	369	410
Ground contacts	4	8	16	36	40

Free cable connector

Table 2 – Maximum number of contacts – free cable connector

System units (Height = Coordination dimension)	1 SU (25)	2 SU (50)	4 SU (100)
Styles (see 2.2.1.1)	A	B	D
Signal contacts	41	82	164
Ground contacts	4	8	16



Installation options:

- 1 Rear of the backplane
- 2 Module side of the backplane
- 3 Front of the module

Figure 1 – Recommended installation

1.2 Ratings and characteristics

Proof voltage:	contact/ground > 750 V r.m.s. (according to table 15)		
Current rating:	2,1 A (grid 2,5 mm × 2,5 mm)		
(at 70 °C)	2,2 A (grid 2,5 mm × 5 mm “chess”)		
	2,7 A (grid 5 mm × 5 mm)		
Insulation resistance:	10 ⁴ MΩ		
Climatic category:	PL1: 40/100/56 PL2: 40/100/21		
Printed board thickness:	Backplane 1,6 mm to 4,5 mm Plug-in unit 1,6 mm to 3,2 mm		
Metal-plated hole:	0,94 mm – 1,09 mm		
Contact gap:	2,5 mm × 2,5 mm		
Shielding effectiveness:	4 contacts/25 mm	Style: A (1 SU) : 10 dB	(at 300 MHz)
	(arrangement 4, table 7)	B (2 SU) : 14 dB	(at 300 MHz)
		D (4 SU) : 20 dB	(at 300 MHz)

1.3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61076. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, 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. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

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

IEC 60068-2-21:1999, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60326-3:1991, *Printed boards – Part 3: Design and use of printed boards*

IEC 60352-1:1997, *Solderless connections – Part 1: Wrapped connections – General requirements, test methods and practical guidance*

IEC 60352-2:1990, *Solderless connections – Part 2: Solderless crimped connections – General requirements, test methods and practical guidance*
Amendment 1:1996

IEC 60352-3:1993, *Solderless connections – Part 3: Solderless accessible insulation displacement connections – General requirements, test methods and practical 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 (all parts), *Connectors for electronic equipment – Tests and measurements*

IEC 60512-1-100:2001, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

IEC 60917-1:1998, *Modular order for the development of mechanical structures for electronic equipment practices – Part 1: Generic standard*

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

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

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

IEC 61076-4-001:1996, *Connectors with assessed quality for use in d.c., low-frequency analogue and digital high-speed data applications – Part 4: Printed board connectors – Section 001: Blank detail specification*

IEC 61076-4-100:2001, *Connectors for electronic equipment – Part 4-100: Printed board connectors with assessed quality – Detail specification for two-part connector modules having a grid of 2,5 mm for printed boards and backplanes*

ISO 1302:1992, *Technical drawings – Method of indicating surface texture*

1.4 Marking

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

Marking examples (according to 1.5)

Fixed board connector

Style 4 SU male connector, male contacts equipped in “chess” pattern, press-in termination with rear plug-up cable connection, with ground contacts, surface of the signal and ground contacts gold-plated, meeting performance level 1 and assessment level G:

IEC 61076-4-108 – R088M – 24 – R1 – 1 – 1G

Free cable connector

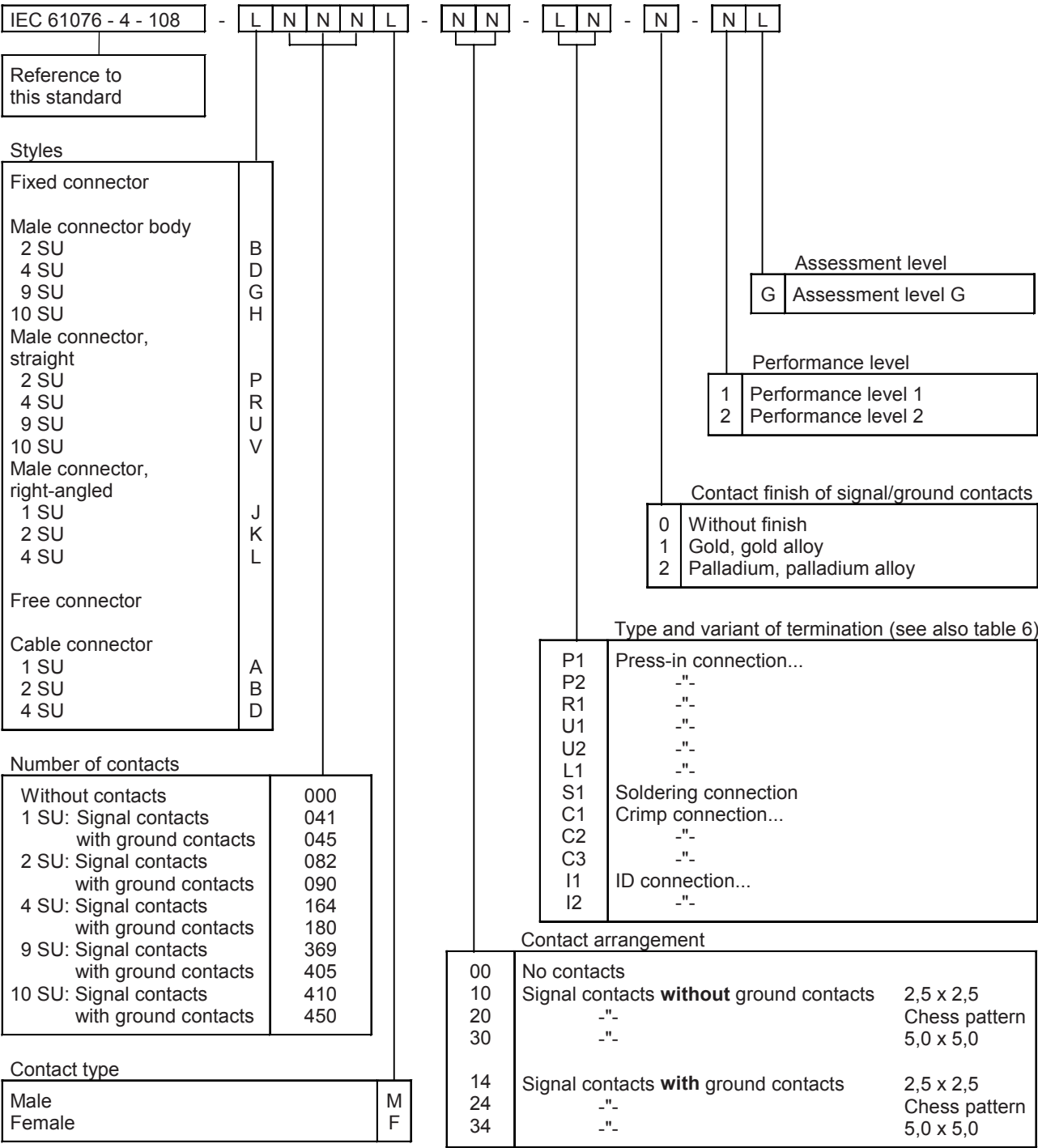
Style 1 SU, female contacts equipped in 2,5 mm × 2,5 mm grid pattern, without ground contacts, surface of the signal contacts palladium alloy, cable with solid conductors, with crimp termination (AWG 30 – 24), meeting performance level 2 and assessment level G:

IEC 61076-4-108 – A041F – 10 – C3 – 2 – 2G

1.5 IEC type designation

The designation of plug-in connectors shall be defined as follows in accordance with this standard:

L stands for letter, N stands for number.



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 information

2.1 Definitions

2.1.1 Mechanical features

2.1.1.1

system unit (SU)

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

2.1.1.2

mounting code

special marks on the connector housings simplify correct installation of male connectors (fixed connectors) or male connector bodies and contact equipment in the case of cable connectors (free connectors).

2.1.2 Contacts and terminations

2.1.2.1

engaging range

the minimum to maximum distance between the reference planes of the fixed and free connectors, within which reliable contact making is guaranteed

2.1.2.2

equipment grid

the equipment grid can be freely selected within the basic grid of 2,5 mm × 2,5 mm. The male/female contacts can be arranged according to the application. A system unit (SU) can be equipped with a maximum of 41 signal contacts and a maximum of four ground contacts.

2.1.2.3

standard equipment

full grid: contact arrangement in which all grid positions are equipped.

chess pattern grid: contact arrangement in which the grid positions are equipped alternately like the squares on a chess board.

2.1.2.4

rear plug-up contact

termination post, usually being pressed-in into the backplane and provided at the rear of the backplane with a contact area, to which a free connector (cable connector) can be connected

2.1.2.5

press-in shoulders

areas of the male contact, by means of which the contact can be pressed into the backplane

2.1.3 Engagement sequence

2.1.3.1

contact range

range of all contacts which engage/separate simultaneously, within the limits of the required reliable engaging range

2.1.3.2

engaging cycles

an engaging cycle comprises the engaging/separating process for a connector

2.1.3.3**first possible contact point**

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

2.1.3.4**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, locking**2.1.4.1****coding devices**

accessories allowing pairs of connectors to be assigned to each other non-reversible, i.e. only connector pairs equipped with matching coding devices can mate. Mating of pairs with different coding is reliably prevented.

2.1.4.2**180° polarization**

housing parts of the fixed and free connector have a 180° polarization to prevent incorrect insertion

2.1.4.3**locking**

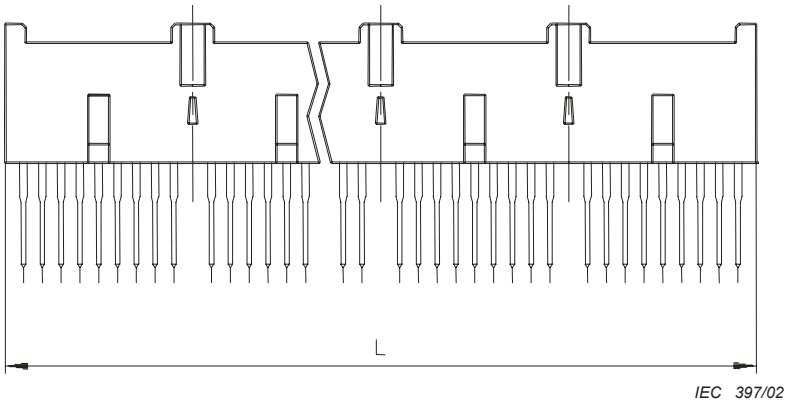
protrusions on the side of the housing of the free cable connector used for latching in the male connector body of the fixed board connector

2.2 Surveys of styles and variants**2.2.1 Styles of connectors****2.2.1.1 Survey of connector style designations****Table 3 – Connector style designations**

(System units)	(1 SU)	(2 SU)	(4 SU)	(9 SU)	(10 SU)
Styles					
Printed board connectors					
Male connector body	–	B	D	G	H
Male connector, straight connection	–	P	R	U	V
Male connector, right-angled connection	J	K	L	–	–
Cable connectors	A	B	D	–	–

2.2.1.2 Fixed board connectors

Table 4 – Styles – fixed connectors

 IEC 397/02				
Male connector (without flange)	P	R	U	V
Length L (coordination dimension)	50	100	225	250

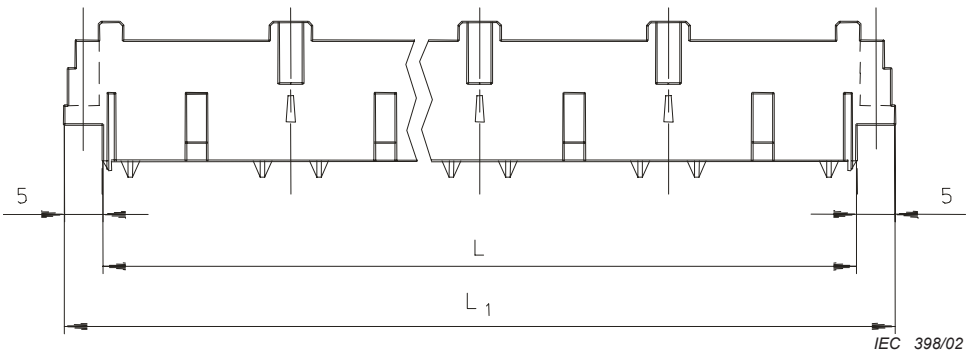
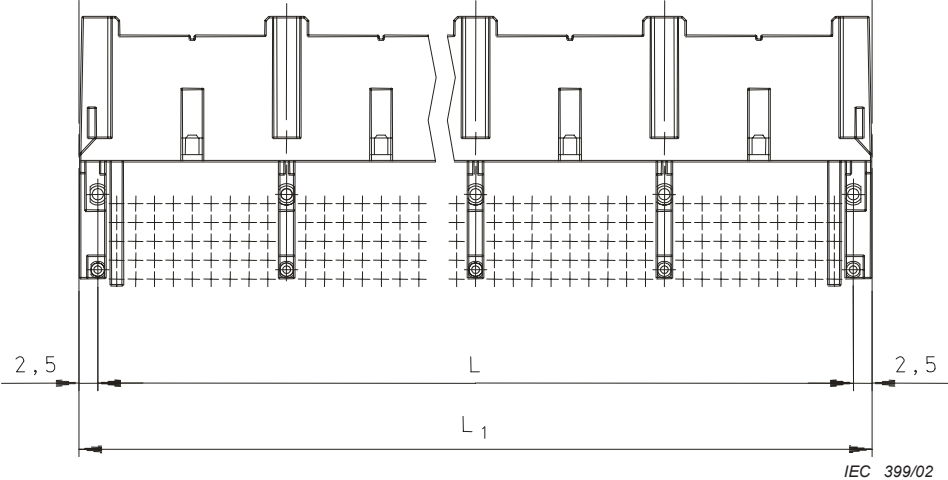
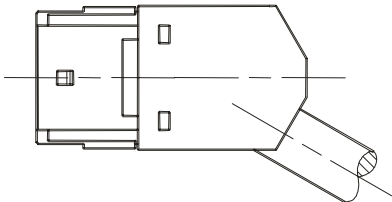
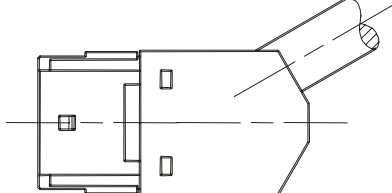
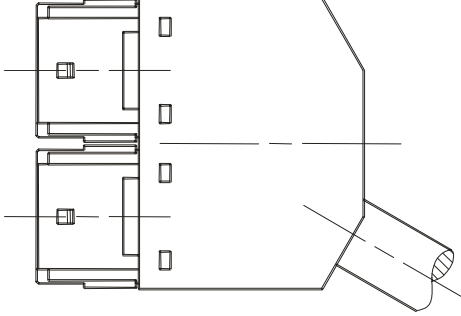
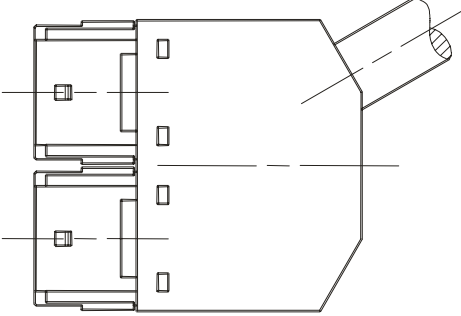
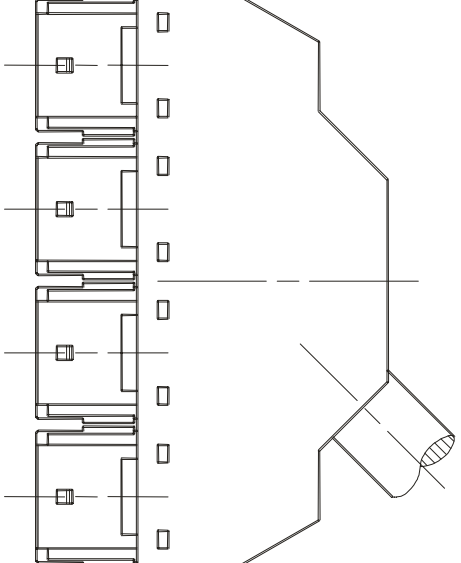
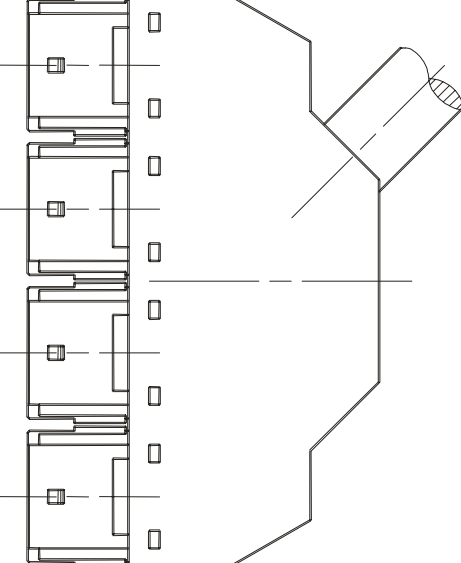
 IEC 398/02				
Male connector body (with flange)	B	D	G	H
Length L (coordination dimension)	50	100	225	250
Length $L_1 = L + 2 \times 5$ (coordination dimension)	60	110	235	260

Table 4 (continued)

			
Male connector for front installation	J	K	L
Length L (coordination dimension)	25	50	100
Length $L_1 = L + 2 \times 2,5$ (coordination dimension)	30	55	105

2.2.1.3 Free cable connectors

Table 5 – Styles – free connectors

Style (Height)	Cable outlet	
	Bottom	Top
A (25)		 <i>IEC 400/02</i>
B (50)		 <i>IEC 401/02</i>
D (100)		 <i>IEC 402/02</i>

2.2.2 Survey of termination variants

Table 6 – Termination variants

		Basic type of termination	Variant	Lengths (see also 3.4.2)
Male con- tact	P	Press-in connection for plated through-hole Ø 1 mm, straight, according to IEC 60352-5	P1	4,5 mm
			P2	6,0 mm
	R	Press-in connection for plated through-hole Ø 1 mm, straight, with rear plug-up connection according to IEC 60352-5	R1	14,0 mm / 15,75 mm (standard / premating)
	U	Press-in connection for plated through-hole Ø 1 mm, straight, with rear plug-up and wrap connection according to IEC 60352-5	U1	17,75 mm / 19,5 mm (standard / premating)
			U2	21,5 mm / 23,25 mm (standard / premating)
	L	90° angled press-in connection for plated- through hole Ø 1 mm, according to IEC 60352-5	L1	3 mm
	S	90° angled solder connection according to IEC 60352-1	S1	3 mm

		Basic type of termination	Variant	Wire gauges
Fe- male con- tact	C	Crimp connection according to IEC 60352-2	C1	1 × stranded wire: 0,14 mm ² to 0,35 mm ² (AWG 26 to AWG 22)
			C2	1 × stranded wire: 0,05 mm ² to 0,14 mm ² (AWG 30 to AWG 26)
			C3	1 × solid wire: Ø 0,25 mm to 0,50 mm (AWG 30 to AWG 24)
	I	Insulation displacement connection according to IEC 60352-3	I1	Stranded wire: 0,09 mm ² to 0,14 mm ² (AWG 28 to AWG 26) Solid wire: Ø 0,25 mm to 0,40 mm (AWG 30 to AWG 26)
			I2	Stranded wire: 0,22 mm ² to 0,35 mm ² (AWG 24 to AWG 22) Solid wire: Ø 0,40 mm to 0,63 mm (AWG 26 to AWG 22)

2.3 Information on application

2.3.1 Connector pairs

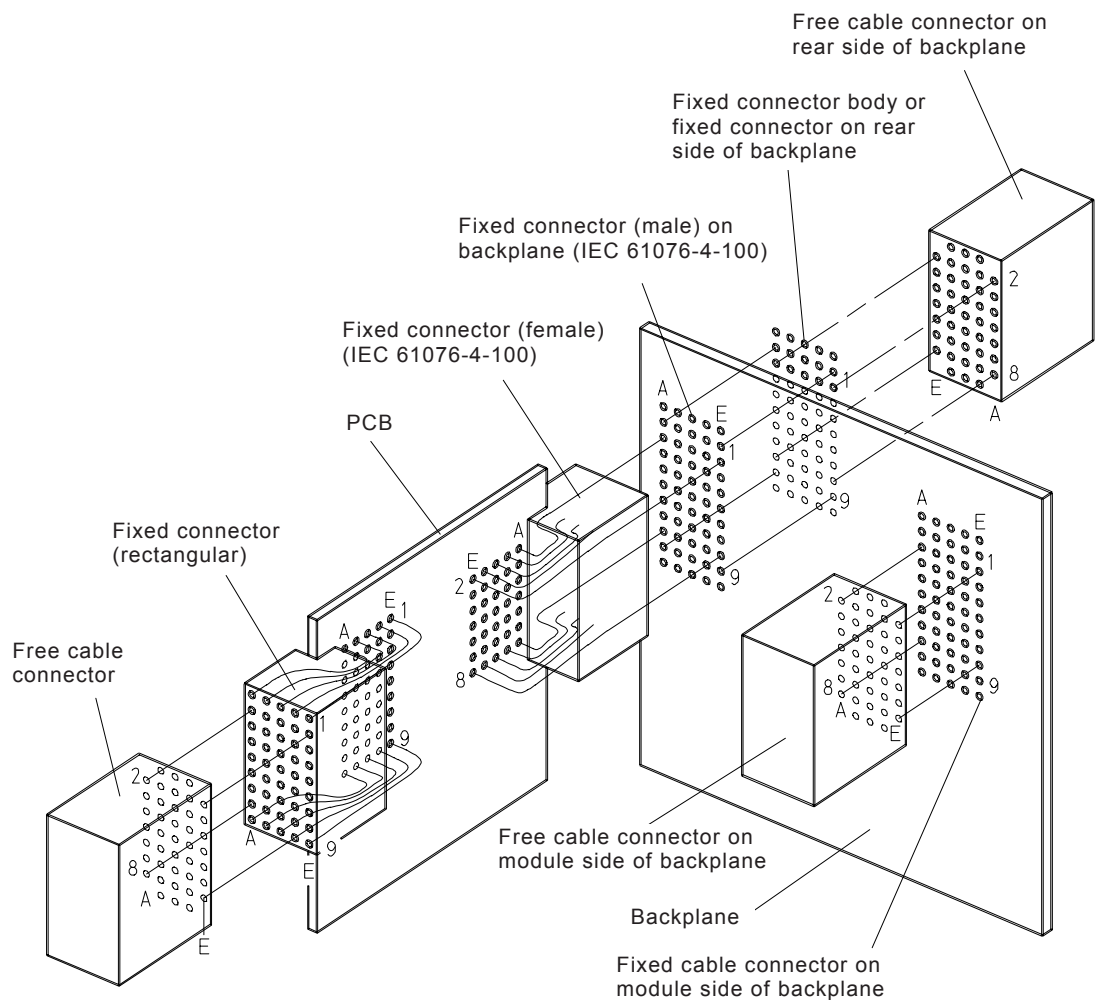
Description

Male connectors or male connector bodies connected to the rear contact areas of male contacts shall be arranged in any position – horizontally or vertically – in the backplane of a subrack.

The male connector bodies are subdivided into individual SU areas into which the various cable connector types – mounted side by side – can be plugged. In the plugged-in position, the cable connectors engage in the male connector bodies.

Contact designation

The methods of mounting described in 1.1 and shown in figure 1 allow the use of connectors in opposite mating directions. The contact designation (rows and position) shall be designated in the viewing and mating direction onto the module side of the backplane and assigned to the individual components in this way (male contacts in the backplane). When a cable connector is inserted on the rear of a backplane, the contact row designation of the male connector or male connector body is – theoretically – reversed. This “reversal” of the contact row designation shall be taken into account in the electrical assignment between fixed board connector and free cable connector at the rear of the backplane. See also figure 2.



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Figure 2 – Method of numbering contacts

2.3.2 Fixed board connectors

Mounting

Male connector bodies are generally pushed onto a suitable connection area of the male contacts which are pressed into the backplane, for example a male connector according to IEC 61076-4-100. They can be fixed to the subrack, the backplane or to the pressed-in male contacts directly; the requirements of the test schedule shall be guaranteed. The male connector bodies shall be provided with visual indications in the form of different outside contours, for example in the area of the lateral walls of the male connector body to ensure installation in the correct position in a male contact field. In case of direct fixing to the male contacts – in the full grid contact arrangement – the male contact geometry according to IEC 61076-4-100 shall be observed.

Mounting position

The male connectors or male connector bodies can be mounted primarily in the vertical position, but also horizontally, for example in a full grid of 2,5 mm. The smallest mounting pitch is 15 mm.

Mounting of a male connector body at the rear of a backplane:

The depth stop for setting the correct contact engaging range shall be guaranteed by male contacts in the area of the lateral walls of the male connector body (see also 3.4.2).

Mounting of a male connector body on the module side of a backplane:

The male connector body is flush-mounted. Premating male contacts shall be used to ensure the correct contact engaging range.

Connector styles without a flange can be installed side by side flush – without loss of pitch. Overlapping connection of modules and subracks is possible, for example at the rear of a backplane.

Contact levels and sequencing

Reliable contacting between the fixed and free connector shall be guaranteed by the contact level which is defined in the engaging areas of the various male contact lengths, for example by a depth stop in the male connector body.

Different contact levels should be staggered by at least 1,75 mm in order to ensure an electrically reliable engaging sequence.

2.3.3 Free cable connectors

Mounting

Cable connectors are usually delivered as separate piece parts, consisting primarily of one or more female connector bodies, female contacts, single-section or multi-section housing and a cable clamp, together with an insertion and extraction tool. When assembling a plug-in cable, these parts shall always be combined to form a complete cable connector using suitable tools and the manufacturer's instructions. Care shall be taken to ensure that the completed cable connector fulfils the specified requirements.

Polarization

The sides of the receptacle shall have polarized contours, which prevent a wrong engagement in the male connector body.

Engaging sequence

The first possible contact point between the female and male contacts during the connection process shall comply with the requirements of 3.5.2.

2.3.4 Accessories

2.3.4.1 Special contacts

Four shielding/ground contacts shall be arranged along the sides or at the corners of the female connector body. These contacts connect a fully shielded female connector housing with the male contacts of a fixed board connector.