

Connectors for electronic equipment —

Part 4-115: Printed board connectors — Backplane connector for InfiniBand equipment

The European Standard EN 61076-4-115:2003 has the status of a
British Standard

ICS 31.220.10

National foreword

This British Standard is the official English language version of EN 61076-4-115:2003. It is identical with IEC 61076-4-115:2003.

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, 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.

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

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

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 68, an inside back cover 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 October 2003

ISBN 0 580 42666 1

Connectors for electronic equipment
Part 4-115: Printed board connectors –
Backplane connector for InfiniBand equipment
(IEC 61076-4-115:2003)

Connecteurs pour équipements
électroniques
Partie 4-115: Connecteurs pour cartes
imprimées –
Connecteur de fond de panier pour
équipement InfiniBand
(CEI 61076-4-115:2003)

Steckverbinder für elektronische
Einrichtungen
Teil 4-115: Steckverbinder für gedruckte
Schaltungen –
Rückplatten-Steckverbinder für
InfiniBand-Geräte
(IEC 61076-4-115:2003)

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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/1288/FDIS, future edition 1 of IEC 61076-4-115, 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 61076-4-115 on 2003-05-01.

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) 2004-03-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-05-01

The International Electrotechnical Commission (IEC) and CENELEC draw attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning

- a) an electrical connector assembly for establishing electrical contact with contacting devices of external terminals, e.g. with solder points of a circuit board;
- b) an electrical connector assembly for establishing electrical contact with external terminals having contacting devices with contact faces, e.g. with solder points of a circuit board;
- c) an electrical connector assembly with an electrical connector having a connecting position and contacting devices for establishing electrical contact between a first and a second printed circuit board.

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Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A, B and ZA are normative.
Annex ZA has been added by CENELEC.

Endorsement notice

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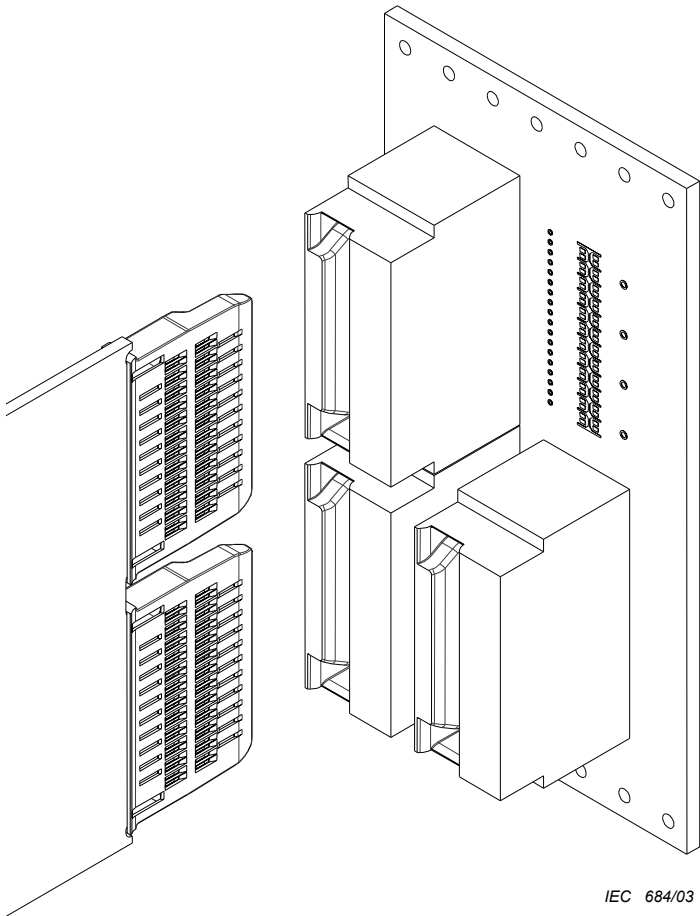
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CONNECTORS FOR ELECTRONIC EQUIPMENT –
Part 4-115: Printed board connectors –
Backplane connector
for InfiniBand equipment

IEC SC 48B – Connectors	
Electronic components of assessed quality in accordance with IEC 61076-1:1995	Blank detail specification: IEC 61076-4-001:1996
 IEC 684/03	Single-part hybrid connector, with a section for high-speed on a 3 mm grid and a low-speed section with power and ground connections on a 2 mm grid, for printed boards and backplanes in accordance with IEC 60917-2-2.
	Hybrid connector having one section containing 2 rows of 12 contact pairs for differential pair transmission on a 3 mm pitch and one section with 1 row of 18 contacts for low-speed and power connections on a 2 mm pitch. The fixed connectors are 50 mm high, pressed-in or surface mount soldered onto the backplane. The plug-in card interface is protected by a paddle-guard.
	Performance levels (PL): 1

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

1 General data

1.1 Recommended method of mounting

Three methods of mounting to the backplane may be adopted.

a) **Press-in/compression connections**

The fixed connector is pressed-in onto the backplane, using 18 press-in low-speed connections and four press-in pins.

The high-speed contacts to the backplane use compression connections. See Figure 1.

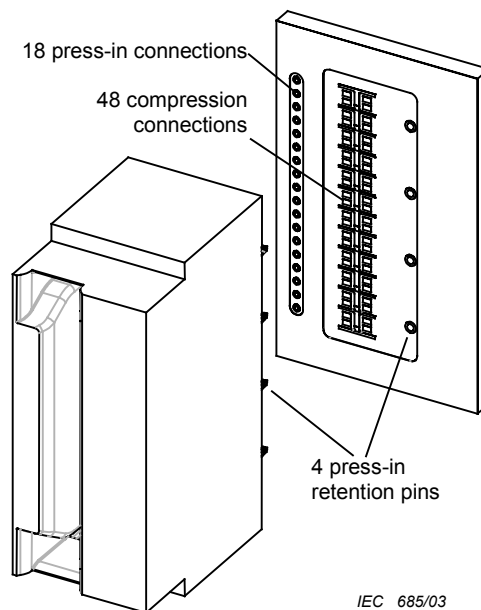


Figure 1 – Press-in/compression method of mounting

b) **Press-in connections only**

Under consideration.

c) **Surface mount soldered connections**

Under consideration.

The plug-in card has an extension in the form of a paddle, with contact pads for compression connections. The paddle shall be protected by a paddle-guard, which may be removable or permanently mounted.

Number of contacts and contact cavities

Table 1 – Number of contacts for fixed connector

Styles	Number of I/O channels	Differential pairs	Low-speed contacts
A	4 x I/O channels	4 + 4	18
C	12 x I/O channels	12 + 12	18

Table 2 – Number of cavities for paddle guard

Styles	Cavities for differential pair entries	Cavities for low-speed entries
I	12 + 12	18

1.2 Ratings and characteristics

High-speed section

Compression connections	bifurcated contacts with independently operating beams
Creepage and clearance	0,3 mm min. between contacts mutually and ground
Rated voltage	within same pair 100 V r.m.s. pair to ground 100 V r.m.s.
Current rating	0,25 A per contact pair at 70 °C (all contacts loaded)
Insulation resistance	1 GΩ min.
Differential impedance	100 Ω ± 10 Ω at 100 ps risetime in the connector

Low-speed section

Compression connections	bifurcated contacts with independently operating beams
Creepage and clearance	0,8 mm min. between contacts mutually and ground
Rated voltage	contact/contact 500 V r.m.s. contact to ground 500 V r.m.s.
Current rating	2,5 A per contact at 70 °C (all contacts loaded)
Insulation resistance	5 GΩ min.
Printed board	thickness range for use with same fixed connector = 1,44 mm to 2,64 mm thickness range for a given paddle-guard = ± 10 % of nominal thickness
Backplane	1,6 mm min. plated-through press-in hole for low-speed connections = Ø 0,6 mm ± 0,05 mm press-in hole diameter for fixed connector retention pins = Ø 1 mm +0,09/-0,06 mm

1.3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

IEC 60352-5:2001, *Solderless connections – Part 5: Press-in connections – General requirements, test methods and practical guidance*

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 60917-2-2:1994, *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 in 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 in digital high-speed data applications – Part 4: Printed board connectors – Section 001: Blank detail specification*

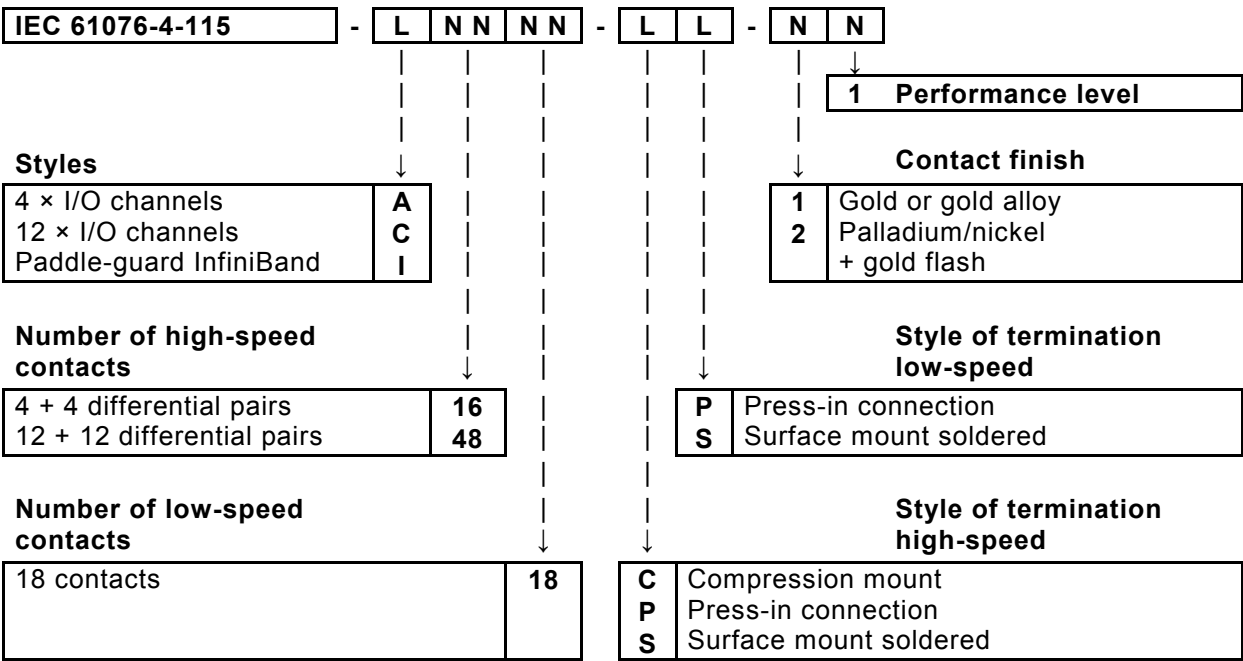
ISO 1302:2002, *Geometrical Product Specifications (GPS) – Indication of surface texture in technical product documentation*

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.



NOTE "L" stands for letter; "N" stands for number.

Example for fixed connector

A style C fixed connector, press-in/compression mounted, with 2 × 12 differential pairs and 18 low-speed contacts, gold plated, meeting performance level 1, is designated as follows:

IEC 61076-4-115 – C4818 – CP – 11

Example for paddle-guard

A style I paddle-guard, with apertures for 2 × 12 differential pairs and 18 low-speed contacts, meeting performance level 1, is designated as follows:

IEC 61076-4-115 – I4818 – CP – 11

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 of IEC 61076, the following definitions apply.

2.1.1 Mechanical features

paddle-guard – Protective plastic glove that covers the milled edges of the board paddle at the plug-in unit. It is a robust and accurate interface to the fixed connector; it aligns the contact beams to the pads and activates the mating movement of the high-speed section during insertion and withdrawal of the plug-in unit.

2.1.2 Contacts and terminations

contact range – The range from minimum to maximum distance between the reference planes of the fixed and free boards, within which the specified contact resistance is met.

contact beam – Part of the contact that makes the contact to the pad on the board, this part is usually plated and shaped like the back of a spoon.

compression connection – Solderless connection between a contact beam and a contact pad on the board, accomplished through a specific pressure in the contact area, generated by a continuous compression force and a spherical shape of the beam.

dual compression connection – Connection between a bifurcated contact beams and one contact pad on the board.

2.1.3 Engagement sequence

contact level – set of contacts which engage/separate simultaneously, taking the accuracy required by the engaging sequence into account.

engaging sequence – given order of engagement/separation of contacts belonging to different contact levels, which assures that all contacts of a given level do close/open after the previous level and before the next level.

2.2 Survey of styles and variants

2.2.1 Styles of connectors

Table 3 – Survey of fixed connectors

Style	Colour	I/O Channels	Length
A	Black	4	50 mm
C	Blue	12	50 mm

Table 4 – Survey of paddle-guards

Style	Engagement sequence low-speed
I	InfiniBand configuration (see 3.7.2)

2.2.2 Styles of termination

Termination to the backplane

Table 5 – Survey of terminations to the backplane

Method of mounting	Section	Style of termination	Dimensions
Press-in/compression	High-speed	Dual compression connection	–
	Low-speed	Press-in connection, according to IEC 60352-5	Ø 0,6 mm ± 0,05 mm
Press-in only	High-speed	Under consideration	Under consideration
	Low-speed	Press-in connection, according to IEC 60352-5	Ø 0,6 mm ± 0,05 mm
Surface mount soldered	High-speed	Under consideration	–
	Low-speed	Under consideration	–

Termination to the plug-in card

All bifurcated contacts shall make a dual compression connection to the contact pads at the plug-in card.

2.2.3 Variants of the paddle-guard

Thickness of the plug-in card

Table 6 – Survey of paddle-guard variants

Variant	Thickness of plug-in card	Tolerance range on thickness
1	1,6 mm	1,44 mm – 1,76 mm
2	2 mm	1,8 mm – 2,2 mm
3	2,4 mm	2,16 mm – 2,64 mm

2.3 Information on application

2.3.1 Description of the connector

The connector is basically a one-part fixed connector, mounted on the backplane.

On the plug-in card however, a paddle-guard shall be applied.

Only the outer features and characteristics of the paddle-guard that determine the interface to the fixed connector are a normative part of this specification.

The footprint and the plating of the contact pads on the plug-in card are equally important for the functionality of the interface and are also a normative part of this specification.

Details about the shape of the plug-in card paddle and the features needed for paddle-guard assembly are however shown for guidance and as an example for information only.

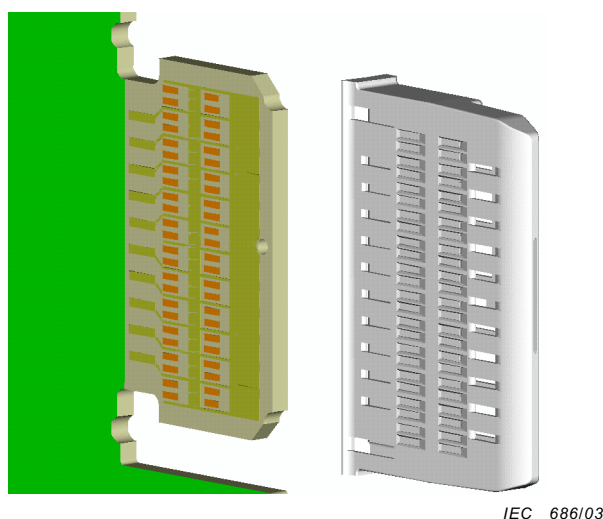


Figure 2 – Example of a paddle-guard, to be mounted on the plug-in card paddle

The two sections in the connector

The high-speed and the low-speed sections have different characteristics and test programs. Their mechanical features and connection technologies are basically different.

High-speed section

The high-speed contact pairs are mounted in an electrically conductive shell. The insertion of the plug-in unit pushes the shell towards the paddle-guard. With this movement, the bifurcated contact beams enter the apertures in the paddle-guard and make a dual wiping compression contact to the pads on the component side of the plug-in card.

Withdrawal of the plug-in unit pulls the shell back from the paddle-guard and makes all contact pairs lift off and leave the apertures of the paddle-guard.

Cams on the paddle-guard and on the shell drive the movement of the shell.

Low-speed section

The low speed contacts operate similarly to card-edge connections. However, instead of opening the contact beams with the edge of the plug-in card, the smooth edge of the paddle-guards lifts the bifurcated contact beams over the edge to let them sink into the apertures and make a dual wiping compression connection to the pads on the solder side of the plug-in card.

The staged length of the apertures controls the engaging sequence of the low-speed connections (see 2.3.3).

Plug-in card thickness

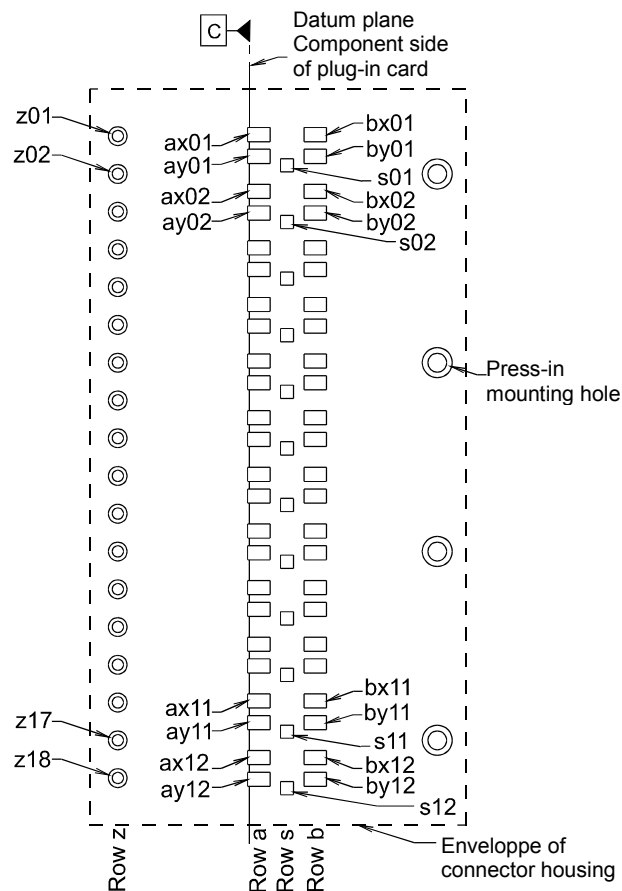
The fixed connector is capable of mating with a range of plug-in card thicknesses. The reference plane of the plug-in unit – the component side – shall always remain in the same position, the difference in thickness must be made up by the flexibility of the low-speed contacts.

The outer dimensions of the paddle-guard remain the same for the whole range of card thicknesses, only the depth of the apertures for the low-speed connections varies according to the chosen card thickness.

2.3.2 Contact designation

2.3.2.1 Contact designation on the backplane

a) Press-in/compression mounted fixed connector



IEC 687/03

Figure 3 – Designation of contacts on backplane for press-in/compression mounting

- b) **Press-in mounted fixed connector**
Under consideration.
- c) **Surface mount soldered fixed connector**
Under consideration.

2.3.2.2 Contact designation on plug-in card

a) Component side of the plug-in card

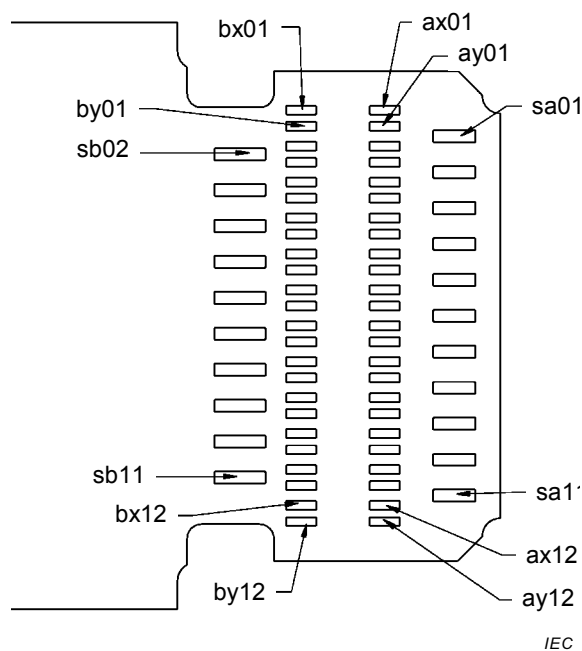


Figure 4 – Designation of contacts on component side

b) Solder side of the plug-in card

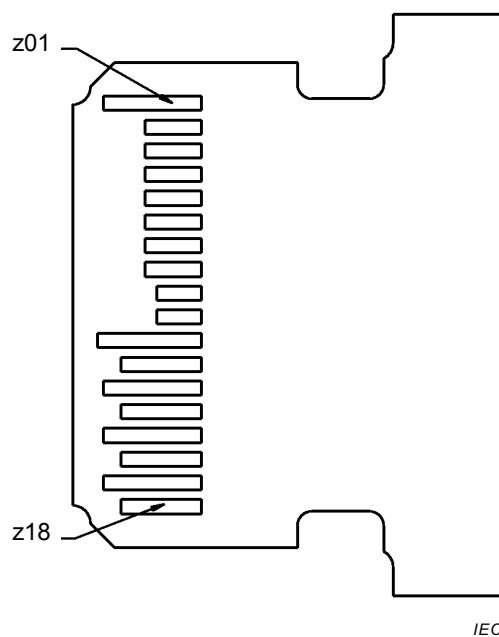
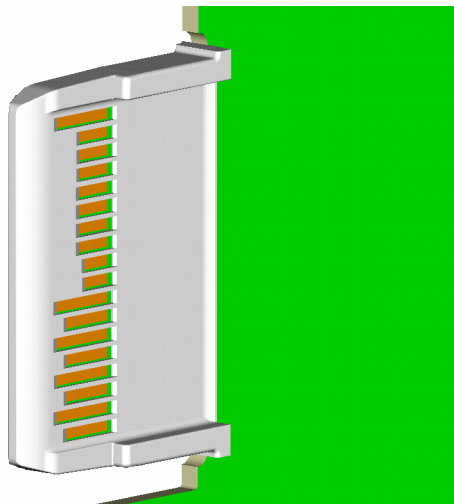


Figure 5 – Designation of contacts on solder side

2.3.3 Arrangement of contact levels

In the high-speed section, all connections operate simultaneously. Connections are made no earlier than 2,3 mm before full insertion; reliable connection is achieved no later than 1,7 mm before full insertion.

In the low-speed sections, the connections may operate in four different levels, staged by a minimum of 1,5 mm.



IEC 690/03

Figure 6 – Low-speed section – Apertures in paddle-guard control engaging sequence

Potential inclination of the incoming plug-in unit shall be taken into account when assigning contact positions to the different contact levels, in order to avoid mismatch in the engaging sequence.

2.3.4 Polarisation and keying

The shape of the card slot in the fixed connector will prevent all wrong engagement. No keying features are provided.

2.3.5 Mounting on backplane

Three alternative methods of mounting to the backplane may be adopted.

a) Press-in/compression connections

The high-speed connections to the backplane are made by bifurcated compression contacts. During the lifetime of the interconnection, the press-in attachment to the backplane shall support a reliable pressure on these contacts.

On one side the fixed connector housing is attached to the backplane by 4 metal pins, pressed into plated-through holes, and by the 18 low-speed press-in terminations on the other side.

After provisional placement on the backplane, multiple fixed connectors may be pressed-in simultaneously using a flat rock press-in tool.

b) Press-in connections only

Under consideration.

c) Surface mount soldered connections

Under consideration.

2.3.6 Mounting on the plug-in card

The paddle-guard shall be rigidly fixed to the plug-in card paddle, in such a way that the gap between the surface of the board and the slot in the paddle-guard does not exceed 0,1 mm on the component side (datum C).

3 Dimensional information

3.1 General

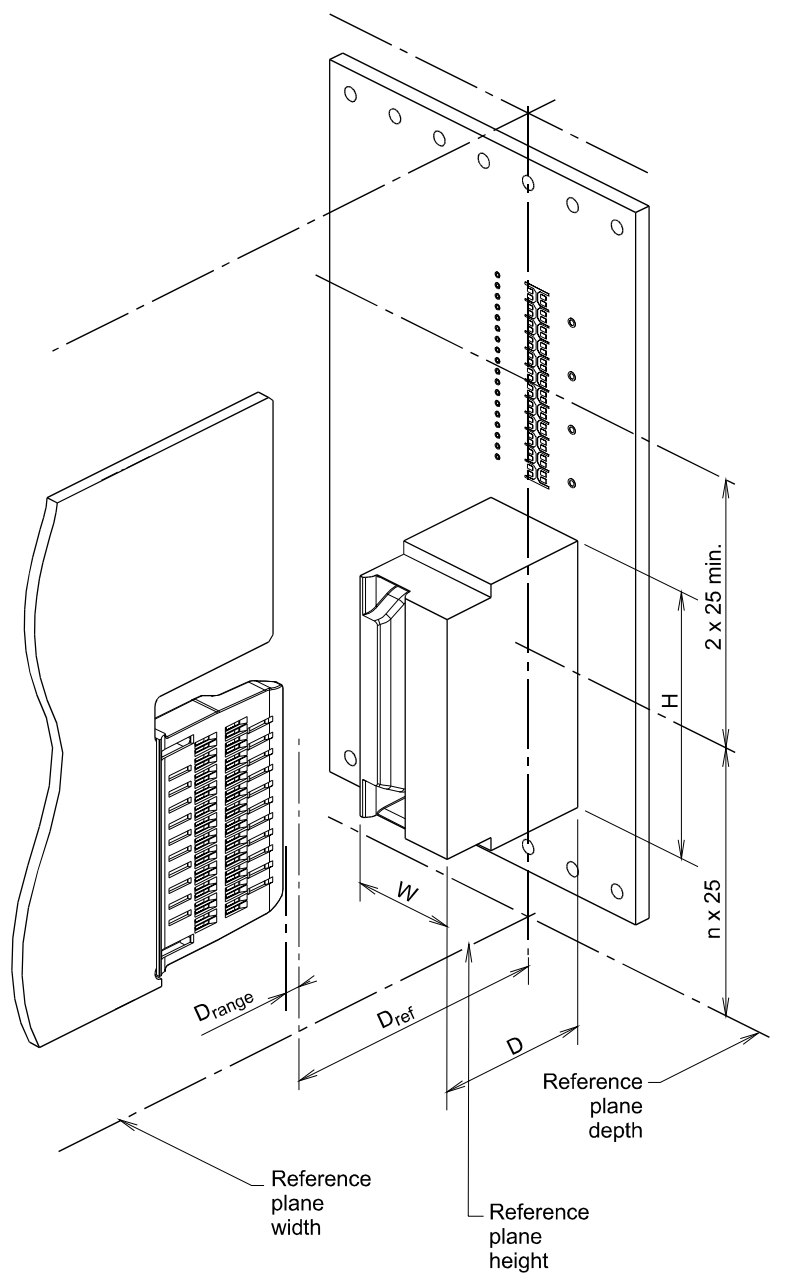
Original dimensions are in millimetres and all dimensions on the drawings and tables are in millimetres.

All drawings are shown in first angle projection.

The shape of the parts may deviate from the one given in the drawings, as long as the specified dimensions are not affected and the intended functionality is provided.

Dimensions not specified may be chosen according to required characteristics and intended use.

3.2 Isometric view and common features



Key

See Table 7.

IEC 691/03

NOTE For guidance the reference planes are shown in accordance with IEC 60917-2-2.

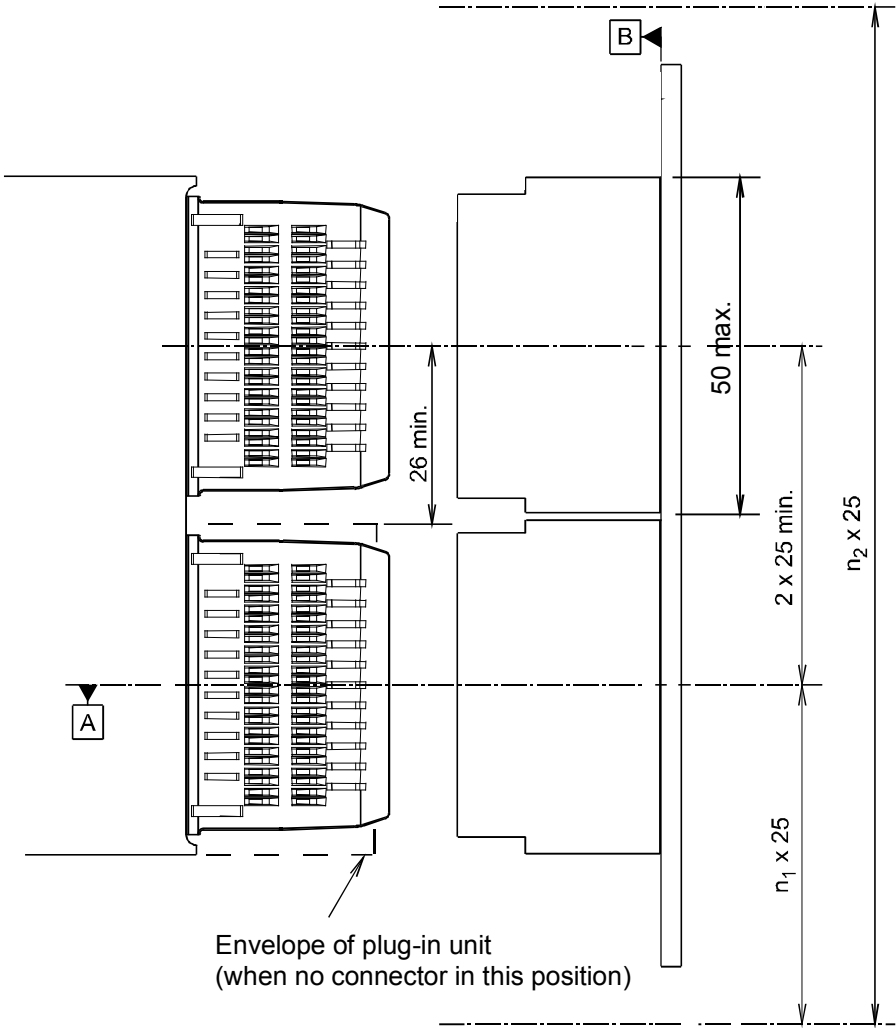
Figure 7 – Co-ordination dimensions

3.2.1 Common features

Table 7 – Co-ordination dimensions and common features

Dimension		Feature description
H	50 mm	Maximum overall height of the fixed connector
D	30 mm	Maximum overall depth of the fixed connector
$D_{ref.}$	0	Depth co-ordination dimension: tip of paddle-guard stops at backplane
D_{range}	0 to 1,5 mm	Contact range
W	20 mm	Overall width of fixed connector

3.2.2 Height dimensions

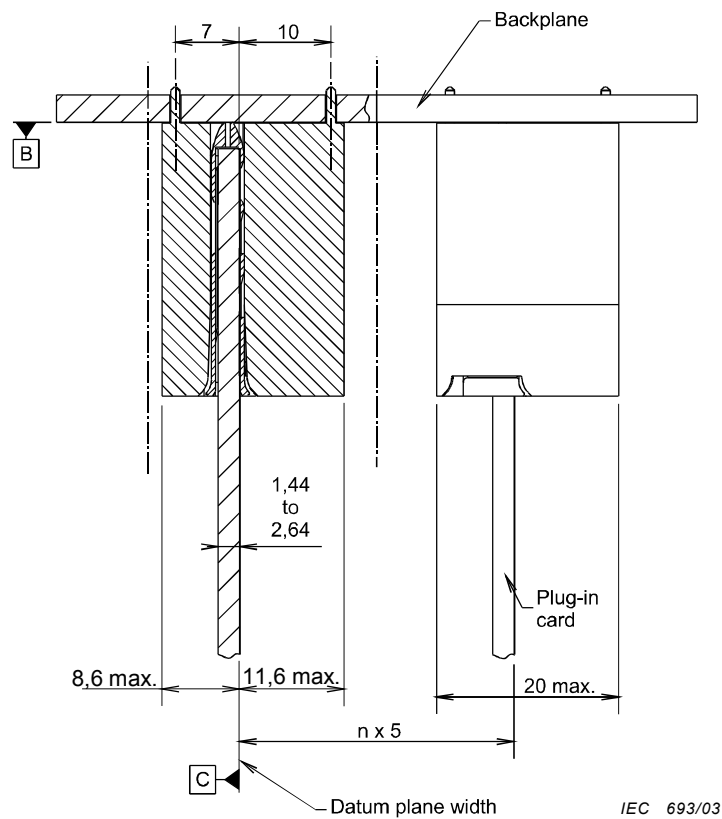


IEC 692/03

NOTE For guidance, the reference planes are shown in accordance with IEC 60917-2-2.

Figure 8 – Height dimensions and mounting pitch

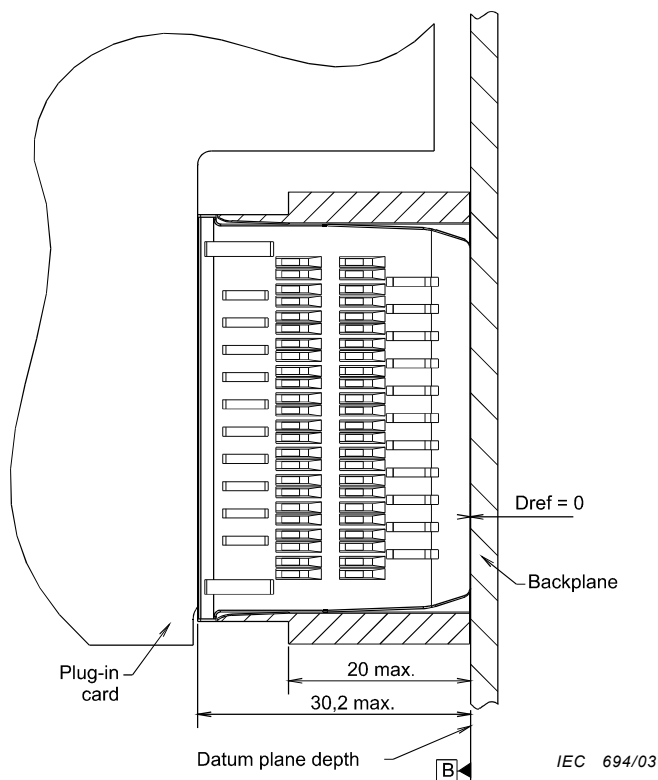
3.2.3 Width dimensions



NOTE For guidance, the reference planes are shown in accordance with IEC 60917-2-2.

Figure 9 – Width dimensions and mounting pitch

3.2.4 Depth dimensions



NOTE For guidance, the reference planes are shown in accordance with IEC 60917-2-2.

Figure 10 – Depth dimensions