INTERNATIONAL IEC STANDARD 60297-3-101

First edition 2004-08

Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series –

Part 3-101: Subracks and associated plug-in units



Reference number IEC 60297-3-101:2004(E)

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Part 3-101: Subracks and associated plug-in units

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL STRUCTURES FOR ELECTRONIC EQUIPMENT – DIMENSIONS OF MECHANICAL STRUCTURES OF THE 482,6 mm (19 in) SERIES –

Part 3-101: Subracks and associated plug-in units

FOREWORD

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International Standard IEC 60297-3-101 has been prepared by subcommittee 48D: Mechanical structures for electronic equipment, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

This standard cancels and replaces IEC 60297-3, IEC 60297-4, IEC 60297-5-100, IEC 60297-5-102, IEC 60297-5-103, IEC 60297-5-107.

The text of this standard is based on following documents:

FDIS	Report on voting
48D/299/FDIS	48D/306/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The IEC 60297-3 series consists of the following parts, under the general title *Mechanical* structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series

Part 3-101: Subracks and associated plug-in units

Part 3-102: Injector/extractor handle

Part 3-103: Keying and alignment pin

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual edition of this standard may be issued at a later date.

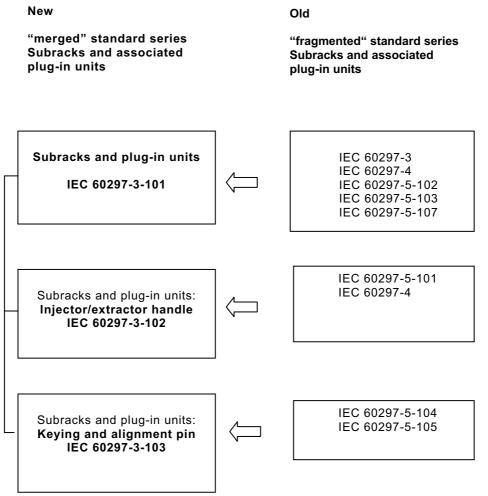
INTRODUCTION

The "Dimensions of mechanical structures of the 482,6 mm (19 in) standards are defined in IEC 60297. To the original IEC 60297-3:1988 publication was added Amendment 1:1995. The additional requirements were published in IEC 60297-4:1995 with Amendment 1:1999.

The extended requirements were published in the IEC 60297-5-1XX series (2001). Responding to market requirements and for more clarity it became necessary to merge and technically enhance these standard "parts" into 3 "new" standards for subracks and associated plug-in units. This "merged" standard series now defined as IEC 60297-3-101, IEC 60297-3-102 and IEC 60297-3-103 explains its relationship to the previous "fragmented" IEC 60297-X standards, see Figure 1.

The nomenclature of these new standards has been revised. The relationship to IEC 60297-1 (Part 1: Panels and Racks) has been maintained. The relationship to IEC 60297-2 (Part 2: Cabinets and pitches of rack structures) has been maintained. The relationship to IEC 61587-1 (Part 1: Climatic, mechanical tests and safety aspects for cabinets, racks, subracks and chassis) and IEC TS 61587-3 (Part 3: Electromagnetic shielding performance tests for cabinets, racks and subracks) has been added.

The IEC 60297-3-101 standard defines the interfaces of the basic 482,6 mm (19 in) subrack and associated plug-in units.



IEC 1089/04

Figure 1 – Relationship between the new IEC 60297-3 series and the old IEC 60297 series

MECHANICAL STRUCTURES FOR ELECTRONIC EQUIPMENT – DIMENSIONS OF MECHANICAL STRUCTURES OF THE 482,6 mm (19 in) SERIES –

Part 3-101: Subracks and associated plug-in units

1 Scope and object

This part of IEC 60297 covers the basic dimensional relationship of a modular range of subracks and associated plug-in units in compliance with the IEC 60297 series.

The purpose of this standard is to specify dimensions which will ensure dimensional interchangeability of subracks and associated plug-in units. Connector related dimensions are limited to "inspection dimensions" only.

For mechanical and climatic tests refer to IEC 61587-1.

For electromagnetic shielding performance tests, refer to IEC 61587-3.

2 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 60249-2-1, Base materials for printed circuits – Part 2: Specifications. Specification No. 1: Phenolic cellulose paper copper-clad laminated sheet, high electrical quality

IEC 60297-1:1986, Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 1: Panels and racks

IEC 60297-2:1982, Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 2: Cabinets and pitches of rack structures

IEC 60603-2:1995, Connectors for frequencies below 3 MHz for use with printed boards – Part 2: Detail specification for two-part connectors with assessed quality, for printed boards, for basic grid of 2,54 mm (0,1 in) with common mounting features

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

IEC 61076-4-101:2001, Connectors for electronic equipment – Part 4-101: Printed board connectors with assessed quality – Detail specification for two-part connector modules, having a basic grid of 2,0 mm for printed boards and backplanes in accordance with IEC 60917

IEC 61076-4-113:2002, Connectors for electronic equipment – Printed board connectors – Part 4-113: Detail specification for two-part connectors having 5 rows with a grid of 2,54 mm for printed boards and backplanes in bus applications

IEC 61587-1:1999, Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 1: Climatic, mechanical tests and safety aspects for cabinets, racks, subracks and chassis

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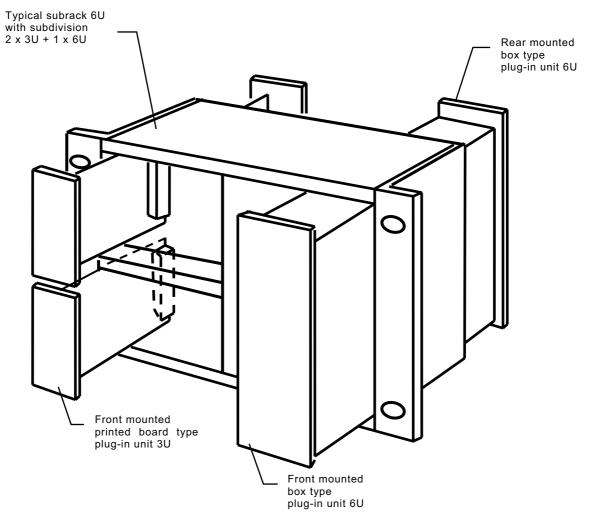
IEC 61587-3:1999, Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 3: Electromagnetic shielding performance tests for cabinets, racks and subracks

3 Terms and definitions

For the purposes of this part of IEC 60297, the terms and definitions given in IEC 60917-1 apply.

4 Arrangement overview

The arrangement overview shown in Figure 2 illustrates a typical 6U subrack with subdivisions and rear mounted plug-in units.



IEC 1090/04

Abbreviation: 1U = 44,45 mm (see Table 3).

Optional features: Subrack and plug-in units electromagnetic shielding provisions (see Clause 10). Plug-in units electrostatic discharge provisions (see Clause 11).

Figure 2 – Arrangement overview

5 Subrack dimensions, front mounting area

The front mounting area of a subrack defines the aperture dimensions for plug-in units, the guide rail positions, the mounting dimensions to the cabinet and the depth dimensions with the relevant connectors, as shown in Figures 3 to 5.

Dimensions in millimetres

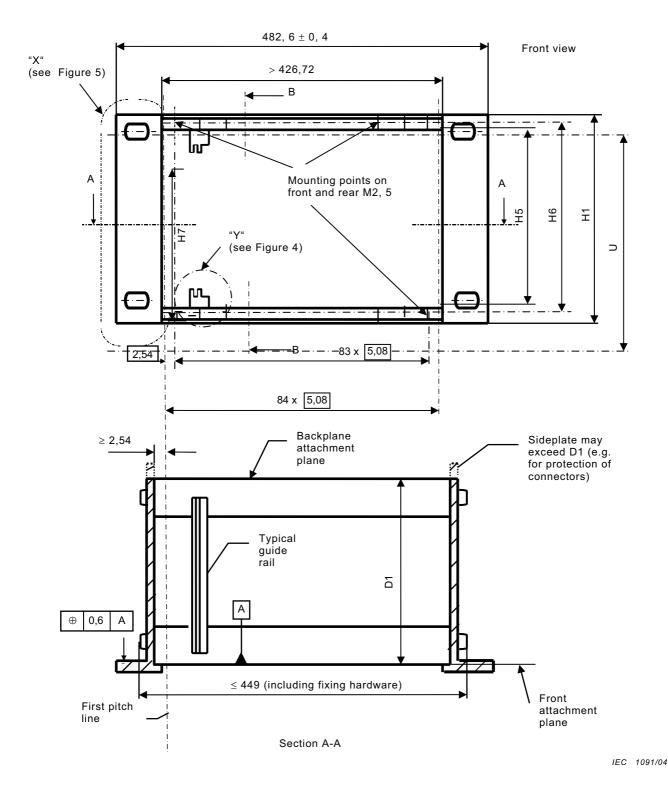
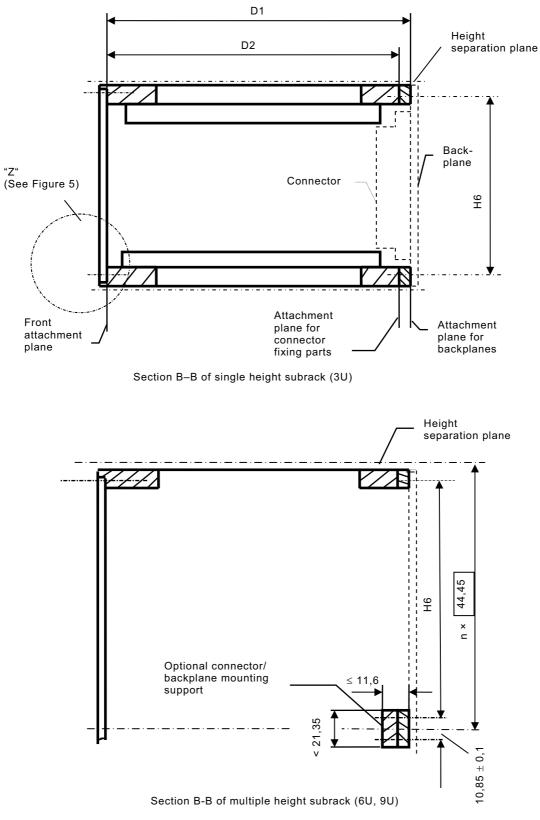


Figure 3 – Subrack dimensions, front mounting area – Part 1

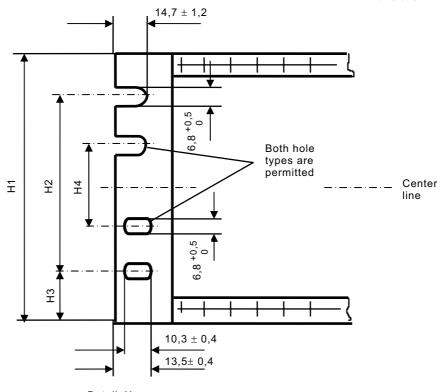
Dimensions in millimetres



IEC 1092/04

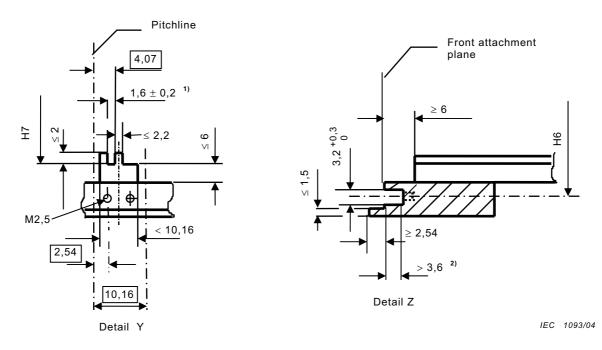
Figure 4 – Subrack dimensions, front mounting area – Part 2

Dimensions in millimetres



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Detail X



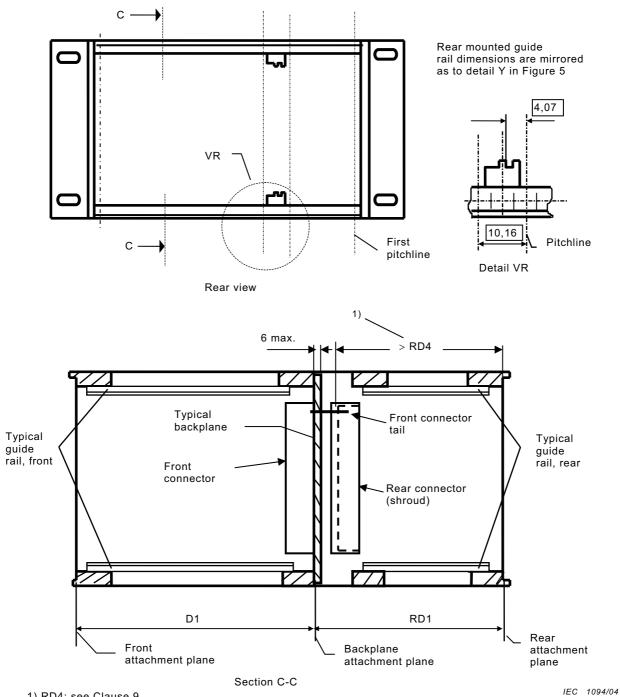
- For board thickness 1,6 in accordance to IEC 60249-2. The dimension 4,07 is the reference for the position of the right hand side of the printed board. Thicker boards can only expand to the left hand side. The guide rail shall be made of electrically insulating material.
- 2) See Clause 7, detail "V" for thread dimensions.

Figure 5 – Subrack dimensions, front mounting area – Part 3

6 Subrack dimensions, rear mounting area

The rear mounting area of a subrack defines the aperture dimensions for rear plug-in units, the guide rail positions and the depth dimensions with the relevant connectors (see Table 1 and Figure 6).

Dimensions in millimetres



1) RD4: see Clause 9.

Figure 6 – Subrack dimensions, rear mounting area

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Table 1 – RD1 dimensions

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Dimensions in millimetres

Printed board depth reference (D3)	60	80	100	120	140	160	220	280
Subrack Type A ¹⁾	82,48	102,48	122,48	142,48	162,48	182,48	242,48	302,48
RD1 ± 0, 25								
Subrack Type B ²⁾	80	100	120	140	160	180	240	300
RD1 ± 0, 25								

RD1: Depth inspection dimensions using connectors

¹⁾ IEC 60603-2 and 61076-4-113.

²⁾ IEC 61076-4-101.

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7 Printed board type plug-in units, front mounted

The dimensions of front panels, printed boards and fixing parts will insure the compatibility of front mounted plug-in units into subracks (see Figures 7 to 9).

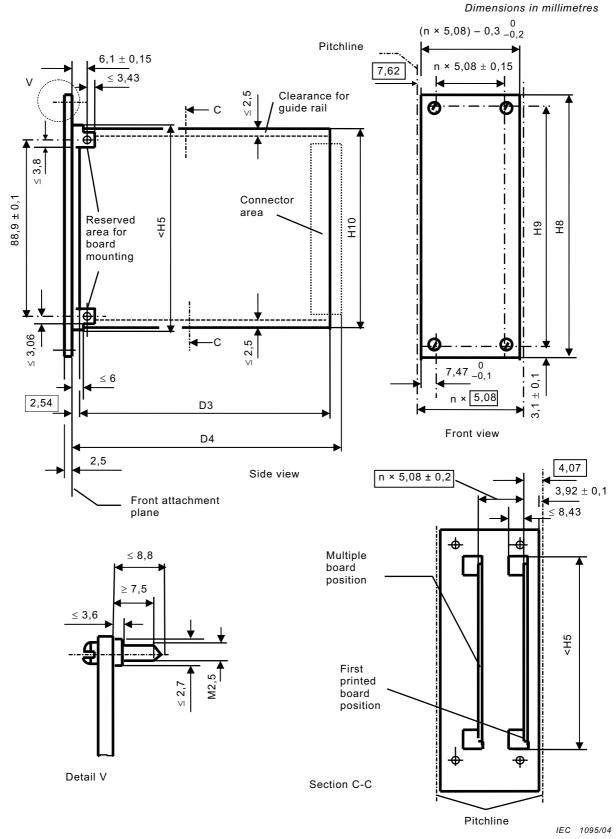
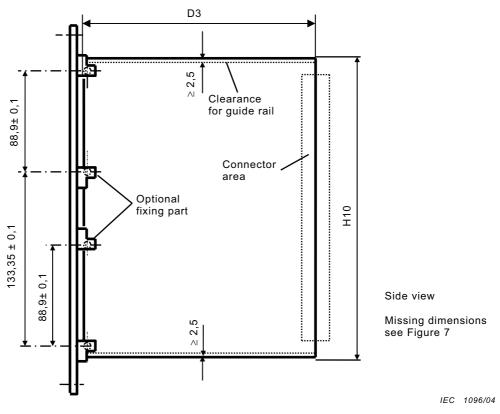


Figure 7 – Printed board type plug-in unit, 3U

Dimensions in millimetres



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Dimensions in millimetres

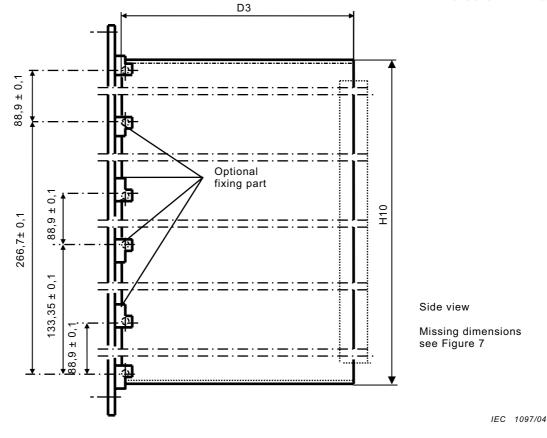
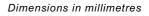
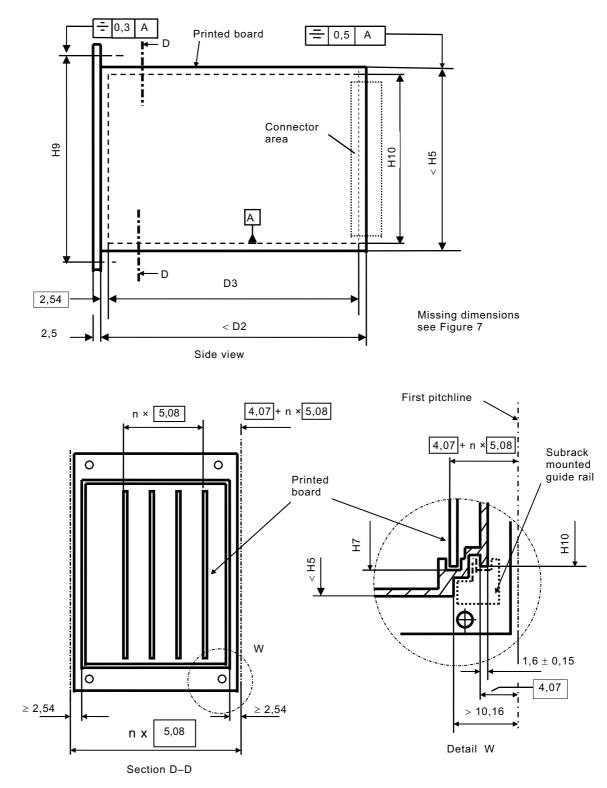


Figure 9 – Printed board type plug-in unit, 9U

8 Box type plug-in units, front mounted

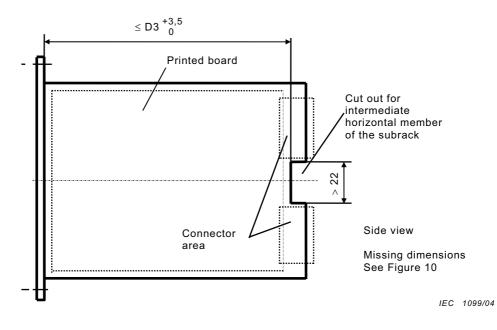
The box type plug-in units have the specific geometry to fit into the same guide rails as the printed board type plug-in units. The inside aperture dimensions are suitable for the same printed board dimensions as they fit into subracks (see Figures 10 to 12).





IEC 1098/04

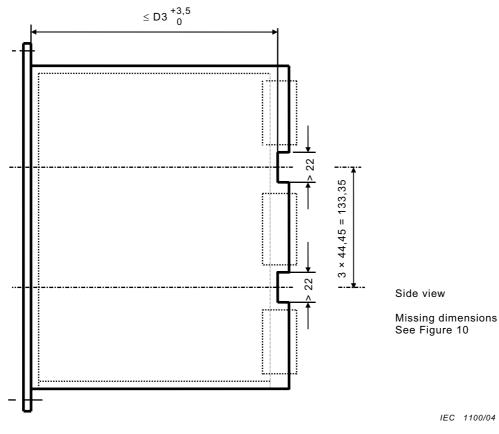
Dimensions in millimetres



– 16 –



Dimensions in millimetres



9 Printed board type plug-in units, rear mounted

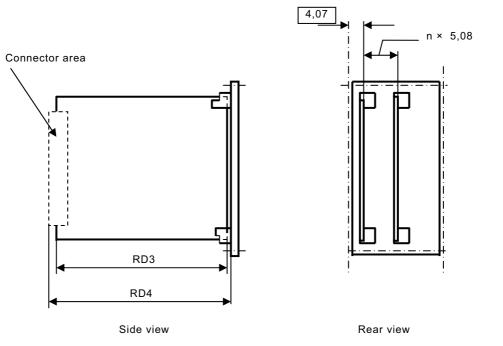
The rear mounted printed board type plug-in units are mirrored to the front mounted plug-in units. The depth dimensions are suitable for the relevant connectors (see Table 2 and Figure 13).

Table 2	– Depth	dimensions	RD3,	RD4
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Dimensions in millimetres

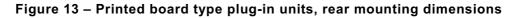
RD3 -0,3/+0	60	80	100	120	140	160		
RD4 ± 0,4 IEC 61076-4-101	71,74	91,74	111,74	131,74	151,74	171,74		
RD4 ± 0,4 IEC 60603-2	69,88	89,88	109,88	129,88	149,88	169,88		
RD4 ± 0,4 IEC 61076-4-113	72,38	92,38	112,38	132,38	152,38	172,38		
NOTE RD4 dependent on connector type (for IEC 60603-2 and IEC 61076-4-113 inverse types used).								

Dimensions in millimetres



IEC 1101/04

Missing dimensions, see Figure 7.



10 Subrack and plug-in units with electromagnetic shielding provisions

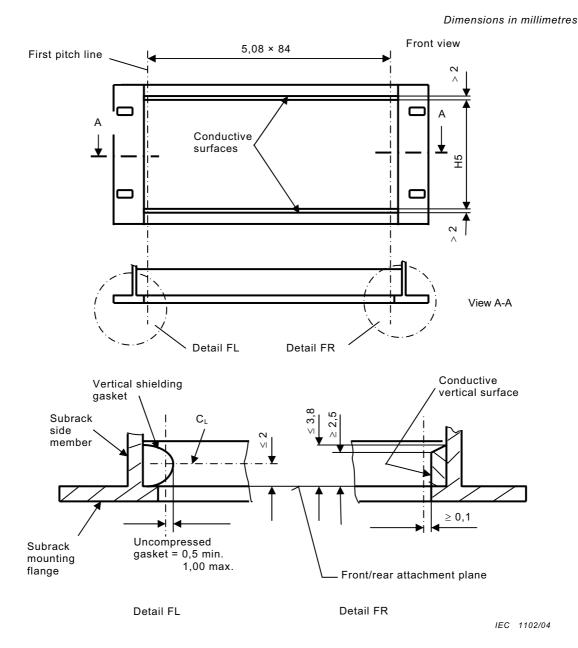
10.1 General

The dimensional specifications of electromagnetic shielding provisions for subracks and associated plug-in units are restricted to the subrack and plug-in unit interfaces. The basic dimensions are in accordance with Clauses 5, 6, 7 and 8 of this part of IEC 60297. Only the extended dimensions of the shielding interfaces are the subject of this Clause. Materials of the shielding interfaces should be chosen for adequate contact properties.

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10.2 Subrack shielding interface dimensions

For subrack shielding interface dimensions, see Figure 14. For corresponding plug-in unit dimensions, see 10.3.



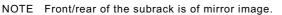
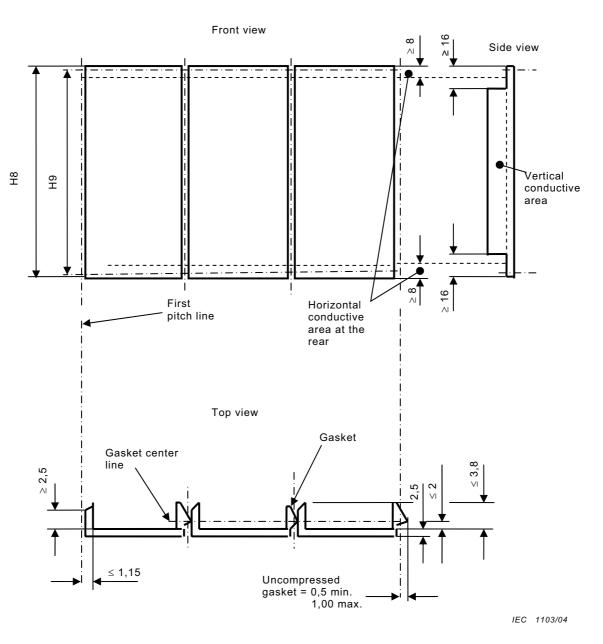


Figure 14 – Subrack shielding interface dimensions

10.3 Plug-in unit and filler panels with electromagnetic shielding provisions

The basic dimensions are in accordance with Clauses 7 and 8 of this part of IEC 60297. Only the extended dimensions of the shielding interface are shown. See Figure 15.



Dimensions in millimetres

Figure 15 – Plug-in unit and filler panels shielding interface dimensions

11 Plug-in units electrostatic discharge provisions

11.1 General

This Clause specifies the interface dimensions for an electrostatic discharge (ESD) contact implemented in the guide rail and the corresponding conductive strip on the plug-in unit printed board (see Figures 16 and 17).

The conductive strips on the printed board are shown for two application requirements: with permanent connection along with the depth dimension of the board or with interruption before the board is fully engaged in the connector.

11.2 ESD contact interface dimensions

The ESD contact shall be connected to the subrack horizontal member and spring load fixed within the determined guide rail area. The ESD contact shall be able to connect the inserted board on both sides.

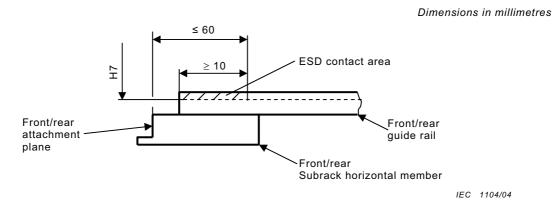
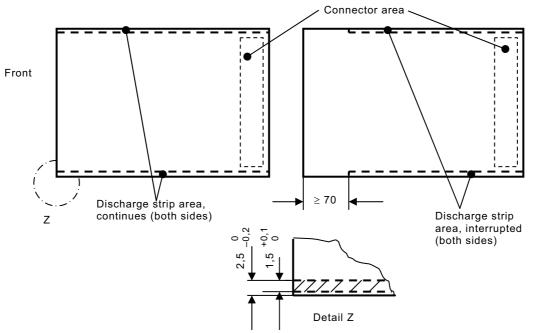


Figure 16 – ESD contact interface dimensions



Dimensions in millimetres

IEC 1105/04

Figure 17 – ESD strip interface dimensions

Table 3 – Height dimensions

Dimensions in millimetres

Height units	2U	3U	4U	5U	6U	7U	8U	9U	10U	11U	12U
H1 ± 0,4	88,10	132,55	177,00	221,45	265,90	310,35	354,80	399,25	443,70	488,15	532,60
H2 ± 0,4	76,20	57,15	101,60	146,05	190,50	234,95	279,40	323,85	368,30	412,75	457,20
H3 ± 0,4	5,95	37,70	37,70	37,70	37,70	37,70	37,70	37,70	37,70	37,70	37,70
H4 ± 0,4	-	-	-	-	76,20 ¹⁾	57,15	76,20	120,65	165,10	146,05	190,50
H5 ≥	67,55	112,00	156,45	200,90	245,35	289,80	334,25	378,70	423,15	467,60	512,05
H6 ± 0,2	78,05	122,50	166,95	211,40	255,85	300,30	344,75	389,20	433,65	478,10	522,55
H7 +0,5 _0	55,75	100,20	144,65	189,10	233,55	278,00	322,45	366,90	411,35	455,80	500,25
H8 ± 0,15	84,10	128,55	173,00	217,45	261,90	306,35	350,80	395,25	439,70	484,15	528,60
H9 ± 0,2	78,05	122,50	166,95	211,40	255,85	300,30	344,75	389,20	433,65	478,10	522,55
H10 +0 _0,3	55,55	100,00	144,45	188,90	233,35	277,80	322,25	366,70	411,15	455,60	500,05

¹⁾ Optional.

Preferred dimensions are in bold.

Table 4 – Depth dimensions

D1 ± 0,5	75,6	95,60	115,60	135,60	155,60	175,60	235,60	295,60
D2 ± 0,5	72,24	92,24	112,24	132,24	152,24	172,24	232,24	292,24
D3 - 0,3	60	80,00	100,00	120	140	160,00	220,00	280,00
D4 \pm 0,4 ¹⁾	69,93	89,93	109,93	129,93	149,93	169,93	229,93	289,93
D4 \pm 0,4 ²⁾	71,93	91,93	111,93	131,93	151,93	171,93	231,93	291,93
D4 \pm 0,4 ³⁾	71,74	91,74	111,74	131,74	151,74	171,74	231,74	291,74

Dimensions in millimetres

¹⁾ Depth inspection dimension with connector see IEC 60603-2, Type B,C,D and IEC 61076-4-113.

²⁾Depth inspection dimension with connector see IEC 60603-2, Type F,G,H.

³⁾ Depth inspection dimension with connector see IEC 61076-4-101.

Preferred dimensions are in bold.

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12 Dimensions used in the figures

Height

- U: Coordination height unit of 44,45 mm (1,75 in). See IEC 60297-1.
- H1: Subrack heights (equal to dimension E of IEC 60297-1).
- H2: Subrack to cabinet or rack mounting hole positions (equal to dimensions Y/Z of IEC 60297-1).

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- H3: Subrack to cabinet or rack mounting hole positions (equal to dimensions A of IEC 60297-1).
- H4: Subrack to cabinet or rack mounting hole positions (equal to dimensions Y/Z of IEC 60297-1).
- H5: Subrack vertical aperture opening for plug-in units.
- H6: Mounting center distance for plug-in units, front panels, backplanes and connector supports.
- H7: Plug-in unit and printed board guidance height.
- H8: Plug-in unit front panel height.
- H9: Vertical plug-in unit front panel or backplane onto subrack mounting dimensions.
- H10: Printed Board height or plug-in unit into subrack guidance height.

Width

- HP: The subrack aperture is theoretically divided into 84 Horizontal Pitches (HP) of 5,08 mm. The subrack aperture may be divided into 168 half pitches of 2,54 mm.
 - The plug-in unit front panel width is divided into Nx 5,08 mm horizontal pitches.
 - The plug-in unit front panel width may be divided into Nx 2,54 mm half pitches.
 - The plug-in unit guide to guide position is divided into Nx 5,08 mm horizontal pitches.
 - The plug-in unit guide to guide position may be divided into Nx 2,54 mm half pitches.

Depth

- D1: Subrack test dimension for front mounted plug-in units.
- RD1: Subrack test dimension for rear mounted plug-in units.
- D2: Is irrelevant and should be removed or (alternatively) D2 should be defined as "Optional backplane insulation space" only with no dimensions.
- D3: Front mounted printed board recommended depth (may be increased or decreased according to connector choice).
- RD3: Rear mounted printed board recommended depth (may be increased or decreased according to connector choice).
- D4: Front plug-in unit test dimension, connector dependent.
- RD4: Rear plug-in unit test dimension, connector dependent.



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