

# INTERNATIONAL STANDARD

**IEC**  
**60297-5-104**

First edition  
2001-01

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

### **Part 5-104: Subracks and associated plug-in units – Keying**

*Structures mécaniques pour équipement électronique –  
Dimensions des structures mécaniques de la série  
de 482,6 mm (19 in) –*

*Partie 5-104:  
Bacs et blocs enfichables associés –  
Codage*



Reference number  
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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 5-104: Subracks and associated plug-in units –  
Keying**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 60297-5-104 has been prepared by subcommittee 48D: Mechanical structures for electronic equipment, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

The text of this standard is based on the following documents:

| FDIS         | Report on voting |
|--------------|------------------|
| 48D/242/FDIS | 48D/251/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 3.

IEC 60297-5 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 5-100, Subracks and associated plug-in units – Design overview

Part 5-101, Subracks and associated plug-in units – Injector/extractor handle

Part 5-102, Subracks and associated plug-in units – Electromagnetic shielding provision

Part 5-103, Subracks and associated plug-in units – Electrostatic discharge protection

Part 5-104, Subracks and associated plug-in units – Keying

Part 5-105, Subracks and associated plug-in units – Alignment and/or earth pin

Part 5-107, Subracks and associated plug-in units – Rear mounted plug-in units

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

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Withdrawn

## INTRODUCTION

This part of IEC 60297 is based on IEC 60297-3 (1984), its Amendment 1 (1992), and IEC 60297-4 (1995). It contains detail dimensions which ensure dimensional interchangeability of subracks, plug-in units and keys where board type plug-in units requiring an accessible method of keying for subrack front and/or rear mounted plug-in units.

This standard applies only to the mechanical structures for electronic equipment practices according to the IEC 60297 series.

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

## Part 5-104: Subracks and associated plug-in units – Keying

### 1 Scope and object

This part of IEC 60297 covers extended features of a retained keying method added to subracks and plug-in units with front panels according to IEC 60297-3, IEC 60297-4 and IEC 60297-5-107. By implementing this extended feature to the subracks and plug-in units, a new subrack and plug-in unit type (incompatible with IEC 60297-3 and IEC 60297-4) is created.

The purpose of this standard is to specify dimensions which will ensure dimensional interchangeability of subracks and associated plug-in units using the extended feature of a retained keying method added to IEC 60297-3, IEC 60297-4 and IEC 60297-5-107.

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

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60297. 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 60297 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 60297-3, *Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3: Subracks and associated plug-in units*

IEC 60297-4, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 4: Subracks and associated plug-in units – Additional dimensions*<sup>1</sup>

IEC 60297-5-100, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 5-100: Subracks and associated plug-in units – Design overview*

IEC 60297-5-107, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 5-107: Subracks and associated plug-in units – Rear mounted plug-in units*

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

IEC 61587-1, *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*

<sup>1</sup> There is a consolidated edition 1.1 (1999) that includes IEC 60297-4 (1995) and its amendment 1 (1999).

### 3 Definitions

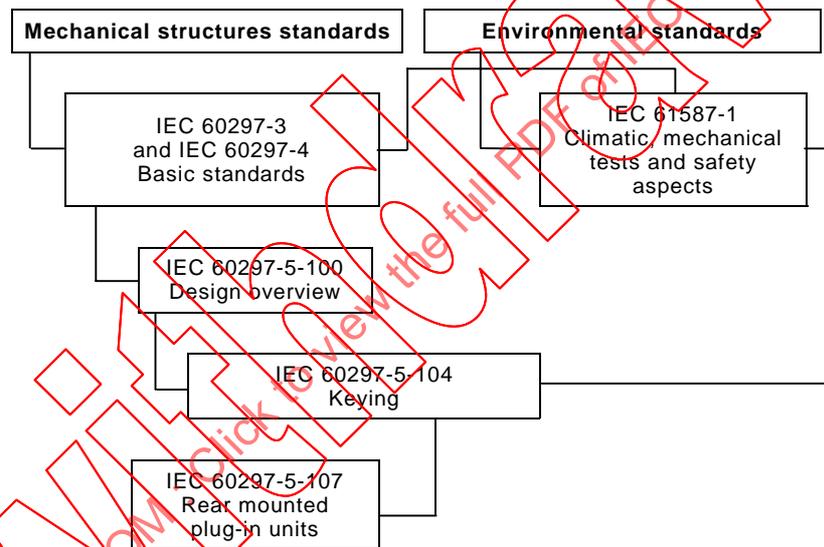
For the purpose of this part of IEC 60297, the definitions of IEC 60917-1 apply.

### 4 Extended feature added to IEC 60297-3 and IEC 60297-4

This standard gives dimensions only where they differ from or supplement those to be found in IEC 60297-3 and 60297-4. The dimensions used in this standard shall take precedence over those of IEC 60297-3 and 60297-4 when conformance to this standard is claimed. Dimensions shown in brackets are for reference only and are found in the stated standards.

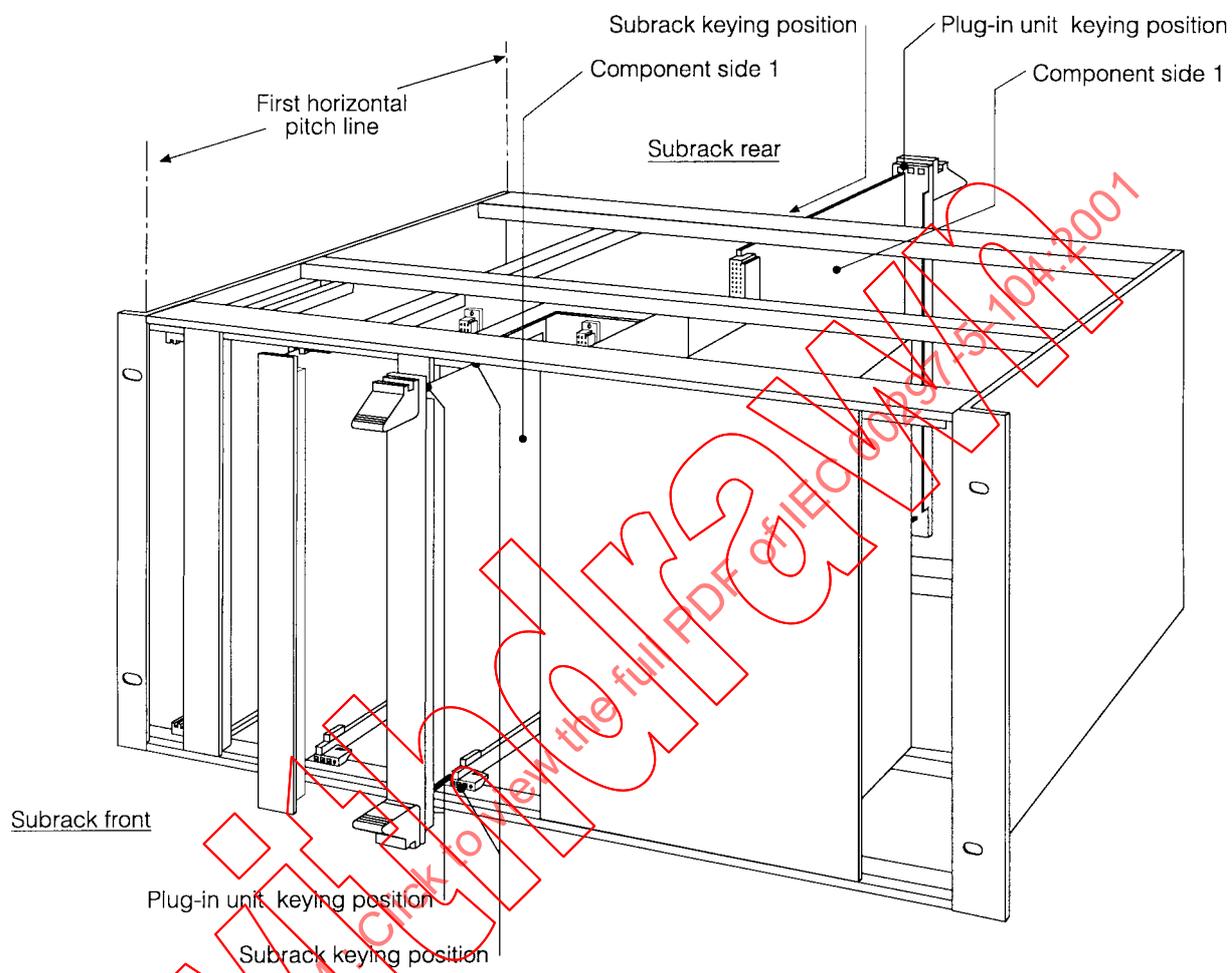
The drawings in this standard are not intended to indicate product design.

| Extended feature | Basic standards            | Extended standards                        | Environmental standards |
|------------------|----------------------------|---|-------------------------|
| Keying           | IEC 60297-3<br>IEC 60297-4 | <b>IEC 60297-5-104</b><br>IEC 60297-5-107 | IEC 61587-1             |



### 5 General equipment arrangement

Generally, these are subracks featuring front and/or rear subrack mounted plug-in units with keying.

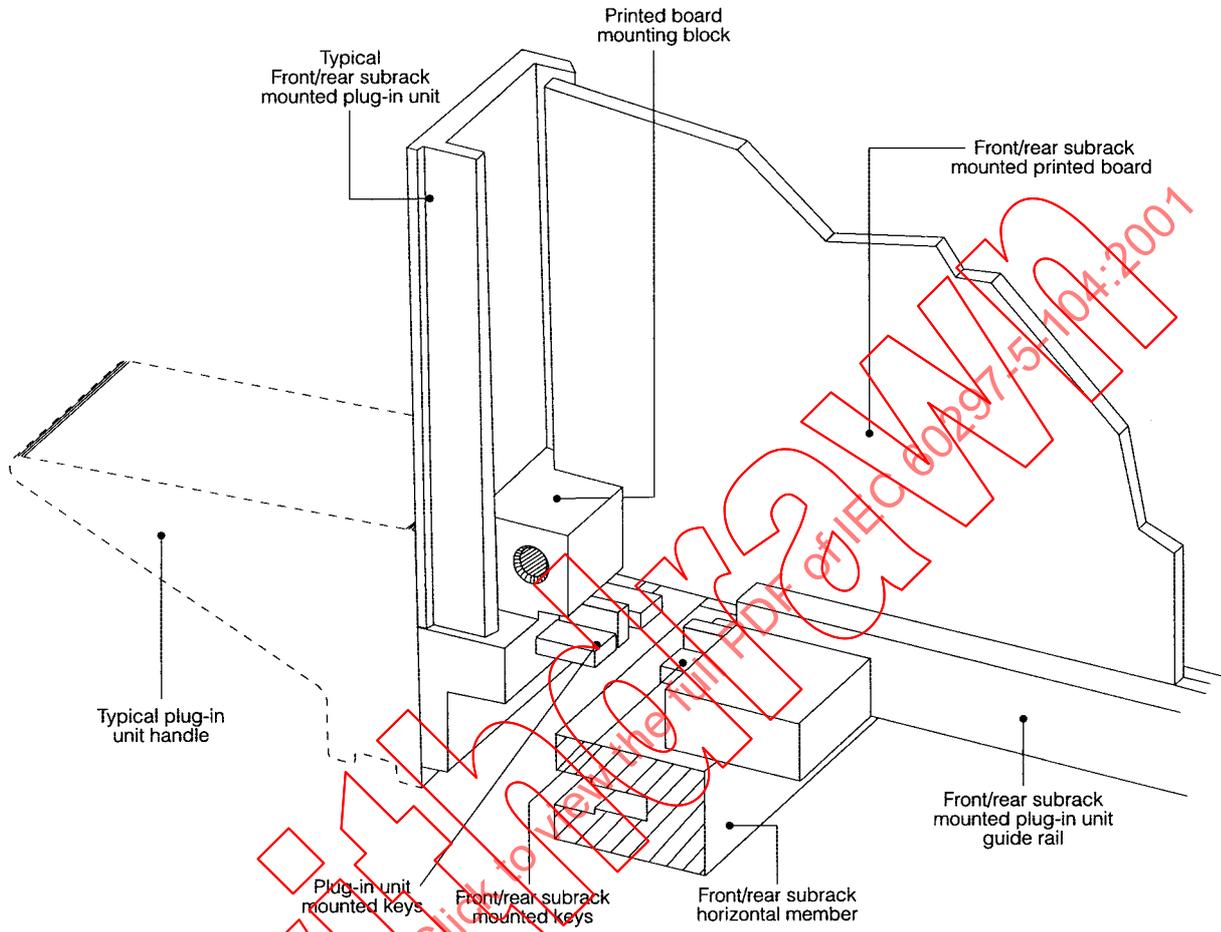


IEC 2828/2000

**Figure 1 – General equipment arrangement – Typical 6U subrack with front and/or rear mounted plug-in units featured with keying**

## 6 Detail equipment arrangement

The detail arrangement below points out the added keying feature of this standard.



IEC 2829/2000

Figure 2 – Design detail equipment arrangement

## 7 Keying of plug-in units in a subrack

Applications require functional plug-in units to be assigned to specific subrack guide positions. Plugging the wrong plug-in unit into the wrong position may cause the system to malfunction. Therefore the need for keying is essential to ensure the correct functioning of systems.

This standard details a keying system that is user programmable from the front and/or rear of a subrack and on the rear face of a plug-in unit. The programmable key can be set, removed or changed by the user.

A subrack assembled with guide rails in accordance with IEC 60297-3, IEC 60297-4 and IEC 60297-5-107 (without a keying feature) will accept plug-in units with front panels in accordance with this standard (with keys removed).

### 7.1 Subrack guide rail dimensions for the keying of box and printed board type plug-in units with front panels

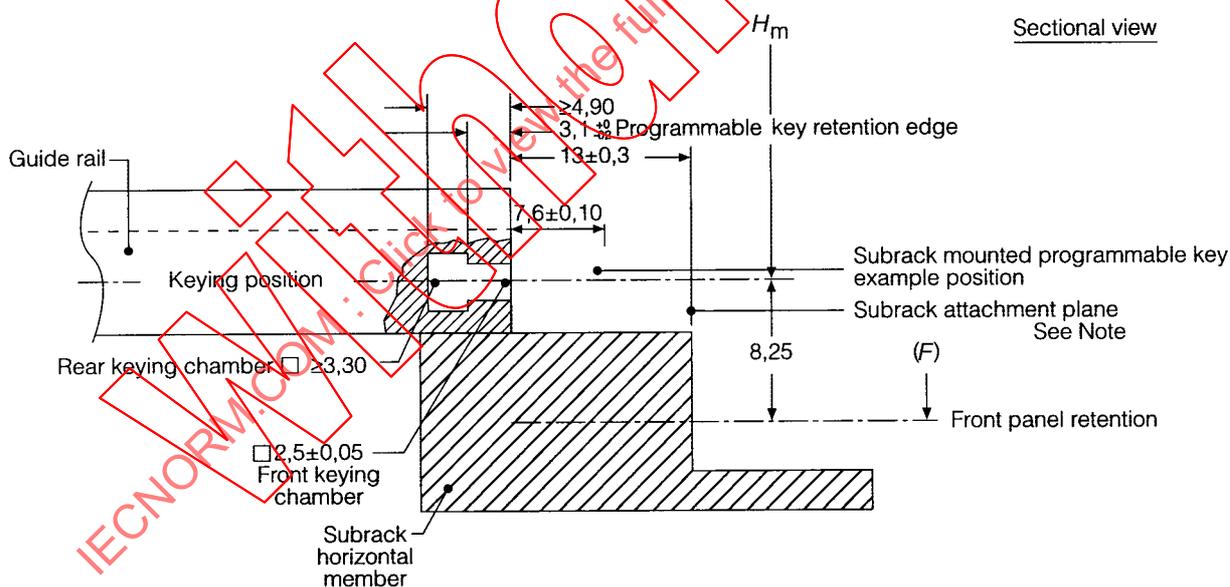
Board type plug-in units are defined in IEC 60297-3 and IEC 60297-4.

Box type plug-in units are defined in IEC 60297-3.

Subrack rear mounting of plug-in units are defined in IEC 60297-5-107.

$H_m$  is the centre line for the keying position in the upper and lower subrack guide rail. See table 1.

( ) See IEC 60297-3 and IEC 60297-4.



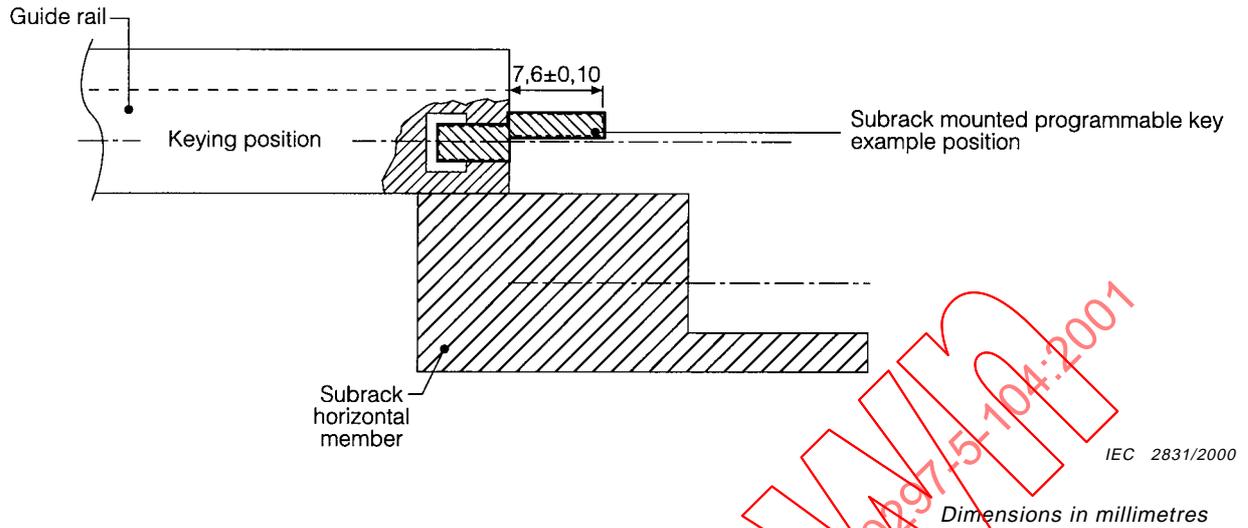
IEC 2830/2000

Dimensions in millimetres

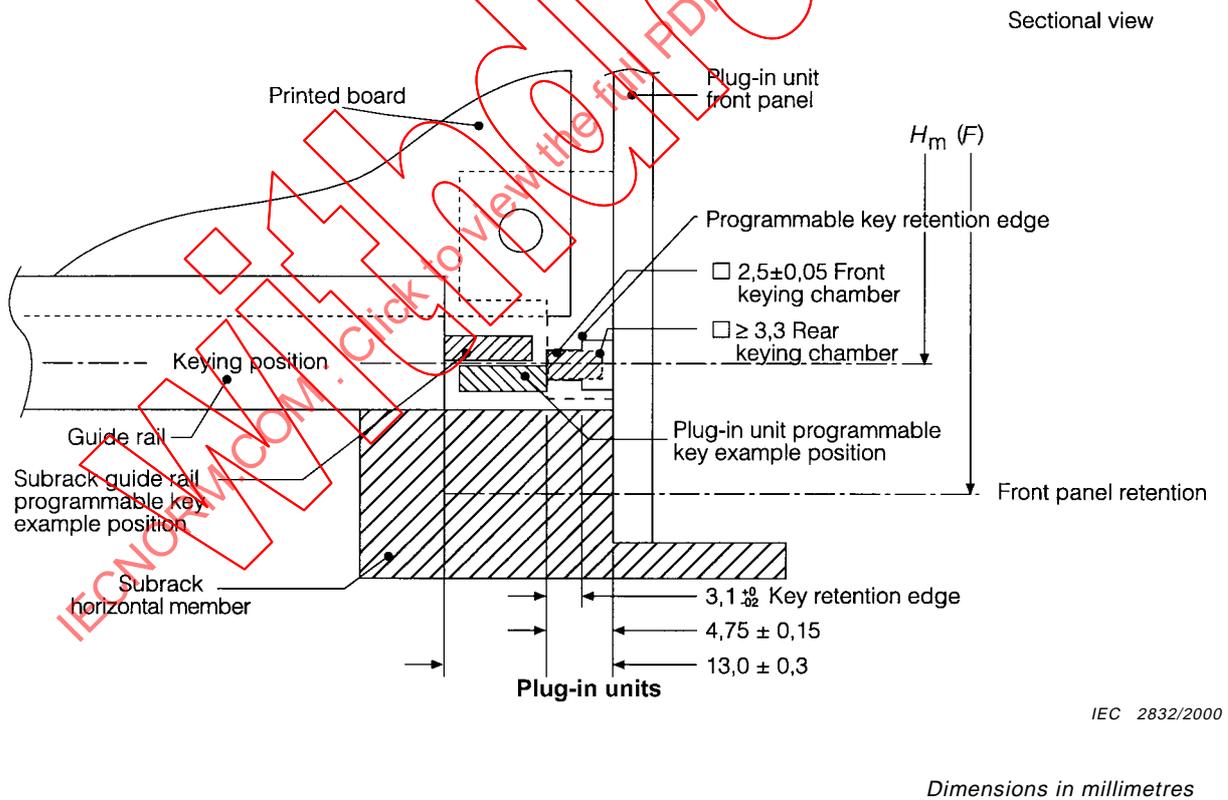
NOTE The subrack attachment plane (front/rear) is used to attach (front/rear) subrack mounted plug-in unit front panels.

Figure 3a – Subrack guide rail dimensions for the keying of box and printed board type plug-in units

( ) See IEC 60297-3 and IEC 60297-4.



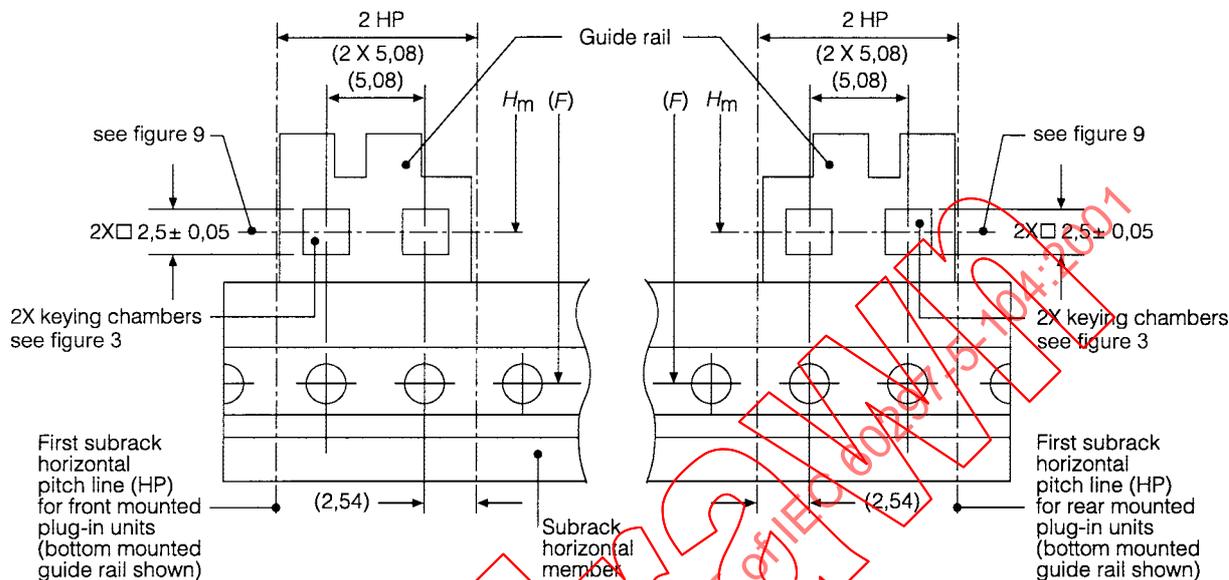
**Figure 3b – Subrack guide rail mounted key dimension for the keying of box and printed board type plug-in units**



**Figure 4 – Plug-in unit dimensions for the programmable keying of box and printed board type plug-in units**

**7.2 Subrack guide rail dimensions for the keying of box and printed board type plug-in units ≥ 2HP with front panels**

( ) See IEC 60297-3 and IEC 60297-4.



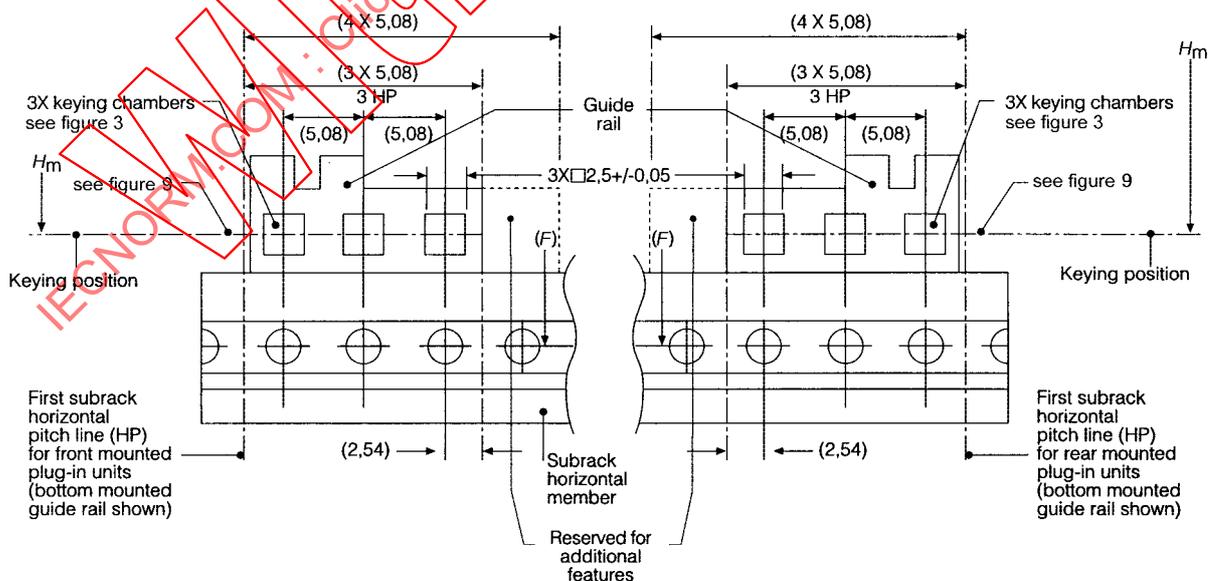
IEC 2833/2000

Dimensions in millimetres

**Figure 5 – Subrack guide rail dimensions for the keying of box and printed board type plug-in units ≥ 2HP**

**7.3 Guide rail dimensions for the keying of board type plug-in units ≥ 3HP**

( ) See IEC 60297-3 and IEC 60297-4.



IEC 2834/2000

Dimensions in millimetres

**Figure 6 – Guide rail dimensions for the keying of printed board type plug-in units ≥ 3HP**

NOTE Not suitable for box type plug-in units.

#### 7.4 Programmable key dimensions

With the dimensions found in figures 3, 4, 5, 6 and 7, interchangeability of keys by various manufacturers is maintained and key retention features can be derived.

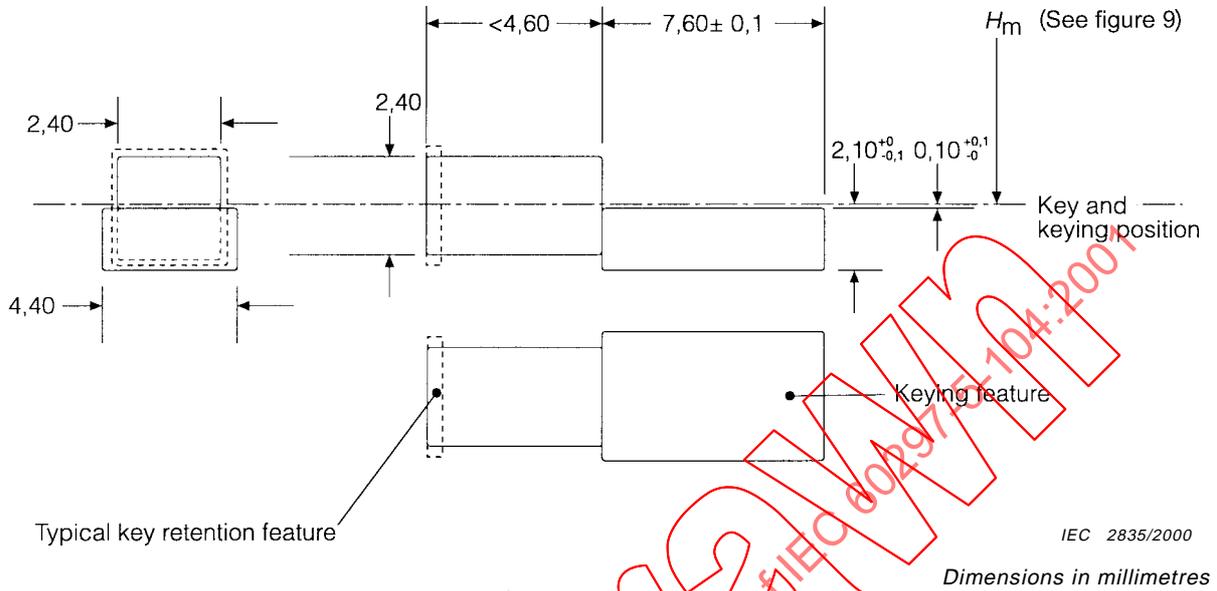


Figure 7 – Programmable key dimensions

### 7.5 Programming of keys

Programmable keying defines a standardized designation of keying combinations.

The key provides for four keying positions in a single keying chamber. All keying chambers are defined by letters and by key rotation number marking 1 to 4.

Figure 8 shows keying on the front of the subrack with front mounted plug-in units. If the keying is also used at the rear of the subrack with rear mounted plug-in units per IEC 60297-5-107, the letters are upside down.

Typically, in 3U subracks equipped with plug-in units for 3U subracks, keying is used on the bottom only.

- Chambers D E F at the front of the subrack. Chambers A B C on the rear of the subrack (see IEC 60297-5-107).
- Typically, in 6U and 9U subracks equipped with plug-in units for 6U and 9U subracks, keying is used at the bottom and the top. Chambers A B C D E F at the front and/or the rear (see IEC 60297-5-107) of the subrack. On the rear of the subrack the letters ABC will be found at the bottom of the subrack/plug-in unit.

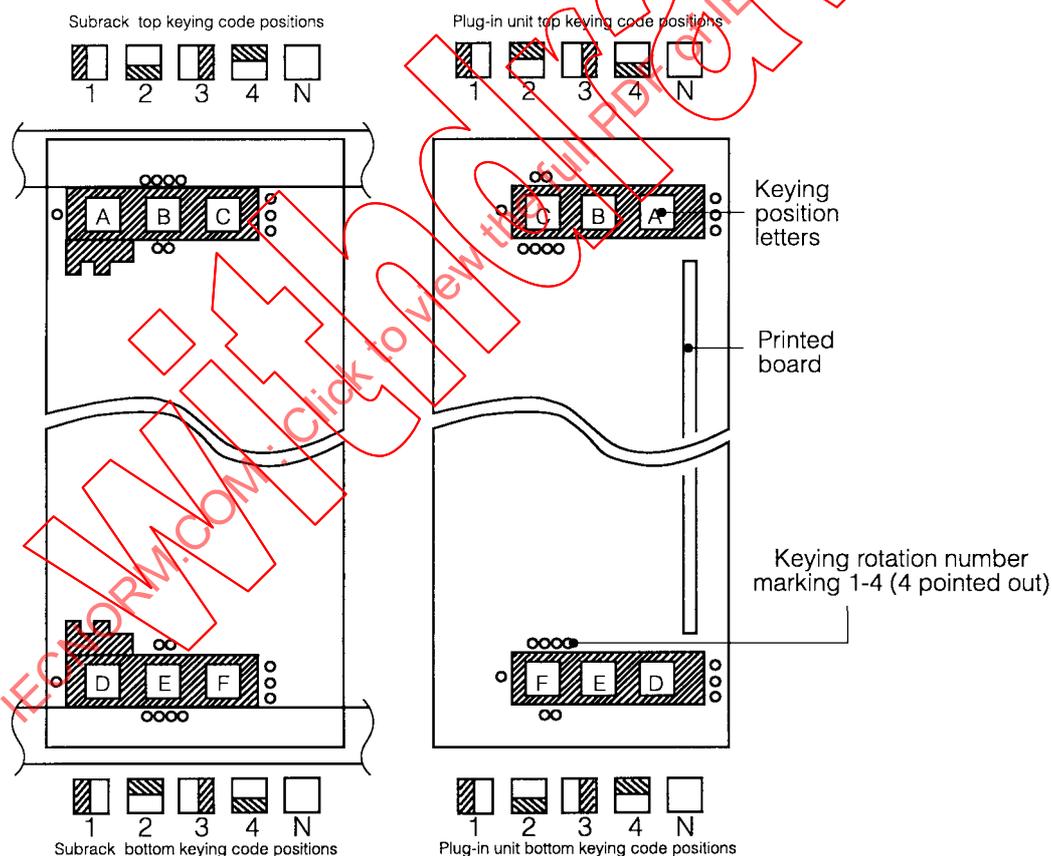


Figure 8 – Programming of keys

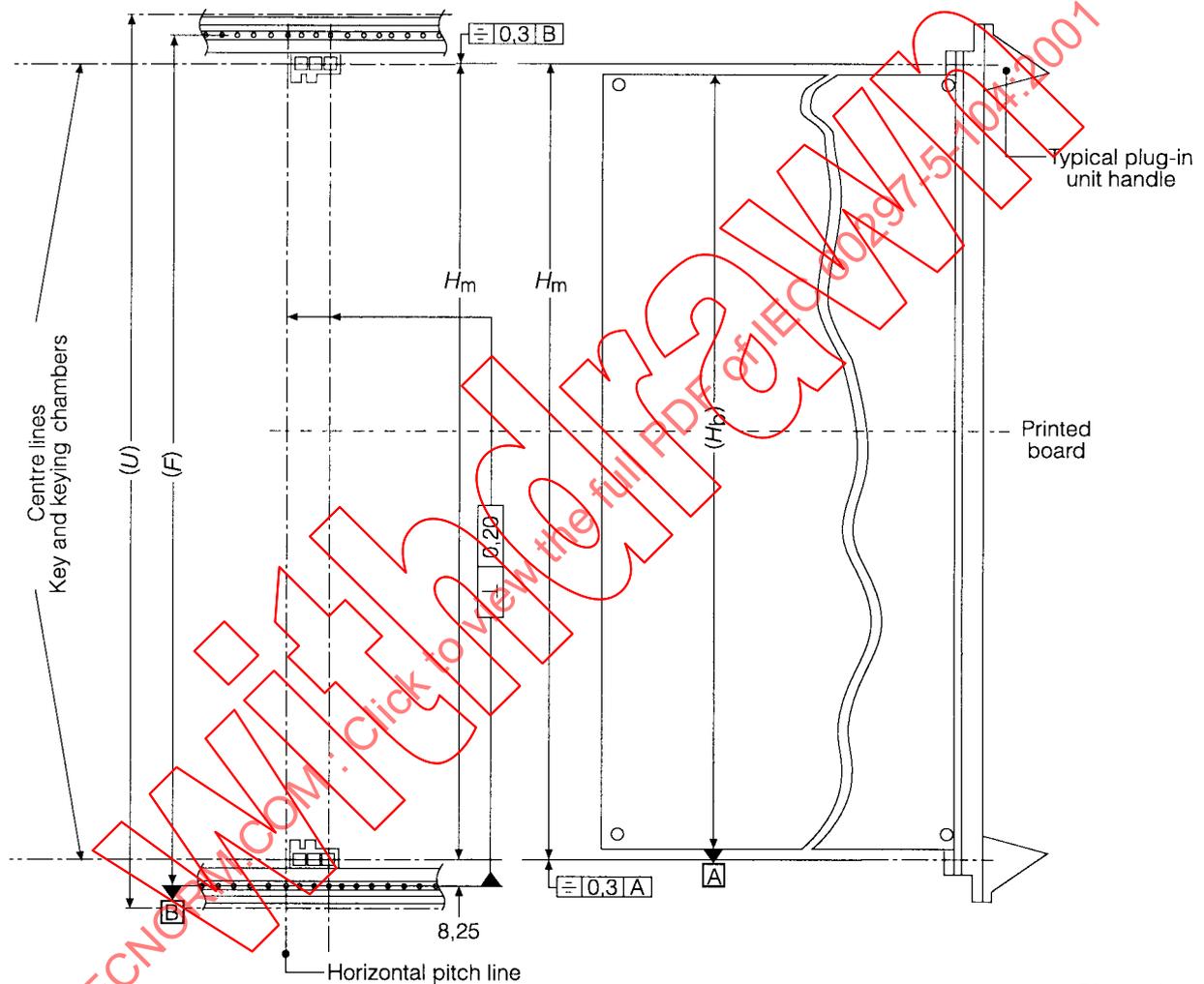
## 7.6 Keying chamber inspection dimensions

Table 1 – Subrack and plug-in unit keying chamber inspection dimensions

*Dimensions in millimetres*

| (U)           | 3      | 6      | 9      |
|---------------|--------|--------|--------|
| $H_m \pm 0,3$ | 106,00 | 239,35 | 372,70 |

( ) See IEC 60297-3 and IEC 60297-4.



IEC 2837/2000

*Dimensions in millimetres*

Figure 9 – Front and/or rear subrack and plug-in unit keying chamber inspection dimensions