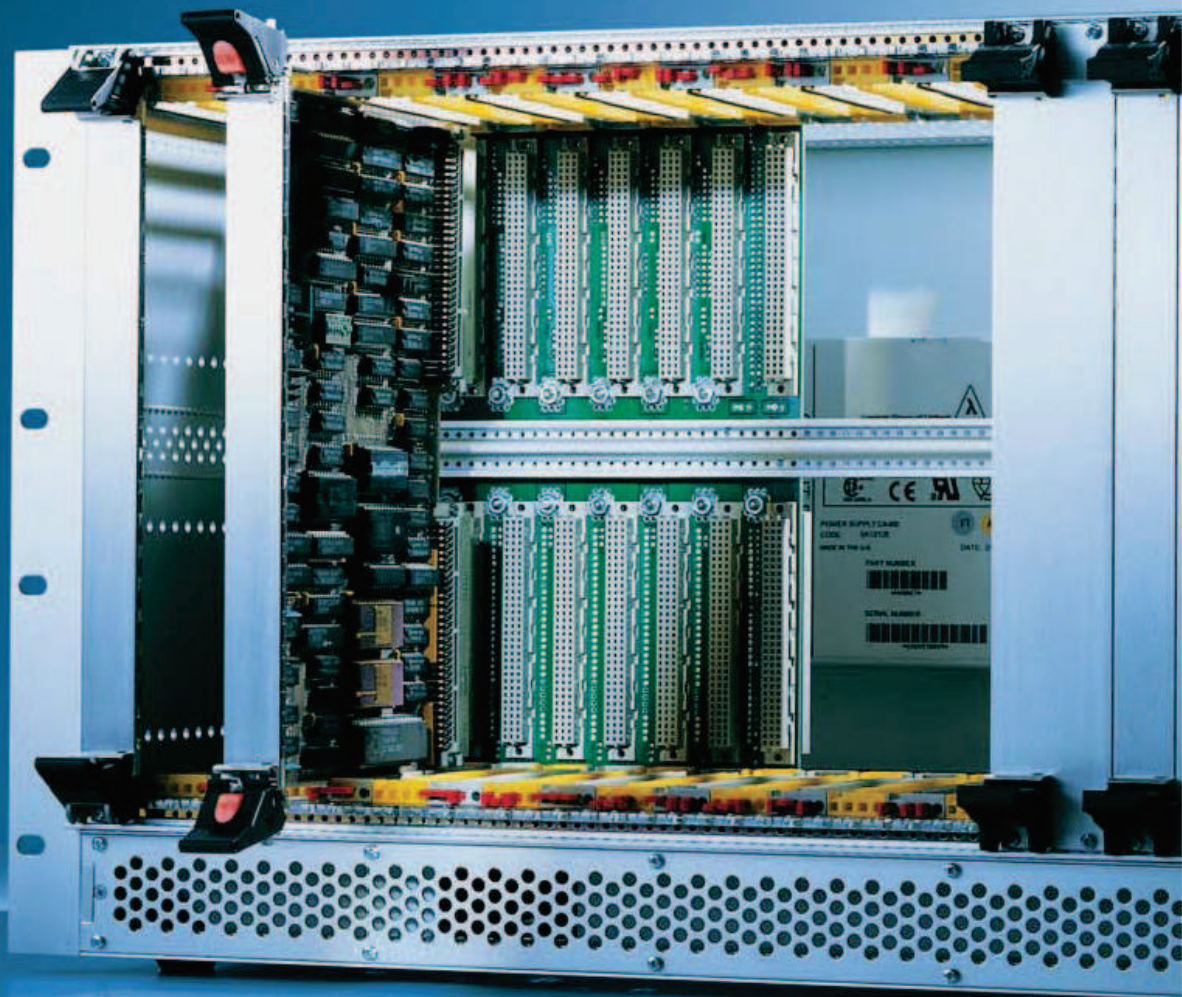


TECHNOLOGY EXPERTISE



WE CREATE YOUR ELECTRONIC WORLD

Overview of standards

Designs for electronic systems (dimensions for 19-inch design)

IEC 60297-3-100	Basic dimensions of front panels, subracks, rack-mount systems, racks and cabinets
IEC 60297-3-101	Subracks and assembly modules
IEC 60297-3-102	Injector/extractor handle
IEC 60297-3-103	Keying and guide pin
IEC 60297-3-104	Connector dependent interface dimensions of subracks and assembly modules
IEC 60297-3-105	Dimensions and layout of 1 U high rack-mount systems
IEC 60297-3-106	Adaptation dimensions for subracks and rack-mount systems applicable with metric cabinets or racks in accordance with IEC 60917-2-1

Environmental conditions for designs as per IEC 60917, IEC 60297

DIN EN 61587-1	Climatic and mechanic tests and safety aspects for cabinets, racks, subracks and rack-mount systems
DIN EN 61587-2	Seismic tests for cabinets and racks
DIN EN 61587-3	Electromagnetic shielding performance tests for cabinets and subracks
VG 95373, part 15	Electromagnetic compatibility of equipment Part 15: Measuring method for coupling and shielding

Safety

IEC 60950-1	Information Technology Equipment – Safety Part 1: General requirements
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Rail

EN 50155	Electronic equipment used on rail vehicles
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TECHNOLOGY EXPERTISE

19-INCH PACKAGING SYSTEM

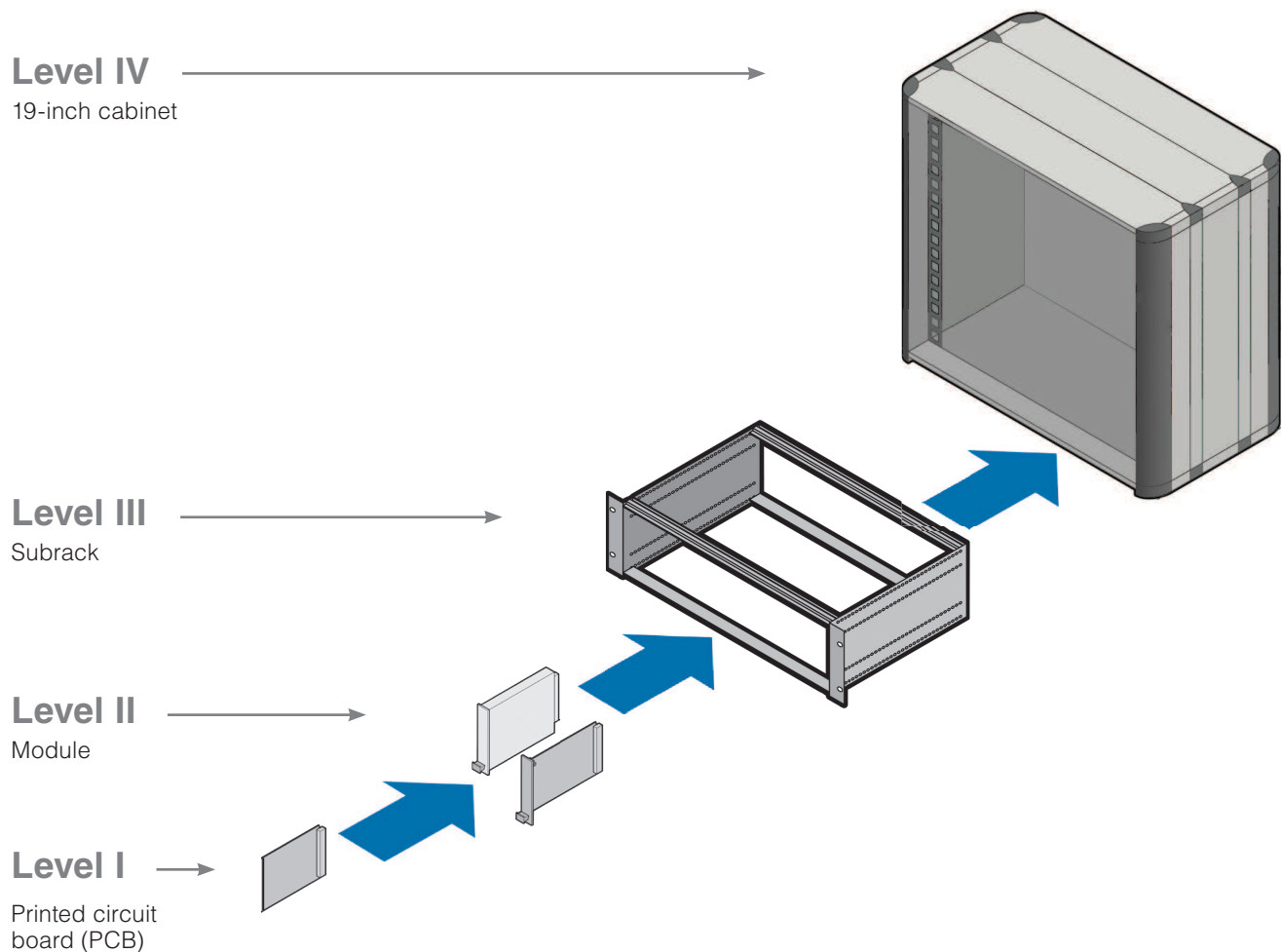
19-inch technology: dimensional relationships

The 19" packaging system is based on internationally applicable dimensional standards that describe the coordinated, modular system structure. The various parts making up the IEC 60297 series of standards describes the mechanical structure of the system.

The objective of these provisions is to ensure that different devices and modules from all potential manufacturers can be combined and substituted without difficulty.

The 19" packaging system is now used in almost every area of industrial electronics: transportation, energy, IT and industrial control.

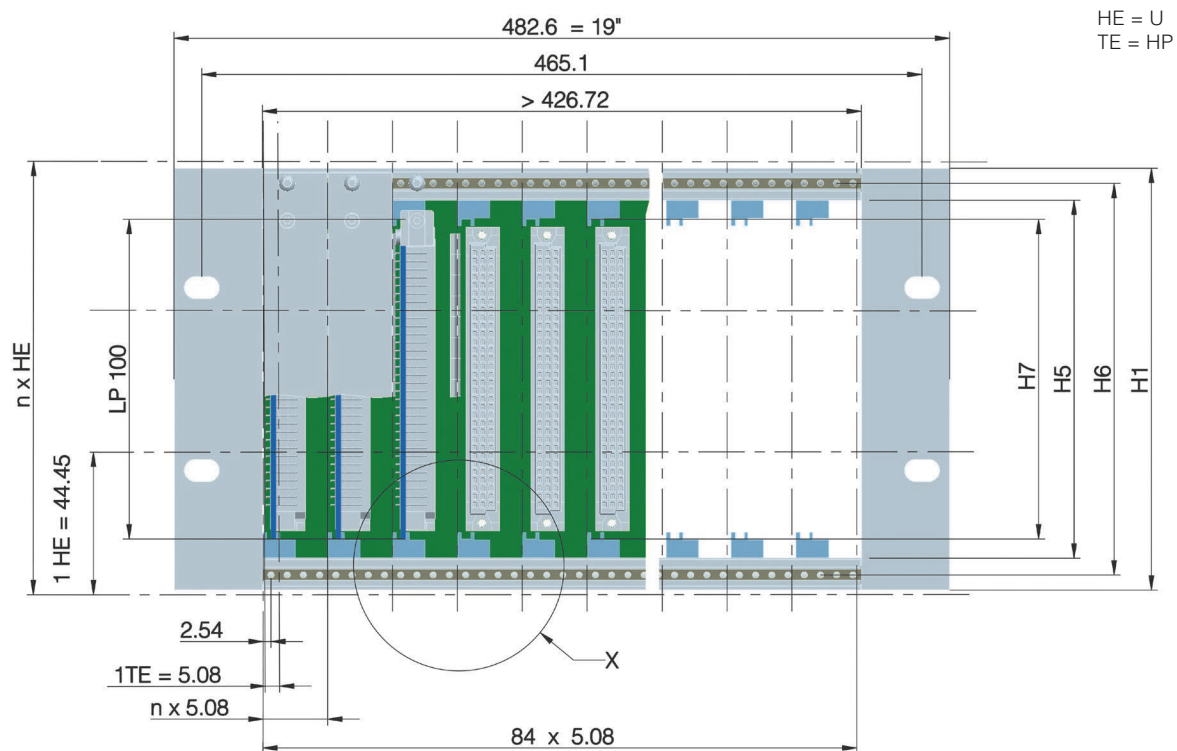
More specifically, the 19" packaging system can be divided into the following four levels:



TECHNOLOGY EXPERTISE

19-INCH PACKAGING SYSTEM

Level 3: Subrack



Height units	3 U	6 U	9 U
H1 ± 0.4	132.55	265.90	399.25
H5 ≥	112.00	245.35	378.70
H6 ± 0.2	122.50	255.85	389.20
H7 + 0.5 -0	100.20	233.55	366.90

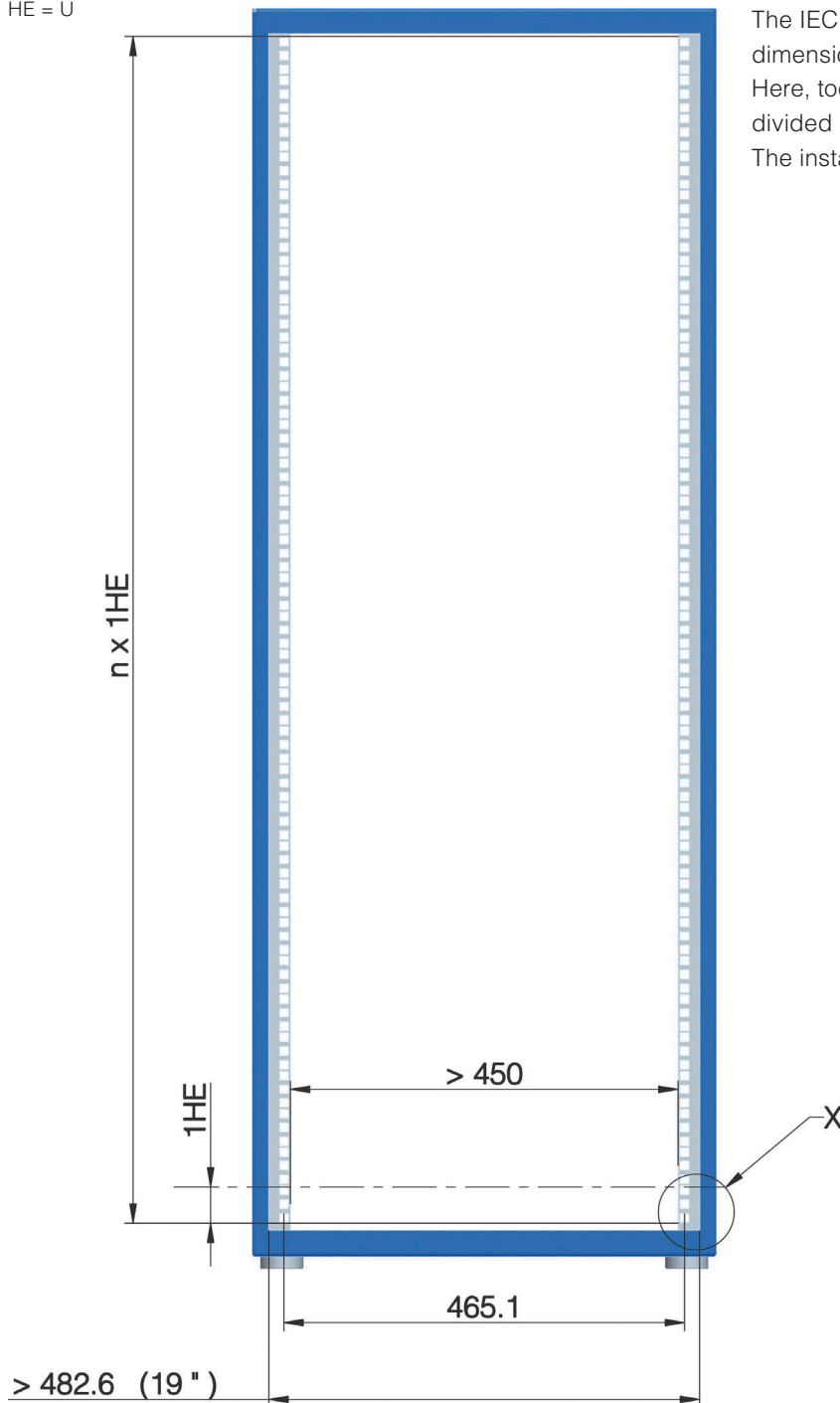
DIN EN 60297-3-101 provides a figure of 482.6 mm (19 inches) for the width of the subrack front.

The maximum subrack height is given as a multiple of one height unit (1 U), or 44.45 mm. This ensures that the subrack height is coordinated with the height of the plug-in units used. Typical sizes are 3 U, 6 U and 9 U (refer to table).

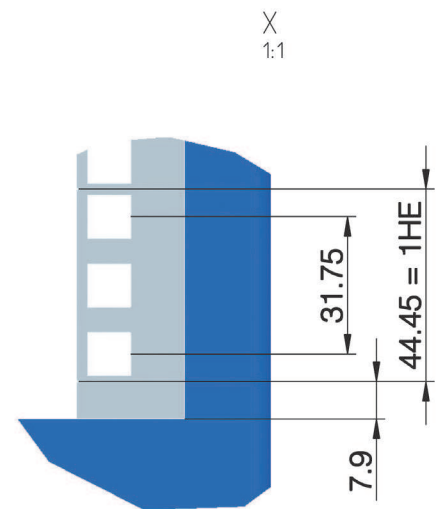
The installation space for the modules is divided into horizontal pitch units (HP) of 5.08 mm (0.2 inch), or 84 HP for a subrack width of 19 inches.

Level 4: 19-inch cabinet

HE = U



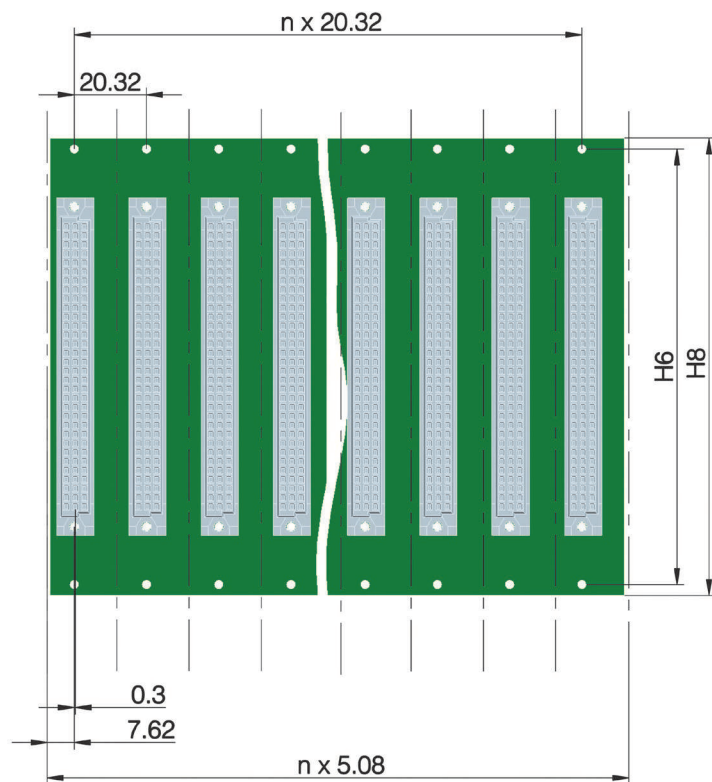
The IEC 60297-3-100 standard describes the basic dimensions of the 19-inch cabinet. Here, too, the space available to fit the subracks is divided into multiples of 1 U. The installation space must be at least 450 mm wide.



TECHNOLOGY EXPERTISE

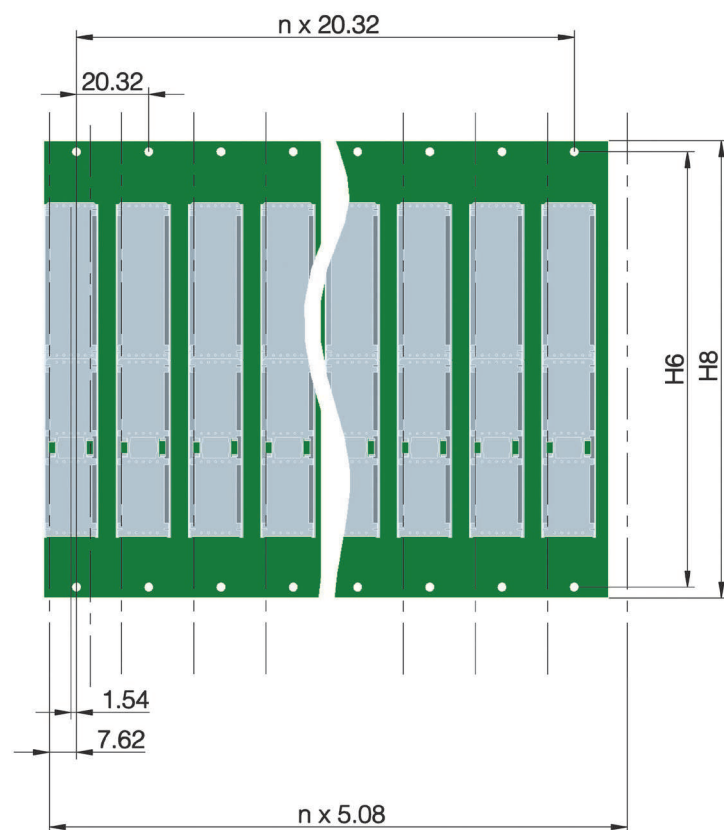
19-INCH PACKAGING SYSTEM

Backplane



Backplane with plug connector as per
DIN 41612/IEC 60603-2 and IEC 61076-4-113

Typical application: VME/VME64 systems



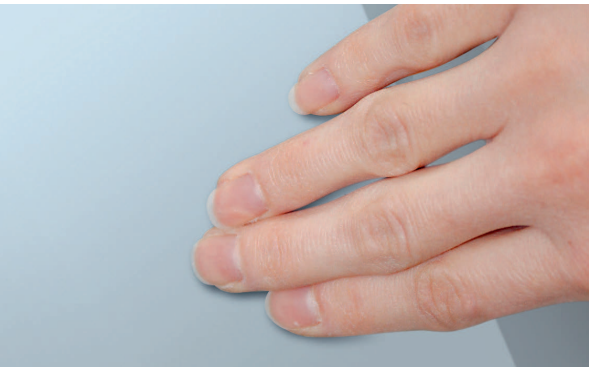
Backplane with plug connector as per
IEC 61076-4-101

Typical application: CPCI systems

The IEC 60297-3-104 standard describes the dimensions of the backplanes for the most common height variations (refer to table).

Height units	3 U	6 U	9 U
H6 ± 0.2	122.50	255.85	389.20
H8 ± 0.15	128.55	261.90	395.25

IP protection levels – chassis protection classes (IP code)



1st IP number

2nd IP number

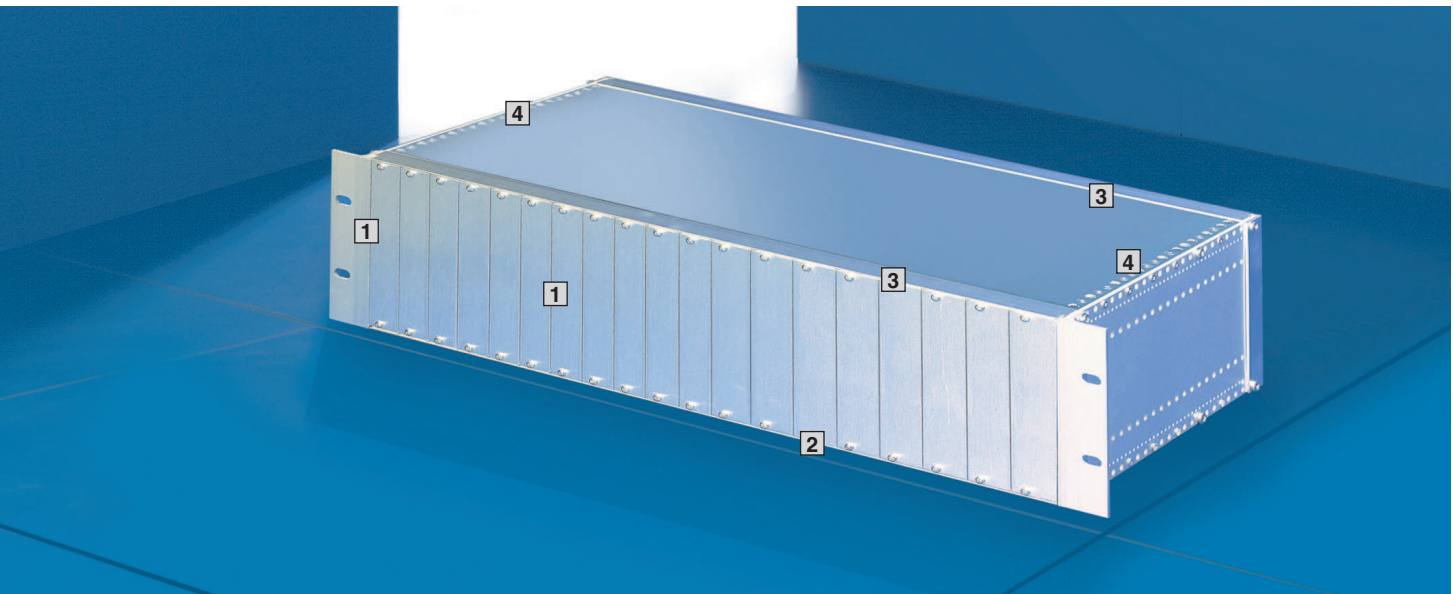
	Protection against solid objects
0	No protection
1	Protected against solid objects over 50 mm in diameter
2	Protected against solid objects over 12.5 mm in diameter
3	Protected against solid objects over 2.5 mm in diameter
4	Protected against solid objects over 1.0 mm in diameter
5	Protected against dust (limited ingress, no harmful deposit)
6	Totally protected against dust

	Protection against contact
0	No protection
1	Protected against contact with back of hand
2	Protected against contact with fingers
3	Protected against tools
4	Protected against wires
5	Complete protection against contact
6	Complete protection against contact

	Protection against liquid
0	No protection
1	Protected against vertically falling drops of water, e.g. condensation
2	Protected against direct sprays of water up to 15 degrees from vertical
3	Protected against sprays up to 60 degrees from vertical
4	Protected against water sprayed from all directions
5	Protected against low-pressure jets of water from all directions
6	Protected against strong jets of water
7	Protected against the effects of short-term immersion
8	Protected against long periods of immersion

TECHNOLOGY EXPERTISE PROTECTION REQUIREMENTS

Electromagnetic compatibility (EMC)



- 1** EMC gaskets, vertical
- 2** EMC gaskets, horizontal
- 3** EMC gaskets for cover plates
- 4** Mounting blocks

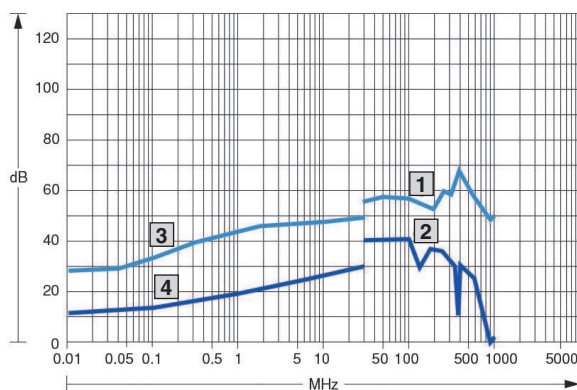
EMC (electromagnetic compatibility) refers to the ability of an electrical device to function satisfactorily in its electromagnetic environment without influencing this environment more than is admissible. These requirements were taken into account when developing the HEITEC subracks.

They are made entirely from metal and coated with a conductive surface finish. Stainless steel EMC gaskets ensure a conductive connection between the separate parts.

Testing of measurements of the shielding effectiveness of empty chassis is based on DIN EN 61587-3 or military standards, e.g. MIL STD 285 (US) or VG 95373 Part 15 (GER).

International EMC standards are published mainly by IEC (International Electrotechnical Commission) and CISPR (International Special Committee on Radio Interference).

Key series of EMC standards with global importance: IEC 61000



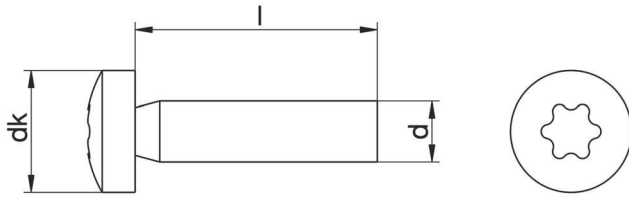
- MHz = frequency
- dB = HF attenuation
- 1** E-Field = electric field (V/m)
EMC chassis
- 2** E-Field standard chassis
- 3** H-Field = magnetic field (A/m)
EMC chassis
- 4** H-Field standard chassis

The above diagram shows the extent to which EMC shielding influences the attenuation of the electromagnetic field. The attenuation of a standard chassis with no suitable EMC components is thus much lower than that of a HeiPac Vario EMC subrack.

Of particular interest is the shielding factor provided by the attenuation.

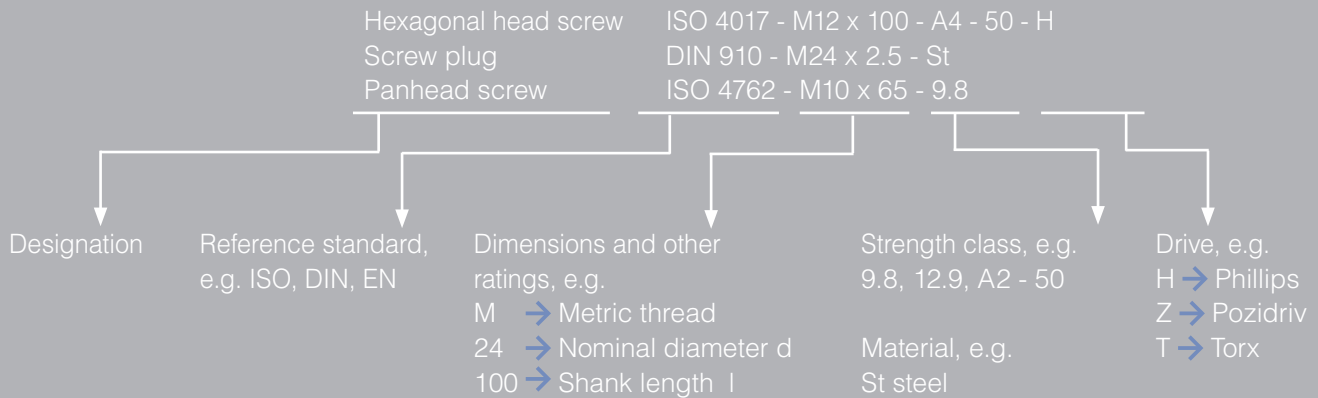
HF attenuation (dB)	Shielding (%)
6	50
20	90
40	99
60	99.9

Screws

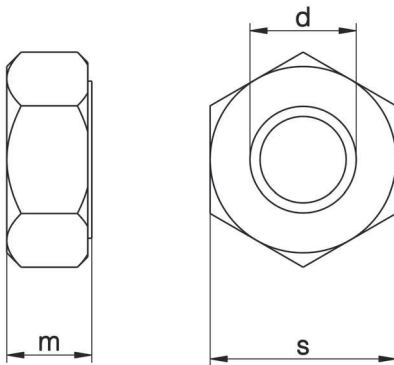


Screws are used to achieve a tight connection between two or more components. They form part of a screw gear consisting of two standardised, paired components. Friction on the wedge-shaped thread under load prevents the screws from coming loose.

Examples



Nuts



Nuts are the counterpart to the screws. They have a standardised inside thread that matches the thread of the screw. The prismatic outside contour is shaped to accommodate a wrench, which is used to tighten the nut. In terms of dimensions, the height of a nut is approximately half the width across the flats.

Examples

