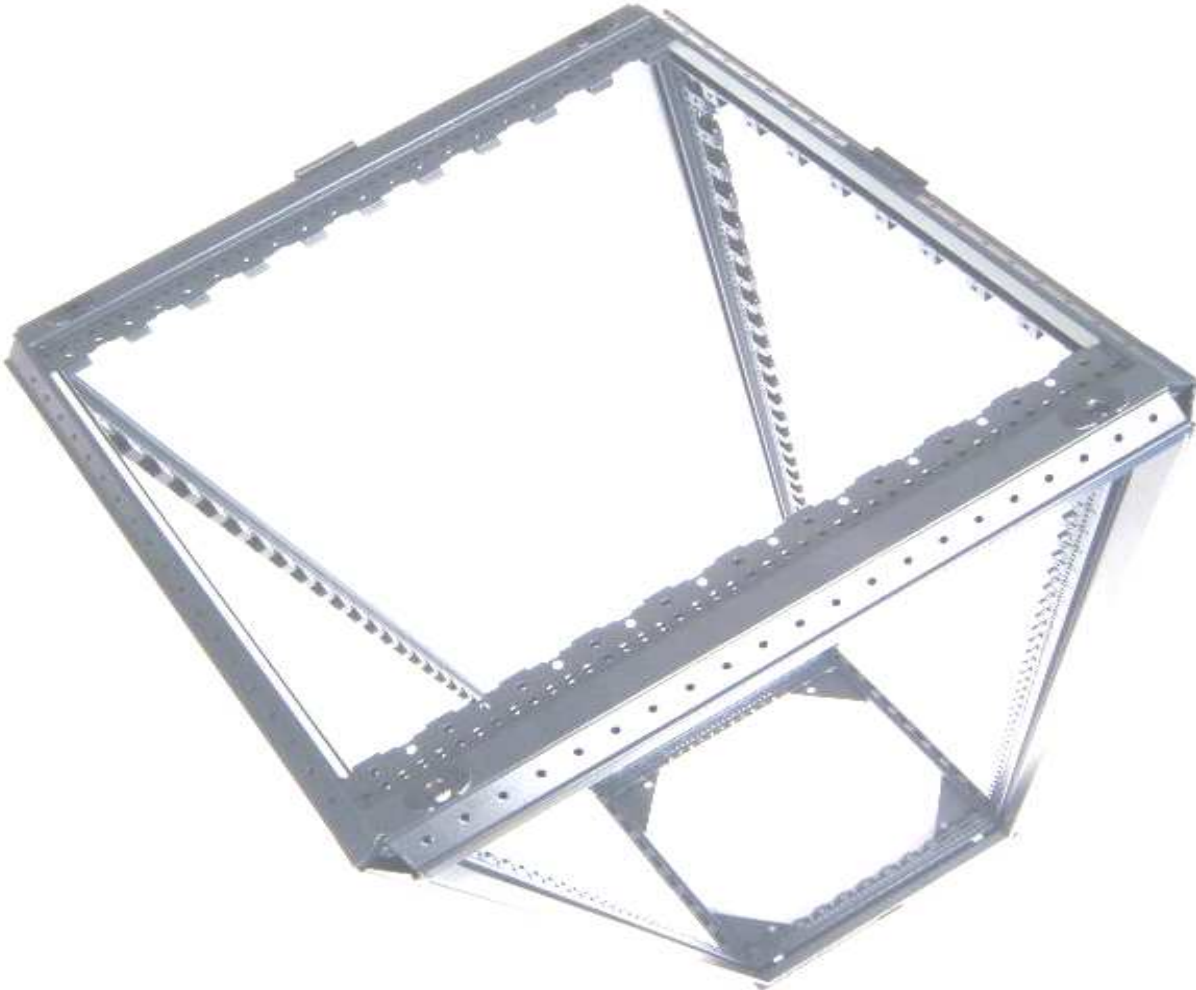


**THE UNIVERSAL CABINET CONCEPT
FOR THE WORLD OF ELECTRONICS**



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1. INTRODUCTION

With a universal cabinet concept one can understand the modular compatibility and cabinet accessories for rack mounting according to international standards (IEC). In contrast to simple construction for constrained standards, a global concept must offer a selection for users with specific configurations from of the modular assembly system. These characteristics significantly influence the logistics, like the timely implementation of projects.

The latest development of electronics in conjunction with stronger regulations regarding universal compatibility, places higher demands on the materials, the efficiency of the electronic and mechanical protection functions, and the thermal management, like the mechanical robustness regarding shock, vibration, and seismic applications.

1.1 Cabinet Dimensions:

- What components should be integrated into the cabinet?
- 19" or metric?
- Is room for cabling needed?

1.2 Static and Dynamic Capability:

- How much of a load can the cabinet hold while stationary?
- Can the cabinet be moved or pushed after the integration?
- Is there a different dynamic capability during the transportation of the cabinet to its installation location?
- Is the cabinet shock and vibration influence set out? For example...
 - in the vicinity of a rotating machine?
 - near a railway or street signal?
 - on a ship?

1.3 Electromagnetic Shielding:

- Is shielding of the equipment necessary?
- What are the critical interference frequencies?
- How high should the shielding be?

1.4 Seismic Tests:

- Is the installation location in a seismic zone?
- For which seismic zone should the cabinet be designed?
- What is the highest static load?

These specifications and essential test procedures will be described in the following pages to specify the development of a cabinet. The above specifications will be clarified in relation to electronic cabinet platform VARISTAR from Schroff.

2. DESIGN

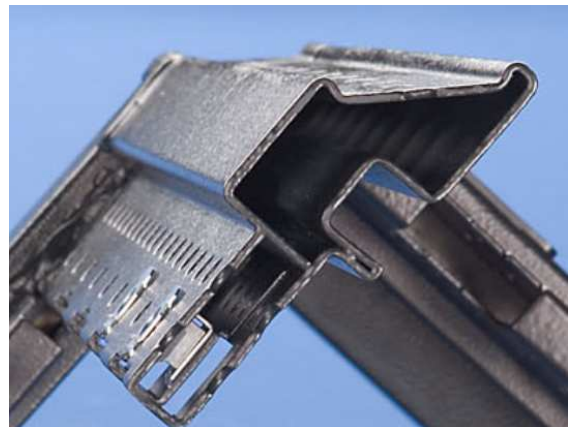
Meander Profile

Varistar is based on welded frame constructed from closed section rolled steel profiles.

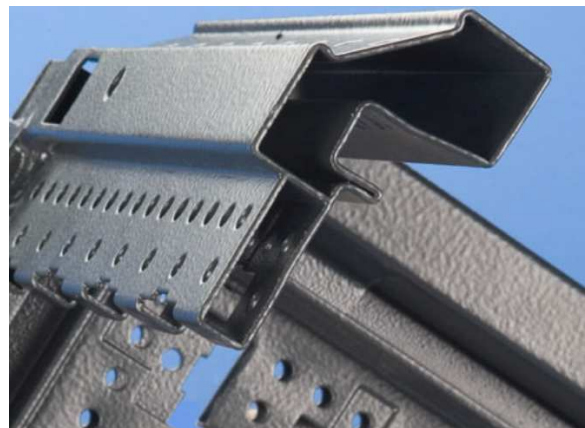


Two profiles with different sections are for two important requirements:

SLIM-LINE is the smaller profile and is used for frames that fall under the IEC 61587-1 with load to 400 kg. SLIM-LINE frames offer the maximum internal width so 19" components according to IEC 60297-3-100*, and „hard metric“ IEC 60917-2-2 and respectively ETS 3001 119-2/ 3 can be placed within the frame.



HEAVY-DUTY is the larger profile and can withstand heavier loads. The higher stiffness follows the definition in IEC 61587-1 with load to 800 kg. With the same outer measurements as the SLIM-LINE, the inner width is smaller and therefore intended for the use of 19" components according to IEC 60297-3-100* only.



* IEC 60297-3-100 the projected replacement for IEC 60297-1 and IEC 60297-2.

3. DIMENSIONAL STANDARDS

Three defined dimensions for the cabinet:

- IEC 60297-3-100** (19 inch Standard)
- IEC 60917-2-2** (25mm metric Standard)
- ETS 300 119-2/3** (European Telecommunication Standard)

With the same outer measurements the HEAVY-DUTY and SLIM-LINE cabinets are differentiated by their internal clearance widths and by their accessories.

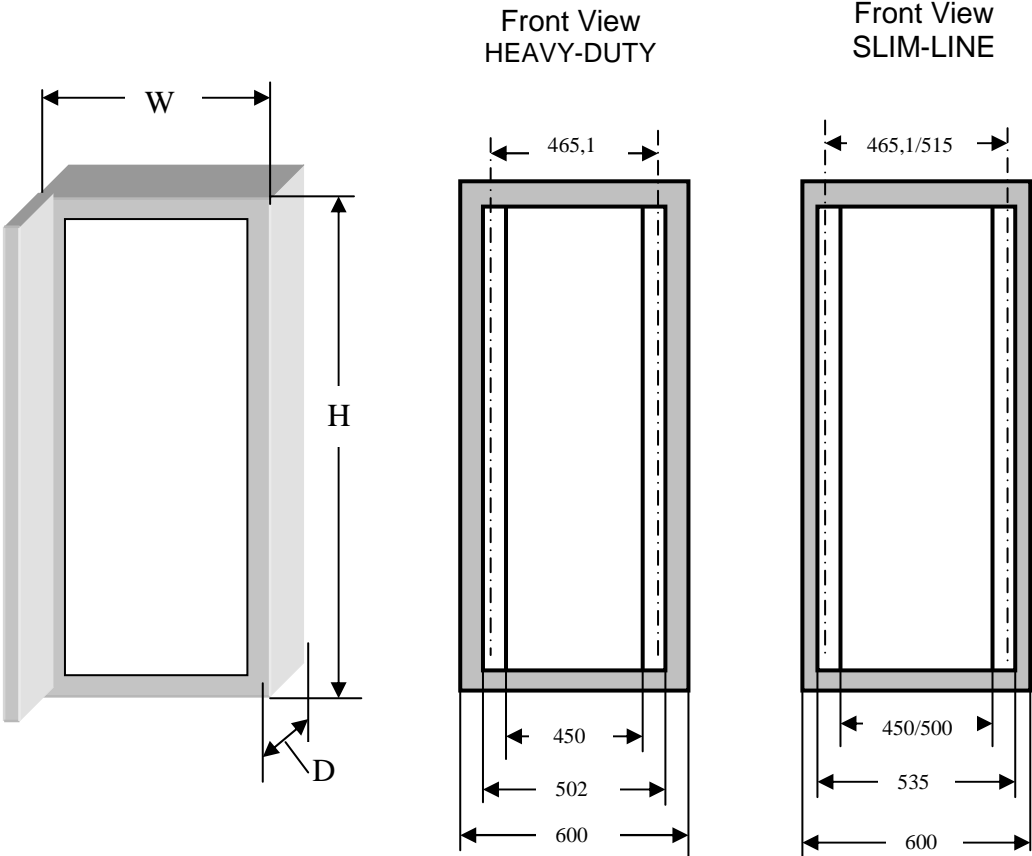


Figure 1:
Assembly dimensions for HEAVY-DUTY and SLIM-LINE

Front view dimensions are defined.

(Missing dimensions are detailed in the above quoted standards)

4. CLIMATIC, MECHANICAL TESTS AND SAFETY ASPECTS ACCORDING TO IEC 61587-1, THERMAL MANAGEMENT

4.1 Climate, Industry Atmosphere

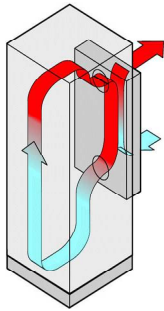

The goal of the climatic tests is for safeguarding the reliable serviceability of the cabinets in their operating environment.

The construction elements of VARISTAR follow the classification requirements C 3 and A 3 according to IEC 61587-1:

- C 3: Temperature range -40°C to +85°C
- A 3: Heavy concentration of harmful substances 25 cm³/m³ SO₂, 15 cm³/m³ H₂S, 5% NaCl

4.2 Thermal Management

The most frequent reason for operating failures in electronic devices built into cabinets is thermal overload. In project design components must be near an open area, and cabling is respected by the dimension of convenient cooling measures. Inner temperatures and outer temperature required for the planning of open rooms with adequate cooling throughout regardless of the important parameters such as power dissipation. If the open room is too small then the attainment of required air volumes with high air speeds is necessary to cool, which could create objectionably high noises. For this it is advisable to operate according to IEC 62454. After this it is possible to choose the most practical system for the allowed inner temperatures of the devices.

| Description | Passive Cooling, Thermal Radiation | Passive Cooling Free Convection | Active Cooling with Air | Active Cooling with Air | Active Cooling with Aid | Active Cooling with Aid | Active Cooling with Water (closed system) |
|----------------------------|------------------------------------|---|---|-------------------------|---|-----------------------------|---|
| Cooling Concept | | | | |  | |  |
| Product | Closed Cabinet | - Perforated Doors - Air slots - Raised Top Cover | - 19" blower units - top cover with fans | Filter Fan | Air/Air Heat Exchanger | Climate Device | Air/Water Heat Exchanger (Varistar LHX 20) |
| Protection type | ≥ IP 20 | ≥ IP 20 | ≥ IP 20 | ≤ IP 54 | ≥ IP 54 | ≥ IP 54 | ≥ IP 54 |
| Noise Level | 0 | 0 | 34...67dB(A) | 39...71dB(A) | 55...75dB(A) | 60...81dB(A) | 50...60dB(A) |
| Environmental Conditions | $T_i > T_A$ | $T_i > T_A$ | $T_i > T_A$ | $T_i > T_A$ | $T_i > T_u$ | $T_i \leq 35^\circ\text{C}$ | $T_i \geq 20^\circ\text{C}$ |
| Location | Office or Industry | Office or Industry | Office or Industry | Industry | Industry | Industry | Office or Industry |
| approx. Cooling Capacity # | < 500 W | 500 W ... 1000 W | < 2000 W | < 1500 W | < 2000 W | ≤3000 W | ≤ 20000 W |

T_i = Cabinet Temperature
 T_A = Ambient Temperature

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