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We connect and protect

Basics of Modular Enclosures

The Fundamentals

A modular enclosure is comprised of separate, standardized parts that can be combined and interchanged to create different enclosure configurations tailored to a specific application or customer.

Equipment Protection

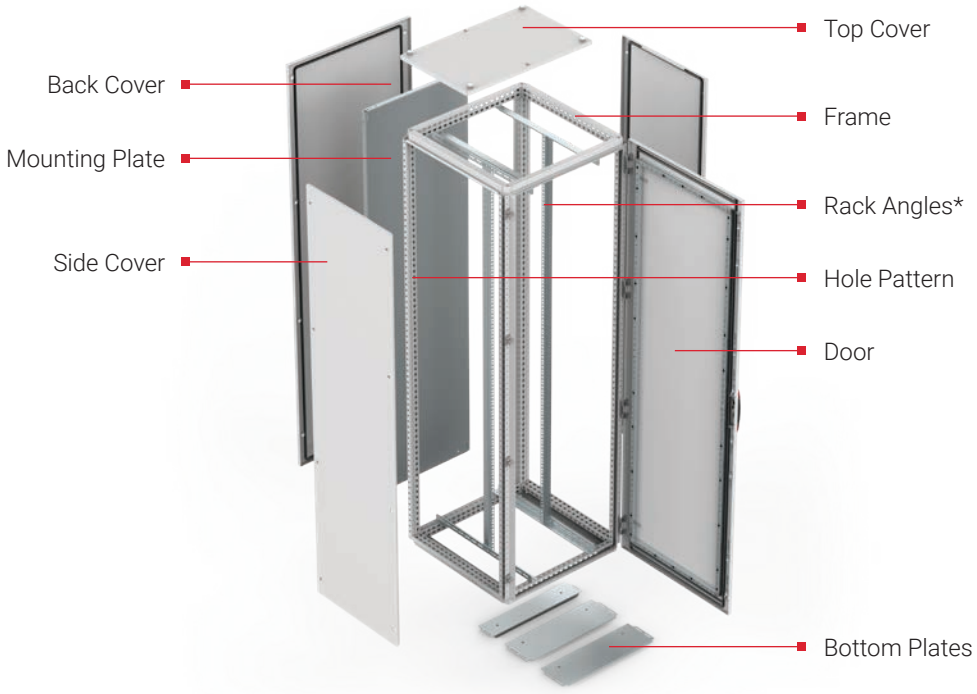
The primary function of a modular enclosure is the same as any electrical enclosure:

1. To protect electrical equipment inside the enclosure from the operating environment.
2. Protect users of the electrical equipment from electrical and/or mechanical hazards of the equipment.
3. Potentially act as an interface between required human interaction with the electrical equipment.

Modularity

Modular design is routinely used in many different technologies, some of which are data solutions, automotive and industrial power distribution. A modular design creates flexibility and allows for custom solutions while maintaining standardization. The smaller parts are familiar and static, while the combination of them creates unique, dynamic solutions.

Nuts and Bolts of Modular Enclosures



The Frame

The core of a modular enclosure is the frame because it is what bears the load of the electrical equipment mounted inside. Regardless of how the enclosure is populated, the vast majority of the weight of the equipment is supported by the frame. From the frame, one or more sub panels can be mounted. Rack equipment is mounted on rack angles which mount to the frame with brackets designed to transfer the load to the frame. Profiles (also known as grid straps) are used to create a custom mounting system inside the enclosure to mount any type of equipment. They are also designed to transfer the load back to the frame. The frame of the modular enclosure is as important to the enclosure integrity as the foundation and the weight bearing walls are to a building's stability.

Mounting Plate

In standard electrical enclosures most of the electrical equipment is fixed to a full mounting plate (also known as subpanel) within the enclosure. In a modular enclosure, the mounting plate can be in almost any location–front, middle, back–and multiple plates can easily be used. Full mounting plates are still frequently used in the back of modular enclosures, however the enclosure could also utilize additional full, partial or hinged mounting plates.

Hole Pattern

A hole pattern (also known as a grid system) in a modular enclosure extends the internal framework so that essentially anything can be mounted securely inside the enclosure. Electrical equipment, shelves, keyboard compartments and cable management accessories all can be mounted easily onto the pattern, which is created by combining vertical and horizontal profiles.

Tops/Bases/Covers/Doors

Electrical equipment is typically mounted inside a modular enclosure supported by the frame, but in order to protect the equipment—to make an enclosure—the frame needs to be covered. Tops, bases, covers and doors must form a "skin" around the frame and be attached in a way that maintains an environmental rating necessary for the surroundings. In this area, the modular nature of the system offers great variety. Users can choose from a diverse array of standard tops, bases, covers and doors which can be used on the front, rear, side, top and bottom—essentially covering the six planes of the cube created by the frame.

Sometimes components are mounted on the 'skins' of the modular enclosure. Common applications for this would be an HMI or other human interface devices like a console or keyboard; cooling equipment; or even components that generate too much heat to house inside the enclosure like large drives or motors.

Rack Angles*

Supplied as an accessory.

Rack angles are vertical "scaffolding" that have the spacing and compatible holes to easily mount standard rack mount equipment. A wide variety of industrial controls, measurement instrumentation and other technical equipment are designed with a standard housing size and mounting brackets to be compatible with standard rack mount sizes. 19 inch wide is the most common width, however 23 inch, 24 inch and some metric widths are also used. The height of a rack mount unit is measured in 'rack units'. One "rack unit" is 1.752 inches (44.5 mm). Rack mount equipment can easily be mounted in a modular enclosure.

Why Do People Use Modular Enclosures?

People use modular enclosures because the modularity creates solution flexibility, and the removable nature of the components makes loading, modifying or baying/joining the enclosure easier and faster. Faster population translates into cost savings. Modular enclosures fit very well in 'Lean' manufacturing environments. The process time savings of faster population eliminates waste and the modularity of the system lends itself to faster, easier changes as work flows change.

Better interior access

Covers, doors, bottom plates and tops can easily be removed. This makes it easier to wire equipment, route cabling, access instruments, load panels, troubleshoot problems, make field modifications and more.

More efficient space utilization

In standard enclosures, a full mounting plate is the primary method of populating the enclosure. In a modular enclosure, a variety of different mounting methods can easily be used. Full mounting plates can be mounted back-to-back in the center of the enclosure and a door can be used on the front and the rear to ensure adequate user access. A mounting plate could be used in the back of the enclosure, and a hinged mounting plate could be used in front of it. Partial mounting plates could be used in several different areas of the cabinet, and the remaining space could be used for rack mount equipment or a hole pattern for other options. For OEM customers, extra space could be reserved for other models that may require more electronics—enabling OEM customers to standardize on one or two sizes of enclosure to streamline manufacturing processes.

Easy expansion

A modular enclosure solution allows you to easily bay or join cabinets without the need for drilling or cutting. This process not only saves time and prevents a messy cleanup, but it also ensures the environmental rating of the enclosure remains uncompromised. The ability to expand easily in the future means the enclosure can be designed for the current needs—with assurance that in the future you can expand as needed without hassle or extra costs.

Flexibility

With a modular enclosure, you can mount equipment any way you want it. You can have any top, side or door you desire, just remove the component that is no longer wanted, and add the one you need. You can also make modifications to a component more easily by removing it and bringing just that part to add the holes and cutouts to.

Safety options and other useful accessories

Barrier panels make it easy to separate lower voltage DC electronics from higher voltage AC or DC power. The separation can not only potentially protect the electrical equipment but most importantly, the people who may need to access the low voltage area of the enclosure. Disconnect enclosures are as simple to configure as standard enclosures. A variety of "preferred" disconnect door cut-outs are available, designed for use with many commercially available disconnect handles and circuit breakers. Some of the manufacturers include Rockwell Allen-Bradley, ABB Controls, Eaton Cutler-Hammer, General Electric, Siemens and Schneider.

A variety of other accessories are available to add value to OEM solutions and speed up enclosure population through enhanced ease of use. LED light kits, window kits, keyboard trays, and cable management solutions are just a few of the standard accessories available.

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