

## The advantages of a well-made electrical enclosure

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*Figure 1: The GEOS line of harsh environment outdoor industrial enclosures. Source: Altech*

At first thought, it might not seem as if enclosures would be an important element in electrical system design. But upon closer inspection, and especially when you consider that they can contain electrical wiring, fiber optic devices, microcontrollers, routers, switches, power supplies and other components, it becomes clear that when properly designed these boxes play a vital role in protecting against high temperatures, moisture and humidity.

Overheating and moisture can shorten the life expectancy of the equipment in need of protection, resulting in major system failures and the possibility of electrical shock to users. An enclosure such as the new Altech GEOS line employs materials to ensure proper functioning and long-term reliability of all protected components.

GEOS enclosures are manufactured from lightweight polycarbonate, which delivers impact resistance, scratch resistance and shatterproof safety. The material also provides temperature, corrosion, UV and weather resistance in a wide variety of environments. Although this rugged enclosure was manufactured with outdoor applications in mind it can also be used for indoor applications.

Five basic housing sizes are available ranging up to 15.75 in x 19.69 in x 8.9 in, allowing for different internal heights. Accessories enable customization for any application.

### Ratings and standards

Rated IP67, GEOS enclosures are in full compliance with IEC 62208 and IEC 61439 requirements and other relevant international standards. IP ratings are comprised of two numbers. The first ranges from 0 to 6 and is used to measure the degree of protection of the device against solid objects such as debris, sand, dirt and dust. A “0” rating indicates that the device is not protected from solid items while a “6” rating states that the device is highly secured from solid objects as small as dust.

The second rating ranges from 0 to 9, whereby a “0” rating means that the device is not protected from liquids, while a “9” rating indicates that it can withstand high pressure jets at high temperature. The IP67 rating of the GEOS series means it is dust tight and short term immersible in water.

The UV and weather resistance of the GEOS polycarbonate enclosure, combined with a new “drain protect” sealing system, is engineered to prevent the ingress of harmful contaminants (moisture, dust, dirt, rain, snow, cold and heat), resist corrosion as well as oil or greases, and withstand strong shocks. Drain protect helps to keep the housing tight and dry in accordance with UL Type 4X and 12K standards by discharging water from condensates or wash downs before moisture can reach the enclosure’s elastomer seal. This seal provides additional protection against water, dust and dirt.

By way of review, UL has developed testing standards for electrical enclosures to ensure safety, compatibility and proper function of electrical products. These ratings provide the standards that help define the types of environments in which various electrical enclosures can be used. UL Type ratings indicate an enclosure has been tested for its ability to withstand certain environmental conditions. GEOS enclosures have been UL approved for use in US, Canada and Europe and carry UL Type 4X and 12K ratings.

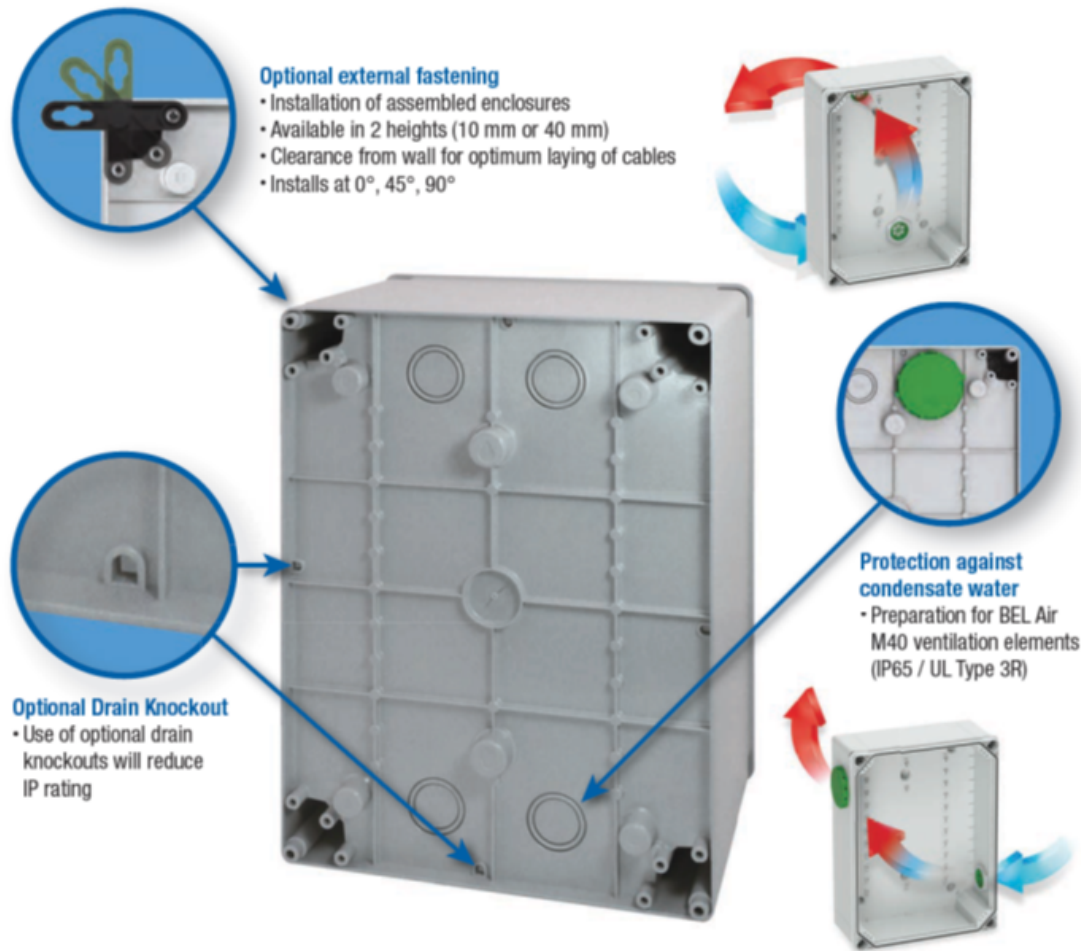


Figure 2: These boxes have a variety of advantages. Source: Altech

## Benefits

GEOS enclosures integrate reinforced double insulation, ensuring IEC Class 2 electrical protection. GEOS enclosures may be operated in electrical networks with a rated voltage of up to 1,000 V AC/1,500 V DC, where the prospective short circuit current ( $I_{cp}$ ) does not exceed 10 kA. If a higher  $I_{cp}$  is expected at the input, then a current-limiting protection device with a maximum cut-off current of 17 kA should be provided.

The Altech GEOS enclosure uses a unique design that diverts moisture to the back side of the enclosure by using an overlapping cover with a built-in drainage channel along the top edge of the enclosure. The GEOS enclosures can also have drainage holes on all the sides of the box base; the drainage holes can be opened if necessary before or after installation.

There may be condensation problems when using sealed enclosures in environments with varying temperature and humidity. The explanation for this is that air can hold only a certain amount of water vapor at a certain temperature and a certain pressure. The higher the temperature and the higher the air pressure, the greater the maximum possible water content. Compared to a temperature of 55° C, the air can hold only 20% of the water at a temperature of 20° C. Due to the power dissipated by the built-in devices, the air inside the enclosure can heat up to 55° C.

When appropriate devices and wiring are installed, this temperature can be even higher. The warm air in the enclosure gradually absorbs the water vapor contained in the ambient air. If the outside temperature falls, then the outer walls of the enclosure cool down. When the dew point temperature is reached, the water vapor contained in the air condenses on the inside of the enclosure as condensate. This water collects in the box and may cause damage.



*Figure 3: An optional patented ventilation element provides continuous air exchange to prevent condensation. Source: Altech*

An optional, patented air ventilation element can be used with the GEOS enclosures to prevent condensate water while maintaining the high IP level of protection. The continuous exchange of air allows the inside air to mix constantly with the surrounding air and transports the moisture to the outside. Air exchange also takes place in environments with almost constant air humidity and temperature, as the inside temperature increases due to the installed components. The ventilation element is designed to be maintenance-free. It is provided with a replaceable filter element that traps particles larger than 10 microns.

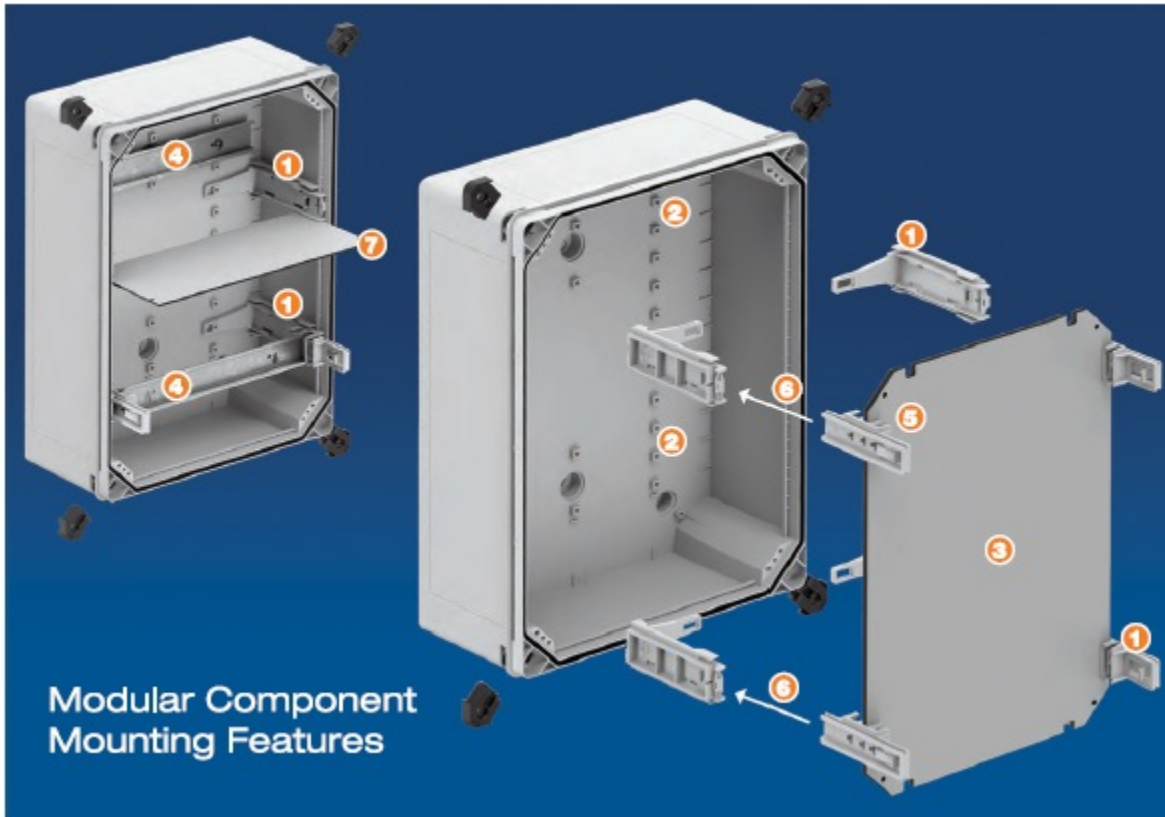


Figure 4: Modular component system affords ease and convenience for preassembled subassemblies. Source: Altech

## Mounting

GEOS enclosures can be wall mounted or pole mounted. Wall mounting is achieved by internal corner hole mounts outside the lid seal area, three point mounting through the base of the enclosure or using optional external mounting fasteners. Pole mounting kits are available as an accessory for mounting to poles of 2.4" to 8.3" diameters.

Accessories include standard DIN rails, mounting plates, front panels and dividers that can be installed using a unique tool-less mounting system. The accessories can be attached to mounting brackets at varying heights and simply slid into the enclosure allowing for convenient preassembly outside of the enclosure. No tools are required for insertion or subsequent removal of the assembled modules.

Typical applications for GEOS enclosures include any type of electrical installation, such as those found in the solar and wind power industry; in large plants or building HVAC controls; and in industrial applications such as in the food and beverage industry, where wash-down might be expected.

In all of these applications, selecting the right enclosure is essential. For example, if the cables and electronics are located outside, you'll want to be sure that the enclosure is rainproof and dustproof and has a high protection rating.

### Summary

In summary, while an enclosure may be one of the simplest of electrical components to specify, it is extremely important that it's designed properly. Although engineers can find extensive choices available in the market, the challenge is in knowing which electrical enclosure is right for a given application.

For more information on GEOS enclosures, visit [www.altechcorp.com/enclosures/GEOS.html](http://www.altechcorp.com/enclosures/GEOS.html).