

# How to Select an Electrical Enclosure

Enclosures house and protect electronic and electrical components from the environment or from accidental contact. With an almost limitless variety of enclosures to choose from, this article will help guide you in the selection process to find the right enclosure for your application. Here are a few things you will need to consider.



## What kind of environment does your enclosure need to withstand?

This is the most important question and will determine the longevity of your enclosure. Is there rain, salt water, dust or wind storms: all of them lead to a NEMA (National Electrical Manufacturers Association) or IEC (International Electrotechnical Commission) rating. For example, NEMA 4X (IP66) protects against rain, dust, salt spray, and offers corrosion resistant properties. However, if your application is less harsh, NEMA 1 enclosures are general purpose, economical, and ideal for indoor applications. NEMA 4 or 12 enclosures would suit most applications in between. NEMA 12 provides protection from dust and dripping water while NEMA 4 can guard against hose directed water. Each NEMA or IP rating outlines the protection levels, that the rating provides to guard and protect the devices installed in the enclosure.

The environment will also determine what material the enclosure needs to be. 304 and 316 Stainless Steel enclosures are ideal for harsh applications due to their corrosion resistance. 316 stainless steel will be more resistant to chlorine and salts so it is the best suited for marine applications. More cost effective solutions are Fiberglass and Polycarbonate enclosures. They have a high strength to weight ratio and are much easier to modify in the field than their steel counterparts.

## Figure out the size of the enclosure that fits your application.

First you need to find out the length, width, and height of your project with all the components when mounted on a back panel. With that, you now have your minimum internal dimensions of the enclosure. You can size up accordingly if heat dissipation is a factor or if there will be controls mounted onto the cover of the enclosure. Lastly, if the enclosure is fitting into an existing footprint make sure to double check external dimensions.

## Does it need Thermal Management?

Heat naturally dissipates from enclosures but in many cases natural cooling or heating is not enough for an application. Steel enclosures conduct heat to bring the internal temperature closer to the ambient outside temperature while polycarbonate/fiberglass enclosures insulate the internal temperature. This may not always suit your components' temperature requirements. Thus, thermal management must be considered since overheating/freezing will damage or shorten the life of your devices. Vent kits, exhaust fans, and air conditioners can be used in conjunction with thermostats to regulate heat. Heaters and hygostats can also be used to control condensation in damp environments.

## Other considerations

Armed with all the basic requirements for your enclosure, there are a few final bases to cover and you should be confident you are choosing the right one. Will your mounting surface be able to hold the weight of the enclosure? Do you plan on doing any modifications to the enclosure? Will you need an inner-panel (some enclosures require the panels to be purchased separately)? Also, there are a variety of optional accessories to choose from including door locking hardware, hinged front panels, pole mount kits, hole plugs, and even lighting. The more parts you can source from the same manufacturer the better since it will yield the highest compatibility.

Click here to [Shop Now](#) or if you have any questions and need assistance choosing an enclosure for your application please contact us at (888) 886-8185.



## Metal Enclosures



**Sizes:** 1.98" x 1.77" x 1.00" to 86" x 187" x 14"

### **Advantages & Applications:**

**Aluminum:** For general indoor and outdoor use, lightweight, corrosion-resistant to hydrogen sulfide, and is perfect for waste water treatment applications.

**Carbon Steel:** Cost effective solution for general indoor and outdoor use where corrosion is not an issue.

**Stainless Steel (304 & 316):** Known for tough, corrosion-resistant construction. Ideally suited for food processing areas, dairies, breweries or any wet areas (marine environments). Also works well where caustic elements or alkalis are present.

## Polycarbonate Enclosures



**Sizes:** 3.9" x 3.9" x 1.4" to 29.9" x 22" x 9.8"

**Advantages:** Exhibits four times the impact resistance than fiberglass enclosures, easy to modify, light weight, and high gloss finish.

**Applications:** Due to its advantages, it can be used in many automotive, aircraft, industrial, and electrical applications. Also recommended for wireless applications (Does not block radio waves).

## Fiberglass Enclosures



**Sizes:** 6" x 6" x 4" to 72" x 49" x 25"

**Advantages:** Good rigidity, chemical resistance, wide temperature range, and electrical properties.

**Applications:** Indoor or outdoor use where environments of extreme temperature, high salt concentration, strong alkalis, acids or organic solvents are present. Also, recommended for continuously wet environments and wireless applications (Does not block radio waves).

## Thermal Management



- Side or top mounting air conditioners (1200 - 24000 BTU/H)
- Compact enclosure heaters
- Hygrostats, Hygrotherms, Thermostats, & Relays
- Filter fans & fan trays (14 - 1017 cfm)
- Energy saving enclosure lights

## NEMA Ratings

|                |  |
|----------------|--|
| <b>NEMA 1</b>  | General purpose electrical enclosure for indoor use to protect against falling dirt but are not dust tight (Can be used as a junction, pull, or switch box)  |
| <b>NEMA 3R</b> | Designed for indoor and outdoor use to protect against rain, sleet, snow, and dripping water   |
| <b>NEMA 4</b>  | Provides protection where equipment maybe hosed down or very wet (For use in dairies and breweries)  |
| <b>NEMA 4X</b> | Same protection as NEMA 4 enclosures, but provides an additional level of protection against corrosion (Suitable for food processing plants, dairies, and refineries)  |
| <b>NEMA 6P</b> | Same level of protection as NEMA 4, but provides an additional level of protection against prolonged submersion in water at a limited depth (Suitable for ship decks, water treatment plants, storm drains)                                  |
| <b>NEMA 12</b> | Protection against dripping and light splashes of liquid   |
| <b>NEMA 13</b> | Same protection as NEMA 12 but provides an additional protection against the spraying, splashing, and seepage of water, oil, and non-corrosive coolants (Suitable for application to machine tools and other industrial processing machines) |

## IP Ratings

| IP Rating (First Number) | Degree of Protection Against Solids  | IP Rating (Second Number) | Degree of Protection Against Water   |
|--------------------------|--|---------------------------|--|
| 0                        | No special protection  | 0                         | No protection  |
| 1                        | Protected against solid objects over 50 mm, e.g. accidental touch by person's hands. | 1                         | Protection against vertically falling drops of water e.g. condensation.                                |
| 2                        | Protected against solid objects over 12 mm, e.g. persons fingers.                    | 2                         | Protection against direct sprays of water up to 15o from the vertical.                                 |
| 3                        | Protected against solid objects over 2.5 mm (tools and wires).                       | 3                         | Protected against direct sprays of water up to 60o from the vertical.                                  |
| 4                        | Protected against solid objects over 1 mm (tools, wires, and small wires).           | 4                         | Protection against water sprayed from all directions - limited ingress permitted.                      |
| 5                        | Protected against dust limited ingress (no harmful deposit).                         | 5                         | Protected against low pressure jets of water from all directions - limited ingress.                    |
| 6                        | Totally protected against dust.  | 6                         | Protected against temporary flooding of water, e.g. for use on ship decks - limited ingress permitted. |
|                          |  | 7                         | Protected against the effect of immersion between 15 cm and 1 m.                                       |
|                          |  | 8                         | Protects against long periods of immersion under pressure.   |