

NEMA Enclosures For Every Application

You've invested time, talent, and money in your control system. Protect it with a quality enclosure.

A quality enclosure in an industrial environment not only maintains a better appearance over time, it also does a better job protecting the components in it.

What is a NEMA enclosure?

NEMA enclosures meet the National Electrical Manufacturers Association standards for performance and protection of the electrical equipment installed within them. NEMA enclosures range in size from small pushbutton boxes to room-size panels. Enclosures are given a NEMA rating according to the types of applications the enclosure serves.

What are NEMA enclosures used for?

NEMA enclosures house all kinds of electrical components from simple terminal blocks, to industrial automation systems, to high voltage switchgear. In industrial automation systems, NEMA enclosures often house motor controls, drives, PLC/PC control systems, pushbuttons, and termination systems. Some enclosures are configured to be operator consoles, while others are designed with flanges for mounting disconnects.

Do we have the enclosure you need?

AUTOMATIONDIRECT offers over 4,300 enclosure part numbers across NEMA 1, 3, 3R, 3S, 4, 4X, 5, 6, 6P, 12, and 13 standards.

AUTOMATIONDIRECT has teamed up with three enclosure manufacturers to offer you quality NEMA enclosures at great Prices.

Our wide selection of quality Wiegmann, AttaBox, Hammond or Integra enclosures should allow you to find the perfect one for your industrial automation application. All four brands offer a full line of subpanels and accessories to allow you to tailor your enclosure to your application.

30-day money-back guarantee

Order with the assurance of our unconditional 30-day money-back guarantee on enclosures. See terms and conditions for details.



Hammond Manufacturing Company, Limited, manufactures a broad range of carbon steel, galvanized steel, stainless steel, and aluminum enclosure products for electrical and electronic applications at their facilities in Guelph, Ontario, Canada.

We offer same-day shipping on most enclosures and accessories direct from Hammond's US headquarters in Cheektowaga, New York. Non-stock models can be shipped within 15 business days.



WIEGMANN

Hubbell-Wiegmann is one of the largest enclosure manufacturers in North America. Their enclosure line includes a wide variety of carbon steel, galvanized steel, stainless steel, and aluminum enclosures, including enclosures for disconnects, pushbuttons, and operator consoles.

We offer same-day shipping on select enclosure models and accessories direct from the Hubbell-Wiegmann manufacturing facility in Freeburg, IL. Other sizes and products can be shipped within 20 business days.

We also offer customization of a limited number of Wiegmann enclosures. This service is available only through the AUTOMATIONDIRECT web store, and only to registered users.



AttaBox
A ROBROY ENCLOSURES™ BRAND

AttaBox is one of the brands of Robroy Enclosures, the original US manufacturer of non-metallic enclosures. The AttaBox line includes both fiberglass-reinforced polyester and polycarbonate enclosures.

We offer same-day shipping on most enclosures and accessories direct from the Robroy manufacturing facility in Belding, Michigan. Non-stock models can be shipped within 20 business days.



Integra is a manufacturer of top-quality polycarbonate enclosures that are well suited for a wide range of outdoor applications, such as remote monitoring, alternative energy, water treatment, and marine and marina.

All Integra enclosures are stocked at AUTOMATIONDIRECT for same-day shipping.

How to Select Your Enclosure

1. What kind of environment is your enclosure going to be in and what level of protection do you need?

Your enclosure's primary function is to protect the equipment inside it from the surrounding environment. Therefore, you need to understand the environment where the enclosure will be located and select the appropriate level of protection.

An enclosure's level of protection is defined by its NEMA rating. Refer to "What Do the NEMA Ratings Mean?" later in this section for more information.

Keep in mind that it is just as important not to over-specify the protection level of your enclosure as it is to under-specify, as increasing the protection level typically increases the cost of the enclosure.

2. Determine your security requirements.

Your enclosure may also need to protect its contents from unauthorized access to the components it houses.

AUTOMATIONDIRECT has options to meet a wide variety of security needs. For low-risk installations, a screw cover, lift-off cover, or Single Door with clamps may be sufficient. In higher risk installations, an enclosure with keylocking and/or padlocking capabilities may be needed.

If you cannot find a stock enclosure with the security features that you need, AUTOMATIONDIRECT offers replacement locks and latches that you can retrofit to your enclosure.

3. Determine the size enclosure you need.

Physical space for your components is not the only requirement. Considerations like heat dissipation and venting must be taken into account.

First, determine the height and width for your enclosure by laying out the footprint space needed for your control components on a standard subpanel size. Remember to consider the mounting holes for the subpanel when planning the required footprint space. The size of the enclosure will determine if you need a Single Door, two-door, or wall-mount. The height and width of your enclosure will determine whether it should be a wall-mount, floor-mount, or freestanding enclosure.

Next, you'll need to determine your panel depth. Remember that the subpanel mounting takes up a small portion of the depth. Also, any pushbuttons, operator interfaces, indicators, meters, etc., that you plan to mount on the enclosure door will occupy some enclosure depth.

Finally, you must allow for heat dissipation [see step 4]. If you have estimated component sizes or heat generation, it's always better to oversize the enclosure when you have the available space.

For assistance in finding the enclosure series that meets your needs, refer to the "Enclosure Attributes" chart later in this section.

4. Determine your thermal management needs.

Your enclosure must be able to dissipate the heat generated by the components inside of it either alone or by adding a cooling device. You might be able to side-step additional cooling by upsizing your enclosure to increase the surface area through which heat is transferred to the atmosphere.

If additional cooling is required, AUTOMATIONDIRECT has many devices to choose from. But always remember that the heat dissipation method you select must be compatible with the enclosure's NEMA rating.

For some applications, a simple louver plate will provide adequate heat dissipation. A fan kit and louver combination is your next most economical ventilation option. For small enclosures, a vortex cooler using compressed air is another option. A sealed enclosure may require a heat exchanger or an air conditioner controlling the internal temperature without introducing outside air and its contaminants.

If you need help with these calculations, go to http://support.automationdirect.com/notes/enclosure_environment.html.

An enclosure may also require heating where environmental conditions are conducive to condensation and/or ice formation inside the enclosure.

Unfortunately, we cannot make these determinations for you as all control applications are different. Conservative choices increase your margin of safety and allow for future changes.

5. Choose your accessories.

AUTOMATIONDIRECT offers a wide range of accessories for our enclosures.

- Subpanels - our enclosures do not come with subpanels unless specified in the product description.
- Mounting alternatives - floor stand kits, mounting feet, casters, and pole-mounting kits
- Drip shields for outdoor enclosures
- Window kits
- Folding shelves
- Hole seals and hole plugs
- Adapter plates for disconnects
- Grounding accessories
- Replacement locks and latches
- Electrical interlocks
- Print pockets
- Panel-mounting accessories - swing-out panel kits, adjustable depth-mounting kits, panel supports for heavily-loaded panels, and dead front kits
- Frames, channels and rails for rack-mounted equipment
- Terminal brackets and straps, mounting channels, grid straps, and DIN-rails
- Touch-up paint
- Replacement gaskets

What Do The NEMA Ratings Mean?

The National Electrical Manufacturers Association (NEMA) is a US Manufacturers Organization which actively promotes standardized product specifications for electrical apparatus. While NEMA does not actually test products, it establishes the performance criteria for enclosures intended for specific environments.

NEMA standards describe each type of enclosure in general and functional terms, and specifically omits reference to construction details. In other words, NEMA specifies what an enclosure must do, not how to manufacture it. This is also true about the EN 60.529/IEC 529.

NEMA performance criteria and test methods are used by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA) as guidelines for investigation and listing of electrical enclosures. The tested enclosures are then authorized to carry a label by UL or CSA to prove it has passed the required tests and meets the applicable UL and CSA standard.

NEMA Classifications

NEMA 1 enclosures are typically used for protecting controls and terminations from objects and personnel. This style of enclosure, while offering a latching door, does not have a gasketed sealing surface. NEMA 1 enclosures are used in applications where sealing out dust, oil, and water is not required.

NEMA 2 enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.

NEMA 3 enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet, and external ice formation.

NEMA 3R enclosures are typically used in outdoor applications for wiring and junction boxes. This style of enclosure provides protection against falling rain, sleet, snow, and external ice formation. Indoors they protect against dripping water. This style of enclosure does not have a gasketed sealing surface. Some models have hasps for padlocking.

NEMA 3RX enclosures are typically used in outdoor applications for wiring and junction boxes. This style of enclosure provides protection against falling rain, sleet, snow, and external ice formation and provides an additional level of protection against corrosion. Indoors they protect against dripping water. This style of enclosure does not have a gasketed sealing surface. Some models have hasps for padlocking.

NEMA 3S enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, sleet, and to provide for operation of external mechanisms when ice laden.

NEMA 4 enclosures are used in many applications where an occasional washdown occurs or where machine tool cutter coolant is used. They also serve in applications where a pressurized stream of water will be used. NEMA 4 enclosures are gasketed and the door is clamped for maximum sealing.

NEMA 4X enclosures are made of stainless steel, aluminum, fiberglass, or polycarbonate. NEMA 4X enclosures are used in harsh environments where corrosive materials and caustic cleaners are used. Applications include food, such as meat/poultry processing facilities, where total washdown with disinfectants occur repeatedly, and petro-chemical facilities, including offshore petroleum sites.

NEMA 5 enclosures are intended for indoor use primarily to provide a degree of protection against settling airborne dust, falling dirt, and dripping non-corrosive liquids.

NEMA 6 enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during occasional, temporary submersion at a limited depth.

NEMA 6P enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against the entry of water during prolonged submersion at a limited depth.

NEMA 11 enclosures are intended for indoor use primarily to provide, by oil submersion, a degree of protection to enclosed equipment against the corrosive effects of liquids and gases.

NEMA 12 enclosures are intended for indoor use to provide a degree of protection against drips, falling dirt, and dripping non-corrosive liquids. NEMA 12 enclosures are most commonly used for indoor applications of automation control and electronic drives systems, including packaging, material handling, non-corrosive process control, and manufacturing applications. Gasketed doors seal the enclosure's contents from airborne contaminants and non-pressurized water and oil.

NEMA 12K enclosures with knock-outs are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids other than at knock-outs.

NEMA 13 enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and non-corrosive coolant.

What Do The NEMA Ratings Mean?

Comparison of Non-Hazardous Applications for Indoor Locations

Provides a Degree of Protection Against the Following Environmental Conditions	Enclosure NEMA Type										
	1*	2*	4	4X	5	6	6P	11	12	12K	13
<i>Incidental contact with the enclosed equipment</i>	X	X	X	X	X	X	X	X	X	X	X
<i>Falling dirt</i>	X	X	X	X	X	X	X	X	X	X	X
<i>Falling liquids and light splashing</i>		X	X	X		X	X	X	X	X	X
<i>Dust, lint, fibers, and flyings</i>			X	X	X	X	X		X	X	X
<i>Hose down and splashing water</i>			X	X		X	X				
<i>Oil and coolant seepage</i>									X	X	X
<i>Oil or coolant spraying and splashing</i>											X
<i>Corrosive agents</i>				X			X	X			
<i>Occasional temporary submersion</i>						X	X				
<i>Occasional prolonged submersion</i>							X				

**These enclosures may be ventilated. However, Type 1 may not provide protection against small particles of falling dirt when ventilation is provided in the enclosure top.*

The European IP Code

European Union members use the EN60.529/IEC 529 standard to classify an enclosure’s protection against various hazards. This system has been adopted by many other countries outside of Europe. The ingress protection (IP) system uses a two-digit code to describe the enclosure’s protection capabilities. The first digit signifies the protection level against solid objects, including dust. The second digit represents the enclosure’s degree of protection against ingress of water. The two-digit code is preceded by the prefix “IP.”

The cross-referenced table on the next pages is an approximate comparison of NEMA and International Electrotechnical Commission (IEC) classifications. It is offered for reference only. Please consult the appropriate standards for a full description of the requirements for each classification.

NEMA to IEC - Enclosure Rating Cross Reference*

NEMA Type	IP23	IP30	IP32	IP55	IP64	IP65	IP66	IP67
1	X							
2		X						
3					X			
3R			X					
4							X	
4X							X	
6								X
12				X				
13						X		

*Note: This cross-reference table is an approximation of NEMA and IEC classifications for reference only. Please consult the appropriate agency’s requirements and test qualifications for complete information.