Preparing For An IoT World

A simple guide to protecting network equipment in the age of the Internet of Things.

FIGURE 1. Enclosures need to adapt to changing environmental conditions due to edge computing.

High throughput, low latency, network availability, reliability, and security have always been top priorities in data centers, but the recent wave of technological advances — autonomous cars, augmented reality, 5G, and all other connected objects of the Internet of Things (IoT) — are taking those priorities to a new level and bringing new challenges to IT systems administrators and data centers managers.

In order to successfully host and deliver services on a global scale, and to ensure real-time data to the enduser, data centers are having to spread their networks to the edge, closer to the devices where that data is processed. These edge locations can be anywhere from warehouses, oilfields and mines, commercial areas, roadsides, and manufacturing floors — a big difference from the environmentally controlled data center environment IT systems administrators are used to.

In fact, IT systems administrators, as well as BICSI Registered Communications Distribution Designers, have to specify equipment for nontraditional spaces, which requires learning about special industrial enclosures, cooling systems, and cable entry methods that protect equipment from exposure to dust and liquid.

SELECTING AN ENCLOSURE TO PROTECT EQUIPMENT FROM DUST AND LIQUID

Extending the network into nontraditional spaces requires the components and equipment to be rated for use in areas that are dusty or dirty, possibly wet, and may experience wide temperature variations. The enclosure housing cable and network switches should be the first consideration, as it provides the primary protection for equipment. Unlike standard data center cabinets, industrial enclosures are completely sealed when closed.

ENCLOSURE TYPES OF PROTECTION

Fortunately, there are standards that define degrees of environmental protection by enclosures to simplify selection. Basically, enclosure classifications are organized around use. There are enclosures for hazardous and nonhazardous locations, and enclosures for indoor and outdoor use. There are also enclosures with corrosion protection, which are typically used around chemical and food processing, and outdoors, etc. Hazardous locations include oilfields, mines, grain elevators, munitions storage, anywhere that a spark could cause combustion or explosion. For these areas, you should seek an electrician or electrical engineer to aid with specification. The electrical code is very specific for these locations and the enclosure should be highly defined. Nonhazardous locations include warehouses, factory floors, noncombustible processing

Typical Application	Indoor or Outdoor Use	Protection Against Solids	Protection Against Liquids	Corrosion Protection	Minimum Enclosure Rating
Manufacturing floor, warehouse	Indoor	Dust Tight	Dripping liquid or Light Spray	No	IP54 NEMA Type 12
Utility distribution, network distribution	Indoor and Outdoor	Dust Tight	Heavy Spray, Rain, Snow, Sleet*	No	IP66 NEMA Type 4
Food** and chemical processing, salt water	Indoor and Outdoor	Dust Tight	Heavy Spray, Rain, Snow, Sleet*	Yes***	NEMA Type 4X

TABLE 1. Comparison of three most common enclosure ratings for non-hazardous locations used in IIoT digitization.

Note *NEMA Type 4 and NEMA Type 4X enclosures are rated for use in sleet, but if external mechanisms need to be operable when the enclosure is ice covered, a NEMA Type 3S or 3SX design or a special hinge design may be required. **Food processing generally requires a stainless steel enclosure with a removable seal for sanitizing. There are different enclosure Types (ratings) used in hazardous locations around flammable dust and chemicals, such as mines, refineries, mills, and aboard ship. ***IP66 provides similar protection to NEMA Type 4X, but IP Codes do not address corrosion protection.

areas, and outdoors. There are 16 options for protection ratings in these locations, but it is possible to satisfy most requirements with three.

THE ONLY THREE ENCLOSURES YOU REALLY NEED

The following three enclosures cover the majority of nonhazardous environmental requirements and can be field-adapted with drains, vents, fans, or air conditioners as required.

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SELECTING AN ENCLOSURE

In addition to protection rating, it is important to define the type of enclosure, the equipment mounting system, cooling method, and cable entry method. There are four basic types of enclosures:

- Modular enclosures are a frame with bolt-on panel work. They can be used in multi-enclosure bays and kitted with any combination of doors and side panels.
- Free-standing enclosures are simpler designs, formed as single monolithic enclosures in specific sizes used as standalone enclosures. They can have both front and rear doors.
- Floor-mount enclosures are a basic box with a single or front and rear door. They feature floor stands, adding clearance and easier cable access.
- Wall-mount enclosures create a space on walls or columns when there is no floor space for equipment.

There are two types of equipment mounting systems in these enclosures: 19 in. EIA mounting rails for rack-mount IT equipment or panels for automation electronics and electrical controls. To address thermal concerns, you can add filter fans, air conditioners, vents, and drains. For cable entry points, there are special grommets available in the market that completely maintain a seal around cables. As an alternative, if you only have one cable to pass into the enclosure, a basic gasket seal (i.e., one cable, one opening) will work.

It is important to note that all accessories should also have rated protection rating as the enclosure, and be installed so they maintain the seal in order to protect equipment properly.

Other important considerations include:

- NEMA-rated cooling units and fans to provide proper cooling to equipment
- NEMA-rated cable entry grommets that completely seal around cables
- Remote power management at the device level to reduce the need to open the enclosure on a regular basis

EMBRACING THE UNIQUENESS OF EVERY DEPLOYMENT

As a final consideration, it is important to know that no deployment at the edge is the same. To increase your competitive advantage and simplify deployment, look for industrial enclosure vendors that can provide the following benefits, at minimum:

- Product customization, selection, and ordering on demand and under one part number
- Robotically-applied sealing foam
- UL® 508-A listing
- Products that arrive ready with accessories for equipment integration

PREPARING FOR AN IOT WORLD

Just recently, market intelligence firm Gartner published its Strategic Planning Assumption Research stating IoT technology will be in 95% of electronics for new product designs by 2020. Digitalization is affecting every workplace, and many businesses are — or will have to — extend the network into nontraditional spaces. In order to succeed, equipment enclosures that are fully sealed have taken the front seat. ■

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