

ARMORED FOR IOT: PROTECTING EQUIPMENT IN NONTRADITIONAL ENVIRONMENTS

written by Raissa Carey April 6, 2018



Expansion into mobility and demand for real-time data are pushing businesses in every sector to expand their network to the edge and rethink how to lay out their IT infrastructure to support the booming Internet of Things (IoT). The opportunities in IoT are tremendous (about \$2 trillion, according to market-intelligence firm IDC), and to survive, companies will need to invest in IT for their digital transformation. Case in point: technology firm Dell, which announced in October 2017 a \$1 billion investment in a new IoT division this year.

<http://www.datacenterjournal.com/armored-iot-protecting-equipment-nontraditional-environments/>

“Computing needs to happen in dirty, dank, dangerous environments where most PCs go to die,” Dell’s IoT solutions director Kevin Terwilliger said, according to *Enterprise IoT Insights*. “Oilfields, mines and warehouses are the types of places Dell sees demand for edge computing to process IoT data.”

And while digital transformation takes off, IT-systems administrators will likely be the ones responsible for extending the network to connect IoT and business systems. This duty means placing equipment in nontraditional spaces such as warehouses, manufacturing floors and outdoors. To specify equipment for such locations, administrators will need to learn 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

How do you extend the network into nontraditional spaces? Simply stated, the network is fundamentally the same, but the components and equipment must be rated for use in areas that are dusty or dirty, possibly wet, and may experience wide temperature variations. Obviously, it includes the cable and network switches, but the enclosure should be the first consideration.

In nontraditional spaces, the enclosure is the primary protection for equipment. The main difference between industrial enclosures and standard IT enclosures is that industrial enclosures are completely sealed when closed.

A Tale of Enclosure Types

Fortunately, there are already standards that define degrees of environmental protection by enclosures to simplify selection. Basically, enclosure classifications are organized around use. Some enclosures are for hazardous and nonhazardous locations, and some are for indoor and outdoor use. There are also enclosures with corrosion protection—they typically serve around chemical and food processing, outdoors, and so on. Hazardous locations include oilfields, mines, grain elevators, munitions storage, and 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 specific for these locations, and the enclosure should be highly defined. Nonhazardous locations include warehouses, factory floors, noncombustible processing areas, outdoors and so on. In such areas, you have 16 options for protection ratings, but you can satisfy most requirements with 3.

The Big Three: The Enclosures You Really Need

The following three enclosures cover most requirements for nonhazardous environments and can be field adapted with drains, vents, fans or air conditioners as necessary.

Comparison of three most common enclosure ratings for nonhazardous locations used in IIoT digitization

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

*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.*

Enclosure Selection

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

- **Modular enclosures.** These enclosures are a frame with bolt-on panel work. They can serve in multi-enclosure bays and can be kitted with any combination of doors and side panels.
- **Free-standing enclosures.** This type employs simpler designs. They’re formed as single monolithic enclosures in specific sizes and serve as standalone enclosures. They can have both front and rear doors.
- **Floor-mount enclosures.** These enclosures are a basic box with a single door or front and rear doors. They feature floor stands, adding clearance and easing cable access.

- **Wall-mount enclosures.** This type creates a space on walls or columns when no floor space is available for equipment.

These enclosures use two types of equipment-mounting systems: 19" EIA mounting rails for rack-mount IT equipment, and panels for automation electronics and electrical controls. To address thermal concerns, you can add filter fans, air conditioners, vents and drains. Finally, for cable-entry points, the market offers special grommets that maintain a complete seal around cables. Alternatively, if you only have one cable to pass into the enclosure, a basic gasket seal (i.e., one cable, one opening) will work.

Note that all accessories should also have the same protection rating as the enclosure and be installed so they maintain the seal to protect equipment properly. Other important considerations include the following:

- **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 regularly open the enclosure

Owing to the complexity of enclosure selection, enclosure vendors offer online sizing tools to help pick a complete solution, as this [online product designer demonstrates](#).

Arriving Prepared

Within just two years, about 60 percent of all enterprises will have a formal digital-transformation plan, according to IDC. Digitalization is affecting every workplace, and many businesses are—or will have to—extend the network into nontraditional spaces. To succeed, equipment enclosures have taken the front seat. For a detailed description of enclosure selection, protection ratings and features to consider, [download this white paper](#).

About the Author



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