design FAQs

Rectangular and Circular Connectors

FREQUENTLY ASKED QUESTIONS

Q. What kinds of connectors can engineers specify for machine designs today?

A. Design engineers have two choices for industrial electrical connectors: circular and rectangular. Circular connectors have a long history in military applications and in food and beverage processing. Rectangular connectors are used widely in modular machine design, factory automation, robotics, transportation and power generation. Both have benefits - for example, circular connectors are advantageous when a cable is passing through a cable tray. Rectangular connectors offer other benefits, such as easy customization with standard modules and space saving.

Q. Why are circular connectors so common, if they pose drawbacks?

Circular connectors are common because they have been the standard for a long time. This does not mean that they are the best solution for every application as the benefits of rectangular connectors often outweigh the benefits of circular connectors. For example, any side-by-side circular connector arrangement requires additional space for accessibility to twist and lock in the connectors. A rectangular connector arrangement does not require as much space in between connectors.

Q. How are today's connectors different than those in the past?

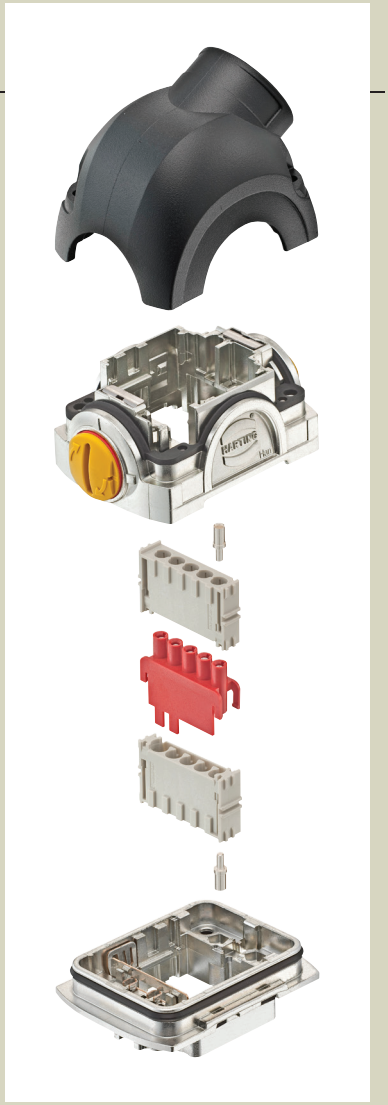
A. In the past connectors simply passed voltages between two points. Today's connectors must meet the complex needs of modern systems by allowing the incorporation of multiple medias, such as power, signal, coax, Ethernet, fiber optics and pneumatics cabling into a single connector. A rectangular connector can easily combine multiple medias into a single connector using standard modules that can be easily arranged into a custom solution. Systems using circular connectors still require separate connectors for Ethernet, fiber optic, and coax power.

Q. What are the main benefits of rectangular connectors?

A. When compared to circular connectors rectangular connectors are generally less expensive, have shorter lead times, and are more easily customizable. Rectangular connectors also have a better grounding system providing more protection against overvoltage and have a visual polarization for easy mating. They can also be easily keyed.

Key advantages for using rectangular connectors over circular include:

- Off-the-shelf modules for easy custom designs for any application
- Superior space efficiency
- More termination options – crimp, solder, screw terminal, others
- More locking options - single or double -lever and push button
- Ability to connect to other devices such as a PCB
- Greater contact density possible
- Greater cabling flexibility – top, dual, side or angled cable entry
- Surface mount, panel mount and cable-to-cable compatibility
- Lower cost
- Better protection against over overvoltage
- Easier visual mating



Q. Which connectors are more reliable?

A. Rectangular connectors are more reliable than circular connectors. While both protect against vibration, the locking elements and seals or rectangular connectors do not allow the penetration of dust and dirt. Rectangular connectors also offer guide pins to protect signal pins and key the connection to prevent mismating a similar connector. In contrast, the threads on circular connectors are more prone to damage.

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They also require thread or bayonet-style locking and run the risk of cross threading.

Q. What other challenges does the connector market face?

A. The biggest challenge to the connector market as a whole is direct hardwiring. This has been historically very common in the US compared to the rest of the world. However, despite its wide usage hardwiring has obvious drawbacks. Using a pre-tested connector system reduces installation and maintenance time, lowering operational costs and downtime. Connector systems also offer flexibility during development when configuration changes are common.

Q. Do rectangular connectors provide other electrical benefits?

A. Rectangular connectors have a solid and reliable protected earth (PE), or ground connection that is first mate (last break). Grounding is a standard feature in rectangular connectors for safety reasons. That means designers can mix male and female contacts on same side. This allows more flexibility in the choice or wire gauge and the handling of shields.

In contrast, a PE connection in circular connectors is not a standard feature. It can be added, but it will be a costly option. Since there is a limited number of pin configurations, only a specific pin can function as ground, and there is only one contact gender per side.

Q. What does the future hold for rectangular connectors?

A. The latest is a new line of fiberglass reinforced plastic connectors that can utilize existing time- tested rectangular connector inserts and modules. Compared to standard aluminium die-cast connectors, the plastic connectors are low cost, lightweight and can be used in machinery of all types. These new connectors also provide protection in corrosive environments, such as salt water. There are many applications where metal connectors are not needed, but they have been used only because there is no other choice. ■

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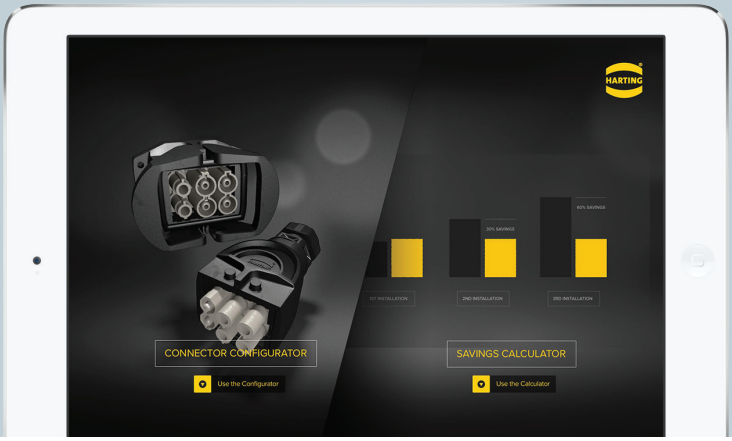

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