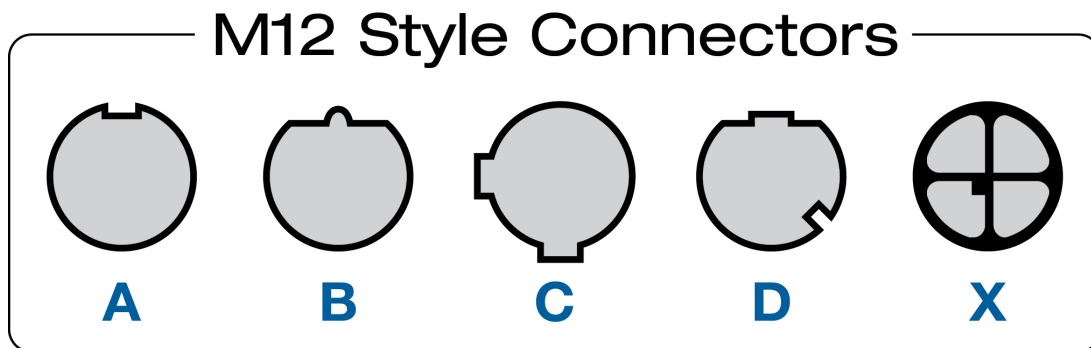


M12 CONNECTOR CODING FOR AUTOMATION AND INDUSTRY 4.0 COMPLIANCE

Connectors are critical in the ongoing operation of any kind of electronic or electrical apparatus. They are found on every application imaginable and used to interconnect every type of sensor, control, and factory management system out there. Overall, the M12 family of circular connectors have an important place in this market.

New automation products are entering the market every day and each device requires that the connector is the right type and corresponds with the application. Connectors that are coded differently will offer different specifications and electrical features that correspond to their intended uses. To distinguish between the various styles, each connector has a different keyway to prevent a cable from being used in an incorrect application (see Drawing 1).



Because M12 connectors are found at multiple levels in automation, several styles of coding exist to prevent incorrect mating on products. Some considerations to keep in mind include the use of shielded connectors as well as IP rated connectors for washdown and/or corrosive environments. IP rating includes everything from IP65, which are dust-tight and water resistant to IP 68, which is not only dust-tight but protected against complete and continuous submersion in water.

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The five most common types of M12 connector codings include:

- **A-coded connectors**

As the most common style of connector, they are incorporated for use with sensors, actuators, motors, and many other standard devices used in a wide variety of applications at the device level for DC power and signal transfer. The connectors can vary in pin numbers from two pins to 12 pins. You'll see these connectors used regularly in robotics and other factory floor equipment where extreme temperatures and/or harsh operating environments are typical.

- **B-coded connectors**

Most often used as network interconnects, such as Fieldbus, B-coded connectors typically have three to five pins. These connectors are a vital component needed in IIoT and Industry 4.0 applications.

- **C-coded connectors**

Less common than A- or B-coded connectors, they are primarily used with AC powered devices including sensors and actuators. The connectors also have a dual keyway for increased security. They typically have three or six pins.

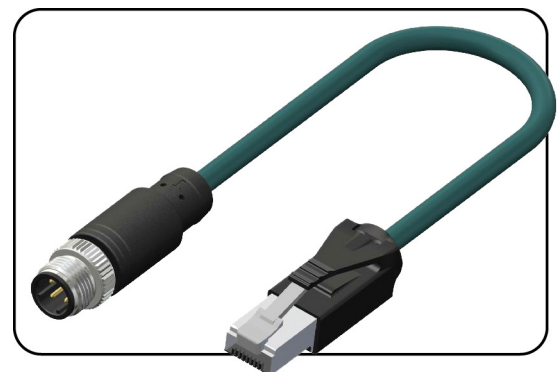
- **D-coded connectors**

Used as network cables for Ethernet and ProfiNet protocols—which includes industrial protocols like Ethernet/IP and EtherCat), D-coded connectors are able to transfer real time data up to 100 Mb. They typically have three to five pins.

- **X-coded connectors**

These connectors are growing in popularity because of their ability to transfer large amounts of data at high speeds through an Ethernet connection. X-coded connectors transfer up to 10 Gb of data and are ideal for high-speed data transfer in industrial applications. While other connectors typically vary in how many pins they have, X-coded connectors will always have eight pins. These connectors are often used in vision and industrial robotic applications where precise data transfer is a must.

Connectors and cables have been around for a long time and have evolved as the needs have changed. Of the above five codes, the X-coded connector is a clear indication of where the industry is headed—into the high-speed data transfer realm—and will slowly begin to replace some of the other connector codes as time goes forward. Knowing which connector to specify can be the difference between early failure and long life.



High-speed Ethernet M12 connection cable.

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