

Whitepaper

WHY M8 CONNECTORS ARE THE RIGHT SOLUTION FOR SMART FARMING APPLICATIONS



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An autonomous tractor with 5G connectivity generates and collects data using IoT networks. (Image credit: Adobe Stock)

Smart farming, sometimes called Agriculture 4.0, incorporates Internet of Things (IoT) technology into farming operations. Farmers used to rely upon historical data and their own experience to make decisions. Today, they use sensors, robots, drones, and artificial intelligence (AI) to initiate more informed, data-driven growing and harvest processes.

SMART FARMING, THE IOT, AND HIGH-SPEED CONNECTIONS

IoT technology has the potential to increase crop yield, improve agricultural commodity quality, and reduce costs in nearly every aspect of commercial farming. Reaching that potential depends upon fast, reliable connectivity throughout the network. Without this vital link, technology such as sensors, 33 location systems, robots, and drones are unable to communicate, limiting their synergistic value to the farmer.

Connected devices are useful in many key agricultural applications, such as:

- Crop selection and planning
- Soil preparation
- Soil monitoring
- Seed selection
- Seed sowing
- Fertilizer use
- Irrigation control
- Harvesting
- Packaging and storing

REAPING THE BENEFITS OF SMARTER FARMING

IoT technology helps farmers determine the optimal combination of water, energy, fertilizer, and other inputs. Real-time data allows farmers to detect problems, like plant diseases, as they develop. With this improved precision and control, yields can be significantly increased.

By automating processes such as sowing, treating crops, and harvesting, farmers are less dependent on a fluctuating labor market. More precise weather forecasting and monitoring soil moisture help reduce water usage, which lowers costs and enhances sustainability. Overall, efficient land management helps minimize the impact on the environment through reduced energy consumption and gas emissions.



Robotic arm harvesting hydroponic lettuce in a smart greenhouse. (Image credit: Adobe Stock)

M8 CONNECTORS: THE RIGHT CHOICE FOR SENSOR-BASED APPLICATIONS

Compact and versatile, M8 connectors offer the most effective connectivity solution for smart farming applications that depend on sensor technology. Connecting multiple sensors enables real-time updates, allowing data-driven responses to changing conditions.

For example, M8 connectors are used in smart greenhouses to connect the network of sensors that prompt adjustments in irrigation, lighting, temperature, and spraying that is critical to these sensitive microclimates. They are also used in the remote monitoring systems that measure indoor CO₂, humidity, soil moisture, soil pH, and air pressure.

In addition to greenhouse applications, M8 connectors are ideal for chemical control, disease prevention, crop monitoring, irrigation control, and supply chain traceability.

M8 FEATURES AND OPTIONS

Finding the best M8 connector for an application requires the right combination of variations, such as pin number, housing, or IP level of protection. M8 connectors are available with 3, 4, 5, 6, 8, or 12 pins. The ideal pin count depends on the application. Most M8 sensor and power applications use 3 to 12 pins, whereas PROFINET and Ethernet use only 4.

M8 connectors are extremely versatile and can be further customized by selecting other options such as:

- Gender: male, female, male/female
- Termination style: screw, solder, wired, PCB, or IDT (Insulation Displacement Termination)
- Housing material: plastic, metal, or stainless steel
- Contact plating material: Au (gold)
- Degree of protection: IP67, IP68, or IP69K
- Cable jacket: PUR or PVC
- Connector Type: Panel mounted, cordset, or field attachable
- Rated voltage: 30V – 60V
- Rated current: 1A – 4A

M8-D CONNECTORS: THE RIGHT CHOICE FOR DATA TRANSMISSION APPLICATIONS

The M8 D-code, or M8-D, is ideal for smart farming applications where fast, reliable data transmission between devices is critical. This connector provides a cost-efficient way to connect miniaturized sensors in Ethernet networks. The M8-D is easily adaptable to a wide variety of applications, meeting data transmission requirements while taking up minimal space.

M8-D connectors deliver data rates of up to 100 Mb/s in almost a third less space than M12 connectors, making them the better choice for applications that use miniaturized sensors, such as:

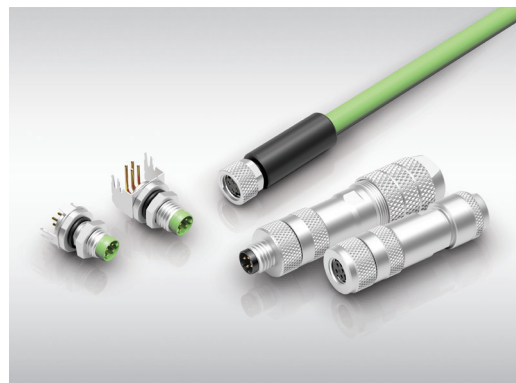
- Seeding and planting
- Surveying
- Vehicle and machinery control
- Harvesting
- Chemical control and disease prevention
- Crop monitoring
- Irrigation control
- Soil management
- Air pressure measurement and regulation in greenhouses

M8-D FEATURES AND OPTIONS

The M8-D is available with 4 pins, the ideal pin count for most data transmission applications using PROFINET and Ethernet IP Protocols, and Power over Ethernet (PoE and PoE+) technology.

The connector choice for a specific application can be further customized by selecting options such as:

- Gender: male, female, male/female, male/male
- Termination style: screw, wired, or PCB
- Housing material: metal
- Contact plating material: Au (gold)
- Degree of protection: IP67
- Cable jacket: PUR or TPE
- Data rate: Up to 100 Mbit/s
- Rated voltage: 63 V(DC). Rated surge voltage: 1500 V
- Rated current: 4 A
- Mating cycles: >100



[binder field-attachable, shieldable M8-D connectors](#)
with IP67 level of protection when mated.
(Image credit: binder USA)

LOOKING FORWARD: THE FUTURE OF SMART FARMING

Global challenges such as extreme weather, fluctuating labor costs, overpopulation, and the resulting hunger crises can be mitigated through smart farming practices. There is tremendous potential to positively impact agriculture worldwide. Reaching that potential will require reliable connections between hardware, software, sensors, data analytics, and wireless technologies.

M8 and M8-D connectors will play an important role in building the robust IoT networks that are the foundation of smart farming.



Drone taking high-resolution photos for crop analysis. (Image credit: Adobe Stock)

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