

The M12Plus, with a four-core cable in a flexible polyurethane outer sheath and with A-coded M12 male connectors, complies with the latest standards used in many industrial plants



# M12Plus – The Cable Medics

**Turck is shifting the condition monitoring of the cabling directly to the plug connector – including wireless measured value transfer via Bluetooth Low Energy**

Despite the further development of wireless systems and communication connections, the digital transformation of industry also requires safe cable connection solutions in the future. As the establishment of the Industrial Internet of Things (IIoT) continues to advance, smart and networked devices also will always need a reliable communication connection and power supply. Connectivity thus also plays a critical role in the digital transformation of industry.

Turck has offered a broad range of connectivity products for decades, from the standard M12 connector to splitters and countless variants right through to customized cordsets. Turck's extensive offering, including several connection types and cable variants, creates a range of flexible combination options that cover a large number of applications.

## Technology for the early detection of problems

However, time does not stand still, even in the area of connection technology. Turck's M12Plus connector is one of the latest innovations in this area, consisting of an M12 connector with integrated voltage and current monitoring electronics, which was developed in collaboration with IMS Connector Systems and the Fraunhofer EMI. The M12Plus connector moves the condition monitoring of cables subject to severe stress directly to the connection technology level.

Besides the incorporated measurement technology, the M12Plus also features an onboard Bluetooth chip. This enables it to measure voltages and currents and send these measured values to a data interface in the plant, such as Turck's TBEN-PLC. A Bluetooth dongle enables the robust IP67 controller to read a host of Bluetooth-enabled devices, and the scan intervals can be adjusted for the particular application in order to ensure optimum performance. The cable data is transferred to the controller in real time. This information can be used to determine potential issues such as voltage drops in the cable or the plug contact, even



before the connection actually fails. If required, the controller can be programmed so that an alarm is triggered as soon as a specific threshold value is reached.

## Effective protection from cable failures

The gradual degradation of the copper wire may increasingly occur in applications where cables are frequently bent in drag chains or on robots. The

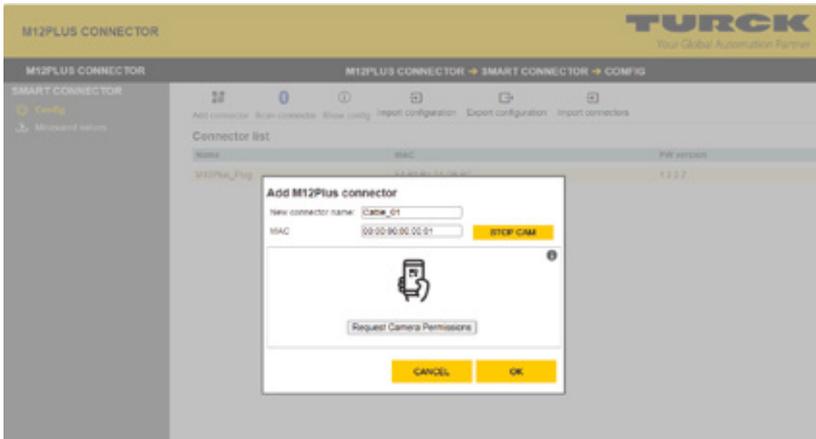
Cables are particularly subject to severe stress in drag chains – constant condition monitoring with the M12Plus enables cables at risk of failure to be replaced in good time

## QUICK READ

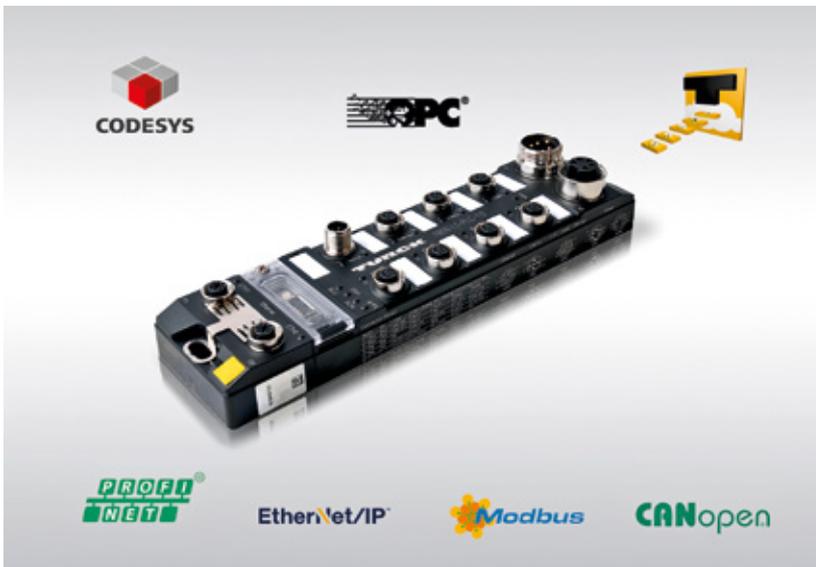
Defective cabling and contact problems can lead to expensive plant downtimes and unscheduled maintenance work – and are one of the most frequent causes of faults. Turck's smart M12Plus connectors now provide a solution and enable the condition monitoring of cables and contacts by measuring current and voltage. The cable is continuously analyzed thanks to the early voltage drop detection function. Error sources can be identified and localized as each plug connector is assigned a unique address. This ensures trouble-free plant operation and prevents costly downtimes or unscheduled maintenance. The M12Plus connector allows a completely new approach to predictive maintenance.



The Turck Automation Suite graphically displays the measured values of the M12Plus



The M12Plus can be configured conveniently via TAS



Turck's robust TBEN-PLC IP67 controller is able to receive the measured data of the M12Plus wirelessly via a Bluetooth dongle

millions of tension and torsion stresses present in these applications impair the quality of the copper and can cause breaks in the wires or strands.

The smart M12Plus connector with integrated measurement electronics consists of a four-core cable (4 x 0.34 mm<sup>2</sup>) of the TXL series with a polyurethane outer sheath and is specially designed for use in drag chains. A-coded M12 connectors are fitted to both ends of the sensor/actuator cable. This design complies with the latest standard used in many industrial plants.

The sensor integrated in the M12Plus connectors enables precise voltage and current measurement at the male and female connector. Comparing input and output values thus enables problems such as cable kinks, cable breaks or an inadequate power supply to be detected early on. The highly accurate measured values enable the precise monitoring of contact quality for lasting and reliable connectivity. Factors such as contact corrosion or wear by repeated mating are taken into consideration here.

### Optimized plant availability thanks to precise cable location

A plant with thousands of connections presents a significant problem: in the event of a fault in a cable connection, an engineer has to first of all locate the fault in the field and of course do this as quickly as possible to minimize any financial losses caused by plant downtime. With IP67 connectors this requires far more effort than with the wiring in a control cabinet.

Turck's smart M12Plus connector provides a solution here and offers a critical benefit for localization: the unique MAC address of each M12Plus connector makes it possible to identify the cable at risk of failure directly via the documentation. Without wasting valuable time in fault localization, an engineer can now replace the affected cable with the appropriate replacement at the time of his choosing so that the plant can continue operating without any unscheduled downtimes.

### Configuration via Turck Automation Suite

The configuration of the M12Plus connectors and the visualization of measured values can be conveniently carried out via Turck's IIoT and service tool TAS (Turck Automation Suite). The browser-based toolkit has been extended with the necessary functionalities in the latest release. For example, each M12Plus can be given an individual designation via TAS. If you are looking for a specific connector in your plant, you can make it flash specifically by clicking on it. The visualization of the applied current and voltage values can also be called up via TAS at the click of a mouse.

### Outlook

The M12Plus showcased is the first model of a new generation of smart connectors that can be designed in a large number of other variants and can be specially tailored to individual requirements. This includes further developments such as application specific designs, cables with different cross sections, different numbers of cores as well as a wide selection of voltage ranges.

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