

Farewell to a Diva

Turck's Ethernet-capable two-watt Q300 read/write head increases the reliability of UHF RFID applications, and thanks to its external antennas, also enables use in the production environment close to the machine

For a long time, UHF RFID was considered the diva of industrial identification technology. This is because it is actually able to achieve great things and unbeatable when everything is working well, but is unfortunately often difficult to handle. If the environment is not right, the technology becomes unreliable. Metal objects or liquids cause reflections that subsequently result in overreaches or null spots. These issues then have to be rectified by means of mechanical measures, filters or algorithms in the middleware. UHF systems only read 99 percent reliably in the worst case. While this sounds very good, it means that ten read errors occur daily in an application with 1000 read operations. For a tracking system, these are far too many.

Due to these kinds of problems, machine building applications primarily use the HF frequency range, provided that the achievable ranges are enough. HF technology enables goods or workpiece carriers and also tool changers and forms to be detected very reliably in controlled and guided processes.

Identification beyond factory limits requires UHF

Products, however, increasingly have to be identified and traced beyond process sections and the limits of the factory. This is where HF technology reaches its limits. The short ranges do not provide the necessary flexibility for reliable identification in different production sections. UHF technology has therefore been used

Square-shaped, practical, good: Identification with the Q300 can be up and running with just an Ethernet cable

QUICK READ

Two watts of power, integrated RFID U interface, direct Ethernet connection with PoE and ports for up to four external antennas, four universal I/Os for trigger and status signals, reader variants with a Codesys, Linux, Windows or OPC UA platform – these are the basic specifications of Turck's new UHF RFID flag ship Q300. The reader can be easily installed, both in terms of software and hardware. The Q300 can be used both in logistics as well as in conventional HF domains, such as the identification of workpiece carriers in production. With its new read/write head, Turck is taking one step further towards Industry 4.0.

for a long time more widely than HF technology in logistics, where warehouse goods are mainly involved rather than components, primary products and products. Metal interference sources occur here less frequently than in production.

Industry 4.0 requires item level tagging

Nowadays in production there has been a growing demand for so-called item level tagging, i.e. the identification of individual components instead of the workpiece carrier. Especially in the automobile industry, there are now very few components that go through their production halls without carrying a tag. As is so often the case, car manufacturers have been the early adopters of the latest in production and automation technology. Other sectors are now following suit.

Q300 UHF reader enables UHF RFID in HF domains

With its Q300 UHF reader series, Turck is introducing new read/write heads that break down the limits between UHF and HF. The option to connect external near field antennas directly to the UHF read/write head enables the Q300 to also be used in conventional HF areas, such as for the optimal detection of components or workpiece carriers. Many of the problems normally associated with UHF can be avoided through the

connection of special near field antennas. Conventional UHF read/write heads with an active antenna are normally too large and have too wide a radiation to be successfully used in the near field range.

The use of the Q300 for detection of workpiece carriers in a production line can also be attractive in terms of costs. The purchase of five read/write heads and an RFID interface is unnecessary, since the application can also be implemented with one Q300 and up to four external passive antennas. The read/write head detects which antenna is reading a tag and can thus assign the different read/write points. The use of an additional RFID interface with IP20 or IP67 protection is totally unnecessary, since this interface is already integrated in the housing of the Q300 with the antenna and processor.

Integrated universal I/Os for connecting trigger and light signals

The sensors are connected directly to the Q300 housing as triggers or actuators as well as signal lights for status signaling via I/Os. A separate I/O module for this is also unnecessary here since the reader features four universal M12 inputs or outputs.

Turck is initially offering a Codesys variant of its new UHF read/write head series in order to allow greater





Null spots caused by reflections on metal objects are prevented by the switchable polarization



The multiplex operation of external antennas on the Q300 also enables faster operation in gate applications in logistics

use of UHF in machine building and in the production environment near the controller. The third version of the open Codesys PLC language enjoys particular widespread use in machine building and for PLC programming. The Q300-CDS is the only UHF reader with a direct connection for Ethernet and external antennas, which can be programmed with Codesys.

The Q300-CDS is provided with the U interface already integrated. U stands for the universal interface and is normally used on Turck's TBEN-L and TBEN-S RFID block interfaces. The interface enables all the necessary parameters to be set both for HF as well as for UHF devices. Users who are already familiar with the U interface through the use of TBEN-L and TBEN-S

RFID interfaces do not have to change anything. All others can master the technology quickly thanks to its intuitive operation.

Turck has integrated the platform of its TBEN-L block I/O devices in the housing of the new readers. The Codesys variants of the Q300 can consequently be used as a station in Profinet, Ethernet/IP or Modbus TCP networks without any intervention required of the user. The readers are also powered via the Ethernet cable. This power over Ethernet (PoE) technology keeps the wiring effort to a minimum. Even external I/Os can be powered up to a certain level via PoE. Only when power hungry actuators are used does an additional external power supply become necessary.

In 2019 Turck will offer a Linux and a Windows variant with Windows Embedded Compact 2013 on the market. Both devices are attractive for system integrators who run middleware on Linux or Windows systems. This software can be integrated and run directly on the Q300. The setup of often expensive industrial PCs is therefore no longer necessary as Q300 can communicate directly with ERP systems or other Ethernet stations. On both Linux and Windows variants, the applications can be programmed in the languages .Net, C++, C# in order to implement middleware functions.

Switchable polarization for greater read reliability

The Q300 can really show its strengths in material handling and intralogistics applications. With an output of two watts it can achieve maximum ranges. However, the high output power also brings with it several requirements. Waves are reflected from walls and metal objects or objects containing water, overlap each other and thus create overreaches or also null spots. In order to avoid these, the new Turck reader uses a technical trick. The polarization of the antenna can be switched so that tags are detected on different polarization planes. This increases detection reliability and increases the read and detection rate of tags in problematic environments.

Use in the automobile industry

The Q300 can also provide solutions in the automobile industry better than alternative UHF systems. Metal objects and not least the vehicles themselves are the frequent source of reflections. The polarization switching and the resulting maximum detection rate are therefore a great benefit. UHF is generally more widely used here than in other production industries, as components are also detected individually at tier X suppliers in order to implement seamless just-in-sequence production. The tags are attached anyway on most vehicle parts and car bodies.

Integration effort minimized – costs reduced

In individual cases very short ranges are also required in the automobile industry, for which special passive antennas are used. The location and assignment to component carriers is easier with external antennas which are specially suited to near field detection. Sophisticated algorithms in the software that would otherwise have to locate tags therefore become unnecessary. This saves money since the integration of RFID systems, particularly the programming effort required, often represents a major part of the costs.

RFID and OPC UA: Key technologies for Industry 4.0

RFID is a key technology of Industry 4.0 for networking machines, processes and data. Turck will consequently also be launching in 2019 a Q300 model with an OPC UA interface for direct communication with OPC UA clients. OPC UA increases future investment security for a customer's investment as well as the connectivity of the RFID solution. The independence of the protocol from operating systems also enables changes to be

»The Q300 is a versatile and powerful multi-tool for Industry 4.0 and the Industrial Internet of Things«

made to the corporate IT. The interconnectivity of production levels, identification systems and ERP or MES level remains unaffected by this.

High-speed gate applications save time in logistics

UHF systems are frequently used in logistics to detect pallets, trays and other goods carriers. The Q300 with a two-watt output offers impressive results here as well as suitably large ranges. The Q300 with its integrated multiplex mode, which controls the external antennas in turn, simplifies gate applications in particular. Tags that pass the gate are thus read reliably and quickly. As the gates are installed on the usual routes, they save time in the process since the separate scanning of barcodes or other codes becomes unnecessary. The high-performance readers like the Q300 also make it unnecessary to reduce the speed.

Conclusion

The Q300 is an IP67 reader, which combines the entire RFID technology in a single housing, and provides a consistent separation between the production level and the corporate IT. This also simplifies the expansion of existing plants, since control cabinets or other complex installations and cabling are neither required in the field nor in the IT. Everything that is needed for item identification is integrated in the housing of the Q300. Only the Ethernet cable is needed to supply data to higher-level controllers or other IT systems. A more streamlined or process-friendly ID solution cannot be designed.

With its range of Ethernet interfaces (Profinet, Ethernet/IP, Modbus TCP) and platforms (Codesys, Linux, Windows, OPC UA), as well as the external antennas, Turck's new UHF read/write head is unique on the market. The Q300 can thus offer impressive results in UHF domains like logistics, as well as in conventional HF domains such as the production environment close to the controller.

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