

# Integration Helper for RFID

Turck's new TBEN-S and TBEN-L Ethernet/RFID block I/O modules simplify the direct RFID integration of HF or UHF read/write heads in installations



Compact, robust and simple: Turck's new TBEN-S and TBEN-L IP67 RFID interfaces reduce the effort involved in industrial identification solutions

There are many unanswered questions for several aspects of Industry 4.0. There is, however, a consensus of agreement about the position of RFID technology in the production of the future: A highly automated, highly flexible and closely networked industrial production system requires efficient technology for the identification of employees, systems, tools, workpieces and products. Due to its specific benefits, RFID stands

out from alternative solutions such as optical identification – and is therefore without doubt one of the key technologies for Industry 4.0.

The implementation of RFID in production processes is often still too complicated and time consuming in many areas. Even though this effort is worthwhile, many users, particularly in small plants, are put off by what is involved. RFID applications must become easier

to implement if they are one day to provide total transparency for industrial production.

### RFID interfaces simplify integration

With its latest RFID interfaces, Turck has set itself the task of making integration considerably simpler. Previously, users could essentially choose between two types of RFID interfaces for Turck's BL20 and BL67 modular I/O systems: On the one hand the simple integration via RFID-S modules (Simple), which transfer data in the bus cycle. The volume of data here is 8 bytes per cycle – sufficient for a UID but with UHF communication or large tags with 2 kilobytes the S module requires long read times. On the other hand, the so-called A slices (Advanced) are available, which can process larger data volumes via acyclic bus communication but which require more effort for their implementation.

### RFID integration without controller function blocks

The new RFID interfaces are based on IP67 block I/O devices of the TBEN-S and TBEN-L series and combine the benefits of the two previous alternatives: a simple integration, combined with high performance communication. The TBEN-S RFID interfaces in particular simplify setup in the application by eliminating the need for controller function blocks. The compact modules communicate with two RFID read/write heads in the HF or UHF frequency band and connect an additional four sensors or actuators via the integrated universal I/Os.

The key feature is the fact that the RFID ports in the controller can be treated simply like normal I/Os. The difference is simply in the fact that it is now also possible to process mapped data from read/write heads instead of the analog or digital value of a sensor. The TBEN-S interface is set up via a GSDML file instead of via separate controller function blocks. The data is transferred by the TBEN-S in a prepared table (mapping table) via the Ethernet interface and can be processed further by the controller accordingly, i.e. filtered and forwarded to higher-level systems. The handling of the HF and UHF read/write heads via the TBEN-S module is largely identical. With UHF read/write heads it is also possible to set some additional parameters.

### TBEN-S: ultracompact and performant

Due to their compact design with a width of only 35 mm and the high IP67/IP69K degree of protection, the TBEN-S block I/O devices are optimally designed for retrofitting in production plants. The user does not require any additional control cabinet since the modules can be fitted directly in the field – for example, on 40 millimeter aluminum profiles. Up to two RFID read/write heads in the HF or UHF frequency band can be connected to each module. Thanks to the integrated switch, the modules can be configured in a linear topology, which saves cabling effort. Furthermore, up to 32 HF read/write heads can be linked via their RS485 interface.

Besides the signals of the two read/write heads, the Ethernet cable also brings up to four sensor or actuator



signals to the controller. As multiprotocol devices, the modules detect independently whether communication is being carried out on the Ethernet cable via Profinet, Modbus TCP or Ethernet/IP and adjust themselves accordingly. The connection of sensors or actuators also couldn't be easier: The universal DXP terminals set themselves automatically to input or output, depending on whether a sensor or actuator is connected. The allocation of functions via the controller becomes unnecessary. Trigger signals can thus be integrated even faster and actuators such as signal lights can be connected in no time at all.

### Performance for UHF applications

In spite of its compact design, the TBEN-S RFID interfaces offer sufficient performance. They communicate cyclically up to 128 bytes of user data per channel with the PLC. Through the use of data fragments in the UHF data interface it is also possible for the module to process data volumes larger than 128 bytes. Over 100 UHF or HF tags with 8 kilobytes can thus be detected quickly and conveniently. This is made possible by the direct transfer of data to the memory of the TBEN-S module (16 Kbyte per channel).

The integrated web server of the TBEN-S modules enables the devices to be set up via a PC or via mobile

Both RFID block I/O modules are suitable for demanding UHF applications in logistics

## QUICK READ

RFID integration must get easier so that it can provide total transparency in the industrial production of the future. That is why Turck is presenting two compact Ethernet RFID interfaces based on its TBEN-L and TBEN-S block I/O series at the SPS IPC Drives fair. The multiprotocol devices bring data from HF or UHF read/write heads via Profinet, Ethernet/IP or Modbus TCP to the controller. The compact TBEN-S RFID module enables integration without programming or function blocks and thus simplifies implementation. The Codesys programmable TBEN-L variant provides controller functions and can thus already filter and pre-process RFID data, and even link it directly with the control operations.



In applications using many read/write heads, wiring effort is reduced by the possible cascading of the RFID interfaces

devices. During operation the web browser is ideally suited for the diagnostics and maintenance of the connected components and system data. All that is needed is the installation of an HTML5-capable browser on the device. Although the "S" of TBEN-S actually stands for "small" – it could also stand for "simple" on the TBEN-S-2RFID-4DXP.

#### **TBEN-L: Codesys 3 on board**

The big brother of the TBEN-S adds a bit more weight to the scales, but also provides added intelligence on board. The TBEN-L interface offers four RFID ports for HF or UHF readers alike, and eight universal DXP I/Os for sensors or actuators. The TBEN-L comes with Codesys 3, thus providing an open system for control tasks. The mapped RFID data can thus already be preprocessed and filtered on the module itself. Control tasks can also be programmed on the basis of the RFID information directly on the module. The eight universal I/Os can be addressed directly – without any rerouting via a central controller. This enables smaller machines with identification tasks to even be run entirely autonomously.

The TBEN-Lx-4RFID-8DXP-CDS can also be set to one of the Ethernet protocols – Profinet, EtherNet/IP or Modbus TCP. However, this is not automatic, but must be set in the configuration in the Codesys environment. TBEN-L runs on an 800 MHz CPU, which accesses a 128 MB DDR3-RAM. The flash memory of the module is 256 MB. Other differences are in the electrical connection of the TBEN-L. These are connected via an M12 connector to the Ethernet and supplied with power via a 7/8" connector. On the more compact TBEN-S block modules, the power supply and network connection are implemented via M8 connectors. These are the most important differences between the two modules. Other features, such as the integrated switch for linear topologies, the transfer rate (10 Mbps/100 Mbps), the degree of protection (IP67/69K) and the integrated web server are offered by both the L and also the S module.

#### **Simple complexity**

The question remains how can a module for more complex applications nevertheless be implemented and commissioned more simply. The developers at Turck have armed the module with many new functions. This means that they do not have to be extensively programmed as before. For example, the user can select the "Continuous Mode" so that the read/write head reads in data continuously and passes it to the module until the mode is switched off again. This data is then kept in the module until the higher-level controller decides to call it. Benefit: The read/write head does not have to be retriggered by the controller every time and the resulting data traffic and programming required by the user for this kind of function are unnecessary.

Another useful function is the new "Report Mode", in which the read/write head receives its command already in advance and performs it immediately, as soon as a tag enters the detection range. The action previously had to be always performed by the PLC itself and sent to the read/write head so that valuable time was lost with fast read events.

#### **Outlook**

Turck will also offer the TBEN-L RFID interface in a version with Windows Embedded Compact 2013 for system integrators. This will thus allow integrators to program middleware functions on the module in Net, C++ or C#. The communication to the higher-level system is then not implemented via an industrial Ethernet protocol but via TCP/IP. Apart from the operating system, the module will have the same performance specifications as the Codesys RFID module.

Similarly, Turck will also bring a version to the market with the open Linux operating system – likewise for integrators. The TBEN-L platform could also provide a system with an OPC-UA interface, e.g. compliant with the AIM specification for identification devices. This would thus complete the next step towards Industry 4.0. OPC-UA is the Industry 4.0 blueprint for connecting production data to higher level MES and ERP systems.

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