

Cross Border Traffic

A new I/O block module with protection to IP67 is enabling data exchange for the first time between two Ethernet networks directly in the field without the need for a control cabinet

Compared to point-to-point wiring, this saves the user considerable costs for the connection technology and the wiring. There is also a time saving benefit when the machine is set up at the customer. Instead of running several individual cables to the control cabinet, it is normally only necessary with fieldbus or Ethernet systems to run one communication cable and power supply in order to connect the I/O level to the controller. The wiring of the periphery to the remote I/O technology can then be done in advance at the machine builder and thus consistently reflects the procedures of modular machine building. Besides the I/O technology, Turck's TBEN-L-PLC also offers control technology in IP67.

Turck has been offering robust RFID interfaces with IP67 protection for a long time. The decentralized architecture has the best results if it can be implemented end-to-end, i.e. if the use of a separate control cabinet is ideally no longer necessary. The TBEN-L

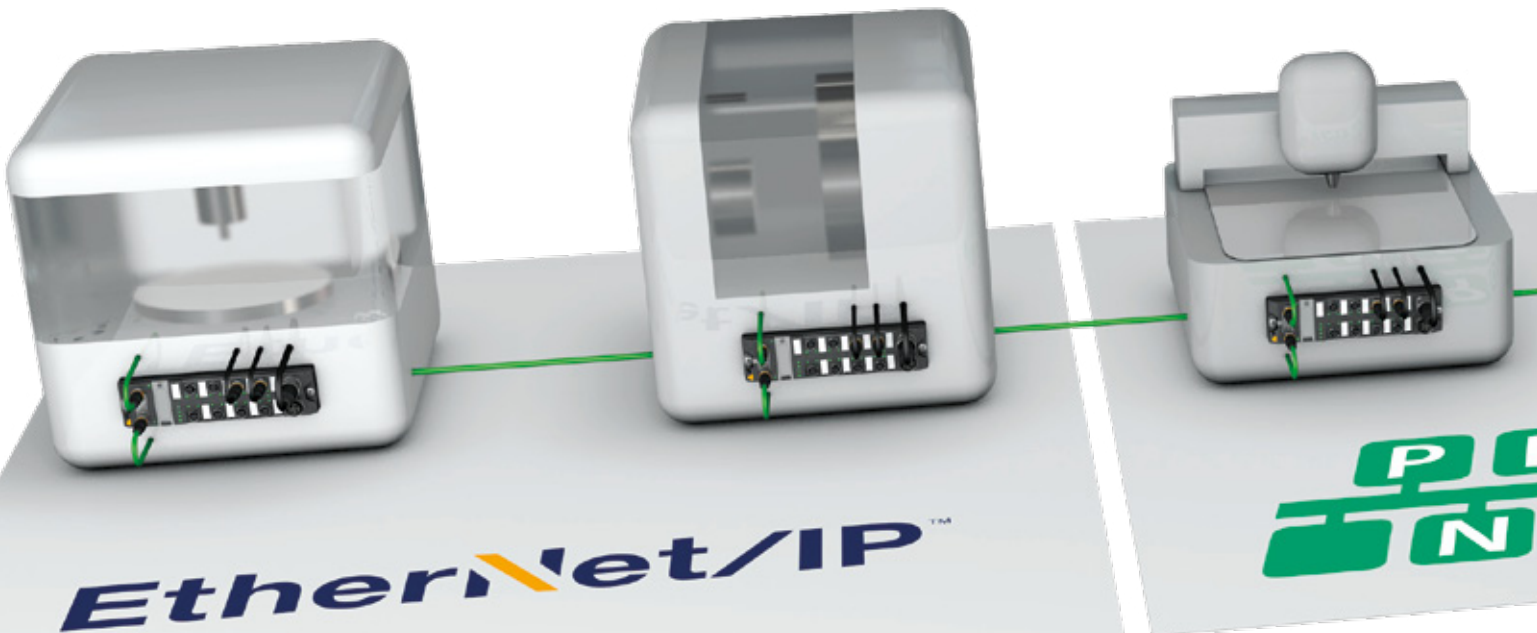
spanner is another product on the journey towards this objective. In its function as a slave for both sides, it offers bidirectional data exchange from master to master.

The production chains of factory automation are usually made up of the plant sections of different manufacturers. Major customers can often demand the installation of a specific controller. However, whilst smaller companies are supplied with the plant sections they require, these are often equipped with controllers of different manufacturers. Even very large automobile manufacturers may implement production lines consisting of machines from different controller manufacturers due to their international structure and production strategy.

Data transfer between "foreign" machines

Up to now, the data transfer between the machinery in this type of line has often been implemented with an

The TBEN-L spanner module with IP67 protection combines modular production chains with different Ethernet protocols without the need for control cabinets and extensive wiring



I/O coupling and restricted to a few bits. Interfaces for this could be set up easily. However, the move towards smart and predictive production chains has required the machinery and therefore the controllers to exchange more information between each other than simply "product ready to transfer" or "transfer station ready to receive" messages. Operators often use an identification system for the data transfer that is based on barcodes or RFID. However, for many product types this is too expensive and simply not possible.

Conventional Ethernet gateways with IP20 protection are used when the two machines to be connected use controllers with the same Ethernet protocol. These have to be wired into the control cabinet and therefore require long cabling runs.

First spanner for the field

Turck is consistently taking the decentralization further away from the control cabinet into the field. The

QUICK READ

Turck's TBEN-L spanner provides another answer to the requirements of Industry 4.0. The robust IP67 block I/O module exchanges data between two networks directly in the field. The device replaces the last I/O module of a machine and functions as a first slave for the next controller in a production line. Compared to conventional IP20 Ethernet gateway solutions, this reduces costs and wiring effort. With its first IP67 spanner module, Turck is taking one more step out of the control cabinet into the field and is enabling data transmission for intelligent production processes, even beyond the limits of individual Ethernet networks.

automation specialist has developed the first block I/O module with degree of protection IP67, which enables communication between two networks directly in the field. The TBEN-L spanner exchanges data bidirectionally from master to master. Unlike the existing products on the market, the Turck spanner does not require a control cabinet, thanks to its high degree of protection (up to IP69K). Data exchange is thus carried out where the action takes place: directly in the field where the machines are connected. The spanner acts as a slave for both controllers and thus enables direct master-master communication. The data moves with the





Industry 4.0 tools: Turck's I/O module series FEN20, TBEN-S and TBEN-L are not only suitable for multiprotocol operation, but can also be used as intelligent FLCs

Field Logic Controller

With the field logic controllers (FLC) Turck offers another highly flexible, user-friendly automation solution. This is made possible by the browser-based programming environment ARGEE. It is based on HTML5 and JavaScript and allows the user to program conditions and actions in a very simple way, even in the field with mobile devices. By using ARGEE Turck's multiprotocol block I/Os can be used as independent logic controllers. ARGEE will not replace any PLC completely, but the engineering software enables new ways of control technology. Turck FLC devices can independently control applications, perform arithmetic, timer, counter and binary switch functions and exchange data with higher-level controllers.

An FLC with ARGEE FLOW can

- be configured with boolean logic
- logically link input and output signals
- use up to two timers and counters
- communicate with a PLC

An FLC with ARGEE PRO can

- perform arithmetic operations
- use numerous internal variables, timers and counters up to 6 kB total size
- exchange comprehensive data with a PLC
- perform if-conditions and state sequences

product via the spanner from one machine to the next. This enables the signal and data flow to be branched in the production lines – fully in line with the principles of Industry 4.0.

Versatile multiprotocol module

Thanks to its multiprotocol technology, the TBEN-L spanner can process the data of Ethernet protocols such as Profinet, EtherNet/IP or Modbus TCP. For example, it can connect a Profinet master with an EtherNet/IP master or an EtherNet/IP controller with a Modbus TCP controller. The data interface acts as a postbox for both masters, in which both controllers can put and get data. The spanner also features 16 digital inputs. It therefore has a dual function. The Turck spanner can replace an I/O module which the machine builder would have had to use anyway. Compared to an external Ethernet spanner in the control cabinet, this solution is more cost effective, since the spanner simply replaces the standard I/O module that is required anyway.

1:1 NAT router

The different machine builders do not have to take into account the IP address of the other production lines for the data transfer to be successful. The NAT router function (Network Address Translation) of the TBEN-L spanner makes the coordination of IP address spaces between manufacturers unnecessary. It is often the case that machine builders use their usual IP addresses. This means that it is very possible for two manufacturers to use the same IP address. If these networks were connected, major problems would occur, since two identical IP addresses cannot be connected in the same network.



»With our growing portfolio of robust and intelligent IP67 solutions, we are supporting the trend towards modular production chains and pave the way for our customers to Industry 4.0«

However, the TBEN-L spanner works as a NAT router, which converts the IP addresses. The spanner handles the IP addresses of the manufacturers as unique addresses and thus prevents a double assignment in the network, irrespective of the actual settings made by the manufacturers. In this way, the spanner guarantees a unique possibility of integration for plant manufacturers, as they no longer have to make arrangements between themselves in order to prevent a double assignment.

Large portfolio of decentralized solutions – IP67 controllers included

Besides the TBEN-L spanner, Turck offers a large portfolio of decentralized solutions. Turck's FLC (Field Logic Controller) technology brings the logic to the

field level. The ARGEE web-based programming environment adds logic functionality to Turck's block I/O modules. ARGEE enables PLC functions to be programmed directly on the modules of the TBEN-L, TBEN-S and FEN20 block I/O series. In this way, simple controller functions can be outsourced to the I/O modules, thus relieving the workload on the central PLC and the bus communication.

The ARGEE programming environment is a simple web application. It simply requires a PC with a web browser such as Chrome or Firefox. Thanks to Turck's multiprotocol Ethernet, modules pre-programmed in this way can be used in Profinet, Ethernet/IP or Modbus TCP networks. Simple requirements can also be implemented on the Turck block I/O modules completely autonomously with ARGEE. The additional



The TBEN-L5-EN1 spanner module functions as a slave for both controllers and thus enables direct master-master communication. Thanks to its multiprotocol technology, it works in Profinet, EtherNet/IP and Modbus TCP networks



The browser-based ARGEE programming environment can also be operated with mobile devices

controller intelligence provided by ARGEE makes Turck's block I/O modules ideally equipped to meet the requirements of Industry 4.0 scenarios: They support the key Industry 4.0 technologies of Ethernet and IO-Link. RFID Ethernet interfaces with ARGEE onboard are now in the Turck program.

Genuine IP67 PLC

As well as the programming environment for low to medium complexity applications, Turck also offers a full featured PLC with IP67 protection. The TBEN-L-PLC Codesys-3 controller is a compact IP67 controller for use directly in the field. When used as a master, the device also supports Modbus RTU, in addition to CANopen and SAE J1939, as well as the industrial Ethernet protocols Profinet, EtherNet/IP and Modbus TCP. The TBEN-L-PLC can also be run as a slave (e.g. device) in the CANopen and Modbus RTU networks as well as in the three supported industrial Ethernet networks, thus enabling it to be used as a protocol converter. For example, the controller can operate as the CANopen manager of a machine module networked with CANopen and connect this module to a

system running with Profinet. With the increasing digitization of industrial production processes, the PLC enables existing machine concepts to be made fit for the challenges of closely networked, highly flexible production.

Onward to Industry 4.0

With its portfolio of decentralized solutions, Turck is showing how existing machinery and plants can benefit from increased efficiency and increased transparency resulting from the evolution of Industry 4.0. They open up possibilities for retrofitting plants or show new ways for the modular design and electrical planning of machines and production lines.

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