

Beep!

Turck's Backplane Ethernet Extension Protocol, or Beep for short, connects up to 33 I/O modules with just one IP address in Profinet, Ethernet/IP and Modbus TCP networks

Language connects worlds together. Particularly if different nations can communicate in a common language. This process is not only limited to communication between people but is also the case in industry. Controllers and fieldbus devices used to use different protocols in different markets and regions. Besides the preferences of different regions, application requirements also determine the choice of protocol. Due to the fact that a uniform global standard is unrealistic, Turck presented its multiprotocol technology launched in 2012 as a unique and pragmatic way of handling different languages. Devices with multiprotocol Ethernet technology are able to communicate with the three most common Ethernet protocols worldwide – Profinet, Ethernet/IP and Modbus TCP. They combine three protocols in one device.

Thanks to Beep only one IP address is required to connect up to 33 I/O modules in Ethernet networks

Problem solver

Every day, industry is faced with new challenges. The solving of a problem mostly involves the discovery of new requirements that have to be met. The development of Turck's Beep technology is based precisely on this principle. With the launching of its TBEN-S and TBEN-L device series, Turck has offered autonomous fieldbus modules that can each be accessed individually with a single IP address in the network. A useful innovation, since the customer saves costs for additional fieldbus couplers and can manage without the use of proprietary sub-bus structures. There is no other more efficient I/O solution, particularly for applications with a medium to low I/O density, such as on robots.

In very large networks containing many stations, however, a direct fieldbus connection can be a disad-



vantage. In these kinds of installations, IP addresses can be rare. The number of connections that controllers can manage is also limited. In order to solve this problem, Turck developed the new Backplane Ethernet Extension Protocol. Beep enables up to 33 block I/O modules and up to 480 bytes of process data to be combined as an Ethernet subnet. This type of subnet only needs one IP address and communicates via a single connection with the controller. Irrespective of whether it is a Profinet, Ethernet/IP or Modbus TCP network.

Beep simplifies communication

In this kind of Beep network one module acts as a master while a maximum of 32 additional modules act as slaves. Users thus benefit twice over: They firstly do not have to purchase any special gateways with proprietary cabling in order to establish the subnets and reduce IP addresses. This is because each block I/O module can either be used as a Beep master or slave. Secondly, through the reduction of the IP addresses, the user can create I/O networks with a high density and connect them with low cost controllers via a smaller number of supported connections.

Another benefit is the fact that Beep operates with all standard Ethernet components. Furthermore, configuration couldn't be easier thanks to the integrat-

QUICK READ

With the launch of its multiprotocol technology six years ago, Turck introduced a new "era of simplicity" in fieldbus technology: Under the maxim "One device – three protocols", Turck's I/O modules have been able since then to operate in Profinet, Ethernet/IP and Modbus TCP networks, reducing the number of devices that users have to keep in reserve. Turck's Backplane Ethernet Extension Protocol now allows another milestone to be reached. The new protocol enables the connection of up to 33 I/O modules in a network via a single IP address.

ed web server. The user defines here the first device on the line as the Beep master and the others are automatically assigned as slaves. The master saves here all the parameters of the device configuration.

If a slave has to be replaced due to a fault or any other reason, this can be performed simply by drop-in replacement. This not only reduces the downtimes required but also the associated costs. The new slave used is automatically detected by the Beep master and





Turck's TBEN-S block I/O modules are particularly suitable for applications in restricted space

Turck TBEN-S offers unbeatable efficiency in medium to low I/O density networks, such as in robot applications



ETHERNET MULTIPROTOCOL

Under the name Multiprotocol, Turck offers fieldbus gateways and block I/O modules that combine the three Ethernet protocols – Profinet, Modbus TCP and Ethernet/IP – in a single device. The multiprotocol devices can be operated automatically in each of the three Ethernet systems. Turck's multiprotocol I/O devices detect the master after startup and adjust themselves automatically to the protocol. Read access via Modbus TCP is a special highlight, also when the controller is connected via Profinet or Ethernet/IP. In this way, HMIs as well as edge gateways and cloud systems can access all process values in parallel with the PLC.

The multiprotocol technology offers users of Ethernet protocols many benefits:

Profinet

- Profinet Real Time (RT) Conformance Class B with topology detection and automatic address assignment
- Fast startup (FSU), best in class with < 150ms
- Ring redundancy (MRP)

Ethernet/IP

- Fast startup (QuickConnect), best in class with < 150ms
- Ring redundancy (DLR)
- Different configuration options for different controller environments

Modbus TCP

- All standard Modbus function codes supported
- Simple integration in Schneider and Mitsubishi controllers, industry PCs and control systems for process automation

supplied with the necessary parameters. A new manual configuration is unnecessary.

The configuration must ensure that the Beep network is installed in a linear topology. The Beep master here always has a static IP address whereas the Beep slaves are not assigned any IP addresses. Several Beep networks can also be operated in sequence along a line. They are configured according to the same principle: Master – Slave – ... – Master – Slave. Mixed operation consisting of Beep networks and the devices of other manufacturers is possible without any problem.

Users benefit from the large product portfolio

Beep is available as a firmware update for all Turck multiprotocol modules of the TBEN-S and TBEN-L series as well as on the FEN20 modules. Turck's TBEN-L modules are some of the classics of the IP67 block I/O modules. Besides modules with normal I/O interfaces, the TBEN-L series also includes IO-Link masters, Profisafe and Ethernet/IP, CIP safety, as well as RFID interfaces. Turck's TBEN-L-PLC also offers a full-featured IP67 controller based on Codesys-3. Thanks to their robust housing and high degree of protection, this



Beep is available as standard on all TBEN-L, TBEN-S and FEN20 modules

product series is particularly suitable for the automobile sector as well as for logistics and machine building. While the TBEN-L is used in applications requiring extremely robust devices with high degrees of protection, the FEN20 module stands out for precisely the opposite reasons. With the FEN20, Turck is offering its customers one of the smallest block I/O modules for installation in control cabinets. It offers impressive performance particularly in decentralized applications with a small number of I/O points. Thanks to its extremely compact dimensions, the FEN20 is also ideal for retrofitting Ethernet functions in existing control cabinets and small switch boxes.

Extensive application range: TBEN-S series

Turck's TBEN-S product series combines the benefits of TBEN-L and FEN20. Thanks to the fully potted housing and the extended protection range, it offers a robust design in protection classes IP65/67 and IP69K. These certified protection classes for the TBEN-S series are the result of Turck's "Out of the cabinet" strategy. The ultra-compact I/O module series is also suitable for applications in restricted space.

Like the other Beep-compatible block modules, the modules of the TBEN-S series are multiprotocol-capable and thus support the three standard Ethernet protocols. The specific protocol is detected entirely automatically. In this way, customers can connect the modules to different controller systems without any problems. This feature is particularly useful for globally operating companies.

The many modules of the TBEN-S series offer outstanding flexibility compared to the competition. The universal channels of the DXP modules can, for example, be used as inputs or outputs without any configuration. The universal analog modules can

process thermocouple and RTD signals as well as current and voltage signals. In this way, these modules also help to reduce the number of device variants that the customer has to keep in stock. Turck gives special consideration to IO-Link technology, which is a universal digital interface for the sensor/actuator level. TBEN-S modules are therefore also available as I/O-Link masters.

Turck has dedicated itself to making the commissioning and maintenance of modules as easy as possible for engineers; in terms of design as well as in terms electrical circuitry and engineering. In line with this approach, the wiring of the TBEN-S series in the field couldn't be easier – just like the direct integration in industrial Ethernet networks. While problems in installations can never be totally avoided, the TBEN-S offers users comprehensive diagnostic functions for overvoltage, current and short circuit. If a device has to be replaced, this can be performed easily and without any complicated configuration.

Turck's I/O modules already support today read access via Modbus TCP parallel to the controller connection. This approach enables HMIs and control systems, as well as edge gateways and cloud systems to access all process values. The latest protocols such as OPC UA and MQTT are naturally being worked on in the background. Turck is also an active participant in the standardization of appropriate profiles in the IO-Link community.

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