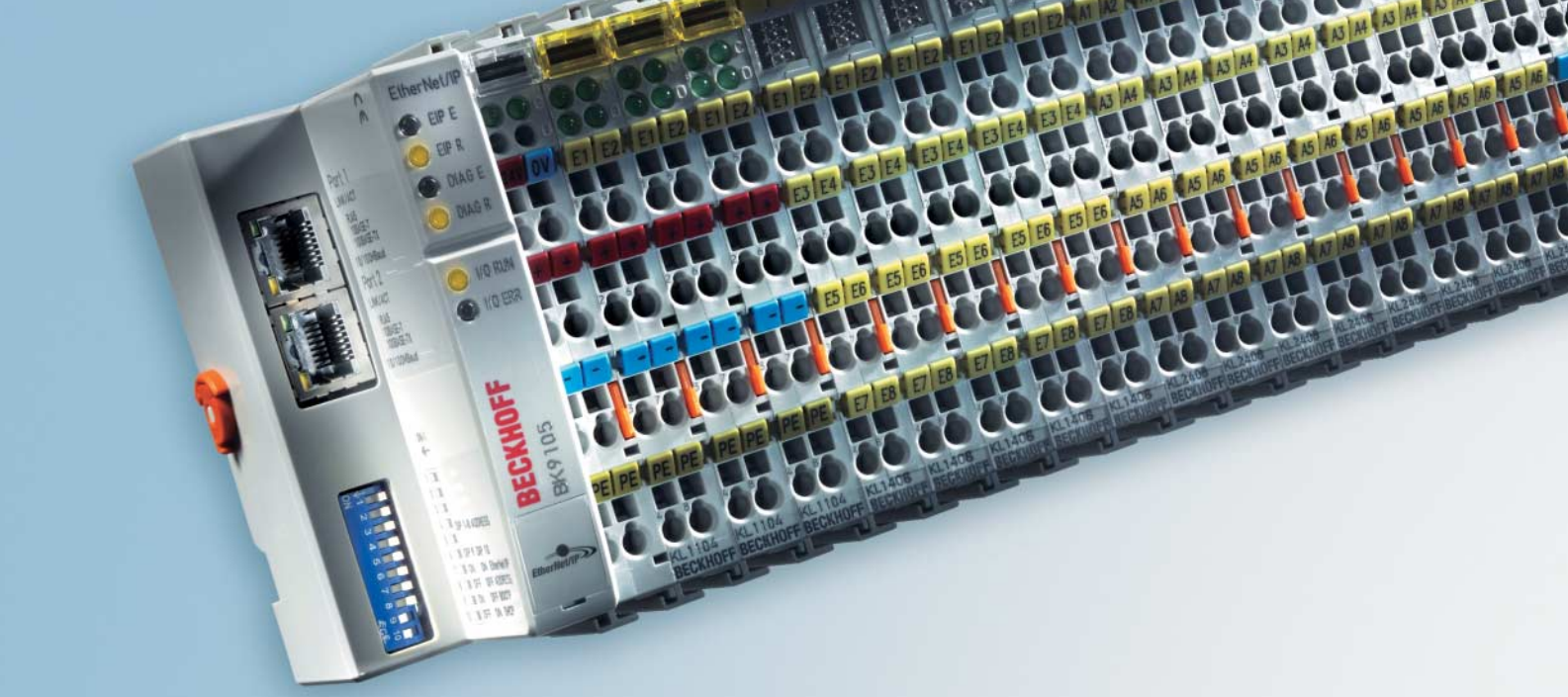


**Affordable EtherNet/IP Bus Coupler for Beckhoff I/O system**

# Open Ethernet technology for fieldbus and industrial networking

**Beckhoff maintains a long-standing tradition of open control technology and giving customers the flexibility to choose from all leading Ethernet protocols. The BK9105 Bus Coupler makes the comprehensive Beckhoff Bus Terminal I/O system of over 200 different signal types fully available to EtherNet/IP users. The BK9105 is ODVA certified and follows the producer and consumer model for I/O data.**

The BK9105 Bus Coupler is an EtherNet/IP slave and uses standard RJ45 connectors and auto-negotiates either a 10 Mbit/s or 100 Mbit/s Ethernet connection. The coupler has an integrated dual port Ethernet switch which allows for extremely flexible topology configurations. I/O nodes can be configured in a line topology as an alternative to the traditional star topology. In many applications the line topology and use of RJ45 connectors significantly reduces the required wiring effort and cabling cost. The maximum distance between two couplers is 100 m. Up to 20 BK9105 Bus Couplers are cascadable, resulting in a maximum line length of 2 km (see topology diagram).

The BK9105 can be given an IP address via several different mechanisms. For example, the BK9105 can be auto-addressed via a BootP or DHCP server, BK9105 and the server assigned IP address can be stored permanently. The BK9105 can also be addressed manually or via DIP switches.

The data transfer time of a slave or BK9105 is specified in the EtherNet/IP master. In addition to the process data the BK9105 transfers diagnostic data (status of the K-bus and the connected I/O terminals). Twelve different LEDs offer users a wealth of diagnostic information without additional tools, including: simple voltage displays, Ethernet port status and a wide range of information regarding established connections or EtherNet/IP communication status.

EtherNet/IP (Ethernet Industrial Protocol) is based on TCP and UDP. EtherNet/IP is specified by the ODVA, which also specified DeviceNet and ControlNet, and is based on these two protocols. EtherNet/IP devices are primarily used in North America. With the implementation of EtherNet/IP the wide range of electronic modular terminal blocks is now also available for these applications. The Beckhoff I/O system covers all input and output channels required in automation, from the digital and analog world right through to the serial interface.

A wealth of experience with the development of fieldbus connections led to the successful debut of the BK9105 at the EtherNet/IP Plugfest in Chicago in May this year. The BK9105 can therefore be operated in a cross-vendor EtherNet/IP network.

### Open Ethernet solution supports numerous protocols

In addition to the ultra high-speed, deterministic EtherCAT system, Beckhoff supports almost every major "Ethernet fieldbus", complementing traditional fieldbus systems. The Beckhoff Bus Terminal system supports 17 bus systems and 7 different Ethernet protocols:

- BK9000, BK9100: ModbusTCP, ADS/TCP, ADS/UDP, real-time Ethernet
- BK9103: PROFINET (in preparation)
- BK9105: EtherNet/IP
- BK1120: EtherCAT

A separate Beckhoff I/O Bus Terminal system is also available for EtherCAT. In contrast to Bus Terminals, where the fieldbus signal is contained within the Bus Coupler and translated into a "fieldbus-neutral" terminal bus, the EtherCAT protocol remains fully intact as it passes through each individual I/O terminal. EtherCAT enables the Ethernet star topology to be replaced with a simple line structure containing any number of nodes or with flexible tree topologies.

→ EtherNet/IP Bus Coupler
**www.beckhoff.com/BK9105**
→ Bus Terminal
**www.beckhoff.com/busterminal**

## Committed to tradition

Ralf Vienken, Product Manager for the Bus Terminal system and specialist for bus interfacing at Beckhoff, comments on the fieldbus and Ethernet diversity: "The automation market is very dynamic. New fieldbuses appear, while others disappear from the market. Innovations in this segment create competitive advantages for the customer: Machines and systems become faster, production times are reduced. With Industrial Ethernet, processes are simplified through networking of the field level and IT level. However, given the wide range of existing fieldbus systems, the question is whether the market really needs more Ethernet systems. Ethernet-based fieldbus systems such as ModbusTCP, EtherNet/IP, PROFINET or EtherCAT have the advantage of standardized transfer components, i.e. cables, connectors and switches. Ethernet offers cost-effective, proven and fast serial data communication. However, different solutions uses different protocol layers and are therefore incompatible.

Beckhoff traditionally uses open automation solutions based on standard technologies. Since the introduction of the Bus Terminal I/O system in 1995, we have supported fieldbuses such as PROFIBUS and CANopen in parallel to the Beckhoff-developed Lightbus. This fieldbus know-how is now proving beneficial for the development of new products and implementations. As a system provider for control technology, we supply a complete automation solution. When it comes to communication media, the customer is free to select the bus system that suits his application and control architecture. It is therefore only consistent that we support further Ethernet 'dialects' in addition to our favored EtherCAT solution.

With the BK9000 Ethernet TCP/IP Bus Coupler, Beckhoff responded to the trend of Ethernet-based control technology at an early stage. The BK9000 offers four different protocols, i.e. ModbusTCP, ADS/TCP, ADS/UDP and real-time (RT) Ethernet. The BK9100 extended the successful series with a version with integrated dual-port switch. Following the philosophy of open control technology, the Bus Terminal system has now been complemented with a Bus Coupler for EtherNet/IP. The BK9103 Bus Coupler for PROFINET will be available starting in the fourth quarter of 2006."

**Topology configuration of EtherNet/IP with BK9105 Bus Couplers**