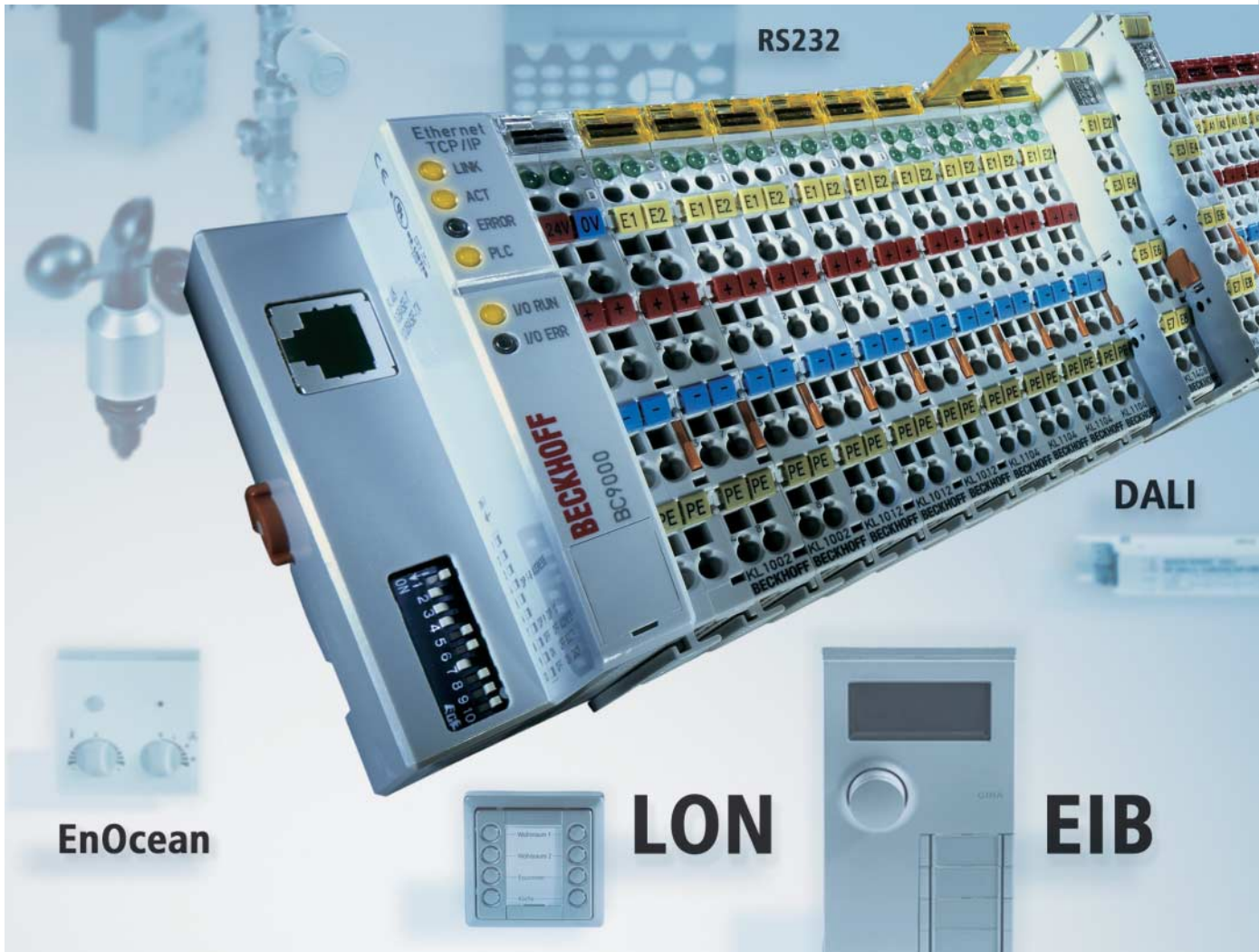


EIB and LON devices integrated in Ethernet network

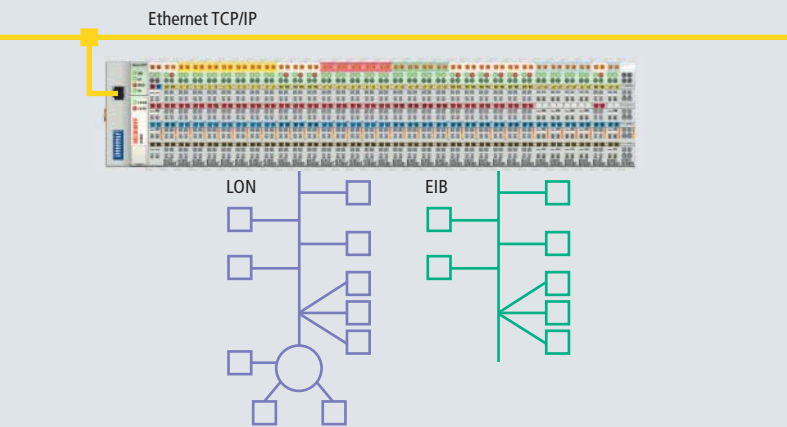


→ EIB and LON devices can now also benefit from Beckhoff PC- and Ethernet-based building automation technology. EIB and LON Bus Terminal I/O can be used to integrate associated sensors and actuators into the Beckhoff Bus Terminal system and, via Bus Couplers or Embedded PCs, into the Ethernet network or other bus systems. This approach offers cost savings during the design, construction, commissioning, and operating phases.

PC- and Ethernet-based automation is becoming more and more established as the standard in building automation and is now often preferred over traditional bus systems such as EIB and LON. Ethernet TCP/IP is the worldwide communication standard. As the existing data infrastructure, it can be used both for the office network and for building management purposes. The universal Ethernet communication system links the data worlds of office and building services. The Beckhoff Bus Terminal system and associated Ethernet couplers enable consistent application of Ethernet from the sensor/actuator level to the command level. Further arguments in favor of the Ethernet-TCP/IP solution are transfer rate per-

formance and real-time behavior. Depending on the cabling length, the maximum EIB transfer rate is 9.6 kbaud. The standard LON transfer rate is 78 kbaud, with a maximum of 1.250 Mbaud. EIB and LON are therefore less than ideal for more complex applications with high data throughput, such as HVAC control processes.

With a transfer rate of 100 Mbaud, Ethernet TCP/IP even offers adequate reserve capacity for image and voice data. After all, the integration of multimedia functions such as "Voice over IP" and communication access for mobile devices such as PDAs, mobile phones, webcams, etc. are substantial reasons for the universal



Integration into the Bus Terminal system largely retains the flexible EIB and LON topology. No EIB area or line couplers are required. Mixed operation of EIB, LON and/or further communication terminals at a single station is possible.

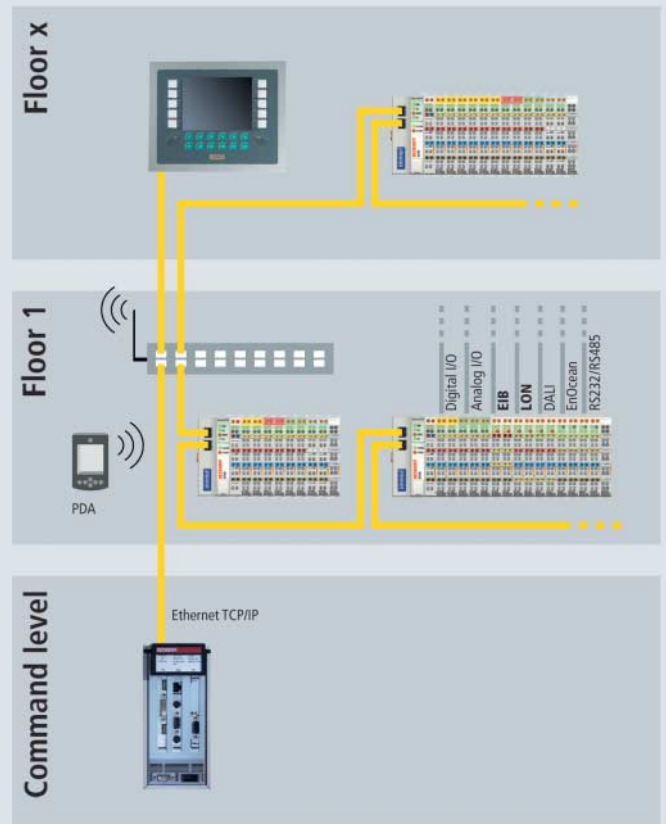
application of Ethernet. Ethernet-based bus systems for building services enable the use of cost-effective, standard components such as hubs, switches, cables and connectors. Since no separate bus system is required, no associated special technical know-how is required either.

The benefits offered by the Bus Terminal system are also available for EIB and LON users

A wide range of sensors and actuators, such as room control units, sensing devices or probes, are available (and in use) for the EIB and LON bus systems. The KL6301 (EIB) and KL6401 (LON) communication terminals were developed as extensions of the Bus Terminal system in order to enable these devices (as a quasi sub-bus) to be connected to the Beckhoff control world. Devices for traditional building bus systems can be integrated with the Beckhoff building control system, for example, as part of modernization or retrofitting projects.

Integration into the flexible Beckhoff Bus Terminal system opens up new application options for EIB/LON users: Due to the implementation as "fieldbus-independent" communication terminals, EIB/LON devices can be connected to all higher-level bus systems for which Bus Couplers or Bus Terminal Controllers are available. The system currently supports 15 fieldbuses such as Ethernet, PROFIBUS or Interbus.

The signal variety offered by Bus Terminals is now also available to EIB/LON users. The advantage is that standard sensors and actuators are used that do not require an additional bus interface. With more than 180 different Bus Terminals, the modular Beckhoff I/O system supports all relevant sensors and actuators for building automation applications. Light switches, for example, can be connected directly to a digital input terminal. Consumers up to 16 A can be connected via

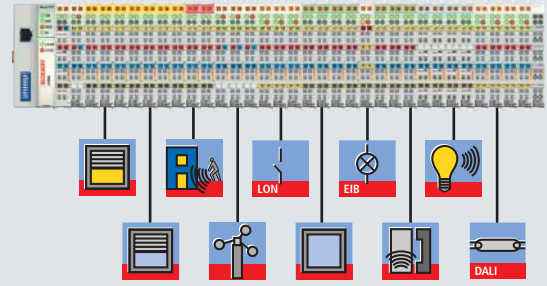


Application example for PC and Ethernet-based building automation: Ethernet is used for all office/IT infrastructure and building services communication. Subordinate systems such as EIB, LON, DALI or devices with serial interfaces are integrated into the overall system via distributed Bus Terminal stations.

digital output terminals. Wind or hydro/thermo sensors, actuators or universal dimmers can be monitored and controlled via 0...10 V analog terminals. Humidity sensors can be coupled with the control system via the 4...20 mA analog signal. Even lighting and motors for blinds can be connected directly to the system using relay output terminals.

DALI subsystems, the bus system for digital lighting system ballasts, the AS interface, RS232 or RS485, e.g. for communication with access control door terminals, can be integrated via Bus Terminals. Radio sensors can also be integrated, using EnOcean technology. The Beckhoff automation kit enables almost any building services requirement to be implemented. Functions can be amended flexibly and upgraded easily during each construction phase.

The Beckhoff Bus Terminal components enable users to operate mixed signal configurations without restriction at each station. The fine granularity of the Bus Terminals enables bit-precise composition of the required I/O channels. Several communication terminals such as EIB, LON or DALI-devices can be connected to a single I/O station, and even mixed-type configurations are possible. This significantly reduces hardware and commissioning effort and costs.



Ethernet as higher-level network

Ideally, the Beckhoff building automation concept should employ the use of Ethernet as the bus system. The use of Ethernet as a higher-level bus system offers several benefits for EIB/LON components:

- | Almost limitless data transfer due to high transfer rate;
- | in many buildings the infrastructure already exists in the form of the office network;
- | simple integration with the IT world;
- | EIB/LON components become Ethernet-compatible, since no sophisticated gateway solutions are required;
- | software updates and program downloads are available via Ethernet;
- | building services can be accessed from any PC, e.g. via HTML-based user interfaces.

Through interfacing with the locally usable Bus Terminal system, EIB/LON applications can also be used in large buildings. Integration of the subsystems into the decentralized terminal network creates smaller networks with simple and clear topology. The overall system can be split into several similar subsystems (e.g. rooms/storeys). The software applications for similar rooms and applications only have to be created once and can subsequently be transferred simply. An additional advantage of smaller networks is easier troubleshooting.

The new communication terminals can not only be used in Ethernet networks in larger buildings, they also offer benefits for smaller applications such as home automation: Powerful and scalable control systems can be created based on BC/BX Bus Terminal Controllers or on a CX series Embedded PC as intelligent head station, to which EIB and LON devices can be connected.

Application example for individual room control: The Beckhoff Bus Terminals cover all data points in a single system. The fact that standard sensors and actuators requiring no additional bus interface are used is an advantage compared with pure EIB and LON systems. Using a Bus Terminal controller or an Embedded PC as a head station, compact controllers can be configured without a higher-level system (e.g. for home automation).

EIB Bus Terminal KL6301

EIB (European Installation Bus), as the name suggests, is widely used in Europe as a bus system for cabling in buildings. It is supported by many manufacturers, particularly for home products. EIB runs on commercially available twisted pair cables with a data rate of 9.6 kbaud.

The KL6301 EIB Bus Terminal is integrated in an EIB network and can receive/transmit data from/to other EIB devices. Through integration into the Bus Terminal system, each Bus Terminal can handle up to 64 EIB components. The EIB terminal has 4 filters that filter the group addresses. Application programmers can use the filters to specify which telegrams are relevant for the application, and which are not. The start address of the group is configured (e.g. 1/2/10). This address indicates the length of the group address. At a length of 10, for example, all telegrams between 1/2/10 and 1/2/19 are transferred to the control system. A total of 256 group addresses, resulting from 4 filters with a maximum length of 64 per filter, are available. The KL6301 ignores all other telegrams. If more than 256 group addresses are required, a further EIB Bus Terminal has to be used. Arbitrary group addresses can be used for writing data to EIB devices, offering almost unlimited flexibility. An IEC 61131-3 library is used for data communication with the Beckhoff controller and for configuring the filters.

LON Bus Terminal KL6401

LON (Local Operating Network) is a multi-network-capable communication system for distributed applications. In a building automation context it is mainly used in commercial buildings. LON devices communicate with each other via a Neuron microcontroller. The maximum data transmission rate is 1.25 Mbaud, depending on the distance that has to be covered.

The LON Bus Terminal supports 62 SNVTs (standard network variable types) that can be chosen from more than 170 SNVTs. For example, 61 input SNVTs and 1 output SNVT could be configured. An XIF file is created for configuration via a LON tool, in which case no additional plugin is required.

The programmer decides how and when a network variable is to be sent; in other words, the system offers maximum flexibility for the application. Additional LON Bus Terminals can be integrated if more than 62 SNVTs are required.

Commissioning of the EIB/LON Bus Terminals

The EIB and LON Bus Terminals can be used with all Beckhoff controllers, i.e. BC, BX, CX and PC. IEC 61131-3 function blocks for TwinCAT PLC that are available free of charge are used for communication with the Bus Terminals. In addition to TwinCAT PLC, the following software tools are required:

- | **EIB:** ETS software (standard commissioning tool for EIB networks) for configuration of the connected EIB devices.
- | **LON:** KS2000 configuration software from Beckhoff, version 4.3.0.39 or higher, LON integration tool, e.g. LonMaker.