

New Bus Terminal generation:  
Packing density doubled,  
space requirements halved

Doubling of the packing  
density from 8 to 16  
connection points

Available for Beckhoff  
Bus Terminals and  
EtherCAT Terminals



**16** connection points in the 12 mm I/O terminals. The High-Density Bus Terminals are available in different variants, e.g.:

- | 16 digital inputs
- | 16 digital outputs
- | 8 digital inputs + 8 digital outputs
- | 8 digital inputs (2-wire system)
- | 8 digital outputs (2-wire system)

12 mm

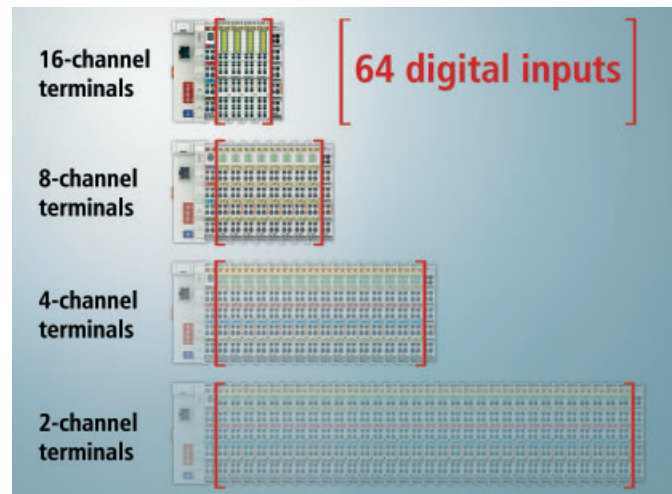
# The HD Bus Terminals from Beckhoff: 16 channels in 12 mm wide I/O

Beckhoff has expanded its IP 20 I/O systems with a new generation of Bus Terminals that dramatically increases packing density. The HD Bus Terminals (High Density) feature 16 digital channels in the housing of a 12 mm electronic terminal block. The continuous increase in electronics efficiency the last few years has reduced the power dissipation so that "double packing density" is possible for I/O today. This results in multiple cost advantages: the space requirements in control cabinets can be reduced and the per channel price has dropped significantly. The 16-channel terminals are available both as standard Bus Terminals and as EtherCAT Terminals.



### Development history of the 12 mm Beckhoff Bus Terminals:

- 1996:** Introduction of Bus Terminals with 2- and 4-channel terminals
- 2001:** 8-channel digital I/O Bus Terminals
- 2003:** Introduction of EtherCAT Terminals in 2-, 4- and 8-channel versions
- 2004:** 8-channel analog I/O for EtherCAT and Bus Terminals
- 2009:** 16-channel digital I/Os for EtherCAT and Bus Terminals



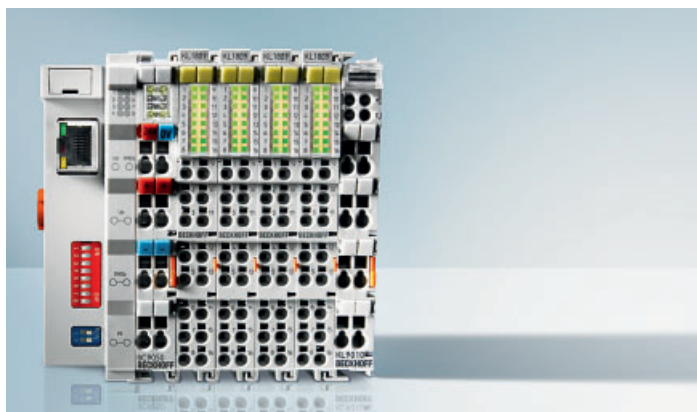
The Beckhoff I/O system has been continuously expanded since the introduction of Bus Terminals in 1996. For a long time, the physical limitation of 8 channels in a 12 mm terminal block was considered to be the maximum high density for the format. With the development of the standard housing, the number of channels has now been doubled. The new High-Density Terminals with 16 connection points have identical external dimensions to existing Bus Terminals and are compatible with these. The inner workings, however, have been completely revised. What seemed unthinkable years ago – a doubling of the number of channels – has been achieved due to state-of-the-art contact technology and electronics. The general evolution of electronic components, which are designed smaller and with lower power dissipation, a more compact structural design in the manufacturing of circuit boards as well as new materials and manufacturing processes in contact technology have provided the conditions required to set this new milestone in I/O technology.

Compression in the control cabinet: HD and standard Bus Terminals in comparison. With 64 digital inputs, an installation width of 384 mm results if 2-channel Bus Terminals are used (12 mm per terminal x 32), with 16-channel terminals it is reduced to 48 mm (plus a Bus Coupler in each case). The space requirement in the control cabinet is thus significantly reduced.

Uwe Prüßmeier, product manager for Beckhoff I/O systems, said: "The continuous development of the Bus Terminal system secures Beckhoff a leading role in the field of modular I/O systems. With the HD Bus Terminals, this innovation is also clearly visible from the outside. The space required for each channel has reached a new minimum."



The HD Bus Terminals make extremely compact controllers possible: the example application combines an Ethernet Controller with IEC-61131-3 mini PLC and 64 digital I/Os including the end terminal in a space of just 104 mm.



### Reduction of control cabinet space

The Beckhoff I/O system is based on the 12 mm terminal block with an internal system bus: K-bus for Bus Terminals and E-bus for EtherCAT Terminals. With the introduction of Bus Terminals, 4-channel terminals were initially available. 8-channel digital terminals followed in 2001 and, in 2004, 8-channel analog terminals in a 12 mm housing. The majority of the I/O terminals produced by Beckhoff are digital terminals. In most machines and systems, the acquisition and output of 24 V digital inputs and outputs form the main part of the controller. The compact 16-channel Bus Terminals offer new benefits for project planning: doubling the channel density lead to a halving of the required control cabinet space, the price per channel is reduced and assembly is greatly simplified.

### Overview HD Bus Terminals

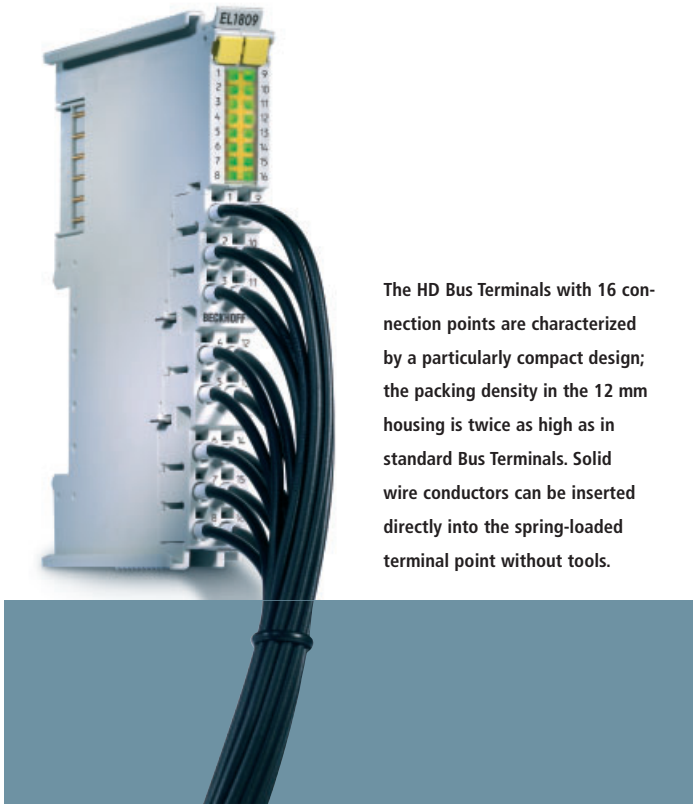
EtherCAT Terminal	Bus Terminal	Signal
EL1809	KL1809	16 x digital input 24 V DC, 3 ms, IEC 61131-2 type 3/1
EL1889	KL1889	16 x digital input 24 V DC, 3 ms, ground switching
EL1804	KL1804	4 x digital input 24 V DC, 8 x 24 V DC, 4 x 0 V DC, 3-wire connection, 3 ms, IEC 61131-2 type 3/1
EL1808	KL1808	8 x digital input 24 V DC, 8 x 24 V DC, 2-wire connection, 3 ms, IEC 61131-2 type 3/1
EL1819	KL1819	16 x digital input 24 V DC, 0.2 ms (KL1819) or 10 $\mu$ s (EL1819), IEC 61131-2 type 3/1
EL1814	KL1814	4 x digital input 24 V DC, 8 x 24 V DC, 4 x 0 V DC, 3-wire connection, 0.2 ms (KL1814) or 10 $\mu$ s (EL1814), IEC 61131-2 type 3/1
EL1859	KL1859	8 x digital input 24 V DC IEC 61131-2 type 3/1, 8 x digital output 24 V DC, 3 ms, 0.5 A
EL2809	KL2809	16 x digital output, 24 V DC, 0.5 A
EL2808	KL2808	8 x digital output, 24 V DC, 0.5 A, 8 x 0 V DC, 2-wire connection
EL2889	KL2889	16 x digital output, 24 V DC, 0.5 A, ground switching
EL9184	KL9184	8 x 24 V DC + 8 x 0 V DC, potential distribution terminal
EL9188	KL9188	16 x 24 V DC potential distribution terminal
EL9189	KL9189	16 x 0 V DC potential distribution terminal

### Wide range of applications – more compact machines

The benefits of HD Bus Terminals can be utilized for a wide range of applications, from building automation to control engineering. Miniaturization in the field of control technology allows designers to build their machines even smaller and more compact. The reduced I/O volume requirement also leads to greater creative freedom, because the design does not have to give so much consideration to the space requirements of the controller.

### Tool-less assembly

Despite higher channel density, wiring is simpler due to tool-less assembly. The conductors are connected without tools for solid wire conductors



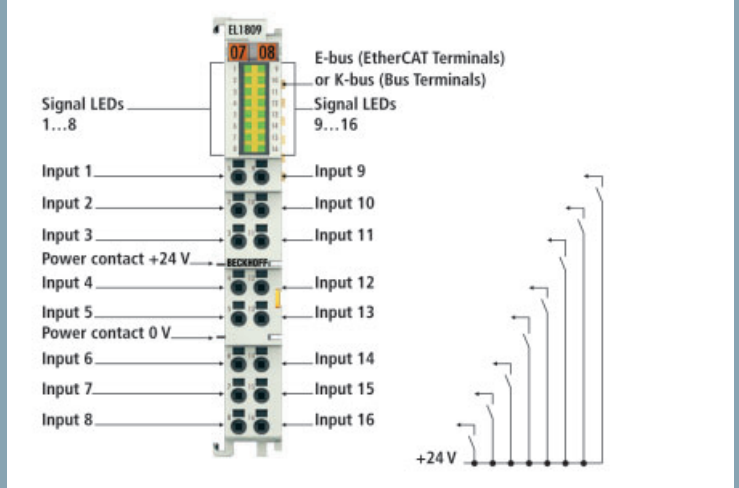
The HD Bus Terminals with 16 connection points are characterized by a particularly compact design; the packing density in the 12 mm housing is twice as high as in standard Bus Terminals. Solid wire conductors can be inserted directly into the spring-loaded terminal point without tools.

using the direct plug-in technique, i.e. the cable is simply plugged into the contact point. The cables are released, as usual, using the contact release with the aid of a suitable screwdriver. The power consumption of a single terminal is limited to 8 A or 0.5 A per channel. The permissible conductor cross-section for conductors with a ferrule is 0.14...0.75 mm<sup>2</sup>, for solid wires 0.08...1.5 mm<sup>2</sup> and for stranded wires 0.25...1.5 mm<sup>2</sup>.

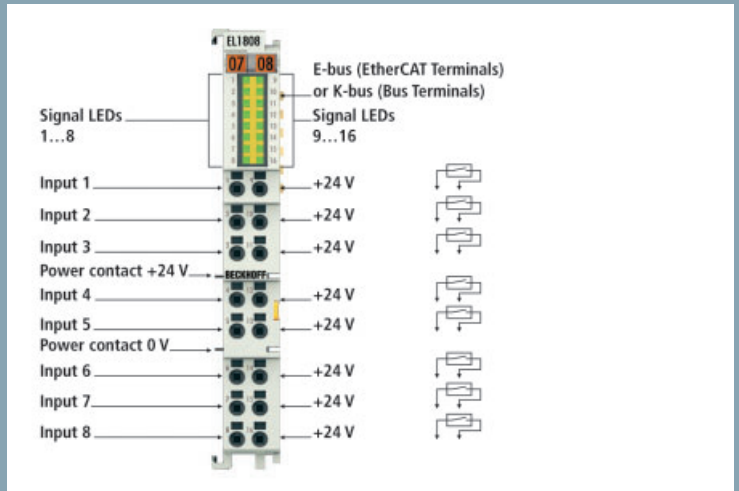
**16-channel format for Bus Terminals and EtherCAT Terminals**

The new 16-channel terminals are available for both the Bus Terminal system and the EtherCAT Terminal system. The "fieldbus-neutral" Bus Terminals with internal K-bus can be used in all common fieldbus and Industrial Ethernet systems. With around 400 different Bus Terminals, Beckhoff offers a comprehensive I/O system that covers virtually all applications in the sensor/actuator field.

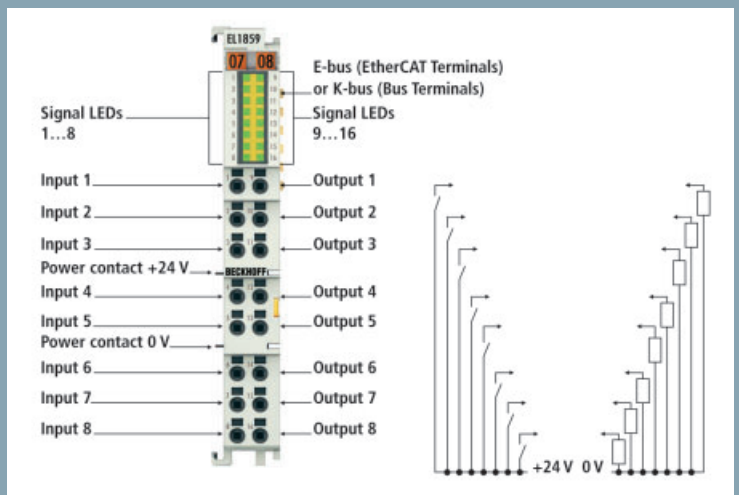
Analogous to the Bus Terminals, the EtherCAT Terminal system is a modular I/O system consisting of electronic terminal blocks. The modular housing concept of the EtherCAT Terminals is identical to that of the Bus Terminals and differs only with respect to the "inner workings." As opposed to Bus Terminals, where the fieldbus signal is converted in the Bus Coupler to the internal, fieldbus-independent K-bus, the EtherCAT protocol with 100 Mbit/s is fully retained to each individual terminal, so that the sub-bus is eliminated. The high performance of the EtherCAT Terminals enables the integration of new functions in the I/O station, such as high-end measurement technology.



Example application of an HD Bus Terminal: the EL1809 and EL1819 EtherCAT Terminals feature 16 digital inputs each with a single-wire connection. The reference ground for all inputs is the 0 V power contact. These versions have input filters with different speeds.



The EL1808 EtherCAT Terminal features eight digital inputs, consisting of signal input and + 24 V DC for 2-wire connection.



The EL1859 EtherCAT Terminal combines eight digital inputs and eight digital outputs each with a single-wire connection.