

KL6811 Master Bus Terminal for the new DALI standard

Digital light management integrated in I/O system

Modern building automation requires flexibility down to the last data point. PC and Ethernet-based automation enables complex control concepts to be realized at the medium and company-wide building management level. The new DALI standard now offers a further alternative for the lower automation level. The Digital Addressable Lighting Interface is an industrial standard for controlling digital electronic (mainly lighting) devices.

Fluorescent lamps have been a standard component of lighting systems for decades. High efficiency and long operating life are the main advantages compared with filament technology. The entry of electronics into this sector, in particular the development of electronic starters, led to noticeable improvements for the application. The electronic ballast controls the complete energy flow electronically. The lamp can be started quickly and gently. The efficiency of fluorescent lamps could be increased further, and they can now be dimmed without problem.

How does the user tell the electronic ballast the desired brightness value? A further cable is required. The electronic ballast fully controls the mains voltage to ensure the functionality of the lamp. It therefore

seems pointless to additionally switch the mains voltage via a switching contact. The electronic ballast requires a digital interface that should be as cost-effective as possible and simple to handle. Ideally, all lamps should be operated in parallel from the 230 V AC mains supply and via a 2-wire bus. This would minimize the installation effort and the cost of materials. With DALI, several manufacturers of lamps and electronic ballasts have defined a standard that meets all requirements and opens up new options.

DALI master in standard bus terminal

Beckhoff regards itself as a specialist for communication technology and supports access to DALI net-

works in simple form. A type KL6811 Bus Terminal with an overall width of only 12 mm contains a DALI master and a DALI power supply unit for the operation of up to 64 DALI devices (slaves). As a DALI controller, the KL6811 searches the addresses during start-up and supports the user during commissioning of his system. Due to its design as a master terminal, the unit is independent of the Bus Coupler used. The DALI Bus Terminal can therefore be integrated as a subsystem in all common bus systems such as Ethernet, Profibus or CANopen.

DALI was designed as a standardized interface for the control of electronic ballasts for fluorescent lamps via digital control signals. Individual addressing is possible, which means that each lamp can be controlled in-

An ideal combination: Ethernet and DALI

The significance of Ethernet for building automation will continue to grow. EtherCAT opens up further options in terms of cost reductions and performance. The DALI standard is the ideal complement to Ethernet: low costs for actuator control, simple installation, low design effort.

dividually. For each KL6811 Bus Terminal, 64 addresses can be assigned, which means that 64 digital devices can be connected and controlled independently via the same control line. The 64 devices can be grouped into a maximum of 16 groups. So-called broadcast addresses are available that offer the option of addressing all units connected to the KL6811 Bus Terminals independent of their individual device address.

The Digital Addressable Lighting Interface

DALI is not a building management bus system, but a signal for the digital control of lighting devices. To this end it links lighting, sensor, switch and contact elements with each other. These DALI connections

can be changed without problem. The technical precursor of DALI was the Digital Serial Interface (DSI). The digital DSI control signal (8-bit serial) is transferred to the devices via two wires. The KL6811 Bus Terminal also supports DSI. DALI is an expanded DSI interface with a 19-bit command set and is supported by all main electronic ballast manufacturers. The additional information in the control code is mainly used to enable individual addressing (8 bit) of the individual electronic ballast lamps in one or several groups. The respective command comprises 8 bits; in addition there is 1 start bit and 2 stop bits. Like for DSI, DALI also provides fault feedback (11 bits, 1 start bit, 2 stop bits, 1 data byte) for devices.

DALI enables flexible lighting control for changing conditions, e.g. changes in room layout. Lamps and operation elements are reassigned. DALI is seen as future-proof and can easily be connected to higher-level bus systems and controlled via gateways. The DALI signal is protected against incorrect connection and interference and enables faultless transfer of the control information, even over long distances.

Features at a glance

- | DALI definition in IEC 60 929
- | User data transfer rates of 1200 bit/s enable failsafe operation
- | Potential-free control input
- | Two-wire cable, no polarity
- | Up to 64 DALI devices
- | Addressing options: all together, group-wise, individual
- | Scene storage within the DALI device (maximum 16)
- | Programmable dimming times, dimming range (depending on the electronic ballast used) 0.1%–100%
- | Feedback of information: ON/ OFF, current brightness value
- | Cable lengths: up to 100 meters (0.5 mm² minimum diameter), 100-150 meters (0.75 mm²), more than 150 meters (1.5 mm²)
- | Max. cable length between two connected system devices: 300 m

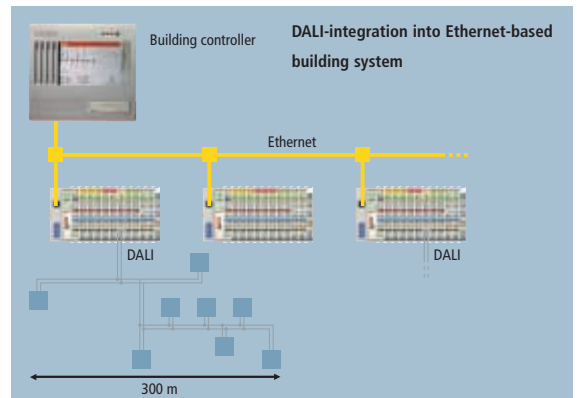
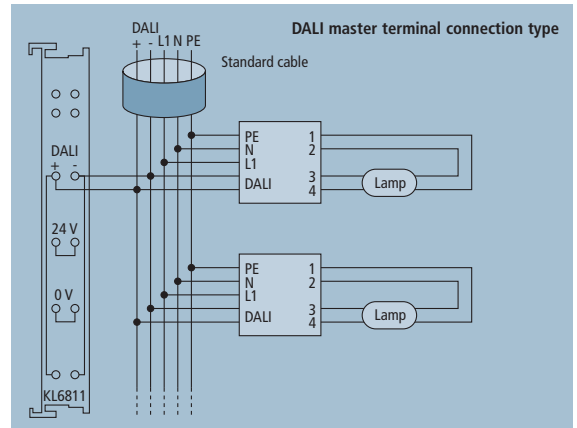
→ For further information:
DALI Activity Group
www.dali-ag.org

Simple installation

Installation of the DALI system is extremely simple and can be implemented via the mains voltage and a standard 5-wire line (NYM ribbon conductor or non-metallic sheathed cable). Since the DALI signal does not have any polarity, the possibility of a wrong connection is eliminated from the outset. Further protection is offered by the DALI Bus Terminal, which is not damaged if 230 V are connected accidentally, but switches off.

Today, the main DALI devices are electronic DALI ballasts. In order to reduce the load on the DALI interface, part of the intelligence of the DALI controller was moved into the electronic ballasts. Compared with previous models, they now have additional intelligence and are able to

manage up to 16 light scenes and can save 16 light values. Change-over times and rates, and minimum and maximum values can also be set via the DALI interface. As a controller, the KL6811 Bus Terminal only sends control sequences such as ON, OFF, UP, DOWN, GO TO SCENE, ADD TO GROUP, etc. via the interface to the electronic ballast, for example, which executes the commands independently. Furthermore, the electronic ballast can communicate with the KL6811 Bus Terminal and transfer feedback regarding lamp faults, dimming value, error messages, etc.



KS2000: Groups of lights are simply allocated via mouse click

The Beckhoff configuration software KS2000 enables simple configuration or commissioning of the DALI master terminals and the connected DALI devices. For each DALI device, the basic setting, variable changes and the group or scene allocation can be set. Direct or indirect lighting control according to the DALI specification can be implemented via the device settings. Buttons that send an associated DALI command to the selected device are available for the main functions.

With DALI, intelligence is not fully centralized in the master, but is stored in the ballasts in the form of variables. The light values can be changed via the "variables" setting. In addition, each DALI device can be assigned to one or several groups simply by clicking. For each DALI master, up to 16 groups are possible. If a DALI device receives a command in combination with a group number that is parameterized for the device, this command is executed. The assignment of up to 16 different scenes, in which the light intensity can be defined, is just as simple.

Like for other bus terminals, a connection between the PC and the respective bus coupler is established for configuring the DALI master terminals. If Ethernet is used as the building bus, the KS2000 functionalities can also be operated via the network.