DALI lighting control systems

Delivering maximum control and flexibility by bridging the gap between KNX and DALI.
Where once the ‘green office’ was something of a buzz word, the passing of new government legislation now demands that all building owners and landlords demonstrate the energy efficiency rating of their building.

The revolutionary DALI lighting control system delivers unparalleled performance, easy installation and maintenance, maximum control and flexibility and increased energy savings, making it one of the easiest ways for building managers and owners to achieve higher energy efficiency ratings.

DALI provides simplified communication and installation, yet maximum control and flexibility. Wiring is simpler. Installation costs are lower.

What's more, it allows architects and designers to create high-performance lighting that is perfectly matched to the needs of the building’s occupants.

Optimizing energy savings
Simple to install and commission, a DALI lighting control system can monitor and control lighting within a commercial office environment, which significantly reduces the use of energy. Energy costs are lowered through daylight harvesting and standard controls such as dimming and occupancy sensors.

Rather than depend on staff to turn off the lighting, the intuitive DALI system does it for you.

The system also allows facility managers and building owners to receive status reports so they can monitor energy savings and adjust lighting where necessary.

An intuitive DALI system also delivers lower maintenance costs.

A comfortable work environment
Savings in energy bills aside, the more effective the lighting control in an office, the more comfortable it is for the occupants. The DALI lighting control system allows lighting to be customized to each work environment and gives occupants control of their own lighting. The continuous automatic adjustment of lighting in response to changing ambient light levels provides occupants with a constant light level. More comfortable lighting helps to enhance workplace productivity and efficiency.

Compatibility and interchangeability
DALI was designed by leading lighting manufacturers to offer a standard to the lighting market that complies with all requirements and solves complex lighting tasks in a simple and cost-effective manner.

DALI allows interchangeability of different manufacturers’ devices and controls to create a lighting system. This includes ballasts, control systems, sensors, controllers, switches and emergency and exit signs.

Lighting flexibility
With DALI, design and user flexibility is dramatically improved over conventional, proprietary systems.

A DALI control lighting system can be scaled from a single room to a complete commercial office building. Each ballast can be individually controlled as well as belong to any or all of 16 different groups.

When building occupancy needs change, the DALI system can easily be reconfigured without the need for complex and costly rewiring.

A green office for the future
A DALI lighting control system can help deliver a higher energy efficiency rating for commercial office spaces. Increasingly, tenants and buyers are demanding buildings with a better environmental performance, demonstrated by a high energy efficiency rating, because it means their power bills are less and they can meet their company sustainability goals.

DALI sets the standard
DALI is an industry standard protocol that allows DALI-compliant components from different manufacturers to be mixed and matched together seamlessly into complete systems.

The DALI standard, specified in IEC standard 60929, is one of the world’s preferred standards.
The daily cycle of lighting within a typical office

The energy requirements throughout a 24-hour cycle in an office environment vary. Coordinating the different services within a Philips lighting control system allows an automated event-based strategy which maximizes energy efficiency and creates a comfortable and productive work environment.

The energy requirements throughout a 24-hour cycle in an office environment vary.

An automated event-based strategy maximizes energy efficiency and occupancy comfort throughout the daily cycle.
Understanding the importance of lighting control

One of the biggest challenges facing commercial building owners is reducing the day-to-day operating costs of a building while maintaining occupant comfort.

Too much or too little lighting can impact on occupant comfort levels and productivity.

Intelligent lighting control systems allow building owners to create inviting and functional office environments that improve light quality, enhance efficiency and productivity and optimize energy use.

Lighting control systems empower individuals to have direct control over their work environment and also allow users to plan for future layout and occupancy changes.

Think of it as a system that allows a building to make intelligent decisions about the optimum delivery of light. Lighting controls can switch lights off when no one is around, automatically adjust lighting levels based on the amount of natural daylight in the space and turn off or dim lights, based on the daily cycle of the office.

The perfect control of lighting means that the least possible amount of light is supplied when needed.

It’s easy to see how automatic lighting control can deliver significant bottom-line savings in energy costs as well as ensuring optimum comfort for occupants.

What is DALI?

DALI stands for Digital Addressable Lighting Interface. In other words, it is a worldwide standardized digital lighting interface. The DALI standard, specified in IEC standard 60929, ensures interchangeability and compatibility of lighting products from different manufacturers.

The DALI system was created by leading lighting manufacturers who recognized the need for a common interface. DALI was engineered to meet the new challenges of lighting control – more flexibility, greater scalability of control and faster installation.

What can DALI MultiMaster do for lighting?

Good lighting design has to include good control design and there’s no better control solution than DALI MultiMaster.

Put simply, DALI MultiMaster is a two-way communication system that brings digital technology to lighting. Every aspect of lighting can be incorporated into a DALI MultiMaster control solution.

DALI can control a single light fitting or a defined group of light fittings within a network. It brings remarkable flexibility to lighting systems. Previous generations of lighting control techniques relied on two or more data networks to be wired throughout the project for the different lamps and user interfaces within the system.

DALI MultiMaster allows for light fittings and user interfaces to use the same data network effectively reducing cabling by half.

KNX is a standardized (EN 50090, ISO/IEC 14543), OSI-based network communications protocol for intelligent buildings. Products available in the market cater for many diverse applications, for example, the integration of:

- Lighting control
- Heating/ventilation & Air Conditioning control
- Shutter/Blind & shading control
- Alarm monitoring
- Energy management & Electricity/Gas/Water metering
- Audio & video distribution

Typical Floor Plan

This diagram illustrates how an office floor with controls can achieve efficiency and effectiveness.

“A DALI system helps reduce day-to-day running costs of a building while increasing occupancy comfort.”
The advantages of a DALI office lighting control system

The DALI system at work
Traditional DALI allows for individual light fittings to be controlled and grouped together into logical areas. The DALI protocol allows for a maximum of 64 fittings on a single network and the network can be broken up into 16 different possible areas.

Shown on the right is an example of 64 DALI light fittings connected in a single network, which is divided into seven different areas.

Standby Power Management
The DALI network only controls the output level of the lamps. Once a lamp has been instructed by the control system to 0%, it’s still consuming a standby current consumption.

Individual lamp standby power consumption may not seem significant, but multiply the number of lamps within one project and it is considerable.

Without a power management strategy, this standby power consumption does not stop, 24 hours a day, 365 days a year.

The Philips Controls LightMaster portfolio solution eliminates consumption does not stop, 24 hours a day, 365 days a year.

Understanding DALI hardware and wiring
A DALI system normally consists of DALI compatible light fittings and a DALI controller. In the example below, the DALI system has all fittings connected in one network and the sensors within each of the areas are connected back on a separate control systems network.

Grouped lighting and emergency light monitoring

The DALI specification allows for a maximum of 64 lamps per network, which can be broken up into 16 different groups, each with its own lighting scene. The diagram below shows all the fittings directly connected to each other.

DALI emergency exit fittings are also compatible, allowing for scheduled testing of the lamp and battery.

Unlimited scalability with multiple DALI networks
The DALI specification details how to operate a single network. However, most projects require multiple DALI networks operating together to create a single seamless lighting system solution. The LightMaster portfolio allows unlimited scalability by combining multiple DALI networks into one system.

Any single area can be supported by multiple DALI networks that are coordinated via a single user interface.

“Easily control an entire building or multiple small tenancies.”

Reduce network cabling by up to 50%
Using the existing DALI bus for lighting control system user interface communication, effectively reduces the required network cabling by half. As the user interfaces are still networked devices, they can issue commands to change any lighting group on its own DALI network or any other lighting group within the Philips LightMaster portfolio network.

Controlling more than DALI
Sometimes a project does require more than DALI. For instance, lighting groups that require phase cut dimming, switching control or blind integration, will need more than a DALI system.

All Philips devices in the LightMaster portfolio support KNX communication, which allows a unit to communicate directly to any other unit on the KNX network without additional network gateways or central micro controllers.

This network topology supports the full range of LightMaster user interfaces, sensors and other types of load controllers.
Introducing the innovative DALI MultiMaster range

Maximizing the DALI network advantages
Philips has developed a dedicated range of products in its LightMaster KNX portfolio that provide the scalability and feature-set of our system. Below is an outline of the product features that combine to produce a new benchmark in office lighting control.

DALI MultiMaster Controller
PDBC120-DALI-KNX
- Supports full DALI network of 64 fittings.
- Allows for 10 LightMaster DALI user interfaces on the DALI bus.
- Device is fully self contained requiring no external devices for power or to be part of the DALI network.
- Built-in DALI power supply and DALI transmitter; no external devices required.
- Built-in 20A lighting power relay for removing standby power consumption when lighting is not needed.
- Directly integrated into the Philips LightMaster KNX network.

Dry Contact Interface
PPMI4-DALI
- 4 x Dry contact inputs.
- Fully DALI network compatible with no need for extra power supply.
- All settings are software configurable allowing for remote programming.
- Able to control multiple DALI groups, fitting and other Philips LightMaster KNX load controllers.
- Supports a wide range of selectable functions lighting scene select or ramping.
- Fully powered from the DALI network.

Multifunction Sensor
PLOS-CM-DALI
- Multifunction sensor supporting PIR and measured light level detection.
- Fully DALI network compatible with no need for extra power supply.
- All settings are software configurable allowing sensors to have different responses throughout a 24-hour work cycle.
- Able to control multiple DALI groups, multiple DALI networks and other Philips LightMaster KNX portfolio load controllers.
- Supporting multiple functions such as performing daylight harvesting once motion has been detected.
- Fully powered from the DALI network.

Simple network cabling means lower installation costs
The Philips LightMaster KNX portfolio of user interfaces connect directly to the same network bus as other DALI devices. There is no need for additional network or power wiring, which removes the need to run multiple networks across the office space for the lighting control system.

On any single DALI network, a total of 10 LightMaster DALI user interfaces can be mounted. These devices do not use the fittings of the DALI addressing system, allowing for the full use of 64 DALI fittings. Using the existing DALI bus means up to 50% less network cabling.

“Up to 50% less network cabling that you’ll never touch again.”
LightMaster KNX DALI MultiMaster brings functionality to every project

Often a project floor layout is not known until the late stages of construction, which means electrical installers need to change the DALI bus to match the desired floor plan, ensuring that each area does not cross the physical boundary from one DALI network into another.

The LightMaster KNX DALI MultiMaster system overcomes these restrictions by directly connecting each of the load controllers in the electrical switchboard via the KNX bus. This allows the LightMaster KNX system to coordinate multiple DALI networks into one seamless system. So, a sensor physically connected in one DALI network can control a fitting in another, reducing the number of user interfaces and allowing for unlimited area shapes and sizes.

In the example below, each colored area represents a potential area within a project. Two of the required control areas have crossed from one physical DALI network into another. The LightMaster KNX system can automatically manage the logical areas so that the DALI network physical boundaries are no longer a restriction. Intuitive head-end software allows users the freedom to change lighting zones easily.

Integrate LightMaster KNX DALI MultiMaster into an entire system solution

The LightMaster KNX DALI MultiMaster system complements the many features and product options available within the LightMaster KNX portfolio of Philips lighting controls solution offers.

The LightMaster KNX DALI MultiMaster can be used in conjunction with other devices to control non-DALI light fittings and integrate with other elements of a project, including blinds and AV systems.

This diagram shows how the LightMaster KNX DALI MultiMaster can become part of the whole system solution. A direct connection with any other device in the Dynalite system gives the complete flexibility of DALI and the full features of LightMaster KNX.

With a direct connection to the KNX bus, the LightMaster KNX DALI MultiMaster controllers can be in direct communication with any other device, requiring no additional gateways or commissioning tools.

Below: Each colored area represents a potential area within a project.
The Philips LightMaster Solution

The Philips LightMaster range has been developed to ensure easy integration into today’s modern office environment, for either retrofit or new installations by maximizing the effectiveness of KNX and DALI.

The Philips LightMaster range now brings additional solutions to the KNX world including:

- dimming actuator solutions that allow the user to decide which lighting protocol output they want to work with, including DALI addressed, DALI broadcast, DSI and 1-10v.
- a true structured cabling solution to bring the benefits of faster installation, commissioning and reduced costs.
- the benefits of being able to add sensors and dry contact user interfaces to the DALI line, reducing installation costs in field wiring.
- low profile aesthetics to the sensor range, reducing ceiling clutter without compromising performance.

The Philips LightMaster office based controls system is fully scalable and suited to both large and small installations.