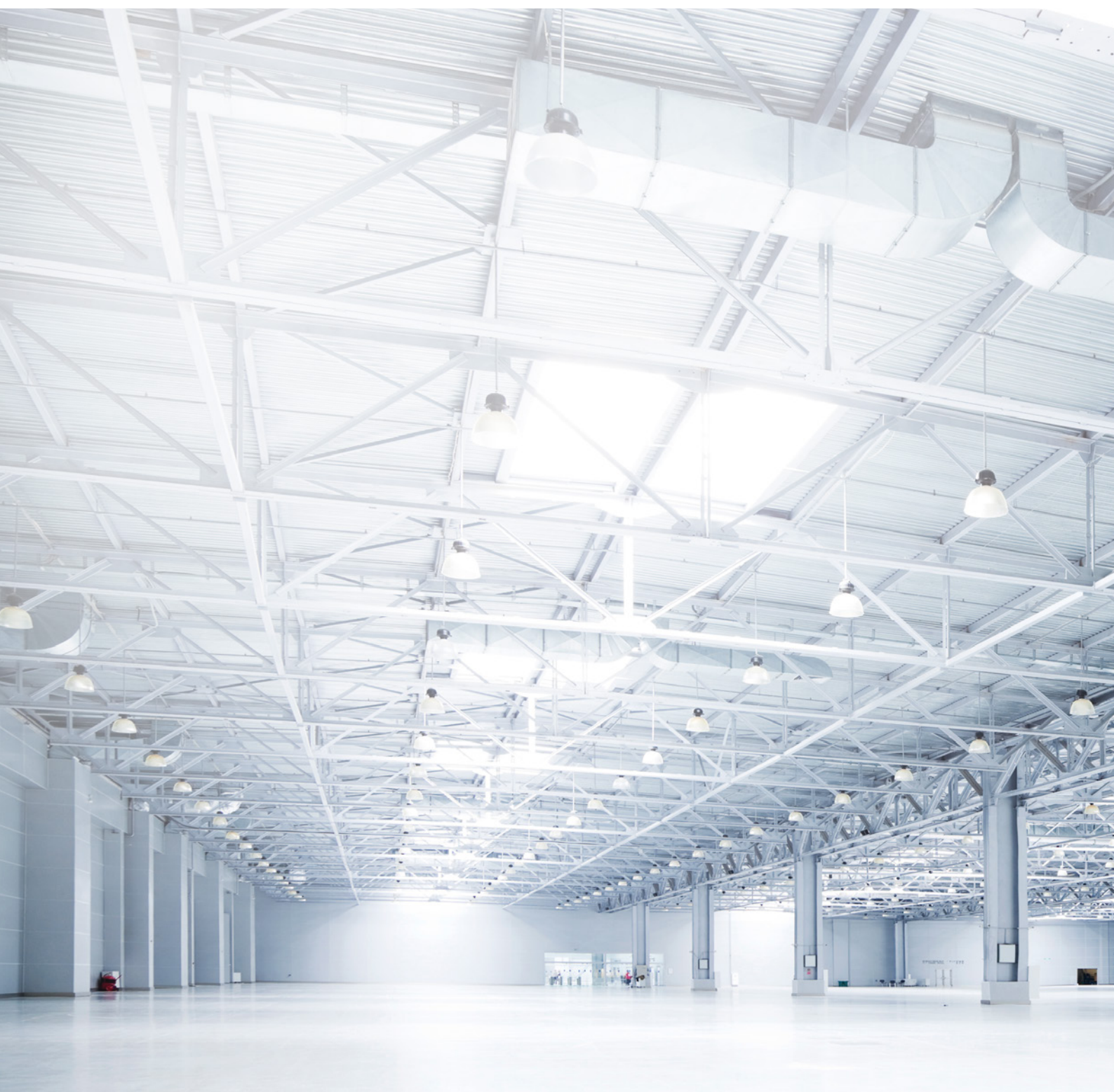# WAGO Lighting Management

The Right Light, at the Right Time, in the Right Amount

The potential for saving energy is particularly high in industrial environments because multiple shifts and night operation, as well as lack of daylight, dramatically increase the use of artificial lighting. These causes mean that investments in lighting management are amortized rapidly.
Here, you can learn how to control your system with WAGO Lighting Management to save time and money.

Content

Lighting Management – Influencing Factors

Every lighting system is over-dimensioned on day one, so it will also provide the minimum lighting demanded on day X (maintenance factor). However, without control, potential savings simply vanish. It is apparent that light not only influences our sense of well-being, it also affects the bottom line. A cost analysis should also include operating costs (energy, maintenance and service costs), which greatly exceed the initial investment for building auto-mation. From a user's point of view, no one would want to forgo some type of regulation or control being limited to merely switching lights on and off is so last century. State-of-the-art systems can be controlled and serviced independently without great effort; an example, converting the hall equipment and changing the lighting conditions. Moreover, integrating the lighting equipment into a master system is very practical for tasks like adapting lighting to your production times. Naturally, the most important thing is – and remains – ensuring sufficient lighting at the work-place to provide safe working conditions.

Good Reasons for Lighting Management

Ergonomic Reasons:
- Increase safety
- Orient occupants
- Create a user-friendly space
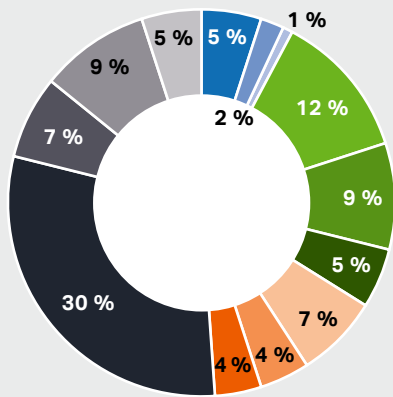- Enhance well-being
- Improve comfort

Economic Reasons:
- Save energy
- Reduce costs
- Decrease work required for opera-tion and service; simplify usage via browser
- Intelligently interlink services
- Increase building value

Psychological Reasons:
- Spark attention
- Strengthen motivation
- Boost mood

Potential Energy Savings in Buildings
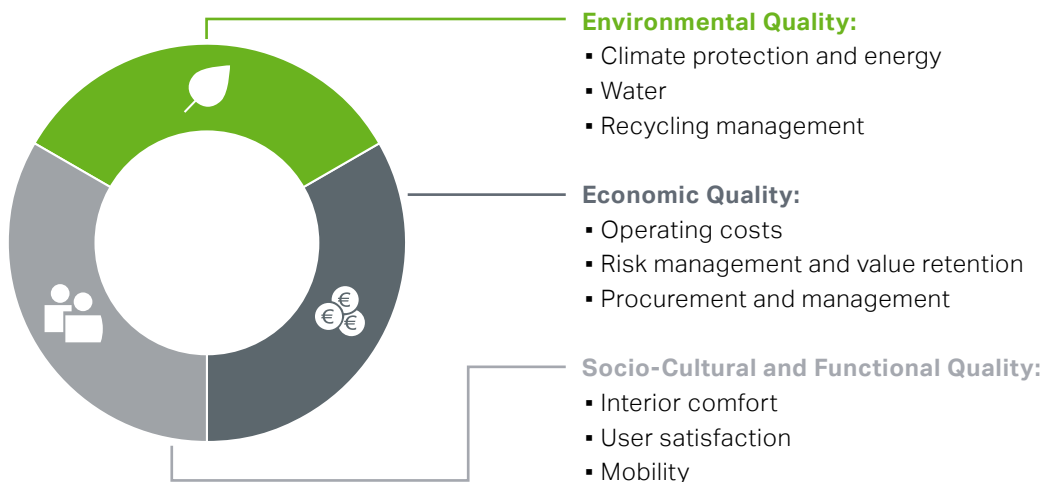

Legend:
- Raising user awareness
- Management
- Demand management
- Production lines
- Air pressure system
- Drives
- Exhaust heat utilized for heating
- Hot/cold water system
- Ventilation system
- Lighting
- Buildings
- Heating system
- (other)

Values shown: 5 %, 1 %, 2 %, 12 %, 9 %, 5 %, 7 %, 4 %, 4 %, 30 %, 7 %, 9 %, 5 %

In what areas have energy-saving measures led to the greatest energy efficiency increase in your company (n = 1047)? (Source: Study by the EEP, University of Stuttgart)

Therefore, politicians are increasing the regulation of lighting efficiency. In Germany, the Energy Saving Ordinance (EnEV) implements the various EU directives regarding building efficiency. It considers energy consumption values for heating, ventilation, cooling, hot water supply, and naturally, lighting. Certification bodies such as DGNB, which also evaluate the criteria of sustainable construction, include important lighting management factors in their assessments. These include building-related life cycle costs, flexibility and conversion capability, as well as convenience features, such as visual comfort. In addition to energy consumption goals, legal requirements, costs, lighting quality and user convenience all play parts in the decision. A simple yes-no question transforms into a complex field of topics.

Environmental Quality:
- Climate protection and energy
- Water
- Recycling management

Economic Quality:
- Operating costs
- Risk management and value retention
- Procurement and management

Socio-Cultural and Functional Quality:
- Interior comfort
- User satisfaction
- Mobility

Following nine criteria, the system focuses on all relevant topics for sustainable building operation and long-term value maintenance. The basic structure of the DGNB system "Building in operation" is based on the established three-pillar model of sustainability. It divides the essential aspects of sustainable building operation into the topics of environmental quality, economic quality as well as socio-cultural and functional quality.

The Right Light, at the Right Time, in the Right Amount

Monitoring and Service for Continuous Functionality

WAGO Lighting Management is the perfect solution for new systems and retrofits alike. It doesn't matter if it's a small production facility or a large logistics system, our scalability offers precisely the right concept to meet your needs. Reduce lifecycle costs through efficient lighting management!

Many helpful features support you as you independently operate your lighting system. An example includes a wizard-based configuration that guides commissioning. Do you only want to convert certain areas in your plant? No problem! Your plant personnel can easily reconfigure the segments in the Web GUI. Moreover, an integrated time management feature allows you to synchronize your lighting system with usage plans. The comprehensive diagnostic features, including maintenance charts, alarm tables, status displays and recording of operating time, provide additional support in planning service.

You can also easily record the energy data for lighting to comply with the Energy Services Act (EDL-G).
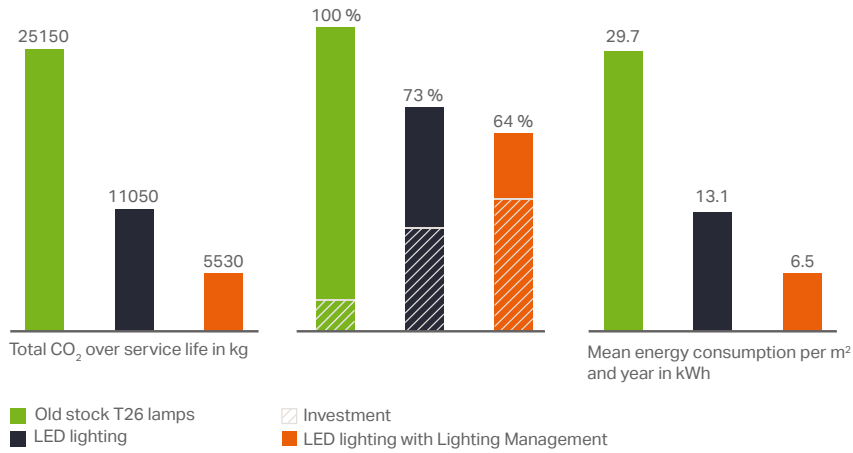Above all, this solution's focus must be the user – a large selection of functions and interface options make life easier.
WAGO Lighting Management includes an HTML5 Web User Interface (WUI) for operating and monitoring during operation.
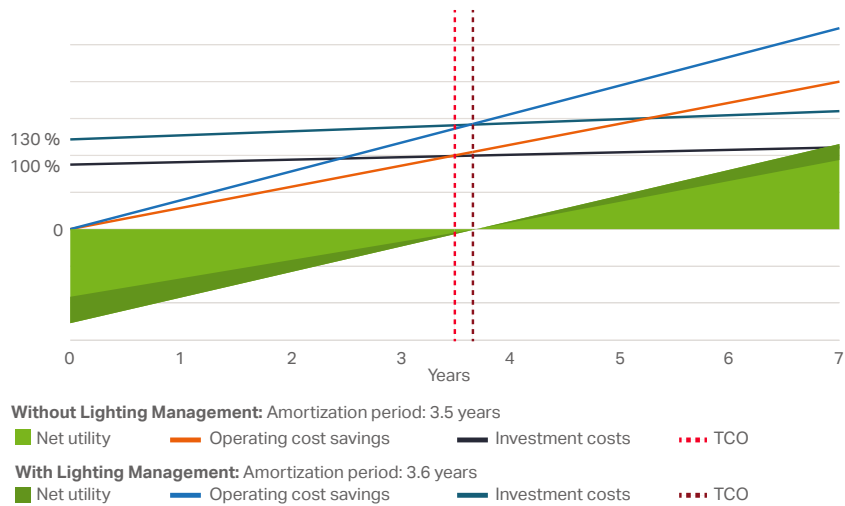Access is performed via a standard Web browser. A responsive design ensures perfect display on desktop PCs, touch panels, tablets and smartphones.
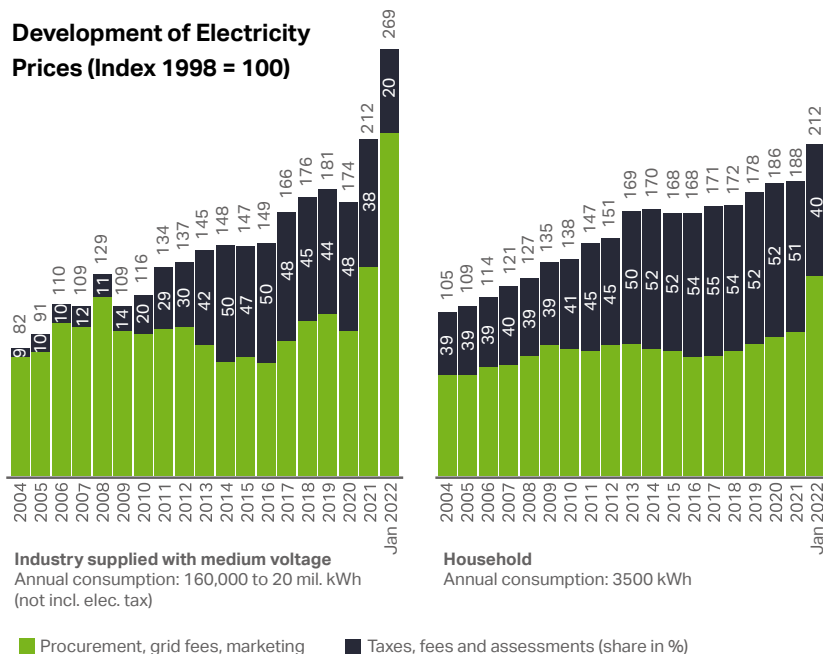
Energy Consumption and Costs for a Warehouse with 24-Hour Operation

Chart 1 (Total CO₂ over service life in kg):
- 25150
- 11050
- 5530

Chart 2 (Percentage):
- 100 %
- 73 %
- 64 %

Chart 3 (Mean energy consumption per m² and year in kWh):
- 29.7
- 13.1
- 6.5

Total CO$_2$ over service life in kg

Mean energy consumption per m² and year in kWh

Legend:
- ■ Old stock T26 lamps
- ■ LED lighting
- ▨ Investment
- ■ LED lighting with Lighting Management

Cost/Earnings Curve for a Warehouse with 24-Hour Operation

130 %
100 %
0

0 1 2 3 4 5 6 7
Years

Without Lighting Management: Amortization period: 3.5 years
- ■ Net utility
- ── Operating cost savings
- ── Investment costs
- ▪▪▪ TCO

With Lighting Management: Amortization period: 3.6 years
- ■ Net utility
- ── Operating cost savings
- ── Investment costs
- ▪▪▪ TCO

Development of Electricity Prices (Index 1998 = 100)

Industry supplied with medium voltage (Taxes, fees and assessments / total):
- 2004: 9 / 82
- 2005: 10 / 91
- 2006: 10 / 110
- 2007: 12 / 109
- 2008: 11 / 129
- 2009: 14 / 109
- 2010: 20 / 116
- 2011: 29 / 134
- 2012: 30 / 137
- 2013: 42 / 145
- 2014: 50 / 148
- 2015: 47 / 147
- 2016: 50 / 149
- 2017: 48 / 166
- 2018: 45 / 176
- 2019: 44 / 181
- 2020: 48 / 174
- 2021: 38 / 212
- Jan 2022: 20 / 269

Household (Taxes, fees and assessments / total):
- 2004: 39 / 105
- 2005: 39 / 109
- 2006: 39 / 114
- 2007: 40 / 121
- 2008: 39 / 127
- 2009: 39 / 135
- 2010: 41 / 138
- 2011: 45 / 147
- 2012: 45 / 151
- 2013: 50 / 169
- 2014: 52 / 170
- 2015: 52 / 168
- 2016: 54 / 168
- 2017: 55 / 171
- 2018: 54 / 172
- 2019: 52 / 178
- 2020: 52 / 186
- 2021: 51 / 188
- Jan 2022: 40 / 212

Industry supplied with medium voltage
Annual consumption: 160,000 to 20 mil. kWh (not incl. elec. tax)

Household
Annual consumption: 3500 kWh

- ■ Procurement, grid fees, marketing
- ■ Taxes, fees and assessments (share in %)

Source: VEA, BDEW; Date: 01/2022

Application Areas

Warehouses

Lighting is one of the greatest costs for large spaces such as warehouses. Modern lighting management is therefore essential these days. WAGO's automation solutions significantly reduce these costs because the lighting automatically adapts to the ambient brightness and is only switched on when needed via motion detectors. Energy is saved, the environment is protected and operating costs are reduced.

Production Facilities

Optimal lighting control and a flexible lighting management system have increasingly important roles within production facilities. WAGO's lighting management system facilitates the design and commissioning of new lighting systems while providing numerous additional advantages. For example, it is possible to easily divide the lighting into new areas when there is a change in use, without changing the installation or wiring.

Offices

Efficient and flexible lighting management in buildings improves working conditions and the general ambiance. Thanks to intelligent regulation and control, WAGO's solutions are geared towards these aspects. WAGO Lighting Management also supports "Human Centric Lighting" (HCL) to meet all ergonomic workplace lighting requirements. In addition, wizard-based configuration ensures that the systems can be easily activated.

Public Infrastructure Buildings

Whether it's in the airport, the arena or at school: Security, comfort and cost reduction are essential to public infrastructure. With WAGO's lighting solutions certified to follow the current DALI-2 standard, all requirements are met, ensuring perfect operation. In addition, they are easy to use without programming and can be adapted to all requirements.

Our Solution

Modern lighting management offers more than just the opportunity to save energy and money – it combines cost-effectiveness and resource conservation with user comfort and flexibility.

Our Solution

WAGO Lighting Management is a proven solution based on predefined hardware and preconfigured software, which greatly simplifies planning, commissioning and operation. The basic idea: WAGO Lighting Management is ready for the vastly different light requirements of warehouses and production facilities.

For example, a production facility is divided into different areas known as "segments" in which the light can be flexibly adapted. Each segment can be flexibly and uniquely tailored to the sensors, actuators and functions used. With the help of the segments, it is possible to implement retrofits and room changes quickly and easily – all through web configuration.

Configuration

WAGO Lighting Management features a Web interface that allows you to easily create and edit segments. Do you need to illuminate a production line, hallway or storage area? No problem – simply create three different segments with the required functions. The values can be forwarded to a higher-level building control system or to a production control center via Modbus TCP/IP or OPC UA. The connection to various cloud systems is also possible and offers location-independent operation and system monitoring, including fault message management and evaluation of energy consumption data, for example.

WAGO Lighting Management significantly reduces the overall costs of new installations and conversions. WAGO Lighting Management provides the perfect combination of high-quality hardware and intuitive custom software. Reduce lifecycle costs with quick and simple commission-ing, comprehensive diagnostic and service capabilities and straightforward lighting adaptation to varying require-ments.

Works photo, WAGO
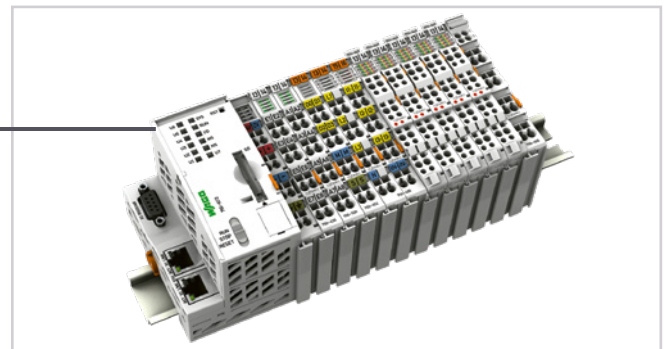
Your Benefits:
- Reduce lifecycle costs through efficient lighting man-agement
- Scalable to any system requirement
- Commissioning via self-guiding, wizard-based configu-ration
- Simple conversion without programming
- Connect to higher-level management and control sys-tems within industrial or technical building environments

Operation

Operation

WAGO Lighting Management has a visualization interface for particularly convenient and clear operation via different end devices. WAGO Lighting Management Visualization is available as an optional (and additional) function. The visualization works for all controllers and enables access to several controllers in the same network.

Features:

- HTML5 WUI for WAGO Lighting Management operation and monitoring
- Access via standard Web browser
- Responsive design for perfect display on desktop PCs, touch panels, tablets and smartphones
- Creating and managing profiles (including areas and rooms) and assigning them to operating devices and/or users
- Setup wizard for easy commissioning
- Customize UI colors

Lighting Management Controller 1   Lighting Management Controller 2   Lighting Management Controller 3
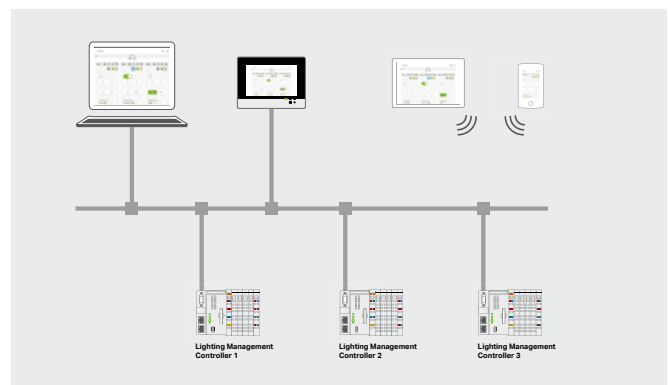
WAGO Lighting Management Visualization – Custom Views
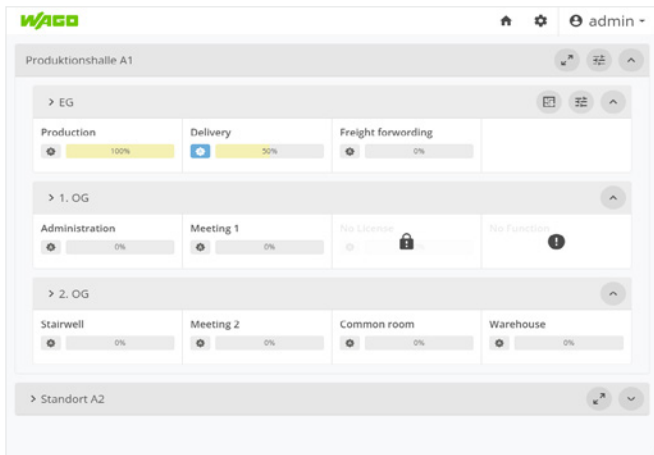
Overall View

The overall view summarizes all sections (e.g., buildings), sub-sections (e.g., floors) and configurable rooms. The number of controls is minimized in this view.
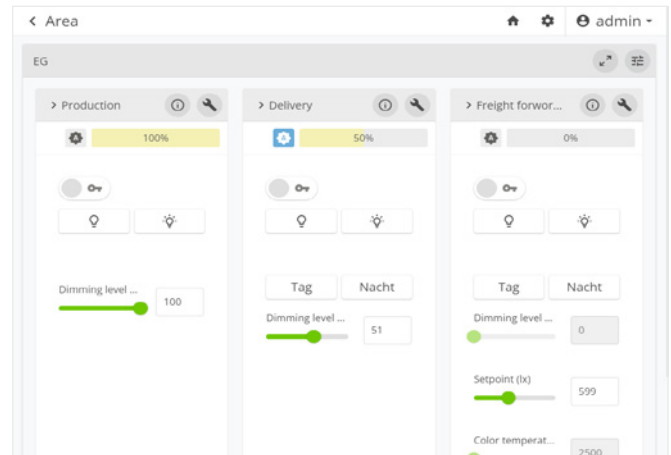

Section View

In this view, the individual rooms are assigned to the sections. In addition, graphical control elements (e.g., switches, push-buttons or setpoint sliders) are displayed for lighting control.
Furthermore, various status messages are also displayed.
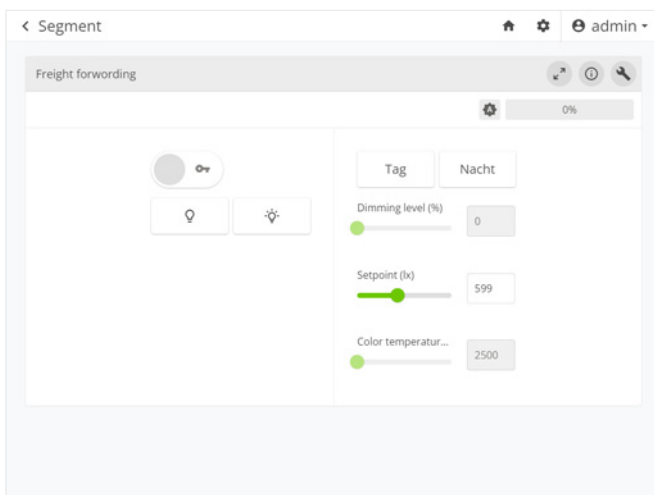
Room View

This view also shows graphical operating elements for lighting control. These controls configure a single room.
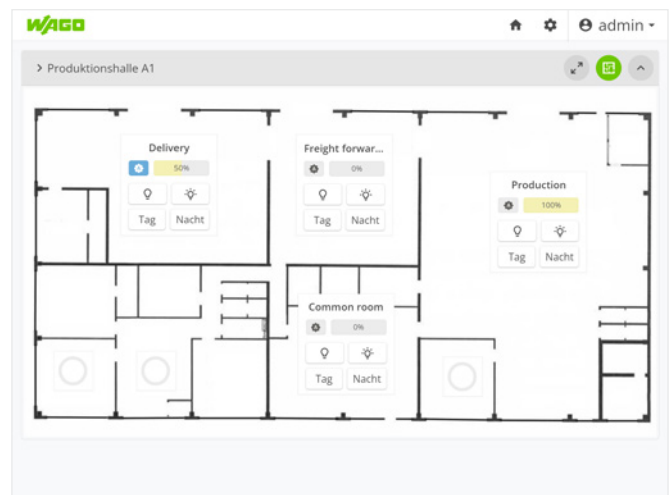
Floor Plan

This view provides a compact graphical overview of the building floor plan. The status in different areas can be seen at a glance and the most important operating interventions can be performed from here.
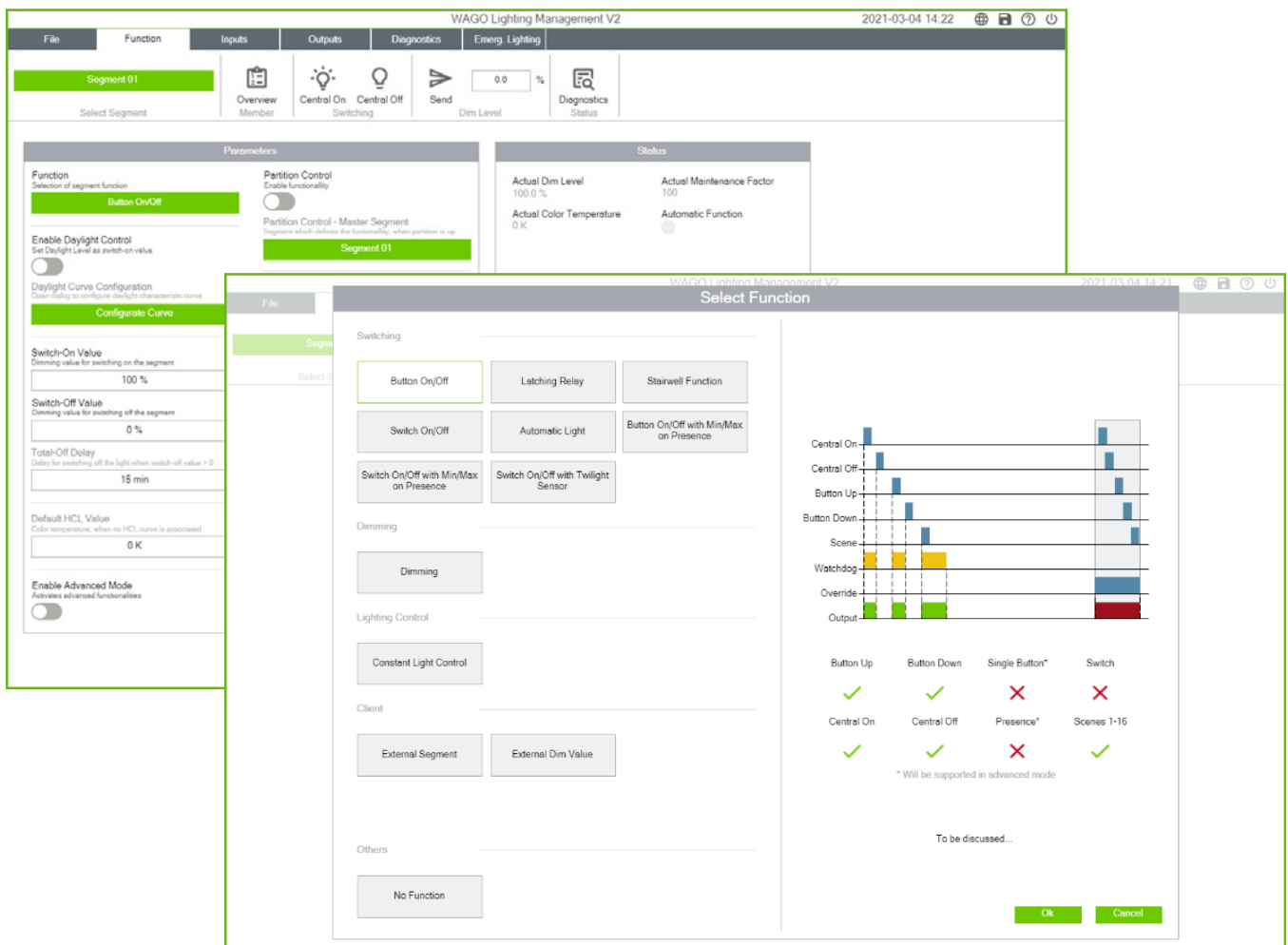
Functions

Clever Lighting Management Today!

WAGO Lighting Management supports the optimal lighting control in a building. Browser-based software makes it easy to replace default parameters with custom settings any time adaptations are required. Connections to higher-level management and control systems in industrial or technical building environments are also supported. Moreover: Simple connection to master controls or building control systems via Modbus TCP/UDP, UPC UA protocol or connection to the cloud.

Well-Organized Input Screen
Screen masks with default settings are pre-populated for basic parameters and operating states are displayed.
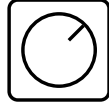

Screenshot – Example: Daylight Control

Function Overview:
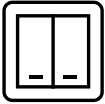
Switching
- Power on/off
  (with and without watchdog)
- Latching relays
- Staircase function
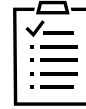- Automatic light
  (motion detector)
- Twilight control

Dimming
- Automatic dimming
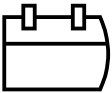- Dimming with
  presence sensors

Light Control
- Constant light control
- Human-centric lighting (HCL)
- Daylight control:
  - Switching function
  - Staircase function
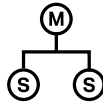 - Advanced functions

Simple project documentation by mouse click

Time Functions
- Weekly
- Vacation
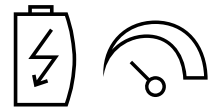- Special switching programs
- Holidays

Slave Function
- Cross-communication
  between diffusers
- External virtual room
- External dimming value

Safety Lighting
- Single battery
- Central battery

- Precise energy consumption measurement
- Calculation of energy consumption for virtual room (VR)
- Measurement of total power; calculation per virtual room

Software Scope Overview:

Maximum Number	Description
16	DALI Multi-Sensors per DALI Multi-Master Module*
32	DALI Push-Button Coupler per DALI Multi-Master Module*
64	DALI ECG per DALI Multi-Master Module
100	EnOcean® Rocker
100	Digital Inputs
60	KNX® Push-Button
24	HCL Curves
64	Timer Programs
100	Digital Outputs

* In total, a maximum of 32 input devices (multi-sensors + key couplers) are supported.
General system limits of DALI technology must be observed.

Interfaces

Cloud, UPC-UA, DALI-2, EnOcean® and KNX®

Stay on top of things with cloud connectivity – at any time, from any place, for any system.
Today, central monitoring of distributed installations is becoming increasingly important. To react quickly to malfunctions or plan maintenance, it must be possible to record current system values and any malfunctions in widespread installations. They must also be monitored in a decentralized manner, visualized at a central location and evaluated by the system operator or commissioned service personnel.

WAGO Lighting Management can be connected to a cloud, thus enabling centralized and location-independent access to system values of individual buildings or even distributed building complexes. WAGO Lighting Management provides operating data, such as fault messages and energy consumption values, to the WAGO Cloud or optionally to other cloud systems. This data can be evaluated there, visualized and further analyzed and processed in reports or diagrams. This provides the system operator with a comprehensive overview of their installations and the possibility of evaluating energy consumption, reacting to faults and optimizing the system operation.

Messages
- Status and faults of lights, sensors, push-buttons per segment
- Undervoltage
- Voltage error and short circuit in DALI lines
- Cross communication interference
- Safety lighting faults

Energy Data
- Active, apparent, reactive energy
- Active, apparent, reactive power
- Current
- Voltage
- Energy consumption per segment

If required, remote access allows full access to all system details, including the possibility to change parameters or configuration settings.

The connection to cloud systems is an optional function extension and enables additional options for system monitoring and data evaluation. The local installations of WAGO Lighting Management always run autonomously and independently of the cloud connection.

OPC UA – for communication to higher-level control systems
"Open Platform Communications Unified Architecture" (OPC UA) is an established data exchange standard that is becoming increasingly important in building automation. This technology is vendor-independent and includes numerous security mechanisms.

WAGO Lighting Management supports data exchange via OPC UA and transmits data such as status messages, operating values, and fault messages to a higher-level management station. It is also possible to write values such as switching commands or dimming values from a management station via OPC UA to the lighting management system.

The OPC UA Mapping Editor allows data mapping to any model and supports the setup of OPC UA communication for different applications.

> If you need more information about Cloud, DALI, En-Ocean®, KNX® or OPC UA, see our attachment or visit:
> wago.com/cloud
> www.wago.com/dali
> wago.com/enocean
> wago.com/knx
> wago.com/opc-ua

DALI

Digital Addressable Lighting Interface (DALI) is a technical standard for controlling lighting devices (e.g., electronic control gears). DALI features digital communication and streamlined installation. It meets lighting requirements, such as switching, dimming, light grouping or status information feedback. The new DALI-2 standard also supports sensors on the DALI bus.
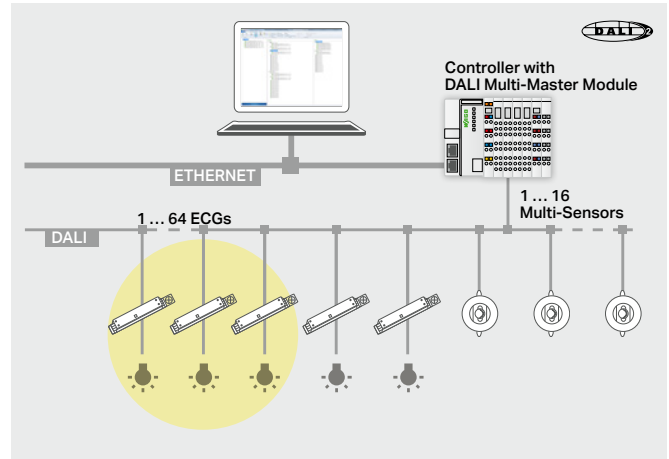

DALI System Layout

EnOcean® Radio Technology

Battery-free EnOcean® technology transmits short telegrams and requires very little energy to send radio signals. Transmitters use electrodynamic/thermoelectric energy converters or the energy from solar cells (energy-harvesting technologies). Characteristics include a long range (up to 30 m indoors and 50 m in production halls), high transmission reliability (short telegrams) and multiple telegram transmission.
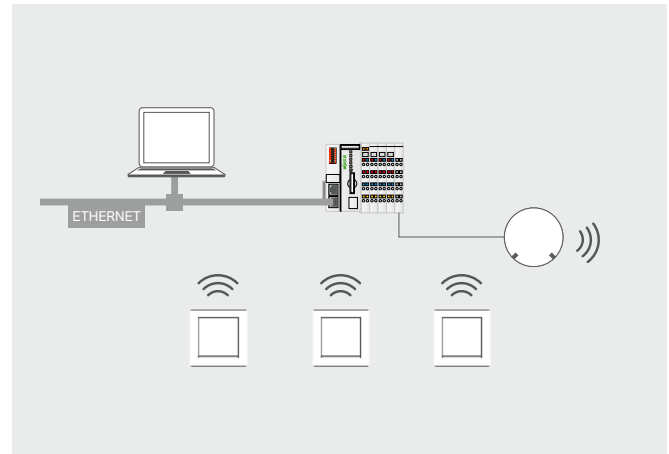
System Configuration EnOcean®

KNX®

KNX® is a uniform, manufacturer-independent communication protocol for intelligently networking state-of-the-art home and building system technologies. KNX® plans and controls energy-efficient solutions for more functionality and convenience while simultaneously reducing energy costs.
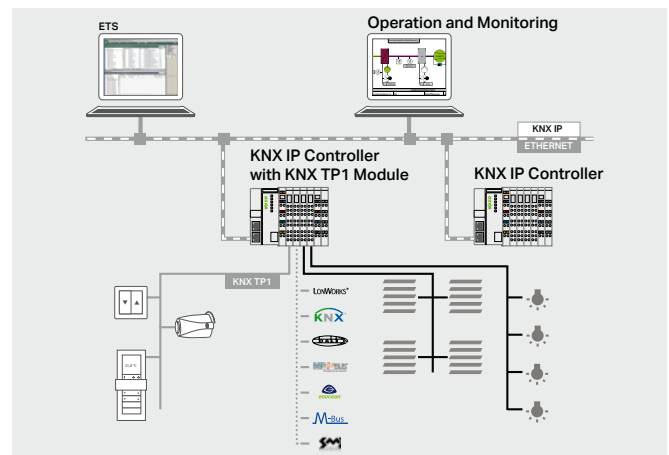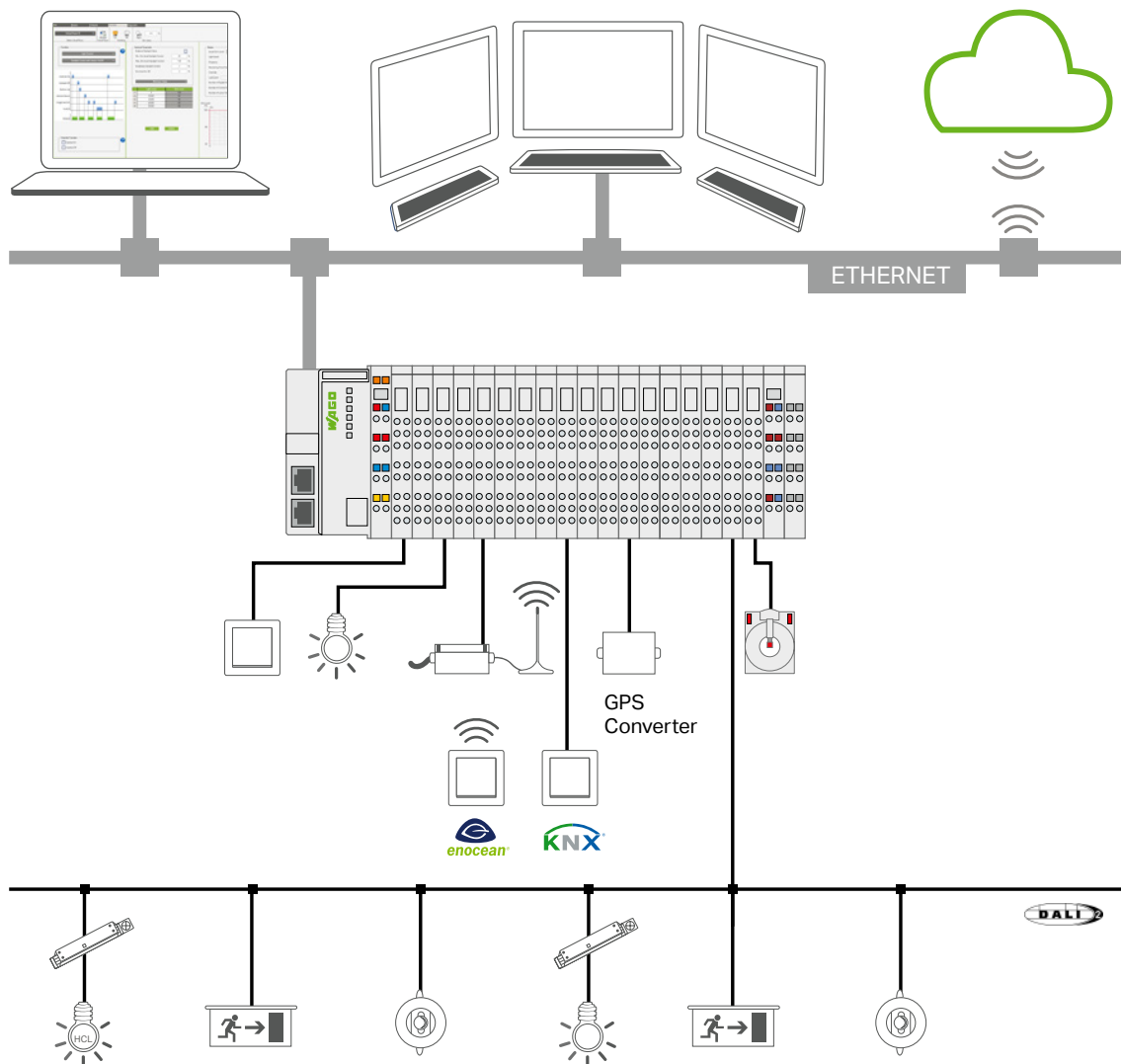
Clever Lighting

From Planning to Commissioning and Operation
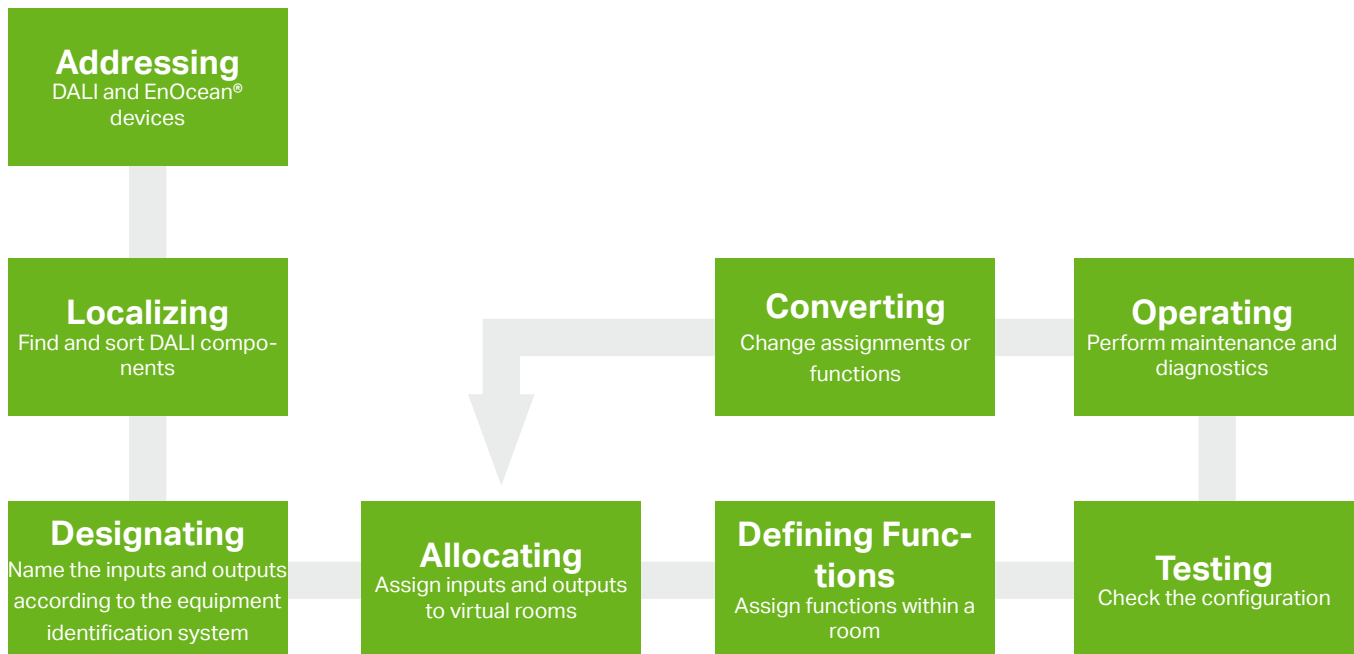
Planning

Government regulations ensure that important sustainability objectives are met. For this reason, it is necessary to observe all current standards when planning a lighting system. Adhering to standards, such as DIN EN 12464-1 for indoor workplaces, are mandatory for lighting designers. This requires that artificial light be produced with minimum energy consumption. The energy certificate required by the Energy Saving Ordinance (EnEV 2014) considers the lighting in the balance of the total building energy requirements. WAGO Lighting Management also satisfies the mandates the DGNB places on industrial buildings by enhancing 46% of the assessment criteria.

ETHERNET

GPS
Converter

Lighting Management System Layout

Commissioning

Addressing
DALI and EnOcean® devices

Localizing
Find and sort DALI components

Designating
Name the inputs and outputs according to the equipment identification system

Allocating
Assign inputs and outputs to virtual rooms

Converting
Change assignments or functions

Operating
Perform maintenance and diagnostics

Defining Functions
Assign functions within a room

Testing
Check the configuration

Simple workflow – wizard-based commissioning

Easy Commissioning:
- Classification of rooms using a Web browser view
- Configuration with standard PC
- Without having to install additional applications programs
- Automatic detection of modules used and associated components (lamps, sensors)
- Automatic documentation during commissioning
- Optional configuration with Microsoft Excel via import/export

Operation

The WAGO Lighting Management visualization provides an independent web-based UI for operating and monitoring a controller's segments. With its responsive design, the visualization adapts to any screen size, from tablets and smartphones to WAGO Touch Panels 600. The visualization is easily opened via the browser. Simultaneously accessing several lighting management controllers from the visualization is also possible. New requirements for lighting control (e.g., change of use) can be met with simple configuration changes – even during operation.

Order Overview and Accessories

WAGO Lighting Management is compatible with the following components:

Components	Item No.	Note
Base Unit		
Controller PFC200; 2nd generation; 2 x ETHERNET, RS-232/-485	750-8212	The controllers can communicate with each other.
Lighting Management – Application	2759-0204/0261-1000	Download: wago.com/applicationcontroller
Lighting Management – Visualization (optional)	2759-2101/0271-1000 2759-2102/0271-1000 2759-2103/0271-1000	WAGO Visualization "Lighting Management" – S (1 controller) WAGO Visualization – M (up to 3 controllers) WAGO Visualization "Lighting Management" – L (up to 10 controllers) Lighting Management Visualization S – for operating one (1) controller Lighting Management Visualization M – for operating up to three (3) controllers Lighting Management Visualization L – for operating up to ten (10) controllers
DALI Multi-Master	753-647	In addition to 64 DALI Actuators (ECGs), a DALI Multi-Master supports up to 16 DALI Multi-Sensors (max. 64 sensor addresses); max. 10 DALI Modules per base unit (controller).
End Module	750-600	An end module must be snapped onto the assembly at the end of a fieldbus node.
Power Supply to I/O Node	787-1112	24 VDC power supply (2.5 A) to controllers and additional modules
Power Supply to DALI Multi-Master	787-1007	Supplies a maximum of five DALI Multi-Masters
Power Supply Compact; DALI; 18 VDC	787-2857	DALI-2 certification only in conjunction with DALI Multi-Master (Item No. 753-647)
EnOcean® RS-485 Gateway; 868 MHz	750-940	With integrated antenna, suitable for direct ceiling/wall mounting
Extension for Inputs/Buttons		
16-Channel Digital Input; 24 VDC; 3 ms	750-1405	For 1 … 16 light button/switch inputs; max. 4 extension packages per base package
Extension for Outputs/Actuators		
16-Channel Digital Output; 24 VDC; 0.5 A	750-1504	For 1 … 16 actuators/lamps/relays/ECG control; max. 2 extension packages per base package
Socket with Relay; 1 Make Contact; 24 VDC	788-357	Light switching via relay
Extension for EnOcean® Radio		
Serial Interface RS-232/485	750-652	Serial interface connects to STC65-RS-485 EVC EnOcean® Radio Transmitter/Receiver for 1 … 64 rocker switches
EnOcean® Receiver/Transmitter	2852-7101	Receives EnOcean® radio signals and transmits them to the I/O node
EnOcean® Repeater	2852-7102	Extends the transmission range (for more planning information, visit the EnOcean® website)
Radio Transmitter; EnOcean® easyfit PTM 250; 2-channel lighting controller	758-940/001-000	1 … 2 or 1 … 4 signals; range of 30 meters from the radio receiver in buildings
Radio Transmitter; EnOcean® easyfit PTM 250; 4-channel lighting controller	758-940/003-000	
Extension for External Time Request		
Real-Time Clock Module	750-640	Time synchronization module, if no time server connection is possible
GPS DCF Converter	2852-7901	Converter/external receiver for time synchronization
Extension for Energy Data Measurement		
3-Phase Power Measurement; 690 VAC	750-495/xxx-xxx	
Current and Voltage Connections	2007-8874 2007-8877	Pre-assembled terminal block assemblies for easy connection and short-circuiting of current transformers (for current transformers, see Full Line Catalog, Volume 4)
Extension for KNX® Buttons		
KNX® Module	753-646	Connects KNX® buttons to the I/O node
Extension for Sensors		
DALI-2 Sensors	2852-7210 2852-7213 2852-7214 2852-7220 2852-7221 2852-7222 2852-7230 2852-7231 2852-7232 2852-7233	PD11-BMS-FLAT PD4-BMS-GH PD4N-BMS MSensor G3 SRC 30 PIR 5DPI WH MSensor G3 SSM 30 10DPI WH Sensor G3 SFI 30 PIR 16DPI WH IR Quattro HD DALI 2 IR Quattro SLIM XS DALI 2 IS3360 MX Highbay DALI 2 IS345 MX Highbay DALI 2

* Other compatible DALI (input devices) sensors are listed in the DiiA product database.
   See link: www.dali-alliance.org/products

Interesting Facts – General Questions

Why do I need to install a controller when using LED lamps?
Because a controller for the lighting provides additional savings.

Potential Energy Savings for Interior Lighting

#01 Older system from 1980s with three fluorescent tubes (26 mm ø) with low-loss ballasts, older lights with white grids	**20 %**
#02 New system, state-of-the-art, fluorescent lights (16 mm ø) with electronic ballast	**55 %**
#03 Modern LED lights	**65 %**
#04 With daylight control	**75 %**
#05 With presence detection and daylight control	**80 %**

Savings potential for interior lighting: The baseline reference is an older system from the '70s that uses standard fluorescent tubes, ø 38 mm with conventional ballasts; older lights with soft opal reflector (source: licht.de)

What intervals should be observed when installing lights in a high hall?
The important factor is uniform illumination, which depends on the lamp. In high halls, the cones of light should begin to overlap at a greater height instead of at the assessment level. It is best to have an expert calculate the lighting requirements and complete the planning based on current standards and regulations, such as the Technical Regulations for Workplaces (ASR).


Measurement level
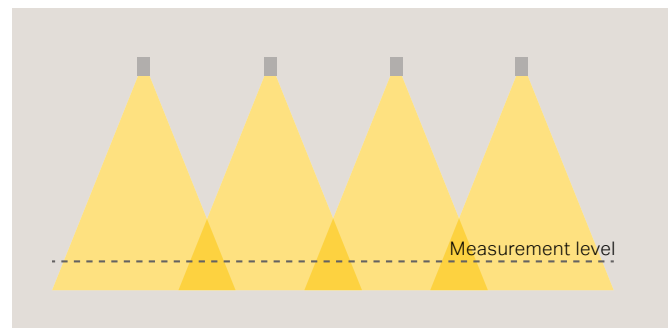
Hall illumination

How should sensors be placed?
What needs to be observed?
You should maintain a certain distance from the light so the sensor is not affected by the light's brightness. It is important to note that the sensor measures the brightness directly at the device.
Tip: Do not attach sensors directly above surfaces with an irregular reflection. Take, for example, a sensor attached directly above a welding workspace. The uneven brightness will cause the sensor to continuously adapt the light, making it dark while welding and then increasing the intensity again.
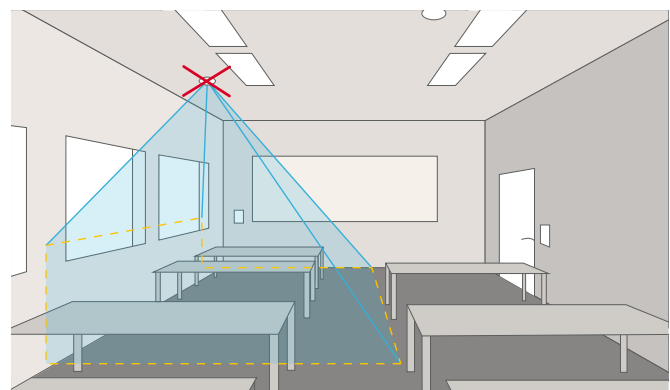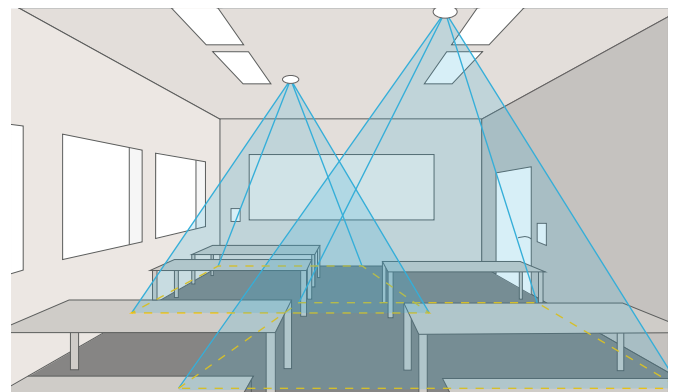
Sensor positioning in a room

Interesting Facts – General Questions

How can the correct brightness value be measured at the workplace?
Special devices are specified in the standards for measuring the light intensity. For example, a sensor can be placed on a table and the brightness measured there, allowing the light to be adjusted to the desired value.

What needs to be considered when illuminating production facilities and warehouses?
Daylight should be utilized for work, maximizing both energy efficiency and economizing lighting costs. In this case, it is important to know that 90% of all halls do not have uniform light incidence. For this reason, it is necessary to install many sensors.

What needs to be observed with sensors in high bay warehouses?
Ceiling heights of up to 14 meters are typical in high bay warehouses, placing tremendous demands on lighting equipment. It is necessary for the sensors to measure reliably from such heights while detecting motion only in the assigned aisle. The only sensors suitable for such purposes are infrared sensors – usually called HIGH BAY Sensors.
Tip 1: The sensors can be interlinked to monitor larger areas.
Tip 2: Too many sensors and different sensor types should be avoided.

What should be observed with sensors in warehouses?
Artificial light is frequently used to illuminate storage areas. Often the light shines for an entire shift, even though it is only required for short periods. Presence sensors or intelligent controls switch the light on only when required. Otherwise, it is off or can be dimmed by 10% in standby mode. For example, suppose you have an aisle that a forklift only drives down occasionally. In that case, the lighting is set to 10%, so the driver does not drive into a black hole before the presence sensor detects the vehicle turning into the aisle. If you do not have any external light, motion sensors are perfect for switching on artificial light. Important: The space must be covered by the sensor's detection zone.

What needs to be observed regarding illumination for night shifts?
If, for example, only 1/3 of the hall needs to be completely illuminated for work, the Rules for Workplaces (ASR) require that the remaining 2/3 of the hall also be illuminated; a value of 10% is recommended for this.
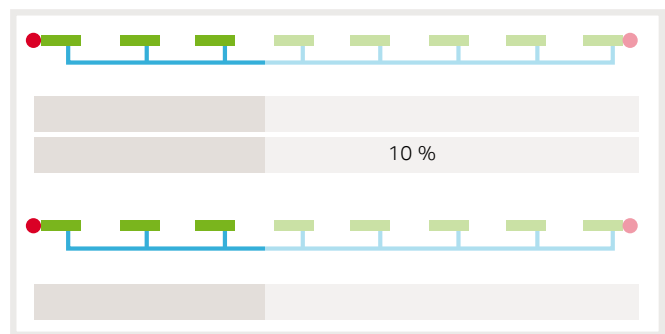
Illuminating a hall section during the night shift

There are conventional sensors and sensors for high ceilings. Which are suitable for what applications?
A normal sensor can be used for ceiling heights up to 4.5 m. With DALI-2, one HIGH BAY Sensor can monitor a height of over 13 m.

What must be observed regarding light coming from outdoors? How does a control system work using outdoor brightness?

A daylight circuit uses incident daylight and automatically switches the light to a minimum illumination intensity when activated. Artificial lighting is only switched on, or is lit gradually and continuously intensified, when there is insufficient daylight. If there is enough daylight, the lighting may even be switched off completely. This is accomplished with the aid of a brightness measurement sensor, which relays the value to a control that increases or dims the light. If daylight presence varies, excessive switching operations can be avoided with a time delay. This feature means the lighting does not always have to provide full power, thus saving energy. It also ensures a constant lighting level at greater room depth (constant light illumination).

Important: The sensor should measure as much natural light as possible and not be placed too close to a light fixture.
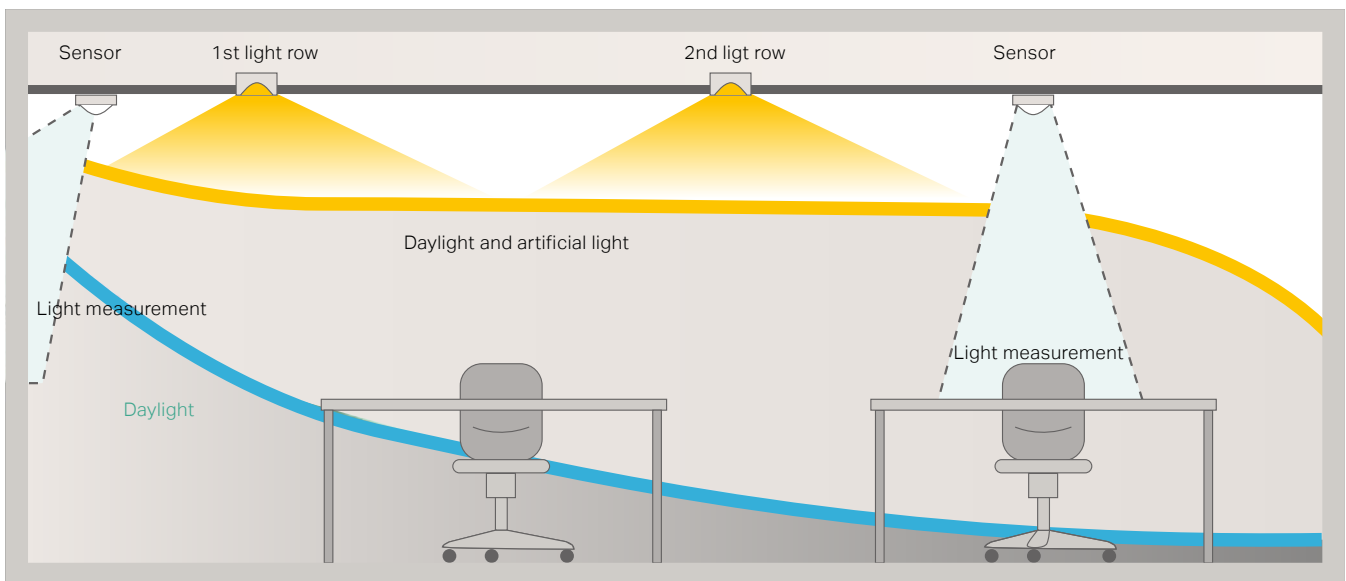
Example: light incidence from outdoors

Is there a rule of thumb for the savings potential?

Yes, the indicator LENI (Lighting Energy Numeric Indicator) stands for the actual energy consumption of a lighting system in kWh per square meter and year. The LENI value is determined as described in the specification EN 15193 (Energy performance of buildings – Energy requirements for lighting).

The following factors typically affect possible energy savings:
- Use of daylight
- Use of presence sensors
- Practical control of lighting
- Annual utilization times
- Illuminated area

How is WAGO Lighting Management used?

A separate visualization interface is available for this purpose, which is optimized for operation and monitoring. Access is performed via a standard web browser and by entering the IP address of WAGO's Lighting Management Controller. A responsive design ensures perfect display on different end devices, such as touch panels, tablets and smartphones.

Interesting Facts – General Questions

How must I wire DALI lines?
Supply and control wires can be routed together in the same cable. The wiring can be implemented in series, radially or in a hybrid configuration. Ring circuits should be avoided completely.

How large can the DALI network be?
A maximum of 64 actuators, 16 sensors, 32 DALI push-button couplers and a maximum of 16 groups are permissible per DALI line.

Can I use a Y(ST)Y cable or other extra low-voltage cables for the DALI bus?
Unfortunately, no; this is only an extra low-voltage cable and the DALI bus line must be laid out for 230 V, including the specified dielectric strength. Detailed information is also given in IEC 62386.

Which cable lengths must be observed?
The maximum cable length is determined by the maximum permissible voltage drop in the DALI line; it is defined at a maximum of 2 V. This corresponds to a maximum line length of 300 m, with a 1.5 mm² cable cross-section.

Which standards do subscribers in a DALI line have to fulfill?
DALI subscribers are subject to IEC 62386.

What are the minimum lighting intensities required?
See Appendix or Technical Regulations for Workplaces (ASR).

Is it also necessary to burn in LED lights?
No.

What does a lighting control system cost compared to a conventional system? Is there a price based on floor space?
This is a typical question for planning lighting systems. An expert will happily calculate amortization for you.

Are subsidies available?
Information on current subsidies is available at: www.bafa.de

Interesting Facts – about WAGO Lighting Management

Which sensors should be used? Can other sensors be connected?
It is best to use the specified sensors to ensure that the system functions properly. Generally, all DALI-2 sensors listed at the DiiA can be used.

What interfaces are there for a Building Management System (BMS) or other automation systems?
WAGO Lighting Management has a Modbus®, OPC-UA and cloud interface. Measured values and status information are provided via Modbus TCP and can be read and used by other devices or systems. In the opposite direction, input values and setpoints can transfer to WAGO Lighting Management via Modbus®.

How is WAGO Lighting Management put into operation?
The system can be commissioned using a Web GUI; no additional software is required.

Who commissions WAGO Lighting Management?
It is not necessary to program the lighting management system, making it easy to commission yourself. A WAGO solution provider would be happy to help. We also offer a one-day training course.

How high are the commissioning costs?
The system is laid out so that the purchase price covers all license costs; there are no additional costs for software or licensing. Moreover, the system offers an interface for bulk processing, making commissioning very efficient.

Are there any additional costs for hardware?
No, you purchase a controller, the required number of I/O modules and the lighting management system is ready to use.

Can other I/O modules be added?
Yes, if needed, you can add more I/O modules. Simply look in the order overview.

Are tender texts available for the complete system?
Yes, they are. Follow the link: wago.com/lighting-management.

Is there a model circuit diagram for the control cabinet in form of a WS-CAD or EPLAN document?
Yes, they are. Follow the link: wago.com/lighting-management.

Who will deliver my complete system?
Ask our solution providers.

Lighting Guidelines

For Work Environments in Interior Spaces per EN 12464-1

Type of Room, Task or Activity

Traffic Zones and General Areas in Buildings	Em	UGRL	Uo	Ra
Traffic Zones inside Buildings				
Circulation areas and corridors	100	28	0.40	40
Stairs, escalators, travelators	100	25	0.40	40
Elevators, lifts	100	25	0.40	40
Loading ramps, loading bays	100	25	0.40	40
Rest, Sanitation and First Aid Rooms				
Canteens and pantries	200	22	0.40	80
Restrooms	100	22	0.40	80
Excercise rooms	300	22	0.40	80
Coatrooms, washrooms, baths, toilets	200	25	0.40	80
Sanitation rooms	500	19	0.60	80
Infirmaries	500	16	0.60	90
Control Rooms				
Rooms for facility installations, switchgear rooms	200	25	0.40	60
Telex and mailrooms, telephone switchboards	500	19	0.60	80
Storerooms and Cold Stores				
Store and stockrooms	100	25	0.40	60
Dispatch packing handling areas	300	25	0.60	60
Unmanned gangways	20	-	0.40	40
Manned gangways	150	22	0.40	60
Control station	150	22	0.60	80
High-bay front	200	-	0.40	60

Symbols for Assessment Values

DIN EN 12464-1 defines the following symbols for technical light evaluation values for general use:

- Em: Warning value for (mean) light intensity
- Ez: Mean cylindrical luminous intensity
- Ex: Mean vertical luminous intensity
- UGRL: UGR limiting value for evaluation of glare
- Uo: Uniformity, corresponding to g1
- Ra: Color rendering index

Contact

Technical Support

WAGO's technical support staff is ready to assist you with advice and guidance – from selecting the right product, through telephone support during commissioning, all the way up to on-site troubleshooting.
You directly benefit from knowledgeable WAGO experts who dramatically expedite project implementation.

WAGO provides advice and support with:
- Product selection
- Product commissioning
- Troubleshooting
- All technical questions you may have about WAGO products and solutions

As a WAGO customer, you benefit from first-class support:
- Qualified fieldbus specialists
- Troubleshooting
- Spare parts service
- Contact via telephone, on-site or using the form

Project Support

WAGO's technical support offers consultation and project planning services to help devise the best possible solutions for your custom building automation and installation projects. Our experienced team of professionals will gladly help you implement your projects with WAGO products.

Planning and project development:
- Conceptual design
- Network planning
- Application design
- Component selection
- Quote generation

WAGO helps customers with:
- Advice while planning the construction project from experts with years of project experience
- Customizing solutions to ensure the technical and financial success of large projects
- Technical support while implementing building projects

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Note: For more information,
please visit our website at:
www.wago.com/lighting-management