

Modern Lighting Management

Thinking Beyond the Terms of Lumens per Watt



**INSPIRING LIGHT SCENARIOS FOR
A NOVEL OFFICE EXPERIENCE**

**BUILDING INSTALLATIONS – THE BETTER
TECHNOLOGY FOR NEW AND EXISTING
CONSTRUCTION**

**INNOVATIVE LED LUMINAIRES AS
PLUG-AND-PLAY SOLUTION**

flexROOM[®] – THE SOLUTION FOR INTEGRATED ROOM AUTOMATION



Efficient. Individual. Easy.

Realization of buildings optimized for energy efficiency with WAGO *flexROOM*[®]

Software application already integrated in the PFC200

Modern Web visualization with HTML5

Secure configuration via HTTPS

Secure transmission of configuration data via SFTP

www.wago.com/flexroom



EDITORIAL THIS ISSUE

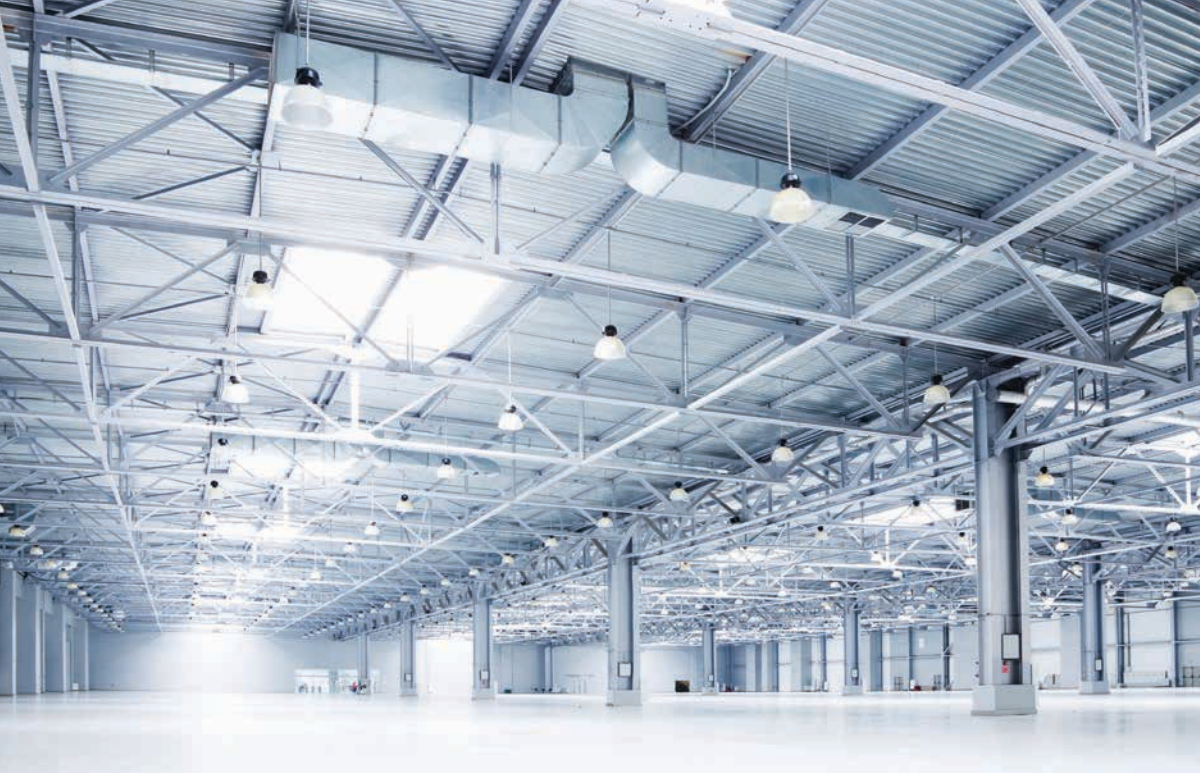
Dear Readers,

Light influences our lives in numerous ways, for example, it exerts substantial power over our well-being and productivity. When there is not enough natural light for a task, it has to be supplemented or replaced with artificial light in order to create optimal lighting for various work environments. At the same time, lighting is the greatest electrical consumer in our buildings. Does this mean that good lighting and energy efficiency are in conflict? In order to keep you informed about the best technical possibilities and what is happening on the market, we spoke with experts in the field and examined the topic of lighting management from diverse angles.

The results are in and they include an opinionated interview with lighting designer and energy efficiency expert Mathias Wambsganß (p. 24) as well as an in depth report about the new Philips headquarters in Hamburg (p. 18). On pages 28 to 31, we present an exclusive look inside our company and provide you with the possibilities of lighting control, using our own production hall as an example of a project completed using the new WAGO Lighting Management system.

In addition: our customer magazine is also appearing in a new light. The clear, linear design and the new structure should provide better orientation and more transparency. Naturally, we retained the proven mix of application reports, product announcements, and professional articles as well as the high quality of our reports – which is exactly what you expect from our products. I hope that you like the new look and wish you the best of times while reading WAGOdirect building!

Florian Tremmel



TITLE TOPIC

Modern Lighting Management

Lighting Management – is that even necessary?
From a purely mathematical standpoint, yes. Because every lighting system is over-dimensioned on day one so that it will also provide the minimum lighting demanded on day X. However, without controllers, the potential savings simply vanish. From a user's point of view, no one would want to go without some type of regulation or control – being limited to switching lights on and off is so last century. Despite these reasons, it is not an easy feat to find a suitable lighting solution for new construction or for a renovation. In addition to energy goals, many other factors play an important role, and a simple yes-no question transforms into a complex field of topics.

CONTENTS OF THIS ISSUE

OPINIONS

Editorial

Modern lighting technology between energy efficiency and user comfort; WAGOdirect has a new layout. 3

TITLE TOPIC: MODERN LIGHTING MANAGEMENT

Thinking Beyond the Terms of Lumens per Watt

It is no minor task to find a suitable lighting solution, as numerous factors play a role in the decision. 10

Inspiring Light Scenarios for a Novel Office Experience

The flexROOM® variable room concept controls innovative lighting designs in Philips' new construction. 18

A Plea for More Light

Interview with lighting designer and energy efficiency expert, Mathias Wambsganß 24

Production Hall of Fame

Illuminating a Production Hall Efficiently and Flexibly with DALI and WAGO Lighting Management 28

APPLICATIONS

The "Internet of Things" Gains a Foothold in Buildings

Cisco is relying on IoT-based systems, which communicate with traditional building systems using WAGO's BACnet Controller for their innovation center in Berlin. 6

Tenant Fit Out Improvements Must Be Carried Out Quickly

Tanus Tower in Frankfurt: Quickly install lights thanks to Linect® 32

Better Installation Technology for Existing and New Construction

Proven WAGO technology for flexible and future-oriented installations in all buildings 36

Unique Uniformity

Innovative LED Luminaires as Plug-and-Play Solution 38

TECHNOLOGIES

Lighting Management from WAGO

Optimal production hall lighting at lower costs 17

A More Efficient Path to Individual Room Automation

flexROOM®: The new version is even easier and more flexible 23

Compact Terminal Block – Large Cross-Section

PCB terminal blocks from the 2059 Series have new approvals 41

Establishing Connections Just Became Easier

WAGO's new ECO Controller and Coupler for BACnet/IP promote time-saving, convenient, and affordable building automation. 42



CISCO

Cisco is relying on IoT-based systems, which communicate with traditional building systems using WAGO's BACnet Controller for their innovation center in Berlin.

The "Internet of Things" Gains a Foothold in Buildings

With the opening of the "Cisco openBerlin Innovation Center," the global leader in Internet and network solutions is writing a new chapter in building technology. In less than one year, a factory located on the EUREF Campus in Schöneberg Berlin has been transformed into a Lifestyle Workspace, which provides Cisco with an idea factory and innovation platform for the "Internet of Things" (IoT) in order to search for more of the same. Implementing the project required partners invested in innovation. These include HOSCH Gebäudeautomation in cooperation with WAGO; the IoT specialist, relayr; and many other start-up companies.

At first glance, the Cisco Innovation Center building captivates with its charm. Built in the early 20th century, the vintage industrial brick building appears warm and inviting, providing an impression linked more closely to a start-up than a global IT corporation. Which is part of the strategy. "Our focus was not on the building technology as such, but instead, we asked ourselves about the people who work here, what they need to feel comfortable and to give their creativity free rein," explains Mitko Vasilev, co-founder and CTO of openBerlin.

IoT forms the center of openBerlin, which focuses on manufacturing, transportation, and logistics.

The project gains Cisco an open platform for partners, start-ups, and other enterprises, in order to globally accelerate development. For this reason, the idea factory was conceived as an open structure and equipped with about 100 workstations. Cisco wants to draw in researchers, developers, and representatives from leading institutions, customers, and partner firms, like azeti, Bosch, and Intel, in order to collaboratively work on innovative IoT solutions.

BACnet/IP Backbone

The former manufactory is located near the Berlin Gasometer, and production continued there up until 2014, which made its transition to the idea factory an ambitious project with respect to time. In order to create a display piece for the "Internet of things," Cisco also set the technological bar extremely high. This included equipping the space, around 1,000 m², with more than 10,000 sensors and high-tech communication units to detect the most detailed information about current conditions as well as movements and locations of people within the building. The data collection extends from lighting and climate conditions through facial recognition up to smartwatches.

When selecting the technologies for the building, open source standards and communication ability were ranked most important. In terms of cooperation, Vasilev emphasizes that,



The BACnet Controller detects energy consumption in the building, controls all pumps, fans, and vents for room temperature regulation, and also controls the lighting in the entire building.

"We needed partners who believe in our vision, are open to new concepts, and bring with them the flexibility to implement this under time pressure in order to successfully realize this project." The team was granted only three months to design and install the building automation. For the IP-based aspects, Cisco turned to relayr, Berlin-based IoT experts. The system integration specialists, HOSCH Gebäudeautomation from Teltow, and their technology partner, WAGO from Minden, provided the designs and implemented the building technology. WAGO's 750-831 BACnet/IP Programmable Fieldbus Controller with CODESYS forms the core of the system. As the link between

tap electrical consumption and hot water using M-Bus, and the lights are controlled via DALI. In addition, the BACnet Controller takes on the control of all pumps and fans for room temperature regulation.

WAGO's controller communicates with an IoT-based control system using BACnet. There is no building management system. The building's multifunctional sensors, around 3,000 of which have since been installed, and which unite eight sensors in one device, transmit their data via wifi and *Bluetooth*®. The data are then collected, filtered in a fog gateway (micro cloud) stationed in the building, and provided for use via a Web application with access to the cloud. Users can use any smartphone or tablet to individually regulate light scenarios, among other things, at their individual workstations, with continuous light intensity settings and color options.

"We needed partners who believe in our vision and are open to new concepts in order to successfully realize this project."

the IP-based sensors and the conventional building technology, it takes on the control of room automation and lighting technology.

Building Management Systems Become Obsolete

The finely modular design of the BACnet Controller, part of the WAGO-I/O-SYSTEM 750, offers an extremely high level of flexibility in the compilation of the necessary I/O modules, and thus a high degree of scalability. In addition, technology islands using different protocols, like LON®, KNX, MP-Bus, EnOcean, and SMI, can be easily united into one system. For example, the meters in openBerlin

Data Pool of Inexhaustible Possibilities

In principle, however, the building automation is designed to automatically set lighting and the indoor climate control to the optimal comfort conditions for employees, customers, and partners, without outside intervention. This means that light intensity and color change according to the season or time of day, so that the best conditions prevail for the individual person, or in harmony with the use of the room or workstation. For optimum indoor climate conditions, the sensors detect temperature, humidity, and CO₂ content, which the BACnet Controller then processes. For

example, if more people gather in one space, the system registers this and automatically lowers the room temperature.

"At the moment, we record 26.5 GB of data per day," states Vasilev. "Of that, we probably use only about 5%." This should change in the future as the system is expanded by artificial intelligence in order to integrate, for example, proactive measures in building automation. This project is impressive, not just due to the level of innovation, but also with regard to the investment costs and energy efficiency. In comparison with other Cisco properties, the initial investment saved around 30%, while the energy savings amount to around 60%, due in part to the need-based temperature and lighting control.

Vasilev provides a positive summary, "We are highly satisfied with the results of the project. The IoT-based building automation, which we developed with our partners, is the most innovative and modern open-source system. At the same time, it relies on components that are available in series production." The concept additionally serves as a global model for other innovation centers and Cisco projects. Due to high system flexibility, Cisco was able to achieve investment security and create the ideal basis on which to realize many other ideas on site.

TEXT STEPHAN LAMPE | WAGO

PHOTO KLAUS HEYMACH | vor-ort-foto.de



Mitko Vasilev, co-founder and CTO of open-Berlin, "Our IoT-based building automation is unique. We have succeeded here in realizing a revolutionary solution using standardized high tech components."

Please take off your shoes: The loft is designed to invite relaxation. As in all rooms, access via facial recognition is possible.





THINKING BEYOND THE TERMS OF LUMENS PER WATT

Modern Lighting Management

Lighting Management – is that even necessary? From a purely mathematical standpoint, yes. Because every lighting system is over-dimensioned on day one so that it will also provide the minimum lighting demanded on day X. However, without controllers, the potential savings simply vanish. This is especially true with modern lights, like LEDs are used, which have long lifespans. From a user's point of view, no one would want to go without some type of regulation or control – being limited to switching lights on and off is so last century. Despite these reasons, it is not an easy feat to find a suitable lighting solution for new construction or for a renovation. In addition to energy consumption goals, legal requirements, costs, lighting quality, and user convenience all have parts to play in the decision. A simple yes-no question transforms into a complex field of topics.





iStock.com/eggeeggjiew

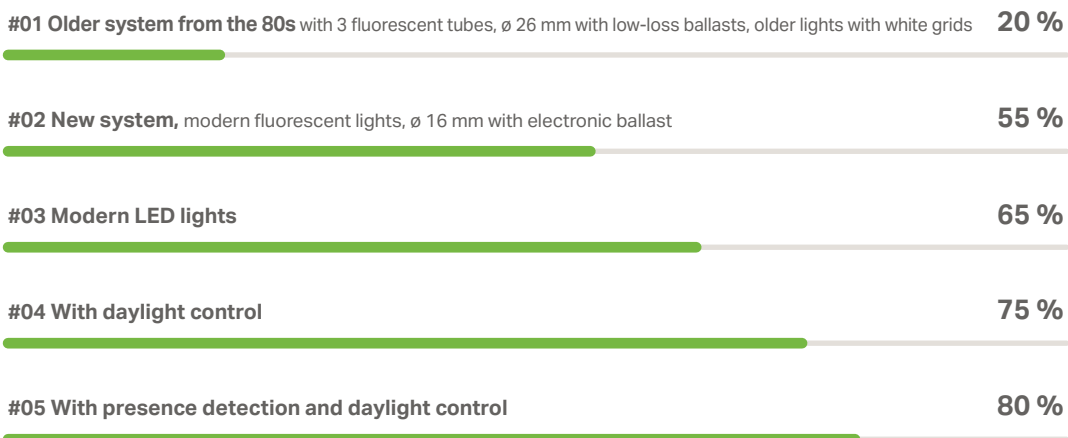
Artificial light illuminates living spaces, office buildings, and manufacturing halls; it lights up the streets at night and establishes landmarks with their own limelight. According to studies by the European Commission, lighting accounts for around 19% of electrical use today. In workshops, for service providers, and commercial enterprises, the percentage is significantly higher, namely around 30%. It is therefore quite clear that light not only influences our feelings of comfort, but it also affects the bottom line.

In addition, the energy consumed for lighting plays an important role in environmental quality. Energy-related emissions are responsible for around 80% of air pollution and thus are of central

importance with regard to damaging environmental influences. Therefore, increasing regulation of lighting efficiency is appearing from the political side. The European Ecodesign Directive, for example, defines minimum levels of efficiency of so-called energy-related products (ERP), such as lighting units and drive gears. Conventional lightbulbs have already been banned from the European market. Standards have not only been defined for individual components, but also for the entire "building" system. 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.



Potential Energy Savings for Interior Lighting



Savings potential for interior lighting: Reference is to an older system from the 70s using standard fluorescent tubes, ø 38 mm with conventional ballasts, older lights with soft-opal reflector (source: licht.de)

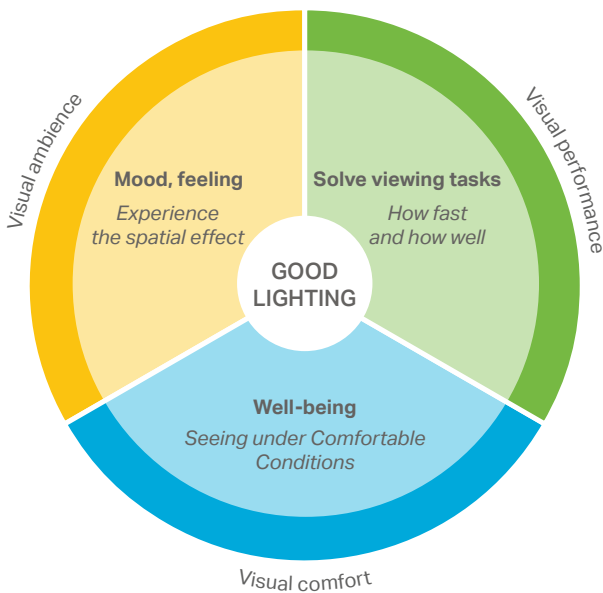
Lighting Management – Leveraging Greater Efficiency

The potential savings in the lighting sector are great because almost two-thirds of the lighting systems in Europe are more than 25 years old. Transitioning to modern lighting technology can quickly and easily reduce energy consumption. Just replacing the bulbs makes economic sense, for example, as modern fluorescent lights with electronic ballasts use 55% less energy. Adding a lighting management solution opens the door to other potential savings: presence controls and daylight-based regulation can lead to savings of 80%.

Planning Goal: Quality

At the center of every lighting design stand human demands for configuring their work spaces. In Germany, DIN EN 12464-1 covers the requirements for lighting work environments in interior spaces. It defines minimum values for all quality features in lighting technology that must be considered during design. These are then totaled to find the lighting quality.

However, the actual quality of light is hard to define. Aspects like incident daylight, glare, intensity, or external environmental influences affect our perception of light. Quality lighting is therefore not merely defined by parameters, like illuminance or limits on glare, which influence our visual functionality, but also by factors affecting visual comfort and optical ambiance. A harmonious light distribution in the space and good color reproduction properties of the lamps, for example, create a sense of visual comfort, and thus, general well-being. Light orientation, shadowing, the color of the light from a lamp: all influence light's effect in a space. This spatial atmosphere is essential for the lived experience.



Visual performance, visual comfort, and visual ambience are the parameters for assessing lighting quality according to DIN EN 12464-1 (source: Fördergemeinschaft Gutes Licht)



iStock.com/Maxim Blinkov

Improved Work with Good Lighting

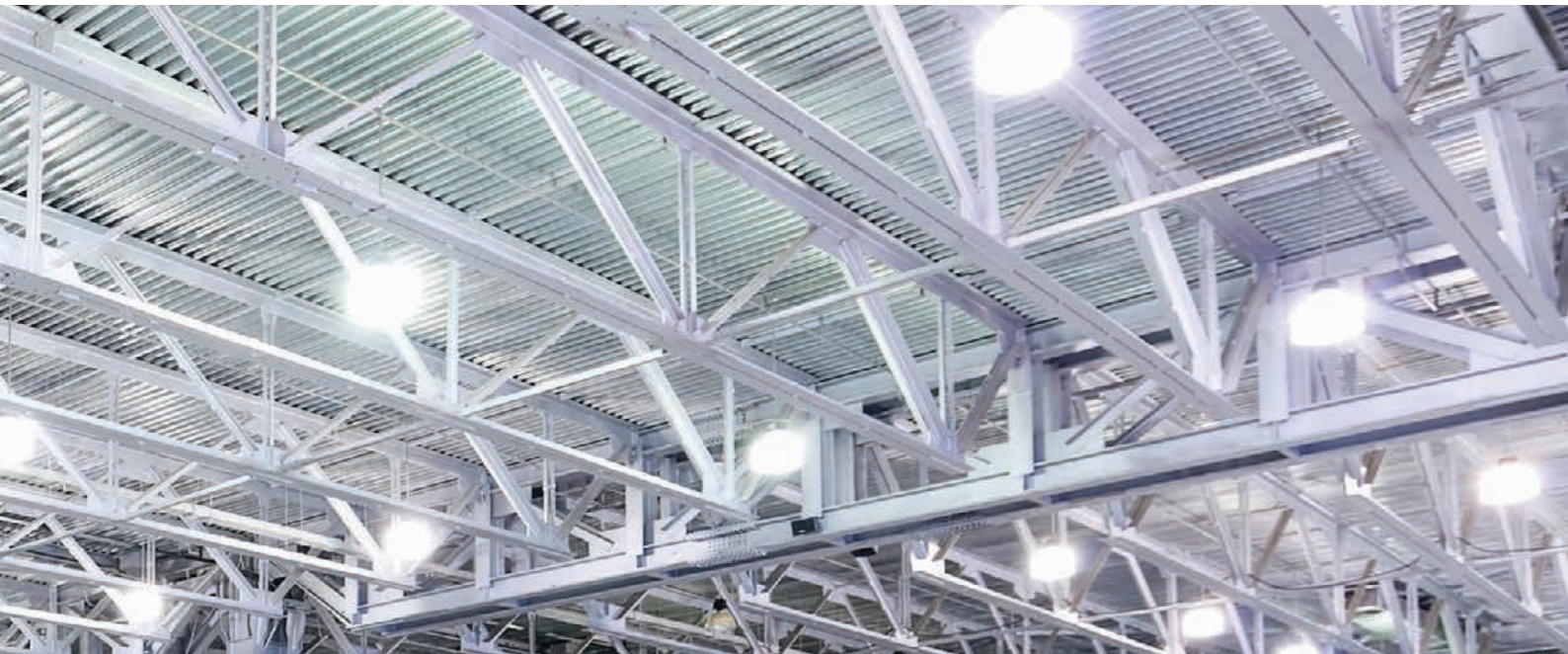
Lighting is a critical factor in industrial and manual labor. Optimal production results depend on the performance of the employees. The correct lighting helps to increase motivation, reduce fatigue, maintain health, and prevent accidents. Poor visual conditions have the opposite effect: if it is too dark, productivity drops, we tire easily, and errors quickly accrue.

Studies have confirmed the connection between illumination and human performance. More light demonstratively leads to better results in tasks with difficult viewing situations. How much light is needed also depends on age. Over the years, the lens of the human eye becomes blurry, the pupil width increases in response, and visual

acuity decreases. Older people therefore require higher lighting levels than younger in order to have the same impression of brightness.

The color of the light is also decisive in questions of quality, because humans don't simply view the world in shades of gray, but in color. High quality lighting management foregrounds the individual adjustment of color temperatures to certain purposes or, ideally, a targeted approximation of daylight throughout the day. When the color of the lighting can adjust from warm to natural white, the character of a room can be changed, and natural lighting qualities can be imitated in an interior room. These measures are effective, because light is not only required for visual acuity, it also sets our interior clocks.

Warehouses often have to make do without natural light. The high roof designs and narrow pathways between racks contribute to the challenges placed on the lighting.



iStock.com/Jkitan

For these reasons, modern lighting designs consider the biological effects of light by transferring the dynamics of daylight to artificial illumination.

Consistent Cost Reductions

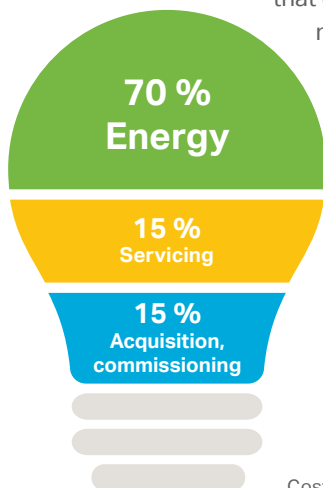
From the business side, another aspect is always under consideration: economics. The largest influencing factor here is the cost of energy, which, at around 70% of the total costs of a lighting system, are reflected in the budget. Energy optimization of each lighting system, whether through upgrades or purchased new, will be apparent in future savings. However, the goal is also to reduce investment costs, without having to sacrifice high-quality hardware. The key lies in a solution which is easy and flexible to configure during commissioning. To assist with this, modern lighting management systems offer user-friendly software applications with graphic user interfaces that can be used to adjust the system. Programming knowledge is no longer necessary for this task, as the relevant functions have already been implemented. Adjustments are carried out with the click of a mouse; hardware components can be assigned to their respective spaces, or operating parameters can be entered. Qualified staff can quickly carry out the commissioning, and the documentation generally takes place automatically.

Systems like this also have numerous advantages during operation and maintenance, since they are not only easy to maintain, but also provide comprehensive information about the system status. Impending failure of individual components can often be detected early, and, if a fault does occur, the identification of the error is substantially simplified. An additional advantage: when the use of a space changes, the lighting system can be flexibly adapted to the new spatial characteristics and the company's facility management team can carry out the changes.

In sum, it should be clear that modern lighting management offers more than mere reductions in energy and costs: it unites economics and efficient use of resources with comfort and flexibility for the users. The foundation is an intelligent control, which ensures that the correct light is available in the right amount at the right time by using daylight sensors, presence sensors, and well-conceived lighting scenarios.

TEXT JULIA OCKENGA | WAGO

PHOTO iStock.com



Cost distribution of a lighting system

LIGHTING MANAGEMENT FROM WAGO

Optimal Production Hall Lighting at Lower Costs

WAGO Lighting Management is the intelligent solution for lighting control in large spaces, for example, in production halls or warehouses. Using a combination of predefined hardware and user-friendly software, WAGO Lighting Management facilitates the design and commissioning of new lighting systems, and also offers numerous advantages for their operation.

Solid Hardware

On the hardware side, the new WAGO PFC200 Controller and the DALI Bus Module from the WAGO-I/O-SYSTEM 750 form the foundation. Every module can integrate up to 64 DALI lights, up to 16 DALI sensors, and up to 16 DALI transmitters into the system. Since the number of bus modules is variable, WAGO Lighting Management can be used for small production halls, and also in large logistics centers. Furthermore, additional I/O modules can be linked to the controller, for example, 3-Phase Power Measurement Modules for power measurement or wireless receivers for EnOcean wireless controls.

Modern Software

However, WAGO Lighting Management becomes a powerful and user-friendly lighting solution due to the software applications implemented at the controller. All settings, for commissioning and during operation, can be carried out at the controller with the click of a mouse. No programming is required. Since the graphic user interface can be accessed by any standard browser, there is no need for local software installation. The Web visualization, based on HTML5, configures the work with particular ease. Parameter values are stored on the SD card or a backup server via SFTP. The values can be forwarded to a higher-level building control or to a production control center using Modbus TCP/IP.

Innovative Operating Concept

WAGO Lighting Management is oriented toward the different light requirements of warehouses and production halls. The foundation: the hall is divided into virtual rooms corresponding to the different functions and activities there – for example, assembly lines, traffic paths, or offices. Each virtual room receives signals from the sensors and actuators in order to automatically generate the optimal lighting ratios for the respective tasks, depending on the functions that have been set.



Advantages of WAGO Lighting Management

- Reduction in lifecycle costs due to efficient lighting management.
- Easy commissioning via wizard-based configuration
- Easy conversion without programming
- Operation via standard Web browsers – no software installation necessary
- Connect to higher-level management and control systems within industrial or technical building environments
- Support in the planning of maintenance
- Scalability – from the small workshop to the logistic center
- Automatic documentation during commissioning

PHILIPS



The **flexROOM**® variable room concept guides innovative lighting designs in Philips' new construction.

INSPIRING LIGHT SCENARIOS FOR A NOVEL OFFICE EXPERIENCE

Philips, the technology company, has created not only a highly modern workspace with creatively themed areas at its DACH regional headquarters in Hamburg, but the building is also a display piece for innovative lighting technology. The variable solution for building automation, **flexROOM**® from WAGO takes on the complete automation of rooms in the six-story venue, which covers an office area of 13,500 m².

"Work Place Innovation" (WPI) is the key word, which played an important role during the design of the new headquarters for Germany, Austria, and Switzerland (DACH). With WPI, Philips is demanding efficient, results-oriented, and flexible working methods, and is creating more space for a better work-life balance. The design includes spaces that are equipped with advanced information and communication technologies to be functional, inspiring, and suitably configured.

During a tour through the building, the associations with this claim become clear: the employees have open team work areas available, which are in turn surrounded by focus rooms for concentrated activities and confidential discussions. Meeting rooms and creative spaces invite discussions and brainstorming. In addition, so-called "breakout areas" offer the potential for less structured get-togethers, as they are styled with a maritime flair, a forest ambiance, or the Hamburg red-light district.

A Journey of Discovery Focusing on Light

The topic of light played an important role in the successful realization of the 40 million euro project, which was developed, planned, and carried out by ECE Project Management from Hamburg, in collaboration with the engineering firm Plegge Plantener GmbH. "Our goal was to configure the spaces to be lively and to provide the employees with a comfortable atmosphere and a completely different office environment,"

explains Rainer Barth, LiAS Manager – Lighting Application Specialists and Design at Philips. “Therefore, we created the building as a show case for employees and customers. It is a lot of fun, it inspires us to go on exploratory journeys, and it allows our energy-efficient LED technology to shine.”

Three years of design time were allotted to the construction project. The celebratory opening in October 2015 had been fixed for a long time, while Philips worked in parallel on the development of specialized pendant lights for the building. These pendant lights unite direct and indirect illumination with accent lighting and a presence sensor. The indirect portion of the light passes through the color spectrum, from warm to natural white, over the course of the day. This makes it possible to change the character of a room and to copy natural light ratios in the building’s interior. Additional features of the design include light-

ing components for wall washing in all rooms and hallways, which underscore the area-dependent color configuration in the various floors.

Intelligent Room Automation using *flexROOM*®

Around 600 sensors were installed to regulate the lighting in the building. Controlling more than 10,000 communication-capable lighting elements is quite complex. Simultaneously, the time pressures on the project began to accumulate. Therefore, Philips decided to implement the room automation using WAGO’s *flexROOM*® System Distribution Boxes.

flexROOM® is a proven, intelligent solution for flexible automation of lighting, sun-shades, and individual room controls, which include heating and cooling. The idea behind this concept is to consistently use standardized hardware and software, which simultaneously allow sufficient flexibility in order to satisfy the requirements for specific projects.

Therefore, *flexROOM*® is based on the WAGO-I/O-SYSTEM

750, which, depending on the application, can be combined with the necessary components, like power supplies, switches, relays, junction boxes, and rail-mounted terminal blocks, as well as *WINSTA*® connectors, to form complete system distribution boxes.

The *flexROOM*® concept is oriented according to room segments. A segment is the smallest common denominator and represents the part of a room that has a window. Each room segment includes functions for controlling lighting, sun protection, and temperature regulation. The system software runs in a decentralized manner on the individual controllers, can be called up by any internet browser, and enables easy and quick parameterization of segments, thanks to a user-friendly graphic interface.

Consolidated under One Source – Using Only Four Types of Distribution Boxes

In order to operate all necessary functions in the Philip’s headquarters, WAGO designed four different *flexROOM*® Office Distribution Box variants, which each cover 16 room



In all, WAGO provided more than 100 *flexROOM*® system distribution boxes for the building automation, which are based on the WAGO-I/O-SYSTEM 750.



Philips' WPI concept includes themed areas, different meeting rooms and creative spaces

segments. Around 110 distribution boxes are deployed throughout the building. In addition, there is a **flexROOM®** Weather Distribution Box installed on the roof, which detects, processes, and provides weather data to the office distribution boxes.

One challenge of the project consisted in merging the different

systems in the building. Thanks to the **flexROOM®** concept, it was possible, and easy, to design a simple solution: while the lighting is implemented using DALI, **flexROOM®** communicates via KNX for the room control and via SMI for setting the blinds and shades. The individual office distribution boxes exchange data via Modbus/TCP, and communication at the man-

agement level is carried out using BACnet/IP.

After release of the functional specification document in June 2015, the installations for the building automation were available a mere four months later. Thanks to good preparation and the advantages of the **flexROOM®** concept, the project came in on schedule and according to plan.



Rainer Barth, LiAS Manager – Light Application Specialist at Philips, in conversation with Stephan Lampe from WAGO

Lighting: Individual and Sustainable

The Lighting Specialist, Barth, declares himself satisfied with the result, "We are proud to have created a high-tech campus with modern and attractive working areas, which support the process flows and the future needs of our company." A highlight of this is, in his opinion, the unique lighting design, which can elegantly create multiple lighting scenarios with the aid of the pendant lights, up to and including night service in the office areas. "After the end of the regular work day, we can switch the indirect proportion of the pendant

lights to blue. Any observers traveling along the main highway from the Hamburg airport to the Inner City see the building lit up in 'Philip's blue,'" he explains happily.

At the same time, the innovative lighting concept is setting standards for energy efficiency and sustainability at approximately 6 W/m². Since the lighting is controlled as a function of daylight and human presence, the energy consumption actually lies at around 50% of this value. The lights are virtually always run in a dimmed state. This saves energy, protects the lights, and the environment. The lighting experts

assume that the LED modules will require almost no maintenance during their lifetime of at least 25 years of operating time. For its high ecological standards, the building has already received a silver certification from the German Sustainable Building Council (DGNB).

TEXT STEPHAN LAMPE | WAGO

PHOTO FABIAN SCHINDLER | vor-ort-foto.de

FRANK VON WIEDLING | PHILIPS

"We are proud to have created a high-tech campus with modern and attractive working areas, which support the process flows and the future needs of our company."

A MORE EFFICIENT PATH TO INDIVIDUAL ROOM AUTOMATION

flexROOM®: The new version is even easier and more flexible

WAGO offers a standardized solution with their **flexROOM®** system, providing room automation that is easy to implement. In order to improve the speed of parameterization, a fundamentally reconfigured software application will be introduced at the Light + Building 2016 trade faire. The new release includes a completely reworked user interface that noticeably improves usability.

WAGO included comprehensive practical knowledge gained from users in the new version of the **flexROOM®** application. Therefore, it doesn't merely look and feel better, it incorporates fundamental changes, like reorganized configuration templates and expanded settings possibilities to make the workflow more consistent. However, the foundational principle of **flexROOM®** remains dividing rooms into defined segments. They form the smallest common denominator and are generally assigned to a window. This enables a **flexROOM®** configuration that varies according to building usage. In the case of repurposing, it is sufficient to enter the changed room segments into the software and then individually set the parameters assigned for lighting, sun shade, and room controls with a few adjustments.

Improved Navigation Helps You Work Faster

The new **flexROOM®** version allows you to carry out these tasks on tablets and smartphones thanks to the Web interface based on HTML5. In addition, the interface has been configured to be more transparent and ergonomic by including navigation ribbons known from modern software tools. Moving beyond usability, the room automation solution now also supports DALI Multi-Master Modules from WAGO. These can drive up to 64 lamps with ballasts and process up to 16 sensors on one line.

Due to the incorporation of the new WAGO PFC200 Controller, **flexROOM®** also offers secure configuration and data transmission via HTTPS and SFTP. And because **flexROOM®** is based on the WAGO-I/O-SYSTEM 750, WAGO will incorporate this modularity more strongly into their room automation applications. Individual solutions, tailored to specific projects, are stepping forward into the limelight.

In the new version of **flexROOM®**, the graphic user interface for configuration can be called up on smartphones and tablets. Users can modify all individual settings and view the system status.



A PLEA FOR MORE LIGHT

Mathias Wambsganß is Professor of Lighting Design and Building Technology at the Rosenheim University of Applied Sciences, sits on the board of the German Lighting Technology Association (LiTG) and is a founding partner of 3lpi, a lighting design studio in Munich. For the past 15 years, he has been involved in energy monitoring under the auspices of the Federal Ministry of Economy, where he carves up buildings into "energy slices". In the interview, Wambsganß talks about the use of carelessly selected lighting systems, missed savings potentials, and the absolute necessity of placing humans at the center of any design.

Lighting today is supposed to be as efficient as possible. At the same time, users want convenience. Can these work together?

» There is absolutely no contradiction, not initially, since highly efficient lighting means are now available. There is, thus, no need to optimize a lighting system based solely on its energy consumption. In addition, energy consumption, and its associated costs, should always be considered in relation to other cost factors. Personnel costs, for example, are a much larger line item in the corporate budget. Lighting an office costs, in the worst case scenario of low availability of natural light and long operating times, 8 to 10 euros per square meter per year. As a comparison, employers pay 5,000 euros and more per employee over the same time period measured according to the same space. Considered this way, we must absolutely stop measuring lighting solutions based primarily on their energy characteristics, and start placing more emphasis on lighting quality. Because ultimately, lighting exerts an enormous influence on the well-being of colleagues, and thus on their output. «



If the quality of the lighting is not used as the basis for designing a conventional lighting system for a commercial building, what is?

» There are standards for lighting a work place, which codify certain minimum levels, for example, 500 lux in an office. Many regard meeting these illumination levels as equivalent to lighting quality. However, lighting illuminance cannot actually be seen. It describes the amount of light which strikes a surface. The effect on the human eye, however, depends on the surface material. In addition, this standard assumes an employee who is 20 years old. Someone who is 50, on the other hand, requires fifty percent more light to be able to perform visual tasks at the same level of quality. Therefore, I begin with the question as to whether “500 lux” is the correct design goal at all. In consideration of productivity and the influences on health, it has become quite clear that we need more light for tasks at certain times. In an expert forum at the LiTG, we are currently discussing whether this standard is sustainable in its current form over the long term. In this case, defining a bandwidth of, for example, 500 to 1,000 lux would probably be a better solution. «

But the Energy Saving Ordinance also includes specifications. Will your desire for “more light” potentially conflict with efficiency goals?

» To a certain but small extent, yes. However, you have to look at the total relationship and consider things from a different point of view. For example, the installed output versus what is actually used, since the energy balance sheet ultimately counts that which was actually consumed. In order to arrive at a good result, a two-fold process makes more sense in my opinion: first, we should ask which lighting conditions are most useful in the work situation. The significance of the person who will work at this position plays an important role. Then, we undertake the necessary measures to configure the most efficient lighting solution. In addition to selecting efficient products, questions should also be raised about controlling or regulating the light. Although it has been documented that installing somewhat more lighting output makes financial sense, the savings potential of a lighting management system are even greater. «



The basis for selecting a specific lighting system are becoming less cost-based. Instead, the guidelines issued by the legislature are granted more weight, and they have stated that the question involves employee health and productivity.

» The key phrase here is “the right light at the right time”, which certainly relates to the quantity of light, and, where it makes sense, to the spectrum used. This means that the type and means for controlling light must be developed further so that the “right” illumination gains greater significance along with efficiency. «

How should this look in your opinion?

» If you consider how sensitively and directly our eyes react, then it is actually quite difficult to control or regulate lighting. In my opinion, this has yet to be sufficiently described. Therefore, we need information as to how to best bring the technical specifications into harmony with the ergonomics of the human eye. An example: if an office is equipped with daylight-dependent lighting control, then the brightness should not begin at 100% and then drop to the set point. The user has the feeling that it is too dark, because the human eye adjusts quickly to higher light levels, but takes longer to adapt to reduced light.

The message to the user is inevitably that he or she could have more light, but is not getting it. In order to set such points correctly in the controller, the programmer needs to know what the suitable values are for each function, and which system characteristics are expected by the user upon start up. «

Is the current procedure for the acceptance of lighting systems thus not mature enough because the electrical engineers do not know enough about the specifics of visual ergonomics?

» To a certain extent, yes. Many experts are not sensitive to this. In general, they don't know how the eye functions, and thus cannot adequately consider the relevant factors during operation or acceptance. From this, we should derive that it is actually logical to work toward a better method for operation and acceptance of lighting systems. This does not have to be a standard established by the legislature. It could, for example, also be based on information from the manufacturers of lighting controllers regarding how a system with their components functions most ergonomically in specific applications. The knowledge that we already have only helps the operator if someone has used the information to derive ways to improve things. That is, we need a recommendation for best practices. «

Do you assume then, that your stated claim of promoting lighting quality through good lighting control will have any influence on available sensors?

» That could become necessary, since the currently available sensors generally only measure brightness in addition to presence. If you look at a current, common topic, “Lighting and Health”, then sensors are necessary for evaluating the light received by the non-visual function of the eye, or to measure the spectral composition of the light. Prof. Herbert Plischke, endowed chair for “Lighting and Health” at the University of Munich, is currently experimenting with sensors which should contribute to this. However, I assume that it will take applications on a large scale before such sensors are affordable. «

“However, you will spare yourself aggravation on the part of your users, and that is almost priceless.”

Do you believe that a system which functions well differs, from an investment standpoint, from a system that does not operate as well? The use of technology is often quite similar...

system leads later to control which is virtually inoperable, then there are naturally increased operating costs in this case. The potential savings are lost. «

» There is certainly no difference from the hardware side. I have seen lighting solutions with expensive hardware that did not function, or only had limited functionality. Hardware can obviously be a source of errors, for example, if a sensor was selected with features that don't fit the installation location. However, if I assume that designers sought the correct components, then the question becomes whether a greater expense is incurred during commissioning if it is carried out properly, that is, if it was correctly dimensioned and parameterized. In which case, I believe yes. However, I am also of the opinion that this expense should be paid. If the challenges on the part of the design are suitably documented, then they should not be put down as a type of “extra” costs by the building owners. «

Can you count on savings during operation if the commissioning has been carefully carried out?

Imagine that you were the operator and get to decide which system should be installed. Do you see an advantage if your own personnel were in a position of replacing defective components or adapting the system when the spaces are restructured?

» Aren't a lot of systems virtually proprietary, because they bear the earmarks of the programmer? Even when selecting an open-source system, a certain relationship of dependency is generated during commissioning... Against this background, what you are describing seems almost like a dream. It would have to be function like this: in case I convert the space, I could assign the lights and switches with my own personnel and wouldn't need a highly-trained programmer who costs a lot of money. As an operator, I would certainly not be happy with a forced marriage to my system programmer. «

» Not necessarily. However, you will spare yourself aggravation on the part of your users, and that is almost priceless. If a carelessly commissioned



Illuminating a Production Hall

Efficiently and Flexibly with DALI and WAGO Lighting Management

PRODUCTION HALL OF FAME

High demands are placed on lighting at the workstation: it has to be reliable, efficient, and must create the optimal atmosphere as needed. Using powerful automation technology, additional usages can be created: it reduces programming on the part of technicians during commissioning and supports them during conversion and maintenance. WAGO recently introduced a solution of this type at their new stamping plant in Minden-Päpinghausen, Germany.



Lighting a total area of 25,000 square meters places high demands on the building automation. Up to 64 DALI lights are controlled by one I/O module. Ten DALI modules can be operated by one WAGO controller.

25,000 square meters, close in size to three soccer fields: almost 20 million euros of investment stand behind WAGO's new stamping plant. The building was used to manufacture furniture until the end of 2014, and has received a complete overhaul in recent months. "We updated the entire technology – we only left the sprinkler systems," states Marcus Kübler. Over the course of the renovations, the WAGO facility manager and his colleagues designed the lighting for the production hall.

Automation as the Basis for Lighting Control

The new generation of PFC200 Controllers, expanded with I/O modules from the WAGO-I/O-SYSTEM 750, forms the starting point for WAGO's Lighting Management. The most important element in this interaction is the DALI bus module, which integrates up to 64 DALI lights and up to 16 DALI sensors into the system. In addition to the ten DALI bus modules,



Facility Manager Kübler, "The WAGO lighting management foregrounds the relevant topics: efficiency, reliability, operability."

which can be driven by the controller, there are additional I/O modules connected for every task or signal, for example, for energy measurement in the 3-phase electrical network, for battery-free EnOcean wireless controls, or digital input/output signals.

Due to the extent of the floor space in WAGO's Papinghausen production hall, a total of four automation systems were installed for the lighting. "Mostly, this means that we had to take the DALI maximum conductor lengths into consideration, that is, 300 meters at conductor cross sections of 1.5 mm²," explains Kübler. For this reason, the four PFC200 Controllers are installed in separate control cabinets in the maintenance platform located in the center of the building. They communicate with each other and with the control center via Modbus TCP.

Modern Web Visualization Based on HTML5

The hardware may satisfy the technical prerequisites; however, it is not solely responsible for the

fact that the WAGO Lighting Management solution is as powerful as it is user friendly: WAGO implemented a specialized application on every controller which reduces the programming complexity for the user. During commissioning and operation, all settings can be carried out with the click of a mouse. Because the graphic user interface can be accessed using a standard Web browser, there is no need for local software installation on a PC. The Web visualization, based on HTML5, configures the task in an especially convenient way.

In the first configuration step, all DALI participants – the lights, sensors, switches, and transmitters – are assigned initial DALI addresses. They are then linked to EnOcean radio switches or digital input and output values. The lights can also be grouped into so-called virtual rooms; in the production hall in Papinghausen, these include, for example, traffic paths or areas with production machinery. There are no limits placed on the user: thus, for example, lights which are identified as belonging to a specific virtual room can be located on any computer within the network.

Multiple Functions

The control software in WAGO Lighting Management offers multiple means for contributing to energy efficiency, comfort, and work safety during operation. In addition to standard functions, like dimming or switching on and off, sophisticated features can be realized in connection with corresponding sensors: for example, daylight control dims the lights depending on the current ambient brightness, while presence sensors ensure that

Development into a Standard Product

The experiences that WAGO has collected during the design of the lighting control for their new stamping facility in Papinghausen, and from client projects, also benefits other customers. The PFC200 will soon be available as a standard product, including the software. Customers will then be able to order the controller with the necessary I/O modules for DALI, EnOcean, energy measurement, and inputs and outputs. "WAGO Lighting

“WAGO Lighting Management is ideally suited for lighting control in production halls and warehouses, because it places the relevant topics in the foreground: efficiency, reliability, operability.”

the lights are only on when someone is actually in the area affected by the lighting. Using the scheduler, detailed lighting scenarios can be defined for every day of the week or for any time of day, for example, a central "light's out" at the end of the work day.

WAGO Lighting Management, in connection with DALI, offers advantages across the entire lighting control, for example, in maintenance. Operating hour counters for each light, for example, enable proactive planning of maintenance in previously defined intervals. In addition, the lights report a corresponding message if an illuminant is defective. Furthermore, additional information can be stored in the software for the technicians, for example, detailing the type of illuminant or the tools necessary to exchange it.

Management is ideally suited for lighting control in production halls and warehouses, because it places the relevant topics in the foreground: efficiency, reliability, operability," concludes facility manager Kübler. "Programming expenses are definitely not among those."

TEXT DIRK RÖSCHER | WAGO

PHOTO WAGO



Central component of the WAGO lighting management: with a few mouse clicks, all lighting functions are carried out via the graphic user interface – no programming expertise necessary.

The Taunus Tower is considered by insiders to be one of the most beautiful sky scrapers in the Frankfurt Inner City.



Quickly Install Lights Thanks to Linect®

TENANT FIT OUT IMPROVEMENTS MUST BE CARRIED OUT QUICKLY

The Taunus Tower in Frankfurt's Inner City is considered by insiders to be one of the most beautiful sky scrapers in the banking metropolis on the Main. The global real estate agency, Tishman Speyer, constructed the tower at the start of 2014, and has leased out the majority of its space in the meantime. The "green building" was developed by the joint venture partners, Tishman Speyer and Commerz Real AG. Highest priority was granted to, and continues to be assigned to efficient use of resources and fast implementation of all correctional measures. In order to enable fast installation of lights in the building, the manufacturer-independent Linect® lighting system is used.

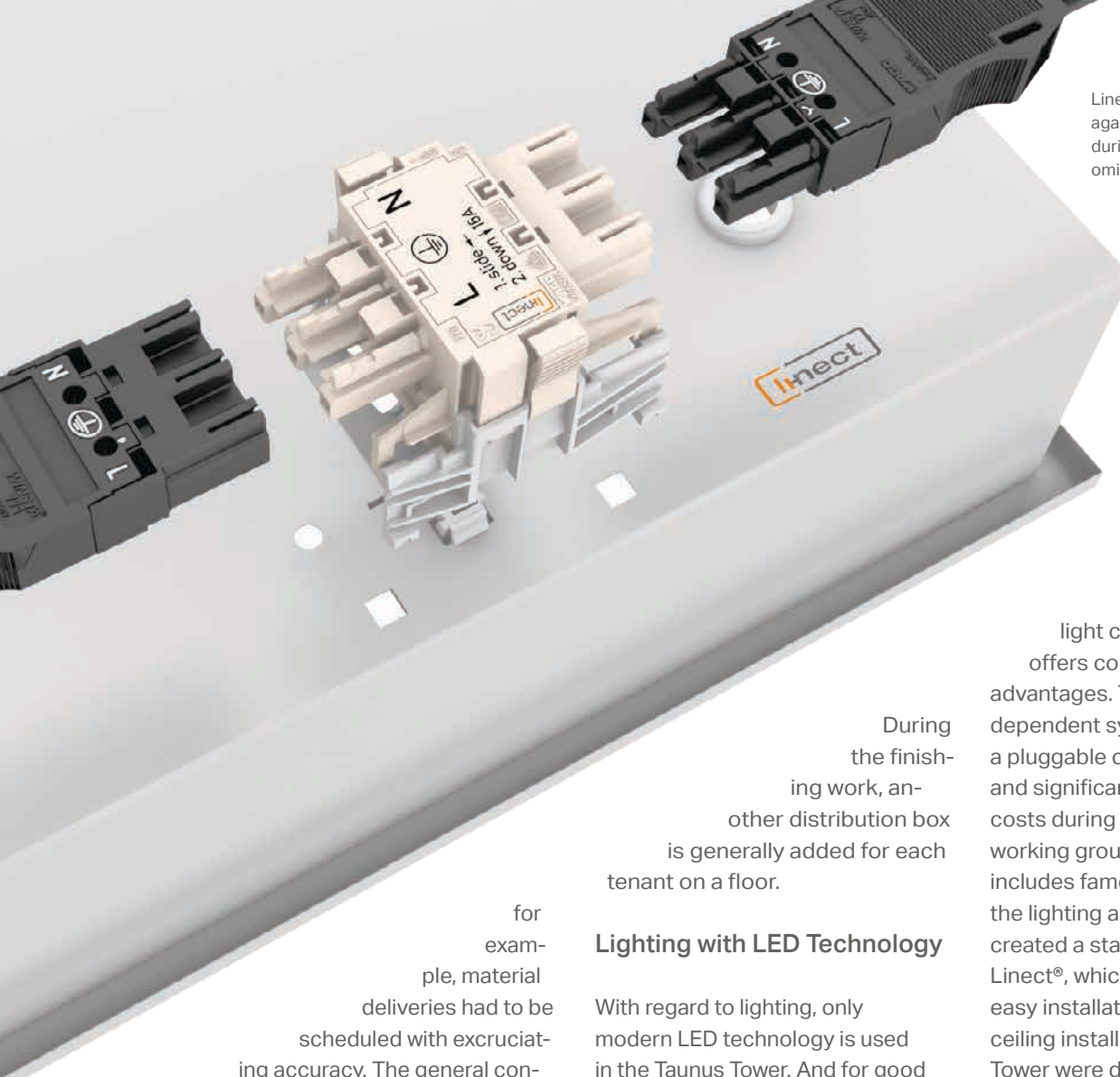
Tishman Speyer is one of the leading global developers, owners, operators, and asset managers of first-class real estate, with activities in North and South America, Europe, and Asia. Many prestigious firms around the world rely on Tishman Speyer to provide them with suitable office space. As of July 30, 2014, the company had purchased, developed, or managed a portfolio of more than 12.17 million square meters with a total value of more than \$68.1 billion. The most famous buildings include Rockefeller Center and the Chrysler Building in New York, Terre Norte in Sao Paulo, the Ventura Corporate

Towers in Rio de Janeiro, and the Opera Tower in Frankfurt. Tishman Speyer guides multiple projects in different phases of development in Brasilia, Chengdu, Frankfurt, Gurgaon, Hyderabad, Paris, Rio de Janeiro, San Francisco, Sao Paulo, Shanghai, and Suzhou. The new Taunus Tower in the Inner City of Frankfurt was added to this portfolio at the beginning of 2014. Tishman Speyer built the sky scraper, with a total of 60,000 square meters of office space, within two years, and has since moved its German headquarters into the building. Ecological construction and energy efficient operation are especially important

to the real estate company, and were thus important framing conditions to consider during the design of the Taunus Tower. The building received the highest certification according to LEED – platinum (see text box).

High Demands on Building Logistics

At the beginning of 2012, construction work began on the Taunus Tower with the first ceremonial shovel of dirt. The location of the construction site in the center of the Frankfurt Inner City placed great challenges on all participants;



Linect® plugs are protected against polarity reversal; errors during installation are virtually omitted.

for example, material deliveries had to be scheduled with excruciating accuracy. The general contractor tapped by Tishman Speyer had to realize the construction as quickly as possible. Thus, finishing work began in the lower levels while construction was still ongoing in the upper floors. The electrical systems were installed by Salvia Elektrotechnik GmbH. The mid-sized company has a workforce of approximately 180 at four locations in Munich, Frankfurt, Eislingen, and Schkeuditz. As senior site engineer from Salvia Elektrotechnik, Steffen Bergert supervised the work at the Taunus Tower: "We designed the entire power supply for the building – from the medium-voltage transformers up to the plugs and lights in the individual floors." A busbar system distributes electrical energy from the transformers to the floors. A floor distribution box is installed in the technology section of each level in order to distribute electricity.

During the finishing work, another distribution box is generally added for each tenant on a floor.

Lighting with LED Technology

With regard to lighting, only modern LED technology is used in the Taunus Tower. And for good reasons: the energy savings over conventional illumination is around 20% – a significant argument within the context of the LEED certification. "The lifecycle of LED lights is significantly longer," states Sven Käßler, who is the project manager at Salvia Elektrotechnik responsible for the Taunus Tower electrical installations. The higher purchase costs for the lights can be quickly recouped, and additional savings are realized during operation. "LED lights also have a significantly longer warranty period, which is guaranteed by the manufacturers."

Wiring Installations at High Speed

The electrical installations selected to accommodate the lights are also a version with higher initial costs; however, Linect®, the universal

light connection system, offers compelling long-term advantages. The manufacturer-independent system is based on a pluggable connector system and significantly reduces labor costs during installation. The ZVEI working group Linect®, which includes famous companies from the lighting and electrical sectors, created a standard system with Linect®, which enables fast and easy installation. The LED lights for ceiling installations in the Taunus Tower were designed and manufactured by Zumtobel Lighting and Siteco Beleuchtungstechnik. "All lights have a Linect® connection, which we equip with a T-connector from WAGO," explains Käßler. As a Linect® member, WAGO offers a comprehensive program for pluggable lighting connections. First, WINSTA® distribution boxes, which are also from WAGO, were installed at various points in the ceilings. The lights then simply had to be plugged into the distribution boxes using pre-configured Linect® lines. Adding additional lights, which are designed to be switched together, is carried out easily; they can be connected using the T-connectors or additional Linect® lines. At Salvia Elektrotechnik, they value the time advantages that Linect® systems offer during installation. However, they really only recognized how large the potential time savings are

when the products they needed were delivered using the “just in time” principle. “For us, the short delivery times that WAGO can offer are particularly important,” Bergert emphasizes, “if the implementation and assembly schedule are shortened, then everything has to move really fast.” Long delivery times are not acceptable.

In addition to the speed of wiring lighting installations, Linect® has another important advantage – faulty contacting or reverse connections are practically impossible.

DALI Is Also Retroactively Possible

If lights in the Taunus Tower should be individually switched or dimmed, then Linect® can also be used in combination with DALI (Digital Addressable Lighting Interface). The control lines for the DALI protocol are already universally available.

DALI is already in use in the building’s main lobby. Depending on the amount of daylight, different lighting scenarios can be called up. LED lights are also installed in the lobby, which are connected using pre-configured Linect® lines. At present, Salvia Elektrotechnik has installed around 6,000 flexible Linect® lines in the Taunus Tower. During additional tenant fit outs, as additional floors become available, this number will only increase.

TEXT MICHAEL DEWALD | WAGO

PHOTO KLAUS OHLENSCHLÄGER | vor-ort-foto.de

Sustainability in the Taunus Tower

Sustainability has already played an important role during the design and construction phases of the building, and will during operation. The building was designed as a low energy project in which the owners used sustainable solutions in all areas. The heating-cooling ceilings function, for example, according to a particularly energy-efficient system, and thus save around 30% of the energy used by conventional systems. Solar control glazing, a natural stone facade,

water-savings technologies and storm water utilization, an intelligent elevator design, energy-saving LED lighting – the list of measures is quite long. Tishman Speyer’s goal is certification according to the American LEED standard (Leadership in Energy and Environmental Design). They plan to achieve the highest “platinum” level.



A new mounting carrier enables use of WAGO's popular 221 Series COMPACT Splicing Connectors on carrier rails in compliance with standards. It ensures a secure mounting of the connectors and offers additional marking possibilities.

BETTER INSTALLATION TECHNOLOGY FOR EXISTING AND NEW CONSTRUCTION

Easily accessible, simple to assign, transparent structures, and all of this according to standards: With the new mounting carrier, electricians can also use WAGO's popular 221 Series COMPACT Splicing Connectors in distribution cabinets, and thereby also maintain the valid VDE standards. The carrier is particularly suited for retrofits, or for expanding the distribution cabinets. In new construction of distribution cabinets, WAGO also offers installation rail-mounted terminal blocks, which offer a multitude of advantages in comparison to installations using N/PE rails. Using this installation technology ensures future-oriented installations in all buildings.

The challenge in building technology is always to integrate more functions into increasingly smaller cabinets. Every millimeter counts, particularly when the existing electrical installations need to be expanded. With the 221 Series, WAGO offers electrical engineers lever-actuated splicing connectors that are particularly compact – a total of 40% smaller than their predecessors.

With the new mounting carriers, WAGO has succeeded in transferring the advantages valued in the 221 Series Splicing Connectors into the distribution cabinet itself. The carrier is suited for all connector variants. It guarantees easy servicing, inspec-

tion, maintenance, and accessibility, as well as simple assignment and testing of the connected conductors according to VDE 0100-510. The carrier can be snapped onto standard DIN rails horizontally or vertically, or screw-mounted to smooth surfaces. Due to the specific design, in which one side remains open, the electrician has the option of using the operating lever for opening the connectors, even when inserted. Conductors can thus be conveniently connected and removed before or after inserting the connector into the carrier. The design also ensures that a test slot is always accessible, and the clamping unit can also be easily marked.

Proven Quality for New Distribution Cabinets

If the combination of 221 Series Splicing Connectors and Mounting Carrier enable an expansion of existing wiring installations that conform to standards, there is an even better solution for new building projects: wiring installations using installation rail-mounted terminal blocks, for example, using TOBJOB® S from WAGO. In this type of installation, the terminal blocks are snapped directly onto the DIN rail, providing faster electrical system wiring. Above all, WAGO's proven Push-in CAGE CLAMP® Connection Technology saves time and ensures safety,

because the terminal blocks establish a continuously good electrical connection.

With a glance at the future, building installations with rail-mounted terminal blocks expands the options for subsequent changes to or expansions of electrical systems, while reducing complications. As a practical feature, electricians can quickly loosen connections, and also have a clear wiring configuration with significantly more flexibility in circuit configuration, in comparison to installations using PE/N rails.

Building Safety

In addition to transparency and flexibility, safety in the electrical installations in buildings is a sensitive area in which small errors can have very large effects. The rules for proper installation and maintenance are correspondingly comprehensive. One safety measure is the so-called insulation resistance measurement. As every insulating fault conceals a potential hazard, the execution of this test is mandatory in fire-prone locations according to the building code DIN VDE 0100-482 and for public buildings according to DIN VDE 0100-718. In practice, installation terminal blocks are used almost exclusively due to the normative requirement that a simple measurement of the insulation resistance must be possible for conductors with cross-sections of less than 10 mm² without branching off the conductor.

In addition to legally-mandated implementation, insulation resistance measurement is also a fixed component of voluntary tests. With an E-check, for example, renters of private or commercial real estate can multiply document the state of the electrical systems according to code, prior to transfer of the rental

space. Some insurers have likewise recognized the advantages of the test and offer their customers reduced premiums if they regularly carry it out.

Insulation Resistance Measurement with Multilevel Installation Terminal Blocks

During the test, the insulation resistance is measured between the two live conductors and the PE conductor connected to the ground. The N and L potentials may be electrically connected to each other during the test – in order to prevent a risk to humans or animals, or damage to property and equipment. These measurements are only fast, safe, and accurate when carried out according to the standard, that is, if the neutral conductor can be separated via a mechanical device integrated into the terminal block, without having to disconnect the terminal block. Therefore, WAGO's 2003 and 2005 Series TOPJOB® S Multilevel Installation Terminal Blocks have an N-disconnect slide link or an internal N knife disconnect.

Clear Lines in the Electrical System

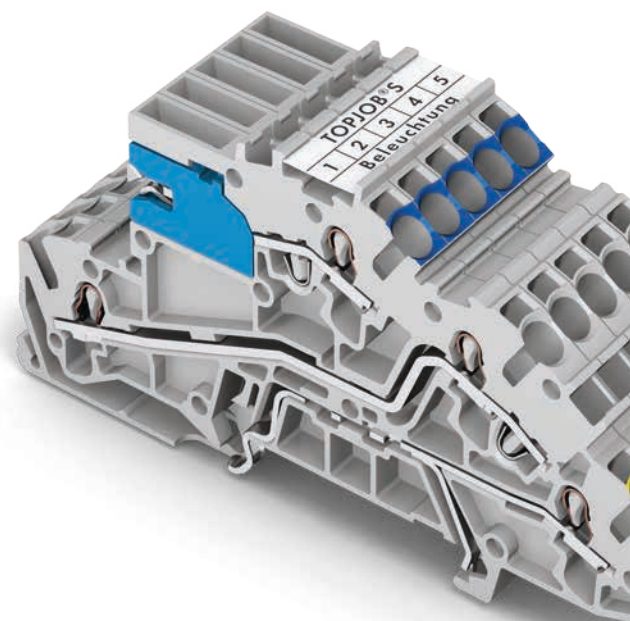
The use of WAGO's Installation Rail-Mounted Terminal Blocks also functions effectively in terms of image. Because the appearance of the switching cabinet presents the visible calling card of an electrical installing firm, a tidy, well-structured electrical cabinet provides real competitive advantages. The designation of each clamping unit with easily legible marking is likewise part of the professional appearance of a distribution cabinet. Within the TOPJOB® S Series, WAGO offers solutions for quickly and neatly marking the rail-mounted terminal blocks – up to 3 lines of text and easily legible when wired.

Conclusion

Installations using rail-mounted terminal blocks are increasingly replacing conventional connection technology using PE- and N-rails in building projects in renovations, and also in new construction. The system from WAGO can be flexibly adapted so that retrofits or expansions can be carried out in a way that saves time. In existing systems, WAGO's new 221 Series COMPACT Splicing Connectors save both space and time. A carrier makes it possible to securely mount the connectors onto the carrier rail.

TEXT ANDREAS BRETTSCHEIDER, WAGO

PHOTO WAGO



Plug-and-play: Future Electronics has developed standard LED modules specially designed for the linear remote phosphor profiles from Intematix. The profiles simply slide over the LED modules – the complete luminaire is then ready.

Innovative LED Luminaires as Plug-and-Play Solution

UNIQUE UNIFORMITY

Electronics distributor Future Electronics has developed standard LED modules for linear remote phosphor profiles from Intematix. This provides lighting manufacturers with a complete LED luminaire which is both highly efficient and produces an extremely uniform light. WAGO SMD terminal blocks ensure a convenient connection.

When lighting designers describe the lighting effect produced by their products, they use terms like warm, soft, cozy, neutral, or even accentuated. The right lighting can be provided for virtually any atmosphere since sophisticated lighting systems can create every conceivable mood. With the coming of LED technology, however, traditional methods were

cast aside. "After it was consciously recognized that LEDs are perceived as spot lighting sources, it has since emerged that this factor appears as a disturbance in some lighting applications. Instead, lighting with a uniform radiation, without any recognizable LED points, is desired," explains Marcel Nierhoff, program manager for lighting integration at the electronics distributor Future Electronics. However, in order for LED lighting to radiate just as warmly and uniformly as related lighting systems that use filament bulbs or fluorescent tubes, optical diffuser technologies, such as coated foils, are required. "Remote phosphor profiles offer a different approach," says Marcel Nierhoff.

Phosphor is normally applied to blue LEDs in order to produce white light

from the additive mixture of yellow phosphor with blue LEDs. The US manufacturer Intematix has been creating a sensation for some time now with a new innovation. "Intematix is a trailblazer in processes in which the phosphor is not applied directly to the LED. The desired effects are achieved instead by means of a 'remote' phosphor profile, that is, applied at a distance from the LED," explains Marcel Nierhoff. This has clear benefits. "Due to the spatial separation of the LED and the phosphor, the generation of white light is more efficient than with a conventional white LED. Losses which occur through the use of a diffuser are also eliminated. The absolute uniformity of the light source shouldn't be forgotten either," explains lighting specialist Nierhoff.



Convenient Wiring

However, there was a small snag in the solution: although lighting manufacturers could purchase the required Intematix products via the electronics distributor, which has several thousand employees worldwide, there were no LED modules on the market with royal blue LEDs which fitted the linear phosphor profiles. However, none of the modules with royal blue LEDs on the market could be used with the linear remote phosphor profiles. Manufacturing the required components on their own was not an option for their customers. In response to considerable feedback, Future Electronics undertook the initiative themselves. "We developed the LED modules ourselves so that we could offer our customers the right products," says

Nierhoff. With its many years of experience in the field of integrated LED solutions, the manufacturer, headquartered in Montreal, Canada, was able to respond more specifically to customer requirements.

The lighting experts in Future Lighting Solutions work in facilities scattered around the world. It took them half a year to develop the components and production processes. Their work resulted in aluminum profiles with fitted LED modules in standard 560 and 1,160 millimeter lengths, which are perfectly matched to the linear profiles from Intematix. The profiles simply slide over the LED modules – the complete luminaire is then ready. Because Intematix uses different phosphor mixtures for its linear profiles, lighting designers can choose between different CCT (cor-

related color temperature) and CRI (color rendering index) values.

To ensure a high quality wiring design that was also convenient for customers, Marcel Nierhoff turned to WAGO. "We were pleased to be the first people they contacted. Working together, we quickly found the right solution," says Patrick Schirmmacher, Market Manager for PCB Applications & Lighting at WAGO. The Minden-based company has been offering PCB terminal blocks, specifically designed for LED boards, since 2011. The terminal blocks are both extremely flat and they can be soldered using the reflow process. As surface-mount devices (SMD) they are designed exclusively for surface mounting on PCBs. The 2060 Series SMD Terminal Blocks are equipped with push-in CAGE CLAMP® connection technology.



Broad spectrum: In addition to the LED modules for linear remote phosphor profiles, Future Electronics has more in-house developments in its offering. This includes an LED module for ceiling luminaires, high-voltage models, and models specifically designed for use with high power LEDs. All of them can be wired conveniently using WAGO's SMD terminals blocks.

They are suitable for solid and fine-stranded conductors; rigid, solid conductors can be connected simply by pushing them in. The integrated push-button allows the clamping unit to be opened for connecting or removing all types of conductors. Patrick Schirmmacher describes the most important features, "What makes modules so successful is the fact that they combine several features: side-by-side assembly without the loss of any poles, the integrated push-button for intuitive connection and removal of conductors, and especially the compact design."

"The WAGO products give our customers the security that they can design the wiring flexibly and meet demanding requirements."

WAGO's entire SMD range comprises 1-, 2- and 3-pole terminal blocks in three sizes (2059, 2060 and 2061 Series) for conductor cross sections from 0.14 to 1.5 mm². High-voltage variants of the 2060 Series are also available. Additional board-to-board links for the 2060 Series can be used to fit several boards together. Another special feature: the terminal blocks are beveled at the input. "Cameras for quality control can thus better view and check the conductor entry from above," explains Schirmmacher.

New Generation, New Features

Future Electronics relies on two-pole terminal blocks from the 2060 Series with an installation height of just 4.5 millimeters for the production of their linear LED modules. "By using WAGO products, our customers are assured that the wiring is flexibly designed and meets demanding requirements," says Nierhoff. The most recently optimized design of the 2060 Series is used for series production of modules. Due to their pure white color and particularly robust design, the new version of the

terminal blocks is highly suited for manual and automated wiring.

In addition to the linear remote phosphor modules, Future Electronics also offers other LED modules that it has developed in-house. The so-called "SimpleLED" range was only recently upgraded and can be wired conveniently thanks to the WAGO's SMD terminal blocks. Three Zhaga-compliant LED models, with lengths of 280, 560 and 1,120 millimeters, are included in the portfolio, and a flexible modular device for

street and industrial lighting is also included. The offering also includes high-voltage modules that can be connected directly to the AC mains. "In certain areas, we see a need for products, in which the driver can be eliminated and which have the electronics on board," Nierhoff explains.

With this project, Future Electronics has once again demonstrated their expertise in the field of lighting. "The intelligent combination of technologies to form complete lighting solutions provides customers with a rapid entry into the field of LED lighting. In the future, we will expand this approach," concludes Marcel Nierhoff. "An obvious idea is the ability to control and regulate the LED lights to increase their efficiency." An area in which WAGO has a lot of expertise.

TEXT DIRK SCHÄFER | ALPHADIALOG

PHOTO BERND HERGERT | vor-ort-foto.de

COMPACT TERMINAL BLOCK – LARGE CROSS-SECTION

WAGO's 2059 Series SMD PCB Terminal Blocks are now approved for 20 AWG/0.5 mm² solid conductors.

New approvals offer manufacturers the perfect tool to rein in the size of LED modules. WAGO's 2059 Series Terminal Blocks provide a particularly compact connection for the conductor cross-sections that are staples in the lighting industry. Further boosting the 2059 Series' appeal for LED lighting is a low profile of just 2.7 mm, which reduces on-board shadowing to provides more uniform light distribution.

The new approval complements the 2059 Series' established EN/IEC and UL approvals for world-wide applications.

2059 Series – Compact PCB Terminal Blocks for Small LED Modules

The SMD PCB terminal blocks from the 2059 Series are perfectly suited for small LED modules in spotlights, downlights and streetlights. As WAGO's most compact PCB terminal blocks, the 2059 Series accommodates solid conductors from 26–20 AWG (0.14–0.5 mm²) and features 3 mm pin spacing. The terminal blocks offer a current rating up to 3 A and a rated voltage of at least

160 V (IEC) or 250 V (UL). Furthermore, WAGO's proven PUSH WIRE® connection provides easy push-in termination of solid conductors. Operating tools are available for conductor removal.

A Variety of Terminal Blocks Form the SMD Family

In addition to the 2059 Series SMD Terminal Blocks, WAGO offers an extensive range of products with its 2060 and 2061 Series PCB terminal blocks for SMD applications up to a maximum conductor cross-section of 1.5 mm².

All of WAGO's SMD PCB Terminal Blocks are available in tape-and-reel packaging for automated PCB assembly. This allows full integration into SMT assembly and manufacturing processes.



WAGO's 2059 Series SMD PCB Terminal Block is ideal for small LED modules thanks to its low profile of just 2.7 mm.

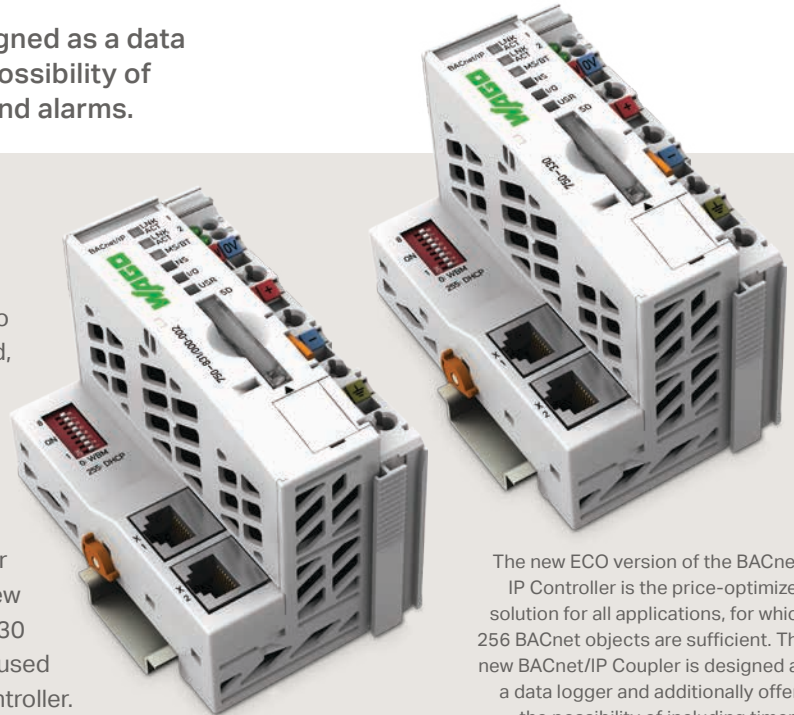
BACnet: ESTABLISHING CONNECTIONS JUST BECAME EASIER

The new BACnet/IP Coupler is designed as a data logger and additionally offers the possibility of including timers, trend recorders, and alarms.

There exists a particular variety of different communication protocols in building services, which must be harmonized in order to function. As a globally established standard, BACnet has the task of connecting autonomous technology islands in buildings with one another. With the new 750-831/000-002 BACnet/IP ECO Controller, WAGO has brought a device to market which is a cost-effective solution for applications which require comparatively few BACnet objects to be sufficient. The 750-330 BACnet/IP Coupler is also new, and can be used as a data logger and autonomous small controller.

For up to 256 BACnet Objects: WAGO's New BACnet/IP Controller

LON®, KNX, and DALI are three typical representatives of communication protocols which are widely used in building technology. The new BACnet/IP ECO Controller integrates the subsystems that depend on these protocols into the building control system using standardized communication. In this way, room automation or an HVAC control can be realized easily and efficiently. WAGO offers a price-optimized solution as an ECO version of the established 750-831 BACnet/IP Controller – for all applications where 256 BACnet objects are sufficient. The new device has an internal flash memory of 4.5 MB, can be freely programmed using the languages from IEC 61131-3, and offers a 2-port switch for ETHERNET line topologies, in addition to an SD card slot.



The new ECO version of the BACnet/IP Controller is the price-optimized solution for all applications, for which 256 BACnet objects are sufficient. The new BACnet/IP Coupler is designed as a data logger and additionally offers the possibility of including timers, trend recorders, and alarms.

Powerful Data Logger: WAGO's New BACnet/IP Coupler

Decentrally detect, translate, and forward I/O signals: the new 750-330 BACnet/IP Coupler is designed as a data logger and additionally offers the possibility for including timers, trend recorders, and alarms. The fieldbus coupler, equipped according to BACnet revision 12, can also manage up to 256 BACnet objects. WAGO has made corresponding software tools available for simple configuration and fast commissioning. Both devices support the standardized BACnet device profile B-BC (BACnet building controller) with all necessary BACnet objects, BACnet interoperability building blocks (BIBBs), and interoperability areas. Thus, complete BACnet integration and interoperability with other manufacturers' components is guaranteed.

MODERN LIGHTING CONTROL USING DALI

Flexible Solutions and Simple Commissioning



DALI Multi-Master Module – the ideal interface to the WAGO-I/O-SYSTEM 750

DALI sensors for parallel connection,
together with lighting devices, on one DALI line.

DALI Configurator with newly designed user interface for convenient
configuration and simple commissioning of complete DALI networks.

www.wago.com/dali

Legal Information

WAGOdirect building, February 2016
Editor: Julia Ockenga
(responsible editor)
Phone: +49 571/ 887-77396
Fax: +49 571/ 887-877396

Free reuse of this content is possible
following approval and with appropriate
citation.

Contact: Julia Ockenga.
We assume no liability for unsolicited
manuscripts and photos.
WAGOdirect building is published
periodically.

WAGO Kontakttechnik GmbH & Co. KG

Postfach 2880 · 32385 Minden
Hansastraße 27 · 32423 Minden
info@wago.com
www.wago.com

| | |
|---------------|------------------------|
| Headquarters | +49 571/ 887 - 0 |
| Sales | +49 571/ 887 - 222 |
| Order Service | +49 571/ 887 - 44 333 |
| Fax | +49 571/ 887 - 844 169 |

WAGO is a registered trademark of WAGO Verwaltungsgesellschaft mbH. Cover picture: iStock.com/Jkitan

“Copyright – WAGO Kontakttechnik GmbH & Co. KG – all rights reserved. The content and structure of the WAGO websites, catalogs, videos, and other WAGO media are subject to copyright. Distribution or modification to the contents of these pages and videos is prohibited. Furthermore, the content may neither be copied nor made available to third parties for commercial purposes. Also subject to copyright are the images and videos that were made available to WAGO Kontakttechnik GmbH & Co. KG by third parties.”