# SECURELY NETWORKED

## MODERN AUTOMATION AND CYBERSECURITY ARE THE BASIS OF EFFICIENT BUILDINGS

**Topics in Focus**

Better Overview for Retailers

–

Critical Cybersecurity in Buildings

–

Hotel Group Relies on Efficiency

–

Save Energy with Help from the Cloud

# SMART AUTOMATION –

## WITH *flex*ROOM® FROM WAGO

Flexible work environments require versatile room designs. *flex*ROOM®, the room automation solution from WAGO, allows you to adapt lighting, sun protection and temperature control to your exact needs – without any programming. You can also benefit from the *flex*ROOM® all-in-one solution for your building project.

**www.wago.com/flexroom**

# WE'RE NOT AFRAID OF CLIMATE CHANGE

It was only a matter of time before Europe turbocharged its response to climate change. The building sector offers immense energy saving potentials: Around 35% of buildings in Europe are more than 50 years old, according to statistics from the European Union, yet only a fraction of these inefficient $CO_2$ emitters have been renovated to conserve energy. This could change soon: directives, like the revised EU Building Efficiency Guidelines, require and promote efficiency measures and digitization (page 10). In addition, the latest energy technologies and modern automation solutions offer building owners the potential for converting inefficient, existing buildings into sustainable smart buildings at a manageable cost.

WAGO has already been actively successful in energy-efficient building operations for years. One current example is the Stühlinger city hall in Freiburg: with the aid of WAGO room automation, it has been converted into the first plus-energy public building in Europe (page 20). Or consider the plans of the Radisson Hotel Group: their buildings are undergoing a comprehensive program of modifications and modernization in order to achieve reduced energy consumption and increased comfort levels for guests. WAGO technology assumes a key role in these actions (page 28).

However, smart buildings cannot be implemented without building automation, and this, in turn, only functions with networked building systems and an Internet connection. In this case, the highest priority lies in preventing manipulation or cyber attacks. Professor Norbert Pohlmann, cybersecurity expert and Managing Director of the IT Security Association Germany, among other things, states clearly in our interview that the risk of attacks rises with increased levels of connectivity; however, it can be controlled – primarily if companies in the building automation sector establish common security standards and employ up-to-date security technologies (page 16).

This is precisely what is taking place now: modern automation solutions are permanently protected using instruments and methods, like firewalls, encryption, and corresponding organization, so that attacks by third parties may be prevented at the highest possible levels. The open, interoperable automation solutions from WAGO already offer comprehensive security functions for secure building operation.

Energy efficiency through automation and cybersecurity are two topics, which do not initially appear to have much in common; yet, it appears that they are actually inseparable. WAGO is proficient in both topics. Are you interested in the proof? Then we would like to recommend the articles in this magazine.

Best regards,

**Martin Hardenfels**

# SECURELY NETWORKED

When is Europe turbocharging its response to climate change? Buildings offer immense potential for energy savings; however, how can networking and digitization be advanced while building operators fear attacks on their building automation? Cybersecurity has become a hot topic in the building sector. The good news is that suppliers of building automation systems are also taking this very seriously. WAGO protects its solutions with up-to-date security technologies so that attacks can be impeded at the highest level. At the same time, its open, interoperable automation solutions offer users all kinds of possibilities for implementing energy efficiency projects. The combination of flexibility and security has been well received on the market, as the success stories in this magazine will prove.

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## OPINIONS

## APPLICATIONS

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## RETAILERS FIND SUITABLE PRODUCTS AND SOLUTIONS AT WAGO

Retailers have to satisfy many demands to remain competitive. Economical operation tops the list. It can only be achieved if the consumption of energy and resources is significantly reduced while increasing the availability of technical systems in stores. Retailers also know that customers expect a comfortable atmosphere. They have to offer ideal temperatures, perfect lighting and shopper-friendly store layouts. At WAGO, retailers can find store-ready products and solutions that efficiently meet these challenges: from lighting, market and shade control through WAGO energy data management up to cash register signaling equipment. Retailers grow, and so do their challenges. WAGO is a trusted retail partner that provides a solid foundation for others to build on.

**In addition to a good selection of products, other factors, like lighting and temperature, contribute to customer comfort. A good shop controller can ensure this.**

# IN A SHOPPING MOOD

How can you reduce energy and maintenance costs in retail stores, while simultaneously improving customer experiences? With an energy management system for widely dispersed retail properties that provides the necessary overview.

Guest commentary by Jo Deceuninck, Sumi Smart & Connected Buildings

Technical object management is a major challenge for retailers. Their employees, who boast a wide variety of other desirable skills, often have difficulties getting their bearings in a store's utility closet. So they may not notice that the heating and air conditioning are running at the same time, or when water and energy are being wasted at other points. This begs the question: how can you monitor various technical systems in distributed retail properties?

And the answer lies in "Shopcontroller," an energy management system designed by the Belgian company Sumi Smart & Connected Buildings, which helps manage widely distributed properties. It consists of a user-friendly web interface, a cloud-based database and a WAGO controller. Using the central web application and an automated controller (for functions like heat, lighting and air conditioning), it is possible to monitor all of a retailer's stores in realtime (for electricity, gas, water, temperatures and brightness) simultaneously – from any location.

## Saving Energy with Artificial Intelligence

Algorithmically optimized data, like historical building data, current exterior and interior temperatures or predictions, provide the foundation for the automated controller. Via artificial intelligence, Shopcontroller can calculate the exact moment on a winter day when the heat can be switched off in the retailer's Amsterdam store, cost-effectively maintaining comfort until closing time. On the same afternoon, the system defines another point in time for the same retailer's shop in Helsinki, without employee intervention. In addition, various alert messages and thresholds notify employees when they need to perform

»WAGO controllers were selected for the Shopcontroller retail concept thanks to their high standards in technical service and how often they are used for communication with all types of standard protocols.«

preventive measures. This information is quite valuable, as prevention helps eliminate expensive repairs.

The Shopcontroller also provides the retailer with the tools that enable every one of their shops to provide customers with an identical experience – no matter which shop they happen to visit. This includes a focus on in-store environmental variables, like ideal temperature, brightness, the selection of room fragrances, or background music. This capability has led a host of diverse retailers – including Decathlon, fnac, Vanden Borre, Renmans, Henri Boucher, Boulangerie Louise, e5 and Delhaize – to either add the Shopcontroller platform to their operations or make plans to do so soon.

## Best Practices with WAGO

For example, the Renmans Group manages around 400 butcher shops, most of which share retail space with ALDI supermarkets in Belgium, Luxembourg and France. The Shopcontroller platform can be used by hundreds of internal and external users at different levels, such as butchers, sales personnel, regional managers, facility managers, refrigeration technicians, electricians, or HVAC technicians (heating, ventilation, air conditioning). Each user level has a

specialized dashboard, which only displays the graphics and numbers that are needed at that particular level.

Facility managers, for example, can use the Shopcontroller to set up sophisticated warning systems, and then send them only to those who really need to see them. By using these types of warning systems, the responsible people are always updated, e.g., with information about the status of an action, timing, or results. WAGO controllers were selected for the Shopcontroller retail concept thanks to their high standards in technical service and how often they are used for communication with standard protocols, like Modbus®, BACnet, DALI and KNX. The controller is thus one of the essential factors in enabling the Shopcontroller system to provide retailers with real added value, like energy savings, reduced maintenance costs and increased employee productivity.

**The controller allows shops to be easily monitored from any location with the aid of a user-friendly web interface.**

# SECURELY NETWORKED

**Climate protection in Germany and Europe depends on the fact that the immense potential for energy savings in existing buildings has not yet been exhausted. These can be converted at manageable cost into smart buildings with high energy efficiency and increased comfort by employing modern building automation. Up-to-date cybersecurity ensures secure building operation.**

Energy-modernized buildings like this school avoid emissions and protect the climate.

Although scientists strenuously recommend drastic measures in order to still achieve the goal of two degrees in international climate policies, there is still too little movement towards climate protection. Countries like Brazil or the USA continue their intransigent reliance on coal, while erstwhile leaders in Europe, like Germany, hobble behind their goals. One reason is the high level of energy consumption for heating rooms, hot water, lighting, and cooling in buildings. Around 40 percent of the total energy consumption and one-third of the $CO_2$ emissions in Germany, as in Europe, can be assigned to the building sector. The reduction in greenhouse gases lies far below expectations.

In order to accelerate this decrease, experts primarily recommend building renovations. In the European Union, only 0.4 to 1.2% of existing buildings receive an energy renovation per year, according to EU statistics. According to Oliver Rapf, Executive Director of the "Building Performance Institute Europe",

a charitable organization in Brussels, this number must be increased to 3% to make the 97% of European buildings, which are currently not suited for a low-carbon future, climate-friendly and sustainable.

## New Incentives for Intelligently Networked Buildings

The Energy Performance of Buildings Directive (EPBD), published by the EU in 2018, can help remedy the backlog in renovations. It must be enacted into national legal and administrative provisions prior to March 2020; in Germany, this will lead to an amendment of the Heating Costs Ordinance, which should create incentives to reduce consumption of heat and hot water. In addition, the EPBD introduced the term, 'Smart Readiness Indicator' (SRI), to indicate intelligence capabilities. This should enable evaluations of the levels at which a building interacts with its users and

the electrical network, and how building operations can be controlled in a more energy efficient way. Evaluation criteria include achievable energy savings, comfort measures, flexibility in energy demands, and information and reporting by means of the building automation. In addition to classic building equipment, this now includes, for example, smart meters, intelligent electrical meters, energy stores or charging stations for eVehicles.

The SRI can contribute to the value of a building in the future, and can measure how intelligently the structure is networked, according to the German Association of Energy and WATER Industries (BDEW), which supports the introduction of this measure. "The intelligence indicator can stimulate the demand for smart real estate," is the hope at least. However, smart buildings have two essential prerequisites: they require – and this is also promoted by the EPBD – building automation as the basis for energy efficient operation.

Open-source, interoperable building automation solutions offer decisive advantages: they can flexibly detect measurement signals and facilitate standardized communication between components from different manufacturers and with the building management system. In addition, so-called 'smart meter gateways' are necessary to function as central communication units for linking the building automation to the smart grid. Only through networking can building technology systems become part of the smart grid, which intelligently integrates all connected systems to achieve efficiency, reliability, and cost effectiveness.

## Network Security as the Basis for Climate Protection

During the nationwide introduction of smart meter gateways, the connection of intelligent networks to the Internet should also be scrutinized. According to Norbert Pohlmann, IT Professor for distributed systems and information security and head of the Institute for Internet Security at the University of Applied Sciences in Gelsenkirchen, "all of the attacks, that we are familiar with from the Internet, can also be used against intelligent networks." To guarantee appropriate cybersecurity, the Federal Office for Information Security (BSI) conceives of smart meter gateways that offer security services, like data integrity, authentication, encryption, and a guarantee of data privacy protection. "Smart meter gateways offer a high level of security," says Pohlmann. However, the expert also warns that cybersecurity should not be treated casually: you can read his interview with WAGO on page 16. Building automation systems are increasingly networked with IT solutions; however, processes that focus on security against internal and external network attacks have not been commonly present before now. Historically, this has led to largely unprotected systems in building technology meeting a complex IT world. This can have fatal consequences in buildings with critical infrastructure, according to Pohlmann.

## Security Obligations and Manufacturers

Pohlmann views building operators as primarily obligated to prevent attacks: "It is a matter of using effective IT security solutions to make it as hard as possible for the attackers. As a first step, this means using conventional instruments and methods, like firewalls and encryption." In addition, he advises companies that provide building automation to offer suitable systems to building operators. Companies who work in the building automation sector would do well to develop a competitive edge by using current security technologies, and emphasizing this fact. "Such a solution may cost more; however, buyers will flock to it, because – all things being equal – they will have to pay more to secure their systems after an attack or to repair damage."

WAGO provides the expertise and technology, so that that buildings may be designed and constructed in a more energy efficient and secure manner. Its experts have years of experience in building automation and cybersecurity, and know both how to incorporate IT infrastructure for building automation into design, and also how to sustainably protect it. WAGO PFC200 and PFC100 controllers play a key role in this, because they include standard, integrated

**40%** of energy consumption and 36% of $CO_2$ emissions in Europe can be ascribed to the building sector. (EU)

**2 Degrees Celsius** is considered the absolute upper limit of global warming. To achieve this, countries have to reduce their $CO_2$ emissions to 0 over the next 25 years. (Süddeutsche Zeitung)
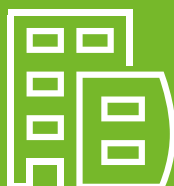
**18 MILLION** new jobs could be created in Europe if the existing buildings were consistently renovated. (EU)

**5%** of total energy consumption and $CO_2$ emissions would be saved by a comprehensive renovation of Europe's building stock. (EU)

**50 YEARS OLD** is the age of 35% of European buildings. Only one-fourth of these comply with current energy standards. (EU)

firewalls, that protect from network attacks. In addition, they are equipped with cloud connectivity, which optimally protects building data from unauthorized data attacks. Information is directly encrypted in the controller and then transmitted to the cloud via IPsec or OpenVPN.

## Groundbreaking and Record-Setting Projects

In Saarlouis, a city in Saarland, a combination of WAGO PFC200 controllers and the WAGO Cloud are used,, for example, to monitor a municipal energy plant and well system, in order to operate them more efficiently. The controllers collect the data and transmit it to the cloud, where the city administrators can access it from any location. If, for example, the systems in the central energy plant are running inefficiently, then the employees immediately recognize this, in the context of asset management, and can initiate direct counter measures. They do not have to worry about security tasks, because WAGO, or the WAGO technology equipped with security features, takes over these functions.

Not all energy efficiency projects take place in the cloud. The city hall, Rathaus Stühlinger in Freiburg, demonstrates that proven room automation concepts, like **flex**ROOM® from WAGO, can implement sustainable initiatives. It generates more energy than it consumes, which makes it the first net plus-energy office building in Europe. The annual energy consumption is around 55 kWh per m2 for heating, cooling, ventilation, hot water, and lighting – which is 40% of the primary energy requirements for a comparable office building. A combination of heat pumps, solar thermal energy, and photovoltaics

on the roof and the facade generate at least this amount. **flex**ROOM® ensures that the HVAC systems, lighting, and shading are controlled in an energy efficient way in the office areas. Why did the LAE engineering consulting firm rely on a WAGO solution for these tasks? Because the variable room concept can be changed at any time without programming expenses through parameterization, according to Karl-Heinz Götz, who heads the energy and building technology department at LAE. In other words, **flex**ROOM® ensures flexibility and makes energy saving easy and lucrative.

Projects like the city hall building in Freiburg are leading the way. Building owners are increasingly investing in energy saving buildings – spurred, no doubt, by directives, digitization, and a view toward cost savings. Open, interoperable automation solutions will succeed, because they offer freedom for networking and cloud connectivity, and also offer effective cybersecurity at the same time. These solutions are available and have already been successfully and profitably incorporated in many projects. And one would never argue against results that lead the building sector in the right direction regarding the climate.

**Your Benefits:**

- New workflow for easily creating a large number of objects in the WAGO BACnet Configurator
- Secure standard connection to cloud solutions via MQTT interface and TLS 1.2 encryption
- Proven compliance with the BACnet standard through BTL certificate
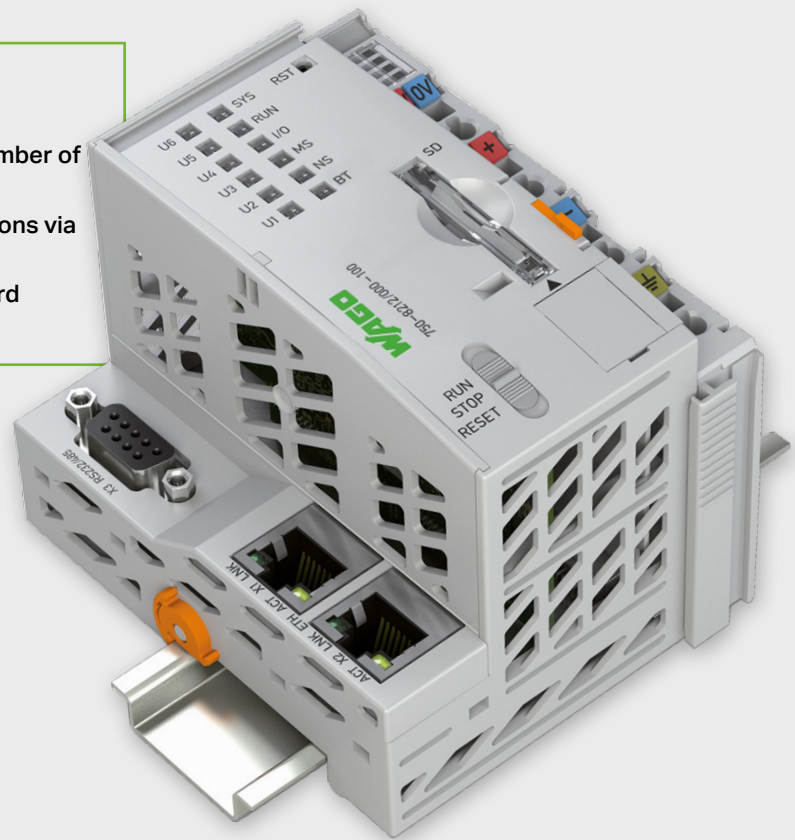
# THE PERFECT FOUNDATION FOR SMART BUILDINGS WITH BACnet

## A new workflow in the WAGO BACnet Configurator makes BACnet easier for the PFC200 BACnet/IP Controller.

In building automation, BACnet is increasingly being used for data transfer with a multitude of BACnet objects. The WAGO BACnet Configurator now efficiently processes a large number of BACnet objects in the IP network for the PFC200 BACnet/IP Controller while seamlessly synchronizing with *e!COCKPIT*. The new and significantly more powerful PFC200 BACnet/ IP Controller is characterized by many other features. It combines the advantages of the open Linux® operating system, *e!COCKPIT* Engineering Software based on CODESYS V3 and

a standardized MQTT interface. In conjunction with TLS 1.2 encryption, the controller provides a secure standard connection to cloud solutions, making it the perfect automation solution for smart buildings. The controller can reliably and simultaneously process a large number of BACnet objects. It fulfills the BACnet Building Controller (B-BC) profile, has passed the BACnet compliance test and is listed at BACnet International with the BACnet Testing Laboratories (BTL) logo.

# »POSITIONED TOO WEAKLY IN CYBERSECURITY«

Norbert Pohlmann, IT Professor for distributed systems and information security and head of the Institute for Internet Security at the University of Applied Sciences in Gelsenkirchen, explains why companies must update their building automation's security settings to the highest level – and maintain these updates.

**IT crime is undergoing increasing industrialization and attaining higher levels of professionalism. How does this affect buildings, and more specifically, how are attacks carried out on building automation systems?**

**Norbert Pohlmann:** "It is an unfortunate truth that all information technology can be attacked. There is no such thing as 100 percent security. Buildings today have complex IT structures that control heating, lighting, blinds, elevators and other systems. All areas can be affected."

**Can you give us an example?**

**Pohlmann:** "We hacked into the heating system of a hospital once as a demonstration. This attack was performed to illustrate security vulnerabilities. The hospital operators could then close these security holes, which unexpectedly took us several months. Imagine this scenario: what if they were real hackers, intent on blackmail, and posed the threat of completely disabling the heating systems? It is also conceivable that we could have caused panic by suddenly dropping the blinds or shutting electronically controlled doors. In a hospital, these scenarios put lives at risk. However, it is also conceivable that hackers would gain information about a building and its security infrastructure as a first step, and then switch off security cameras in a targeted fashion to facil-itate the robbery. And there are also other threats. Malware, for example, can cripple systems, and networked devices (like security cameras) can be attacked. Thousands of these devices can be linked into botnets to initiate denial of service attacks in order to paralyze web servers.

**How realistic are these scenarios?**

**Pohlmann:** "Very real, and the threat increases every year. The digital transformation has brought with it increasing numbers of systems and devices in buildings that are linked to each other via networks and/or coupled to the internet. This increases the potential points of attack. There is this saying in IT security: there are only two types of companies – those who know they have been attacked, and those that don't yet know it. Officially, all companies are under attack."

**Who are the criminals?**

**Pohlmann:** "They cover a broad spectrum. For example, simple script kiddies and junior hackers usually just want to try out the hacker tools – which are freely available online – and score some quick wins. Above them are criminal gangs, who plan modest attacks for monetary gain. The highest level are government-sanctioned and financed hackers, whose hacking serves the political agenda of various countries. This has warlike features; however, no war has been officially declared."

**You said that there is no such thing as 100 percent security. Does that mean we should just throw in the towel?**

**Pohlmann:** "No, quite the contrary! While it is true that there is not 100 percent security, this should serve as a goal, not a reason to surrender. It is a matter of using effective IT security solutions to make it as hard as possible for the attackers. As a first step, this means using conventional instruments and methods, like firewalls and encryption. It also means being as proactive as possible. Because there is always a vulnerability somewhere, then next step is recognizing attacks as quickly as possible, such as with an Intrusion Detection System. Then, when I identify an intruder, I can react and potentially stop the hackers during the attack. Even if that does not work, the attack should be analyzed and the vulnerability should be closed."

**Aside from technical security equipment, what can help?**

**Pohlmann:** "Larger companies should have a team of employees who form a kind of task force in the event of an attack. They could then quickly make all of the necessary decisions. This might include taking systems out of the network or shutting them down to stop an attack. Another important topic is regular employee training. Employees should

Norbert Pohlmann is considered to be one of the leading cybersecurity experts. His observation: that the risk of attack increases every year.

know about potential risks, because that is the only way for them to be prevented."

### How do you view the manufacturer's role in this?

**Pohlmann:** "They bear a large part of the responsibility. Operating systems or Office applications, areas where US companies like Microsoft, Apple, and Google dominate, are unfortunately designed so that the software is explicitly unsecured. Edward Snowden's revelations ensured that this fact was disclosed. German companies working in the building automation sector would do well to develop a competitive edge by using current security technologies and emphasize this fact. Cybersecurity is an attribute that is only becoming more important. A solution may then cost a bit more; however, the buyers will be rewarded. Because all things considered, they will have to pay more to secure their systems after an attack or to repair damage."

### Would regulatory guidelines make sense here?

**Pohlmann:** "There are already a few that do. The most well known are surely the regulations for companies that operate critical infrastructure. It would certainly be helpful if other companies, which are not part of this sector, also aligned their practices with these standards. However, I do not think that additional regulations stemming from politics are necessary. It would be nice if the companies from the building automation sector would unite to create common security standards. They could achieve a lot through this type of cooperation, and they could generally implement secure and reliable building automation."

### How does an ideal world appear, in which IT systems are much more secure than they are now?

**Pohlmann:** "As a scientist, I know that research into current security

**In Norbert Pohlmann's opinion, companies have done too little to protect themselves from hackers.**

Norbert Pohlmann is widely regarded as a proven cybersecurity expert. Since 2003, he has been an IT Professor for distributed systems and information security and managing director of the Institute for Internet Security – if(is) – at the University of Applied Sciences in Gelsenkirchen. In addition, Pohlmann is CEO of TeleTrust, a federal association for cybersecurity; a board member of the internet industry association, eco; a member of the German Association for Data Protection and Data Security (GDD); and serves on the steering committee for the "Cybersecurity in the Economy" initiative of the Federal Ministry of Economics and Technology.

standards runs about five years ahead of commercially viable systems. Germany has positioned itself quite well in cybersecurity research; we are actually the leaders in Europe. What's more, we have a well-developed IT security industry. In North Rhine-Westphalia alone, there are more than 400 companies that are active in this sector. This means that companies could be doing significantly better with regard to cybersecurity than they actually are. When measured against the possibilities, they are positioned too weakly. It should also be required that companies upgrade their security solutions faster to current standards. This would also be economically advantageous because the costs of fixing potential damages can be substantial."

**Mr. Pohlmann, thank you for the conversation.**

**»German companies that work in the building automation sector would do well to develop a cowmpetitive edge by using current security technologies.«**

# A CITY HALL FOR THE RECORD BOOKS

Freiburg im Breisgau is considered one of the most ecologically conscious cities in Germany. The proof is in the new city hall: In 2017, the first phase of construction was initiated on one of the first net plus-energy public buildings in the world. The WAGO *flex*ROOM® room automation system contributes to the city hall's high levels of energy efficiency.

The world's first net plus-energy public building is located in Freiburg im Breisgau, Germany. Over the course of a year, the new city hall in Stühlinger generates more electricity than it uses. The excess energy is supplied to the city's electrical network. The approximately 24,000 m$^2$ provides workspace for around 840 employees, who previously worked at other offices in the area. The building also includes a daycare center with an additional 1500 m$^2$ of space. The dedication in November 2017 marked the first construction phase. In a second phase, additional buildings for municipal administrative functions are scheduled for completion in 2024.

## Design Unifies Comfort and Efficiency

The energy design of the city hall fulfills the strict criteria for passive house standards – buildings with an annual energy consumption of around 55 kWh per m$^2$ for heating, cooling, ventilation, hot water, and lighting – which is 40% of the primary energy requirements for a comparable office building. A combination of heat pumps, solar thermal energy and photovoltaics on the roof and facade generate at least this amount. The Drees & Sommer engineering design company developed the building energy concept, which unites high efficiency with user comfort.

This design also includes room automation, heating and air conditioning, lighting and even the shading within offices. The engineering service provider, LAE Engineering, was tasked with designing and installing the room automation systems. This medium-sized company offers services for building technology,

industry and electricity generation. With around 60 employees, IAE executes projects for commercial buildings, like office blocks, wholesale stores or factory halls.

"We implemented the room automation for the new city hall in Freiburg largely by using *flex*ROOM® from WAGO," states Karlheinz Götz, who manages the Energy and Building Technology section at LAE. The versatile solution for building automation provides lighting, sun protection and temperature control – without any programming. The *flex*ROOM® System is based on a single system housing containing all the necessary components. In addition to a controller, these components include interfaces to the sensors and actuators, the power supply, and a network connection. All of the interfaces have a plug-in design, which minimizes wiring expenses related to installation.

Application software, which functions based on the room axes concept, is already installed on the controller.

The City Hall in Stühlinger in Freiburg generates more energy than it consumes, which makes it the first net plus-energy office building in Europe.

**All interfaces in the city hall are pluggable. This design minimizes wiring expenses.**

A single window axis makes up the smallest modular unit, and includes the complete measurement and control system for lighting, shading, heating, and cooling. Several axes can be combined as needed for flexibly designing rooms of any size. Special areas, such as corridors, stairwells and restrooms, can also be individually configured. The **flex**ROOM® Distribution Boxes are available in different variants for 8, 16 or 24 axes.

## Setting Parameters instead of Programming

The software on the **flex**ROOM® Controllers is so universally configured, that it has already been mapped with all possible scenarios. "Parameters are easy to set using the Webserver that's integrated into in the controller," explains Götz. "We don't need to do any programming at all." The division of the rooms, the configuration of the outlets, and connection of the switches, pushbuttons, temperature sensors and other items is done via mouse click in the Web interface. The **flex**ROOM®

Distribution Boxes support all protocols and communication interfaces required for room automation. This includes KNX, SMI, DALI and EnOcean. According to Götz, "Even though EnOcean has the distinct advantage of flexible room arrangements, the builder wanted to install wired switches and pushbuttons for this project." This, too, is possible with **flex**ROOM®.

The rooms in the Freiburg City Hall are constructed with heated and chilled ceilings that provide incredibly comfortable rooms. The temperature regulation in the heating system operates at three levels: In night mode, the room temperature is lowered and then raised to a standby temperature shortly before the start of business. The temperature is only increased to a comfortable level, typically a preset of 21°C (70°F), when the presence detector registers a person in the room. The heated/chilled ceiling is controlled by PWM valves, which are connected to the digital outputs of the **flex**ROOM® Distribution Box. The presence detectors in the rooms are connected via DALI, which is simultaneously used for the lighting system that provides constant lighting

control. Thus, if the sun shines through the windows, the controller dims the lighting to save energy. This approach makes heating, cooling and lighting very energy efficient.

Even the blinds on the windows contribute to energy efficiency. "At low temperatures, the blinds are closed at night to provide extra insulation," explains Götz. "And in strong winds, the blinds open again automatically to prevent damage." These functions, which access data from a central weather station, are also already implemented in the **flex**ROOM® program – they only need to be parameterized.

One of the main reasons behind the decision to use **flex**ROOM® was the ease with which the parameters can be changed. Thus, no external service provider is required if, for example, the standby temperature needs to be raised by one degree, or the lighting intensity in one part of the office should be lowered. Facility managers can easily adjust the corresponding parameters from their desks using a standard Web browser.

## Controlling Light Scenarios for the Citizens' Service Center

Some 130 **flex**ROOM® Distribution Boxes were installed in the city hall. LAE parameterized them before the installation and then commissioned them on site. During the commissioning, the fact that each controller was equipped with a webserver received favorable reviews. As Götz explains, "The **flex**ROOM® Distribution Boxes in the rooms could be directly accessed from a laptop via WLAN connection. We could immediately test every change." The password-protected access via the webserver also paid off after commissioning. Götz is pleased to report that, "changes can be made quickly in response to customer requests without us leaving our desks."

However, there are also applications, where even **flex**ROOM® reaches its limits. In the Freiburg City Hall, these are the kitchen, cafeteria and the citizens' service center. "Because there are no fixed room axes here, like there are in the office areas, we used WAGO's freely programmable PFC200 Controllers," explains Götz. In addition to heating and cooling, they control different lighting scenarios, as well as kitchen ventilation.

In order to access the preprogrammed lighting scenarios, a 10-inch touch screen is installed in both the citizens' service center and the kitchen manager's office. These can also be used, for example, to set the parameters for the kitchen ventilation system. "The rooms in most of the building can be automated using **flex**ROOM®; however, for special areas, we always need freely programmable controllers," states Götz. LAE turned to the WAGO **e!**COCKPIT Automation Software for the project design. This enables both easy programming in languages that adhere to the IEC 61131-3 standard and easy visualization, which is implemented on a Webserver contained in the controller. This allows the facility manager to change setpoints, and the actual values from various sensors can be read and evaluated.

## High Accolades

Energy-efficient room automation is included, along with other criteria, when evaluating a building for environmental awards. The City Hall in Stühlinger satisfies the highest requirements in virtually all areas. The building contractor is especially proud that the building won first place in the "Sustainable Building" awards competition, organized in 2018 by the DGNB (German Sustainable Building Council). Götz is convinced that, "the energy-efficient room automation made a definitive contribution."



A well-coordinated team: Building experts Michael Dewald from WAGO (left) and Karlheinz Götz from LAE Engineering focus on customer benefits.

# ENERGY-CONSCIOUS RELAXATION

**Architectural jewel with superior technology: The Kaifu Bad in Hamburg**

With its measurement and control technology for swimming pools, the Franconian company, Autech Tesla, ensures uninterrupted swimming fun at the Kaifu pool complex in Hamburg. Controlling water treatment, heating, and ventilation systems, and sauna stoves is a challenging task. So Autech Tesla relies on proven, reliable I/O components from WAGO for its control systems.

A large pool for athletes, a small one for casual swimmers, and perhaps a musty sauna in the basement: German swimming complexes in the 70s and 80s did not offer much more than this. There is no comparison with today: spacious sauna landscapes, outside pools heated to near bathtub temperatures and comfortable quiet zones that invite patrons to take a break from everyday life.

The expectations of pool visitors have increased over the past decades, leading the behind-the-scenes technology to evolve in order to satisfy these higher demands. And it's not just about patron comfort, the technology must also address economical operation and safety. For ex-

ample, regarding resource efficiency: whereas earlier, the circulation pump in the outdoor pool ran all season at max speed, it is now usually throttled down at night, or when there are few swimmers. This simple change trims around twenty percent from electrical costs.

With the increased demands on water treatment, heating, ventilation, and sauna technology, controlling these systems has become significantly more complex. "Coordinating the individual systems is a very challenging task today," explains Frank Weiß, CEO of Autech Tesla. The business, based in Wertheim near Würzburg – a sister company to Aquila, the renowned manufacturer of water treatment technology – is among the market leaders in measurement and control technology for swimming pools. Autech Tesla is behind some of Germany's most beautiful pools; among its crown gems is the Kaifu Bad in Hamburg, an architectural jewel dating from 1890 that happens to be one of the oldest in the country. The modular WAGO I/O System is always included: As the central component of the control cabinets that Autech Tesla builds in its

facility, the WAGO system synchronizes communication between the control system and individual systems.

## Responsibility for Pool Guests and Employees

To explain how complex the control of pool technology has become, Weiß offers the showers as an example. "The operators are required to regularly rinse the shower heads with water at 70°C to prevent the formation of Legionella bacteria. As this is significantly hotter than normal for showers, the control system must correspondingly increase the temperature in the buffer reservoir. Once this value is reached, the thermal disinfection starts," Weiß states. At the same time, the pool supervisor must be able to manually intervene, in case the cleaning crew is working in the showers. "With our systems, we assume responsibility not only for the pool users, but also for the employees," explains the Autech Tesla CEO.

# »Our customers often demand interfaces to third-party systems. We can rely on WAGO for that.«

For Weiß, safety is the driving reason for placing the highest priority on integrating high-quality hardware and software.

Heat management is also a real challenge for many swimming pools: for example, the thermal pool in Bad Ems in the Rhineland-Palatinate draws water from a thermal spring, which is naturally around 70°C. ICA technology from Autech Tesla ensures that heat exchangers bring the water used for the showers, outdoor and indoor pools to their respective temperatures, and additionally cools the water so that it can be released into the nearby river Lahn.

## Web-based Visualization of All Systems

The control technology from Autech Tesla for the individual systems is incredibly sophisticated, yet using it is equally simple – both for the pool technicians and for employees of the pools and saunas. This begins with the possibility of establishing scenarios, for example, for particular sauna events. The employees can then adapt the operation of the sauna stoves and other relevant values with a push of a button. "They select the function, and the system takes over the implementation," explains Weiß. "This simplifies the work and prevents operating errors."

Compact design and quality – these are the features that Autech Tesla CEO Frank Weiß values most in the I/O systems from WAGO.

An important instrument for this is the "AT Suite": a web-based solution for system visualization, developed by Autech Tesla, which pool employees can use to access all system parameters in real time with the aid of a well-structured navigation system. This also functions remotely, for example, using a smartphone or a PC with internet access. To provide solutions of superior quality, Autech Tesla uses its proprietary function library, which is constantly adapted and expanded. "We program in a strictly standardized way: all employees use the same function modules. This guarantees that the expertise of our entire operation flows into the solution," claims Weiß.

## WAGO: "Durable Products at a Fair Price"

This demand for quality is also one reason that Autech Tesla relies solely on WAGO for its I/O systems and power supplies. "Component quality has to match because we offer a five-year warranty. It would be disastrous if we were to use inferior components that became defective in two years. WAGO offers the durability that we require." states Weiß.

In addition, the modular structure of the I/O systems from WAGO enables them to work as small sections. "This is important for us because we have to keep the control cabinets compact. Many pools simply lack space." For example, when Autech Tesla equipped the Hamburg Bäderland Bondenwald with ISA technology, the control cabinet for the sauna could not be more than 60 centimeters

wide, as the technology room is very narrow. "The flexibility of WAGO products helps us to solve such problems because we can install only those I/O components that we need there," explains Weiß. In addition, the vast selection of components (currently more than 500), the quality of service and advice, and the possibility for products to link to higher-level building management systems, all speak highly for WAGO as a supplier. "Our customers often demand interfaces to third-party systems. We can rely on WAGO for that," states Weiß.

Even though the focus at Autech Tesla lies with swimming pools, the company has long been active in other sectors where high water quality is a must. Thus, the ISA specialist counts food producers and breweries in Germany and abroad, among its customers. However, one should not ignore the fact that water treatment for swimming pools has a special place in Frank Weiß's heart. "It takes a lot of experience and technical ability to continuously maintain pool water within the correct parameters," he concludes. "This is the ultimate test for systems!"

# THE BLU HOTEL TURNS GREEN

**The buildings owned by the Raddison Hotel Group in Germany are undergoing a comprehensive modernization and modification program. This work has already been completed in Cologne, resulting in lower energy consumption levels despite guests experiencing more comfortable stays. A flexible building automation system in the Blu Hotel now enables a more controlled interplay of heating, ventilation, sun shades and lighting, which are more in tune with each other.**

Due to aging building technology and structural restrictions, the modernization of existing buildings demands that designers be flexible and willing to improvise. The Radisson Blu Hotel project in Cologne is an excellent example: the building was designed and constructed in the mid-90s as a hotel from the start. However, "even the best technology reaches an end point despite maintenance," according to Detlef Brunke, CEO of DBU Planungs- und Projektmanagement GmbH.

Therefore, the Radisson Blu's building technology was subjected to a fundamental upgrade – all while it continued operating as usual while staying on budget and schedule.

"We wanted to implement something innovative – a sustainable and cost-optimized solution for the investor, Pandox – instead of simply replacing old technology with new," recalls Brunke of the initial planning. A fundamental goal of the modernization was replacing the management and operating equipment (MOE) and switching the hotel rooms to the new one. "We had originally intended to set up a new network using WAGO controllers," explains Ingo Andrä, project manager for ICA technology and building automation at Kynast Elektroanlagen. The company received the tender to implement the building automation that DBU designed. However, a substantial problem arose because ETHERNET was not available for a distributed I/O system. And fire safety reasons meant that a TCP/IP network could not be retrofitted. The ETHERNET cables would have to be run through the hallways, and then only in specific fire protection ducts. "That was simply not acceptable here," recalls Andrä.

## Resource Conservation as the Main Goal in the Building Automation

Only the two-wire connections from the originally installed LON® network were available for connecting to the higher-level MOE. "We could use that for BacNet TP," explains Steffen Poranski, an ICA programmer Kynast. Even though all of those involved in the project would have preferred a stronger bus system, "two wires freed us to take a large step toward sustainable building automation."

The primary concerns in the Radisson Blu project were to increase energy efficiency and guest comfort. Specifically, this meant better control of the heating, ventilation, blinds and lighting in the hotel rooms. It also meant the hotel had to operate more efficiently, with a greater emphasis on conserving resources. "Thanks to the new control technology, we can see which buildings within the company group have the lowest energy consumption, how much water and primary energy are consumed by each business, and how the sun shades are set," states Marcus Moll. The technical manager of the Radisson Blu Hotel in Cologne then shared the following example. In addition, presence sensors ensure that the temperature of vacant rooms is reduced appropriately. The base temperature is maintained by the central MOE and the ventilation levels are dialed back.

By connecting the MOE to the hotel reservation system, essential status information is available at the reception desk for each room. For example, if the room key is not inserted into the card switch, the lights won't function. If this happens, the guest calls reception because they have not noticed the card switch, then the system shows the hotel employee that the switch has not been activated. "We can quickly help our guests, and do not have to run through the entire building every time," Moll happily states.

**Modern automation technology ensures the perfect light and climate in hotel rooms.**

## Modernizing with WAGO as Needed and Planned

For the 365 rooms to be amenable without the central MOE, a WAGO BACnet MS/TP Controller (750-829) is used in each room. It is configured so that it can autonomously control the room, without access to the central network, and offers guests defined setting possibilities. The input and output cards are assigned to the BACnet bus so they can be directly addressed. This independence played a substantial role in successfully modernizing the hotel rooms while monitoring the Radisson Blu's reservation levels.

In addition, the conversion occurred without back coupling to the old network, which remained in operation until the modernization work was completed. "We did not plug the BACnet MS/TP bus connection into the controller until every room on a communication strand had been converted. That was up to 55 rooms per line," explains project manager Ingo Andrä. For the new connection to the updated MOE, Kynast replaced the current LON® gateways with two MS/TP routers per floor.

The BACnet controllers were installed in the control cabinets kept from the original installation. This is still situated behind a closet wall, which meant work occurred in very narrow spaces. Updating to the modern WAGO technology was carried out in a mere two hours per room, because the "retrofitting kit" was delivered ready-to-install. Overall, six months were required for modernizing the room automation, all while accom-modating large conferences and trade shows, which meant every room had to be available.

## Open Automation with Clear Benefits

In addition to room considerations, there was another modernization level undertaken at the Radisson Blu: a second automation level in which WAGO controllers were also used. The BACnet version of the PFC200 provides the visualization of the rooms, and additionally offers quick access via building technology to the individual room controllers, independently from the central MOE. The visualization integrated into WAGO's PFC200 is based on HTML5 and can be opened in any browser.

"Due to negative experiences with proprietary systems, we intentionally chose an open industry solution for Cologne," Detlef Brunke explains. Those experiences led all of the project partners to overwhelmingly choose WAGO controllers for the upgrades. Due to the high degree of standardization, the hotel operators and building owners could be equally certain that replacement parts, expansion components, and, most importantly, technical support would be available for many years.

The modernization of the Radisson Blu Hotel in Cologne demonstrates how powerful building automation can be when retrofitted – even if structural restrictions lead to serious limitations, particularly for communication.

In this case, WAGO controllers create a platform that brings maximum intelligence on site. The data volume is thus reduced to the amount of bandwidth that can be transmitted with the previous LON® bus. The modular structure of the WAGO controllers also provides wide-ranging possibilities for adding new room automation functions.

**Lots of light, less energy consumption – these are the two essential features of the updated Radisson Blu Hotel in Cologne.**

**Collaborating in modernization: Detlef Brunke from DBU Planungs- und Projektmanagement GmbH, Marcus Moll from the Radisson Blu Hotel Cologne, and Ingo Andrä and Steffen Poranski from Kynast Elektroanlagen.**

# THE BEST LIGHTING IN EUROPE

No fewer than 3,500 new lights illuminate the lecture and community rooms in the Duborg-Skolen [Duborg Danish school] in Flensburg, and they were installed quickly and safely using the *WINSTA®* Pluggable Connector System from WAGO.

To this day, it's clear that Flensburg, a city in the northern German state of Schleswig-Holstein, was part of the Kingdom of Denmark until the middle of the 19th century. More than 2,300 of the 89,500 residents have dual German-Danish citizenship, and the surrounding areas have similar proportions of dual citizens. Growing up bilingual in German and Danish is considered quite normal here. The Sydslesvigsk Forening (SSF South Schleswig Association), the main cultural organization for the Danish minority in Flensburg, resides in the "Flensburghus" – a building rich in tradition. There is an entire series of social and cultural institutions for this minority population. Prime examples include Danish health services, the Danish central library, or the association of Danish schools. The latter operates 55 daycare centers and 46 schools in southern Schleswig. One of these

is the Duborg Skolen, an integrated, comprehensive school that includes a college-preparatory secondary school. Built at the beginning of the 1920s on the Marienberg in Flensburg, the school is only a few hundred meters from the Danish consulate general's office.

**»For the lighting decisions, WAGO's installation technology scored the most points in several categories. The lighting system can be flexibly and easily expanded at any time that this becomes necessary.«**

The sophisticated lighting design helps maintain students' concentration levels over longer periods at the Duborg Skolen.

## No Place for Half Measures

The students who attend the Duborg Skolen can consider themselves to be privileged. On the one hand, both Germany and Denmark recognize the school-finishing exams. And on the other hand, the Danish government invests quite a bit in the Danish school and educational systems in northern Germany. The Danes believe that teaching and learning should be a positive experience for both teachers and students. School should be a joy, and the learning environment should contribute to this success.

However, the environment was increasingly unsupportive by the end of the 1990s. The physical premises of the Duborg Skolen were designed for approximately 600 students; however, almost twice as many attended in 2007. Because this development had been predicted, the Association of Danish Schools, with significant support from the A. P. Møller-Fond as an investor, decided in 2005 to build the A. P. Møller-Skolen, a new college-preparatory secondary school,

in Schleswig for 45 million Euros. Part of the plan was also modernizing the Duborg Skolen from the ground up. In addition to comprehensive structural measures, both inside and outside of the building, a communication standard based on KNX/EIB was selected for building automation. The already existing IT infrastructure was sustainably expanded, and all of the instructional, communal and administrative spaces were updated with contemporary lighting – the total investment: around 13 million Euros.

## Light in Focus

"The A. P. Møller-Fond gave us only one requirement for the lighting design," recalls Markus Wiederhold, an architect from Odense and project manager for the modernization, "the Duborg Skolen should have the best light in Europe." Okholm Lighting A/S, a traditional and internationally renowned manufacturer of interior and exterior lighting from Tønder in Denmark, won the tender. Their experts also asked Ulrike Brandt, the internationally successful lighting

designer from Hamburg, to join the project.

The result is a new type of light, which uses DALI interfaces to imitate natural daylight – including the weather. The lights shine brightly on cloudless days and mimic cloudy skies with an opaque, diffused light. The lighting controller automatically adjusts the temperature color according to the time of day; however, the lighting intensity remains constant. This trick helps maintain the students' attention at a fairly consistent high level – even during the sixth or seventh hour of instruction. The lights are designed as round pendant lights or as light bars for installation in ceiling fixtures. Some 3,500 were installed in the instructional and communal spaces in the Duborg Skolen.

While the lights were being developed, the electrical planning was underway under the direction of Jürgen Mond at the GDP engineering consulting firm in Büdelsdorf. The installation of the lighting technology was implemented by Köster Elek-

tro-Technik GmbH & Co from Husum. The engineering consulting firm Beyer from Neumünster was tasked by Köster with setting up the WAGO lighting controllers with the DALI lights and KNX sensors.

## Good Reasons for Choosing WAGO

The building engineers from Husum have collaborated with WAGO for years, giving them extensive experience with the installation technology designed in Minden. For Andreas Peter, an electrical engineer at Köster, WAGO's "total package" was the tipping point. "In addition to the *WINSTA®* cabling for the Duborg Skolen project, we also incorporated power supplies, various I/O modules and ETHERNET fieldbus controllers – from a single provider who has everything on hand," explains Peter.

Dirk Beyer, founder and owner of the eponymous engineering company, selected WAGO as the first choice for a different reason, "The lights to be installed in the Duborg Skolen are DALI standard device type 8, DT8 for short. To control the color of the lights, gateways have to be introduced between the DALI controllers and the KNX system. Many manufacturers produce these gateways; however, only a few function with the DT8 protocol, which can cause problems during programming. This simply does not happen with the WAGO I/O System."

Wiederhold's positive conclusion is that, "as a builder, you must always keep your eye on the overall costs – even if discussions concluded a while ago. Everyone here was focused on the sustainability, durability, fail-safe nature and flexibility of the systems to be installed here. For the lighting decisions, WAGO's installation tech-

nology scored the most points in several categories. The lighting system can be flexibly and easily expanded when needed and can be done so while using the currently installed components. This represents peak sustainability."



**Fast and easy connection with WAGO's *WINSTA®* Pluggable Connectors**

# LIGHT, LIKE IN THE GULF OF MEXICO

The SwissShrimp AG in Rheinfelden is the first Swiss company dedicated to sustainable prawn farming. Because the lighting is crucial, the startup relies on lighting controllers from WAGO.

Let the raw shrimp marinate for half an hour in a mixture lime juice, chili and cilantro, and then serve them cold – that is Markus Thon's favorite recipe for the delicacies. However, it takes quite a bit of time before the production manager can actually prepare and enjoy his ceviche. Delivered during the post-larval stage at a scant three to four millimeters in size, the shrimp require at least six months to mature until they are as big around as a man's thumb and as long as a pen. Only then are they ready for the Central American dish.

In order for the animals to remain healthy, they require plant-based food, which is produced in Europe, and the correct lighting. The nimble swimmers absolutely hate abrupt changes in light. This places them at such high stress levels, that they

Using automation technology from WAGO, SwissShrimp simulates optimal lighting conditions for indoor, inland shrimp farming.

can die of heart attacks, in which case they end up as food for more stress-resistant members of their colony.

## Simulating the Natural Habitat

Creativity is required so that the shrimp arrive on the plates of Swiss gourmets and not in the bellies of their fellow prawns. CEO Rafael Waber explains, "the animals should grow up in the environment they are familiar with." While this sounds logical, the implementation has proven difficult. Out in the wild, prawns spend time among mangrove roots and algae. However, these features would impair the water treatment system's function – once per hour, it completely processes the contents of the large

plastic ponds, at 40 by 5 meters, and cleans the excretions of the approximately 80,000 inhabitants from the 100 cubic meters of water. Additional organic waste would require a more complex system.

So, how can the natural habitat of saltwater life be recreated without throwing a wrench in the waterworks? The managers at SwissShrimp found an interesting approach. By using 210 DALI lights, they could simulate the lighting conditions on the Gulf of Mexico in two windowless halls. Additional structures to increase surface area, like plastic tubes lowered into the ponds, replicate retreats without the contaminants that mangroves or algae would bring.

By simulating the light in the Gulf of Mexico, SwissShrimp has blazed a

trail that could prove to be ground-breaking for the entire sector. In most aquaculture operations, the first employee to arrive in the morning switches the lights on, and the last to leave shuts them off. Smooth transitions from darkness to light and vice versa, which would greatly benefit the animals, are difficult to achieve with a simple light switch.

## Finely Graduated Dimming with Programming Experience

But how do you simulate the day-to-night flow that prevails in the Gulf of Mexico? This question led Rafael Waber and Marcus Thon to Autcomp AG. The engineering services provider, located in Chur with subsidiaries throughout Switzerland, has been putting buildings and tunnels in the right light for decades. However, despite their expertise, this project was something different – even for the Building Automation department in Wohlen/Aargau/Switzerland. "Simulating the sun's position through programming is not a typical task," explains Reto Guglielmo from Autcomp AG.

The problem, being able to gradually dim the lights, proved to be relatively

easy with a PFC100 Controller from WAGO. Using *e!COCKPIT*, Reto Guglielmo programmed an intuitive visualization, which is easy to operate and provides only the most necessary, basic functions. This approach allows the employees without programming experience to operate the controllers and, for example, manually define a light curve for daylight progression.

## Controlling via Web Visualization

So that the production manager, Thon, can tailor light to the growth phase of the shrimp, the pond lighting in the two halls is divided into two groups: one light strand for each of the four pools in the first floor, and the same for the four on the second floor. The groups can act independently, and play back an individual lighting program in automatic mode. Eleven parts can be defined, stored, and assigned to the respective light strands by the lighting program. Clever trick: Thon only has to define one brightness value per hour to simulate daylight; the program automatically divides each hour into six parts in order to more gradually alter the brightness level. The controller transmits the newly calculated value to all lights every ten minutes via the DALI bus.

The managers of SwissShrimp are quite satisfied with the lighting solution from Autcomp AG. It is easy to operate and allows for individual lighting scenarios that can be adapted to the prawns' growth phases. Thon is quite happy that he can access the web visualization using a notebook, desktop, tablet, or smartphone at anytime from anywhere. While he lives within a stone's throw of his workplace, now he can travel without guilt. Because ultimately, it comes down to the health of the shrimp – even if he prefers them as ceviche.

# ENERGY EFFICIENT, SCALABLE, AND MORE FLEXIBLE

**WAGO Lighting Management with New Functions
for Even More Application Possibilities**

WAGO Lighting Management combines predefined hardware components with a pre-programmed software application. It can scale and adapt to any requirements, and is ready to work – no extensive software experience needed. WAGO Lighting Management, the sophisticated solution for lighting control, now offers users even more options. In the new version, a dimming value and/or setpoint curve for the brightness value (lux) can now be used in addition to the color temperature curve for color temperature control (HCL). As a result, lighting can be more easily adapted to mimic external light as the day progresses. In addition, a room function can now be selected for each schedule entry. This enables a time-controlled change in the functions, such as from daytime presence-dependent lighting control to manual on and off control via push buttons at night. New switching functions, a download page for the KNX data point list, a diagnostics report and the ability to email diagnostic reports complete the update.

**Advantages:**

- Extended application possibilities by considering the illumination intensity in color temperature control (HCL)
- Time-controlled room function change possible
- Support for DALI-2 Multi-Sensors
- Parameterizing without prior knowledge – configuring, not programming

Known as casemates, the facility houses
numerous restaurants. Their central energy
supply is now controlled with the help of the
cloud.

# FROM THE CASEMATES TO THE CLOUD

Data relating to error reports and monitoring is sent to the cloud to enable better monitoring of both the Saarlouis central energy supply and a well system. The program's success has led the German city to consider expanding cloud projects.

Between 1824 and 1829, the Prussians expanded parts of the old fortifications left from the Thirty Years' War to provide command posts along with housing for soldiers, horses and provisions. In this process, they created the historical ramparts, often called casemates, as a bomb-proof defensive line that still defines the Saarlouis cityscape. However, their use has changed quite a bit over time: there are now restaurants under the arches that attract visitors from near and far to the longest buffet in the Saarland.

Although the casemates might be an easy commute from the city center, the telecommunications network does not reach that far. Data connections are therefore difficult to establish, even though they are important for regulating the local district heating used by ten cafés and restaurants. The energy control center, with two pumps for providing hot water to the restaurants, is installed at the head of the casemates. If the pumps fail, then guests get cold feet because it may take time for the error to be reported, for a city employee to arrive on site, and for the problem to be solved.

## Easily Using the Cloud without Programming Knowledge

Therefore, the city administrators in Saarlouis had to act. "System availability is important to me," says Bodo Jenal, building automation project manager in the Saarlouis building department. Because tearing up the street was not cost-effective, a mobile solution was selected. Together with specialists from the building technology company, BVT Bellmann, from the neighboring town of Dillingen, city administrators developed a cloud-based solution for fault reports and data collection. A WAGO PFC200 Controller with a mobile radio module forms the project's core.

"We are beginning with fault reports for now," says Jenal. Fabian Klauck, electronics project manager at BVT Bellmann, believes that the combination of the PFC200 with the WAGO Cloud will ease them into digital asset management. "The dashboard enables convenient and intuitive

»The biggest advantage is that no programming knowledge is necessary to get the data to the cloud.«

**The cloud project in Saarlouis was supervised by Jens Königsamen from WAGO, Fabian Klauck from BVT Bellmann and Bodo Jenal from the City of Saarlouis (from left to right).**

operation of all windows. However, the biggest advantage is that no programming knowledge is necessary to get the data to the cloud," says Klauck.

## Many Additional Monitoring Functions

Jenal sees another advantage in the demand-driven scalability of the cloud system. "In the future, we'll undoubtedly think of several different tasks we can handle using this cloud-based technology." For example, additional monitoring functions are available that would be quite useful for drinking water sanitation. Early warnings are especially critical for preventing a Legionella outbreak. The city administrators in Saarlouis don't have to do much to benefit from the WAGO Cloud. "We no longer have to worry about it from an administrative and safety point of view," says Jenal. "We retrieve the values from the cloud and visualize them as we want; WAGO handles everything else in the background."

## Data as the Basis for Trend Analyses

**Change of location:** Out of the casemates, and into Saarlouis' green belt – the city park outside the old fortification walls. A WAGO PFC200 Controller with an integrated mobile radio module is used here to collect level data from a freshwater well drilled in the 1950s. The city administration uses the well to replenish a pond and for general irrigation – in other words, watering flowers.

"When drawing off the water, we need to make sure that we are not overtaxing the well's capacity and endangering the aquifer," explains Jenal.

Thanks to the cloud solution, the people in charge have everything reliably under control. The fill-level data can be securely retrieved from anywhere. The data can also be used to create trend analyses, which allow for better predicting dry periods, and thus better irrigation planning.

Fabian Klauck from BVT Bellmann envisions further applications for the PFC200 and WAGO Cloud: For instance, the controller could be used to regulate entire ventilation systems and to transmit relevant building technology data to the cloud for further processing. "With the PFC200, the casemates and city park now have a powerful, freely programmable PLC. This opens up so many possibilities," concludes Klauck.