CONSTRUCTING FUTURE-PROOF BUILDINGS

MEETING THE CHALLENGES OF TOMORROW WITH AN OPEN MIND

Topics in this Issue

YOUR BUILDING PROJECT IS OUR PASSION!

GREATER EFFICIENCY, FLEXIBILITY, INTELLIGENCE

Demands on buildings are increasing. Regardless of whether this is an existing or new building: as your partner in electrical installations and building automation, we recognize the potentials and can work with you to develop sustainable, individualized solutions for your project.

WAGO

www.wago.com/global/building-technology

DIGITIZATION IN BUILDINGS
OPPORTUNITY AND RESPONSIBILITY IN ONE

Dear readers,

we work in an exciting sector that once again finds itself in a time of great change. While electrification and automation have been important drivers in the building sector for decades, a new industrial revolution is currently making inroads into buildings – digitization. If you consider the changes that we see, or perhaps can largely only intuit, then it is becoming obvious that the effects of this industrial revolution will be at least as large as those caused by electrification and automation.

We see a world that is more closely networked, where systems comprehensively communicate with each other, regardless of whether they are on site or somewhere else around the world. The focus is increasingly on the user: buildings are becoming more complex and have to satisfy increased demands related to comfort and energy efficiency. Cycles for innovation have become shorter, and the technology used in this has also changed.

At the same time, we are confronted with the challenges inherent in a sector where projects have to be planned with a level foresight demanded by no other. We trade in our smartphones every 2 years, and cars average only 9.5 years. Buildings, however, have to last for decades, which usually also applies to the technology installed in them. The difficulty is obvious: who knows what technology will look like in 10 years, or what challenges we will face. Flexibility and openness have become, hands down, the greatest virtue of sustainable buildings. From this perspective, we ask: how should building automation today be set up for the future? What does logical building management look like? How much digitization does a building currently use? And what roles will cloud applications play in the future? These are key questions that have guided us in this edition of **WAGO DIRECT**BUILDING, and which we will illustrate for you in the following pages.

We find ourselves in a time of upheaval, in which the more we look around, the more we question how can meet the future challenges in building technology with an open mind. This means we have both the opportunity to create buildings, using current technology, which are more efficient and sustainable over their entire lifespan, and also the responsibility to construct buildings that can grow along with the demands of the coming years.

Sincerely, Daniel Wehmeier
Head of Market Management, Building at WAGO

CONSTRUCTING FUTURE-PROOF BUILDINGS

Digitization has driven many aspects of technology in the last few years, including in the building sector. Smart buildings are no longer a foreign concept. Buildings are more networked, with greater digital potential, and thus more comfortable and energy efficient. At the same time, demands are increasing. That, which is possible using the current state of building technology, can be easily exceeded tomorrow.
Yet how should building operators and automation specialists best engage with a quickly changing technical sector when their properties are designed to last for decades? How can buildings, equipped with current technology, prepare for tomorrow's demands? And what could these demands look like? We have concentrated on precisely these questions in this edition of **WAGO DIRECT**BUILDING.

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DIGITIZATION IN BUILDINGS

CONFIGURING BUILDING AUTOMATION TO BE FUTURE-PROOF

Digitization and connectivity are trailblazing developments of the 21st century – with enormous influence on the building sector. Automated building technology, in which the individual sensors and actuators are networked, communicate with one another, and are controlled via controllers, has long since become standard in modern buildings. Yet, how much smart automation does a building really need? And how can the increasing levels of building technology be reasonably and sustainably managed?

Building technology is governed by a changing, increasingly-digital world, which has driven innovative developments over the last decades, especially in building automation. Communication, in and between buildings, has increased substantially and become more comprehensive. Individual systems, like heating or lighting, used to require independent controllers. Today, these various systems are upscaled to a joint database and the recorded data are displayed together. Equipment and systems are considered in an integrated fashion: the buildings of today function with open, networked systems, instead of proprietary islands. IP-based controllers, sensors, and switching systems, which can be linked to a network using fieldbuses and ETHERNET, as well as manufacturer-independent protocols like **BACnet®**, are now firmly established at the field and automation levels. As a supplier of components and systems, WAGO has, from the beginning, pursued the availability of networks that use the IP layers of building components. "If you look back at building automation from the last 20 years, we were always working in a technical area that is now usually designated as the Internet of Things," summarizes Head of Market Management, Building at WAGO. "We were always a field that had our fingers on a lot of sensors and actuators in the field, and controlled and regulated them."

The sector has long recognized the potential added value of the data pools generated from this, as demonstrated by current developments in the management and operator levels. Management systems thereby access the databases and use them for higher-level building monitoring tasks, like analyses and optimizations, for example.

»If you look back at building automation from the last 20 years, we were always working in a technical area that is now usually designated as the Internet of Things. We were always a field that had our fingers on a lot of sensors and actuators in the field, and controlled and regulated them.«

While management systems are nothing new, they still reflect advancements in digitization and the trend toward connectivity: in addition to locally installed, on-premises systems, manufacturers and building operators are increasingly turning to cloud-based management systems and the opportunities that they offer. However, the following still applies: the more automation a building has, the more data are available for evaluation and optimization; therefore, it becomes more logical to consider different management solutions. The first question that a building operator must ask is this: how smart should my building actually be now?

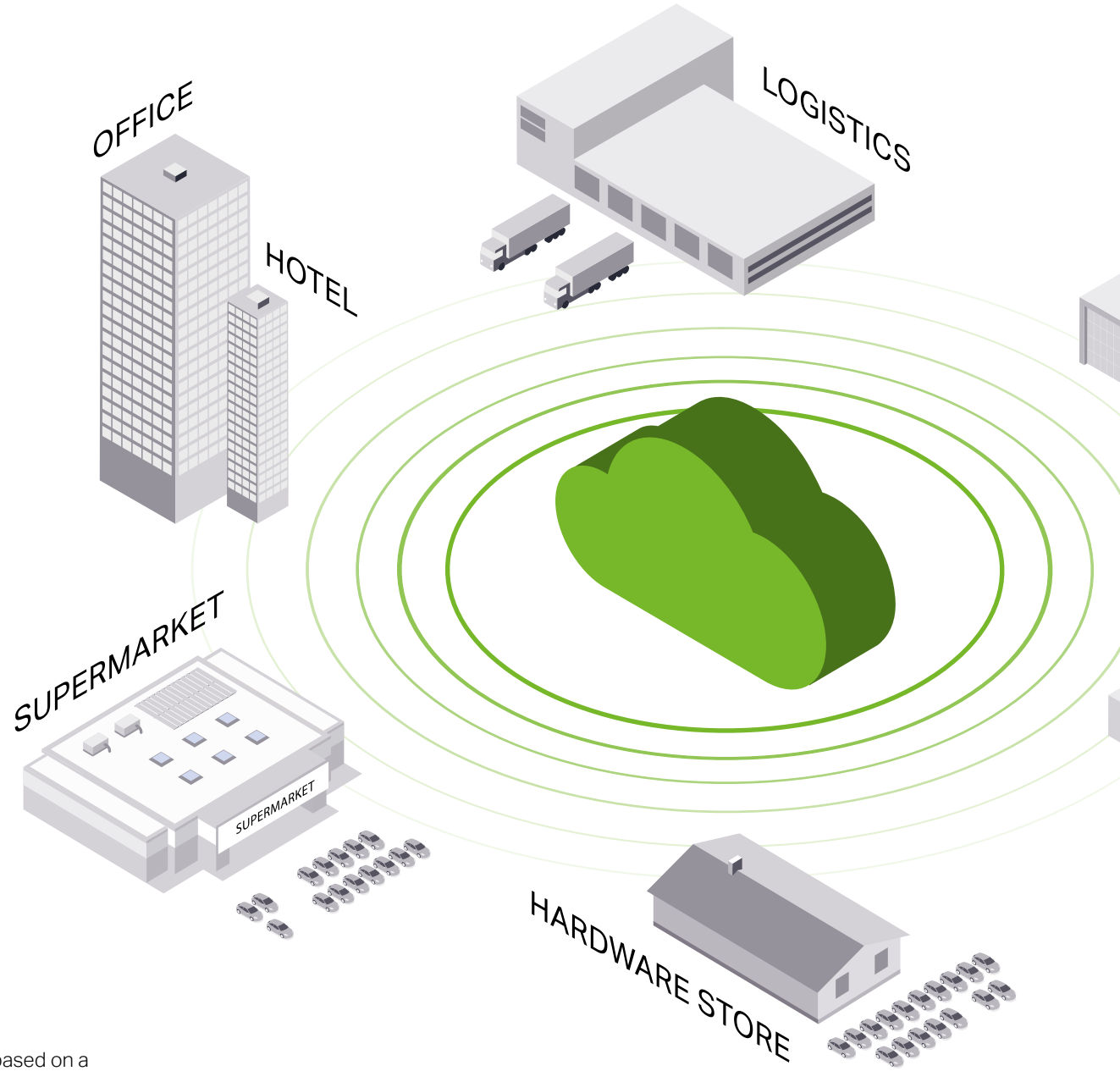
All building data at a glance: The WAGO Cloud Building Operation and Control app can be called up on a mobile device at any time and from any location.

How Smart Must a Building Be?

There is no general answer as to what constitutes an appropriate degree of automation in a building today, as there is no single standard that a building should currently follow. Instead, the degree of automation depends on individual desires and demands by the users. For buildings designed for especially flexible use, like rental spaces for offices, a higher level of technical equipment makes sense. The opportunities offered by building automation have also exposed an important driver of innovation: efficiency. Building automation contributes decisively to economically and ecologically efficient internal building operations. This was also enshrined in important guidelines for the building sector, like the Energy Performance of Building Directive (EPBD), which has been updated numerous times since 2002. The EU building directive is supposed to promote improvements in overall energy efficiency of new and existing buildings, and therefore requires a minimum level of intelligence in buildings. In addition, so much more is now technically possible within the context of self-learning systems, from room automation through initial approaches to artificial intelligence. However, "not everything that is technically possible is ultimately useful," according to Wehmeier. "Buildings should not be indiscriminately over-automated. In the end, automation must always provide added value for the users or the operators."

The great challenge here, which is difficult to predict, is how the building market or directives, like the German Energy Act for Buildings (GEG), will develop. Then, add fast technical development to this mixture. That which offers no added value for users today, could look quite different tomorrow. At the same time, budget limitations also often play a role in building projects. It often makes

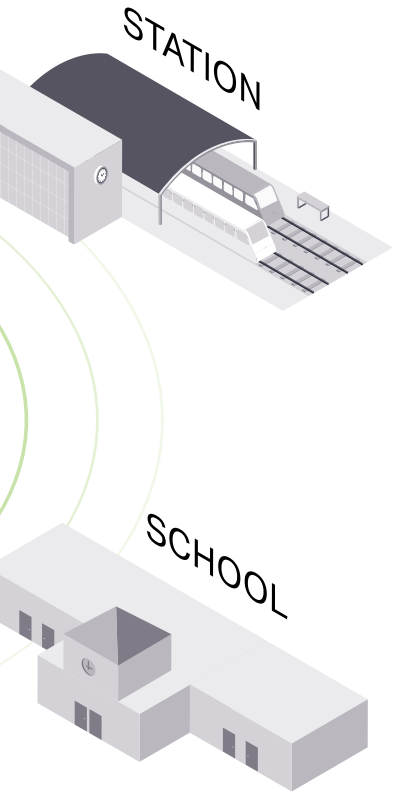
Using the WAGO Cloud Building Operation and Control app, all relevant information for a building, or for distributed properties, can be processed and compiled into reports.



more sense, based on a number of different reasons, to equip buildings gradually and according to their respective needs, than to leap in with closed, comprehensive management or automation systems from the outset. However, it remains important that buildings are prepared from the beginning for subsequent retrofitting and new demands, and thus retain the potential to correspondingly expand their technology. This preparation can be easily mapped using the so-called smart readiness indicator (SRI).

Constructed Sustainably: the Smart Readiness Indicator

The smart readiness indicator was first mentioned in the EU Building Directive (EPBD) in 2018. The SRI provides a value, which is determined from various criteria, that indicates how well a building is prepared for future demands, for example, in relation to renewable energy networks and the requirements of the building's users. The goal of the SRI is to sketch out possibilities for improving smart readiness and to depict this based on a spectrum. This allows build-



ing operators to gauge which level of building automation is more logical for their goals, both when designing new construction and also when designing significant upgrading projects. "Ultimately, everything that I install in a building must have the potential to contribute to the whole," according to Wehmeier. "We currently have a lot of scaling ability in our technology, so that we can perfectly adjust to any logical and desired smart readiness factor." The most important roles are played by open interfaces and communication protocols, which function regardless of manufacturer and also allow for flexible expansion in the future. This provides wiggle room, both for technologies and systems that we don't have yet, and also makes it possible to equip the building automation according to its needs, finances, and desires, and to expand it any time this becomes necessary. While this flexibility, in the form of open and interoperable systems, justifiably and increasingly permeates I&C technology, a certain lack of flexibility remains in management systems.

Building Management of the Future – Everything in the Cloud, or What?!

Management systems in building automation take over functions, like the higher-level operation of the entirety of a system, establishing comparisons, and dealing with alarms in the case of faults. In these cases, data from the building automation is collected and made available. Management systems thus provide an overview into building operations as a whole, and thus support increases in energy efficiency. The current status quo for building management systems is local installation. "The question is: what does the management system of the future look like? What must it be able to do and what demands do we have for it?" These are questions that engage WAGO in their predictions for building systems in the future. It is obvious that there are no 'right' or 'wrong' answers, and that this depends on the building type and its intended use. Management systems can be constituted three ways: as a locally installed, on-premises solution; as an on-premises solution with a cloud option, for example using edge devices; or entirely as a cloud-based solution. "There are justifications and different reasons for each system. However, we do notice that we can overcome certain challenges using the cloud that would be difficult to solve with the other systems," according to Wehmeier. "This is particularly the case for distributed properties."

Future reliability is a major factor in favor of cloud systems. It is no longer considered practical to cut systems off from the outside world. Systems are active and have to communicate, since the applications and demands on buildings are also changing. This requires flexibility in both buildings and their corresponding management systems. In the case of on-premises systems, the building operator is required to maintain and update the system, which is linked to personnel costs and in-house IT infrastructures. By using cloud-based systems, topics like security, updates, hardware reliability, general system maintenance, and reliable backup management, are passed on to the cloud operator. Building operators can then concentrate on their core business, and comfortably manage their buildings from anywhere using web visualization, without having to carry out administrative system work. Smaller and medium-sized buildings are the major beneficiaries when administrative tasks are outsourced. One example: A university clinic naturally has a round the clock facilities management team that monitors operations, as well as an IT system or IT operators, who are available 24/7. In contrast, this is unlikely

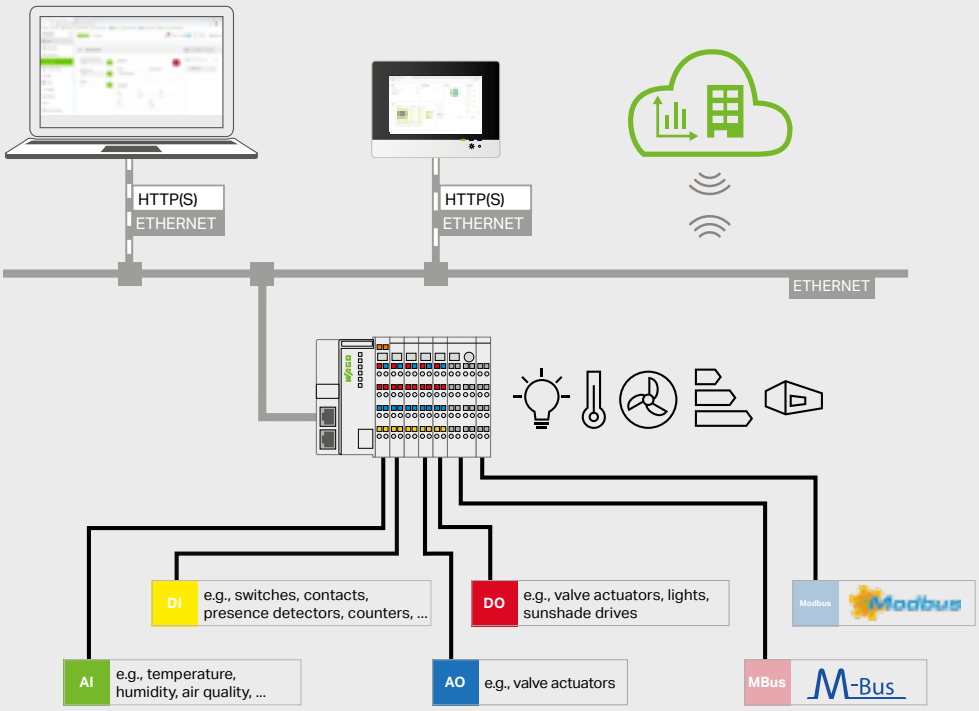
for an elementary school. In this case, the cloud scores higher, with benefits like reliable maintenance. The added value becomes even more apparent for distributed properties made up of smaller buildings. Locally installed systems can quickly run into limitations, purely due to lack of space. In order to centrally collect the data from individual properties, a higher level network must be established, which takes effort. It is simply logical to combine the various properties in the cloud, while allowing local operations to remain unchanged in their complete functionality.

Flexibility Also Sought in Building Management

The WAGO team implemented their vision of a simple, sustainable building management system with the WAGO Cloud Building Operation and Control. The goal was to create a solution, particularly for building operators, that would be both as comprehensive as needed and simultaneously as lean as possible. It is thus not a 'complete' building management system; instead, it provides users with the components, from sensors through control devices up to an entire system, so that they can acquire everything from one provider, WAGO. "In our view, the Building Operation and Control Cloud application is the final piece of the puzzle for an integrated, building-specific system solution, from the controllers up to the software," according to Wehmeier. All relevant information for a building, for example, the energy data, can be processed at the operator level in the WAGO cloud, and collected into reports. While the system is less graphically oriented, the 'reduced' user and control interface of the Building Operation and Control app still satisfies the requirements for BAFA-listed energy management software, and is thus eligible for funding and fully subsidized.

During the development of the Building Operation and Control app, WAGO followed its decades-long principle of open automation, and equipped the system with a REST API programming interface. The openness of the Building Operation and Control app also permits the integration of future technical achievements into the internal system workings. The REST API also provides another decisive advantage over on-premises systems: co-existent systems are possible in the cloud solution, if they are needed. This could be the case, for example, if a building is already using energy management, and the owners want to relocate its management and operation level into the cloud. The energy management can then be integrated using the Building Operation and Control and the REST API. "Ideally, it works like this: I configure the building management in a way that I currently need, and which I consider logical. I concentrate the data in the cloud, and then have the potential, through the REST API, to incorporate third-party systems, like **energy management systems**, workplace apps, and the like," explains Wehmeier. "This allows for optimal operation at the current time, and also leaves the door open for later expansions. Because we really have no idea what future requirements will look like. We currently find ourselves in a highly dynamic time, and we can only remain vigilant and prepare ourselves as well as we can."

»We don’t know what future requirements will look like. We currently find ourselves in a highly dynamic time, and we can only remain vigilant and prepare ourselves as well as we can.«



AUTOMATING FLEXIBLY

WAGO Application Building Control is the new pre-programmed solution for use in buildings and distributed properties.

Building automation is configured similarly in many applications: heating, air conditioning, lighting, and blinds must all be controlled and regulated. WAGO offers a new, pre-programmed application solution for this, which unites a high degree of flexibility with easy and efficient handling. The Building Control app automatically recognizes the installed I/O modules and enables flexible function definitions between inputs, outputs, and communication interfaces. From logical functions, through mathematical calculations, control loops, comparisons, status conditions and characteristics, up to timer programs – the application offers many options for implementing custom requirements. The system integrator uses configuration to compile all the functions and put them into operation, without any programming work.

This pre-programmed solution offers all the functions needed for the various building systems, including monitoring and alarms. The user interface, which is used both for the configuration and also for on-going operation, is based on a modern web visualization. System integrators and building operators can access all of the functions using a standard Web browser. The integrated dashboard offers a modern visualization of equipment status information and allows simple, clearly organized operation of the entire system. The data from the app can optionally be transmitted to the WAGO Cloud Building Operation and Control application. This combination yields a complete solution, which is also ideal for central monitoring, data analysis, and the operation of distributed properties.

Item numbers: 750-8212 and 2759-2120/0261-1000

Your Benefits:

- **Pre-programmed application solution for flexible use in building automation**
- **Easy configuration and commissioning without requiring programming knowledge**
- **Integrated dashboard for appealing visualizations**
- **A connection to WAGO Cloud Building Operation and Control allows access to all the data from anywhere in the world.**

EASY AND EFFICIENT CENTRAL BUILDING MANAGEMENT

The WAGO Cloud Building Operation and Control provides an optimal introduction to cloud-based building management.

Digitalization of facility management offers great potential for efficiency improvement. The WAGO Cloud Building Operation and Control app offers a great way to get started with managing and monitoring distributed properties using local infrastructure and decentralized systems from a central point – all in a single package from WAGO. Individual building systems like heating, air-conditioning, ventilation, lighting and other electrical systems are easy to connect to WAGO Cloud via local automation and an IoT gateway. The cloud-based visualization provides facilities operators with a comprehensive overview of the information from all their properties at all times, which they can then use for comparisons and well-informed analyses – an important feature for optimizing processes and saving energy. Status and alarm notifications from the distributed properties can also be centrally recorded, which allows for optimal coordination of service and maintenance work, for example.

Your Benefits:

- **Easy connection of distributed properties**
- **Central monitoring of sensor data and alarm limits**
- **Optimized service and efficient operation**

Item number: 2760 Series

CLOUD SOLUTION FOR DISTRIBUTED PROPERTIES

INTERVIEW

BUILDING TECHNOLOGY THROUGH THE YEARS

Which milestones have decisively shaped building technology in recent years? What are the current challenges? And which demands on buildings will drive further technical development in wiring installations and building automation in the next few years? In an interview with us, Martin Hardenfels, Head of Business Development, Building at WAGO, and Daniel Wehmeier, Head of Market Management, Building at WAGO, take a look at building technology over time and offer insights into what will engage the sector in the coming years.

Mr Wehmeier, Mr Hardenfels, before we start looking at the developments in building technology, what are, in your opinions, the biggest advances that we have seen in building electrical installations and automation in the last few years?

Daniel Wehmeier: »Building technology usually finds itself to be living in interesting times. Many systems are becoming more intelligent, are converging more strongly, and prefabrication of subsystems is increasing. Pluggable wiring technology should certainly be mentioned here as it relates to electrical engineering, and pluggable building installations have followed the various trends of recent years. A higher degree of prefabrication takes place now, which reduces expenses and enables the construction of buildings at lower costs and in shorter time frames. These demands are precisely why we at WAGO have our *WINSTA*® pluggable connection system. I think that the standardization of these systems, in comparison to classic electrical installations, particularly in the context of design methods like BIM, will ideally suit future demands by the market in the context of digitization, and pluggable electrical installations will continue to penetrate the market.«

And in building automation?

Martin Hardenfels: »In the area of automation, the last decades have seen a clear movement away from proprietary, island systems to open, networked systems that are manufacturer independent. This transition to an integrated view of the systems, which increases efficiency potentials, and the accompanying change in designing networked systems have decisively contributed to a conception of efficient building operations that can no longer be imagined without automation systems. And efficiency is relevant for more than just economical reasons.«

What would you say was the most formative development, and what are the current challenges?

Wehmeier: »We generally communicate a lot more in buildings, and also between equipment and systems. Open fieldbus systems and interoperability are therefore recent topics, and WAGO has also substantially contributed to them, for example, in the development of our WAGO I/O system. With regard to digitization, we are currently standing with both feet in the middle of an industrial revolution, whose effects will influence not only our building automation, but all of society. For building automation, this is, in turn, a journey to a completely new world, where willingness to make changes will again be in demand. Manufacturer-independent communication is no longer a relevant topic, as it has become a matter of course. Instead, we currently discuss expanding our familiar world to include new possibilities, technologies, and services. We are already in

Martin Hardenfels, Head of Business Development, Buildings at WAGO, has gathered more than 25 years of expertise in building automation.

the middle of the transition, in what can only be exciting times.«

You have mentioned the "journey to a new world" – what will this new world look like, in your opinion?

Daniel Wehmeier: »Much better networked than before! In past decades, we talked about pure synchronization of the protocols; now, we are seeing the interplay of entire building systems and higher-level applications. Boundaries are blurring, and everything is growing more interconnected as a whole, which brings new tasks with it. We naturally see a multitude of innovative software applications that provide substantial added value and increase building transparency and comfort. However, these applications are also quite data intensive, and these data have to be recorded and also transmitted. Building automation in a new, digital world will have to deal with recording substantially more data, transmitting them, and providing them to a multitude of applications,

As Head of Market Management, Building, Daniel Wehmeier brings a breath of fresh air to the building technology division at WAGO.

and evaluating this increased level of data, and also user interfaces for all of it.«

What do you think: what will our buildings look like in 10 to 20 years? And what does that mean for companies like WAGO?

Wehmeier: »We have already mentioned a journey to a new world, and I find this comparison quite apt. Christopher Columbus had no idea what waited for him in search of a route to the Spice Islands, or the implications that would result from his voyage. At this point in time, we can only gauge the direction in which we are moving, which is why we are speaking about greater connectivity, significantly more data, and evaluations in higher-level systems that actively support us. For WAGO, this means maximum flexibility on the one hand, in order to be able to react to constant changes and developments, and also deliberate and continuous development in our core competency: establishing connections. In an increasingly networked world, we ensure the necessary connections, both in electrical wiring installations and also in the automation and digitization.«

What does that mean specifically for the Building division at WAGO in the next years?

Hardenfels: »In the future, development will certainly focus on refining the points we have mentioned that are aligned with these challenges. We are also addressing building technology issues with WAGO Cloud Services. By evolving our infrastructure, we are able to offer solutions for the increasing demands in the area of network security in building automation networks. With the HMI expansions of our Series TP600 to include a BACnet® option, our users are well-positioned to overcome future challenges.«

Wehmeier: »WAGO decisively shaped the last major change in wiring installations and automation, and will consistently choose the path toward change. With the WAGO Cloud, we already currently offer the foundation for everything required by the new system architectures. At the same time, we will continue to rely on the variety of interfaces at the field level in order to actually facilitate the Internet of Things. WAGO will continue to develop and reinforce its vision of itself as the "Backbone of a smart, connected world". Specifically, this means new products and solutions, from field connectivity up to cloud-based applications and continuous software engineering at all levels. You should stay tuned.«

»WAGO decisively shaped the last major change in wiring installations and automation, and will consistently choose the path toward change.«

THE CONSTRUCTION INDUSTRY DISCOVERS THE BENEFITS OF PLUGGABLE ELECTICAL INSTALLATIONS

Plugging in electrical installations, instead of terminating wires, remains an exception for many electricians and electrical designers in Germany. However, this has long been the standard in countries like the Netherlands and Sweden. Pluggable electrical installation works with pre-assembled cables and connectors, precisely designed in advance, which are then plugged together at the construction site – quickly, safely, and error-free. Pluggable connector systems are primarily used in non-residential buildings and their standardization and prefabrication facilitate the construction process. These systems have already been used in Sweden for more than 25 years to significantly simplify electrical wiring installations in offices, hospitals, and schools. The Swedes recognized early that work time can be reduced by an average of 50%, in comparison to working with conventional wiring installations, which includes scaling cables and manual connections in the boxes. In Germany, pluggable wiring installations are also gaining in popularity due to their numerous benefits.

Satisfied with the punctual opening of Charly's Kinderparadies in Dissen: from the left: Heinrich Mackensen, Heinz Repin, Hans-Georg Rethmann, and Astrid Kerkenhoff

LEARN MORE ABOUT THE *WINSTA*® PLUGGABLE CONNECTOR SYSTEM FROM WAGO.

A COMPLETE DAY CARE CENTER IN 12 WEEKS

EFFICIENT CONSTRUCTION WITH PLUGGABLE ELECTRICAL INSTALLATIONS

At the beginning of 2019, Dissen am Teutoburger Wald commissioned the construction of a day care center and kindergarten. The challenge lay in the opening date: the first groups of children were supposed to arrive in early summer. Faced with a construction time frame of only 12 weeks, the electricians gambled on the time-efficient features of the *WINSTA*® Pluggable Connector System from WAGO.

Kindergarten spots are scarce in Germany and urgently needed. Dissen in Lower Saxony is facing this problem as well: According to the Cologne Institute for Economic Research, there is a shortage of 30,500 day care spots in Lower Saxony alone. To ease the tense day care availability situation for communities and families as quickly as possible, Dissen commissioned the construction of a day care center and kindergarten at the beginning of 2019. Using conventional construction methods, the planners calculated a construction time of nine to twelve months – a length of time that was simply too long for many parents, the town of Dissen, and the developer, Charly's Kinderparadies. It was clear to Heinrich Mackensen, the first chairmen of the trustee organization, that conventional construction methods would not suffice for a tighter construction deadline. The solution was to erect two buildings using wood frame construction and *WINSTA*® pluggable electrical installations from WAGO.

An Ambitious Construction Project

To erect the two buildings in just twelve weeks, the planners relied primarily on time efficiency. Therefore, state-of-the-art wood-frame structures, which were custom-assembled in advance with exterior and interior walls already included, provided the basic skeleton of the day care center and kindergarten – this saved time during construction, as well as in the subsequent connection phase.

Two companies that specialize in timber construction were hired to build the day care and kindergarten buildings simultaneously. Two construction concepts came into play. The builders of the kindergarten building provided the exterior walls of the wood-frame structure with OSB on one side. The interior walls arrived at the construction site still unsealed. In this construction method, it was possible to lay all the

Hans-Georg Rethmann, technical manager of Elektro Herkenhoff GmbH & Co. KG (left), and Heinz Repin, head of design at the Greve engineering consulting firm (right), had the challenging task of getting the Dissen kindergarten ready for operation, including wiring, in just 12 weeks.

conduits and cables in the walls right at the construction site. The walls were then sealed and insulated after this work was finished. For construction of the two-story day care center, the timber construction company chose a different approach. The walls were already provided with completed, closed conduits in the workshop, and delivered to the construction site already sealed. The conduits used in both structures provided another decisive advantage: the electrical cables did not have to be laid, which entails time and money, but instead could be simply pushed through the conduits and connected without mismating errors.

Plugging in, Not Wiring Terminals

The planners broke new ground with the electrical installation. "Due to the limited time frame, we decided to use a pluggable installation," explained Heinz Repin, the designer from Greve, the engineering firm responsible for the project. "When testing the systems available on the market, the *WINSTA®* system from WAGO had clear advantages. We were searching for the simplest and most optimal solution. *WINSTA®* provides all of the components needed for the work in the daycare and kindergarten in a round connector version. In order to quickly lay the cables in the walls, we submitted a tender for 25 mm conduit. Using cables with rectangular connectors would have required significantly larger conduits." The designers found suitable switches and outlets at Peha Elektro GmbH, a *WINSTA®* system partner.

WAGO's *WINSTA®* Pluggable Connector system, which is especially well suited for buildings with hollow walls, was the ideal solution for the building projects in Dissen. "We broke new ground with this assignment," confirmed Hans-Georg Rethmann, technical manager at Elektro Herkenhoff GmbH & Co. KG.

"This was the first building in which we designed all of the electrical connections to be pluggable." The complete cabling system, including sockets, switches, and distribution boxes, had to be precisely designed in advance, and was then easily fitted into place on site thanks to the pre-fabricated cables. "At construction sites of this size, we need about 14 to 16 employees in the construction phase," he explains further. "By using *WINSTA®*, we were able to halve the team and still complete all of the work within the time frame and without additional expenditures."

Correctly Designed = Already Half Installed

This project was also a new challenge for Heinz Repin. "Plugging in instead of terminating," he explains, "speeds up the work at the construction site a great deal, but also requires very extensive and precise planning." The engineering firm Greve had drawn up all the plans in great detail. All the cables were placed precisely in the drawings. Each cable length was entered in the documentation, each socket measured, and all of the functions of the control boxes were exactingly described. The extensive preliminary planning paid off: by using the *WINSTA®* system and its pluggable, pre-fabricated system components, the installation time on site was reduced by about half. Repin's planning led to benefits in other areas: "We needed more time for planning, coordination meetings and follow-up, but the time savings in the construction phase made up for that several times over."

Elektro Herkenhoff also adjusted quickly to working with *WINSTA®*. "We were most unfamiliar with the logistics," explained Rethmann. "We ordered all the material in advance. In our warehouse, we then assigned all the materials to individual rooms of the day care center and kindergarten and delivered them to the site according to the current stage of construction."

Time Advantages Using *WINSTA®* from WAGO

- **Fast installation using push-in CAGE CLAMP® spring pressure connection technology allows conductor termination**
- **Minimal installation time through optimal planning with a pre-assembled system solution**
- **Protection against mismating through matching prefabricated conductors and standard components**
- **Straightforward connection to electrical components, like sockets and lights, through the program of *WINSTA®* system partners**

Pluggable connector systems show their advantages everywhere that there are repetitive demands on wiring installations, for example, in the wiring of lighting systems

System Synergies for Greater Efficiency

Systems that are perfectly in tune with each other make things easier for the electricians at the building site, and also accelerate the workflow. The planners in Dissen took advantage of this for additional time savings: all switches and sockets, including the lighting elements, were delivered with *WINSTA®* connection capability, had integrated connectors, and could therefore be easily connected to the WAGO system. For example, the down lights were already equipped with *WINSTA®* cables in the electrical workshop, so that they just needed to be plugged into the system once they arrived on site. "It was marvelously easy and fast work for us," remembers Hans-Georg Rethmann. "The carpenters cut the openings for the down lights, and then we only had to hang the luminaires, plug them in, and everything worked. Our experiences with *WINSTA®* were absolutely positive. The system allowed us to minimize the work at the construction site and stay on schedule." The day care center opened in May of 2019; the kindergarten followed a few weeks later.

WHY INTEGRATED PLANNING AND OPEN AUTOMATION ARE NECESSARY FOR SUSTAINABLE BUILDING PROJECTS

The demands on modern buildings are high: They must ensure their user's comfort throughout the year, function as efficiently and economically as possible, and ideally run sustainably while conserving resources. This requires intelligent building concepts, holistically planned from the beginning including open automation.

If a building is designed today, then this usually follows a conventional path: Technical planers and architects often consider only those building systems that they have to design, and rely in many cases on functional, yet closed solutions, which means that they often do not consider possible, sensible interactions with other trades and systems. Although the systems are then usually equipped with communication technology, they either cannot exchange information at all, or data exchange is problematic, due to a lack of interface planning and the use of different communication protocols.

Integrated Planning

In contrast, it is desirable to create a network, in which different systems and equipment, specialized for their areas, communicate with one another, exchange data, and use the data to optimize all energy-related processes running in the building. One example: If the sun shade is coupled to a presence sensor, then natural light can be guided in a targeted way to spaces occupied by building users. In the absence of people, the sun shade closes completely to provide maximum insulation from solar energy and avoid loads on the cooling system; this increases user comfort and also saves energy. In order for the automated building technology to function as seamlessly as in the example, it is important to consider all desired functions and automation systems from the beginning as part of holistic and interdisciplinary building planning: this optimizes the planning process, supports system synergies, and prevents the need for subsequent changes.

This is made possibly by integrated planning, an approach that spans skilled trades and systems and ensures information exchanges between the individual system parts. The key to success in integrated planning, and thus for optimized building operation, lies in an exact consideration of the interfaces. Interfaces, which are standardized to the highest possible level, ensure that all parts of the technical building equipment, from the primary systems up to the individual rooms, are networked and can exchange data. For example, the sun shades can only support the heating system in an intelligent fashion if the demands on individual thermal room regulation are known in the system. If these informational flows are lacking, then solar energy cannot be targeted at spaces and used to save heating energy.

Open Automation

Integrated planning is decisive for the successful implementation of intelligently-controlled buildings. And open and interoperable automation solutions are essential for integrated planning. They can flexibly record measurement signals, and facilitate easy communication between components from different manufacturers. “For this to work, you need systems that can integrate diverse interface solutions for fieldbus systems and subsystems,” explains Stephan Lampe , project manager at WAGO. “Our **WAGO-I/O-SYSTEM** seamlessly regulates, controls and monitors every building system. The open automation approach helps, specifically in complex tasks, in which many different devices and systems from various disciplines have to be brought together.”

The **BACnet®** open-source communication standard, which is likewise included among the variety of interfaces in the WAGO I/O system, plays an important role here. The BACnet® (Building Automation and Control Networks) data transmission protocol connects different systems and products, and guarantees data exchange between different devices in a single overall system. It supports a number of network technologies and topologies including the IP protocol, allowing cross-system integration of primary systems, lighting control, security, and fire alarm systems. That means increased flexibility and also lower maintenance and installation costs in the building automation and control.

Conclusion

In order to successfully operate buildings, configure them in a sustainable way, and exploit the complete potential of currently available building technologies, you need networked structures, both between operators, planners, and system integrators as well as between systems and equipment. Integrated planning and the use of open automation systems are indispensable for this.

INCREASED EFFICIENCY IN THE BUILDING SECTOR DEPENDS ON RENOVATIONS

Climate action is one of the goals stated by the European Union and its member states. Greenhouse gases should be reduced to a minimum by 2050. The building sector will play an important role in this, as 40 percent of total energy consumption and approximately 36 percent of all CO_2 emissions can be traced back to buildings. There is an enormous potential for energy savings here. However, the focus on sustainable building projects often privileges new construction, while potential energy savings are primarily found in modernizing extant building stock.

While building automation is already common in the 24,000 non-residential buildings constructed every year (which is due to established energy standards for new construction), existing building stock also has quite a bit of potential for optimization. At the moment, it is estimated that there are 2.7 million non-residential buildings in Germany (dena* Report, 2019), which represent a total of 13 percent of German building stock. At the same time, non-residential buildings represent one-third of total building energy consumption. Reducing these numbers will require more than just efficient new construction: a focus on energy efficient renovations is needed that extends beyond mere improvements in insulation or innovative heating technology, and instead includes retrofitted building automation that decisively increases the energy performance of existing buildings.

High energy savings can be achieved by carefully considered building automation systems, which detect, control, and regulate building technology processes, while networking equipment and building systems. Individual systems would communicate with each other, or with a higher-level management system. Heating, ventilation, and air conditioning, lights, and sunshades, would interact and exploit synergies for energy optimal operation, which allows primary energy to be used initially in a demand-oriented way, as it is needed. For example, the room climate conditions are automatically adjusted depending on human presence, so that users are presented with a comfortable working climate, where they can be productive. When the room is not in use, the systems regulate the space in ways that save energy that is not needed. The controllers, sensors, and actuators required for this can usually be retroffited without much difficulty.

Renovation Rate Is Too Low

Across Europe, the rate of renovation is approximately 11 percent, and only a few of these cases focus on efficient, sustainable building operation. Renovations that actually achieve improvements in energy efficiency account for only around 1 percent of projects. The proportion of so-called “extensive building renovations”, which include energy savings of 60 percent, is even lower, a mere 0.2 percent. This begs the question as to why so few buildings are retrofitted with suitable automation technology during renovation.

In addition to a lack of information about this, building operators and investors often believe that energy efficient technologies are less economical than conventional solutions. While access to financing is usually available, many projects simply lack an overall vision as to what is required, which prerequisites are required for the systems, and how these can be satisfied. In addition, many building owners are insufficiently informed about the energy consumption states of their buildings and the potentials offered by current technology. It is therefore urgently time to act. If the EU is to achieve its goal of having a climate-neutral building sector by 2050, then the rate of renovation must at least double within the next 9 years, at the latest.

* German Energy Agency

Building Renovation Has Long Been a Topic in EU Politics

The fact that renovations and building automation decisively contribute to energy savings in buildings has been accepted politically for a number of years. Corresponding guidelines, like the European "Energy Performance of Building Directive" (EPBD), was supposed to be incorporated into national law by the EU countries by the beginning of this year. While the EU building guidelines from 2018 may have focused on the building skin, the amended directive recognizes and revisits the savings potential provided by building automation. The areas of focus:

- Communication capability/monitoring
- Installation of self-regulating equipment
- Intelligent charging of electric vehicles
- Smart readiness indicator

The guidelines also focus on digitization in the building sector and increased networking of all technical systems, including smart sensors and actuators. This is because extensive networking, recording and monitoring of information are basic requirements for a sustainable, smart building.

The goal of the EPBD is thus both to bring extant buildings up to the current state of the technology, and thus exploit the energy savings potentials linked to that, and also to ensure that buildings are technically prepared for future demands and systems. The smart readiness indicator, alluded to in relation to the amended guidelines, provides an orientation for measuring a building's capability for using intelligent systems. The smart readiness indicator "is composed of features for increased energy savings, benchmarks, and flexibility, and also improvements in functions and capabilities that can be attributed to increases in networked and intelligent devices" (EPBD, appendix IA). The indicator is designed to offer an orientation regarding in the ways in which buildings and their current technology satisfy present and future demands, and where there are needs for optimization, according to prevailing technology. However, it has not yet been fully clarified as to how this value will be used in the future to evaluate buildings, for example, in relation to energy certification.

In general, the EU building guidelines leave room for growth when standardizing building automation measures. At the same time, they provide building operators with guidelines today – as intended with the smart readiness indicator – about which renovation measures will additionally increase building efficiency, and where things need to be rectified in order to enable retrofitting of future systems to retain a more energy efficient level of operation at all times. It has become obvious that it will not be possible to sustainably achieve the defined energy reduction targets without building renovations and retrofits with efficient building automation systems.

European Building Stock at a Glance

220 MILLION residential and non-residential buildings were constructed before 2001 – or 85% of the total building stock in Europe.

The majority of currently existing buildings are **NOT ENERGY EFFICIENT**.

According to EU directives, the rate of renovation must at least **DOUBLE** in the coming years.

Only **AROUND 1%** of buildings are renovated in an energy efficient way each year.

Buildings are responsible for **40%** of total energy consumption and **36%** of CO_2 emissions.

CO_2 emissions are supposed to be reduced **BY AT LEAST 55% in 2030** (in comparison to 1990).

Therefore, buildings have until 2030 to reduce their CO_2 emissions by **60%**, final energy consumption by **14%**, and energy used for heating and cooling by **18%**.

EXPERT TIPS FROM ACHIM ZERBST, ENERGY MANAGER AT WAGO

Successful Approaches to Energy Efficiency Projects

Do you want to configure your building operations to be more efficient and more economical over the long term, but do not know where to begin? We asked our energy manager, Achim Zerbst, for his personal tips:

1. Find the right energy consultant

»When seeking a suitable energy consultant for an efficiency project, it is helpful to select a company that is listed with the BAFA (Federal Office for Economic Affairs and Export Control), that specializes in the area where you want to increase energy efficiency, e.g., in buildings. Geographic proximity, at the country or even state level, between the consulting company and your site offers additional advantages – both in relation to face to face meetings, but also because energy consultants located in the same state often possess more in-depth knowledge about specific challenges in the area, and also possible solutions linked to the region or site. Lastly, you must have confidence in your selection«

2. Explore funding and persuade top management

»n order to persuade top management, potential funding grants can be submitted as models so that energy managers can gain a first hearing with decision makers. This is particularly applicable in companies with a corporate group structure, but this also applies elsewhere. However, any eligibility conditions should already be met in principle; otherwise, your efforts will be in vain. Therefore, the appropriate incentive option should be tailored to the entire concept, not just one part. It is recommended that you make use of the services of an external funding advisor, so that you do not lose track of potential or combinable financial sources.«

3. Ensure secure footing for the implementation

»Motivated allies in the company are important for efficiency projects. However, implementation also requires more than just participation: specialist expertise is an absolute prerequisite. Most companies can't do it alone – and not just for technical reasons concerning available resources. Depending on the size of the project, support from a planning specialist and a specialist attorney may be advisable. Furthermore, public tenders are required for financial incentive programs above a specific investment level at the state, national, and EU level. Eligibility alone is also not sufficient to get the funding; the need for financial support must be legally established in order to actually receive aid money.«

THE »ALTER WALL«:
METAMORPHOSIS OF A BUILDING

AUTOMATION THAT CAN ALSO BE EXPANDED IN THE FUTURE

Entertainment, work, incomparable shopping: All of this can be found under one roof, and behind a natural stone facade listed as a historic monument, located in the middle of the Hamburg city center. The "Alter Wall" is both a large-scale project and ambitious in several aspects. It will provide 15,000 square meters for the finer things in life, and another 18,000 square meters for modern offices. A consequence of the conflicting priorities at play in these very different utilizations is a specific set of requirements for the building automation systems. WAGO controllers take on important communication and gateway functions in a close-knit network.

It is the longest, historical facade in Hamburg, and it is being thoroughly renovated and equipped with modern technology. Directly across from the Rathaus lies a completely new world at the Alter Wall [Old Wall]. At one time, it formed the imaginary boundary dividing the Old City from the New – and is still visible in the character of the Alsterfleet canal. If the retailers at the Neuer Wall [New Wall] belong to the exclusive luxury market, then the Old City, from Mönckebergstraße to Spitalerstraße, represents the diversity of market experiences. The Alter Wall ensemble project has reduced the importance of this boundary line, not least due to a new bridge crossing the Alsterfleet canal. A lively boulevard filled with upscale retailers, exclusive office properties, and fine restaurants: this was the goal pursued by Art-Invest Real Estate, the project developer and investment company. The company, located in Cologne,

A number of office spaces are located in the Alter Wall.

regularly invests in well-situated commercial properties in Germany's largest cities. The "Alter Wall" renovation project stands out due to the metamorphosis required to update the technology.

New Technology in an Old Building

The versatility and modularity of the technologies used for the building automation is immensely important, especially in a project as complex as the Alter Wall and its diverse end users. The **WAGO I/O System 750** takes on multiple tasks as a control unit: it coordinates the technology in the office areas and shopping mall, collects data from sensors and individual room controllers through KNX, and uses Modbus TCP/IP to form the interface to the superordinate operating and management level. In addition, 52 system distribution boxes and 54 additional **WAGO controllers** are used in the electric sub-distribution boards for individual offices spaces; **touch panels** are also provided for local operation.

In those parts of the building that are primarily rented out as offices, 40 additional ETHERNET controllers in the sub-distribution boards provide lighting control and automated sun shading based on weather conditions. The latter is linked to four weather stations on the roof, which use the WAGO ***flex***ROOM® Weather distribution box to measure outside humidity, outside temperature, natural radiation, wind speed and direction, rain, light, and twilight, among others, in order to obtain valuable information to efficiently operate the building technology.

Open Systems Provide Options for Future Building Demands

All individual tasks of the technical building equipment are divided into independent areas, regardless of whether they relate to district heating, lighting, heating, cooling controls, ventilation controls, or smoke extraction. The physical segregation of the complex into three sections

has allowed for the autonomous operation of each, due to independent power supplies and operating and management levels. For the owner, Art-Invest, the clear separation provides an additional advantage, in that the building parts can be sold independently without any restrictions on the building technology. The company should certainly be listed among those enterprises that develop projects for long-term, permanent use. "We construct and renovate buildings for human beings, and not just with a focus on the rate of return," emphasizes Christoph Stephan, Senior Investment Manager, HVAC and Building Services at Art-Invest. In this light, the company has a preference for systems that can be expanded and grow alongside a building. "We want to become more digital," says Stephan. "Longevity and good, sustainable equipment count toward the selection of equipment, fieldbus systems, or ICA technology."

Interface Variety for Individual Project Needs

Art-Invest collaborated closely with the Petersen engineering consulting firm from Flensburg on the Hamburg project. The entire project was implemented by VM-Technik from Hamfelde. "We incorporate building trades and construction planning into the design," explains VM-Technik CEO Klaus Mayrhofer. His company cooperates closely with WAGO as a solution provider. "These are reliable products, that have never been defective for us in operation; therefore, we consider them important for operational safety." The building technology specialists, located east of Hamburg, therefore also use the WAGO I/O System, primarily "because we can use their universal components and interfaces to build applications precisely the way we need them." According to Mayrhofer, this pervasive level of modularity "is pretty rare on the market."

As the control unit, the WAGO I/O System 750 takes on the coordination of the technology, collects data, and forms the interface to the superordinate management and operator level.

AIR CONDITIONING FROM A CONTAINER

USING AUTOMATION TECHNOLOGY FROM WAGO TO RETROFIT COMPLEX HVAC SOLUTIONS

How do you install a new absorptions chiller, including its peripherals, in a shipping container, for use in an existing building? You call on the right partner for systems and building technology, who knows about a suitable automation solution. CHRISTOFFERS from Delmenhorst came up with a proposal, together with WAGO from Minden, and saved the customer a lot of time and money. From the frequency converters through the heat exchanger up to the connection to the building control systems – the entire automation in the chiller runs through a PFC200. The WAGO I/O System 750 also demonstrates once again that it is qualified both for series production and individual solutions.

Retrofitting buildings with air conditioning technology is indeed possible; however, it presupposes flexibility and a certain degree of creativity. An annex was required in this case to accommodate the new technology, so that a chiller could be fully and retroactively installed for an existing building located at a northern German university. Because the application for the construction permit would have had no chance for successful handling in the near term, ingenuity was needed, and also an innovative partner with extensive expertise.

Creative Customized Solution from Longtime Experts

Instead of building an equipment room from bricks and mortar, the facility managers at the university quickly decided to use an overseas shipping container. While these types of 'mobile' solutions require satisfying a certain number of regulations, the approval process is still much simpler than for a permanent structure. "In contrast to a freely designed annex, the dimensions of a standard container are simply what they are," says David Gellermann. The division manager for electrical engineering at CHRISTOFFERS, a systems and building services consulting firm, led the charge in accommodating the customer's complex, 318 kW absorption chiller behind the steel walls of the 8 by 40 foot container.

The HVAC specialists from Delmenhorst are quite familiar with these types of custom projects. The around 130 employees at CHRISTOFFERS are always the first ones called when things get complicated and specialized solutions are needed. As was the case here: the actual construction of the chiller only took about three to four weeks, once the system layout had been devised and the automation control cabinet was planned out. "Because containers are transportable, we could finish the majority of the work on the hydraulics, pipes and conduits, and electrical engineering at our headquarters. That meant that we only had to install the heat exchanger on site and complete the connection work," states the electrical engineer, ticking off yet another benefit.

Multiple Subsystems, One Automation

A total of four pumps are required to cool the existing building through the container. The first conveys the hot water, necessary for absorption, from the CHP at the nearby heating plant to the chiller. A second pumps cold water from the chiller to the heat exchanger, located on the container roof. The third pump connects the chiller to the university's air conditioning network. And finally, the fourth functions as a so-called free cooling pump, and is used whenever very cold outside temperatures can be exploited to use ambient air to generate cooling across the heat exchanger and its

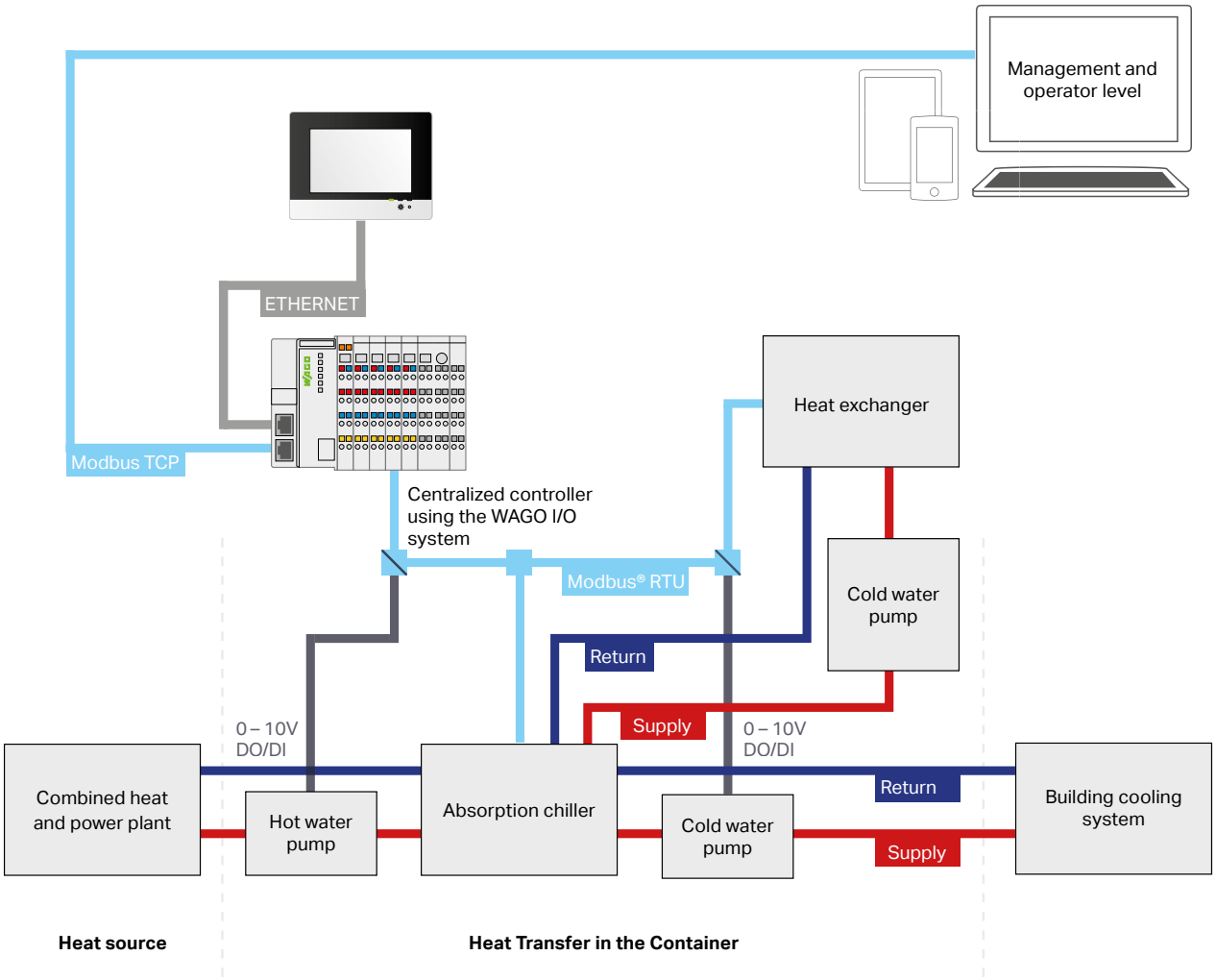
Creative solution: An absorption chiller, and its peripherals, were installed in a shipping container to retrofit an air conditioning system onto an existing building.

auxiliary. This saves additional costs, because the chiller can be temporarily powered down.

"Of courses, these four subsystems and their individual components were not provided by the same manufacturer," explains Gellermann, pointing to one challenge in the system. "Our task was to link the proprietary controller for the chiller and and its peripherals in the container to the automation technology, and connect that to the higher level building control technology." This required an automation system that was as open as it was modular – something like the **WAGO I/O System 750**, which CHRISTOFFERS has routinely employed in its projects for years.

Uniform Communication from the Chiller to the Building Control Technology

A **PFC200** forms the central control unit for the container chiller. A total of 15 I/O modules are connected in series to the controller, in order to link in the various digital and analog signals. On the input side, this includes operating and fault notifications, supply and return temperatures, and position



System layout for the retrofitted cooling technology: the WAGO I/O system takes on the centralized control of the absorption chiller and the pumps.

feedback signals. The frequency converter, valves, and shutoff flaps are controlled on the output side. The chiller and heat exchanger talk to an additional serial interface module from the I/O system via Modbus RTU. The PFC200 (item no. 750-8212) has a factory-installed RS-232-/RS-484 and two ETHERNET connections on board, via which the Modbus TCP communication is established in this application to the building control system, as well as a connection to the WAGO Touch Panel 600.

The WAGO automation is technically implemented using ***e!****COCKPIT*. "Instead of using several individual programs, we design much more efficiently using WAGO's engineering software, because the entire portfolio is included in one up-to-date program in a manageable way," states David Gellermann. All applications for the university were conveniently implemented in ***e!****COCKPIT* using function blocks based on CODESYS V3. This convenience stems primarily from the fact that WAGO provides prefabricated HVAC libraries, which contain almost all typical tasks mapped onto heating, ventilation, and air conditioning in building systems. "This made it easy for us to seamlessly automate the chiller in the first attempt," recalls Gellermann, who has worked at CHRISTOFFERS in Delmenhorst for more than seven years.

Individualized, Standardized Solution

The university chiller is a special solution, which has no counterpart in Germany – at least not yet. That said, the first inquiries about similar container solutions have already arrived at CHRISTOFFERS. David Gellermann and his team are well prepared, in part due to the flexible automation technology from Minden. "All possibilities are open to us, both in building and in system designs, because we can communicate using almost any fieldbus and transmit almost every signal. By using the WAGO I/O System 750, we are able to implement each individual request in a standardized way."

»Our task was to link the proprietary controller for the chiller and its peripherals in the container to the automation technology, and connect that to the higher level building control technology.«

A total of four pumps are required to cool the building using the container.

Everything at a glance with the WAGO Touch Panel 600

MODERN BUILDING MANAGEMENT VIA RADIO COMMUNICATION

The path to the IoT: WAGO offers RS-485 gateways for EnOcean® and Zigbee®.

Intelligent control of lighting and building technology via wireless communication is becoming more and more important, especially with the increasing relevance of the Internet of Things. WAGO is launching RS-485 gateways for two wireless protocols, EnOcean® and Zigbee®. They can be easily linked to the WAGO I/O System 750 via a serial interface using either a serial module of the I/O System or a controller with a serial interface. Integration into ***e!****COCKPIT* and support of standard protocols, like Modbus® and ESP-3 (EnOcean®), simplifies bidirectional communication between the I/O System and the EnOcean® and Zigbee® Gateways.

Serial transfer also allows long cable lengths, so the gateways can be installed far from the I/O System. Since the maximum range of the wireless protocols within buildings is restricted, this is especially important when the engineering room containing the controller and I/O System is located is farther away. The design and the internal antenna also permit mounting in a visible location, such as on a wall or ceiling. An integrated DIN-rail bracket and the option of connecting an external antenna also allow installation in a control cabinet.

Item numbers:
750-940 (EnOcean®)
750-941* (Zigbee®)

Your Benefits:

- **Easy connection of EnOcean® and Zigbee® to the WAGO I/O System 750**
- **Can be installed far from the I/O system.**
- **Suitable design for visible mounting on a wall or ceiling**

enocean®

Zigbee®

MODERN LIGHTING CONTROL

THIS IS HOW LIGHTING MANAGEMENT WORKS TODAY

Lighting control: It is commonly underestimated and yet is part of the most important technical equipment in buildings. The ability to simply switch the lights on and off is so last century. Larger spaces with different lighting zones, like warehouses and production halls or offices, require intelligent lighting controls. WAGO has created a comprehensive overall solution with their Light Management System: it is easy to configure, has flexible functionality, and can be intuitively operated.

Simple Configuration – No Programming

The concept behind the solution is simple: different spaces have different lighting needs. For example, a production line has different requirements for lighting than in an office, which also differs from a conference room. In order to do justice to different light scenarios, the lighting management system divides larger spaces into virtual rooms, in which the light is flexibly adapted. This is where the WAGO Lighting Management System is particularly easy for users to operate: the application solution is easy to configure, with no complex programming required. This is because the system functions using a combination of pre-configured hardware and user-friendly software.

This simplifies the planning and commissioning of new lighting systems: the parameters are all you have to enter.

Modern Lighting Control

Lighting management systems support and improve three essential areas: the efficiency of the building, general economic viability, and, not least, the comfort and thus the productivity of the people who work there. The light is therefore precisely supplied: where it is needed, at the correct levels, at the right time. This saves energy, resources, and ultimately money. If there are changes in how spaces are used, this can be quickly and efficiently mapped in the lighting management system. The previously generated virtual rooms are then easily reconfigured – actions that previously required reprogramming by specialists.

Using the WAGO Lighting Management System, all common functions, like dimming, intelligent lighting control, or timed switching, can be established and controlled for the individual virtual rooms. Even more complex lighting concepts are not a problem for the WAGO Lighting Management System, see, for example, "Human Centric Lighting". As is obvious from the expression, human beings are the focus of "human centric lighting". The goal of the concept is to use the lighting systems to imitate natural light cycles. This positively affects the well-being and performance abilities of the people using the room – they are more attentive, alert, and have higher concentration levels. This is reflected in new lighting schedules: just like natural light changes in intensity, color temperature, and direction over the course of the day, the optimal artificial lighting scenario must also simulate these characteristics. Basically, a higher illumination level with a greater proportion of blue, that is cooler light, is suitable for mornings and midday times, while warmer light with a higher proportion of red is better for afternoons. Hourly parameters are defined in the lighting management system in order to correspondingly control the lights – while also taking the actual environmental conditions into account. The light temperature is automatically adjusted over the course of the day, thus guaranteeing optimal work place conditions, and transforming "human centric lighting" into one of the central functions of the lighting management system.

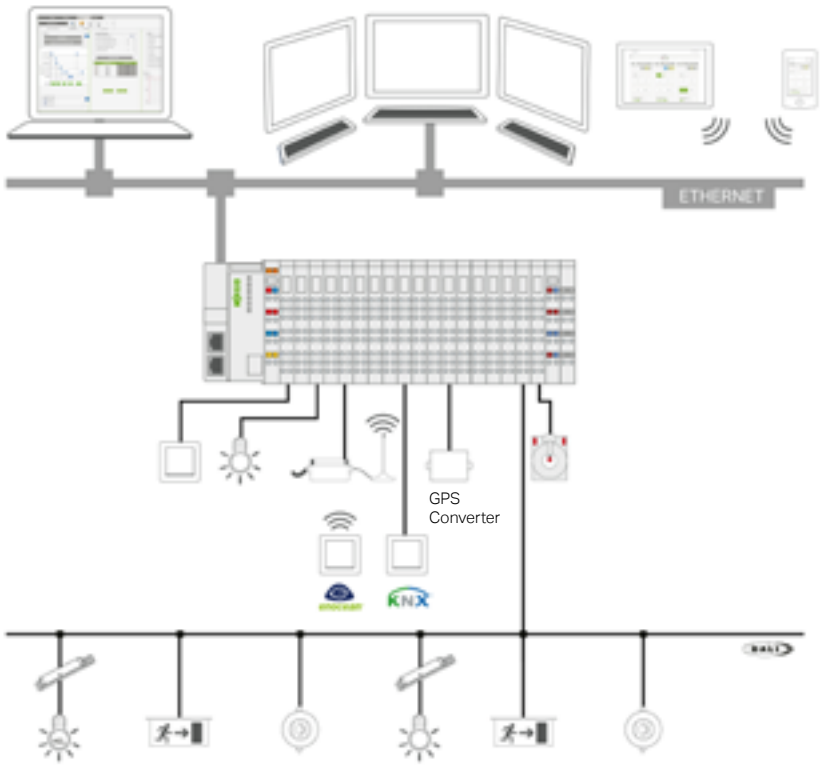
Automatic Testing System for Safety Lighting

The WAGO Lighting Management System is likewise well established in the area of safety lighting. This is linked directly into the system via **DALI**. The connection to the system can thereby be carried out as independent single-battery lighting or centralized emergency escape lighting. The requirement, that emergency escape lighting systems must be tested on a regular basis, reveals a major advantage in this connection: the Lighting Management System greatly simplifies this process by providing an automatic testing system. It supports operators by conducting and properly logging the required test processes on a defined schedule – without having to connect to an additional program.

Considering Hardware and Software as a Whole

This is possible through a holistic interaction of hardware and software. On the hardware side, the **WAGO PFC200 Controller** and the WAGO I/O and interface modules from the **WAGO I/O System 750** form the foundation of the system. Since the number of modules is variable, the WAGO Lighting Management System can be used for small production facilities and also for large logistics centers. In addition to conventional input and output signals, subbus systems, like DALI-2, KNX, and the connection of EnOcean® wireless, pushbutton panels, are also supported. This variety of interfaces translates to flexibility in use and ensures high levels of compatibility, so that a multitude of sensors and components from different manufacturers can be connected to the WAGO Lighting Management System. In addition, all configuration settings and parameters can be recorded and stored in the project documentation.

System graphic for WAGO Lighting Management



The software application, implemented and pre-programmed in the controller, establishes WAGO Lighting Management as a powerful and user-friendly solution. All settings can be carried out, both during commissioning and operation, with the click of a mouse. The values can then be forwarded to a higher-level building control system or to a production control center via Modbus TCP/IP.

Convenient and Transparent Lighting Control

During operation, the system basically functions using two interfaces: one, the application, is used for configuration and commissioning, while the recently-added visualization is used for settings and observations during operation. The new visualization provides a streamlined user interface, optimized for daily tasks. The HTML5 Web user interface allows transparent and convenient operation of the entire lighting system, regardless of whether the operator uses a desktop computer, **touch panel**, tablet, or smartphone. Access is carried out using a conventional web browser, and the responsive design ensures perfect display on all end devices. By taking advantage of the visualization of the lighting system's operating data, operators can remain constantly informed about the current status of the entire lighting system. Simultaneous access to several lighting management controls is also possible via the new visualization interface. In addition to language and color settings, HMI devices, users, rooms and custom profiles can be easily created and managed. Through these capabilities, you can fine-tune lighting to meet incredibly specific needs.

Conclusion

Holistic lighting management systems belong in modern, automated buildings, and will increasingly gain importance in the coming years. They are the central connection point for a multitude of technologies, and provide substantial assistance in configuring lighting systems to be efficient, comfortable, and flexible – especially in larger spaces. The strength of good, professional lighting management systems lies in their great flexibility, combined with minimal complexity. This is a characteristic that WAGO Lighting Management also shares. In addition, the system offers a multitude of interfaces and connections, both to industrial and building technology systems, and to the higher-level IT systems, like manufacturing control systems. The company from Minden has succeeded in uniting the various demands on lighting systems into a uniform approach, and thus has created a comprehensive, total solution for modern lighting concepts.

The HTML5 Web user interface allows clear and convenient operation of the entire lighting system.

GET TO KNOW ...
MARTIN HARDENFELS

What drives us at WAGO, and what does our work look like – we introduce one of our colleagues from Building Technology in each issue of WAGO DIRECTBUILDING. This time: Martin Hardenfels, Head of Business Development, Building.

Mr Hardenfels, what exactly do you do at WAGO?

»I and my team in Sales, Germany, are responsible for the solutions business in building technology systems. We provide guidance to contact persons relating to specific building technology projects, where we supervise all phases of new construction and renovation, from design to implementation.«

How long have you worked in this field?

»I've worked in electrical engineering for 36 years, with more than 25 years of experience in control technology and building automation systems.«

What fascinates you about building technology?

»The variety of projects. Buildings look so similar from the outside, but they are all different from each other. This makes every project very individualized. In addition, the technology and the demands are always developing, so it's never boring.«

What do you find particularly fun about your work?

»The way projects develop. It starts with a very simple idea, which becomes a design, and then a reality. Recently, I've been able to supervise many construction projects and renovations, and I got to watch large buildings being created. And I could contribute to this work, so that the projects were successfully implemented. This is a special part of my work.«

What work topic is particularly important to you?

»A lot of energy is used to operate buildings. So for me, an important aspect is to configure solutions that use no more energy that is required for optimal operations. We can contribute good solutions, so that only as much CO_2 is released as is absolutely necessary. I hope that I can contribute to a time when building operations are CO_2 neutral and also energy neutral.«

What are you looking forward to in 2021?

»We are anticipating a new system in 2021, that we recently developed for one of our customers. We get to introduce it to our other customers this year, and thus offer an important expansion in efficient building operations and also add to our portfolio in building automation.«

Thank you!

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