WAGO NEWS

Special Edition
on the Factory of the Future

DIGITALIZATION

NEW TECHNOLOGIES FOR THE SMART FACTORY

Networking, analytics, increased productivity, and new business models are challenges that manufacturers must address. Fortunately, WAGO offers a broad array of innovative solutions for these enterprises.

WAGO's new solutions for digital transformation in mechanical engineering and the processing industry are generating interest. "The trend toward digitalization poses numerous challenges for manufacturers that must be resolved in the near future," stresses Christian Sallach, Chief Digital Officer at WAGO. "We are offering crucial tools for this – from new, open source-automation solutions to cloud connectivity, and from solutions for modular devices and systems up to Plant Asset Management solutions."

Interruption-free Communication: This includes the new WAGO I/O System Advanced. It is prepared for the communication standard of the future, "Time-Sensitive Networking" (TSN), which has the advantage of being used at all levels of an automation system – from the sensor to the cloud. TSN enables continuous communication without gateways or interruptions. The head of the system is the WAGO PFC200 ADV controller, whose open-source structure provides users with easy entry into the new system, as well as cloud connectivity. This can be established directly from the PLC program using the MQTT protocol, meaning users can continue relying on their preferred software tools.

Optimize Maintenance with Artificial Intelligence: Monitoring the operating resources in a system via Plant Asset Management is another vital task smart factory task. "There is an increased need for optimized maintenance, which can be scheduled into the production cycle and does not depend on the training level of personnel, particularly for parts subject to wear and tear, such as pumps, motors and heat exchangers," explains Ulrich Hempen, Head of Market Management Industry & Process at WAGO. This requirement can be met by combining the Plant Asset Management System with a self-learning and self-optimizing AI application. WAGO offers products and solutions for implementing communication nodes in the Plant Asset Management System. The solutions are based on an open-source Linux® platform with freely selectable interfaces, like OPC UA, and the most current cybersecurity security technologies. With WAGO's approach, the AI applications can run either in a decentralized way in the controllers or the cloud.

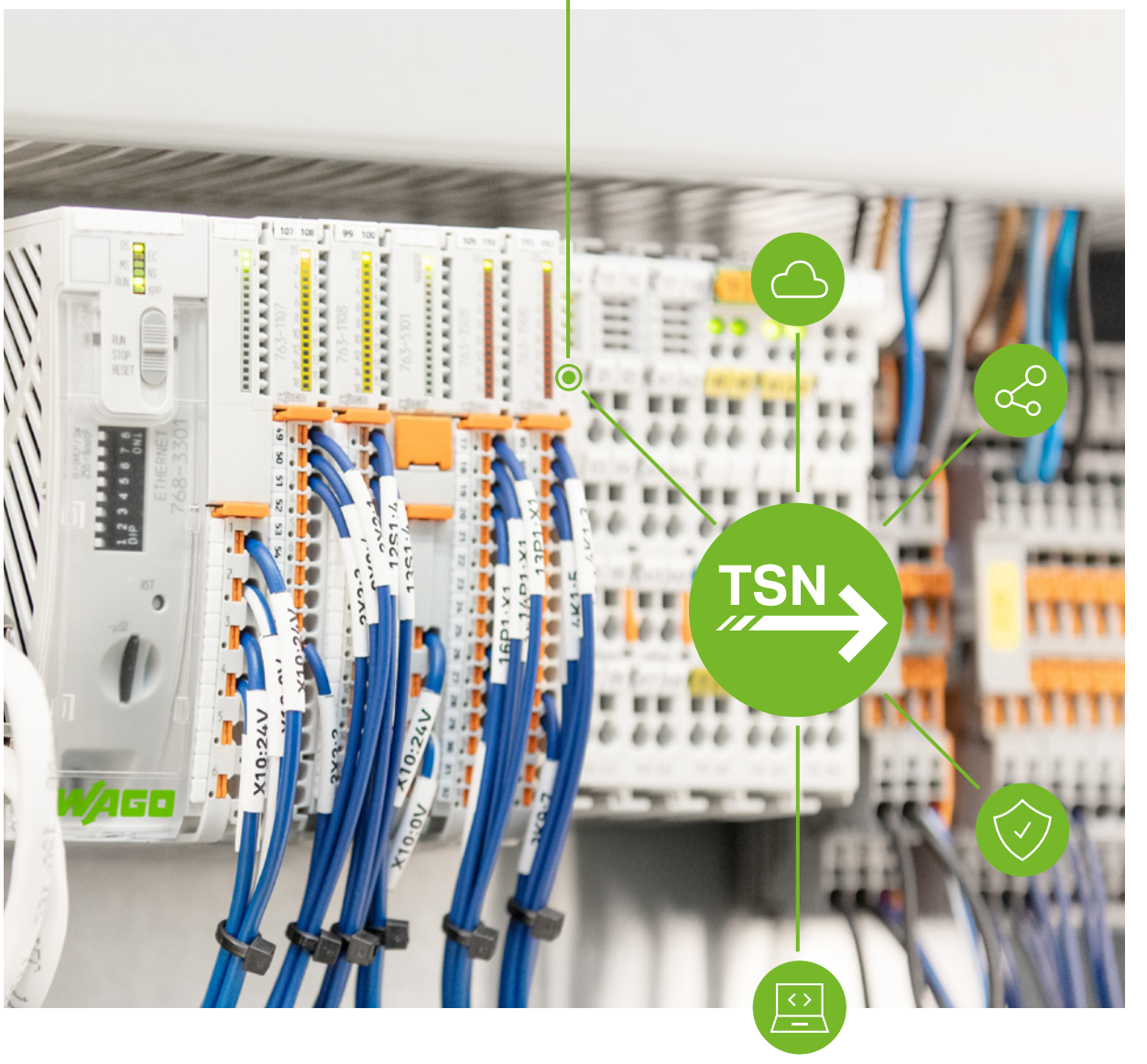
Adapt Modular Devices Faster: WAGO additionally provides the variable peripheral configuration function, a solution for the engineering design and configuration of modular devices. By using this function, software can be programmed once and then implemented on different variants of a device with little effort – no additional programming is required. The WAGO PROFINET IO Fieldbus Coupler is at the core of the solution. When combined with PROFIsafe safety technology, it ensures that individual function blocks can be easily, quickly, and safely exchanged, optimized, and re-used. This solution demonstrates WAGO's strategy: the company grapples intensively with new demands and develops specific approaches, based on current technologies, that provide users with measurable added value.

The Future of Industrial Production Lines

High availability coupled with the efficient use of personnel and energy, along with the flexibility to quickly adapt to changing production demands, these are among the challenges currently impacting industrial production systems. WAGO, as a one-stop-shop for control cabinets and decentralized electrical components, can dramatically boost a company's ability to meet these demands. With the WAGO I/O System Advanced and the I/O System Field, WAGO is debuting two new automation solutions that are ready for "Time-Sensitive Networking" (TSN), the communication standard of the future. In this magazine, we invite you to read about the unparalleled advantages that TSN can bring to equipment and systems – especially when combined with OPC UA. You can also learn how to substantially increase the availability of your production with the aid of "Plant Asset Management." Production lines must be almost completely digitally recorded to meet these challenges. We offer you an excellent foundation for this with highly scalable I/O components and parallel multi-communication solutions that combine a decentralized controller with a Linux® operating system and high-performance cybersecurity. In addition, we can show you many more innovations in the field of modular software, cloud connectivity, I/O diversity, and data analysis. Are you ready to make your production fit for the future? Read on about how you can succeed with WAGO. We hope you find the following articles insightful!

Ulrich Hempen
Head of International Key Accounts
and Industry Management

WAGO I/O SYSTEM ADVANCED



MADE FOR TSN

The new WAGO I/O System Advanced offers proven technology with highest performance and is ready for modern mechanical engineering applications.

With the WAGO I/O System Advanced, WAGO has developed the leading solution for future-proof automation in mechanical engineering. As a gateway to WAGO's universal I/O System 750, the new IP20 I/O System Advanced combines the proven benefits and functionality of the 750 Series with a fresh and ergonomic design, error-preventing mechanics, and outstanding performance. The results: Short reaction times, high signal transmission synchronicity and the ability to use fast ETHERNET fieldbuses (e.g., PROFINET, EtherCAT®, Ethernet/IP), as well as TSN in the future – all of which make the I/O System Advanced the new benchmark for high-end industrial automation systems. With the debut of I/O System Advanced, WAGO is also relaunching the PFC200 Controller that pairs the new system's exterior design with industry-proven PFC technology. It forms a bridge to various IT technologies, via the Linux® operating system and Docker virtualization, as well as to OT technologies thanks to the IEC 61131 runtime system. Sending data to the cloud and leveraging all the benefits of cloud computing are straightforward, thanks to a large number of interfaces and the highest cybersecurity standards. The customer decides whether to use WAGO Cloud or an external solution. Users can benefit from these advantages without investing a significant amount of time or money in this transition. The I/O System Advanced also supports well-known PFC functionalities and CODESYS-based programming via e!COCKPIT. The software engineering tool will continue providing its well-established configurators and other functions. Alternatively, the PFC can also be programmed using an open-source approach and its software can be supplemented or replaced thanks to the Linux® OS. The Docker interface offers a simple solution for linking to open-source software. Independently executable software components can also be integrated into the PFC200 Advanced via containers. In addition, this gateway to the universal I/O System 750 allows all 500+ modules to be directly connected, maximizing the return on investment.

More information about about the WAGO I/O System Advanced

3 QUESTIONS FOR JÜRGEN GORKA WAGO PRODUCT MANAGER

»The new, fast IP20 I/O System provides a glimpse of upcoming trends like OPC UA and TSN.«

WAGO: What's in a name that's as promising as "WAGO I/O System Advanced?"

Jürgen Gorka: The new system is a logical advancement of our I/O 750 family. The structure, which includes a head station and linked I/O modules, is very similar in the two systems. However, the gateway assumes a central role in seamlessly combining the two product families. And thanks to this integration, it's possible to start using the New Advanced System while benefiting from access to the broad and well-established Series 750.

WAGO: Does this mean that the new system is not a replacement for the Series 750?

Jürgen Gorka: No, absolutely not. The 750 System will remain on the market and will continue to benefit from continuous development. After all, it is already the system of choice within many industrial sectors. Mechanical engineers will be able to easily augment existing I/O applications with components from the new system, allowing their firms to react swiftly to changing market demands.

WAGO: Which demands?

Jürgen Gorka: In machine and system design, these are primarily demands for increased performance. This increase can only be handled over the long term by using new system technology. This also includes support for all current (and future) communication standards, like TSN and its accompanying protocols. WAGO has already taken this step, making the new I/O System Advanced a keystone of an automation system that will that will offer long-term sustainability.

DIGITALIZATION

THE START IS CLEAR FOR TSN-BASED INDUSTRIAL COMMUNICATION

WAGO's open-source automation platform is generating interest. With the new I/O System Advanced and communication based on "Time-Sensitive Networking" (TSN), the future communication standard, the company now offers crucial tools for digital transformation within mechanical engineering and the processing industry.

The digital transformation poses challenges for users and manufacturers in the production industry: networking, analytics, increasing productivity and new business models are topics that companies must address. Flexibility is also in demand: product cycles are becoming shorter because customer demands are changing at a faster pace. "Companies need to be supported in their applications. This is best achieved through a completely open automation system that can quickly adapt to new demands," according to Christian Sallach, Chief Digital Officer at WAGO Kontakttechnik GmbH & Co. KG. In contrast, proprietary, manufacturer-specific systems cannot handle these new challenges.

The company from Minden was the first to employ the Linux® operating system. This allowed WAGO to quickly address needs like cloud connectivity and security. In addition, the large Linux® community has developed many additional solutions that can be easily used in WAGO controllers or in automation control solutions. These include Docker technology, which simplifies the preparation of applications. However, even the best automation solution has little value if it lacks reliable connection technology, as was pointed out by the Digital Officer, "What good is a networking strategy with real-time processors if the contact to the cable is missing during operation?" Fortunately, WAGO provides both. Its maintenance-free modules are based on the spring connection technology that the company created and has continually refined since the 1950s. And its automation technologies are crucial to meeting the challenges placed on modern machine and system design – from modular software up to fieldbus-independent I/O systems. "We combine the real-world demands with the requirements placed on virtual processes," explains Sallach.

Communication without Gateways or Interruptions: This is underscored by the development of the all-new WAGO I/O System Advanced. It was developed specifically for mechanical engineering and the processing industry. Due to extremely short latency of the system and the high synchronicity between input and output signals, which itself is linked to latency, a variety of fast ETHERNET fieldbuses can be used – an essential requirement for effective industrial communication. To ensure this in the future, the I/O System Advanced is prepared for the new communication standard, Time-Sensitive Networking (TSN). "TSN has what it takes, particularly when combined with the OPC UA protocol, to trigger a real paradigm shift within industrial communication," explains WAGO Innovation Leader, Dr. Thomas Holm. This is because one single technology is now available that can be used at every level in an automation system – from sensors to the cloud. Holm envisions a major advantage in this expansion of the ETHERNET standard, as it provides continuous communication without gateways or interruptions.

Open Automation Technology as a Bridge to Information Technology: WAGO is also introducing a suitable controller, the PFC200 ADV, along with the I/O System Advanced. It functions as the head of the system, and provides users with easy entry into the new system, thanks to its open-source design. Along with the open-source Linux® operating system and Docker technology, the controller forms a bridge between hard real-time applications in the microsecond range and numerous IT technologies. Cloud connectivity is also easily implemented with the WAGO controller. This can be established directly from the PLC program using the MQTT protocol, meaning that users can continue employing their preferred software tools. The cloud solutions and services are supported by various providers, for example, Amazon Web Services, IBM or Microsoft Azure. This can be used in combination with proven security mechanisms, like firewalls and Virtual Private Networks (VPNs) that enable encrypted transmission of data via the Internet, to secure the final gap up to the controller. The new WAGO I/O System has already garnered extensive interest within the industrial sector, according to Holm. Systems would still be needed that support the latest communication technologies and transmit data within industrial production in real-time and a manufacturer-independent manner. The trend toward decentralized intelligence is also increasing. "Fortunately, this matches our product portfolio: many small, open systems can exchange information with one another, while larger computing tasks migrate to the cloud. Monolithic systems, and those that are hard to adapt, will eventually give way."

»Companies must be supported in their various applications. "This can be best accomplished by using completely open automation systems, which can quickly adjust to new requirements.«

Christian Sallach
Chief Marketing Officer & Chief Digital Officer

»TSN has what it takes, particularly when combined with the OPC UA protocol, to trigger a real paradigm shift within industrial communication.«

Dr. Thomas Holm
Head of Innovation & Technology

ASSET MANAGEMENT

EASILY RECORD SYSTEMS DIGITALLY

If an autonomous, fully automated production system is the goal, then all components have to be digitized. WAGO offers the optimal approach with its solutions for a Plant Asset Management System.

Production systems should become more flexible in production planning and function in a fully automated manner while maximizing quality and error prevention. They should be accessible through the communication system down to the smallest component and ideally should predict their own maintenance. And they should do all of this without human intervention while maximizing security against dangerous IT attacks. So, how can this all be achieved?

Decentralizing and Adding Sensors: In order to control processes, you must be able to measure them. There is an old saying in measurement and control technology, "In the beginning was measurement." If entire production systems are supposed to be coordinated, this must apply not only to the control circuit and/or control loop but also to the entire system environment. Because only if the digital recording of a manufacturing system is virtually complete, by including all of the peripherals necessary for production, can a system be managed digitally or independently. This also means that those elements and processes, which are not part of the automation system, have to be integrated. So, what does the optimal data recording system even look like? Projects have demonstrated that it's less expensive to locate the additional sensors needed for seamless data recording in decentralized communication nodes than it is to integrate them into existing control systems or PLCs. This is because integration at the control system level requires a higher software engineering cost per sensor. In addition, system parts are often provided as modules from the manufacturers, and retrofitting these may void the warranty.

Sealing Automation Off for Security Against Hackers: Separating the automation and asset management systems offers another decisive advantage: the Plant Asset Management System often requires decentralized access via the web architecture. And this access often serves as a gateway for IT attacks. If, in contrast, an independent data stream is established by the automation system, then hackers have no opportunity to use the Plant Asset Management System as a backdoor into the automation system.

Gaining More Freedom with the Open-Source Linux® Operating System: WAGO offers products and solutions for implementing communication nodes in the Plant Asset Management System. WAGO automation solutions are based on an open-source Linux® platform with freely selectable interfaces, like OPC UA, and the most up-to-date cybersecurity technologies. Additional benefits include an open programming environment or the manufacturer-independent PLC CODESYS software, more than 500 adaptable I/O modules in 12-millimeter housings and cloud interfaces. All of these products and solutions are available in the smallest footprint yet have all the relevant approvals for systems in manufacturing technology, the processing industry, and the power and marine sectors.

Continuous Monitoring of All Field Devices: Integrating HART communication and DTM interpretation (DTM = Device Type Manager), which is used for the digital description of HART field devices, offers other advantages. These benefits include the possibility of reading and completely representing each HART field device, including its specific parameters. Several successful customer integrations of WAGO's Plant Asset Management System confirm high industry acceptance of this solution. With the increasing need for digitalization of production systems, a new market is being created, that extends far beyond the unidirectional monitoring of components.

Optimizing Maintenance through Artificial Intelligence: While there is an increased need for optimized maintenance, it can be conveniently scheduled into production. Best of all, this maintenance doesn't depend on the training level of personnel, particularly for parts subject to wear and tear, such as pumps, motors and heat exchangers. This requirement can be met by combining the Plant Asset Management System with a self-learning and self-optimizing AI application. In the WAGO approach, these AI applications can run either in a decentralized way in the controllers or in the cloud.

»All components in a production system must be completely recorded digitally; this is the only path to reach autonomous, fully automated production.«

Ulrich Hempen
Head of Market Management Industry & Process

PERFECT FOUNDATION FOR ASSET MANAGEMENT: **THE WAGO IOT BOX**

Production systems must be linked to the IT infrastructure; however, many machines and systems are intrinsically unable to transmit data. This is precisely the point where the WAGO IoT Box comes into play. The complete, ready-made solution can be retroactively docked to existing machines at a minimal cost and with no need to interrupt the production process. Thanks to open automation technology, the IoT Box can be universally deployed and is ideal for recording currents, voltages, production cycles, and system statuses, among other variables. The connection to the IT infrastructure can be established via ETHERNET or WLAN, or a mobile communication network can be used for location-independent connection. Necessary security is ensured through the separation of the IT and OT networks, as well as additional measures, like TLS encryption, and VPN tunneling, which are standard features in the PFC controllers. The IoT Box is based on the WAGO-I/O-SYSTEM 750, so it offers a large variety of interfaces. More than 500 I/O modules are available, allowing you to customize the IoT Box to your production environments. The recorded signals can be flexibly processed and forwarded, for example, to cloud systems or to an existing control system.

For more information and a download of the WAGO IoT Box brochure

VARIABLE PERIPHERAL CONFIGURATION

ADAPT MODULAR DEVICES FASTER

The PROFINET IO Fieldbus Coupler from WAGO can save a lot of time during design engineering and the configuration of your devices. By using the variable peripheral configuration function, an innovative way to select options, software can be programmed once and then implemented on different variants with minimal effort.

Customized products, shorter product cycles, greater product diversity – all demand greater manufacturing flexibility at a lower cost. Modular devices provide the solution because their individual function blocks can be exchanged, optimized and reused. Combining the PROFINET IO Fieldbus Coupler from WAGO with PROFIsafe safety technology makes everything quick, easy and safe. Variable peripheral configuration of the fieldbus nodes provides an innovative way of setting options. Using it, mechanical engineers and operators can create the ideal system configuration for a device just once; they can then easily configure any variants of that device by using the PLC application – at any time, without requiring a software engineering system.

Easily Activate Machine Elements Using the PLC Application: Conventional solutions for providing flexibility within systems require extensive adaptation of the software systems to the changes. This primarily affects hardware configurations. With variable peripheral configuration, the customer or technician can easily and immediately enable and directly commission planned device elements by adapting the variable values from the PLC program. The PLC program automatically checks the validity of the variable values so that the changes can be correctly applied. In other words, devices can be assembled in a highly flexible way to suit specific orders or jobs, without reprogramming or adapting the hardware configuration – an essential requirement for Industry 4.0.

Latitude for Many Customized Device Variants: Another advantage of variable peripheral configuration is that there is no longer a need to maintain older software versions. Only the values of the variables change when using the variable peripheral configuration – the source code remains identical. Mistakes can be avoided and costs can be saved because different versions of the software are no longer necessary. A real-world example shows how easy it is to implement the WAGO solution. On average, a mechanical systems designer does not require more than ten different versions of an I/O module – including variations of digital and analog inputs and outputs, encoders, the IO-Link communication system and the PROFIsafe safety technology – to address various functions. In the first step of system and hardware configuration, the programmer implements a maximum node structure that contains all existing module versions. Since the PROFINET IO Fieldbus Coupler from WAGO supports a maximum of 250 I/O modules, it can accommodate enough modules of each variant in its node structure – an example: 5 times 8DI, 5 times 8DO, 3 times 4-channel IO-Link master, 3 times 4FDI/4FDO. All other node structures can now be derived as a subset of this largest basic configuration, which then enables the configuration of custom module versions. An added level of security is also provided because a password-protected area of the visualization can be used for the configurations.

An Argument for this Open and Flexible Automation Solution: PLC programmers and mechanical engineers can program their software once, and use the variable peripheral configuration function to implement different versions of the unit. Device manufacturers can also take advantage of this configuration flexibility, as they have traditionally had to use different controllers from different manufacturers for different markets. Fortunately, this is no longer the case because the variable peripheral configuration is neither manufacturer or firmware dependent.

OUR EXPERTS

Jürgen Pfeifer
Industry Manager Factory Automation

Jürgen Prütting
Safety System Specialist

MODULE TYPE PACKAGE

PAVING THE WAY FOR MODULAR PRODUCTION

WAGO LAUNCHES THE “MODULE TYPE PACKAGE” (MTP)

To meet growing demands for modular systems, WAGO is adding the “Module Type Package” (MTP) to its range of automation solutions. MTP works as a standardized interface and functional map of entire system modules in compliance with VDI/VDE/NAMUR 2658, creating the foundation for automating versatile production systems. MTP can be used with WAGO Controllers (PFC200/PFC200 XTR) and WAGO Touch Panels (600). The WAGO ***e!****COCKPIT* Engineering Software solution provides both an add-on and a library with many preparatory functions for module engineering. Once the module has been created, the MTP is automatically generated with a single click and can be read into a wide variety of process control systems. In manufacturing and process engineering, modular automation has quickly become a dominant trend. In fact, when systems consist of several stand-alone modules, operations become much more flexible and faster than they were with conventional systems designed from individual parts.

WAGO I/O SYSTEM FIELD

DECENTRALIZED I/OS

NEW WAGO I/O SYSTEM FIELD IN IP67

The new WAGO I/O System Field with IP67 protection is the perfect solution for cabinet-free automation. It combines speed with ETHERNET-based fieldbuses (e.g., PROFINET), technologies such as OPC UA or Webserver and soon, MQTT as a communication protocol. Additionally, the system is ready for TSN, which is crucial for end-to-end, flexible, powerful and secure networking. The I/O System Field supports all major ETHERNET, fieldbus and Industrial IoT standards. For superior flexibility, the IP67 system is available in a host of configurations for adapting perfectly to a particular application or machine. The IO-Link communication standard enables seamless data flow from the control level to the sensor level. This considerably simplifies configuration and cabling. And the results are entirely new possibilities for diagnostics, parameterization and device identification. The system is powered via an L-coded high-current M12 connector, providing up to 16 A, allowing more power to be connected in less space. Innovative load management ensures that the system’s power is fully utilized via supply current management. Both output currents and the overload limits of supply currents can be monitored and specified channel by channel. As a result, errors can be detected faster and more clearly differentiated in the event of faults. Errors are also more easily predicted, which supports industry trends such as predictive maintenance.

WAGO Power Loss Cost Calculator

How much can the WAGO Pro 2 Power Supply save you? Find out now. The WAGO power loss cost calculator is available online at: **wago.com/vlkr**

PRO 2 POWER SUPPLY

MINDEN'S EFFICIENCY CHAMPION

With the Pro 2 Power Supply, WAGO offers a new solution that satisfies all the requirements of modern mechanical engineering. This article highlights the features that distinguish this innovation.

Efficient and economical – these are the characteristics of modern power supplies. Machine and system design has also seen a rise in demands for more efficient power supplies. So, what does a power supply unit need in order to maximize efficiency? And what is the connection between efficiency and size? WAGO has created a new solution with the Pro 2 Power Supply, which satisfies current and future market demands for efficiency and environmental friendliness.

Efficiency is a Core Element for High-End Power Supplies: The variety of power supplies on the market reflects the broad scope of applications. Competition is good for users because it enables them to select the power supply that best suits their application. Efficiency, and the consequently high output levels, can be decisive, competitive advantages. Add to this a reduced level of power losses and lower temperature increases in the control cabinet, and your result is a reduction in system costs and an extended service life for the power supply. However, higher efficiencies reduce more than just the "total costs of ownership"; ecological aspects, like reduced CO_2 emissions, as well as reduced heat losses in the control cabinet, also play a role. The new WAGO Pro 2 Power Supply can show you precisely how this works. "The savings potential hidden behind the use of modern power supplies is enormous, and often underestimated. This becomes immediately clear during initial conversations with our customers. The cost savings from reduced power loses in Euros, and the CO_2 reductions obtained by using the Pro 2 are significantly higher than customers first assume," says Florian Kothe, Business Development Manager Interface Electronics at WAGO.

Design as a Factor for Success: User demands focused on pricing, efficiency, voltage ranges, adjustability and size vary wildly. They even occasionally contradict themselves, which leads to challenges in developing power supplies. Important decisions related to efficiency and costs have to be made as early as the selection of the modules' topology. "Soft" switching resonant converters, in which losses are decreased by switching at the zero-crossing point, are currently among the most efficient and economical topologies. Power losses can be further reduced by combining this with active synchronous rectification and an active power factor correction. The development of a single transmitter, adapted to each power supply unit, ensures high efficiency, reliability, and a smaller overall size. Component selection is also performed with a focus on efficiency and cost optimization. Altogether, these make the WAGO Pro 2 Power Supply an affordable efficiency champion.

Long Service Life, Guaranteed: Using low-loss switching technology ensures that the components are exposed to minimal thermal stresses. This significantly increases their expected life spans, especially those of heat-sensitive capacitors or semiconductors. The result is very good values when calculating the mean time between failures (MTBF) or the lifetime of the capacitor (Lifetime Cap). Applications for 24/7 continuous operation, such as those in buildings, could benefit from a reliable power supply. This is particularly relevant here because devices installed in system distribution boxes within suspended ceilings can be difficult to access. Other examples for applications requiring 24/7 operation include the production of chemical products, use in toll bridges, or local transformer stations. "Long life spans, maximum efficiency and minimum installation size lead to maximum reductions in operating costs. These are all direct benefits for our customers and also for system operators – from the very first day of use," says Klaus Böhmer, Manager, Interface Electronics Business Unit at WAGO.

OUR **EXPERTS**

Klaus Böhmer
Head of the Business Unit Interface Electronics

»The cost savings from reduced power losses in Euros, and the CO_2 reductions obtained by using the Pro 2 are significantly higher than customers first assume.«

Florian Kothe
Business Development Manager
Interface Electronics

WAGO CLOUD

DATA ANALYSIS WITHOUT IT SKILLS

WAGO Cloud is the universal IoT solution for machines, systems and buildings.

It doesn't matter if it's in industry, in buildings or in retail – worldwide access to data has become essential for any company. WAGO Cloud allows you to centrally collect and analyze data from different machines, systems and buildings. Furthermore, you can easily manage and monitor all WAGO controllers, including your data and applications, on a PC, in a conference room or on a tablet while traveling. With simple, user-friendly functions, WAGO Cloud was developed so that people can use it without needing extensive IT experience. Using WAGO Cloud is highly intuitive due to its app structure. Many standard functions, such as visualization, remote maintenance and firmware updating, are already set up. WAGO Cloud is ready to use after just a few mouse clicks. It is based on the established Microsoft Azure cloud platform. Microsoft Azure is highly scalable in terms of computing power, data storage, transactions, availability and security standards – it is a future-proof solution.

WAGO ANALYTICS

MAXIMUM OPTIMIZATION OF MACHINES AND SYSTEMS

When it comes to optimizing your own machines or systems, the challenge is to both increase and quantify process knowledge and then to integrate this into the process. WAGO Analytics supports users in data acquisition and analysis, and creates intuitive visualizations of the dependencies in their systems. The discovered connections are then integrated into the process to help guide efforts to maximize every possibility for optimization. WAGO Analytics is implemented in three steps. The first step involves recording current machine and sensor data. This may require various hardware products to establish the corresponding database. WAGO offers a wide product portfolio with different components, which support all common interfaces and most industrial protocols. In addition to the WAGO I/O System 750, the PFC family of controllers and modules for current measurement, WAGO IoT Boxes are also available for end-users. The boxes enable measurement and sensor data acquisition (see page 4).

In the second step, WAGO Cloud offers users the option of aggregating data from various machines and systems into a central location. The machine and system data that has been collected can then be used both centrally or decentrally for analysis: the third step in the process. The central analysis can only be performed in a cloud environment. Unlike the decentralized approach, data in the cloud can be accessed at any time from anywhere in the world. The decentralized solution offers the advantage that data can be analyzed directly in the system. Users can employ WAGO's Docker technology, for example, to run analysis applications on the controller. WAGO's PFC200 Series Controllers are already Docker-ready, meaning that modern software and numerous other applications can be run easily and quickly on the PFC200.

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