# WAGO NEWS

Special Issue
**Focus: New Automation Technologies**





INDUSTRIAL AUTOMATION

# NEW TECHNO-LOGIES FOR THE DIGITAL FUTURE

**Networking and analytics are challenges manufacturing companies must face. WAGO offers the best solutions and forward-looking technologies for upgrading or new construction of machines, systems and entire production facilities for modern mechanical engineering.**

WAGO is moving to the fore with new solutions for the digital transformation in mechanical engineering and the manufacturing industry. "The trend toward digitization poses numerous challenges that manufacturers will have to meet in the near future," says Christian Sallach, Chief Digital Officer at WAGO. "We offer the crucial tools for this." These include new, open automation solutions, cloud connectivity, edge computing and the right communication solutions for sensor-to-cloud applications.

**A successful demonstration:** In developing OPC UA over TSN, WAGO's experts have now met an important technological challenge: With a technology demo, they show how the deterministic real-time behavior of OPC UA PubSub can be combined with TSN. This is a big step for Thomas Holm, Head of Innovation, since the technology can be used on all levels of the automation system, from the sensor to the cloud. "This makes it possible to achieve continuous communication without gateways or discontinuities in the technology."

**Made for TSN:** To exploit this advantage, WAGO is preparing its new systems to use the upcoming communication standard. "Made for TSN" is the philosophy of the I/O System Advanced, for example, which WAGO is currently developing. Short reaction times, high signal transmission synchronicity, use of fast fieldbuses – and, in the future, of TSN – these advantages make the I/O System Advanced, as the next logical step in expanding the WAGO I/O System 750, the new benchmark for high-end industrial automation systems.

The IP67 I/O System Field for cabinet-free automation already offers this connectivity spectrum, and in the future it will also offer the option of using TSN. In combination with IO-Link, the Field system can play the role of the I/O distributor for acquisition and distribution of data and ensure a seamless data flow from the cloud, through the controller level, to the sensor and actuator level.

**Data mining made easy:** Where real-time data is involved, data processing is becoming more and more important. "More and more computing power is needed, and this places corresponding demands on databases directly in the field," explains WAGO systems specialist Jens Sparmann. WAGO offers solutions in the form of the Edge Controller and Edge Computer. The devices process applications right on the machine, taking the pressure off the controllers so they can focus on low latency and a high level of determinism.

These solutions don't exclude data use in the cloud: WAGO recognized the great significance of cloud communication early on and integrated the MQTT protocol, which makes it very easy to connect to the WAGO Cloud or other cloud platforms with the Edge Controller as well.

## Ready for Your Digital Future

We at WAGO are doing everything we can to allow you to meet your modern mechanical engineering requirements quickly and easily. Take the opportunity to get to know some of our newest automation solutions and forward-looking technologies. In this issue, we focus in particular on "Time-Sensitive Networking" (TSN). We are convinced that TSN in combination with OPC UA will be the key technology for powerful, secure end-to-end networking of machines and systems. That's why we are also a driving force within the OPC Foundation for the development of the upcoming communication standard. For instance, you can read about our successful demonstration of combining the real-time behavior of OPC UA PubSub with TSN. In parallel, we are also developing TSN-ready automation solutions, such as the WAGO I/O System Advanced. In this way, we offer you the ideal basis for finding future-proof solutions to the challenges of industrial production. We will also show you additional innovations in cloud connectivity, edge computing and data analysis. Do you want to prepare yourself for the digital future? Read on to learn how you can succeed with WAGO. We hope you find the following articles insightful and interesting!

**Marco Henkel**
Head of *AUTOMATION* Business Unit

OPC UA PUBSUB OVER TSN

# A PARADIGM SHIFT IN PRODUCTION

**The “Field Level Communication” Initiative of the OPC Foundation aims to establish OPC UA with Time-Sensitive Networking as a real-time-capable communication standard. WAGO successfully demonstrates how TSN can be combined with OPC UA PubSub.**

Implementing modern industrial production concepts requires comprehensive availability of data and information. Therefore, end-to-end communication is a basic requirement for efficient, modern production systems. This in turn requires openness and manufacturer-independence.

OPC UA is one of the most important communication standards for automation technology. Besides pure data transfer, it also includes semantic annotation, which is indispensable for information modeling. The devices describe their own structure and functions, as it were – and the communication then not only transfers data, but also supplies its meaning.

**Determinism All the Way to the Local Bus Level:** Deterministic real-time behavior is another important requirement in industrial automation. Especially in time-critical processes on the field level, it is necessary to indicate the maximum latency for the guaranteed conclusion of the communication. The combination of OPC UA and TSN yields this kind of real-time-capable communication. The great advantage of TSN is that it can be used on all levels of an automation system, from the sensor to the cloud. This makes continuous communication achievable without gateways or discontinuities in the technology. Therefore, OPC UA over TSN has the potential to supersede proprietary fieldbus systems and become the uniform IIoT communication standard.

The specialists at WAGO have now met this important technological challenge and demonstrate how the deterministic real-time behavior of OPC UA PubSub can be combined with TSN. OPC UA PubSub communication scenarios vary greatly. The Publish/Subscribe mechanism allows one-to-many communication in which multiple subscribers can receive data from one publisher simultaneously. Especially at the interface to the field level, many information recipients accessing one subscriber is to be expected. Thus the PubSub extension is an important precondition for deterministic real-time behavior of OPC UA.

**A Repository of Know-How in the OPC Foundation:** The specialists use the WAGO technology demo to show how various controllers communicate in real time with OPC UA PubSub over TSN. The devices can be configured in the network to ensure determinism all the way to the local bus level. It is also possible to demonstrate how to transfer time-critical process data over OPC UA PubSub, how to reserve TSN bandwidth for this time-critical data, and how to ensure that the devices receive the data within the specified timeframe and that the local bus used by WAGO is able to address the modules in synchrony with the network environment. The goal is to constantly validate the state of the discussions of the FLC (Field Level Communication) Initiative of the OPC Foundation and incorporate the results.

The FLC Initiative originated in the so-called Shaper Group, which has been crucial in overseeing the development of TSN. WAGO has been a member of this group since the beginning of 2018 and also has a seat on the current Steering Committee of the OPC Foundation. Through its involvement in the FLC Initiative, WAGO is pursuing a vision of real-time-capable, manufacturer-independent, platform-independent communication among different devices. The point of the valuable technology demo is to build up know-how about TSN and ensure acceptance of the new communication technology.

## OUR EXPERTS

**»The goal is to constantly validate the state of the discussions of the FLC Initiative of the OPC Foundation and incorporate the results.«**

**Dr. Thomas Holm**
Head of Controller & HMI Product Line,
Head of Innovation & Technology

OPEN AUTOMATION

# GREEN LIGHT FOR TSN-BASED INDUSTRIAL COMMUNICATION

**WAGO's open-source automation platform is generating interest. With the I/O System Advanced, which is currently in development, and communication based on the Time-Sensitive Networking (TSN) communication standard, the company will in future offer crucial tools for the digital transformation in mechanical engineering and the manufacturing 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 need to face. Flexibility is also in demand: Product cycles are becoming shorter because customer demands are changing more and more quickly. "Companies need support for their applications. This is best achieved through a completely open automation system that can quickly adapt to new demands," says Christian Sallach, Chief Digital Officer at WAGO Kontakttechnik GmbH & Co. KG. In contrast, proprietary, manufacturer-specific systems cannot handle these new challenges.

Therefore, this company from Minden was one of the first vendors to focus on 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, the control solution for automation. These include Docker® technology, which simplifies the provision of applications. However, even the best automation solution has little value if it lacks reliable connection technology, as the Digital Officer emphasizes: "What good is a networking strategy with real-time processors if there's no contact with the cable during operation?" Fortunately, WAGO provides both. Its maintenance-free modules are based on the established spring connection technology that the company created in the 1950s. And its automation technologies are crucial to meeting the challenges placed on modern machine and system design – from modular software, to fieldbus-independent I/O systems. "We reconcile the real-world demands with the requirements on virtual processes," explains Sallach.

**Communication without gateways or discontinuities:** The manufacturer underscores this with, other things, the WAGO I/O System Advanced, which is being developed specifically for mechanical engineering and the manufacturing industry. Due to extremely low latency of the system and the associated high level of synchronicity between input and output signals, a variety of fast fieldbuses can be used – an essential requirement for effective industrial communication. To make sure this remains possible 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's Head of Innovation, Dr. Thomas Holm, because it provides a single technology that can be used at every level in an automation system – from the sensor to the cloud. Holm sees a major advantage in this expansion of the ETHERNET standard, as it provides continuous communication without gateways or discontinuities.

**Open automation technology as a bridge to information technology:** WAGO will also introduce a suitable controller, the PFC200 ADV, along with the I/O System Advanced. It is the brain of the system and makes it easy for users to get started with 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 the various IT technologies. Cloud connectivity is also easy with the WAGO controller – it can be implemented directly from the PLC program using the MQTT protocol, so users can continue to use their preferred software tools. The cloud solutions and services are supported by various providers, for example, Amazon Web Services, IBM and Microsoft Azure. In combination with proven security mechanisms, like firewalls and Virtual Private Networks (VPNs) that enable encrypted transmission of data via the Internet, users can also secure the "last yard" to the controller. The WAGO I/O System Advanced has already garnered extensive interest within the industrial sector, according to Holm. What is needed are systems 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 that are hard to adapt will gradually become redundant."

**»Companies need support for their various applications. This is 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 Controller & HMI Product Line,
Head of Innovation & Technology

WAGO I/O SYSTEM ADVANCED

# MADE FOR TSN

## PROVEN TECHNOLOGY WITH TOP PERFORMANCE: WAGO IS DEVELOPING THE I/O SYSTEM ADVANCED FOR MODERN MECHANICAL ENGINEERING

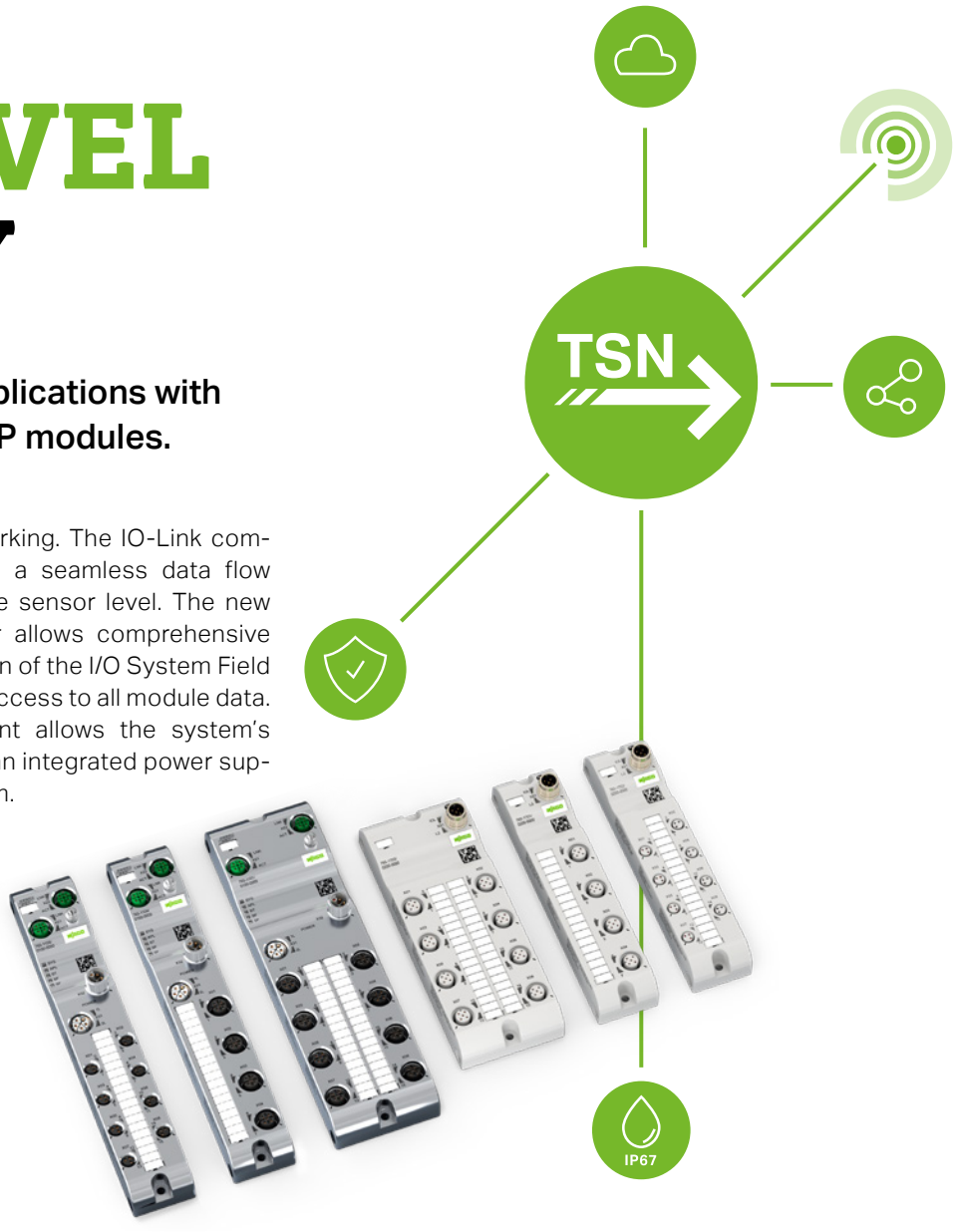
With the WAGO I/O System Advanced, WAGO is developing the leading solution for future-proof automation in mechanical engineering. As the gateway to WAGO's universal I/O System 750, the new IP20 system will combine the proven benefits and functionality of the 750 Series with a fresh and ergonomic design, mechanical features that prevent errors and outstanding performance. The results: Short reaction times, high signal transmission synchronicity, use of fast fieldbuses – and, in future, TSN. These advantages make the I/O System Advanced the new benchmark for high-end industrial automation systems. A new design of the PFC200 Controller, based on proven PFC technology, will also be launched along with the system. 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 simple thanks to a large number of interfaces and the highest cybersecurity standards. The customer can decide 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 continues to support well-known PFC functionalities and CODESYS-based programming via ***e!****COCKPIT*. The familiar configurators and options of the engineering tool are also available. 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. In addition, the Docker® interface offers a simple solution for the integration of open-source software. It will also be possible to integrate independently executable software components into the upcoming PFC200 Advanced via containers. In addition, this gateway to the universal 750 Series system allows all of the around 500 modules to be directly connected, maximizing the return on investment.


WAGO I/O SYSTEM FIELD

# HIGH FIELD-LEVEL CONNECTIVITY

**WAGO's IP67 I/O System Field opens up a wide range of applications with different housing styles and new EtherCAT® and EtherNet/IP modules.**

The WAGO I/O System Field provides uncompromising protection with either its encapsulated metal housings for the harshest environments or robust, non-encapsulated and lightweight plastic housings for mobile applications. The system works safely and reliably at temperatures from −25 °C to +70 °C. Customizable mounting options for front and side module installation provide extra flexibility. The modules can be fitted with either WMB Inline markers or marking strips; they also feature unique serial number identification and a Data Matrix code for machine readability. WAGO has also expanded the connectivity capabilities offered by I/O System Field: The I/O modules can be connected to fast, ETHERNET-based fieldbus systems such as PROFINET, and now also to EtherCAT® and EtherNet/IP. This expansion allows the system to be used in other industries and applications. It also integrates a Webserver and OPC UA server. Going forward, the fieldbus modules will also support MQTT as a communication protocol, enabling cloud connectivity. Additionally, the system is ready for TSN, which is crucial for end-to-end, flexible, powerful, secure networking. The IO-Link communication standard allows a seamless data flow from the control level to the sensor level. The new WAGO IO-Link Configurator allows comprehensive and fast IO-Link configuration of the I/O System Field while providing convenient access to all module data. Innovative load management allows the system's power to be fully utilized by an integrated power supply load management system.



TIME-SENSITIVE NETWORKING (TSN)

# »WE PUT A FACE ON TOPICS LIKE OPC UA AND TSN«

**WAGO product manager Jürgen Gorka explains the technology and solutions customers can use to achieve future-proof automation for mechanical engineering.**


**WAGO: For WAGO, TSN is one of the essential tools for the digital transformation in mechanical engineering. What is special about it?**

**Jürgen Gorka:** TSN can form the basis for the fieldbus systems of today and tomorrow and can boast a very positive development. As soon as the hardware is available at marketable prices and the specifications for modeling the bus systems on TSN have been finalized, we will see a successful launch of TSN. It is an ETHERNET transfer medium that provides enabling technology based on standards. It offers advantages like reserved bandwidths, simultaneous transfer of multiple protocols, including real-time-capable ones, and quality-of-service (QoS) mechanisms.

**WAGO: What are the preconditions for using TSN in automation?**

**Jürgen Gorka:** TSN is an ETHERNET enabling technology specified by the IEEE (Institute of Electrical and Electronics Engineers). Using it in automation requires protocols like OPC UA or PROFINET. A solution first emerges when TSN is combined with an application layer. TSN and TCP/IP are then available for the different application emphases. Both transfer media use OPC UA as the protocol. The advantage: Standard ETHERNET is used everywhere proprietary approaches used to be necessary.

**WAGO: The result is an end-to-end system, from the cloud to the sensor, without discontinuities?**

**Jürgen Gorka:** Yes, and that's real added value. The performance requirements in the field can be met with TSN on the basis of standard, open technology.

**WAGO: Will TSN replace all other fieldbus?**

**Jürgen Gorka:** At the moment, it is not yet possible to equipment systems on a TSN basis. That requires a minimum infrastructure with a certain diversity of devices. The diversity of fieldbuses will not disappear in the short term. There will always be requirements for which the existing technologies continue to be necessary. There is also a lot of valuable know-how out there. Even if we focus on TSN, we will continue to support other protocols like BACnet/IP and ETHERNET-based telecontrol protocols like IEC 60870-5-104, which have not been affected by TSN at all so far. EtherCAT® is also very widespread. EtherCAT® is optimized for one specific domain of use, namely as a fieldbus in machine and plant optimization. EtherCAT® represents a combination of an application protocol and special ETHERNET use.

**WAGO: With the WAGO I/O System Advanced, WAGO is developing a solution that is ready to use TSN. What exactly is meant by its promising name?**

**Jürgen Gorka:** The new system is the next logical step in advancing our I/O 750 family. With it, we put a face on topics like OPC UA and TSN. The structure, which includes a head station and linked I/O modules, is very similar in the two systems. However, the gateway plays a central role in seamlessly combining the two product families. And thanks to this integration, it will be possible to start using the new Advanced system and still have access to the broad, established 750 Series.

**WAGO: So the new system is not conceived as a replacement for the 750 Series?**

**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: What demands?**

**Jürgen Gorka:** In mechanical engineering, these are primarily demands for increased performance. In the long term, this increase can only be achieved with new system technology. This also includes support for all current communication standards, as well as upcoming ones, like TSN and its protocols. WAGO has already taken this step with the new I/O System Advanced as a component of an automation system that will offer long-term sustainability.

## OUR **EXPERTS**

**»The new system is the next logical step in advancing our I/O 750 family.«**

**Jürgen Gorka**
WAGO Product Manager

WAGO CLOUD

# GREATER TRANSPARENCY AND USER-FRIENDLINESS

**The latest WAGO Cloud release includes many new functions.**

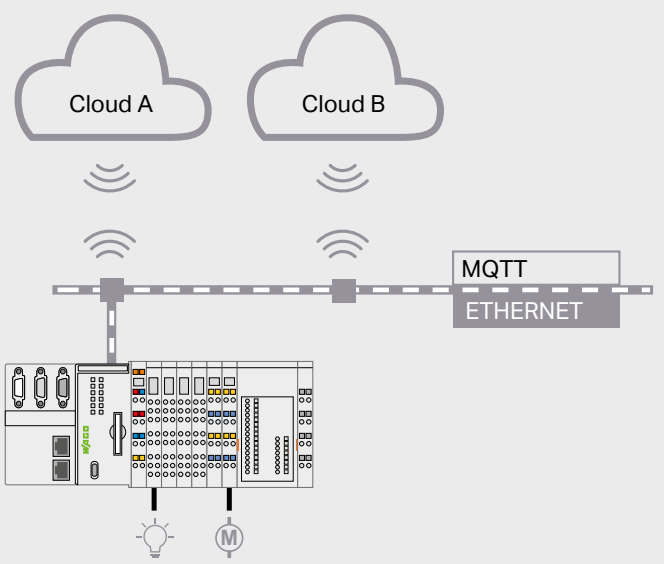
WAGO Cloud is a complete IoT system that, together with WAGO's PFC Controllers and Touch Panels, allows easy connection of machines and systems. In this most recent update, WAGO has substantially revised the dashboard to dramatically improve usability. Chief among the improvements are interactive dashboards that now offer a zoom-in function and support both visualization and display functions. Additionally, data from different sources can be combined to identify correlations more easily. A comparison with historical data is also possible. Calculations can now also be performed in a few steps. This convenience simplifies trend analyses, regressions and correlations, providing the foundation for data-driven decision making. Finally, the release now offers more billing options: WAGO has added an automated monthly billing option using cloud license points. This allows users to individually set upper-limit thresholds to control costs. Additionally, a flat rate for WAGO Energy Data Management (EDM) with fixed costs for each WAGO Cloud-connected controller is possible.

CLOUD CONNECTIVITY

# USE TWO CLOUD SYSTEMS IN PARALLEL

## WAGO'S PFC200 CONTROLLERS AND TOUCH PANELS, NOW WITH MULTI-CLOUD CONNECTIVITY

WAGO now offers multi-cloud connectivity for PFC200 Controllers and Touch Panels, allowing these devices to be connected in parallel to two different cloud systems, IoT platforms or MQTT brokers. Additionally, multi-cloud connectivity enables different tasks to be implemented in a cloud application. For example, device management can be performed within WAGO Cloud, while specific tasks are implemented in another cloud-based solution, e.g., IBM Watson, Amazon Web Services (AWS) or another specialized IoT platform. Data can also be split up, allowing, for example, critical data to go to a local MQTT broker and all other data to a cloud. Configuration is performed via the Web-Based Management (WBM) of the PFC200 or Touch Panel, and programming is done in the usual way in ***e!****COCKPIT*.



EDGE COMPUTING

# OPTIMAL DATA USE IN THE FIELD


Edge Computer (left) and Edge Controller

**In many cases, transferring data from machines and systems directly to a cloud solution is resource-intensive and infeasible due to the low latency required in industrial environments. Edge computing has established itself as a concept that combines the advantages of decentralized cloud architectures with those of a local network architecture.**

The OT and IT levels within components are converging more and more. "Not least, this lets employees involved in production know what beneficial processes exist in the IT domain," emphasizes Jens Sparmann. He gives the example of Docker® technology. "Since all the processes are becoming more and more intelligent, more and more data is also being collected," explains Dr. André Kleine. Instead of enormous data volumes being sent to the cloud, a portion of the processing takes place at the network's edge. "So data processing is becoming more and more important where real-time data is involved," he adds. It is also possible to implement low latency applications. "More and more computing power is needed, and this places corresponding demands on databases directly in the field," emphasizes Sparmann. "That can't be covered by a conventional PLC. But servers are usually overengineered for such applications."

Therefore, WAGO is introducing two new edge devices that meet these needs: the Edge Controller and the Edge Computer. "They benefit high-level language programmers, since they get closer to the sensor as the data supplier," emphasizes Kleine. "The last mile ceases to be a hurdle; the IT and OT environments merge." Cloud services can also run on the edge devices, for instance to ensure that only critical data is transferred to WAGO Cloud. Edge devices have additional advantages when data needs to be buffered temporarily, for instance in mobile applications.

**With a comprehensive selection of interfaces:** "Both new devices are based on cabinet-compatible hardware, can be powered with 24 V and fit perfectly into the automation environment," reports Sparmann. The Edge Controller is equipped with an ARM Cortex-A9 quad-core processor and an extensive selection of interfaces, including two ETHERNET ports, one CANopen port and two USB ports. The visualization can be displayed locally via the HDMI interface.

Alternatively, the visualization can also be provided to other Web clients via the integrated Webserver. It also has a serial RS-232-/RS-485 interface and four digital inputs/outputs for connecting local devices or sensors. "The device can also be connected with Modbus®," adds Kleine. "The diversity of interfaces allows the device to be integrated easily into existing systems."

The ability to DIN-rail mount the Edge Controller – either horizontally or vertically – saves space. Project design can be performed in the familiar ***e!****COCKPIT* engineering environment, so it fits seamlessly within WAGO's automation solution ecosystem. "The firmware is also very similar to that of our HMI devices," emphasizes Kleine. "This also ensures a high degree of reusability on the software side." For instance, existing WAGO Docker® containers can be used.

The Edge Controller can be provided with additional licenses for connecting to BACnet or EtherCAT®. Data can be transferred to the cloud via MQTT. This makes it very easy to connect to WAGO Cloud or other cloud platforms. "It is easy to set up a multi-cloud landscape," says Kleine. "WAGO recognized the great significance of cloud communication very early on and integrated the MQTT protocol into ***e!****COCKPIT*. Our own high-performance OPC UA stack is the next step now." However, OPC UA communication is already possible now too via the CODESYS stack.

**Process high data volumes:** Where demands on computing power and memory are high, WAGO also offers the perfect solution with the Edge Computer. It features a 1.91 GHz quad-core Atom processor and is equipped with standard Debian Linux. "Users can draw on abundant resources and model entire automation processes on them," says Sparmann with satisfaction. Display devices can be connected directly via HDMI or DisplayPort. Several USB ports and 2-Gbit ETHERNET ports are available for communication. A choice between 4 GB and 8 GB of RAM, as well as 64 GB of flash memory, makes even more resource-intensive projects feasible.

When very large data volumes need to be processed, such as large-scale database applications, the Edge Computer can be expanded with an SSD. The housing conveniently provides a mounting space for a

**»The last mile ceases to be a hurdle; the IT and OT environments merge.«**

**Dr. André Kleine**
HMI & Edge Controller Product Manager

**»Both new devices fit perfectly into the automation environment.«**

**Jens Sparmann**
System Specialist

2.5 inch SSD for this purpose. Despite its extended temperature range from −20 °C to 60 °C, the Edge Computer does without a fan and is compact, making it easy to mount on a DIN-rail in a control cabinet without taking up much space. "That also makes it low-maintenance," adds Kleine.

Standard software and WAGO Docker® containers, such as Node-RED, can be used on the Edge Computer. For example, the open-source Grafana application is an excellent choice for graphical data display.

Security also plays an important role in the new devices. A TPM 2.0 chip allows an encryption mechanism to be used to ensure data security. "The devices are also equipped with the best software technology for high security," says Sparmann. "A large proportion of the software on the devices is open-source, so security is always part of the pictures, since the large open-source community is continually reviewing the source code and providing bugfixes."

Besides the standard VPN applications, the devices are open for special security solutions such as Tosibox and Hooc. Thus, in addition to WAGO's own VPN solution, users can also access other remote maintenance solutions with a high degree of security, in line with the #openandeasy principle.

**The right hardware for every edge application:** The two new edge devices offer a hardware platform that supports users in easily implementing their own edge applications at the interface between WAGO's automation architecture and WAGO Cloud. "Both devices are excellent additions to our portfolio," says Sparmann with confidence. "While the Edge Controller brings the OT level closer to the IT level, our Edge Computer works the other way around."

[This article is a lightly edited excerpt from: open automation, 4/2020.]

WAGO ANALYTICS

# MAXIMUM OPTIMIZATION **OF MACHINES AND SYSTEMS**

When it comes to optimizing your own machines or systems, the challenge is to increase and quantify process knowledge, and then to integrate it into the process. WAGO Analytics supports users in data acquisition and analysis and provides intuitive visualizations of the dependencies in their systems. The connections this reveals can then be integrated into the process so potential optimizations can be exploited. WAGO Analytics is implemented in three steps. The first step involves recording current machine and sensor data. This requires various hardware products that supply the corresponding data. WAGO offers a wide product portfolio with various components that 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 measurement and sensor data acquisition.

In the second step, WAGO Cloud offers users the option of aggregating data from various machines and systems in a central location.

The machine and system data that has been collected can then be used either centrally or decentrally for analysis – the third step in the process. Centralized analysis then merely requires transfer of the data to a cloud environment. Unlike in 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, so modern software and numerous other applications can be run quickly and easily on the PFC200.


# IMPRINT

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