



WAGO IoT Box

The Easy Way to Get Started with Digitization



**CUSTOM
CONTROL
CABINET
SOLUTIONS**

A Ready-to-Use Solution for Digitizing (All) Your Applications

The WAGO IoT Box is the perfect solution for connecting new and existing systems.

Integrating equipment and machines into the “Internet of Things” or local systems like a MES (Manufacturing Execution System) is easy with the WAGO IoT Box. The complete system is ready for immediate use and offers all the functions required for digitization, from signal acquisition to cloud connectivity.

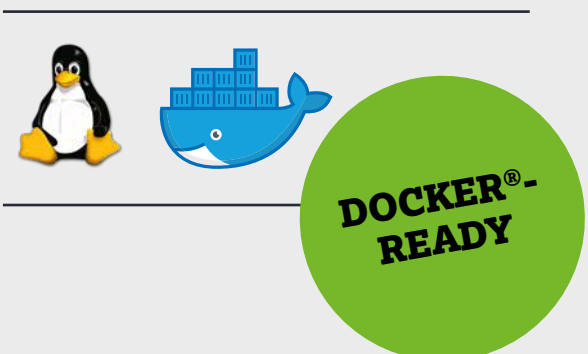
The WAGO IoT Box was designed as a **ready-to-use solution** – no hardware engineering required. To get the data to the IoT application you want, all you need to do is set a few parameters.

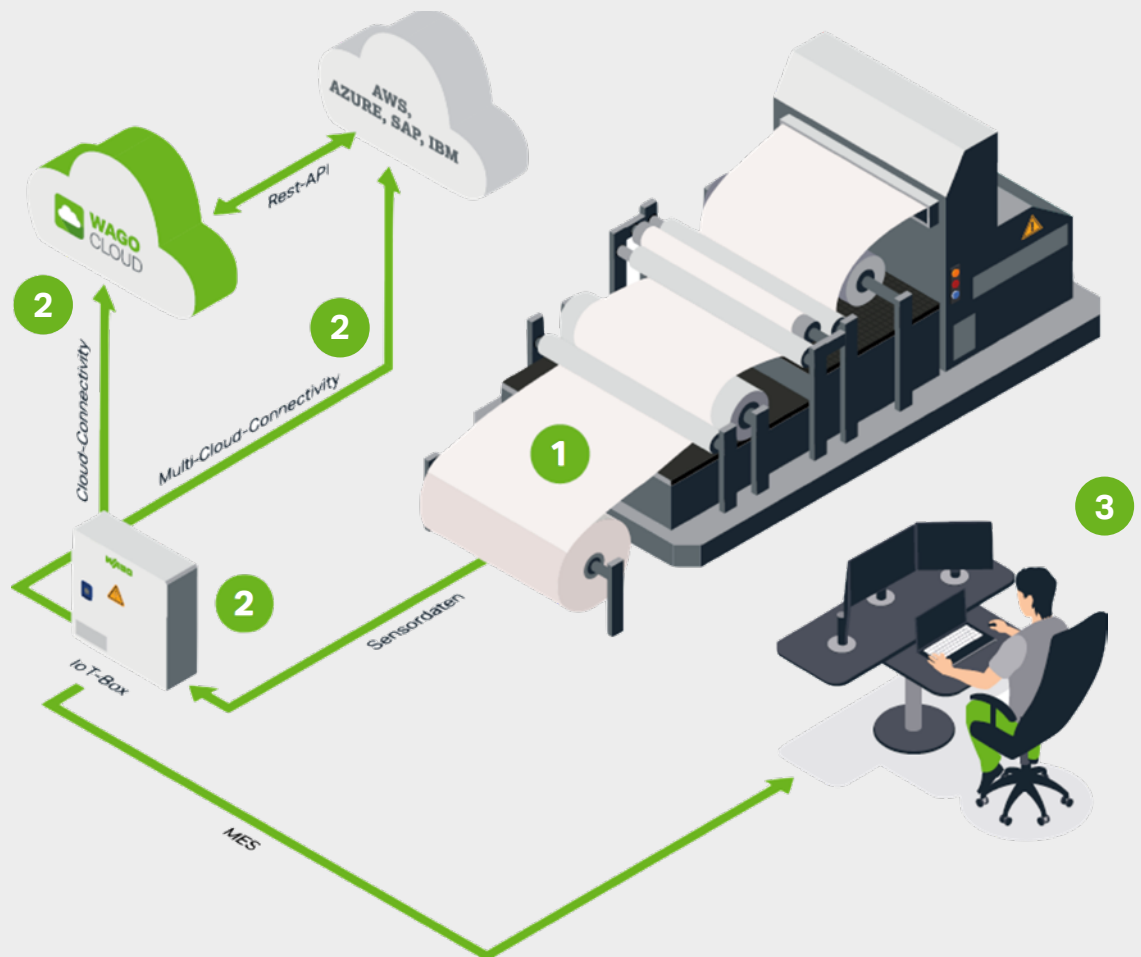
The Benefits for You:

- Easy to commission and use: configuring – not programming
- An open, ready-made solution: rapid connection to the IoT environment, in cloud systems or as a gateway for existing production systems – multi-cloud connectivity: separation of process and device data
- Security: encrypted communication with the cloud; separation of IT and OT networks



Depending on the application, additional I/O modules can be added later to adapt the system to specific requirements. Additional options include a protocol gateway to various fieldbus and control protocols and data evaluation and pre-processing using PLC functionality and/or applications on Linux®, including Docker®.

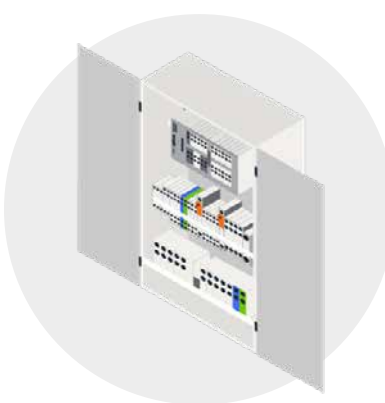




1. Machine or Energy Data Sources

2. WAGO IoT Box

3. Back Office Employees



The WAGO IoT Box can collect sensor signals and data from systems and machines and also supports measurement of electricity, production cycles, system status information and other signals for purposes like predictive maintenance.

Configuration is easy, and each WAGO IoT Box can be connected quickly and securely to cloud systems or an MES system. To do so, you can freely select among protocols like MQTT, Modbus® and OPC UA.

With the right software application, you can implement a wide variety of functions: from calculations with integrated mathematical functions, to automatic switching of outputs based on input values, to employee notifications when out-of-spec conditions trigger alarms – including email functionality.

Added Value Out of the Box

With its IoT Box, Liebherr has created an infrastructure that derives added value from production data for many application areas. Its core is a WAGO PFC200 Controller, which allows connection of any systems and machines for maximum flexibility. With this new infrastructure, Liebherr can optimize existing processes and set up new business models, preparing itself well for future opportunities and challenges.

Welding robots are an indispensable manufacturing technology for Liebherr-Hydraulikbagger GmbH. This company from Kirchdorf an der Iller (Upper Swabia) is the world's market leader in mobile excavators. But that's not all these robots can do: Like all industrial systems and machines, they also produce many kinds of data. This source can be exploited to increase value creation and efficiency – not only in manufacturing, but also for many other domains: financial controlling and maintenance, as well as IT management and purchasing.

However, doing so requires reading out the relevant data from the system and machines, consolidating it, analyzing and linking it to other data. Liebherr IT-Services GmbH has now created a powerful, scalable infrastructure for all these purposes: a compact IoT box with a modular design. When installed near the machine or system in question, it receives the data through a network cable, processes it on site, evaluates it and makes it available to higher-level systems, such as an MES or PLM system.

"Both the hardware and the software of the IoT box boast enormous flexibility," explains Torben Handeck, Head of Programming and

Welding Technology at Liebherr-Hydraulic Bagger GmbH.

"We can connect any systems and machines to it. With data it collects, we can then perform a wide variety of analyses, which give us valuable knowledge for any possible challenges."

"A Problem-Solver for Many Different Domains"

This makes the IoT Box a "problem-solver for many different domains," says Handeck – "independent of how you view the system or machine." As a specific example, he mentions the welding wire drums that supply material to welding robot systems. "We're now able to retrofit a scale and connect it to the IoT box. This gives employees working with the system a clear picture of how much wire remains in the drums, so they can replenish it in plenty of time," explains the expert. Another possible application might be providing consumption data to the purchasing department automatically, reducing the production employees' workload.

The IoT box could even establish a completely new business model for this process. "We could pass the data to a service provider, which would then ensure a reliable supply of sufficient welding wire to the system, without the need for production or purchasing employees' involvement," explains Handeck. "That would significantly increase efficiency!"

The IoT box lets Liebherr do more than just optimize existing processes: The company is also using it to prepare for future opportunities and challenges. With this infrastructure, Liebherr-Hydraulikbagger GmbH and the other Liebherr plants now have an IT foundation which they will be able to use for developing and implementing future business models that no one has even thought of yet.

WAGO Makes Standalone Solutions Obsolete

The core of the IoT box is a PFC 200 Controller from WAGO. It records all the relevant data from the system or machine, as well as data from sensors on peripheral devices that the machine's control system does not capture. "If the PFC200's basic connectivity ever isn't enough, the WAGO system's modular design makes it easy to expand by adding I/O units or fieldbus couplers," explains Matthias Morath, PLM Innovation Consultant at





Liebherr-IT Services GmbH. Thus virtually any system can be connected to the infrastructure, regardless of its manufacturer and age, without significant expense. That is a great advantage, especially for companies like Liebherr-Hydraulikbagger GmbH with its broad portfolio of products. This approach avoids standalone solutions: "Thanks to the controller's flexibility, we don't have to implement a separate system for every digitization purpose," says the expert.

Data is harmonized with a defined data model directly on the PFC200. "Because the connected systems and machines are so heterogeneous, it's more efficient to do this right on the controller," explains Morath. That is handled by either a PLC program or a micro service, which runs as a customized Docker container on the WAGO product. "The latter has several advantages, not least the fact that IT can use a standard tool for global software maintenance and orchestration and develop the software further with a view to new use cases," explains Morath. With protocols like MQTT, the harmonized data is then transferred to the higher-level systems on a server or in a cloud – for example, for predictive maintenance or PLM (Product Lifecycle Management). Of course, a possible alternative would be to import the unharmonized raw data into systems.

Why did Liebherr choose WAGO at such a key point? "Both companies have something very important in common: They're family-run technology companies committed to long-term investment in their products," says Morath. "Like Liebherr, WAGO focuses on customers and their needs. That's clear in everything they do – both the service and the technology." Of course, Liebherr's selection process also applied a hard benchmark for both the hardware and the software. "WAGO's products and services clearly stood out from the competition," he reports.

Gradual Infrastructure Expansion

So far, five IoT boxes have been implemented, all at Liebherr-Hydraulikbagger GmbH. "We're expanding this infrastructure gradually," says Handeck. The box that Liebherr IT-Services GmbH created at its site in Oberopfingen, Swabia, is also available to the other Liebherr plants.

Through its IoT box, Liebherr is also involved in the European 4.0 Transformation Center (E4TC) at RWTH Aachen University, which works with renowned partners from industry and research to test technologies for implementing digitization strategies. In this cooperation, Liebherr has coupled its box with a laser cutting machine and aims to demonstrate possible applications and further its development.



Go to the customer application video

Transparent Energy Measurement in Your Applications

System and machine manufacturers want to use energy more efficiently and more sustainably. The WAGO IoT Box provides the data and information this requires.

It can be used to record detailed energy flows and consumption data for all production facilities. These can be connected directly to a cloud or IoT platform – no IT expertise required. Connecting existing systems and machines involves just a small number of technical adjustments or modifications.

Energy can be a costly factor for system operators and companies. In the face of energy cost fluctuations and increases, as well as stringent government efficiency requirements, managing energy data is critical. A company's energy consumption is typically measured using individual electricity meters. However, an energy management system requires acquisition and knowledge of the relevant consumption data, all the way down to the system/machine (cost center) level. With the WAGO Energy EDM IoT Box, system operators and companies can record the energy consumption of an individual system/machine in real time and manage the data in the cloud.

The WAGO IoT Box's features include:

- Energy data collection and storage in the cloud; this historical data can be used later for analysis and carbon footprint calculation
- Storage and comparison of detailed information about all systems/machines
- Data provision for intelligent energy management systems
- Visualization of the energy flows for transparency in the production facilities



ISO 50001

For ISO 50001 compliance, companies must meet certain requirements, such as the sustainable improvement of energy consumption and energy efficiency. That requires the relevant data to be collected in advance.

The WAGO IoT Box can collect various types of data to provide end-to-end transparency. Transferring the data to a cloud creates a complete database to identify energy consumption and flow in detail and document improvements.

The WAGO IoT Box enables you to meet the requirements of the ISO 50001 standard.

Benefits of the WAGO IoT Box:

- Capture energy usage and consumption
- Store historical data in the cloud or locally (SD card)
- Visualize gradients
- Support data collection for ISO 50001 certification

For more information, please visit:

www.wago.com/en/energy-management

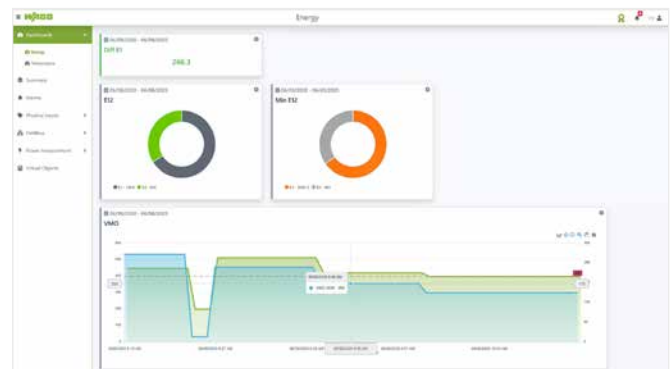
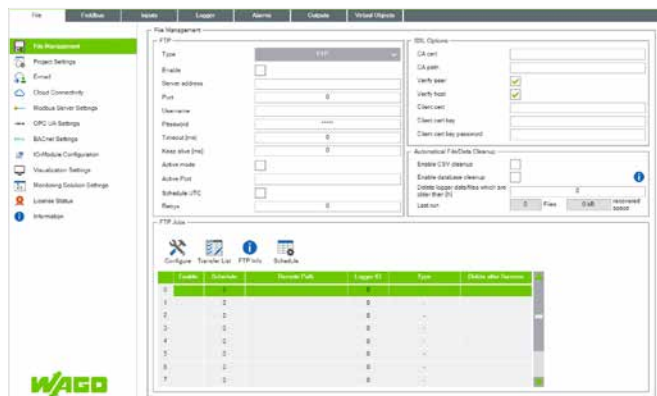


The WAGO IoT Box combines the individual data sources in the cloud and supports a general overview of consumption across all levels of buildings, systems and machines. Use of a cloud still offers the option of direct comparisons among individual buildings, systems and machines. A data summary and historical analysis also improve a company's ability to forecast consumption.

With the WAGO Energy EDM IoT Box, a system operator or company can record and monitor energy consumption in order to cut costs.

In addition to controlling and monitoring energy consumption, the WAGO IoT Box also offers the option of using the installed digital/analog input modules to display various values, such as temperatures, or CO₂ values for determining air quality.

Of course, it is also possible to provide individual signals to an MES or determine OEE KPIs. Using the WAGO IoT Box and installing it in systems and machines gives you access to all the necessary information about the current status of systems and alerts you to problems early on. Data-based monitoring via the cloud allows system operators and companies to continuously monitor their systems and machines and detect even the smallest changes or deviations. This not only reduces costs, but also helps identify potential problems sooner to reduce unplanned downtime.



WAGO Energy Data Management Application

WAGO Energy Data Management

Parameter Setting – Not Programming

Configuring Connections

- Automatic detection of connected I/O modules
- Easy coupling of Modbus® devices through CSV file import
- Clear presentation of all configured inputs

Data Visualization

- Visualization of configured data points on line or bar charts via the data plotter
- Simultaneous visualization of multiple data points over the same time interval

Alarm Function

Alarms for:

- Limiting value overrun, value change, feedback monitoring

Responses when an alarm occurs:

- Alarm logging, email notification, switching an output

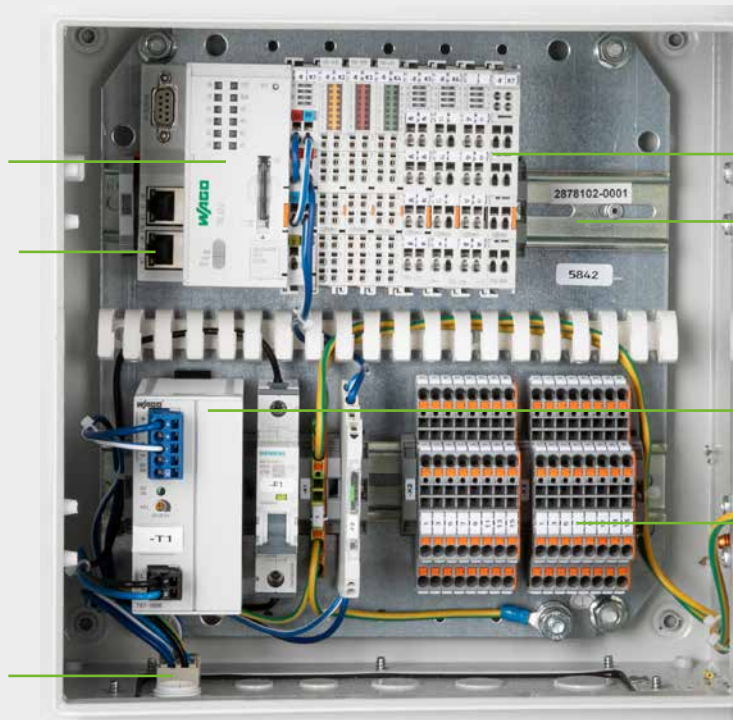
More information at:



CONTROLLER
OF YOUR CHOICE

ETHERNET
CONNECTION

CABLE FEED-
THROUGH



I/O MODULES OF
YOUR CHOICE
(OPTIONAL) - ADD
SWITCH

POWER SUPPLY
OF YOUR CHOICE

RAIL-MOUNT
TERMINALBLOCKS

Modular Hardware Assembly



- Modular: hardware and software can be adapted to your customer projects and remain scalable



- Plug-and-play: pre-assembled and wired system distribution boxes for worldwide use right out of the box



- Flexible international use:
from proof-of-concept to mass roll-out



Certification: supports ISO 50001
www.wago.com/en/energy-management/standards



- Connectivity: your gateway between OT and local IT systems, individual cloud and multi-cloud connections

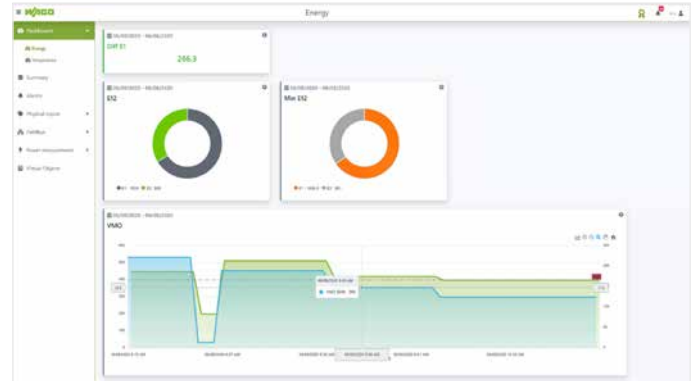
Plug-and-Play Hardware and Software for Various Industries



Load Management in Charging Parks

Item No. 8007-0100/1000-0333

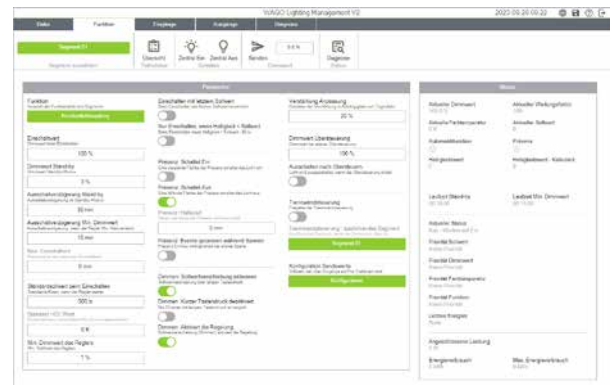
Integrate charging stations and energy measurement devices with the WAGO Load Management application.



Light and Room Automation

Item No. 2854-301/000-0xx

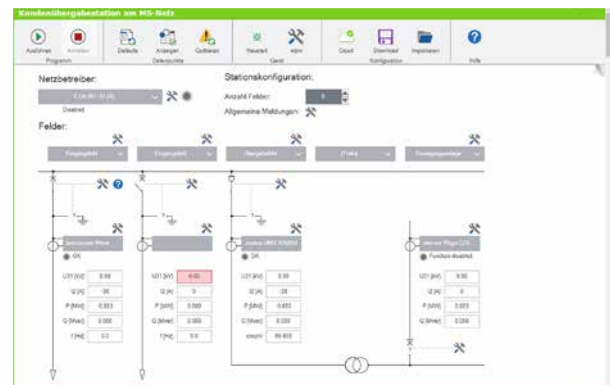
The WAGO Lighting Management application and WAGO *flexROOM*® application support modular parameterization for your building so you can take advantage of scalable control cabinet solutions.



Connecting Customer Substations

Item No. 8007-0100/1000-0247

Use drag-and-drop gestures to configure your substation – with the WAGO Customer Substation application – and fail-safe control cabinets.



Substation Digitization

Item No. 2759-2015/260-1000

Digitize transformer stations and parameterize location-specific features with the WAGO Grid Gateway application.



Variants

- Support for all standard fieldbus protocols
- Embedded Linux operating system
- CODESYS development environments per IEC 6113-3
- Docker®, TSN and much more



WAGO Energy IoT Box

Item No. 2854 0099/0000-0005

- WAGO Compact Controller 100 with integrated I/O
- Programmable via CODESYS
- 3-phase energy measurement
- Steel housing



WAGO Energy MID 2PCT IoT Box

Item No. 2854-099/0000-0009

- WAGO Compact Controller 100 with integrated I/O
- Configurable WAGO Energy Data Management application pre-installed, including visualization
- MID meter with current and voltage transformer measurement
- Plastic housing



WAGO Energy PFC200 EDM IoT Box

Item No. 2854-099/0000-0012

- DI/DO, AI, 3-phase energy measurement, Modbus®
- Configurable WAGO Energy Data Management application pre-installed, including visualization
- Plastic housing



WAGO Flex Gateway IoT Box (4G or LAN)

Item No. 2854-099/000-006

- Fully configurable
- Integrated fuse, power supply and rail-mount terminal blocks
- 4G version available
- Steel housing



WAGO Energy Data IoT Box

Item No. 2854-0099/0000-0001

- Signal acquisition, including power and energy measurement (DI/O, AI/O)
- Configurable application software (40 inputs and outputs)
- 4G version available
- Steel housing

WAGO MES IoT Box

Item No. 2854-0099/0000-0002

- Signal acquisition DI/DO, AI/AO
- Configurable WAGO Energy Data Management application pre-installed, including visualization
- 4G version available
- Steel housing

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