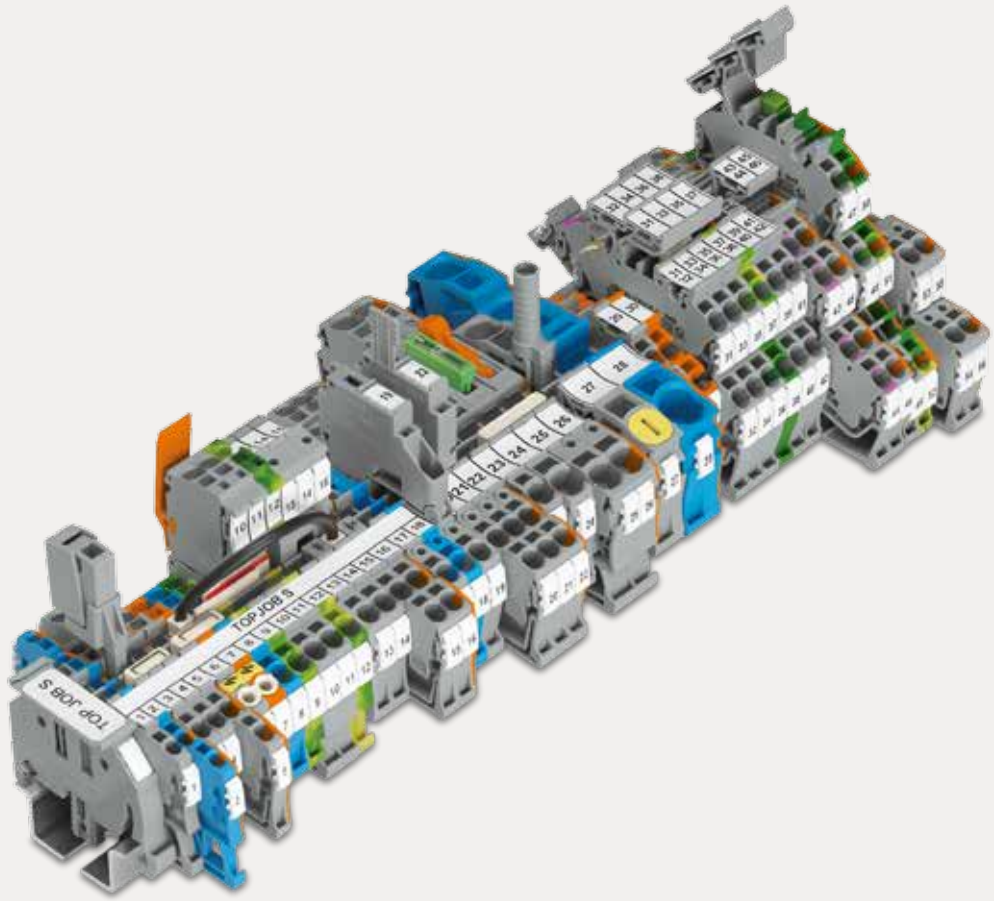
Industrial/Factory Automation

Contents

ENERGY SUPPLY AND DISTRIBUTION

TOPJOB® S Rail-Mount Terminal Blocks with Push-in CAGE CLAMP® Reliability



The Safe and Flexible Rail-Mount Terminal Block System

In machine and equipment engineering, the focus is on meeting the automation challenge. Besides control technology and mechanical systems, having the proper electronic equipment in the control cabinet is also crucial. In order to implement safe energy and signal distribution, consistency, speed and flexibility must be in the foreground.

The push-in technology in the **TOPJOB® S Rail-Mount Terminal Blocks** leaves nothing to be desired. All conductor cross-sections from 0.14 mm² to 185 mm² (24 AWG–350 kcmil) are covered.

Consistent and rapid marking increases efficiency, giving you more time to tackle the automation challenge.

PUSH-IN CAGE CLAMP®

High-Current, Rail-Mount Terminal Blocks for Conductors up to 185 mm² (350 kcmil)

The key to WAGO's success: Springs, not screws. This design gives POWER CAGE CLAMP the appropriate clamping force for conductors up to 35, 50, 95 and 185 mm² (2, 2/0, 4/0 AWG and 350 kcmil).

The high-current, rail-mount terminal blocks meet the most stringent requirements, including those specified for railway and marine applications. They are resistant to heat and cold – even under the heaviest of loads. The terminal blocks can be wired quickly – no time-consuming preparation of the conductors with ring terminals or ferrules is required. WAGO' blocks offer perfect clamping force, independent of operator skill.

In short, they are:
vibration-proof – fast – maintenance-free

Smaller conductors can also be connected effortlessly utilizing power taps. Convenient accessories are also available such as jumpers, warning covers, test plug adapters, continuous marking strips and WMB markers.

POWER CAGE CLAMP®

CLEAR COMMUNICATION AND HIGH UPTIME

Perfect Shielding with the Right Hardware and Professional Knowledge

Easy to use and with a wide range of accessories, the WAGO Shield Connection System allows users to easily customize their installations.

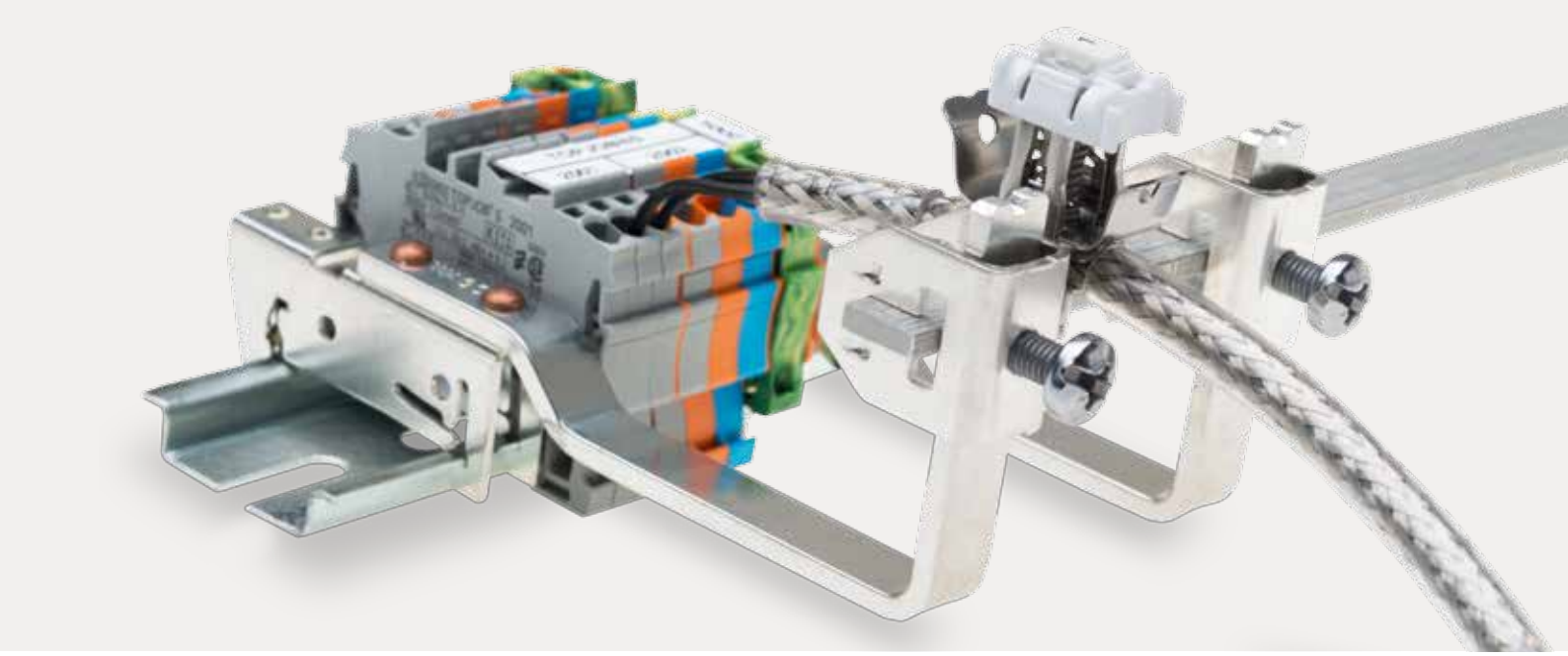
Today's industry requires that equipment have some form of electromagnetic compatibility (EMC). Minimizing sensitivity and transmission of magnetic flux helps achieve this goal. Electromagnetic interference can have many different causes (e.g., frequency converters or fast load changes).

Taking measurements is the only way to detect any electromagnetic disturbances. When they are detected, precautions need to be taken that include: proper enclosure grounding and large shield connection (skin effect with high-frequency interference signals). WAGO's shield connection system offers a broad range of very effective shielding solutions for this.

Both EMC and compliance with existing standards and guidelines are accounted for during the planning stage, while retrofitting can also be performed easily. WAGO's shield connection system is insulated and can also be used as a grounding potential.

Improve Shielding Performance by Placing the Shield over a Large Area

Greater shielding performance is achieved via low-impedance connection between shield and ground. To achieve this, connect the shield over a large surface area, e.g., using the WAGO Shield Connection System. This is strongly recommended for large-scale systems where equalizing current or high impulse-type currents (e.g., caused by atmospheric discharge) may occur.



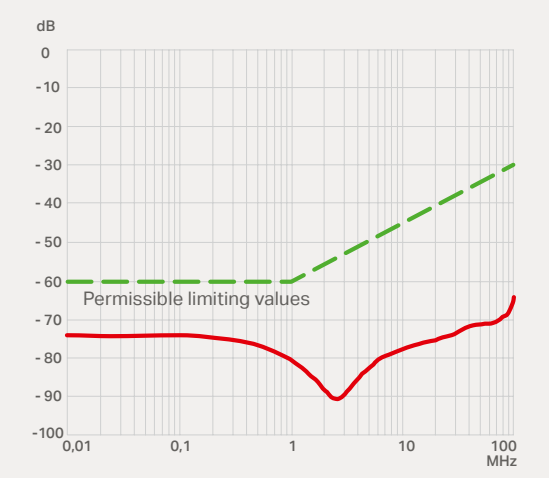
Keep Data and Signal Lines Away from Sources of Interference

Route data and signal lines separately from all high voltage cables and other sources of high electromagnetic emissions (e.g., frequency converters or drives).

Connect the Cable Shield to the Ground Potential

Integrated shielding is mandatory to meet technical specifications in regarding measurement accuracy. Connect the cable shield and ground potential at the inlet to the cabinet or housing. This allows induced interference to dissipate and be kept away from devices in the cabinet or housing.

Negative Shield Attenuation



WAGO's shield connection system is highly effective because the clamping unit can be brought very close to the unshielded part of the cable.

ADVANCED POWER SUPPLY SYSTEM

EPSITRON® – Switched-Mode Power Supplies

The core …

… of the *EPSITRON*® power supply system consists of power supplies and system modules. This comprehensive portfolio covers nearly all domains of application in the various industries. Its problem-solving expertise can be seen in the unique combination of power supplies and system modules that are industry-proven.

***EPSITRON*® ECO Power – the Economical Power Supply for Standard Applications**

- 1- and 3-phase power supplies, 24 VDC, 30 W … 960 W
- Optional DC OK contact
- Available, tool-free CAGE CLAMP® connection technology
- Optional ATEX/IEC Ex approval, Zone 2 and Class I Div. 2
- Versatile mounting options thanks to DIN-35 rail and screw mounting

***EPSITRON*® CLASSIC Power – the Robust Power Supply with Optional TopBoost**

- 1- and 3-phase power supplies, 12, 24, 48 VDC, 24 W … 960 W
- Error-free, pluggable CAGE CLAMP® connection technology
- DC OK signal/contact
- Device marking
- Optional integrated TopBoost

***EPSITRON*® Pro Power – the Professional Power Supply with Optional TopBoost**

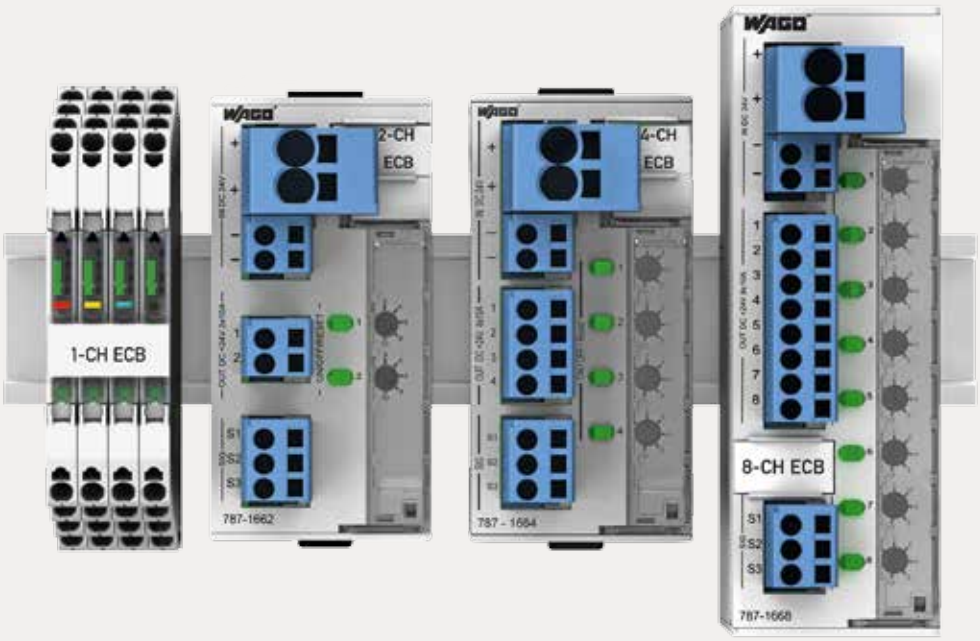
- TopBoost provides up to 60 A of additional output for 50 ms
- PowerBoost offers up to 200% output power for four seconds
- DC OK contact and stand-by input
- LineMonitor (optional) provides configuration and monitoring of signal inputs and outputs

NEC Class 2[1]

[1] Observe note on data sheet

COMPACT AND PRECISE

EPSITRON® Electronic Circuit Breakers for DC Circuits



In addition to the 24 V energy supply, modern control cabinets are now unimaginable without electronic fuses. With fuses, reliable cable and device protection are combined with the benefits of notification/acknowledgment and activation/deactivation of fuse channels by the controller technology.

The space requirements in the switch cabinet play a crucial role in mechanical engineering. With up to eight fuse channels on an installation width of just 42 mm, WAGO's electronic fuses lead the industry with their compact size.

The electronic circuit breakers are available in one-, two-, four- and eight-channel versions and offer adjustable current ranges from 0.5 A to 12 A depending on the device type. The trip characteristics offer reliable and precise disconnection in case of overcurrent or short circuit. The nominal current adjustment offers six levels per channel, and the trip time can be set at specified levels.

Numerous approvals and excellent technical properties make *EPSITRON*® a "must have" in machine and equipment engineering.

The following options are available, depending on the device type:

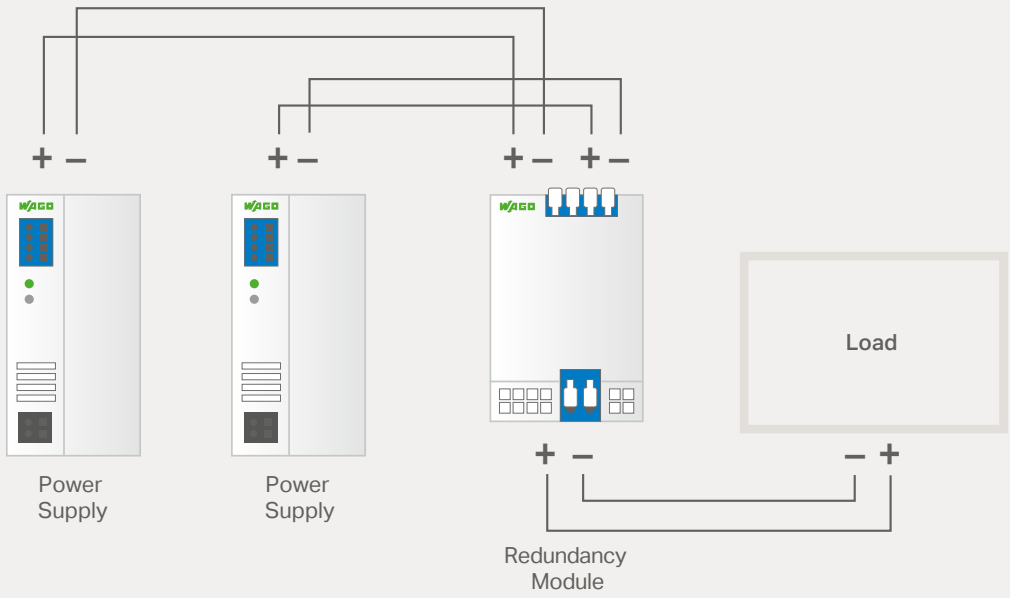
- Active short circuit current limitation to 1.7 times the nominal current setting
- Potential-free contact
- Remote control input
- Activation of all tripped channels via an impulse at the remote control input
- Load-dependent trip time
- Power-off behavior: Fixed or load-dependent time-delayed channel switching
- Indication: "triggered," "switched off" and "overcurrent"
- Reading the current actual current (devices with active short circuit current limitation)
- Selective power on/off for each channel – via the controller as well

Benefits:

- Two, four or eight channels with a six-stage adjustable nominal current
- Slim design, communication capability
- No false tripping due to high switch-on capacity
- Optional active current limitation

RELIABLY INCREASING POWER SUPPLY AVAILABILITY

EPSITRON® – Redundancy Module



Reliably Increasing Power Supply Availability

Redundancy modules decouple two parallel-connected power supplies and are ideal for applications where an electrical load must be reliably supplied – even in the event of a power supply failure.

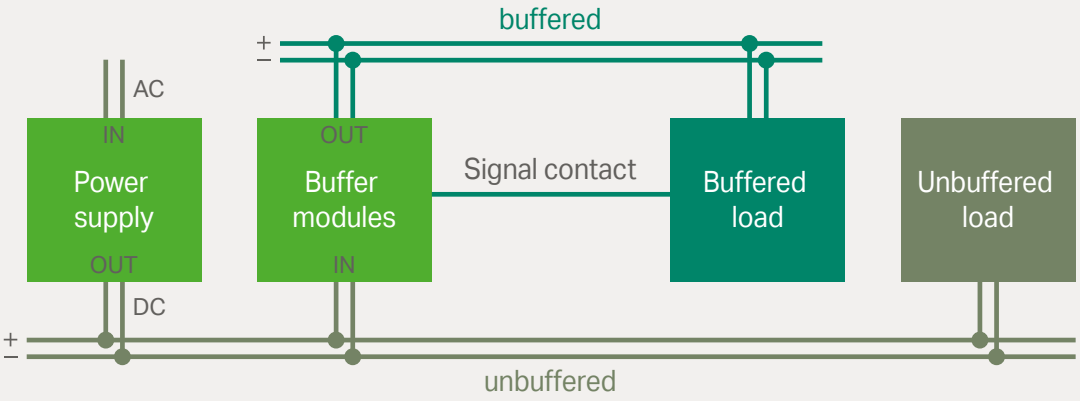
c UL us LISTED

Benefits:

- Integrated power diodes with overload capacity
- Solutions for 12/24/48 VDC supply, up to 76 A
- Parallel connections possible, reverse voltage protection
- LED indication and optional signal contact

SHORT-TERM POWER RESERVE FOR POWER OUTAGE AND LOAD CHANGE

EPSITRON® – Capacitive Buffer Modules



Capacitive buffer modules are used when the controller technology needs to be protected against sudden voltage drops, for example, and it is necessary to ensure controlled shut-down of the operating system. Furthermore, the devices can temporarily supply the stored energy to power highly dynamic applications with selective increases in power demands, for example.

c UL us LISTED

Essential Features:

Decoupled Output
- Integrated diode
- Buffered and unbuffered loads can be decoupled
- Parallel connection of multiple buffer modules to increase buffer time or load current

Signaling
- Three LEDs (green/yellow/red) indicate the current operating status
- A potential-free signal contact indicates the charge level

Benefits:
- Maintenance-free, high-energy gold caps
- Integrated diodes for decoupling buffered loads from unbuffered loads
- Unlimited parallel connections possible
- Configurable switch-on threshold

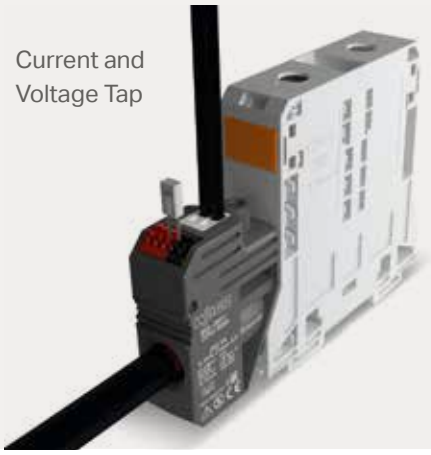
EVERYTHING YOU NEED FROM MEASUREMENT TO CONFIGURATION

And Always Fieldbus-Independent!

Current Transformers and Rogowski Coils

Measuring

Space-saving installation



Current and Voltage Tap

Conduit for primary conductors from 25 mm² to 95 mm²

Converting

Three-Phase Power Measurement Modules

Energy Management Always Pays Off

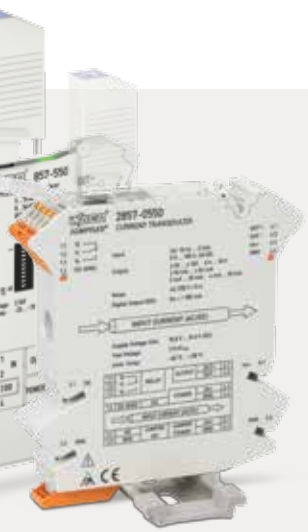
- Industrial firms have enjoyed these advantages since 2015:
  – Reduced electricity and eco taxes as revenue peak adjustment
  – Exemption from the “German Renewable Energy Act” levy (EEG apportionment) for energy-intensive companies that invest more than 14% of their gross value added in energy
- Transparency via energy data
- Energy cost reduction
- Lowered company greenhouse gas emissions and carbon footprint

From Evaluation to Visualization

Complementary energy data management solutions maximize transparency and cost savings. WAGO provides the right product for every link in the energy measurement chain.

Measuring –
Systematically Record Energy Consumption

Anywhere high currents are measured and processed, make WAGO’s 855 Series Plug-In Current Transformers your first choice. If existing systems need to be upgraded without detaching cables or interrupting processes, Series 855 Rogowski coils can be used.



JUMPFLEX®
Signal Conditioners

WAGO-I/O-*CHECK*

Visualizing & Configuring

Evaluating

WAGO-I/O-SYSTEM

JUMPFLEX®-ToGo
Configuration App

Evaluating –
Identifying and Planning Energy Use

Three different three-phase power measurement modules are available for evaluating actual energy consumption via the WAGO-I/O-SYSTEM 750. Depending on the application or customer preference, the energy data can also be converted to an analog standard signal using the 857 and 2857 Series *JUMPFLEX®* Current and Rogowski Signal Conditioners.

Visualizing and Configuring –
Energy Characteristics per DIN EN ISO 50001

WAGO offers the free *JUMPFLEX®*-ToGo Configuration App for smartphones and tablets, in addition to PC-based software. The WAGO-I/O-*CHECK* Software is an easy-to-use Windows® application for configuring, operating and displaying a WAGO-I/O-SYSTEM 750 node.

FLEXIBILITY WITHOUT ADDITIONAL DOWNTIME

Reduced costs can be achieved through both less downtime and shorter engineering turnaround. With WAGO as a partner, you can achieve both – the best of both worlds.

The optional use of PROFINET and PROFIsafe technology in the fieldbus couplers and configuration options in the controllers allow users and machine builders a high degree of flexibility alongside high availability and minimal engineering.

- Reconfiguration without engineering
- "Options handling"
- Communication redundancy

A batch size of 1 represents a new flexibility challenge for machines and systems in connection with changing products and formats:

- Sensors need to recognize different product types.
- Guide and conveying elements require flexibility for adapting to various product types.

Manually adjusting sensors and mechanisms requires time, and settings may not always be reproducible.

Stepper and DC Drive Controllers

- Space-saving stepper and DC drive controllers allow mechanical guide and conveying elements to move and adapt to a new format.

IO-Link as the Standard Communication for Sensors

- Forms the base for mechanical engineering within Industry 4.0.
- In addition to cyclic process data, a parameter channel adjusts sensors for their new assignment.

IO-Link

Proportional Valve Module

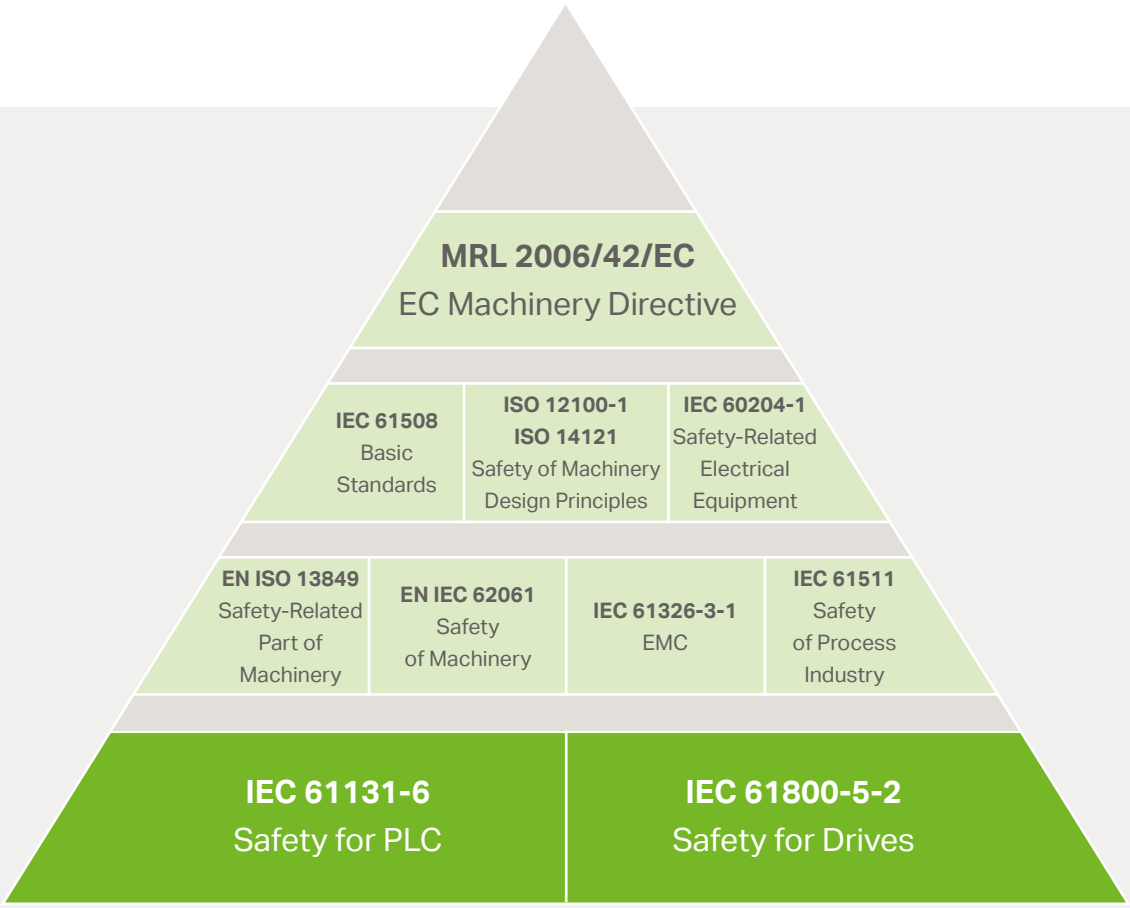
- A highly precise proportional valve module is available for hydraulic adjustments.
- Additional electronics and fieldbus interfaces on the valve are not necessary.
- Required data can be saved in the controller and associated system for maximum reproducibility, allowing product and format change without additional downtime.

SAFETY FOR PEOPLE AND MACHINES

Meeting Requirements Easily and Safely

In the European Union, the machinery directive defines the requirements for machine and system safety. This ensures a uniform standard for the protection of "life and limb" for people within a machine's operating area.

The required risk assessment is based on harmonized standards (e.g., EN 13849) and identifies existing risks and required risk reduction (SIL or PL quality). Based on the risk assessment, safety functionality can be implemented, e.g., by presence detection or protection zone violations using secure switches or light arrays to immediately shut down the "risk."



For this purpose, the safety signals are detected by the “yellow” safety modules and transmitted via “PROFIsafe” to the failsafe PLC for further processing. The result is then executed via safe actuator (e.g., output module or controller).

The uniquely characteristic safety values of the WAGO modules facilitate calculation of the final safety function up to Cat. 4/PLe according to EN 13849, or SIL3 according to EN 62061 or IEC 61511.

EASY INTEGRATION OF SAFETY-RELATED CONTROLLERS

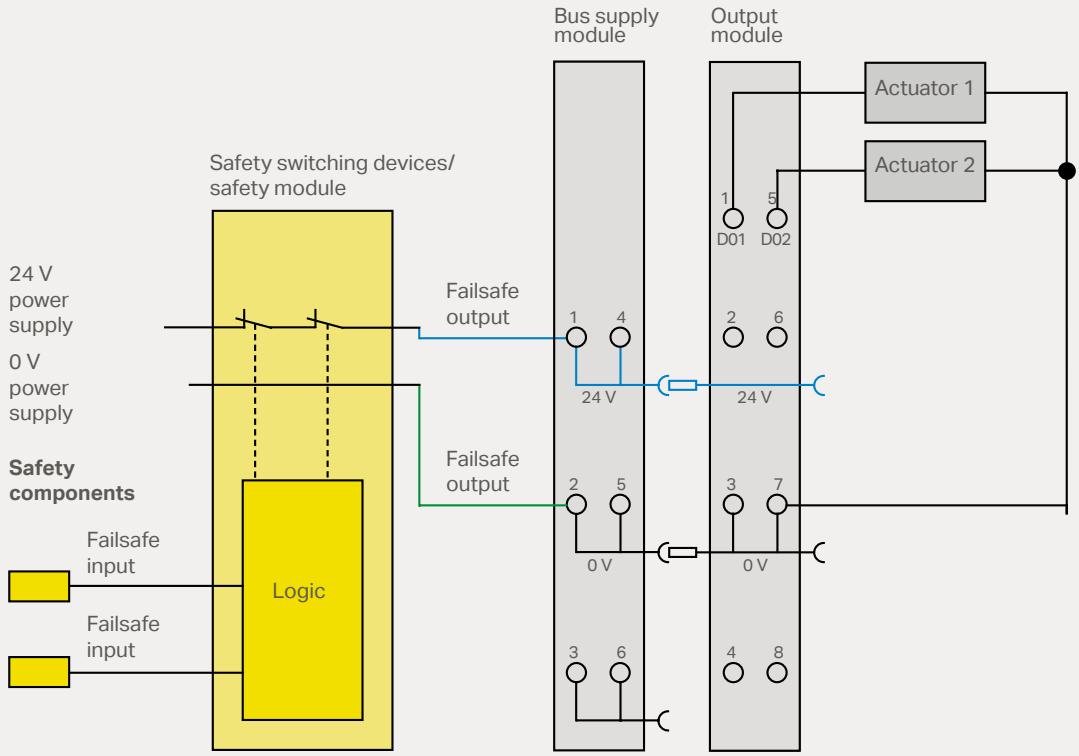
iStock.com/Richard Clark

The challenges that integration entails for designers are diverse and complex. This makes simple solutions for implementing the necessary safety functions all the more valuable.

TCI and iPar technology gives WAGO users efficient mechanisms for implementing integrated functional safety with PROFIsafe under PROFIBUS or PROFINET:

- Plug-in and data storage in the engineering environment
- Upload, download and comparison of the iParameters
- Module exchange without tooling
- Detailed diagnostic Information

INTERFERENCE-FREE IN SAFETY-RELATED APPLICATIONS



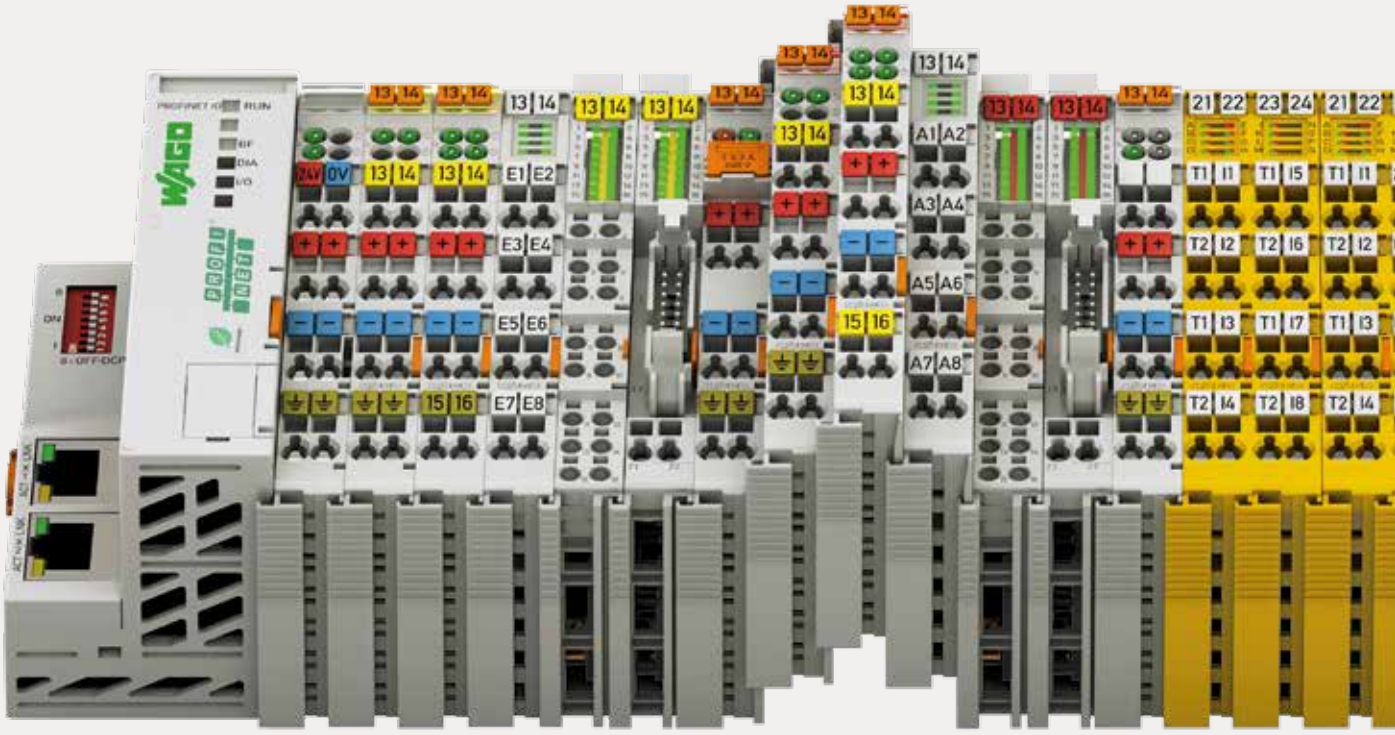
To implement safety functions, besides the higher-level PLC – for example via external safety switching devices – interference-free outputs offer a cost-effective solution.

Interference-Free in Safety-Related Applications:

To easily and safely perform cost-effective, centralized deactivation of complete actuator groups, the actuator's power supply can be switched off using a safety switching device. This can be performed either for each individual actuator or by turning off the power supply to a group of control outputs.

UNIVERSAL, COMPACT, ECONOMICAL

The Ideal Fieldbus Node



Maximum Fieldbus Independence

The system's modularity is also reflected in its support for numerous fieldbus systems and ETHERNET standards. Depending on the application, it is possible to choose between fieldbus couplers and communication modules for different protocols.

Extremely Compact

WAGO's patented mechanical design leads to extremely compact I/O nodes. In fact, it can accommodate up to 16 channels on a module width of 12 mm (1/2").

- Finely granular I/O modules enable node customization
- Space-saving design permits high integration density

Pluggable Connections

For the ultimate convenience, 753 Series modules are compatible with the 750 Series and feature pluggable connectors. A detachable wiring interface allows an operator to easily replace a module without removing and then rewiring all pre-existing wiring. This convenience virtually eliminates installation errors and saves time, providing flexible and time-saving final assembly via pre-wired connectors, with placeholder modules if necessary.

Maximum Reliability and Ruggedness

The WAGO-I/O-SYSTEM is engineered and tested for use in the most demanding environments in accordance with the highest standards, e.g., those required in marine applications. The system is distinguished from other products that are solely intended for industrial use because of:

- Greatly increased vibration rating
- Significantly greater immunity to interference (ESD)
- Lower emission of interference
- Larger voltage fluctuation range
- Greater durability for continuous operation in upper temperature ranges

Maximum Flexibility

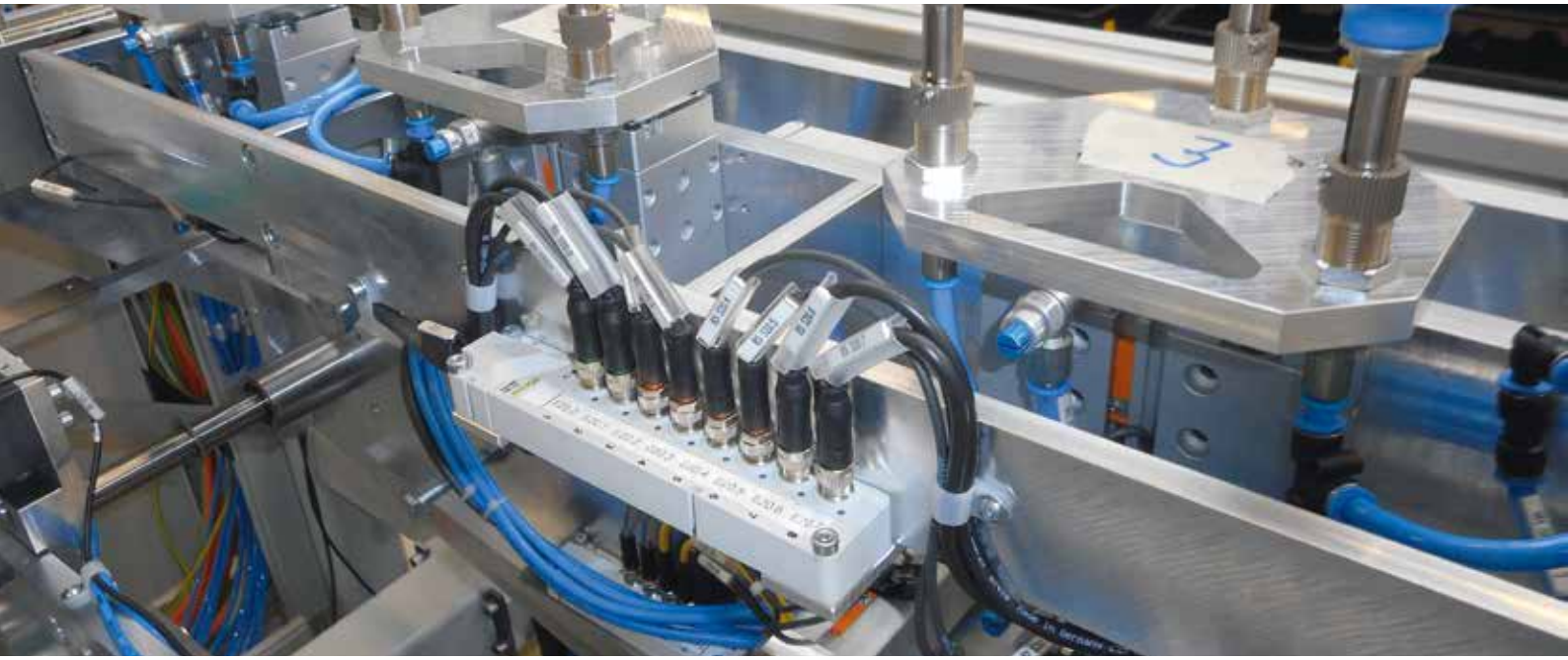
Each node in the WAGO-I/O-SYSTEM can be configured to meet every channel's requirements; various potentials and signal types are available (granularity of one to 16 channels). Digital and analog I/O modules, as well as specialty modules, can be freely mixed in the same node. Supply modules permit different voltages within the same node.

Easy to Use

A modular, DIN-rail-mount design permits easy installation, expansion and modification of the I/O node without tools. The straightforward design prevents installation errors. In addition, the connection is established on the field side with proven CAGE CLAMP® technology.

SENSOR/ACTUATOR BOXES

For Signal Acquisition at the Machine Level



Signal Acquisition in Exceptionally Harsh Conditions

The sensor/actuator boxes are very robust and comply with the IP67 and IP68 degrees of protection with molded cabling. Therefore, these modules are the ideal solution for applications where signals must be recorded under extreme environmental conditions (temperature, shock, vibration) at the machine level without a control cabinet when using an active IP67 I/O system would not be cost-effective.

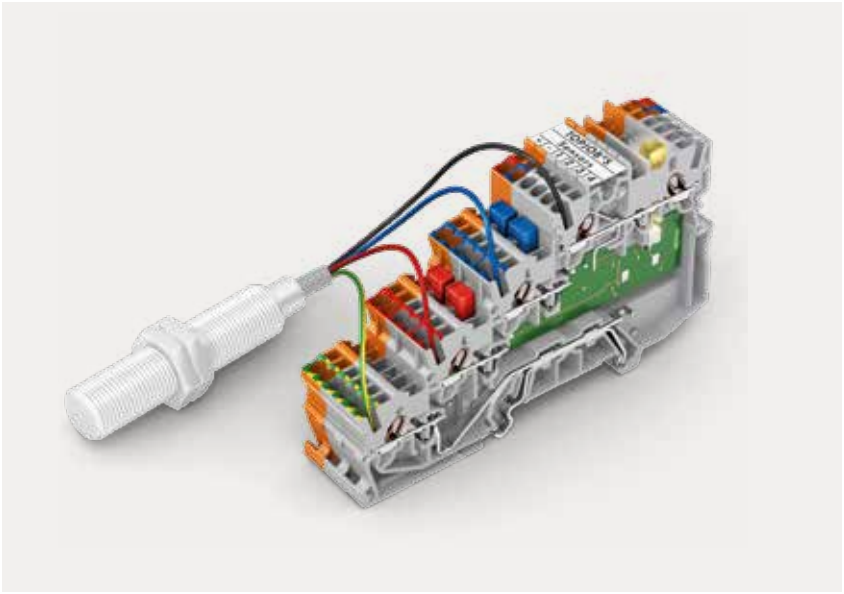
Passive M8/M12 sensor/actuator boxes are placed close to the process and acquire signals at the machine level. They can be used in very harsh environmental conditions and establish the connection from sensors and actuators to the controller across molded or detachable cables.

Benefits:

- Simple and economical addition to IP20 automation systems
  – For stricter requirements on environmental conditions
  – For plug-and-play connector technology when needed
  – For simpler cable installation in the form of trunk cables
- High-quality PUR connection cables (drag chains compatible, halogen-free)
- Fully encapsulated (resistance and leak-proofness)
- Flange sockets with metal design
- Operating temperature range: −25 … +80°C
- LEDs for status indication

TOPJOB® S Sensor/Actuator Terminal Blocks

- Secure connection via Push-in CAGE CLAMP® termination
- Maximum signal density – just 3.5 mm (1.38") spacing per sensor
- Multifunctional jumper program – commoning with standard jumpers – no pole number limitation
- Fastest marking system – perfect identification with multi-line marking strips that do not cover the jumper slot



- Clear terminal block structure – separation of potential and signal levels
- Perfect visibility – LEDs, jumpers and markers are always visible – even when wired

NEW

- Pluggable signal level to make system wiring modular with pre-assembled connectors!
- Coding pluggable connectors prevents wiring errors

FIELDBUS-INDEPENDENT

The Right Fieldbus Coupler and Controller for Every Application

Fieldbus Couplers

- Fieldbus couplers connect the WAGO-I/O-SYSTEM 750 to a higher-level control system
- Fieldbus-independent – support all standard fieldbus protocols and ETHERNET standards
- Space-saving design

750 Series Controllers

- Controllers for all prominent fieldbus systems and ETHERNET standards
- Quick commissioning
- Programmable via CODESYS per IEC 61131-3
- Direct connection to a wide range of I/O modules within the WAGO-I/O-SYSTEM 750
- Flexible platform adapts to diverse applications and environments
- PFC Controllers

PFC Controllers

- Controllers for all prominent fieldbus systems and ETHERNET standards
- High processing speed
- Multiple communication interfaces can be used in parallel
- Scalable performance
- Programmable via CODESYS per IEC 61131-3
- Modern engineering with ***e!****COCKPIT*
- Can be combined with high-level languages
- Linux® real-time operating system
- Robust and maintenance-free
- SSH and SSL/TLS provide high levels of security

ENGINEERING SOFTWARE

Programming per IEC 61131-3

Software Factors into Success

Today's mechanical engineering and related industries are characterized by ever-shortening development times, exponentially more complex projects and the increasing role of software as part of the overall solution. In fact, software is becoming an essential factor that influences the success of a project.

Linux® and WAGO – Automation for the Future

WAGO's Microsoft Windows-based engineering software perfectly dovetails with our controller portfolio that features the Linux® operating system. In addition to their scalability through the open source community, the Linux®-based controllers boast a code base that can rise to any future challenges. WAGO's controllers offer programming in either IEC 61131 with CODESYS or directly in Linux® to create complex tasks.

CODESYS – as an Integrated Environment

CODESYS

All WAGO Controllers are equipped with the high-performing CODESYS industry standard. This enables software development in the IEC 61131-3 PLC programming languages (ST, FBD, LD, IL, SFC and CFC). As a trusted programming environment, CODESYS guides developers, enabling them to reuse and further develop existing programs without relearning software. This means that modern paradigms, such as Object-Oriented Programming (OOP), and modern visualization technologies are available.

eCOCKPIT

Based on CODESYS 3

- Integrated engineering: one software for every task
- A smart design that invites you to discover
- State-of-the-art software: Comprehensive data retention and automatic online upgrades
- Based on CODESYS 3 technology
- Graphical network configuration

WAGO-I/O-*PRO*

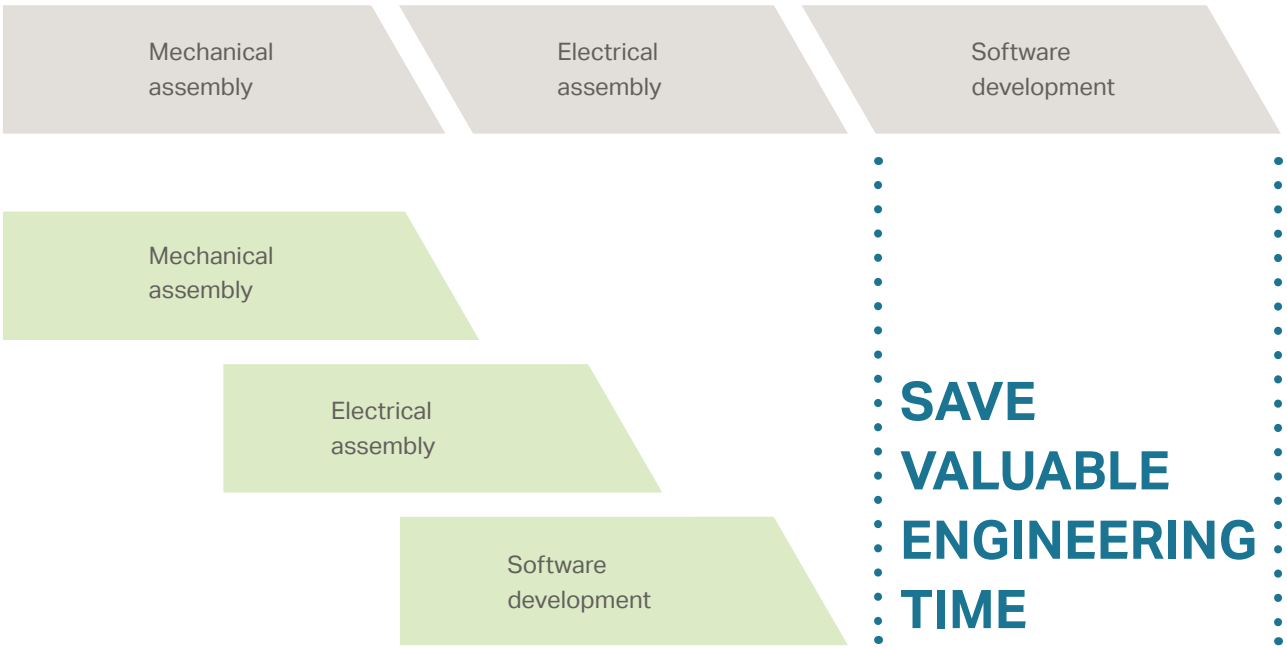
Based on CODESYS 2.3

- Efficiently translate between programming languages
- Automatic variable declaration
- Library management
- Online status display using the program code
- Offline simulation and integrated process visualization
- Record and graphically display project variables

MECHATRONICS TODAY

Engineering is a Key Factor for Success

Traditional Machine Development



Modern Machine Development through Simultaneous Implementation and Integration Every Step of the Way

The Challenge of Mechatronics

The merging of mechanical, electrical and software components has enabled today's machinery, plant engineering and related industries to achieve what was once seemingly impossible – shortening development cycles while increasing both product diversity and sophistication.

Software is a Distinguishing Feature

The amount of software embedded in a mechatronic unit is steadily rising, and this software is being tasked with increasing levels of machine functionality. In fact, this change has led to software becoming more and more important as a key differentiator between automation systems.

Integrated Development is a Crucial Factor

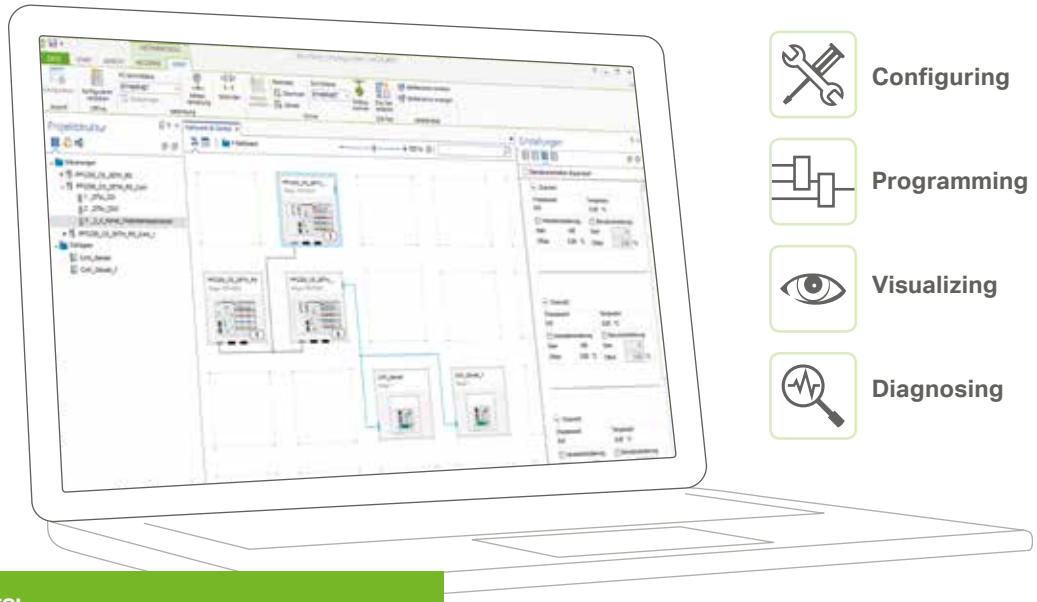
Developing high-performance mechatronic units relies on integrated development. However, success only occurs when mechanical and electrical engineering are tightly integrated into software development. Every task and function must be seamlessly synchronized in order to meet critical time-to-market deadlines.

Leverage Your Engineering Tools

State-of-the-art engineering tools support every step of the development cycle – from assembly up to machine operation. Thus engineering software is crucial to the development of sophisticated solutions.

e!COCKPIT – MODERN DEVELOPMENT

Software for Seamless Engineering



Benefits:

- One software package for every task
- Consistent look & feel
- Perfectly integrated into a machine's life cycle

One Automation Software Package

Quickly implementing complex machine functions is critical in modern mechanical engineering applications. Both in the office and on the shop floor, development engineers and technicians must manage challenging tasks.

e!*COCKPIT* is an integrated development environment that supports every automation task from hardware configuration, programming, simulation and visualization up to commissioning – in just one software package. Completely re-imagined, this development environment enables users to easily master complex automation networks, saving both time and money.

Embedded in the Development Process

It has never been more important for users to artfully align each task and function to master the onslaught of increasingly complex – and demanding – parallel development of multiple product lines. To keep projects on time, ***e!****COCKPIT* provides end-to-end data storage for every automation task – all in one project.

In addition, ***e!****COCKPIT* offers interfaces for master data exchange with external electrical and mechanical engineering software. This simplifies complex data transmission, while largely eliminating error-prone double inputs.

EMBEDDED Linux®

Automation for the Future

Uniting what belongs together: High-performance WAGO hardware and future-ready Linux® operating system!

For example, WAGO's impressive "Embedded Linux®" Controllers have base images that are expandable via open-source packages or by integrating external CODESYS libraries. WAGO is, and will continue to be, a primary source for information on the "open-source" operating system; we are also dedicated to distributing "Board Support Packages" (BSP).

In addition to their scalability through the open-source community, WAGO controllers with open-source operating system boast code bases that are continually developed and maintained by WAGO. This dedication means that the controllers will rise to any future challenges. WAGO's controllers offer programming in either IEC 61131 with CODESYS or directly in Linux® to create complex tasks.

Benefits:

- User-friendly
- Expandable
- Transparency
- No need for updates

Linux® DISTRIBUTION FOR A NEW GENERATION OF CONTROLLERS

Automation Controller

- Reports directly as the PLC
- IEC 61131
- Linux® in the background

PFC Controller

- Safe
- Real-time
- Stability

Open Linux®

- Open Source
- Freedom
- Scalability

WAGO's controllers are fully equipped, powerful Linux® machines. WAGO offers a comprehensive Board Support Package (BSP) with many tools and multiple IEC libraries to integrate more than 500 different I/O modules. Embedded Linux® is based on an RT-Preempt real-time kernel, which features a real-time patch.

The base image of all controllers with a Linux® operating system can be individually expanded with open-source packages. Thus, it is possible to use several runtime environments, such as PHP and Python.

Another advantage of Linux®-based controllers is the integration of external CODESYS libraries that are written in C code to quickly expand the PLC functions. Alternatively, the runtime environment can also be completely created with your own C/C++ programs for access to both the internal bus and MODBUS, CAN and PROFIBUS.

Advantages of "Embedded Linux®" in WAGO's controllers:

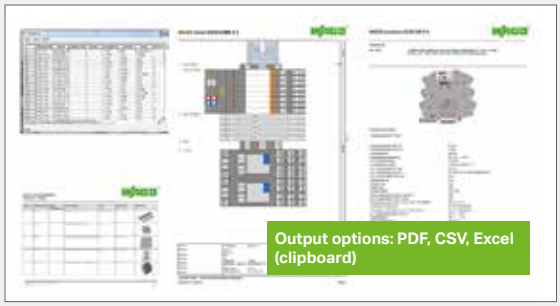
- Linux® BSP as a distribution with many tools
- Integrate 500 different I/O modules via IEC libraries
- Superior investment protection
- Excellent price–performance ratio
- Strictest quality assurance

THE WAGO TOOL CHAIN

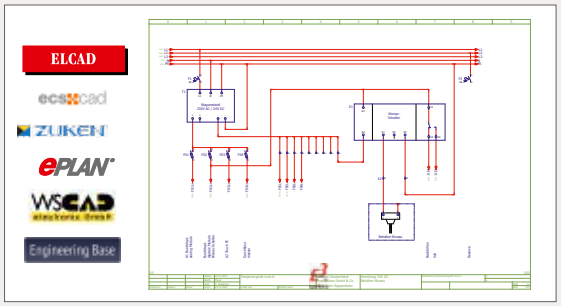
Full Support – from Planning to Commissioning

*smart*DESIGNER

Planning



Export/Import



CAD Data Download

*e!*COCKPIT

Programming

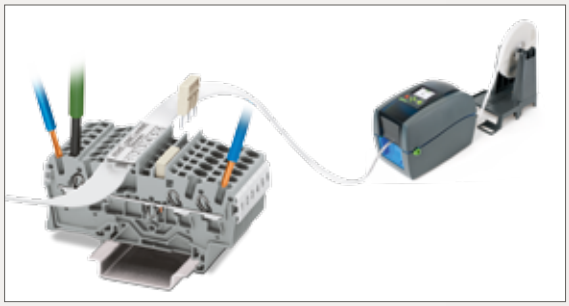
Visualization

Configuration

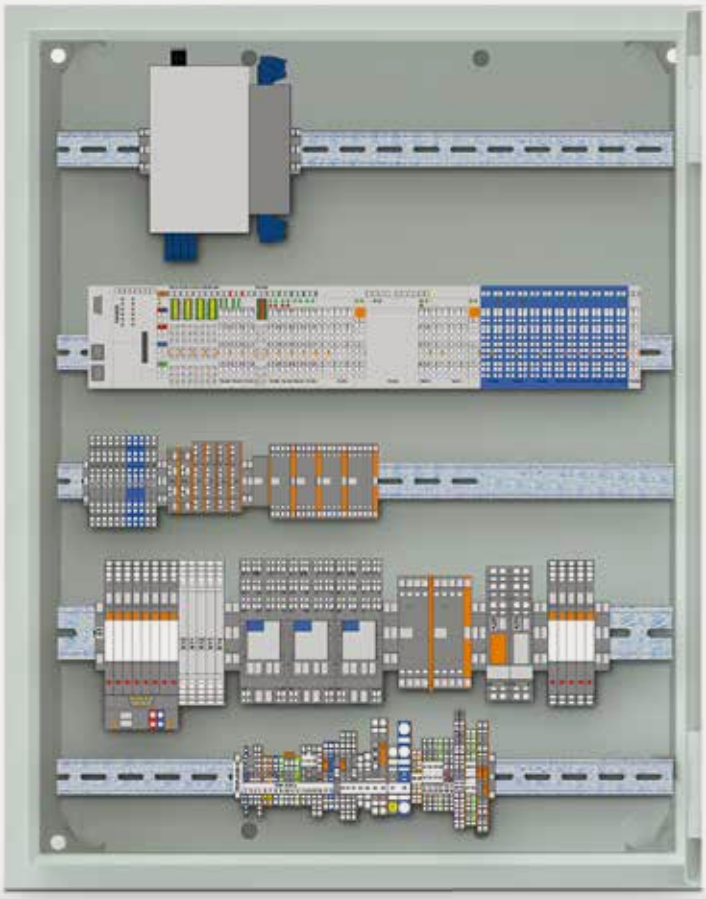
Timely engineering is essential for success in today's globally networked world. You must adapt to your customers' needs and demands in order to tap into new markets and outperform competitors. WAGO supports you in these efforts with an end-to-end tool chain.

smartDESIGNER accompanies you in every phase of control cabinet construction – with bidirectional interfaces to CAE systems, ***smart***PRINTER and WAGO's eShop. As a result, the management of master data and parts lists is performed at one single point.

Marking



Diagnostics



e!*COCKPIT* ***i****nvites you to discover:*
All project visualization from graphic network design up to the parameterization and diagnostics of the WAGO-I/O-SYSTEM 750, standards-compliant programming in CODESYS 3.5, modern visualization in HTML5.

Continual Support:

- ***e!****COCKPIT* for integrated engineering in automation
- ***smart***DESIGNER for the life cycle of a control cabinet
- Seamless integration into CAE systems

INDUSTRY 4.0

The First Milestone – the Smart Factory

Measure First, Then Manage

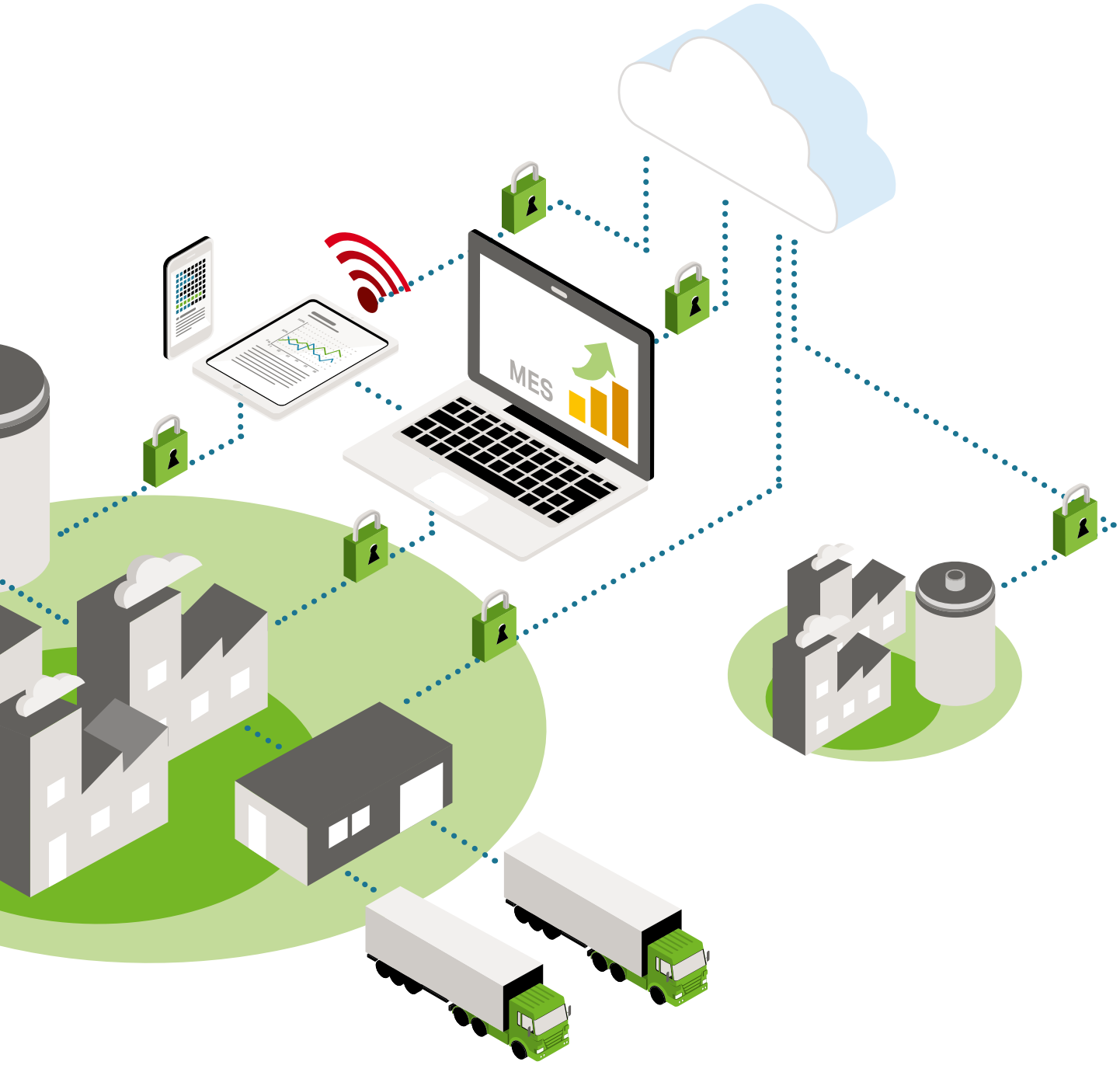
The “smart factory” is an important milestone in the process of evolution to Industry 4.0. The production line of the future will not only be networked and intelligent – it will control and optimize itself, partially automatically too, making it resource-efficient.

From the central perspectives of developing the range of Industry 4.0 topics, the various technologies will play a pragmatic role. Investments in network infrastructure, data security and data transparency – ultimately investments in horizontal and vertical integration – primarily serve the purpose of cost-effective production. Against the background of global competition and the demand for product customization, right down to a batch size of 1, this objective is vitally important.

Resource efficiency and the optimization of systems engineering, for example, offer starting points for the improvement of the production processes. Necessary preconditions for the transformation of an existing factory into an “intelligent factory” include networking existing processes and recording all relevant product, machine and process data. The evaluation on the basis of relational algorithms then supplies the necessary information (KPIs) for directing the production process and indications of latent optimization potential.

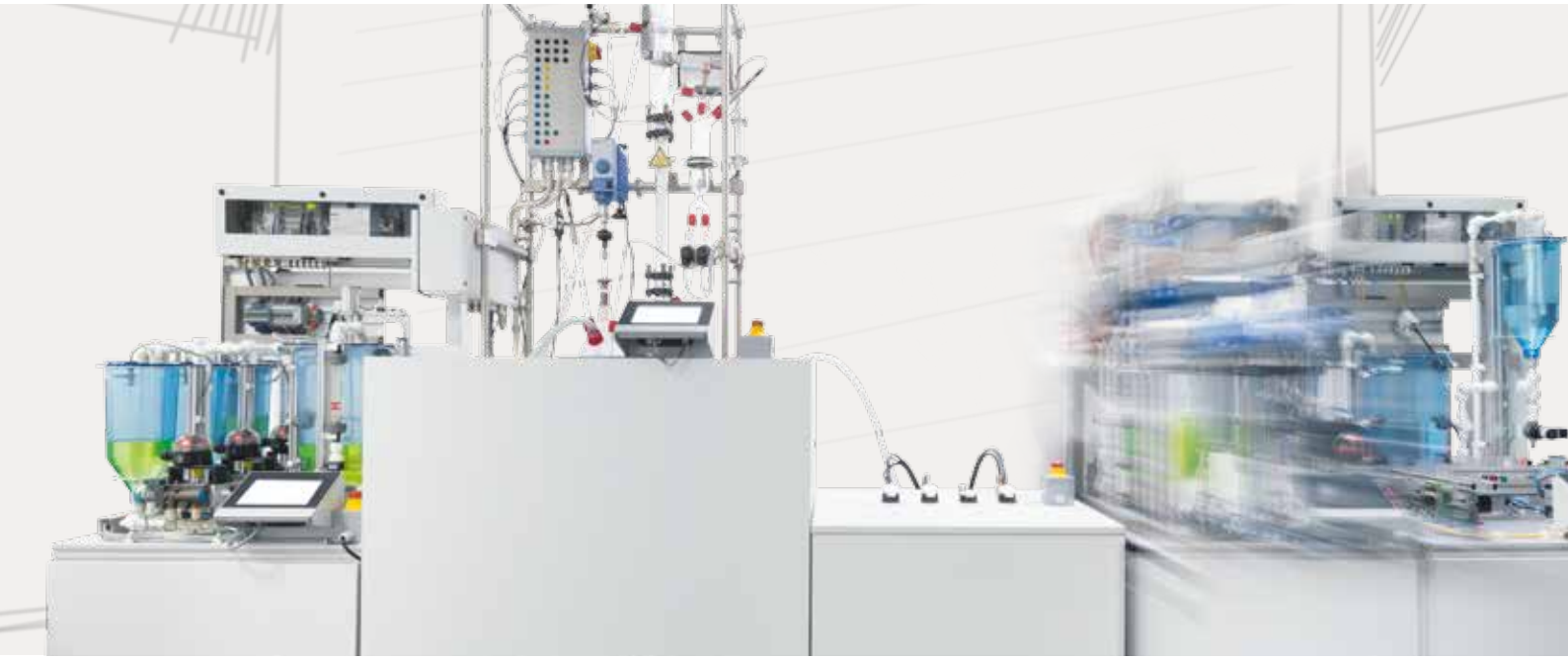
Automation solutions such as the WAGO-I/O-SYSTEM 750 are already available now for recording, capturing and transferring data into a “Manufacturing Execution System” (MES) or product management system. With over 500 modules and the powerful PFC200 Controllers, it offers an appropriate solution for nearly any domain of application. This also applies especially to integration into existing systems.

To maximize resource efficiency during production, you need transparent information on production procedures, performance and quality. And the way to achieve this is by ensuring all components are networked and “speaking” to each other during the value creation process. This process works best with modular automation technology.


MES

INDUSTRY 4.0

Adaptable Production Processes – Engineering in Record Time



Modular Systems

To remain competitive, companies need to respond quickly to changing market conditions. However, this is possible only when the production process can be upgraded and converted flexibly and quickly.

Our solution: DIMA (Decentralized Intelligence for Modular Applications). DIMA makes possible what modular system operators have sought for years: Coupling and uncoupling modules within a control system – without programming. This solution allows modules to be integrated into an application and working in less than three minutes.

The advantages of adaptable production processes are:

- Standardized plug-and-produce solutions
- Reduced engineering time
- Streamlined system planning
- Minimized configuration costs
- Essential Industry 4.0 component

Flexible Automation Solutions with WAGO's PFC Controllers

Versatile and Secure ...

Internet of Things (IoT) applications demand reliable automation technology that heavily emphasizes IT security. Ultimately, production data are a valuable asset that must be well protected. And WAGO focused heavily on this need while developing the PFC100 and PFC200 Controllers. They are characterized by a cross-platform real-time Linux® system, which is available as an open-source operating system that can be scaled and updated. This makes them ideal for use as secure gateways.

The factory-installed Linux® base not only supports essential security protocols, but also ensures that these will be constantly refined thanks to the large Linux® community. WAGO's controllers are not merely simple PLCs capable of transmitting data to the cloud. Rather, they are fully fledged Linux® computers, which also happen to support CODESYS PLC Runtime.

... and Other Benefits

The various interfaces and fieldbuses, such as CANopen, PROFIBUS DP, DeviceNet and Modbus-TCP, can be utilized independent of the manufacturer. All members of the WAGO PFC200 family are also designed to implement the current highest security requirements according to ISO 27000 – depending on the application and the risk analysis.

INDUSTRY 4.0

On the Path to IT Security

IT Security Made by WAGO

Progressive digitization and networking have resulted in production data being transferred along a variety of paths to locations outside the factory rather than remaining where it is produced. Consequently, greater and greater security concerns arise because security mechanisms that were once established according to “defense-in-depth” standards have long since ceased to suffice.

The risk: During connection to higher-level systems or clouds, information can be tapped from outside.

IT Security by DESIGN

WAGO is one critical step ahead with the PFC200 and PFC100 Controllers: These encrypt information right in the controller and provide secure, advanced data transport with comprehensive on-board security mechanisms such as SS/TLS 1.2, SSH, VPN and a firewall.

Closed letter (encrypted information) and sealed letter (encrypted channel)

Open letter (information not encrypted); Information remains secure because it never leaves the factory.

Open letter (information not encrypted)

01 PREVIOUSLY: DATA REMAINED IN THE MANUFACTURING HALL

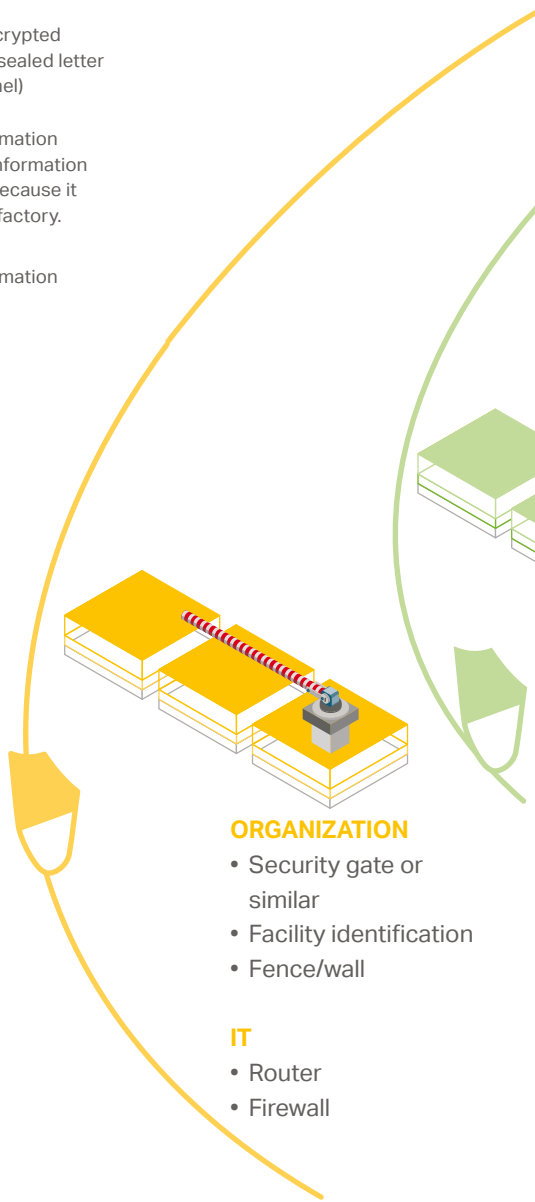
- Low risk of undesired data access
- Machine data sufficiently protected by defense in depth measures

02 DIGITALIZATION: POSSIBLE RISKS FOR DEFENSE IN DEPTH

- Constant availability of data at various locations required for the purpose of continuing digitalization
- Encryption of machine data required
- High risk of unauthorized intrusion through indirect routes, e.g. via external encryption components such as routers and firewalls, and with it the danger of data theft, data manipulation or infiltration with malware

03 THE SOLUTION: DATA ENCRYPTION IN THE CONTROLLER

- Encrypt information directly in the controller with the WAGO PFC100 and PFC200 Controllers
- Secure data transport into the cloud via IPsec or OpenVPN connection
- Optimal protection of machine data against undesired access



ORGANIZATION

- Security gate or similar
- Facility identification
- Fence/wall

IT

- Router
- Firewall

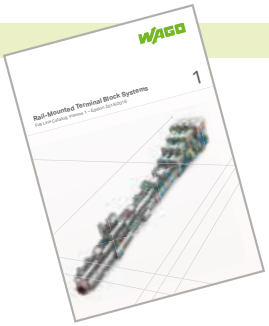
ORGANIZATION
- Access control systems
- USB drives forbidden
- Password regulations

IT
- Physical network segmentation/VLAN
- Switches/router/firewall
- WLAN, WPA encryption

ORGANIZATION
- Role-based accesses
- Personal machine access

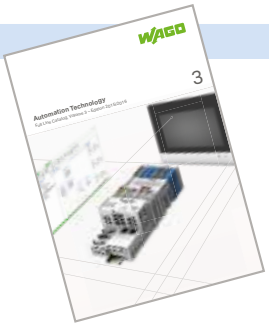
IT
- Segmentation using VLANs
- Switches/router/firewall
- Radius server

All WAGO products shown in this brochure are available in the following WAGO full line catalogs:



Volume 1, Rail-Mount Terminal Block Systems

- Rail-mount terminal blocks
- Rail-mount terminal blocks with pluggable connector (X-COM®-SYSTEM and X-COM®S-SYSTEM)
- Patchboard systems
- Terminal strips
- PUSH WIRE® connectors for junction boxes
- Lighting connectors
- Shield connecting system



Volume 3, Automation Technology

- Software
- Operating & monitoring – *PERSPECTO*®
- Controllers
- Modular I/O-SYSTEMS, IP20/IP67
- Industrial switches
- Radio technology, *TO-PASS*® telecontrol technology
- IP67 sensor/actuator boxes, IP67 cables and connectors

Volume 4, Interface Electronic

- Relay and optocoupler modules
- *JUMPFLEX*® Signal Conditioners and Isolation Amplifiers
- Current and energy measurement technology
- *EPSITRON*® Power Supply System
- Interface modules and system wiring
- Overvoltage protection
- Interface modules with specialty functions
- Empty housings

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60337813 – 0888-0123/0100-6901 – FACTORY BROCHURE 1.0 US – 05/2017 – Printed in Germany – Subject to design changes. Title theme: iStock.com/chinaface

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