COMPLETE line

Build your cabinet with confidence

PHOENIX CONTACT
INSPIRING INNOVATIONS

LIMITED LIFETIME
WARRANTY

BUILD WITH CONFIDENCE

Build with confidence

Our Limited Lifetime Warranty is our promise to you that the products you install in your control cabinets are built to last. In industry and infrastructure, we stand with you. Simply register and relax. Isn't it time you trusted Phoenix Contact to build your cabinet confidence?

Register today at: **www.phoenixcontact.com/LLW**

COMPLETE line
Industrial solutions from sensor to cloud

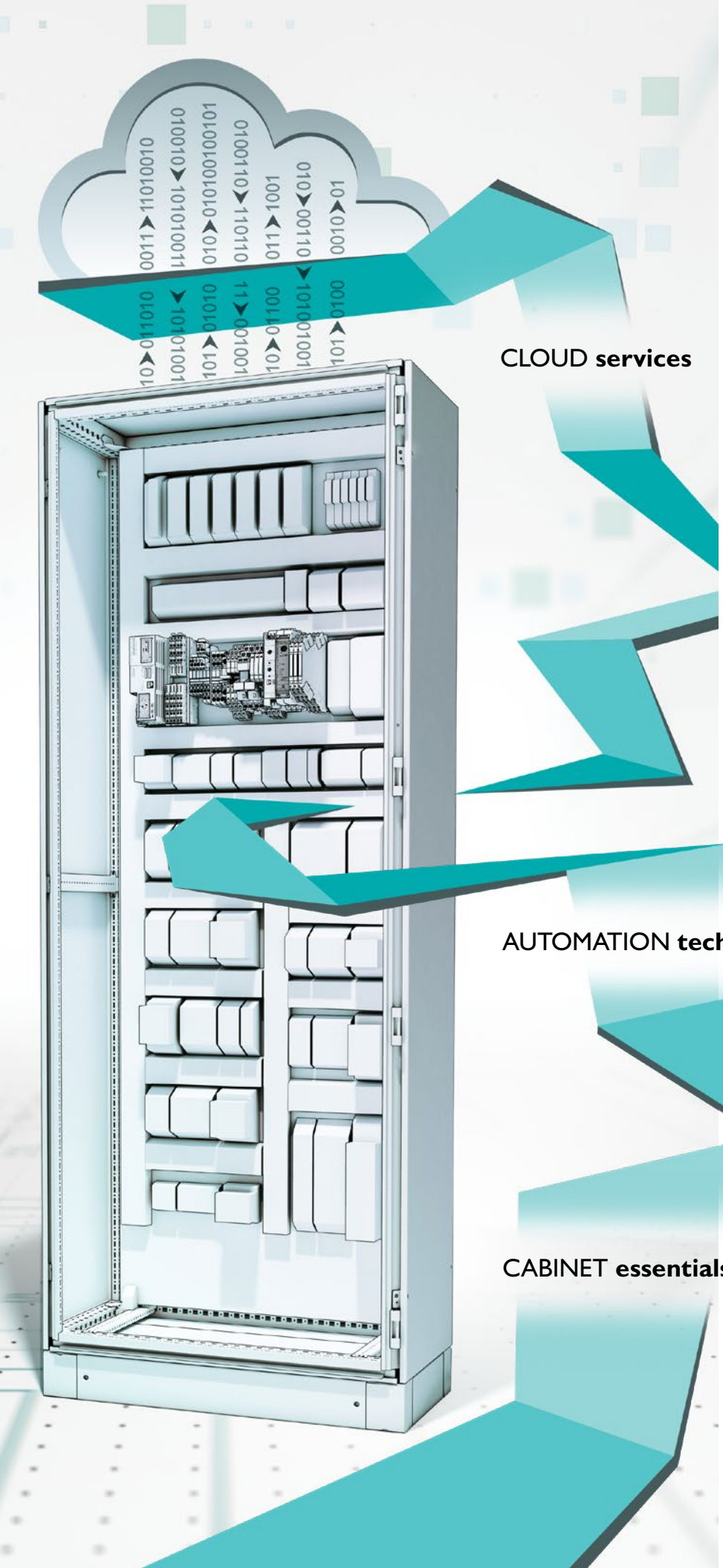
Control cabinet designers must constantly rethink their processes to remain competitive in the market. This often requires extensive research to develop the required knowledge of the latest available technologies. With a proven record of innovation, Phoenix Contact is the perfect partner to support this continual evolution of system design.

Working as a collaborative partner, Phoenix Contact provides comprehensive solutions that enable reliable access to the digital data required to effectively optimize processes and save time. The perfectly coordinated interaction between hardware and software in the COMPLETE line approach streamlines your processes – from initial design, to implementation, to the reliable execution and running of your applications.

COMPLETE **line**

Your advantages

- ☑ Thorough planning and documentation with complete digital data for all projects
- ☑ Interoperable products simplify handling and ensure optimal performance
- ☑ Scalable manufacturing solutions for customized processes



Contents

Power reliability

Don’t over look the basics. Power touches every aspect of a control system, and logic platforms are dependent on proper power and protection. No matter how sophisticated your control system, a “line down” situation is only one power disturbance away.

True power reliability involves protection against surges and overcurrents, conversion of AC to DC while providing redundancy and battery back-up, monitoring for faults, and distributing power to end-devices. Combined, these four elements provide the foundation on which a reliable control system should be built.

POWER RELIABILITY

- Protection
- Conversion
- Monitoring
- Distribution

Power reliability

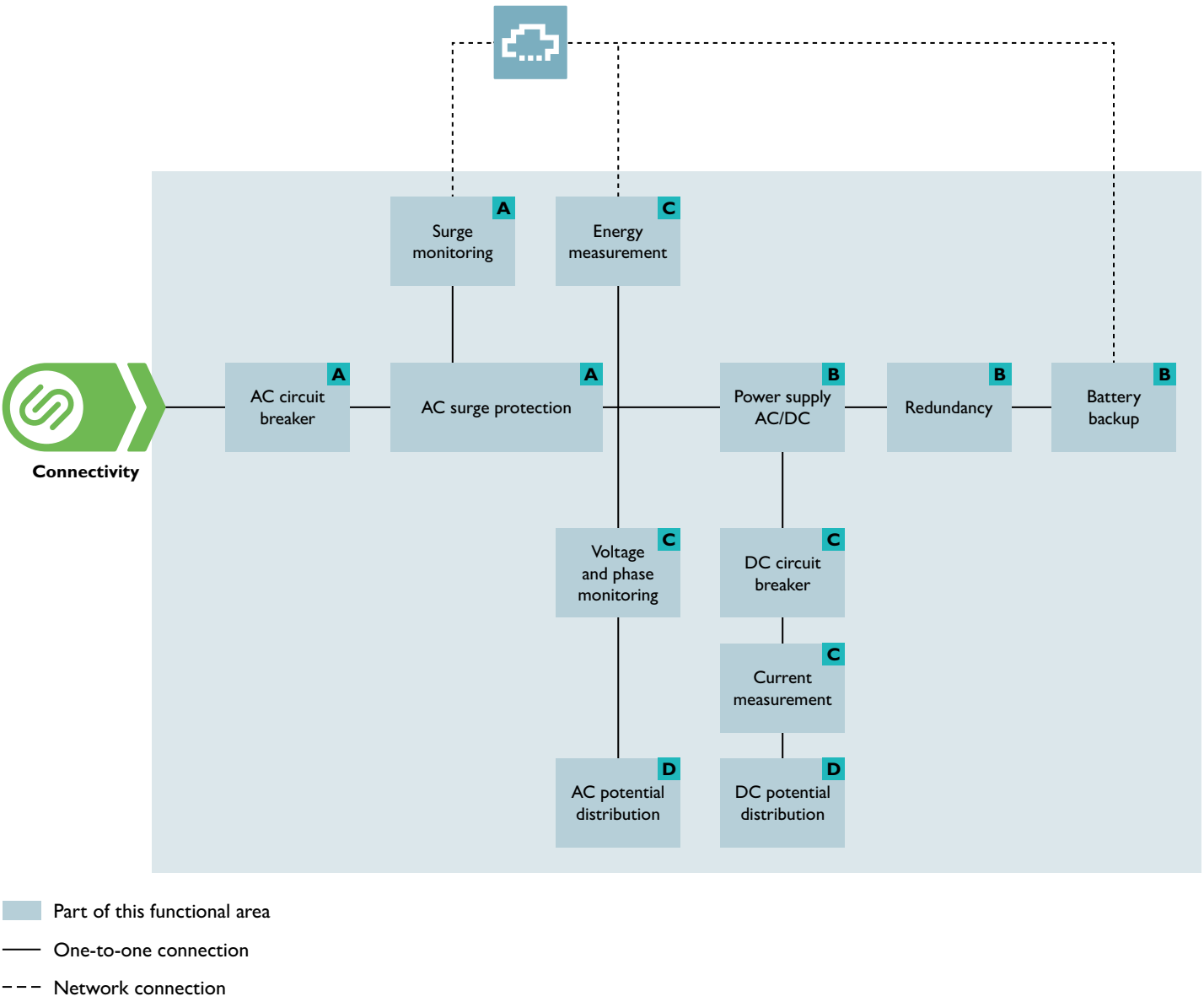
No other function in your control cabinet impacts overall system performance more than reliable power. Phoenix Contact features all the necessary components to reliably protect, convert, monitor, and distribute low-voltage power within your system.

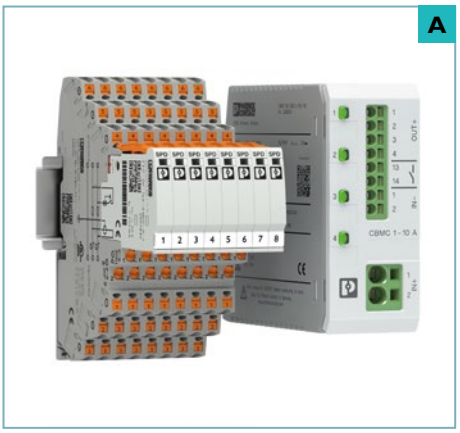
High-performance surge protection and circuit breakers protect equipment from transient overvoltage and overcurrent disturbances. Transmission of those disruptive events to a "cloud" enables preventive maintenance.

Redundant solutions or batteries supplement the DC power supply when needed, thus safeguarding low-voltage power, even in critical situations.

In addition to power reliability, future-proof monitoring systems help to save energy in the overall system.

Innovative solutions for AC or DC potential distribution reduce space requirements and installation times in the control cabinet.

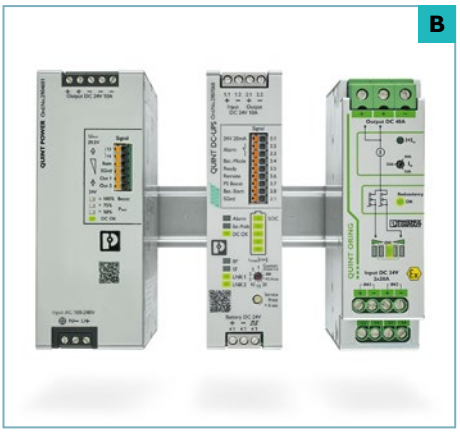




Protection

Maximizing the reliability of systems to maintain uptime is more imperative than ever before. Applications that generate revenue and involve human safety demand operational integrity, and require protection from transient surges and overcurrent conditions that can interrupt such processes.

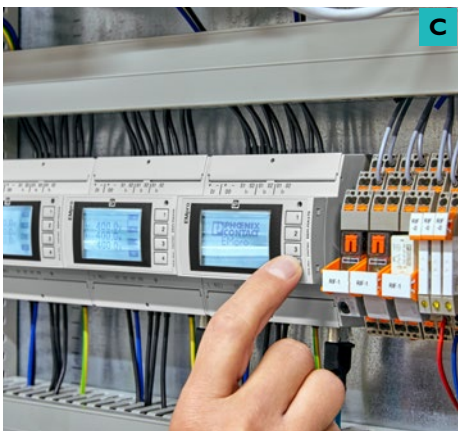
Surge protection devices and circuit breakers from Phoenix Contact address these critical needs through a wide range of products with industry-leading features to enable data-driven decisions.



Conversion

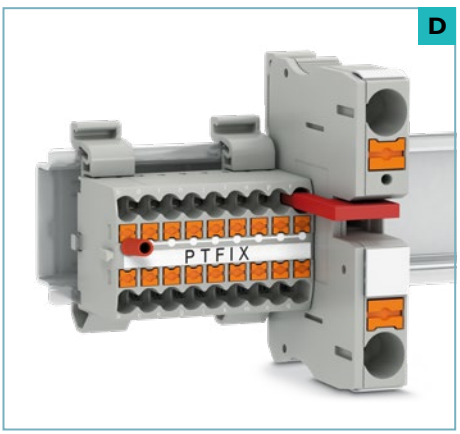
Phoenix Contact's POWER products supply your applications with leading technology and high quality. Power supplies, DC/DC converters, redundancy modules, and uninterruptible power supplies are optimally tailored in design and functionality to the requirements of various industries.

With our QUINT, TRIO, and UNO product ranges, you are equipped to choose a basic, standard, or critical device for your application. These products have attributes and price points to fit any application.



Monitoring

Just-in-time maintenance starts with machine health data. Energy efficiency improvement relies on identifying waste. However, it is impossible to know what is happening or what can be improved within a machine if it is not being monitored. Basic monitoring provides a greater edge in maintaining an efficient, reliable system with minimal downtime.

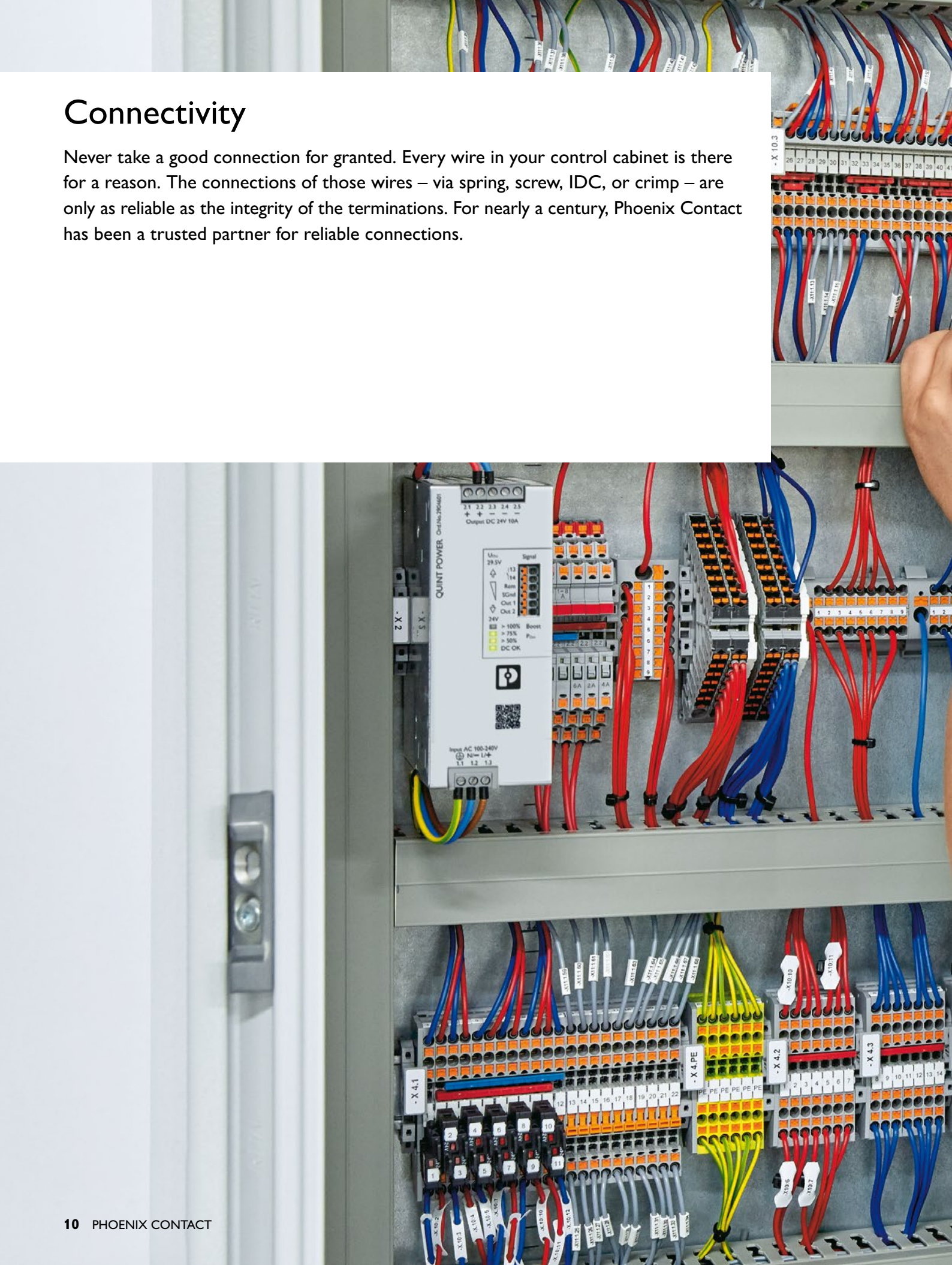


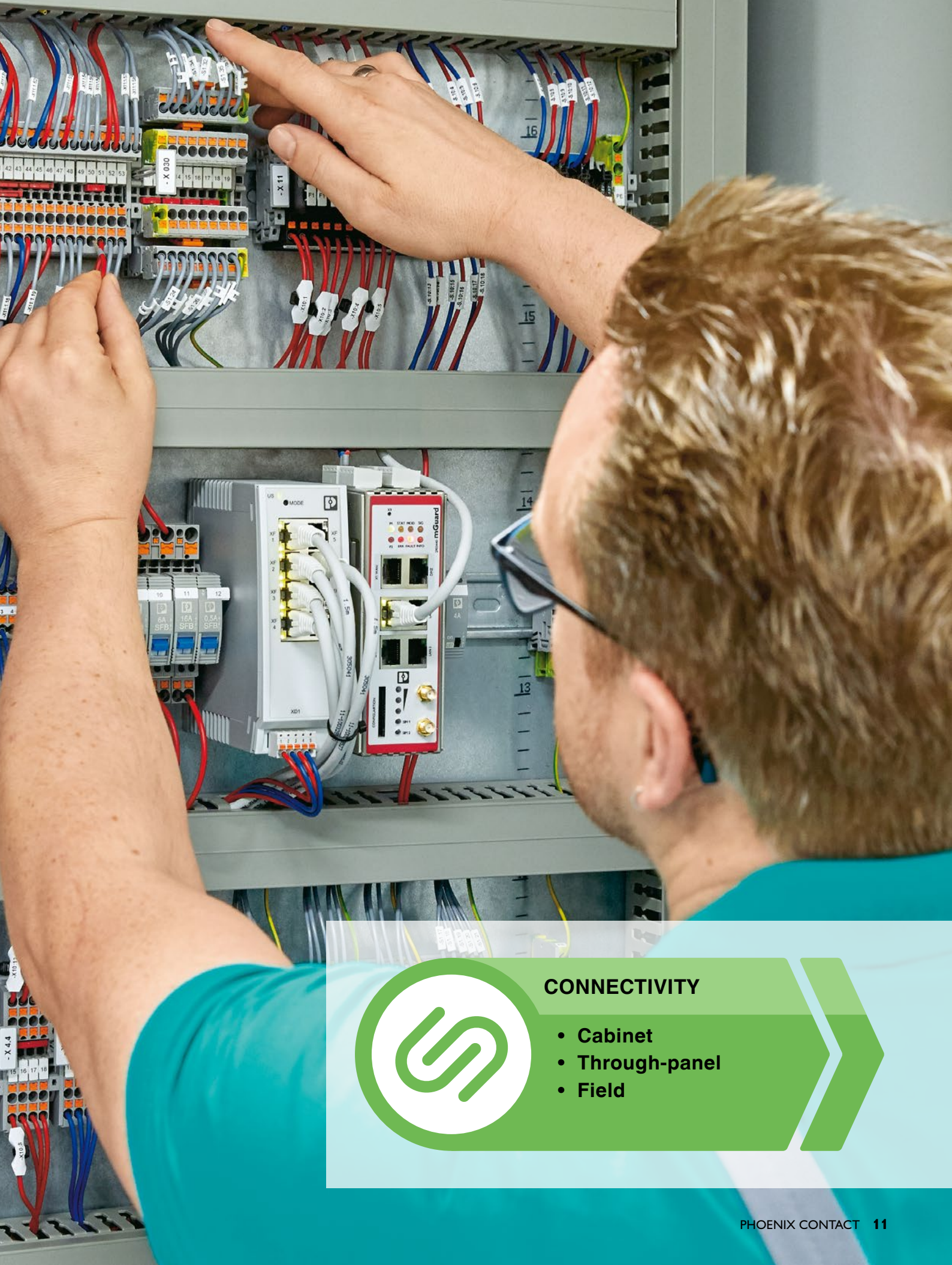
Distribution

It is often said that one should never overlook the basics. When it comes to electrical connections, that couldn't be more true. Every wire in a control system has a purpose – and every connection counts. Phoenix Contact is proud to offer a variety of high-quality power distribution solutions, all built around the industry's most robust connection technologies.

Connectivity

Never take a good connection for granted. Every wire in your control cabinet is there for a reason. The connections of those wires – via spring, screw, IDC, or crimp – are only as reliable as the integrity of the terminations. For nearly a century, Phoenix Contact has been a trusted partner for reliable connections.





CONNECTIVITY

- Cabinet
- Through-panel
- Field

Connectivity

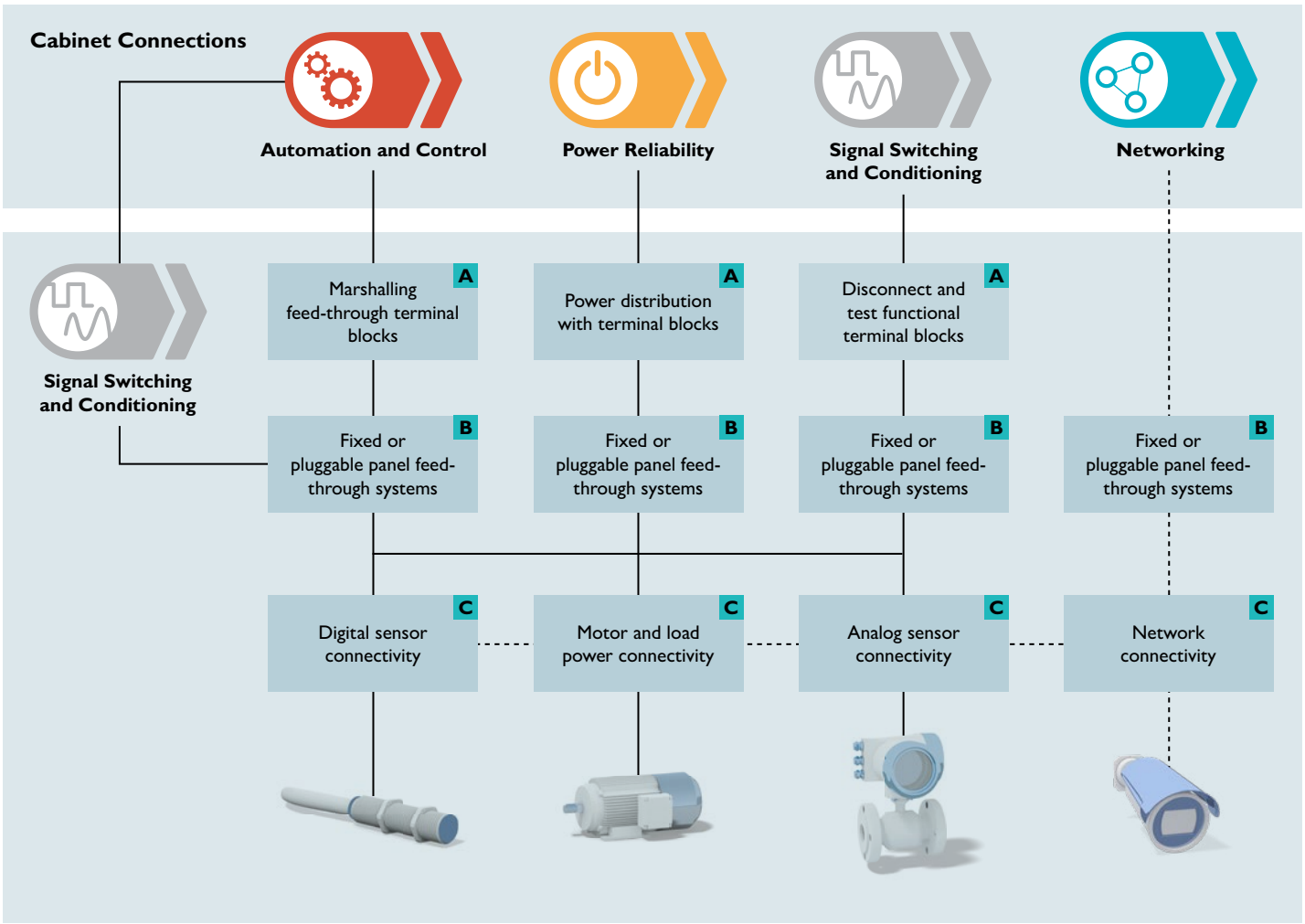
Connections in the cabinet, through the cabinet, and in the field are the bridge between the field-based sensors and logic controlling a system.

The automation and control level reads inputs and drives outputs. These devices must be connected by secure discrete wiring or through networks.

These same devices must be reliably powered, which requires efficient distribution and marshalling to energize and balance loads. Loads can range from small milliamp signals to high horsepower motor connections, depending on the end application.

Analog signals often require special functionality at the connection point, such as testing, measurement, or fusing. Specialty terminal blocks support these functions.

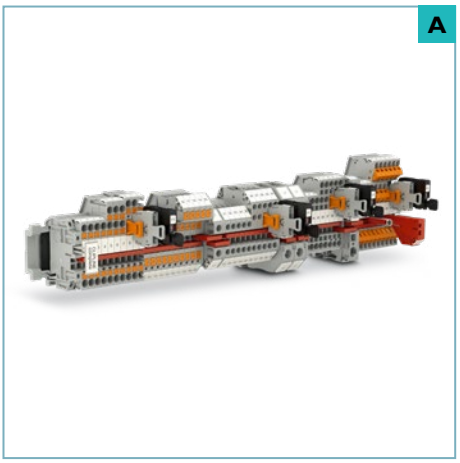
When system complexity and I/Os increase, networking field signals outside the enclosure is often a more efficient way to integrate larger systems than point-to-point wiring.



Part of this functional area

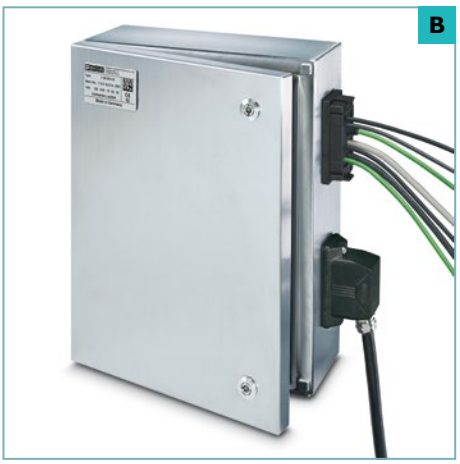
One-to-one connection

Network connection



Cabinet

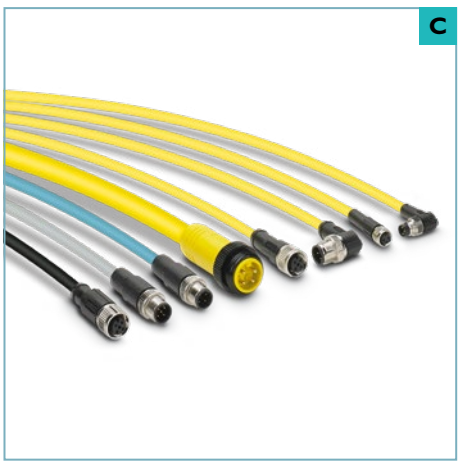
The control cabinet is the operating headquarters for any sophisticated control system. Without an efficient and dependable control cabinet, the performance of circuits and devices powered outside the cabinet may be compromised, and low quality connections will degrade the performance of the entire network. A robust and reliable system begins in the control cabinet, and requires robust and reliable connections.



Through

Products on DIN rail inside an enclosure need to either collect data from, communicate with, or control devices outside of the cabinet. While there are wireless solutions available for some of these transmissions, it's generally not practical or possible to make all connections wireless.

When it comes to making wired connections for power, signal, or data transmissions, there are a seemingly infinite number of solutions available. Fortunately, you can count on Phoenix Contact to provide recommendations on secure, water-tight, and vibration-proof methods to bring cabling from the field into the cabinet.



Field

Every end device needs to be powered, as well as communicate its intended information. Device power can be either AC or DC and range from a few milliamps to hundreds of amps. Sensor connectivity collects field-level digital analog signals and brings them back to the control level. Networks or industrial protocols are used to communicate with devices using the same language.

Signal switching and conditioning

Every signal has a specific purpose and not all signals are the same. And sometimes along the journey, signals may need to be isolated, amplified, or converted to serve their purpose in the system. Ensuring the signal's mission is accomplished can be as simple as choosing a universal product, or might require digging deeper and allowing the application to dictate product selection. Analog signals, digital signals, and motors all require the right product to ensure that the signal gets the job done.

SIGNAL SWITCHING AND CONDITIONING

- Analog
- Digital
- Motor switching

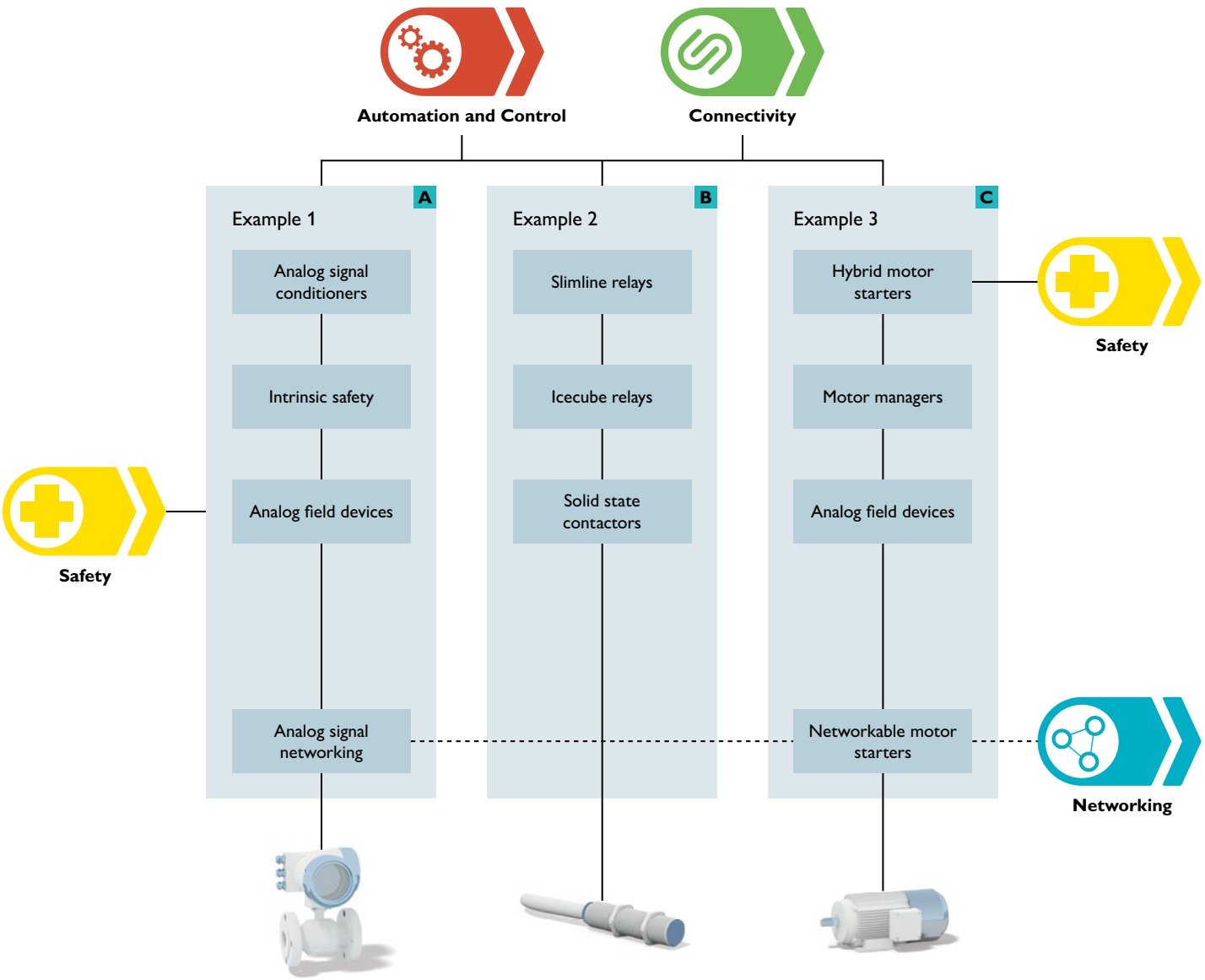
Signal switching and conditioning

The COMPLETE line system provides all the necessary products for the reliable transmission of signals. From controller and connectivity solutions to sensors and motors, this group of products ensures the right switching at the right time.

Analog signals can be switched and/or conditioned in the industry-leading 6.2mm housing. And if safety is the goal, look to the C1D2, ATEX, and IECEx-rated signal conditioners. (Example 1)

Digital signals remain the heartbeat of most industrial demands. Being able to engage with sensors and actuators is critical, and our extensive relay portfolio enables functions from basic switching to easy I/O automation. (Example 2)

Motor switching's hybrid compact products can safely and reliably switch loads practically wear-free over a very long service life. When integrated into networks, this technology can share performance data, allowing predictive maintenance and added safety for every connected motor. (Example 3)



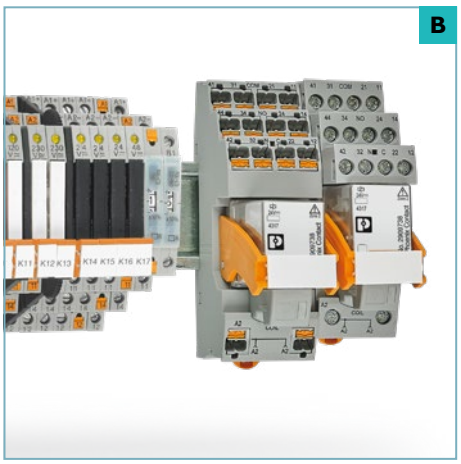
Part of this functional area

One-to-one connection

Network connection

Analog

Analog signals establish the backbone for many processes and industries. These signals transmit information such as temperature, compression, position, flow, level, frequency, pH, and more. The origin of these signals is often transducers that are typically embedded in a process out in the field. Phoenix Contact has a variety of solutions to convert, display, isolate, and network analog process data. Analog devices for field applications reduce installation efforts and increase uptime and safety.



Digital

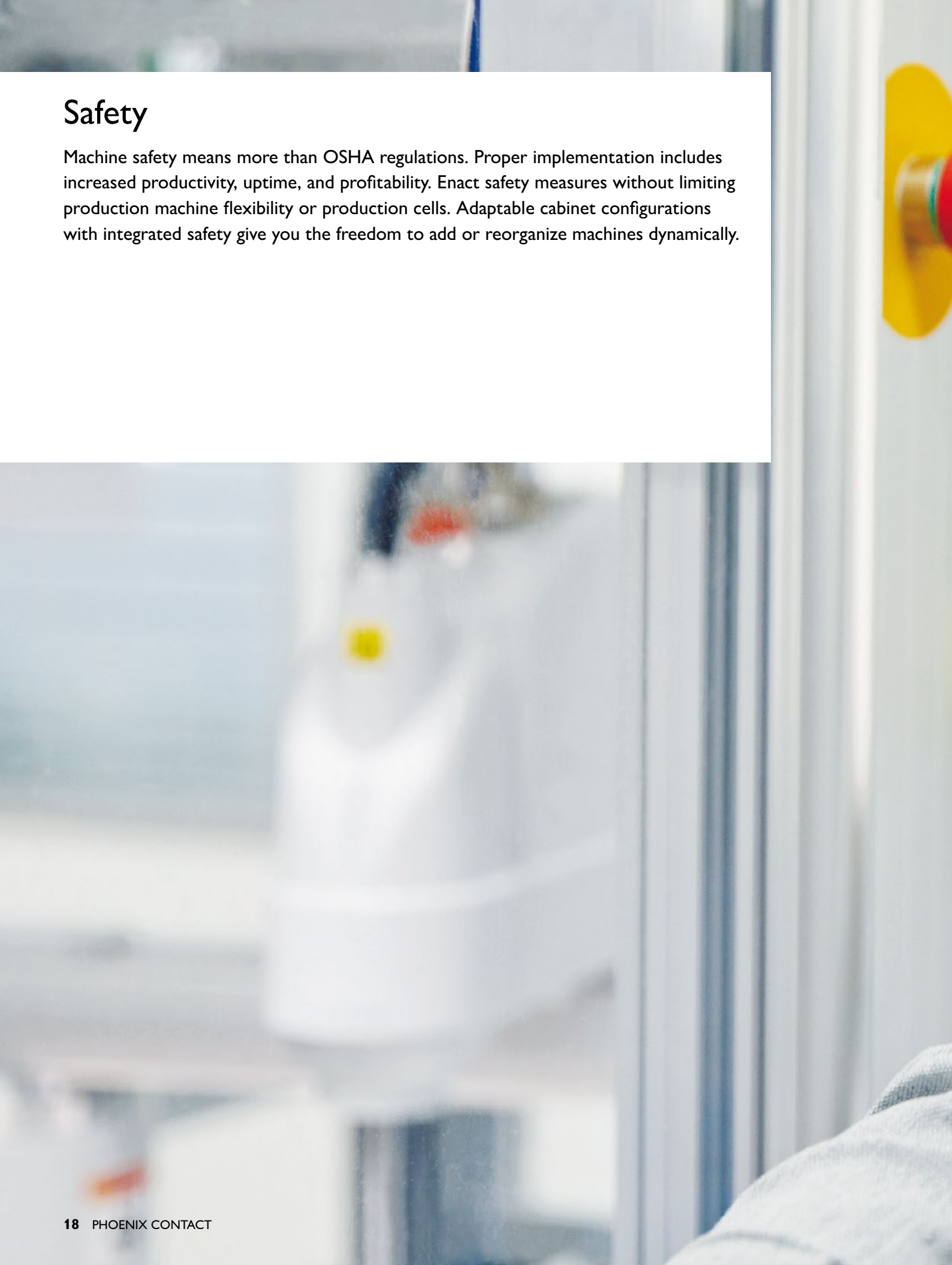
The most basic function of the industrial relay is to act as an interface module to switch something from one state to another. Phoenix Contact products do that and much more. The need to switch, isolate, amplify, or convert digital signals can be found in every industry, and our wide range of products offers a variety of cost-effective solutions to meet all requirements, from simple switching to more advanced control.

Motor switching

Electric motors are used in virtually all industrial applications, from pumps and fans to conveyors and controlling movements. Phoenix Contact offers an innovative take on motor switching technology with CONTACTRON hybrid motor starters. Further monitoring and advanced control of motors can be realized with the motor manager suite of products. By combining the functionality of traditional starters with intelligent, long-life switching devices and advanced monitoring capabilities, our solutions save significant space and operational cost. This leads to a more productive, profitable, and IIoT-ready system.

Safety

Machine safety means more than OSHA regulations. Proper implementation includes increased productivity, uptime, and profitability. Enact safety measures without limiting production machine flexibility or production cells. Adaptable cabinet configurations with integrated safety give you the freedom to add or reorganize machines dynamically.



SAFETY

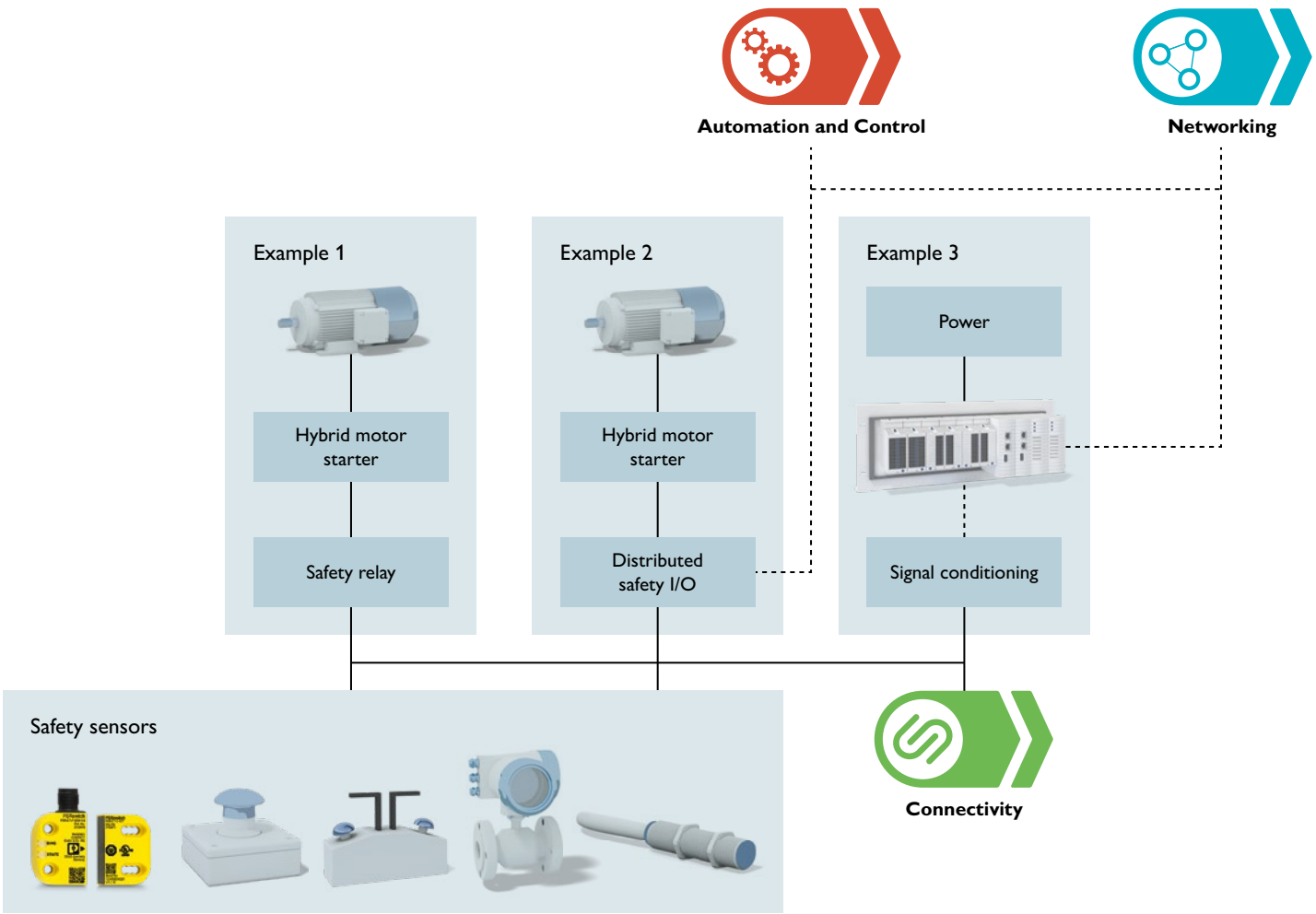
- **Machine**
- **Process**

Safety

Functional safety management starts at the top and should encompass an entire company strategy. In application, safety is applied in two major areas: Machine and Process.

Machine safety can be as simple as a single safety sensor tied to a safety relay controlling a motor, or as complex as multiple fail-safe PLCs with distributed safety I/O networked throughout a factory. No matter how large your system, it will always have three pieces: Inputs, outputs, and logic. (Example 1)

Process safety is usually larger in scope, and therefore inherently more complex. In addition to controlling inputs and outputs (Example 2), some signals from the field come from explosive areas and need to be properly conditioned. Over-voltage protection and power redundancy also become necessities in a continuous process. (Example 3).



Part of this functional area

One-to-one connection

Network connection

Machine

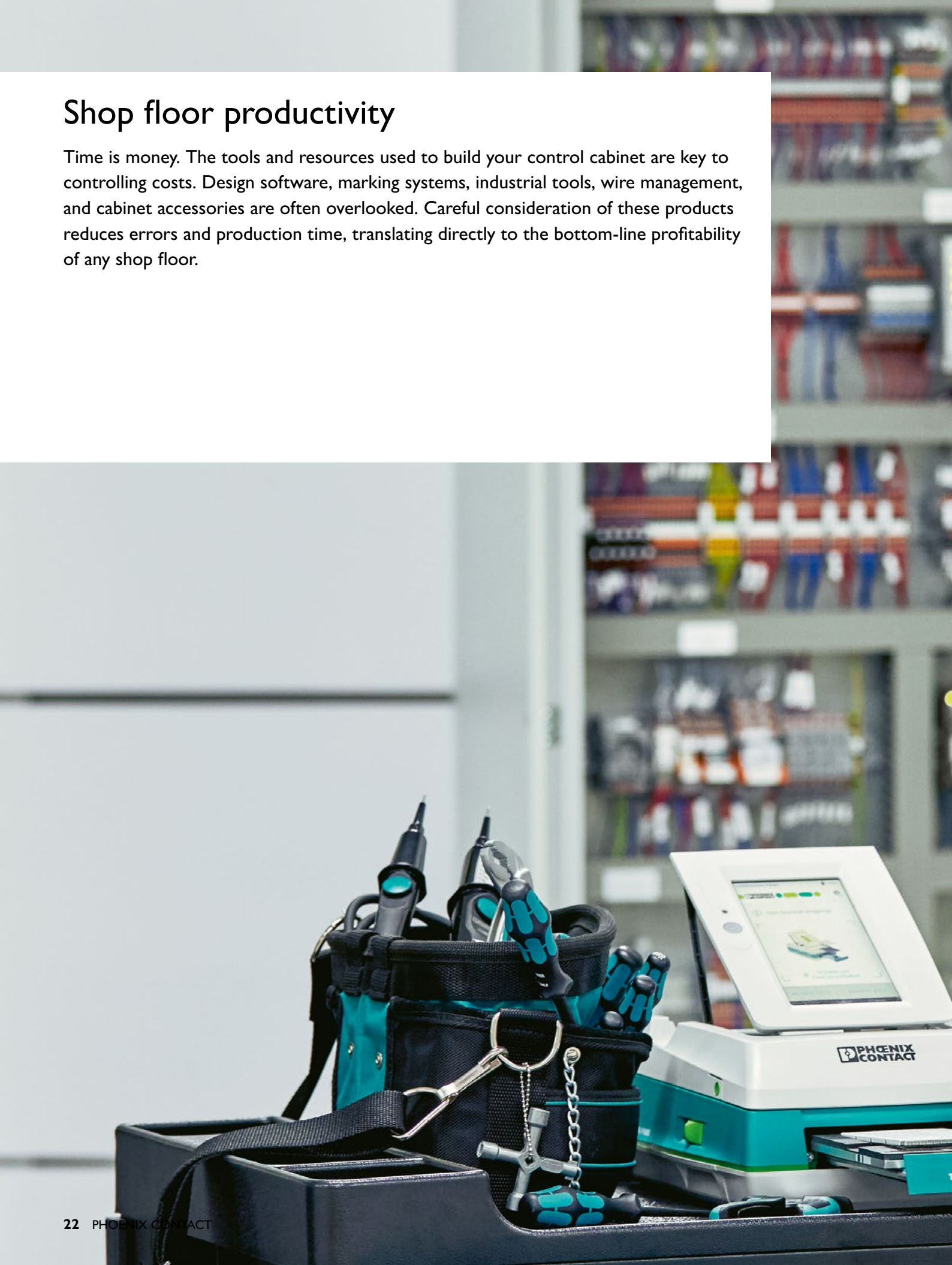
Protect your machine with the required building blocks of functional safety. Sense, decide, and control the hazardous energy in your system utilizing inputs, logic, and outputs. The compact PSR switch is an electronic coded safety switch for flexible safety door and position monitoring. Thanks to the integrated RFID technology and intelligence, it provides maximum protection against manipulation and the highest level of safety. From the world's smallest, 6.8-mm-wide PSRmini safety relay up to the innovative SafetyBridge distributed safety system, you can customize and tailor safety logic to the demands of your system. The CONTACTRON safe hybrid motor starters combine up to four functions in one device: Emergency stop, motor starter, reversing function, and motor protection against overload.

Process

Safety Integrity Level (SIL) is a measure of safety system performance in terms of the probability of failure on demand. The SIL rating of a device reflects the degree of reliability in which the product has to fail safely. As the SIL increases, the safety level of the product increases, meaning the probability that the system will fail to perform properly decreases. Often used in the processing industry, SIL provides intricate safety regulations to ensure the avoidance of catastrophic accidents and errors that can be detrimental to the most stringent operations.

Shop floor productivity

Time is money. The tools and resources used to build your control cabinet are key to controlling costs. Design software, marking systems, industrial tools, wire management, and cabinet accessories are often overlooked. Careful consideration of these products reduces errors and production time, translating directly to the bottom-line profitability of any shop floor.

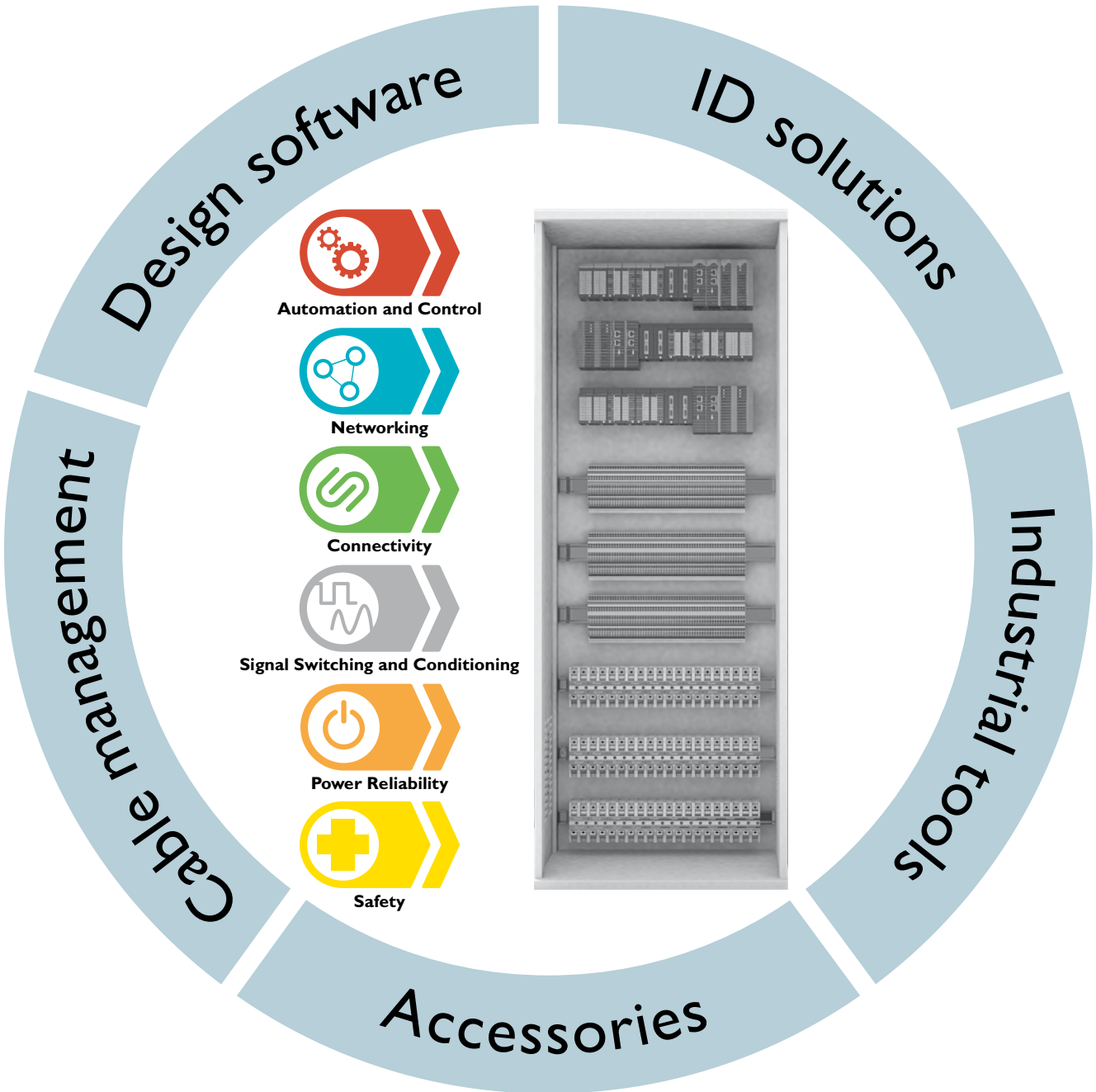


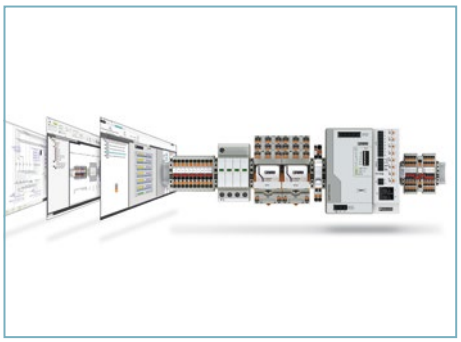
SHOP FLOOR PRODUCTIVITY

- Design software
- ID solutions
- Industrial tools
- Cable management

Shop floor productivity

All aspects of your cabinet design and build will require tools and equipment on the shop floor. Wires and components in and around the cabinet will need to be processed, organized, and identified. This family of products ensures the production of a high-quality cabinet.



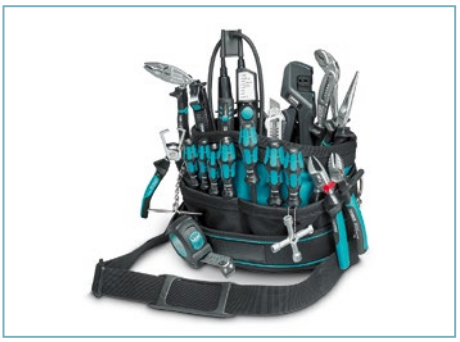


Design software

Increasing productivity begins with a good cabinet design. Phoenix Contact's rail assembly and marking design software suite is a free, easy-to-use tool to get you started. This allows you to easily design a DIN rail assembly, add accessories, and run auto-correction to ensure you have a correct layout. Then use the marking software to design and print on any of our labeling materials.

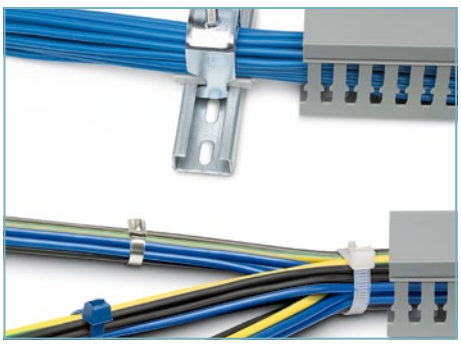
ID solutions

When it comes to printing, we offer a full line of desktop and portable printers for high- or low-volume projects. Our product line includes laser, ultraviolet, and thermal transfer technology printers. With an array of markers and labels for components, wires, as well as the inside and outside of the cabinet, all of your printing needs are covered.



Industrial tools

Phoenix Contact offers a variety of industrial tools to assist with all facets of control cabinet assembly, including the painstaking task of wire termination. Choose from a variety of manual and semi-automatic wire cutting, stripping, and crimping tools. Selecting our electric bench-style devices not only reduces fatigue, it also increases your bottom line. Trust Phoenix Contact tools to bring everything in your cabinet together.



Cable management

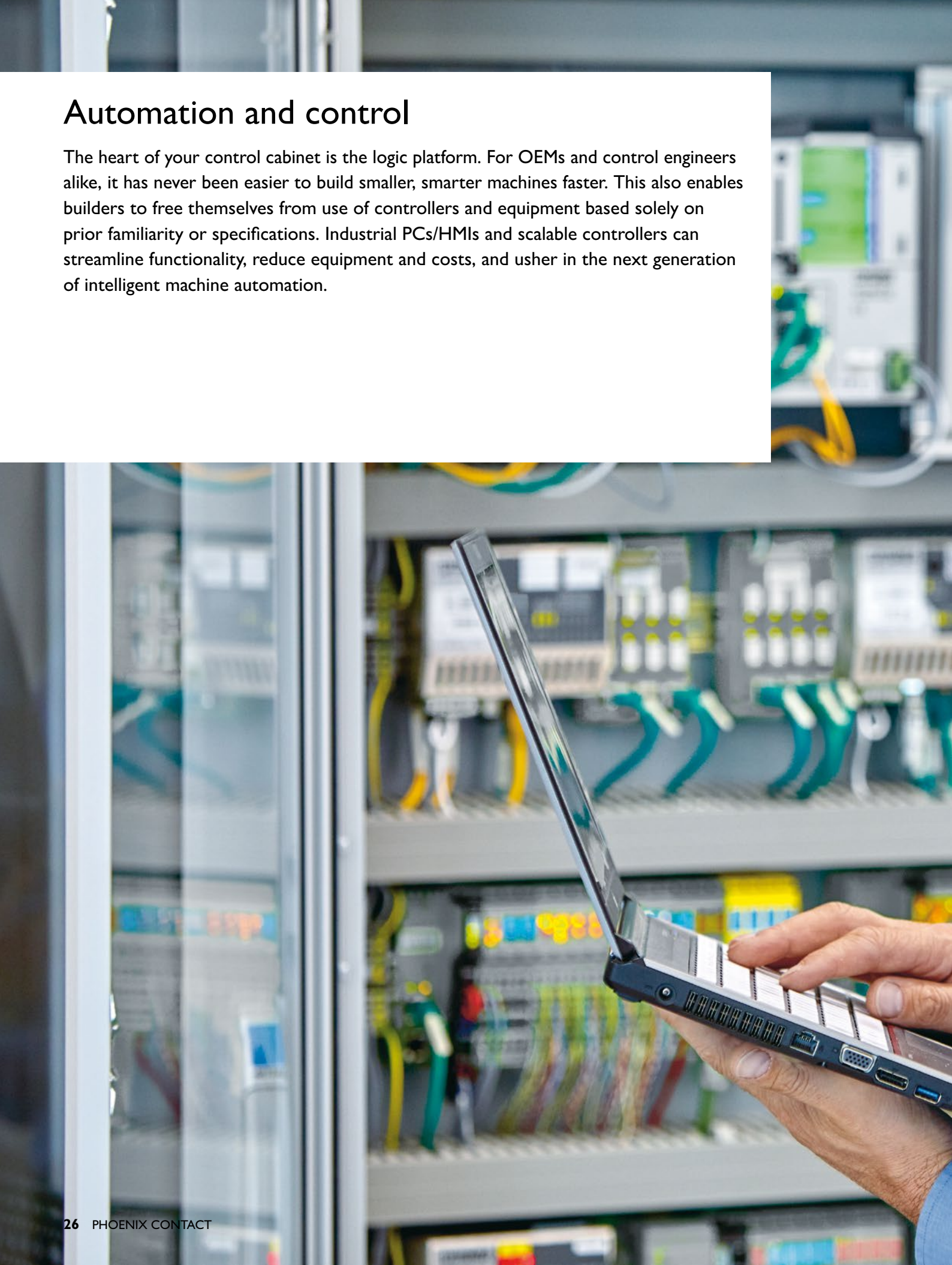
Easily route large amounts of wire in an organized way. Narrow, finger-channel wire duct with matching covers are available as a single part number for convenient ordering. In addition, we have a variety of cable ties, cable routing, and protection hoses that include plastic and stainless-steel options.

Accessories

Cabinets require accessories to help reduce and secure components and wiring, provide easy access to electrical outlets, and improve lighting. UL 508 power outlets come completely assembled in a single or dual touch-safe box. Our LED cabinet lighting provides enhanced visibility to aid the maintenance process. In addition, we offer a variety of DIN rail, including raised rail.

Automation and control

The heart of your control cabinet is the logic platform. For OEMs and control engineers alike, it has never been easier to build smaller, smarter machines faster. This also enables builders to free themselves from use of controllers and equipment based solely on prior familiarity or specifications. Industrial PCs/HMIs and scalable controllers can streamline functionality, reduce equipment and costs, and usher in the next generation of intelligent machine automation.



AUTOMATION AND CONTROL

- Programmable controllers
- Industrial PCs/HMIs
- Remote I/O

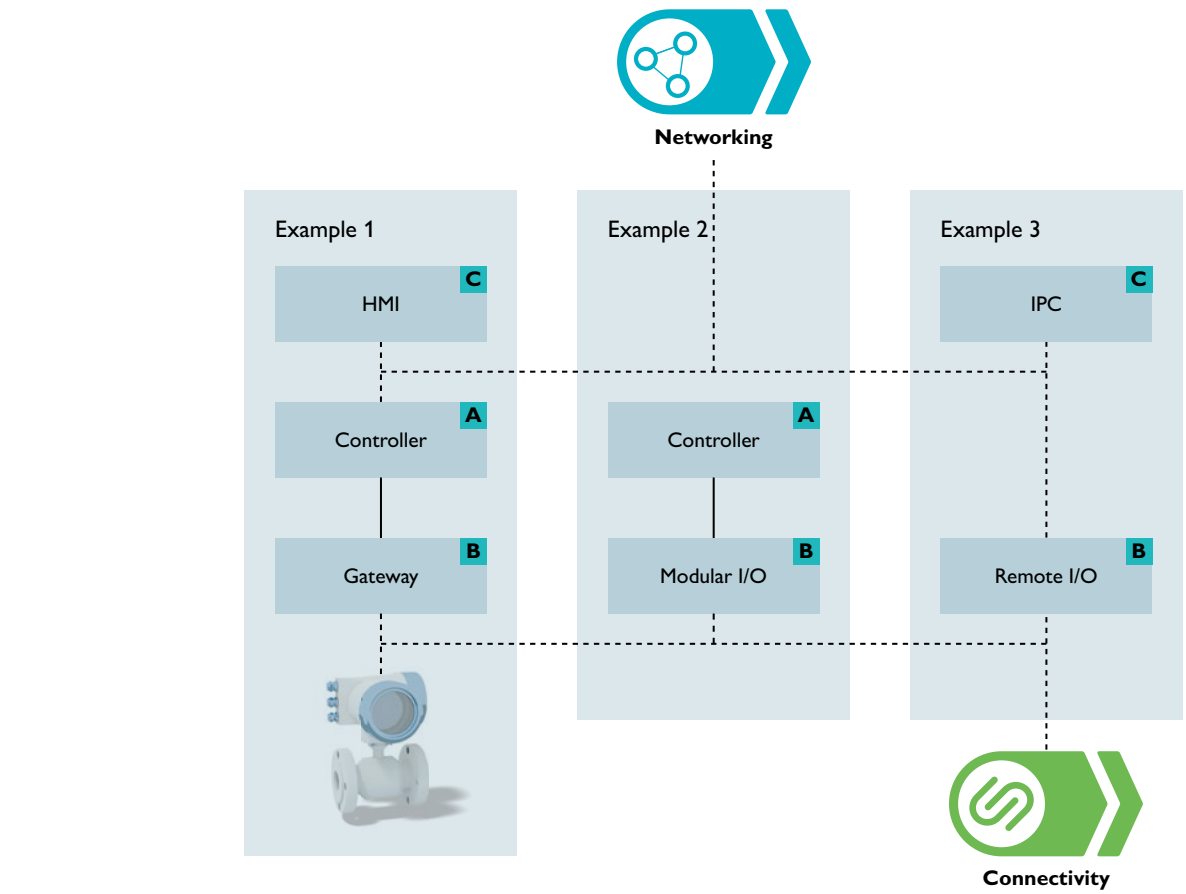
Automation and control

Control systems can range from simple, single-function control to real-time SCADA applications. Below, three application examples are depicted.

In the first example, we have an application where the PLC has been updated and an HMI has been included for visualization. A gateway is used in order to connect with the legacy devices in the field. (Example 1)

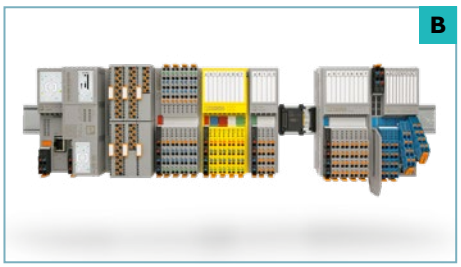
The next system represents a compact PLC and modular I/O combination. I/O can be added directly to the PLC module or distributed in the network. This is a modern and powerful control solution. (Example 2)

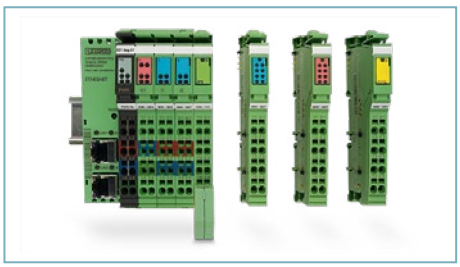
In the final example, an industrial PC is being used as a controller and is connected to remote I/O in the system. The industrial PC offers more performance from the CPU in an open and more configurable platform. (Example 3)



Programmable controllers

Programmable Logic Controllers (PLCs) from Phoenix Contact are scalable from a simple RTU or data-logger to bumpless, redundant, high-performance automation packages for the most demanding applications. Development is made easy by using either the PC WORX standard IEC 61131 environment or the software platform of your choice with high-level languages (C++, C#, MATLAB, etc.) by using PLCnext Technology. Test and simulation tools, integrated visualization software, and diagnostic tools give developers, users, and technicians an unprecedented level of insight into the running system, along with plenty of flexibility while developing the system.





Remote I/Os and gateways

Let Phoenix Contact help you monitor and control I/O via common industrial protocols like Modbus, PROFINET, PROFIBUS, EtherCAT, and EtherNet/IP. Whether in the cabinet (IP20) or in the field (IP67), Phoenix Contact offers several I/O and gateway variants to meet all your application requirements, including standard digital and analog I/O, as well as safety, intrinsically safe, IO-Link, and special-function applications.

Industrial PCs and HMIs

Industrial PCs from Phoenix Contact are available in a variety of performance classes, screen sizes, and form factors, such as blind-node configurations. Their powerful CPUs, fan-less design, and nonrotating, solid-state drive options make them rugged and reliable, even in the most demanding applications. A wide variety of HMI operator panels connect easily to third-party PLCs. A new generation of HTML5-based web panels connect securely to any web server by simply entering the IP address.

Networking

The modern factory, driven by IIoT and big data, has given rise to increased network traffic and subsequent vulnerabilities and risks, both internal and external. Resilient network infrastructure starts with the correct selection of switches, cellular and wireless radios, and security appliances to maximize efficient and resilient communication, enable secure remote access, and prevent network breaches.

NETWORKING

- **Ethernet infrastructure**
- **Network security**
- **Remote connectivity**
- **Wireless**

Networking

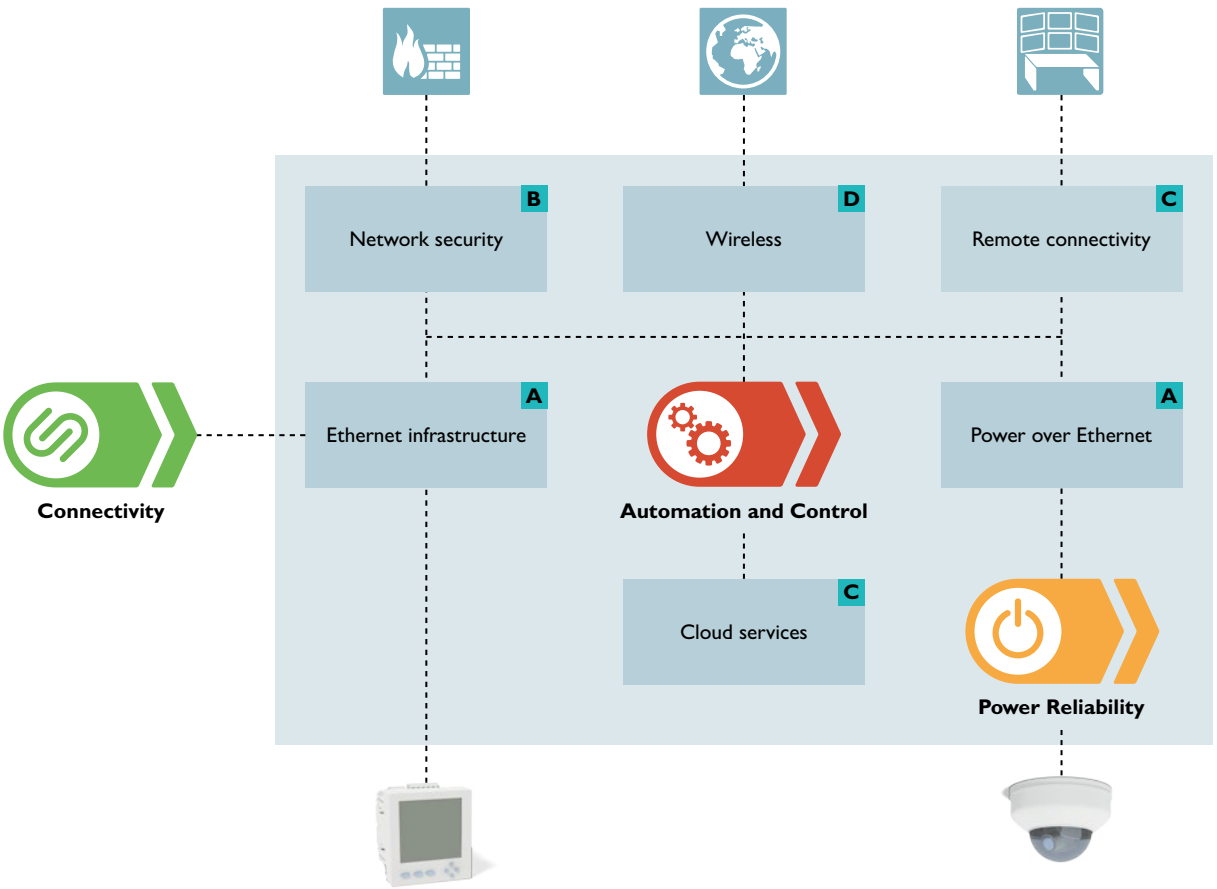
With the broad range of technologies supported by Phoenix Contact networking and security products, you can design and implement scalable, reliable, and high-functioning systems.

Ethernet infrastructure devices provide everything from basic connectivity to advanced managed switches, with options that include powering end devices, field-wiring connectivity, and converting between physical media.

With network security, proper separation of IT and OT networks can be achieved along with providing defense-in-depth to ensure critical assets are protected by state-of-the-art technology.

Cellular remote connectivity powers communication with devices around the globe, while the increasing capabilities of cloud services provide the support and data management that is behind IIoT.

Wireless technology enables convenient, reliable, and cost-effective communication whether on the factory floor or to remote sites miles away.



Part of this functional area

One-to-one connection

Network connection

A

Ethernet infrastructure

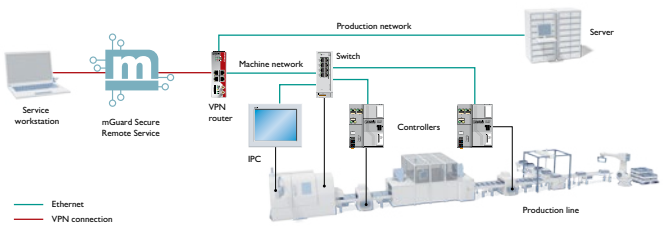
Whether wired or wireless, fiber or copper, Ethernet or serial, your network infrastructure is the backbone of communication and the means for moving data that is the lifeblood of any application.

B

Network security

The trend of smart factories means the convergence between operational technology (OT) and informational technology (IT) actively sharing data. This connectivity impacts the security of critical industrial control systems (ICS). Protecting your industrial network and critical processes in this complex world is essential to a secure and resilient application.

C



Remote connectivity

Industrial applications typically involve equipment and assets located in remote locations. Whether for an OEM looking to provide support to their customers or an asset owner looking to store and analyze production data, industrial cellular hardware and cloud services provide valuable platforms for remote connectivity.

D

Wireless

Today's communication needs often extend beyond hardwired networks. Whether it is wireless Ethernet, long range point-to-point, or remote signal acquisition, today's technologies allow fast, reliable, and secure communication wherever it is required.

Your trusted partner for digital transformation

The world is changing. Digital transformation is occurring throughout every industry as organizations realize the cost benefits and new revenue streams generated by connected technologies. Phoenix Contact has acknowledged this macrotrend and offers a wide breadth of products, software, and professional services to help you achieve your business objectives with IIoT.

Products and services designed for IIoT

Minimizing unplanned downtime, preventing costly service calls, improving overall equipment effectiveness, remote diagnostics, over-the-air updates, preventative maintenance, and improved operational insight are all benefits from digital transformation and the Industrial Internet of Things. Phoenix Contact has a wide breadth of products, software, and professional services to help achieve your business objectives through IIoT.

IIoT edge computing

PLCnext Technology and industrial PCs live on the edge of a network to collect, compute, and transform industrial data into IoT-ready data. Create your own application or install a third-party SDK to send data to public clouds, private clouds, or on-premise servers.

Software applications

The PLCnext edge gateway software application is designed to simplify the process of getting data from industrial control systems to the cloud. Default cloud connections include Proficloud, AWS, Azure, and Google IoT.

Professional industrial cloud

The Proficloud is a professional IIoT platform optimized for easy data visualization and storage. All PLCnext devices come standard with check-box connectivity to Proficloud.

Secure remote access

The award-winning mGuard Secure Cloud provides simple yet secure remote access to industrial machines and networked devices.

Smart energy monitoring

EMpro energy measuring devices acquire and communicate energy data to higher-level control and management systems. The integrated REST interface and direct connection to the cloud pave the way to the digital world and the Internet of Things.

Professional services

Whether it's a small machine upgrade, a network security assessment, or a complete digital transformation project, our technology and industry experts can provide help and guidance to achieve your business objectives.

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Ongoing communication with customers and partners worldwide

Phoenix Contact is a global market leader based in Germany. We are known for our future-oriented components, systems, and solutions in the fields of electrical engineering, electronics, and automation. With a global network reaching across more than 100 countries with over 17,400 employees, we stay in close contact with our customers, something we believe is essential for success.

Our wide variety of innovative products makes it easy for our customers to find future-oriented solutions for multiple applications and industries. We focus predominantly on the fields of energy, infrastructure, process, and factory automation.

You can find your local partner at

www.phoenixcontact.com

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