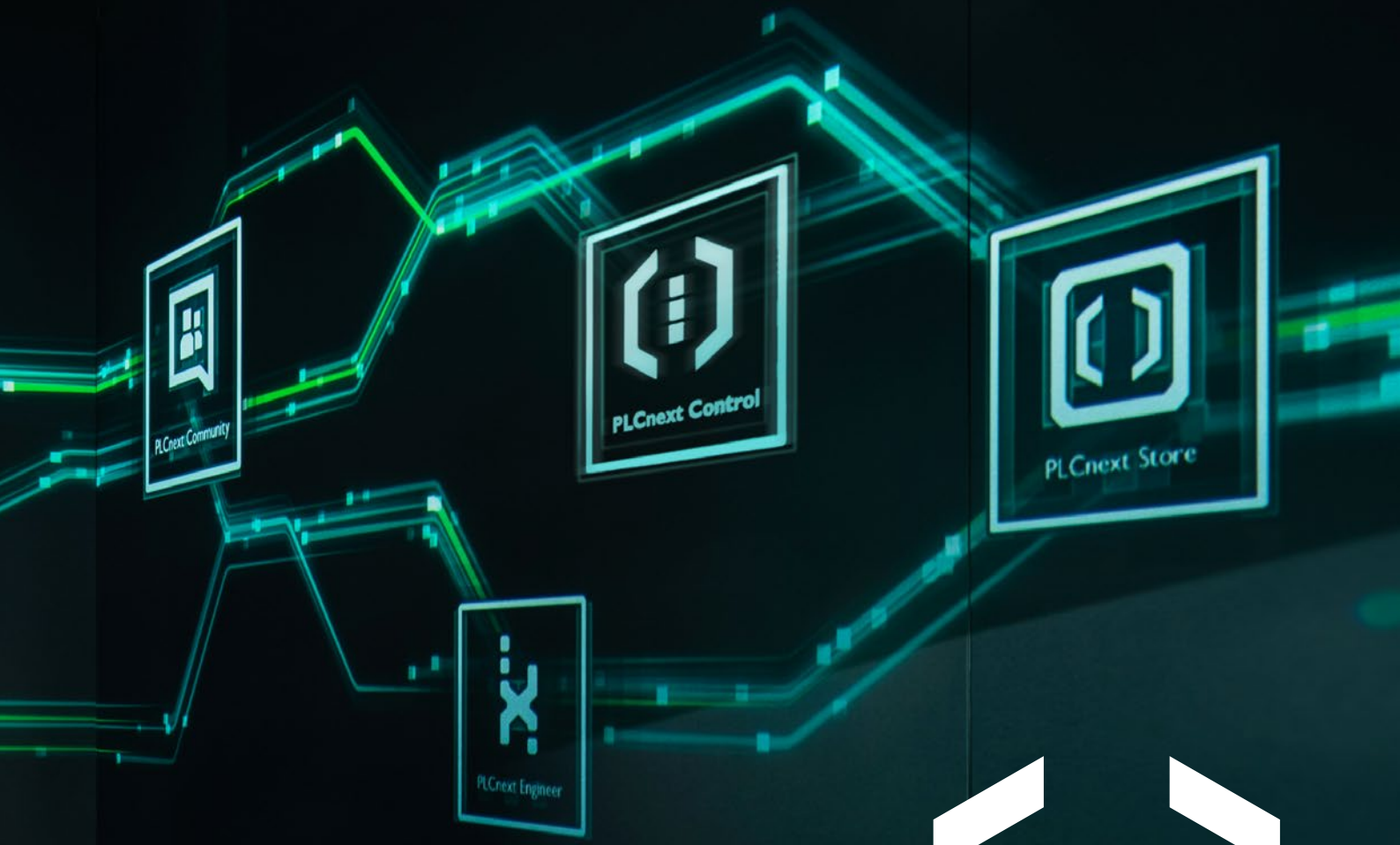
PLCnext Technology

Designed by Phoenix Contact



PLCnext Technology

Ecosystem for limitless automation

Open to the future

Automation is currently experiencing an unprecedented global paradigm shift. The digitalization, networking, and globalization of business and technical systems are generating new market requirements. Classic system structures are developing into globally interlinked production systems. The pace of innovation is increasing rapidly, technologies are converging, and products and infrastructures are becoming more intelligent. Young engineers and software specialists are shaping new working methodologies, and cloud and edge computing are making forward-thinking industrial business models possible.

For many companies, this means rethinking and changing processes. In particular, many advancements and innovations will arise from communities and the creativity of many people sharing ideas. Flexibility and efficiency are becoming the most pressing requirements for us all. This means we need to reuse what has already been developed and proven, and have complete openness. Openness in thinking and openness of systems.

This is why we have developed PLCnext Technology. PLCnext Technology is an open ecosystem that extends the use of familiar PLCs in ways that will change the future of industrial automation.

plcnext-community.net

Contents

You will find buttons throughout this e-paper that enable further interaction. Watch videos, view our products in 3D, and get more detailed information on our products in our web shop.

Link

Product info

3D object

Video

Blog/forum

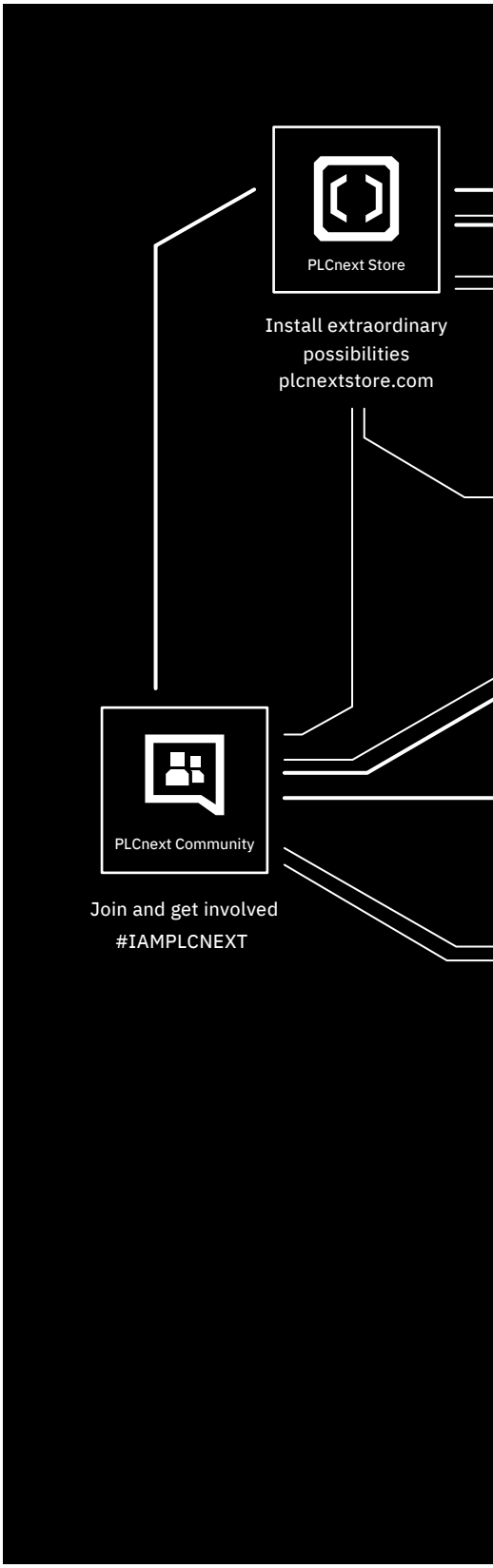
The ecosystem

PLCnext Technology connects the IT and OT worlds

PLCnext Technology is the ecosystem for industrial automation, consisting of open hardware, modular engineering software, a global community, and a digital software marketplace. This combination makes it easy to adapt to changing demands and enables efficient utilization of existing and future software services, swarm intelligence, and technologies.

The precisely tailored design of the open automation system is just as important as flexible, modular expansion. In addition to standard PLC programming in accordance with IEC 61131-3, parallel programming and the combination of programming languages such as C/C++, C#, and Matlab® Simulink® in real time is also possible with PLCnext Control. Accelerate your application development process with the free basic version of PLCnext Engineer. Or use your familiar programming environment – you decide!

With simple cloud integration, the option to use open source software, and the ever-expanding expertise of the PLCnext Community, you will benefit from new forms of collaboration. The resulting solution apps, software modules, runtime systems, and function extensions are available in the PLCnext Store and save an enormous amount of time and money when creating applications. Are you a developer? Then publish an app yourself in the PLCnext Store and gain access to a new, wide target group. This makes PLCnext Technology the ideal ecosystem for your modern automation challenge.



PLCnext Control

PLCnext Engineer

PLCnext Store

PLCnext Community

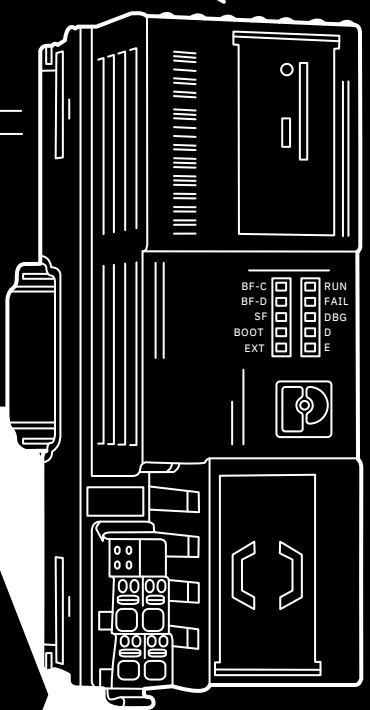
PLCnext Technology

Designed by Phoenix Contact

The open ecosystem for limitless automation

PLCnext Engineer

Speed up your
application development



PLCnext Control

Discover flexible
automation

Make your
application fit for IIoT
and Industry 4.0!

Ecosystem advantages

In a rapidly changing world, in which more things are now networked together than there are people, industrial automation is also undergoing a fundamental shift: Classic system structures are developing into cyber physical systems, and future-proof automation systems must be flexible, open, and networked.

It is time for an ecosystem that provides completely new levels of freedom for automation. It is time to think in new ways. It is time for PLCnext Technology.

Connected coworking

With PLCnext Technology, several developers from different generations can work on one control program, in parallel and yet independently, using different programming languages. This enables you to develop complex applications quickly by combining the advantages of the classic PLC world with the openness and flexibility of PLCnext Technology.

Real-time execution across different programming languages

Combine program sequences in different languages into tasks as desired. The patented PLCnext Technology task handling system enables program routines of different origins to run as classic IEC 61131 PLC code – your high-level language programs become automatically deterministic. The platform ensures consistent data exchange and synchronous execution of the program code.

Flexible integration of open source software and apps

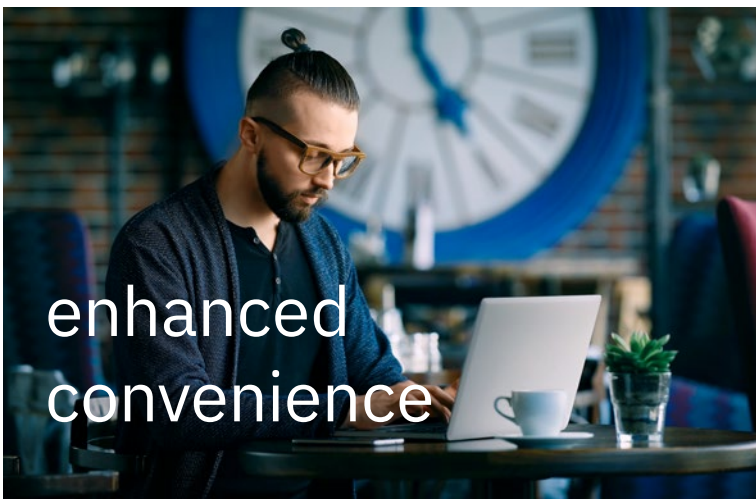
PLCnext Technology enables you to combine independent program parts created in various environments and complete applications in any way you like. Using open source software and apps improves the efficiency of your development processes. The sky is the limit when it comes to future expansions.

Open interfaces and cloud integration

PLCnext Technology enables you to integrate current and future interfaces and protocols for open communication in highly networked automation systems. Implement new IoT-based business models through direct connection to cloud-based services and databases.

Use of your favorite programming tool

The openness of PLCnext Technology enables you to use your favorite programming language, be it IEC 61131 or high-level language. Develop your individual solution conveniently in a familiar development environment such as PLCnext Engineer, Matlab® Simulink®, Eclipse, or Visual Studio.




PLCnext
Control

Real-time-capable and combinable: IEC 61131-3 and high-level languages

PLCnext Control is the hardware for the PLCnext Technology Ecosystem. It enables the implementation of automation projects without the limitations of proprietary systems. The PLCs based on a Linux kernel are characterized by their real-time capability, both for IEC 61131-3 and for high-level languages such as C/C++, C#, and Matlab® Simulink®. The patented task handling allows any combination of IEC 61131-3 code, high-level languages, and model-based tools in one task. Integrate open source code and apps, or network with PLCnext Control via cloud connections. Your data is perfectly protected because PLCnext Control is secure by design in accordance with IEC 62443 and has been certified by TÜV SÜD.

PLCnext Control offers scalable controllers with IP20 degree of protection. From modular controllers for basic applications and centrally managed high-performance controllers to PC-based edge devices – this product family always offers a suitable solution for your project. The open Linux core also allows you to integrate new technologies such as OPC UA, TSN, and 5G. PLCnext Control thus offers a high degree of future-proofing.

Find out more

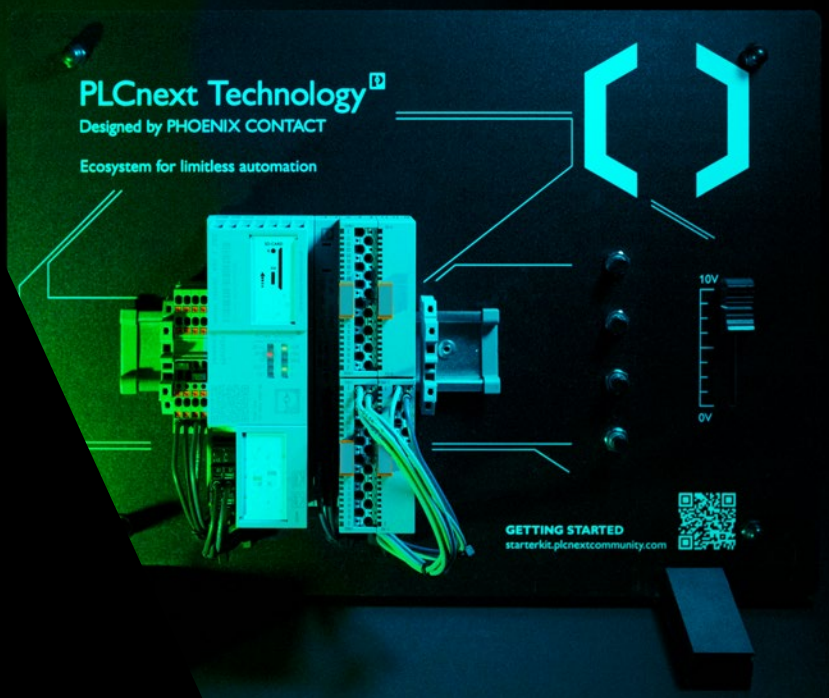
Your advantages

- PLC-typical real-time performance and data consistency, even for high-level languages and model-based code, including an optimized development environment
- Open Linux operating system
- Unlimited adaptability with quick and easy integration of open source software, apps, and future technologies
- Intelligent networking with cloud connection, such as to Proficloud.io, enables you to analyze your global machine and system data
- PLCs with different performance classes and optimized for various fields of application

If you want to implement AI or edge applications, our portfolio also offers specially optimized hardware for this.

Get started with PLCnext Technology now!

Enter the open world of PLCnext Technology and take inspiration from the functionality, operation, and exceptional performance in a small application. The PLCnext Technology Starterkit includes a PLCnext Control AXC F 2152 and a backplane with four Axioline Smart Elements. This station can be extended to suit your needs.



Find out more

Modular and flexible: PLCnext Control for simple to complex applications

The robust Phoenix Contact Axiocontrol series features several PLCs in various performance classes for PLCnext Technology. These modular controllers give you flexibility for your station structure. The PLCs can be extended with modules for the Axioline and Inline IP20 I/O systems. Furthermore, you can also add further interfaces and control functions to the left of the PLCnext Control. PLCnext Control is secure by design and certified by TÜV SÜD. Security is based on a Trusted Platform Module (TPM) where user certificates can also be stored.

Go to the product overview

View 3D object

Extending PLCnext Control functionality

Extend the functions of your PLCnext Control with a safety, Ethernet, or AI module that can be aligned to the left of the controller, for example. This allows you to provide an additional Ethernet interface and to optimize your controller for applications with artificial intelligence and machine learning. The left-alignable PROFIsafe extensions are fully functional safety-oriented PLCs that extend the functional scope of your PLCnext Control for safety applications up to SIL 3. In addition, an INTERBUS and PROFIBUS controller is available that allows you to integrate INTERBUS and PROFIBUS remote bus devices into the station. Connect up to three modules to your PLC with an additional extension module.

Go to the product overview

View 3D object

> “The integration of **Docker with the firmware** of PLCnext Control offers the advantages of **scalability** and outsourcing. Thanks to the **gRPC microservice architecture**, it is easy to develop containerized applications in all **common programming languages**.”

Dr. Tobias Frank, Phoenix Contact,
Vice President Automation Systems

High modularity in the automation system with I/Os

Do you need I/Os for your automation system? With the extensive portfolio of I/O modules, PLC stations which optimally satisfy the relevant application requirements can be set up based on the modular principle. You can then connect the block-modular I/O modules from the Axioline F product family as well as the Axioline Smart Elements, which can be assembled flexibly in a confined space, to an Axiocontrol series PLCnext Control. You can even combine both I/O systems with up to 63 I/O modules. In addition to digital and analog modules, the I/O portfolio also includes various function modules. Some Axioline F modules are also available in versions for very harsh ambient conditions.

Go to the product overview

View 3D object

Safe and redundant: PLCnext Control for large networks

High-performance controllers for PLCnext Technology enable you to realize automation applications that place high demands on safety or availability, for example. For applications requiring a high safety level, play it safe with our safety controllers up to SIL 3. They combine high-level safety, due to the use of two independent CPUs, with a high-performance four-core system which can operate very large networks with up to 300 safety-related devices. Furthermore, the safety controller is available as a box PC version.

With redundant automation technology, you can reduce downtimes, work cost-effectively, and also avoid potential dangers, such as in tunnels or at airports. The integrated redundancy function based on fiber optics means that the process is not interrupted if one controller fails or is replaced. The RFC controller is based on PROFINET and establishes system redundancy automatically with AutoSync Technology.

Both RFCs feature a simple user interface with improved handling with a resistive touch screen. This ensures a high level of monitoring. With the embedded OPC UA server, the PLCs are already equipped to handle future demands today with the use of a standardized communication protocol.

Go to the product overview

View 3D object

Data-centered and compact: PLCnext Control for edge computing

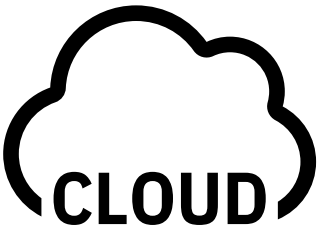
PLCnext Control for edge applications allows you to create intelligent IoT edge solutions for making the best cloud-based use of data from the field. This allows you to close the gap between the IT and OT worlds. PLCnext Technology makes easy integration into existing IT infrastructure possible.

You can reduce development and provision times using preinstalled software tools such as Node-RED, a local time series database, and a simple cloud connection. Data processing in close physical proximity to the user allows information to be exchanged quickly, securely, and without latency. Simple and secure management is guaranteed via an integrated web-based management tool. Moreover, the edge device is particularly compact and cooled passively in a full metal housing.

Go to the product overview

View 3D object

Any cloud:
Intelligent networking through cloud connections



PLCnext Control can connect to any cloud, whether Phoenix Contact's own Proficloud.io, Amazon's AWS, Microsoft's Azure, or your own cloud solution on site. Make the most of your data. Take advantage of individual cloud services to optimize your processes. As a result, you increase the quality of your products or system, reduce costs, and do not have to intervene in running applications. Your data is perfectly protected here.

Even though the PLCnext Control range comes with a direct connection to Proficloud.io as standard, you can either download ready-made cloud connectors from the PLCnext Store to your PLCnext Control, eliminating annoying programming work, or use standard communication protocols such as OPC UA or MQTT for connecting to your chosen cloud solution.

Proficloud.io:
Your ticket to the Industrial IoT

Proficloud.io is a plug-and-play IIoT platform that enables companies to easily connect their devices to a cloud infrastructure. Take advantage of our cloud-based smart services. These are based on Industrial IoT technologies and enable users to get an overview of the status of their devices and systems – from anywhere, at any time. By using the cloud services for data visualization and analysis, users of the Proficloud.io IIoT platform and smart services can manage operations and maintenance processes as efficiently as possible. With the assistance of smart services, you can reduce downtime through remote monitoring and improve your manual workflows.

Find out more

You will find an overview of all Proficloud.io smart services on page 66.

PLCnext Control for functional safety and industrial security

PLCnext Control sets a milestone as the first PLC on the market that has received both the IEC 62443-4-1 ML 3 Full Process Profile and IEC 62443-4-2 certifications from TÜV SÜD. These significant certifications prove that the entire Secure Development Lifecycle was consistently observed during the development of PLCnext Control. The product certifications underline the high cybersecurity standards during the development phase and provide insight into the implemented technical security requirements. By activating the security profile, users have access to a wide range of security level 2 (SL2) functions. In addition to the AXC F 2152 and AXC F 3152 models, the RFC 4072S and BPC 9102S safety controllers as well as the AXC F T SPLC 1000 safety PLC extension have also been certified.

Our AXC F 2152 and AXC F 3152 controllers have also received IEC 61850 Ed. 2.1 and IEC 62351-3 certification from DNV, which ensure communications security in power grids.

Error states are detected early in safety-related applications due to double calculation. Our safety controllers are tested by TÜV Rheinland and can be used in applications with the highest safety requirements in accordance with SIL 3 or PLe.

Find out more about IEC 62443

More about IEC 62351-3 and IEC 61850 Ed. 2.1

Go to the Cybersecurity Info Center

Industrial IT Security
TÜV SÜD
IACS Component
Secure Product Development Lifecycle assessed & monitored according to IEC 62443-4-1
Technical Security Requirements assessed according to IEC 62443-4-2

TÜVRheinland CERTIFIED
Product Safety
Functional Safety
www.tuv.com
ID 0600000000

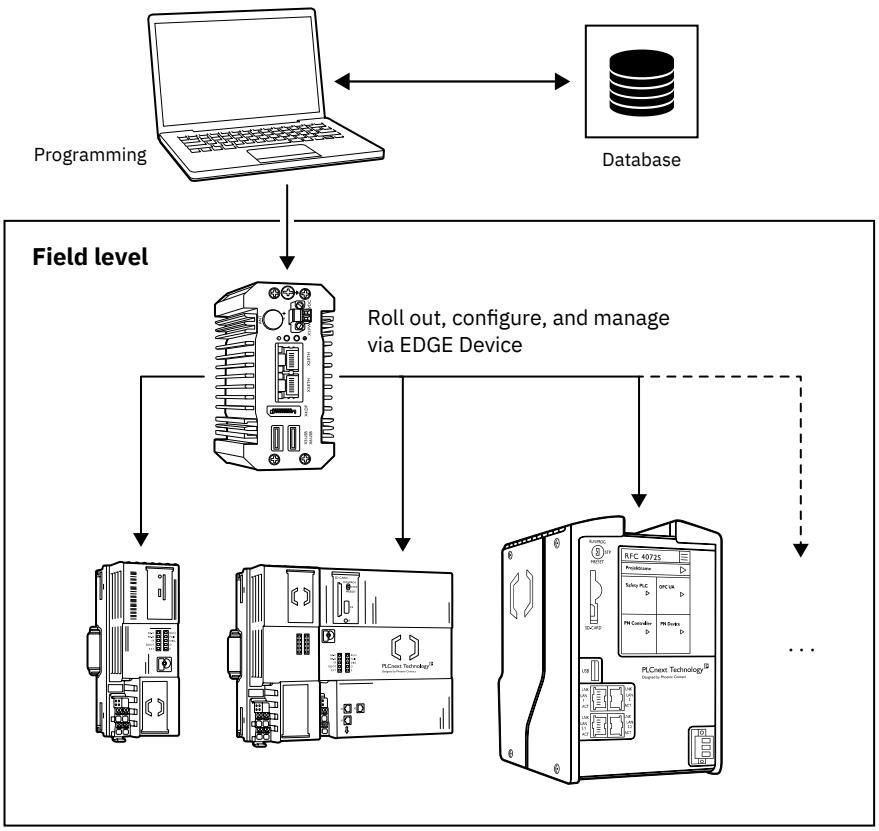
Did you know?
PLCnext Control is the first PLC on the market to be certified by TÜV SÜD for cybersecurity.

Device and update management

The smarter automation components become and the more they communicate with remote (cloud) systems, for example, the more important it is to have up-to-date firmware for the individual components. Updates can be rolled out manually or automatically – and across manufacturers – with OPC UA-based device and update management. This saves time and costs, and minimizes the risk of cyberattacks.

- Security risks due to outdated firmware are ruled out at an early stage
- Firmware from the manufacturer is provided automatically and enables easy automation of updates
- Possibility of distributing PLCnext Engineer projects and updates
- Easy inventory of hardware and firmware data (software/firmware status of all devices at a glance)

Secure IT/OT center



Unified device and update management

Device and update management can also be executed via:

A Windows solution for the PC

A container-based solution in IT

A software app via the PLCnext Store

> “**Device and update management** is the basis for optimum **cybersecurity** in companies.”
>
> Arno Fast, Phoenix Contact, Senior Specialist Digital Services

PLCnext Technology architecture

The PLCnext Technology architecture is based on an open Linux system with real-time patch and combines the features of a classic PLC with those of a smart device. Real-time capability and consistent process data management are the fundamental requirements for control technology. High-level languages become deterministic with PLCnext Technology. The Execution and Synchronization Manager (ESM) and Global Data Space (GDS) components ensure deterministic interaction between programs from different areas. The ESM real-time task scheduler makes it possible to bring programs from different programming languages into a defined sequence. GDS, on the other hand, ensures synchronous and consistent process data exchange between programs, fieldbus systems, and other components.

The open architecture allows programs to be executed directly within the PLCnext Runtime System and non-control programs to be executed directly on the Linux system. Here, the variables and the service components (e.g., OPC UA server, Proficloud.io gateway, web-based management, and HMI web server) can be accessed via a variety of interfaces.

128

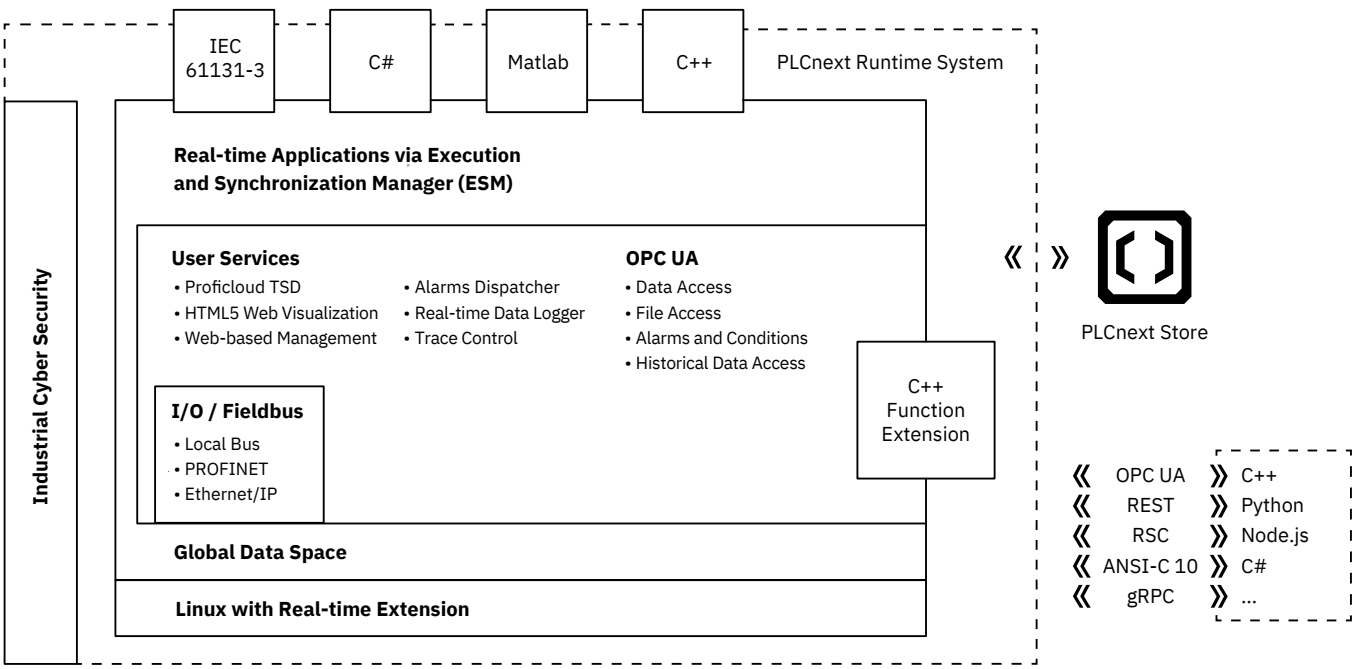
simultaneous real-time tasks

8

processor cores

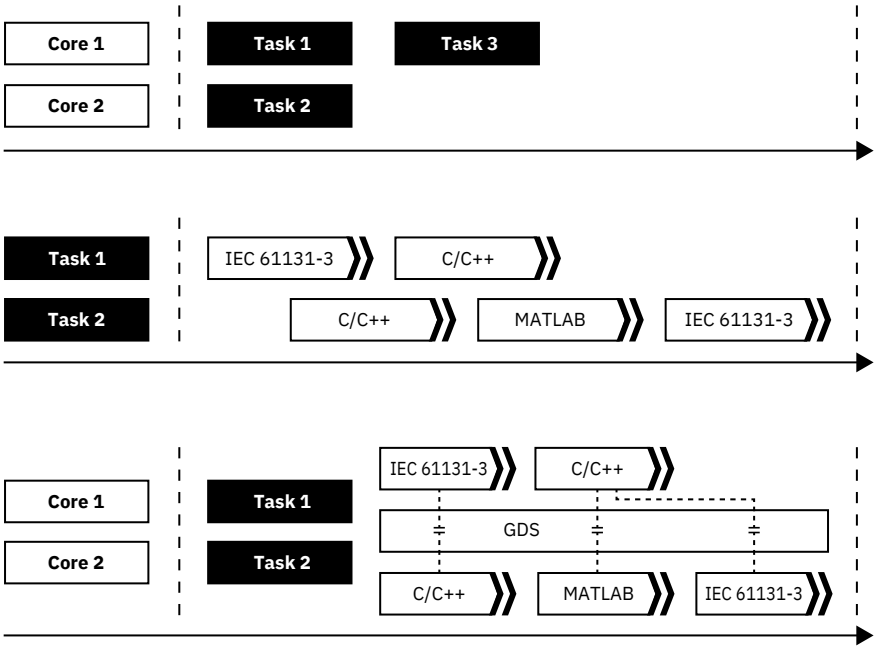
16 GB

memory



PLCnext Technology runtime system

Synchronicity and real time



With multicore support, the processing of tasks can be distributed to multiple processor cores.

Combine different programming languages in any way in one task.

Task-synchronous data exchange between programs of different domains is assured by the GDS (Global Data Space).

Task handling in the Execution and Synchronization Manager

It is possible to add new functions via an app, from the cloud, or via a function block programmed by the user, as well as use software from the PLCnext Store and open source communities. With multicore support, the processing of tasks can be distributed to multiple processor cores. This makes it possible to optimize the utilization of the controller power.

In addition to executing programs in a single programming language, PLCnext Technology offers the option of defining tasks whose individual components come from different programming languages. ESM task management allows any combination of IEC 61131-3 code, high-level languages, and model-based tools in one task. The user not only defines the number of PLC tasks, but can also specify the exact timing as well as the priority. Data exchange between programs created in Matlab® Simulink®, C++, C#, or IEC 61131-3 is task-consistent, even if the program flow is interrupted by a higher-level task. Synchronicity and consistent data access from all programs are thus ensured at all times.

500 µs

fastest cycle time

1 µs/device

local bus speed

Supported communication protocols

Two options are already available as fieldbus protocols: PROFINET and EIP (Adapter Class). Further fieldbus protocols, e.g., INTERBUS, PROFIBUS, or CAN, can be realized with appropriate hardware components. The following established communication protocols are also available: HTTP, HTTPS, SFTP, SNTP, IPsec, syslog, and OPC UA. In addition, due to the open architecture of PLCnext Control, you can easily add missing protocols. The special feature of PLCnext Control is that further function blocks can be loaded later via the PLCnext Store, which is accessible to every user. Via the PLCnext Store, you can download ready-made solutions and controller extensions or add them yourself. Examples include MQTT, CODESYS, Modbus/TCP, and libraries for ready-made industrial solutions. Furthermore, additional runtimes can be emulated via IEC 61131 or even integrated into the firmware. This can also be realized with third-party software. The open architecture of PLCnext Technology makes it possible.

Up to

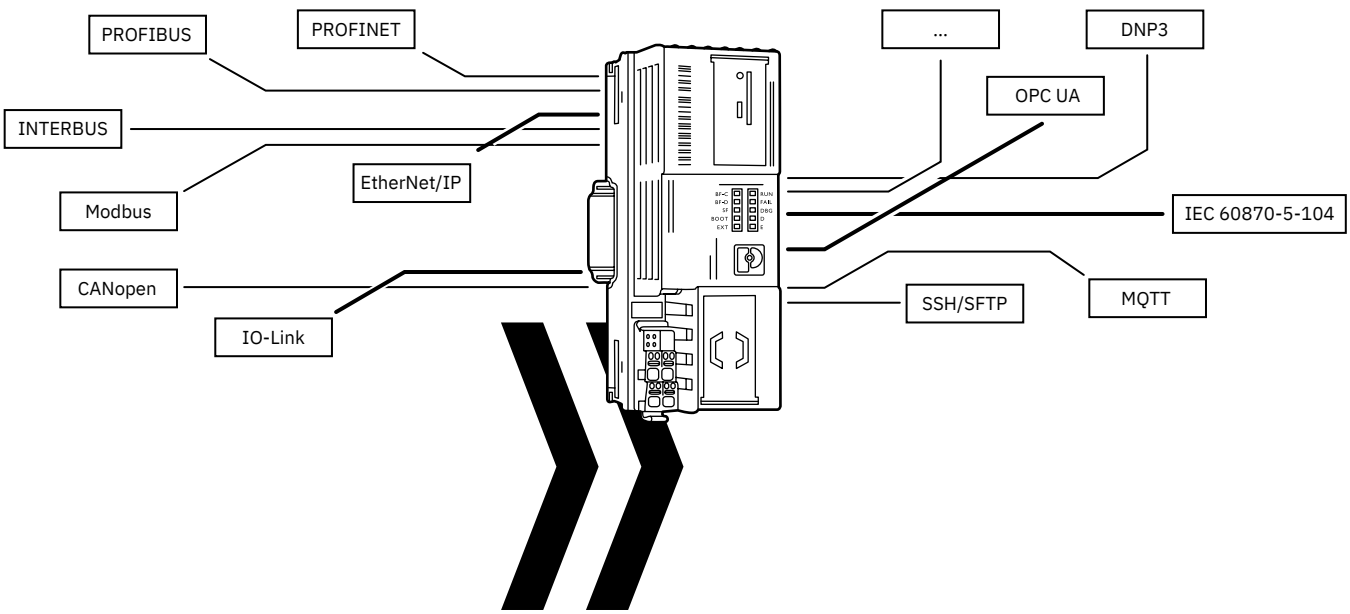
256

PROFINET devices

Up to

300

PROFIsafe devices



Supported communication protocols for PLCnext Control


PLCnext
Engineer

Application development with your favorite tools

PLCnext Engineer is the engineering tool for your PLCnext project. By combining all essential functions for the engineering process in one software program, the flexible engineering tool is more than an all-in-one tool for classic programming. One software program for all engineering tasks – configuration, programming in accordance with IEC 61131-3, safety programming and configuration, visualization, and diagnostics.

With PLCnext Engineer, you can configure your PROFINET networks easily, integrate high-level language programs or Matlab® Simulink® models, and commission and manage these on a PLCnext Control. In addition, you can conveniently integrate IO-Link and IO-Link Safety devices, or configure existing INTERBUS or Modbus/TCP networks.

All editors have been developed in accordance with modern usability and user experience specifications, which can also be found in other software tools from Phoenix Contact. Regardless of whether you are planning Phoenix Contact components with clipx ENGINEER, configuring network components with FL Network Manager, or programming controllers with PLCnext Engineer, you can always work in a homogeneous software landscape.

Find out more

Go to the product

Video: Speed up your application development with PLCnext Engineer

Your advantages

- One software program for all engineering tasks
- Time and cost savings through programming in one interface
- Flexible engineering with the integration of individual function add-ins and software applications (apps)
- Future-proof: PLCnext Engineer will continue to be extended by further communication systems based on existing usability concepts and thus adapted to current trends in automation.

Commission your PLCnext Control more quickly! Holistic programming within one interface offers enormous time and cost savings.

Convenient configuration with free choice of programming language and tools

PLCnext Engineer allows intuitive programming in accordance with IEC 61131-3 and supports the following languages: structured text, ladder diagram, function block diagram, and flow chart (sequential function chart).

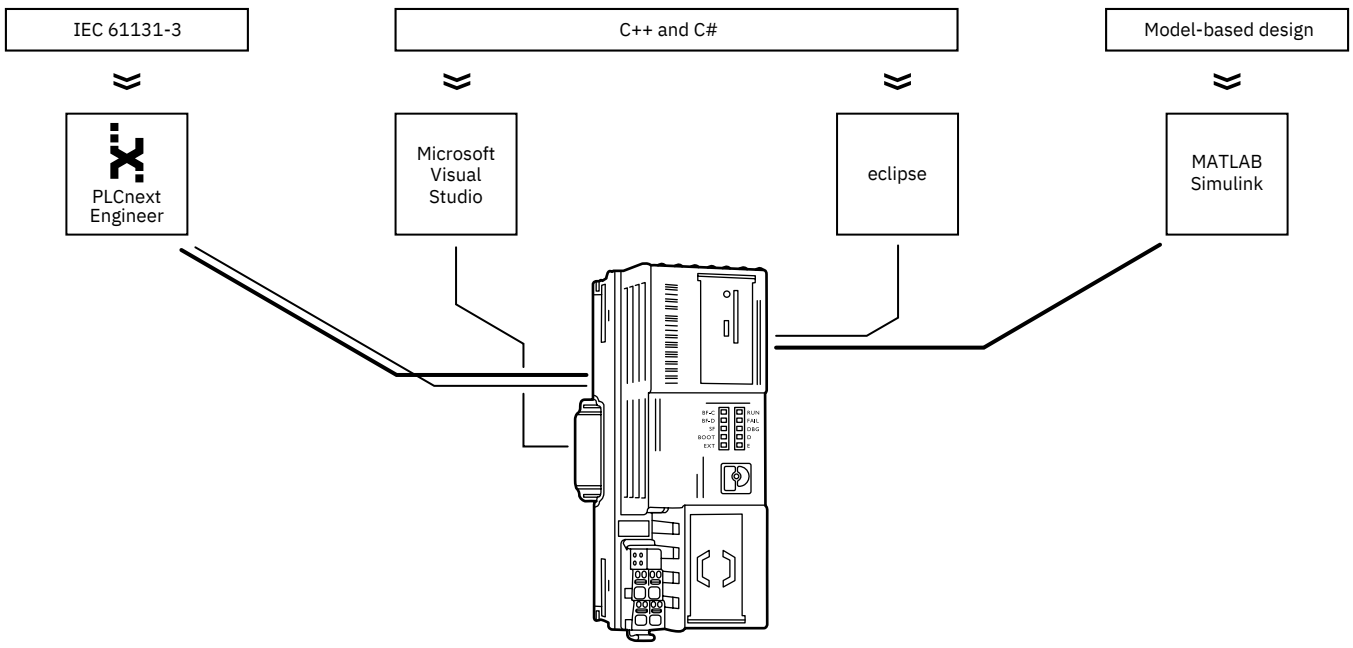
Benefit from convenient handling when combining high-level language programs and standard automation.

For graphical programming languages, you can choose between network-oriented and free graphical programming and mix the different languages within program organization units.

All variables and interfaces can be linked via the data lists, for example, in order to directly connect physical inputs and outputs to high-level language code and to exchange data. As a result, the commissioning and maintenance of highly complex systems without any IEC 61131-3 code is also greatly simplified with PLCnext Engineer.

Get started with the quick-start guide for PLCnext Engineer

Tutorials: Learn about the important features and functions of the user interface



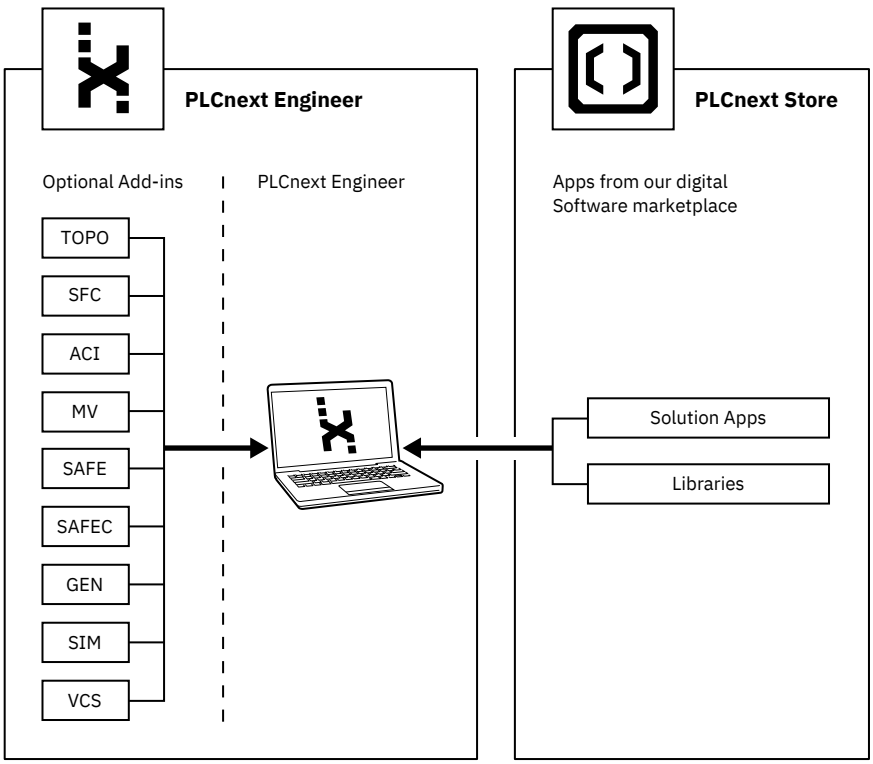
Convenient configuration with free choice of programming languages and tools

Flexible extensions for full individuality with add-ins and software applications

Tailor the free basic version of PLCnext Engineer easily and intuitively to your project needs. To do so, simply add further functions and interfaces to the free basic version via the configurator on our website. PLCnext Engineer's modular architecture means that there are no limits to what you can do.

Optional function add-ins allow you to extend the range of functions to suit your individual needs. Safety solutions, a Matlab® Simulink® viewer, or a visualization generator can be easily integrated into the engineering platform.

In addition to extending the range of functions via add-ins, you have the option of speeding up your application development by using ready-made software applications (apps) and libraries from the PLCnext Store.



Benefit from full flexibility with add-ins and software applications

Optional function extensions:

TOPO (ETH TOP VIEW) makes it possible to read in, display, and diagnose the connected Ethernet topology.

SFC (Sequential Function Chart Editor) for programming the IEC 61131-3-compliant sequential function chart with integrated error analysis.

ACI (Application Control Interface) provides an interface for controlling the PLCnext Engineer software remotely from external high-level language applications.

MV (Viewer for Simulink®) for displaying Matlab® Simulink® models that are processed on a PLCnext Technology controller.

SAFE (Functional Safety Editor), certified by TÜV Rheinland, for programming safety-related user applications and for configuring and starting up PROFIsafe devices on safety-related controllers with PLCnext Technology.

SAFEC (SAFE-CFUNC) for creating high-level language-based function libraries and protecting them via certificates for safety programming.

GEN (HMI Generator) for generating a complete visualization based on a user project, without any manual effort.

SIM (Simulation) makes it possible to test applications for AXC F 2152 and AXC F 3152 devices without a real controller being connected.

VCS (Version Control System) enables the direct connection of PLCnext Engineer to version management systems such as GIT and Subversion.

Simulation

The new simulation makes it possible to test applications for AXC F 2152 and 3152 devices without a real controller being connected. It is now even easier and more convenient to test and optimize your PLCnext Engineer applications, even without control hardware. The PLCnext Engineer simulation offers a wide range of options for simulating the functions, components, and models of your project.

Find out more

Simulation allows you to run your PLCnext Engineer project without a connected PLCnext Control, including:

- IEC 61131-3 code
- Matlab® Simulink® models
- High-level language components

During the simulation, you can:

- Influence the flow of the program code by forcing process data input variables or debugging output signals
- Simulate and test the eHMI part of your PLCnext Engineer project with full functionality
- Use the web-based management of your simulated hardware target to test the behavior of your project with respect to different user authentications
- Configure, prepare, and test the OPC UA server connection with an OPC UA client on your local computer

Discover our highlights

Safety programming

Safety programming was developed in accordance with IEC 61508 and is certified by TÜV Rheinland. Network-oriented editors make it possible to combine function block diagram and ladder diagram. A safe semantic code analysis system runs constantly in the background during code entry. It supports users in positioning safety-related or standard signals and blocks.

Web-based visualization

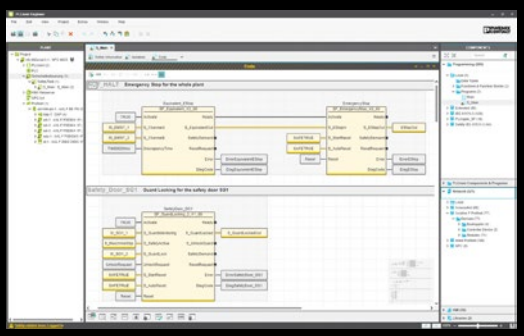
PLCnext Engineer has been optimized for the creation of modern visualization solutions. Already familiar operating concepts from other editors make it easier to get started. With respect to the technology, the visualization integrated in PLCnext Engineer is based on open standards such as HTML5 and JavaScript. No web design knowledge is required; the software features numerous symbols and templates and can be extended as desired.

Viewer for Matlab® Simulink®

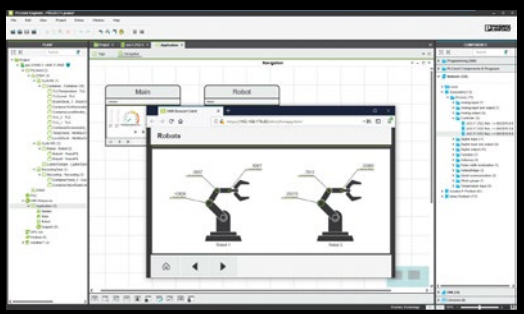
The PLCnext Target for Simulink® toolchain enables model-based design with Matlab®. Prototypes can be developed quickly and cost-effectively because simultaneous simulation and verification is possible. The resulting models can also be displayed with online values in PLCnext Engineer using the Viewer for Simulink® add-in.

Diagnostics of the overall system

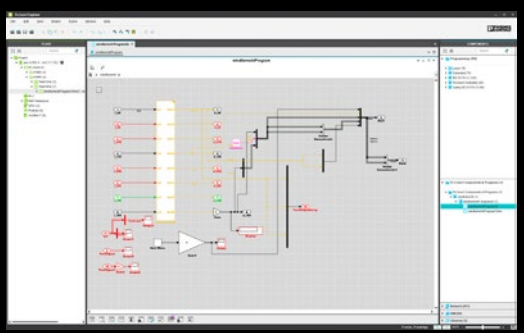
Users can determine the overall status of their application from the central controller cockpit. They can determine whether sufficient resources are available or whether the limits have already been exceeded. Planned PROFINET topologies are checked online and errors or differences in the diagnostic archive of the controller cockpit are displayed.



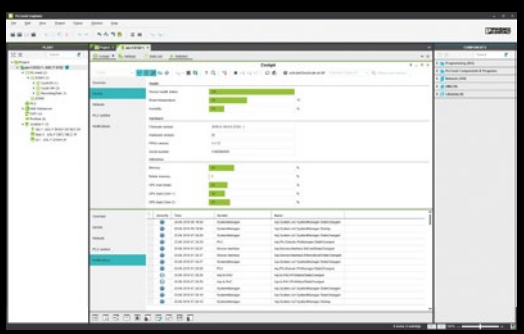
Safety programming



Web-based visualization



Viewer for Matlab® Simulink®



Diagnostics of the overall system

Node-RED

Node-RED is installed as a function extension on the Linux operating system of your PLCnext Control. The advantage is that it is open source and supported by a large global community of programmers.

Node-RED is a visual programming tool based on the JavaScript runtime environment node.js. It interacts seamlessly with the other programs running on the PLCnext Control, e.g., the classic IEC 61131-3 programs. Various nodes are available that can be used like function blocks in IEC programming. A combination of different nodes is called a sequence, which corresponds to a program in the IEC world. The sequences are executed outside the real-time environment of PLCnext Control. The communication between Node-RED and the PLCnext Control programs can be performed, for example, via OPC UA or REST API. The programming is implemented in a web-based editor.

The recommended way of installing node.js is via the PLCnext store

On the Maker's Blog, you can find more articles to help you get started with PLCnext Control and Node-RED, such as:

Installing node.js on an RFC 4072S

Communication with PLCnext Control via the REST API

Docker and containerization

Your PLCnext Control is Docker-ready – it combines the reliability of a control system with the possibilities of modern software distribution.

With firmware version 2020.0, the PLCnext Control AXC F 2152 is now Docker-enabled. This means it is even easier to create, distribute, and operate your PLCnext Technology applications.

The use of OCI containers (such as Docker or Balena) has revolutionized the IT landscape in recent years. They enable easier and faster management of existing and customer-specific functions and their integration into a continuous, automated development process. This means that PLCnext Technology combines the reliability of a control system with the possibilities of modern software distribution. Create your own microservices, utilize existing applications, and manage your container fleet on PLCnext Control.

Find out more

You can find instructions for installing the Balena Engine on GitHub

Find out more about the application. Discuss your requirements with our specialists in the community forum

Read here how to use an OCI container to turn a PLCnext Control into an AWS IoT Greengrass device

Python

Python has become one of the most popular programming languages and offers ready-made solutions for almost any problem in IoT business. That is why your PLCnext Control already features an integrated Python3 interpreter.

Python is a powerful programming language with many applications for Industry 4.0, such as machine learning and cloud connectivity, making it ideal for applications that use PLCnext Technology. PLCnext Control already features an integrated Python3 interpreter and is thus ideally equipped for your applications.

Python has become one of the most popular programming languages and, with its enormous community support, offers ready-made solutions for almost any problem.

OPC UA

To get you ready for the next industrial revolution, your PLCnext Control has an embedded OPC UA server and focuses on deep integration of the OPC UA specification and mechanisms.

PLCnext Technology is committed to deep integration of the OPC UA specification and mechanisms, and with its embedded OPC UA server is already well equipped for the future of the next industrial revolution. The integrated OPC UA server (eUA server) supports users from the commissioning phase right through to productive operation in the system. Along with the data access features via Data Access and Subscriptions, further OPC UA facets are supported, such as automatic certificate exchange in accordance with the OPC UA GDS standard, file access to the Linux file system, access to historical data, and support of alarms from the context of both IEC 61131-3 and C++.

OPC UA (Open Platform Communication Unified Architecture) is, among other things, the basis for increasingly strong, manufacturer-independent, and secure networking of the individual components and machines of a modern factory.

Find out more

Read about process data utilization with Python

How to configure the OPC UA client

Unlimited programming possibilities


{
sell=
code.
solutions
}
Buy
automation
solutions
PLCnext
Store

Accelerated application development

As a result of advancing digitalization, complex software functions are taking up more and more space within automation projects. This requires increasingly specialized software skills in application development. Not all programmers have the necessary expertise for this. Phoenix Contact has established the PLCnext Store digital software marketplace precisely for this purpose.

The PLCnext Store offers software applications (apps) with which you can immediately and easily extend the functions of PLCnext Control. This can significantly increase the efficiency of your development processes. The apps on offer range from software libraries for accelerated programming to fully programmed apps that can be used without programming knowledge.

The openness of the store also allows third-party developers to use the platform to commercialize the apps they develop. With the dynamically growing range on offer, the variety and application possibilities are constantly increasing. Be inspired! The PLCnext Store provides innovative solutions and creative ideas, even for highly specialized requirements.

Find out more

Video: Install extraordinary possibilities

Video: Industrial automation – completely different with the PLCnext Store

Your advantages

- Accelerated application development with easy access to software applications (apps) for PLCnext Control
- Innovative solution approaches as well as expanded versatility and possible applications for your automation solution with the dynamically growing range of apps
- Creative ideas and new solutions for your application, including special software – even for niche markets

Be inspired!
The PLCnext Store provides innovative solutions and creative ideas, even for highly specialized requirements.

PLCnext Store for users

Increased efficiency for your development project

In times of shortening innovation cycles, it is important to use resources economically. Eliminate time-consuming programming steps and reduce the time required in the engineering process by using apps from the PLCnext Store. You will find innovative solutions here, even for highly specialized requirements.

Register for the PLCnext Store

“We need to make better use of existing **potential**, for **faster developments** and more **innovative strength**. The PLCnext Store was designed to use the **collective intelligence** of the entire industry.”

Ulrich Leidecker, Phoenix Contact,
COO and President Business Area Industry Management & Automation

Speed up your application development

The PLCnext Store follows the idea of using existing industry expertise. Universal, customizable software solutions are available for a wide range of projects. Depending on the use case, you can use software libraries for accelerated programming or fully programmed apps. Load the apps directly onto your PLCnext Control or integrate them into your engineering environment – through a simple plug-and-work mechanism.

Stay fit for the future

With their knowledge and innovative solutions, many software experts contribute to a diverse range of offers in the PLCnext Store. The number of apps available is constantly increasing. Make use of this potential. Keep pace with changing requirements and technology trends.

>200

software applications for simple functional extension of PLCnext Control

>30

app developers providing expertise from different areas

0

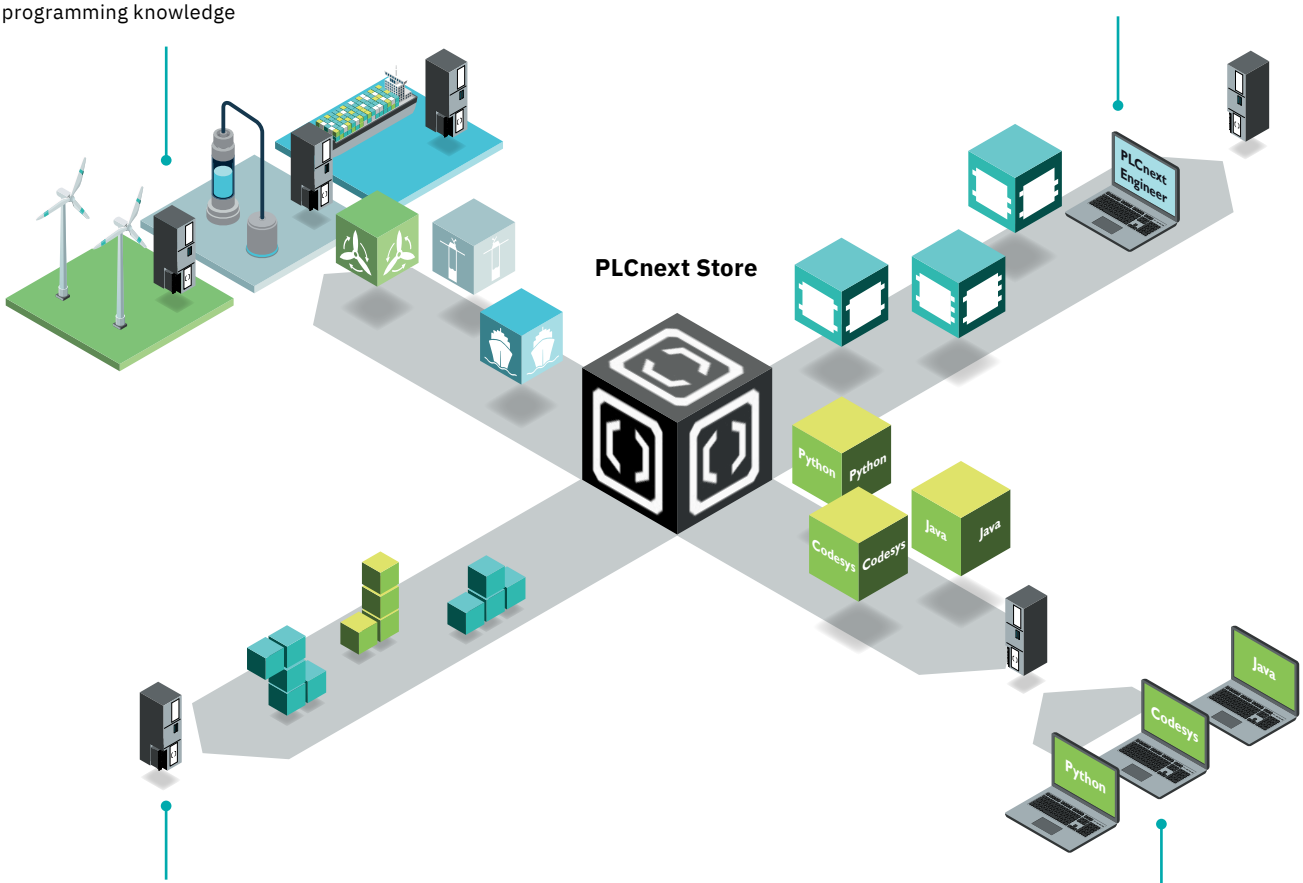
limitations in the implementation of automation projects

Large variety of functions

Artificial intelligence, cloud connector, communication, database, Human Machine Interface, I/O module functions, redundancy, remote control, remote monitoring, safety, security

Transform your PLCnext Control into a fully functional application-specific controller without additional programming knowledge

Accelerate your engineering processes through the integration of turnkey software libraries



Install function extensions for your PLCnext Control, such as cloud integration and MQTT servers

Extend your programming options with additional runtime environments

PLCnext Store for app developers

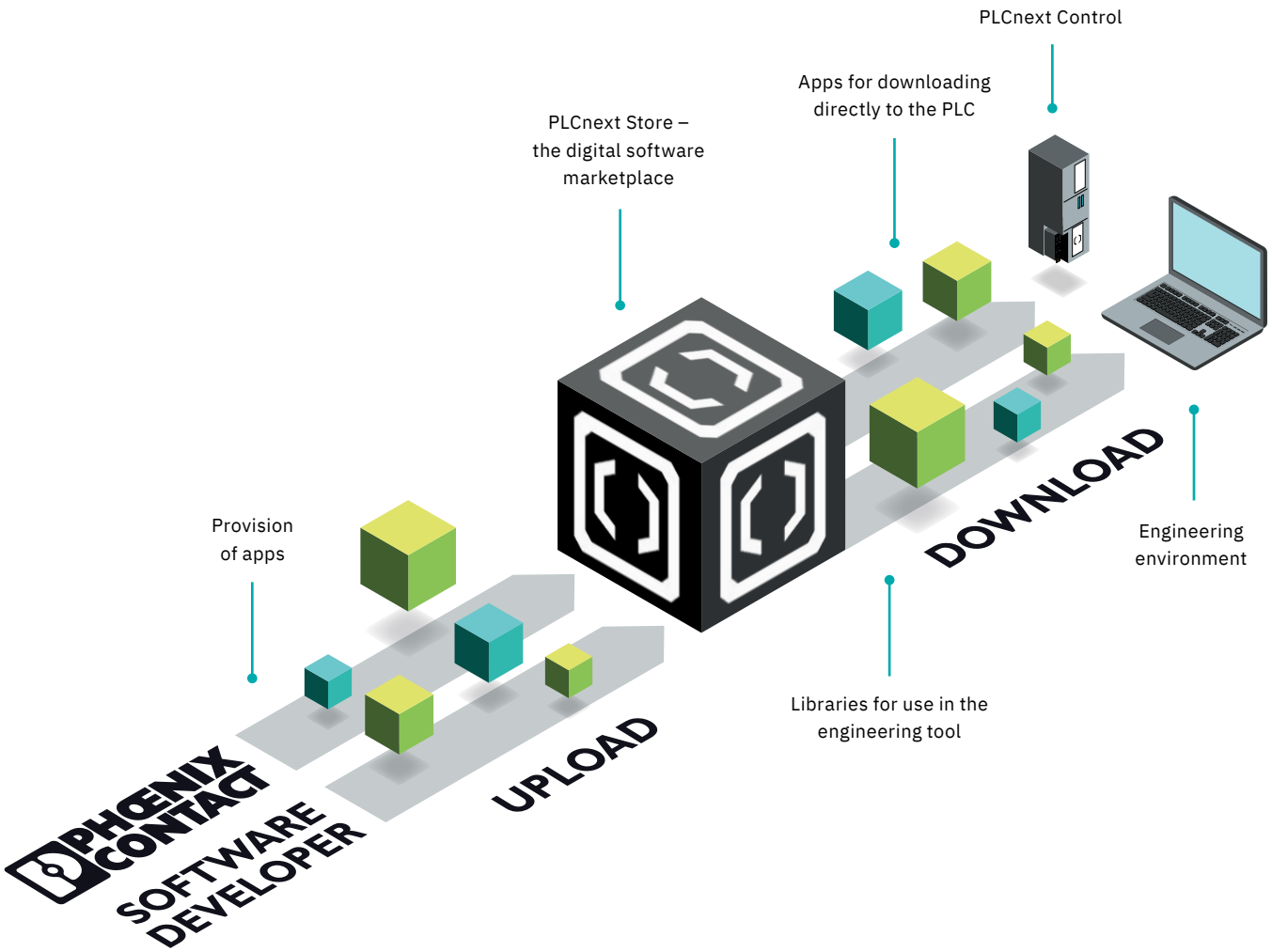
Experience new business perspectives

Have you already developed software solutions or would you like to create an app for automation with a PLC from the PLCnext Control range?

PLCnext Store is the digital marketplace and central platform for connecting software professionals with PLCnext Technology users. It is the marketplace where the best software ideas are turned into great automation projects.

We help you to market your software profitably in the PLCnext Store.

Get started as a PLCnext Store developer



Reach new customer groups

As a digital marketplace, the PLCnext Store is the central point that connects you with users of PLCnext Technology. Benefit from access to a new, broad customer base and use the PLCnext Store to sell your software modules and solutions.

Increase your brand awareness: Publish your app in more than 50 countries around the world and reach new customers in an industrial environment that is relevant to you.

Easy processes – success in just a few steps

Along with the easy access to a broad and industry-specific target group, you will also be benefiting from a new, digital business model. The PLCnext Store opens up new opportunities for you to quickly extend and scale your reach. Commercialize your software for PLCnext Technology without having to worry about distribution, licensing, or commercial issues. You set the price for your developments yourself – we take care of the licensing process and sales management for you.

It has never been easier to be part of PLCnext Technology. Publishing your app in the PLCnext Store gives you access to a wide range of tools and resources. Receive support for every phase of development – we will accompany you on your way from the idea to the code.

> “We were able to deploy an app to connect to the AnyViz cloud in just **a few weeks**. This would not have been possible without the **open** and well-documented PLCnext Technology Ecosystem.”
>
> Thomas Hepp, Mirasoft, co-founder

Start with the development

You will find helpful tools for turning your idea into code here:

- Register now!
  Create a developer account easily and directly
- Go to the PLCnext Store Info Center, which contains detailed documentation on various topics relating to PLCnext Technology
- Go to the software development kit – a toolchain consisting of an SDK and a cross-compiler

PLCnext Community

Benefit from crowd knowledge

The PLCnext Community refers to the people working with PLCnext Technology. As digitalization and globalization advance, new types of collaboration are becoming both possible and necessary. Because of shortened cycles in development and high competition, your company faces new challenges that are very difficult to overcome alone. We are therefore promoting more effective collaboration and crowd knowledge. With PLCnext Technology, several developers from different disciplines can work together on one project or use open source software, for example, from GitHub. This leads to fast application developments, especially for complex applications. With the help of the community, the code is less vulnerable to error and faster bug fixes are available. This means you can increase your innovative strength and save resources.

Stay in touch with us through our PLCnext Community website and social media channels. Be the first to know about firmware updates and product news. Exchange ideas with other users at any time, share your experience, or ask a question in the forum. Learn more about new industry trends and already-realized applications. Would you like to dive deeper into the world of the PLCnext Technology Ecosystem? There is a wide range of tutorials, e-learning programs, and webinars awaiting you, or you can participate in one of our events and experience PLCnext Technology live.

Join and get involved
Whether you're looking for testimonials, apps, expert advice, 24/7 support, events and webinars, launch news, or industry trends, you will find everything in one place.

Find out more about the PLCnext Community.

Your advantages

- New and more efficient forms of collaboration
- Shorter innovation cycles with a higher degree of innovation
- Faster application development, even for complex applications
- Lower error rates and faster bug-fixing
- Exchange ideas with other users, share experiences, and ask questions at any time

Become a part of the PLCnext Community!
#iamplcnext
#plcnext

Why the sum is more than its parts

When it comes to cooperation in the PLCnext Technology Ecosystem, one plus one does not equal two. Because the more partners there are, the more valuable it becomes for each of the participants. When specialists work together and contribute their expertise and experience, both sides can grow. Collaboration makes it possible to solve problems and achieve goals that seem unattainable alone. But collaboration in an open ecosystem is more than just a handshake captured in a photo. Instead, it is a matter of attitude and mindset.

Find the right partner for you

What else is required beyond trust? Read more here

> “Without trust, we do not really work together; we merely coordinate or, at best, cooperate. It is **trust** that turns a group of people into a **team.**”
>
> Stephen Covey, The Speed of Trust

Join and get involved

There is always someone talking about PLCnext Technology – and we hope you will be one of them. Whether you are looking for peer experiences, applications, advice from experts, informal chats, live event feeds, launch news, or industry trends, you will find them here. Become a part of the PLCnext Community and join in the good work. Meet new like-minded people, share experiences, discuss new ideas, ask questions, and talk to our experts. Simply use the hashtags #plcnext, #iamplcnext, or the tag @plcnext.

~5,000
registered users

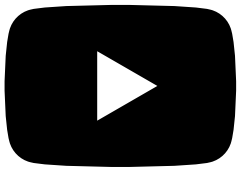
>8,500
questions asked and answered in the forum

>4,000
times #plcnext has been used

@plcnext #plcnext #iamplcnext

Videos and tutorials on YouTube

Find PLCnext Technology on YouTube and watch new videos – whether live recordings, customer experiences, application examples, or reports from trade fairs and events. Subscribe to the Phoenix Contact YouTube channel and watch new clips regularly to make sure you don't miss any new application examples or live reports.



Tutorials for technical support

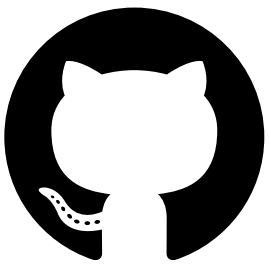
You can also use our tutorials to learn more about PLCnext Technology. The tutorials cover a wide range of knowledge, depending on your level of experience, from basic and introductory tutorials to the finer points of high-level language programming, data logging, OPC UA, and debugging.

Experience PLCnext Technology on YouTube

Technical support and tutorials

Use and share open source code

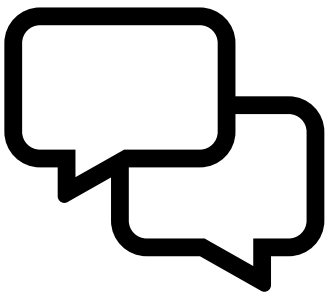
Find open source code for PLCnext Technology on GitHub and start your own project. Use sample code for C++, C#, MQTT, Node-RED, and Docker, for example. You can also download our PLCnext Technology toolchain to support high-level language programming here.



Go directly to GitHub

Ask a question in the forum

Do you have a question? Then take a look at our FAQs or ask directly in the forum. Other users or our PLCnext Technology experts will respond to your question as soon as possible. Find the right webinar for you, watch tutorials, and get the information you need from our detailed documentation in the Help Center.



Go directly to the forum

Information, support, and useful resources

Collaboration for innovation – become a partner now

To keep up in our rapidly changing industrial world, we need to bring together the knowledge and expertise of the leading minds of our automation world. Our strong partner network, with experts from all areas of the industry, has innovative power and future viability.

Would you like to be a part of the ecosystem and become a partner?
If so, just contact us.

“Companies have to keep up with a range of technologies in an ever shorter period of time, and they can hardly do it alone. We are seeing a **paradigm shift**: Competitors are becoming **collaborative partners**.”

Tobias Unger, Yaskawa,
General Manager European Technology Center

“The goal must be to work together with various **experts** to develop a solution for the customer. That’s the only way to a **fast solution** and **innovation**.”

Jörn Steinbeck, oee.ai,
Co-Founder

Taking swarm intelligence into the future of automation

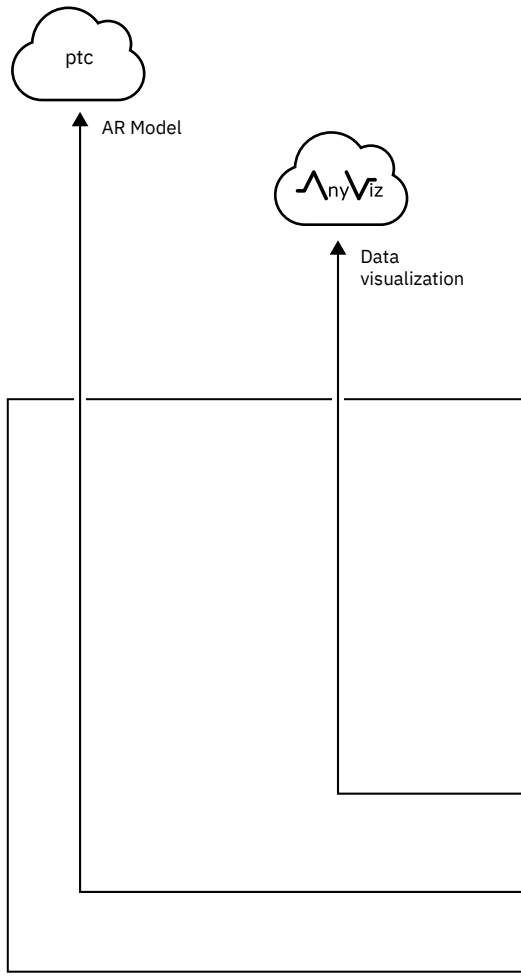
Together with the PLCnext Community, we have created a smart version of a beehive that uses intelligent automation to improve the lives of bees and thus make a sustainable contribution to our environment. Bees are indispensable to our ecosystem: They pollinate around 80% of all wild and cultivated plants, thus ensuring high-yield harvests and an immense variety of foodstuffs.

The Beehyve – a crowd project from PLCnext Technology

IT specialists, automation specialists, development partners, cybersecurity experts, app developers, universities, and the science community made The Beehyve a reality within just 10 months. A digital twin of the hive with information on the carbon footprint was created, in addition to innovative projects for artificial intelligence, cloud and edge computing, augmented reality, cybersecurity, data infrastructure, and data visualization.

Find out more

Experience more on YouTube



7
projects

>50,000
new community members

>100
people involved

16
dedicated partner companies

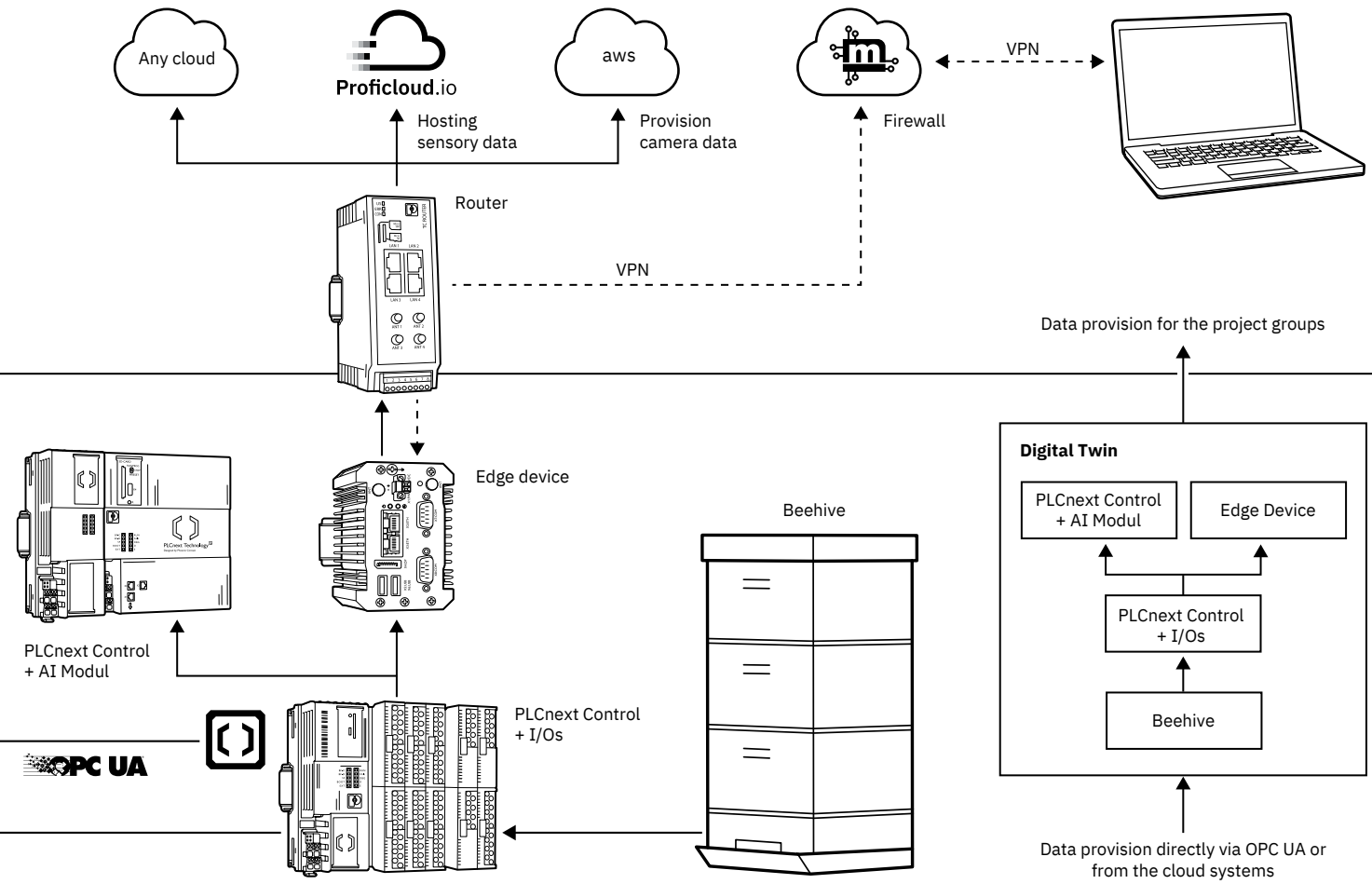
300
newsletter registrations

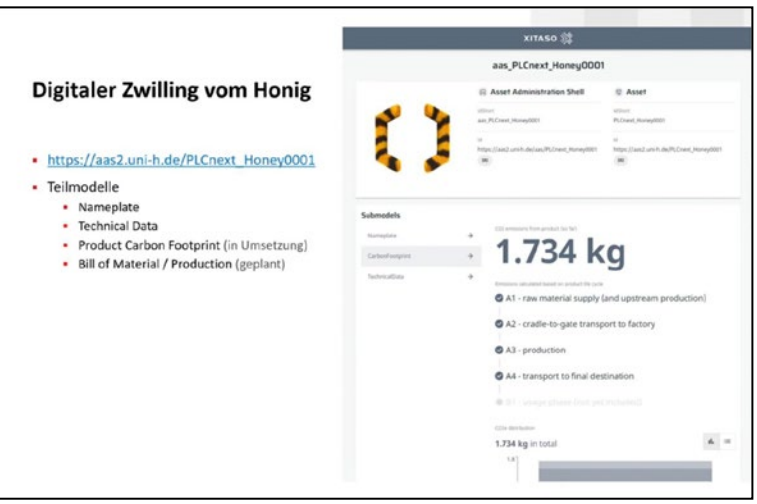
257
Slack registrations

Bringing The Beehyve to life

Two bee colonies moved into the project at Phoenix Contact. The latest control technology was used and the community projects were implemented in this smart home for bees. In addition to the two PLCnext Control versions AXC F 2152 and EPC 1522, a PLCnext Control AXC F 3152 is also used. We have connected the new extension module for machine learning (AXC F XT ML1000) to these so that we can also execute applications that require artificial intelligence. The beehive is also equipped with a weather station so that weather data can be acquired. However, the most important components are the 18 sensors. We always have an overview of our bees with temperature, humidity, vibration, and weight data being measured as well as a large amount of camera data.

Learn about some of our projects.



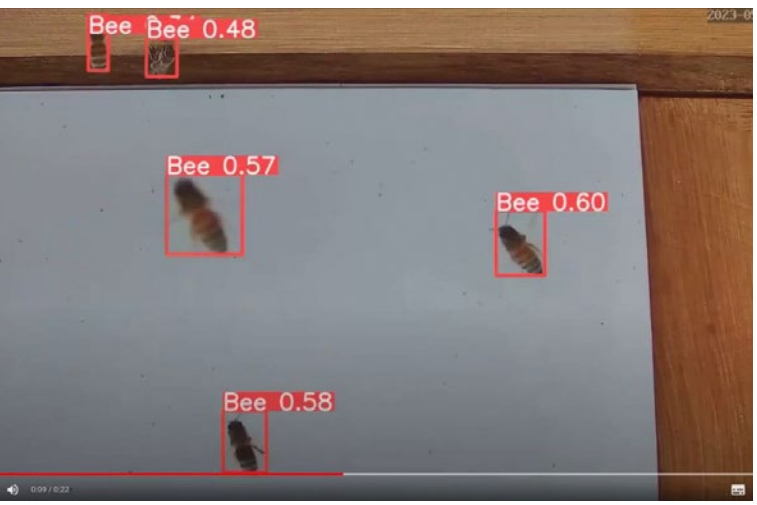


Digital twin

Bees also send data: By creating a virtual representation of the hive based on the global standard of the administration shell, this data is available centrally and digitally with additional information.

Realized by: Mittelstand Digital Zentrum Hannover, Germany

Find out more

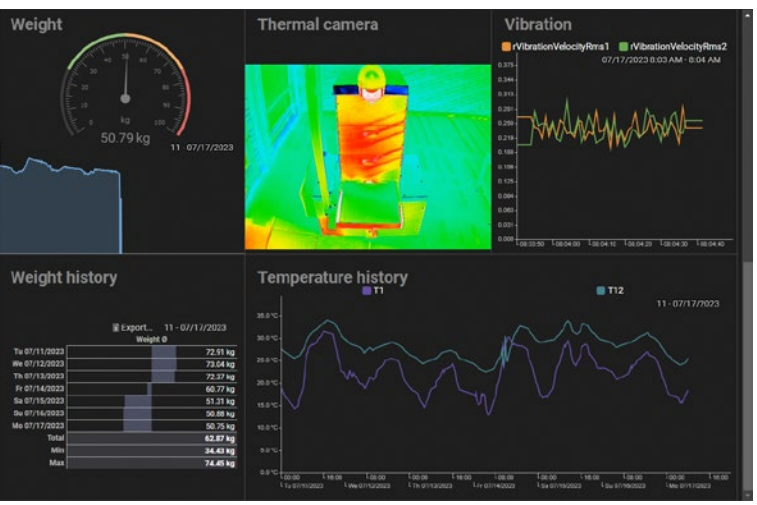


AI-based object detection

The members of the codecentric team have developed a reliable and efficient system for monitoring bee activity using a camera and the PLCnext ML extension module. The main objective is to analyze the bee behavior at the entrance of a beehive by means of camera-supported object detection using AI.

Realized by: codecentric

Find out more



Data visualization

(Bee)Data at a glance with AnyViz: A dashboard for real-time data analysis and AI-based anomaly detection is made possible by integrating PLCnext Control, Proficloud data, IP cameras, and external sources such as weather data.

Realized by: Mirasoft

Find out more

Process optimization with AR

The augmented model of the beehive enables real-time data to be reviewed intuitively. The model is available as a higher-level data model on the real beehive and as a completely virtual model.

Realized by: Phoenix Contact

Find out more

AI beekeeping hand movements

From beekeeping to the production line: improved process control can be achieved – for bees as well as in industrial environments – by using AI and computer vision for manual gesture analysis.

Realized by: Phoenix Contact

Find out more

BeeSmartNext

BeeSmartNext is a web application for protecting bees by closing the gap between beekeeping and agriculture. By using data on bee activity and weather data, it is possible to predict the most bee-friendly time for farmers to deploy their plant protection products.

Realized by: Sokratel

Find out more

Made with PLCnext Technology

Use cases and applications

PLCnext Technology is much more than just a grand vision. Operators and developers experience every day how PLCnext Technology opens the doors to the future. Experience a selection of projects that are already “Made with PLCnext Technology”.

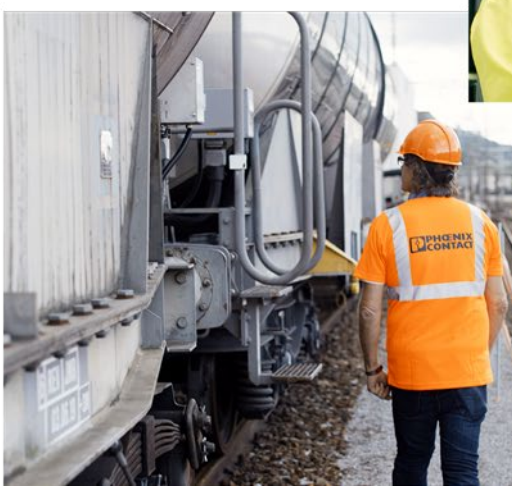
Experience further use cases and applications

Use case: Smart automation
Automation solutions for different industries can be realized with PLCnext Technology – from controlling cooling and ventilation systems in industrial systems, through climate management in hotels, to monitoring infotainment screens for advertising.

Read the whole use case

Use case: AGVS in production
Automated guided vehicle systems (AGVS) are increasingly taking over transport tasks in production, logistics, and the service sector. Learn more about the AGVS in our production system and how PLCnext Technology helped to optimize processes by combining high speed and safety with an open system.

Read the whole use case



Application: Installing an app from the PLCnext Store on a PLC
Since the advent of smart devices, everyone has become familiar with app stores, online marketplaces for software from which applications can be installed directly on a smart device. But how does that work with a PLC?

Read the whole application note

There is much to discover.
Join us in thinking about
the future of automation
today.

Finding new solutions with the strength of the community

>9,500
members in the Facebook group

1 day
of porting work

1 h 15 min
of time saved per week

Optimization of brewing processes at the Gutshofbrauerei “Das Freie”

The number of craft beer breweries is growing steadily and the brewing community is well networked between themselves. Manuel Fritsch is well known in the brewing world because he has developed a control solution specifically for this application based on a Raspberry Pi – the CraftBeerPi. Using PLCnext Control, Manuel has introduced an open control system to the community with which breweries can switch to an industry standard and thus further professionalize their brewing process.

At the Gutshofbrauerei in Hanover, PLCnext Control is already controlling the brewing process reliably today, replacing the CraftBeerPi in the control cabinet. PLCnext Technology makes it possible to switch from a Raspberry Pi solution to an industrial control system with little programming effort, thereby making processes more efficient in the long term and making your system more failsafe. The challenge in brewing is bringing the beer to different temperature levels reliably. Any variation in temperature or deviation in the speed at which heating or cooling takes place has an influence on the chemical processes and thus on the quality and taste of the beer. PLCnext Control reads the data from the temperature sensors, controls the heating process, and ensures that the mash is stirred so that the temperature is uniform throughout.

Drawing upon the CraftBeerPi community and a lot of creativity and inventiveness, further developments and process improvements will be usable in the future – no matter whether a Raspberry Pi or a PLCnext Control is used. The open PLCnext Technology Ecosystem makes it possible to use the CraftBeerPi solution programmed in high-level language easily.

Find out more

Video: Collaborating on solutions

Advantages for the brewery

Convenience and efficiency
Now, brewers no longer have to wake up at four in the morning to start up the system. In addition, the processes can be monitored and controlled via a cellphone app, which saves an enormous amount of time – currently approx. 15 min. per day. That's 75 minutes for a five-day week, equating to just under one working day in a month.

Fast porting
Whether using industrial hardware or Raspberry Pi, the software solution remains unchanged. The Python-based CraftBeerPi application was ported to PLCnext Control in no time. Plug-and-play, so to speak.

Openness and visions for the future
In order to sustainably improve the results during production, the openness of PLCnext Technology will even allow AI to be used to monitor the fermentation process in the future.

Crowd knowledge
Utilizing swarm intelligence, a higher degree of innovation can be achieved with faster innovation times. In addition, potential errors in the software are detected and corrected more quickly. This saves time and resources.

Suitability for industrial applications
In addition to easy connection to peripheral devices, the robustness of the hardware is a major advantage for the Gutshofbrauerei "Das Freie".

Extendibility
Easy extendibility with Axioline Smart Element I/O modules.

"The **community** is so much **more creative** than I could be on my own. And this is also shown by the fact there are now **70 plug-ins**, which is just **crazy**."

Manuel Fritsch, CraftbeerPi,
founder

A strong ecosystem on the road to success

PLCnext Control
PLCnext Control was used to switch from a Raspberry Pi solution to an industrial control system.

PLCnext Engineer
PLCnext Engineer was used for the configuration. PLCnext Control is programmed in a high-level language with Python.

PLCnext Community
With swarm intelligence and collaboration, new ideas are shared in the CraftBeerPi community on Facebook. More than 5,000 brewers and brewing enthusiasts from more than 60 countries are connected with each other here. The community develops new solutions together, exchanges information, and helps with questions.

360
PV half-cell panels

37
inverters

4
transformer stations

1
power control unit (feed-in controller)

Increasing efficiency for a sustainable future

Climate-friendly and robust automation system for the solar park of the Dessora industrial park

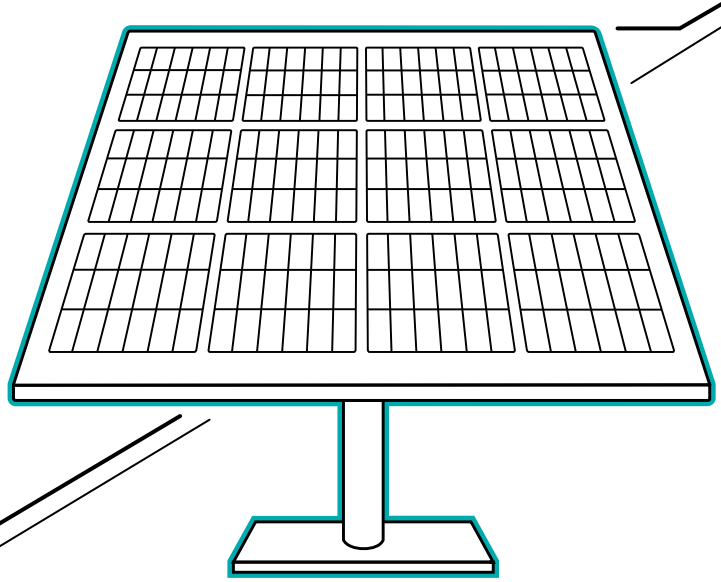
ASG Engineering developed an intelligent comprehensive solution for reactive power control in photovoltaic systems at night based on PLCnext Technology for the solar park at the Dessora industrial park. The new Q@Night control function prevents capacitive and inductive power dissipation from the solar parks, meaning that the grid operator of the 10 MW solar system does not have to buy reactive power. The financial outlay for such purchases would add up to a mid-range five-digit amount over the course of a year.

The Q@Night controller function programmed by the company and integrated into the power control unit now ensures that the inverters in the photovoltaic park do not shut down during the night, as is normally the case, but continue to provide reactive power. The inductive and capacitive losses are balanced.

Find out more

A strong ecosystem on the road to success

PLCnext Engineer
The Q@Night function is programmed in Matlab® Simulink® with PLCnext Engineer.



PLCnext Store
This feed-in control is available as an app in the PLCnext Store. There are six different licenses depending on the system output.

PLCnext Control
The hardware and software of the feed-in controller can be adapted individually and project-specifically at any time, as can the Q@Night control function.

Distributed power generation contributes significantly to reliable power supply in the All Electric Society.

Advantages for the solar park

Intelligent comprehensive solution
PLCnext Technology hardware, software, and license.

Suitability for industrial applications
The robustness and industrial suitability of PLCnext Technology is essential in the application of the large 10 MW solar park in particular.

Failsafe performance and adaptability
The reliable and failsafe hardware and software of the PLCnext Technology feed-in controller extension can be adapted individually for a specific project.

Efficient extendibility
With the possibility of further development through Matlab® Simulink® on the PLCnext Control, the Q@Night controller function could be developed quickly, saving costs and electricity.

Safety
System operators need a certified feed-in controller. This feed-in controller, certified in accordance with the German Directive VDE-AR-N 4110/4120, ensures that distributed power generation plants that are connected to medium- and high-voltage grids feed in electricity in accordance with the grid requirements. The feed-in controller received the component certificate in 2019.

Sustainability
The Q@Night function prevents power dissipation and saves electricity.

Technical solutions for a livable world

A global society with renewable and affordable energy and a neutral carbon balance – this is the All Electric Society. It counteracts climate change and at the same time does justice to the aspirations of the global population for prosperity and development. To be able to realize this vision, the entire energy flow has to be optimized – starting with generation, through conversion, storage, and distribution, all the way to consumption. This will allow energy to be used as and when it is needed. Of equal importance is that the global energy demand has to be reduced through efficiency measures. Phoenix Contact provides products, solutions, and services that make all of this possible.

Renewable energy as the basis

Distributed power generation plants contribute significantly to reliable power supply in the All Electric Society. Our solutions for solar park management enable the extremely reliable and economical operation of PV systems. From the field level to the visualization of data in a portal, we have developed a scalable, seamless concept for the comprehensive operational management of the system portfolio. This open system enables solar parks to be integrated and commissioned quickly and easily. Certified feed-in controllers from Phoenix Contact enable the fast and unbureaucratic grid connection of new systems – without having to wait a long time for the certificate of grid conformity. In this way, they not only simplify the path to the energy transition – they actually accelerate the process.

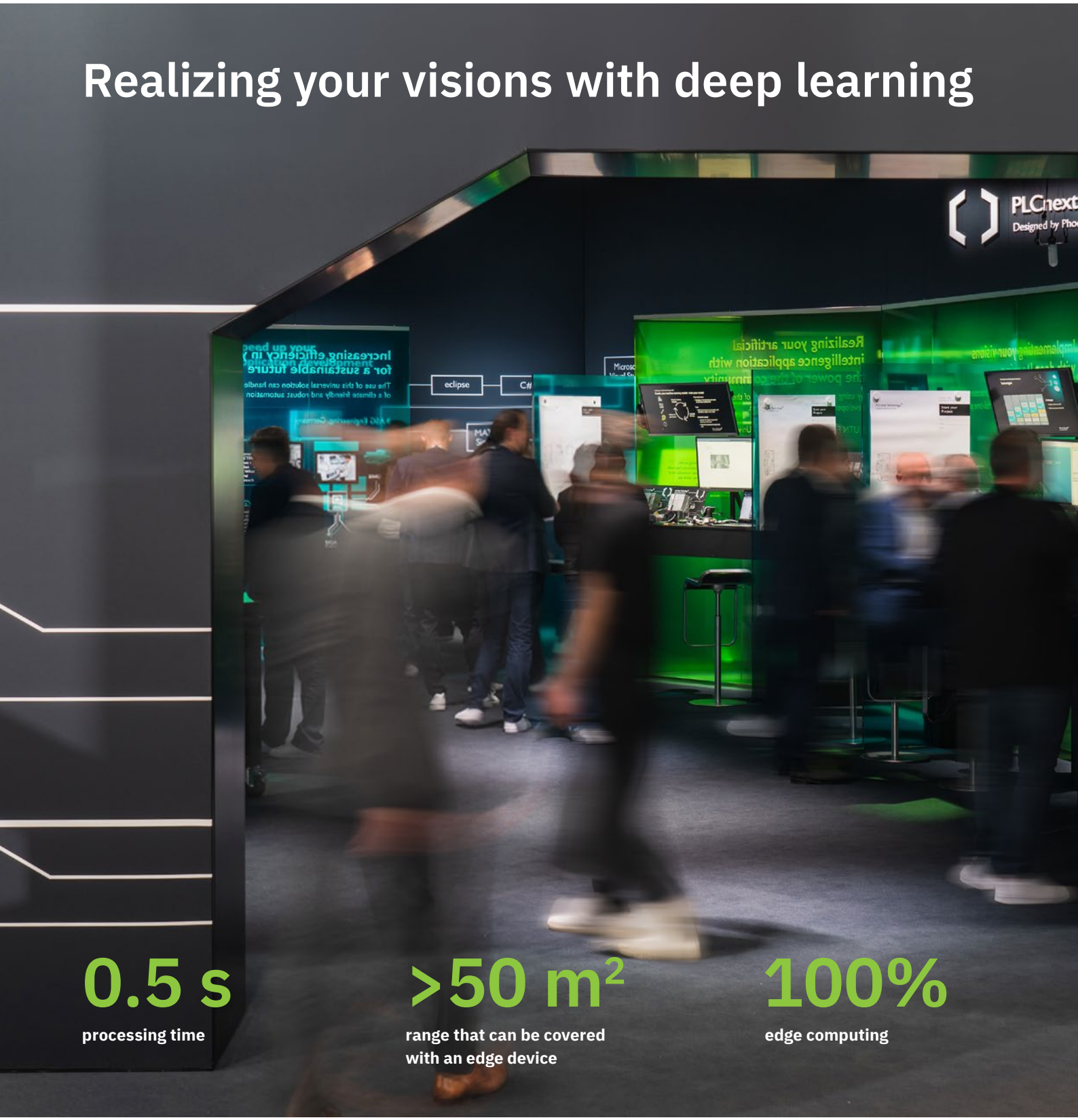
Find out more

Experience the All Electric Society

Video: Introduction to the All Electric Society

Empowering the All Electric Society

Realizing your visions with deep learning



0.5 s
processing time

>50 m²
range that can be covered with an edge device

100%
edge computing

Real-time clearance detection utilizing artificial intelligence with codecentric

IT company codecentric specializes in individual software developments, including AI applications. Executing applications in the cloud or on servers is preferred here. However, more and more applications demand decentralized operation. That is why an industrial solution was needed, which is now implemented with PLCnext Control and available to customers as a comprehensive solution in combination with the software from codecentric.

In the first joint project, the company developed a solution for AI-supported access management, such as for entrances and exits at festival sites. Visitor flows can be monitored as well as clearances measured and analyzed. If necessary, the solution can be used to immediately block turnstiles or play loudspeaker announcements, for example. For this purpose, the clearances between people, machines, and even objects are recorded via cameras and processed and analyzed by the codecentric software on a PLCnext Control in conjunction with an AI extension module. When necessary, the PLC controls photoelectric barriers or triggers actions, for example.

Find out more

Advantages for the IT company

Suitability for industrial applications
One reason why codecentric chose PLCnext Control was its industrial suitability. The solution ran on a Raspberry Pi previously. They were looking for a reliable hardware partner with an appropriate system.

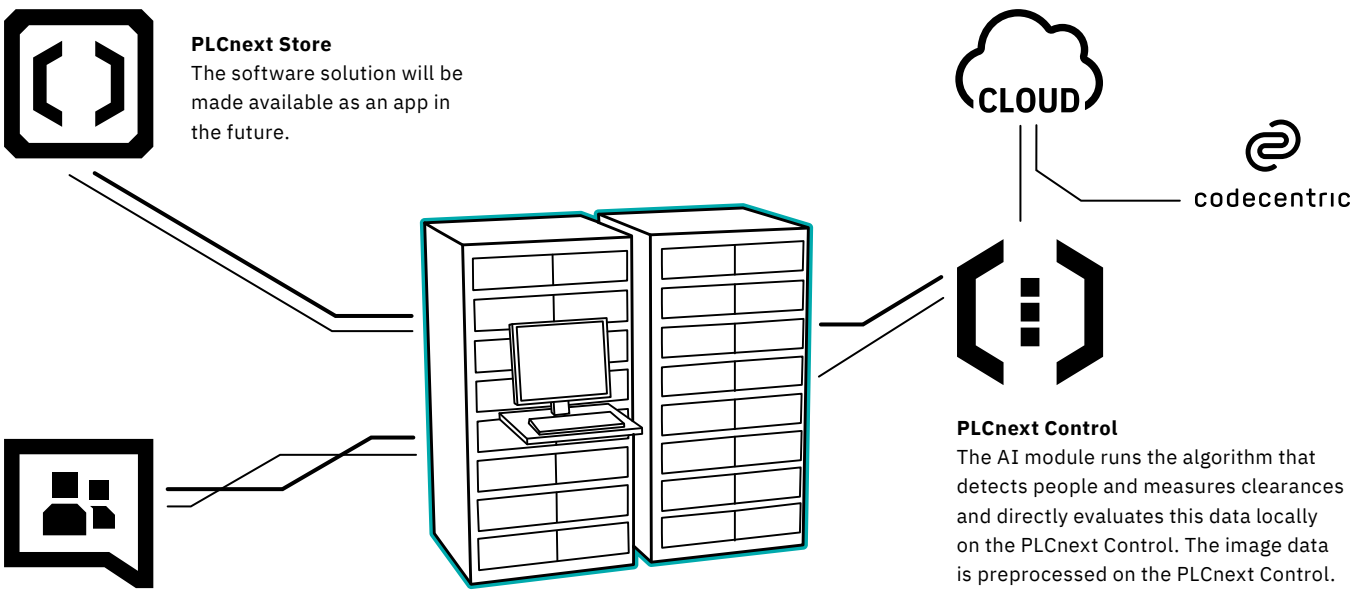
Quick and easy programming
It was possible to transfer the in-house software solution to a PLCnext Control within a few days. The openness of the hardware was decisive here.

Retrofitting
When using this solution, customers benefit from the fact that they can continue to use the camera systems that are already installed. Simple surveillance cameras can thus become intelligent systems for access management, for example.

Data protection compliance
The data can be analyzed and evaluated in compliance with data protection regulations because the AI-trained model works in real time and only evaluates the images locally on the edge. This means that only coordinates are sent and no confidential images are stored.

Real-time performance
Through performance in real time, visitor flows and the clearances between individual visitors can be made immediately transparent for the system.

A strong ecosystem on the road to success



PLCnext Store
The software solution will be made available as an app in the future.

PLCnext Control
The AI module runs the algorithm that detects people and measures clearances and directly evaluates this data locally on the PLCnext Control. The image data is preprocessed on the PLCnext Control. The extension module performs object classification in the images and significantly speeds up processing on the PLCnext Control.

PLCnext Community
To create the solution, codecentric employees gathered information via the PLCnext Community website and used a variety of tools (e.g., the forum, the Makers Blog).

“All **calculations** and **machine learning algorithms** can be computed directly **on the edge** – all while maintaining **data privacy**.”

Dr. Meike Wocken, codecentric AG,
Head of Industrial Solutions

Using data to increase productivity

270 TB
of operating and process data per year

2.7 million
data points per day

31,800
SMT data points per hour

3 … 5%

of I/Os for process monitoring

Obtaining minimally invasive process insights in production at Phoenix Contact

Data acquisition is essential to the future viability of a business. We produce products for automation, safety applications, and network security in our electronics production facility in Bad Pyrmont – our PLCnext Factory. Annually, 270 TB of process and machine data is read and collected from our systems and then evaluated. Through data analysis, we can increase system effectiveness and design manufacturing processes that are sustainable and secure. The Data Collection Box enables us to easily obtain digital data from production in a minimally invasive way.

“In our rapidly changing world, we have to rethink our production processes every single day. **Digitalization is the key to this.** We push boundaries every day, are flexible, and are open to new ways of working together. **As is the case for our products.**”

Dr. Till Potente, Phoenix Contact,
Vice President Operations & Sustainability

Find out more

DIGITAL FACTORY now

Advantages for production

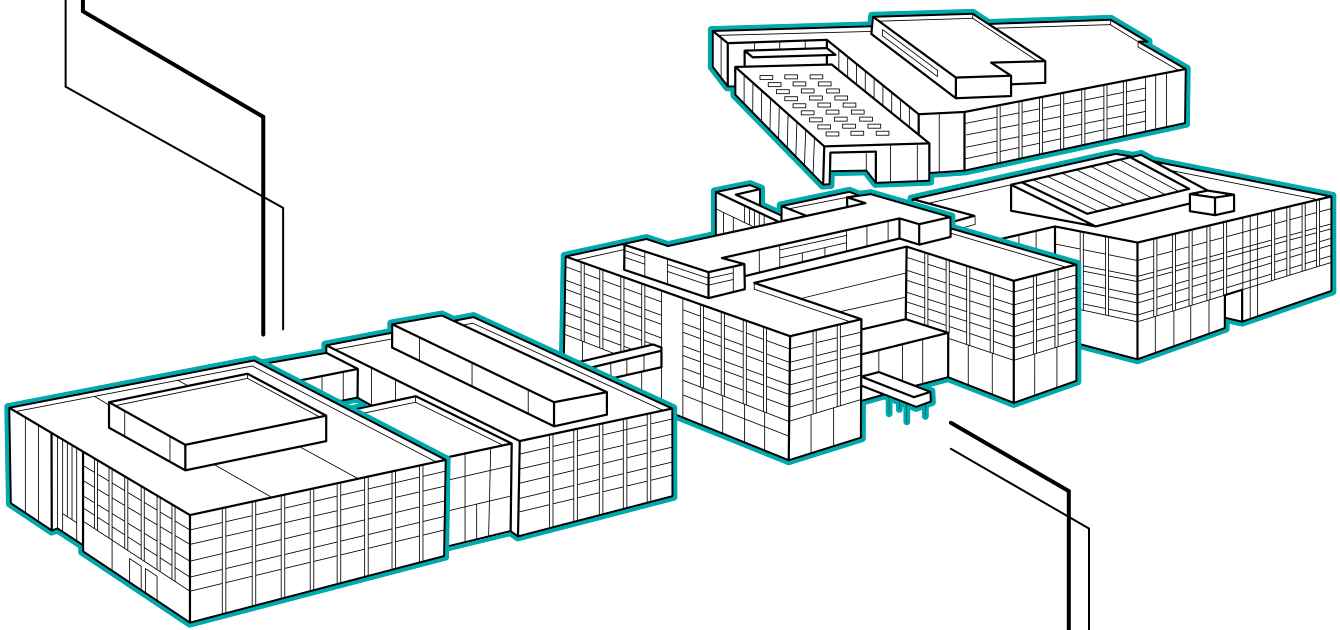
Retrofitting
The Data Collection Box is retrofitted easily into existing systems via plug-and-play. In addition, the solution based on the Box is 30 to 50% cheaper than a classic MES approach.

Any analysis and visualization methods
PLCnext Control is used as a data collector in the Data Collection Box. This means that the data can be stored in any cloud and, at the same time, any systems can be used for data analysis and visualization.

Scalability
In this context, we are talking about the development and clear trend towards a microservice architecture. With the Data Collection Box, we collect data in many different places in a very decentralized way. The openness of the PLCnext Technology Ecosystem forms the basis for building these new structures.

A strong ecosystem on the road to success

PLCnext Control
The PLCnext Control in the Data Collection Box acquires the data from systems in a minimally invasive way and makes it available for analysis and processing. To comprehensively map processes and make reliable derivations, it is sufficient to connect the PLCnext Control to 3 to 5% of the I/Os. The system CE is not affected, so new certification and TÜV approval is not necessary.



docker

elisa INDUSTRIQ

SIGA OT Solutions

MQTT

PLCnext Community
Our PLCnext Community provides access to numerous specialists in the industry. For example, the Israeli start-up SIGA OT Solutions has developed SigaInsight, an app that uses a Data Collection Box to forward the collected data to a learning algorithm. Early in the process, the algorithm detects deviations and reliably reports them to employees via smart alerts. This enables a rapid response to anomalies.

Controllers

Type	AXC F 2152	AXC F 3152	RFC 4072S	RFC 4072R
				
Item no.	2404267	1069208	1051328	1136419
Processor/clock frequency	ARM Cortex A9, 2 x 800 MHz	Intel Atom E3930, 2 x 1.3 GHz	Intel Core i5-6300U, 2 x 2.4 GHz	Intel Core 5-6300U, 2 x 2.4 GHz
Main memory (RAM)	0.5 GB	2 GB	8 GB	8 GB
PROFINET devices	64	128	256	256
Number of tasks (cycle)	32 (1 ms)	32 (500 µs)	32 (500 µs)	1 (10 ms recomm.)
Security	IEC 62443-4-1 and IEC 62443-4-2 Full ML3, IEC 61850 Ed. 2.1, and IEC 62351-3	IEC 62443-4-1 and IEC 62443-4-2 Full ML3, IEC 61850 Ed. 2.1, and IEC 62351-3	IEC 62443-4-1 and IEC 62443-4-2 Full ML3	–
Interfaces	Axioline, PROFINET, PLCnext Control extensions	Axioline, PROFINET, PLCnext Control extensions	PROFINET/PROFIsafe	PROFINET, Sync Link
Certifications	UL, CE, Maritime, IECEx, ATEX, PROFINET	UL HazLoc, CE, Maritime, PROFINET	UL, CE, PROFINET/PROFIsafe	CE
Other			300 PROFIsafe devices	Redundancy operation

Type	BPC 9102S	EPC 1502	EPC 1522
			
Item no.	1246285	1185416	1185423
Processor/clock frequency	Intel Core i7-107000TE, 8 x 2 GHz	Intel Celeron N3350, 2 x 1.1 GHz	Intel Celeron N3350, 2 x 1.1 GHz
Main memory (RAM)	16 GB	2 GB	4 GB
PROFINET devices	256	256	256
Number of tasks (cycle)	128 (500 µs)	32 (1 ms)	32 (1 ms)
Security	IEC 62443-4-1 and IEC 62443-4-2 Full ML3	–	–
Interfaces	PROFINET/PROFIsafe	PROFINET	PROFINET
Certifications	UL, CE, PROFINET/PROFIsafe	UL, CE	UL, CE
Other	300 PROFIsafe devices	Preinstalled Edge software, Wi-Fi	Preinstalled Edge software, Wi-Fi

For further product information, please click on the respective item number.

View 3D object

PLC extensions

Type	AXC F XT ML1000	AXC F XT SPLC 1000	AXC F XT SPLC 3000	AXC F XT ETH 1TX
				
Item no.	1259849	1159811	1160157	2403115
Description	Artificial intelligence	Safety 1000	Safety 3000	Ethernet
Extension...	...with a machine learning module	...with a safety-related controller	...with a safety-related controller	...with an additional Ethernet interface
Type	**AXC F XT PB**	**AXC F XT EXP**	**AXC F XT IB**	**AXC F XT KIT**
				
Item no.	1091657	1139999	2403018	1383116
Description	PROFIBUS	Expansion	INTERBUS	Extension kit
Extension...	...for connecting a PROFIBUS network	...for connecting up to three further PLCnext Control extensions	...for connecting an INTERBUS remote bus	...with a universal miniPCIe interface

For further product information, please click on the respective item number.

View 3D object

PLCnext Technology Starterkit

Would you like to test the operation, handling, and performance of PLCnext Technology in a small application first?

The starter kit includes:

- PLCnext Control AXC F 2152
- Axioline Smart Elements: digital input, digital output, analog voltage input 0 V ... 10 V
- 24 V power supply unit and space for extensions on a DIN rail

Item no. 1188165

Go to the product

View 3D object

Proficloud.io smart services

Device Management Service

Device Management Service
Powered by Proficloud.io

The standard for all smart devices from Phoenix Contact

- Overview of all devices
- State of health of devices
- Firmware update from the cloud
- Digital nameplate and device logs

Further information on the Device Management Service

User Management Service

User Management Service
Powered by Proficloud.io

Invite users to Proficloud.io organizations and assign individual permissions

- Inviting people to Proficloud.io organizations
- Predefined roles such as admin, editor, and viewer
- Create new organizations quickly and easily
- Manage multiple locations with one login

Further information on the User Management Service

Time Series Data Service

Time Series Data Service
Powered by Proficloud.io

All process data available centrally – at any time, anywhere

- Access to process data from any location
- Downtimes and workloads can be planned
- Increased product quality through data
- Warnings in the smart service or via email indicate impending problems
- Expert knowledge accessible to every employee

Further information on the Time Series Data Service

Impulse Analytics Service

Impulse Analytics Service
Powered by Proficloud.io

The world's first intelligent assistance system for surge protection in the field of mains protection

- Improved workflows with remote monitoring
- From reactive to proactive maintenance
- Detailed information on overcurrent events (State of Health reports) and remaining service life of the surge protective device (SPD)
- Greater availability and improved process stability

Further information on the Impulse Analytics Service

EMMA service

EMMA Service
Powered by Proficloud.io

Energy, Monitoring, Management, Analytics: Smart energy management anytime, from anywhere.

- Visualization and analysis of energy data
- Warning about limits that will be imminently over- or undershot
- Visualization of the key indicator "Energy Performance Indicator (EnPI)"
- Integration of external data possible
- Easy export of data for further processing in other systems possible

Further information on the EMMA service

Find out more

Getting started

FAQs

Go to the service store

Axioline Smart Elements (AXL SE)

Description	Type	Item no.
Digital input module, 16 channels, 1-conductor	AXL SE DI16/1	1088127
Digital input module (NPN), 16 channels, 1-conductor	AXL SE DI16/1 NPN	1105559
Relay module, two relay outputs, changeover contact, 220 V DC, 230 V AC	AXL SE DOR2 W 230	1105562
Digital output module, four channels, 2 A, 2-conductor	AXL SE DO4/2 2A EF	1181790
Digital output module, 16 channels, 1-conductor	AXL SE DO16/1	1088129
Digital output module (NPN), 16 channels, 1-conductor	AXL SE DO16/1 NPN	1105560
Safe digital input module (PROFIsafe), 8 channels (1-channel assignment), 4 channels (2-channel assignment)	AXL SE PSDI8/3	1079241
Safe digital input module (SafetyBridge Technology), 8 channels (1-channel assignment), 4 channels (2-channel assignment)	AXL SE SSDI8/3	1190012
Safe digital output module (PROFIsafe), 4 channels (1-channel assignment), 2 channels (2-channel assignment)	AXL SE PSDO 4/2 2A	1079231
Safe digital output module (SafetyBridge Technology), 4 channels (1-channel assignment), 2 channels (2-channel assignment)	AXL SE SSDO4/2 2A	1190017
Analog input module, 4 channels, 0 mA ... 20 mA, single ended	AXL SE AI4 I 0-20	1296378
Analog input module, 4 channels, 4 mA ... 20 mA, single ended	AXL SE AI4 I 4-20	1088062
Analog input module, 4 channels, 0 V ... 10 V, single ended	AXL SE AI4 U 0-10	1088104
Analog input module, 4 channels, -10 V ... 10 V, single ended	AXL SE AI U -10-10	1487836
Analog output module, 4 channels, 0 mA ... 20 mA, single ended	AXL SE AO4 I 0-20	1296372
Analog output module, 4 channels, 4 mA ... 20 mA, single ended	AXL SE AO4 I 4-20	1088123
Analog output module, 4 channels, 0 V ... 10 V, single ended	AXL SE AO4 U 0-10	1088126
Analog output module, 4 channels, -10 V ... 10 V, single ended	AXL SE AO U -10-10	1487835
Temperature measurement module, 4 channels for connecting resistance temperature detectors (Pt 100)	AXL SE RTD4 PT100	1088106
Temperature measurement module, 4 channels for connecting resistance temperature detectors (Pt 1000)	AXL SE RTD4 PT1000	1182190
Temperature measurement module, 4 channels for connecting thermocouples or linear voltage	AXL SE UTH4 EF	1182068
Communication module, IO-Link master, 4 IO-Link ports Class A	AXL SE IOL4	1088132
Communication module, RS-485 serial interface	AXL SE RS485	1088128
Communication module, RS-232 serial interface	AXL SE RS232	1181787
Function module, counter input for 24 V sensors	AXL SE CNT1	1088131
Function module, symmetrical incremental encoder	AXL SE INC1 SYM	1088130
Function module, asymmetrical incremental encoder	AXL SE INC1 ASYM	1182185
Potential distribution module, 24 V DC	AXL SE PD16 24V	1337223
Potential distribution module, GND	AXL SE PD16 GND	1337224
Potential distribution module, 24 V DC, GND	AXL SE PD8/8 24V/GND	1337225
Module for covering unused backplane slots, active	AXL SE SC-A	1088134
Module for covering unused backplane slots, passive	AXL SE SC	1167159
Backplane, for accommodating 4 Axioline Smart Elements	AXL F BP SE4	1088135
Backplane, for accommodating 6 Axioline Smart Elements	AXL F BP SE6	1088136

Axioline F: Standard I/O modules

Description	Type	Item no.
Digital input module, 8 channels, 2-conductor, 24 V DC	AXL F DI8/2 24DC 1F	2702783
Digital input module, 8 channels, 2-conductor, 48 V, 60 V	AXL F DI8/2 48/60DC 1F	2702654
Digital input module, 8 channels, 2-conductor, 110 V DC	AXL F DI8/2 110/220DC 1F	2700684
Digital input module, 16 channels, 1-conductor, 24 V DC	AXL F DI16/1 1H	2688310
Digital input module, 16 channels, 1-conductor, 24 V DC, with fast inputs	AXL F DI16/1 HS 1H	2701722
Digital input module, 16 channels, 4-conductor, 24 V DC	AXL F DI16/4 2F	2688022
Digital input module, 32 channels, 1-conductor, 24 V DC, 35 mm overall width	AXL F DI32/1 2H	2702052
Digital input module, 32 channels, 1-conductor, 24 V DC, 54 mm overall width	AXL F DI32/1 1F	2688035
Digital input module, 64 channels, 1-conductor, 24 V DC	AXL F DI64/1 2F	2701450
Safe digital input module (PROFIsafe), 8 channels (1-channel assignment), 4 channels (2-channel assignment)	AXL F PSDI8/4 1F	2701559
Safe digital input module (SafetyBridge Technology), 8 channels (1-channel assignment), 4 channels (2-channel assignment)	AXL F SSDI8/4 1F	2702263
Digital output module, 4 channels, 3-conductor, 24 V DC	AXL F DO4/3 AC 1F	2702068
Digital output module, 4 channels, 2-conductor, 24 V DC	AXL F DOR4/2 AC/220DC 1F	2700608
Digital output module, 8 channels, 2-conductor, 24 V DC	AXL F DO8/2 2A 1H	2688381
Digital output module, 16 channels, 1-conductor, 24 V DC	AXL F DO16/1 1H	2688349
Digital output module, 16 channels, 1-conductor, 24 V DC, with FLK connection	AXL F DO16 FLK 1H	2701813
Digital output module, 16 channels, 2-conductor, 24 V DC	AXL F DO16/2 2H	1027904
Digital output module, 16 channels, 3-conductor, 24 V DC	AXL F DO16/3 2F	2688048
Digital output module, 32 channels, 1-conductor, 24 V DC, 54 mm overall width	AXL F DO32/1 1F	2688051
Digital output module, 32 channels, 1-conductor, 24 V DC, 35 mm overall width	AXL F DO32/1 2H	1004925
Digital output module, 64 channels, 1-conductor, 24 V DC	AXL F DO64/1 2F	2702053
Safe digital output module (PROFIsafe), 8 channels (1-channel assignment), 4 channels (2-channel assignment)	AXL F PSDO8/3 1F	2701560
Safe relay output module (PROFIsafe), 4 safe relay outputs	AXL F PSDOR4/2 1F	2702858
Safe digital output module (SafetyBridge Technology), 8 channels (1-channel assignment), 4 channels (2-channel assignment)	AXL F SSDO8/3 1F	2702264
Safe digital output module (SafetyBridge Technology), 8 channels (1-channel assignment), 4 channels (2-channel assignment), with integrated safety logic	AXL F LPSDO8/3 1F	2702171
Safe relay output module (SafetyBridge Technology), 4 safe relay outputs	AXL F SSDOR4/2 1F	2702859
Digital input/output module, 8 channels each, 1-conductor, 24 V DC	AXL F DI8/1 DO8/1 1H	2701916
Digital input/output module, 8 channels each, 3-conductor, 24 V DC	AXL F DI8/3 DO8/3 2H	2702071
Digital input/output module, 16 channels each, 3-conductor, 24 V DC	AXL F DI16/1 DO16/1 2H	2702106
Digital I/O module, 16 channels (input), 1-conductor, 8 channels (output), 2-conductor, 24 V DC	AXL F DI16/1 DO8/22A 2H	2702291
Analog input module, 4 channels, current, configurable current ranges	AXL F AI4 I 1H	2688491
Analog input module, 4 channels, voltage, configurable voltage ranges	AXL F AI4 U 1H	2688501
Analog input module, 8 channels, current/voltage, configurable current and voltage ranges	AXL F AI8 1F	2688064
Safe analog input module (PROFIsafe), 8 channels (1-channel assignment), 4 channels (2-channel assignment)	AXL F PSAI8 I 1F	1061424

Axioline F: Standard I/O modules

Description	Type	Item no.
Analog input/output module, 2 channels each, current/voltage, configurable current and voltage ranges	AXL F AI2 AO2 1H	2702072
Analog output module, 4 channels, current/voltage, configurable current and voltage ranges	AXL F AO4 1H	2688527
Analog output module, 8 channels, current/voltage, configurable current and voltage ranges	AXL F AO8 1F	2688080
Temperature measurement module, 4 channels for connecting resistance temperature detectors (RTDs)	AXL F RTD4 1H	2688556
Temperature measurement module, 8 channels for connecting resistance temperature detectors (RTDs)	AXL F RTD8 1F	2688077
Temperature measurement module, 8 channels for connecting resistance temperature detectors (RTDs), with high dynamic range	AXL F RTD8 S 1F	2702120
Temperature measurement module, 4 channels for connecting thermocouples	AXL F UTH4 1H	2688598
Temperature measurement module, 8 channels for connecting thermocouples	AXL F UTH8 1F	2688417
Function module, 2 counter inputs for 24 V signals, 2 incremental encoder inputs, 8 digital inputs	AXL F CNT2 INC2 1F	2688093
Communication module, serial interface, can be parameterized	AXL F RS UNI 1H	2688666
Communication module, IO-Link master, 8 channels	AXL F IOL8 2H	1027843
DALI master, 2 channels, integrated DALI power supply unit	AXL F MA DALI2 1H	2702864
M-Bus master, for connecting M-Bus meters in accordance with EN 13757-2	AXL F MA MBUS 1H	1104545
Function module, 1 SSI interface for absolute encoder, 1 analog output	AXL F SSI1 AO1 1H	2688433
Function module, pulse width modulation	AXL F PWM2 1H	1007352
Strain gauge capture module	AXL F SGI2 1H	2702911
Power measurement module, voltage, and current measurements	AXL F PM EF 1F	2702671
Power module for the communications power UBus	AXL F PWR 1H	2688297

Updating your Inline station

We have to adapt ever more quickly to new technologies, including those that are considered futuristic even by today's standards. But why dispose of an entire control station when you can adapt it easily to future technologies?

- Connectors for 63 Inline I/Os
- 24 PCP devices can be used
- 4,096 bit input/output data
- Current consumption 20 mA
- Approvals: UL, CUL-DNV/GL, LR, BV, ABS, Rina

Go to the product

AXC F IL ADAPT
Item no. 1020304

Axioline F: I/O modules for extreme environments

Description	Type	Item no.
Digital input module, 16 channels, 4-conductor, extended temperature range	AXL F DI16/4 XC 2F	2701224
Digital input module, 16 channels, NAMUR, extended temperature range	AXL F DI16 NAM XC 1F	1052427
Digital input module, 16 channels, NAMUR, intrinsically safe, extended temperature range	AXL F EX IS DI16 NAM XC 1F	1052423
Digital input module, 32 channels, 1-conductor, extended temperature range	AXL F DI32/1 XC 1F	2701226
Digital output module, 4 channels, 24 V DC, 48 mA, intrinsically safe, extended temperature range	AXL F EX IS DO4 SD 24-48 XC 1F	1086901
Digital output module, 4 channels, 21 V DC, 60 mA, intrinsically safe, extended temperature range	AXL F EX IS DO4 SD 21-60 XC 1F	1086902
Digital output module, 8 channels, 2-conductor, extended temperature range	AXL F DO8/2 2A XC 1H	1035427
Digital output module, 16 channels, 3-conductor, extended temperature range	AXL F DO16/3 XC 2F	2701228
Digital output module, 32 channels, 1-conductor, extended temperature range	AXL F DO32/1 XC 1F	2701230
Digital input/output module, 8 channels each, 1-conductor, 24 V DC, extended temperature range	AXL F DI8/1 DO8/1 XC 1H	2702017
Analog input module, 4 channels, current, configurable current ranges, extended temperature range	AXL F AI4 I XC 1H	2702007
Analog input module, 4 channels, voltage, configurable voltage ranges, extended temperature range	AXL F AI4 U XC 1H	2702008
Analog input module, 8 channels, current/voltage, configurable current and voltage ranges, extended temperature range	AXL F AI8 XC 1F	2701232
Analog input module, 8 channels, HART, extended temperature range	AXL F AI8 HART XC 1F	1052434
Analog input module, 8 channels, HART, intrinsically safe, extended temperature range	AXL F EX IS AI8 HART XC 1F	1052432
Analog output module, 4 channels, current/voltage, configurable current and voltage ranges, extended temperature range	AXL F AO4 XC 1H	2702153
Analog output module, 4 channels, HART, extended temperature range	AXL F AO4 HART XC 1F	1087080
Analog output module, 4 channels, HART, intrinsically safe, extended temperature range	AXL F EX IS AO4 HART XC 1F	1087081
Analog output module, 8 channels, current/voltage, configurable current and voltage ranges, extended temperature range	AXL F AO8 XC 1F	2701237
Analog input/output module, 2 channels each, current/voltage, configurable current and voltage ranges, extended temperature range	AXL F AI2 AO2 XC 1H	1035429
Temperature measurement module, 4 channels for connecting resistance temperature detectors (RTDs), extended temperature range	AXL F RTD4 XC 1H	1035430
Temperature measurement module, 8 channels for connecting resistance temperature detectors (RTDs), extended temperature range	AXL F RTD8 XC 1F	2701235
Temperature measurement module, 8 channels for connecting thermocouples, extended temperature range	AXL F UTH8 XC 1F	2702464
Function module, 2 counter inputs for 24 V signals, 2 incremental encoder inputs, 8 digital inputs, extended temperature range	AXL F CNT2 INC2 XC 1F	2701239
Communication module for serial data transmission, 1 interface can be parameterized as RS-485/RS-422 or RS-232, extended temperature range	AXL F RS UNI XC 1H	2702006
Function module, 2 digital pulse interfaces for evaluating magnetostrictive position sensors with start/stop interface, for extended temperature range	AXL F IMPULSE2 XC 1H	2702655

Open communication with customers and partners worldwide

Phoenix Contact is a global market leader based in Germany. We are known for producing future-oriented products and solutions for the electrification, networking, and automation of all sectors of the economy and infrastructure. With a global network reaching across more than 100 countries with over 21,000 employees, we maintain close relationships with our customers, something we believe is essential for our common success.

Our wide range of innovative products makes it easy for our customers to implement the latest technology in a variety of applications and industries. This especially applies to the target markets of energy, infrastructure, industry, and mobility.

You can find your local partner at

phoenixcontact.com

PHOENIX CONTACT

Join and get involved.

plcnextstore.com
plcnext-community.net

@plcnext #plcnext

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