

Automation and Digitalization

Intelligent Machine Networking With u-mation

Scalable Automation and Digitalization Solutions



Weidmüller 

u-mation.

More than Automation. Digital Solutions.

The factory of the future will be able to control itself through intelligent networking and have the flexibility to adapt to new requirements. Thanks to u-mation, this vision is a reality, as u-mation paves your way towards the IoT (Internet of Things) and beyond. The perfectly coordinated portfolio combines modular automation hardware as well as innovative engineering and visualization tools with well thought-out digitalization solutions. Thus, it enables the intelligent connection of all process levels – from sensor to cloud. From control applications to data-based, predictive maintenance through Industrial Analytics, with u-mation you create a future-proof basis for more efficient production concepts. Individually scalable depending on the complexity of your system.

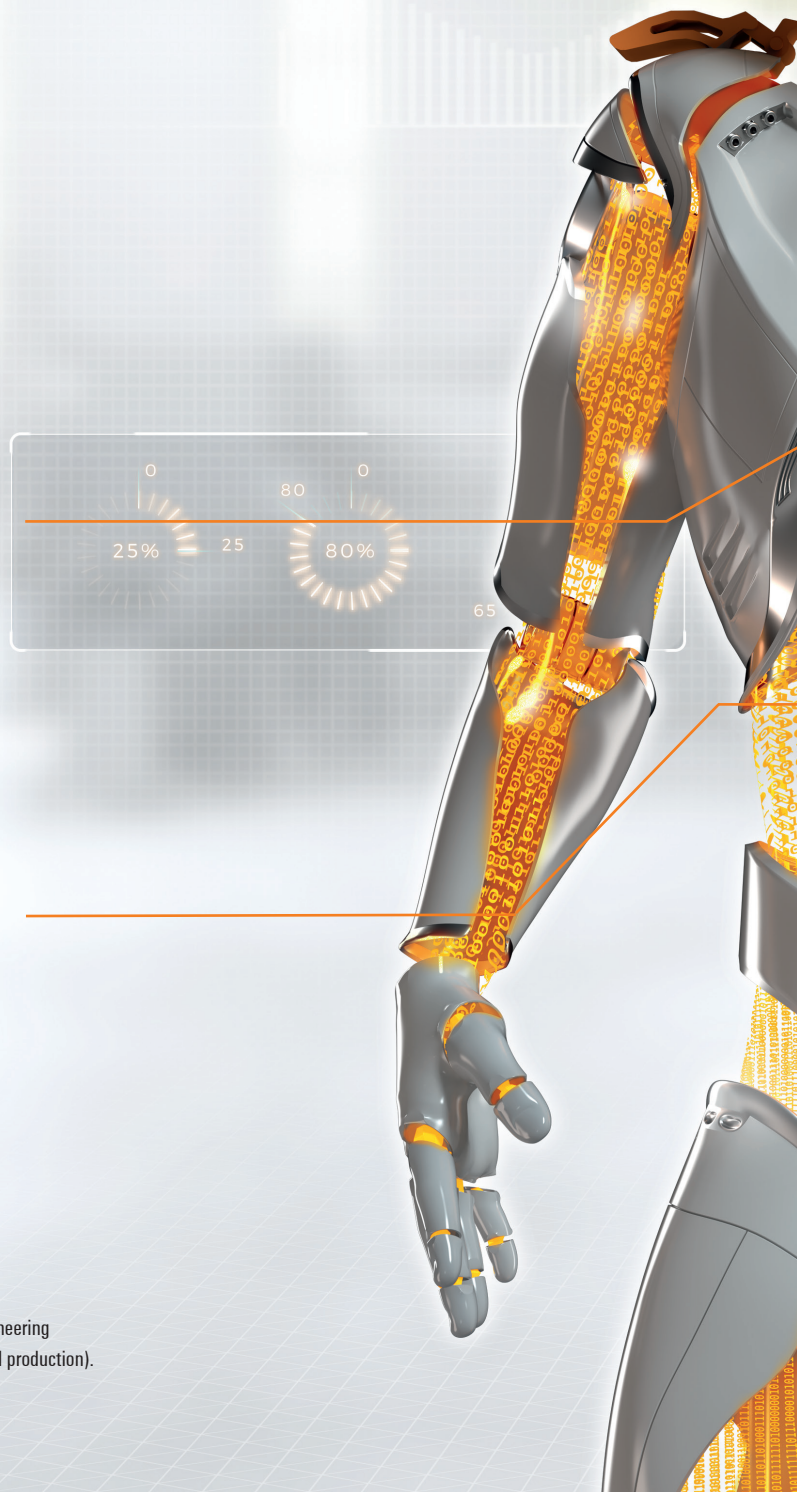
AUTOMATION

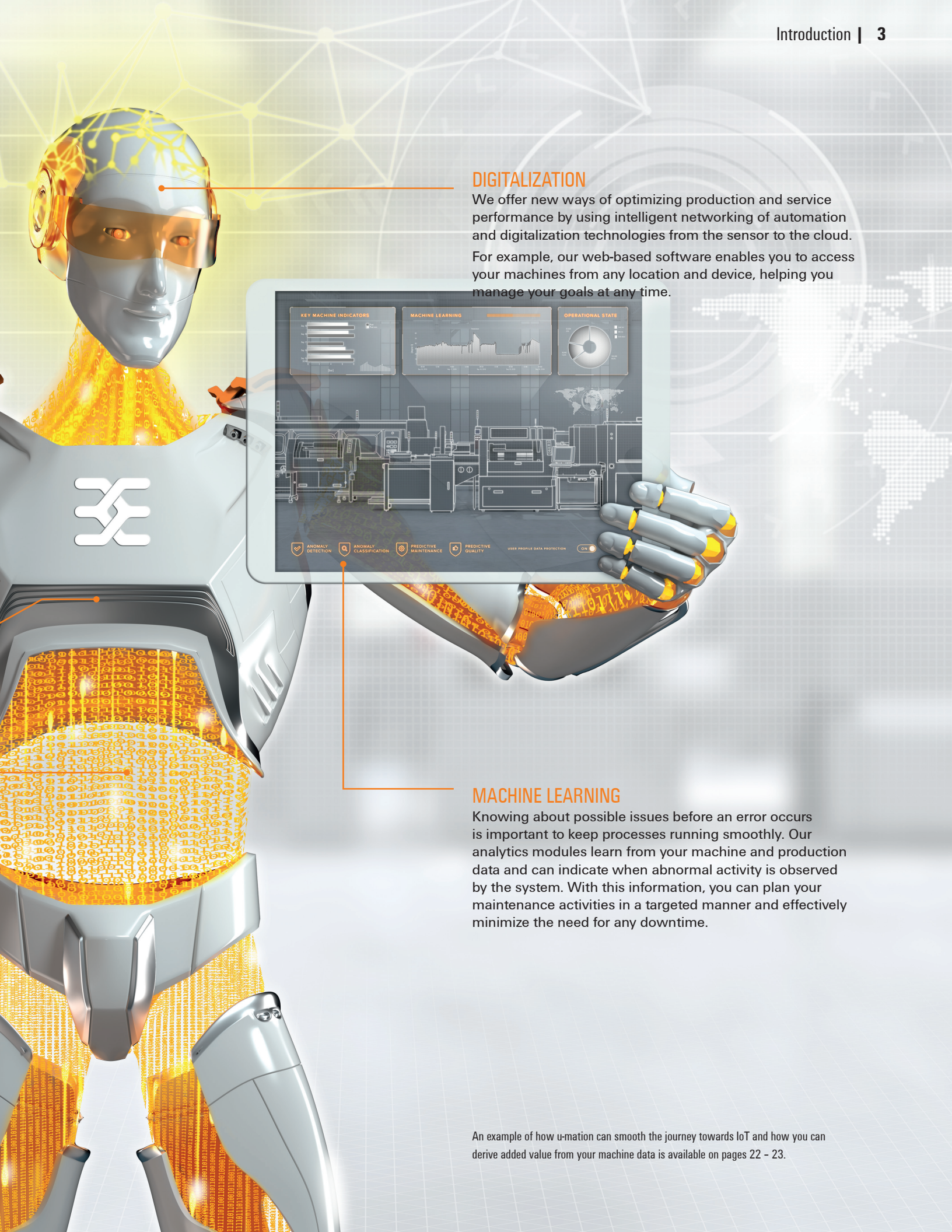
Powerful and easy-to-use hardware is the basis of each automation solution. Our flexible controller u-control, modular I/O system u-remote and intuitive multi-touch panels u-view form the core of the u-mation hardware portfolio. These components offer you maximum flexibility to create individual solutions for your needs.

ENGINEERING LANDSCAPE

Our engineering tools breathe life into your applications. With web-based software you gain location-independent access to your machines, while IoT technology enables your communication to the cloud. Implement complex control tasks using software based on your familiar engineering environment. Whatever the task, Weidmüller offers the ideal software for your needs, with the flexibility to expand in line with your application requirements.

Examples of the perfect interaction between the u-mation automation hardware and the engineering landscape can be found on pages 14 – 15 (stand-alone machines) and 16 – 17 (decentralized production).

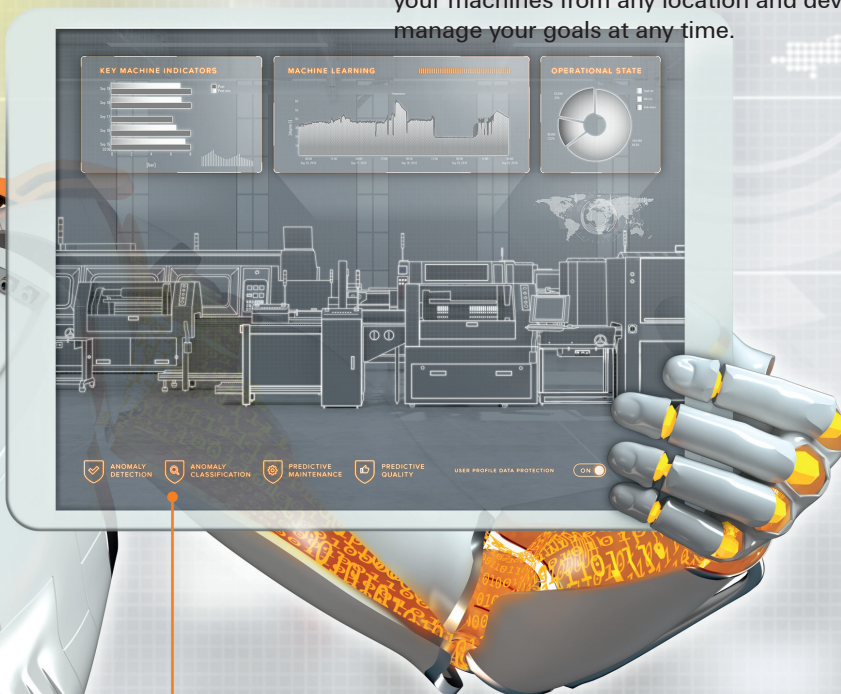




DIGITALIZATION

We offer new ways of optimizing production and service performance by using intelligent networking of automation and digitalization technologies from the sensor to the cloud.

For example, our web-based software enables you to access your machines from any location and device, helping you manage your goals at any time.



MACHINE LEARNING

Knowing about possible issues before an error occurs is important to keep processes running smoothly. Our analytics modules learn from your machine and production data and can indicate when abnormal activity is observed by the system. With this information, you can plan your maintenance activities in a targeted manner and effectively minimize the need for any downtime.

An example of how u-mation can smooth the journey towards IoT and how you can derive added value from your machine data is available on pages 22 - 23.

Automated. Digitalized. Intelligent.

u-mation allows you to communicate from the sensor to the future.

Automation

In order to meet the requirements of the Internet of Things (IoT), automation technology needs to improve on its performance and reactivity all the time. u-mation offers you a tailored hardware portfolio with which you can perfectly prepare your machines and systems for future functions.

The central element of our automation hardware is u-control 2000, one of the most state-of-the-art and compact controllers on the market. u-control 2000 is compatible with our u-remote system and forms the hardware platform for our engineering solutions u-create web, and u-create IoT. Our range is rounded off by the high-performance u-view multitouch panels, which meet all the requirements of state-of-the-art visualization, control and IoT applications. In combination with the platform-independent visualization software u-create visu, the u-view multitouch panels allow you to create a dynamic, scalable visualization of your automation functions.

Engineering Landscape

Future-proof automation solutions should adapt flexibly to new requirements. In order for this to happen, the production-related software needs to guarantee this adaptability. u-mation offers extensive engineering tools which have an open software architecture to give you maximum flexibility for individual applications.

You could opt for u-create web, which is a web-based engineering software for platform-independent configuration, system parametrization and programming from anywhere. The u-create IoT software, which is also web-based, smooths the journey towards the IoT by allowing you to prepare sensor information and send it to the cloud. The optimum interface between human and machine is provided by u-create visu. The dynamic visualization software implements tailored solutions for a wide range of automation functions.



Digitalization (IoT)

Digitalization is about the intelligent networking of machines and processes. In the industrial Internet of Things, all the components in a production environment are connected to one another via a digital infrastructure, making them stakeholders in the process. With u-mation, Weidmüller combines innovative automation technologies with smart digitalization solutions, thus achieving a future-proof connection of all process levels, from the sensor to the cloud. Communication-capable components, such as the ACT20C signal converter and the PROtop power supply with CANopen communication module, form the basis for consistent digital networking and provide continuous information on device status, signals and data. In combination with web-based software u-create IoT, our u-control 2000 controller provides the option of preparing sensor information from u-remote I/O modules and forwarding it directly to the cloud. Thanks to the Node-RED implementation, various IoT applications can be implemented within a short space of time based on a modular principle.



Machine Learning

The key to increased efficiency and cost control in the life cycle of your systems is the profitable use of machine and process data. Thanks to state-of-the-art sensor systems and digital networking, u-mation enables you to extract the data which are relevant to you and use them in intelligent analytics processes. Our machine learning service is all about innovative analytics solutions which allow you to initiate targeted maintenance measures and thus minimize unnecessary downtimes. Make the most of predictive maintenance in order to plan future service intervals based on your requirements. Seamless monitoring of your sensor, status and process data also provides you with reliable information about the quality of your products (predictive quality). The analytics modules learn from your machine data and thus become more accurate over time. The machine learning models provide a future-proof foundation for more efficient production strategies.



Automation and digitalization solutions

Scalable and perfectly matched

As an expert in Industrial Connectivity, Weidmüller can offer u-mation, an integrated service for the automation and digitalization of your machines and systems. You can benefit from the perfect interaction between all components and optimum integration into your systems. Combine hardware and software as required to produce future-proof automation and digitalization solutions. u-mation allows you to tap into future-proof application opportunities and increase your competitiveness.

Machine Learning

- Data recording and selection
- Visualization
- Machine learning
- Anomaly detection
- Predictive maintenance

Digitalisation (IoT)



Extract from u-mation IoT portfolio

Automation



Extract from u-mation hardware portfolio



u-control 2000:

High-performance, flexible controller hardware. Picks up on the modular approach of the u-remote hardware and is compatible with all u-create software applications.



u-remote:

The most modern, flexible and slimmest I/O system on the market. Available in protection classes IP20 for the panel or IP67 for use in the field.



u-view:

High-resolution multitouch panels for intuitive visualization and operation of HMI applications. Ideal for web-based visualization solutions in an industrial environment, such as u-create visu.



Industrial Analytics:

Development of tailored analytics modules to effectively reduce downtimes. Analytics solutions from Weidmüller make it possible to generate added value from machine and process data, e.g. through predictive quality or predictive maintenance.



u-control 2000 with u-create IoT:

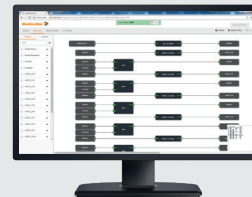
As well as safe controls, modern systems need to be able to send machine data directly to a cloud. u-control 2000 in combination with u-create IoT enables sensor information from u-remote I/O modules to be pre-processed and forwarded to the cloud via MQTT, OPC-UA or AMQP.

Engineering Landscape



u-create visu:

u-create visu is the engineering software for your web-based visualisation of modern HMI concepts.



u-create web:

Web-based engineering software for platform-neutral and location-independent configuration, system parametrization and programming, as well as basic visualization of small and medium-sized control applications in accordance with IEC 61131-3.

The web browser becomes an engineering platform.



u-create IoT:

Web-based u-create IoT is a device and platform-independent solution which enables quick and uncomplicated implementation of IoT applications by means of Node-RED. Compatible with Cloud providers such as Microsoft Azure*, IBM Cloud and Amazon AWS.



*The u-create IoT solution is certified for the Microsoft Azure cloud.

Mastering increasing complexity systematically

With modular, flexible automation hardware

Driven by global competition and shortening innovation cycles, the demands faced by machinery and plant engineering are becoming increasingly complex. As well as centralized automation technology, there is increasing need for decentralized, intelligent control systems in order to give production environments the flexibility they require.

Our response to increasing complexity is a modular hardware portfolio which can be flexibly combined and extended. This applies to a traditional panel application as well as a decentralized controller. With the u-remote I/O system and the u-control 2000 controller based on it, u-mation offers you flexible hardware solutions that stand out due to their perfect compatibility and needs-based scalability.

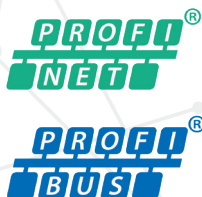


u-remote modular I/O system

The most state-of-the-art and compact system on the market is suitable for all conventional applications in machinery and plant engineering. With the simple-to-use u-remote modules, you can connect signal systems in the panel, in mixed IP20 and IP67 applications or directly in the field. The modular construction allows simple system design and quick, error-free installation. u-remote offers ultra-high performance within a confined space and makes your systems not only more affordable, but also more efficient.

Your special advantages

- Modular I/O system for streamlined planning, simple installation and fast commissioning
- Over 100 modules available for IP20 and IP67 applications
- Built-in web server with diagnostics functions for simple commissioning and accelerated maintenance work
- Two electrically isolated 10 A current paths for supply of inputs and outputs - for minimum supply requirement and maximum flexibility



u-control 2000 controller

Taking our modular hardware further, intelligently: the high-performance u-control 2000 controller is based on the compact design of the u-remote fieldbus coupler and can replace it on a one-to-one basis, enabling even greater space saving and maximum flexibility when it comes to the implementation of individual automation solutions. The controller is compatible with the whole u-remote range and allows I/O modules to be connected directly. It can be combined with our versatile u-create studio, u-create web and u-create IoT engineering tools for a full range of applications.

Your special advantages

- Fitted with a fieldbus and TCP/IP interface, plus an optional CAN interface
- Dual Core Arm A9 processor
- Compatible with u-create software applications and u-remote I/O modules
- Allows you to save projects.
- Provides USB service interface and Ethernet ports
- u-control 2000 can be addressed, irrespective of the system, via a web server application
- Battery-buffered realtime clock and slot for Micro SD cards up to 32 GB



Technical data for u-control 2000

Type	Description	Processor	Memory (flash)	Realtime clock	max. no. of I/O modules	Interface	Order no.:	VPE
UC20-WL2000-IOT	IOT Controller incl. Node-RED	Dual Core ARM Cortex A9, 624 MHz, 512MByte RAM	32 GB via microSD	Battery buffered	64	2x Ethernet TCP/IP, 1x Micro USB	1334990000	1
UC20-WL2000-AC	Automation Controller incl. u-create web	Dual Core ARM Cortex A9, 624 MHz, 512MByte RAM	32 GB via microSD	Battery buffered	64	2x Ethernet TCP/IP, 1x Micro USB	1334950000	1

Flexible automation of applications

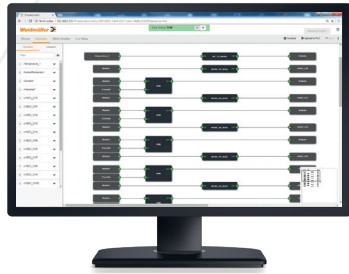
u-control 2000 hardware with u-create software

In order to keep pace with the rapid developments in machinery and plant engineering, you need automation solutions which are not only extremely efficient but also incredibly flexible. The u-control 2000 modular controller fulfills these requirements. In combination with our u-create software portfolio, you are equipped for a wide range of applications and the implementation of compact or more complex as well as networked control solutions.

In u-create web and IoT, we can offer you high-performance software solutions which will allow you to realise a range of different automation applications. The u-create range is a safe bet because every one of our engineering tools is based on the "Security by Design" concept. As a result of continuous tests and the consideration of exacting standards, you can benefit from top-notch security in the application. The u-control 2000 with u-create IoT solution is certified for the Microsoft Azure cloud.

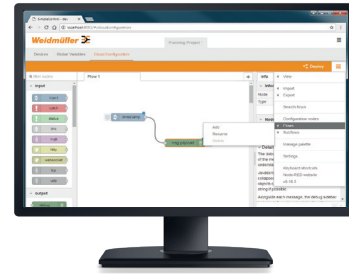


Whether it is local or in the cloud: your security is our top priority. This is why we develop our software based on the "Security by Design" concept and collaborate with Microsoft to accelerate Internet of Things solutions.



u-create web

The web-based engineering software u-create web enables platform and device-neutral programming, configuration and system parametrization in accordance with IEC 61131-3. The application is simply accessed from your web browser. u-create web can be extended with additional software apps and used on all standard operating systems which support HTML5, CSS and JavaScript. Due to the integration of Node-RED, u-create web also features industrial IoT functionality. In combination with u-control and u-remote, the application offers the optimum programming environment for flexible engineering.



u-create IoT

The u-create IoT software, which is also web-based, provides the option of pre-processing sensor information from I/O modules if used in conjunction with u-control 2000 and u-remote. These can then simply be forwarded to the cloud via MQTT or AMQP. The data are transferred directly based on Node-RED. Cloud providers Microsoft Azure (certified), IBM Cloud and Amazon AWS are supported. You can access u-create IoT via your web browser and the application can thus be used on any platform or device. The intuitive, flexible user interface of u-create IoT makes it possible to abstract a wide range of different technologies.

Your special advantages

- Web-based, license-free engineering software
- Platform and device-neutral programming via web browser
- Programming standard in accordance with IEC 61131-3
- Use of standardized web technologies such as HTML5

Your special advantages

- Web-based, license-free software
- Platform and device-neutral programming via web browser
- Future-proof thanks to the use of standardized web technologies such as HTML5
- Intuitive implementation of IoT applications using Node-RED

Optimum visualization and operation

u-view multitouch panels with u-create visu software

Industry 4.0 and the Internet of Things are revolutionizing how we work with machines. Not only are process workflows changing, but so are the demands in terms of analysis, maintenance and operation options. With the u-view multitouch panels and the web-based, scalable software u-create visu, you have the whole process chain at your fingertips.

U-create visu simplifies the implementation of flexible, scalable visualization concepts. The client/server architecture enables rapid integration or replacement of terminal devices without having to configure local software. As it is platform-independent and web-based, u-create visu guarantees access to all the relevant information from wherever you are.

This reduces response times and efficiently optimizes your production processes. The user interfaces are based on JavaScript and HTML5, so they can easily be displayed on the browser of your terminal device. You can adjust the client-side visualization to your requirements based on style guides and predefined project libraries.

u-view multitouch panels combine high-performance hardware with a high-resolution display. Modern touch technology makes them just as intuitive to use as mobile devices. In combination with u-create visu, you can plan and monitor your processes, control machines and implement flexible, versatile IoT applications.



Perfect interaction between hardware and software: u-view Advanced Line multitouch panels in combination with the u-create visu engineering environment and the u-control 2000 controller.

The benefits of u-create visu software

- Dynamic user interface with adaptive design
- Communications driver for access to controllers from all standard providers
- Can be used in different languages thanks to Unicode standard
- Efficient engineering by means of object-oriented layout/container and class/instance concepts
- Detailed user and permissions management



Top-notch image quality and high-performance processors make working with u-view multitouch panels a real pleasure. The panels are very flat and have a robust IP66 aluminium casing.

u-view Basic Line

- Resistive touch controls
- Elegant, flat aluminium front in IP66 degree of protection
- Ethernet interfaces: 1 x 100 Mbit
- Different display sizes and resolutions:
4.3"- 480 x 272 pixels
7"- 800 x 480 pixels
10.1"- 1.280 x 800 pixels

u-view Advanced Line

- Capacitive multitouch operation
- Smooth user interface for optimum cleaning in IP66 degree of protection
- Ethernet interfaces: 2 x 10/100/1.000 Mbit
- Different display sizes and resolutions:
7"- 800 x 480 pixels
10.1"- 1.280 x 800 pixels
15.6"- 1.366 x 768 pixels

u-view technical data

Type	Touch screen	Size	Processor	Memory (flash)	Order no.:	EAN	VPE
UC20-ADV-10-CAP-W	capacitive	10.1 "	ARM Cortex A9 1 GHz NXP® i.MX6 DualLite	4 MB	2555840000	4050118566208	1
UC20-ADV-15-CAP-W	capacitive	15.6 "	ARM Cortex A9 1 GHz NXP® i.MX6 DualLite	4 MB	2555850000	4050118566215	1
UC20-ADV-7-CAP-W	capacitive	7 "	ARM Cortex A9 1 GHz NXP® i.MX6 DualLite	4 MB	2555830000	4050118566192	1
UC20-BAS-10-RES-W	resistive	10.1 "	ARM Cortex A8 processor Freescale® i.MX535 1 GHz	4 MB	2555820000	4050118566185	1
UC20-BAS-4-RES-W	resistive	4.3 "	ARM Cortex A8 processor Freescale® i.MX535 1 GHz	4 MB	2555800000	4050118566161	1
UC20-BAS-7-RES-W	resistive	7 "	ARM Cortex A8 processor Freescale® i.MX535 1 GHz	4 MB	2555810000	4050118566178	1

Easy control of stand-alone machines

u-control 2000 controller with u-create web software

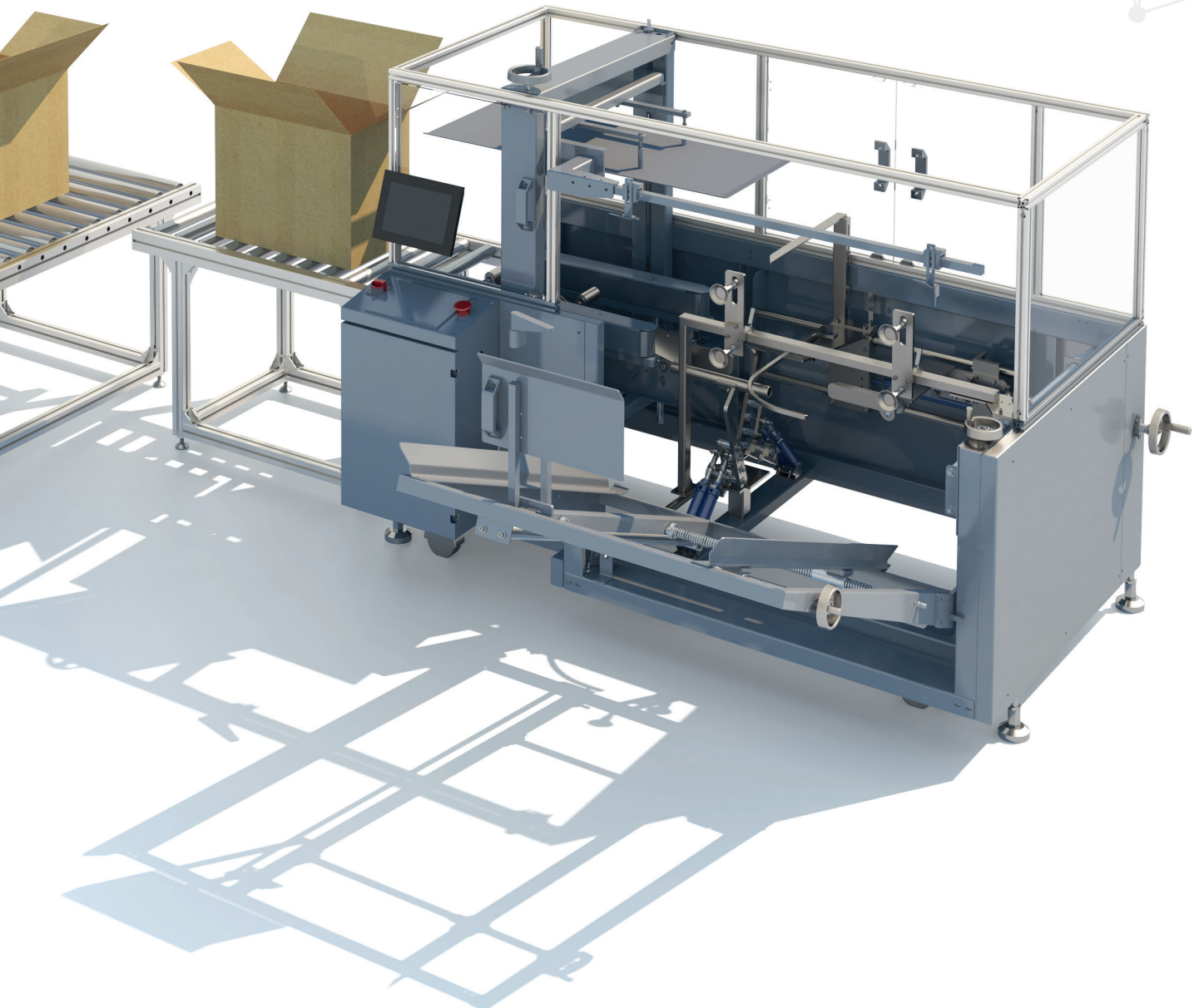
Stand-alone machines such as cardboard box erectors are able to carry out their functions independently without a connection to a higher-level system, which means they are very versatile to use. This requires decentralized automation solutions which enable autonomous machine control.

You can implement decentralized controller applications efficiently and easily with the modular hardware and software portfolio from u-mation. For the main controller of a stand-alone machine, simply replace the u-remote fieldbus coupler with our u-control 2000 controller. Then combine this with the u-create engineering software.



Modular hardware

The u-control 2000 controller is based on the compact design of the fieldbus coupler in our u-remote range, and can replace it on a one-for-one basis. This saves space and gives you the maximum flexibility for your individual automation applications. u-control 2000 is compatible with a wide range of components in the u-mation range and thus allows u-remote I/O modules to be connected directly.



Flexible software

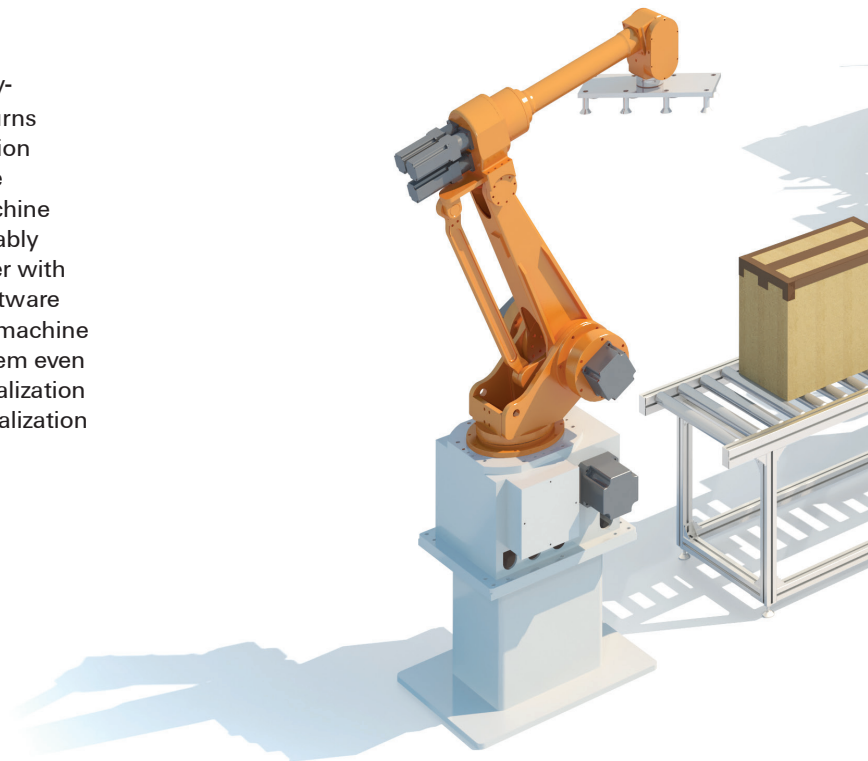
The combination of the complete u-create studio engineering tool and the u-control 2000 controller provides a high-performance automation solution for user-friendly parametrization and control of stand-alone machines.

Commission machines from anywhere

u-control 2000 with u-create web as intuitive controller

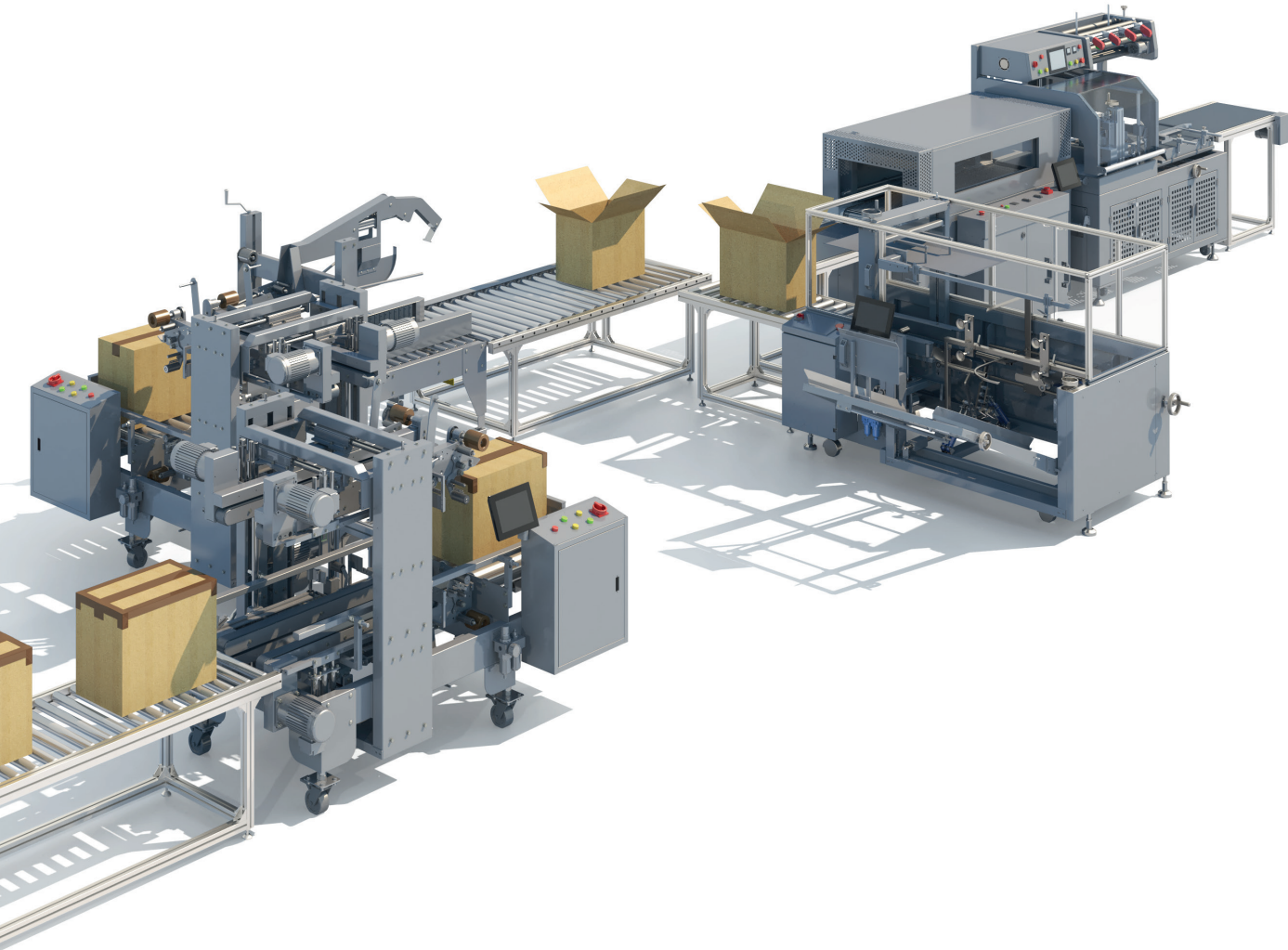
In machinery and plant engineering, the elements of a line are only seldom produced on the same production site. In order to prevent long installation times at the installation location, it is good practice to be able to commission machine components even before they are assembled.

u-mation offers you flexible solutions for decentralized automation applications which you can access from anywhere. The web-based control software u-create web turns your browser into an engineering platform. In combination with our u-control 2000 controller hardware, we enable intuitive commissioning of individual assemblies or machine components from anywhere. Implementation is remarkably straightforward: simply replace the u-remote bus coupler with u-control 2000, which already has the u-create web software installed on it. Using the browser, you can commission machine components from wherever you are and parametrize them even before the whole machine is assembled. Using our visualization software u-create visu, an integrated operating and visualization concept for the entire plant can then be realized.



Modular hardware

The design of the u-control 2000 controller is based on our established remote I/O system, u-remote. The modular construction means that u-control 2000 is compatible with a range of different automation components in the u-mation range and can be extended as required.



Web-based control

The web-based software u-create web turns u-control 2000 into a primary controller and enables machine components to be commissioned via a web browser from anywhere. This simplifies and accelerates the subsequent assembly of machines produced on a decentralized basis.



Intuitive operation

The visualization software u-create visu enables user-friendly implementation of multitouch-compatible HMI solutions. The associated web server provides the user interface as Web Runtime by means of JavaScript and HTML5. This enables HMI panels to be calibrated from any terminal device. Our high resolution u-view multitouch panels allow optimum visualization and operation.

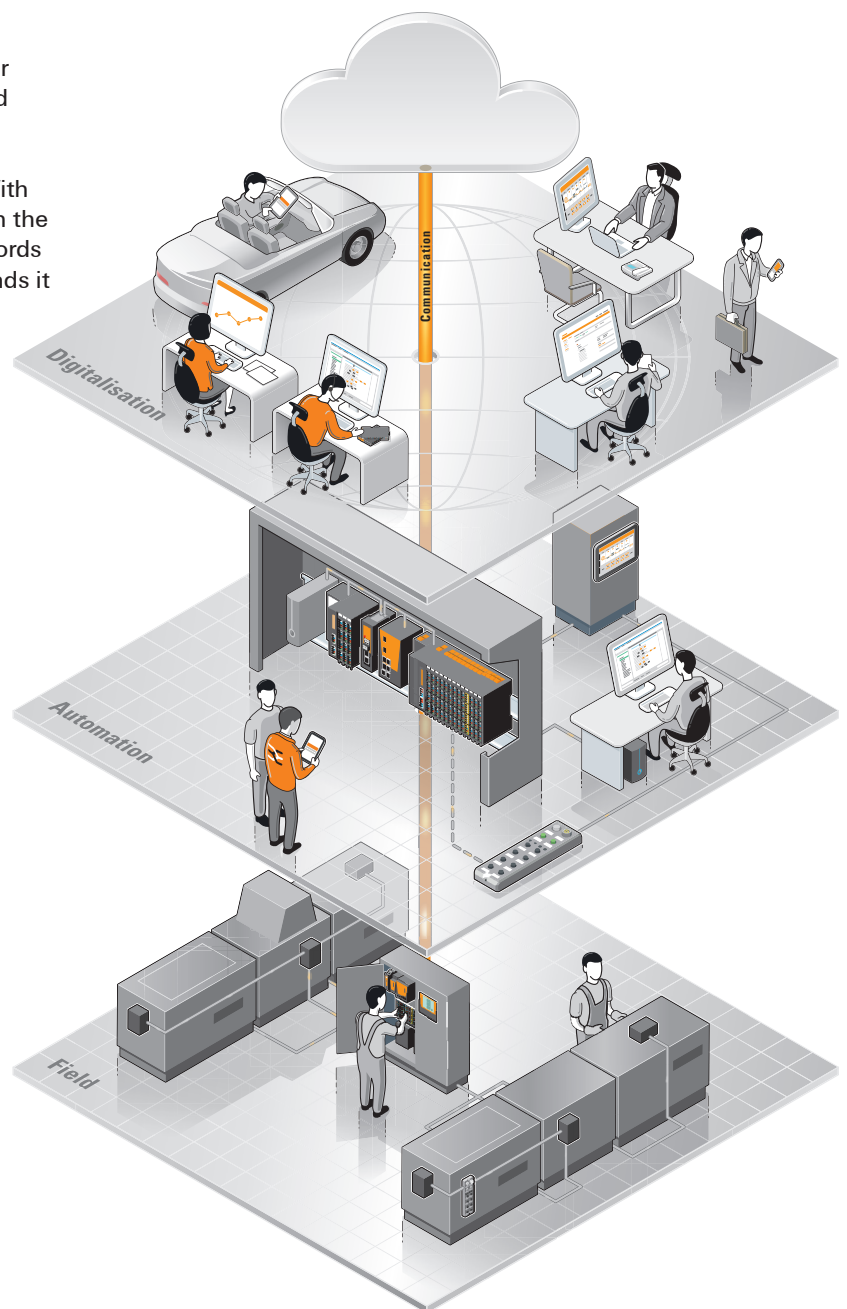
Consistent communication from the sensor to the future

Industrial digitalization driven by Weidmüller

Digitalization is in full flow across all sectors of industry. As a complete automation and digitalization service provider, Weidmüller can support your digital transformation process with an integrated range of hardware, software, services and comprehensive application know-how. Based on the latest technologies, we are developing innovative automation and digitalization solutions for your applications. A one-stop shop for a perfectly tailored service.

As an expert in connection technology, Weidmüller is the ideal contact when it comes to acquiring and forwarding sensor data on the machine. We are therefore able to implement all-in solutions which extend all the way from the sensor to the cloud. With communication-capable components, we establish the infrastructure for networked production which records comprehensive machine and process data and sends it to the cloud for further processing.

Once analyzed, your data offers a range of ways of securing a long-lasting competitive advantage, for example, by optimizing your production processes and your power management systems.



u-create IoT – access to the Internet of Things

The u-create IoT software enables sensor information from u-remote I/O modules to be pre-processed and forwarded to the cloud via MQTT or AMQP – u-create IoT uses the graphical development environment Node Red for the simple implementation of IoT applications. Cloud providers Microsoft Azure (certified), IBM Cloud and Amazon aws are supported. The platform-independent software is accessed via a web browser.



u-link – secure remote maintenance and cloud service

The u-link remote maintenance solution provides secure and location-independent access to machines and systems. There is also an online platform on secure servers in Western Europe which ensures the conformity of different IT systems when it comes to remote maintenance. u-link can be extended indefinitely by additional routers and users and thus enables the economical and secure setup of needs-oriented remote maintenance topologies.



PROtop – communication-capable power supply

Communication-enabled components like PROtop form the basis for intelligent networking between machines and IT systems by providing the process data required. Existing PROtop power supplies can be upgraded by retrofitting them with a plug-in communication module.

If embedded into the condition monitoring system, this enables comprehensive process optimization. Through remote access, PROtop is perfect for systems with demanding hygiene requirements or offshore wind parks which are difficult to access.



Make your machines smart

Analyze, display, predict – with Industrial Analytics

Advancing digitalization in industry brings with it many advantages which could save you time and therefore money and even open up new business models for you. With our integrated analytics solutions, you can reduce downtimes or rejects, for example, or optimize performance.

You decide whether you want to work with our experienced data scientists and jointly design solutions or whether you want to use the Automated Machine Learning Tool to independently exploit the advantages of artificial intelligence.

Anomaly detection



Classification



Predictive maintenance



Predictive quality

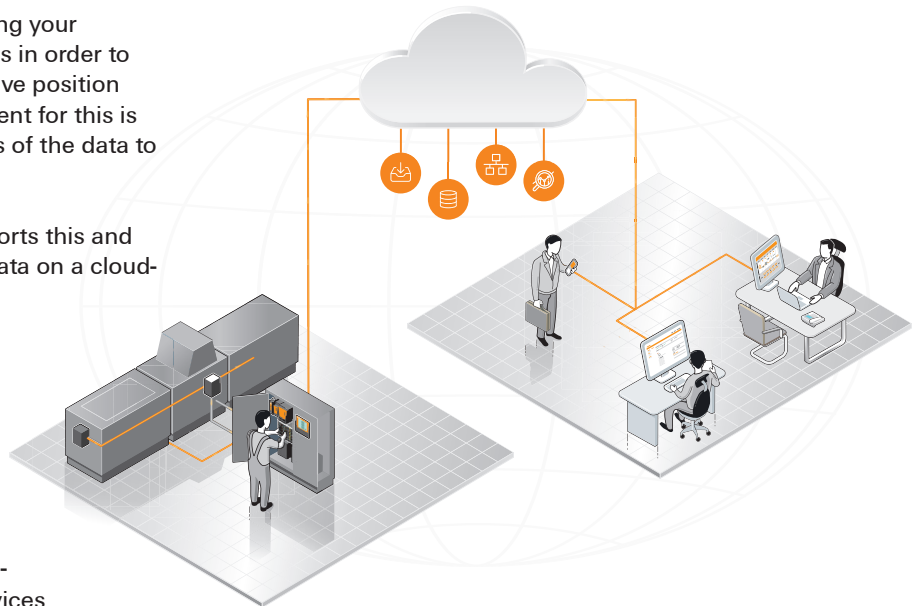


In order to be able to predict machine behaviour and the quality of the end product through predictive maintenance, a number of steps are necessary.

Industrial IoT platform for data-based services

Are you faced with the challenge of expanding your high-margin service and aftermarket business in order to strengthen, expand or defend your competitive position against new players? An important requirement for this is the networking of machines and the analysis of the data to be in a position to offer these very services.

The Weidmüller Industrial IoT platform supports this and offers fast and targeted access to machine data on a cloud-based software architecture.

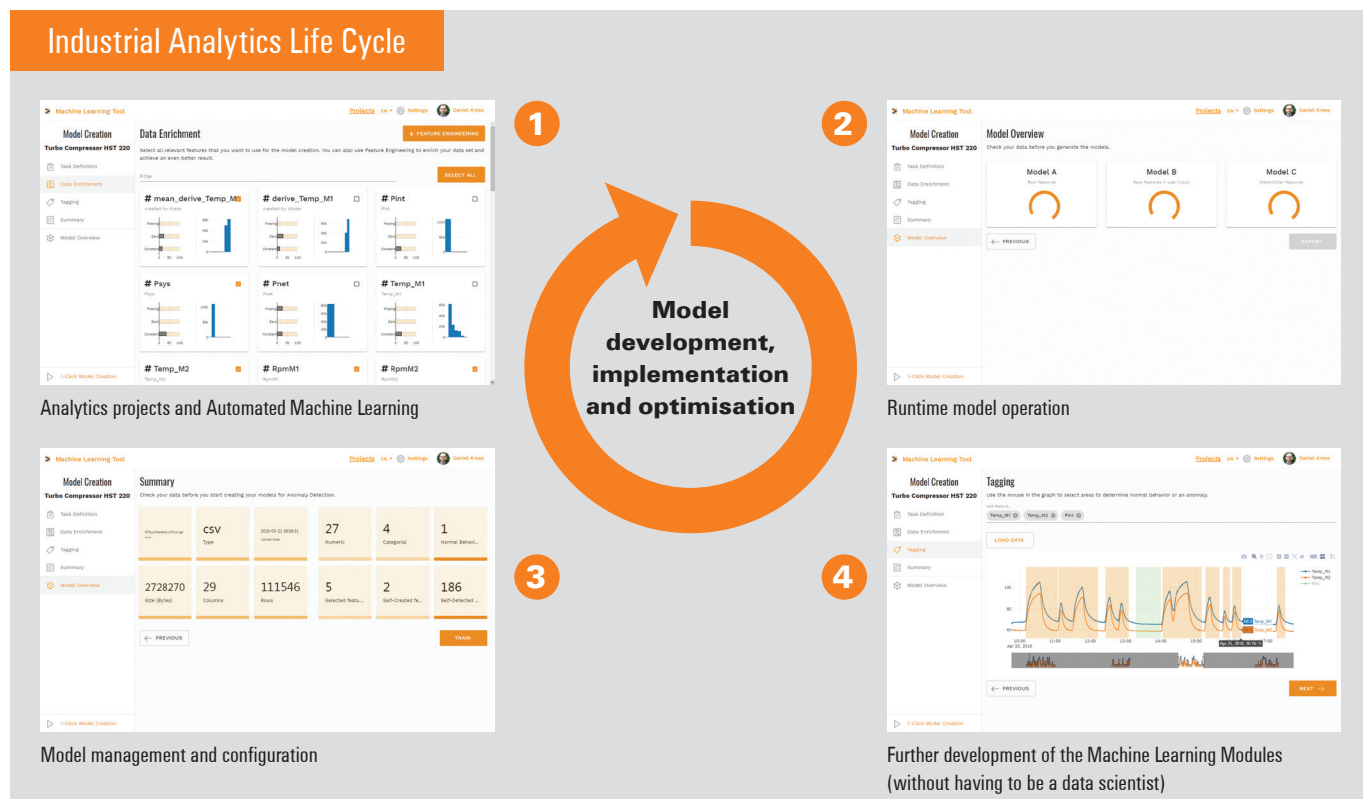


Your special advantages

- Simple implementation of end-to-end solutions from a single source
- Customized solution for the optimal implementation of business processes and services
- Protection of investments thanks to maximum transparency (e.g. through service levels that can be called up at any time)
- An optimal basis for new services including Industrial Analytics

Automated machine learning: Become a pro yourself

Developing industrial analytics solutions usually requires the specific know-how of a data scientist. Our Automated Machine Learning tool allows you to use AI and ML-based models independently, without the need for external support. It enables you to generate models that can recognise the normal and erroneous behaviour of your machines based on your own data and application know-how. The platform-independent software helps you to do this with automated model generation and a simple user interface.



The industrial analytics life cycle: model development, runtime model operation, life cycle model advancement and model management

Your special advantages

- Based on your own data and expert knowledge
- Without the need for external consulting or a data scientist
- Automatic generation of models
- Simpler and faster solution development process
- Visualization of machine data
- Independent training of the software to detect normal operation and malfunction of the machine
- Platform-neutral
- Independent continuous optimization of the models

Maximum application diversity with u-mation

Benefit from our comprehensive range

Modern processes and systems require automation solutions which extract the very best from every work stage. With u-mation, our integrated automation and digitalization range, we can support you from fitting out the panels through data transfer to the cloud to optimization of your production processes, whether they are assembly lines or stand-alone applications. The wide range of applications of u-mation means you can find the optimum solution for every requirement.



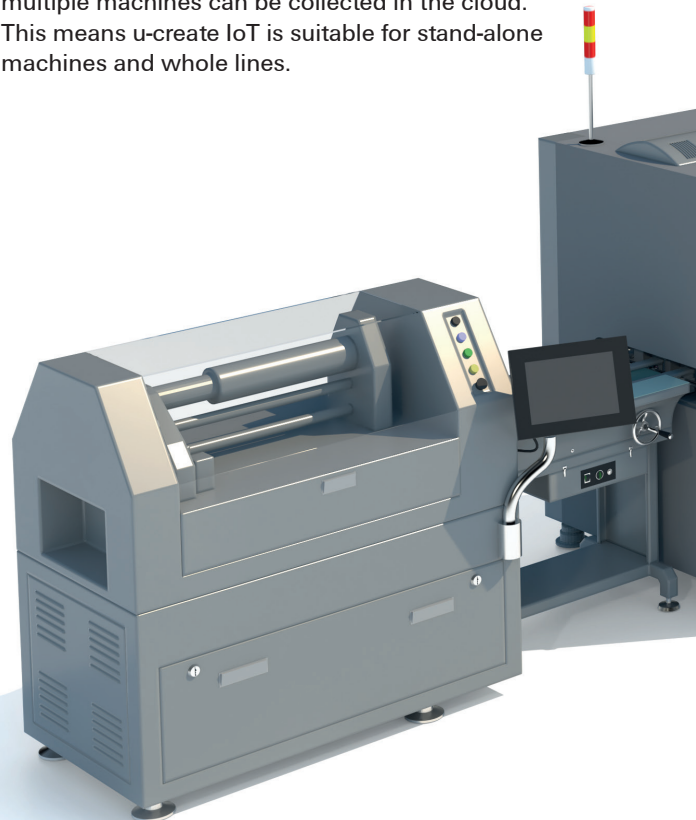
Versatile IoT applications

In combination with the u-control 2000 controller, the u-create IoT engineering software can be used to pre-process sensor information and send it to the cloud via Node-RED. This lays the foundation for data-based applications, such as u-link remote maintenance and machine learning. Data from multiple machines can be collected in the cloud. This means u-create IoT is suitable for stand-alone machines and whole lines.



Modular hardware

u-mation offers a modular hardware portfolio which will be continually optimized, extended and further developed. The best example of this is our u-control 2000 controller, which represents the next intelligent stage of the evolution of the u-remote fieldbus coupler.





Industrial data transfer

Thanks to the innovative programming tool Node RED, communication from the field level to the cloud is possible with our u-control IoT. The u-link remote maintenance module can also be used here. This provides secure access to machines and systems from anywhere via a VPN connection.



Machine Learning

Our individual Industrial Analytics solutions learn from machine and process data. They enable the reliable detection and classification of anomalies in machine behaviour, right through to predictive maintenance.



Efficiency evaluation and optimization

Energy management according to ISO 50001 requires continuous testing and optimisation of energy efficiency. u-create ResMa is the universal tool for recording and monitoring energy flows and process data. The web-based software solution is ideally suited for energy management. In addition, u-create ResMa also integrates into existing systems of automation technology, control technology and building automation.



Intuitive visualization and operation

Our HMI software u-create visu ensures simple implementation of the configuration of dynamic multitouch-capable visualization solutions from anywhere. High-resolution u-view multitouch panels are available for visualization and operation.

Weidmuller – Your partner in Industrial Connectivity

As experienced experts, we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data. We are at home in their industries and markets and know the technological challenges of tomorrow. We are therefore continuously developing innovative, sustainable and useful solutions for their individual needs. Together we set standards in Industrial Connectivity.

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