

# KUKA



The control system of the future\_ **KR C4**



# The control system of the future\_KR C4



<b>_Versatility</b> One for for all The all-rounder KR C4	4
<b>_Flexibility</b> A global communicator KR C4 for compatibility worldwide	6
<b>_Hardware</b> Superior in each and every form The KR C4 variants	8
<b>_Control panel</b> Simply more freedom The intelligent KUKA smartPAD	10
<b>_Programming</b> Quickly on target KR C4 makes programming easy	12
<b>_Software</b> Work more efficiently The KUKA.WorkVisual engineering suite	14
<b>_Integration</b> One interface for all KUKA.PLC mxAutomation	16
<b>_Applications</b> Makes the generalist a specialist Application and additional software	18
<b>_Sustainability</b> Leading today and tomorrow Thanks to proven industrial standards	20
<b>_Safety</b> Helps and protects Safety with the KR C4	22
<b>_Energy efficiency</b> Resource-conserving robotics Does more with less	24

## One for all

The all-rounder KR C4

The KR C4 controller is a pioneer for the automation of today and tomorrow. It reduces your costs in integration, maintenance and servicing. At the same time, the long-term efficiency and flexibility of the systems are increased – thanks to common, open industry standards.

The KR C4 software architecture integrates Robot Control, PLC Control, Motion Control (e.g. KUKA.CNC) and Safety Control. All controllers share a database and infrastructure. This makes automation simpler and more powerful. Both now and in the future.

### KR C4: one for all

- Robot, PLC, Motion and Safety Control seamlessly and interactively integrated
- Uses a shared database and infrastructure
- Maximum performance, scalability and flexibility
- Effortless control of entire systems
- Understands KRL and the PLC and CNC languages (G-code)



## Four control processes in one control system

And always safe

The KR C4 concept is revolutionary. For the first time, Robot and Motion Control are seamlessly and interactively integrated with control processes for PLC, CNC and Safety. With simple and flexible robot programming via inline forms and new Spline motion programming, KR C4-based automation solutions are superior in every way. Furthermore, the KR C4 features intelligent, flexible and scalable application potential.

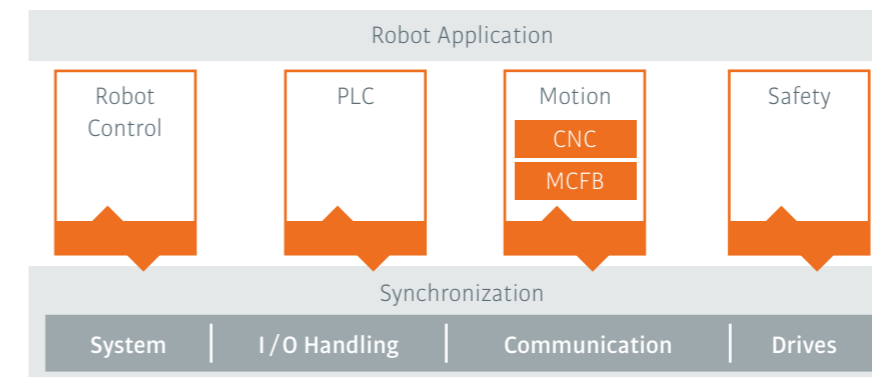
**High-end PLC support.** The high-end SoftPLC option allows full access to the entire controller I/O system and has a high runtime performance. It allows the I/O handling of the robot, a complete robot cell or line of robots. In addition, variables such as axis positions or velocities can be read and processed via function blocks.

**More performance in CNC machining.** The KUKA.CNC control option enables direct programming and operation of KUKA robots via G-code. It can process even the most complex programs from CAD/CAM systems and provides utmost accuracy due to CNC path planning. This hugely simplifies the integration of robots into an existing CNC environment. Thanks to the increasing number of robot-specific functions in upstream CAD/CAM systems, the robot can play a direct role in machining processes.

**Fully integrated safety controller.** The KR C4 seamlessly integrates the complete safety controller into the control system without proprietary hardware. Safety functions and safety-oriented communication are implemented via Ethernet-based protocols. The safety concept uses multi-core technology and enables the dual-channel operation required for safety applications.



Direct execution of all standard G and M commands for tool handling and HSC (High-Speed Cutting).



On the basis of the new hardware and software architecture of the KR C4, all dedicated control processes communicate directly. Without interface limitations. In real-time.

## A global communicator KR C4 for compatibility worldwide

No matter where in the world high-performance control systems are required, KR C4 is the answer. It works reliably with different mains voltages and types. In extreme cold, heat or humidity. It speaks 25 languages – including the major Asian ones – and meets all globally relevant ISO and US standards.



**Conforms to all relevant standards.**  
The KR C4 meets all relevant ISO standards as well as the UL1740 / CSA434-3 / ANSI RIA 15.06 standards required in the USA and Canada.



**Fully functional in every climate.**  
Can be used at ambient temperatures between +5 °C and +45 °C and optionally as high as +55 °C.



**For different mains voltages and types.**  
Using transformers, the KR C4 works flexibly with rated supply voltages of 208 – 575 V (with 380 / 400 / 440 / 480 V also without an additional transformer).



**Can be operated in 25 languages.**  
In addition to all official EU languages, the KR C4 also supports the major Asian languages.

- Advantages of the KR C4**
- Meets all globally relevant ISO and US standards
  - Suitable for operation in most environmental conditions
  - Supports different mains voltages and types
  - User interface in 25 languages

## Superior in each and every form

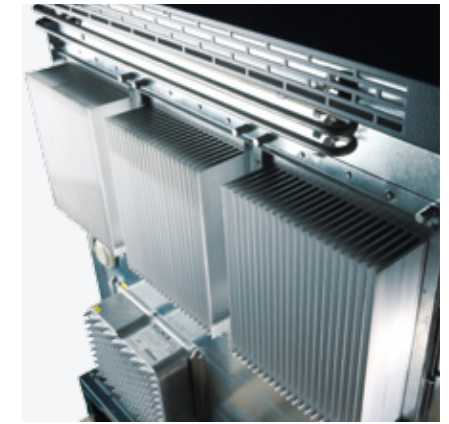
### The KR C4 variants

With five variants, the KR C4 can be optimally integrated into your automation environment. Requirements for stackability, protection against dust, humidity and other influences can thus be taken into account.

#### KR C4 – the versatile concept

- Available in five cabinet variants designed for different areas of application
- Control cabinets with protection rating IP54, rack version KR C4 compact with protection rating IP20
- For control of up to 16 axes

The heat exchange system, with separate air circulation in the inner and outer zones of the controller, allows low-maintenance operation even in dusty environments. Entirely without filter mats.



KR C4 compact

KR C4 smallsize-2

	KR C4 compact	KR C4 smallsize-2
Dimensions (H x W x D)	271 x 483 x 460 mm	615 x 580 x 540 mm
Processor	Multi-core technology	Multi-core technology
Hard drive	SSD	SSD
Interface	USB3.0, GbE, DVI-D, Display Port	USB3.0, GbE, DVI-D, Display Port
Number of axes (max.)	6 + 2 (with add. axis box)	6 + 6 (with add. axis box)
Mains frequency	50 / 60 Hz ± 1 Hz	50 / 60 Hz ± 1 Hz
Rated supply voltage	AC 200 V to 230 V	AC 3 x 208 V to 3 x 575 V
w/o transformer	–	AC 3 x 380 / 400 / 440 / 480 V
Protection rating	IP20	IP54
Ambient temperature	+5°C to +45°C	+5°C to +45°C
Weight	33 kg	60 kg

The 19" KR C4 compact controller is ideal for space-saving installation in customer enclosures or in small protective housings. Designed for up to six robot axes in the low payload category. Optionally expandable by up to two external axes with a motor capacity of up to approx. 2 kW.

The universal KR C4 smallsize-2 controller with protection rating IP54 is designed for industrial operation of up to six robot axes in the low payload category. Optionally expandable by up to six high-performance external axes.

KR C4

KR C4 midsize

KR C4 extended

	KR C4	KR C4 midsize	KR C4 extended
Dimensions (H x W x D)	960 x 792 x 558 mm	1,160 x 792 x 558 mm	1,600 x 842 x 562 mm
Processor	Multi-core technology	Multi-core technology	Multi-core technology
Hard drive	SSD	SSD	SSD
Interface	USB3.0, GbE, DVI-D, Display Port	USB3.0, GbE, DVI-D, Display Port	USB3.0, GbE, DVI-D, Display Port
Number of axes (max.)	9	9	16
Mains frequency	49 to 61 Hz	49 to 61 Hz	49 to 61 Hz
Rated supply voltage	AC 3 x 208 V to 3 x 575 V	AC 3 x 208 V to 3 x 575 V	AC 3 x 208 V to 3 x 575 V
w/o transformer	AC 3 x 380 / 400 / 440 / 480 V	AC 3 x 380 / 400 / 440 / 480 V	AC 3 x 380 / 400 V
Protection rating	IP54	IP54	IP54
Ambient temperature	+5°C to +45°C	+5°C to +45°C	+5°C to +45°C
Weight	150 kg	160 kg	240 kg

The universal KR C4 controller with protection rating IP54 is designed for industrial operation of up to nine robot axes in the high payload category.

The universal KR C4 midsize controller with protection rating IP54 is designed for industrial operation of up to nine robot axes in the high payload category. Expanded with additional installation space and a side connector panel for integration of customer options.

The universal KR C4 extended controller with protection rating IP54 is designed for industrial operation of up to twelve robot axes and four external axes in the heavy-duty category. Expanded with additional installation space and a side connector panel for integration of customer options.

## Simply more freedom

### The intelligent KUKA smartPAD

Master even complex operating tasks easily – that's what the KUKA smartPAD is designed for. The context-sensitive interface only displays the options relevant at the moment of operation. Thanks to the intuitive operator guidance, less experienced and expert users alike can work quickly and efficiently with a minimum of training.

**Ergonomic design.** Reduced weight and anatomically designed for efficient, comfortable operation.

**Universally applicable.** Operate all KUKA robots and KR C4 controllers with the KUKA smartPAD.

**Antireflection touch display.** Operator control is quick and easy via the well-lit 8.4" screen with an intuitive user interface. The smartPAD can even be operated safely and quickly when the operator is wearing protective gloves.

**6D mouse.** Intuitive, Cartesian movement and reorientation of the robot in three or all six degrees of freedom.

**Eight jog keys.** Separate jog keys for direct control of up to eight axes or external axes without switching.

**Multilingual.** The user interface for operation and programming is suitable for international use due to the wide range of languages available by simple selection. Systematic further development of the tried-and-tested KUKA operator control and programming concept.

Simple, intuitive operator control via touch screen.



USB port for direct saving and loading of application programs.



Ergonomic 6D mouse.



#### KUKA smartPAD: operation with all the advantages

- Universally applicable for all KUKA robots and KR C4 controllers
- Can be connected and disconnected at any time, integrated USB port
- Suitable for international use
- Intuitive operator control via the well-lit 8.4" touch display
- Eight jog keys for direct control of eight axes / external axes



**Hot-pluggable.** The KUKA smartPAD can be simply connected to and disconnected from a KR C4 controller at any time – making it ideal for use with other KUKA robots or for avoidance of inadvertent operator errors.



**Integrated USB connection.** USB port for direct saving and loading of application programs.



#### Control panel: KUKA smartPAD

Type	KUKA smartPAD
Display	scratch-resistant industrial touch display
Display size	8.4"
Dimensions (H x W x D)	240 x 290 x 50 mm
Weight	1,100 g

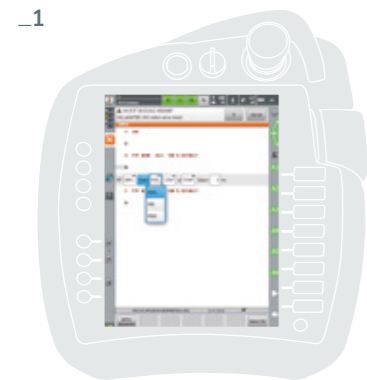
# Quickly on target

KR C4 makes programming easy

Whether you're a novice or programming expert, the KUKA smartPAD will quickly take you to your goal. Because it offers the suitable programming options for every requirement. A single control panel to reliably perform the most varied of tasks.



## KUKA smartPAD options



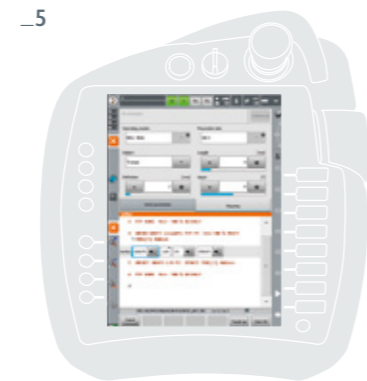
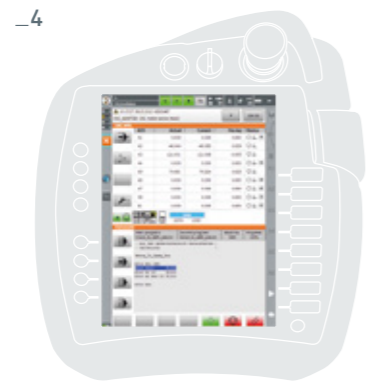
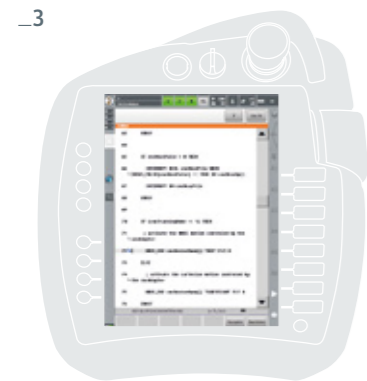
\_1\_2\_3 Simple programming with KUKA inline forms

\_4 KUKA.CNC application

\_5 Application in the arc welding sector

\_6 Application in the plastics sector

\_7 KUKA HMI.zenon application



## Complexity classes of programming



**KR C4 offers the right programming option for every group of operators:** from simple template programming for non-specialists to highly differentiated expert programming.

**KUKA.KRL – the programming language of advanced robotics.** “KUKA Robot Language” is a standard programming language across the globe. It is easy to learn and is perfectly suited to the wide-ranging options provided by KUKA robotics. The intuitive KUKA smartPAD can be used to create complex and customized programs for robot motion steps and tasks in a broad range of applications – both online and offline.

**Simple and efficient: programming with inline forms.** The KR C4 provides inline forms for the fast, error-free programming of tasks and motion steps. They can be called via menus and are available as standard. This simplifies the programming of RoboTeams with up to six synchronized robots.

**Customer-defined program modules.** KUKA integrators can expand the library of available KUKA inline forms according to customer requirements. This leads to the creation of special applications which can be easily programmed for recurring tasks. A competitive advantage for system integrators: specially developed inline forms allow for unique solutions, optimally tailored to the companies which use them.



## Work more efficiently

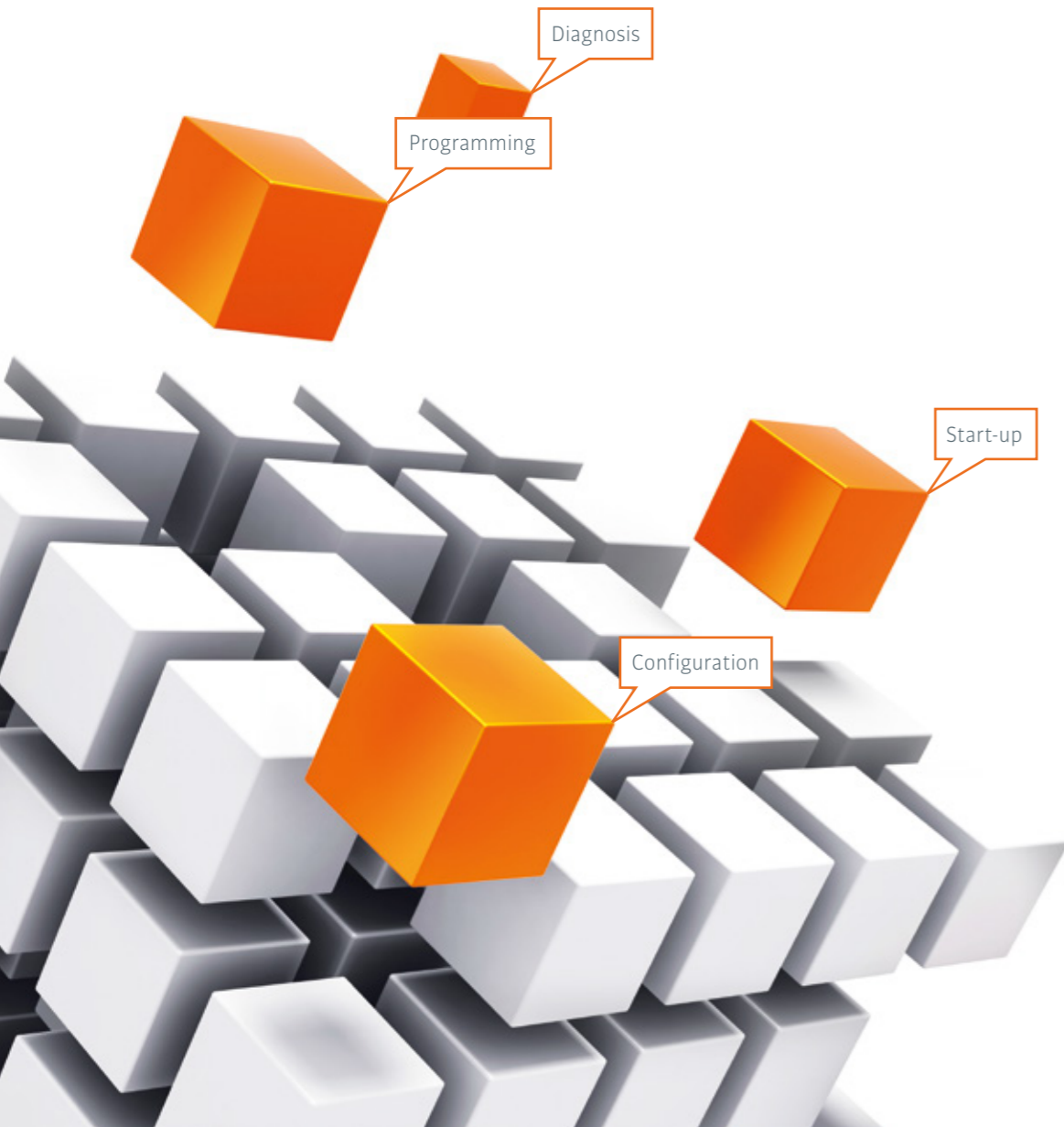
### The KUKA.WorkVisual engineering suite

**Configuration, programming, start-up and diagnosis.** KUKA.WorkVisual provides a homogenous offline development, online diagnosis and maintenance environment. Program-neutral catalogs and project data ensure consistency and seamless integration.

**Tools with a uniform interface and menu system.** The program code is already checked for logic in the background while programming steps are being carried out. This means that errors are nipped in the bud, and projects can be implemented more efficiently and consistently. Interactions are made visible by visual tools – making them more intuitive and easier to operate.

**Perfectly coordinated with the dedicated control processes of the KR C4.**

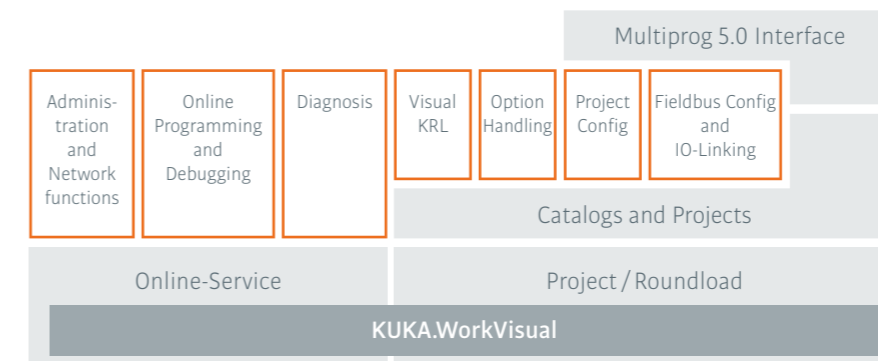
Coordinated with Robot, PLC, Motion and Safety Control, it is possible for I / O configuration, mapping, non-KUKA kinematic systems, RoboTeams and SafeRobot 3.0 to be configured directly in KUKA.WorkVisual. The configuration can thus be completed and checked offline. This makes for a significantly shorter start-up time combined with minimized risks.



## More efficiency, more consistency

### Throughout the entire software life cycle

The KUKA.WorkVisual engineering suite can be used for cell configuration, as a universal programming environment and as a shop floor unit. It covers all areas in the life cycle of a program – and establishes perfect consistency between the online and offline worlds with WorkVisual Roundload. Editors and infrastructure components systematically access central services, such as project database, catalogs and online services, in the modular software architecture of KUKA.WorkVisual. In addition to the basic tools – VisualProject, VisualConfig, VisualKRL and VisualAssistance – the platform offers slots for further modules – Multiprog and others.



Program life cycle in the KUKA.WorkVisual engineering suite.

#### KUKA.WorkVisual

- Uniform, standards-oriented user interface
- Consistent project data storage facility, avoidance of error-prone multiple entry of the same data
- Network administration of all KR C4 controllers
- Comprehensive diagnostic options
- Integrated, uniform field bus I / O configuration, mapping and diagnosis on the robot controller and between Robot Control and SoftPLC
- Supported field buses: PROFINET, PROFIBUS, INTERBUS, EtherCAT, Ethernet/IP, DeviceNet and VARANBUS
- Drag & drop configuration and menu-guided parameterization for RoboTeam, ProfiSafe, CIP/Safety and FSoE
- Editors for textual programming of cell components
- Online working – enables convenient editing of controller programs, independently of specific projects, directly in the engineering environment

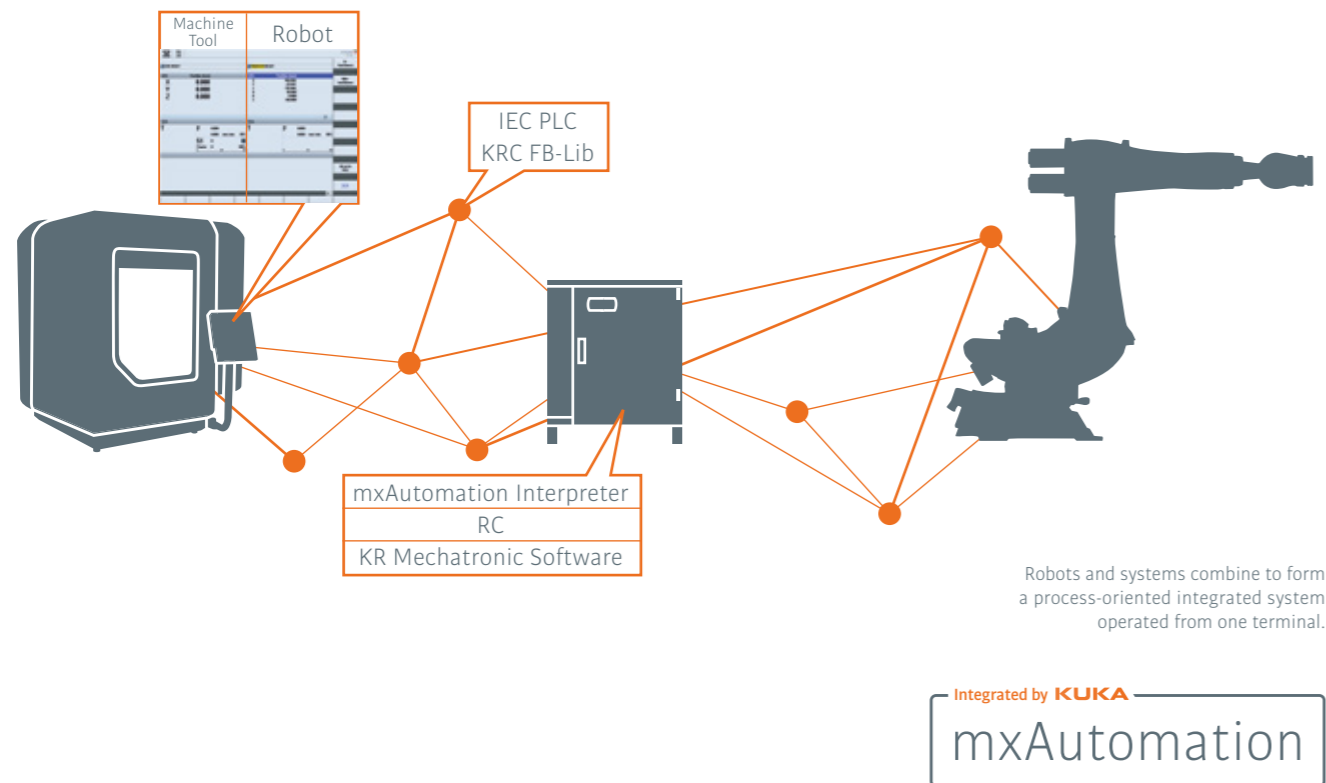


## One interface for all KUKA.PLC mxAutomation

Native programming interfaces make for simple programming and integration of KUKA robots into your machine environment. The mxAutomation function package, KUKA.PLC mxAutomation, makes it possible for external controllers with an embedded PLC to command KUKA robots on the basis of elementary motion instructions. This provides an easy route to implementing a central operator control concept for robot-automated production machines that is highly convenient for end customers. The outstanding kinematic and safety-relevant functions of the KUKA KR C4 controller remain fully available since the mxAutomation command interpreter of the KR C4 communicates the PLC commands to the path planning module, which sets the robot in motion with the accustomed precision and reliability. With the new version of the software, KUKA enables interfacing to KUKA.ConveyorTech (pick&place on a conveyor) and KUKA.VectorMove (Cartesian soft axis mode). What is more, the usability of the software has been further enhanced, and new functions, for example for Motion Control, have been added. This has also allowed KUKA.PLC mx.Automation version 2.1 to satisfy the standard for programmable logic controllers (PLCs); as a result, it is now certified to PLCopen.

### KUKA.PLC mxAutomation

- Can be programmed without knowledge of robot programming
- Direct commanding of the robot with PLC function blocks
- Supports control systems of the major PLC manufacturers



## 0% need to adapt KUKA speaks your language

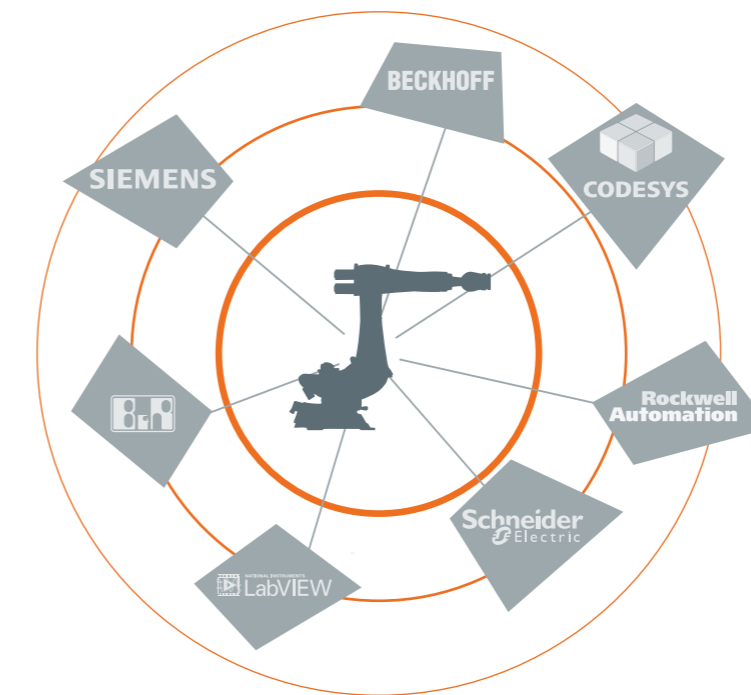
KUKA.PLC mxAutomation supports the external control systems SIMATIC S7® via Profinet and Rockwell Logix Controller® via EtherNet / IP and is thus prepared for use in Europe, Asia and America. The CODESYS-based control platforms are also supported with KUKA.PLC mxAutomation 2.0. Profinet, EtherNet I / P and EtherCAT are thus taken into account in the reference application.

**Simple programming.** With KUKA.PLC mxAutomation, the user requires minimal knowledge of robot programming. The mxAutomation function blocks allow the KUKA robot to be commanded within the familiar PLC programming environment.

**High flexibility.** If the requirements in production are changed, the appropriate modifications or expansions can be implemented at any time with mxA-based operator control. The flexibility made possible by using robots with regard to processing new series of parts or performing additional tasks is made available for the operator in his customary environment.

**Single point of operation.** Thanks to the combination of robot and machine control, KUKA robots can be effortlessly integrated into existing operator control concepts. The robot can therefore also be controlled via the customary human-machine interface. Teach pendants for the machine can be used for teaching the robot as well, provided appropriate safety precautions are implemented. A good integration example in this context is the incorporation of KUKA robots into the Sinumerik world on the basis of mxAutomation for S7, as offered by Siemens®.

### mxAutomation supports a wide range of PLC suppliers



### KUKA.PLC mxAutomation 2.0:

- Siemens
  - SINUMERIK (Run myRobot)
  - SIMATIC
  - STEP 7 V5.4, S7-300 and S7-400
  - STEP 7 (TIA Portal), S7-300 and S7-400
  - STEP 7 (TIA Portal), S7-1500
- CoDeSys
- AllenBradley
- LabView

### New partners with V2.1:

- Beckhoff (series status mid-2016)
- Schneider-Electric
- B&R
- Siemens
  - TIA-Portal (SIMATIC)
  - SIMOTION

## Makes the generalist a specialist

### Application and additional software

KUKA provides a wide range of predefined application and additional software for the KR C4 for virtually all common robot applications. This makes it possible to program sequences quickly so that the system is operational in a short time, for example for adhesive bonding and arc welding applications. In addition, function and technology packages can compensate for deviations in the shape or position of workpieces, automatically transform the CNC data generated with a CAM system into a robot program and carry out further industry-specific tasks.



#### Special applications with the KR C4

- Application and additional software for virtually every robotic application
- Quickly customized and made ready for operation
- Tried and tested in all sectors relevant to robotics

#### KUKA function and technology packages

KUKA.Gripper & SpotTech	Programming of grippers and weld guns via easy-to-use inline forms for many industrial applications.
KUKA.ArcTech	For rapid start-up, simple programming and automatic power source control of arc welding applications.
KUKA.ArcSense	Option for KUKA.ArcTech – with through-the-arc sensors for seam tracking.
KUKA.TouchSense	Software technology package for tactile component / seam finding before a joining process.
KUKA.SeamTech	Options for both component / seam finding before a joining process and for edge / seam tracking during a joining process using an intelligent triangulation laser sensor.
KUKA.TRACC TCP	With this option, the robot can automatically check and if necessary recalibrate its TCP with the desired regularity during production operation.
KUKA.LaserTech	A modular, time-saving and easy-to-operate programming support package for laser cutting and laser welding. Both applications can be executed using the same robot – giving maximum flexibility as the workpiece needs to be clamped only once.
KUKA.ServoGun	Enables the operation of electric motor-driven spot weld guns with the KUKA robot controller. Various additional software options allow e.g. the elimination of mechanical gun compensation and other functions.
KUKA.GlueTech	Enables user-friendly programming of dispensing applications such as bonding, seam sealing or application of support seams using inline forms on the KUKA robot controller.
KUKA.VisionTech	KUKA.VisionTech makes it possible to pick up unsorted parts and remove non-aligned parts, e.g. for Pick & Place applications in a single plane or in space.
KUKA.ConveyorTech	KUKA.ConveyorTech makes it possible to synchronize program execution of the robot with an externally controlled conveyor. The robot can be synchronized with both linear and circular conveyor systems.
KUKA.ForceTorque Control	Robots typically move along programmed paths solely under position control, without consideration of the forces and torques acting on the tool or workpiece. In many cases, however, the setting or maintaining of precisely defined process forces has a decisive influence on the quality and process reliability of an application (e.g. assembly, polishing, grinding, bending). In such cases, the process forces and torques must be taken into consideration during the programming of robot motions. This is possible with KUKA.ForceTorqueControl.
KUKA.RoboTeam	Enables and coordinates the high-precision interaction of a team of robots for handling a shared load or for working together on a moving workpiece.
KUKA.EtherNet KRL	Makes it possible to exchange data with external computers via the Ethernet interface. The robot can function here both as a client and as a server.
KUKA.OPC-Server	Basic technology for standardized data exchange between robots and external controllers for non-real-time information streams. Ideal for interfacing with external visualization and MES systems.
KUKA.HMI zenon	Increases usability with the simple creation of user-defined interfaces or plugins by means of drag & drop. 2D / 3D graphics can be quickly displayed to facilitate operation or diagnosis of the automation system for the user.
KUKA.PLC Multiprog	Programming environment for an extremely fast SoftPLC conforming to the IEC61131 standard. Expands the functionality of the KR C4 and offers virtually unlimited openness in the programming of automation cells and applications.
KUKA.PLC ProConOS	Runtime system of the KUKA.PLC Multiprog SoftPLC. PLC programs created with KUKA.Multiprog are run directly on the KR C4, with full access to the entire I / O system of the robot. Reading and processing of variables such as axis positions and velocity via function blocks.
KUKA.PLC Multiprog MCFB	Complex application requirements can be flexibly implemented by using axes / motors which are external to the robot.
KUKA.PLC mxAutomation	Allows direct commanding and positioning of the robot by external controllers (Siemens®, Rockwell®, etc.). The user thus requires no knowledge of robot programming in the KUKA-specific robot language KRL.
KUKA.CNC	Complete software-based CNC implementation for execution of machine tool code (G-code) directly on the robot controller. This turns the robot, with its accuracy and stiffness, into a machining center for path-supported processes.
KUKA.Sim	The simulation programs of KUKA.Sim allow robotic cells to be planned with true-to-life accuracy.
KUKA.UserTech	Enables the definition, integration and use of user-specific inline forms, technology keys and dialog-guided scripts.
KUKA.RobotSensorInterface	Enables data exchange between the robot controller and sensor system, cyclical signal processing and evaluation at sensor cycle rate, and also makes it possible to influence the robot motion or program execution by processing sensor signals.
KUKA.FlexPal	Allows the easy definition of packing patterns as well as pallet, pickup/setdown and slipsheet stations.
KUKA.ExpertTech	Provides a user interface which can be used to simplify the entry of "Expert commands". This makes KUKA.ExpertTech a convenient tool for advanced programming.
KUKA.SafeOperation	Enables protected spaces to be freely defined in the software, whether between machines or between humans and machines.
KUKA.Load	Supports the evaluation of the load on a KUKA robot or the selection of a suitable robot for a given load.

## Leading today and tomorrow

Thanks to proven industrial standards

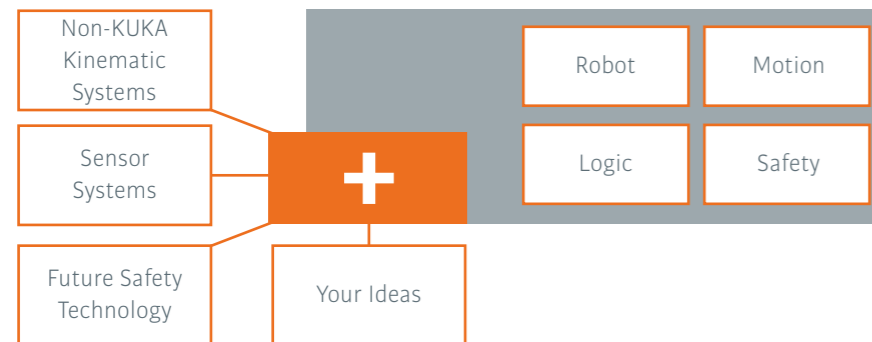
Today, mainstream technologies such as multi-core architecture and Gigabit Ethernet enable industry-standard performance. The KR C4 uses these technologies, allowing for the comprehensive expandability of software-based interfaces. It can be used to realize new safety concepts in automation, for example in human-robot cooperation tasks. Sensors which require numerous inputs and outputs can be easily connected to the KR C4.



Interior of the KR C4: systematic reduction of hardware.

### KR C4 – the future-proof choice

- No proprietary hardware, open industry standards such as multi-core and Ethernet
- Integrates Ethernet-based field bus systems, such as Profinet or Ethernet/IP as software functions



Robot, motion, sequence, process and safety control: all in one system. The KR C4 unites all the control tasks for the efficient use of robots in a single, smart system.

## Four dedicated control modules

One control system

Less is more: the number of hardware modules, connectors and cables in the KR C4 has been drastically reduced. It integrates Ethernet-based field bus systems such as Profinet or Ethernet/IP as software functions. The systematic use of software allows the controller to be modified within a short time so that all future developments in control technology can keep pace without the need for costly new investments. The KR C4 thus offers a high security of investment and performance, today and for years to come.



## Helps and protects

### Safety with the KR C4

The KR C4 integrates complete robot, motion, sequence, process and safety control. It also seamlessly incorporates the complete safety controller into the control system. Its multi-core technology enables the dual-channel operation required for safety applications. Safety functions and safety-oriented communication are implemented on the basis of Ethernet-based protocols.

This means that software-based safety interfaces have a virtually limitless capacity for expansion. New safety concepts in automation can be realized, for example for advanced human-robot cooperation tasks. The keyword “Safe Robot” becomes a reality with the KR C4. It saves production space, simplifies manual loading stations without the need for additional safety equipment and allows direct human-robot collaboration.

**Safety and sensitivity are in demand.** Numerous KUKA Safe Robots in the medical sector attest to the performance of the KR C4. Just one of the many impressive examples is the medical application for robot-supported angiography developed by KUKA. Controlled by a KR C4, a robot examines the patient.

Pioneering human-robot cooperation:  
KUKA robotics with the KR C4 controller.  
Robot-Source: KraussMaffei



#### The KR C4 safety advantage

- Integrated safety controller, multi-core technology for the required dual-channel operation
- Safety functions and safety communication via Ethernet-based protocols
- Software-based interfaces for pioneering human-robot cooperation

#### Advanced safety concept

Verification by an independent certification unit
All functions correspond to the latest ISO 10218-1:2011
Continuous performance level D / category 3: implementation of all safety functions in accordance with ISO 13849-1
Simple upgrade to future KUKA safety functions
Various interfaces to higher-level safety controllers (discrete 2-channel wiring, ProfiSafe, CIP Safety)

#### System integration

Safe inputs: operator safety (safety fence)
Safe standstill monitoring of all axes (robot & external axes)
Emergency Stop
Safe outputs
Safe disconnection of 24 V load voltage of peripheral components
Safe monitoring of max. 250 mm / s in T1 mode

#### Extended safety functions

Additional monitoring of the safety fence
Monitoring of axis ranges: robot & external axes, configurable axis group such as multiple positioners
Safe operational stop and restart monitoring for robots & external axes
Configurable axis group, such as multiple positioners
Offline configuration via WorkVisual or directly on the KUKA smartPAD
Assurance of the safety configuration by means of checksum methods and password-protected data entry menu
Protection against unintentional change
Graphical representation of monitoring ranges in simulation and in real time on the KUKA smartPAD
Proof of reliability based on applications with higher safety requirements (entertainment, medical)



#### Safety for the machine – motion with foresight

**Protection against overheating** with temperature monitoring: for a maximum value or interval-based (I2T monitoring).

**Avoidance of collisions** with collision detection technology. By comparison of the pre-calculated motion with the real motion execution, a collision is detected and the robot stopped.

**Following error monitoring** and error message if limit value is exceeded and configurable online load data monitoring.



#### Safety for humans – in contact with machines

**Safe operational stop** and restart monitoring for the safe proximity of humans and robots.

**Safe Robot Technology** monitors the robot in safe technology in its predefined working envelope and reduces reaction times.

## Resource-conserving robotics

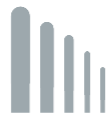
Does more with less

The energy efficiency of the KR C4 sustainably conserves resources and minimizes the cost risks inherent in rising energy prices.

The KR C4's integrated energy management offers various standby modes and an Eco mode. These reduce energy consumption and can mean savings of up to 95% for individual operating states. The energy consumption can be simulated and calculated even in the engineering phase. During operation, the energy consumption can be displayed and verified on the control panel. KR C4 means efficiency with transparent energy consumption. This forms the basis for energy saving certification with tax advantages (ISO 50001).



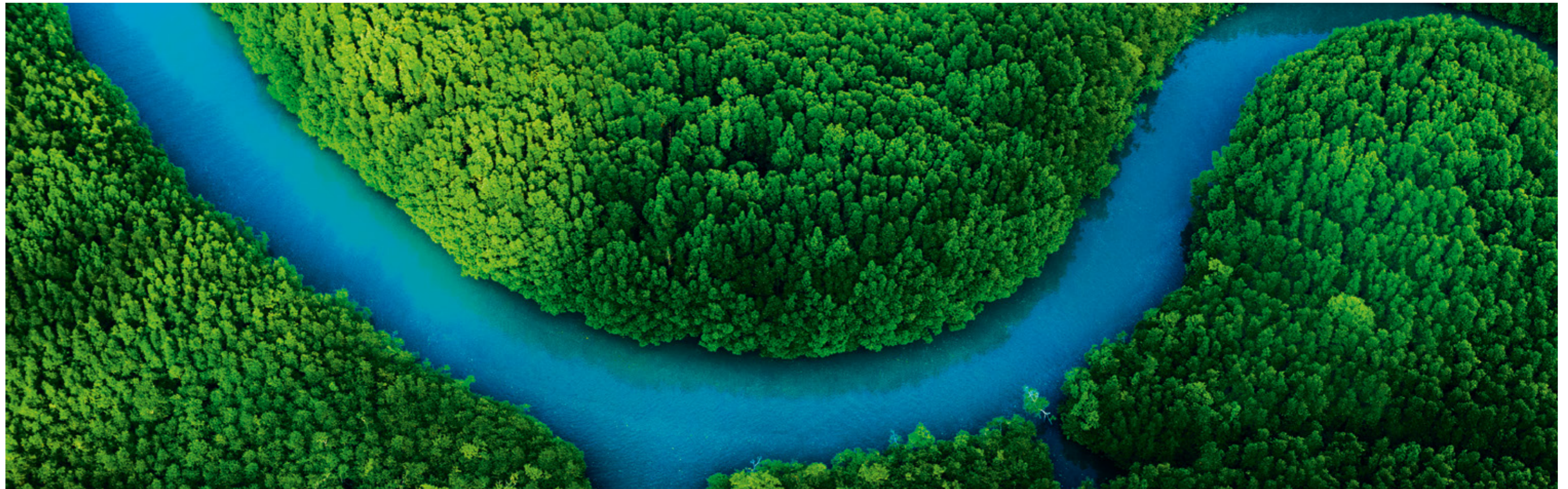
**Standby modes: up to 95% less energy consumption.** Three different standby modes allow for energy savings by switching off the drives or the drives and controller. The KR C4's energy management thus drastically reduces power consumption in production-free times. Energy savings in standby mode: up to 95%.



**Transparent energy balance: energy and tax savings.** In simulation, the KR C4 optimizes energy consumption. Consumption during operation is continuously displayed. This paves the way for energy saving certification, which provides tax advantages.



**Intelligent brake management: stops high costs.** The KR C4's programmable brake management reduces the strain on motors and keeps robots exactly in position with less power consumption.





[www.contact.kuka-robotics.com](http://www.contact.kuka-robotics.com)



[www.facebook.com/KUKA.Robotics](https://www.facebook.com/KUKA.Robotics)



[www.youtube.com/kukarobotgroup](https://www.youtube.com/kukarobotgroup)



Twitter: @kuka\_roboticsEN

Details provided about the properties and usability of the products are purely for information purposes and do not constitute a guarantee of these characteristics. The extent of goods delivered is determined by the subject matter of the specific contract. No liability accepted for errors or omissions. Subject to technical alterations.  
© 2016 KUKA Roboter GmbH