KUKA

AMR - Autonomous mobile robotics

Logistics "as simple as it gets"

_Mobile platforms and mobile robotics

Mobile solutions for agile production.

If you want to get things moving, you have to stay in motion.

Mobility is an important driver of Industry 4.0. KUKA develops mobility concepts for the next stage in the evolution of more flexible industrial production. In the cyber-physical world of Industry 4.0, established structures are becoming a thing of the past. Static production facilities and assembly lines are obsolete. KUKA develops intelligent, mobile units that work together perfectly and find their destination autonomously.

KMP 600-S diffDrive

KMP 1500P

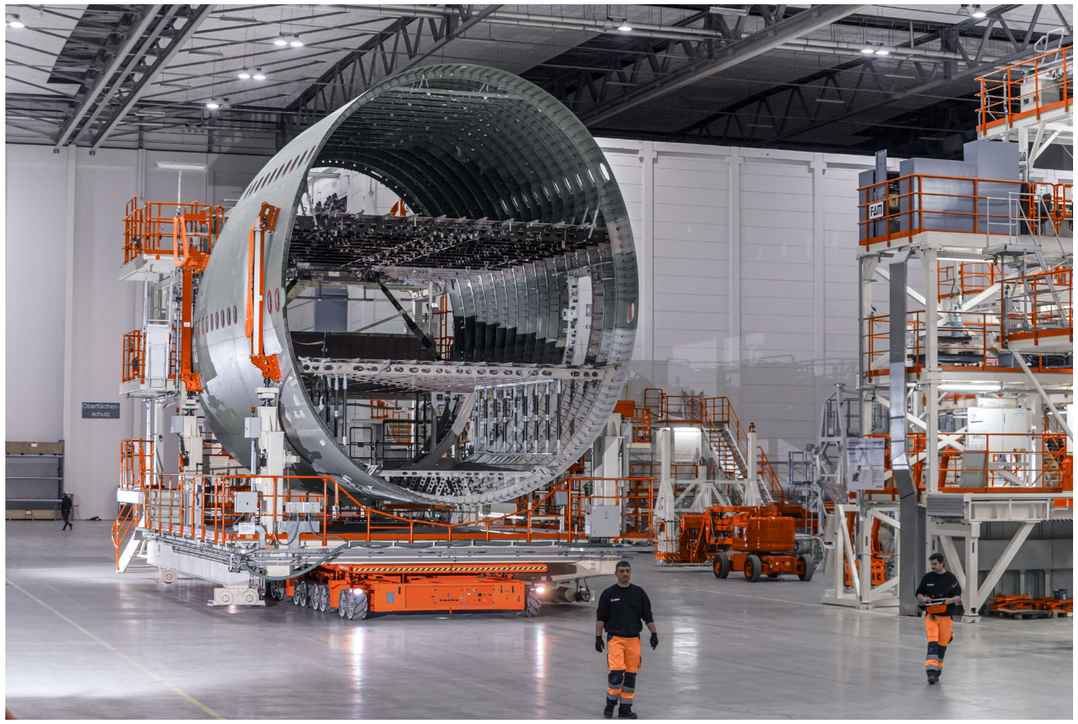
KMP 1500

omniMove

KMR iiwa

KMR iisy

Get your production moving.



Mobile platforms from KUKA open up new dimensions of mobility in the age of Industry 4.0. Whether it is for the aerospace or automotive industry, or for many other sectors, it has never been easier to integrate autonomous robots and mobile platforms quickly and reliably into cells and systems.

All mobile platforms ensure maximum freedom of movement. The Mecanum wheel system enables high-precision transport – even with the heaviest loads.

Autonomously navigating systems are used for fully automatic operation. Our portfolio of omnidirectional mobile robot platforms provides the foundation for the flexible production facilities of the future.

The factory of the future demands mobility and flexibility. Static production lines are making way for the next generation of robots: intelligent, mobile robotic units are taking their place. Mobile robots navigate autonomously, act in swarms and offer total flexibility for industrial manufacturing. This is especially important for internal logistics. KUKA offers a vast mobility portfolio, from manually – movable to autonomously navigating solutions.

Our robots work hand in hand with humans and align to the workpiece to within a millimeter. In addition, the fully autonomous variants work without any induction loops, floor markings or magnets. Our range of mobile robots is heralding the next era of cyber-physical production.

_Mobile platforms and mobile robotics

KUKA.NavigationSolution. The reliable interface for your autonomous logistics.

Mobile robots receive their commands via Wi-Fi. They perform their driving and handling tasks fully autonomously. They use algorithms to position themselves, plan their route and take on loads.

All mobile robotic systems from KUKA can be equipped with KUKA.NavigationSolution. This makes them flexible and mobile. The navigation solution also includes an ideal fleet management system.

It meets the latest demands of mobile robotics with the appropriate interfaces – fully in keeping with Industry 4.0.

Our smart navigation solution consists of an industrial PC that is installed in the automated guided vehicle system and the actual navigation software – a software package that manages all vehicles and coordinates planning.

Autonomous control. KUKA.NavigationSolution enables autonomous navigation of mobile platforms – with no risk of collision and without the need for artificial markings.

The software acquires all the data from the safety laser scanners and wheel sensors and uses them to create a corresponding map of the surroundings by means of the SLAM method (Simultaneous Localization and Mapping).

The system responds to changes in the environment – which occur frequently in a flexible logistics system. The use of virtual tracks makes it possible to move the platform exclusively along defined routes.

Flexible software integration. KUKA offers an Eclipse-based development environment that can be used to program applications in Java. The modular Java API with suitable interfaces for the requirements of mobile robotics allows the integration of third-party software. The existing platform fleets can be easily updated, and other platforms can be added to or removed from the existing system.

Exact positioning. KUKA.NavigationSolution offers the following options for high-precision positioning of the mobile platform in its environment:

- Fine localization for precise determination of the vehicle position relative to the object, or in an environment
- Fine positioning for increased pose repeatability
- Relative positioning through CAD-based object recognition and tracking, e.g. for picking up loads

Hardware-independent software. The hardware-independent navigation software of KUKA.NavigationSolution can be used for different platform kinematic systems.

It can handle any motion principles, including holonomic vehicles with Mecanum wheels, such as the KUKA omniMove.

The machine parameters are configured via a standardized interface.

Freely scalable, modular setup. Additional features, such as object recognition and tracking and relative positioning, enable coordinated planning.

KMP 600-S diffDrive.

Mobile freedom thanks to AGVs: material transport in dynamic environments.

The KUKA Mobile Platform KMP 600-S diffDrive opens up new avenues and more flexibility for production intralogistics. The KMP 600-S diffDrive provides support as an automated guided vehicle (AGV) with a payload of up to 600 kilograms. In addition, it allows maximum freedom of movement for employees, as it does not require any protective fencing. The laser scanners at the front and rear provide maximum safety and allow high speeds in all directions when cycle times require it.

What advantages do the AGVs offer for in-house logistics? AGVs bring required goods and raw materials fully automatically to the right place at the right time. They take on physically demanding transportation tasks and are able to share passageways with human operators and conventional industrial trucks thanks to their comprehensive safety technology. Through the use of camera-based 3D object detection, they integrate seamlessly into existing production environments.

The KMP 600-S diffDrive can also be expanded with 3D object detection. This allows the AGV to autonomously detect obstacles that are between 30 millimeters and 2.10 meters above the ground. At the same time, the KMP 600-S diffDrive is ideally equipped for the tough everyday environment of industrial production: thanks to its IP 54 design, it is protected against splashes of water and dust, for example.

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High safety standard
- Laser scanners at the front and rear
- 3D obstacle detection available
- Four emergency stops
- Eight safety zones at both the front and rear of the vehicle

Extremely fast
- The AGV travels up to 2 meters per second
- Full speed in all directions
- Integrated lift of up to 60 millimeters in under 3 seconds

Protection class IP 54
- Optimally equipped for the daily work of industrial production
- Protection against foreign objects such as (metal) dust
- Protected against water spray from any direction

Intelligent navigation
- Fleet manager software for the entire KUKA AGV portfolio
- Navigation via laser scanner and a pre-generated environment map
- Identifies the fastest route – even in complex environments

Automated guided vehicles from KUKA: Fast commissioning, simple maintenance. Applications can be programmed via JAVA. In order for KUKA's intelligent, autonomous vehicles to optimally support in-house material flows, they must first be taught. The KMP 600-S diffDrive is commissioned quickly and easily via a wireless controller. Maintenance is just as easy as start-up: No tools are required to access AGV components, such as rollers, laser scanners and service interfaces – for inspection, firmware updates, calibration, and repairs.

Eight security zones. There are eight safety zones in front of and behind the KMP 600-S diffDrive, which customers can customize to suit the application situation. The size of the protective field changes dynamically depending on the speed and direction of travel.

	KMP 600S-2 diffDrive
Dimensions (L×W×H)	1,000×750×353
Weight	246 kg
Rated payload	600 kg
Maximum speed straight ahead	2 m/s
Maximum acceleration	1.25 m/s
Maximum braking acceleration	1.5 m/s
Battery capacity	at least 8 hours
Charging time	2 hours
Interfaces	48 VDC, 24 VDC, EtherCAT, I/O, STO
Integrated lifting device	up to 60 mm
Pose accuracy	±10 mm

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KMP 1500P. The smart AMR platform maximizes efficiency in production halls and warehouses.

The autonomous mobile platform, is designed to enhance intralogistics, material supply for production lines and process linkage applications. With its cutting-edge slam navigation, precision positioning, advanced load identification, 3D cameras, and innovative charging technology, this AMR offers a package of high-performance features, safety, and flexibility in automated transport and material handling.

The autonomous mobile robot (AMR) is a game-changing solution to optimize intralogistics operation. The KMP 1500P lifts all types of load carriers and could be easily implemented into existing industrial projects to deliver exceptional solutions, whether it is optimizing warehouse processes, streamlining assembly lines, or enhancing material handling in complex industrial environments.

The AMR platform can identify the load due to its technology and QR code readers, which improves material traceability and operational efficiency. In addition, the 3D cameras provide an additional layer of safety, detecting obstacles in three-dimensional space, and ensuring the well-being of the AMR, the load and equipment.

The KMP 1500P offers easy programming that allows workflows to be quickly adapted and optimized, reducing the time and resources required for implementation, and resulting in increased operational efficiency and flexibility.

The driverless transport system is the perfect solution for automating material supply. Small and medium-sized companies also benefit from lower operating costs and a high degree of flexibility when using mobile robotics.

Versatile use of driverless robotics in intralogistics

The AMR automatically delivers the required goods and raw materials to the right place at the right time. The Autonomous Mobile Robot (AMR), with its differential drive technology, is optimally equipped for tasks in production and in-plant logistics. A wide range of applications can be supported.

- **Material supply to stations and lines.** Enables efficient just in time material supply from the warehouse or supermarket to stations, assembly and pre-assembly lines.
- **Process linkage/chaining.** Autonomous transport of components and workpieces from station to station by the KMP 1500P increases the flexibility in the production and makes unflexible conveyers obsolete.
- **Commissioning.** Flexible picking processes, goods-to-person, autonomous piece picking or flexible sorting.
- **Warehousing and point-to-point transports.** Reliable stock management and inventory control thanks to the KMP 1500P and its capable fleetmanager KMReS.

Configuring instead of programming – the KMReS navigation system

The No-Code-Platform with AI functionality is easy and intuitive to use. The navigation system KRMeS makes it possible to configure settings by courser in the browser instead of programming them. This allows new or modified routes to be planned quickly and efficiently. Additional comfort and AI functions as automatic rack recognition increase the efficiency during integration.

The software also enables comprehensive fleet management of the entire AMR system. It fully regulates all fleet traffic and is able to automatically reschedule in the event of obstacles.

Smart traffic management for optimized material flow: different AMRs and AMRs on one digital platform.

Demands on mobile robotics in the age of Logistics 4.0

The autonomous mobile platform KMP 1500P provides a safe and autonomous transport solution for heavy loads in factories and logistics centers. With its flexible movement, the KMP 1500P can navigate complex and dynamic environments, adapt to changing requirements and optimize material flow. This provides agility and versatility in operations, ultimately helping businesses to respond quickly to evolving market demands and achieve higher productivity.

The autonomous transport system is characterized by high flexibility, safety and scalability

Autonomous navigation

- Slam-Navigation
- Camera underneath the mobile platform, reading QR-codes for high positioning accuracy ±5 mm
- Easy to integrate, operate and maintain due to No-Code-Platform with AI functionality KMRes
- Connection via Wi-Fi, 5G capable

Highest safety standards

- Laser scanners for safe obstacle detection
- 3D cameras additionally detect obstacles and people, protecting AMR, load and employees
- Bumper / safety edge for extra safety
- Acoustic and optical signals, as well as 4 emergency stop switches (at each corner of the platform)

Intelligent charging management

- Docking station for conductive charging with digital touch screen
- As soon as the battery level gets low, the AMR is automatically routed to a free charging station
- No installation of special power supply required due to single phase
- 2 h charge for 8 h of use. 1 h charge for 20-80 % capacity
- Inductive charging available in 2024

Extras for flexible use

- Lift with treated hole grid pattern (for pins, etc.)
- Lifting height: 60 mm
- High load capacity up to 1,5 t
- Max. speed: 1.8 m/s without load, 1.5 m/s loaded
- On-platform camera for QR load identification
- Sound module for notifications, alarms, music

International certification

- IP 54 protection class: protection against splash water, dust, and chips
- ICE, UL, and FCC approval for the IoT devices

KMP 1500. The solution for a flexible production process.

The KUKA KMP 1500 autonomously – controlled platform is our answer to the increasing demand of production departments for shorter response times and greater flexibility in their manufacturing concepts. Predefined routes and rigid processes are a thing of the past in the factory of the future.

This is why KUKA develops intelligent, autonomous vehicles that supply materials to robots and machines with perfect timing. The KMP 1500 makes flexible production possible to an extent that has been unimaginable until now.

The KMP 1500 is an autonomously controlled platform that integrates seamlessly into the production process. The vehicle is also excellently suited to the matrix body shop. The KMP 1500 independently and autonomously handles the transport of products independently and autonomously through all process steps.

This production concept from KUKA enables you to optimize your logistics management. The KMP 1500 provides cost-effective support for your warehouse organization or between – manufacturing processes – and is used only as needed.

Unrestricted and precise maneuvering. Thanks to KUKA omniMove drive technology, the KMP 1500 can move in any direction from a standing position. The sophisticated wheel technology allows for precise positioning with an accuracy of ±5 millimeters even in tight spaces. This results in space-saving and highly precise automation solutions for logistics.

Autonomous, flexible warehouse management. The KMP 1500 autonomously fetches the required components or returns them to the warehouse after processing. Thanks to the KUKA. NavigationSolution, it can move about freely and without conventional guidance or navigation elements. This makes integration into modified environments much easier and increases efficiency in logistics management.

Strong, safe and reliable. With a payload capacity of up to 1,500 kilograms, the KMP 1500 safely moves your products through the entire manufacturing process. It meets all necessary safety standards and is also extremely flexible. Integrated safety laser scanners enable autonomous navigation through your production shop.

click for more

KMP 1500	
Dimensions (L × W × H)	2,000 × 800 × 470 mm (with scanners)
Weight	711 kg / 935 kg (with lifting system and battery system extender)
Rated payload	1,500 kg
Velocity straight ahead	max. 1 m/s
Velocity diagonally and sideways	max. 0.56 m/s
Wheel diameter	310 mm
Battery capacity	52 Ah / 96 V (at least 4 hours)
Charging time	1 hour

Lifting system (optional)	
Lift table height	max. 200 mm
Lifting speed	max. 50 mm/s
Weight	+144 kg

Battery system extender (optional)	
Battery capacity	104 Ah / 96 V (at least 8 hours)
Charging time	2 hours
Weight	+80 kg

Supplied accessories
Radio control unit
Floor charging contact plate
Brake release device

KUKA omniMove.

We move big things – with millimeter precision.

Simply move underneath and lift. The KUKA omniMove mobile heavy-duty platform can move your XXL loads with ease. The heavy-duty AGV can be controlled manually, but can also move autonomously. Despite its enormous size and payload capacity, it navigates safely, moving virtually independently. You can also optionally expand it with a self-contained energy supply.

Specially developed wheels allow the mobile heavy-duty platform to move in any direction – even from a standing start. The sophisticated navigation system KUKA.NavigationSolution ensures autonomous maneuvering without risk of collision and without requiring artificial floor markings.

The KUKA omniMove can be freely scaled in size, width and length within a modular system – to suit your requirements.

Mecanum wheel for maximum mobility: the specially developed KUKA omniMove drive technology based on the Mecanum wheel ensures that the KUKA omniMove can maneuver omnidirectionally. The wheels with individual, barrel-shaped rollers can move independently of each other. This allows the KUKA omniMove to perform translational and rotational motions in the tightest of spaces from a standing start. It can thus move swiftly in all directions.

Powerful. Depending on the vehicle variant, the KUKA omniMove can move even the heaviest XXL components safely and conveniently. It has a payload capacity of up to 90 tonnes and – in the maximum version – reaches a length up to 30 meters.

Precise. The KUKA omniMove positions even enormous payloads to within ±3 millimeters without contact.

Modular. We design your ideal solution. You can choose from ten different vehicle variants, and we will then personalize your selection with individual option packages and modules – fully in accordance with your requirements and wishes.

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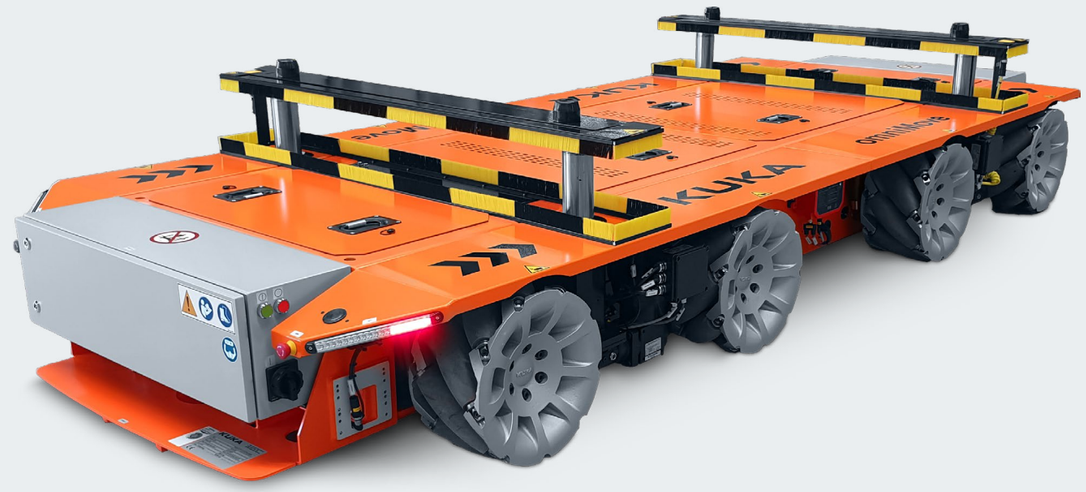

Wheel sizes E375	3000	7000
Payload	3,000 kg	7,000 kg
Height	420 mm	420 mm
Length (with laser scanner)	2,750 mm	3,650 mm
Width (with laser scanner)	1,600 mm	1,600 mm
Number of wheels	4	8
Weight	1,650 kg	2,600 kg
Travel speed	3.0 km/h	3.0 km/h

Wheel sizes E575	7000	12000	17000	25000
Payload	7,000 kg	12,000 kg	17,000 kg	25,000 kg
Height	650 mm	650 mm	650 mm	650 mm
Length (with laser scanner)	3,220 mm	3,520 mm	4,620 mm	5,560 mm
Width (with laser scanner)	2,050 mm	2,050 mm	2,050 mm	2,050 mm
Number of wheels	4	6	8	12
Weight	3,700 kg	4,500 kg	5,200 kg	8,700 kg
Travel speed	3.0 km/h	3.0 km/h	3.0 km/h	3.0 km/h

Operating condition	
Ambient temperature	+5 to 40 °C

Power supply connection	
Charger, type 1	400 V / 50 Hz / 32 A CEE
Charger, type 2	480 V / 60 Hz / 30 A Hubbell HBL2731; UL

KMR iiwa.
Always spot-on safely.

Significantly optimizes your production. The KMR iiwa is a combination of the sensitive LBR iiwa lightweight robot and a mobile, flexible platform. As the name and the individual components already suggest, the KMR iiwa stands out with its high degree of mobility and flexibility.

Manufacturing processes are changing constantly. This is why mobile robot systems must be very adaptable. Maximum mobility and autonomous working methods significantly optimize your production.

Combinable. Design your individual turnkey system solution. The modular KMR iiwa system offers numerous combinations of robot technology, mobile platforms and industrial components.

Sensitive. Seven special joint torque sensors on each axis of the LBR iiwa lightweight robot make it highly sensitive to its environment. It navigates safely and without protective fencing – external contact will cause it to stop immediately.

Autonomous. Thanks to the laser scanners, the mobile platform can navigate fully autonomously. It monitors its environment. And it reacts immediately if a person or object is in the way.

Agile. Specially developed Mecanum wheels allow the mobile platform to move omnidirectionally and execute 360° rotations. A wheel consists of several rollers that are each aligned at an angle of 45° relative to the axle. This top-notch maneuverability shortens throughput times and reduces idle times in the manufacturing process.

Precise. The KMR iiwa achieves a positioning accuracy of up to ±0.1 millimeters, even in the tightest spaces.

Intelligent. With KUKA.NavigationSolution, the KMR iiwa can reliably move around obstacles and find a new route.

Independent. The vehicle and robot are supplied directly with power from Li-ion batteries.

User-friendly. KUKA Sunrise Cabinet and KUKA Sunrise.OS for vehicles and robots simplify the operation and use of the KMR iiwa.

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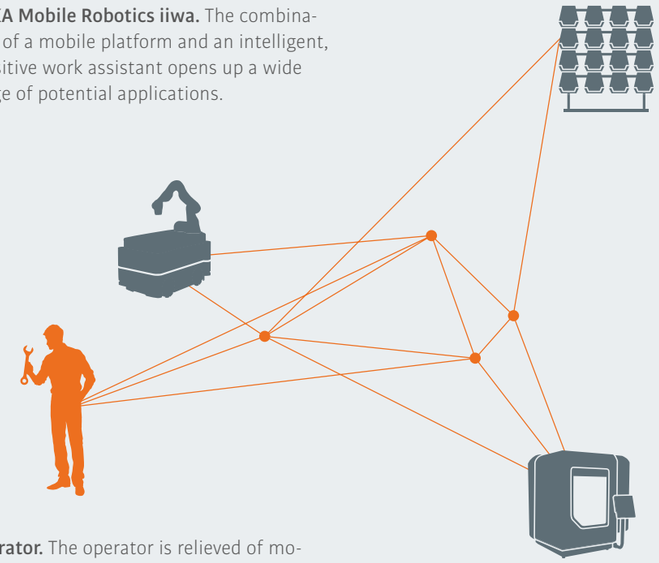
Intelligent system.

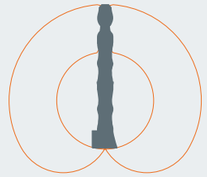
KUKA Mobile Robotics iiwa. The combination of a mobile platform and an intelligent, sensitive work assistant opens up a wide range of potential applications.



High-bay racking. Thanks to its innovative navigation system, the KMR iiwa operates autonomously and is able, for example, to set down machined workpieces or independently fetch -required components.

Operator. The operator is relieved of monotonous, non-ergonomic tasks and can concentrate on important processing steps.

Machine tool. The KMR iiwa takes over the tending of machine tools and relieves the human operator of strenuous and tiring tasks.



LBR iiwa	LBR iiwa 14 R820	LBR iiwa 7 R800
Rated payload	14 kg	7 kg
Number of axes	7	7
Reach	820 mm	800 mm
Wrist variant	In-line wrist	In-line wrist
Mounting flange on axis 7	DIN ISO 9409-1-A50	DIN ISO 9409-1-A50
Pose repeatability	±0.15 mm	±0.1 mm
Axis-specific torque accuracy	±2%	±2%
Weight	29.9 kg	23.9 kg
Protection rating	IP 54	IP 54
Variants	CR	CR
Installation position	Floor, ceiling, wall	Floor, ceiling, wall

Mobile platforms	
Dimensions (H × W × B)	700 × 1,080 × 630 mm (with scanners and protected areas)
Weight	390 mm
Maximum payload	170 kg / 200 kg without LBR iiwa
Velocity in longitudinal direction	max. 3.6 km/h
Velocity in lateral direction	max. 2.0 km/h
Wheel diameter	250 mm
Cleanroom class	ISO 5

CR Suitable for cleanrooms

The technical data in the tables apply exclusively to standard versions.

click for more

KMR iisy. Flexibility and reliability combined: the autonomous mobile cobot as the optimal solution for industrial environments.

Autonomous, flexible and with an eye on all obstacles – the KMR iisy is a smart partner in warehouse logistics and production as a fully integrated combination of cobot and transport platform.

The autonomous mobile robot KMR iisy enables the dynamic use of cobot at different workstations and is therefore indispensable as an automation solution. With the HRC-capable KMR iisy, we offer an AMR (Autonomous Mobile Robot) that can move quickly and safely. This is made possible by safety scanners and 3D cameras in combination with cobot LBR iisy. It detects not only humans around the platform with it`s lidar scanner, but also potential collisions with humans and the cobot LBR iisy. 3D cameras spot obstacles up to two meetwers above the ground.

Mobile cobots in cleanrooms: efficient automation for demanding environments. Due to its low particle and emission levels and its ESD certification, the KMR iisy is also suitable for use in cleanrooms. Pick-and-place applications, material transport and palletizing tasks in the semiconductor or electronics industry can be carried out more efficiently and cost-effectively.

Design and intelligent technology of AMR: ideal for collaborative operation in assembly, intralogistics and as a service robot system. Due to its adaptability, high flexibility and free navigation, the KMR iisy can be used in the warehouse or as a workpiece carrier.

Get more out of Industry 4.0 with the use of mobile cobot platforms

Safe collaboration between humans and robotics, automation of more complex, physically demanding tasks for humans, flexible travel paths, collision protection and uninterrupted operation – the autonomous mobile cobot KMR iisy offers numerous advantages for loading and unloading, quality testing in the production line as well as workpiece and material transport. It enables companies to design processes more cost-effectively and efficiently than before.

Demands on our autonomous mobile cobot

Flexible and cost effective transportation. The mobile KMR iisy Cobot links any number of stations in the desired sequence, without the limitations of conventional material transport solutions. This allows smaller batches and different products to be produced in parallel, enabling rapid response to changing customer requirements. Additionally, the AMR allows switching between products fast and less costly, resulting in the ability to deliver small batches with competitive pricing.

Smart operation. Both the cobot and the mobile platform are controlled by a single teach pendant, smartPAD pro. This is integrated into the platform and acts as a status display. Decoupling the smartPad pro is therefore not required, preventing misplacement and ensuring direct access if needed. There is no need for an additional control pannel.

Autonomous navigation. Free navigation via Slam ensures that the robot can drive autonomously and stop in front of unforeseen obstacles. QR codes can be used to increase the positioning accuracy in workstations.

High safety. The collaborative AMR is equipped with safety components. Sensors, safety scanners and 3D cameras detect workers and obstacles up to 2 m above the ground. A high level of collision protection is guaranteed.

Predictability. KMR iisy documents its tasks automatically and on-the-fly and constantly transmits its coordinates, so the status and location of the load is known at any time. This increases the material traceability, prevents failures in the material supply.

24/7 operation. The AMR platform can be used in 24/7 operation thanks to its inductive charging pads. The lithium-ion battery can be charged in a charging station as well as in workstation during the process.

Easy maintenance. Maintenance on the KMR iisy is quick and easy. The platform components are easily accessible via the large access hatches on both broad sides. A control cabinet provides space for additional customer-specific applications.

Protected construction. IP 54 protection makes the KRM iisy a reliable AMR solution in demanding environments. Clean room class 3 and ESD protection to ISO 61340-5-1 and ANSI ESD S20.20 further qualify it for sensitive workspaces.

Designed to work dynamically.
- Load capacity cobot: 11 kg or 15 kg
- Mobile platform capacity: up to 200 kg
- Size of platform area: 695 × 850 mm
- Max. speed: 1,5 m/s
- Precise positioning using QR code technology in workstations

International certification
- ICE, UL, and FCC approval for the IoT devices
- TÜV Saar tested MRK system (robotics, grippers)

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