



Additional options.

**KUKA omniMove UTV.**

KUKA offers comprehensive additional functions to expand their mobile platforms' scope of performance. These additional functions and other options can be quoted on request according to specific requirements:

## KUKA omniMove UTV options overview



### Navigation options

- [+] Optical guidance
- [+] Optical fine positioning
- [+] Inductive guidance
- [+] RFID location detection
- [+] WLAN interface
- [+] KUKA Navigation.Solution Basic KoM



### Battery management

- [+] Variation of charging devices
- [+] Floor charging contacts
- [+] On-board charger
- [+] Battery tray



### Load options

- [+] Electrical lifting elements
- [+] Hydraulic lifting elements
- [+] CupCone centering
- [+] Optical load detection
- [+] RFID load detection



### Safety options

- [+] Safe laser scanners
- [+] Radio-controlled enabling switch
- [+] Paintwork HYJET-IV-resistant
- [+] Halogen-free cabling



### Additional options

- [+] Tandem mode
- [+] LED work spotlight
- [+] RFID transponder, HF, floor
- [+] RFID transponder, UHF, tool

**KUKA**



# Navigation options

## Optical guidance

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The vehicle's optical guidance system "1 direction" is designed for longitudinal movements. For this, the vehicle carries two cameras which are mounted in the longitudinal direction on the center line of the vehicle. The vehicle's optical guidance system "2 directions" is designed for both longitudinal and lateral movements. For this, the vehicle carries four cameras, two of which are mounted in the longitudinal direction and two in the lateral direction, each of them on the respective center line of the vehicle. Stop positions and commands for lateral movements are detected using additional markings which are placed next to the guidance markings.

The motion command itself, i.e. starting and stopping motion and specifying speed, is given by the user, who accompanies the vehicle with a remote control. The guidance can also be active during manual operation of the vehicle and, as such, allows for precise jogging. For an automatic solution, the motion commands themselves i.e. starting and stopping motions and specifying the speed, can be transmitted via a network adapter (not included in the "guidance" option) from the customer's production system straight to the vehicle.

## Optical fine positioning

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With optical fine positioning in relation to the load frame, two cameras with an upwards-facing field of vision are added to the vehicle. Two optical markings are placed on the load. Using these markings, the vehicle can align itself automatically to within  $\pm 2$  mm of the load to be lifted. This option is particularly useful when the vehicle has to be aligned very accurately with floor markings and/or a load frame, for example, to load components directly into a machining process.

## Inductive guidance

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A vehicle with inductive guidance works in the same way as a vehicle equipped with an optical guidance system. In this case, instead of cameras, antennae are used to follow an inductive loop installed in the floor by the customer. The inductive guidance is laid out in one direction. It is also possible to have inductive guidance in two directions.

However, start and stop positions as well as commands for lateral movements are determined by the system and must be defined in different ways. If you are aiming for an automated solution, the additional "RFID location detection" option will be required. In this case, the relevant details are clarified with the customer. The inductive loop is defined and installed by the customer himself in accordance with the production processes.

### **RFID location detection, 1 direction**

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RFID location detection can be considered an advanced option package for automated movement along an optical or inductive guide. If a guided vehicle is to be automated, position detection is required to indicate a change in direction. With RFID location detection, a so-called “RFID HF floor transponder” is installed firmly and flush with the floor at the intersection of the guides. When the vehicle reaches the position of the transponder, an RFID reader informs the vehicle controller so that the vehicle changes its direction of motion.

The RFID HF floor transponder is not included in the scope of supply.

### **WLAN interface**

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The network adapter serves as an interface between the KUKA omniMove UTV and the customer’s production system. The transport vehicle can receive motion commands via the network adapter and execute them automatically in conjunction with the “Guidance” option. Jogging remains possible at any time.

The customer or a third party must integrate the KUKA omniMove UTV into the production system as this is not included in the KUKA Roboter GmbH scope of supply and service. Details regarding this must be specified during the handling of the project.

### **KUKA.NavigationSolution Basic KoM 1.3**

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With KUKA.NavigationSolution, KUKA is presenting its mobility solution for autonomously navigating vehicles. The KUKA Navigation Solution software is used for autonomous navigation, control, management and monitoring of mobile platforms. Without any risk of collision and without the requirement for artificial markings in the environment, based on the SLAM method (simultaneous localization and mapping).

#### **Simultaneous Localization and Mapping (SLAM)**

- Based on laser and wheel measurement values
- No floor markings or changes to the environment are necessary
- Unaffected by moving objects

#### **Navigation with various levels of autonomy**

- Semi-autonomous navigation using virtual paths
- Fully autonomous navigation
- Maximum flexibility

## Various options for KUKA Navigation.Solution

### **KUKA.NavigationSolution FreeNav**

The “Free Navigation & Obstacle Avoidance” option enables the vehicle to determine its own path, unlike with the basic package → maximum level of autonomy and flexibility.

### **KUKA.NavigationSolution FineLocPos**

The “FineLocPos” option enables high-precision positioning of the mobile platform in its environment. The positioning accuracy increases up to +/- 1 mm.

### **KUKA.NavigationSolution FleetManager**

KUKA FleetManager is software on a central computer with interfaces to the customer’s logistics and material flow system.

This translates the commands from the customer’s ERPs (Enterprise Resource Planning). The FleetManager also monitors and coordinates two or more vehicles equipped with the KUKA.NavigationSolution Basic package. The KUKA platforms may be of different types.

### **KUKA.NavigationSolution Spindle**

The “Spindle” option monitors and controls the lifting elements of an omniMove in conjunction with KUKA.NavigationSolution. It ensures that the lifting elements work in sync and reach their defined lift height at constant velocity.

### **KUKA.NavigationSolution Coupling**

If two or more omniMove vehicles of the same design are equipped with the motor-driven coupling option and are operated in tandem mode, this option can carry out the coupling of the vehicles in a completely autonomous manner in conjunction with KUKA.NavigationSolution.

### **KUKA.NavigationSolution ObjectTrack**

CAD-based object detection:

- Tracking, e.g. for picking up loads
- Relative positioning to the detected workpiece



# Battery management

## Chargers

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There is the option to shorten the charging time by opting to charge using two chargers or a more powerful single charger.

## Floor charging contacts

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This option package allows you to charge the vehicle without having to connect a charging cable. Current collectors are mounted on the underside of the vehicle. The vehicle establishes a connection to the charging station automatically when it moves onto the fixed floor contacts. The vehicle is then charged at the charging station.

## On-board charger

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The on-board charger is a battery charging device installed on the vehicle (200 A and 48 V). Using this charger increases the flexibility of the UTV and allows the batteries to be charged wherever there is a suitable power connection. The charging cable is manually plugged into the suitable connection. The sealing cover is safeguarded by a break contact, i.e. the cover must be closed prior to motion in order to prevent accidental motion while the cable harness is removed.

## Battery tray

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The KoM UTV can be equipped with the option “Battery changing system” - “Battery tray” - in order to guarantee continuous operation, less idle time and suitable battery management. The battery tray can be removed from a vehicle manually from above using a gantry crane, making it possible to change the battery.



## Load options

### Electrical lifting elements

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The electrical lifting system is used to raise and lower the customer's loads being transported. The option package usually comprises four electrical lifting elements (lift spindles) mounted on the longitudinal frame of the KUKA omniMove. Depending on the size and weight of the load and the flexion tolerance, other lifting elements may also be available. The mechanical / physical interface (points of contact) between the vehicle and the load is typically the upper edge of the lifting elements.

In addition, the electrical lifting elements can be fitted with the option "Emergency release". This allows the load to be lowered, even without electrical supply.

The standard lifting elements are dependent on the vehicle size and differ in lift height and payload.

#### **Mobile platforms of type**

- E375 have a maximum lift height of 250 mm.
- E575 have a maximum lift height of 350 mm.
- Various other lifting heights have been implemented many times and are available on request.

### Hydraulic lifting elements

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The hydraulic lifting system is used to raise and lower the customer's transport item. The option package usually comprises four hydraulic lifting elements (cylinders) mounted on the longitudinal frame of the KUKA omniMove. Depending on the size and weight of the load and the flexion tolerance, other lifting elements may also be available. The mechanical / physical interface (points of contact) between the vehicle and the load is typically the upper edge of the lifting elements.

The standard lifting elements are dependent on the vehicle size and differ in lift height and payload.

#### **Mobile platforms of type**

- E375 have a maximum lift height of 250 mm.
- E575 have a maximum lift height of 750 mm.
- Various other lifting heights have been implemented many times and are available on request.

### **CupCone centering**

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CupCone centering refers to the mechanical centering of the load on the vehicle. A centering cone is fixed to each side, either on the lifting elements or on the supporting points of the vehicle. The accuracy of the load centering depends on the accuracy of the chosen CupCone.

CupCone centering, rough: Accuracy  $\pm 1$  mm

CupCone centering, fine: Accuracy  $\pm 0.1$  mm

The relevant counterpart is not included in the scope of supply and must be sourced by the customer.

### **Optical load detection**

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With “optical load detection”, two cameras with an upwards-facing field of vision are added to the vehicle. Optical markings are placed on the load. Using these markings, the vehicle can detect the load and make the necessary adjustments, for example, to the scanner fields (only in conjunction with a safe laser scanner). This option is particularly useful when different load items have to be transported. Its purpose is to ensure safety when loading and can be combined with the “Optical fine positioning” option.

### **RFID load detection**

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An RFID reader is mounted on the upper side of the vehicle for load detection. The so-called “Transponder RFID UHF tool” is mounted on the workpiece. The type of load is then saved on this storage medium. When used in conjunction with the “safe laser scanner” option, the scanner fields can be adjusted automatically to the transport situation, for example, or other functions can be triggered.

The “Transponder RFID UHF tool” is not included in the scope of supply.



## Safety options

### Safe laser scanners

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The purpose of the laser system is to provide safety to individuals and machines. From a height of approx. 200 mm above the ground, four laser units monitor the entire area around the vehicle and divide it into three scanner fields: Protection, safety and warning fields. If an object is detected in one of the three scanner fields, the system responds by reducing the speed all the way to a standstill. The system monitors in both automatic and manual mode.

### Radio-controlled enabling switch

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Based on the dual control principle, the vehicle control system is extended to include an enabling switch for a second user (attendant). The user gives the motion commands to the vehicle, the attendant confirms these motion commands by holding down the enabling switch. In line with the dead-man switch principle, as soon as the user releases the button or pushes it down completely, the vehicle stops.

This option is useful in the case of confusing transport tasks (due to size, payload or environment) and serves to provide safety to individuals, machines and the load.

### Paintwork HYJET-IV-resistance

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HYJET-IV or Skydrol is an aggressive hydraulic oil used primarily in the aerospace industry. If this option is chosen, the entire vehicle, including all covers, is armed with a special HYJET-IV-/Skydrol-resistant paint. All relevant apertures, grooves and other elements are designed in such a way that the internal components are protected against drips.

Recommended for use in the aerospace environment.

### Halogen-free cabling

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The cabling in the vehicle has a halogen-free sheath. This option is recommended for environments with a significant risk of fire.





# Additional options

## **Tandem mode**

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The KUKA omniMove vehicles can be combined into a tandem formation for the transport of very large goods. This makes it possible to transport large components in a cost-effective way, as KUKA omniMove vehicles can be operated individually or in tandem at any time. KUKA omniMove vehicles which are linked together continue to be controlled using a single remote control.

Vehicles which are operated in tandem mode are always mechanically coupled. Due to the fact that coupled vehicles respond in the same way as a single vehicle, the power exerted on the tools or on the load is reduced to a minimum. The vehicles can either be combined using manual coupling or a motor coupling, depending on the requirements profile.

### **Tandem mode coupling, manual**

One hardware connection point per vehicle and one electrical coupling using a hand plug.

### **Tandem mode coupling, motor**

One hardware connection point per vehicle and one electrical coupling using an optical data transceiver. If you are aiming for an automated solution, the coupling must be motor-driven. In addition, the KUKA NavigationSolution Basic KoM incl. the software option KUKA NavigationSolution Coupling is required.

## **LED work spotlight**

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Depending on the customer's requirements, the UTV can be equipped with two LED work spotlights. These can be used, for example, to illuminate the motion range or as a lighting unit on the platform.

## **RFID transponder**

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### **RFID transponder, HF, floor**

The RFID HF floor transponder is a high frequency RFID storage medium which is suitable for floor installation. The number of RFID transponders provided depends on the project.

### **The RFID transponder, UHF workpiece**

The RFID HF transponder workpiece is an ultrahigh frequency RFID storage medium which is suitable for installation on the workpiece. The number of RFID transponders provided depends on the type and number of different workpieces to be transported.

The installation of the RFID transponder is not included in the scope of supply.