



# Construction Equipment

Product Catalog for Camera, Monitor and Mirror Systems







## Elektronik Expertise

**Dear Customers, our vision is safety!**

**Vision and safety are of utmost importance to us.**

The following pages contain an overview of our camera monitor systems. MEKRAtronic GmbH is a wholly-owned subsidiary of MEKRA Lang GmbH & Co. KG, the market leader in vision systems for commercial vehicles.

MEKRAtronic GmbH has specialized in meeting customer-specific, individualized retrofitting requests and requirements. Our product portfolio covers applications for trucks, agricultural vehicles, construction machinery, municipal vehicles, light commercial vehicles, as well as the respective specific requirements.

We also offer compelling customized solutions for the products of various body and special vehicle manufacturers. We want you to benefit from MEKRA Lang GmbH & Co. KG's decades of experience in the commercial vehicle market and to experience the outstanding customer service and care MEKRAtronic GmbH provides.

We offer:

- a wide range of products to fulfill your individual requirements
- personal and competent on-site consultation
- reliable installation service and sustainable customer care
- sales training for your team as well as effective field support

Treat yourself to a proven higher degree of safety and comfort with camera monitor systems by MEKRAtronic.

**Our vision ... is safety!**

Jan Snel  
President



# A short history of vision

Toward a new dimension

## VISION 1.0

Direct vision

Daily farm work in the 19th century was characterized by hard physical labor. Just



about every task was performed by hand and the use of any kind of machinery was a rarity. Some of the work was facilitated by using horses and horse-drawn carts, and the visibility requirements, both in the field and on the road, were still sufficiently met by direct vision.

## VISION 2.0

Emergence of mechanization

During the 20th century, farm life changed dramatically. Little by little, manpower and horsepower were replaced by machines. The introduction of the tractor, which would quickly prove to be indispensable to the farming community, sparked the invention of a range of additional useful farm vehicles. These developments had a significant impact on the vision requirements for agricultural vehicles. Rather than using direct vision, as had been adequate for



centuries, mirrors were now employed to monitor the areas around vehicles indirectly.

## VISION 3.0

Increase in machine complexity

In the late 1960s, based on decades of experience in the area of mirror production, MEKRA Lang took up manufacturing rear-view and exterior mirrors for the commercial vehicle industry. As agricultural vehicles became ever larger and more complex, obstructed vision presented more and more of a problem, placing an extreme burden on drivers and raising safety concerns for machine operators. New

solutions were needed to ensure adequate visibility in agricultural settings. MEKRA Lang answered the call by initiating its in-house development of camera monitor systems while continuing to optimize its mirror portfolio. This added a critical element to indirect vision solutions, ensuring true 360° visibility around machines. By optimizing the visualization of hazardous areas, MEKRA Lang camera monitor systems enable operators to work safely and much more efficiently. The MEKRATronics subsidiary was founded to accommodate the individual needs of our customers in the retrofit sector. This ensures a quick response to the respective requirements and a solution with products in original equip-



ment quality. With the close cooperation of our development department from MEKRA Lang we are able to validate innovations and are able to create a large number of specialty mounted vision equipment. 80 years of development expertise and commitment to the continuous optimization of machine operations through improved visibility have led us into a new dimension of visualizing the work space.

## VISION 4.0

Entering a new dimension

Vision 4.0 is a mirror replacement system for vehicles that uses HDR cameras and monitors exclusively for the first time. All viewing areas are combined and displayed on just one monitor on each side of the cab. By providing the driver with considerable assistance in operating the vehicle, the new system offers important additional safety benefits, such as faster detection of environmental conditions, better assessment of hazardous situations, and significantly improved night vision thanks to the use of particularly sensitive cameras. Additionally, the system's flexibility in terms of camera placement adds a new dimension to vehicle design. A specifically agricultural application of our Vision 4.0 concept can be experienced first hand in the Smart CAB, which was developed as part of the CAB Concept Cluster initiative.



 **CAB**  
Concept Cluster

# The platform concept

## Aperture angle selection

We will consult with you to determine the field of vision and the corresponding aperture angle required for your application.



## Image processing

Image processing parameters vary depending on the intended purpose of the application. The platform concept makes customization easy and cost efficient.



## Transmission set-up

Whether digital or analog, each transmission type has its specific advantages and each application requires the appropriate connection set-up. Our platform concept allows us to accommodate these factors quickly and efficiently.



# The benefits of modularity

The MEKRA Lang platform camera and its high quality components are characterized by a high degree of modularity which enables us to offer customized camera solutions perfectly adapted to our customers' preferences.

The camera is particularly well suited for machine applications in the agriculture and construction sectors. Thanks to its modular design, the camera can be **adapted** to any vehicle type quickly and in a cost efficient way.

The individual camera components are extremely **robust** and compact in size (35x35 mm). The length of the camera varies with the individual models. The minimum length of every model, however, is 34 mm, which makes it easy to **integrate** and attach almost anywhere in or on the vehicle. The modular design allows for a

customized low-cost combination of various image sensors and image processing and transmission techniques optimizing our **adaptation** efforts for each individual customer.

The available image sensors are automotive-grade and offer image resolution from standard VGA up to **1.2 megapixels**. The image processor is matched to the performance characteristics of the specific image sensor. Transmission technology options include analog PAL or NTSC based video transmission as well as digital transmission standards, such as **Fast Ethernet**, BroadR-Reach and LVDS.

It is also possible to combine various lenses with different horizontal **aperture angles** within the platform components. Aperture angles for analog options include 70°, 100° and 120°, and for digital

options 100°, 120° and 180° (wider aperture angles are also supported).

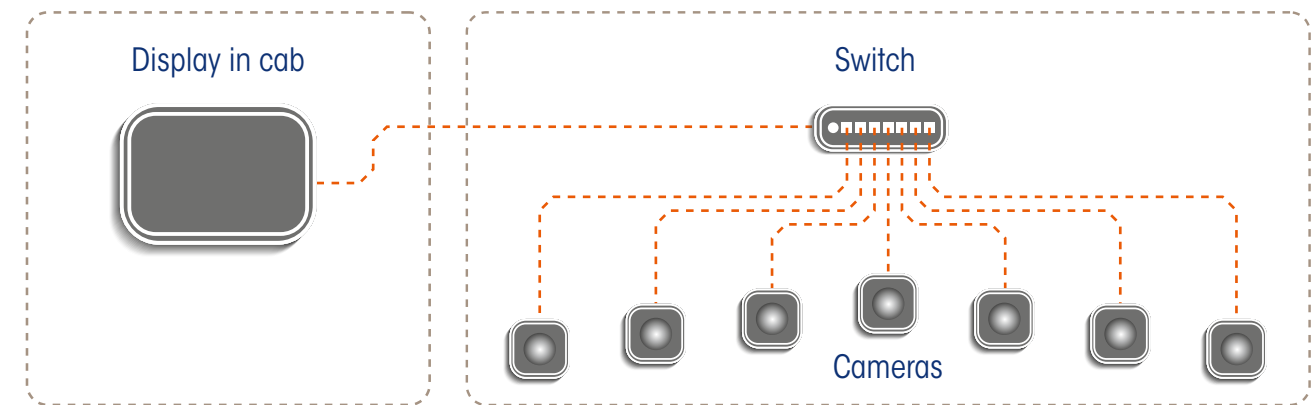
The MEKRA platform camera features an especially rugged **housing** perfectly suitable for rough environmental conditions. And thanks to its high-performance integrated heating system, the camera can be operated under all weather conditions.

# Digitization enables new types of application

Digital data transmission allows for significantly higher image resolution. Several cameras connected to a vehicle network share one single data connection between switch and display, which reduces

wiring requirements significantly. This connection supports the transmission not only of image data but also of various other camera control signals, e.g. for activating the cleaning system. In the future,

added value will be created by supporting new systems based on the analysis of digital data collected from the camera's sensor chip.



# Specifications overview

## Digital ethernet camera

Dimensions	35 x 35 x 49 mm (W x H x D)
Ingress protection	IP 69 K
Operating temperature	-40 °C to +85 °C
Operating voltage	9 - 36 V
Aperture angle (hor.)	100°, 120° or 180°
Image sensor	1.2 megapixels
Image resolution	1280 x 720 pixels
Video transmission	UDP or RTP
Video compression	MJPEG or H.264



## Analog camera

Dimensions	35 x 35 x 34 mm (W x H x D)
Ingress protection	IP 69 K
Operating temperature	-40 °C to +85 °C
Operating voltage	9 - 36 V
Aperture angle (hor.)	70°, 100° or 120°
Image sensor	VGA
Image resolution	640 x 480 pixels
Video transmission	PAL or NTSC







## Content

Value-added camera systems	10
Innovative Solutions for work safety	12
Surround View	14
Innovation to increase performance and work safety	16
Radar	17
Video radio system	18



## Value-added camera systems

### Sample applications

There are many good reasons for installing camera systems. Two of the most important reasons for installing camera systems developed by MEKRAtronics are high efficiency and safe operation. A properly installed system with all components securely attached can help minimize property damage and prevent personal injuries. Drivers will also welcome improved ergonomics and a more comfortable ride.

That is why you should choose products by MEKRAtronics, your partner for efficiency and safety at work.

### Rear View Camera

For areas behind construction equipment that lack visibility even when mirrors are used, a rear view camera provides an effective solution. This camera has become a standard feature in new equipment, and retrofitting existing machines is highly recommended. Ideally, the camera provides a 120° aperture angle.



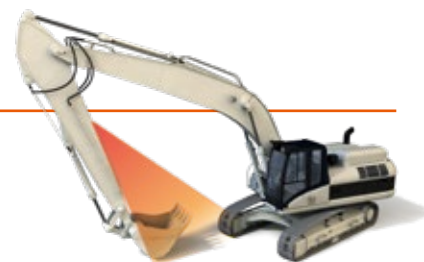
### Side View Camera

The areas around heavy equipment, such as wheeled or crawler excavators and telescopic handlers, are often characterized by poor visibility or even a complete lack thereof. This problem can be solved and a high degree of additional jobsite and equipment safety can be achieved by using a combination of side and rear view cameras.



### Work Area Camera

A work area camera helps to efficiently monitor and control mounted implements as well as loading and unloading operations. Mounted to the dipper arm of a long front excavator or the trolley of a crane, a work area camera also provides an overview of areas which are almost or completely invisible to the naked eye. Ideally, the camera provides a 28° to 70° aperture angle.



### Front View Camera

Using a front view camera with a 100° to 130° aperture angle on wheel loaders, dumpers and articulated dump trucks significantly facilitates monitoring the path of travel in front of the machine. For example, equipping road graders with two cameras perpendicular to the direction of travel on the left and right hand side of the front lamp carrier, will make it significantly easier for drivers to enter areas of poor visibility. As a rule, cameras with a 50° to 70° aperture angle are best suited for these scenarios.



### Cross-traffic-camera-monitor-system

Thanks to the cross-traffic-camera-monitor-system (Q-KMS) it is now possible to eliminate field-of-vision limitations caused by front-end dimensions in excess of 3.5 m when using frontline attachments in road traffic. The requirements of the properties in terms of function, operation, image quality and presentation are fully met as long as the system is configured and installed in accordance with the relevant recommendations of the Verkehrsblatt 23/2016-180.



### Active Camera system

To increase safety, the rear camera can be combined with a radar system. The driver/operator of the machine/vehicle will receive a visual as well as an acoustic warning, if there is a person or an object in the driving path. At the same time, the monitor shows him the obstacle. As a result, the situation can be quickly grasped and security can be increased.







## Cross-traffic-camera-monitor-system

BIGGER, FASTER, FARTHER...

that seems to be what it is all about these days and it is a good thing, too. After all, there would be no progress otherwise. However, while this mindset drives innovation, it can also generate problems.

Let us think back 30 years and remember what it was like then: a traditional tractor on the road was certainly a large object, but did not completely obstruct the view. These days, however, if you happen to run into one of the current models on a small road in Franconia, you might actually panic. The same is true for other "monstrosities", including combines, corn choppers, sprayers, etc.

While for us as fellow road users, the worst-case scenario is feeling intimidated, the drivers of these gigantic vehicles face a completely different set of challenges. Not only do they find themselves perpetually under stress due to their vehicles' sheer size, in most cases, they also violate German traffic rule, which demand a clearly defined field of vision as well as specific maximum dimensions. What this actually means is this: most modern farm equipment already exceeds the mandatory 3.5-meter front-end limitation when it leaves the factory, or at the latest when a front-mounted implement is added. In this case, the field of vision is obstructed to such an extent that the driver cannot safely enter particularly critical locations, like intersections or driveways.

Here is where German law requires the use of a signaler who will guide the driver of such a vehicle through challenging traffic flow situations. In practice, however, this rule is hardly ever implemented, or if it is,

poses a significant accident risk to the signaller. To complicate things even further, modern farm equipment is often not approved for two-person-operation on public roads which means that the signaller has to travel in a separate vehicle.

MEKRAtronics has developed a solution for this problem: the cross-traffic camera monitor system (Querkamera-Monitorsystem, Q-KMS) is designed to eliminate field-of-vision limitations due to excess front-end dimensions. The system is mounted at the front-end of the vehicle and can be activated on demand.

The extremely rugged "Professional" version features a camera that is itself housed in a stable, extendable enclosure. This makes the system suitable for winter service vehicles and an excellent choice for municipal vehicle operators and contractors. Any requirements regarding functionality, operation, image quality, and display are fully met, as long as the system is configured and installed in accordance with the relevant recommendations provided by the German Federal Ministry of Transport and Digital Infrastructure (see Verkehrsblatt 23/2016-180). Private farmers will prefer the straightforward "Basic" version, which is available for about half the cost.

This system meets legal requirements as well (i.e. is "certifiable"), but is subject to certain restrictions regarding poor visibility and weather conditions potentially limiting its use during the winter season which is generally not a deal breaker for farmers. Essentially, the "Basic" model can easily be upgraded to the "Professional" version by using mostly the same components.

After the system has been installed and approved by the German technical inspection service TÜV (including a field-of-vision test), it will be officially entered in the vehicle's registration papers. Thanks to the extended field of vision, farmers and municipalities can achieve a significant degree of risk mitigation and at the same time lawfully operate their vehicles without using the otherwise mandatory signaller. This saves money, protects resources, and helps prevent accidents.



## Surround View

Individual vehicle

At a glance, everything in view: The MEKRA Lang all-round vision system is based on years of proven and extremely robust cameras, which are brought together in the new monitor generation to form a surround view.

According to his requirements, the driver can manually determine the display of the individual camera images or have them automatically displayed via vehicle signals. The view can be adapted to the most critical and necessary areas: rear-view camera, combination of side-view and rear-view cameras up to the complete surround view.

The system does not require a control unit to combine the camera images, which requires initial calibration. In addition, complex machine shapes do not create new „blind spots.“



## Specifications overview

### Monitor

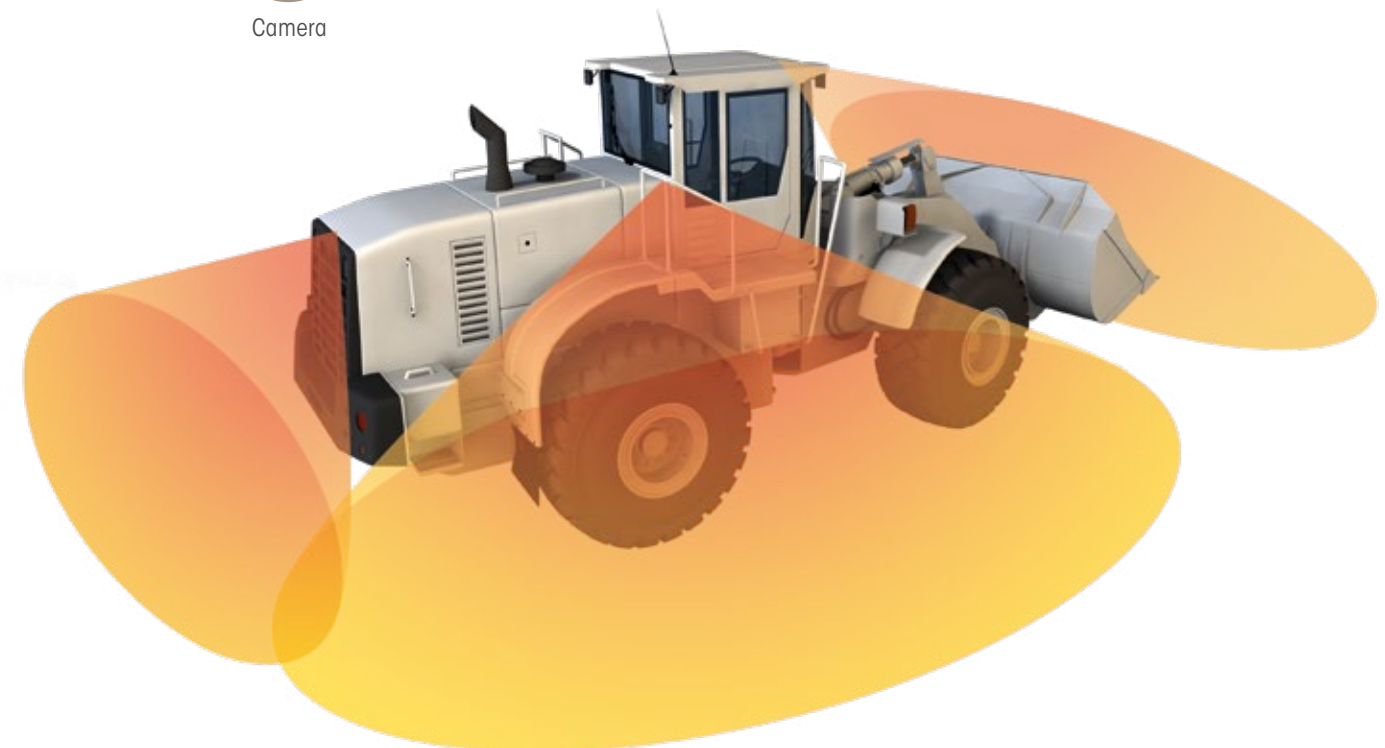
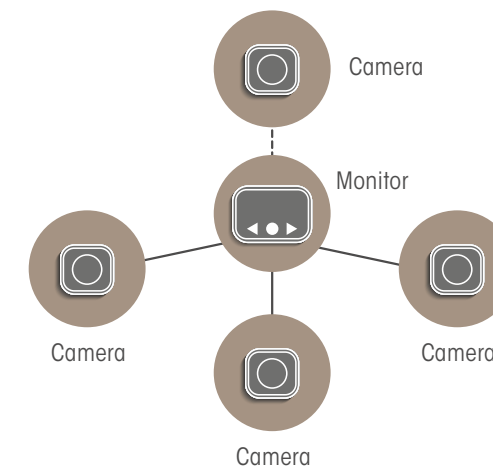
Operating voltage	10 - 36 V
Temperature range	-30 °C bis +85 °C
Protection class	IP 65
Resolution	800 x 480 Pixel

### Camera

Temperature range	-40 °C bis +85 °C
Protection class	IP 69 K
Video format	720 x 486 Pixel
Temperature range	-40 °C bis + 85 °C



### Sample system configuration:





## Innovation to increase performance and work safety

Introduction of the latest technology in this area

### Object and traffic surveillance

The vehicle can receive additional monitoring in certain areas with the help of radar sensors.

The operator of the vehicle will receive an audible warning if there is a person or an object in the driving path or in the left lane and can intervene immediately. Audio frequency and display will show the distance to the object. Combined with a camera system it is easy to estimate the distance with one look at the monitor.

Construction machines, trucks and forklifts have been using our partner PRECO Electronics sensors and radars successfully; the sensors can detect relevant items at close and long range around the machine.

Various sensors are available in order to meet the specific requirements of the various applications in the best possible way. In these cases, the detection areas can be

individually adapted and thus adapted to the appropriate vehicle. Capture ranges of three, four and a half and six meters are provided by default for the majority of applications, but ranges of up to 10 meters are also possible. A turning assistant expands our portfolio to make a significant contribution to road safety. The radar sensors are extremely resistant to pollution and operate under the most difficult environmental situations such as dust, rain or snow. Objects and people are reliably detected. All sensors can be connected to our MEKRA Lang monitor, combining the camera image and warning. Flexible configurations allow the systems to be individualized.

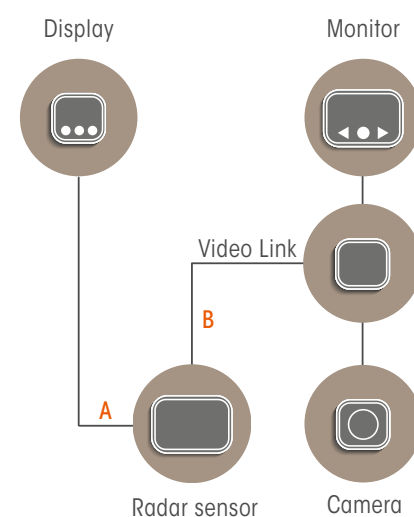


#### Specifications:

- Frequency range: 24,00 - 24,25 GHz
- Operating voltage: 9 - 33 V
- Current draw: < 0.5A
- Operation temperature: -40 °C bis +85 °C
- Vibration resistance: 25 G
- Protection Class: IP 69 K



#### Sample system configuration:

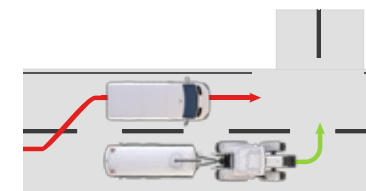


## Radar

Sample applications

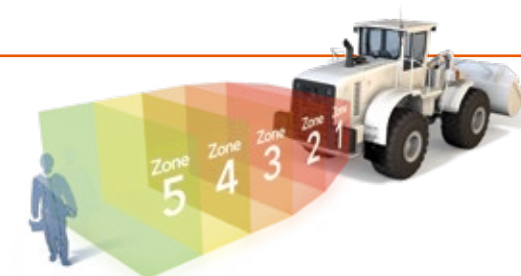
### Lane Assist

Taking a left turn imposes a danger to the operator of the vehicle, there is always the chance a faster vehicle will try to pass. The Side Defender monitors the left lane area and warns visually and/or acoustically when an object approaches during the turn process.



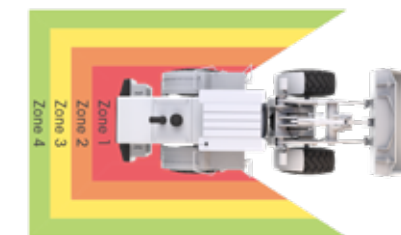
### Object detection I

It is easy to overlook an approaching person, especially when maneuvering a vehicle in large enclosed areas with large machinery all around. A radar based rear monitoring device gives a visual and/or audible warning.



### Object detection II

Realistically you can monitor the whole work area of a large machine/vehicle with three sensors. Not only the rear area, but also the two sides are monitored. The operator of the machine can concentrate completely on his/her task and receives a visual and/or audible warning if necessary.





## Video radio system

Digital radio system – EWS-10

A wired video route is not always feasible. This is where the MEKRAtronic video radio system remedies the situation.

Whether on tower cranes, large telescopic handlers or anywhere where moving components of a work machine prevent the routing of a cable, the video radio system enables a delay-free image transmission. In large and small facilities, processes can thus be viewed and distributed to several addressees:

For example, the level of a crusher plant can be sent to several feeding vehicles.

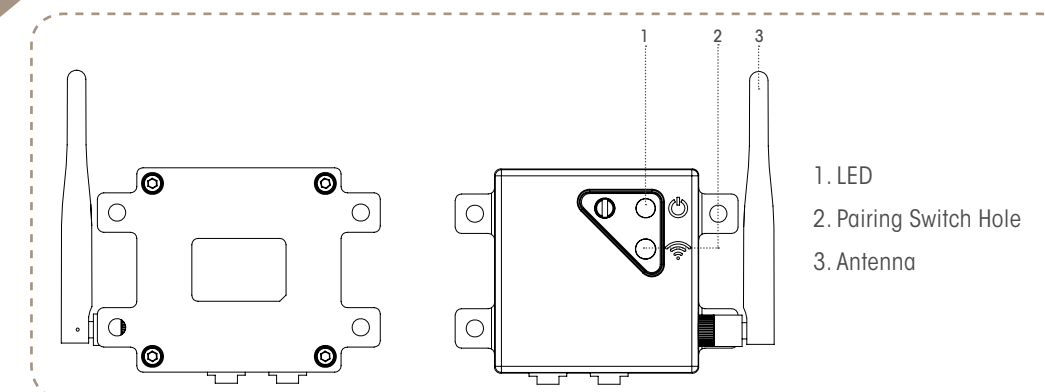
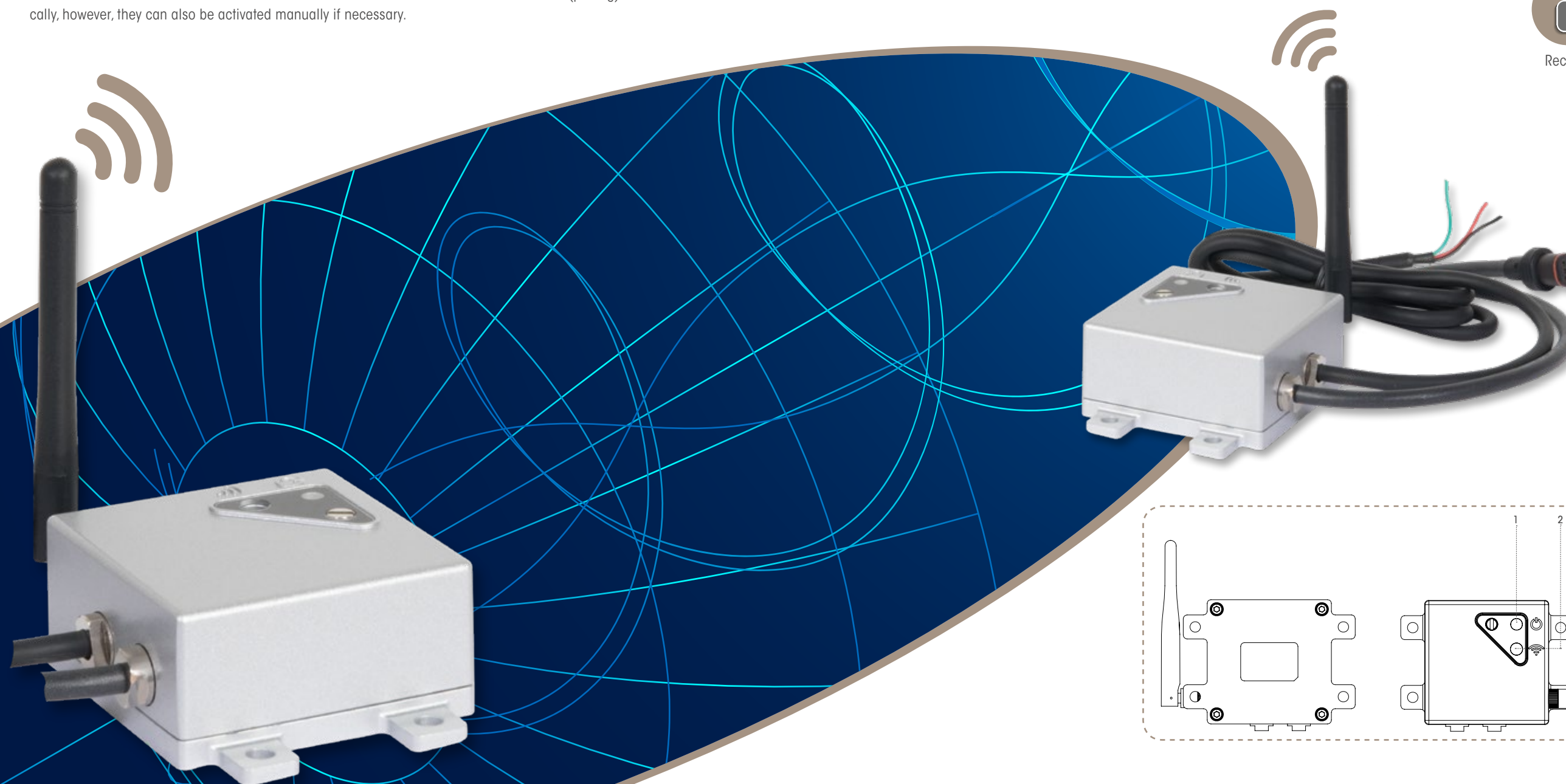
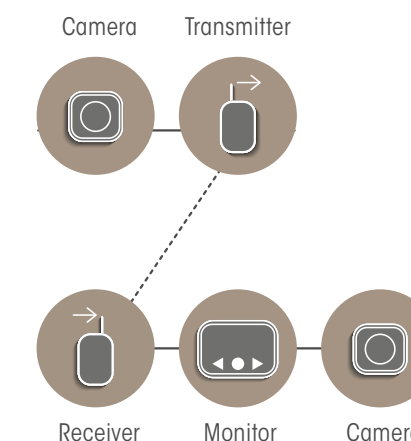
Our radio system offers optimal image transmission, where a direct connection cannot be implemented by means of cables. Both the transmitter and receiver are very robust and suitable for both 12V and 24V on-board networks. The image transfer takes place without interference in real time (latency time approx. 100ms).

For a secure radio connection, transmitters and receivers must be connected to each other (pairing). As a rule, this is done automatically, however, they can also be activated manually if necessary.

### Specifications overview

Operating frequency	2.408 – 2.468 GHz
Transmission rate	max. 4 Mbps
Transmission path	200 m (open area)
Frame rate	Up to 30 fps bei 720 x 480 (NTSC)
Power consumption	10 – 32 V DC
Power consumption	max. 20 W
Protection Class	IP 69 K
Dimensions	65 x 65 x 33 mm (W x H x D)
Weight	ca. 200 g (2x)
Operating temperature	-40 °C to + 85 °C

#### Sample system configuration:







## Sample Applications

The range of potential applications for our camera monitor systems is unlimited. The following pages provide an overview of typical application scenarios for our products.

Do you need very specific solutions customized to meet your individual requirements? **Not a problem!**

Just contact us and let us know what your needs are, and we will be happy to develop custom-tailored system solutions just for you! Our team of skilled service representatives is standing by to support you, whether on-site or by telephone, to install your system or to help with any technical integration or application issues.

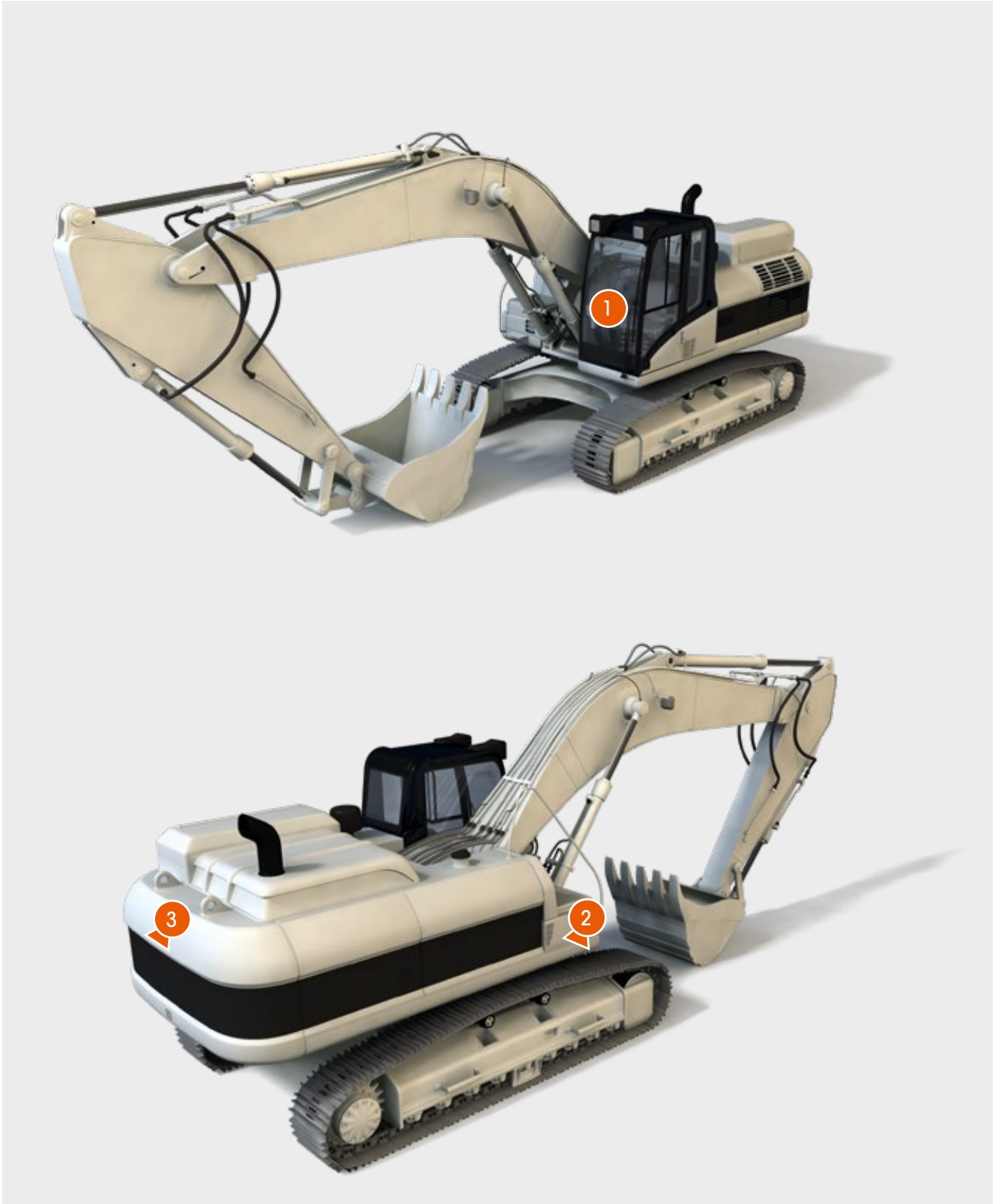
<b>Small Dumper Loader</b>	<b>22</b>
<b>Crawler Excavator and Wheel Excavator</b>	<b>24</b>
<b>Long Front Excavator</b>	<b>28</b>
<b>Material Handler</b>	<b>30</b>
<b>Compact Loader</b>	<b>32</b>
<b>Telescopic Handler</b>	<b>34</b>
<b>Wheel and Crawler Loader</b>	<b>36</b>
<b>Crawler Dozer</b>	<b>40</b>
<b>Scraper</b>	<b>42</b>
<b>Grader</b>	<b>44</b>
<b>Dumper Loader</b>	<b>46</b>
<b>Dump Truck</b>	<b>48</b>
<b>Crusher</b>	<b>50</b>
<b>Road Milling Machine</b>	<b>52</b>
<b>Paver</b>	<b>54</b>
<b>Compactor</b>	<b>56</b>
<b>Tandem Roller</b>	<b>58</b>



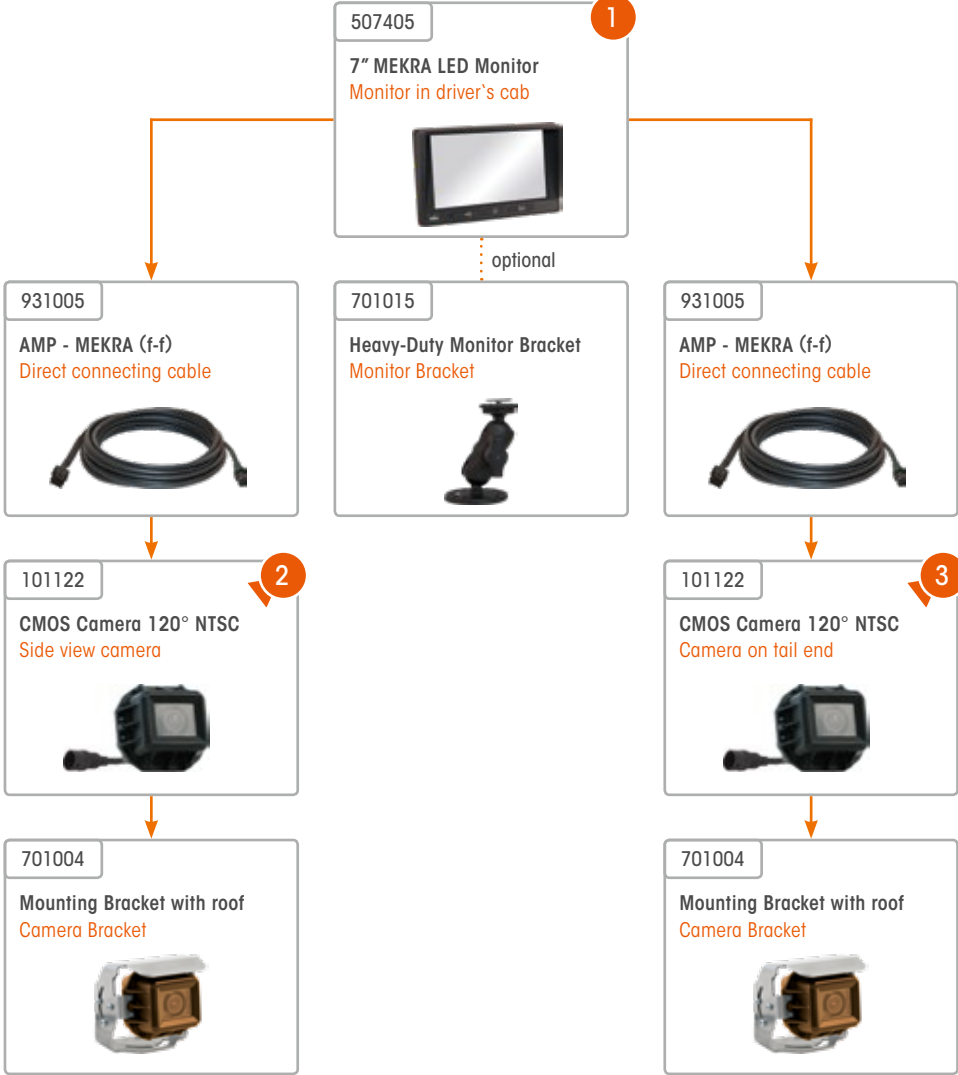


## Installation Scheme for Increased Efficiency and Safety at Work





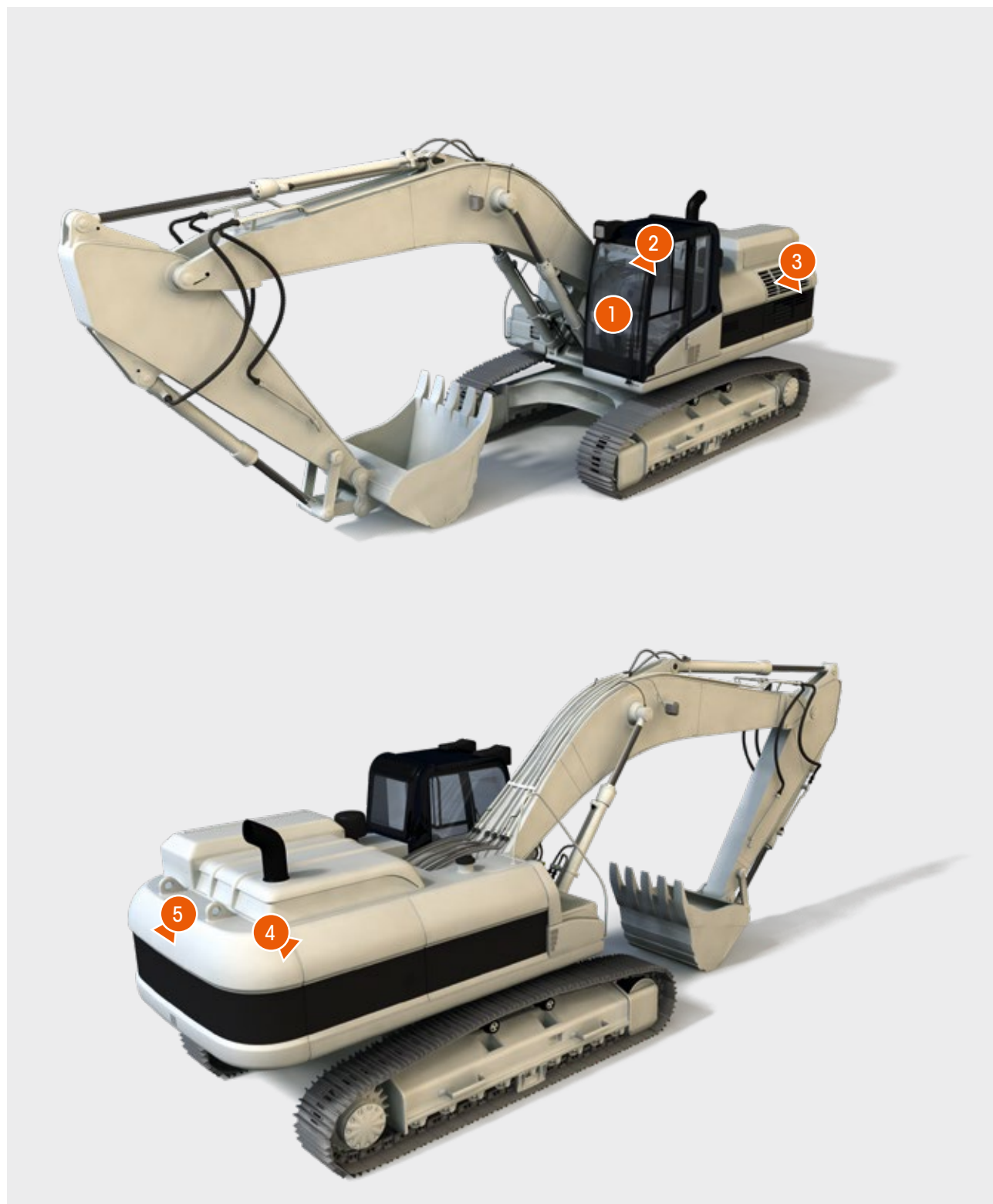
## Installation Scheme for Increased Efficiency and Safety at Work







## Installation Scheme for Increased Efficiency and Safety at Work





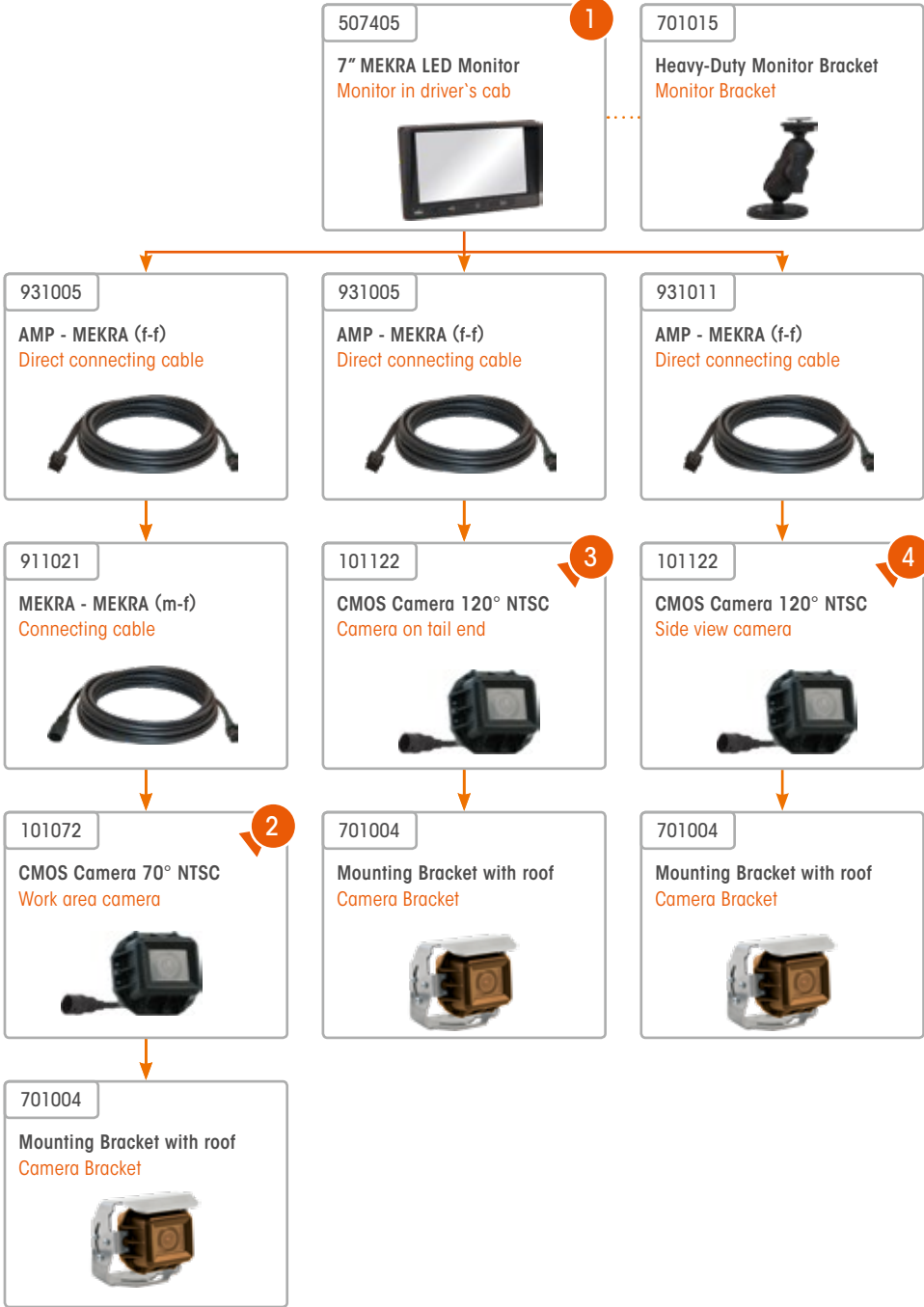
### Installation Scheme for Increased Efficiency and Safety at Work







Installation Scheme for Increased Efficiency and Safety at Work





## Installation Scheme for Increased Efficiency and Safety at Work





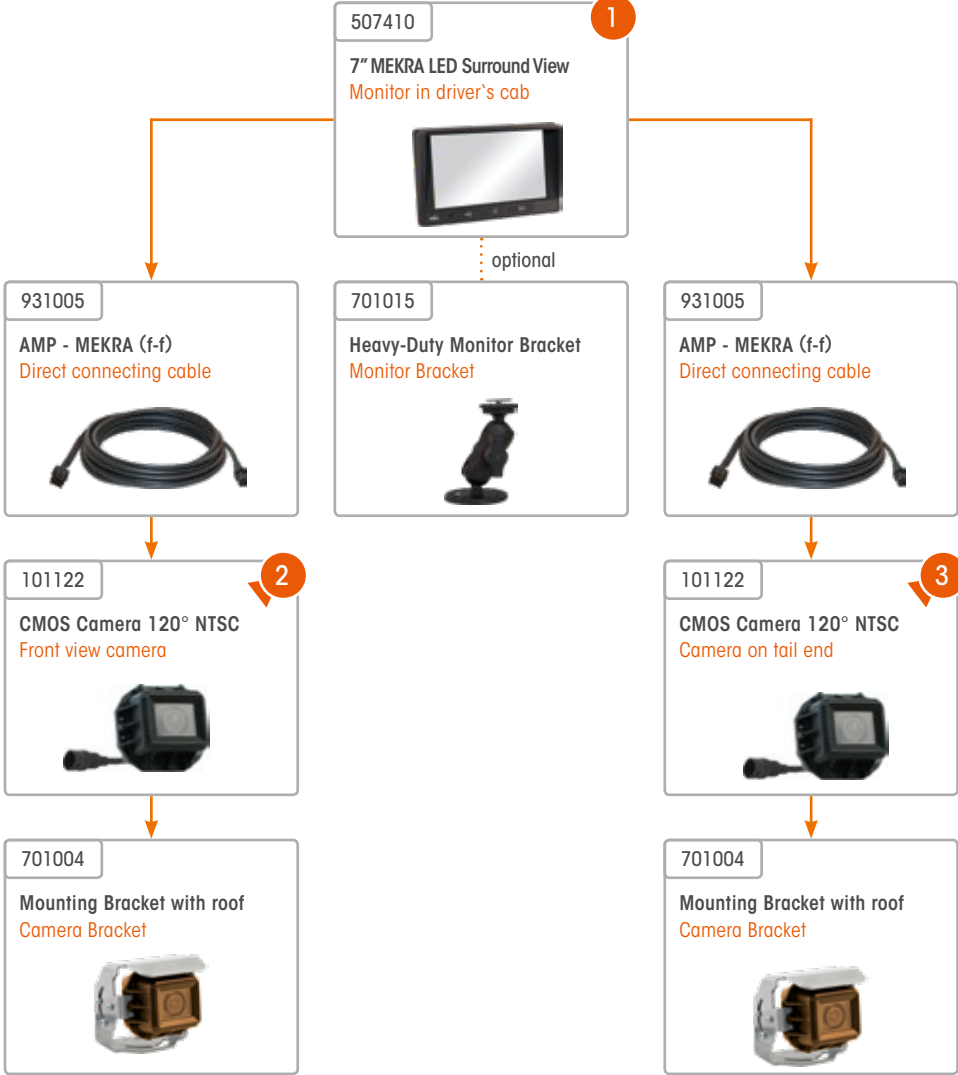


Installation Scheme for Increased Efficiency and Safety at Work





## Installation Scheme for Increased Efficiency and Safety at Work







## Installation Scheme for Increased Efficiency and Safety at Work

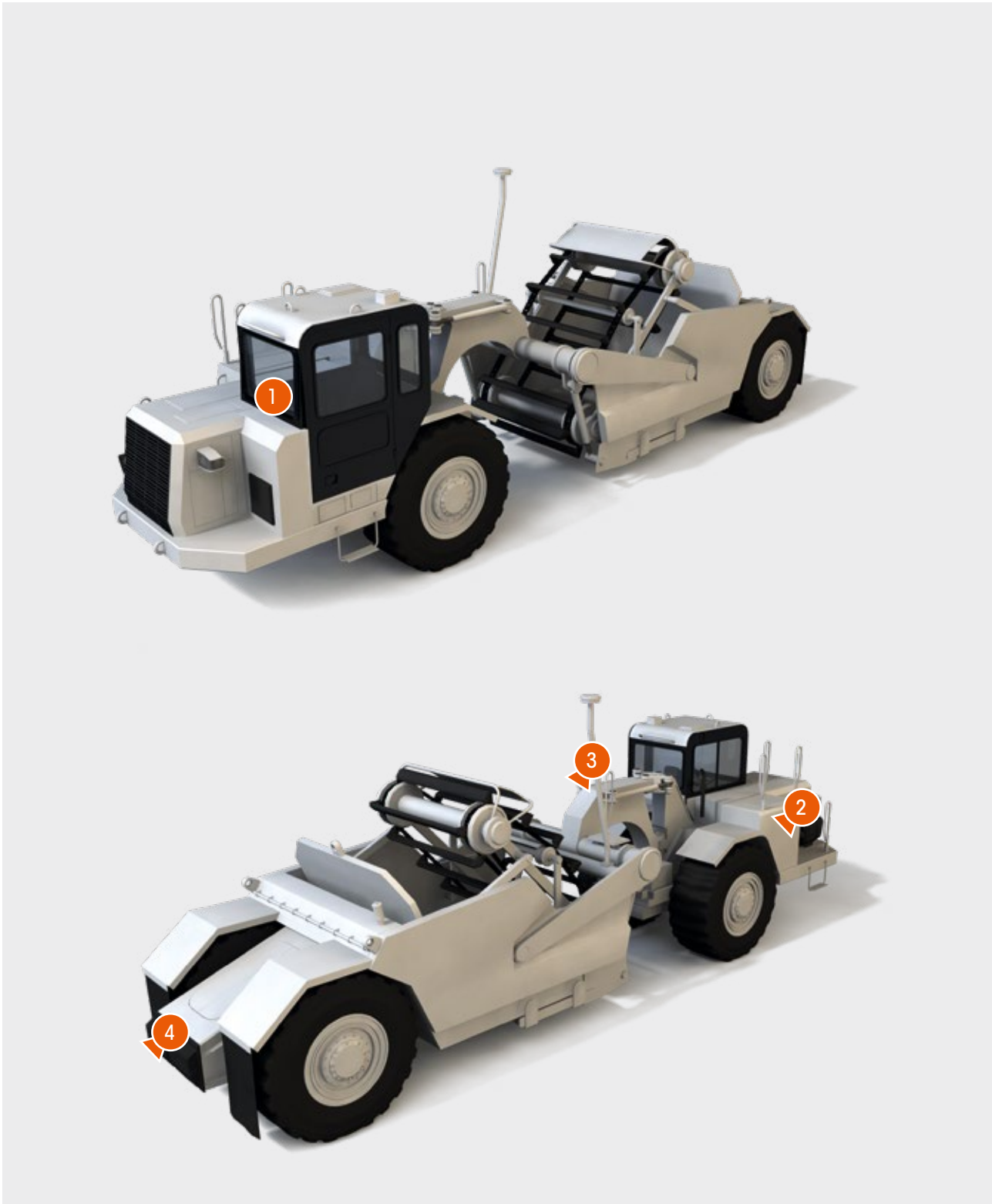




## Installation Scheme for Increased Efficiency and Safety at Work







Installation Scheme for Increased Efficiency and Safety at Work





Installation diagram for C-TCM basic No. 600071-K







### Installation Scheme for Increased Efficiency and Safety at Work





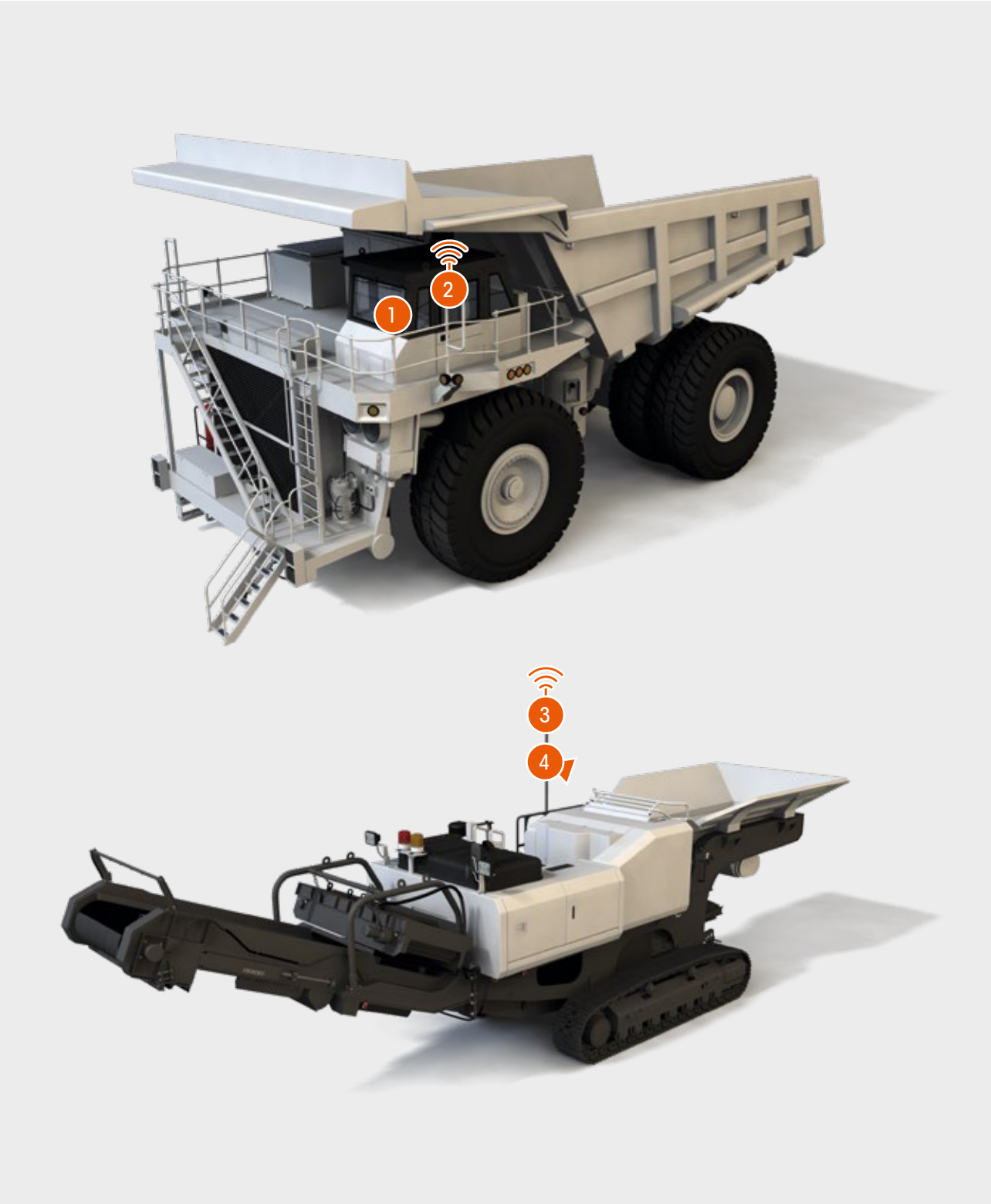
Installation Scheme for Increased Efficiency and Safety at Work

360°

VISION





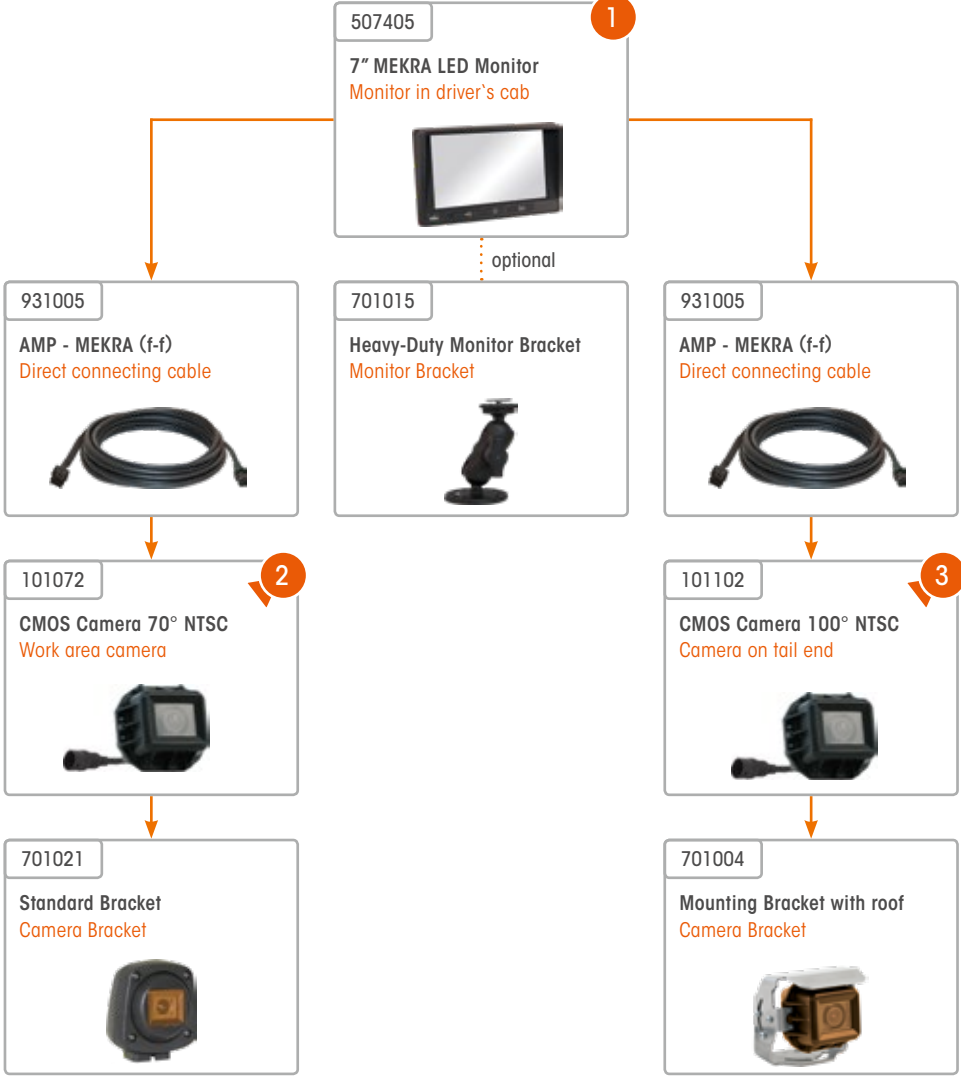


### Installation Scheme for Increased Efficiency and Safety at Work





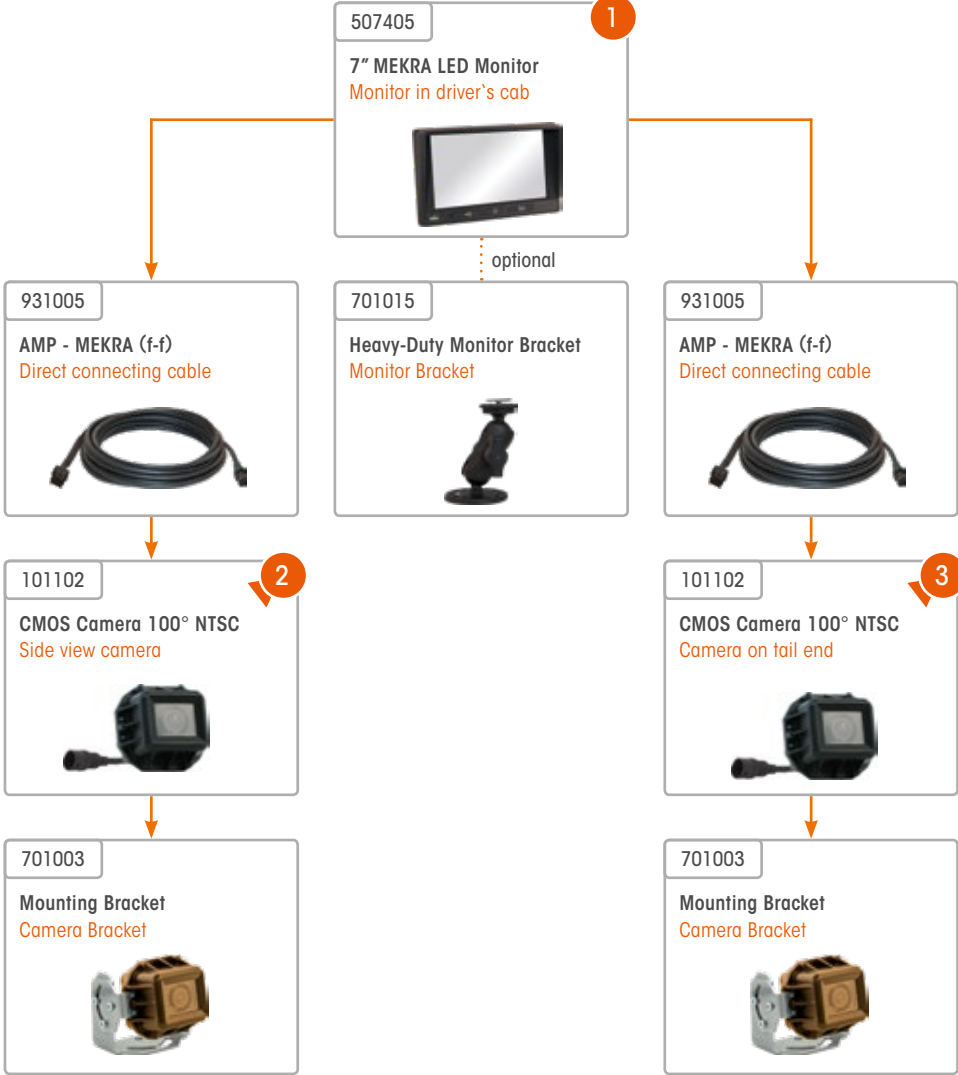
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Installation Scheme for Increased Efficiency and Safety at Work



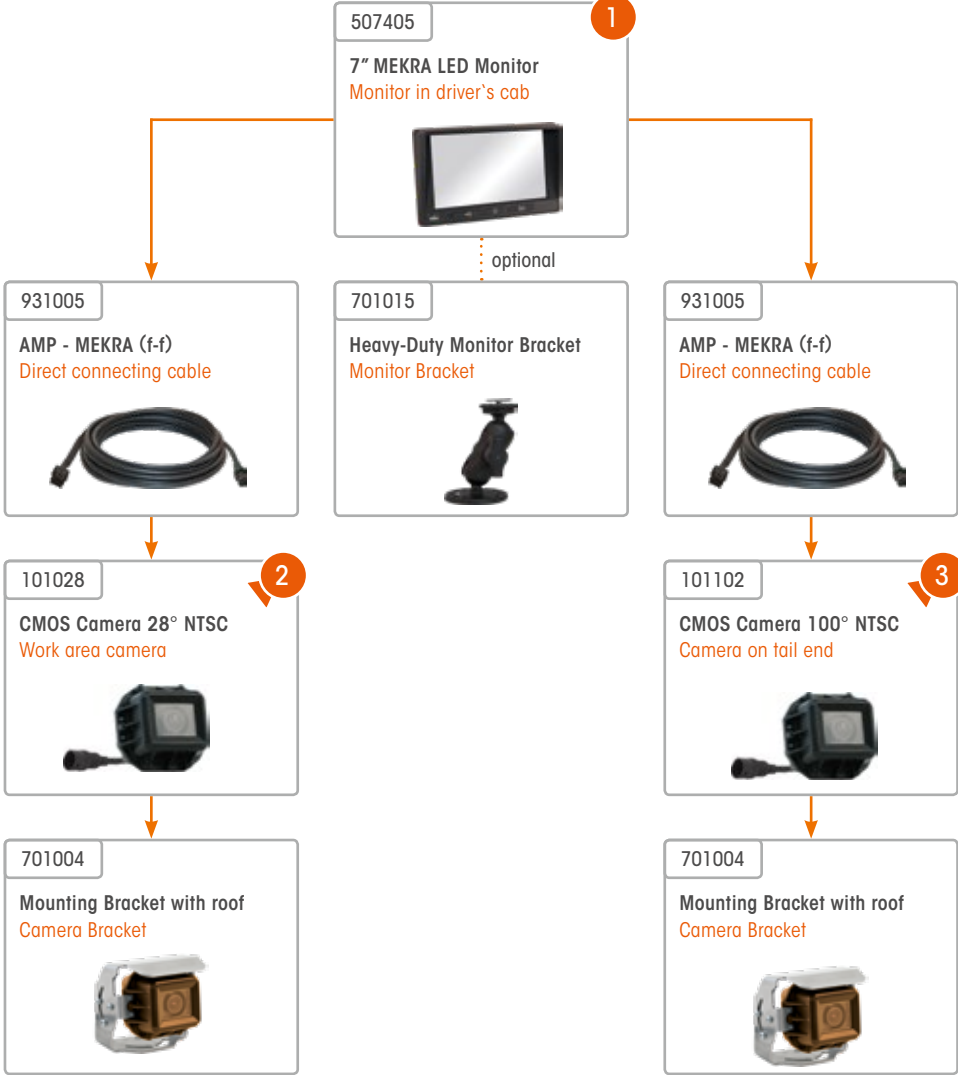
## Installation Scheme for Increased Efficiency and Safety at Work



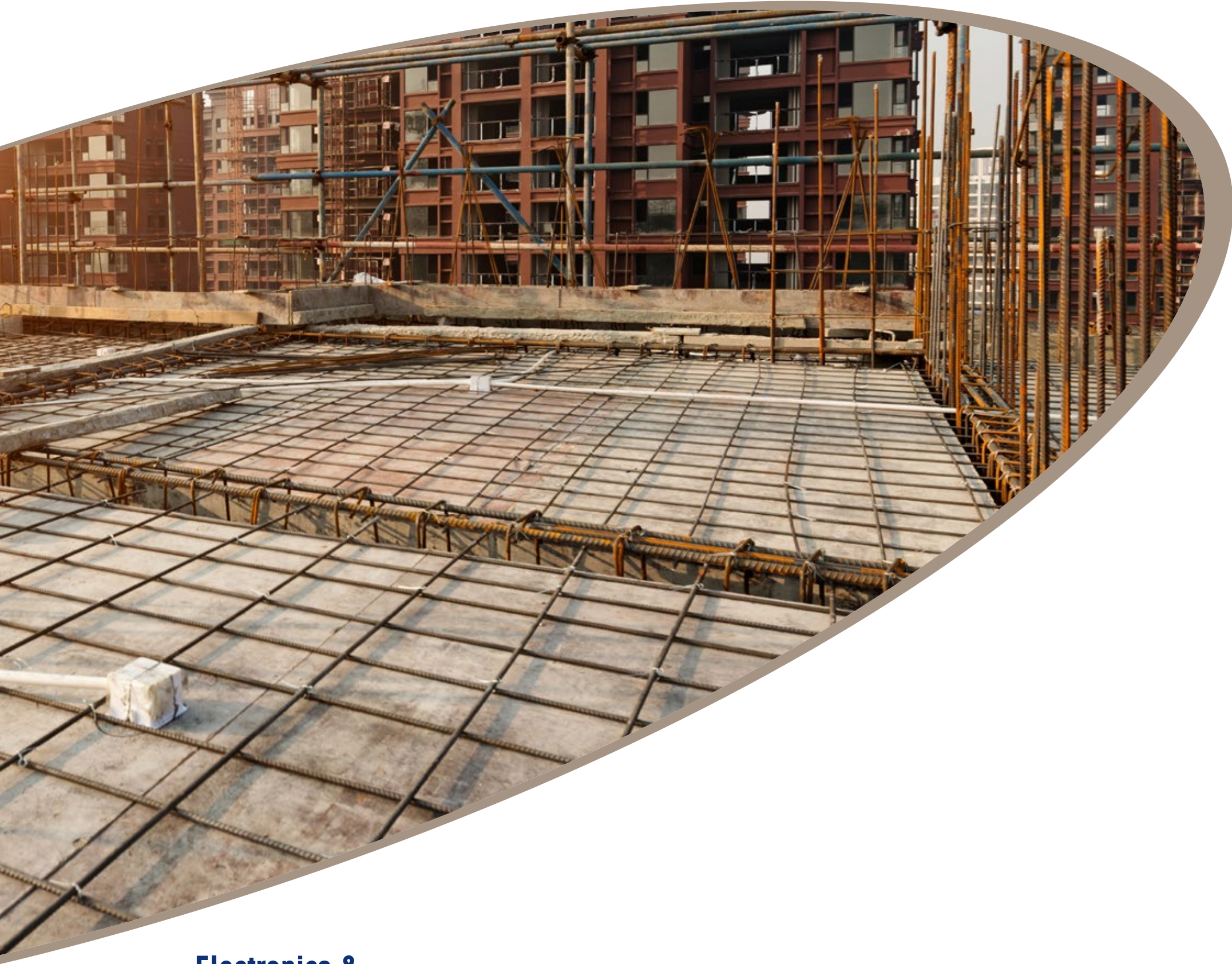




Installation Scheme for Increased Efficiency and Safety at Work







# Electronics & Accessories

Camera monitor systems by MEKRAtronic impress with their world-class quality. Even under the most difficult conditions, including back-light or darkness, our cameras produce images of superior quality.

Our broad product portfolio enables us to cover a wide variety of applications. We are committed to provide you with the best solution for your requirements.

In addition to our cameras and monitors, which are at the very heart of our product portfolio, we also offer a wide range of cables and accessories which you will find on the following pages.

Monitors	62
Cables and Connections	64
Adapter Cables	67
Camera Systems	68
Accessories	70
Wireless Video Systems	72
Active Alarm Systems	73
Accessories	74
Camera-Monitorsystems	77



Monitors

Output Devices

Let us help you find the appropriate monitor for every use scenario. MEKRAtronic has the appropriate monitor for each of your applications, whether you need a 5,6" or 7" screen, a watertight enclosure, 2 or 4 camera inputs, or a split-screen or full image display.

5,6" TFT-LCD Monitor 2 Cameras

- Resolution: 320 x 234 Pixel
- Aspect ratio: 4:3
- Brightness: 200 cd/m²
- Operating voltage: 12 - 24 V
- Temperature range: -20 °C to +70 °C
- Contrast ratio: 300:1
- Camera input: 2
- Connection: MiniDIN
- DDIN mounting frame



Item description	Item number
1 5,6" TFT-LCD Monitor 2 Cameras	505201

7" TFT-LCD Monitor 2 Cameras

- Resolution: 800 x 480 Pixel
- Aspect ratio: 16:9
- Brightness: 500 cd/m²
- Operating voltage: 12 - 24 V
- Temperature range: -30 °C to +75 °C
- Contrast ratio: 400:1
- Camera input: 2
- Connection: MiniDIN
- For 527102: 1 x MiniDIN + 1AV



Item description	Item number
1 7" TFT-LCD Monitor 2 Cameras	527202

7" TFT-LCD Monitor 2 Cameras IP69 K

- Resolution: 800 x 480 Pixel
- Aspect ratio: 16:9
- Brightness: 500 cd/m²
- Operating voltage: 10 - 32 V
- Temperature range: -30 °C to +75 °C
- Contrast ratio: 400:1
- Camera input: 2
- Connection: MiniDIN
- Protection class: IP69 K
- Shutter controller



Item description	Item number
1 7" TFT-LCD Monitor 2 Cameras IP69 K	527204

7" TFT-LCD Monitor Quad

- Resolution: 800 x 480 Pixel
- Aspect ratio: 16:9
- Brightness: 500 cd/m²
- Operating voltage: 12 - 24 V
- Temperature range: -25 °C to +75 °C
- Contrast ratio: 400:1
- Camera input: 4
- Connection: MiniDIN
- AV ON/OFF
- Protection class: IP65
- Shutter controller



Item description	Item number
1 7" TFT-LCD Monitor Quad	527403

7" MEKRA LED Monitor

- Resolution: 800 x 480 Pixel
- Aspect ratio: 16:9
- Brightness: 500 cd/m²
- Operating voltage: 9 - 36 V
- Temperature range: -30 °C to +85 °C
- Contrast ratio: 600:1
- Camera input: 4
- Connection: AMP
- Protection class: IP65
- Homologated
- Integrated trailer detection
- Made in Germany!



Item description	Item number
1 7" MEKRA LED Monitor	507405

7" MEKRA LED Surround View Monitor

- Resolution: 800 x 480 Pixel
- Aspect ratio: 16:9
- Brightness: 500 cd/m²
- Operating voltage: 9 - 36 V
- Temperature range: -30 °C to +85 °C
- Contrast ratio: 600:1
- Camera input: 4
- Connection: AMP
- Protection class: IP65
- Homologated
- Integrated trailer detection
- Made in Germany!



Item description	Item number
1 7" MEKRA LED Surround View Monitor	507410

# Cables and Connections

Cables and Connectors

## MiniDIN - MEKRA (m-f)

- For directly connecting MEKRA 100000 series cameras to monitors with MiniDIN connectors
- Resistant to UV rays, oil, and gasoline
- IP69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 MiniDIN - MEKRA	0.5 m	921500
2 MiniDIN - MEKRA	3 m	921003
3 MiniDIN - MEKRA	5 m	921005
4 MiniDIN - MEKRA	11 m	921011
5 MiniDIN - MEKRA	16 m	921016
6 MiniDIN - MEKRA	21 m	921021

## AMP - MEKRA (f-f)

- For directly connecting MEKRA 100000 series cameras to 507405 and 507410 MEKRA monitors
- ADR tested
- Resistant to UV rays, oil, and gasoline
- IP69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 AMP - MEKRA	0.5 m	900001
2 AMP - MEKRA	5 m	931005
3 AMP - MEKRA	11 m	931011
4 AMP - MEKRA	16 m	931016
5 AMP - MEKRA	21 m	931021

## MiniDIN - MiniDIN HD (m-f)

- For directly connecting S-cameras, cameras for light commercial vehicles, and shutter cameras to monitors with MiniDIN connectors



Item description	Length	Item number
1 MiniDIN - MiniDIN HD	5 m	923005
2 MiniDIN - MiniDIN HD	10 m	923010
3 MiniDIN - MiniDIN HD	15 m	923015
4 MiniDIN - MiniDIN HD	20 m	923020

## Multi Cable MEKRA - MEKRA (m-f)

- For extending all connection cables equipped with MEKRA connectors
- ADR tested
- Resistant to UV rays, oil, and gasoline
- IP69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 Multi Cable MEKRA - MEKRA	2 m	911002
2 Multi Cable MEKRA - MEKRA	5 m	911005
3 Multi Cable MEKRA - MEKRA	11 m	911011
4 Multi Cable MEKRA - MEKRA	16 m	911016
5 Multi Cable MEKRA - MEKRA	21 m	911021

## MEKRA - ABS 7-pin (m-m)

- Adapter cable for on-board MEKRA connectors
- ADR tested
- Resistant to UV rays, oil, and gasoline
- IP69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 MEKRA - ABS 7-pin	0.5 m	917500

## ABS spiral cable 7-pin (f-f)

- For semi trailer applications
- ADR tested
- Resistant to UV rays, oil, and gasoline
- Color-coded



Item description	Length	Item number
1 ABS spiral cable 7-pin	3 m	977003

## ABS 7-pin - MEKRA (m-f)

- Adapter cable for semi trailer applications
- For connecting MEKRA 100000 series cameras, trailer-side
- ADR tested
- Resistant to UV rays, oil, and gasoline
- IP69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 ABS 7-pin - MEKRA	0.5 m	971500



# Cables and Connections

Cables and Connectors

## ABS 7-pin - MEKRA (f-f)

- Connection for 100000 series cameras, trailer-side
- Resistant to UV rays, oil, and gasoline
- IP 69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 ABS 7-pin - MEKRA	5 m	971005
2 ABS 7-pin - MEKRA	11 m	971011
3 ABS 7-pin - MEKRA ADR tested	16 m	971016
4 ABS 7-pin - MEKRA	21 m	971021

## 2 x MEKRA - ABS 7-pin (m-m)

- Adapter cable for on-board MEKRA connectors
- ADR tested
- Resistant to UV rays, oil, and gasoline
- IP 69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 2 x MEKRA - ABS 7-pin	0.5 m	917502

## ABS 7-pin - 2 x MEKRA (f-f)

- Connection for 100000 series cameras, trailer-side
- Resistant to UV rays, oil, and gasoline
- IP 69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 ABS 7-pin - 2 x MEKRA	3 m	971203

# Adapter Cables

Adaptation Solutions

## MiniDin HD - MEKRA (m-f)

- Adapter cable for integrating the 1000000 camera series with MiniDIN HD connectors
- IP 69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 MiniDin HD - MEKRA	0.5 m	900032

## Binder - MEKRA (m-f)

- Adapter cable for integrating the 1000000 camera series with Binder M16 connectors
- IP 69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 Binder - MEKRA, mirrored	0.5 m	900041
2 Binder - MEKRA	0.5 m	900042

## MEKRA - Binder (m-f)

- Adapter cable for integrating existing cameras featuring Binder M16 connectors with MEKRA monitors
- IP 69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 MEKRA - Binder	0.5 m	900043

## MEKRA - Binder (m-m)

- Adapter cable for integrating existing cameras featuring Binder M16 connectors with MEKRA monitors
- IP 69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 MEKRA - MEKRA	0.5 m	900045

## CMOS Camera

- Protection class IP 69 K: Resistant to high-pressure cleaning, dust-proof
- Vibration resistance: 50 G
- Operating voltage: 10 - 36 V
- Dimensions: 65 x 59 x 50 mm
- Cable length: 0.5 m
- Operation temperature: -40 °C to +85 °C
- Aperture angles: 28°/50°/70°/100°/120°/130°
- Video format: PAL/NTSC
- IP 69 K pluggable connection (MEKRA-side)
- Made in Germany!



RoHS FC CE

Item description	Aperture angles	Item number
1 CMOS Camera	70° PAL	101070
2 CMOS Camera	70° NTSC	101072
3 CMOS Camera	100° PAL	101100
4 CMOS Camera	100° NTSC	101102
5 CMOS Camera low distortion	100° PAL	102100
6 CMOS Camera low distortion	100° NTSC	102102
7 CMOS Camera dist.	100° PAL	102200
8 CMOS Camera dist.	100° NTSC	102202
9 CMOS Camera	120° PAL	101120
10 CMOS Camera	120° NTSC	101122
11 CMOS Camera low distortion	120° PAL	102120
12 CMOS Camera low distortion	120° NTSC	102122
13 CMOS Camera	130° PAL	101130
14 CMOS Camera	130° NTSC	101132

## CMOS Ball Camera

- Protection class IP 69 K: Resistant to high-pressure cleaning, dust-proof
- Vibration resistance: 50 G
- Operating voltage: 10 - 36 V
- Dimensions: 65 x 59 x 50 mm
- Cable length: 0.35 m
- Operation temperature: -40 °C to +85 °C
- Aperture angles: 70°/100°/120°
- Video format: PAL/ NTSC
- IP 69 K pluggable connection (MEKRA-side)
- Made in Germany!



RoHS FC CE

Item description	Aperture angles	Item number
1 CMOS Ball Camera	70° PAL	103070
2 CMOS Ball Camera	70° NTSC	103072
3 CMOS Ball Camera	100° PAL	103100
4 CMOS Ball Camera	100° NTSC	103102
5 CMOS Ball Camera	120° PAL	103120
6 CMOS Ball Camera	120° NTSC	103122

## CMOS Ball Camera Binder

- Protection class IP 69 K: Resistant to high-pressure cleaning, dust-proof
- Vibration resistance: 50 G
- Operating voltage: 10 - 36 V
- Dimensions: 65 x 59 x 50 mm
- Cable length: 1 m
- Operation temperature: -40 °C to +85 °C
- Aperture angles: 120°
- Video format: NTSC
- Pluggable connection: M16
- Made in Germany!



RoHS FC CE

Item description	Aperture angles	Item number
1 CMOS Ball Camera Binder	120° NTSC	103222
2 CMOS Ball Camera Binder, mirrored	120° NTSC	103223

## CMOS Camera 85° (pivoted) IP 68

- Protection class IP 68: Watertight and dust-proof
- Vibration resistance: 7 G
- Operating voltage: 12 V
- Dimensions: 54 x 64 x 71 mm
- Operation temperature: -30 °C to + 80 °C
- Aperture angle: 85°
- Light sensitivity: 0 Lux (IRLEDs)
- Video format: PAL
- Pivots in bracket to accommodate various installation configurations



RoHS FC CE

Item description	Aperture angles	Item number
1 CMOS Camera 85° (pivoted) IP 68	85° PAL	224090



# Accessories

Brackets and Mounting Supplies

## Standard Bracket Ball Camera

- 80 x 71 x 28 mm (W x H x D)
- ABS plastics
- Its orientation can be adjusted as needed



Item description	Item number
1 Standard Bracket Ball Camera	703001

## Design Bracket

- 125 x 102 x 73 mm (W x H x D)
- Sleek and attractive design bracket
- ABS plastics
- Its orientation can be adjusted as needed



Item description	Item number
1 Design Bracket	701022

## Standard Bracket

- ABS plastics
- Its orientation can be adjusted as needed



Item description	Item number
1 Standard Bracket	701021

## Magnetic Base

- 66 x 19 mm (Dia. x H)
- 180 N adhesive force
- Compatible with:  
701021/ 701003/ 701004/ 701006
- Ideal for switching between vehicles or  
for work area cameras requiring  
adjustment flexibility



Item description	Item number
1 Magnetic Base	701005

## Mounting Bracket not adjustable

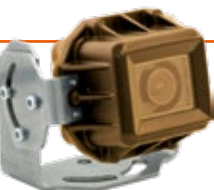
- 77 x 49,9 x 20.5 mm (W x H x D)
- Stainless steel
- Space-saving holder
- Ideal for overhead mounting



Item description	Item number
1 Mounting Bracket not adjustable	701014

## Mounting Bracket

- 87 x 70 x 74 mm (W x H x D)
- Stainless steel
- Compact bracket
- Ideally suited for overhead installations
- The camera can be tilted 180° within the  
bracket and swivelled with the bracket
- Its orientation can be adjusted as needed



Item description	Item number
1 Mounting Bracket	701003

## Mounting Bracket with roof

- 87 x 74 x 74 mm (W x H x D)
- Stainless steel
- Compact bracket
- Its orientation can be adjusted as needed
- The hood offers additional protection in  
tough work environments
- The camera can be tilted 180° within the  
bracket and swivelled with the bracket



Item description	Item number
1 Mounting Bracket with roof	701004

## Mounting Bracket with roof incl. Spray Nozzle

- 87 x 80 x 74 mm (W x H x D)
- Stainless steel
- Compact bracket
- Its orientation can be adjusted as needed
- Required for high-pressure cleaning  
unit 12/24 V.
- The camera can be tilted 180° within the  
bracket and swivelled with the bracket



Item description	Item number
1 Mounting Bracket with roof incl. Spray Nozzle	701006



# Wireless Video System

Receiver and Transmitter

## Wireless System Receiver

- Frequency range: 5,84 GHz
- Operating voltage: 9 - 36 V
- Dimensions (excl. antenna): 150 x 64 x 34 mm (W x H x D)
- Operation temperature: -40 °C to +85 °C
- Protection class IP 66
- Number of channels: 8
- Transmit power: 25 mW max.
- IP 69 K pluggable connection (MEKRA-side)



Item description	Item number
1 Wireless System Receiver	730001

## Wireless System Transmitter

- Frequency range: 5,84 GHz
- Operating voltage: 9 - 36 V
- Dimensions (excl. antenna): 150 x 64 x 34 mm (W x H x D)
- Operation temperature: -40 °C to +85 °C
- Protection class IP 66
- Number of channels: 8
- Transmit power: 25 mW max.
- IP 69 K pluggable connection (MEKRA-side)



Item description	Item number
1 Wireless System Transmitter	730002

## Digital Wireless System

- Frequency range: 2,408 GHz
- Dimensions: 65 x 65 x 33 mm (W x H x D)
- Operation temperature: -40 °C bis +85 °C
- Protection class (IP 69 K)
- Number of channels: 8
- IP 69 K pluggable connection



Item description	Item number
1 Digitales Wireless System	730010

# Active Alarm Systems

Object and Pedestrian Detection

## Radar Sensor Sentry

- Frequency range: 24 GHz
- Operating voltage: 9 - 33 V
- Dimensions: 103 x 125 x 33 mm (W x H x D)
- Operating temperature: -40 °C to +85 °C
- Vibration resistance: 25 G
- Protection class: IP69 K



Item description	Detection range	Item number
1 Sensor	3 m	820130
2 Sensor	4.5 m	820145
3 Sensor	6 m	820160

## InCab Display and Cable Set

- LED indication of 5 detection zones
- Audio alert via integrated buzzer
- Dimensions: 57 x 25 x 51 mm (W x H x D)
- Volume control
- Powered by sensor
- Data update rate: 70 ms



Item description	Length	Item number
1 InCab Display	/	820005
2 Cable Set for InCab Display	10 m	810010
3 Cable Set for InCab Display	15 m	810015
4 Cable Set for InCab Display	20 m	810020

## Sentry Radar Kit

- Frequency range: 24 GHz
- Operating voltage: 9 - 33 V
- Dimensions: 103 x 125 x 33 mm (W x H x D)
- Operating temperature: -40 °C to +85 °C
- Vibration resistance: 25 G
- Protection class: IP69 K



Item description	Detection range	Item number
1 Radar Kit with Display, adjustable bracket and 15 m Cable	3 m	820300-K
2 Radar Kit with Display, adjustable bracket and 15 m Cable	4.5 m	820450-K
3 Radar Kit with Display, adjustable bracket and 15 m Cable	6 m	820600-K

# Accessories

Brackets and Mounting Supplies

## Video Link Modul and Cable Set

- Dimensions: 130 x 118 x 36 mm (W x H x D)
- Operating temperature: -40 °C to +85 °C
- Operating voltage: 12 - 24 V
- Vibration resistance: 25 G
- Video Signal: NTSC
- Connector: Deutsch DTM 13 series



Item description	Length	Item number
1 Video Link Module NTSC	/	810050
2 Video Link Module PAL	/	810055
3 Video Link cable set	12 m	810060
4 Buzzer Kit for Video Link	/	810070
5 Video Link AMP Adapter	0.5 m	810080
6 Video Link Binder Adapter	0.5 m	810085

## SAS - Safety Alert System and Cable Set

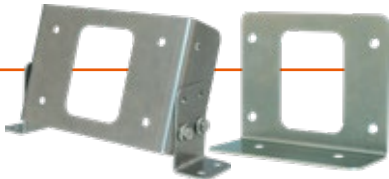
- Volume: 87 dB to 112 dB – 180° radiation angle
- Dimensions: 83 x 180 x 100 mm (W x H x D)
- Operating temperature: -40 °C to +85 °C
- Operating voltage: 12 - 24 V
- Connector: Deutsch DT 04-3P-E005



Item description	Item number
1 Safety Alert System	810200
2 SAS Cable for Cab Display	810210
3 SAS Connector for Cab Display	810220
4 SAS Cable for Video Link	810230

## Stainless Steel Bracket

- Made from stainless steel
- Dimensions: 155 x 285 x 155 mm (W x H x D)
- adjustable: 220 x 120 x 50 mm (W x H x D)
- fixed: 130 x 105 x 50 mm (W x H x D)



Item description	Item number
1 Adjustable Bracket Sentry	820170
2 Fixed Bracket Sentry	820190

## Heavy-Duty Monitor Bracket Holder

- Excellent choice for particularly rough work environments



Item description	Item number
1 Heavy-Duty Monitor Bracket Holder	701015

## ABS Plug Holder

- Provides a variety of ABS socket mounting positions on your vehicle



Item description	Item number
1 ABS Plug Holder	750001
2 ABS Parking Socket	900003

## MEKRA open end

- Adapter cable for customized cable configurations
- Repair cable incl. shrink tubing
- IP69 K pluggable connection (MEKRA-side)



Item description	Length	Item number
1 MEKRA open end male	0.5 m	900050
2 MEKRA open end female	0.5 m	900051

## MEKRA protective caps

- For the repair of damaged Suitable for cable connections
- IP69 K pluggable connection (MEKRA-side)



Item description	Art.-Nr.
1 MEKRA Protective Cab	900052

## Switch Box MEKRA to 2 x MEKRA (m-f)

- Manual camera selection switch for two cameras
- For interior use only



Item description	Item number
1 Switch Box MEKRA to 2 x MEKRA (m-f)	710005

# Accessories

Object and Pedestrian Detection

## Quad Split Box

- Camera selection switch for up to four cameras
- Various full-view and split-view display configurations available
- Triggered via vehicle signals
- For interior use only
- Operating voltage: 10 - 32 V
- Temperature range: -25 °C to +75 °C
- Video format: PAL/ NTSC
- Dimensions: 154 x 105 x 29 mm (W x H x D)
- Vibration resistance: 5 G



Item description	Item number
1 Quad Split Box	710004

## Omnidirectional antenna (replacement)

- Usable for transmitter and receiver, 730001 and 730002



Item description	Length	Item number
1 Omnidirectional antenna (replacement)	0.5 m	730004

## Aerial cable

- Usable for transmitter and receiver, 730001 and 730002



Item description	Length	Item number
1 Aerial cable	0.5 m	730003

## High-Pressure Cleaning Unit

- For 701006 mounting bracket with 100000 series cameras
- Cleans the lens under difficult environmental conditions to remove mud, dirt, and salt
- Incl. cable, control switch, 15 m tubing, tank (8 liters), check valve



Item description	Item number
1 High-Pressure Cleaning Unit 24 V	750002
2 High-Pressure Cleaning Unit 12 V	750003

# Camera-Monitorsystems

Installation and Use

## What You Should Know

The quality offered by MEKRAtronic camera monitor systems is second to none. Even under the most difficult conditions, including back-light or darkness, they produce images of superior clarity. Our extensive product portfolio enables us to cover a wide range of applications. We are committed to provide you with the best solution for your requirements.

## Monitor Position

With increasing distance between the monitor and the driver's eyes, the objects being displayed on the monitor appear smaller. For a 7" display the distance should be between 40 and 100 cm.

## Camera Position

MEKRAtronic cameras are available with various aperture angles which – depending on mounting position and requirements – provide an ideal representation of the targeted field of vision. Please consider the following: While a larger aperture angle extends the total area displayed, objects in that area will appear smaller.

## Low Distortion

You will notice that the product description of several MEKRA Lang CMOS camera models contains the keyword "low distortion".

This term refers to using a special processing technique for images which would normally appear distorted.

The illustrations on the right clearly show the difference between a "distorted" image (top) and a low-distortion image (bottom).



## Camera Image

The following examples illustrate the differences between the individual aperture angles.

28° aperture angle



70° aperture angle



100° aperture angle



120° aperture angle



130° aperture angle







## Mirrors & Accessories

MEKRAtronic mirror systems are highly adaptable and an excellent choice for retrofitting purposes. Due to their extremely rugged design, they are especially well suited for heavy-duty applications.

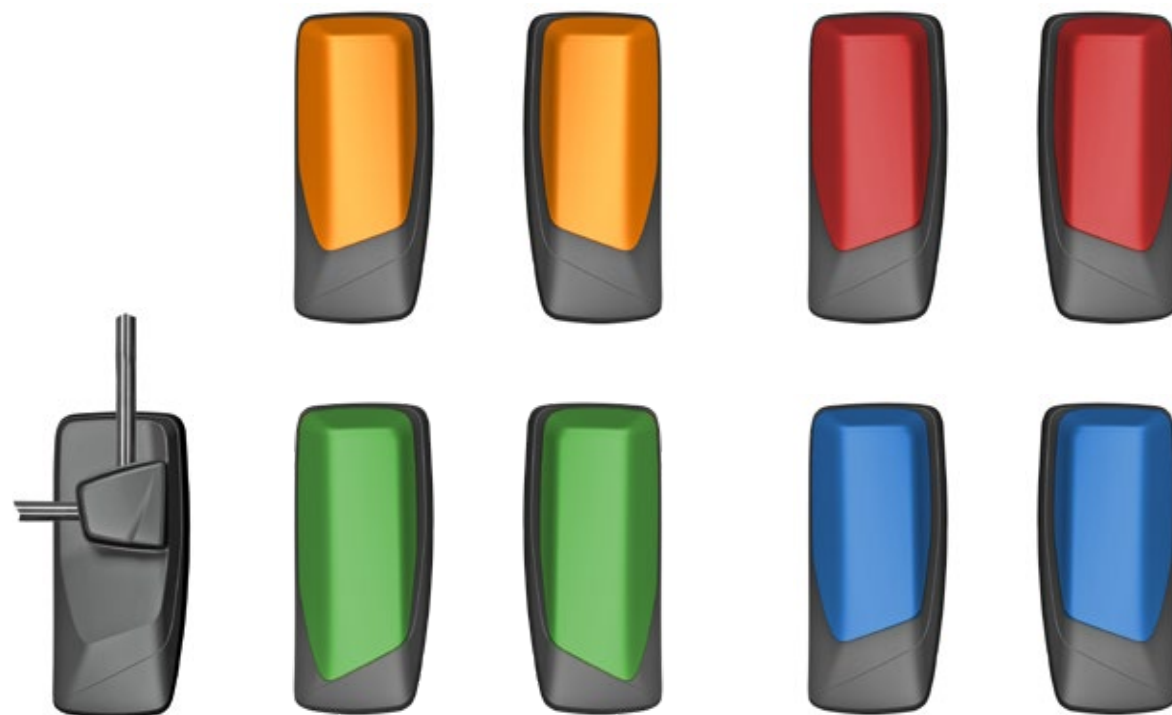
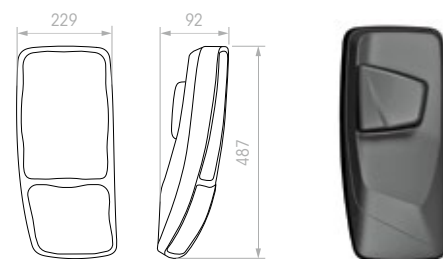
The mirrors are available in powered and heated configurations (12V and 24V). Various mounting systems and tubular bracket geometries round out our comprehensive product portfolio allowing us to accomodate a wide range of installation and viewing requirements. Additional solutions are available upon request.

When positioned correctly, the mirrors reliably comply with the applicable regulatory provisions regarding fields of vision and other legal requirements.

Mirror systems	80
Mounting Systems	84
T&C	88

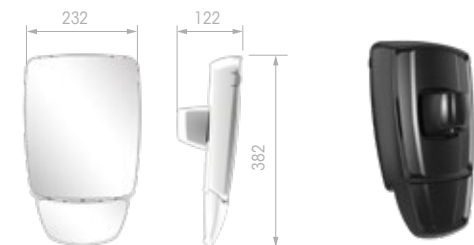
Combi mirror 1036

- Glass size (WxH) Main mirror 297 x 200 mm, close-proximity mirror 176 x 190 mm
- Radius of curvature Main mirror 1200 mm, close-proximity mirror 300 mm
- Mounting side right or left
- Heating system unheated or heated 12 or 24V
- Adjustment manual or electrical 12 or 24V
- Adjustment range up/down: >±8° – left/right: >±8°
- Mirror mounting bracket interface Clamp for 18-22 or 28 mm tube diameter
- On-board power supply connection 2- or 6-lead flange socket, additional options upon request
- Material shock-proof ASA plastic, black, UV resistant



Modular mirror 1009, homologated for field-of-vision class II

- Glass size (WxH) Main mirror 225 x 286 mm, close-proximity mirror 178 x 91 mm
- Radius of curvature Main mirror 1200 mm, close-proximity mirror 240/300 mm
- Mounting side right and left
- Heating system unheated or heated 12 or 24V
- Adjustment manual or electrical 12 or 24V
- Adjustment range up/down: >±8° – left/right: >±8°
- Mirror mounting bracket interface Clamp for 18-22 mm tube diameter
- On-board power supply connection 2- or 6-lead flange socket, direct contacting and additional options upon request
- Material shock-proof ABS plastic, black, UV resistant



Item number	Mounting side	Adjustment	Heating system	Connection
<b>Main mirror 1</b>				
51.1009.001.001	right and left	manual	unheated	
51.1009.081.001	right and left	manual	heated 12 V	2-lead flange socket
51.1009.113.001	right and left	electrical	heated 12 V	6-lead flange socket
<b>Combination main and close-proximity mirror 2</b>				
51.1009.017.001	right and left	manual	unheated	
51.1009.049.001	right and left	manual	heated 12 V	2-lead flange socket
51.1009.097.001	right and left	electrical	heated 12 V	6-lead flange socket
<b>Extra large close-proximity 4</b>				
51.1009.019.001	left	manual	unheated	
51.1009.020.001	right	manual	unheated	

Options (more on request)



Compact mirror 1010, homologated for field-of-vision class II

Glass size (WxH)

Radius of curvature

Mounting side

Heating system

Adjustment

Adjustment range

Mirror mounting bracket interface

On-board power supply connection

Material

169 x 277 mm

1200 mm

right and left

unheated or heated 12 V

manual

up/down: >±9° – left/right: >±9°

Clamp for 14-20 mm or 18-22 mm tube diameter

-

shock-proof ABS plastic, black, UV resistant

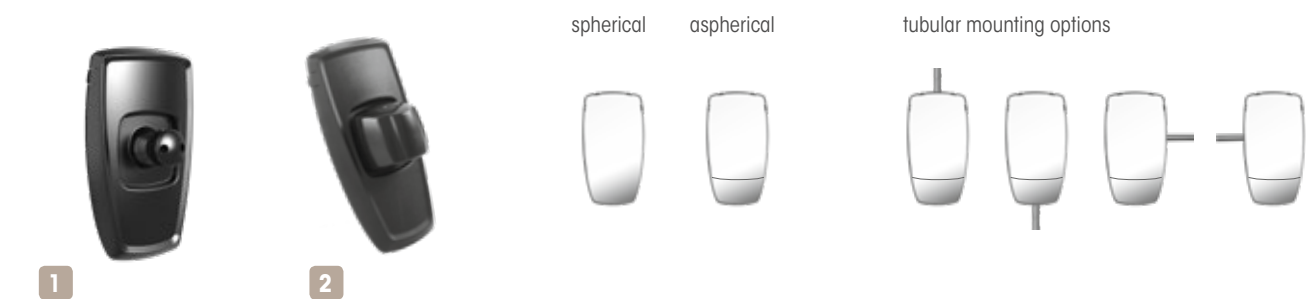
176

75

284

Item number	Mounting side	Adjustment	Heating system	Connection
for tube diameter 14-20 mm 1				
51.1010.000.001	right and left	manual	unheated	aspherical
51.1010.010.001	right and left	manual	unheated	spherical
51.1010.009.001	right and left	manual	heated 12 V	aspherical
for tube diameter 18-22 mm 2				
51.1010.001.001	right and left	manual	unheated	aspherical

Options (more on request)





Product Overview

List of All Products

Item No.	Item description	Version
Monitors		
505201	5,6" TFT-LCD Monitor 2 Cameras	
507405	7" MEKRA LED Monitor	
507410	7" MEKRA LED Surround View Monitor	
527202	7" TFT-LCD Monitor 2 Cameras	
527204	7" TFT-LCD Monitor 2 Cameras IP 69 K	
527403	7" TFT-LCD Monitor Quad IP 65	
Cables and Connections		
900001	AMP - MEKRA (f-f)	0.5 m
911002	Multi Cable MEKRA - MEKRA (m-f)	2 m
911005	Multi Cable MEKRA - MEKRA (m-f)	5 m
911011	Multi Cable MEKRA - MEKRA (m-f)	11 m
911016	Multi Cable MEKRA - MEKRA (m-f)	16 m
911021	Multi Cable MEKRA - MEKRA (m-f)	21 m
917500	MEKRA - ABS 7-pin (m-m)	0.5 m
917502	2 x MEKRA - ABS 7-pin (m-m)	0.5 m
921003	MiniDIN - MEKRA (m-f)	3 m
921005	MiniDIN - MEKRA (m-f)	5 m
921011	MiniDIN - MEKRA (m-f)	11 m
921016	MiniDIN - MEKRA (m-f)	16 m
921021	MiniDIN - MEKRA (m-f)	21 m
921500	MiniDIN - MEKRA (m-f)	0.5 m
923005	MiniDIN - MiniDIN HD (m-f)	5 m
923010	MiniDIN - MiniDIN HD (m-f)	10 m
923015	MiniDIN - MiniDIN HD (m-f)	15 m
923020	MiniDIN - MiniDIN HD (m-f)	20 m
931005	AMP - MEKRA (f-f)	5 m
931011	AMP - MEKRA (f-f)	11 m
931016	AMP - MEKRA (f-f)	16 m
931021	AMP - MEKRA (f-f)	21 m
971005	ABS 7-pin - MEKRA (f-f)	5 m
971011	ABS 7-pin - MEKRA (f-f)	11 m
971016	ABS 7-pin - MEKRA ADR tested	16 m
971021	ABS 7-pin - MEKRA (f-f)	21 m
971203	ABS 7-pin - 2 x MEKRA (f-f)	3 m
971500	ABS 7-pin - MEKRA (m-f)	0.5 m
977003	ABS spiral cable 7-pin (f-f)	3 m
Adapter Cable		
900032	MiniDin HD - MEKRA (m-f)	0.5 m
900041	Binder - MEKRA, mirrored (m-f)	0.5 m
900042	Binder - MEKRA (m-f)	0.5 m
900043	MEKRA - Binder (m-f)	0.5 m

900045	MEKRA - Binder (m-m)	0.5 m
900050	MEKRA open end male	0.5 m
900051	MEKRA open end female	0.5 m
Cameras		
101070	CMOS Camera	70° PAL
101072	CMOS Camera	70° NTSC
101100	CMOS Camera	100° PAL
101102	CMOS Camera	100° NTSC
101120	CMOS Camera	120° PAL
101122	CMOS Camera	120° NTSC
101130	CMOS Camera	130° PAL
101132	CMOS Camera	130° NTSC
102100	CMOS Camera low distortion	100° PAL
102102	CMOS Camera low distortion	100° NTSC
102120	CMOS Camera low distortion	120° PAL
102122	CMOS Camera low distortion	120° NTSC
102200	CMOS Camera dist.	100° PAL
102202	CMOS Camera dist.	100° NTSC
103070	CMOS Ball Camera	70° PAL
103072	CMOS Ball Camera	70° NTSC
103100	CMOS Ball Camera	100° PAL
103102	CMOS Ball Camera	100° NTSC
103120	CMOS Ball Camera	120° PAL
103122	CMOS Ball Camera	120° NTSC
103222	CMOS Ball Camera Binder	120° NTSC
103223	CMOS Ball Camera Binder, mirrored	120° NTSC
224090	CMOS Camera 85° (pivoted) IP 68	85° PAL
Wireless Video System		
730001	Wireless System Receiver	
730002	Wireless System Transmitter	
730010	Digitale Wireless System	
Active Alarm Systems		
810010	Cable Set for InCab Display	10 m
810015	Cable Set for InCab Display	15 m
810020	Cable Set for InCab Display	20 m
820005	InCab Display	
820130	Sensor, Detection Range	3 m
820145	Sensor, Detection Range	4.5 m
820160	Sensor, Detection Range	6 m
820300-K	Radar Kit, Detection Range	3 m
820450-K	Radar Kit, Detection Range	4.5 m
820600-K	Radar Kit, Detection Range	6 m

Accessories		
701001	Standard Bracket	
701002	Design Bracket	
701003	Mounting Bracket	
701004	Mounting Bracket with roof	
701005	Magnetic Base	
701006	Mounting Bracket with roof incl. Spray Nozzle	
701014	Mounting Bracket not adjustable	
701015	Heavy-Duty Monitor Bracket Holder	
703001	Standard Bracket Ball Camera	
710004	Quad Split Box	
710005	Switchbox MEKRA to 2 x MEKRA (m-f)	
730003	Wireless System Aerial cable	0.5 m
730004	Wireless System Omnidirectional antenna (replacement)	
750001	ABS Plug Holder	
750002	High-Pressure Cleaning Unit	24 V
750003	High-Pressure Cleaning Unit	12 V
810050	Video Link Module NTSC	
810055	Video Link Module PAL	
810060	Video Link cable set	12 m
810070	Buzzer Kit for Video Link	
810080	Video Link AMP Adapter	0.5 m
810085	Video Link AMP Binder	0.5 m
810200	Safety Alert System	
810210	SAS Cable for Cab Display	
810220	SAS Connector for Cab Display	
810230	SAS Cable for Video Link	
820170	Adjustable Bracket Sentry	
820190	Fixed Bracket Sentry	
900003	ABS Parking Socket	
900052	MEKRA Protective Cab	

Modular mirror system		
Item No.	Adjustment	Heating system
51.1009.001.001	manual	unheated
51.1009.081.001	manual	heated 12 V
51.1009.113.001	electrical	heated 12 V
51.1009.017.001	manual	unheated
51.1009.049.001	manual	heated 12 V
51.1009.097.001	electrical	heated 12 V
51.1009.019.001	manual	unheated
51.1009.020.001	manual	unheated
Compact mirror system		
Item No.	Adjustment	Heating system
51.1010.000.001	manual	unheated
51.1010.010.001	manual	unheated
51.1010.009.001	manual	beheizt, 12 V
51.1010.001.001	manual	unheated

## I. General Provisions

The provisions of the contract between MEKRAtronics GmbH, and our orderers who are contractors as defined in para. 14 BGB are solely governed by these General Terms and Conditions. Our offers are exclusively meant for entrepreneurs as defined by Article 4 BGB (German Civil Code). Deviating business terms of the customer, even if they are known to us, shall not become a part of the contract. Our offers are always subject to change without notice. Our General Terms and Conditions of Sale and Delivery are considered accepted upon placement of order, at the latest upon receipt of goods. In the case of repeated business relations these General Terms and Conditions of Sale and Delivery also apply for all future transactions. Should individual provisions be or become completely or partially ineffective, then the validity of the other provisions shall thereby not be affected. MEKRAtronics and the customer shall agree upon a regulation the economic success of which shall be as close as possible to the ineffective one. Until such agreement the laws, administrative practice and judicature effective at the time of execution are to be applied.

## II. Conclusion of Contract and Prices

1. By ordering merchandise the purchaser bindingly declares that he wants to buy the merchandise ordered. He shall be bound to this statement for two weeks. We are entitled to accept the offer of a contract underlying the order within two weeks upon receipt of the latter by us. The acceptance may be declared in writing, electronically, or by delivery of the goods to the purchaser.
2. The obligations in electronic commerce according to Section 312e, par. 1 sentence 1, Nos. 1 to 3, and sentence 2 of BGB (German Civil Code) are excluded.
3. The conclusion of the contract takes place subject to the correct and timely delivery by our sub-suppliers to us. This applies only in case we are not responsible for the non-delivery, especially in case of the conclusion of a congruent hedging business transaction with our sub-suppliers. The purchaser shall be informed about the non-availability of the product without delay, and the equivalent, insofar as already paid, shall be reimbursed immediately.
4. All contractual financial obligations are to be fulfilled solely in EURO.
5. Prices are understood to be net as ex-factory or supply depot. Freight, packaging and import costs, customs duties and other additional taxes are payable by the purchaser.

## III. Period of Delivery and Supply Commitment

1. Our written or electronic order confirmation shall be decisive for extent, type, and date of the delivery. Partial shipments shall be permitted.
2. A liability in meeting delivery deadlines determined as binding shall only be accepted under the condition of undisturbed flow of operations and distribution. In particular in cases of acts of God and other disruptive events at our facilities or those of our sub-suppliers or transport contractors, for example operational or traffic disruptions, fire, flooding, labour-, energy-, or traffic shortages, strikes, lockouts, official measures as well as technical or technological situations that considerably aggravate the execution of the contract, release us from liability in punctual delivery or give us the right to stop delivery without obligation for subsequent delivery.

3. If not agreed otherwise, we have the right to deliver earlier than the delivery deadline. Unless otherwise agreed upon, delivery effected by us one up to a maximum of two weeks after the stipulated delivery date shall not be considered as delayed.
4. Delivery deadlines shall be considered met when the goods have left the works or dispatch depot or the purchaser has received notice by expiration of the deadline of our readiness to deliver. Subsequent alteration of contract shall be cause for a reasonable extension of delivery deadlines.
5. In the case of contracts whose performance consists of several deliveries, non-performance, defective or delayed performance of one delivery remains without influence upon the other deliveries of the contract.
6. Default of payments, handing in of a state meant in lieu of an oath of disclosure in accordance with § 807 ZPO (German Code of Civil Procedure), temporary shortage of liquid funds, or public knowledge of a considerable deterioration of the financial circumstances of the purchaser shall entitle us at your discretion to demand payment in advance for outstanding deliveries or to stop deliveries immediately and to deny performance of current contracts. At the same time we shall be entitled to make immediately due and payable those accounts receivable from the customer which are not due yet.

## IV. Shipment, Passage of Risk

1. Packing, shipping route and method of transportation remain at our discretion unless special agreements have been made.
2. The risk of accidental loss and accidental deterioration of the merchandise shall pass over to the purchaser upon handing it over, in case of a mail order purchase upon delivery of the matter to the forwarding agent, the carrier, or another person or institution determined to execute the shipment. If the purchaser is overdue in accepting, this shall be equal to a handing over of the merchandise.
3. Merchandise out of call orders shall be accepted within 3 months after issuance of the acknowledgement of order, unless otherwise agreed.
4. Insurance against breakage and transportation risks shall only be taken out upon special request and shall be billed.
5. Customs duties and other expenses, also the costs for payment of the necessary papers for import into the country of destination, shall be payable by the purchaser.

## V. Payments, Terms of Payment

1. Invoices shall be payable: within 30 days from date of invoice without cash discount of the accumulated invoice value.
2. Cash discount shall only be granted after all payment commitments out of earlier deliveries have been fulfilled and the invoice amount has been punctually paid to us in cash or has been credited to our account by the aforementioned due dates. The drawing of a bill of exchange can thus not lead to the granting of a cash discount. In case of cashless payment, especially when a cheque is submitted, the date of the credit entry shall be decisive. A cash discount cannot be granted in the case of payment or credit entry under reserve, with limiting conditions or any other restrictions.

The purchaser shall assume all risks of method of payment. Invoices for tools are subject to immediate payment without cash discount.

3. Bills of exchange and checks shall only be accepted on account of payment. Corresponding credit entries are made only under the limiting condition of correct receipt of the complete amount due. We reserve the right to take in external or own acceptances. Costs and discount expenses are payable by the purchaser. We assume no responsibility for submission and protest. Protest imposed against the purchaser's own bills of exchange or non-immediate repayment of protested external bills of exchange shall entitle us to return all bills in circulation. At the same time we shall be entitled to make immediately due and payable those accounts receivable from the purchaser which are not yet due. Antedated checks shall not be accepted.
4. Interest on defaulted payment of 9%-points over the discount rate of the German Central Bank referred to in § 247 BGB (German Civil Law) as well as a liquidated damages of 40.00 Euro shall be charged in the case of missed payment dates. The right of assertion of further damages caused by delayed performance and other claims shall remain reserved.
5. Advance and part payments are not subject to interest payments.
6. The purchaser shall only be entitled to offset or withhold payment if his counterclaim is undisputed or has been determined legally binding. The purchaser may execute a right of retention only if his counter claim is based on the same contractual relationship.
7. Customer and invoice numbers are to be given by the purchaser when invoices are balanced. Delays or incorrect booking resulting from failure to do so shall be payable by the purchaser.

## VI. Retention of Ownership, Factoring

1. The delivered goods shall remain our property until payment of all claims has been received. The purchaser has the right to resell the proviso goods within the scope of proper and orderly course of business; however, a pledge or transfer by way of security is not permissible. The purchaser is required to ensure our rights in the case of resale of proviso goods on credit.
2. The accounts receivable by the purchaser based on the resale of the merchandise subject to reservation shall now already be transferred to us in the amount of the invoice. We hereby agree to accept this transfer. Regardless of the assignment, the purchaser shall retain the right to collect payment under the condition that he fulfils his responsibilities to us according to the underlying contractual relationship and does not fall into financial decline. Otherwise the purchaser must provide the information about the assignment necessary for collection upon our demand and notify his debtors of the respective assignment. In this case we reserve the right to collect the accounts receivable by ourselves.

3. A possible finishing or processing of the merchandise sold subject to reservation by the purchaser shall always take place on our behalf and by order of us, without any obligations resulting for us from this, however. In the case of processing of proviso goods with other goods not belonging to us, we are entitled to the co-owner portion of the resulting product corresponding to the value of the proviso goods in relation to the other processed goods. Insofar as here and in the following the value of the proviso goods is referred to, this value results from our invoice value.

4. Should the purchaser acquire sole ownership of the new product according to § 947 paragraph 2 BGB, it is agreed upon that the purchaser grants co-ownership in the proportion of the value of the processed, attached, or mixed proviso goods, and that he protects these free of charge.

5. In the case of resale of the proviso goods together with other goods, regardless of with or without processing, attachment or mixing, the assignment in advance agreed to above shall be valid only to the extent of the value of proviso goods that were resold together with the other goods. We shall be obligated to release on demand the securities entitled as provided above, if the value exceeds secured payments by 20 %.

6. The purchaser must immediately notify us and provide the material necessary for an intervention in the case of compulsory execution by third parties against the proviso goods or in case of claims assigned in advance. Any costs resulting from such intervention shall be payable by the purchaser.

7. The purchaser shall be obligated to adequately insure the merchandise sold subject to reservation against fire and burglary and has to prove such insurance to us on demand.

## VII. Warranty

1. The period of limitation for any warranty claim shall be 24 months as from handover of the goods.
2. First of all, we shall remedy a defect or make a substitute delivery at our discretion. In case of failure to rectify defects or to substitute delivery, the purchaser can demand rescission of the contract or reduction of the payment. In case there is only a minor contract violation, especially if there are only minor defects, the purchaser shall not have the right of contract cancellation, however.
3. The purchaser must notify us in writing of any obvious flaws immediately, at the latest within 7 days after receipt of the goods, and must refrain from any eventual working of protested goods. Otherwise claims based on defects are excluded. The timely dispatch shall suffice for the observance of the warranty deadline. The full burden of proof for all claim prerequisites rests with the purchaser, especially for the defect itself, for the date of the establishment of the defect, and for the timeliness of the complaint about the defect.
4. Defects which could not be ascertained within this time span despite careful inspection are to be reported to us in writing immediately upon discovery. If the purchaser opts for a withdrawal from the contract because of a legal imperfection or a physical defect after a failed subsequent fulfilment, then he shall not be additionally entitled to a claim for compensation because of the defect.

5. If, after a failed subsequent fulfilment, the purchaser opts for a compensation of the damage, then the merchandise shall remain with the purchaser if this can reasonably be considered acceptable. The compensation is restricted to the difference between the purchase price and the value of the defective product. This shall not apply if we caused the contract violation maliciously.

6. Goods which replaced by us become our property.
7. Claims cannot be made for damages that resulted from the purchaser's culpably
  - A) improper handling or overstressing the purchased item or
  - B) altering the purchased item in a manner not agreed upon or
  - C) not following the instructions of the mounting or operating manual or
  - D) not observing the complaint and delivery responsibility according to points 3 and 4 above or
  - E) further using the purchased item after ascertaining the defect.

Natural wear and tear is excepted from the warranty.

## VIII. Liability

1. In case of simply negligent violations of obligations our liability shall be restricted to an average damage predictable for the type of merchandise, typical for such a contract, and immediate. This also applies in case of simply negligent violations of our legal representatives or agents. We shall not be held liable in case of a simply negligent violation of nonessential contract obligations.
2. The liability by virtue of acceptance of a guarantee as well as due to product liability remains unaffected; the same applies in case of bodily harm or health impairment attributable to us or in the event of loss of life of the purchaser
3. Compensation claims of the purchaser because of a defect shall superannuate after one year from the delivery of the merchandise to the purchaser. This shall not apply if we can be charged with gross negligence as well as in case of bodily harm or health impairment attributable to us or in the event of loss of life of the purchaser.

## IX. Returns

Properly ordered and delivered goods shall in principle not be taken back. Returns that have been agreed upon with us shall remain the exception, which additionally require the following pre-requisites to be met:

1. The products must have been acquired directly from us or from one of our works depots.
2. Flawless and unaltered condition of the goods.
3. In principle, return shall only be possible when the articles in question are still in our product range.
4. Return shipment must be „free domicile“ to our Ergersheim works or to the appropriate works depot with accompanying delivery note date and number. Value reduction for returns:
  - in the first year after delivery date ./ 10 % of the contract price
  - in the second year after delivery date ./ 25 % of the contract price
  - goods older than 2 year shall not be taken back.

Technical inspection and completion of the credit slip shall be carried out under consideration of eventual value reduction upon receipt of the articles. Freight costs, insofar as any occurred to us for the original shipping, reduce the remaining value.

## X. Industrial Property Rights

1. The purchaser is held liable to us for the exemption from industrial protection rights of third parties on articles ordered, indemnifies us against any possible claims of third parties and has to reimburse any damage to us possibly resulting from a violation of this obligation.
2. Our designs and design proposals are to be kept confidential and may not be passed on to third parties.
3. All drawings, construction plans, and samples which the purchaser has received, shall remain our intellectual property.

## XI. Place of Fulfillment and Jurisdiction, Other Agreements

1. On principle, the product description of the manufacturer is understood to be decisive for the characteristics of the goods. Public statements, sales talks, or advertisements made apart from this do not represent a contractual description of the characteristics of the goods. Samples and specimens serve as approximate illustrative articles in terms of quality, measurements and colour. Legal claims cannot be inferred from this. Technical changes as well as alterations in shape, colour, and/or weight are reserved within reasonable scope.
2. If the purchaser receives a faulty assembly instruction, we shall only be obliged to furnish a faultless assembly instruction and this only if the fault of the assembly instruction is in contradiction with a proper assembly.
3. The purchaser does not receive warranties in the legal sense of the word from us; warranties of the manufacturers, however, shall remain unaffected by this.
4. Place of fulfillment for our deliveries ex works shall be the delivery works, for delivery ex storage the warehouse. Place of fulfillment for all payments shall be Ergersheim / Bavaria.
5. The exclusive place of jurisdiction for all litigations from this contract shall be Fuerth / Bavaria, Germany. This also applies to lawsuits based on a cheque or bill of exchange.
6. These provisions shall be governed by the Law of the Federal Republic of Germany. The provisions of the UN Purchase Law shall not be applicable. The wording of the German language version of our „General Terms and Conditions of Sale and Delivery“ shall solely be decisive for these General Business Terms.
7. The special terms of our products published with the appropriate price lists shall additionally be applicable.
8. The purchaser itself shall be responsible to examine the suitability of the goods for the intended final usage.
9. German law (BDSG-Federal Data Protection Law) requires us to inform you that all data of our purchasers are electronically saved.

As of: 07/2017





Our vision ... is safety!

Your contact person:



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