

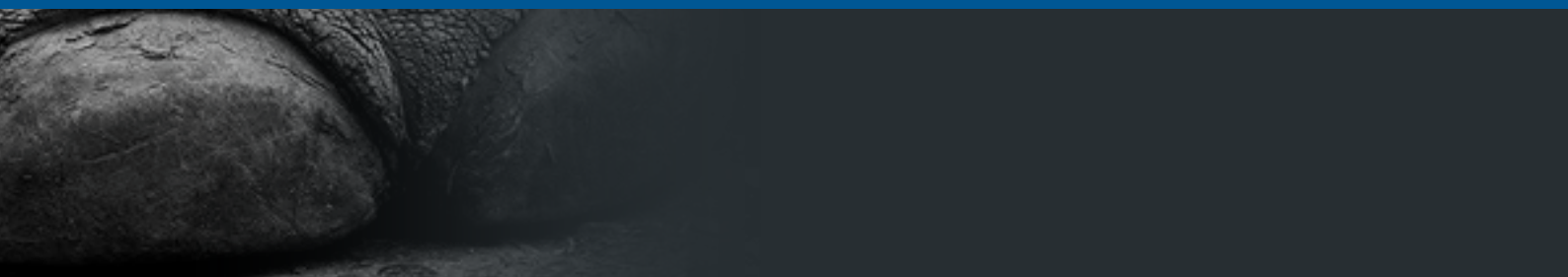


49



Motec Camera Monitor Systems  
for Transport and Municipal Vehicles

More safety, fewer accidents



## MOTEC HEAVY-DUTY CAMERA SOLUTIONS

Motec specializes in the development and production of camera-based driver assistance systems for utility vehicles and mobile machinery.

Motec protects lives by making mobile machinery and their surroundings safer. Its cameras make operators' work easier by reducing stress and uncomfortable physical movements. And, it helps companies become more successful by accelerating processes and avoiding damage.

Motec has over 25 years of experience in the construction and manufacture of robust, reliable mobile cameras, including the associated electronics.

Its product range includes reversing cameras, industrial cameras, displays, advanced video controllers, DVRs, customer-specific wiring looms, and wireless video transmission solutions.

Motec's customers are leading OEMs of utility vehicles and mobile machinery for industries working in tough environments.

At its development center for utility vehicle assistance systems (MENAS) Motec develops, tests and validates software algorithms for customized driver assistance systems. Its suite of algorithms incorporates solutions for real-time image processing, aerial view projection, sensor fusion (e.g. cameras, ultrasound sensors, radar sensors, lasers), stereo view, image processing and driver assistance systems.

Motec is a unit of AMETEK Inc. a leading global manufacturer of electronic instruments and electromechanical products.



## Motec camera monitoring systems for the vehicle industry

Motec camera monitoring systems support the operator of large and complex vehicles by allowing them to move safely and more efficiently, regardless of the vehicle's size. With the assistance of extremely resilient heavy-duty cameras, an operator can detect people and objects within the machine's danger zone before it is too late. This way, Motec systems save lives, make working conditions safer, and save costs.

### Technical service – guaranteed fast support

Top quality means also top service. When faced with difficult technical challenges or questions that need answers, Motec can assist. Its sales and engineering departments work hand in hand. Customers benefit from efficient communication with no red tape. Motec engineers understand customers processes, know what they need and can find a solution quickly.

### Hotline

Phone +49 6433 9145-9888  
 Fax: +49 6433 9145-9877  
 motec.service@ametek.com



## Robust modular hardware and intelligent software

- High housing protection class
- Shock- and vibration-resistant
- High temperature range
- Modular components
- In-house cable production
- Digital technology for superior image quality
- Development, validation and integration of algorithms
- Real-time image processing
- Top view projections 270°/360°
- Sensor fusion (ultrasound/radar)
- Stereo cameras (object detection)
- Driver assistance system (collision warning)

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## MVS system with 360° birdseye view

### Rigid lorry example

The Motec Mobile Vicinity Scout (MVS) is a camera system designed especially for utility vehicles. It provides the driver with a clear, seamless 270° or 360° view around his vehicle.

The MVS system complies with the requirements demanded in the area of municipal transport and goods traffic. The rugged design guarantees a long service life and a high degree of flexibility that allows the adaptation to a variety of vehicles and associated visual problems.

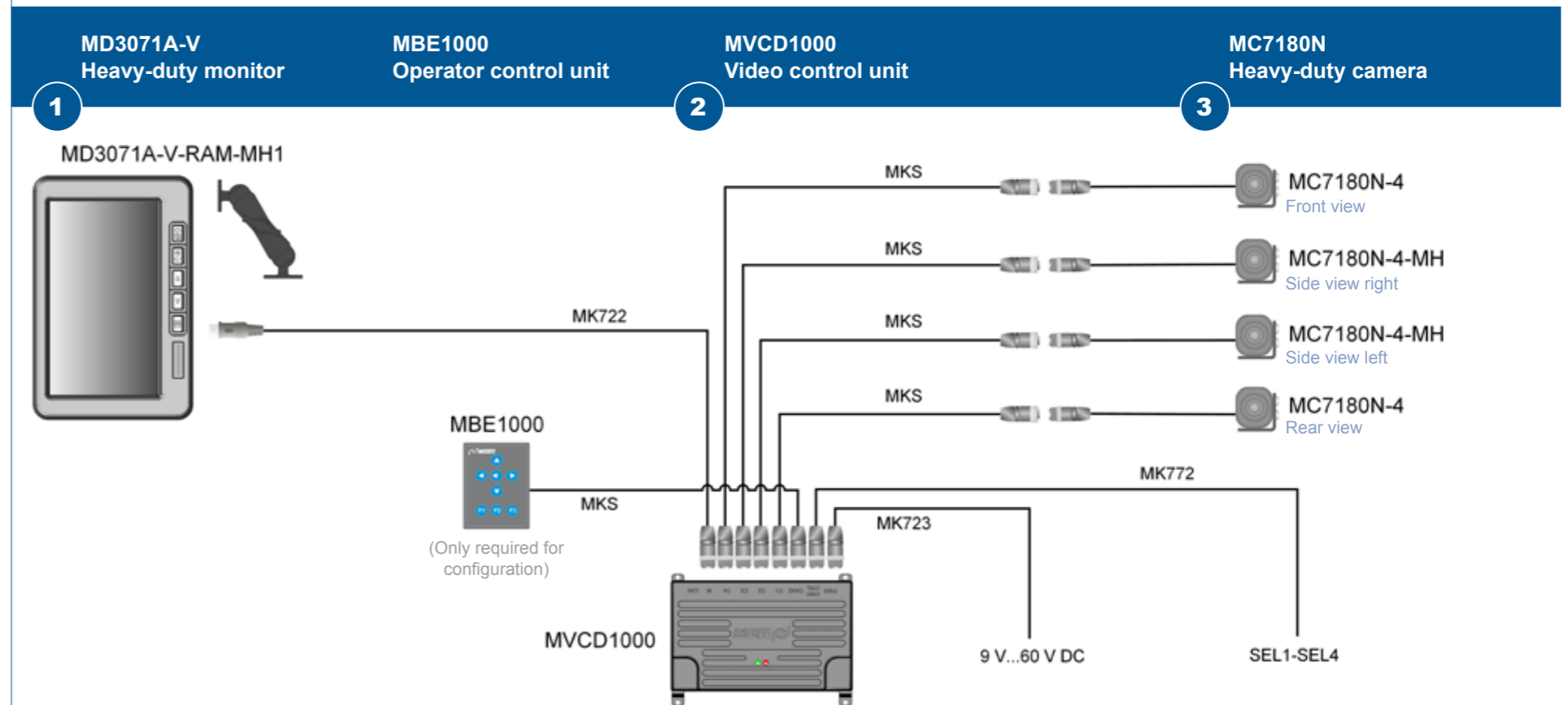
The open interfaces allow a comprehensive integration into the vehicle's electronic system and interconnection with currently installed sensors.



Installation positions of the MVS cameras. Sides, front and rear for 360° birdseye view.



### EXAMPLE: Rigid lorry



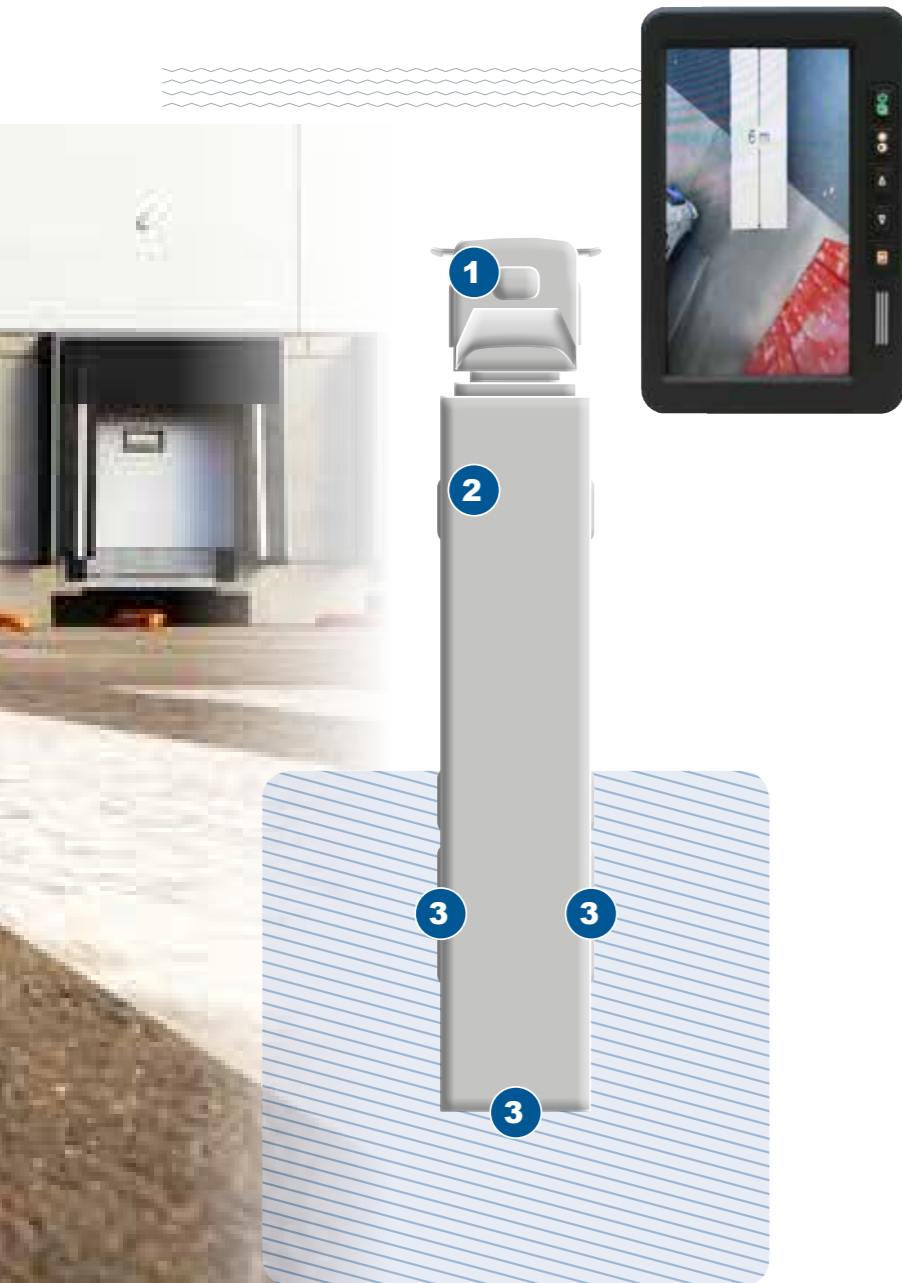
## MVS system with 270° view Semi-trailer truck example

A semi-trailer truck or an articulated lorry are equipped with 6 mirrors. However, the surrounding area of the combination vehicle can only be observed if the tractor vehicle is aligned with the trailer. When manoeuvring through a corner, the mirrors provide only limited assistance. Furthermore, the rear of the trailer is not visible to the driver.

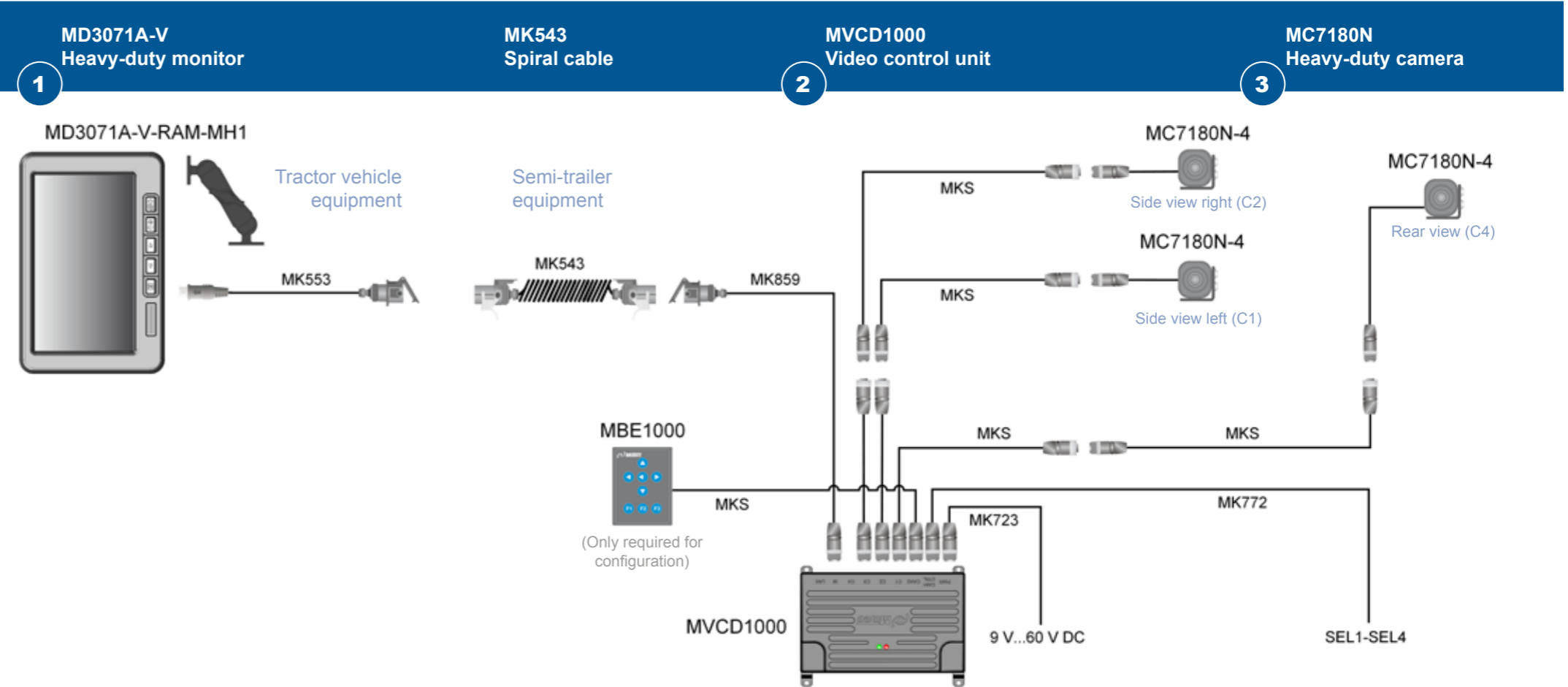
When using a camera that provides a 270° view around the rear of the trailer unit, a bird's eye view around the articulated lorry or semi-trailer truck allows the driver to see any obstacle in this area. This ensures that accidents and hazardous situations can be avoided.



Installation positions of the MVS cameras.  
Sides and rear for 270° birdseye view.



### EXAMPLE: Semi-trailer truck



## Rigid lorry

### Monitoring the rear and sides of the truck

Reversing, manoeuvring or making a right-hand turn can create potentially dangerous situations. In spite of all available mirrors the truck operator does not have the necessary view into all dangerous zones.

Camera monitoring systems support the driver and indicate obstacles and persons and make the approach to loading and unloading areas easier.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

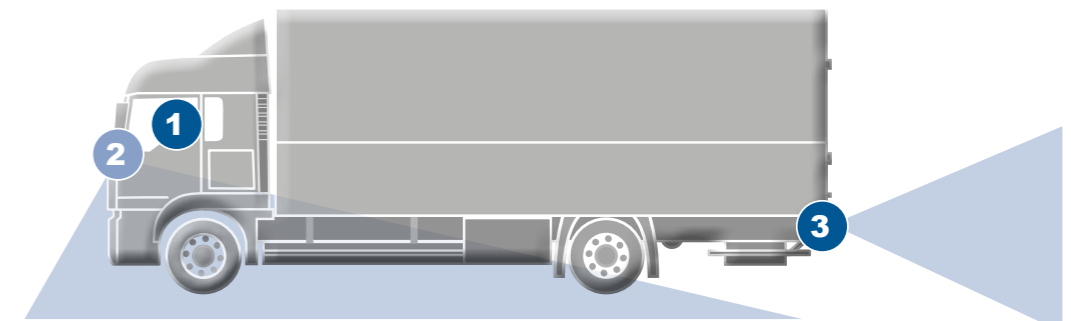


Side room monitoring for safe right turn.



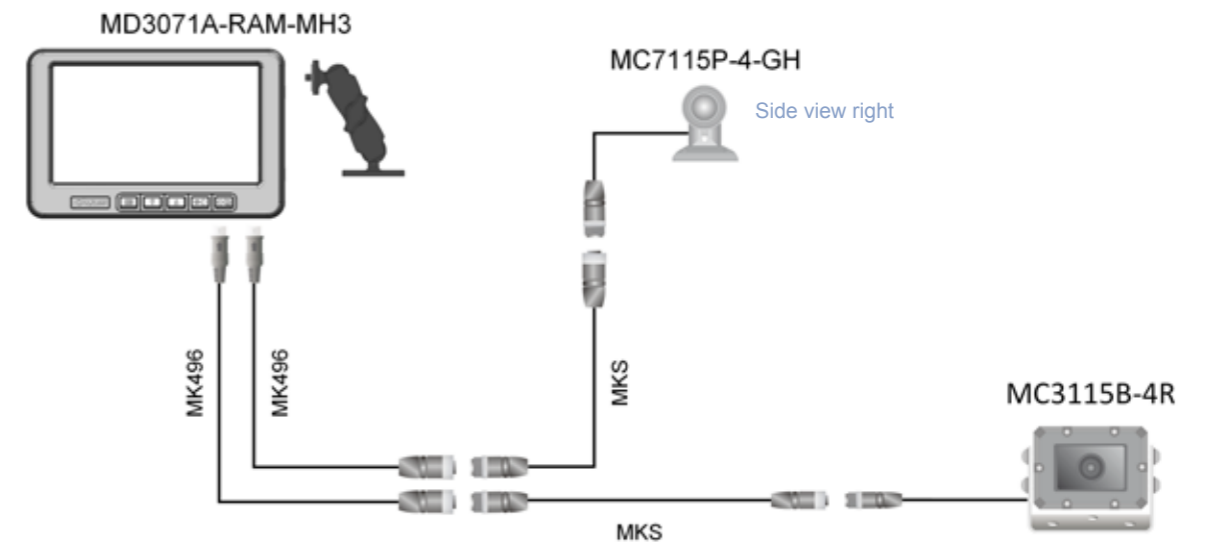
Heavy-duty camera to monitor the vehicle's rear area.

8 9



EXAMPLE:  
Rigid lorry

- 1  
**MD3071A**  
Heavy-duty monitor
- 2  
**MC7000P-GH**  
Heavy-duty camera
- 3  
**MC3000B**  
Heavy-duty camera



## Articulated lorry

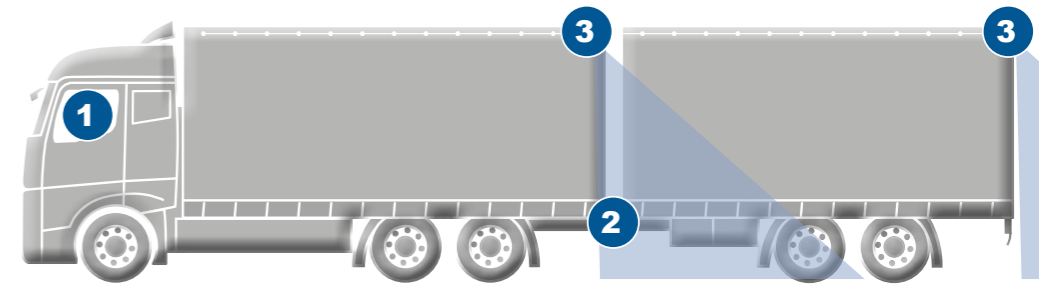
### Monitoring the rear of a vehicle using automatic camera switching

Driving in reverse, shunting and turning right are potentially hazardous situations. Despite the presence of mirrors, vehicle drivers do not have the necessary visibility of all hazardous areas. For articulated trains, this applies in particular to the non-visible drawbar area and the rear of the trailer. The camera is automatically switched over when a trailer is coupled – the camera image switches from camera 1 (traction vehicle) to camera 2 (trailer).

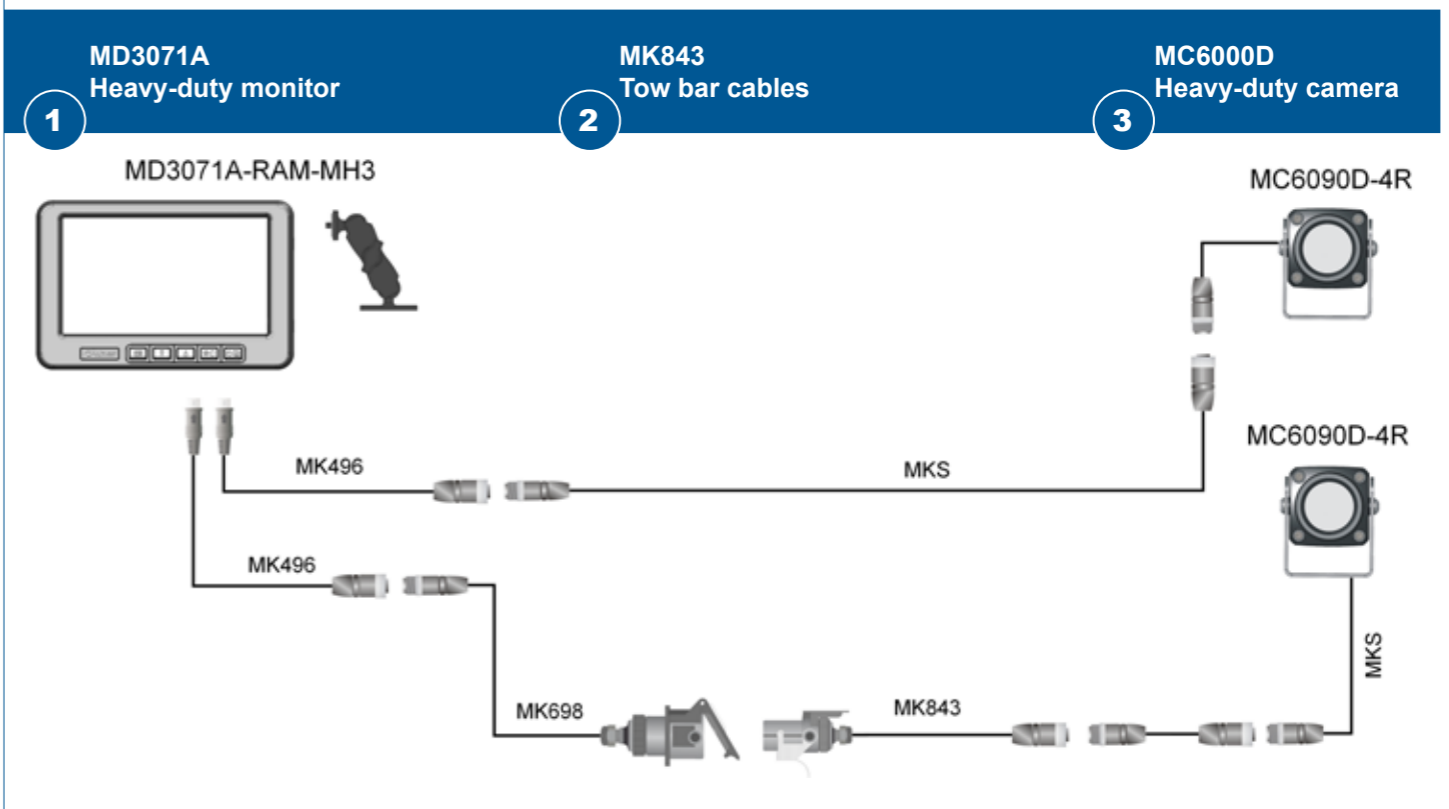
Camera monitor systems support the driver by showing obstacles and people in hazardous areas, making it easier to approach loading and unloading stations. This effectively reduces accidents and costs by simplifying and accelerating working processes.



Motec heavy-duty cameras are used in a variety of articulated vehicles. In this example, for instance, a box truck and tipper truck



EXAMPLE:  
Articulated lorry



## Semi-trailer truck

### Monitoring the rear and sides of the truck

Reversing, manoeuvring or making a right-hand turn can create potentially dangerous situations. In spite of all available mirrors, the truck operator does not have the necessary view into all dangerous zones.

Camera monitoring systems support the driver and indicate obstacles and persons and make the approach to loading and unloading areas easier.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

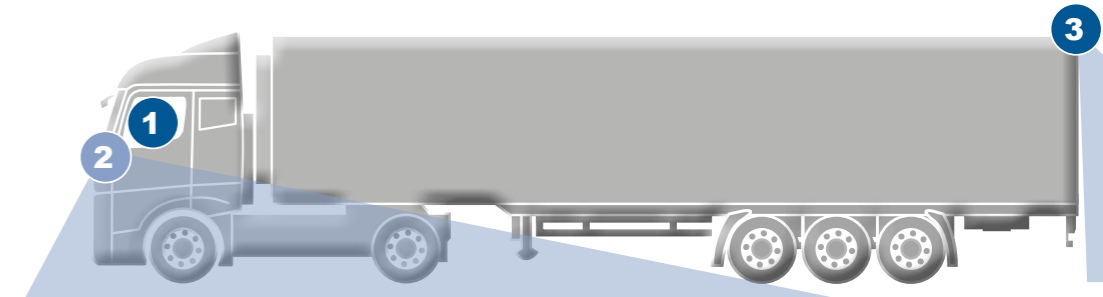


Semi-trailer truck with heavy-duty camera above the portal to monitor the rear area of the vehicle.

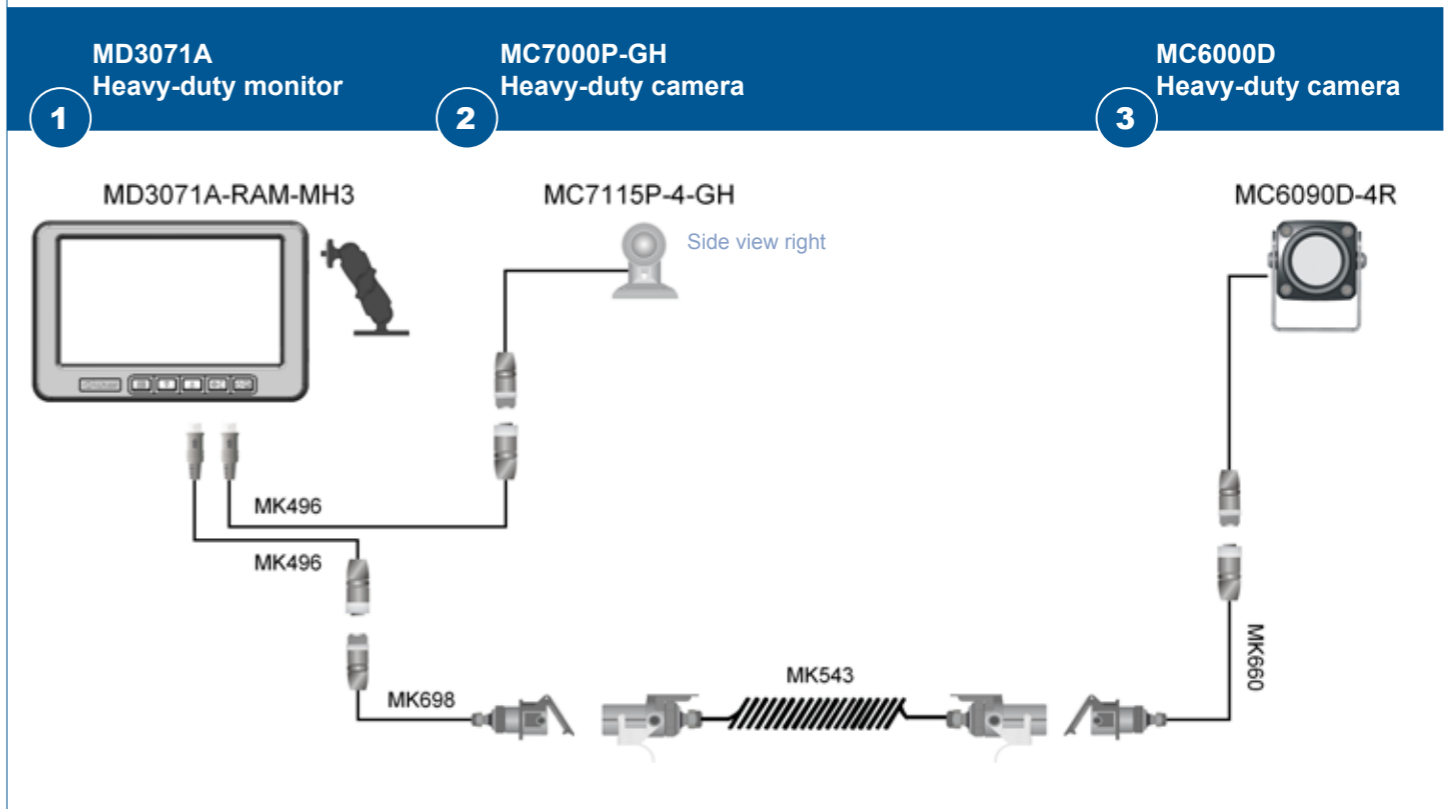


Heavy-duty camera installed on the tractor unit to increase visibility when making turns right.

12 13



EXAMPLE:  
Semi-trailer truck



## Petrol tanker

### Visual solutions for ADR vehicles

Reversing, manoeuvring or making a right-hand turn can create potentially dangerous situations. In spite of all available mirrors, the truck operator does not have the necessary view into all dangerous zones.

Camera monitoring systems approved for the transportation of hazardous materials, assist the driver and indicate obstacles and persons and make the approach to loading and unloading areas easier.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

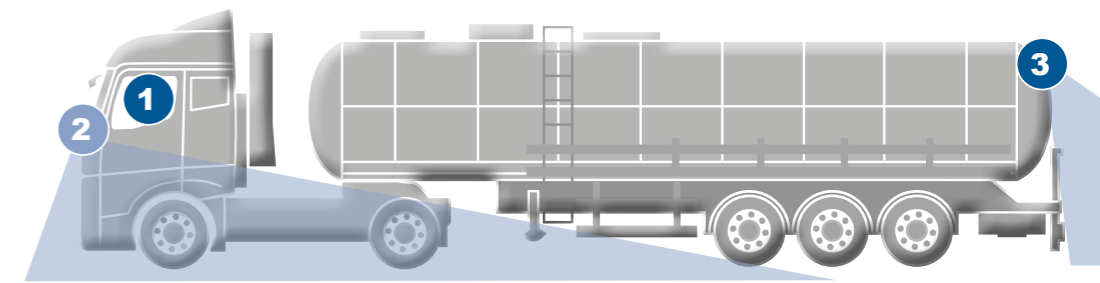


Tankers with heavy-duty camera to monitor the rear area of the vehicle.



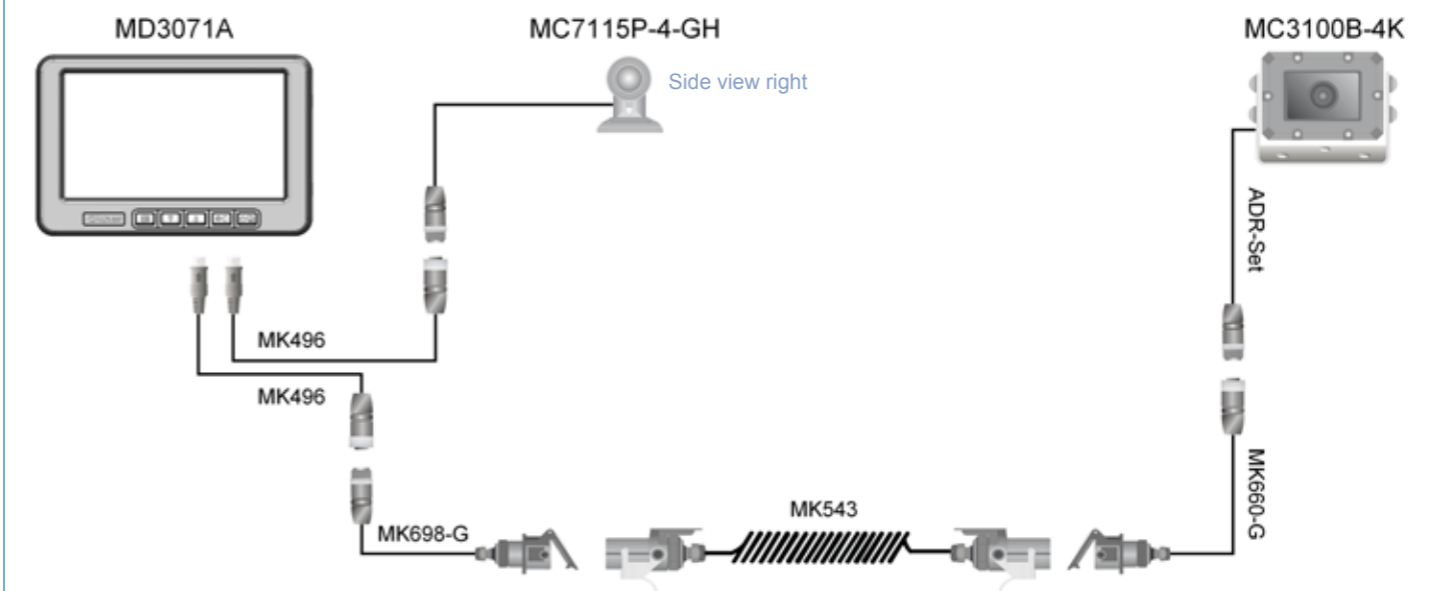
Tractor units with heavy-duty camera to increase the safety when making turns right.

14 15



EXAMPLE:  
Petrol tanker

- 1  
MD3071A  
Heavy-duty monitor
- 2  
MC7000P-GH  
Heavy-duty camera
- 3  
MC3000B  
Heavy-duty camera





## Aircraft refueling vehicle

### Multiple camera systems to monitor the operating and manoeuvring areas

The fuelling of aircraft must always be completed within a short time, and the number of personnel during the preparation of the aircraft clearly increases the risk of personal injuries and material damage.

Camera monitoring systems approved for the transportation of hazardous materials make the positioning of the vehicle easier and faster and allow to observe the entire surroundings of the vehicle.

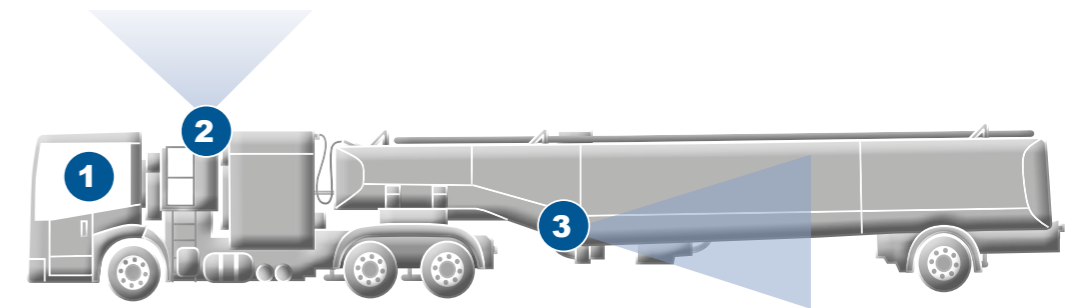
Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.



Mounting positions for the platform camera.

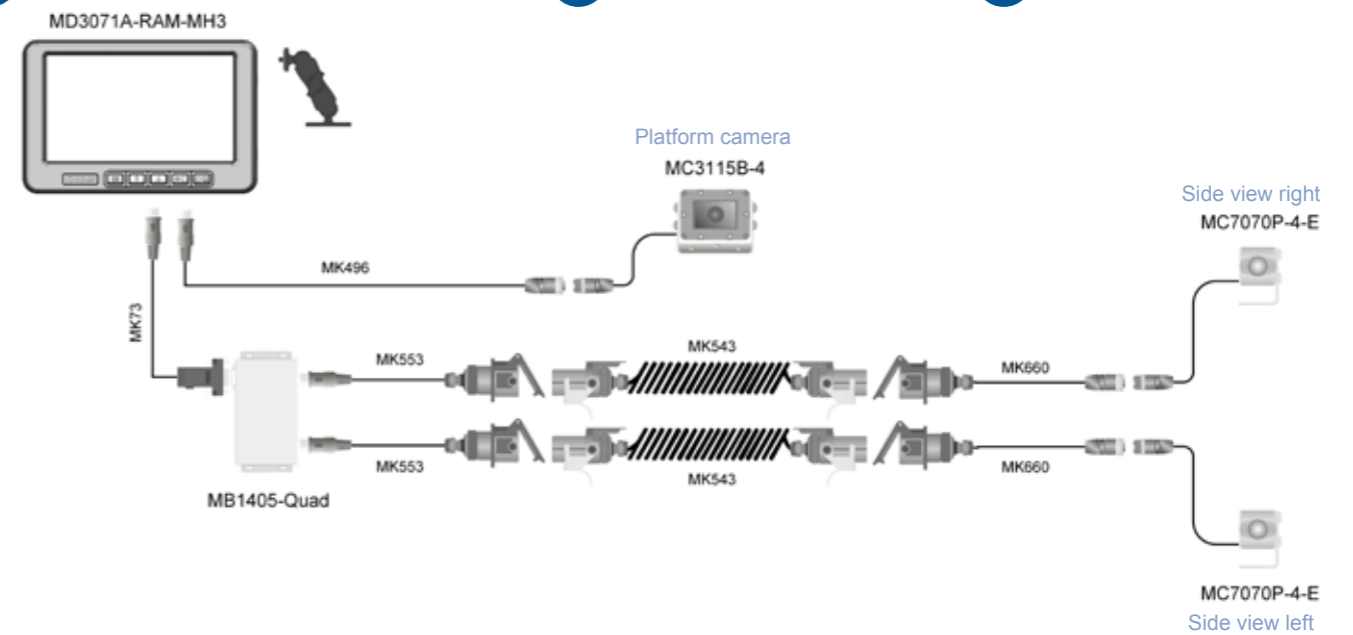


Mounting positions for the side camera.



EXAMPLE:  
Airfield tanker

- |   |                               |   |                              |   |                                |
|---|-------------------------------|---|------------------------------|---|--------------------------------|
| 1 | MD3071A<br>Heavy-duty monitor | 2 | MC3000B<br>Heavy-duty camera | 3 | MC7000P-E<br>Heavy-duty camera |
|---|-------------------------------|---|------------------------------|---|--------------------------------|



## Heavy haulage vehicle Digital wireless system

For instance, when using self-steering trailers during the transport of excessively long and heavy goods, the use of camera systems with permanently installed cables is hardly possible.

The digital wireless system with ECE approval is the optimum solution to transmit image signals between trailer and tractor vehicle to a distance of up to 120 m.

This allows for the purposeful monitoring of hazardous areas and the freight, and thus, preventing personal injuries and material damage.

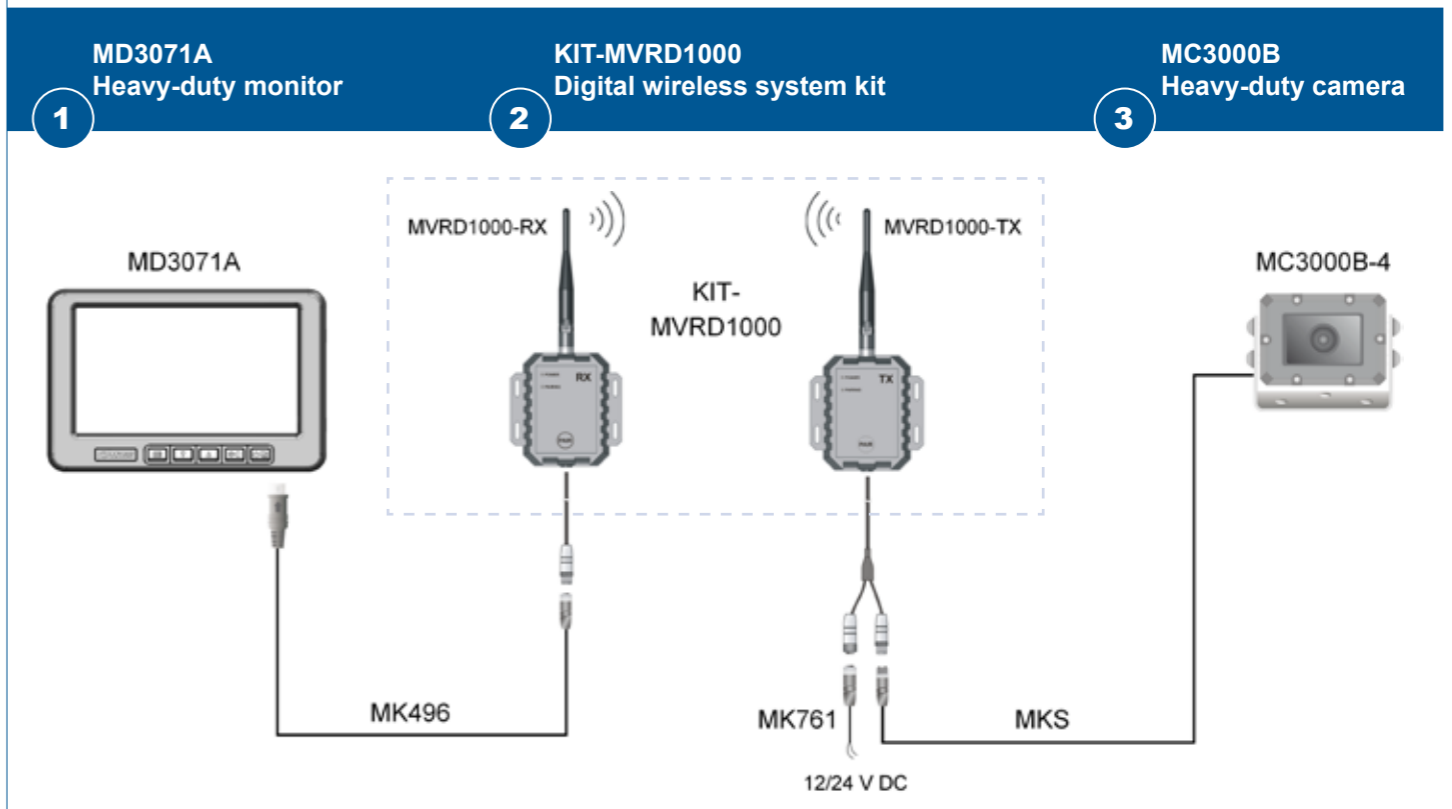


Digital wireless system with a maximum range of 120 meters.



EXAMPLE:  
Heavy transporters

18 19



## Refuse collection vehicle with MVS system

360° birdseye view with monitoring of the vehicle's rear area and running boards

The Motec Mobile Vicinity Scout (MVS) is a camera system designed especially for utility vehicles. It provides the driver with a clear, seamless 270° or 360° view around his vehicle.

The MVS system complies with the requirements demanded in the area of municipal transport and goods traffic. The rugged design guarantees a long service life and a high degree of flexibility that allows the adaptation to a variety of vehicles and associated visual problems.

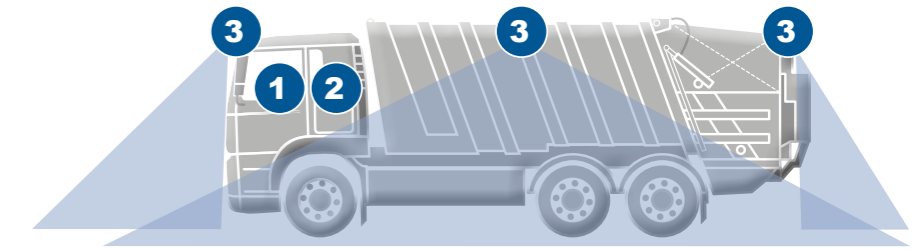
The open interfaces allow a comprehensive integration into the vehicle's electronic system and interconnection with currently installed sensors.



Heavy-duty cameras for monitoring the vehicle's rear and operating area as well as the vehicle's sides.

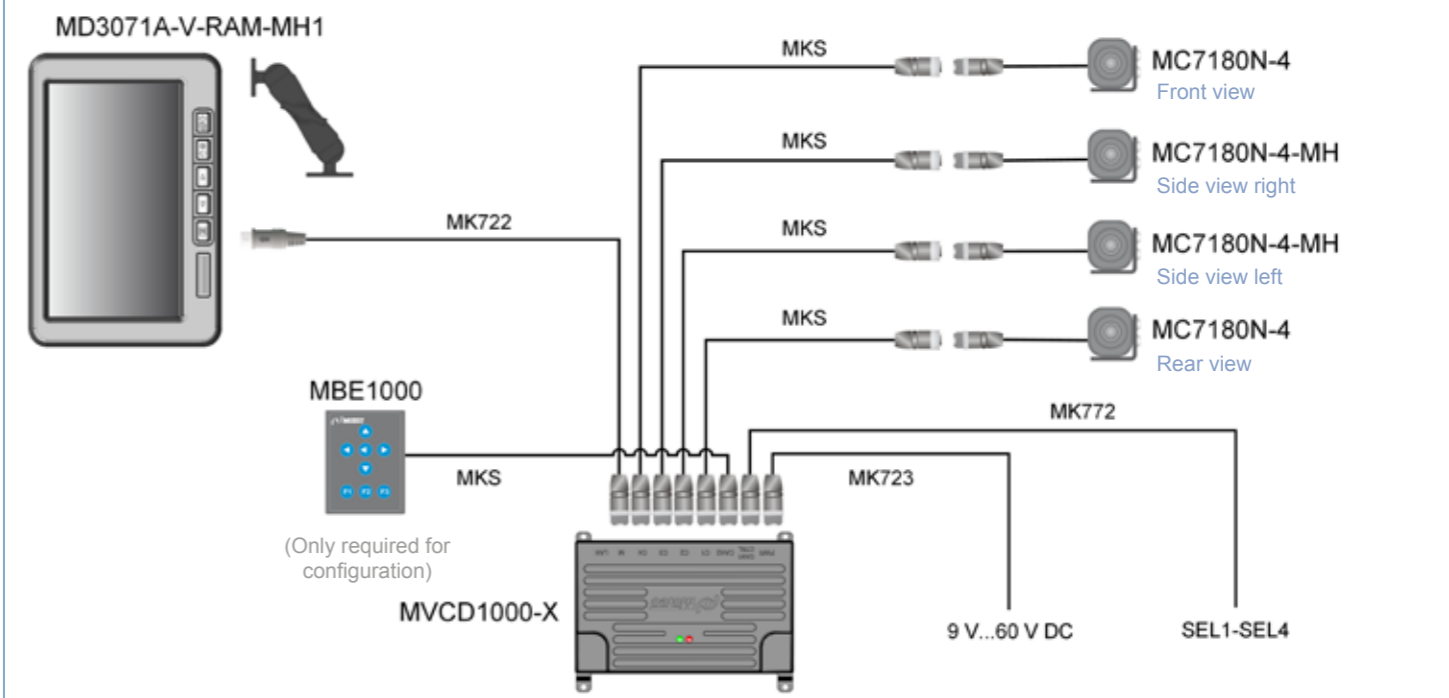


20 21



EXAMPLE:  
Refuse collection vehicle

<b>1</b> <b>MD3071A-V</b> Heavy-duty monitor	<b>2</b> <b>MVCD1000</b> Video control unit	<b>3</b> <b>MC7180N</b> Heavy-duty camera
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## Refuse collection vehicle with radar sensor

### Monitoring of multiple operating zones and hazardous areas

Vehicles with only the driver demand special requirements regarding safety while reversing the truck.

A system consisting of a combination of cameras and radar sensors warn the driver visually and acoustically of persons and objects in the danger zone behind the vehicle.

The radar detects object outside of the camera's range of view at a distance of up to 50 m and can graphically display the direction as well as the distance.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

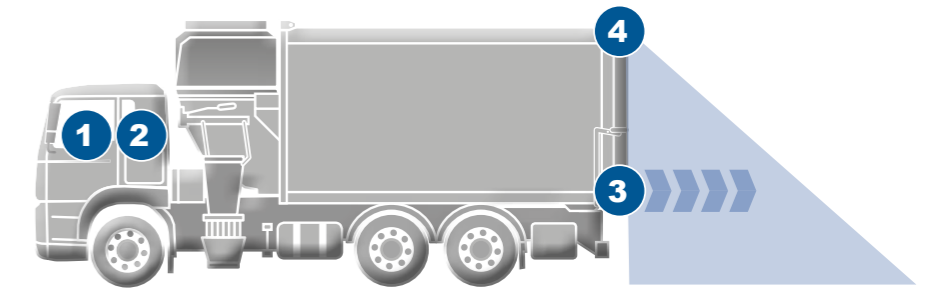


Camera for monitoring the side or operating area.

Refuse collection vehicle with a radar sensor at the rear.

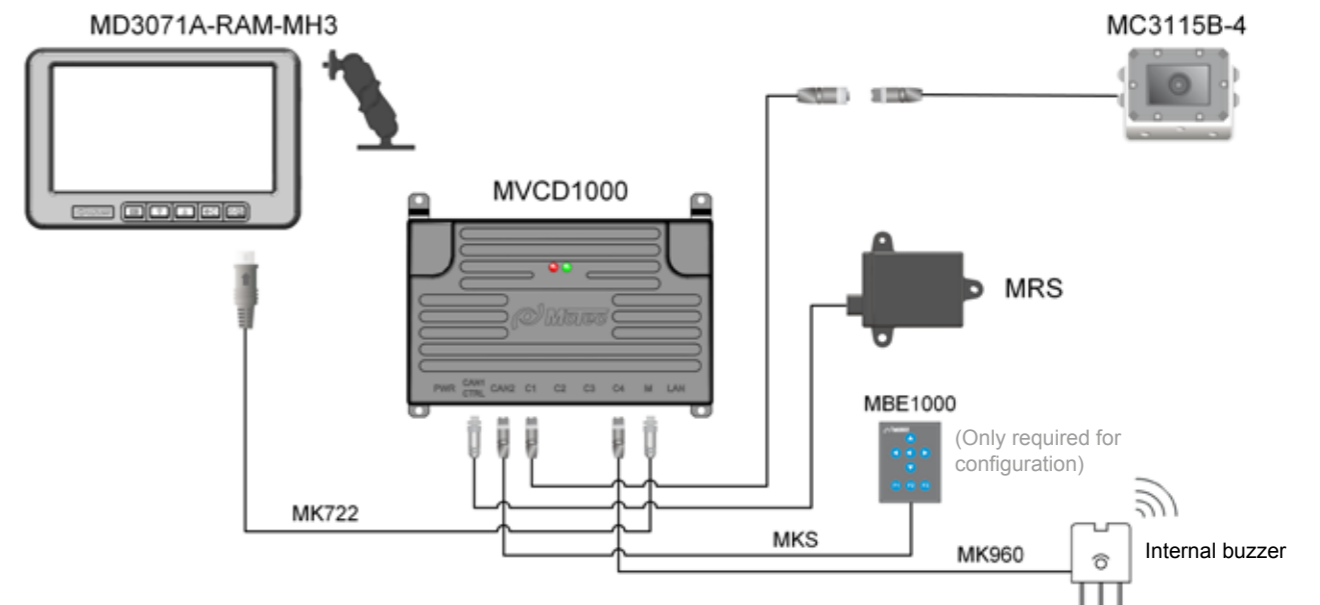


22 23



EXAMPLE:  
Refuse collection vehicle with radar sensor

- |   |                               |   |                                |   |                     |   |                              |
|---|-------------------------------|---|--------------------------------|---|---------------------|---|------------------------------|
| 1 | MD3071A<br>Heavy-duty monitor | 2 | MVCD1000<br>Video control unit | 3 | MRS<br>Radar sensor | 4 | MC3000B<br>Heavy-duty camera |
|---|-------------------------------|---|--------------------------------|---|---------------------|---|------------------------------|



## Refuse collection vehicle with ultrasound sensors

### Reversing with activated warning system

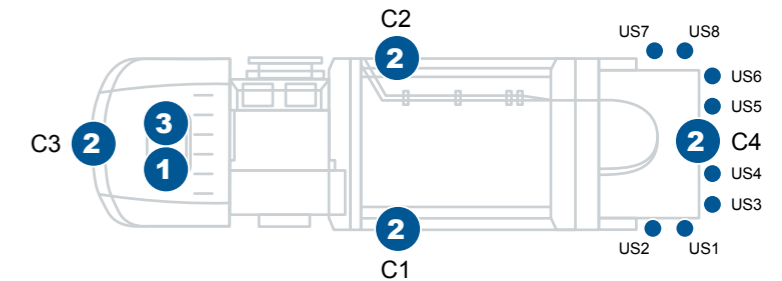
Reversing and manoeuvring is inherently dangerous. In spite of a large exterior mirrors, the necessary overall view into the

To warn the driver well in time and to increase the safety during reversing, Motec uses cameras in combination with ultrasound sensors.

According to the customer's requirements, visual and acoustic warning signals can be implemented. The system can be combined with the Mobile Vicinity Scout (MVS) and, therefore, offers active and passive monitoring around the entire vehicle. The control unit MVCU1300 provides the option to use up to 12 ultrasound sensors.



Installation examples for ultrasonic sensors.  
Left: Rear bumper  
Centre: Front bumper (inside)  
Right: Front bumper

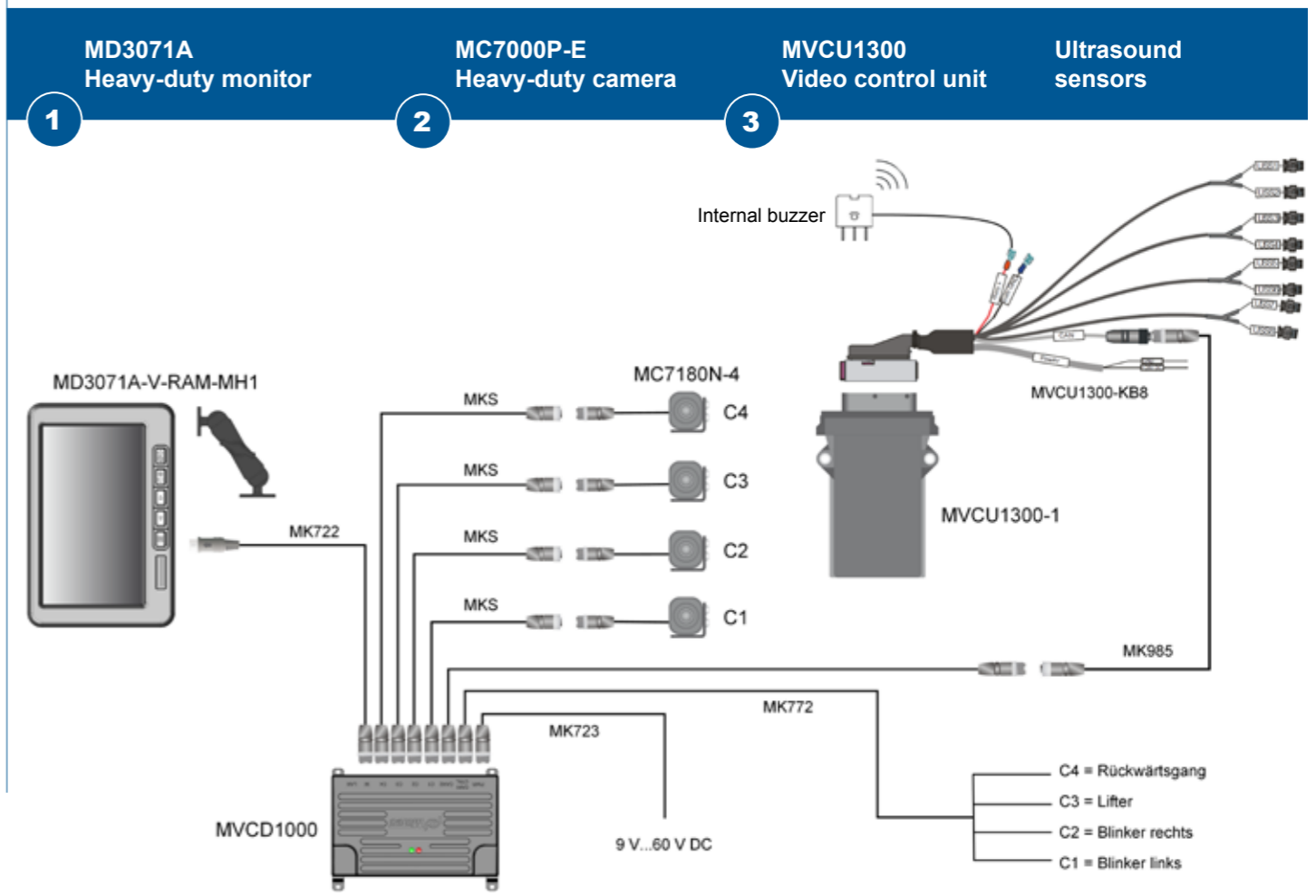


24 25



Ultrasound sensors in connection with the MVS system.

### EXAMPLE: Refuse collection vehicle with ultrasound sensors



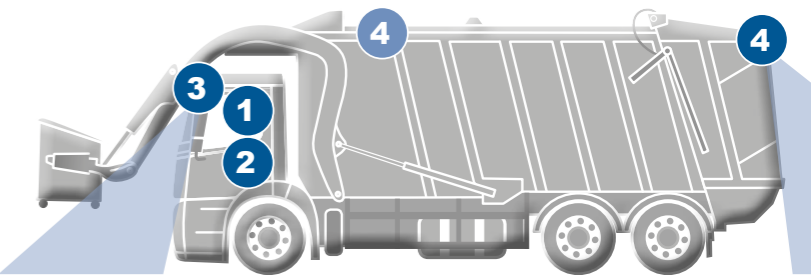
## Refuse collection vehicle front loader Cameras replacing mirrors of group V and VI

Driving in reverse, shunting and turning right are potentially hazardous situations. Despite the presence of mirrors, vehicle drivers do not have the necessary visibility of all hazardous areas. For articulated trains, this applies in particular to the non-visible drawbar area and the rear of the trailer. The camera is automatically switched over when a trailer is coupled – the camera image switches from camera 1 (traction vehicle) to camera 2 (trailer).

Camera monitor systems support the driver by showing obstacles and people in hazardous areas, making it easier to approach loading and unloading stations. This effectively reduces accidents and costs by simplifying and accelerating working processes.

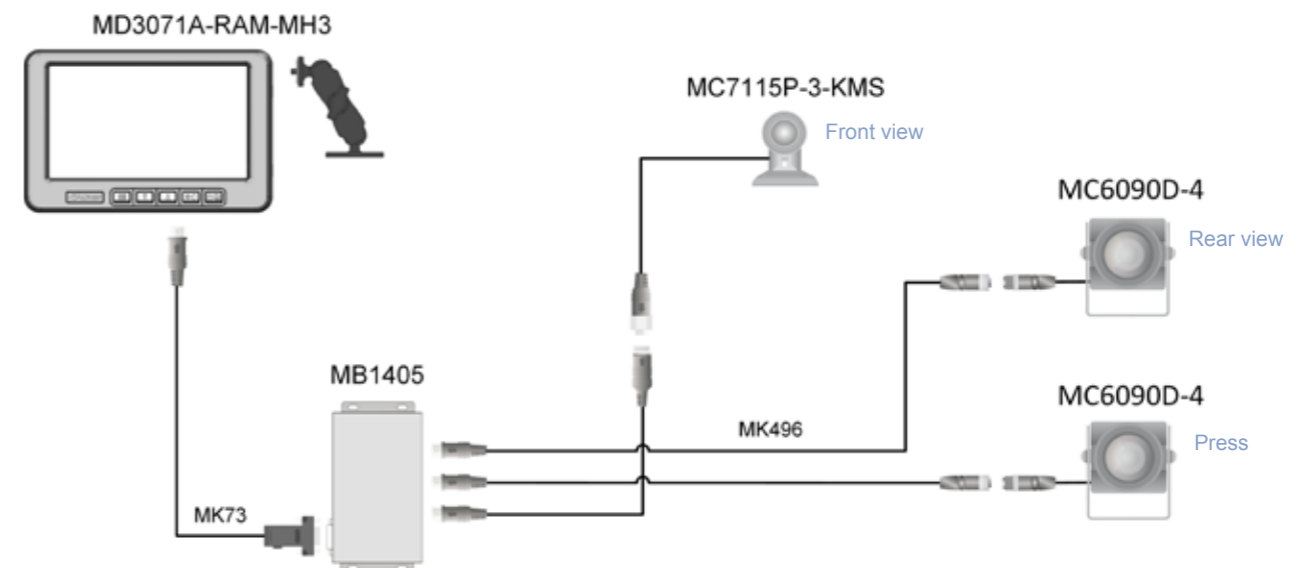


Refuse collection vehicles with camera for monitoring the front area of the vehicle.  
Heavy-duty camera for monitoring the rear and operating areas.



### EXAMPLE: Refuse collection vehicle front loader

- 1 **MD3071A**  
Heavy-duty monitor
- 2 **MB1405**  
Video control unit
- 3 **MC7000P**  
Heavy-duty camera
- 4 **MC6000D**  
Heavy-duty camera



## Suction flushing vehicle

### MVS – 360° birdseye view with configurable overlays

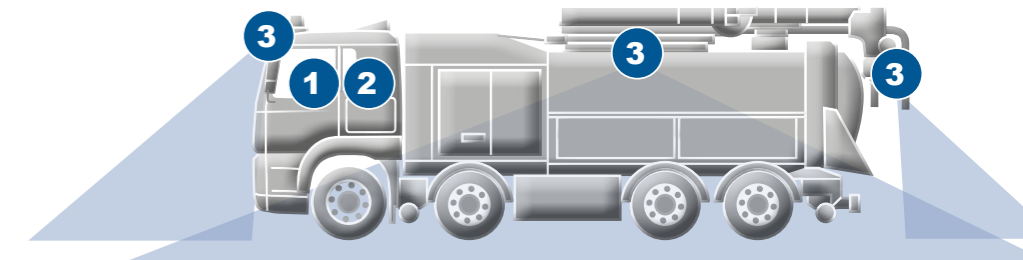
Manoeuvring of complex vehicles and pinpoint positioning at the job site is the challenge.

The Mobile Vicinity Scout (MVS) offers the driver 100% birdseye view for the safe manoeuvring of his vehicle. Graphic displays of operating areas, for example, support the driver to position his vehicle rapidly and accurately.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

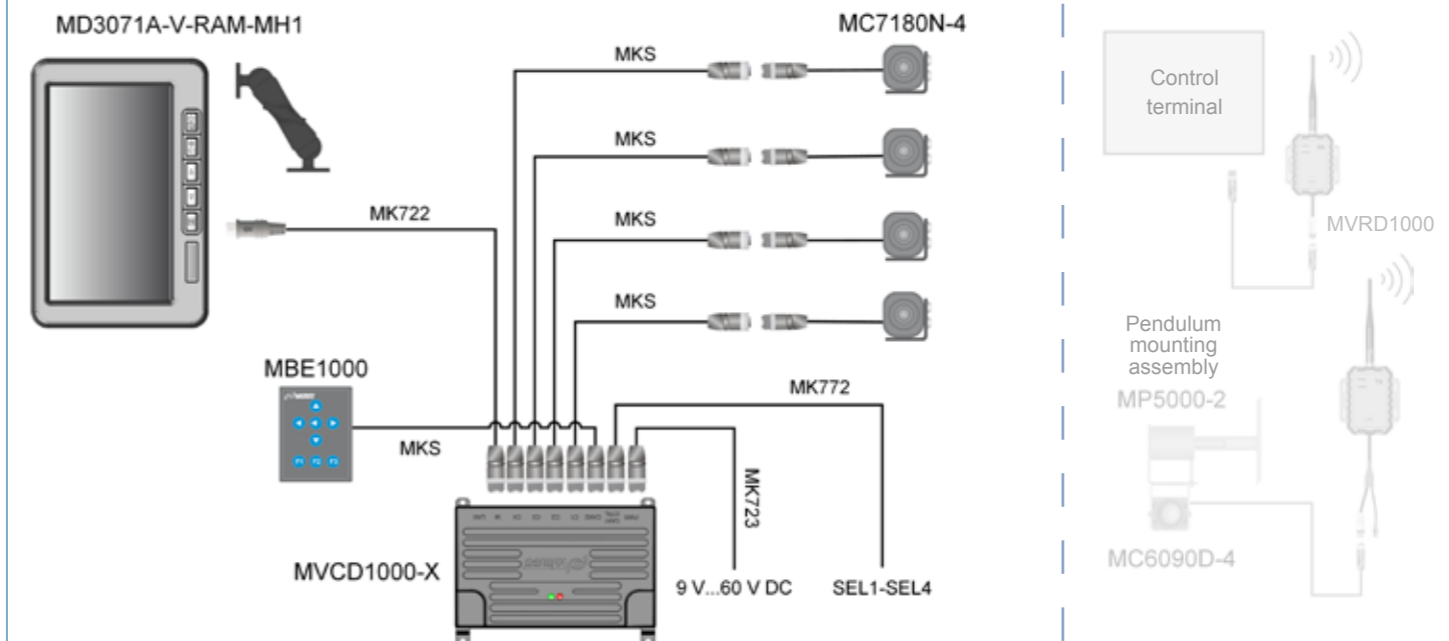


There are 4 cameras installed around the vehicle allow for a 360° birdseye view.



#### EXAMPLE: Suction flushing vehicle

- |                                 |                                |                              |   |
|---------------------------------|--------------------------------|------------------------------|---|
| <b>1</b>                        | <b>2</b>                       | <b>3</b>                     |   |
| MD3071A-V<br>Heavy-duty monitor | MVCD1000<br>Video control unit | MC7180N<br>Heavy-duty camera | MC6000D with pendulum mounting assembly |



## Small road sweeper

### MVS – Obstacles in the area of city cleaning

The operator of a small road sweeper must be aware of the general traffic and equipment around him, and, in particular, he must watch pedestrians and bicyclists as well as for posts, street lights, public lawn areas.

The Motec Mobile Vicinity Scout (MVS) is a camera system designed especially for utility vehicles. It provides the driver with a clear, seamless 270° or 360° view around his vehicle.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

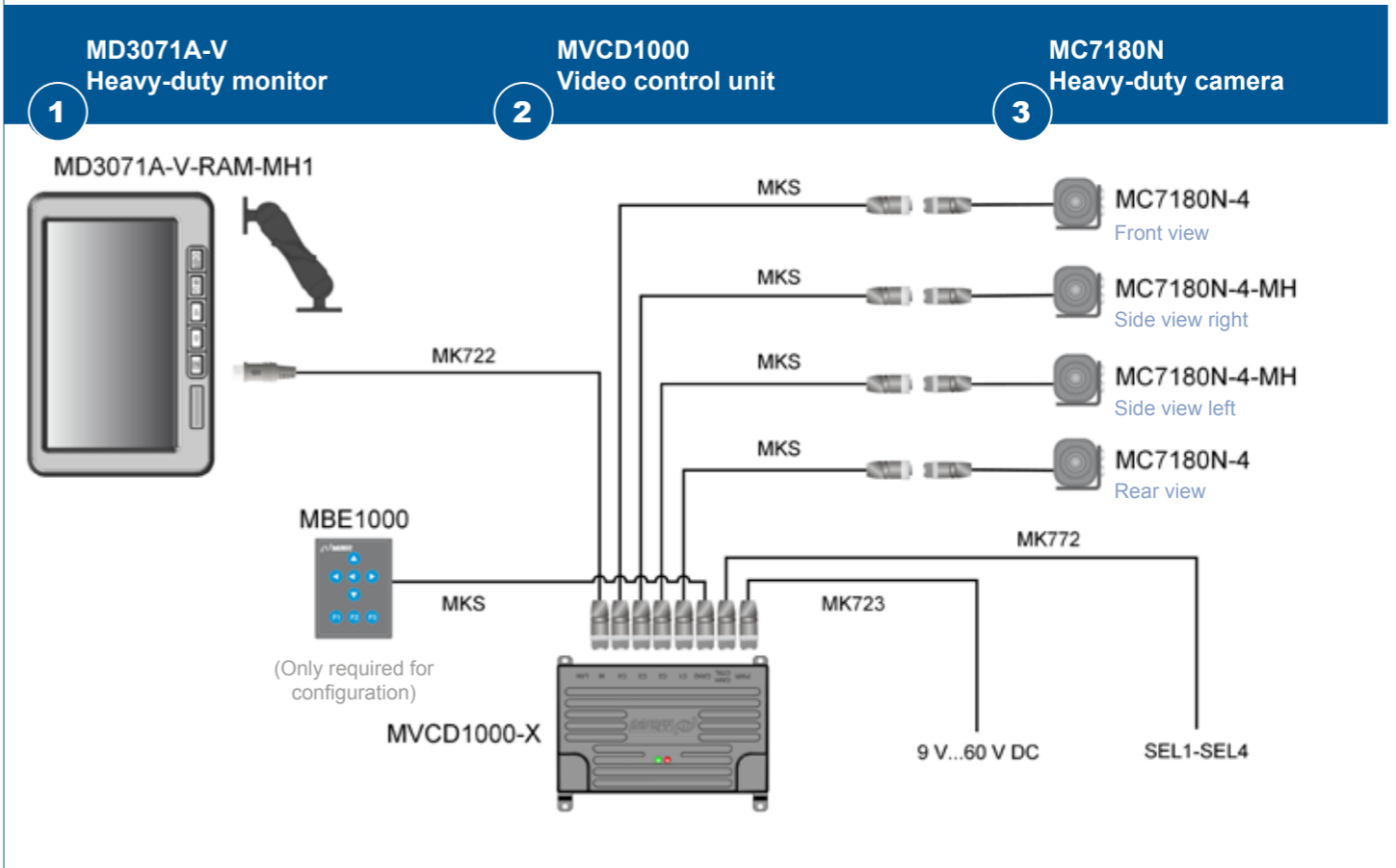
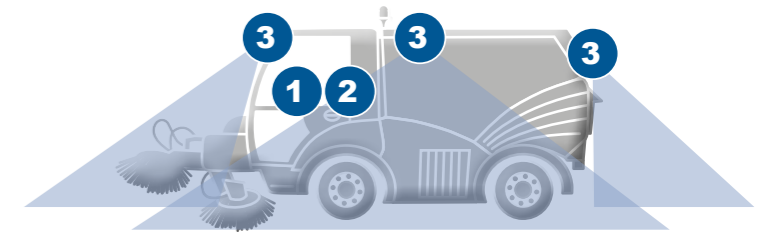


There are 4 cameras installed around the vehicle allow for a 360° birdseye view.

30 31



EXAMPLE:  
Small road sweeper





## Large street sweeper

### Monitoring of several operating areas

The operator of the large road sweepers most observe simultaneously the traffic around him and the rotating brushes of his vehicle. Motec camera solutions provide the operator with the right camera image at any situation.

The operator can monitor the area behind the machine, the brushes, the vacuum intake and the sweeping result during the sweeping operation.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

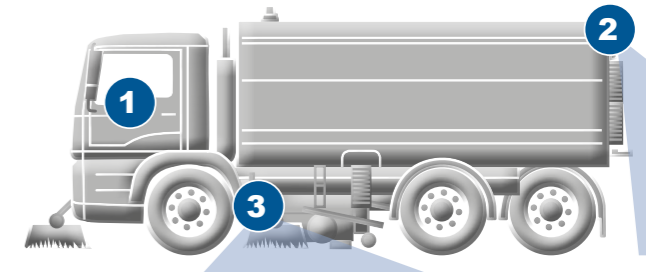


Heavy-duty camera at the rear of a road sweeper.



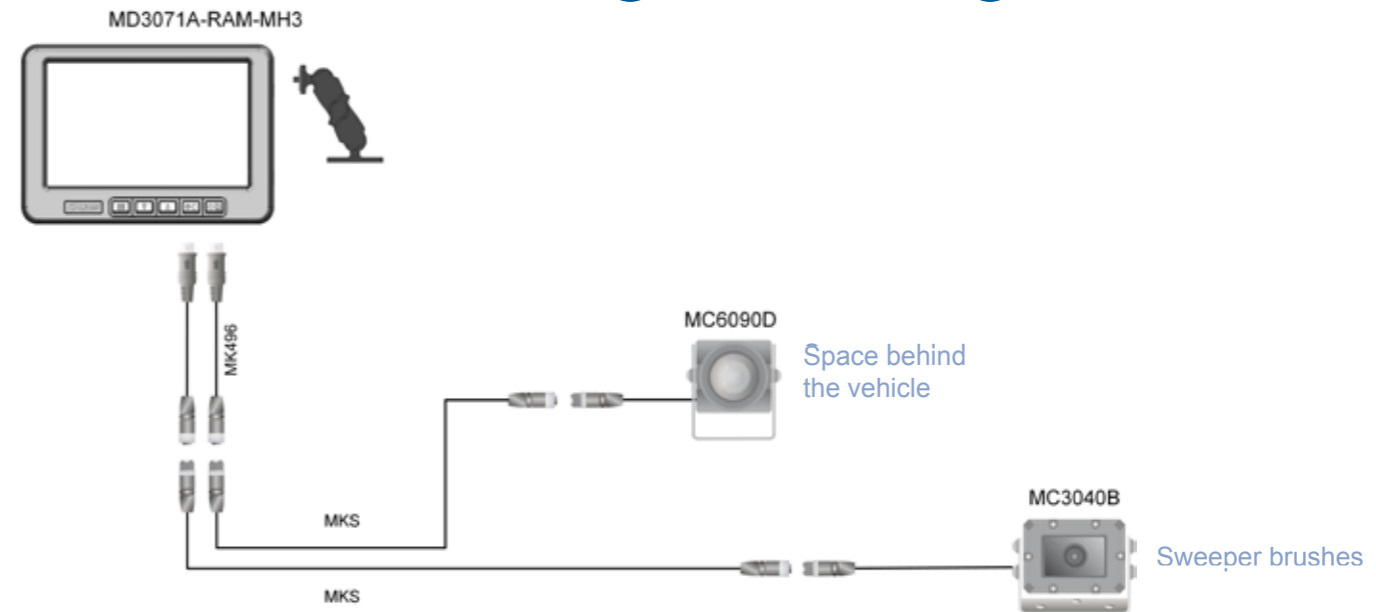
Using a camera to monitor the road sweeper's brushes.

32 33



#### EXAMPLE: Large street sweepers

- 1  
**MD3071A**  
Heavy-duty monitor
- 2  
**MC6000D**  
Heavy-duty camera
- 3  
**MC3000B**  
Heavy-duty camera



## Municipal vehicle for summer and winter road maintenance

### Monitoring the operating and rear area of a vehicle

Motec cameras are mounted above the gritting unit, allowing the driver to watch the traffic, the gritting table and the grit distribution.

During the manoeuvring of this vehicle, the driver will see persons in the danger zones while entering the salt storage hall, he can observe the grit pattern and see the result of the clearing operation while driving.

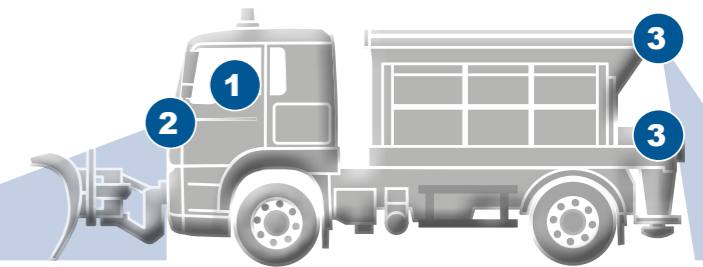
Different add-on installations make it possible to employ the equipment carrier all year round. It only requires a few quick steps to change the reverse view camera between the fast-change brackets.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.



Side camera for monitoring the clearing blade (top left).  
Heavy duty rear view camera with cleaning system (bottom left).

34 35



#### EXAMPLE: Winter road maintenance vehicle

**MD3071A**  
Heavy-duty monitor

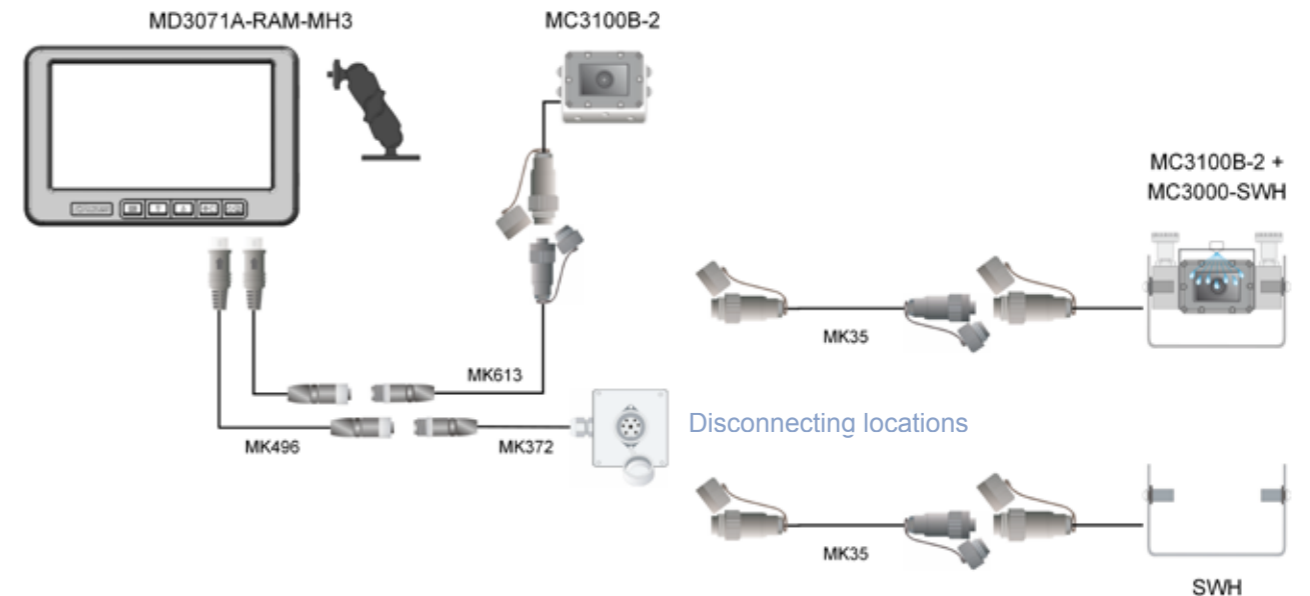
**MC3000B**  
Heavy-duty camera

**MC3000B-Cleaning system and quick release bracket**

1

2

3



## Fire brigade appliances, civil defence and rescue vehicles

### Manoeuvring assistance at the job site

Drivers of utility vehicles must be able to manoeuvre and reverse their trucks safely in locations that are difficult to access.

Motec cameras make it easier for the driver to manoeuvre his vehicle in impassable terrain and operate the truck in obscure driving situations at the job site. 4 cameras capture the entire danger zone around the vehicle.

By using thermal imaging devices built into the front of the vehicle, the job site is reached safely and quickly, even if the weather conditions are poor or excessive smoke developed around the area.

Consequently, it effectively prevents accidents and saves costs through simple and fast operating procedures.

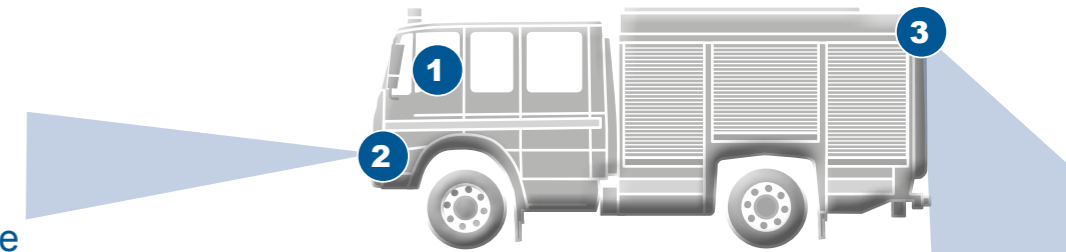


Heavy-duty camera for monitoring the rear area of the vehicle.

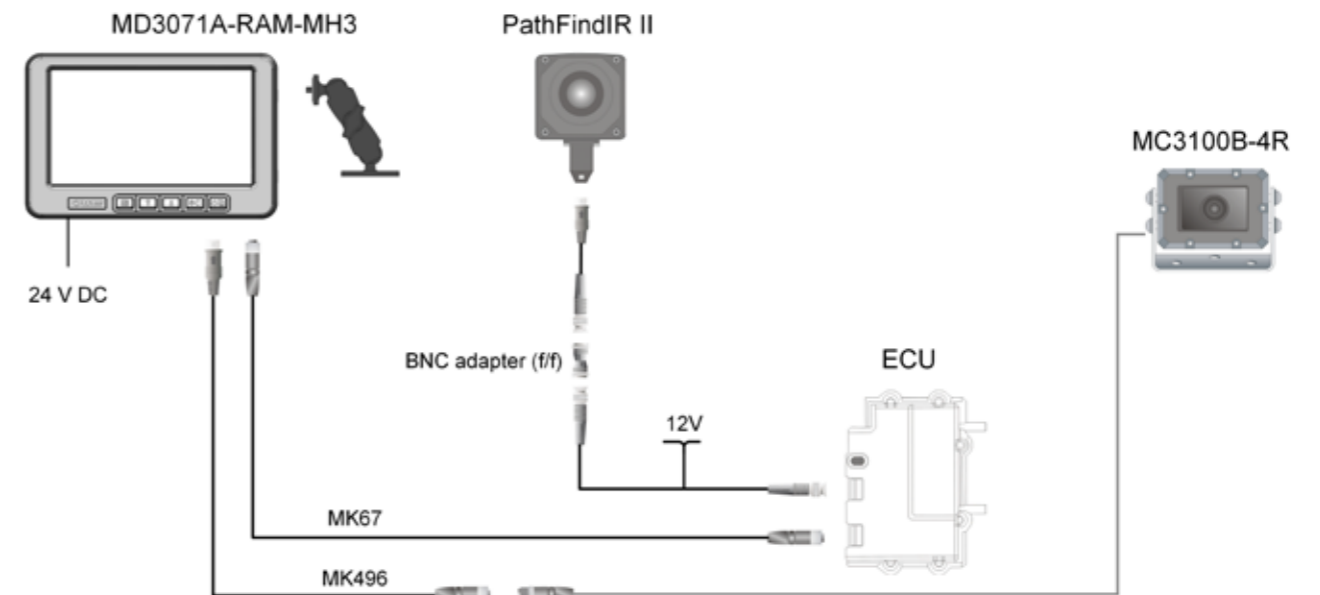
36 37



EXAMPLE:  
Airfield fire fighting vehicle



- 1  
**MD3071A**  
Heavy-duty monitor
- 2  
**PathFindIR**  
Thermal imaging camera
- 3  
**MC3000B**  
Heavy-duty camera



## Operating area monitoring

Reversing, manoeuvring or working with add-on equipment can lead to potentially dangerous situations. This applies in particular during deployment when stress levels are elevated. Camera monitoring systems support the vehicle crew by showing them obstacles or persons in the danger zones around the vehicle. The systems enable the crew to carry out their tasks while remaining protected inside the vehicle. This effectively prevents accidents, increases the safety of the crew, and accelerates the work sequences.

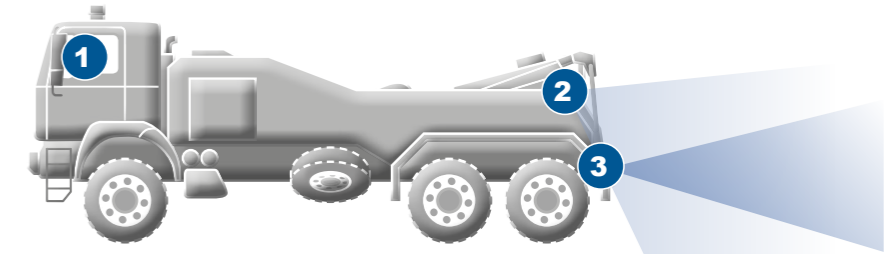
Camera systems increase the safety when machines and vehicles are operating in obscure situations. When mounted on manned and unmanned vehicles or equipment carriers, the camera systems make it possible to steer precisely and enable the operator to use the equipment in safety.



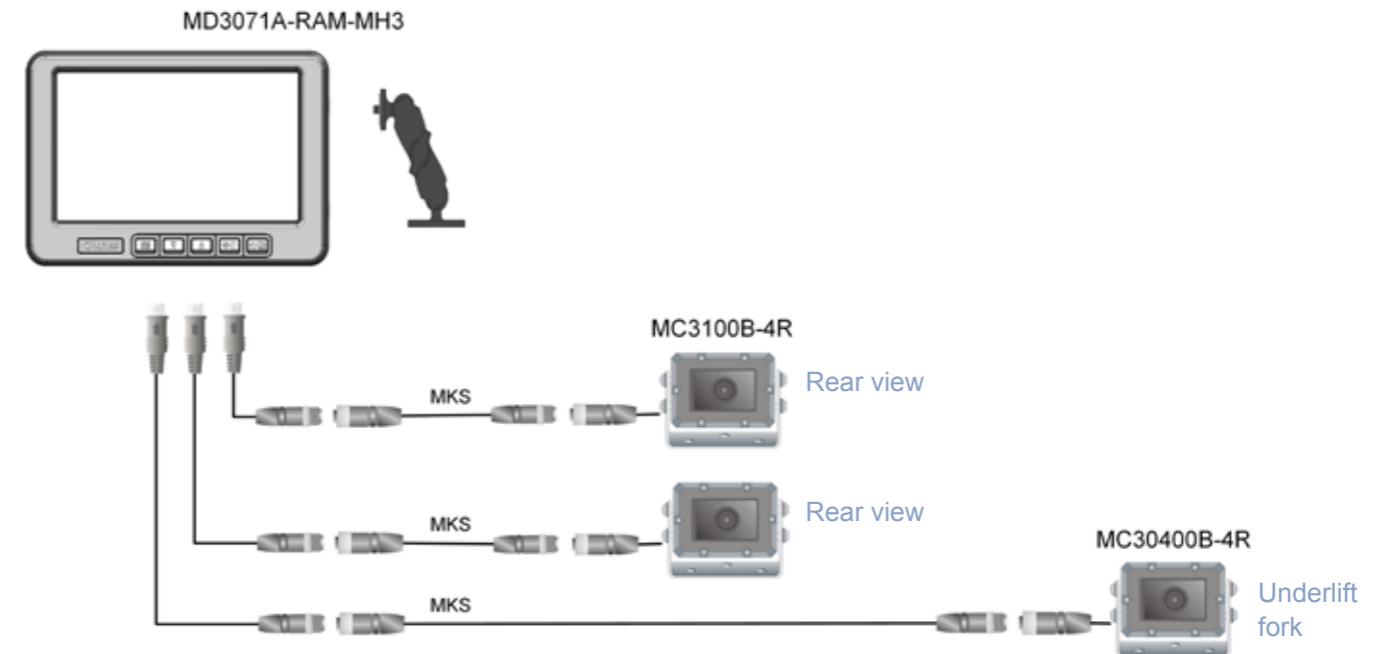
Heavy-duty camera on a recovery vehicle for supporting operation and monitoring of the underlift fork (left) and rear space monitoring (right).



### EXAMPLE: Recovery vehicle



- 1
  
MD3071A  
Heavy-duty monitor
- 2
  
MC3000B  
Heavy-duty camera
- 3
  
MC3000B  
Heavy-duty camera



## Situational awareness

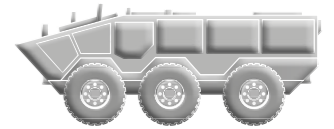
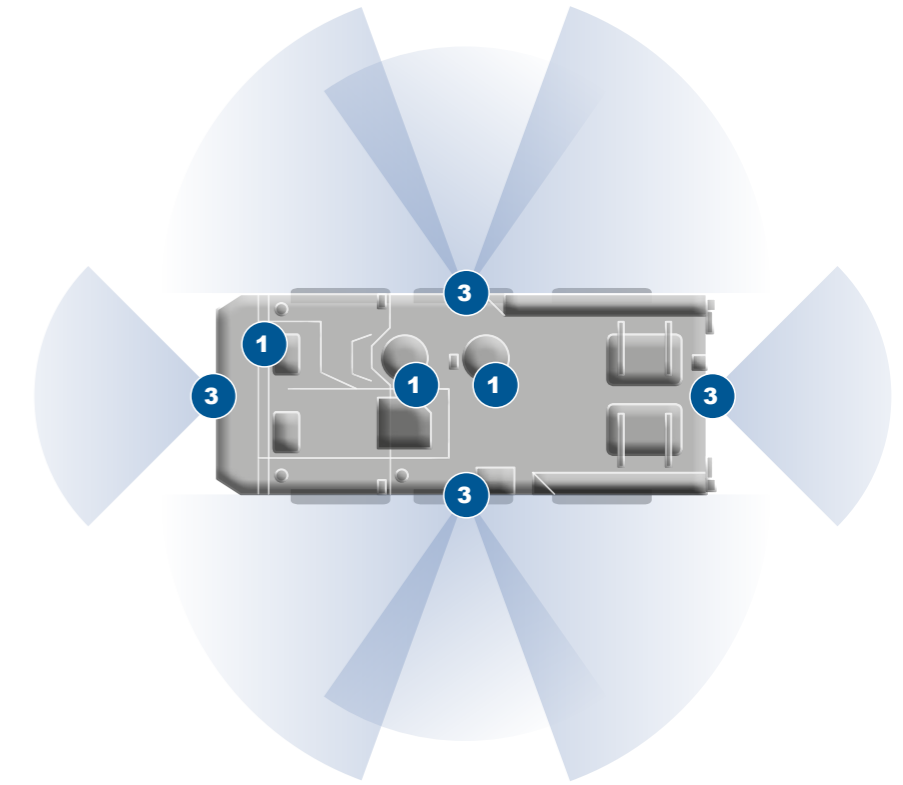
In obscure deployment situations situational awareness systems offer the driver, the commander and other crew members an overview of the surrounding proximity of the vehicle. By day and at night. Using night vision-capable infrared cameras, SA systems enable a better assessment of the situation and the potential dangers.

The systems can consist of up to 8 cameras and 5 monitors. The arrangement of the cameras and the camera variations are flexibly adapted to the vehicle and the viewing requirements of the users.

On the connected monitors, whether they be from Motec or another manufacturer, the video control unit MVCU1600 allows to display independent and individually pre-configured selectable contents.

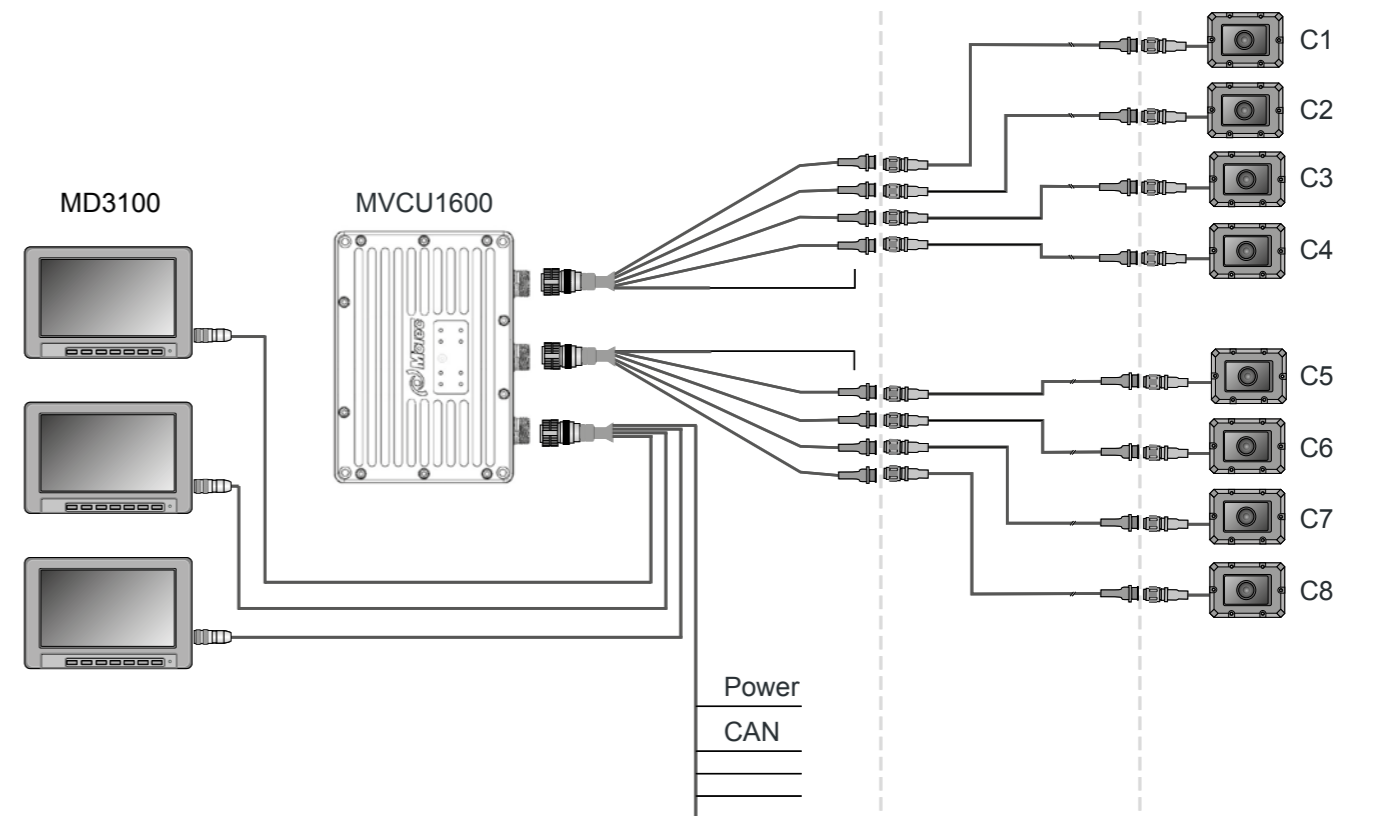


Above: Integrated Motec camera MC3000.  
Below: MC4000A-IR camera with infrared illumination.



### EXAMPLE: Armoured personnel carrier

- 1  
**MD3100**  
Heavy-duty monitor
- 2  
**MVCU1600**  
Video control unit
- 3  
**MC4000A**  
Heavy-duty camera



## Terminal connection

### Connectivity – quick and easy retrofitting

Vehicles that were equipped at the factory with a video operator terminal or combination instrument, can be easily and quickly connected to a camera system by using individually configurable connecting adapters.

Based on the integration of the video image into the available display and information concept of the vehicle, the omission of additional display instruments takes a considerable load off the driver. Thus, the driver will now be able to quickly detect and precisely assess dangerous situations during the manoeuvring and reversing of his vehicle.

The driver sees persons behind the vehicle as well as obstacles such as parking vehicles for example.

42 43

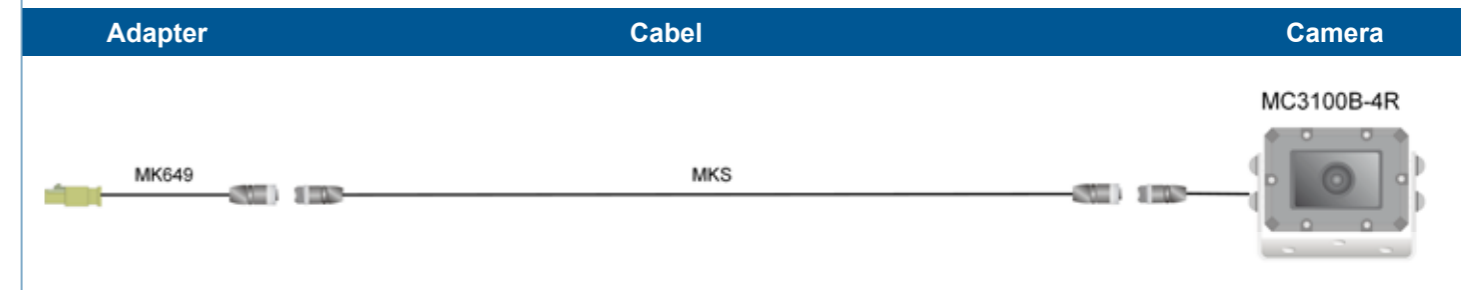


IVECO, Mercedes-Benz, MAN, etc., ... additional terminals upon request

- Quick and easy retrofitting
- Utilisation of the vehicle-specific display and information concept
- Additional display devices inside the driver's cabin are omitted

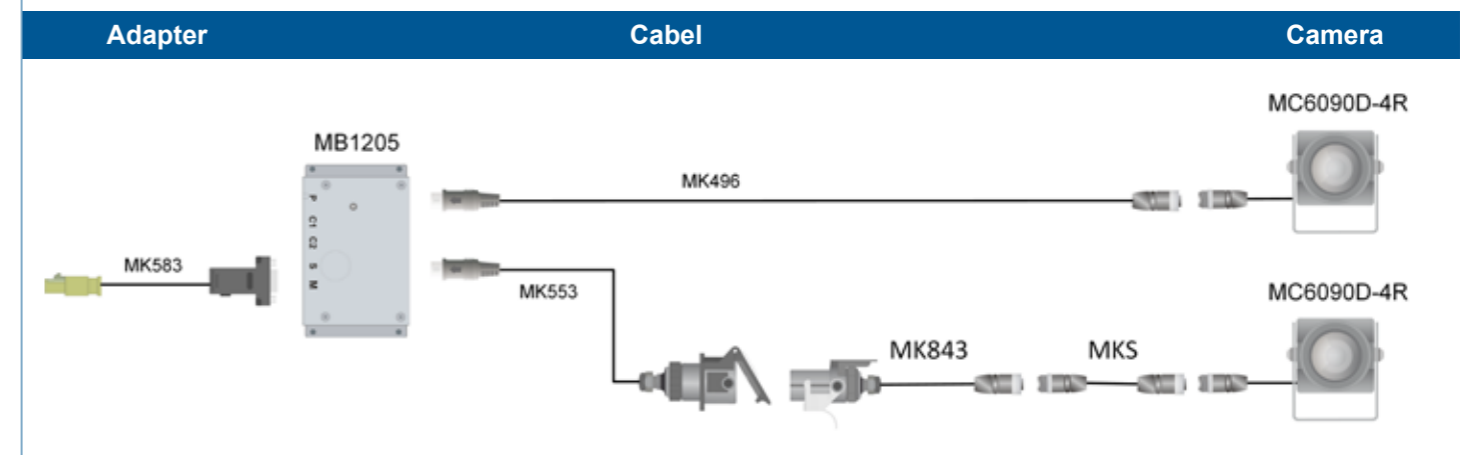
EXAMPLE:

### Terminal connection for rigid lorry



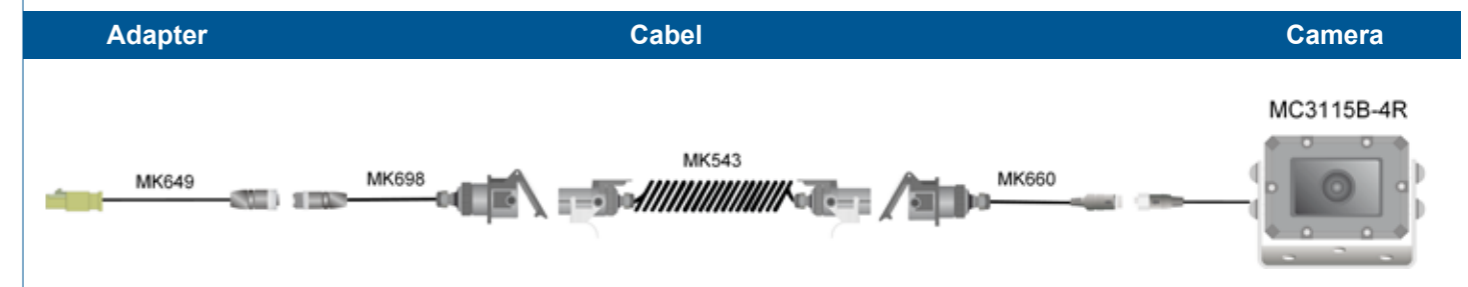
EXAMPLE:

### Terminal connection for articulated lorry



EXAMPLE:

### Terminal connection for winter road maintenance vehicle



## Cables and cable harness production

High flexibility – certified quality



### Cables and cable harnesses, cable accessories, cable protection systems and customer-specific solutions

Motec GmbH has more than 25 years of expertise in assembling high-quality, customised cable systems in Germany. At this point in time, we produce approximately 1.000 different cables in various lengths and designs.

Individually-customised solutions are our specialty: We use all standard plug-in connectors and can produce complex cable harnesses and cable sets.

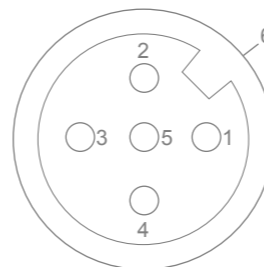
We process any type of wire or conductor, with diameters from 0.013 mm<sup>2</sup> (AWG36) to 107.2 mm<sup>2</sup> (AWG 4/0), without any limits in the number of conductors.



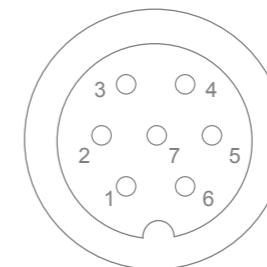
#### Certified quality for highest demands

- Pull testing
- Micrograph laboratory
- Crimp height measuring
- Automatic crimping force monitoring
- 100 % semi-automatic, logged and functional end testing
- EDP-supported merchandise management and production planning and control systems
- Operational data recording via bar code
- 100 % traceability (via batch and serial numbers)

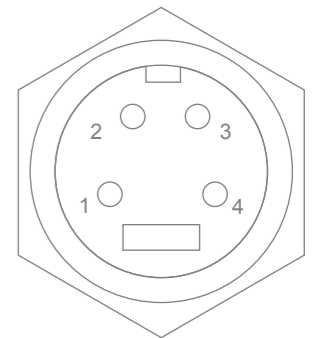
#### M12 plug connectors MKS cables



#### RD24 plug connectors MK35 cables

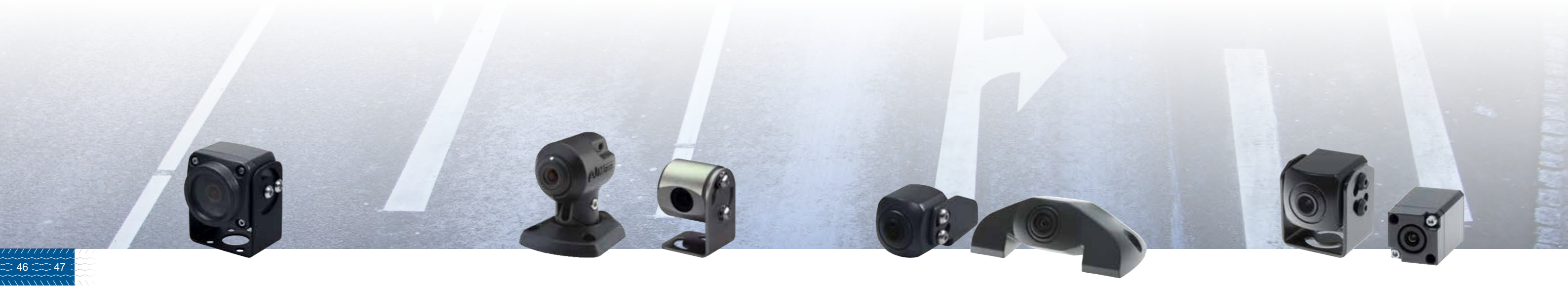


#### Mini DIN plug connectors MKW/MKWW cables



## Rear view cameras

### Overview



#### MC6000D Heavy-duty camera

The MC6000D camera was developed especially for heavy-duty applications and is not only used in **communal areas**, but also on **agricultural machinery and in freight traffic**. The robust design and special surface treatment makes it the perfect choice for use in extreme weather conditions.

**Features:**

- Interference immune electrical design
- Operating and storage temperature -40 °C to +85 °C
- Thermally hardened, undistorted glass
- 2.5 Watt window heating system
- Automotive CMOS sensor
- On-board power supply 9 V to 32 V DC
- Waterproof if submerged in water or if subjected to high-pressure cleaners (IP68 und IP69K)
- 90° or 70° horizontal angle of view

#### MC7000P/-E Heavy-duty camera

The MC7000P-E camera is a reliable heavy-duty camera that can be used in many different ways despite its **small design**. Whether as side room, mirror replacement camera or to monitor work areas inside and out - the rugged, weatherproof stainless steel housing allows it to be used in the toughest conditions.

**Features:**

- State-of-the-art image electronics (CMOS image sensor)
- Fast adaptation to ambient lighting
- Sharp, high-contrast images
- High shock and vibration resistance
- Operating temperature -35 °C to +65 °C
- Highest protection class IP69K
- 70°, 90° and 115° horizontal angle of view

#### MC7180N Heavy-duty camera

The MC7180N-4 is a heavy-duty wide-angle camera used for **360° panoramic view systems or 270° rear view/front view systems**. But the robust 180° camera can also be used as a standalone camera. The real flexibility of the camera enables adaptation to different visual requirements and vehicles, e.g. as a MC7180N-4-MH with **integral holder**.

**Features:**

- CMOS 1/3,6" image sensor with sensor resolution H 672 x V 492 pixels
- Operating and storage temperature -40 °C to +85 °C
- Resistant to high-pressure cleaners (IP69K)
- 180° horizontal angle of view

#### MC7000A Heavy-Duty camera

Due to its **compact size**, the MC7000A is a reliable heavy-duty **rear-view camera** with a 2.4 cm side length (without housing) for integration into commercial vehicle chassis. With a robust aluminium housing the camera is also used as a **side space camera** on commercial vehicles.

**Features:**

- CMOS 1/4"-image sensor with sensor resolution H 640 x V 480 pixels
- Operating and storage temperature -40 °C...+85 °C
- Resistant to high-pressure cleaners (IP68 und IP69K)
- 90°, 115° und 180° horizontal angle of view
- Very small heavy-duty camera



## Rear view cameras

### Overview

## Digital cameras

### Overview



### MC3000B Heavy-duty camera

There are no visibility issues the MC3000B with its anodised and coated aluminium housing cannot handle in robust, heavy-duty applications and under extreme weather and environmental conditions. Its numerous available view angles and plug connections make it the perfect choice for a **wide range of applications in utility vehicles and mobile machinery**.

#### Features:

- Housing made of machined aluminium
- Automatically controlled camera heating
- Automatic brightness adjustment
- Energy-efficient automotive CMOS sensor
- Sensor resolution H 640 x V 480 pixels
- Permafrost-capable to -60 °C
- Salt mist resistant
- High degree of shock- and vibration-resistance
- Waterproof if submerged in water or if subjected to high-pressure cleaners (IP68 and IP69K)
- 20°, 40°, 70°, 90°, 100° and 115° horizontal angle of view (other angles upon request)

### MC3000C-IR/-WL Heavy-duty camera

The MC3000C-IR/-WL is a heavy-duty camera with **infrared LEDs (night vision) or white light LEDs**. Both cameras automatically switch to LED mode as darkness sets in. The IR and WL version is characterized by high electromagnetic compatibility (EMC). The development is based on the high demands of industry and defense.

#### Features:

- Energy efficient automotive 1/4" CMOS sensor
- Sensor resolution H 640 x V 480 pixels
- Infrared lighting with a wavelength of 850 nm or White light with a 120° beam angle
- FBAS 1Vss interface
- Resistant to water immersion and high pressure cleaners (IP68 and IP69K)
- 20°, 40°, 70°, 90°, 100° and 115° horizontal view angle (depending on model)
- Operating temperature -46 °C...+55 °C (IR mode) or -46 °C...+85 °C (without IR mode)

### MCDE3000-FullHD Ethernet camera

The MCDE3000-FullHD is a FullHD Ethernet camera suitable for mobile use. It can be utilised in networks compliant with IEEE 802.3 (LAN). Fitted with intelligent image processing, a high optical dynamic range (HDR) and dynamic overlays, it functions as a **smart sensor** in a variety of applications. For example, it can be integrated into existing **video monitoring systems** or used for **video streaming** across large distances.

#### Features:

- Energy efficient automotive 2 megapixel 1/2.7" CMOS sensor
- Integrated FPGA-based video processing
- Sensor resolution H 1920 x V 1080 pixels
- Interfaces: 100 Mbit/s Ethernet in accordance with IEEE 802.3, IP, TCP, UDP, HTTP, RTP, RTSP
- Resistant to water immersion and high pressure cleaners (IP68 and IP69K)
- 100° horizontal view angle (other view angles on request)
- Operating temperature -30 °C...+85 °C

### MCDE7000-FullHD Ethernet camera

The MCDE7000-FullHD is a FullHD Ethernet camera suitable for mobile use. It can be utilised in networks compliant with IEEE 802.3 (LAN). Fitted with intelligent image processing, a high optical dynamic range (HDR) and dynamic overlays, it functions as a **smart sensor** in a variety of applications. For example, it can be integrated into existing **video monitoring systems** or used for **video streaming** across large distances.

Also available as BroadR-Reach camera (MCDB7000-FullHD) and as LVDS camera (MCDL7000-FullHD).

#### Features:

- Energy efficient automotive 2 megapixel 1/2.7" CMOS sensor
- Integrated FPGA-based video processing
- Sensor resolution H 1920 x V 1080 pixels
- Interfaces: 100 Mbit/s Ethernet in accordance with IEEE 802.3 RTP, AVB, UDP
- Resistant to water immersion and high pressure cleaners (IP68 and IP69K)
- 0°, 40°, 70°, 90°, 100°, 115° and 180° horizontal view angle (other angles on request)
- Operating temperature -40 °C...+95 °C

## Monitors

### Overview



#### MD3071A/MD3071A-V Heavy-duty monitor

Due to its compact and versatile design and its integrated functions, the tough heavy-duty MD3071A monitor offers a wide range of applications, for example the **horizontal and vertical version** in the **270°/360° bird's eye view system** (MVS). The software update option ensures that the MD3071A/-V is always up to date and thereby future-proof.

**Features:**

- 7" monitor (17.8 cm diagonal)
- PAL/NTSC video system
- Supply voltage 9 V to 60 V DC
- Up to 2 cameras and an additional external video controller (for up to 4 additional cameras) can be connected
- Auto dimmer function
- Illuminated keyboard
- Deep light protection cover (impact-protected) as standard
- Made in Germany

#### MD3072B-Quad Heavy-duty monitor

The MD3072B-Quad monitor has an integrated video control unit. Up to **4 camera** feeds can be displayed **simultaneously**. An integrated menu function and control cables to the automatic controls of the connected cameras ensure quick image changes.

**Features:**

- 7" monitor (17.8 cm diagonal)
- Instant connection of up to 4 cameras
- Split screen (up to 4 video sources simultaneously)
- Manual or automatic camera selection
- Image mirroring (by camera)
- High shock and vibration resistance
- Integrated Video control unite

#### MD3073 Heavy-duty monitor

The **waterproof and dustproof** monitor MD3073 was specially developed for mobile machines in which moisture and dust play a role. Mainly it is used in the forklift and logistics area (**cold store operation**). Furthermore, the robust monitor is used on construction and agricultural machinery as well as foundry vehicles. Especially its use in **alternating operation in cold and warm temperatures** are its strengths.

**Features:**

- 7" monitor (17.8 cm, measured diagonally)
- Up to 2 cameras and an additional external video controller (for up to 4 additional cameras) can be connected
- Water and dust-proof
- Horizontal and vertical image mirroring
- PAL-480 representation (no image distortion)
- Automatic brightness adjustment
- Administrator and user rights
- Advanced expert settings function
- Protection class IP67

#### MD3100 Heavy-duty monitor

The MD3100A has a **10" screen** and thereby is suitable to simultaneously display multiple camera images. For **industrial use** it was equipped with a powder coated metal housing, which fulfills the protection class IP54 on the front side.

**Features:**

- 10" monitor (25.9 cm diagonal)
- Picture in Picture display (PiP)
- Sturdy metal housing
- Front side compliant with protection class IP54
- For ultra-severe environmental conditions
- Power supply via video control unit

## Video control units

### Overview



#### MB1205 Video control unit

The MB1205 is a **video control unit** for 2 cameras mounted on tractor vehicles. The functions of the MB1205, e.g., automatic switching of camera images for articulated trucks, cycle signals to activate the camera change-over, adjustable image mirroring for each camera, and third-party installations, are the outstanding features of the video control unit.

**Features:**

- Up to 2 cameras in single image display
- Camera switching via trailer and indicator signal detection
- Image mirroring can be configured separately for each camera (with Motec monitor only)
- On-board network integration capability (9 V...60 V DC)

#### MB1405-Quad Video control unit

The **video control unit** MB1405-Quad allows the display of up to 4 camera images simultaneously in what is referred to as quad split mode.

The supplied remote control is used to automatically control or manually switch between the different camera images.

**Features:**

- Integrated quad split function:
  - Display of up to 4 camera images available
- Selection of the camera to be activated via control leads or operator control unit
- Power supply of TFT monitor and 4 heavy-duty cameras
- Separate setting of image mirroring
- Automatic trailer detection of articulated trains

#### MVCU1300 Video control unit

The MVCU1300 is an intelligent, **CAN-controlled** video control unit that **combines additional sensor information** (such as ultrasound distance information) and displays this data on up to 2 monitors.

**Features:**

- Connection of up to 12 analogue or digital single-wire sensors
- Connection of up to 10 sensors on CAN bus
- Connection of one LASER (I/O) per control lead
- Control via CAN bus (MSB 2.0) and/or 4 control leads
- A CAN data bus is used to display the imported sensor data
- MVCU acts as power supply

#### MVCU1400 Video control unit

The MVCU1400 is an intelligent, **CAN-controlled** heavy-duty multi camera video control unit, that processes up to 4 camera images and displays them on up to 2 monitors in a variety of modes.

**Features:**

- Connection of up to 4 heavy-duty cameras or 3 heavy-duty cameras plus one motor zoom camera
- Control via CAN bus (MSB 2.0), a monitor toggle lead and/or 4 control leads
- Main monitor output as single, split, triple or PiP (freely configurable),
- Quad and OSD in 4 colours
- 2. Monitor output (single, split, quad)

## Video control units

### Overview

## Accessory

### Overview



### MVCU1600

#### Video control unit

The MVCU1600 is an intelligent, CAN-controlled, **high end heavy-duty multi camera-video control unit**, that processes up to 8 camera images and distributes them to 5 monitors in a variety of modes and with individual overlays.

**Features:**

- Connection of up to 8 heavy-duty cameras
- Display on up to 5 monitors
- Monitor output with flexible display options
- Display of symbols, logos and images available

### MVCD1000

#### Video control unit

The MVCD1000 is a **digital heavy-duty multi camera-video control unit**, that can process up to 4 camera images in parallel, can consolidate additional sensor data, and can display this data via an analogue monitor output or via an Ethernet video stream.

**Features:**

- Video input up to 4 cameras (PAL/NTSC)
- Integration in vehicle electronic via bidirectional control lead, CAN interface or Ethernet connection
- System expandable with active sensors such as radar or ultrasound
- Altera FPGA (SoC) with 925 MHz dual-core ARM Cortex-A9 MPCore processor, 1GB RAM, 4 GB flash (expandable)
- Prepared for future requirements thanks to software updates

### MVRD1000

#### Digital wireless system

The digital wireless system MVRD1000 is a robust transmitter/receiver system that uses **wireless image transmission**. Using the compact wireless units, digital camera signals are quickly and without delay sent over long distances to the monitor.

**Features:**

- Range approx. 120 metres
- Up to 10 parallel equipment pairs
- Robust metal housing
- Operation and status display
- Small, compact design
- Water- and dust-tight (IP69K)
- Rugged plug-in connectors
- Low power consumption

### RS3000

#### Cleaning set

The **high pressure cleaning set for MC3000B** series cameras can be used to clean dirty camera front panels, even when driving. It consists of a bracket with cleaning model, the hosts out with 5 metres of hoses and a 13 litre water tank with bracket.

**Features:**

- Operation using universal switch or MD3071A monitor
- Operating temperature -10 °C...+70 °C
- Suitable for frost protection additive

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