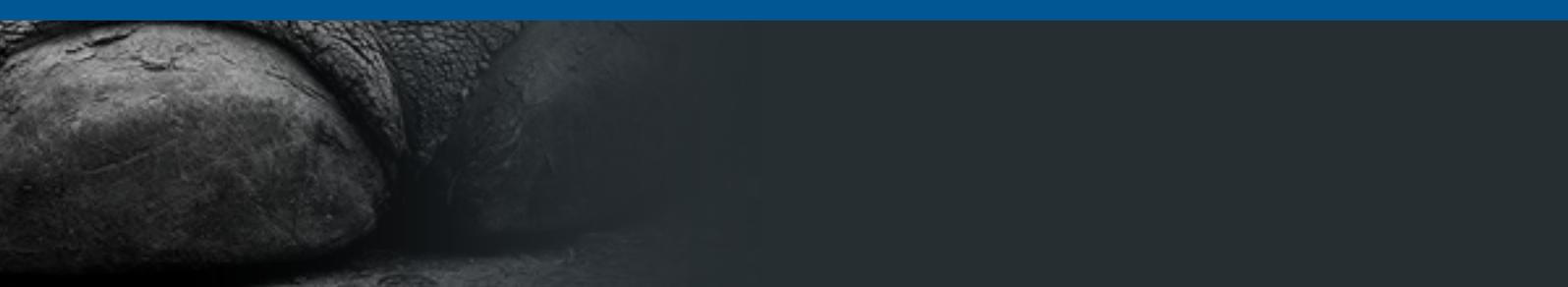




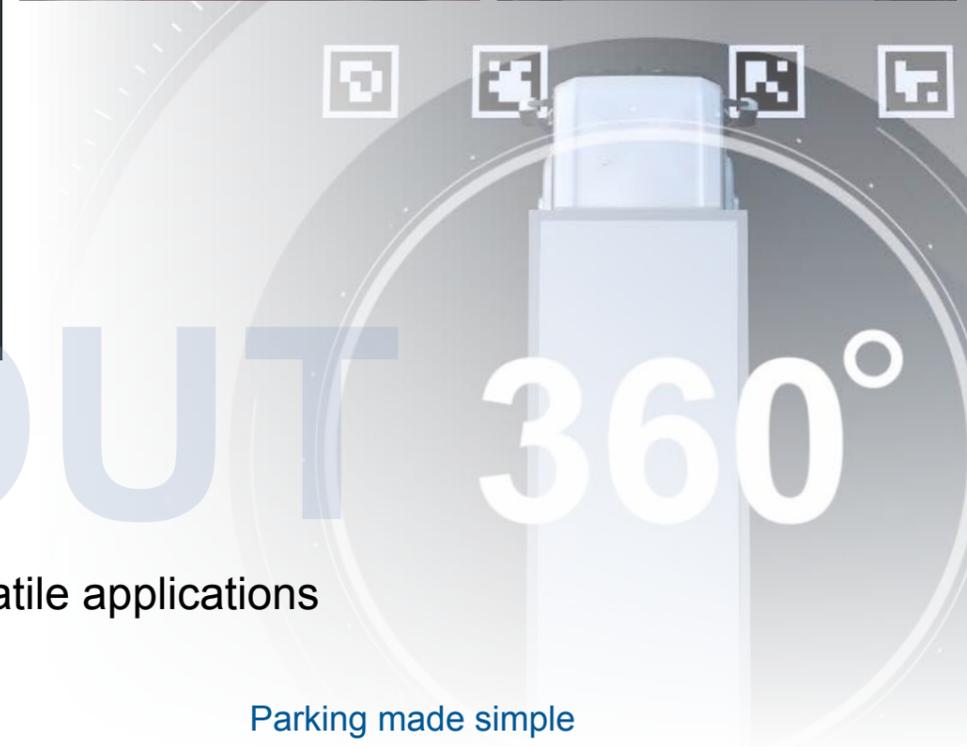
MVS – Mobile Vicinity Scout
Heavy-Duty 360°-Bird View System





An overview of the advantages

- Flexible adaptations to all vehicle geometries and viewing requirements
- A wide variety of display modes and overlays
- Active collision warning in connection with ultrasonic or radar sensors
- Vertical or horizontal alignment of the monitor
- Simple on-board calibration without a laptop or time in the workshop being required
- Robust hardware and software "Made in Germany"



MOBILE VICINITY SCOUT

Seamless visibility around the vehicle

An overview of the MVS system

The Motec Mobile Vicinity Scout is a rugged bird view system intended for utility vehicles and mobile machinery. It provides the operator with a clear, seamless and intuitive 360° view around the vehicle.

The Motec Mobile Vicinity Scout complies with all requirements applicable to the heavy-duty and utility vehicles deployed in the construction industry, for the municipal and other freight traffic, in the agricultural and logistics industry. The rugged design guarantees a long service life under rough conditions. Its flexibility allows the adaptation to a variety of vehicles and associated visibility problems. Thus, the Motec MVS systems protect lives, help people, and save money.

The interfaces – CAN-bus, control lines, and Ethernet – make a comprehensive integration into the vehicle's electronic system possible and enable the link to other sensors. The system can be calibrated within minutes – only one person is required. A laptop or a service call are not needed.

All hardware and software components are made in Germany. The parts are developed, programmed, and produced coming from a single source – Quality "Made in Germany".

One system – versatile applications

Manoeuvring made easy

Manoeuvring through narrow passages with ease: The 360° panoramic view of the Motec MVS system supports the vehicle operator when manoeuvring in the tightest spaces. And he can do that fast and without leaving the cabin. This makes it easy to approach ramps and avoid obstacles.

Starting without risks

Moving the vehicle forwards or reversing the vehicle: The 360° panoramic view monitor of the Motec MVS shows the operator immediately whether there is someone in front, next to or behind his vehicle.

Parking made simple

Blind spots are a thing of the past: Whether mounted onto the vehicle, the machine or the trailer, when reversing into a park space, the split screen display provides the operator with a clear view of the surroundings and the rear of his vehicle.

Turning corners made easy

No risk for cyclists or pedestrians: With the assistance of the Motec MVS system, the operator can early detect potential dangers in blind bends when making left- or right-hand turns.

360° panoramic view

4 camera system

4 wide angle cameras (180° view angle) on each side of the vehicle monitor the vehicle in all directions and provide unlimited 360° panoramic view of all sides, the front, and the rear areas. Depending on the particular application, the viewing range around the vehicle can be up to 7 metres.

270° view of the rear or front area

3+1 camera system

Depending on the vehicle and the application, the system may also be equipped with 3 wide angle cameras – providing a 270° view of the vehicle's sides as well as the front or rear area.

A fourth camera is especially designed to monitor equipment, loads, cargo, coupling, trailer as well as front or rear attachments. All this to protect lives, help people, and save money.



AN OVERVIEW OF THE SYSTEM COMPONENTS

The MVS system is adaptable to many different vehicle geometries and visibility requirements.



MC7180N-4

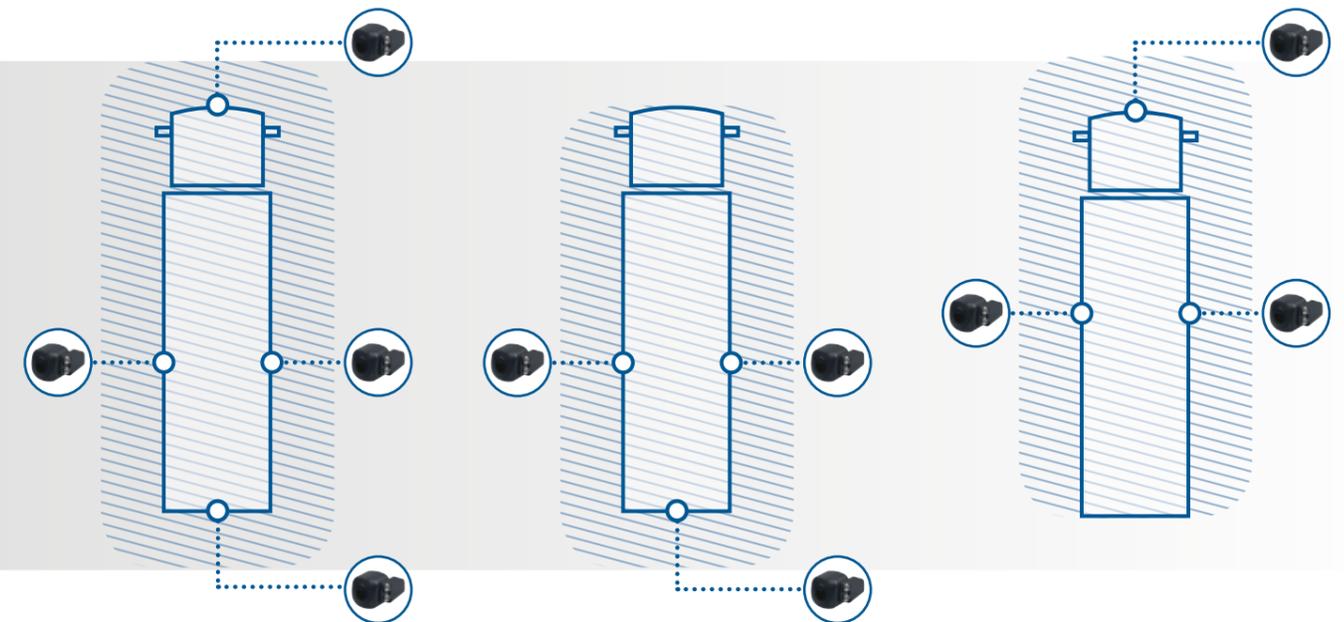
The MC7180N-4 **wide angle camera** is a rugged camera for the Motec Heavy-Duty MVS bird view system. The 180° view angle and its small design make it easy to install the unit to a variety of vehicles and to different visibility requirements. The camera's housing can easily absorb shock impacts up to 50 g and oscillations up to 10 g; and it is resistant against high-pressure cleaners. The energy-efficient automotive CMOS sensor continuously delivers an excellent image quality at operating temperatures between -40 °C and 85 °C.

MD3071A/MD3071A-V

The 2 designs (horizontal and vertical) of the monitor MD3071A offer a variety of application options in the heavy-duty range. The menu can be used to connect up to 2 cameras directly, and an additional video control unit can be used to link up to 4 additional cameras. The unit uses a background illumination of 500 cd/m² and a contrast ratio of 800, which ensures to deliver a brilliant image at the highest possible quality. Furthermore, the camera can withstand operating temperatures from -30 °C to +80 °C. The **display** is equipped with an illuminated keyboard and an automatic dimming function.

MVCD1000

Equipped with an Altera FPGA (SoC) with 925 MHz dual-core ARM Cortex-A9 MPCore processor, 1 GB RAM, 4 GB Flash (expandable) and a functionally expandable embedded Linux, the MVCD1000 is a heavy-duty **video control unit** which can be used universally. The camera is equipped with 4 video inputs (PAL/NTSC). It can use a bi-directional switch line and CAN interface to be integrated into the vehicle's electronics system. The MVCD1000 is protected from dust, is resistant to water jets and is immersion proof (IP65 and IP68).



360° panoramic view

270° rear view

270° front view

Blending process

Flexible and reliable

During the blending process, the video images of the 4 wide angle cameras are combined to generate a 360° panoramic view, without losing any image information in the corners of the vehicle. The video control unit combines the 4 images – which overlap at the edges – and creates an overall image (referred to as ‘stitching’). During this process, the pixels are blended using different blending methods.

The standard Motec MVS system uses 4 different blending processes to be selected from the menu in order to meet individual viewing requirements. The MVS system also allows the operator to implement user-specific settings for the blending process.

INDIVIDUAL AND ACCURATE TO THE VEHICLE’S CONTOUR

The blending processes can be individually adjusted for each corner/camera.

Complete mix blending
For the presentation of small objects (“highest security”)

Tile mix diagonal blending
Providing a representation of the surroundings that is as realistic as possible

Level mix blending
Enables the observation of objects close to the vehicle

Stitching
In order to observe larger objects (“highest image comfort”)

FREELY CONFIGURABLE OVERLAYS

assist while driving, manoeuvring, and positioning.



Examples: Dangerous areas are always created when turning corners, reversing into parking space, inside the radius of the swivel arm of suction and cleaning vehicles, around support points of the concrete pump’s bases, the unloading zone of grape harvesters.

Overlays

Marking of special action zones

While in the bird view, it is possible to superimpose the camera image with individual overlays.

The following complex geometric shapes are available: circles, ellipses, rectangles, polygons, and lines. All of them can be tailored to meet the shape of the vehicle.

Here, the user can select between filled surface views and contour views. He may define a variety of colours, line thickness and transparency levels from 0 to 100%.

270° view and monitoring of equipment

Example of an application for excavators and construction machinery



Markings driven over and damaged, damage to property and personal injuries are typical examples of the limited view the operator of an excavator on construction sites has to deal with every day. The 3 wide angle cameras of the MVS system provide the operator with a 270° view that is unobstructed and covers both sides and the rear of the vehicle. A fourth camera is mounted onto the arm of the excavator and monitors the equipment and the load.

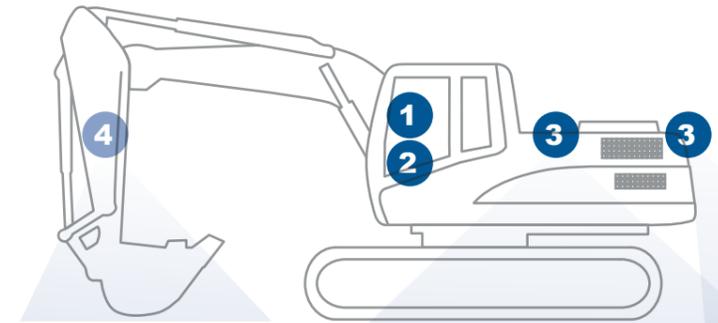
This ensures the ergonomic, efficient and cost-effective completion of work. This means, no unnecessary contorting of the operator's upper body, resulting in more fluid and faster motions, preventing personal injuries and damage to material and machine.

DANGER DUE TO LIMITED VISIBILITY

The design of utility vehicles and mobile machinery is complex and working with them can be dangerous.

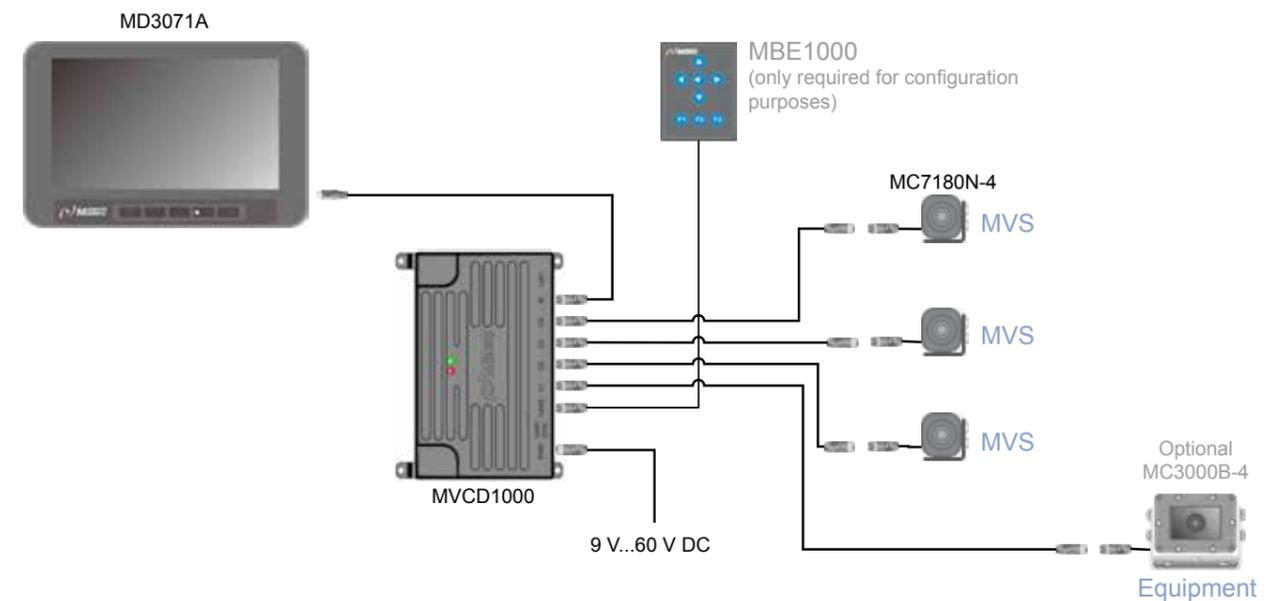


Left: Camera inside boom to monitor the working area
Centre: Camera to monitor the vehicle's sides
Right: Camera to monitor the vehicle's rear area



EXAMPLE: Excavator with 270° system

- | | | | |
|---|--|--|--|
| 1 MD3071A Heavy-duty monitor | 2 MVCD1000 Video control unit | 3 MC7180N Wide angle camera | 4 MC3000B Heavy-duty camera |
|---|--|--|--|





270° or 360° panoramic view
Application example of tractors and harvesters



Areas which cannot be observed or allow only a limited viewing area by the operator of large agricultural machinery are a high safety risk for man and machine. Here too, the MVS system uses the video control unit to combine the images of 3 or 4 cameras to an image from the bird's perspective. The driver sees the immediate surroundings of his vehicle and thus is supported during manoeuvring, passing through narrow town roads and farm buildings and in case of a swerving of the rear.

If using the 270° system, a fourth camera can be optionally used to monitor work processes, for example the transfer of loads, when transporting crop or in order to monitor the filling level in the tank of a seed drill. This increases efficiency and saves costs.

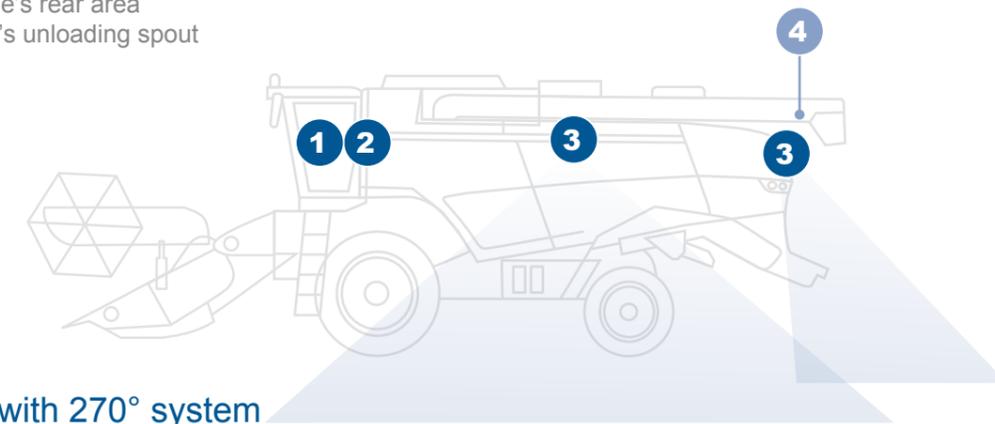


THIRD-PARTY TERMINALS

Display of MVS image also on factory-installed video-compatible monitors.

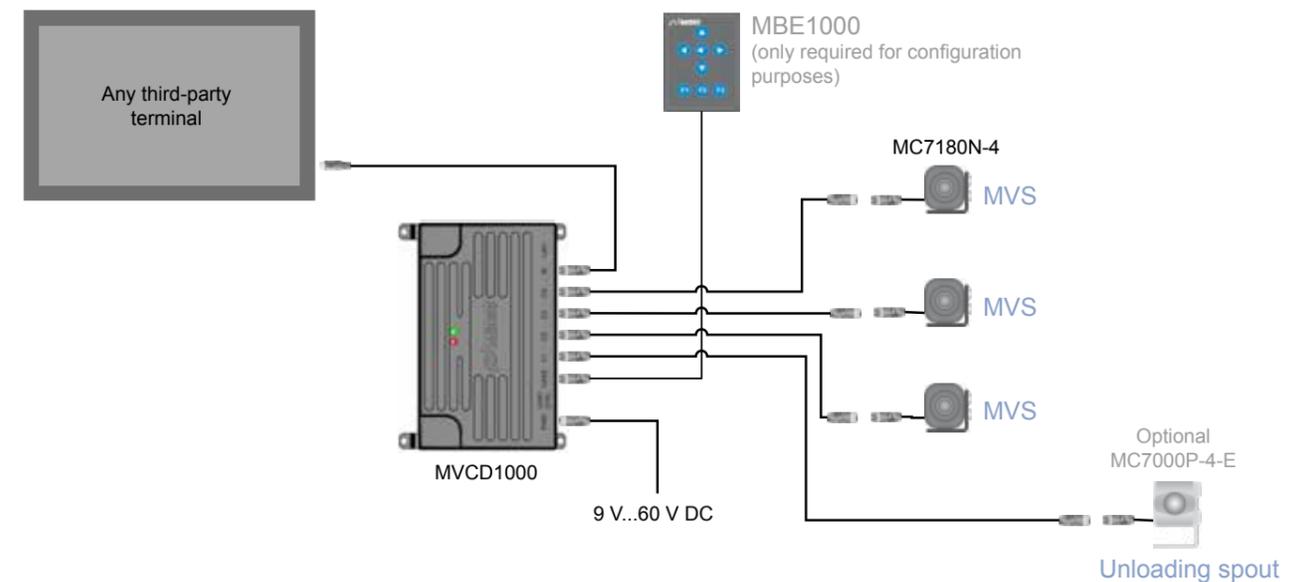


Left: Camera to monitor the vehicle's sides
Centre: Camera to monitor the vehicle's rear area
Right: Camera to monitor the vehicle's unloading spout



EXAMPLE:
Combine harvesters with 270° system

| | | | |
|---------|--------------------------------|------------------------------|----------------------------------|
| 1 | 2 | 3 | 4 |
| Monitor | MVCD1000 Video control unit | MC7180N Wide angle camera | MC7000P-4-E Heavy-duty camera |



270° or 360° panoramic view
Application example for forklift trucks

When using fast-moving and highly manoeuvrable industrial trucks, the Motec MVS system with its all-round view from the bird's perspective reduces the risk of injury to people, limits the damage to goods, high-rack storage systems and the vehicle itself.

3 wide angle cameras allow the driver to capture his immediate surroundings. A fourth camera on the mast – adjusted to capture the view across high and bulky loads – is used to monitor the storage aisles or if installed as a fork-mounted camera for correct positioning of the fork.

In addition, the quality of the workplace is improved by the more ergonomic seating position of the driver.



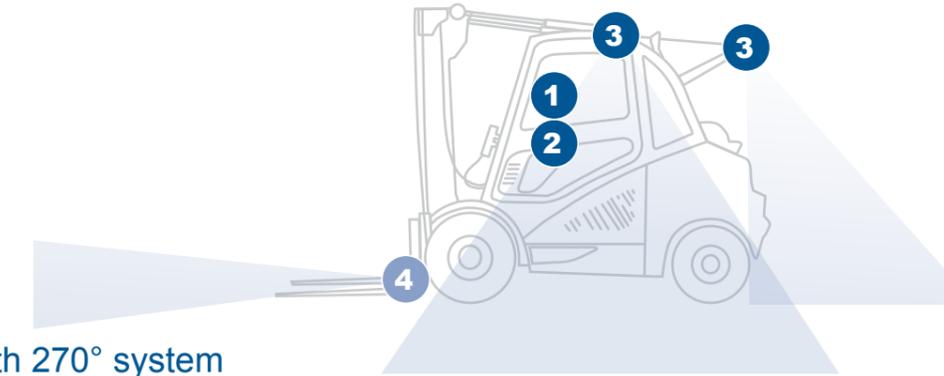
NO MORE DANGER BY BLIND SPOTS
Obstacles of all kinds can be detected quickly and intuitively.



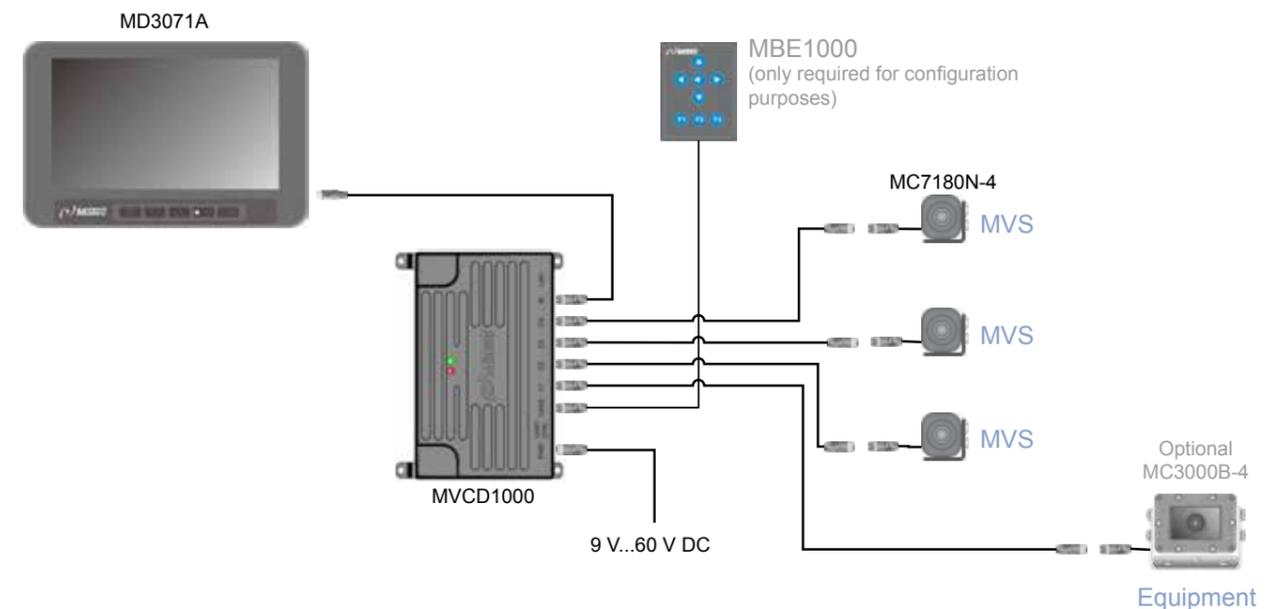
Left: Camera to monitor the vehicle's sides
Centre: Camera to monitor the vehicle's rear
Right: Camera to monitor the forklift truck



EXAMPLE:
Counterbalance truck with 270° system



- 1
MD3071A
Heavy-duty monitor
- 2
MVCD1000
Video control unit
- 3
MC7180N
Wide angle camera
- 4
MC3000B
Heavy-duty camera





360° panoramic view

Application examples for transport, municipal, and emergency vehicles



In addition to the dangers associated with normal road traffic, manoeuvring and start-up operations, reversing and passing narrow roads, drivers of municipal vehicles must pay more attention to obstacles such as pedestrians and cyclists as well as pillars and lanterns.

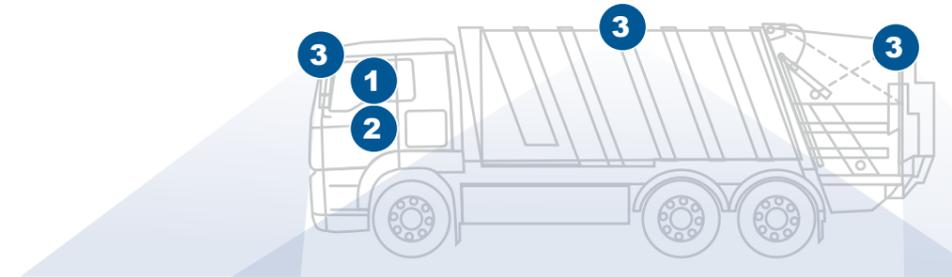
The Motec bird view system helps to protect life by improving the driver's overall view, reducing the risk of accidents, and helping people by optimising their sitting posture. The system reduces costs by minimising damage and downtime.

HORIZONTAL AND VERTICAL MONITOR VERSION

Depending on the application, for example the 360° view system, the vertical monitor installation is more advantageous.

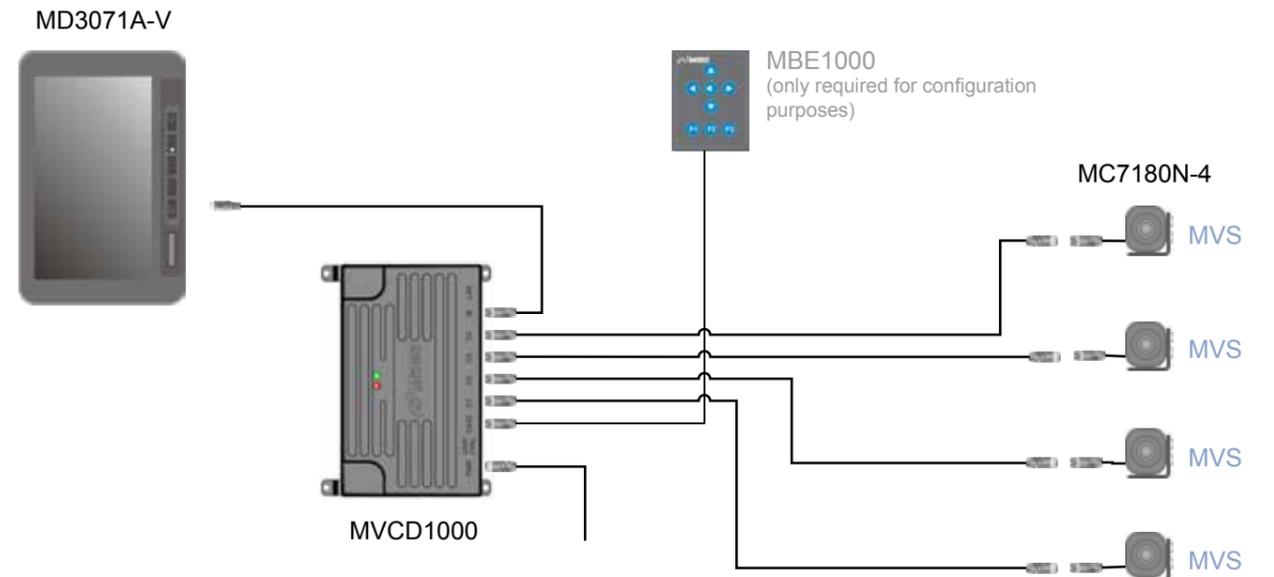


Left: Camera to monitor the vehicle's front
Centre: Camera to monitor the vehicle's sides
Right: Camera to monitor the vehicle's rear area



EXAMPLE:
Refuse collection vehicle with 360° system

- 1 **MD3071A-V**
Heavy-duty monitor
- 2 **MVCD1000**
Video control unit
- 3 **MC7000N**
Heavy-duty camera



Supplementary sensors

Ultrasonic and radar sensors

By incorporating ultrasonic or radar sensors, the driver is additionally supported during monitoring the surroundings. The distance of detected persons or obstacles is displayed as a coloured warning area/overlay on the monitor. An internal buzzer supports the visual displaying by an interval beep.

To monitor the close proximity area around the vehicle (up to 3 metres) up to 12 ultrasonic sensors can be connected by using a video control unit.

For ranges up to 50 meters (depending on vehicle, application and speed), radar sensors supplement the MVS system.

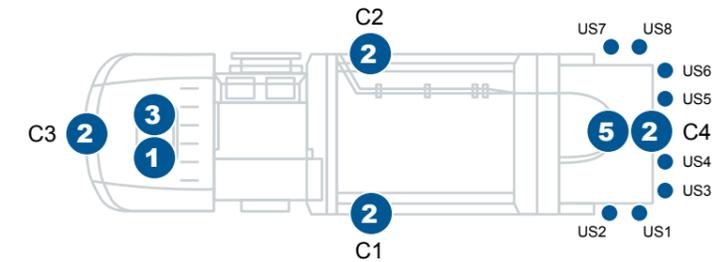


INTERFACES

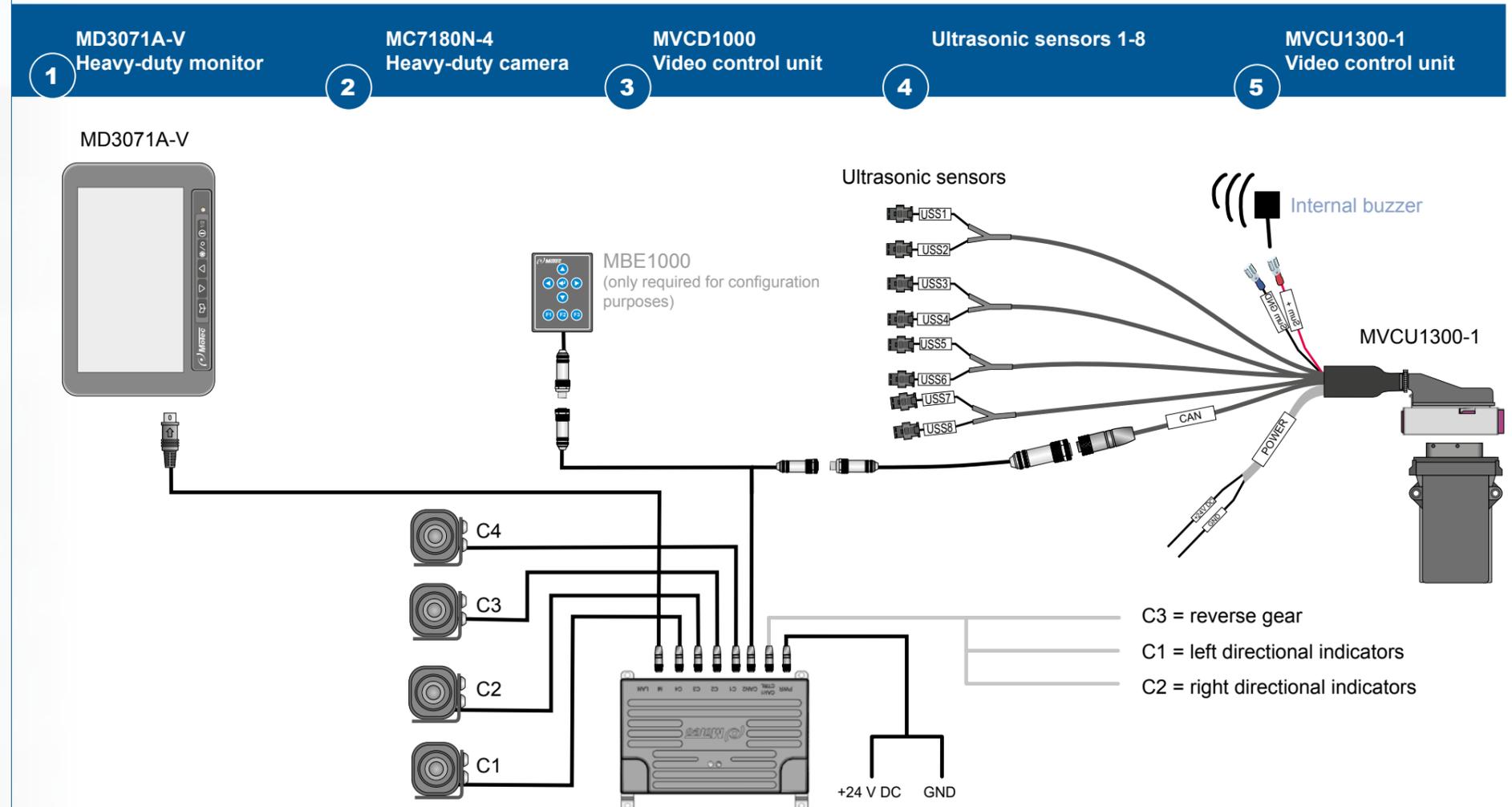
CAN bus, control lines, and Ethernet.



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



EXAMPLE: MVS with ultrasonic system



Calibration

Determining the visible areas

In order to calibrate the system, the vehicle must be on a level ground and the clearance around must be at least 3 meters.

When laying out the calibration markers, measuring the length and width of the vehicle (distance of the calibration marker) and entering the information via the monitor into the system, the corresponding viewing area is calibrated.

At the corners, 2 images are superimposed. The visual range of the 2 superimposed images is set to the required conditions in the menu item 'Blending'.

Once all settings have been completed, the semi-automatic calibration is started. The system automatically calibrates itself. If necessary, this process can also be performed manually.

For videos of the calibration process, visit our YouTube site at www.youtube.com/user/MotecCamera



EASY ON-BOARD CALIBRATION PROCEDURE

Installation and calibration at any time without a laptop and without a visit at the vehicle workshop.



Left: Arranging the tags

Centre: Measuring the distances or dimensions of the vehicle inclusive its add-on components

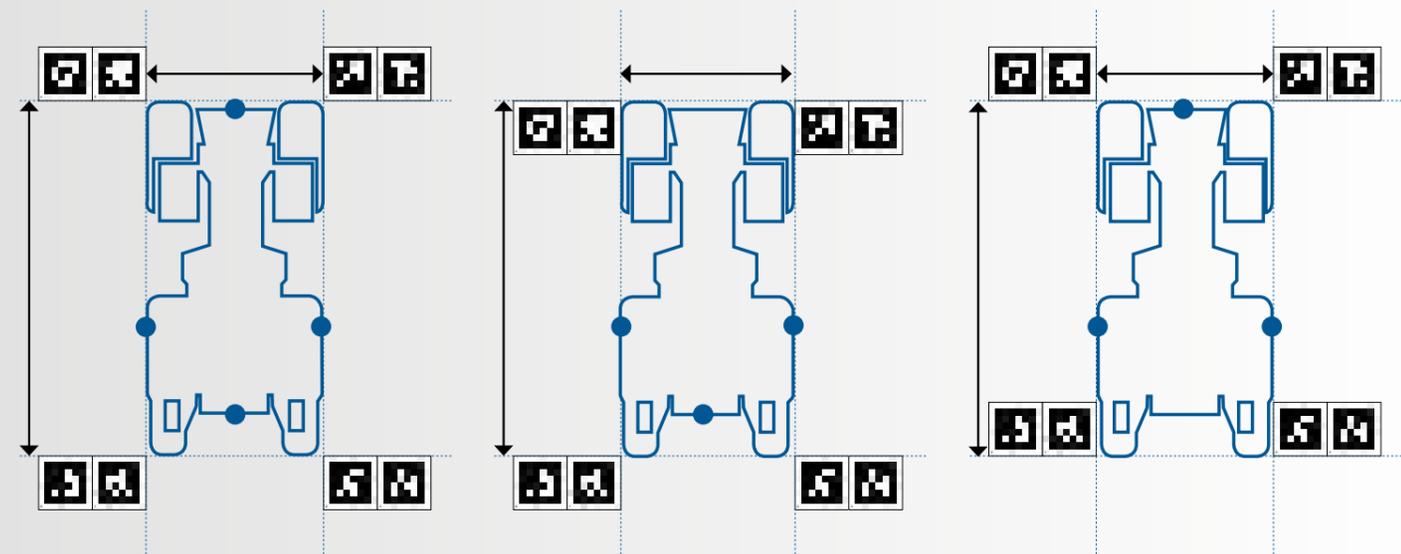
Right: Starting the semi-automatic calibration

Function monitoring

The system stability is continuously monitored and ensured by built-in safety functions. If a malfunction occurs, for example a camera failure, the system is restarted, preventing a freezing of the image.

Control lines

The video control unit of the MVS system has 4 control lines, which are freely configurable and can be connected to the vehicle electrical system. Thus, it can be determined that the reversing camera is displayed in a split screen mode if a specific signal is transmitted, such as shifting into the reverse gear.



Marker positioning for 360° panoramic view

Marker positioning for 270° rear view

Marker positioning for 270° front view

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