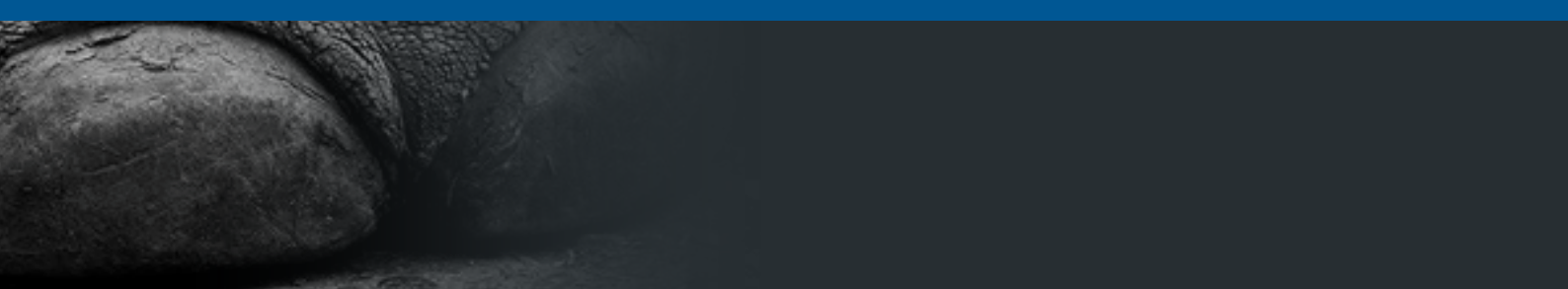


Motec camera system for construction equipment
More safety, fewer accidents



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.

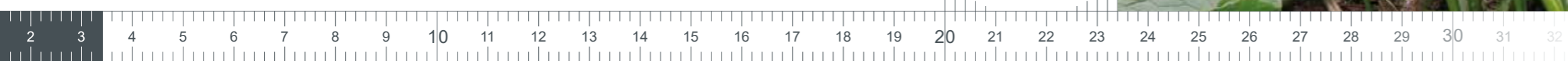
Motec has over 25 years of experience in the construction and manufacture of robust, reliable mobile cameras, including the associated electronics.

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 system for construction machines

Motec camera monitoring systems ensure that the operators of large and complex construction machines and vehicles are able to move them safely and more efficiently. Thanks to the ultra-rugged and strong heavy-duty cameras, the operator can early detect people and objects in the machine's danger zone. Thus, Motec camera systems do their part in complying with the requirements of the Machinery Directive 2006/97/EC. For excavator and front-end loaders in particular, the Motec camera monitoring systems meet the visibility requirements defined in ISO 5006 and ISO 16001 – protecting lives, avoiding accidents, and saving money.

This brochure contains a presentation of our selection of possible system solutions for your applications.

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

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 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)

Content

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Front-end loaders

Rear-space monitoring in loading mode

Reversing front-end loaders is dangerous due to the size of the vehicle and the very limited visual range of rear mirrors. Mirrors vibrate during movement, become dirty in poor weather and distort the real picture. Hence, the risk of "driving blind". Camera monitoring systems assist the driver by displaying crystal clear images of the blind areas on the monitor and enabling him to survey the entire working area at one glance.

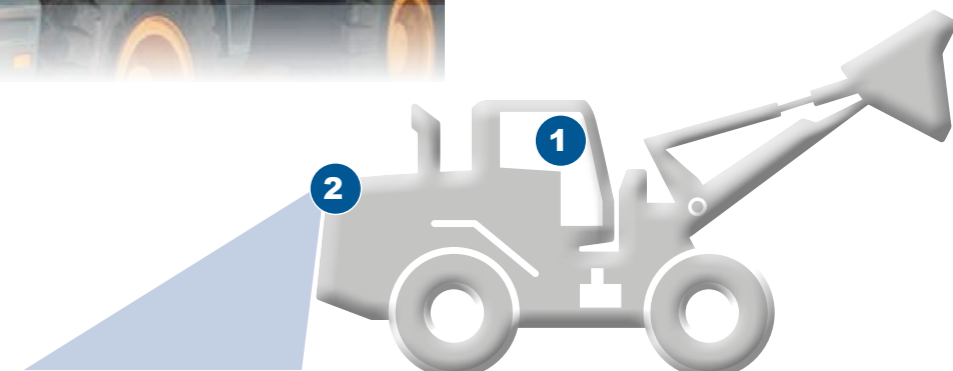
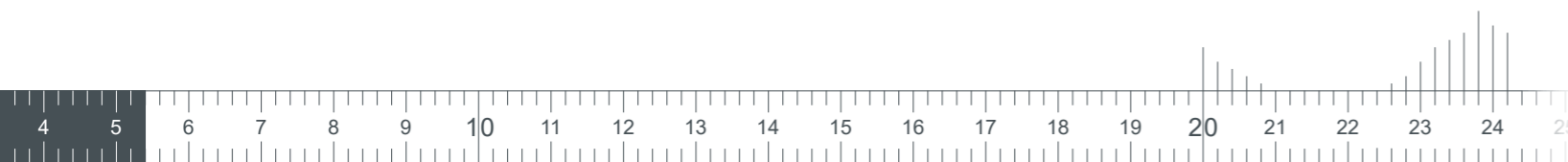
Ergonomic, efficient, and cost-saving working is ensured; that is, no twisting the upper body; fluid and fast working and no damages to people, material, or the machine.



Front-end loader with the MD3071A heavy-duty monitor for rear-space monitoring. The display provides a crystal clear representation of the camera images.

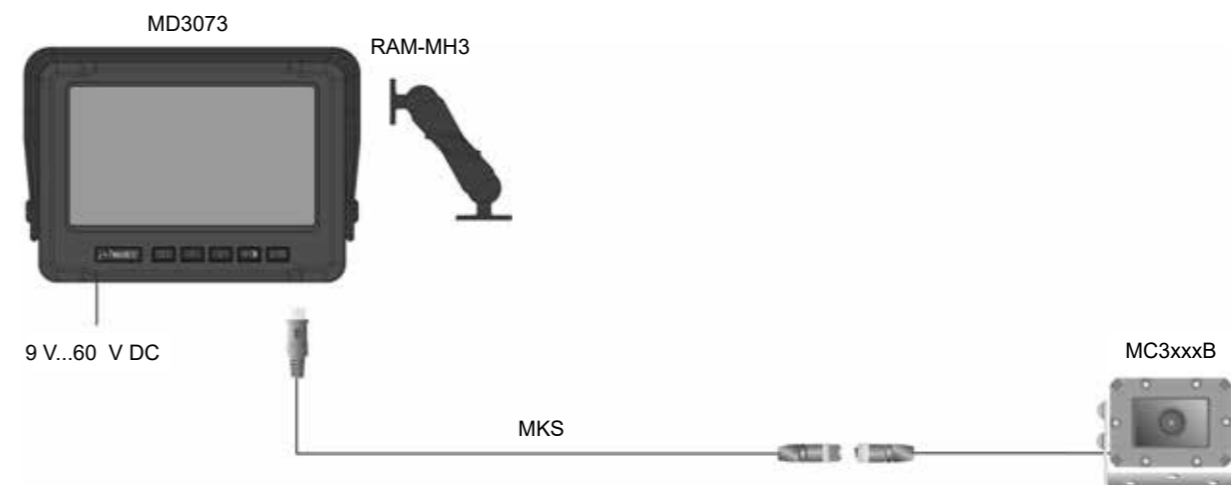


Front-end loader with MC3000B heavy-duty monitor at the rear for rear-space monitoring.



EXAMPLE:
Front-end loader

1 MD3073 Heavy-duty monitor	2 MC3000B Heavy-duty camera
--	--



Crushers and riddles

Controlling the filling level and avoiding material build-ups

Efficiency is the keyword for complex crusher systems. Overload due to material build-up interrupt the crushing operation and cause delays and, ultimately, higher costs. Camera monitoring systems combined with digital radio prevent an overload of the machines.

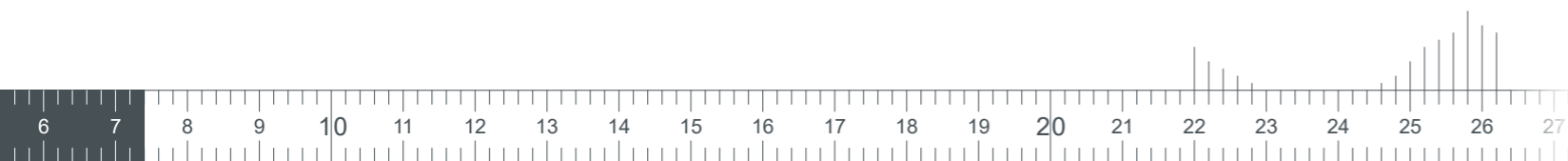
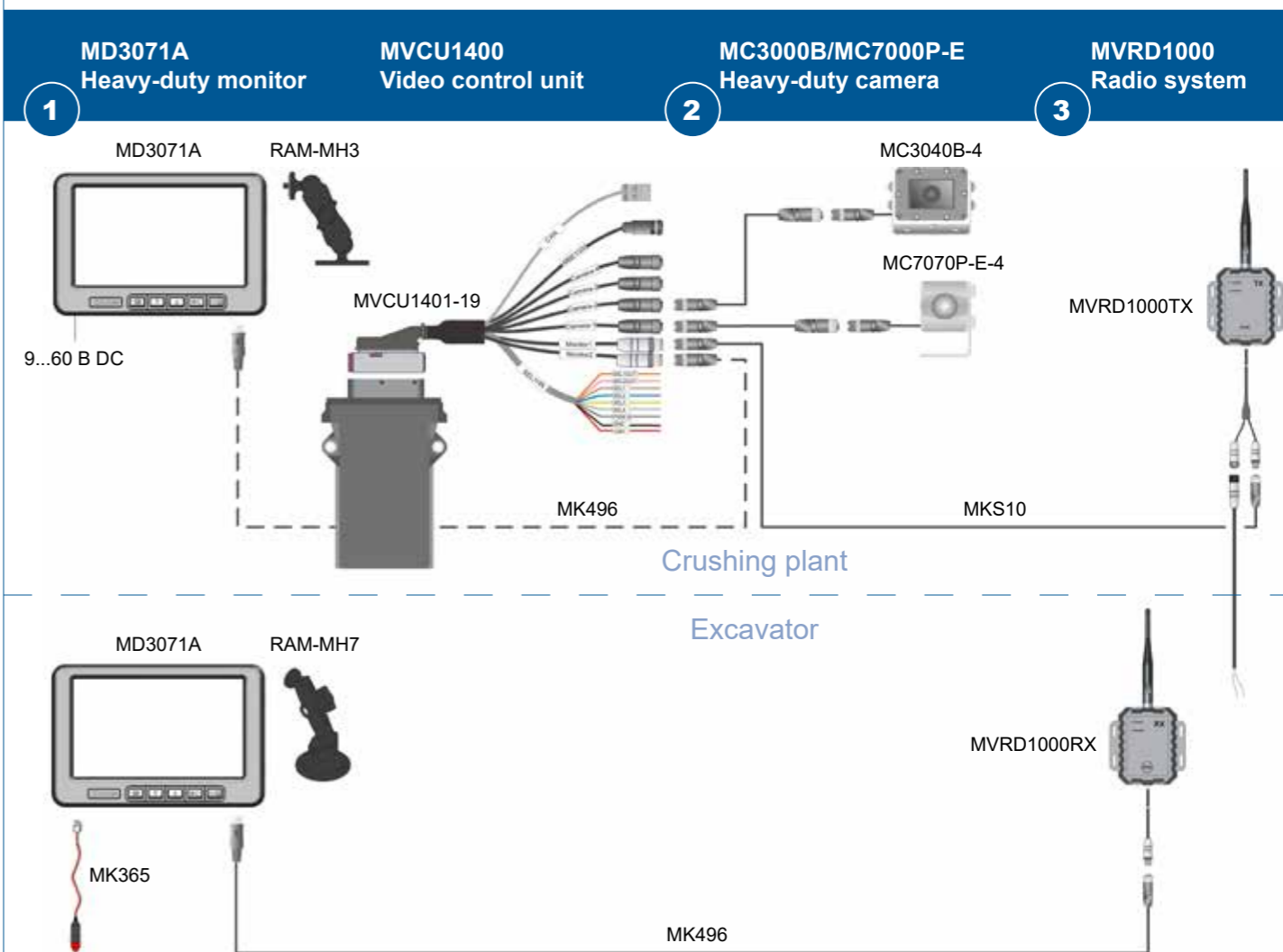
Up to 10 parallel-running systems allow high flexibility, in particular in the adaptation of crusher systems switched in sequence. The robust MVRD1000 sender/receiver system provides the drivers of front-end loaders and excavators with a simultaneous camera image of the situation at the crusher or riddle. Material build-ups of foreign matter in the feed hopper are detected early.



Timely intervention before material build-ups ensures smooth operation.



EXAMPLE: Crushers and riddles



Excavators and construction machinery

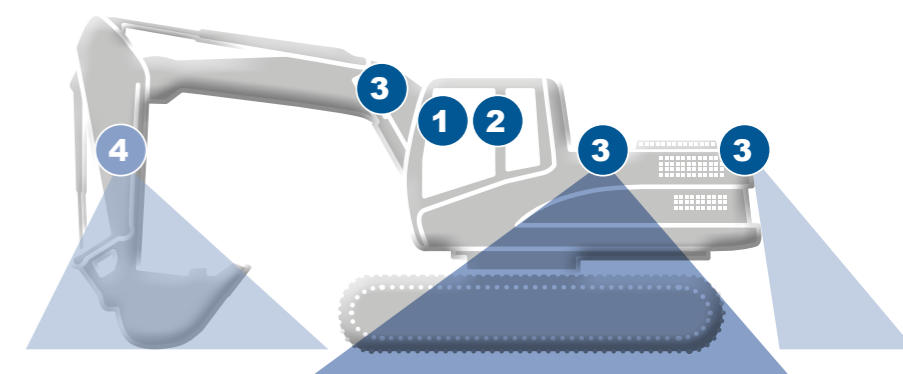
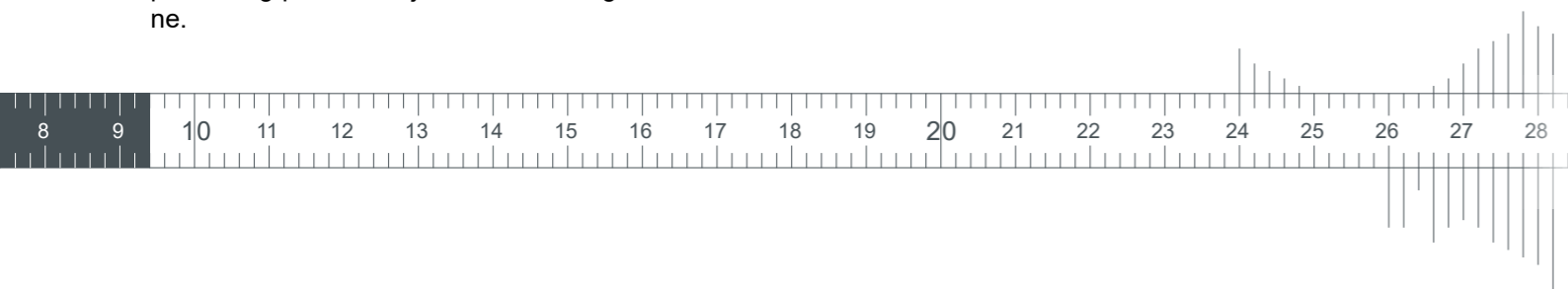
270° view and monitoring of equipment

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.

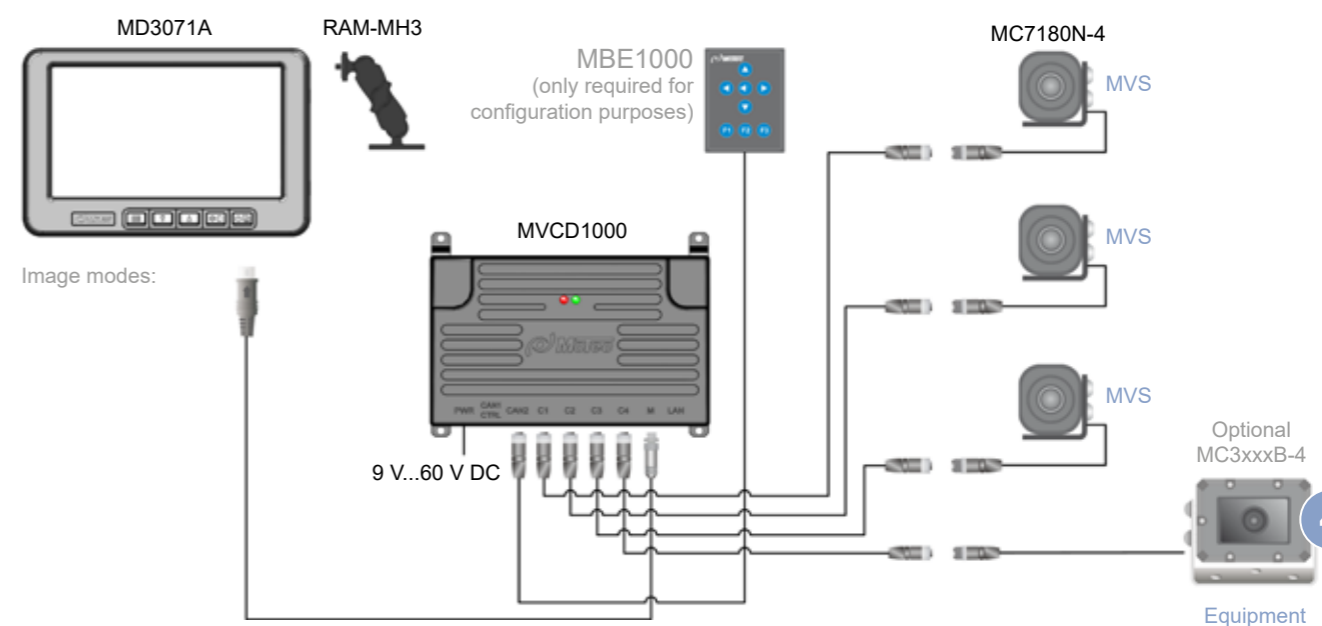
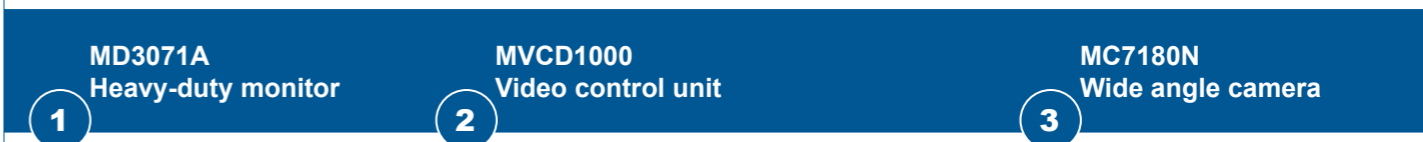
This ensures the ergonomic, efficient and cost-effective completion of work. This means, no unnecessary contorting of the operator's upper body, resulting in more fluid and faster motions, preventing personal injuries and damage to material and machine.



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° visual system



Excavators and material handling equipment

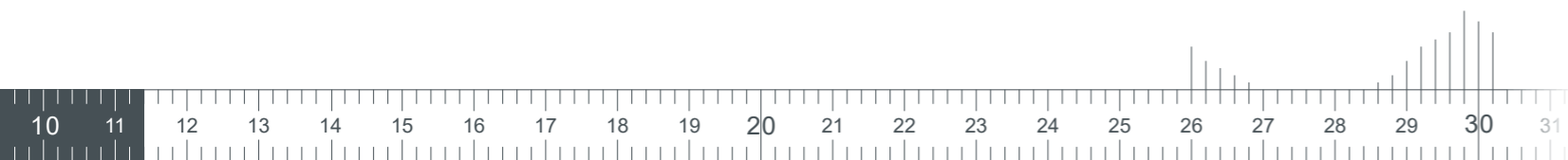
Rear, work space and side space monitoring

Excavators and material handling equipment are large and view-obstructing vehicles requiring the unconditional attention of the operator when moving in the work area. Thanks to a flexible camera and monitor system, blind areas are captured and made visible for the operator. The operator can see up to 4 images on one monitor at a glance – without taking his eyes off the mirrors.

Ergonomic, efficient, and cost-saving working is ensured; that is, no twisting the upper body; fluid and fast working and no damages to people, material, or the machine.



Mobile material handling excavator, fitted with a complete Motec camera and monitor system.

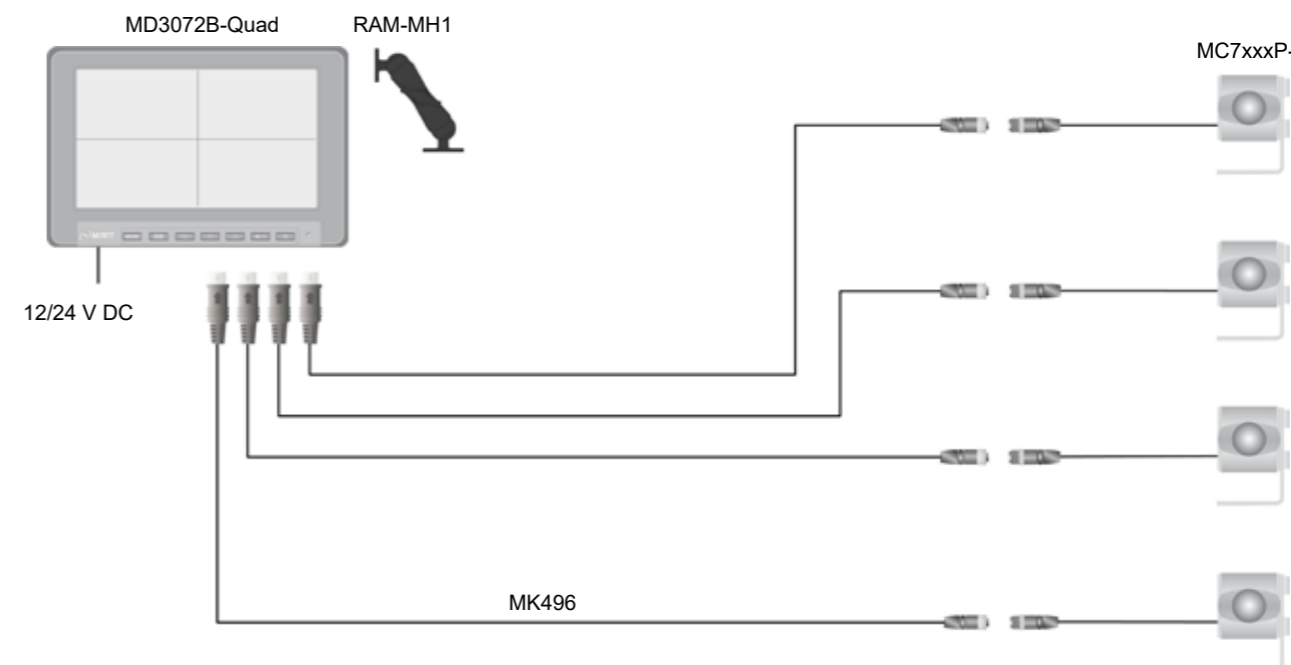


Top: Camera in the jib for load monitoring.
Centre: Camera for side monitoring.
Bottom: Camera for rear space monitoring.



EXAMPLE: Material handling equipment

1	MD3072B-Quad Heavy-duty monitor	2	MC7000P Heavy-duty camera
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Camera monitor system for front implements

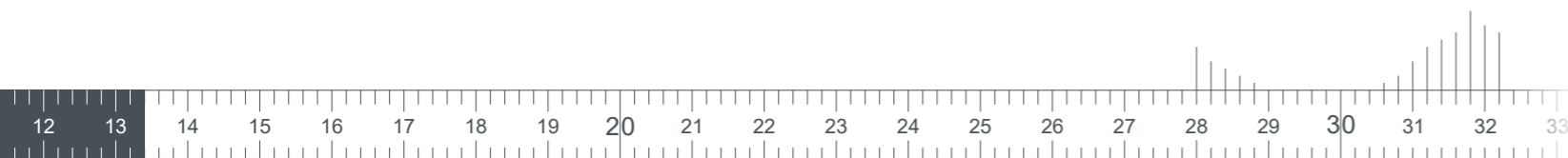
Cross-traffic monitoring

According to German regulations, a signaller or a suitable camera system must be used to compensate for limited visibility when the distance between the centre of the steering wheel and the end of a front implement exceeds 3.50 m.

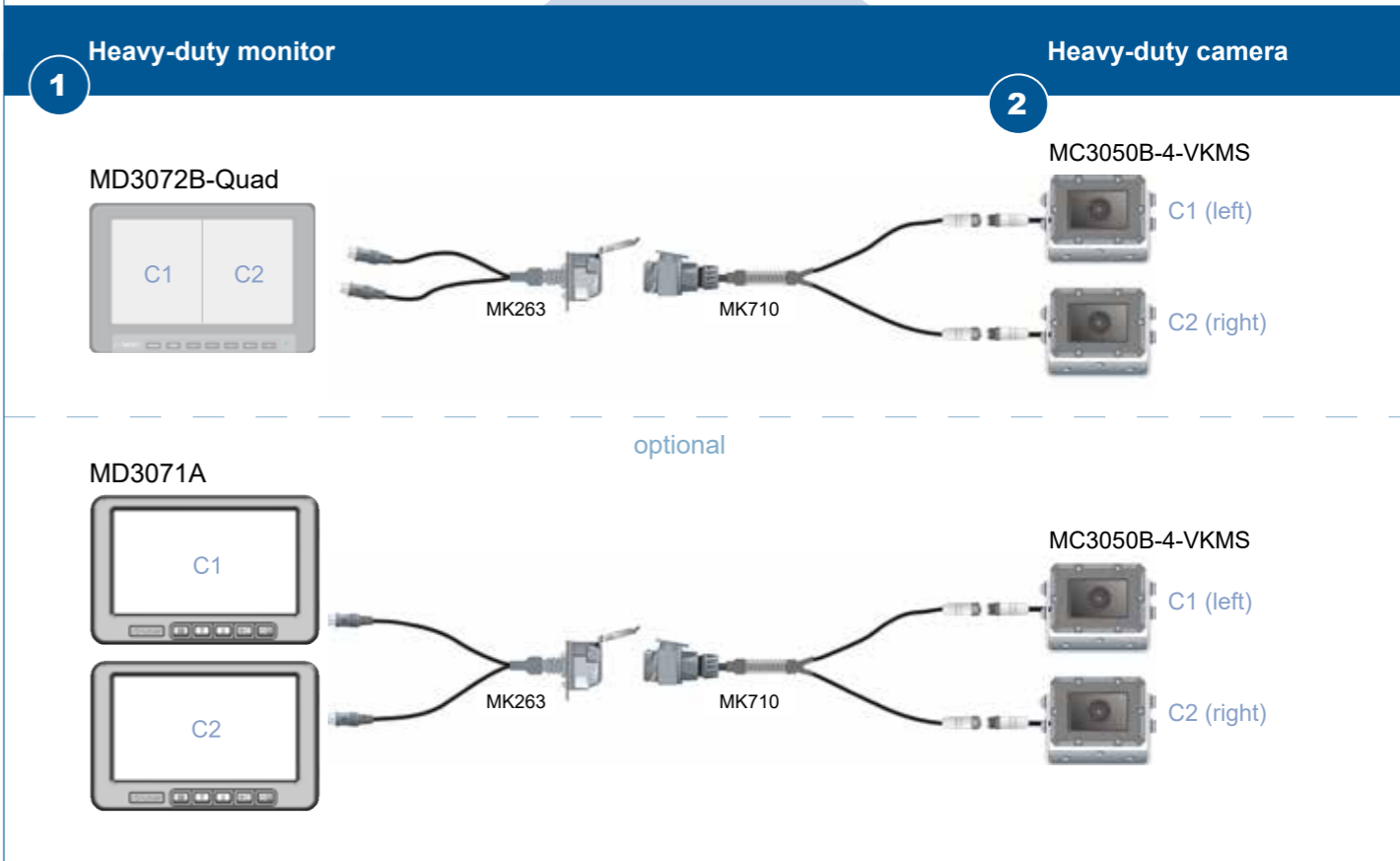
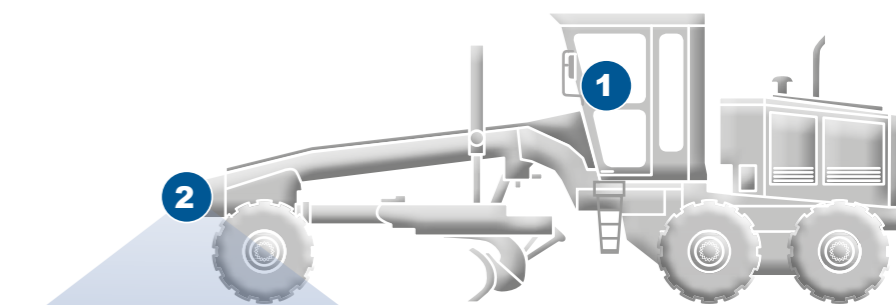
Two cameras are installed on the front implement to ensure that the tractor and implement can safely turn into priority roads and intersections. The Motec MC3000B camera series provides operators with good visibility of both their immediate and mid-range environment to allow them to identify other road users or obstacles early on and avoid accidents.



Camera positions on various front-mounted implements



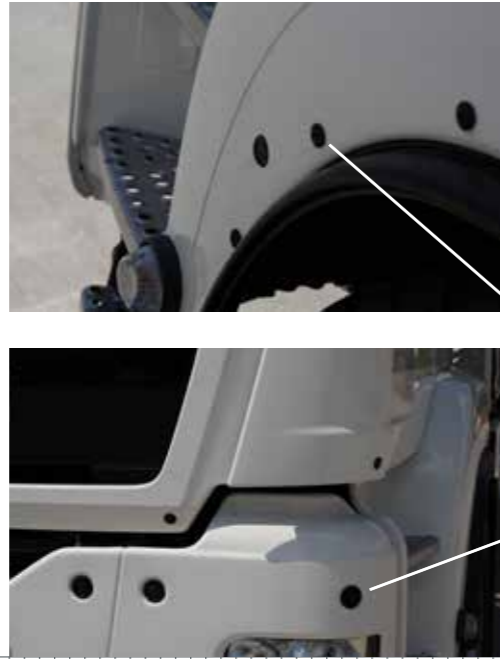
EXAMPLE: Front-mounted system



Concrete pumps 360° panoramic surveillance

The movement of large concrete pumps is not just dangerous on construction sites but also on public roads. Thanks to 360° panoramic surveillance system, the operator must only focus on his 7" monitor when manoeuvring the vehicle. At one glance, he can see the entire vicinity of his vehicle.

Using visual and acoustic signals, connected ultrasound sensors actively alert the driver of obstacles and hazards, in particular during right turns in public traffic. Sketched-in overlays simplify the placement of supports.



Putzmeister concrete pump truck with front camera, ultrasound and radar sensor, side monitoring and rear space monitoring.



EXAMPLE: Putzmeister concrete pump

MD3071A-V
Heavy-duty monitor

MVCU1300
Video controller

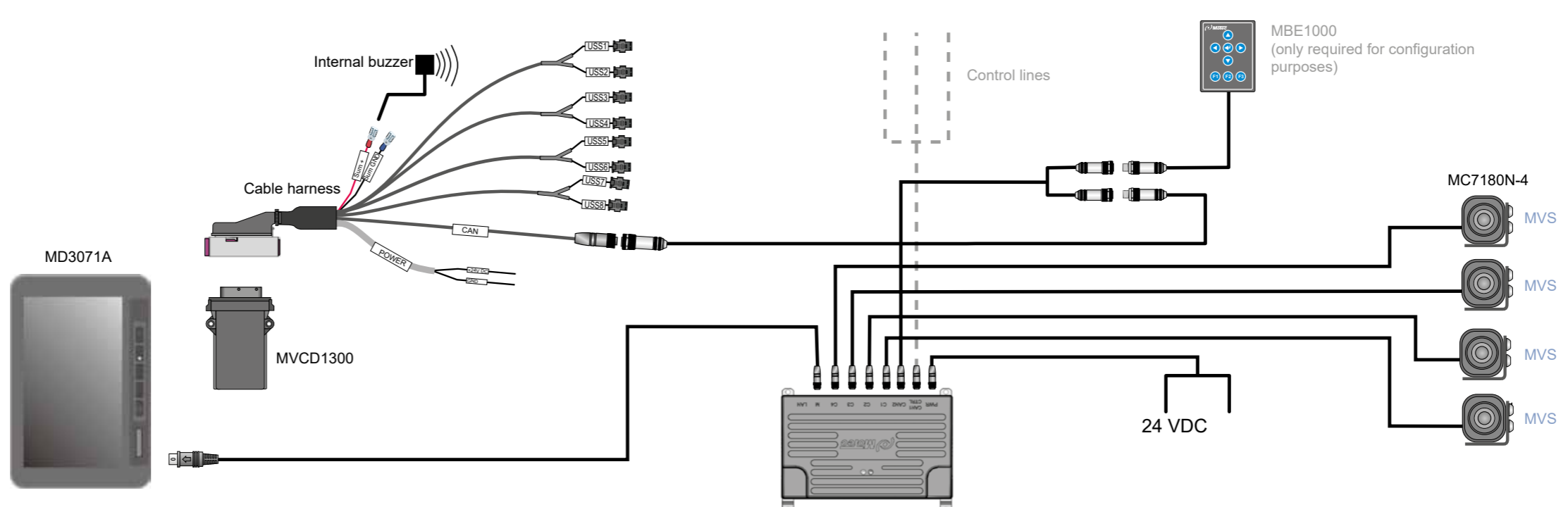
Ultrasound
sensors 1-8

MVCD1000
Video controller

MBE1000
Operator control module

MC7180N-4
Heavy-duty camera

View of overlays:
1. Cone-shaped overlays of ultrasound sensors.
2. End point of telescopic supports.



Agitating lorry

Secure and fast approach of the filling hopper

Reversing agitating lorries is dangerous as the driver is unable to see the rear space – not even with mirrors. Camera and monitor systems display blind spaces and allow the driver to fully observe the space in the rear.

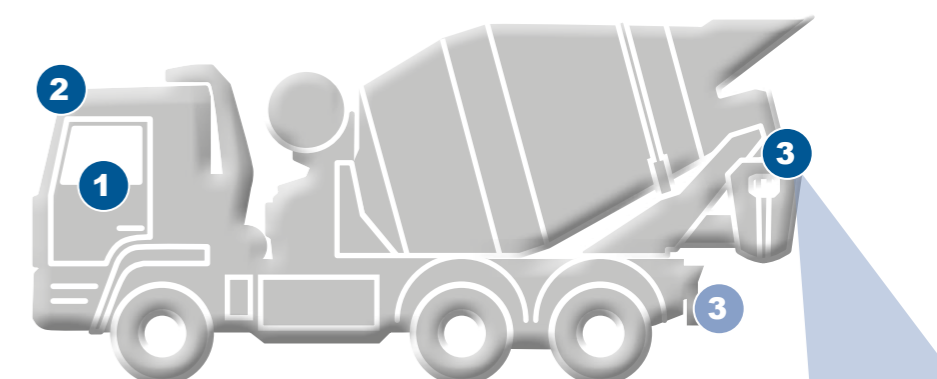
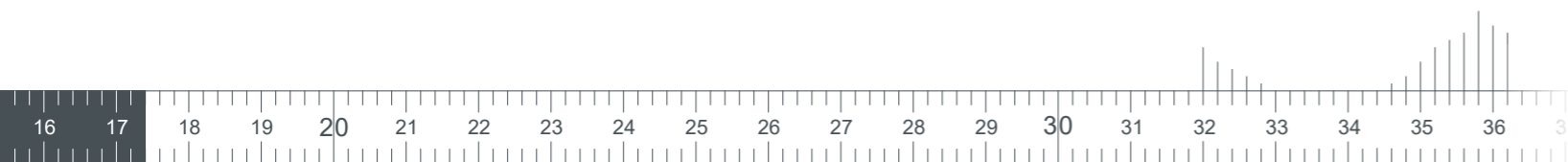
Thanks to the 7" monitor, the operator can always observe the rear manoeuvring space without losing sight of the two outside mirrors. No twisting of the upper body or an additional signaller required.



Precise approach of the filling hopper.

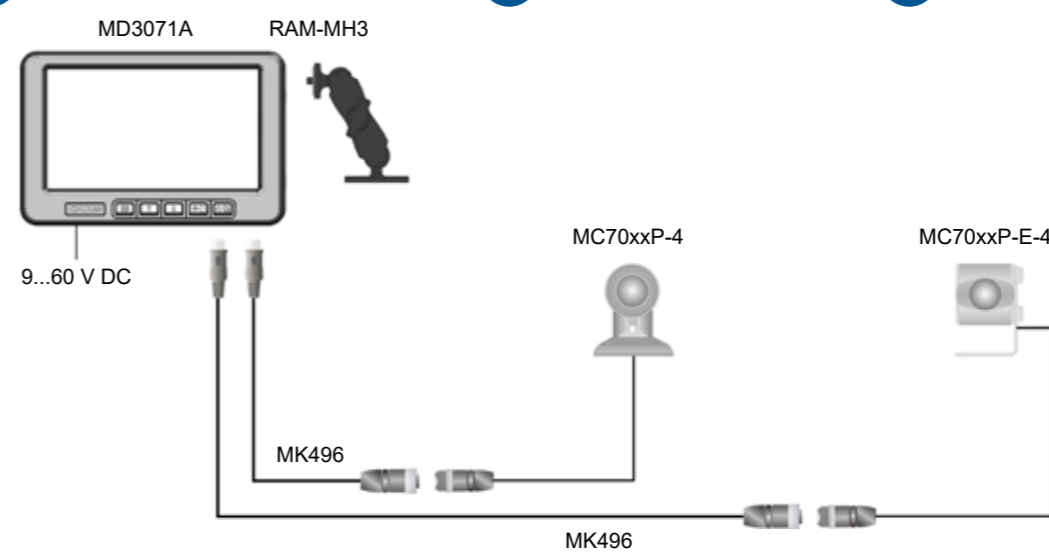


Motec MC7000P-E heavy-duty camera for monitoring the filling unit.



EXAMPLE:
Agitating lorry

1	2	3
MD3071A Heavy-duty monitor	MC7000P Heavy-duty camera	MC7000P-E Heavy-duty camera



Tunnelling machines

Pressure lock and material transport in sight

Camera and monitor systems are particularly suitable to survey blind and dangerous areas and instruments. Cameras are used at many locations in large drilling machines, for example, at pressure locks, milling and drilling tools or when removing material.

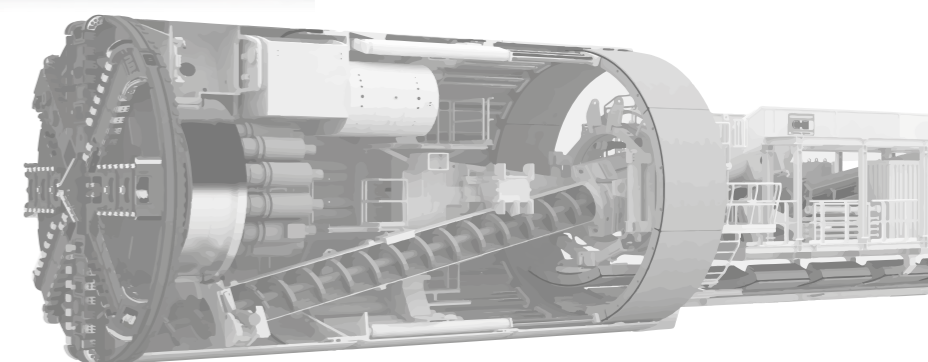
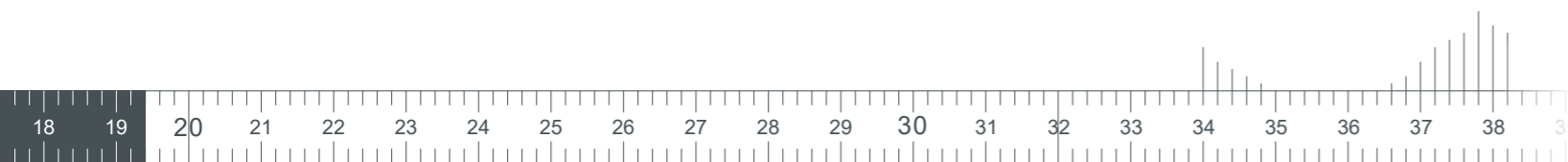
Thanks to a video signal amplifier, crystal clear images are transmitted from deep down in the earth. Potential problems in the process are signalled in a timely manner.



Tunnelling machine at work:
Break-through of the drilling head with its rotating bits.



Motec camera monitoring systems can be flexibly applied, in microtunneling for example.

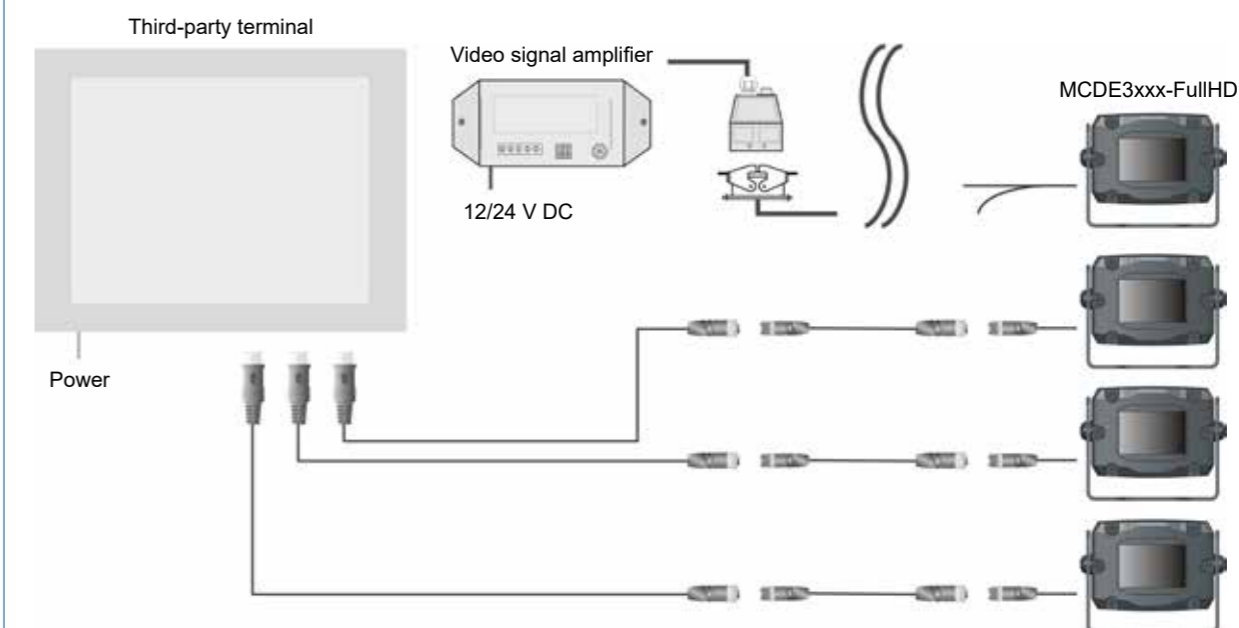


EXAMPLE: Tunnelling machine

Third-party terminal
Monitor

Video signal amplifier

MCDE3000-FullHD
Ethernet camera



Horizontal boring machines

View of thread support and receiving pit

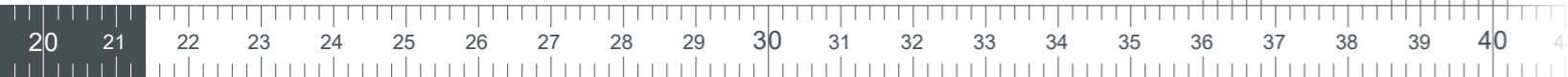
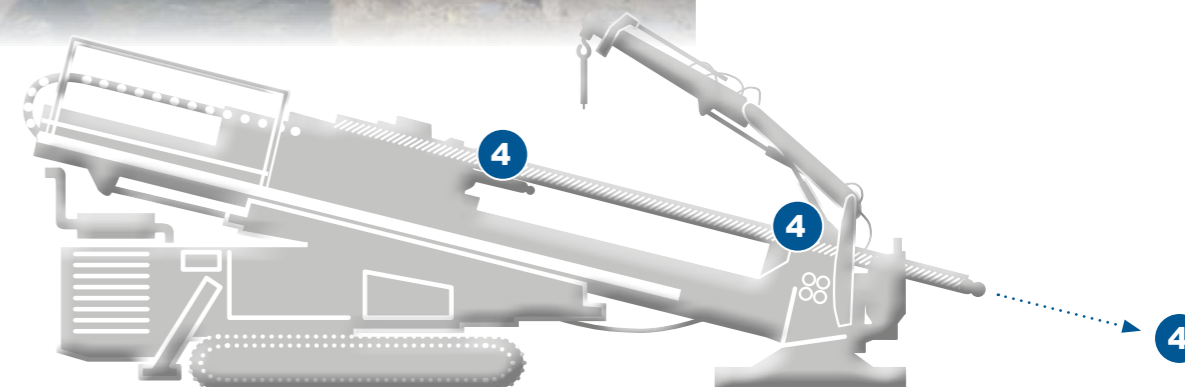
Camera and monitor systems at horizontal boring machines are specifically used in areas with poor visibility or none at all as the bores may be several hundreds of metres long with the receiving pit being quite distant.

By using camera and monitor systems, the operators of horizontal boring machines can remotely observe the boring tools and the receiving pit. Any disturbances of the work sequence and in the boring process itself are noted in good time.

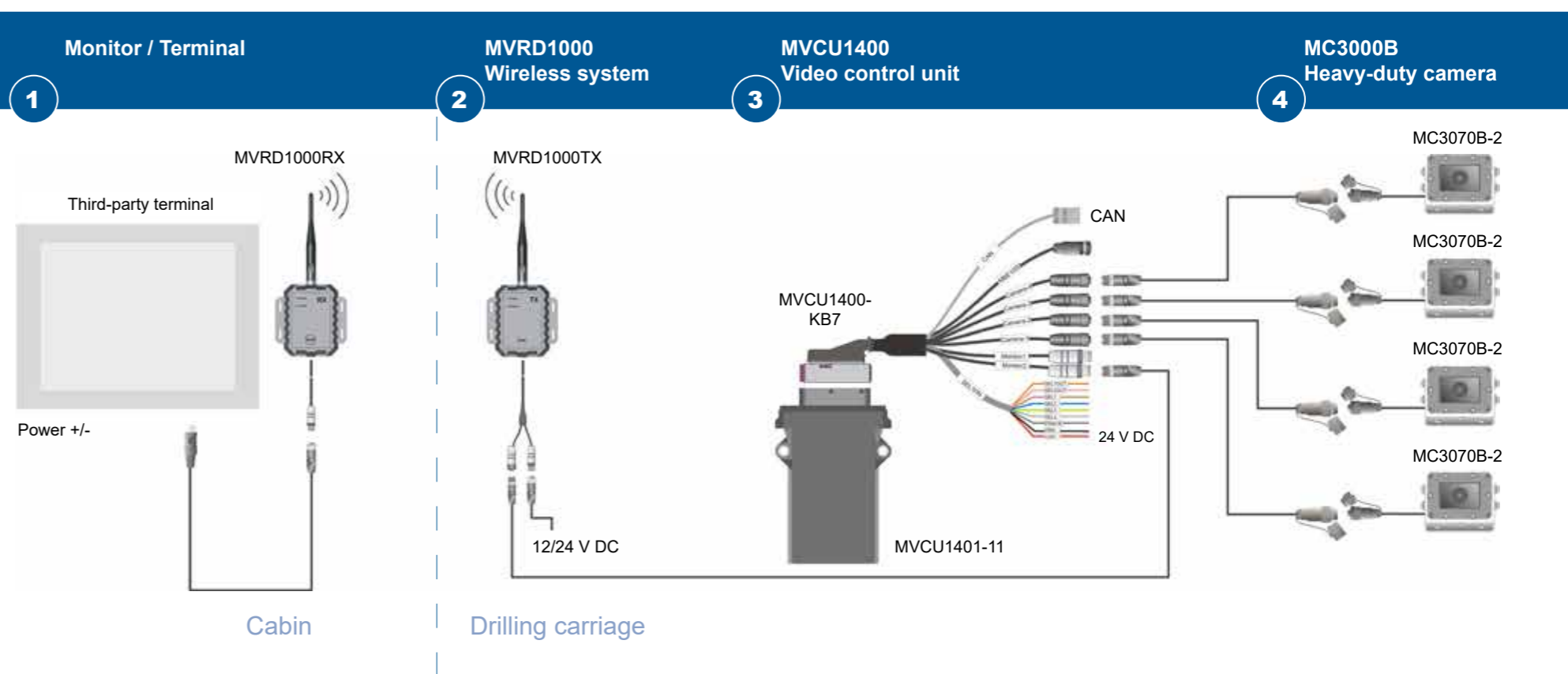


A new horizontal boring machine fitted with a Motec heavy-duty camera system.

The drill head is composed of screwed boring tool segments. This design ensures the required flexibility for the entire drill string.



EXAMPLE: Horizontal boring machine

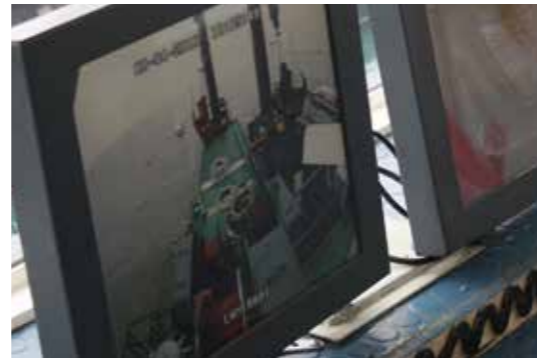


Floating dredgers

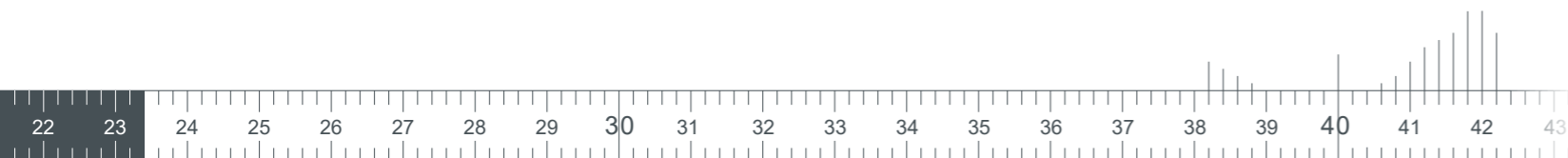
Special solutions for offshore applications

The demands of floating dredgers on a camera and monitor system are high with regard to system complexity and material strength. All system components are individually adapted and matched for the specific requirement.

Special cables are used to send the images monitoring the lifting unit, the spiral drill, the engine chamber and the anchoring to one or several monitors. Safe and efficient operation is thus assured.



Stationary "Pirate X" cutter suction dredger off the coast of Lower Saxony. Fitted with a Motec camera and monitor system for monitoring cable winch winding, for example.



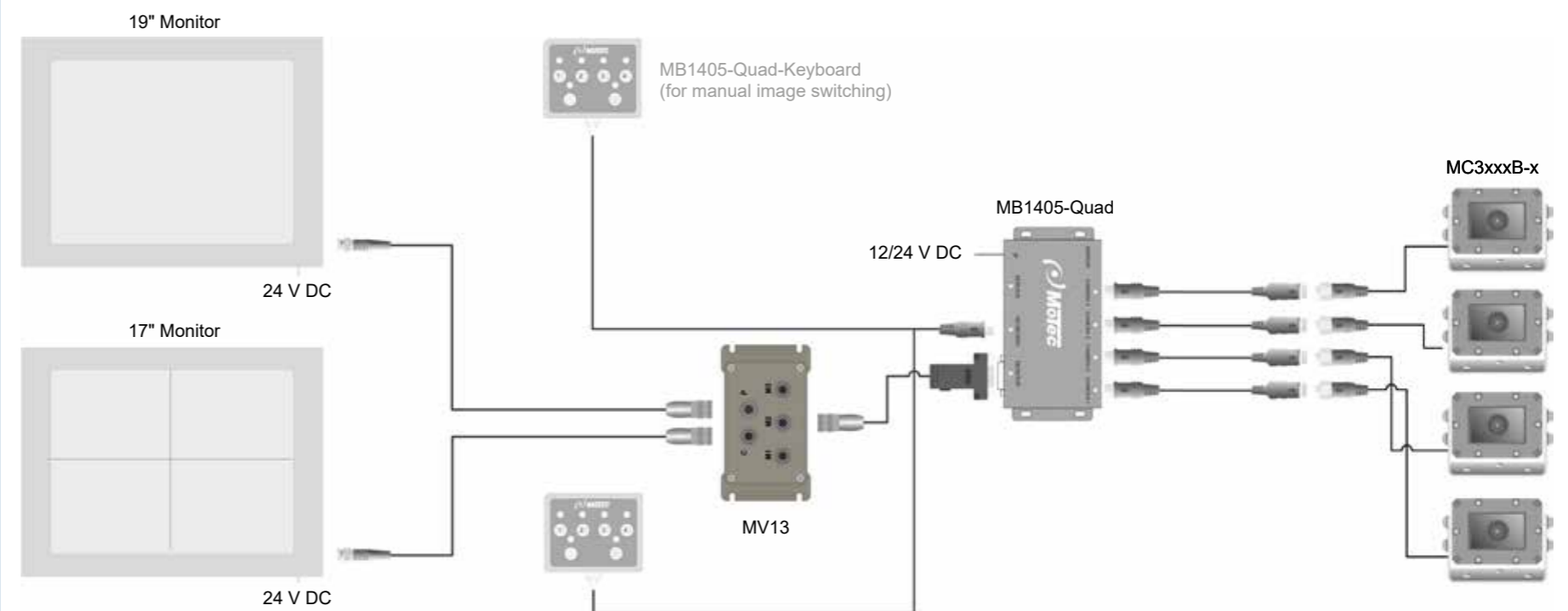
EXAMPLE: Floating dredgers

17"/19"
Metal housing monitor

MV13
Controller

MB1405-Quad
Video controller

MC3000B
Heavy-duty camera



Analog cameras

Overview



MC3000B-4
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. Also available with stainless steel alloy as MC3000B-VA.



MC7000P-4-E
Heavy-duty camera

Based on its small design, the MC7000P-4-E is perfectly suitable for the installation on mobile machines with limited space available. The individually adjustable lens makes it possible to install the camera vertically, horizontally, at an angle, or overhead. The stainless steel housing guarantees a high level of durability to prevent corrosion and resist acids.



MC7180N-4
Wide angle 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.

Digital cameras

Overview



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.



MCDB7000-FullHD
BroadR-Reach camera

The MCDB7000-FullHD is a FullHD BroadR-Reach 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 is used in a variety of applications. For example, it can be used for 360°-bird's eye view systems or as rear view camera.



MCDL7000-FullHD
LVDS camera

The MCDL7000-FullHD is a compact LVDS camera suitable for mobile use. The LVDS interface provides uncompressed data transmission of raw data up to 3 gigabits per second without loss of quality for image processing. LVDS cameras are used in applications that require high-speed serial communications, for example, video streaming, 360°-bird's eye view systems or stereo cameras.



MC5200
Heavy-duty camera

The MC5200 heavy-duty motor zoom camera has been developed specifically for load monitoring on cranes. Modern video module technology returns sharp, high-contrast images and allows zooming to 216x. Operation of the camera is simple, thanks to the Motec system bus (MSB).



MC3000C-IR/-WL
Night vision capable 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.



MC9150P
Pinhole camera

The MC9150P is designed for mounting on the fork carriage, fork bend and spreader. The 50° viewing angle makes it possible to observe both forks. Based on its pinhole size opening in the housing, the lens is protected from damage that may be caused by lattice boxes or pallets. The camera has a very high shock and permanently shock resistant up to 100 g.



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.

Monitors

Overview



MD3071A/MD3071A-V
7" 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 360° bird's eye view system (MVS). The software update option ensures that the MD3071A is always up to date and thereby future-proof.



MD3072B-Quad
7" 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.



MD3074A-Quad
7" monitor

The MD3074A-Quad is a tough heavy-duty monitor that, due to its protection class IP65, can not be harmed by water and is even able to be used in cooling warehouses. Various picture modes can be selected and up to 4 camera images displayed simultaneously, including interval controlled image selection.

Video control units

Overview



MB1405-Quad
Video control unit

The MB1405-Quad operating unit enables the simultaneous display of up to 4 camera images in the so-called quad-split mode.

The supplied remote control is used to manually switch between the different camera images. Automatic control of all cameras and the image-splitting function is also possible.



MBE5201-1
Operator control module

All functions of the MC5201-1 motor zoom camera can be conveniently operated with the MBE5201-1 operator control module.

The module also offers an expansion option for connecting an additional fixed focal length camera.



MVCD1000
Video control unit

The MVCD1000 is a digital, intelligent, FPGA-SoC-based Ethernet and CAN bus capable heavy-duty multi camera video control unit that processes up to 4 camera images in a parallel mode. It can consolidate sensory data and display it via a monitor output or via an Ethernet video stream. It is the video controller for MVS and radar applications.

26 27



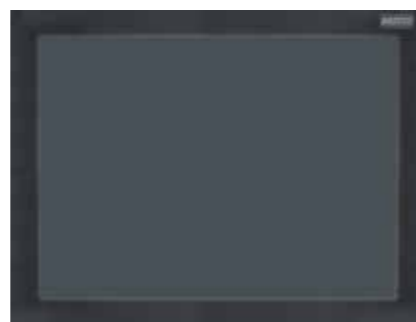
MD3073
7" monitor

The waterproof and dustproof monitor MD3073 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. It fulfills the protection class IP67.



MD3100
10" 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.



LCD-Monitor
Metal housing monitor

The LCD monitor is a monitor for industrial applications and stationary use with powder-coated metal housing. The large screen size ensures the display of complex image combinations. The higher resolution provides sharp camera images that are true to the detail. Available in 12", 17" and 19" version.



MVCU1300/MVCU1400
Video control unit

The MVCU1300 is an intelligent, CAN-controlled heavy-duty video control unit, capable of combining video and additional sensor information, for example such as ultrasound distance data, and outputting on up to 2 monitors. (MVCU1400 up to 4 camera images on up to 2 monitors.)



MVCU1500
Video control unit

The MVCU1500 is an intelligent, CAN-controlled heavy-duty multi camera video control unit that processes up to 8 camera images and displays them on up to 2 monitors in various modes.



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.

STANDARD PLUG-IN CONNECTOR

Others on request



M12

Plug-in connector for increased requirements. A special shielding concept ensures compliance with higher levels of the EMC standard.



Mini DIN

Robust mini DIN plug-ins with a watertight hexagon threaded permanent connections.



RD24

Robust watertight plastic plug with dirt-resistant coarse thread. Recommended for use during wintertime and when using gloves is necessary. A lockable protective cap prevents the permeation of road salt.



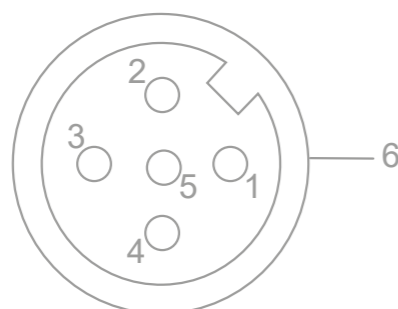
M16

Robust all-metal plug-in with threaded locking device. Suitable for connections that require only occasional removal.

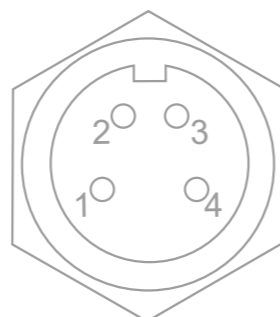
28 29

PIN assignment	Function	Colour	Function	Colour
1	Video signal	Coax cable core	Video signal	Coax cable core
2	Mirror	White	Mirror	White
3	12 V DC	Red	Switch signal	Black
4	Earth	Black	12 V DC	Red
5	Video shield	Coaxial shield	Earth/video shield	Coaxial shield
6	Exterior shield	Exterior shield	---	---
7	---	---	---	---

Camera Connector Code: -4

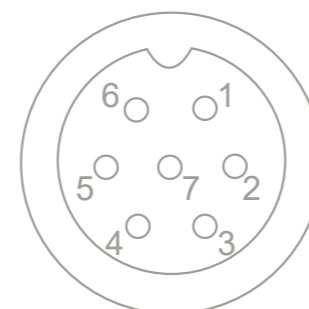


Camera Connector Code: -3

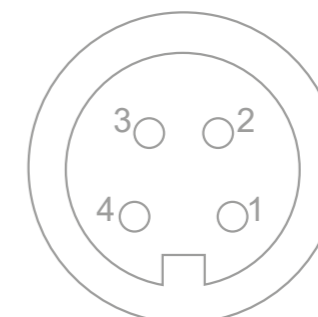


Function	Colour	Function	Colour	PIN assignment
Video signal	Coax cable core	Video signal	Coax cable core	1
Video shield	Coaxial shield	Video shield	Coaxial shield	2
12 V DC	Red	12 V DC	Red	3
Earth	Coaxial shield (MKW)	Earth	Coaxial shield	4
---	Black (MKS)	---	---	5
---	---	---	---	6
---	---	---	---	7

Camera Connector Code: -2



Camera Connector Code: -/-



Wireless systems for construction machinery and vehicles

Overview



MVR5201-1

Digital crane radio system

The **digital crane radio system** MVR 5201-1 makes it possible to transmit a camera image of the motor zoom camera type MC5201-1 without any interference. In addition to the image transmission to the video receiver, the signals required for camera control are also sent to the camera via integrated data radio transmission.

Features:

- Radio characteristics
- Range about 300 meters (free visual connection)
- Protection class IP65
- Interference-free image transmission
- Up to 5 video channels – automatic selection of the optimal channel
- ISM band
- Integrated data radio transmission for camera control

MVRD1000

Digital radio system

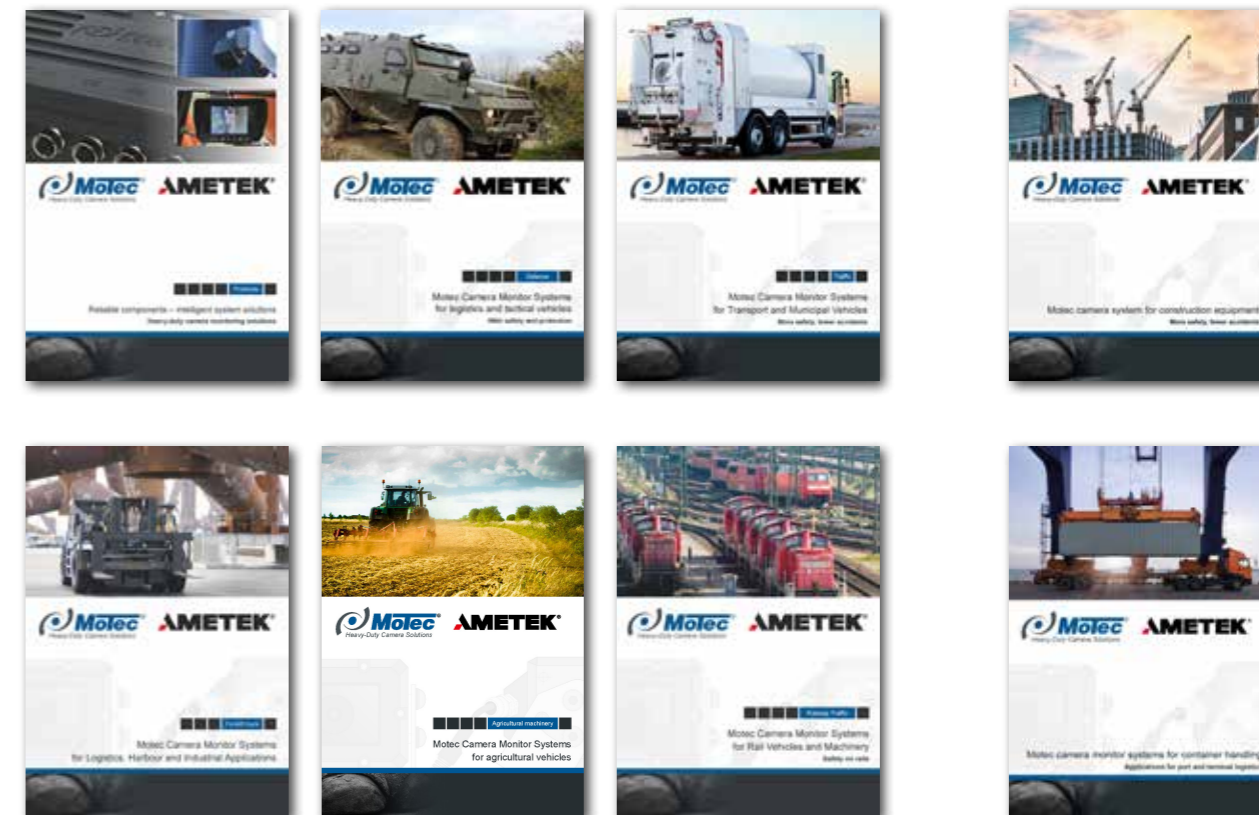
The **digital radio system** MVRD1000 is a robust transmitter/receiver system for a wireless image transmission. Using the compact wireless units, digital camera signals are quickly and without delay sent over long distances to the monitor.

Features:

- Omnidirectional characteristics
- Range about 120 m
- Protection class IP69K
- Up to 10 parallel equipment pairs
- Robust metal housing
- Operation and status display
- Small, compact design
- Low power consumption

System solutions

Customised solutions for numerous other industries



Catalogues

- Product program
- Defence
- Traffic/Transport
- Forklift truck
- Agricultural machines
- Railways

Brochures

- Cranes
- Port and terminal logistics

Motec is certified according to the quality standard ISO 9001:2015 and ISO14001:2015 for environmental management. For the development and production of road-use products, the management system also has an extended certification for approval-relevant requirements (GRA).

Legal notice

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