

Reliable components – intelligent system solutions  
Heavy-duty camera monitoring solutions





Custom-made products

## ADVANTAGE THROUGH DEVELOPMENT KNOW-HOW

- . 25 years of industry experience
- . In-house development centre
- . Modular product program
- . Certified product quality

### MOTEC – CAMERA MONITOR SYSTEMS

Whether in the construction industry, in goods traffic, industry, logistics or agriculture – Motec has been one of the leading manufacturers of high-quality and intelligent heavy-duty camera monitoring systems for commercial vehicles and mobile applications.

In the past 25 years, we developed from a camera manufacturer to a system provider. Today, the name Motec stands for intelligent solutions that are tailor-made for the respective requirements and applications of our customers. It is our objective to offer solutions that are best suited to solve your viewing challenges. In addition to efficient technologies we count on the experience and comprehensive market and industry knowledge of our employees.

Motec complies with all international industry and quality standards. All of our processes are monitored and documented 100%. Furthermore, we count on a high level of integration – it's quality "Made in Germany". Selection and processing of raw and finished materials as well as development, production, and service procedures are at OEM level.

### MOTEC – HIGHLY EFFICIENT SERVICE

Excellent service made simple:

- . **Simply call our hotline**
- . **Within 24 hours we will ship a replacement unit**
- . **Just return faulty devices**
- . **We inspect the damage and calculate the cost for the repair**
- . **Repair or keep the replacement device – it's your decision**

#### HOTLINE

Phone +49 6433 9145-9888

Fax: +49 6433 9145-9877

service@motec-cameras.com

#### ELECTRONIC SYSTEM DEVELOPMENT

Motec has many years of experience in the development of robust cameras for mobile use and their adaptation to customer- and application-specific features. This expertise extends to the development of complex and reliable video control monitors, e.g., CMOS technology. In addition, we develop complex high-speed designs with Altera or Xilinx-FPGA memory integration.

Our developments consider the environmental effects in the application of commercial vehicles (vibration, shock, and temperature resistance, electromagnetic compatibility, protective circuits, etc.) to the same extent as special requirements of mobile power supply systems (wide voltage range, load dump, etc.). In addition, we comply with specific requirements and standards (e.g., industry and MIL standards) of the respective industry sector in which we work.

#### SOFTWARE DEVELOPMENT

Our software development engineers have years of extensive experience in the programming of:

- . Complex embedded systems including FPGA- and micro controller programming (Hardware/Software Codesign, In-the-loop testing)
- . CAN bus and the evaluation and programming of analogue and digital control signals
- . Image processing and image evaluation, such as image optimisation, pattern recognition, stitching, etc.
- . Ergonomic user interfaces and development of applications
- . Apps for operating systems of mobile terminals such as Android or iOS

#### DESIGN DEVELOPMENT

The optimum protection of our product housing requires extensive development with regard to:

- . Durability and air-tightness, especially when it comes to the protection from environmental effects (waste water, dust, chemicals, electromagnetic radiation)
- . Material properties, e.g., aluminium die casting and housings made of plastic injection moulding, housings made of milled aluminium and stainless steel, bent sheet metal parts and surface finishing
- . Robust design, especially for explosion-hazardous areas of Zone 1 and 2
- . View angle and field of vision design
- . Ergonomics

#### CABLE PRODUCTION

To achieve an optimum connection between robust camera monitoring systems, it requires standardised cables with a long service life. In order to ensure our systems comply with these conditions, the following are considered the minimum requirements for our cable production:

- . 100 % traceability (via batch and serial numbers)
- . 100% semi-automatic, logged and functional end test
- . Crimp height measuring
- . Automatic crimping force monitoring
- . Pull testing
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Heavy-duty cameras

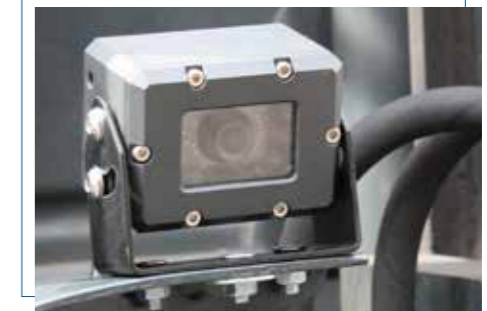
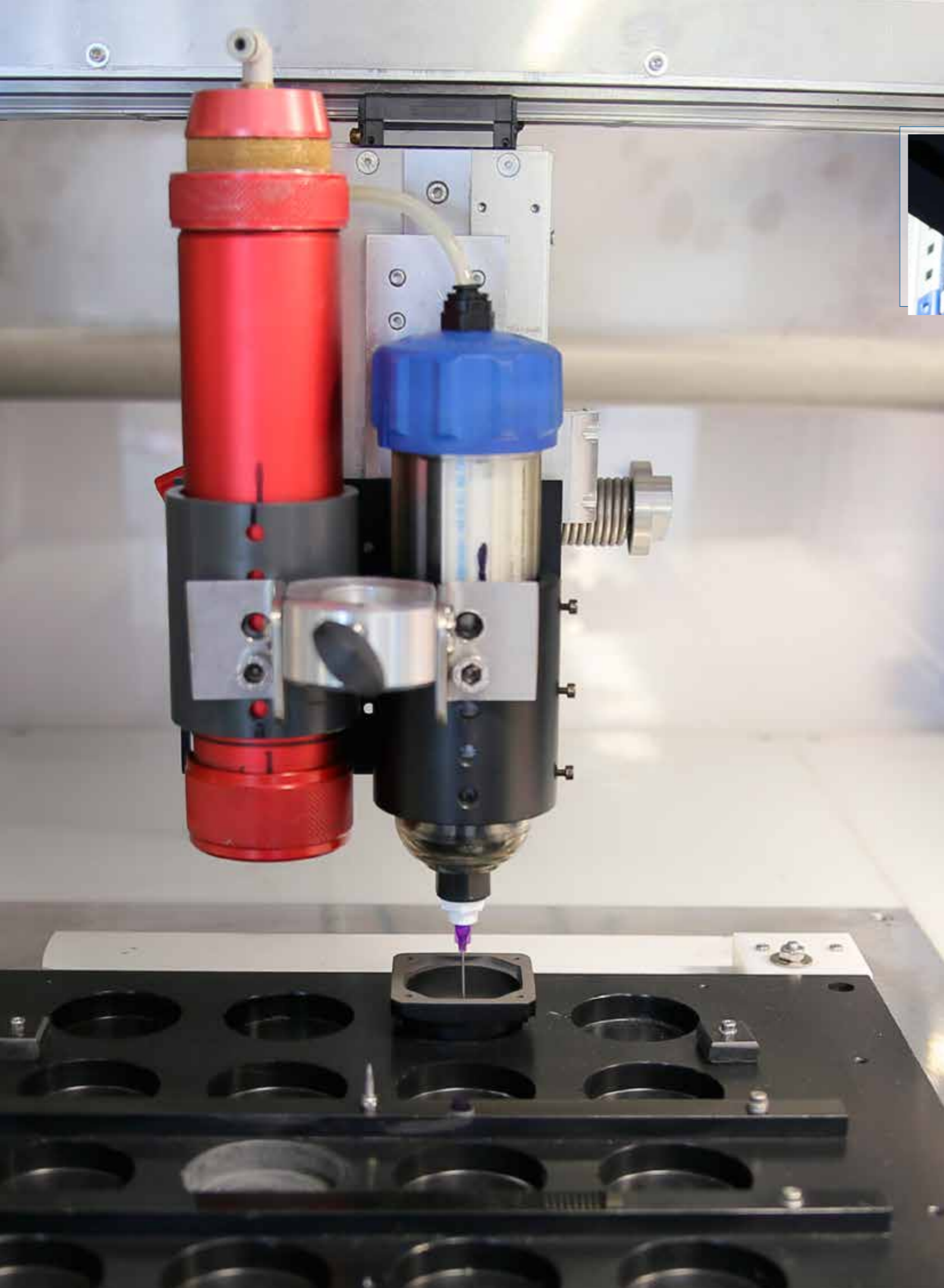
Heavy-duty monitors

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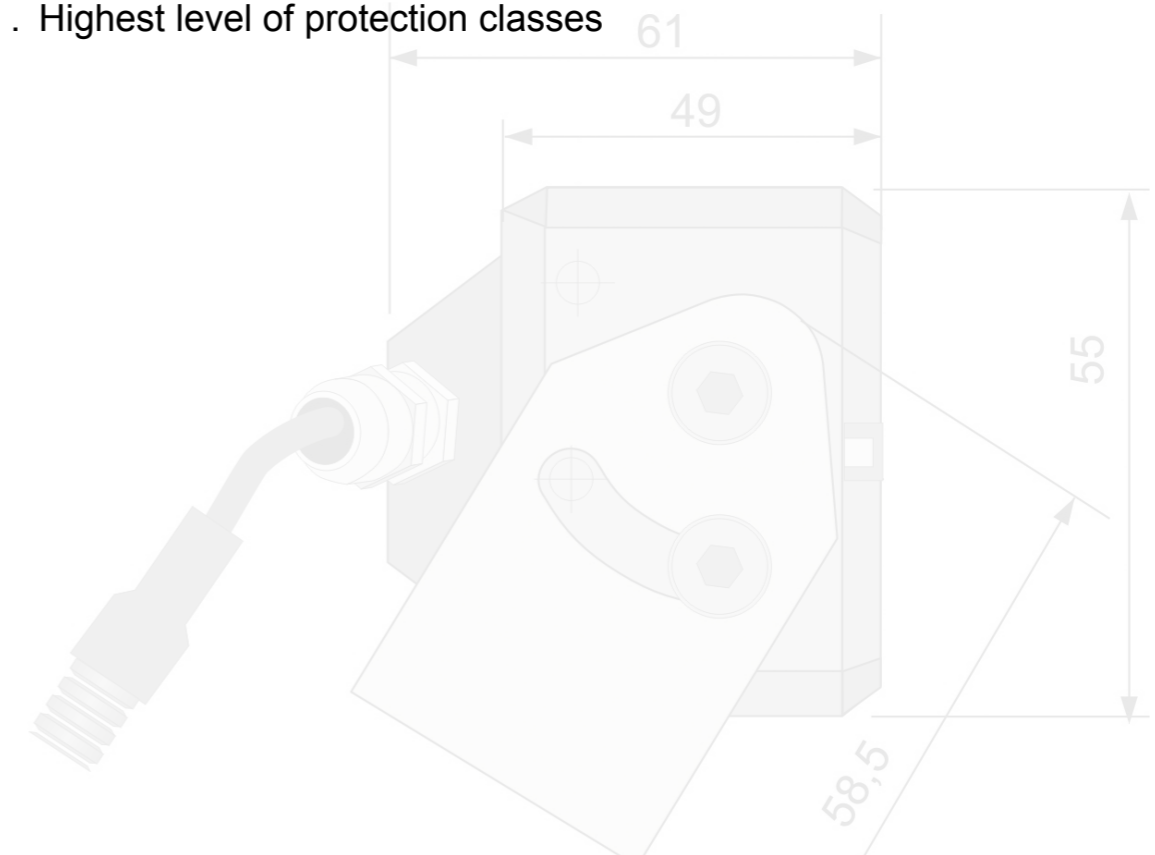


### Heavy-duty cameras: robust, reliable, versatile

## MOTEC CAMERAS CAN TAKE A LOT AND GIVE EVEN MORE

Motec cameras are easy to integrate thanks to their modular design:

- . Numerous connection cables and a variety of plug options
- . Support of many video protocols
- . Analogue and digital video engines in SD and HD resolution
- . Lenses with horizontal angle of view from 20° to 180°
- . With and without IR illumination
- . Highest level of protection classes



# HEAVY-DUTY CAMERAS



## MC3000B series

Based on its design and equipment, the MC3000B is a **heavy-duty camera** with many applications. Multiple angles of view and the robust aluminium housing makes this design the optimum camera for large view-obstructing machines that are subject to extreme weather and environmental conditions. The MC3000B is also available as EX2 variant.



## MC3000B-VA series

The MC3000B-VA **heavy-duty camera** is made of **alloy steel** and suitable for the use in maritime applications and in areas requiring a high degree of hygiene. The VA steel and the applicable protection class allows the use of steam for cleaning purposes and increases the camera's resistance to corrosion and acid.



## MCDE3000 series

The MCDE3000 is a **heavy-duty Ethernet camera** and can be used in networks compliant with IEEE 802.3 (LAN). Fitted with intelligent image processing and dynamic overlays, the camera functions as a smart sensor in a variety of applications, e.g., integration into video monitoring systems or video streaming.



## MC6000D series

Based on its design, the MC6000D is a very flexible **heavy-duty camera** that can be used for municipality purposes as well in the agriculture and transportation area. The camera's robust design and special surface treatment makes it suitable for use in inclement weather conditions.

| Technical Data           | MC3xxx-B-x                          | MC3xxxB-x-VA                        |
|--------------------------|-------------------------------------|-------------------------------------|
| Image sensor             | CMOS 1/4"                           | CMOS 1/4"                           |
| Horizontal angle of view | 20°   40°   70°   90°   100°   115° | 20°   40°   70°   90°   100°   115° |
| Resolution               | H 640 x V 480 pixels                | H 640 x V 480 pixels                |
| Luminous sensitivity     | < 0.05 lx                           | < 0.05 lx                           |
| Window heater            | ✓                                   | ✓                                   |
| Protective glass         | ✓                                   | ✓                                   |
| Voltage supply           | 9 V to 32 V DC                      | 9 V to 32 V                         |
| Video system             | PAL                                 | PAL                                 |
| Type of protection       | IP68   IP69K                        | IP68   IP69K                        |
| Shock-resistant          | 50 g                                | 50 g                                |
| Vibration-resistant      | 5 g                                 | 5 g                                 |
| Storage temperature      | -60 °C to +85 °C                    | -60 °C to +85 °C                    |
| Operating temperature    | -60 °C to +85 °C                    | -60 °C to +85 °C                    |
| Housing                  | Aluminium, anodised                 | Stainless steel                     |
| Weight                   | 0.40 kg                             | 1.10 kg                             |

| MCDE3xxx                  | MC60xxD-x            | Technical Data           |
|---------------------------|----------------------|--------------------------|
| CMOS 1/4"                 | CMOS 1/4"            | Image sensor             |
| 20°   40°   70°   90°     | 70°   90°            | Horizontal angle of view |
| H 640 x V 480 pixels      | H 640 x V 480 pixels | Resolution               |
| < 0.05 lx                 | < 0.05 lx            | Luminous sensitivity     |
| ✓                         | ✓                    | Window heater            |
| ✓                         | ✓                    | Protective glass         |
| PoE+ acc. to IEEE 802.3at | 9 V to 32 V DC       | Voltage supply           |
| PAL                       | PAL                  | Video system             |
| IP68   IP69K              | IP68   IP69K         | Type of protection       |
| 50 g                      | 50 g                 | Shock-resistant          |
| 10 g                      | 5 g                  | Vibration-resistant      |
| -40 °C to +85 °C          | -40 °C to +85 °C     | Storage temperature      |
| -40 °C to +70 °C          | -40 °C to +85 °C     | Operating temperature    |
| Aluminium, anodised       | Aluminium, anodised  | Housing                  |
| 0.40 kg                   | 0.40 kg              | Weight                   |

# HEAVY-DUTY CAMERAS



## MC7000P-GH series

Based on its **mini module design**, the MC7000P-GH is suitable for the installation in 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 material of the housing has a high content of elastomer that allows for the elastic deformation during periods of tensile and pressure loads. However, subsequently, this allows the housing to return to its original shape.



## MC7000P-E series

Based on its **small design**, the MC7000 P-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

The MC7180N is a **heavy-duty wide-angle camera**, used with 270°/360° visual systems. The 180° angle of vision and the small robust design guarantee a long service life even during rough applications. The high flexibility of the system allows the adaptation to different vehicles and visual problems.



## MC5200

The MC5200 is a **heavy-duty motor zoom camera** to monitor crane hooks, winches and loads. State-of-the-art video module technology provides sharp and high-contrast images allowing for an 18-times optical zoom and a 26-times digital zoom. The Motec System-Bus (MSB) controls the camera. The MC5200 it is also available as EX2 version.

| Technical Data           | MC7xxxP-x-GH         | MC7xxx-P-x-E         |
|--------------------------|----------------------|----------------------|
| Image sensor             | CMOS 1/4"            | CMOS 1/4"            |
| Horizontal angle of view | 70°   90°   115°     | 70°   90°   115°     |
| Resolution               | H 640 x V 480 pixels | H 640 x V 480 pixels |
| Luminous sensitivity     | < 1 lx               | < 1 lx               |
| Window heater            | Passive              | Passive              |
| Protective glass         | ---                  | ---                  |
| Voltage supply           | 9 V to 16 V DC       | 9 V to 16 V DC       |
| Video system             | PAL                  | PAL                  |
| Type of protection       | IP68   IP69K         | IP68   IP69K         |
| Shock-resistant          | 50 g                 | 50 g                 |
| Vibration-resistant      | 10 g                 | 10 g                 |
| Storage temperature      | -40 °C to +85 °C     | -40 °C to +85 °C     |
| Operating temperature    | -35 °C to +65 °C     | -35 °C to +65 °C     |
| Housing                  | Plastic (elastomer)  | Stainless steel      |
| Weight                   | 0.15 kg              | 0.25 kg              |

| MC7180N-4            | MC5200                | Technical Data           |
|----------------------|-----------------------|--------------------------|
| CMOS 1/3"            | CCD, 1/4" EX View HAD | Image sensor             |
| 180°                 | 1.6° to 47.5°         | Horizontal angle of view |
| H 672 x V 492 pixels | H 850 x V 670 pixels  | Resolution               |
| < 0.5 lx             | < 0.7 lx              | Luminous sensitivity     |
| Passive              | ✓                     | Window heater            |
| ---                  | ✓                     | Protective glass         |
| 9 V to 16 V DC       | 18 V to 32 V DC       | Voltage supply           |
| NTSC                 | PAL                   | Video system             |
| IP68   IP69K         | IPX5   IP68           | Type of protection       |
| 50 g                 | 50 g                  | Shock-resistant          |
| 5 g                  | --                    | Vibration-resistant      |
| -40 °C to +85 °C     | -40 °C to +85 °C      | Storage temperature      |
| -35 °C to +65 °C     | -35 °C to +60 °C      | Operating temperature    |
| Aluminium, anodised  | Aluminium, anodised   | Housing                  |
| 0.11 kg              | 1.13 kg               | Weight                   |

# HEAVY-DUTY CAMERAS



## MC9000

The MC9000 **fork camera** is designed especially for forklift trucks and is mounted to the **inside of the fork**. This places the camera at the eye level of the pallet. Based on its pinhole size opening in the housing, the lens is protected from damage that may be caused by lattice boxes or pallets.



## MC9150P

The MC9150P camera is designed especially for forklift trucks and is mounted to the **back of the fork**. 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.



## MC9250

The MC9250 **fork camera** is designed especially for fork lift trucks and is integrated into the **tips of the lift's fork**. This places the camera at the eye level of the pallet. Based on its pinhole size opening in the housing, the lens is protected from damage that may be caused by lattice boxes or pallets.



## MC925C

The MC925C **fork camera** is designed especially for forklift trucks and is mounted to the **inside of the fork**. Two **LED** high resolution modules let the forklift operator maintain visual contact with the forks even during poor lighting conditions. Based on its pinhole size opening in the housing, the lens is protected from damage that may be caused by lattice boxes or pallets.

| Technical Data           | MC90xx               | MC9150P              |
|--------------------------|----------------------|----------------------|
| Image sensor             | CMOS 1/4"            | CMOS 1/4"            |
| Horizontal angle of view | 30°   50°            | 50°                  |
| Resolution               | H 640 x V 480 pixels | H 640 x V 480 pixels |
| Luminous sensitivity     | < 0.2 lx             | < 0.2 lx             |
| Window heater            | Passive              | Passive              |
| Protective glass         | ✓ (plastic)          | ✓ (plastic)          |
| Voltage supply           | 12 V DC ±10%         | 12 V DC ±10%         |
| Video system             | PAL                  | PAL                  |
| Type of protection       | IP68   IP69K         | IP68   IP69K         |
| Shock-resistant          | 100 g                | 100 g                |
| Vibration-resistant      | 10 g                 | 10 g                 |
| Storage temperature      | -40 °C to +85 °C     | -40 °C to +85 °C     |
| Operating temperature    | -40 °C to +85 °C     | -40 °C to +85 °C     |
| Housing                  | Stainless steel      | Stainless steel      |
| Weight                   | 0.30 kg              | 0.21 kg              |

| MC9250               | MC925C               | Technical Data           |
|----------------------|----------------------|--------------------------|
| CMOS 1/4"            | CCD 1/4"             | Image sensor             |
| 30°   50°            | 45°                  | Horizontal angle of view |
| H 640 x V 480 pixels | H 542 x V 586 pixels | Resolution               |
| < 0.2 lx             | < 0.5 lx             | Luminous sensitivity     |
| Passive              | Passive              | Window heater            |
| ✓ (plastic)          | ✓ (plastic)          | Protective glass         |
| 12 V DC ±10%         | 12 V DC ±10%         | Voltage supply           |
| PAL                  | CCIR                 | Video system             |
| IP68   IP69K         | IP68                 | Type of protection       |
| 100 g                | 100 g                | Shock-resistant          |
| 10 g                 | 10 g                 | Vibration-resistant      |
| -40 °C to +85 °C     | -35 °C to +75 °C     | Storage temperature      |
| -40 °C to +85 °C     | -30 °C to +65 °C     | Operating temperature    |
| Stainless steel      | Stainless steel      | Housing                  |
| 0.30 kg              | 0.40 kg              | Weight                   |

# HEAVY-DUTY CAMERAS



## MC4000A-IR

The MC4000A-IR is a **heavy-duty camera** with a high degree of electromagnetic compatibility (**EMC**) and **infra-red lighting**. This enables the camera to be used especially in the dark and in areas where the changing conditions of electric or electromagnetic effects must be eliminated.



## PathFindIR II

The **PathFindIR II** is a **thermal imaging camera**, that is used especially in 100% darkness, in areas with high smoke concentration, in fog, or during snowstorms. The operator receives a clear image and can see five times farther than with conventional floodlights and, therefore, can detect persons, animals and objects well ahead of time.

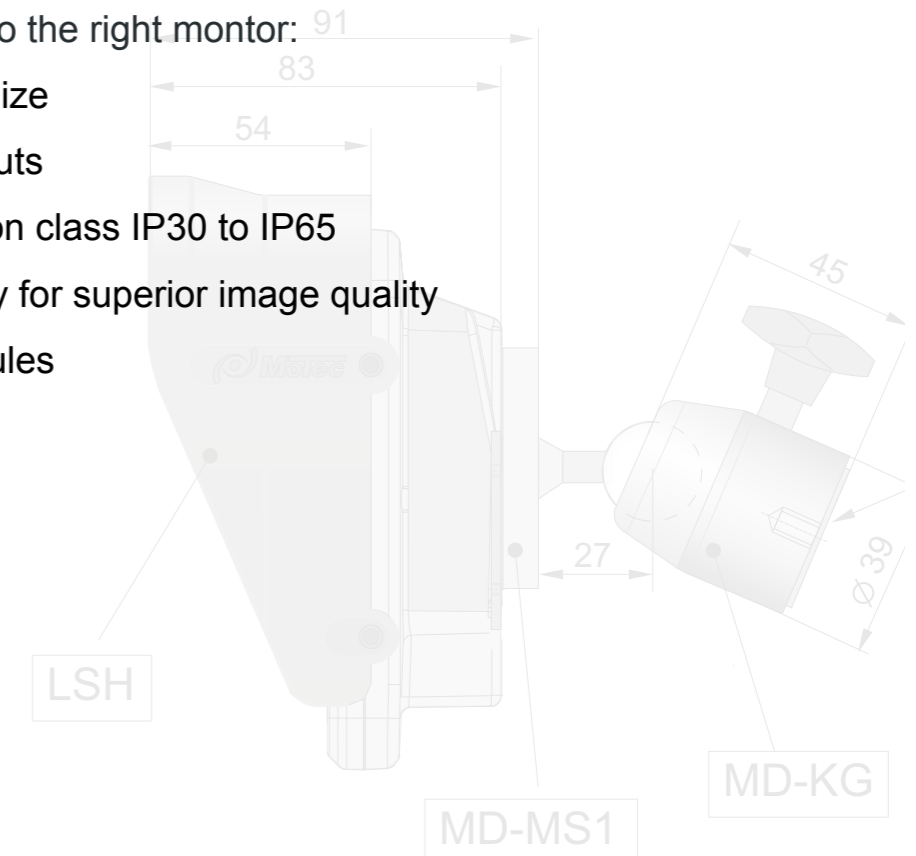
| Technical Data           | MC4000A-IR                          | PathFindIR II                  |
|--------------------------|-------------------------------------|--------------------------------|
| Image sensor             | CMOS 1/4"                           | Microbolometer without cooling |
| Horizontal angle of view | 20°   40°   70°   90°   100°   115° | H 24° x V 18°                  |
| Resolution               | H 640 x V 480 pixels                | 320 x 240 pixels               |
| Luminous sensitivity     | 0 lx                                | 0 lx                           |
| Window heater            | ✓                                   | ✓                              |
| Protective glass         | ✓ (extremely scratch-resistant)     | ✓                              |
| Voltage supply           | 9 V to 32 V DC                      | 6 V DC to 16 V DC              |
| Video system             | PAL                                 | NTSC                           |
| Type of protection       | IP68   IP69K                        | IP69K                          |
| Shock-resistant          | 50 g                                | ✓                              |
| Vibration-resistant      | 5 g                                 | ✓                              |
| Storage temperature      | -46 °C to +85 °C                    | -55 °C to +95 °C               |
| Operating temperature    | -46 °C to +85 °C                    | -40 °C to +80 °C               |
| Housing                  | Aluminium, anodised                 | Aluminium                      |
| Weight                   | 0.40 kg                             | 0.30 kg                        |



**Heavy-duty monitors provide the best possible images, regardless of the situation**

## MOTEC CAMERAS CAN BE PLACED ALMOST ANYWHERE

- For every applicatio the right montor:
- . 7" to 19" screen size
  - . Up to 4 video inputs
  - . Housing protection class IP30 to IP65
  - . Digital technology for superior image quality
  - . Available in modules



# HEAVY-DUTY MONITORS



## MD3071A

Based on its design and accessories, the MD3071A is a **heavy-duty monitor** that can be used in all industry sectors. The images of the display are crystal clear, even under the most severe environmental conditions. The option to upgrade the software keeps the MD3071A at the state-of-the-art technology level and makes the camera future-proof.



## MD3071A-V

The MD3071A-V is especially designed for the Motec 360° birdseye view system (MVS). The camera's **vertical design** displays the vehicle in a bird's eye view and in the direction of travel. The option to update the software ensures that the MD3071A can be updated any time and, therefore, makes the product future-proof.



## MD3072B-Quad

The MD3072B-Quad is designed especially for mobile machines on which several cameras are mounted. When using the **integrated video control unit**, the monitor can display 4 camera images simultaneously. The integrated menu function and control leads for the automatic control of the cameras ensure the quick change of images.



## MD3074A-Quad

The MD3074A-Quad is designed especially for mobile machines on which several cameras are mounted. When using the **integrated video control unit**, the monitor can display 4 camera images simultaneously. Compliance with this protection types makes the monitor watertight and suitable for storage monitoring. The integrated menu function and control leads for the automatic control of the cameras ensure the quick change of images.

| Technical Data        | MD3071A   | MD3071A-V   |
|-----------------------|---|---|
| Screen size           | 7"   17.8 cm   16:9 format                        | 7"   17.8 cm   16:9 format                        |
| Resolution            | H 800 x V 480 pixels                              | H 480 x V 800 pixels                              |
| Video inputs          | 3   | 3   |
| Image display         | Single image                                      | Single image                                      |
| Menu guide            | Multiple languages                                | Multiple languages                                |
| Voltage supply        | 9 V to 60 V DC                                    | 9 V to 60 V DC                                    |
| Video system          | PAL   NTSC  | PAL   NTSC  |
| Type of protection    | IP30  | IP30  |
| Shock-resistant       | 50 g  | 50 g  |
| Vibration-resistant   | 5 g   | 5 g   |
| Storage temperature   | -30 °C to +80 °C                                  | -30 °C to +80 °C                                  |
| Operating temperature | -30 °C to +80 °C                                  | -30 °C to +80 °C                                  |
| Weight                | 0.61 kg   | 0.48 kg   |
| Scope of delivery     | Monitor, connection cable, operating instructions | Monitor, connection cable, operating instructions |

| MD3072B-Quad                                      | MD3074A-Quad   | Technical Data        |
|---|--|-----------------------|
| 7"   17.8 cm   16:9 format                        | 7"   17.8 cm   16:9 format                                     | Screen size           |
| H 800 x V 480 pixels                              | H 800 x V 480 pixels   | Resolution            |
| 4   | 4  | Video inputs          |
| Single   split   triple   quad image              | Single   split   triple   quad image                           | Image display         |
| ✓   | ✓  | Menu guide            |
| 10 V to 32 V DC                                   | 12/24 V DC (with MPM48, 48 V DC)                               | Voltage supply        |
| PAL   NTSC  | PAL   NTSC   | Video system          |
| IP30  | IP66   | Type of protection    |
| 20 g  | 25 g   | Shock-resistant       |
| 10 g  | 10 g   | Vibration-resistant   |
| -30 °C to +85 °C                                  | -30 °C to +85 °C   | Storage temperature   |
| -20 °C to +80 °C                                  | -30 °C to +80 °C (at -40°C, warm-up/start-up period of 5 min.) | Operating temperature |
| 0.62 kg   | 1.10 kg  | Weight                |
| Monitor, connection cable, operating instructions | Monitor, connection cable, operating instructions              | Scope of delivery     |

# HEAVY-DUTY MONITORS



## MD3100

The MD3100 is a **10.2" LCD monitor** for industrial application with powder-coated metal housing. The front of the monitor complies with the regulations of the dust and spray water protection class.



## 17"-LCD Monitor

The 17" 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.



## 19"-LCD Monitor

The 19" LCD monitor is a monitor for industrial applications and stationary use with **non-reflecting lens** and 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.

| Technical Data        | MD3100                          | 17" LCD monitor                               |
|-----------------------|---------------------------------|---|
| Screen size           | 10.2"   25.9 cm   16:9 format   | 17"   43.2 cm   4:3 format                    |
| Resolution            | H 800 x V 480 pixels            | H 1280 x V 1024 pixels                        |
| Video inputs          | 1                               | 1   |
| Image display         | Single image                    | Single image                                  |
| Menu guide            | Multiple languages              | Multiple languages                            |
| Voltage supply        | 10 V DC to 32 V DC              | 230 V AC (alternatively available as 24 V DC) |
| Video system          | PAL   NTSC                      | PAL   NTSC                                    |
| Type of protection    | IP54 (front)                    | IP65 (front)                                  |
| Shock-resistant       | 25 g                            | 5 g   |
| Storage temperature   | -30 °C to +85 °C                | -20 °C to +60 °C                              |
| Operating temperature | -20 °C to +70 °C                | 0 °C to +50 °C                                |
| Weight                | 1.66 kg                         | 4.50 kg                                       |
| Scope of delivery     | Monitor, operating instructions | Monitor, operating instructions               |

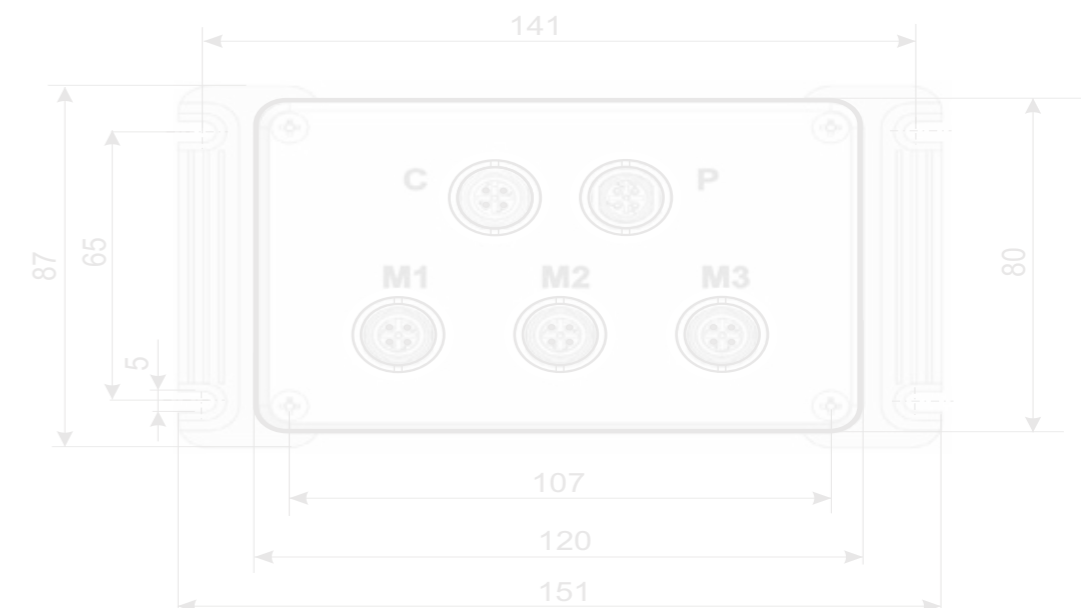
| 19" LCD monitor                 | Technical Data        |
|---------------------------------|-----------------------|
| 19"   48.3 cm   4:3 format      | Screen size           |
| H 1280 x V 1024 pixels          | Resolution            |
| 1                               | Video inputs          |
| Single image                    | Image display         |
| Multiple languages              | Menu guide            |
| 24 V DC                         | Voltage supply        |
| ---                             | Video system          |
| IP54   IP65 (front)             | Type of protection    |
| 5 g                             | Shock-resistant       |
| -20 °C to +60 °C                | Storage temperature   |
| 0 °C to +50 °C                  | Operating temperature |
| 7.00 kg                         | Weight                |
| Monitor, operating instructions | Scope of delivery     |

## WHETHER 1, 2 OR 8 CAMERAS

WITH MOTEC CONTROL UNITS, THE OPERATOR WILL ALWAYS BE TOP OF IT

These are your advantages:

- . Up to 8 heavy-duty cameras
- . Up to 5 heavy-duty monitors
- . Analogue and digital radio transmission



# HEAVY-DUTY CONTROL UNITS



## MB1205

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.



## MB1405-Quad

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 switch between the different camera images.



## MBE5200-1

The MBE5200-1 **operator control unit** makes it easy to manipulate all functions of the MC5200-1 motor zoom camera with a single device. Furthermore, the control module offers the opportunity to expand the system for the connection of an additional camera with a prime lens.



## MVCD1000

The MVCD1000 is a digital, FPGA-SoC based, Ethernet and CAN-Bus heavy-duty **video control unit**. It is capable of processing 4 camera images in parallel, can merge additional sensor data and uses a monitor output or Ethernet video streaming to display these images.

| Technical Data        | MB1205           | MB1405-Quad                          |
|-----------------------|------------------|--------------------------------------|
| Camera inputs         | 2                | 4                                    |
| Monitor connections   | 1                | 1                                    |
| Control leads         | 2 x SEL IN       | 4 x SEL IN, quad                     |
| Image modes           | Single image     | Single   split   triple   quad image |
| Voltage supply        | 10 V to 32 V DC  | 12 V to 24 V DC                      |
| Video system          | PAL   NTSC       | PAL   NTSC                           |
| Type of protection    | IP30             | IP30                                 |
| Shock-resistant       | 10 g             | 10 g                                 |
| Vibration-resistant   | 5 g              | 5 g                                  |
| Storage temperature   | -40 °C to +95 °C | -30 °C to +80 °C                     |
| Operating temperature | -30 °C to +75 °C | -25 °C to +75 °C                     |

| MBE5200-1        | MVCD100x                                       | Technical Data        |
|------------------|--|-----------------------|
| 2                | 4  | Camera inputs         |
| 2                | 1  | Monitor connections   |
| 4                | 0   4 x GPIO*                                  | Control leads         |
| 1                | 2   1*   | CAN bus               |
| --               | Static   dynamic                               | Overlays              |
| Single image     | Single   split   triple   quad image   PIP   H | Image modes           |
| ---              | Ultrasound   radar   inclination   laser       | Sensors               |
| 18 V to 32 V     | 9 V to 60 V                                    | Voltage supply        |
| PAL              | PAL   NTSC                                     | Video system          |
| IP54 (front)     | IP68   | Type of protection    |
| 50 g             | 50 g   | Shock-resistant       |
| 5 g              | 5 g  | Vibration-resistant   |
| -40 °C to +80 °C | -40 °C to +85 °C                               | Storage temperature   |
| -30 °C to +80 °C | -30 °C to +85 °C                               | Operating temperature |

\* Only available in combination:  
0 control leads + 2 CAN bus connections or 4 control leads and one CAN bus connection

# HEAVY-DUTY CONTROL UNITS



## MVCU1300

The MVCU1300 is an intelligent, CAN-controlled **heavy-duty-video control unit**. It combines video and sensor data (max. 12 sensors, e.g., ultrasound to measure distance) and can display this information on up to 2 monitors.



## MVCU1400

The MVCU1400 is an intelligent, CAN-controlled **heavy-duty multi camera video control unit**. It can process up to 4 camera images and display these images on up to 2 monitors in a variety of modes.



## MVCU1500

The MVCU1500 is an intelligent, CAN-controlled **heavy-duty multi camera video control unit**. It can process up to 8 camera images and display these images on up to 2 monitors in a variety of modes.



## MVCU1600

The MVCU1600 is an intelligent, CAN-controlled high-end **heavy-duty multi camera video control unit**. It can process up to 8 camera images and display these images on up to 5 monitors in a variety of modes and with individual overlays.

| Technical Data        | MVCU1300                         | MVCU1401                                       | MVCU1402        |
|-----------------------|----------------------------------|--|-----------------|
| Camera inputs         | 1                                | 4  |                 |
| Monitor connections   | 2                                | 2  |                 |
| Control leads         | 4 x SEL IN                       | 4 x SEL IN                                     | 2 x SEL IN      |
| CAN bus               | 1                                | 1  |                 |
| Overlays              | Static   dynamic                 | Static   |                 |
| Image modes           | Single image                     | Single   split   triple   quad image   PIP   H |                 |
| Sensors               | Ultrasound   inclination   laser | --   |                 |
| Voltage supply        | 9 V to 60 V                      | 9 V to 32 V DC                                 | 18 V to 32 V DC |
| Video system          | PAL   NTSC                       | PAL   NTSC                                     |                 |
| Type of protection    | IP69K                            | IP69K  |                 |
| Shock-resistant       | 50 g                             | 50 g   |                 |
| Vibration-resistant   | 5 g                              | 5 g  |                 |
| Storage temperature   | -40 °C to +85 °C                 | -35 °C to +85 °C                               |                 |
| Operating temperature | -30 °C to +85 °C                 | -30 °C to +70 °C                               |                 |

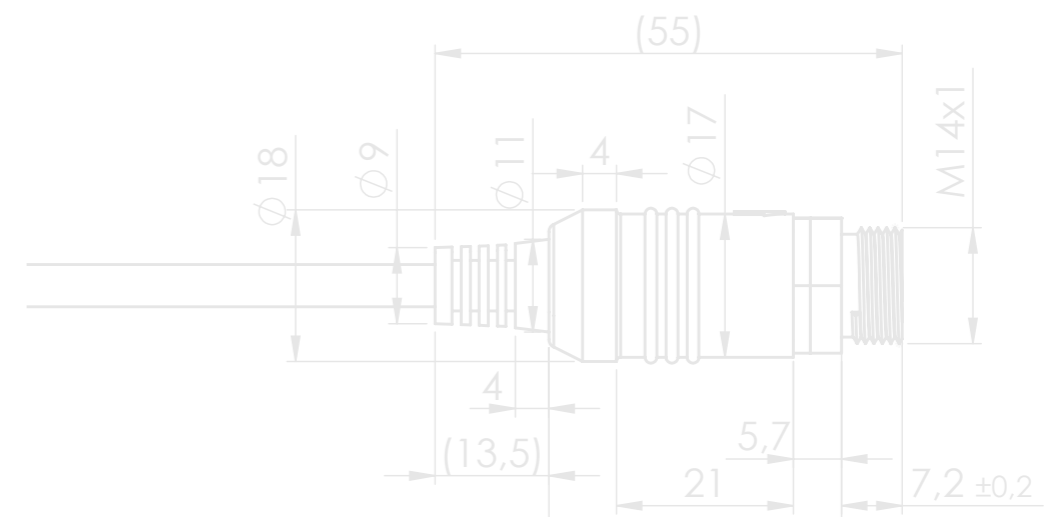
| MVCU1500                                       | MVCU1600   | Technical Data        |
|--|--|-----------------------|
| 8  | 8  | Camera inputs         |
| 2  | 5  | Monitor connections   |
| 8 x SEL IN                                     | 8 x GPIO   | Control leads         |
| 1  | 1  | CAN bus               |
| Static   | Static   dynamic                                       | Overlays              |
| Single   split   triple   quad image   PIP   H | Single   split   triple   quad   octal image   PIP   H | Image modes           |
| --   | --   | Sensors               |
| 18 V to 32 V DC                                | 9 V to 60 V  | Voltage supply        |
| PAL   NTSC                                     | PAL   NTSC   | Video system          |
| IP65   | IP68   | Type of protection    |
| 100 g  | 50 g   | Shock-resistant       |
| 5 g  | 5 g  | Vibration-resistant   |
| -40 °C to +85 °C                               | -50 °C to +85 °C                                       | Storage temperature   |
| -30 °C to +65 °C                               | -46 °C to +85 °C                                       | Operating temperature |

### The Motec radio systems and cables connect all components

## RADIO, DATA TRANSMISSION AND RECORDING, CABLE AND WLAN

The transmission mode and link for any requirement:

- . Analogue and digital radio transmission
- . In-house cable production
- . All cables come in a variety of lengths and designs
- . Reinforced cables and plugs – robust and durable



# MOTEC RADIO SYSTEMS



## MVR6000

The **analogue radio system** MVRD6000 is a robust transmitter/receiver system for a wireless image transmission. Camera images are transmitted across great distances and displayed on the monitor without time delay. Several vehicles can seem signals broadcasted by a single transmitter.



## MVRD1000

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.



## MVR5200-1

The **digital crane radio system** MVR 5200-1 makes it possible to transmit a camera image of the motor zoom camera type MC5200-1 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.

| Technical Data        | MVR6000-TX        | MVR6000-RX               | MVRD1000-TX             | MVRD1000-RX    |
|-----------------------|-------------------|--------------------------|-------------------------|----------------|
| Function              | Video transmitter | Video receiver           | Video transmitter       | Video receiver |
| Range                 | Up to 500 m       |                          | Up to 120 m             |                |
| Channels              | 3                 |                          | 1                       |                |
| Transmitter output    | 10 mW             |                          | 18 dBm EIRP             |                |
| Signal input          |                   | 1Vpp (30% Sync neg) /75Ω |                         | -86 dBm        |
| Frequency range       | 2400 MHz          |                          | 2400 MHz to 2483.5 MHz  |                |
| Voltage supply        | 12 V DC           |                          | 9 V to 32 V DC          |                |
| Video system          | PAL               |                          | PAL 25 f/s, NTSC 30 f/s |                |
| Type of protection    | IP30              |                          | IP69K                   |                |
| Shock-resistant       | 5 g               |                          | 30 g                    |                |
| Storage temperature   | -20 °C to +75 °C  |                          | -30 °C to +80 °C RH 90% |                |
| Operating temperature | +10 °C to +65 °C  |                          | -20 °C to +70 °C RH 90% |                |

| VS5200.24-1                        | VE5200.24-1        | Technical Data        |
|------------------------------------|--------------------|-----------------------|
| Video transmitter                  | Video receiver     | Function              |
| 300 m unobstructed view connection |                    | Range                 |
| 1                                  |                    | Channels              |
| Max. 25 mW                         |                    | Transmitter output    |
|                                    | Max. 10 mW (1% ED) | Signal input          |
| 5775 to 5830 MHz                   | 868.0 to 868.6 MHz | Frequency range       |
| 18 V to 32 V                       |                    | Voltage supply        |
| CCIR                               |                    | Video system          |
| IP65                               |                    | Type of protection    |
| 30 g                               |                    | Shock-resistant       |
| -40 °C to +85 °C                   |                    | Storage temperature   |
| -35 °C to +60 °C                   |                    | Operating temperature |

# MOTEC DIGITAL RECORDER



## DVR-EMV200S

The DVR-EMV200S is a 2-channel H264 **mobile recorder** that supports up to 2 cameras. The recorder uses the functions 'Permanent recordings' or 'Proceed with event-controlled recordings'. The recording takes place during real time FullID1 with up to 50 images. An Ethernet interface is used as remote control and networks are used to control the recorder.



## DVR-EMV400/-WLAN

The DVR-EMV400 or DVR-EMV400-WLAN is a 4-channel MPEG4 **digital recorder** used in mobile application for efficient hard drive and network utilisation. The graphic user interface, the recording speed, resolution, and quality can be adjusted individual for each camera. The recorder is equipped with a thermostatically-control heater. An Ethernet interface is used as remote control and networks are used to control the recorder.



## DVR-BD-301W-3G/-WIFI

The DVR-BD-301 W-WIFI is a WLAN enabled digital recorder for mobile application. Up to 2 heavy-duty cameras can be connected. The recording is started by simply pressing a button, it can be event- and time-controlled or controlled by movements in the AVI format. Live view and still images are possible in parallel and image quality and frame rate can also be set. GPS data can be displayed in the image. Housing with a locking mechanism.

| Technical Data        | DVR-EMV200S   | DVR-EMV400 / DVR-EMV400-WLAN                |
|-----------------------|---|---|
| Video format          | PAL   NTSC  | PAL   NTSC                                  |
| Video input           | 2   | 4   |
| Video output          | 1   | 2   |
| Recording resolution  | 704 x 576/704 x 288/352 x 288   704 x 480/704 x 240/352 x 240 | 704 x 576/704 x 288/352 x 288 pixels        |
| Recording speed       | 1 ~ 50 images for all resolutions                             | 1 to 100 images   1 to 50 images            |
| Memory                | SD/SDHC/SDXC, 64 GB max.                                      | 2.5" SATA removable hard drive              |
| Data export           | USB   SD card   | USB   Network                               |
| GPS                   | Integrated  | Optional                                    |
| Ethernet              | ✓   | ✓   |
| Interfaces            | 1 x USB   1 x RS-232  | 1 x RS-232   1 x RS-485   3 x USB   1 x GPS |
| Operating voltage     | 10 V DC to 32 V DC  | 10 V DC to 36 V DC                          |
| Shock-resistant       | ---   | 8 g   |
| Vibration-resistant   | ---   | 0.75 g                                      |
| Storage temperature   | -40 °C to +85 °C  | -40 °C to +85 °C                            |
| Operating temperature | -10 °C to +55 °C  | -40 °C to +55 °C                            |

| DVR-BD-301W-3G/-WIFI                          |                   | Technical Data        |
|---|-------------------|-----------------------|
| PAL   | NTSC              | Video format          |
| 2   |                   | Video input           |
| 1   |                   | Video output          |
| 1280 x 512 pixels                             | 1248 x 416 pixels | Recording resolution  |
| 1-50  | 1-60              | Recording speed       |
| SD   SDHC   SDXC   128 GB                     |                   | Memory                |
| USB   SD   Network                            |                   | Data export           |
| Optional                                      |                   | GPS                   |
| ✓   |                   | Ethernet              |
| 1 x USB   1 x RS-45   2 x RS-232   1 x RS-485 |                   | Interfaces            |
| 8 V DC to 40 V DC                             |                   | Operating voltage     |
| ---   |                   | Shock-resistant       |
| ---   |                   | Vibration-resistant   |
| -10 °C to +60 °C                              |                   | Storage temperature   |
| -10 °C to +60 °C                              |                   | Operating temperature |

# MOTEC STANDARD PLUG-IN CONNECTOR

(excerpts)



## 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

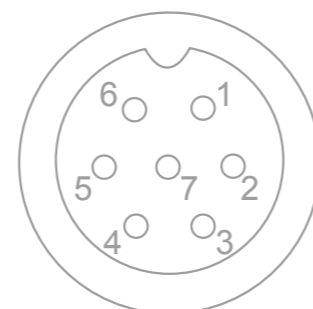
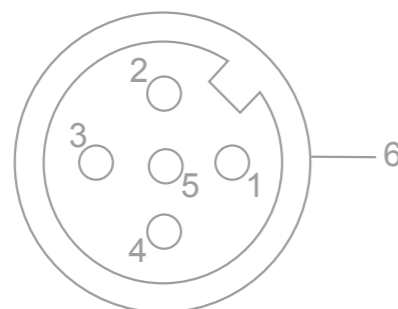
Robust watertight plastic plug with dirt-resistant coarse thread. Recommended for use during wintertime and when using gloves is necessary. A lockable protective cap prevents the permeation of road salt.



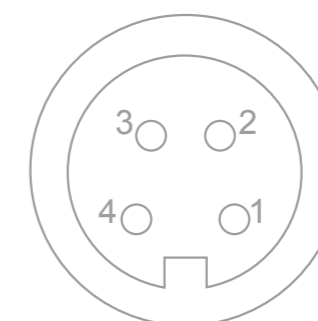
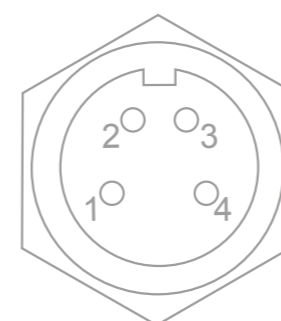
## M16

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

| 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              | ---             | ---             | ---                | ---             |



| 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              |



## MOTEC STANDARD CABLE

(excerpts)

### Connecting cable



**MK496**  
Connecting cable

Plug-in connector:  
Mini DIN to M12, male 4p - female 5p  
Various lengths



**MKS**  
Connecting cable

Plug-in connector:  
M12 to M12, male 5p - female 5p  
Various lengths



**MKW**  
Connecting cable

Plug-in connector:  
Mini DIN to Mini DIN, male 4p - female 4p  
Various lengths



**MKWW**  
Connecting cable

Plug-in connector:  
Mini DIN to Mini DIN, male 4p - female 4p  
Various lengths



**MK24**

Plug-in connector:  
Mini DIN to M16, male 4p - female 4p  
Various lengths



**MK5**

Plug-in connector:  
M16 to M16, male 4p - female 4p  
Various lengths

## MOTEC SPECIAL CABLE

(excerpts)



**MK588**  
Spiral cable

Plug-in connector:  
M12 to M12, male 5p - female 5p  
Various lengths



**MK701**  
Duo-mast cable

Plug-in connector:  
M12 to M12, male 5p - female 5p  
Various lengths



**Spring-operated cable reel**  
FLT-S-1.10-MTP-M12

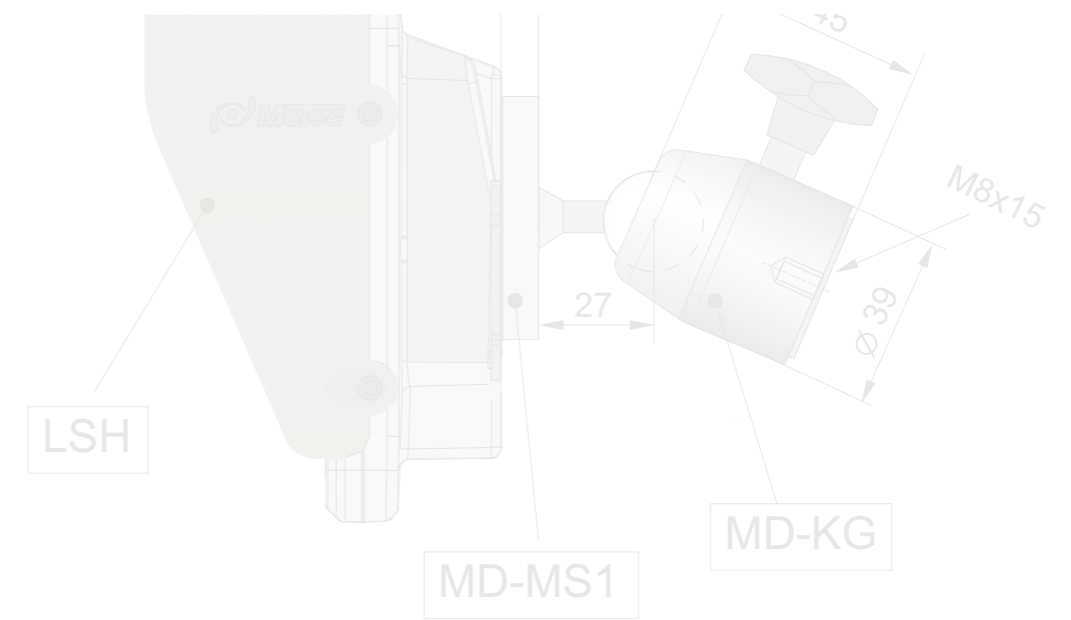
Spring-operated cable reels are used to all wind up wires/cable automatically on mobile consumers. Flat spiral springs are used for the activation. This device is intended for mobile applications and connection to Motec products.



**Spring-operated cable reel**  
FLT-S-4.6-MTP-M12

### Mast and spiral cable

### Spring-operated cable reels



### Useful product supplements

## THE MOTEC ACCESSORY PROGRAM OFFERS PROFESSIONAL ADD-ONS

Harmonised product supplements for Motec camera monitor systems:

- . Modularly applicable
- . Customized and functional
- . Enhanced comfort and protection



# MOTEC ACCESSORIES FOR CAMERAS

## Retainers



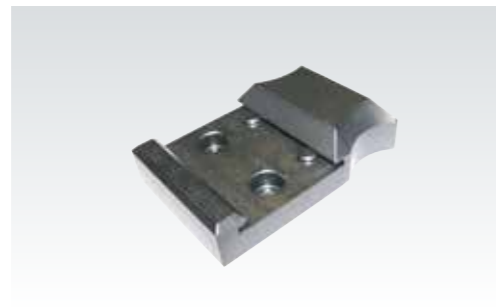
**Quick-change bracket  
MC3000-SWH-1**

Stainless steel bracket for easy and fast retrofitting vehicles that use multiple cameras. For cameras of the MC3000B series.



**Vibration bracket/damper set  
MC1000**

Reliable vibration dampers for cameras of the MC4000 and MC3000B series. The retaining bracket makes installation easy.



**Quick-change bracket  
MC6000-SWH**

Stainless steel bracket for easy and fast retrofitting vehicles that use multiple cameras. For cameras of the MC6000D series.



**Retaining bracket set  
MC9000-H1**

Stainless steel retainer for the MC9150 camera installation on the back of the fork. Protects the camera from damage.



**Pendulum bracket  
MP5000-2**

The bracket and damper for the MC5200-1 motor zoom camera. This assembly will keep the camera steady even during heavy winds and movements of the boom.



**Installation bracket  
MC7000-MH10**

Installation bracket for the heavy-duty camera MC7180N-4. Protects the camera from damage caused by tree branches or similar obstacles.

## Light shield



**Light shield for MC3000B  
MC3000-LSL (long)**

Effective glare shield made of 1 mm stainless steel for guaranteed sharp images, even in direct sunlight.

## Cleaning system













**High-pressure cleaning set  
RS3000 for MC3000B**

High-pressure cleaning set with pump, 5 m hose and 13 litre water tank. For cleaning dirty camera lenses, even while driving the vehicle.

For additional information and more products go to our website: [www.motec-cameras.com](http://www.motec-cameras.com)

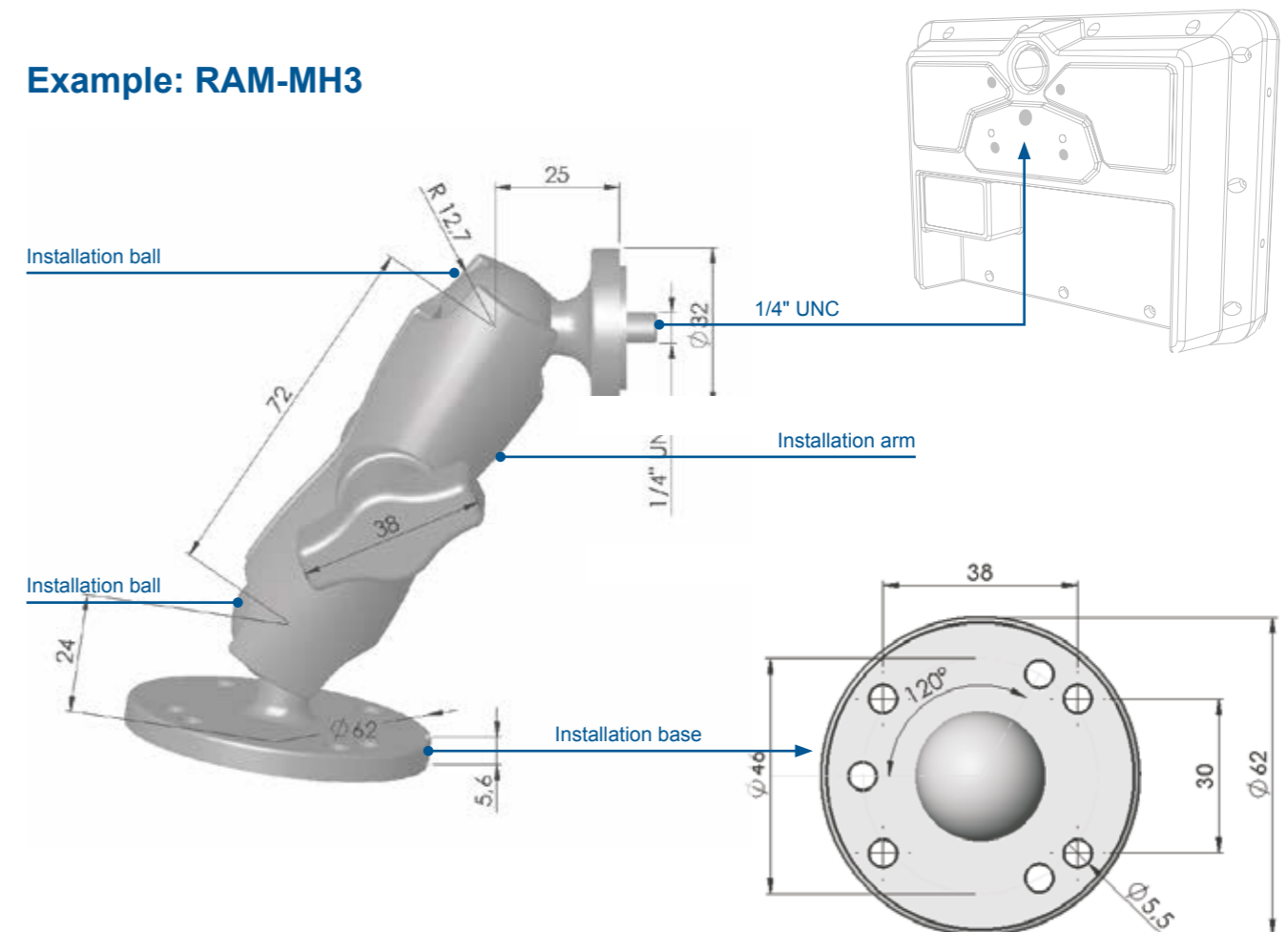
# MOTEC ACCESSORIES FOR MONITORS

## Retainers

|                 |                                     |  |   |
|-----------------|-------------------------------------|--|---|
| <b>RAM-MH1</b>  | Total length 187 mm                 | Ball joint 1.5" with flange<br>Installation base ball joint 1.5"   |    |
| <b>RAM-MH2</b>  | Total length 187 mm                 | Ball joint 1.5" with flange<br>Installation base ball joint 1.5"<br>Installation plate VESA (powder-coated)                          |    |
| <b>RAM-MH3</b>  | Total length 125 mm                 | Installation of ball 1"<br>Installation arm ball joint 1"<br>Round installation base ball joint 1"                                   |    |
| <b>RAM-MH4</b>  | Total length 218 mm                 | Ball joint 1.5" with flange<br>Connecting element/arm 1.5" ball<br>Dual clamp shell with C-ball 1.5"                                 |   |
| <b>RAM-MH5</b>  | Total length 149 mm                 | Installation of ball 1"<br>Installation arm ball joint 1"<br>Installation base with 1" ball  |  |
| <b>RAM-MH6</b>  | Total length 274 mm                 | Ball joint 1.5" with flange<br>Connecting element/arm 1.5" ball<br>Installation base with 2.5"/1.5" ball                             |  |
| <b>RAM-MH7</b>  | Total length 169 mm                 | Installation of ball 1"<br>Installation arm ball joint 1"<br>Suction base  |  |
| <b>RAM-MH8</b>  | Total length 125 mm<br>(+M6 170 mm) | Installation of ball 1"<br>Installation arm ball joint 1"<br>Installation base   |  |
| <b>RAM-MH9</b>  | Total length 125 mm                 | Installation of ball 1"<br>Installation arm ball joint 1"<br>Round installation base ball joint 1"<br>Retainer plate<br>Chassis disk |  |
| <b>RAM-MH10</b> | Total length 111 mm                 | Ball joint 1.5" with flange<br>Installation arm<br>Installation base for 1.5" ball   |  |



### Example: RAM-MH3



(All sets including fastening materials, some special tools and installation instruction.)

## MOTEC ACCESSORIES FOR MONITORS

## MOTEC ACCESSORY VOLTAGE/CURRENT

### Batteries and charging units

### Light shields



**Light shield  
MD3100-LSH**

Light shields and glare protection for monitors improve visibility and readability, even if exposed to direct sunlight.



**Light shield  
MD3071A-LSH**



**Battery box  
MAB5000**

The battery box MAB5000 can supply the MVR5200 video radio system from the transmitter side. 24 V DC.



**Battery box  
MAB5000-1**

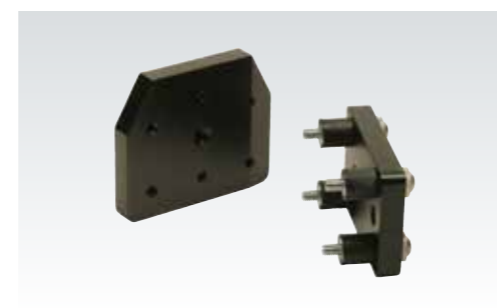
Battery box with additional time relay which switches off the connected consumer if movement does not occur.

### Damping sets

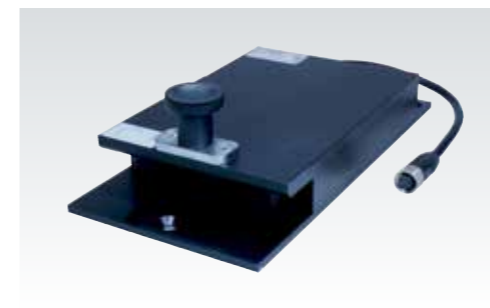


**Installation and damping set  
MD-MS.V**

Installation and damping sets absorb vibrations and shocks and, therefore, prevent the transmission of vibrations onto the monitor.



**Installation and damping set  
MD-MS1.V1**



**Battery box  
MAB1000**

Flexible battery boxes that can be easily installed for the digital Motec radio system. Robust housing including lithium-ion battery.



**Replaceable battery  
MAB1000 battery**

Supply voltage 12.6 V DC. Operating time up to 23 hours. Resistant to temperatures up to -20 °C. Charging time 3 to 5 hours. Li-Ion battery.

Betriebsspannung 12,6 V DC. Einsatzzeit bis zu 23 Stunden. Bis zu -20 °C. Ladezeit 3...5 Stunden. Li-Ion-Akku.



**Battery charging unit  
MAB1000-LG-1**

The MAB1000-LG1 charger allows the user to charge a battery of type MAB1000. Charging temperature 0 to 40 °C.

## MOTEC ACCESSORY VOLTAGE/CURRENT

## MOTEC ACCESSORY MISCELLANEOUS

### Voltage transformers



**Voltage transformers**  
SW103.48.24/SW103.80.24

DC voltage converters for the uninterrupted power supply of camera systems. Available for 48 V DC and 80 V DC input voltage.



**Voltage transformers**  
MPM48

Voltage converter suitable for the use in cold storage and easy "piggyback" installation to the MD3074A monitor. For input voltage 48 V DC.

### Power packs



**Power pack**  
NG230.12

Power packs guarantee an uninterrupted power supply of 12 or 24 Volt V DC.



**Power pack**  
NG230.24



**MV13**  
Signal boosting and distribution

The video distribution box MV13 distributes an analogue video signal and transmits this video signal to up to 3 outputs.



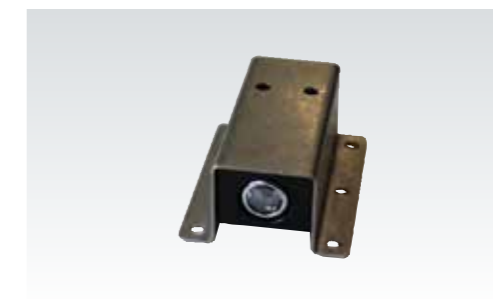
**Video signal distributor 4x8**

Video distributor with 4 inputs and 8 outputs. BNC connection on video distributor. Power supply 12 V DC.



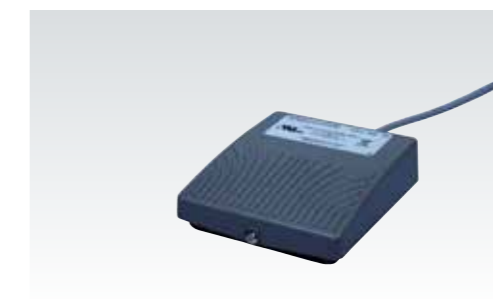
**MBE1000**  
Operator control unit

The MBE1000 is a CAN bus-enabled operating unit.



**Motec Power Light**  
MPL-LED

LED signal light with ultra-bright LED and lens. Protection class IP67. Power supply 12 V DC.



**MBE5200 Foot switch**

The foot-operated rocker switch MBE5200 allows the machine operator to activate the simple zooming function of a Motec MC5200 motor zoom camera.

### Miscellaneous

## MOTEC ACCESSORIES FOR MAST CABLES

### Pulleys



**Pulley**  
MPS, MPS-2, MPS-3

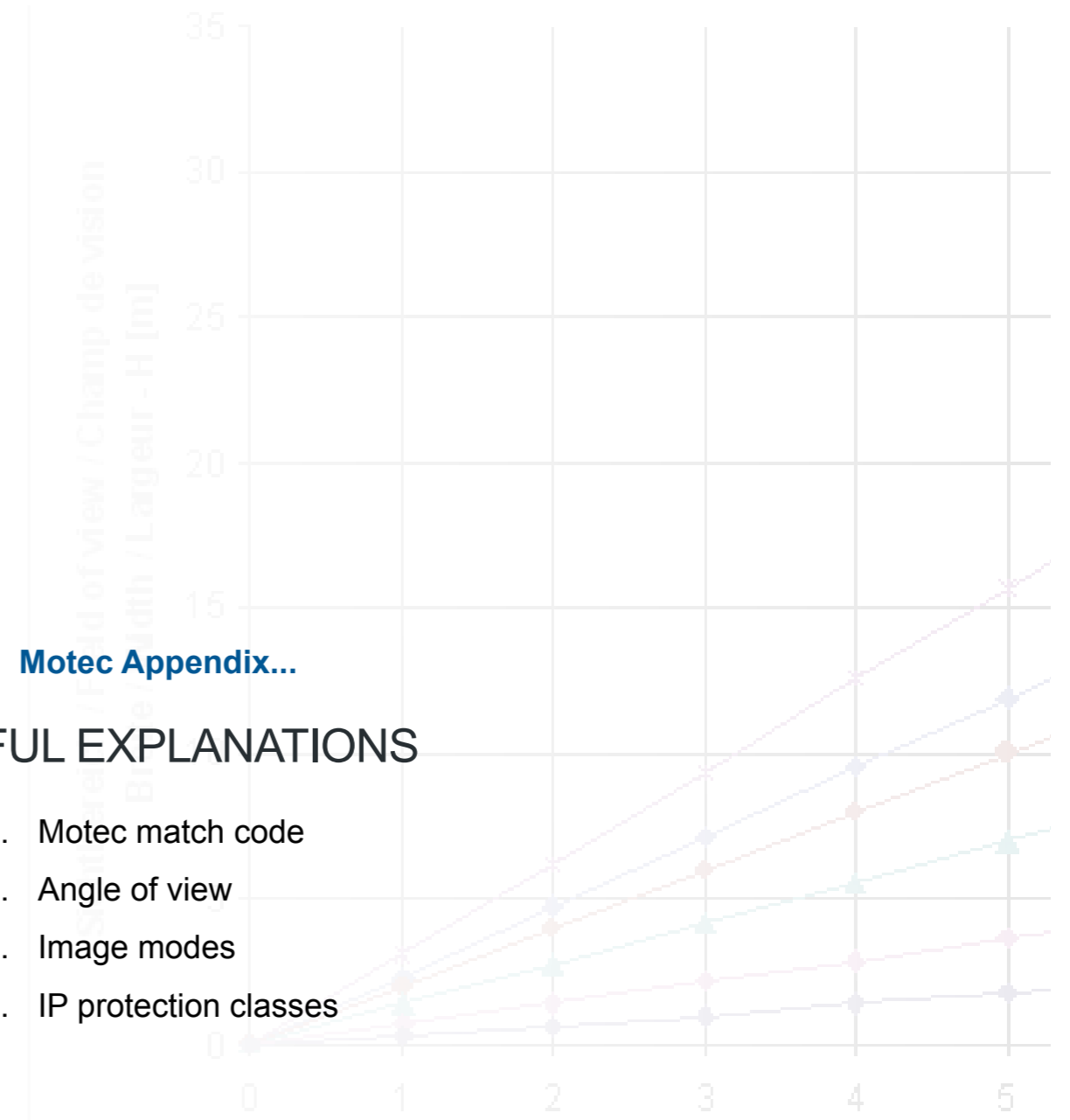
Pulley for the selective guidance of a mast cable during the lifting process. Available for a variety of diameters.

### Tension relief set



**Tension relief set**  
for mast cables

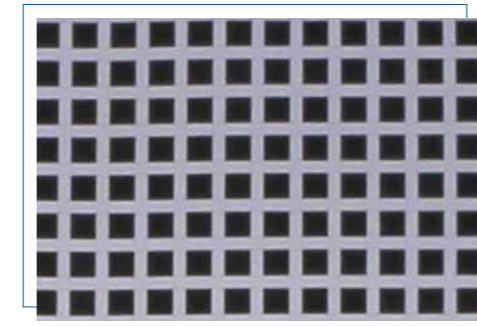
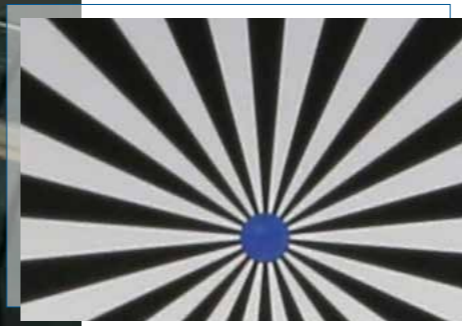
Designed for the prevention of damage to the mast cable's plug-in connection.



Motec Appendix...

USEFUL EXPLANATIONS

- . Motec match code
- . Angle of view
- . Image modes
- . IP protection classes







# PRODUCT KEY FOR MOTEC CAMERAS

## Camera match code

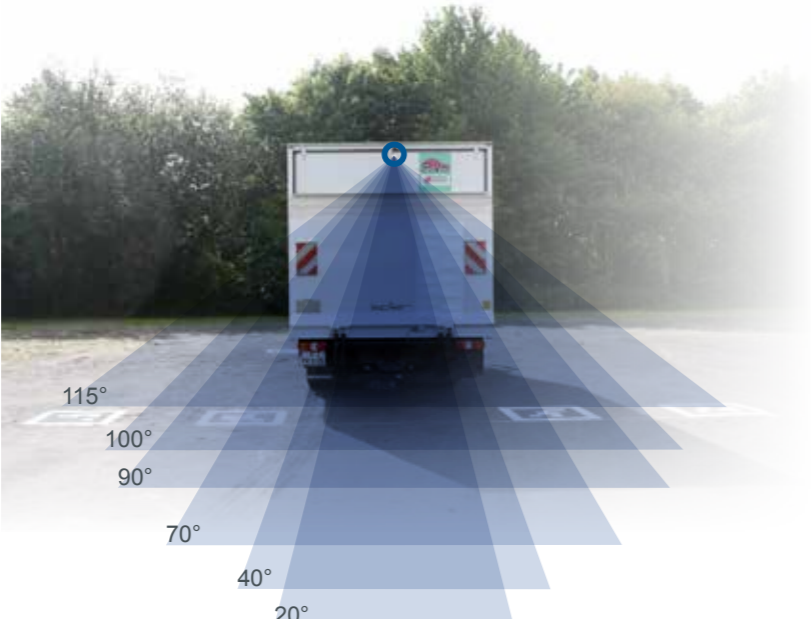
|          |          |          |          |          |          |          |          |          |          |           |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| <b>M</b> | <b>C</b> | <b>X</b> | <b>X</b> | <b>X</b> | <b>X</b> | <b>X</b> | <b>X</b> | <b>-</b> | <b>X</b> | <b>R*</b> |
| O        | A        |          |          |          |          |          |          |          |          |           |
| T        | M        |          |          |          |          |          |          |          |          |           |
| E        | E        |          |          |          |          |          |          |          |          |           |
| C        | R        |          |          |          |          |          |          |          |          |           |
| A        | A        |          |          |          |          |          |          |          |          |           |

\* = Mirrored camera

- 2 = Plug RD24/7pin 
- 3 = Plug MiniDIN4pin (14x1) 
- 4 = Plug M12/5pin 
- = Plug M16/4pin 

Horizontal angle of view (20°=020,

- 3 = Cameras of series 3000
- 5 = Motor zoom camera 5200
- 6 = Cameras of series 6000
- 7 = Cameras of series 7000
- 9 = Cameras of series 9000

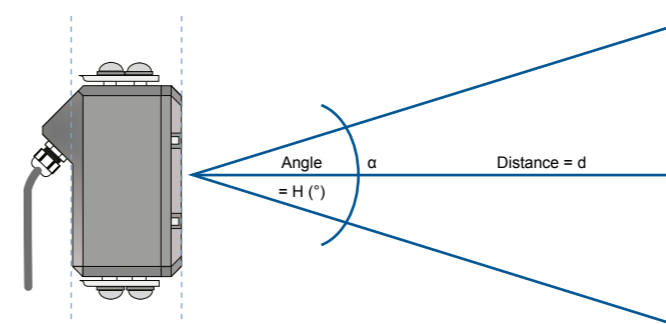


115°  
100°  
90°  
70°  
40°  
20°

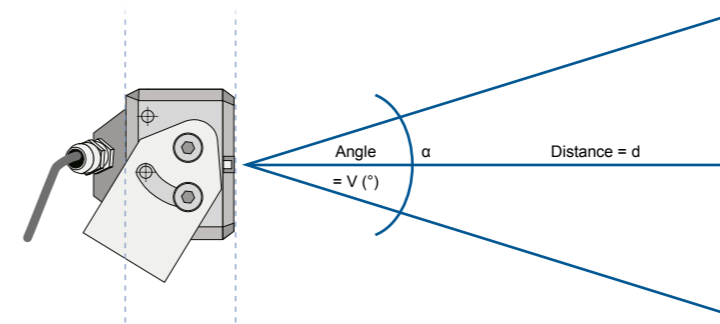
# ANGLE OF VIEW HORIZONTAL AND VERTICAL

## Angle of view

### ILLUSTRATION OF THE HORIZONTAL ANGLE OF VIEW:



### ILLUSTRATION OF THE VERTICAL ANGLE OF VIEW:



### CALCULATING THE REFERENCE POINT

The correlation between the displayed object field or the detection range and the distance (to the object) as a function of the selected camera's angle of view can be calculated by applying the following formula:

$$S = 2 * d * \tan(\alpha/2)$$

S = Size of object field  
d = Distance (optical axis)  
α = Aperture angle

## POSSIBLE ILLUSTRATIONS OF VARIOUS CAMERA IMAGES

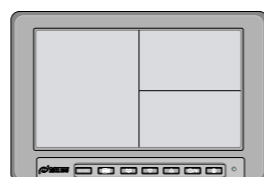
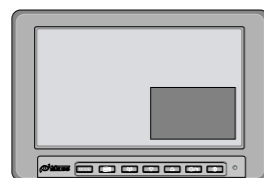
### Image modes



Single mode



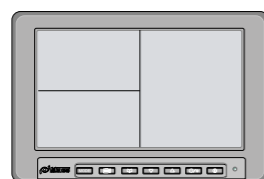
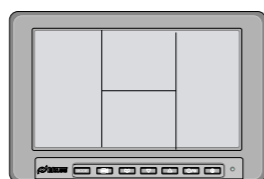
Split mode (horizontal)


 Triple mode  
1/4 images, right


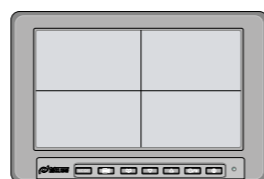
PIP mode (flexible PIP)



Split mode (vertical)


 Triple mode  
1/4 images, top

 Triple mode  
1/4 images, left


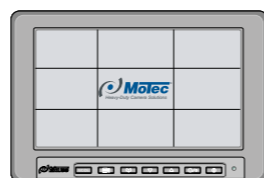
H mode



Quad mode (vertical)


 Triple mode  
1/4 images, bottom


PIP mode (1-3 PIP)



Octal mode

(See also page 18-19.)

## OVERVIEW OF IP PROTECTION CLASSES

### IP CODE ACCORDING TO IEC 60529

Dust, water, vibrations – cameras must operate reliably even under difficult conditions. The IP code according to IEC 60529 specifies the environmental conditions under which the camera must be operating properly. The abbreviation IP stands for "Ingress Protection". In the IP code consists of 2 digits. The first digit defines the protection from contact and a specified test tool (1 mm test finger) and the ingress of solid materials (parts, wire, dust, etc.). The second digit defines the behaviour towards liquids (water drops, splash & spray water, high-pressure cleaners, etc.).

### IP code

| Code number 1 | Scope of protection   | Code number 2 | Scope of protection  |
|---------------|---|---------------|--|
| 0             | No protection against contact, no protection against solid foreign objects  | 0             | No water protection  |
| 1             | Protection against large-area contact by hand, protection against foreign objects with $\varnothing > 50$ mm  | 1             | Protection against vertical water drops  |
| 2             | Protection against finger contact, protection against foreign objects   | 2             | Protection against water drops contacting the surface at a random angle up to 15° from the vertical plane                      |
| 3             | Protection against contact with tools, wires or similar objects with $\varnothing > 2.5$ mm, protection against foreign objects with $\varnothing > 2.5$ mm | 3             | Protection against water drops contacting the surface at a random angle up to 60° from the vertical plane                      |
| 4             | Similar to 3, however, with the specification of $\varnothing > 1$ mm   | 4             | Protection against splash water from all directions  |
| 5             | Protection against contact, protection against dust deposits on the inside  | 5             | Protection against water jet (nozzle) from any random angle  |
| 6             | Complete protection against contact, protection against ingress of dust   | 6             | Protection from water permeation during temporary flooding   |
|               |   | 7             | Protection from water permeation during temporary immersion in water   |
|               |   | 8             | Protection from water permeation during permanent immersion in water   |
|               |   | 9K            | Protection against permeating water during exposure to high pressure/steam operation (specified at 100 bar/80 °C and 16 L/min) |



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