



Construction Machines

Product Catalog for Camera, Monitor and Mirror Systems



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Editorial

Dear Readers,

We are delighted to provide you with our brand new construction machines catalog.

As a supplier of robust and high-quality indirect vision systems, we offer standard solutions as well as vehicle-specific adaptations and customized products based on your own designs.

Our standardized concepts and related modules enable us to provide optimized mirror and/or camera monitor systems for any type of vehicle.

We would be honored to partner with you in developing flexible and cost effective value-added solutions, and we look forward to your inquiry.

This catalog is designed to provide useful information on the subject of indirect vision as well as a comprehensive idea of Mekra Lang's standard portfolio. As a next step, we would be happy to discuss your specific needs in this area and offer you highly customized systems perfectly tailored to your requirements.

This catalog contains numerous innovations that are based on our long-standing expertise and commitment to the development of pragmatic solutions in the field of indirect vision.

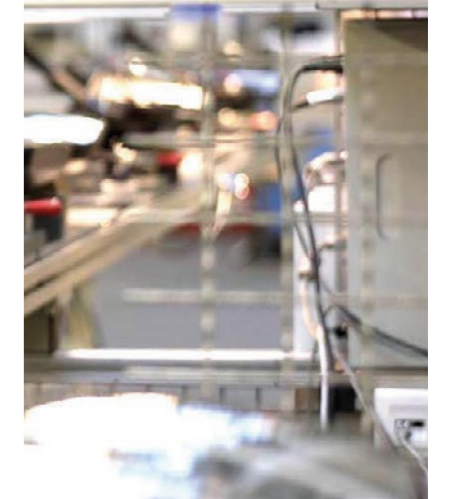
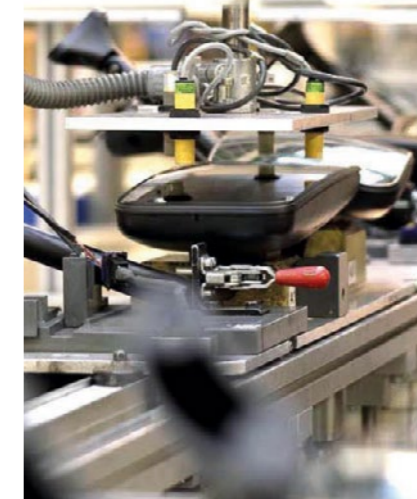
As you will see, our reliable products do not only provide considerable added value but also fundamental benefits for your daily operations.

We look forward to assisting you as you meet your present and future challenges.

With kind regards,



Michael Heckel
Sales Director OFF ROAD



A short history of vision

Toward a new dimension

VISION 1.0

Direct vision

Daily construction work in the 19th century was characterized by hard physical labor. Just about every task was perfor-



med by hand and the use of any kind of machinery was a rarity. Some of the work was facilitated by using horses and horse-drawn carts, and the visibility requirements, both on the construction sites and on the the road, were still sufficiently met by direct vision.

VISION 2.0

Emergence of mechanization

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



using direct vision, as had been adequate for centuries, mirrors were now employed to monitor the areas around vehicles indirectly.

VISION 3.0

Increase in machine complexity

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

New solutions were needed to ensure adequate visibility in construction settings. MEKRA Lang answered the call by initiating its in-house development of camera monitor systems while continuing to optimize its mirror portfolio. This added a critical element to indirect vision solutions, ensuring true 360° visibility around machines. By optimizing the visualization of hazardous areas, MEKRA Lang camera monitor systems enable operators to work safely and much more efficiently. 80 years of development expertise and commitment to the cont-



inuous optimization of machine operations through improved visibility have led us into a new dimension of visualizing the work space.

VISION 4.0

Entering a new dimension

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



Highlights

Mirror and mounting systems

Modular mirror 1009



- Continuous field-of-vision from close proximity to horizon
- Obstacles and persons are detectable in close proximity
- Reduces risk of injuries and property damage
- Compatible with tube diameters between 18 mm and 22 mm
- Expandable modular mirror system
- Tool-free mirror glass replacement

For a detailed description, please see page 40

Mirror mounting system 1045



- Integrierte Kabelführung
- Robust und korrosionsunempfindlich
- Easy assembly
- Identical mounting hole layout telescop mirror arm 1017
- Horizontale oder Vertikale Rohranbindung
- Lange Ausladung zur Erfüllung ISO 5721

For a detailed description, please see page 57

Highlights

Camera monitor systems

Platform camera



- Modular assembly kit, customized solutions to accommodate individual customer requests
- Time and cost efficient adaptability to each camera type
- Discrete and extremely rugged camera components
- Image resolution from standard VGA to 1.2 megapixels
- Analog and digital transmission standards supported
- Various aperture angles can be combined with platform components
- High-performance integrated heating system

For a detailed description, please see page 62

MEKRA Lang digital monitor



- For analog and digital transmission standards
- Up to 7 cameras possible
- 7", 10" and 12" available
- Operation via touch screen
- Software can be individually configured
- CAN integration possible
- Zoom function – adjustable for each camera picture
- Robust aluminum back housing
- Recording functionality

For a detailed description, please see page 68



Development expertise

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Production expertise	14

Development expertise

Overview of current regulations

Surround vision regulations for construction machinery

The revised Machinery Directive 2006/42/EC forms the legal basis for visibility requirements concerning construction machinery. In this context, compliance with the internationally applicable standards

- ISO 5006
- ISO 14401

is of particular importance because it is directly mandated by the harmonized European Standard EN 474. This means that a surround vision configuration for construction machinery that is in compliance with the provisions of ISO 5006 and ISO 14401 ensures that the general

“visibility” provisions of Machinery Directive 2006/42/EC are also properly met.

ISO 5006

ISO 5006 defines minimum surround vision requirements for construction machinery addressing seven different areas:

- RB: Rectangular boundary drawn around the machine at a 1 m distance. The height of the objects that are located

on the rectangular boundary (Objects of Immediate proximity), and that must be seen by the operator, is depending on the type of machinery according to size (mass).

- A-F: 6 sectors of a 12 m circle drawn on the ground, with the eye position of the

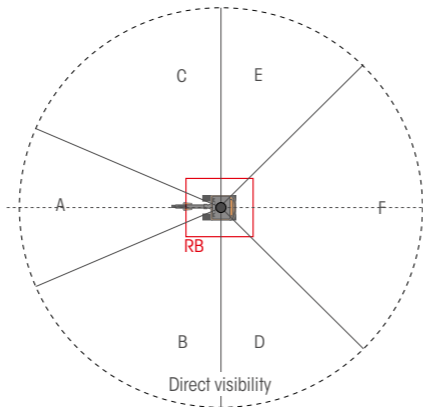
machine operator as the center (relates to objects in indirect close proximity). Objects must be visible in each of these six sectors.

ISO 5006 details the exact visibility requirements for each of the machine types in question (see illustration below).

Visibility areas around a construction machine according to ISO 5006

For each of the seven visibility areas (RB, A-F), subsectors of a certain maximum permissible size are defined, which are allowed to be invisible to the machine operator. The individual measurements depend on specific machine types and weight classifications:

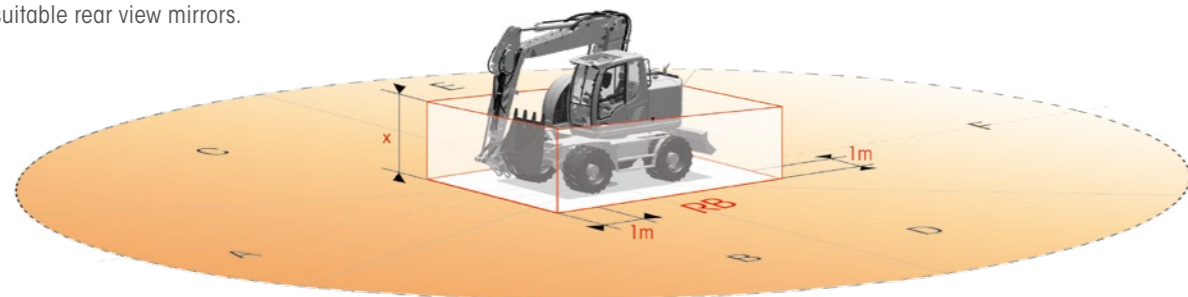
For example, in visibility area A a wheel loader with a total mass under 10 tons is allowed to have a maximum of two concealed areas extending by no more than 700 mm each. For this machine type, concealed areas on the rectangular boundary (RB) may not be wider than 300 mm.



ISO 14401

ISO 14401 contains provisions concerning fields of vision in the rear of construction machinery which need to be made visible by using suitable rear view mirrors.

The fields of vision to be implemented are specified for various types of machinery.

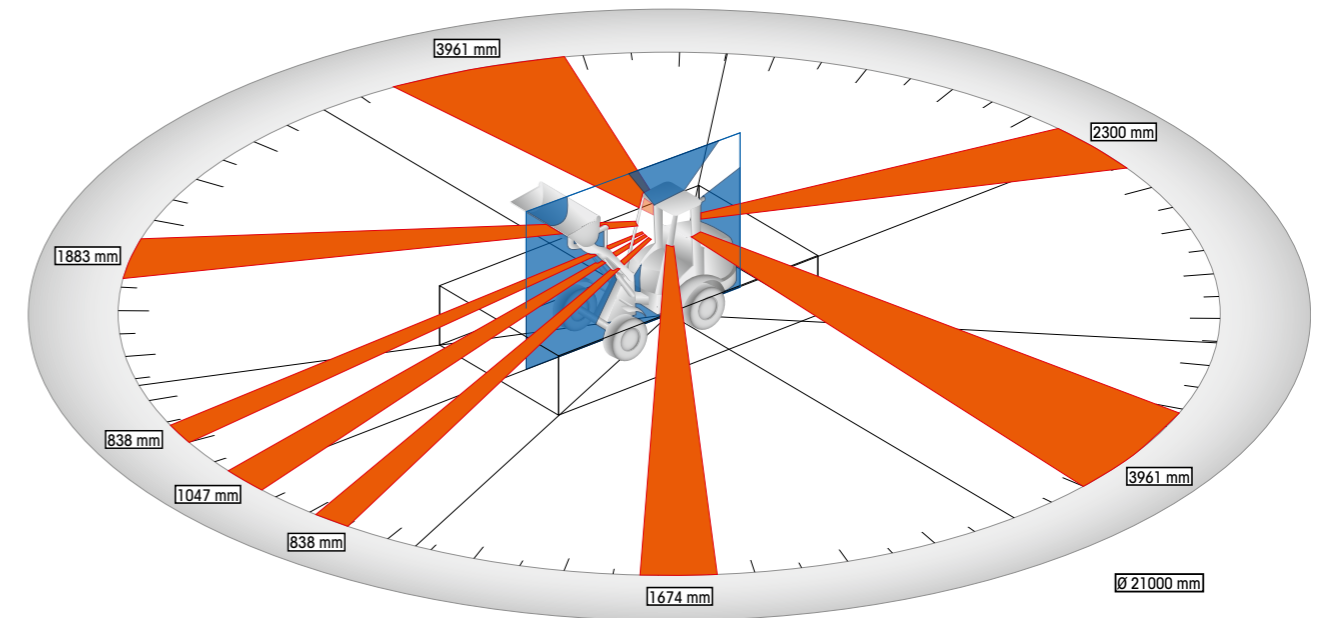
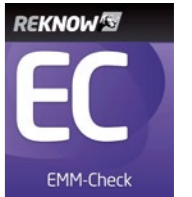


Field of vision study

Using virtual vehicle models, MEKRA Lang conducts realistic field-of-vision studies in-house, ensuring the development of optimized vision systems adapted to individual, vehicle-specific characteristics, such as body shape and cab layout, providing proven safety benefits for everyday applications.

We work with systems that can help you identify potential field-of-vision obstructions early in the development process and show you ways to offset these problems using mirror and camera systems.

www.reknow.de/emm-check/emm-check



MEKRA Lang surround vision systems

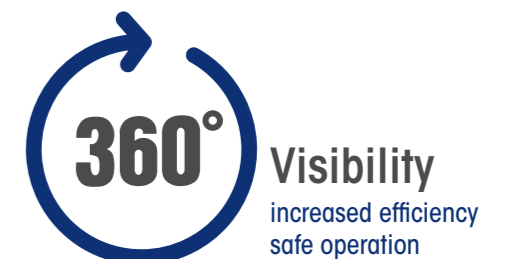
The development of surround vision systems is our key competency, and it is our goal to increase work and traffic safety as well as to improve efficiency and performance.

To this end, MEKRA Lang offers a product portfolio that is as diverse and versatile as its many areas of application.

In individual cases, the components must be selected based on the special characteristics of the respective construction machines.

Our highly qualified customer service representatives will help you select a surround vision system that is a perfect match for your construction machine requirements as well as the most efficient solution for you.

Call on us – we love a challenge!



Electronics expertise

Modular vision solution for analog and digital applications

The platform concept

Aperture angle selection

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



Image processing

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



Transmission set-up

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



The benefits of modularity

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

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

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

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

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

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

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

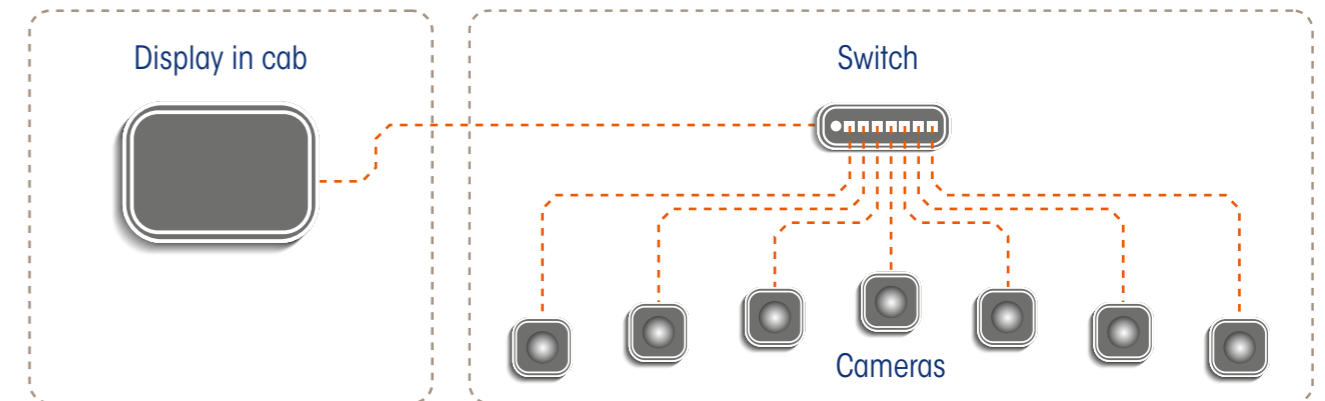
The MEKRA platform camera features an especially rugged **housing** perfectly suitable for rough environmental conditions. And thanks to its high-performance integrated heating system, the camera can be operated under all weather conditions.

Digitization enables new types of application

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

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

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



Specifications overview

Digital ethernet camera

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



Analog camera

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



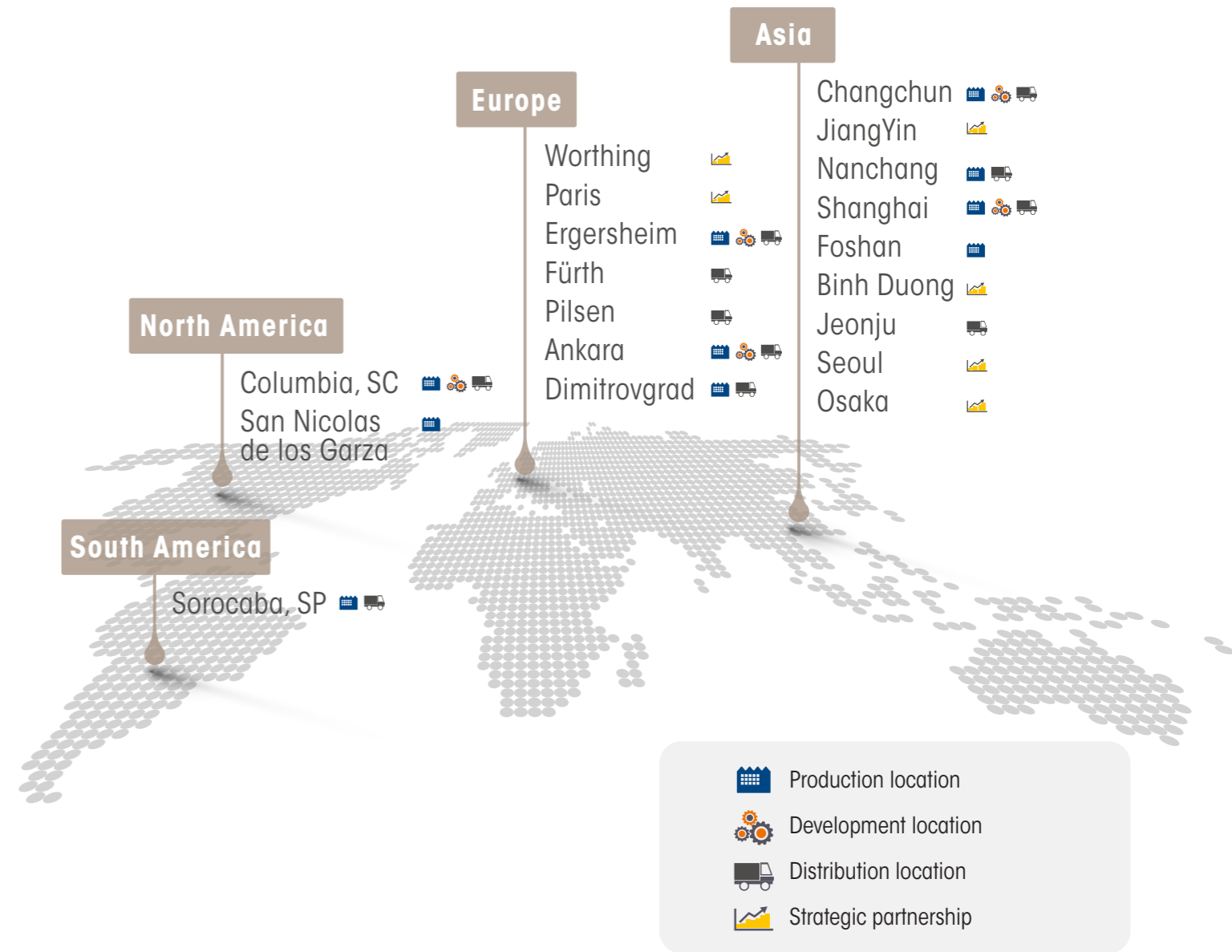
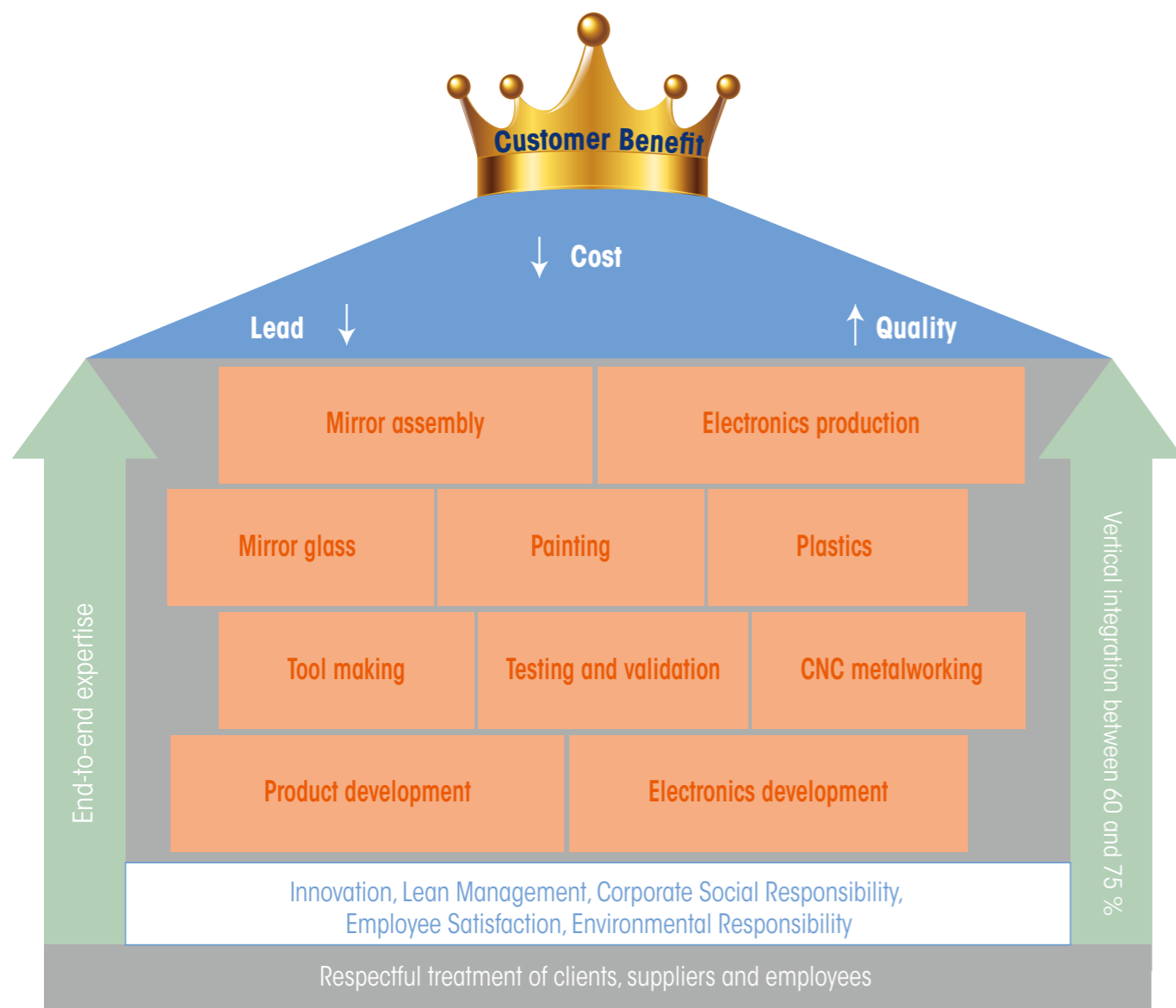
Production expertise

Customer satisfaction, vertical integration, and global footprint

All activities on MEKRA Lang shop floors are based on „Lean Thinking“ principles and the associated methods of value creation, focussing on error-free and customer-centric business process flows. It is our goal to raise our employees' awareness of these issues, both in Germany

and internationally. All of us working for the MEKRA Group are united in striving for continuous improvement of our workflows and processes with customer satisfaction at the center of everything we do. Thanks to the incremental improvement of our overall system based on cutting-edge insights

and technological advances, we are able to add value for the benefit of our customers and to offer high-quality, flawless „just in time“ delivery.













Bringing all departments to the table to collaborate on the development of new product and manufacturing concepts has always been very beneficial for us. It involves testing various product requirements and processes in a team setting early on in the development phase and clears the way for implementing our common goal. We can identify and leverage opportunities in a timely manner, thereby ensuring a smooth ramp-up to batch production.

Depending on the location of our production facilities and underlying conditions, we adapt our shop floor configuration to the specific task at hand. This enables us to optimize our assembly lines for the production of the durable and versatile products typically required for agricultural applications and gives us great flexibility to respond to customer requests, even with small production units. MEKRA Lang operates production facilities all around the

world, which means that we can use our expertise to implement almost all projects in close proximity to our customers.



**Field-of-vision solutions
for increased driving safety**

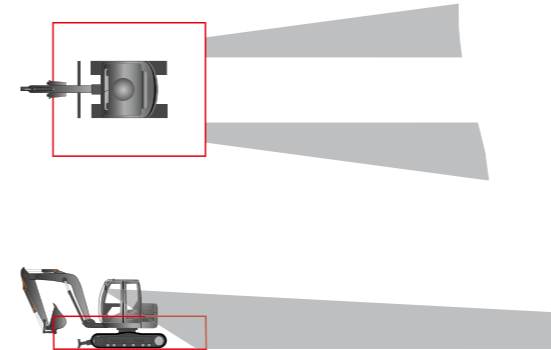
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	Combined MEKRA Lang mirror and camera monitor system	
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Mini Excavators

MEKRA Lang mirror system



Standard solution



MEKRA Lang solution



360° Visibility
increased efficiency
safe operation

MEKRA Lang mirror system

Item no.	Item description	Page
1010	Compact mirror left and right side, 1200 mm radius of curvature, including aspherical area	41
1016	Mirror mounting system left side, ø 22 mm	54
1016	Mirror mounting system right side, ø 22 mm	54

The systems shown are recommended by MEKRA Lang. Beginning on page 39, you will find additional MEKRA lang product solutions and alternatives.

Wheel Excavators

Combined MEKRA Lang mirror and camera monitor systems



1
1016
Mirror mounting system

1009-240
Modular mirror

2
270-7
Mirror mounting system

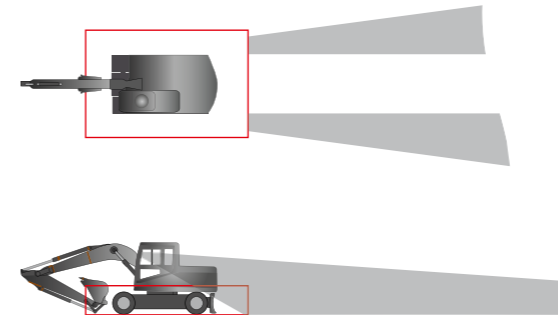
1009
Modular mirror with close-proximity

3
MCM-Monitor

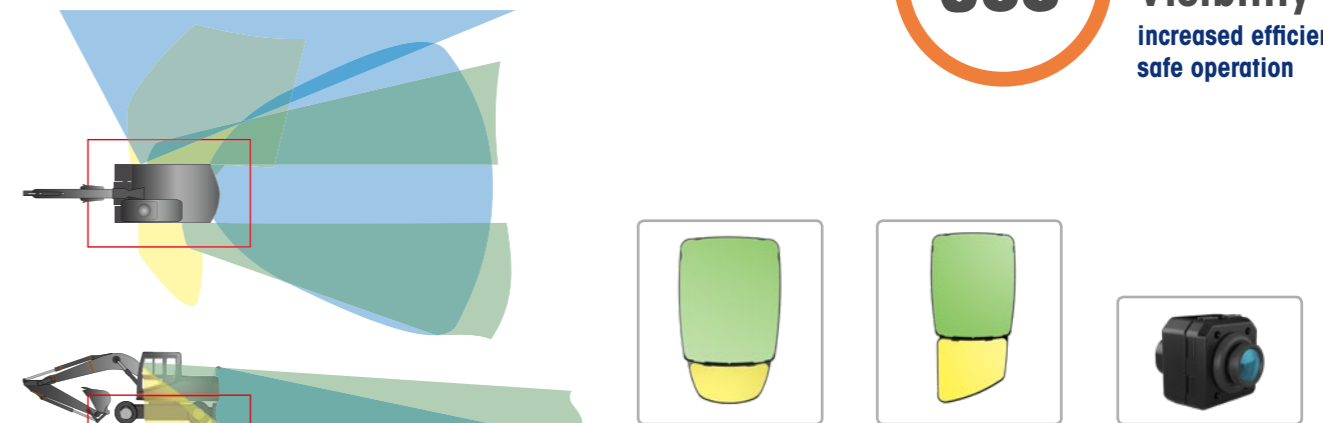
4
MCC-
Side camera

5
MCC-
Rear camera

Standard solution



MEKRA Lang solution



MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Page
1009-240	Modular mirror with close-proximity mirror, left side, 1200/240 mm radius of curvature, manual adjustment, heated 12 V	40
1016	Main mirror system left side, ø 22 mm	54
1009	Modular mirror with close-proximity mirror, right side, 1200/300 mm radius of curvature, electrical adjustment, heated 12 V	40
270-7	Mirror mounting system right side, ø 28 mm	58

MEKRA Lang camera monitor systems

Item No.	Item description	Page
MCM	TFT-Monitor 7", 4 camera inputs	68
MCC	Rear camera, CMOS color camera 100° (platform base)	62
MCC	Fodder output camera, CMOS color camera 100°, low distortion (platform base)	62

The systems shown are recommended by MEKRA Lang. Beginning on page 39, you will find additional MEKRA lang product solutions and alternatives.

Crawler Excavators

Combined MEKRA Lang mirror and camera monitor systems

1
1016
Mirror mounting system

1
270-7
Mirror mounting system

3
MCM-Monitor

4
MCC-
Side camera

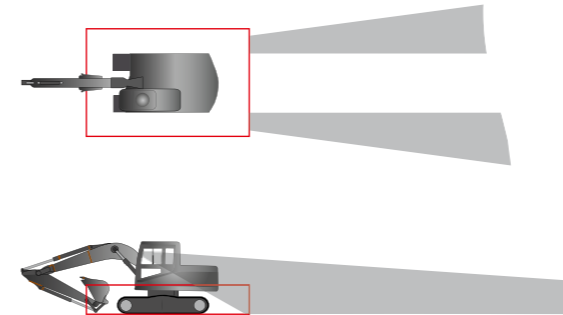
5
MCC-
Rear camera

572
Main mirror

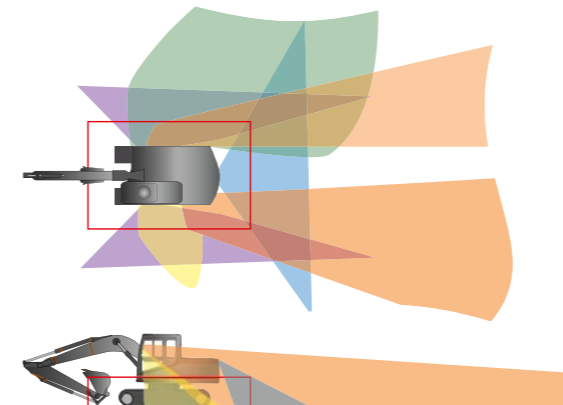
1009-240
Modular mirror

573
Wide-angle mirror

Standard solution

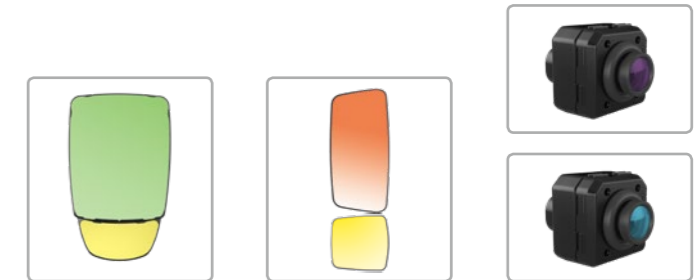


MEKRA Lang solution



360°

Visibility
increased efficiency
safe operation



MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Page
572	Main mirror left and right side, 1200 mm radius of curvature, electrical adjustment, heated 12 V	46
573	Wide-angle mirror right side, 300 mm radius of curvature, electrical adjustment, heated 12 V	46
1016	Mirror mounting system left side, ø 22 mm	54
1009	Modular mirror with close-proximity mirror, right side, 1200/300 mm radius of curvature, electrical adjustment, heated 12 V	40
270-7	Mirror mounting system right side, ø 28 mm	58

MEKRA Lang camera monitor systems

Item No.	Item description	Page
MCM	TFT-Monitor 7", 4 camera inputs	68
MCC	Rear camera, CMOS color camera 100° (Platform base)	62
MCC	Side camera, CMOS color camera 100° (Platform base)	62

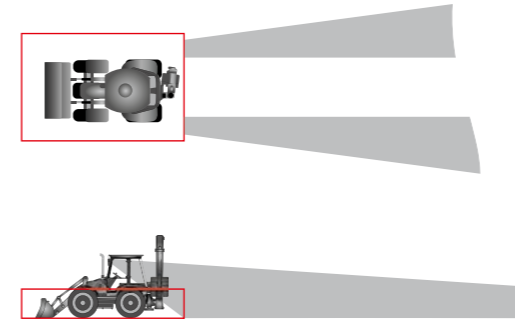
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Backhoe Loaders

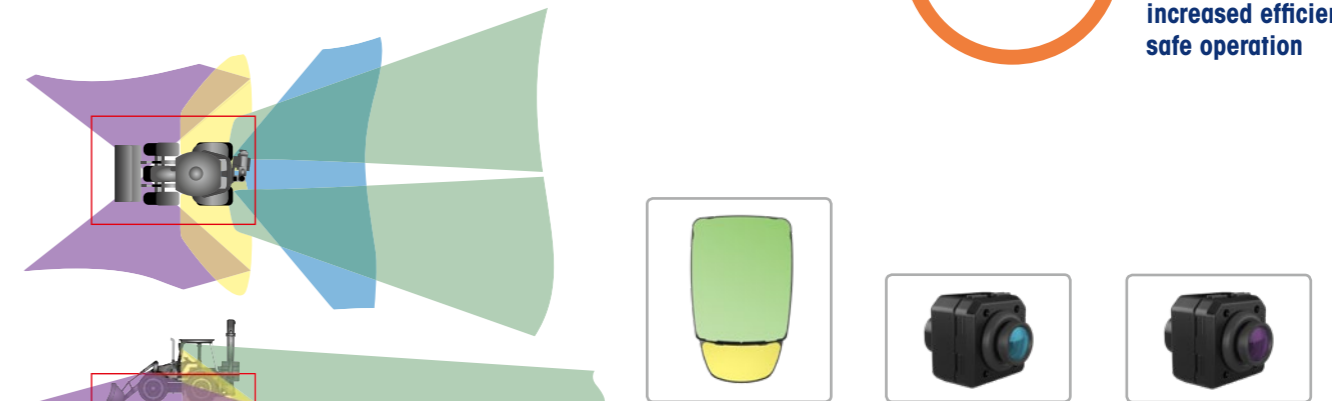
Combined MEKRA Lang mirror and camera monitor systems



Standard solution



MEKRA Lang solution



360° Visibility
increased efficiency
safe operation

MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Page
1009-240	Modular mirror with close-proximity mirror, right side, 1200/240 mm radius of curvature, manual adjustment, heated 12 V	40
1016	Mirror mounting system left side, ø 22 mm	54
1016	Mirror mounting system right side, ø 22 mm	54

MEKRA Lang camera system

Item No.	Item description	Page
MCM	TFT-Monitor 7", 4 camera inputs	68
MCC	Rear camera, CMOS color camera 100° (Platform base)	62
MCC	Side camera, CMOS color camera 100° (Platform base)	62

The systems shown are recommended by MEKRA Lang. Beginning on page 39, you will find additional MEKRA lang product solutions and alternatives.

1
1016
Mirror mounting system

1009-240
Modular mirror

2
1016
Mirror mounting system

1009-240
Modular mirror

3
MCM-Monitor

4
MCC-
Side camera

5
MCC-
Rear camera

Wheel Loaders

Combined MEKRA Lang mirror and camera monitor systems



1
270-7
Mirror mounting system



572
Main mirror



573
Wide-angle mirror



2
270-7
Mirror mounting system



572
Main mirror




573
Wide-angle mirror



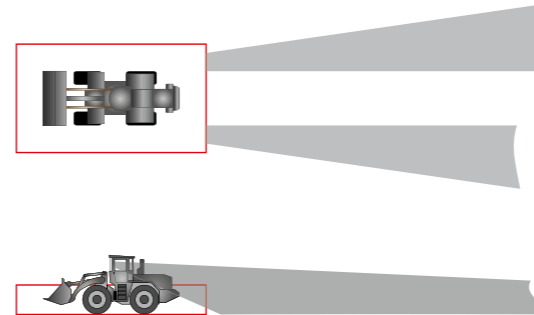
3
MCM-Monitor



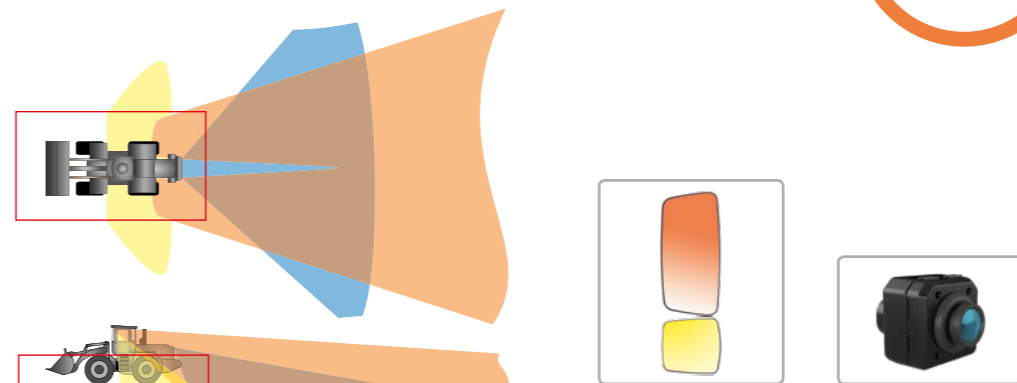
4
MCC-
Rear camera



Standard solution



MEKRA Lang solution



360° Visibility
increased efficiency
safe operation

MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Page
572	Main mirror left and right side, 1200 mm radius of curvature, electrical adjustment, heated 12 V	46
573	Wide-angle mirror left and right side, 300 mm radius of curvature, electrical adjustment, heated 12 V	46
270-7	Mirror mounting system left and right side, ø 28 mm	58

MEKRA Lang camera monitor systems

Item No.	Item description	Page
MCM	MEKRA Lang Digital Monitor	68
MCC	Rear camera, CMOS color camera 100° (Digital Platform base)	62

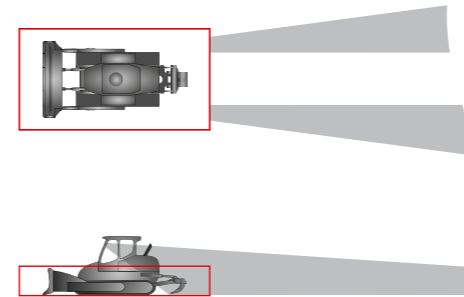
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Crawler-Dozers

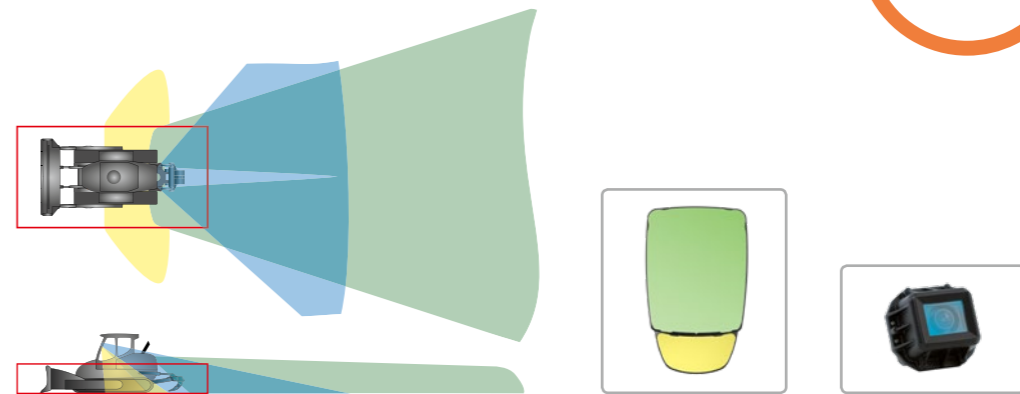
Combined MEKRA Lang mirror and camera monitor systems



Standard solution



MEKRA Lang solution



360° Visibility
increased efficiency
safe operation

MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Page
1009-240	Modular mirror with close-proximity mirror, left and right side, 1200/240 mm radius of curvature, manual adjustment, heated 12 V	40
1016	Mirror mounting system left side, ø 22 mm	54
1016	Mirror mounting system right side, ø 22 mm	54

MEKRA Lang camera monitor systems

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MCM	TFT-Monitor 7", 4 camera inputs	68
MCC	Rear camera, CMOS color camera 120°	64

The systems shown are recommended by MEKRA Lang. Beginning on page 39, you will find additional MEKRA lang product solutions and alternatives.

1
1016
Mirror mounting system

1009-240
Modular mirror

2
1016
Mirror mounting system

1009-240
Modular mirror

3
MCM-Monitor

4
MCC-
Rear camera

Telescopic Handlers

Combined MEKRA Lang mirror and camera monitor systems

1
1016
Mirror mounting system




1010
Compact mirror

2
270-7
Mirror mounting system




1009
Modular mirror with close-proximity

3
MCM-Monitor



4
MCC-
Side camera



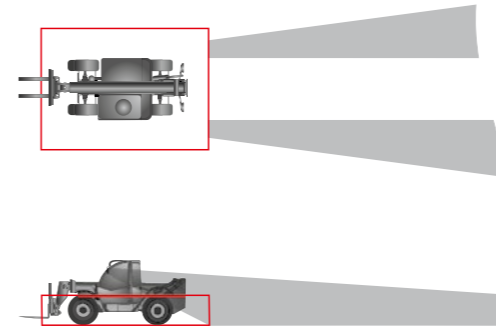
5
MCC-
Rear camera



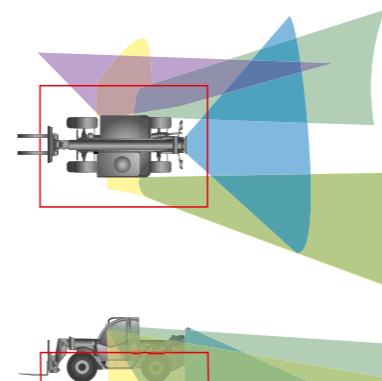
6
Digital wireless
system



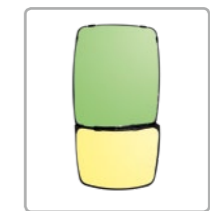
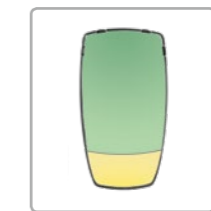
Standard solution



MEKRA Lang solution



Visibility
increased efficiency
safe operation



MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Seite
1010	Compact mirror left side, 1200 mm radius of curvature, including aspherical area	41
1016	Mirror mounting system left side, ø 22 mm	54
1009	Modular mirror with close-proximity mirror, right side, 1200/300 mm radius of curvature, electrical adjustment, heated 12V	40
270-7	Mirror mounting system right side, ø 28 mm	58

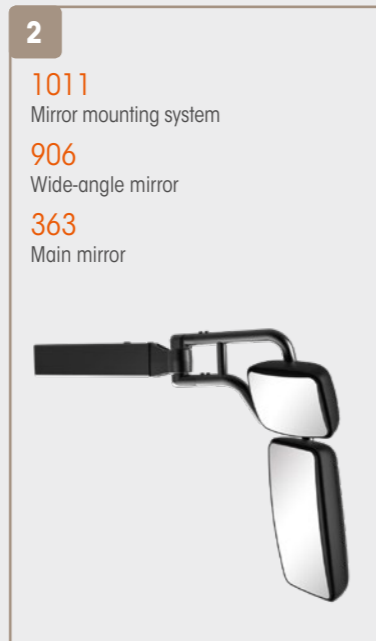
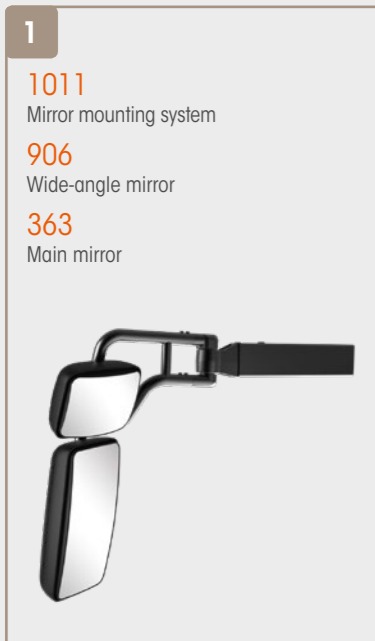
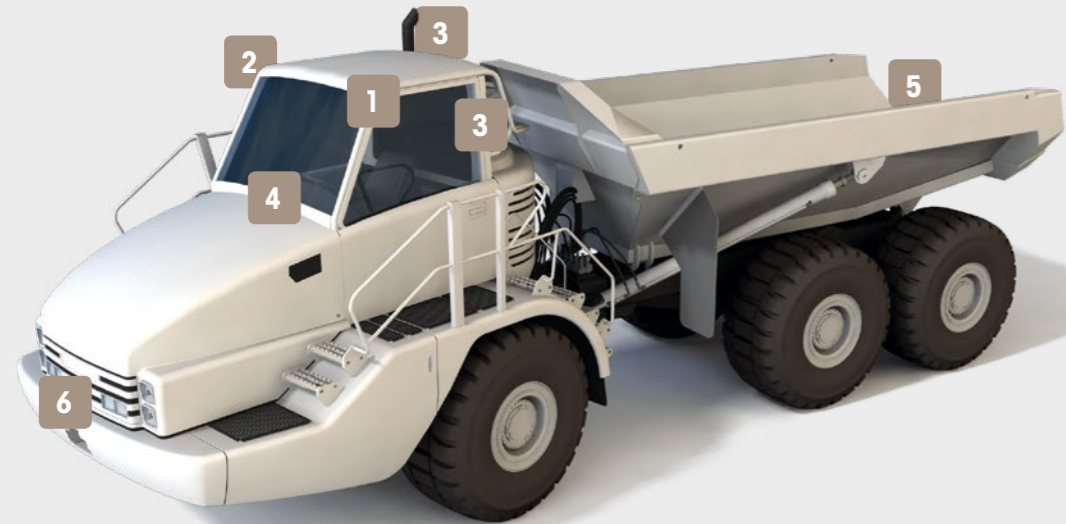
MEKRA Lang camera system

Item No.	Item description	Seite
MCM	TFT-Monitor 7", 4 camera inputs	68
MCC	Rear camera, CMOS color camera 100° (Platform base)	62
MCC	Side camera, CMOS color camera 100° (Platform base)	62
EWS-10	Digital wireless system	69

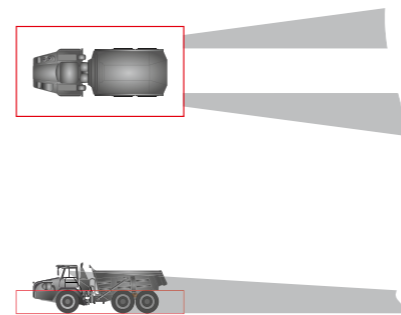
The systems shown are recommended by MEKRA Lang. Beginning on page 39, you will find additional MEKRA lang product solutions and alternatives.

Dump Trucks

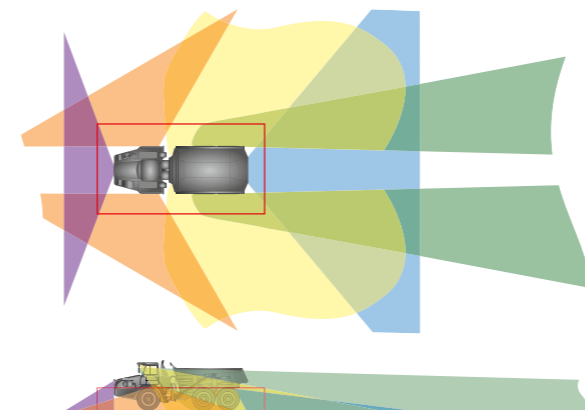
Combined MEKRA Lang mirror and camera monitor systems



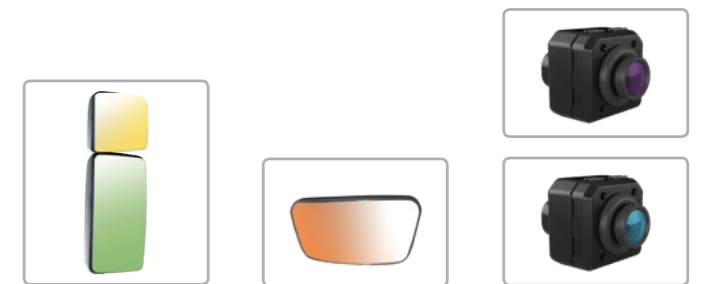
Standard solution



MEKRA Lang solution



360° Visibility
increased efficiency
safe operation



MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Seite
363	Main mirror left and right side, 1200 mm radius of curvature, electrical adjustment, heated 24 V	44
906	Wide-angle mirror left and right side, 300 mm radius of curvature, heated 24 V	44
1011	Main mirror system left and right side, ø 28 mm	59
552	Close-proximity mirror left and right side, 300 mm radius of curvature, heated 12 V	48

MEKRA Lang camera system

Item No.	Item description	Seite
MCM	TFT-Monitor 7", 4 camera input	68
MCC	Rear camera, CMOS color camera 100° (Platform base)	62
MCC	Front camera, CMOS color camera 100° (Platform base)	62

The systems shown are recommended by MEKRA Lang. Beginning on page 39, you will find additional MEKRA lang product solutions and alternatives.

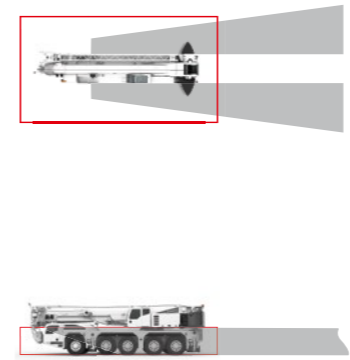
Title

Combined MEKRA Lang mirror and camera monitor systems

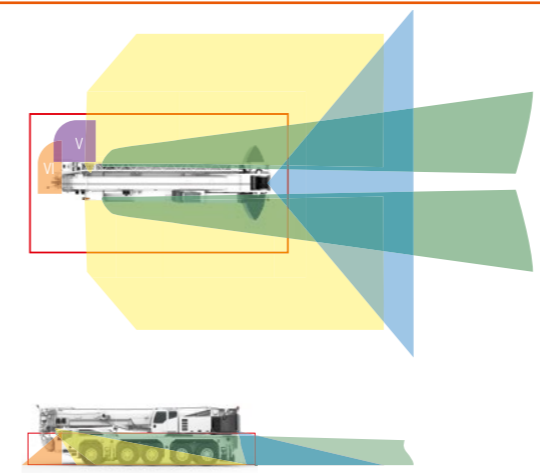


<p>1 378 Mirror mounting system</p> 	<p>2 1005 Close-proximity mirror</p> 	<p>4 MCM-Monitor</p> 
<p>363 Main mirror</p>  <p>906 Wide-angle mirror</p> 	<p>3 389 Front camera</p> 	<p>5 MCC- Rear camera</p> 

Standard solution



MEKRA Lang solution



360° Visibility
increased efficiency
safe operation



MEKRA Lang mirror and camera monitor systems

MEKRA Lang mirror system

Item No.	Item description	Seite
363	Main mirror left and right side, 1200 mm radius of curvature, electrical adjustment, heated 24 V	44
906	Wide-angle mirror left and right side, 300 mm radius of curvature, heated 24 V	44
378	Mirror mounting system right side, ø 28 mm	57
1005	Close-proximity mirror right side, 300 mm radius of curvature, heated 24 V	48
389	Front camera left side, 300 mm radius of curvature, heated 24 V	50

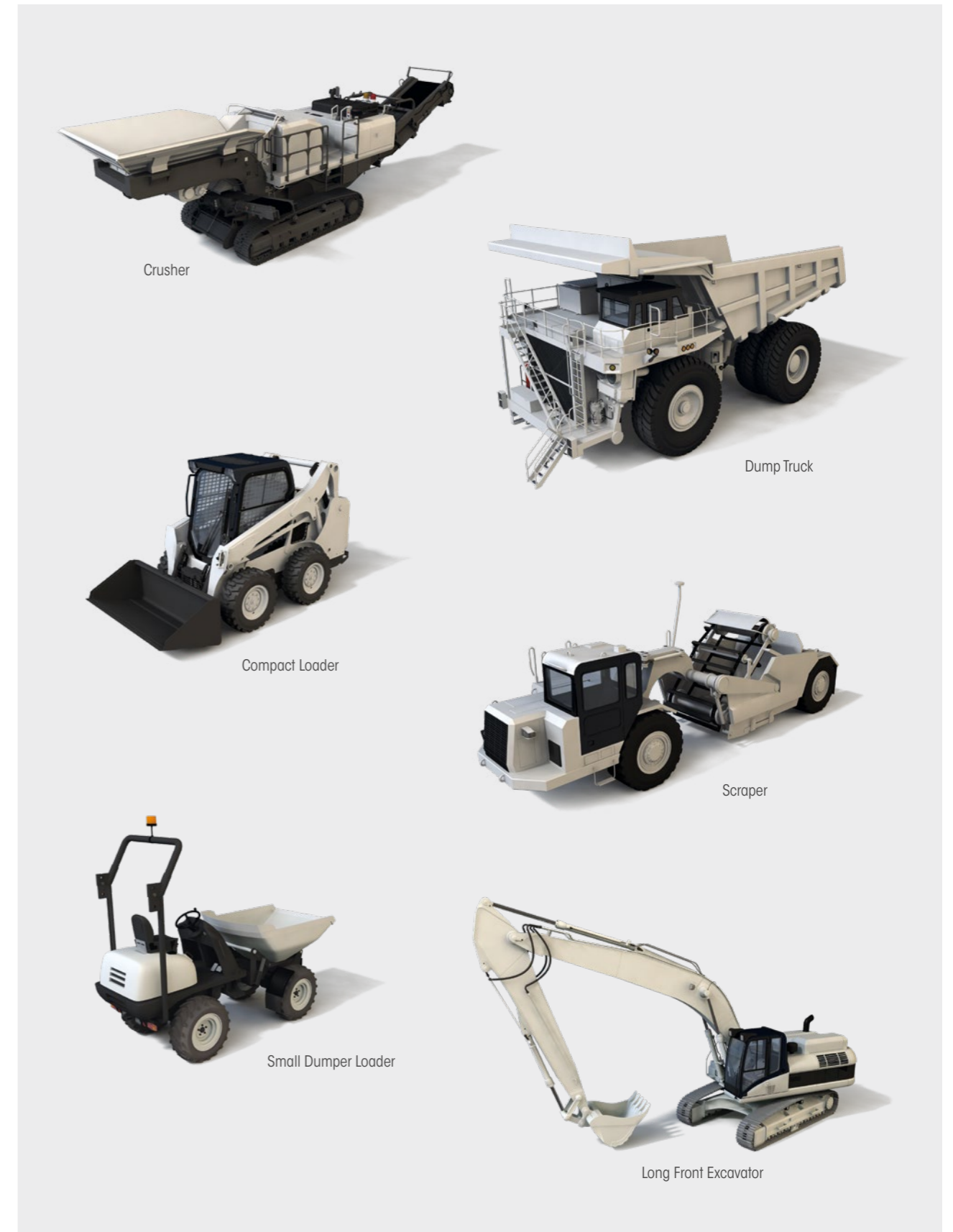
MEKRA Lang camera system

Item No.	Item description	Seite
MCM	TFT-Monitor 7", 4 camera input	68
MCC	Rear camera, CMOS color camera 120° (Platform base)	62

The systems shown are recommended by MEKRA Lang. Beginning on page 39, you will find additional MEKRA lang product solutions and alternatives.

Special Vehicles

Further applications of combined MEKRA Lang mirror camera systems





MEKRA Lang mirror systems and accessories

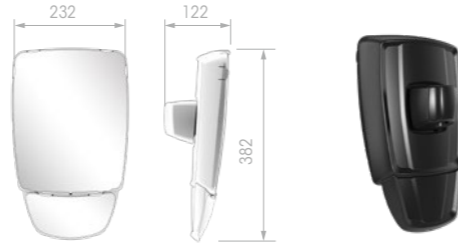
Modular mirror 1009	40
Compact mirror 1010	41
Combi mirror 1036	42
Main mirror 385	42
Main mirror 348	43
Wide-angle mirror 348	43
Main mirror 363	44
Wide-angle mirror 906	44
Wide-angle mirror 386	45
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Wide-angle mirror 573	46
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Wide-angle mirror 267	47
Close-proximity mirror 1005	48
Close-proximity mirror 552	48
Close-proximity mirror 558	49
Close-proximity mirror 559	49
Close-proximity mirror 389	50
Interior mirror 202	50
Close-proximity mirror 360	51

Mirror systems

Modular and compact mirrors

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

Glass size (W x H)	Main mirror 225 x 286 mm, close-proximity mirror 178 x 91 mm
Radius of curvature	Main mirror 1200 mm, close-proximity mirror 240/300 mm
Mounting side	right and left
Heating system	unheated or heated 12 or 24V
Adjustment	manual or electrical 12 or 24V
Adjustment range	up/down: >±8° – left/right: >±8°
Mirror mounting bracket interface	Clamp for 18-22 mm tube diameter 28 mm on request
On-board power supply connection	2- or 6-lead flange socket, direct contacting and additional options upon request
Material	shock-proof ABS plastic, black, UV resistant



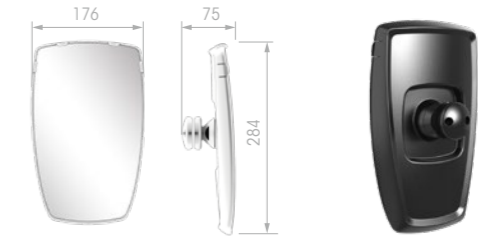
Item number	Mounting side	Adjustment	Heating system	Connection
Main mirror 1				
51.1009.001.001	right and left	manual	unheated	
51.1009.081.001	right and left	manual	heated 12 V	2-lead flange socket
51.1009.113.001	right and left	electrical	heated 12 V	6-lead flange socket
Combination main and close-proximity mirror 2				
51.1009.017.001	right and left	manual	unheated	
51.1009.049.001	right and left	manual	heated 12 V	2-lead flange socket
51.1009.097.001	right and left	electrical	heated 12 V	6-lead flange socket
Extra large close-proximity 3 (only right applicable)				
individual	right	manual	unheated	
individual	right	electrical	heated 12 / 24 V	
Extra large close-proximity 4 (right/ left applicable)				
individual	right or left	manual	unheated	2-lead flange socket
individual	right or left	electrical	heated 12 / 24 V	6-lead flange socket

Options (more on request)



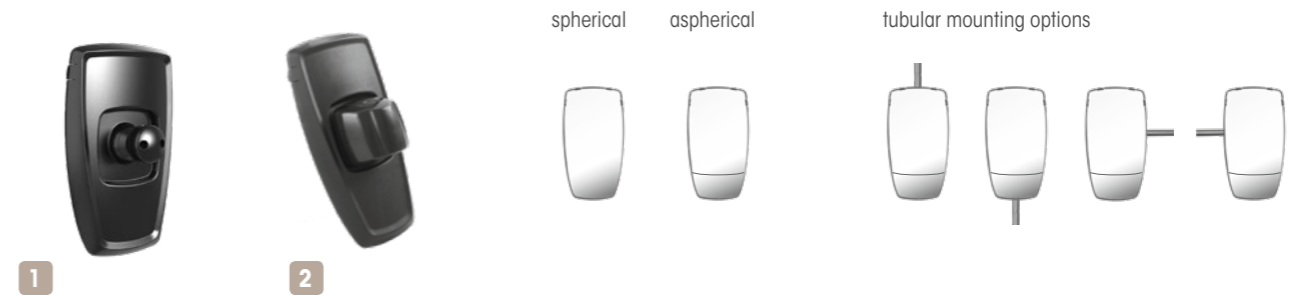
Compact mirror 1010, homologated for field-of-vision class II

Glass size	169 x 277 mm (W x H)
Radius of curvature	1200 mm
Mounting side	right and left
Heating system	unheated or heated 12 V
Adjustment	manual
Adjustment range	up/down: >±9° – left/right: >±9°
Mirror mounting bracket interface	Clamp for 14-20 mm or 18-22 mm tube diameter
On-board power supply connection	2-lead flange socket
Material	shock-proof ABS plastic, black, UV resistant



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

Options (more on request)

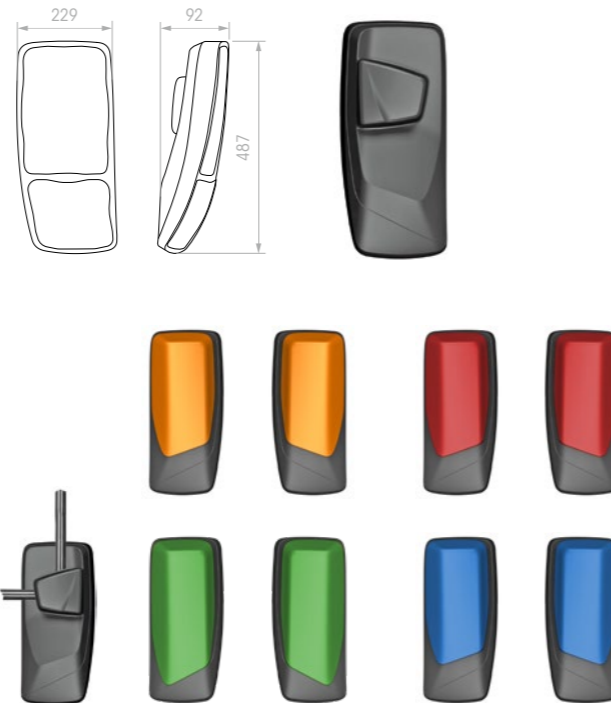


Mirror systems

Combi, Main and Wide-angle mirrors

Combi mirror 1036

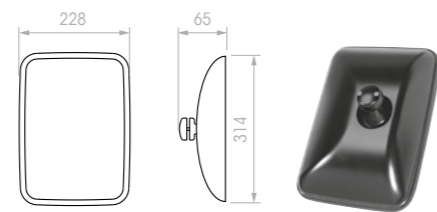
- Glass size** Main mirror 297 x 200 mm (W x H), close-proximity mirror 176 x 190 mm (W x H)
- Radius of curvature** Main mirror 1200 mm, close-proximity mirror 300 mm
- Mounting side** right or left
- Heating system** unheated or heated 12 or 24V
- Adjustment** manual or electrical 12 or 24V
- Adjustment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



Options (more on request)

Main mirror 385, homologated for field-of-vision class II

- Glass size** Main mirror 314 x 228 mm
- Radius of curvature** 1800 mm
- Mounting side** right and left
- Heating system** unheated or heated 12 or 24V
- Adjustment** manual or electrical
- Adjustment range** up/down: $>\pm 15^\circ$ – left/right: $>\pm 15^\circ$
- Mirror mounting bracket interface** Clamp for 14-20 / 20-30 mm tube diameter
- On-board power supply connection** 2- or 6-lead flange socket
- Material** shock-proof ABS plastic, black, UV resistant

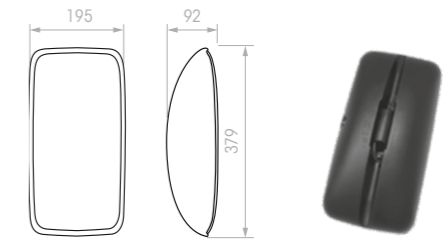


Item number	Mounting side	Adjustment	Heating system	Connection
51.3850.127 H	right and left	manual	unheated	clamp 14-20 mm
51.3850.227	right and left	manual	unheated	clamp 20-30 mm
51.3850.137	right and left	manual	heated 12V	clamp 14-20 mm
51.3850.157	right and left	electrical	heated 12V	clamp 14-20 mm

Options (more on request)

Main mirror 348, homologated for field-of-vision class II

- Glass size** 190 x 375 mm (W x H)
- Radius of curvature** 1200 mm
- Mounting side** right and left
- Heating system** heated 24V, unheated on request
- Adjustment** manual or electrical 24V
- Adjustment range** up/down: $>\pm 10^\circ$ – left/right: $>\pm 10^\circ$
- Mirror mounting bracket interface** Clamp for 22 mm tube diameter
- On-board power supply connection** 2- or 6-lead flange socket
- Material** shock-proof ABS plastic, black, UV resistant

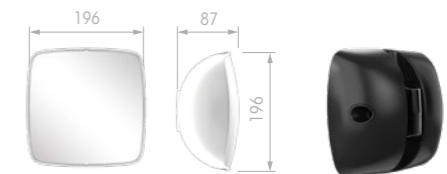


Item number	Mounting side	Adjustment	Heating system	Connection
61.3480.149 H	right and left	manual	heated 24V	

Options (more on request)

Wide-angle mirror 348, homologated for field-of-vision class IV

- Glass size** 191.5 x 191.5 mm (W x H)
- Radius of curvature** 300 mm
- Mounting side** right and left
- Heating system** heated 24V, unheated on request
- Adjustment** manual
- Adjustment range** up/down: $>\pm 10^\circ$ – left/right: $>\pm 10^\circ$
- Mirror mounting bracket interface** Clamp for 22 mm tube diameter
- On-board power supply connection** contacts
- Material** shock-proof ABS plastic, black, UV resistant



Item number	Mounting side	Adjustment	Heating system	Connection
61.3482.149 H	right and left	manual	heated 24V	

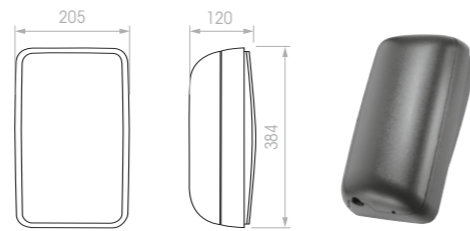
Options (more on request)

Mirror systems

Main and Wide-angle mirrors

Main mirror 363, homologated for field-of-vision class II

Glass size 185 x 363.5 mm (W x H)
Radius of curvature 1200 mm
Mounting side right and left
Heating system unheated or heated 12 or 24V
Adjustment manual or electrical 12 or 24V
Adjustment range up/down: $>\pm 7^\circ$ – left/right: $>\pm 13^\circ$
Mirror mounting bracket interface Clamp for 18-28 mm tube diameter
On-board power supply connection 2- or 6-lead flange socket
Material shock-proof ABS plastic, black, UV resistant

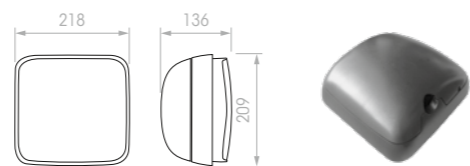


Item number	Mounting side	Adjustment	Heating system	Connection
51.3635.201	left	manual	unheated	
51.3636.201	right	manual	unheated	
51.3635.204	left	manual	heated 24 V	2-lead flange socket
51.3636.204	right	manual	heated 24 V	2-lead flange socket
51.3635.206	left	electrical	heated 24 V	6-lead flange socket
51.3636.206	right	electrical	heated 24 V	6-lead flange socket

Options (more on request)

Wide-angle mirror 906, homologated for field-of-vision class IV

Glass size 198 x 189 mm (W x H)
Radius of curvature 300 mm
Mounting side right and left
Heating system unheated or heated 12 or 24V
Adjustment manual
Adjustment range up/down: $>\pm 10^\circ$ – left/right: $>\pm 10^\circ$
Mirror mounting bracket interface Clamp for 20-28 mm tube diameter
On-board power supply connection 2-lead flange socket
Material shock-proof ABS plastic, black, UV resistant

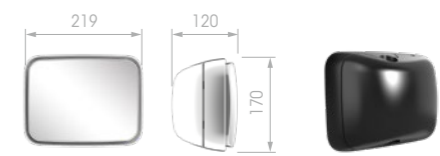


Item number	Mounting side	Adjustment	Heating system	Connection
56.9065.132	right and left	manual	unheated	
56.9065.110	right and left	manual	heated 12 V	2-lead flange socket

Options (more on request)

Wide-angle mirror 386, homologated for field-of-vision class IV

Glass size 149 x 198 mm (W x H)
Radius of curvature 400 or 300 mm
Mounting side right and left side / right or left side
Heating system unheated or heated 12 or 24V
Adjustment manual or electrical 12 or 24V
Adjustment range up/down: $>\pm 6^\circ$ – left/right: $>\pm 8^\circ$
Mirror mounting bracket interface Clamp for 18-28 mm tube diameter
On-board power supply connection 2- or 6-lead flange socket, direct contacting upon request
Material shock-proof ABS plastic, black, UV resistant



Item number	Mounting side	Adjustment	Heating system	Connection
56.3860.212	right and left	manual	unheated	
56.3860.214	right and left	manual	heated 24 V	2-lead flange socket
56.3861.116 H	left	electrical	heated 24 V	6-lead flange socket
56.3862.116 H	right	electrical	heated 24 V	6-lead flange socket

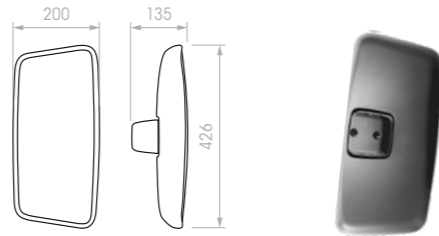
Options (more on request)

Mirror systems

Main and Wide-angle mirrors

Main mirror 572, homologated for field-of-vision class II

Glass size	179 x 405 mm (W x H)
Radius of curvature	1200 mm
Mounting side	right and left side / right or left side
Heating system	unheated or heated 12 or 24V
Adjustment	manual or electrical 12 or 24V
Adjustment range	up/down: $>\pm 10^\circ$ – left/right: $>\pm 10^\circ$
Mirror mounting bracket interface	Clamp for 22, 24 or 28 mm tube diameter
On-board power supply connection	2- or 6-lead flange socket
Material	shock-proof ABS plastic, black, UV resistant

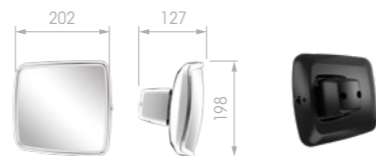


Item number	Mounting side	Adjustment	Heating system	Connection
for tube diameter 22 mm				
51.5720.120H	right and left	manual	unheated	
51.5720.140H	right and left	manual	heated 24 V	2-lead flange socket
51.5721.160H	left	electrical	heated 24 V	6-lead flange socket
51.5722.160H	right	electrical	heated 24 V	6-lead flange socket
for tube diameter 28 mm				
51.5720.127H	right and left	manual	unheated	

Options (more on request)

Wide-angle mirror 573, homologated for field-of-vision class IV

Glass size	177 x 182 mm (W x H)
Radius of curvature	300 mm
Mounting side	right and left
Heating system	unheated or heated 24V
Adjustment	manual
Adjustment range	up/down: $>\pm 10^\circ$ – left/right: $>\pm 10^\circ$
Mirror mounting bracket interface	Clamp for 22, 24 or 28 mm tube diameter
On-board power supply connection	2-lead flange socket
Material	shock-proof ABS plastic, black, UV resistant

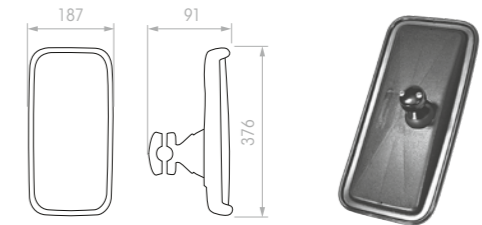


Item number	Mounting side	Adjustment	Heating system	Connection
for tube diameter 22 mm				
56.5730.120	right and left	manual	unheated	
56.5730.140	right and left	manual	heated 24 V	2-lead flange socket
for tube diameter 28 mm				
51.5733.001	right and left	manual	unheated	

Options (more on request)

Main mirror 364, homologated for field-of-vision class II

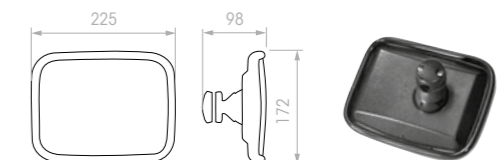
Glass size	175 x 355 mm (W x H)
Radius of curvature	1200 and 2200 mm
Mounting side	right and left
Heating system	unheated or heated 12 or 24V
Adjustment	manual
Adjustment range	up/down: $>\pm 15^\circ$ – left/right: $>\pm 15^\circ$
Mirror mounting bracket interface	Clamp for 14-20 mm tube diameter
On-board power supply connection	2-lead flange socket
Material	shock-proof ABS plastic, black, UV resistant



Item number	Mounting side	Adjustment	Heating system	Connection
1200 mm radius of curvature				
51.3640.128.001	right and left	manual	unheated	
Radius of curvature 1800 mm				
51.3640.147H	right and left	manual	heated 24 V	2-lead flange socket

Wide-angle mirror 267, homologated for field-of-vision class IV

Glass size	211 x 161 mm (W x H)
Radius of curvature	400 mm
Mounting side	right and left
Heating system	unheated or heated 24V
Adjustment	manual
Adjustment range	up/down: $>\pm 15^\circ$ – left/right: $>\pm 15^\circ$
Mirror mounting bracket interface	Clamp for 14-20 mm tube diameter
On-board power supply connection	2-lead flange socket
Material	shock-proof ABS plastic, black, UV resistant



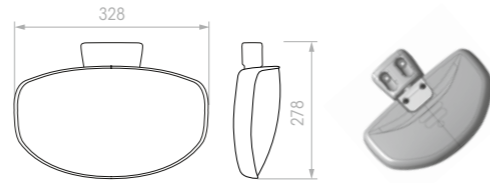
Item number	Mounting side	Adjustment	Heating system	Connection
Options				
56.2670.127H	right and left	manual		
56.2670.147H	right and left	manual	heated 24 V	2-lead flange socket

Mirror systems

Close-proximity mirrors

Close-proximity mirror 1005, homologated for field-of-vision class V

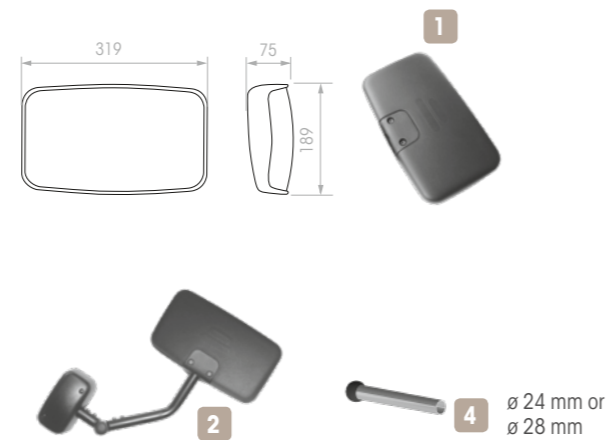
Glass size 322 x 190 mm (W x H)
Radius of curvature 300 mm
Mounting side top
Heating system unheated or heated 24 V
Adjustment manual
Adjustment range up/down: >±10°
Mirror mounting bracket interface holder
On-board power supply connection contacts
Material shock-proof ABS plastic, black, UV resistant



Item number	Mounting side	Adjustment	Heating system	Connection
Options				
59.1005.005.001	top	manual	unheated	
59.1005.004.001	top	manual	heated 24 V	

Close-proximity mirror 552, homologated for field-of-vision class V + VI

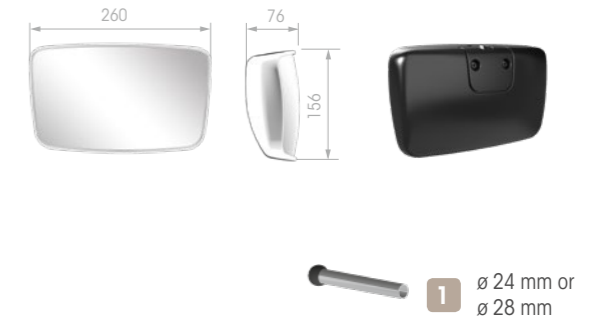
Glass size 310 x 180 mm (W x H)
Radius of curvature 300 or 400 mm
Mounting side universal
Heating system unheated or heated 24 V
Adjustment manual
Adjustment range up/down: >±10°
Mirror mounting bracket interface holder
Vehicle interface 2-lead flange socket, direct contacting and additional options upon request 4
On-board power supply connection contacts
Material shock-proof ABS plastic, black, UV resistant



Item number	Mounting side	Adjustment	Heating system	Connection
300 mm radius of curvature, for ball stud 1				
51.5524.930	universal	manual	unheated	
51.1009.113.001	right	electrical	heated 24 V	
300 mm radius of curvature, screwed with mounting base 2				
59.5524.530 H	right and left	manual	unheated	

Close-proximity mirror 558, homologated for field-of-vision class V + VI

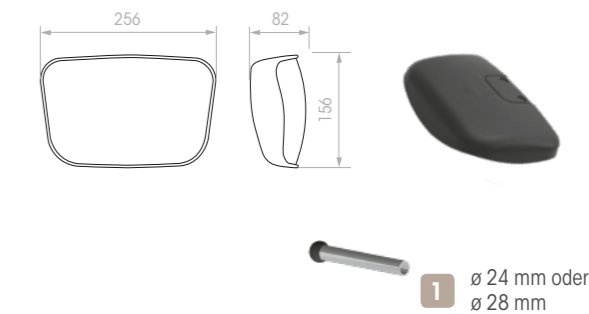
Glass size 257 x 154 mm (W x H)
Radius of curvature 300 mm
Mounting side universal
Heating system unheated
Adjustment manual
Adjustment range up/down: >±10°
Vehicle interface 2-lead flange socket, direct contacting and additional options upon request 1
Material shock-proof ABS plastic, black, UV resistant



Item number	Mounting side	Adjustment	Heating system	Connection
Option				
51.5589.100	universal	manual	unheated	

Close-proximity mirror 559, homologated for field-of-vision class V + VI

Glass size 248 x 157 mm (W x H)
Radius of curvature 240 mm
Mounting side universal
Heating system unheated
Adjustment manual
Adjustment range up/down: >±10°
Vehicle interface 2-lead flange socket, direct contacting and additional options upon request 1
On-board power supply connection -
Material shock-proof ABS plastic, black, UV resistant



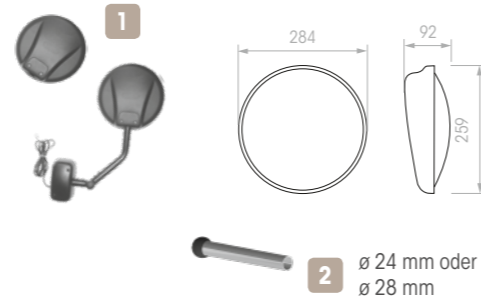
Item number	Mounting side	Adjustment	Heating system	Connection
Option				
51.5590.020	universal	manual	unheated	

Mirror systems

Main and Close-proximity mirrors

Close-proximity mirror 389, homologated for field-of-vision class II

Glass size	Main mirror 250 x 250 mm (W x H)
Radius of curvature	240 mm
Mounting side	universal
Heating system	unheated or heated 12 or 24V
Adjustment	manual
Adjustment range	up/down: $>\pm 10^\circ$
Mirror mounting bracket interface	Ball stud and tube connection, customized for vehicle or mounting system, additional options upon request
On-board power supply connection	contacts
Material	shock-proof ABS plastic, grey, UV resistant

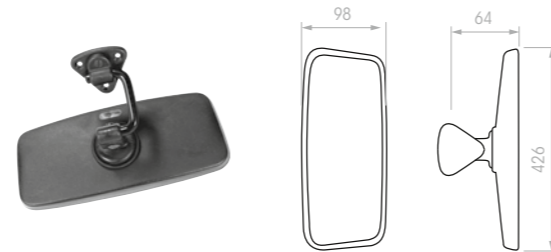


Item number	Mounting side	Adjustment	Heating system	Connection
Options				
51.3894.140	universal	manual	unheated	
51.3894.160	universal	manual	heated 24 V	
51.3894.140H	universal	manual	unheated	
51.3894.150H	universal	electrical	unheated	

Options (more on request)

Interior mirror 202, homologated for field-of-vision class I

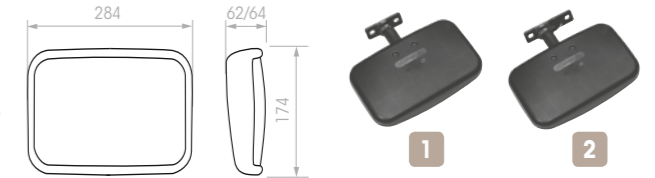
Glass size	217 x 88 mm (W x H)
Radius of curvature	flat glass
Mounting side	Cabin inside
Heating system	unheated
Adjustment	manual
Mirror mounting bracket interface	Screw connection with 3xM5 screws
Material	shock-proof ABS plastic, black matt



Item number	Mounting side	Adjustment	Heating system	Connection
Variante				
55.2020.177	universal	manual	unheated	

Close-proximity mirror 360, homologated for field-of-vision class V

Glass size	272 x 162 mm (W x H)
Radius of curvature	300 or 400 mm
Mounting side	universal
Heating system	unheated or heated 24V
Adjustment	manual
Adjustment range	up/down: $>\pm 15^\circ$
Vehicle interface	bolted, 2 x M8 through mounting bracket
On-board power supply connection	contacts
Material	shock-proof ABS plastic, black, UV resistant



Item number	hole spacing	Mounting side	Adjustment	Heating system	Connection
300 mm radius of curvature 1					
59.3601.178	100 mm	universal	manual	unheated	
59.3601.188	100 mm	universal	manual	heated 24 V	
59.3604.178	50 mm	universal	manual	unheated	
400 mm radius of curvature 2					
59.3601.128	100 mm	universal	manual	unheated	
59.3604.128	50 mm	universal	manual	unheated	



MEKRA Lang mounting systems

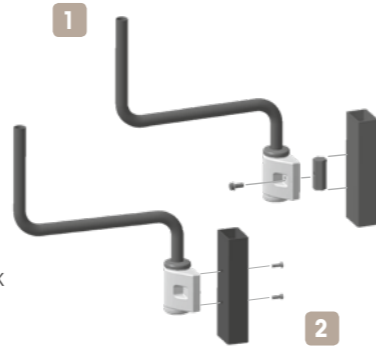
Mirror mounting system 1016	54
Mounting system 270A/ 271/ 248	55
Mirror mounting system 1017	56
Mirror mounting system 1045	57
Mirror mounting system 378	57
Wedge mounts for mirror mounting system 270A/ 271/ 248	58
Mounting system 270/7	58
Individual components	59
Mirror mounting system 1007 and 1011	59

Mounting systems

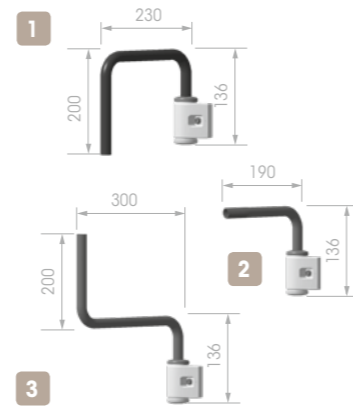
Universal solutions

Mirror mounting system 1016

Maximum throat	500 mm
Tube diameter	22 mm
Mounting side	right or left side, mounting system bolted down
Adjustment	manual, bosh angle every 30°
Folding torque	25 Nm
Vehicle interface	Wedge mount
Wiring	choice of open and hidden cable guiding
Material	pressure-molded aluminium, powder-coated tubular steel, black

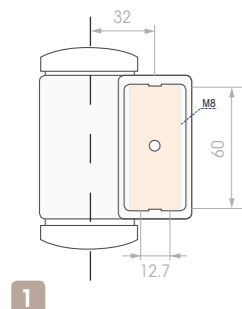


Item number	Mounting side	variants
U-shaped tubes 1		
58.1016.001.001	left	1
58.1016.002.001	right	1
58.1016.003.001	left	2
58.1016.004.001	right	2
L-shaped tubes 2		
58.1016.009.001	left	1
58.1016.010.001	right	1
Z-shaped tubes 3		
58.1016.005.001	left	1
58.1016.006.001	right	1

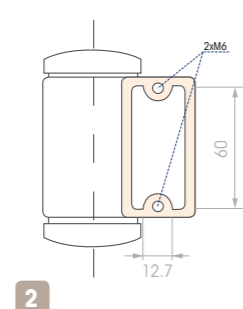


customizable tube design

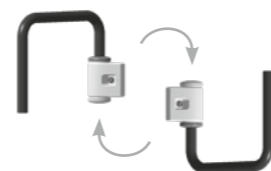
Mounting base bolted through hex attachment



Mounting base directly bolted



Mounting sides can be switched, tube orientation will change as shown below:



Mirror mounting system 270A/ 271/ 248

Maximum throat	700 mm
Tube diameter	28 mm
Mounting side	right or left side, mounting system removable
Adjustment	manual, bosh angle 52° or 60°
Folding torque	30-120 Nm
Vehicle interface	Wedge mount 248-2 A/271 A
Wiring	choice of open and hidden cable guiding
Material	powder-coated tubular steel, black



Dove tail guide

Item number	Mounting side	Adjustment	Heating system	Verkabelung
Dimensions: 256 x 450 mm (W x H), 90° bracket angle, including control cable and wedge mount 1				
58.2704.051 H	universal	manual	mirror heating	Connector contacting
Dimensions: 160 x 500 mm (W x H), 90° bracket angle, including heating cable and wedge mount 2				
58.2704.048	universal	manual	mirror heating	Connector contacting
Dimensions: 676 x 327 mm (W x H), 6° bracket angle, including control cable and wedge mount 3				
58.2704.093	universal	electrical	mirror heating	Direct contacting



Mounting systems

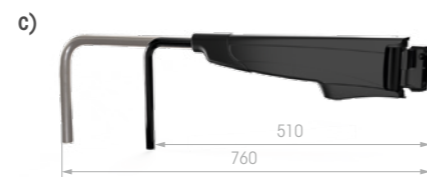
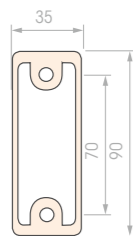
Universal solutions

Mirror mounting system 1017

- Radius** Opt. a: manually adjustable from 510 to 800 mm
Opt. b: electrically adjustable from 510 to 760 mm
- Tube diameter** 22 mm
- Mounting side** right and left side, folds bidirectionally
- Adjustment** one operating position, folds bidirectionally
- Folding torque** 60 Nm
- Vehicle interface** bolted, 2 x M8 through mounting bracket
- Wiring** hidden cable routing
- Material** pressure-molded aluminium, powder-coated tubular steel, black



Item number	Mounting side	Adjustment	Heating system	Wiring
manual mirror arm adjustment (Opt. a)				
58.1017.005.001	left	manual	unheated	without cable
58.1017.006.001	right	manual	unheated	without cable
58.1017.013.001	left	manual	heated	Connector contacting
58.1017.014.001	right	manual	heated	Connector contacting
58.1017.011.001	left	electrical	heated	Connector contacting
58.1017.012.001	right	electrical	heated	Connector contacting
electrical mirror arm adjustment (Opt. b)				
58.1017.015.001	left	electrical	heated	Connector contacting
58.1017.016.001	right	electrical	heated	Connector contacting
boarding light (Opt. c)				
individual	right	electrical	heated	Connector contacting



Mounting system 1045

- Radius** 505 mm
- Tube diameter** 22 mm
- Mounting side** right and left side, folds bidirectionally
- Adjustment** one operating position, folds bidirectionally
- Folding torque** 120 Nm
- Vehicle interface** bolted, 2 x M8 through mounting bracket
- Wiring** hidden cable routing
- Material** pressure-molded aluminium, powder-coated tubular steel, black



Item number	Mounting side	Adjustment	Heating system	Wiring
Options				
individual	left	manual	unheated	without cable
individual	right	manual	unheated	without cable

Mounting system 378

- Radius** Variable
- Tube diameter** 28 mm
- Mounting side** right and left side, folds bidirectionally
- Adjustment** 22°
- Folding torque** ≥30 Nm
- Vehicle interface** 378 holder, 378 bearing block
- Wiring** hidden cable routing
- Material** powder-coated tubular steel, black



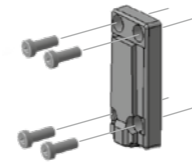
Item number	Mounting side	Adjustment	Heating system	Wiring
Options				
individual	left	manual		with or without cable
individual	right	manual		with or without cable

Mounting systems

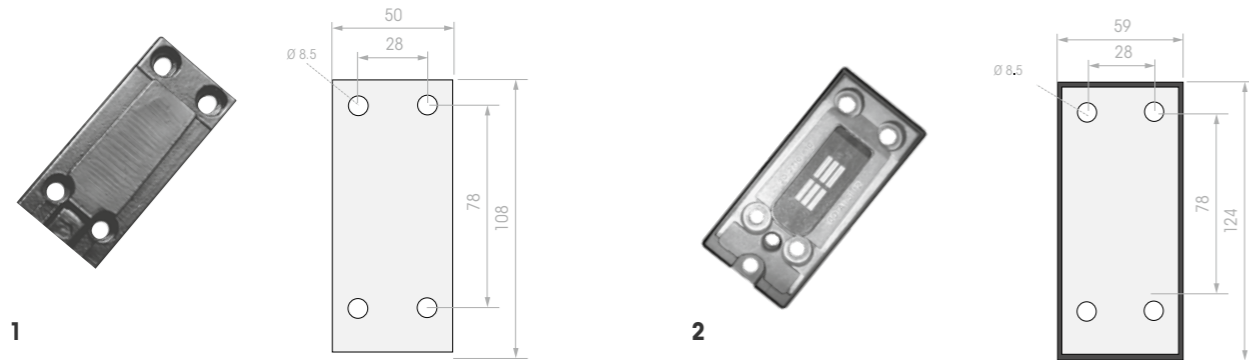
Universal solutions

Wedge mounts for mirror mounting system 270A/ 271/ 248

Size	varying
Design	for plug or direct contacting
Installation	4 mounting points for M8 allen screws
Material	pressure-molded aluminium, powder-coated, black



Item number	Mounting side	Adjustment	Heating system	Wiring
Wedge mount 248-2A for connector contacting, 50 x 108 x 15 mm (W x H x D) 1				
20.2480.210	universal	manual	-	without cable
20.2480.221	universal	electrical	mirror heating	Plug/cable 2.5 m
Wedge mount 271 A for direct contacting, 59 x 124 x 21 mm (W x H x D) 2				
20.2710.640	universal	electrical	mirror heating	Standard wire/cable 0.15 m



Mirror mounting system 270-7

Maximum throat	600 mm
Tube diameter	28 mm
Mounting side	right and left side, mounting system bolted down
Adjustment	manual, bosh angle 51.4°
Folding torque	75 Nm
Vehicle interface	2 x M8 for bolting from inside of cabin
Wiring	choice of open and hidden cable guiding, for heated and/or electrically adjustable mirrors
Material	customizable tube design



customizable tube design



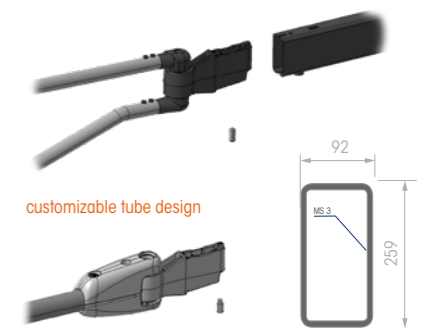
Individual components

Item number	Wiring	control
Heating cable with connector		
09.2070.101 1	2-lead oval right-angle connector - open end, length 2.07 m	-
09.2000.301 2	2-lead round right-angle connector - open end, length 2.0 m	-
Control cable with integrated heating lead		
09.3200.310 3	6-lead round right-angle connector - 2.8 crimp, length 2.0 m	One-mirror control
09.3200.320 4	6-lead round right-angle connector - 6.3 crimp, length 2.0 m	Two-mirror control
Power-supply line for mirror switch		
09.3200.210 5	open end - 2.8 crimp, length 1.0 m	One-mirror control
09.3200.220 6	open end - 6.3 crimp, length 1.0 m	Two-mirror control
Mirror switch		
08.3200.233 7	12 and 24 V on-board voltage, size: 42 x 42 x 54 mm (W x H x D)	Two-mirror control
Cable sets for remote controlled mirrors		
09.3200.420H 6,4,4		



Mirror mounting system 1007 and 1011

Maximum throat	up to 700 mm
Tube diameter	28 mm / 40 mm
Mounting side	right and left side, mounting system bolted down
Adjustment	manual, bosh angle 52°
Folding torque	60 Nm
Vehicle interface	Insertion into rectangular tube
Wiring	choice of open and hidden cable guiding
Material	pressure-molded aluminium, powder-coated tubular steel, black



customizable tube design



MEKRA Lang electronics and accessories

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Modular and effective

Platform concept overview

Analog camera

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



Ethernet camera

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



Easy integration

One of the critical advantages this camera offers is its easy and smooth integration into **any part** of the respective vehicle and at virtually any meaningful location. Thanks to its modular design, it is possible to generate **customized** solutions for individual customers without requiring a great deal of development work. The components are extremely robust and **compact** in size making the unit particularly easy to handle. The camera also features cutting-edge mounting bracket technology which further **facilitates** integration.

Integration example (current state of development)



ADVANCED BRACKET

Concept



Advanced bracket concept

Our Advanced Bracket Concept was specifically created for the platform camera and complements it perfectly. This smart mounting system features a **modular** design making installation easy and **cost efficient**. All components connect to an amazingly simple plug-in system which is attached to the vehicle with just four screws. The bracket system can be used with or without its cover and enhanced by adding an innovative spray nozzle. The cleaning function uses either water or compressed air. **Traditional** bracket options are also available for the new platform camera.

Variable bracket options (current state of development)



Camera monitor systems

CMOS and CMOS round cameras

CMOS cameras

Video system	NTSC or PAL
Sensor resolution	640 x 480 px (W x H)
Image format	NTSC: 720 x 486 px (W x H), PAL: 720 x 576 px (W x H)
Connector	MEKRA, Ø < 18 mm, ADR tested, IP 69 K
Cable	ADR tested, oil and gasoline resistant, 0.5 m
Housing	pressure-molded aluminium, pointed black, dust proof and withstands high-pressure cleaning (IP 69 K)
Shock resistance	50 G
Minimum illumination	>1:50 of 0.5 lx
Video output	FBAS 1Vpp at 75 Ω
Power consumption	< 1 W (< 3.5 W, with heating on)
Temperatur range	-40 °C to +85 °C
Storage temperatur	-40 °C to +90 °C
Protection class	IP 69 K
Operating voltage	9 V to 36 V
Outside dimensions, excluding mounting bracket	65 x 59 x 50 mm (WxHxD)



Item number	Aperture angles	Adjustment
NTSC color cameras		
28.1301.007.099	70°	horizontal
28.1301.001.099	100°	horizontal
28.1301.005.099	100°	horizontal low distortion
28.1301.003.099	120°	horizontal
28.1301.009.099	120°	horizontal low distortion
28.1301.050.099	130°	horizontal
PAL color cameras		
28.1301.008.099	70°	horizontal
28.1301.046.099	100°	horizontal
28.1301.006.099	100°	horizontal low distortion
28.1301.004.099	120°	horizontal
28.1301.010.099	120°	horizontal low distortion
28.1301.051.099	130°	horizontal

CMOS round cameras

Video system	NTSC or PAL
Sensor resolution	640 x 480 px (W x H)
Image format	NTSC: 720 x 486 px (W x H), PAL: 720 x 576 px (W x H)
Connector	MEKRA, Ø < 18 mm, ADR tested, IP 69 K
Cable	ADR tested, oil and gasoline resistant, 0.5 m
Housing	pressure-molded aluminium, pointed black, dust proof and withstands high-pressure cleaning (IP 69 K)
Shock resistance	50 G
Minimum illumination	>1:50 of 0.5 lx
Video output	FBAS 1Vpp at 75 Ω
Power consumption	< 1 W (< 3.5 W, with heating on)
Temperatur range	-40 °C to +85 °C
Storage temperatur	-40 °C to +90 °C
Protection class	IP 69 K
Operating voltage	9 V to 36 V
Outside dimensions, excluding mounting bracket	55 x 47 mm (WxD)



Item number	Aperture angles	Adjustment
NTSC color cameras		
28.1301.011.099	70°	horizontal
28.1301.013.099	100°	horizontal
28.1301.017.099	100°	horizontal low distortion
28.1301.038.099	120°	horizontal
PAL color cameras		
28.1301.012.099	70°	horizontal
28.1301.014.099	100°	horizontal
28.1301.018.099	100°	horizontal
28.1301.039.099	120°	horizontal

Camera accessories

Brackets and mounting supplies

Camera bracket, shock-proof ABS plastic, black, UV resistant

Standard bracket

Item number	20.5630.400
Dimensions	90 x 100 x 73 mm (WxHxD)
Orientation	flexible adjusted
Adjustment	thanks to its swivel head design, the camera can be rotated 360°
Material	ABS plastics



Design bracket

Item number	20.5631.400
Dimensions	125 x 102 x 73 mm (WxHxD)
Orientation	flexible adjusted
Adjustment	thanks to its swivel head design, the camera can be rotated 360°
Material	ABS plastics



Standard bracket ball camera

Item number	20.5620.601
Dimensions	80 x 71 x 28 mm (WxHxD)
Orientation	flexible adjusted
Adjustment	thanks to its swivel head design, the camera can be rotated 360°
Material	ABS plastics



Camera bracket, stainless steel

Mounting bracket

Item number	11.1200.501.099
Dimensions	87 x 70 x 65 mm (WxHxD)
Orientation	flexible adjusted
Adjustment	thanks to its swivel head design, the camera can be rotated 360°



Mounting bracket with roof

Item number	11.1200.502.099
Dimensions	87 x 74 x 74 mm (WxHxD)
Orientation	flexible adjusted
Adjustment	thanks to its swivel head design, the camera can be rotated 360°



Magnetic base

Item number	20.5640.101
Dimensions	66 x 66 x 19 mm (WxHxD)



Camera monitor systems

Monitors / monitor brackets / wireless system transmitter

TFT color monitor

MEKRA Lang Surround View Monitor

Resolution	800 x 480 pixels
Temperatur range	-30 °C to +85 °C
Brightness	500 cd/m ²
Camera input	4
Screen	16:9
Contrast ratio	600:1
Operating voltage	9-36 V
Connector system	AMP



MEKRA 7" TFT-LCD Monitor Quad IP 65

Resolution	800 x 480 pixels
Temperatur range	-30 °C to +85 °C
Brightness	500 cd/m ²
Camera input	4
Screen	16:9
Contrast ratio	600:1
Operating voltage	9-36 V
Connector system	AMP



MEKRA Lang Digital Monitor

Brightness	600 cd/m ²
Contrast ratio	700:1
Display	Touchscreen
Video signal	2 x Ethernet, 2 x analogue (PAL/NTSC)
Operating temperature	-30 °C to +85 °C
Operating voltage display	9-36 V



Dimensions	Resolution
MEKRA 7" Digital Monitor	
210 x 120 x 40	800 x 480 pixels
MEKRA 10" Digital Monitor	
250 x 190 x 40	1280 x 720 pixels
MEKRA 12" Digital Monitor	
310 x 200 x 40	1280 x 720 pixels

Still in development; design and specifications subject to change.

Monitor bracket

Individual monitor bracket (depending on requirements)

Different vehicles require different vision solutions. While our monitor is the ideal choice for any electronic vision solution, in-cab installation requirements can vary widely. We will put together a customized installation package based on various component options to meet your specific usage needs. Please see below for a small selection of these options:



Wireless video system

Digital wireless system – EWS-10

Operating frequency	2.408 GHz – 2.468 GHz
Transmission rate	4 Mbps maximum
Transmission distance	200 m (open terrain)
Frame rate	Up to 30 fps at 720 x 480 (NTSC)
Operating voltage	10 – 32 V DC
Power consumption	20 W maximum
Ingress protection	IP 69 K
Dimensions	65 x 65 x 33 mm (WxHxD)
Weight	app. 200g (2x)
Operating temperature	-40 °C to + 85 °C



Camera monitor systems

Cables

MEKRA Lang cable

Mini-DIN - MEKRA (m-f)

Item number	Length
09.5610.352	0.5 m
09.1201.007.099	5 m
09.1201.006.099	11 m
09.1201.008.099	16 m
09.1201.009.099	21 m



AMP - MEKRA (f-f)

Item number	Length
09.5610.360	0.5 m
09.1301.003.099	5 m
09.1301.004.099	11 m
09.1301.005.099	16 m
09.1301.006.099	21 m



Multi Cable MEKRA - MEKRA (m-f)

Item number	Length
09.5610.111	5 m
09.5610.121	11 m
09.5610.131	16 m
09.5610.141	21 m



MEKRA Lang cable

MEKRA - ABS 7-pin (m-m)

Item number	09.5610.320
Item description	Adapter cable
Length	0.5 m



Adapter cable ABS 7-pin - MEKRA (f-f)

Item number	09.1201.012.099
Item description	Adapter cable
Length	16 m



MEKRA (m) - open end

Item number	09.5610.050
Item description	Repair kit
Length	0.5 m



MEKRA (f) - open end

Item number	09.5610.051
Item description	Repair kit
Length	0.5 m



General Terms and Conditions

As of: 06/2017

I. General Provisions

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

II. Conclusion of Contract and Prices

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

III. Period of Delivery and Supply Commitment

- Our written or electronic order confirmation shall be decisive for extent, type, and date of the delivery. Partial shipments shall be permitted.
- A liability in meeting delivery deadlines determined as binding shall only be accepted under the condition of undisturbed flow of operations and distribution. In particular in cases of acts of God and other disruptive events at our facilities or those of our sub-suppliers or transport contractors, for example operational or traffic disruptions, fire, flooding, labour-, energy-, or traffic shortages, strikes, lockouts, official measures as well as technical or technological situations that considerably aggravate the execution of the contract, release us from liability in punctual delivery or give us the right to stop delivery without obligation for subsequent delivery.
- If not agreed otherwise, we have the right to deliver earlier than the delivery deadline. Unless otherwise agreed upon, delivery effected by us one up to a maximum of two weeks after the stipulated delivery date shall not be considered as delayed.
- Delivery deadlines shall be considered met when the goods have left the works or dispatch depot or the customer has received notice by expiration of the deadline of our

readiness to deliver. Subsequent alteration of contract shall be cause for a reasonable extension of delivery deadlines.

- In the case of contracts whose performance consists of several deliveries, non-performance, defective or delayed performance of one delivery remains without influence upon the other deliveries of the contract.
- Default of payments, handing in of a state meant in lieu of an oath of disclosure in accordance with § 807 ZPO (German Code of Civil Procedure), temporary shortage of liquid funds, or public knowledge of a considerable deterioration of the financial circumstances of the customer shall entitle us at our discretion to demand payment in advance for outstanding deliveries or to stop deliveries immediately and to deny performance of current contracts. At the same time we shall be entitled to make immediately due and payable those accounts receivable from the customer which are not due yet.

IV. Shipment, Passage of Risk

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

V. Payments, Terms of Payment

- Invoices shall be payable:
 - within 14 days from date of invoice with 2 % cash discount of the accumulated invoice value;
 - within 30 days from date of invoice without cash discount of the accumulated invoice value.
- Cash discount shall only be granted after all payment commitments out of earlier deliveries have been fulfilled and the invoice amount has been punctually paid to us in cash or has been credited to our account by the aforementioned due dates. The drawing of a bill of exchange can thus not lead to the granting of a cash discount. In case of cashless payment, especially when a cheque is submitted, the date of the credit entry shall be decisive. A cash discount cannot be granted in the case of payment or credit entry under reserve, with limiting conditions or any other restrictions. The customer shall assume all risks of method of payment. Invoices for tools are subject to immediate payment without cash discount.
- Bills of exchange and checks shall only be accepted on account of payment. Corresponding credit entries are made only under the limiting condition of correct receipt of the complete amount due. We reserve the right to take in external or own acceptances. Costs and discount expenses are payable by the customer. We assume no responsibility for submission and protest. Protest imposed against the customer's own bills of exchange or non-immediate repayment of protested external bills of exchange shall entitle us to return all bills in circulation. At the same time we shall be entitled to make immediately due and payable those accounts receivable from the customer which are not yet due. Antedated checks shall not be accepted.
- Interest on defaulted payment of 9%-points over the discount rate of the German Central Bank referred to in § 247

BGB (German Civil Law) as well as a liquidated damages of 40.00 Euro shall be charged in the case of missed payment dates. The right of assertion of further damages caused by delayed performance and other claims shall remain reserved.

- Advance and part payments are not subject to interest payments.
- The customer shall only be entitled to offset or withhold payment if his counterclaim is undisputed or has been determined legally binding. The customer may execute a right of retention only if his counter claim is based on the same contractual relationship.
- Customer and invoice numbers are to be given by the customer when invoices are balanced. Delays or incorrect booking resulting from failure to do so shall be payable by the customer.

VI. Retention of Ownership, Factoring

- The delivered goods shall remain our property until payment of all claims has been received. The customer has the right to resell the proviso goods within the scope of proper and orderly course of business; however, a pledge or transfer by way of security is not permissible. The customer is required to ensure our rights in the case of resale of proviso goods on credit.
- The accounts receivable by the customer based on the resale of the merchandise subject to reservation shall now already be transferred to us in the amount of the invoice. We hereby agree to accept this transfer. Regardless of the assignment, the customer shall retain the right to collect payment under the condition that he fulfils his responsibilities to us according to the underlying contractual relationship and does not fall into financial decline. Otherwise the customer must provide the information about the assignment necessary for collection upon our demand and notify his debtors of the respective assignment. In this case we reserve the right to collect the accounts receivable by ourselves.
- A possible finishing or processing of the merchandise sold subject to reservation by the customer shall always take place on our behalf and by order of us, without any obligations resulting for us from this, however. In the case of processing of proviso goods with other goods not belonging to us, we are entitled to the co-owner portion of the resulting product corresponding to the value of the proviso goods in relation to the other processed goods. Insofar as here and in the following the value of the proviso goods is referred to, this value results from our invoice value.
- Should the customer acquire sole ownership of the new product according to § 947 paragraph 2 BGB, it is agreed upon that the customer grants co-ownership in the proportion of the value of the processed, attached, or mixed proviso goods, and that he protects these free of charge.
- In the case of resale of the proviso goods together with other goods, regardless of with or without processing, attachment or mixing, the assignment in advance agreed to above shall be valid only to the extent of the value of proviso goods that were resold together with the other goods. We shall be obligated to release on demand the securities entitled as provided above, if the value exceeds secured payments by 20 %.
- The customer must immediately notify us and provide the material necessary for an intervention in the case of compulsory execution by third parties against the proviso goods or in case of claims assigned in advance. Any costs resulting from such intervention shall be payable by the customer.
- The customer shall be obligated to adequately insure the merchandise sold subject to reservation against fire and burglary and has to prove such insurance to us on demand.

VII. Warranty

- The period of limitation for any warranty claim shall be 24 months as from handover of the goods.
- First of all, we shall remedy a defect or make a substitute delivery at our discretion. In case of failure to rectify defects or to substitute delivery, the customer can demand rescission of the contract or reduction of the payment. In case there is only a minor contract violation, especially if there are only minor defects, the customer shall not have the right of contract cancellation, however.
- The customer must notify us in writing of any obvious flaws immediately, at the latest within 7 days after receipt of the goods, and must refrain from any eventual working of protested goods. Otherwise claims based on defects are excluded. The timely dispatch shall suffice for the observance of the warranty deadline. The full burden of proof for all claim prerequisites rests with the customer, especially for the defect itself, for the date of the establishment of the defect, and for the timeliness of the complaint about the defect.
- Defects which could not be ascertained within this time span despite careful inspection are to be reported to us in writing immediately upon discovery. If the customer opts for a withdrawal from the contract because of a legal imperfection or a physical defect after a failed subsequent fulfilment, then he shall not be additionally entitled to a claim for compensation because of the defect.
- If, after a failed subsequent fulfilment, the customer opts for a compensation of the damage, then the merchandise shall remain with the customer if this can reasonably be considered acceptable. The compensation is restricted to the difference between the purchase price and the value of the defective product. This shall not apply if we caused the contract violation maliciously.
- Merchandise for which we have effected compensation shall become our property and is to be returned to us against reimbursement of costs.
- Claims cannot be made for damages that resulted from the customer's culpably
 - improper handling or overstressing the purchased item or
 - altering the purchased item in a manner not agreed upon or
 - not following the instructions of the mounting or operating manual or
 - not observing the complaint and delivery responsibility according to points 3 and 4 above or
 - further using the purchased item after ascertaining the defect.Natural wear and tear is excepted from the warranty.

VIII. Liability

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

IX. Returns

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

following pre-requisites to be met:

- The products must have been acquired directly from us or from one of our works depots.
- Flawless and unaltered condition of the goods.
- In principle, return shall only be possible when the articles in question are still in our product range.
- Return shipment must be „free domicile“ to our Ergersheim works or to the appropriate works depot with accompanying delivery note date and number. Value reduction for returns:
 - in the first year after delivery date ./ 10 % of the contract price
 - in the second year after delivery date ./ 25 % of the contract price
 - between the 3rd & the 5th year after deliv.date ./ 50 % of the contract price
 - merchandise over five years old – no return possibleTechnical inspection and completion of the credit slip shall be carried out under consideration of eventual value reduction upon receipt of the articles. Freight costs, insofar as any occurred to us for the original shipping, reduce the remaining value.

X. Industrial Property Rights

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

XI. Place of Fulfillment and Jurisdiction, Other Agreements

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

MEKRA Lang - passion for excellence.

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Contents are subject to change
Last Update: March 2019

