



## Buses

Product Catalog for Mirror and Camera Monitor Systems



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## Editorial

Dear Readers,

We are delighted to present to you our new product catalog for mirror and camera monitor system for buses.

As a supplier of robust and high-quality indirect vision systems, we offer standard solutions as well as vehicle-specific adaptations and customized configurations 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 are looking forward to your inquiry.

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

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

You will notice that our reliable products do not only provide considerable added value but also fundamental benefits for your daily operations.

We look forward to being by your side as you meet your present and future challenges.

With kind regards



Your Account Managers and Assistants in the Bus and Motorhome Division



## **Directives**





Vehicle Classes and Fields of Vision **8**

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# Directives

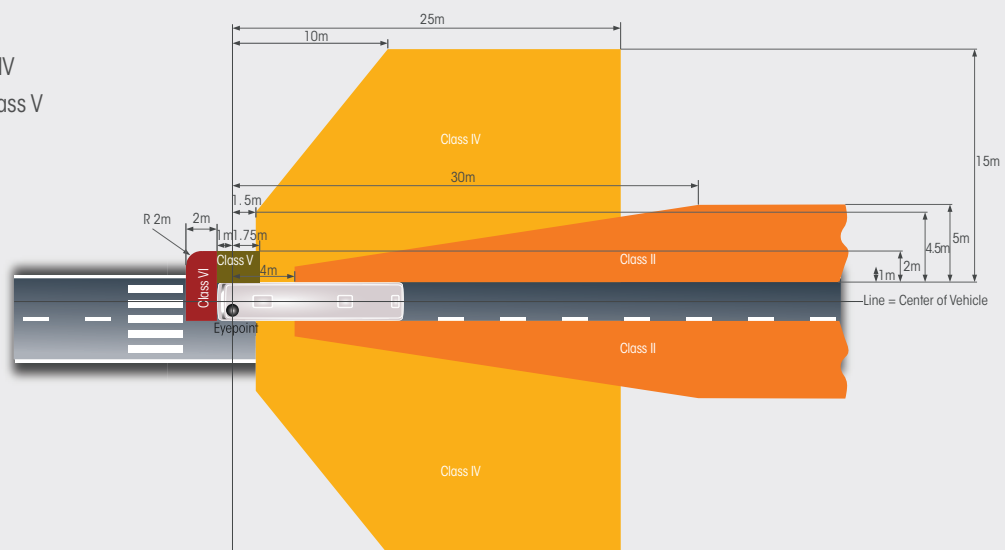
## Vehicle Classes and Fields of Vision

Vehicle Class	Interior mirror		Exterior mirror	
	Class I interior mirror	Class II main mirror (large)	Class III main mirror (small)	Class III main mirror (small)
<b>M<sub>1</sub></b> up to 8 persons	<b>Compulsory</b> Unless in the field of vision required according to para. 15.2.4.1, the vehicle is equipped with something other than safety glazing material.	<b>Optional</b>	<b>Compulsory</b> 1 on the driver's side and 1 on the passenger's side Alternatively, class II mirrors may be installed.	<b>Compulsory</b> 1 on the driver's side and 1 on the passenger's side Alternatively, class II mirrors may be installed.
<b>M<sub>2</sub></b> > 8 persons up to 5 tons	<b>Optional</b> (No field-of-vision requirements)	<b>Compulsory</b> 1 on the driver's side and 1 on the passenger's side	<b>Compulsory</b> 1 on the driver's side and 1 on the passenger's side	<b>Not permitted</b>
<b>M<sub>3</sub></b> > 8 persons > 5 tons	<b>Optional</b> (No field-of-vision requirements)	<b>Compulsory</b> 1 on the driver's side and 1 on the passenger's side	<b>Compulsory</b> 1 on the driver's side and 1 on the passenger's side	<b>Not permitted</b>

### Relevant fields of vision for buses from the ECE

Legend	<span style="color: orange;">■</span> HS = Main mirror	≙ Class II	<span style="color: green;">■</span> NBS = Close-proximity mirror	≙ Class V
	<span style="color: yellow;">■</span> WWS = Wide-angle mirror	≙ Class IV	<span style="color: red;">■</span> FS = Front mirror	≙ Class VI

- Main mirror Class II
- Wide-angle mirror Class IV
- Close-proximity mirror Class V
- Front mirror Class VI



The statutory fields of view represent minimum requirements. The MEKRA fields of vision shown in ideal-typical representation may vary depending on vehicle size, shape, and mounting location. They do, however, always meet the legal minimum requirements.



Class IV wide-angle mirror	Class V close-proximity mirror	Class VI front mirror
<b>Optional</b> 1 on the driver's side and/ or 1 on the passenger's side	<b>Optional</b> 1 on the driver's side and 1 on the passenger's side (must both be installed at least 2 m above the ground)	<b>Optional</b> (must be installed at least 2 m above the ground)
<b>Optional</b> 1 on the driver's side and/ or 1 on the passenger's side	<b>Optional</b> 1 on the driver's side and 1 on the passenger's side (must both be installed at least 2 m above the ground)	<b>Optional</b> (must be installed at least 2 m above the ground)
<b>Optional</b> 1 on the driver's side and/ or 1 on the passenger's side	<b>Optional</b> 1 on the driver's side and 1 on the passenger's side (must both be installed at least 2 m above the ground)	<b>Optional</b> (must be installed at least 2 m above the ground)

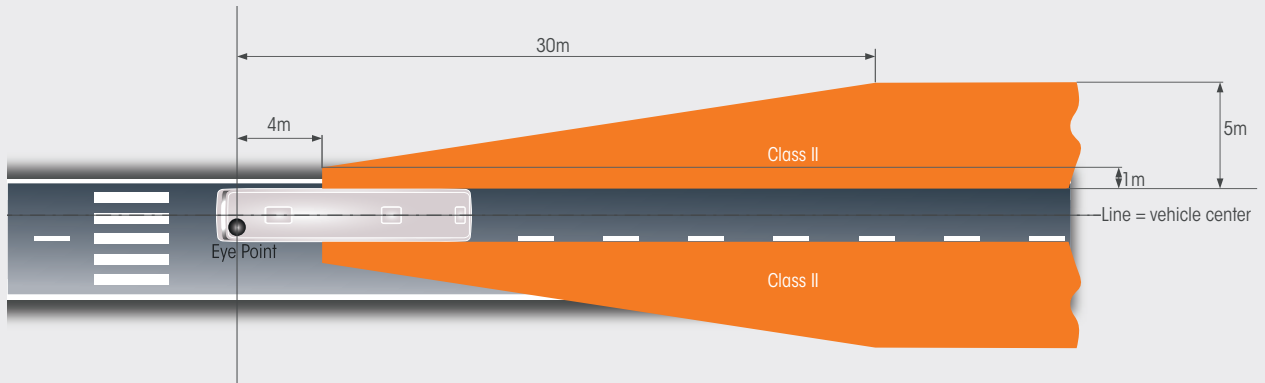
### European directive overview with designations

<b>UN ECE R 10</b>	Electromagnetic compatibility (EMC)
<b>UN ECE R 107</b>	General design for buses and coaches of classes M2 and M3
<b>UN ECE R 118</b>	Burning behavior of interior material
<b>UN ECE R 151</b>	Toter Winkel Assistent zur Erkennung von gefährdeten Personen (Fußgänger, Fahrradfahrer)

# Directives

European Regulations and Directives for Buses

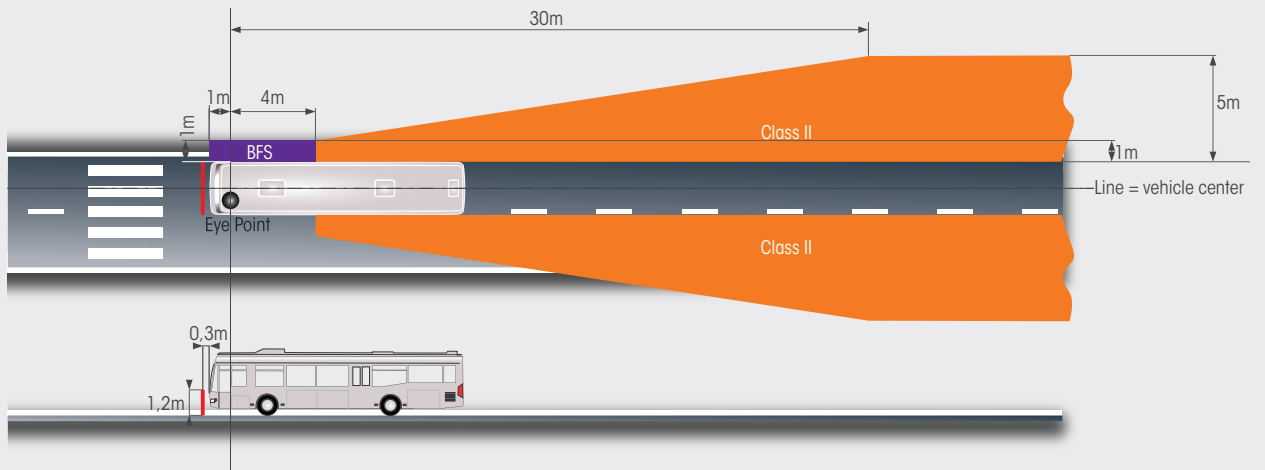
## Legally Required Field of Vision for Buses



- Class II main mirror on both sides
- Wide-angle mirror permitted – not compulsory

The statutory fields of view represent minimum requirements. The MEKRA fields of vision shown in ideal-typical representation may vary depending on vehicle size, shape, and mounting location. They do, however, always meet the legal minimum requirements.





## German School Bus Regulation



- Class II main mirror on both sides
- Passenger's side (BFS) with mirror, camera monitor system optional
- Direct front view of measuring stick or front mirror, camera monitor system optional

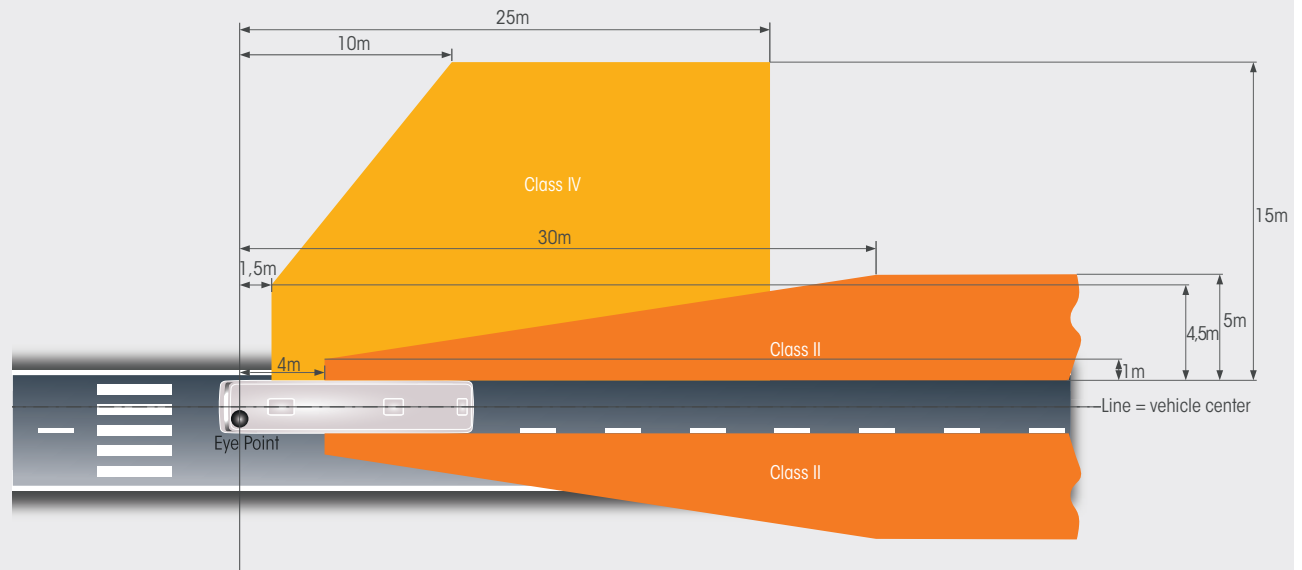
The statutory fields of view represent minimum requirements. The MEKRA fields of vision shown in ideal-typical representation may vary depending on vehicle size, shape, and mounting location. They do, however, always meet the legal minimum requirements.

## Legend

	HS	= Main mirror	≅ Class II		NBS	= Close-proximity mirror	≅ Class V
	WWS	= Wide-angle mirror	≅ Class IV		FS	= Front mirror	≅ Class VI



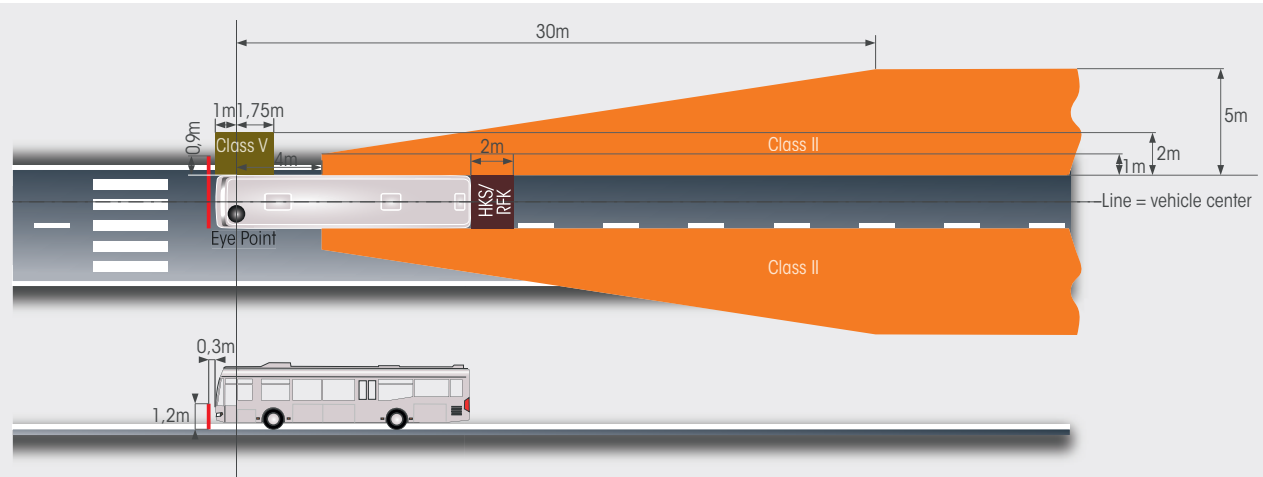
## Belgian Regulation



- Class II main mirror on both sides
- Class IV wide-angle mirror on the passenger's side
- Class IV wide-angle mirror on left side permitted – not compulsory

The statutory fields of view represent minimum requirements. The MEKRA fields of vision shown in ideal-typical representation may vary depending on vehicle size, shape, and mounting location. They do, however, always meet the legal minimum requirements.

## Spanish School Bus Regulation

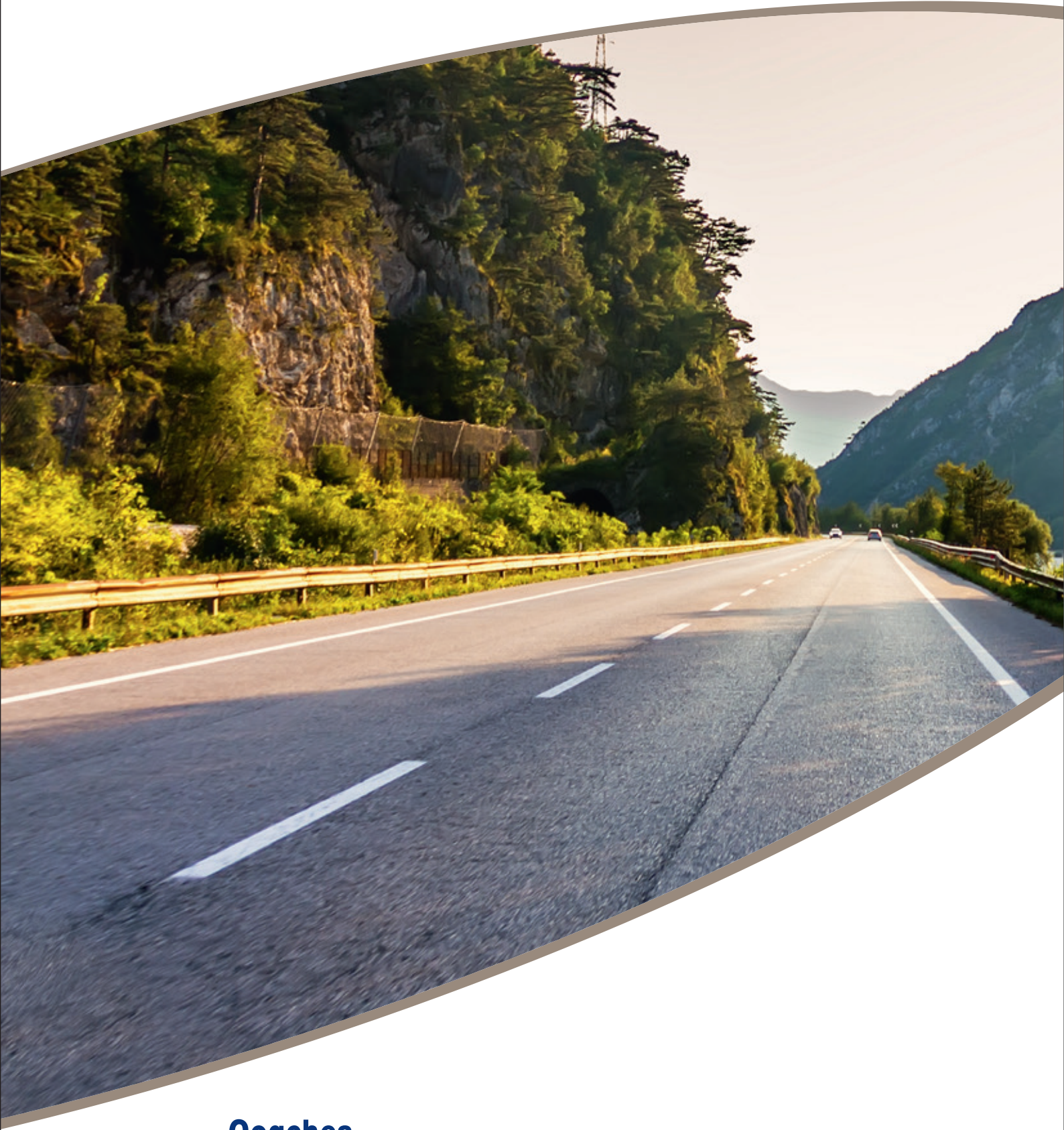


- Class II main mirror on both sides
- Class V close-proximity mirror right side, camera monitor system optional
- Direct front view of measuring stick or front mirror Class VI, camera monitor system optional
- Class V close-proximity mirror on right side not required, if the field of vision is ensured by a combination of Class IV wide-angle mirror and Class VI front mirror
- Rear camera, rear mirror optional

The statutory fields of view represent minimum requirements. The MEKRA fields of vision shown in ideal-typical representation may vary depending on vehicle size, shape, and mounting location. They do, however, always meet the legal minimum requirements.

- BFS = Passenger's side  $\cong$  visible, legally required field of vision
- HKS/RFK = Rear mirror / rear-view camera

■ Measuring stick front view



## **Coaches**





# Mirror System 291

Coaches

## Features

- ECE R46/02-compliant main and wide-angle mirrors
- Modular system
- Variable mounting lengths and angles
- Manual or power folding mirrors
- Manually or electrically adjustable mirror glasses, heated
- Optional configuration with wide-angle or front crossview mirror
- Paintable plastic (ABS) trim options with fine-grain texture
- LED entry light can be integrated
- Camera can be integrated
- Ultra-robust mounting arm construction, vibration-resistant
- Optional configurations for country-specific field-of-vision regulations
- Ample supply of spare parts
- Left-hand and right-hand drive options
- Easy to disassemble
- Tool-free glass replacement (snap-and-slide locking)
- Various 12 V options available



## Mirror configurations

### HS Main mirror II

R 1200 (II E1 021203)  
heated, 24 V  
electrically adjustable

### WWS Wide-angle mirror IV

R 300 (IV E1 021207)  
heated, 24 V  
manually adjustable

### BS Front crossview mirror

R 200  
heated, 24 V  
manually adjustable

### Folding feature manual or powered



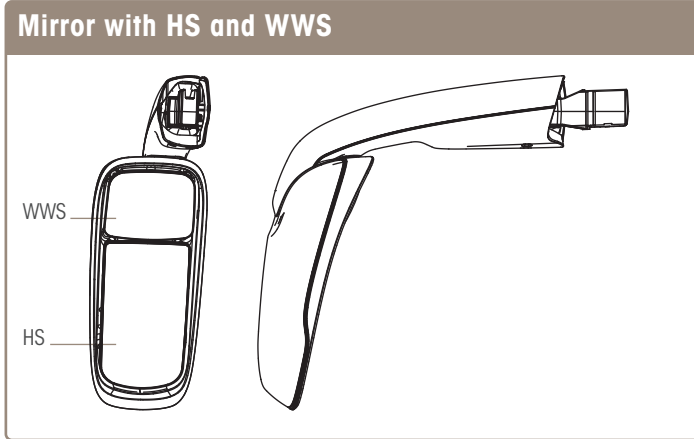
### Camera



### LED entry light

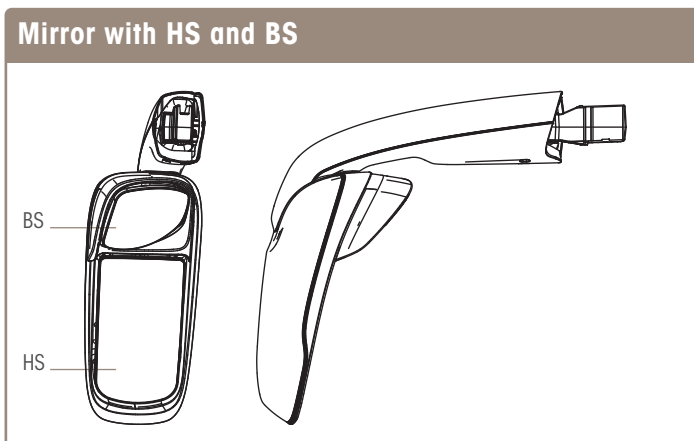


## System options



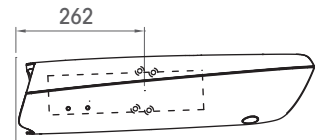
or

+

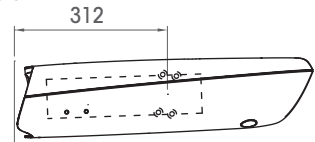


**Mounting arm** available in three mounting sizes

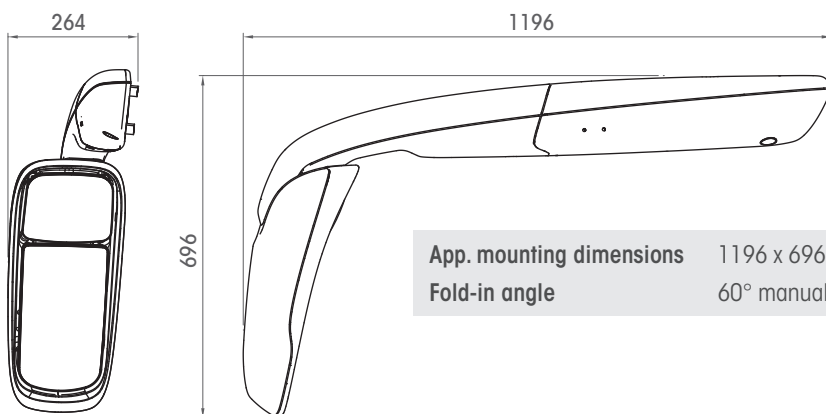
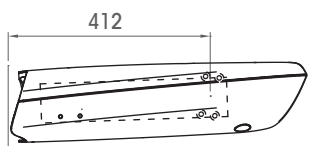
Short



Medium



Long



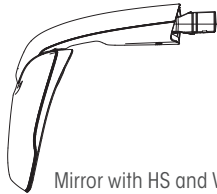
App. mounting dimensions 1196 x 696 x 264 mm (L x H x D)  
 Fold-in angle 60° manual operation

# Mirror System 291

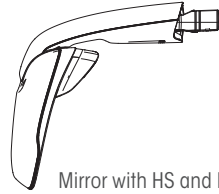
Coaches

## Mirror configurations

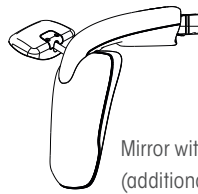
291



Mirror with HS and WWS



Mirror with HS and BS



Mirror with HS, WWS and ZS (additional mirror)



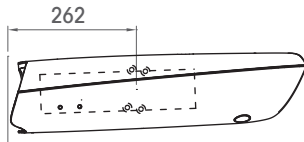
Mirror with HS, WWS and NBS (close proximity-mirror)

Item number	Assembly	Configuration	Directives
<b>Manual folding</b>			
<b>left-hand drive</b>			
59.2910.001.001	left side	HS WWS	
59.2910.002.001	right side	HS WWS	
59.2910.003.001	left side	HS BS	
59.2910.004.001	right side	HS BS	
59.2910.011.001	left side	HS WWS Camera	
59.2910.012.001	right side	HS WWS Camera	
59.2910.013.001	left side	HS WWS ZS 559	
59.2910.014.001	right side	HS WWS NBS 558	
<b>right-hand drive</b>			
59.2910.009.001	left side	HS WWS	
59.2910.010.001	right side	HS WWS	
59.2910.017.001	left side	HS BS	
59.2910.018.001	right side	HS BS	
<b>Power folding</b>			
<b>left-hand drive</b>			
59.2910.005.001	left side	HS WWS	
59.2910.006.001	right side	HS WWS	
59.2910.007.001	left side	HS BS	
59.2910.008.001	right side	HS BS	
59.2910.015.001	left side	HS WWS Camera	
59.2910.016.001	right side	HS WWS Camera	

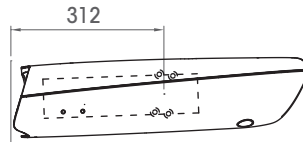
Additional options upon request



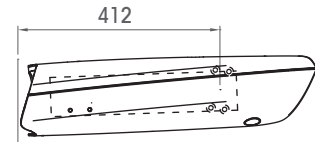
## 291



Short



Medium



Long

Item number	Assembly	Length	Equipment	
<b>Mounting arm</b>				
61.2910.001.001	291-1	left side	Short	Covers
61.2910.002.001	291-1	right side	Short	Covers
61.2910.003.001	291-2	left side	Medium	Covers
61.2910.004.001	291-2	right side	Medium	Covers
61.2910.005.001	291-3	left side	Long	Covers
61.2910.006.001	291-3	right side	Long	Covers

Additional options upon request, including an integrated LED entry light. LED entry light retrofittable.

## Accessories

Item number		Length
<b>Connecting cable to vehicle</b>		
09.2910.002.099	for HS and WWS	6.00 m
09.2910.003.099	2-pin for entry light or folding feature	6.00 m
<b>Mirror adjustment switch</b>		
08.3200.233	for 2-mirror operation	
<b>Other</b>		
08.3950.001.099	Controller for power folding mechanism	
08.2910.001.002	Power LED entry light 9 - 32 V incl. mounting clips	



retrofittable



## **City Buses**



Mirror System 277	20
Mirror System 278	22
Mirror System 1018 Bus	24
Mirror System 1041	26
Mirror System 1042	27
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# Mirror System 277

City Buses

## Features

- ECE R46/02-compliant main mirror
- Auxiliary mirror complies with German School Bus Regulation (Deutsche Schulbusverordnung)
- Can be used below 2 m, folding mirror head
- Manually or electrically adjustable mirror glasses, heated
- Manual or power folding mirror arm
- Paintable plastic (ABS) trim options with fine-grain texture
- Tool-free glass replacement (snap-and-slide locking)
- Easy to disassemble
- Ample supply of spare parts
- Ultra-robust mounting arm construction, vibration-resistant
- LED entry light can be integrated



## Mirror configurations

### HS Main mirror II

R 1200 (II E1 02 0915)  
heated, 24 V  
electrically adjustable

### ZS Auxiliary mirror

R 200  
heated, 24 V  
manually or electrically adjustable



HS and ZS

### LED entry light

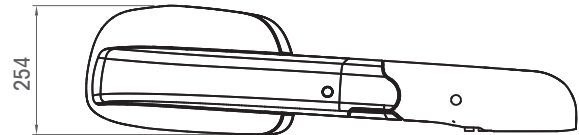
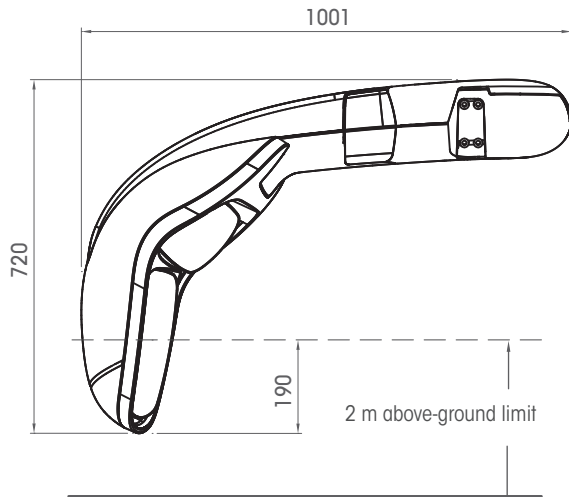


### Mirror head with folding mechanism



### Folding feature (manual or powered operation)





<b>App. mounting dimensions</b>	1001 x 720 x 254 mm (L x H x D)
<b>Fold-in angle</b>	60° manual operation 60° power operation, 24 V with safety shut-off

Item number	Configuration	Directives
<b>right-hand mount, heated 24 V</b>		
<b>Manual folding mirrors</b>		
59.2770.210.001	HS electrically adjustable ZS electrically adjustable	ECE
59.2770.211.001	HS electrically adjustable ZS electrically adjustable	ECE
59.2770.310.001	HS electrically adjustable ZS electrically adjustable	ECE
<b>Power folding mirrors</b>		
59.2771.210 *	HS electrically adjustable ZS electrically adjustable	ECE
59.2771.310.001 *	HS electrically adjustable ZS electrically adjustable	ECE

\* Use is limited to European requirement profiles and exclusively in conjunction with the controller for power folding mechanism 08.3950.001.099

## Accessories

Item number		Length
<b>Connecting cables</b>		
09.2770.211 + 09.2770.210	for 59.2770.211.001	6,00 m
09.2770.210	for 59.2770.210	6,00 m
09.2770.230	for 59.2771.210	6,00 m
09.2770.220	for 59.2770.110	6,00 m
09.2910.003.099	2-pin for entry light	6,00 m
<b>Mirror switches</b>		
08.3200.233	Switch for 2-mirror operation	
08.2770.001.000	Switch for 3-mirror operation	
<b>Entry light/ Others</b>		
08.2910.001.002	Power LED entry light 9 - 32 V incl. mounting clips	
08.3950.001.099	Controller for power folding mechanism	

# Mirror System 278

City Buses

## Features

- ECE R46/02-compliant main and wide-angle mirrors
- Integrated wide-angle mirror
- Manual folding mirror
- Manually or electrically adjustable main mirror, heated
- Manually adjustable wide-angle mirror, heated
- Upright and overhang versions
- Paintable plastic (ABS) trim options with fine-grain texture
- Ultra-robust mounting arm construction, vibration-resistant
- Ample supply of spare parts
- Easily detachable, direct contact connection (spring clips)
- Tool-free glass replacement (snap-and-slide locking)
- Use below 2 m permitted



Overhang version



Upright version

## Mirror configurations

### HS Main mirror II

R 1200 (II E1 020951)  
heated, 24 V  
electrically adjustable

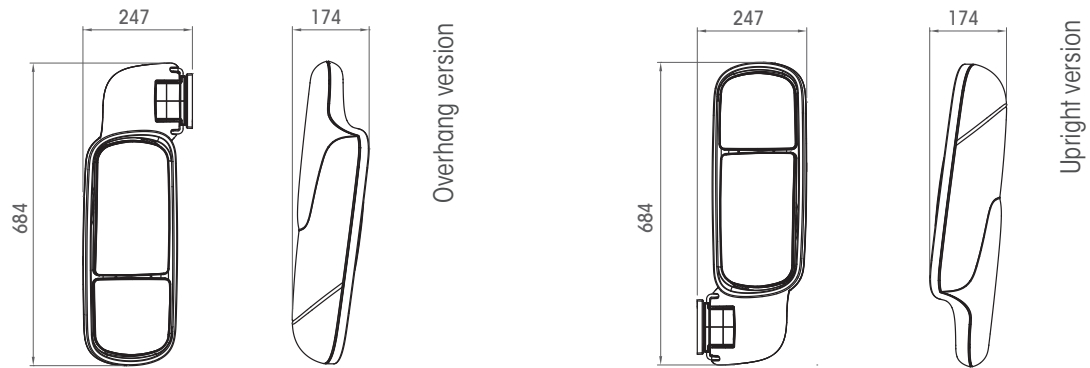
### WWS Wide-angle mirror IV

R 300 (IV E1 020952)  
heated, 24 V  
manually adjustable











HS and WWS





App. mounting dimensions 684 x 247 x 174 mm (L x W x D)

Item number	Assembly	Configuration			Directives
<b>Overhang version with direct contact connection 271, WWS manually adjustable</b>					
59.2780.120.001	left side	HS	electrically adjustable	heated, 24 V	 
59.2781.120	right side	HS	electrically adjustable	heated, 24 V	 
<b>Upright version with direct contact connection 271, WWS manually adjustable *</b>					
59.2780.150.001	left side	HS	electrically adjustable	heated, 24 V	 
59.2780.160.001	right side	HS	electrically adjustable	heated, 24 V	 

\* only in combination with wedge mount 278, item number 20.2780.630, and mirror adjustment switch, item number 08.2770.001.000

## Accessories

Item	
Wedge mounts	see Accessories - Wedge mounts – Direct Contact Connection 271,
Mirror switch	see Accessories – Mirror switch, page 87

# Mirror System 1018 Bus

City Buses

## Features

- ECE R46/02-compliant main and wide-angle mirrors
- Folding mirror head for use below 2 m, collision protection and parking position
- Manually or electrically adjustable main mirror glasses, heated
- Manually adjustable wide-angle mirror glasses, heated
- Paintable plastic (ABS) trim options with fine-grain texture
- Ultra-robust mounting arm construction, vibration-resistant
- Tool-free glass replacement (snap-and-slide locking)



right side



left side

## Option Front mirror VI

VI E1 020937



## Mirror configurations




### HS Main mirror II

R 1200 (II E1 021281)  
heated, 24 V  
electrically adjustable

### WWS Wide-angle mirror IV

R 300 (IV E1 021282)  
heated, 24 V  
manually adjustable

## 1018 Bus

Item number	Assembly	Configuration				Directives
<b>Mirror System 1018 Bus, heated 24 V</b>						
59.1018.501.001	left side	HS	electrically adjustable	WWS	manually adjustable	
59.1018.502.001	right side	HS	electrically adjustable	WWS	manually adjustable	
59.1018.601.001	right side	HS	electrically adjustable	WWS	manually adjustable with front mirror 389	

## Accessories

Item number		Length
<b>Connecting cables to vehicle</b>		
09.2910.002.099	for HS and WWS	6,00 m
09.2910.004.099	for HS and WWS	2,70 m
09.2910.005.099	for HS and WWS	3,50 m
<b>Mirror Switch</b>		
08.3200.233	for 2-mirror operation	
<b>Paintable mirror head covers</b>		
12.1018.001.000	left side	
12.1018.002.000	right side	



# Mirror System 1041

City Buses

**Features**

- ECE R46/04-compliant main mirrors
- Front crossview mirror
- Modern design
- Suitable for city, intercity & tour buses
- Manually or electrically adjustable mirror glasses, heated
- Manual folding mirror arm
- Paintable plastic trim options with fine-grain texture
- Made from UV-resistant ASA
- Tool-free glass replacement (snap-and-slide locking)
- Ultra-robust mounting arm construction, vibration-resistant



## Mirror configurations

### HS Main mirror II

R1200 (II E1 041480)  
heated, 24 V  
electrically adjustable

### ZS Auxiliary mirror

R 200  
heated, 24 V  
manually or electrically adjustable



HS und ZS

## 1041

Item number	Assembly	Configuration	Directives
<b>Mirror System 1041, heated 24 V, manually folding</b>			
<b>Variants over 2m</b>			
59.1041.001.001	right	HS electrically adjustable	BS manually adjustable
59.1041.002.001	right	HS electrically adjustable	BS electrically adjustable
<b>Variants under 2m</b>			
59.1041.004.001	right	HS electrically adjustable	BS manually adjustable, standard length
59.1041.005.001	right	HS electrically adjustable	BS manually adjustable, 120mm extended

## Accessories

Item number		Lengths
09.1041.002.001	Connecting cable for mirror 1041	2,4 m
09.1041.004.001	Connecting cable for mirror 1041/1042 electrical WWS/BS	2,4 m
08.2910.001.002	Power LED entrance light 9-32V with mounting brackets retrofittable at 59.1041.005.001	2,4 m
09.2910.003.099	2-pole for entrance light	6 m

Other variants on request

retrofittable



# Mirror System 1042

City Buses

## Features

- ECE R46/04-compliant main and wide-angle mirrors
- Modern design
- Suitable for city buses and coaches
- Use below 2 m permitted
- Manually or electrically adjustable mirror glasses, heated
- Manual folding mirror head
- Paintable plastic trim options with fine-grain texture
- Made from UV-resistant ASA
- Tool-free glass replacement (snap-and-slide locking)
- Ultra-robust mounting arm construction, vibration-resistant



## Mirror configurations

### HS Main mirror II

R 1200 (II E1 041481)  
heated, 24 V  
electrically adjustable

### WWS Wide-angle mirror IV

R 300 (IV E1 041482)  
heated, 24 V  
manually adjustable

## 1042

Item number	Assembly	Configuration	Directives
<b>Mirror System 1042, heated 24 V, manually folding</b>			
<b>Overhang Version</b>			
59.1042.001.001	left side	HS electrically adjustable WWS manually adjustable	ECE
59.1042.002.001	right side	HS electrically adjustable WWS manually adjustable door assembly	ECE
59.1042.004.001	right side	HS electrically adjustable WWS manually adjustable adapter a-pillar	ECE
59.1042.005.001	left side	HS electrically adjustable WWS manually adjustable	ECE
<b>Upright Version</b>			
59.1042.003.001	left side	HS electrically adjustable WWS manuell verstellbar	ECE

## Accessories

Item number	Lengths
20.1042.002.001	Slip-on wedge with connection cable for mirror 1042 2,1 m
20.1042.003.001	Wedge mount with connecting cable for mirror 1042 2,5 m
09.1041.004.001	Connecting cable for mirror 1041/ 1042 electrical WWS/BS 2,4 m

# Mirror System 276

City Buses

## Features

- ECE R46/02-compliant main mirrors
- Manually or electrically adjustable main mirror, heated
- Manual folding feature
- Hidden wiring, direct contact connection
- Paintable surfaces
- Tool-free glass replacement (snap-and-slide locking)
- Easy to disassemble/ remove
- Overhang and upright versions
- 12 V and 24 V options available
- Use below 2 m permitted

Overhang version



Upright version



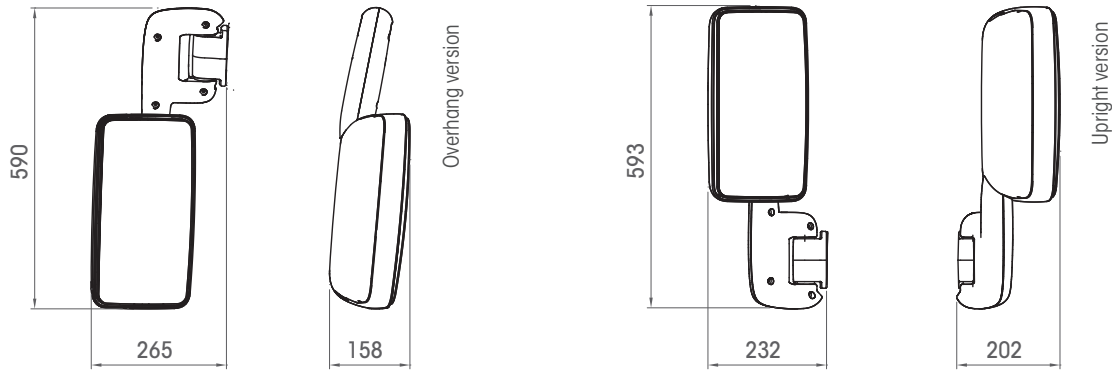
## Mirror configuration

### HS Main mirror II

R 1800/ R 1200  
(II E1 020923)  
heated, 24 V  
manually or  
electrically adjustable



HS



App. mounting dimensions 590 x 265 x 158 mm (L x W x D)

App. mounting dimensions 593 x 232 x 202 mm (L x W x D)

Item number	Assembly				Directives
<b>Overhang version with direct contact connection 271, R 1800</b>					
<b>manually adjustable</b>					
59.2760.112	left side	left-hand drive	no wedge mount	unheated	<b>ECE</b>
59.2760.212	right side	left-hand drive	no wedge mount	unheated	<b>ECE</b>
<b>electrically adjustable</b>					
59.2761.112	left side	left-hand drive	no wedge mount	heated, 12 V	<b>ECE</b>
59.2761.212	right side	left-hand drive	no wedge mount	heated, 12 V	<b>ECE</b>
59.2762.101	left side	left-hand drive	with wedge mount 271	heated, 24 V	<b>ECE</b>
59.2760.007.001	left side, R 1200	left-hand drive	no wedge mount	heated, 24 V	<b>ECE</b>

Item number	Assembly				Directions
<b>Upright version with direct contact connection 271</b>					
<b>manually adjustable, R 1800</b>					
59.2760.302	left side	left-hand drive	no wedge mount	unheated	<b>ECE</b>
59.2760.402	right side	left-hand drive	no wedge mount	unheated	<b>ECE</b>
<b>electrically adjustable, R 1800</b>					
59.2761.302	left side	left-hand drive	no wedge mount	heated, 12 V	<b>ECE</b>
59.2761.402	right side	left-hand drive	no wedge mount	heated, 12 V	<b>ECE</b>
<b>electrically adjustable, R 1200</b>					
59.2762.302	left side	left-hand drive	no wedge mount	heated, 24 V	<b>ECE</b>
59.2762.402	right side	left-hand drive	no wedge mount	heated, 24 V	<b>ECE</b>

## Accessories

Item number	
Wedge mounts	see Accessories - Wedge mounts – Direct Contact Connection 271 , page 52
Spiegelschalter	see Accessories – Mirror switch, page 54





**Motorhomes**





# Mirror System 1018

Motorhomes

Features

- ECE R46/02-compliant main and wide-angle mirrors
- Modular system
- Variable mounting lengths and angles
- Highly adaptable to customer needs (e. g. vehicle interface)
- Folding mirror head for use below 2 m, collision protection and parking position
- Manually or electrically adjustable main mirror glasses, heated
- Manually adjustable wide-angle mirror glasses, heated
- Paintable plastic (ABS) trim options with fine-grain texture
- Ultra-robust mounting arm construction, vibration-resistant
- Ample supply of spare parts
- Left-hand and right-hand drive options
- Optional: integrated film antenna
- Easy to disassemble
- Tool-free glass replacement (snap-and-slide locking)



## Mirror configurations

### HS Main mirror II

R 1200 (II E1 021281)  
heated, 12 V  
electrically adjustable

### WWS Wide-angle mirror IV

R 300 (IV E1 021282)  
heated, 12 V  
manually adjustable

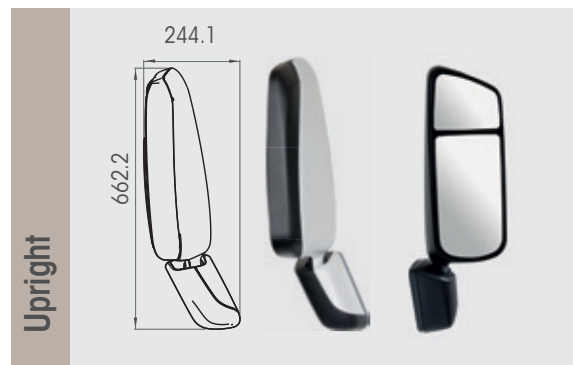
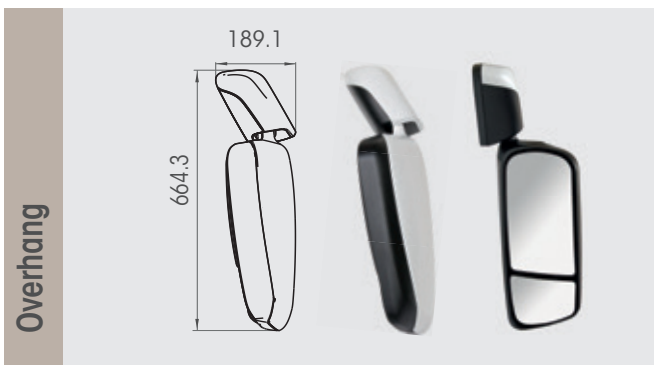


### Mirror head with folding mechanism manual

for use below 2 m, collision protection,  
parking position



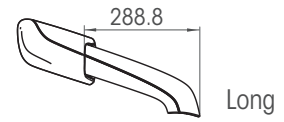
## System options



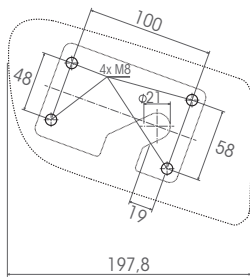
# Mirror System 1018

Motorhomes

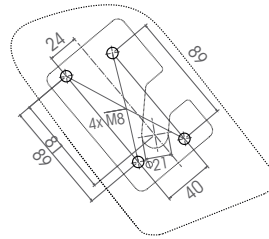
Mounting arm  
available in three lengths



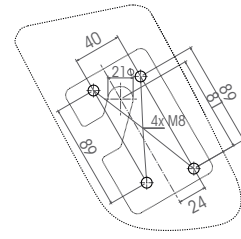
Mounting hole layout - overhang  
with mounting arm



Mounting hole layout - overhang  
without mounting arm



Mounting hole layout - upright  
without mounting arm





### Standard factory-supplied configuration



Lower mounting arm cover, adapter plate, mirror head attached to mounting arm:  
- without mounting base cover  
- without upper mounting arm cover  
- without mirror head cover



### Add-on: Paintable covers

Mounting base cover



Mirror head cover



Upper mounting arm cover

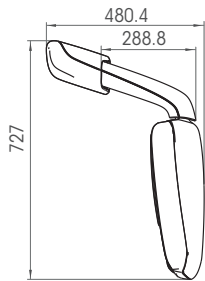




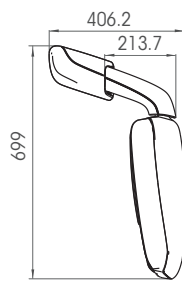
# Mirror System 1018

Motorhomes

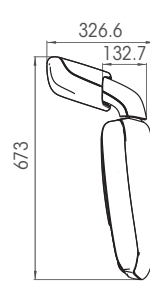
1018



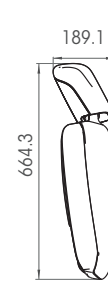
Long



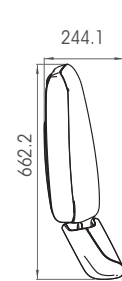
Medium



Short



Overhang



Upright

Item number	Assembly	Configuration	Directives
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Standard factory-supplied configuration, see page 39

**left-hand drive**

59.1018.001.001	left side	HS WWS	overhang long	ECE
59.1018.002.001	right side	HS WWS	overhang long	ECE
59.1018.003.001	left side	HS WWS	overhang short	ECE
59.1018.004.001	right side	HS WWS	overhang short	ECE
59.1018.005.001	left side	HS WWS	upright	ECE
59.1018.006.001	right side	HS WWS	upright	ECE
59.1018.007.001	left side	HS WWS	overhang medium	ECE
59.1018.008.001	right side	HS WWS	overhang medium	ECE
59.1018.015.001	left side	HS WWS	overhang	ECE
59.1018.016.001	right side	HS WWS	overhang	ECE
59.1018.019.001	right side	HS WWS	antenna overhang medium	ECE

**right-hand drive**

59.1018.017.001	left side	HS WWS	overhang medium	ECE
59.1018.018.001	right side	HS WWS	overhang medium	ECE
59.1018.020.001	right side	HS WWS	antenna overhang medium	ECE

24 V versions upon request, additional right-hand drive versions in standard lengths upon request

## Covers

Item number Assembly

### Paintable covers included in standard factory-supplied configuration

12.1018.004.000	left side/ right side	Lower mounting arm cover 1018, short
12.1018.006.000	left side/ right side	Lower mounting arm cover 1018, medium
12.1018.008.000	left side/ right side	Lower mounting arm cover 1018, long

Item number Assembly

### Add-on: paintable covers to standard factory-supplied configuration, see page 39

12.1018.001.000	left side	Mirror head cover 1018 left side
12.1018.002.000	right side	Mirror head cover 1018 right side
12.1018.012.001	right side	Mirror head cover 1018 right side with antenna
12.1018.003.000	left side/ right side	Upper mounting arm cover 1018, short
12.1018.005.000	left side/ right side	Upper mounting arm cover 1018, medium
12.1018.007.000	left side/ right side	Upper mounting arm cover 1018, long
12.1018.009.001	left side	Mouting base cover 1018 left side
12.1018.010.001	right side	Mounting base cover 1018 right side

(not included in standard factory-supplied configuration)

## Accessories

Item number Length

### Connecting cable to vehicle

09.2910.004.099	for HS and WWS	2.70 m
09.2910.005.099	for HS and WWS	3.50 m
09.2910.002.099	for HS and WWS	6.00 m
09.1018.004.001	for film antenna	4.50 m

### Mirror adjustment switch

08.3200.233	for 2-mirror operation
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**Components**



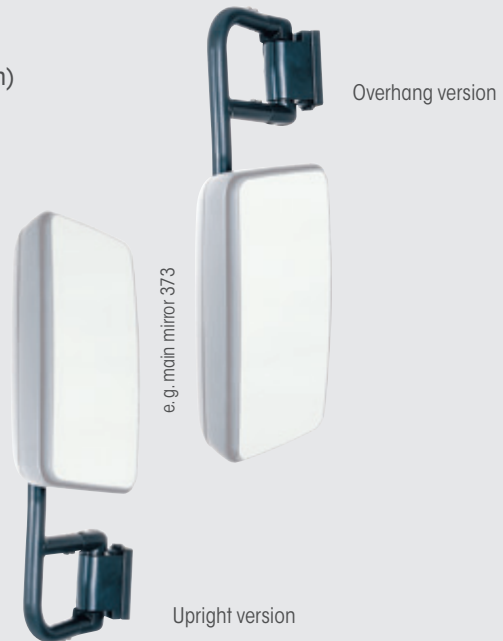
<b>Tubular Bracket System 270, left side</b>	<b>40</b>
<b>Tubular Bracket System 270, right side</b>	<b>41</b>
<b>Main Mirrors</b>	<b>42</b>
<b>Wide-Angle Mirrors</b>	<b>44</b>
<b>Interior Mirrors</b>	<b>46</b>
<b>Special Application Mirrors</b>	<b>48</b>

# Tubular Bracket System 270, left side

## Components

### Features

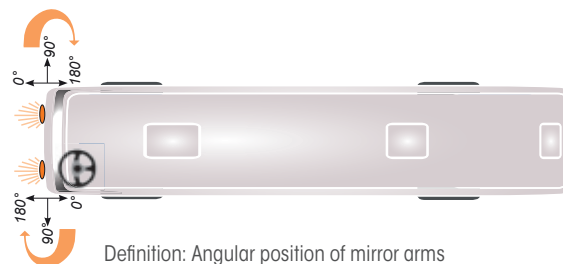
- Slip-on bracket system for city buses, coaches (low-cost version)
- Suitable for main mirrors 373/ 363 or additional main mirrors
- Foldable mounting base, angular position can be factory-set from 0° to 180°, field-adjustable by +/- 8°
- Cabling for heater and glass adjustment integrated in tubular bracket
- Pluggable connection via connecting cable 248 with female socket or via direct contact connection 271 (no plug), see page 84
- Tubular bracket can be mounted in overhang or upright configuration, may also be mounted below 2 m depending on the angular position
- Dimensions: 500 x 160 x Ø 28 mm
- Additional configurations on request



The mirror heads are represented schematically only.

Item number	Configuration		
<b>Tubular Bracket System 270, left side</b>			
<b>overhang</b>			
58.2704.059	Tubular bracket with heating cable	Cable connection 248	wedge included
58.2704.090	Tubular bracket with heating cable	Direct contact connection 271	20.2710.620 *
<b>upright</b>			
58.2704.088	Tubular bracket with control cable	Direct contact connection 271	20.2710.620 *

\* Other wedges, see accessories pages



Definition: Angular position of mirror arms



# Tubular Bracket System 270, right side

## Components

### Features

- Slip-on bracket system for city buses, coaches (low-cost version)
- Suitable for main mirrors 373/363 or additional main mirrors
- Foldable mounting base for carwash, angular position can be factory set between 0° and 180°, field-adjustable by +/- 8°
- Wiring (heating or control cable) in tubular bracket
- Pluggable connection via connecting cable 248 with female socket or via direct contact connection 271 (no plug), see page 84
- Tubular bracket mounted in overhang configuration; if mounted below 2 m, folding hinge can be included (folding rod)
- Dimensions for rigid version: 732 x 327 x Ø 28 mm
- Dimensions for folding version: 668 x 350 x Ø 28 mm
- Additional configurations on request



Item number	Configuration		
<b>Tubular Bracket System 270, right side</b>			
<b>rigid version</b>			
58.2704.086	Tubular bracket with heating and control cable	Cable connection 248	wedge included
58.2704.093	Tubular bracket with heating and control cable	Direct contact connection 271	20.2710.630 *
<b>foldable version</b>			
58.2705.001	Tubular bracket with brace, heating and control cable	Cable connection 248	wedge included
58.2705.002	Tubular bracket without brace, heating and control cable	Cable connection 248	wedge included

\* Other wedges, see accessories pages

# Main Mirror

## Components

### Main Mirror 363 (II E1 020923)

<b>Material</b>	Plastic mirror housing (ABS)
<b>Housing</b>	384 x 205 x 120 mm
<b>Back cover</b>	Removable, paintable
<b>Clamp</b>	
<b>Glass unit</b>	368 x 189 x 40 mm
<b>Heater</b>	24 V



Item number	Assembly	Configuration		
<b>Mirror head</b>				
51.3635.204	left side		heated, 24 V	R 1200
51.3636.204	right side		heated, 24 V	R 1200
51.3635.206	left side	electrically adjustable	heated, 24 V	R 1200
51.3636.206	right side	electrically adjustable	heated, 24 V	R 1200

#### Item number

#### Spare parts

15.3802.840F	Glass unit		heated, 24 V	R 1200
11.3730.210	Cover			

### Main Mirror 373 (II E1 020923)

<b>Material</b>	Plastic mirror housing (ABS)
<b>Housing</b>	384 x 205 x 120 mm
<b>Back cover</b>	Removable, paintable
<b>Clamp</b>	
<b>Glass unit</b>	368 x 189 x 40 mm
<b>Heater</b>	24 V



Item number	Assembly	Configuration		
<b>Mirror head</b>				
51.3731.324	left side		heated, 24 V	R 1800
51.3732.324	right side		heated, 24 V	R 1800
51.3731.326	left side	electrically adjustable	heated, 24 V	R 1800
51.3732.326	right side	electrically adjustable	heated, 24 V	R 1800

#### Item number

#### Spare parts

15.3731.470	Glass unit		heated, 24 V	R 1800
11.3730.210	Cover			

## Main Mirror 375 (II E1 020941)

<b>Material</b>	Plastic mirror housing (ABS)
<b>Housing</b>	388 x 168 x 68 mm
<b>Components</b>	Complete mirror assembly only available with three components
<b>Clamp</b>	Ø 28 mm
<b>Glass unit</b>	380 x 160 x 15 mm
<b>Heater</b>	24 V



Item number	Configuration			
<b>Components left-side/ right-side, please order mirror head, glass unit, mounting element separately</b>				
61.3752.147H	Mirror Head		heated, 24 V	without glass unit
61.3752.167H	Mirror Head	electrically adjustable	heated, 24 V	without glass unit
15.3752.470	Glass unit		heated, 24 V	R 1800
61.3780.100	Mounting element including cover			

## Main Mirror 378 (II e1 03\*0018)

<b>Material</b>	Plastic mirror housing (ABS)
<b>Housing</b>	433 x 188 x 85 mm
<b>Components</b>	Complete mirror assembly only available with three components
<b>Glass unit</b>	433 x 188 x 15 mm
<b>Clamp</b>	
<b>Heater</b>	24 V



Item number	Configuration			
<b>Components left-side/ right-side, please order mirror head, glass unit, mounting element separately</b>				
61.3782.147H	Mirror head		heated, 24 V	without glass unit
61.3782.167H	Mirror head	electrically adjustable	heated, 24 V	without glass unit
15.3784.470H	Glass unit		heated, 24 V	R 1800
61.3780.100	Mounting element including cover			

# Wide-Angle Mirror

## Components

### Wide-Angle Mirrors 377 (IV e1 03\*0019)



<b>Material</b>	Plastic mirror housing (ABS)
<b>Housing</b>	200 x 200 x 68 mm
<b>Components</b>	Complete mirror assembly only available with three components
<b>Clamp</b>	Ø 28 mm
<b>Glass unit</b>	200 x 200 x 15 mm
<b>Heater</b>	24 V

Item number	Configuration
<b>Components left-side/ right-side, please order mirror head, glass unit, mounting element separately</b>	
56.3773.147	Mounting element including cover
61.3780.100	Mounting element including cover

### Wide-Angle Mirrors 386 (IV E1 021248)



<b>Material</b>	Plastic mirror housing
<b>Housing</b>	219 x 170 x 120 mm
<b>Back cover</b>	Removable, paintable
<b>Glass unit</b>	203 x 154 x 36 mm
<b>Clamp</b>	Ø 22 bis 28 mm
<b>Heater</b>	24 V

Item number	Assembly	Configuration
<b>Mirror head</b>		
56.3860.214	left side/ right side	heated, 24 V R 400
61.3865.124H	left side/ right side	heated, 24 V R 300

Item number	Configuration
<b>Spare parts</b>	
15.3861.114H	Glass unit heated, 24 V R 400
11.3860.500	Cover 386
09.2000.301	Heating cable, 2-pin, 2 m
15.3862.174H	Glass unit heated, 24 V R 300

# Wide-Angle Mirror

## Components

### Wide-Angle Mirror 906 (IV E1 020906)



<b>Material</b>	Plastic mirror housing
<b>Housing</b>	209 x 218 x 136 mm
<b>Back cover</b>	Removable, paintable
<b>Glass unit</b>	204 x 195 x 58 mm

#### Item number

#### Mirror head left side/ right side

##### heated 24 V

56.9065.130	Mirror Head	clamp Ø 20 - 28 mm	Female socket	R 300
56.9065.110	Mirror Head	clamp Ø 28 mm	Female socket	R 300

##### unheated

56.9065.132	Mirror Head	clamp Ø 20 - 28 mm		R 300
-------------	-------------	--------------------	--	-------

#### Item number

#### Spare parts

15.9060.870H	Glass unit		heated, 24 V	R 300
15.9060.670F	Glass unit		unheated	R 300
11.9060.100	Cover 906			

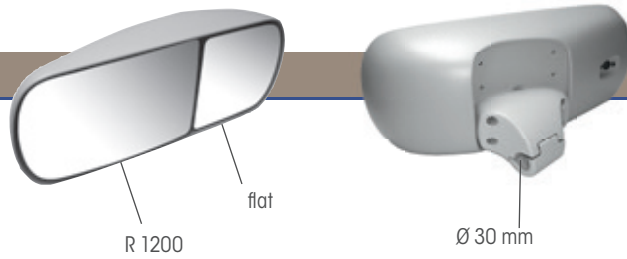


# Interior Mirror

## Components

### Interior mirror 256

<b>Material</b>	Plastic mirror housing
<b>Housing</b>	545 x 219 x 227 mm
<b>R 1200 glass unit</b>	324 x 201 x 17 mm
<b>Flat glass unit</b>	199 x 195 x 17 mm



#### Item number

#### Mirror head, R 1200, flat

55.2561.110.002	Mirror head	electrically adjustable	MAN-Logic
55.2561.010	Mirror head	manually adjustable	
55.2561.111.001	Mirror head	electrically adjustable	MEKRA-Logic

#### Accessories – Connecting Cables

09.2560.200	Control line 256 exterior	7,00 m
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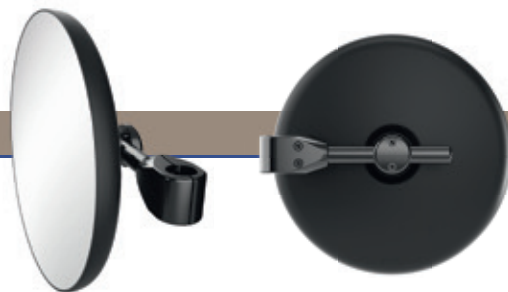
#### Item number

#### Spare parts

15.2561.600	Glass unit	unheated	flat
15.2561.640	Glass unit	unheated	R 1200

### Interior mirror 300

<b>Material</b>	Mirror housing with profile ring
<b>Housing</b>	Ø 305 mm
<b>Glass</b>	Ø 300 mm



#### Item number

#### Configuration

#### Mirror head

55.3000.002.001	Interior mirror with bracket and clamp	for Ø 30 mm	unheated	R 1800
55.3000.004.001	Interior mirror with bracket and clamp	for Ø 35 mm	unheated	R 1800

#### Item number

#### Spare parts

51.3000.002.001	Mirror head		R 1800
61.3000.003.010	Mounting bracket	for Ø 30 mm	
61.3000.004.010	Mounting bracket	for Ø 35 mm	

## Interior mirror 364

**Material** Plastic mirror housing  
**Housing** 376 x 187 mm  
**Glass** 264 x 175 mm



Item number

### Mirror head

51.3640.127	Mirror head	1	for tubular bracket Ø 14 - 20 mm	unheated	R 1800
11.1523.212	Holder, universal, black	2	clamp Ø 14 - 20 mm		

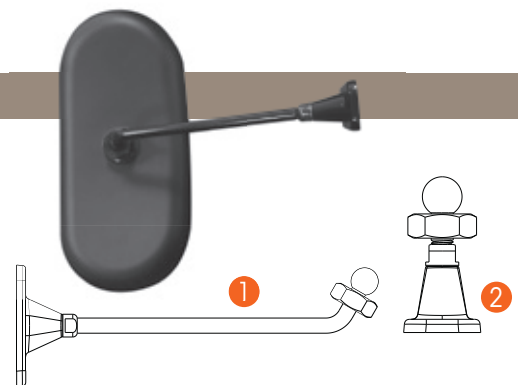
Item number

### Spare parts

40.3640.222H	Replacement glass			unheated	R 1800
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## Interior mirror 750

**Material** Plastic mirror housing  
**Housing** 301 x 141 mm  
**Glass** 295 x 135 mm



Item number

Configuration

Length

### Mirror head

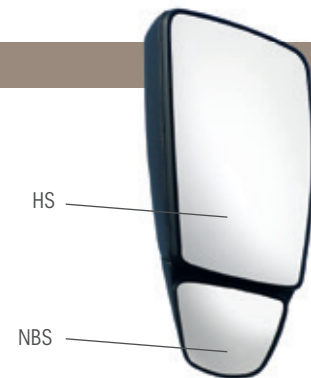
51.7504.044.001	Mirror head		unheated	R 450	
20.7504.044.001	Mounting bracket long	1	For screwing		229,5 mm
20.7504.003.001	Mounting bracket short	2	for gluing		70,7 mm
20.7504.045.001	Mounting bracket medium		For screwing		

# Special Application Mirrors

## Components

### 1009

<b>Material</b>	Plastic mirror housing (ABS), black
<b>Clamp</b>	Ø 18 bis 22 mm
<b>Glass HS</b>	255 x 286 mm
<b>Glass NBS</b>	180 x 85 mm



Item number	Assembly	Configuration		
<b>Main mirror, R 1200, housing 232 x 219 x 122 mm</b>				
51.1009.000.001	left side/ right side	manually adjustable	unheated	
51.1009.081.001	left side/ right side	manually adjustable	heated, 12 V	2-pin female socket
on request	left side/ right side	manually adjustable	heated, 24 V	2-pin female socket
51.1009.113.001	left side/ right side	electrically adjustable	heated, 12 V	6-pin female socket
51.1009.009.001	left side/ right side	electrically adjustable	heated, 24 V	6-pin female socket
<b>Combined HS and NBS, R 1200/ R300, housing 232 x 382 x 122 mm</b>				
51.1009.017.001	left side/ right side	manually adjustable	unheated	
51.1009.049.001	left side/ right side	manually adjustable	heated, 12 V	2-pin female socket
on request	left side/ right side	manually adjustable	heated, 24 V	2-pin female socket
51.1009.097.001	left side/ right side	electrically adjustable	heated, 12 V	6-pin female socket
51.1009.025.001	left side/ right side	electrically adjustable	heated, 24 V	6-pin female socket

### 1010

<b>Material</b>	Plastic mirror housing (ABS), black
<b>Clamp</b>	Ø 14 bis 20 mm/ Ø 18 bis 22 mm
<b>Housing</b>	176 x 284 mm
<b>Glass</b>	145 x 277 mm (aspherical)



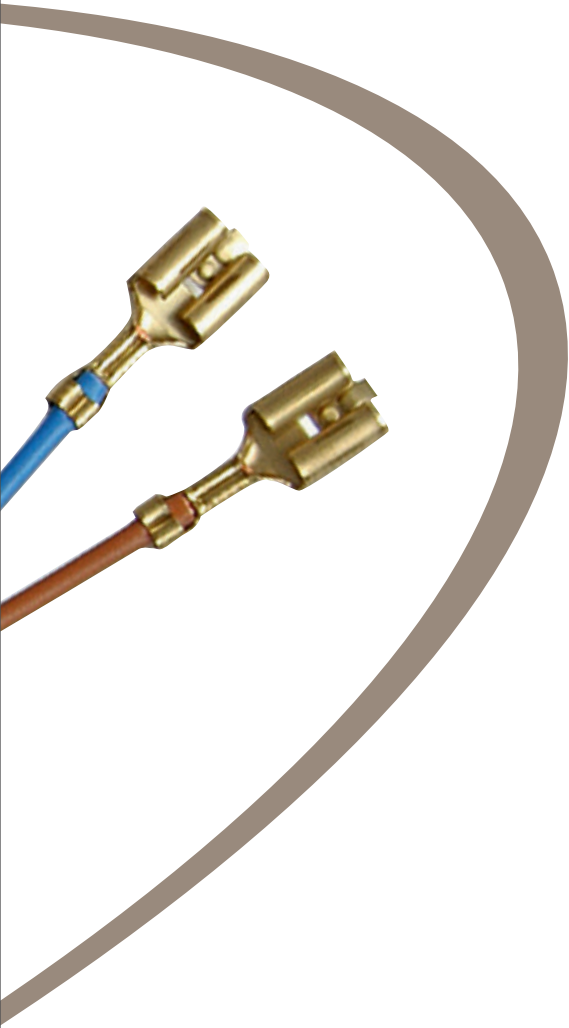
Item number	Assembly	Configuration		
<b>Main mirror for 14 - 20 mm tubular diameter</b>				
51.1010.000.001	left side/ right side	manually adjustable	unheated	R 1200
<b>Main mirror for 18 - 22 mm tubular diameter</b>				
51.1010.001.001	left side/ right side	manually adjustable	unheated	R 1200
51.1010.003.001	left side/ right side	manually adjustable	unheated	R 1200
51.1010.005.001	left side/ right side	manually adjustable	unheated	R 1200
51.1010.007.001	left side/ right side	manually adjustable	unheated	R 1200







## Accessories



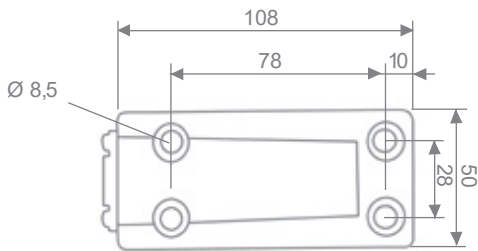
Wedge Mounts	52
Cables	53
Switches/Others	54



# Wedge Mounts

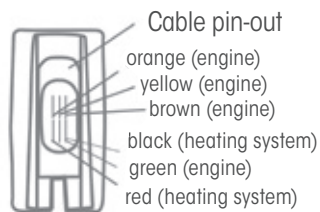
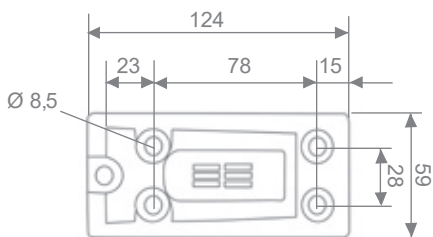
Accessories

## Cable connection 248



Item number	Configuration	Length	Blade Receptacle
20.2480.210	no cable	-	-
20.2480.211	with heating cable	2.50 m	-
20.2480.216	with control cable	2.00 m	5.0 x 6.3 mm
20.2480.217	with control cable	5.00 m	5.0 x 6.3 mm
20.2480.218	with control cable	9.00 m	5.0 x 6.3 mm
20.2480.219	with control cable	6.00 m	5.0 x 6.3 mm
20.2480.221	with control cable	2.50 m	5.0 x 6.3 mm
20.2480.222	with control cable	4.00 m	5.0 x 6.3 mm
20.2480.223	with control cable	0.15 m	plug housing
09.5000.300	cable with plug	5.00 m	receptacle housing

## Direct contact connection 271



Item number	Configuration	Length	Connection
20.2710.610	no cable	-	-
20.2710.620	with control cable	0.50 m	-
20.2710.630	with control cable	2.50 m	-
20.2710.001.001	with control cable, ZINK	2.50 m	-
20.2710.650	with control cable	3.50 m	-
20.2710.640	with control cable	0.15 m	plug housing
09.5000.300	cable with plug	5.00 m	receptacle housing

# Cables

Accessories

## Heating cable with plug



Item number	Configuration	Length
<b>Version 1</b>		
09.2070.101	2-pin, oval right-angle connector	2.00 m
<b>Version 2</b>		
09.2000.301	2-pin, round right-angle connector	2.00 m

## Control cable



Item number	Configuration	Length	Blade Receptacle
09.3200.310	6-pin for single mirror operation for driver's or passenger's side	2.00 m	3 x 2.8 mm 2 x 6.3 mm
09.3200.320	6-pin for dual mirror operation for driver's and passenger's side with mirror model 373/ 363, for passenger's side with mirror models 340 and 385	2.00 m	5 x 6.3 mm
09.3300.421	6-pin for dual mirror operation for driver's side with mirror models 340 and 385	2.00 m	5 x 6.3 mm

## Switches/ Others

Accessories

### Mirror switches



Item number	Configuration
<b>Version 1</b>	
08.3200.233	Switch for 2-mirror operation 12 V/ 24 V Blade connector, 6.3 mm
<b>Version 2</b>	
08.2770.001.000	Switch for 3-mirror operation Blade connector, 2.8 mm within compact connector

### Entry lights/ controller



Item number	Configuration
08.2910.001.002	Power LED entry light 9 - 32 V incl. mounting clips 3
08.3950.001.099	Controller for power folding mechanism 4

### Blind spot indicator


The in-mirror blind-spot indicator is ergonomically advantageous, because the color LED indicator provides additional information about the area behind the vehicle when the driver routinely checks the mirror during back-up maneuvers. An audible alarm option is available to warn the driver whenever a minimum distance is exceeded.







**Electronics**



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## Camera Overview

Camera monitor systems

**Our new generation of cameras is based on a high-quality modular development platform allowing the implementation of customized solutions in a camera that is perfectly tailored to our customers' requirements.**

With installed dimensions of 35 x 35 mm, the extremely rugged camera components are highly compact. The length of the camera varies with the individual models, however, the minimum length of every model is 34 mm which makes it easy to integrate and attach almost anywhere in or on the vehicle. **The modular design allows for a wide variety of image sensors as well as image processing and transmission technologies to be combined, providing a customized and cost effective solution uniquely adapted to the individual needs of the customer.**

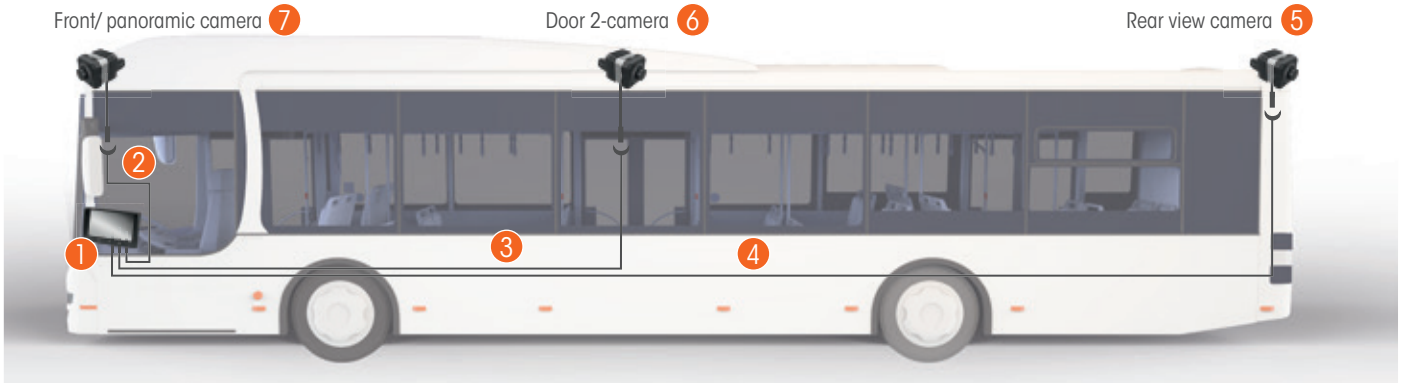
The available image sensors are automotive-grade and offer image resolutions from standard VGA up to 1.2 mega pixels. The image processor is matched to the performance characteristics of the specific image sensor. Transmission technology options include analog PAL or NTSC based video transmission as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

**It is also possible to combine the platform components with various lenses providing different horizontal aperture angles.** Aperture angles for analog options include 70°, 100°, and 120°, and for digital options 100°, 120°, 160°, and 176° (wider aperture angles are also supported).

The MEKRA Lang platform camera features a particularly rugged housing which makes it perfectly suited for rough environmental conditions. And thanks to its high-performance integrated heating system, which de-ices the lens within just a few minutes, the camera can be operated under all weather conditions.



## Sample application



Item number	No.			Length
<b>MEKRA Lang camera monitor system</b>				
24.1301.501.099	1	MCM-5029	LED TFT-color monitor 7"	
09.1301.003.099	2	MAC-5052	Connecting cable	5,00 m
09.1301.005.099	3	MAC-5054	Connecting cable	16,00 m
09.1301.006.099	4	MAC-5055	Connecting cable	21,00 m
28.1307.011.099	5	MCC-5524	Rear view camera 100° VZA	
28.1307.006.099	6	MCC-5480	Side view camera 120°	
28.1307.004.099	7	MCC-5478	Front view camera 70°	



# Analog and Digital Platform Cameras

Camera monitor systems

## Analog camera 1307

<b>Video system</b>	NTSC or PAL
<b>Image resolution</b>	640 x 480 pixels (W x H)
<b>Image display</b>	NTSC: 720 x 486 pixels (W x H), PAL: 720 x 576 (B x H)
<b>Image sensor</b>	VGA
<b>Connector</b>	MEKRA, Ø < 18 mm, ADR tested, IP 69 K
<b>Aperture angle</b>	70°, 100° or 120°
<b>Cable</b>	ADR tested, oil and gasoline resistant, 0.3 m (only Pigrail)
<b>Shock resistance</b>	50 G
<b>Min. illumination</b>	Contrast ratio >1:50 at 0.5 lux
<b>Video output</b>	FBAS 1Vpp at 75 Ω
<b>Power consumption</b>	< 1 W (< 3.5 W, with heating system ON)
<b>Operating temperature</b>	-40 °C to +85 °C
<b>Storage temperature</b>	-40 °C to +90 °C
<b>Protection class</b>	IP 69 K
<b>Operating voltage</b>	9 - 36 V



Item number	Aperture angle	
<b>NTSC color camera</b>		
28.1307.004.099	70°	horizontal
28.1307.005.099	100°	horizontal
28.1307.006.099	120°	horizontal
28.1307.011.099	100°	horizontal low distortion
<b>PAL color camera</b>		
28.1307.001.099	70°	horizontal
28.1307.002.099	100°	horizontal
28.1307.003.099	120°	horizontal
28.1307.010.099	100°	horizontal low distortion

## Ethernet camera 1308

Video transmission	UDP or RTP
Video compression	MJPEG or H.264
Image resolution	1280 x 720 pixels (W x H)
Image display	45 Hz to 1280 x 960 pixels, 60 Hz to 1280 x 720 pixels
Image sensor	1,2 MP
Aperture angle	100°, 120°, 160° or 176°
Shock resistance	50 G
Min. illumination	Contrast ratio >1:50 at 0.5 lux
Power consumption	< 1 W (< 3.5 W, with heating system ON)
Operating temperature	-40 °C to +85 °C
Storage temperature	-40 °C to +90 °C
Protection class	IP 69 K
Operating voltage	9 - 36 V



Item number	Aperture angle		
<b>Digital platform camera</b>			
28.1308.001.099	100°	24 V	horizontal
28.1308.003.099	120°, 160°	24 V	horizontal
28.1308.005.099	176°	24 V	horizontal

## Advantages of the platform camera

- Very compact - camera can be easily integrated in the vehicle body, roof, mirror, etc.
- Higher resolution - sharper image (digital camera)
- Each camera can be controlled separately (digital camera)
- Reduced network wiring requirements result in cost savings (digital camera)
- Digital signals may be used for additional information purposes (digital camera)
- Digital camera can control additional components, e.g. our shutter camera bracket
- Platform concept allows for quick and easy adjustments

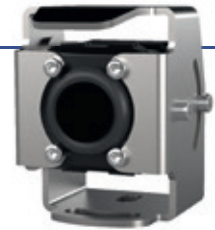
# Brackets

Camera monitor systems

## Platform camera brackets

### Mounting bracket with roof

**Dimensions** 53 x 58 x 58 mm (W x H x D)  
**Material** Stainless steel



**Item number**  
11.1307.028.099

### Ball bracket

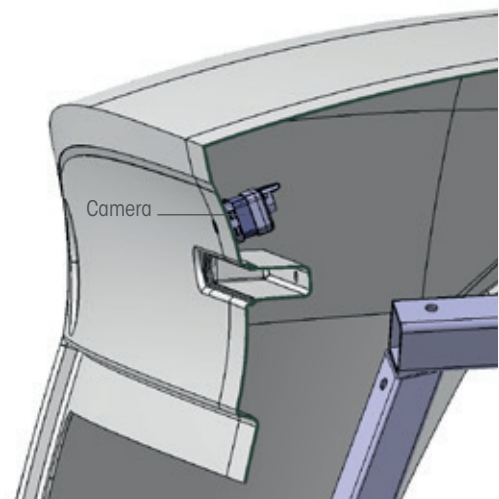
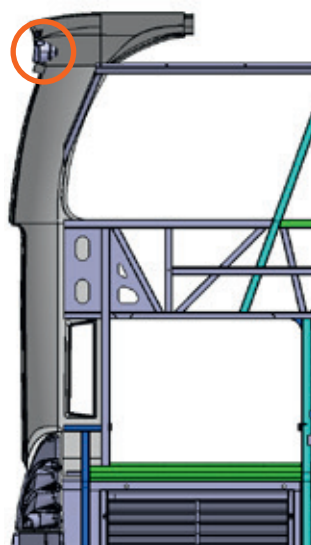
**Dimensions** 80 x 71 x 42 mm (W x H x D)  
**Orientation** flexible adjusted  
**Adjustment** Thanks to its swivel head design, the camera can be rotated 0° - 360°.  
**Material** ABS plastics



**Item number**  
11.1307.027.099

## Example for integration in the back of a bus

One of the critical advantages this camera offers is the fact that it can be effortlessly and seamlessly integrated into **any component** at virtually any appropriate vehicle location. For example, this camera can be perfectly placed and used inside buses. Thanks to its modular design, it is possible to generate **highly individualized** solutions for each customer with minimal development effort. The individual components are extremely robust and **compact** in size, making the camera particularly easy to handle.



# Shutter Camera Bracket with Integrated LED Lamp

Camera monitor systems

## Shutter camera bracket with integrated LED lamp

<b>Dimensions</b>	114 x 96 x 107 (W x H x D)
<b>Adjustment</b>	Camera is rigid within bracket; for shutter camera bracket mounting positions (see below)
<b>Material</b>	ABS plastics
<b>Operating temperature</b>	-40 °C bis + 85 °C
<b>Operating voltage</b>	12 - 24 V
<b>Protection class</b>	IP 67



### Item number

61.1307.014.099	Shutter case	24V
61.1307.015.099	Shutter case	12V

## Shutter camera bracket mounting positions



### Advantages of the shutter camera bracket

- Camera protection
- Improved night vision
- Rugged design
- Shutter camera bracket and gears are decoupled from one another
- Very high IP rating (IP 67 = can be submerged in water for 30 minutes)
- Choice of various mounting positions (see next page)
- Shutter camera bracket can be used with both analog and digital cameras
- Lateral cable routing
- Temperature range from -40 °C to + 85 °C
- One second opening time and one second closing time
- 12 V and 24 V operating voltage

### Advantages of the LED lamp

- Optimized night vision:** In complete darkness, an 8 x 8 m area is illuminated uniformly. Only one LED is required.
- No integrated filter:** Produces an image with high color fidelity. No black and white image.
- IR range:** An IR range is used, within which the human eye cannot detect the red light of the LED. Consequently, ECE approval is not required and the LED can be installed anywhere on the vehicle.
- Intelligent control:** The LED is controlled by a brightness sensor.



# CMOS Camera and CMOS Spherical Camera

Camera monitor systems

## CMOS Cameras 1301

### CMOS Camera



<b>Dimensions</b>	65 x 59 x 50 mm (BxHxT)
<b>Operating voltage</b>	10 - 36 V
<b>Operating temperature</b>	-40 °C bis +85 °C
<b>Opening angle</b>	70°/100°/120°/130°
<b>Shock resistance</b>	50 G
<b>Protection class</b>	IP 69 K, dust-tight, resistant to high-pressure cleaners
<b>Plug connection</b>	MEKRA, IP 69 K
<b>Video format</b>	NTSC/PAL (analog)

RoHS FC CE

Heated and extra hardened front glass

Made in Germany

ADR-tested

Item number		Aperture angle
<b>Video format PAL</b>		
28.1301.008.099	CMOS camera 70° PAL	70°
28.1301.002.099	CMOS camera 100° PAL	100°
28.1301.004.099	CMOS camera 120° PAL	120°
28.1301.006.099	CMOS camera 100° PAL low distortion	100°
28.1301.175.099	CMOS camera 100° PAL With distance marking	100°
28.1301.050.099	CMOS camera 130° PAL	130°
<b>Video format NTSC</b>		
28.1301.007.099	CMOS Kamera 70° NTSC	70°
28.1301.001.099	CMOS Kamera 100° NTSC	100°
28.1301.003.099	CMOS Kamera 120° NTSC	120°
28.1301.005.099	CMOS Kamera 100° NTSC low distortion	100°
28.1301.176.099	CMOS Kamera 100° NTSC With distance marking	100°
28.1301.051.099	CMOS Kamera 130° NTSC	130°

## Accessories for CMOS cameras

### Design holder

<b>Abmessungen</b>	125 x 102 x 73 mm (WxHxD)	Visually appealing design holder
<b>Ausrichtung</b>	flexible adjusted	
<b>Material</b>	ABS plastics	



Item number	
11.1301.018.099	Design holder

## CMOS spherical camera 1301

<b>Video system</b>	NTSC or PAL
<b>Image resolution</b>	640 x 480 pixels (W x H)
<b>Image display</b>	NTSC: 720 x 486 pixels (W x H), PAL: 720 x 576 (B x H)
<b>Connector</b>	MEKRA, Ø < 18 mm, ADR-geprüft, (IP 69 K)
<b>Cable</b>	ADR tested, oil and gasoline resistant, 0.5 m
<b>Housing</b>	Pressure-molded aluminum, painted black, dust-proof and resistant to high-pressure cleaning (IP 69 K), heated and extra hardened front glass
<b>Shock resistance</b>	50 G
<b>Min. illumination</b>	Contrast ratio >1:50 at 0.5 lux
<b>Video output</b>	FBAS 1Vpp at 75 Ω
<b>Power consumption</b>	< 1 W (< 3.5 W, with heating system ON)
<b>Operating temperature</b>	-40 °C to +85 °C
<b>Storage temperature</b>	-40 °C to +90 °C
<b>Protection class</b>	IP 69 K
<b>Operating voltage</b>	9 - 36 V
<b>Outside dimensions, excluding bracket</b>	55 x 47 mm (D x T)



Item number	Aperture angle	
<b>NTSC color camera</b>		
28.1301.011.099	70°	horizontal
28.1301.013.099	100°	horizontal
28.1301.017.099	100°	horizontal low distortion
28.1301.039.099	120°	horizontal
<b>PAL color camera</b>		
28.1301.012.099	70°	horizontal
28.1301.014.099	100°	horizontal
28.1301.038.099	120°	horizontal

# Brackets and Accessories CMOS Camera

Camera accessories

Camera bracket made from shock-proof ABS plastics, black, UV resistant

## Standard bracket

<b>Dimensions</b>	90 x 100 x 73 mm (W x H x D)
<b>Orientation</b>	flexible adjusted
<b>Adjustment</b>	thanks to its swivel head design, the camera can be rotated 0° - 360°.
<b>Material</b>	ABS plastics



### Item number

20.5630.400

11.1301.016.099 without E1 number

## Design bracket

<b>Dimensions</b>	125 x 102 x 73 mm (W x H x D)
<b>Orientation</b>	flexible adjusted
<b>Adjustment</b>	thanks to its swivel head design, the camera can be rotated 0° - 360°.
<b>Material</b>	ABS plastics



### Item number

20.5631.400

11.1301.019.099 without E1 number

## Standard bracket for spherical camera

<b>Dimensions</b>	80 x 71 x 29 mm (W x H x D)
<b>Orientation</b>	flexible adjusted
<b>Adjustment</b>	thanks to its swivel head design, the camera can be rotated 0° - 360°.
<b>Material</b>	ABS plastics



### Item number

20.5620.601 Standard bracket for spherical camera

## Camera bracket, stainless steel

### Mounting bracket

<b>Dimensions</b>	87 x 70 x 65 mm (W x H x D)
<b>Orientation</b>	flexible adjusted
<b>Adjustment</b>	the camera can be tilted 180° within the bracket and swiveled with the bracket
<b>Material</b>	Stainless steel



#### Item number

11.1200.501.099

### Mounting bracket with roof

<b>Dimensions</b>	87 x 74 x 74 mm (W x H x D)
<b>Orientation</b>	flexible adjusted
<b>Adjustment</b>	the camera can be tilted 180° within the bracket and swiveled with the bracket
<b>Material</b>	Stainless steel



#### Item number

11.1200.502.099

### Magnetic base

<b>Dimensions</b>	66 x 66 x 19 mm (W x H x D)
-------------------	-----------------------------



#### Item number

20.5640.101

# Monitor Overview

Camera monitor systems

Our camera monitor systems will increase your efficiency and safety at work. A properly installed system with all components securely attached can help minimize property damage and prevent personal injuries. It also comes with significant ergonomic advantages and better comfort.

Its rugged design withstands even the most extreme conditions and its range of global applications is virtually unlimited.



## Various monitor brackets



## TFT color monitors

### MEKRA Lang 7" surround view monitor

- Dimensions: 189 x 119 x 44 mm (B x H x T)
- Images can be rotated 90°, 180° and 270°
- Display modes are freely configurable
- Multiple trigger signals can be employed
- Up to 9 views are freely configurable
- Kit with sun visor, bracket and connection cable



### MEKRA Lang 7" TFT-LCD quad monitor IP 65

- Dimensions: 189 x 119 x 44 mm (W x H x D)
- Picture-in-picture (PiP) display
- Up to 4 camera inputs can be selected
- Up to 4 trigger signals can be employed
- Kit includes sun visor, bracket, and connecting cable (24.1301.501.099)



#### Item number

24.1301.512.099

Surround View Monitor 7

24.1301.501.099

TFT-LCD Monitor Quad 7

#### Spare parts

Kit with sun visor, holder and connection cable

Kit with sun visor, holder and connection cable



# Cables

Camera monitor systems

## MEKRA Lang cables for analog camera system

### Mini-DIN - MEKRA (m-f)

**Item name** Adapter cable  
**Length** 0.5/ 5/ 11/ 16/ 21 m



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) Direct connection camera to monitor

**Item name** Adapter cable  
**Length** 0,5/ 5/ 11/ 16/ 21 m



without grommet



with grommet

Item number	Length		Item number	Length	
09.5610.360	0,5 m	without grommet	09.1307.008.099	5 m	with grommet
09.1301.003.099	5 m	without grommet	09.1307.007.099	11 m	with grommet
09.1301.004.099	11 m	without grommet	09.1307.006.099	16 m	with grommet
09.1301.005.099	16 m	without grommet	09.1307.005.099	21 m	with grommet
09.1301.006.099	21 m	without grommet			

### Multikabel MEKRA - MEKRA (m-f) Extension cable

**Item name** Adapter cable  
**Length** 5/ 11/ 16/ 21 m



without grommet



with grommet

Item number	Length		Item number	Length	
09.5610.111	5 m	without grommet	09.1301.014.099	0,5	with grommet
09.5610.121	11 m	without grommet	09.1307.013.099	5 m	with grommet
09.5610.131	16 m	without grommet	09.1307.012.099	11 m	with grommet
09.5610.141	21 m	without grommet	09.1307.011.099	16 m	with grommet
			09.1307.010.099	21 m	with grommet

### MEKRA (m) - open End

---

Item name                      Repair kit  
Length                            0,5 m



---

Item number                      Length  
09.5610.050                      0,5 m

---

### MEKRA (f) - open End

---

Item name                      Repair kit  
Length                            0,5 m



---

Item number                      Length  
09.5610.051                      0,5 m

---

# MEKRA Digital VisionSystem (DVS) Generation I

DVS Features/ Applications

## Ready for the road?

---

MEKRA Lang GmbH & Co. KG is a global player in the field of specialized vision systems for the commercial vehicle industry. Our success is based on our strong innovative spirit and our consistent willingness to embark on new ventures and production methods. Consequently, we are deeply committed to applying our long-standing expertise in the area of mirror system production to the development of electronic vision systems. Our MEKRA Digital Vision System sets a new standard for mirror replacement systems in the commercial vehicle industry.

It is the first mirror replacement system to have received Europe-wide TÜV approval and the first to be installed as a standard truck component in series production. Making the most of our innovative strength, we are taking reliability, form, and function to the next level. It is our mission to revolutionize the market and contribute to making road traffic safer for everyone.

Read on to find out what makes this system so unique and how partnering with us as specialists in the field of electronic vision systems could benefit the development of your future vehicles



## Features

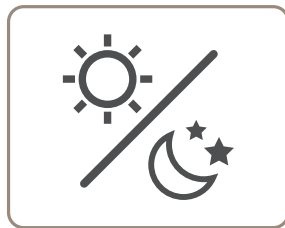
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The design of a vehicle's frontal area plays an important part in determining its air resistance. The lower the air resistance, the lower the vehicle's fuel consumption. At MEKRA Lang, we have made our mission to help reduce fuel consumption significantly. Our sleek single camera concept lives up to this goal while providing a uniquely innovative solution.

Our mirror replacement system combines fuel efficiency with perfect vision.



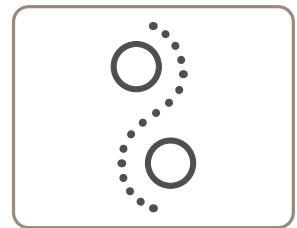
Improved aerodynamics



Perfect vision at day & night



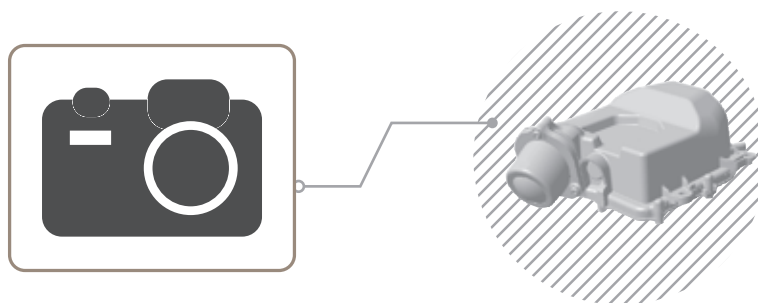
Perfect vision at in rain



Improved ergonomics

## Project related applications on request

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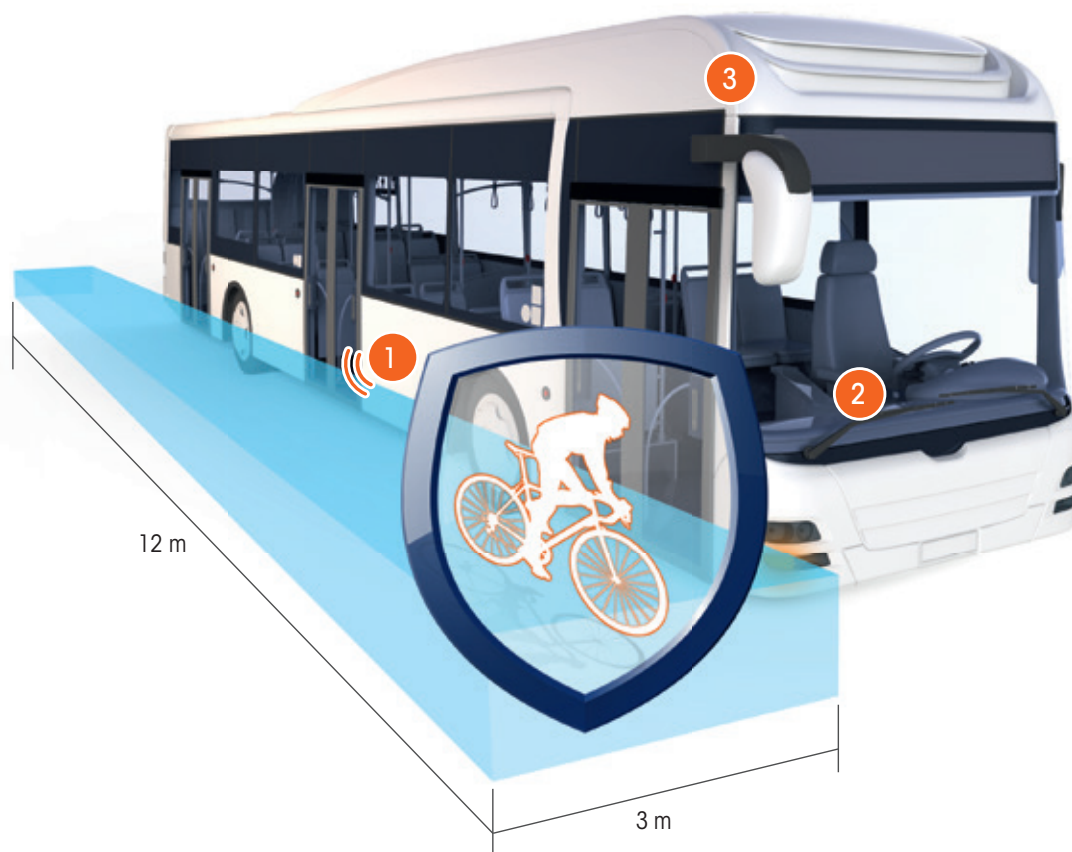
# Intelligent and tough

GPS/ CAN Turn Assist System

## AAS turn assist system

The AAS-GPS/ CAN turn assist system is based on the PRECO Preview Side Defender® II FMCW radar sensor. The object detection system alerts drivers of medium-size and heavy-duty commercial vehicles (>3.5 t) when other road users are in the danger zone next to the vehicle.

- Thanks to its intelligent operating modes, the AAS triggers alerts when bicyclists or other vehicles enter the detection zone. False alerts due to stationary objects are kept to a minimum.
- The radar sensor features a built-in self test (BIST) function.
- Specifically developed for this application, the wide horizontal field of vision (up to +/-85°) covers an area approximately 12 m long and 3 m wide next to the vehicle.
- The LED display on the A-pillar provides the driver with visual alerts.
- When the turn signal is activated, an additional audible alert is generated.
- The sensor can handle tough environmental conditions and works during the day and at night.



1

The rugged **sensor** holds up to tough environments and detects and categorizes multiple objects at the same time. Depending on the situation, it differentiates between stationary and moving objects. That is why the sensor can also be used as a lane-change assistant at higher speeds.

2

The in-cab **display** on the A-pillar provides the driver with reliable visual and audible alerts when potential dangers arise next to the vehicle. Additionally, all system function status reports are displayed here.

3

The vehicle speed is essential for the accurate assessment of a given traffic situation. It is provided in one of two ways: by an active **GPS antenna** or the vehicle's own CAN bus.

## Turn assist system

### CAN



Item number

61.1312.001.099

### GPS



Item number

61.1312.002.099



#### Sensor

Frequency range	24 GHz
Operating voltage	9 - 33 V
Dimensions	103 x 124 x 33 mm (W x H x D)
Temperature range	-40 °C to +85 °C
Protection class	IP 69 K
Vibration resistance	25 G

1



#### Display

Power supply	Via radar sensor
Dimensions	50 x 27 mm (DM x T)
Temperature range	-40 °C bis +85 °C
Protection class	IP 67
Vibration resistance	10 G
Housing	ABS plastics, black

2



# Intelligent and tough

GPS/ CAN Turn Assist System

## Turn assistant 1312

---

### Item number

#### Turn-off assistant 1312 Kit: Sensor / Display (without connection cable)

61.1312.006.099	System AAS CAN	Sensor/Display	LHD
61.1312.004.099	System AAS GPS	Sensor/Display	LHD
61.1312.005.099	System AAS GPS	Sensor/Display	RHD
61.1312.007.099	System AAS CAN	Sensor/Display	RHD

### Item number

#### Accessories, single components, cables

08.1312.001.099	Sensor CAN		
24.1312.001.099	Display GPS		
24.1312.002.099	Display CAN		
09.1312.006.099	Chassis cable AAS	7,6 m	
09.1312.007.099	Cabin cable AAS	1 m	

# For even more safety when turning right

Turn assist 1314 AAS BSIS 151

## Features

- Meets the latest guidelines for
- Turn assistants according to UN ECE R151
- 180° Detection without blind spots
- Quick installation
- Establish voltage supply only
- im Standardverbau keine Kalibrierung notwendig
- No calibration necessary in standard shoring
- no vehicle signals necessary
- Suitable for almost all types of vehicles
- Large monitoring area of 70 meters x 4.5 meters
- Registration according to ABE 92031\*00 for the type: „ABE 100 ID“ to obtain the possible eligibility of BSIS 151. For example at IBB Berlin.

Side Radar



LED-Display

### Integrated Measuring Unit (IMU)

Among other things, the IMU contains sensors for determining speed and direction change. In this way, all the necessary data is determined without any further tapping on the vehicle. Installation is thus considerably simplified.



### Spare parts

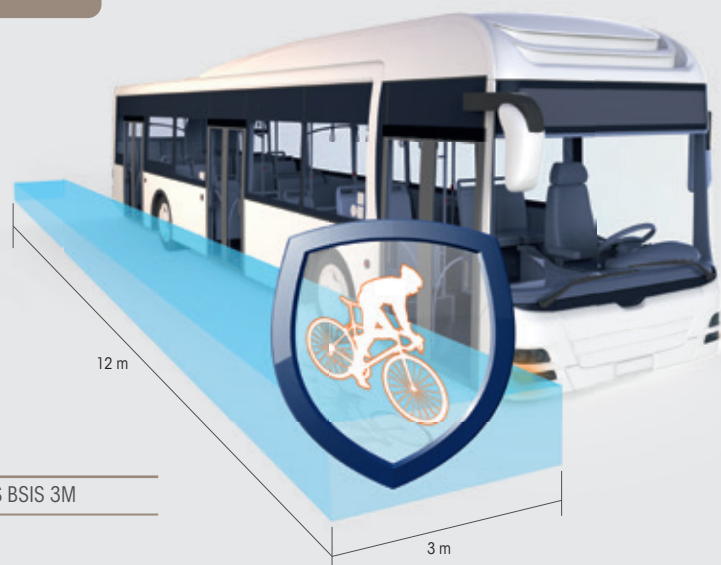
- 180° Side radar
- LED display
- Wiring harness
- Inertial Measurement Unit (IMU)

### Warning zone 37 m x 4.5 m

This is divided into three individual zones. The position of the object is thus quickly visible to the driver.

### Technical data sensor

Frequency range	76-77 GHz
Coverage	80 m x 7 m
Detection range	70 m x 4,5 m
Warning zone	37 m x 4,5 m
Horizontal angle	180°
Dimensions	115 x 9,5 x 41 mm (B x H x T)
Weight	230 g
Power	7 W
Operating voltage	8 - 32 V
Temperature range	-40 °C bis +85 °C
Protection class	IP 69 K
Vibration resistance	50 G



### Item number

09.1314.002.099      Extension line 1314 AAS BSIS 3M

## Safety first

Turn Assist System with Side View Camera



Making a right turn at an intersection requires the bus driver's full attention. Bicyclists and pedestrians find themselves in dangerous situations, especially when making eye contact is impossible.

- Within just a few seconds, bus drivers have to process and evaluate large amounts of information.
- Mirrors alone cannot provide complete visibility of all areas around a bus.
- Poorly adjusted mirrors exacerbate the problem by reducing visibility even more.
- Bicyclists and pedestrians are often unaware of the dangerous situation.
- The risk of accidents is frequently increased by inattention and time pressure of those involved.





### Side view camera

Shock resistance	50 G
Operating voltage	10 - 36 V
Dimensions	Camera: 65 x 59 x 50 mm (W x H x D) Bracket: 80 x 71 x 28 mm (W x H x D)
Aperture angle	70°/100°/120°
Video format	PAL or NTSC
Temperature range	-40 °C bis +80 °C
Protection class	IP 69 K
Orientation	flexible adjusted
Bracket material	ABS plastics
Adjustment	Thanks to its ball shape, the camera can be rotated 360°

1

### 7" MEKRA LED monitor

Resolution	800 x 480 pixels
Operating voltage	9 - 36 V
Video format	PAL/NTSC (automatic)
Camera inputs	4, split screen available
Aspect ratio	7"/16:9
Day/ night switching	Automatic, sensor-based
Power consumption	app. 10 W
Protection class	IP 65

2

#### Side view camera

The side view camera covers the critical area on the right side of the vehicle, making it easier for the driver to assess the situation correctly. The image can be displayed on an additional monitor or the existing on-board information systems.

#### Surround view monitor

360° visibility can be achieved using the surround view monitor. When the vehicle makes a turn, the side view camera's image is displayed in full screen mode.

#### Everything at a glance

Both the control box and the monitor can be used to expand this system to include up to 4 cameras. For example, safety around the vehicle can be increased by employing the rear view camera. Turn signals, reverse gear or a variety of other vehicle signals can be used for activation.



**Service**



Maintenance and Contact Connections 271 and 248 **82**

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Installation Information/ Glass Replacement **83**

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# Maintenance and Contact Connections 271 and 248

Service

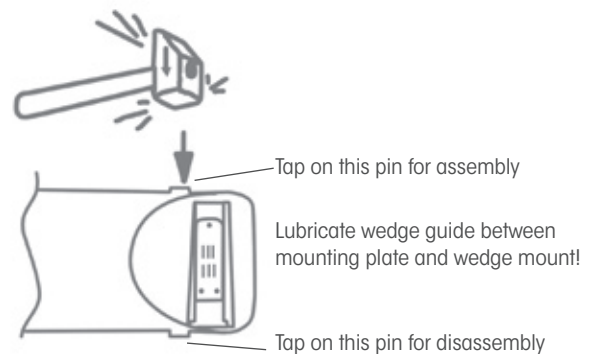
## Maintenance and contact connection

Although the installation and wedge mount systems as well as the electrical connectors are designed for convenient, tool-free removal and replacement of the mirror assemblies, it is not recommended to perform these activities on a daily basis.

### Maintenance information for direct contact connection 271 and cable connection 248

**Important:** The contact element which is attached to the vehicle must be kept clean and dry. If lubricate wedge guide between required, lubricate with contact grease.

**Caution:** Do not use graphite grease!



### Direct contact connection 271



The direct contact connection system 271 consists of two contact elements, one of which forms part of the mounting base, while the other forms part of the wedge mount. By dovetailing these two elements, the spring clips on the mounting base make a connection with the contact area in the wedge mount. The mounting base element is equipped with a rubber gasket to protect against water ingress. When the two elements are dovetailed, the rubber gasket also serves the function of cleaning the contact area on the wedge.

The contact elements must be kept clean and dry and should be lubricated with contact grease (no graphite grease!) if required. It is important to ensure that the mating dovetails are securely in place.

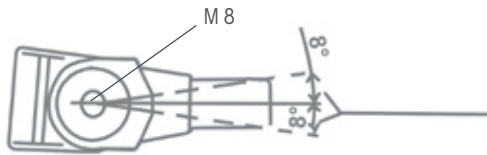
To facilitate assembly or disassembly, use a rubber mallet to lightly tap on the corresponding pins or the mounting base.

# Assembly Information/ Glass Replacement

Service

## Assembly information for mounting base system 270/ 271

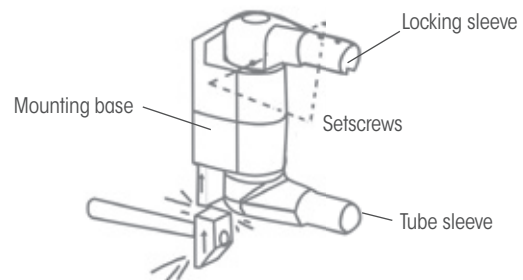
### Fine-tuning the tubular bracket angle at the mirror arm pivot point



Cross-section of the swivel joint (upper tube connector)

Adjust the two setscrews M8 x 16 to achieve the desired angle between travel direction and mirror arm. Once adjusted, tighten both screws to a torque of  $M = 8 + 1 \text{ Nm}$ . The maximum adjustability

### Disassemble the mirror arm directly at the mounting base



**Important:** Lubricate the dovetail between wedge mount and mounting base!

## Mirror head glass replacement

### Main mirror/ wide-angle mirror

#### Removal:

1. Tilt glass unit down completely
2. Pull glass unit up and out
3. Disconnect heating cable



#### Installation:

1. Tilt adjustment unit (power/ manual) down
2. Connect heating cable
3. Slide glass unit top-down onto adjustment unit
4. Verify that unit is securely in place



### Auxiliary mirror 271

#### Removal:

1. Set glass in neutral position
2. Adjust glass sideways
3. Detach glass unit from locking hooks and remove from ball plate
4. Disconnect heating cable



#### Installation:

1. Connect heating cable
2. Align centering guides of glass unit with ball plate
3. Position glass unit and press down on its center until it locks into place
4. Verify that unit is securely in place



# General Terms and Conditions

Last Update: 06/2024

## I. General Provisions

The contractual relationship between us, MEKRA Lang GmbH & Co. KG ("MEKRA Lang"), and our ordering parties ("Purchasers"), who are entrepreneurs as defined in § 14 BGB (German Civil Code), is solely governed by the General Terms and Conditions of Sale and Delivery (AGB) set out below. Dissenting terms and conditions of the Purchaser, even if known to us, shall not form part of the contract. Our offers shall be non-binding at all times. Our General Terms and Conditions of Sale and Delivery shall be regarded as accepted upon order placement, at the latest upon acceptance of the goods. In the case of an on-going business relationship, these General Terms and Conditions of Sale and Delivery shall also apply to all subsequent transactions. The invalidity of any provision of these general terms and conditions, in whole or in part, shall not affect the validity of the remaining provisions. In this case, MEKRA Lang and the Purchaser shall agree on provisions that shall be suitable to implement the economic purpose of the invalid provisions to the greatest extent possible. Until such time, the relevant legal provisions shall apply.

## II. Contract Conclusion and Prices

- By ordering goods the Purchaser bindingly states the wish to purchase the goods ordered. This statement shall remain binding for a period of two weeks. We shall be entitled to accept the submitted contract offer within a period of two weeks after receipt thereof. Acceptance may be declared in writing, electronically, or by delivery of the goods to the Purchaser.
- The obligations pertaining to electronic commerce set forth in § 312e Sec. 1 sentence 1 Nos. 1 to 3 and sentence 2 BGB shall be excluded.
- The conclusion of the contract shall be subject to orderly and timely receipt of goods from our own suppliers. This shall apply only, if we cannot be held responsible for the non-delivery, especially if we have entered into a congruent coverage transaction with our own suppliers. The Purchaser shall be informed of the non-availability of the goods or services without delay, and any compensation that has already been paid shall be reimbursed immediately.
- All payments to be made hereunder shall be made in Euros.
- All prices quoted shall be net ex works or distribution warehouse, respectively. Freight, packaging and import costs, as well as customs duties and other ancillary expenses shall be payable by the Purchaser.

## III. Delivery Time and Delivery Obligation

- Extent, type, and time of delivery shall be subject to our written or electronic order confirmation. Partial deliveries shall be permissible.
- Any obligation to comply with delivery deadlines deemed as binding shall be conditional on the undisturbed flow of operations and distribution processes; particularly in cases of force majeure and other disruptive events at our facilities or those of our suppliers or carriers, including but not limited to operational or traffic disruptions, fire, flooding, labor, energy, or traffic shortages, strikes, lockouts, acts of public authorities as well as technical or technological conditions that considerably impede the execution of the contract, shall release us from the obligation to deliver on time or entitle us to suspend delivery without any obligation for subsequent delivery.
- Unless otherwise agreed, we shall be entitled to deliver before a stated delivery date. Additionally, unless otherwise agreed, any delivery of up to two weeks past a stated delivery date shall not be regarded as delayed on our end.
- When the goods have left the factory or distribution warehouse or the Purchaser has received notice of our readiness to deliver by the time the delivery dates expire, said delivery dates shall be regarded as met. Subsequent contract amendments shall provide for reasonable delivery date extensions.
- Where the performance of a contract consists of multiple deliveries, the non-fulfillment, improper fulfillment or delayed fulfillment of one delivery shall not affect the other deliveries

pertaining to the contract.

- Defaults in payment, declarations in lieu of an oath as per § 807 ZPO (German Code of Civil Procedure), emergent payment difficulties or signs of significant deterioration in the Purchaser's financial position shall entitle us, at our discretion, to demand advance payment for deliveries not yet completed, or to call off deliveries immediately and to refuse the fulfillment of current contracts. At the same time, we shall be entitled to make due and payable with immediate effect any accounts receivable from the Purchaser which are not due yet.

## IV. Shipping, Transfer of Risk

- Unless otherwise agreed by the contracting parties, packaging, shipping route and method of transportation remain at our discretion.
- Upon hand-over, or in case of a sale by dispatch upon delivery of the goods to the forwarding agent, the carrier, or any other person or institution designated to execute the shipment, the risk of accidental loss and accidental deterioration of the goods shall be passed on to the Purchaser. If the Purchaser defaults on acceptance, this shall be deemed equivalent to hand-over.
- Unless otherwise agreed, goods from call orders shall be accepted within 3 months upon order confirmation.
- Insurance coverage for breakage and transportation risks shall be taken out upon special request only, and for a corresponding fee.
- Customs duties and other expenses, including those for obtaining the required import documents for the country of destination, shall be payable by the Purchaser.

## V. Payment, Payment Terms

- Invoices shall be payable:
  - within 14 days from the date of invoice including a 2 % cash discount on the final invoice value;
  - within 30 days from the date of invoice without a cash discount on the final invoice value.
- A cash discount shall be granted only, if all payment obligations arising from earlier deliveries have been fulfilled and the invoice amount has been submitted to us in cash or credited to our account in a timely fashion by the aforementioned due dates. As a result, the submission of a bill of exchange cannot lead to the granting of a cash discount. In case of a cashless payment, especially when a check is submitted, the time the amount is credited shall be the determining factor. A cash discount cannot be granted for amounts that are paid or credited conditionally or subject to other limitations. The Purchaser shall assume any and all risks in connection with the method of payment. Invoices for tools shall be payable immediately without cash discount.
- Bills of exchange and cheques shall be accepted on account of performance only. The corresponding amounts shall be credited subject to receipt of the full amount due. We reserve the right to accept other or own acceptances. Expenses and discount charges shall be payable by the Purchaser. We shall assume no responsibility for submission and protest. If the Purchaser's own bills of exchange have been protested or if protested other bills of exchange not have not been covered immediately, we shall be entitled to return any and all pending bills of exchange. At the same time we shall be entitled to make immediately due and payable those accounts receivable from the Purchaser which are not due yet. Pre-dated checks shall not be accepted.
- In case of missed payment dates, interest on defaulted payment of 9 % above the base rate of the German Central Bank according to § 247 BGB shall be payable, as well as damages due to late performance in the amount of € 40.00 according to § 288 Sec. 5 BGB. We shall continue to reserve the right of assertion of further damages due to late performance and other claims.
- Advance and interim payments shall be non-interest bearing.
- The Purchaser shall be entitled to offset or withhold payment only if the counterclaim is undisputed or has been determined

legally binding. The Purchaser may execute a right of retention only if his counter claim is based on the same contractual relationship.

- When settling invoices, the Purchaser shall provide the respective customer and invoice numbers. Any costs due to delays or accounting errors resulting from a failure to do so, shall be borne by the Purchaser.

## VI. Retention of Title, Factoring

- We shall retain full title to the goods that have been delivered, until such time as any and all receivables arising from the business relationship with the Purchaser have been paid. The Purchaser shall be entitled to resell the goods to which we have retained title within the ordinary course of business; however, any pledging or security transfer shall not be permissible. Where the goods to which we have retained title are being resold on credit, the Purchaser must ensure that our rights are protected.
- The Purchaser hereby assigns to us any of the Purchaser's receivables arising from the resale of the goods to which we have retained title in the amount invoiced; we hereby accept such assignment. Regardless of the assignment, the Purchaser shall retain the right to collect payment, provided that he fulfills his obligations owed to us according to the underlying contractual relationship and does not fall into financial decline. Otherwise the Purchaser shall, upon our request, provide any information about the assigned receivables that are required for collection, and shall notify his debtors of the assignment. In this case we shall reserve the right to collect the receivables on our own.
- Any finishing or processing of the goods to which we have retained title by the Purchaser shall be performed on our behalf and by our order, however, without resulting in any obligations for us. If the goods to which we have retained title are processed with goods that are third-party property, then we shall acquire co-title to the new goods. The proportion of co-title shall follow from the proportion of the value of the goods to which we have retained title and the value of the other processed goods. Any references herein to the value of the goods to which we have retained title shall be based on our invoice value.
- Should the Purchaser acquire sole ownership of the new goods according to § 947 Sec. 2 BGB, it is agreed that the Purchaser shall grant us co-title to the new goods in proportion of the value of the processed, combined, or mixed goods to which we have retained title, and shall remain custodian of the goods which shall be free of charge.
- Where the goods to which we have retained title are resold together with other goods, regardless of whether or not they were processed, combined or mixed, the advance assignment agreed to above is valid only to the extent of the value of the goods to which we have retained title that were resold together with the other goods. If requested, we shall release the securities we are entitled to as provided above, insofar as the value exceeds the claims to be secured by 20 %.
- The Purchaser shall immediately notify us of any third-party compulsory execution measures regarding the goods to which we have retained title or the receivables assigned in advance and shall provide us with any documents required for an intervention. Any related intervention costs shall be payable by the Purchaser.
- The Purchaser shall take out adequate fire and burglary insurance for the goods to which we have retained title and shall provide us with corresponding proof, if requested.

## VII. Warranty Claims

- The period of limitation for warranty claims is 24 months from the delivery of the goods.
- Initially, we shall remedy any defects in the products through either reworking or replacement (at our discretion). Where defects cannot be remedied through reworking or replacement, the Purchaser shall have the right to demand a cancellation of the contract or a reduction in compensation. However, the

Purchaser shall not be entitled to cancel, if the lack of conformity is minor, and particularly if the defects are minor.

3. The Purchaser must notify us in writing of any obvious defects without delay, at the latest within 7 days after receipt of the goods, suspending any processing immediately. Otherwise the assertion of any warranty claims shall be excluded. The timely dispatch of the notification shall be deemed sufficient for compliance with the notification period. The full burden of proof regarding all requirements for asserting claims shall be borne by the Purchaser, especially for the defect itself, for the time of the establishment of the defect, and for the timeliness of the complaint regarding the defect.
4. Defects which, despite careful inspection, cannot be ascertained within this time period are to be reported to us in writing immediately upon discovery. If, after a failed cure, the Purchaser opts for a withdrawal from the contract due to a legal or material defect, the Purchaser shall not also be entitled to seek damages based on the defect.
5. If, after a failed cure, the Purchaser opts for damages, the goods shall remain with the Purchaser, if this can be reasonably expected. Damages are limited 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.
6. Title to all goods for which we provided replacement, will pass to us and such goods shall be returned to us for a reimbursement of costs.
7. No claims may be asserted for damages which were negligently caused by the Purchaser through
  - a) improper handling or excessive use of the purchased item, or
  - b) unauthorized modification of the purchased item, or
  - c) non-compliance with the assembly or operating instructions, or
  - d) a breach of the complaint and delivery obligations according to para. 3 and 4 above, or
  - e) continued use of the purchased item after the defect has been ascertained. Ordinary wear and tear shall be excepted from the warranty.

#### VIII. Liability

1. In case of slightly negligent breaches of duty, our liability shall be limited to the average immediate damage that can be reasonably and typically expected for the respective contract type. The aforementioned shall also apply to slightly negligent breaches of duty by our legal representatives or agents. We shall not be held liable in case of a slightly negligent breach of nonessential contract obligations.
2. Any liability based on assumed warranties as well as product liability shall remain unaffected, including for bodily harm or health impairments attributable to us or loss of life of the Purchaser.
3. The period during which the Purchaser shall be entitled to claims for damages due to a defect is limited to one year from delivery of the goods. The aforementioned shall not apply, if we can be accused of willful intent or gross negligence, as well as bodily harm or health impairments attributable to us or loss of life of the Purchaser.
4. Notice Regarding Market Surveillance: As a distributor and importer, you play an important part in ensuring the compliance and safety of products in the market. As a distributor and importer of our products, you are required to comply with the applicable legal provisions and obligations regarding market surveillance, should there be any indications of discrepancies (e.g. in the form of complaints regarding non-compliance with ECE R46 or general, safety-related issues). Please adhere to the corresponding reporting requirements in connection with the above-mentioned anomalies. Any reports to us should be comprised of transparent and verifiable information. Please contact your sales team representative.

#### IX. Returns

As a rule, returns of goods that were properly ordered and delivered shall not be accepted. Returns that have been arranged with us shall be the exception. In addition, the following prerequisites must be met:

1. The products must have been purchased directly from us or from one of our factory warehouses.
2. The goods must be in flawless and unaltered condition.
3. As a rule, we shall accept returned goods or parts only if they are still part of our current product portfolio.
4. Returns must be shipped „free domicile“ to our plant in Ergersheim or to the appropriate factory warehouse and must include the respective delivery note dates and numbers. Value reduction for returns:
  - in the 1st year after delivery date ./ 10 % of the contract price
  - in the 2nd year after delivery date ./ 25 % of the contract price
  - between the 3rd and the 5th year after delivery date ./ 50 % of the contract price
  - Any goods older than 5 years may not be returned.Upon receipt of the parts, a technical inspection shall be performed and a credit slip completed, taking into account any applicable value reductions. The remaining value shall be reduced by any original shipping costs incurred by us.

#### X. Intellectual Property Rights

1. Regarding custom-made products, the Purchaser shall be liable to us for the exemption from third-party intellectual property rights in connection with the items ordered, shall indemnify us against any possible third-party claims and shall compensate us for any damages resulting from a breach of this obligation.
2. Our designs and design proposals shall be kept confidential and may not be passed on to third parties.
3. Any drawings, construction plans, and samples provided to the Purchaser shall remain our intellectual property.

#### XI. Place of Fulfillment, Jurisdiction, Other Agreements

1. As a rule, it shall be considered agreed that the condition of the goods is solely set forth in our product description. Any public statements, sales talks, or advertisements by us shall not represent a contractual description of the condition of the goods. Samples and specimens shall serve as approximate illustrative articles regarding product quality, dimensions and color and cannot serve as the basis for asserting any legal claims. We reserve the right to make reasonable technical changes as well as modifications in shape, color, and/or weight.
2. If the Purchaser receives inaccurate assembly instructions, we shall only be obliged to provide accurate assembly instructions, and only, if the inaccurate assembly instructions prevent proper assembly.
3. We shall not grant any warranties in the legal sense to the Purchaser; the aforementioned shall not affect any manufacturer's warranties.
4. The place of fulfillment for our deliveries ex works shall be the delivery plant; the place of fulfillment for our deliveries ex stock shall be the warehouse. The place of fulfillment for any payments shall be Ergersheim in Bavaria, Germany.
5. The exclusive place of jurisdiction for any disputes regarding this contract shall be Fürth in Bavaria, Germany. This shall also apply to lawsuits regarding checks or bills of exchange.
6. The law of the Federal Republic of Germany shall govern these provisions. The provisions of the UN United Nations Convention on Contracts for the International Sale of Goods shall not apply. The German-language version of these General Terms and Conditions of Sale and Delivery shall apply exclusively.
7. The special terms of our products published with the appropriate price lists shall apply as well.
8. The Purchaser shall be responsible for examining the suitability of the goods for their intended use.
9. In accordance with the provisions of the German Federal Data Protection Law (BDSG), we wish to note that all Purchaser data required for order processing will be stored electronically.



# MEKRA Lang - **passion** for excellence.

## Headquarters

MEKRA Lang GmbH & Co. KG

Buchheimer Str. 4

D-91465 Ergersheim

[www.mekra.de](http://www.mekra.de)

Contents are subject to change Last

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