

EFIS® 4 VEHICLE INSPECTION MIRROR

Trolley mirror with LEDS





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The information presented in this document relates to an entire range of products. The technical data for individual units can be requested from Ebinger, by quoting the model name and serial number.

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1	General safety guidelines	4
1.1	About these operating instructions	4
1.2	Handling technical faults	5
1.3	Instructions for LED models	5
1.4	Instructions for models powered by disposable or rechargeable batteries	5
1.5	Instructions for cleaning	6
1.6	Usage in professional security work	6
2	Product description	7
2.1	EFIS - Ebinger inspection tools - Trolley mirror systems	7
2.2	EFIS® 4 Vehicle inspection mirror	7
3	Components	8
3.1	Components	8
3.2	Identification	9
4	Assembly	9
4.1	Connecting the telescopic handle to the mirror support	9
4.2	Changing the dry batteries	10
4.3	Recharging the rechargeable batteries	11
5	Start-up procedure and operation	12
5.1	Changing the handle length and mirror angle	12
5.2	Changing the angle of the mirror head	13
5.2.1	Manual change of the the mirror head angle	13
5.2.2	Using the (optional) mechanism to change the angle of the mirror head	14
5.3	Activating mirror illumination	14
5.4	Using the search and inspection mirror	15
6	Care and troubleshooting	16
6.1	General equipment care instructions	16
6.2	Troubleshooting	16
6.3	Replacing the control cable	17
7	Accessories and order details	18
7.1	Available spare parts / part numbers	18
7.2	Dimensions	19 - 22
7.3	Components / part numbers / weight	23
7.4	Optional accessories	24 - 25
8	Technical data	26

1. GENERAL SAFETY GUIDELINES

This section presents some important safety guidelines that must be observed at all times when using the unit.

1.1 About these operating instructions

Important:

Before starting to use this unit, read and observe the following safety guidelines:

- 1 Read this manual carefully before assembly and use!
- 2 Ensure that you follow the instructions in this manual for all work involving this unit!
EBINGER and EBINGER's representatives do not accept liability for losses resulting from actions or activities that have not been described in this manual.
- 3 Use the unit only for the intended purpose as described in this manual!

Warning notices, precautionary measures, instructions and tips present information of particular importance for the user and are marked as follows:



WARNING

Warning notices indicate situations that can present health hazards or endanger life. Instructions in these sections must be followed strictly at all times!



CAUTION

Precautionary measures relate to situations in which damage to the unit or consequential damages or loss (e.g. data loss) may occur. Instructions in these sections must be followed strictly at all times!



ADVICE

Follow the advice given in these sections to avoid faults, which may occur when operating the unit.



TIP

Follow the advice given in these sections to improve operating.

1.2 Handling technical faults



WARNING

Do not continue to use the unit if connection leads or components are damaged!

If parts are defective or missing, replace them only with original EBINGER spare parts. Failure to do so may present a risk of short-circuits, overloading, incorrect polarity or electric shock.

Perform maintenance activities only as described in this manual or as instructed during specialist training courses provided by the manufacturer.



TIP

If problems occur, please first read the „Maintenance and Troubleshooting“ section thoroughly before contacting your local EBINGER Service.

1.3 Instructions for LEDs



WARNING

Do not look directly into the LEDs.

1.4 Instructions for devices powered by disposable or rechargeable batteries



WARNING

*Batteries and rechargeable batteries can explode if used incorrectly!
Always ensure you follow below the warning notices:*

- Use disposable or rechargeable batteries as specified in the Operating Instructions.
- When inserting batteries, ensure correct polarity.
- Do not expose batteries to fire or high temperatures.
- Never attempt to recharge, short-circuit, disassemble or recharge disposable dry batteries.
- In case of a short-circuit, rechargeable batteries can generate especially high currents that can cause cable fires, sparks or injury. An integrated electronic fuse prevents damage of the device.
- Keep disposable or rechargeable battery contacts dry and avoid short circuits, do not let them come into contact with conductive materials.

**CAUTION**

Observe the following safety precautions to avoid damage:

- If the unit is to be stored or not used for a longer period of time, remove batteries.
- Avoid deep discharge of rechargeable batteries. Resulting damage cannot be claimed against product warranty.
- Before operating the battery charger, check for correct voltage of mains supply.

**ADVICE**

Dispose unserviceable batteries only as per applicable local regulatory provisions.

1.5 Instructions for cleaning

**CAUTION**

Do not use chemical substances to clean the unit. Chemical substances may react with housing components and cause irreparable damage. For cleaning, please use a soft cloth dampened with water.

1.6 Usage in professional security work

**WARNING**

Any equipment used to support the search for potentially dangerous objects should be used only by personnel who possess the necessary qualifications according to the applicable international and/or national regulations.

Before deployment in a potentially danger inclined work qualified personnel must assess and decide on the tactical suitability of the unit.

2. PRODUCT DESCRIPTION

This section informs you about the key properties of this unit and/or of the unit's corresponding product range.

2.1 EFIS® – Ebinger inspection tools – Trolley mirror systems

Ebinger Prüf- und Ortungstechnik GmbH offers a complete range of search and inspection mirrors – and systems.

The EFIS® – search mirrors help to rapidly inspect areas that are difficult or impossible to view directly. Our mirrors have a wide range of applications. For example, they can be used to look under vehicles, into packing nets, spaces between or above items of furniture, as well as into cavities and gaps or areas of buildings hidden from direct view. The mirrors enable police, customs, military and security personnel to make a much more precise and thorough search or improve checkpoint processing times. Our inspection mirrors stand out from the average due to their robust, all-weather design.

We have mirrors to fit a wide range of requirements, including:

- Hand held and/or wheeled version
- Shadowless illumination by torch or LEDs to support inspection in low light conditions
- Convex shaped mirror to enlarge the field of view
- Video search apparatus using videocamera and colour monitors

2.2 EFIS® 4 Vehicle inspection mirrors

The trolley mirror EFIS®4 is a convenient tool for a fast and easy inspection of the underside of vehicles and furniture etc. It is characterised in particular by the following product features:

- Easy to handle, rugged, weatherproof
- Petrol prove LED illumination
- Wheeled, telescopic handle
- Can be dismantled for transport

The following special models are available:

- Remote controlled mirror angle adjustment
- Mirror head, 200 x 400 mm
- Rugged polished stainless steel mirror

Ten splashproof LEDs provide a bright illumination of the inspection area. The unit has an ergonomic design: the telescopic handle can be adjusted to suit tall or short operators and to reach far under large vehicles.

The LEDs are powered by 3 disposable 1.5 V C-cell batteries (IEC no. LR 14). Upon request rechargeable NiMH batteries and a suitable charger are available as optional accessory.

3. COMPONENTS

This section informs you about the parts from which the EFIS®4 inspection mirror is built as well as the features that you can use to unambiguously identify the unit.

3.1 Components

The EFIS® 4 Vehicle inspection mirror consists of the following components:

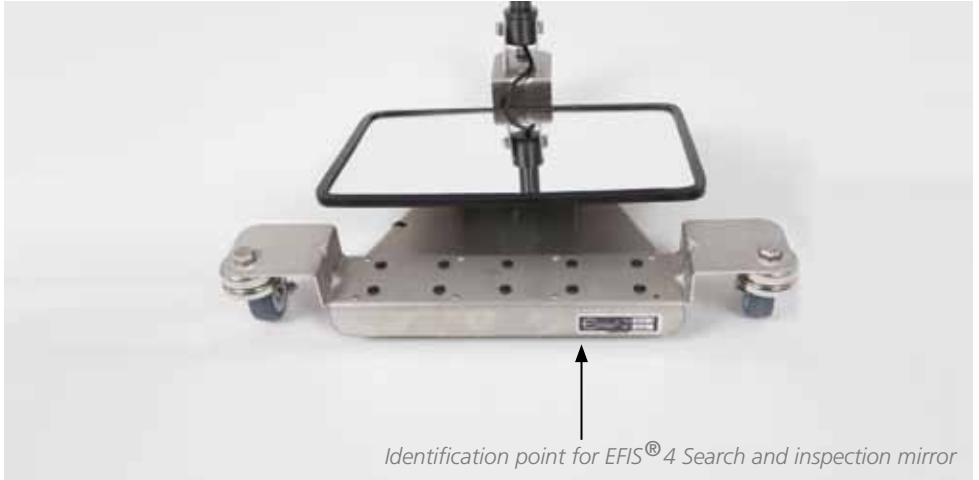
<ul style="list-style-type: none"> ❶ Mirror chassis 200 x 300 mm with three rollers and LED illumination (10 LEDs) ❷ Telescopic handle with controls and integrated battery compartment 	
<p>Battery operation:</p> <ul style="list-style-type: none"> ❸ 3 x 1.5 V C-cells (IEC LR14) 	<p>Rech. battery operation (accessory part):</p> <ul style="list-style-type: none"> ❸ 3 x rechargeable 1.2 V NiMH C-cell batteries, 4500 mAh ❹ ACS 110 charger for 3 x 1.2 V NiMH 4500 mAh with charging cable
<p><i>EFIS® 4 components</i></p>	

- Operating instructions (not shown)

3.2 Identification

Information about the unit type and serial number, as well as any customer-specific reference codes, can be found at the following location:

- Label on the mirror support chassis, specifying the model type and serial number.



4. ASSEMBLY

This section informs you about the correct assembly of the unit. For the EFIS® 4 search mirror, assembly merely involves the fitting of the telescopic tube and the insertion of batteries into the battery compartment.



ADVICE

Before assembling components and parts, inspect these to ensure they are clean, undamaged and complete.

4.1 Connecting the telescopic handle to the mirror support

1. Open the locking clamp located at the lower end of the telescopic handle.
2. Insert the end of the telescopic tube – as shown in the following figure – into the hinge joint attached to the mirror support.
3. Close the locking clamp.

**ADVICE**

During assembly, the locking clamp on the telescopic handle should point upwards in order to ensure that the other user controls on the telescopic handle are aligned in the correct position (see figure).

Connecting the telescopic handle to the mirror support



4.2 Changing the batteries

The battery compartment is located inside the upper end of the telescopic handle. Electric power is supplied by:

- 3 x 1.5 V dry batteries (C-cells, IEC LR14) or
- 3 x 1.2 V rechargeable NiMH 4500 mAh

**CAUTION**

Do not use a mix of dry batteries and rechargeable batteries!

Proceed as follows:

1. Open the battery compartment by turning the protective cap in anti-clockwise direction.
2. Remove any batteries which might be still in the compartment.
3. Fit 3 dry or rechargeable batteries to the battery compartment.
4. The batteries' positive terminals must point towards the closure of battery compartment.
5. Close and lock the battery compartment by turning the closure in clockwise sense.

**CAUTION**

Take care not to damage the rim the protective cap when replacing it!



Opening the battery compartment and replacing the batteries

4.3 Recharging the NiMH batteries

Rechargeable NiMH batteries can be recharged directly inside the battery compartment. To do so, use the Ebinger supplied charger accessory available for the unit.

1. Insert the plug of the charger connection lead into the charging socket located laterally at the telescopic tube control section.
2. Follow the charger's operating instructions.



Connecting the charger to the charging socket on the controls

**CAUTION**

Never attempt to recharge dry batteries! This can cause them to explode!

Always follow the advice given in the charger's operating instructions!

Ensure that the mains rating given for the charger matches the specifications of your electricity distribution network!

5. START-UP PROCEDURE AND OPERATION

This section familiarises you with the unit's various operating and display components. It provides you with details of the various procedures required for unit start-up and for checking the unit is functioning properly.

**TIP**

To make this section easier to understand, we assume that you have assembled the unit according to the instructions in the previous section.

5.1 Changing the handle length and mirror angle

The length of the telescopic handle can be adjusted. After opening the locking clamp, the telescopic handle can be freely adjusted for operator comfort.

Locking clamp on telescopic handle to adjust the handle length



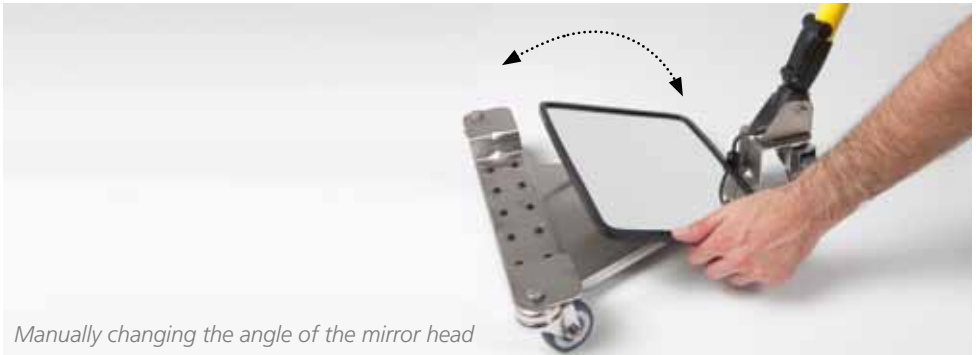


5.2 Changing the angle of the mirror head

The tilt-adjustable mirror is attached to the support at 90° to the front wheel axis.

5.2.1 Manual change of the mirror angle

To ensure the best possible view of the vehicle underside, the tilt angle of the mirror can be adjusted manually.



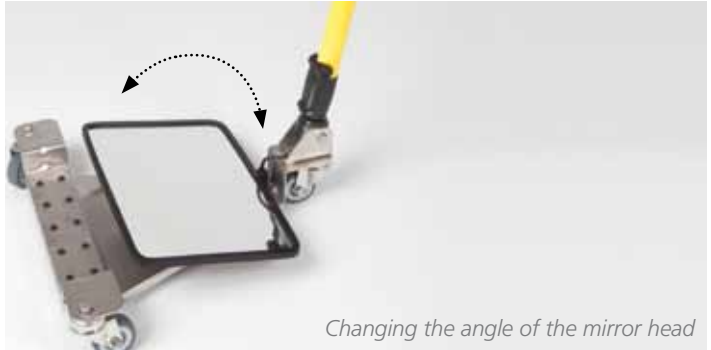
ADVICE

To avoid damaging the unit, the desired tilt angle of the mirror must be set manually, if you have ordered the EFIS® 4 without a mechanical adjustment mechanism!

5.2.2 Using the (optional) mechanism to change the angle of the mirror head

The adjustment lever at the upper end of the telescopic handle can be used to adjust the mirror mechanically, to give the best possible view.

Adjustment lever for the control cable



Changing the angle of the mirror head



ADVICE

Lubricate the control cable from time to time, to extend the life cycle of the control cable. After about 20,000 activations, the control cable will need replacing.

5.3 Activating mirror illumination

To improve visibility under poor light conditions or in darkness, the mirror has been fitted with LEDs, which illuminate the inspection area.

The LEDs are switched on and off by a rocker switch at the upper end of the telescopic handle.

ON/OFF switch for the LED mirror illumination



LED mirror illumination with 10 LEDs

**WARNING**

Do not look directly into the LEDs!

5.4 Using the search and inspection mirror

The search and inspection mirror can now be used. Use the telescopic handle to push the mirror under the object to be investigated. The rubber edging of the mirror prevents scratching if it comes into contact with the object's surface.

The mirror can be tilted to various angles to ensure the user can search the underside of the object under investigation; if lighting conditions are poor, the user can activate the mirror illumination by pushing the rocker switch at the handle.



Example use

6. CARE AND TROUBLESHOOTING

This section describes both general and specific care procedures that you can and should complete as a user. The section also presents some advice for troubleshooting.

6.1 General equipment care instructions

Users should complete the following maintenance procedures:

- The unit must be switched off when not in use.
- Electrical contacts, terminals and mechanical connection points, especially the screw thread, etc. should be kept clean.
- Clean the unit with a damp cloth if soiled before and/or after use. To clean the mirror surface, we recommend using a lint-free cloth or paper towel and standard commercial glass cleaner.



ADVICE

During winter conditions in particular, clean all salt water off the unit!

- Do not pack and store the unit while it is still damp.
- Remove batteries if equipment is stored as leaking batteries can damage the unit.
- Check rechargeable batteries monthly. If required, recharge them using the charger supplied.



CAUTION

Replace the batteries if the LEDs start losing their brightness!

Before storing the unit, ensure illumination is switched off to avoid inadvertent battery discharge. Remove (rechargeable) batteries if the unit is to be stored unused for longer periods. Charge rechargeable batteries regularly to protect them against becoming fully discharged.

Always charge and use rechargeable batteries as a set (3 batteries)!

6.2 Troubleshooting

Unit does not switch on or goes off randomly when in use.

Cure:

- Ensure that there are fresh batteries in the compartment. Check for correct polarity
- If rechargeable batteries used, check for sufficient charge and recharge as required
- Check terminals at the telescopic handle's end and on the mirror support chassis
- Contact Service

6.3 Replacing the control cable

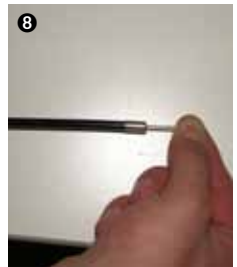
After approx. 20,000 operations, the control cable of the mirror mechanism may need service by replacing the internal cable of the bowden cable.

To replace the wire, use the following tools and procedure:

- Screwdriver
- Flat - nose pliers
- Wire cutters

- ❶ Disengage the cable from the clamps on the telescopic handle.
- ❷ Disengage the telescopic handle from the hinge joint on the mirror support.
- ❸ Loosen the cable guide bolt on the control cable adjustment lever.
- ❹ Pull the inner control cable through the slot in the side of the adjustment lever, until the end is exposed so that you can release the control cable from the handle.
- ❺ Use the screwdriver to loosen the fixture securing the control cable to the underside of the mirror.
- ❻ Pull the free end of the control cable through the mirror support duct.
- ❼ Pull the free end of the control cable carefully through the opening in the hinged joint, until it is freed.
- ❽ Starting from the upper end of the control cable, pull the wire out of the sheath.

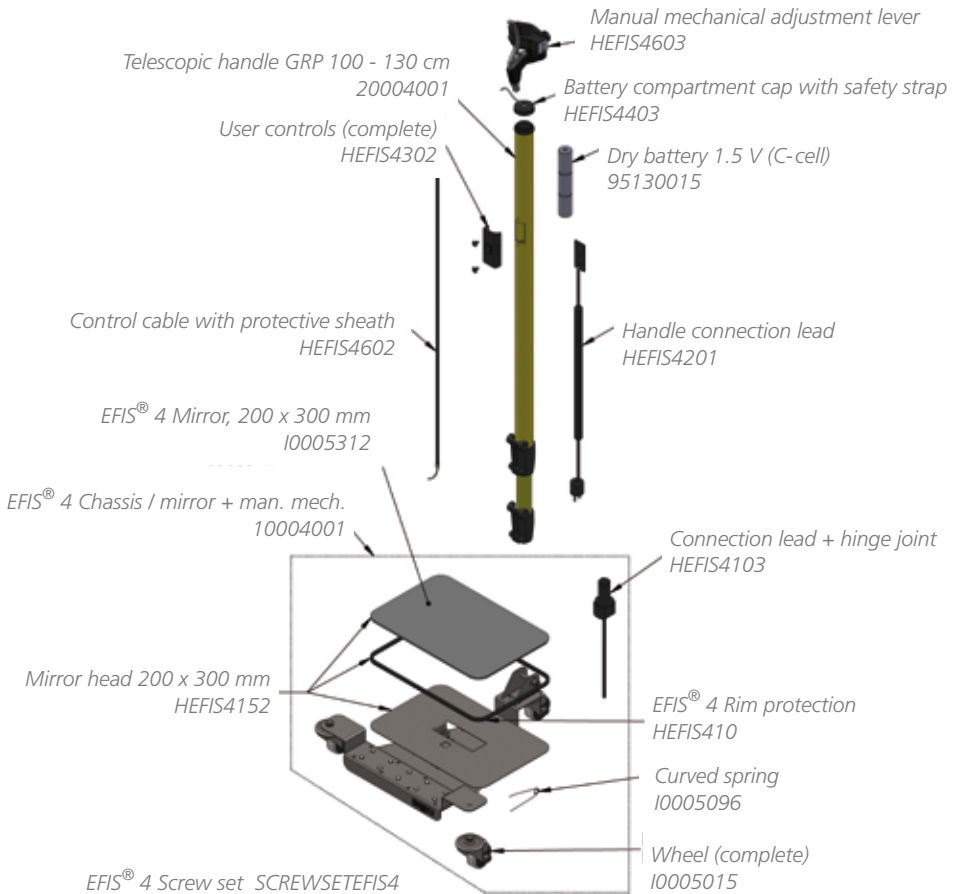
Install the replacement wire in the cable by completing steps 1 – 8 in reverse order.



7. ACCESSORIES AND ORDER DETAILS

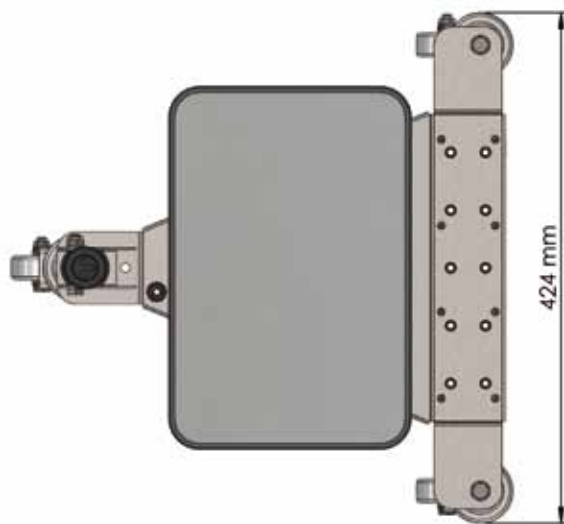
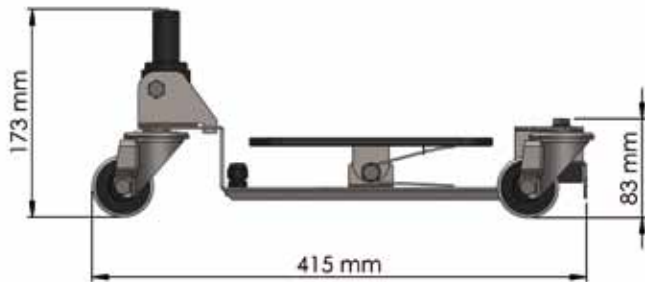
This section gives you an overview of the spare parts available and the dimensions of the EFIS® 4 unit. In addition, the section also lists all details for components and accessory parts.

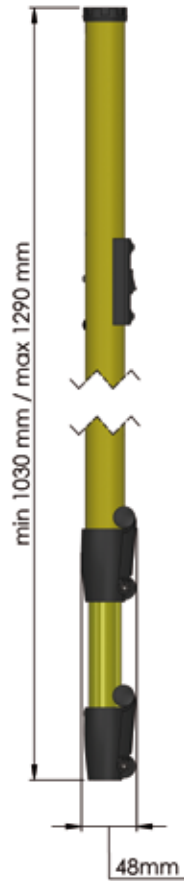
7.1 Available spare parts / part numbers

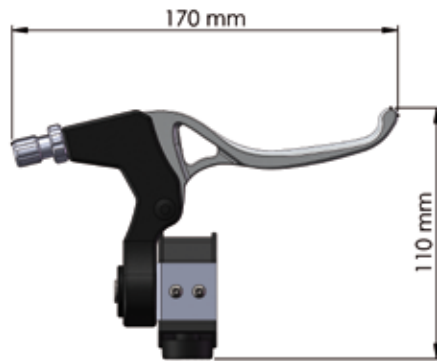


7.2 Dimensions

























7.3 Components / part numbers / weight

Description	Part no.	Weight
1. Telescopic handle GRP 100 - 130 cm	20004001	611 g
2. User controls (complete)	HEFIS4302	21 g
3. Battery compartment cap with safety strap	HEFIS4403	7 g
4. Dry battery 1.5 V (C-cell)	95130015	71,5g
5. Handle connection lead	HEFIS4201	101 g
6. Manual mechanical adjustment lever	HEFIS4603	191 g
7. Control cable + protective sheath	HEFIS4602	81,5g
8. EFIS® 4 Chassis / mirror + man. mech.	10004001	3251,5g
9. Connection lead + hinge joint	HEFIS4103	100g
- Wheel (complete)	I0005015	137g
- Curved spring	I0005096	2,5g
- Mirror head 200 x 300 mm	HEFIS4152	941 g
- EFIS® 4 Mirror, 200 x 300 mm	I0005312	436g
- EFIS® 4 Edge protection	HEFIS410	44 g

Description	Part no.	Quantity	
EFIS® 4 Screw set, consisting of:	SCREWSETEFIS4	1	
1. Knurled bolt	i0001391	1	
2. Raised countersunk head screw M3x10 / DIN 966	I0000858	3	
3. Raised countersunk head screw (with hexagon socket)	I0000860	10	
4. Self-locking nut M8 / DIN 985	I0001678	6	
5. Flat washer 8,4 / DIN 125	I0001679	4	
6. Flat washer 6,4 / DIN 125	I0001707	1	
7. Hexagon socket head cap screw M6x25 / DIN 912	I0001782	1	
8. Raised countersunk head screw M3x25 / DIN 966	I0001785	1	
9. Raised cheese head screw M3x6 / DIN 7985	I0001845	6	
10. Countersunk flat head screw M2,5x8 / DIN 965	I0004080	1	
11. Raised cheese head screw M3x12 / DIN 7985	I0004315	1	
12. Raised cheese head screw M3x16 / DIN 7985 2	I0004316	2	
13. Cylindrical pin M4 x 24 / DIN 7	I0004774	1	
14. Hexagon head screw M8 x 16 / DIN 933	I0003636	2	
15. Hexagon head screw M8x30 / DIN 933	I0003637	3	
16. Hexagon head screw M8 x 45 / DIN 933	I0003638	1	

7.4 Optional accessories

1. Mirror head, 200 x 400 mm (Panel + Edge protection)

Part number: HEFIS4111

❶ Mirror reflector 200 x 400 mm

Part number: I0005497

❷ Rim protection

Part number: HEFIS420



2. Mechanical mirror angle adjustment

Part number: 60004000



3. Carrying bag

Part number: 60004610



4. Charger with connection lead + plug

Part number: 60000037



5. Rechargeable NIMH batteries 1.2 V / 4500 mAh (not shown)

Part number: 95230113

8. TECHNICAL DATA

Dimensions	(W x H x D)
Chassis	approx. 410 x 424 x 173 mm
Mirror	approx. 200 x 300 mm
Telescopic handle	approx. 1,030 - 1,290 mm
Weight (mass)	approx. 4 kg
Illumination	10 LEDs (white)
Power supply	
<i>Using disposable batteries</i>	3 x C-cells 1.5 V (IEC LR 14)
<i>Using rechargeable batteries</i>	3 x C-cells 1.2 V NiMH 4500 mAh
Power consumption	approx. 500 mA
Battery life	
<i>Using disposable batteries</i>	approx. 20 h
<i>Using rechargeable batteries</i>	approx. 9 h

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