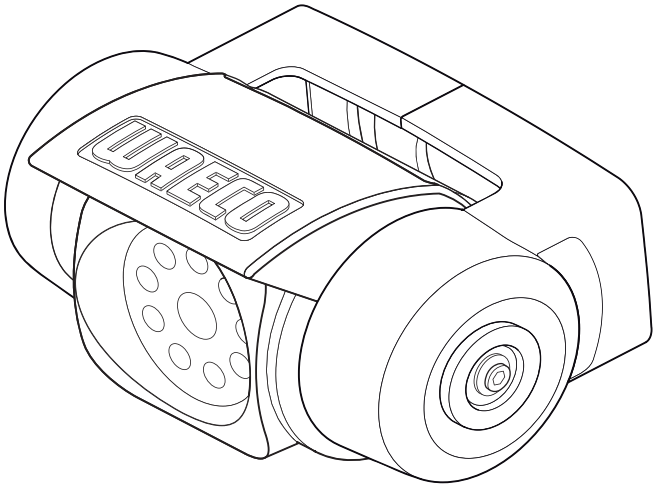
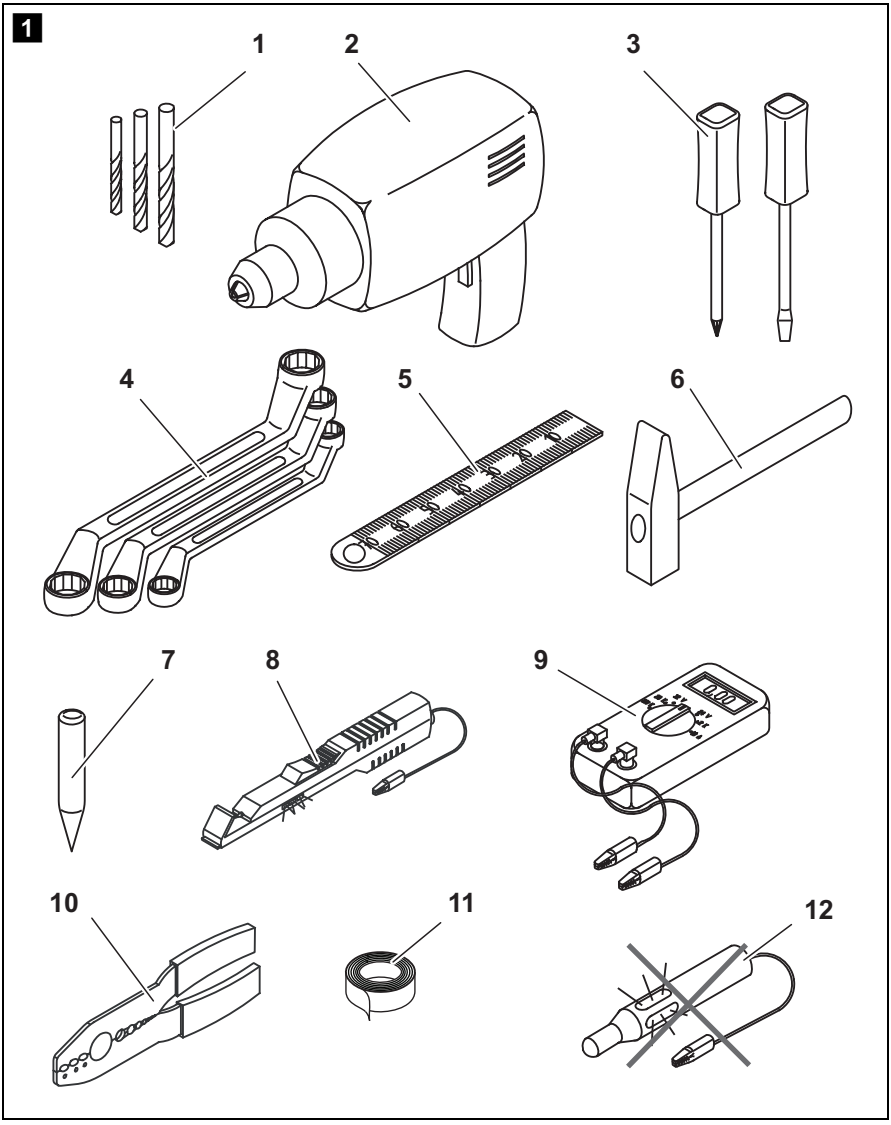
WAECO
by Dometic GROUP



PerfectView CAM50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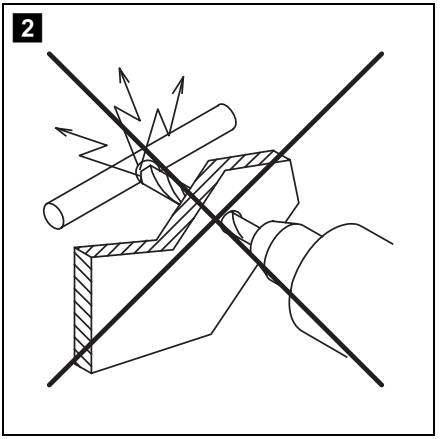
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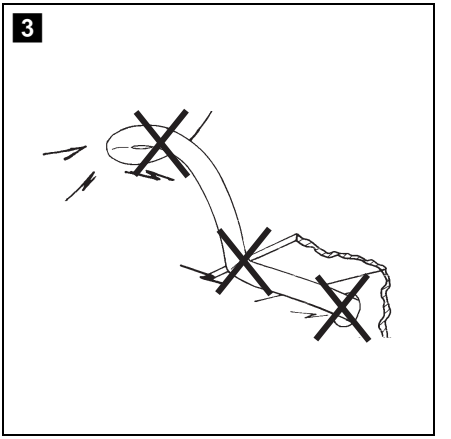
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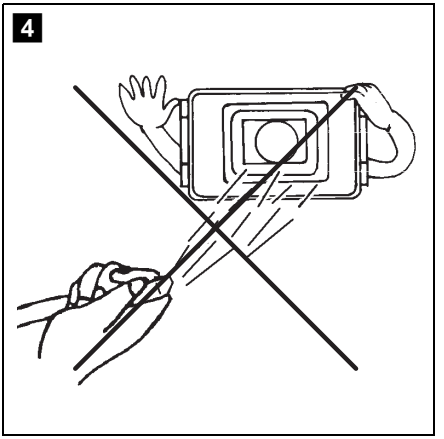
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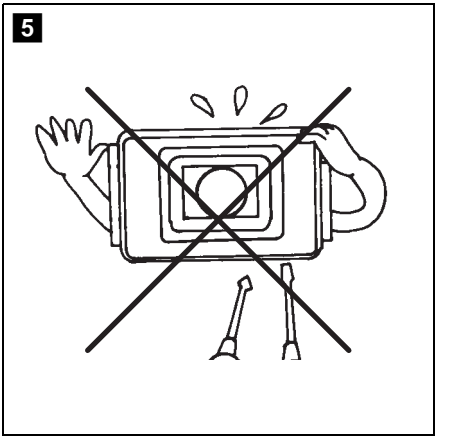
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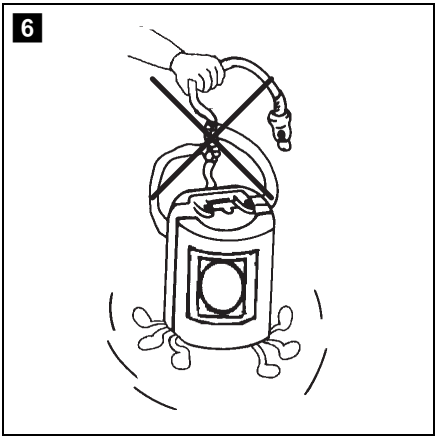
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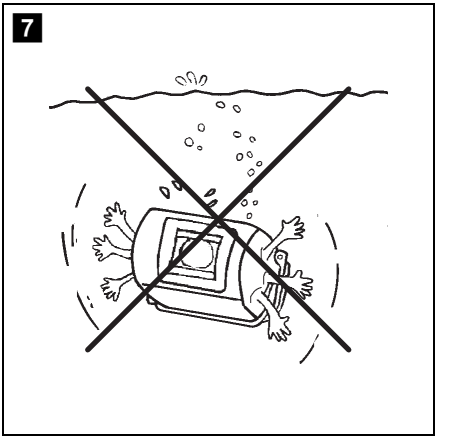
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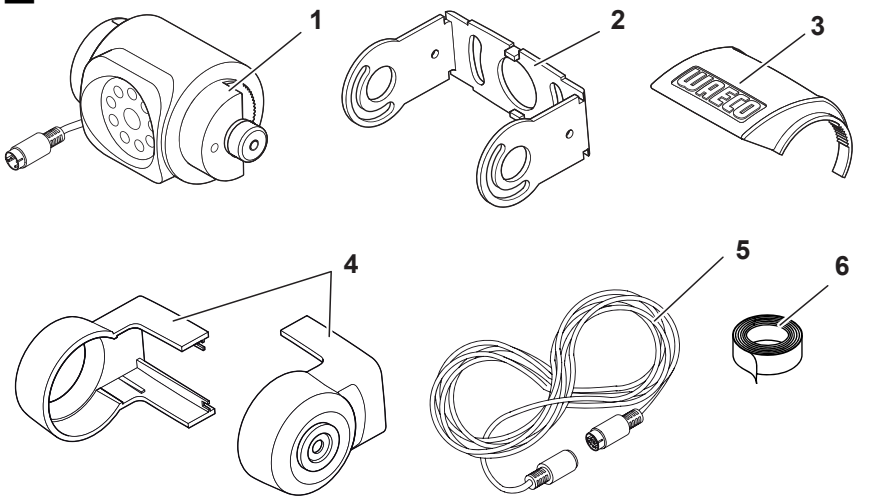

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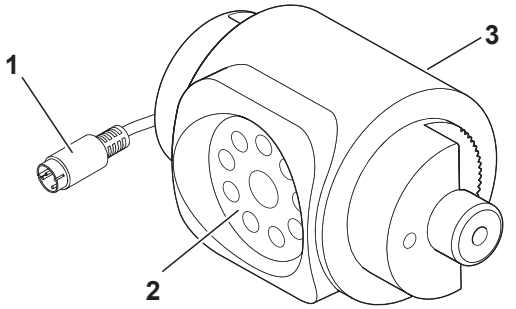

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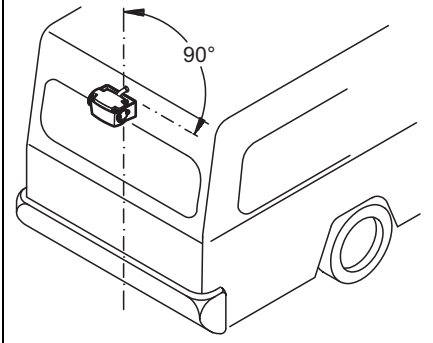

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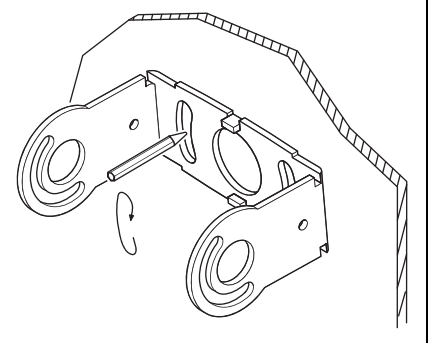

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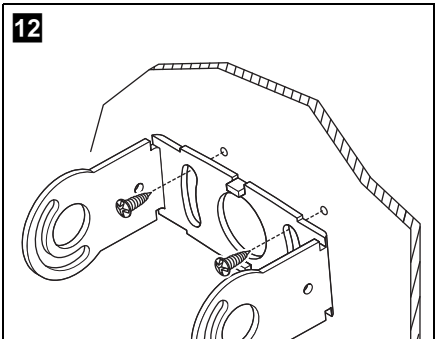

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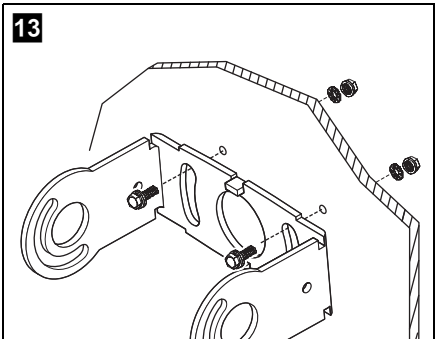

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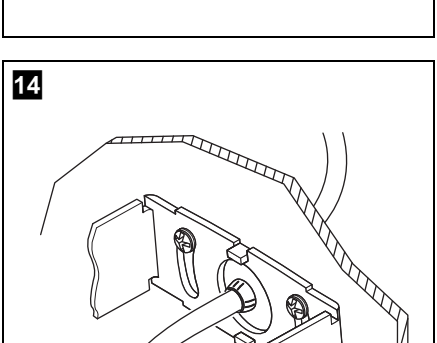

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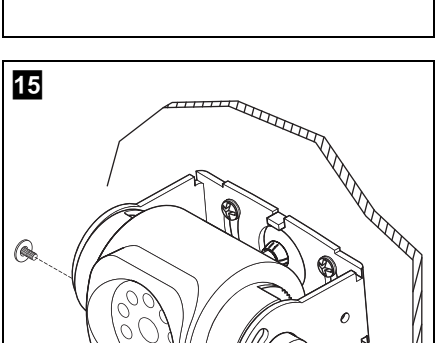

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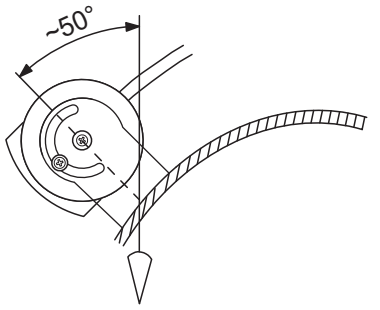

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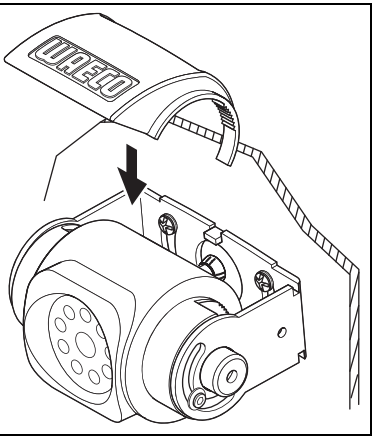

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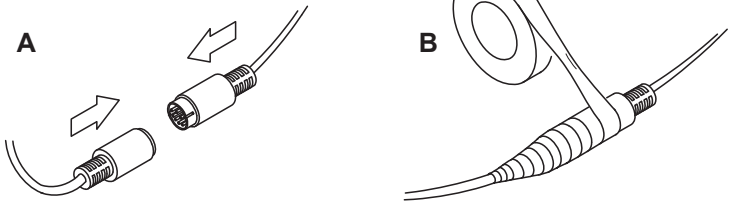

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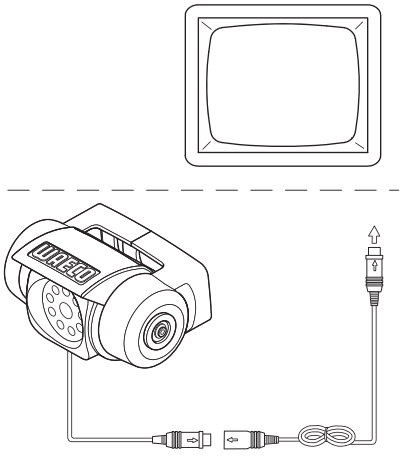

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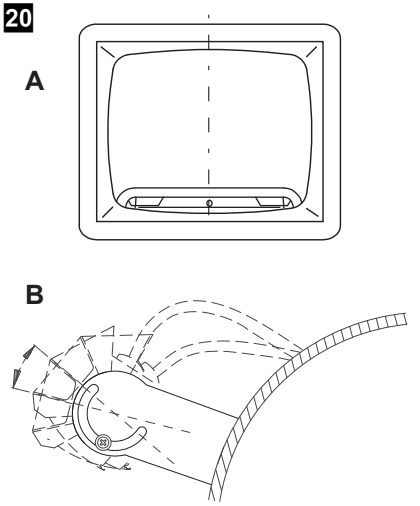

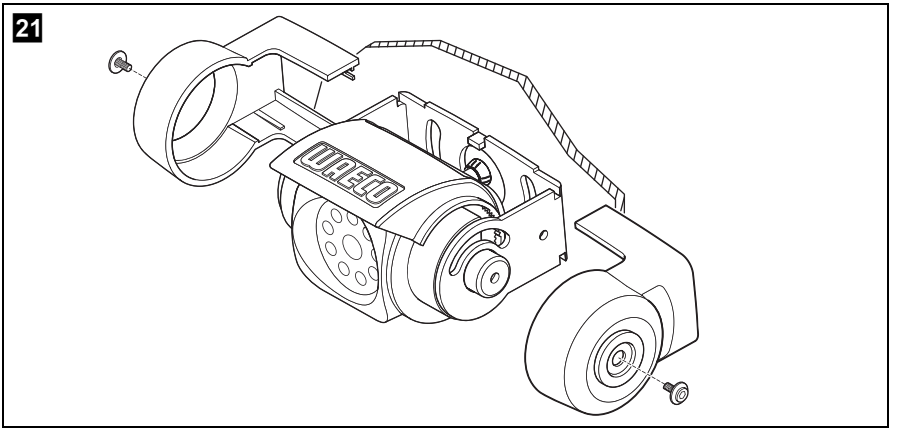
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Please read this instruction manual carefully before installation and first use, and store it in a safe place. If you pass on the product to another person, hand over this instruction manual along with it.

Contents

1 Explanation of symbols

WARNING!
Safety instruction: Failure to observe this instruction can cause fatal or serious injury.

CAUTION!
Safety instruction: Failure to observe this instruction can lead to injury.

NOTICE!
Failure to observe this instruction can cause material damage and impair the function of the product.

NOTE
Supplementary information for operating the product.

➤ **Action:** This symbol indicates that action is required on your part. The required action is described step-by-step.

✓ This symbol describes the result of an action.

fig. 1 5, page 3: This refers to an element in an illustration. In this case, item 5 in figure 1 on page 3.

2 Safety and installation instructions

Please observe the prescribed safety instructions and stipulations from the vehicle manufacturer and service workshops.

The manufacturer accepts no liability for damage in the following cases:

- Faulty assembly or connection
- Damage to the product resulting from mechanical influences and excess voltage
- Alterations to the product without express permission from the manufacturer
- Use for purposes other than those described in the operating manual

Please observe the following instructions:

- To prevent short circuits, always disconnect the negative terminal of the vehicle's electrical system before working on it.
  If the vehicle has an additional battery, its negative terminal should also be disconnected.
- Insufficient supply line connections could result in short circuits which
  – Cause cable fires
  – Trigger the airbags
  – Damage electronic control devices
  – Cause electric functions to fail (indicators, brake light, horn, ignition, lights)
- When working on the following lines, only use insulated cable lugs, plugs and tab sleeves:
  – 30 (direct supply from positive battery terminal)
  – 15 (connected positive terminal, behind the battery)
  – 31 (return line from the battery, earth)
  – 58 (reversing light)

  Do **not** use porcelain wire connectors.
- Use a crimping tool (fig. **1** 10, page 2) to connect the cables.
- When connecting to supply line 31 (earth), screw the cable
  – To the vehicle's earth bolt with a cable lug and a gear disc or
  – To the sheet metal body work with a cable lug and a self-tapping screw.

  Ensure that there is a good earth connection.

When the negative terminal of the battery is disconnected, all data stored in the volatile memories will be lost.

- The following data must be set again, depending on the vehicle equipment options:
  – Radio code
  – Vehicle clock
  – Timer
  – On-board computer
  – Seat position

  You can find instructions for making these settings in the appropriate operating instructions.

Observe the following installation instructions:

- Secure the parts of the camera installed in the vehicle in such a way that they cannot become loose under any circumstances (sudden braking, accidents) and cause **injuries to the occupants** of the vehicle.
- Secure any parts of the system covered by the bodywork in such a manner that they cannot be come loose or damage other parts and cables and impair vehicle functions (steering, pedals, etc.).
- To prevent damage, when drilling ensure that there is sufficient room for the drill head to come out on the other side (fig. **2**, page 3).
- Deburr all drill holes and treat them with a rust-protection agent.
- Always follow the safety instructions of the vehicle manufacturer. Some work (e.g. on retention systems such as the AIRBAG etc.) may only be performed by qualified specialists.

Observe the following instructions when working with electrical parts:

- When testing the voltage in electrical cables, only use a diode test lamp (fig. **1** 8, page 2) or a voltmeter (fig. **1** 9, page 2).
  Test lamps with an illuminant (fig. **1** 12, page 2) take up voltages which are too high and which can damage the vehicle's electronic system.
- When making electrical connections, ensure that
  – They are not kinked or twisted
  – They do not rub on edges
  – They are not laid in sharp edged ducts without protection (see fig. **3**, page 3)
- Insulate all connections.
- Secure the cables against mechanical wear with cable binders or insulating tape, for example to existing cables.

The camera is watertight. However, the sealings on the camera cannot withstand a high-pressure cleaner (fig. **4**, page 3). Therefore, you should observe the following instructions when handling the camera:

- People (including children) whose physical, sensory or mental capacities or whose lack of experience or knowledge prevent them from using this product safely should not use it without the supervision or instruction of a responsible person.
- Do not open the camera, as this impairs the sealing and the function of the camera (fig. **5**, page 3).

- Do not pull at the cables, as this impairs the sealing and the function of the camera (fig. 6, page 3).
- The camera is not suitable for submerged operation (fig. 7, page 3).

3 Scope of delivery

No. in fig. 8, page 4	Quantity	Description	Item number
1	1	Monochrome camera CAM50 Colour camera CAM50C	9102000028 9102000019
2	1	Camera bracket	9102200066
3	1	Camera guard	9102200067
4	2	Side covers	
5	1	Extension cable	9102200030
–	1	Fastening material	

4 Accessories

Available as accessory (not included in scope of delivery):

Description	Item number
Extension cable 5 m RV-805	91022000028
Extension cable 8 m RV-810	91022000029
Extension cable 20 m RV-820	91022000030
Spiral cable for trailer operation RV-150-SPK	91022000031

5 Intended use

The CAM50 monochrome camera (item no. 9102000028) and the CAM50C colour camera (item no. 9102000019) are primarily intended for use in vehicles. They can be used in rear view video systems to observe the space directly beside or behind the vehicle from the driver's seat when manoeuvring or parking, for example.

WARNING!
Risk of injury!
Since rear view systems are designed merely as an additional aid for reversing, it does **not relieve you of the duty to take proper care when reversing**.

6 Technical description

The camera with integrated microphone, which is encased in aluminium housing, transmits image and sound to a monitor via a cable. The built-in infrared LEDs improve night vision.

The camera transmits the image as if you are looking in the rear mirror.

The camera consists of the following main elements:

No. in fig. 9, page 4	Description
1	6-pin connection cable
2	Infrared LEDs
3	Microphone (back side)

7 Notes on the electrical connections

7.1 Laying cables

NOTICE! Risk of damage!

- To prevent damage, when drilling ensure that there is sufficient space on the other side for the drill head to come out.
- Cables and connections which are not properly installed will cause malfunctions or damage to components. Correct installation of cables and connections is the basic prerequisite for lasting and trouble-free operation of the retrofitted components.
- The cables may not be exposed for long periods to solvents such as benzine, as the solvents can damage the cable.

Please observe the following instructions:

- As far as possible, use original openings or alternative openings for the connecting cable duct, e.g. the paneling edges, ventilation grilles or blank panels. If no openings are available, you must drill holes for the cables. Check beforehand that there is sufficient room for the drill head to come out on the other side.
- Wherever possible lay cables inside the vehicle, as they are better protected inside than outside the vehicle.
  If you do need to lay a cable outside the vehicle, ensure that it is well secured (use additional cable ties, insulating tape, etc.).
- To prevent damage to the cables, when laying them ensure that there is sufficient distance to hot or moving vehicle components (exhaust pipes, drive shafts, light systems, fans, heater etc.). Use corrugated piping or other protective materials to protect against mechanical wear.
- Screw on the plug connections of the connecting cables to protect against water penetration (fig. **18**, page 6).
- When laying electric connections, ensure that
  – They are not kinked or twisted
  – They do not rub on edges
  – They are not laid in sharp edged ducts without protection (fig. **3**, page 3)
- Attach the cables securely in the vehicles to prevent tripping hazards. Use cable binders, insulating tape or glue the cables in place.
- Protect every through-hole made in the bodywork against water penetration, e.g. by using a cable with a sealant and by spraying the cable and the the cable sleeve with sealant.

NOTE
Do not start sealing the through-holes until all installation work has been finished for the camera, and the required cable lengths have been established.

8 Mounting the camera

8.1 Tools required

For **installation and assembly** you will require the following tools:

- Drill bit set (fig. 1 1, page 2)
- Drill (fig. 1 2, page 2)
- Screwdriver (fig. 1 3, page 2)
- Set of ring or open-ended spanners (fig. 1 4, page 2)
- Measuring ruler (fig. 1 5, page 2)
- Hammer (fig. 1 6, page 2)
- Centre punch (fig. 1 7, page 2)

To make and test the **electrical connection**, the following tools are required:

- Diode test lamp (fig. 1 8, page 2) or voltmeter (fig. 1 9, page 2)
- Insulating tape (fig. 1 11, page 2)
- Cable bushing sleeves, if necessary

To **fasten the cables** you may require additional cable binders.

8.2 Mounting the camera

CAUTION!
Select a location for the camera and attach it so securely that it cannot under any circumstances fall off and injure bystanders (e.g. by being knocked off by branches brushing over the roof of the vehicle).

NOTE
If installing the camera alters the vehicle height or length specified in the vehicle documents, your vehicle must be inspected by the appropriate authorities.
Make sure that you are in possession of documents verifying that your vehicle has passed this inspection.

Observe the following installation instructions:

- To provide a suitable viewing angle, the camera must be attached at a height of at least 2 m.
  Ensure that you have a firm place from which to work when mounting the camera.
- Ensure that the installation location of the camera is sufficiently firm (e.g. to prevent the camera from being knocked down by branches that may brush over the roof of the vehicle).
- Mount the camera bracket horizontally and in the middle of the rear of the vehicle (fig. **10**, page 5).
- The most secure type of attachment is with screws fitted through the body. Please observe the following instructions:
  – There must be sufficient space for the mounting procedure behind the chosen installation location.
  – Suitable measures must be taken to prevent water penetrating through any holes made (e.g. by using screws and sealant and/or spraying the outer attachment parts with a sealant).
  – The location on the body where you wish to attach the camera must be rigid enough to allow the camera to be tightly fastened.
- Check beforehand that there is sufficient room for the drill head to come out on the other side (fig. **2**, page 3).
- If you are not sure about the location you have chosen, consult the vehicle manufacturer or dealer.

NOTE
We recommend greasing the threads of the bolts to prevent corrosion.

When mounting the camera, proceed as follows:

➤ Hold the camera on the chosen location and mark at least two different points for the drill holes (fig. **11**, page 5).

➤ Using a hammer and centre punch, gently pre-punch the previously marked points to prevent the drill head from slipping off.

If you want to screw on the camera with self-tapping screws (fig. 12, page 5)

NOTICE! Risk of damage!
The holder may only be attached to steel panels with a minimum thickness of 1.5 mm using self-tapping screws.

➤ Drill Ø 2 mm holes at the points you have just marked.

➤ Deburr all drill holes and apply rust-protection.

➤ Screw the camera bracket on with the 3 x 10 mm self-tapping screws.

If you would like to attach the camera with threaded screws fitted through the construction (fig. 13, page 5)

NOTICE! Risk of damage!
Ensure that that nuts cannot be pulled through the body shell when they are tightened.
Use larger washers or metal plates if necessary.

➤ Drill Ø 3.5 mm holes at the points you have just marked.

➤ Deburr all drill holes and apply rust-protection.

➤ Screw the camera bracket on with the M3 x 20 mm threaded screws. Depending on the thickness of the construction, you may require longer threaded screws.

Creating a through-hole for the camera connection cable (fig. 14, page 5)

NOTE
If possible, use available openings – such as ventilation grilles – to feed the connection cables through. If there are no existing openings, you must drill a hole with a 16 mm diameter.

NOTICE! Risk of damage!
Ensure that there is sufficient space on the other side for the drill head to come out

➤ Drill a hole of Ø 16 mm near the camera.

➤ Deburr all drill holes that have been made in the sheet metal and apply rust-protection.

➤ Place cable sleeves in all sharp edged ducts.

Mounting the camera

NOTICE! Risk of damage!
Only use the screws supplied to mount the camera in the camera bracket. Longer screws will damage the camera.

➤ Push the camera into the camera bracket.

➤ Attach the camera **loosely** with the two screws M3 x 6 mm in the slots (fig. **15**, page 5).

➤ Align the camera provisorily so that the lens is at an angle of approx. 50° to the perpendicular axis of the vehicle (fig. **16**, page 6).

NOTICE! Risk of damage!
Never mount the camera without the camera guard.

➤ Push the camera guard over the camera (fig. **17**, page 6)

Connecting the camera

NOTE

- Lay the camera cable so that should you need to remove the camera, you can access the plug connection between the camera and the extension cable easily. This considerably eases dismantling work.
- To minimise corrosion in the plug, apply a small amount of grease – such as pin grease – inside the plug.
- Additional extension cables are available on request (see “Accessories” on page 27).

➤ Guide the camera cable into the vehicle interior.

➤ Insert the plug of the camera cable into the socket of the extension cable.

➤ Screw on the plug connections of the connecting cables to protect against water penetration (fig. **18**, page 6).

Aligning the camera

NOTE
If necessary before aligning the camera connect the camera to a monitor and to a power supply (see connecting diagram, fig. 19, page 6

➤ Use the monitor image to align the camera:

The monitor image should show the bottom edge of the rear or the bumper of your vehicle (**A**). The middle of the bumper should be in the middle of the screen. (fig. 20, page 6).

➤ Check the function of the camera after you have connected it to a monitor.

Fastening the camera

➤ Thighten the two screws in the slots of the **camera bracket**.

➤ Mount the side covers with the two screws M3 x 8 mm in the middle drill holes (fig. 21, page 7).

9 Cleaning and caring for the camera

NOTICE! Risk of damage!
Do not use sharp or hard objects to clean the device as these may damage the device.

➤ Clean the camera with a soft, damp cloth from time to time.

10 Guarantee

The statutory warranty period applies. If the product is defective, please contact the manufacturer's branch in your country (see the back of the instruction manual for the addresses) or your retailer.

For repair and guarantee processing, please send the following items:

- Defect components
- A copy of the receipt with purchasing date
- A reason for the claim or description of the fault

11 Disposal

➤ Place the packaging material in the appropriate recycling waste bins wherever possible.

If you wish to finally dispose of the product, ask your local recycling centre or specialist dealer for details about how to do this in accordance with the applicable disposal regulations.

12 Technical data

	PerfectView CAM50	PerfectView CAM50C
Item no:	9102000028	9102000019
Image sensor:	1/4" CCD	
Pixels:	approx. 270000 pixels	
Video standard:	PAL, 1 Vpp	
Light sensitivity:	< 1 Lux / 0 Lux with infrared LEDs	
Picture angle:	approx. 120° diagonal approx. 100° horizontal approx. 70° vertical	
Operating voltage:	11 – 16 V⎓	
Power consumption:	1.8 W	
Operating temperature:	–20 °C to +65 °C	
Protection class:	IP68	
Resistance against vibration:	6g	
Dimensions W x H x D (with camera bracket):	94 x 62 x 48 mm	
Weight:	approx. 0.4 kg	

Versions, technical modifications and delivery options reserved.

Approval

The device has the E11 approval.

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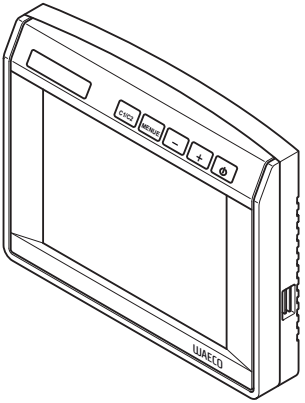

WAECO PerfectView M5L, M7L, M7LX

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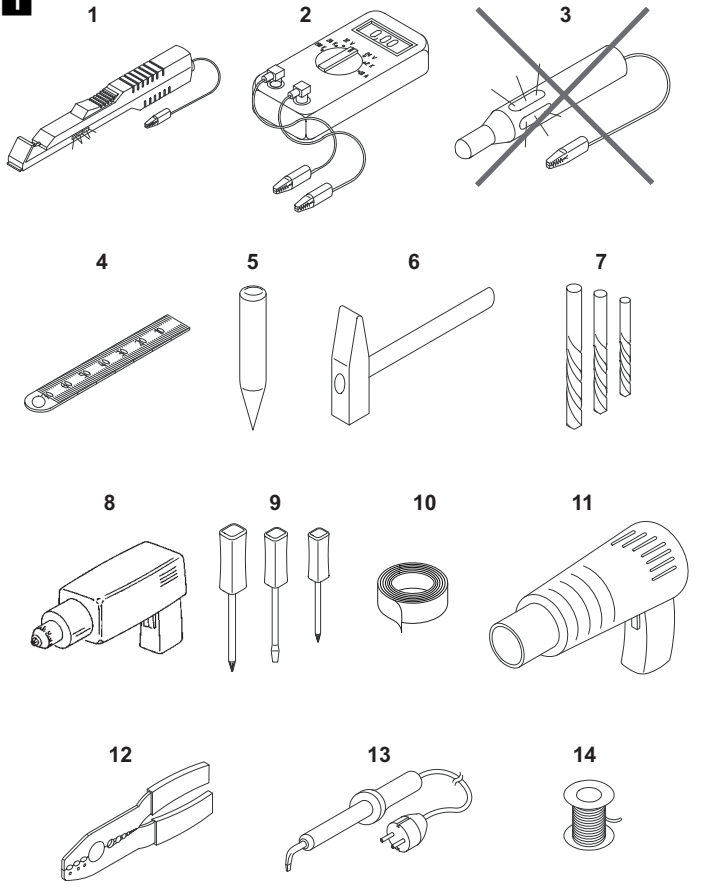

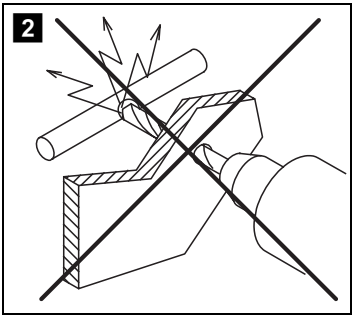
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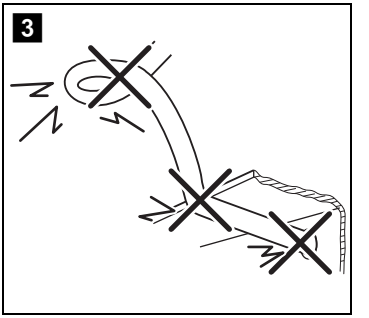
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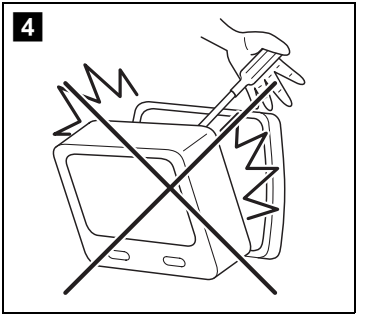
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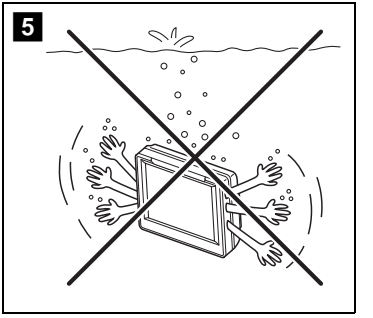
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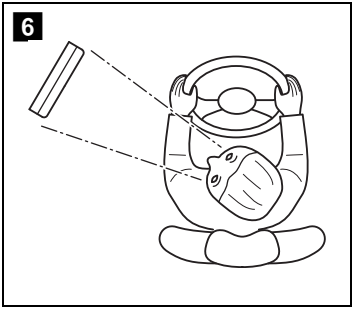
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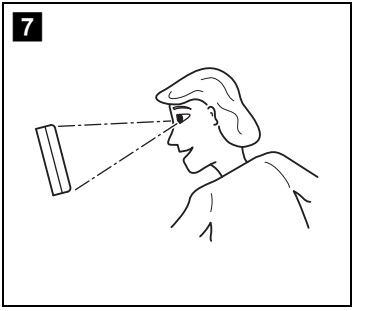
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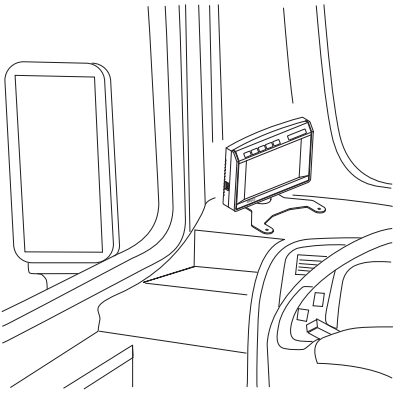

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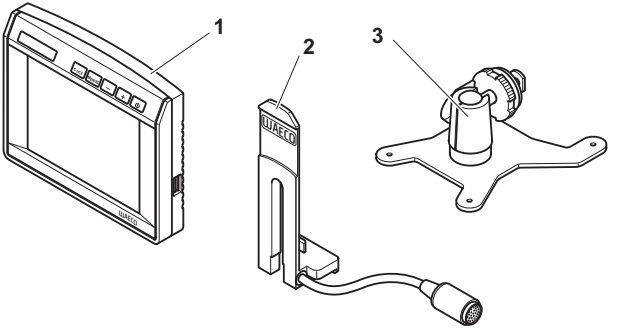

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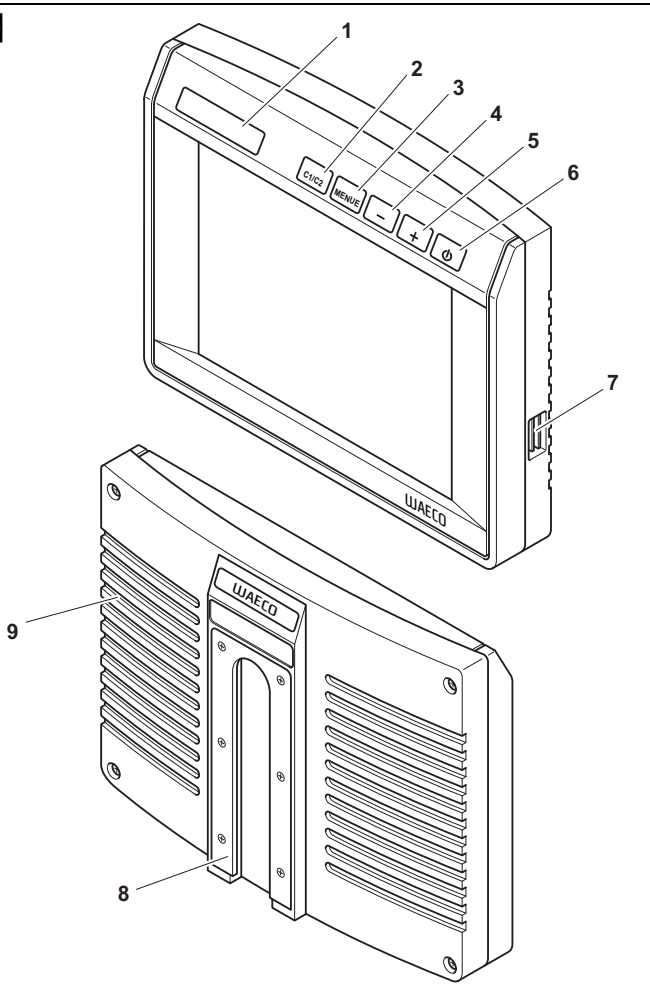

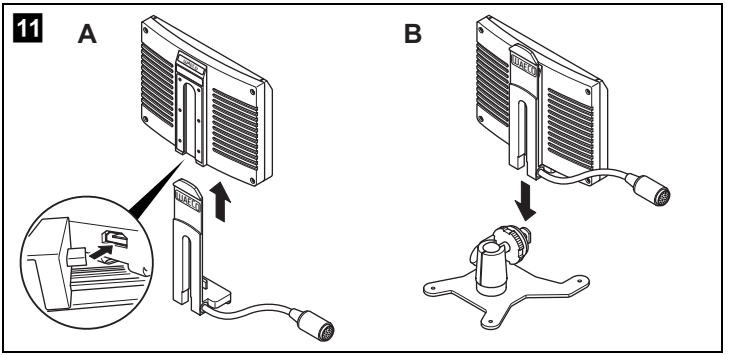
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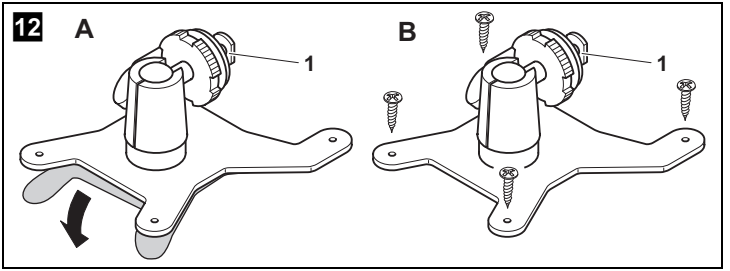
A
B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A
1
B
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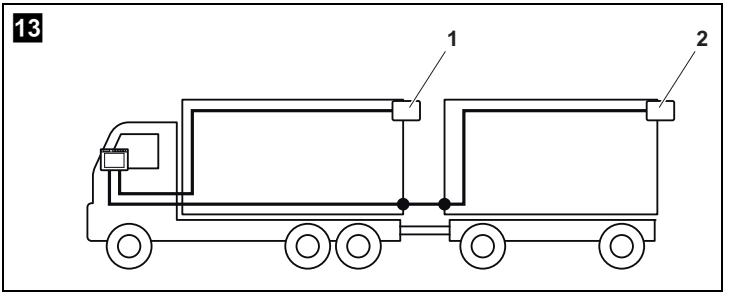
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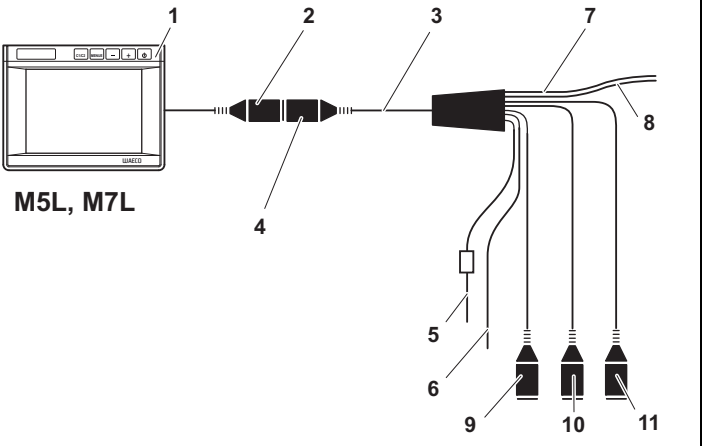

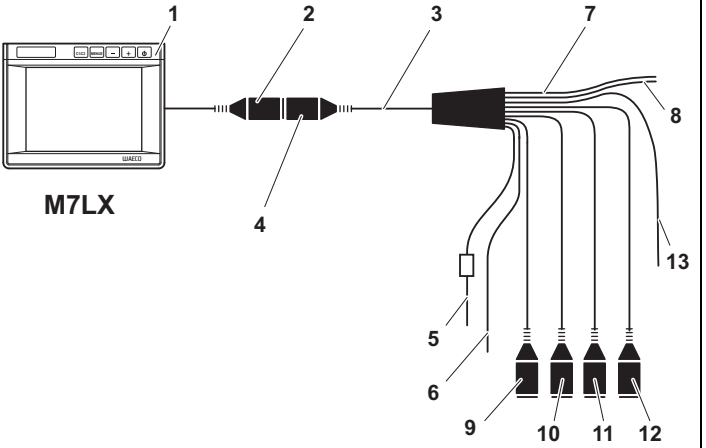

Please read this instruction manual carefully before installation and first use, and store it in a safe place. If you pass on the product to another person, hand over this instruction manual along with it.

Contents

1 Explanation of symbols

CAUTION!
Safety instruction: Failure to observe this instruction can lead to injury.

NOTICE!
Failure to observe this instruction can cause material damage and impair the function of the product.

NOTE
Supplementary information for operating the product.

➤ **Action:** This symbol indicates that action is required on your part. The required action is described step-by-step.

✓ This symbol describes the result of an action.

fig. 1 5, page 3: This refers to an element in an illustration. In this case, item 5 in figure 1 on page 3.

2 Safety and installation instructions

Please observe the prescribed safety instructions and stipulations from the vehicle manufacturer and service workshops.

The manufacturer accepts no liability for damage in the following cases:
- Faulty assembly or connection
- Damage to the product resulting from mechanical influences and excess voltage
- Alterations to the product without express permission from the manufacturer
- Use for purposes other than those described in the operating manual

NOTICE! Risk of damage!
- To prevent short circuits, always disconnect the negative terminal of the electrical system before working on the vehicle.
  If the vehicle has an additional battery, its negative terminal should also be disconnected.
- Inadequate supply cable connections could result in short circuits which:
  – Cause cable fires
  – Trigger the airbag
  – Damage electronic control devices
  – Cause electric functions to fail (indicators, brake light, horn, ignition, lights)

Please observe the following instructions:
- When working on the following cables, only use insulated cable lugs, plugs and tab sleeves:
  – 30 (direct supply from positive battery terminal)
  – 15 (connected positive terminal, behind the battery)
  – 31 (return cable from the battery, earth)
  – 58 (reversing light)

  Do **not** use plastic terminal strips.
- Use a crimping tool (fig. **1** 11, page 2) to connect the cables.
- When connecting to supply cable 31 (earth), screw the cable
  – To the vehicle's earth bolt with a cable lug and a gear disc or
  – To the sheet metal body work with a cable lug and a self-tapping screw

  Ensure that there is a good earth connection.

When the negative terminal of the battery is disconnected, all data stored in the volatile memories will be lost.
- The following data must be set again, depending on the vehicle equipment options:
  – Radio code
  – Vehicle clock
  – Timer
  – On-board computer
  – Seat position

  You can find instructions for making these settings in the appropriate operating instructions.

Observe the following installation instructions:

CAUTION!
- Secure the monitor in such a way that it cannot become loose under any circumstances (sudden braking, accidents) and cause **injuries to the occupants** of the vehicle.
- Do not attach the monitor in the area that may be used by an airbag, as this could cause injury if the airbags are triggered.

Observe the following instructions when working with electrical parts:
- When testing the voltage in electrical cables, only use a diode test lamp (fig. **1** 1, page 2) or a voltmeter (fig. **1** 2, page 2).
  Test lamps with an illuminant (fig. **1** 3, page 2) take up voltages which are too high and which can damage the vehicle's electronic system.
- When making electrical connections, ensure that
  – They are not kinked or twisted
  – They do not rub on edges
  – They are not laid in sharp edged ducts without protection (fig. **3**, page 3).
- Insulate all connections.
- Secure the cables against mechanical wear with cable binders or insulating tape, for example to existing cables.

Observe the following instructions when handling the LCD monitor:

CAUTION!
- People (including children) whose physical, sensory or mental capacities or whose lack of experience or knowledge prevent them from using this product safely should not use it without the supervision or instruction of a responsible person.
- Do not open the monitor (fig. **4**, page 3).
- Do not submerge the monitor in water (fig. **5**, page 3); the monitor is not waterproof.
- The monitor may not impair your vision when driving (fig. **8**, page 4).
- Do not operate the monitor with wet hands.
- Do not operate the monitor if the housing has been damaged.

NOTICE!

- Connect it to the correct voltage.
- Do not use the monitor in areas which
  - are subjected to direct sunlight,
  - are subject to strong temperature fluctuations,
  - have high levels of humidity,
  - are poorly ventilated,
  - are dusty or oily.
- Do not press the LCD display.
- Do not drop the monitor.
- If you use the monitor in vehicles, the vehicle should be running during operation to prevent the vehicle battery from becoming fully discharged.
- The picture quality can be impaired in the vicinity of electromagnetic fields. For this reason do not mount the monitor near loudspeakers.

3 Scope of delivery

No. in fig. 9, page 4	Quantity	Designation	Item no.	
			M5L	M7L
1	1	Monitor	9102100006	9102100007
2	1	Monitor bracket	9102200052	9102200053
3	1	Support base	9102200054	
–	1	Connection cable	9102200055	
–	–	Fastening material		

No. in fig. 9, page 4	Quantity	Designation	Item no.
			M7LX
1	1	Monitor	9102100008
2	1	Monitor bracket	9102200053
3	1	Support base	9102200054
–	1	Connection cable	9102200056
–	–	Fastening material	

4 Accessories

Available as accessory (not included in scope of delivery):

Designation	Item no.
Monitor bracket with support for M5L	9102200049
Monitor bracket with support for M7L	9102200050

5 Intended use

The LCD monitors PerfectView M5L, M7L and M7LX are monitors which are primarily intended for use in vehicles. They can be used together with cameras (e.g. a reversing video system) or other video sources.

The LCD monitors are designed for use in all vehicles.

6 Technical description

6.1 Function description

The LCD monitor is a monitor for the connection of cameras (e. g. reversing video systems) or other video sources (e. g. TV set). It is possible to switch back and forth between video sources.

The monitor features control cables which allow the cameras to be activated automatically.

To secure it and connect the power, slide it onto the monitor bracket. The Easylink system allows the monitor to be easily removed from the monitor bracket. It can therefore be removed to protect it from theft, or for use in several trucks in a fleet (fleet solution).

The monitors **M5L** and **M7L** can operate up to two cameras.

The monitor **M7LX** can operate up to three cameras. Alongside the usual controls, the three cameras can be switched consecutively in automatic mode. This monitor also features a distance indicator in the display which is activated automatically when the reverse gear is engaged.

A further video source can also be connected to the monitors, e.g. a reversing camera on the trailer (trailer operation). This additional video input has signal detection: when a video source is connected to this video input, video input C1 is automatically deactivated (e.g. the reversing camera on the tractor) and the image from the additional video input is displayed instead.

The brightness of the monitor adapts automatically to the ambient light.

6.2 Control elements

The following control elements are located on the **monitor**:

No. in fig. 10, page 5	Designation	Description
1		Sensor window for the dimmer function. The brightness of the display is automatically adapted to the ambient light.
2	C1/C2	1. Switches from video source 1 to video source 2 (C1 and C2) and vice-versa. 2. Switches the menu off. 3. **M7LX:** Switches the automatic camera panning on (the cameras are activated in preset time intervals, e. g. for horse transporters with multi-box monitoring).
3	MENU	1. Switches the menu on. 2. Calls up the parameters for setting. The parameters are distributed over two screen pages in the following order: **Page 1** – Brightness – Contrast – Colour **Page 2** – Language: “English” or “German” – Reset (“Default”): Default setting for all parameters – Camera1/Camera2: “Normal” or “Mirrored” – **M7LX:** Camera3: “Normal” or “Mirrored” – **M7LX:** Distance: Distance marker setting
4	–	Decreases the value of the selected parameter.
5	+	Increases the value of the selected parameter.
6	⏻	Switches the monitor on and off.
7		USB charger output (5 V, 500 mA)
8		Monitor bracket
9		Loudspeaker

7 Mounting the LCD monitor

7.1 Tools required (fig. 1, page 2)

For **installation and assembly** you will require the following tools:
- Measuring ruler (**4**)
- Centre punch (**5**)
- Hammer (**6**)
- Drill bit set (**7**)
- Drill (**8**)
- Screwdriver (**9**)

To make and test the **electrical connection**, the following tools are required:
- Diode test lamp (**1**) or voltmeter (**2**)
- Insulating tape (**10**)
- Heat shrinking sleeve
- Hot air blower (**11**)
- Crimping tool (**12**)
- Soldering iron, if required (**13**)
- Solder, if required (**14**)
- Cable bushing sleeves, if necessary

To **fasten the cables**, you may require additional cable binders.

7.2 Installing the monitor

CAUTION! Risk of injury!
Select the location of the monitor so that it cannot injure anybody in the vehicle under any circumstances (e.g. sudden braking, road traffic accidents).

Observe the following installation instructions:
- Select an installation location that provides an unobstructed view of the monitor (fig. 6, page 3 and fig. 7, page 3).
- Never install the monitor in areas where your head may impact or in the area that would be filled by an expanding airbag. This could cause injury if the airbag opens.
- The monitor may not impair your vision when driving (fig. 8, page 4).
- The installation location should be flat.
- Check that there is sufficient room underneath the installation location to attach the washers and nuts.
- Check beforehand that there is sufficient room for the drill head to come out on the other side (fig. 2, page 3).
- Bear in mind the weight of the monitor. Provide reinforcement if necessary (larger washers or plates).
- Ensure that you can lay the connection cables to the monitor.

Choosing the installation location

- ➤ Place the monitor and the mounting rail on the monitor bracket (fig. **11** A, page 6).
- ➤ Place the monitor bracket and the mounting rail onto the support base and secure it using the knurled nuts (fig. **11** B, page 6).
- ➤ Position the monitor and the attached monitor bracket provisionally.
- ➤ Mark the outlines of the corners of the support base on the dashboard.
- ➤ Unscrew the support base from the monitor holder.

NOTE
You can fasten the support base using adhesive or screws.

Sticking the monitor bracket onto the dashboard (fig. 12 A, page 6)

- ➤ Remove the film from under the support base.
- ➤ Stick the support base to the position of your choice.

Screwing the monitor bracket onto the dashboard (fig. 12 B, page 6)

- ➤ Hold the support base within the outlines marked beforehand.
- ➤ Mark four different drilling points.
- ➤ Drill a hole of ∅ 2 mm at each of the points marked beforehand.
- ➤ Screw the support base on using 4 x 20 mm self-tapping screws.

Fastening the monitor

- ➤ Place the monitor and the mounting rail onto the support base and secure it using the knurled nuts (fig. **11**, page 6).

7.3 Connecting the monitor electrically

The circuit diagram for the LCD monitor can be found in fig. 14, page 7.

No. in fig. 14, page 7	Designation
1	Monitor
2	20-pin socket
3	Monitor line
4	20-pin plug
5	12–24 V positive cable (red): connected to the positive pole of the ignition (connected positive, terminal 15) or the positive pole of the battery (terminal 30).
6	Earth cable (black): connected to the negative pole of the voltage source.
7	Cable (green): control input for video input C1, e. g. for connection to the reversing light.
8	Cable (white): control input for video input C2, e. g. side camera.
9	6 pin socket C1 (connection to video source 1)
10	6 pin socket C2 (connection to video source 2)
11	6 pin socket C3 (connection to video source 3) **M5L, M7L only:** with video signal recognition)
12	**M7LX only:** 6 pin socket C4 (connection to video source 4, with video signal recognition).
13	**M7LX only:** Cable (blue): Control input for video input C3.

NOTICE!

Cables and connections that are not properly installed will cause malfunctions or damage to components. Correct installation of cables and connections ensures lasting and trouble-free operation of the retrofitted components.

Observe the following instructions when laying the connection cable:

- Feed the connection cable through existing ducts or other openings where possible, e. g. ventilation grilles. If no suitable ducts or openings are available you will need to drill a hole of ∅ 20 mm. Check beforehand that there is sufficient space on the other side for the drill head to emerge (fig. **2**, page 3).
- To prevent damage to the cables, when laying them ensure that there is always a sufficient interval to vehicle components which can become hot (lights, heaters, ventilators etc.).
- Wrap insulating tape around every connection on the cable (even inside the vehicle).
- When laying the cables, make sure:
  - they are not kinked or twisted
  - they do not rub on edges
  - they are not laid in sharp-edged ducts without protection (fig. **3**, page 3).

Connecting the monitor as a reversing video system (fig. 14, page 7)

➤ Lay the connection cable for the monitor bracket on the dashboard.

➤ Insert the plug of the monitor cable (**2**) into the socket (**4**) of the connection cable (**3**).

NOTICE! Risk of damage
Make sure the polarity is correct when connecting to a voltage source.

➤ Connect the red and black cables of the connection cable to a suitable voltage supply:
  - Connect the red cable (**5**) to terminal 15 (ignition).
  - Connect the black cable (**6**) to terminal 31 (earth).

➤ If the monitor is to be activated when reverse gear is selected, connect the green cable (**8**) to the positive cable of the reversing light.

NOTE
If voltage is present in the green cable (**8**), the reversing camera will be activated automatically. The reversing camera has priority.

➤ If the monitor is to be activated e. g. when the indicator is flashing, connect the following control cable to a positive cable of the indicator:
  - **M5L, M7L:** white cable (**8**)
  - **M7LX:** white cable (**8**), blue cable (**13**)

NOTE
If voltage is present in this control cable, the following video input will be activated:
- **M5L, M7L:** video input C2
- **M7LX:** video input C2, video input C3

This control cable is used as a signal cable for the activation e. g. of a side camera when an indicator is flashing.

➤ If necessary, connect the socket C1 (**9**) of the connection cable to the plug of the video source 1 (e. g. camera).
➤ If necessary, connect the socket C2 (**10**) of the connection cable to the plug of the video source 2 (e. g. side camera).
➤ **M7LX only:** If necessary, connect the socket C3 (**11**) of the connection cable to the plug of the video source 3 (e. g. reversing camera).

NOTE
Observe the power consumption of the video system. The cameras are equipped with heaters. A maximum current of 1.5 A can flow (three cameras in heating mode). Use a disconnector switch for direct connection to the battery. This allows you to disconnect the video system from the battery easily if you are no longer using the vehicle.

Connecting an additional reversing camera (trailer operation)
➤ **M5L, M7L:** If necessary, connect socket C3 (**11**) of the connection cable to the plug of the additional reversing camera.
➤ **M7LX:** If necessary, connect socket C4 (**12**) of the connection cable to the plug of the additional reversing camera.

8 Using the LCD monitor

8.1 Switching on the monitor

➤ If the monitor is switched off, press the "⏻" button (fig. **10** 6, page 5) to switch the monitor on.
✓ The picture appears.

8.2 Switching off the monitor

➤ Press the "⏻" (fig. **10** 6, page 5) button to switch off the monitor.
✓ The picture disappears.

8.3 Adjusting the monitor (fig. 10, page 5)

To set the monitor to suit your requirements, proceed as follows:
➤ Press the "MENU" button (**3**) to call up the required parameter.
✓ The parameters to be set appear in the following order:
Page 1:
– Brightness: 0 – 60
– Contrast: 0 – 60
– Colour: 0 – 60

Page 2:
- Language: “English” or “German”
- Reset (“Default”): Default setting for all parameters
- Camera1/Camera2: “Normal” or “Mirrored”
- **M7LX:** Camera3: “Normal” or “Mirrored”
- **M7LX:** Distance: Distance markers (“Setting distance markers (M7LX) (fig. 0, page 5)” on page 35)

➤ Press the “–” button (**4**) or “+” button (**5**) to set the parameter of your choice.
➤ Press the “–” button (**4**) to **reduce** the value of the selected parameter.
➤ Press the “+” button (**5**) to **increase** the value of the selected parameter.

8.4 Setting the video source (fig. 10, page 5)

NOTE
If you have connected the green cable to the reversing light and voltage is present, reversing camera V1 is activated automatically (see “Using the monitor with two reversing cameras (trailer operation) (fig. c, page 6)” on page 35).

M5L, M7L

➤ If you wish to switch to a different video source (from camera 1 to camera 2), press the “C1/C2” button (**1**).
✓ The monitor switches from camera 1 to camera 2 or vice-versa.

M7LX

➤ If you would like to switch to a different video source, press the “C1/C2/C3” button (**1**).
✓ The monitor changes the camera in the order “camera 1 – camera 2 – camera 3”.

➤ If you wish the cameras to run **automatically**, press and hold the “C1/C2/C3” button (**1**) for at least three seconds.
✓ The monitor display the “AUTO” mode.
✓ The monitor changes the cameras in the order “camera 1 – camera 2 – camera 3” automatically in the preset time intervals.
No sound is available in this operating mode.
➤ If you wish to set the display time (2 s to 16 s):
Press the “–” button (**4**) to reduce the camera display time.
Press the “+” button (**5**) to increase the camera display time.
➤ To end the automatic function, press the “C1/C2/C3” button (**1**) again.
✓ The monitor displays the “MANUAL” mode.

8.5 Using the monitor with two reversing cameras (trailer operation) (fig. 13, page 6)

You do not need to make any settings to the monitor during operation. The monitor automatically detects whether one or two cameras are connected (e.g. to a truck-trailer combination).

- One camera connected (e. g. tractor or trailer): the camera connected to C1 (**1**) is activated.
- Two cameras connected (e. g. tractor with trailer):
  - **M5L, M7L only:** the camera connected to C3 (**2**) is activated. (C1 is inactive).
  - **M7LX only:** the camera connected to C4 (**2**) is activated. (C1 is inactive).

8.6 Setting distance markers (M7LX) (fig. 10, page 5)

To set the distance markers, proceed as follows:

➤ Press the “MENU” button (**3**) to call up the required parameter.
✓ The parameters to be set appear.
➤ Press the “MENU” button (**3**) again to select the parameter “Set distance markers”.
➤ Press the “–” button (**4**) to display the distance markers.
➤ Press the “–” button (**4**) again to select the parts to be set.
✓ The parts to be set are highlighted in red.
➤ Press the “+” button (**5**) to set the part highlighted in red.
You can slide each distance marker to one of three positions.
The first time you press, the side marker will be activated, the second time the upper distance marker, the third time the middle, the fourth time the lower, etc.
➤ Press the “MENU” button (**3**) to exit the settings.

9 Cleaning and caring for the LCD monitor

NOTICE! Risk of damage

- Do not use sharp or hard objects for cleaning as these may damage the monitor.
- Remove the cable before cleaning the monitor to prevent short circuiting.

➤ Clean the monitor with a soft, damp cloth from time to time.

10 Guarantee

The statutory warranty period applies. If the product is defective, please contact the manufacturer's branch in your country (see the back of the instruction manual for the addresses) or your retailer.

For repair and guarantee processing, please send the following items:

- Defect components
- A copy of the receipt with purchasing date
- A reason for the claim or description of the fault

11 Disposal

➤ Place the packaging material in the appropriate recycling waste bins wherever possible.

If you wish to finally dispose of the product, ask your local recycling centre or specialist dealer for details about how to do this in accordance with the applicable disposal regulations.

12 Technical data

	PerfectView M5L	PerfectView M7L	PerfectView M7LX
Item no.:	9102100006	9102100007	9102100008
Type:	Colour TFT LCD		
Display size:	5" (12.7 cm)	7" (17.8 cm)	
Brightness:	Approx. 300 cd/m²	Approx. 300 cd/m²	
Display resolution, H x V:	337000 pixels	337000 pixels	
Video standard:	PAL/NTSC (automatic switching)		
Operating voltage:	12–24 V DC		
Power:	Max. 10 W		
USB charger output:	5 V, 500 mA		
Operating temperature:	–10 °C to 60 °C		
Storage temperature:	–25 °C to 80 °C		
Relative humidity:	Max. 85 %		
Vibration resistance:	4 g		
Dimensions in mm W x H x D (with bracket):	144 x 145 x 118	186 x 145 x 118	
Weight:	350 g	400 g	

Versions, technical modifications and delivery options reserved.

Certifications

The appliance has E11 certification.

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