

# MLA900 Operating Instructions

Conductivity measuring device  
for light petroleum products



Operation  
Maintenance  
Approval



## Document information

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### Described product

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### Warranty information

Indicated product characteristics and technical data do not constitute warranty statements.

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## Warning symbols

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Hazard (general)



Hazard in potentially explosive areas



Hazard by explosive substances/mixtures

## Warning levels / signal words

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### WARNING

Risk or hazardous situation that could result in serious injuries or death.

### CAUTION

Hazard with the possible consequence of minor or slight injuries *and/or* risk of damage to property.

### IMPORTANT

Hazard with the possible consequence of property damage.

## Information symbols

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Important technical information for this product



Nice to know



Supplemental information



Link to information at another place

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# MLA900

## 1 For your own safety


General safety  
The most important safety rules


## 1.1 General safety in potentially explosive areas


	<b>WARNING: Hazards in potentially explosive areas</b> <ul style="list-style-type: none"><li>• <i>Before using the instrument for the first time in a potentially explosive area:</i> Observe all safety instructions in these operating instructions.</li></ul>
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## 1.2 The most important safety rules for the MLA900

Observe the following safety notes when assembling, operating, maintaining, repairing or replacing parts:

	<b>CAUTION: Risk of wrong measurements</b> <ul style="list-style-type: none"><li>• Before each use of the MLA900, carry out a function test outside of the hazardous areas.</li></ul>
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	<b>WARNING: Risk of explosion if potential equalisation is missing</b> <ul style="list-style-type: none"><li>• <i>Before lowering the measuring probe into the liquid container:</i> Establish a safe electrical connection between the ground clamp of the display unit and the liquid container (potential equalisation),</li></ul>
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	<b>WARNING: Risk of explosion if the housing is open</b> <ul style="list-style-type: none"><li>• Never open the housing while it is in a potentially explosive area.</li></ul>
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	<b>WARNING: Hazard due to defective instrument</b> <ul style="list-style-type: none"><li>• <i>If the instrument may no longer be safe to operate:</i> Take the instrument out of operation and secure it against unauthorised use</li></ul>
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# MLA900

## 2 Instructions for use

Application area  
Application restrictions  
Approval

## 2.1 Proper use

### 2.1.1 Intended area of application

#### Measuring function

The MLA900 determines the electrical conductivity and temperature of petroleum products such as aviation fuel and other petroleum products.

These liquids can become electrostatically charged during filling, pumping or filtering operations. If an ignitable gas mixture is also present in the environment, there is a hazard that the gas mixture will be ignited by a discharge spark, i.e. explode. The electrical conductivity of the liquid is measured to assess this hazard, (see DIN 51 412-T02-79, "Determination of electrical conductivity, field method").

The conductivity is given in the physical unit "pS/m" (picosiemens per metre). The unit "c.u." (conductivity unit), which is still frequently used in the mineral oil industry, is equivalent:

$$1 \frac{\text{pS}}{\text{m}} = 1 \text{ c.u.}$$

#### Ambient conditions

The MLA900 is designed as a measuring instrument for outdoor use.

Operate the MLA900 at an ambient temperature of -20 °C to +60 °C. Outside this temperature range, the instrument functions are not guaranteed.



- At temperatures above +60 °C, there is a hazard that corrosive liquid may leak from the battery and damage the electronics. In addition, the LC displays may become defective (irreversible blackening).
- At temperatures below -20 °C, the LC displays in the display unit may freeze; as a result, the housings of the LC displays may burst.
- Low temperatures affect the flexibility of the probe cables. Avoid bending the probe cables excessively at low temperatures. Otherwise a cable could break due to brittleness of the cable sheath.

### 2.1.2 Application restrictions

The MLA900 must only be used for conductivity and temperature measurement of petroleum products such as petrol, kerosene and oils/greases. Other liquids, such as acids or solvents containing chlorinated hydrocarbons, may damage the measuring probe.

Component	Clean with	Avoid contact with
measuring probe probe cables	petrol spirit (ethanol) isopropanol	acids chlorinated hydrocarbons (CHC) methanol acetone

**The measuring method of the MLA900 complies with:**

- German standard DIN 51412-T02-79 "Determination of electrical conductivity, field method"
- ASTM 02624 "Standard Test Methods for Electrical Conductivity of Aviation and Distillate Fuels"

**Technical design of the MLA900:**

The rules and standards relevant to the MLA900 are listed in the Declaration of Conformity.

## 2.2

**Approval****Approved area of application**

The MLA900 is approved for use in potentially explosive areas where flammable gases, vapours or mists may occur (EEx ia IIB T6). The MLA900 measuring probe is approved for use in Zone 0, the display unit for Zone 1.

**Prescribed operating conditions**

The following applies to the use of the MLA900 conductivity meter in the area of application of the "Ordinance on Electrical Installations in Potentially Explosive Atmospheres (ElexV)":

**WARNING: Operation in potentially explosive areas**

- The MLA900 is intended exclusively for mobile, portable use.
- The measuring probe of the MLA900 is approved for use in containers for flammable liquids (hazardous area Zone 0).
- The display unit of the MLA900 may only be used in the hazardous area Zone 1.
- The measuring probe may only be used in such liquids to which its materials are sufficiently chemically resistant.
- Damaged measuring probes must not be used.
- Before the measuring probe is brought into Zone 0, all plug/screw connections of the cable must be checked.
- The measuring probe may only be used with the associated display unit.
- Before lowering the measuring probe into the liquid container, the grounding cable of the display unit must be connected to the container in order to equalise the electrical potentials.
- The carrying case does not have to be approved for use in the potentially explosive area.
- The certificate of compliance of the MLA900 must be observed.



**MLA900**

## **3 Preparation for use**

Supplied parts  
Assembly

## 3.1

**Supplied parts**

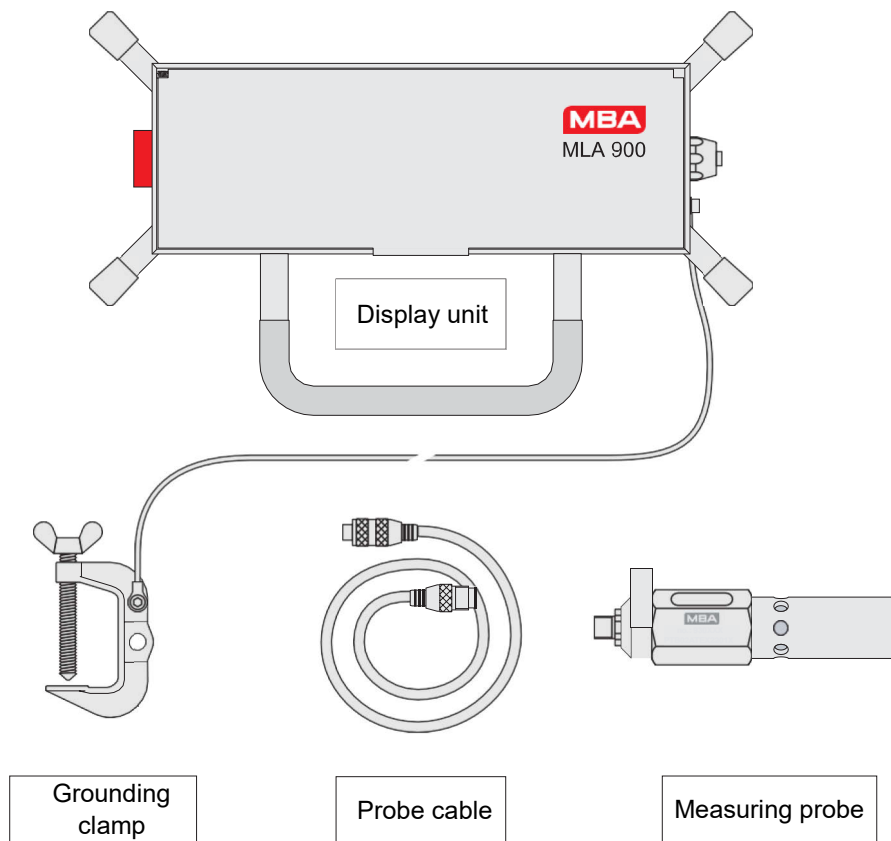
When delivered, the MLA 900 consists of:

- display unit with grounding clamp
- measuring probe
- probe cable
  - standard length: 2 m
  - optionally: 5m, 10 m, 17 m, 24m
- Carrying case (not approved for potentially explosive areas)

**CAUTION: Risk of damage**

- Small bending radii can damage the cables (cable breakage).
- Damaged cables must not be used in potentially explosive areas.
- Do not kink the probe cables and do not bend them too much.
- At temperatures below 0 °C, handle the probe cables with special care because the cable sheathing can become brittle at these temperatures.
- Avoid small bending radii (risk of breakage).

Figure 1: Supplied parts of the MLA900



**Keep the carrying case even if you do not intend to use it when operating the MLA900. It may be useful as a shipping packaging.**

## 3.2

## Assembly

The MLA900 consists of four instrument parts (measuring probe, display unit, grounding clamp, probe cable). - Please note: The parts only comply with the safety regulations for conductivity measurement in the petroleum industry when assembled.

### Combination of the measuring probe and the display unit

The measuring probe and display unit have been optimally matched to each other at the manufacturer's factory. If another unit is connected, the measuring accuracy cannot be guaranteed.

- Only use the display unit with the measuring probe that has the identical serial number.

### Probe cable

- Connect the display unit and the measuring probe using one of the supplied probe cables (select cable length to suit the application).



You can also connect the probe cables together to create a 12 m long cable. With additional cable pieces, you can also realise longer cable lengths. The probe cable must not be longer than 24 m in total.



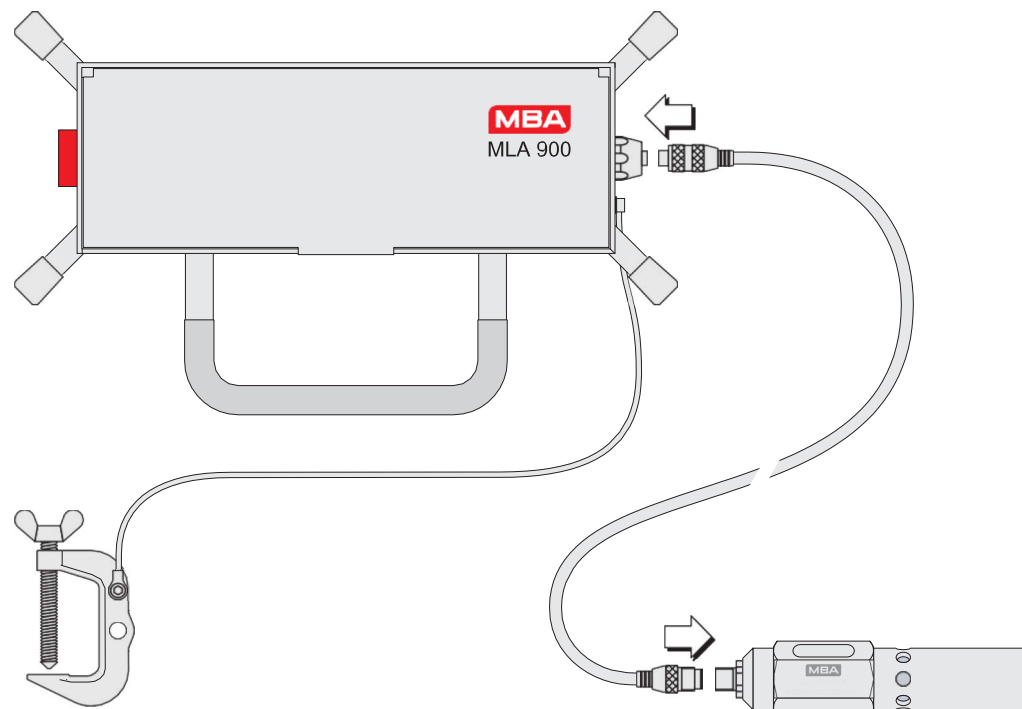
### WARNING: Hazard with incorrect equipment

Only use cables of the type supplied to connect the measuring probe and the display unit. Operation with other cables is not permitted in potentially explosive areas.

### Grounding clamp

- Ensure that the grounding clamp is firmly connected to the display unit (screw connections, cable lugs).
- Do not operate the MLA900 if this is not ensured.

Connecting the probe cable

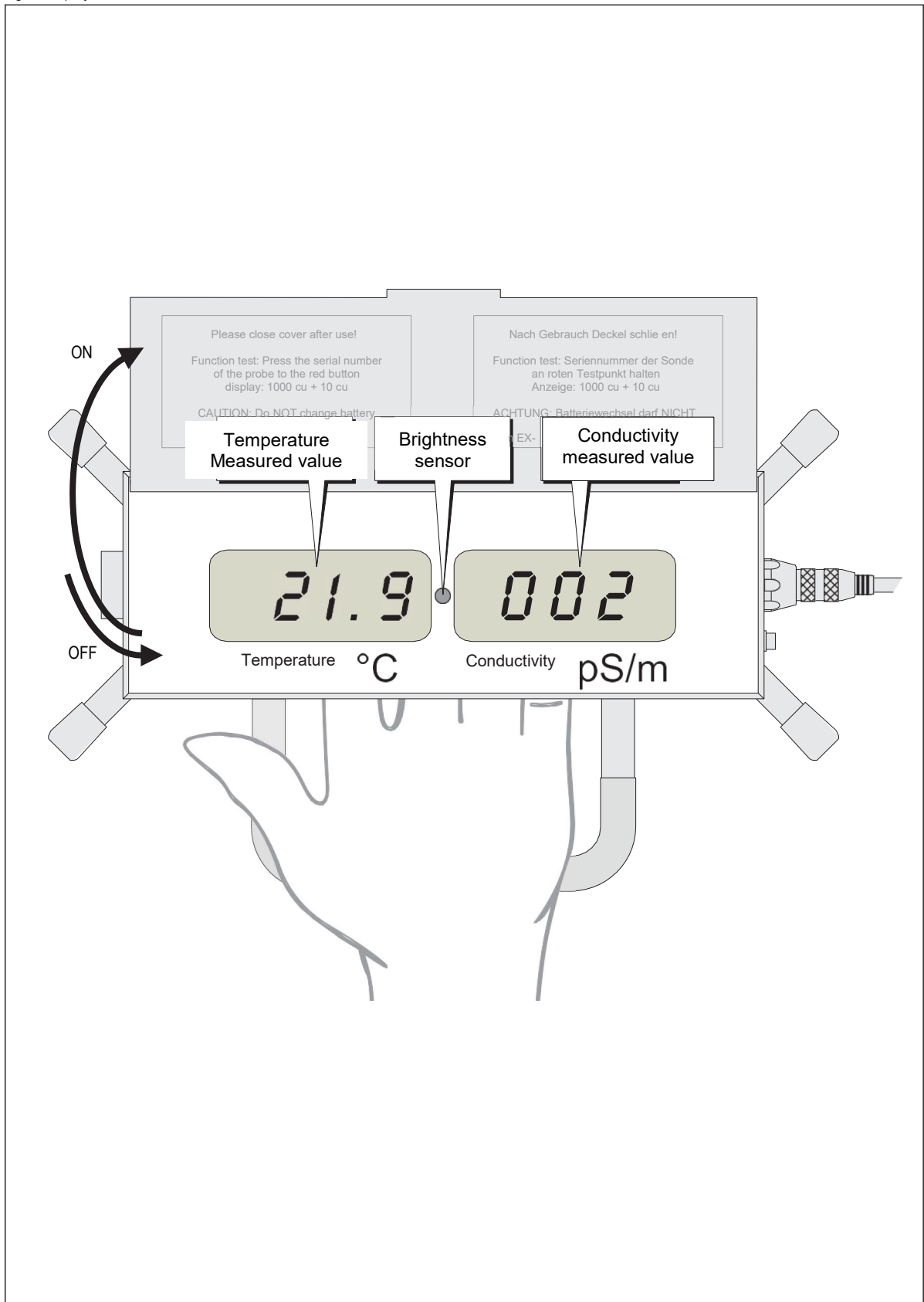


# MLA900

## 4 Handling

Instrument display  
Function test  
Measuring procedure

Fig. 3 Display unit



## 4.1 Display unit

### 4.1.1 Handling

#### Handling during transport

- Always use the carrying handle of the housing for carrying.
- Do not use the cover flap and the cable holders as a carrying handle.

#### Handling when measuring

- During measurements, hold the display unit in your hand as firmly as possible.



**If you put the display unit down while measuring: Make sure that the display unit is standing securely. This is because the display unit could be pulled from its location by the weight of the measuring probe or even fall into the liquid container.**



#### **WARNING: Hazards due to incorrect use**

- In potentially explosive areas, only operate the display within "Zone 1".
- *Before lowering the measuring probe into the liquid container:* Connect the grounding cable of the measuring probe to the container.

### 4.1.2 Switching on and off

*Switching on:* Open the cover flap of the display unit.

- The MLA900 switches on automatically when the brightness sensor is exposed to light.

*Switching off:* Close the cover flap of the display unit.

- The MLA900 switches itself off automatically when the flap is closed.

### 4.1.3 Measured value displays

Left display:
Temperature of the measuring probe / liquid
Display range: -199 ... +199 °C

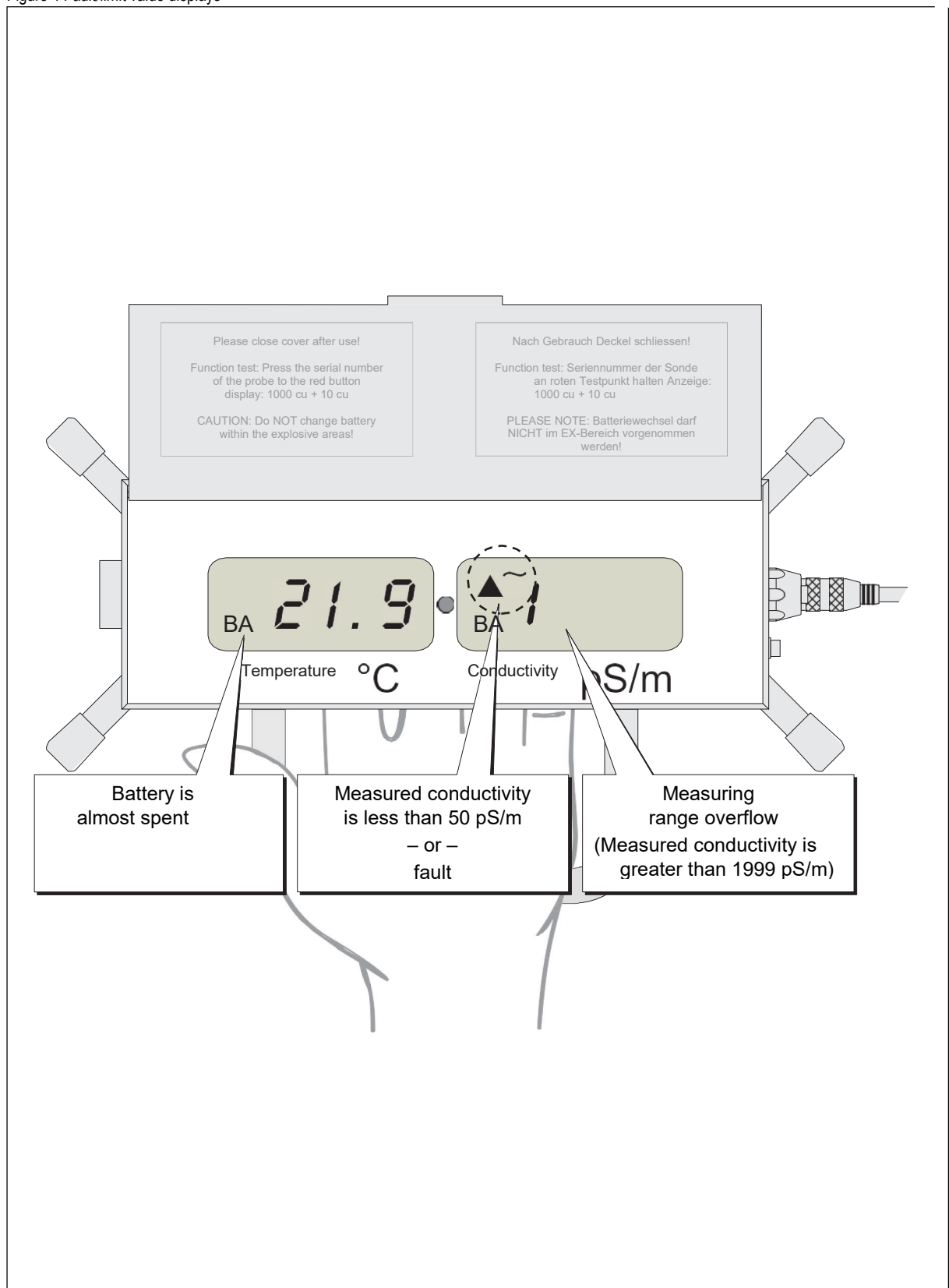
Right display:
Measured conductivity
Measurement range: 0 ... 1999

Pay attention to possible fault or limit value indications.



The MLA900 is only approved for measurement in potentially explosive areas in the temperature range **-20 ... +60 °C**. The MLA900 meets the stated specifications in this temperature range.

Figure 4 Fault/limit value displays



## 4.2

**Fault/limit value displays****BAT** (shown on both displays)

Meaning	Measures/instructions
The built-in battery is almost spent: The battery voltage is less than 8 V (new battery: 9 V).	Replace the battery.

▲~ (right display, conductivity)

Meaning	Measures/instructions
The measuring probe is outside the liquid.	Immerse the probe in the liquid.
The conductivity of the measuring medium is less than 50 pS/m.	Observe the safety rules and carry out the measures prescribed for this case.

▲~ 1xxx + constantly changing temperature measured value

Meaning	Measures/instructions
The probe cable is broken.	Perform a function test. <i>If not successful:</i> Change the probe cable. Then carry out another function test.
The measuring probe is very dirty or damp (wetted with water).	Clean and dry the measuring probe.

**WARNING: Danger if cable is defective**

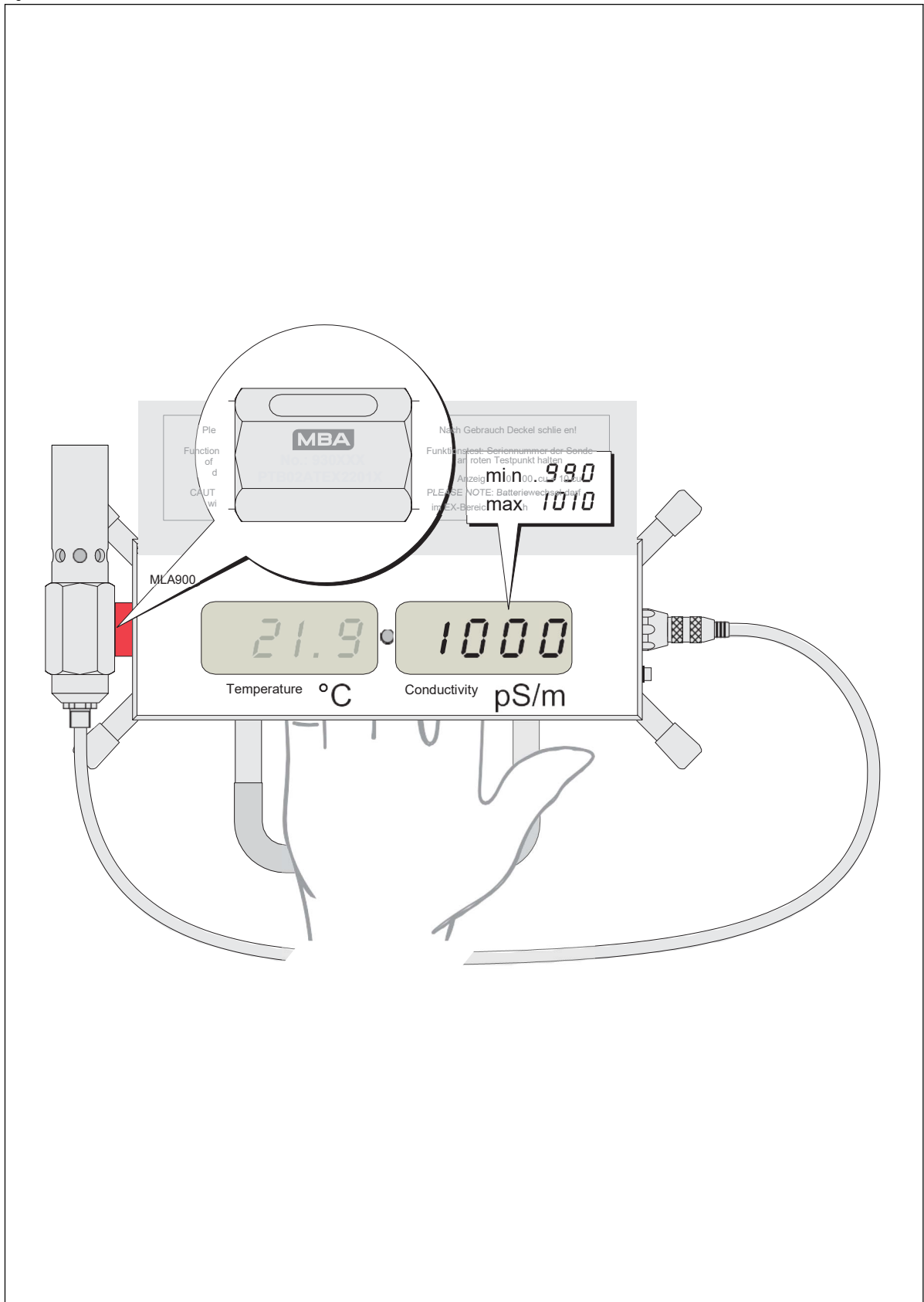
- Do not operate the MLA900 in potentially explosive areas if the cable is damaged or defective.
- Only change the probe cable outside potentially explosive areas.

1

Meaning	Measures/instructions
The measured value is greater than <b>1999</b> pS/m.	Check whether the conductivity of the liquid can actually be greater than 1999 pS/m.
The measuring probe is very dirty or damp (wetted with water).	Clean and dry the measuring probe.
The MLA900 is defective.	Perform a function test.



Figure 6 Function test



## Function test

**CAUTION: Risk of incorrect measurements**

Always carry out a function test before using the MLA900.  
Carry out the function test outside potentially explosive areas.

**Check the condition of the instrument**

- 1 Make sure
  - that the outer cylinder of the measuring probe is firmly screwed on,
  - that the measuring probe is sufficiently clean and dry,
  - that the display unit and measuring probe are correctly connected to each other (check cables and plug connectors).

**Check basic condition**

- 2 Open the display unit cover to switch on the MLA900.  
Let the measuring probe hang freely in the air.  
The conductivity reading should now be **-2 ... 2** pS/m.  
*If a value above 2 pS/m is displayed:* Clean the measuring probe carefully.  
*If a value below -2 pS/m is displayed:* Check the battery.

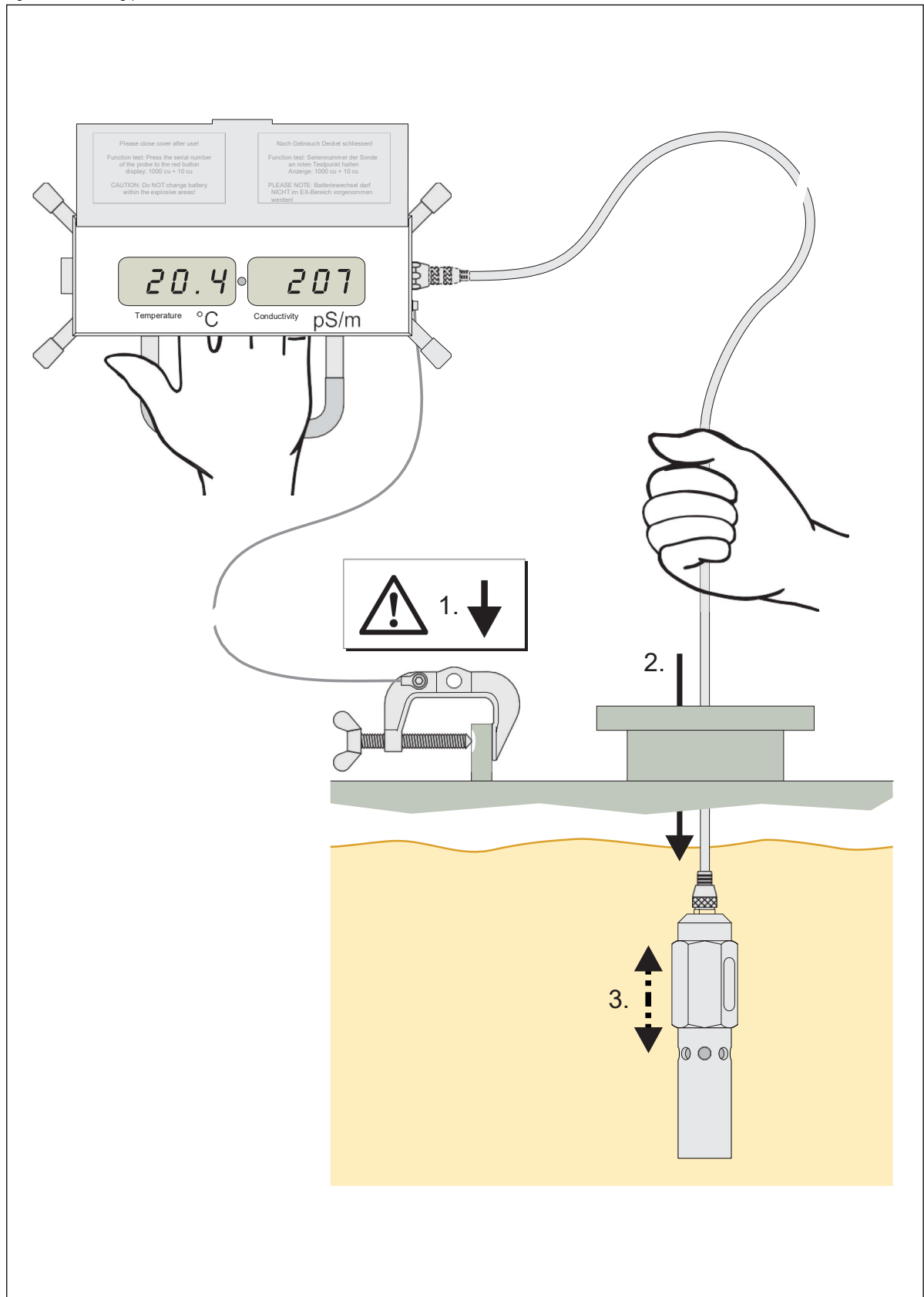
**Check the measuring function**

- 3 Hold the face of the measuring probe bearing the company logo close to the red disc on the display unit.  
The MLA900 should now read **1000** pS/m ( $\pm 10$  pS/m).  
*If the reading is not between 990 and 1010 pS/m:* Check the battery.



Calibration (readjustment of probe and electronics) is normally not necessary. If necessary, this work must be carried out at the manufacturer's factory for safety reasons. Please observe the instructions for transport before shipping the instruments.

Figure 6 Measuring procedure



## 4.4

**Measuring procedure****Checking the instrument**

1.	Are the measuring probe and probe cable firmly connected?	That way, the measuring probe won't get lost in the liquid container.
2.	Is the outer cylinder of the measuring probe screwed on tightly?	Otherwise, faulty measurements or malfunctions may occur.
3.	Is the measuring probe clean?	Dirtying leads to incorrect measurement results.
4.	Are the grounding clamp and display unit properly connected?	Otherwise, safety is not guaranteed.

**Measuring**

Hold the display unit in your hand or use the carrying case to hold the display unit. Do not put the display unit down!

- 1 **Attach the grounding clamp:** Attach the grounding clamp to a metallic, unpainted, rust- and grease-free location on the liquid container. Make sure there is a good metallic connection between the liquid container and the display unit.

**WARNING: Explosion hazard**

Never immerse the measuring probe in the container until the earthing clamp is securely connected to the container.

- 2 **Immerse the measuring probe:** Remove the measuring probe and the probe cable from the display unit brackets and carefully lower the probe, hanging it by the cable, into the liquid.
- 3 **Measure:** Open the cover flap of the display unit and read the measured values. In the process, please observe the following:

**PLEASE NOTE:**

- Make sure that the measuring probe is completely filled with liquid. Air bubbles will distort the measurement result.
- If possible, measure the conductivity immediately after reaching the desired immersion depth or move the measuring probe constantly during the measuring process.<sup>1</sup>
- Do not read the temperature until the temperature display remains approximately constant.<sup>2</sup>
- Please bear in mind that different temperatures may prevail at different immersion depths.

<sup>1</sup> When the measuring probe is at rest in the liquid, the conductivity reading will gradually change; this is due to unavoidable electrochemical effects (ion migration, polarisation, surface effects).

<sup>2</sup> After immersion, this takes about 30 seconds; constantly moving the measuring probe accelerates the process.

**Dismantle instrument**

- 1 **Switch off the MLA900:** Close the cover flap of the display unit.
- 2 **Remove the measuring probe:** Carefully pull the measuring probe out of the liquid container. Stow the cables and probe in the display unit brackets.
- 3 **Stow the grounding clamp:** Detach the grounding clamp and attach it to the underside of the display unit.

4.5

### Measures in the event of a defect/damage



**WARNING: Hazards due to damage**

- If any part of the unit is defective or damaged, do not bring the MLA900 into a potentially explosive area.
- *If the MLA900 is defective or damaged:*
- Clearly mark the instrument as defective (e.g. by means of a sticker).
- Make sure that the MAL900 is no longer used in hazardous areas



**CAUTION: Hazard due to damage to the measuring probe**

If the outer cylinder of the measuring probe is deformed (e.g. partly dented), the conductivity readings will be distorted. This defect may not be detected during the function test.

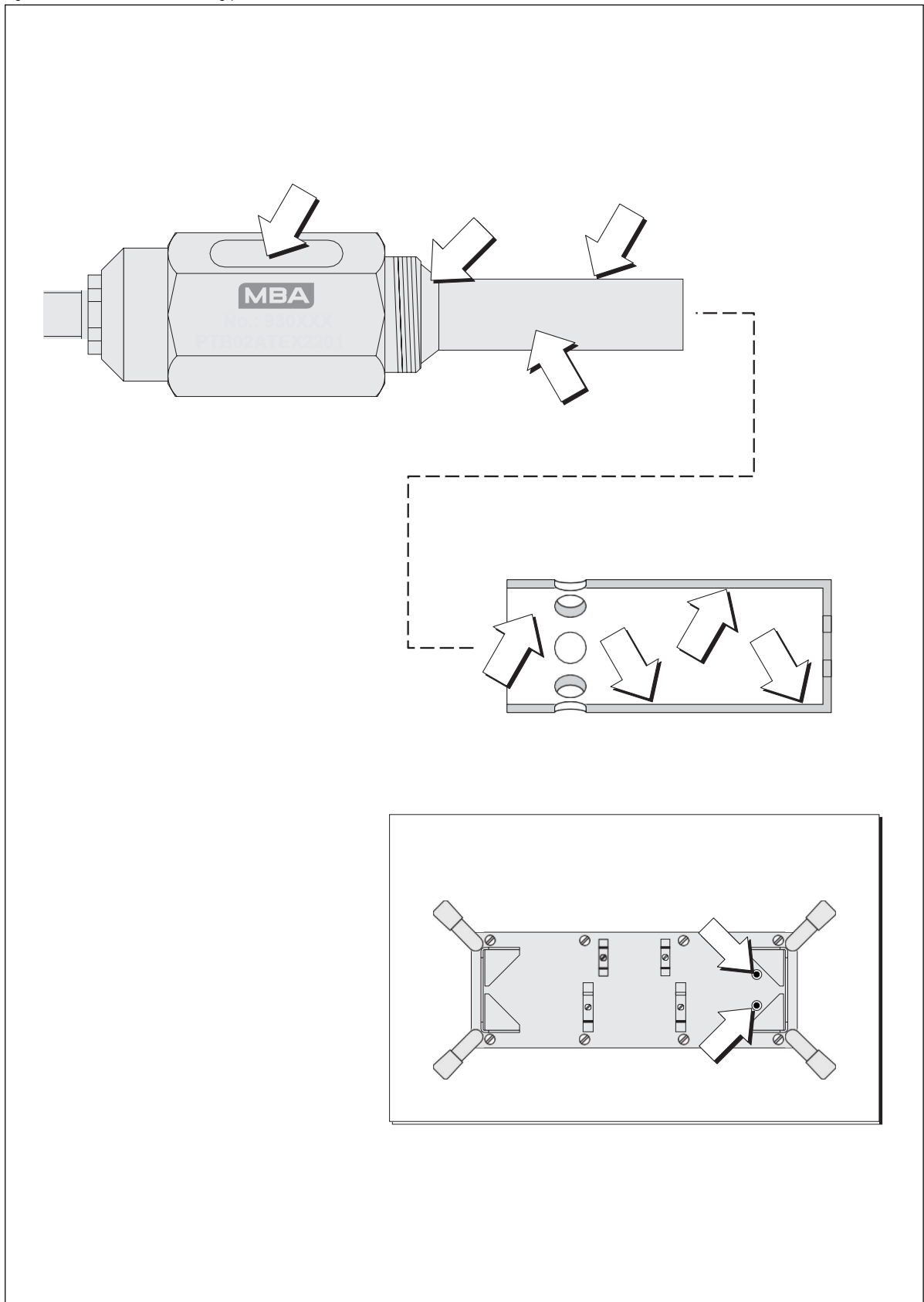
*If the MLA900 is defective or damaged:* Send the display unit and measuring probe together to the manufacturer for repair.

## MLA900

# 5 Maintenance

Calibration  
Cleaning Battery  
replacement  
Spare parts

Figure 7 Surfaces of the measuring probe that are sensitive to dirt



## 5.1 Calibration

The display of the MLA900 should be calibrated regularly. As manufacturer we recommend a factory calibration at MBA Instruments GmbH and to repeat it every 3 years. The factory calibration is confirmed by a certificate.

## 5.2 Cleaning



### **WARNING: Hazard in potentially explosive areas**

Carry out any cleaning work outside potentially explosive areas.

### 5.2.1 Cleaning the probe cable

- *To clean the probe cable:* Use a soft cloth moistened with spirit or another "mild" solvent.
- Make sure that both dirt and solvent residues are completely removed.

### 5.2.2 Cleaning the measuring probe

- 1 Unscrew the outer cylinder of the measuring probe.



#### ***If the outer cylinder cannot be unscrewed by hand:***

**Use the two pegs on the underside of the display unit as an auxiliary tool. The pegs fit into the front of the outer cylinder.**



#### **CAUTION: Risk of damage**

Do not clamp the probe in a vice – neither the housing nor the outer cylinder.

The pressure of the vice can cause the plastic material in the measuring probe to burst. Deformations of the outer cylinder will lead to incorrect measurement results.

- 2 Carefully clean all surfaces of the probe housing and the outer cylinder



**The cleanliness of the parts determines the quality of your next measurement.**

with a soft cloth moistened with a mild solvent.



#### **CAUTION: Risk of damage**

- Only use solvents that cannot attack the materials of the measuring probe.
- Make sure that the plastic material is not scratched. Dirt stuck in scratches can distort the measurement result.
- Do not use measuring probes that are damaged or attacked by solvents in potentially explosive areas.

### 5.2.3 Cleaning the display unit

- Clean the display unit housing regularly with a soft cloth moistened with a mild detergent or solvent.
- Only use solvents that do not corrode the display unit's housing and imprint.

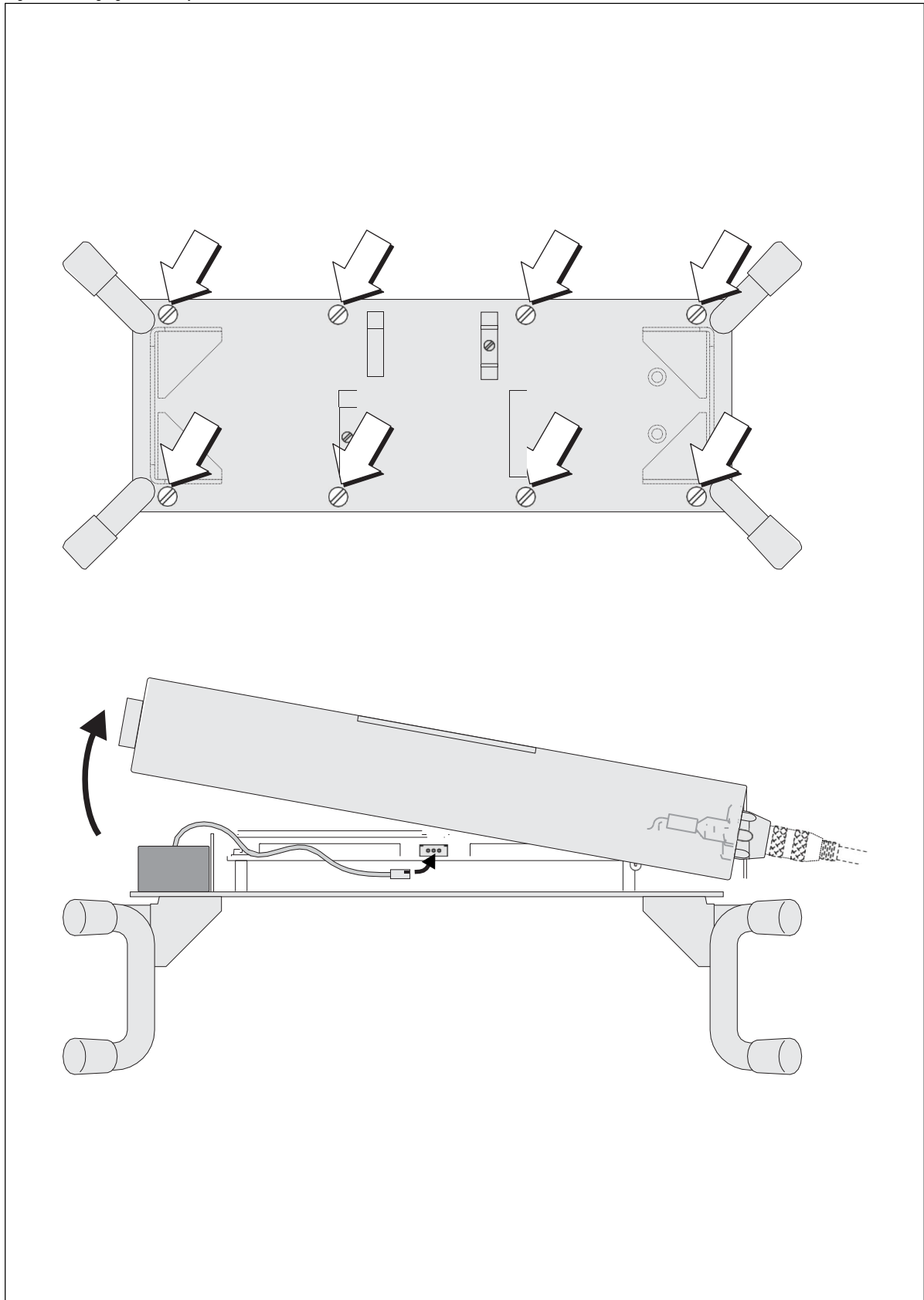


#### **CAUTION: Hazard due to damage**

*If the display unit housing has been attacked by solvents:*  
Do not operate the MLA900 again.



Figure 8 Changing the battery



## 5.3

## Battery

### Check

When the charge of the built-in battery is almost depleted, **BAT** will appear on the displays.

When opening the display unit, check whether **BAT** is displayed.

**PLEASE NOTE: Risk of damage from battery fluid**

Corrosive liquid can leak from a used battery and damage the electronics of the display unit.

- Remove a used battery as soon as possible.
- Replace the installed battery after 3 years at the latest.
- Make a note in a suitable place of when the battery was last replaced.

### Replacing the battery

**WARNING: Hazards in potentially explosive areas**

- Only operate the MLA900 in potentially explosive areas with batteries of the original type.
- Never open the housing inside potentially explosive areas.

- 1 Undo 8 screws on the back of the display unit.
- 2 Lift the upper part of the housing on the left side.  
The battery is in the lower part.
- 3 Disconnect the battery cable from the electronics (plug connection) and remove the battery.
- 4 Check the housing seal.  
*If the seal is damaged:* Replace the seal.
- 5 Insert the new battery and connect the battery cable.
- 6 Screw the housing back together. Make sure,
  - that the housing seal is correctly seated
  - that no cables are pinched.
- 7 Carry out a function test – *Caution:* For safety reasons, carry out this first function test after replacing the battery when you are outside potentially explosive areas.

**MLA900**

## **6 Storage, transport**

Correct storage  
Shipping notes

## 6.1 Correct storage

Please follow these instructions if the MLA900 will be out of service for more than 3 months.

- Remove the battery.
- Observe the permissible storage and transport temperature (-20 ... +60 °C)



### **WARNING: Risk of damage due to incorrect storage**

- At low temperatures, the LC displays in the display unit may freeze; as a result, the housings of the LC displays may burst.
- Low temperatures affect the flexibility of the probe cables. Avoid bending the probe cables too much at low temperatures; otherwise a cable could break due to brittleness of the cable sheath.
- At higher temperatures, there is a hazard of corrosive liquid leaking from the battery and damaging the electronics. In addition, the LC displays may become defective (irreversible blackening).

## 6.2 Transport over short distances

- Wind the probe cable and the grounding cable onto the cable holder of the display unit.
- Secure the probe and grounding clamp in the display unit holders – do not detach the cable connections.
- Carry the instrument by the hand-grip.

## 6.3 Correct transport

If the MLA900 is to be transported over long distances:

- *Secure the instrument:* Wind the probe cable and the grounding cable onto the calibration of the display unit. Secure the probe and grounding clamp in the display unit holders – do not detach the cable connections.
- *Protect the display unit:* Protect the display unit against condensation, the effects of humidity and water splashes
- *Packing:* Stow the MLA900 in the supplied transport case.
- Observe the permissible storage and transport temperature.
- *If the instrument is to be sent for repair.*

## 6.4 Shipping for repair

Always ship the probe and display unit together for repair



If only the measuring probe or the display unit has become unusable or has been lost, you can send the remaining part to the manufacturer's factory and have it made back into a complete MLA900.

Please include the following notes:

- As detailed and precise a description of the fault as possible (keywords are quite sufficient, but a quick note that "the instrument is defective" is of little help); if the cause of the fault is unclear, also a brief description of the operating conditions and installations (upstream instruments, etc.).
- The name of our employee who is informed about the defect or with whom you have agreed to send the unit to the manufacturer.
- A contact person in your own company, for any queries.
- Please also include a note if the matter has already been discussed in detail with an employee of the manufacturer.

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