



Maintenance and Repair Manual

AURA[®] handheld NIR

Revision 1 | 2227-503 & 2207-870

Knowledge of this manual is required for the repair and maintenance of the device. You should therefore familiarize yourself with the contents of this manual and pay special attention to instructions concerning the safe operation of the device.

We reserve the right to make changes in the interest of technological advancement; the user manual is not subject to updating or revision.

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Caution



GENERAL HAZARD

Observe the safety instructions in the "AURA® handheld NIR" User Manual, publication number: UM AURA® handheld NIR - 2207-870 / E or UM AURA® handheld NIR - 2227-503 / E.

Note



Further information on the proper use of the measurement system can be found in the "AURA® handheld NIR" User Manual.

Note



A comprehensive set of information and downloads for the AURA handheld NIR can be found in the Zeiss info portal: www.zeiss.com/info-ah.

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1 About this manual

Welcome to the Maintenance & Repair Manual of the AURA handheld NIR device.

Purpose of manual

The information contained in this manual will enable you to carry out repairs and replace components properly and safely.

Familiarize yourself with the contents of this manual, follow the instructions and observe the safety information.

Readership

The AURA handheld NIR may only be repaired and maintained by suitably qualified and trained personnel.

This maintenance and repair manual is therefore intended both for the specialist personnel responsible for setting up the device and using it on site and for persons authorized to issue instructions. The manual allows them to fulfil their duty of instruction.

Experience in handling measurement technology is required, as is training in an engineering or scientific discipline.

Storage

Keep the operating manual, together with all applicable documents issued upon purchase and delivery, in a safe place.

Ensure that the operating manual and all applicable documents are readily available to all users at all times.

2 Safety

2.1 General safety notes

Caution



GENERAL HAZARD

All activities listed below may only be performed by Service employees of Carl Zeiss Spectroscopy GmbH or by appropriately trained personnel.

Caution



HAZARD FROM ELECTRIC ENERGY

Remove the battery from the device before carrying out any of the activities described below.

Caution



HAZARD FROM THERMAL ENERGY

Allow the halogen lamp to cool down for approx. 10 minutes before removing it.

Caution



SENSITIVE OPTICAL COMPONENTS

Only carry out work on optical components in a very clean working environment.

Do not touch the glass bulb of the new halogen lamp without cotton gloves.

Caution



SENSITIVE ELECTRONIC COMPONENTS

Perform all the following activities at an ESD workstation.

2.2 Information on environmental protection



Our company operates a certified environmental management system in accordance with ISO 14001. The product was developed, tested and manufactured in conformance with the applicable regulations and environmental directives of the European Union.

The product and its accessories comply with EU directives 2011/65/EC (RoHS 2) and 2012/19/EC (WEEE), as applicable to this product. We have set up a take-back and recycling process that ensures proper recycling in accordance with the above EU directives.

Please contact the sales/service organization responsible for your region for details on disposal and recycling. The product may not be disposed of in the household waste or by the communal waste disposal service.

If the device is resold, the seller is obliged to inform the buyer of the correct means of disposing of the product.

2.3 Warranty and liability

Limitation of liability and warranty

In the event of damage being incurred to the device as the result of failure to observe the safety instructions, Carl Zeiss Spectroscopy GmbH will not accept any warranty claims, even during the warranty period, and is exempt from statutory accident liability obligations.

Carl Zeiss Spectroscopy GmbH will be released from its warranty obligation if the user fails to observe the safety instructions.

Carl Zeiss Spectroscopy GmbH only guarantees the safety, reliability and performance of the device if the safety instructions are observed.

The manufacturer guarantees that the device left the factory with no material or manufacturing defects. Any defects must be reported to the manufacturer immediately and steps taken to minimize possible damage. As soon as the manufacturer becomes aware of a defect, he is obliged to remedy it at his discretion either by repairing it or by supplying a replacement device.

Warranty claims are excluded for defects arising from natural wear (especially wear parts) and improper use.

The manufacturer is not liable for damage caused by improper operation, negligence or unauthorized modifications to the device, in particular the removal or replacement of components or the use of accessories from other manufacturers. Any such action will result in the exclusion of all warranty claims.

No maintenance or repair work may be carried out on the device, with the exception of the work described in this maintenance & repair manual. Repairs may only be performed by ZEISS Service employees or persons authorized by ZEISS.

Contact the Customer Service Department at Carl Zeiss Spectroscopy GmbH (service.spectroscopy@zeiss.com) if defects or errors arise in the device or individual components.

INFO**NOTES ON WARRANTY**

Detailed information on the warranty can be found in the General Terms and Conditions of Carl Zeiss Spectroscopy GmbH. These can be found on the Internet at "<https://www.zeiss.com/spectroscopy/legal-information/company-information.html>".

3 Changing the display

- Requirements**
- The control software of the device has been shut down and the device switched off.
 - The ESD workstation and the ESD protective equipment have been made ready.
 - Put the following spare parts ready:
 - Display, order no. 000000-2315-414
 - Put the following tools and equipment ready:
 - Screwdriver TX 8
 - 3 mm flat tip screwdriver

Procedure 1 Remove battery

Procedure for device version 000000-2207-870:

Release the clip fastener **1** on the battery compartment.

Carefully open the lower battery compartment **2**.

Remove the battery **3** from the battery compartment using the grip strap.

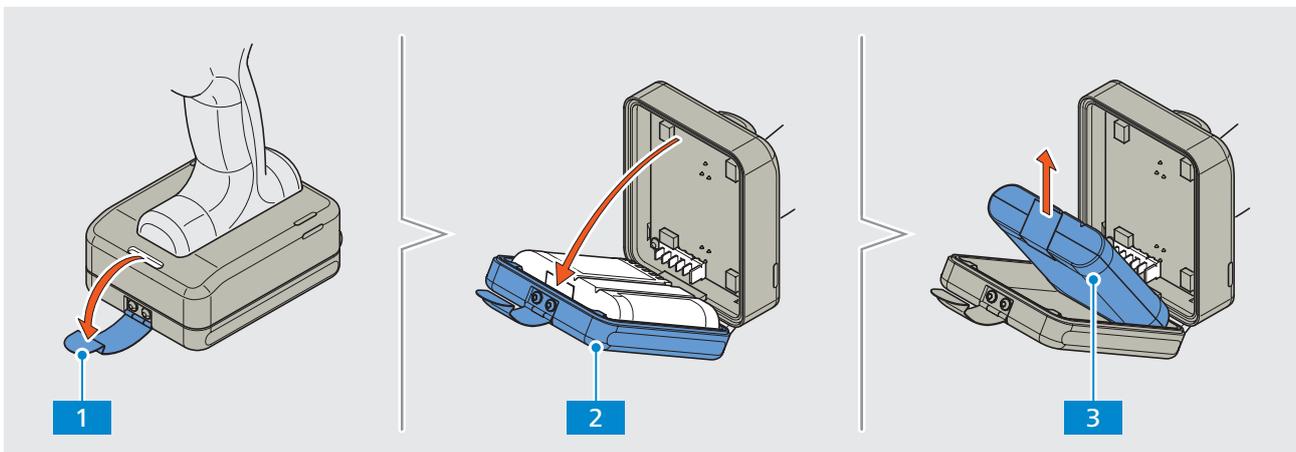


Fig. 1 Remove battery (2207-870)

Close the battery compartment back up.

Procedure for device version 000000-2227-503:

Press in the two fasteners **1** on the right and left of the grip.

Carefully pull the lower battery compartment **2** downwards.

Remove the battery **3** from the lower battery compartment.

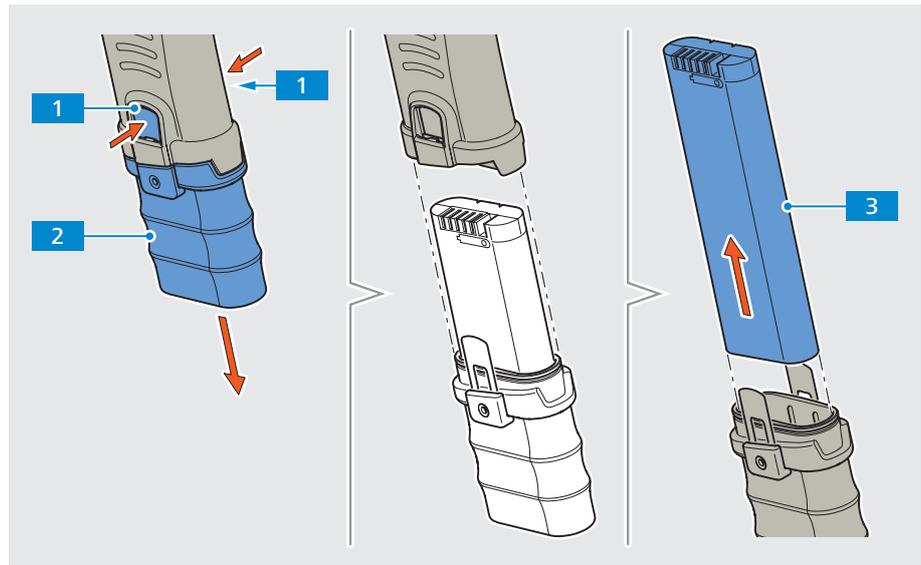


Fig. 2 Remove battery (2227-503)

Close the battery compartment back up.

2 Remove the rubber display protectors

Pull the two rubber display protectors **1** off the device by hand **2**.

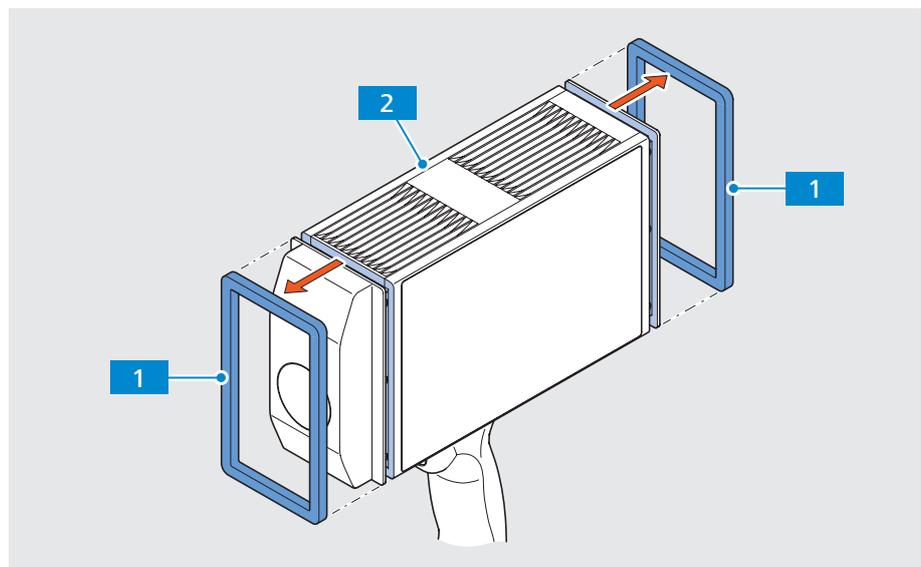


Fig. 3 Remove the rubber display protectors

3 Remove the slotted screws on the rear of the device

Unscrew the two slotted screws **2** on the rear of the device **1** from the housing. Use a 3 mm flat tip screwdriver for this.

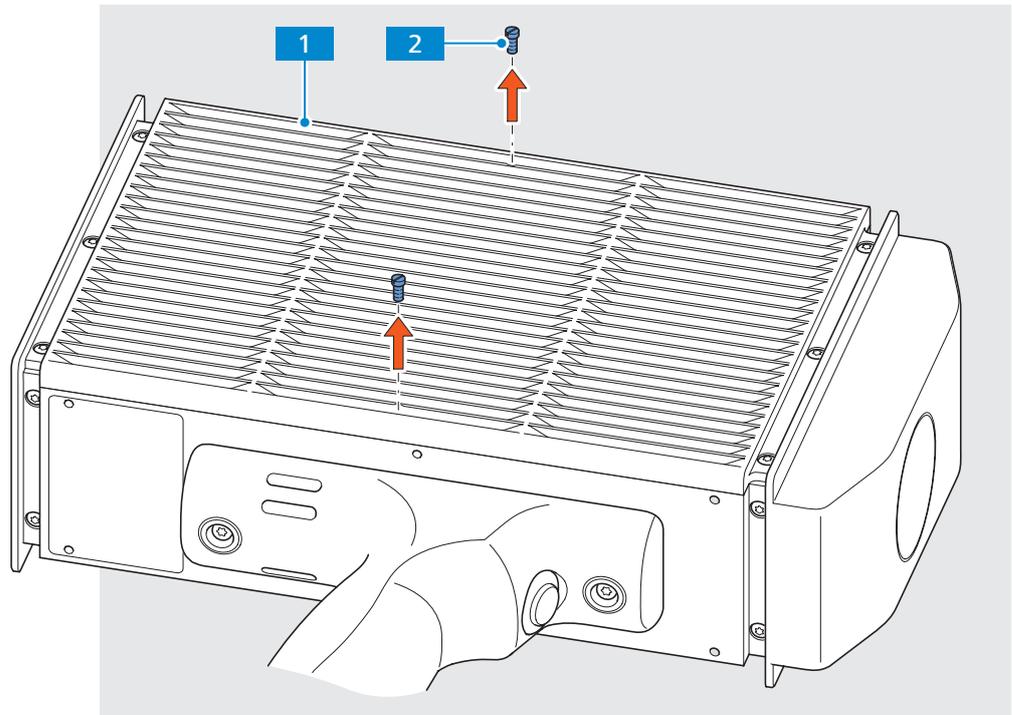


Fig. 4 Remove the slotted screws on the rear of the device

4 Remove the Torx screws on the display side and lift out the display

Unscrew the six Torx screws **1** on the display side from the housing. Use a TX 8 Torx screwdriver for this.

Carefully lift the display **2** straight out of the housing until the two screw bolts **3** are outside the device.

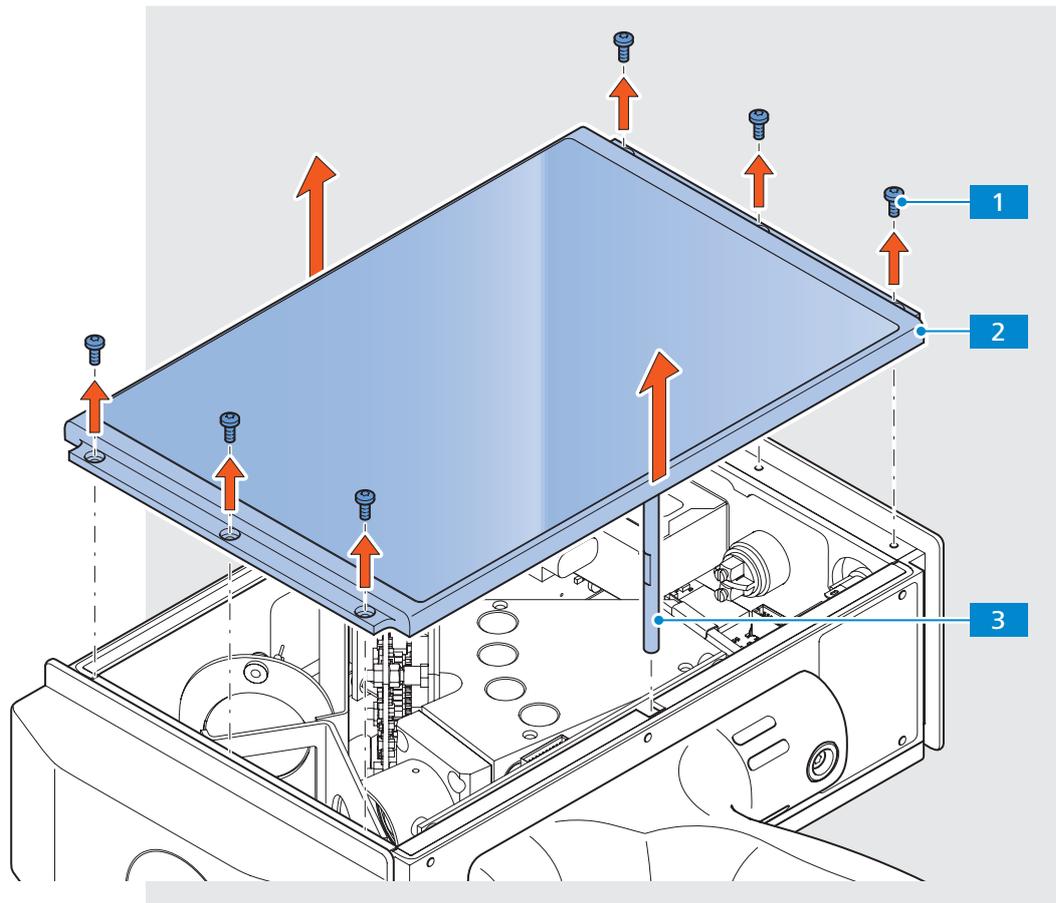


Fig. 5 Remove the Torx screws on the display side and lift out the display

5 Disconnect the display cable

Tilt the display **1** to one side until you can see the display cable **2** and the connector socket **3** in slot X3 on the "FBG Handheld PGS CarrierBoard".

Pull down the latch **3.1** of the connector socket **3.2**.

Disconnect the display cable **2** from slot X3.

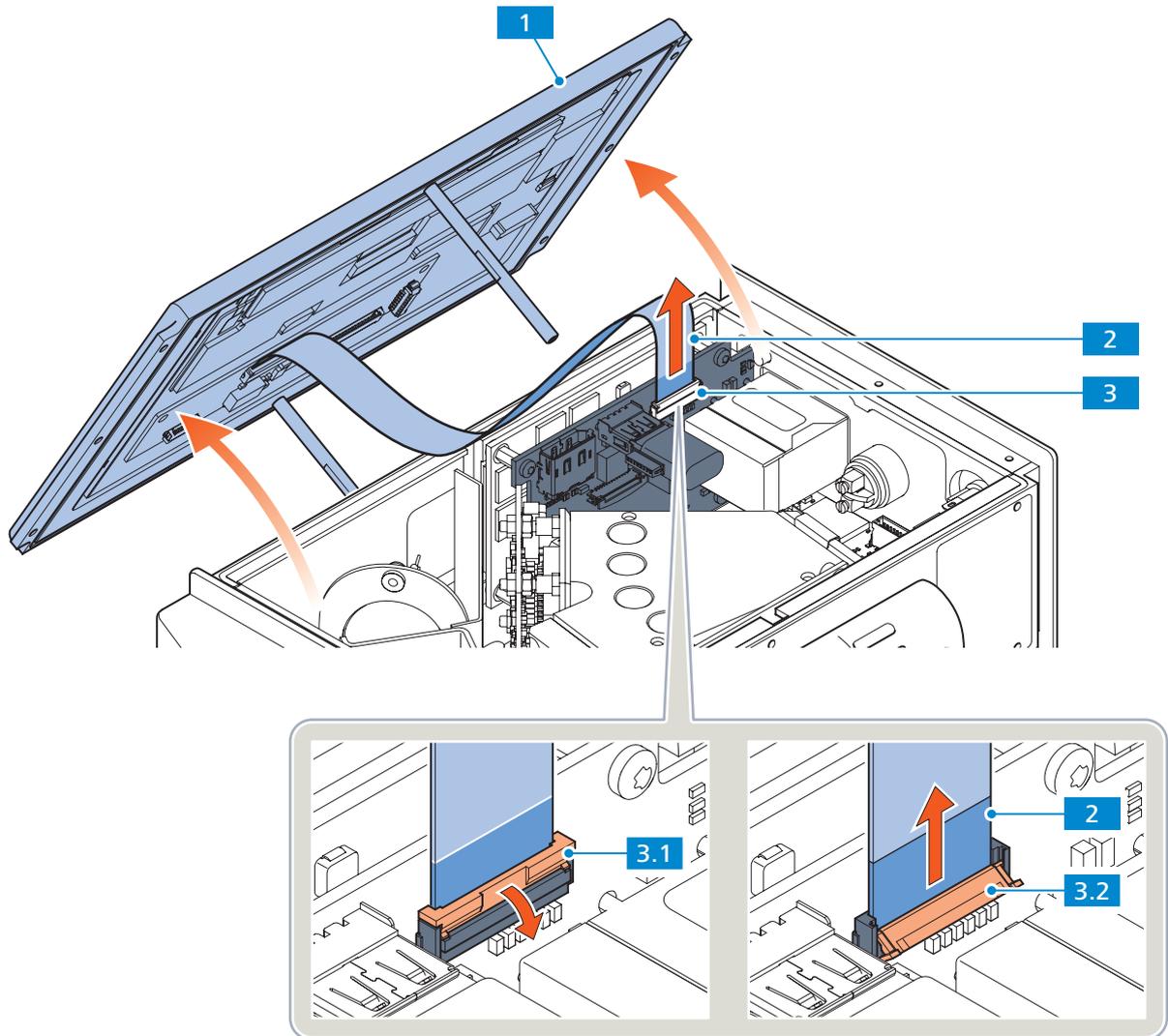


Fig. 6 Disconnect the display cable

6 Lay down the display

Place the display **1** on the rubber display protectors **2**.

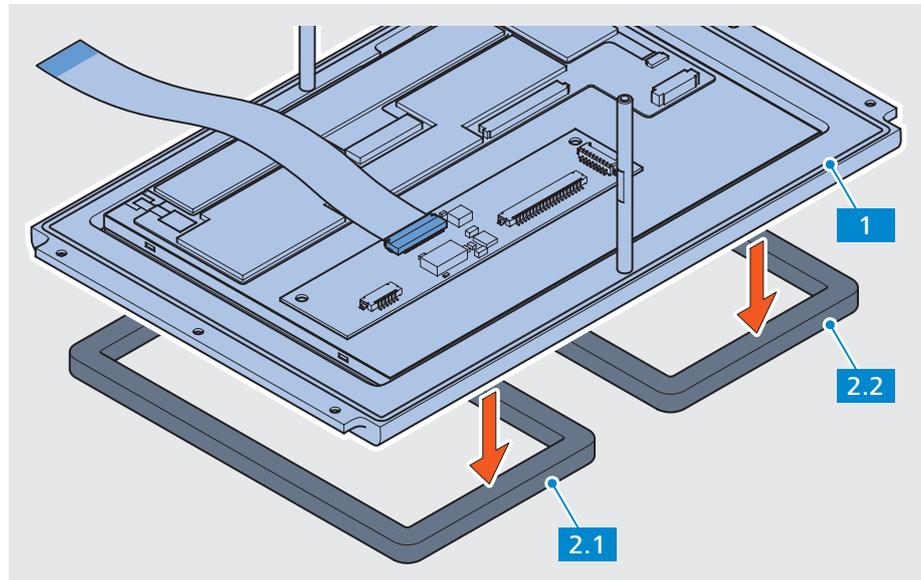


Fig. 7 Lay down the display

7 Install a new display

Carry out the previous disassembly work steps 1 to 5 in reverse order.

Note

NOTE REGARDING ASSEMBLY

When plugging in the display cable, make sure that the cable end marked in blue is in the correct position. The blue marking must be visible!

See also "Fig. 6 Disconnect the display cable" on page 12.

4 Replacing the halogen lamp

- Requirements**
- The display has been removed (see section “3 Changing the display”, steps 1 to 6)
 - Put the following spare parts ready:
 - Halogen lamp, order no. 000000-2345-437
 - Put the following tools and equipment ready:
 - TX 8 and TX 10 screwdrivers
 - 3 mm flat tip screwdriver
 - Screw-holding tweezers
 - Cotton gloves

Procedure 1 Remove the lamp holder with halogen lamp

Unscrew the two Torx screws **2** from the base of the housing. Use a TX 10 Torx screwdriver for this.

Carefully extract the lamp holder **1** upwards.

Disconnect the lamp cable **3** from the halogen lamp.

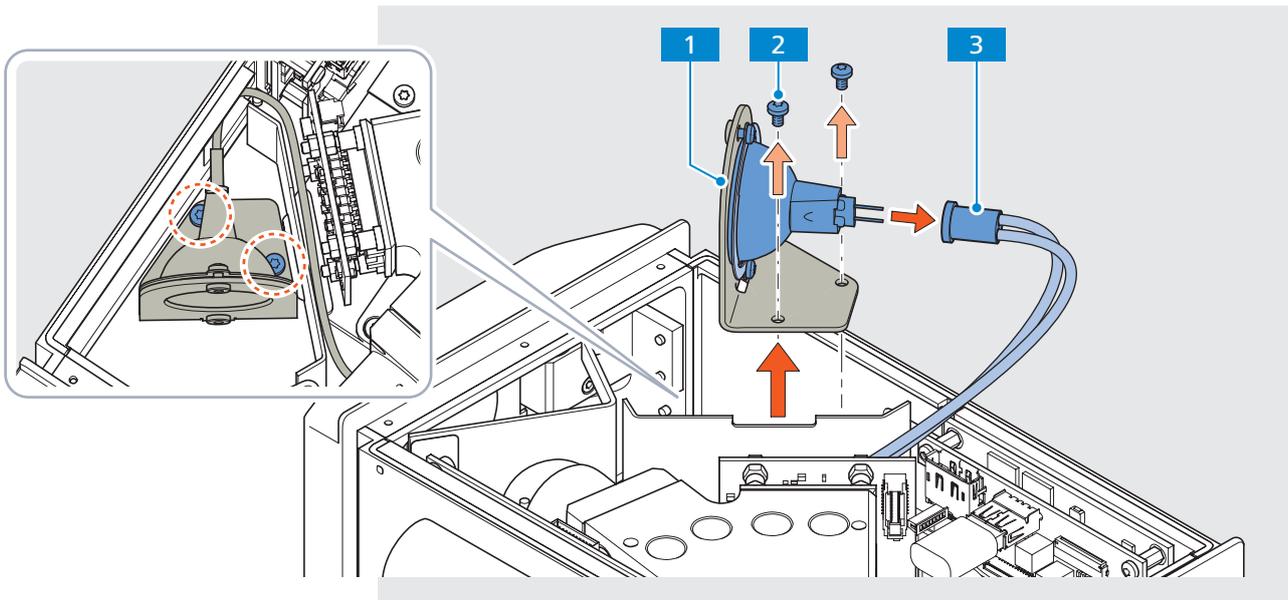


Fig. 8 Remove the lamp holder with halogen lamp

2 Remove the halogen lamp

Unscrew the two Torx screws **1** from the lamp holder **4**.
Use a TX 8 Torx screwdriver for this.

Remove the retaining ring **2** from the old halogen lamp **3**.

Dispose of the old halogen lamp.

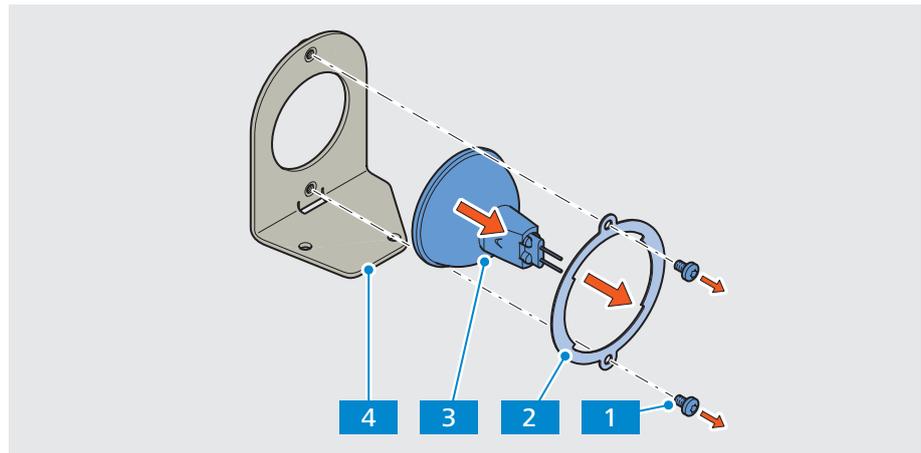


Fig. 9 Remove the halogen lamp

3 Install new halogen lamp

Put on cotton gloves.

Carry out the previous disassembly work steps 1 to 2 in reverse order.

Note

NOTE REGARDING ASSEMBLY

To avoid damaging the inside of the unit, use screw-holding tweezers to insert the two screws on the base of the housing when reinstalling the lamp holder.

See also "Fig. 8 Remove the lamp holder with halogen lamp" on page 14.

Final steps 4 Calibrating the compensation data

The halogen lamp must be recalibrated after each lamp change.

- 5 To do this, read section "7 Calibrating the compensation data" on page 29 and carry out the work steps listed there.

5 Changing the lamp cable (optional)

The following steps should only be performed if required.
Scheduled regular replacement of the lamp cable is not required.

- Requirements**
- The display has been removed (see section “3 Changing the display” on page 8)
 - The front plate 1 has been removed (see section “6 Changing the motor”, steps 1 to 2)
 - The motor cable lying above the lamp cable has been brought out of its normal position for the time being.
 - The lamp holder 2 has been disassembled (see section “4 Replacing the halogen lamp”)
 - Put the following spare parts ready:
 - lamp cable, order no. 000000-2224-159

Procedure 1 Disconnect the lamp cable from the halogen lamp

Disconnect the lamp cable from the halogen lamp 3.

At the narrow points (see red dotted ellipse in the figure below), take special care to avoid damaging the electronic components (or the new lamp cable during installation).

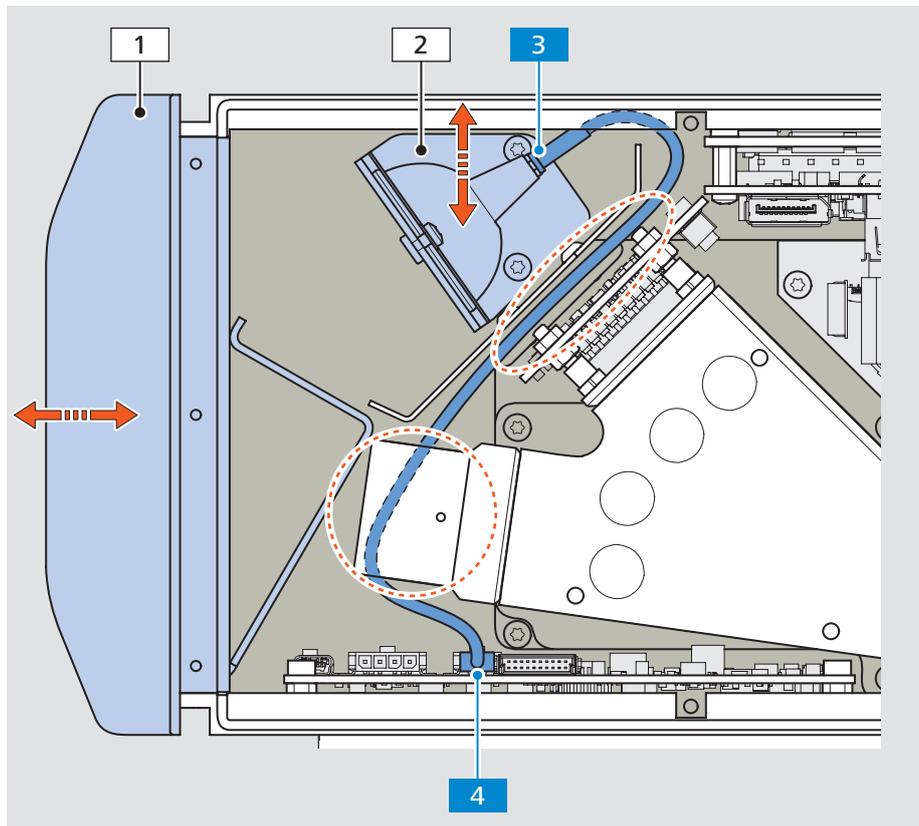


Fig. 10 Disconnect the lamp cable from the halogen lamp

2 Disconnect the lamp cable from the circuit board

Release the lock of the connector **1** in slot **X600** **2** on the “FBG PowerBoard” **3**.

Pull the lamp cable from slot **X600** (see also “Fig. 10 Disconnect the lamp cable from the halogen lamp” on page 16, item **4**).

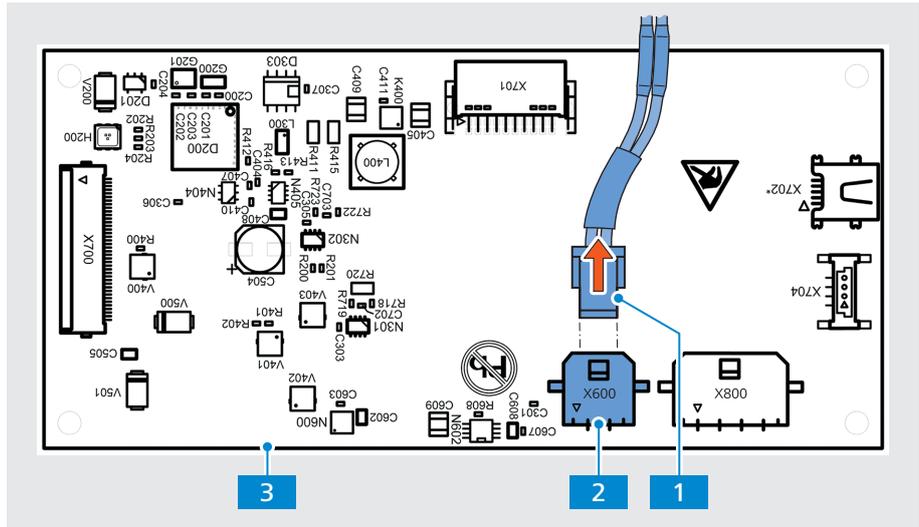


Fig. 11 Disconnect the lamp cable from the circuit board

3 Install a new lamp cable

Carry out the previous disassembly work steps 1 to 2 in reverse order.

When doing so, route the lamp cable **1** very carefully underneath the narrow side of the analog board **2** and underneath the optical opening of the detector **3**.

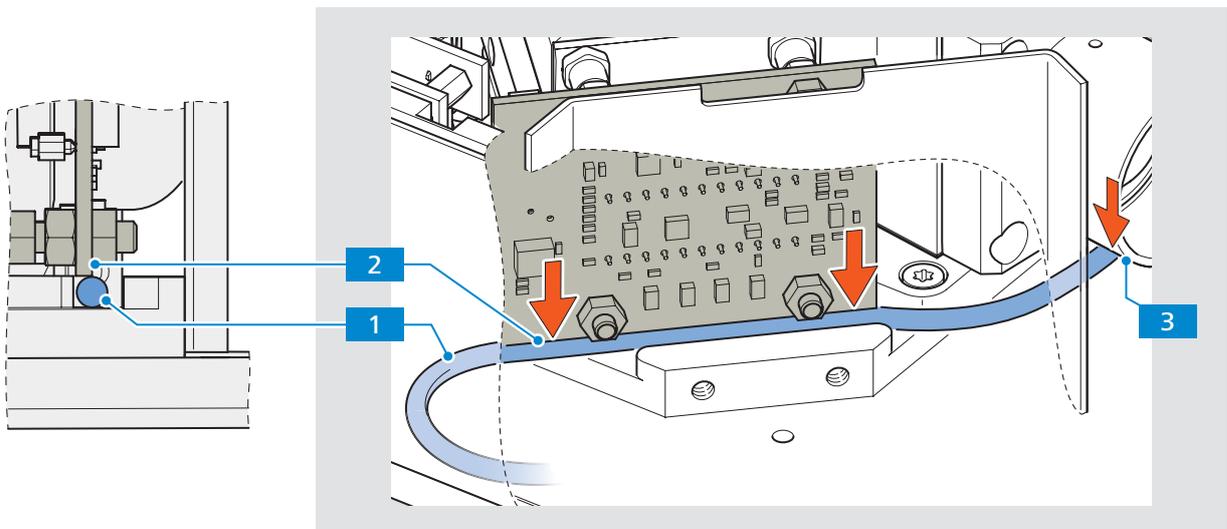


Fig. 12 Laying new lamp cable

4 Reposition the motor cable

In order to restore the original condition before changing the lamp cable, it is necessary to return the motor cable to its prescribed position.

To do this, route the motor cable **2** so that it runs above the already routed lamp cable **1** and below the two bolt threads **3** of the analog board.

Following this, the motor cable must be routed along below the optical opening of the detector **4**.

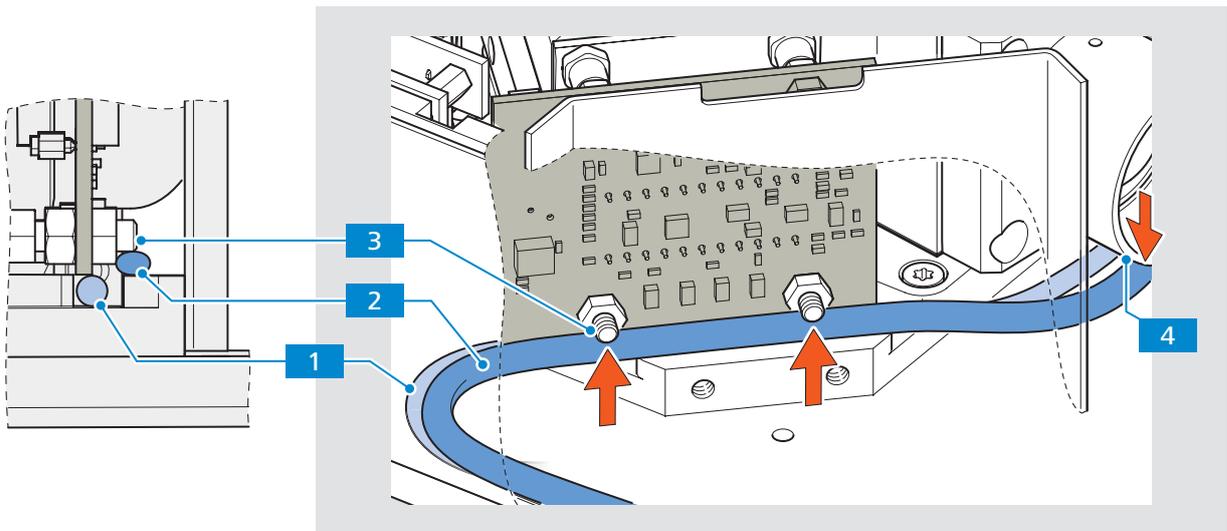


Fig. 13 Reposition the motor cable

6 Changing the motor

- Requirements**
- The display has been removed (see section “3 Changing the display”, steps 1 to 6).
 - The lamp holder with halogen lamp has been removed (see section “4 Replacing the halogen lamp”, step 1).
 - Put the following spare parts ready:
 - Motor with cable, order no. 000000-2326-676
 - Put the following tools and equipment ready:
 - TX 8 Torx screwdriver
 - 2 mm flat tip screwdriver

Procedure 1 Remove the fastening screws of the front panel

Lay down the device with its back **1** facing upwards.

Unscrew the seven Torx screws **2** (3x on rear, 2x on top, 2x on bottom) from the housing. Use a TX 8 Torx screwdriver for this.

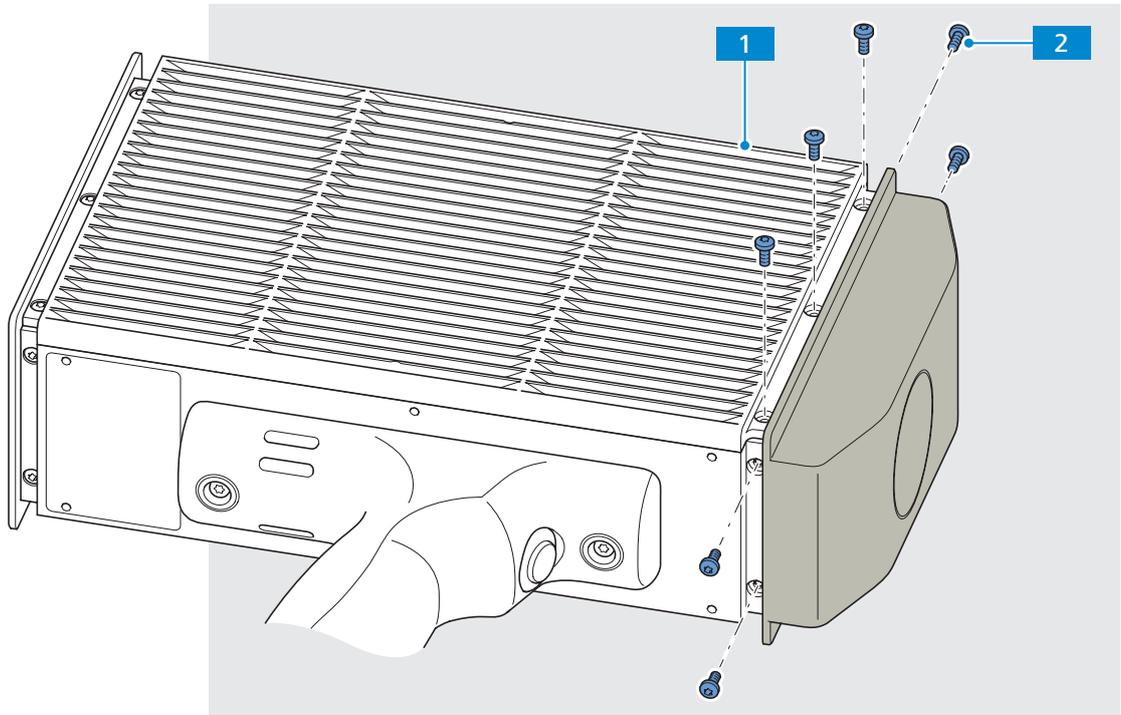


Fig. 14 Remove the fastening screws on the front panel

Hold the front panel and turn the device so that you can lay it back down with the open device side facing upwards.

2 Remove the front panel and disconnect the cable

Note

NOTES ON DISASSEMBLY AND REASSEMBLY

It is much easier to remove and install the front panel if you also remove the lamp holder (see "4 Replacing the halogen lamp" on page 14, step 1).

Take photos of the individual steps if necessary. This simplifies subsequent work steps and avoids errors during reassembly.

Raise the front panel **1** enough to expose the cable underneath.

Then you can lay the front panel down slightly outside the housing.

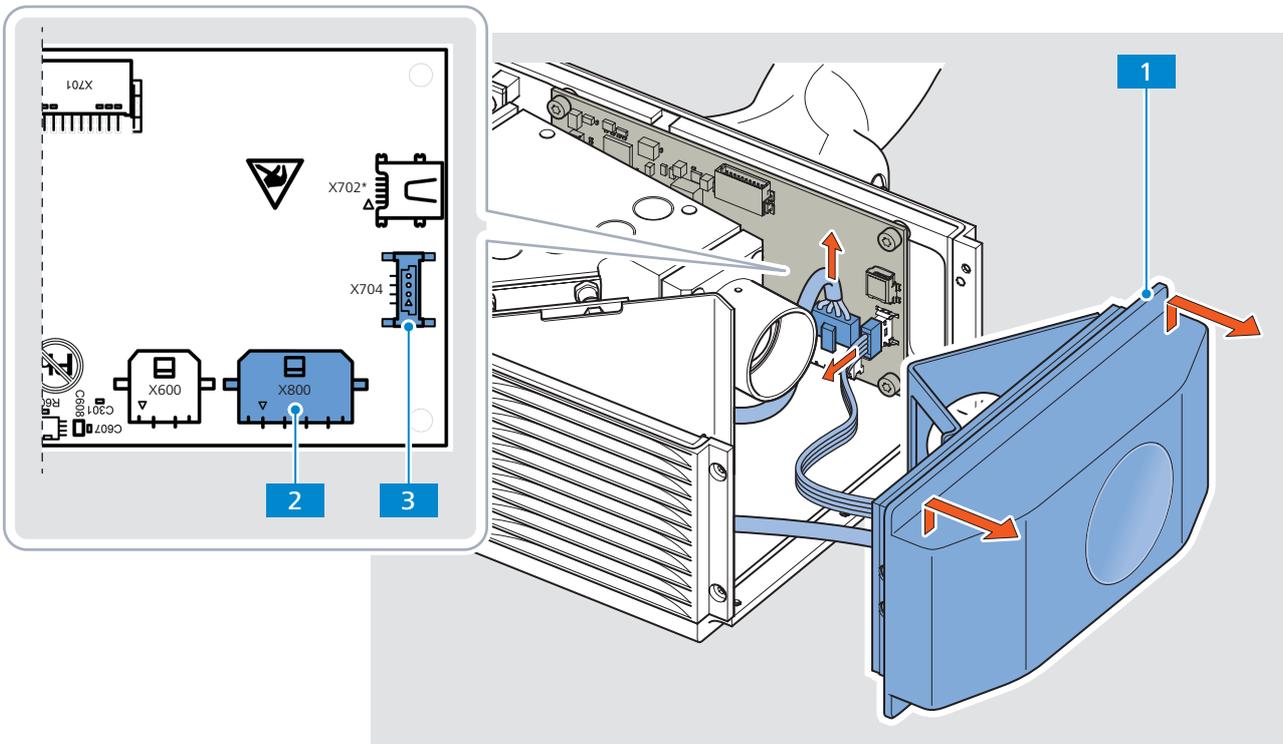


Fig. 15 Remove the front panel

Release the catch of the control cable connector in slot **X704** **3** on the "FBG PowerBoard" by pressing a narrow flat tip screwdriver into the small opening on the side of the socket.

Proceed very carefully!

Disconnect the control cable from slot **X704**.

Release the catch of the motor cable connector in slot **X800** **2** by pressing on the connector latch.

Disconnect the control cable from slot **X800**.

Now remove the front panel completely.

3 Remove the motor holder

Caution



SENSITIVE COMPONENTS

Avoid touching the white surface of the white reference assembly with your fingers.

This can cause contamination which can then falsify your measurement results.

Unscrew the two Torx screws **2** from the front plate **1**.
Use a TX 8 Torx screwdriver for this.

Remove the motor holder **3** with cables and the white reference from the front panel.

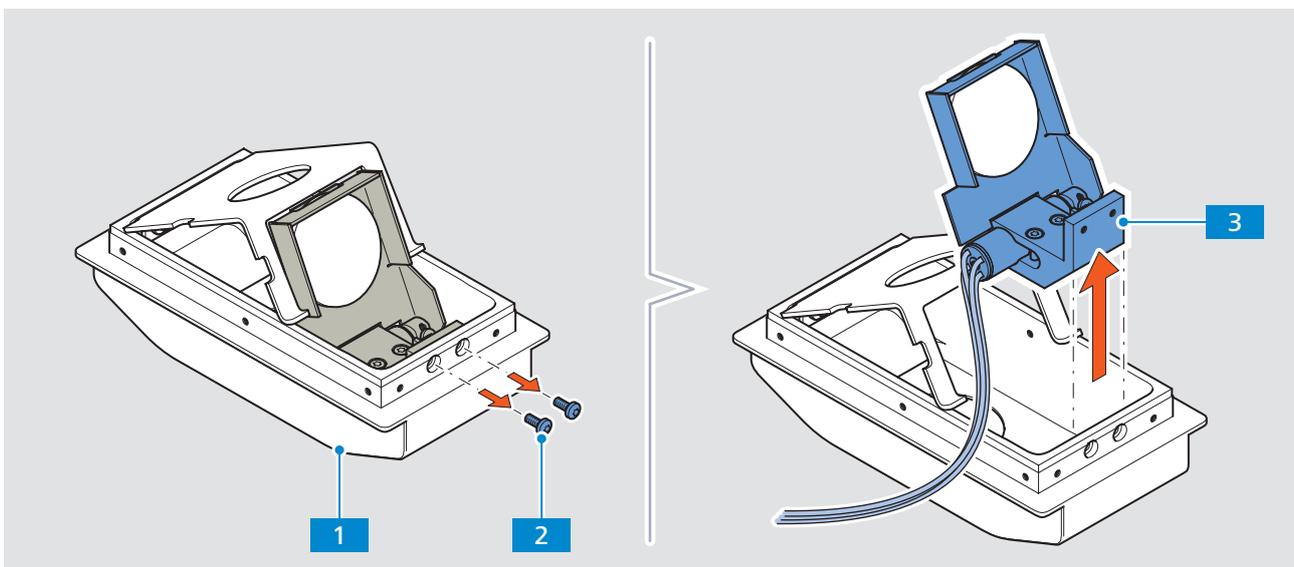


Fig. 16 Remove the motor holder

4 Dismantle the white reference assembly

Unscrew the two Torx screws **1** from the white reference mount **3**.
Use a TX 8 Torx screwdriver for this.

Remove the white reference assembly **2**.

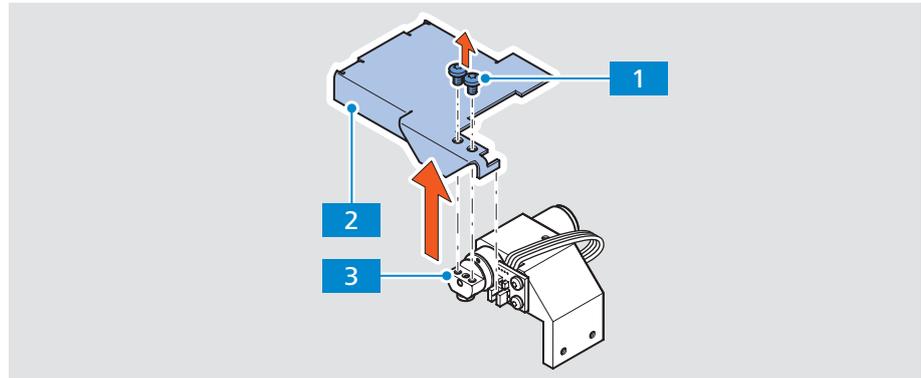


Fig. 17 Dismantle the white reference assembly

5 Pull out the motor with cable

Unscrew the two Torx screws **2** from the motor holder **1**.
Use a TX 8 Torx screwdriver for this.

Pull the motor **3** out of the motor holder.

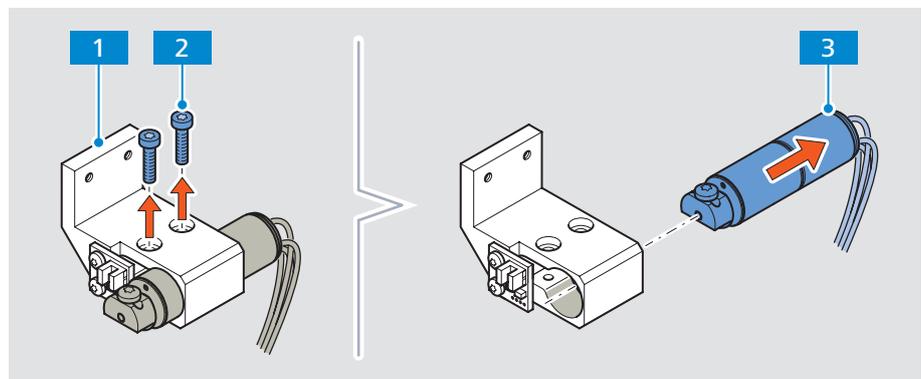


Fig. 18 Pull out the motor with its cable

6 Remove semicular mount from old motor

Loosen the Torx screw **1** on the semicular mount **2**.

Use a TX 8 Torx screwdriver for this.

Pull the semicular mount **2** off the motor shaft **3**.

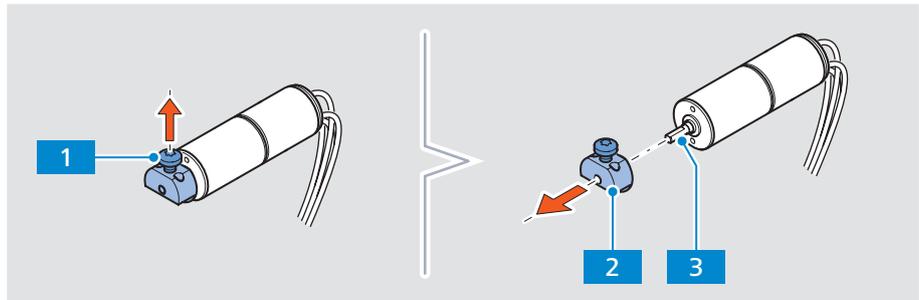


Fig. 19 Dismantle the semicular mount

7 Mount the semicular mount onto the new motor

Align the screw **3** of the semicular mount **1** and the flattened side of the motor shaft **2** so that both point upward during assembly.

Push the semicular mount **1** onto the motor shaft as far as it will go **2**.

Tighten the Torx screw **3** again. Use a TX 8 Torx screwdriver for this.

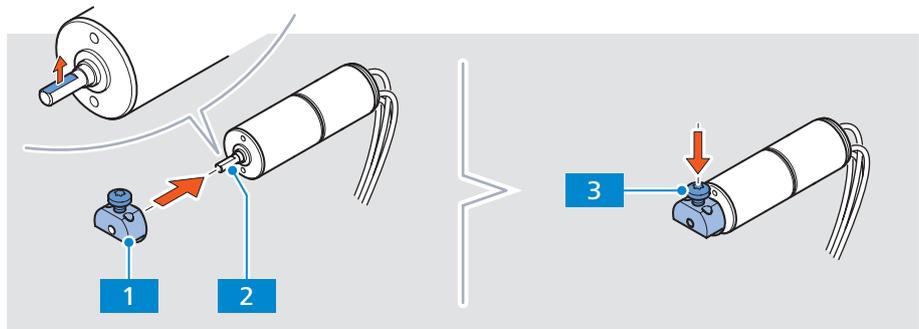


Fig. 20 Mount the semicular mount

8 Install new motor

Insert the motor into the motor holder **2** right up to the mechanical stop **1**.

Turn the motor so that the screw **5** of the semicircular mount faces upwards and the cables **4** of the motor point downwards.

Screw the two clamping screws **3** relatively loosely into the motor holder so that the motor can still be moved.

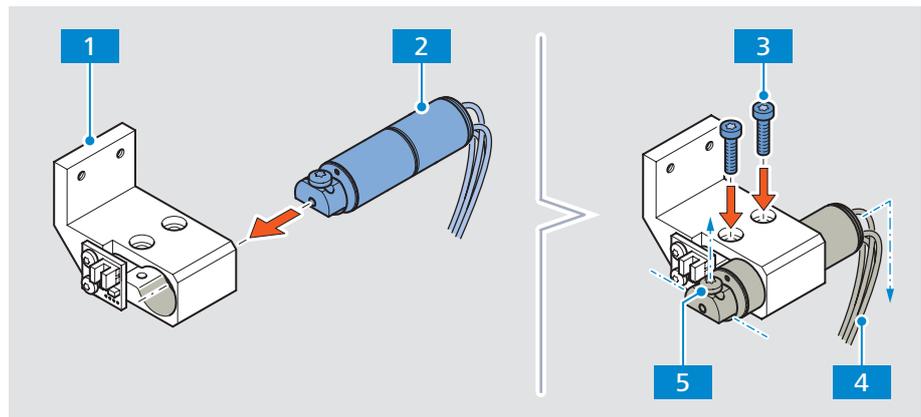


Fig. 21 Install new motor

9 Attach the white reference assembly

Place the white reference assembly **2** onto the white reference mount of the motor shaft **1**.

Secure the white reference assembly **2** using the two Torx screws **3**. Use a TX 8 Torx screwdriver for this.

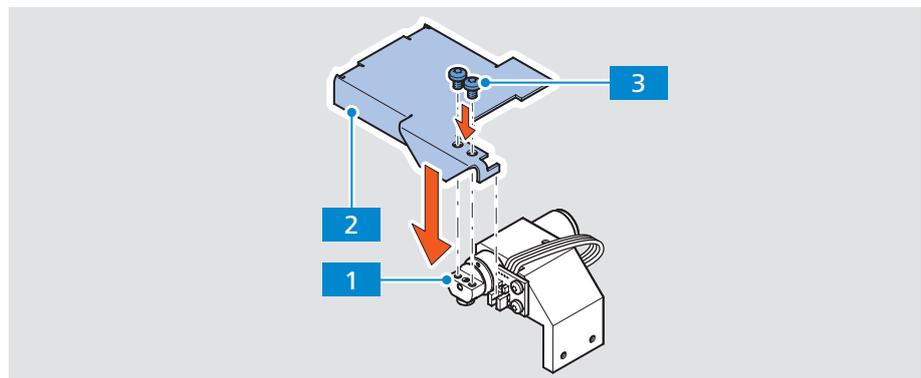


Fig. 22 Attach the white reference assembly

10 Install motor holder

Caution



SENSITIVE COMPONENTS

When installing the motor holder with white reference assembly, ensure that the motor cables are handled very carefully.

Insert the motor holder **1** with cables and the white reference into the front panel **2**.

Fasten the motor holder with the two Torx screws **5**, at first only loosely, to the front plate **2**. Use a TX 8 Torx screwdriver for this.

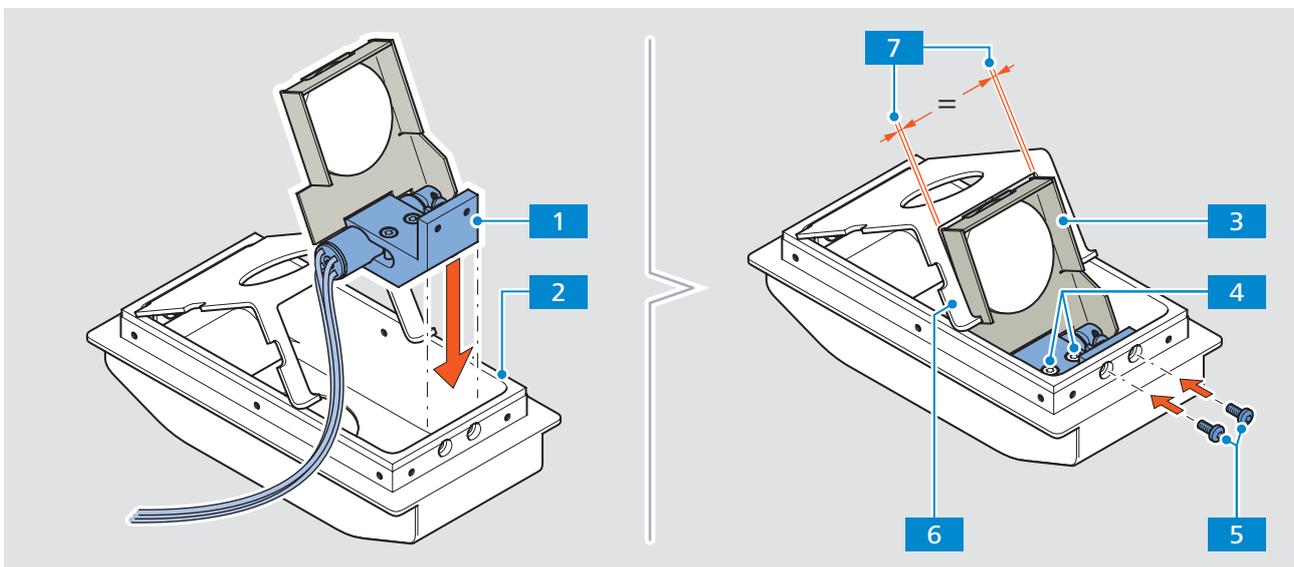


Fig. 23 Install motor holder

Note

NOTE REGARDING ASSEMBLY

During assembly, make sure that the white reference assembly **3** has the same clearance **7** on the right and left to the inner plate **6**.

When you have aligned the white reference assembly (see clearance **7**), tighten the two clamping screws **4** of the motor holder to lock the motor.

Then tighten the two Torx screws **5** to lock the motor holder **1**.

Now check if the white reference can move through the inner plate of the front panel without catching. If not, realign by adjusting the clamping screws of the motor as well as the screws fastening the motor holder to the front panel.

11 Lay cable and insert front panel

Pull the front panel **2** slightly out of the housing.

Plug the flat control cable **4.2** into slot **X704 4.1** on the "FBG PowerBoard" (see also Fig. 25 for this purpose).

Route the motor cable **3.2** so that it runs above the already routed lamp cable **7** and below the two bolt threads **5** of the analog board.

Following this, run the motor cable along below the optical opening of the detector **6**.

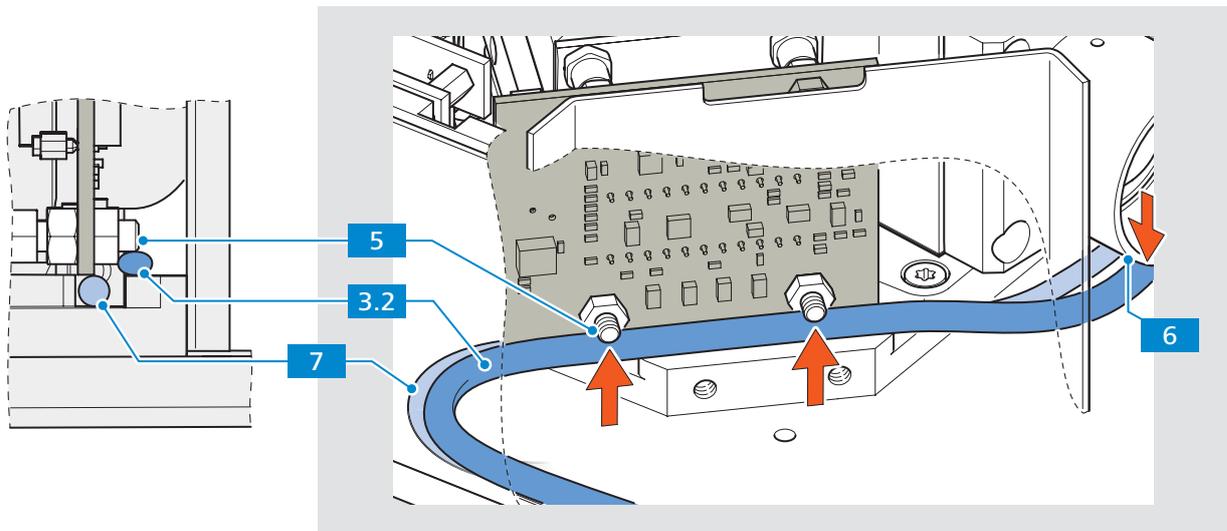


Fig. 24 Laying the new motor cable

Note

NOTE ON LAYING THE MOTOR CABLE

It is much easier to lay the cables if the lamp holder is temporarily dismantled/removed from the housing.

At the narrow points (see red dotted ellipse in Fig. 26 on page 28), take special care to avoid damaging the electronic components or cables.

Plug the motor cable **3.2** into slot **X800** **3.1**.

Insert the front panel **2** very carefully into the housing from above **1**. Ensure that the flat control cable is laid so that it runs through the two recesses on the underside of the sheet metal **2.1** of the front panel **2** (see the two red dashed circles in in Fig. 26 on page 28).

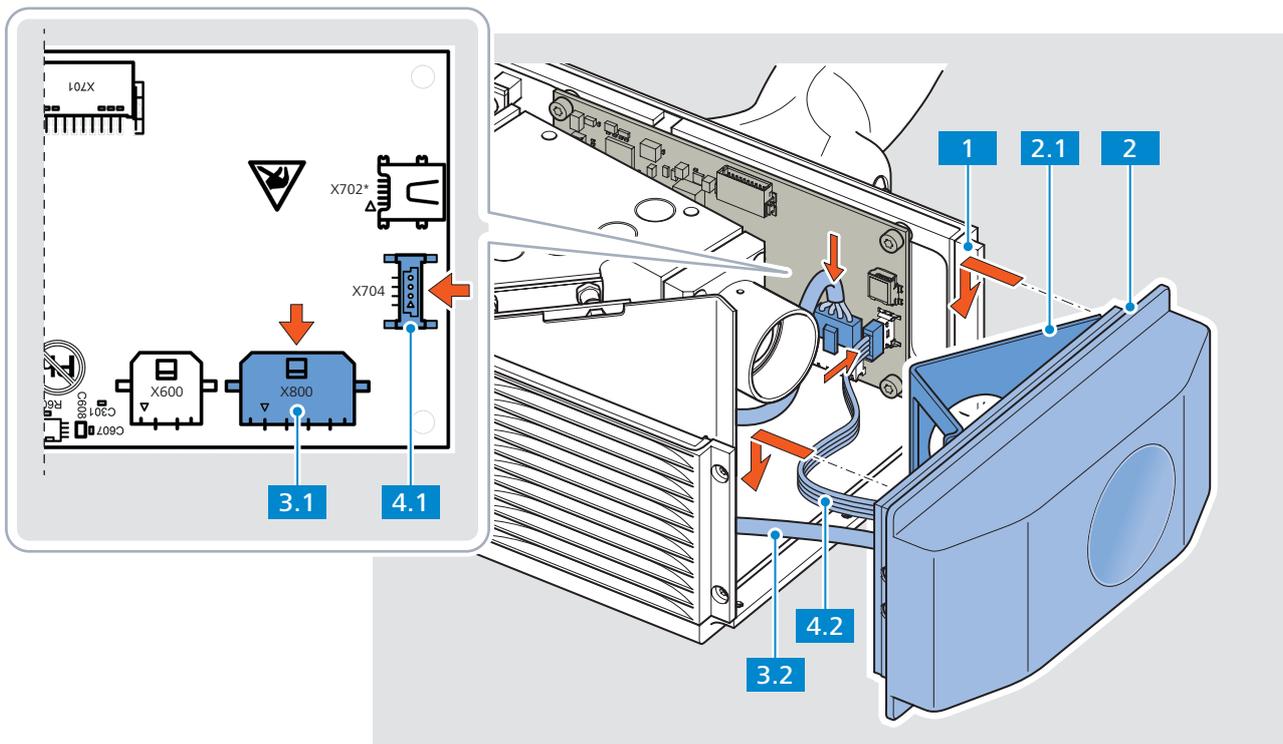


Fig. 25 Lay the cable and insert the front panel

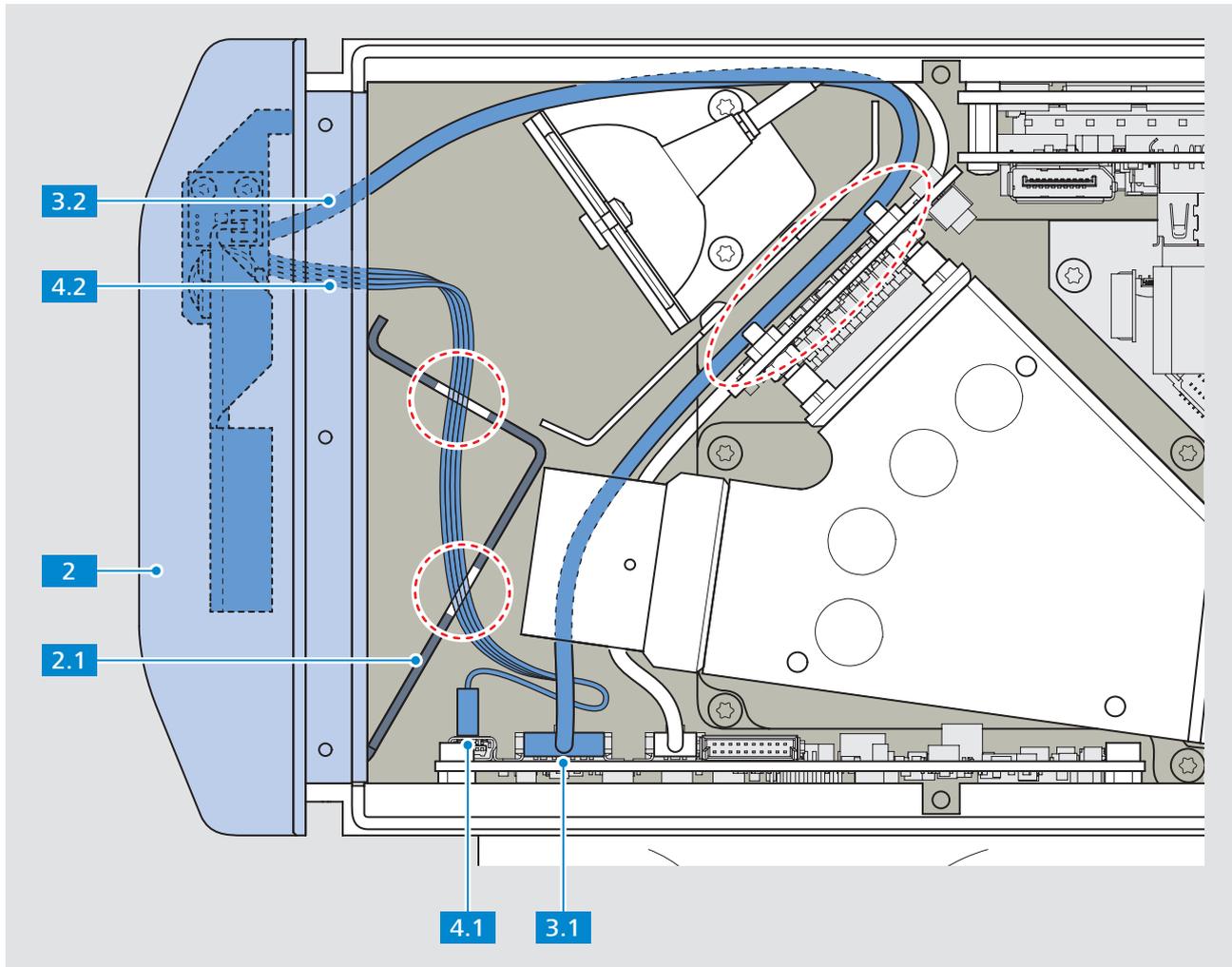


Fig. 26 Laying the cable - details

12 Screw on the front panel

Finally, attach the front panel as follows:

- First screw the 2 screws above and below the front panel back into the housing.
- Then screw the 3 screws on the side of the front panel back into the housing.
- Tighten all 7 screws.

(See also “Fig. 14 Remove the fastening screws on the front panel” on page 19)

7 Calibrating the compensation data

- Requirements**
- The halogen lamp has been replaced and the device closed back up.
 - Put the following parts ready:
 - Stand for AURA handheld NIR, order no. 000000-2355-515
 - White reference with certificate, order no. 000000-2393-701
 - Gray reference with certificate, order no. 000000-2394-676
 - Black reference (cavity) order no. 000000-1270-164
 - Attachment for external referencing, order no. 000000-2355-512
 - Check the white, gray and black references.



Caution

SENSITIVE SURFACES

Do not touch the surface of the white reference.

Make sure that the white, gray and black references are clean. If necessary, clean the references with compressed air.

The white and gray references are set in glass and can be cleaned using alcohol.



Note

Make sure that the white and gray reference certificates have not expired.

You will find the appropriate certificate on the USB stick enclosed in the storage case.

Procedure 1 Connect the device to the power supply

For acceptance testing with "TestCenter", always connect the device to a power supply unit.

2 Connect the device to the test computer

Connect the device to the measuring computer using an Ethernet cable.

⇒ See next page for further steps ⇒

3 Place the device in the stand and apply the attachment for external referencing

Insert the device **2** into the stand **1** and fit the attachment for external referencing **3** onto the measuring window.

4 Insert the reference

Insert the relevant reference **4** into the centering aid.

Make sure that the reference is correctly aligned with the attachment (the nose of the reference should slot into the groove of the attachment).

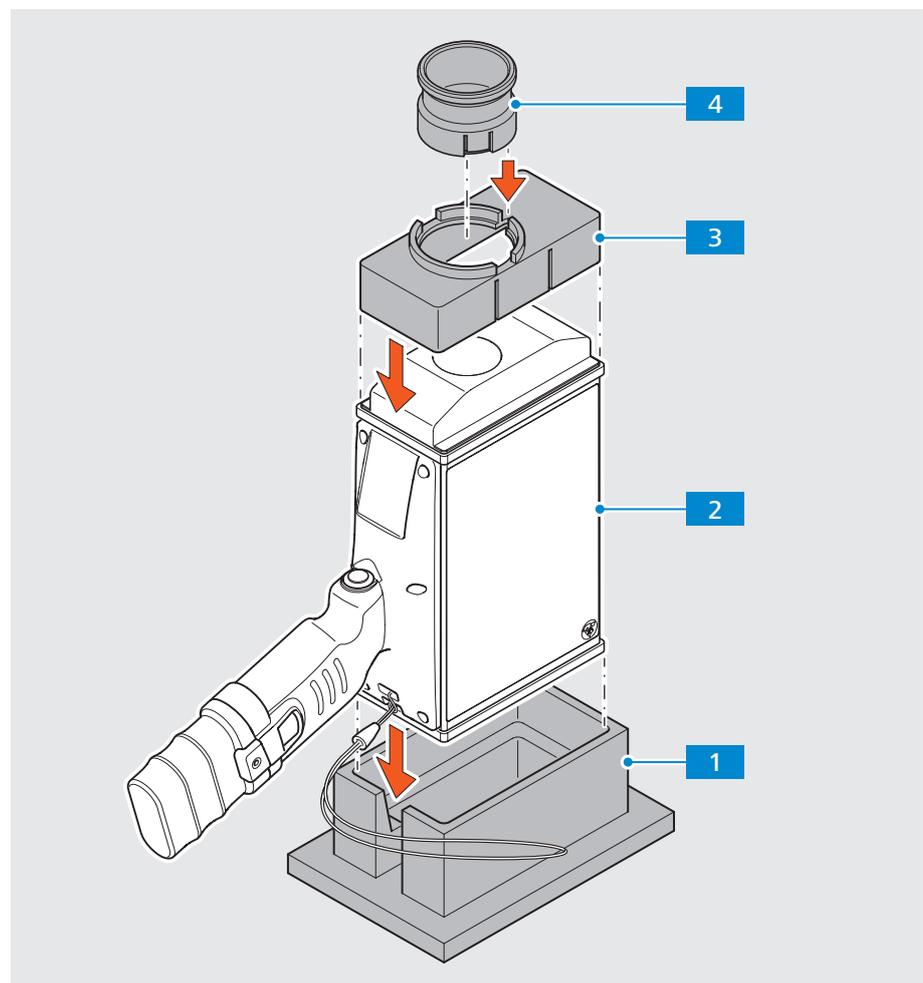
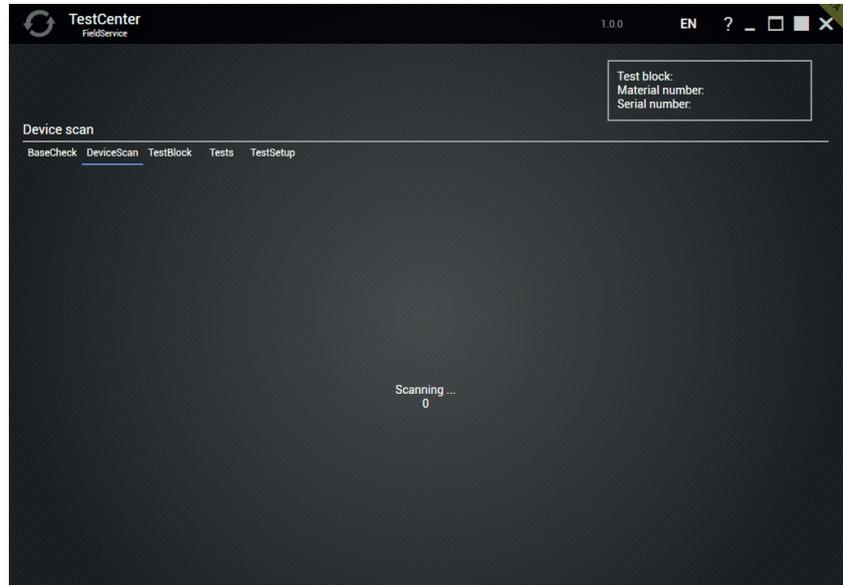


Fig. 27 Prepare device for calibration

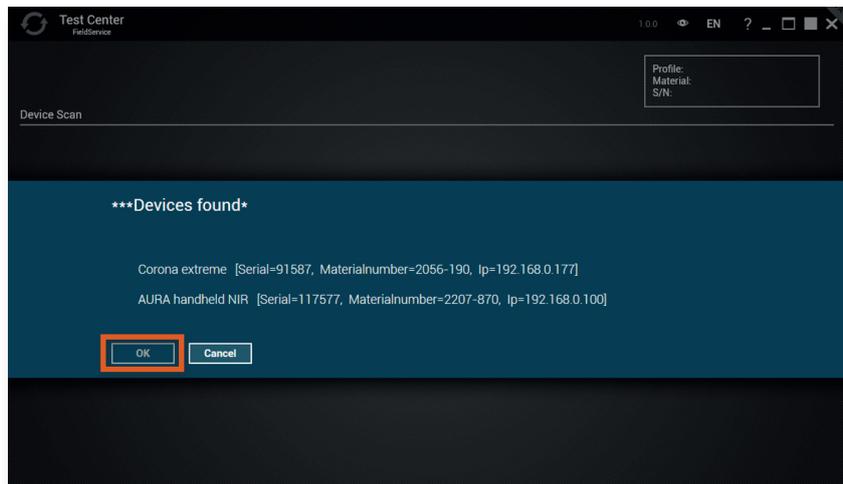
5 Start TestCenter

Start the TestCenter. A scan is run for appropriate devices.



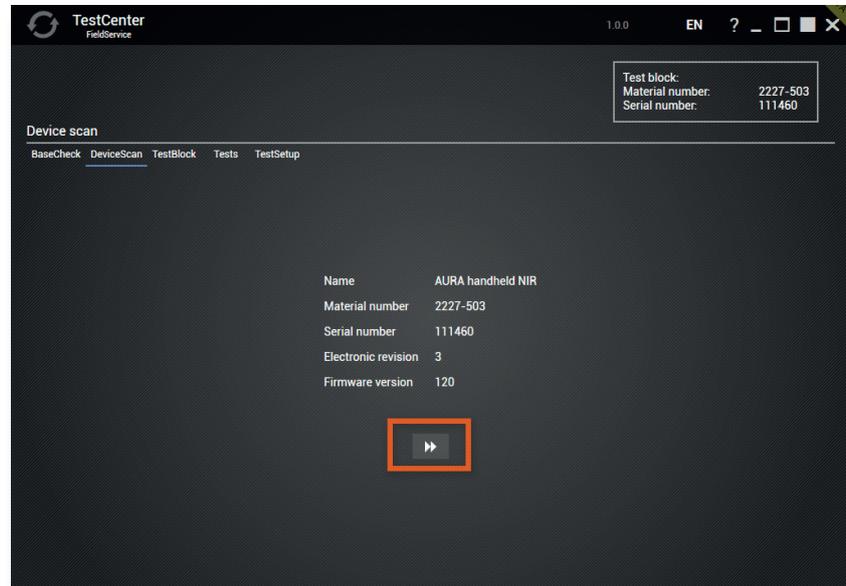
Once the scanning process is complete, any devices which have been found will be displayed.

If necessary, select the device to be tested and confirm your selection with **OK**.



The following screen displays additional information about the selected device.

 = Skip to next program section



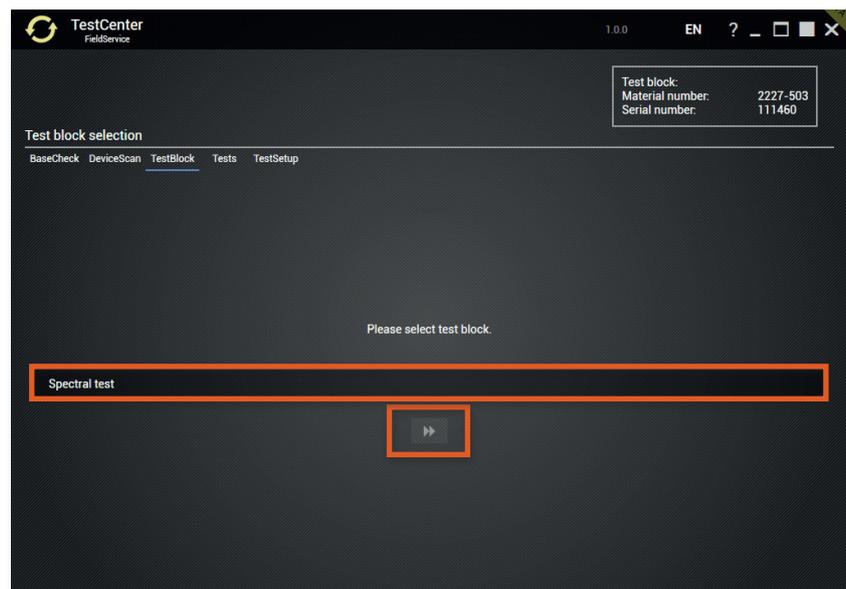
Click  to proceed to the next step.

6 Select test block

A scan is run for suitable test blocks (there is only one suitable test block for the AURA® handheld NIR device).

Select the "Spectral test" test block.

 = Connection status "not connected"

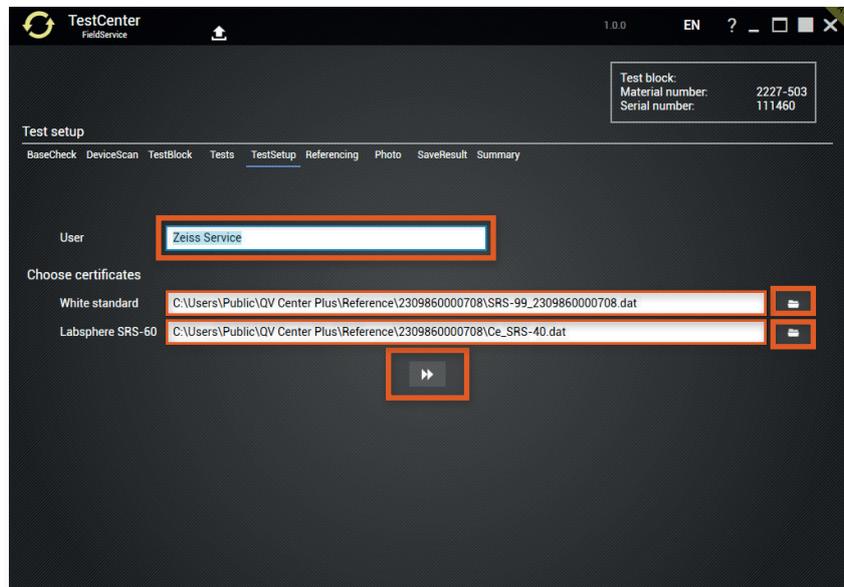


Click  to proceed to the next step.

7 Select certificates

Enter your name in the "User" input field.

Use the  buttons to select your reference certificates.

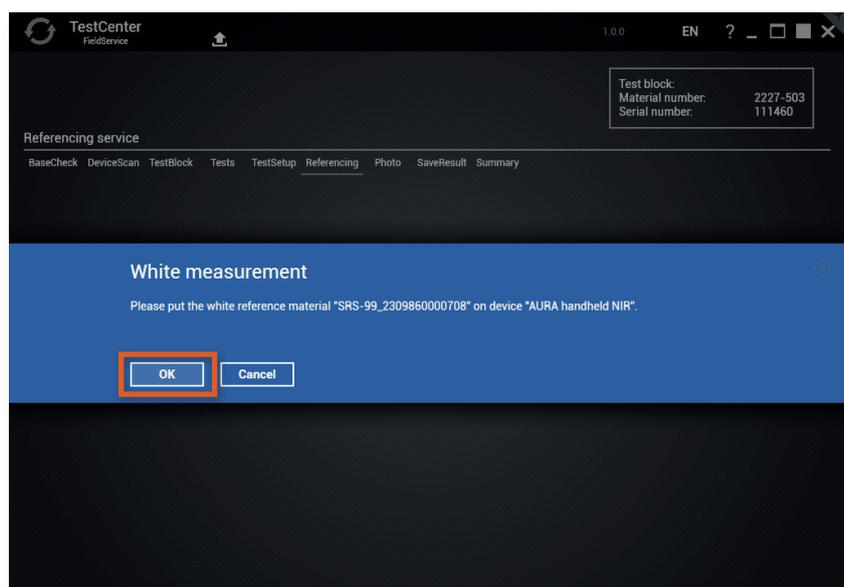


Click  to proceed to the next step.

8 Referencing – Calibration of white reference

Place the white reference on the centering aid. Make sure that the markings on the reference and the centering aid are aligned.

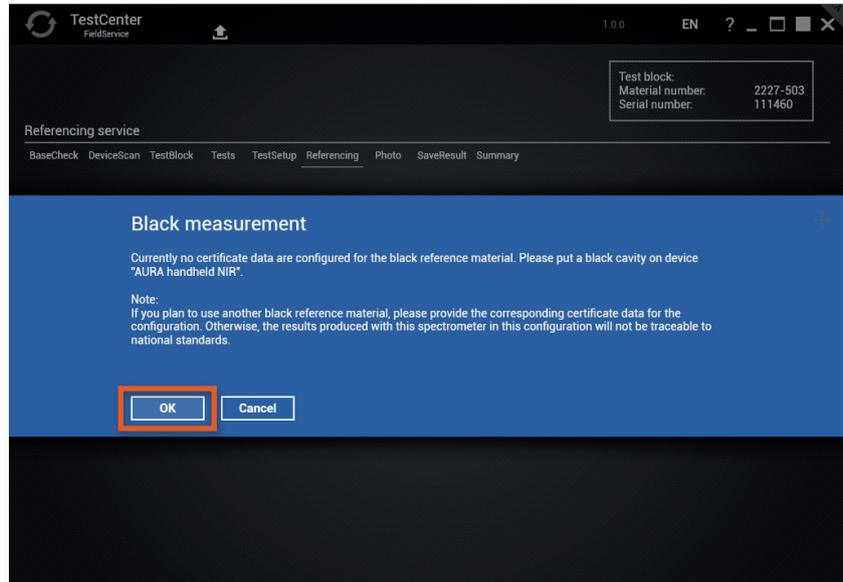
Click **OK** to start the calibration.



9 Referencing – Calibration of cavity (black reference)

Place the black reference on the centering aid. Make sure that the markings on the reference and the centering aid are aligned.

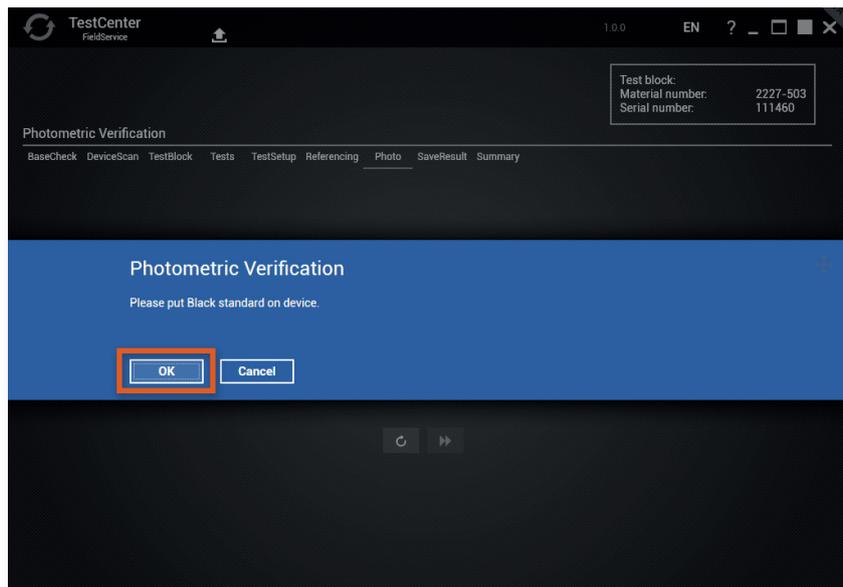
Click **OK** to start the calibration.



10 Photometric verification – Cavity measurement (black reference)

Place the black reference on the centering aid.

Click **OK** to start the measurement.



 = Repetition of last part of program

Click  to repeat the measurement.

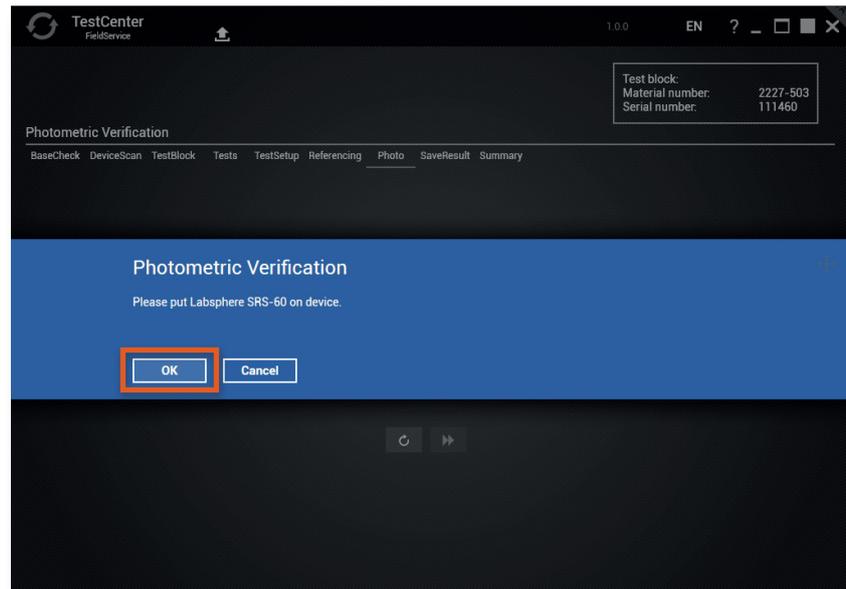
Click  to proceed to the next step.

11 Photometric verification – Gray reference measurement

Place the gray reference on the centering aid.

Make sure that the reference is correctly aligned with the attachment (the nose of the reference should slot into the groove of the attachment).

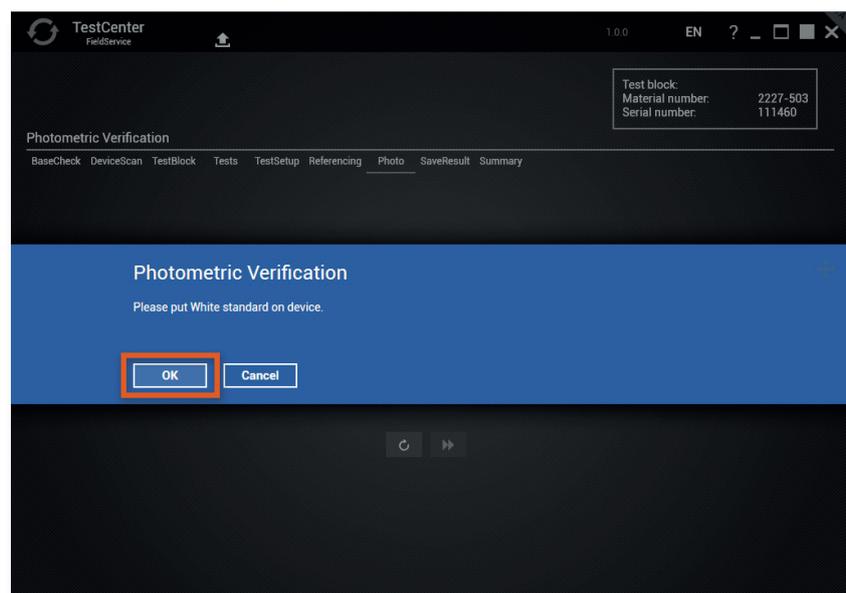
Click **OK** to start the measurement.



12 Photometric verification – White reference measurement

Place the white reference on the centering aid.

Click **OK** to start the measurement.

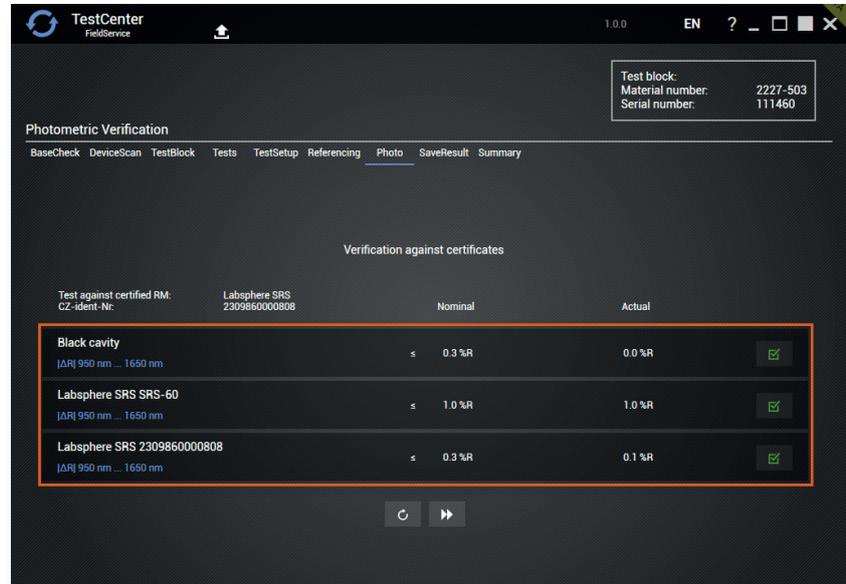


13 Evaluation of the photometry measurement

In the following screen you will receive an evaluation of the measurements.

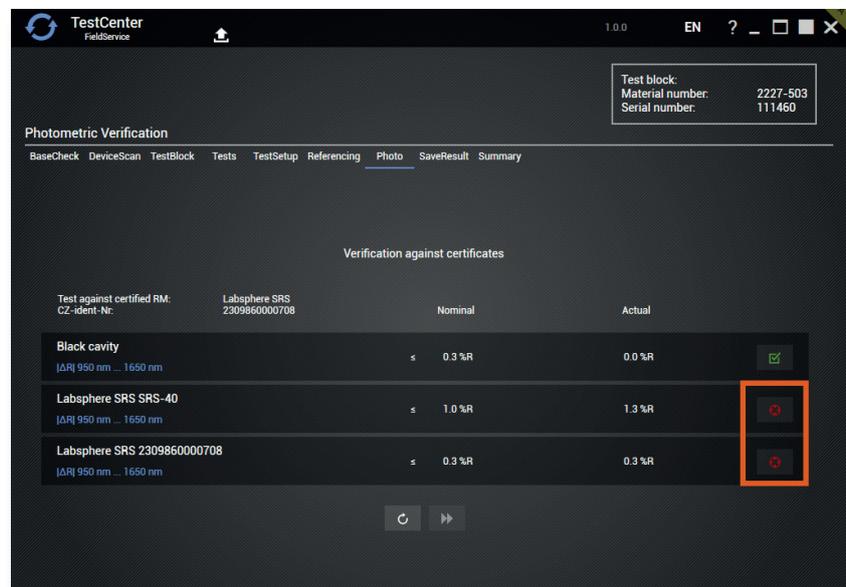
 = Connection status "connected"

 = Measurement successful



If measurements are unsuccessful, this is indicated by the following pictogram: .

 = Measurement unsuccessful



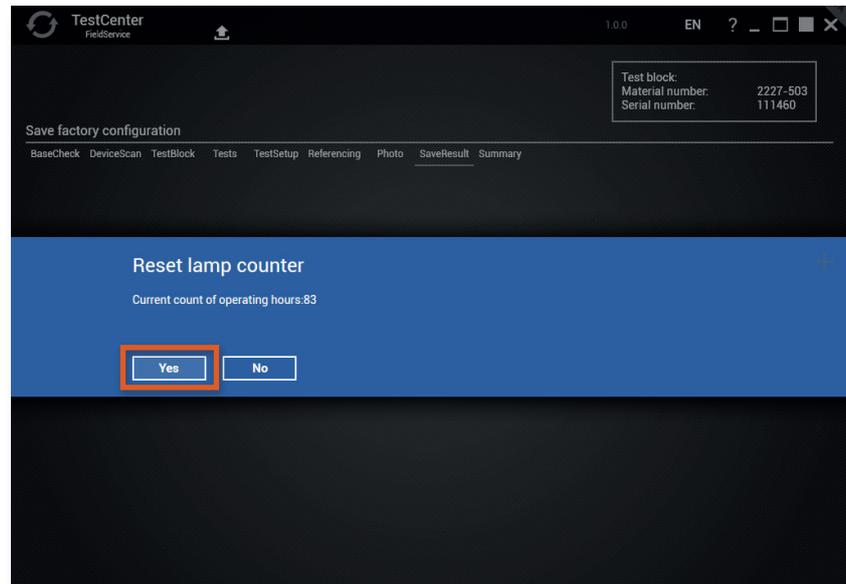
Click  to repeat the measurement.

Click  to proceed to the next step.

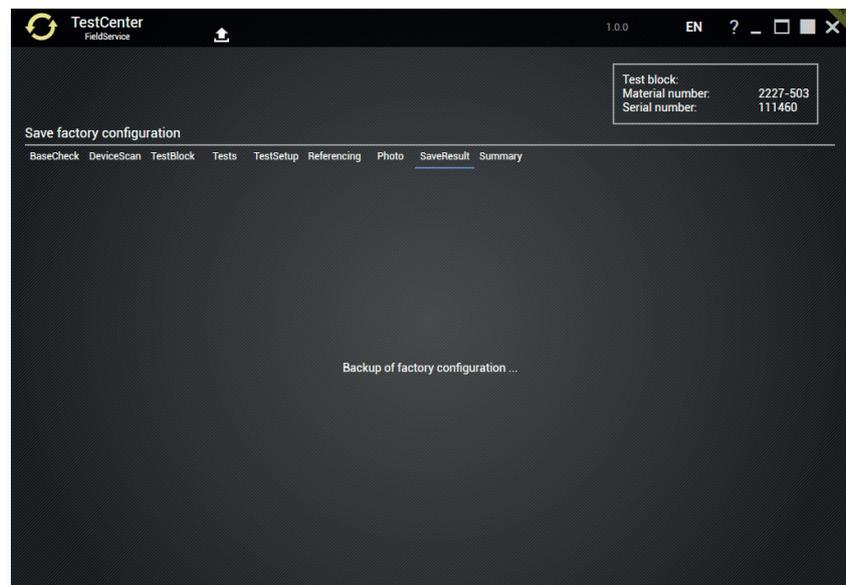
14 Change the device profile

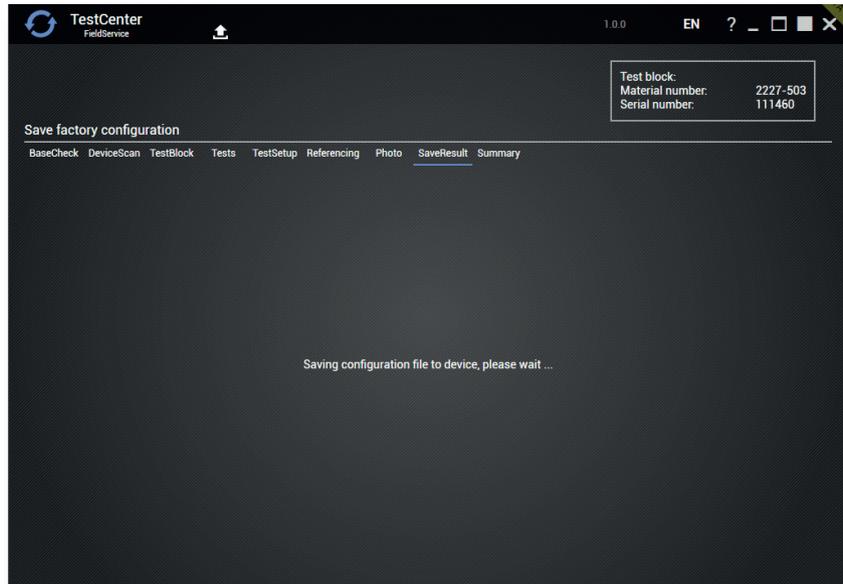
The counter must be reset each time the halogen lamp is replaced. The previous configuration of the device is now invalid.

Click **Yes** to reset.

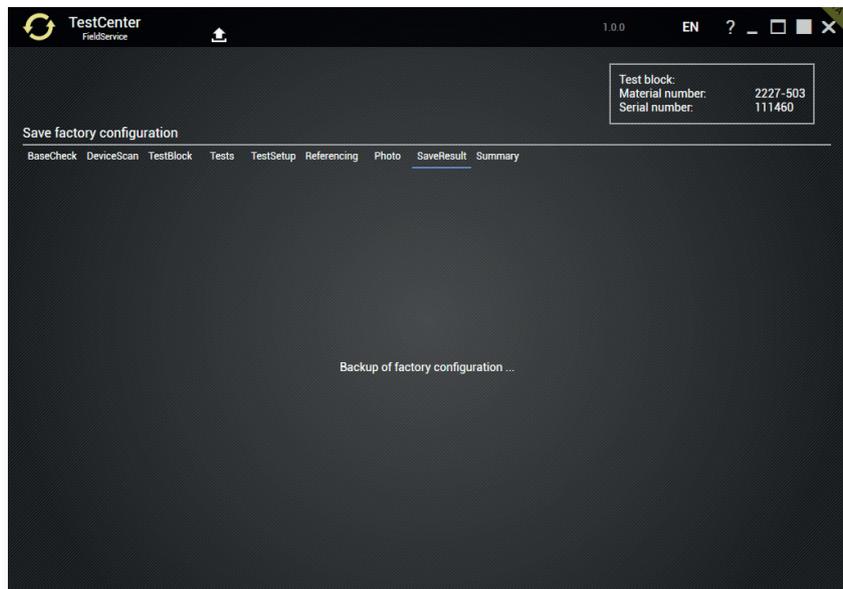


Several steps now need to be taken to store the current reference as the new default setting on the device.



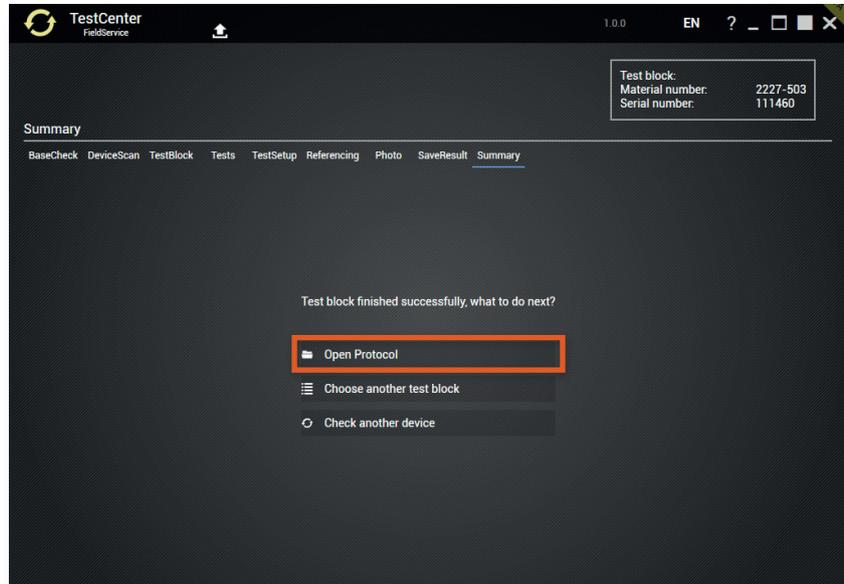


The new configuration is read by the device (as a check) and a backup is created.



15 Open protocol

Click **Open Protocol** to open the acceptance protocol.

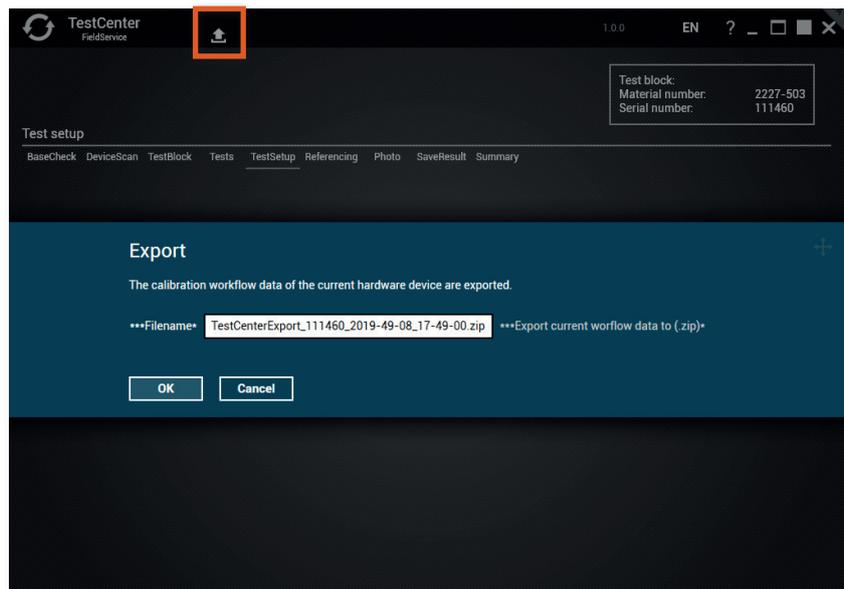


16 Export calibration workflow data

The calibration workflow data / test data of the current device can be exported at any time for error analysis or to save the test data for backup and analysis purposes.

Click on  to start the export.

 = Start export



8 Accessories and spare parts for AURA handheld NIR - Rev. 1

Spare parts for AURA handheld NIR	Order number
Halogen lamp	000000-2345-437
Lamp cable	000000-2224-159
Motor with cable	000000-2326-676
Display	000000-2315-414
Inclined handle (only for device version 000000-2227-503)	000000-2281-649
White reference with holder	000000-2326-674
Edge protector set	000000-2345-546
Inclined handle, battery compartment	000000-2281-575

Spare parts in service kit for AURA handheld NIR	Order number
Black reference (cavity)	000000-1270-164
White reference with certificate	000000-2441-590
Gray reference with certificate	000000-2441-591
Stand for AURA handheld NIR	000000-2355-515
Attachment for external referencing	000000-2355-512