



## micro-wave-scan 3

Orange Peel Meter

Operating Instructions



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# 1 Introduction

Dear customer,

thank you for having decided for a BYK-Gardner product. BYK-Gardner is committed to providing you with quality products and services. We offer complete system solutions to solve your problems in areas of color, appearance, and physical properties. As the basis of our worldwide business, we strongly believe in total customer satisfaction. Therefore, in addition to our products, we offer VALUE-ADDED services:

- Technical Sales Force
- Technical & Application Support
- Application and Technical Seminars
- Repair & Certification Service

BYK-Gardner is part of the ALTANA Group and a direct subsidiary of BYK, the worldwide leader of additives for coatings and plastics. Together we offer complete and unique solutions for you, our customer.

Thank you for your trust and confidence. If there is anything we can do better to serve your needs, do not hesitate to let us know.

Your BYK-Gardner Team

[www.byk-instruments.com](http://www.byk-instruments.com)

## 1.1 For Your Safety

Before operating the instrument the first time, please read the operating instructions and take particular notice of the safety instructions. If you use the instrument and the accessories properly, there are no hazards to fear.

This product is equipped with safety features. Nevertheless, read the safety instructions carefully and use the product only as described in these instructions to avoid accidental injury or damage.

No claims of product liability or warranty can be honored if the device is not operated in accordance with the operating instructions.

### 1.1.1 Meaning of the Symbols

Throughout this document the following symbols and terms are used.



#### **WARNING**

This symbol warns of the danger of injuries. The term WARNING warns of **severe** injuries and material damage. Different symbols can be used - if applicable.



#### **CAUTION**

This symbol warns of the danger of injuries. The term CAUTION warns of **slight** injuries or damage. Different symbols can be used - if applicable.



#### **NOTICE**

This symbol points out additional information - which can be important for the operation of the instrument.

### 1.1.2 Warning - Possibility of Injuries



#### **CAUTION: Familiarization with safety instructions is necessary**

Absence of knowledge of safety instructions threatens your health and can damage the instrument. Read the safety instructions before you use the instrument the first time.

The safety instructions are part of the delivery content. You find the safety instructions in the dedicated booklet enclosed to the instrument carrying case.

The safety instructions also include information about disposal, liability, and copyright.



#### **WARNING: Injuries possible due to defects and extraordinary loads**

If safe operation can no longer be presumed, shut down the device and secure it against unintended operation.

The device must be presumed unsafe to operate:

- If visible damage is evident,
- if the instrument is no longer working,
- if it has been stored for long periods under adverse conditions or
- after harsh treatment during shipping.

**WARNING: Safety advices for rechargeable battery packs**

Do not crush or dismantle, do not heat, or incinerate, do not immerse in any liquid, do not place in or near high temperature places or in direct sunlight. Batteries can explode or release harmful substances.

Ensure batteries have no short circuit on the contacts (for example due to damaged insulation). Metallic objects must not come in contact with the bare contacts. Immediately discontinue use if batteries appear abnormal in any way.

Use only the battery pack included with delivery. Use only the power supply included with delivery. Do not use battery pack or power supply for other devices.

**WARNING: Do not try to repair your instrument on your own**

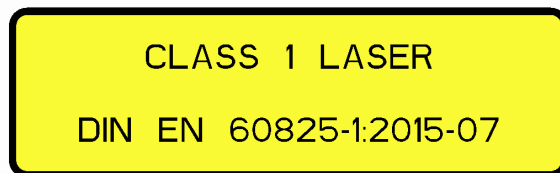
Do not perform any repairs on the instrument. The measurement unit must be opened by BYK-Gardner authorized repair locations only.

Devices returned to BYK-Gardner for repairs or service / recertification must be shipped **without** battery pack in the case / instrument.

**WARNING: Eye damage caused by illumination LEDs**

Looking into the illumination LEDs during measurement could harm your eyes. Do not look into the measurement aperture when the instrument is turned on - even if you assume a fault with the instrument.

The instrument is a class 1 laser product. To indicate the risks following label is placed on the housing and / or on the base of the instrument.

**WARNING: Severe material damage**

The instrument consists of sensitive optical and electronic precision parts. Prevent it from being dropped, bumped, or shaken!

Avoid exposure to continuous humidity and condensation. Avoid splashing with water, chemicals, or other liquids.

Please use only accessories that are available for the unit.

Only devices meeting the requirements for low voltage safety may be connected to the USB interface.

The charger in the docking station is only to be used to charge the battery packs delivered with the instrument.

**CAUTION: Material damage**

Do not allow any foreign objects to get into the measurement opening.

Do not expose the unit to direct sunlight for extended periods of time. Do not store it in a hot or dusty environment. Use the instrument case for storage.

Rechargeable Li-Ion battery packs: Do not charge at temperatures below 0 °C. The allowed temperature range is 10 °C to +40 °C for operation and 0 °C to 60 °C for storage.

Do not use any acetone for cleaning the unit! The unit housing is resistant to many solvents. For cleaning you should use a soft, moist cloth. Excessive dirt and dust can be removed with ethanol or cleaning alcohol.

In case you intend not to use the instrument for a longer period of time, take out the batteries.

**NOTICE: Disconnecting from any power source**

To disconnect the instrument: Remove the battery pack and / or the USB interface cable.

To disconnect the docking station: Disconnect the plug from the power supply and / or the USB interface cable.

To disconnect the power supply: Disconnect the power cable from the power supply and / or from mains socket.

Please make certain that the power supply plug is easily accessible. Use only the power supply included with delivery.

**NOTICE: Using the instrument**

You will find the technical data for all system components on the respective manufacturer's plates and in the section "Technical Data".



## 1.2 Disposal

Disused electrical equipment such as this instrument and its batteries must be professionally disposed. Do not dispose it in household garbage and make sure to observe the national law in your country.

## 1.3 Disclaimer

### Exclusion of Liability

No liability other than as provided by law is assumed for direct or indirect damage sustained in association with the use of the instrument, the software or documentation.

BYK-Gardner precludes all liability claims if the usage described in "Intended Use" is disregarded. Any other usage than described in "Intended Use" is not according to the purpose of the instrument and leads to termination of liability claims.



## 1.4 Copyright

Specific properties and structural characteristics of the instrument are intellectual property of BYK-Gardner. The copyright of this manual remains with BYK-Gardner.

This document must not be reproduced fully or in part, published or used for any other competitive purposes, no matter whether against payment or not, without prior written authorization from BYK-Gardner.

BYK-Gardner reserves the right to update the instrument, software, and written documentation without prior notice.

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## 1.5 Declarations

### 1.5.1 EU Declaration of Conformity

Hereby,

BYK-Gardner GmbH

Lausitzer Strasse 8

D-82538 Geretsried

declares, that the product

- **micro-wave-scan 3**

complies with the requirements of the following EU directives:

- 2014/30/EU - Electromagnetic Compatibility (EMC)
- 2014/35/EU - Low Voltage
- 2014/53/EU - Radio Equipment Directive (RED)

The following harmonized standards were applied:

- EN 60825-1:2014 - Laser Requirements
- EN 61010-1:2010/A1:2019 - Safety Requirements
- EN 61326-1:2013 - EMC Requirements

Geretsried, July 16, 2024



Dr. Jörg Krames

President • BYK-Gardner GmbH

## 1.5.2 UK Declaration of Conformity

Hereby,  
BYK Gardner GmbH  
Lausitzer Strasse 8  
D-82538 Geretsried  
declare, that the instrument

- **micro-wave-scan 3**

complies with the requirements of the following UK directives:

- S.I. 2016/1091 - Electromagnetic Compatibility (EMC)
- S.I. 2016/1101 - Low Voltage
- S.I. 2017/1206 - Radio Equipment Regulations (RED)

The following harmonized standards were applied:

- EN 60825-1:2014 - Laser Requirements
- EN 61010-1:2010/A1:2019 - Safety Requirements
- EN 61326-1:2013 - EMC Requirements

Geretsried, July 16, 2024



Dr. Jörg Krames  
President • BYK-Gardner GmbH

## 1.5.3 FCC Declaration (USA)

This equipment contains a radio module with FCC ID QPU8000.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### RF exposure statement (portable devices)

This device complies with the RF exposure SAR test exclusion requirements for portable devices, if a minimum separation distance (2 cm) to the antenna is kept. If the device is used and held correctly, the distance to the antenna will be maintained and the risk of human contact during normal operation is minimized.

## 1.5.4 IC Declaration (Canada)

This equipment contains a radio module with IC ID 4523A-SN8000.

This Class A digital apparatus complies with Canadian ICES-003.

This device complies with Industry Canada's license-exempt RSSs.

Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

## 1.5.5 Japanese Declaration

This equipment contains specified radio equipment that has been certified to the Technical Regulation Conformity Certification under the Japanese Radio Law.

MIC ID: R 006-000497



## 1.6 Intended Use

The **micro-wave-scan 3** (7420) is designed to measure orange peel on high-gloss surfaces. It is optimized for small and curved parts. The minimum sample size is 25 mm x 40 mm.



By placing the base plate of the unit onto the surface, pressing the **Operate** button on the front and moving the instrument over the surface, it measures the properties of the surface and processes, stores and displays the measured data.

The instrument can be connected via USB or WiFi to a PC to read or write data. The capacitive display allows an easy configuration and usage of the instrument.

## 2 System Description

The **micro-wave-scan 3** is a portable surface analyzer that measures orange peel on high-gloss surfaces. The instrument is controlled by the **Operate** button and the touch-screen display on the front side. The **Operate** button is used to switch on the instrument and to trigger a measurement. The touch-screen display is used to select icons and functions directly.

### 2.1 Delivery Content

The system comes complete with: Measurement unit, docking station, external power supply unit with power connection line, 2 rechargeable Li-Ion battery packs, USB cable, cover, test tile, certificate, safety instructions and short instructions.

#### 2.1.1 Transportation Case

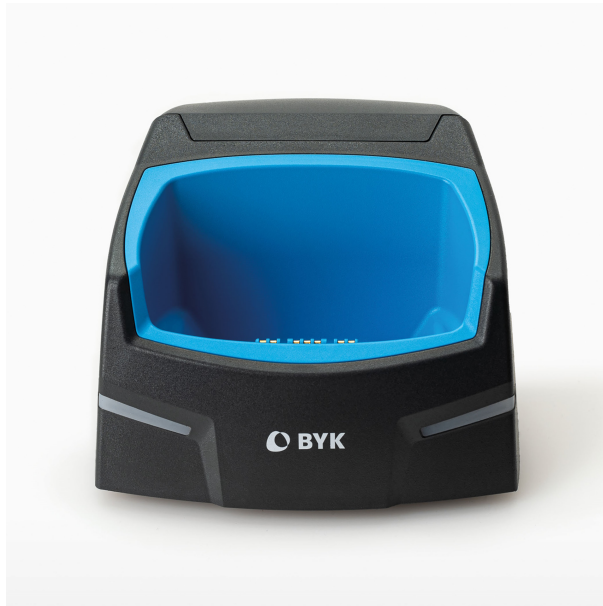


The items listed below are contained in the packaging. Please contact BYK-Gardner if any item is missing or damaged.

1 Transportation case with padding	5 Internal charger with rechargeable battery pack #2
2 Safety instructions, short instructions, and retraceable certificate	6 Docking station
3 Measurement unit with protection cover and rechargeable battery pack #1	7 Hand strap, power cable, USB interface cable
4 Standard plate with cover - includes the checking tile	

## 2.1.2 Names and Functions of Parts

The basic system consists of the measurement unit and the docking station. The docking station is used to exchange data and to charge the rechargeable battery pack in the instrument and in the docking station.



### NOTICE

When the instrument is not in use, place it in the docking station. This way the rechargeable battery pack will be charged, and the instrument will always be ready for measurements.

The instrument comes with a protection cover. Remove it before operation and attach it after operation. Also attach the cover before placing the unit in the transport case.



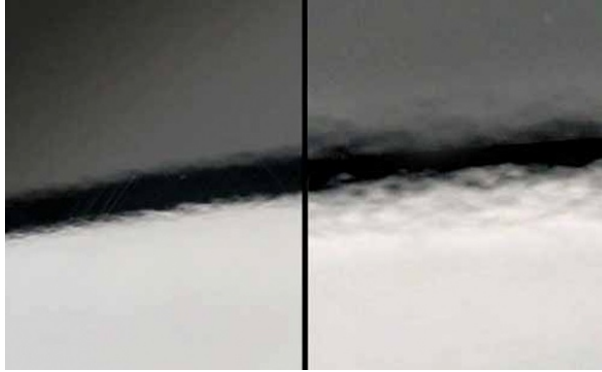
The button **Operate** and the touch-screen display are used to control the system. Pressing **Operate** turns the unit on and causes the instrument's dashboard (main menu) to be displayed. All settings within the menus are made by the display.

In measuring mode pressing the button **Operate** performs measurements. In configuration mode it has the same function as the symbol **Back**.

System operation is supported by an auto-diagnosis test, comments, and error messages. Measurement values and comments appear in the display.

## 2.2 Measurement Principle

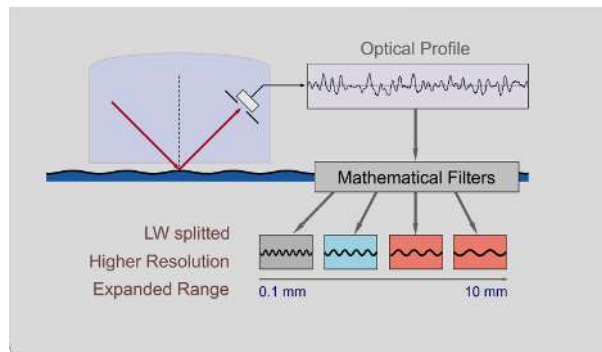
The **micro-wave-scan 3** is the objective eye for a brilliant finish on small and curved parts. It provides quality control and troubleshooting for class A surfaces.



Surface appearance changes with the size and distinctness of wavy structures. The **micro-wave-scan 3** analyzes waviness intensity with 4 wavelength ranges (0.1 mm - 10 mm) and evaluates the brilliance of the surface. The results form a "structure spectrum" and help to analyze and optimize the surface quality based on material and / or process parameters.

### 2.2.1 Measurement of Waviness

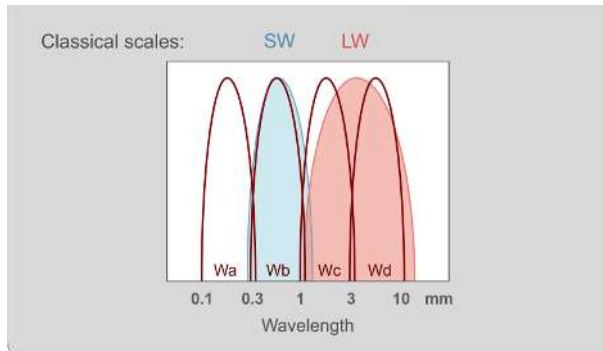
The **micro-wave-scan 3** simulates visual perception. Like our eyes, the instrument optically scans the wavy light / dark pattern. A laser point light source illuminates the specimen at a 60° angle and a CCD camera measures the reflected light intensity at the equal but opposite angle.



The instrument is rolled across the surface and measures point by point the optical profile of the surface across a defined distance. The **micro-wave-scan 3** analyzes the structures according to their size. To simulate the human eye's resolution at various distances, the measurement signal is divided into several ranges of wavelength using mathematical filter functions.

## 2.2.2 Wavelength and Scales

Standard scales for wavelength are classic scales **SW** and **LW** and modern scales **Wa .. Wd**.



The "classic" scales have following ranges:

- Shortwave (SW) = 0.3 ... 1.2 mm
- Longwave (LW) = 1.2 ... 12 mm

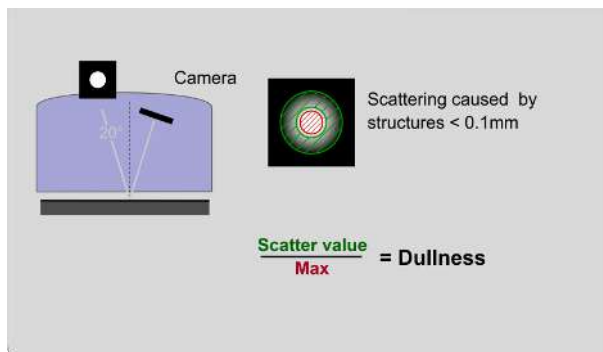
The "modern" scales have following ranges:

- $W_a = 0.1 \dots 0.3$  mm
- $W_b = 0.3 \dots 1$  mm
- $W_c = 1 \dots 3$  mm
- $W_d = 3 \dots 10$  mm

These scales (and various customer-specific scales) can be activated in the instrument.

## 2.2.3 Measurement of Dullness

Structures smaller than 0.1 mm influence visual perception, therefore the wave-scan uses a CCD camera to measure the diffused light caused by these fine structures.



This parameter is referred to as "dullness".



## 2.3 Desktop Software

All critical color and appearance parameters can be saved and analyzed with one software package, "smart-process". This includes the measurement of orange peel with the instruments of the **wave-scan 3** family.

### 2.3.1 Download

For the **wave-scan 3** family the software is available as following package:

- **smart-process**: Offers the setup of organizers for clear sample identification and a menu guided operation on the instrument.

To download the software package, go to following web-site:

- <https://www.byk-instruments.com/wave-scan> or
- <https://www.byk-instruments.com/software#wave-scan>

Via these links you can easily open and view the software package with your preferred browser application. It is recommended to save the package on the hard drive of your PC before installation.

### 2.3.2 Installation



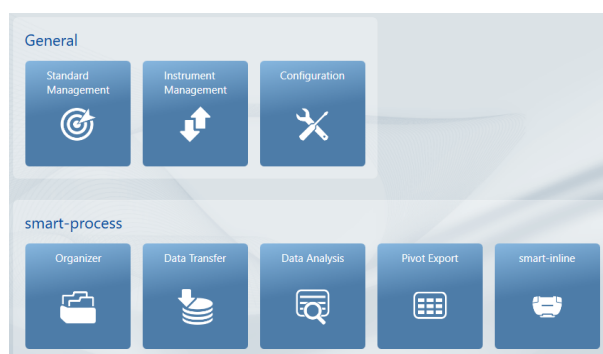
#### NOTICE

You need administrator privilege on the PC in order to install the software package.

To install the software package - provided as a ZIP archive:

1. Save the file on your hard drive into a new folder.
2. Extract the complete ZIP archive.
3. In the extracted folder, right mouse click on the file "**install.exe**".
4. Select "**Run as administrator**".
5. Follow the setup instructions on the screen.

Using the software, you can create organizer files with complex measurement series and download to the instrument.



After upload of the measured data to the database in your PC you can use the software for data analysis and statistics.



#### NOTICE

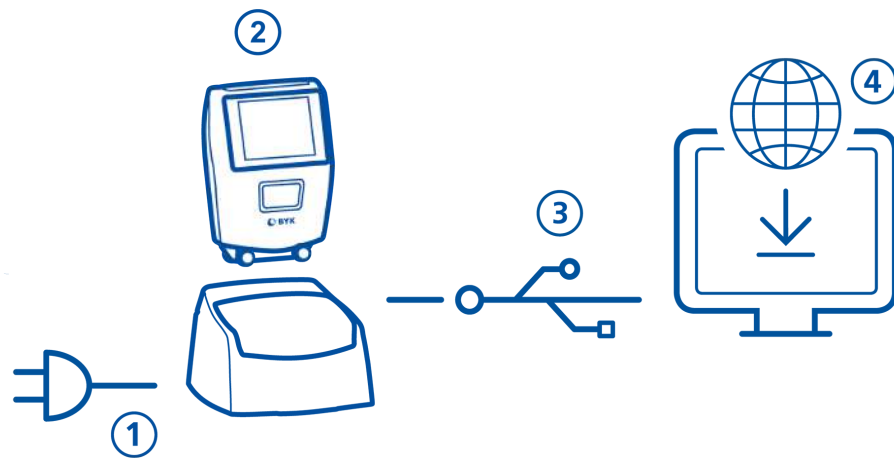
After download and installation, the software package can be used for **30 days** free trial. Thereafter, you need to register your software package. The standard delivery includes two PC licenses for the selected software package.

## 3 Getting Started

Before operating the instrument for the first time, please read the operating manual completely and take particular notice of the safety instructions. Unpack the instrument and check the delivery for completeness, see [Delivery Content](#) [▶ 13].

### 3.1 System Diagram

The entire system consists of instrument, docking station and test tiles and software for data transfer and analysis.



To assemble the measurement system, place the instrument in the docking station and power the docking station.

- Connect docking station with power supply **(1)**.
- Power is provided to the instrument by the rechargeable battery pack; charged in the docking station.
- The delivery comprises a second rechargeable battery pack; you can use one of them while recharging the other one.
- Place instrument in the docking station **(2)**.
- The docking station automatically charges the battery pack in the docking station and in the instrument.
- Connect docking station with PC via USB cable **(3)**.
- Download and install the software "smart-chart" **(4)**.
- Turn instrument on by pressing the **Operate** button.

The instrument switches off automatically, if not used. To switch it off manually, select **Configuration > Shutdown**.

## 3.2 Powering the Instrument

The measurement unit can be operated with the rechargeable battery pack included in the delivery. Depending on the specific brand, the capacity of the battery pack is sufficient for up to 1,000 measurements.

### 3.2.1 Rechargeable Battery Pack



To place the instrument in service, the rechargeable battery pack must be inserted until it locks in place. The second battery pack is inserted in the docking station. The battery pack can only be attached when it is in the correct position.



#### **WARNING: Removal of rechargeable battery pack**

Do not remove the rechargeable battery pack while the instrument is switched on. Always perform regular shutdown before opening the instrument's housing.

When inserting the rechargeable battery pack, ensure that its contacts are aligned with those of the instrument.



#### **NOTICE: Using rechargeable battery packs**

To ensure uniform utilization, the rechargeable battery packs should be exchanged regularly between instrument and docking station. The recommendation is a weekly exchange.

The rechargeable battery pack should be fully charged in regular intervals to maintain its full capacity. The recommendation is at least once every 6 months.

### 3.2.2 Charging the Instrument

The charging takes place via the docking station:

1. Connect the docking station to the power supply.
2. Remove the protection plate from the instrument.
3. Put the instrument into the docking station.

Both battery packs are charged. The battery pack in the docking station is charged faster than the one in the device.



The charge LEDs indicate the current state:

- Left: Battery pack #1 in the instrument is charged.
- Right: Battery pack #2 in the docking station is charged.

For the charge LED following rules apply:

- LED pulsates red as long as the battery charge is  $< 15\%$ .
- LED pulsates yellow as long as the battery charge is  $< 50\%$ .
- LED pulsates green as long as the battery charge is  $< 90\%$ .
- LED lights up in green when the battery charge is  $\geq 90\%$ .

With green LED light the device is fully charged and can be put in operation. Keep the device in the docking station if it is not in use.

### 3.2.3 Battery Warning

When the battery voltage falls below the required operating voltage in the course of operation, the following message appears on the display.



To ensure that the instrument is always ready for operation, it is recommended to have the second battery pack handy, especially when performing measurements in the field.

## 3.2.4 Switching On

The instrument is turned on via the **Operate** button on the front. After turning on the instrument the display above shows the main menu.

The instrument is operated completely via the display and the **Operate** button.

The instrument turns off automatically, if not used, see **Configuration > Display Time** [▶ 53]. For manual turn off select **Configuration > Shutdown** [▶ 56].

## 3.3 Attaching the Hand Strap

There is a fastening option for the safety wristband on the back. Use the hand strap as protection against dropping the instrument.

## 3.4 Using the Main Menu

The instrument comes with a capacitive display. To select the items on the screen you can tap with the finger on the display. Alternatively, you can use a pen (sold separately). The pen should have a size of min. 6 mm in order to work on the display. For each main function a separate icon is available.



### 1 Quick check

Take a fast measurement using the default parameters.

### 3 Browse

View and delete measurement data.

### 5 Organizer

Appears after downloading at least one organizer from "smart-chart".

### 2 Measure

Take measurements. Results are saved automatically.

### 4 Configuration

Change measurement parameters or instrument settings.

### Additional Symbols

On the top additional symbols are displaying the current system status:

- **WiFi:** A wireless connection can be used in addition to the default USB connection.
- **Time:** Current system time, see **Configuration > Date / Time > Set time**.
- **Power:** Current charge level of battery pack in the device.

## 3.5 Inclination Sensor

The angle of holding the instrument is observed by the integrated sensor. Depending on the current angle the display is automatically flipped.



To flip the display back change the angle of holding until the sensor detects the difference and flips the display again.

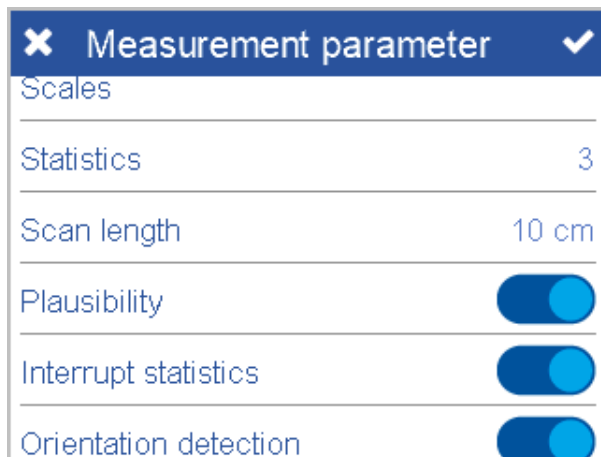


### NOTICE

This feature can be deactivated, see [Configuration](#) [▶ 44] > [Auto-Rotation](#) [▶ 52].

## 3.6 Starting Measurements

You can directly start taking measurements. The instrument is working with default parameters.



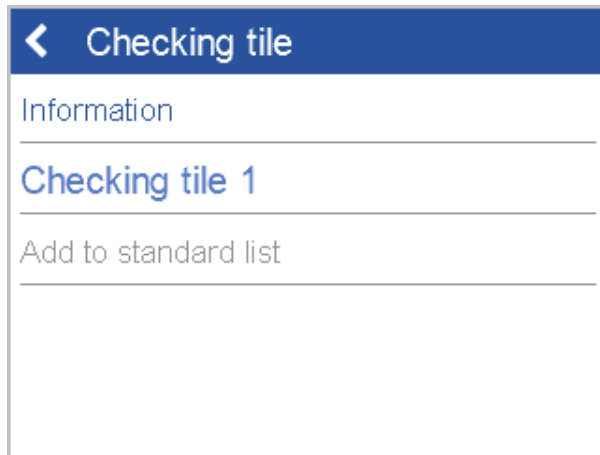
Select **Configuration** > **Measurement Parameters** [▶ 46] to change these settings.

## 3.7 Testing the Instrument

Due to the underlying measurement principle, no calibration of the instrument is required. It is recommended, however, to check the functionality of the instrument at regular intervals.

The recommendation is **once every three months**. The checking tile included with delivery is provided for this purpose.

The tile is fix assigned to your instrument. Select **Measure > Standards** and select the checking tile. See [Checking Tile \[▶ 53\]](#) for more details.



Place the instrument on the checking tile and perform a measurement. Your instrument measures correctly if the measured data is within given range. The range is stored in the system memory and printed on the tile.

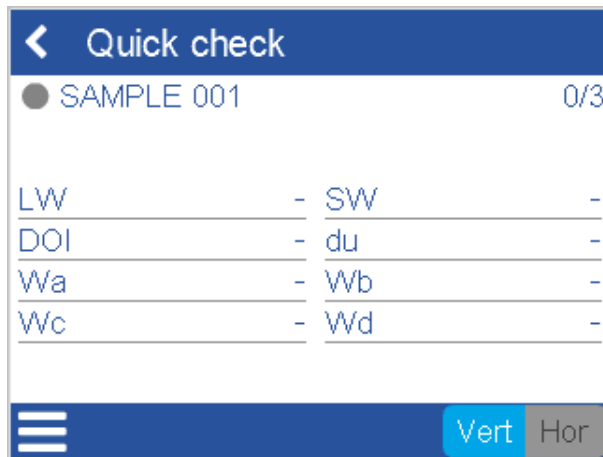
## 4 Quick Measurements



With this function you can easily perform one or more measurements. For example: You can measure a standard and a sample probe and compare the results manually. Make sure the parameters are set, see [Measurement Parameters](#) [▶ 46].

### 4.1 Measuring

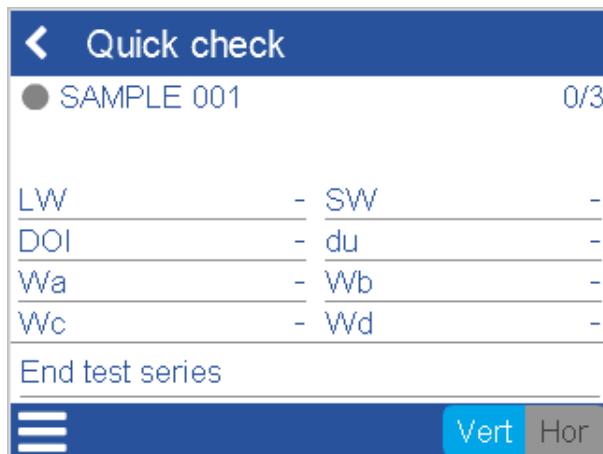
Click on icon **Quick check**. The measuring screen is displayed; showing the first sample to be measured.



The instrument is ready to measure.

### 4.2 Initial Menu

At this state the context menu contains the single option **End test series**.



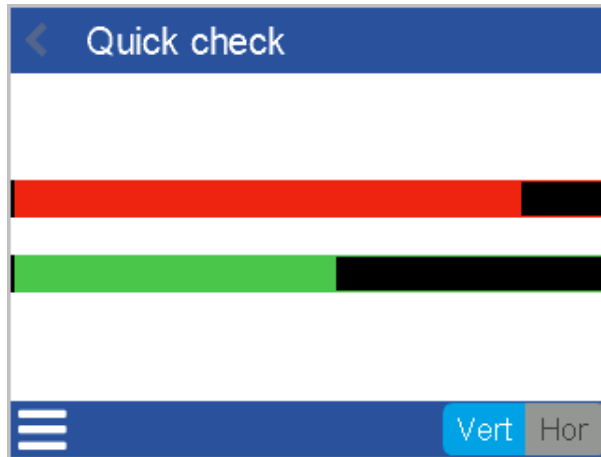
Via this option you can go back to the main menu. This is also possible via the icon **Back** in the upper left.



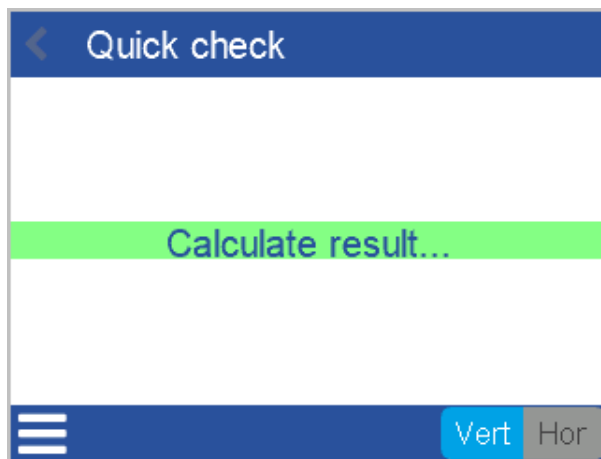
## 4.3 Procedure

In **Quick check** mode perform the following steps:

1. Place instrument on first sample to be measured.
2. Press and hold the **Operate** button to measure the sample.
3. Move the instrument evenly and slowly over the sample's surface.
4. For measurement at standstill (scan length = 0 cm) see [Configuration \[▶ 44\]](#) > [Scan Length \[▶ 48\]](#).



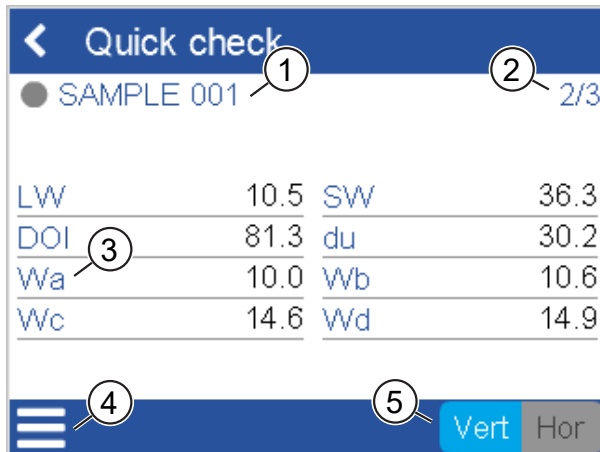
5. During measurement two colored bars are displayed:
  - Upper bar: Indicates current speed.
  - Lower bar: Indicates scan distance / duration (scan length = 0 cm).
6. The sample is measured; the measured data is evaluated.



The results of the evaluation are shown in the display, see below.

## 4.4 Results

After successful measurement the result screen may look like this.



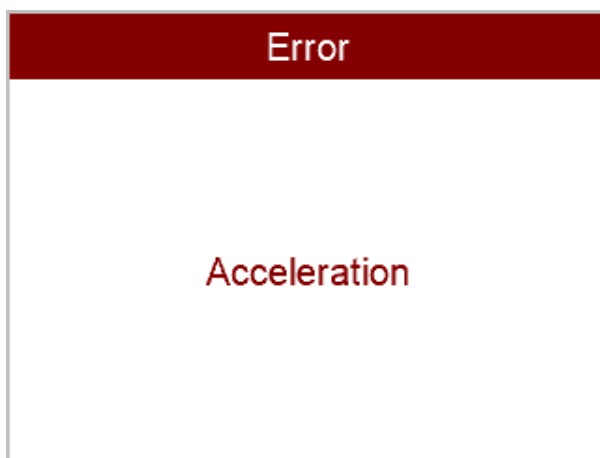
The items on the screen have the following meaning.

<p><b>1 Name</b></p> <p>The name of the sample currently measured, see also <a href="#">Standard Measurements [▶ 28]</a> &gt; <a href="#">Overview [▶ 28]</a>.</p>	<p><b>2 Statistics</b></p> <p>Measures taken and measures to be taken, see <a href="#">Statistics [▶ 47]</a>.</p>
<p><b>3 Scales</b></p> <p>Scales can be configured in the measurement parameters, see <a href="#">Scales [▶ 47]</a>.</p>	<p><b>4 Context Menu</b></p> <p>Contains the measurement options currently available, see <a href="#">Final Menu [▶ 27]</a>.</p>
<p><b>5 Orientation</b></p> <p>Can be switched to the correct value, if required, see <a href="#">Orientation Detection [▶ 49]</a>.</p>	

After required number of measurements on the current sample place instrument on the next sample and measure it.

## 4.5 Messages

Performing a successful measurement requires some practice. Error messages indicating the type of error may appear during the first trials.

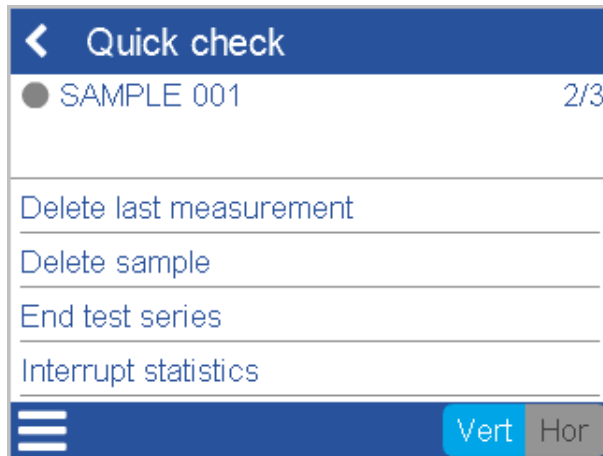


The LED light on the instrument turns to red and a warn signal is given out, see [Configuration \[▶ 44\]](#) > **Sound**. Check the message and repeat.

**NOTICE**

Different messages are possible; depending on the current state of instrument or measurement, see [System Messages](#) [▶ 60].

## 4.6 Final Menu



The context menu now contains additional entries:

- **Delete last measurement:** Enables you to repeat the last measurement.
- **Delete sample:** Enables you to repeat all measurements on the current sample.
- **End test series:** Enables you to repeat the complete test series.
- **Interrupt statistics:** Interrupts the measurements on the current sample before reaching the preset number of measurements, details see [Statistics](#) [▶ 47].

You can continue to measure further samples or stop the quick check via the **Back** symbol.

**NOTICE**

In **Quick check** mode the measurements are not saved. If you go back to the dashboard, your measurement data is dropped. Use **Measure** mode to store data.

## 5 Standard Measurements

This function allows to perform various test series with different samples and variable number of measurements. The results are stored automatically. If more than one measurement is done on a sample, statistics are evaluated. Make sure the parameters are set, see: [Measurement Parameters \[▶ 46\]](#).

**Prerequisite:** You are familiar with the [Quick Measurements \[▶ 24\]](#) mode.



### NOTICE

Standards can be created in the instruments and can be downloaded from “smart-chart”. Downloaded standards cannot be deleted in the instrument, but only via the software.

### 5.1 Overview

You are able to manage your measurements as shown in the following example.

```
Standard 001
--- Test series 001
--- --- Sample 001
--- --- --- Measurement 1
--- --- --- Measurement 2
--- --- --- ...
--- --- --- Measurement n
--- --- Sample 002
--- --- ...
--- --- Sample n
--- Test series 002
--- ...
--- Test series n
...
Standard 2
...
Standard n
```

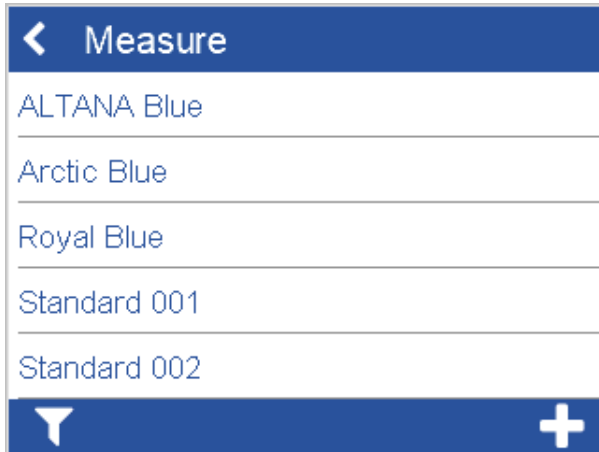
The objects listed above are to be administrated in the following way:

- **Standard:** Contains different **Test series**. Create and fill in **Measure** mode. Renaming is not supported. View and delete in **Browse** mode – only if filled with data.
- **Test series:** Contains different **Samples**. Create and rename in **Measure** mode. Delete in **Measure** mode or in **Browse** mode. View in **Browse** mode.
- **Sample:** Contains different **Measurements**. Create and rename in **Measure** mode. Delete in **Measure** mode. View in **Browse** mode. Number of **Measurements** see **Configuration > Measurement Parameters > Statistics**.
- **Measurement:** Contains different **measurement data**. Create and rename in **Measure** mode. Delete in **Measure** mode. View in **Browse** mode. Data displayed see **Configuration > Measurement Parameters > Scales**.

## 5.2 Measuring



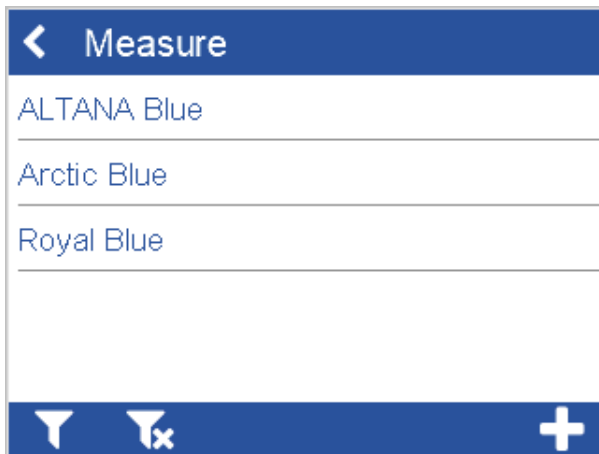
Click on icon **Measure**. The list with existing standards is displayed.



The items in the list can be filtered. Click on the filter icon.



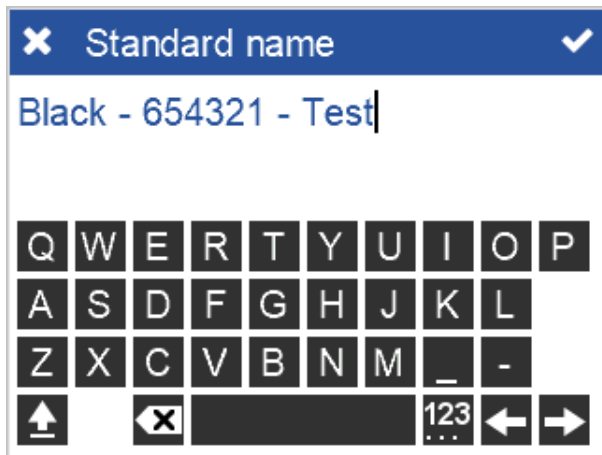
Enter the filter criteria and click on the accept icon.



The list of items only contains the standard matching the filter criteria.

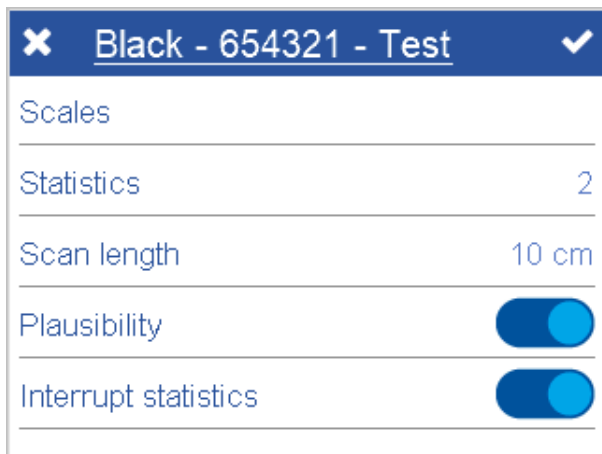
## 5.3 Standards

Select an existing **Standard** or create a new one > with the **Plus** symbol. You can use the default name or enter a new one.



A screenshot of a mobile application interface for creating a standard. At the top, there is a blue header bar with a white 'X' icon on the left and a white checkmark icon on the right. Below the header, the text 'Standard name' is displayed. The main input area contains the text 'Black - 654321 - Test' with a cursor at the end. Below the text is a virtual QWERTY keyboard with three rows of letters and symbols. The bottom row includes an arrow pointing up, a white 'X' icon, a numeric keypad icon with '123' and three dots, and left and right arrow keys.

After confirmation you can check and change the default measurement parameters for the current standard.

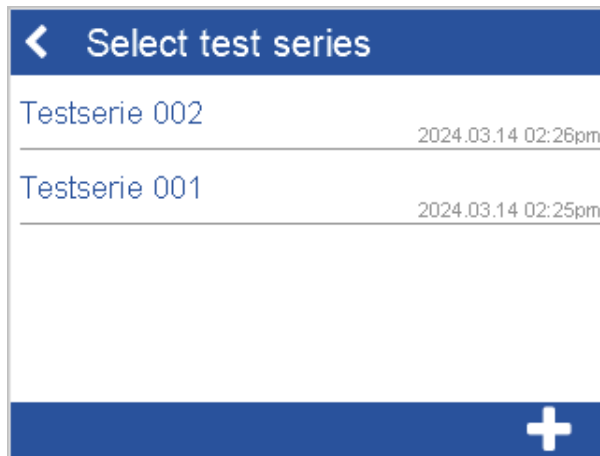


A screenshot of a mobile application interface for configuring a standard. At the top, there is a blue header bar with a white 'X' icon on the left and a white checkmark icon on the right. Below the header, the text 'Black - 654321 - Test' is displayed. The main area contains a list of configuration options, each with a horizontal line below it: 'Scales', 'Statistics' with the value '2', 'Scan length' with the value '10 cm', 'Plausibility' with a blue toggle switch that is turned on, and 'Interrupt statistics' with a blue toggle switch that is turned on.

After confirmation you are ready to measure.

## 5.4 Test Series

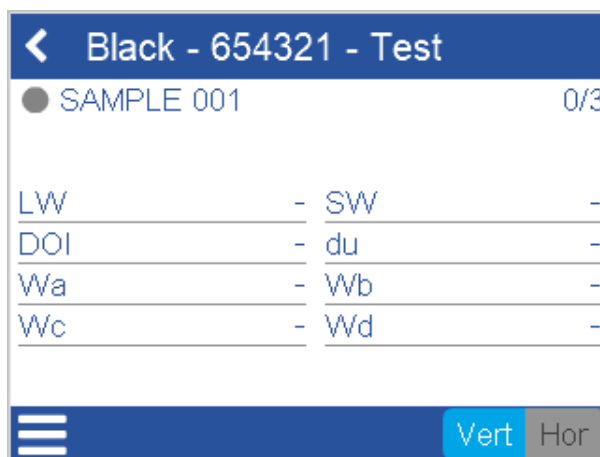
After selecting an existing **Standard**, the screen **Select test series** is displayed. In case of new standard the first test series is created automatically.



Select an existing **Test series** or create a new one > with the entry **Plus** symbol.

## 5.5 Samples

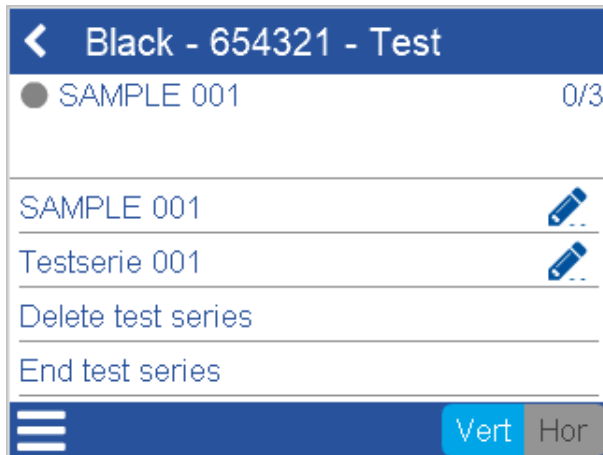
After creating a new **Test series**, the measurement screen for **Sample 001** is displayed. In case of an already existing test series the next sample to be measured is displayed.



The instrument is now ready to measure.

## 5.5.1 Initial Menu

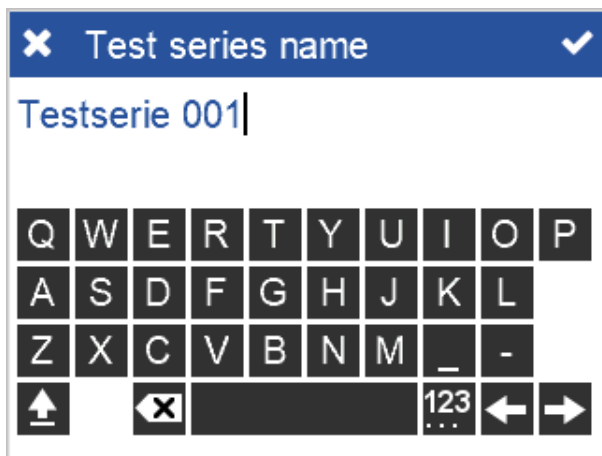
At this state the menu contains following options.



The available options are:

- **Sample > Edit:** You can rename the sample.
- **Test series > Edit:** You can rename the test series.
- **Delete test series:** Enables you to repeat all measurements in the current test series.
- **End test series:** Brings you back to the test series selection screen.

Use the pencil symbol to rename the objects according to your needs.

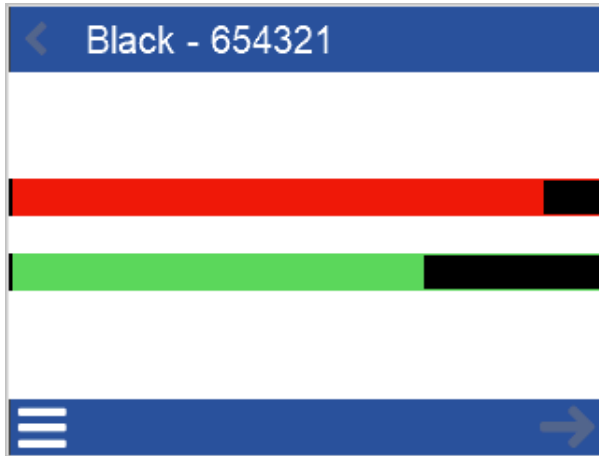


Now you can start measuring.

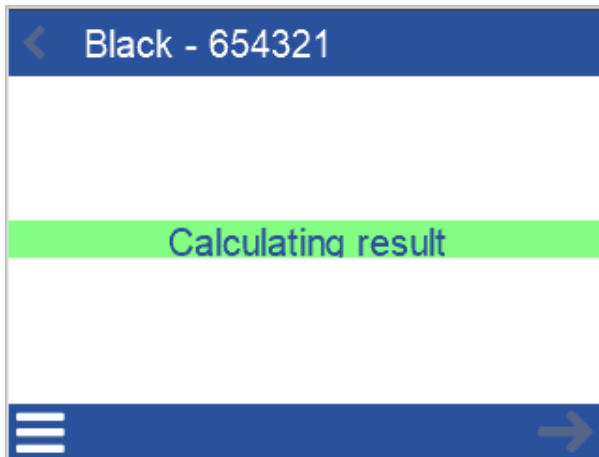


## 5.5.2 First Measurement

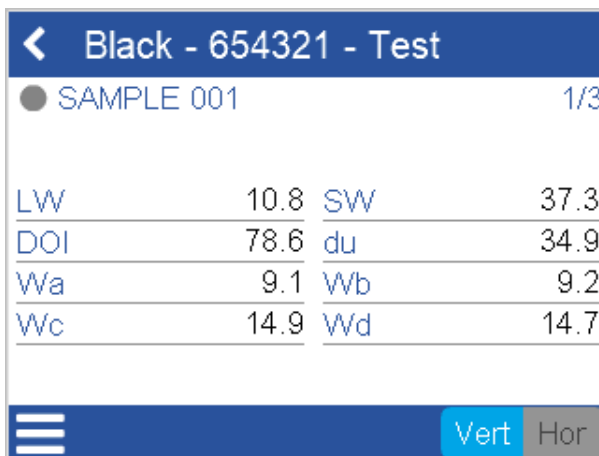
Perform the first measurement on the first sample. The procedure is the same as in the [Quick Measurements \[▶ 24\]](#) mode. During the measurement a progress bar and the velocity are shown.



Afterwards the instrument calculates the results.



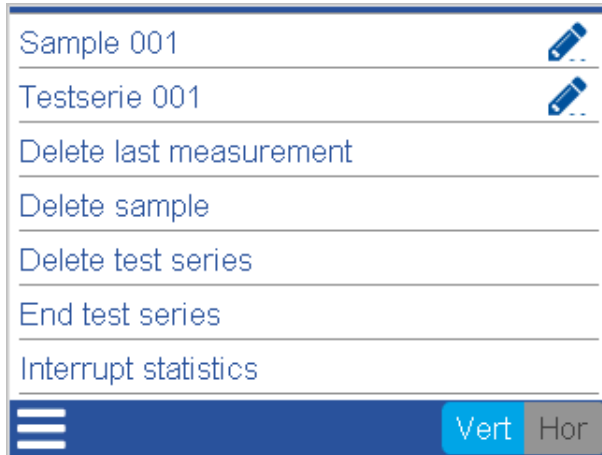
The results are shown in the display.



You can now proceed with the next measurement.

### 5.5.3 Final Menu

After a successful measurement the menu contains following options.




The available options are:

- **Sample > Edit:** See above.
- **Test series > Edit:** See above.
- **Delete last measurement:** Enables you to repeat the last measurement.
- **Delete sample:** Enables you to repeat all measurements on the current sample.
- **Delete test series:** Enables you to repeat the complete test series.
- **End test series:** Enables you to stop the current test series. You can continue later.
- **Interrupt statistics:** Interrupts the measurements on the current sample before reaching the preset number of measurements, details see [Statistics \[► 47\]](#).

Perform the next measurement and all other required measurements on the first sample.


## 5.5.4 Next Measurement

When all measurements according to the current statistics settings are done, the next measurement will be automatically assigned to the next sample.

Black - 654321 - Test			
● SAMPLE 001		3/3	
LW	10.8	SW	37.3
DOI	78.6	du	34.9
Wa	9.1	Wb	9.2
Wc	14.9	Wd	14.7
 <span style="float: right;">Vert Hor</span>			

Proceed with the following steps:

- Perform the next measurement until the current sample is completed.
- Measure the next sample until the current test series is completed.
- Repeat this procedure for all other test series until the current standard is completed.

Black - 654321 - Test			
● SAMPLE 002		1/3	
LW	10.9	SW	41.1
DOI	79.5	du	33.2
Wa	9.9	Wb	10.2
Wc	15.7	Wd	16.0
 <span style="float: right;">Vert Hor</span>			

You can now proceed with the next standard to be measured.

## 5.6 Aborting

You can abort the measurement procedure at any time via the menu option **End test series** and return later to continue.



### NOTICE

The modus **Measure** always shows the next measurement to be done. If you want to view or manage results, please use the **Browse** function in the main menu.

## 6 Organizer Measurements



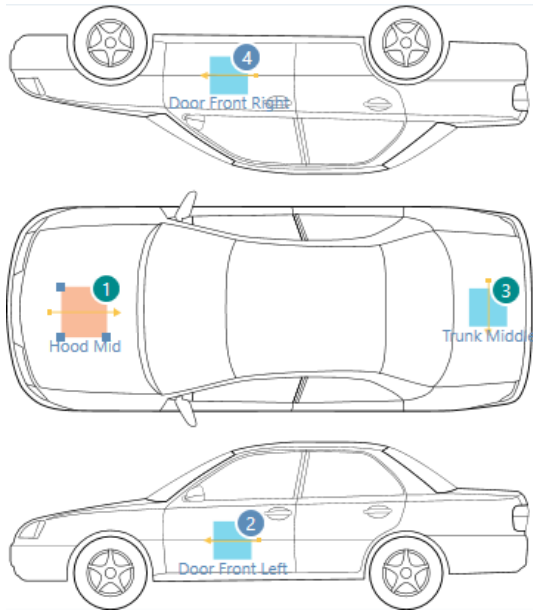
The instrument can be connected to the software suite “smart-chart”. Using the software standards and organizers can be downloaded into the instrument.

Measurement results can be uploaded and evaluated later on. Organizers contain complex series of measurements and help you to organize your measurement process.

### 6.1 Organizer Files

#### Definition of Check Zones

Depending on the application, the system can be used in various ways, from single measurements in R&D up to routine quality control procedures (e.g., automobile industries).



In order to guarantee a flexible data analysis, it is essential to allocate the data to a clearly defined object (identification).

#### Checkzones



## Download to Instrument

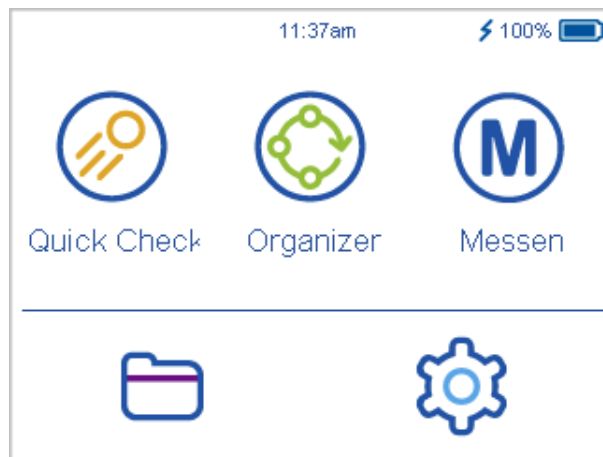
An organizer file clearly defines the object to be measured. The organizers need to be created in the software "smart-chart".



Each organizer defines the measurement sequence (sampling procedure). This organizer is transferred to the instrument. It is used to guide you as the user during the measurement procedure.

## 6.2 Organizer Process

If at least one organizer file has been downloaded into the instrument, the corresponding icon appears in the main menu.



Clicking this icon displays the list of organizers in the instrument.



By using an organizer all required check zones can be clearly identified.

The screenshot shows the 'Organizer' app interface with a table of measurements. The table has two columns for measurements and their values. The 'Hood L' check zone is highlighted with a red dot and '3/3' next to it. The 'du' measurement is highlighted with a red background and '32.5' next to it. At the bottom, there is a blue bar with a menu icon and two buttons: 'Vert' and 'Hor'.

Organizer			
● Hood L			3/3
SW	41.2	LW	9.9
DOI	-	du	32.5
Wa	10.2	Wb	9.6
Wc	15.3	Wd	14.1

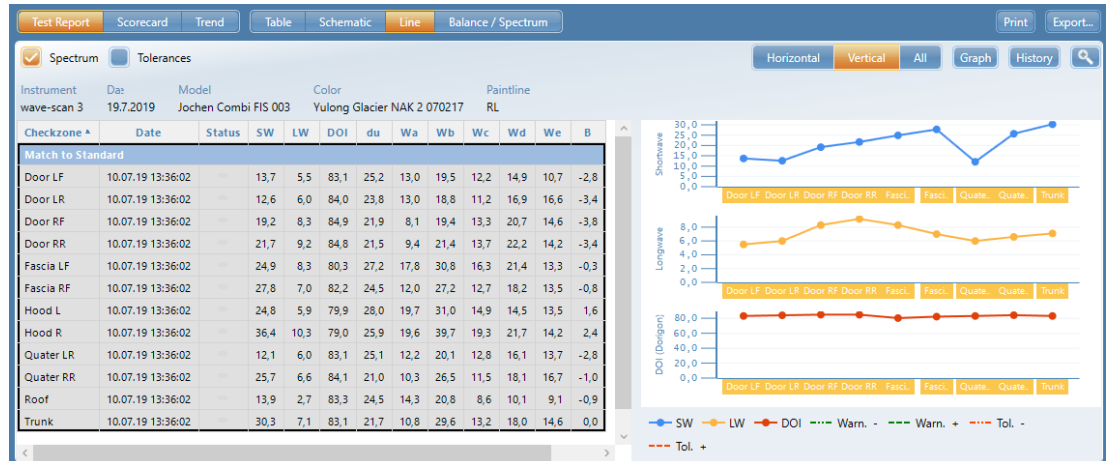
In the example shown above each check zone requires three measurements. With the next measurement the following check zone in the organizer will be selected automatically. This allows fast processing of all check zones defined in an organizer.

### 6.3 Upload to Database

The saved results are transferred to the PC and displayed as a QC report. The data is saved in a database for further analysis over time. Pre-prepared test reports in the software “smart-chart” assist in analyzing the data.

#### Storage Structure

Each measurement series contains a header and the individual measurements with their name (check zone) and the measured values.



In the header, up to 5 parameters can be defined for object identification, for example:

- 1: Model
- 2: Color
- 3: Paint line
- 4: Comment
- 5: Vehicle-ID

Parameters #1 to #3 are defined in the organizer file, parameters #4 and #5 can be entered before storage in the database. Additionally, date and time of the measurements are stored.

This structure determines the data organization in the instrument and in the database. In addition to the definition of parameters **before** the measurements using organizers, the parameters and check zones can also be entered **during** the measurements, see [Standard Measurements](#) [▶ 28].

## 7 Browse Measurements



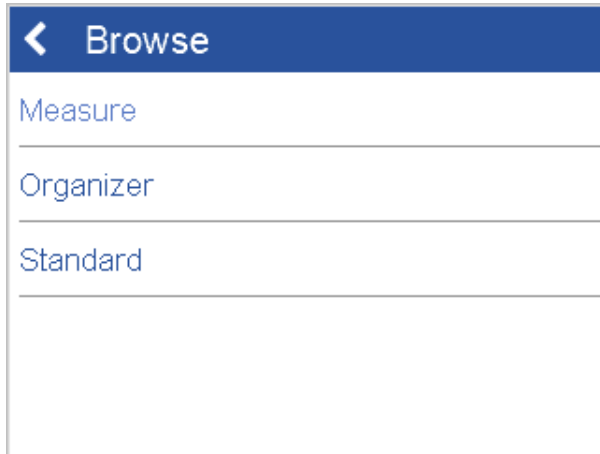
Measurement data and objects can be viewed and deleted directly at the instrument and in “smart-chart”. Below the administration at the instrument is described.

The **Browse** function allows you to view your existing measurements and to delete existing **Standards** and / or **Test series**, if necessary.

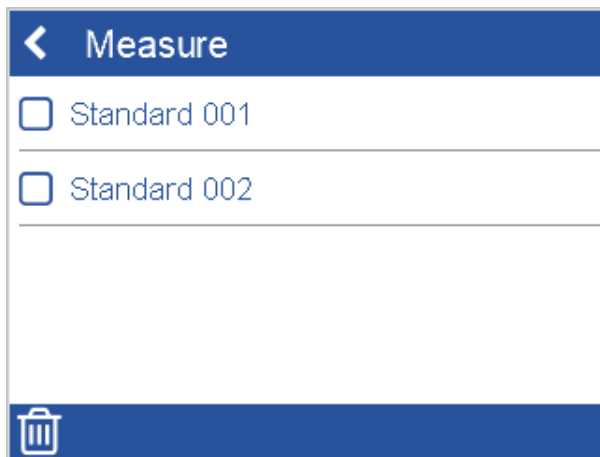
**Prerequisite:** At least one measurement is stored.

### 7.1 View Data

Click on icon **Browse**. The list with all types of measurements is displayed.



Click on the desired measurement type, e.g., on **Measure**. The list with all dedicated measurements appears.

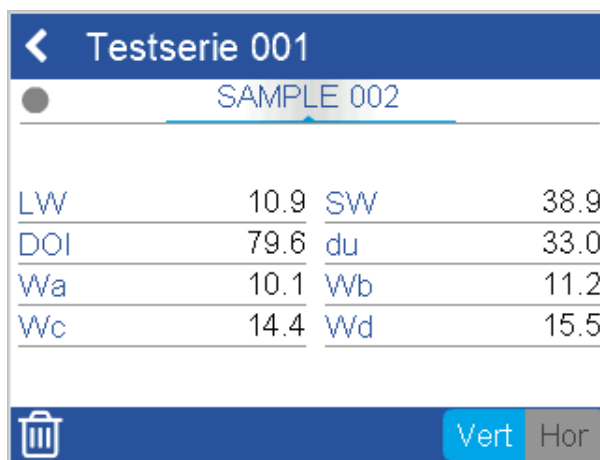


Click on the desired object. The list with all dedicated test series appears.

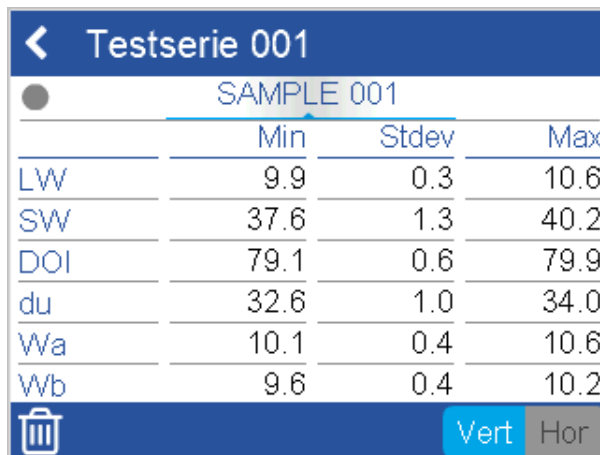




Click on the desired test series. The details for this measurement appear. Now you can view the samples measured in this test series.



You can turn the item "Sample xxx" to the left and to the right. For each sample the average data is displayed. Scroll down to view the statistical data.



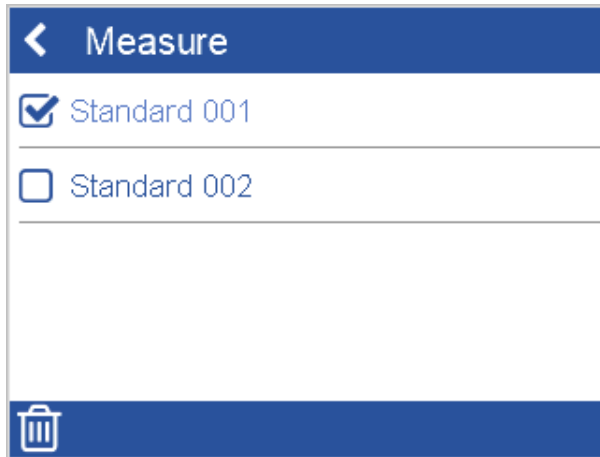
This can be activated under [Configuration \[▶ 44\]](#) > [Measurement Parameters \[▶ 46\]](#) > [Statistics \[▶ 47\]](#).

## 7.2 Delete Data

You can delete complete measurements and/or complete test series.

### Delete Measurement

To delete a complete measurement, select it from the list. You can also make a multi-selection here.



Click on the **Trashcan** icon. A confirmation message is displayed.



Confirm with the checkmark. The measurement is deleted.

## Delete Test Series

To delete a complete test series, select it from the list. You can also make a multi-selection here.



Click on the **Trashcan** icon. A confirmation message is displayed.



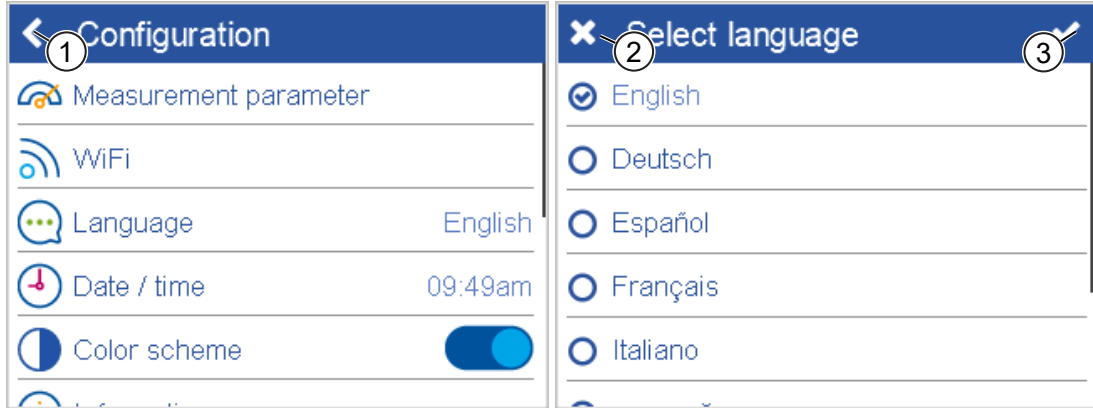
Confirm with the checkmark. The test series is deleted.

# 8 Configuration

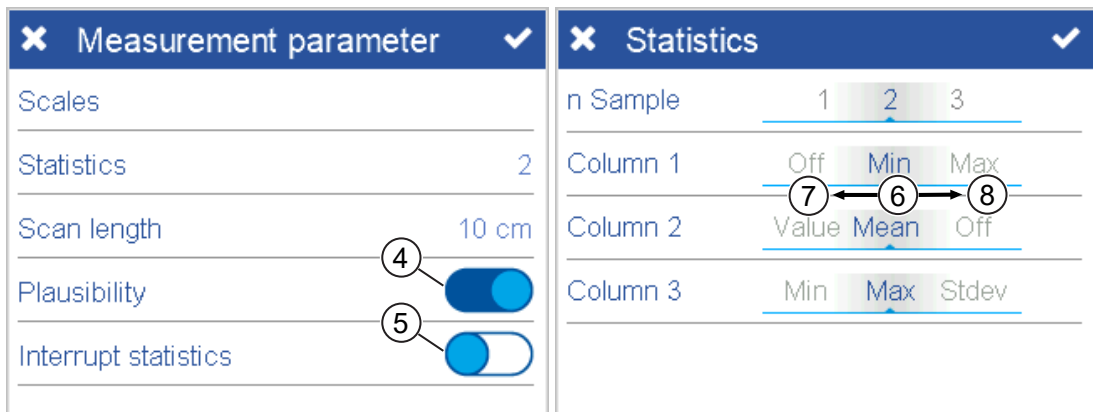


With this function you can configure the system according to your needs. There are different types provided to change the configuration of the system.

Click on icon **Configuration**. The configuration screens provide buttons for easy navigation. The current settings can just be viewed or changed and saved.



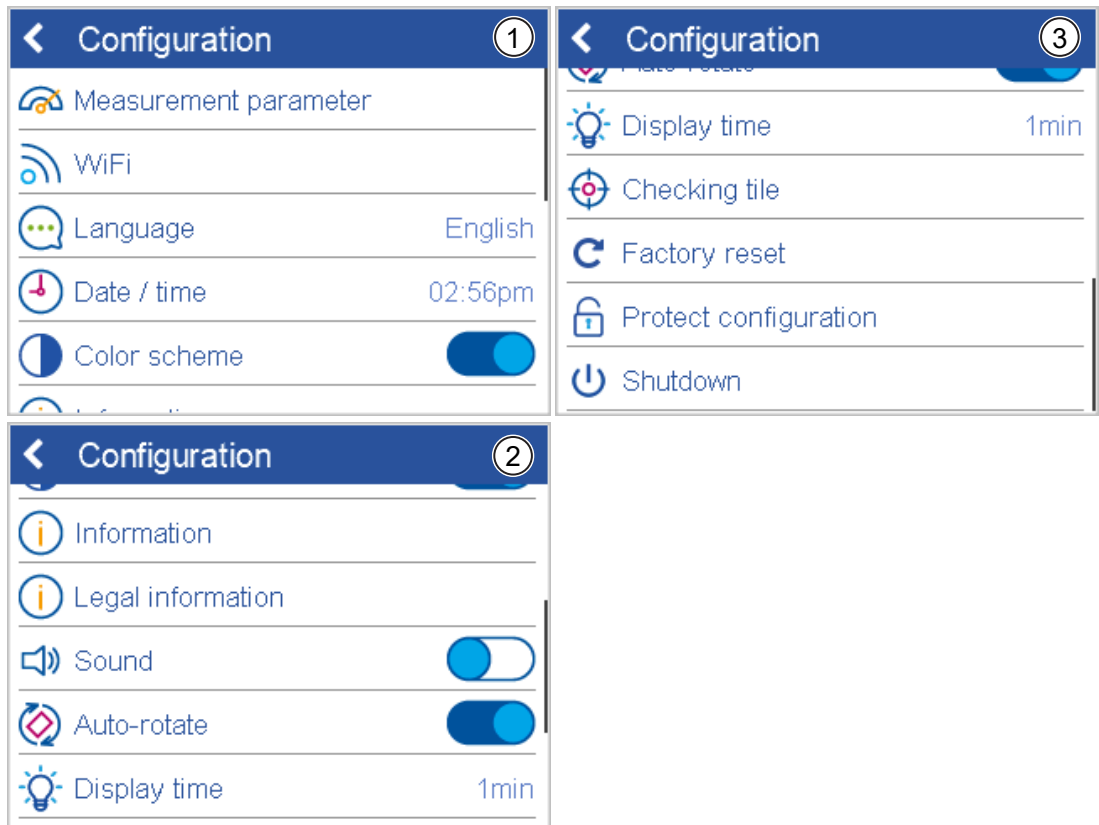
Some options can be activated via a so-called toggle button. Some options can be configured via a rotating menu. This menu is working like a wheel.



These options have following meaning.

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1 <b>Back:</b> Go back to previous screen.</li> <li>3 <b>Accept:</b> Go back to the previous screen and save your changes.</li> <li>5 <b>Inactive:</b> Option is deactivated. Click right to activate.</li> <li>7 <b>Left:</b> One step to the left moves the wheel to next value.</li> </ul> | <ul style="list-style-type: none"> <li>2 <b>Cancel:</b> Go back to previous screen without saving.</li> <li>4 <b>Active:</b> Option is activated. Click left to deactivate.</li> <li>6 <b>Wheel:</b> Tap an entry in the menu and move it to the left or to the right.</li> <li>8 <b>Right:</b> One step to the right moves the wheel to previous value.</li> </ul> |
|--|---|

The configuration screen consists of an upper and a lower part. You can slide the screen to the bottom and back to the top to view the options available.



**Measurement Parameters:** Check and change the default settings, see [Measurement Parameters](#) [▶ 46].

**WiFi:** Establish a wireless connection, see [WiFi Connection](#) [▶ 50].

**Language:** Set instrument language here.

**Date / time:** Set system time, time zone and daylight-saving time here.

**Color scheme:** Adjust screen brightness to day and night conditions here.

**Information:** Shows system, network, and legal information, see [System Information](#) [▶ 52].

**Legal Information:** Shows license information for free and open-source software.

**Sound:** Activate or deactivate the internal beeper here; useful for pass-fail measurements.

**Auto rotate:** Switch the automatic display rotation on or off, see [Auto-Rotation](#) [▶ 52].

**Display time:** Define the interval for automatic shutdown here, see [Display Time](#) [▶ 53].

**Checking tile:** Add the tile to the list of standards in the system memory, see [Checking Tile](#) [▶ 53].

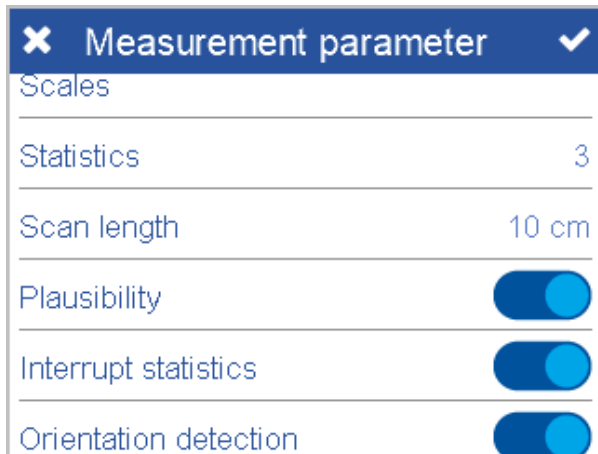
**Factory reset:** Reset instrument to factory settings here, see [Factory Reset](#) [▶ 54].

**Protect configuration:** Password is required to open the configuration screen, see [Protect Configuration](#) [▶ 55].

**Shutdown:** Perform manually switch off to safe battery power or replace battery pack here, see [Shutdown](#) [▶ 56].

## 8.1 Measurement Parameters

Via this function you can configure how the measurements are to be done.



These options have following meaning.

<b>Scales</b>	Selected scales are displayed after measurement, see <a href="#">Scales [▶ 47]</a> .
<b>Statistics</b>	No. of readings to be taken per sample. Statistics are evaluated, if n > 1, see <a href="#">Statistics [▶ 47]</a> .
<b>Scan length</b>	Distance the device is to be moved to complete a measurement, see <a href="#">Scan Length [▶ 48]</a> .
<b>Plausibility</b>	Compares corrected and uncorrected measurement value, see <a href="#">Plausibility [▶ 49]</a> .
<b>Interrupt statistics</b>	Test series can be interrupted before reaching the defined no. of readings, see <a href="#">Interrupt Statistics [▶ 49]</a> .
<b>Orientation detection</b>	Automatically detects orientation of device > vertical or horizontal, see <a href="#">Orientation Detection [▶ 49]</a> .

To set measurement parameters:

1. Click on the parameter you want to set. The list with selectable parameters appears.
2. Choose the required parameter and confirm by clicking on the check mark in the upper right corner.
3. Repeat this procedure until all your desired parameters are set.
4. Confirm by clicking on the checkmark in the upper right corner.

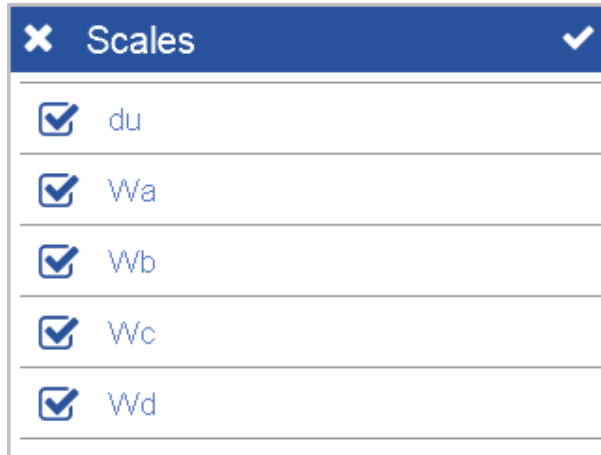


### NOTICE

If you change the measurement parameters, e.g. the no. of measurements: These changes become valid for new configurations / test series. Existing objects will not be changed.

### 8.1.1 Scales

Via this function you can decide, which data is to be displayed in the measurements results.



Following entries are default scales:

- Dullnes (du)
- Wavelength - Range A (Wa)
- Wavelength - Range B (Wb)
- Wavelength - Range C (Wc)
- Wavelength - Range D (Wd)
- Longwave (LW)
- Shortwave (SW)
- Structure Balance (B)

All other scales are project-specific. Consult your project documentation for more information.

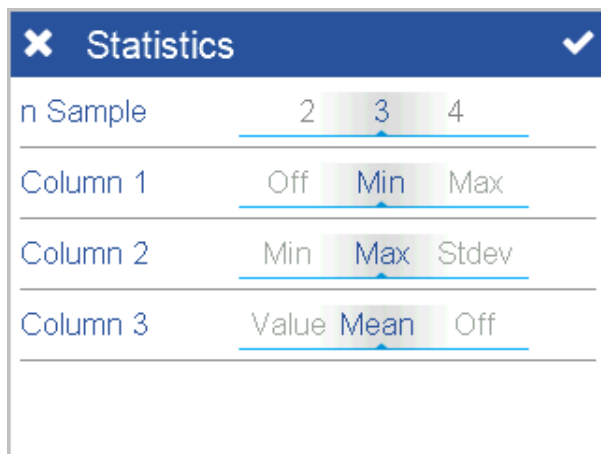


**NOTICE**

Measurement data will be saved for all scales. The activation of a scale has no impact on the data to be saved; it just toggles the display of a scale while measuring.

### 8.1.2 Statistics

If the number of measurements is set to a value greater than 1, statistics values are shown in the display after measurement.



You have following options:

- **n Sample:** Defines how many measurements are to be taken.
- **Column 1 .. 3:** For each column you can decide, which value is to be displayed.

The statistic function comprises following data:

- **Off:** Column w/o data
- **Min:** Minimum value
- **Max:** Maximum value
- **Stdev:** Standard deviation
- **Range:** Measurement interval
- **Value:** Actual value
- **Mean:** Arithmetic average



#### NOTICE

To switch off statistics you must set **n = 1**. To save this setting it is required, to set all columns to **Off**.

### 8.1.3 Scan Length

You can define the distance the device is to be moved across the surface of the sample to complete a measurement.

You have following options:

- **0 cm:** For very small samples  $W_a$ ,  $W_b$  and  $D_u$  can be measured without moving. For this the image of the CCD camera is used. Do not move instrument during measurement.
- **5 cm**
- **10 cm**
- **20 cm**



#### NOTICE

The selected scan length has impact on measurement accuracy. Using a short scan length will result in strong statistical skewing of measurement values for large wavelengths. Thus, when using the  $W_d$  scale with a scan length of 5 cm, at least 3 measurements should be made per sample to ensure representative values.



## 8.1.4 Plausibility

Defects on the sample surface, such as scratches or craters, can cause major errors in measurement values. The instrument automatically corrects these errors: The affected scan areas are cut out and the measurement values are calculated from the corrected data.

If **Plausibility** is active, the instrument compares the corrected and uncorrected measurement value. The greater the difference between the corrected and uncorrected data, the more critical is the surface defect.

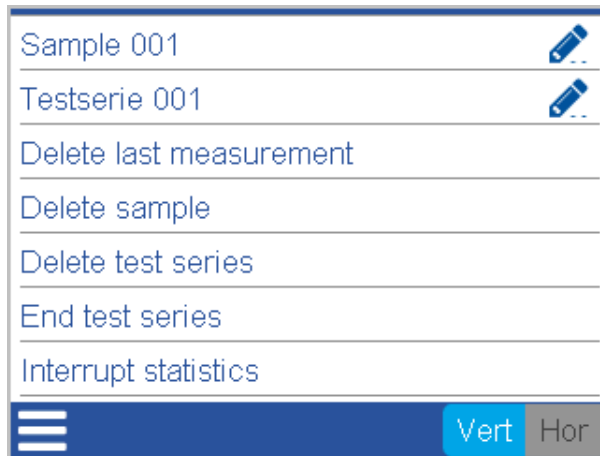


### NOTICE

If the difference is greater than 20%, the measurement will be evaluated as a faulty measurement and an error message appears. In this case a new measurement is needed.

## 8.1.5 Interrupt Statistics

If this option is activated, the corresponding entry appears in the context menu during measurements.



By selecting this entry during measurements, you can interrupt the measurements on a sample before reaching the number of measurements set in the statistics.

## 8.1.6 Orientation Detection

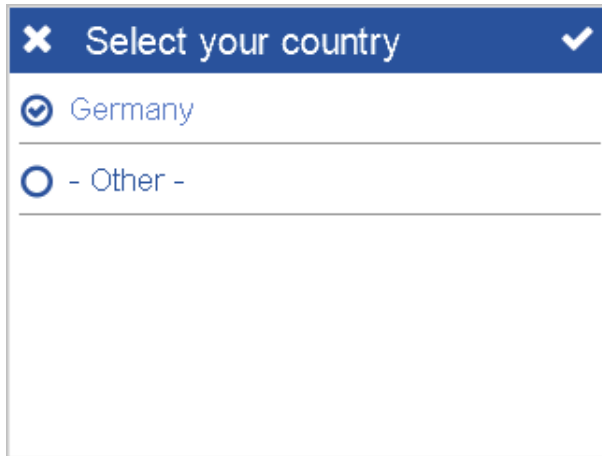
If activated the instrument automatically detects the current orientation of the device > vertical or horizontal, during the measurements.

Standard 001			
● Sample 002		1/3	
LW	10.3	SW	37.3
B	-6.5	DOI	78.5
du	35.0	Wa	10.1
Wb	9.4	Wc	14.9
Wd	14.2	We	30.0

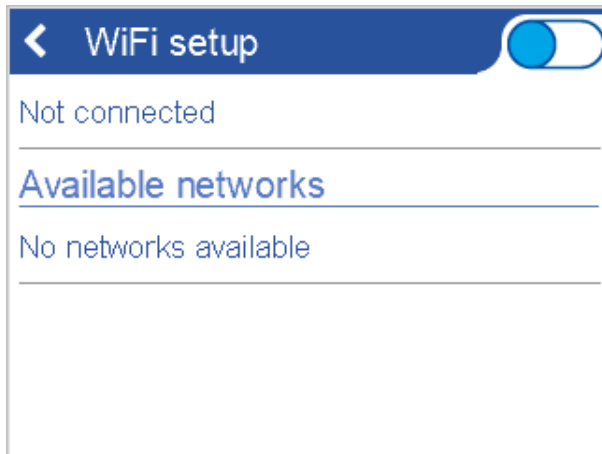
The result of the detection is shown in the measurement screen. You can also alter the orientation manually by selecting **Vert** or **Hor**.

## 8.2 WiFi Connection

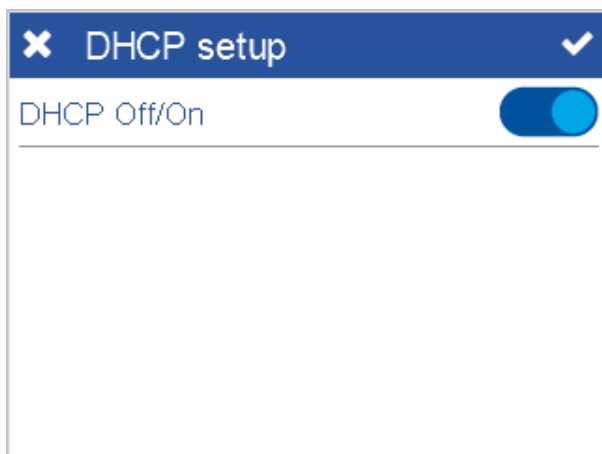
The instrument is equipped with a WiFi adapter. You can use the WiFi connection alternatively to the USB connection. To connect to a WiFi network, click on the WiFi symbol.



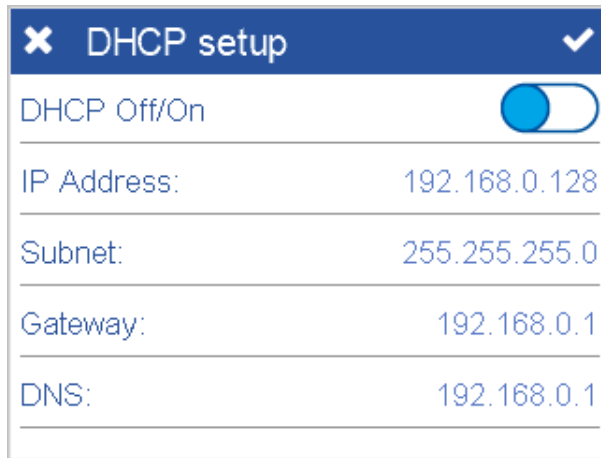
Select your country and accept to continue.



Activate the WiFi toggle button and select the desired network from the list. By clicking on the line showing **Not connected** or **<Network-Name>** you can decide to activate or deactivate the **DHCP** option.



If the **DHCP** option is inactive, you can enter the IP details for the WiFi connection manually. Click a line to enter the corresponding data.



Accept your changes to enter the WiFi key; required if the network is secured.



The instrument connects to the network. A confirmation message is displayed.



**WiFi connection  
successful!**

Accept the message. You are connected to the network. In the dashboard the WiFi symbol is shown indicating the current field strength. To disconnect from network, switch the WiFi option off in the WiFi configuration screen.

## 8.3 System Information

Via this menu entry you can view the details about your instrument.



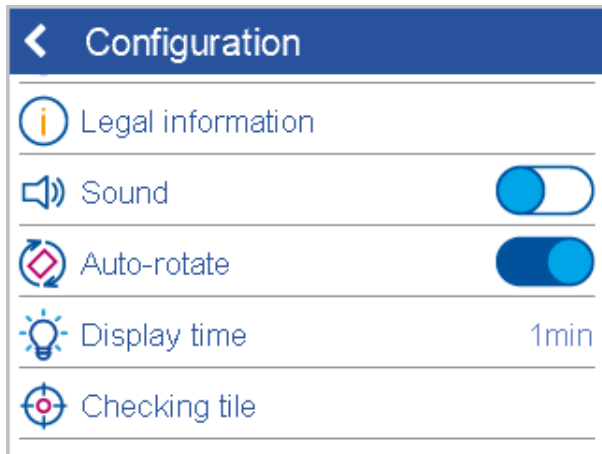
Following data is displayed:

- Serial Number: The unique ID of your instrument.
- Catalog Number: The order number in our products catalog.
- Firmware Version: The current version of the system software.
- Certification Date: The date of the last certification. A re-certification by BYK-Gardner should take place once a year.
- Network data like MAC or IP address: Only relevant in case of active WiFi connection.

In case you contact your local BYK-Gardner service center please have these data handy.

## 8.4 Auto-Rotation

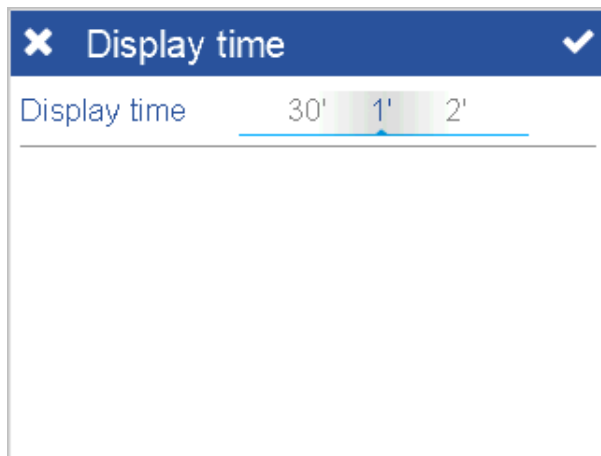
This option can be used to switch off the automatic display rotation.



When switching to OFF, the current orientation is saved and remains.

## 8.5 Display Time

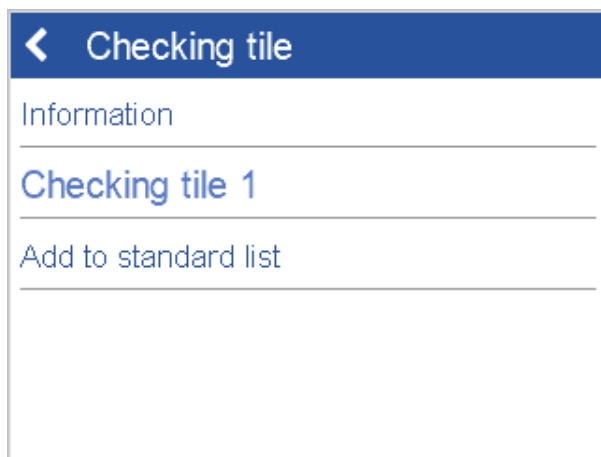
You can configure the time interval for the automatic shutdown of your instrument.



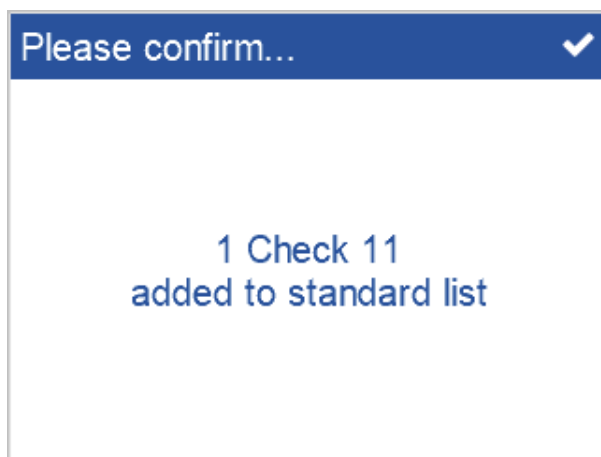
Following values are possible (in minutes): 1, 2, 5, 10, 15, 30.

## 8.6 Checking Tile

To document the correct measurement status of your instrument, you can save the checking tiles in the system memory. Select the option **Add to standard list**.



The option **Add to standard list** is active if the checking tile has not been added yet. To delete these entries from memory, use the function [Browse Measurements \[▶ 40\]](#) > **Standards**.



Now you can use the function [Standard Measurements \[▶ 28\]](#) to check the tolerances. Details see [Testing the Instrument \[▶ 23\]](#).

If the differences are within your tolerances, you can continue to measure with your instrument. Otherwise clean the standards and repeat, see [Cleaning Instructions \[▶ 58\]](#).



#### NOTICE

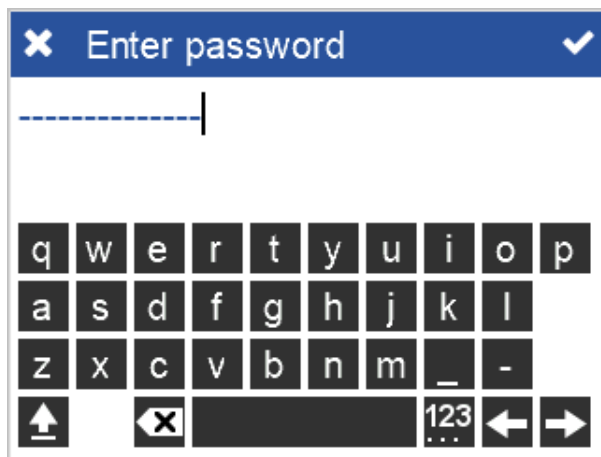
All measurements on the checking tile are stored in the instrument. Transfer the measurement data to “smart-chart” to document all test case performed.

## 8.7 Factory Reset

If you are having technical problems with your instrument, you can perform a fallback to the factory settings.



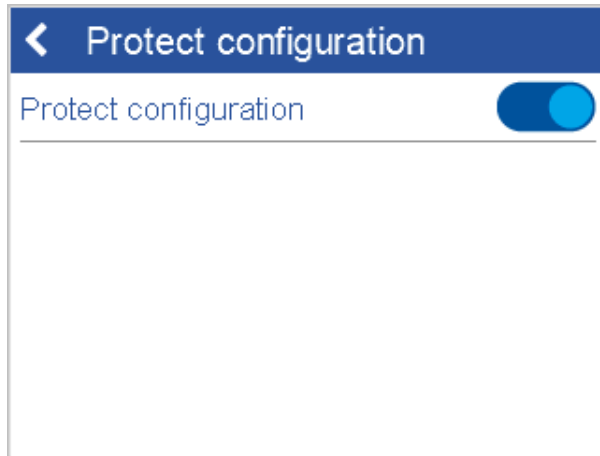
Confirm the security message to perform the fallback. You must enter the password “byk-instruments”, see also [Technical Data \[▶ 66\]](#) > section **General Data**.



After fallback all your personal configuration and measurement data in the device will be lost. The instrument starts in a fresh state.

## 8.8 Protect Configuration

You can protect the current configuration of your instrument via password against accidental or intentional changes. Select **Protect configuration**.



Activate the option. You must enter a password. The password is shown in clear text during input. There is no 2<sup>nd</sup> confirmation input of password required.



If the option is activated the **Configuration** menu can only be accessed from the dashboard by entering the password.



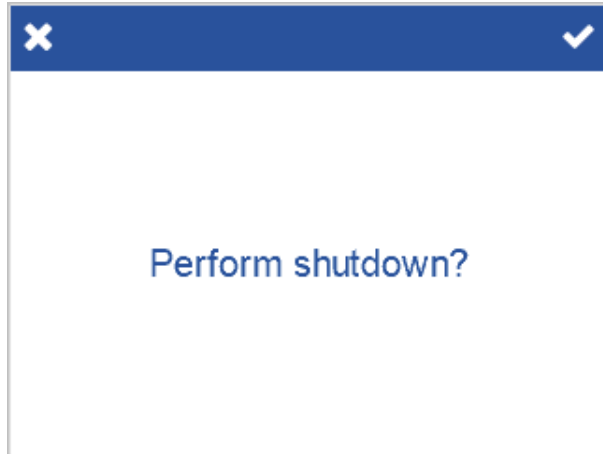
### NOTICE

Save down the password on a secure place > if you do not remember, you will have to contact your local BYK-Gardner certified service center to get the master password.

## 8.9 Shutdown

The instrument is switched off automatically after the time interval configured, see [Display Time](#) [▶ 53].

Select **Shutdown** to switch off the instrument manually – e.g., before you remove the rechargeable battery pack.



The instrument switches off after confirmation.



# 9 Appendix

## 9.1 Application Hints

This section lists the common measurement tasks and the recommended procedure.

### Single Measurements

For occasional sample-measurements:

- Take readings, see chapter [Quick Measurements \[▶ 24\]](#).
- Transfer results directly to "smart-chart".

### Regular Test series

Here test sequence / identification can be standardized - e.g., batch control:

- Take readings, see chapter [Standard Measurements \[▶ 28\]](#).
- Transfer results directly to "smart-chart".

### Objects with several Test Zones

Here test sequence / identification can be standardized - e.g., automobile or add-on parts:

- Create an organizer in "smart-chart".
- Transfer organizer to the instrument.
- Take readings, see chapter [Organizer Measurements \[▶ 36\]](#).
- Transfer results to "smart-chart" and store in database.
- Perform data analysis in "smart-chart".

### Occasional Test Series

Here test sequence / identification cannot be standardized - e.g., projects:

- Generate new measurement configuration.
- Take readings, see chapter [Standard Measurements \[▶ 28\]](#).
- Transfer results directly to "smart-chart".

## 9.2 Cleaning Instructions

For a professional cleaning of your instrument see:

- [www.byk-instruments.com/preventive-maintenance](http://www.byk-instruments.com/preventive-maintenance)



### **WARNING: Disconnect from power**

Before cleaning, the instrument and accessories must be disconnected from the power supply as described in section [Safety Instructions](#) [▶ 6].



### **CAUTION: Stay away from measurement aperture**

Do not insert any objects into the measurement aperture for cleaning. The instrument could get damaged, affecting a proper and safe operation.



### **WARNING: Do not use any acetone!**

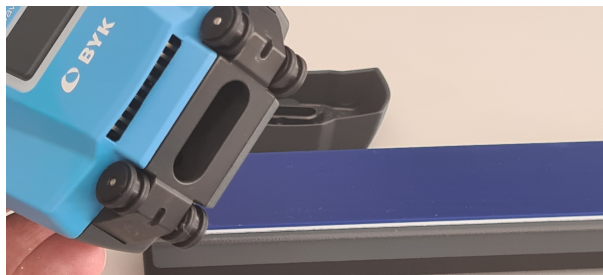
The instrument housing is resistant to a number of solvents but cannot be guaranteed to withstand all chemicals. You should therefore use a soft, moist cloth for cleaning. For cleaning excessive dirt, use propanol.

### Cleaning the Instrument

A cleaning mat to clean the wheels measurement unit is situated on top of the cover for the checking tile.



To clean the wheels, roll the measurement unit several times over the blue mat and then over a clean sheet of paper. Dirt will stick to the mat and can be removed with clear water.



Check if the cleaning was sufficient and repeat the procedure if required.

## Cleaning the Checking Tile



### **WARNING: Do not use any acetone!**

The accuracy of the measurement can be significantly impacted by using dirty or damaged standards.

Since the surface of the checking tile is highly sensitive, cleaning must be undertaken with great care.

To clean the tile, use a new lint-free cloth, dust-free lens paper or an optical cloth.

Apply only slight pressure as you clean and make certain there are no large particles stuck in the cloth that could damage the surface.

For dirt that is difficult to remove, use an optical cloth dipped in liquid. Then wipe the surface with a dry optical cloth.



### **NOTICE**

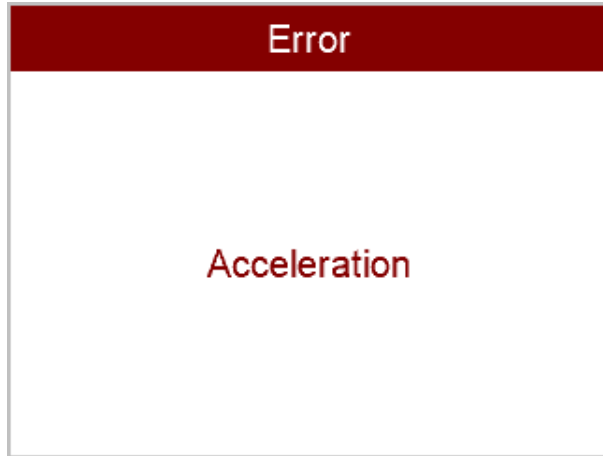
An exact checking is not possible unless the tile is in perfect condition. If the condition of the checking tile seems doubtful because of its appearance or measurement errors, we will be happy to check it for you.

## 9.3 System Messages

Measurement errors are indicated by type. Confirm with button **Operate**.

### Acceleration

The instrument was accelerated too fast across the sample, or the scan direction was changed too fast. Repeat the measurement.



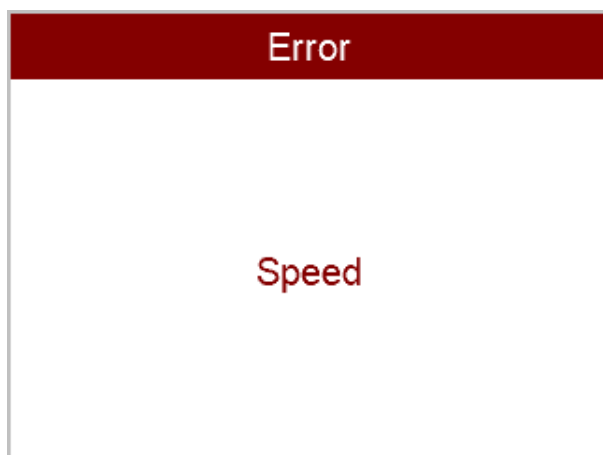
### Scan length

The required scan length has not been reached completely. Repeat until a short audio confirmation is heard. Small areas can be measured by moving the instrument back and forth.

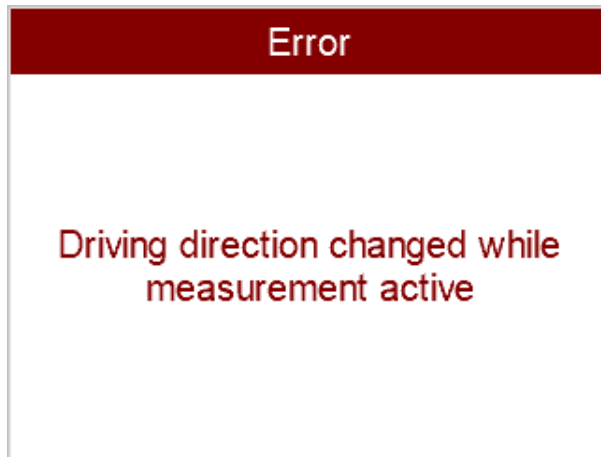


### Speed

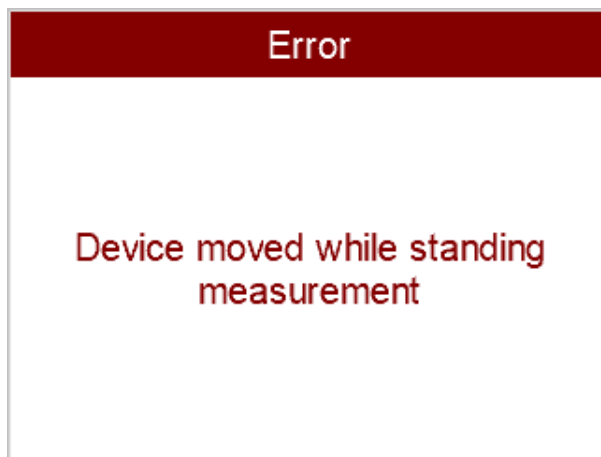
You have moved the measurement unit too quickly or unevenly over the sample. Repeat the measurement.



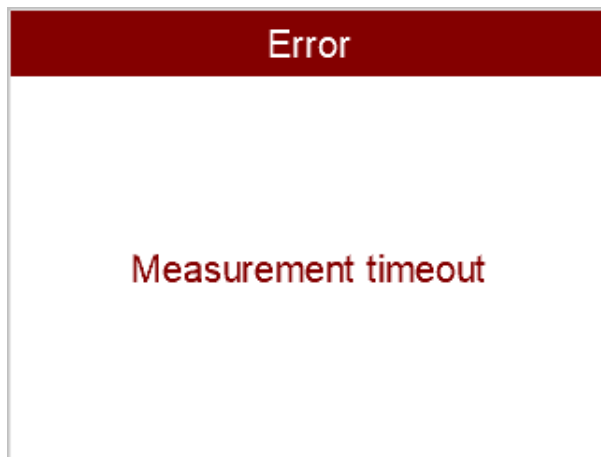
Direction change    The **micro-wave-scan 3** measures by taking images with the CCD camera. This does not allow changes in the direction while measuring.



Device moved    The **micro-wave-scan 3** supports standing measurements (scan length = 0 cm). While a standing measurement is active, the device should not be moved to allow the CCD camera to take the required picture.



Measurement timeout    The device stopped for more too long. Repeat the measurement.



Dull surface

The measurement was performed on a too matt surface. No measurement values can be displayed.



Linear range -  
steep slope

The measurement was out of the linear range.



Steep slope

The measurement was performed on a surface with steep structure slopes.



Very steep slope      The measurement was performed on a surface with very steep structure slopes. Samples with different image forming quality are not comparable!



Low battery      The rechargeable battery pack has insufficient capacity left to power the instrument. Charge or replace battery pack.



## 9.4 Replacements

Following accessories and replacements can be ordered.

### Measurement Unit

- **7420:** micro-wave-scan 3

### Accessories

- **4831:** Software smart-process  
Software for professional analysis and documentation of color and appearance.
- **7421:** Li-Ion battery pack  
Rechargeable battery for automatic charge in the docking station.
- **7422:** Docking station  
Incl. USB cable and power supply 100 - 240 V - self adapting.

### Checking Tile Replacement

Please contact your local service department for replacement of your checking tile.

- **7423:** Checking tile for micro-wave-scan 3

### Service Departments

To find your nearest local service department refer to:

- <https://www.byk-instruments.com/global-service-centers>

See also section [Service Points](#) [► 68].



## 9.5 Global Services

Besides the repair of your instrument, we offer the following additional services.

### First Diagnosis on the Telephone or by E-mail

Call us or send us an e-mail and we will try to solve your problem. If this is not successful, please send us the instrument for repair.

### Preventive Maintenance, Calibration, and Recertification

For precautionary reasons we recommend regular preventive maintenance. We carry out this preventive maintenance automatically when you send us your instrument for maintenance and recertification.

We clean the optics, check all functions, test and, if required, adjust the measured values by using reference standards.

You will receive a certificate, which can be retraced to international standards. Details see:

- [www.byk-instruments.com/technical-services](http://www.byk-instruments.com/technical-services)

### Provisioning of Loaners

During the period of repair, we furnish you with a loaner on request and availability.

### Maintenance Agreement

In case you want to make sure that the necessary maintenance is being done on a regular basis and on time, we recommend a maintenance agreement.

### Extended Warranty Contracts

Furthermore, you can request an extended warranty contract for additional 12 months. Ordering Information:












- SE-4840 Extended Warranty

## 9.6 Technical Data

### Measuring Data

Light source	Laser diode (LED)
Laser diode	Laser class 1, $P \leq 390 \mu\text{W}$ , $\lambda=670 \text{ nm}$ , DIN EN 60825-1:2015-07
Measurement range	High-gloss surfaces: Dullness $< 40$ , linear range
Structure spectrum	Dullness ( $du$ ): $< 0.1 \text{ mm}$ Wavelength a ( $W_a$ ): 0.1 to 0.3 mm Wavelength b ( $W_b$ ): 0.3 to 1.0 mm Wavelength c ( $W_c$ ): 1.0 to 3.0 mm Wavelength d ( $W_d$ ): 3.0 to 10.0 mm
Scan length	0 cm (standing measurement) 5 cm 10 cm 20 cm
Repeatability	Dullness $< 40$ : 4% or $> 0.4$ (standard deviation)
Reproducibility	Dullness $< 40$ : 6% or $> 0.6$ (standard deviation)
Object radius	$> 300 \text{ mm}$
Smallest sample size	25 mm x 40 mm
Resolution	375 pixel per cm
Battery capacity	Up to 4,000 readings; depending on duty cycle and display-on time
Memory capacity	10,000 readings 4,000 standards 1,000 test series 50 organizers

## Charging Data

Rechargeable battery pack	3.6 V  ; 2040 mAh ; 7.344 Wh
Power supply - device	12 V  ; max. 1 A (docking) 5 V  ; max. 0.5 A (docking) 5 V  ; max. 1.5 A (USB-C)
Power supply - docking station	Input: - 12 V  ; max. 2 A (power supply) - 5 V  ; max. 0.5 A (USB-B)  Output: - 12 V  ; max. 1 A (power supply) - 5 V  ; max. 0.5 A (USB pass-through)  Charger: - 4.2 V  ; max. 1.5 A
External power supply	Input: 100 - 240 V  ; 50 - 60 Hz ; max. 1 A Output: 12 V  ; 3 A ; 36 W

## General Data

Temperature range	10° C to 40° C for operation 0° C to 60° C for storage
Relative humidity	Up to 85% non-condensing at 35° C
Dimensions (LxWxH)	84 x 44 x 115 mm (3.3 x 1.7 x 4.5 in)
Weight	Ca. 700 g
Interface - device	USB type C
Interface – docking station	USB type B
Password for factory reset	byk-instruments

You can find more details about your product on our website:

- <https://www.byk-instruments.com/p/7420>

## 9.7 Service Points



Global service centers with ISO / IEC 17025 accredited laboratories

### Headquarter

BYK-Gardner GmbH  
Lausitzer Strasse 8, 82538 Geretsried, Germany

### Service Point USA

c/o BYK-Gardner USA  
9104 Guilford Road, Suite H,  
Columbia, MD 21046, USA

### North Latin America

Exacolor Laboratories S.A. de  
C.V., Barranquilla 150, Alta  
Vista, 64840 Monterrey, N.L.,  
Mexico

### Service Point France

c/o Eckart France S.A.S.  
27 Allée du Chargement,  
59650 Villeneuve d'Ascq,  
France

### Service Point Spain

c/o Actega Artística S.A.U.  
Calle Balmes 8, Suite: 3º 2ª,  
08291 Ripollet, Spain

### Service Point Austria, Hun- gary, Slovenia

c/o Friedrich W. Bloch GmbH  
Wagramerstrasse 201, 1210  
Vienna, Austria

### Service Point China

c/o BYK (Tongling) Co. Ltd.  
Shanghai Branch  
Block 6A, Building A, No 88  
Hong Cao Road, Xuhui Dis-  
trict, Shanghai 200233, P.R.  
China

### Service Point India

c/o IMCD India  
Private Limited  
1101-03, B-Wing, ONE BKC,  
Bandra Kurla Complex, Ban-  
dra East, Mumbai, MH. Pin.:  
400 051. India

### Service Point Japan

c/o Tetsutani Co. Ltd.  
Chuo-ku, Osaka, Tokui cho  
2-2-2, Japan

### Service Point South Latin America

c/o MAST Comercial e Importadora LTDA  
Rua Itaporanga, 340-B, Bairro Paraiso,  
Santo André - SP, 09190-640, Brazil

Complete list: <https://www.byk-instruments.com/global-service-centers>

Authorized agents: <https://www.byk-instruments.com/contact-infos>







A member of  **ALTANA**

Download your manuals from:

<https://www.byk-instruments.com/p/7420>

Download your software from:

<https://www.byk-instruments.com/software>

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[www.byk-instruments.com](http://www.byk-instruments.com)



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