BYK

spectro2profiler

Color and 3D Surface Texture Measurement

Operating Manual

A member of ALTANA

Table of Contents

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 many VALUE-ADDED services:

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

BYK-Gardner is part of Altana AG and a direct subsidiary of BYK, a leading supplier of additives for coatings and plastics. Together, we offer complete and unique solutions for you, our customer.

Thank your 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

- https://www.byk-instruments.com

1.1 For Your Safety

CAUTION: Familiarization with safety instructions 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.

CAUTION: Ergonomic hazard due to discomfort and fatigue possible

Discomfort and fatigue during usage of the instrument could lead to ergonomic hazards. For example a drop-down of the instrument is conceivable.

Always use the instrument with the safety wrist strap and take regularly breaks during your work with instrument.

WARNING: Eye damage can be 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.

1.2 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.

See also

- Intended Use 11

1.3 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 party, 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.

1.4 Disposal

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

1.5 Declarations

1.5.1 Declaration of Conformity (EU)

We,

BYK-Gardner GmbH

Lausitzer Strasse 8

D-82538 Geretsried

declare, that the instrument **spectro2profiler** complies with the requirements of the following EU directives:

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

The following harmonized standards were applied:

- EN 61010-1:2010
- EN 61326-1:2013

Geretsried, November 2019

Frank R. Wagner
Managing Director

1.5.2 Declaration of Conformity (UK)

Hereby,

BYK-Gardner GmbH

Lausitzer Strasse 8

D-82538 Geretsried

declares, that the products of type **spectro2profiler** comply with the requirements of the following directives for Electromagnetic Compatibility (EC) of the European Union (EU):

- S.I. 2016/1091 - Electromagnetic Compatibility Regulations
- S.I. 2016/1101 - Low Voltage

The following harmonized standards were applied:

- EN 61010-1:2010
- EN 61326-1:2013

Geretsried, November 2021

Frank R. Wagner
Managing Director

1.5.3 FCC Declaration (USA)

This equipment contains a radio module with FCC-ID: 2ADHKATWINC1500U.

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 spectro2profiler is designed to measure color, gloss, 2D reflectivity and 3D structure on different surfaces. Via the integrated camera the current spot on the surface can be viewed on the display - allowing exact positioning.

By placing the base plate of the measurement unit onto a surface and pressing either the **Operate** button on the side of the instrument or triggering the measurement on the display, the instrument measures the surface and processes, displays and stores the measured values.

The instrument can be connected via USB or WiFi to a computer in order to read or write data. A resistive display allows additional functions.

2

System Description

The spectro2profiler is a portable spectrophotometer that measures color, gloss, 2D reflectivity and 3D structure of surfaces. It is operated by the **Operate** button and the touch-screen display on the top 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.

With the purchase of the product you also get one day of training on the usage of the product and the software from BYK-Gardner.

For more details on the spectro2profiler refer to our website:

- https://www.byk-instruments.com/p/7300

2.1 Delivery Content

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

1	Safety instructions and short instructions	6	Black: Test standard for gloss
2	Instrument	7	USB cable type A/C for charging and data transfer
3	Protective cap	8	USB cable type C/C for fast charging and data transfer
4	White: Calibration standard	9	Power adapters
5	Green: Test standard for color	10	Power supply

2.2 Names and Functions of Parts

2.2.1 Frontside

1	Button **Operate**: Instrument is off: • Press completely: Turns instrument on. In “Autodiagnosis” or “Calibration” mode: • Press halfway or completely: Executes the measurement on the test / calibration tile. In “Measurement” mode: • Press halfway: Camera is switched on showing the surface to be measured on the display. • Press completely: Executes a measurement.
2	Touch-screen display: Tap the icons on the screen with your finger or with a pen in order to operate the instrument.
3+4	System status LEDs: If display is off the battery status during charging is indicated: • 0..5%: Empty - no LED indication • > 5%: Not good - red blinking • > 20% Good - yellow blinking • > 68% Good - green blinking • 100%: Full - lights up green (no blinking) If display is on the battery symbol indicates the charging status. If display is on the status during measurements is indicated: • Check zone passed - green blinking • Check zone failed - red blinking Errors during measurement are shown on the display (no LED indication).

2.2.2 Backside

1	USB type C plug: • Connected to power-supply: Charge the battery in the instrument. • Connected to PC: Charge and transfer data between instrument and computer. For fast charge see "Fast Charge 23 ".

2.2.3 Protective Cap

Protective cap:

- Use it to protect the measurement aperture of the instrument.
- Always attach to measurement aperture if instrument is not used.

2.2.4 Power Supply

Power supply and adapters:

- Use to charge the battery in the instrument.
- Use the adapter matching your current wall socket.

2.2.5 USB Cables

USB cables:

- Type A to C: Connect instrument with power supply for charging and with PC for charging and data transfer.
- Type C to C: Connect instrument with PC for fast charging and data transfer. For fast charge see "Fast Charge 23 ".

2.2.6 Checking Tiles

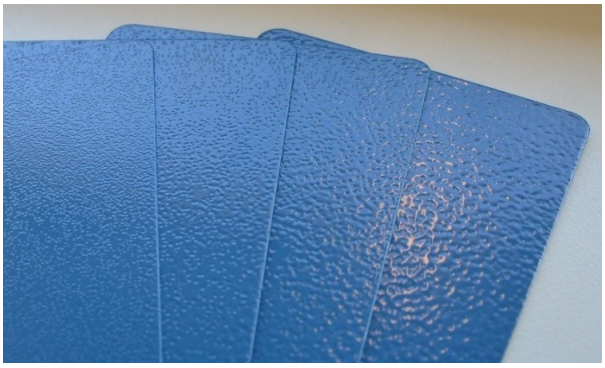
In the case following checking tiles are placed:

- Green standard: Used to test color measurement.
- Black standard: Used to test gloss measurement.
- White standard: Used to calibrate the instrument.

Consult "Test and Calibration 27 " for more information.

2.3 Measurement Principle

Our visual perception sees color, gloss, and surface topography together.For example: Following powder coating samples have same color, but dif-ferent textures.



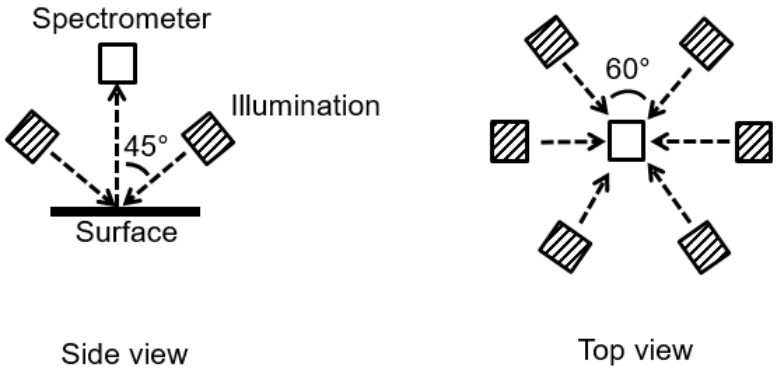
The same applies to leather-like surfaces. For example: Following car interior samples have same color, but different grains.

The conclusion is: To measure just color is not enough - color and topography of a sample is to be measured in order to be able to compare it to a standard. The spectro2profiler is the combination of different measurement techniques in **one** instrument:

- Color measurement
- Gloss measurement
- 2D reflectivity measurement
- 3D topography measurement

2.3.1 Color Measurement

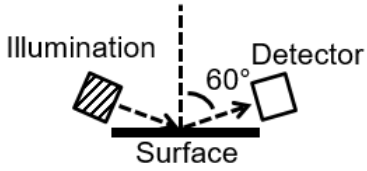
The spectro2profiler uses a 45/0 geometry with 6 illuminations.



The 45/0 is more close to our visual impression (gloss is excluded). The measurement aperture size is bigger than in conventional solid color measurement instruments. This gives statistical better values for larger parts.

2.3.2 Gloss Measurement

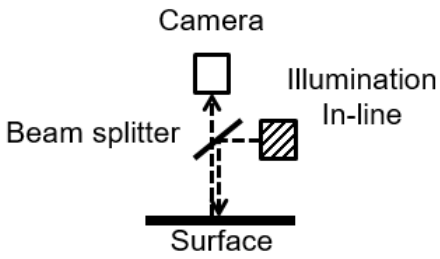
The spectro2profiler uses classic 60° gloss measurement - according to international standards. This way the measurement results can be compared to historical data.



This is a must-have due to existing specifications for e.g. interior parts. However, the results strongly depend on the measuring direction - with the disadvantage that cast shadows on a structured surface falsify the results.

2.3.3 2D Reflectivity Measurement

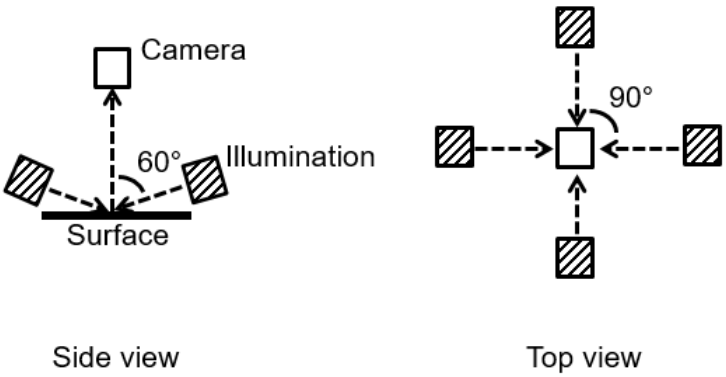
To overcome the disadvantage mentioned above the spectro2profiler uses a new approach for objective measurement: The illumination takes place in-line; the reflections are measured with a 2D camera.



The in-line setup eliminates cast shadows. The advantage is: No shadow zones, no directionality in the measurement results. Additionally, the camera image provides 2D reflectivity data for spatially resolved reflectivity measurements.

2.3.4 3D Topography Measurement

The spectro2profiler uses photometric stereo technique with 4 light sources. With this setup multiple images are taken under different lightning conditions.



The analysis of these multiple images allows to estimate the surface curvature. Based on the curvature the height map of the surface can be calculated.

2.3.5 Summary

The spectro2profiler is the combination of different measurement techniques in one instrument:

- Classic color measurement
- Classic gloss measurement
- New 2D reflectivity measurement
- New 3D topography measurement

Consult "Measurement Parameter 53 " and the separate glossary for more information on the measurement parameters supported by instrument and software smart-chart.

For more details on this approach for objective measurement BYK-Gardner provides professional trainings to interested customers.

3

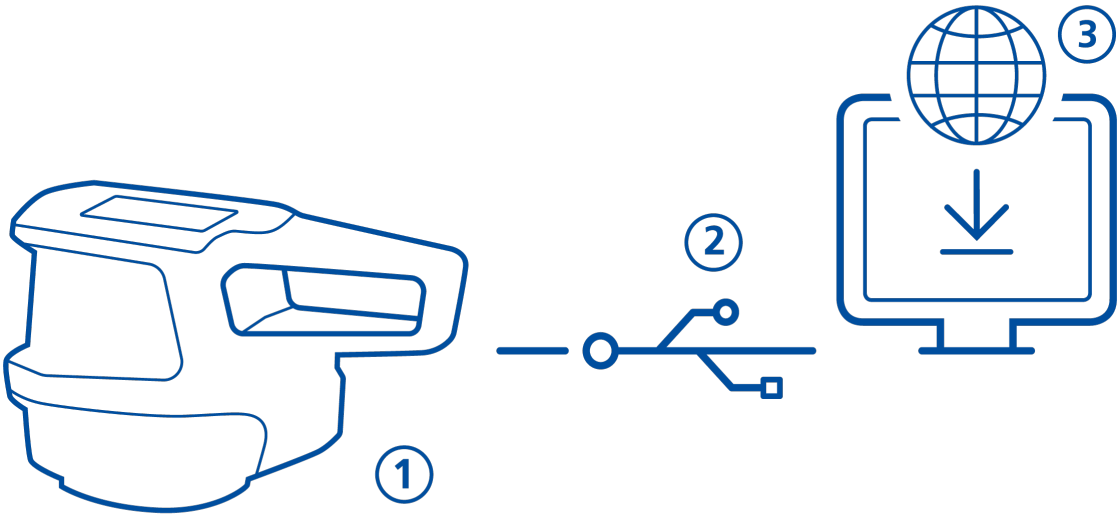
Getting Started

Please observe following notes when you put the instrument into operation:

- Assemble the system, consisting of instrument, USB cable, power supply or PC and software. Consult System Diagram 22 for more information.
- Connect the instrument to the power supply and allow it to charge fully. Consult Charging Procedures 23 for more information.
- Perform a calibration if necessary. Consult Calibration 73 for more information.
- Press the **Operate** button in order to turn the instrument on.
- Become familiar with the main menu for a quick navigation. Consult Using the Main Menu 24 for more information.
- Tap the icons on the touch-screen with your finger or with a stylus in order to navigate through the menu and perform functions.
- Check and adjust measurement parameters. Consult Measurement Parameter 53 for more information.
- Always hold the instrument carefully as protection against dropping.
- Use the software smart-chart to tap the full potential of the instrument. Consult Software Installation 26 for more information.

3.1 System Diagram

The entire system consists of instrument, calibration and test tiles and soft-ware for data transfer and analysis.



1. Connect instrument with PC via USB cable **(1)**.
2. After first connect instrument is automatically turned on.
3. The battery pack in the instrument is automatically charged **(2)**.
4. If instrument has turned off, turn it on by pressing the **Operate** button.
5. Download and install smart-chart software **(3)**.

3.2 Charging Procedures

The instrument provides two ways for charging:

- Standard charge via USB Type A / C
- Fast charge via USB Type C / C

3.2.1 Standard Charge

The power supply is connected to the wall socket.

Connect the instrument via USB cable type A / C to the power supply.

The charge LED indicates the current status:

- Pulsates red as long as the battery charge is < 15%.
- Pulsates yellow as long as the battery charge is < 50%.
- Pulsates green as long as the battery charge is < 90%.
- Lights up in green when the battery charge is ≥ 90%.

Keep the instrument connected as long as the instrument is not in use.

The instrument is fully charged and can be put in operation.

NOTICE

The USB connector type A is to be inserted in the correct direction.

3.2.2 Fast Charge

Connect the instrument with the USB cable type C / C to your PC.

The instrument loading bar on the display shows the battery charge.

Disconnect the instrument from the USB cable when it is fully charged.

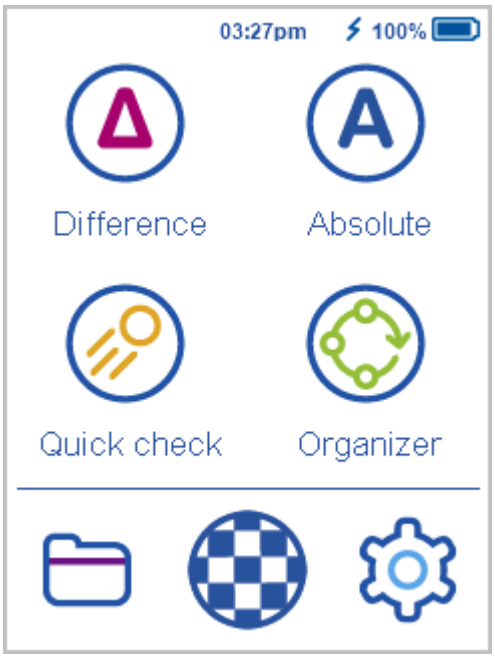
The instrument is fully charged and can be put in operation.

NOTICE

The USB connector type C can be inserted in both directions.

3.3 Using the Main Menu

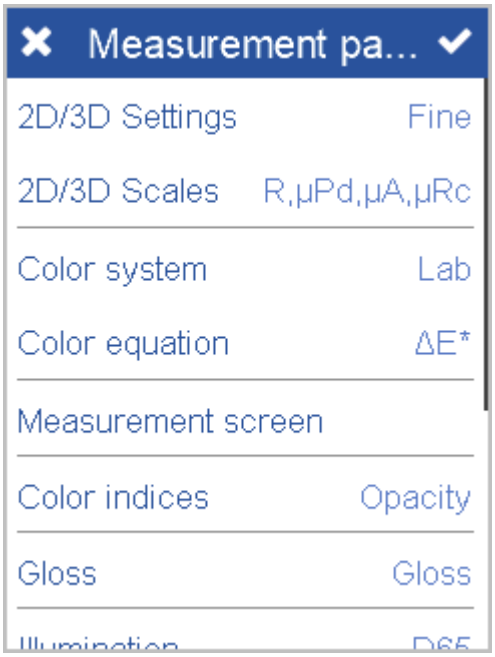
The screen below shows the icons that can be displayed on the main menu.

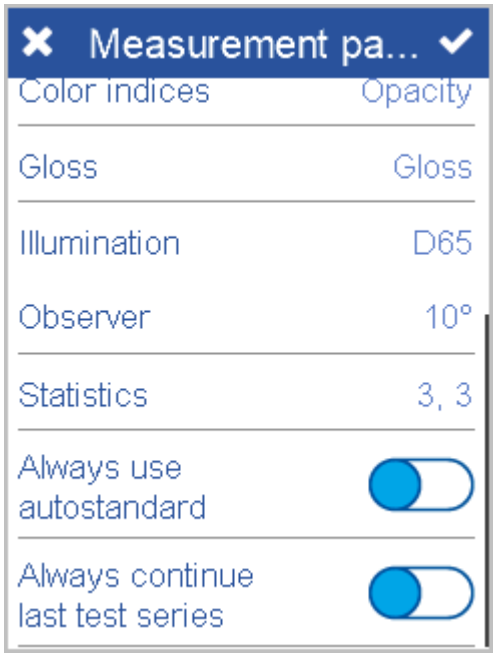


1	**Difference**: Compare standard and sample. Results are saved automatically.	2	**Absolute**: Take absolute measurements without compare. Results are saved automatically.
3	**Quick Check**: Perform quick evaluations without saving.	4	**Organizer**: Download at least one organizer from smart-chart.
5	**Browse**: View and delete measurement data in system memory.	6	**Opacity**: Activate under **Configuration** > **Measurement Parameters** > **Color Indices**.
7	**Configuration** Change measurement parameter or instrument settings and calibrate instrument.		

3.4 Setting Parameters

The instrument is working with default measurement parameters. Before starting with measurements these parameters may have to be controlled. Below the default values are shown. For more details see "System Configuration[52] " > "Measurement Parameter[53] ".





2D/3D Settings Select measurement mode: Results can be compared to the National Research of Canada or to the predecessor instrument **color-view**. Default is **NRC**.	**Gloss** Turn gloss measurement on or off.
2D/3D Scales Select scales for 2D reflectivity measurement and 3D structure analysis.	**Illumination** Select standard illuminant. Default is **D65**.
Color system Select color system. Default is **CIE L*a*b***.	**Observer** Select standard observer. Default is **10°**.
Color equation Select color equation. Default is **ΔE***.	**Statistics** Define number of readings (n), statistical values to be displayed and activate / deactivate the option **Statistic fixed** (not more readings than (n) are possible).
Measurement Screen Select the values to be displayed after a measurement. Default is **ΔSMP** (difference sample to standard).	**Always use autostandard** Search for nearest standard is always active.
Color indices Select color indices. Default is **none**.	**Always continue last test series** Latest series is opened automatically to add new measurement data.

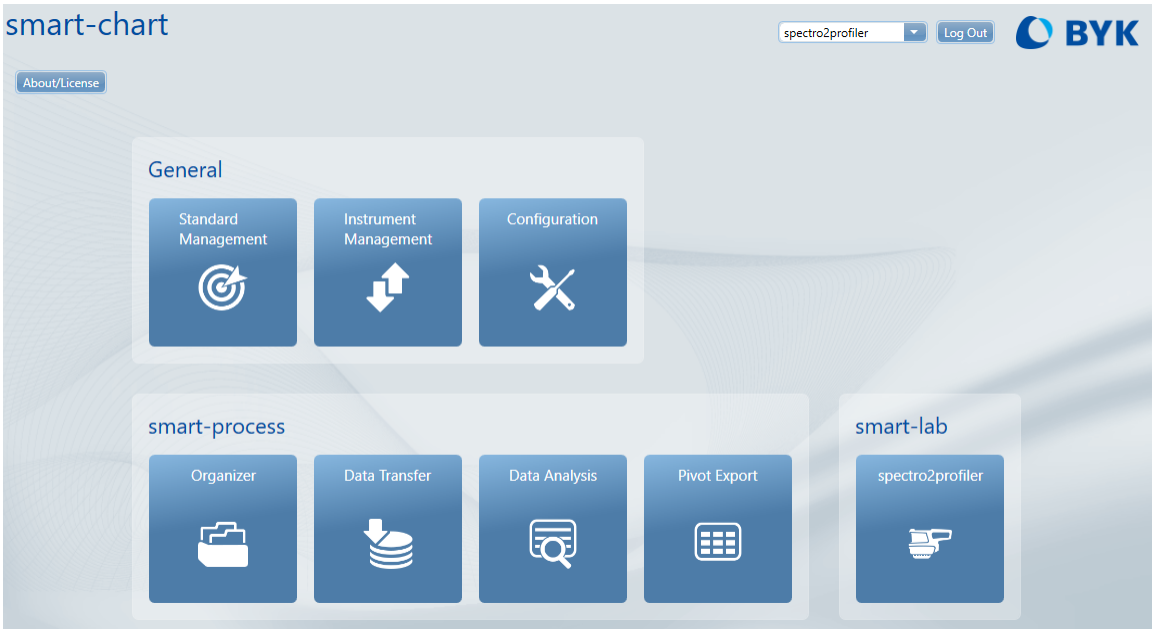
Setting measurement parameters is required for off-line mode only. Standards and organizers transferred from smart-chart have already set all necessary parameters.

NOTICE

Changes in the measurement parameters apply to new standards only. Standards with existing measurement data will be measured with previous parameter in order to ensure data consistency.

3.5 Software Installation

The software suite smart-chart is a modern and intuitive PC program to document, analyze and optimize your color, gloss, reflectivity and topography data.



It is available in two different software packages: “smart-lab” and “smart-process”.

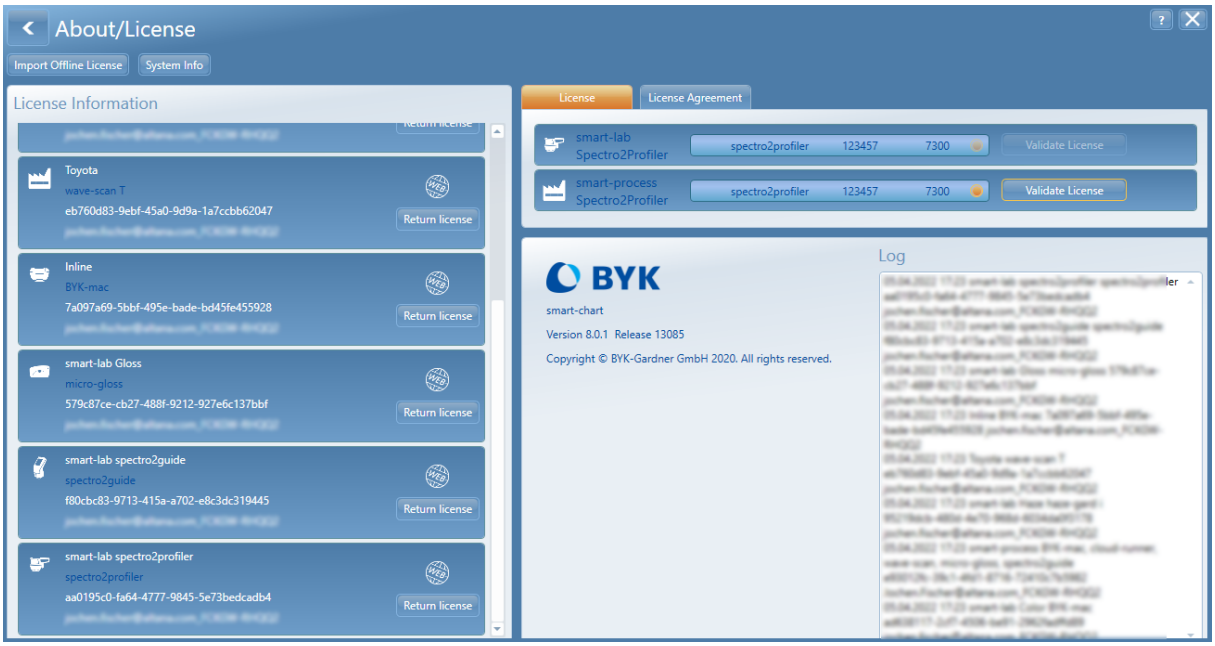
3.5.1 Download and Installation

Perform following steps:

1. Download the ZIP file from: https://www.byk-instruments.com/software
2. Save it on your hard drive into a new folder.
3. Extract the complete archive.
4. In the extracted folder, right mouse click on the file "install.exe".
5. Select **Run as administrator**.
6. Follow the setup instructions on the screen.

3.5.2 Software Registration

After download the software can be used for **30 days** free trial. Thereafter, you need to decide and register for the required software package. The standard delivery includes two licenses. In the main window of smart-chart click on the button **About/ License**.



You can retrieve your license on-line or off-line. In order to change your PC you can return your license on your old PC and re-install it on your new PC. In case of questions contact your application support team at BYK-Gardner.

3.6 Test and Calibration

The spectro2profiler has a long-term stable calibration. This can be monitored using the calibration standard included in the delivery.

If you measure the standard and the values are out of the specification, the instrument will ask you for calibration using this standard.

See “Calibration 73 “ for more information.

4

Perform Measurements

Following measurements are supported:

- Difference Measurement[31]
- Absolute Measurement[38]
- Perform Quick Check[39]
- Opacity Measurement[40]
- Organizer Measurement[43]

Make sure your measurement parameters are set, see "Measurement Parameter[53] " for more information.

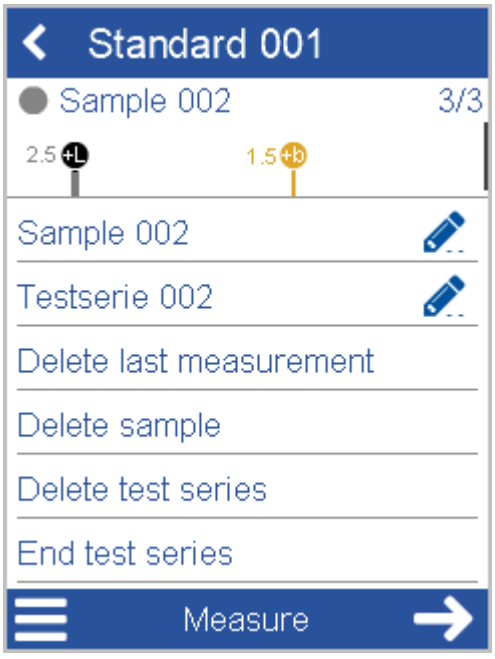
4.1 Common Functions

The spectro2profiler provides an easy-to-use graphical interface which supports to you speed up your daily work. Following common functions are available:

- Context Menu[29]: Allows you to control your current test series.
- Filter Function[30]: Allows you to shorten the list of standards displayed.

4.1.1 Context Menu

Ongoing measurements are controlled via the context menu - available via the hamburger icon in the lower left corner of the display. The context menu starts with less entries and grows up during measurements.



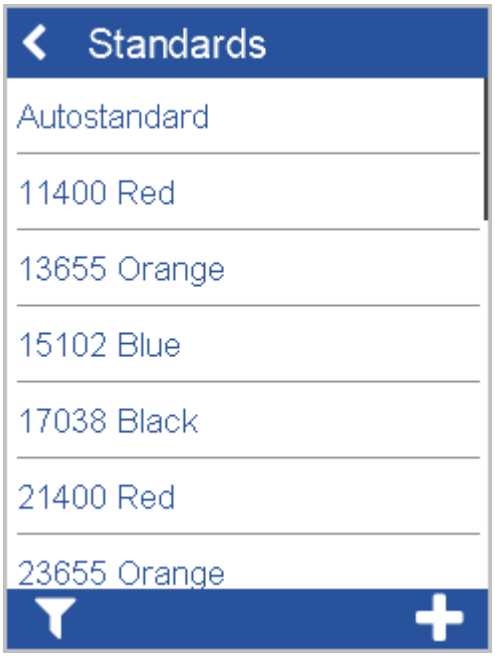
Finally the context menu provides following options:

- Rename sample
- Rename testserie
- Delete last measurement
- Delete complete sample
- Delete test series
- End test series

Using these options complete control of a measurement is possible.

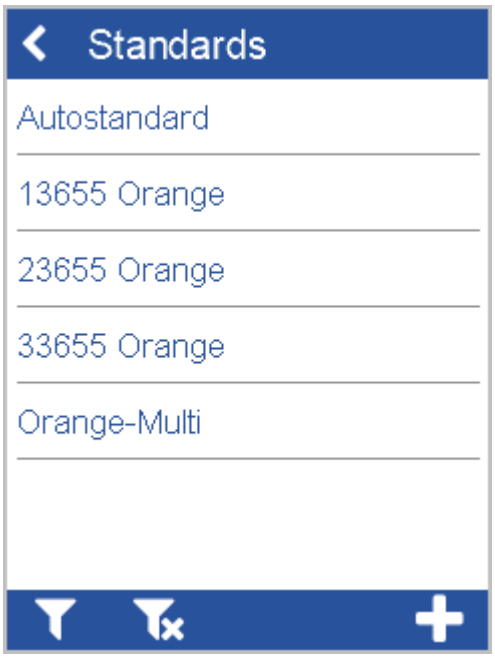
4.1.2 Filter Function

The instrument provides a function to filter for standards. This is helpful in case of many standards being stored in the instruments memory.



Click on the filter icon in the lower left. The screen to enter the filter criteria is displayed.

Enter the criteria for the filter - i.e. a part of the standard name.



To change the filter criteria click the filter icon again; to remove the filter click the cancel filter icon.

4.2 Difference Measurement

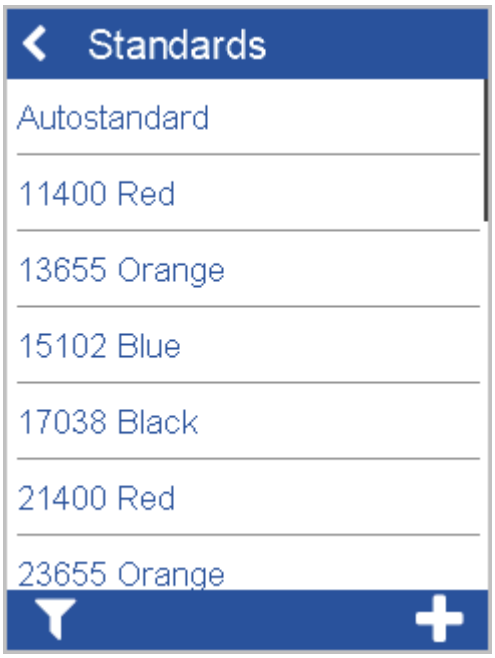
In difference mode following measurements are supported:

- Load existing Standard[31] : Compare sample(s) to a standard.
- Search for closest Standard[34] : Search for best match in memory.
- Create new Standard[36] : Create standard based on current sample.

To start difference mode click on icon **Difference**.

4.2.1 Load existing Standard

In case standards are already stored in the instrument - see "Create new Standard[36] " - or downloaded from smart-chart - the list with existing standards appears.

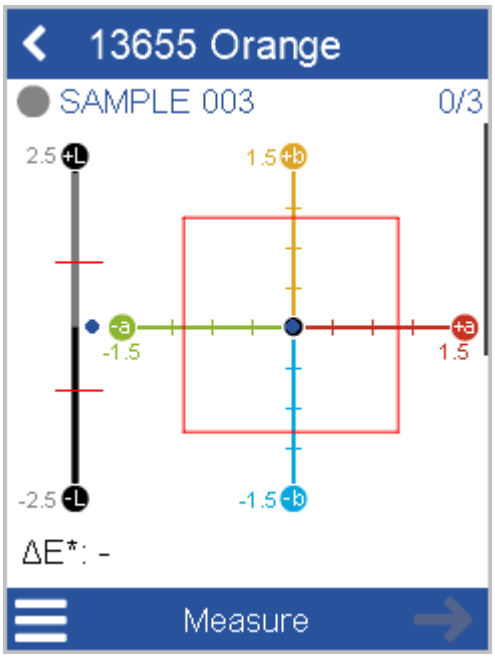


Select a standard to continue. The list with existing test series appears.

You have two options:

- To continue existing test serie select it from list.
- To add a new test serie click on item **New test series**; a new test serie will be created created.

The measurement screen is displayed.



Select **Rename test series** from context menu, if required.

Enter the name and confirm via the check mark in the upper right corner, the instrument is ready to measure. Proceed with following steps:

1. Place sample on instrument.
2. To activate camera, press **Operate** button halfway.
3. Click on **Measure** or press the **Operate** button completely.
4. Sample is measured and automatically saved.
5. Scroll down to see data table and statistics.
6. Continue with the next sample, if required.

To end difference mode select **End test series** from context menu.

NOTICE

There are various options to configure the display of the measurement results, e.g.:

- Display absolute values for standard and sample

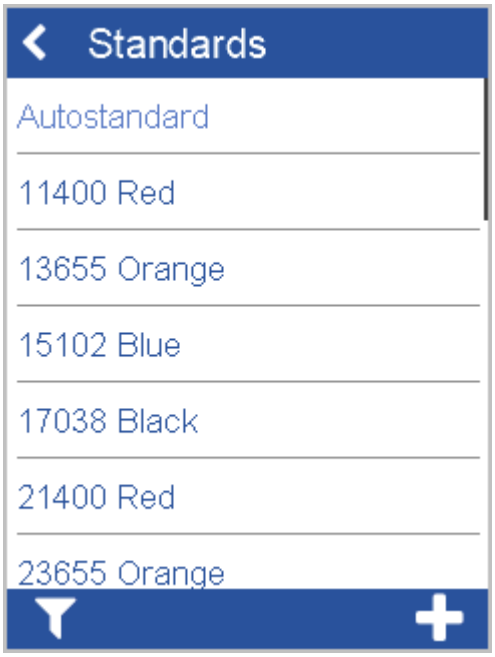
- Display differences between standard and sample
- Display statistical data with 1..3 columns
- Activate / inactivate fixed statistics etc.

Details see "Measurement Parameter 53 " > "Measurement Screen 57 ".

4.2.2 Search for closest Standard

Using this function you can measure any sample - the system will automatically present the standard(s) in the instrument, which are closest to the current sample.

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

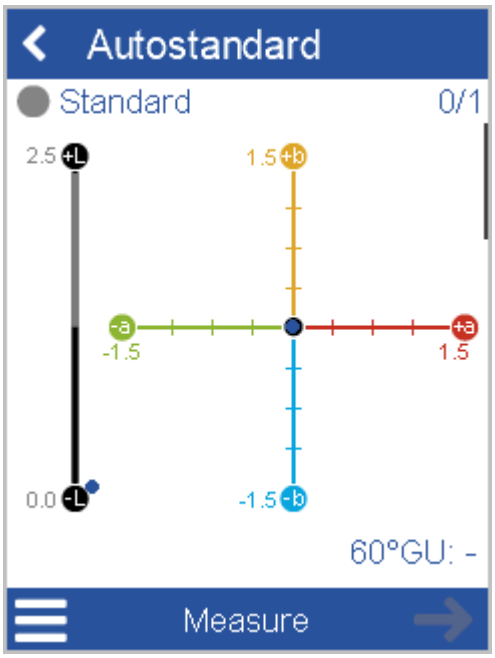


Click on item **Autostandard**.

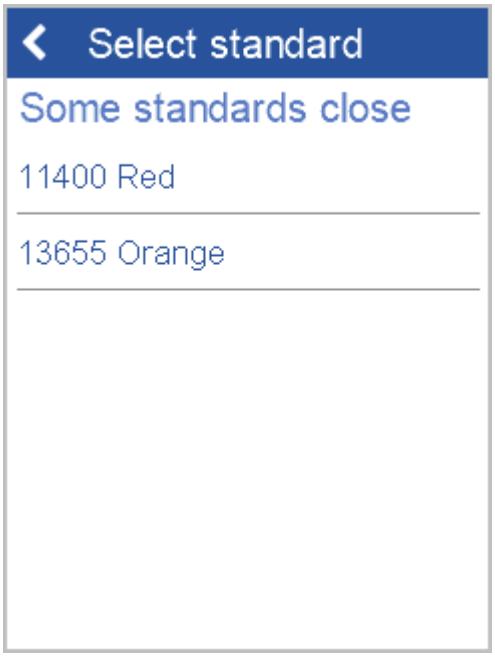
NOTICE

The option **Autostandard** only appears when at least one standard is stored in the instrument.

The measurement screen is displayed.



Measure your current sample **just one time**, the instrument measures the current sample and searches for the closest standard in the memory.



Following scenarios are supported:

- **Nearest standard found**: If matching standard is found in memory, it is selected automatically.
- **Some standards close**: If more than one matching standard is found in memory, a list for selection is displayed.
- **No good match**: No matching standard was found in the instrument.

If a matching standard was found you can contiune to measure samples and compare with this standard.

NOTICE

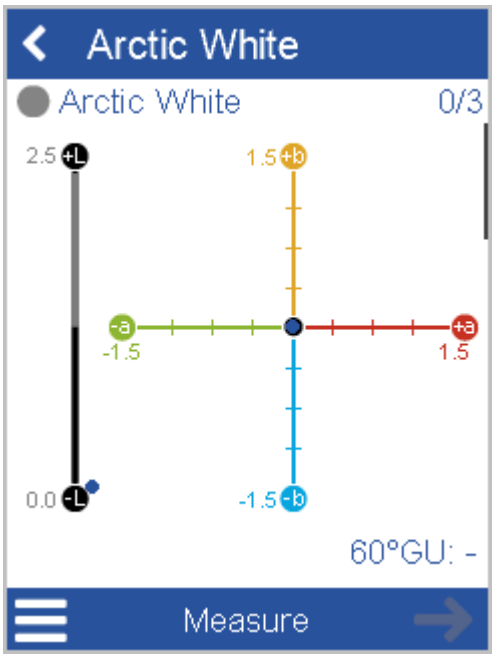
The option **Autostandard** can be set to always active. Details see "Measurement Parameter[53] " > "Autostandard[64] ".

4.2.3 Create new Standard

Using this function you can create new standards. Click on icon **Difference**. The list with existing standards is displayed.

To add a new standard click on the **Plus** symbol **(+)**; a new standard is created and the input for the standard name appears.

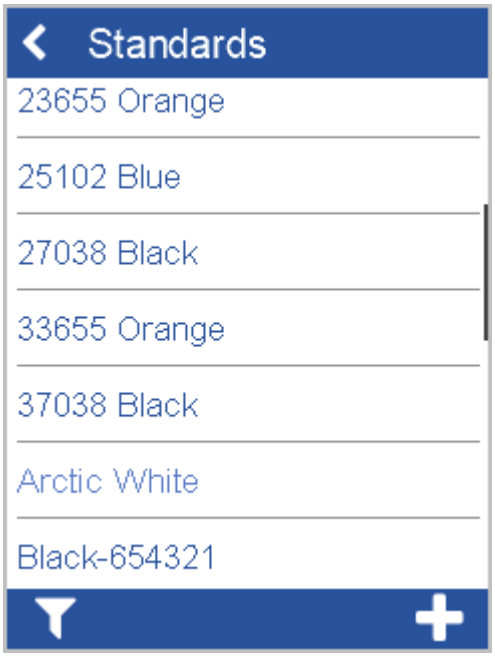
Accept the default name or enter a desired name and click on the check mark in the upper right corner. The instrument is now ready to measure the current standard.



Proceed with following steps:

1. Place instrument on standard.
2. To activate camera, press **Operate** button halfway.
3. Click on **Measure** or press the **Operate** button completely.
4. Standard is measured and automatically saved.

Now the measured standard exists as new digital standard in instrument memory.



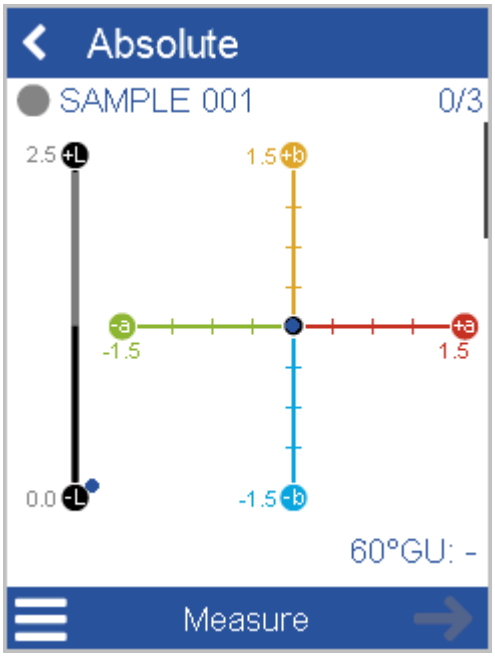
Transfer the new data to smart-chart to import it into the measurement database. From here the new standard can be shared with all other locations in the world.

NOTICE

The vice-versa operation is also possible - new standards can also be downloaded from smart-chart into the instrument at any time.

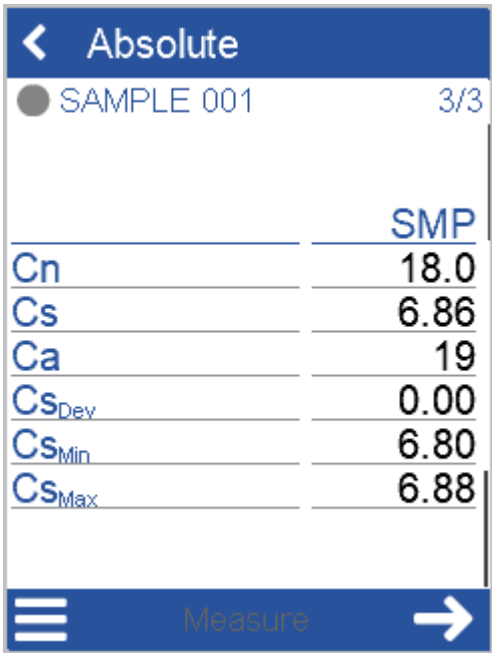
4.3 Absolute Measurement

Using this function you can take measurements without comparing to a standard. Click on icon **Absolute**.



Proceed with following steps:

1. Place instrument on sample.
2. To activate camera, press **Operate** button halfway.
3. Click on **Measure** or press the **Operate** button completely.
4. Sample is measured, results are automatically saved.
5. Scroll down to see data table and statistics.

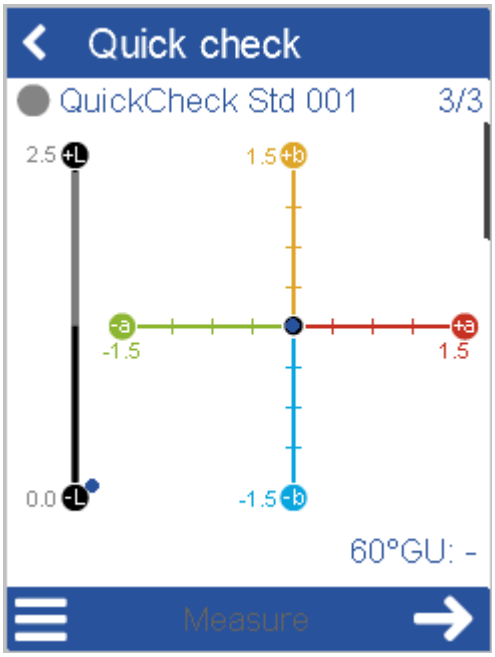


Continue with the next sample, if required. To end absolute mode select **End test series** from context menu.

4.4 Perform Quick Check

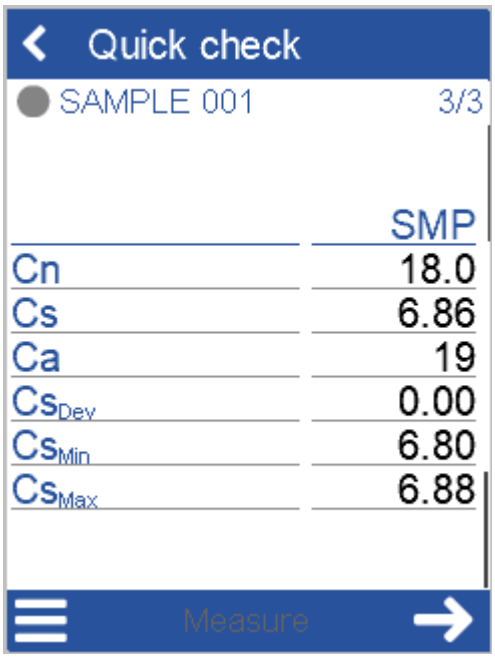
Using this function you can compare a standard with one or more samples without automatic saving - use it for the quick evaluation of your current samples.

Click on icon **Quick check**. The instrument is ready to measure the *standard*.



Proceed with following steps:

1. Place instrument on *standard*.
2. To activate camera, press **Operate** button halfway.
3. Click on **Measure** or press button **Operate** completely to measure the *standard*.
4. Continue with **Next** and place instrument on the *sample*.
5. Click on **Measure** or press button **Operate** completely to measure the *sample*.



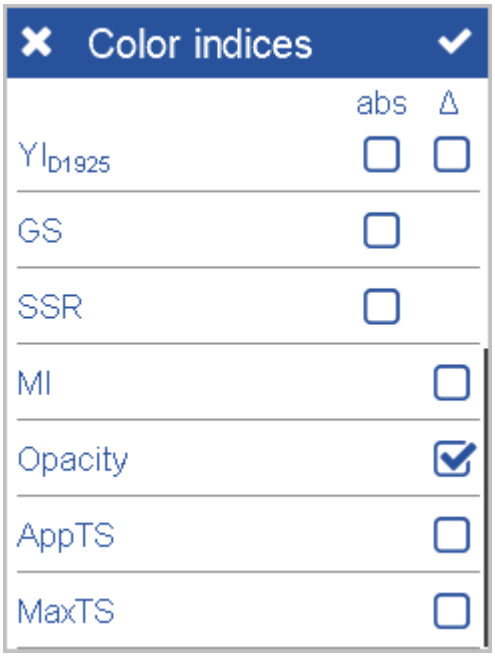
Continue with the next sample, if required. To end quick check mode select **End test series** from context menu.

4.5 Opacity Measurement

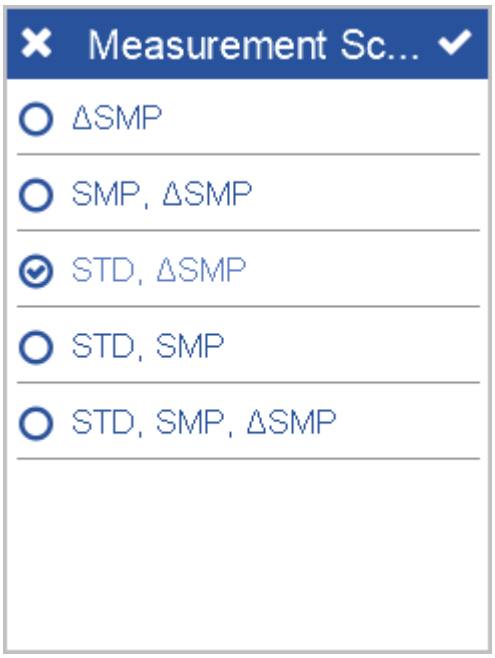
With this function the hiding power of a coating can be measured - using for example the BYK-Gardner **byko-charts**:

- https://www.byk-instruments.com/c/p-5916

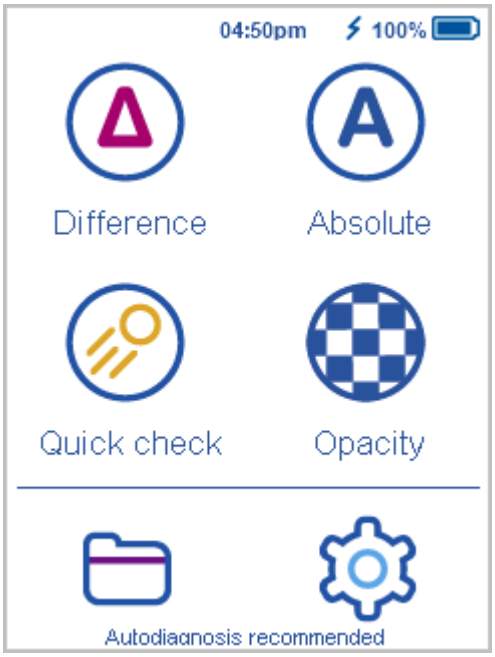
To display the measurement icon in the main menu, select **Opacity** as a color index, see "Color Indices 55 ".



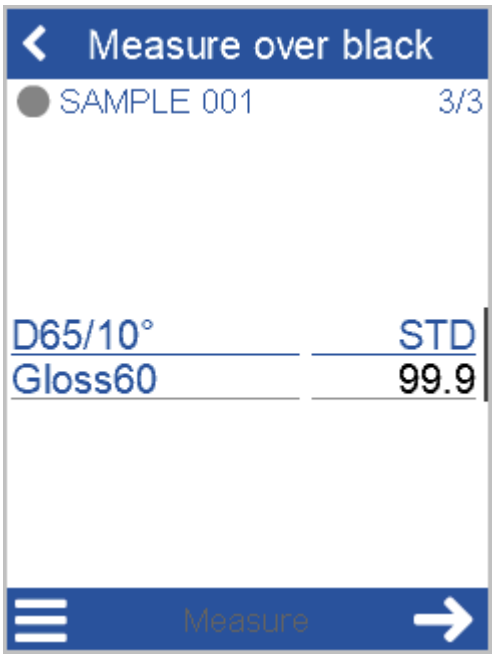
In **Measurement Screen** an option with standard and sample has to be selected, see "Measurement Screen 57 ".



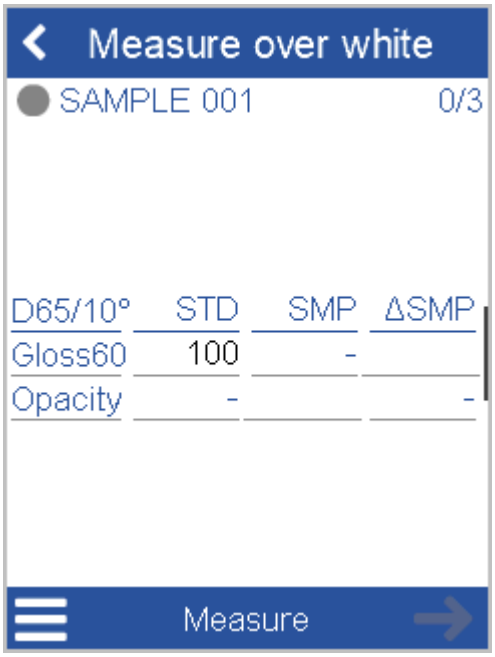
In the main menu click on icon **Opacity**; the measurement starts with the reading over *black* and finishes with the reading over *white*.



Place instrument on the *black* background and click on **Measure** or press the **Operate** button.

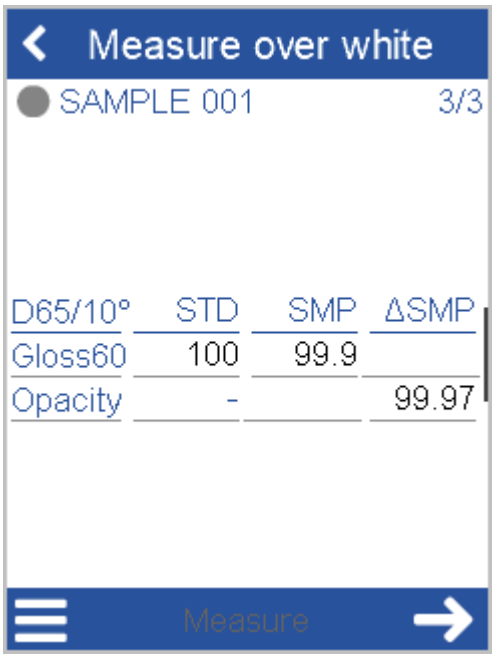


The sample is measured and automatically saved; continue with **Next** and place instrument on the *white* background.



Click on **Measure** or press the **Operate** button; the sample is measured again and automatically saved.

Scroll down to see the **Opacity** value in %. A higher value indicates that the hiding power of the coating is good.

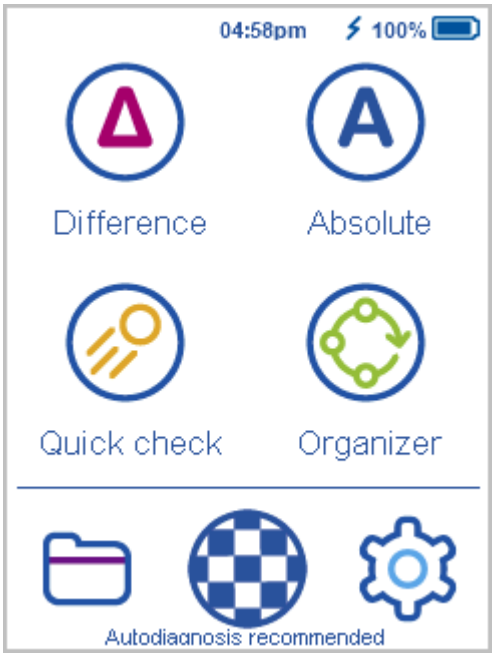


To end quick check mode select **End test series** from context menu.

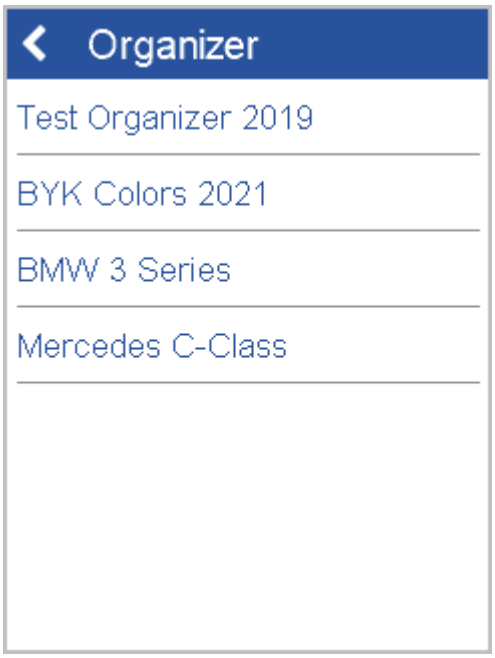
4.6 Organizer Measurement

It is possible to predefine the measurement sequence in the software smart-process with the so-called "organizer" - allowing a standardization of the measurement procedure.

The organizer icon appears after downloading an organizer from smart-process into the instrument.



Multiple organizers can be downloaded to the instrument. Select the organizer to be used from the list.



Afterwards the objects in the organizer can be selected - for example car model, color / standard and the paint line in the production.

Continue with **Next**; the organizer will guide step by step and check zone by check zone you through the whole measurement process.

5

Browse Measurements

Using this function you can view measured data and / or delete existing standards or test series.

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

You can browse through the list in order to view or delete the data. Following operations are supported:

- View Measurement Data 46
- Delete Test Series 48
- Delete Standard 49

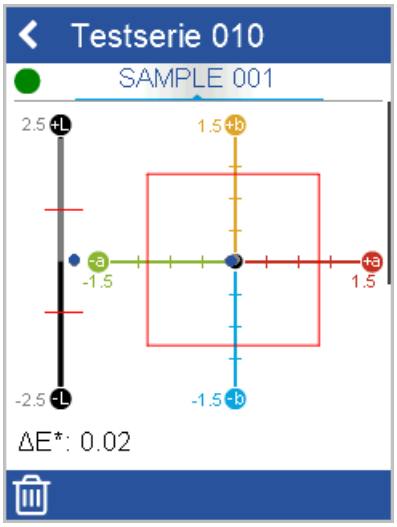
NOTICE

You can also use the software smart-chart in order to delete stored measurement values or complete standards from instrument memory.

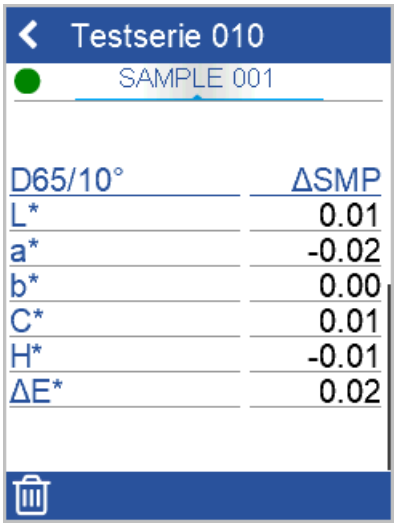
5.1 View Measurement Data

In the list of measurement types open the object for which you want to view the measured data - for example **Difference**. The standards for which test series were measured are displayed.

Open the desired object to view the measurement data.



Scroll down to view data values and statistics.



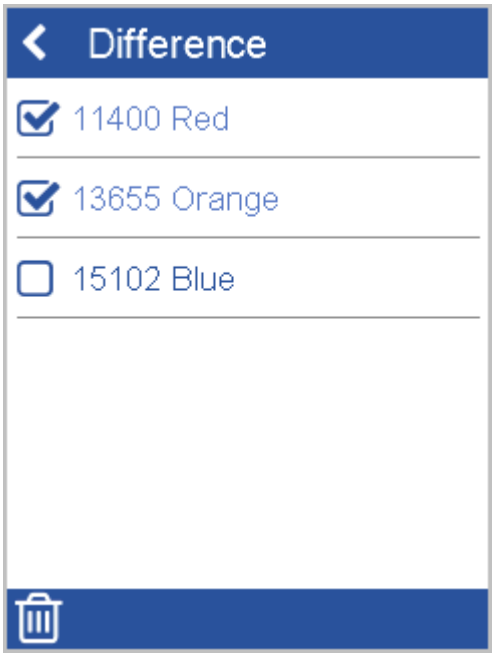
Use the **Previous** / **Next** icons to navigate through the different samples measured.

NOTICE

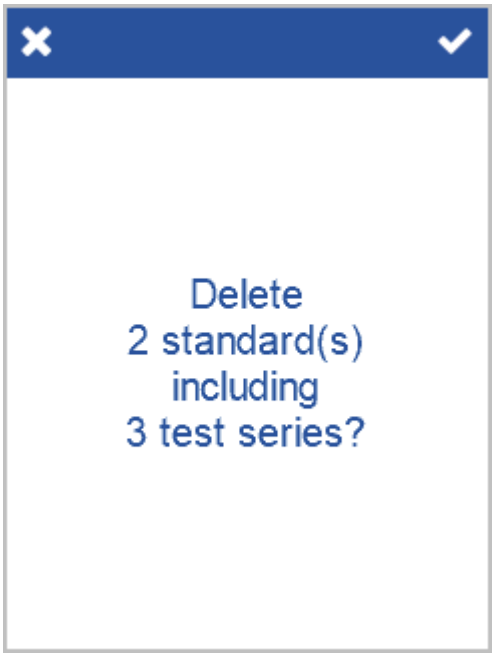
The values show are the average values for all measurements on this sample.

5.2 Delete Test Series

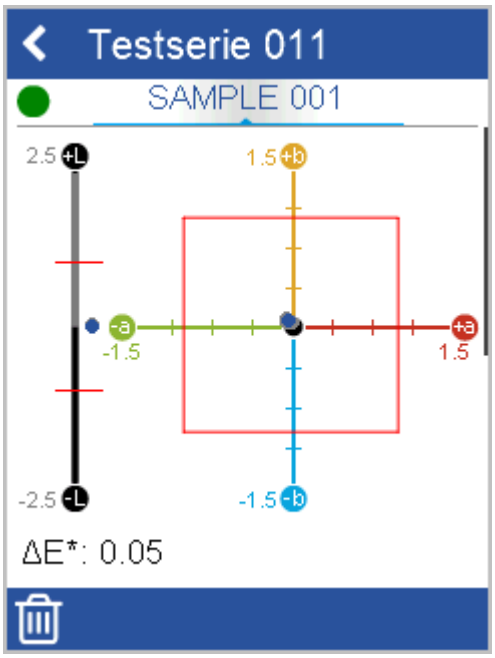
To delete a single test series from a standard select **Difference** in the Browse[46] menu, click on the standard to open it and select the test series to be deleted in the list.



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



Confirm with the check mark in the upper right corner. The selected objects are deleted. To abort the deletion click on the cross icon to leave the dialog.

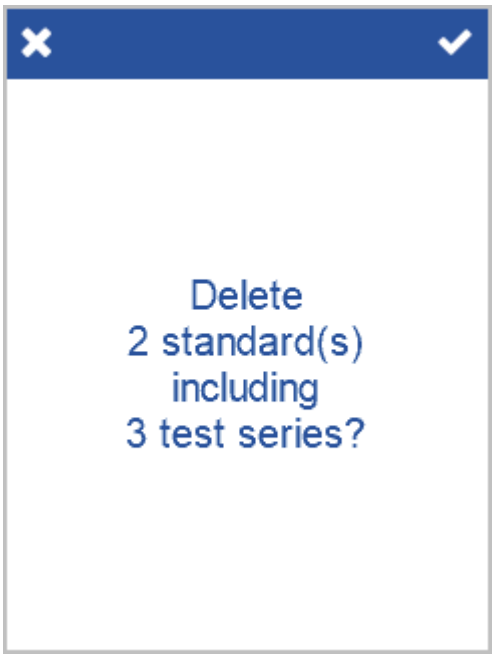


If only on single test series exists in the standard, it can also be deleted directly from the measurement screen using the **Trashcan** icon.

5.3 Delete Standard

You can delete complete standards with all their test series stored from instrument memory. In the Browse 46 menu click on **Standard** and select the standard(s) to be deleted in the list.

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



Confirm with the check mark in the upper right corner. The selected objects are deleted. To abort the deletion click on the cross icon to leave the dialog.

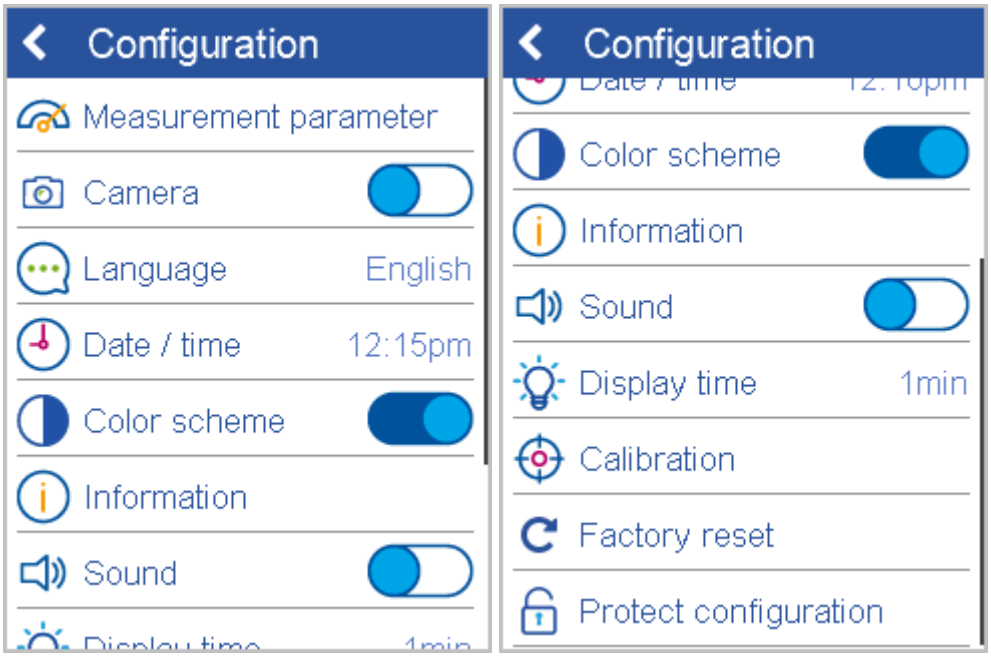
NOTICE

Standards (and organizers) received from smart-process can not be deleted on the instrument - use smart-process to delete these objects.

6

System Configuration

With this function you can configure the instrument according to your needs.

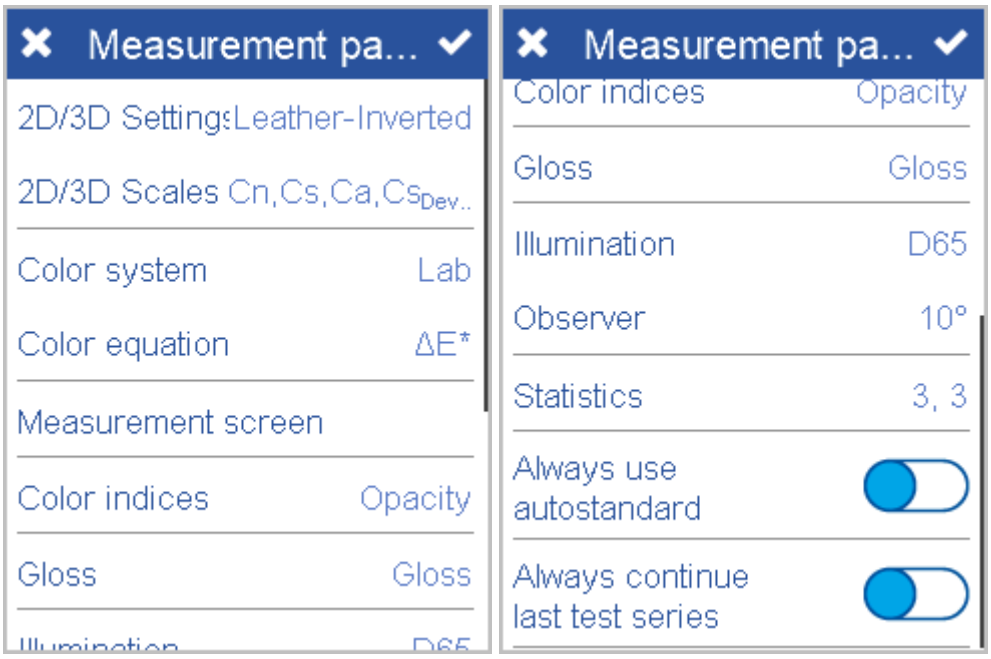


The configuration menu comprises following options:

- Measurement Parameter[53] :
  - 2D/3D Settings[54]
  - 2D/3D Scales[55]
  - Color System[55]
  - Color Equation[56]
  - Measurement Screen[57]
  - Color Indices[58]
  - Gloss[59]
  - Illumination[60]
  - Observer[61]
  - Statistics[62]
  - Autostandard[64]
  - Test Series[66]
- Language[68]
- Date / Time[69]
- Color Scheme[71]
- Information[71]
- Sound[72]
- Calibration[73]
- Factory Reset[79]
- Config Protect[80]

6.1 Measurement Parameter

The default values for the measurement parameter are shown in System Operation[24] > Parameters[25]. Below more details on these parameters are given.



Following measurement parameter can be set:

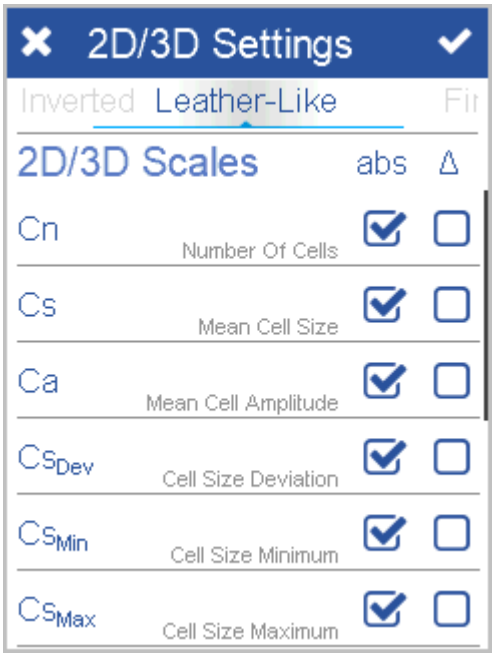
- 2D/3D Settings[54]
- 2D/3D Scales[55]
- Color System[55]
- Color Equation[56]
- Measurement Screen[57]
- Color Indices[58]
- Gloss[59]
- Illumination[60]
- Observer[61]
- Statistics[62]
- Autostandard[64]
- Test Series[66]

NOTICE

Save your settings with the check mark in the upper right corner. To leave a settings dialog without saving go back to the previous level with the back arrow icon in the upper left corner.

6.1.1 2D/3D Settings

Via this function you can configure how the measurements are to be done. With the wheel on the top the instrument can be configured for different predefined analysis modes.



Following modes are supported:

- **Leather-like structures**
- **Leather-inverted**
- **Fine structures**
- **Coarse paint**
- **None**: Switches off 2D / 3D for pure / fast color measurements. Can be activated in smart-chart.

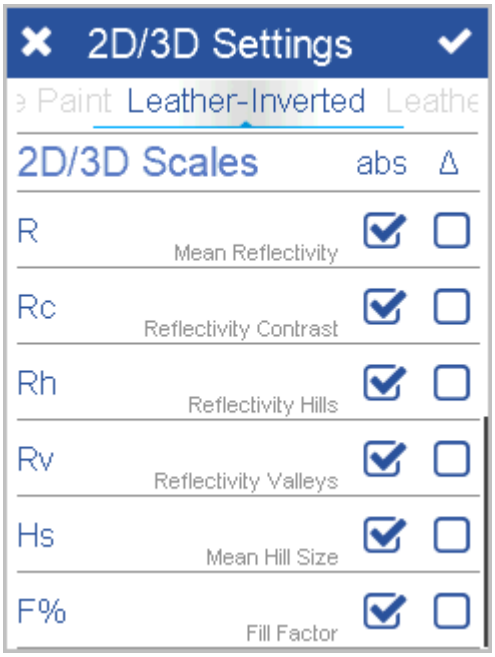
Possible settings can be found in "Application Hints[82] ". These settings are described in the separate glossary document for the spectro2profiler, see "Documentation[86] ".

NOTICE

The glossary also explains how to best edit the settings for watershed and reflectivity calculation. These settings can be optimized in the module **Standard Management** of smart-chart - based on your specific structure / texture.

6.1.2 2D/3D Scales

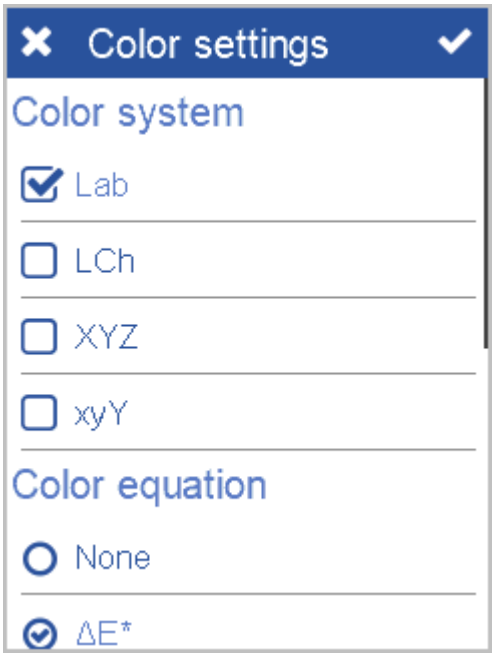
Depending on the chosen predefined analysis modes - see "2D/3D Settings 54 " - the various scales are preselected. Scroll up and down to see all options.



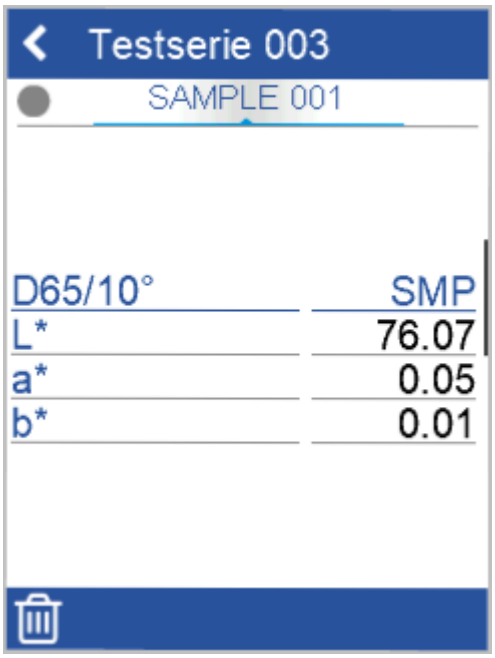
Scales can be activated / deactivated by tapping the corresponding check box. For each scale both absolute value and / or delta to the standard can be selected.

6.1.3 Color System

The instrument can measure multiple color indices and display the results. Go to **Measurement parameter** > **Color system** and select the color system(s) you want to use for measurements.



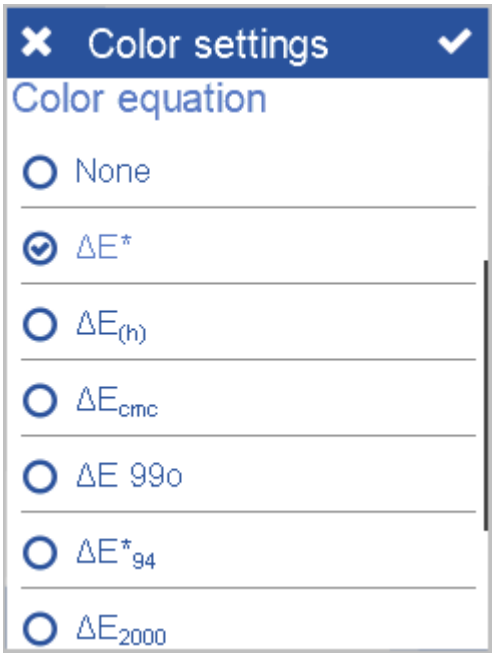
These color systems are visible in the measurements results.



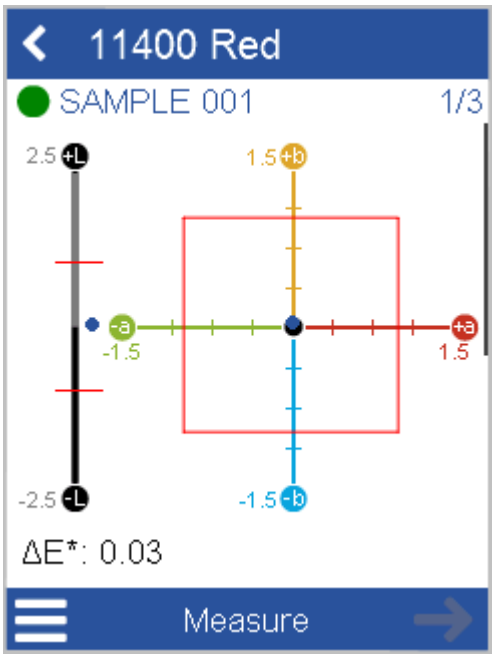
If the graph with the tolerances is shown, scroll down to see results in the first color system. Scroll more down to see the results in the next color system.

6.1.4 Color Equation

Go to **Measurement parameter** > **Color equation** and select the color equation you want to use for measurements.



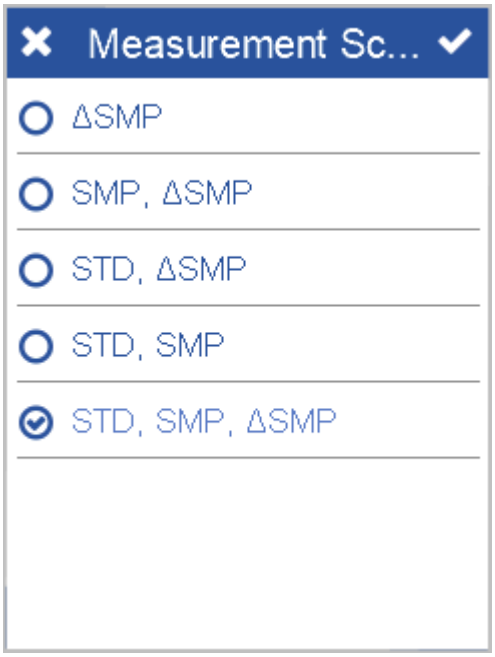
First measure the standard and second measure the sample in order to see the differences.



If the graph with the tolerances is shown, scroll down to see data table and statistics.

6.1.5 Measurement Screen

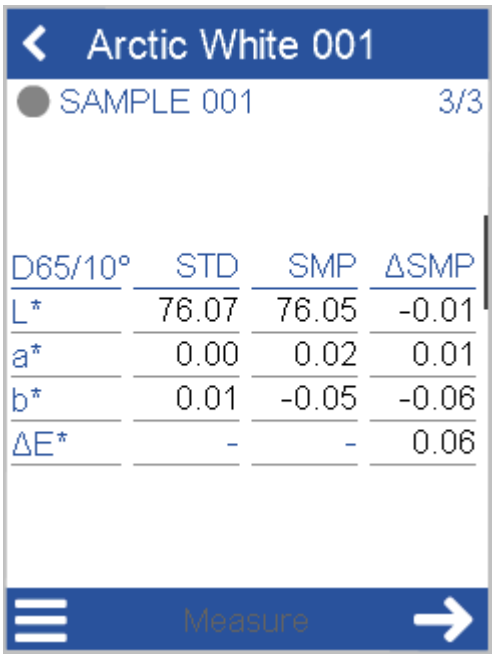
Go to **Measurement parameter** > **Color equation** and scroll down to **Measurement screen**. Select the data to be displayed in the measurement results.



Following data can be selected:

- STD = Standard
- SMP = Sample
- Δ = Difference (Delta) between Standard and Sample.

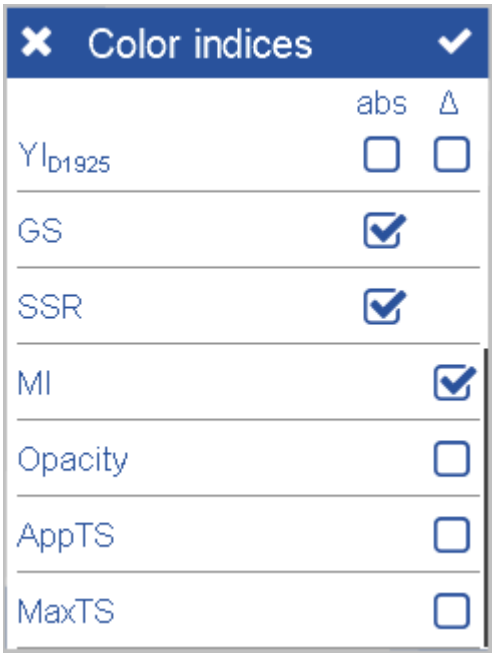
These data are visible in the measurements results.



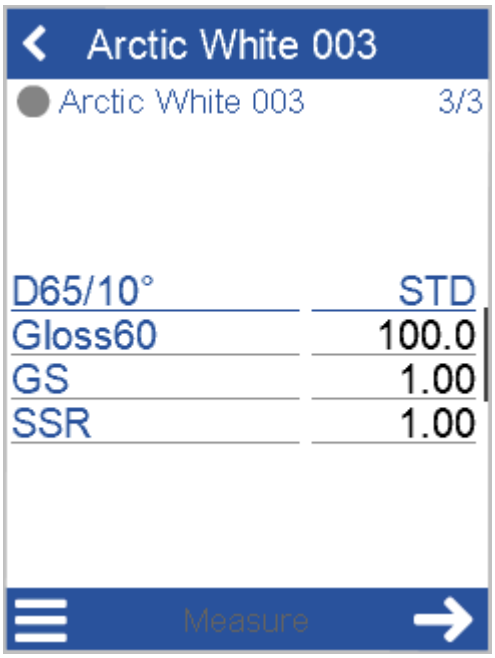
The default setting is **SMP, ΔSMP**. In the example shown above the value for **STD** is displayed too.

6.1.6 Color Indices

The instrument can measure multiple color indices and display the results. Go to **Measurement parameter** > **Color indices** and select color indices you want to use for measurements. You can decide to display absolute and / or difference values.



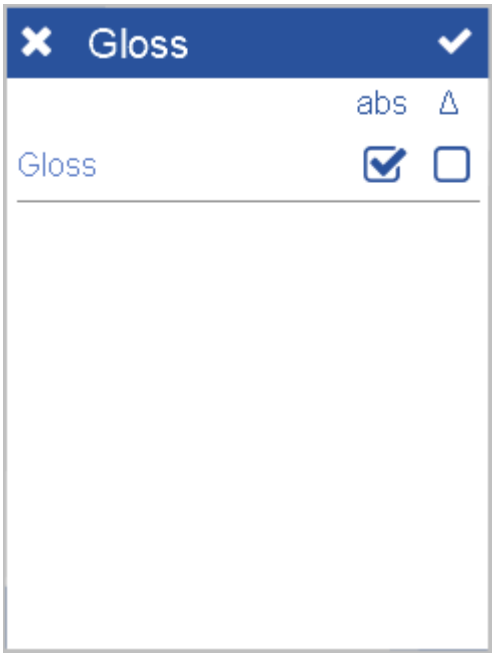
These color indices are visible in the measurements results. First measure the standard and second measure the sample in order to see the differences.



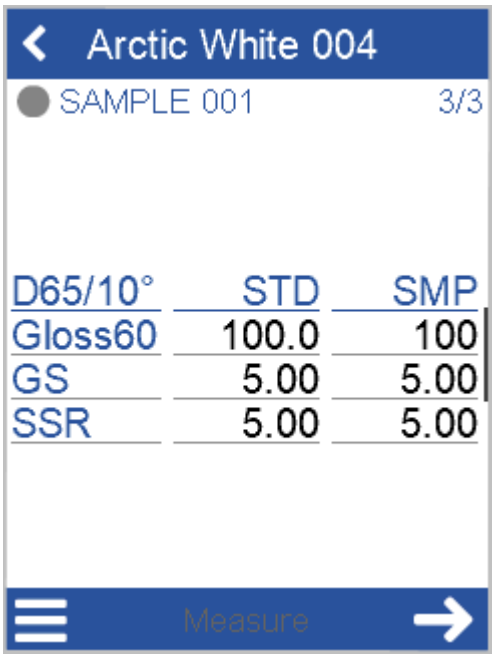
Another example can be found in Opacity Measurement 40 .

6.1.7 Gloss

The spectro2profiler can measure gloss under 60°. Go to **Measurement parameter** > **Gloss** and activate the gloss values you want to be displayed in the measurement results.



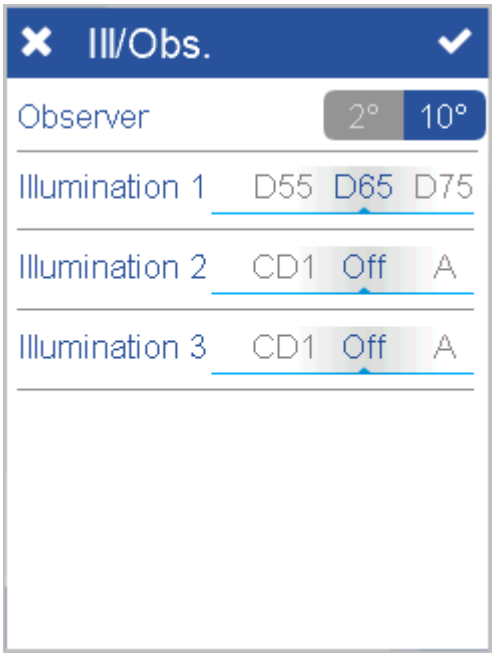
The gloss value is visible in the measurements results.



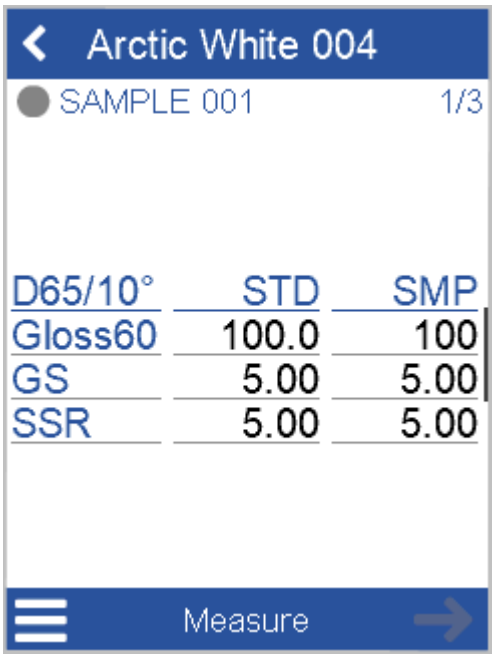
The default setting is the absolute gloss value (**abs**).

6.1.8 Illumination

The spectro2profiler can calculate the measurement results under up to three different illuminations. Go to **Measurement parameter** > **Illumination** and select the illuminations you want to get displayed.



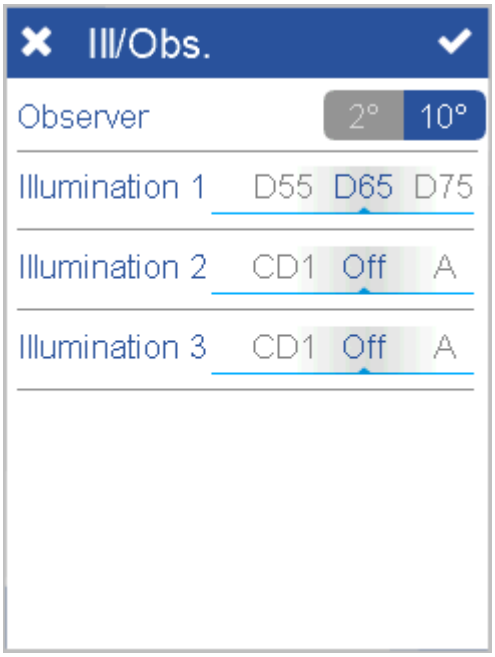
The selected illuminations are visible in the measurements results, scroll down to see the results for each illumination.



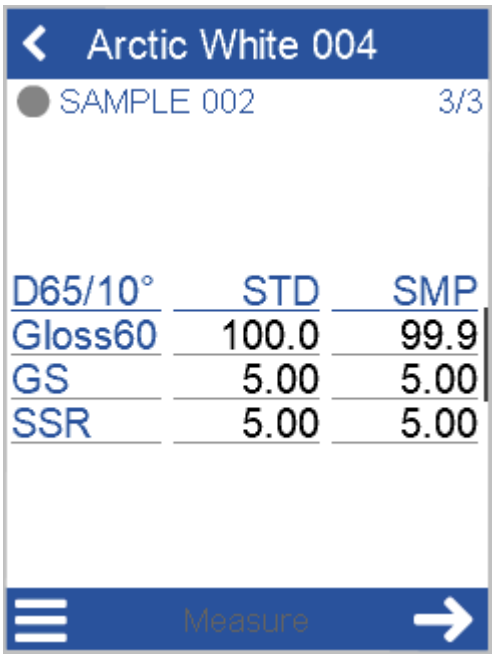
Using three different illuminations for the same measurement will provide more reliable results.

6.1.9 Observer

The spectro2profiler can measure gloss with an observer of 2° or 10°. Go to **Measurement parameter** > **Observer** and activate the option you want to use for measurements.



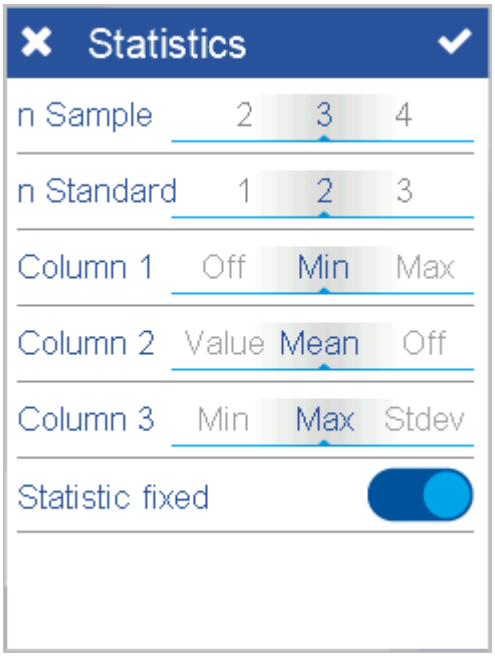
The selected observer is visible in the measurements results - along with the "Illumination[60] ". Scroll down to see the current value.



You can for example measure a standard or a sample with 2° first, change the configuration and repeat the measurement with 60°.

6.1.10 Statistics

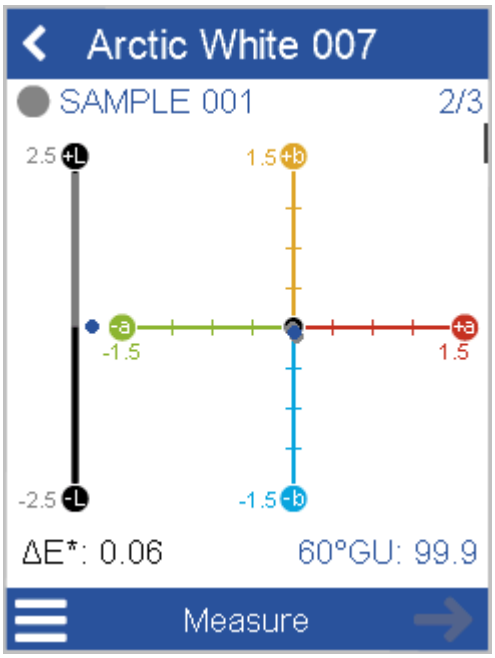
Go to **Measurement parameter** > **Statistics** and select the statistic options to be used during measurement: The number of measurements required on standard and on sample and statistic data to be displayed.



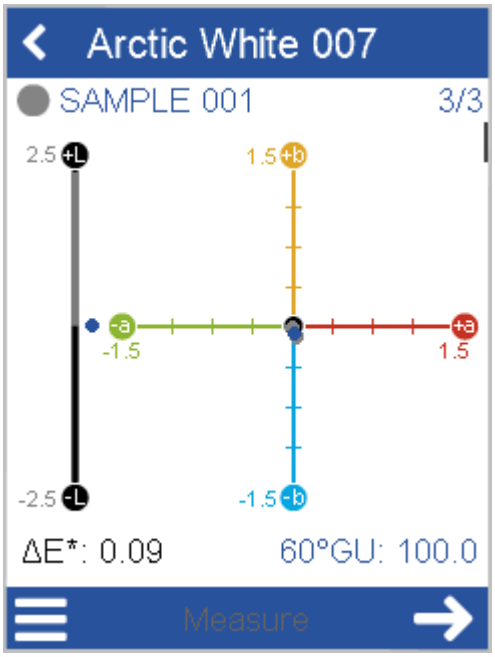
You can also select the statistic data to be displayed:

- **Min**: The minimum value for all measurements.
- **Max**: The maximum value for all measurements.
- **Mean**: The average value for all measurements.

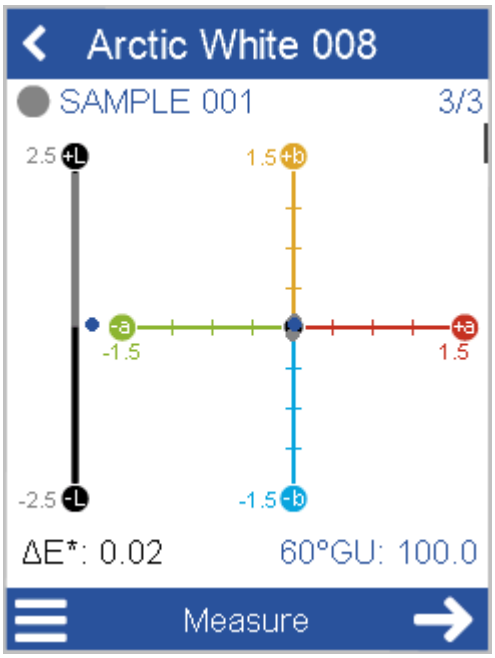
The number of measurements required is visible in the measurements results in the upper right of the screen, e.g. “2/3” means: 3 measurements are required and 2 measurements are already done.



If the no. of measurements is e.g. "3", the icon for **Next** becomes active after the 3rd measurement.



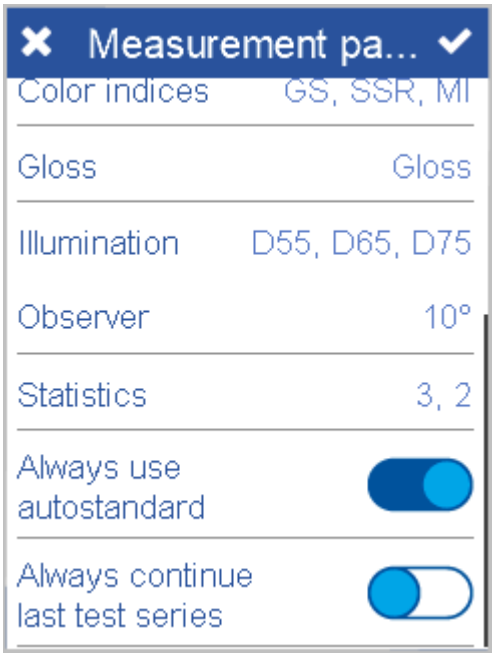
The option **Statistic fixed** means: The exact no. of measurements is to be made.



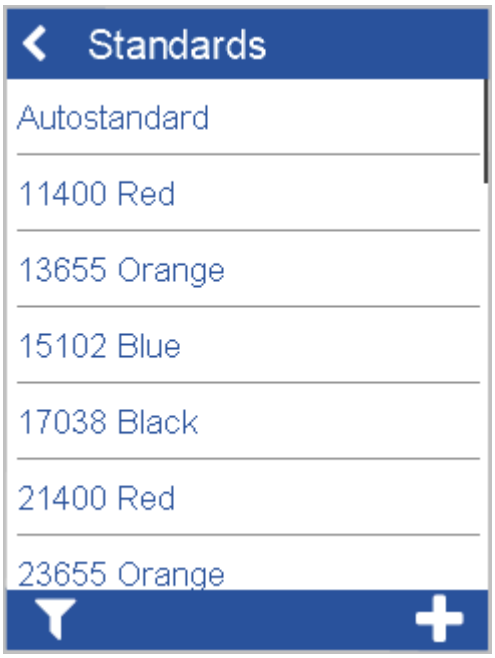
If this options is inactive, the minimum no. is required, but additional measurements can be made - both **Measure** and **Next** are active.

6.1.11 Autostandard

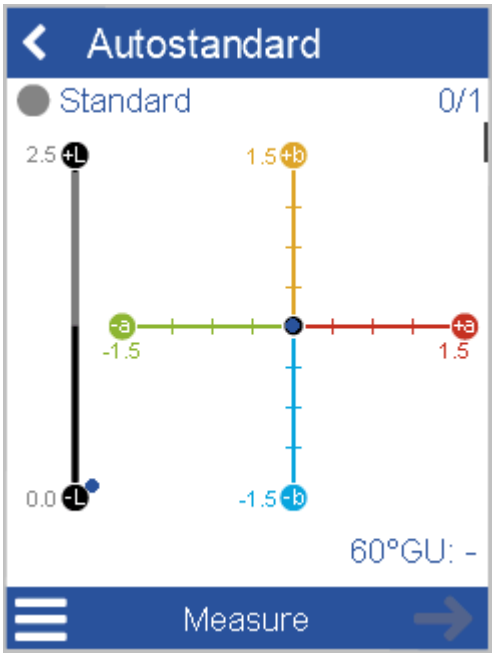
The option **Always use autostandard** is a comfort function.



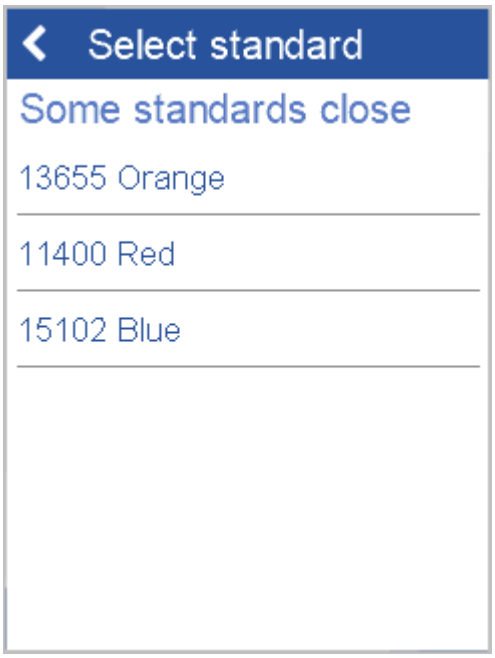
If the option is inactive, the **Standards** dialog displayed when starting the **Difference** mode.



If the option is active, the search for the nearest standard is always active, the measurement screen is displayed immediately.



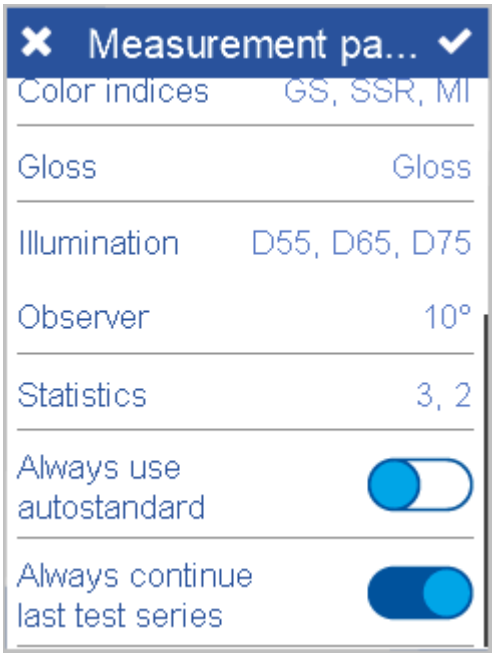
Place the instrument on the sample and click on **Measure**, the sample is measured and the nearest standards in system memory will be displayed.



More details see "Difference Measurement[31] " > "Search for closest Standard[34] ".

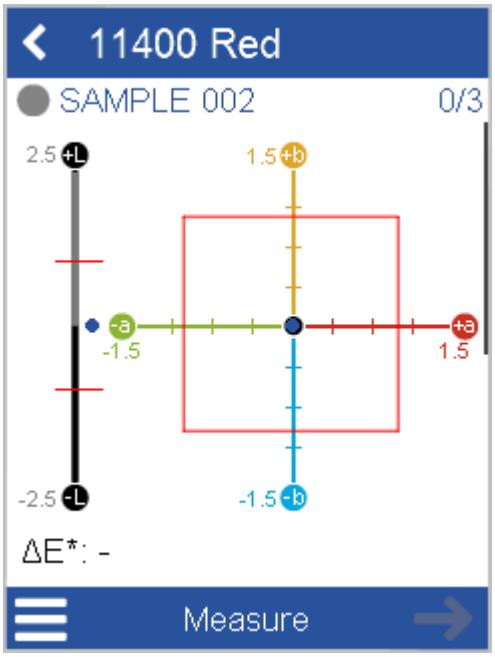
6.1.12 Test Series

The option **Always continue last test series** is a comfort function.



If the option is inactive, the **Select test series** dialog displayed when starting a measurement.

If the option is active, the latest series in the current measurement mode is opened automatically.



More details see "Perform Measurements[29] " > "Context Menu[29] ".

6.2 Language

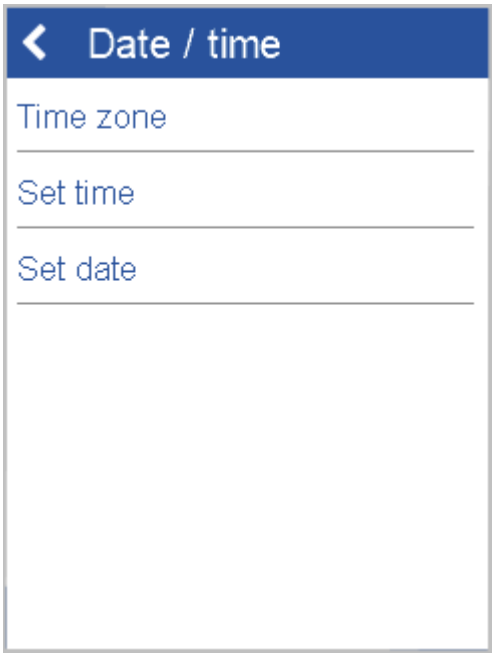
Select the language of the user interface.

Following languages are supported:

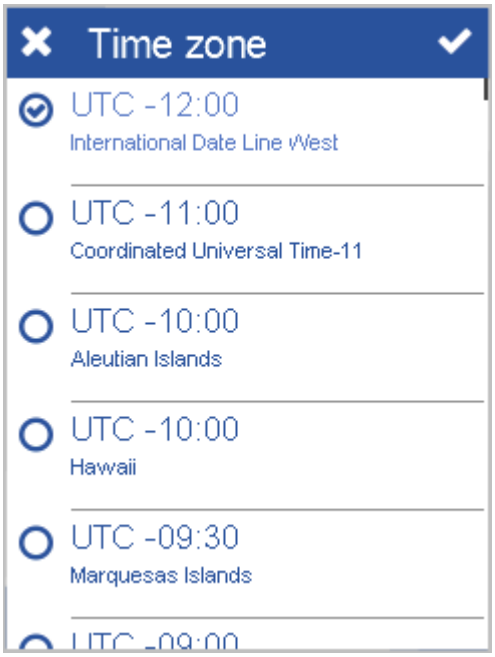
- English (English)
- Deutsch (German)
- Español (Spanish)
- Français (French)
- Русский (Russian)
- 日本語 (Japanese)
- 中国 (Chinese)

6.3 Date / Time

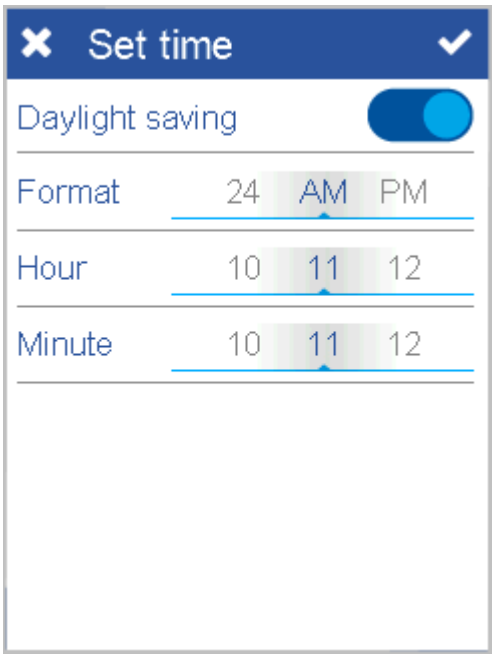
Here you can enter date, time and time zone for your current location.



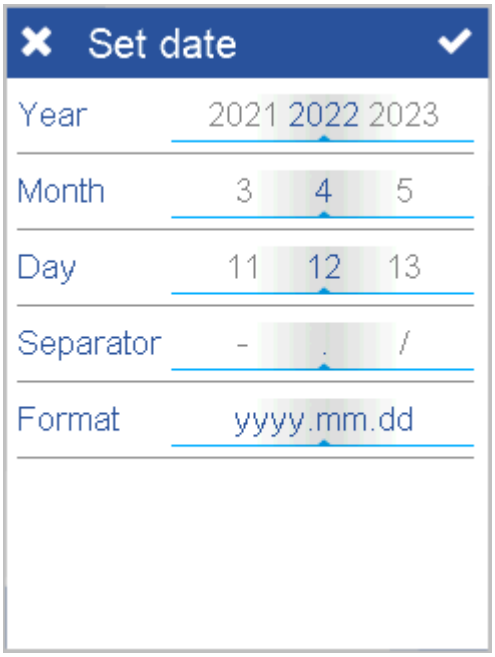
The time zone is the difference of your location in hours compared to the Universal Time Code (UTC): London is UTC +00:00, Berlin is UTC +01:00 and so on.



The time can be entered in hours and minute, during summer time activate **Daylight saving**.



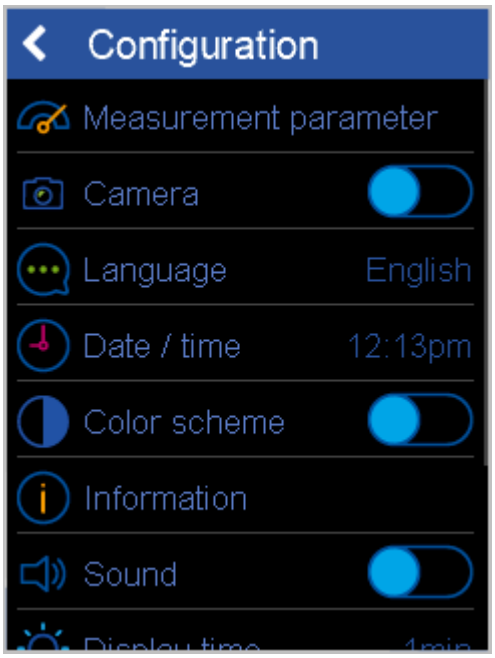
The date is entered with day, month and year.



For **Date** and **Time** the **Format** to be displayed can be selected.

6.4 Color Scheme

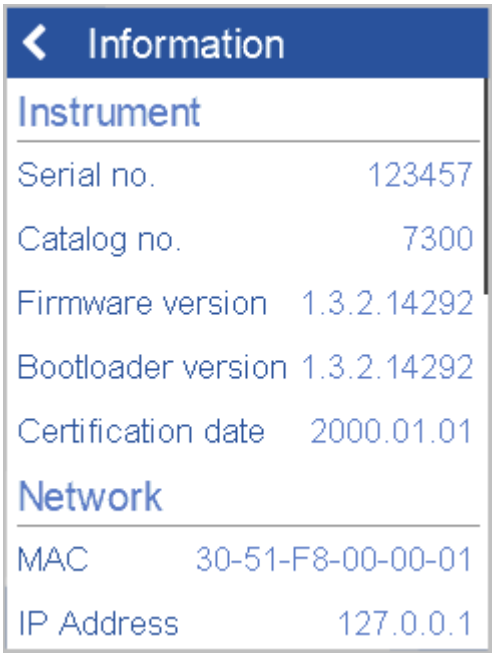
If this option is activated the white background of the display turns to black. This option is preferred in case of darker surroundings.



If this option is deactivated the background turns back to white.

6.5 Information

Under this option the details about instrument, firmware and certification can be retrieved.



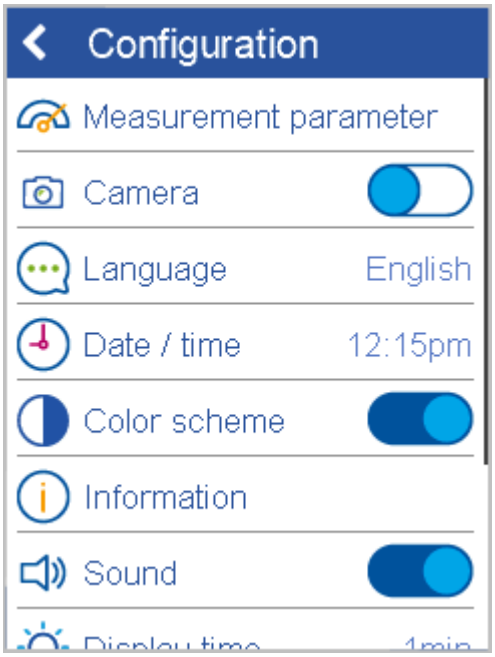
In case you contact your local BYK-Gardner service center please have these data handy.

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.

6.6 Sound

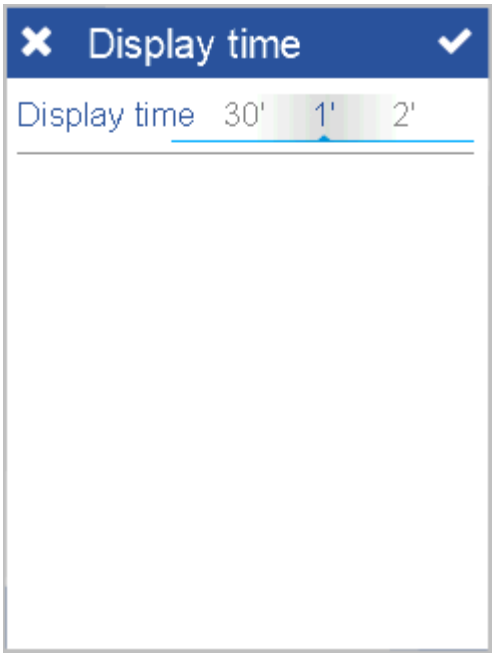
If this option is activated the internal speaker is used to indicate the measurement progress.



If this option is deactivated the measurements take place in silent mode.

6.7 Display Time

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



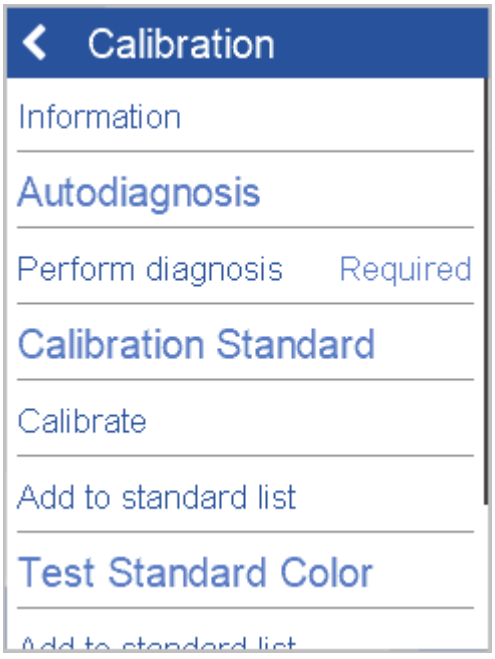
Following values are possible (in minutes): 1, 2, 5, 10, 15, 30.

6.8 Calibration

The system delivery comprises a calibration tile and test tiles for color and gloss, see "Checking Tiles 17 ". These tiles can be used to check if your instrument is measuring correctly. Each tile comes with a dedicated serial number matching your instrument.

To use the calibration standard or a checking tile, open the cover.

Remove the protective cap from your instrument and place instrument on checking tile. In the configuration menu select **Calibration**.



The instrument calibration comprises following functions:

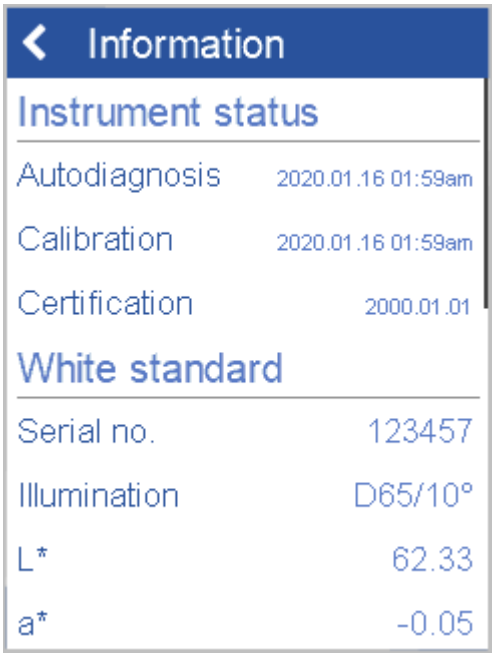
- Calibration Information 75
- Diagnosis Color / Gloss 75
- Calibration on White 76
- Saving Standards 77

NOTICE

- We recommend to test your instrument once a day and to calibrate your instrument once a month.
- Place standards and instrument on a stable base. Keep instrument steady during diagnosis / calibration.
- Take care that your calibration tile and test tiles are clean. Always keep them closed in the transportation case.

6.8.1 Information

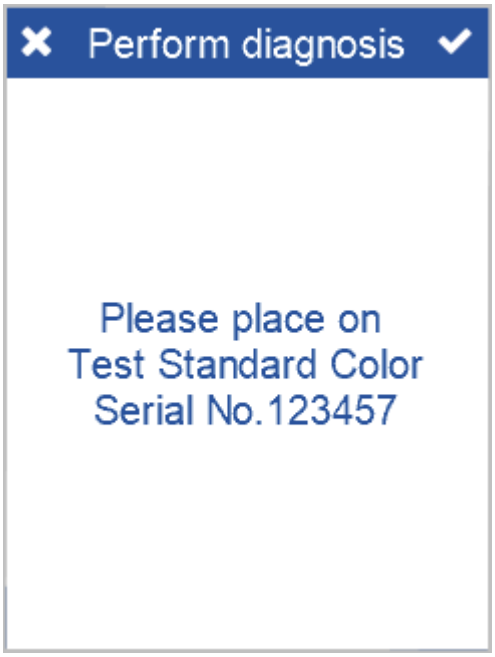
Use the information screen to check the current status of diagnosis and calibration.



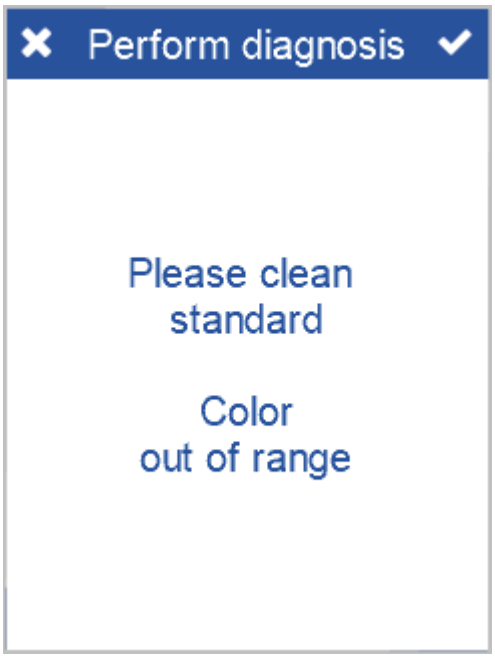
You can check date of last calibration and serial numbers for your calibration and test tiles. Scroll down to see all details.

6.8.2 Autodiagnosis

In regular intervals a diagnosis is requested. Use the color and gloss test standards for this check. Click on **Perform diagnosis**. The instrument will guide you through the diagnosis procedure. Confirm with the check mark or press the button **Operate**.



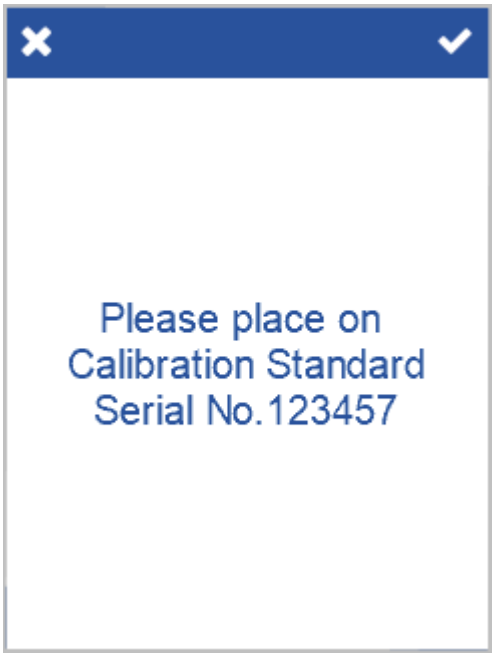
If the diagnosis passes, you can use the instruments to measure. If the diagnosis fails, following message appears: “Please clean test standard or calibrate on external white calibration standard.”.



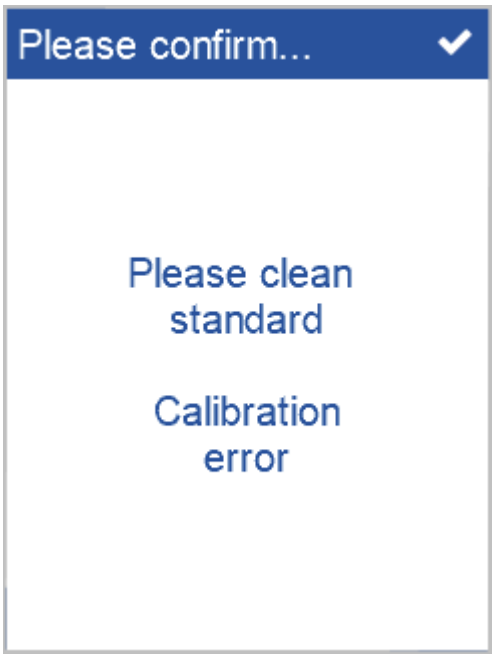
Clean the test standard and repeat. If diagnosis still fails, calibrate the instrument on the white standard, see "Calibration on White 76 ".

6.8.3 Calibration on White

Calibration on white is required if the diagnosis fails. Click on **Calibrate**. The instrument will guide you through the calibration procedure. Confirm with the check mark or press the button **Operate**.



If the calibration passes, you repeat the diagnosis, see "Autodiagnosis 75 ". If the calibration fails, following message appears: “Please clean standard, calibration error”.



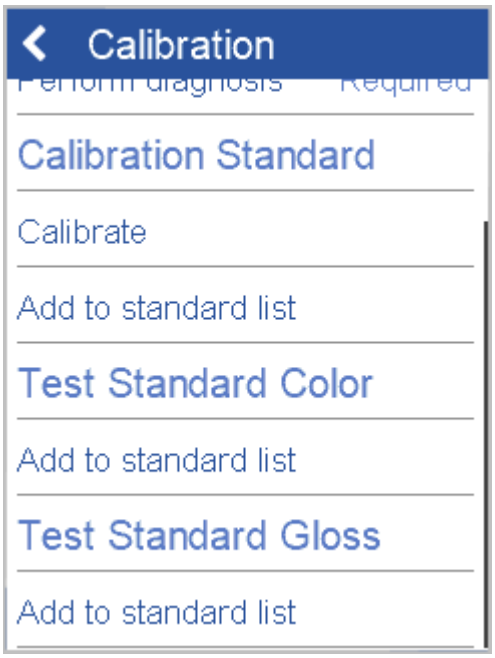
Clean the white calibration standard and repeat. If calibration still fails, contact the BYK-Gardner service team.

NOTICE

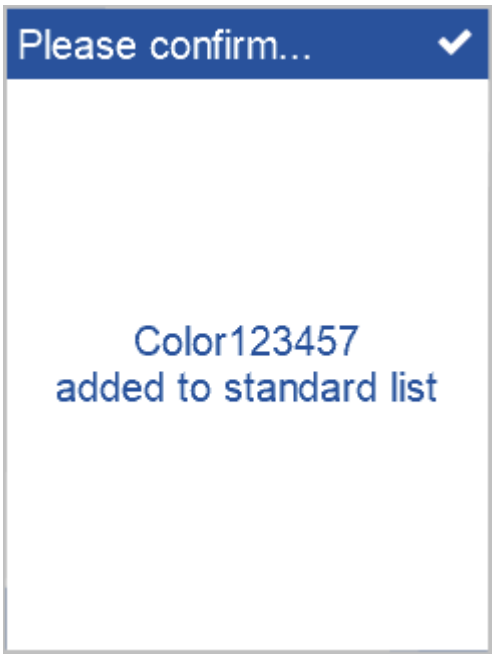
We recommend to test your instrument once a day and to calibrate your instrument once a month. Take care that your calibration tile and test tiles are clean. Always keep them closed in the transportation case.

6.8.4 Saving Standards

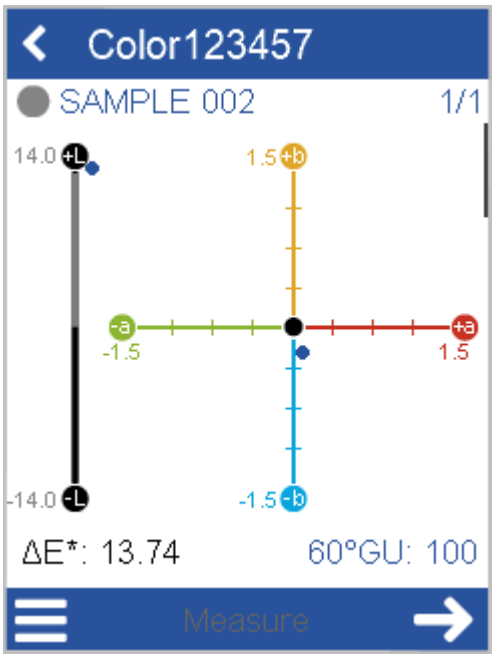
In order to document the correct measurement status of your instrument you can save the test standards in the system memory. Select the option **Add standard to list**.



The standard is added to the list of standards in the instrument memory.



Use "Difference Measurement[31] " > "Load existing Standard[31] " to frequently monitor instrument performance. If the differences are within your tolerances you can continue to measure with your instrument. Otherwise calibrate your instrument on the white standard, see "Calibration on White[76] ".



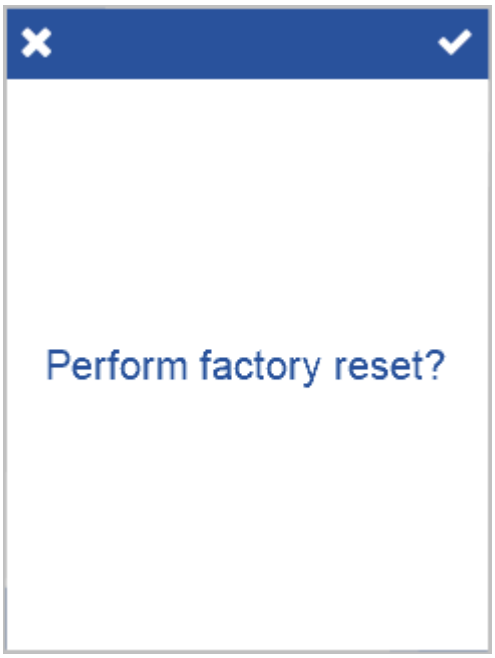
The option **Add to standard list** will be inactive next time when this standard has already been added to the instrument memory. To delete the item from the memory use the function "Browse Measurements[46] " > "Delete Standard[49] ".

NOTICE

Every difference measurement is stored in the instrument. Transfer the measurement data to smart-chart to document each test case.

6.9 Factory Reset

If you are having technical problems with your instrument, you can perform a fallback to the factory settings. In the configuration menu select **Factory reset**.

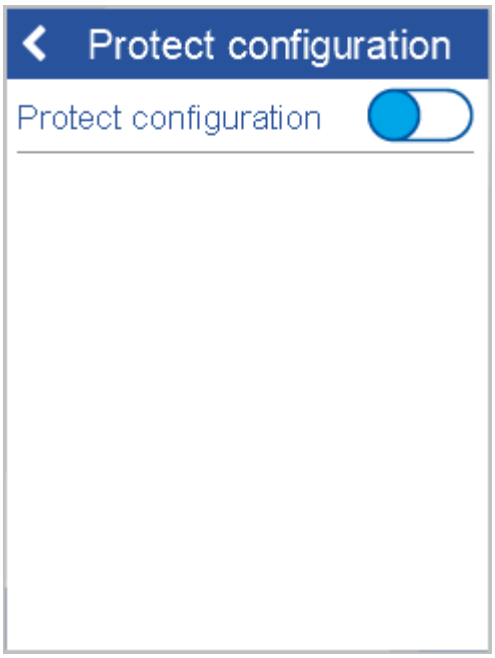


Confirm the security message to perform the fallback. You have to enter a password - details see "Technical Data 84 " > "General Data 85 ".

After fallback all your personal configuration and measurement data in the device will be lost. The instrument is set back to original state.

6.10 Config Protect

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



Activate the option. You have to enter a password. The password is shown in clear text during input. There is no second confirmation input of password required.

If the option is activated the configuration menu can only be accessed from the main menu by entering the password.

To remove the password, deactivate the option **Protect configuration**. This will delete the password from instrument memory. After reactivation to enter a new password.

NOTICE

Store 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.

7
Appendix

7.1 Application Hints

The following settings can be selected in the spectro2profiler via the "Measurement Parameter 53 " and in smart-chart via the module **Standard Management**.

Algorithm	**2D Reflectivity**	**3D Topography**
Leather-like **Leather-inverted**		
	R -Mean Reflectivity	
	Rh -Reflectivity Hills	
	Rv - Reflectivity Valleys	
	Rc - Reflectivity Contrast	
		Cn - Number of Cells (count)
		Cs - Mean Cell Size (mm²)
		Ca - Mean Cell Amplitude (P-µm)
		Hs - Mean Hill Size (mm²)
		F% - Fill Factor
Coarse Paint		
		Cn - Number of Cells (count)
		Cs - Mean Cell Size (mm²)
		Ca - Mean Cell Amplitude (P-µm)
		CsMin - Cell Size Minimum (mm²)
		CsMax - Cell Size Maximum (mm²)
		Cs-Dev - Cell Size Deviation
Fine Texture		
	R - Mean Reflectivity	
	µRc - Micro Reflectivity Contrast	
		µPd - Micro Mean Peak Distance (µm)
		µA - Micro Mean Local Amplitude (P-µm)

The parameters supported are described in the separate glossary document for the spectro2profiler, see Documentation 86 .

7.2 Troubleshooting

Problem / Error Message	Solution
Error! Please clean white tile or call customer service.	Clean white tile and repeat white calibration. If white calibration fails again, contact service.
Calibration invalid. Please perform calibration.	Perform calibration using the white calibration standard.
Measurement failed! Please repeat. Ambient light ...	Appears if an error occurs during measurement. Make sure to completely cover measurement aperture. Make sure to hold the instrument stable during measurement. Repeat measurement.
Battery empty. Instrument is switching off ...	Charge the instrument using the USB cable.
Battery empty.	Charge the instrument using the USB cable.
Instrument temperature too high!	Instrument temperature is > 45°C. Allow the instrument to cool down.
Instrument temperature too low!	Instrument temperature is < 5°C. Allow the instrument to warm up.
Memory full! Please delete stored measurements.	Delete stored measurements.
Light protection ring is broken or fell off.	Contact service.
Error! White calibration on external white calibration standard.	Repeat calibration. If white calibration is okay, clean external white calibration standard. If calibration fails again, contact service.
Instrument is not charging via USB connection.	Make sure USB power supply provides a minimum of 500 mA (1500 mA recommended).
No connection between instrument and software.	Make sure instrument is connected via USB.
No data transfer to software.	Instrument within a measurement. Switch back to the main menu.

7.3 Technical Data

7.3.1 Color Measurement

Geometry	45°c:0°
Aperture size	Diameter 25 mm
Spectral range	400 - 700 nm, 10 nm resolution
Repeatability(1)	0.01 ΔE94 (10 readings on white)
Reproducibility(1)	0.1 ΔE94 (average of 12 BCRA tiles)
Color systems	CIELab/Ch, Lab(h), XYZ, Yxy
Color differences	ΔE*, ΔE(h), ΔE94, ΔECMC, ΔE99, ΔE2000
Color indices	YI_{E313}, YI_{D1925}, WI_{E313}, WI_{CIE}, WI_{Berger}, Opacity, Metamerism, Gray Scale
Illuminants	A, C, D50, D55, D65, D75, F2, F6, F7, F8,F10, F11, UL30
Observer	2°, 10°

7.3.2 Gloss Measurement

Aperture size	25 × 15 mm
Repeatability(1)	Measurement range 0 - 20 GU: ± 0.1 GU Measurement range 20 - 100 GU: ± 0.2 GU
Reproducibility(1)	Measurement range 0 - 20 GU: ± 0.2 GU Measurement range 20 - 100 GU: ± 1.0 GU

GU = Gloss Unit

7.3.3 2D Reflectivity

Aperture size	15 × 15 mm
Measurement range	0 - 500 000, technical performance guaranteed within 0 - 2500
Spatial resolution	60 µm
Repeatability(1)	0.5 % (10 readings on structure reference standard)
Reproducibility(1)	1.0 % (on structure reference standard)

7.3.4 3D Structure

Aperture size	15 × 15 mm
Measurement range	Cell size (Cs): 0 - 255 mm^2 Cell amplitude (Ca): 2 µm - 2 mm (perceived)
Spatial resolution	60 µm
Height resolution	1 - 2 µm
Repeatability(1)	2% (10 readings on structure reference standard)
Reproducibility(1)	5% (on structure reference standard)

(1) Standard Deviation

7.3.5 General Data

Temperature range	Operation: 10° C to 40° C (50° F to 104° F) Storage: 0° C to 60° C (32° F to 140° F)
Relative humidity	Up to 85 % at 35° C (95° F) non-condensing
Operating altitude	Up to 2000 m (6561 ft)
Memory	3000 samples with images 10 000 samples without images
Languages	English, German, French, Italian, Spanish, Russian, Japanese, Chinese
Dimensions (LxWxH)	150 x 240 x 155 mm (5.9 × 9.5 × 6.1 in)
Weight	1.53 kg (3.37 lbs)
Interface	USB Type-C (USB 3.1)
Battery	7.2 V; 2350 mAh; 16.92 Wh
Power supply device	Input: 5 V - 12 V ⎓ ; max. 3.0 A
External power supply	Input: 100 - 240 V ∿ , 50 - 60 Hz, max. 1 A Output: 12 V ⎓ , max. 3 A Vendor: Sunny, www.sunny-euro.com Model: SYS1561-Wxx series Safety approvals: CB | CE | GS | FCC | cULus | CCC | BSMI | PSE | KC (5Vonly) | SAA | RCM | PSB(1005,1212) | EAC | BIS(1005) | S-MARK(1105)
Passwords for factory reset	byk-instruments

Technical data are subject to change without notice.

7.4 Service Points

List of 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 Columbia, Suite H, MD 21046 / USA	**Service Point Austria, Hungary, Slovenia** c/o Friedrich W. Bloch GmbH Wagramerstrasse 201, 1210 Vienna / Austria	**Service Point France** c/o Eckart France S.A.S. 31 Rue Amilcar Cipriani, 93400 Saint Ouen / France
Service Point Spain c/o Actega Artística S.A.U. Calle Balmes 8, Suite: 3º2ª 08291 Ripollet / Spain	**Service Point China** c/o BYK (Tongling) Co. Ltd. Shanghai Branch Block 6A, Building A, No 88 Hong Cao Road, Xuhui District, Shanghai 200233 / P.R. China	**Service Point India** c/o IMCD India Private Limited 1101-03, B-Wing, ONE BKC, Bandra Kurla Complex, Bandra East, Mumbai, MH. Pin.: 400 051 / India
Service Point Japan c/o Tetsutani Co. Ltd. Chuo-ku, Osaka Tokuicho 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 List of authorized agents: https://www.byk-instruments.com/contact-infos		

7.5 Documentation

Safety Instructions	283 025 448	24 languages
Short Instructions	283 025 449	English, German, French, Italian, Spanish, Chinese, Japanese, Russian
Operating Manual	283 025 450 E	English
Glossary / Terminology	283 025 846	English, German, French

A member of ALTANA

Download your manuals from:
https://www.byk-instruments.com/global-search/7300

Download your software from:
https://www.byk-instruments.com/spectro2profiler

BYK-Gardner GmbH
Lausitzer Strasse 8
82538 Geretsried
Germany

Tel +49 8171 3493-0
Fax +49 8171 3493-140

info.byk.gardner@altana.com
www.byk-instruments.com

BYK

283 025 450 E 2601