Measure what you see.

micro-wave-scan

Manual

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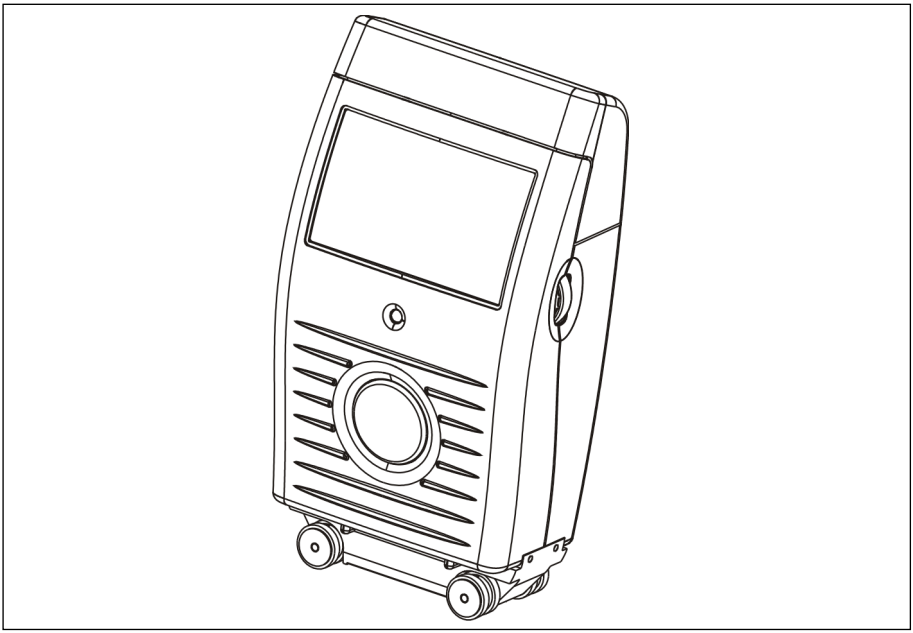
Additives & Instruments

micro-wave-scan

Manual



Patent pending

262 022 432 E 1111

BYK-Gardner GmbH
Lausitzer Str. 8
D-82538 Geretsried
Germany
Tel. 0-800-gardner
(0-800-4273637)
+49-8171-3493-0
Fax +49-8171-3493-140

BYK - Gardner USA
9104 Guilford Road
Columbia, MD 21046
USA
Phone 800-343-7721
301-483-6500
Fax 800-394-8215
301-483-6555

www.byk.com/instruments

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 gloss 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 valueadded services:

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

BYK-Gardner is part of Altana AG and a direct subsidiary of BYK-Chemie GmbH, a leading supplier 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

Table of content

1. Safety instructions

- Before operating the instrument the first time, please read the operating instructions and take particular notice of the safety instructions.

- If you use the unit and accessories properly, there are no hazards to fear.

- This product is equipped with safety features. Nevertheless, read the safety warnings 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.

- Keep these instructions for future reference.

- If you pass this instrument to somebody else, make sure to include these instructions.

The following symbols and terms are used.

This symbol warns of the danger of injury.

This symbol warns of the danger of injury caused by electricity.

This sign points out additional information.

DANGER

The term DANGER warns of possible severe injuries and danger to life.

WARNING

The term WARNING warns of injuries and severe material damage.

CAUTION

The term CAUTION warns of slight injuries or damage.

DANGER injuries possible

- 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
- after harsh treatment during shipping.

- Safety advices for batteries: Do not crush or dismantle, do not heat or incinerate, do not immerse in any liquid. This may cause explosion or release harmful substances.

- Do not perform any repairs on the unit yourself. The unit must be opened by trained professionals only. Please contact our customer service department in such cases.
- The measurement device may be disconnected from any power source as follows:

a) by removing the battery compartment.

Docking station:

a) by disconnecting the plug from the docking station or from

b) the mains socket.

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

- When working with the batteries /rechargeable batteries make certain there is no short circuit on the contacts. Metallic objects must not come in contact with the bare contacts.

Great Britain:

- The measurement unit is a class II laser product.

  The labels shown left are on the housing and base of the measurement unit.

Laser Light
Do not stare into beam
Class 2 Laser Product
max < 1 mW 630 – 690 nm
According to IEC 825

(EN 60825)

Caution:

USA:

- Never look into the measurement aperture when the device is turned on. The laser beam can penetrate your eye and cause injuries.

AVOID EXPOSURE
Laser light is
emitted from
this aperture

WARNING severe material damage

- The measurement unit 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 that meet the requirements for low voltage safety may be connected to the interface.

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 allowable discharge temperature range is -20 to +60°C.
- **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 propanol.
- In case you intend not to use the instrument for a longer period of time, take out the batteries.

Additonal information on use:

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

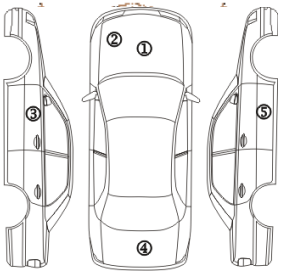
- Batteries and rechargeable batteries are special waste and must therefore not be disposed of with household trash. Make certain to observe the disposal instructions of the battery or rechargeable battery manufacturer.

2. System description and Delivery notes

Please read the instruction manual before using the instrument and note the safety instructions.

The measurement unit is used to evaluate the appearance of high-quality surfaces (Orange Peel, DOI).

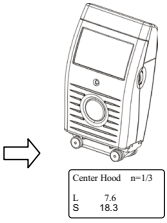
The measurement system consists of the portable measurement device, docking station and the smart-chart program.



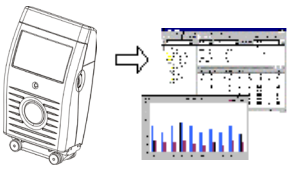
Depending on the application, the system can be used in various ways, from single measurements in R & D up to routine quality control procedures (e.g. automobile).

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

Organizer	
1	CenterHood
2	Hood Left
3	Left Door
4	C-Pil.Left
5	TrunkCentr



The so-called “Organizer” file clearly defines the object to be measured. The Organizer needs to be created in the smart-chart software and defines the measurement sequence (sampling procedure). This file is transferred to the instrument then to guide the user during measurement.



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 smart-chart software assist in analyzing the data.

Storage structure

Header data	
1	hood center
2	hood left
3	door left
…	…

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

In the header, up to 5 parameters can be defined for object identification. Parameters 1 to 3 are defined in the Organizer file, parameters 4 and 5 can be entered before storage in the data base. Additionally, date and time of the measurement are stored.

Header data:

Parameter	Example car
1	Model
2	Color
3	Paint line
4	Comment
5	Vehicle-ID

This structure determines the data organization in the instrument and in the data base. In addition to using Organizers, i. e. definition of parameters before the measurements, parameters and test zones can also be entered during the measurements. See chapter “Memory”.

Application hints:

Measurement task	Recommendation
1. Single measurements, e.g. occasional sample-measurements	- Menu “Measure“>MEMORY“. - Transfer results directly to smart-chart.
2. Objects with several test zones. Test sequence / identifikation can be standardized, e.g. automobile or add-on parts	- Generate Organizer in smart-chart and transfer it to the instrument. - Take readings, see chapter 8.3. - Transfer results to smart-chart and store in data base. - Data analysis smart-chart.
3. Regular test series. Test sequence / identifikation can be standardized, e.g. batch control	see 2.
4. Occasional test series. Test sequence / identifikation can not be standardized, e.g. projects	- Generate new Memory (chapter Memory, Config. New). - Take readings, see chapter 8.2. - Transfer results directly to smart-chart.

micro-wave-scan	AW-4824

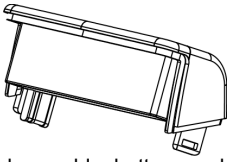
Comes complete with:

Measurement device, Docking station,External power supply unit with power connection line, 2 Li-Ion rechargeable battery pack,1 Battery-compartment, 2 AA batteries, Handstrap, Test tile, CD with smart-chart software, PC cable, Operating instructions, Certificate

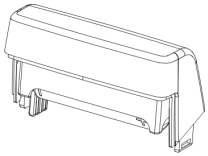
Accessories and Replacements:

Test tile	AW-4829
Docking station	AW-4857
Li-Ion rechargeable pack	AW-4827
smart-chart software	AW-4831

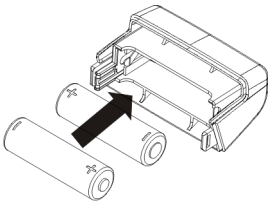
3. Power supply

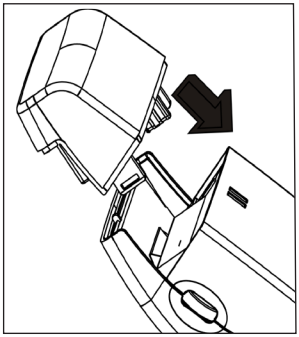


Rechargeable battery pack



Battery compartment





Before operating the instrument for the first time, please read the operating manual and take particular notice of the Safety Instructions. Unpack the instrument and check the delivery for completeness (See chapter “Delivery Notes”).

Powering the instrument

The measurement unit can be operated either with rechargeable battery pack included with delivery or with AA (LR6) alkaline batteries.

Battery:

To operate the instrument using batteries, the battery compartment must be fitted with two1.5-V mignon AA(LR6) batteries and must be inserted into the measurement unit until it locks into place.

Ensure that the batteries are correctly oriented in the compartment according to the (+) and (-) marks. See adjacent figure.

Use only alkaline batteries (AA /LR6)!

Depending on the specific brand, the capacity of the battery included with delivery is sufficient for about 1000 measurements. When the battery voltage falls below the required operating voltage in the course of operation, the following message appears on the display:

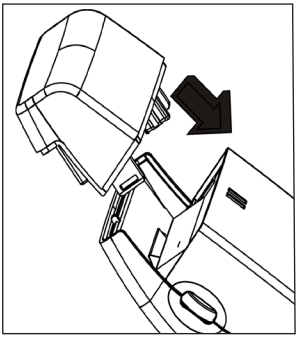
“Low Battery!”

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

3.1 Rechargeable battery pack

To place the instrument in service, the rechargeable battery pack must be inserted until it locks in place.

The rechargeable battery pack can only be attached when it is in the correct position.



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

The capacity of the rechargeable battery pack included with delivery is sufficient for about 1000 measurements. When the voltage of the rechargeable battery pack falls below the required operating voltage in the course of operation, the following message appears on the display:

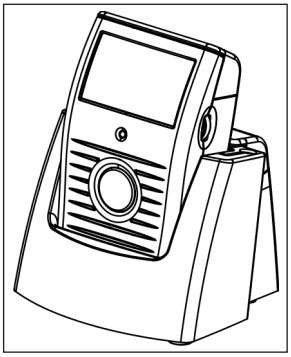
“Low Battery!”

3.2 Docking station power supply

Power is supplied to the docking station through the external power supply unit. Connect the external power supply unit to the docking station. Connect the appropriate end of the power connection line to the power supply unit and the plug end of the power connection line to the power outlet after verifying that the specifications of the power supply unit match the power source in terms of current and voltage.

Note: To ensure uniform utilization, the rechargeble battery packs should be exchanged regularly between instrument and docking station (weekly recommended).

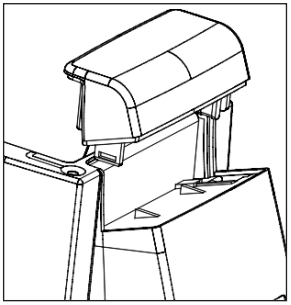
3.3 Charging the rechargeable battery



The rechargeable battery pack included with delivery may be charged in the docking station. Charging time for an empty battery pack is aprox. 2 hours. Please note chapter “Safety Instructions”!

1. Battery pack in the instrument:

The lithium ion rechargeable battery will begin charging immediately upon insertion of the instrument into the docking station. To do this, power must be supplied to the docking station through the corresponding power supply unit.

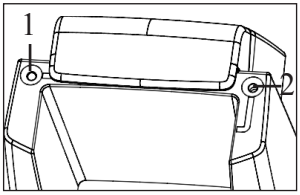


Insert the measurement unit into the docking station as shown in the neighboring illustration.

2. Battery pack on docking station:

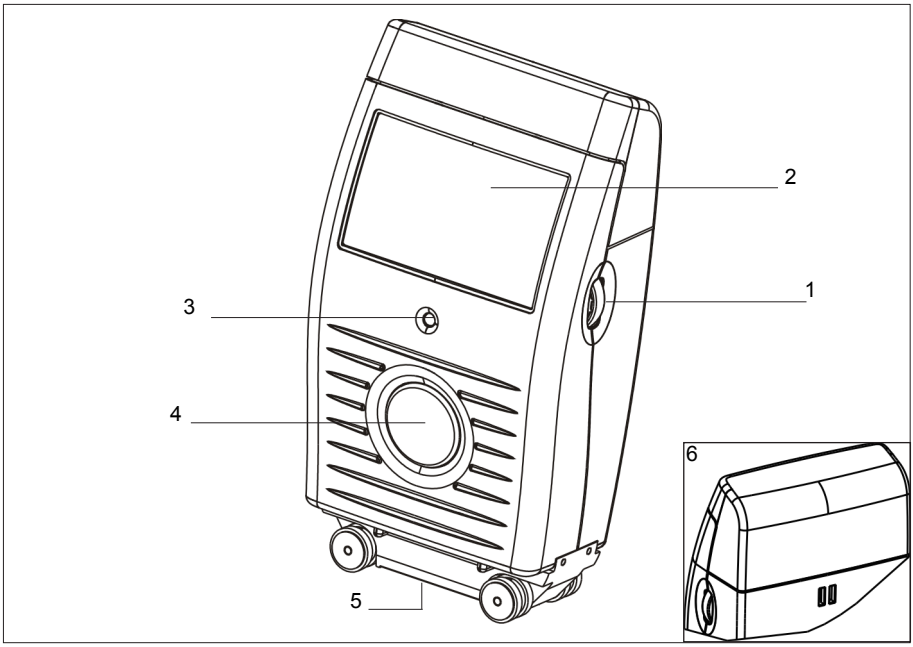
A second charging shaft is located behind the shaft for the instrument. Insert the second battery pack here for charging, so it will be handy at any time to replace the other battery when it is discharged.

The compartment for AA batteries may not be inserted into the charging shaft.



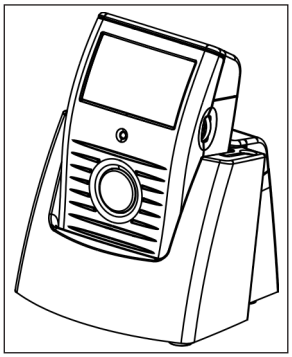
Charging indicator for:
1: additional battery pack
2: instrument
Indication light:
green: ready
red: charging

4. Controls



Measurement unit

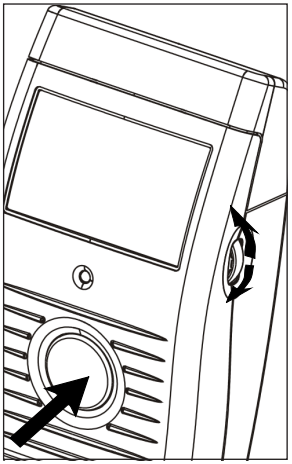
1 Mode scroll wheel: Menu selection
2 Display for user guidance and measurement values
3 Signal lamp
4 Operate button: Turn on, measurement and confirmation of menu items.
5 Measurement aperture
6 Opening for hand strap



The basic system consists of the measurement device and the docking station.

The docking station is used to exchange data and to charge the rechargeable battery pack.

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

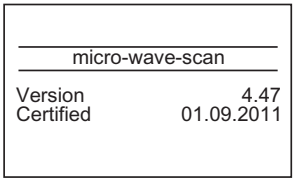


The operate button and scroll wheel are used to control the system. Pressing “operate“ turns the unit on and causes a menu to be displayed. All settings within the menus are made by turning the wheel and pressing “operate”.

Pressing the operate button performs measurements or runs selected functions. System operation is supported by an autodiagnosis test, comments and error messages. Measurement values and comments appear in the display.

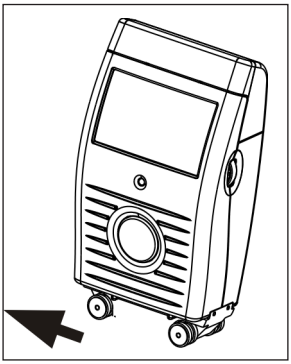
5. Getting started

5.1 Turning the unit on and measuring

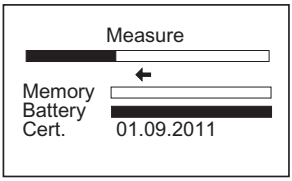


Turn the instrument on by pressing the operate button.
If the operate button is depressed while switching the unit on, a reference to the firmware appears along with the date of the last certification.

The unit then switches to the last measurement mode to be selected.
If no measurement mode has been previously selected, the main menu appears. For the first steps, select MEMORY under the “Measure” menu.

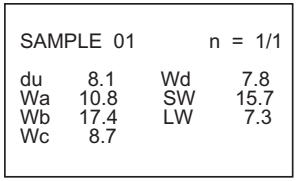


To perform a measurement, press and hold the operate button.
Move the instrument evenly and slowly from the right to the left over the sample surface.



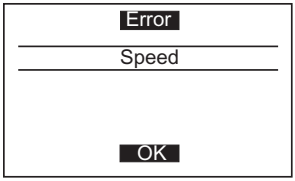
During the measurement, the following information appears in the display:

The upper bar shows the progress of the measurement, while the arrow shows the scan direction. The two lower bars provide information about the status of the memory and battery capacity.



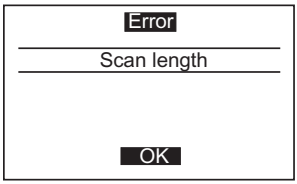
After completing a measurement, the measurement results are displayed. Performing the measurement requires some practice. The following error messages are especially likely to occur during the first trials.
A warning signal is heard and the light diode flashes at a rapid rate. At the same time, a message appears in the display indicating the type of error:

Speed



You have moved the measurement unit too quickly or unevenly over the sample. Confirm this information by pressing the operate button and repeat the measurement.

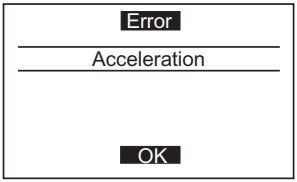
Scan length



The required scan length has not been reached completely.
Repeat the measurement, moving the device until a short audio confirmation is heard.

Small areas can be measured by moving the instrument back and forth.

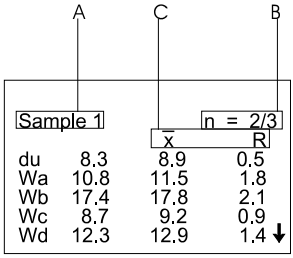
Acceleration



The instrument was accelerated too fast across the specimen or the scan direction was changed too fast.
Confirm the message by pressing “operate” and repeat the measurement.

5.2 Display of measurement results

The measurement results displayed will vary depending on the options selected in the Configuration (see chapter 9, 10). Displayed results may be broken down into the following elements:



A: Name of the measured sample or checkzone.

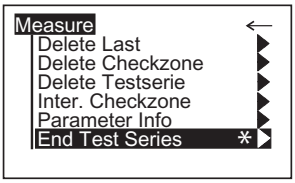
B: The number of performed and predefined measurements (e.g. 2 of 3).

The statistic function is activate if the predefined number of measurements is greater than 1.

C: If the statistic function is activated, the selected statistical values appear here.

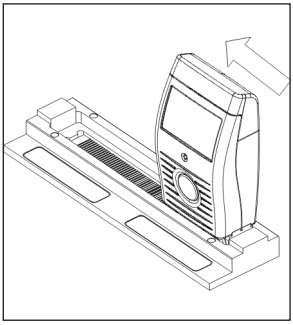
The measurement values appear in the lower part of the display area.

Pressing the operate button now, the values will disappear and the number of readings is increased by one. Or, if a sample is finished, the name of the next checkzone/sample will be displayed.

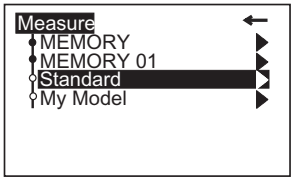


To exit the measurements, press the scroll wheel. A menu for deleting, interrupt or ending the series appears. Use the scroll wheel to move the cursor to “End Test Series” and press operate. The display switches to the Measure menu after a request for confirmation.

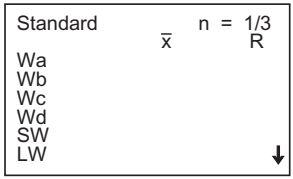
6. Testing the instrument



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 (about once every 3 months). The reference tile included with delivery is provided for this purpose.



Select the “Standard” in the Measure menu. The configuration of this organizer is fixed and cannot be changed.



The unit then switches to the measurement mode.

Place the instrument on the test tile and perform three measurements.

The values printed on the reference tile are the corrected readings. If the values measured on the reference tile are within the printed tolerance range, the requirements are met.

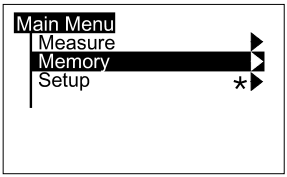
If the mean value is not within the desired tolerance range, try carefully cleaning the test tile (see Chap. 16). If this produces no improvement, please contact our Customer Service department.

Reference tile

To ensure a precise instrument test, only original test tiles from the manufacturer should be used. Their surface must not be touched and must be protected against scratches. Due to environmental influences, however, the values of test tiles can change over the course of time even if they are handled gently. For this reason, have the test tiles checked by the manufacturer at regular intervals (annual checks are recommended).

7. Menu operation

7.1 Navigation



All functions are controlled by the mode scroll wheel and the operate button.

Pressing the operate button or the scroll wheel causes a menu to appear in the display. Turning the wheel allows you to move the cursor to the desired function. Select or activate the function by pressing the operate button.

The following symbols can be found throughout the menus to aid navigation:

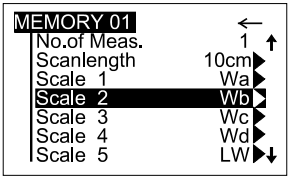
▶ A black triangle to the right of a function indicates that selecting this function will open a sub-menu.

← The arrow at the top right is used to move back one level within the menu system.

√ A check mark on the right indicates that the function in question has been activated.

• In submenus which require a selection, the actual setting is indicated by a dot.

* The star guides you to the Language menu.

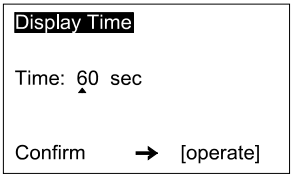


Arrows pointing up or down indicate that there are other menu options above or below the part of the menu that is visible. To reach these menu options, simply turn the scroll wheel in the direction in which the arrow is pointing.

7.2 Overview of main menu

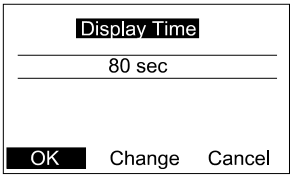
Measure	
MEMORY	Default memory for single measurements
MY MEMORY	User-defined memory (appears only if generated under “Memory” menu)
Standard	To verify the device function on the test panel
My Model	Measurement with Organizer (appears only if loaded from PC)
Memory	
Config. New	Create a new memory
Config. Change	Change the settings of a memory
Config. Delete	Delete a memory
Data View	View measured data of a memory
Data Delete	Delete measured data
Setup	Change the language, date/time and switch-off time; activate audio signal and confirmation by scroll wheel.

7.3 Changing names and numbers



For some functions, you can enter or change the date or name. The triangle pointing upward marks the item that can be changed. To change the character, turn the scroll wheel. When you press the scroll wheel, the arrow jumps to the next character.

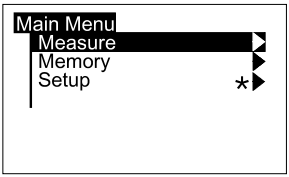
After you have adjusted the last character, confirm your input by pressing the operate key.



A confirmation message appears which allows you to save the settings or change incorrect entries. Use “Cancel” to exit the function without making any changes.

8. Measure

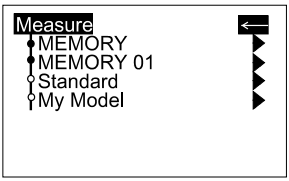
8.1 Measure



For beginning a new test series, select Measure from the Main Menu. The Measure menu offers a list of names to identify the new test series (Parameter1). Individual entries can be added to the list.

Two types of test procedures can be differenciated by a symbol in front of the names:

Memories:



generated in the instrument, allow to input identification parameters during measurement procedure.

Organizer:

downloaded from the smart-chart software, offer a predefined test procedure for user guidance and identification.

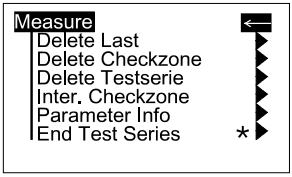
A virgin instrument contains only two entries in the menu, which can not be deleted:

MEMORY - for simple measurement of samples.

Standard - for checking the instrument on the test tile (see chapter 6)

Select a desired item from the list to start the test series and perform the measurements according to section 5.

Differences between the measurement procedures will be explained in chapter 8.2 to 8.4.



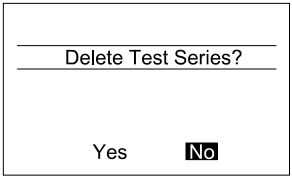
To exit a measurement series, press the scroll wheel. A menu appears for deleting, interrupt and ending the series:

Delete Last

Deletes the last measurement within a checkzone. There is no additional warning before the deletion.

Delete Checkzone

Deletes the entire last checkzone. There is no additional warning before the deletion.



Delete Test Series

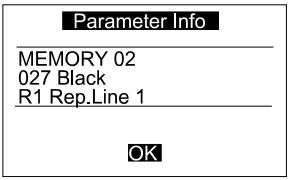
Deletes the entire measurement series. A confirmation display appears before final deletion.

Interrupt Checkzone

This function allows you to exit a checkzone/ sample before reaching the preset number of measurements or to skip a checkzone. Then you can continue the measurement series with the next checkzone.

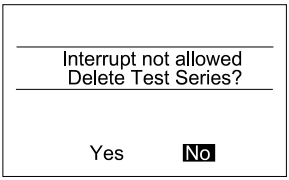
If Interrupt is not activated in the Configuration menu (Chapt. 9) or the Configuration of the selected Organizer, a message will be displayed.

Parameter Info



Gives you an information about the selected parameters of the sample.

End Test Series



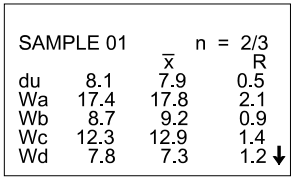
Ends the entire measurement series. A confirmation display appears. The instrument returns to the Measure menu.

If Interrupt is not activated in the Configuration, a message will be displayed in the case that the test series is not finished yet.

Note:

Only complete series can be saved, i.e. you can exit series only by deletion.

8.2 MEMORY



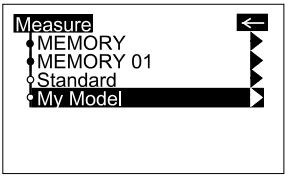
This is a memory with default settings for single measurements on samples.

The settings can be changed for individual needs, e.g. scale selection, statistics or scan length.

For further information please refer to chapter “Configuration”.

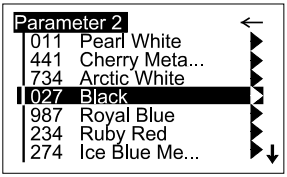
! Changes in the configuration are only possible if no measurement data are saved under the desired memory name. Before you change the configuration, first backup the stored data and then delete them.

8.3 Organizer

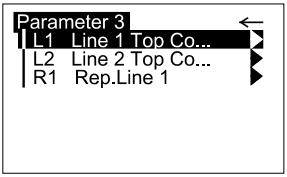


An organizer file defines a test sequence for user guidance, e. g. for measuring a car body with several checkzones. These files can be generated with the smart-chart software.

If no Organizer is loaded in the device, one must be transferred from a PC.



Once an Organizer is selected, a menu appears for Parameter 2 of the Organizer. Colors are listed as an example of this in the menu to the side. After you have selected the appropriate color, a selection menu appears for Parameter 3.

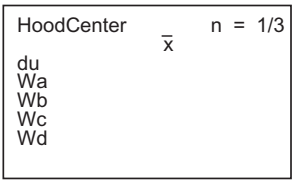


The illustrated example features automotive paint lines.

If “Input Comment” is activated in the Organizer, you are prompted to enter additional information.

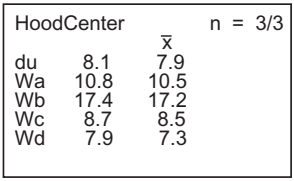
If “Input ID” is activated in the Organizer, you are prompted to enter a code, e.g. the vehicle ID.

Upon definition of all parameters, the following measurement series is identified and the instrument goes into measurement mode.



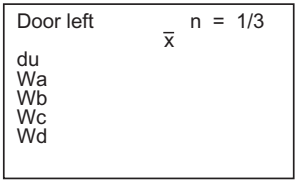
The name of the checkzone to be measured first, appears on the left side of the display.

The number of performed and predefined measurements (e.g. 2 of 3) appear in the upper right corner.



Once the number of measurements for the checkzone is reached, a double audio signal is heard.

The display shows the results of the measurement and indicates that the measurement of the checkzone is complete (e.g.3/3).

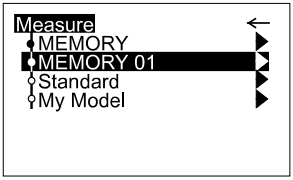


Pressing briefly the operate button allows the next checkzone to appear in the display.

The instrument is ready for the next measurement.

Once all checkzones have been measured, the instrument returns to the Measure menu.

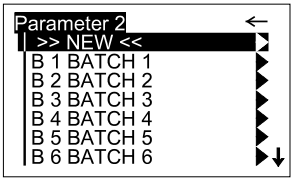
8.4 Memory with Parameter Input



By using the internal memory function of the instrument, measurement series and samples/ checkzones can be identified by individual names during the test procedure.

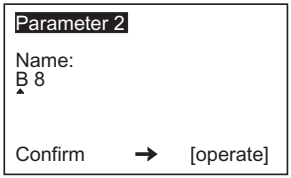
Therefore, input options of the menu item Advanced Configuration need to be activated for the desired memory.

You can use the existing MEMORY in the instrument or create another memory name (Parameter 1). For more information about change of configuration please refer to section Configuration.

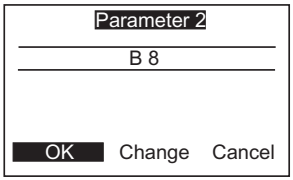


Select a memory for which Input Parameter 2, 3, Input Comment or Input ID are activated. A menu appears to assign a name.

If there are preexisting names for this memory, they are shown in a list for selection. The >>NEW<< option opens another menu with a list of all names available in the instrument. Here, the menu item >>NEW<< opens an input mask which allows you to create a new designation.

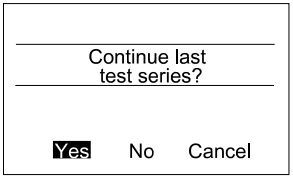


Enter the name by using the scroll wheel. When finished, press the operate button.



A confirmation display appears which allows to verify that the entered data is correct.

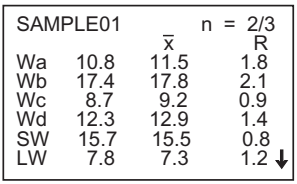
Next, a selection menu may appear to enter an additional parameter. Proceed as described above.



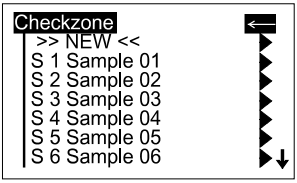
If a memory is selected that already contains measurements, the test series can be continued.

A display appears to confirm this. By selecting No, a new test series will be started.

The device goes to the measurement mode, you can start taking readings.



Once you have reached the preset number of measurements (n = ...) you might be prompted to enter a name for the checkzone (“Input Checkzone” aktivated).



Proceed by entering the name of the checkzone as described above for the parameters.

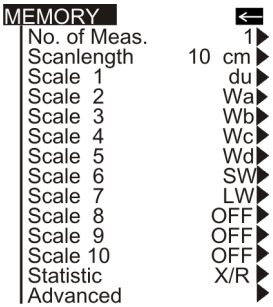
If “Input Checkzone” is deactivated, the instrument automatically assigns the name SAMPLE 01 and then increments this name.

To exit the test series, presss the scroll wheel and activate End Test Series.

9 Configuration

For every memory, specific settings can be made that affect the test procedure and the evaluation of the data.These settings are individually definable in the Memory menu:

- Config New
  for a new memory
- Config Change
  for an existing memory

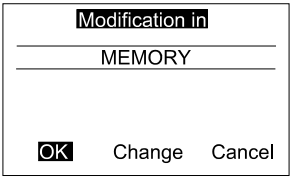


Once a memory is selected, the menu with the various configuration items appears.

The complete contents of the menu are shown in the neighboring illustration.

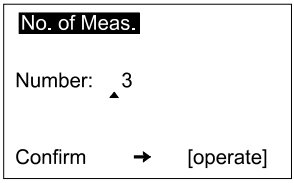
The current settings are displayed on the right side next to the black triangles.

To exit the menu, scroll the cursor to ← and press the operate button.



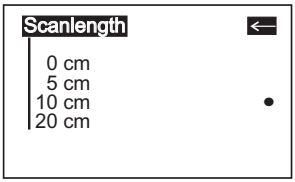
A display appears to confirm the changes.

9.1 Number of Measurements



This function allows selection of the numbers of readings to be taken per sample. If the number is greater than 1, the measurements are statistically evaluated. Turning the scroll wheel adjusts the number while pressing it shifts the decimal place one further over. Pressing operate completes the process and a confirmation display appears.

9.2 Scanlength



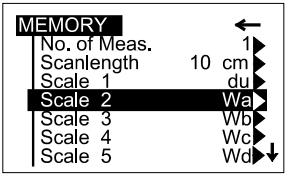
The setting options for Scanlength are shown in the neighboring illustration. The current setting is identified by a black dot at the end of the line. Move the cursor to the desired setting and press the operate button. The instrument returns to the previous menu.

In the setting 0 cm, you can perform measurements without scan motion. However, you can only determine the scales du, Wa, Wb and DOI here.

Note:

Using a short scanlength will result in strong statistical skewing of measurement values for large wavelengths. Thus, when using the Wd scale with a scanlength of 5 cm, at least 3 measurements should be made per checkzone to ensure representative values.

9.3 Scale

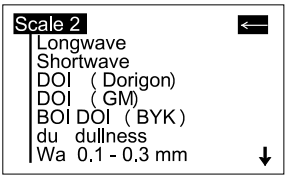


Up to 10 scales may be selected for the display of the measurement results.

Select the desired scale to be changed and press the operate button.

Following scales are available:

Longwave (0...100)
Shortwave (0...100)
The classical scales
Longwave (1,2 - 12 mm) and
Shortwave (0,3 - 1.2 mm)



DOI (Dorigon) (47...96)
Correlation to ASTM E 430, value range similar to 20° gloss.

DOI (GM) (47...96)
GM specification

DOI (BYK) (30...100)
Higher resolution but lower values than DOI (Dorigon)

du (1...60)
Dullness, fine structures smaller than 0.1 mm

Wa...Wd (0...100)
The structure spectrum is evaluated by applying filter functions to the measured optical profile. The values Wa...Wd stand for the respective wavelength/range.

B **(- 10 ...+20)**

Structure Balance: The ratio of small and large waves is evaluated based on “well balanced“ structure spectrum curves found in visual correlation studies.

Ford Scales

LU	(25...92)
Luster:	A scale for gloss
SH	(25...96)
Sharpness:	A scale for DOI
OP	(25...96)
Orange Peel:	A scale for levelling
CF	(25...95.4)
Comb. Ford:	Overall quality scale

Daimler Chrysler Scales

GL	(25...92)
Gloss DCA:	A scale for gloss
DI	(25...96)
Dori DCA:	A scale for DOI
OP	(25...96)
Orange Peel:	A scale for Orange Peel
OA	(25...95.2)
Over All DCA:	Overall quality scale

BMW Scales (0...10)

N1	
Note 1m:	Ranking for 1m observation
N3	
Note 3m:	Ranking for 3m observation

Structure Space **(-100...+100)**

WL:	Wet Look
LC:	Longwave Coverage

Rating **(3...10.5)**
Orange Peel based on ACT panels

Tension **(6...24,5)**
Scale for Orange Peel

GM-Tension **(6...21)**
GM specification

MB-Tension **(6...20)**
Mercedes Benz specification

H-Tension **(0...20)**
Honda specification

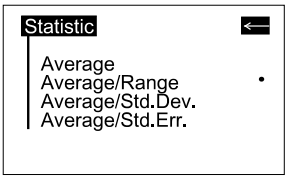
P-Tension **(6...20)**
Honda specification

Hada **(1...6)**
Note for Orange Peel (outdated)

CR-overall **(6...100)**
Ford correlation (outdated)

OFF
Turns the Scale off.

9.4 Statistic



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

You can select the values to be displayed in the Statistic submenu.

The current setting is identified by a dot at the end of the line.

Use the scroll wheel to move the cursor to the desired setting and press the operate button. The selection is accepted and the instrument returns to the previous menu.

Average

Display of the arithmetic mean $\bar{x}$.

Average/Range

Display of the arithmetic mean $\bar{x}$ and the difference between the maximum and minimum value.

Standard deviation:

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

Average/St.Dev.

Display of the arithmetic mean $\bar{x}$ and the standard deviation.

Standard Error:

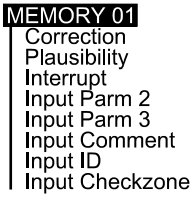
$$\varepsilon = \sqrt{\frac{s^2}{n}}$$

Average/Std.Err.

Display of the arithmetic mean $\bar{x}$ and the standard error ε.

10. Advanced Configuration

10.1 Correction



Defects on the sample surface, such as scratches or craters, can cause major errors in measurement values. When Correction is activated, the affected scan areas are cut out and the measurement values are calculated from the sanitized data.
Pressing “operate” turns Correction on and off.

10.2 Plausibility Control

An option for comparing the corrected and uncorrected measurement value. The greater the difference between the corrected and uncorrected data, the more critical is the surface defect. If the difference is greater than 20 %, the measurement will be evaluated as a faulty measurement. An error message appears and a new measurement is then needed.
Pressing “operate” turns Plausibility Control on and off.

10.3 Interrupt

If statistic is activated in the configuration of the selected memory (n > 1), you can interrupt a checkzone (sample) before reaching the preset number of measurements.

10.4 Input Parameter 2, 3 and Comment

When active, these parameters allow to assign individual names for identification of a new test series.

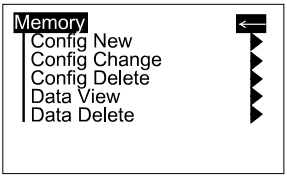
10.5 Input ID

When this function is active, you can enter an identification code e.g. vehicle ID number for each new test series.

10.6 Input Checkzone

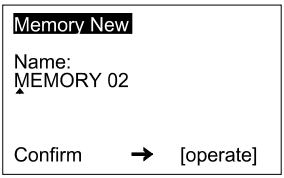
When active, you can enter a designation for every sample during a test series. When deactivated, the instrument automatically assigns sample names incrementally, beginning with SAMPLE 01.

11. Memory



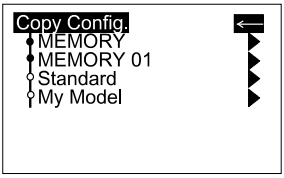
In the Memory menu you can create new memories with a configuration according to specific needs (e.g. scales, statistics). Also, the configuration of existing memories can be changed. Memories which are no longer needed, will be deleted with the function “Config Delete”. Additionally, the menu allows to recall or delete a measured test series.

11.1 Configuration New

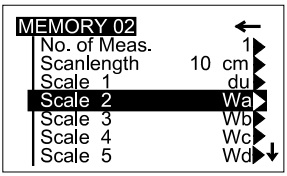


After selecting this menu item, you will be prompted to enter a name for the new Memory (Parameter 1).
Enter a name by using the scroll wheel. When finished, press the “operate” button.

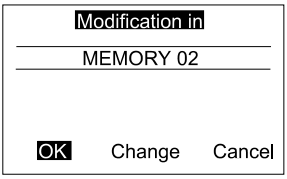
A display appears to check and confirm the entries.



The next step allows to copy the configuration from an existing Memory or Organizer. Select the desired entry from the list.

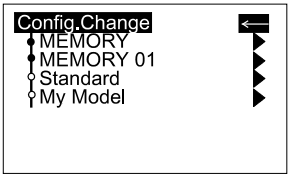


A menu will then appear with the copied configuration for the new Memory.
To change the settings, refer to chapter 9 and 10.



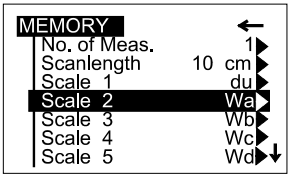
To exit the menu, activate the arrow at the top of the list. A confirmation display appears to complete the creation of a new memory. The display now returns to the Memory menu.

11.2 Configuration Change



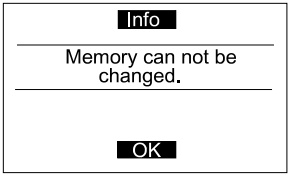
This function allows to modify the configuration of an existing memory. A menu appears with a list of the existing memories and organizers.

Select the desired memory.



A menu then appears listing the configuration of the selected memory. To change the settings, refer to chapter 9 and 10.

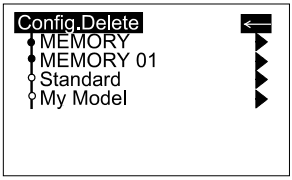
To exit the menu, activate the arrow at the top of the menu.



Note: Changes to the settings of Organizer files are not permitted. If an Organizer is selected, a warning message will appear.

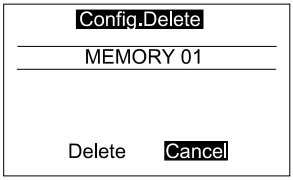
! The configuration can only be changed if no readings are saved in the selected memory. Before changing, first backup the readings and then delete the data.

11.3 Configuration Delete



The delete function opens the selection menu for the memories which are present.

Select the memory to be deleted.



A display appears to confirm the deletion process.

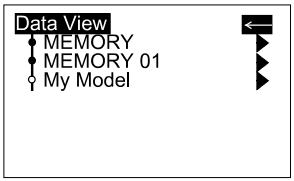
The instrument returns to the Memory menu.

Note: Deletion of a memory that contains measurement data is not permitted.

If necessary, use the Data Delete function described at the end of this chapter.

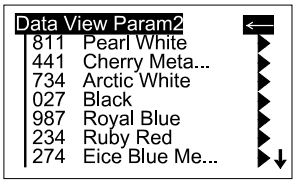
! Deletion of an Organizer is only permitted if its corresponding lock-function is deactivated in the smart-chart software (organizer protected).

11.4 Data View

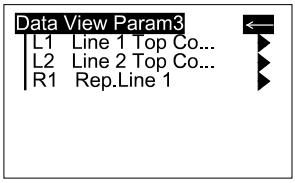


You can use this function to display all measurement series stored in the instrument. First, the selection menu for existing memories will be shown.

Select the desired memory to recall its contents. If the selected memory is identified by additional parameters, further menus will appear:

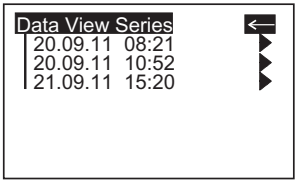


Select Parameter 2.

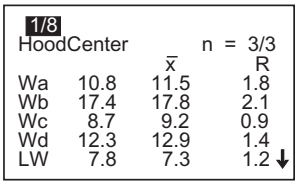


Select Parameter 3.

As appropriate, select Comment and ID accordingly.



Finally, select the measurement series itself under date and time.



The measurement values appear in the display.

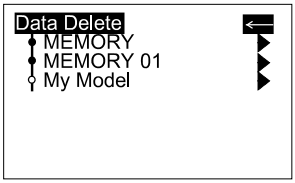
Press the operate button to display the next checkzone.

The numbers at the upper left of the display represent the displayed/existing checkzone numbers.
The checkzone name is displayed just below.

If more measurement data is present than can be displayed, an arrow will appear on the right edge of the display. Scroll down to view the remaining data.

Pressing the scroll will exit this display. The instrument returns to the Memory menu.

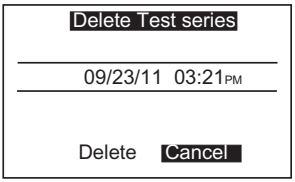
11.5 Data Delete



This function deletes a desired test series stored in the instrument.

Select the memory containing the data to be deleted.

For the following selection of parameters and the measurement series itself, please proceed as described in the previous paragraph, Data View.



After selecting the desired test series, a display appears to confirm the deletion.

The instrument returns to the Memory menu.

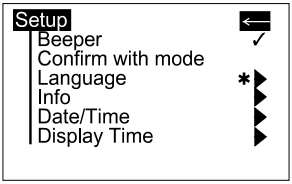
Note:

Measurement data of Organizers may only be deleted if its corresponding lock-function is deactivated in the smart-chart software(Organizer protected).

12. Setup

In the Setup menu you find functions to adjust the following general settings of the instrument:

12.1 Beeper



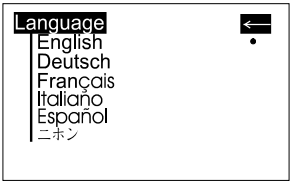
This menu option turns the beeper on or off. Use the scroll wheel to move the cursor to Beeper and press “operate”.

When the beeper is activated, a checkmark appears at the end of the line.

12.2 Confirm with mode

Setting a checkmark on this option, activates the function to select menu items by pressing the scroll wheel too.

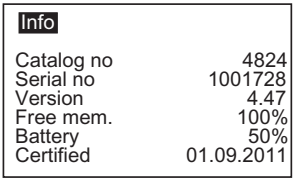
12.3 Language



You can use this menu to select the display language.
If a foreign language is activated actually, you allways can find the language settings by following the ✻ symbol in the menus.

Use the scroll wheel to move the cursor to the desired language and press the operate key.

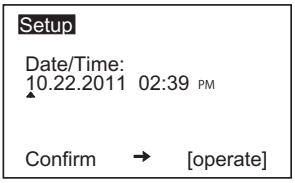
12.4 Info



This menu displays the following information about the device:

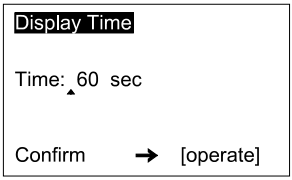
- Catalog no
- Serial no
- Firmware version
- Free memory capacity
- Battery capacity
- Date of last certification

12.5 Date / Time



The unit contains an integrated clock. This makes the date and time of the measurement available for data transfer to a PC. The date and time are not lost even when the battery is changed. If necessary, adjust the data by using the scroll wheel.

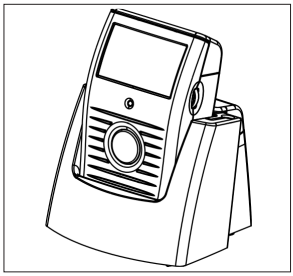
12.6 Display Time



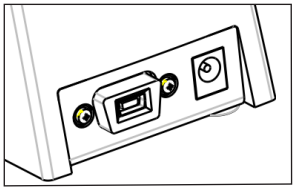
To save energy, the unit automatically turns off after a certain amount of time. You can determine what this time is by specifying a switch off time between 15 and 99 seconds.

13. Interface

13.1 Connecting the measurement unit to a PC



Data transfer to and from the measurement unit takes place through the docking station. It contains the USB interface connecting the instrument with a PC.



The connection point for the USB cable is located on the back of the docking station. Plug in the cable included with delivery.

To transfer data, the instrument must be inserted into the docking station.

The data transfer itself takes place with the smart-chart program, which is included with delivery.

Set up the computer and additional instruments as described in the corresponding manuals.
To transfer data, the connection cable must be connected to a USB port. For the position and assignment of the socket, please refer to your computer manual.

14. Technical Data

General technical data:

Temperature range	10°C to 40°C (operation)
	0°C to 60°C (storage)
Rel. humidity	up to 85% at 35°C, non-condensing

Measurement unit:

Battery power supply	2 x 1.5V ⎓; 0.5A Alkaline batteries AA / LR6	
Rechargeable battery pack	Measurement operation: 3.7 V⎓; 0.5A; 830 mAh Charging operation: 4.2 V⎓; 0.8 A	
Battery capacity	approx. 1000 readings	
Measurement range	DOI, du	0 to 100
	LW, SW	0 to 100
	Wa - Wd	0 to 100
Structure spectrum	du:	< 0.1 mm
	Wa	0.1 to 0.3 mm
	Wb	0.3 to 1.0 mm
	Wc	1.0 to 3.0 mm
	Wd	3.0 to 10.0 mm
Scanlength	Measurement scales	
5, 10, 20 cm	du, Wa...Wd, L,S, DOI	
0 cm	du, Wa, Wb, DOI	
Repeatability	8% or > 0.8 (standard deviation)	
Reproducibility	12% or > 1.2 (standard deviation)	
Object radius	> 300 mm	
Smallest sample size	25 mm x 40 mm	
Measurement surface	4 mm x Scanlength	
Resolution	375 points / cm	
Memory	2000 measurements	
Interface	USB 1.1	
Light source	Laser diode LED	
Laser energy	< 1 mW (laser class 2)	
Dimensions (WxLxH)	70 x 40 x 120 mm	
Weight	250 g	

Docking station:

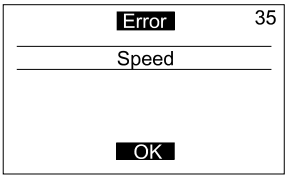
Power supply	5 V ⎓; 2.5 A
Dimensions (WxLxH)	100x100x85mm
Weight	315 g

External power supply:

Power supply	Input: 100-240 V ~ ; 50/60 Hz; 800 mA Output: 5 V⎓; 2.5 A
Dimensions (WxLxH)	95x55x35mm
Weight	320 g

15. Info and Error messages

Error



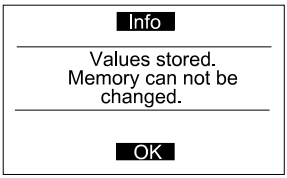
If an error occurs while using the instrument, the display will indicate the error type.

Confirm the error by pressing the the operate button.

Repeat the process or the entry.

In the upper right corner, an additional number is shown for service purposes.

Info



Informative displays always appear when device-internal settings or limits are reached or exceeded.

Confirm the message by pressing the the operate button.

Error	Error Messages
FPGA Firmware not found	Identifies an internal error. Load a firmware update. When in doubt, call the Customer Service department.
Speed	The measurement unit was moved across the sample too fast. The measurement is invalid and must be repeated.
Acceleration	The instrument was accelerated too fast across the specimen or the scan direction was changed too fast. Confirm the message by pressing “operate” and repeat the measurement.
Failed	Appears when the “Plausibility Control“ function in the Configuration of the used Memory or Organizer file is ON and the corrected value deviates by more than 20% from the uncorrected value. Repeat the measurement.
Exposure	Not enough light is reflected by the surface. Repeat the measurement on an appropriate sample area.
Scanlength	The operate key was released before the full scanlength was reached. Perform a new measurement.
Invalid Date	Day or month falls outside the valid range of 1 - 31 or 1 - 12. Repeat the entry.

Error messages

Error Only a value between 1-20 is allowed.	Appears when the number of measurements in “Memory-Config Change” is set to a value less than 1 or greater than 20. Repeat the setting with a value between 1 and 20.
Date before Year 2000 Date after Year 2100	The specified year falls outside the valid range from 2000 to 2100. Please repeat the input with a valid year.
Only a value between 15-99 is allowed.	While adjusting the Display Time, you entered a value outside the valid range from 15 - 99. Please repeat the entry with a valid value.
Maximum number of Test series reached	Appears when the maximum number of measurement series is reached for the selected memory area.
Dull Surface	The measurement was performed on a surface with too low image forming qualities. Repeat the measurement on a more suitable surface.
Maximum number of checkzones-names reached	Appears when you have measured 100 checkzones with one memory area. Create a new memory area and continue your measurements.

Error	
Not enough memory capacity	When attempting to measure an Organizer near the end of memory capacity, the instrument can detect, based on the Organizer structure, that memory will be exhausted before the end of the measurement series. It then generates this error before the measurement begins.
Memory is full	No more free memory capacity available. Delete measurement series which are no longer required.
Info	**Information**
Interrupt not allowed	The setting option “Interrupt” for the selected memory is not activated or not allowed (Organizer).
Values stored. Memory can not be deleted.	Warning message indicating that measurement values are present in the memory selected for deletion.
Maximum number of checkzones-names reached	You can only assign a maximum of 100 sample names per memory. That number has been reached.
Maximum number of Parameter 2 reached	You can only assign a maximum of 500 names for Parameter 2 per memory. That number has been reached.
Maximum number of Parameter 3 reached	You can only assign a maximum of 20 names for Parameter 3 per memory. That number has been reached.
Memory name already exists	You have assigned an already existing name while filing a memory area.

Memory can not be changed.	You have attempted to change the settings of an Organizer. Organizers cannot be changed.
Memory can not be deleted.	You have attempted to delete a protected Organizer.
Only 5% free memory capacity	This notice appears when 95 % of the device memory is filled.

16. Cleaning and maintenance

- Before cleanig, the instrument and accessories must be disconnected from the power supply as described in the safety instructions.

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

- **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.

- A cleaning mat to clean the unit's wheels is situated on top of the reference tile's cover. Therefore, roll the wheels several times over the mat and then over a cleen sheet of paper. Dirt will stick to the mat and can be removed with clear water.

Cleaning the test tile

- **Do not use any acetone!**

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

Since the surfaces of the standards are highly sensitive, cleaning must be undertaken with great care.

To clean standards, 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.

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

17. Service and Certification

Service

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 includes the retraceability to international standards.

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-4824 extended warranty

Service Centers for BYK-Gardner products

Germany

BYK-Gardner GmbH
Lausitzer Strasse 8

82538 Geretsried
Germany

Phone:+49-8171-3493-0
Fax: +49-8171-3493-166

USA

BYK-Gardner USA
9104 Guilford Road
Columbia, MD 21046
USA

Phone:+1-301-483-6500
Fax: +1-301-483-6555

China

BYK-Gardner Shanghai Office

3/F, Building 22
No. 140 Tian Lin Road
Xuhui District
Shanghai 200233
P.R. China

Phone.: +86(021)3367-6331
Fax: +86(021)3367-6332

Brazil

BYK-Gardner Latin America
Rua Itaporanga, 340
Bairro Paraíso -Santo André-SP
CEP 09190-640
Brazil

Phone.: +55-11-2147-1199
Fax: +55-11-2147-1168

18. Copyright

This instruction manual is an important part of this instrument. It contains essential information about setting up, placing in service and use. If you pass the device on to another user, please ensure that the instruction manual is included with the instrument. The manual must be studied carefully before working with the equipment. Please contact your regional service office if you have any questions or require additional information about the device.

The technology and fittings are based on state-of-the art optic and electronic technology. New developments and innovations are constantly being integrated into the equipment. Thus, the diagrams, dimensions, and technical data used in this manual may have changed as a result of adapting the device to new information and improvements.

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BYK-Gardner GmbH offers no guarantee that the software will function without error or that the functions incorporated therein can be executed in all applications and combinations selected by you.

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

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