Measure what you see.

haze-gard i

Manual

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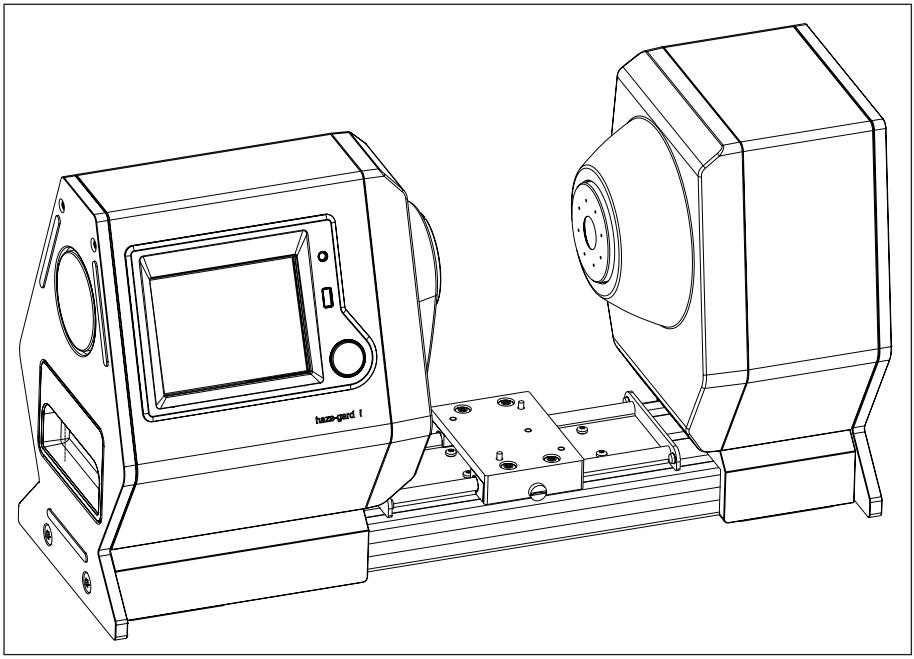
BYK
Additives & Instruments

haze-gard i

Manual



International patents pending
International design patent pending

293 022 980 E 1501

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 deciding to purchase 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 & 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 instrument 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 disconnecting the plug from the instrument

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.

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.
- **Never clean the interior of the detector sphere (haze-port) !**
- 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.
- Avoid prolonged high relative humidity and do not allow condensation water.
- **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.
- Align the protection caps when the instrument is not in use.

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

2 System Description and Delivery notes

Please read the instruction manual before placing the instrument in service and observe the safety instructions.

The haze-gard i is a stationary instrument designed to measure the appearance of glass and films, packaging, and other parts made of plastic and other transparent materials.

The specimen surface is illuminated perpendicularly and the transmitted light is measured photoelectronically using an integrating sphere (0°/diffuse geometry). Two international standard methods are implemented in the unit:

- Compensated (ISO 13468 and 14782)
- Uncompensated (ASTM D1003)

With the uncompensated method, the surface reflection on the specimen affects the measurement result whereas the compensated method is corrected for this effect (see Chapter 15, Parameters).

The haze-gard i sets new standards in transparency measurement instruments. Apart from its speed and ease of operation, it also offers the following features:

- High accuracy and reliability thanks to reference-beam optics
- Long-term calibration and selfdiagnosis
- Open specimen area for the measurement of small and large products
- Closed optics and electronics
- Memory to store readings, PC interface

haze-gard i	4775

comes complete with:

haze meter, guide carriage for sample holder, foot switch, calibration standard, protection cap, interface cable, power supply, software smart-chart, traceable certificate, operating manual, short instruction

Accessories:

Sample holder for films and sheets	4788
Thin film holder for very thin films	4784
Taber abrasion holder	4785
Cuvette table for measurement of liquids	4786
Clarity reference standard	4777
Haze Standards, set of 5 pieces in hard box	4795
Transmittance standards, set of 4 pieces	4783

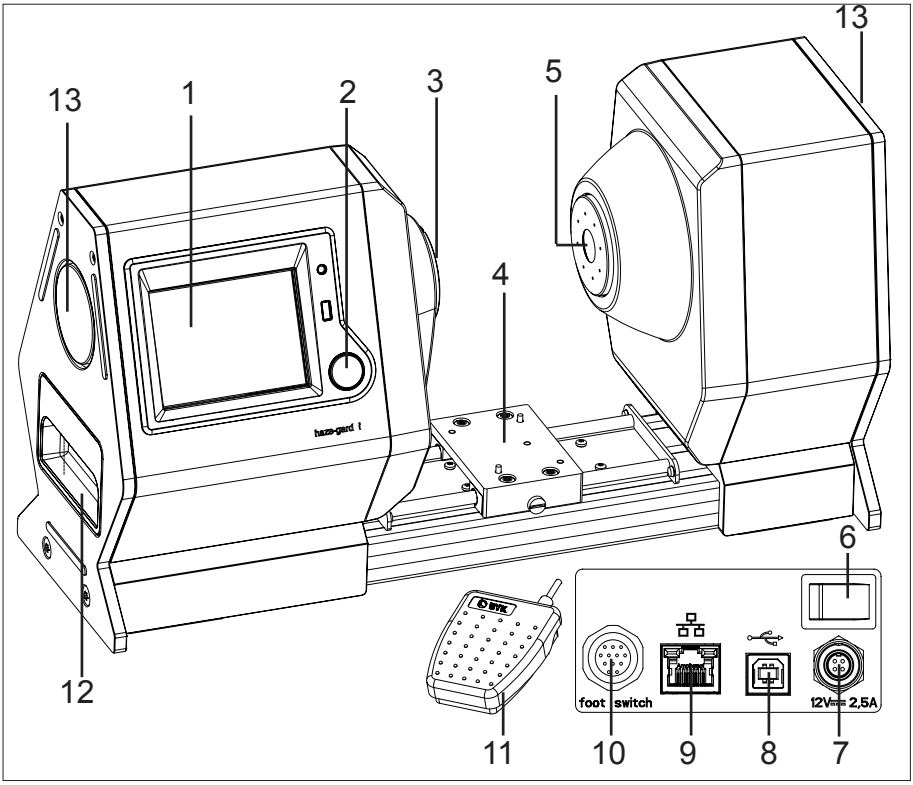
3. Power supply

Power is supplied to the instrument through the external power supply unit. Connect the external power supply unit to the instrument.

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.

Please verify that the specifications of the power supply unit match the power source in terms of current and voltage.

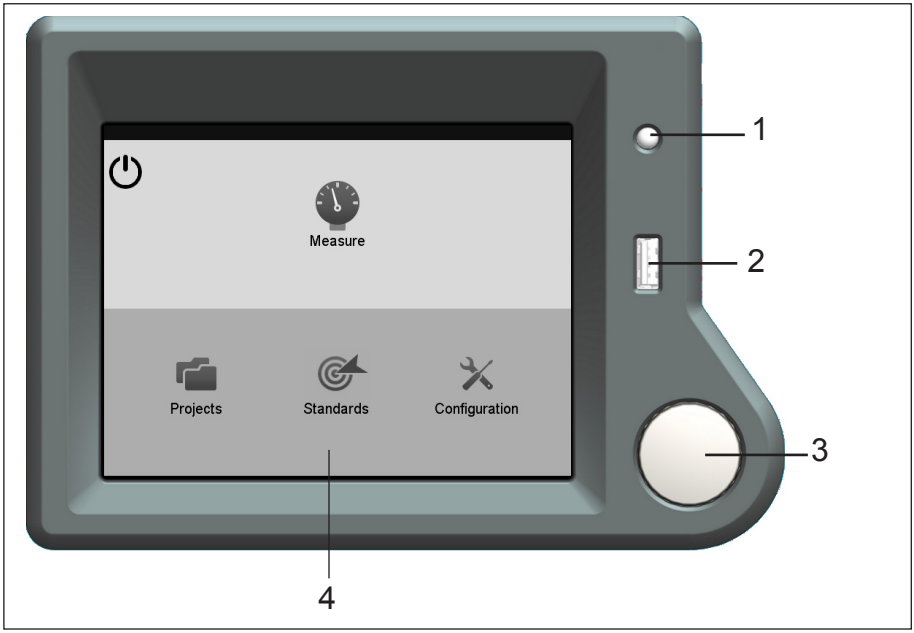
4. Controls



Measurement unit

1	Touchdisplay	10	Foot switch port
2	Measurement button	11	Foot switch
3	Illumination/clarity-port	12	Grip for handling
4	Slide for sample holders	13	Deposit slot for protection cap
5	haze-port		
6	Power switch		
7	Power connection port		
8	USB port		
9	LAN port		

4.1 Display



1	Indicator lamp (during measurement)
2	Connector for USB flash drive
3	Measurement button
4	Touchscreen

4.2 Icons

Measure: Turns the instrument into the measurement mode. Press the measurement button to start the measurement.

Continuous: In Continuous Mode, the specimen is measured repeatedly and the result on the display is updated accordingly. This allows you to run a large specimen through the device to establish whether its quality is homogenous (needs to be activated in „Configuration“).

Projects: Here you can create projects where you can store the measurements. In addition, you can combine measurements into a project.

Standards: Create new or edit existing product standards. Standards enable to define the scales and pass/fail limits depending on the QC specification of the product to be tested.

Configuration: You can set up the configuration of the instrument.

Note: Before you switch off the instrument, allways first tap the power down icon to avoid loss of data or malfunctions.

4.3 Navigation

The touch screen is used to control the instrument. All settings within the menu are made by direct navigation on the touch screen.

Pressing the measurement button or touching the corresponding field on the touch screen starts the measurement mode or performs functions that are displayed.

The lamp indicates measurement in progress.

The USB connector allows to save readings via USB stick.

System operation is supported by comments and error messages, which appear on the display.

5. Getting started

5.1 Important Notes!

Before operating the instrument for the first time, please read the instructions and note particularly the safety information provided in Chapter 1.

The device has no special environmental requirements. However, it is important to observe the standard operating conditions for electronic instruments. Please avoid:

- excessive oscillations and vibrations,
- extreme ambient temperatures or rapid changes in temperature,
- relative humidity in excess of 85% and splashing with water or other liquids,
- contact with caustic and explosive chemicals, vapors, and gases,
- extreme electromagnetic fields,
- intrusion of foreign objects or extraneous matter through measuring apertures.

5.2 Cleaning and Maintenance

The instrument chassis is resistant to a number of solvents but cannot be guaranteed to withstand contact with all chemicals. Thus, use only a small damp cloth for cleaning. A little rubbing alcohol or mild detergent may be used to remove stubborn stains. Clean the front lens of the clarity port only with a soft lint-free cloth (preferably a damp optical wipe).

Never clean the interior of the detector sphere (haze-port)!

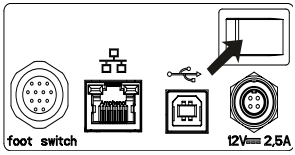
If the instrument malfunctions, do not attempt to repair it yourself. Our Customer Service will be glad to provide you with rapid assistance.

5.3 Setting the Equipment Up

Always switch off the device before plugging in or unplugging the various connectors (foot switch, LAN cable, USB cable, and power cable)!

- Unpack the device and check for possible damage sustained during shipment (visual inspection).
- Before starting the device for the first time, check that all components have been delivered (for a list of package contents, see Chapter 2 System description and Delivery notes).
- Confirm that the voltage of the power supply complies with your local voltage.
- Plug the enclosed power cord into the power supply and into a grounded power outlet.
- If applicable, plug the foot switch, PC or LAN connection into the appropriate slots.

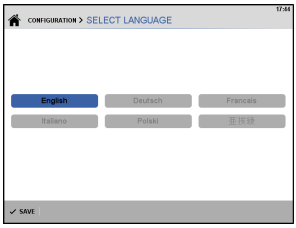
5.4 Power-Up and Initialization



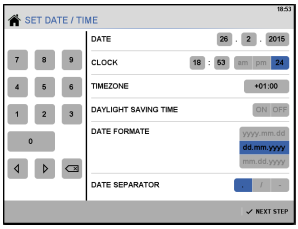
Before you switch-on the device, remove the protective covers from the haze- and clarity-port.

To switch on the instrument, press the power switch on the rear side of the device.

If the instrument is switched on for the very first time, the user is led through the first settings in three steps.

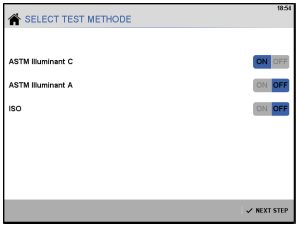


In the first step you are requested to select a language, tap on the appropriate language and then on “Next Step“.

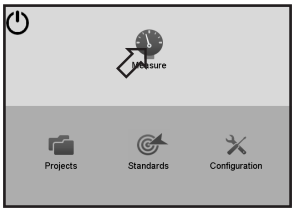


In the second step you can enter date and time. You can also set timezone, daylight saving time, data formate and data separator.

To change a field, click on it and then use the keypad on the left side of the screen.

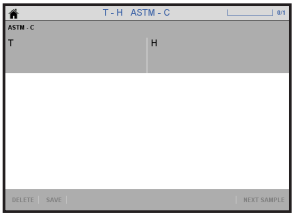


In the third step you can choose the measurement method which you wish to use (default setting is ASTM illuminant C).



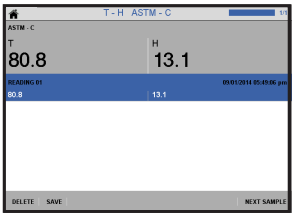
When you have finished these steps, the main menu appears.

Tap the Measure icon on the screen to open the measure window.



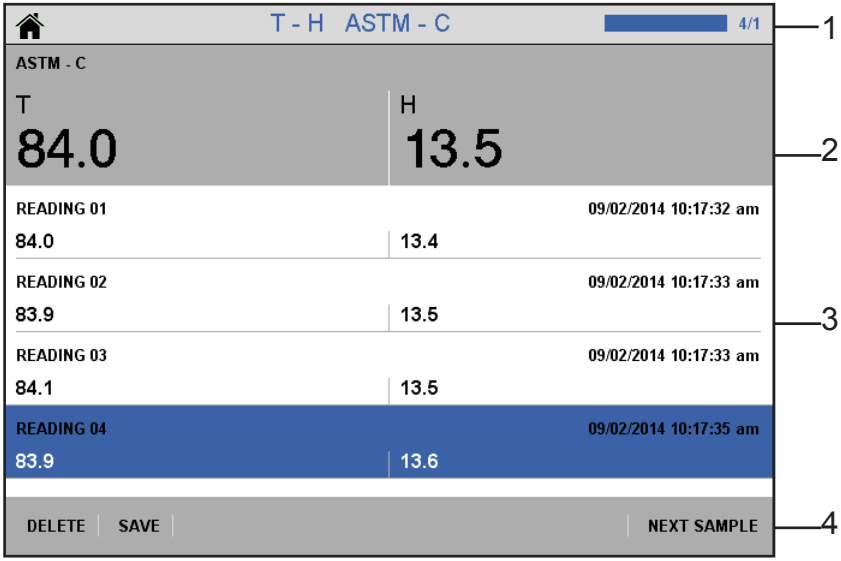
The display shows the scales according to the selected measurement method.

Place the sample at the haze-port and press the measurement button or use the foot switch.



The measurement values are displayed.

5.5 The Measurement Screen



1 Header:

Shows information about the actual test series, like standard or sample ID. On the right side the number of measurements per sample is displayed and a progress bar. The “Home“ icon let you return to the main menu.

2 Average values:

The arithmetic mean of the actual sample is displayed.

3 Measurements:

The single readings of the actual sample are listed.

4 Command bar:

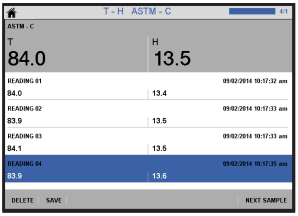
Here you can activate context dependent funtions, like saving or editing. To start measuring another specimen, tap “Next Sample“.

5.6 Selecting a Measurement Method

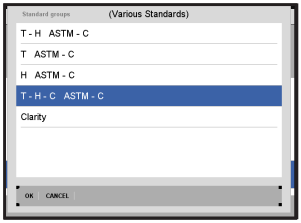
The display shows in the middle of the header information on the actual test serie like e.g. measurement method, used standard, sample and project name.

If test series are saved, these informations are arranged as an adress path and allow to tap on a part of the path to go to that level.

As long no series is saved, just the used method or standard is displayed in the header.



Tap on the entry to open the selection menu for the standards.

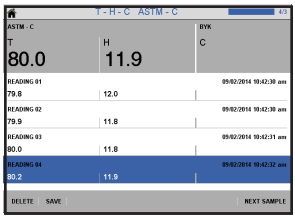


The selection menu for the standards opens. Choose the appropriate standard or scale combination and then tap on OK.

T - Total Transmittance

H - Haze

C - Clarity



The new standard appears in the header.

6. Calibration

6.1 Calibration

Thanks to the use of state-of-the-art technology and the reference beam principle, calibration does not have to be carried out very often. We recommend a calibration interval of two months. Calibration is also necessary:

- at the initial startup,
- in the event of a drastic change in ambient temperature (for example, if the device has been moved to a new location),
- if a message appears on the display requesting calibration (e.g.following the modification of stored calibration values),

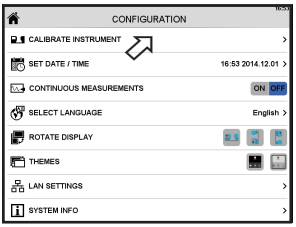
To ensure accurate calibration, use only original standards from BYK-Gardner. Do not touch the reference surface and protect it against scratching. Even with careful treatment, ambient conditions may alter a standard's values over time. For that reason, have Customer Service check your standards regularly (e.g. once a year).

Make sure the calibration standard is clean and free from scratches !

6.2 How to Calibrate the Device

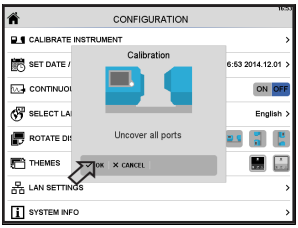
Calibration is carried out in the Configuration Menu. Calibration is done for all test methods in one pass.

This menu is opened by taping the "Configuration" icon.



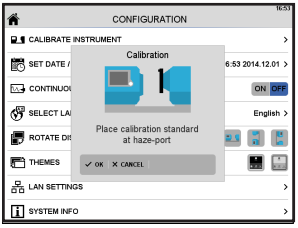
Tap on the menu item “Calibrate” to start calibration.

The instrument will lead you through the calibration process.



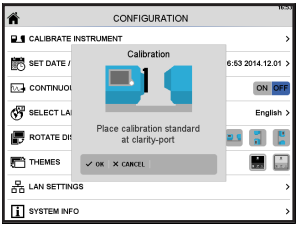
Calibration starts with the request to uncover all ports.

Tap OK when ready.



Next step is to place the calibration standard at the haze-port. The calibration standard has a nose. This nose must allways point in the direction of the display.

Tap OK when ready.



Finally place the calibration standard at the clarity-port.

Tap OK when ready.

Calibration is done.

To interrupt the calibration procedure at any time, tap on “cancel”.

6.3 Additional Standards for Monitoring Test Equipment

To check that the measurement device is working correctly, measurements should be performed at regular intervals with special test standards available from the manufacturer. Under normal laboratory conditions and careful handling, an interval of one month is recommended for the monitoring of test equipment.

The displayed readings should fall within the specified values for the standard. If they do not, check that the standard was clean and that the device was correctly calibrated. If cleaning the standard and recalibration do not correct the error, please contact Customer Service. For information about cleaning the standards, see Chapter 6.5.

6.4 Storing and Handling Standards

The precision of measurements can be considerably impaired by the use of damaged or dirty standards. Please ensure that standards are clean and unscratched. The standard surfaces are very sensitive.Therefore, you must not touch the standard surface and protect it against scratching (store in a secure place). For instructions on the cleaning of standards, see Chapter 6.5. The standards must not be exposed to direct sunlight or be stored in a dirty or dusty environment. Contact with chemicals and aggressive vapors must also be avoided.

6.5 Cleaning the Standards

The standard surfaces are very sensitive. Hence, standards should be cleaned as seldom as possible. Dust and lint can cause incorrect measurements. Thus, standards must be cleaned with oil-free compressed air before use.

Never rub the standard dry! The rubbing action may cause scratches from dust.

Extreme care must be taken when cleaning standards. Use a fresh soft cloth and wash the standards in distilled water. Do not apply pressure or rubbing action. Ensure that there are no particles adhering to the cloth that might damage the standard surface. Do not use aggressive cleaners such as solvents, rubbing alcohol, trichloroethylene, benzene, strong alcohols, acids or lyes. Chemical cleaners and polishes are equally damaging. To remove stubborn dirt, add a little household dish detergent (acid-free) to the water. Rinse in distilled water. Dry with oil-free compressed air and blow off any remaining dust or lint.

6.6 The Validity of Standard Values

Even if handled carefully, the measurement values of the standards can change due to environmental factors. Thus, you should let the standards check regularly by the manufacturer.

The monitoring interval is depending on the conditions of use, a one year interval is recommended under usual laboratory usage.

7. Measurement

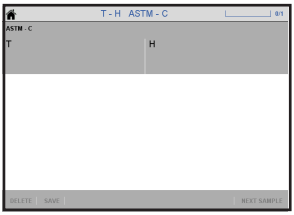
Depending on the selected measuring scales the sample has to be placed on the:

haze-port Total Transmittance, Haze

clarity-port Clarity

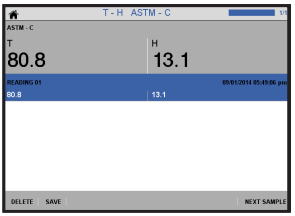
In case you choose Clarity together with Transmittance or Haze, the instrument will guide you through the measuring procedure.

7.1 Single port

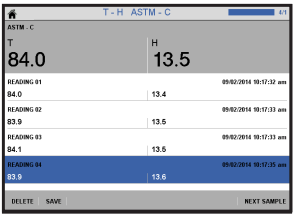


Place your specimen at the appropriate port and press the measurement button.

The instrument starts measuring and the indication lamp is flashing.



After the measurement is finished, the results appear in the display. The progess bar right in the header and the number of readings are incremented, e.g. 1/3 means that the first of 3 readings per sample is performed.

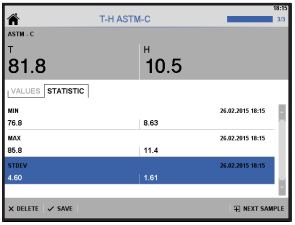


If you continue with further measurements, the results of each single measurement are listed. The average values are displayed in bold letters above the single readings.

The number of measurements per sample can be predefined for each different standard separately (refer to chapter 8). Anyhow, if a number of e.g. 3 is specified, you even can add further readings to the statistic of the current specimen until you tap the “Next Sample“ icon in the command bar at the display.

In case a measuring error occured, e.g. at a dirty sample position, use the “Delete“ function to remove the reading.

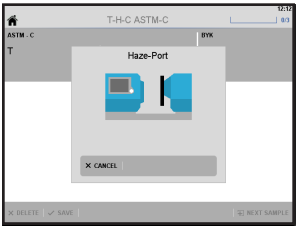
Statistic



If Statistic is activated in the Configuration Menu (see chapter 14.10), you can toggle between the measurement values and the statistics of a measurement.

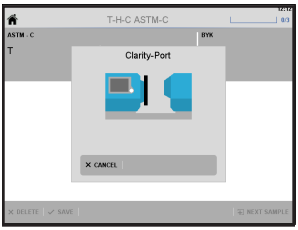
Tap on ”Statistic” to display MIN, MAX and STDEV. To return to the measurement values tap on ”Values”.

7.2 Two ports



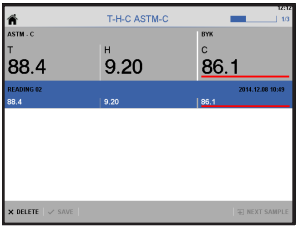
When you start measurement by pressing the measurement button, the instrument instructs you where to place the specimen.

Hold the sample at the appropriate port and press the measurement button again.



After the first step the instrument shows you at which port to place the specimen next.

Move the sample to the appropriate port and press the measurement button again.



The measurement is performed and the results are displayed.

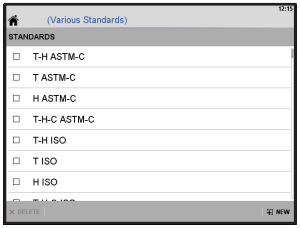
8. Standards: Define the limits

Standards enable you to define the method, scales and tolerance limits depending on the QC specification of the product to be tested. The limit values are also used for pass/fail indication of the measurement results.

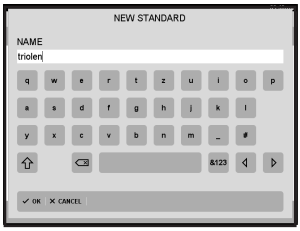
Standards can be created via the software or by use of the instruments display.

8.1 Add a Standard

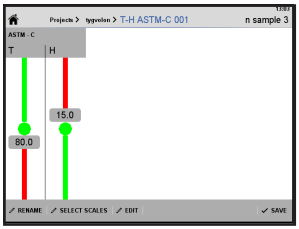
Activate “Standards“ from the main menu.



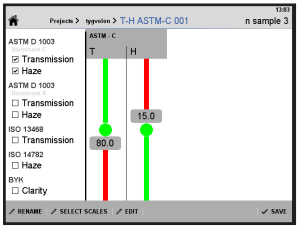
Select a Standard Group if applicable, or tap the “+NEW“ function.



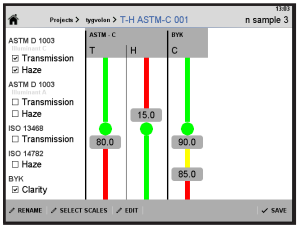
A keyboard opens to enter a name for the new standard. When finished, click “OK“.



A window opens which allows to edit pass/fail limits and to select the measurement method and scales. The “Rename“ Icon enables to change the standard name.

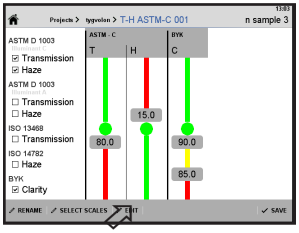


The “Select Scales“ function let all measurement methods appear on the left side of the window, where you can choose the required scales according to your specification.

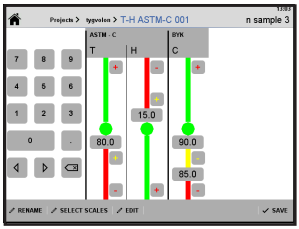


When you checkmark an additional scale, it is displayed immediately on the screen.

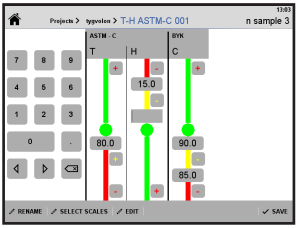
Edit limits:



To edit the limit of a scale, click on “Edit“.

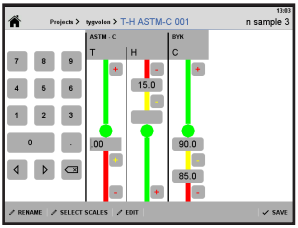


A window opens, where you can add or remove limits and edit their values via a keypad.



Add a limit:

The [+] and [-] buttons aside a scale allow to add and remove a limit range, e.g. yellow for a warning indication.

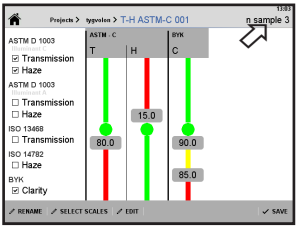


Edit a limit:

Click into the field of a limit value you want to change. A marking appears in the field.

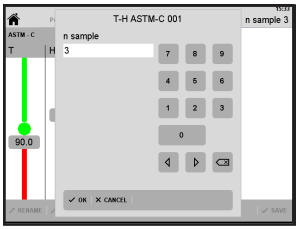
You can move the marking with the left and right arrows on the keypad. To erase entries use the erase button. Subsequently you can enter the new limit with the keypad.

Edit statistics:

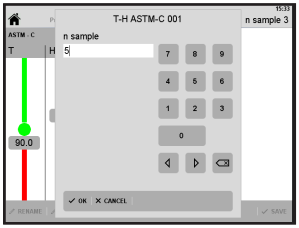


The right side of the header indicates the number of measurements per sample for statistical evaluation.

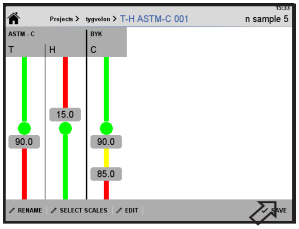
Tap on the field to change the entry.



A keypad opens, you can move the marking with the left and right arrows on the keypad. To erase entries use the erase button. Subsequently you can enter the new limit with the keypad.

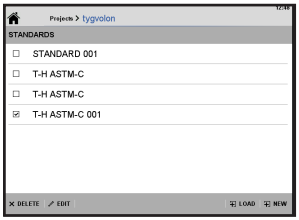


Click “OK“ to confirm the new value.



To save the new standard tap on the “Save“ icon.

8.2 Edit Standards



Activate “Standards“ from the main menu. In the Standards window tap the desired standard to be modified and continue as described above.

9. Projects: Save your test series

Saving of the measurement data is organized in socalled “Projects“. Projects can be created via the software or by use of the instruments display.

Each project can include several test series with different samples measured. A test series is related to a standard as described in the previous section.

A project could be e.g. a certain production line and the test series could include the readings of the batches. The standard defines the limits for pass/fail indication.

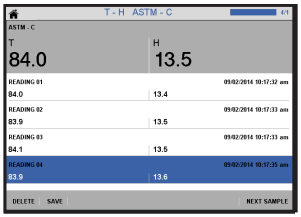
Information on the project, standard and test series are arranged as an adress path in the header and allow to tap on a part of the path to go to that level, e.g.:

Project A > Standard XY > Batch 38

As long no series is saved, just the used method or standard is displayed in the header.

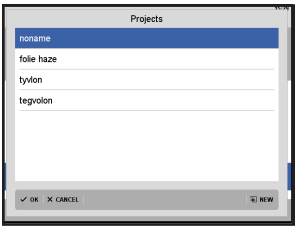
A new project can be generated prior to the measurements or “on the fly“ after testing a sample.

9.1 Saving new measurements “on the fly“

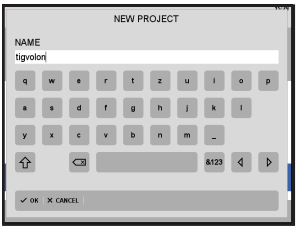


You have finished the measurement and you want to save the measurement values.

Tap the “Save“ button in the command bar at the bottom.

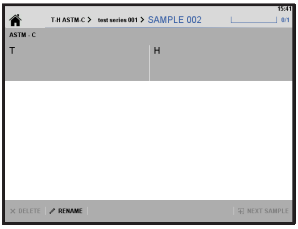


If there are projects allready saved, a window opens for selection. Choose the appropriate project if applicable or create a new project, therefore tap on “+New“.



You can enter a name for the project using the keyboard.

When finished, click “OK“.



The instrument generates automatically a name for the test series.

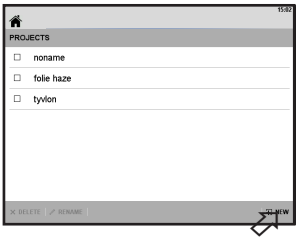
The data of the standard used is saved together with the test series.

The sample number is incremented and you can perform measurements on another specimen. All the following samples are saved now in your new test series until you create a new or change to another series.

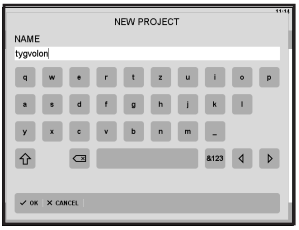
Note: The name of a project, standard, sample or test series can be changed at the appropriate window, except protected standards defined via the software.

9.2 Creating a new project

Analysis and documentation of QC trends or R&D projects require well-structured identification of the measurement data. The function “Projects“ of the main menu allows to organize saving before measuring.

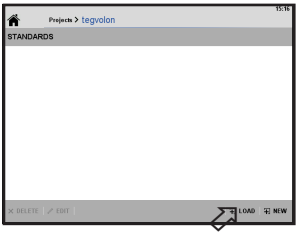


To create a new project, first tap on “Projects“ and then on “+New“.

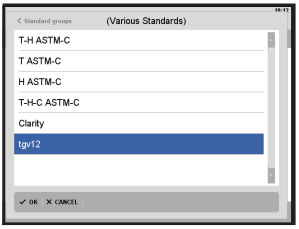


Enter a name for the project using the keyboard.

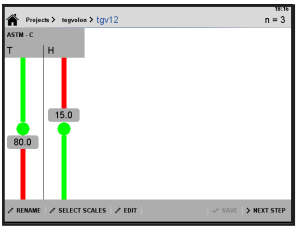
When finished, tap “OK“.



In the next step you are requested to add a standard. Tap “+Load“ to choose an existing standard if defined yet, or use the ”+New“ function to create a standard (please refer to chapter 8)

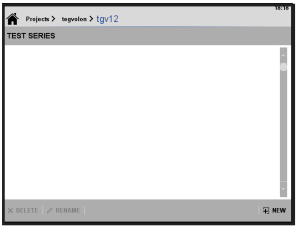


The “Load“ function opens a window for selection. Highlight the desired standard and tap “OK“.

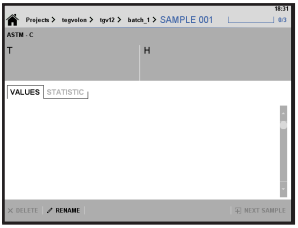


A window opens where you can modify the standard if necessary (see chapter 8).

Tap on “Next Step“ to accept the settings.

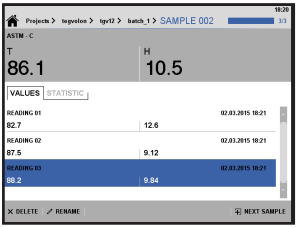


Now you can enter a name for the test series. Tap on “New“ to open the keyboard window and enter a name, e.g. batch 1, then tap on “OK“.



The measurement window opens.

Tap on “Add Measurement“ to start the first sample or press the measure button.



In the header you find the name of the project, the standard used, the name of the test series and the sample name.

If you need to correct one of these names, tap the appropriate entry in the header and apply the “Rename“ function of the command bar.

9.3 View saved measurement data

The saved data can be transfered to a computer for analysis and quality documentation.

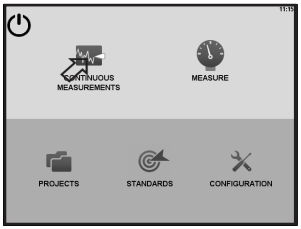
Also, you can recall the saved data directly via the “Projects“ icon of the main menu. A window will open where you can select the project needed. In the next steps choose the appropriate standard and test series.

If required, a test series can be continued with the “+Add Measurement“ function.

10. Continuous Mode

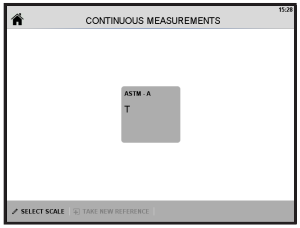
10.1 Measure

In the normal measuring mode, individual measurements are started by pressing the measurement button or the foot switch. In Continuous Mode, the specimen is measured repeatedly and the result on the display is updated accordingly (approx. 1 reading/second). This allows you to evaluate the homogeneity of a specimen.

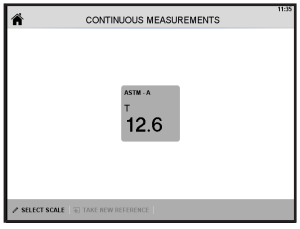


To make the Continuous Mode available in the main menu, tap the “Configuration“ icon and set the “Continuous Measurements“ to ON.

Click the “Home“ icon and you will find the icon for activation of the continuous mode on the main screen.

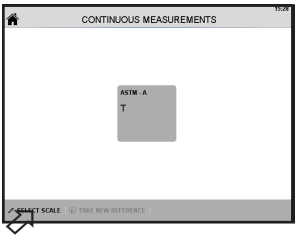


Tap the icon and the screen for continuous measurement will open.

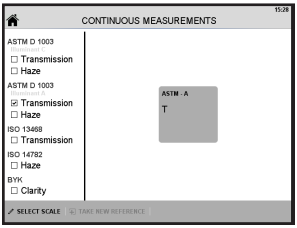


When you press the measurement button the instrument starts measuring.

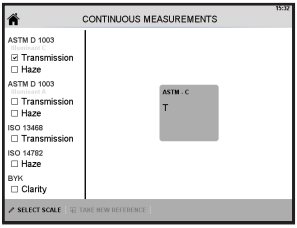
The Continuous Mode function can only be executed for a single scale e.g. Haze or Transmittance.



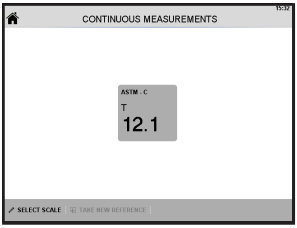
To select a different scale, click on “Select Scale“



The selection window opens.

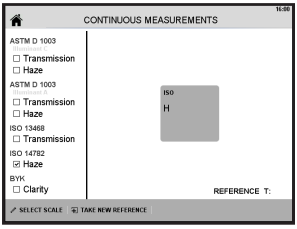


Set the checkmark on the desired scale.



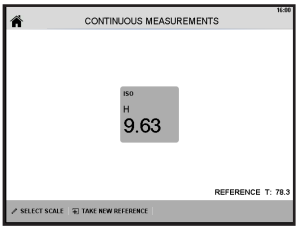
Continuous measurement starts as soon you press the measurement button.

10.2 Measurement with reference

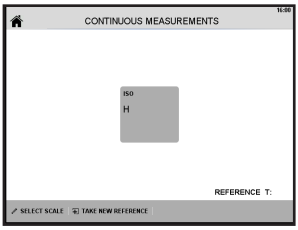


Haze is related to the “Total Transmittance*, thus the Haze measurement requires the Transmittance value of the sample as reference.

$$*H = 100 \frac{T_{diffuse}}{T_{total}}$$

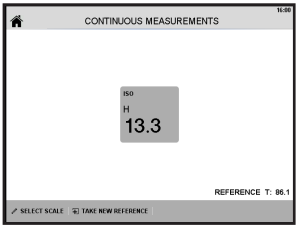


When you have selected an appropriate measurement method, Transmittance is automatically measured first and the reference value is indicated on the lower right side of the display.



If you want to change to another specimen click on “+Take New Reference“. The instrument stops the current measurement.

Place the new sample at the haze-port and press the measurement button.



The instrument will carry out the measurement with the new reference. The haze value is then shown on the display. The corresponding transmittance reference is indicated in the lower right corner of the display.

After changing a specimen, always be sure to update the reference measurement for the new specimen before proceeding.

10.3 Standby

Continuous Mode is interrupted if no change in the measurement values occur after approx. 3 minutes.

Measurement is continued if a significant change is detected in the optical path (e.g. placing of a specimen).

11. USB flash drive

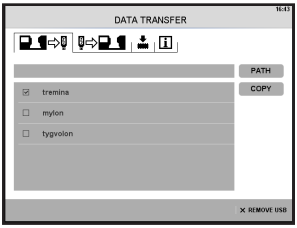
Via the USB port on the right side of the display you can transfer data to a flash drive or to the instrument, you can make an update of the instrument firmware and you can save a service file to the USB drive in case of problems.

Please note FAT 32 formatting is required !

To unplug the flash drive, allways first tap on “Remove USB“ before you take it out.

11.1 Saving data

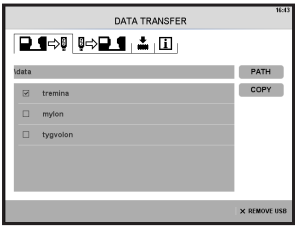
To save data to the USB key or vice versa to the instrument is essentially the same. So only saving data to the stick will be described.



When you insert the stick to the USB connector on the right side of the display, the data transfer menu is indicated on the screen.

All data on your instrument are displayed. Then tap on “Path“ to select the directory on the flash drive

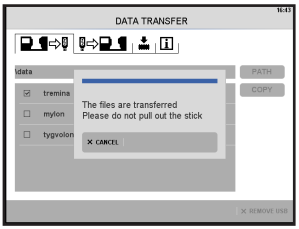
Choose your desired folder where to save the data on your USB drive and tap OK.



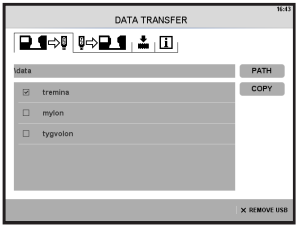
The target path is displayed and the instrument is ready for data transfer.

Checkmark the data you want to transfer.

When ready click on “Copy“.

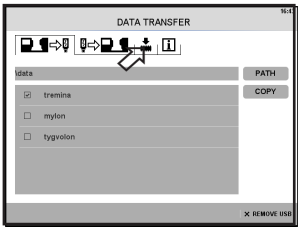


The data are copied to the flash drive and a status message appears on the display.



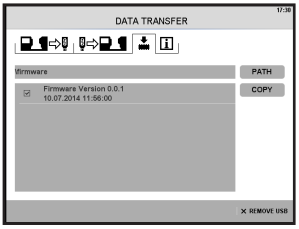
When data transfer has finished, the instrument returns to the initial menu.

11.2 Firmware Update



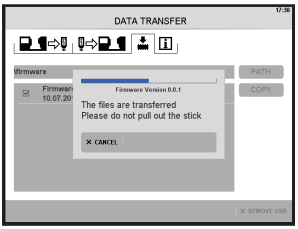
Insert the flash drive which contains the required update files. The data transfer menu appears. Click on the firmware symbol.

Then click on “Path“ to select the path on the flash drive where the update files are located.



The target path is displayed and the instrument is ready for data transfer.

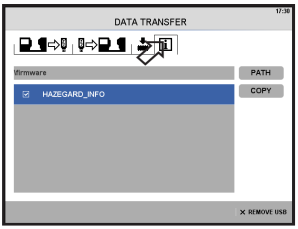
Checkmark the appropriate “Firmware version“ data and tap on “Copy“.



After the data are copied, the update process will start automatically and a status message appears on the display.

When the update has finished, the instrument returns to the initial menu.

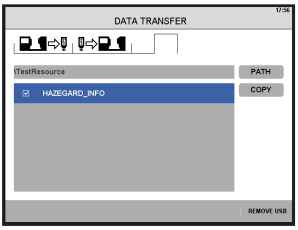
11.3 Service Information



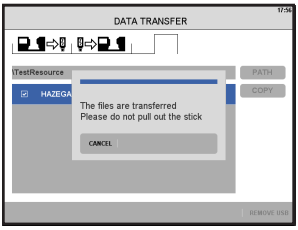
The frontal USB port can also be used to copy service information files to a flash drive, which can be send to the manufacturer for diagnosis purposes.

Tap on the “information“ symbol.

Then click on “Path“ to select the directory on the USB drive.



When the desired target path is displayed select “Hazegard_Info“ and tap on “Copy“.

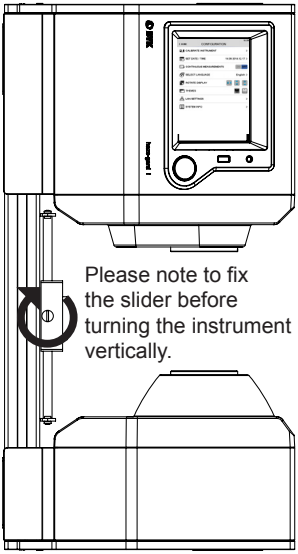


The data are copied to the flash drive and a status message appears on the display.

When data transfer has finished, the instrument returns to the initial menu.

To unplug the flash drive, first click on “Remove USB“ then take it out.

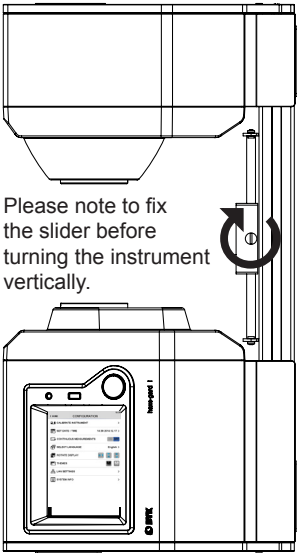
12. Setup of the Instrument



You can place the instrument at any time on one of the two faces for your convenience.

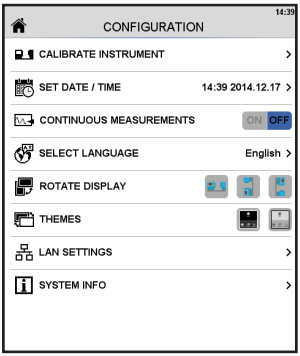
On the right face if you have to measure transmission or haze on samples which you can lay on the haze-port, e.g. petri dish.

Please make sure that no foreign objects fall into the sphere and close the port with the protection cap when the instrument is not in use !



You can turn the unit to the left face if you have to measure clarity on objects or foils which you can lay on the clarity-port.

You can rotate the display according to the face on which the instrument stands.



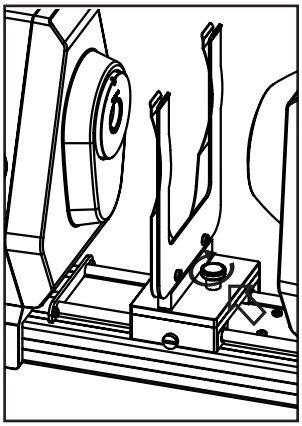
Go to the “Configuration Menu“ and select under “Rotate Display“ the appropriate side to which you want to rotate the menu.

13. Sample Holders

The precision guide carriage allows easy fitting of holders with a single knurled screw. Also, own specific holders can be mounted on the slider (please refer to the drawing chapter 13.5).

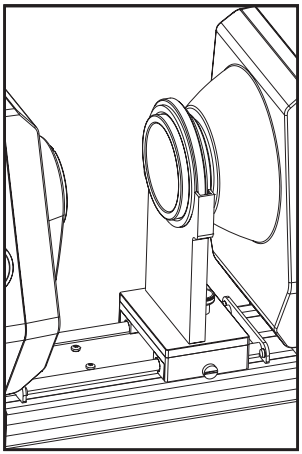
The following holders are available:

13.1 Holder for films and sheets (Cat.No. 4788)

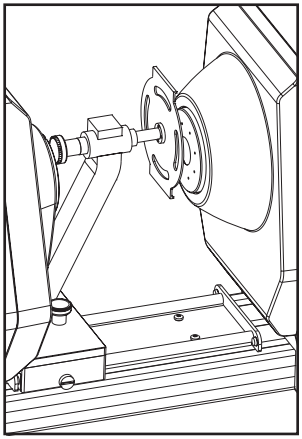


Place the appropriate holder on the two metal pins and fix it with the knurled screw.

13.2 Special holder for very thin films, e.g. shrink films (Cat.No. 4784).



13.3 Taber abrasion holder (Cat.No. 4785)



The measurement of haze is used to determine abrasion resistance of transparent materials. The abrasion holder facilitates positioning of the abraded area in the measurement beam.

Please note to calibrate the instrument with the holder included.

Install the taber abrasion holder in front of the haze-port so that its axis touches the sphere entrance.

Now calibrate the instrument according to chapter 6.

During calibration keep the standard fixed at the port by hand to prevent it from damage and asure proper calibration.

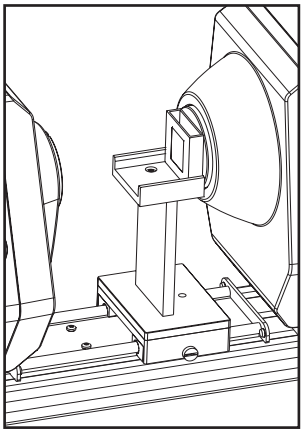
For measuring place the taber sample with the abraded surface in direction of the haze-port. Adjust the appropriate slit of the taber holder centered to the sphere opening.

If the taber abrasion holder is removed for regular measurements, the instrument needs to be recalibrated without the holder.

Note:

When working with the taber abrasion holder, only measure haze or transmittance. Clarity measurements are not possible with the holder due to changed optical conditons.

13.4 Cuvette holder (Cat.No. 4786) for measurement of liquids



Appropriate cuvettes are available from the manufacturer.

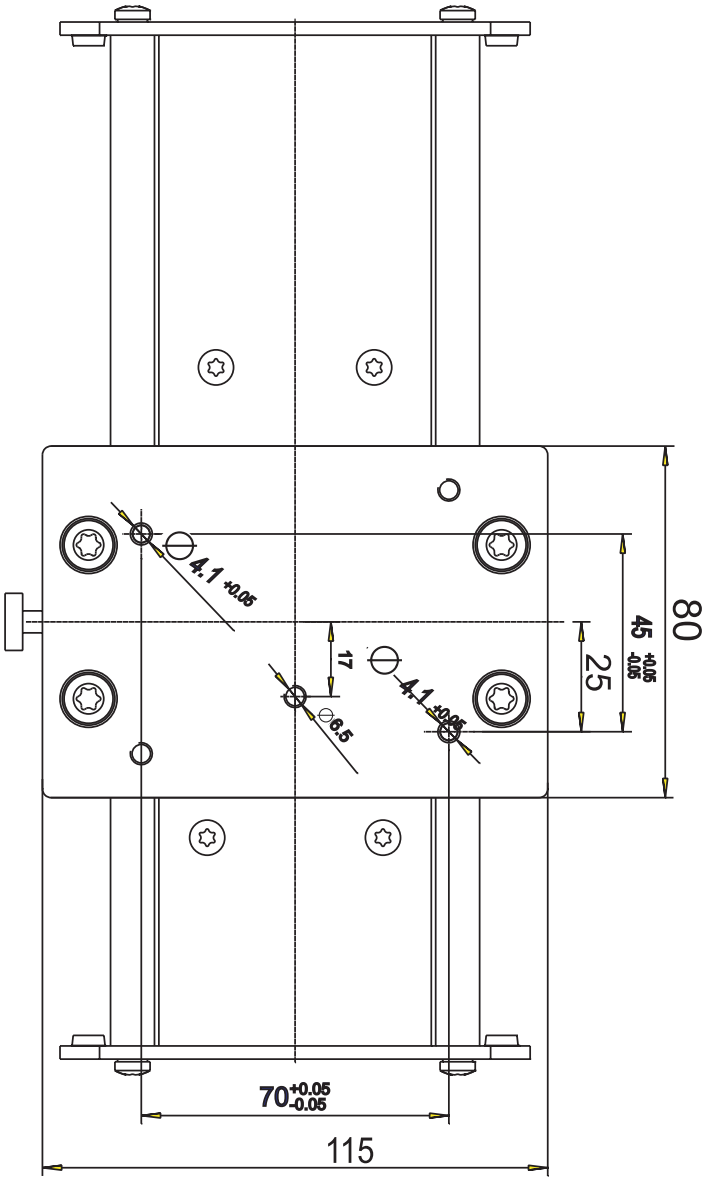
Please note to calibrate the instrument with the cuvette included.

Install the cuvette table on the slider. Now calibrate the instrument according to chapter 6 together with the cuvette. It is recommended to use a clear reference liquid whith a refractive index close to that of the liquids to be tested.

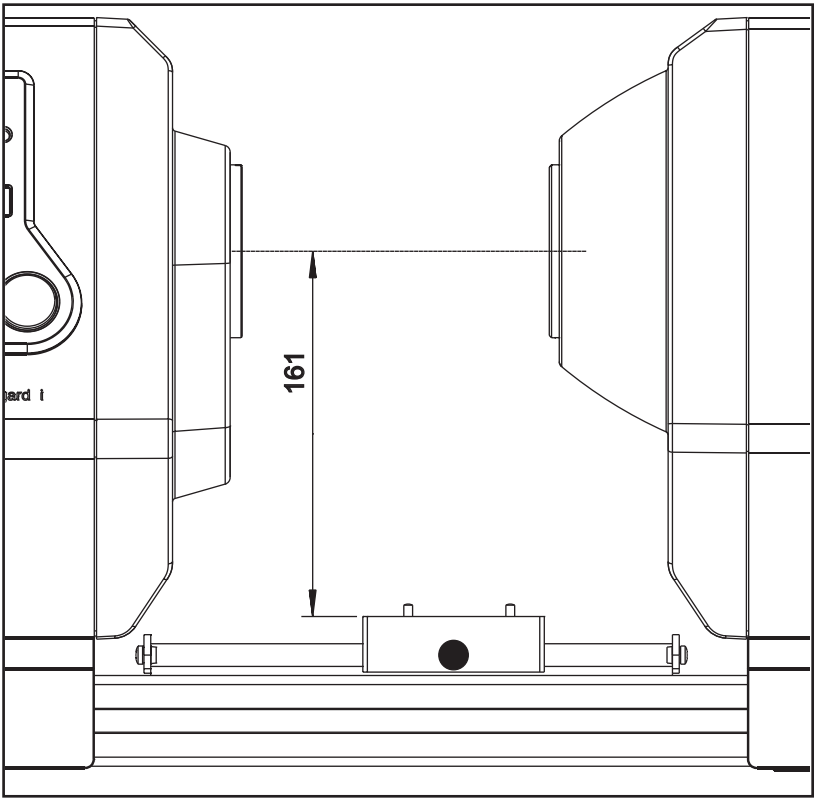
If the cuvette table is removed for regular measurements, the instrument needs to be recalibrated without the cuvette.

13.5 Drawing of the connection plate.

For customized holders to be mounted on the slider

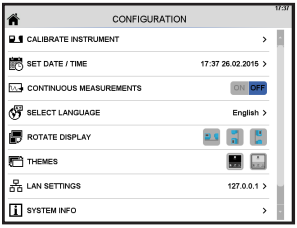


13.6 Reference to the optical axis



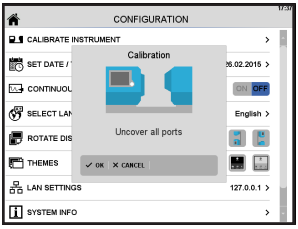
14. Configuration

14.1 General Information



The Configuration menu allows you to set the various device parameters, select a language, and carry out calibration. The Configuration menu and settings within the menu are executed by clicking on the appropriate item. Either the desired setting is executed directly, or a submenu opens.

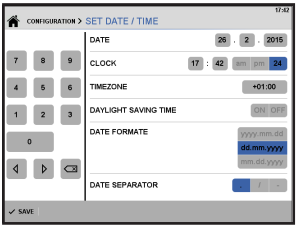
14.2 Calibration



Click on the menu item “Calibrate” to start calibration.

The instrument will lead you through the calibration process (see Chapter 6.2 How to Calibrate the Device).

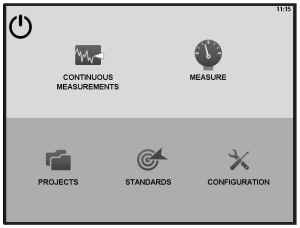
14.3 Set Date / Time



Here you can enter date and time. You can also set timezone, daylight saving time, data format and date separator.

To change a field, tap on it and then use the keypad on the left side of the screen.

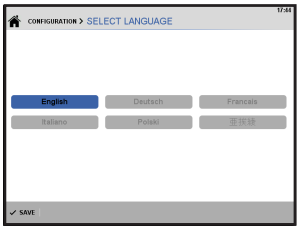
14.4 Continuous Measurement



In Continuous Mode, the specimen can be measured repeatedly and the result on the display is updated accordingly. This allows you to run a large specimen through the device to establish whether its quality is homogenous.

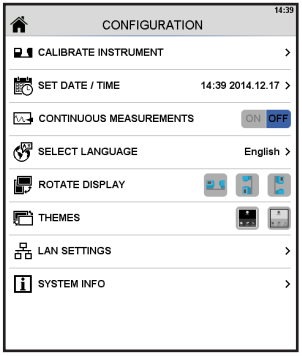
To make the Continuous Mode available in the main menu, set the „Continuous Measurements“ option to ON.

14.5 Select Language



Select language opens a submenu where you can change the language. Tap on the appropriate language and confirm with “Save“.

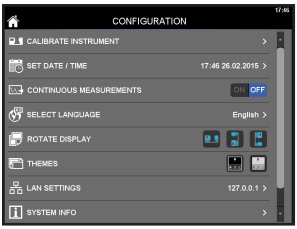
14.6 Rotate Display



You can rotate the display if you have decided to setup the instrument to a vertical position.

Tap the appropriate icon.

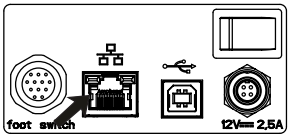
14.7 Themes



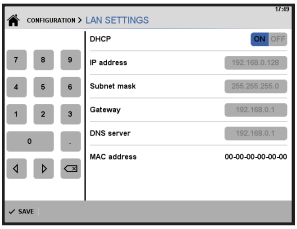
Themes lets you select between a dark and a bright screen for your convenience.

Tap the appropriate icon.

14.8 LAN Settings



To connect the instrument with a LAN you have to insert the LAN cable into the LAN socket on the back of the instrument.



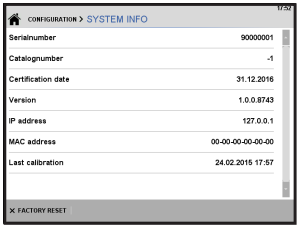
In the delivery configuration the DHCP switch is set to “ON“, which means that the DHCP server provides all necessary information to your instrument.

If you want to connect the instrument manually you have to consult your network administrator for the addresses first.

Then set the DHCP swith to “OFF“. Click on the addressfields and enter the addresses using the keypad.

Finally click on “Save“.

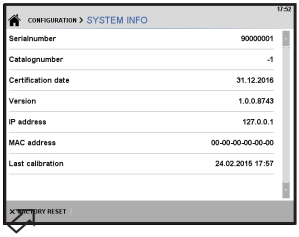
14.9 System Info



This menu displays the following information about the device:

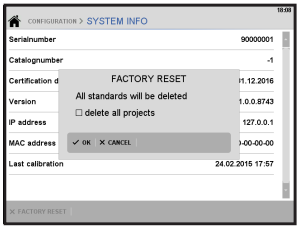
- Serial number
- Catalog number
- Certification date
- Version
- Last calibration

Factory Reset



"Factory Reset" allows to set the instrument back to the configuration at delivery.

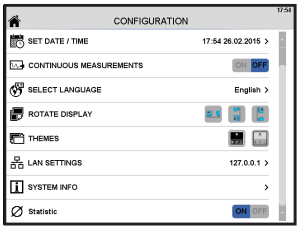
The instrument will restart with the initial setup procedure where you can select language, date and time and measurement method (see chapter 5.3).



Please note that all standards are deleted!

To leave the Info screen, tap "Configuration" in the header or the Home icon.

14.10 Statistic



This function allows to activate the statistic evaluation during measurement.

15. Parameters

15.1 Appearance of Transparent Materials

When a transparent specimen is illuminated, a number of effects may result, depending on the nature of the material:

- Homogenous material with a smooth surface

Some of the light will be reflected from the surfaces and some will pass through the specimen unaltered. The specimen will appear glossy and crystal clear.

The intensity of the transmitted light will be diminished by the inherent absobance of the materials, dyes or pigments.

- Haze (Wide-angle scattering)

Diffuse scattering will decrease the imaging quality of an object. Particles in the material or structures on its surface may act as “scatterers”. The light in these areas is diffused uniformly in all directions and the light intensity per angle is small. This reduces contrast and results in a milky or cloudy appearance. This effect is called haze.

- Clarity (Narrow-angle scattering)

Narrow-angle scattering deflects light in a small angle range. Contours may be distorted and seem less distinct. This effect, called Clarity, is distance-dependent and deteriorates as the distance between the specimen and the observed object increases.

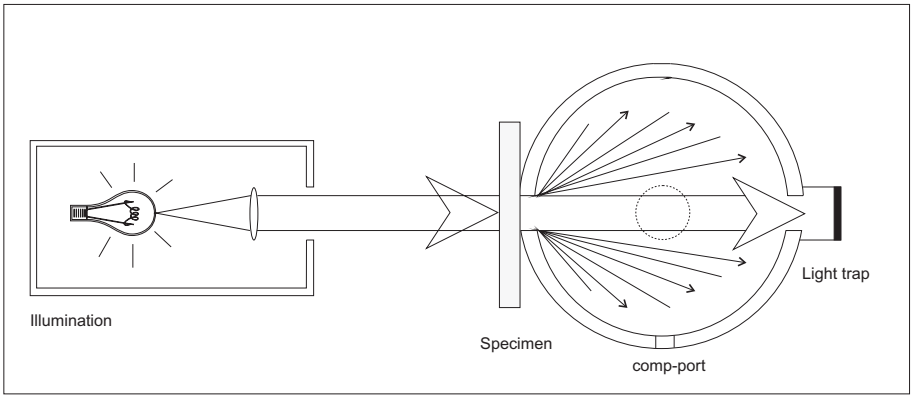
15.2 Criteria for the Evaluation of Transparency

The appearance of a transparent product is a function of gloss, color, and transparency. Essential criteria of transparency are total transmittance, haze and clarity.

The total transmittance is the ratio of the total transmitted light to incident light. It is reduced by reflectance and absorbance.

According to ASTM 1003, haze is the percentage of light that deviates from the incident beam by more than 2.5° on average.

Clarity is evaluated at angles of less than 2.5°.



15.3 Measurement Principle

A beam strikes the specimen and enters an integrating sphere. The light, which is uniformly distributed by the matte white coating on the sphere wall is measured by a detector. The total transmittance is measured with the sphere outlet closed and haze is measured with the outlet open.

In the measurement method based on ISO 13468 and ISO 14782, the sphere effectiveness is taken into account in the measurement.

15.4 Standards

ASTM D 1003:

Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.

ASTM D 1044:

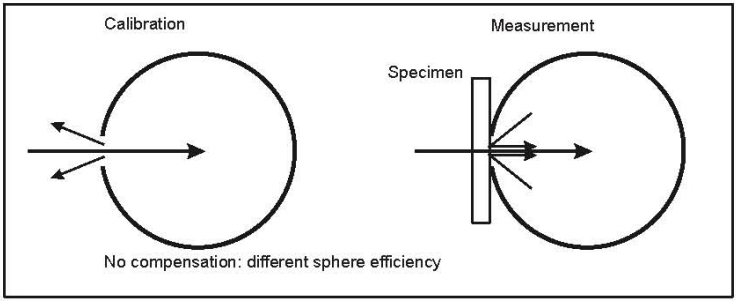
Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.

ISO 13468

Plastics - Determination of the total luminous transmittance of transparent materials.

ISO 14782

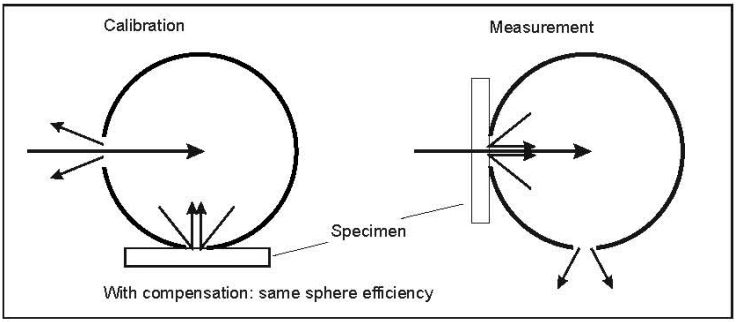
Plastics - Determination of haze for transparent materials.



ASTM D 1003

Measurement conditions are different during calibration and actual measurement.

During calibration, part of the light escapes through the open entrance port of the hazemeter. While taking a measurement, the entrance port is covered with the sample. Thus, the amount of light in the sphere is increased by the light reflected at the sample surface.



ISO 13468

Measurement conditions are kept equal during calibration and measurement due to an additional opening in the sphere. During calibration the sample is placed at the compensation port. For the actual measurement, the sample is changed to the entrance port. Thus, the so-called sphere efficiency is independent of the reflection properties of the sample.

Differences between the two methods can be approximately 2 % Total Transmittance on clear, glossy samples.

The instrument objectively measures Total transmittance and Haze according to the ASTM and ISO standard methods.

The new optical design allows simultaneous measurement without placing the sample to a separate compensation port (dual beam method).

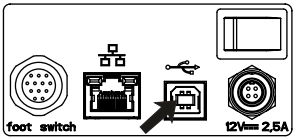
15.5 Notes

- During measurement, the mean is taken across the illuminated surface of the specimen. As it cannot be assumed that the optical properties are the same for the entire surface of the specimen, we recommend to take readings at several points on the specimen.

- There is little sense in taking readings from dirty, scratched, or otherwise damaged specimen areas, unless you wish to obtain the measurements as an indication of the extent of the damage, e.g. measuring abrasion resistance (Taber Abraser).
- Specimen surfaces must be as plane-parallel as possible; a wedge shape will deflect light.
- When taking comparative measurements, note the specimen thickness, since absorbance and scattering increase with the thickness.
- Differences in reflection characteristics may affect transparency measurements. If specimens are glossy on one side and dull on the other, the same surface should always be directed toward the sphere aperture (matte side recommended).
- Optical quality cuvettes with plane-parallel walls and an edge length of at least 50 mm can be used to take readings on liquids.
- In practice, it may be important to know whether scattering is caused by internal scatterers or surface structure. In these cases, surface scattering can be eliminated by immersing the specimen during the readings in a liquid with the same refractive index as the specimen. Only bulk scattering will then come into play.

16. Interface

16.1 Connecting the instrument to a PC



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

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.

17. Technical Data

Instrument:

Measurement geometry:	0°/diffuse
Sample Port:	25.4 mm(0.85 in.)
Measurement Area:	18.0 mm(0.65 in.)
Spectral response:	CIE luminosity function y
Illuminants:	ASTM-D1003 CIE-C, CIE-A ISO 13468, 14782 CIE-D65
Measurement range:	
Transmittance:	0–100%
Haze:	0–100%
Clarity	0-100%
Repeatability:	± 0,1 units*
Reproducibility:	± 0,4 units*
Statistics memory:	5000 readings
Interface:	LAN, USB 2.0, additional front USB port for flash drive
Operating temperature:	+ 10°C to + 40°C (+ 50 to 104°F)
Storage temperature:	0°C to +50°C (+ 32 to 122°F)
Dimensions:	62 x 33 x 22 cm (24 x 13 x 9 in.)
Weight:	18 kg (40 lbs)

*standard deviation

Technical Data subject to change without notice.

External power supply:

Input	100 - 240 V ~ , 50/60 Hz, 620 mA
Output	12 V ⎓, 2,5 A

18. 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 traceability 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.

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 China
Instruments Service
BYK (Tongling) Co., Ltd.
Shanghai Branch
3/F, Bldg A, No8, Lane 1305
Huajing Road, Xuhui District
Shanghai 200231
P.R. China
Tel.: +86(021)6496-7931
Fax: +86(021)6496-7932

Brazil

BYK-Gardner Latin America
Rua Itaporanga, 340
Bairro Paraíso -Santo André-SP
CEP 09190-640
Brazil
Tel.: +55-11-2147-1199
Fax: +55-11-2147-1168

19. 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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