BYK

byko-visc RT

Rotational Viscometer

Operating Manual

A member of ALTANA

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Introduction

Dear customer,

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

Therefore, in addition to our products, we offer many VALUE-ADDED services:

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

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

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

Your BYK-Gardner Team

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

1.1 For Your Safety

CAUTION: Familiarization with safety instructions necessary

Failure to read and understand the safety instructions threatens your health and can damage the instrument. Read the safety instructions before you use the instrument the first time.

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

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

WARNING: Injuries possible

This manual cannot address all of the safety considerations associated with its use. It is the responsibility of the user to consult this manual and establish appropriate safety practices for use with this equipment and the individual material being tested.

The byko-visc viscometers are designed and intended for the use described in the manual. Using the viscometer for other purposes for which it was not designed may reduce or eliminate the protection offered by the features of the device. Serious injury may result.

This instrument is not intended for use in a potentially hazardous environment or with materials that may release toxic or flammable gases at the temperatures encountered during testing.

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

WARNING: Severe material damage

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

1.2 Symbols

The label on the instrument contains the following symbols.

Do not dispose of this product together with your household trash. Please refer to the information of your local community or contact our dealers regarding the proper handling of end-of-live electric and electronic equipment. Recycling of this product will help to conserve natural resources and prevent potential negative consequences for the environment and hum health caused by inappropriate waste handling.

Read the instruction manual before operation.

The manufacturer or importer affirms the good's conformity with European health, safety, and environmental protection standards. Details see Declarations 11.

This symbol denotes the TUV certification mark for the United Kindom and the European Union.

This symbol denotes the TUV certification mark for Canada and the United States.

1.3 Disclaimer

Exclusion of Liability

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

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

See also

- Intended Use 13

1.4 Copyright

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

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

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

1.5 Declarations

1.5.1 Declaration of Conformity (EU)

We,

BYK-Gardner GmbH

Lausitzer Strasse 8

D-82538 Geretsried

declare, that the instrument **byko visc RT** complies with the requirements of the following EU directives:

- 2014/30/EU - Electromagnetic Compatibility
- 2014/35/EU - Low Voltage

The following harmonized standards were applied:

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

Geretsried, November 2021

Frank R. Wagner
Managing Director

1.5.2 Declaration of Conformity (UK)

Hereby,

BYK-Gardner GmbH

Lausitzer Strasse 8

D-82538 Geretsried

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

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

The following harmonized standards were applied:

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

Geretsried, November 2021

Frank R. Wagner
Managing Director

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System Description

The byko visc RT is a benchtop viscometer which is operated by the touch screen. The power button - used to switch on the instrument - is located on the rear of the instrument above the power connector. Using the touch screen display icons and functions can be selected directly. The instrument can be used to repeatably measure viscosity of many types of liquid samples in the laboratory and in production.

2.1 Intended Use

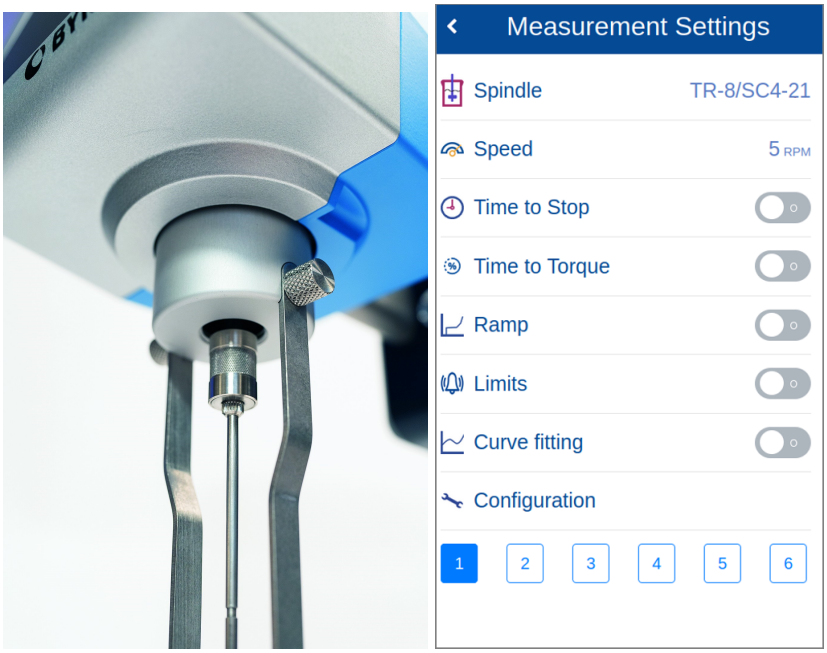
Thank you for acquiring your new byko visc RT viscometer from BYK-Gardner.

The byko visc RT is a rotational viscometer, based on the measurement of the torque of a rotating spindle in a sample at a specified velocity. Three different available spring torques, as well as various accessories, allow it to cover a wide range of viscosity measurement.

The instrument is designed for indoor use. For supported functions see Feature Matrix 15.

2.2 Measurement Principle

The instrument uses a precise stepper motor drive to rotate a specially designed spindle at a specific RPM in a sample of liquid. A torque spring is connected between the spindle immersed in the sample and a sensor system to determine the amount of torque required to rotate the spindle through a sample. The torque requirement can then be used to calculate the viscosity of the sample.



The touchscreen display allows user interaction with the instrument and the display of measurement results. Results can also be saved and transferred to a USB thumb drive for importation into Microsoft Excel on a PC for further data analysis.

2.3 Feature Matrix

The BYK-Gardner byko-visc RT product family offers a wide range of high quality benchtop viscometers. For every purpose the best instrument is available. The byko-visc RT product group offers the premium models. The byko-visc RT Lite product group offers the economic models.

	byko-visc RT	**byko-visc RT Lite**
Low viscosity Regular viscosity High viscosity	8356: byko-visc RT L 8357: byko-visc RT R 8358: byko-visc RT H	8350: byko-visc RT Lite L 8351: byko-visc RT Lite R 8352: byko-visc RT Lite H
Measurement range	Low: 1(*) - 6,000,000 cP Regular: 5(*) - 40,000,000 cP High: 300 - 320,000,000 cP (*) With Low Viscosity Adapter (LVA) accessory	Low: 1(*) - 2,000,000 cP Regular: 5(*) - 13,000,000 cP High: 300 - 106,000,000 cP (*) With Low Viscosity Adapter (LVA) accessory
Spindles included	byko-visc RT L: 4 byko-visc RT R: 6 byko-visc RT H: 6	byko-visc RT Lite L: 4 byko-visc RT Lite R: 6 byko-visc RT Lite H: 6
Speed range	0.1 to 250 rpm	0.3 to 200 rpm in 21 steps
No. of speeds	Freely selectable within speed range	21
Repeatability	0.2%	0.2%
Accuracy	1.0% of full-scale range	1.0% of full-scale range
Preset memory	6 memory locations for measurement settings presets	-
Measurement mode	Multi-point	Single-point
Measurement features	Curve Fitting, Multi-Step Ramp, QC Limits, Time to Stop, Time to Torque	Time to Stop, Time to Torque
Data display features	Current viscosity, torque, temperature, graph and table over time	Current viscosity, torque, temperature
Temperature measurement	PT100 temperature probe	PT100 temperature probe (optional)
Product image		

For more product details see https://www.byk-instruments.com/c/1535#1896.

3

Getting Started

The entire system consists of instrument, power supply and a set of spindles.

3.1 Delivery Content

The items listed below are contained in the packaging:

- Rotational viscometer instrument mounted to adjustable stand
- 4 spindles for L spring models, 6 spindles for R and H spring models
- Temperature probe (standard on RT, optional accessory on RT Lite)
- Documentation: Safety Instructions and Short Instructions
- Certificate with instrument calibration data
- External power supply
- Spindle storage rack
- Spindle guard

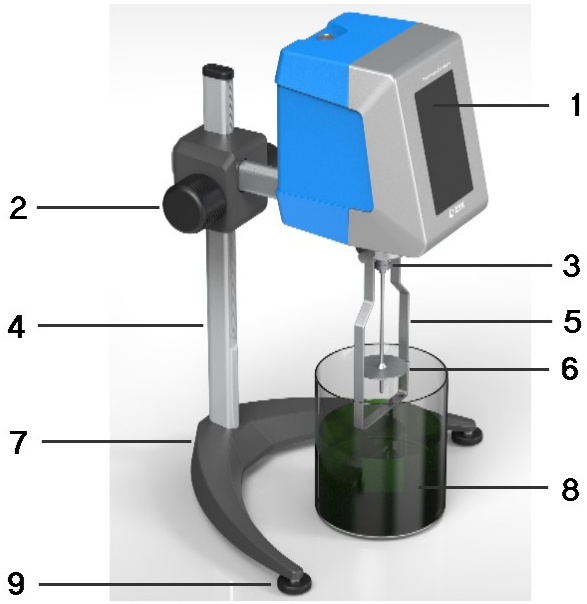
Please contact BYK-Gardner if any item is missing or damaged.

NOTICE

Retain the packaging in case you want to ship the instrument at a later date.

3.2 Control Elements

Control of the instrument is provided by following elements.



1 Touch-screen display

2 Adjustable stand:

- Knob for vertical adjustment
- Lock for horizontal adjustment

3 Spindle attachment (protective cap removed)

4 Support rod for stand

5 Spindle protector (form depends on model)

6 Spindle

7 Base for stand

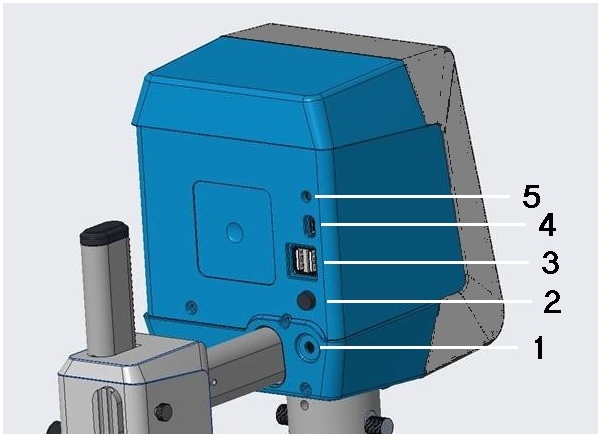
8 Sample container(*)

9 Adjustable feet (3x)

(*) Not included, recommended: 600 ml low form glass beaker (see Ordering Information 59)

3.3 Viscometer Head

On the back of the viscometer head following controls / connectors are provided.



1 External power supply

2 Power button: Power on and off

3 USB Type A:

- USB flash drive
- USB printer (or vice versa)

4 USB Type C: PC communication(*)

5 Temperature probe

(*) Not used yet, foreseen for upcoming firmware versions

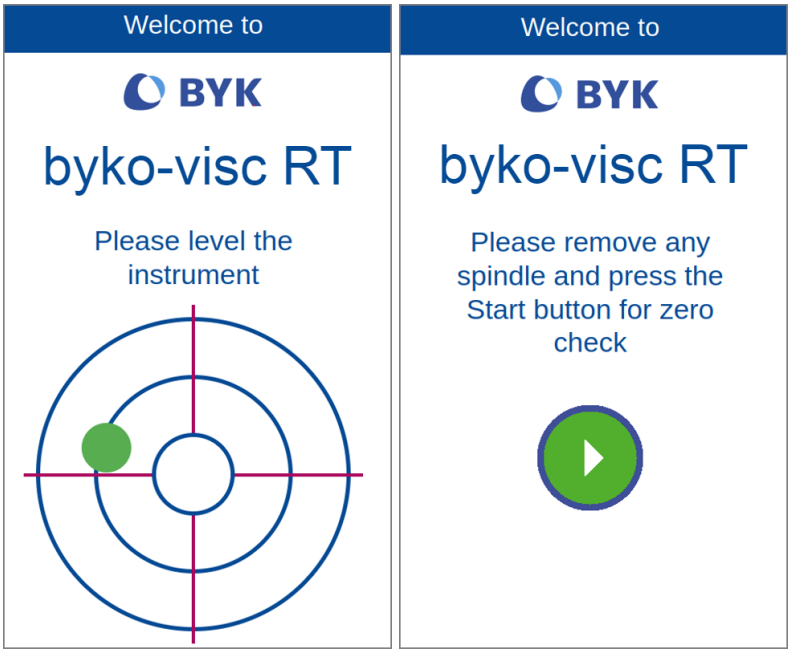
NOTICE

Before switching off the instrument always return to the Main Menu 20 to save all data. In order to turn off the unit press the power button (2) and the unit will shut down. After switch off always wait 30 seconds before you switch on again. To disconnect the unit from the power source unplug the external power supply from (1).

3.4 Instrument Set-up

Perform following steps:

1. Place the viscometer in a suitable location.
2. Turn protective cap clockwise to access spindle attachment.
3. Plug the power supply into a mains outlet and plug the output cable into the back of the viscometer head.
4. Turn instrument on with the power button located on the back of the viscometer head.
5. After power on a level check takes place; use the adjustable feet to level the instrument.
6. A message appears when instrument is leveled; after 3..5 seconds the zero screen is displayed.
7. Press green **Start** button to start the zero check; the zero viscosity point is automatically determined.



After finishing zero check the instrument will automatically go to the main menu.

CAUTION!

To avoid damage of the precise mechanic: Always remove the spindle and attach the protective cap before moving the instrument.

NOTICE

Tap on the icon with the question mark to open the context sensitive help.

3.5 System Operation

The instrument is operated using the icons on the touch-screen display to select functions and configure settings.

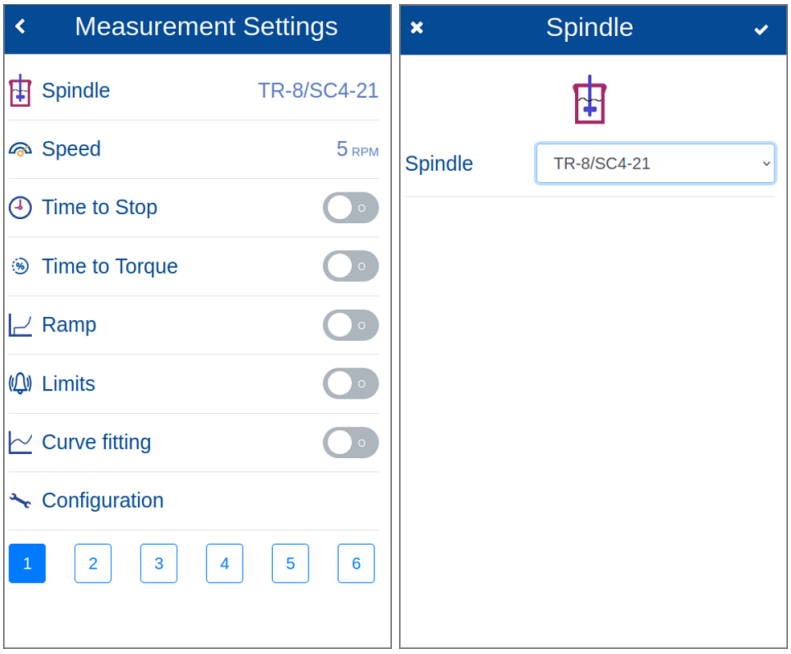
3.5.1 Main Menu

In the main menu the following symbols are displayed.

	**Viscosity Measurement** Perform measurements using existing parameters, change parameters and save results in instrument memory.
	**Browse Measurements** View and manage measurement results saved in instrument memory.
	**Measurement Settings** Change measurement settings and / or instrument configuration.

3.5.2 Configuration Options

To configure the system the following options are available.



	**Activated** The current option or function is active. Tap to deactivate.
	**Deactivated** The current option or function is inactive. Tap to activate.
	**Save** Save your changes and go back to previous screen.
	**Back** Go back to previous screen with existing settings.
	**Close** Go back to previous screen without saving.

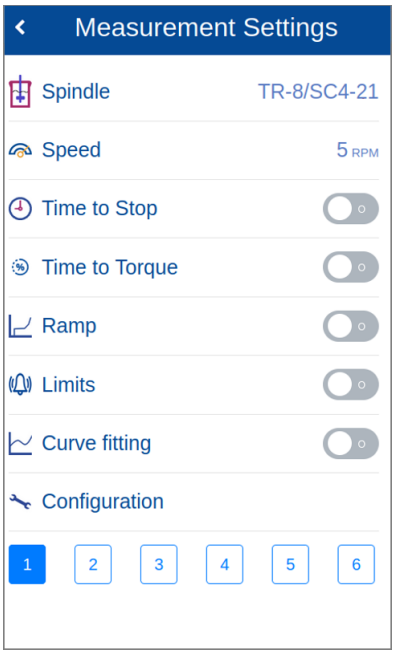
NOTICE

If there is a check mark for **Save** it is to be tapped to save the changes in the current screen. If there is no such check mark all changes are automatically saved.

4

Measurement Settings

Tap the settings icon in the main menu to manage settings that are **often** changed. Before starting with measurements these parameters may have to be controlled.



For settings that are **seldom** changed see System Configuration 29 .

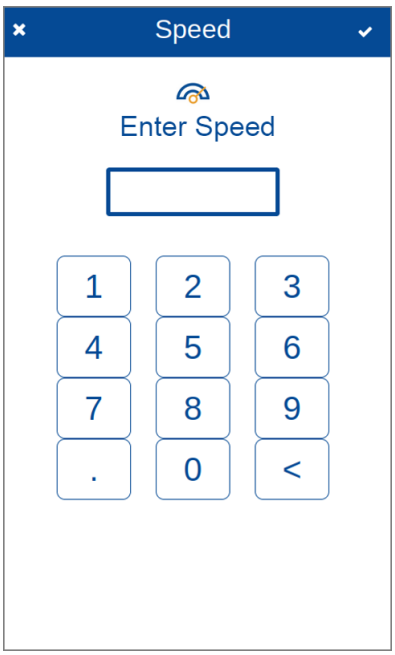
4.1 Spindle

Here the spindle currently mounted can be selected to announce it to the measurement system.

The spindle to be selected depends on the viscometer model, namely the spring torque. Make sure that spindle matches instrument. The spindle type is printed on the head of the spindle.

4.2 Speed

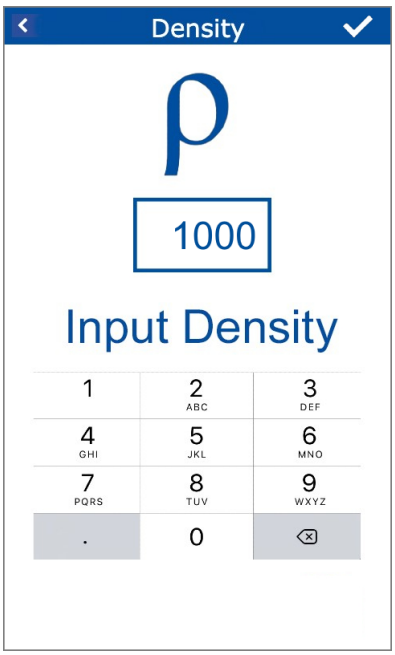
Enter the speed of the spindle in Revolutions per Minute (RPM).



Type in the requested value - between 0.1 and 250 - and save with the check mark.

4.3 Density

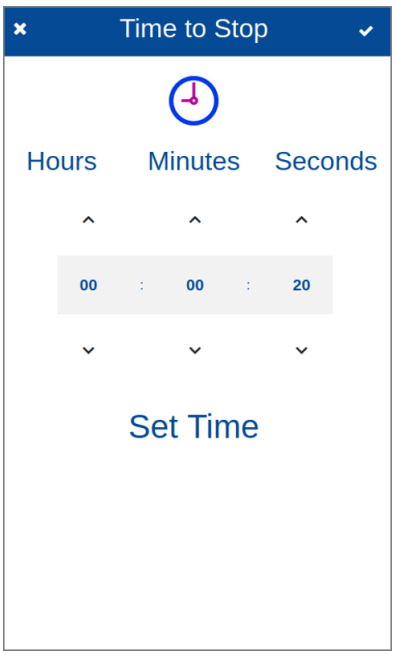
Enter the target density value of the material to be measured.



This option is available, if activated under System Configuration[29] > Density[30].

4.4 Time to Stop

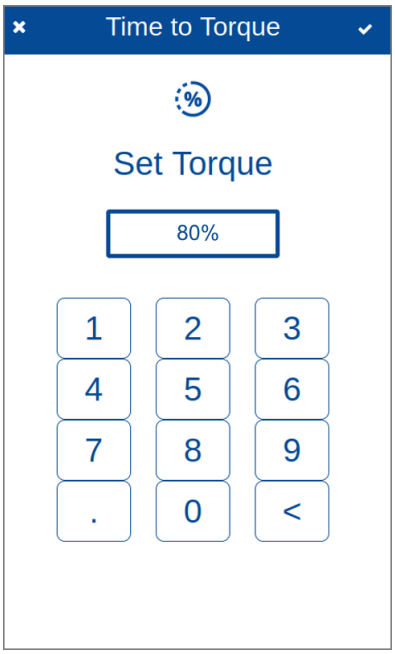
Enter the measurement time here. Activate the option to go the the screen **Time to Stop**.



Use the arrow buttons to enter **Hours**, **Minutes** and **Seconds** and save with the check mark.

4.5 Time to Torque

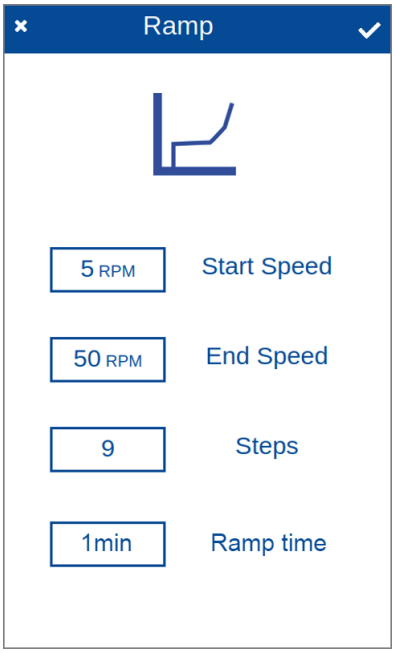
Enter the target torque here. Measurement will stop, when the given value has been reached. Activate the option to go the the screen **Time to Torque**.



Enter the value (in percent) and save with the check mark.

4.6 Ramp

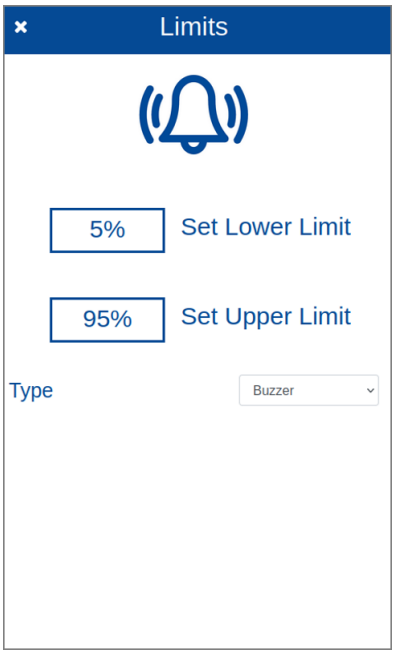
Enter a dynamic speed range here. Instrument will adjust speed accordingly. Activate the option **Ramp** and tap the values to go the details screen **Ramp**.



Enter a **Start Speed** greater Zero (e.g. "5") and an **End Speed** (e.g. "50") and the required **Steps** for increasing / decreasing the speed (e.g. "9"). The measurement time for the ramp-up is calculated by the instrument.

4.7 Limits

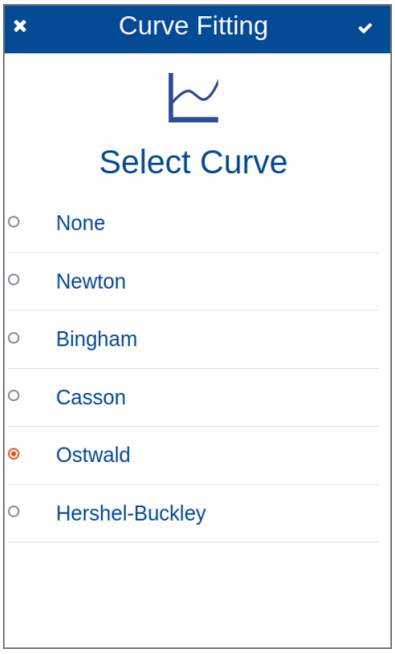
Here you can specify torque values to be observed for quality control. An alarm can be activated if current sample is not within the give range.



Tap on **Set Upper Limit** to enter the maxmium torque values (e.g. "5%"). Repeat for **Set Lower Limit** (e.g. "95%"). Finally select the **Type** for the alarm: **Buzzer**, **Display Flash** or **Both**.

4.8 Curve Fitting

Select the curve fitting model according to the rheological behavior of your sample; this curve fitting should be applicated on the ramp curve you did before on your sample and it gives rheological parameters you need to identify your products.



Following curves can be selected:

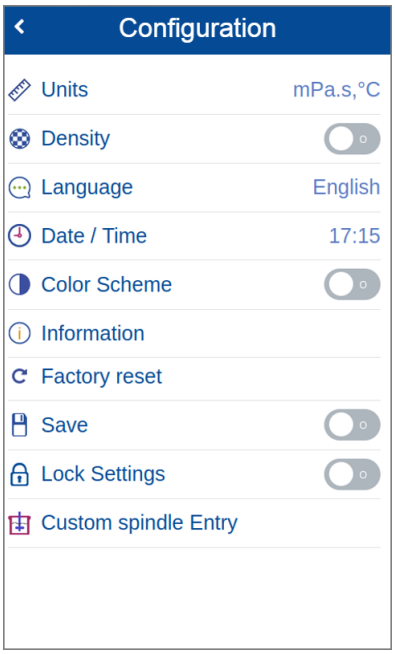
- None
- Newton
- Bingham
- Casson
- Ostwald
- Hershel-Buckley

Select the required curve from the list and save with the check mark.

5

System Configuration

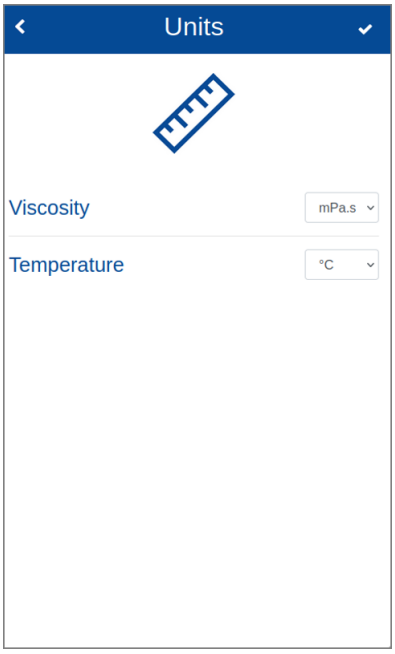
Tap the settings icon in the main menu and tap on **Configuration** to manage settings that are **seldom** changed.



Before starting with measurements the configuration may have to be controlled.

5.1 Units

Select the units used for measurement.



For the **Viscosity** following units are supported:

- Milli Pascal Second: **mPa.s**
- Centepoise: **cP**

For the temperature following units are supported:

- Celsius: **°C**
- Farad: **°F**

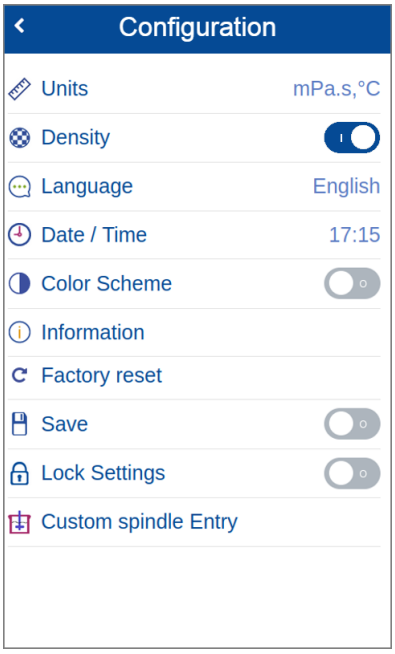
Select the required unit and save with the check mark.

NOTICE

The configuration for **Units** will be used as default and can also be changed directly during measurements.

5.2 Density

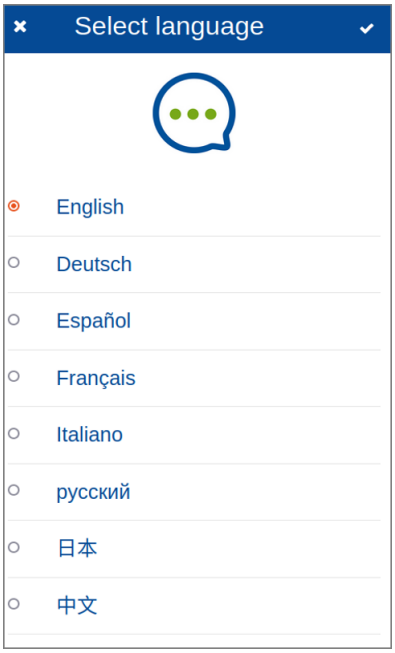
If this option is activated the Density[24] appears in the Measurement Settings[23].



If the option is active, the instrument switches to a special measurement mode, see Density[43].

5.3 Language

Select the language of the user interface here.



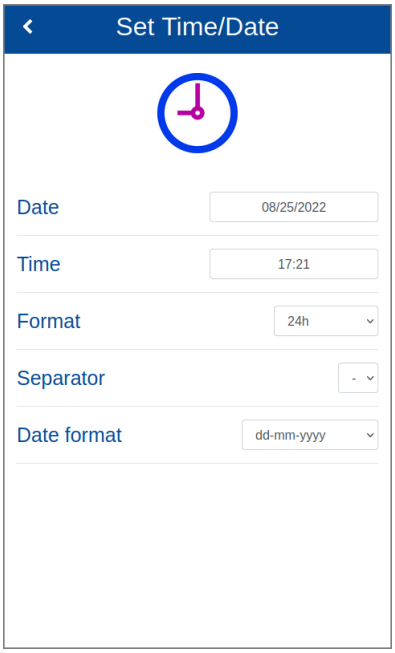
Following languages are supported:

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

Select the required language and save with the check mark.

5.4 Date / Time

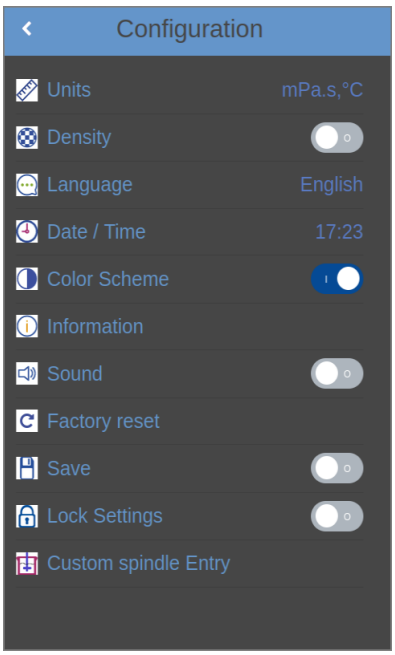
Here you can enter date, time and the format.



The **Time** is entered with **Hour** and **Minute**. The **Date** is entered with **Day**, **Month** and **Year**. For **Date** and **Time** the **Format** to be displayed can be selected.

5.5 Color-Scheme

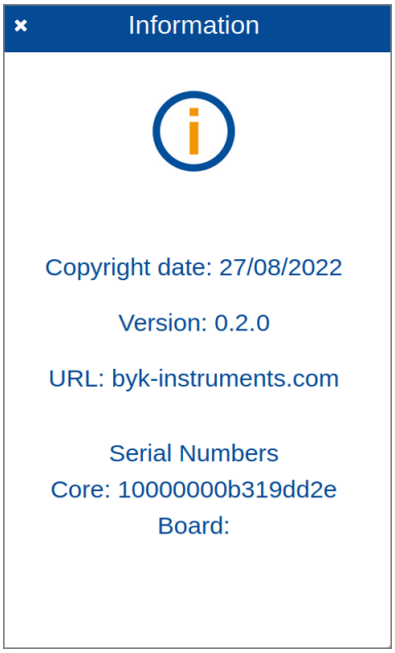
If this option is activated the white background of the display turns to black. This option is preferred in case of darker surroundings.



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

5.6 Information

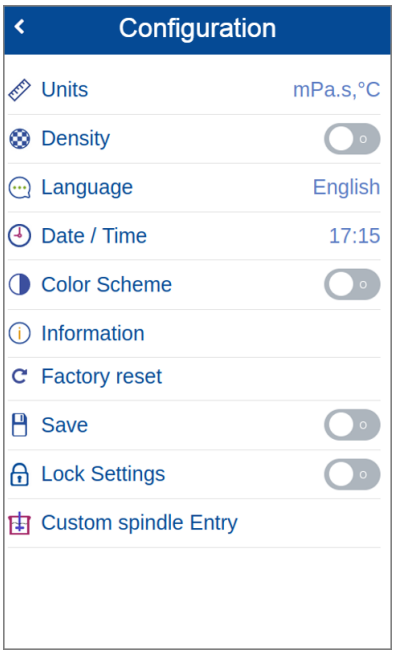
Under this option the details about instrument, firmware version and serial number can be retrieved.



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

5.7 Factory Reset

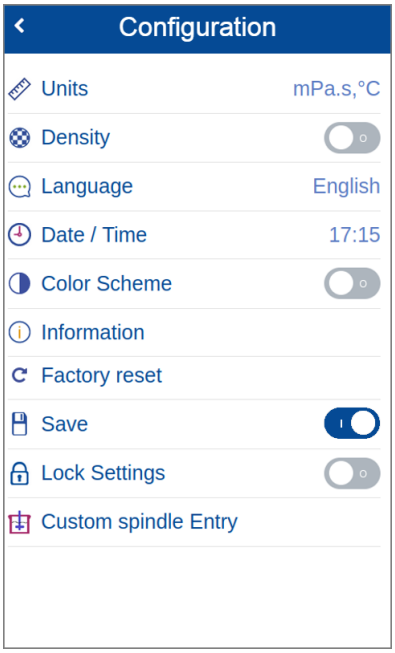
This option can be used to reset instrument to the factory settings.



Tap on **Factory Reset** and follow the instructions on the display to perform the reset.

5.8 Save Results

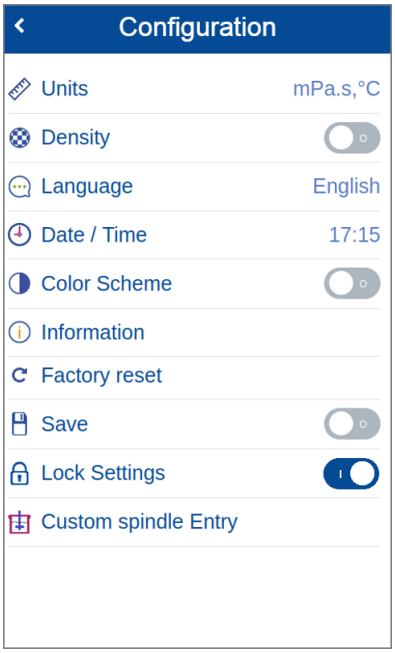
This option can be used to turn on saving the results of the viscosity measurements, see Browse Measurements 51.



If this option is deactivated the measurements results are not saved and will not be shown in the browse screen.

5.9 Lock Settings

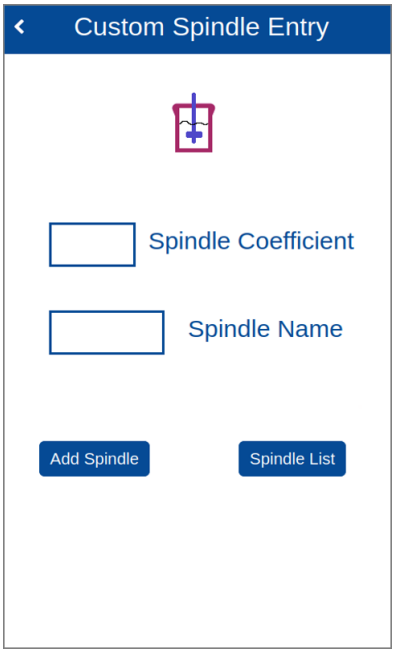
This option can be used to lock the current settings against unintentional changes.



If this option is deactivated the settings can be changed again.

5.10 Custom Spindle

This option can be used to announce custom spindles to the viscosity measurement system.



For custom spindles the specific **Spindle Coefficient** and a **Spindle Name** to identify the spindle is to be entered.

6

Perform Measurements

Tap the measurement icon in the main menu to access the measurement screen. For viscosity measurements perform following steps:

6.1 Attach Spindle

Perform following steps:

1. If protective cap is attached, turn it clockwise to remove.
2. Move spindle attachment upwards, insert spindle and release attachment.
3. To remove the spindle do the same and release the spindle.

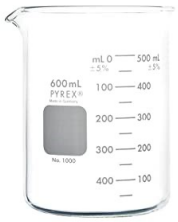
The spindle attachment can be kept with one hand.

The spindle can be attached with the other hand. On the spindle head the type label is available.

The spindle attached has to be selected in Measurement Settings[23] > Spindle[23] - or directly in Measure Viscosity[38].

6.2 Measure Viscosity

To measure viscosity a sample container is necessary (not part of delivery). We recommend a 600 ml low form glass beaker.

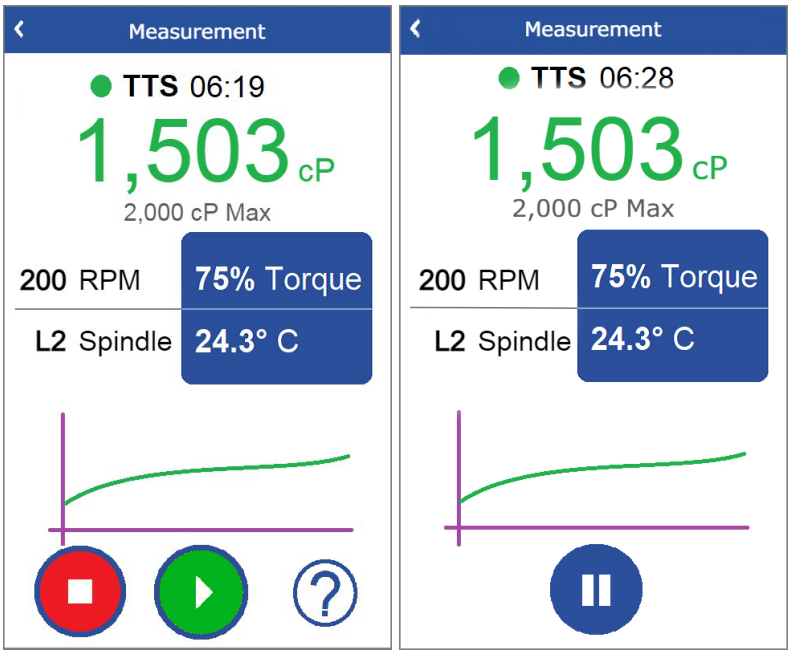


Perform following steps:

1. Go to the main menu.
2. Tap the measurement icon.
3. The measurement screen is displayed.
4. Lower unit into sample and tap the green **Start** button.
5. The measurement is started using the existing settings.

Re-adjust vertical and horizontal position of the instrument head, if required - see Control Elements[18].

The measurement screen displays the following items.

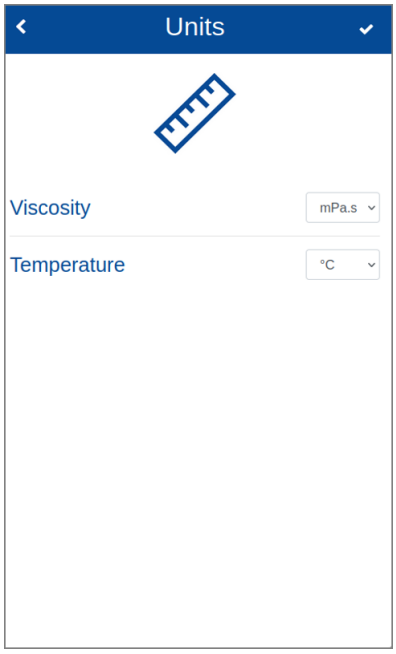


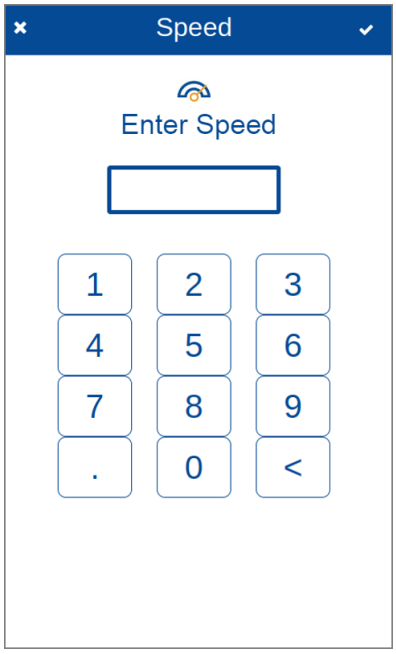
1	TTS / TTT	Counter for Time to Stop or Time to Torque
2	Viscosity	Average of measurements - taken every spindle revolution, tap unit to change
3	Maximum	Maximum value, depending on current spindle and speed
4	Speed	Current spindle speed in rotations per minute (RPM), tap value to change
5	Spindle	Identifier for current spindle, tap entry to change
6	Torque	Current value in percent: Values < 15% or > 95% indicate that speed or spindle settings should be changed (invalid measurement)
7	Temp	Current temperature of sample in °C or °F (if temperature probe is attached)
8	Graph	Live updating graph of viscosity over time
9	Start	Green **Start** button: Start and resume measurement
10	Pause	Blue **Pause** button: Pause measurement
11	Stop	Red **Stop** button: End measurement and save results
12	Help	White **Question** mark: Open context-sensitive help

6.3 Change Parameters

During measurement following parameters can be changed directly:

1. Units[29]: Tap on the unit currently shown.
2. Speed[24]: Tap the speed in RPM currently shown.
3. Spindle[23]: Tap the spindle name currently shown.



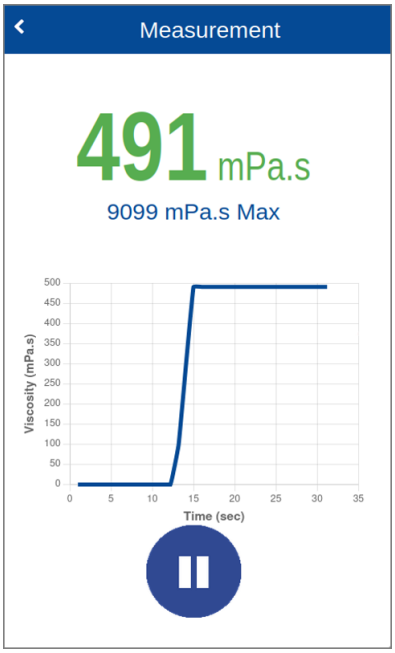


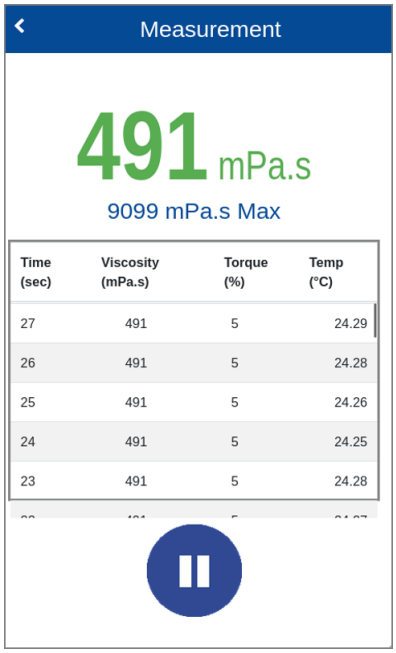
To change all other settings, stop the measurement and go back to the Measurement Settings[23].

6.4 Access all Screens

Swipe left and right to access the other screens:

- Graph: Measurement data in graphical form
- Table: Measurement data in table form





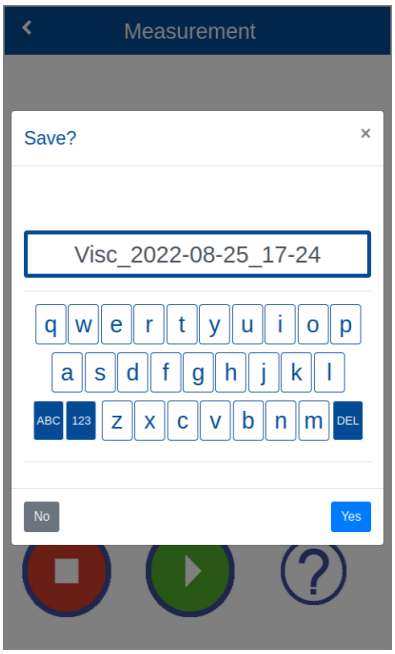
You can also double swipe left and right to access the other screens.

6.5 End Measurement

To end the measurement first tap the blue **Pause** button and than on red **Stop** button.

To end the measurement directly tap the **Back** button in the title row.

A confirmation for saving the data is displayed.



Tap on the file name to change it, if required. For saving you have following options:

- **No**: Current measurement data is not saved, use this to make quick measurements without saving.
- **Yes**: Current measurement data is saved in instrument memory.

NOTICE

The dialog box **Save?** will be displayed, if option Save[34] is active in System Configuration[29].

Go to Browse Measurements[51] to check the results or make a new measurement.

7

Special Measurements

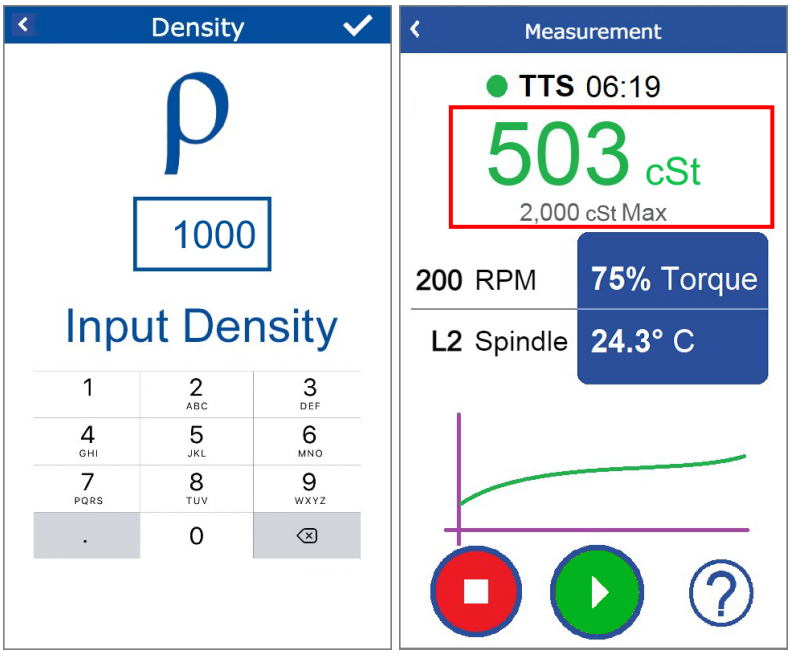
The instrument supports various viscosity measurement modes:

- Density 43
- Time to Stop 44
- Time to Torque 45
- Ramp-Up 47
- QC-Limits 46
- Curve Fitting 48
- Temperature 49

7.1 Density

To use the **Density** feature perform following steps:

1. Go to System Configuration 29 and activate the option **Density**.
2. Go to Measurement Settings 23 and tap on the option **Density**.
3. Enter the target density value of the material to be measured.
4. Perform a measurement and check the results.

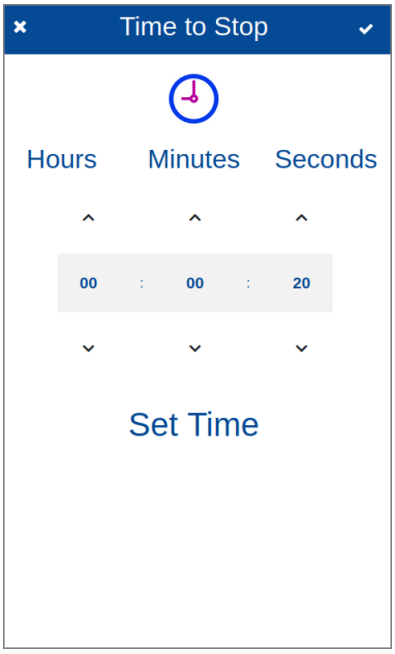


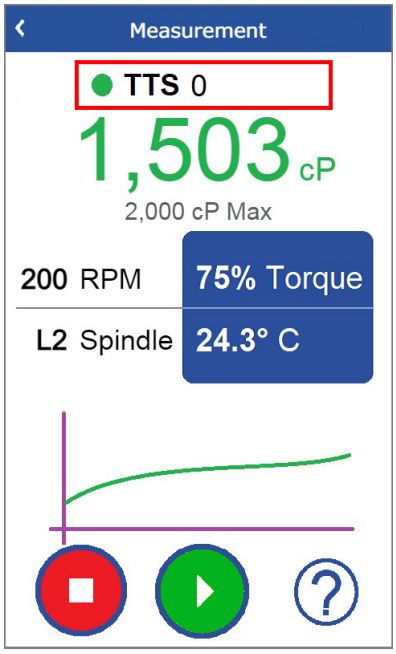
The density is measured in Centistokes (cSt).

7.2 Time to Stop

To use the **Time to Stop** feature perform following steps:

1. Go to Measurement Settings[23] and tap on **Time to Stop**.
2. Enter the time duration the measurement should last.
3. Perform a measurement and check the remaining time.





The measurement is stopped when the time has expired. Press **Play** to restart measurement.

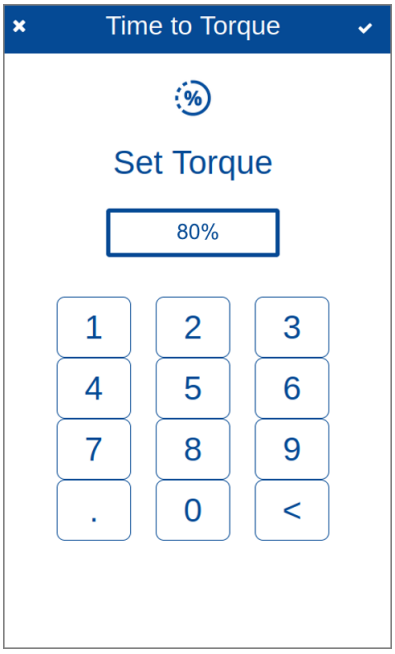
NOTICE

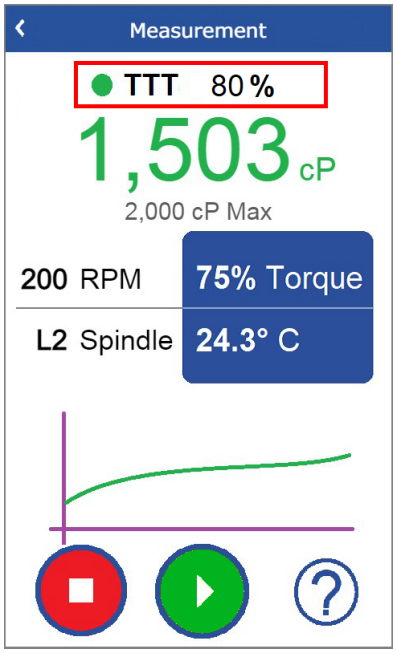
The time feature can be used alternatively to Time to Torque[45].

7.3 Time to Torque

To use the **Time to Torque** feature perform following steps:

1. Go to Measurement Settings 23 and tap on **Time to Torque**.
2. Enter the target torque at which the measurement should stop.
3. Perform a measurement and check the current torque value.





The measurement is stopped when the given torque has been reached. Press **Play** to restart measurement.

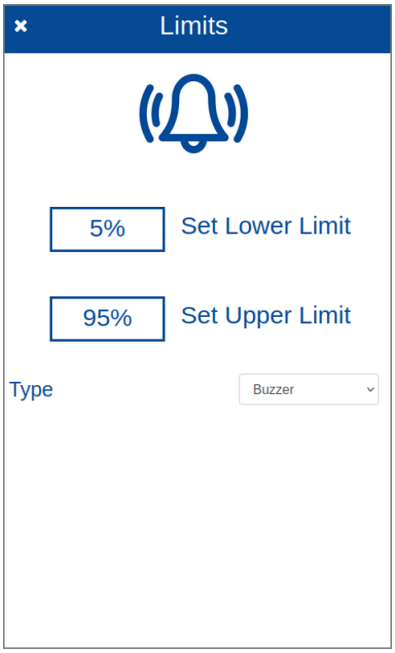
NOTICE

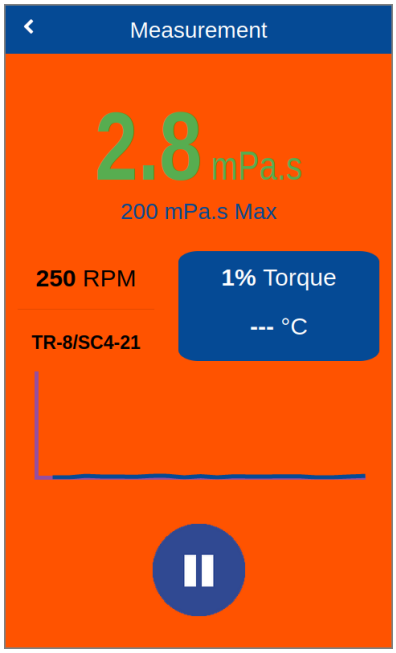
The torque feature can be used alternatively to Time to Stop 44.

7.4 QC-Limits

To use the **QC Limits** feature perform following steps:

1. Go to Measurement Settings[23] and tap on **Limits**.
2. Enter the required values for **Upper** and **Lower** limit.
3. Select the required Alarm type: **Buzzer** or **Flash** or **Both**.
4. Perform a measurement and check the current torque value.





In the given example the display will start to flash if the torque measured is below 20% or above 60% of target value.

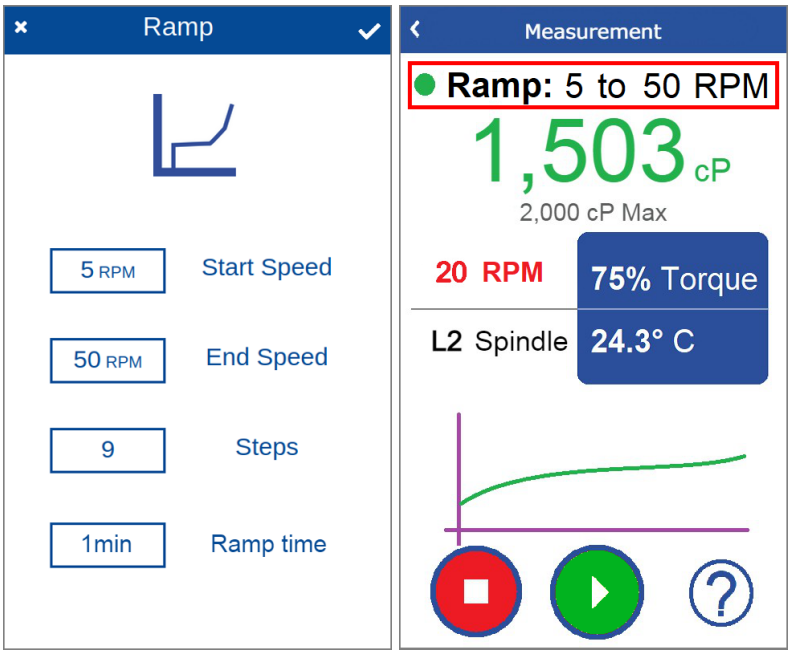
NOTICE

The limits feature can be combined with Ramp[47] and with Time to Stop[44] or with Time to Torque[45].

7.5 Ramp-Up

To use the **Ramp-up** feature perform following steps:

1. Go to Measurement Settings[23] and tap on **Ramp**.
2. Enter the required values for the ramp:
   - **Start speed**: 0.1 ... 150 RPM
   - **End speed**: 0.1 ... 150 RPM
   - **Steps**: 2 ... 500
3. Perform a measurement and check ramp data and current speed in RPM.

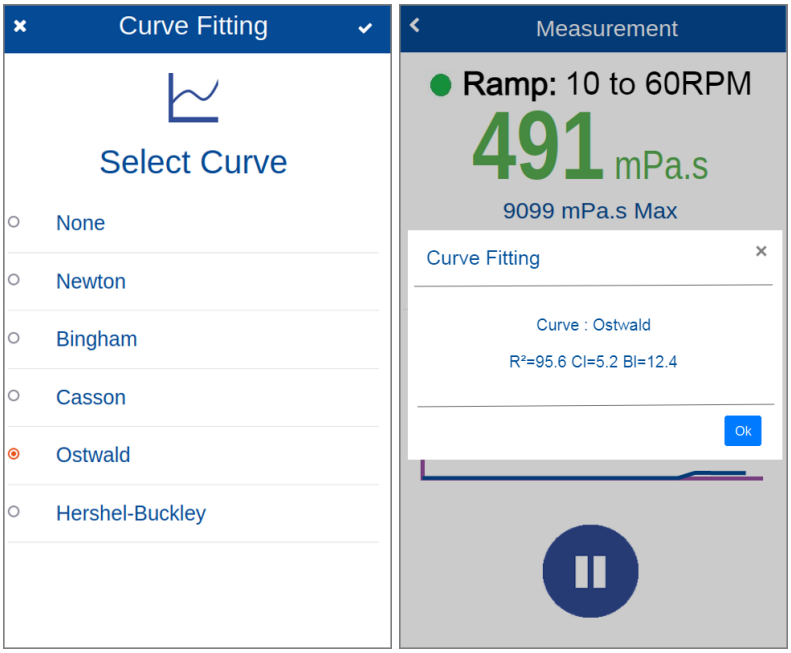


In the given example the instrument will start at 5 RPM, increase to 20 RPM and will end when 50 RPM have been reached. The measurement time for the ramp-up is calculated by the instrument.

7.6 Curve Fitting

To use the **Curve Fitting** feature perform following steps:

1. Go to Measurement Settings[23] and tap on **Curve Fitting**.
2. Select the required curve and save with the check mark.
3. Activating **Curve Fitting** simultaneously activates Ramp-Up[47].
4. Tap on **Ramp** and configure the ramp-up to be measured.
5. Go to Measure Viscosity[38] to start the ramp measurement.



During measurement swipe left or right to access data and table screen. When the ramp has finished, tap on **Back** or **Stop**. The curve fitting results are listed:

- Behavior Index (BI)
- Consistency Index (CI)
- Correlation Factor (R^2)
- Plastic Viscosity (PV)
- Yield Value (YV)

This depends on the curve selected:

- **Newton**: R^2, PV
- **Bingham**: R^2, PV, YV
- **Casson**: R^2, PV, YV
- **Ostwald**: R^2, CI, BI
- **Hershel-Buckley**: R^2, CI, BI, YV

With Export to USB[52] / Print to USB[53] following data will be exported:

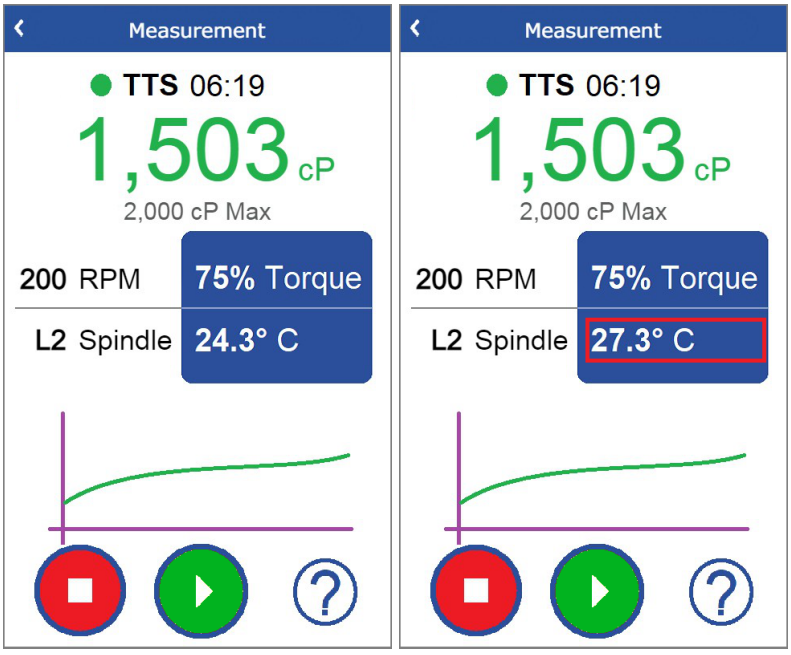
- Name of measurement file
- Curve fitting data
- Ramp data

7.7 Temperature

The temperature probe PT100 is part of the delivery.

To measure the temperature of your sample perform following steps:

1. Attach the temperature probe to the Viscometer Head 18.
2. Fix the cable for the probe on the spindle protector.
3. Insert spindle and temperature probe into the sample.
4. Perform a measurement and observe the temperature.

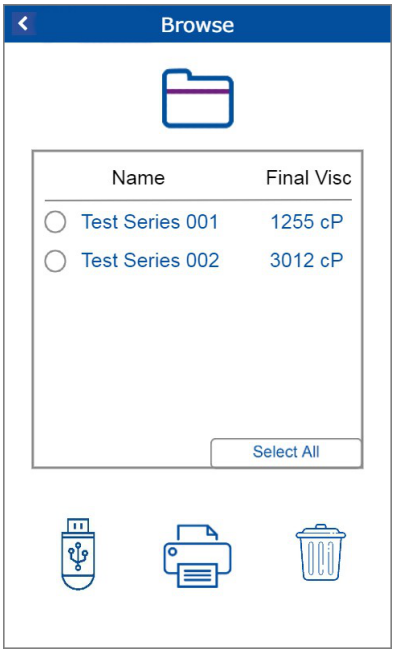


Tap on the temperature value to change the Units 29, if required.

8

Browse Measurements

Using this function you can manage the measured data. Click on icon **Browse**. The final viscosity value for a measurement is displayed here.



Following operations are supported:

- Rename Test Series[51]
- Export to USB[52]
- Print to USB[53]
- Delete Data[54]

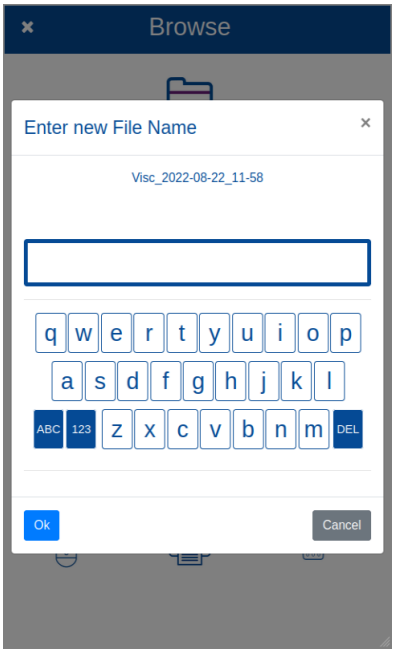
NOTICE

You can select single or multiple test series. Alternatively you can select all test series at once.

8.1 Rename Test Series

You can rename existing test series. Perform following steps:

1. Tap the check box for the series to be renamed.
2. Tap on button **File Name**.
3. Enter the new file name.
4. Tap on **OK** to save name.



NOTICE

The default file name can be configured in Date / Time 32 .

8.2 Export to USB

Export to USB to see all viscosity values measured over time. Perform following steps:

1. Attach USB flash drive to the viscometer head.
2. Select all test series to be exported.
3. Tap on the **Export USB** icon.
4. Wait until process finishes.
5. Connect USB drive to PC.
6. Use MS Excel to view data.

	A	B	C	D	E	F
1	Time(sec)	Viscosity(cP)	Torque(%)	Speed(RPM)	Temperature(°C)	
2	0	0	0	0	-24484	
3	1	0	0	0	-24484	
4	2	0	0	0	-24484	
5	3	0	0	0	-24484	
6	4	0	0	0	-24483	
7	5	0	0	0	-24481	
8	6	0	0	90	-24482	
9	7	0	0	124	-24484	
10	8	0	0	150	-24484	
11	9	0	0	150	-24484	
12	10	2	0	150	-24488	
13	11	2	0	150	-24490	
14	12	220	41	150	-24491	
15	13	532	99	150	-24487	
16	14	532	99	150	-24488	
17	15	532	99	150	-24488	
18	16	532	99	150	-24488	
19	17	532	99	150	-24491	
20						
21	532					
22						

NOTICE

The export format is Comma Separated Values (CSV). In MS Excel create an empty sheet and select **Data** > **Get Data** > **From File** > **From Text/CSV** to convert the data in your file.

8.3 Print to USB

You can directly print a test series to a USB printer. Perform following steps:

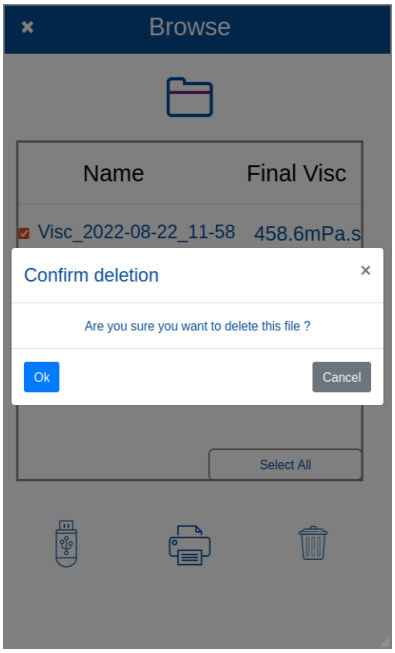
1. Attach USB printer to the viscometer head.
2. Select all test series to be printed.
3. Tap on the **Print USB** icon.
4. Wait until process finishes.

We suggest a USB label printer, for example the Dymo Labelwriter 450 or 550.

Depending on paper role you can print labels for the probes or just paper output.

8.4 Delete Data

Measurement data not required anymore can be deleted from instrument memory. Tap the test series to be deleted - to delete all test series at once tap on button **Select All** - and tap on button **Delete**.



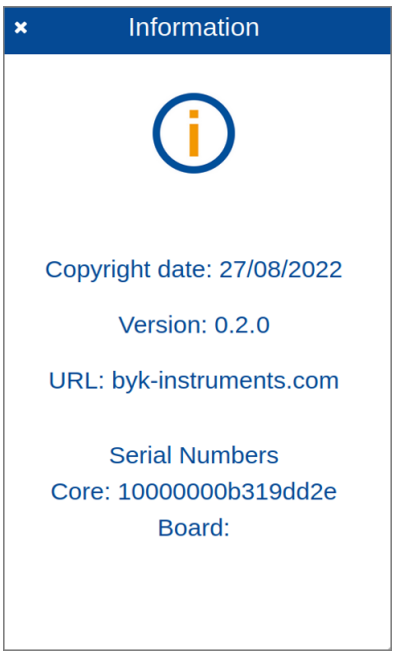
Tap on **Yes** to confirm the request. The selected objects are deleted. To abort the deletion tap on **No**.

9
Appendix

9.1 Firmware Update

To update the firmware of your instrument perform following steps:

1. Go to System Configuration[29] and tap on **Information**.
2. Check the current firmware version.
3. Get the new firmware, it is a compressed file of type "byko_update_x.y.z.tar.gz".
4. Copy the file into root directory of a USB flash drive.
5. Go to the Main Menu[20].
6. Attach the flash drive to the Viscometer Head[18].
7. The new firmware is detected and automatically installed.
8. Do not switch off the instrument during the update!
9. The system performs a reboot to load the new firmware.
10. Check the new version in the information screen.



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

NOTICE

The file with the new firmware will automatically be deleted from the USB flash drive.

9.2 Technical Data

All technical data are subject to change without notice.

9.2.1 Instrument

Catalog number	8356: byko-visc RT L (Low viscosity) 8357: byko-visc RT R (Regular viscosity) 8358: byko-visc RT H (High viscosity)
Measurement range	byko-visc RT L: 1* - 6,000,000 cP byko-visc RT R: 5* - 40,000,000 cP byko-visc RT H: 300 - 320,000,000 cP * With Low Viscosity Adapter (LVA) accessory
Spindles included	byko-visc RT L: 4 byko-visc RT R: 6 byko-visc RT H: 6
Speed range	0.1 - 250 rpm
No. of speeds	Freely selectable within speed range
Repeatability	0.2%
Accuracy	1.0% of range
Preset memory	6 memory locations for measurement settings presets
Measurement features	Curve Fitting, Density, QC Limits, Multi-point Tests
Programmable features	Time to Stop, Time to Torque, Multi-step Ramp
Temperature measurement	PT100 temperature probe
Display	Capacitive color display
Languages	English, German, French, Italian, Spanish, Russian, Japanese, Chinese

9.2.2 General Data

General Data

Usage	Indoor use
Temperature range	10° C to 40° C (50° F to 104° F) for operation 0° C to 60° C (32° F to 140° F) for storage
Relative humidity	Up to 85% non-condensing at 35° C (95° F)
Operation altitude	Up to 2000 m (6561 ft)
Dimensions (LxWxH)	250 x 310 x 470 mm (9.8 x 12.2 x 18.5 in)
Interface	2x USB Type A 1x USB Type C
Weight	6.5 kg (14.3 lbs)
Power supply	24 V ⎓, max. 1.25 A
Fuse	Bourns SF-1206SA250W-2 rated at 2.5 A
External power supply	Input: 100 - 240 V ∿ ; 50 - 60 Hz ; max. 0.7 A Output: 24 V ⎓ ; max. 1.25 A Vendor: Mean Well Model: GE30I24 Safety standards: UL62368-1, CSA C22.2 NO. 62368-1,TUV BS EN/EN62368-1, AS/NZS 60950.1, CCC GB4943,EAC TP TC 004 approved
Overvoltage category	I
Pollution degree	2

9.2.3 Documentation

Safety Instructions	300 003 475	26 languages
Short Instructions	300 003 476	8 languages
Operating Manual	300 003 478 E	English

Download: https://www.byk-instruments.com/p/8356

9.3 Maintenance

Cleaning and Routine Maintenance

Remove the spindle after use to clean. Severe damage to the instrument can occur if the spindle is cleaned while mounted to the viscometer. The stainless steel paddle spindle may be cleaned with solvents required for the material being measured and a non-abrasive cloth.

Remove spilled material from the instrument case and base. Avoid solvents on the faceplate and the color display as they may be seriously damaged by strong solvents.

Restart instrument to check both leveling and zero check in regular intervals.

Troubleshooting

If problems occur, verify that power is being applied, first to the power supply then from the power supply to the instrument. If the power is good, disconnect the power supply from the back of the instrument for at least 30 seconds, reconnect the power supply and turn on the power switch. If problems persist, please contact your local BYK-Gardner office.

Service and Spare Parts

For all service and spare parts requirements, please contact your local BYK-Gardner office.

Do not perform any repairs on the unit. The unit must be opened by BYK-Gardner authorized repair locations only. Repair as this will void the warranty and affect the safety protection.

Ordering Information

byko-visc RT L	byko-visc RT R	byko-visc RT H
Viscometer with stand (8356)	Viscometer with stand (8357)	Viscometer with stand (8358)
Spindle set L (4981)	Spindle set R / H (4986)	
Spindle guard L (300003462)	Spindle guard R / H (300003430)	
Spindle rack (300003438)		
Temperature probe (8363)		
Glass beaker, 600ml, low form (8364)		
Power supply (8360)		

9.4 Service Points

List of global service centers with ISO / IEC 17025 accredited laboratories		
Headquarter Germany c/o BYK-Gardner GmbH Lausitzer Strasse 8 82538 Geretsried / Germany	**Headquarter USA** c/o BYK-Gardner USA 9104 Guilford Road Columbia, MD 21046 / USA	**Headquarter PTE** c/o BYK USA dba Paul N. Gardner 316 N.E. First Street, Pompano Beach, FL 33060 - 6608 / USA
BYK-Gardner Service Point Austria, Hungary, Slovenia c/o Friedrich W. Bloch GmbH Wagramerstrasse 201 1210 Vienna / Austria	**BYK-Gardner Service Point France** c/o Eckart France S.A.S. 31 Rue Amilcar Cipriani 93400 Saint Ouen / France	**BYK-Gardner Service Point Spain** c/o Actega Artística S.A.U. Calle Balmes 8, Suite: 3º2ª 08291 Ripollet / Spain
BYK-Gardner Service Point China c/o BYK (Tongling) Co. Ltd. Shanghai Branch Block 6A, Building A, No 88 Hong Cao Road, Xuhui District, Shanghai 200233 / P.R. China	**BYK-Gardner Service Point India** c/o IMCD India Private Limited 1101-03, B-Wing, ONE BKC, Bandra Kurla Complex, Bandra East, Mumbai, MH. Pin.:400 051. India	**BYK-Gardner Service Point Japan** c/o Tetsutani Co. Ltd. Chuo-ku, Osaka Tokuicho 2-2-2 / Japan
BYK-Gardner Service Point South Latin America c/o MAST Comercial e Importadora LTDA Rua Itaporanga, 340-B, Bairro Paraiso, Santo André - SP, 09190-640 / Brazil		
Complete list: https://www.byk-instruments.com/global-service-centers List of authorized agents: https://www.byk-instruments.com/contact-infos		

Notes

Notes

Notes

A member of ALTANA

Download your manuals from:
https://www.byk-instruments.com/p/8356

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