

Instruction Manual and Safety Information

ViscoQC 300 R

ViscoQC 300 L

ViscoQC 300 H

Find out more



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Original instructions

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1 Safety instructions



Read the documentation

- Read the documentation before using the product.
- Follow all hints and instructions in the documentation to ensure the correct use and safe functioning of the product.

1.1 General safety instructions

General

- The documentation is a part of the product. Keep it for the complete working life of the product and make it easily accessible to all persons involved with the product. If you receive any additions or revisions from Anton Paar, these must be treated as part of the documentation.

Liability

- This document does not claim to address all safety issues associated with the use of the product and samples. It is your responsibility to establish health and safety practices and to determine the applicability of regulatory limitations.
- Anton Paar only warrants the safe and proper functioning of the product if no modifications are made to mechanics, electronics, or software.
- Use the product only for the purpose described in the documentation. Anton Paar is not liable for damages caused by incorrect use of the product.
- The results delivered by the product depend on the correct function of the product and various other factors. We recommend that you have experts check the results (i.e., perform plausibility testing) before taking consequential actions based on the results.
- The proper function of the instrument's protective devices is only guaranteed when operated correctly within the specified scope of applications.

General precautions

- Observe and adhere to your national safety regulations regarding the handling of all substances associated with your measurements (e.g. use safety goggles, gloves, respiratory protection, etc.).
- Substances used must be labeled. The corresponding material safety data sheets must be observed and made available near the measuring setup.
- Samples and cleaning liquids that have been used in the measuring system are not suited for human consumption after use.
- Check the wetted parts of the product for chemical resistance to all samples and cleaning liquids.

- Take care that samples, cleaning liquids and gases are chemically compatible when they come into contact with each other. They must not react exothermally or produce hazardous substances.

Installation

- Install the product so that you can easily separate it from the electrical supply (pull the power plug) at any time.
- The installation procedure shall only be carried out by authorized personnel who are familiar with the installation instructions.
- Never use the product outside the specified ambient conditions and specifications.
- Use only accessories, consumables, or spare parts supplied or approved by Anton Paar.
- Do not expose the product to direct sunlight for extended periods of time.

Using the product

- Ensure that all operators have been trained beforehand to use the product safely and correctly.
- Ensure that the product is sufficiently supervised during operation.
- In case of damage or malfunction, stop operating the product. Do not operate the product under conditions that could result in damage to goods or injuries or loss of life.
- If you suspect that spilled substances got into the product, disconnect the product from the electrical supply and have it checked for electrical safety by a service technician authorized by Anton Paar.

Operator's skills

- All personnel involved in the operation and/or maintenance of the product must be qualified or properly instructed in its use.
- Operators must be able to read and understand the instructions within the manual.
- It is the owner's responsibility that all operators are sufficiently trained in the correct and safe use of the product.
- Operators must be able to judge dangerous situations and take the right measures to prevent accidents, injury and damage.
- Operators must have knowledge of chemistry and its rules.

Precautions for flammable samples and cleaning agents

- Keep potential sources of ignition, like sparks or open flames, at a safe distance from the product.
- Store only the minimum required amount of sample, cleaning liquids, and other hazardous materials near the product.
- Place the product and all samples in a fume hood of adequate capacity.

- Do not spill sample/cleaning liquids or leave their containers uncovered. Immediately remove spilled sample/cleaning liquids.
- Ensure that the setup location is sufficiently ventilated. The environment of the product must be kept free from flammable gases and vapors.
- Provide fire-extinguishing equipment.

Operation in areas with risk of explosion

- The product is **not** explosion-proof and therefore must not be operated in areas with risk of explosion.

Service and repairs

- Service and repair procedures may be carried out only by authorized persons or by Anton Paar.

Disposal

- Concerning the disposal of the product, observe the legal requirements in your country. Contact your Anton Paar representative for further questions.

1.2 Special safety instructions

- Do not use the product to measure fluids of the IIC group according to EN 60079-14, such as e.g. carbon disulfide or acetylene.
- Move the head up and down using the hand wheel on the head.
- To move or lift the product, grasp the rod of the stand with one hand and the foot of the stand with the other hand. Do not take the product by the measuring head, nor by the spindle guard.
- Carry the product in front of you and keep it close to your body.
- Disconnect spindles or measuring systems by pulling them sideways. This reduces strain on and wear of the internal low-friction bearing.

1.3 Remaining risks

Knocking over the product might cause damage to other lab equipment due to the instrument's weight. If measuring hazardous samples, take care not to knock over the sample vessel. The spillage of hazardous samples represents a serious health risk.



CAUTION

Risk of injury, health risk

Using chemically or biologically hazardous chemicals as samples or cleaning liquids is a health risk. Measuring at high (> 40 °C) or low temperatures (< 0 °C) is a health risk.

The above risks could cause serious injuries unless special precautions are taken.

- Consult the material safety data sheets of the sample substances and cleaning liquids.
- Operate the instrument in a fume hood and make sure to use suitable protective equipment.



Wear safety gloves

Wear protective gloves when handling samples and cleaning liquids.



Wear safety goggles

Wear safety goggles when handling samples and cleaning liquids.



Use protective clothing

Wear protective clothing when handling samples and cleaning liquids.

2 Overview

ViscoQC 300 is a rotational viscometer that determines the dynamic (apparent) viscosity as multiple points. The instrument serves for quality control of liquid samples such as solvents up to semi-solid substances such as lotions. It returns instant results on a built-in color screen. Measured data are stored in the data memory and can be printed or exported as .csv or .pdf format.

The Toolmaster™ system automatically recognizes connected measuring systems (spindles and cylinder systems). A Pt100 temperature sensor allows to monitor the temperature of the measured sample.

A magnetic coupling serves as connection for spindles or measuring systems. This reduces the risk to bend or damage parts.

Optional software packages for additional functions:

- V-Curve: online graph of real time measurement data, programmability of up to 50 steps, mathematical models and yield stress determination with vane spindles
- V-Comply: joint with pharma qualification package for perfect traceability and to fulfill regulations of FDA 21 CFR part 11

If ViscoQC 300 has been ordered together with a software package, the instrument comes with a certificate with the unlock code. Activate software packages during initial installation. If upgrading existing devices, you just get an unlock code. The first 8 characters of the code are the serial number of the ViscoQC 300.

AP Connect: From software 1.60 on, ViscoQC 300 supports the use of the digital lab execution software AP Connect. It allows data management and start of measurements (refer *Menu > Setup > Control Panel > External Interface Settings*). For more information, please refer to the AP Connect documentation.



Fig. 1: Rotational viscometers: ViscoQC 300

2.1 Intended use of the instrument

ViscoQC 300 is an instrument for determination of dynamic viscosity. It can measure a wide range of viscous and viscoelastic samples within the specified measuring range. There are three different models available for different viscosity measuring ranges (L – low, R – regular, and H – high). These ranges depend on the torque range of the model. Refer to Appendix A [▶ 33].

NOTICE

Risk of damage to the instrument

- Do not test a sample if you do not know which cleaning liquid removes this sample. Make sure the wetted parts of the instrument are chemically resistant to any tested sample or cleaning liquid.
- Do not test any samples which harden or solidify during the time they are in contact with parts of the instrument.
- Do not test any samples that are specified in Section 1.2 [▶ 6].

2.2 Functional components



Fig. 2: ViscoQC 300 - front view

- 1 Hand wheel – move the measuring head up or down
- 2 Measuring head retention
- 3 Rod of stand
- 4 Foot of stand
- 5 Leveling screws – level the ViscoQC
- 6 Spindle coupling (magnetic)
- 7 Touch screen
- 8 ViscoQC 300 measuring head

Turn the hand wheel to move the measuring head up or down. If you are in front of ViscoQC, turn the hand wheel towards you to lower the head; turn the hand wheel away from you to lift the head.

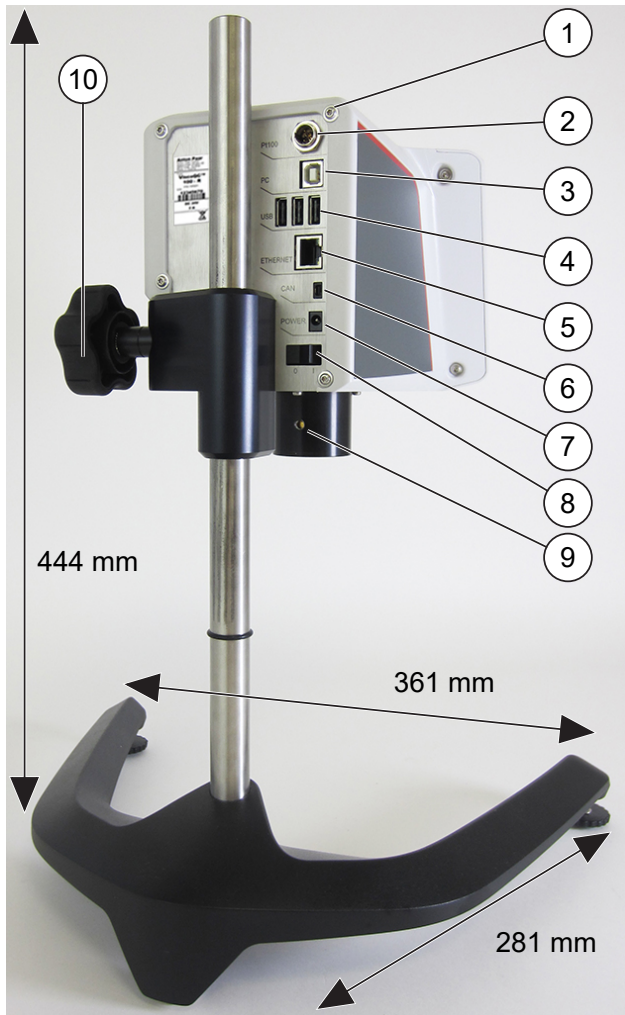


Fig. 3: ViscoQC 300 - rear view


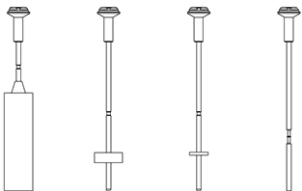
- 1 ViscoQC 100 measuring head
- 2 Interface for optional Pt100 temperature sensor
- 3 PC interface (for V-Collect Software)
- 4 USB interface (3x) – to connect optional 2D bar code reader, external keyboard, a USB printer, or for data export to USB device. Also for firmware update from storage device.
- 5 Ethernet interface – for connection to a network printer or AP Connect
- 6 CAN interface for optional accessories
- 7 Power inlet
- 8 Power switch
- 9 Mount for spindle guard or measuring cup on the measuring flange
- 10 Type plate with serial number

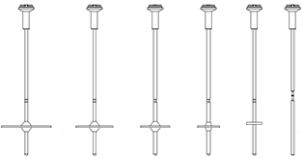





3 Supplied parts

The product was tested and packed carefully before shipment. However, damage may occur during transport.

- Keep the packaging material (box, foam piece, transport protection) for possible returns and further questions from the transport and insurance company.
- Check the delivery for completeness by comparing the supplied parts to those noted in the table(s) below.
- If a part is missing, contact your Anton Paar representative.
- If a part is damaged, contact the transport company and your Anton Paar representative.

Table 1: Supplied parts

	Qty.	Description	Mat. No.
	1	ViscoQC 300 – L ^a or ViscoQC 300 – L ^a or ViscoQC 300 – L ^a (with transport protection for magnetic coupling –indicated by the arrow)	105023 105024 105025
	1	Viscometer stand (above picture)	189184
	1	Set of spindles depending on torque model:	
		Set L-spindles – supplied with ViscoQC 300 - L: consisting of 4 spindles L1 to L4 Order a guard (if required) separately: Guard L: Mat. No. 191707	190845

	Qty.	Description	Mat. No.
		Set RH-spindles – supplied with ViscoQC 300 - R / H: consisting of 6 spindles RH2 to RH7 <i>Order a guard (if required) separately:</i> <i>Guard R: Mat. No. 191718</i>	190846
	1	Set of torque range stickers L / R / H <i>Find this set on the front page of this instruction manual.</i>	189804
	1	Power supply unit with connection cable to ViscoQC (comes in a cardboard box – <i>a reminder to remove the ViscoQC transport protection covers the box</i>)	186547
	1	one of the following power cords Power cord EUR Power cord USA Power cord GBR Power cord Switzerland Power cord China Power cord Brazil Power cord Thailand Power cord Australia	52112 52656 61865 93408 27011 130117 79730 173747
	1	USB cable (1.8 m)	94228
	1	Standard Operating Procedure (SOP)	
	1	Instruction Manual and Safety Information	

^a Refer to Appendix A [▶ 33] for specifications of viscosity and torque measuring range.

4 Installation

4.1 Installation requirements

Read the Safety Instructions in Section 1 [▶ 5].

Find all Technical Data and required ambient conditions in Appendix A [▶ 33].

NOTICE

Risk of damage to the instrument

Before switching the instrument on, make sure that the correct line voltage and line frequency are available (AC 100 V to 240 V, 50/60 Hz). If large voltage fluctuations are to be expected, we recommend using a constant voltage source (UPS).

4.1.1 Environmental requirements

The setup location and surroundings should meet the requirements of a typical laboratory.

Place the product on a stable, flat lab desk that is free of vibrations.

To ensure temperature stability and trouble-free measurement never locate your product:

- next to a heating facility
- near an air conditioning, ventilation system or an open window
- in direct sunlight

Keep the product away from magnetic fields.

4.2 Installation

1. Carefully unpack the instrument. Lift it out of the box by the rod of the stand and place it on the lab desk.
2. Unscrew the transport protection from the magnetic coupling by turning it clockwise.

Keep the transport protection for later use.

3. If required, place the correct torque range sticker (L, R, or H) clearly visible on the ViscoQC measuring head (e.g. on top or on the side).



Fig. 4: Removing the transport protection

- 1 *Transport protection*
4. Connect optional equipment (e.g. printer) to the corresponding interfaces.
5. Allow the equipment to reach ambient temperature before installation. This is very important if the equipment has been stored or transported at lower temperatures.

4.2.1 Connecting and switching on the instrument



WARNING

High voltage. Risk of injury or death

- Connect the power supply unit of the instrument to the mains via protective earthing only.
- Never connect the power supply unit to the mains via protective separation or protective insulation.
- Make sure that the non-fused earth conductor of the power cord is connected to earth.

1. Connect the power supply unit of ViscoQC to the mains using the supplied power cord.
2. Connect the power supply unit and the power inlet of ViscoQC.
3. Switch the instrument on using the power switch on the rear of the measuring head. ViscoQC boots.

4.2.2 Level/zero adjustment

1. Wait that ViscoQC initializes.
2. Level ViscoQC by turning the two leveling screws on the foot of the stand. An adjusted, built-in leveling chip serves as reference. Center the colored dot in the colored ring.
 - A: RED – Adjust the two leveling screws.
 - B: YELLOW – Wait; the instrument stabilizes.
 - C: GREEN – ViscoQC is correctly leveled.
3. Tap OK to continue.

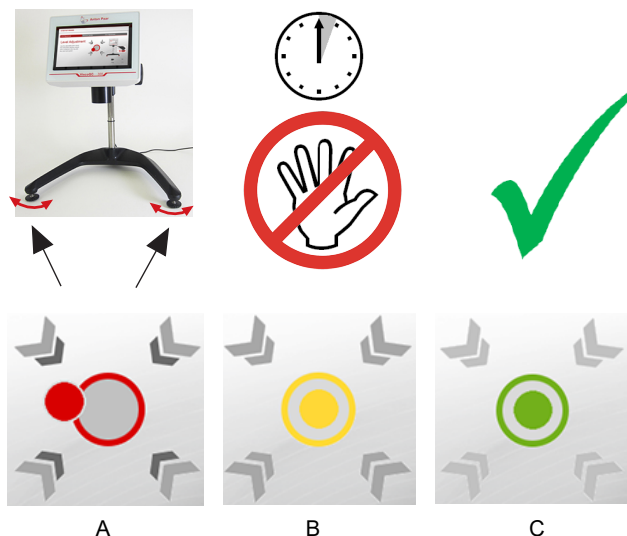


Fig. 5: Levelling ViscoQC

If you skip the level adjustment, you directly jump to the main screen. It is not possible to measure, you can only open the menu and quick access functions.

Zero adjustment

For correct function of ViscoQC the instrument determines the start position for zero torque without load (i.e. spindle or measuring system).

1. ViscoQC prompts you to remove the spindle. Tap *Next* to continue.
2. ViscoQC performs a Zero Adjustment. Do not touch the instrument. Once the Zero Adjustment is finished, tap *OK*. ViscoQC displays the Autozero Offset.
In case you abort the Zero Adjustment by tapping *Abort* and then *Cancel*, you can access main screen and menu, but cannot perform measurements.
3. ViscoQC is now ready for operation. Connect a spindle or measuring system.

You can start a Level/Zero Adjustment any time from the menu. Tap *Menu* and select *Adjustments >Level/Zero Adjustment*.

TIP: Perform these adjustments every time you moved ViscoQC. Every time ViscoQC boots, the Level Adjustment screen comes up.

4.2.3 Mounting additional components

In case you use additional or optional equipment, connect and/or install it as follows.

4.2.3.1 Pt100 sensor

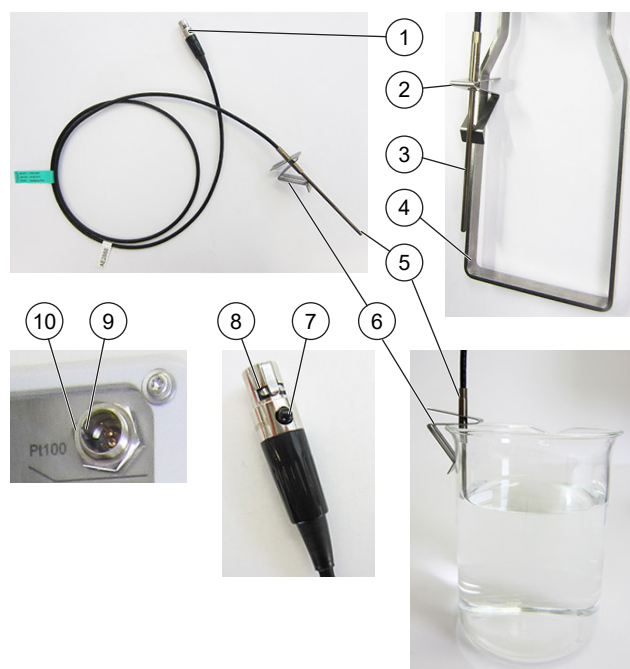


Fig. 6: Setting up the Pt100 sensor

- 1 Pt100 plug
- 2 Clip for fixing Pt100 sensor
- 3 Pt100 sensor
- 4 Spindle guard
- 5 Pt100 sensor
- 6 Clip for fixing Pt100 sensor
- 7 Release knob
- 8 Pt100 guide
- 9 Recess for Pt100 guide
- 10 Pt100 socket

Plug the optional Pt100 sensor into the connector on the rear of ViscoQC. Fit the guide on the Pt100 plug into the recess of the socket. Immerse the Pt100 sensor in the sample vessel. Fix the Pt100 sensor on the rim of the sample vessel or on the guard with the metal clip.

The sensor must not touch the spindle. If required, perform a temperature calibration and set a temperature offset (Section 6.2.1 [► 19]).

To disconnect the Pt100 cable, press the release knob on the plug and pull out the plug.

The Pt100 sensor is also suitable for use with a DIN Adapter (Section 8.1.2 [► 26]).

4.2.3.2 Printer

For printout of measurement results, Anton Paar offers a USB label printer.

- Recommended label size: 89 mm x 36 mm

First, connect the printer cable to the printer. Then plug the printer cable into the USB interface of ViscoQC. Connect the printer to the mains. Follow the safety and operating instructions of the printer's documentation.

TIP: If "Automatic Printout" is active and Dymo Label-Writer 450 (Duo) is set as target, ViscoQC automatically prints when a measurement is finished. For multi-point measurements only recommended for a maximum of 5 points.

4.2.3.3 V-Collect software

You can connect ViscoQC to a PC with USB interface and export the measurement results directly to MS Excel via V-Collect Software.

Plug the supplied USB cable into the PC interface and to ViscoQC. Install V-Collect software (macro-based MS Excel Add-in). You need administrator rights on the PC in question.

TIP: Always use the latest version of V-Collect.

NOTE: It is not possible to use automatic printout via V-Collect for measurements, which use steps (applies to V-Curve software package only).

Download V-Collect software here:

www.anton-paar.com/viscoqc-webpack



Fig. 7: QR code for download of V-Collect package

PC software requirements

- Windows 7 or newer
- Microsoft Excel 2010 or newer

Find instructions how to install and operate V-Collect software in the download package.

4.2.3.4 Temperature device or bath thermostat

For accurate temperature control use a Peltier Temperature Device:

- PTD 80 (+15 °C to +80 °C),
- PTD 175 (-45 °C to +175 °C),
- ETD 300 (+25 °C to +300 °C), or
- PTD 100 Cone-Plate (0 °C to +100 °C).

Refer to Appendix B [▶ 33] to learn which measuring system is suitable for the used device.

For basic temperature control of samples in 600 mL beakers, use a bath thermostat.

Recommended:

- Julabo CORIO™ C-BT5 bath thermostat +
- Stainless bath cover for 600 mL beaker +
- Stand for Bath Thermostat CORIO™ C-BT5

Refer to the ViscoQC Temperature Devices Instruction Manual or the ViscoQC Product Description List.

5 Operation

5.1 Log on/off and user management

When delivered, the instrument is freely accessible without password. Three user accounts are factory preset. For the administrator user, the auto logon function is activated.

Table 2: Factory default user management

User	Password	User group	Group icon
Operator	operator	Operator	
Manager	manager	Manager	
Administrator	administrator	Administrator	
Service	-- service personnel only --		

TIP: It is recommended to replace the default passwords when setting the instrument into operation.

The menu tree (Appendix C [▶ 36]) shows the different levels of factory default user group rights. You cannot edit or delete default user groups.

Log on/off

1. Tap the user indicator (Fig. 8 [▶ 13]) on the right side of the main screen's header.
2. Select your *User name*, enter your *Password*, and tap *OK*.

To log off, tap on the user indicator. Tap *Log off* in the logon dialog.

- If no user has auto logon rights, the user indicator changes its appearance to:
- The instrument finishes the current measurement or measurement series but does not accept any input until someone logs on.
- If a user has auto logon rights, this user is automatically logged on.

User accounts

1. Tap *Menu* and select *Setup > User Management > User Administration*.
2. Tap *More (+New)* to create a new user account or tap an existing user name to edit this user account.
3. Specify the following settings:
 - User name, User group, password (optional)
 - Activate/deactivate the user account
 - Activate/deactivate the "Auto logon"

You need administrator rights to create, edit, or delete user accounts. Maximum: 250 user accounts

TIP: A user with a deactivated account cannot log on until the account is activated again. Users without administrator rights can only change their own password.

Naming and password rules

User names are not case sensitive. They must be at least one character long and can contain only characters from the ASCII table (letters, numbers and most special characters).

If you do not set a password, users can log on by selecting their user name from the user list. Passwords must consist of at least one character and contain only characters from the ASCII table (letters, numbers and most special characters). Passwords are case sensitive, i.e. "Anton Paar" and "anton paar" are treated as different entries.

Custom user groups

Tap *Menu* and select *Setup > User Management > User Group Administration*.

Create new user groups by copying existing ones (based on the default user groups *manager* or *operator*). For custom user groups, grant access rights to the instrument's functions as needed.

Functions, for which access is customizable, include menu entries, the operating elements on the main screen, and additional entries.

You can export a summary of a user group's rights as .csv file (table format).

5.2 The display

Main screen

Header, left side: name of the currently active method and sample name/number.

Header, middle: spindle guard indicator, connected spindle/measuring system, maximum viscosity that is measurable with this spindle and speed

Header, right side: clock and user name/indicator (2) (shows which type of user is logged on)

The **content area** shows measuring parameters and data. It is constantly updated during measurement. The data are frozen after measurement until you tap the monitor button. The number and appearance of displayed fields depends on the selected method and display layout. Tap on output fields to assign them a different quantity.

The **progress bar** displays the selected measurement mode. It shows information on the status of a measurement, while a counter on the right is active after starting a test (not in Manual Mode).

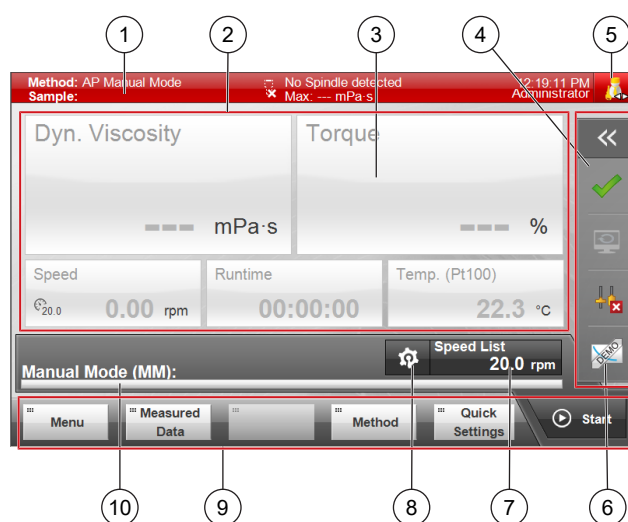












Fig. 8: Main screen - example: ViscoQC 300 (before measuring)








- 1 Header
- 2 Content area
- 3 Output field
- 4 Quick access area
- 5 User indicator
- 6 DEMO button for optional software package V-Curve
- 7 Input field for the set value (available for Manual Mode (MM) only)
- 8 "Parameter" button: select a parameter (speed or shear rate) for the set value (available for Manual Mode (MM) only)
- 9 Buttons area
- 10 Progress bar

The ideal torque range is between 10 - 100 %.

Torque < 10 %	Dynamic viscosity and torque appear gray
Torque < 0 %	"---" no dynamic visc. shown
Torque < -10 %	"<<<" shown as torque value
Torque > 100 %	">>>" shown as torque value

Quick access area

Button	Function
	Opens the message list. A little yellow note shows the number of messages in the list, if any. The button changes its appearance depending on the current error status:
	Green OK sign: General instrument status and error status of measured sample are OK.
	A yellow warning sign signals a minor problem. If you ignore the warning message, measurement is still possible. Examples for warnings: <ul style="list-style-type: none"> – ViscoQC is not leveled. – The wrong guard is connected (<i>TruGuard™ enabled, NOT mandatory</i>) – V-Curve demo (30 days) is activated
	A red error sign signals a serious problem that prevents measurement. Examples for errors: <ul style="list-style-type: none"> – No valid Zero Adjustment. – The wrong guard is connected (<i>TruGuard™ is mandatory</i>)
	Unfreezes the screen after a finished measurement. The screen is frozen.
	The screen is unfrozen. A continuous reading of the current measuring values is shown.
Spindle information	
	Shows connected spindle/measuring system type plus details (factors, guard)
	If the Toolmaster™ is disabled: Selection of spindle/measuring system. Refer to Section 7.4 [▶ 22]
	"x" signals that no spindle is connected or selected.
	Demo button – activate V-Curve demo version (30 days).
	Demo trail is active and available. <i>If you deactivate the demo trail before it expires, you cannot activate it again!</i>

Button	Function
	Demo trail expired or deactivated The Demo button is not visible, if V-Curve full version has been activated.
	Displays information on using favorites: Tap  in the header of a dialog to add this dialog to the quick access area. Confirm or change the name. Tap <i>OK</i> . The info icon is visible only if the quick access area is expanded. It disappears when at least one favorite is in use.
 	Expand or collapse the quick access area. All dialogs that you choose as favorites are stored here. Inside the quick access area: <ul style="list-style-type: none"> – Browse:  – Reorder, rename or delete items:  You cannot rename or delete the default functions (the ones explained above).

Buttons area

Menu	Opens the main menu
Measured Data	Opens the measurement data memory (multiple sample view)
Quick Settings	Opens the quick settings – even users without rights to edit method settings have access to the quick settings
Method	Select a method from the methods list (refer to Section 7.2 [▶ 20])
Start/Stop	Start/Stop (or abort) measurement

Menu screen

The functions of the buttons change when you enter a sub-menu.

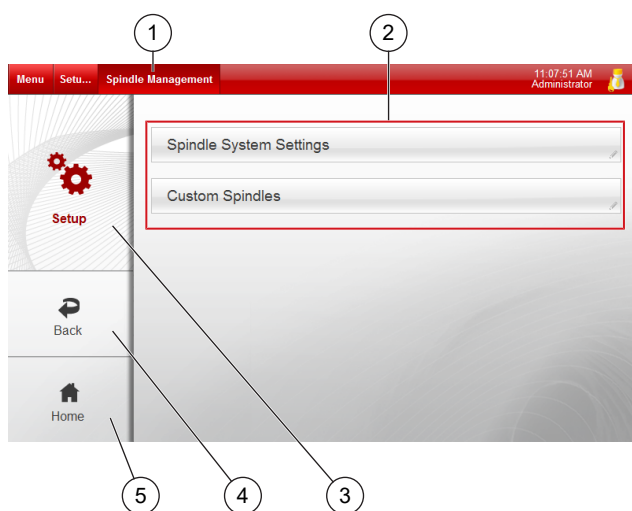


Fig. 9: Menu screen - example: ViscoQC 300 setup

- 1 Header - shows the navigation path
- 2 (Sub)menu items
- 3 Current submenu
- 4 "Back" button - go one menu level up
- 5 "Home" button - go to main screen

Menu navigation

If you tap an item, you choose it or open a dialog. Buttons perform the functions written on them. Generally, *OK* serves to confirm your input and saves it. *Cancel* discards any input.

In lists such as measurement or adjustment data and method settings, a long press (> 3 s) on an item frames the item red and displays additional options for this item. To return to the list without selecting an option, tap anywhere on the dark part of the screen.

Button *More* also displays additional options.

A capital "A" marks input fields: enter characters via virtual keys or via an optional USB keyboard.

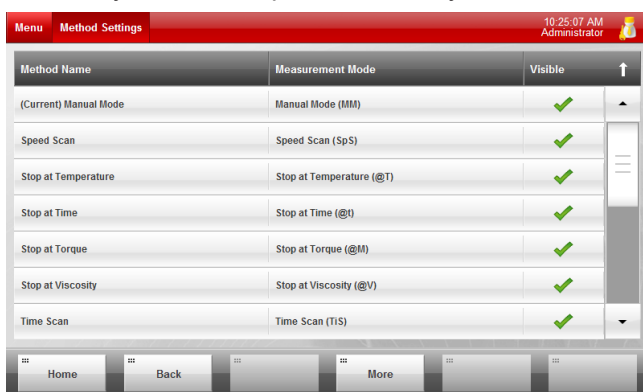


Fig. 10: List – example: Methods (Method Settings)

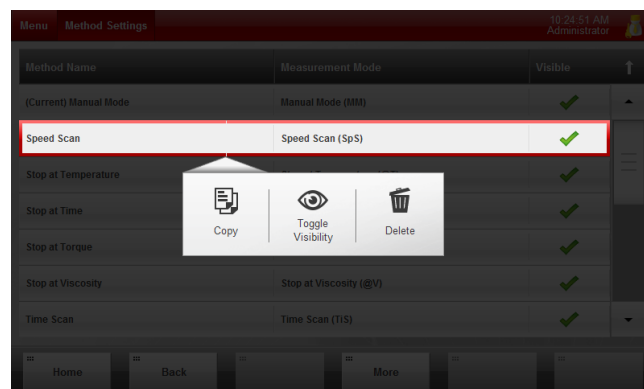


Fig. 11: Methods list – example: long press on a method

TIP: The <Home> button does not save your settings! In case you tap <Home> instead of <OK>, ViscoQC discards your input.

5.3 Spindle, guard, DIN adapter

5.3.1 Connecting and removing a spindle

ViscoQC features a magnetic coupling. To connect a spindle, take the spindle shaft beneath the coupling and approach the coupling on the measuring head from below. Rotate the spindle slightly and wait until it clicks into place.

To remove a spindle, take the spindle shaft beneath the coupling and incline the spindle sideways. Then pull the spindle downwards.

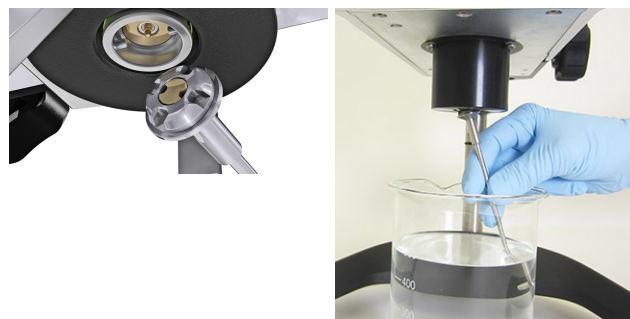


Fig. 12: Connecting/removing spindles

5.3.2 Connecting and removing a spindle guard or DIN adapter

The spindle guard is fixed to the rear of the measuring flange with an encoded screw showing the identification of the guard (**L** or **R**).

If using DIN measuring systems (concentric cylinders CC or double-gap DG) a DIN Adapter is fixed to the same thread. The fixing screw of a DIN Adapter is marked **D**.

ViscoQC can automatically detect the type of fixing screw (Section 7.4.1.1 [► 23]).

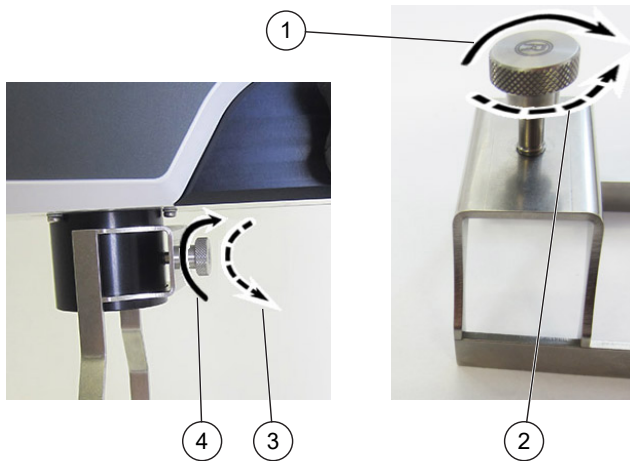


Fig. 13: Fixing screw for spindle guard/DIN adapter

- 1 Inserting the fixing screw into the holder
- 2 Removing the fixing screw from the holder
- 3 Removing a spindle guard/DIN adapter
- 4 Mounting a spindle guard/DIN adapter

The fixing screw is positioned in a threaded hole on the holder of the guard/DIN adapter. The screw cannot drop out accidentally due to the hole's thread. To remove the fixing screw from the holder you unscrew it.

Align the holder of the guard or DIN adapter with the rear of the measuring flange and fasten the screw (right thread). If you loosen the screw, hold the spindle guard/DIN adapter, so that it does not drop.

TIP: If using a temperature device, no DIN adapter is needed. Refer to the instruction manual of temperature device.

6 Adjustment and calibration

Adjusting means changing some hardware or software factors on the instrument that will have an influence on future measurement results. Calibrating means verifying that the instrument measures according to certain specifications: You perform a check measurement with a certified reference material (CRM).

Apart from Level Adjustment and Zero Adjustment, you can calibrate and adjust:

- Spindles (Section 6.1 [▶ 16])
- Temperature measurement (Section 6.2 [▶ 18])

6.1 Calibrating and adjusting spindles

TIP: Verify that ViscoQC measures correctly at least once a month.

Measure a certified reference material. Determine how much the measuring result may deviate from the reference value. Check the actual deviation.

Equipment and consumables

- Certified reference material. Use only reference materials which were stored in their closed original containers in cool and dark places. Check the expiry date.
- For standard spindles:
600 mL lab (low Griffin) beaker
- Pt100 temperature sensor, calibrated (Section 6.2.1 [▶ 19]), plus fixing clip and thermostat bath (stability ± 0.1 °C) or calibrated PTD 80/175, ETD 300 or PTD 100 Cone-Plate
- Spindle, guard (if required)/measuring system

Silicone standards are recommended for 600 mL beaker due to their lower temperature sensitivity compared to petroleum-based standards.

TIP: Due to the small surface of the following spindles, they are not recommended for calibration: L4, RH7. Their small surface does not allow for the required accuracy.

Preparation

1. Set the thermostat bath or the temperature device to the desired temperature.
2. Fill the certified reference material into the sample vessel.
3. Immerse the spindle (if in use: also the spindle guard) in the sample.
4. Place the Pt100 sensor in the sample vessel if applicable.
5. Mount the parts as described in Section 4.2.3.1 [▶ 11] and Section 5.3 [▶ 15].
6. Place the sample vessel in the thermostat bath or temperature device.

Wait for temperature equilibrium. The displayed temperature must be stable (± 0.1 °C) before you start measuring. Let the spindle rotate at slow speed for better temperature distribution.

TIP: If using a standard spindle that requires 500 mL of reference material, wait for at least one hour (from the moment the bath thermostat has reached the set temperature). Spindle L1 requires more than 500 mL filling volume or place the beaker in a higher position (e.g. on a lab boy).

Determining the allowed deviation

The allowed deviation is the total of the accuracy of the ViscoQC model (1 % of full scale range, refer to Appendix A [▶ 33]) plus the uncertainty of the certified reference material (refer to the material's certificate).

Use the ViscoQC Calibration Certificate from the ViscoQC webpack to determine the allowed deviation and the actual deviation.

The built-in *Spindle Calibration* automatically determines the actual deviation (refer to below paragraph).

Spindle calibration and correction

1. Tap *Menu* and select *Adjustments > Spindle Calibration*.
2. ViscoQC prompts you to prepare the measuring system. Tap *Next*.
3. Enter the Calibration Settings:
 - Speed
 - Limit (i.e. allowed deviation)
 - Target Time (time from reaching the set speed to taking the result)
 - If using a temperature device or when no Pt100 sensor is connected: Temperature(s)

TIP: Shear warming effects or turbulences might occur at high shear rates. For calibration, a maximum shear rate of $1,000 \text{ s}^{-1}$ is recommended to avoid shear warming.

Turbulences result in falsely high viscosity values and can occur at high speeds with relative systems (L or RH spindles). Examples for critical setups are:

- L1 spindle: $15 \text{ mPa}\cdot\text{s}$ at 60 rpm
- L2 spindle: $100 \text{ mPa}\cdot\text{s}$ at 200 rpm
- RH1 spindle: $100 \text{ mPa}\cdot\text{s}$ at 50 rpm
- RH2 spindle: $500 \text{ mPa}\cdot\text{s}$ at 60 rpm

The torque should be higher than 80 % to achieve the desired accuracy.

1. Tap *Next*. Enter:
 - Name of the used reference standard oil.
 - Reference temperatures and viscosity values of the standard oil.

Find these values on the certificate of the oil. If the calibration temperature and the reference temperature are the same, one temperature value is sufficient. For calibration with Pt100 or for a different set temperature (with temperature device), ViscoQC requires two reference values. It interpolates the reference value for the calibration temperature.
2. ViscoQC starts measuring. A red bar and relevant parameters show the progress. When ready, ViscoQC displays a window "Calibration finished". It shows the following data (some in a table) before correction and after correction:
 - Set values
 - Reference value at calibration temperature
 - Measured dyn. viscosity and temperature
 - Set limit
 - Deviation from measured to reference values
 - OK or NOK (= not OK) – NOK means that the deviation was greater than allowed.
 - Spindle Correction Factor SCF

TIP: If the viscosity deviation is not OK, check the viscosity values. A high deviation can also indicate erroneous reference values (due to a typing error).

3. Scroll down to view the spindle data and further calibration settings.
 - *Before Correction:* If you do not apply the correction, the displayed viscosity deviation persists and the SCF is not changed.
 - *After Correction:* If you apply the correction, ViscoQC corrects the displayed viscosity deviation.

Applying the correction factor will influence future measuring results with this spindle!

TIP: To print or export the data, tap <Print> before taking any further action. Rejecting, applying or saving the data closes this window.

4. Depending on the results, ViscoQC recommends an action. It marks the recommended button with an arrow.
 - *Apply:* Active only if the measured torque is valid (10 % to 95 %) AND the deviation is outside the limit AND the newly calculated SCF is between 0.1 and 2.0.

If you apply the correction, you correct the viscosity deviation and store the new SCF on the Toolmaster™ chip of the spindle. The calibration and the fact that you applied it are saved.

 - *Save only History:* The measured torque is valid (10 % to 95 %) AND one of the two following criteria applies. Either the deviation is within the limit OR the new SCF is out of the specified range (0.1 to 2.0). The calibration results are saved in the Adjustment Data. The SCF is not stored on the spindle.
 - *Reject:* The measured torque is <10 %. You do not apply the correction and do not save the data.

TIP: Only users with administrator rights are allowed to apply a calibration correction. Depending on your user level, ViscoQC asks for an administrator password.

If you set a new SCF, it is recommended to repeat the calibration to verify the SCF.

6.1.1 Setting spindle correction factors

The *Spindle Correction Factor* (SCF) serves to adjust the results you obtain with a certain ViscoQC setup to a (certified) reference value. This is necessary if a calibration yields a deviation that is greater than allowed (Section 6.1 [► 16]) even if all preconditions for a good measurement are fulfilled.

When performing a Spindle Calibration, you can directly correct the SCF if required (previous section).

The ViscoQC setup includes test speed, test temperature, spindle, sample vessel, and (if applicable) spindle guard.

TIP: You can also adjust the SCF if you do not use the spindle guard for a spindle that requires it, or if the size of your vessel is other than recommended.

The SCF is stored directly on the Toolmaster™ chip of the spindle. It is a spindle-specific parameter, not an instrument-specific one. Therefore, you can edit the SCF only if the Toolmaster™ is enabled (Section 7.4.1.2 [▶ 23]).

Determining the SCF

NOTICE

Risk of erroneous measuring results

Work with great care to eliminate disturbing influences such as change of temperature, big air bubbles (especially with disc spindles), different immersion depth of the spindle, and different position of the sample vessel (centricity). Depending on the setup, the effect of these influences may even exceed the effect of the SCF!

1. In order to determine the SCF, measure a certified reference material with the desired setup. Proceed according to the instructions for calibrating (Section 6.1 [▶ 16]).
2. Note down the measured viscosity.
3. Calculate the new SCF:

$$SCF_1 = SCF_0 \cdot \frac{\eta_R}{\eta_M}$$

SCF_1 ... new spindle correction factor

SCF_0 ... old SCF (= current SCF)

η_R ... reference viscosity

η_M ... measured viscosity

4. Enter the new SCF in the ViscoQC and repeat the measurement. The measuring results should now match the reference data.
Default SCF settings: SCF = 1.000

Setting a spindle correction factor (SCF)

1. Tap *Menu* and select *Adjustments > Edit Spindle Correction*.
2. ViscoQC shows the old (currently valid) SCF and further spindle information. Enter your input via virtual or USB keyboard.
3. Tap *OK* (2x) to save the SCF. ViscoQC prompts you to wait and displays a message when the data have been saved.

6.2 Temperature calibration

TIP: With optional Pt100 sensor or a temperature device only. Refer to the instruction manual of the temperature device.

The Pt100 sensor comes ready for use. If required, calibrate the sensor.

Required equipment

- Reference thermometer and sensor of better accuracy than the optional Pt100 sensor (Appendix A [▶ 33]), e.g. Anton Paar MKT 10. For temperature calibration with the instrument software, an MKT 10 or 50 is mandatory.
- Ethernet crossover connection cable for MKT
- Water or sample substance, provided the latter is not highly viscous.

Temperature calibration and correction

1. Fill a vessel with the above medium and let it reach a stable temperature. Ideally, calibrate the Pt100 sensor at or close to the usual measuring temperature.
2. Connect the MKT to ViscoQC via an Ethernet crossover cable. Set the MKT's IP address to 10.0.0.2 and "N:" to 50 in the Temperature Statistics Display.
3. Place the reference sensor and the Pt100 sensor side by side in the sample vessel. The sensor tips should be on the same level.
4. Wait for temperature equilibrium (approx. 10 minutes). The values should be stable.
5. Tap *Menu* and select *Adjustments > Temperature Calibration*.
6. ViscoQC prompts you to prepare the temperature sensor and the MKT. Tap *Next*.
7. When the MKT is connected, enter:
 - Maximum (allowed) deviation
 - Equilibration Time
 - Pt100 serial number
8. Tap *Next*. ViscoQC starts measuring. A red bar and relevant parameters show the progress. When ready, ViscoQC displays a window *Calibration finished*. It shows the following data (some in a table) before correction and after correction:
 - Set values
 - Reference temperature of the MKT
 - Measured temperature of Pt100
 - Deviation from measured to reference values
 - OK or NOK (= not OK) – NOK means that the deviation was greater than allowed.
 - Pt100 Temperature Offset
9. Scroll down to view the Pt100 data and further calibration settings.
 - *Before Correction:* If you do not apply the correction, the displayed temperature deviation persists and the offset is not changed.
 - *After Correction:* If you apply the correction, ViscoQC corrects the displayed temperature deviation.

Applying the correction will influence future measuring results of the Pt100!

TIP: To print or export the data, tap *Print before taking any further action*. Rejecting, applying or saving the data closes this window.

10. Depending on the results, ViscoQC recommends an action. It marks the recommended button with an arrow.
- **Apply:** Active only if the temperature is outside the allowed deviation AND if the new offset is within the allowed offset range (± 5.0 °C). If you apply the correction, you correct the temperature deviation and store the new offset. The calibration and the fact that you applied it are saved.
 - **Save only History:** The temperature is within the allowed deviation OR the new offset is out of the allowed offset range (± 5.0 °C). The calibration results are saved in the Adjustment Data.
 - **Reject:** You do not apply the offset and do not save the calibration data.

TIP: Only users with administrator rights are allowed to apply a new offset. Depending on your user level, ViscoQC asks for an administrator password.

6.2.1 Setting a temperature offset manually

This applies to an optional Pt100 sensor only.

Default offset value: 0 °C. Allowed offset range:

± 5.0 °C (± 5.0 K) in steps of 1/10 °C (1/10 K) /

± 9.0 °F in steps of 1/10 °F

1. Tap *Menu* and select *Adjustments > Edit Temperature Offset*.
2. ViscoQC shows the current offset and an input field for the serial number of Pt100. Enter your input via virtual or USB keyboard.
3. Tap *OK* (2x) to save the offset.

6.3 Calibration and adjustment data

View calibration and adjustment data in the data memory. Select *Menu > Data Memory > Adjustment Data*.

Select the current adjustment report or the adjustment history (*Adjustment Data*), which traces all calibrations and adjustments (including TruSine™ bearing checks) performed on this instrument.

Spindle correction factors are not listed, because they are stored on the Toolmaster™ chip of the spindle. You can print, export or delete adjustment data.

7 Measuring settings, methods and modes

7.1 Measuring speeds - Speed list

The instrument covers a speed range from 0.01 rpm to 250 rpm. It comes with 19 preset measuring speeds. You can select them from the *Speed List*. The list ranges from minimum to maximum preset speed. If

not using the *Speed List*, measuring speeds are freely selectable within the speed range (refer to Appendix A [▶ 33]).

Table 3: Speed List Example (ViscoQC 300 - L, spindle L2)

Speed	Info	Max. Viscosity
0.3 rpm	L	100 Pa·s
0.5 rpm	R/H	60.0 Pa·s
:	:	:
100 rpm	R/H	0.30 Pa·s
200 rpm	C	0.15 Pa·s

- The *Speed List* is available on the main screen for methods using the *Manual Mode* (MM) or in the method settings.
- To select a speed, tap it.
- **Speed:** Measuring speed
- **Info:** Shows the ViscoQC model(s) for which this speed is standardized. This is only for information; you can also measure with a model other than the displayed one(s).
200 rpm is not specified in any standard for rotational viscometers. It is a custom speed C. By tapping on the list headers, you can sort the list either by speeds (increasing/decreasing) or by *Info*. In the method setting, you can add custom speeds to the list: Select *Speed List Items*, button *More*. Users without rights to edit method settings can select custom speeds in Manual Mode on the main screen.
- **Max. Viscosity:** Maximum viscosity that is measurable with this speed and the connected spindle.

7.1.1 TruMode™ (automatic speed search)

TIP: Option *Heli-Plus* only: when the *Helix Mode* is enabled, the *TruMode™* is not available.

The option *TruMode™* adjusts the speed so that ViscoQC reaches a torque within a preset range. Default torque range:

- Upper limit (Auto torque Max.) = 90 %
- Lower limit (Auto torque Min.) = 20 %

Speed range: 1 rpm to 250 rpm

You can adapt the torque limits to your application. ViscoQC always tries to get as close as possible to the upper limit.

TruMode™ is available for measurement modes *Manual Mode* (MM) and *Stop at Time (@t)*.

If using *TruMode™*, ViscoQC searches for the right speed until it has reached the desired torque, and the values have been stable for at least 10 s.

NOTE: Once the desired torque and stability have been reached with a certain speed, ViscoQC uses this measuring speed for the entire test duration. If the

torque changes later during the test due to e.g. shear thinning/thickening or temperature influences, the measuring speed is not adjusted.

If the required torque cannot be reached or the torque range is exceeded, ViscoQC displays an error and a message in the message list recommending the use of a bigger or smaller spindle. The message also tells if the viscosity range of the sample does not fit into the current setup, current spindle, or the torque range of the ViscoQC model.

7.2 Measurement methods

TIP: By default, only users with administrator rights can access the method settings.

The ViscoQC 300 base model comes with seven default methods: there is one preset method for each measurement mode (refer to Section 7.3 [► 22]). Default methods are named after their modes. Their names start with the letters *AP* (Anton Paar). You cannot edit default methods. To customize a method, copy the default method, which best fits your requirements.

1. Tap *Menu* and select *Method Settings*.
2. *More* allows you to create or delete methods, and to set their visibility. Users cannot select invisible methods for measuring.
3. Long press on a method to copy it.
4. Tap a (copied) method to edit it.
5. By tapping on the list headers, you can sort the methods either by name, mode or visibility.

If you create or edit a method, define the following settings. Each method has mode-specific and general settings. Refer to the below table. Maximum: 60 methods.

For some methods it is possible to show the estimated measurement duration: Tap on a widget on the main screen and select *Estimated Duration*. This estimation works for *Speed Scan*, *Stop at Time* and the ASTM/DIN methods (refer to Appendix C [► 36], *Method Settings*). The estimation does not consider the time required to reach *T-Ready* or *Sensor-Ready* with a temperature device. It is a fixed value and does not count down during measurement.

Table 4: Method settings depending on the selected measurement mode

Manual Mode (MM)	Speed Scan (SpS)	Stop at Temp. (@T)	Stop atTime (@t)	Stop at Torque (@M)	Stop at Viscosity (@V)
<i>Method Name</i> (enter a method name)					
<i>Use Steps</i> (only available if software package V-Curve has been activated)					
<i>Measurement Mode</i> (select mode, according to table header)					
<i>Specific Method Settings</i>					
– <i>Speed List Items</i>	– Set value parameter	– Set value parameter	– Set value parameter	– Set value parameter	– Set value parameter
– <i>Auto Torque Max.</i>	– <i>Start Set Value</i>	– <i>Set Value</i>	– <i>Set Value</i>	– <i>Set Value</i>	– <i>Set Value</i>
– <i>Auto Torque Min.</i>	– <i>Stop Set Value</i>				
	– <i>Number of Points</i>	– <i>Averaging Time</i>	– <i>Set Temp.</i> ¹	– <i>Set Temp.</i> ¹	– <i>Set Temp.</i> ¹
	– <i>Distribution type</i>		– <i>Use Temp. Tolerance</i> ¹	– <i>Use Temp. Tolerance</i> ¹	– <i>Use Temp. Tolerance</i> ¹
– <i>Use Temp. Tolerance</i> ¹	– <i>Preshear Time</i>	– <i>Target Pt100 Temperature</i>	– <i>Set Tolerance Range</i> ¹	– <i>Set Tolerance Range</i> ¹	– <i>Set Tolerance Range</i> ¹
– <i>Set Tolerance Range</i> ¹	– <i>Set Temp.</i> ¹		– <i>Sensor-Ready</i> ¹	– <i>Sensor-Ready</i> ¹	– <i>Sensor-Ready</i> ¹
– <i>Sensor-Ready</i> ¹	– <i>Use Temp. Tolerance</i> ¹		– <i>T-Ready</i> ²	– <i>T-Ready</i> ²	– <i>T-Ready</i> ²
– <i>T-Ready</i> ²	– <i>Set Tolerance Range</i> ¹				
	– <i>Sensor-Ready</i> ¹		– <i>Averaging Time</i>	– <i>Averaging Time</i>	– <i>Averaging Time</i>
– <i>Averaging Time</i>	– <i>T-Ready</i> ²		–		
	– <i>Averaging Time</i>		– <i>Target Time</i>	– <i>Target Torque</i>	– <i>Target Dyn. Viscosity</i>
	– <i>Target Time</i>				

¹ Only applicable for PTD 80/175, ETD 300, and PTD 100 Cone-Plate

² Only applicable for PTD 80/175 and ETD 300, not displayed for PTD 100 Cone-Plate

Manual Mode (MM)	Speed Scan (SpS)	Stop at Temp. (@T)	Stop at Time (@t)	Stop at Torque (@M)	Stop at Viscosity (@V)
<ul style="list-style-type: none"> – Multipoint – Step Width <p>(more info on the right)</p>		<ul style="list-style-type: none"> – Multipoint Data Collection (enable/disable) – Step Width hh:mm:ss (if enabled, set interval for recording points) <p>TIP: If you perform a multipoint test and software package V-Curve is activated, you can evaluate test data using mathematical models.</p>			
General Method Settings					
	<ul style="list-style-type: none"> – Display Layout (select: 4 / 5 / 6 Widgets V-Curve³: 1 Graph + 5 or 6 Widgets) – Only with option Heli-Plus (motorized stand adapter): Use Helix Mode (enable/disable) – define Heli-Plus positions for each method – Immersion Depth for spindles (V71, V72, V73, GT6): Full (default) / Half – Restrict use of spindles (enable/disable) – Restrict to Unique Spindle Identifier UID (enable/disable)⁴ – Allowed Spindles (if enabled, select from spindle list) – Use Limits (enable/disable) – Limits (if enabled, set limits → quantities and values) – Use operator instructions (enable/disable) – Operator instruction text (max. 100 char.) (if enabled, enter max. 100 characters) – Use Brabender Units (enable/disable – torque units) – Use Density input (enable/disable): – Density (if enabled, default value 1.000 g/cm³, range: 0.0000 g/cm³ to 9.9999 g/cm³) 				
Mathematical model (with V-Curve³)					
<ul style="list-style-type: none"> – Beep when finished (enable/disable – if enabled, ViscoQC beeps when measurement finished) – Use Cleaning Instructions (enable/disable – if enabled, instructions pop up after measurement) – Cleaning Instruction (if enabled, enter cleaning instructions for the operator, max. 100 characters) 					
Quick Settings – Access to quick settings depends on the settings in the <i>User Group Administration</i> (Section 5.1 [▶ 12]). It is possible to access the <i>quick settings</i> without full access rights to method settings.					
<ul style="list-style-type: none"> – Sample Name is mandatory (enable/disable) 					
	<ul style="list-style-type: none"> – Show Set Value (enable/disable) – Set value is mandatory (enable/disable) 				
	<ul style="list-style-type: none"> – Show Set Temperature (enable/disable)¹ – Set temperature is mandatory (enable/disable)¹ 				
<ul style="list-style-type: none"> – Density Input (enable/disable) – Density Input is mandatory (enable/disable) 					
<ul style="list-style-type: none"> – Show Immersion Depth for Spindles (V71, V72, V73, GT6) (enable/disable) – Immersion Depth is mandatory (enable/disable) 					
<ul style="list-style-type: none"> – Show Batch Number (enable/disable) – Batch Number is Mandatory (enable/disable) 					
<ul style="list-style-type: none"> – Show AR Number (enable/disable) – AR Number is Mandatory (enable/disable) 					
<ul style="list-style-type: none"> – Show Custom (enable/disable) – Custom Name (enter a name for a custom field, <i>Quick Settings</i> show this name) – Custom is Mandatory (enable/disable) 					

³ V-Curve: Choice of mathematical model only available if software package V-Curve has been activated

⁴ Disconnect any spindle before you enable this option (or the "Allowed Spindles" list will be empty). Then open the list and connect the desired spindle.

7.3 Measurement modes

Visco QC 300 base model provides seven measurement modes:

- Manual Mode (MM)
- Speed Scan (SpS)
- Stop at Time (@t)
- Stop at Torque (@M) – "M" = Latin "momentum"
- Stop at Temperature (@T) – with Pt100 sensor only
- Stop at Viscosity (@V)
- Temperature Scan (TS)

TIP: Mode "Temperature Scan" is usable with PTD 80/175 or ETD 300 only. Refer to the instruction manual of the temperature device.

Manual Mode (MM)

Start measurement manually with *Start*. Preset a speed or shear rate value. ViscoQC measures at the set value until you tap *Start* again. There are no further mode parameters.

TIP: You can change the set value while the measurement is running: Change the set value directly from the main screen (<Parameter> button).

Speed Scan (SpS)

This mode is suitable for analyzing a sample's flow behavior (Newtonian / shear thinning / shear thickening). With the optional V-Curve software package, the data can be further analyzed using e.g. mathematical regression models. Select speed or shear rate as set value. Enter a start value, a stop value, and the number of measurement points. Select linear or logarithmic distribution of points.

TIP: For a wide speed range, logarithmic distribution may give better results. (Linear distribution gives several points at high speed where usually no significant changes happen to the sample. So, in the low-speed range, you do not get as many points as would be of interest).

Optionally, you can set a preshear time. Enter a target time to define the test duration for each point.

Start the test with *Start*. ViscoQC starts turning and sets the start speed. If selected, it preshears the sample. Otherwise, ViscoQC starts taking the time as soon as it has reached the start speed. When the target time has passed, ViscoQC sets the next speed and records the next point. The test stops when measurement has been completed at the stop speed.

Stop at time (@t)

Preset a speed or shear rate value. Enter a *target time* (duration).

Start the test with *Start*. When the instrument has reached the set value, it starts taking the time. The test stops when the target time has passed.

TIP: The target time shall be long enough for stable reading. A minimum of 5 full revolutions is recommended. Rule of thumb: for > 5 rpm at least 20 s, for < 5 rpm at least 60 s.

Stop at Torque (@M)

Preset a speed or shear rate value. Enter a *target torque*.

Start the test with *Start*. ViscoQC starts measuring. Within the first 5 seconds of the runtime, ViscoQC does not react if the target torque is exceeded. This eliminates false results due to transient effects. The test stops when the target torque is reached. The only other way to end the test is to abort it by tapping *Start*. The instrument shows the runtime (duration) of the test.

Stop at Torque serves to check hardening or solidification processes. You expect that the sample's viscosity will increase. It is relevant to know how long it takes until a certain torque is reached.

Stop at Temperature (@T)

TIP: With optional Pt100 sensor only.

Preset a speed or shear rate value. Enter a *target temperature*.

Start the test with *Start*. When the instrument has reached the set value, it starts taking the time. The test stops when the target temperature is reached. The only other way to end the test is to abort it by tapping *Start* key. The instrument shows the runtime (duration) of the test.

Stop at Temperature serves to observe the influence of temperature on a substance's viscosity. You require an optional Pt100 sensor.

Stop at Viscosity (@V)

Preset a speed or shear rate value. Enter a *target dynamic viscosity*.

Start the test with *Start*. ViscoQC starts measuring. Within the first 5 seconds of the runtime, ViscoQC does not react if the target viscosity is exceeded. This eliminates false results due to transient effects. The test stops when the target viscosity has been reached. The only other way to end the test is to abort it by tapping *Stop*. The instrument shows the runtime (duration) of the test.

Stop at Viscosity serves to observe the sample's flow behavior. You expect that the sample's viscosity will change. It is relevant to know how long it takes until a certain viscosity is reached.

7.4 Spindles and measuring systems

Spindle List

TIP: The list is only available if the Toolmaster™ is disabled.

How to select a spindle:

- Tap the spindle icon in the quick access area. The spindle information is displayed. Tap *Spindle*.

The list contains all spindles and measuring systems, which you can use with ViscoQC. (Find an overview in Appendix B [▶ 33]).

The spindle information shows the selected spindle, it's factors and which type of guard is required.

TIP: All spindles are available independent of the ViscoQC torque range (e.g. RH-spindles can also be used with ViscoQC - L). In addition to all predefined spindles/measuring systems you can select custom spindles (Section 7.5.3 [▶ 25]).

- **Guard type required:** Shows which spindle guard is recommended. If no guard is specified, the spindle does not require one.

The spindle guard is a metal frame. It influences the flow conditions in the sample substance. The guard is a common item with rotational viscometers of similar type as ViscoQC. For low-viscosity samples the guard's influence needs to be considered. Otherwise measuring results are not comparable to results measured with a similar viscometer, spindle, and guard. Consequently, certain ViscoQC spindles and torque ranges require a spindle guard:

- ViscoQC - L, spindles L1, L2: Guard L
- ViscoQC - R, spindles RH1, RH2: Guard R

The selected spindle is used in all methods.

7.4.1 Spindle system settings

TIP: By default, only users with administrator rights can access the spindle system settings.

Spindle system settings contain all settings relevant for tracing spindles and measuring systems.

Select *Menu > Setup > Spindle Management > Spindle System Settings*. Tap check boxes to enable/disable them.

7.4.1.1 TruGuard™ (Guard detection)

TruGuard™ is relevant for spindles and DIN/SSA/UL/ASTM systems. Refer to Section 5.3.2 [▶ 15] and Appendix B [▶ 33].

- Default: *TruGuard™* is enabled (green check).
- ViscoQC detects whether a guard/DIN adapter is mounted and the type of guard. If no or the wrong item is connected, you get a warning.
- You can ignore the warning and perform measurements. The message list shows a warning sign for the guard.
- If you disable *TruGuard™* (check box empty), the instrument no longer monitors if and which guard/DIN adapter is connected.

- If you set *TruGuard™* as mandatory (green check), you cannot start measuring if a wrong or no guard is connected (for spindles with recommended guard). The message shows an error for the guard.

7.4.1.2 Toolmaster™

All ViscoQC spindles and measuring systems have a chip inside their magnetic coupling. This chip carries the following information:

- Spindle/system identification (name + UID)
- Spindle/system factors – if editing the SCF (Section 6.1.1 [▶ 17]), it is stored on this chip

When a spindle/measuring system is connected, the Toolmaster™ board in the upper part of the magnetic coupling reads the data and ViscoQC uses them for measurement.

- Toolmaster™ enabled (default): You do not need to select a spindle or measuring system.
- Toolmaster™ disabled: You have to select spindles/measuring systems manually from the Spindlelist (Section 7.4 [▶ 22]). There is no communication between ViscoQC and spindle. It is not possible to edit the spindle correction factor (Section 6.1.1 [▶ 17]). Unique identifier is not available.

Restrict a method to certain spindles

It is possible to restrict a measuring method to defined spindles or even to spindle UIDs (refer to general method settings in Section 7.2 [▶ 20]).

1. Make sure no spindle is connected (or the list of *Allowed Spindles* will be empty if restricting to UID).
2. Enable *Restrict Use of Spindles* and select the desired spindles in the list of *Allowed Spindles*.
3. If required, enable *Restrict to Unique Spindle Identifier*. Open the *Allowed Spindles* list. Connect the desired spindle. The spindle is automatically selected. Confirm with *OK*.

7.5 Instrument setup

7.5.1 Setting units

ViscoQC allows to customize the displayed units for physical quantities.

1. Tap *Menu* and select *Meas. Settings Setup > Set Units*.

Table 5: Available quantities and units

Quantity	Units (bold print = default unit)
Temperature	<ul style="list-style-type: none"> – °C (degree Celsius) – °F (degree Fahrenheit) – K (Kelvin)
Dynamic viscosity	<ul style="list-style-type: none"> – mPa·s (milliPascal-second) – Pa·s (Pascal-second) – cP (centiPoise) – P (Poise)
Kinematic viscosity	<ul style="list-style-type: none"> – mm²/s (squaremillimeter per second) – cSt (centiStokes) – St (Stokes)
Torque	<ul style="list-style-type: none"> – µNm (microNewton-meter) – mNm (milliNewton-meter) – % (percent of full-scale range) – dyn.cm (dyne-centimeter)
Shear Stress	<ul style="list-style-type: none"> – N/m² (Newton per squaremeter) – dyn/cm² (dyne per squarecentimeter) – Pa (Pascal)

2. Tap on a quantity.
3. Select the desired unit.
4. Tap *OK* to save the selected units.

7.5.2 Control panel

In the control panel define how the instrument communicates with the user. Refer to the menu tree for default access rights of user groups.

Tap *Menu* and select *Setup > Control Panel*:

- Sound – enable/disable sound
If enabled, ViscoQC beeps when:
 - a measurement is finished
 - connecting a spindle
 - connecting a spindle guard or DIN adapter
 - connecting a Pt100 sensor
- Date and time – set date and time
The format depends on the regional settings.
- Regional settings
Select your language, a data format (decimal separator, date/time format) and the preferred keyboard layout.
- Time server settings
Using a time server allows you to connect your instrument to a server providing the current time of your country. Set the time zone:

- Connect the instrument to your local network via Ethernet interface.
- Activate the check box *Use Time Server*.
- Enter the addresses of the time servers that shall be used for the synchronization. Separate the addresses by a semicolon. Servers of ntp.org are used per default.
- Select your time zone from the list.
- Tap *OK*. The instrument reboots.
- Printer Management
- Select an option for printout. Add or delete options. Default options:
 - PDF Export – transfer to USB storage device, PC, or LAN
 - Dymo LabelWriter 450 Duo – Section 4.2.3.2 [▶ 11]
 - V-Collect software – Section 4.2.3.3 [▶ 12]
 You can define an option as default printer. Depending on the printer type, set details (e.g. paper format, color print, IP address).
- Network
Connecting the instrument to your local network, enables you to use a network printer for printouts and to retrieve the instrument's system information from any PC on the network (also required for AP Connect).

- Connect the instrument over its Ethernet interface to your local network.
- If your network server provides DHCP functionality, activate *Obtain an IP address automatically (DHCP)* and tap *OK*.
- If your network server does not provide DHCP functionality, enter the correct settings manually: IP address, subnet mask, default gateway, addresses for the primary and secondary DNS server. Then tap *OK*.

TIP: Here you also find the unique MAC address of the instrument.

- Instrument name and location
If you have more than one Anton Paar instrument, and want to differentiate between them in printouts, data exports or within your local network (LIMS), you can define instrument names and locations.
- FTP settings
If data transfer to and from USB storage devices is not possible, you can alternatively export data to an FTP server. Create, edit and delete an FTP server connection:
If necessary, contact your local IT administrator for information on FTP server path (IP address), user name and password.
 - Connect the instrument over its Ethernet interface to your local network.

- Tap *More* and + *New* to specify the following settings:
 - Name of the connection: choose freely FTP server path: IP address
 - Username: user name used in the FTP client
 - Password: password used in the FTP client
 The name specified for the connection is now listed as an optional storage location.

TIP: *User name and password are case sensitive.*

7.5.3 Custom spindles

TIP: *By default, only users with administrator rights can access the custom spindles.*

Custom spindles equipped with Toolmaster™ are automatically recognized by the instrument. All spindle factors are stored on the chip. It is possible to edit the SCF (Section 6.1.1 [► 17]). If a custom spindle is without Toolmaster™, data for the custom spindle can be stored in the instrument.

Manually setting a custom spindle

1. Tap *Menu* and select *Setup > Spindle Management > Custom Spindles*.

Set the spindle factors SMC (Spindle Multiplier Constant), and SRC (Shear Rate Constant). If the shear rate is not defined for this spindle, SRC remains undefined. DIN/SSA/UL/ASTM systems with defined geometry have shear rate constants.

For vane spindles (for paste- or gel-like substances), enter a YMC (Yield Multiplier Constant).

2. Tap a factor. Enter your input.
3. Tap *OK* to save your input.

Default settings:

- Spindle Multiplier Constant SMC = 1.000
- Shear Rate Constant SRC = ---
- Yield Multiplier Constant YMC = ---

The factors of a custom spindle without Toolmaster™ are stored inside ViscoQC. You can change them if required. It is not possible to edit the SCF of a spindle without Toolmaster™.

TIP: *If working with two Toolmaster™ custom spindles, ViscoQC identifies each spindle by its name plus the unique identifier (UID) of the Toolmaster™ chip. The spindle name shows in the header on the main screen together with the maximum measurable viscosity. The UID appears in the spindle information. If not connected, you can identify a custom spindle by an engraved number below the magnetic coupling.*

8 Performing a measurement

8.1 Preparation and sample filling

If available, prepare your sample according to a suitable standard test method, guide or practice.

The equipment employed for measurement must be clean and free of residues.



WARNING

Risk of injury, health risk

- Using chemically or biologically hazardous chemicals as samples or cleaning liquids is a health risk.
- Measuring hot (> 40 °C/104 °F) or very cold (< 0 °C/32 °F) substances is a health risk.

The above risks could cause serious injuries unless special precautions are taken.

Consult the material safety data sheets of the sample substances and cleaning liquids.

Operate the ViscoQC in a fume hood and make sure to use suitable protective equipment.

Adhere to the instructions in Section 1 [► 5].

NOTICE

Risk of damage to instrument parts

- Make sure that all wetted parts are resistant to the sample substance and cleaning liquids (Section 9.2 [► 28]).
- Make sure that sample temperature is between -60 °C and +100 °C (-76 °F to +212 °F).
- Make sure that the sample will not solidify or harden inside the sample vessel. Otherwise, you may have to dispose of the spindle/measuring system and/or spindle guard.

8.1.1 Measuring with spindles

1. Use a sample vessel of at least 500 mL filling volume (e.g. typical 600 mL lab beaker with approx. 83 mm inner diameter). Fill the sample into the test vessel.

A sufficient sample filling height is important, because the tip of the spindle should be at least 10 mm above the vessel's bottom and the spindle should be immersed as far as the mark on its shaft.

2. Slowly dip the spindle into the sample vessel. Incline disc spindles so that you do not trap air bubbles on the bottom side of the spindle.

If using a spindle guard, immerse that first (then the spindle).

3. Put the sample vessel beneath the measuring head. Move the ViscoQC measuring head slowly downwards until it nearly touches the spindle. Pull

the spindle upwards and fix it on the measuring head. If applicable, mount the guard on the measuring flange (Section 5.3 [▶ 15]).

4. If applicable, place the Pt100 sensor in the sample vessel (Section 4.2.3.1 [▶ 11]).
5. Adjust the height of the measuring head: immerse the spindle until the sample level reaches the mark (small recess) on the spindle shaft. Adjust the position of the sample vessel: the spindle must be centered.

TIP: The beaker can be positioned exactly centrally to the spindle by using the flexible cup holder.

NOTE: Vane spindles V71 to V73 and GT6 have two immersion marks (full and half). Per default, the immersion depth is set to full and this SMC is used for calculation of viscosity. If only low sample volume is available and half immersion is needed, set the correct immersion depth in the method settings (refer to Section 7.2 [▶ 20]). The recommended speed range for vane spindles is up to 10 rpm. Above 10 rpm turbulences (Eddy currents) might cause higher viscosity readings.

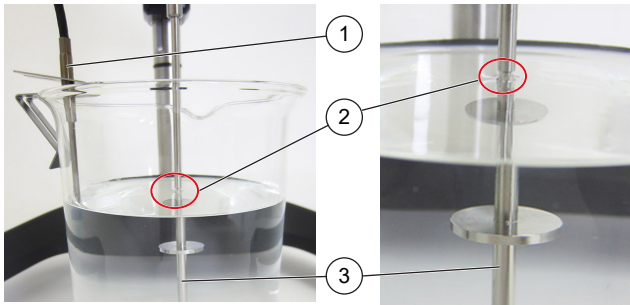


Fig. 14: Positioning a spindle in the sample vessel

- 1 Pt100 sensor
- 2 Immersion mark
- 3 Spindle

8.1.2 Measuring with systems with cup

If using a temperature device, refer to the instruction manual of the temperature device.

NOTICE

Risk of erroneous measuring results

If you calibrate a DIN/SSA/UL/ASTM system, the calibration includes all following parts: spindle (bob), cup, hook, coupling and the DIN Adapter.

When exchanging any of these parts (disposable parts: for each batch) or the Peltier temperature device (if applicable), perform a new calibration to verify the measured values!

1. For DIN/SSA/UL measuring systems, mount the DIN Adapter on the measuring head (Section 5.3.2 [▶ 15]).

TIP: If using a Pt100 sensor, insert this sensor in the DIN Adapter before mounting the DIN Adapter.

2. Fill the sample into the provided cup up to the mark or use the recommended sample filling volume. Proceed slowly to avoid air bubbles.
3. Dip the selected measuring bob into the sample.
4. Insert the cup into the DIN adapter from below until it clicks. The upper rim of the cup is now level with the rim of the DIN adapter.
5. Rotate the cup until the notch on its rim clicks into place.
6. Pull the measuring bob upwards and fix it on the measuring head (Section 5.3 [▶ 15]). Place the optional cover on the cup (if applicable).

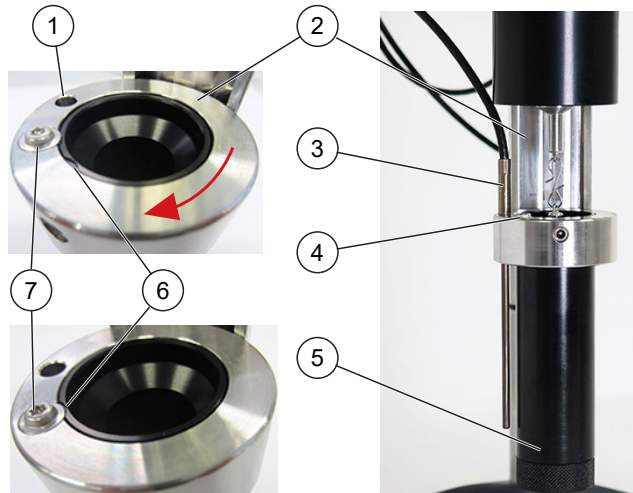


Fig. 15: Mounting a DIN measuring system

- 1 Bore for optional Pt100 sensor
- 2 DIN adapter
- 3 Pt100 sensor (optional)
- 4 Cup positioning screw
- 5 Cup
- 6 Notch on cup rim
- 7 Cup positioning screw

8.2 Measurement procedure

Set the measuring parameters (Section 7 [▶ 19]). Tap the *Start* to start measuring. The display depends on the selected method.

When you start measuring, ViscoQC starts the motor. Until it reaches the set value (for TruMode™, this is the speed that gives the target torque) the progress bar is red and in motion and says *Preparing*. The counter starts at once (not in Manual Mode), but the runtime is not yet counting. Viscosity and torque values are gray until the measured torque is at least 10 % of the full-scale range, then they turn black.

TIP: In order to get reliable measuring values, the spindle should have completed at least five revolutions before a value is accepted. In case you do not manually stop the test, your settings should agree with this rule (especially if the measuring speed is low).

Recommendation: > 5 rpm: 20 s / < 5 rpm: 60 s

If no Pt100 sensor is connected, the temperature reading is " --- ".



Fig. 16: Measuring – example Manual Mode

After preparation and optional preshearing: The progress bar is red and in motion. It says *Measuring*. The runtime starts counting.




Fig. 17: Measurement finished – example Manual Mode

When the measurement is ready, the progress bar turns green and says *Finished*. If an error or warning occurs, the progress bar is also red. The counter shows the duration of the total test procedure. The runtime shows the duration of the actual measurement. All measured values are frozen on the screen.

To unfreeze the screen tap .

If you stop a measurement before ViscoQC has finished *Preparing* or before it has reached a target value, the progress bar is red and reads *Finished*. Data are not exported to V-Collect Software nor sent to the USB printer. Target values depend on the set measurement mode.

When you have finished, remove all parts:

 **WARNING**

Risk of injury, health risk

If you measured at very high or low temperatures, wait until the sample reaches a temperature between 15 °C and 40 °C before you handle the hot or cold parts or make sure to use suitable protective equipment.

Adhere to the instructions in Section 1 [▶ 5].

1. Unscrew the spindle guard (if used) and disconnect the spindle. For DIN/SSA/UL systems, first disconnect the measuring bob, then turn the cup to unlock it from the DIN adapter and pull the cup downwards.





2. Put the sample vessel aside and lift the parts out of the sample substance for cleaning.

TIP: Do not let the sample dry on the wetted parts. Clean all wetted parts immediately.

8.3 Measured data

To view measured data, tap the button *Measured Data* on the main screen or select *Menu > Data Memory > Measured Data*.

The multiple sample view shows a list of all measurements. In the first column of the multiple sample view, you find an icon for each measured sample. The icon indicates the status of the sample.

	Sample successfully measured
	Warning: e.g. spindle guard required but not used
	No result due to a malfunction: e.g. Tru-Mode™ cannot reach target torque
	Measurement aborted

Tap a measurement to view details.

TIP: For multipoint tests, ViscoQC displays a maximum of 11 points. A line informs on the total number of points. To view all points, print/export the data.


You can select, print/export or delete (by default only with administrator/manager rights) data. In the multiple sample view, tap *More* or perform a long press on a measurement to access these options.

NOTE: If automatic printout via V-Collect software is active, access to data memory on the touch screen is not possible during measurement.

9 Upkeep and cleaning

Calibrate the ViscoQC regularly. Refer to Section 6.1 [▶ 16].

Clean the measuring system and instrument after each measurement.

 **WARNING**

Risk of injury, health risk

Using chemically or biologically hazardous chemicals as cleaning liquids is a health risk.

The above risks could cause serious injuries unless special precautions are taken.

Clean parts in a fume hood and make sure to use suitable protective equipment.

Adhere to the instructions in Section 1 [▶ 5].

The selection of the cleaning liquid(s) depends on the samples. All wetted parts must be chemically resistant to the cleaning liquid(s). Section "Wetted parts" lists all wetted parts and materials.

Cleaning liquid 1 must dissolve and remove sample residues in the measuring system.

The chemical quality must be high enough so that the cleaning liquid evaporates without leaving residues (e.g. particles). If cleaning liquid 1 does not dissolve the sample completely or does not dry up fast and/or without leaving residues, a second cleaning liquid is required.

Cleaning liquid 2 removes cleaning liquid 1 and evaporates easily with a stream of dry air.

9.1 Standard cleaning

Required equipment

- Cleaning liquid(s), above section
- Optional: vessels for immersing parts
- Lint-free tissue or lab paper
- Soft cleaning cloth or soft brush
- Protective equipment for user
- Procedure

NOTICE

Risk of damage to instrument parts and faulty measuring results

- Do not bend or drop spindles or measuring systems, nor the spindle guard. Spindles are vertically aligned and may be damaged if moved sideways with force. Any damage, however small, can cause large measurement errors.
 - The spindle coupling and the instrument side of the coupling must be completely clean. The coupling must not be oiled or lubricated.
 - Do not use force when removing sample substances from a spindle or measuring system. Do not use abrasive substances or tools for cleaning. Those would scratch the surface of the spindle/cup.
 - Do not immerse the Toolmaster™ chip on the top of a spindle coupling into liquids. Do not place the Toolmaster™ chip in an oven at 70 °C (158 °F) or higher.
 - Do not immerse the Pt100 sensor deeper than the end of the sensor sleeve. The sensor cable must not be immersed.
1. Take all parts (spindle, if applicable: spindle guard and Pt100 sensor) out of the sample substance and clean them.
 2. First, wipe the part with dry paper. Wet a fresh sheet of paper with cleaning liquid and wipe the part again. If the sample is hard to remove, immerse the part except for the Toolmaster™ chip in cleaning liquid. Let the part soak for some time before wiping it.

3. You can also clean the parts with a soft sponge or soft brush.
4. If necessary, clean the parts again with a second cleaning liquid.
5. Empty the sample vessel and clean it. Proceed as described above. For cups with plug, pull this off (DG: unscrew the bottom, then pull) and clean the parts separately.
6. Dispose of sample substance and contaminated paper according to the regulations of your country. Consult the material safety data sheets of the sample substances and cleaning liquids.
7. If you need to clean the Toolmaster™ chip, use a soft tissue and wet it with e.g. ethanol, isopropyl alcohol or petroleum benzene. Wipe the chip.
8. If necessary, wipe housing and touch screen: Use a soft cloth dipped in ethanol or warm water (optionally plus a mild solvent, pH < 10).

9.2 Wetted parts

The following materials are in contact with samples and the cleaning liquids:

Table 6: Sample wetted parts

Material	Part
Stainless steel 1.4404/1.4435/ 1.4545 (AISI 316L)	Spindles, spindle guard (optional), DIN system bobs, DIN system cup of DG26/SS, C-CC18/SS SSA systems (bob + cup), UL26 bob, 4B2 spindle, HT-DIN-81, PTD 100 Cone-Plate measuring cup and bobs
Anodized aluminum 3.2315 (6082)	DIN system cups of CC12, CC18, CC26, DG26; UL26 bob
1.4310 (AISI 301)	DIN/SSA/UL26/L1D22 system spindle hook, clip Pt100 sensor (optional)
Titanium 3.7165/64	L1D22 spindle
PEEK	Sample cover (optional)
PEEK black	DIN/SSA/UL26 cup plug, insulation 4B2 spindle, sample cover (optional)
FKM	O-ring of DIN cup bottom in CC12, CC18, CC26, DG26, UL26, SSA systems
EPDM 70	O-ring of DIN cup bottom plug in DG26/SS
Aluminium (Al 99.7/99.5)	Disposable cup of system CC12/D18, 4B2, L1D22, and of ETD 300, disposable spindle SC4-27
Stainless steel 1.4571 (SS316Ti)	Pt100 sensor (optional)

NOTICE**Risk of damage to measuring system**

Anodized aluminum measuring cups are resistant to samples with **pH values between 5.0 and 8.5**.

- a) For samples that are more chemically aggressive or outside this pH range, stainless steel cups made of AISI 316L are recommended. However, strong acids especially at high temperatures can also corrode this high-quality steel.
- b) It is the responsibility of the user to ensure that the tested samples are suitable and do not damage the surface of the cup.

NOTICE**Risk of data loss**

- Before updating the software, contact your Anton Paar representative, as an update can possibly affect settings concerning data transfer and interfaces.
- To update the system, you need administrator rights (Section 5.1 [▶ 12]). It is not possible to downgrade the system to an older version!

To update the instrument, you need a USB storage device or FTP server with an update file in the root directory. The current software/firmware package is available from Anton Paar.

Download it with the following link:

www.anton-paar.com/viscoqc-webpack

Make sure to extract all files correctly.

1. Plug the USB storage device into the USB interface on the rear of ViscoQC or connect ViscoQC to the FTP server.
2. Tap *Menu* and select *Service > Update > System Update*. Select the storage location and the file name of the new software package. Follow the procedure via messages on the display.
3. When the update is finished, select your operating language and restore all customized settings (method settings, custom speeds, temp. offset...).

9.3 Software administration

Find all software upkeep functions in the Service menu. Tap *Menu* and select *Service*:

- Backup Instrument settings (Section 9.3.3 [▶ 29])
- Restore Instrument Settings (Section 9.3.3 [▶ 29])
- TruSine (Bearing check) (Section 9.3.1 [▶ 29])
- Software Update (Section 9.3.2 [▶ 29])
- System information: shows ViscoQC model and serial no., current software and firmware version, serial numbers of motor/sensor unit and main board, if in use: data of optional temperature device, operating system, active software packages (V-Curve/V-Comply)
- Activate Software Packages (enter token to activate V-Curve and/or V-Comply)

9.3.1 TruSine™ (Bearing check)

The *TruSine™* (Bearing check) checks whether the measuring apparatus of ViscoQC is in good working order. It proves that sensitive parts such as the spring and the point jewel (bearing) are not damaged or worn.

Perform a new bearing check: *Menu > Service > TruSine (Bearing check)*. Remove the spindle and tap *Next*. Do not touch the instrument until the check is finished. A successful bearing check shows a very smooth decrease of torque.

The final torque value should be between 0.0 % and 0.5 % to be valid. Message: *Successfully*. Tap *OK*.

If the bearing check fails, calibrate with a reference standard liquid (refer to Section 6.1 [▶ 16]). If calibrating also fails, contact your local Anton Paar representative.

9.3.2 Software update

TIP: Before updating the system, perform a system backup (Section 9.3.3 [▶ 29]).

9.3.3 Backup / restore instrument settings

TIP: You require connection to a storage device (USB) or storage location (FTP server, Section 7.5 [▶ 23]).

Use instrument backup to save data before a software update or to transfer settings from one instrument to another (e.g. unit, method, or user settings). Depending on the selected backup/restore settings, the ViscoQC torque model and the active software packages must conform. The default storage file name contains the ViscoQC serial number, model and software packages (CU: V-Curve, CO: V-Comply, CC: V-Curve + V-Comply).

Backup

1. Connect the storage device/location to ViscoQC.
2. Tap *Menu* and select *Service > Backup Instrument Settings*. Select which data you want to save.
3. Tap *Next*. Select a storage location and file name.
4. Tap *Backup*. Wait until a message confirms the successful backup.

Restore

1. Connect the storage device/location with the backup file to ViscoQC.
2. Tap *Menu* and select *Service > Restore Instrument Settings*. Select a storage location and backup file (extension ".abf").

3. Tap *Next*. Select which data you want to restore. Data, which do not conform to the torque model or active software package, are not transferred to the instrument.
4. Tap *Restore*. If methods with the same name already exist, select one of the following options:
 - Replace the existing method by the one from the backup file
 - Restore the method from backup using a new name
 - Do not restore the method from backup
 - You can automatically repeat the selected option for all affected methods.
5. The backup data are transferred to the ViscoQC. Finally, the instrument reboots.

Restore rules:

- Differing ViscoQC serial numbers: No restore of adjustment and measurement data.
- Differing torque range models: No restore of method settings.
- SW package(s) not available (no license key available for the ViscoQC, on which you perform the restore):
 - V-Comply: No restore of security settings
 - V-Curve/Demo: No restore of methods with steps and yield mode, of data from step or yield methods, of graph and math models.
- You can add users and methods to existing ones (provided the name is different – refer to Step 4. [▶ 30]). Data and settings always replace (=overwrite) all previous (i.e. existing data) on the instrument, on which you perform the restore.

9.4 Adjusting the head retention

The head retention holds the measuring head on the rod of the stand. It defines how easily the head moves when you turn the hand wheel.

To adjust the head retention, insert a large slotted screw driver or small coin into one of the slits on the head retention.

- To tighten the hold, turn clockwise.
- To loosen the head retention, turn counter-clockwise.



CAUTION

Danger of hand injuries, squeezing

The head can drop uncontrollably if you open the head retention. Do not open or close the head retention unless the head is in the lowest position on the rod.

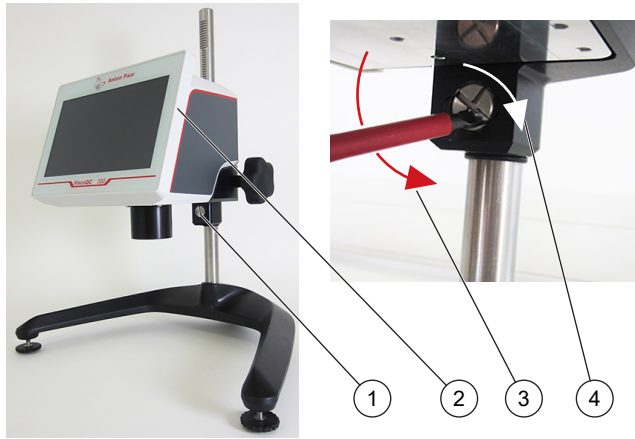


Fig. 18: Adjusting the head retention

- 1 Head retention
- 2 Measuring head
- 3 Loosen the head retention
- 4 Tighten the head retention

Tighten the head retention just enough so that the measuring head does not move down by itself, even if you place a weight of approx. 700 g on the head.

NOTE: Tightening the head retention too much will cause premature wear of the retention block and hand wheel.

If the hand wheel slips, the head slides down uncontrollably and you cannot fasten the head retention, replace the hand wheel and head retention block. Order the Hand Wheel Set, mat. no. 267644.

9.5 Storing and transporting the instrument

Clean all parts of the instrument before storing it. Clean these parts as described in Section 9.1 [▶ 28]. Make sure no sample residues or spills remain on the instrument. Disconnect the instrument from the mains supply.

Screw the transport protection onto the magnetic coupling by turning it to the right.

Put all parts into the original packing box or cover the instrument with a dust protection hood.

Store the instrument in a dry, clean place.

9.6 Packing the instrument for returns

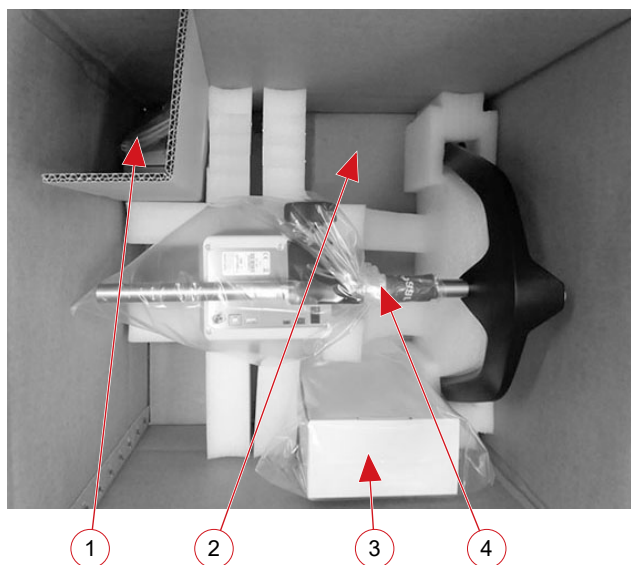


Fig. 19: Placing ViscoQC in the original box

- 1 Power supply and cables
- 2 Bottom foam filler
- 3 Spindle box
- 4 ViscoQC

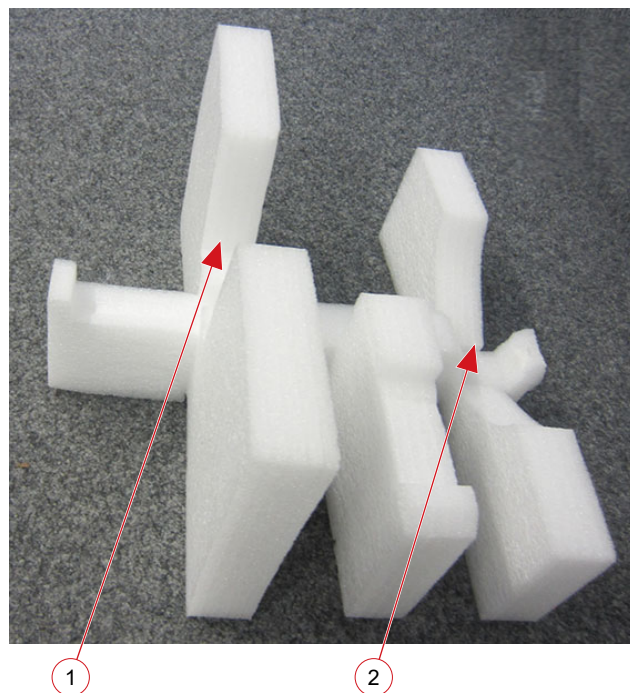


Fig. 20: Top foam filler

- 1 Space for ViscoQC measuring head
- 2 Space for ViscoQC foot

Use the original cardboard box and foam fillers to pack the ViscoQC. Cover the ViscoQC and parts with the top foam filler.

10 Maintenance and repair

10.1 Maintenance performed by an authorized Anton Paar representative

The product does not require a periodic maintenance by an authorized Anton Paar representative to retain warranty coverage.

If the product is no longer performing optimally (e.g., sensor performance), consider ordering product maintenance.

Please contact your local Anton Paar representative for more information about service options (e.g., service, possible warranty extension).

To fulfill requirements of regulatory authorities e.g. FDA 21 CFR 211.67, PIC/S 023-2 (5.5), Anton Paar offers services for compliant preventive maintenance and requalification for qualified Anton Paar products in case of software update, repair, and location change.⁵

⁵ For detailed information, please refer to general terms of delivery (GTD) on the Anton Paar website (<https://www.anton-paar.com>).

Table 7: Maintenance and repair

Component	Action	Interval	Classification
ViscoQC	Check and calibrate	1 year	Recommended
Hand wheel of ViscoQC	Replace	after 7,500 up/down-cycles	Recommended
Head retention block	Replace	if worn down to less than 13.3 mm	Recommended
Battery on DCB board	Replace	every 10 years	Mandatory

Following parts are generally excluded from the warranty (wear and tear parts)

- Fuses
- Measuring systems – except in case of malfunction of the Toolmaster™ chip in spite of correct handling (refer to Section 7.4.1.2 [► 23])
- O-Rings
- Hand wheel
- Head retention block

10.2 Repair performed by an authorized Anton Paar representative

In case your product needs repair, contact your local Anton Paar representative, who will take care of the necessary steps. If your product needs to be returned, request an RMA (Return Material Authorization Number). It must not be sent without the RMA and the filled “Safety Declaration for Instrument Repairs”. Please make sure it is cleaned before return. Do not return products that are contaminated by radioactive materials, infectious agents or other substances that cause health hazards.

TIP: Find the contact data of your local Anton Paar representative on the Anton Paar website (<https://www.anton-paar.com>) under “Contact”.

Appendix A Technical data

Table 8: Torque specifications

Torque range (10 % to 100 %)	
- L	0.00673 mNm to 0.0673 mNm
- R	0.07187 mNm to 0.7187 mNm
- H	0.57496 mNm to 5.7496 mNm
Accuracy (± 1 % of FSR ^a)	
- L	0.673 μ Nm
- R	7.187 μ Nm
- H	57.496 μ Nm
Resolution (± 0.1 % of FSR ^a)	
- L	0.0673 μ Nm
- R	0.7187 μ Nm
- H	5.7496 μ Nm
Repeatability	± 0.2 % of FSR ^a

^a FSR = Full Scale Range = 100 % torque

Table 9: Speed specifications

Speed range	0.01 rpm to 250 rpm
Number of speeds	<ul style="list-style-type: none"> – Speedlist with 18 standard speeds – 1 fixed custom speed C0 (200 rpm) – Freely selectable speeds within the speed range
Resolution	<ul style="list-style-type: none"> – 0.01 rpm to 9.99 rpm: 0.01 rpm – 10 rpm to 59.9 rpm: 0.1 rpm – higher 60 rpm: 1 rpm

Table 10: Pt100 temperature sensor

Measuring range	Accuracy (non-calibrated)
+15 °C to +30 °C (+59 °F to 86 °F)	± 0.5 °C (± 1.0 °F)
-60 °C to +149 °C (-76 °F to +300 °F)	± 1.0 °C (± 2.0 °F)
+150 °C to +300 °C (+302 °F to +572 °F)	± 2.0 °C (± 4.0 °F)
Resolution	0.1 °C (0.2 °F)
Max. measuring temperature ViscoQC: 100 °C	

Table 11: Ambient conditions

Ambient temperature	0 °C to 40 °C (32 °F to 104 °F)
Air humidity, relative	≤ 80 % up to 31 °C (88 °F), linearly decreasing down to 50 % at 40 °C (104 °F), non-condensing
Absolute altitude	maximum 4000 m
Pollution degree	2 (EN 61010 ^a)
Environment	laboratory and industry, indoor use only
Environmental standards	EN 61326 EN 61010 ^a
Airborne noise emitted	< 70 dB/A

^a EN 61010:2010 +A1:2019 +A1:2019/AC:2019

Table 12: General specification

Dimensions WxDxH	361 mm x 281 mm x 444 mm (14.2 in x 11.1 in x 17.5 in)
Net weight	6.2 kg (13.7 lbs) ViscoQC + stand
Shipping weight	9.6 kg (21.2 lbs) Box + supplied parts
Power supply:	
At Instrument	DC 24 V / 3 A
AC Adapter	90 VAC to 264 VAC; 47 Hz to 63 Hz
Power	70 W max.
ViscoQC housing material	
Housing	PC (Polycarbonate) + ABS (Acrylonitrile Butadiene Styrene)
Stand rod	Stainless steel 1.4301 (SS304)
Stand leg	Zamak 5 Z410 (ZnAl ₄ Cu ₁)
Interface specifications	
3x USB-A, USB-B, CAN, Ethernet, Pt100 sensor	

Data storage: up to 999 measurements with 10,000 steps (sub measurements) or 150 MB

Appendix B Spindle overview

Find spindle factors inside ViscoQC, refer to Spindle information, Section 5.2 [► 13].

TIP: In order to view factors of spindles that are not actually at hand, deactivate the Toolmaster™ (Section 7.4.1.2 [► 23]) before you open the Spindle information. Via spindle list (field "Spindle") you can then view all available spindles and measuring systems.

Table 13: ViscoQC spindles

Spindle name	Guard required	Filling volume	
Standard spindles			
L1	L	500 mL (600 mL beaker)	
L2	L		
L3	L can be used, its influence does not significantly affect measuring results		
L4			
L5			
RH1	R (only for ViscoQC - R)		
RH2	R (only for ViscoQC - R)		
RH3	R can be used, its influence does not significantly affect measuring results		
RH4			
RH5			
RH6			
RH7			
Concentric cylinder measuring systems (according to ISO 3219) ^a			
CC12	D (DIN adapter or PTD 80/175)		2 mL
CC18 and CC18/SS	D (DIN adapter or PTD 80/175)	6.4 mL	
CC26	D (DIN adapter or PTD 80/175)	18.5 mL	
Concentric cylinder measuring system with wider gap and disposable cup ^a			
CC12/D18	D (DIN adapter or PTD 80/175)	11.8 mL	
Double-gap cylinder measuring system ^a			
DG26 and DG26/SS	D (DIN adapter or PTD 80/175)	7.5 mL ^{b - Note!}	
Small Sample Adapter (SSA) measuring systems for low sample volume ^a			
SC4-18	D (DIN adapter, PTD 80/175, or ETD 300)	6.7 mL / ETD 300: 7.0 mL	
SC4-21	D (DIN adapter, PTD 80/175, or ETD 300)	7.1 mL / ETD 300: 7.0 mL	
SC4-25	D (DIN adapter or PTD 80/175)	16.1 mL	
SC4-27	D (DIN adapter, PTD 80/175, or ETD 300)	10.4 mL / ETD 300: 10.5 mL	
SC4-28	D (DIN adapter, PTD 80/175, or ETD 300)	11.0 mL / ETD 300: 11.0 mL	
SC4-29	D (DIN adapter, PTD 80/175, or ETD 300)	13.5 mL / ETD 300: 13.5 mL	
SC4-31	D (DIN adapter, PTD 80/175, or ETD 300)	9.0 mL / ETD 300: 9.0 mL	
SC4-34	D (DIN adapter, PTD 80/175, or ETD 300)	9.4 mL / ETD 300: 9.5 mL	
SC4-14/6R	D (DIN adapter or PTD 80/175)	2.1 mL	
SC4-15/7R	D (DIN adapter or PTD 80/175)	3.8 mL	
SC4-16/8R	D (DIN adapter or PTD 80/175)	4.2 mL	
Ultra-low viscosity measuring system ^a			
UL26	D (DIN adapter or PTD 175)	16 mL	
Vane spindles (for gel or paste like substances / for shear sensitive substances) – max. 10 rpm			
V71	no spindle guard	500 mL / 300 mL ^c (600 mL beaker)	
V72	no spindle guard	350 mL / 250 mL ^c (400 mL beaker)	

Spindle name	Guard required	Filling volume
V73	no spindle guard	200 mL / 160 mL ^c (250 mL beaker)
V74	no spindle guard	20 mL (25 mL beaker)
V75	no spindle guard	60 mL (100 mL beaker)
Glass rod GT6 for gel time determination		
GT6	no spindle guard or D (PTD 80/175, or ETD 300)	wide beaker or test tubes (~25 mL): 20 mL / 11.5 mL ^c (25 mL tube)
ASTM D5133/7110 measuring system ^{a, d}		
L1D22	D (PTD 175)	16.1 mL
ASTM D2983/8210 measuring system ^{a, d} – also suitable for DIN 51398		
4B2	D (PTD 175)	20 mL
T-bar measuring systems for paste-like substances and gels		
T-A to T-F (6 pcs.)	no spindle guard	500 mL (600 mL beaker)
Cone-plate measuring bobs for PTD 100 Cone-Plate only ^e		
CP-40	PTD 100 (the required measuring cup is supplied with PTD 100)	0.5 mL
CP-41		2.0 mL
CP-42		1.0 mL
CP-51		0.5 mL
CP-52		0.5 mL
For ETD 300: HT-DIN-81	ETD 300 (the required measuring cup is supplied with ETD 300)	6.5 mL
Spiral adapter		
Spiral spindle	no spindle guard	no defined volume, spiral chamber immersed in sample
Custom spindle: Set in <i>Menu > Setup > Spindle Management</i> (Section 7.5.3 [▶ 25]).		
Custom	depends on spindle	

^a Define a Spindle Correction Factor (Section 6.1.1 [▶ 17]) in order to achieve measuring accuracy better ± 3 % of the FSR.

^b NOTE: It is essential to fill the exact sample volume precisely between measuring bob and cup wall. Use a syringe! No sample shall be on top of the measuring bob. DG26 is a very sensitive measuring system. Therefore, you may have to wait for at least 5 minutes for stable results, even if the speed is higher than 5 rpm.

^c Immersion depth: Full / Half

^d Intended for use with PTD 175, and thus not recommended for ViscoQC 100.

^e For CP bobs, is mandatory to define a Spindle Correction Factor (Section 6.1.1 [▶ 17]) in order to achieve measuring accuracy of at least ± 1 % of the FSR.

Appendix C Menu tree

The colors show which parts of the menu are accessible for users with administrator, manager, or operator rights (default settings).

Administrator
Administrator, Manager
Administrator, Manager, Operator

Tap *Menu* to access ViscoQC 300 main menu:

Data Memory	Measured Data	View, select, print/export or delete (only administrator/manager) measured data		
	Analysis ^a	Analysis Measured Data	Analyze data, print (pdf) the analysis.	
		Compare Measured Data	Select and compare up to 5 meas.	
	Adjustment Data	Current Adjustment Report	View, print/export the current <i>Level/Zero Adjustment</i> data.	
		Adjustment Data	View history of: <i>Level/Zero Adjustments</i> , Spindle and Temperature Calibrations, manual SCF or temp. offset correction (Section 6 [▶ 16]). Select, print (also as pdf), or delete (only administrator/manager) calibration and adjustment data.	
Audit Trail ^b	View all audit trail data. Print/export, comment (only administrator) or delete (only administrator/manager) data.			
Method Settings	(Current) AP Manual Mode selected by default	Measurement Mode: Manual Mode (MM)	Set method visibility: show methods, which can be selected for measurement (button <i>Method</i>). The current method is always visible. Sort methods (by name, mode or visibility). <i>Copy, delete</i> (not allowed for the current method) methods. You get the default "AP" methods. You cannot edit or alter default methods! Copy a method suitable for your application and edit it. For each method: Set measurement parameters depending on the selected measurement mode <i>Maximum number of methods: 60</i>	
	AP ASTM D2983/ D8210 ^{c, a}	Mode: ASTM D4402 (ASPH)		
	AP ASTM D4402 ^{a, d}	Mode: ASTM D2983/D8210 (LTV)		
	AP ASTM D5133 ^{c, a}	Mode: Temperature Ramp (TR)		
	AP ASTM D7110 ^{c, a}	Mode: Temperature Ramp (TR)		
	AP DIN 51398 ^{c, a}	Mode: Steps (StP)		
	AP Programmed Steps ^a	Mode: Steps (StP)		
	AP Speed Scan	Mode: Speed Scan (SpS)		
	AP Stop at Temperature ^e	Mode: Stop at Temperature		
	AP Stop at Time	Mode: Stop at Time (@t)		
	AP Stop at Torque	Mode: Stop at Torque (@M) → Latin "Momentum"		
	AP Stop at Viscosity	Mode: Stop at Viscosity (@V)		
	AP Temperature Scan ^f	Mode: Temperature Scan		
	AP Yield Point ^{a, g}	Mode: Yield Stress (YiS)		

^a This function or method/mode is only available with upgraded software package V-Curve!

^b Only available with upgraded software package V-Comply!

^c Only available with PTD 175, refer to instruction manual of temperature device

^d Only available with temperature device ETD 300, refer to instruction manual of temperature device

^e Not available with any temperature device PTD or ETD 300, requires an optional external Pt100 sensor

^f Only works with temperature device PTD 80/175 or ETD 300, refer to instruction manual of temperature device

^g Requires the use of a Vane spindle (V71 to V75).

Setup	Spindle Management	Spindle System Settings	Enable / disable Toolmaster™ (automatic spindle recognition) and TruGuard™ (automatic spindle guard detection).
		Custom Spindles	Create, edit or delete custom spindles.
	Heli-Plus ^a	Set Points	Set points for Helix Mode (method-specific)
		Initialization	Find reference position for Heli-Plus
	Set Units	- Temperature (°C °F K) - Dyn. Viscosity (mPa·s Pa·s cP P) - Kin. Viscosity (mm ² /s cSt St) - Torque (μNm mNm % dyn·cm) - Shear Stress (N/m ² dyn/cm ² Pa)	Set units for the listed quantities
	Control Panel	Sound	Select when audio signal (beep) should be emitted
		FTP Settings	Settings for storing data to a network (Section 7.5.2 [► 24])
		VNC Settings	Enable / disable operation via LAN by external PC and virtual network client software "AP Instrument Viewer"
		Date and Time	Set instrument data and time
		Regional Settings	Select language, data format, keyboard layout
		Time Server Settings	Enable / disable use of time server; name time server and select time zone
		Printer Management	Select, edit or add printers. PDF File Printer = default
		Network	Enter IP address, subnet mask, default gateway, primary and secondary DNS
		External Interface Settings	Select LIMS (outdated) or AP Connect to manage data; enable the option to start remote measurements.
		Instrument Name and Location	Set instrument name and location. Default: None
	System Security ^b	Security Level	Low or 21 CFR Part 11. View details for each setting
		Electronic Signature	Enable / disable: Electronic signature, signature password, substitute signing. Select which signature levels to use (submit / review / approve).
		Non Storage Mode	Enable / disable <i>Non Storage Mode</i> (which allows operation compliant with US Pharmacopeia 1058 CAT-B)
		Value Visibility Mode	Show measuring values: always, during measurement, or only when measurement finished. Enable / disable: <i>Show Temperature</i> value(s)
Audit Trail		Enable / disable audit trail and reminder for backup file. Set remind period (in days)	
Logon Settings		Enable / disable and set a value for: - Auto-Logoff: 1 to 60 min - Password expiry time: 1 to 365 days - Minimum password length: 6 to 30 characters - User deactivation after failed logon: 1 to 10 attempt(s) - Use of complex passwords	
Increased Security		Enable / disable increased security level. View details	
Advanced Security		Disable use of USB storage devices Service logon only with customer password Enable <i>Advanced Data Integrity</i> : <i>archive</i> instead of <i>delete</i>	

^a Only available with Motorized Stand Adapter Heli-Plus – refer to Heli-Plus Short Instruction

^b Only available with upgraded software package V-Comply!

Setup	User Management	User Administration	Administrator:	Add/edit/delete users. Change passwords. Set user accounts, auto logon.	
			Manager:	Change manager password	
			Operator:	Change operator password	
	Export and Print-out Settings	Export Settings	User Group Administration	Manage user groups and access rights for all instrument functions (Section 5.1 [▶ 12]).	
			Automatic Printout	Enable / disable automatic printout (also of subsamples). Select printer type, report design, export file name to use.	
			Select Logos	Select report logo and background from a list.	
			Import Logos	Import logos from external source.	
Report Signature Settings			Enable / disable for printed reports (GxP compliance): up to 2 signature captions, signature time, printed by		
Name and Address			Enter report heading. Max. 50 characters / field		
Adjustments	Level / Zero Adjustment		Perform a Level / Zero Adjustment.		
	Edit Spindle Correction		Enter new SCF manually, reset to default =1 (Section 6.1.1 [▶ 17])		
	Spindle Calibration		Calibrate ViscoQC spindle, correct SCF (Section 6.1 [▶ 16]).		
	Edit Temp. Offset Pt100 ^a		Enter temperature offset for Pt100 sensor. (Section 6.2.1 [▶ 19])		
	Edit Temperature Offset/ Gain PTD 80/ ETD 300 ^b		Enter offset and gain for temperature device PTD 80 or ETD 300.		
	Edit Temperature Offset Table ^c		Enter temperature offset values for temperature device PTD 175.		
	Temperature Calibration		Calibrate temperature measurement of ViscoQC. Apply a correction (offset / PTD 80: also gain / PTD 175 or ETD 300: multiple temperature values) if required (Section 6.2 [▶ 18]).		
Service	Lubricate Rod of Stand ^d		Information on lubrication of the stand rod, reset reminder.		
	Backup Instrument Settings		Create a backup. (Section 9.3.3 [▶ 29])		
	Restore Instrument Settings		Restore data from backup. (Section 9.3.3 [▶ 29])		
	TruSine (Bearing check)		Perform a bearing check. (Section 9.3.1 [▶ 29])		
	Update	System Update		Perform a software update.	
		Install Language Pack		Update existing languages.	
	System Information		View the system information, instrument type, active software packages, firmware/software versions, serial numbers of instrument, motor sensor unit and main board. If connected: FW version of temp. device, serial no., offset, gain (PTD 80) / Heli-Plus – FW version, serial no., main board serial no.		
	Activate Software Packages		Upgrade ViscoQC with one or both software packages (V-Curve, V-Comply). Enter the provided unlock code here. Note! The first 8 digits of the unlock code are the serial number of the instrument.		
Unlock Service		Enter unlock code to access service level (renounce Anton Paar warranty), set customer service password.			

^a Not available with any temperature device PTD or ETD 300, requires an optional external Pt100 sensor

^b Only available with PTD 80 or ETD 300, refer to instruction manual of temperature device

^c Only available with PTD 175, refer to instruction manual of temperature device

^d Only available with Motorized Stand Adapter Heli-Plus – refer to Heli-Plus Short Instruction

Appendix D Trouble shooting

Errors and warnings which might occur during operating ViscoQC.

Number	Type	Description
01	Error	Maximum torque exceeded. Use smaller spindle.
02	Error	Severe firmware error during booting. Restart ViscoQC. If the error persists, contact support.
03, 04, 07, 08	Error	Error in Motor-Sensor unit. Contact support!
05, 06	Error	No adjustment found. Contact support!
09	Warning	Motor will soon turn off. Stop test! (Motor is getting too hot)
10	Error	Motor overheat. Wait for cooling down.
11	Error	Restart ViscoQC! If the error persists contact support!
12	Error	Toolmaster™ error: severe firmware error. Restart ViscoQC. If the error persists, contact support.
13	Error	Change spindle! If error persists contact support!
14	Error	SCF saving failed. Attach spindle and repeat!
15	Error	Restart ViscoQC. If the error persists, contact support!
16, 17, 18, 19	Error	Pt100 error. Disconnect/reconnect Pt100 sensor. Restart ViscoQC. If the error persists, contact support!
20	Error	Unknown guard. Clean guard screw!
21	Error	Guard short circuit. Clean guard screw!
22	Error	Retry Level Adjust. Contact support!
23	Warning	Not leveled.
24 / 25	Warning / Error	For spindle [YZ] {X} Guard/DIN adapter/No Guard is recommended / required.
26 / 27	Error / Warning	Perform Level and Zero Adjust.
28	Warning	Torque too high for TruMode AM. Use smaller spindle.
29	Warning	Torque too low for TruMode AM. Use bigger spindle.
30	Error	Pt100 is required for @T. Attach Pt100 sensor.
31	Error	Attach a spindle or choose from list.
32	Warning	Measurement with ViscoQC aborted by user.
40	Error	Target Viscosity must be lower than maximum viscosity for the speed/spindle combination.
41 / 42	Warning	Limit 1 / 2 exceeded. Limits were defined in the method settings. At most, you can set limits for two different quantities (1 and 2). Either the upper or the lower limit of quantity 1 or 2 was exceeded.
50 ^a	Error	Spindle with YMC is required for measurement mode <i>Yield Stress (YiS)</i> .
51 ^a	Error	No yield stress value was determined. Either the sample under test does not have a yield point or the selected measurement parameters are unsuitable.
52 ^a	Error	No dynamic viscosity for calculation of relative target viscosity in mode <i>Stop at Viscosity (@V)</i> available. The measurement will not deliver an absolute dynamic viscosity value (e.g. because the range has been exceeded). Therefore, it is impossible to calculate a relative target viscosity from the non-existent absolute value.

Number	Type	Description
97	Error	Measurement was stopped, because the maximum number of points (10,000) or the maximum duration (99 h) was reached.
98	Error	Measurement was canceled by the user.
99	Error	Power off during measurement. Check the mains supply. Switch ViscoQC on again. If the screen stays dark, contact support.
501 ^a	Warning/Error	Invalid settings for mathematical model. Adapt your settings to allow valid calculation.
537 ^a	Error	Invalid mathematical model or no SRC. Select a suitable model. Make sure to use a suitable measuring system (which has a Shear Rate Constant – refer to Section 7.4 [► 22],).

^a Only in connection with upgraded software package V-Curve

TIP: Errors and warnings concerning PTD/ETD: refer to the Instruction Manual of the temperature device.

Appendix E Declarations of conformity

DocuSign Envelope ID: 0C166638-92B1-430B-84DC-E3C1344CECA4

EU Declaration of Conformity

(original)



The Manufacturer **Anton Paar GmbH**, Anton-Paar-Str. 20, A-8054 Graz, Austria – Europe hereby declares that the product listed below

Product designation: **ViscoQC 300**

Model: **ViscoQC 300 – L**
ViscoQC 300 – R
ViscoQC 300 – H

Material number: 105023, 105024, 105025

is in conformity with the relevant European Union harmonisation legislation. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Electromagnetic Compatibility (2014/30/EU, OJ L 96/79 of 29.3.2014)

Applied standards:

- EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

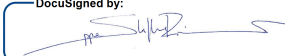
Low Voltage Directive (2014/35/EU, OJ L 96/357 of 29.3.2014)


Applied standards:

- EN 61010-1:2010 +A1:2019 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

RoHS Directive (2011/65/EU, OJ L 174/88 of 1.7.2011)

Place and date of issue: Graz, 2022-11-11

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