Anton Paar

Instruction Manual and Safety Information

Snap 51

Find out more

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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.

Cybersecurity

- The product must be installed in a physically restricted and access-controlled environment (e.g., non-public area, behind a firewall). Attacks requiring disassembly or hardware modification are out of scope.
- The user must use strong, unique passwords for each device and must keep them confidential, ensuring access is limited to authorized personnel only.
- The user must change or refresh passwords / PINs periodically.
- Security settings delivered by Anton Paar (e.g., authentication, PIN, encryption, logging) must remain enabled. Disabling or modifying them shifts responsibility and risk to the user and requires the customer to perform their own risk assessment.
- The user must configure the product in accordance with their company's recommended network and security policies.

- The user must regularly check for product updates and must install them (either independently or through Anton Paar processes).
- For software products, the customer must ensure proper access control to the host PC. The installer directory must be restricted to administrators.
- Security policies must ensure that users protect authenticators: keep them in their possession, do not share them, and report lost or compromised authenticators immediately. The user must not leave the product unlocked or unattended while authenticated.
- The product must operate only on a managed, regularly updated, and trusted operating system. It cannot protect against a compromised operating system.
- Only approved and conformant third-party components must be used. Secure implementation of connections to such components remains the responsibility of Anton Paar.
- The user must recognize that deviations from the Anton Paar–defined intended product use, environment, or documented security settings may introduce additional risks not covered by the provided security measures.

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.).
- 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.
- Ensure that the instrument is clean and free from microbiological contamination before you put the sample tube into the measuring container.

Installation

- The product is not insulated against high voltages. Measuring samples under high voltage (e.g. in energized battery banks) bears the risk of an electric shock. Define appropriate testing procedures and safety measures to protect yourself from any electric shock.
- Do not expose the product to temperatures below 0 °C (32 °F) when the measuring cell contains water. Freezing water will cause rupture of the measuring cell.
- Use only accessories, consumables, or spare parts supplied or approved by Anton Paar.

Using the product

- Ensure that all operators have been trained beforehand to use the product safely and correctly.

– 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.

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.
– 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.

Batteries

– Never open the battery compartment in hazardous areas. Exchange the batteries only outside hazardous areas.
– If the product is not to be used for a longer period, remove the batteries from the battery compartment.
– Never short-circuit or open batteries.
– Do not expose batteries to heat or throw them into fire.
– Do not charge non-rechargeable batteries. There is a risk of explosion.
– Do not use lithium ion rechargeable batteries or lithium ion batteries with the product.

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.
– Disassembly of the measuring cell by unauthorized persons will void any warranty.

Disposal

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

1.2 Conventions for safety messages and typography

Conventions for safety messages

The following conventions for safety messages are used in this document:

WARNING

Description of risk

Warning indicates a hazardous situation which, if not avoided, **could** result in death or serious injury.

CAUTION

Description of risk

Caution indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Description of risk

Notice indicates a situation which, if not avoided, could result in damage to property.

TIP: *Tip gives extra information about the situation at hand.*

Typographical conventions

The following typographical conventions are used in this instruction manual:

Convention	Description
Names for physical buttons *Labels for tabs, buttons etc. in the software*	The names and labels are written in *italic*.
Menu Level 1 > Menu Level 2	Menu paths are written in *italic*. The menu levels are connected using a closing angle bracket.

2 Overview

Snap 51 is a portable alcohol meter for the determination of the alcohol concentration in distilled spirits that can be considered to be binary mixtures of ethanol and water. The concentration determination is based on density measurement by the oscillating U-tube method.

Quick on-site measurements

The robust instrument measures samples directly out of the sample container – without the necessity to pour the sample into a measuring cylinder. After pressing down the lever of the pump, the metal tube is immersed directly into the storage vessel to suck up 2 mL of sample. Within seconds the instrument displays the alcohol concentration with an accuracy of 0.1 % v/v.

The instrument is operated via keys on the front. Up to 1024 measured data can be stored in the memory of the instrument and can be recalled, exported to a PC, or printed later. The transfer of the stored measured data to a printer or PC is done wirelessly using the integrated Bluetooth interface.

The instrument is additionally equipped with an RFID interface enabling to uniquely link sample IDs and methods to an RFID tag. Later on, by reading the RFID tag, you can switch quickly and easily between different sample IDs and methods, thus further increasing the efficiency of your measuring process.

The instrument is compatible with AP Connect, the lab execution software by Anton Paar.

One instrument for distilled spirits of all strengths

Snap 51 covers a measuring range from 0–100 % v/v (0–200 °Proof), and therefore measures distilled spirits of all strengths – be it pure distilled spirits, samples during the dilution of pure distilled spirit to drinking strength, or a check of the final product.

Automatic temperature compensation

Snap 51 measures sample temperatures from 0 °C to 40 °C, and automatically converts the measured result to compensate for the deviation from the required reference temperature (20 °C or 15 °C for % v/v alcohol, 60 °F for °Proof).

2.1 Measuring principle

Definition of density

The density (ρ) of a sample is defined as its mass (m) divided by its volume (V):

$$\rho = \frac{m}{V}$$

As the volume changes with temperature, density is a temperature-dependent measuring parameter.

The oscillating U-tube method

The sample is introduced into a U-shaped tube, made of Hastelloy that is being excited to oscillate at its characteristic frequency, which changes with temperature and density of the filled sample. Through determination of the characteristic frequency, the density of the sample can be calculated.

Due to the temperature-dependency of density, the metal tube surrounding the measuring cell has to stay immersed in the sample during the measurement. This ensures quick temperature equilibrium between the sample in the cell and the material surrounding the cell whilst eliminating the influence of the ambient temperature.

Density and temperature are measured simultaneously and are the basis for the calculation of the alcohol content, which is temperature-compensated to correlate with a certain reference temperature.

Concentration measurement

In binary mixtures, the density of the mixture is a function of its composition. Thus, by using density/concentration tables, the density value of a binary mixture can be used to calculate its composition.

This is also possible with so-called quasi binary mixtures. These are mixtures containing two major components and some additional ones that are present in very small concentrations compared to the two main components.

Many decarbonated soft drinks, for example, can be considered to be quasi binary mixtures of sugar in water because the concentrations of flavors and acids are very small compared to sugar and water. Therefore, the sugar concentration can be determined with a density meter.

The same holds for the determination of the alcohol concentration in distilled spirits that can be considered to be quasi binary mixtures of ethanol and water.

In contrast, all kinds of liqueurs have to be considered as ternary solutions of water, ethanol, and sugar. They are typically produced by mixing distilled spirits with fruit juices, herbs, dairy products etc., and adding sugar. Therefore, the determination of the true alcohol concentration based on density measurement is not possible for liqueurs.

2.2 Functional components

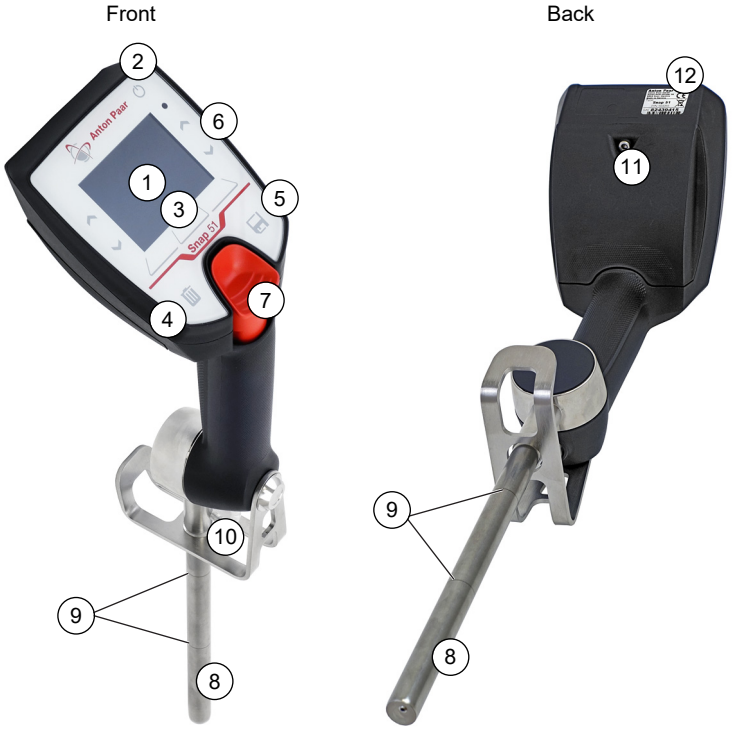


Fig. 1: *Views of the instrument*

1	*LC display*	*7*	*Filling pump*
2	*Power on/off key*	*8*	*Metal tube with measuring cell*
3	*Function keys*	*9*	*Markings for the correct immersion depth*
4	*Delete key*	*10*	*Silicone connection hose*
5	*Data storage key*	*11*	*Screw of battery compartment*
6	*Arrow keys*	*12*	*RFID interface and type plate with serial number*

Table 1: Keys on the front

	Power on/off key	to switch the instrument on and off
	Data storage key	to start a measurement *When the measurement is finished, the result is stored automatically in the internal memory.*
	Delete key	to remove the data of the last measurement
	Arrow keys	to navigate in the quick access area, in menus, or in selection/character lists
	Function keys	to activate a key function displayed directly above

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 2: Supplied parts

	Qty.	Description	Mat. No.
	1	Snap 51 portable alcohol meter **NOTE:** *The battery compartment comes separately to avoid discharge of the batteries during storage.*	183055
-	1	Battery compartment PP DMA 35 / Snap	171506
-	1	Carrying case Snap 51	189144
-	1	Instruction manual	189147
	1	Allen key 3 mm DIN 911	58264
	0.2 m	Hose 3x5 mm silicone (transparent)	50814

Table 3: Optional accessories and consumables

Article description	Mat. no.
Rubber housing operating panel	177115
Spare wristband for portable instruments	92477
Set carrying strap DMA 35/Snap	177301
Bluetooth USB adapter	99180
ABS disc tag 30 mm, 5 mm hole R/W	88443
White PVC sticker disc tag 30 mm R/W	88445
Black laundry tag 30 mm R/W	88444
Printer CMP-20BT Bluetooth/RS232C	97154
Alkaline battery 1.5 V LR06 mignon AA	82610
Custom parameter	181868
Installation custom parameter	181797
Wall bracket for DMA 35, DMA 35 Ampere, DMA 35 Ex / Ex Petrol	244859
AP Connect Standard (permanent) one-time license fee	254081
Instrument adapter for AP Connect software license	266422

4 Installation

4.1 Mounting the battery compartment

WARNING

Risk of explosion or fire

When you mount the battery compartment, sparks may be generated, which can cause an explosion or fire in hazardous areas. Serious injuries are possible.

– Mount the battery compartment only outside hazardous areas.

Fig. 2: *Mounting the battery compartment*

1. Slide the supplied battery compartment into its position on the back of the instrument's display.
2. Fix the screw of the battery compartment with the supplied Allen key.

4.2 Switching the instrument on/off

– To **switch on** the instrument, tap and hold the ⏻ key until the display lights up.
– To **switch off** the instrument, tap and hold the ⏻ key until the instrument is switched off.

TIP: *For proper operation, cover the entire key area with your finger.*

The instrument switches itself off after 5 minutes when idle and not moved.

5 Operation

5.1 Main screen

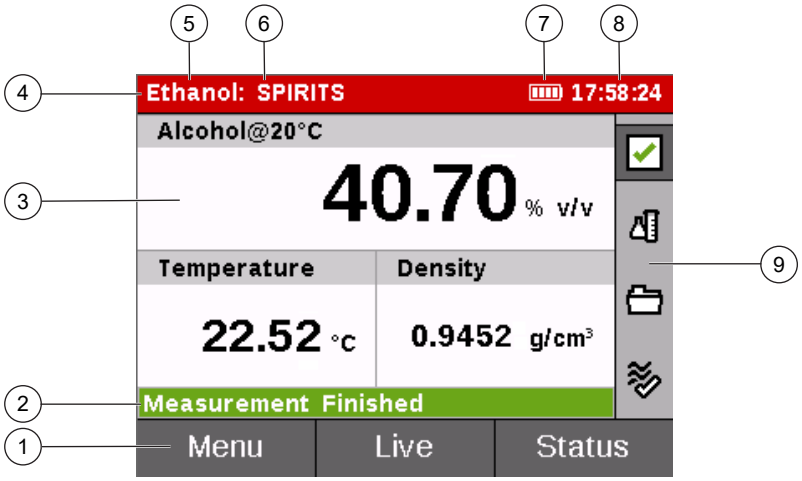


Fig. 3: *Example main screen*

1 Key functions
2 Status bar
3 Output field
4 Header
5 Method
6 Sample ID
7 Battery charge status symbol
8 Current time
9 Quick access area

Header

On the left of the header, you find information on the currently used method, the sample ID, the number of stored data sets, or the index of the currently shown data set, depending on the active mode and function.

On the right of the header, the battery charge status and the current time are displayed. When activated, the symbol for Bluetooth may also show at the left of the battery symbol.

Table 4: Symbols in the header

	The battery charge status symbol indicates the battery charge level of your instrument, for details refer to Section 12.7 [▶ 47].
	The RFID symbol shows in the header of the main screen when an RFID tag is read.
	The Bluetooth symbol shows in the header of the main screen when data are sent via Bluetooth.

Output fields

You can select 2 or 3 sample parameters to be simultaneously displayed on the main screen. Each parameter is shown in a separate output field.

Status bar

The status bar shows the status of the instrument or a measurement. If applicable, a progress bar will show the progress of activities.

5.2 Quick access area

Use the arrow keys to select a quick access function. Activate the function with the right function key.

The following quick access functions are available:

Icon	Function	
	Status function Use it to check the measurement status. The status indicator can assume 3 states:	
		– green check mark: status OK
		– yellow symbol with exclamation mark: there is a warning message
		– red symbol with lightning: there is an error message

Icon	Function
	*Sample* / *Sample ID* function Use it to select a measuring method and a sample ID for the next measurement.
	*Data* function Use it to view measurement and check data stored in the data memory.
	*Check* function Use it to initiate a check.

5.3 Key functions

The key functions correspond to the function keys below/above the display (the assignment of keys adapts to the active selection). The following key functions are available:

Function	Description
Back	Leaves the menu and goes to the next higher menu level.
Cancel	Aborts an operation.
Delete	Initiates deleting a value or deletes the next character to the left.
Done	Finishes an entry.
Edit	Switches into editing mode allowing you to enter values or change the current selection.
Enter	Enters a character.
Live	Unfreezes the last measuring result and returns to showing continuous live readings.
Menu	Opens the main menu.
New	Initiates entering a new value.
Next	Continues with a procedure or selects the next item to the right.
No	Rejects a proposition.
OK	Confirms a selection or finishes a procedure.
Prev	Selects the next item to the left.
Print	Prints the selected data.
RFID	Reads an RFID tag.

Function	Description
Save	Saves adjustment data.
Start	Starts a procedure.
Yes	Accepts a proposition.

On the main screen, the right function key can assume the following functions according to the icon selected in the quick access area:

Function	Description
Check	Quick access to the checks.
Data	Quick access to the measurement data.
Sample	Quick access to the method list and sample ID list for making a selection.
Status	Quick access to the measurement status and any associated warning or error message.

5.4 Menu navigation

– Use the **function keys** to switch menus and to trigger selection-specific activities.

– Use the **arrow keys** to navigate within menus and to select an item.
With longer screen content, a black scroll bar will show on the right of the scrollable area. Use the arrow keys to scroll through the content.

– Tap *Back* repeatedly to **return to the main screen** at the end of any procedure.

5.5 Entering text or numbers

After you have switched into editing mode, you see a selection bar on the right of the screen:

1. Use the arrow keys to select the next character/digit to enter.

TIP: *Keep the arrow keys pressed to scroll through the selection bar quickly.*

Select the red left arrow ◂, if available, to edit the previous position (one character to the left).
Select the red left arrow with shaft ←, if available, to delete the last character.

2. Tap *Enter* to enter the selected character at the current position.
Tap *Prev*, if available, to move the current position one character to the left.
Tap *Delete*, if available, to delete the character left of the current position.
The editing line will show the whole current text/number.

TIP: *To enter a negative number, you need to delete all digits first. Only then will the negative sign "–" be available.*

3. Tap *Done* to finish character entry and to confirm the entered text/ number. Tap *Cancel* at any time to abort character entry and to discard the entered text/ number.

5.6 Selecting from a list

After you have switched into editing mode, you see a selection list folded out:

1. Use the arrow keys to select your choice.
2. Tap *OK* to confirm the selected value or *Cancel* to abort selection.

5.7 Operation by gestures

You can start or abort a measurement and also assign method and sample ID to a measurement via RFID by gestures instead of key operation. To be able to do so, enable gesture control in the setup menu, refer to Section 6.7 [▸ 25].

To start a measurement

– Turn the instrument to the right as shown in the below figure and hold the position until the measurement starts.

Fig. 4: *Instrument turned to the right*

To abort a measurement

1. Turn the instrument to the left as shown in the below figure and hold the position until a confirmation message appears.

Fig. 5: *Instrument turned to the left*

2. Confirm:
   – To confirm canceling, turn the instrument to the left again as shown in the above figure, and hold the position until the measurement has stopped.
   – To continue with the measurement, turn the instrument to the right.

To assign method and sample ID to a measurement via RFID

– Tilt the instrument towards you and hold the position until *Reading tag* appears on the screen.
  Continue as described in Section 7.6 [▶ 32].

6 Instrument settings

6.1 Setting the language

1. Tap *Menu* and select *Setup* > *Language*.
2. Tap *Edit*.
3. Select the preferred language.

6.2 Setting date and time

Date and time are automatically saved with measurement and check data. During operation, the current time is displayed on the right of the header.

To set the date or time

1. Tap *Menu* and select *Setup* > *Date and time* > *Set date and time*.
2. Select *Set date* or *Set time* and tap *Edit*.
   With the 12 hour clock selected, also select the appropriate time of day from the selection list *AM / PM*.
3. Enter the current date or time/time of day, respectively.

To set the date or time format

1. Tap *Menu* and select *Setup* > *Date and time* > *Set date and time*.
2. Select *Set date format* or *Set time format* and tap *Edit*.
3. Select one of three date formats (DD = day, MM = month, YYYY = year):
   DD.MM.YYYY | YYYY-MM-DD | MM/DD/YYYY
   Select one of two time formats (24 hour clock or 12 hour clock):
   24h | AM/PM

6.3 PIN protection

You can protect access to the menu by a PIN (personal identification number). After you have set PIN protection, you can still use all functions of the quick access area (perform measurements and checks, select methods and sample IDs, etc.) without the need for entering a PIN.

To activate PIN protection

1. Tap *Menu* and select *Setup* > *PIN settings*.
2. Select *Set PIN protection* and tap *Edit*.
3. Select *On* from the selection list.
4. Select *New PIN* and tap *Edit*.
5. Enter your 4-digit PIN.
6. Select *Confirm new PIN* and tap *Edit*.
7. Repeat the PIN that you have entered before.

Every time you tap *Menu* while PIN protection is activated, you will have to enter the active PIN and confirm it with *OK* to be able to continue.

NOTICE

Be sure to remember the set PIN as you will not be able to deactivate PIN protection without it.

To deactivate PIN protection

1. Tap *Menu* and enter the active PIN.
2. Select *Setup* > *PIN settings*.
3. *Active PIN* is preselected.
   Tap *Edit* and enter the active PIN.
4. Select *Set PIN protection* and tap *Edit*.
5. Select *Off* from the selection list.

To change the active PIN

1. Tap *Menu* and enter the currently active PIN.

2. Select *Setup* > *PIN settings*.
3. *Active PIN* is preselected.
   Tap *Edit* and enter the currently active PIN.
4. Select *New PIN* and tap *Edit*.
5. Enter the new PIN.
6. Select *Confirm new PIN* and tap *Edit*.
7. Repeat the PIN that you have entered before.

6.4 Display settings

In this menu you can activate/deactivate the automatic display rotation. Furthermore, you can set the display brightness as well as the time after which the illumination of the display and the measuring cell will be automatically dimmed.

To activate / deactivate the automatic display rotation

1. Tap *Menu* and select *Setup* > *Display settings*.
2. Select *Display rotation* and tap *Edit*.
3. Select *On* or *Off* from the selection list.

To set the display brightness

1. Tap *Menu* and select *Setup* > *Display settings*.
2. Select *Display brightness* and tap *Edit*.
3. Select a brightness option.

To set the display dimming

1. Tap *Menu* and select *Setup* > *Display settings*.
2. Select *Display dimming* and tap *Edit*.
3. Select a dimming option (*Off* = no dimming).

6.5 Sound settings

Enables beeps when a key is tapped or when a measurement is finished.

1. Tap *Menu* and select *Setup* > *Sound*.
2. Tap *Edit*.
3. Select *On* or *Off* from the selection list.

6.6 Display units for density and temperature

1. Tap *Menu* and select *Setup* > *Units*.

2. Select *Density unit* or *Temperature unit* and tap *Edit*.
3. Select a density unit or a temperature unit.

6.7 Enabling / disabling gesture control

When gesture control is enabled, you can control certain operating steps by specific movements of the instrument in your hand.

1. Tap *Menu* and select *Setup* > *Gesture control*.
2. Tap *Edit*.
3. Select *On* or *Off* from the selection list.

6.8 Reset to factory settings

1. Tap *Menu* and select *Setup* > *Reset to factory settings*.
   The following settings will be reset:

Setting	Factory setting
Language	English
Date format	DD.MM.YYYY
Time format	24h
Display settings	Rotation: on / brightness: high / dimming: 30 s
Printer	None
Export file format	CSV
Export table delimiter	Semicolon
Export data decimal separator	Comma
PIN protection	Off
Temperature unit	°C
Density unit	g/cm^3
Measurement mode	Precise
Methods	Predefined methods
Active method	Ethanol
Sample IDs	ID / The sample ID counter is reset.
Custom parameters	Factory preset custom parameters

TIP: *Export or print the measurement data, the methods, the sample IDs, and the custom parameters before you reset to factory settings as this function will erase all these data.*

2. Tap *Yes* to reset to factory settings or *No* to cancel the operation.

7 Measurement settings

To set up a measurement, you need to specify a *method* and a *sample ID*.

– A *method* is a set of measurement settings, with the exception of the separately defined measurement mode.

– *Sample IDs* identify your sample varieties.

To alter a measurement setting, edit the current method.

7.1 Setting the measurement mode

The instrument features three measurement modes – *Precise*, *Fast*, and *Manual*.

For each measurement mode, different stability criteria have to be fulfilled before the measuring result is saved. The stability criterion is always related to the temperature:

– *Measurement mode Precise*:
The result is saved as soon as the measured temperature value stays within 0.2 K for 10 seconds.
This measurement mode delivers the most accurate results, but may take a longer time in case the sample temperature differs greatly from the ambient temperature.

– *Measurement mode Fast*:
The result is saved as soon as the measured temperature value stays within 0.4 K for 10 seconds.
This measurement mode delivers quicker results than the *Precise* mode, but as the density is highly temperature-dependent, the measured result is not as accurate.

– *Measurement mode Manual*:
You decide yourself when your measurement result will be saved:
Tap the data storage key to save the result immediately.

To set the measurement mode

1. Tap *Menu* and select *Setup* > *Measurement mode*.
2. Tap *Edit*.
3. Select a measurement mode.

7.2 Methods

Methods are preset measurement settings, which you can simply assign to a measurement by the method name.

A method comprises the following method settings:

– Method name
  Choose as required.
  – Method names can be up to 10 characters long.
  – You may use the letters *A*–*Z*, digits *0*–*9*, special characters ., -, #, and spaces for the composition of a method name.
– Parameter 1–2
  Select the parameters to be displayed on the measuring screen.
  Refer to the parameter overview in Appendix B.1 [▸ 54] for possible choices.
  – Parameter lists are filtered by parameter type.
  – If you select *None*, the parameter will not be displayed.
– Temperature coefficient Alpha (if applicable for the selected parameter)
  Refer to Section 7.2.4 [▸ 29] for details on the temperature coefficient.
– Offset
  This value will be automatically added to parameter 1.
  You can define a different offset for each method.

TIP: *If the instrument's measuring results show a constant deviation from your reference value, define an offset for parameter 1.*

– Limits
  Define the upper and lower limit for the measurement results.
  Refer to Section 7.2.3 [▸ 28] for details.

IMPORTANT: *Limits can only be applied to parameter 1.*

The instrument comes with 4 predefined methods covering the most common applications, as in the below table.

All calculated parameters of the methods derive from the sample density at the measured temperature.

Table 5: Predefined methods

Method	Parameter 1	Parameter 2
Ethanol	Alcohol % v/v@20°C	Density
Extract	Extract	Density
Sugar	Brix	Density
Density	Density	SG (20/20)

7.2.1 Managing methods

You can edit the predefined methods or define new ones (in addition to the predefined methods) to meet your requirements.

Defining your own methods

1. Tap *Menu* and select *Methods* > *New method*.

2. Edit the method settings as described below.

Editing methods

1. Tap *Menu* and select *Methods* > *Edit method*.
2. Select a method that you want to edit and tap *Edit*.
3. Select a method setting that you want to edit and tap *Edit*.
4. Enter a value or select it from a list as appropriate.
5. Repeat steps 3–4 for all method settings that you want to edit.

Importing/exporting methods

To import methods from a methods file, refer to Appendix C [▸ 57] for an example file, or to export all methods, proceed as described in Section 11.2 [▸ 43].

– Select *Import methods* as the import function, or
– select *Export methods* as the export function.

Deleting methods

1. Tap *Menu* and select *Methods* > *Edit method*.
2. Select a method that you want to delete, and tap *Delete*.
   You cannot delete the last remaining method.
3. Tap *Yes* to confirm deletion or *No* to abort the operation.

7.2.2 Assigning a method to a measurement

1. In the quick access area, activate (*Sample* function).
2. Select *Method* and tap *Edit*.
3. Select the appropriate method from the list.

All subsequent measurements will use the selected method until you assign a new one.

The assigned method is shown in the header.

7.2.3 Defining limits

The function will give a warning when measurement results of parameter 1 lie outside the margins of your internal quality specification.

Define limits in the method settings. Measurement results outside the thereby defined margins will be highlighted by a yellow background color and marked in the data memory accordingly.

1. Tap *Menu* and select *Methods* > *Edit method*.
2. Select a method from the list and tap *Edit*.

3. Select *Limit* and tap *Yes* to activate the limit function.
   Two more input fields for entering the limit values come up in the parameter list.
4. Enter the values for *Upper limit* and *Lower limit*.

IMPORTANT: *The limits apply only to parameter 1.*

7.2.4 Calculating the temperature coefficient Alpha

The temperature coefficient Alpha [g/cm³/K] is required for the calculation of the following measuring units:

- Density@
- Specific Gravity SG
- Baumé

The temperature coefficient Alpha can be calculated as follows:

$$\text{temperature coefficient Alpha} = \left|\frac{\rho_1 - \rho_2}{T_1 - T_2}\right|$$

ρ_1 … density at temperature T_1
ρ_2 … density at temperature T_2

Typical temperature coefficients	Alpha
Numerous aqueous solutions from 0 % to approx. 20 %	0.0003
Numerous aqueous solutions from 10 % to approx. 50 %	0.0005
Numerous organic solutions	0.001

7.3 Custom parameters

The instrument is able to handle a limited number of custom parameters in addition to the standard measuring parameters.

If you need additional custom parameters, contact your local Anton Paar representative. You will receive a file from Anton Paar containing the custom parameter(s) in the correct format. Parameters from this file can be imported into your instrument.

IMPORTANT: *The import will replace all your current custom parameters and is limited to 11 parameters.*

Importing/exporting custom parameters

To import custom parameters from a custom parameters file or to export all custom parameters, proceed as described in Section 11.2 [▶ 43].

- Select *Import custom parameters* as the import function, or

– select *Export custom parameters* as the export function.

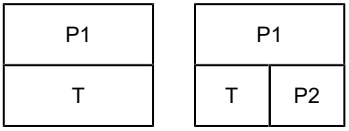
Using custom parameters

Edit a method definition, refer to Section 7.2.1 [▸ 27]:

1. Select parameter type *Custom*.
2. Select the custom parameter.

7.4 Output fields on the main screen

The arrangement of output fields on the main screen depends on your choice of parameters to be displayed (which you have made with the method settings, refer to Section 7.2.1 [▸ 27].



P1/P2... freely configurable parameters
T ..... measuring temperature

Fig. 6: *Possible arrangements of output fields*

7.5 Sample IDs

Sample IDs serve to tag your measurement results, e.g. with a designation from your product varieties, thus facilitating full traceability of your measurement results.

Up to 250 different sample IDs can be manually defined or imported.

– Sample IDs can be up to 10 characters long.
– You may use the letters *A*–*Z*, digits *0*–*9*, special characters ., -, #, and spaces for the composition of a sample ID.

Default counter “ID”

A sample ID named *ID* is treated as a 4-digit measurement counter that keeps counting all measurements (regardless of sample ID changes in between) until it starts over after having reached its maximum value.

Custom counters

Sample IDs can include counters identifying single measurements performed with that sample ID:

– Include a sequence of hash characters # in the sample ID (at any position).
– The first hash character sequence in the sample ID is interpreted as a counter.

– The number of consecutive hash characters in that sequence defines the length of the counter.
– Custom counters will be reset to 1 when you select a new sample ID.

Example:

– Name your sample ID *Tank## PV1* for your product variety 1.
– Measurements with that sample ID will be identified as *Tank01 PV1*, *Tank02 PV1*, *Tank03 PV1*, and so on until you select a new sample ID (thus re-setting the counter).

7.5.1 Managing sample IDs

Defining a sample ID

1. Tap *Menu* and select *Sample IDs*.
2. Tap *New*.
3. Tap *Edit* and enter a sample ID.

Importing/exporting sample IDs

To import sample IDs from a sample IDs file, refer to Appendix C [▸ 57] for an example file, or to export all sample IDs, proceed as described in Section 11.2 [▸ 43].

– Select *Import sample IDs* as the import function, or
– select *Export sample IDs* as the export function.

Deleting a sample ID

1. Tap *Menu* and select *Sample IDs*.
2. Select a sample ID that you want to delete and tap *Delete*.
3. Tap *Yes* to confirm deletion or *No* to abort the operation.

TIP: *You cannot delete the currently used sample ID.*

7.5.2 Assigning a sample ID to a measurement

1. In the quick access area, activate (*Sample ID* function).
2. Select *Sample ID* and tap *Edit*.
3. Select the appropriate sample ID from the list.

All subsequent measurements will use the selected sample ID until you assign a new one.

The assigned sample ID is shown in the header.

7.6 Using the RFID function

The RFID function enables you to assign sample IDs and methods to RFID tags and to use these tags for quick and convenient assignment during measurements. Depending on the type of RFID tag, the way data is stored and read differs.

Types of RFID tags

– **Read/write (R/W) tags**

  These tags can store data directly on the tag itself. When you use the function Write RFID, the selected method and/or sample ID are written onto the tag. The instrument can then read this tag and display the stored method and/or sample ID.

– **Read-only (R) tags**

  These tags cannot store data on the tag. Instead, each R-tag has a unique identification number (UID). When you use Write RFID / Allocate RFID with an R-tag, the method and/or sample ID are linked to this UID, but **only on the instrument that performed the allocation**. If you read this R-tag with the same instrument, the assigned method and/or sample ID are displayed. If you read the R-tag with a different instrument, only the UID is shown. The UID number of an R-tag will always be used as the sample ID **unless another sample ID is explicitly allocated to the tag.**

Technical notes

The reading distance of the RFID receiver integrated in the instrument is about 2 cm (0.8 in). The RFID tag must be within this distance for the instrument to be able to successfully read it.

TIP: *The larger the diameter of a tag, the larger is the reading distance.*

For optimal reading, place the RFID tag about 0.5 cm (0.2 in) below the RFID interface (near the instrument's RFID antenna) on the top of the instrument, Fig. 1 [▶ 12].

TIP: *When you use the instrument with the rubber housing for the operating panel mounted, hold the RFID mark on the housing close to the RFID tag for reliable reading.*

TIP: *Reading RFID tags near or on a metal surface may be difficult. Use on-metal tags or place a non-metal spacer between the RFID tag and the metal surface.*

The instrument supports passive read/write or read-only RFID tags.

Supported RFID tags

Anton Paar has tested the following RFID tags for use:

– Read/write passive RFID disc tag 30 mm, Chip Hitag S2048, 125 kHz
– Read-only passive RFID disc tag 30 mm, Chip EM4102, 125 kHz

Reading RFID tags

The RFID tag information comprises:

- UID (unique identification number) of the RFID tag,
- information if the tag is writable (*Yes* or *No*),
- the method stored on the tag or to which the tag has been allocated (default = *None*),
- the sample ID stored on the tag or to which the tag has been allocated (default = *UID of the tag*).

1. Tap *Menu* and select *Setup* > *RFID* > *Read tag*.
2. Hold the RFID interface of the instrument to the RFID tag until the RFID tag information is displayed.
3. To read another RFID tag, tap *Back*, then select *Read tag*, and continue with step 2.

Programming RFID tags

Read-only RFID tags evidently cannot be written to. Instead, their UID is allocated to the specified method and/or sample ID on the instrument.

- **R/W tags**
  The method and/or sample ID are written directly to the tag. Any supported instrument can read this information.
- **R-tags**
  The UID of the tag is linked to a method and/or sample ID on the current instrument. This allocation is only valid on that specific instrument.

NOTE:

- *With R/W tags, the same method and sample ID can be written to any number of tags.*
- *With R-tags, only one tag can be allocated to each method and sample ID. If you try to allocate another tag, you will see the message “Already in use! Replace?”. Confirming will replace the old tag with the new one.*

1. Tap *Menu* and select *Setup* > *RFID* > *Write tag*.
2. Select *Method* and tap *Edit*, then choose the desired method.
3. Select *Sample ID* and tap *Edit*, then choose the desired sample ID.
4. Hold the RFID interface of the instrument to the RFID tag.
5. Select *Write method/sample ID* or *Write method* or *Write Sample ID* and tap *OK*.
   The RFID tag will be programmed with the selected method / sample ID.
6. Repeat this procedure to program further RFID tags with methods and sample IDs. The tag is now programmed (R/W) or allocated (R).

Erasing RFID tags

Read-only RFID tags will be deallocated by erasing. After erasing, all RFID tags hold the default information.

1. Tap *Menu* and select *Setup* > *RFID* > *Erase tag*.
2. Hold the RFID interface of the instrument to the RFID tag.
3. Tap *OK*.
4. To erase another RFID tag, select *Erase tag* and repeat steps 2 to 3.

Assigning method and sample ID to a measurement via RFID

This procedure works only if the method name and sample ID on the RFID tag are also saved on the instrument.

1. Activate RFID tag identification:
   – On the main screen, tap *RFID*,
   – or use the corresponding gesture, refer to Section 5.7 [▶ 21], if gesture control is enabled.
2. Hold the RFID interface of the instrument to the programmed RFID tag.
   After reading the RFID tag information, the instrument returns to the main screen. The method name and sample ID from the RFID tag (or to which the RFID tag has been allocated) are shown in the header.
   All subsequent measurements will use the assigned method / sample ID until you assign new ones.

TIP: *If a read-only RFID tag has not been programmed before (and holds only its UID), the currently assigned method will not change, and the UID will be used as the sample ID. A read/write tag holding only its UID will generate the message "Tag empty".*

8 Performing a measurement

WARNING

Risk of burns

Handling samples with temperatures of more than 70 °C bears the risk of heavy burns.

– Wear protective clothes or ensure alternative protection from burns when you handle high temperature samples.

NOTICE

Before you perform a measurement, make sure that the wetted parts are resistant to the sample, refer to Appendix A.3 [▶ 53].

IMPORTANT: *Samples containing dissolved CO_2 create bubbles in the measuring cell rendering the measurement results invalid. Degas the sample properly before measurement by:*

– *boiling it for several minutes,*
– *stirring it vigorously for 5 to 15 minutes until bubbling ceases, or*
– *putting it into an ultrasonic bath for approximately 5 to 10 minutes.*

8.1 Checks before the measurement

Before you start a measurement, check that

– you have selected the proper measurement mode, refer to Section 7.1 [▶ 26],
– you have assigned the proper method, refer to Section 7.2.2 [▶ 28],
– you have assigned the proper sample ID, refer to Section 7.5.2 [▶ 31],
– your sample vessel has an appropriate opening for inserting the metal tube (maximum diameter of the tube: 14.5 mm / 0.57 in);
– the filling volume of your sample container permits to sink the metal tube into the sample during measurement to a minimum depth of approx. 80 mm / 3.15 in (maximum reach of the metal tube into the sample container: 185 mm / 7.28 in);
– suitable solvents for cleaning are at hand.

8.2 Filling the sample

The measuring cell is filled using the built-in hand pump.

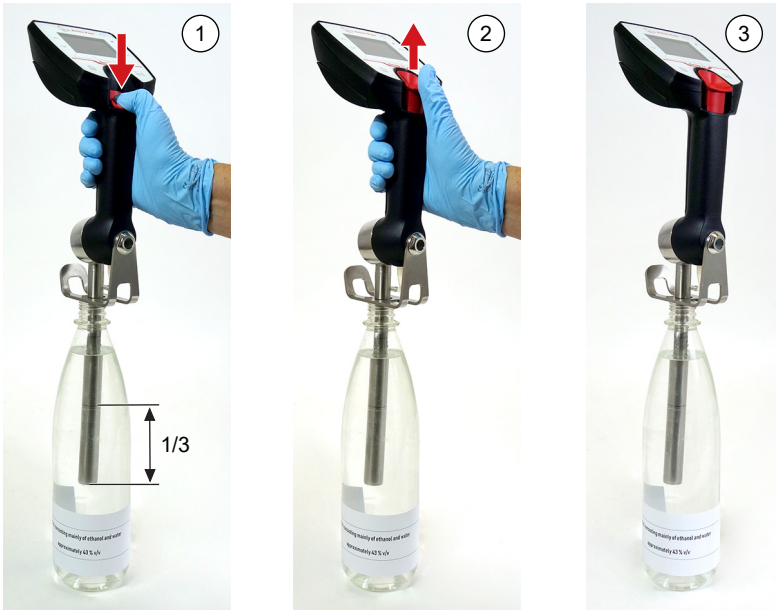


Fig. 7: *Filling sample*

1. Press down the pump lever as far as it will go.
2. Sink the metal tube into the sample (1).
   At least one third of the metal tube should be submerged in the sample to ensure quick and precise temperature equilibrium. A marking on the tube helps you find the minimum immersion depth (approx. 80 mm / 3.15 in).

TIP: *To obtain the highest possible accuracy, submerge two thirds of the metal tube in the sample (second marking, approx. 150 mm /). By doing so, you eliminate any external temperature influence.*

3. Slowly release the pump lever (2).
   3 shows the instrument ready for the measurement.

8.3 Measurement procedure

1. Perform the checks in Section 8.1 [▶ 35].
2. Fill the sample, refer to Section 8.2 [▶ 36].
   The instrument shows continuous live readings of measuring values.
3. Start the measurement: Tap the data storage key .
   Make sure that at least one third of the metal tube stays submerged in the sample during the measurement.

You may abort a measurement by tapping *Cancel*.

4. When the measurement is finished (indicated in the status bar), the measuring result will freeze on the display, and the result is saved in the internal data memory.
   Tap *Live* to unfreeze the measuring result and return to showing continuous live readings.

9 Checks and adjustments

Perform a water check every day before you start the measurements to verify that the instrument is measuring with adequate accuracy.

Perform a water adjustment if the water check advises you to do so.

9.1 Performing a water check

Use freshly degassed ultra-pure water.

1. Clean the measuring cell as described in Section 12.1 [▸ 44].
2. Rinse the measuring cell until no residues of cleaning agent are present anymore.
3. In the quick access area, activate (*Check* function).
4. Select *Water check* and tap *OK*.
5. Fill in ultra-pure water with 5 °C to 40 °C (41 °F to 104 °F) as described in Section 8.2 [▸ 36].
6. Tap *Start*.
7. After the procedure has finished, the check result is displayed.
   If the deviation from the target value exceeds defined limits, you will see a recommendation to perform a water adjustment.
   Tap *OK*.

9.2 Performing a water adjustment

Use freshly degassed ultra-pure water.

1. Clean the measuring cell as described in Section 12.1 [▸ 44].
2. Rinse the measuring cell until no residues of cleaning agent are present anymore.
3. Tap *Menu* and select *Adjustments* > *Water adjustment*.
4. Fill in ultra-pure water with 5 °C to 30 °C (41 °F to 86 °F) as described in Section 8.2 [▸ 36].
5. Tap *Start*.
6. After the procedure has finished, the density deviation from the previous adjustment is displayed.

7. To save the new adjustment, tap *Save*. Or tap *Cancel* to reject it.

9.3 Performing a custom adjustment

You can use any reference liquid with a known density at 20 °C (68 °F) and a known temperature coefficient Alpha to perform a custom adjustment.

We recommend to perform a custom adjustment if, for example, you measure only liquids in a specific density range (e.g. high density) and want to achieve more accurate results in this range.

1. Clean the measuring cell as described in Section 12.1 [▶ 44].
2. Rinse the measuring cell until no residues of cleaning agent are present anymore.
3. Tap *Menu* and select *Adjustments* > *Custom adjustment*.
4. Fill in your reference liquid with 5 °C to 30 °C (41 °F to 86 °F) as described in Section 8.2 [▶ 36].
5. Tap *Start*.
6. Tap *Edit* and enter the density of the reference liquid at 20 °C (68 °F).
7. Tap *Next*.
8. Tap *Edit* and enter the temperature coefficient Alpha of the reference liquid.
9. Tap *Next*.
10. After the procedure has finished, the density deviation from the previous adjustment is displayed.
11. To save the new adjustment, tap *Save*. Or tap *Cancel* to reject it.

9.4 Reset to factory adjustment

If you want to undo all your adjustments, reset the instrument to factory adjustment.

1. Tap *Menu* and select *Adjustments* > *Factory adjustment*.
2. Tap *Yes* to reset the instrument to factory adjustment.
   The factory adjustment will be restored.

10 Measurement/check data in the data memory

Measurement data as well as check data are saved automatically in the data memory. The data memory can hold a total of 1024 data sets. Further measurements will overwrite the oldest stored data sets. All stored data sets include the date and time of the measurement or check.

10.1 Viewing data

1. In the quick access area, activate (*Data* function).
   The last data set will be displayed.
2. Use the arrow keys to browse through the data sets in the data memory.
   The index of the currently displayed data set is shown in the header beside the total number of data sets stored.
   Measurement data are shown with gray background, check data with blue background.

10.2 Printing data

Before you can print data in the data memory on a Bluetooth printer, you need to set up the Bluetooth connection as described in Section 11.1.2 [▸ 42].

Be sure to switch on your printer.

Printing a single data set

1. In the quick access area, activate (*Data* function).
2. Use the arrow keys to select the data set to be printed.
3. Tap *Print*.

Printing all data sets

1. Tap *Menu* and select *Measurement data* > *Print all*.
2. Tap *Yes* to confirm printing or *No* to abort the operation.

10.3 Exporting data to a PC

Before you can export data in the data memory to a PC, you need to set up the Bluetooth connection as described in Section 11.1.1 [▸ 42].

Setting the export file format for measurement/check data

You can export the measurement/check data as a common text file (TXT) or in CSV format.

1. Tap *Menu* and select *Setup* > *Data transfer* > *Configure data format*.
2. Select *File format* and tap *Edit*.

3. Select an export file format: CSV | TXT.
4. If you have selected CSV:
   a. Select *Table delimiter* and tap *Edit*.
   b. Select a table delimiter: *;* (semicolon) | */* (slash) | *,* (comma) | TAB.
   c. Select *Decimal separator* and tap *Edit*.
   d. Select a decimal separator: *.* (point) | *,* (comma).

To export measurement/check data

1. Prepare the PC to receive data as described in Section 11.2.2 [▶ 43] (1).
2. On the instrument, send the data to the PC:
   a. Tap *Menu* and select *Measurement data* > *Export measurement data*.
   b. Tap *Yes* to confirm the transfer.
   c. Tap *OK* to finish the file transfer.
3. On the PC, specify a location where the file with the exported data shall be saved, then click *Finish* to save the file.

To export methods, sample IDs, custom parameters

To export all methods, all sample IDs, or all custom parameters, proceed as described in Section 11.2 [▶ 43].

– Select *Export methods* as the export function, or
– select *Export sample IDs* as the export function, or
– select *Export custom parameters* as the export function.

To export a CSV file for AP Connect

IMPORTANT: *Before you can transfer measurement data to AP Connect, you have to install the Instrument Adapter software on the PC. Refer to the "Reference Guide Instrument Adapter for AP Connect Software" for detailed information on the data transfer procedure.*

TIP: *CSV files for AP Connect are different from CSV files generated by a regular export of measurement data, which cannot be processed by AP Connect.*

1. Prepare the PC to receive data as described in Section 11.2.2 [▶ 43] (1).
2. On the instrument, send the data to the PC:
   a. Tap *Menu* and select *Measurement data* > *Export AP Connect file*.
   b. Tap *Yes* to confirm the transfer.
   c. Tap *OK* to finish the file transfer.
3. On the PC, specify a location where the file with the exported data shall be saved, then click *Finish* to save the file.

IMPORTANT: *After a CSV file for AP Connect has been exported, the exported measurement data are blocked for another export. However, it is possible to manually enable a re-export (as explained below).*

To enable a re-export to AP Connect

1. Tap *Menu* and select *Setup* > *Data transfer* > *File transfer* > *Reset APC export*.
2. Tap *Yes* to confirm the reset or *No* to abort the operation.

TIP: *Consider that you will get double entries in AP Connect if you transfer the measurement data twice.*

10.4 Deleting data

Deleting the last data set in data memory

Method 1

– Tap the key.
The last data set is deleted. You will not be asked for confirmation.

Method 2

1. Tap *Menu* and select Measurement *Data* > *Delete last*.
2. Tap *Yes* to confirm deletion or *No* to abort the operation.

Deleting all data

1. Tap *Menu* and select *Measurement data* > *Delete all*.
2. Tap *Yes* to confirm deletion or *No* to abort the operation.

11 Bluetooth connections / file transfer / data transfer

IMPORTANT: *Before the instrument can communicate with a Bluetooth device, you have to set up the connection once.*

TIP: *This manual describes Bluetooth communication between the instrument and a PC running MS Windows. Communication with devices running other common operating systems (Linux, Android, macOS) should work, too. The instrument cannot communicate with devices running iOS.*

11.1 Setting up Bluetooth connections

IMPORTANT: *If you experience transfer problems after you have changed a Bluetooth connection, remove the instrument from the Devices and printers control panel on the PC (access also via Show Bluetooth devices from the Bluetooth icon in the notification area of the task bar). Then set up the Bluetooth connection anew.*

11.1.1 Setting up the connection to a PC

1. Switch on the PC, which has to be Bluetooth enabled (if necessary, install an external Bluetooth adapter).
2. Make the PC discoverable/visible over Bluetooth, refer to Windows help.
3. On the instrument, tap *Menu* and select *Setup* > *Data transfer* > *Configure export target*.

TIP: *The connection will be valid for export as well as import.*

4. Tap *Start* to search for available Bluetooth devices.
5. Tap *Edit* and select the PC.
6. Tap *Next* and then *OK* to save the connection.

IMPORTANT: *You can only save one PC connection. If you set up a new PC connection, the previous one will be overwritten.*

11.1.2 Setting up the connection to a printer

1. Switch on the Bluetooth printer.
2. On the instrument, tap *Menu* and select *Setup* > *Data transfer* > *Configure printer*.
3. Tap *Edit* and select *Bluetooth printer*.
4. Tap *Back*.
5. Select *Configure printer target*.
6. Tap *Start* to search for available Bluetooth devices.

7. Tap *Edit* and select the Bluetooth printer.
8. Tap *Next* and then *OK* to save the connection.

IMPORTANT: *You can only save one PC connection. If you set up a new PC connection, the previous one will be overwritten.*

11.2 File transfer via Bluetooth

11.2.1 Importing files from a PC

1. Save the import file on the PC for which a Bluetooth connection has been set up, refer to Section 11.1.1 [▸ 42].
2. Prepare the instrument to receive data:
   a. Tap *Menu* and select *Setup* > *Data transfer* > *File transfer*.
   b. Then select the appropriate import function.
   c. Tap *Start* to start the automatic import procedure.
   The instrument's identification will be shown.
3. On the PC, send the file to the instrument:
   a. Right-click the import file and select *Send to* > *Bluetooth device*.
   b. Select the instrument from the device list and click *Next*.
   c. On a first time connection / if necessary:
   - Click on the popup notification to accept the connection.
   - Accept the connection PIN (*yes*) and click *Next*.
   - Close the notification window that the device has been added.
   d. Click *Finish* to finish the file transfer.

11.2.2 Exporting files to a PC

1. Prepare the PC, for which a Bluetooth connection has been set up, refer to Section 11.1.1 [▸ 42] (also refer to Windows help for detailed information), to receive data:
   a. Turn the Bluetooth wireless service on.
   b. In the notification area of the task bar, click the Bluetooth icon.
   c. Select *Receive a file*.
2. On the instrument, send the file to the PC:
   a. Tap *Menu* and select *Setup* > *Data transfer* > *File transfer*.
   b. Then select the appropriate export function.
   c. Tap *Yes* to confirm the transfer.
   d. Tap *OK* to finish the file transfer.

3. On the PC, specify a location where the export file shall be saved, then click *Finish* to save the file.

11.3 Sending data to a terminal program on a PC

In the Bluetooth settings on your PC, an incoming COM port has to be assigned for the connection to work (refer to Windows help).

1. Set up a Bluetooth connection with the PC as printer, refer to Section 11.1.2 [▸ 42].
2. On the PC, start a terminal program and set it up as follows:
   - Baud rate: 115200
   - Data bits: 8
   - Parity: none
   - Stop bits: 1
   - Handshake: none
3. On the instrument, send data by printing as described in Section 10.2 [▸ 39].

12 Upkeep and cleaning

NOTICE

– Make sure the solvent that you use for cleaning is suitable. For details on recommended cleaning agents, refer to Section 12.2.2 [▸ 45].

– Do not use any mechanical action for cleaning the measuring cell.

12.1 Cleaning the measuring cell

Clean the measuring cell with a suitable solvent regularly before and after each measurement series to ensure the long-term accuracy of your results. If the measuring cell is not sufficiently cleaned, residues may form in the measuring cell and lead to inaccurate measurement results. Depending on the application, also cleaning between measurements may be required.

1. Empty the measuring cell:
   a. Lead the filling tube into a suitable waste vessel.
   b. Press the pump lever to empty the measuring cell.
2. Fill the measuring cell with a suitable solvent.
3. Pump the solvent through the whole measuring system several times.
4. Empty the measuring cell.

12.2 Cleaning interval

The cleaning interval strongly depends on the application. For some samples, a displacement of the previous sample by the next one will suffice. For other applications, a cleaning after each measurement may be necessary.

Displacing the sample	For samples that are very similar to each other. – To displace the sample, empty the measuring cell after the measurement and rinse it with the next sample before measuring that one. – Clean the instrument thoroughly at the end of your measurement series.
Cleaning after each measurement	For samples with different chemical properties that are immiscible or difficult to remove from the measuring cell.

12.2.1 Cleaning at the end of a measurement series

At the end of your measurement series, clean your instrument thoroughly before you store it. You need not dry the measuring cell (provided that the cleaning liquid will not freeze in the measuring cell).

You can leave ultra-pure water in the measuring cell when you store the instrument for a day.

12.2.2 Cleaning agents – recommendations

For cleaning the measuring cell, use two cleaning liquids:

– **Cleaning liquid 1** dissolves and removes sample residues in the measuring cell. It has to be a good solvent for all sample components.

– **Cleaning liquid 2** removes cleaning liquid 1 (has to be a good solvent for cleaning liquid 1) and evaporates easily so that it accelerates drying of the cell. It must not attack the U-tube or leave any deposits, as drops of cleaning liquid 2 will remain in the U-tube.

TIP: *To prevent limestone deposits, never use tap water as the cleaning liquid 2. Use ultra-pure water instead.*

Table 6: Typical samples and recommended cleaning agents

Sample	Cleaning liquid
Distilled spirits of all strengths	distilled water or ethanol
Cooling and cleaning agents	distilled water or ethanol
Fruit juice, must	– first (distilled) water, – then ethanol

12.3 Cleaning the metal tube

To avoid contamination of your sample to be measured, clean the metal tube before and after measurement.

1. Hold the metal tube under running tap water, or wipe it with a soft cloth dipped in ethanol or water.
2. Wipe the metal tube dry before sinking it into the next sample.

12.4 Cleaning the filling pump

Clean the filling pump regularly. Intervals depend on your application.

Dismounting the pump

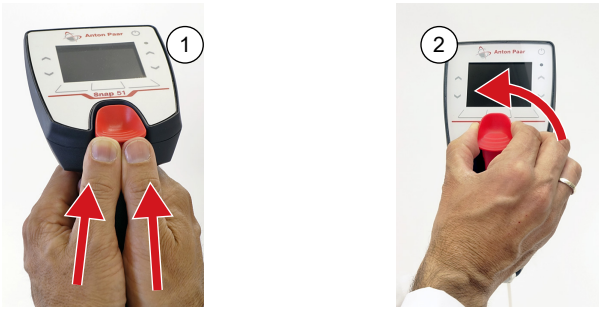


Fig. 8: *Dismounting the pump*

1. Push the pump lever upwards with both thumbs.
2. Release the pump by a quarter turn counterclockwise.
3. Pull out the pump.

Cleaning the pump

1. Rinse the pump with running tap water.
2. Dry the pump with a lint-free cloth.

Remounting the pump

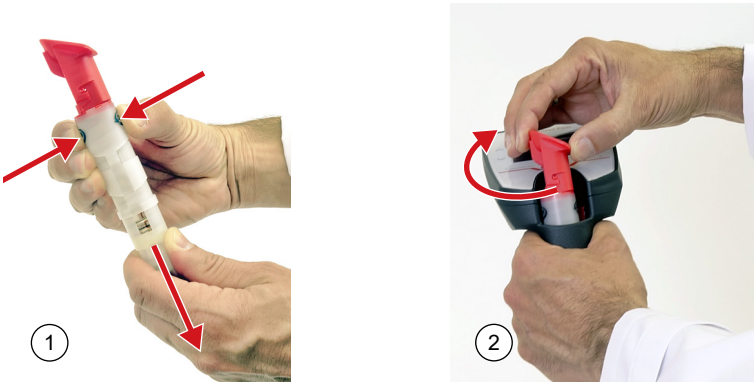


Fig. 9: *1: Releasing a locked pump | 2: Remounting the pump*

1. If the pump shaft has been locked, release the lock (1):
   a. Press on the marks on the front and back of the pump shaft.
   b. Pull at the end of the pump shaft.
2. Insert the pump with the pump lever's top pointing to the left (2).
3. Turn the pump clockwise until it engages.
   The pump lever's top should point towards the instrument's display.
4. Push the pump lever down to fix the pump.

12.5 Cleaning the housing and the display

To clean the housing and the display, use a soft cloth dipped in ethanol or warm water. If necessary, you can use a mild solvent (pH < 10).

12.6 Storing the instrument

Before you store the instrument for a longer period, clean the measuring cell as described in Section 12.1 [▸ 44].

For storage lasting less than one day, fill the measuring cell with ultra-pure water or with solvent.

12.7 Exchanging the batteries

Battery charge status

A symbol in the header of the screen indicates the battery charge level. When the batteries are almost depleted, the icon starts to flash, and after a short time the instrument switches itself off.

To exchange the batteries

WARNING

Risk of explosion or fire

When you open the battery compartment or exchange batteries, sparks may be generated, which can cause an explosion or fire in hazardous areas. Serious injuries are possible.

- Never open the battery compartment in hazardous areas.
- Exchange the batteries only outside hazardous areas.

1. Unscrew the screw fixing the battery compartment on the back of the instrument's display, refer to Section 4.1 [▸ 16], with the supplied Allen key.
2. Lift off the battery compartment.
   The screw stays loosely attached to the battery compartment so that it cannot get lost.
3. Remove the cover of the battery compartment by pressing on it and sliding it forward simultaneously (as in the below figure).

Fig. 10: *Removing the cover of the battery compartment*

4. Exchange the batteries for new ones.

NOTICE

Risk of damage

- Observe the correct polarity when you insert the batteries, see the engraving in the battery compartment.
- Use only batteries of the same type and with the same charge level.
- Ensure that the interior of the instrument is perfectly dry. Any kind of liquid will cause damage to the electronic parts of the instrument.

5. Reassemble all parts in reverse order.

WARNING

The cover of the battery compartment must always be closed when you use the instrument.

12.8 Exchanging the pump lever

1. Dismount the pump as described in Section 12.4 [▶ 46].
2. The pump lever sits on the two pivot pins. Pull it off carefully by hand. Do not use any tools.
3. Mount the new pump lever by shifting it in place.
4. Remount the pump as described in section Section 12.4 [▶ 46].

12.9 Exchanging the silicone connection hose

If the silicone hose is old and worn, exchange it for a new one.

Fig. 11: *Silicone connection hose*

1. Pull off the old silicone hose.
2. Cut a piece of suitable length (approx. 5 cm/2 in) from the supplied silicone hose.
3. Attach each end of the new hose to a hose connector.

12.10 Software update

Your Anton Paar representative will inform you when a new software update for your instrument is available. After you have received the update file, you can import it into the instrument via Bluetooth.

NOTICE

Risk of data loss

All data and settings will be deleted or reset to factory settings during the update.

– Export and save all important data (methods, sample IDs, custom parameters, measured data, etc.) before you perform a software update.

IMPORTANT: *Ensure that the batteries of the instrument are fully charged before you start a software update.*

1. Save the update file (file extension ".afp") on the PC for which a Bluetooth connection has been set up, refer to Section 11.1.1 [▸ 42].
2. Prepare the instrument to receive the update:
   a. Tap *Menu* and select *Setup* > *Data transfer* > *Software update*.
   b. Tap *Start* to start the automatic update procedure.
   The instrument's identification will be shown.
3. On the PC, send the update file to the instrument as described in section Section 11.2.1 [▸ 43] (3).

IMPORTANT: *After the software update remove the instrument from the Devices and printers control panel on the PC. Then set up the Bluetooth connection anew, refer to Section 11.1.1 [▸ 42].*

12.11 System information

To access system information including serial numbers, software and hardware versions, etc.:

– Tap *Menu* and select *Service* > *System information*.

13 Maintenance and repair

13.1 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.

However, optional services are available from your local Anton Paar representative upon request.

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

- syringes
- hoses
- adapters, connectors, fittings
- pump diaphragms
- filters
- O-rings, seals, gaskets
- cables
- fuses
- batteries
- desiccants
- protection foils and covers

All parts damaged in consequence of a fall of the product are generally excluded from the warranty as well.

13.2 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

Appendix A.1 Specifications

Alcohol	
Measuring range	0 % v/v to 100 % v/v
Accuracy [a]	0.1 % v/v
Repeatability s.d. [b]	0.05 % v/v
Reproducibility, s.d. [b]	0.07 % v/v
Resolution	0.01 % v/v
Density	
Measuring range	0 g/cm³ to 1.5 g/cm³
Accuracy [a]	0.0001 g/cm³
Resolution	0.0001 g/cm³
Temperature	
Measuring range	0 °C to 40 °C (32 °F to 104 °F)
Accuracy	0.1 °C (0.2 °F)
Repeatability, s.d. [b]	0.05 °C (0.1 °F)
Resolution	0.01 °C (0.01 °F)
Measuring cell volume	2 mL

[a] *Viscosity < 30 mPa·s*

[b] *According to ISO 5725*

Appendix A.2 Instrument data and operating conditions

Tube for filling	
Diameter	max. 14.5 mm (0.57 in)
Min. immersion depth	approx. 80 mm (3.15 in)
Immersion depth for maximum accuracy	approx. 150 mm (5.9 in)
Max. immersion depth in sample container	185 mm (7.28 in)
Ambient temperature[a]	–10 °C to +50 °C (+14 °F to +122 °F)

Air humidity	5 % to 90 % relative humidity, non-condensing
Protection class	IP54
Interfaces	Bluetooth®, RFID
Data memory	1024 measured data sets 250 sample IDs | 30 measuring methods
Languages	English, German, Chinese, Japanese, French, Russian, Italian, Portuguese, Turkish, Spanish, Traditional Chinese
Power supply	
Battery type	3x alkaline battery 1.5 V AA (LR6), type EN91
Battery life	> 100 hours
Dimensions (L x W x H)	468 mm x 108 mm x 119 mm (18.4 in x 4.3 in x 4.7 in)
Weight	860 g (30.3 oz) incl. batteries

[a] *The sample must not freeze in the measuring cell.*

Appendix A.3 Wetted parts

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

Material	**Part**
Borosilicate glass	filling pump
Hastelloy C-276/2.4819	metal tube
Inconel 600/2.4816	measuring cell
PP (polypropylene)	housing
PVDF (polyvinylidene fluoride)	connection block, screw plug, pump lever
Stainless steel 1.4404	metal tube
Stainless steel 1.4571	metal tube
Viton Extreme	sealing of the filling pump

Appendix B Measuring parameters

Appendix B.1 Parameter overview

Parameters marked with * require additional settings, refer to Appendix B.2 [▶ 55] for an overview of the additional settings and Appendix B.3 [▶ 56] for more details.

The parameter number (*no.*) is used in method files (for method import).

Table 7: Parameter overview

Param. type	Parameter	no.	Description
Density	Density	1	Density at the displayed measuring temperature in g/cm³, kg/m³ or lb/gal
	*Density@	2	Density at the selected reference temperature in in g/cm³, kg/m³ or lb/gal The temperature influence is compensated by the temperature coefficient Alpha [g/cm³/K].
	*Specific Gravity SG	3	Specific gravity is the density of the sample at the selected reference temperature divided by the density of water at the selected reference temperature. The temperature influence is compensated by the temperature coefficient Alpha [g/cm³/K].
Alcohol	Alcohol % v/v @ 15°C	54	Ethanol concentration in water in % v/v at 15 °C
	Alcohol % v/v @ 20°C	4	Ethanol concentration in water in % v/v at 20 °C
	Alcohol % w/w	5	Ethanol concentration in water in % w/w at 20 °C
	Alcohol US @ 60°F	6	(Degrees) Proof at 60 °F
	Shusei-do	55	Ethanol concentration in water in % v/v at 15 °C Available only in the software version that includes Japanese.
Baumé	*Baumé	43	Degrees Baumé at 60 °F The temperature influence is compensated by the temperature coefficient Alpha [g/cm³/K]. Degrees Baumé are calculated differently

Param. type	Parameter	no.	Description
			for densities above or below the density of water. The instrument applies the correct calculation method automatically.
Sugar	Brix	46	Concentration of sugar in °Brix
	Extract	47	Concentration of sugar in °Plato
	Nihonshu-do	56	Japanese Sake Meter Value to measure the sweetness to dryness level of sake Available only in the software version that includes Japanese.
Raw Data	Period	48	Period value in µs of the oscillator at the measuring temperature
	Resistance	–	Resistance in Ω of the temperature sensor (only for service purposes)

Appendix B.2 Additional settings

Table 8: Additional settings

Parameter	Additional settings	Description
Baumé	Alpha (g/cm³/K)	Temperature coefficient, refer to Section 7.2.4 [▶ 29]
Nihonshu-do	Alpha (g/cm³/K)	Temperature coefficient, refer to Section 7.2.4 [▶ 29]
Density@	Temperature 1	Reference temperature for which the density is displayed
	Alpha (g/cm³/K)	Temperature coefficient, refer to Section 7.2.4 [▶ 29]
Specific Gravity SG	Temperature 1	Reference temperature for the density of the sample
	Temperature 2	Reference temperature for the density of water
	Alpha (g/cm³/K)	Temperature coefficient, refer to Section 7.2.4 [▶ 29]

Appendix B.3 Parameter details

Table 9: Parameter details

Parameter	Min.	Max.	Unit	Format	Offset format
Alcohol % v/v @ 15°C	000.0	100.0	% v/v	nnn.n	00n.n
Alcohol % v/v @ 20°C	000.0	100.0	% v/v	nnn.n	00n.n
Alcohol % w/w	000.0	100.0	% w/w	nnn.n	00n.n
Alcohol US @ 60°F	000.0	200.0	Proof	nnn.n	00n.n
Baumé	000.0	100.0	°Baumé	nnn.n	00n.n
Brix	–10.0	85.0	°Brix	nnn.n	00n.n
Density Density @ xx°C	0.0000	3.0000	g/cm^3	n.nnnn	0.0nnn
	0000.0	3000.0	kg/m^3	nnnn.n	00nn.n
	00.000	25.000	lb/gal	nn.nnn	0.nnn
Extract	–10.0	85.0	°Plato	nnn.n	00n.n
Period	0000.00	9999.99	µs	nnnn.nn	–
Resistance	–	–	Ohm	nnnn	–
Specific Gravity SG	0.0000	3.0000	–	n.nnnn	0.0nnn

Appendix C Example files

methods.txt

```
Method:
Name=Ethanol
Parameter1=4
Offset=0.000000
Parameter2=1
Method:
Name=Extract
Parameter1=47
Offset=0.000000
Parameter2=1
```

NOTE: *For the numbers of the parameters Parameter1 and Parameter2, refer to Table 7 [▸ 54].*

sampleID.txt

```
ID 1
ID 2
ID 3
```

Appendix D Menu tree

Measurement data	Export measurement data		
	Print all		
	Delete last		
	Delete all		
Sample IDs			
Methods	New method		
	Edit method		
Setup	Data transfer	Configure export target	
		Configure printer target	
		Configure printer	
		Configure data format	
		File transfer	Export sample IDs
			Export methods
			Export custom parameters
			Import sample IDs
			Import methods
			Import custom parameters
		Software update	
	RFID	Write tag	
		Read tag	
		Erase tag	
	Measurement mode		
	PIN settings		
	Date and time	Set date and time	

		Set date and time format	
	Language		
	Display settings		
	Gesture control		
	Sound		
	Units		
	Reset to factory settings		
Adjustments	Water adjustment		
	Custom adjustment		
	Factory adjustment		
Service	System information		
	Live raw data		
	Adjustment mode		

Appendix E Density of water

Table 10: Density of Water [g/cm³] (0.0 °C to 40.9 °C)[1]

T °C	.0	.1	.2	.3	.4	.5	.6	.7	.8
0	.99984	.99985	.99985	.99986	.99987	.99987	.99988	.99988	.99989
1	.99990	.99990	.99991	.99991	.99992	.99992	.99993	.99993	.99993
2	.99994	.99994	.99995	.99995	.99995	.99995	.99996	.99996	.99996
3	.99996	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997
4	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997	.99997
5	.99996	.99996	.99996	.99996	.99996	.99995	.99995	.99995	.99995
6	.99994	.99994	.99993	.99993	.99993	.99992	.99992	.99991	.99991
7	.99990	.99990	.99989	.99989	.99988	.99988	.99987	.99987	.99986
8	.99985	.99984	.99984	.99983	.99982	.99982	.99981	.99980	.99980
9	.99978	.99977	.99977	.99976	.99975	.99974	.99973	.99973	.99972
10	.99970	.99969	.99968	.99967	.99966	.99965	.99964	.99963	.99962
11	.99960	.99959	.99958	.99957	.99956	.99955	.99954	.99953	.99952
12	.99950	.99949	.99947	.99946	.99945	.99944	.99943	.99941	.99940
13	.99938	.99936	.99935	.99934	.99933	.99931	.99930	.99929	.99927
14	.99924	.99923	.99922	.99920	.99919	.99917	.99916	.99914	.99913
15	.99910	.99908	.99907	.99905	.99904	.99902	.99901	.99899	.99897
16	.99894	.99893	.99891	.99889	.99888	.99886	.99884	.99883	.99881
17	.99877	.99876	.99874	.99872	.99870	.99869	.99867	.99865	.99863
18	.99859	.99858	.99856	.99854	.99852	.99850	.99848	.99846	.99844
19	.99840	.99838	.99836	.99835	.99833	.99831	.99828	.99826	.99824
20	.99820	.99818	.99816	.99814	.99812	.99810	.99808	.99806	.99803
21	.99799	.99797	.99795	.99793	.99790	.99788	.99786	.99784	.99781
22	.99777	.99775	.99772	.99770	.99768	.99765	.99763	.99761	.99758
23	.99754	.99751	.99749	.99747	.99744	.99742	.99739	.99737	.99734
24	.99730	.99727	.99725	.99722	.99720	.99717	.99715	.99712	.99709

[1] Excerpt from F. Spieweck, H. Bettin: Review: Solid and liquid density determination.
tm – Technisches Messen 59 (1992) 7–8, pp. 285–292.

T °C	.0	.1	.2	.3	.4	.5	.6	.7	.8
25	.99704	.99702	.99699	.99697	.99694	.99691	.99689	.99686	.99683
26	.99678	.99676	.99673	.99670	.99667	.99665	.99662	.99659	.99657
27	.99651	.99648	.99646	.99643	.99640	.99637	.99634	.99632	.99629
28	.99623	.99620	.99617	.99615	.99612	.99609	.99606	.99603	.99600
29	.99594	.99591	.99588	.99585	.99582	.99579	.99577	.99574	.99571
30	.99564	.99561	.99558	.99555	.99552	.99549	.99546	.99543	.99540
31	.99534	.99531	.99528	.99524	.99521	.99518	.99515	.99512	.99509
32	.99502	.99499	.99496	.99493	.99490	.99486	.99483	.99480	.99477
33	.99470	.99467	.99463	.99460	.99457	.99454	.99450	.99447	.99444
34	.99437	.99433	.99430	.99427	.99423	.99420	.99417	.99413	.99410
35	.99403	.99399	.99396	.99393	.99389	.99386	.99382	.99379	.99375
36	.99368	.99365	.99361	.99358	.99354	.99350	.99347	.99343	.99340
37	.99333	.99329	.99325	.99322	.99318	.99314	.99311	.99307	.99304
38	.99296	.99292	.99289	.99285	.99281	.99278	.99274	.99270	.99267
39	.99259	.99255	.99252	.99248	.99244	.99240	.99236	.99233	.99229
40	.99221	.99217	.99214	.99210	.99206	.99202	.99198	.99194	.99190

Appendix F Declarations of conformity

DocuSign Envelope ID: 3AAFD11A-F0FE-4CF2-83C2-066354BE5CFC

EU Declaration of Conformity

(original)

Anton Paar

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

Product designation:	**SNAP 51 PORTABLE ALCOHOL METER**
Model:	**Snap 51**
Material number:	183055

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 + A1:2019/AC:2019 — Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

Radio Equipment Directive (2014/53/EU, ABl. L153/62 vom 22.5.2014)

Applied standards:

- EN 300 328 V2.2.2
- EN 300 330 V2.1.1

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

Place and date of issue: Graz, 12.6.2024

DocuSigned by:
17130DDD5260426...

DI Steffen Riemer, MBA
Executive Director
Business Unit Measurement

DocuSigned by:
66833374CFAF464...

DI Dr. Wolfgang Baumgartner
Head of Lab Density & Concentration
Business Unit Measurement

UK Declaration of Conformity

Anton Paar

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

Product designation:	**SNAP 51 PORTABLE ALCOHOL METER**
Model:	**Snap 51**
Material number:	183055

is in conformity with all the relevant UK legislation. This declaration of conformity is issued under the sole responsibility of the manufacturer.

Electrical Equipment (Safety) Regulations 2016, 2016 No. 1101

Electromagnetic Compatibility Regulations 2016, 2016 No. 1091

Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, 2012 No. 3032

Radio Equipment Regulations 2017, 2017 No. 1206

complies with the designated standards:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- EN 61326-1:2013
- EN 300 328 V2.2.2
- EN 300 330 V2.1.1

Importer: Anton Paar Ltd., Unit F, The Courtyard, Hatfield Rd., St. Albans AL4 0LA, United Kingdom

Place and date of issue: Graz, 12 June 2024

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