Anton Paar

Reference Guide

Alcolyzer 7001
Alcolyzer 5001

Find out more

www.anton-paar.com

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Table of contents

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.

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.
- 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.
- Before you start a measurement or cleaning procedure, take care that all parts, in particular the measuring cells, the filling adapters, the hoses, and the waste vessel, are properly connected and in good condition.
- Before you start a measurement or cleaning procedure, check the filling adapters for leak tightness.
- Take measures that spilled liquids cannot get into plug connections or venting slots of electrical appliances.
- Connect the measuring system to the AC power supply via a safety switch located at a safe distance from the instruments. In an emergency, turn off the power using this switch instead of the power switch on the instruments.

Installation

- The installation procedure shall only be carried out by authorized personnel who are familiar with the installation instructions.
- 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.
- 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.

Precautions for flammable samples and cleaning agents

- Keep potential sources of ignition, like sparks or open flames, at a safe distance from the product.
- Place the instrument on a laboratory bench made of fireproof material, preferably bricks, ceramics, or stoneware
- 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.

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 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

Alcolyzer 5001 and Alcolyzer 7001 determine the alcohol content of beverages by a patented NIR (near infrared) analysis method. The instruments combine highest accuracy with easy handling and robust design.

Table 1: Comparison of model expandability

Model	Optional color measurement	Optional automation
Alcolyzer 5001	no	no
Alcolyzer 7001	yes	yes

Alcolyzer 7001 is optionally available with an integrated color measurement device. The color value (EBC or SRM (ASBC)) is determined by the measurement of light absorption (light of a wavelength of 430 nm).

Optionally, Alcolyzer 7001 can be combined with sample changers Xsample 3100 or Xsample 5100.

User interface

– The touchscreen user interface supports easy and intuitive operation.

– Freely define your favorites on the home screen and have quick access to the instrument functions that you need every day.

– Define your own products (in addition to the predefined product measurement settings), your own measurement parameters (derived from the parameters coming with the instrument), or the contents of output reports.

– Export all measured data as a PDF or CSV file onto any connected storage device or a network share. Data can be printed via USB, network, or serial port.

– If you prefer, you can optionally connect an external keyboard or mouse and a barcode reader.

Compact and robust design

The instrument is ready for reliable measurements also in demanding environments due to:

– compact design;

– sealed housing that withstands shocks, dirt, and spillages;

– robust housing materials: coated aluminum (top and sides), aluminum (base and back), polystyrene/butadiene (front).

2.1 Intended use of the instrument

Your instrument is capable of measuring the alcohol content of beverages.

Restrictions and exclusions

- Do not leave beverage samples longer than necessary in the measuring cell because the sugar content will leave residues on the inner surface of the glass cuvette.
- Do not fill a sample if you do not know which cleaning liquid removes this sample.
- Do not fill and test liquids that attack the instrument's materials.
- Do not use hydrofluoric acid as a cleaning agent as it attacks the glass of the measuring cell.
- Do not fill substances that may harden inside the measuring cell.
- Do not mix substances inside the measuring cell if these substances may react chemically.

2.2 Functional components

Fig. 1: *Views of the instrument*

Front

1 Home button
2 Touchscreen

Right side

3 Syringe holder
4 Sample outlet
5 Sample inlet
6 Extension slot cover plate (Alcolyzer 7001)

Left side

7 Blind covers
8 Protection cover for the USB sockets
9 USB 2.0 sockets (type A), 3x

Rear

10 Fan
11 Type plate with serial number (P/N = mat. no.)
12 AC power jack
13 Fuse holder
14 Power on/off switch

Interface connectors on the rear

15 Service port
16 COM / RS-232 serial port (DE-9F connector)
17 USB OTG socket (Micro-A)
18 USB 2.0 socket (type A)
19 Ethernet terminal (RJ45 connector)
20 CAN interface

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

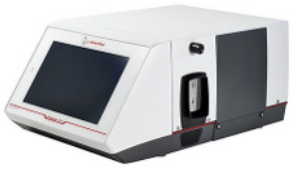
	Qty.	Description	Mat. No.
	1	Alcolyzer 5001 *or* Alcolyzer 7001	320420 320421
	1	Option Color 430 nm *(if applicable, indicated on the type plate – only available for Alcolyzer 7001)*	90684
	1	Power cable	-
	1	Instruction Manual and Safety Information English	385853
	1	Waste vessel 500 mL	6210

Table 3: Supplied parts: Accessory kit Alcolyzer 5001

	Qty.	Description	Mat. No.
	1	Accessory kit Alcolyzer 5001 *(only with Alcolyzer 5001)*	324891
		containing	
	2	Adapter Luer ¼" UNF	64792
	2	Hose 140x3x2 PTFE 2x¼"-28 UNF	187223
	5	Syringe 20 mL Luer	53393

Table 4: Supplied parts: Accessory kit Alcolyzer 7001

	Qty.	Description	Mat. No.
	1	Accessory kit Alcolyzer 7001 *(only with Alcolyzer 7001)*	324892
		containing	
	2	Adapter Luer ¼" UNF	64792
	2	Hose 140x3x2 PTFE 2x¼"-28 UNF	187223
	5	Syringe 20 mL Luer	53393
	2	UNF filling adapter fitting with metal tube	159945
	2 m	Hose 1.6x3.2 Tygon	67540
	2	Tube d=2.1 D=2.4 L=20 1.4571	67982

Table 5: Optional accessories and consumables

Article description	Mat. no.
Data I/O	
Keyboard USA USB	80807
Keyboard German USB	80809
Printer Epson TM-U220	93362
Protection	
Protecting cover for keyboard	13350
Interface caps DMA HR01 series	232006
Syringes	
Syringes 20 mL Luer (100 pcs.)	21656

4 Installation

4.1 Installation requirements

WARNING

Using hazardous or flammable chemicals as samples or cleaning liquids could destroy the instrument and cause serious injuries unless you take special precautions.

– Observe the safety instructions in Section 1.1 [▶ 6] concerning a suitable setup location.

The instrument is designed for operation under typical laboratory benchtop conditions.

The setup location and surroundings must meet the minimum requirements specified under “Operating conditions” in the technical data, refer to Appendix A.2 [▶ 49].

Allow the equipment to reach ambient temperature before installation. This is particularly important if the equipment has been stored or transported at lower temperatures.

The right place

NOTICE

No spray water protection

Consider that the instrument is not protected against spray water.

Place the instrument on a stable, flat bench.

To ensure temperature stability and trouble-free measurement, do **not** position your instrument:

– next to a heating facility,

– in a drafty place (e.g. near an air conditioning, ventilation system, or an open window),

– in direct sunlight.

NOTICE

Do not inhibit heat dissipation

A strong built-in cooling fan dissipates heat through the bottom and rear of the instrument. Ensure that the air flow is not blocked and provide for a minimum distance of 10 cm (4 in) to walls behind and beside the instrument.

The instrument requires an electrical outlet nearby:

– 100–240 V~, 50/60 Hz, fluctuation ±10 %

IMPORTANT: *Ensure that the power plug and the power switch are always easily accessible so that the instrument can be easily disconnected from the AC power supply at any time.*

4.2 Installing the instrument

Table 6: Installation procedure

Step	Refer to
1. **Place** the instrument on a bench in an appropriate environment.	Section 4.2 [▶ 11]
2. Mount the **hoses** and connect the **waste vessel**.	Section 4.2.1 [▶ 11]
3. Connect the instrument to the **power supply** and **switch** it **on**.	Section 4.2.2 [▶ 12] Section 4.2.3 [▶ 12]
4. Define basic **instrument settings** and perform a **first check**.	Section 4.2.4 [▶ 12]

Installation of an optional sample changer – only Alcolyzer 7001

Refer to the instructions coming with the sample changer.

WARNING

Risk of electric shock

Connect only voltages that comply with PELV (protective extra-low voltage) according to EN 61140 or with SELV (safety extra-low voltage) according to EN IEC 62368-1 to the interface connectors (except the power inlet) of the instrument.

IMPORTANT: *Connect only Anton Paar equipment with a maximum power consumption of 40 W to the CAN interface. Otherwise the instrument will not work.*

4.2.1 Mounting the hoses / waste vessel

CAUTION

Possible leakage of dangerous liquids

Dangerous liquids leaking from the instrument may cause injuries or risk of fire.

a) Only use the supplied hoses and waste vessel if their materials are resistant to your samples and cleaning liquids.

b) If the supplied parts are not suitable, use other parts made of an appropriate material.

Fig. 2: *All hoses mounted – syringe connected*

1 Adapter Luer 1/4" UNF
2 Syringe holder
3 Hose 140x3x2 PTFE
4 Hose 140x3x2 PTFE
5 Waste vessel

Filling hose

1. Screw an adapter Luer ¼" UNF, mat. no. 64792 (from the accessory kit), into the upper screw hole of the syringe holder (1+2 in above figure).
2. Screw one end of a hose 140x3x2 PTFE, mat. no. 187223 (from the accessory kit), into the lower screw hole of the syringe holder (2+3 in above figure).
3. Screw the other end of the hose into the sample inlet “IN” (lower screw hole), as in the above figure.

Waste hose / waste vessel

1. Screw one end of a hose 140x3x2 PTFE, mat. no. 187223 (from the accessory kit), into the threaded hole in the cap of the waste vessel (4+5 in above figure).
2. Screw the other end of the hose into the sample outlet “OUT” (upper screw hole), as in the above figure.

IMPORTANT: *Always keep the waste vessel closed with the cap during operation.*

4.2.2 Power connection

WARNING

Risk of electric shock or fire

- Connect the instrument only to an electrical outlet with protective earthing.
- Never connect the instrument to the AC power supply with protective separation or protective insulation.
- Ensure that the non-fused earth conductor of the power cable is connected to earth.
- Ensure that the current rating of the power cable is at least 10 A.

NOTICE

Possible damage due to wrong voltage

Before you switch on the instrument, make sure that the correct line voltage and line frequency are available (AC 100–240 V, 50/60 Hz).

If large voltage fluctuations are to be expected, we recommend using a constant voltage source (UPS).

- Connect the AC power jack of the instrument (12, Fig. 1 [▸ 8]) to a suitable electrical outlet with the supplied power cable.

4.2.3 Switching the instrument on/off

- Use the power switch on the rear of the instrument (14, Fig. 1 [▸ 8]) to switch the instrument on or off. After the instrument has been switched on, the home screen will come up on the display.
- After power-on wait at least 30 minutes for the internal temperature to stabilize.

NOTICE

Risk of damaging the instrument

Never plug or unplug CAN cables while the instrument is switched on.

TIP: *Do not turn off the instrument during the night. This allows the measuring cell to achieve long term temperature stability.*

IMPORTANT: *After you have switched off the instrument, the electrical components stay live for a few seconds.*

*If you have to **restart** the instrument, switch it off and **wait** approx. **15 seconds** before switching it on again.*

4.2.4 Basic instrument settings / first check

After installation set the instrument settings, refer to Section 6 [▸ 20].

If you want to use product settings already defined on another instrument, you can import them, refer to Section 7.1.1 [▸ 22].

Conclude initial setup with a zero alcohol check, refer to Section 9.1 [▶ 27], to verify that your instrument is in perfect condition. Your instrument has been factory adjusted, but during transport the adjustment may have been compromised.

IMPORTANT: *Wait at least 15 minutes after a restart for the internal temperature to stabilize.*

- If the check succeeds, your instrument is ready for routine measurements.
- If the check fails, clean the measuring cell thoroughly and repeat the check.
- If the check still fails, perform an alcohol zero adjustment as described in Section 9.2 [▶ 28].

5 Operation

5.1 Basic operation and input devices

IMPORTANT: *All instructions in this manual relate to touchscreen operation.*

5.1.1 Touchscreen

Basically, you can operate your instrument like a smartphone. The touchscreen of the instrument accepts the following finger movements.

Tap

Tap on any functional element, and it will do whatever its purpose is: a button will initiate an action, a switch will change its state, a drop-down box will fold out a selection list, etc.

Tap on an item to select it.

Hold

Tap and hold your touch a little longer. Holding a screen element may pop up options depending on the context. For example, on the onscreen keyboard, holding some keys will open a box with more options to select from (if available).

Drag

Holding and dragging a screen element will move it up, down, left, right, if the operation is available.

Slide

Slide a finger on the screen in one direction. The operation is similar to dragging.

To access the dashboard, slide up the current screen (provided it is not modal). To return, slide down the dashboard.

To **scroll** information that does not fit on the screen, slide it up/down or left/right (if available). To scroll items in a list, slide up/down in the list. In these cases, a slider will appear (and after some time disappear again) beside (for up/down) or below (for left/right) the text.

TIP: *Sometimes it may not be clear whether portions of an information are out of screen. Simply try scrolling this part of the screen to make sure.*

5.1.2 Onscreen keyboard

If you tap on an input field, an onscreen keyboard will slide in so that you can type text or numbers.

You may see variants with a subset of characters, depending on reasonable options for the particular input field.

Fig. 3: *Example onscreen keyboards (English) – above: alphabetic | below: numerical*

- Tap on characters to enter them at the cursor position in the input field.
- Some keys of the onscreen keyboard (e.g., upper row on the alphabetic keyboard) provide multiple character options to select from:
  - Hold the key until a character selection box folds out (example below).

Fig. 4: *Example character selection box on "e" key*

  - Then tap on one of the keys in the selection box to enter it at the cursor position in the input field.

  Special characters on the alphabetic keyboard:

  - @: Hold “1” key (top row) and select.
  - ^{2}: Hold “2” key (top row) and select.
  - ^{3}: Hold “3” key (top row) and select.
  - $: Hold “4” key (top row) and select.
- Some keys have special functions. Refer to Table 7 [▶ 13] for their meaning.

Table 7: Function keys on the onscreen keyboard

	Hides the onscreen keyboard. (Tap on the input field to have it reappear.)
	Switches alphabetic/numerical keyboard to numerical/alphabetic keyboard.
	

↑	Shifts the next letter to upper case. (Disabled on the numerical keyboard.)
‹	Moves the cursor (entry point for the next character) left/right.
›	
⌫	Deletes the character left of the cursor.
enter	Finishes input and hides the onscreen keyboard.

5.1.3 USB mouse (optional)

If you connect a USB mouse to one of the instrument's USB sockets, you can use it in addition to the touchscreen.

The mouse will be detected and installed automatically when plugged in.

Touchscreen operations translate to mouse operations as follows:

- A mouse **click** is equivalent to a touchscreen tap.
- A mouse **click and hold** is equivalent to a touchscreen hold.
- A mouse **drag** is equivalent to a touchscreen drag.
- There is no mouse equivalent for a touchscreen slide.

  However, you can also access the dashboard by a click operation.

  A mouse **scroll** (with a scroll wheel) is equivalent to a touchscreen scroll. You can also drag with the mouse to scroll.

5.1.4 USB keyboard (optional)

If you connect a USB keyboard to one of the instrument's USB sockets, you can use it in addition to the touchscreen for data input.

The keyboard will be detected and installed automatically when plugged in.

Set the keyboard layout according to your USB keyboard so that the correct characters will be entered, refer to Section 6.1 [▸ 20].

- Select any input field and type on the keyboard to enter text or numbers.

5.1.5 USB barcode reader (optional)

If you connect a USB barcode reader to one of the instrument's USB sockets, you can use it in addition to the touchscreen for data input.

IMPORTANT: *The barcode reader has to be configured as "USB Keyboard HID" (refer to the manual of the barcode reader).*

If you encounter reading problems, refer to the manual of the barcode reader, further settings may be necessary.

TIP: *If you get incorrect readings directly after starting the barcode reader or when reading in quick succession, try to increase the keystroke delay and the USB polling interval, or disable "USB Fast HID" (refer to the manual of the barcode reader).*

The barcode reader will be detected and installed automatically when plugged in.

- Select any input field and scan a barcode to enter text or numbers.

5.1.6 USB memory devices (optional)

IMPORTANT: *USB memory devices have to be formatted with FAT32 or exFAT file system.*

If you connect a USB memory device to one of the instrument's USB sockets, the icon in the header shows that it is ready for use.

- To safely remove the USB memory device, always tap beside the corresponding header icon.

5.2 Functional screen elements

Common screen elements

- The Home button on any screen brings you back to the home screen (where you basically start all operations).
- Tap to go back to the previous screen.
- Tap to open the menu.
- Tap to access the dashboard.

5.2.1 Header

The header at the top of the screen always keeps you concisely informed on crucial instrument settings including the instrument date/time.

- Tap on an element in the header to have a control panel slide in showing more details or associated operations or a selection of settings that you can change on the fly.
- Tap anywhere outside the control panel to close it.

5.2.2 System notifications

System notifications are collected in the header under . A number beside the symbol shows the number of collected notifications. Colors indicate the notification category.

Table 8: Notification categories

	Error: A severe problem has occurred, which needs to be solved before you continue with your measurements.
	Warning: A minor problem (may be temporary) or a reminder requires your attention.
	Information: Non-critical message from your instrument.

– Tap to view all notifications.

– Tap on a notification to see all available details.

5.2.3 Favorites button

The favorites button adds (☆) or removes (★) a link to the current spot on the home screen. It switches between the two states “already added” (★) and “not yet added” (☆).

Favorites on the home screen give you quick access to the instrument functions that you need every day.

5.2.4 Action boxes

Action boxes contain tools suited for the context in which they appear. They are used in spots as **spot actions** or with lists as **list actions**.

– Tap to fold out more details of an action box.

Details include explanations of the icons or may even reveal more tools:

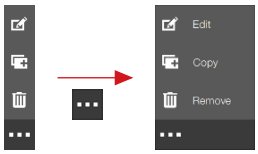


Fig. 5: *Example of a spot action without/with details*

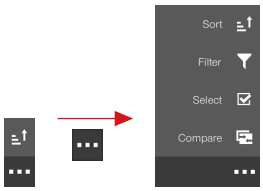


Fig. 6: *Example of a list action without/with details*

Action controls

Some actions open action controls. Multiple action controls can be open at the same time.

An action control consists of three parts:

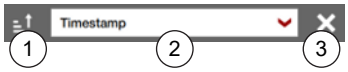


Fig. 7: *Example of an action control for sorting a list*

1 Icon identifying the action control
2 Control part defining the actual function
3 Close button of the action control

– Tap on the control part to configure the control function (further settings may fold out).

Some action controls look like this:

Fig. 8: *Example of an action control for selecting and then removing, exporting, comparing, or printing the selected items*

In this case even the identifying icon carries a function (select/deselect all items by tapping on the icon).

– Tap on one of the icons in the control part to start an activity controlled by the action.

– Tap to close an action control.

5.3 Screens – navigation, information, control

5.3.1 Home screen – your favorites

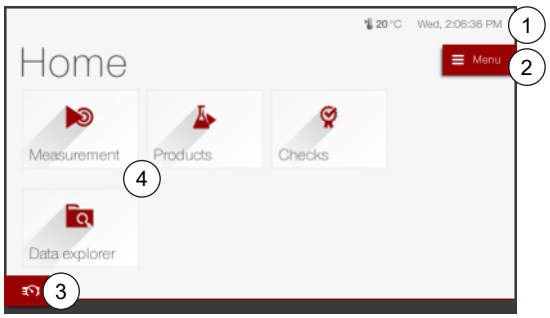


Fig. 9: *Example home screen*

1 Header
2 Menu button
3 Dashboard button
4 Currently added favorites

The home screen collects your favorites (4) giving you quick access to the instrument functions that you need every day.

It is the first screen that you see when the instrument has finished its initialization routines, and it is the place where you basically start all operations.

The Home button always brings you back to the home screen. Alternatively tap (back) repeatedly.

The instrument comes with useful favorites already placed on the home screen. Of course, you can completely define and arrange the favorites on the home screen as you like:

– Hold a favorite on the home screen, then drag it to a different place.

– Hold a favorite on the home screen, then remove it (tap).

– To add new favorites, tap ☆ where available.

New favorites are marked “New” on the home screen until you first use them.

5.3.2 Menu – all the functions

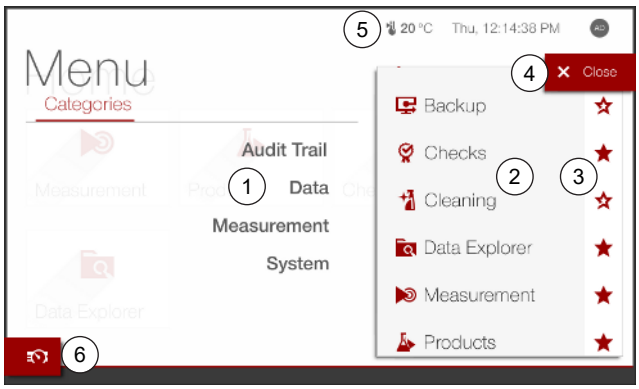


Fig. 10: *Example menu screen*

1 *Filter categories for the functions*
2 *List of (filtered) functions*
3 *Select/deselect functions as favorites here*
4 *Close button (closes menu)*
5 *Header*
6 *Dashboard button*

The menu links to all functions available on your instrument.

When you tap ☰, it is superimposed on the current screen as a transparent layer.

- If you tap on a function in the list, you will be taken directly to the spot or to a list for further selections, depending on the function.
- You can filter the list on the right by selecting a category on the left.
  Tap on the category again to reset the filter.
- To add/remove functions as favorites on the home screen for quick access, select/deselect them in column 3, as in above figure, also refer to Section 5.2.3 [▶ 15].

5.3.3 Spots

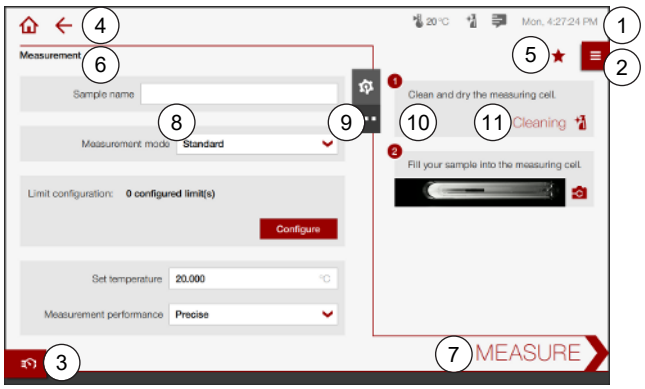


Fig. 11: *A typical spot screen*

1 *Header*
2 *Menu button*
3 *Dashboard button*
4 *Return to the previous screen or the home screen*
5 *Select/deselect the spot as a favorite here*
6 *Spot title: start here, follow the red line ...*
7 *... and end here (initiate a target action)*
8 *Settings for the task*
9 *Spot actions*
10 *Hints for the task / steps for the procedure*
11 *Link to a preparatory procedure*

A spot assembles all operations and settings for a specific task in one place. Spots can be quite diverse, but they share a common concept and a common layout as shown in the example figure.

Work your way through a spot step by step, starting at top left (6) and finishing at bottom right (7).

Spot actions (9) provide tools to deal with the whole spot or with elements of it. Available actions depend on the spot. Also refer to Section 5.2.4 [▶ 15].

The spot will give you useful hints for the task (10) and also guide you through preparatory or intermediate procedures (11), e.g. allowing you to start and stop components of the measuring system.

Usually, one side of the red line is reserved for settings pertaining to the spot (8). Before you start an operation, check if the settings are appropriate, and edit them if required. Spots will allow to edit modifiable settings either directly or via spot actions.

TIP: *Be sure to scroll down the settings area to see all available settings.*

You can always switch to the dashboard, refer to Section 5.3.5 [▶ 17] and back (3).

Spots can be added to your favorites on the home screen for quick access (5).

5.3.4 Wizards

Wizards are similar to spots except that they will not allow you to depart from the set course of a procedure. Wizards guide you through procedures when the correct sequence of steps is crucial.

Therefore, a wizard will only allow you to follow the procedure to the end – or to cancel the whole procedure. (Wizards are modal screens.)

5.3.5 Dashboards – the measurement stage

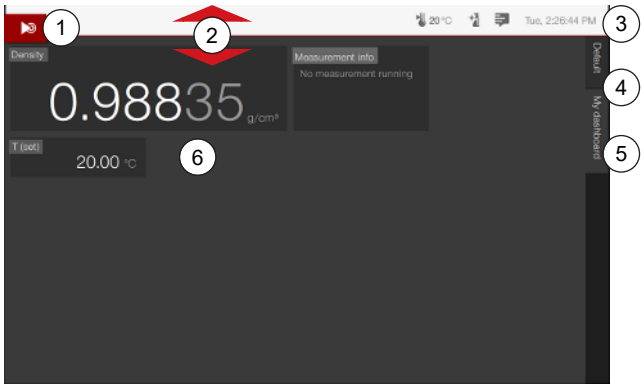


Fig. 12: *Example dashboard*

1 *Return to the current screen*
2 *Slide up to access dashboards / slide down to close dashboards (return to the current screen)*
3 *Header*
4 *List of dashboards*
5 *Current dashboard*
6 *Widgets on the dashboard*

A dashboard serves to monitor your measurements.

– Slide the bottom of the current screen up (unless it is a modal screen) to access the dashboards.

  Or tap .

– Slide the top of the dashboards down to return to the current screen (2).

  Or tap the button in the top left corner (1).

Managing dashboards

Holding the name of a dashboard in the list of dashboards (4) allows to **copy** the dashboard (), to **remove** it (), or to **edit** its name ().

Creating your own dashboard

The instrument comes with various predefined dashboards, however, you can create your own dashboard entirely according to your requirements.

– You may consider copying an existing dashboard, and then edit the copy.

– Or you can create an entirely new dashboard:

  – Hold any part (widget or background) of the current dashboard to switch it into edit mode.

  – Tap .

  – Enter a name and tap *Create*.

  – Start adding widgets to the empty dashboard.

5.3.6 Widgets on a dashboard

IMPORTANT: *To change the **output quantities** shown on the dashboard, or to change the **units** of an output quantity, edit the widget's properties.*

Holding any part (widget or background) of the dashboard switches the dashboard into **edit mode** (figure below). Note the grid lines used to arrange the widgets.

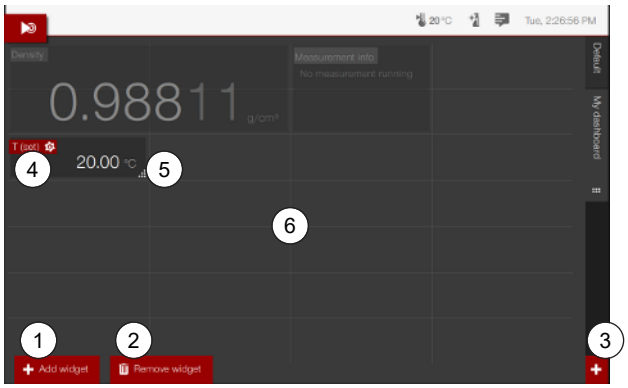


Fig. 13: *Dashboard in edit mode*

1 *Add a new widget*
2 *Remove the selected widget*
3 *Add a new dashboard*
4 *Edit the properties of the selected widget*
5 *Handle to resize the selected widget*
6 *Grid lines for the arrangement of the widgets*

– Tap on a widget to **select** it.

  – Drag it to any **position** on the dashboard (provided there is enough space for it). It will automatically snap to the grid (6).

  – Drag its handle (5) to **resize** it (the widget's content will be resized accordingly).

  – Tap (4) to **edit the properties** of the widget.

    In this way you can change output quantities or the units displayed for an output quantity or the number of digits displayed.
    Tap *Save* to save the changed properties.

  – Tap (2) to **remove** the selected widget.

IMPORTANT: *The operations take effect immediately, without request for confirmation.*

– Tap (1) to **add** a new widget.

  – Position the widget on the dashboard.

  – Adjust its size.

  – Edit its properties to suit your requirements.

Tap anywhere on the grid lines to leave the edit mode and to return to normal display.

5.3.7 Modal messages

Modal messages appear when the measurement system needs to present an important information or requires an immediate decision from you.

Modal messages will block your interaction with the measurement system until you have answered them.

5.4 The data explorer

The data explorer is your tool to access and manage all saved data, be it measurement data, checks, adjustments, or the products for which you have defined the measurement settings.

1. Select *Data explorer* in the menu to access data in the data memory.
2. Then tap on one of the available data categories, for example *Measurements* or *Products*.

   You will see a list of the available data sets in this data category.

   – You can sort and filter the list of data sets by various properties:

     Use the actions in the action box on the spot.

Sub-measurements are shown indented under the main measurement. The set of sub-measurements will always be treated as a whole.

Actions available in the data explorer

Depending on its context, an action box in the data explorer may include any of the following actions:

Table 9: Actions in the data explorer

	Compare Compares items in the list, which means that all data are shown side by side in a table. The data columns shown can be configured separately (refer to Section 5.4.1 [▶ 18]).
	Create Creates a new item.
	Filter Opens an action control where you can specify criteria which items shall be shown in the list.
	Search Opens an action control where you can enter a text string to be searched in the names of the list items. As a result, only items matching the search string are shown.
	Select Opens an action control and enables you to select items in the list. While the action control is present: – Tap on an item to select it. – Tap on an item again to deselect it. – Tap on the action control icon to select all items. – Tap on the action control icon to deselect all items.
	Sort Opens an action control where you can specify properties by which the items in the list shall be sorted.

5.4.1 Comparing data sets

Tap *Compare* in the action box on the spot to generate a comparison list of the filtered data sets.

– Tap in the action box to configure the data shown in the columns of the comparison list.

  The currently selected data are shown on the right, preceded by the column number.

  – To add further data, use the area on the left: First select a data category in the selection box on the top, then add data from the list below by tapping +.
  – Tap on any of the items in the list on the right to select it. You can then modify the displayed properties of the item, change its position in the list, or remove it from the list.
  – Tap on a selected item again to deselect it.
  – Finally tap *Save* to save the list configuration and return to the comparison list.

5.4.2 Exporting or printing single data sets

Tap on a data set in the list to access it.

The corresponding report will be shown (refer to Section 5.5 [▶ 18] for more information on reports and report configuration).

– Tap in the action box to print the report on one of the registered printers (Section 11.4 [▶ 36]).

– Tap in the action box to export the data set onto a connected USB memory device or one of the registered network shares (Section 11.2 [▶ 35]).

  You can export the data as a PDF file or a CSV file.

  – If you choose to export a CSV file, you can define the data format by tapping .

5.4.3 Exporting or removing multiple data sets

TIP: *If your list of data sets is very long, filter the list before making your selections. In this way you get a conveniently short list.*

1. Select one or more data sets that you want to export or remove (Table 9 [▶ 18]).
2. In the action control of the *Select* action, select the desired activity:

   – Tap to export the selected data sets.

     Define the data format of the CSV file by tapping .

   – Tap to remove the selected data sets.

The number of data sets exported is limited to 500.

5.5 Reports

Results shown in the data explorer are presented in the form of reports, which can also be printed or exported onto external storage.

5.5.1 Configuring report contents

Reports are always generated according to the current report configuration, which you can change at any time.

1. Access the measurement or product settings:

   For measurement reports:

   – Select *Measurement* in the menu.

   – Tap in the action box.

   For product measurement reports:

   – Select *Products* in the menu.

   – Open the particular product.

   – Tap in the action box.

2. Under *Report configuration* tap *Configure*.

   The currently selected contents are shown in an ordered list on the right.

3. Configure the report contents:

   – To add further data, use the area on the left: First select a data group in the selection box on the top, then add data from the list below by tapping .

   – Tap on any of the items in the list on the right to select it. You can then modify the displayed properties of the item, change its position in the list, or remove it from the list.

   – Tap on a selected item again to deselect it.

4. Tap *Save* to save the report configuration.

5. Tap *Save* to save the measurement or product settings.

TIP: *You can find measurement-specific parameters, like date of measurement or sample name, in the data group Measurement.*

5.5.2 Report templates

Report templates allow to include company information in reports and to configure reports so that they meet certain formal requirements.

Defining or editing a report template

IMPORTANT: *If you want to include images like a company logo or a background image, you have to add them first to the image repository on the instrument (refer to Section 5.6 [▸ 19]).*

1. Select *Settings* in the menu.

2. On the *Settings* screen, under *Reports* select *Report templates*.

3. Tap in the action box to add a **new** report template or tap on an existing report template to **edit** its settings.

   The configuration wizard shows a preview of your configuration on the right.

4. Specify a name for the report template.

5. Specify any of the available options according to your requirements.

   – Company information may include a company logo, which you can select from the list of available images. The image will be scaled proportionally to fit into the header of the report.

   – A background image may be selected from the list of available images. It will be scaled proportionally to fill the whole content area of the report.

   – Activate *GxP compliant* to include the specified number of signature lines.

   – Activate *Extended footer* to include the user who has generated the report in the footer.

6. Tap *Save* to save the report template.

Assigning a report template to a report category

You can assign different report templates to each of the results categories like measurements, checks, adjustments.

1. Select *Data explorer* in the menu, then open the particular results category (for example *Measurements*).

2. Tap on one of the results.

3. Tap in the action box.

4. Select the appropriate report template from the list.

5. Tap *Save*.

   The selected report template will be assigned to the whole results category.

5.5.3 Instrument settings report

You can export a report collecting various instrument and measurement settings.

1. Select *System information* in the menu.

2. Tap *Export instrument settings* in the action box.

3. Select which settings shall be included in the report.

4. Select a report template (Section 5.5.2 [▸ 19]) and a location where the report shall be stored.

5. Tap *Save*.

5.6 Images

You can upload your own images onto the instrument for further use, for example to be included in reports.

Images qualify for upload if they meet the following conditions:

– image file format: .bmp, .jpg, .png

– image file size: < 300,000 bytes

– image size: longest side < 800 pixels

Adding or removing images

1. Select *Settings* in the menu, then under *System* select *Images*.

   You see thumbnails of the currently stored images.
2. To add or remove images:
   – Tap in the action box to **add** an image.
   – Tap below an image to **remove** it.

6 Instrument settings

For the configuration of an optional sample changer (only Alcolyzer 7001), refer to the instructions that come with the sample changer.

6.1 Language and regional settings

– Select *Settings* in the menu, then under *System* select *Time & language*.

First of all you will want to set the system **language** so that you feel comfortable on the instrument:

– Set *Language* to a language that you prefer.

On the occasion set the number format (decimal symbols etc.) and the date and time **formats**:

– Select *Format* according to your requirements.

Finally select the **keyboard layout** for the onscreen keyboard and the **keymap** for an optional USB keyboard:

– Set *Keyboard layout* and *HW keyboard keymap* appropriately.

6.2 Time settings

Set the system time correctly so that the time stamps of measurements and system events are correct and traceable:

1. Select *Settings* in the menu, then under *System* select *Time & language*.
2. Set *Region* and *City* to your time zone.

   Daylight saving time will be calculated automatically.

TIP: *The date and time formats are defined with the Format setting (refer to Section 6.1 [▶ 20]).*

*To set date and time **manually**:*

– Set *Date* to the current date.
– Set *Time* to the current time.

*Alternatively, set date and time via **time server**:*

1. Configure a network connection first.
2. Switch *Use time server* to *Yes*.

   The *Time servers* input field replaces the input fields *Date* and *Time*.
3. The *Time servers* setting depends on your network settings.
   – If you have set up an **automatic** network configuration, you can leave the *Time servers* input field empty.
   – If you have set up a **manual** network configuration, or if you want to specify a time server anyway:
   Specify the address(es) of your time server(s) in the *Time servers* input field.
   Put each time server in a new line. Do not separate addresses by commas or semicolons etc.
4. It depends on your time server when the system time will be synchronized. It may also be necessary to restart the instrument.

6.3 Display brightness

1. Select *Settings* in the menu, then under *Hardware* select *Instrument settings*.
2. To set the *Display brightness*, drag the slider to a convenient position.

TIP: *The display brightness is reduced when no user interaction has been detected for 20 minutes. As soon as you touch the screen, the display brightness is back to its previous value.*

6.4 Speaker volume

You can set the volume of the sound signaling the end of a measurement:

1. Select *Settings* in the menu, then under *Hardware* select *Instrument settings*.
2. Set the volume with the slider *Speaker volume*.

   To silence the speaker, set the volume to 0.

6.5 Global units

Global units will be used as default units on the instrument:

1. Select *Settings* in the menu, then under *System* select *Global units*.
2. Set the global units that you prefer.

6.6 Automatic sample names

You can set the instrument so that it generates pattern-based automatic sample names.

1. Activate the function:
   a. Select *Settings* in the menu, then under *System* select *Sample naming*.
   b. Switch *Use automatic sample naming* to *Yes*.
2. After the function has been activated, define a pattern for the automatic sample names:
   – Tap *Configure*.

   The current elements of the name pattern are shown in an ordered list on the right, which shows their position in the pattern.

3. Assemble the name elements of the pattern:
   – To add a name element, select it from the list of available elements in the area on the left (tap ✚).
   – Tap on any of the elements in the name pattern on the right to select it. You can then change its position in the pattern or remove it from the pattern.
   – Tap on a selected element in the name pattern again to deselect it.
   – You can arrange name elements in any order and you can repeat elements in the pattern (for example a separator).
   – Special name elements:

     Separator is the character "_", which can be used to separate name elements.

     User input will be replaced with the sample name that you specify when you start a measurement.

     Text inserts a text string into the name. To define the text string, select the particular name element in the name pattern, then enter the text string in the input field *Text*.
4. Tap *Save* to save the name pattern.

6.7 Automatic printout or export of result reports

You can configure the instrument so that after a measurement, check, or adjustment, result reports are automatically printed or exported onto an external storage device in addition to the internal data memory (for example to process them in a LIMS).

1. Select *Settings* in the menu, then under *Reports* select *Automatic printout* or *Automatic export*.
2. Configure the automatic transfer:
   – *Automatic printout:*

     Set the switch to *Yes* for any data type to activate the function for the corresponding data.

     After you have activated the function, you can select a printer and configure the format of the printout.
   – *Automatic export:*

     Set the switch to *activated* for any data type to activate the function for the corresponding data.

     After you have activated the function, you can select and configure a file format, specify a location where the exported data shall be stored, and specify whether the measurement or check data shall be automatically removed from the instrument after export.

TIP: *Before you can use a network share, you have to register it on the instrument.*

IMPORTANT: *Adjustments of measuring modules are currently not included in the automatic printout and export.*

6.8 Ethanol table

An ethanol table defines the relation between the ethanol concentration and the density of a binary water/ethanol mixture.

Select one of the predefined tables or provide a user-defined table or a polynomial function. By default the ethanol table is set to *EtOH OIML (% v/v)*.

Selecting a specific ethanol table

1. Select *Settings* in the menu, then under *Modules* select your alcohol module.
2. Tap in the action box and select an ethanol table from the drop-down box.
3. Tap *Save*.

User-defined ethanol table

Instead of selecting a predefined ethanol table:

1. Select *User-defined table*, then tap *Edit table*.
2. Import a table of data pairs:
   ethanol concentration [% v/v]; true density
   (example: 0.18;0.99795)
   – each data pair in a separate line
   – data values of a pair separated by a semicolon
   – up to 1000 data pairs

TIP: *You can export a table template and edit it.*

TIP: *The larger the number of data pairs and the higher the accuracy of the data pairs, the higher the accuracy of the results that you can obtain.*

TIP: *Table data will be interpolated but not extrapolated. This means that the data pairs should cover the whole range of values that you want to measure.*

User-defined polynomial function

Instead of selecting a predefined ethanol table:

1. Select *User-defined polynomial function*.
2. Specify the two sets of coefficients A0 to A4 and B0 to B4 for the required two polynomials (eq. 1 and eq. 2):

$$c = A0 + A1 \cdot \rho + A2 \cdot \rho^2 + A3 \cdot \rho^3 + A4 \cdot \rho^4$$

c.....ethanol concentration [% v/v]
ρ.....true density = input
Ai.....coefficients to be determined

Fig. 14: *eq. 1*

$$\rho = B0 + B1 \cdot c + B2 \cdot c^2 + B3 \cdot c^3 + B4 \cdot c^4$$

ρ.....true density
c.....ethanol concentration [% v/v] = input
Bi.....coefficients to be determined

Fig. 15: *eq. 2*

The function in eq. 2 is the inverse of the function in eq. 1.

7 Measurement settings – products

7.1 Products

You can individually define the measurement settings for each of your products or sample varieties and save them for repeated use:

1. Select *Products* in the menu.
2. Tap *Create product*.
3. Specify a name and a description for the product.
4. Define measurement settings and optionally configure limits.
5. Tap to select an image for the representation of the product.
6. Tap *Save* to save the collection of measurement settings for the product.

TIP: *The instrument comes with several predefined product settings, which you can use as a template.*

TIP: *We recommend to use the predefined product "Beer (decarbonated)" for all types of beer, beer mix drinks, and alcopops. Use the predefined product "Wine Ext." for wines with more than 50 extract.*

7.1.1 Importing/exporting products

You can define the measurement settings for a product on one instrument and transfer the product settings to another instrument of the same type.

Export of products

1. Select *Data explorer* in the menu, then tap on *Products*.
2. Tap *Select* in the action box, then select the product settings that you want to export.
3. Tap in the action control for the selection and specify where the export file shall be stored.

IMPORTANT: *Measurement modes are currently not included in the export.*

Import of products

1. Select *Products* in the menu.
2. Tap *Import products*, then select a file with the product settings that you have exported before.

   You can select which products to import from the file.
3. Tap *Import* to import the selected products.

   The instrument will restart.

7.2 Measurement settings

Measurement settings comprise the measurement parameters, the assignment of a dashboard, and a report configuration for the results.

– For measurements without predefined product, assign dashboard and report configuration under *Setup* on the *Measurement* spot.

7.2.1 Dashboards / measuring quantities

Dashboards serve to monitor your measurements.

The instrument already comes with dashboards predefined for various generic products. You can adapt them to your needs or define new dashboards according to your requirements.

You can place the following widgets onto a dashboard of the instrument:

– measurement information (giving information about the current status of the measurement)

– display boxes for any measuring quantity

  (Select *Quantities* in the menu for a complete reference of available quantities. Tap on any of the quantities to see a comprehensive description.)

7.2.2 Reports

Measurement results are presented as reports, which you can access in the data explorer.

TIP: *The report configuration can also be changed after the measurement. It is independent of the dashboard configuration.*

7.2.3 User-defined measurement information

If you want to record additional specific information with every sample or product measurement, you can activate custom data fields. These data fields will show as input fields before you start a sample measurement. The text that you enter in a field can be included in the measurement report.

You find all activated custom data fields in the data group *Measurement*.

Defining custom data fields

1. Select *Settings* in the menu, then under *System* select *Custom data fields*.
2. Activate any of the available custom data fields with the corresponding switch.
3. Define a name for the custom data field.

   This name will identify the custom data field and serve as a label.
4. Optionally declare the custom data field as mandatory with the corresponding switch.

   If a custom data field is mandatory, you cannot start a measurement before you have entered text in the input field.

7.3 Measurement parameters

7.3.1 Measurement mode

– Select *Standard* for a standard single measurement of the filled sample.

– Alternatively, select one of the measurement modes from the list.

  Refer to the table below for a description of the predefined measurement modes coming with the instrument. The table specifies the default settings, which you can adapt according to your needs. You may even completely reconfigure each of the predefined measurement modes.

  Refer to Section 7.4 [▶ 23] for a comprehensive description of measurement modes and on how to define your own modes.

Predefined measurement modes

Mode	Description
Multiple Filling	3 determinations of a single sample; new filling of sample for each determination; cleaning before refill
Multiple Meas.	3 determinations of a single sample from one filling
Repeated Mode	up to 3 determinations of a single sample; new filling of sample for each determination; no cleaning before refill; stops if two consecutive determinations deviate by less than 0.01 % v/v, or after 3 determinations; saves all measurements

7.3.2 Alcohol offset

If you see a deviation between the alcohol content determined by Alcolyzer 5001/7001 and your reference value (e.g., alcohol content determined with the distillation method), you can define an offset to compensate for the deviation.

The offset can be in the range from –10 % v/v to +10 % v/v.

7.3.3 Temperature mode

The selected temperature mode (15 °C or 20 °C) determines for which temperature all results of the measurement system will be shown.

– After a temperature change between measurements, perform an equilibration measurement.

7.3.4 Ethanol table

The ethanol table can be set as an instrument setting and as a measurement setting (e.g. when you define a product). For a detailed description, refer to Section 6.8 [▶ 21].

7.4 Measurement modes

Measurement modes allow to define measurements as sequences of sub-measurements. They include the definition of filling and cleaning parameters, criteria when a sequence is finished, and the definition of temperature variation parameters.

The instrument comes with various predefined measurement modes, however, you can create your own measurement modes entirely according to your requirements.

7.4.1 Creating a measurement mode

– You can customize one of the existing measurement modes.

– Or you can create an entirely new measurement mode:

  a. Select *Measurement modes* in the menu, then tap .

  b. Specify a name for the measurement mode.

  c. Define the settings (refer to Section 7.4.2 [▶ 23] and Section 7.4.3 [▶ 23]).

  d. Tap *Save*.

7.4.2 Temperature variation settings

As the instrument measures at a fixed temperature, ignore these settings (*Constant*, *Table*).

7.4.3 Measurement mode parameters

Define all measurement mode parameters except temperature variation settings on the right half of the measurement mode screen.

With the available parameters, you can configure automatic routines consisting of multiple determinations (sub-measurements).

Number of determinations

Defines the maximum number of sub-measurements to be performed at the measuring temperature.

TIP: *The actual number of determinations performed may depend also on your comparison settings and the results of the determinations.*

If your measurement consists of more than one determination, an arithmetic mean and the standard deviation will be included in the measurement results.

Refill

Defines whether you want to refill sample between determinations.

Intermediate cleaning

Defines whether you want to perform a cleaning before sample is refilled between determinations.

Comparison settings

With this setting, you can activate measurement routines using different comparison criteria:

– *Compare and stop*

  Performs a series of determinations with stability check.

  – *If a deviation limit is defined:*

    The measurement is finished when two consecutive determinations deviate by less than the deviation limit. *Save mode* determines what will be saved. The results of all measurements saved will be averaged for the calculation of the mean.

    If the comparison criterion cannot be met because the results of the single determinations differ too much, the measurement is finished after the set maximum number of determinations have been performed. In this case all results are saved.

  – *Else:*

    Similar to selecting *None* as the comparison setting.

– *None*

  No comparison criteria will be used. All specified determinations will be performed. All measurement results will be saved and averaged for the calculation of the mean.

Save mode

(only available with compare and stop)

Defines what results of the single determinations will be stored in addition to the mean and standard deviation of the series.

– *Save all measurements*

  Saves the results of all single determinations.

– *Valid two only*

  Saves the two consecutive results that meet all set comparison criteria.

– *Last one only*

  Saves the last determination meeting the comparison criteria.

7.5 Limit configuration

With products, you can define limits for any measuring quantity to be monitored. If the defined limits are exceeded during measurement, this will be indicated in the measurement report.

1. Select the product and tap in the action box to access the product settings.
2. Under *Limit configuration* tap *Configure*.

   The currently defined limits are shown in a list on the right.
3. Configure the limits:
   – To add measuring quantities, use the area on the left: First select a data group in the selection box on the top, then add quantities from the list below by tapping .
   – Tap on any of the items in the list on the right to select it. You can then select a unit for the quantity and define a lower and an upper limit to be monitored, or you can remove the quantity from the list.
   – Tap on a selected item again to deselect it.
4. Tap *Save* to save the configuration of limits.
5. Tap *Save* to save the product settings.

8 Performing a measurement

Table 10: Steps of a typical measurement cycle

Step			refer to
A	Check that the **measurement system** is properly installed and in good working order, and that all conditions for a good measurement are met.		Section 4.1 [▶ 11], below
B	Perform a **zero alcohol check** to verify the instrument's accuracy before you start your daily routine measurements.		Section 9.1 [▶ 27]
C	1	Define the **measurement settings**: Select a **product** or define the settings on the fly. Specify additional measurement information (sample name, custom data fields).	Section 8.1.1 [▶ 25], Section 7 [▶ 22]
	2	**Prepare** your **sample** if required.	Section 8.4 [▶ 26]
	3	**Fill** the **sample**.	Section 8.1.2 [▶ 25]
	4	**Perform** the **measurement**.	Section 8.1.3 [▶ 26]
	5	**Clean** the measuring cell.	Section 10.1 [▶ 31]
D	Perform a **zero alcohol check** to verify the efficiency of your cleaning procedure after you have finished your daily routine measurements and the measuring cell has been cleaned.		Section 9.1 [▶ 27]

WARNING

Risk of injuries and fire by liquids leaking

Filling samples and cleaning liquids that the wetted parts are not resistant to will corrode the wetted parts. Sample leaking from corroded parts may cause serious injuries.

Before you fill any sample or cleaning liquid into the instrument:

- Strictly follow all safety instructions concerning the use of chemicals and the use of flammable chemicals, refer to Section 1.1 [▸ 6].
- Make sure that all wetted parts are resistant to the filled-in liquid, refer to Appendix A.3 [▸ 49]. Consider also the wetted parts of installed options.
  The chemical resistance depends on the temperature and concentration of the liquid.
- Make sure that you have suitable cleaning liquids at hand for cleaning the measuring cell, refer to Section 10.1 [▸ 31].

Preparatory steps

Before you start a measurement, check that:

- the measuring cell is clean,
- hoses are connected correctly,
- hose connections are tight,
- the waste hose leads into the waste container,
- the volume of the waste container is large enough for the number of samples,
- suitable cleaning liquids are at hand.

To speed up measurements

- Use automatic sample names (refer to Section 6.6 [▸ 20]).
- Bring the sample to measuring temperature in advance.

8.1 Measurement with syringe filling

8.1.1 Starting a measurement

Product measurements

For routine measurements, define your measurement settings as a product. You can add your routine product measurements to the home screen as favorites in order to start measurements directly from there.

- **Setting a product measurement as favorite**
  a. Select *Products* in the menu, then open the specific product.
  b. Verify that the product settings are correct, then tap Create measurement *Create measurement*.
  c. Add the spot with the measurement setup as favorite (tap☆).
  From here you can start a measurement by tapping *MEASURE*.
- **Starting a product measurement from the home screen:**
  The favorite on the home screen combines two links.
  - Tap *Measure* ❯ on the favorite to directly start a quick or routine product measurement that requires no sample details.
    If you have activated a mandatory sample name or mandatory custom data fields, you will not be able to start a measurement directly. Tap on the product name instead.
  - Tap on the product name to start a measurement from the measurement setup.
    There you can add a sample name or verify the product settings (tap *Details…*).
  - To start a measurement, tap *MEASURE*.

Measurements without predefined product

You can also perform a measurement without predefined product and define all measurement settings on the fly:

1. Select *Measurement* in the menu.
2. Define the measurement settings.
3. To start a measurement, tap *MEASURE*.

Additional measurement information on the measurement setup

- *Sample name*:
  The name entered here may be included in the pattern of an automatic sample name as *User input* (Section 6.6 [▸ 20]).
  Sample names can be declared as **mandatory**:
  - Select *Settings* in the menu, then under *System* select *Custom data fields*.
  - Switch *Sample name mandatory* to *Yes*.
    In this case, you cannot start a measurement before you have entered a sample name.
- *Custom data fields* (if defined, refer to Section 7.2.3 [▸ 22]):
  Text entered in a custom data field will be included in the measurement report.
- External density input
  Switch *External density* to *Yes* and specify a density value determined by an external density meter if the instrument shall calculate output quantities which require a density input (e.g. extract).

8.1.2 Filling sample

To achieve highly accurate measuring results, fill the sample into the measuring cell steadily and without bubbles.

IMPORTANT: *For high accuracy measurements, be sure to apply exactly the same filling procedure for checks, adjustments, and measurements.*

Sample amount

If the measuring cell is clean, you need approx. 20 mL of sample

Filling with a syringe (Luer tip)

IMPORTANT: *Do not use syringes that contain lubricants. The lubricants can dissolve into your sample and lead to a systematic measuring error.*

1. Connect the syringe (filled with sample) to the adapter Luer 1/4" UNF on the syringe holder.
2. Push the plunger of the syringe slowly and steadily until a drop emerges from the sample outlet adapter.
3. Leave the syringe in the filling position during the measurement.

TIP: *For high accuracy measurements, inject the entire sample volume.*

8.1.3 Actual measurement procedure

– When you have verified that all measurement settings are correct, and the sample has been filled, tap *MEASURE*.

  The measurement will be performed according to your settings. The progress bar shows the progress of the measurement.

  When the measurement is finished, the results are displayed.

  The results together with the camera image and a time stamp are automatically saved in the data memory.

  Saved data can be accessed in the data explorer.

– Tap
  – *DONE* to close the results and finish or
  – *REMEASURE* to perform another measurement with the same settings.

8.2 Filling automatically with Xsample

(only Alcolyzer 7001)

See the manual of the Xsample for instructions on its installation and use.

TIP: *When you use the measurement system for the first time, rinse the measurement system thoroughly before you start a measurement. This is due to the inner surface tension of new Tygon hoses, which decreases after a few rinsing cycles.If bubbles are visible in the hoses, rinse the whole measurement system with ethanol before you start the next measurement. Do not dry the system after rinsing.*

8.2.1 Measuring with Xsample 3100

Start a product measurement as described in Section 8.1 [▸ 25].

8.2.2 Measuring with Xsample 5100

1. Select *Job list* in the menu and select a job list, which you have previously defined.
   Refer to the documentation of Xsample 5100 for information on how to define job lists.
2. Tap *CREATE JOBS*.
3. Fill the vials with sample as described in the documentation of Xsample 5100 and according to your job list.
4. Specify a sample name for each job position or use automatic sample names, refer to Section 6.6 [▸ 20].
   You can also define a vial position for each job if the order of vials differs from the job sequence.
5. Tap *MEASURE* to start processing the job list.
   Also refer to Section 8.1.3 [▸ 26].
6. Measurement results can be accessed in the data explorer.
7. After the last measurement clean the measuring cell as described in Section 10.1 [▸ 31].

8.3 Data management

Saved data can be accessed in the data explorer:

– Measurements
– Checks
– Adjustments
– Products

1. Select *Data explorer* in the menu, then select one of the available data categories.
2. Select one of the saved data sets to see it.
   Tap to export a report, tap to print it.

For details refer to Section 5.4 [▸ 18].

8.4 Degassing samples

Pay attention to always treat all samples the same way in order to get reproducible measuring results.

Degassing samples according to the MEBAK regulations

1. Fill a 1 L glass flask one third with sample.
   The sample temperature has to be between 20 °C (68 °F) and 25 °C (77 °F).
2. Seal the flask with a glass stopper.
3. Shake the flask and release the pressure until there is no more built-up pressure.
4. Filter the degassed sample through a fluted paper filter.
5. Immediately cover the funnel with a watch glass to prevent loss of alcohol.

6. Fill the filtered sample into glass containers and seal the containers, or analyze the sample immediately.
7. Keep the sample containers sealed and at a temperature of approximately 20 °C (68 °F) before use.
8. Before filling the sample into the vials of the sample changer, swirl the sample gently.
   This is to bring any condensations of alcohol back into the solution.

IMPORTANT: *Do not use any anti-foaming agent.*

Using an ultrasonic bath

Put your sample for approx. 5–10 minutes into an ultrasonic bath until bubbling ceases.

9 Checking, adjusting and calibrating

9.1 Checks

By checks, carried out in regular intervals, you can ensure that your measurements consistently deliver results of high accuracy.

With an alcohol check, you fill a medium of known alcohol concentration into the measuring cell and compare the measured alcohol concentration with the target value.

– Use **zero alcohol checks** to verify the validity of the zero point of alcohol.

  We recommend to perform a zero alcohol check every day before you start your measurements and after cleaning at the end of the day.

  Perform additional zero alcohol checks as required and at your own discretion, e.g. when you get unexpected results.

– Use **alcohol concentration checks (beer checks, wine checks, spirits checks) and custom checks** to verify that the instrument is measuring with satisfactory accuracy.

  We recommend to perform an alcohol concentration check weekly.

  Perform additional alcohol concentration checks or custom checks as required and at your own discretion, e.g. when you get unexpected results.

TIP: *If your measurement system includes an Xsample 5100, perform the SOP, refer to Section 9.1.4 [▸ 28] instead of the single checks.*

9.1.1 Check settings / custom checks

You can define checks for any measuring quantity available on the instrument.

– To define a custom check:
  a. Select *Checks* in the menu, then tap .
  b. Specify a name for the check and define the check settings.
– To edit check settings:
  a. Select *Checks* in the menu, then select one of the defined checks.
  b. Tap .
  c. Edit the settings as appropriate and save them.

Check settings

– Measurement settings for a check have to be defined as a product.
– *Target type*:
  – For a zero alcohol check, select *Water*.
  – For a custom check, select *Constant*.
– *Limit configuration*:
  a. Tap *Configure* to select the quantities to be checked and to define the check parameters.
  b. On the left select a group (if available) to see a filtered list of measuring quantities.
  c. To check a quantity, select it from the list on the left (tap).
  d. Tap on a selected quantity in the list on the right to edit the check parameters for the quantity.
– Check parameters:
  – Select a unit for the check parameters and a reference value (if available) to be tested with the check.
  – For a zero alcohol check, specify an upper and a lower deviation from the reference value. These are the maximum deviations allowed for the check to be passed.
  – For a custom check, specify an upper and a lower limit for the measuring quantity. The result of the check measurement must lie within the specified range for the check to be passed.

Table 11: Factory settings of check limits for predefined checks [Alcohol (% v/v)]

Zero alcohol check	–0.03 / +0.03
Beer check	4.95 / 5.05
Wine check	11.95 / 12.05
Spirits check	39.90 / 40.10

9.1.2 Check execution reminder

You can activate and define a reminder that will tell you when to perform the next check.

1. Select *Checks* in the menu, then select the check for which you want to set a reminder.
2. To edit the check parameters, tap .
3. Activate *Check execution reminder*: *Yes*.

4. Now you can define
   – a time interval between check reminders
   – a time when the reminder shall be shown
   – whether the check is obligatory

     An obligatory check will not allow you to perform a measurement before you have performed the next valid check.
5. Save the settings.

Pending checks are indicated by in the header.

9.1.3 Performing a check

1. Select *Checks* in the menu, then select one of the available checks.
2. Observe all hints on the screen and fill the check medium.

   For a *zero alcohol check*, use freshly degassed ultra-pure water.
3. Tap *START CHECK*.
4. The summary of the check will show the check results and a recommendation if the check has failed and an adjustment is necessary.

   All results are also saved in the data memory.
5. Tap *DONE* to close the summary.

IMPORTANT: *We advise you to follow the recommendations.*

If the zero alcohol check has failed

We recommend taking corrective actions until the check is valid again:

– Check the quality of the water.
– Clean the measuring cell thoroughly.
– If above actions do not help, perform an alcohol zero adjustment.

9.1.4 SOP

For measurement systems with an Xsample 5100, the integrated SOP (standard operating procedure) enables you to perform an automatic check measurement of all measuring parameters followed by an optional adjustment.

The following measuring parameters can be checked with the SOP:

Parameter	Adjustment point	Check medium
Alcohol [% v/v]	Zero	ultra-pure water
Alcohol [% v/v]	Low concentration	ethanol/water solution 8–12 % v/v (beer) or 8–15 % v/v (wine/sake)
Alcohol [% v/v]	High concentration	ethanol/water solution approx. 40 % v/v
Color [EBC]	Zero	ultra-pure water
Color [EBC]	Color concentration	tartrazine standard

Performing the SOP

You have to define a filling program in the settings of Xsample 5100 (see manual of Xsample 5100 for details) before you can configure the SOP.

1. Select *SOP* in the menu.
2. Select the proper filling program.
3. Activate the parameters that you want to check/adjust, and set the check limits.
4. Place the vials with the reference substances in the magazine positions indicated on the right of the SOP spot.
5. Tap *START SOP*.
6. After all measurements have been performed, you can decide for each of the checked parameters
   – to save the measurement as a check (by tapping *Reject*) or
   – to save the measurement as a new adjustment for the specific module in case the check results are out of limits.

After you have performed the SOP, the SOP configuration will be saved for the next SOP.

9.2 Adjustments

With an adjustment, a sample of exactly known measurement properties (standard) is measured, and the instrument constants are adjusted in a way that the instrument delivers the known correct results.

9.2.1 Alcohol adjustments

When to perform adjustments

Always perform a check measurement with the clean measurement system before performing an adjustment.

– Perform an alcohol zero adjustment, refer to Section 9.2.1.1 [▶ 29] if a zero alcohol check has failed and corrective actions have not helped.

– Perform an alcohol concentration adjustment, refer to Section 9.2.1.2 [▶ 29]
  – if a custom check has failed and corrective actions have not helped;
  – after changing the temperature mode.

Table 12: Recommended alcohol concentration adjustments

Alcohol range of measurements	Low	High[a]
0 % v/v to 20 % v/v[b]	•	-
35 % v/v to 65 % v/v	-	•

[a] *After you have performed a special multipoint adjustment, high concentration adjustments will use it as baseline.*

[b] *If you use the product "Cognac", use alcohol concentration adjustment "High", irrespective of the alcohol range of your measurements.*

– Perform an **alcohol special multipoint adjustment**, refer to Section 9.2.1.3 [▶ 30] only if you need to analyze samples with different alcohol contents (differing by more than 10 % v/v) in the high concentration range. No new alcohol zero adjustment is required.

  Repeat the special multipoint adjustment:
  – if monthly checks at both ends of your alcohol range show deviations > 0.1 % v/v;
  – at least once per year.

Before the adjustment

Before the adjustment, the system has to be turned on for at least one hour. However, after transport full stabilization may even take up to one day. The ambient temperature has to be stable within a maximal variation of ±3 °C (±5.4 °F).

– Before the adjustment, prepare the required solutions.

For binary ethanol solutions use the concentration calculator on the device:

– *Menu > Concentration Calculator*
– Enter the specific ethanol concentrations of the solutions, the required final solution concentration and the required final volume. The calculator calculates the required volumes of each solution to reach your specific concentration.

9.2.1.1 Alcohol zero adjustment

IMPORTANT: *Before you start the adjustment, make sure that the measuring cells are clean.*

1. Prepare freshly degassed ultra-pure water for filling:
   a. Boil ultra-pure water for several minutes to remove dissolved gas.
   b. Fill up a clean glass flask with the freshly degassed ultra-pure water, and cover it.
   c. Wait until the water has cooled down to approx. 20 ±3 °C (68 ±5.4 °F).
   d. Pour the water into a container suited for filling with your filling device (see documentation of the filling device).
2. Select *Adjustments* in the menu, then select *Zero alcohol*.
3. Follow the instructions on the screen.
   The adjustment routine is carried out, and the results are shown.
4. Apply or reject the adjustment.
   The signal level compared to factory adjustment decreases mainly due to coating of the measuring cell.
   – If the level goes below 80 %, clean the measuring cell thoroughly and repeat the alcohol zero adjustment.

9.2.1.2 Alcohol concentration adjustment

IMPORTANT: *Always perform an alcohol zero adjustment before alcohol concentration adjustments.*

IMPORTANT: *All water/ethanol solutions have to be prepared at least 12 hours before use. This period starts again if you perform small corrections like adding water or ethanol to a solution.*

IMPORTANT: *Use only freshly degassed ultra-pure water, refer to Section 9.2.1.1 [▶ 29] and high-proof ethanol without denaturant for the water/ethanol solutions.*

IMPORTANT: *Before you start the adjustment, make sure that the measuring cells are clean.*

1. Prepare the water/ethanol solutions for your instrument model with defined concentrations in the range given in the below table.

Table 13: Recommended alcohol concentration ranges for the alcohol low/high concentration adjustment

Application	Low	High
Low concentrations	8–15 % v/v	–
High concentrations	–	40 % v/v
Beer	8–12 % v/v	–
Wine, Sake	8–15 % v/v	–
Spirits, liqueurs	–	40 % v/v

As a guideline, mix the volumes given in the table below to get 1 L solution of the specified ethanol concentration.

Ethanol concentration	Volume ethanol 96 %	Volume water
10 % v/v	104 mL	fill up to 1 L
40 % v/v	417 mL	

NOTE: *We recommend to determine the accurate concentration by reference measurement at the required temperature.*

   a. Mix the volumes of water and ethanol in a flask. Shake gently.

b. Cover the flasks and leave the solutions for 12 hours at 20 ±3 °C (68 ±5.4 °F).
Before filling the solutions must be free of gas bubbles (e.g. use an ultrasonic bath).

c. Pour the solutions into containers suited for filling with your filling device (refer to the documentation of the filling device).

TIP: *Improve measurement performance by adjusting the instrument at an alcohol concentration close to that of your samples.*

2. Select *Adjustments* in the menu, then select the appropriate adjustment: *Low concentration alcohol* or *High concentration alcohol*.
3. Follow the instructions on the screen.
4. When asked to select measurement products (low concentration adjustment):
The instrument can be adjusted for both *Beer & Wine* products (recommended selection).
The selection has an influence on the wavelengths used.
5. When asked for the ethanol concentration of your adjustment medium, enter the exact concentration and tap *Confirm*.
6. When the adjustment results are shown, apply or reject the adjustment.

9.2.1.3 Alcohol special multipoint adjustment

IMPORTANT: *All binary solutions have to be prepared at least 12 hours before use. This period starts again if you perform small corrections like adding water or ethanol to a solution.*

IMPORTANT: *Use only freshly degassed ultra-pure water, refer to Section 9.2.1.1 [▸ 29] and high-proof ethanol without denaturant for the water/ethanol solutions.*

IMPORTANT: *Before you start the adjustment, make sure that the measuring cells are clean.*

1. Prepare water/ethanol solutions with defined concentrations as given in the below table (±1 % v/v).

Table 14: Alcohol concentrations of adjustment solutions

Solution	Recommended concentration
Solution 1	ultra-pure water
Solution 2	18 % v/v
Solution 3	45 % v/v
Solution 4	55 % v/v
Solution 5	64 % v/v

As a guideline, mix the volumes given in the table below to get 1 L solution of the specified ethanol concentration.

Ethanol concentration	Volume ethanol 96 %	Volume water
18 % v/v	188 mL	fill up to 1 L
45 % v/v	469 mL	
55 % v/v	573 mL	
64 % v/v	666 mL	

NOTE: *We recommend to determine the accurate concentration by reference measurement at the required temperature.*

a. Mix the volumes of water and ethanol in a flask. Shake gently.

b. Cover the flasks and leave the solutions for 12 hours at 20 ±3 °C (68 ±5.4 °F).
Before filling the solutions must be free of gas bubbles (e.g. use an ultrasonic bath).

c. Pour the solutions into containers suited for filling with your filling device (refer to the documentation of the filling device).

2. Select *Adjustments* in the menu, then select *Multipoint alcohol*.
3. Follow the instructions on the screen.
4. When asked for the ethanol concentration of your adjustment medium, enter the exact concentration and tap *Confirm*.
5. When the adjustment results are shown, apply or reject the adjustment.

9.2.2 Color adjustments

(only Alcolyzer 7001 with Option Color 430 nm)

The light source for the color measurement undergoes a continuous aging process resulting in a drift of the color value measured. A drift of up to 0.5 EBC (0.25 SRM (ASBC)) per week can be considered normal.

We recommend to check the zero color value daily (include a color check in the zero alcohol check).

When to perform adjustments

– Perform a **color zero adjustment** if a zero color check has failed and corrective actions have not helped.
– It is sufficient to perform a **color concentration** adjustment once a year.

9.2.2.1 Color zero adjustment

IMPORTANT: *Before you start the adjustment, make sure that the measuring cells are clean.*

Adjustment medium: freshly degassed ultra-pure water

1. Select *Adjustments* in the menu, then select *Zero color*.
2. Follow the instructions on the screen.
The adjustment routine is carried out, and the results are shown.

3. Apply or reject the adjustment.
   The signal level compared to factory adjustment decreases by-and-by due to aging of the LED as well as coating of the measuring cell.
   – If the level goes below 80 %, clean the measuring cell thoroughly and repeat the color zero adjustment.
   – If the level stays low, aging of the LED is the cause. However, you need not worry as long as adjustments are carried out successfully.
   – If you don't get successful adjustments anymore, contact your local Anton Paar representative.

9.2.2.2 Color concentration adjustment

IMPORTANT: *Always perform a color zero adjustment before a color concentration adjustment.*

Adjustment medium: color standard (tartrazine) with a color value between 1.00 EBC and 60.00 EBC (between 0.50 ASBC and 30.48 ASBC), preferably at approx. 50.00 EBC (25.40 ASBC)

TIP: *Use the color adjustment set, mat. no. 12627 (shelf life of the tartrazine color standards and water standards: three months).*

1. Select *Adjustments* in the menu, then select *Concentration color*.
2. Follow the instructions on the screen.
3. When asked for the concentration of your adjustment medium, enter the color value of the color standard according to the appropriate scale (*unit*). The input field is preset with the value determined by Option Color 430 nm.
4. Tap *Confirm*.
5. When the adjustment results are shown, apply or reject the adjustment.

9.2.3 Viewing the adjustment history

You can access and manage adjustment reports, like all saved data, in the data explorer:

– Select *Data explorer* in the menu, then select the data category *Adjustments*.

  You will see a list of adjustments performed.

Alternatively, there is a shortcut from the adjustments spot to the data explorer:

– Select *Adjustments* in the menu, then tap below any of the defined adjustments.

  You will see the adjustment history already filtered for the specific adjustment.

9.2.4 Resetting the adjustment data to factory adjustment

You can re-activate the factory adjustment of all installed instruments:

1. Select *Adjustments* in the menu, then tap in the action box.
2. Switch the adjustments that you want to reset to *Yes*.
3. Tap *Reset*.

   The selected adjustments will be reset.

10 Upkeep and cleaning

– The instrument requires periodical upkeep to ensure error-free operation as well as reliable and accurate measuring results.

– Employ a regular and effective cleaning routine and store the instrument under the recommended conditions.

– Reorder consumables from Anton Paar.

– If the repeatability of your color measurements (only Alcolyzer 7001 with Option Color 430 nm) is not satisfactory any more, even after a thorough cleaning, the light source for the color measurement may have come to the end of its life. In this case contact your Anton Paar representative.

Table 15: Regular upkeep routines

What	When
Regular cleaning	Refer to Section 10.1 [▶ 31]
Regular checks	Refer to Section 9.1 [▶ 27]
Color concentration adjustment	once a year Refer to Section 9.2.2.2 [▶ 31]
Exchange hoses (same material, same length)	– every 2 years – immediately if heavily colored Refer to Section 4.2.1 [▶ 11]

10.1 Cleaning the measuring cell

Clean immediately after the end of your measurements to avoid sample residues in the measuring cells after a measurement cycle.

Also clean the measuring cell before you perform adjustments.

10.1.1 Between series of measurements on the same day

– Clean the measuring cells with ultra-pure water. The ultra-pure water can stay in the measuring cells until the next measurement.

– **With Xsample:** Always perform two measurements of ultra-pure water at the end of a series.

Before starting a new measurement, rinse the measuring cells with an approx. 10 % ethanol/ water solution (for example, your adjustment solution) to decrease the surface tension. This avoids air bubbles.

10.1.2 At the end of the day

- Clean the measuring cells with
  - a laboratory cleaner

    Leave the cleaner in the measuring cell for **approx. 5 minutes**.

    Suitable laboratory cleaners:
    e.g., Mucasol®, Alconox®, Tergazyme®, Extran, and RBS 50 concentrate.

    Attend to the product information concerning the cleaning agent's concentration (e.g., Mucasol® has to be used as a 3 % solution, Alconox® and Tergazyme® as a 1 % solution).
  - ultra-pure water (at least 60 mL)

    The ultra-pure water can stay in the measuring cell until the next measurement.
- With **Xsample**: At the end of the day, perform a measurement of laboratory cleaner followed by four measurements of ultra-pure water to remove it.

Before starting a new measurement, rinse the measuring cells with an approx. 10 % ethanol/ water solution (for example, your adjustment solution) to decrease the surface tension. This avoids air bubbles.

10.1.3 Once a week (preferably before the weekend)

- Clean the measuring cell with:
  - a cleaner containing NaOCl (chlorine bleach) and NaOH (sodium hydroxide) or KOH (potassium hydroxide)

    Attend to the product information concerning the cleaning agent's concentration. The total NaOH (or KOH) and NaOCl concentration shall not exceed 1 % in the applied dilution.

    Leave the cleaner in the measuring cell for **maximal 5 minutes**.

    Suitable cleaners containing NaOCl and NaOH (or KOH):
    "Winepress Cleaner PM Membrane Presses", cat. no. 409004, by Wigol®
    "TM Desana" by Thonhauser
    Alternatively, you can prepare a cleaner by yourself: Prepare an aqueous solution of 0.5 % w/w NaOCl and 0.5 % w/w NaOH (or KOH).
  - ultra-pure water (at least 4 measurements)

    The ultra-pure water can stay in the measuring cell until the next measurement.
- With **Xsample**: Perform a measurement of the cleaner described above followed by four measurements of ultra-pure water to remove it.

Before starting a new measurement, rinse the measuring cells with an approx. 10 % ethanol/ water solution (for example, your adjustment solution) to decrease the surface tension. This avoids air bubbles.

10.2 Cleaning the instrument housing and the touchscreen

WARNING

Risk of fire and explosion

Ethanol is a highly flammable liquid.

- Strictly follow all safety instructions concerning the use of flammable liquids, refer to Section 1.1 [▶ 6].

NOTICE

Corrosion due to unsuited means of cleaning

Using substances for cleaning that are not suitable causes corrosion of the instrument housing.

Never use:

- any chemicals aggressive against glass,
- highly nonpolar solvents (e.g. toluene, hexane, solvent naphtha),
- strong acids or bases (e.g. nitric acid, sulfuric acid, hydrochloric acid, caustic soda),
- strong mechanical action (steel brush).

To clean the instrument housing or the touchscreen, use a soft tissue, which can be wetted with ethanol or warm water, if necessary with a mild cleaning agent added (pH < 10).

10.3 Storing the instrument

Clean the measuring cell before you store the instrument for more than one day. Otherwise algae may grow on the glass surface, which are difficult to remove.

WARNING

Risk of fire and explosion

Ethanol is a highly flammable liquid.

- Strictly follow all safety instructions concerning the use of flammable liquids, refer to Section 1.1 [▶ 6].

IMPORTANT: *Do not use denatured ethanol. The denaturing agent may stick to the surface of the measuring cell and cause measuring errors in subsequent measurements.*

Storing for short periods (maximal 2 weeks)

1. Clean the measuring cell according to the cleaning procedure at the end of the day, refer to Section 10.1.2 [▶ 32].
2. Fill ultra-pure water into the measuring cell and leave it filled up until the next measurement.
   If you have filled by syringe, leave the syringe mounted in the syringe holder to keep the liquid from running out.

IMPORTANT: *The storage temperature must be high enough so that the water in the measuring cell cannot freeze.*

Storing for long periods or for transportation

1. Clean the measuring cell thoroughly according to the weekly cleaning procedure, refer to Section 10.1.3 [▶ 32].
   Use highly concentrated ethanol as the last cleaning agent.
2. Blow air through the measuring cell once with a syringe to remove ethanol residues.

10.4 Transporting the instrument

CAUTION

Risk of squeezing your fingers

Do not hold the instrument by its bottom to avoid squeezing your fingers when you put down the instrument.

- Before you move or lift the instrument, prepare it for transportation as described in Section 10.3 [▶ 32] (empty the measuring cell and dry it).
- To carry the instrument, put one hand into the recessed grip below the front, and grasp the metal ledge on the rear with the other hand.
- Carry the instrument in front of you and keep it close to your body.

10.5 Backup and restore

Reasons for making a backup

- Safety – a backup enables you to easily recover settings that may have been modified by mistake.
- Intermediate storage – save all settings and measurement data when components of the instrument are to be upgraded or exchanged.
- Standard setup – configure the settings on one instrument and replicate them onto further instruments (of the same model).

TIP: *We recommend to make a backup of the settings after system installation.*

Data included in backup / restore choices

You can individually select to backup settings and measurements:

- *Settings* include all instrument settings, measurement settings, products, custom quantities, and check definitions. Dashboards and favorites are included, as well.
- *Measurements* include all data stored with the results of product measurements and check measurements, but no measurement settings.

All backups include the whole set of adjustment data as well as instrument data for identification.

With the restore function, you can select which data shall be restored (you can only select data included in the backup package):

- Select *Settings* to restore saved settings from the same instrument or to transfer settings from a reference setup onto another instrument.
- *Measurements*
  It is probably only meaningful to restore measurement data on the same instrument.
- *Adjustments* can only be selected if the backup package has been made on the same instrument, because adjustments are instrument-specific.

IMPORTANT: *If you select to restore only measurements, the restore procedure will still reset all settings to factory settings.*

10.5.1 Making a backup

IMPORTANT: *You can only start the backup procedure if no measurement is running.*

1. Select *Backup* in the menu.
2. Select a storage location where the backup package shall go: a connected USB memory device or a registered network share.
3. Select which data shall be included in the backup package.

   The storage size available and a rough estimate of the storage size needed for the backup are shown in the hints area of the spot.
4. Tap *BACKUP* to start the backup procedure.

10.5.2 Restoring data from a backup

IMPORTANT: *You can only restore data from a backup package made on the same instrument model.*

TIP: *Restored data that have been exported before the backup will keep their "exported" status.*

1. Select *Restore* in the menu.
2. Open a backup package on a connected USB memory device or a registered network share.
3. Select which data shall be restored.
4. Tap *RESTORE* to start the restore procedure.
   - First, after a reboot, the instrument will be reset to factory settings.

     Measurement data will be removed.

     Adjustment data will only be reset if the backup package has been made on the same instrument, else not.
   - Then the selected data will be restored from the backup package.
   - Finally, the instrument reboots to load the restored settings.

10.6 Software administration

10.6.1 System information

All detailed technical information, version numbers, and serial numbers concerning your measurement system (including installed options), are listed in the system information:

1. Select *System information* in the menu.
2. Scroll through the listed information: software, components, boards, modules, etc.

10.6.2 Diagnostics package

In case of problems, you can greatly help Anton Paar's support team by providing a diagnostics package when asked for it.

Here's how to generate a diagnostics package:

1. Select *System information* in the menu.
2. Tap *Save diagnostics package* in the action box.
3. Select a storage location: a connected USB memory device or a registered network share.
4. Best leave the *File name* as is.
5. Tap *Save*.

10.6.3 Software update installation

TIP: *Your Anton Paar representative will inform you when a software update for your instrument is available.*

TIP: *You can download the latest instruction manual for your instrument from the product page on https://www.anton-paar.com.*

TIP: *Before you start a system update, make a backup of the system.*

1. Save the software update package in the root directory of a USB memory device or a registered network share.

   The software update package is a file with a file name extension ".aup". Its file name usually includes a version number that should be higher than that of the software installed on your instrument.
2. *With USB memory device:* Connect it to one of the USB sockets of the instrument.

NOTICE

A failed system update may render your instrument unusable

Do not disconnect the USB memory device during the update process.

3. Select *System update* in the menu.
4. Tap *Select package* and select the software update package on the USB memory device or on the network share.
5. Tap *Open*.

   The version of the software in the package is shown side by side with the currently installed software version. Check that this is the software version that you want to install.
6. Tap *INSTALL* and wait for the installation to finish.

10.7 Service functions and reset

The *Settings* menu includes a *Service* section:

– *Reset to factory* serves as a last resort to reset your instrument to factory settings.

  Avoid if possible.

– *Service mode* is reserved for authorized service technicians.

11 Network and printer configuration

11.1 Network connection

TIP: *If you are in doubt about the correct settings, consult your network administrator.*

If you want to access network resources (like a network printer), you need to set up an Ethernet or WiFi connection first.

11.1.1 Setting up an Ethernet connection

1. Make sure that your instrument is connected to the network.
2. Select *Settings* in the menu, then under *Network & connections* select *Ethernet*.
3. Switch *Ethernet* to *ON*.

   The network configuration settings slide in.
4. To edit an already defined configuration:

   Scroll down to the end of the list and tap *Configure*. Then scroll back up.
5. Use the Configuration switch to select automatic or manual configuration.

   Automatic configuration (recommended)
   Use automatic configuration if your network server supports DHCP.

   – Scroll down to *DNS suffixes*.

   – Enter one or more DNS suffixes in the proper order (your domain names).

   Manual configuration
   Use manual configuration to set a fixed IP address for the instrument.

   – Set the IP address, the subnet mask, and the gateway address according to your local network.

   – Set the primary (and secondary) DNS name server addresses.

– Enter one or more DNS suffixes in the proper order (your domain names).

6. Tap *Connect*.

If you experience problems connecting to the network, verify that your settings are correct.

TIP: *You cannot change the shown MAC address. This is a unique address specific for your instrument.*

11.1.2 Setting up a WiFi connection

1. Connect the WiFi dongle, mat. no. 194727, to one of the USB sockets of your instrument.
2. Select *Settings* in the menu, then under *Network & connections* select *WiFi*.
3. Switch *WiFi* to *Enabled*.

   Under *Available Networks* you will see networks found.
4. Select a network and tap *Connect*.

   The name and connection status of the selected network will be displayed for the WiFi connection.

   To terminate the WiFi connection, tap *Disconnect*.
5. Tap *Settings* to edit the network configuration:
   – Use the *IP Configuration* switch to select automatic or manual configuration.

     With manual IP configuration, set the IP address, the subnet mask, and the gateway address according to your local network.
   – With automatic IP configuration, use the *DNS Configuration* switch to select automatic or manual configuration.

     With manual DNS configuration, set the primary and secondary DNS name server addresses and one or more DNS suffixes in the proper order (your domain names).
   – Tap *Save* to save the settings.

The settings of previously used networks are saved so that you need not configure them every time you connect to them.

Previously used networks are listed under *Known Networks*.

– To remove the connection details for a known network, select it in the list, then tap *Remove*.

11.2 Network shares

Table 16: Supported network shares

– Windows Server 2012
– Windows Server 2016
– Windows Server 2019

TIP: *If you are in doubt about the correct settings, consult your network administrator.*

You can use network shares as storage locations. To make them available for this purpose, register them on the instrument:

1. Configure a network connection first (Section 11.1 [▶ 34]).
2. Select *Settings* in the menu, then under *Network & connections* select *Network shares*.
3. Tap in the action box to add a **new** network share or tap on an existing network share to **edit** its settings.
4. Switch *Network share* to *Enabled* or *Disabled*.
   – *Enabled* makes the network share available for use.
   – *Disabled* temporarily disables the network share.
5. Define a unique *Display name* for the network share. You will later be able to identify it by this registered name.
6. In the *Server* input field, specify the full network path to the network share.

   A correct path begins with a double slash character (//).

   Mind to use the correct slash characters for the path. The instrument will not accept backslash characters (\).
7. We recommend to leave the *SMB version* at *Default* (setting it to the highest version available for communication).

   Alternatively, select a SMB version supported by the specified server.
8. Enter the correct authentication data for the network share in the *User name* and *Password* input fields.

   If you enter incorrect authentication data, you will later not be able to transfer data between the instrument and the network share.
9. Some configurations require to specify the domain for the authentication explicitly.

   In this case switch *Use domain* to *YES* and specify the domain name.
10. Tap *Test connection* to verify that the network path is correct.
11. Tap *Add* or *Save* (if you have edited an existing network share) to save the new settings.

After this, you can use the network share as a storage location identified by the registered display name.

If you experience problems writing to or reading from the network share, verify that your settings are correct.

11.3 Remote interface / AP Connect

Activating the remote interface, enables AP Connect to get access to the instrument.

1. Configure a network connection first (Section 11.1 [▶ 34]).

2. Activate the remote interface:
   – Select *Settings* in the menu, then under *Network & connections* select *Remote interface*.
   – Switch *Remote interface* to *activated*.
   – When the remote interface is activated, the status of the interface is shown in the header.
   – To enable communication with AP Connect, do not alter the preset TCP port 8393.
3. Optionally define an instrument name, which will be used as a hostname in the DNS (Domain Name System):
   – Select *Settings* in the menu, then under *Network & connections* select *Instrument name*.
   – Enter a *Hostname* for the instrument.

11.4 Printers

You have to register your printer on the instrument to make it available for printing. The following sections describe the printer registration for each of the supported printer types.

11.4.1 Network printers

Table 17: Supported network printer models

– PCL 5 printers
– PCL 6 printers

1. Configure a network connection first (Section 11.1 [▶ 34]).
2. Make sure that your printer is connected to the network and switched on.
3. Select *Settings* in the menu, then under *Hardware* select *Printers*.
4. Tap in the action box to add a **new** network printer or tap on an existing network printer to **edit** its settings.
5. If you add a new network printer:

   Tap *Add network printer*.
6. Define a unique *Printer name* for the network printer. You will later be able to identify it by this registered name.
7. Use the corresponding switch to set the printer as the default printer.
8. From the *Model* list, select a driver class supporting your printer.
   – *Generic PCL 5 compatible printer (b/w)* should work for black & white laser printers.
   – *Generic PCL 6 compatible printer (color)* should work for color printers.
9. Specify the *Hostname* or *IP* of the network printer.

   The name or address depend on your network configuration.
10. Tap *Print test page* to verify that the network printer has been correctly registered and that the connection works.
11. Tap *Create* or *Save* (if you have edited an existing network printer) to save the new settings.

After this, you can use the registered network printer for printing on the instrument.

11.4.2 USB printers

Table 18: Supported USB printer models

– PCL 5 printers
– PCL 6 printers

1. Make sure that your printer is connected to one of the USB sockets of your instrument and switched on.
2. Select *Settings* in the menu, then under *Hardware* select *Printers*.
3. Tap in the action box to add a **new** USB printer or tap on an existing USB printer to **edit** its settings.
4. If you add a new USB printer:

   Tap *Add USB printer*.
5. Define a unique *Printer name* for the USB printer. You will later be able to identify it by this registered name.
6. Use the corresponding switch to set the printer as the default printer.
7. The field *Available printers* should show the connected printer detected by the instrument.

   If the field *Available printers* is empty, the instrument is not able to detect your printer.
   In this case contact your local Anton Paar representative.
8. From the *Model* list, select a driver class supporting your printer.
   – *Generic PCL 5 compatible printer (b/w)* should work for black & white laser printers.
   – *Generic PCL 6 compatible printer (color)* should work for color printers.
9. Tap *Print test page* to verify that the USB printer has been correctly registered and that the connection works.
10. Tap *Create* or *Save* (if you have edited an existing USB printer) to save the new settings.

After this, you can use the registered USB printer for printing on the instrument.

11.4.3 Serial printers

IMPORTANT: *Serial printers cannot be used as a full-featured equivalent of network or USB printers. They are primarily intended for basic measurement, check, and adjustment reports.*

Table 19: Supported serial printers

– Epson TM-U220 (compatible model available from Anton Paar) – Citizen CBM-910 Type II – Epson TM-U330D (Chinese) – Generic RS-232 printer

1. Make sure that your printer is connected to the COM/RS-232 serial port of your instrument and switched on.
2. Select *Settings* in the menu, then under *Hardware* select *Receipt printer*.
3. From the *Receipt printer* list, select your printer model.
4. Use the switches to include or omit the listed information in the reports printed on the serial printer.

   Instrument identification comprises the instrument name, the serial number, and the current software version.

   For check reports, only the setting for *Instrument identification* applies.
5. Tap *Print test page* to verify that the serial printer has been correctly registered and that the connection works.

After this, you can use the registered serial printer for printing on the instrument.

Deactivating the serial printer

1. Select *Settings* in the menu, then under *Hardware* select *Receipt printer*.
2. From the *Receipt printer* list, select *(none)*.

The serial port can now be used for other purposes, for example RS-232 LIMS services.

12 Custom quantities

In addition to the measuring quantities already provided by the instrument, you can define custom quantities to serve your specific needs.

For example, to have your measurement results displayed in a unit not natively supported on your instrument, just define a custom quantity doing the conversion with a formula, and select the custom quantity in a dashboard widget.

You can use custom quantities in exactly the same way as measuring quantities. Therefore, you can include a custom quantity in the definition of another custom quantity.

You find all custom quantities that you have defined in the data group *Custom Quantities*.

12.1 Custom quantity defined by a formula

In this case, the custom quantity Q_c is a function of one or more already defined quantities Q_1, Q_2, …:

$$Q_c = f(Q_1, Q_2, \ldots)$$

The function is defined by the formula f.

You can use the following operators and functions to compose the formula:

Table 20: Available operators and functions

+	addition, unary plus (sign)
–	subtraction, unary minus (sign)
*	multiplication
/	division
**	exponentiation (powers)
sqrt()	square root
abs()	absolute value (discards sign)
log() ln()	logarithms to bases 10 and e
exp()	exponential function
sin() cos() tan() asin() acos() atan()	trigonometric functions and inverse

– Quantities used in the formula are denoted *Q1*, *Q2*, and so on. Case does not matter.

– Quantities have to be added to the formula before they can be used in it (explained below).

TIP: *The character serving as decimal separator in numbers depends on your regional settings.*

To define the custom quantity

1. Select *Quantities* in the menu to open a list of all available quantities.
2. Tap in the action box to add a custom quantity.
3. Select *Add formula*.
4. On the spot for the definition of the custom quantity, specify the name of the new quantity.

   You can also enter

   – a description

   – a designation for the unit to be displayed with the value of the quantity

   – the number of decimal places to be displayed
5. Specify an upper limit and a lower limit for the values of the custom quantity.

   If the value of the custom quantity exceeds these limits, the notification “*Out of range*” will be displayed instead of a value.
6. To enter the defining formula, tap into the *Formula* box and start typing the formula.

   – Combine numerical constants and defined quantities with the available operators and functions.

– To add a quantity to the formula:

Tap *Add quantity* (above the keyboard).

Select the desired *Quantity* after you have selected the proper *Group*. Also select the correct *Unit* of the quantity (if applicable).

Tap *Save*.

The added quantity with its denotation is shown in a list below the *Formula* box. You can now use the denotation in the formula.

7. Tap *Save*.

12.2 Custom quantity defined by a two-dimensional (2D) polynomial

In this case, the custom quantity Q_c is a function of two already defined input quantities Q_1 and Q_2:

$$Q_c = f(Q_1, Q_2)$$

The function is a 2D polynomial of degree 3:

$$f(Q_1, Q_2) = c_{00} + c_{10} \cdot Q_1 + c_{20} \cdot Q_1^2 + c_{30} \cdot Q_1^3 + c_{01} \cdot Q_2 + c_{11} \cdot Q_1 Q_2 + c_{21} \cdot Q_1^2 Q_2 + c_{02} \cdot Q_2^2 + c_{12} \cdot Q_1 Q_2^2 + c_{03} \cdot Q_2^3$$

To define the custom quantity

The custom quantity is defined by the polynomial formula above. The polynomial coefficients c_{ij} have to be imported from a file.

1. Select *Quantities* in the menu to open a list of all available quantities.
2. Tap in the action box to add a custom quantity.
3. Select *Add 2D polynomial*.
4. On the spot for the definition of the custom quantity, specify the name of the new quantity.

   You can also enter

   – a description

   – a designation for the unit to be displayed with the value of the quantity

   – the number of decimal places to be displayed
5. Specify the input quantities 1 (Q_1) and 2 (Q_2):

   For each:

   – Select the proper *Group*.

   – Then select the input *Quantity*.

   – Select the correct *Unit* of the input quantity (if applicable).
6. To import the polynomial coefficients, tap *Import*.

   The CSV file to be imported must contain the coefficients in the correct order:

   – each coefficient in a new line

   – numbers have to use a point (.) as the decimal separator

   – numbers must not contain thousands separators or blanks

   – order of coefficients:
   c_{00} | c_{10} | c_{20} | c_{30} | c_{01} | c_{11} | c_{21} | c_{02} | c_{12} | c_{03}

   If you are not sure about the correct file format, you can generate a template file:

   – Tap *Template*.

   – Specify a file name and a location where it shall be stored.

   – Tap *Save*.

   Open the template file with any text editor and replace the numbers (= coefficient indices) by your coefficients in the given order. Then re-import the file.
7. Select the CSV file with the coefficients and tap *Open*.
8. Tap *Save*.

12.3 Custom quantity defined by a table

In this case, the custom quantity Q_c is a function of an already defined input quantity Q_i:

$$Q_c = f(Q_i)$$

The function is defined by data pairs ($Q_{i,1}/Q_{c,1}$), ($Q_{i,2}/Q_{c,2}$), ($Q_{i,3}/Q_{c,3}$) … relating values of the custom quantity to values of the input quantity and provided as a table in a file.

TIP: *Use table data from the technical literature or use your own experimental data, for example relating concentrations of a binary mixture to measured density values.*

TIP: *The larger the number of data pairs and the higher the accuracy of the data pairs, the higher the accuracy of the results that you can obtain.*

– If the value of the input quantity lies between table values, the function value is determined by linear interpolation.

– Function values will not be extrapolated. Therefore, the range of table values of the input quantity sets the limits of the range for which the function is defined. Ensure that your table data cover the whole range of values that you want to measure.

To define the custom quantity

1. Select *Quantities* in the menu to open a list of all available quantities.
2. Tap in the action box to add a custom quantity.
3. Select *Add Table*.
4. On the spot for the definition of the custom quantity, specify the name of the new quantity.

   You can also enter

   – a description

   – a designation for the unit to be displayed with the value of the quantity

  - the number of decimal places to be displayed
5. Specify the input quantity:
   - Select the proper *Group*.
   - Then select the input *Quantity*.
   - Select the correct *Unit* of the input quantity (if applicable).
6. To import the defining table, tap *Import*.

   The CSV file to be imported must contain the data pairs of the function table:
   - each pair in a new line
   - the values of the pair separated by a semi-colon (;)
   - numbers have to use a point (.) as the decimal separator
   - numbers must not contain thousands separators or blanks

   If you are not sure about the correct file format, you can generate a template file:
   - Tap *Template*.
   - Specify a file name and a location where it shall be stored.
   - Tap *Save*.

   Open the template file with any text editor and replace the sample data by your function table in the same format. Then re-import the file.
7. Select the CSV file with the table data and tap *Open*.
8. Tap *Save*.

12.4 Editing a custom quantity

A protected custom quantity can only be edited by the person who has defined it.

1. Select *Quantities* in the menu to open a list of all available quantities.
2. Tap on a custom quantity that you want to edit.

   You can only edit custom quantities.
3. Tap in the action box.

   You will be back on the spot where you have defined the custom quantity.
4. Edit the properties of the custom quantity, modify the formula, or import a new table, depending on the type of custom quantity.
5. Tap *Save*.

12.5 Removing a custom quantity

A protected custom quantity can only be removed by the person who has defined it.

1. Select *Quantities* in the menu to open a list of all available quantities.
2. Tap on a custom quantity that you want to remove.

   You can only remove custom quantities.
3. Tap in the action box.
4. To confirm removal, tap *Yes*.

TIP: *In certain cases, you will not be able to remove a custom quantity (you will see an error message). This means that the custom quantity is still in use elsewhere. If you want to remove the custom quantity all the same, you will have to resolve the conflict first.*

13 LIMS services via RS-232 serial interface

Your instrument is able to answer service requests by client software like a LIMS (Laboratory Information Management System) or a simple terminal program. The client software may retrieve information from or execute operations on the instrument. Communication is handled via RS-232 serial interface.

- You have to activate RS 232 LIMS services before you can use them (Section 13.2.1 [▶ 39]).

13.1 Serial connection between the instrument and a PC

You need a crossed serial cable for the hardware connection:

- Use RS-232 cable, 1.5 m, crossed, mat. no. 12455.
- Or, with RS-232 connection cable, 3 m, mat. no. 70429, you need also the gender changer, mat. no. 302592.

If your PC does not feature an RS-232 connector, you can connect to a USB socket using a USB/RS-232 converter.

13.2 Status of RS-232 LIMS services

If activated, the RS-232 LIMS services will stay activated after a reboot of the instrument.

13.2.1 Activating RS-232 LIMS services

IMPORTANT: *RS-232 LIMS services and the serial printer share the serial port. You have to deactivate the serial printer first before you can activate RS-232 LIMS services.*

1. Select *Settings* in the menu, then under *Network & connections* select *RS232 LIMS*.
2. Switch *Services* to *Enabled*.

   The header control for RS-232 LIMS services is shown in the header indicating that the instrument is ready for commands via RS-232 serial interface.

3. The hints area of the spot shows the settings of the serial interface. Set the serial interface settings of your client software accordingly (also refer to Section 13.3 [▶ 40]).

Deactivating RS-232 LIMS services

To deactivate RS-232 LIMS services, switch *Services* back to *Disabled*.

13.2.2 Header control for RS-232 LIMS services

To access status information on the RS-232 LIMS services, tap on the header control LIMS.

– On the control panel, you will see an overview of the commands last received by the instrument.
– Tap *CHANGE* to directly access the spot with the settings for the RS-232 LIMS services.

13.3 Interface settings and communication protocol

Settings of the serial interface

Parameter	Setting
Baud rate	9600 baud
Data bits	8
Stop bits	1
Parity	none
Handshake	none

Communication protocol

– Server and client communicate text based with encoding ISO-8859-15.
– Communication is in English, irrespective of the regional settings.
– Command lines and responses are terminated by [CR] (ASCII 13).
– Commands are terminated by a colon (ASCII 58) only if a modifier or an argument follows.
– Command modifiers are terminated by a semicolon (ASCII 59) only if an argument follows.
– Command arguments are terminated by a semicolon (ASCII 59).
– Arguments have a value and may have a name specified in the form *"value"* or *name="value"*.

  Argument names are followed by an equals sign (ASCII 61) and the argument value.

  Argument values:

  – enclosed in double quotation marks (ASCII 34)
  – point (ASCII 46) as decimal separator
  – no thousands separator
  – units enclosed in square brackets
– Commands, modifiers, and argument names are not case sensitive.

Generic description of the communication syntax

Command lines sent by the client have the following form:[a]

`command`
`command: modifier[[; argument1;]...;]`[b]
`command: argument1; [argument2;[...;]]`	

`command`	command to be executed (refer to Section 13.4 [▶ 41] for a command reference)
`modifier`	command modifier (if available)
`argumentN`	command arguments

Responses sent to the client after processing the command have the following form:[a]

`Resp command: ErrorCode (ErrorText) [Data: result1;[result2;[...;]]]`	
`command`	command executed
`ErrorCode`	code describing the outcome after the command has been processed (refer to Table 21 [▶ 41])
`ErrorText`	short text explaining the error code Do only rely on the error code for evaluation. The text may be changed at any time.
`resultN`	Results can have the form *"value"* or *name="value"*. The list of results can be any length, depending on the command.

[a] *Brackets indicate that the enclosed term is optional.*

[b] *Only modifiers* `SingleLineResponse` *and* `NoQuotesResponse` *can be combined with arguments.*

Examples:

```
GetInstrumentInfo
Resp GetInstrumentInfo: 0 (Ok) Data: Type="DMA 4501"; Serial="12345687";

SetTemperature: Temperature="30.0"; Unit="[°C]";
Resp SetTemperature: 0 (Ok)

GetQuantityUnits: quantityID="M0009";
Resp GetQuantityUnits: 0 (Ok) Data: "[°C]";"[°F]";"[K]";
```

Error codes in RS-232 LIMS services response

Table 21: Error codes returned by RS-232 LIMS services

Code	Description
0	*OK* – Everything is in order / the command has been successfully processed / the instrument is idle.
–1	*Too many commands are running* – Wait for a command to be processed and finished before you send a new one.
–2	*Parsing the command line failed* – Check the syntax of your command line.
–3	*Unknown command* – Refer to Section 13.4 [▶ 41] for an overview of the available commands.
–4	*Invalid number of arguments* – The number of arguments specified for the command does not meet requirements. Refer to Section 13.4 [▶ 41] for the correct command syntax.
–5	*Invalid argument* – Verify that the argument name and value are supported and valid.
–6	*System not ready* – The command cannot be processed because another operation is already running on the instrument.
–7	*Processing command failed*
–8	*Operation canceled* – The command has been canceled (by the *Cancel* command or by a user controlling the instrument).
–9	*No data* – No data found or available.

13.4 Command reference

`Cancel`

Use the command to cancel a running operation. Currently only a product measurement started with `StartProductMeasurement` can be canceled.

```
StartProductMeasurement: ProductId="f2210d84bf3f4523a71e847398f3b7fd";
  SampleName="My Demo Sample";

GetMeasurementStatus
Resp GetMeasurementStatus: -6 (SystemNotReady)
```

```
Cancel
Resp Cancel: 0 (Ok)

Resp StartProductMeasurement: -8 (OperationCanceled)

GetMeasurementStatus
Resp GetMeasurementStatus: 0 (Ok)
```

1. In this example, a measurement for product identifier “f2210d84bf3f4523a71e847398f3b7fd” is started.
2. A status check by `GetMeasurementStatus` shows that the system is not ready for the measurement.
3. So you cancel the measurement and receive the corresponding status messages.
4. When you repeat the status check, you see that the instrument is idle (code 0).

GetHelp

Use the command to request a list of available commands or to get information on a specific command and its syntax.

```
GetHelp
Resp GetHelp: 0 (Ok) Data: *RS232 LIMS Services Commands:
** Cancel *Cancel running operation
** GetHelp *Get list of available commands or the description of a single command
** GetInstrumentInfo *Get information about the instrument
** GetMeasurementData *Get measurement data
** GetMeasurementStatus *Get a value indicating whether a product measurement is
  running
** GetProductName *Get name of specified product
** GetProducts *Get list of all available products
** GetProtocolVersion *Get the protocol version of the RS232 LIMS services
** GetQuantities *Get list of available quantities
** GetQuantityName *Get name of specified quantity
** GetQuantityUnits *Get available units of specified quantity
** GetReferenceDate *Get reference date used for GetData command.
** SetReferenceDate *Set reference date used for GetData command.
** SetTemperature *Set the cell temperature
** StartProductMeasurement *Start a measurement for a specified product.

GetHelp: GetProtocolVersion
Resp GetHelp: 0 (Ok) Data: GetProtocolVersion:
*Get the protocol version of the RS232 LIMS services
Usage: GetProtocolVersion
```

1. First the list of commands is requested.
2. Then information on the command `GetProtocolVersion` is requested.

GetInstrumentInfo

Use the command to request the instrument’s type and serial number.

```
GetInstrumentInfo
Resp GetInstrumentInfo: 0 (Ok) Data: Type="DMA 4501"; Serial="12345687";
```

GetMeasurementData

Use the command to retrieve measurement results from the data saved on the instrument. The output depends on selected quantities and units, the current

reference date, and on the availability of measurement data.

```
GetMeasurementData
Resp GetMeasurementData: 0 (Ok) Data: "11720"; "2018-01-07T12:49:08.9657960
  +01:00";"Île-de-France";"Croix";"0";"25.60"; "1.2346";

GetMeasurementData
Resp GetMeasurementData: 0 (Ok) Data: "11721"; "2018-01-07T12:49:27.8313800
  +01:00";"Montélimar";"Lanester";"0";"20.00"; "23.1200";
```

The simplest way to retrieve data is by using `GetMeasurementData` without arguments.

In doing so repeatedly until error code –9 (no data) is returned, you can retrieve one by one all data sets that are newer than the initial reference date.

The concept of the **reference date** is basic for understanding how the command works:

- You can set the reference date with the command `SetReferenceDate` and request it with the command `GetReferenceDate`.
- The default reference date is the date and time when the instrument has been turned on.

  Therefore, `GetMeasurementData` will only deliver measurement data of the day (or none if you have not yet performed a measurement after switching on the instrument) – unless you have set the reference date differently with `SetReferenceDate`.
- If `GetMeasurementData` finds and delivers measurement data, the reference date will subsequently be set to the date and time of the found measurement.

  This enables you to sequentially retrieve measurement data.

`GetMeasurementData` always delivers the oldest set of measurement data that is newer than the refence date.

The data values are in accordance with the currently selected quantities and units.

To retrieve specific quantities or units of a measurement, specify a selection of quantity identifiers, optionally followed by unit identifiers, with the command `GetMeasurementData`.

TIP: *You can select up to 15 quantities with one request.*

TIP: *Use `SetReferenceDate` followed by `GetMeasurementData` with different quantity selections to retrieve additional quantities for the same measurement.*

- You can request a list of all available quantity identifiers with the command `GetQuantities`.
- You can request a list of all available unit identifiers for a specific quantity with the command `GetQuantityUnits`.

RS-232 LIMS services will remember your selection of quantities and units and will apply it (until you reset it) when you subsequently use the command `GetMeasurementData` without arguments.

```
GetMeasurementData:"P0001";"P0002";"M0005 [°F]";"M0017 [kg/m³]";
Resp GetMeasurementData: 0 (Ok) Data: "11720"; "2018-01-07T12:49:08.9657960
  +01:00";"78.08";"1234.6";

GetMeasurementData
Resp GetMeasurementData: 0 (Ok) Data: "11721"; "2018-01-07T12:49:27.8313800
  +01:00";"68.00";"23120.0";

SetReferenceDate: Date="2018-01-07T12:49:27+01:00";
Resp SetReferenceDate: 0 (Ok)

GetMeasurementData:"P0001";"P0002";"M0019";"M0034";"M0024";
Resp GetMeasurementData: 0 (Ok) Data: "11721"; "2018-01-07T12:49:27.8313800
  +01:00";"2.1000";"3.4000";"5.6000";
```

Table 22: Modifiers supported by `GetMeasurementData`

`Header`	Request an identifiers list of the currently selected quantities.
`HeaderNames`	Request a names list of the currently selected quantities.
`NoQuotesResponse`	Suppresses quotation marks in the response.

`ResetSelection`	Resets the current selection of quantities and units to a default. The default selection is also used after switching on the instrument.
`SingleLineResponse`	Delivers the response in a single line (no newline characters).
`Units`	Request an identifiers list of the currently selected units or the default units used.

```
GetMeasurementData: ResetSelection
Resp GetMeasurementData: 0 (Ok)

GetMeasurementData: Header
Resp GetMeasurementData: 0 (Ok) Data: "P0001";"P0002";"P0003";"P0004";
  "P0005";"M0005";"M0017";

GetMeasurementData: HeaderNames
Resp GetMeasurementData: 0 (Ok) Data: "Measurement Number";"Date of
  Measurement";"Sample Name";"Product Name";"Status";"T (cell)";"Density";

GetMeasurementData: Units
Resp GetMeasurementData: 0 (Ok) Data: "[-]";"[-]";"[-]";"[-]";"[-]";"[°C]";
  "[g/cm³]";

GetMeasurementData: SingleLineResponse
Resp GetMeasurementData: 0 (Ok) Data: "0.9883";"20.21";"36";

GetMeasurementData: SingleLineResponse; "M0017";"M0005";"P0001";
Resp GetMeasurementData: 0 (Ok) Data: "0.9883";"20.21";"36";
```

`GetProductName`

Use the command to request the name of the product corresponding to a specific identifier.

You may also use `all` as a modifier to retrieve a list of all available products (similar to the command `GetProducts`). The list includes names. An empty line marks the end of the list.

The command accepts the modifier `NoQuotesResponse`.

```
GetProductName: ProductId="f2210d84bf3f4523a71e847398f3b7fd";
Resp GetProductName: 0 (Ok) Data: Name="Generic Liquids";

GetProductName: all
Resp GetProductName: 0 (Ok) Data:
"f2210d84bf3f4523a71e847398f3b7fd"="Generic Liquids";
"ac815f86a3474acc81f75b00372ecbf1"="Lubricants";
"1feb0d0eab9c4e51860926655ec3f8f6"="Acids and Bases";
"73b331c21c3a4807a715ee2c5e4e3a2f"="Cosmetics (homogeneous)";
"1bfb1f42ed80423294aa07618d8a34c3"="Cosmetics (inhomogeneous)";
"b1bf926ec76d48c69dc39c4b47c0f62c"="Crude Oil";
"721cb88aedb242e7bfc5a2ad11d992b3"="Fuel Oil";
"fc997314de304a3991d01c0ff0d09682"="Pharmaceuticals";
```

`GetProducts`

Use the command to request the unique identifiers for all available products.

Use these identifiers for other commands like `GetProductName` or `StartProductMeasurement`.

```
GetProducts
Resp GetProducts: 0 (Ok) Data: "f2210d84bf3f4523a71e847398f3b7fd";
  "ac815f86a3474acc81f75b00372ecbf1";"1feb0d0eab9c4e51860926655ec3f8f6";
  "73b331c21c3a4807a715ee2c5e4e3a2f";"1bfb1f42ed80423294aa07618d8a34c3";
  "b1bf926ec76d48c69dc39c4b47c0f62c";"721cb88aedb242e7bfc5a2ad11d992b3";
  "fc997314de304a3991d01c0ff0d09682";
```

GetProtocolVersion

Use the command to request the version of the communication protocol.

```
GetProtocolVersion
Resp GetProtocolVersion: 0 (Ok) Data: Version="1.0.0";
```

GetQuantities

Use the command to request the unique identifiers for all available quantities.

Use these identifiers for other commands like `GetQuantityName` or `GetQuantityUnits`.

```
GetQuantities
Resp GetQuantities: 0 (Ok) Data: "P0001";"P0002";"P0003";"P0005";"P0004";
  "M0001";"M0002";"M0003";"M0004";"M0005";"M0006";"M0007";"M0008";"M0009";
  "M0010";"M0011";"M0012";"M0013";"M0014";"M0015";"M0016";"M0017";"M0018";
  "M0019";"M0020";"M0021";"M0022";"M0023";"M0024";"M0025";"M0026";"M0027";
  "M0028";"M0029";"M0030";"M0031";"M0032";"M0033";"M0034";"M0035";"M0036";
  "M0037";"M0038";"M0039";"M0040";"M0041";"M0042";"M0043";"M0044";"M0045";
  "M0046";"M0047";"M0048";"M0049";"M0050";"M0051";"M0052";"M0053";"M0054";
  "M0055";"M0056";"M0057";"M0058";"M0059";"M0060";"M0061";"M0062";"M0063";
  "M0064";"M0065";"M0066";"M0067";"M0068";"M0069";"M0070";"M0071";"M0072";
  "M0073";"M0074";"M0075";"M0076";"M0077";"M0078";"M0079";"M0080";"M0081";
  "M0082";"M0083";"M0084";"M0085";"M0086";"M0087";"M0088";"M0089";"M0090";
  "M0091";"M0092";"M0093";"M0094";"M0095";"M0096";"M0097";"M0098";"M0099";
  "M0100";"M0101";"M0102";"M0103";"M0104";"M0105";"M0106";
```

GetQuantityName

Use the command to request the name of the quantity corresponding to a specific identifier.

You may also use `all` as a modifier to retrieve a list of all available quantities (similar to the command `GetQuantities`). The list includes names. An empty line marks the end of the list.

The command accepts the modifier `NoQuotesResponse`.

```
GetQuantityName: QuantityId="P0003";
Resp GetQuantityName: 0 (Ok) Data: Name="Sample Name";

GetQuantityName: all
Resp GetQuantityName: 0 (Ok) Data:
"P0001"="Measurement Number";
"P0002"="Date of Measurement";
"P0003"="Sample Name";
"P0005"="Status";
```

```
"P0004"="Product Name";
"M0001"="T (Board)";
"M0002"="Hum. (Board)";
"M0003"="p (Board)";
```

GetQuantityUnits

Use the command to request the units available for the quantity corresponding to a specific identifier.

The command accepts the modifier `NoQuotesResponse`.

```
GetQuantityUnits: QuantityID="M0009";
Resp GetQuantityUnits: 0 (Ok) Data: "[°C]";"[°F]";"[K]";

GetQuantityUnits: QuantityID="P0003";
Resp GetQuantityUnits: 0 (Ok) Data: "[-]";
```

GetReferenceDate

Use the command to request the current reference date. Refer to the description of the command `GetMeasurementData` for an explanation of the concept and function of the reference date.

The reference date is delivered in ISO 8601 date/time format including time zone information.

The command accepts the modifier `NoQuotesResponse`.

```
GetReferenceDate
Resp GetReferenceDate: 0 (Ok) Data: Date="2018-01-07T12:49:27.8313800+01:00";
```

SetReferenceDate

Use the command to set the reference date. Refer to the description of the command `GetMeasurementData` for an explanation of the concept and function of the reference date.

The reference date has to be specified in ISO 8601 date/time format including time zone information.

You may also use `now` as the argument to set the reference date to the current date and time.

```
SetReferenceDate: Date="2017-02-23T17:58:12.6035379+01:00";
Resp SetReferenceDate: 0 (Ok)

SetReferenceDate: now
Resp SetReferenceDate: 0 (Ok)

GetReferenceDate
Resp GetReferenceDate: 0 (Ok) Data: Date="2018-03-06T07:59:58.8137648+01:00";
```

SetTemperature

Use the command to set the temperature of the measuring cell.

```
SetTemperature: Temperature="30.0"
Resp SetTemperature: 0 (Ok)
```

```
SetTemperature: Temperature="60.0 [°F]";
Resp SetTemperature: 0 (Ok)
```

1. If no unit is specified with the temperature value, the default unit [°C] is used.
2. You may specify one of the available units with the temperature value: [°C], [°F], [K].

`StartProductMeasurement`

Use the command to start and perform a measurement for a product (specified by identifier).

Specify a sample name as the second argument.

Take care that you do not start a measurement while another process is running on the instrument (for example cleaning, adjusting, measuring).

```
StartProductMeasurement: ProductId="f2210d84bf3f4523a71e847398f3b7fd";
  SampleName="My Demo Sample";
Resp StartProductMeasurement: 0 (Ok)

StartProductMeasurement: ProductId="f2210d84bf3f4523a71e847398f3b7fd";
  SampleName="My Demo Sample";Temperature="68 [°F]";
Resp StartProductMeasurement: 0 (Ok)

StartProductMeasurement: ProductId="f2210d84bf3f4523a71e847398f3b7fd";
  SampleName="My Magazine Sample";Vial="3";
Resp StartProductMeasurement: 0 (Ok)
```

1. The error code returned by RS-232 LIMS services indicates the status of the measurement after it has finished:

   0: The measurement has finished successfully or with warnings.

   –7: The measurement has failed or has finished with errors.

   –8: The measurement has been canceled by the command `Cancel` or by a user on the instrument.
2. You may optionally set a temperature for the measurement, overriding the temperature defined in the product settings.
   - If no unit is specified with the temperature value, the default unit [°C] is used.
   - You may specify one of the available units with the temperature value: [°C], [°F], [K].
3. For measurements with a sample changer, specify the vial number in the magazine as an argument.

14 Maintenance and repair

14.1 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.

14.2 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.

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

IMPORTANT: *Do not return products that are contaminated by radioactive materials, infectious agents or other substances that cause health hazards.*

Appendix A Technical data

Appendix A.1 Specifications

	Alcolyzer 5001	Alcolyzer 7001
Alcohol		
Measuring range		
Beer products	0 % v/v to 12 % v/v	
Wine products	0 % v/v to 20 % v/v	
Sake products	0 % v/v to 20 % v/v	
Whiskey products	35 % v/v to 65 % v/v	
Cognac products	0 % v/v to 65 % v/v	
Vinegar products	on request	
Typical deviation from distillation (all products)	<0.1 % v/v	
Repeatability s.d.	0.03 % v/v	0.01 % v/v
Color (optional)		
Measuring range	-	0 EBC to 120 EBC / 0 SRM (ASBC) to 60.96 SRM (ASBC)
Repeatability s.d.	-	0.1 EBC / 0.05 SRM (ASBC)
Temperature		
Displayed temperature[a]	15 °C or 20 °C (59 °F or 68 °F)	
Repeatability s.d.	0.01 °C (0.018 °F)	
Sample temperature	18 °C to 25 °C (64.4 °F to 77 °F)	
Typical measuring time	1 to 3.5 minutes	
Sample volume	20 mL	20 mL (syringe filling) 40 mL (Xsample filling)

[a] *The sample is actually measured at 25 °C (77 °F) to minimize condensation problems. Results are calculated according to the set temperature mode (15 °C or 20 °C).*

Product[a]	**Typical sample**
Beer products	beer, non-alcoholic beer, beer mixed drinks, RTDs, melasses, wash, kombucha, hard seltzer 0.0 % beers on request[b]
Wine products	sake, cider, wine, fortified wine non-alcoholic wines on request[b]
Sake products	sake, cider, wine, fortified wine non-alcoholic wines on request[b]

Whiskey products	whiskey, tequila, spirits with <5 g/L extract
Cognac products	cognac, rum, spirits with 5 g/L to 20 g/L extract non-alcoholic spirits (<0.5 % v/v ethanol content) on request[b]
–	vinegar on request

[a] *For measuring ranges refer to the table above.*

[b] *Please raise an application request for customized settings.*

Appendix A.2 Instrument data and operating conditions

Data memory	– measurement data: up to 10,000 – check results: up to 300 – adjustment results: up to 300 – products: up to 40 – custom quantities: up to 50 – images: up to 50
Display	10.1" TFT WXGA (1280x800 px); PCAP touchscreen
Controls	touchscreen, optional keyboard, mouse, and barcode reader
Interfaces	4 x USB 2.0 (type A)[a], 1 x USB OTG (Micro-A), 1 x RS-232, 1 x Ethernet (100 Mbit), 1 x CAN Bus
RS-232C printer settings	Baud rate: 9600; Parity: none; Stop bit: 1; Data bits: 8
Environmental conditions (EN 61010)	indoor use only
Ambient temperature	18 °C to 32 °C (64.4 °F to 89.6 °F)
Air humidity	non-condensing 20 °C: < 90 % relative humidity 25 °C: < 60 % relative humidity 30 °C: < 45 % relative humidity
Altitude	max. 3000 m (9800 ft)
Maximal operating pressure	ambient pressure
Pollution degree	2
Overvoltage category	II
Voltage	100 to 240 V~, 50/60 Hz, fluctuation ±10 %
Power consumption	90 VA
Power inlet	according to IEC/EN 60320-1/C14, protection class I
Fuses	ceramic tube fuses 5x20 mm; IEC60127-2; AC 250 V; T 5 AH
Dimensions (L x W x H)	526 mm x 347 mm x 230 mm (20.7 in x 13.7 in x 9 in)
Weight	17.6 kg (38.8 lbs)

[a] *USB memory devices have to be formatted with FAT32 or exFAT file system.*

Appendix A.3 Wetted parts and housing surface materials

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

Instrument

Material	**Part**
EPDM (ethylene propylene diene monomer)	sensor system
Glass	sensor system

NBR (nitrile butadiene rubber)	internal connectors
PFAN (poly (α-fluoro acrylonitrile))	internal tubing
PTFE (polytetrafluoroethylene)	filling nozzle fitting
Stainless steel (1.4404, 1.4301)	sensor system, internal connectors

Standard accessories

Material	**Part**
HDPE (high-density polyethylene)	waste vessel
Polypropylene / polyethylene	syringe 20 mL Luer
PTFE (polytetrafluoroethylene)	hose
Stainless steel 1.4404	UNF filling adapter fitting with metal tube
Stainless steel 1.4571	tube
Tefzel	adapter Luer ¼" UNF, UNF filling adapter fitting with metal tube
Tygon	hose

Instrument housing surface materials

Material	**Part**
Front, top, sides, bottom cover	Durotect PUR Plus 2K texture paint
Back	aluminum
Extension slot cover plate	ABS (acrylonitrile butadiene styrene) + PC (polycarbonate)

Appendix B Calculations / Output quantities

All calculations are valid for 20 °C.

ADF (% w/v) = apparent degree of fermentation in % based on % w/v [for beer products]

$$ADF_{w/v} = \frac{p_{w/v} - Ea_{w/v}}{p_{w/v}} \cdot 100$$

ADF (% w/w) = apparent degree of fermentation in % based on % w/w [for beer products]

$$ADF_{w/w} = \frac{p_{w/w} - Ea_{w/w}}{p_{w/w}} \cdot 100$$

Alcohol (% v/v) = alcohol content in percent by volume [for beer / wine / sake / spirits products]

Alcohol (% v/v) is calculated using a specific function of the absorption intensity of the NIR line of alcohol. The result is valid for the indicated temperature and can be calculated for 15 °C (60 °F), 20 °C (68 °F), or 25 °C (77 °F).

Alcohol (% w/w) = alcohol content in percent by weight [for beer / wine / sake / spirits products]

Since percent by weight is independent of temperature, alcohol (% w/w) is valid for any temperature.

$$alcohol_{w/w} = \frac{alcohol_{w/w} \cdot \rho_{100\%alcohol}}{\rho_{sample}}$$

$$\rho_{100\%\,alcohol} = 0.78924\ g/cm^3$$

Alcohol-ASBC (% w/w) = alcohol content according to the ASBC regulations [for beer products]

$$alcohol\text{-}ASBC = \frac{alcohol_{v/v} \cdot \rho_{100\%alcohol}}{\rho_{sample}}$$

Alcohol-IUPAC (% w/w) = alcohol content according to the IUPAC regulations [for beer products]

$$alcohol\text{-}IUPAC = \frac{alcohol_{v/v} \cdot \rho_{100\%alcohol}}{\rho_{sample}}$$

Calories (kcal/100 mL) = kcal/100 mL [for beer products]

$$kcal/100\ mL = \left(3.5 \cdot Er_{w/w} + 7 \cdot alcohol_{w/w}\right) \cdot alcohol_{sample}$$

Calories (kcal/12 oz) = kcal/12 oz [for beer products]

$$kcal/12\ oz = \left(6.9 \cdot alcohol_{w/w} + 4 \cdot (Er_{w/w} - 0.11)\right) \cdot SG_{sample} \cdot 3.55$$

Calories (kcal/kg) = kcal/kg [for beer products]

$$kcal/kg = \left(3.5 \cdot Er_{w/w} + 7 \cdot alcohol_{w/w}\right) \cdot 10$$

Calories (kJ/100 mL) = kJ/100 mL [for beer products]

$$kJ/100\ mL = \left(15 \cdot Er_{w/w} + 29 \cdot alcohol_{w/w}\right) \cdot \rho_{sample}$$

Calories wine = kcal/100 mL [for wine products]

$$calories\ wine = 5.445756 \cdot alcohol_{\%v/v} + 0.4 \cdot E\ total_{w/v}$$

Calories (Steiner) (kcal/kg) = kcal/kg according to the Steiner formula [for beer products; not with Alcolyzer 1001 Beer]

$$kJ/kg\ (Steiner) = p_{w/w} + 36.4$$

DL = degrees lost [for beer products; not with Alcolyzer 1001 Beer]

$$DL = \sum_{n=0}^{10} A_n \cdot SI^n$$

A0 =	0.0080				
A1 =	4.30003		A6 =	–2.59916898	E–3
A2 =	–2.048839	E–1	A7 =	2.374003555	E–4
A3 =	1.8090493	E–1	A8 =	–1.301128748	E–5
A4 =	–7.3330484	E–2	A9 =	3.9162206	E–7
A5 =	1.7587605	E–2	A10 =	–4.9735684	E–9

Ea (app. extract) (% w/v) = apparent extract in % w/v [for beer products; not with Alcolyzer 1001 Beer]

The apparent extract in percent of weight of solution in the total volume of solution is determined by[1]:

$$Ea_{w/v} = Ea_{w/w} \cdot SG20/04$$

Ea (app. extract) (% w/w) = apparent extract in % w/w [for beer products]

The apparent extract in % w/w is calculated from the sample density using the Plato table.

EG (extract gravity) = extract gravity [for beer products; not with Alcolyzer 1001 Beer]

$$EG = (SG_{extract} - 1) \cdot 1000$$

E JPN (Japanese extract) (g/100 mL) = Japanese extract in g/100 mL [for beer / wine / sake / spirits products; not with Alcolyzer 1001 Beer]

$$Ejap = \frac{density_{sample\ 15\,°C} - density_{alcohol}}{0.9991} \cdot 260$$

[1] SG20/04 = $\rho_{extract\ (20\ °C)}$ / $\rho_{water\ (4\ °C)}$; $\rho_{water\ (4\ °C)}$ = 0.999972 g/cm^3

The density (alcohol) is calculated from the inverse Shusei-do table. Only valid and available for 15 °C.

Er (real extract) (% w/w) = real extract in % w/w [for beer products]

The real extract in % w/w is calculated from the extract density determined by the Tabarié formula[2] using the Plato table.

Er (real extract) (g/100 mL) = real extract in % w/v [for beer products; not with Alcolyzer 1001 Beer]

The real extract in percent of weight of solution in the total volume of solution is determined by[1]:

$$Er_{w/v} = Er_{w/w} \cdot SG20/04$$

E total (% w/v) = total extract in % w/v [g/L] [for wine / sake products]

$$E\ total_{w/v} = E\ total_{w/w} \cdot \rho_{extract} \cdot 10$$

E total (% w/w) = total extract in % w/w [for wine / sake products]

Total extract in % w/w is calculated from the density of extract using a polynomial function.

The density of extract is calculated using the Tabarié formula[2].

The density of alcohol is calculated from the measured alcohol content (% v/v) using a polynomial function.

KMW = Klosterneuburger Mostwaage [for wine / sake products]

$$°KMW = alcohol_{v/v} \cdot 1.2 + E\ total_{w/v} \cdot 0.075 + 2.5$$

OG (original gravity) = original gravity according to the standard formula [for beer products; not with Alcolyzer 1001 Beer]

$$OG = EG + DL$$

OG-BMP (original gravity) = original gravity according to the BMP formula [for beer products; not with Alcolyzer 1001 Beer]

$$OG\text{-}BMP = p_{w/w} \cdot\ (3.86098 + p_{w/w} \cdot 0.01435427)$$

p (original extract) (% w/v) = original extract in % w/v[1] [for beer products; not with Alcolyzer 1001 Beer]

$$p_{w/v} = p_{w/w} \cdot SG20/04$$

p (original extract) (% w/w) = original extract in % w/w [for beer products]

$$p_{w/w} = \frac{(alcohol_{w/w} \cdot 2.0665 + Er_{w/w}) \cdot 100}{100 + alcohol_{w/w} \cdot 1.0665}$$

PG (present gravity) = present gravity [for beer products; not with Alcolyzer 1001 Beer]

$$PG = (SG_{sample} - 1) \cdot 1000$$

Ratio E/A (US) = ratio extract/alcohol [for beer products; not with Alcolyzer 1001 Beer]

$$ratio\ E/A = \frac{Er_{w/w}}{alcohol_{w/w}}$$

RDF (real deg. of ferm.) = real degree of fermentation in % [for beer products]

$$RDF = \frac{alcohol_{w/w} \cdot 2.0665}{alcohol_{w/w} \cdot 2.0665 \cdot Er_{w/w}} \cdot 100$$

RDF-St (real deg. of ferm.) = real degree of fermentation in % according to the standard formula [for beer products; not with Alcolyzer 1001 Beer]

$$RDF_{St} = \frac{p_{w/w} \cdot Er_{w/w}}{p_{w/w}} \cdot 100$$

RDF-US (real deg. of ferm.) = real degree of fermentation in % acc. to the US formula [for beer products; not with Alcolyzer 1001 Beer]

$$RDF_{US} = \frac{100 \cdot (p_{w/w} - Er_{w/w})}{p_{w/w}} \cdot \frac{1}{1 - 0.005161 \cdot Er_{w/w}}$$

SG alcohol (spec. gravity) = specific gravity of the alcohol [for beer / wine / sake / spirits products; not with Alcolyzer 1001 Beer]

$$SG_{alcohol} = \frac{\rho_{alcohol}}{\rho_{water}}$$

The density of alcohol is calculated from the measured alcohol content (% v/v) using a polynomial function.

SG extract (spec. gravity) = specific gravity of the extract [for beer / wine / sake / spirits products; not with Alcolyzer 1001 Beer]

$$SG_{extract} = \frac{\rho_{extract}}{\rho_{water}}$$

The extract density is calculated according to the Tabarié formula[2].

[2] Tabarié formula: $\rho_{extract} = \rho_{water} + \rho_{sample} - \rho_{alcohol}$

SI (spirit indication) = spirit indication
[for beer products; not with Alcolyzer 1001 Beer]

$$SI = (1 - SG_{alcohol}) \cdot 1000$$

Total Extract [Spirits] = total extract
[for spirits products]

Total extract is calculated from the alcohol concentration and the sample density using a polynomial function.

Color measurement
Conversion from EBC into ASBC

$$1\ EBC = 0.508\ °ASBC$$

Appendix C Troubleshooting

Table 23: Checks / adjustments

Problem	Cause / Corrective action	Refer to
Readjustment is necessary very often.	Bad filling: – Properly degas the sample. – Make sure that filling is done from the lower sample inlet to the upper sample outlet.	Section 8.4 [▶ 26]
	The measuring cell is not clean: – Clean the measuring cell perfectly before an adjustment.	Section 10.1 [▶ 31]
	Standards are not stable: – Prepare binary standards 12 hours before the adjustment to achieve homogeneity.	Section 9.2 [▶ 28]
	Direct sunlight on the instrument: – Install the instrument at a place without direct sunlight.	Section 4.1 [▶ 11]
	Dust blocks the fan: – Install the instrument in a dust-free environment.	Section 4.1 [▶ 11]

Table 24: Measurement

Problem	Cause / Corrective action	Refer to
Measurement info: *Filling warning*	Dirty measuring cell: – Perform intensive cleaning.	Section 10.1 [▶ 31]
	Gas bubbles in the measuring cell: – Properly degas the sample. – Fill the sample without bubbles.	Section 8.4 [▶ 26] Section 8.1.2 [▶ 25]
Measurement info: *Timeout error*	Temperature or signal instability: – Clean the measuring cell perfectly. – Perform a new adjustment. – Check for proper filling.	Section 10.1 [▶ 31] Section 9.2 [▶ 28] Section 8.1.2 [▶ 25]
Error *low value* / *high value*	The measurement value is lower/higher than the allowed limit. – Select the correct measurement product.	Section 7.1 [▶ 22]
Measurement value –––	The measurement value is out of range / not delivered. – Check that the measuring cell is properly filled.	Section 8.1.2 [▶ 25]

Table 25: Display

Problem	Cause / Corrective action	Refer to
Display problems	– Restart the instrument.	-

Table 26: Printing

Problem	Cause / Corrective action	Refer to
No printout on printer	Office printer problems: – Check that the printer has enough paper, toner, etc. Refer to the manual of the printer.	-
	The office printer type is not supported by the instrument.	Section 11.4 [▶ 36]
	The printer has not been registered on the instrument.	
	The printer settings are not correct.	
	Chinese printer: – Select the Chinese printer from the list.	
The printout on an RS-232 printer makes no sense.	Wrong communication settings on the RS-232 printer: – Change the DIP switch settings. – Refer to the manual of the printer.	Appendix A.2 [▶ 49]

Table 27: Network

Problem	Cause / Corrective action	Refer to
Network shares lose connection when idle for some time.	Depending on your network configuration, network shares may lose connection when they have been idle for some time. Connections can be forced open: – Select *Settings* in the menu, then under Hardware select *Instrument settings*. – Switch *Keep network share open* to *Yes* and leave the spot screen to activate the setting. When activated, this function will create temporary dummy files (immediately removed again) every 5 minutes on all open network shares.	-

To regain access to a locked instrument

1. Switch the instrument off.
2. Wait for 15 seconds.
3. Switch the instrument on again.

If above instructions do not solve your problem, or if you do not find your problem in the list, contact your local Anton Paar representative.

If your instrument needs repair, refer to Section 14.2 [▶ 47].

Appendix D Declarations of conformity

Docusign Envelope ID: 34F67DE0-36B9-48A8-BAA3-3A503E6005DE

EU Declaration of Conformity

(original)

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

Product designation:	**ALCOLYZER 5001** **ALCOLYZER 7001** **ALCOLYZER 7001 VINEGAR**
Model:	**Alcolyzer 5001** **Alcolyzer 7001**
Material number:	320420, 320421, 325645

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

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

Applied harmonised standard:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
- EN IEC 61010-2-010:2020

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

Applied harmonised standard:

- EN 61326-1:2013

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

Place and date of issue: Graz, 2.4.2025

Signed by:
17130DDD5260426...
Steffen Riemer
Executive Director
Business Unit Measurement

DocuSigned by:
66833374CFAF464...
Dr. Wolfgang Baumgartner
Head of Lab Density & Concentration
Business Unit Measurement

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