Anton Paar

Instruction Manual and Safety Information

Lyza 3000

FTIR Spectrometer

Instrument software version: from 1.4.1
Original Instructions

Find out more

www.anton-paar.com

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1 Safety instructions

General

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

Liability

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

General precautions

- Observe and adhere to your national safety regulations regarding the handling of all substances associated with your measurements (e.g. use safety goggles, gloves, respiratory protection, etc.).
- Substances used must be labeled. The corresponding material safety data sheets must be observed and made available near the measuring setup.
- Samples and cleaning liquids that have been used in the measuring system are not suited for human consumption after use.
- Check the wetted parts of the product for chemical resistance to all samples and cleaning liquids.
- Take care that samples, cleaning liquids and gases are chemically compatible when they come into contact with each other. They must not react exothermally or produce hazardous substances.
- Install the product so that you can easily separate it from the electrical supply (pull the power plug) at any time.
- Before starting a measurement or cleaning procedure, ensure all parts, especially the measurement cell, are properly connected and in good condition.
- Prevent spilled liquids from entering plug connections or venting slots of electrical appliances.

Installation

- The installation procedure shall only be carried out by authorized personnel who are familiar with the installation instructions.
- Never use the product outside the specified ambient conditions and specifications.
- Use only accessories, consumables, or spare parts supplied or approved by Anton Paar.
- Do not expose the product to direct sunlight for extended periods of time.

Using the product

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

Operator's skills

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

Precautions for flammable samples and cleaning agents

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

- Place the product and all samples in a fume hood of adequate capacity.
- Do not spill sample/cleaning liquids or leave their containers uncovered. Immediately remove spilled sample/cleaning liquids.
- Ensure that the setup location is sufficiently ventilated. The environment of the product must be kept free from flammable gases and vapors.
- Provide fire-extinguishing equipment.
- Place the instrument on a laboratory bench made of fireproof material, such as bricks, ceramics, or stoneware.

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.

Transportation

- Empty the measurement cell before moving or lifting the instrument.
- To carry the instrument, place one hand in the recessed grip below the cell module and use the other hand to grasp the back of the instrument.
- Avoid holding the instrument by its bottom to prevent squeezing your fingers when setting it down.
- Carry the instrument in front of you, keeping it close to your body.

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.

1.1 Conventions of safety messages and typography

Conventions for safety messages

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

DANGER

Description of risk

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

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.*

Wear safety gloves

Wear protective gloves when handling the product.

Wear safety goggles

Wear safety goggles when handling the product.

Use protective clothing

Wear protective clothing when handling the product.

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.

1.2 Safety signs on the instrument

NOTICE

It is imperative that the warning signs remain clearly legible.

NOTICE

Laser safety

The label on the rear of the instrument specifies the laser class of the product. Lyza 3000 is classified as Laser Class 1 according to the EN 60825-1: 2014 standard (Directive 2014/35/EU).

Laser Class 1: This classification indicates that the laser is safe under all conditions of indented use. However, it is crucial to follow all safety guidelines and avoid direct exposure to the laser beam.

Ensure you read and understand all safety instructions before operating the instrument. If you have any questions or concerns, contact the manufacturer for further information.

2 An overview

The Lyza 3000 FTIR spectrometer is a versatile instrument designed for a wide range of applications. Utilizing Fourier Transform Infrared (FTIR) spectroscopy, this advanced spectrometer can measure various sample types with high precision. Its capability to accommodate different third-party measurement cells offers exceptional flexibility, enabling the analysis of powders, solids, low- to high-viscosity liquids as well as gases.

Lyza 3000 ensures optimal performance with its integrated system suitability test and guided check procedures. It allows for the activation of library packages or the creation of custom libraries, simplifying the identification of unknown substances and verification of product quality. On-the-spot spectral processing and method creation according to international standards make Lyza 3000 a highly versatile FTIR spectrometer.

Combining high precision with ease of operation and a robust design, Lyza 3000 supports a variety of third-party measurement cells through its removable cell module. This module is customizable with numerous third-party cells, suitable for applications ranging from transmission to single-bounce ATR and HATR, ensuring it meets your specific needs.

To maintain the instrument's condition, Lyza 3000 features automatic self-checks and provides live notifications with recommended actions. Integrated workflows guide users through adjustment procedures and system suitability tests, ensuring the instrument's proper function. Notifications indicate when new background spectra are required.

Operating Lyza 3000 with the Anton Paar Spectroscopy Suite is easy and intuitive.

2.1 Measuring principle

Lyza 3000 is a state-of-the-art FTIR spectrometer that collects high-resolution infrared spectra over a broad spectral range. The raw data, known as interferograms, are mathematically processed through a Fourier transform to produce the final spectrum.

The measured spectra can be used for various applications, including the identification of unknown substances through their spectral fingerprint, detailed analysis of sample composition, interpretation of specific peaks within the spectrum, and application of complex methods involving multiple processing steps.

Lyza 3000 also supports predefined method analysis. The measured sample spectra can be analyzed using methods developed with the Anton Paar Spectroscopy Suite.

2.2 Intended use of the instrument

The Lyza 3000 FTIR spectrometer is designed for precise infrared spectrum collection and analysis, suitable for identifying unknown substances, analyzing sample compositions, and interpreting specific spectral peaks. It supports advanced analytical methods and accommodates various third-party measurement cells, making it ideal for laboratories requiring high precision, robust design, and ease of operation.

2.3 Functional components

Fig. 1: *Front view of the instrument*

1 Cell module

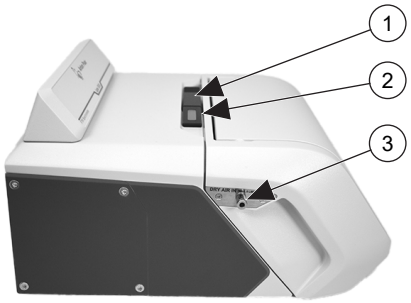

Fig. 2: *Right/top side of the instrument*

1 Cell module lock
2 Status LED
3 Dry air inlet (max.5 L/min)

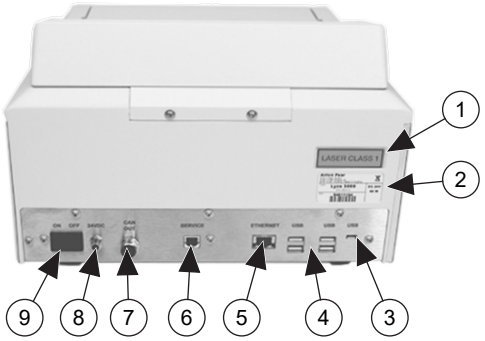

Fig. 3: *Rear view of the instrument*

1 Laser safety label
2 Type plate with serial number (P/N = Mat.No.)
3 USB socket (type Micro-AB)
4 USB 2.0 socket
5 Ethernet terminal (RJ45 connector)
6 Service port
7 CAN bus connector OUT
8 DC power jack
9 ON/OFF switch

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.

Pic.	Qty.	Description	Mat.No.
	1	Lyza 3000	253110
	1	Cell Module Multipurpose Comes pre-connected to the Lyza 3000 base unit. Includes a transmission cell holder.	253251
	1	Instruction Manual and Safety Information Device: Lyza 3000 , language: English	325162
	1	Power supply 24 V 3 A 72 W or power supply 24 V 3.75 A 90 W	183893 or 325849
	1	Power cable	
	1	Screwdriver Torx T25	129903
	1	Ethernet cable for PC connection 2 m, crossed	18597
	1	Hose 2.5x4 1m, polyurethane, transparent	15272
	1	USB 2.0 Fast Ethernet Adapter	240142
	5	Paper sleeve	286751

Tables of the available accessories and the spectral libraries can be found in the Optional accessories.

4 Installing the instrument

4.1 Installation requirements

To achieve optimal measurement results, operate the instrument under typical laboratory conditions:

- Ambient temperature: 23 ± 2 °C (73.4 ± 3.6 °F)
- Relative humidity: < 60%
- No direct sunlight

The setup location and surroundings must meet the minimum requirements specified under Technical data. Also, observe the safety instructions in Safety instructions.

Allow the equipment to reach ambient temperature before installation, especially if it has been stored or transported at lower temperatures.

WARNING

Risk of electric shock

Only connect voltages that comply with PELV (Protective Extra-Low Voltage) according to EN 61140 or SELV (Safety Extra-Low Voltage) according to EN IEC 62368-1 to any of the electrical connectors of the instrument, including the DC 24V power supply.

4.2 Environmental requirements

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

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

Place the instrument on a stable, flat lab desk which is free of vibrations.

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

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

Keep the instrument away from magnetic fields.

Ensure that heat can freely dissipate. Do not install the instrument in a cabinet.

The instrument requires a nearby electrical outlet with the following specifications:

AC 100 V to 240 V, 47 Hz to 63 Hz; DC 24 V, max. 3.75 A

Read the safety instructions in Safety instructions.

Find all technical data in Technical data.

4.3 Unpacking the instrument

The Lyza 3000 FTIR spectrometer comes pre-assembled. The base unit is already connected to the cell module.

To lift the instrument out of the packaging:

- Hold it beneath the back and the cell module.

NOTICE

Possible damage due to moisture

Avoid condensation on KBr windows.

If the instrument has been stored at temperatures below ambient, allow it to warm up to ambient temperature inside the protective bag with the moisture-absorbing desiccant.

Once the instrument has reached ambient temperature, unpack it and immediately switch it on to ensure proper warm-up.

Repair or replacement of moisture-damaged optics due to improper site conditions is not covered by the warranty.

- When the instrument has reached ambient temperature, remove the protective bag.
- Place the instrument in a suitable location as described in Environmental requirements.

4.4 Power connection

WARNING

Risk of electric shock or fire

Use only the power supply that came with your instrument or one explicitly provided for your instrument (DC 24 V complying with PELV [Protective Extra-Low Voltage] according to EN 61140). Connect the power supply only to an electrical outlet with protective grounding.

Connect the power supply to the DC power jack on the rear of the instrument (refer to Fig. 3 [▸ 8], 8) and secure the cable with the knurled sleeve.

Connect the power supply to a suitable electrical outlet using the supplied power cable.

4.5 Switching the instrument on/off

NOTICE

Possible damage due to incorrect voltage

Before switching on the instrument, ensure that the correct line voltage and line frequency are available (AC 100 V to 240 V, 47 Hz to 63 Hz; DC 24 V, max. 3.75 A).

- Use the On/Off switch on the rear of the instrument (refer to Fig. 3 [▸ 8], 9) to switch the instrument on or off.

– After switching on the instrument, the status LED begins to glow.

4.6 Pairing the instrument with the software

– Switch on the computer with the Anton Paar Spectroscopy Suite software installed.
– Connect Lyza 3000 and computer via Ethernet. Use the provided USB-Ethernet adapter (Mat.Nr.: 240142).
– Configure the USB-Ethernet adapter on the computer (first-time use only)
  – Go to *Settings* > *Network and Internet* > *Change adapter options*.
  – Select the relevant adapter (e.g., Realtek USB FE Family Controller).
  – Right-click and open Properties.
  – Go to *Internet Protocol Version 4 (TCP/IPv4)* and double-click.
  – Select *Use following IP address*.
  – Enter the following details:
    IP Address: 192.168.0.149
    Subnet Mask: 255.255.255.0
  – Tap *OK* to save the settings.
– Open the Spectroscopy Suite and go to *Add instrument*.
– Enter the default IP address for Lyza 3000 : 192.168.0.150.
– The instrument will be added to the list.

TIP: *Refer to the reference guide: "Anton Paar Spectroscopy Suite" for more detailed information on software installation or IP configuration settings.*

4.7 Instrument warm-up time

Lyza 3000 requires stable temperature for optimal instrument performance.

TIP: *Do not turn off the instrument during the night or over the weekend. Keep it switched on all the time to allow the measurement unit to achieve long-term temperature stability.*

The instrument notifies you of its warm-up status in the Spectroscopy Suite software.

The remaining warm-up time is shown in the system status.

Warm-up time	Info
15 min.	After 15 minutes, the notification pop-up will disappear. However, the base unit's temperature may still fluctuate as the instrument components continue to warm up.
2 hours	The instrument will reach a relatively stable temperature plateau after a startup period of two hours.
24 hours	Full temperature stabilization may take up to one day.

Fifteen minutes after the instrument has been switched on, the warm-up notification will disappear. However, the temperature of the base unit may still change as the instrument components warm up.

NOTICE

During the warm-up period, measurements may be influenced by the changing temperature of the base unit. Background spectra may be required more frequently.

4.8 Installing the cell module

The multipurpose cell module (Mat.No.: 253251) is already connected to the base unit upon delivery.

Via the cell module lock (refer to Fig. 2 [▶ 8], 1) on top of the instrument you can easily attach and detach the desired cell modules for your measurement.

4.8.1 Disconnecting the cell module

– Pull up the black cell module lock on top of the instrument (refer to Fig. 2 [▶ 8], 1).
– Grab the recessed grips on both sides of the cell module and pull the cell module toward you, holding it securely.
– Place the disconnected cell module on a stable, flat surface.

4.8.2 Connecting the cell module to the base unit

– Hold the cell module upright and slide it into the base unit from the front.
– Close the cell module lock (refer to Fig. 2 [▶ 8], 1) to secure the cell module in place.

An acoustic signal will indicate that the cell module has been successfully installed.

4.8.3 Cell module check

The cell module check is automatically performed each time a cell module is connected to the base unit. The progress and performance of the check can be tracked in the system status (refer to System status).

4.8.4 Initial procedure for new cell modules

Whenever a cell module is connected to the base unit for the first time, the instrument will request a polystyrene adjustment (refer to Section 10.2 [▸ 16]) after the cell module check is complete.

- Follow the instructions on the screen and you will be redirected to the polystyrene adjustment wizard, which will guide you through the procedure.
- Perform the polystyrene adjustment and apply the adjustment to continue.
- Conduct a system suitability test (refer to System suitability test).

4.9 Opening the cell module

Fig. 4: *Cell module with the top lid opened and the bottom cover attached. No measurement cell is mounted*

1 Top lid
2 Locking pins of the top lid
3 Bottom cover
4 Mounting position for measurement cells
5 Cell module

If opening the top lid of the cell module (see Fig. 4 [▸ 12], 1) is not sufficient, the top lid and the bottom cover (see Fig. 4 [▸ 12], 3) can be removed separately for easier access or for the installation of third-party cells. To do this, pull back both spring-loaded locking pins (see Fig. 4 [▸ 12], 2 for the top lid or similar for the bottom cover) simultaneously.

4.10 Mounting the transmission cell holder

TIP: *The transmission cell holder is already premounted in the cell module upon delivery.*

- Open the top lid of the cell module.
- In the empty cell module, position the transmission cell holder as shown in Fig. 5 [▸ 12].
- Use the provided Torx T25 screwdriver (Mat.No. 129903) to secure the transmission cell holder with the captive screw in the correct position.

TIP: *The transmission cell holder can be mounted in three positions: left, middle, or right. The beam focus is centered in the middle position. For optimal beam focus, mount the transmission cell holder according to the specific cell requirements.*

TIP: *In the middle position, the transmission cell holder can be mounted in two orientations. Choose the one that provides easier access for you when sliding in the transmission cells.*

Fig. 5: *Mounting the transmission cell holder*

- To remove the transmission cell holder, loosen the captive screw with the Torx T25 screwdriver.

4.11 Installing third-party cells

Before you mount the third-party cell:

Perform a background spectrum measurement with the empty cell module (refer to Background spectrum)**.** This measurement is necessary for the intensity check after mounting the cell (refer to Checks and adjustments).

4.11.1 Mounting the third-party cell

- Remove the top lid from the empty cell module to provide enough space for the cell**.**
- Verify that the supplied parts of the cell include a matching baseplate with captive screws and purge tubes, which should be mounted on the sides of the cell.
- Ensure that the purge tubes are properly connected and that the baseplate is tightly fixed to the cell body (ATR, HATR).
- Mount the cell into the cell module:

– Fix the baseplate by fastening the captive screws with the provided Torx T25 screwdriver (Mat. No. 129903).
– Loosen the knurled screws on top of the purge tubes and adjust the tubes on both sides to tightly seal the optical path.
– Tighten the knurled screws to fix the purge tubes in their positions (refer to Fig. 6 [▸ 13]).

Fig. 6: *Mounting a third-party cell and fixing the purge tubes*

NOTICE

The purge tubes of the HATR cell come with different screws and must be fixed with the screwdriver provided with the HATR cell's supplied parts.

4.11.2 Intensity check of the third-party cell

The third-party cell accessories have been aligned and tested by the manufacturer to ensure performance according to specifications.

NOTICE

Do not measure a new background spectrum with the installed third-party cell. It was already acquired with the empty cell module before mounting the third-party cell (refer to Installing third-party cells).

– Perform a measurement with the clean and empty cell using the setting *Transmittance* for the result spectrum.
– Compare the transmittance of the acquired spectrum with the expected transmittance according to the performance verification found in the manufacturer's installation and user guide.
– If the specified transmittance is not achieved, an adjustment of the third-party cell may be required (refer to Adjustment of the third-party cell).

4.11.3 Adjustment of the third-party cell

Some third-party cells (e.g., Pike IRIS, Pike MIRacle) may require alignment after installation into Lyza 3000 due to possible variations in optical alignment between spectrometers. For this reason, alignment screws are located on the cell.

NOTICE

Carefully follow the manufacturer's installation and user guide when performing the alignment. Lyza 3000 is a right-to-left beam spectrometer.

– In the software, select *Checks/adjustments*, then select *Third-party cell adjustment* and follow the instructions on the screen.
– Adjust the cell to maximize signal intensity, using the signal intensity live screen to monitor the current intensity reaching the detector.
– When the adjustment is complete, tap *Done* to close the screen.

4.11.4 Changing the third-party cell type

– After mounting and adjusting the third-party cell (refer to Mounting the third-party cell and Intensity check of the third-party cell), the third-party cell type of the cell module must be changed in the software.
– On the home screen, select *Settings* and open *Cell module management*.
– Select the cell module.
– Select *Modify* and choose the correct third-party cell type from the drop-down list.
– Tap *Apply*.
– After changing the third-party cell type, a polystyrene adjustment is required (refer to Section 10.2 [▸ 16]).
– Complete the polystyrene adjustment and apply it.
– Perform a system suitability test (refer to System suitability test).

After you have measured a new background spectrum (refer to Background spectrum), the cell module with the installed third-party cell is ready for measurements.

4.12 Other optional accessories

For the installation of other optional accessories, refer to the specific instructions provided with the accessories.

4.13 First steps after installation

After installation, set the instrument settings (refer to Instrument Settings).

Wait for the instrument to stabilize (at least 15 minutes) before performing reference measurements.

NOTICE

Instrument warm-up notification

A notification will appear if the instrument has not reached stability.

Do not proceed without waiting for stability—failing to do so may result in reduced measurement accuracy.

Conclude the initial setup with a background spectrum measurement (refer to Background spectrum) to prepare the instrument for sample measurements.

5 Operating the instrument

5.1 Operating the software

Refer to the Anton Paar Spectroscopy Suite Reference Guide for a comprehensive description of the installation procedure, first login information, and all available software features.

5.2 Notifications

Notifications with important information about the status of the instrument or the measurement are shown in the notifications list.

– Tap in the header to open the notifications list and see notification details.
A blue, yellow, or red mark on the symbol shows the number of new notifications in the list.

5.3 System status

The system status is the most important source of information about the instrument status.

Tap in the header to open the system status.

The color of the icon indicates whether the instrument is ready for measurements or if user interaction is required.

6 Performing a measurement

Table 1: Steps of a typical measurement

Step		Task	See
1		Ensure that the measurement system is properly installed and in good working order. Verify all conditions for a good measurement are met.	Installation requirements Start-up and preparation
2		Check the validity of the background spectrum. – If the background spectrum is valid, continue with step 4, a. – If the background spectrum is not valid, continue with step 3.	Background spectrum
3		Clean the measurement cell and measure the background spectrum according to the application.	Cleaning the measurement cell, Background spectrum
4	a	Select *Measurement*.	Starting a measurement
	b	Place the sample in the appropriate position of the measurement cell.	
	c	Choose the measurement settings.	
	d	Perform the measurement.	
5		Clean the measurement cell.	Upkeep and cleaning

CAUTION

Risk of eye damage

Never look directly into the spectrometer windows.

6.1 Start-up and preparation

Before starting a measurement, ensure the following:

– The measurement system is correctly installed and in proper working order.
– The measurement cell is properly installed.
– The system status is "ready to measure."
– The measurement cell is clean.
– Suitable cleaning liquids are at hand.
– The sample is prepared for measurement.

– The background spectrum is valid.

6.2 Background spectrum

A good background spectrum is necessary for successful FTIR measurements.

Check the current state of the background spectrum in the system status (refer to System status).

Regular intervals

A new background spectrum should be measured at regular intervals and according to the application.

Recording

A background spectrum can be recorded with the empty cell (air) or with a specific medium (e.g., solvent), which is part of the sample spectrum.

Changing settings

The settings for the validity of the background spectrum can be changed.

– Select *Settings* from the menu.
– Under *Lyza 3000 / Lyza 7000* the background spectrum settings can be changed.
– Change these settings according to your needs.

Default settings

– Validity timer: 2 hours
– Measurement: 24 scans, resolution 4 cm^{-1}, apodization Blackman-Harris, zero padding 1

TIP: *The system status indicates the need for a new background spectrum with a yellow status. You can start the background spectrum measurement directly in system status.*

NOTICE

Measurements can still be performed if the validity of the background spectrum has expired, but the measurement results may be influenced.

6.3 Starting a measurement

Applying the sample

– Apply the sample according to the measurement cell used.
– When using a transmission cell
  – Open the top lid of the cell module.
  – Place the filled transmission cell in the transmission cell holder.
  – Close the top lid.
– For third-party cells, consult the manufacturer's installation and user guide for proper sample positioning.

NOTICE

Take measures to prevent spilled liquids or powders (samples and cleaning agents) from contacting optical components of the measurement cell or cell module not intended for sample contact.

– Select *Measurement* from the menu.
– Specify a sample name for your convenience.
– Specify the measurement settings.
– Ensure that the background spectrum is valid.
– Tap *Start measurement* to start the measurement.

A progress bar indicates the measurement progress. When the measurement is complete, the results are automatically displayed and ready for spectral processing and analysis.

TIP: *Your measurement results are automatically stored in the data explorer and can be exported later.*

6.4 Advanced measurement settings

Apodization

An apodization function is applied during the calculation of the spectrum.

Recommended apodization:

– Blackman-Harris: Provides the most accurate results (default setting).

Other options:

– Boxcar apodization: Can be used when higher resolutions are required, but it may introduce unwanted artifacts in the spectrum.
– Triangular apodization: Commonly required by various measurement guidelines (e.g., ASTM standard).

NOTICE

A spectral resolution of 1.4 cm^{-1} requires Boxcar apodization.

Zero padding

Zero padding is a scaling factor for numerical resolution, i.e., the number of points in the spectrum.

Default numerical resolution: Zero padding = 1.

Increased numerical resolution: Setting zero padding to 2, 4, or 8 increases numerical resolution by a factor of 2, 4, or 8, respectively.

6.4.1 Canceling a measurement

After starting a measurement, tap *STOP* to cancel the measurement.

NOTICE

It is not possible to resume a canceled measurement. A new measurement must be started.

6.4.2 Connecting dry air/gas supply

For some applications, using the dry air/gas option to purge the optical pathway may be desirable.

– Connect the dry air inlet (refer to Fig. 2 [▸ 8], 3) of the instrument to the dry air/gas supply using the provided polyurethane hose.
– Adjust the air/gas flow to your needs, with a maximum inlet flow of 5 L/min.

6.4.3 Data management

Saved data can be accessed in the data explorer.

– Select *Data explorer* in the menu, then select one of the available data categories.
– Select one of the saved data sets to see the measurement report.

7 Analysis and presets

An analysis provides the possibility to apply spectral processing steps as well as various analysis steps on the measured spectrum. These steps can be displayed in a graph.

An analysis preset is a collection of various spectral processing and analysis steps. These steps can be defined by the user and saved as an analysis preset for further use.

Analysis presets can be applied to other measurements or assigned to methods for automatic analysis and interpretation of sample measurements.

TIP: *Refer to the reference guide: "Anton Paar Spectroscopy Suite" for more detailed information on software installation or IP configuration settings.*

8 Libraries

Libraries are collections of substance spectra, including metadata, which can be used to identify unknown samples. A substance in a library consists of a high quality spectrum, metadata belonging to this chemical substance, and GHS safety information.

Libraries can be created by the user and can be filled with their own substances, or they can be licensed libraries (refer to Table 3 [▸ 22]), which are activated with a license key.

– Select Libraries in the menu to get an overview of all available libraries.

TIP: *Refer to the reference guide: "Anton Paar Spectroscopy Suite" for more detailed information on software installation or IP configuration settings.*

9 Methods

Methods can be used to perform a measurement with predefined measurement settings and using presets for spectral processing and analysis. A method can combine several different presets, which are executed after the start of the measurement procedure.

TIP: *Refer to the reference guide: "Anton Paar Spectroscopy Suite" for more detailed information on software installation or IP configuration settings.*

10 Checks and adjustments

10.1 Polystyrene check

Perform a polystyrene check to ensure that the wavenumber accuracy of the instrument is within specifications. An internal polystyrene film is measured to verify peak positions.

– Select *Checks and adjustments* from the home screen.
– Tap *START*.
  A check report will be displayed at the end, showing the final result:
  – Polystyrene check passed: The instrument wavenumber accuracy is within specifications.
  – Polystyrene check failed: The instrument wavenumber accuracy is not within the allowed deviation.
    Perform a polystyrene adjustment (refer to Section 10.2 [▸ 16]).

TIP: *Check/adjustment reports are stored in the data explorer.*

10.2 Polystyrene adjustment

A polystyrene adjustment is required if the polystyrene check fails and the wavenumber accuracy is not within specifications (refer to Section 10.1 [▸ 16]). A polystyrene adjustment is also required if the third-party cell type of a cell module is changed (refer to Installing third-party cells).

– Select Checks and adjustments from the home screen.
– Tap *START*.
  The result will be displayed and can be applied or rejected.
– Tap *Apply* to adjust the reference wavelength to the suggested value.
  The adjustment report will be displayed to show the final results.

10.3 System suitability test

A system suitability test (SST) is required at regular intervals (recommended every 7 days) to guarantee the instrument's performance.

The SST contains several independent test procedures:

SNR check

The signal-to-noise ratio is measured in several wavenumber ranges and compared to a specified limit. The check is passed if all measured SNRs are within the specified limits.

Baseline check

Two single channel spectra are measured subsequently, and the corresponding transmittance spectrum is calculated. The maximum deviation of the 100% transmission baseline is calculated for several wavenumber ranges. The check is passed if all measured values are within the specified limits.

Polystyrene check

An internal polystyrene film is applied to test for wavenumber accuracy of a polystyrene peak. For details, refer to Section 10.1 [▶ 16].

Wavenumber precision check

An internal polystyrene film is used to test the wavenumber precision for several target numbers. If the deviation between the measured and target values is within the specified limits, the check is passed.

– Select *Checks and adjustments* from the home screen, then open the *System suitability test* and follow the on-screen instructions.
– Tap *START*.
  A report is shown at the end of the test. If all subtests have passed, the overall SST is passed.

TIP: *Alternatively, start the SST directly in the system status when the corresponding hint is shown.*

To specify the validity of the SST, select *Settings* > *Lyza 3000/Lyza 7000* and change the validity duration to the desired value (default: 7 days).

Enter the number of days for which the SST should be valid.
When the SST validity has expired, a new SST will be requested automatically by the instrument.

10.4 Third-party cell adjustment

For details, refer to Installing third-party cells.

11 Upkeep and cleaning

11.1 Cleaning the instrument housing

WARNING

Before using any cleaning agents for the instrument's housing:

Strictly follow all safety instructions concerning the use of chemicals and flammable substances. Refer to Safety instructions.

Ensure all parts of the housing are resistant. Refer to Wetted parts. In case of uncertainty, contact your Anton Paar representative.

Decontaminate and remove aggressive sample residues from the instrument.

WARNING

Possible shock hazard due to wet skin

When performing moist cleaning, unplug the power supply from the instrument.

NOTICE

Corrosion due to unsuitable cleaning methods

Using unsuitable substances for cleaning can cause corrosion of the instrument housing. Never use:

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 (e.g., steel brush)

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

11.2 Cleaning the measurement cell

To ensure consistent and high accuracy of your measurements, employ a regular cleaning routine and store the measurement cells under the recommended conditions. Strictly observe the measurement cell manufacturer's recommendations for cleaning.

Find more information about cleaning recommendations in the corresponding manufacturer's manual.

11.3 Replacing the KBr windows

Required materials/tools

– Replacement kit potassium bromide (Mat.No. 263418)
– Rubber gloves
– Scissors (to cut open the packaging)

Keep the workspace clean and free from dust or debris to avoid contamination of the instrument. Turn off the instrument and unplug it from the power source.

– Disconnect the cell module from the base unit.
– Open the package with the KBr windows (Mat.No. 263418).

NOTICE

The windows are made of potassium bromide and must be handled with care. They are sensitive to humidity and must maintain their transparency.

NOTICE

Possible damage due to moisture

Avoid condensation on KBr windows.

If the instrument has been stored at temperatures below ambient, allow it to warm up to ambient temperature inside the protective bag with the moisture-absorbing desiccant.

Once the instrument has reached ambient temperature, unpack it and immediately switch it on to ensure proper warm-up.

Repair or replacement of moisture-damaged optics due to improper site conditions is not covered by the warranty.

– Put on gloves to avoid touching the optical windows with bare hands.

Do not touch the windows directly.

– Remove the four Torx T10 screws (M3x10) on the instrument's left side using the Torx T10 screwdriver (provided with windows potassium bromide Lyza 3000) (refer to Fig. 7 [▸ 18])
– Carefully remove the left KBr window (refer to Fig. 8 [▸ 18])

Fig. 7: *Removing the fixing screws*

Fig. 8: *Removing the KBr window*

– Identify the round immersion position mark on the window frame and the corresponding position mark on the instrument (refer to Fig. 9 [▸ 18]).

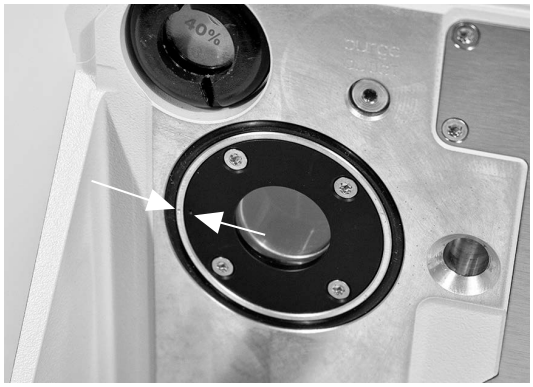

Fig. 9: *Position marks*

– Take the new windows out of their sealed bags.
– Ensure you do not touch them with bare hands.
– Carefully position the new windows in place, making sure the markings on the windows match those on the instrument.

NOTICE

Squeezed or damaged O-rings could lead to leakage and potential damage to the instrument.

When installing the new optical windows, it is important to handle the O-rings with care.

Do not squeeze or damage the O-rings during installation.

NOTICE

Make sure that the O-rings are properly positioned and aligned before tightening the screws.

The O-rings on the KBr windows must point toward the Lyza 3000 base unit.

– Continue with the same procedure for the right window.

NOTICE

Keep the duration of the replacement process short to avoid an increase in the humidity level inside the instrument.

– After replacing the KBr windows, replace the drying cartridge (refer to Replacing the drying cartridge).

11.4 Replacing the drying cartridge

Required materials/tools:

- Drying cartridge (Mat.No. 253717)
- Scissors (to cut open the packaging)

- Cut open the packaging of the new desiccant cartridge (Mat.No. 253717) using scissors.
- Unscrew the old drying cartridge by turning it counterclockwise, using the casing of the new cartridge as a tool (refer to Fig. 10 [▶ 19]).

Fig. 10: *Unscrewing the drying cartridge*

- Unscrew the old drying cartridge from the instrument, and remove it completely (refer to Fig. 11 [▶ 19]).

Fig. 11: *Removing the drying cartridge*

- Unscrew the new drying cartridge from its housing.
- Mount the new drying cartridge immediately afterward.
- Mount the cell module back in position and switch on the instrument.
  - Wait at least 1 hour before checking the instrument.
- Open *System status* (refer to System status) and check if the humidity is within acceptable limits.
- Perform a new polystyrene adjustment and system suitability test (refer to Section 10.2 [▶ 16] and Section 10.3 [▶ 16]).
- If the instrument passes the system tests, it is now ready for use.

12 Maintenance and repair

12.1 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.

To fulfill requirements of regulatory authorities e.g. FDA 21 CFR 211.67, PIC/S 023-2 (5.5), Anton Paar offers services for compliant preventive maintenance and requalification for qualified Anton Paar products in case of software update, repair, and location change. [1]

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

- Syringes
- Hoses
- Adapters, connectors, and fittings
- Pump diaphragms
- Filters
- O-rings, seals, and gaskets
- Cables
- Fuses
- Batteries
- Desiccants
- Protection foils and covers
- Filling tubes
- KBr windows

12.2 Repair performed by an authorized Anton Paar representative

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

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

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

Appendix A Technical data

Parameter	Lyza 3000
Environmental conditions (EN 61010)	Indoor use only
Operating temperature range	10 °C to 30 °C (50 °F to 86 °F)
Air humidity	10 % to 95 % relative humidity, non-condensing
Altitude	max. 3000 m (9800 ft)
Pollution degree	2
Airborne noise emission	< 75 dB (A)
Detector	Pyroelectric DLaTGS detector
Optics	Hermetically sealed aluminum casing with gold-coated mirrors, KBr windows (user-replaceable) and beam splitter
Signal-to-noise ratio	55000:1 (1 min)
Spectral range	350 cm^{-1} to 7500 cm^{-1}
Spectral resolution	1.4 cm^{-1} to 16 cm^{-1}
Wavenumber accuracy	<0.05 cm^{-1} @ 900 cm^{-1} to 3000 cm^{-1}
Wavenumber precision	Repeatability <0.0005 cm^{-1} @ 2000 cm^{-1} (standard deviation of 10 repeated measurements)
Measurement time	<30 seconds
Laser type	Single mode Vertical Cavity Surface Emitting Laser (VCSEL)
Laser class	Class 1, enclosed hermetically
IR source	SiC composite
Interferometer	Permanently aligned cube corner interferometer
Communication interfaces	4 x USB 2.0 (type A) / CAN / Ethernet
Data export formats	.csv, .pdf (via Spectroscopy Suite)
Power supply	AC 100 V to 240 V, 47 Hz to 63 Hz; DC 24 V, max. 3.75 A
Power consumption	Typically 30 W (during operation without a third-party cell)
Dimensions (L x W x H)	363 mm x 315 mm x 204 mm (14.3 in x 12.4 in x 8.0 in)
Weight	11.7 kg (25.8 lbs)

Appendix B Wetted parts

The following materials of Lyza 3000 may be in contact with the samples and cleaning agents:

Material	Part
Aluminum EN AC-46200	Housing
PE (polyethylene)	Instrument foot
Instrument foot	Housing
PUR (polyurethane)	Housing
Silicone	Instrument foot
Steel 1.4301	Back plate
Synthene PR 700	Housing

Appendix C Troubleshooting

Problem	Cause	Corrective action
Instrument warm-up time	The instrument is in the warm-up phase and not ready for measurements yet.	Wait for instrument stability (at least 15 minutes). The notification will automatically disappear when instrument stability is reached.
The cell module state in the system status is red.	The connected cell module is not ready for measurements.	Select *Settings* of the connected instrument and open *Cell module management*. Select the cell module and follow the instructions on the screen.
The humidity state in the system status is red.	The humidity in the instrument is too high.	Replace the drying cartridge (refer to Replacing the drying cartridge). Or contact your local Anton Paar representative.

To reset the instrument's current status:

Switch the instrument off.

Wait for 10 seconds.

Switch the instrument on again.

If the 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 Repair performed by an authorized Anton Paar representative.

Appendix D Optional accessories

Table 2: Optional accessories

Description	Mat.no.
Pike IRIS, germanium ATR cell	262501
Pike IRIS, diamond ATR cell	262502
Pike HATR, zinc selenide combi system	262503
Pike MIRACLE, diamond/ZnSe ATR	262504
Pike IR NIST standard (PS)	262505
Pike IR standard (PS)	262506
Pike SmartSeal liquid cell, 0.025 mm, CaF2	262507
Pike SmartSeal liquid cell, 0.025 mm, KBr	262508
Pike SmartSeal liquid cell, 0.1 mm, KBr	262509
Pike SmartSeal liquid cell, 0.1 mm, ZnSe	262510
Barcode reader with USB cable	189615

Table 3: Available licensed ATR spectra libraries by S.T. Japan

Description	Mat.No.
ATR database L30000 ATR-FTIR all-inclusive database (does not include L20104), 44250+ spectra	263514
ATR database L30001 ATR-FTIR complete collection database (does not include L30130, L30131, L30125, L20104), 43150+ spectra	263515
ATR database L30002-1 Defined polymers & polymer additives database, 5150+ spectra	263516
ATR database L30002-2 Commercial polymers & polymer additives database, 2750+ spectra	263517
ATR database L30003 Food additives & food packaging database, 4250+ spectra	263558
ATR database L30004 Solvents database, 1300+ spectra	263559
ATR database L30005 Organometallics & silicon compounds database, 2200+ spectra	263560
ATR database L30006 Biochemicals database, 7550+ spectra	263561
ATR database L30007 Aldehydes & ketones database, 5400+ spectra	263562
ATR database L30008 Alcohols & phenols database, 3950+ spectra	263563
ATR database L30009 Esters, lactones, anhydrides, carboxylic acids database, 8850+ spectra	263564
ATR database L30010 Hydrocarbons & halogenated hydrocarbons database, 1250+ spectra	263565
ATR database L30011 Flavors, fragrances & cosmetic ingredients database, 4100+ spectra	263566
ATR database L30012 Pesticides database, 3200+ spectra	263567
ATR database L30013 Semiconductor chemicals database, 1350+ spectra	263568
ATR database L30014 Forensic database, 3750+ spectra	263569
ATR database L30015 Dyes, pigments & stains database, 3500+ spectra	263570
ATR database L30016 Sulphur & phosphorus compounds database, 5900+ spectra	263571
ATR database L30017 Hazardous chemicals database, 6700+ spectra	263572
ATR database L30018 Toxic chemicals database, 4150+ spectra	263573
ATR database L30019 Inorganics database, 800+ spectra	263574
ATR database L30020 Pharmaceuticals, drugs & antibiotics database, 4800+ spectra	263575
ATR database L30021 High production volume chemicals database, 2000+ spectra	263576
ATR database L30022 Excipients database (not included in L30020), 1450+ spectra	263577
ATR database L30023 White powders database, 700+ spectra	263578
ATR database L30024 Lubricants database, 1800+ spectra	263579
ATR database L30025 Coatings database, 2400+ spectra	263580
ATR database L30026 Paints database, 3400+ spectra	263581
ATR database L30027 Selected organic compounds database, 5000+ spectra	263582

Description	Mat.No.
ATR database L30028 EuroPharm database, 1950+ spectra	263583
ATR database L30029 Environmental pollutants database, 750+ spectra	263584
ATR database L30030-1 Explosives database excluding restricted compounds, 250+ spectra	263586
ATR database L30033 Essential oils database, 600+ spectra	263587
ATR database L30034 Petrochemicals database, 1150+ spectra	263588
ATR database L30035 Microplastics & related compounds database, 4200+ spectra	263589
ATR database L30036 Fibers database, 700+ spectra	263590
ATR database L30040 Common contaminants database, 1400+ spectra	263591
ATR database L30125 New psychoactive substances & illicit drugs database, 300+ spectra	263592
ATR database L30130 Pharmaceutical tablets & capsules database, 500+ spectra	263593
ATR database L30131 Commercial pharmaceuticals database, 250+ spectra	263594
ATR database L10001 ATR-FTIR Aldrich database, 18500+ spectra	263595
ATR database L20001 ATR-FTIR Ichem database, 22000+ spectra	263596
ATR database L20104 Takayama plastic additives ATR-FTIR database, 600+ spectra	263597

Table 4: Available licensed transmission spectra libraries by S.T. Japan

Description	Mat.No.
Transmission database L50001-1 FTIR KBr databases volume 1–2, 25000+ spectra	263598
Transmission database L50001-2 FTIR liquid film database, 7650+ spectra	263599
Transmission database L50002 Polymers & polymer additives database, 2600+ spectra	263601
Transmission database L50003 Food additives & food packaging database, 2400+ spectra	263602
Transmission database L50004 Solvents database, 1050+ spectra	263603
Transmission database L50005 Organometallics & silicon compounds database, 1500+ spectra	263604
Transmission database L50006 ‘Biochemicals database, 5950+ spectra	263605
Transmission database L50007 Aldehydes & ketones database, 5050+ spectra	263606
Transmission database L50008 Alcohols & phenols database, 3200+ spectra	263607
Transmission database L50009 Esters, lactones, anhydrides, carboxylic acids database, 9300+ spectra	263608
Transmission database L50010 Hydrocarbons database, 1300+ spectra	263609
Transmission database L50011 Flavors, fragrances & cosmetic ingredients database, 2650+ spectra	263610
Transmission database L50012 Pesticides database, 1700+ spectra	263611
Transmission database L50013 Semiconductor chemicals database, 950+ spectra	263612
Transmission database L50014 Forensic database, 1900+ spectra	263613
Transmission database L50015 Dyes, pigments & stains database, 1900+ spectra	263614
Transmission database L50016 Sulphur & phosphorus database, 5350+ spectra	263615
Transmission database L50018 Hazardous & toxic chemicals database, 4300+ spectra	263616
Transmission database L50020 Pharmaceuticals, drugs & antibiotics database, 3700+ spectra	263617
Transmission database L50021 High production volume chemicals database, 1550+ spectra	263618
Transmission database L50022 Excipients database, 650+ spectra	263619
Transmission database L50104 Takayama plastic additives transmission database, 600+ spectra	263620

Appendix E EU declaration of conformity

Docusign Envelope ID: 6ED24178-342E-415E-B384-F47FF34CF84E

EU Declaration of Conformity

(original)

Anton Paar

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

Product designation:	**Lyza 3000**
Model:	Lyza 3000
Material number:	253110

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

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

Applied standards:

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

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

Applied standards:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 — Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
- EN IEC 61010-2-010:2020 — Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2: Particular requirements for laboratory equipment for the heating of materials
- EN 60825-1:2014 + A11:2021 — Safety of laser products- Part 1: Equipment classification and requirements
- EN 62471:2008 — Photobiological safety of lamps and lamp systems

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

Place and date of issue: Graz, 27.11.2024

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