

PURSPEC



ANALYZER

Lipid Analysis System

User Manual

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You can contact us by sending an email to service@purspec.com. We are dedicated to providing you with excellent service and are grateful for your valuable opinions.

Contact Us

If you have new requirements for our products or technical inquiries related to the use, transportation, or disposal, we welcome you to contact us at any time. You can reach out to us through the internet, by phone, or via traditional mail. All contact information is provided in detail on the back cover of this manual.



Content

| | |
|--|----|
| 1. Introduction | 2 |
| 2. Accessories | 2 |
| 3. Safety Precautions | |
| 3.1 Warning | 3 |
| 3.2 Notice | 3 |
| 3.3 Hazards Related to Instrument Use | 4 |
| 3.4 Hazards Related to Instrument Removal | 4 |
| 4. Use Instructions | |
| 4.1 Use Statement | 5 |
| 4.2 Calibration Instructions | 5 |
| 4.3 Maintenance Instructions | 6 |
| 4.4 Quality Control Recommendations | 6 |
| 4.5 Removal Recommendations | 7 |
| 4.6 Storage Recommendations | 7 |
| 5. Schematic Sketch | 8 |
| 6. Specification | 8 |
| 7. Installation | |
| 7.1 Unpacking | 9 |
| 7.2 Installation | 9 |
| 7.3 Host Software Installation | 10 |
| 8. Operation | |
| 8.1 Power On | 11 |
| 8.2 Operation Interface Explanation | 11 |
| 8.3 Calibration | 12 |
| 8.4 Sample Analysis | 13 |
| 8.5 Result | 15 |
| 8.6 Settings | 15 |
| 9. Troubleshooting | |
| 9.1 Common Problems | 16 |
| 9.2 Other Problems | 17 |

1. Introduction

Heartfelt thanks for choosing our company's product!

Our product is a high-precision instrument, and to ensure its proper functioning, as well as the safety of both operators and the instrument itself, please carefully read this manual before use.

In order to continuously improve the quality and operability of the product, there may be occasional adjustments to specific details in aspects such as appearance, structure, and software operations. If there are any discrepancies between the actual product and the illustrations in this manual, please refer to the actual product.

If the instrument experiences abnormalities, please consult the "Troubleshooting Guide" for fault diagnosis. Do not attempt to disassemble the equipment for repairs without proper guidance. The company reserves the right to disclaim responsibility for property damage or personal injury resulting from failure to follow the instructions in this manual.

This manual contains crucial information regarding the installation, operation, maintenance, and troubleshooting of the instrument. Please ensure it is stored securely for future reference.

2. Accessories

In addition to the instrument, the package includes the following accessories:

| | | | |
|-------------------------|---|-------------------------------------|---|
| ◆ Omega Analyzer | 1 | ◆ Spare Reaction Tubes | 1 |
| ◆ Power Adapter | 1 | ◆ PEEK Tube Connectors | 1 |
| ◆ Communication Adapter | 1 | ◆ Leakage Tube | 1 |
| ◆ User Manual | 1 | ◆ Product Qualification Certificate | 1 |

3. Safety Precautions

Please read the manual thoroughly before performing any operations, and follow the guidelines provided in the manual.

3.1 Warning

- Be aware that some samples and chemical reagents used with the instrument may pose chemical, biological, and/or radiation hazards. Understand all potential hazardous effects before using these substances.
- Always adhere to Good Laboratory Practice (GLP) to ensure that your experimental processes comply with standards, enhancing the reliability and repeatability of experiments.
- When working with unknown substances or materials with potential hazards, it is recommended to consult with the safety department of your institution or organization for professional safety guidance.

3.2 Notice

- **Storage Environment:** Store in a dry and cool place with a temperature range between -10 to 50°C (14-122 °F).
- **Usage Environment:** Maintain an operating environment temperature of 15 to 35°C (59-95 °F), with relative humidity not exceeding 75%, and avoid interference from strong electromagnetic fields.
- **Power Supply:** Ensure that the instrument's power supply remains stable within the specified range (100-240V AC, 50/60Hz).
- **Handling Hazardous Substances:** If the tested samples contain toxic, harmful, or corrosive substances, handle them with reasonable caution to prevent harm to operating personnel.
- **Transportation Considerations:** When transporting the instrument, avoid severe impacts and vibrations. Also, protect it from rain and exposure to maintain the stability and integrity of the instrument.
- **Internal Safety:** Do not insert hands into the interior of the instrument to prevent harm to personnel.

3.3

Hazards Related to Instrument Use

UV Lamp Hazard



To avoid exposure to ultraviolet light, do not open the reaction tube rack when the PB mode is on or when the UV lamp status indicator is active. Ensure the system is powered off before replacing reaction tubes.

Solvent Leakage Hazard

1. **Specially Designed Ports:** The system's ports are specially designed to prevent leakage. Before using the instrument, ensure that all interfaces are hand-tightened to guarantee sealing.
2. **Check Before Tube Replacement:** Before replacing reaction tubes, make sure internal interfaces are hand-tightened and then place the tube rack back into the instrument. This step is crucial to ensuring system integrity.
3. **Monitor Initial Run:** After replacing reaction tubes, monitor the initial run to ensure all joints are secure and there is no leakage. This helps detect potential issues promptly.
4. **Compatibility Check:** To avoid chemical degradation of components exposed to solvents, ensure that all provided components are compatible with the specified photochemical workflow. For replacement components not included or differently specified, verify the compatibility of solvents used in the workflow.

3.4

Hazards Related to Instrument Removal

To avoid exposure to biological hazards or toxic materials, wear gloves at all stages when removing the instrument.

UV Lamp Breakage Hazard



To avoid injury due to broken glass or contact with toxic substances, handle the Omega analyzer with care during transportation, movement, and placement. The UV lamp used in the Omega analyzer contains trace amounts of mercury. If the lamp is observed to be damaged, do not attempt to continue use or move the Omega system. Ventilate the room for 30 minutes immediately and contact our customer support for assistance.

4. Use Instructions

4.1 Use Statement

- Omega Analyzer is designed as a professional research tool, intended to provide the capability for in-depth analysis of fine phospholipid structures.
- The Omega Analyzer supports only hydrophilic interaction liquid chromatography (HILIC) and requires acetone as the mobile phase.
- The Omega Analyzer is for **Research Only** and is not intended for clinical diagnostics.

4.2 Calibration Instructions

- Before starting calibration, ensure that the positive and negative modes of the mass spectrometer are correctly calibrated.
- Choose an appropriate calibration method to ensure acceptable mass spectrometry performance. Typically, a phospholipid standard mixture solution containing six major phospholipids (PC, PE, PS, PG, PI, SM) is used as the tuning solution.
- Ensure that the concentration of each phospholipid in the tuning solution is above 5 µg/mL to guarantee proper calibration of the Omega Analyzer. High-quality tuning solutions can be purchased from PURSPEC Technology if needed.
- During the calibration process, ensure that the Omega Analyzer is correctly connected between the LC and MS systems to ensure smooth communication.
- Manually confirm the retention times for each class of phospholipids' elution peaks and input this information into the software configuration.
- If specific instructions are needed for calibration or if issues arise during the calibration process, feel free to contact our technical support for professional assistance and support.

4.3 Maintenance Instructions

Reaction Tube Replacement

To prevent chemical leaks, follow these steps for replacing reaction tubes:

1. Use the sample pump to clear any residual liquid from the reaction tube before replacement. Ensure the sample pump's outlet is connected to the liquid chromatography solvent waste container.
2. During residual liquid clearance, use low flow rates to avoid excessive pressure and reduce the risk of leaks.
3. After visually confirming that the reaction tube is essentially empty, ensure no liquid residue remains.
4. Once it's confirmed that the reaction tube is empty, attempt to loosen the internal PEEK connectors. Exercise caution during this step to prevent unnecessary leaks.

4.4 Quality Control Recommendations

Regular Quality Control

Run quality control samples regularly, including target compound samples at levels below normal, normal, and above normal. Ensure that the results of quality control samples are within an acceptable range and assess precision for each day and run.

If the results of quality control samples are outside the range, exercise caution when interpreting the collected data as it may be invalid.

Matrix Effects Considerations

When analyzing samples from complex matrices (such as soil, tissues, serum/plasma, whole blood, etc.), matrix components may adversely affect the results, either enhancing or suppressing ionization. To minimize these effects, it is recommended to:

- Use appropriate sample pre-treatment methods, such as protein precipitation, liquid-liquid extraction, or solid-phase extraction, before instrument analysis to remove matrix interference.
- Consider using a traditional phospholipid extraction sample pre-treatment process, such as the Folch method.
- Use matrix-matched calibration and quality control samples as much as possible to validate accuracy and precision.

4.5 Removal Recommendations

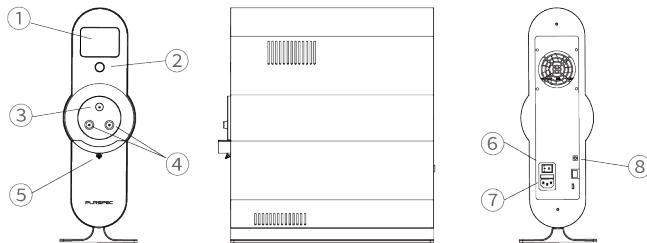
When removing the instrument for transportation, maintenance, or disposal, observe the following safety precautions:

- When handling or disposing of any chemicals, wear gloves resistant to chemical corrosion to provide effective protection.
- Before removing the instrument, perform decontamination treatment on solvent-contact areas. This helps reduce potential hazards during removal.
- During decontamination, anticipate the three areas with the highest contamination:
 - Reaction tubes
 - Solvent leakage collection plate
 - Leakage tube
- While dealing with these areas, be aware of any substances that may contain carcinogenic, toxic, or biological hazards. Take necessary precautions to avoid direct contact with these hazardous substances.

4.6 Storage Recommendations

- The impact of the Omega Analyzer on traditional LC-MS/MS is minimal. If there are no specific storage requirements, consider keeping the Omega connected to the LC-MS/MS system for normal operation. This helps facilitate quick startup and reduces potential issues with reconnection.
- Pay attention to the environment around the instrument during operation and storage of the Omega. Avoid unnecessary dust accumulation and ensure the instrument's surface is clean. Likewise, prevent severe vibrations or accidental tipping of the instrument to avoid damage or performance degradation.
- If the Omega is not used for an extended period, ensure that all solvents are purged from the tubes before storage. Use the sample pump with a low flow rate to push solvents through the tubes into the LC waste container to prevent solvent residue and tube clogging.
- Before storing the Omega Analyzer, pack and store it according to the storage environment requirements provided in the manual. Ensure the instrument is stored at the recommended temperature, humidity, and other environmental conditions to maintain its performance and reliability.

5. Schematic Sketch



| | | |
|-------------------------|------------------------|----------------------|
| 1. Touch Screen | 2. Screen Switch | 3. Tube Rack Switch |
| 4. Reagent Inlet/Outlet | 5. Reagent Leak Outlet | 6. Main Power Switch |
| 7. Power Interface | 8. Antenna Port | |

6. Specification

Power Supply 100~240 V AC, 50/60 Hz

Size 44 × 41 × 14 cm
17.32"×16.14"×5.51"

Weight < 10 kg (22.05 lbs)

Ambience 15~35°C (59~95 °F), relative humidity < 75%.
No strong electromagnetic field interference.

Functions No Magnetic Interference
Adjustable UV Lamp Intensity and Power with Light Feedback
Reaction Tube Lifespan Tracking
Leak Alarm System
Suitable for 1/16-inch Tubing and Traditional PEEK Tubing Systems
Temperature Stability Control
Supports Analysis of 6 Major Classes of Phospholipids

7. Installation



This product is a high-precision analysis instrument, so violent vibrations and collisions should be avoided during installation.



The installation instructions shall be strictly followed. Do not plug in the power cord before the completion of instrument installation.

7.1 Unpacking

1. Open the packaging of the Omega Analyzer and remove the top cover foam.
2. Thoroughly inspect the contents of the box to ensure everything is present. Take out the accompanying accessories from the box and place them in a secure location.
3. Carefully remove the Omega Analyzer from the foam packaging and place it vertically. Ideally, position the instrument between the LC and MS instruments for easier connection.
4. Install the antenna, ensuring it is securely fixed to ensure proper communication and performance of the instrument.
5. Take the power cord from the packaging box, insert it into the power connector on the back of the Omega Analyzer. Ensure that the power cord is inserted correctly and firmly connected.

7.2 Installation

1. Go through the whole manual to have a general understanding of the product.
2. Place the instrument on a stable, level platform, at least 5 cm (1.97") away from LC and MS instruments. Avoid placing the Omega Analyzer near the exhaust or intake ports of the MS instrument to prevent interference.
3. After confirming the position of the Omega Analyzer, carefully unscrew the PEEK tube from the LC to the MS system. Screw one PEEK connector into one of the reagent inlets on the Omega Analyzer.
4. Take out the second PEEK tube from the box, and carefully connect each end of the PEEK fitting to the corresponding positions on the Omega and MS systems. Screw one side into another reagent inlet/outlet on the Omega Analyzer, and the other side into the sample inlet of the MS system.
5. Insert the power cord into the designated power socket, ensuring that the plug is securely connected.

7.3 Host Software Installation

1. Before installing the Omega Analyzer software, ensure that the computer running the instrument operates on the Windows 10 operating system. If uncertain about the OS version, contact our support. If the computer lacks internet connectivity, also contact technical support.
2. Insert the Omega Analyzer installation USB drive and run the Setup installation file. Follow the prompts of the installation wizard to complete the installation process.
3. Insert the communication adapter into a USB slot to initiate the connection between the computer and the Omega Analyzer. The drivers associated with the communication adapter will be automatically installed.
4. Download and install MSConvert, an open-source software available at <https://proteowizard.sourceforge.io/>. Follow the installation guide provided by MSConvert.
5. Run the Omega Analyzer software and proceed with registration. Fill in your information and send the '.lrf' file to service@purspec.com via email. Within 24 hours, you will receive a '.lic' file to activate the Omega Analyzer software.

8. Operation

All instrument controls and status information can be accessed through the Omega Analyzer software. Before shutting down the instrument, ensure that the PB mode has been turned off for at least half an hour. If the PB mode is still active, refrain from shutting down the instrument to prevent potential irreparable damage. Do not move the instrument during operation to avoid accidental reagent leakage or LC tube compression.

8.1 Power On

1. Make sure that the instrument is installed correctly, and the power cord is already supplied with operating voltage.
2. After confirming that all previous steps have been executed correctly, turn on the main power switch located above the power connector to allow the instrument to start automatically.
3. During the instrument startup process, observe the Omega Analyzer logo on the touchscreen. This indicates that the instrument is starting up normally.

8.2 Operation Interface Explanation

Touchscreen Interface



Figure 8.2a



Figure 8.2b

1. Connection Status

2. PB Mode Status (Figure 8.2b)

3. Warning Area

4. Information Icons

Omega Software Interface

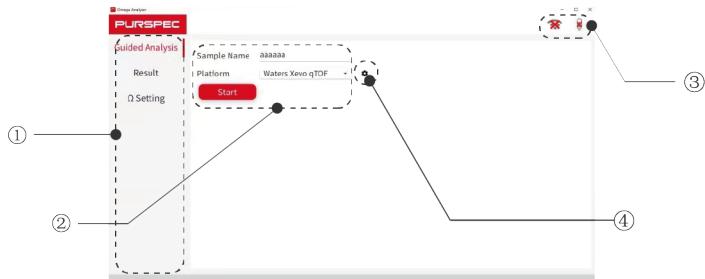


Figure 8.2c

| | |
|----------------------------|--------------------------------------|
| 1. Function Navigation Bar | 2. Sample Name and Mass Spectrometer |
| 3. System Status | 4. Detection Settings |

8.3 Calibration

1. Before making any changes to the LC workflow, it is recommended to perform calibration. Ensure stability in results before conducting any sample analyses.
2. Transfer the provided tuning mixed solution to a suitable sample vial compatible with the LC autosampler.
3. Ensure an HILIC chromatographic column is installed in the LC system. Mobile phase A should contain a 10 mM NH₄Ac solution, and mobile phase B should consist of acetonitrile/isopropanol (1:1, v/v). While modifications to this workflow are acceptable, accuracy of results cannot be guaranteed.
4. Use the LC test tuning solution sample and examine the generated LC chromatogram. Ensure all phospholipid chromatographic peaks are well-separated.
5. Record the start and end times of each chromatographic peak. Enter these times into the configuration interface, as shown in Figure 8.3.
6. After calibrating the instrument, run multiple quality control samples to ensure accurate results. If discrepancies arise, repeat the calibration process until the quality control samples yield correct results.

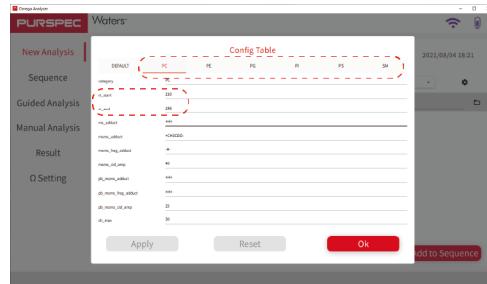


Figure 8.3

8.4 Sample Analysis

Before running samples, ensure that the previous calibration has been correctly saved. If there are any changes to the LC workflow, recalibration is necessary to ensure accurate retention time settings. For in-depth phospholipid structural analysis, three steps need to be performed: MS1, MS/MS, and PB-MS/MS.

MS1 Analysis

1. Open the Omega software and select the "Guided Analysis" tab.
2. Run an MS1 scan using the calibrated LC-MS workflow. After obtaining the MS1 results, use MSConvert software to convert the output data to '.mzml' format.
3. Click the folder icon to select the converted '.mzml' file, then press the start button to perform the calculation.
4. After the calculation is complete, the table below will output the MS/MS method m/z list and lipid classifications. Clicking the list icon allows you to view the complete results.
5. Input all or selected "MS/MS method m/z" values into the mass spectrometry software to establish the MS/MS method.
6. Only after entering all "MS/MS method m/z" values can you click continue.

MS/MS Analysis

1. Click continue to go to the MS/MS tab.
2. Initiate MS/MS analysis on the mass spectrometer to obtain corresponding results.
3. After obtaining MS/MS results, use MSConvert software to convert the output data to '.mzml' format.
4. Click the folder icon to select MS/MS files. If multiple datasets were collected, you can upload multiple files. Press the start button to perform the calculation.
5. After the calculation is complete, the table below will output the PB-MS/MS method m/z list and the lipid acyl composition results. Clicking the list icon allows you to view the complete results.
6. PB-MS/MS method m/z values, including automatic calculation for PB adducts, are included. Input all or selected "PB-MS/MS method m/z" values into the mass spectrometry software to establish the PB-MS/MS method.
7. Only after entering all "PB-MS/MS method m/z" values can you click continue.

PB-MS/MS Analysis

1. Click continue to automatically open the PB mode. Wait for 1 minute before starting the analysis to ensure lamp intensity stability.
2. Initiate PB-MS/MS analysis to obtain results.
3. After obtaining PB-MS/MS results, use MSConvert software to convert the output data to '.mzml' format.
4. Click the folder icon to select PB-MS/MS files. If multiple datasets were collected, you can upload multiple files. Press the start button to perform the calculation.
5. After the calculation is complete, the table below will output comprehensive results. Click the "Finish Analysis" button to save the results and transfer them to the "Results" tab.
6. The Finish button is available at any step. This button concludes the current analysis and saves all currently calculated results. Subsequent analyses can be continued in the Results tab.

8.5 Result

View sample results for all lipids on the left, as shown in Figure 8.5. Click the list icon to view a detailed report.

In each detailed report, the "Combine" checkbox allows users to redo or continue the analysis. If the result data is unsatisfactory or configuration settings have been adjusted, any step can be reanalyzed.

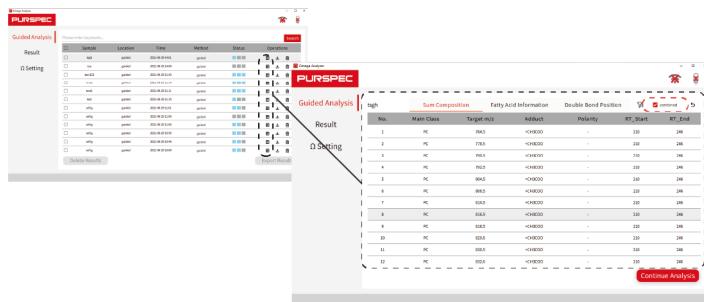


Figure 8.5

8.6 Settings

- On the left, navigate to the "Settings" tab to access the settings interface.
- Here, you can manually control the PB mode to be on or off.
- Temperature settings, UV lamp intensity, and lamp lifespan can be found in this interface.

9. Troubleshooting

9.1 Common problems

| Problem | Susggested Solution |
|--------------------------|--|
| "Replace reaction tube!" | Replace with a new reaction tube. |
| "Low UV lamp intensity!" | <ul style="list-style-type: none">• Restart the instrument power switch.• If the problem persists after restarting, please contact technical support. |
| "Solvent leak detected!" | <ul style="list-style-type: none">• Check if the PEEK fittings and tubing are intact, replace PEEK fittings or tubing if necessary.• Inspect the reaction tube fittings and tubing for integrity, replace the reaction tube.• Wipe off the liquid in the leakage tray, observe for 1 hour after the leakage alert disappears, and check if the leakage alert reoccurs. |
| "Communication error!" | <ul style="list-style-type: none">• Restart the software.• Replug the USB connector.• Restart the power switch of the instrument. |
| "Temperature too high!" | <ul style="list-style-type: none">• Check if the ambient temperature meets the requirements in the manual.• After shutting down to cool, restart the instrument.• Check if you can hear the instrument fan noise, if not, please contact customer service. |

9.2 Other Problems

If the problem observed is not within the faults listed above, or the operation problem cannot be solved using the suggested solution, please contact the service engineers in time. Do not attempt to disassemble or repair the instrument by yourself.

FCC Statement

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

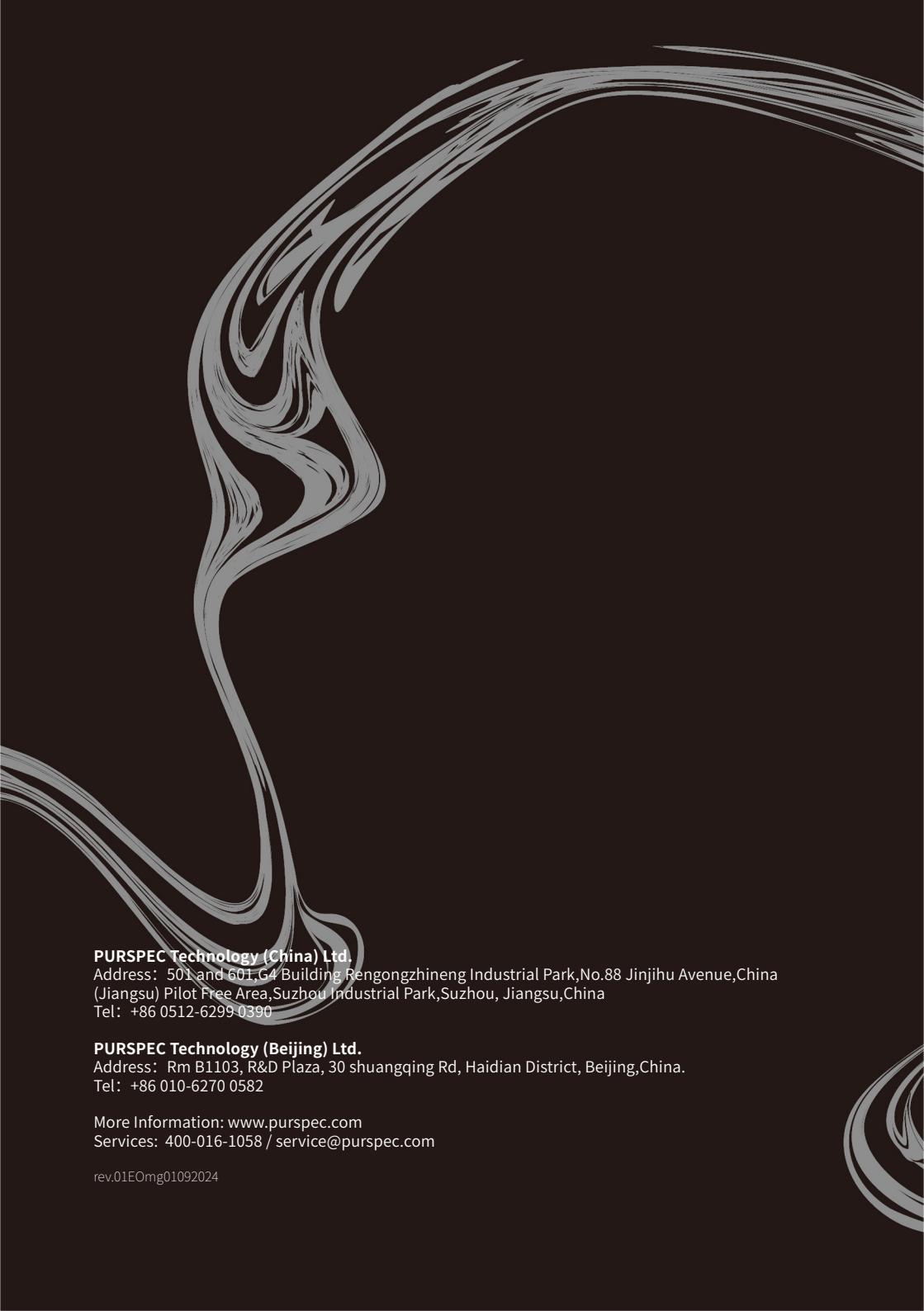
- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.

Note : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates,uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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