



# Instruction Manual

## Genizer Particle Sizer Series

### Instruction Manual

### Genizer Laser Particle Sizer

Catalog No. Dual-Light Particle Sizer (GDPS)





## **1. Open-box Inspection**

Check whether there is any packing damage. Refer to the shipping list for the integrity of the product.

## **2. Product Introduction**

### **2.1 Brief Introduction**

Genizer Dual-Light Particle Sizer (GDPS) is a high-performance and general-purpose particle sizing instrument. With the technique of Dynamic Light Scattering (DLS), GDPS features high-speed digital correlator and high-performance photomultiplier tube as a core device, which have the characteristics of fast-speed, high-resolution, accurate precision, high detection sensitivity, as well as the advantages of not destructing structure of original nano-particles or contaminate testing samples. It can be widely used in pharmaceuticals, emulsions, ceramics, abrasives, nanoparticles, liposomes, inks, paints, dye, clay, lubricants, cells, bacteria, food, additives, graphite, fuels and etc.

### **2.2 SPECIFICATIONS**

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Catalog No.	GDPS
Description	Dual-light Nano Particle Sizer
Size Range	1nm-10 $\mu$ m
Accuracy	<1%
Dimensions	250mm $\times$ 150mm $\times$ 460mm (9.8 in. $\times$ 6 in. $\times$ 18in.)
Weight	15kg (33 Lbs.)
Application	Emulsions, Liposome, Ceramics, Abrasives, Inks, Paints, Nanoparticles

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#### STANDARD FEATURES


Control &Data Collection System	Connecting to a computer with LPSA software
Greenlight source	Max. 30mW, 570nm
Bluelight source	Normal 10mW, 470nm
Supply Voltage	110V/220V 50/60Hz
Temperature	5°C -40°C±0.1°C
Concentration Range	0.1mg/mL-100mg/mL
Scattering Angle	Vertical
Sampling Time	Less than Four Minutes
Detector	Photomultiplier tube (PMT)
Warranty	1 year against any manufacturing defects


#### OPTION FEATURES


Power Supply	Precision UPS voltage stabilizer
Clean	Ultrasound Washer

### **3. Safety Instructions:**


In this manual, the following symbols are used:


 **Attention:** Indicate the correct procedures and practices for operation, to avoid damage to the equipment or other properties.


 **Warning:** Potential Danger. Correct procedures and practices need to be followed to avoid personal injury.


 **Danger:** Correct procedures and practices need to be followed to avoid personal injury. The improper handling could cause hazardous condition, bodily injury and equipment damage could occur.

#### **Please careful note below information:**

 **Warning:** It's necessary to completely read the instruction manual before operating the Genizer Laser Particle Sizer. The operator should be familiar with all the functions and control of this system.


 **Warning:** Do not move the equipment when the system is running. Always disconnect the equipment from the power supply before moving or maintaining.


 **Warning:** Do not look directly into the laser light source, it may cause permanent damage on the eyes.


 **Warning:** The equipment or the components cannot be changed without authorization.


 **Warning:** If the interval between two tests is more than 1 hour,

turn off the sizer in time to avoid reducing service life of sizer (especially the laser). Before each test, turn on the machine 10-15 minutes in advance to preheat.

 **Warning:** Handle the equipment gently and do not put heavy things on the equipment.

 **Attention:** Keep the Genizer Laser Particle Sizer far away from the open fire and high temperature.

 **Attention:** Every time the test is finished, the sample cell shall be cleaned to avoid contamination or affecting test results.

 **Attention:** Please keep the window of the sample holder clean during the tests.

## 4. Installation

4.1 Place the particle sizer on a stable workbench, and keep a distance of more than one meter from other electronic equipment as far as possible to avoid electromagnetic interference;

4.3 Turn on the particle sizer and preheat for 30min and then the computer;

4.2 Connect the wires COM 1 and COM 2 to the particle sizer and computer port respectively;

4.3 Connect the power supply;

## **5. Preparation**

5.1 Select the liquid with good dispersion as the medium. If the selected dispersion medium is water, it is recommended to use the newly prepared distilled water or deionized water.

5.2 Make sure that the dispersion medium is pure and without impurities. It is better to use a filter (filter membrane with diameter 0.2 $\mu$ m).

5.3 Prepare a 50ml beaker, and add about 25ml of dispersion medium and a proper amount of tested sample into it.

5.4 Use the ultrasonic and homogenizer to disperse. After dispersing sufficiently, observe the emulsion concentration.

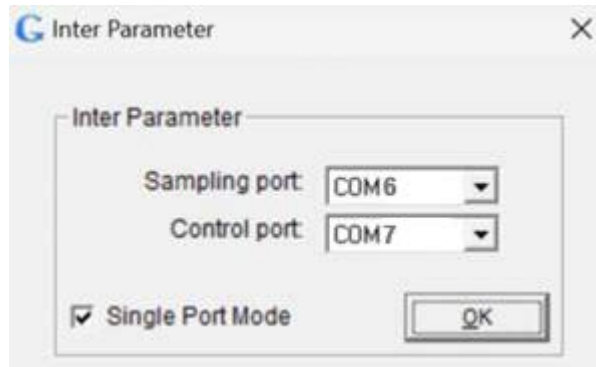
5.5 Take the dispersed sample emulsion, add it to the clean sample cell, and cover the lid ready to be tested.

## **6. Operation**

6.1 LPSA software and port setting

6.1.1 Plug USB KEY into computer, and then double click LPSA on the desktop to open analysis software;

6.1.2 Click "Port settings" in "Parameter setting" and set the port as shown in Figure 1:




**Figure 1:** Port Settings Interface

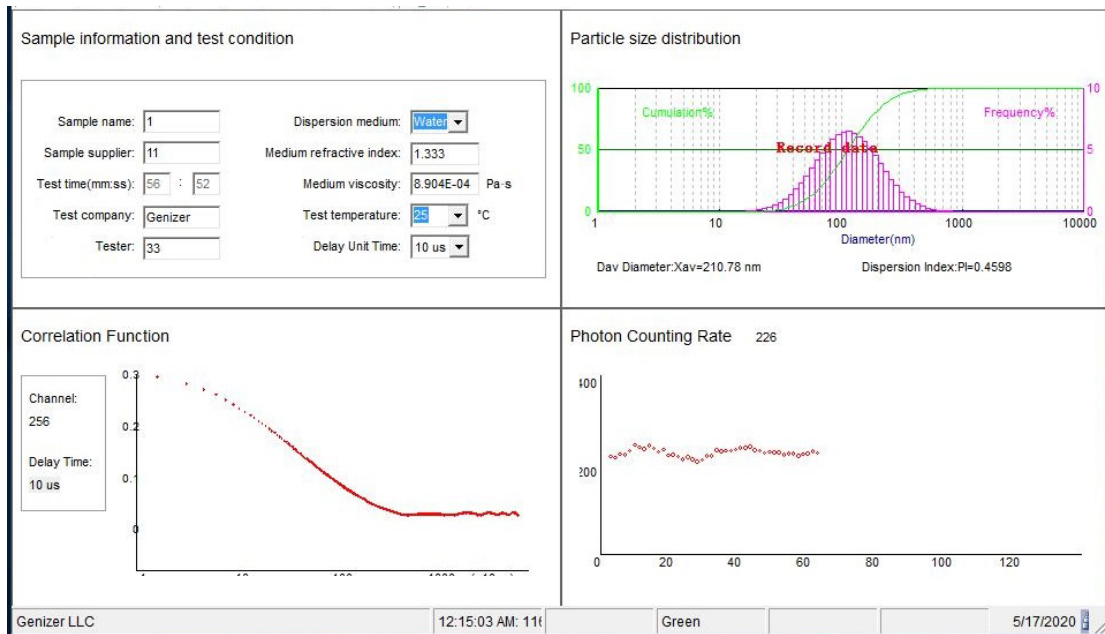
## 6.2 Sample Testing Procedure

6.1.1 Wait for 1-2 minutes to make sure that the sample is completely still;

6.1.2 Fill in the information of the tested sample in the “sample information and test condition” section, and select the name, refractive index, viscosity of the dispersion medium as well as the test temperature.












(Relevant parameters of water and alcohol have already been added to the software. If the dispersion medium is changed, the corresponding parameters shall also be changed);

6.1.3 Click "Start" in the "Run" menu or  on the toolbar to enter the sample test stage:



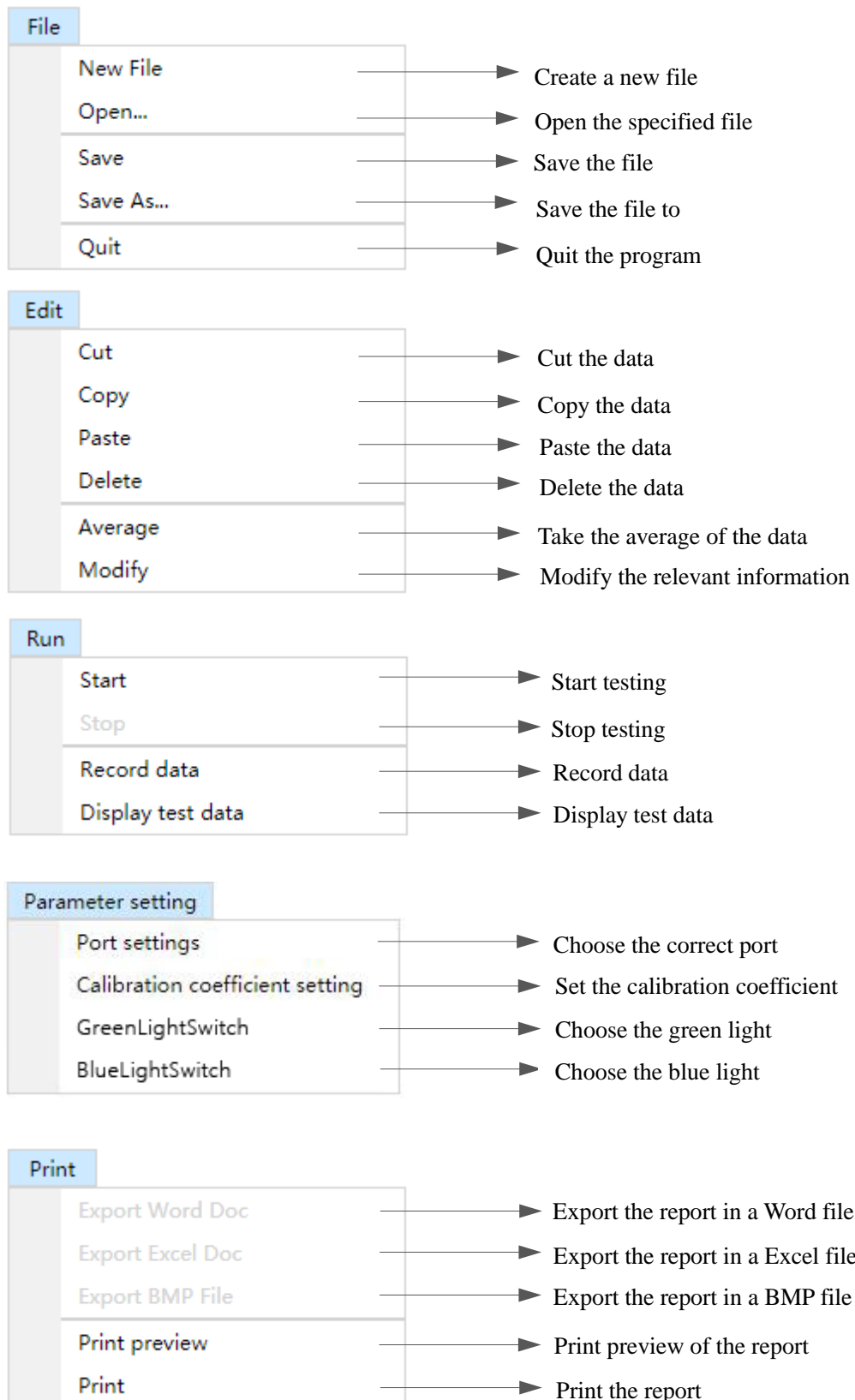
**Figure 2: Sample Test Interface**

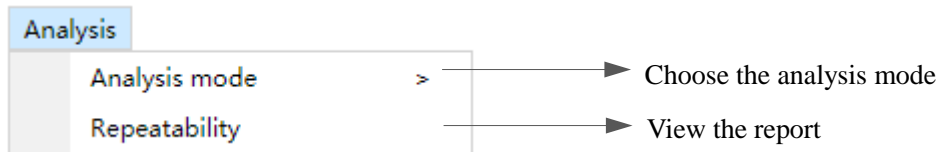
### 6.1.3.1 Toolbar icons

	Create a new file		Open the specified file
	Save the file to		Copy the data
	Cut the data		Paste the data
	Print preview		Print
	Start testing		Stop testing
	Record data		



### 6.1.3.2 Drop-down list






### 6.1.3.3 Composition of interface

The interface consists of four quadrants: Sample Information and Test Condition, Particle Size Distribution, Correlation Function and Photon Counting Rate, among which "Sample Information and Test Condition" interface is used to record the information and test conditions of the test sample, "Particle Size Distribution" interface displays test data and particle size distribution diagram, "Correlation Function" describes the autocorrelation curve outputted by digital correlator, and "Photon Counting Rate" presents the current number of scattered light photons in real time. Observe the correlation curve; if it isn't the ideal one, then it can be adjusted by choosing different delay unit time to achieve the ideal state.

The specific methods are as follows:

6.1.3.3.1 Click  on the toolbar to end the test;

6.1.3.3.2 Change the delay unit time and restart;

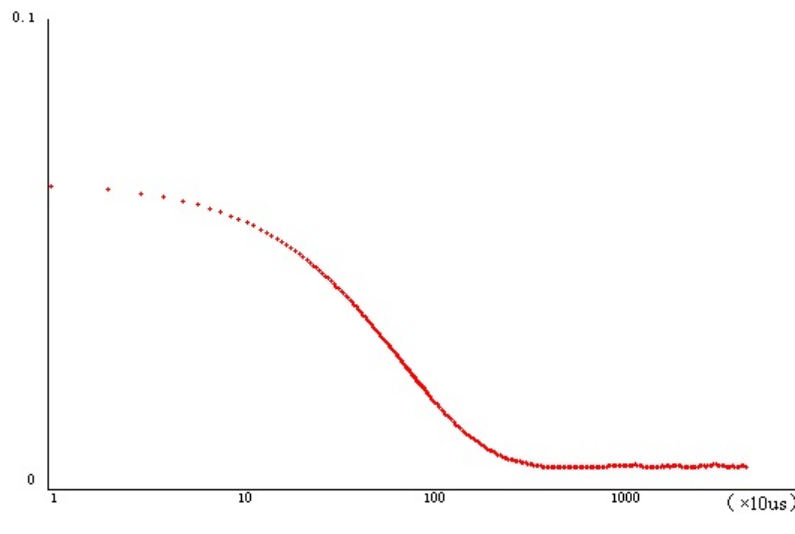
6.1.3.3.3 Observe the correlation curve. If it still fails to meet the requirements, repeat the above operations until the ideal correlation curve is obtained;

6.1.3.3.4 The ideal correlation curve is shown in the figure 3. The front part of the curve is on a downward trend, the latter half is in a stable state,

and the inflection point shall be between 100-1000;

6.1.3.3.5 If the front part of the correlation curve drops sharply and the tail part of the correlation curve is too long, which means the delay unit time is too long. Therefore, a shorter delay unit time shall be selected. But if the stable part of the curve tail is too long, i.e. the inflection point drops and data over 1000, it means that the delay unit time is too short, and a longer delay time shall be better;


6.1.3.3.6 The principle is to select long delay unit time for large particles and short for small particles.



**Figure 3: The Ideal Correlation Curve**

6.1.4 After getting the ideal correlation curve and the test result is stable,

click  on the toolbar to record test results;

6.1.5 Click "End" in the "Run" menu or  on the toolbar to end the test;

6.1.6 Click the blank space to view the test results.

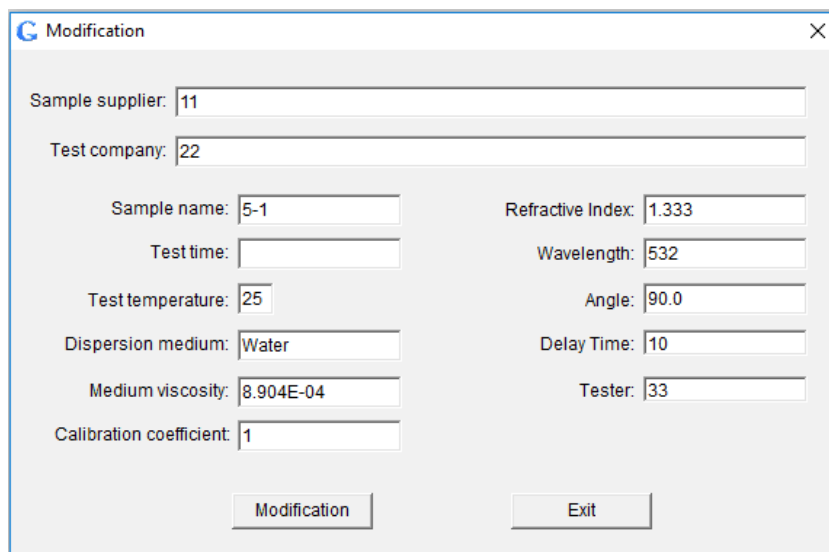
## 6.2 Data Processing

### 6.2.1 Data Deletion

To delete unfavorable records, select the records and then click "Delete" on the "Edit" menu, or press the Delete key on the keyboard to delete directly.

### 6.2.2 Data Modification

If the sample information and test condition is not filled in before the test, the recorded data can also be modified. When modifying, select the data to be modified, click "Modify" on the "Edit" menu, or right-click the mouse to select "Modify" to open the information modification interface.



The screenshot shows a software window titled "Modification" with a close button (X) in the top right corner. The window contains several input fields for data modification:

- Sample supplier: 11
- Test company: 22
- Sample name: 5-1
- Refractive Index: 1.333
- Test time: (empty)
- Wavelength: 532
- Test temperature: 25
- Angle: 90.0
- Dispersion medium: Water
- Delay Time: 10
- Medium viscosity: 8.904E-04
- Tester: 33
- Calibration coefficient: 1

At the bottom of the window, there are two buttons: "Modification" and "Exit".

**Figure 4:** Information Modification Interface

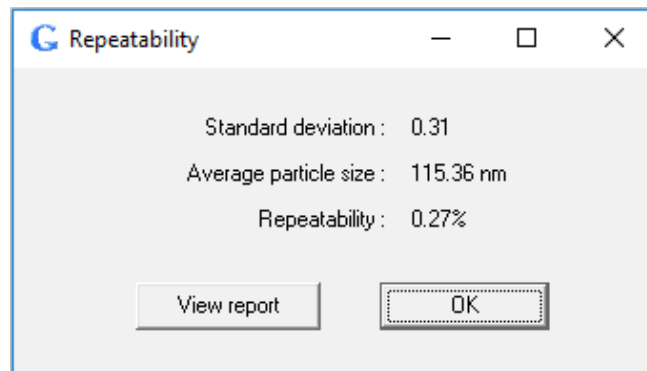
## 6.3 Repeatability of the Test Result

### 6.3.1 Select the data record;

No.	Sample Name	Test Time	Size (nm)
1	1	2020/5/6 13:40:40	115.43
2	1	2020/5/6 13:40:40	115.14
3	1	2020/5/6 13:40:41	114.98
4	1	2020/5/6 13:40:41	114.96
5	1	2020/5/6 13:40:41	115.01
6	1	2020/5/6 13:40:42	114.75
7	1	2020/5/6 13:40:42	114.72


**Figure 5: Data Selection**

6.3.2 Click "Repeatability" on the "Analysis" menu to pop up repeatability interface which shows standard deviation, average particle size and repeatability, then click "average particle size report" to view the average data value of the selected record.




**Figure 6: Repeatability Interface**

## 6.4 Print Preview

Double click for opening the record you want to preview, and click "Print preview" on the "Print" menu or  on the toolbar.

## 6.5 Print

Double click for opening the record you want to print, click "Print" on the "Print" menu or  on the toolbar or a simple Ctrl+P keyboard


shortcut to print.

 **Attention: A4 paper is required for printing test report.**

### 6.6 Test Report Export

In the test report or print preview interface, click options in the "Print" from drop-down menu to export test reports in Word, Excel and BMP formats.

### 6.7 Save Data

After test data recording, click "Save" on the "File" menu or  on the toolbar or Ctrl+S keyboard shortcut to pop up "Save" interface. Select the saving path, input the file name, and click "Save" to save the current record list. The suffix of the saved file is ". wcr".

### 6.8 Laser Switch

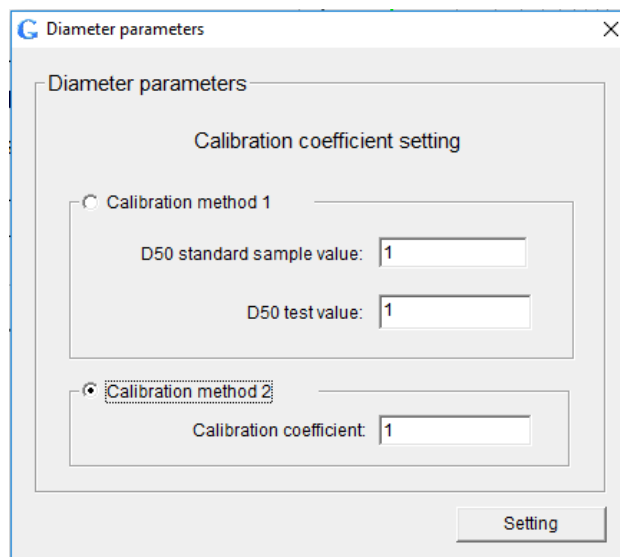
Click "Green Light Switch" or "Blue Light Switch" in "Parameter setting" to choose the light.

**Light selection guidance:** The optimum photon counting rate is ~40 for green laser and ~10 for blue laser. Choose the green light to test at first. If the photon counting rate of the sample is always 1-2, which means that the sample may absorb light, it needs to switch to blue light.

### 6.9 Calibration Method

6.9.1 Click "Calibration coefficient setting" in the "Parameter setting" menu to open the popup window, as shown in Figure 8. In "Calibration method 1", input standard sample value and test value directly and then to click "Setting". If choosing "Calibration method 2", calculate the calibration coefficient first and then fill in it and click "Setting";

$$\text{Calibration Coefficient} = \frac{\text{Standard Sample Value}}{\text{Test Value}}$$



**Figure 8:** Calibration Interface

6.9.2 After adjustment, repeat measurements several times, observe the stability of the measurement results. If the requirements are as expected, the calibration is completed.


## 6.10 Temperature Display




The required working temperature can be manually preset on the enclosure panel, which makes it more intuitive.

## 7. Maintenance

7.1 Please clean the sample cell before closing the system. Do not let the material stay for a long time.

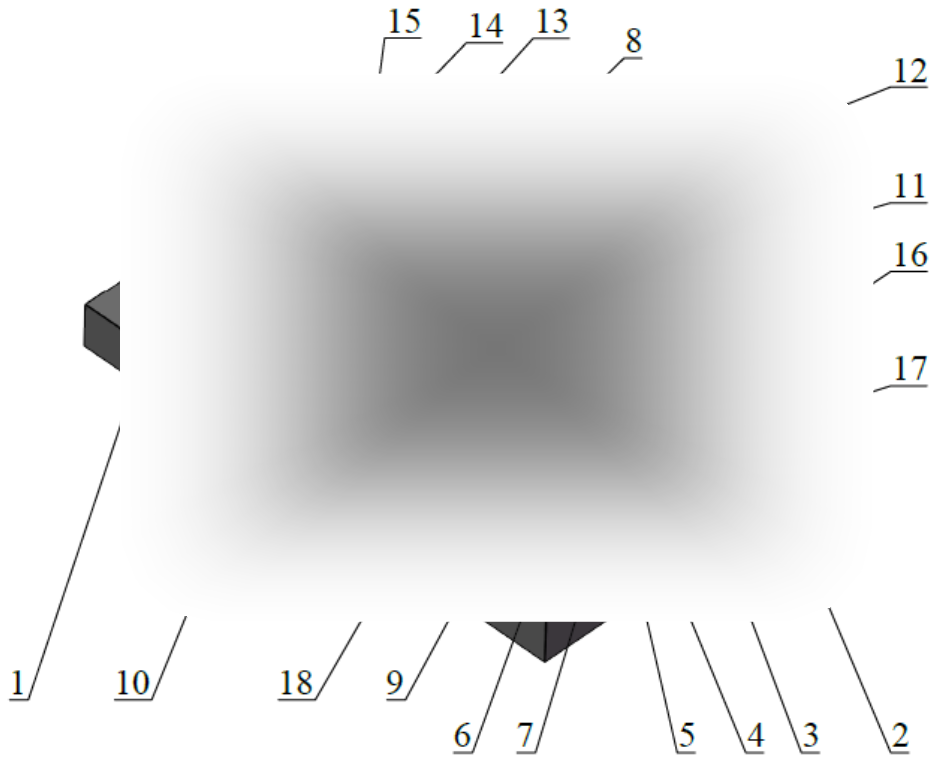
7.2 **Attention**  : Service or maintenance work is prohibited when the system is running.

7.3 **Attention**  : Ensure the power supply has been turned off safely before implementing the service or maintenance work.

## 8. FAQ

If the LPSA software does not respond within 10 minutes, please close the software and restart it after a few minutes.





Detailed Internal Diagram of the GDPS



## Instruction Manual

### Genizer Particle Sizer Series

List of components		
Item	Description	Function
1	Power Switch	When pressed, the power is on and the indicator light is on
2	Fuse	Electric Leakage protection
3	Power Socket	Power cord connection socket
4	COM 3	Laser switching port
5	COM 2	Control port for computer control of instruments
6	COM 1	Sampling port for data communication between instrument and computer
7	Cooling Fan	Cool the internal components
8	Lens-2	Refraction for light
9	Digital Correlator	Obtain autocorrelation function of dynamic scattering light
10	Photomultiplier Tube	Receive scattered light signal and convert it into electrical signal
11	Laser Device 1	Output green laser
12	Laser Device 2	Output blue laser
13	Lens	Converging laser beam
14	Sample Holder	Hold the sample
15	Thermostat Module	Control the temperature of sample holder to be constant
16	Temperature Controller	Control the thermostat module
17	Laser and Photomultiplier Tube Power Supply	Power the laser device and photomultiplier tube
18	24v Switching Power Supply	Supply DC24v

Note: 1. The specification, structure and parameter may be modified without notification.

2. The Dimensions, structure and parameter should be subject to the final product.