



Automatic Colony Counter LMACC-A100

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1. Safety Measures

- Before using the instrument, connect the LMACC-A100 automatic colony counter to PC with a special USB cable, then power the counter. Start the colony counting software, open the light source adjustment, open the serial port, select the light source conditions, connect the camera, and display the preview image in the preview window at the bottom right corner of the colony counting software, indicating that the system is running normally.
- When the system prompts notes or the progress bar does not disappear for a long time, check whether the power cable or data cable is disconnected. Re-power the colony counter and open the software again.
- After the software is installed, the installation directory cannot be changed to prevent loss of statistical data.
- If the instrument is exposed to rain or water enters the instrument during working, immediately disconnect the power supply.
- Do not place sharp objects on the shooting table to avoid scratching.
- Do not excessively bend, twist, or modify the power cord, or subject it to heavy objects; when the power cord is damaged, to avoid danger.
- Disconnect to power supply after using it and place the instrument in a safe position to avoid splashing or bumping.
- After a long idle, carefully check whether there is any damage or be affected by dampness, whether it is exposed to water, whether each part is complete, etc. If an abnormality occurs when powered, the power supply should be disconnected immediately to find the reason.
- If it is determined that the instrument is malfunctioning, it should be sent to a professional for inspection and maintenance in time. The user should not open the instrument without authorization.
- Operate the instrument according to the correct procedure of the menu sequence.
- It must be connected to AC220V 50Hz AC power, otherwise it will cause damage.
- Do not plug or unplug the power plug with wet hands to avoid electric shock.
- Parameters in the maintenance menu are debugged and entered by the manufacturer, users shouldn't change them, or the normal working of the machine will be affected.
- Kindly store the instrument in a dry, ventilated, and sun-proof place.
- Kindly keep this manual properly throughout the life of the instrument.
- Be sure to use the complete original factory product manual.
- Before using this product, kindly read this product manual carefully and familiarize yourself with the operation of the product. Pay particular attention to safety instructions and warnings to prevent personal injury and instrument damage caused by non-standard operation during use.
- The manual should be placed in a nearby location, making it convenient for reading at any time.
- If the product is transferred, kindly transfer this manual to subsequent users of this product.
- Kindly operate the instrument only by the intended use of the instrument and the parameters specified in the technical data, and beyond scope using is forbidden.
- It is forbidden to disassemble this instrument without permission.

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- Do not touch and test live parts without insulation to avoid personal injury and instrument damage.
- Do not store the product of this instrument with chemical solvents and do not use any desiccant.
- Further maintenance work or additional work can only be carried out by specially authorized personnel.
- The object to be tested or the measurement environment may also be affected by unsafe factors. When performing measurements, be sure to observe the effective safety regulations in the area.

2. Introduction

Automatic Colony Counter LMACC-A100 is equipped with a high-definition CCD camera for accurate enumeration of colonies. It can recognize 8 different colony colors, allowing for the differentiation and quantification of various strains. It operates within a broad temperature range from 0 to 50°C. Our colony counter can process up to 300 colonies within 3 seconds ensuring high throughput.

3. Features

- Integrated with smart counter software
- Process multiple plate types
- Crafted with ABS plastic
- Manual addition and deletion of colonies
- Can set non-countable area

4. Specifications

Model No	LMACC-A100
Camera	True Color high definition CCD camera
CCD Resolution	10,000,000 pixels
Counting Software	Smart counter software
Language	English
Colony size resolution	> 0.1 mm
Colony color recognition	8 colors
Applicable methods Plate type	Spread plate, Pour plate, Membrane filter, Spiral plate
Counting speed	300, less than 3 seconds
Light source	Long-life dual LCD light
Working temperature	0 to 50°C
Material	ABS plastic
Size of Petri dish	90 mm and 55 mm standard
Host Dimension	290 × 260 × 380 mm
Power	20 W
Power supply	AC 110 to 220 V, 50 Hz
Weight	3 kg

5. Applications

Automatic Colony Counter is widely used in automatic colony counting, reading for quantitative studies, quality and research purposes across microbiology, hospitals, cosmetic, food industries, and pharmaceuticals units.

6. Instrument Introduction

Instrument Structure

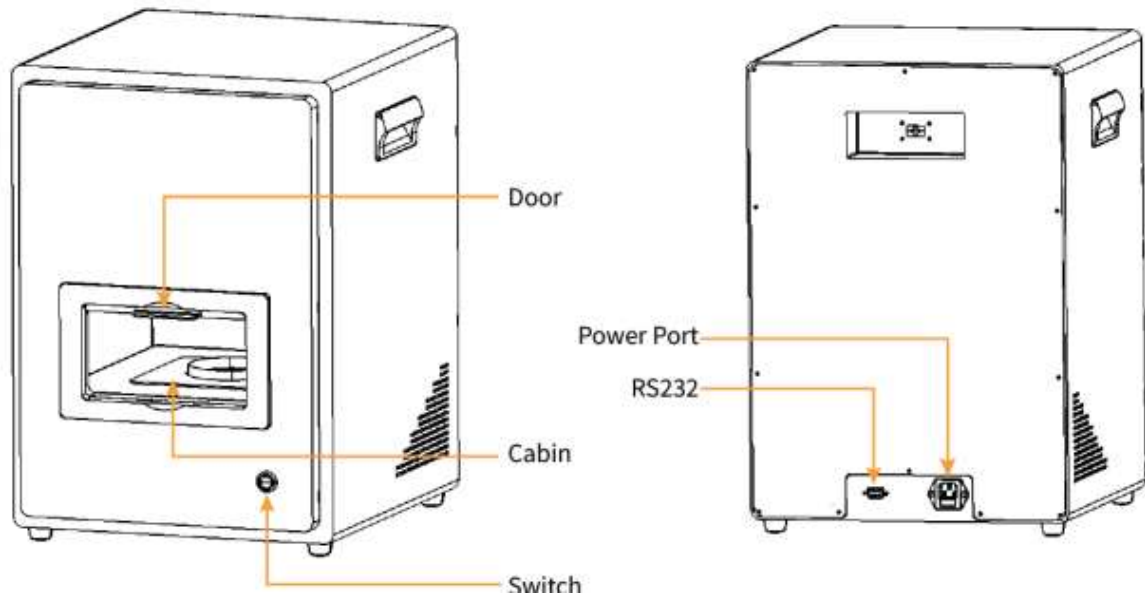


Figure-1

7. Software Operations

7.1 Operation Steps

- Connect to power, turn on the power switch, and pull down the front door after placing it in the petri dish.
- Run colony counting software, select serial port, connect, and select an appropriate combination of light.
- Connect the camera, take pictures, analyze and calculate through the software, and output the colony count and other data.
- After use, take out the petri dish in time, handle it properly, and disconnect the power supply of the instrument.

7.2 Software Function

Automatic colony counting software is the main part of the automatic colony counter,

double click the shortcut icon  to open the software.

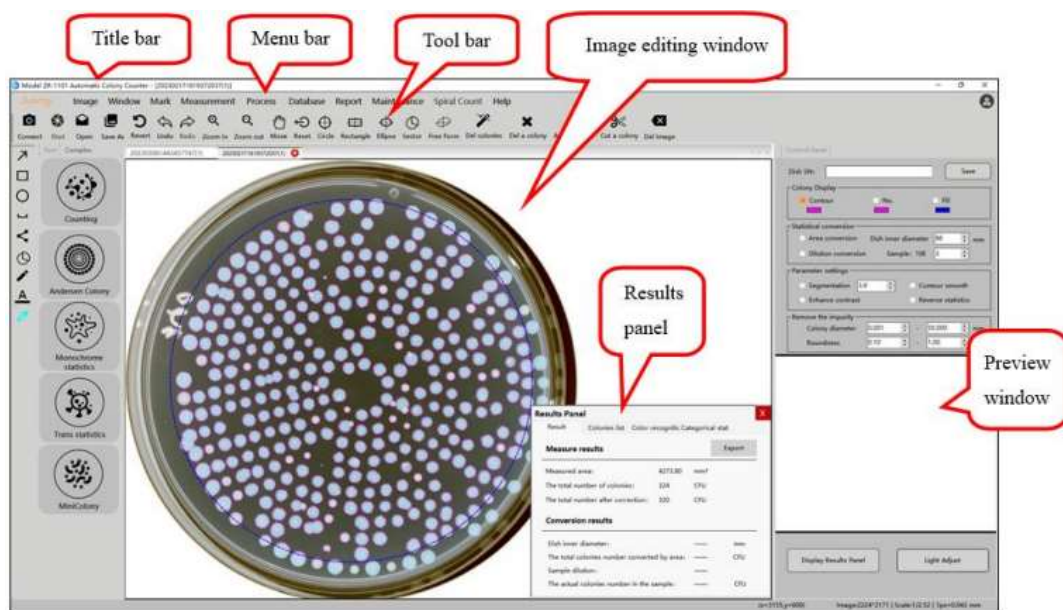


Figure-2 Main Interface

7.2.1 Image Acquisition

The "Image" in the menu bar, contains "Shoot", "Open", "Save as", "Close", "Save path", and "Exit" buttons. Hover the mouse over the shortcut icon for a moment, and the corresponding operation prompt box will appear next to the shortcut. You can also use shortcut keys (such as Ctrl + O to open a file) for easy operation,

Image Window Mark Measurement Process Database Report Maintenance Spiral Count Help

Figure-3 Menu Bar

7.2.1.1 Open

Click "**Image**" in the toolbar, then click "**Open**" in the drop-down menu, or directly click "**Open**" in the toolbar, as shown in **Figure 4** and **5**. The file content is displayed in **Figure 6**.

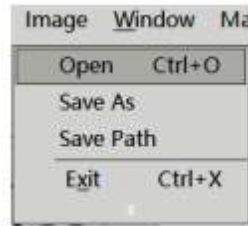


Figure-4 Image Drop-Down Menu



Figure-5 Open Image

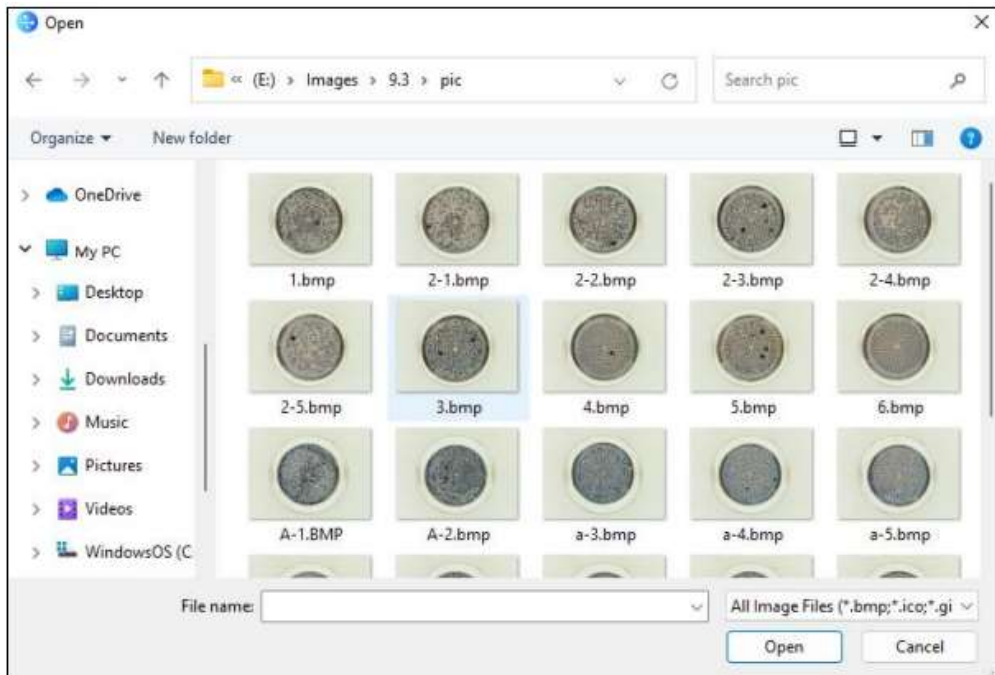


Figure-6 Open Image File

7.2.1.2 Save as

If you want to name a picture, click "**Save as**" to rename the picture and select a storage location.

7.2.1.3 Save Path

After the software takes pictures, the pictures will be automatically saved to the default storage path. You can click "**Save path**" to view the specific location.

7.2.1.4 Exit

The software will exit.

7.2.2 Windows

When multiple pictures are opened, the names of multiple pictures are displayed in the Picture drop-down menu. As shown in **Figure 7**.

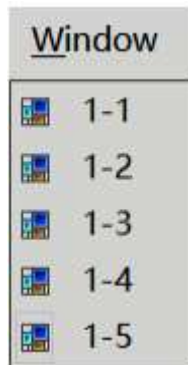


Figure-7 Window

7.2.3 Annotation

The software provides points, rectangles, ellipses, lines, straight lines, angles, rectangles, broken lines, circles, characters, curves, and other graphics annotation methods, which are convenient for users to annotate, and the graphics can be embedded in the image. Annotated graphics can be selected by right-clicking and be dragged by holding down the left mouse button. The toolbar tool is shown in the following Figure.

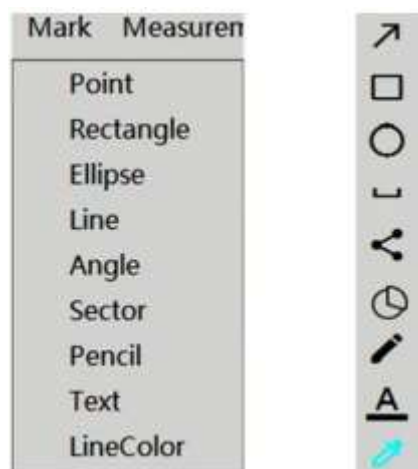


Figure-8 Annotation Toolbar

7.2.4 Measurement

- Click "**Measurement**", and the "**Measurement Tool**" interface appears. Use the calibration tool to calibrate the petri dish size to achieve accurate measurement of colonies.
- Put a ruler in the shooting area, select "**Calibration**", press the left mouse button to move from one scale line on the ruler to another, this degree range is at least 30mm, then fill in the actual length between the scale lines in the pop-up window, click "**OK**" to complete the calibration, or click "**Cancel**", cancel the calibration.
- The instrument has been calibrated out of the factory. If the image taken by the other camera is counted, it needs to be calibrated again.
- "**Recovery**" is used to restore the default factory parameter.
- A variety of shapes can be selected to measure colony area, length, angle, fan area, and other parameters.

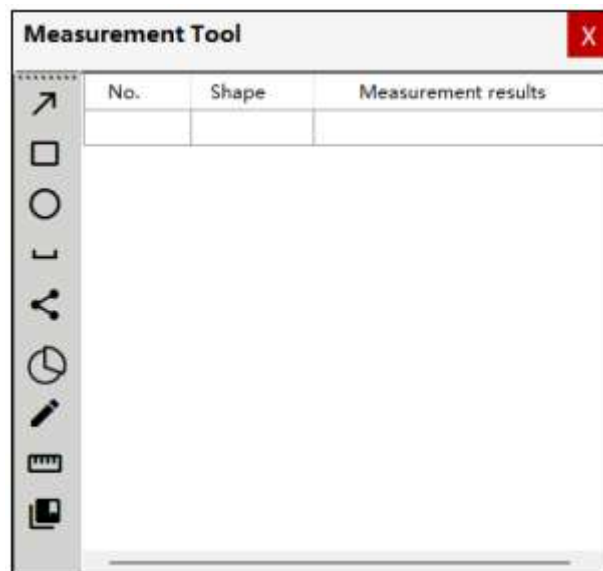


Figure-9 Measurement tool

7.2.5 Image Processing

The software not only has a powerful colony-counting function but also has image image-processing function. According to the features of the original image, the image can be more uniform, the image details can be more obvious, the image edge can be clearer, and the colony count can be more accurate.

Image enhancement: Edge enhancement, Image sharpening.

Image filtering: Gaussian filter, Mean filter, Median filter, Maximum value filter, Minimum value filter, Adaptive smoothing filter.

Edge detection: Canny detection, Scharr detection, Robert's detection, Sobel detection, Prewitt detection, Kirsch detection, Gaussian detection, horizontal detection, vertical detection.

Image conversion: Edge equalization, Grayscale conversion, Negative phase conversion, RGB component adjustment.

Morphology: Corrosion (Square corrosion, Circular corrosion, Cross corrosion), Expansion (Square expansion, Circular expansion, Cross expansion), Open operation, Closed operation.

Image segmentation: RGB segmentation, Grayscale segmentation.

7.2.6 Database

Click "**Database**" from the menu, and click "**Database**" in the drop-down menu, as shown in **Figure 10**, and a "**Dish Query**" window will pop up. Data query can be performed by selecting time or dish number, as shown in **Figure 11**. Select historical data and click "**Open Statistics**" to query historical statistics.



Figure-10 Database Menu

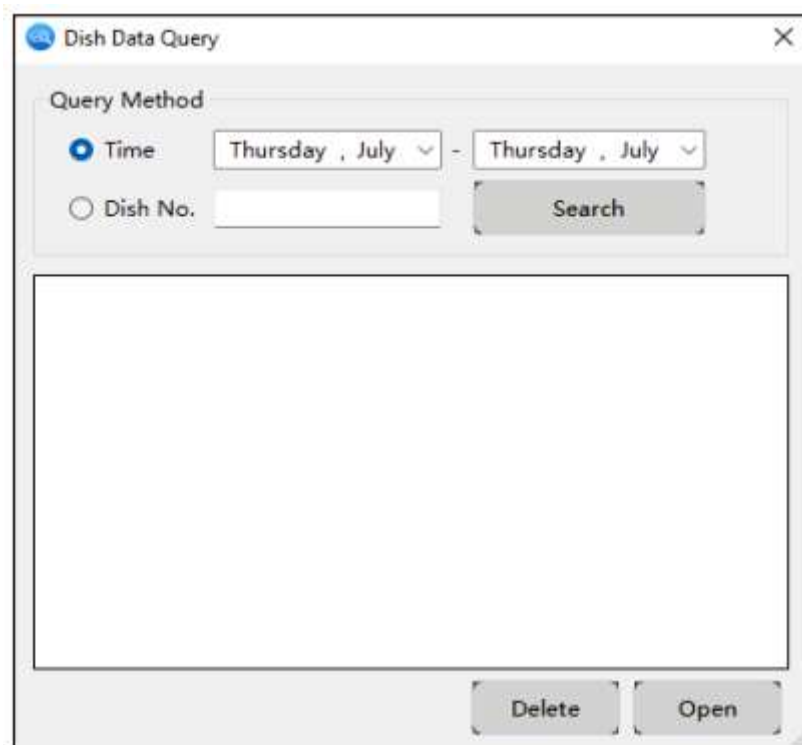


Figure-11 Dish data Query

7.2.6.1 Audit

Click "**Audit**" in the "**Database**" drop-down menu to query data by date. As shown in **Figure 12**.

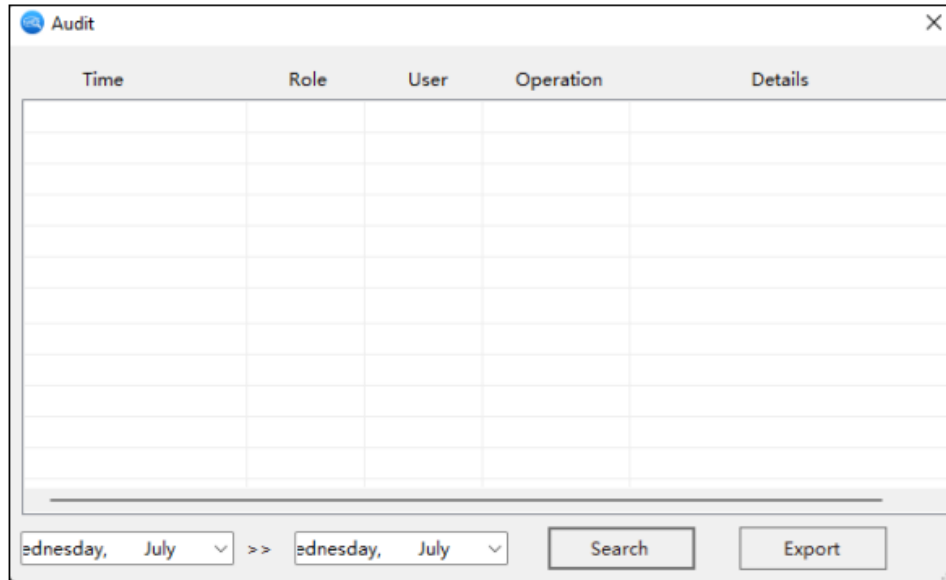


Figure-12 Audit

7.2.7 Report

Click the **"Report"**, and the window in **Figure 13** will appear. Report Parameter **Set**: As shown in **Figure 14**, you can set **"Submission Unit"** and **"Test Unit"** and click **"OK"** to save.

Digital Report: As shown in **Figure 15**, the "Report Information" pops up. Historical reports can be queried respectively by time or report name, and new reports can be edited, as shown in **Figure 16**.



Figure-13 Report Menu

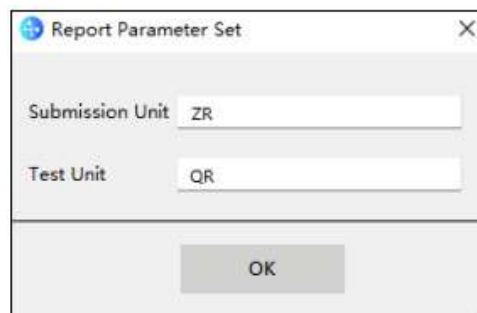
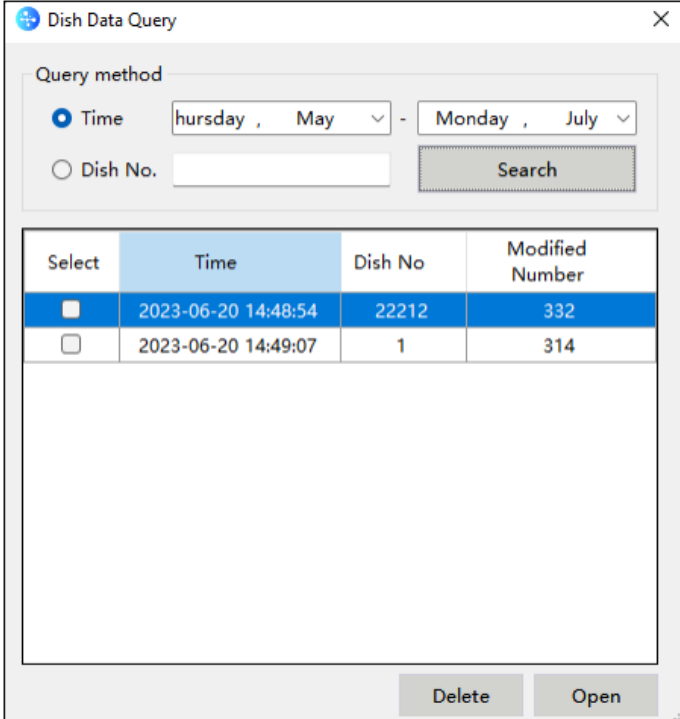


Figure-14 Report Parameter Set

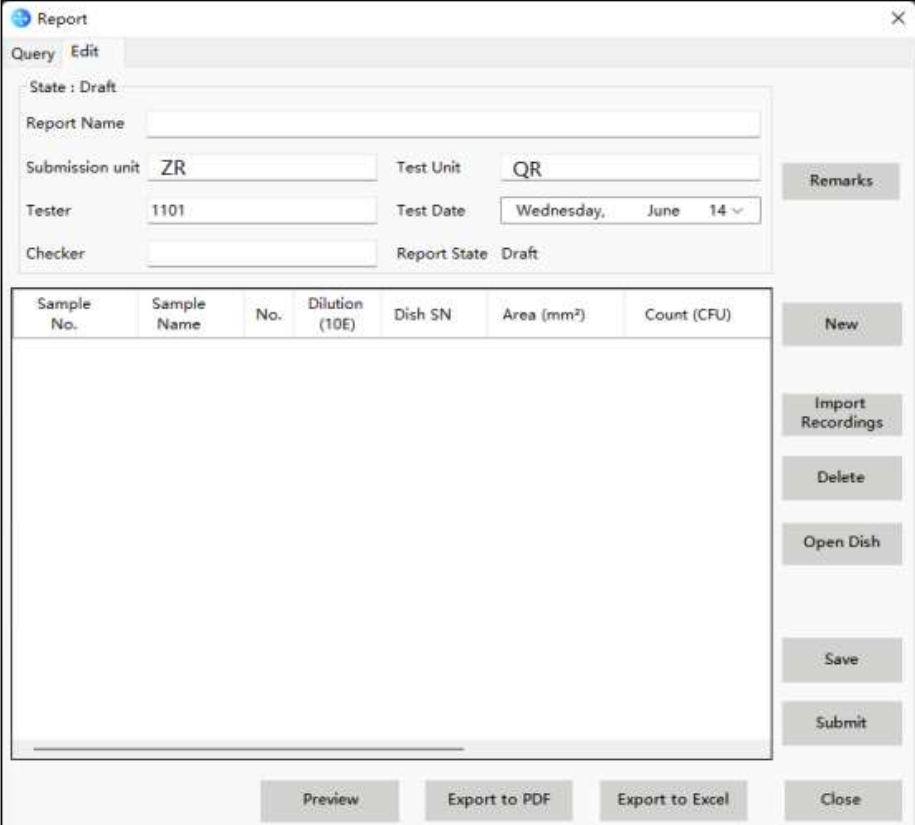
Automatic Colony Counter LMACC-A100



The 'Dish Data Query' window features a 'Query method' section with two options: 'Time' (selected) and 'Dish No.'. The 'Time' method includes two date range dropdowns: 'Thursday, May' and 'Monday, July'. A 'Search' button is located to the right of the 'Dish No.' input field. Below this is a table with four columns: 'Select', 'Time', 'Dish No', and 'Modified Number'. The table contains two rows of data. At the bottom of the window are 'Delete' and 'Open' buttons.

Select	Time	Dish No	Modified Number
☒	2023-06-20 14:48:54	22212	332
☐	2023-06-20 14:49:07	1	314

Figure-15 Report Edit Interface



The 'Report' window has 'Query' and 'Edit' tabs. The 'Edit' tab is active, showing a 'State : Draft' label. Below this are input fields for 'Report Name', 'Submission unit' (set to 'ZR'), 'Test Unit' (set to 'QR'), 'Tester' (set to '1101'), 'Test Date' (set to 'Wednesday, June 14'), and 'Checker'. A 'Report State' dropdown is also present, currently set to 'Draft'. To the right of these fields is a 'Remarks' text area. Below the input fields is a table with seven columns: 'Sample No.', 'Sample Name', 'No.', 'Dilution (10E)', 'Dish SN', 'Area (mm²)', and 'Count (CFU)'. To the right of the table is a vertical stack of buttons: 'New', 'Import Recordings', 'Delete', 'Open Dish', 'Save', 'Submit', and 'Close'. At the bottom of the window are buttons for 'Preview', 'Export to PDF', 'Export to Excel', and 'Close'.

Figure-16 Edit a Report

7.2.8 Maintenance

You can use the default password "2007" to access the maintenance page and view related information. See **Figure 17** and **18**.

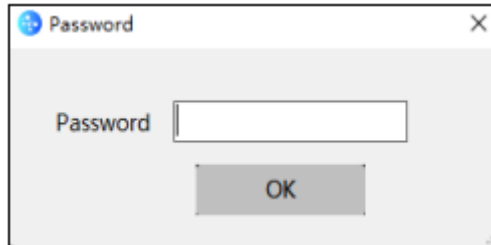


Figure-17 Password

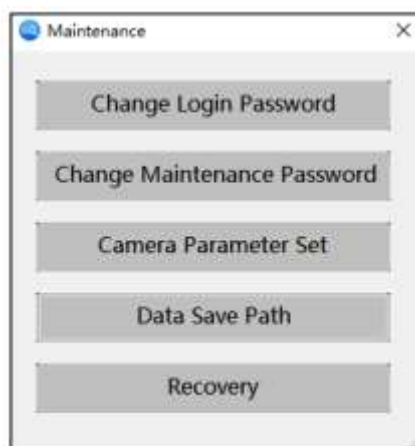


Figure-18 Maintenance Menu

7.2.9 Help

Click the "**Help**" to find the version information of the software.

7.2.10 Login

Click the symbol in the upper right corner to enter the interface in **Figure 19** which displays the name and user role of the current operator. If you need to switch the user, you can click "**Change user**" to enter the login interface of a new user as shown in **Figure 20**.

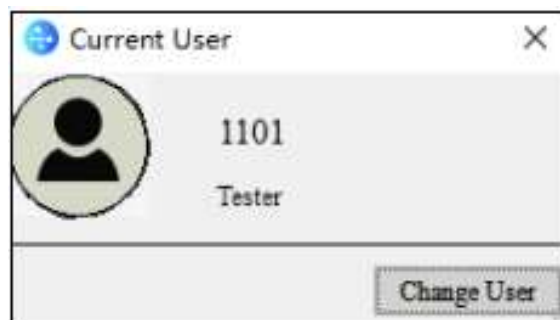


Figure-19 Current user



Figure-20 Login

7.3 Image Acquisition

7.3.1 Light Adjustment

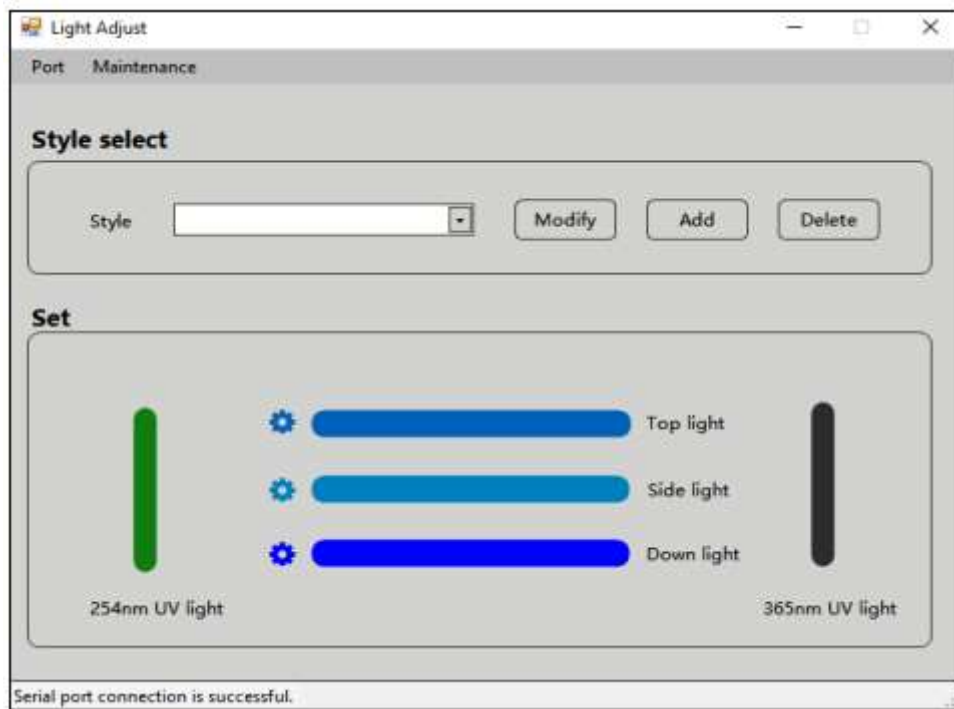


Figure-21 Light Adjust

The automatic colony counter is connected to the computer host via a USB communication line, click "**Light Adjust**", and the "**Light Adjust**" interface will appear, as shown in **Figure 21**. The software will automatically open the serial port set last time to achieve communication with the colony counter.

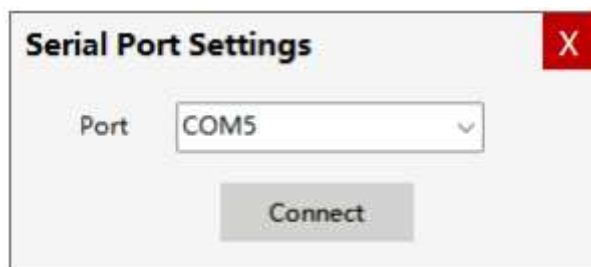


Figure-22 Port Settings

If the serial port is replaced and the lights fail to be set, you can select and set the serial port again by clicking "**Port**" on the menu bar, as shown in **Figure 22**. The status of the serial port is displayed in the status bar.

7.3.1.1 Adding a New Style

You can adjust the light by setting the color of the upper, side, and lower light source, as well as the switch state. After reaching the satisfactory state, click the "**Add**" button, enter the name of the style, and click "**Save**". The style will be added to the database. For ease of management, it is recommended not to add too many styles, less than 20 is best.

7.3.1.2 Select a Style

The next time you use it, click the style drop-down box, select the style, and the software will set all the lights in an instant according to the style parameters.

7.3.1.3 Modify Styles

If you want to modify the selected style, you can modify the parameters of the light in the "**Set**", or you can modify the name of the style in the drop-down box and click "**Modify**" after the modification is completed.

7.3.1.4 Delete a style

If you add too many styles, you can click "**Delete**" to delete the selected style.

7.3.2 Image Acquisition

After selecting the appropriate lighting conditions and connecting the camera, the colony images in the field of view can be collected for statistical information. The specific steps are as follows:

- 1) Put the automatic colony counter on the worktable and connect it to the computer through the USB data cable.
- 2) Turn on the power of the counter and start the colony counting software.
- 3) Click "**Connect camera**", the preview image will be displayed in real-time at the bottom right of the software interface, select/set the appropriate lighting parameters.
- 4) Click the "**Shoot**" button to get the colony image.

7.4 Colony Count

7.4.1 Statistical Region Selection

The software automatically locates the petri dish when the image is opened and sets the default detection area. Users can also select appropriate detection areas for colony statistics from the tools shown in **Figure 23** according to their needs.



Figure-23 Statistical Region Selection

After the selection area is selected, right-click the mouse in the center of the area, and the blue anchor point is displayed, place the mouse in the selection area, and long press the left button of the mouse to move the selection area. At the same time, you can drag the blue anchor point to adjust the size of the selection area.

7.4.2 Counting Modes

The left operation panel of the software has five counting modes: "**Counting**," "**Anderson Colony**," "**Monochrome statistics**," "**Trans statistics**," and "**Microcolony**," which can be selected according to demand.

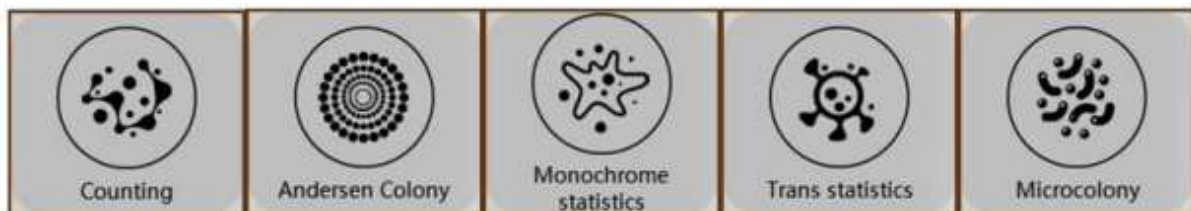


Figure-24 Colony Count mode

7.4.2.1 Counting

After the statistical area is circled, click "**Colony Count**" for one-click statistical counting.

7.4.2.2 Anderson Colony

One-click counting was carried out for the sample of the dish collected by the Anderson sampler. This mode of counting did not cut the colony and is suitable for Anderson's counting mode.

7.4.2.3 Monochromatic Statistics

You can pick up the color of the target colony in the colony image (The color of the picked colony should be very different from the background color), click the color box on the right side of "colony fill color", and the color selection window can pop up, you can freely set the colony to fill color, and adjust the three parameters by adjusting hue, saturation, and brightness, and perform one-click statistics on the picked color colony. See **Figure 25,26**.

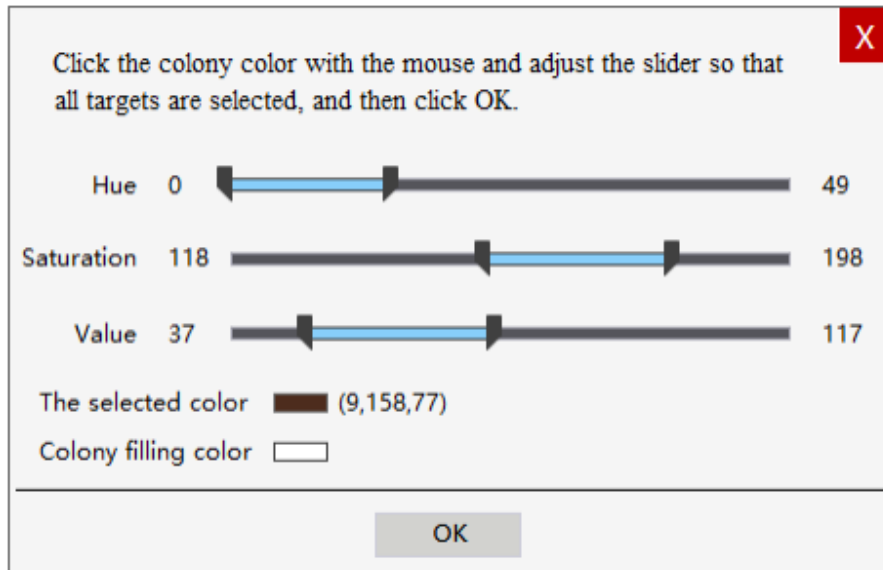


Figure-25 Monochromatic Statistical Interface

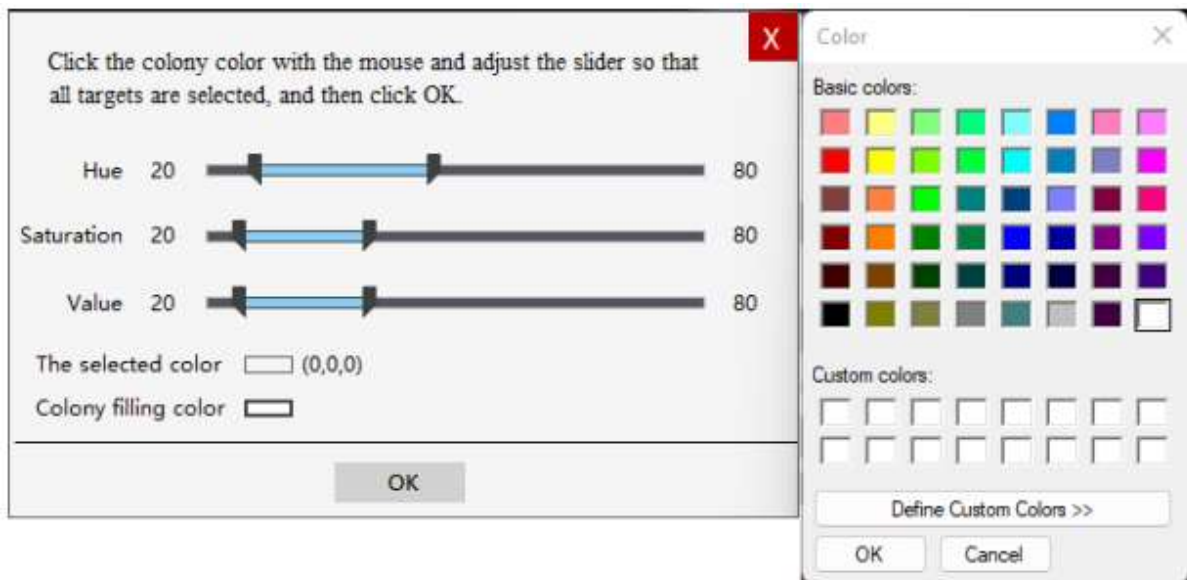


Figure-26 Colony filling color select

7.4.2.4 Trans Statistics

Parameter setting: Click the "**Trans statistics**" mode, click the color box on the right of "background filling color" to select the background filling color, and set the number of colors in "color classification" according to the actual number of colony colors in the dish, as shown in **Figure 27 and 28**. Counting process: Click the mouse on the background with a large color difference from the colony and adjust the background filling by adjusting the positive and negative deviations until the background is filled, as shown in **Figure 29**. Click "**OK**" to automatically count the picked color colony. According to the color classification set in **Figure 27**, the number of colonies corresponding to different colors can be viewed in the statistical results.

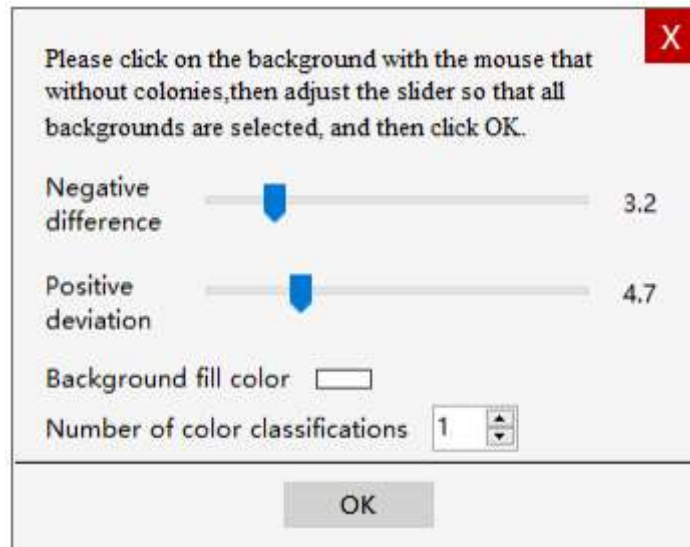


Figure-27 Trans Statistical Interface

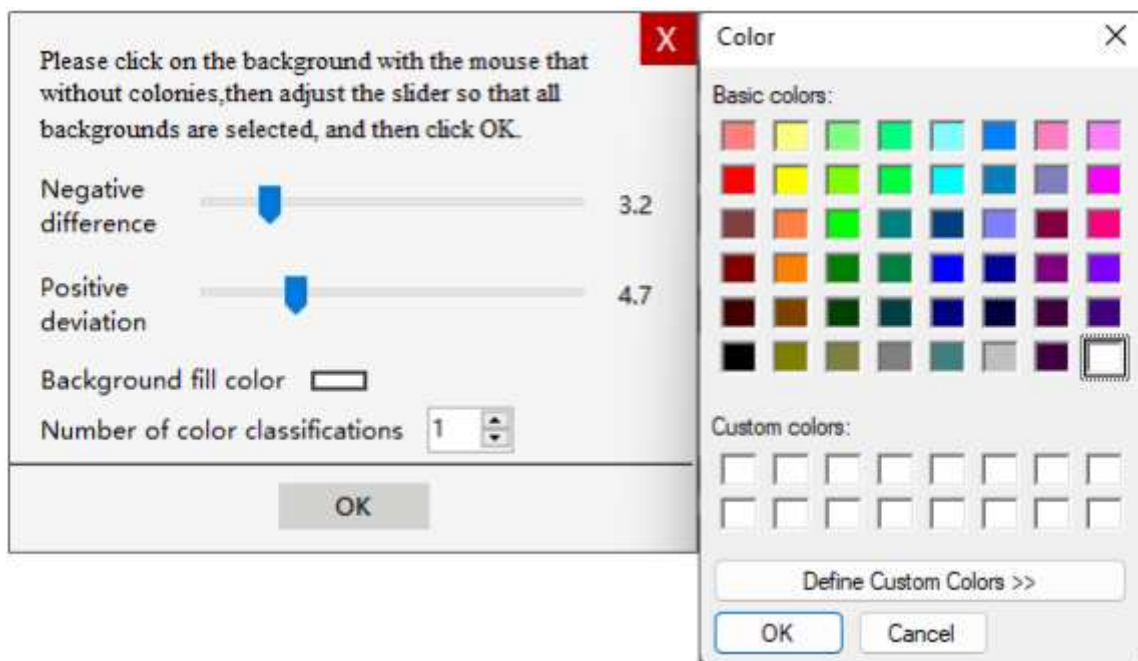


Figure-28 Trans Statistical Color Selection

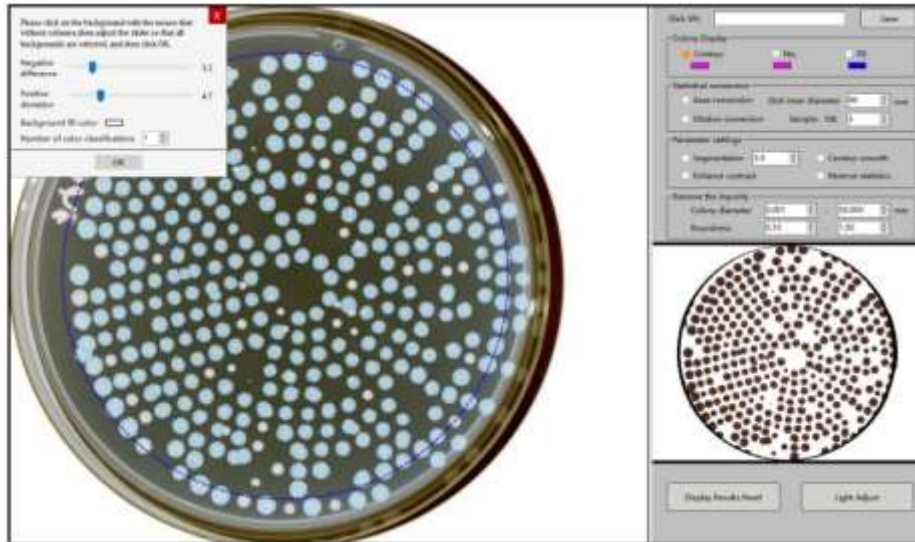


Figure-29 Trans Statistics real-time display interface

7.4.2.5 Microcolony

This pattern is suitable for pouring colonies and can make better identification of tiny colonies.

7.4.3 Counting Parameter Settings

7.4.3.1 Colony Display

Outline, serial number, and fill can be checked to make the colony stand out, and the corresponding color boxes can be changed in color as needed.

7.4.3.2 Statistical Conversion

Select the appropriate statistical conversion method, area conversion, and dilution conversion as needed. Area conversion: The number of colonies is converted according to the ratio of the selected area and the actual area of the dish.

Dilution conversion: Input the dilution ratio of the sample in the statistical conversion interface, and after counting the colonies, the number of colonies in the sample will be calculated in the statistical information.

7.4.3.3 Parameter Settings

Segmentation: For the first four modes, the degree of adhesion segmentation can be adjusted by setting the parameter of segmentation. The smaller the value, the finer the adhesion segmentation.

Contour smooth: Check "**contour smoothing**" to make the contour of the colony smoother.

Enhance contrast: If the contrast between the colony and the background color of the detected image is not obvious, that is, the colony color is like the background color, you can check the "**Enhance contrast**" to increase the difference between the colony and the background color, to successfully identify the colony with a similar color to the background.

Reverse statistics: If colony cutting is selected in the colony count, it may lead to reverse cutting of the picture due to the difference in the image, as shown in **Figure 30**. Check "**reverse statistics**" to restore the cutting to normal.

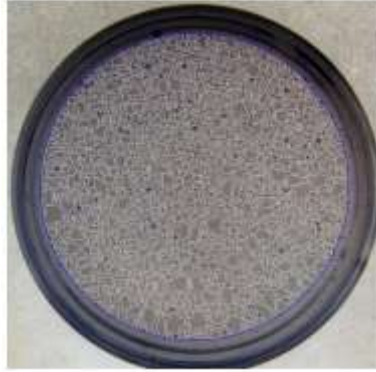


Figure-30 Reverse statistical anomaly

7.4.3.4 Remove the Impurity

By setting the diameter and roundness of the colony, the colony identification is more accurate, and the influence of impurities is removed as much as possible.

Note: The closer the contour of the colony is to a circle, the roundness is the closer to 1.

The Control Panel interface is organized into several sections:

- Dish SN:** A text input field with a 'Save' button.
- Colony Display:** Three radio buttons: 'Contour' (selected, with a pink bar), 'No.' (with a pink bar), and 'Fill' (with a blue bar).
- Statistical conversion:**
 - 'Area conversion' checkbox is unchecked. 'Dish inner diameter' is set to 86 mm.
 - 'Dilution conversion' checkbox is unchecked. 'Sample: 10E' is set to 3.
- Parameter settings:**
 - 'Segmentation' checkbox is unchecked, with a value of 3.9.
 - 'Enhance contrast' checkbox is unchecked.
 - 'Contour smooth' checkbox is unchecked.
 - 'Reverse statistics' checkbox is unchecked.
- Remove the impurity:**
 - 'Colony diameter' is set to 0.001 - 50.000 mm.
 - 'Roundness' is set to 0.10 - 1.00.

Figure-31 Control Panel

7.5 Counting Aid



Figure-32 Counting Aid

7.5.1 Delete all Colonies in an Area

If colonies in an area do not want to be counted, click "**Del colonies**" in the toolbar, press the left mouse button to select the area above the part to be deleted, and release the mouse, colonies in the selected area will not be marked.

7.5.2 Delete Single Colony

If a single colony does not want to be counted, click "**Del a colony**", and you can click the colony to delete.

7.5.3 Add a Colony

Move the mouse over the colony to be added and click the mouse to add the colony. Slide the middle button of the mouse to increase or decrease the size of the colony to be added.

7.5.4 Cut a Colony

To split the colony, click "**Cut a colony**" and underline above the colony you want to split.

7.5.5 Close the current picture

When the number of open photos exceeds the limit, you can close the photos by clicking "**Del Image**".

7.5.6 Revert

After image processing, if you want to restore to the initial state, click "**Revert**".

7.5.7 Undo, Redo

If you need to cancel the operation, you can click "**Undo**" to step back. If the undo operation is more than expected, you can click "**Redo**" to restore.

7.5.8 Zoom in, Zoom Out, Reset, Move

The colony image can be "**Zoom in**" and "**Zoom out**" operation; When the size of the original image needs to be restored, you can click "**Reset**" to restore the size of the image; After zooming in, you can click "**Move**" to move part of the colony image to the visual interface.

7.6 Statistical Information

Click "**Display Results Panel**" at the lower right corner to display the "**Result Panel**", as shown in **Figure 33 to 36**, including "**Result**", "**Colonies list**", "**Color recognition**", and "**Categorical statistics**".

7.6.1 Result

The area information of the statistical area, the number of colonies in the area, and the number of colonies per unit area are displayed, as shown in **Figure 33**.

Automatic Colony Counter LMACC-A100

Results Panel		
Result	Colonies List	Color Recognition Classified Statistics
Measure results		Export
Measured area:	4272.67	mm ²
The total number of colonies:	324	CFU
The total number after correction:	324	CFU
Conversion results		
Dish inner diameter:	86	mm
The total colonies number converted by area:	440	CFU
Sample dilution:	10 ⁻³	
The actual colonies number in the sample:	440000	CFU

Figure-33 Results

7.6.2 Colony List

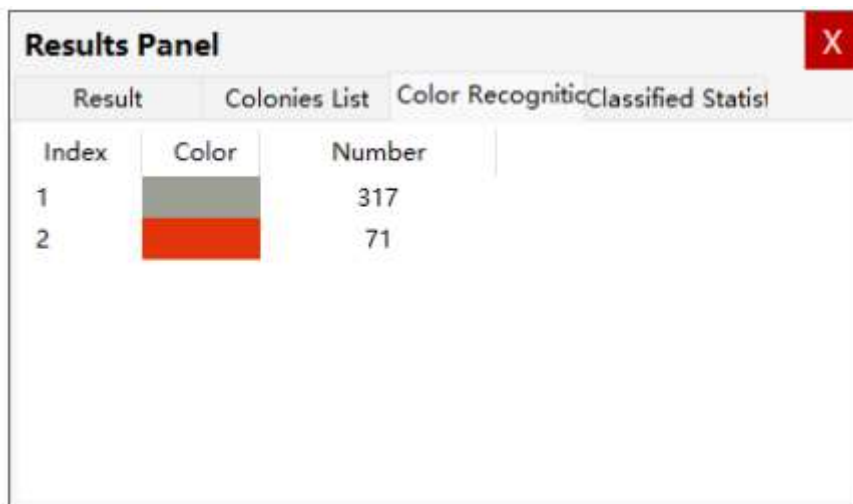
The colony index, location, equivalent diameter, area, length, roundness, short diameter, and long diameter were displayed, as shown in **Figure 34**.

Results Panel							
Result	Colonies List	Color Recognition	Classified Statistics				
Index	Location	Equivalent	Area	Length	Roundness	Short diameter	Long diameter
94	(1680,1395)	2.38	4.43	7.62	0.96	2.32	2.40
95	(1508,1388)	2.09	3.44	6.69	0.96	2.08	2.06
96	(1239,1389)	2.47	4.80	7.98	0.95	2.42	2.50
97	(486,1392)	2.74	5.88	8.75	0.97	2.68	2.70
98	(1062,1382)	2.41	4.56	7.76	0.95	2.37	2.39
99	(829,1386)	2.62	5.40	8.49	0.94	2.61	2.67
100	(1776,1376)	2.60	5.32	8.40	0.95	2.61	2.67
101	(561,1373)	2.59	5.28	8.47	0.92	2.57	2.60
102	(1611,1368)	2.29	4.12	7.38	0.95	2.28	2.30
							Export

Figure-34 Colonies List

7.6.3 Color Recognition

The number of colonies for each color is displayed. As shown in **Figure 35**.

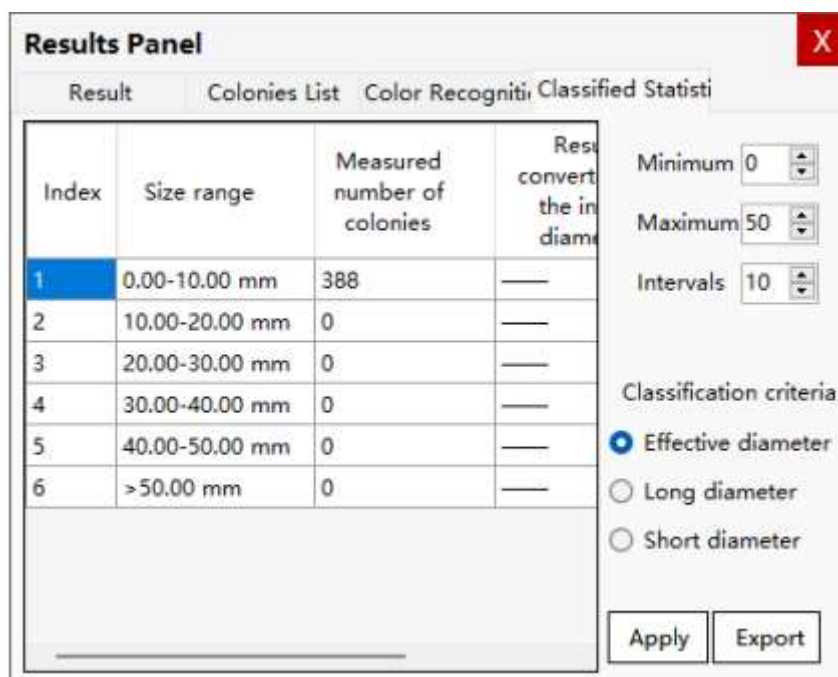


Index	Color	Number
1		317
2		71

Figure-35 Color Recognition Result

7.6.4 Classified Statistics

The number of colonies in each size range can be displayed, and the maximum, minimum, and intervals can be set. The colonies can be classified by equivalent diameter, long diameter, and short diameter, and statistics can be derived. **Figure 36** shows.



Index	Size range	Measured number of colonies	Result
1	0.00-10.00 mm	388	—
2	10.00-20.00 mm	0	—
3	20.00-30.00 mm	0	—
4	30.00-40.00 mm	0	—
5	40.00-50.00 mm	0	—
6	>50.00 mm	0	—

Minimum: 0
Maximum: 50
Intervals: 10

Classification criteria:
☒ Effective diameter
☐ Long diameter
☐ Short diameter

Apply Export

Figure-36 Classified Statistics

7.7 Spiral Counting Function

This software module applies to the automatic microbiological plate spiral inoculator and compatible instruments produced by SBI and IUL of Spain.

7.7.1 Spiral Statistical Analysis Principle

7.7.1.1 SBI Corporation

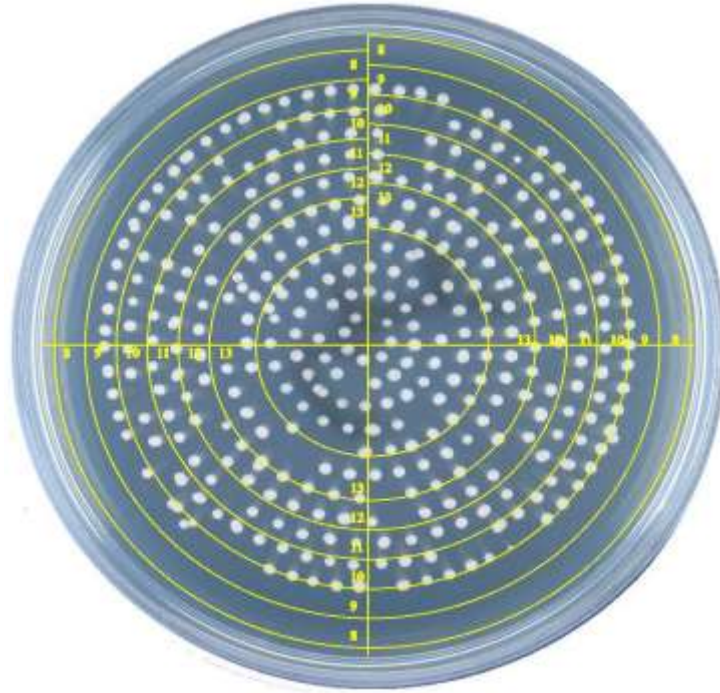


Figure-37 SBI Statistical grid

Taking a 100mm petri dish as an example, the statistical grid is spiral-shaped and divided into 4 fan-shaped regions. Each sector has six fan rings, the number of each ring is 8, 9, 10, 11, 12, and 13 from the outside to the inside. **Spiral counting rule:** Randomly select a sector, start from the first ring 8 on the outer edge to count inward until 20 colonies are counted, and then count the remaining colonies in the fan ring, then from the outermost ring to the plate area covered by the ring is called the counting area. If there are less than 20 colonies in the entire sector from the outer edge to the center, the statistical lower limit is not met. If there are more than 75 colonies in the first ring 8 of a sector, the statistical upper limit is not met.

7.7.1.2 Spain IUL Corporation

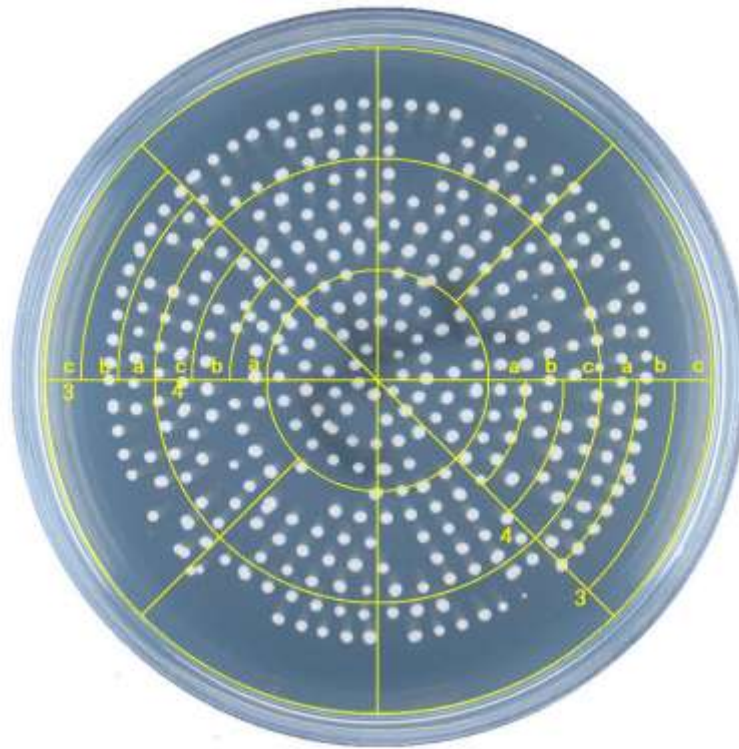


Figure-38 IUL Statistical Grid

Taking a 100mm petri dish as an example, the statistical grid is spiral-shaped and divided into 8 fan-shaped regions. Each sector is divided into 2 grids by 2 arcs (marked 3 and 4 from the outer edges). To facilitate statistics, then the grid is subdivided into 2 arcs and marked with c, b, and a from outside to inside. finally, each statistical sector is divided into 6 sector rings, as shown in **Figure 38** (Each sector in the statistical grid of the 150 mm dish is divided into 4 grids by 4 arcs and labeled 1, 2, 3, 4 from the outer edge inward, and similarly subdivided into grids labeled c, b, a by 2 arcs, ultimately subdividing each statistical sector into 12 grids.)

Spiral counting rule: Randomly select a sector, start from the first ring 3c on the outer edge to count inward until 20 colonies have been counted, and then count the remaining colonies in the grid, then from the outermost ring to the plate area covered by the ring is called the counting area. If there are less than 20 colonies in the entire sector from the outer edge to the center, the statistical lower limit is not met. If there are more than 75 colonies in the first ring 3c of a sector, the statistical upper limit is not met.

7.7.2 Spiral Statistics

The interface of the spiral statistics function is shown as follows:

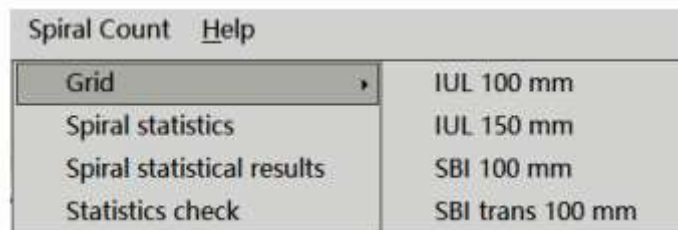


Figure-39 Spiral Statistical Menu

7.7.2.1 Parameter Setting

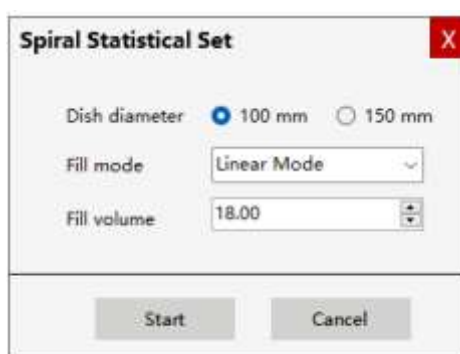


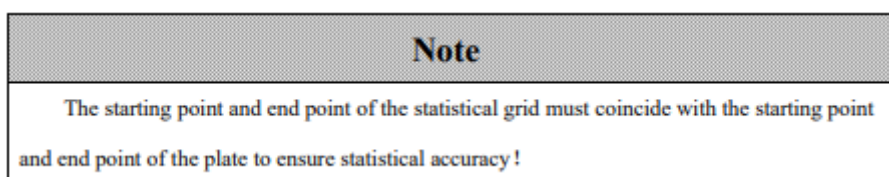
Figure-40 Spiral Statistics Option

The parameter setting interface is used to complete the input of necessary information, such as petri dish diameter, filling mode, filling amount, and other parameter information. "**Plate diameter**" provides an international standard for 100mm specification. The "**Fill mode**" offers three common modes such as "**E Mode**", "**Proportional Mode**" and "**Even Mode**". "**Filling volume**" provides different options according to different filling methods.

The spiral counting function is fully compatible with the software. You can use the panel on the right side of the interface to set and select "**Colony diameter**", "**Colony segmentation**" and "Removal the impurities". The operation is like the usual colony counting, which will not be repeated here.

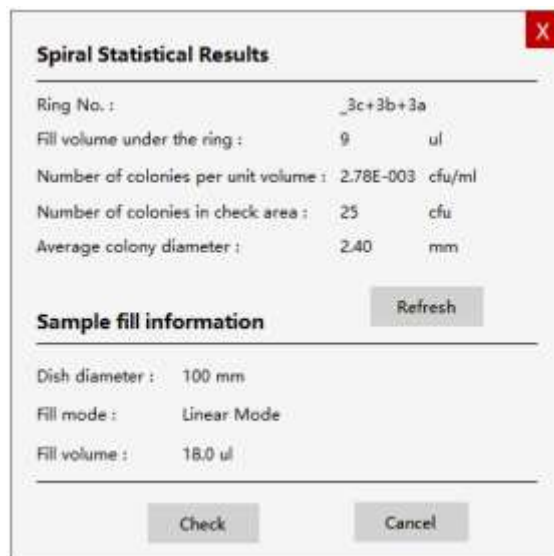
7.7.2.2 Statistical grid drawing

Click on "**Spiral Count/Grid**", according to the edge of the petri dish, simply slide the mouse to complete the drawing of the statistical grid, which is like the operation of the colony detection area.



After the grid is drawn, click the "**Spiral statistics**" button to complete the spiral statistics. For special images, the user can manually correct the detection results according to the image characteristics until the user is satisfied.

7.7.2.3 Statistical Information



The screenshot shows a software window titled "Spiral Statistical Results" with a red close button in the top right corner. The window is divided into two main sections. The top section, titled "Spiral Statistical Results", contains the following data: "Ring No.:" with the value "3c+3b+3a", "Fill volume under the ring:" with the value "9 ul", "Number of colonies per unit volume:" with the value "2.78E-003 cfu/ml", "Number of colonies in check area:" with the value "25 cfu", and "Average colony diameter:" with the value "2.40 mm". Below this section is a "Refresh" button. The bottom section, titled "Sample fill information", contains: "Dish diameter:" with the value "100 mm", "Fill mode:" with the value "Linear Mode", and "Fill volume:" with the value "18.0 ul". At the bottom of the window are "Check" and "Cancel" buttons.

Spiral Statistical Results	
Ring No.:	3c+3b+3a
Fill volume under the ring:	9 ul
Number of colonies per unit volume:	2.78E-003 cfu/ml
Number of colonies in check area:	25 cfu
Average colony diameter:	2.40 mm
Refresh	
Sample fill information	
Dish diameter:	100 mm
Fill mode:	Linear Mode
Fill volume:	18.0 ul
Check Cancel	

Figure-41 Statistical Information Panel

The "**Spiral statistical result**" contains information such as "**Ring No.**", "Fill volume under the ring", "Number of colonies per unit volume", "Number of colonies in check area", and "Average colony diameter".

"Sample filling information" contains "Dish diameter", "**Fill mode**", and "**Fill volume**".

Ring No: Refers to the label of the grid where the 20th colony is in the upper left or lower right sector of the grid, counting colonies from outside to inside.

Fill volume under the ring: According to the filling method, filling volume and ring No. where the 20 colonies are located, the grid injection volume queried in the database is used to calculate the number of colonies per unit volume.

Number of colonies per unit volume: Refers to the average total number of colonies contained in 1 ml of bacterial suspension sample converted by the software according to the statistical results.

Number of colonies in check area: Refers to the number of colonies in the upper left or lower right sectors of the grid.

Average colony diameter: Refers to the average diameter of the counted colonies within the grid.

Dish diameter: Refers to the petri dish diameter value entered by the user according to the actual situation during spiral statistics.

Fill mode: Refers to the filling mode entered by the user according to the actual situation during spiral statistics.

Fill volume: Refers to the actual filling amount selected by the user according to the actual situation during spiral statistics.

7.7.2.4 Statistical Check

Statistical verification is used to verify the results of spiral statistics, as shown in **Figure 42**.

Fill volume	3c	3c+3b	3c+3b+3a	3+4c	3+4c+4b	3+4c+4b+4a
18.00 ul	3	6	9	12	15	18
50.00 ul	8.33	16.67	25	33.33	41.67	50
100.00 ul	16.67	33.34	50	66.67	83.34	100
200.00 ul	33.33	66.67	100	133.33	166.67	200
300.00 ul	50	100	150	200	250	300
400.00 ul	66.67	133.33	200	266.67	333.33	400

22/0.009=2.44E-003 cfu/ml

OK

Figure-42 Statistical Check Interface

The statistical check table includes: "**Fill mode**", "**Fill volume**" and other information, as well as the bacterial suspension distribution value of each statistical grid in the case of specific filling mode and filling volume.

Figure 42 shows that in a 100mm petri dish when the fill mode is "Linear Mode" and the fill volume is "18uL", the injection volume of grid 3c+3b+3a distribution is 3uL, and the injection volume of grid 3c+3b+3a distribution is 9uL, and so on, the injection volume distribution value of each grid in the statistical grid can be seen. The conclusions at the bottom of the statistical information box are converted from the grid-filling distribution value and the number of counted colonies. Users can use the results to verify the conclusions of spiral statistics.

8. Accessories

Standard Accessories

Accessories	Quantity	Unit
Power cord (EN)	1	Piece
USB Hub	1	Piece
Communication line	1	Piece
USB Lock	1	Piece
Ruler	1	Piece
Round plate	1	Piece
U disk	1	Piece
Square plate	1	Piece

Optional Accessories

Barcode Printer and Scanner



Labmate Scientific Inc

Email: info@labmate.com | Website: www.labmate.com