

Digital-P Polarimeter User Manual



Please read the manual before installation and operation.

Drawell International Technology Limited

Chongqing Drawell Instrument CO.,Ltd

Add: Suite 2705, Building No.12, Shiyou Road No.1, Yuzhong District, Chongqing, China
Tel: 0086-023-63268643

Shanghai Drawell Scientific Instrument Co.,Ltd

Add : Suite 1117, Lane561 XiuChuan Rd., PuDong New Area, Shanghai, China

Web : www.drawell.com.cn

Email : sales05@drawell.com.cn

Table of Content

1.General Information and Specialization - 2 -

2.Structure and Principle - 2 -

 a) Visual - 2 -

 b) Basic Principle - 2 -

 c) Optical Null Principle - 2 -

 d) Structure - 2 -

3.User's Manual - 8 -

 a) Operating Condition - 8 -

 b) User Interface and Interaction - 8 -

 c) Sample Procedure for Tests - 32 -

4. Maintaince - 34 -

5. Malfunction and Solutions - 2 -

6. After-sale Service and Producer Liability - 36 -

1. General Information and Specialization

The polarimeter is a machine used to test the optical rotation of any substance. Using the optical rotation, it is possible to test the substances' concentration, purity and etc. Therefore it is being used very often in food, medicine, petroleum, sugar making, chemical engineering and education industry.

The equipment uses LED as its light source. It includes Peltier temperature control system, having both heating and cooling function, and if temperature control test tubes are in use, it is possible to enable temperature controlled tests. The equipment chooses 8 inch touch screen as its user interface, providing a convenient and reliable way to input and receive information

2. Structure and Principle

a) Visual



Front View



b) Basic Principle

Visible light is a type of wave specifically with a wave length of 380nm ~ 780nm. The light wave, in general will direct to all possible directions, and the strength of it across the directions are equal, and this is the so called natural light, Using certain equipment(such as GDX) it is possible to control the direction of the light to one direction, causing the so called plane polarized light. When this light

passes through a certain substance, the angle of the light will change. The substance is called optically activated substances, and the angle is called optical rotation. If the light passes through some pure optically activated substance, the magnitude of the optical rotation usually depends on the following elements:

- a) The wavelength of the plane polarized light: λ
- b) The temperature of the optically activated substances: t
- c) The type of the optically activated substances

We use specific rotation $[\alpha]_{\lambda}^t$ to represent the ability to change the angle of light for a substance. Usually, the length of the polarimeter tube is set to be 1dm(100mm), and the concentration for testing substance is set to be 1g/ml, and temperature is set to t degree Celsius ($^{\circ}\text{C}$). The plane polarized light, with a wavelength of λ would yield the specific rotation of the said substance, represented by $[\alpha]_{\lambda}^t$. It determines the structure of the substance, and therefore is a constant for the same for the same pure substance.

$$\alpha_{\lambda}^t = [\alpha]_{\lambda}^t \cdot L \cdot C \quad (1)$$

L represents the length of the polarimeter tube. The equipment uses mm as its units; C represents the concentration of the optically activated substances in the solution being tested. Usually the equipment takes gram per 100mL solution as units.

For predetermined $[\alpha]_{\lambda}^t$ of the substance, determined length L and α_{λ}^t calculated under a certain temperature and wave length, we can use equation (2)

to calculate the concentration C for the optically activated substances in the solution.

$$C = \frac{\alpha_{\lambda}^t}{[\alpha]_{\lambda}^t \cdot L} \quad (2)$$

If the solution contains optically inactive species, using the concentration when making the solution and C from equation (2), the concentration and/or purity can be calculated for the optically activated specie.

c)Optical Null Principle

If natural light goes through polarizer and the analyzer in the respective order, and set the direction of light going as the original direction, then the degree of the angle changed α and the strength of light I going in can be represented by the Malus Law as:

$$I = I_0 \cos^2 \alpha$$

Shown in Figure 1, curve1

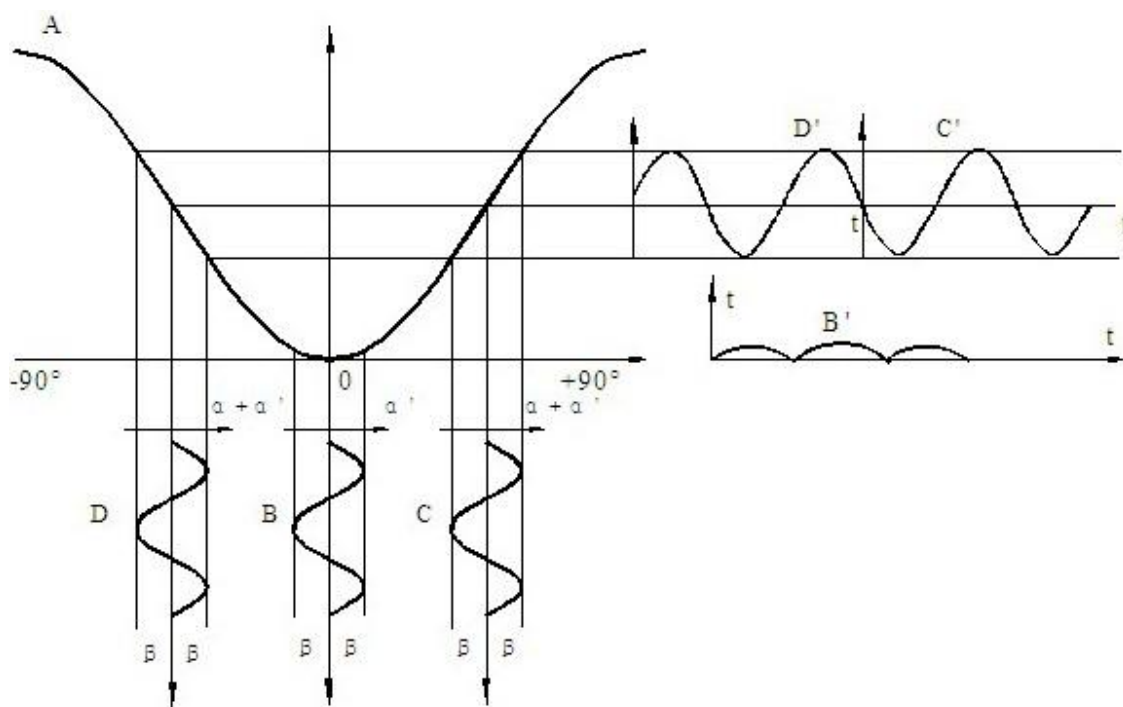


Figure 1

When the sinusoidal alternating voltage $U = u \sin 2 \pi ft$ with frequency f is applied at both ends of Faraday coil, according to Faraday magneto-optical effect, an additional rotation angle will be added to the vibration plane of plane polarized light: $\alpha_1 = \beta \cdot \sin 2 \pi ft$. when there is Faraday coil between the polarizer and the polarizer, the light intensity signal of the polarizer is as follows:

a) In the orthogonal position, it can be obtained that the intensity signal of curve B and B 'in Figure 1 is a constant intensity plus an alternating intensity with a frequency of $2F$.

b) When it deviates from the orthogonal position to the right, it can be concluded that the intensity signal of curve C and C 'in Figure 1 is a constant intensity plus an alternating intensity with a frequency such as F , as shown in curve C'.

c) When deviated from the orthogonal position to the left, it can be obtained that the intensity signals of curve D and d 'in Fig. 1 are a constant intensity, superposed with an alternating intensity of frequency f , as shown in curve d', but the phase of the alternating intensity is just opposite to that of the alternating intensity signal when deviated from the orthogonal position to the right.

Therefore, it is necessary to identify whether the alternating light intensity of F component in the light intensity signal is zero. It can accurately judge whether the polarizer and the polarizer are in the orthogonal position, identify the phase of f -component alternating light intensity, and judge whether the polarizer deviates from the orthogonal position left or right

d)Structure

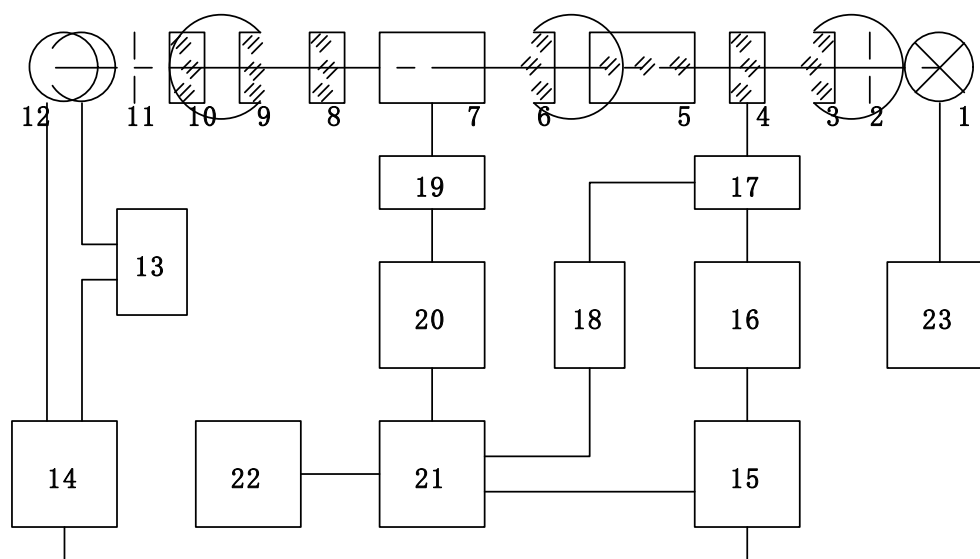


Figure 2

1. LED 2. Diaphragm 3. Condenser 4. Polarizer 5. Modulator
6. Collimator 7. Test tube 8. Polarizer 9. Objective lens
10. Filter 11. Diaphragm 12. Photomultiplier
13. Automatic high voltage 14. Pre amplification 15. Motor control
16. Servo motor 17. Mechanical transmission 18. Rotation coding and counting
19. Heating and cooling 20. Temperature control 21. MCU control 22. LCD 23. Light source power supply

Figure 2 shows the structure of the equipment. The light emitted by LED passes through diaphragm, condenser, polarizer, Faraday modulator and collimator in turn. A beam of collimated plane polarized light whose vibration surface changes with the alternating voltage in Faraday coil is formed. After passing through the test tube with the solution to be tested, it is injected into the polarizer, and then it enters the photomultiplier tube through the receiving objective, filter, diaphragm and monochromatic light with the wavelength of 589.3nm. The photomultiplier tube transforms the light intensity signal into an electric signal, which is amplified by the preamplifier. Automatic high pressure is to automatically change the high pressure of photomultiplier tube according to the light intensity incident to photomultiplier tube, so as to meet the needs of dark samples with low transmittance.

If the polarizer deviates from the orthogonal position with respect to the input polarized light plane, it will be converted into the electric signal of frequency F through the alternating light intensity signal of frequency f , which will be input into the motor control part after pre amplification, and then driven by the servo motor through mechanical transmission after frequency selection and power amplifier to drive the polarizer to rotate, so as to make the polarized light plane produced by the polarizer and the polarizer to be checked. When the device reaches the orthogonal position, the electrical signal with frequency f disappears and the servo motor stops running.

At the beginning of normal operation of the instrument, the polarizer automatically stops at the orthogonal position according to the above process. At this time, the counter is cleared to the zero position, which is defined as the zero position. If the tube containing the sample with a rotation degree of α is put into the sample chamber, the incident plane polarized light deviates from the orthogonal position angle of α with respect to the polarizer, so the polarizer once again turns the polarized light around the angle of α to obtain a new positive position according to the above process. The chip counter and the single chip microcomputer circuit convert the angle of a turned by the polarizer into the rotation and display the measurement results on the LCD.

The instrument has a temperature controller which can control the sample temperature. When temperature control is needed, a temperature controlled optical tube should be used. The actual temperature of the polarizer is measured by platinum resistance and input into the single chip microcomputer. On the one hand, the LCD displays the temperature value and sends the temperature control signal to the temperature control circuit to control the cooling or heating of the semiconductor cooler, so as to keep the temperature of the polarizer near the set value. To control the temperature, press the key to operate on the LCD screen at any time.

3. User's Manual

a) .Operating Condition

1.1. f The instrument shall be installed on a solid workbench, and vibration must be avoided. At least 10cm away from the wall around the instrument to ensure timely heat dissipation.

1.2. The instrument shall be kept dry to avoid the erosion of moisture and corrosive gas. The instrument shall be used in the working environment of 20 °C as far as possible.

1.3. The power supply of the instrument shall be 220V 50Hz AC power supply (if the voltage is not stable, it is required to use AC electronic voltage regulator), insert the power plug into the power socket and ensure the reliable grounding of the grounding base.

b) User Interface and Interaction

b1). Log-in Screen

After the instrument is powered on, wait for a while and the screen will jump to the login window (no login is required by default, you can set the power on login in the user interface), as shown in Figure

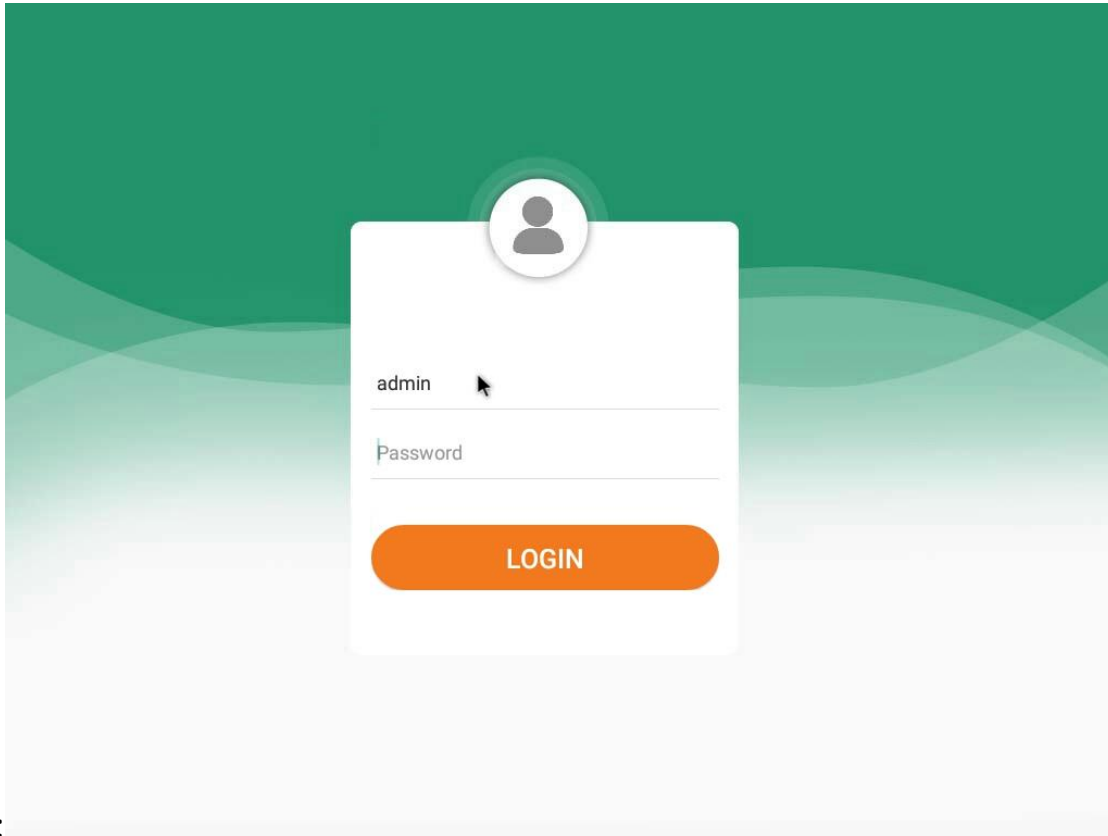


Figure 3

Enter the login interface, enter the user name and password, and click the "login" button to jump to the test interface,

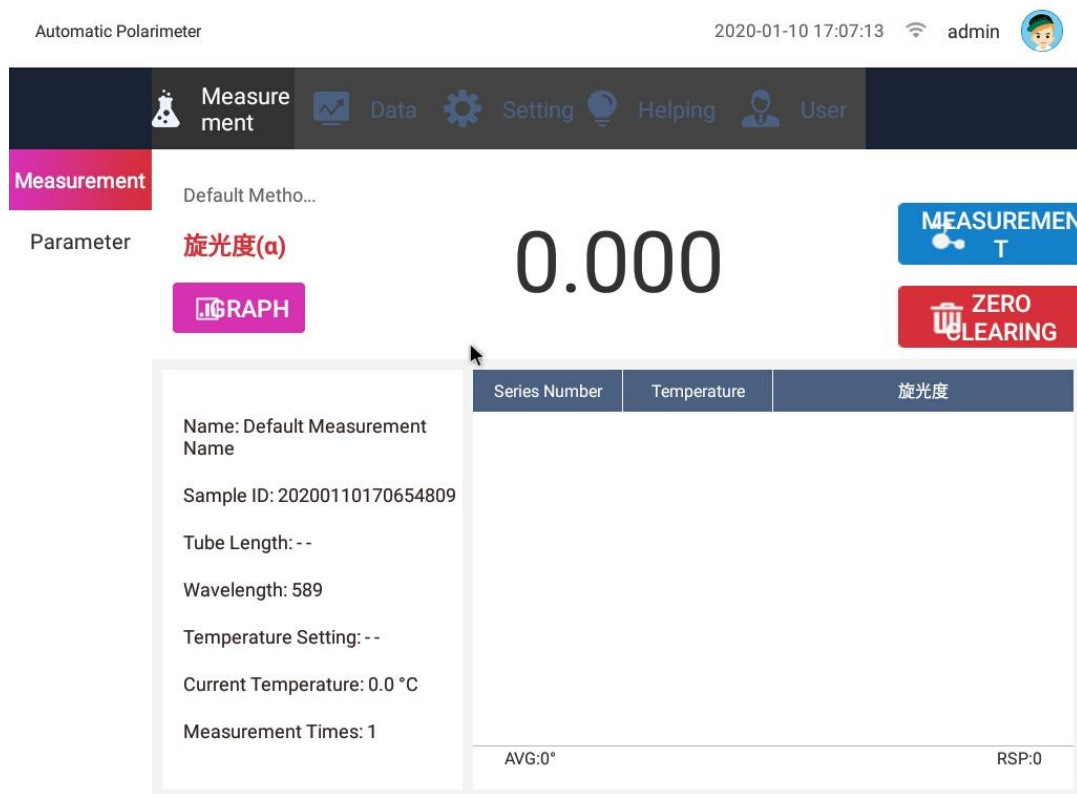
Super administrator user name: admin default password: 888888.

Note: please remember the administrator password. If it is lost, please contact the manufacturer.

b2)Home Page and Menu

There are 5 menu bars on the left side of the main interface, including test, data, settings, help and user. The test interface is the default when the machine

is started on the right side. Click menu in the upper left corner to open the menu bar on the left side of the main interface.



b3)Test

Screen

图 5

In this interface, the user can test or clear to display the current measured data and data map.

Test: the instrument starts to measure and record the measurement data. When the test is in progress, do not click the test button continuously;

Reset: reset the measurement data to zero, and clear the data column below;

Parameter column: in this column, the user can see the sample name, sample number, tube length, wavelength, set temperature, real-time acquisition temperature and measurement times set by himself;

Manual: click "manual" to hide the data item, and the manual box will appear as

shown in Figure 6;

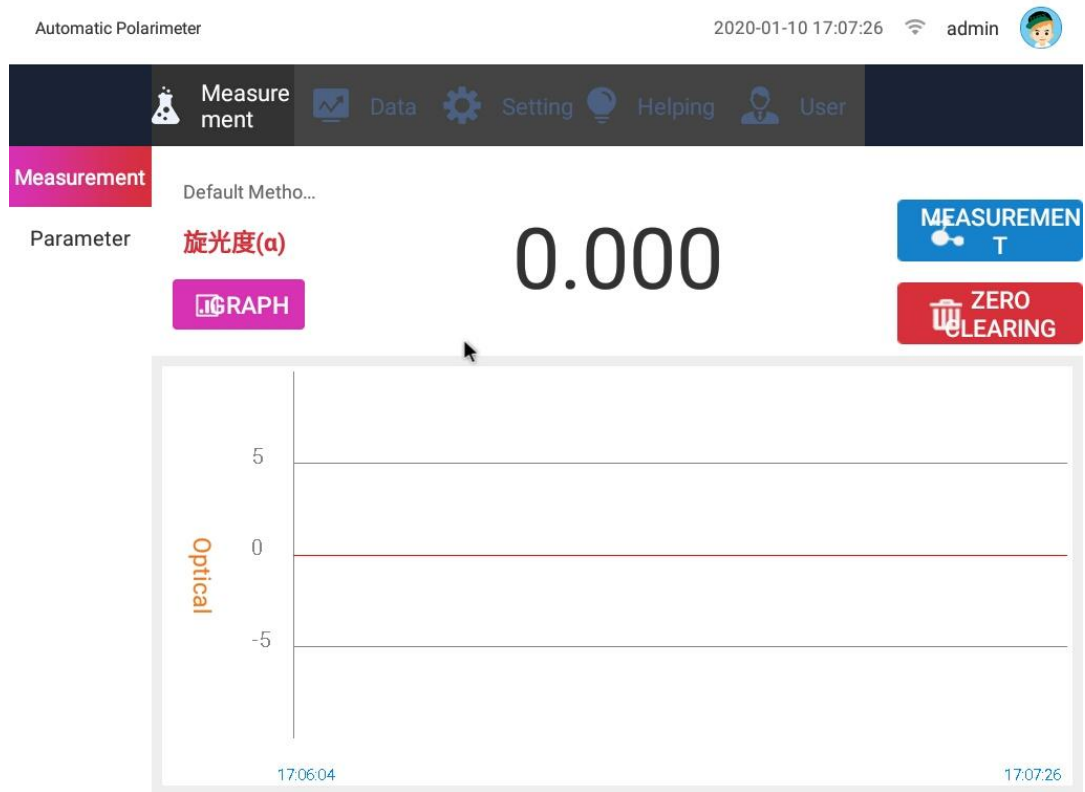


Figure 6

On the left side is the data range of the luminosity, and on the lower two ends are the time range. The atlas collects real-time data every second.

b4)Data Setting

Automatic Polarimeter 2020-01-10 17:08:09 admin

Measurement

Parameter

Name: Default Measurement Nam Sample ID: 20200110170654809

Method: Default Method Name Concentration: g/l

Measurement Times: 1 Measurement Accuracy: Fast

Index: 旋光度(α) Wavelength: 589 nm

Display Resolution: 3 Tube Length: cm

Specific Rotation:

Graph x: 1Hour y: $\pm 10^\circ$

Temperature: °C

Automatic Measurement: Repeat Times Interval

Save

Figure 7

Before the test, click the "parameter setting" button in the secondary menu to set the parameters, as shown in Figure 7.

There are two ways to set parameters:

Method 1: set the temporary parameters according to the test you want to do. You can save directly after setting without selecting the test method.

Method 2: click the drop-down menu of the test method to pull the saved test method (the test method can be set or added in the method setting management in the setting page);

Figure 7 function description of the interface:

Sample name: fill in the sample name for measurement;

Sample number: the sample number can be set;

Test method: select the existing measurement method. If the measurement method meets the requirements of this measurement, it can be measured without modifying other parameters;

Concentration: enter the concentration of the sample. When the result type is specific rotation, it must be entered. The units are g / L, g / ml and g / 100ml

Test times: the number of times that the instrument automatically repeats the test, with the frequency range of 1-6 times;

Measurement accuracy: divided into fast measurement and high-precision measurement;

The results were classified into three types: optical rotation, specific rotation, concentration and international sugar degree;

Wavelength: factory default is 589nm band;

Display digits: data digits after decimal point;

Tube length: input the length of sample tube, which must be input in specific rotation and concentration mode;

Specific rotation: enter the specific rotation of the sample, which must be entered when the result type is concentration;

Atlas: select the time range 1H, 2h or 4H of the X axis of the atlas; select the data range of optical rotation of the Y axis ± 10 , ± 20 , ± 30 , ± 40 , ± 50 , ± 60 , ± 70 , ± 80 , ± 90 ;

Temperature: the thermostatic control function can be turned on and off by the temperature switch. After the thermostatic control function is turned on, input the set temperature value, select the temperature unit, and input the temperature range of 10 °C ~ 50 °C.

Automatic test: after the automatic test is turned on, fill in the number of test repetitions and the time interval of each measurement. The range of repetitions is 1-60;

Note: parameter settings cannot be saved before the test is completed.

b4a)Temperature Control

If the sample is to be measured in temperature control mode, the temperature control type polarizing tube must be used.

Put the sample in the test tube and check that there is no bubble. Put the temperature control tube containing the sample into the sample chamber and press the heat conduction plane of the tube close to the heat conduction plane of the sample chamber, insert the temperature sensor into the temperature measurement hole of the temperature control tube and cover the sample chamber cover.

Note: insert the temperature sensor into the temperature measuring hole of the temperature control tube to make the temperature control work normally.

At this time, the sample temperature starts to change towards the set temperature until it reaches the set value. When the temperature is stable, retest several times to ensure the test results are correct.

Before taking out the temperature control tube or without temperature control est, enter the temperature control interface and click the close button to make

the temperature control in the closed state.

b5)Data

Click "data" in the menu bar to open the data interface, as shown in Figure

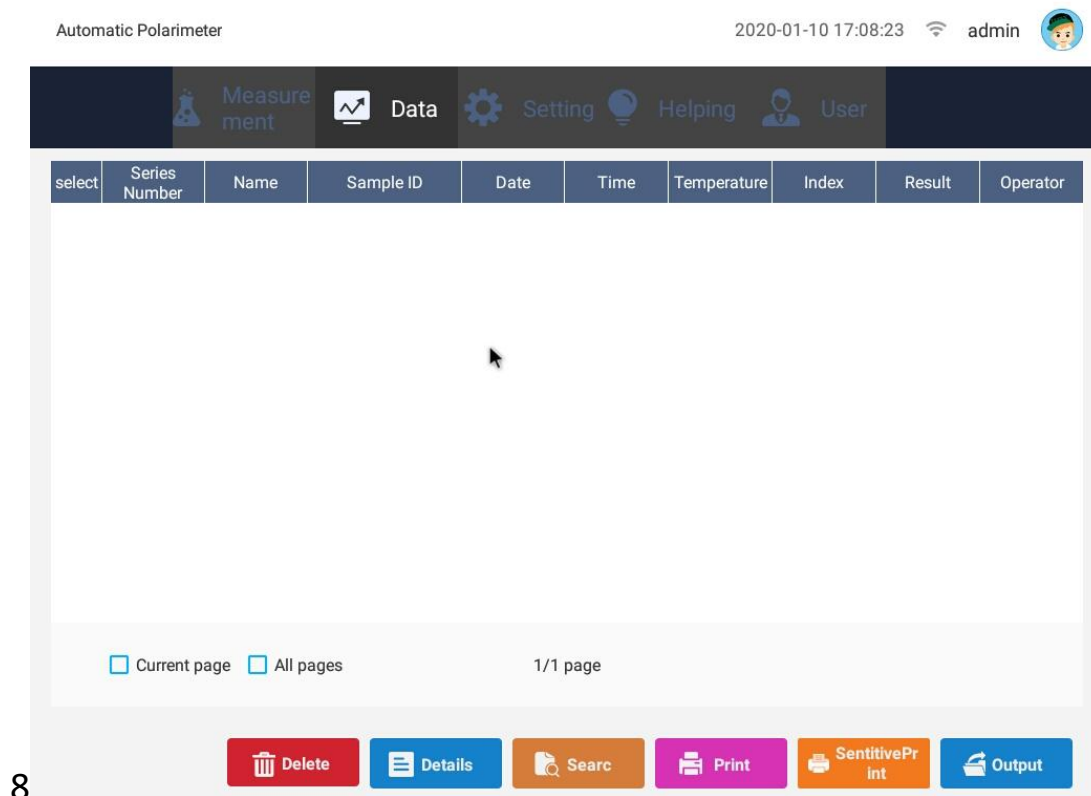


Figure 8

Click the "data" button in the menu bar to open the data interface. As shown in Figure 8, the data interface records the serial number, sample name, sample number, test date, test time, temperature, result type, measurement value and operator of the measurement data. The serial number is continuously accumulated, and the data can be deleted, viewed in detail, retrieved, printed and exported.

Delete: delete the selected data, which can be single data, single page data or all data;

Details: select a single data and click Details to open figure 9 below, where you can see more detailed measurement information;



默认测试名-20191017162656288

Series Number	1219		
Name	默认测试名	Sample ID	20191017162656288
Date	2019-12-30	Time	14:15:31
Index	旋光度(α)	Result	4.989
Temperature Setting	—	Temperature	19.8°C
Wavelength	589nm	Tube Length	
Optical Rotation	4.989	Specific Rotation	
Concentration		Method	默认方法名
Operator	admin		

图 9

Search: click "search" and the pop-up box is as shown in Figure 10 below. You can set the date range, sample name, operator and data range of the search. You can set a single search condition or multiple search conditions. After setting, click

Search

From Date Date closed

From Date 2019 12 09 5 6 7 8 9 10 11
2020 1 10 12 13 14 15 16 17 18
2021 2 11 19 20 21 22 23 24 25
26 27 28 29 30 31

Date closed 2019 12 09 5 6 7 8 9 10 11
2020 1 10 12 13 14 15 16 17 18
2021 2 11 19 20 21 22 23 24 25
26 27 28 29 30 31

Name

Operator

Range <=x<=

"search";

Figure 10

Print: you can print single data, single page data or all data. Click Print to open the following figure 11-a. fill in the title and select typesetting in the pop-up box. Click Print to open figure 11-B to open the basic print information box. After the basic settings to be printed, such as number of copies and direction, can be modified, click "print". In addition, before printing, make sure that the printer corresponds to the driver;

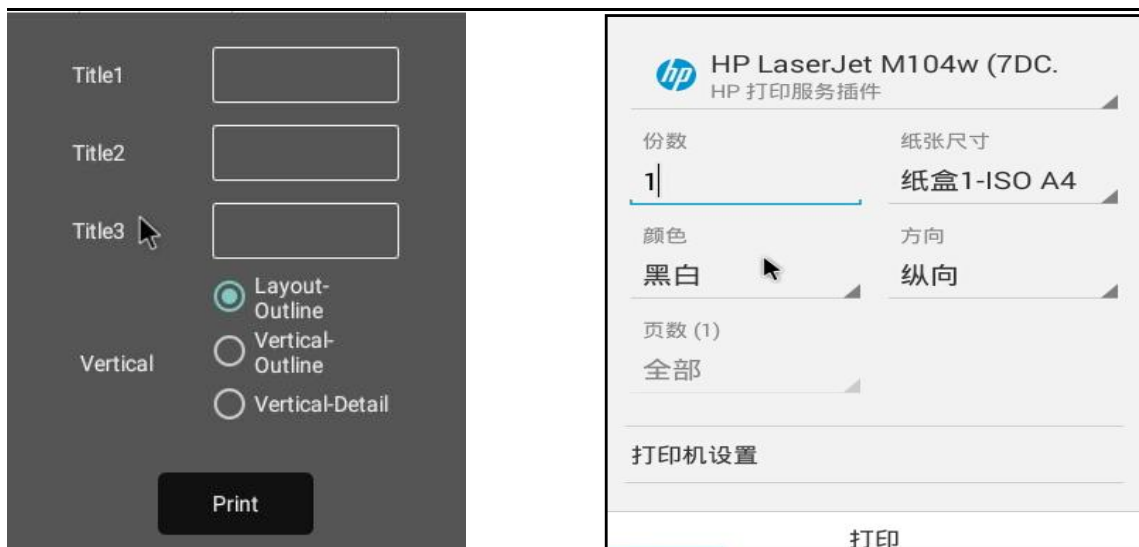


Figure 11-A and Figure 11-B

Export: in Figure 8, select the data and click export. The pop-up box is as shown in Figure 12 below. Fill in the name and title of the exported file, select the required export format, and click save. At the same time, MD5 value is generated. The generated MD5 value can be viewed in the help menu bar. In addition, the export time of PDF format is longer than that of Excel format;

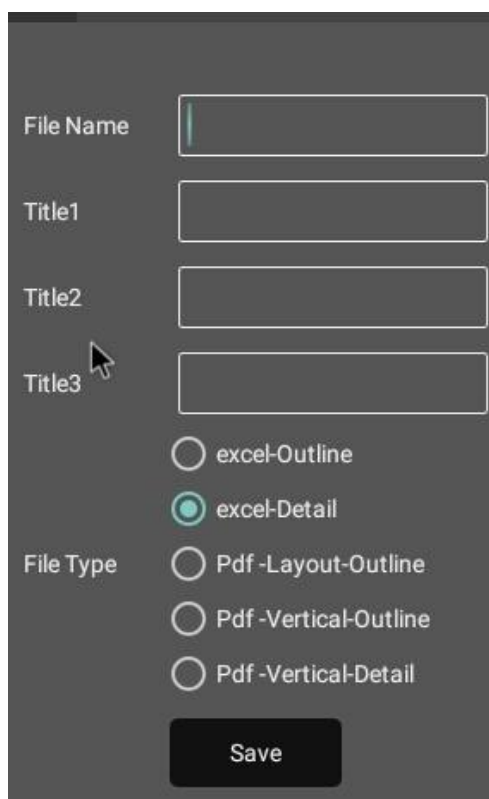


Figure 12

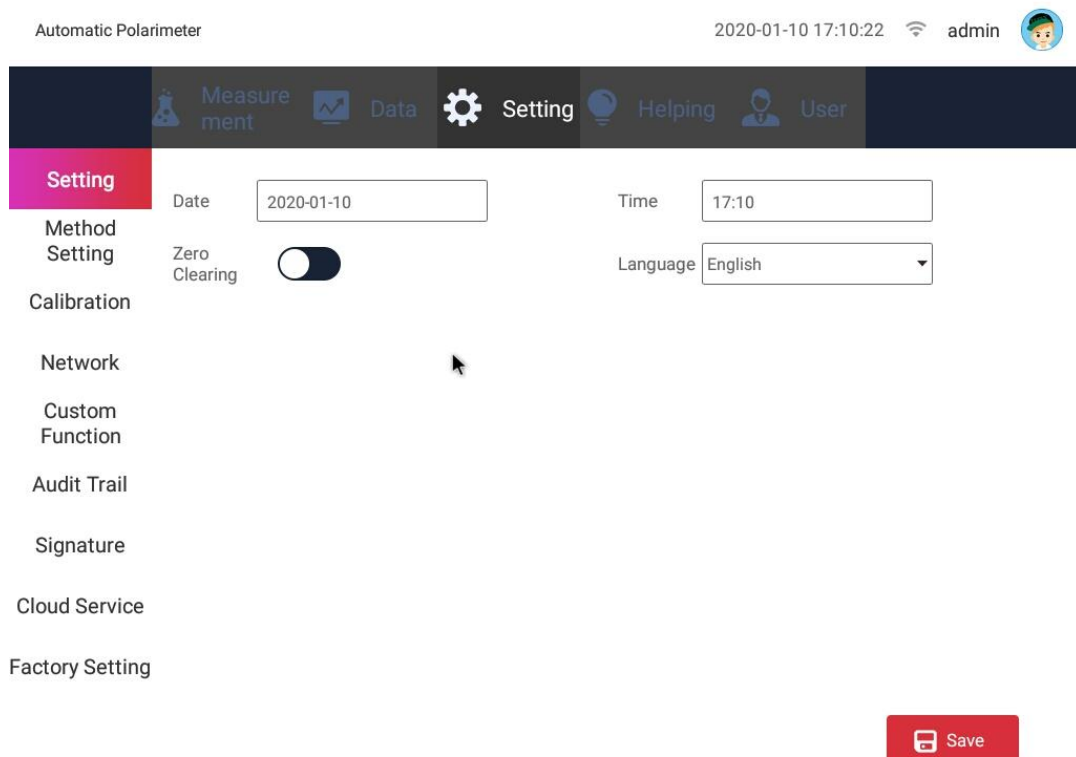
b6) Setting

b6a) General

Click the "Settings" menu bar and select "General Settings", as shown in Figure 13:

Figure 13

In the general setting interface, you can change the time and date, switch between Chinese and English, and turn on or off the automatic reset. When the automatic reset is turned on, the measured stable data will automatically reset to zero within a certain range (± 0.01).



b6b) Method

Click "method setting" to pop up as shown in Figure 14

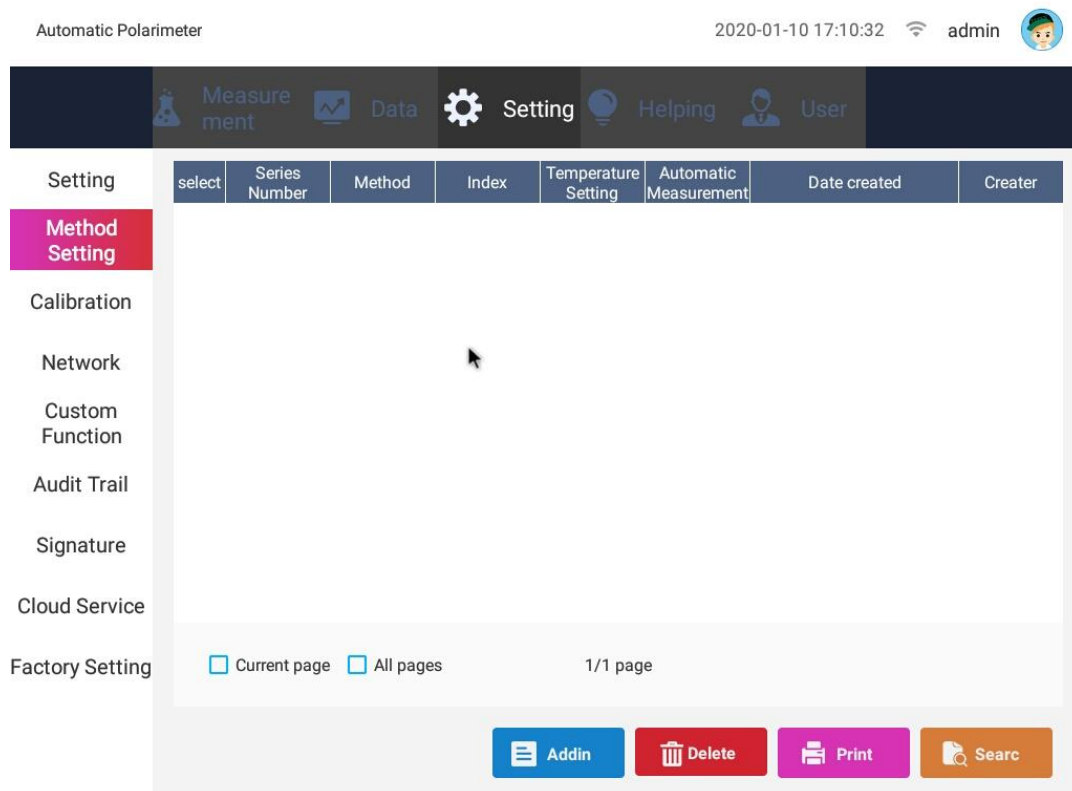


Figure14

The system defaults to a method. Select this method to delete and view the details, as shown in Figure 15 below. Click Modify to reset the parameters;

Figure15

Note: the current method is under test and cannot be modified

Click "add" in Figure 14, as shown in Figure 16. You can set new method name and other parameters. Click "save" after completion, and then you can see the newly added method in the method setting interface.

Adding

Method

Concentration g/l

Measurement Times

Measurement Accuracy

Index

Wavelength

Display Resolution

Tube Length cm

Specific Rotation

Graph x: y:

Temperature °C

Automatic Measurement Repeat Times Interval

Save

Figure16

When there are too many methods set, users can click "retrieve" to view the methods they need, as shown in Figure 17

Search

From Date Date closed

From Date

2019	12	09	12	13	14	15	16	17	18
2020	1	10	19	20	21	22	23	24	25
2021	2	11	26	27	28	29	30	31	

Date closed

2019	12	09	12	13	14	15	16	17	18
2020	1	10	19	20	21	22	23	24	25
2021	2	11	26	27	28	29	30	31	



Operator

Search

Figure17

b6c) Correction

Click "correct" to pop up as shown in Figure 18 below

Automatic Polarimeter 2020-01-10 17:11:33  admin 

Measurement Data Setting Helping User

Setting

Method Setting

Calibration

Network

Custom Function


Audit Trail


Signature


Cloud Service

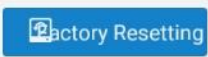
Factory Setting


Wavelength

Optical Rotation 0 

Avg. Value 0 

Temperature 0°C 



Reference Value 

/	Reference Value	Result	Temperature



 

Figure18

Wavelength switching: select the wavelength to be calibrated, and the default wavelength is 589nm. After the wavelength selection is completed, it indicates that the selection is successful;

Test: automatically test three times to get the average value;

Clear: clear the test data and clear the three measurement results;

Save: saves the measured average value to the right display box, and automatically corresponds to the corresponding data. It should be noted that the standard value can be saved only after it is added, and the saved data can take

effect only after the instrument is restarted;

Standard value and add: after the standard value is written, click Add to the display box, and automatically sort from large to small;

Delete: select the data to delete;

OK: automatically sort and save the data in the display box;

Restore factory settings: the data calibrated by the manufacturer of this band can be called and displayed. Click "OK" and wait for a while to complete the factory settings.

Note: do not click the "restore factory settings" and "OK" buttons during the calibration test. The calibration operation cannot be performed before the main interface test is completed.

b6d)Internet Setting

As shown in Figure 19 below, when connecting the wireless network on the left side, you can select the corresponding wireless router; when connecting the wired network port on the right side, you can enter the corresponding IP address.

Figure19

b6e)Formula Editing

Click formula edit to open the

Automatic Polarimeter

Automatic Polarimeter 2020-01-10 17:11:43 admin

Measurement Data Setting Helping User

Setting

Method Setting

Calibration

Network

Custom Function

Audit Trail

Signature

Cloud Service

Factory Setting

ChinaNet-yQs9
jiahangchn
jiahang2
ChinaNet-mvm5
DIRECT-A5-HP DeskJet 4530 series
Xiaomi_CB90
TP-LINK_C00C
TP-LINK_2C78
MERCURY_419A8A
suer

DHCP

IP 192.168.0.128

Subnet Mask 0.0.0.0

Gateway 192.168.0.1

DNS 192.168.0.1

follow

ing 20

figures:

Automatic Polarimeter 2020-01-10 17:11:58 admin

Measurement Data Setting Helping User

Setting

Method Setting

Calibration

Network

Custom Function

Audit Trail

Signature

Cloud Service

Factory Setting

select	Series Number	Name	Short Name	Unit	Precision	Display in %	Date	Time	Description
<input type="checkbox"/>	1	国际精度	Z		3		2011-09-10	01:19:18	

Current page All pages 1/1 page

Addin Delete Details Search

Figure20

You can add, modify, and delete formulas in this box;

Add: click Add to pop up the following figure 21, fill in the formula name and basic parameters, fill in the range of X (required), and click save. If more than one formula needs to be added, click "add result range" to generate a new formula.

The screenshot shows a dark-themed dialog box titled "Adding". It contains several input fields: "Name", "Short Name", "Unit", "Precision" (with a dropdown menu showing "1"), and "Display in %" (with a dropdown menu showing "Yes"). Below these is a "Remark" field. A formula input field is pre-filled with the template: $y = \square x^5 + \square x^4 + \square x^3 + \square x^2 + \square x + \square$. To the right of the formula field is a range input field: $\square \leq x \leq \square$. Below the formula field is a button with a plus sign and the text "Add 'x' value range". At the bottom right of the dialog is an orange "Save" button.

Figure21

Delete: delete the selected formula;

Details: click Details to see the formula details;

Retrieval: set retrieval conditions to view, edit and delete formulas;

Note: formula cannot be modified during test use

26f) Audit Trail

The settings or operations that affect the test results and are not recorded in the data will be recorded in the audit trail, and the user can query the relevant operation records;

As shown in Figure 22, each entry records the operator, time, date, operation interface and sub interface as well as operation events;

Automatic Polarimeter
2020-01-10 17:12:20 admin

Measurement
 Data
 Setting
 Helping
 User

	select	Series Number	Operator	Date	Time	Operation Tab	Sub Tab	Log
Setting	<input type="checkbox"/>	19	admin	2020-01-10	17:06:54	Login		Login
Method Setting	<input type="checkbox"/>	18	admin	2020-01-10	17:06:03	Login		Login
Calibration	<input type="checkbox"/>	17	admin	2020-01-10	16:53:18	Login		Login
Network	<input type="checkbox"/>	16	admin	2020-01-10	16:52:42	User	User Setting	Alter
Custom Function	<input type="checkbox"/>	15	admin	2020-01-10	16:52:38	Login		Login
Audit Trail	<input type="checkbox"/>	14	admin	2020-01-10	16:52:08	User	User Setting	Alter
Signature	<input type="checkbox"/>	12	admin	2020-01-10	16:51:44	User	User Setting	Logout
Cloud Service	<input type="checkbox"/>	11	admin	2020-01-10	16:47:05	Login		Login
Factory Setting	<input type="checkbox"/>	10	admin	2020-01-10	16:44:26	Login		Login

Current page
 All pages
 1/2 page

NEXT

Export
 Search

Figure22

Shadow export: you can export the selected audit trail as a file, fill in the file name in the pop-up box, and click OK;

Hint

File Name

File Name

CANCEL
OK

Figure23

Retrieval: set date range and operator to retrieve operation records;

Figure24

B6g)Factory Setting

Factory settings can only be changed by the manufacturer, and users do not need to use them.

b7)Help**b7a) MD5**

After the data is exported, a file will be generated. At the same time, an MD5 value will be automatically generated. After the MD5 value is changed, it is irreversible. You can judge whether the file is changed according to the MD5 value, as shown in Figure 25 below.

Export: MD5 value can be generated into a file for export;

Retrieval: MD5 value can be retrieved according to time and operator;

The export and retrieval pop-up box of MD5 value is the same as that of audit trail, as shown in Figure 23 and figure 24.

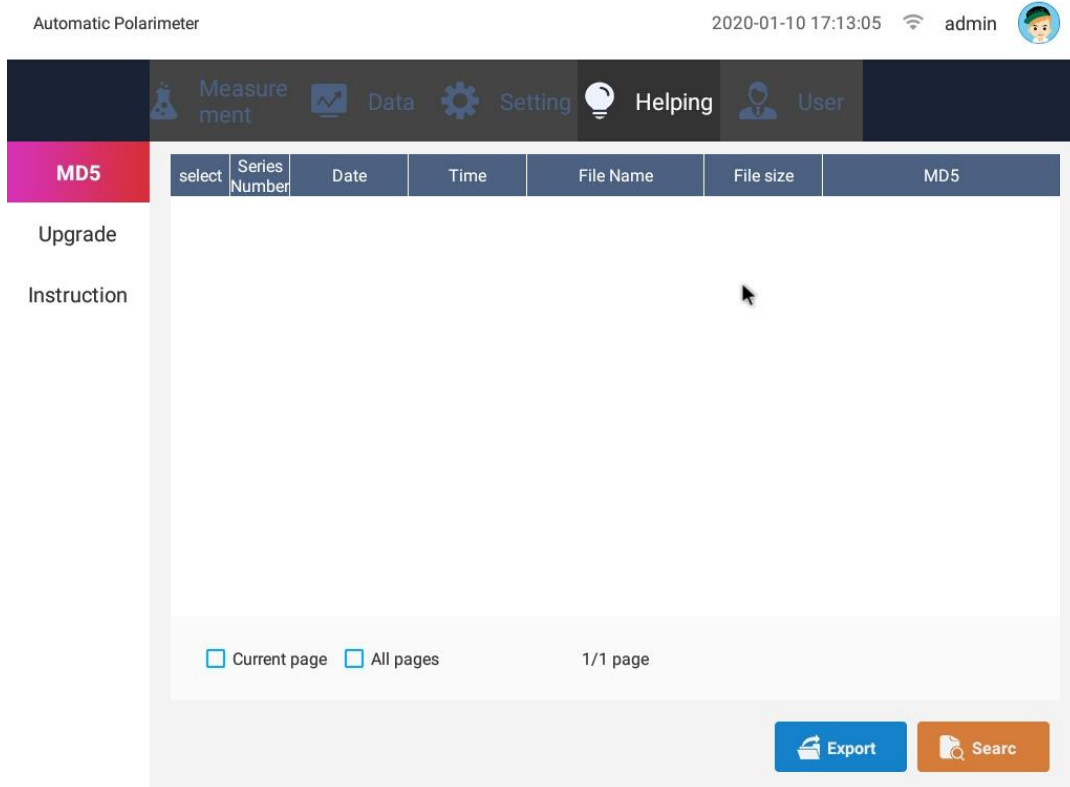


Figure 25

b7b) Version Update

Click "version update" and the system will automatically detect the USB flash disk. If there is a new version, the system will automatically upgrade it. After the upgrade, it will automatically exit and restart. Version upgrade preserves historical data.

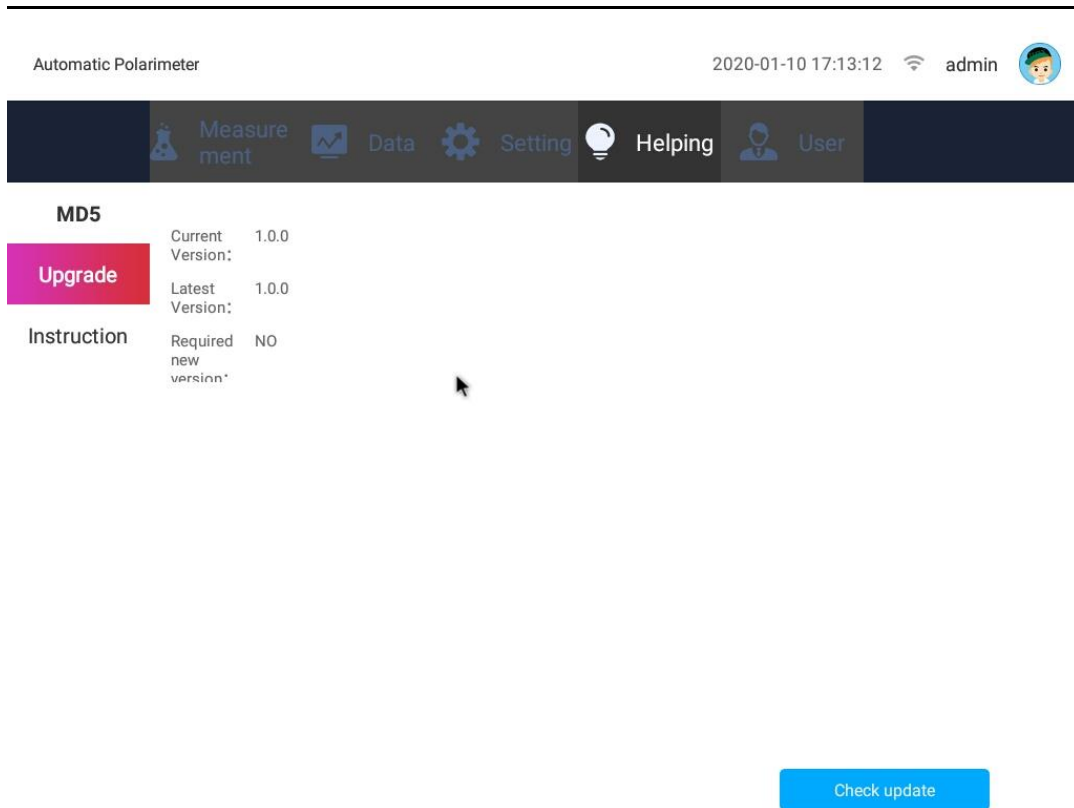



Figure26

b7c)Explanation

The operating instructions and precautions for specific rotation and concentration are provided

The contact information of manufacturer is provided for user consultation;

Automatic Polarimeter

Automatic Polarimeter 2020-01-10 17:13:22 admin 

Measurement Data Setting Helping User

MD5


Upgrade

Instruction When the instrument work in Specific Rotation mode, be sure to enter the concentration and length. When the instrument work in concentration mode, be sure to enter the specific rotation and length. When using, keep the instrument steady ensure the accuracy. If you want to control the temperature, Please turn on the temperature control first, then set the temperature value. If you need more instructions, please refer to the instruction manual. If need help please contact customer service.

Figure27

b8)User

b8a)User Setting

Automatic Polarimeter 2020-01-10 17:13:32 admin 

Measurement Data Setting Helping User

User Setting

User Manage


Change password

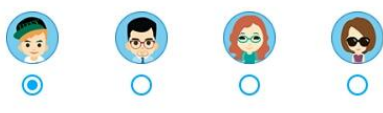
Old Password

New Password

Confirm

Change Icon

Current Icon 



Automatic Login



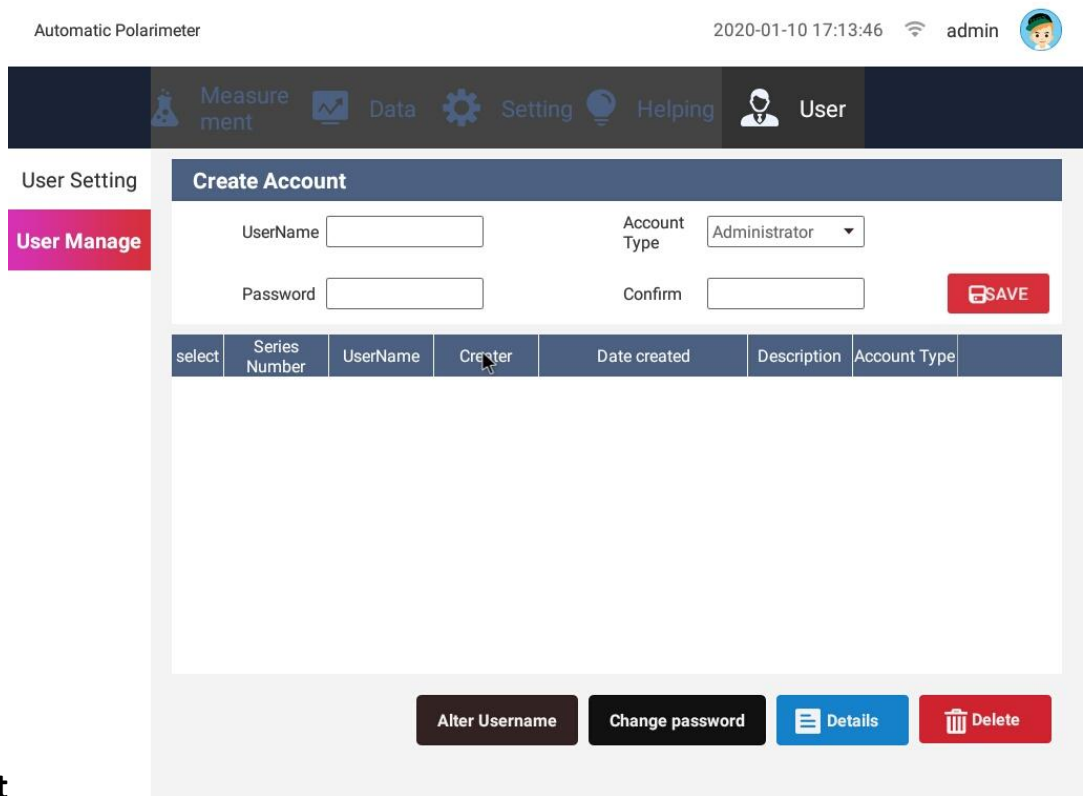
 

Figure28

In Figure 27, the current user can modify the login password in this page, set the user's Avatar, and set the automatic login. After that, click Save to save the current settings, and then click log out to return to the login interface and re-enter the modified password. After setting the automatic login, you can log in without entering the password after shutdown and restart.

b8b)User



Management

Figure29

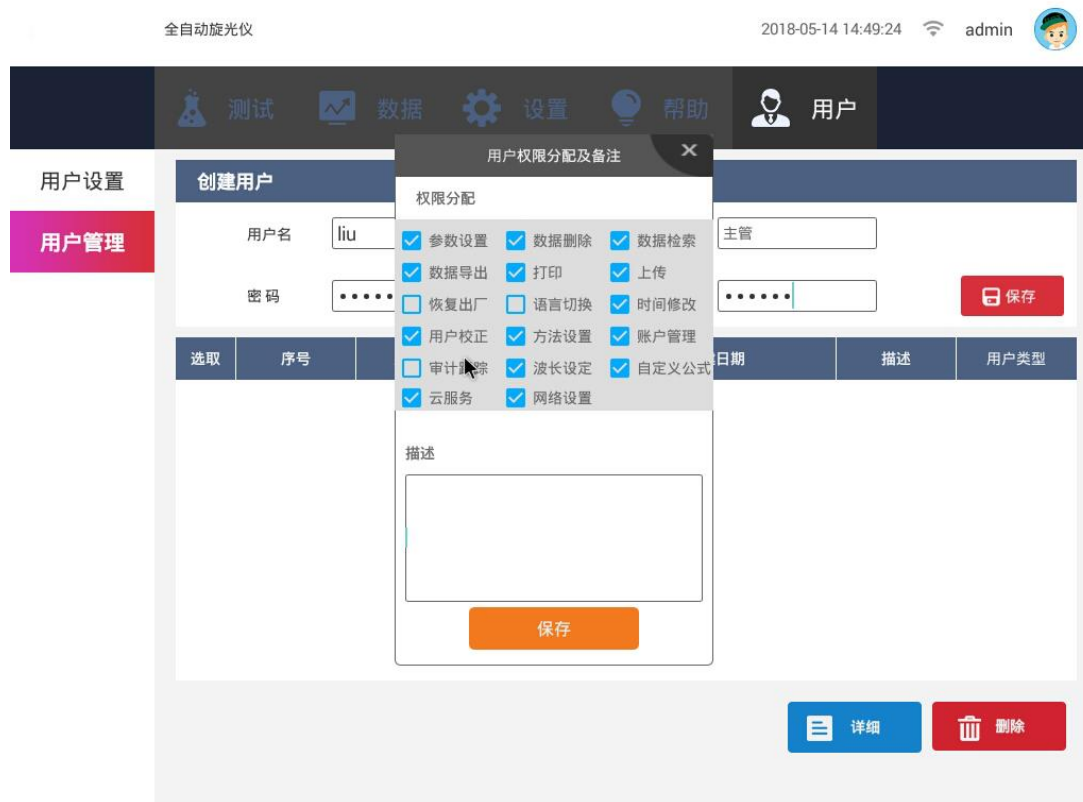


Figure30

In this interface, the administrator can add a new user, set the user name, type and password, and click Save to open the permission assignment box. The administrator can select the corresponding permission, operate the corresponding interface, and fill in the user description. The interface and operation keys without permission are blocked and cannot be seen. After the instrument is started, the user can enter the corresponding account and password to log in.

Note: as the software version will continue to upgrade, the actual interface may be slightly different from the manual, please refer to the actual interface.。

c. Sample Procedure for Tests

[1] Put the test tube containing distilled water or other blank solvent into the sample chamber, cover the sample chamber cover, press the clear key, and the reading of 0 will be displayed. If there are bubbles in the test tube, let the

bubbles float at the convex neck first; the mist like water drops at both ends of the light passing surface shall be wiped dry with a soft cloth. The test tube nut should not be screwed too tightly to avoid stress and affect the reading. Pay attention to the mark, position and direction when placing the test tube.

[2] Remove the tube. Inject the sample to be tested into the test tube, put it into the sample chamber according to the same position and direction, and cover the chamber cover. The instrument will show the optical rotation (or corresponding indication) of the sample.

[3] The instrument is set to automatically measure n times, obtain n readings and display the average value. If the number of measurements is set to 1, the retest key can be used to manually retest. When the number of retests is $n > 1$, press the "retest" key, the instrument will clear the previous measurement value, and then continuously measure n times.

[4] Press the "clear" key before each measurement.

[5] After using the instrument, turn off the power switch.

4. When saving data, you can choose to save it with Excel document or text document.

(1) The formula of specific rotation is $[\alpha] = 100 \alpha / LC$

Where α is the measured optical rotation (degree)

C is the weight of the substance to be tested per 100ml of solution (g)

L is the length of solution (decimeter)

The specific rotation can be operated in mode 2.

(2) The purity of the sample can be calculated from the measured specific rotation

Purity = measured specific rotation / theoretical specific rotation

(3) Measurement of international sugar graduation:

According to the international sugar standard, 26G of pure sugar is required to be made into 100ml solution, which is measured in a 2D tube under 20 °C with sodium light. Its rotational luminosity is + 34.626 ° and its sugar degree is 100 ° Z. The instrument can read the international sugar level directly with mode 4.

4. Maintenance

1. The instrument shall be kept dry to prevent severe vibration, moisture and corrosive gas erosion, and the instrument shall be used in the working environment of 20 °C as far as possible.
2. The polarizing tube put into the sample chamber shall be kept clean as much as possible. Please dry it with a soft cloth before putting into it to avoid corrosive liquid corroding the instrument.

5. Malfunction and Solutions

Malfunction	Possible Reasons	Solution
The lights does not respond after switching on.	<ol style="list-style-type: none"> 1. Switch is broken 2. LED is broken 3. 2A Fuse is broken 	<ol style="list-style-type: none"> 1.Change the switch or return to manufacture for repair 2.Change the switch or return to manufacturer for repair 3. Change the fuse
Touch Screen no respond	<ol style="list-style-type: none"> 1. Touch Screen too close to the protective casing 2. Touch Screen problem 	<ol style="list-style-type: none"> 1. Reducing the contact 2. Check for quality problem
Does not Record	<ol style="list-style-type: none"> 1. Connection problem; 2. Power Problem 	<ol style="list-style-type: none"> 1.Check the connections 2.Check the power 3.Return to manufacture for repair
Does not connect with the computer	<ol style="list-style-type: none"> 1.USB malfunction; 2.Programming problem 	<ol style="list-style-type: none"> 1. Check the connection 2. Please connect the manufacturer.

6. After-sale Service and Producer Liability

This product is warranted for one year from the date of sale (subject to the date of invoice issued), but the following circumstances are not covered by the warranty:

1. Beyond the warranty period;
2. Instrument damage due to improper use;
3. Without the permission of the manufacturer, the instrument is disassembled and damaged by itself;
4. The instrument is damaged due to improper transportation and storage.

Drawell International Technology Limited



Chongqing Drawell Instrument CO.,Ltd

Add: Suite 2705, Building No.12, Shiyou Road No.1, Yuzhong District, Chongqing, China
Tel: 0086-023-63268643

Shanghai Drawell Scientific Instrument Co.,Ltd

Add : Suite 1117, Lane561 XiuChuan Rd., PuDong New Area, Shanghai, China

Web : www.drawell.com.cn

Email : sales05@drawell.com.cn