NOTE

This operating manual is used for model AE-722G visible spectrophotometer.

A & E LAB (UK) CO.,LTD

Table of Contents

AE-722G product implementation standard No. :Q31/0117001043C005

Contact Us:
A & E LAB (UK) CO.,LTD
E-mail: sales@ukaelab.com
Website: www.ukaelab.com

1 Principles, uses and characteristics

1.1 Principle

The substance is selective for the absorption of light, and under the excitation of light, the absorption effect is produced. Different substances have their own absorption spectra. When a monochromatic light passes through the solution, its energy will be absorbed and weakened. The degree of light energy weakening is proportional to the concentration of the substance.

This series of instruments is based on the principle of colorimetry to carry out qualitative and quantitative analysis of samples. Within a certain concentration range, each parameter conforms to Lambert-Beer's law:

Among the

$$A = \lg\frac{1}{T} = KCL \qquad T = \frac{I}{I_0}$$

A: absorbance

T: transmittance

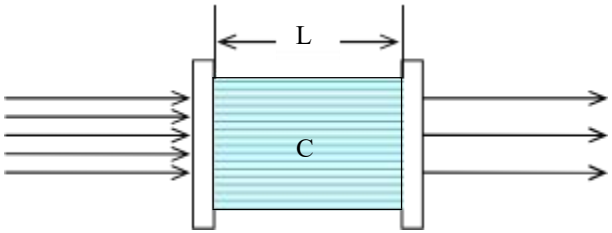
I: transmitted light intensity

I_0: incident light intensity

K: Absorption coefficient of the sample

C: Sample concentration

L: The length of the sample in the optical path



1.2 Use

This series of instruments can perform qualitative and quantitative analysis of sample materials in the UV- Visible spectrum region, and are widely used in medicine and health, clinical testing, biochemistry, petrochemical, environmental protection testing, food hygiene and quality control departments, and can be used as large, teaching demonstrations and experimental instruments for related courses in specialized institutions and secondary schools.

1.3 Features

- **Large screen with colourful touch screen or digital display.**
- **Automatic 100% T adjustment 0A function.**
- **Automatic light source switching.**
- **Concentration factor setting and concentration direct reading function.**
- **RS232C Serial Printer Interface and UVWin7 computer communication software (AE-722G).**

2 Main technical indicators of the instrument

2.1 Optical system

- **Single Beam, 1200 Line/mm Holographic Grating System**

2.2 Accept components

- **Silicon photocell**

2.3 Light source

- **Tungsten Halogen Lamp: 12V/20W**

2.4 Wavelength range

- **AE-722G 325nm~1000nm**

2.5 Maximum allowable wavelengtherror

- 2nm

2.6 Wavelength repeatability

- ≤1nm

2.7 Maximum allowable transmission ratio error

- 0. 5% (tested with NBS930D)

2.8 Transmission ratio repeatability

- ≤0. 2%

2.9 Spectral bandwidth

- 4nm

2.10 Stray light

- **AE-722G ≤0. 5%T (at 360nm)**

2.11 Power supply voltage

- **AE-722G AC110V (±11V), 60Hz(±1Hz) / AC220V (±22V), 50Hz (±1Hz)**

2.12 Dimensions

- **450mm x 390mm x 210mm**

2.13 Weight

- **12kgs**

3 Installation instructions

3.1 Installation conditions

The instrument should be placed on a solid and smooth bench that meets the requirements of the laboratory environment.

The working conditions are:

a. **The laboratory environment temperature is 5 ℃ ~ 35 ℃, and the relative humidity does not exceed 85%.**

b. **The power supply voltage is AC220V±22V, the frequency is 50Hz±1Hz, and a good ground wire must be installed.**

c. **Avoid sunlight, avoid vibration and strong airflow, and avoid corrosive substances.**

d. **Keep away from high-intensity magnetic fields, electric fields and electrical equipment that generate high-frequency wave.**

3.2 Open-box view

Check

Please check the integrity of the outer package before opening the box. If the package is damaged or incomplete, please contact the Transportation Department.

Inventory

Open the seal along the seal (please save the outer packing box for movement needs), count the host and spare parts according to the accessory spare parts list, if there is any error, please contact the local seller or directly with the company.

4 Instrument appearance, keyboard function and display window description

4.1 Instrument appearance

AE- 722G, appearance

4.2 Keyboard

- **T/A/C/F Key : (Or MODE key) Each time you press this key to convert the display mode, repeatedly press this key to display data in:**

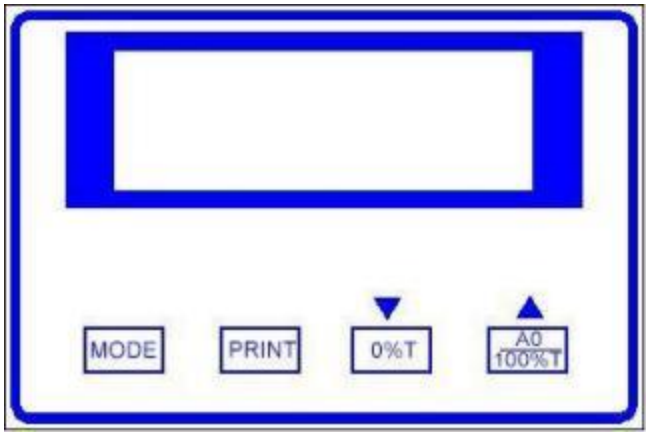
(T) Transmission ratio Trans

(A) Absorbance

(C) Concentration

(F) Concentration Factor

The conversion between, while indicated in the Test mode of the LCD.



- **Print key : This Key has two functions:**

a) It is used for printing with a dedicated printer and transmitting data to the computer through the RS232C serial port.

b) When in the F state, it has the function of confirming the input and modifying the concentration factor, that is, confirming the current F value, and automatically calculating and refreshing the current F value (F = C/A).

c) When in the C state, it has the function of confirming the input and modifying the concentration of the standard sample, that is, confirm the current C value, and automatically calculate and refresh the current F value (F = C/A).

▼0% key : This Key has three functions:

a) Zero adjustment: only valid in T state. Open the sample chamber cover, the button should show 000. 0.

b) Drop input key: valid in F state. Press the key F value will automatically decrease by 0. 1, such as holding down the key, automatically accelerate the decrease by 1. If the F value is 0000, then the button will automatically change 1999, re-decreasing.

c) Drop input key: valid in C state. Press the key C value will automatically decrease by 0. 1, such as holding down the key, automatically accelerate the decrease by 1. If the C value is 0000, stop decreasing.

100%/0A▲ Key : This Key has three functions:

a) The fullness/absorbance is zero: only valid in T and A states. Close the sample chamber lid and display 100. 0 and 0. 000 after pressing.

b) Rising input key: valid in F state. Press the key F value will automatically increase by 0. 1, such as holding down the key, automatically increase by 1. If the F value is 1999, then the button will automatically change

0000, Re-increment.

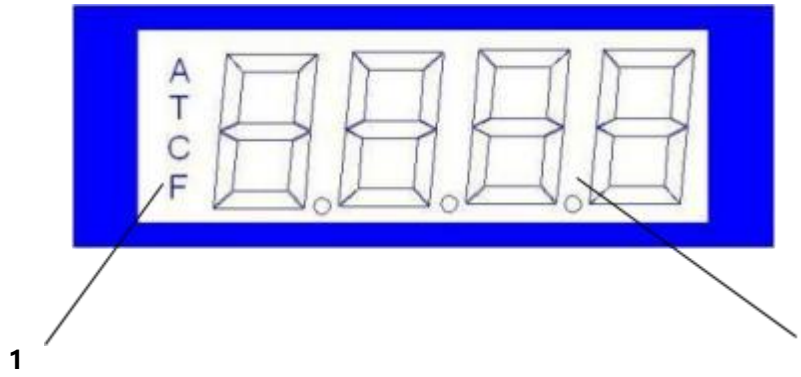
c) Up input key: valid in C state. Press the key, C value will automatically increase by 0. 1, such as holding down the key, automatically accelerate the decrease by 1. If the C value is 1999 × A, the increment is stopped.

4.3 Display

Test method flag display

(T is the transmittance, A is the absorbance, C is the concentration, and F is the slope.)

Data display



s Basic operation of the instrument

5. 1 Display

The instrument is powered on, the microcomputer performs system self-check, and the LCD display window displays the corresponding product model, and the instrument enters the working state. The window is displayed in the default mode T. Note: In order to achieve thermal balance inside the instrument, the preheating time is not less than 30 minutes.

5. 2 Change wavelength

By rotating the wavelength handwheel, the wavelength of the instrument can be changed, and the desired wavelength can be selected on the scale of the wavelength observation window.

5. 3 Place the reference and sample to be tested

Select the cuvette for the test, put the reference and the sample to be tested into the sample holder, and select the position of the sample through the sample holder pull rod. When the lever is in place, there is a sense of positioning, and gently push and pull when in place to ensure correct positioning.

5. 4 Tune 0%T , tune100%T/0A

In order to ensure that the instrument enters the correct test state, after the instrument changes the test wavelength and tests for a period of time, you can press ▼ 0% key and 100%/0A▲ The key is to adjust the instrument to zero, adjust the full degree, and the absorbance is zero.

5. 5 Display mode selection

This instrument has four display modes. The initial state of the instrument when it is turned on is the transmission ratio display mode (T).

- **Transmission ratio (Trans)**
- **Absorbance (Absorbance)**
- **Concentration (Conc.)**
- **Concentration Factor (Factor)**

5. 6 Concentration direct reading and concentration factor setting

Concentration direct reading setting

Press MODE key , select concentration read (C) MODE, press ▼/0% and 100%/0A▲ key to enter the set value of standard sample concentration that users need. After putting in the sample, press Print to confirm, and then unknown.

Sample testing. At this point, the concentration factor will be calculated automatically and then changed accordingly. The user can check the record of F value and directly test the same sample with the concentration factor setting in the later test, no need to do it again. Use a standard sample to calibrate.

Note: When setting the concentration direct reading, it should be put into the standard sample and set. AE-722G no such function.

Concentration factor setting

Press MODE key , select concentration read (F), press ▼/0% and 100%/0A▲ key to enter the concentration factor setting value required by users. Press Print to confirm, and then turn the display mode back to the concentration direct reading (C) mode, and then test the unknown samples. Method, and then test the unknown sample.

5. 7 Print

In the display mode of T, A and C, the device can connect the serial printer through RS232C interface and press Print key to print the displayed data.

Note:	The printer should	be configured separately.

‘ Application operations

6. 1 Transmission ratio and absorbance test

1	Instrument preheating	5	Instrument adjustment 0% T, 100% T/0A when reference samples
2	Select the test wavelength	6	Test of sample to be tested
3	Place the reference and sample to be tested	7	Record or print data
4	Select T(A) mode		

6. 2 Application of concentration direct reading

1	Instrument preheating	5	Select C mode
2	Select the test wavelength	6	▼0% and 100%/0A▲ enter the concentration value of standard sample, put it into standard sample and press Print to confirm
3	When comparing samples, the instrument is adjusted to 0%T and 100%T/0A	7	Test of sample to be tested
4	Select T(A) mode	8	Record or print data

When the analyzed object is relatively stable and the standard curve is basically over the origin, the user does not have to use the more complex Standard curve method to detect the concentration of the sample to be measured, and can directly use the concentration direct reading method for quantitative detection.

Note: After entering the content value, you can pass MODE key F mode to view the value, the recorded value can be directly measured with the concstandard sample entration factor setting during the next measurement.

6. 3 Concentration factor functional application

1	Instrument preheating	5	Select F mode
2	Select the test wavelength	6	▼0% and 100%/0A▲ enter the concentration value of standard sample, put it into standard sample and press Print to confirm
3	When comparing samples, the instrument is adjusted to 0%T and 100%T/0A	7	Test of sample to be tested
4	Select T(A) mode	8	Record or print data

7 Maintenance of instruments and fault identification

7.1 Routine maintenance

a. In order to ensure the stable operation of the instrument, it is recommended that users use more than 500WAC power supply in places with large fluctuations.

b. When the instrument stops working, turn off the instrument power switch, and then cut off the main power supply.

c. Clean the instrument Shell should be lightly rubbed with warm water and soft cloth, avoid the use of organic solutions such as ethanol, ether, acetone, etc. When the instrument is not in use, please protect it with a dust cover.

d. After each use of the instrument, the sample chamber and the cuvette holder should be cleaned to prevent the corrosion of the instrument parts by the sample reagent.

e. After each use, the cuvette should be cleaned with petroleum ether, and wiped clean with a mirror paper, and placed in the cuvette box for use.

f. The wavelength of the instrument should be detected regularly according to the measurement and use regulations to ensure the accuracy of the instrument.

7.2 Light source replacement

The steps are as follows:

- **Tungsten halogen lamp**
  - **a. Turn off the instrument and unplug the power cord of the instrument.**
  - **b. Unscrew the fixing screw and the wavelength handwheel to open the housing.**
  - **c. Remove the protective baffle of the lamp compartment.**
  - **d. Bring clean gloves, unplug the old light source and plug in the new light source.**
  - **e. Turn on the power of the instrument, select the wavelength at 500nm, and check whether the light source filament image is focused on the incident slit. Otherwise, loosen the fixing screws of the light source assembly, and slightly adjust the light source assembly to make the light source light the silk image is focused on the incident slit, while observing the data window data to maximize the displayed data, and then tighten the fixing screws.**
  - **f. Close the instrument housing and tighten the wavelength handwheel.**

7.3 Fault identification

The present image	The original cause	Right strategy
1. Turn on the power switch, the instrument does not respond.	1. Power is not connected 2. Power fuse broken 3. Poor contact of instrument power switch	1. Check the power supply 2. Replace the fuse 3. Replace the instrument power switch
2. Display instability	1. Insufficient warm-up time of instrument 2. Environmental interference 3. Poor power supplyvoltage 4. Poor instrument grounding	1. Guaranteed startup time of 30 min 2. Improving the working environment 3. Check the power supply voltage 4. Improve grounding status
3. No signal	1. Light source is bad 2. The amplifier is bad	1. Replace the light source 2. Repair the amplifier
4. Not 100%	1. Insufficient light energy a.The light source lamp is not focused on the slit. b. There are blocking items on the cuvette rack c. The reference concentration is too high	1. Check the lamp power circuit (repair) a. Adjust the position of the light source b. Remove the cover c. Correct handling
5. Incorrect metering	1. Sample handling error 2. Cuvette pairing error is large 3. Large wavelength error	1. Correct handling 2. Deduction of pairing error or replacement cuvette 3. Correction wavelength

7.4 Correction of wavelength

Two characteristic absorption peaks (529nm and 808nm) of praseodymium filter were adopted for the spectrophotometer (the user should set and calibrate them by himself), and verification and correction were carried out by point-by-point test method.

The instrument spectroscopic system uses a grating as a dispersion element, and its dispersion is linear, so the scale of the wavelength division is also linear. When the scale wavelength recorded by the point-by-point test method and the characteristic absorption wavelength value of the praseodymium filter exceed the error, you can remove the wavelength handwheel, open the shell, unscrew the three positioning screws on the wavelength dial, and place the scale indication on the characteristic absorption wavelength value, just tighten the screw (the error should not be greater than 2nm).

8 Storage and free repair period of the instrument

Storage:

With packaging: the ambient temperature is 0-40 ° C, the humidity is not more than 85%,

Without packaging: the ambient temperature is 5-35 ° C, and the humidity is not more than 85%.

From the date of purchase of the instrument, in the case of non-man-made damage, when the instrument cannot work normally due to poor manufacturing within 12 months, the factory is responsible for free repair (excluding vulnerable and consumable parts, light source and cuvette are non-warranty parts).