

# User Manual



Please carefully read the *User's Manual* prior to the installation and use.

## **DW-F93**

## **Fluorescence Spectrophotometer**

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## Quality Warranty

The Company is responsible for free service of its products within 12 months after delivery (include operation period of not more than 6 months) in case of damaging and abnormal performance due to inferior manufacturing under the condition when the user observes the regulations related to the transportation, maintenance and operation.

The instrument and the quality warranty card are requested to send back to the company for facilitating the services.

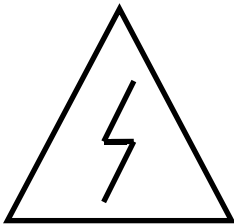
Note:

This manual contains the latest collection of information, instructions and specifications of F93 fluorescence spectrophotometer. Further possible changes of operation instructions and specifications will be made without notice again, because this product is undergoing continuous development.

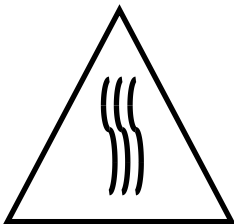
## Safety indicating signs adopted in this manual



This sign indicates that the important information concerning safety operation of the instrument is contained. Please read carefully and observe the instructions followed



This sign indicates that this operation may cause harmful to the instrument. The operation should be performed by qualified personnel according to the corresponding programs



This sign indicates that heat is produced on the surface of this place. Please operate carefully according to the attached instructions.

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## Notices

1. Please read this manual carefully before installation or when the operator runs this instrument at first time.
2. The gain setting should be increased stepwise from 0-7 while unknown concentration samples are under testing.
3. The host should be switched off immediately and re-started again when (or only when) the operator performs wrong operation or when the microcomputer is malfunctioning due to other disturbances.
4. Screws for fixing the monochromator should not become loosen and the optical parts should always be kept clean.

## 1. Features and Applications

### *Applications :*

Fluorescence analysis is a high sensitive and high selective sophisticated analytical method. This method can provide information including excitation and emission spectrum, emission light intensity and measurement of life of emission light and polarization fluorescence etc. This method can provide a wide linear range of working curve. It has becoming an important analytical method in the region of trace analysis. This method has been used in:

- Medical science and clinical analysis: Analysis of biological specimen.
- Pharmaceutical science and pharmacology : Analysis of natural pharmaceutical products, Quality control of pharmaceuticals and research of pharmaceutical metabolites, Quality control of pharmaceuticals and research of pharmaceutical metabolites.
- Biochemistry: Analysis of minute quantity of substances in biological body.
- Food industry: Analysis of minute quantity of constituents in food.
- Pollution analysis: Atmospheric pollution, environmental testing and food contamination analysis.
- Organic and inorganic chemistry: Used in the trace analysis in case of those substances cannot be determined by absorption spectrophotometry.

### *Features :*

- The emission monochromator adopts 1200 line diffraction grating. Its large aperture and non-spherical reflecting mirrors produces extra high sensitivity.
- High luminance and long life LED lamp, ensure high stable.
- High performance photomultiplier to gain best signal-noise ratio.
- Automatic zero adjustment and automatic background subtraction.
- Eight levels gain adjustable.
- Real time fluorescence reading and concentration value print out.
- Standard sample concentration direct reading ability at single wavelength test.
- Extra wide dynamic range of fluorescence reading, accurate measurement of minute changes in samples.

## 2. Instrument Specifications and Standard Accessories

- Light: LED

Standard configure is central wavelength at 365nm LED ( pre-regulated optical performance ). An certain wavelength LED Lamp can be provided on users demand, and replaced by specified engineer.

- Exciting optical filters (Ex 360-600nm):

Standard configure is central wavelength at 365nm of 10nm bandwidth interference optical filter.

An optional interference optical filter of 25mm diameter of 360nm-600nm wavelength range can be provided on users demand with 1-6 months delivery term. Central wavelength at 254nm, 287nm, 313nm, 405nm, 420nm, 436nm, 480nm, 492nm and 525nm interference optical filters are in storage and can be delivered soon or with order directly.

- Emission monochromator: C-T diffraction grating

(Em 360~650nm, 12nm bandwidth)

- Emission wavelength accuracy:  $\leq \pm 2\text{nm}$

wavelength repeatability:  $\leq 1\text{nm}$

- Sensitivity: Sulfuric acid Quinine testing limitation is  $1 \times 10^{-9}$

- Linearity deviation:  $\leq \pm 3.0\%$

- Baseline shifting:  $\leq \pm 0.3\%$  (within 10min)

- Upper limit of display:  $\leq 1.0\%$  ( $220\text{V} \pm 10\%$ )

- Power: AC  $220\text{V} \pm 10\%$   $50 \pm 1\text{Hz}$

- Dimension:  $380 \times 425 \times 240$  (mm)

- Weight: N.W. 7kg G.W. 9kg

- Standard parts:

- |  |        |
|--|--------|
| 1) F93 Fluorescence Spectrophotometer          | 1 set  |
| 2) Power cable                                 | 1 pc   |
| 3) Operate manual                              | 1 copy |
| 4) Product quality certificate (LG1.673.004ZM) | 1 copy |
| 5) Fuse (2A)                                   | 2 pcs  |

- |                                     |        |
|-------------------------------------|--------|
| 6) Quartz fluorescence cuvette 10mm | 1 pair |
| 7) Packing list                     | 1 copy |
- Optional accessories and spare parts
    - 1) Fuse (2A)
    - 2) Quartz fluorescence cuvette 10mm
    - 3) Microprinter for F93 Fluorescence Spectrophotometer
    - 4) Central wavelength at 420nm optional interference optical filter(  $\phi$  25mm)
    - 5) Central wavelength at 475nm optional interference optical filter(  $\phi$  25mm)
    - 6) Central wavelength at 525nm optional interference optical filter(  $\phi$  25mm)
    - 7) 360nm-600nm interference optical filter (  $\phi$  25mm)
 

Central wavelength at 254nm, 287nm, 313nm, 405nm, 420nm, 436nm, 480nm, 492nm and 525nm interference optical filter are recommended.

### 3. Instrument Appearance and Operation keys

1) **Gain/↑** button:

For gain adjustment when the fluorescence value is too low or high. The gain increased one level by pressing this button one time. There are 8 levels of gain (0-7). The highest level is at 7<sup>th</sup> (a temporary display appears while pressing). The gain is automatically setted at 1<sup>st</sup> level when the instrument is start-up.

This button is also used for increassing concentration factor setting value when the user use concentration mode . One unit value is increased by pressing this button. The value is increased rapidly while continuously pressing. Status is automatically confirmed after pressing the **Mode** button.

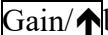
This button is also used for increassing the concentration value setting when user use concentration mode . One unit value is increased by pressing this button. The setting becomes rapidly increased when the button is continuously pressing.


2) **0 Adj./↓** button:

This button is used for adjusting zero (background subtraction) when user use fluorescence value mode. The range of background subtraction is 0-32.5.


This button is also used for reducing the concentration factor setting value when the concentration factor value need to reduce.



This button is also used for reducing the concentration value setting when the user use concentration mode. The operate procedure is same as  button.

3)  button:

Print automatically once at each pressing when the user use fluorescence value, concentration or concentration factor mode.

4)  button:

This button is used for changing test mode. Test mode is cycled in correspondence with indicating lamp in the following order: fluorescence value, extended function, concentration factor and concentration value. The initial status when start-up the instrument is setting at fluorescence value mode.

5) Display window:

Four bit LED is used for displaying test readings and error messages.

The window will display “Err4” when the background subtraction value is too large.

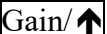

6) Fluorescence value indicator:

It indicates that the display window is showing fluorescence test reading.

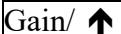
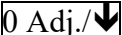
7) Extended function indicator:

For extending the function. It is not in use.

8) Concentration factor indicator:

It indicates that the display window is showing concentration factor setting value. The value can be adjusted by pressing  to increase or pressing  to decrease.

9) Concentration indicator:

It indicates that the display window is showing concentration value. The value can be adjusted by pressing  to increase or pressing  to decrease.

10) Instrument power switch: For turning power on or off.

11) Fuse socket: For fixing fuses.

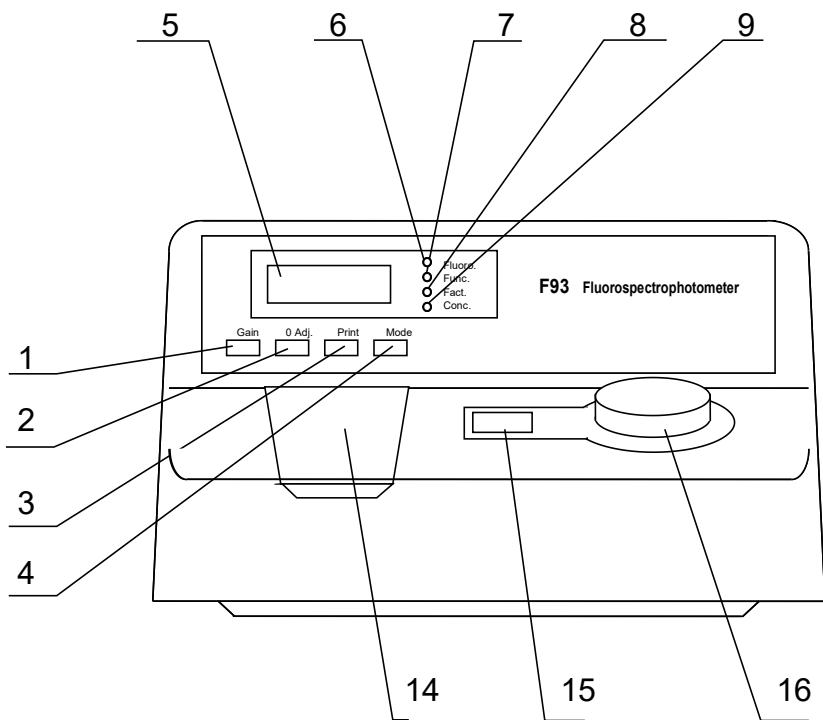
12) Power socket: For connecting power cable.

13) RS232 port: For connecting printer.

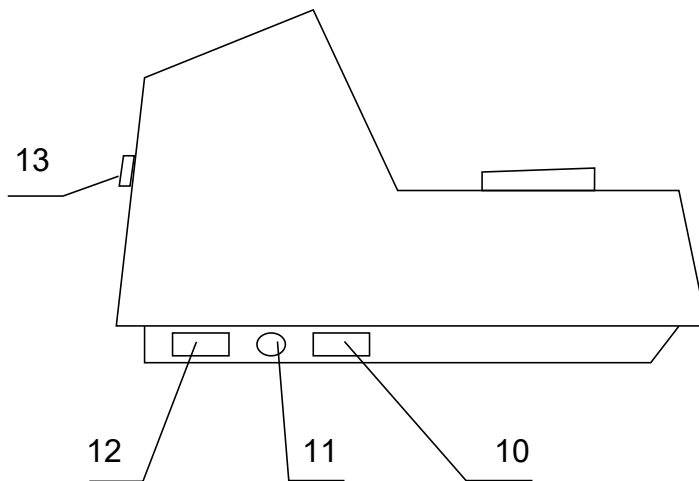
14) Sample compartment: Containing sample rack, for positioning samples.

15) Wavelength indicating window: For displaying present wavelength.

16) Wavelength adjusting knob: For wavelength adjustment.



**Fig. 1**



**Fig. 2**

## 4. Installation

### 4.1 Installation environment

This instrument is suitable for use in laboratory environment.

4.1.1 Environmental temperature: 10~30°C, Environmental humidity should be less than 85%.

4.1.2 The instrument is suitable for putting on a sturdy working bench to avoid vibration and is better to protect from directly sunshine, dust and corrosive gases.

4.1.3 AC voltage should within 220V±22V.

Please use the original package when long distance movement is needed. The environment condition should meet the above mentioned requirements when the instrument used in any other places beside lab. Any special requirements should be ordered at time of purchase as instrument for special purposes.

### 4.2 Unpacking and Inspection

***Note: The instrument is commonly packed in carton (outer wooden case can be requested for distant transportation).***

4.2.1 Please check outer package integrity before unpacking. Please contact transportation insurance agency when the package is found not intact or left some indications of collision or water immersion.

4.2.2 Tear off the sealing tapes and take out the instrument carefully. Please keep the outer package in place for re-use. Check the standard configuration and optional accessories and spare parts according to the packing list. Please contact our local agency or our engineer if any deviation is discovered.

### 4.3 Installation

Remove all fixing tapes, take out instrument and accessories from foam. Place the instrument on a sturdy working bench. The distance of the bench from the wall is about 10 cm. Connect power cable to the electric power socket in the lab.

## 5. Example of determination of 10-6g/mL Sulfuric acid Quinine

5.1 Preheating: Please wait 30 minutes or above after switch on the instrument to get the stabilized test reading.

5.2 Sampling and sample positioning:

Wipe clean all the four surfaces of the quartz fluorescence cuvette after the sample ( $10^{-6}$ g/mL Sulfuric acid Quinine) had been poured into the cuvette. Place the cuvette into the sample rack in sample compartment.

5.3 Wavelength adjustment

Use wavelength adjusting knob(see fig.1-14) to adjust the wavelength which user want to use( the reading will reach highest value when the knob is turning about 450nm) . The wavelength reading is shown on the wavelength indicating window, which is situated at the left side of the adjusting knob(see fig.1-15). Wavelength reading should be taken at vertical position in order to avoid reading error.

5.4 Gain adjustment

Purpose: To adjust the testing sample reading to a suitable value.

Operate: Press the Gain/↑ button to make the fluorescence display within 10-50.

***Note: The gain will decrease automatically to protect the photomultiplier when the fluorescence value is too high. Please check the background zero after gain re-adjustment had been done. The background zero should be adjusted again if any change is occurred.***

5.5 Turn off the instrument

Turn off the power button after finish the test.

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