



**HI 84500**

Free & Total SO<sub>2</sub> Mini Titrator  
for Wine Analysis



**HANNA**<sup>®</sup>  
instruments

# HI 84500 Mini Titrator for Wine Applications

- **Piston Driven Pump with Dynamic Dosing**

This piston driven dosing pump incorporates dynamic dosing to provide highly accurate, repeatable results.

- **Log-on-Demand**

Log data up to 400 samples (200 for titration and 200 for ORP/mV).

- **Graphic Mode/Exportable Data**

Displays in-depth data on titration, which can then be stored and exported to either a USB drive or PC using the USB connection.

- **Automatic Stirrer Speed Control**

Maintains stirrer speed at approximately 700 rpm regardless of viscosity of solution.

- **GLP Feature**

The HI 84500 includes a GLP feature that allows users to view calibration data for the dosing pump.

- **Easy to Use Interface**

User intuitive design with large keys and easy to navigate screens.

- **Application Specific (Electrode)**

The HI 84500 is supplied with the HI 3148B electrode. This versatile electrode is designed to be used in all types of wine related applications



## Easy to Use, Fast and Affordable All-in-one Solution

The HI 84500 is an easy to use, fast and affordable automatic mini titrator designed for testing free or total sulfur dioxide (SO<sub>2</sub>) levels in wine. It includes a pre-programmed analysis method and uses a powerful algorithm in order to determine when the titration reaction has reached completion. The HI 84500 incorporates a precision dosing pump which allows for a highly accurate determination of the amount of titrant used. Pump calibrations, performed with the provided Hanna standards, help assure the measurement accuracy. The HI 84500 also features a new low range measurement and can also be used as a mV meter for direct ORP measurements.

This new generation of mini automatic titrator improves upon the titrant delivery system and measuring ranges for increased accuracy compared to previous models. This meter reflects Hanna's years of experience as a manufacturer of analytical instruments.



## Why Free & Total Sulfur Dioxide is So Important

Wine makers add sulfur dioxide to wine in order to inhibit bacteria and wild yeast growth and to serve as an antioxidant to prevent browning. When SO<sub>2</sub> is added to wine, a portion of it becomes immediately bound while a remaining portion is unbound SO<sub>2</sub>. The portion that is unbound is also called free; it is responsible for protecting the wine. The bound and unbound SO<sub>2</sub> together are referred to as total SO<sub>2</sub>. The relationship between the amount of SO<sub>2</sub> added and the amount of free SO<sub>2</sub> is complex. This relationship is governed by the total amount of SO<sub>2</sub> in the wine.

The exact relationship between free and bound will vary from wine to wine. The amount of free SO<sub>2</sub> depends on how much is added, how much was present before the addition and how much was immediately bound. Free SO<sub>2</sub> exists in two forms. Bisulfite (HSO<sub>3</sub><sup>-</sup>) is the predominant form but is relatively ineffective. Molecular SO<sub>2</sub> is the minor form and is responsible for protecting the wine. The amount of molecular SO<sub>2</sub> available in wine is depended on the amount of free SO<sub>2</sub> present and the pH. Typically 0.8 ppm of molecular SO<sub>2</sub> provides adequate protection against bacteria growth and oxidation. In order to obtain this value for a wine sample that has a pH of 3.2 you would need 22 ppm of free SO<sub>2</sub>, if the pH was at 3.5 you would need double, 44 ppm.

Molecular SO<sub>2</sub> can be detected by human senses at about 2.0 ppm. This level is needed for maximum protection of wine. Higher levels are needed for sweet and most notable, botrytised wine. The HI 84500 can be used to test for free and total SO<sub>2</sub> in all wines, including red, which are difficult to test using traditional methods associated with a distinctive color change to determine the end point.

pH	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9
Free SO <sub>2</sub>	14	18	22	28	35	44	55	69	87	109

Table showing the amount of free SO<sub>2</sub> required at various pH's in order to obtain 0.8 ppm of molecular SO<sub>2</sub>

## All-in-One

Wine Titrator, pH Meter, Electrode and Magnetic Stirrer in one package



### Piston Driven Pump with Dynamic Dosing

The HI 84500 incorporates dynamic dosing to provide precision titrant delivery. Dynamic dosing adjusts the amount of titrant dosed as the end point is approached for increased accuracy in end point detection.

### Piston Burette

Piston burettes provide an exceptionally reliable titrant delivery. This highly accurate dosing method is attained by combining a pulse controlled step motor with a 5 mL polypropylene syringe. The rigid and stable body of our syringe allows for less frequent pump calibration. Users no longer have to account for the changing elasticity of tubing associated with peristaltic pumps.

### More About Dynamic Dosing

With the integration of our piston burette, our titrator can adjust the volume and frequency of titrant dosed based on relative mV changes in the testing solution. This titrant delivery system is known as dynamic dosing, where titrant is delivered in larger doses at the start of the titration and smaller doses near the end point. These differences in dosing volume and frequency results in a faster titration without sacrificing accuracy. With larger doses in the beginning of the titration, the speed of the titration is increased, where smaller doses near the end point allows for more time for the titrant and analyte to react. Smaller doses also prevent the over titration of a sample and a more accurate determination of titrant volume used.

### Application Specific ORP Electrode

The HI 84500 is supplied with the HI 3148B ORP electrode featuring CPS™ technology to prevent the clogging of the reference junction.

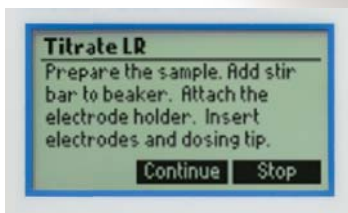
Conventional electrodes may clog quickly in biological samples such as wine. By design, the HI 3148B ORP electrode utilizes a ground glass/PTFE sleeve junction which controls a steady, predictable flow of electrolyte solution, keeping the junction open. The hydrophobic properties of PTFE repels wetness and coatings.

# Features



Setup Screen

The LCD features an easy to use setup screen that allows the user to change measuring range, time, date, language and more.



Tutorial and HELP Screens

Accessing the tutorial menu provides helpful information during calibration and titration.

## Rear USB Outputs

For PC connection and to export data to a USB drive



ORP

During ORP measurements with stirrer on, the stirrer icon will be displayed.



Titration Curve Displayed On Screen

The HI 84500 offers real time graphing of the titration curve on the LCD.



## Display

- 1) Current time and instrument mode information (ORP meter or titrator)
- 2) Instrument status
- 3) Virtual option keys
- 4) Stirrer and reading status

During the instrument's operation a set of information are displayed on the LCD. Displayed icons:



Stirrer on



Pump running



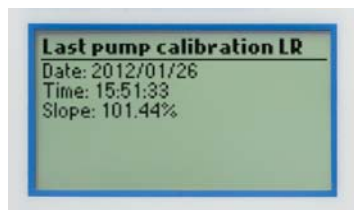
Wait for stable reading



Stirrer is not working properly

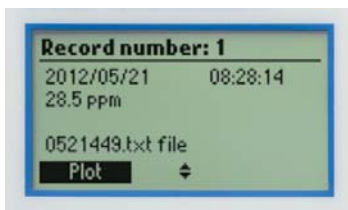


Parameter can be modified



GLP

The GLP feature records pump calibration data to ensure measurements are accurate and reliable.



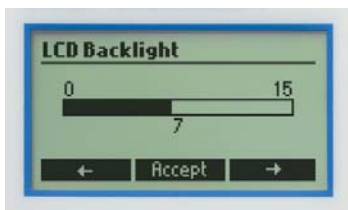
Log and Recall Data

The HI 84500 can log up to 400 samples (200 for titration results; 200 for ORP/mV) and recall or export data to a USB stick or PC.



Procedure Warnings

Users are warned if there is an error in procedures such as the titration exceeded the maximum volume of titrant.



Adjustable Backlit LCD

The HI 84500 offers a backlit LCD with adjustable brightness levels. This ensures that the LCD is always easy to read.

## Specifications

## HI 84500 - Free & Total Sulfur Dioxide

### Titrator

Range	low range: 1.0 to 40.0 ppm of SO <sub>2</sub> high range: 30 to 400 ppm of SO <sub>2</sub>
Resolution	low range: 0.1 ppm; high range: 1 ppm
Accuracy (@25°C/77°F)	low range: 3% of reading or ±0.5 ppm @ 25 °C, whichever is greater high range: 3% of reading or ±1 ppm @ 25 °C, whichever is greater
Method	ripper method
Principle	equivalence point redox titration
Pump speed	10 mL/min
Stirring Speed	700 rpm
Logging Data	up to 200 samples

### ORP Meter

Range	-2000.0 to 2000 mV
Resolution	0.1 mV
Accuracy (@25°C/77°F)	±1 mV
Logging Data	up to 200 samples

### Additional Specifications

ORP Electrode	HI 3148B glass body, refillable, with BNC connector and 1 m (3.3') cable (included)
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Power Supply	12 VDC adapter (included)
Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
Weight	1.9 kg (67.0 oz.)

## Accessories

### Reagents

HI 84500-50	Titration solution for low range (230 mL)
HI 84500-51	Titration solution for high range (230 mL)
HI 84500-55	Calibration standard solution (120 mL)
HI 84500-60	Acid reagent (230 mL)
HI 84500-61	Alkaline reagent (Total SO <sub>2</sub> ) (120 mL)
HI 84500-62	Stabilizer packet (100 pcs.)

### Electrode Fill and Storage Solutions

HI 7082	Electrode fill solution (4 x 30 mL)
HI 70300L	Electrode storage solution (500 mL)

### Electrode Cleaning Solution

HI 70635L	Cleaning solution for wine deposits (500 mL)
HI 70636L	Cleaning solution for wine stains (500 mL)

### Other Accessories

HI 70500	Tube set with cap for titrant bottle, tip and valve
HI 71005/8	115 Vac to 12 Vdc, 800 mA
HI 71006/8	230 Vac to 12 Vdc, 800 mA
HI 731319	Stir bar, 25 x 7 mm (10 pcs.)
HI 740036P	100 mL beaker (10 pcs.)
HI 740037P	20 mL beaker (10 pcs.)
HI 740236	5 mL syringe for mini titrator
HI 920013	PC connection cable

## Ordering Information

HI 84500-01 (115V) and HI 84500-02 (230V) are supplied with:

